WASTEWATER MASTER PLAN

Prepared for:
Spanish Fork City

Prepared by:

154 East 14000 South
Draper, Utah 84020

May 2012

Project No. 204-10-03

WASTEWATER MASTER PLAN

Prepared by:

Bowen Collins
& Associates, Inc.
CONSULTING ENGINEERS

154 East 14000 South
Draper, Utah 84020

PROFESSIONAL ENGINEER
5339557-2202
05-10-12
ANDREW T.
McKINNON
STATE OF UTAH

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LIST OF ACRONYMS

ASCE	American Society of Civil Engineers
BC&A	Bowen, Collins & Associates
CIPP	cured-in-place pipe
DEM	digital evaluation model
EBCO	Ensign Bickford Company
ft	feet
GASB	Government Accounting Standards Board
GIS	geographical information system
GOPB	Governor's Office of Planning and Budget
gpd	gallons per day
gpm	gallons per minute
H_2S	hydrogen sulfide
H2SO4	Sulfuric Acid
I&I	Infiltration and Inflow
in	inch
MACP	Manhole Assessment and Certification Program
mgd	millions of gallons per day
NASSCO	National Association of Sewer Service Companies
O&M	Operations and Maintenance
PACP	Pipeline Assessment and Certification Program
ppm	parts per million
TAZ	Traffic Analysis Zone
UPDES	Utah Pollution Discharge Elimination System
WWTP	Wastewater Treatment Plant

CHAPTER 1
INTRODUCTION AND BACKGROUND

INTRODUCTION

Bowen Collins & Associates (BC&A) was retained by the Spanish Fork City to prepare a Sewer Master Plan for the Spanish Fork City wastewater collection system. The purpose of this Wastewater Master Plan Report is to identify recommended improvements that will resolve existing and projected future deficiencies in the wastewater collection system in Spanish Fork City.

BACKGROUND

Settlement of Spanish Fork City began in the early 1850's. Today there are over 134 miles of sewer main pipelines in the City's collection system ranging in diameter from 4 inches to 36 inches. Mapleton City also utilizes Spanish Fork's collection system and wastewater treatment plant. Therefore, existing and projected flows from Mapleton City were included as part of this study. However, this study does not include an evaluation of Mapleton City's collection system. The location of Mapleton City's connection to Spanish Fork City is shown in Figure 1-1.

The primary purpose of this Wastewater Master Plan is to provide recommended improvements to resolve existing and projected future capacity deficiencies in the Spanish Fork City wastewater collection system based on the City's adopted General Plan.

This document is a working document. Some of the recommended improvements identified in this report are based on the assumption that development and/or potential annexation will occur in a certain manner. If future growth or development patterns change significantly from those assumed and documented in this report, the recommendations may need to be revised. The status of development should be reviewed at least every five years. This report and the associated recommendations should also be updated every five years as well, or more often if assumed land use characteristics change significantly.

SCOPE OF SERVICES

The general scope of this project involved a thorough hydraulic analysis of Spanish Fork City's sewer collection system and its ability to meet the present and future wastewater collection needs of its residents. As part of this project, BC&A completed the following tasks:

Task 1: Developed and utilized a calibrated computerized hydraulic sewer model to simulate operation of existing facilities under current development conditions.

Task 2: Used the hydraulic sewer model to simulate operation of existing collection system facilities under future build-out land use conditions to identify the impacts of future development on existing sewer facilities.

Spanish Fork City
Wastewater Treatment Plant

Mapleton City Sewer Connection

Legend

- WWTP
- Spanish Fork Sewer Trunks
- Mapleton
- Payson
- Salem
- Springville
- Spanish Fork City

Springville
Mapleton
Spanish Fork
Salem
Payson
Elk Ridge
Woodland Hills

NORTH:

SCALE: 0 2,500 5,000 Feet

SPANISH FORK AND MAPLETON
WASTEWATER SERVICE AREA

SPANISH FORK CITY
WASTEWATER MASTER PLAN

Bowen Collins & Associates, Inc.
CONSULTING ENGINEERS

FIGURE NO.
1-1

P:\Spanish Fork City\Sewer Modeling\GIS\MXDs\Figure 1-1 Service Area.mxd mstayner 12/15/2011

Task 3: Used the hydraulic sewer model to evaluate alternative improvements that would resolve the system hydraulic deficiencies identified in Tasks 1 and 2.

Task 4: Prepared a master plan report to document the analytical procedures used in completing the study and to present recommendations and conclusions.

Task 5: Conducted progress and coordination meetings as required to keep City staff involved and informed of progress and activities.

PROJECT STAFF

The project work was performed by the BC&A team members listed below. Team member's roles on the project are also listed. The project was completed in BC&A's Draper, Utah office. Questions may be addressed to Matt Stayner, Project Manager at (801) 495-2224.

Craig Bagley	Senior Review
Matt Stayner	Project Manager
Andrew McKinnon	Project Engineer, Sewer Modeling
Angela Hansen	Word Processing

CHAPTER 2
EXISTING SYSTEM DESCRIPTION

SERVICE AREA

The projected service area for Spanish Fork City wastewater collection system is shown in Figure 2-1. Included in the service area are all areas recently annexed into Spanish Fork City and areas expected to be annexed. The sewer service area consists of a mix of residential, commercial, and industrial customers.

COLLECTION SYSTEM

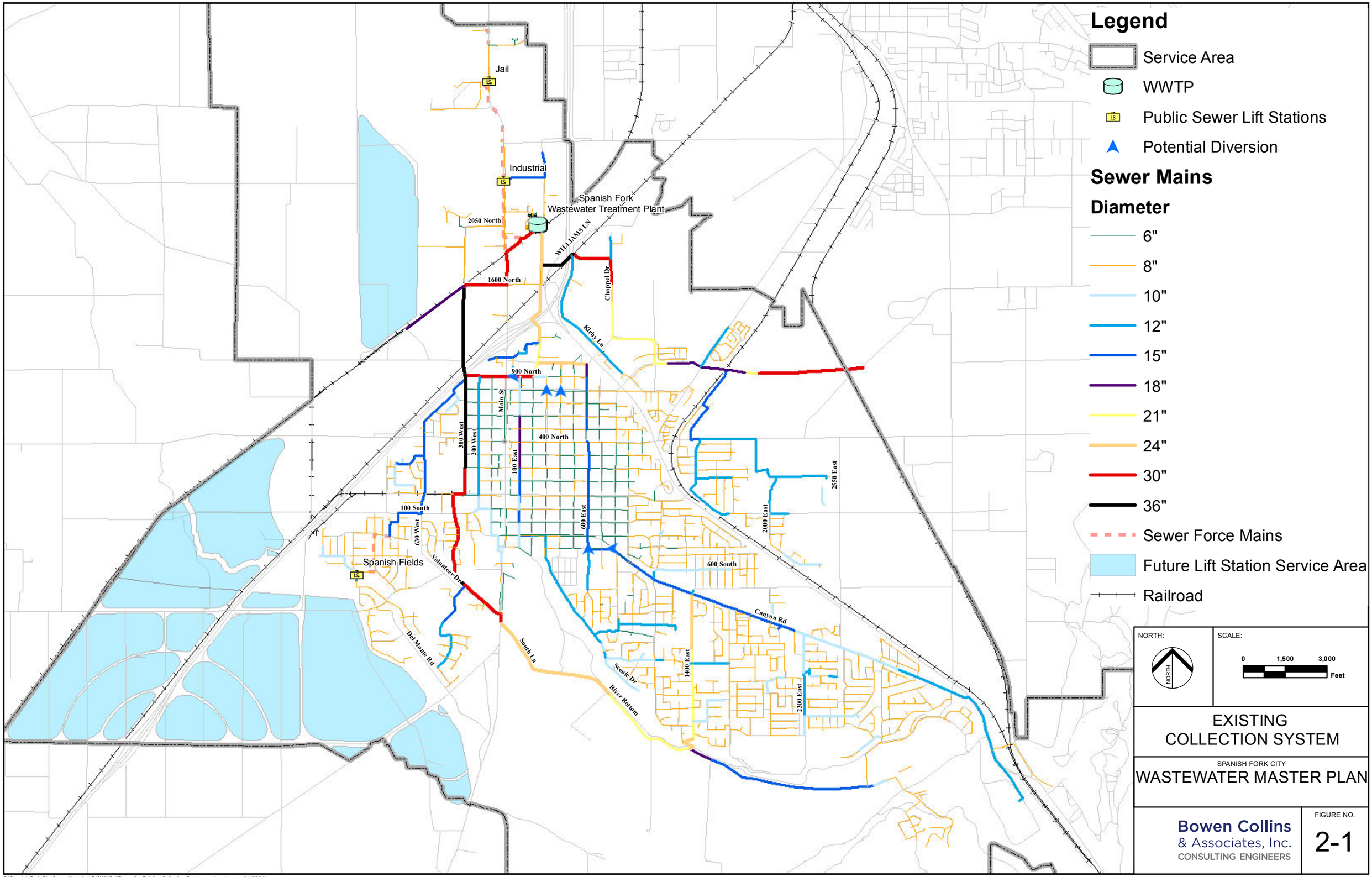
The topography in Spanish Fork generally slopes from Spanish Fork Canyon in the southeast toward Utah Lake which is northwest of the City. Most of the City's collection system can gravity flow to the Spanish Fork City Wastewater Treatment Plant (WWTP). The only exceptions include the industrial areas near the Airport and areas at the southwest end of the City as shown in Figure 2-1. Table 2-1 shows the estimated lengths of sewer main pipelines in the City based on data provided by City personnel.

Table 2-1
Estimated Pipe Length by Diameter in 2010

Pipe Diameter	Length (ft)	Length (mi)	% of Total
4"	1,248	0.24	0.2%
6"	103,252	19.56	14.5%
8"	410,338	77.72	57.8%
10"	39,192	7.42	5.5%
12"	50,858	9.63	7.2%
15"	40,672	7.7	5.7%
18"	7,913	1.5	1.1%
21"	12,938	2.45	1.8%
24"	15,453	2.93	2.2%
30"	16,794	3.18	2.4%
36"	11,828	2.24	1.7%
Total	**710,487**	**135**	**100%**

Lift Stations

There are three Spanish Fork City owned and operated wastewater lift stations in the collection system. Characteristics for these lift stations are shown in Table 2-2.



P:\Spanish Fork City\Sewer Modeling\GIS\MXDs\Figure 2-1 Existing Collection System.mxd mstayner 12/15/2011

Table 2-2
Characteristics of Existing Wastewater Pump Stations

Lift Station Name	Address	Year Built	Wet Well Volume (gallons)	Pump Capacity[b] (gpm)	Total Head (ft)	No. Pumps	Equipped with Backup Power
Industrial	2400 N. Main	1997	14,400[a]	600	55	2	Yes
Jail	3075 N. Main	1994	2,500	430	45+	2	Yes
Spanish Fields	1137 W. 590 S.	2005	1,500	600	25+	2	Yes

[a] maximum available volume based on gravity inlet pipe and pump intake. Control levels unavailable.
[b] pump data provided by Spanish Fork City personnel
+static head, dynamic head unavailable

The Industrial and Jail Lift Stations in the hydraulic model were simulated using a feature in the modeling software that allows the lift stations to pump out at the same rate of wastewater that flows into the lift station. This feature does not reproduce the cycling effect expected at the discharge of a force main, but represents flow from the lift station after attenuation effects. This was a reasonable representation of these two lift stations because they discharge into a large gravity sewer trunk (36") and cycling effects were not observed at the flow meter directly downstream of these force mains. Because no collection pipes that convey wastewater to the Spanish Fields lift station were surveyed or modeled, that lift station was not included in the hydraulic model. Estimated flows from that lift station were input in the model at the closest surveyed manhole on the discharge line.

DIVERSIONS AND INTERCEPTORS

Although Spanish Fork does not operate any mechanical diversions in its wastewater collection system, information in the City's wastewater collection system database indicate that there are five manholes that appear to contain possible diversions or bifurcations. Spanish Fork City personnel identified the primary flow direction at these locations as indicated by the arrows in Figure 2-1 and in Table 2-3.

Table 2-3
Spanish Fork City Potential Diversions

Intersection	Possible Flow Direction	Main Flow Direction
900 North 50 East	North	West
800 North 400 East	West	North
800 North 300 East (southeast of others)	West	North
600 East 400 South (northeastern)	West	North
400 South Canyon Road	North	West

The only manhole that currently serves as a hydraulic diversion is located at 900 North 50 East. As the City updates its collection system database, information at the other locations should be updated to reflect that there is no connection.

SIPHONS

Sewer main siphons or inverted siphons provide a means of conveying wastewater under obstructions such as rivers. Inverted siphons flow under pressure and should have flow velocities greater than 3 ft/sec to keep solids suspended. Spanish Fork has three inverted siphons.

200 East/WWTP Siphon (From South)

This siphon passes underneath the Union Pacific Railroad directly south of the WWTP (flowing north along 200 East). This siphon consists of three pipes: an 8-inch, 10-inch, and 24-inch main.

Fastenal/WWTP Siphon (From West)

This siphon is located west of the WWTP and passes underneath a spur of the Union Pacific Railroad. The upstream end of this siphon surcharged up to 9 feet under normal operating conditions and is within 3 feet of becoming a potential sanitary sewer overflow. The size of this siphon was unknown at the time of this study, and further investigation of this location is recommended.

Quail Hollow Siphon (481 W Riverside Lane)

This siphon is located just west of the home at 481 W. Riverside Lane and flows underneath the Spanish Fork River. This siphon consists of one 8-inch and one 12-inch diameter sewer pipe.

TREATMENT PLANT

The WWTP, located at 175 East 2160 North as shown in Figure 2-1, treats all of the Spanish Fork City wastewater, with the exception of a small amount of discharge that is sent to the Salem Water Treatment Facility. The WWTP also treats discharge from Mapleton City as part of an inter-local agreement. The WWTP was placed into operation in 1956 and has been expanded several times. The most recent expansion occurred in 2011 (see Chapter 7 for additional detail).

RECENT IMPROVEMENT PROJECTS

Several projects were recently completed at the WWTP related to existing deficiencies and future growth. Table 2-4 lists these two projects and their related costs as provided by Spanish Fork City personnel and Aqua Engineering (see Appendix for “Siphon and digester cost attributed to growth” technical memorandum).

Table 2-4
Recently Completed Capital Projects at the WWTP

Project No.	Project Description	Cost	Percent Attributable to Future Growth	Years
TP-0	SUVMWA Land for Regional WWTP	$818,337	100%	2006 - 2011
TP-1	Trunk Line & Siphon Upsize	$181,346	99%	2010 - 2011
TP-2	New Digester and Common Equip.	$1,150,460	80%	2009 - 2011
TP-3	New Digester Engineering	$54,279	100%	2010 - 2011

CHAPTER 3
FUTURE GROWTH

Future growth projections were used in this study to estimate where and what type of future development will occur, and to identify the capital improvements needed for the wastewater collection system. The purpose of this chapter is to document the growth projections used as the basis for evaluation in this report.

POPULATION PROJECTIONS

Population projections for the Spanish Fork City sewer system service area were prepared through the year 2080 in two steps:

1. Population projections through 2080 for Spanish Fork City were provided by Spanish Fork City personnel.

2. Population projections through the year 2030 for Mapleton City, which contributes wastewater flow to the WWTP, were obtained from the Governor's Office of Planning and Budget (GOPB). Mapleton City estimates a build-out population of 29,403. No projections of the growth rate were available, so build-out for Mapleton has been assumed to be the year 2080. A declining growth rate for Mapleton City was assumed from 2031 to 2080 as Mapleton begins to approach build-out.

Table 3-1 shows the projected population for both Spanish Fork City and Mapleton City.

Table 3-1
Projected Population for Spanish Fork City and Mapleton City

Year	Spanish Fork City	Mapleton City	Spanish Fork & Mapleton
2010	34,691	8,764	43,455
2020	42,871	11,644	54,515
2030	51,775	16,358	68,133
2040	61,918	18,967	80,884
2050	73,322	21,576	94,898
2060	85,978	24,185	110,163
2070	99,928	26,794	126,722
2080	115,971	29,403	145,374

In addition to estimating the future population of Spanish Fork City, the distribution of future population was also estimated. This was done using the zoning and land use maps in the City's existing General Plan and estimating the percentage of existing development (using 2009 aerial photography). Table 3-2 lists the zoned land use in the General Plan and the estimated fully-developed equivalent residential units (ERUs) associated with each zoned land use. A single

ERU represents 3.9 persons/unit (based on 2010 census numbers) or a domestic sewer production of 229 gpd/ERU (does not include infiltration).

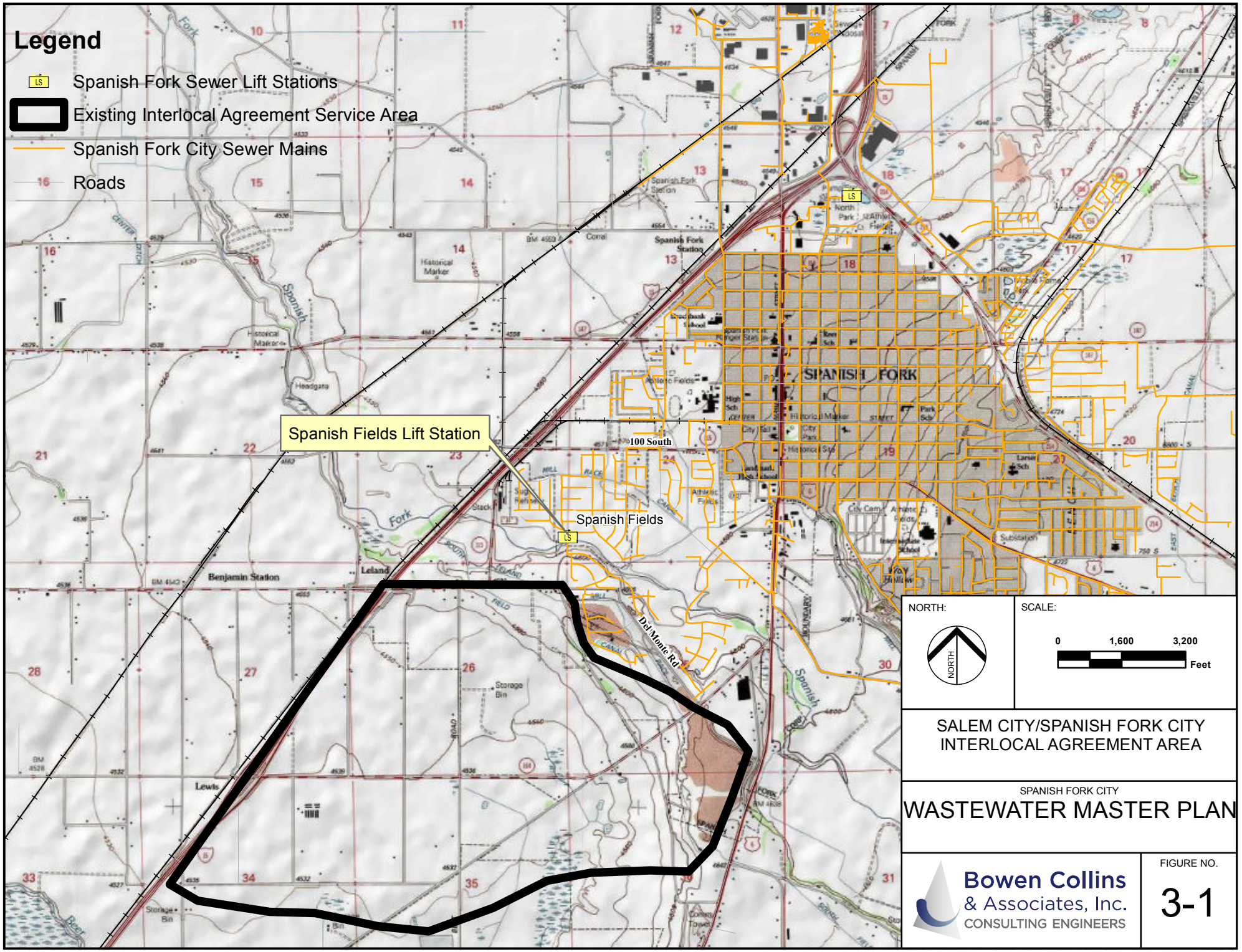
Table 3-2
Approximate Density of Development by Zoned Land Use

Zoned Land Use	ERUs/acre Based on Existing Development Patterns[1]	ERUs/acre Based on Planning Densities[2]
Agricultural	0	0
Low Density Residential[2]	1.9	3.15
Medium Density Residential[2]	3.4	7.2
High Density Residential[2]	5.3	10.8
Mixed Use	3.9	3.9
Commercial	3.0	3.0
Industrial	2.5	2.5
Floodplain (Floodway)	0	0
Public Facilities[3]	0	0

[1] – Developed using Spanish Fork water meter data for developed areas.
[2] – Calculated using planning density from the General Plan and assumes that 10% of developable areas will be dedicated as public right-of-ways.
[3] – Most undeveloped areas zoned as public facilities appear to be parks. Developed public facilities include parks, public recreation centers, schools, churches, etc.

The City's General Plan only lists planning densities for residential zoning types. To estimate the distribution of future flow for other zoned land uses, domestic wastewater production for each zoning type was estimated using water meter data for developed areas of the various zoning types. Because the range of domestic sewer production varies significantly for non-residential zoning types; the average domestic sewer production for existing development was used for the planning densities to estimate ERUs/acre and the associated domestic sewer production for non-residential zones. Note that the planning densities in the City are much higher than observed densities from existing development patterns. Using the planning densities shown in Table 3-2, the estimated build-out population for Spanish Fork based on ERUs is approximately 115,819. This build-out value based on ERUs is approximately equal to the build-out population estimated by Spanish Fork City personnel shown in Table 3-1.

It should be noted that Spanish Fork currently has an interlocal agreement with Salem City to allow wastewater from some of its developable areas to flow to the Salem Wastewater Treatment Facility. The area identified in this interlocal agreement is shown in Figure 3-1. The current interlocal agreement caps the number of units that may be serviced by a Salem City lift station at 400 ERUs. Because Spanish Fork may be able to develop up to 3,600 ERUs within the area of this inter-local agreement, the City should ensure sewer lines are constructed so that wastewater discharges can be conveyed to a future Spanish Fork City owned and operated lift station.



P:\Spanish Fork City\Sewer Modeling\GIS\MXDs\Figure 3-1 - Salem Service.mxd amckinnon 10/28/2011

FUTURE SEWER FLOW ESTIMATES

For the purposes of this study, it was assumed that domestic sewer flow will increase proportionally with population. Total domestic wastewater production for 2010 was estimated to be approximately 2.03 mgd based on 90 percent of indoor water use data collected by the City from 2007 to 2009 for the months of December to April. For 2010, this is equivalent to a per capita domestic sewage production rate of approximately 58.5 gpcd based on Spanish Fork City's current population. The estimated current domestic sewage production rate of 58.5 gpcd has been applied to future populations to estimate future sewer flows for both Spanish Fork and Mapleton. At full build-out, it was estimated that the average daily domestic sewer discharge from Spanish Fork City and Mapleton City will increase to approximately 6.79 mgd and 1.72 mgd respectively as shown in Table 3-3.

Table 3-3
Projected Average Daily Sewer Discharge from Spanish Fork and Mapleton City

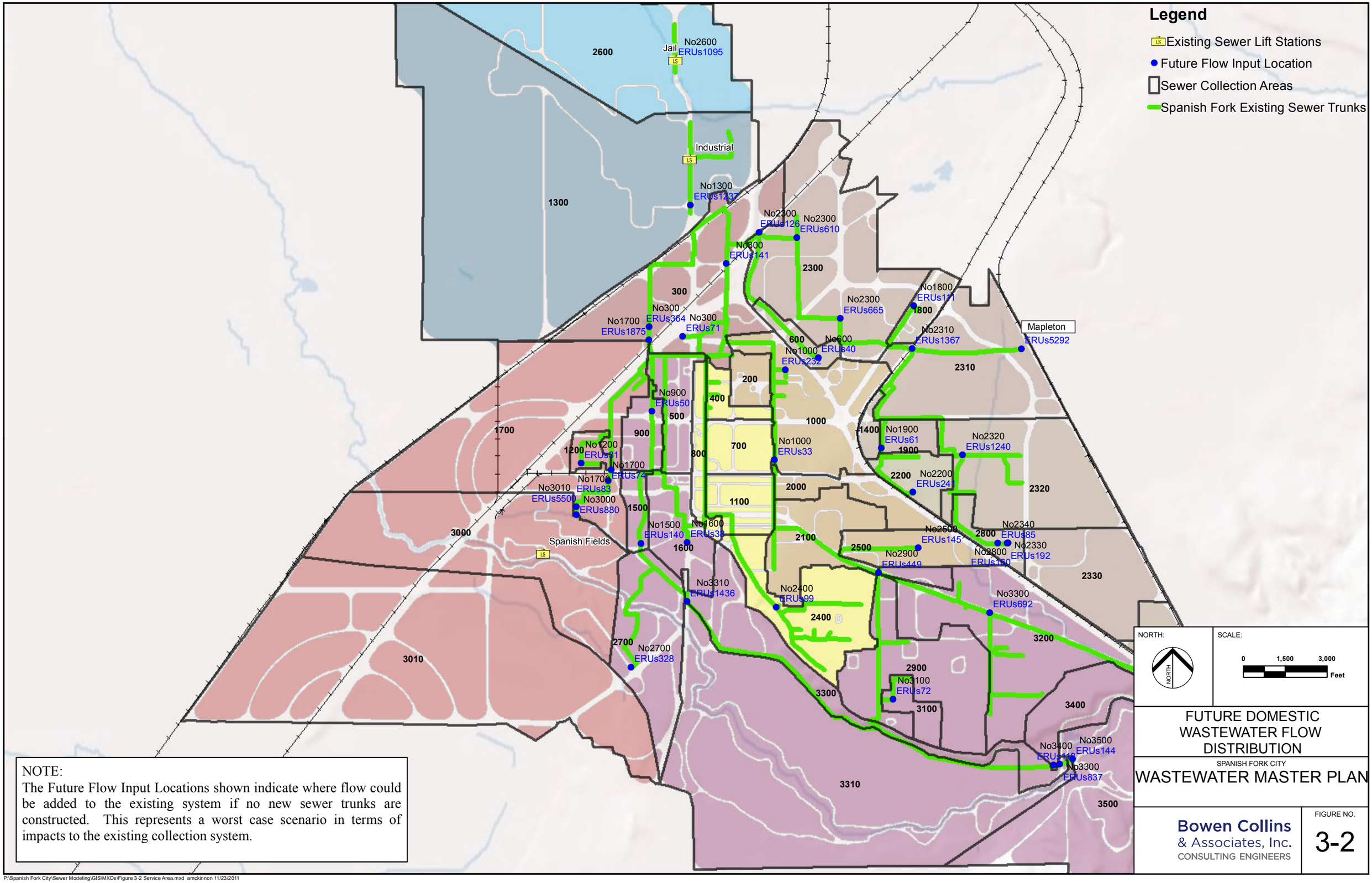
Year	Spanish Fork City Domestic Sewer Production (mgd)	Mapleton Domestic Sewer Production (mgd)	Combined Spanish Fork/Mapleton Domestic Sewer (mgd)	Combined Spanish Fork/Mapleton Infiltration (mgd)	Combined Spanish Fork/Mapleton Total Sewer Flow (mgd)
2010	2.03	0.51	2.54	2.85	5.39
2020	2.51	0.68	3.19	2.95	6.14
2030	3.03	0.96	3.99	3.07	7.05
2040	3.62	1.11	4.73	3.18	7.91
2050	4.29	1.26	5.55	3.30	8.86
2060	5.03	1.42	6.45	3.44	9.88
2070	5.85	1.57	7.42	3.58	11.00
2080	6.79	1.72	8.51	3.75	12.25

Infiltration at the WWTP was estimated to be approximately 2.85 mgd in the spring of 2011 based on the difference between average monthly flows at the WWTP and the estimated domestic production. This was a historic high for the WWTP and represents the planning infiltration that should be expected at the facility during a wet climate year. As the City's population and collection system expands, a small amount of new infiltration was added each year to account for infiltration associated with new construction. For new construction, allowable infiltration should range between 400 and 600 gpd/in-diam/mile[1] compared to a range of 1,000 to 4,000 gpd/in-diam/mile expected for older construction. For new collection systems, this can be estimated to be approximately 15 percent of the domestic sewer production (or approximately 500 gpd/in-diam/mile).

1 "Chapter 3 Quantity of Wastewater." *Gravity Sanitary Sewer Design and Construction*. NY, NY: American Society of Civil Engineers.

DISTRIBUTION OF FUTURE DEVELOPMENT

The City's General Plan was used to distribute future domestic flow by types of zoned land use. Figure 3-2 indicates the locations where future sewer flows were added to the collection system in terms of ERUs. Included in Figure 3-2 are the sewer collection areas used to project future growth.



P:\Spanish Fork City\Sewer Modeling\GIS\MXDs\Figure 3-2 Service Area.mxd amckinnon 11/23/2011

CHAPTER 4
HYDRAULIC MODELING

The existing Spanish Fork City wastewater collection system was evaluated as part of this study using a hydraulic modeling computer program. A hydraulic computer model is a mathematical representation of the pipes, manholes, pumps, and wastewater flows found in the sewer collection system. Hydraulic computer models are useful because they allow the user to simulate operation of large, complex sewer systems and to evaluate how future changes in development and flow conditions will affect those systems. The purpose of this chapter is to describe the development of the Spanish Fork hydraulic sewer model for existing land use conditions.

MODEL SELECTION

The computer modeling software used in this study was Storm and Sanitary Analysis (SSA) developed by Autodesk. Spanish Fork City obtained the SSA software from Autodesk in association with their Civil 3D license. Although there are many other sanitary sewer software packages available to perform hydraulic simulations, SSA was used in this study because it has increased functionality compared to EPA SWMM 5, and it is more economical than many other software programs.

There are two major types of data required to develop a digitized hydraulic model of a sewer system: geometric data and flow data, as described below.

GEOMETRIC MODEL DEVELOPMENT

Geometric data consists of all information needed to represent the physical characteristics of the system.

Modeled Pipelines & Manholes

Because of budget and time constraints, it was not possible to survey and model every collection line and manhole in the Spanish Fork wastewater collection system. Therefore, only the sewer trunk lines were modeled. This is typical for a collection system master plan. For the purpose of this study, trunk lines were defined as having a diameter of 10 inches or larger. Spanish Fork personnel also assisted in identifying some critical 8-inch diameter pipelines to be modeled. The trunk lines were surveyed by City personnel. Information on the physical characteristics of the trunk lines and associated manholes (invert and rim elevations) was also collected during the survey process and assembled by Spanish Fork City personnel. That information was incorporated into the City's GIS database along with the diameter, length and location of each pipe.

Lift Stations

There are three Spanish Fork City owned and operated lift stations in its wastewater collection system. Characteristics for these lift stations are presented in Chapter 2. Because the wet well volumes and operational levels of these lift stations were not known at the time of this study,

these lift stations were modeled using a simplified approach. Flows upstream of the lift station are directed to the force main discharge without cycling through on/off cycles of the lift station pumps, similar to the situation that would exist when variable frequency drives are used.
This modeling approach does not reproduce the cycling effects experienced at the discharge end of a force main, but still reasonably represents flow from the lift station after attenuation effects in the downstream gravity main. This was a reasonable representation of these lift stations because cycling effects of the pump station were not observed at the flow meters directly downstream of the lift station force mains.

Sediment and Debris

Because of the transportable nature of grease and sediment in a sewer collection system, it is generally not possible to use a computer model to identify the exact location and quantity of grease or sediment accumulation in the system for any specific point in time. Similarly, the build-up and erosion rates of sediment in sanitary sewer systems are not always well understood. As a result, detailed computer modeling of sediment, grease, and debris on a system wide basis is not possible because of continually changing conditions. Therefore, no sediment was included in the hydraulic model. Instead, the design and evaluation criteria for the Spanish Fork City collection system is based on "clean" pipes, with an allowance for capacity lost due to the potential accumulation of sediment.

It should be noted that the hydraulic modeling software used to simulate the operation of the Spanish Fork City wastewater collection system does have the ability to set sediment depth in pipes. Therefore, if the City collects sediment data for a given section of pipe, the sediment may be added to the model and its effects evaluated. However, it should be emphasized that any sediment levels defined today may change in the future as flow conditions change or as maintenance practices are implemented to address sediment accumulation.

Wastewater Treatment Plant

The WWTP located at 2160 North 175 East was used as the outfall in the hydraulic model.

FLOW DATA DEVELOPMENT

Development of flow data for a dynamic computer model consists of estimating the magnitude of flow, point of entry into the system, and a definition of how flow varies with time (to establish peak flow rates and consider the effects of flow travel time in the system). There are three potential sources of flow in sewer pipelines: domestic flow, infiltration, and inflow. They are each described below.

Domestic Flow

Domestic flow consists of the wastewater generated by residential, commercial, and industrial customers. Domestic flow from residential and commercial customers varies throughout the day and throughout the week. For Spanish Fork City, flow records indicate that the peak flow typically occurs on Saturdays during the afternoon. Therefore, most of the calibration data used

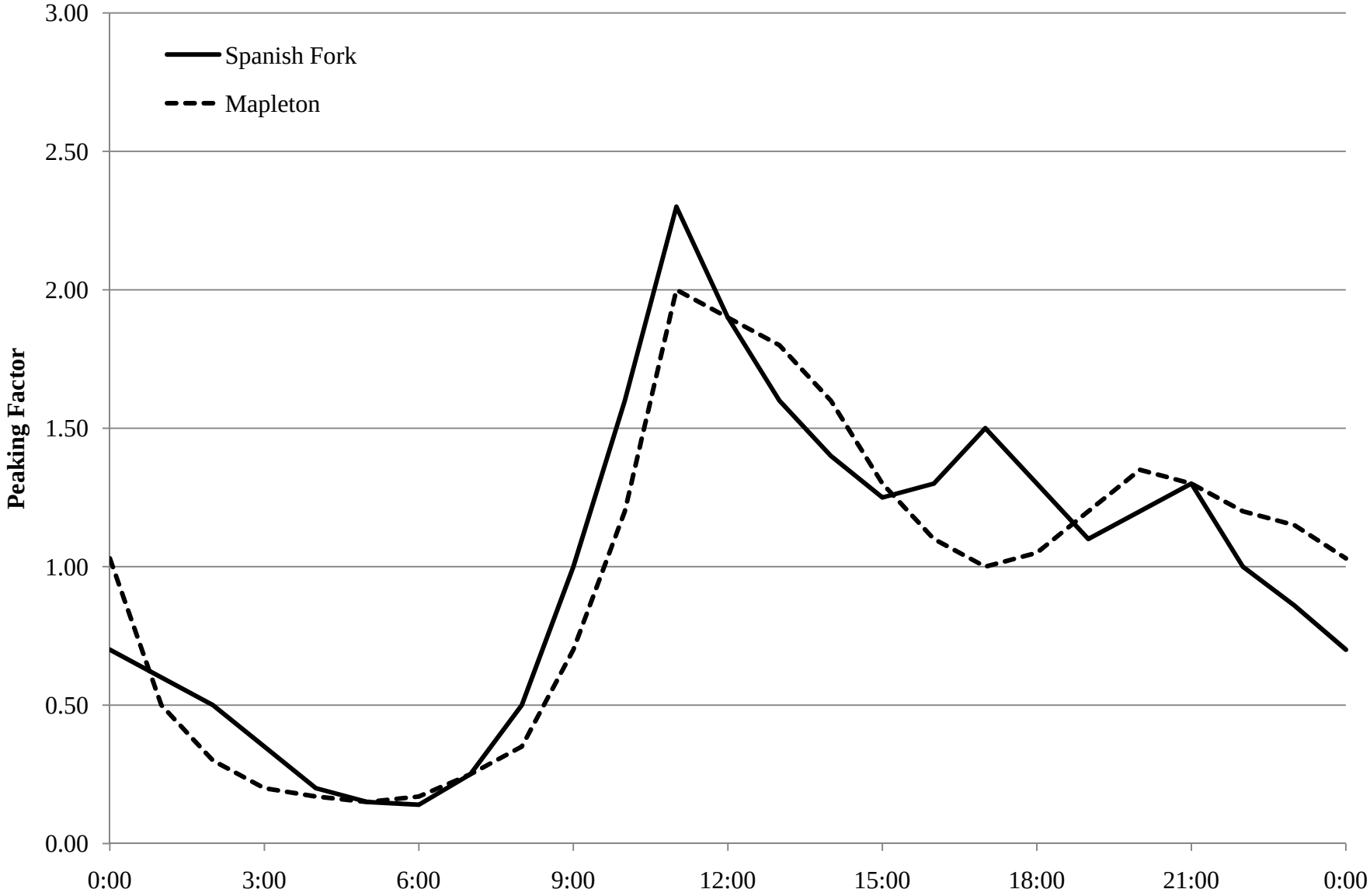
for the hydraulic model used data sampled from Saturdays during various flow-monitoring periods. The diurnal pattern for the City was also developed based on flow monitoring records obtained from locations throughout the City observed on Saturdays. Although commercial and industrial domestic wastewater patterns typically vary from patterns for residential wastewater patterns, no clear commercial or industrial pattern was observed during the flow monitoring. This suggests that while commercial and industrial developments exist in Spanish Fork City, residential flow patterns tend to dominate the overall wastewater production pattern in the City. In addition, industrial wastewater production patterns typically vary greatly depending on the type of industry and therefore cannot be replicated using a single pattern. The diurnal wastewater production pattern shown in Table 4-1 and Figure 4-1 represents most of Spanish Fork City well. While some variation from this pattern is apparent from the various flow meter sites that were monitored in the City, peak flows into the system appear to be simulated well. A separate diurnal pattern was created for Mapleton City because of the large contribution of flow impacting the Spanish Fork collection system.

Table 4-1
Wastewater Production Pattern for Spanish Fork[1]
Wastewater Collection System Model

Hour of the Day	Spanish Fork City Pattern	Mapleton City Pattern
0:00	0.8	1.03
1:00	0.7	0.8
2:00	0.4	0.6
3:00	0.2	0.4
4:00	0.15	0.33
5:00	0.2	0.2
6:00	0.25	0.15
7:00	0.35	0.17
8:00	0.55	0.25
9:00	1.1	0.35
10:00	1.6	0.6
11:00	2.1	1.4
12:00	1.6	1.88
13:00	1.4	1.85
14:00	1.2	1.65
15:00	1.25	1.41
16:00	1.3	1.3
17:00	1.6	1.25
18:00	1.3	1.2
19:00	1.2	1.2
20:00	1.25	1.25
21:00	1.4	1.3
22:00	1.1	1.25
23:00	1	1.15
0:00	0.8	1.03

[1] – Saturdays only

Figure 4-1
Diurnal Patterns applied to Hydraulic Model



For large industrial facilities or developments, the City may consider monitoring wastewater production to develop a unique flow monitoring pattern to input into the model. However, this was not considered necessary to represent system flows as part of this study.

Existing domestic sewer flow data developed for the hydraulic model was based on winter water use data (the sum of water used between the months of December and April) using the City's water meter data (maximum monthly water usage from 2007 to 2009). To estimate domestic wastewater production, it was assumed that 90 percent of metered indoor water use is converted to domestic wastewater. This is somewhat higher than the State of Utah's value of 80 percent used for water rights calculations, but it produced domestic flows that appear to match flow monitor results well. Average domestic wastewater production estimated for 2010 was estimated to be approximately 2.03 mgd.

To distribute wastewater production throughout the hydraulic model, discharge data should be assigned to the nearest sewer main that would collect the indoor water use. Normally, water meter use data would be assigned to the nearest manhole in a collection system. However, because only select sewer trunks were included in the hydraulic model, this approach would not accurately distribute the indoor water use data because the nearest sewer trunk or sewer manhole may not represent the correct flow direction. To improve the accuracy of distributing indoor water use to the modeled sewer lines, 41 sewer collection sub-basins were delineated based on the contributing sewer area throughout the City as shown in Figure 3-2 (Chapter 3). Because accurate elevation data is not available throughout the City, Spanish Fork City personnel reviewed the sub-basins to confirm the accuracy. By defining these sewer sub-basins, it was possible to more accurately assign water meter data for existing flows to the correct sewer trunk. As discussed in Chapter 3, these sewer collection basins were also used to project future domestic flows and assign them to nodes in the hydraulic model.

Infiltration

Figure 4-2 indicates the flow monitoring tributary areas used to identify the level of infiltration throughout the City. Infiltration is the intrusion of groundwater into the sewer system through cracked pipes, broken and offset joints, improper connections, leaky manholes, etc. In areas with aging sewer lines and high groundwater, infiltration can actually be the largest component of flow being conveyed in the sewer. Infiltration is very difficult to measure because it varies across the service area based on climate conditions, water table levels, pipe diameter, and pipe condition.

Figure 4-3 shows the Mapleton City monthly discharge into the Spanish Fork collection system for 2007 through 2011. It is apparent from this figure that Mapleton City infiltration rises and falls with the irrigation season. For the year 2010, measured flows in September were 2.85 times higher than in February of 2010. The difference between these measurements is likely the result of significant fluctuations in infiltration into the Mapleton collection system. For Spanish Fork City, flows do not appear to fluctuate seasonally (as they do in Mapleton) as seen in Figure 4-4. However, it should be noted that domestic wastewater (from indoor water use) and infiltration have been increasing over the last 7 years as seen by the average monthly flows shown in Figure 4-5. While some of this increase is likely the result of development, some of the increase

Jail
Industrial
Other
Spanish Fields
1
2
3
4
5
6
7a
7b
7c
8
9
10
11
12
13
14
15A
15B
16
2
3
4
5
6
7
8
9
10
11
13
14
15

Legend

- Flow Monitor Locations
- Sewer Lift Stations
- Spanish Fork Sewer Trunks

Flow Monitoring Areas

- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 13
- 14
- 15
- Other Areas

NORTH:

SCALE: 0 1,500 3,000 Feet

FLOW MONITORING LOCATIONS AND AREAS

SPANISH FORK CITY
WASTEWATER MASTER PLAN

Bowen Collins & Associates, Inc.
CONSULTING ENGINEERS

FIGURE NO.
4-2

P:\Spanish Fork City\Sewer Modeling\GIS\MXDs\Figure 4-2 Flow Monitoring Areas.mxd amckinnon 11/22/2011

Figure 4-3
Metered Mapleton City Discharges to Spanish Fork City Wastewater Collection System

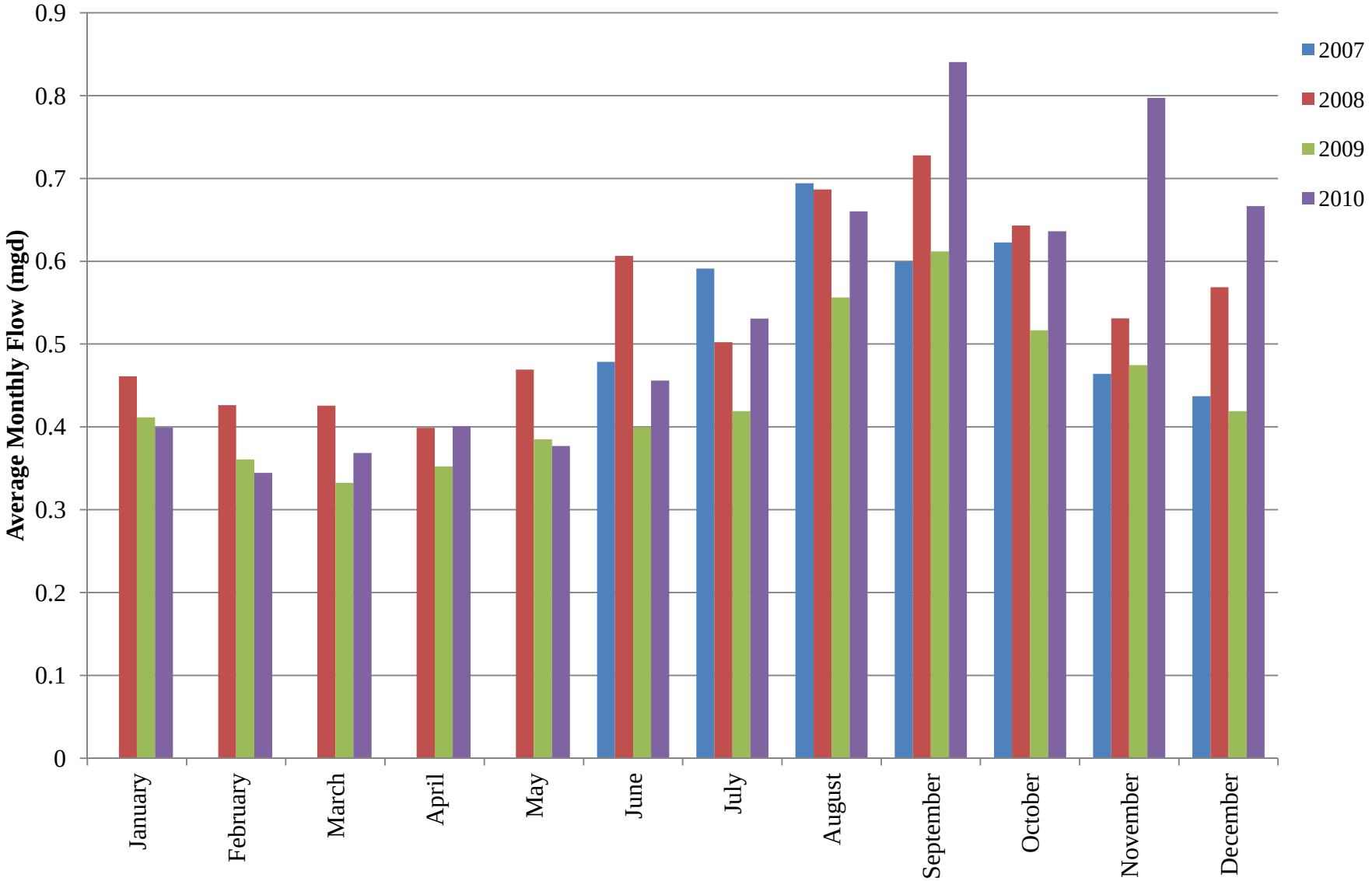


Figure 4-4
Average Monthly Flows Observed at the
Spanish Fork Water Reclamation Facility

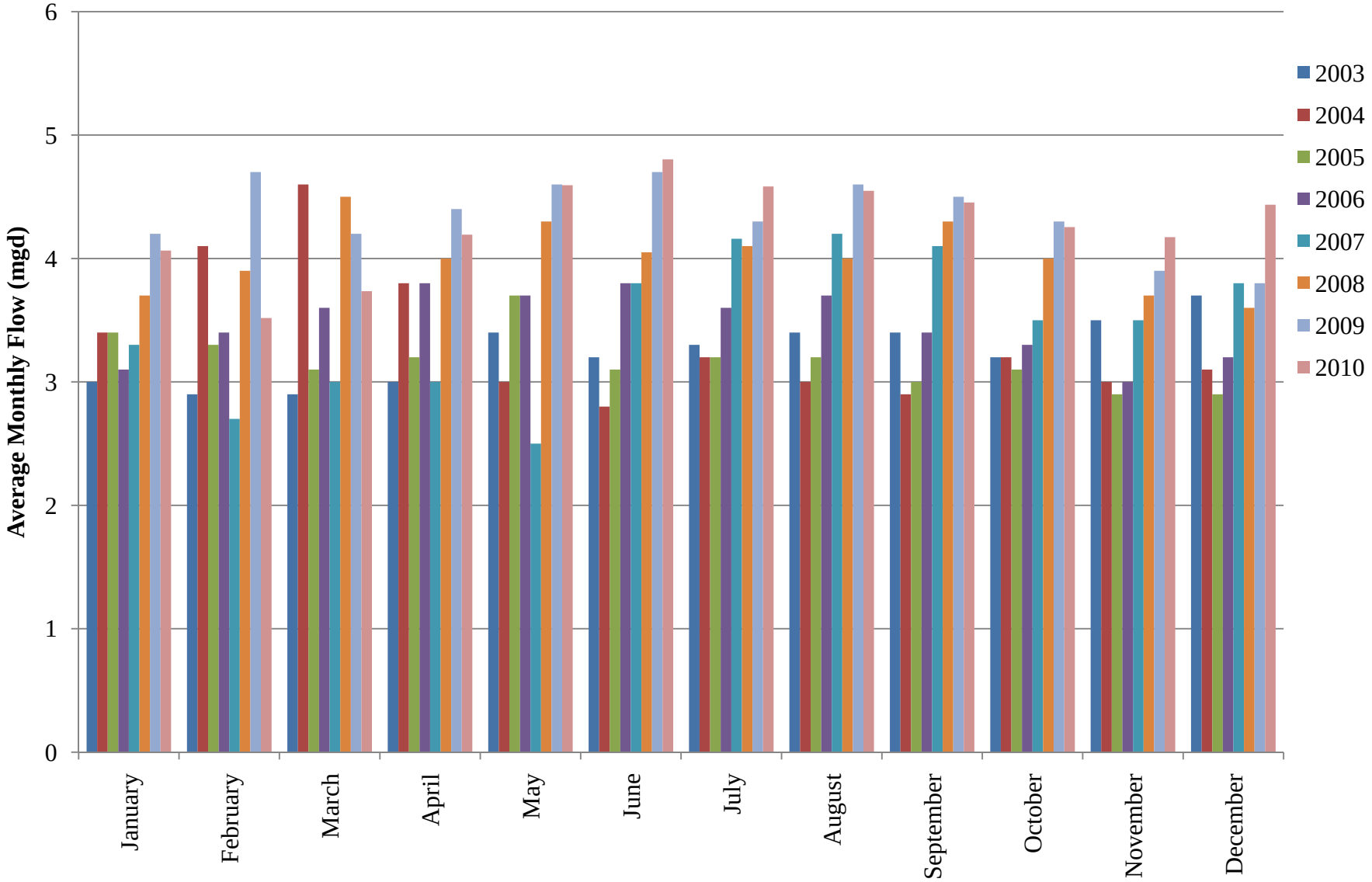
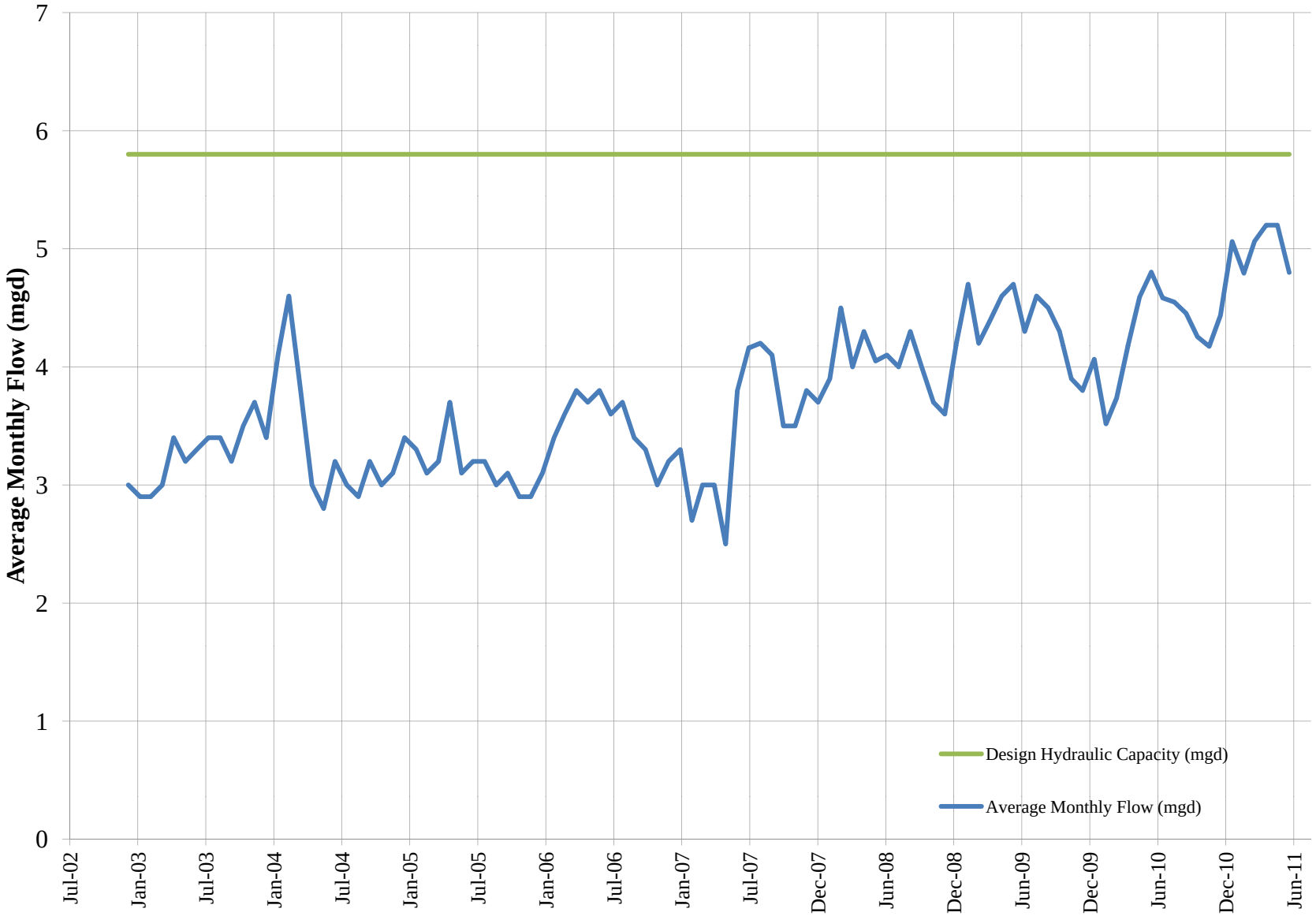


Figure 4-5
Historic Spanish Fork Water Reclamation Facility Flow Rates



is the likely the result of increased infiltration from varying climate conditions. Based on the trend seen in Figure 4-5, it would appear that development within the City is beginning to approach the treatment plant's hydraulic design capacity (see Chapter 7 for discussion of the treatment plant).

To estimate the distribution of infiltration into the Spanish Fork collection system, flow was monitored throughout the City for 15 delineated collection areas (as shown in Figure 4-2). Total infiltration at each flow meter was estimated, and the net infiltration for each sub-basin area was estimated by subtracting upstream infiltration. Estimating flow at each flow meter site required making some assumptions about monitored flows. One approach to estimating infiltration is to use the assumption that domestic wastewater flows will be very small during the early hours of the morning. For the purposes of this study, it has been assumed that approximately 12 percent of the average domestic production measured at flow meter sites is a constant flow into the collection system. Using this assumption, it is possible to estimate domestic wastewater production at each flow meter sites using the following calculation:

Average Domestic Wastewater Flow = (Daily Average – Daily Minimum) / 0.88

Infiltration was subsequently estimated by subtracting the domestic wastewater flow rate from the daily average flow rate. This calculation ignores potential influence of lift stations and diversions in the collection system. Where diversions and lift stations exist upstream of flow meter sites, the data was evaluated to determine if the underlying assumptions were adequate.

Fluctuations in Infiltration. Although infiltration varies with time when examined over a period of several months or years, very little variation in time will occur during a single day. Therefore, when infiltration is added to a hydraulic model as a component of the total estimated sewer flow, it is added simply as a constant flow.

Because the flow meter data used in the hydraulic model was collected at various times of the year beginning in approximately November 2009 and ending in March 2011, it was necessary to make adjustments to some of the data to account for fluctuations in seasonal and/or annual infiltration. Because the highest infiltration rate observed for Spanish Fork City occurred in March 2011, infiltration from some flow meter sites was multiplied by a factor to represent March 2011 infiltration rates. Infiltration at the WWTP was estimated with the assumption that domestic production was relatively constant from November 2009 to March 2011. The infiltration adjustment factor was then calculated for each site and is listed in Table 4-3 with the estimated infiltration at the flow meter site.

Table 4-2
Estimated Infiltration for March 2011 at Various Flow Meter Sites

Flow Meter	Address	Infiltration Adjustment Factor	Estimated Infiltration for Collection Area (mgd)	Estimated Infiltration for Collection Area (gal/in-diam-mile)
1 - WWTP	2160 N 175 E	1.00	2.921	1,688
2	1750N I15	1.63	0.465	2,569
3	1600N 250W	1.63	0.135	1,048
4	1600N 200E	1.63	0.032	1,865
5	1550N Kirby Ln	1.68	0.115	10,229
6	1000N 250E	1.00	0.159	1,866
7	900N 200W	1.16	0.045	586
8	800N 100E-East	1.10	0.314	2,089
9	800N 100E-West	1.10	0.111	4,504
10	750N Mitchell	1.00	0.113	990
11	700N 300W	1.15	0.139	1,427
12	800N 800E	1.68	0.144	3,802
13	100N 600E	1.10	0.024	189
14	100W Volunteer Dr	1.00	0.691	2,910
15	1450E Canyon	1.10	0.011	79
100	Other Areas	1.00	0.057	1,321
Mapleton City	--	--	0.369	--

In sub-basins where infiltration for various flow metering basins could not be estimated reliably because of erratic flow meter data, the estimated average infiltration rate for the entire City was applied to that basin (approximately 1,700 gal/in-diam-mile for March 2011).

The American Society of Civil Engineers (ASCE) recommends an allowable infiltration rate for new construction of 500 gpd/in-dia-mile. For older sewer systems, infiltration rates are usually much greater than this. Average infiltration rates for older sewer systems range between 1000 and 4000 gpd/in-dia-mile depending on groundwater depth and age of pipe. Most of the estimated infiltration rates at locations monitored in this study fall within this range of expected values.

Based on ASCE infiltration criteria, Meter locations 5 and 9 appear to have unusually large amounts of infiltration.

- Meter 5 is located in an industrial area and had an indoor winter water use demand of approximately 37 gpm corresponding to approximately 33 gpm of domestic wastewater production. Average flow at this site was measured as 93 gpm for the month of August 2010. This suggests that more than half of the flow in this sewer trunk is a result of infiltration. Flows in this sewer trunk likely fluctuate significantly with the seasons as a

result of changing infiltration conditions. Although this sewer main only contributes a small amount of flow to the City's collection system, it is recommended this trunk be inspected (using CCTV) to identify any major sources of infiltration.

- Meter 9 is located on the Westside of 100 East and serves neighborhoods between Main Street and 100 East. Indoor winter water use demand for the area was estimated at approximately 43 gpm corresponding to approximately 39 gpm of domestic wastewater production. Flow was monitored for 10 days in February 2011 and averaged as 123 gpm. The sewer main upstream of Meter 9 is located in one of the older areas of Spanish Fork City and may be leaking more than other areas of the collection system. It may be difficult to identify large sources of infiltration for this area because leaks likely come from older service laterals, cracked pipes, broken joints, etc. However, this line should be inspected to determine if rehabilitation efforts would be worthwhile for this area.

Inflow

The third and final component of wastewater flow that must be considered for hydraulic modeling purposes is inflow. Inflow is defined as any water that enters into the sewer system which is directly or indirectly related to a storm event. It can come directly from storm runoff through improper connections to the storm water system, missing or leaky manhole covers, roof drains connected to the system, etc. Storm events can also cause the ground water to raise temporarily, which can cause an increase in flow in the sewer system through the same mechanisms that result in groundwater infiltration during dry weather (cracked pipes, leaky laterals, etc.). This temporary increase in sewer flow due to raising levels of ground water is also considered inflow.

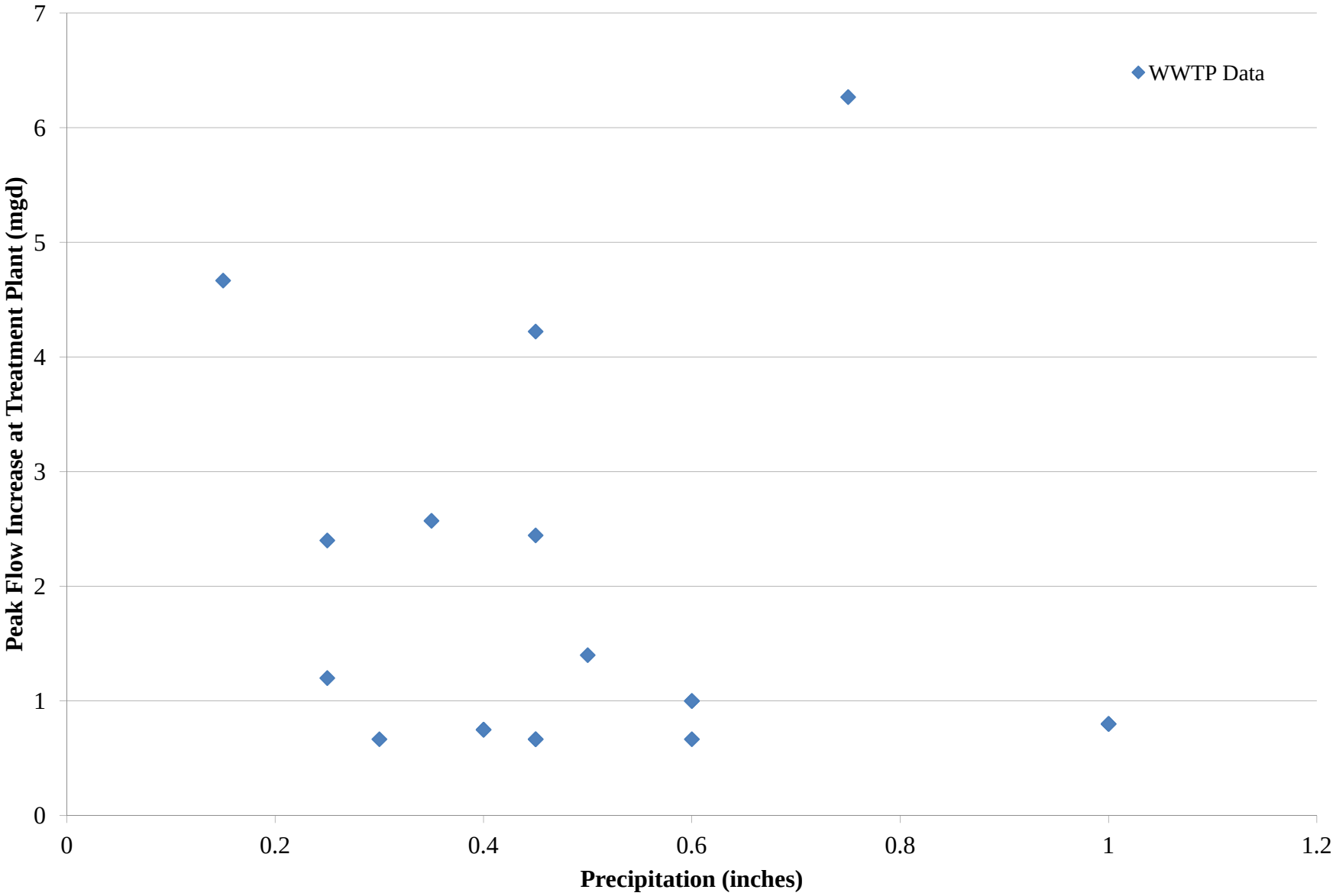
To accurately model inflow into the City collection system, it is necessary to estimate both the magnitude and distribution of the inflow in the system. This requires accurate measurements of precipitation around the City and simultaneous flow measurements throughout the City's collection system. Because this data is not available, inflow was not modeled as part of the hydraulic model.

Figure 4-6 shows the increase in peak flow at the WWTP compared to the corresponding precipitation event. No clear pattern could be obtained from this data, but the figure indicates that inflow can be a significant contribution to sanitary sewer flows in the City. For this study, 25 percent of the pipe's hydraulic capacity is reserved to accommodate the accumulation of sediment or debris or for higher flows from inflow or higher infiltration.

CALIBRATION

Simulated hydraulic flows were calibrated based on March 2011 infiltration conditions because infiltration rates for March 2011 are the highest historical flows observed in Spanish Fork. Where possible, monitored flow meter data was adjusted to reflect March 2011 conditions using estimates of infiltration at the flow meter and fluctuations at the City's wastewater treatment plant. Simulated flows were compared to observed monitored flows at the various flow meter locations shown in Figure 4-2. Although the timing of the peak varies in some cases, the overall magnitude of flow correlates well for most of the flow monitors (see Appendix for Figures M1 to

Figure 4-6
Inflow Response at Spanish Fork Wastewater Treatment Plant



M16). Table 4-3 shows a summary comparison of observed flows to simulated flows in the hydraulic model for each flow monitor site. Based on the table and figures, the following general observations can be made about the hydraulic model simulation:

- **Average Flows** – Average flows for most flow meter sites are within acceptable limits of accuracy (within 20%). At trunks with larger flows (flows greater than 1,000 gpm) the level of accuracy is within 10%. Commentary on sites that exceed this limit are discussed following Table 4.
- **Maximum Flows** – Maximum simulated flows are in most cases higher than those observed within the collection system. Because system deficiencies are controlled by maximum flows, simulated flows should be close to or higher than observed flows to ensure that deficiencies are defined properly in the collection system. Commentary on sites that do not meet this criteria are discussed following Table 4-3.
- **Diurnal Pattern** – The diurnal patterns simulated in the hydraulic model generally follows the observed diurnal patterns in Spanish Fork City for Saturday flows.

Table 4-3
Observed Flows vs. Simulated Flows at Flow Meter Locations[a]

Flow Meter	Observed Max (gpm)	Simulated Max (gpm)	Percent Difference	Observed Average (gpm)	Simulated Average (gpm)	Percent Difference
1	4,784	5,216	9%	3,745	3,731	0%
2	1,623	1,631	0%	1,150	1,119	-3%
3	2,570	2,577	0%	1,646	1,766	7%
4	890	1,109	25%	668	614	-8%
5	188	181	-4%	174	137	-21%
6	748	861	15%	520	449	-14%
7A	799	885	11%	692	583	-16%
7B	80	98	22%	43	58	36%
7C	2,451	2,543	4%	1,855	1,756	-5%
8	575	622	8%	393	395	1%
9	183	166	-9%	129	116	-10%
10	376	359	-4%	221	202	-8%
11[b]	1,136	1,428	26%	840	981	17%
12	240	269	12%	171	148	-13%
13	325	356	10%	152	165	9%
14	1,290	1,193	-8%	875	809	-8%
15[b]	195	308	58%	89	152	72%
16	1,047	1,049	0%	672	639	-5%

[a] Note that observed flows were adjusted to represent March 2011 flows where possible
[b] flow monitoring results considered unreliable due to failure to produce agreement between upstream or downstream flow meter results.

Meter 4

Flow Meter 4 was placed upstream of the City's wastewater treatment plant along 200 East. The simulated average flow at Meter 4 was slightly lower than observed flows while the simulated maximum flow was 25% higher than the observed maximum. The simulated maximum and minimum flows at other flow meter sites higher up in the collection system are much closer to observed flows. This suggests that there is a significant amount of attenuation upstream of this flow meter site. Attenuation reduces the amplitude of swings in a typical diurnal pattern and is caused by friction and storage in system pipes and/or structures. Sediment, debris, roots, siphons, may increase attenuation in a collection system by restricting flow and storing flow temporarily in system pipes. This essentially slows down the time of the peak and reduces the amplitude. Because of unknowns about restrictions such as sediment, roots, and debris, it is very difficult to model attenuation. For areas close to the City's treatment plant, hydraulic deficiencies resulting from peak flows in the hydraulic simulation may be mitigated somewhat by attenuation. This should be considered while defining the priority of system capital improvements.

Meter 5

For smaller collection areas, larger variations in simulated flows from observed flows are difficult to avoid due to the potential for larger fluctuations in wastewater production. For example, wastewater production for the Meter 5 collection area is largely dominated by one industry (Alcoa Extrusions Inc) which makes up for about 75% of the indoor water use for this area. A specific diurnal pattern could be developed for this industry. However, it is unknown how this industrial facility operates. The diurnal pattern could change due to changing industrial requirements. Because the peak simulated flow was close to the observed peak flow from this area, the results were considered satisfactory at this site.

Meter 7A

Meter 7A was installed by a consultant prior to this study, and the results of the meter were considered questionable. Meter 7B and 7C were installed to evaluate the accuracy of this meter and to provide additional flow distribution detail in the City. After evaluating Meters 7B and 7C, flows appear to be satisfactory and model correlation is adequate.

Meter 7B

For smaller collection areas, larger variations in simulated flows from observed flows are difficult to avoid due to the potential for larger fluctuations in wastewater production. The larger difference in simulated to observed flows was considered satisfactory at this site due to the relatively low flows.

Meter 7C

The level of accuracy between simulated and observed flows at this flow meter helped to confirm that flows monitored at Meter 7A were satisfactory.

Meter 11

This meter location was monitored twice during this study because the meter results were considered questionable. Note that the observed maximum and average flows at Meter 14 are higher than those observed at Meter 11. Because Meter 14 is upstream of Meter 11 and there are no reported diversions that would convey flow an alternate direction, this suggests that one of these two meters is not accurate. Because of the relatively small difference in simulated and observed flows at Meter 7C, it would suggest that Meter 11 is less accurate. For future flow monitoring, steps should be taken to try and improve the accuracy of meter data at this location. Relocating this meter further upstream may be necessary to provide improved accuracy.

Meter 15

This meter location was monitored twice during this study because the meter results were considered questionable. The April 2011 monitoring period was conducted further downstream from the March 2011 monitoring period, yet flows were half those observed during March 2011. Because no other information was available to redistribute flows into the collection system, the distribution of simulated flows was considered to be satisfactory. This distribution may result in somewhat higher simulated flows further upstream in the collection system, but this was considered to be a conservative assumption. Any future flow monitoring should be conducted in different locations from those conducted for this study and care should be taken to setup the flow monitor to accurately monitor flows.

FUTURE DOMESTIC FLOW DISTRIBUTION

As discussed in Chapter 3, the City's general plan was used to estimate the buildout population of the City. By estimating the percentage of development for various blocks of land across the City, it was possible to distribute growth in domestic flow to undeveloped areas using the density of development by zoning type. Figure 3-2 (from Chapter 3) shows the various sewer collection areas used to distribute future flows to the existing collection system. Table 4-4 lists the future flow assigned per area.

Table 4-4
Increase in Domestic Wastewater Flow to Sewer Collection Areas at Build-out

Sewer Collection Area	Future Domestic Flow (gpm)	Future Infiltration (gpm)	Future ERUs
200	0	0	0
300	102	15	646
400	0	0	0
500	0	0	0
600	6	1	40
700	0	0	0
800	0	0	0
900	8	1	50
1000	42	6	265
1100	0	0	0
1200	5	1	31
1300	196	29	1,237
1400	0	0	0
1500	22	3	140
1600	6	1	38
1700	322	48	2,032
1800	18	3	111
1900	10	1	61
2000	0	0	0
2100	0	0	0
2200	38	6	241
2300	222	33	1,400
2310	217	32	1,367
2320	196	29	1,240
2330	30	5	192
2340	13	2	85
2400	16	2	101
2500	23	3	145
2600	173	26	1,095
2700	52	8	328
2800	25	4	160
2900	71	11	449
3000	150	22	947
3010	850	128	5,367
3100	11	2	72
3200	110	16	692
3300	133	20	837
3310	228	34	1,436
3400	19	3	118
3500	23	3	144
3600	43	6	271

CHAPTER 5
COLLECTION SYSTEM EVALUATION

The development and calibration of a hydraulic sewer model makes it possible to simulate sewer system operating conditions for both present and future conditions. The purpose of this chapter is to document the evaluation of the hydraulic performance of the collection system and to identify hydraulic deficiencies.

Recommended solutions to identified deficiencies are not included in this chapter. Instead, this chapter identifies the capacity deficiencies identified through modeling, which were used to develop the comprehensive improvement plan presented in Chapter 6.

EVALUATION CRITERIA

In defining what constitutes a hydraulic deficiency, it is important to consider the assumptions made in estimating sewer flows in the model. As described in Chapters 3 and 4, the sewer flow used in hydraulic modeling is composed of two parts: domestic sewer flow and infiltration. The estimated domestic sewer flow for existing conditions came from Spanish Fork water meter data, while future domestic sewer flows were based on an average sewer production as estimated using land area, land use type, and an average unit hydrograph. Infiltration levels in Spanish Fork were developed using the historic high rates in 2011 based on flow data collected at the WWTP. Most of the flow monitoring data used to calibrate the existing hydraulic model was collected from February to March of 2011 or was adjusted to reflect early 2011 conditions. The conditions for defining system deficiencies are therefore based on a historic infiltration year with peak flows from domestic production. Because no inflow data was available for hydraulic model calibration, the criteria for defining deficiencies must be sufficiently conservative to account for inflows into the collection system from snowmelt or storm events. The criteria should also provide a buffer for the potential accumulation of sediment and/or other debris.

The following criteria have been established to help identify capacity deficiencies:

- **Pipeline Capacity** – The most important deficiency to eliminate in the sewer system is inadequate hydraulic capacity. For this master plan, it was decided to define capacity deficiency as any point where the peak daily flow in the pipe exceeds 75 percent of the pipe's full flow capacity. The remaining 25 percent of the pipe's capacity was reserved for inflow and/or unaccounted for fluctuations in domestic flow and infiltration.
- **Lift Station Capacity** – A lift station capacity deficiency is defined as anytime peak daily flows exceed 85 percent of the pump station's pumping capacity.
- **Minimum Velocities** – For the purpose of this report, pipes were identified as having insufficient velocity when the peak daily velocity in the pipe is less than 2.0 feet per second. A velocity of at least 2.0 feet per second is required to keep sediment from accumulating at the bottom of the pipe. Areas identified with this type of deficiency will likely require more frequent maintenance and cleaning than those areas with higher velocities. Many sewer mains for smaller neighborhoods will often have velocities less than 2.0 ft/sec during peak flows. Therefore, only pipes serving approximately 600

ERUs or greater with velocities less than 2.0 ft/sec were identified as deficient. For inverted siphons, the minimum velocity that should be maintained through the pipe is 3.0 ft/sec to keep sediment from accumulating in the siphon.

SYSTEM ANALYSIS

The following sections summarize evaluations of the system for both existing and future conditions. Where possible system deficiencies are listed in order of their relative severity based on total flow volume, surcharging severity, and extent of surcharging.

EXISTING SYSTEM ANALYSIS

The hydraulic model was used to simulate discharges and flow conditions in the wastewater collection system under existing conditions. In general, most of the collection system facilities perform well under existing conditions. However, the hydraulic model did identify a few deficient areas. Figure 5-1 shows the performance of the sewer system under existing flow conditions based on flow monitoring and the calibrated hydraulic model. Pipes in the figure are color coded to show the ratio of peak flow in the pipe to the pipe's full flow capacity. The peak flows under existing conditions were calibrated based on flow monitoring as described in Chapter 3. Existing system deficiencies are summarized below:

A1 – 200 East, 1700 North – The 24-inch sewer main directly south of the Spanish Fork Wastewater Treatment Plant (WWTP) has reached its design capacity and has no additional capacity to accomodate future growth. Development affecting the 100 East, 600 East, or Chappel Dr sewer trunk lines will begin to exceed the capacity of this trunk line.

Observed Deficiencies

Observed deficiencies are deficiencies caused by accumulated sediment and/or debris, or unexplained surcharging of pipes or manholes.

A2 – 150 East, 2160 North – The siphon west of the treatment plant has significant backwater under normal operating conditions. Approximately 2 ft of sediment was measured at the bottom of the upstream and downstream manhole. Hydrogen Sulfide gas was also detected at this location. The siphon and the downstream sewer main should be cleaned and inspected to determine what is causing the backwater condition at the downstream end of the siphon and to assess the capacity of the siphon. This deficiency should be corrected before a sanitary sewer overflow occurs. It should also be noted that the segment of sewer main upstream of this siphon does not have sufficient capacity for build-out flows.

Provo Craft
LS
Jail
LS
Industrial
LS
Spanish Fork
Wastewater Treatment Plant
A1
A2
1600 North
Chappel Dr
Kirby Ln
LS
900 North
Main St
300 West
200 West
100 East
400 North
600 East
2550 East
2000 East
100 South
630 West
Spanish Fields
LS
Volunteer Dr
600 South
Canyon Rd
Del Monte Rd
South Ln
Scenic Dr
River Bottom
1400 East
2300 East

Legend

- Railroad
- WWTP
- Sewer Lift Stations

Pipe Flow Ratio

Peak flow / Capacity

- 0.00 - 0.10
- 0.11 - 0.25
- 0.26 - 0.50
- 0.51 - 0.75
- >0.75

NORTH:

NORTH

SCALE:

0 1,500 3,000

Feet

EXISTING WASTEWATER COLLECTION SYSTEM DEFICIENCIES

SPANISH FORK CITY

WASTEWATER MASTER PLAN

Bowen Collins & Associates, Inc.
CONSULTING ENGINEERS

FIGURE NO.

5-1

P:\Spanish Fork City\Sewer Modeling\GIS\MXDs\Figure 5-1 Existing Deficiencies.mxd amckinnon 12/15/2011

BUILD-OUT SYSTEM ANALYSIS

Figure 5-2 shows the projected performance of the sewer system under build-out development conditions assuming that wastewater discharges from all new growth will be conveyed by the existing collection system. Hydraulic deficiencies observed for build-out conditions include:

B1 – 2000 East, 600 South to 400 North – The sewer trunk along 2000 East from 600 South to 400 North will not have sufficient capacity to accommodate all of the future growth east of 2000 East. This will require either upsizing all of the deficient sewer mains or routing new development flows to a new trunk line.

B2 – Main Street, 2050 North to 2400 North – The sewer line along Main Street from approximately 2050 North to 2400 North will not have sufficient capacity to accommodate all of the potential future growth from the west. This line may need to be upsized to accommodate future development. Because of the wide variability of flows from industrial areas (the general plan zoning type in the vicinity), the capacity of this main should be considered while approving industrial development.

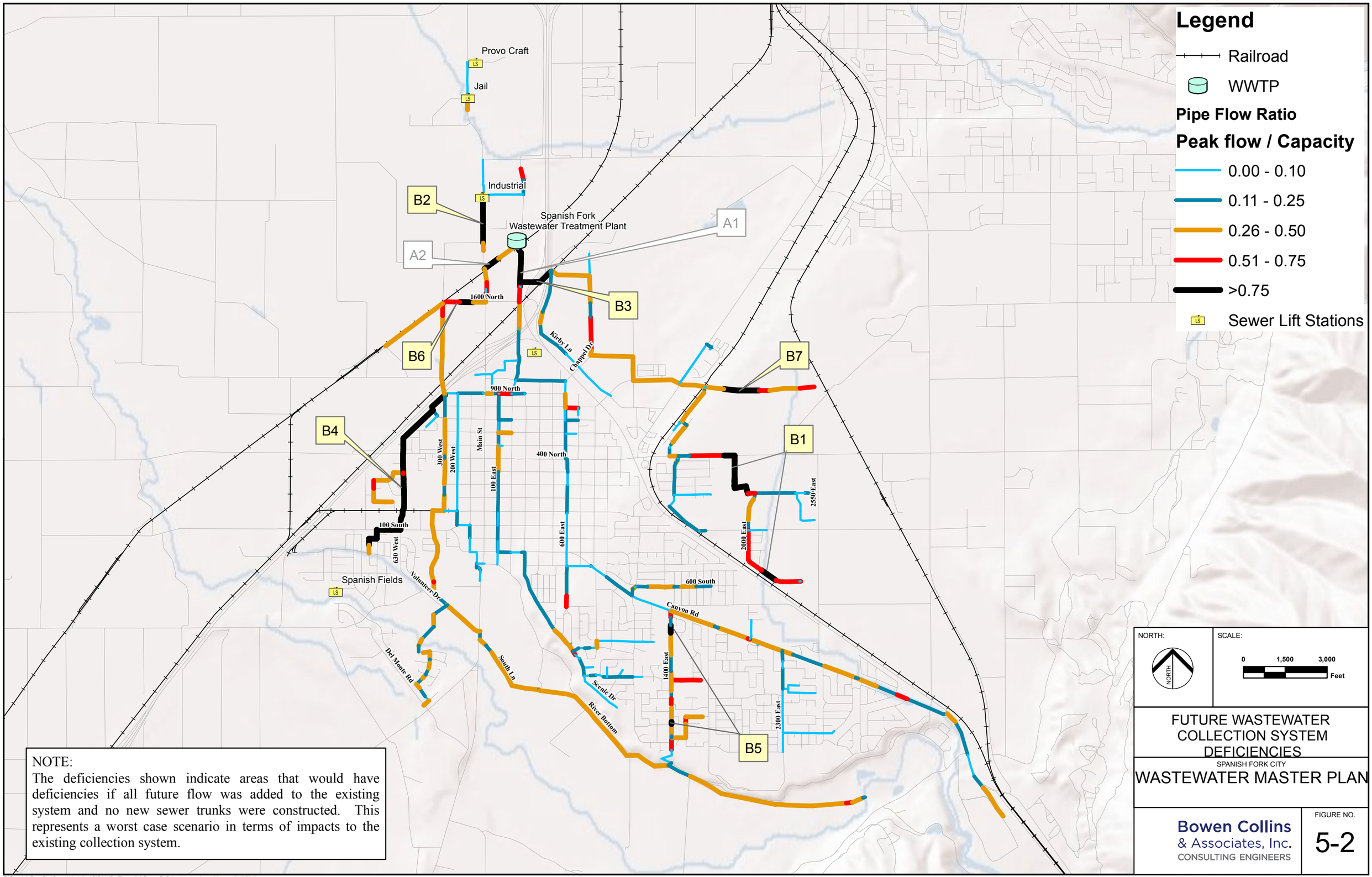
B3 – Williams Lane – The sewer trunk that passes underneath the freeway along Williams Lane does not have sufficient capacity to accommodate buildout flows from the east. The peak flow depth in the pipe is projected to reach approximately 80% of the pipes diameter under dry weather conditions at build-out. Because this sewer main passes underneath I-15 and may not have any local connections, it may not be a significant concern for the City. This pipe should be monitored as the City approaches build-out to determine if there is potential concern for surcharging local connections during a storm event.

B4 – 630 West, Center Street to 400 North – The sewer main downstream of the Spanish Fields Lift Station will not have sufficient capacity to accommodate all of the potential growth from the south and west. Peak flows exceed the capacity of the majority of the pipes along this sewer main. This will require constructing a new lift station further west to accommodate additional development west of the Spanish Fields Lift Station.

B5 – 1400 East, Canyon Road to River Bottom – Several pipes along this section of sewer main will not have sufficient capacity to accommodate buildout flows. This section of trunk line should be monitored as the City approaches build-out to determine if there is potential concern for surcharging local connections during a storm event.

B6 – 1600 North, 300 West to Main – A single pipe along this stretch of pipe may act as a bottleneck at build-out flow conditions. Because this deficiency only affects a single pipe, lower than projected growth may reduce projected flow to within the capacity of this pipeline. This pipe should be monitored as the City approaches build-out to determine if there is potential concern for surcharging local connections during a storm event.

B7 – Existing Mapleton Connection – The sewer trunk downstream of Mapleton City's existing connection to Spanish Fork does not have capacity to accommodate all of the



NOTE:
The deficiencies shown indicate areas that would have deficiencies if all future flow was added to the existing system and no new sewer trunks were constructed. This represents a worst case scenario in terms of impacts to the existing collection system.

FUTURE WASTEWATER COLLECTION SYSTEM DEFICIENCIES

SPANISH FORK CITY
WASTEWATER MASTER PLAN

Bowen Collins & Associates, Inc.
CONSULTING ENGINEERS

FIGURE NO.
5-2

P:\Spanish Fork City\Sewer Modeling\GIS\MXDs\Figure 5-2 Future Deficiencies-.mxd amckinnon 12/15/2011

future growth from Mapleton City. This will require either upsizing all of the deficient sewer mains downstream of the Mapleton Connection or routing some of the flow from Mapleton to a new trunk line.

LIFT STATION ANALYSIS

There are 3 sewer lift stations owned and operated by Spanish Fork City in its sewer collection system. Table 5-1 shows each of the lift stations with their existing capacity and associated peak instantaneous flows for existing and build-out development conditions.

Table 5-1
Lift Station Capacities and Peak Design Flows

Lift Station	Pump Capacity (gpm)	85% Pump Capacity (gpm)	Existing Peak Flow[1,2] (gpm)	Build-out Peak Flow[1] (gpm)
Industrial	600	510	126	775
Jail	430	366	391	868
Spanish Fields	600	510	342	510

(1) Different peaking factors were used for each of the lift stations depending on its overall size. For the lift stations that serve smaller areas, there can be much more variation in flow, resulting in peaking factors that can be much higher than for the City as a whole (see Appendix –Peaking Factors).

(2) Sewer flows estimated based on available water meter data contributing to lift station.

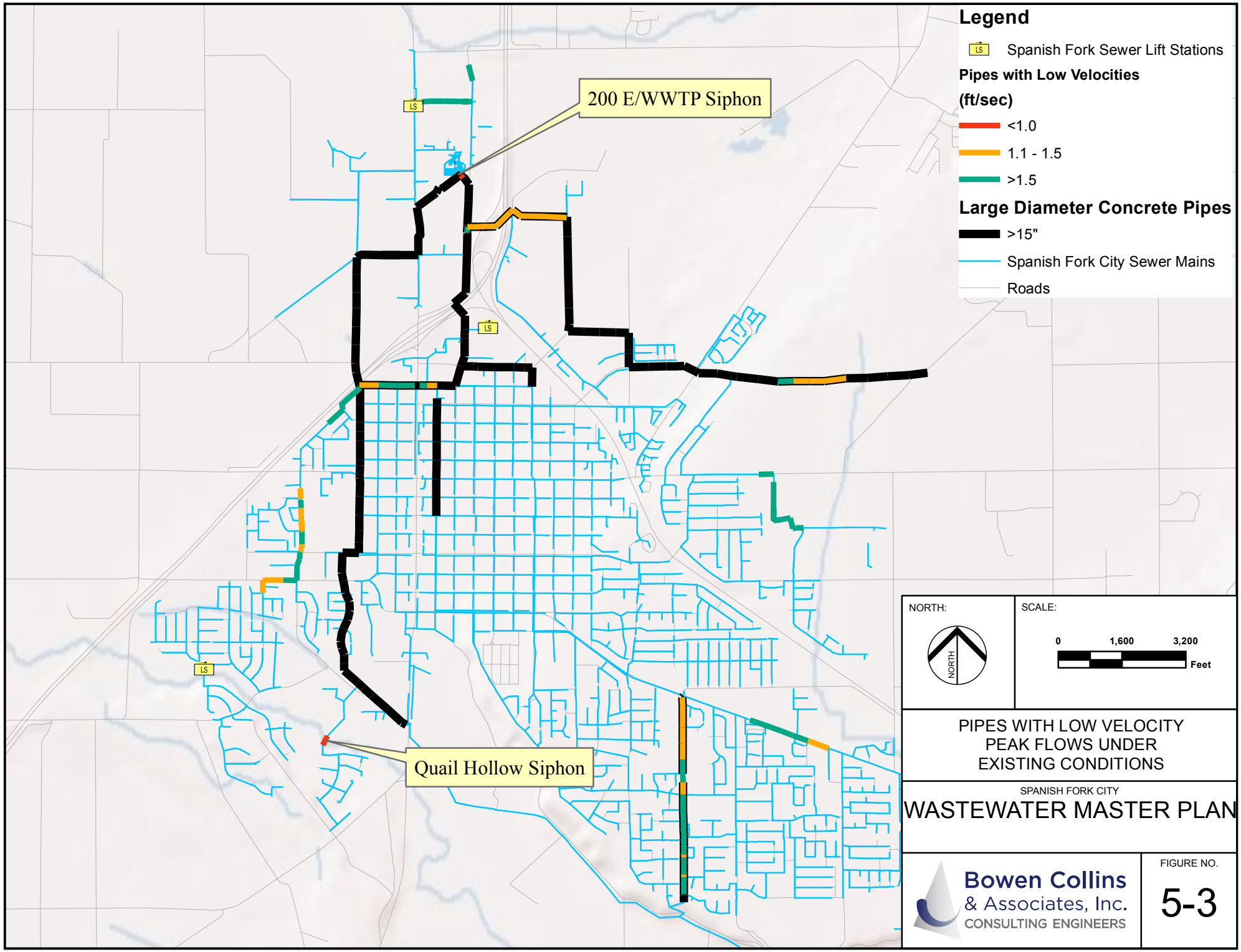
(3) Red indicates that the design flows exceed 85 percent of lift station capacity

From the table, it can be concluded that projected build-out peak instantaneous flows will potentially exceed existing pump station capacities at each of the lift stations. Based on existing flows, no improvements will be needed at the Industrial lift station for many years (depending on the rate of development in the vicinity). However, the Jail lift station may be approaching the lift stations capacity. Flow monitoring should be conducted upstream of the lift station to identify what the peak flow and existing peaking factor is at the lift station.

POTENTIAL MAINTENANCE PROBLEMS

While the main purpose of assembling a sewer model is to identify pipe segments with insufficient capacity, a model may also be used to identify areas of low velocity where potential additional maintenance may be required. Low velocities are not a major concern for the day-to-day operation of the system, but may result in the accumulation of sediment and debris over time. Areas identified with this type of deficiency will likely require more frequent maintenance and cleaning than those areas with higher velocities.

Figure 5-3 shows pipes in the collection system that do not have velocities above 2.0 ft/sec despite having at least 600 ERUs of contributing flow. The figure shows velocity ranges to indicate which areas of the system will likely have need for more frequent maintenance. Of particular concern are large diameter concrete pipes (greater than 15-inch) with low velocity



P:\Spanish Fork City\Sewer Modeling\GIS\MXDs\Figure 5-3 - Low Velocity.mxd amckinnon 10/28/2011

sewer flows. The increased likelihood of sedimentation represents a potential source of hydrogen sulfide gas generation which could reduce the life cycle of the pipes. This figure obviously does not identify all the potential maintenance problems that may exist in the system, but may be useful as a tool to help identify locations that have higher potential for velocity related sedimentation and hydrogen sulfide problems.

Table 5-2 lists areas of the city that require routine maintenance as observed by Spanish Fork City personnel.

Table 5-2
Sewer Mains Requiring Routine Maintenance in Spanish Fork City

Location	Maintenance Frequency
Canyon Dr. to Nebo Dr.	Monthly
Canyon Road, 900 E to 1100 E	Monthly
300 S, 600 E to 700 E	Quarterly
300 S, 300 E to 400 E	Quarterly
200 E, 100 N to 200 N	Quarterly
Main St., 400 S to 500 S	Quarterly
Fastenal/WWTP Siphon	Quarterly
Spanish Fields/River Cove River Crossing	Quarterly
Quail Hollow River Crossing Siphon	Quarterly
200 E/WWTP Siphon	Quarterly

The 200 E/WWTP Siphon and the Quail Hollow Siphon were both simulated in the hydraulic model under existing and build-out flow conditions. Velocities through both of these siphons are much lower than required to keep material suspended (3.0 ft/sec is required). This will cause sediment to accumulate in the siphons until velocities begin to approach 3 ft/sec. This represents a potential source of hydrogen sulfide that could affect sewer trunks upstream and downstream of the siphons. To reduce maintenance requirements, these siphons should be evaluated to determine if there are any operational changes that can be implemented (such as weir walls, temporary plugs, or control gates) to increase velocities through these siphons for existing flow conditions. No information was available for the Fastenal siphon at the time of this study.

CHAPTER 6
RECOMMENDED COLLECTION SYSTEM IMPROVEMENTS

Based on the deficiencies identified in Chapter 5, a number of improvements will be required to accommodate future growth while providing an acceptable level of service. The purpose of this chapter is to discuss recommended system improvements, their costs, and timing of implementation.

IMPROVEMENT ALTERNATIVES

For most of the deficiencies identified in Chapter 5, there may be multiple alternatives for resolving the deficiency. As part of this study, each of thesealternatives was evaluated using a hydraulic model. Because of the large number of alternatives considered, presentation of each one in detail as part of this chapter is not practical. Instead, this chapter only includes the final recommended improvements. The recommended alternatives below were selected based on the effectiveness of the improvement and its relative cost.

Proposed sizes for pipes have been included based on known or estimated pipe slopes and the existing Spanish Fork City General Plan. Once design of sewer mains commences, the design pipe size (capacity) should be based on maintaining a flow depth of less than 75% of the pipes diameter, and should be based on the best available topography and development plans. All pipe improvements should be constructed using acid resistant materials to resist the effects of sulfuric acid (a potential byproduct of wastewater in sanitary sewer pipes). This is particularly important in the construction of large diameter sewer pipes (greater than 8-inch) because of the increased likelihood for hydrogen sulfide production.

COLLECTION SYSTEM IMPROVEMENTS

Many of the deficiencies that appear in Chapter 5 are a result of utilizing existing sewer mains to convey the flow from developing areas. Many of the improvements, therefore, identify possible alignments for new sewer mains to convey flow from developable areas. Figure 6-1 shows the location of improvements recommended to eliminate existing and future hydraulic deficiencies. Figure 6-2 indicates the recommended pipe size.

1 –200 East 36-inch Sewer Trunk

A new parallel 36-inch sewer trunk should be constructed from the Union Pacific Railroad at 200 East south to approximately 1700 North. A new 24-inch sewer trunk should be constructed parallel to the existing trunk along Williams Lane to accommodate projected growth from Mapleton City. The “Spanish Fork – Mapleton Sewer Trunkline Study” prepared in July 2010 indicates that projected growth in Mapleton City may be higher than GOPB projections for growth. The size of the Williams Lane component should be re-evaluated once a Mapleton City wastewater master plan becomes available. For the purpose of this study, a 24-inch main has been assumed. This new trunk will resolve deficiencies A1 and B3 as noted in Chapter 5. Interconnections between each main should be constructed so that flow may be diverted from one pipe to the other for maintenance purposes.

9 - Airport Sewer Main and Lift Station

11 - Jail Lift Station

12 - Industrial Lift Station

2 - 1850 N Main to WWTP

Spanish Fork
Wastewater Treatment Plant

1 - 200 East 36-inch Trunk

4 - Main St Industrial

10 - 1450 North Sewer Main

14 - 1600 North

5 - 1550 West Sewer Trunk

13 - West Lift Station

3 - Spanish Fork - Mapleton (EBCO) Trunk

6 - Canyon Road Interceptor

7 - Southwest Lift Station
and Sewer Mains

8 - 8800 South Trunk

WILLIAMS LN
Chappel Dr
Kirby Ln
900 North
400 North
100 South
300 West
200 West
Main St
100 East
630 West
600 East
600 South
2000 East
2550 East
Volunteer Dr
Del Monte Rd
South Ln
Scenic Dr
River Bottom
1400 East
2300 East
Canyon Rd
8800 South

Legend

- New Sewer Lift Station
- WWTP
- Sewer Lift Stations

Sewer Pipe Improvements

Project No.

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 13
- 14
- Existing Trunks
- Existing Trunks
- Railroad

NORTH:

SCALE: 0 1,500 3,000 Feet

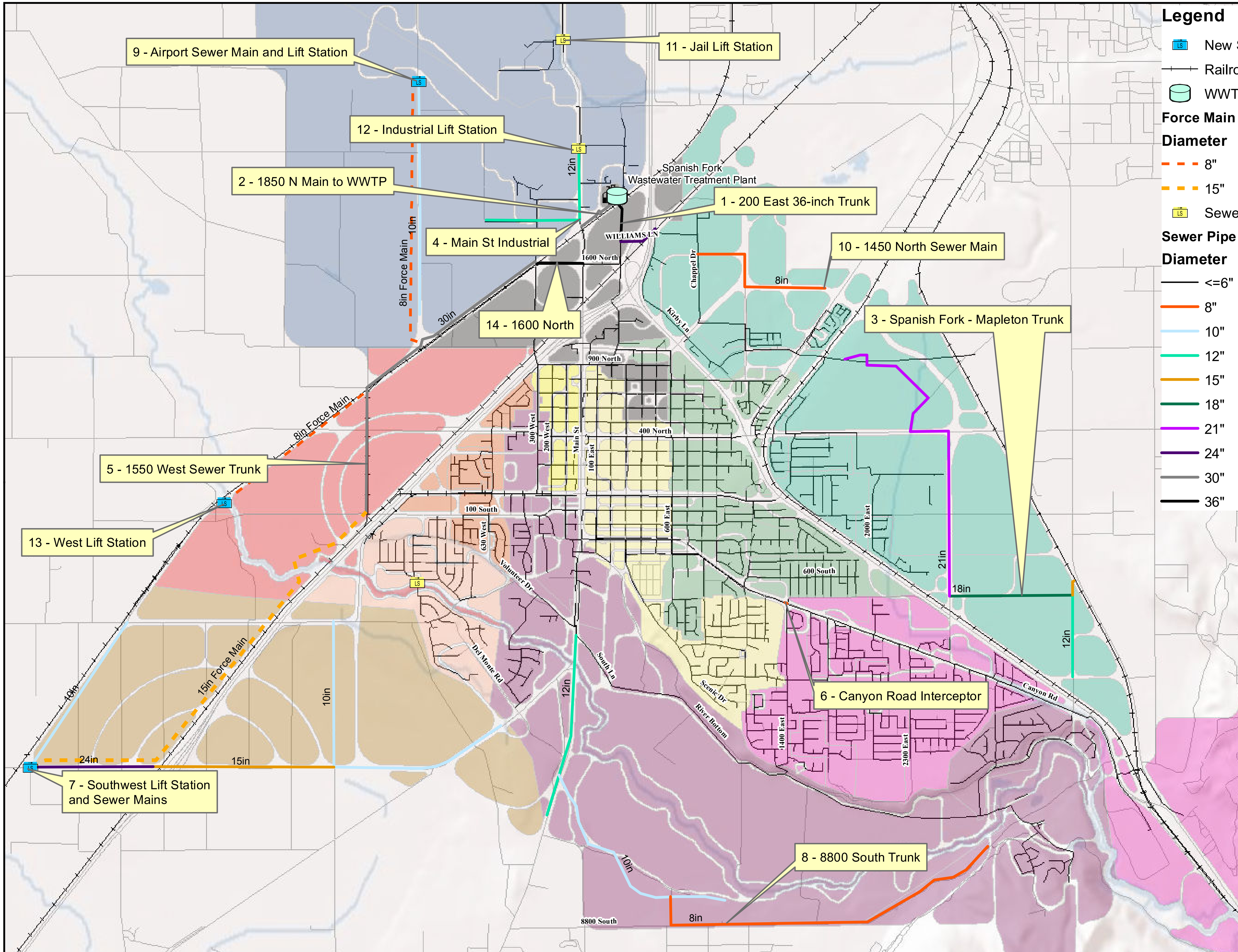
CAPITAL IMPROVEMENTS FOR BUILD-OUT

SPANISH FORK CITY
WASTEWATER MASTER PLAN

Bowen Collins & Associates, Inc.
CONSULTING ENGINEERS

FIGURE NO.
6-1

P:\Spanish Fork City\Sewer Modeling\GIS\MXDs\Figure 6-1 System Improvement.mxd mstayner 12/15/2011



Legend
New Sewer Lift Station
Railroad
WWTP
Force Main Diameter
8"
15"
Sewer Lift Stations
Sewer Pipe Improvements Diameter
<=6"
8"
10"
12"
15"
18"
21"
24"
30"
36"
Sewer Trunk Areas
100 East
1400 East
200 West
300 West
600 East
630 West
North Area
SR6 East
Southwest
Spanish Fields
Treatment Plant
West
1 - 200 East 36-inch Trunk
2 - 1850 N Main to WWTP
3 - Spanish Fork - Mapleton Trunk
4 - Main St Industrial
5 - 1550 West Sewer Trunk
6 - Canyon Road Interceptor
7 - Southwest Lift Station and Sewer Mains
8 - 8800 South Trunk
9 - Airport Sewer Main and Lift Station
10 - 1450 North Sewer Main
11 - Jail Lift Station
12 - Industrial Lift Station
13 - West Lift Station
14 - 1600 North
Spanish Fork Wastewater Treatment Plant
8in Force Main
15in Force Main
NORTH:
SCALE:
0 1,500 3,000 Feet

CAPITAL IMPROVEMENT PIPE DIAMETERS

SPANISH FORK CITY
WASTEWATER MASTER PLAN

Bowen Collins & Associates, Inc.
CONSULTING ENGINEERS

FIGURE NO. 6-2

P:\Spanish Fork City\Sewer Modeling\GIS\MXDs\Figure 6-2 Improvement Diameters.mxd mstayner 12/15/2011

2–1850 North, Main to WWTP

The last stretch of sewer main leading toward the WWTP from 1850 North Main does not have sufficient capacity to accommodate build-out flows. In addition, the downstream end of the existing Fastenal/WWTP siphon has significant backwater problems under existing conditions. This line should be cleaned and inspected in the near future to determine what is causing the backwater on the main, and the capacity of the siphon should be evaluated to determine if there are any deficiencies. For long term capacity issues, a new 30-inch parallel sewer trunk and redundant siphon should be constructed next to the existing sewer trunk. The existing sewer trunk should be lined to prevent deterioration of the concrete structure. This new parallel trunk will resolve deficiency A2 as noted in Chapter 5. Interconnections between each main should be constructed so that flow may be diverted from one pipe to the other for maintenance purposes.

3 – Spanish Fork/Mapleton (Ensign-Bickford Company) Sewer Trunk

The "Spanish Fork – Mapleton Trunkline Study" completed in July 2010 represents the most up to date plans for development along the east side of Spanish Fork City. This study includes three alternatives to convey sewer flow from eastern parts of Spanish Fork City and parts of Mapleton City. The recommended alternative (Alternative B) includes connecting to Spanish Fork City at approximately 750 South from Mapleton City and using a combination of 15-inch to 21-inch pipes to accommodate future wastewater discharge from Mapleton City (approximately 2,200 ERUs) and surrounding areas of Spanish Fork City. As part of this study, pipe diameters decrease from 21-inch to 18-inch from upstream to downstream in some areas because of increased capacity from higher slopes. This is generally not recommended for maintenance purposes. For this master plan, the pipe diameter is maintained as 21-inch for most of the alignment. Conformance with the Spanish Fork City General Plan and other assumptions regarding flow from the July 2010 study are assumed to be based on the best available information from proposed developers and have not been evaluated as part of this study. The July 2010 study also includes the installation of some 21-inch diameter concrete pipe. BC&A recommends that all sewer pipe materials be acid resistant (to mitigate the effects of hydrogen sulfide gas). The sewer main should connect into the sewer main at approximately 950 North 1800 East to avoid causing hydraulic deficiencies in the relatively flat sewer mains downstream of Mapleton City's existing flow meter. This improvement resolves deficiency B1 and B7 as noted in Chapter 5.

4–Main St Industrial Trunk

A new 12-inch sewer main should be constructed to replace the existing 8-inch sewer main conveying flow to the Industrial Lift Station. A new sewer main to the west should also be constructed to service the industrial area. Because of the wide variations in potential industrial wastewater use, this project should be re-evaluated as industrial development occurs.This improvement resolves deficiency B2 as noted in Chapter 5.

5–1550 West Sewer Trunk

A combination of 24-inch and 30-inch sewer mains will be needed to service areas along 1550 West and other areas in the southeast portion of Spanish Fork City. The Spanish Fields lift station should also be redirected through a new force main into this new main. The existing sewer mains along 630 West were not constructed to accommodate the build-out flows that may

contribute to the Spanish Fields lift station. Sending the Spanish Fields lift station flows to a new sewer main will eliminate deficiency B4 as noted in Chapter 5.

6–Canyon Road Diversion/Interceptor

A new 8-inch interceptor and diversion at the intersection of 1400 East and Canyon Road will be needed to divert some flow from Canyon Road northwest. This project will eliminate deficiency B5 as noted in Chapter 5 and will provide some additional flexibility in operation of the collection system.

7–Southwest Sewer Lift Station and Sewer Mains

A combination of sewer main sizes will be needed to service areas near Salem City at the Southwest corner of Spanish Fork City. A new lift station will be required at the southwest end of the City that will pump through a force main to cross the Spanish Fork River and discharge into the 1550 West Sewer Trunk (Project No. 5 above). During pre-design of this collection area, consideration should be given to determine if multiple lift stations will be required and/or if multiple force mains are needed to provide adequate velocities and minimize dynamic head for various stages of development.

8–8800 South Sewer Trunk

A combination of 8-inch to 12-inch sewer mains will be needed to service areas at the very south end of Spanish Fork City.

9–Airport Sewer Main and Lift Station

Based on available topography, a new lift station will be needed near the airport at approximately 1100 West (using Spanish Fork addresses) along with associated gravity and force mains. Based on the current general plan, this lift station should be sized to accommodate a peak flow of approximately 600 gpm.

10–1450 North Sewer Main

A new 8-inch main along 1450 North from approximately 800 East to 1600 East will be needed to service future development.

11–Jail Lift Station Upgrade

Based on estimates of flow, the Jail Lift Station is approaching the limits of its existing pump capacity. Because there is a significant amount of developable land that may flow to this lift station, City personnel should conduct flow monitoring upstream of the lift station to verify the existing flow to capacity ratio and survey nearby land owners to determine if there is near term development planned.

12–Industrial Lift Station

Because there is a significant amount of developable land that may flow to this lift station, City personnel should conduct flow monitoring upstream of the lift station to verify the existing flow to capacity ratio.

13 – West Lift Station

At build-out, the sewer main that the Spanish Fields Lift Station currently discharges to will not have sufficient capacity to accommodate all of the flows that may develop within the Spanish Fields tributary area. To prevent the downstream main from exceeding its design capacity, a new lift station and force main should be constructed to collect areas west of the Spanish Fields lift station and pump to the proposed 1550 West Sewer Trunk (Improvement 5 above). City personnel should periodically monitor flows to the Spanish Fields Lift Station to ensure flows are not approaching its available capacity.

14 – 1600 North, 300 West to Main

A new 36-inch sewer main should be constructed to eliminate the potential bottleneck along this stretch of sewer main. Because the existing pipe is borderline adequate for projected flows, flow monitoring should be conducted to verify the necessity of this project. This improvement resolves deficiency B6 as noted in Chapter 5.

PROJECT COSTS

Tables 6-1 shows the estimated project costs for the improvements recommended above. All costs shown are in 2011 dollars.Only Project 1.1 and 2.2listed in Table 6-1 (below) will be needed to resolve existing deficiencies. The remaining projects will be needed to resolve potential deficiencies arising from future growth. The timing of the following projects will therefore depend on the timing of future development.

Table 6-1
Recommended Collection System Improvements

Project No.	Project Name	Diameter	Length	Design Flow (gpm)	Service ERUs	Percent Attributable to Future Growth	Total Cost in 2011 Dollars
1.1	200 East 36-inch Sewer Trunk	36	1,285	7,650		99	$976,000
1.2	Williams Lane 24-inch	24	1,301			100	$578,000
Project 1 Total							**$1,554,000**
2.1	1850 N to Main	30	1,471			100	$845,000
2.2	Redundant Siphon	NA	NA			60	$115,000
Project 2 Total							**$960,000**
3.1	Mapleton-Spanish Fork Trunk	21	11,406			100	$4,784,000
3.2		18	4,005			100	$1,579,000
3.3		15	502			100	$169,000
3.4		12	2,651			100	$842,000
Project 3 Total							**$7,374,000**
4.1	Main St Industrial Trunk	12	5,376	1,440	720	100	$1,707,000
5.1	1550 West Sewer Trunk	30	11,064	3,400	9,500	100	$6,350,000
6.1	Canyon Road Diversion/Interceptor	8	69	400	400	100	$20,000
7.1	Southwest Force Main	15	15,208	2200	5500	100	$3,901,000
7.2		24	4,000	1,200	2127	100	$1,777,000
7.3		15	5,881	950	1683.875	100	$1,977,000
7.4		10	16,224	--	--	100	$4,886,000
7.5	Southwest Lift Station			2,200		100	$1,780,000
Project 7 Total							**$14,321,000**
8.1	8800 South Sewer Trunk	12	5,970	620	620	100	$1,895,000
8.2		10	7,751	620	620	100	$2,334,000
8.3		8	12,047	310	310	100	$3,432,000
Project 8 Total							**$7,661,000**
9.1	Airport Gravity Sewer Main	10	7,587	600	500	100	$2,285,000
9.2	Force main	8	8,972	600	600	100	$2,556,000
9.3	Airport Lift Station			600		100	$570,000
Project 9 Total							**$5,411,000**
10.1	1450 North Sewer Main	8	5,197	530	530	100	$1,481,000
11.1[a]	Jail Lift Station			1,021		100	$970,000
12.1[a]	Industrial Lift Station			912		100	$860,000
13.1	West Lift Station			600	800	100	$800,000
13.2	West Force Main	8	5,971	600	800	100	$1,701,000
Project 13 Total							**$2,501,000**
14.1	1600 North, 300 West to Main	36	1,512	5700		100	**$1,148,000**
Total Project Costs							**$52,318,000**

[a]costs shown for these lift stations are replacement costs. Early projects will likely be much less and consist of minor repairs or upgrades to pumps.

UNIT COSTS

Many of the projects identified in Table 6-1 will be constructed in undeveloped areas. The City normally requires developers to install 8-inch diameter pipes. However, where capital projects are constructed through developing areas, it is recommended that the City require developers to install the larger pipe size(s) recommended by the model in the master plan. Developers should be reimbursed for the difference between the larger pipe cost and the cost of the 8-inch sewer main. Reimbursement for growth related capacity above 8-inch is listed in Table 6-2. Unit price costs are shown in 2011 dollars based on the July 2011 Engineering News Record (ENR) Construction Index value. Note that these costs may be updated on annual basis using the ratio of the current ENR Index value to the July 2011 ENR Index value.

Table 6-2
Construction Cost Estimates for Sewer Pipe

Pipe Diameter (in)	Cost per Lineal Foot	% Growth Related
8	$189	0%
10	$196	3%
12	$203	7%
15	$236	20%
18	$270	30%
21	$304	38%
24	$338	44%
30	$432	56%
36	$594	68%
42	$756	75%
48	$878	78%

CHAPTER 7
WASTEWATER TREATMENT PLANT SYSTEM IMPROVEMENTS

Spanish Fork City retained Aqua Engineering to prepare a facility plan for the Spanish Fork City WWTP. Note that the WWTP facility plan was prepared independently from the scope of work performed by Bowen Collins & Associates. BC&A made minor clerical corrections and Spanish Fork City personnel provided some effluent requirement corrections to the Aqua facility plan. The purpose of this chapter is to provide background for the WWTP and discuss Aqua's recommended WWTP system improvements, their costs, and timing of implementation.

WWTP HISTORY

The WWTP services most of Mapleton City and all of Spanish Fork City. Currently the ownership of the treatment facility is split between the two Cities with Spanish fork owning 77% and Mapleton owning 23% of the capacity in the treatment facility. As upgrades are made at the facility the financial requirements for the projects are split between the two Cities according to the capacity split.

The original wastewater treatment plant was constructed in 1956. The original treatment facility consisted of a headworks, a primary clarifier, rock trickling filter, secondary clarifier and two anaerobic digesters. The design capacity of the original facility was 1.8 MGD. In 1987 the plan was upgraded through a series of projects that included a new headworks, primary clarifier, plastic media trickling filter, secondary clarifier, and an additional digester. The design capacity of the upgraded facility is 5.0 MGD.

In 1996 there was a permit change that required a dechlorination system. Sodium bisulfate was added to the system along with the equipment to inject it into the end of the chlorine contact basin. In 1998 a small upgrade was completed which expanded the chlorine contact basin. This expansion allowed half of the basin to be shut down for cleaning while the new basin could continue to allow for contact time prior to discharge. In addition, at that time the primary sludge pumps were also replaced.

In 2002 a new sludge dewatering facility was added to the treatment facility. This included a new 2 meter belt press and a dewatering building used to house the equipment. The headworks were also upgraded with two new step screens and washpactors.

In 2003 a new STM Aerotor basin and a 90-foot final clarifier were added to the treatment system. The original rock trickling filter was abandoned due to a concrete failure at the distributor arm connection. In addition the permit was changed to include an ammonia limit which reduced the biological capacity of the existing system. The new biological process replaced the old rock trickling filter and gave the facility the ability to treat for ammonia. However, even with these additions the design capacity of the treatment facility was reduced to 4.9 MGD because of the new permit requirements.

In 2006 an additional STM Aerotor basin was added to the treatment facility along with a thickener facility. In addition, one of the old secondary clarifiers was converted to a primary clarifier. This conversion required a new pumping station for the clarifier. This upgrade increased the design flow to 6MGD

In 2009 a new 50-foot digester was installed. It was installed to better treat the biosolids in the treatment system and the design flow is currently 6MGD.

Design Parameters

Flow:
Spanish Fork – 123 gal/capita/day
Mapleton – 71 gal/capita/day

BOD:
Spanish Fork – 0.17 lb/capita/day
Mapleton – 0.17 lb/capita/day

Facility Average Concentrations:
BOD – 180 mg/l
TSS – 180 mg/l
TKN – 40 mg/l

Design Loadings
BOD – 9007 lb/day
TSS – 9007 lb/day

Effluent Requirements:

BOD – 25 mg/l
TSS – 25 mg/l
E-Coli – 30 Day Average: 126 MPN/100 ml
E-Coli – 70 Day Average: 157 MPN/100 ml
Dissolved Oxygen – 4.8 mg/l
Ammonia – Nitrogen – 18 mg/l
pH – 6.5-9.0

WASTEWATER TREATMENT PLANT FACILITY IMPROVEMENTS

There are three main projects planned for the future which will expand the facility to a total capacity of 8MGD. However, the City will eventually contribute to the construction of a regional treatment facility and has already begun encumbering funds to purchase land (approximately $820,000 as of FYE2011). Estimated funding for future land purchases is estimated to be approximately $1.3 million by Fiscal Year 2018.

Project 1

Primary Mechanism Replacement. The mechanism in the old primary clarifier is 30 years old and it has lasted beyond its anticipated life expectancy. The concrete tank is still in functional shape; therefore, removing the existing mechanism and installing a new mechanism will extend the life of this unit process. Replacing the mechanism will not expand the capacity of the facility. However, it will prevent the facility from losing existing capacity that it already has.

Install Snail Removal System. This part of the project is intended to remove the snails that are growing on the trickling filter before they can accumulate in the STM Aerotor basins and digesters. As the snails accumulate in those structures they reduce the treatment capacity of each of the processes. Snail removal would not be necessary if the trickling filter was removed from the process. However, this project will extend the life of the treatment facility into the future and get as much life out of the existing trickling filter as possible.

Install New Automatic Transfer Switch on Backup Generator. The existing transfer switch is getting old and repair parts are no longer available for repairs. It is assumed that the installation of a new transfer switch will occur in the near future. This could be easily done as a maintenance project if it is found necessary to replace the switch instead of making it part of another project.

Convert Chlorine Contact Basin to UV Disinfection. Installing UV disinfection is a change from the current chlorination process used for disinfection. The driver for this is related to changes in water quality standards. This will be discussed further below. UV systems have become more reliable and efficient over the last few years and it is a better solution than dechlorination. With the risk management plan requirements to store gaseous chlorine and sulfur dioxide most wastewater systems are going to UV for disinfection. This will eliminate the need for a risk management plan at the treatment facility. The cost includes all the lights necessary for the ultimate design flow of 8MGD.

Project 2

New STM Aerotor. New STM Aerotor - This includes the installation of a new aeration basin that will expand the biological capacity of the treatment facility. This new basin will allow the organic loading to the treatment facility to meet the loading required from a design flow of 8MGD.

90-Foot Final Clarifier. A new clarifier is required to handle the additional hydraulic flow allowed by the addition of the biological process. This clarifier is paired with the new STM Aerotor to settle the solids.

Headworks Upgrade. This upgrade is required to allow for the additional flow in the facility. New screens that will allow the additional hydraulic capacity will be required. It is anticipated that the existing screens will have had a full service life at this point in time. If the screens need to be replaced prior to this project, they should be sized for the larger design flow.

Remove Old Trickling Filter. The old rock trickling filter is not functioning. Some of the wall and rocks have been removed but it needs to be completely removed from the facility. Removing this old abandoned structure will help clean up the site.

Project 3

Replace Existing Trickling Filter with STM Aerotor. It is anticipated that the trickling filter will need major renovation in the future to allow it to function. Currently it will not remove nitrogen as well as the STM aerotor processes. Snails grow on the media causing problems in downstream processes. In the winter, when the weather gets cold, there have been freezing

problems with the wastewater on the media. For these reasons it is anticipated that this unit process will be replaced.

A summary of these projects is shown in Table 7-1 below. Projections for growth have come from Spanish Fork City personnel. The timing of when these facility projects will need to be constructed will depend on the rate of growth in Spanish Fork City wastewater service area. The future layout of the 8 MGD facility is shown in the Figure 7-1.

Table 7-1
Recommended WWTP Improvements

Project No.	Total Population (Spanish Fork City + Mapleton City)	Projected Year of Required Completion[1]	Project Name	Percent Attributable to Future Growth	Total Cost in 2011 Dollars
--	--	2018	Purchase Land for Future Regional Treatment Plant	**100%**	**$1,277,000**
1.1	54,000	2013	Primary Mechanism Replacement	**0**	**$140,000**
1.2	54,000	2013	Install Snail Removal System	**0**	**$150,000**
1.3	54,000	2020	Install New Automatic Transfer Switch on Backup Generator	**0**	**$10,000**
1.4	54,000	2020	Convert Chlorine Contact Basin to UV Disinfection	**25%**	**$1,000,000**
	54,000		**Project 1 Total**		**$1,260,000**
2.1	57,637	2023	New STM Aerotor	**100%**	**$2,600,000**
2.2	57,637	2023	90-Foot Final Clarifier	**100%**	**$700,000**
2.3	57,637	2023	Headworks Upgrade	**100%**	**$200,000**
2.4	57,637	2023	Remove Old Trickling Filter	**0**	**$100,000**
			Project 2 Total		**$3,600,000**
3.1	68,000	2030	Replace Existing Trickling Filter With STM Aerotor [2]	**0**	**$3,000,000**
			Project 3 Total		**$3,000,000**
Total WWTP Improvements					**$9,136,030**

1- Based on the population projections as described in Chapter 3.
2- This project will need to be done when the existing trickling filter has reached the useful life or when it becomes too difficult to operate.

KRB 10/12/2011 X:\Spanish Fork Facility plan\1drawings\2011 update\FIGURE 1.DWG

FIGURE: 7-1

AQUA ENGINEERING, INC.
533 W. 2600 S., SUITE 275 BOUNTIFUL, UT 84010
PHONE (801) 299-1327 FAX (801) 299-0153

SPANISH FORK CITY

WATER RECLAMATION FACILITY
8 MGD - OPTION #1
SITE PLAN

ORIGINAL				
NO.	DATE	DESIGN	DRAWN	CHECKED
0	05/15/07	–	–	–
REVISIONS				

FUTURE PERMIT CHANGES

One of the primary items that cause changes in treatment facilities are more stringent permitting requirements. There are several issues that will probably be addressed in future UPDES permits as discussed below.

Chlorine

About 10 years ago there was a push to eliminate chlorine from waterways because of the harm it could cause to aquatic species. When this originally happened Spanish Fork City installed a dechlorination system which used sulfur dioxide to remove chlorine from the water after disinfection. Although this process removed the chlorine it also would reduce the dissolved oxygen if the dosing was high. This required constant monitoring to keep the system in balance to prevent either a chlorine violation or a dissolved oxygen violation. This problem was ultimately remedied by addressing the classification of Dry Creek. It had been misclassified as a warm water fishery. The City documented to the Division of Water Quality that this was actually a drainage ditch and that it was man-made. This changed the classification to 3E which did not have a chlorine standard. In the last triennial review the EPA requested the State to apply a chlorine standard to all aquatic life designations. This would include waters that are classified 3E. Therefore, it is anticipated that a chlorine limit will be applied to the discharge permit in the near future.

Phosphorus

Phosphorus is becoming a big issue throughout the United States along with the State of Utah. Phosphorus is a nutrient that enhances the aquatic growth in water bodies which can cause several different problems such as low dissolved oxygen or taste issues with drinking water or aesthetic issues associated with beneficial uses. In Utah the primary phosphorus control mechanism has been Total Maximum Daily Load (TMDL) analysis. If a water body is listed for a study related to dissolved oxygen or phosphorus, historically a new limit has been placed on point sources within these water bodies.

Currently there is a TMDL study being prepared for Utah Lake which has been in process for the last few years. However, at this point in time they are working on addressing issues associated with the carp population in Utah Lake prior to continuing on with the TMDL study. In addition to the TMDL's requiring a phosphorus limit the State is currently looking at a statewide standard. They have evaluated the cost for setting a limit of 1 mg/l and also of 0.1 mg/l. They are now looking at the benefits associated with this cost study. Based on this it is anticipated that sometime in the future there will be a phosphorus limit in the UPDES permit. The future planning did not consider potential phosphorus limits because, the potential range is somewhere between 1 mg/l and 0.1 mg/l. The treatment requirements will vary greatly based on the final limit. Therefore, it is not practical to forecast costs associated with phosphorus removal until the actual limit is better known. However, the existing facility has the potential to be modified to meet the phosphorus limit. It will most likely include chemical addition and filtration as the primary means of removal.

Nitrate

Nitrate is another nutrient that is becoming a concern with wastewater discharges. The treatment facility was required to remove ammonia in the past. Interestingly, the process of removing ammonia is basically converting it to nitrate, which is now becoming a pollution of greater concern. It looks like this is a little farther out than phosphorus, but scientists are finding that controlling only one of the key nutrients is not solving the problems. Therefore, it is anticipated that nitrate will be regulated in the future. There are unit processes that can be added to the existing treatment system that will convert nitrate to nitrogen gas. Hydraulically the facility will need to add additional pumping and tankage to denitrify.

Pharmaceuticals / Endocrine Disruptors

Pharmaceuticals and endocrine disruptors is a relative new area of research and not a lot is known about the effects of these contaminates. However, this issue is getting quite a bit of attention in the news. This attention is increasing the public's concern with the potential risks associated with these contaminants. This is an area of research that should be monitored for changes but at this time they are just starting research on methods to remove this from wastewater. Because of this new research, the public is doing a better job of disposing of their medication in a safe manner by taking it to a collection area. Historically, it was common for people to flush medications down their toilet and this is one of the major ways these contaminants reached the treatment plant. However, even with this new awareness some of the medication that people use is filtered out through their bodies and wasted not the normal matter. This will continue to be an issue at the wastewater treatment plant and in the future there will be discharge requirements for these contaminants.

REGIONAL TREATMENT FACILITY

The Southern Utah Valley Municipal Water Association (SUVMWA) was tasked with looking at regionalizing wastewater treatment for the southern part of Utah County by the political leaders that is over the organization. The Cities involved with the initial study were all members of SUVMWA and they included Santaquin, Goshen, Genola, Payson, Salem, Elkridge, Woodland Hills, Spanish Fork, Mapleton, and Springville. The first report was finalized in 2001 and the basic conclusion of the report was that the least expensive alternative was to upgrade existing facilities and build a couple of regional facilities. The most expensive alternative was to build a single regional treatment facility. However, the political leaders felt that they should continue to look at a single regional facility. They felt that the even though the cost was higher, having a single facility would have additional benefits that are not accounted for with a simple engineering cost analysis.

The political leaders requested SUVMWA to enhance on the original regionalization study. They wanted to look at more detail of having a single plant site. They also determined from the first study that Goshen and Genola would not be compatible with a regional facility near Utah Lake because they were small and did not contribute much sewage and they would need a substantial lift station. One of the primary purposes of the second study was to locate a potential site for a single plant regional system. As part of the process trunk line routes and lift stations were selected. A general location for a regional facility was selected; several different treatment alternatives were evaluated. One of the tasks of that report was to determine the best time line to combine all the different existing systems. Based on the population predictions given by the Central Utah Project (CUP) it was anticipated that the regional plant would be needed in about

2030. To get to this time period several upgrades to existing facilities would be required. It was anticipated that Spanish Fork would need to get to a design flow of about 8 MGD.

As part of the regionalization plan there was several steps that were outlined that would help facilitate a regional plant they are as follows:

1. Look for an opportunity to purchase a fairly large contiguous piece of property near Utah Lake. It was recommend to find an area at least 100 acres and preferably closer to 300 acres. This would give the treatment plant a large buffer as development occurs in the surrounding area.
2. Create a district that would operate the existing treatment facilities in the area. This would allow for combination of tasks being done at the existing facilities such as pretreatment and maintenance. This would also be the entity that would continue the planning process for the regional facility. It is anticipated that the growth distribution will be different than projected in each of the Cities but this organization would have additional tools to work to a transition to a regional facility. They would have the ability to transfer wastewater from one treatment location to another if it was necessary. This entity would be responsible to work on funding options to facilitate the transfer to a regional facility.
3. Watch the TMDL study that is being prepared for Utah Lake. Jumping to a regional facility would not completely solve the phosphorus issues. However, having a larger group involved will facilitate better treatment alternatives.
4. Many of the existing facilities were going to be operated in the future as scalping plants. This would allow the existing facilities to use water they treat in the summer for reuse. The solids handling would be at the regional facility.
5. It was recommended that a Membrane Bioreactor Facility (MBR) be constructed for the treatment at the regional facility. This would give the best water quality effluent of the evaluated alternatives. It would also have the ability to meet future water quality requirement changes.

At this time SUMVWA has purchased a parcel of land that is intended to be the regional facility in the future. There are quite a few issues that still need to be worked through before a regional facility becomes a reality.

Spanish Fork Contingency Plan

If the regional facility is not installed a contingency plan was briefly evaluated. The purpose of the contingency plan was to see what design flow the Spanish Fork WWTP could get through the existing site without relocating the existing treatment facility. The general site plan is shown in Figure 7-2. The plan was to install a fifth STM Aerotor basin. All the STM Aerotor basins would then be used as pre-air basins for a flat plate membrane facility. The flat plate membranes were selected because they provide air for a large portion of the biological process. With this configuration it was estimated the WWTP could treat up to 20 MGD on the existing site. It was assumed that the membrane treatment would meet the phosphorus limits that are on the horizon. There were no cost estimates done as part of this evaluation. The sole purpose was to see what flow could be treated on the existing site. Another possibility to expand the existing facility would be to move the City's Power Shops to a new location and expand the plant to the North.

100' X 280'
MBR BUILDING

ABANDON CHLORINE CONTACT BASIN

REMOVE CHEMICAL BUILDING

REMOVE CHLORINE CONTACT BASIN/BLDG

FINAL CLARIFIER #2

FINAL CLARIFIER #1

SCUM LIFT STATION

SECONDARY SLUDGE PUMP STATION

YARD DRAIN PUMP STATION

EXISTING STM-AEROTOR BASIN #1

EXISTING STM-AEROTOR BASIN #2

FUTURE STM-AEROTOR BASIN #3

INTERMEDIATE PUMP STATION

PUMP STATION

PRIMARY CLARIFIER #3

REMOVE EXISTING TRICKLING FILTER

FUTURE STM-AEROTOR BASIN #4

REMOVE EXISTING TRICKLING FILTER

FUTURE STM-AEROTOR BASIN #5

PRIMARY CLARIFIER PUMP STATION

PRIMARY CLARIFIER #1

HEADWORKS

UPDATE SCREENS

PRIMARY CLARIFIER #2

DIGESTER

DIGESTER

DIGESTERS

THICKENER BUILDING

BELT PRESS BUILDING

SLUDGE DRYING BEDS

SLUDGE DRYING BEDS

0 30 60 90
Scale in Feet

0 1/2 1
DRAWING IS NOT TO SCALE IF BAR DOES NOT MEASURE 1"

ORIGINAL			
NO.	DATE	DESIGN	DRAWN	CHECKED
0	05/15/07	-	-	-
REVISIONS				

SPANISH FORK CITY

WATER RECLAMATION FACILITY
20 MGD
SITE PLAN

AQUA ENGINEERING, INC.
533 W. 2600 S., SUITE 275 BOUNTIFUL, UT 84010
PHONE (801) 299-1327 FAX (801) 299-0153

FIGURE:
7-2

KRB 10/12/2011 X:\Spanish Fork Facility plan\drawings\2011 update\FIGURE 2.DWG

CHAPTER 8
SYSTEM RENEWAL

In addition to the capacity related improvements described in previous chapters, it is recommended that Spanish Fork City consider and prepare for expected future expenditures associated with the general maintenance and renewal of the existing collection system. The purpose of this chapter is to present recommendations regarding system maintenance and renewal. This is not a comprehensive evaluation of existing maintenance procedures or system conditions, nor is it a complete asset management plan. Instead, it is a collection of general recommendations developed assembled during the master planning process relative to system maintenance and renewal.

SYSTEM RENEWAL

Along with system capacity improvements, effective infrastructure planning must also include asset rehabilitation and replacement, commonly termed renewal. To effectively identify which system facilities need replacement and plan for future asset renewal projects, Spanish Fork City needs to accurately assess and document the current condition of system assets. Towards this goal, BC&A would recommend improvements to its data collection and storage practices regarding system facilities and how the condition of existing facilities is assessed.

Condition Assessment

BC&A recommends implementing two programs for condition assessment in Spanish Fork City:

- **Condition Assessment Coding Using PACP –** The Pipeline Assessment and Certification Program (PACP) is a nationally recognized format for documenting sewer system deficiencies. It is recommended that the City adopt the PACP system to maintain more consistent defect coding during inspection and to make the inspection data more useful for asset management purposes.
- **Refine the Existing Inspection Schedule –** City personnel should inspect all pipes about once every 5 years. This will require City personnel to inspect at least 20 percent of the City's wastewater collection system every year. This will provide sufficient inspection frequency to identify most pipe deterioration issues before they become problems. In some cases, however, groundwater, vegetation, and/or sediment concerns may merit more frequent inspection. If PACP inspection is adopted, the City will be able to establish an inspection history for each pipeline in the system to determine which mains may need more frequent inspection.

Concrete Pipe Assessment and Rehabilitation

One item of concern relative to system renewal is the corrosion of existing concrete pipe. Hydrogen sulfide gas can result in the formation of sulfuric acid (H2SO4) on pipe and manhole walls. Sulfuric acid can result in severe corrosion of ferrous metals and concrete. The top of a moist concrete pipe is a common area for corrosion. This is a significant concern in Spanish Fork because much the City's larger pipes are constructed of concrete pipe.

Other areas of concern for hydrogen sulfide accumulation are at force main discharge locations. Because force mains flow full, very little corrosion will occur through the force main pipe. However, because they flow full, there is a larger hydrogen sulfide (H_2S) producing slime layer. As these pipes discharge into gravity mains and are aerated, hydrogen sulfide gas can be released. The 30-inch trunk near the City's wastewater treatment plant has a siphon and two force mains that discharge into it. This configuration may lead to elevated levels of hydrogen sulfide. Each of the trunks upstream of the WWTP should be monitored to determine if hydrogen sulfide is above normal levels. If high levels of H_2S are present, it is recommended that the concrete pipes be rehabilitated to prevent corrosion. Several available rehabilitation technologies include: cured-in-place pipe, thermoformed pipe, and sliplining.

SYSTEM RENEWAL BUDGET

System Pipes

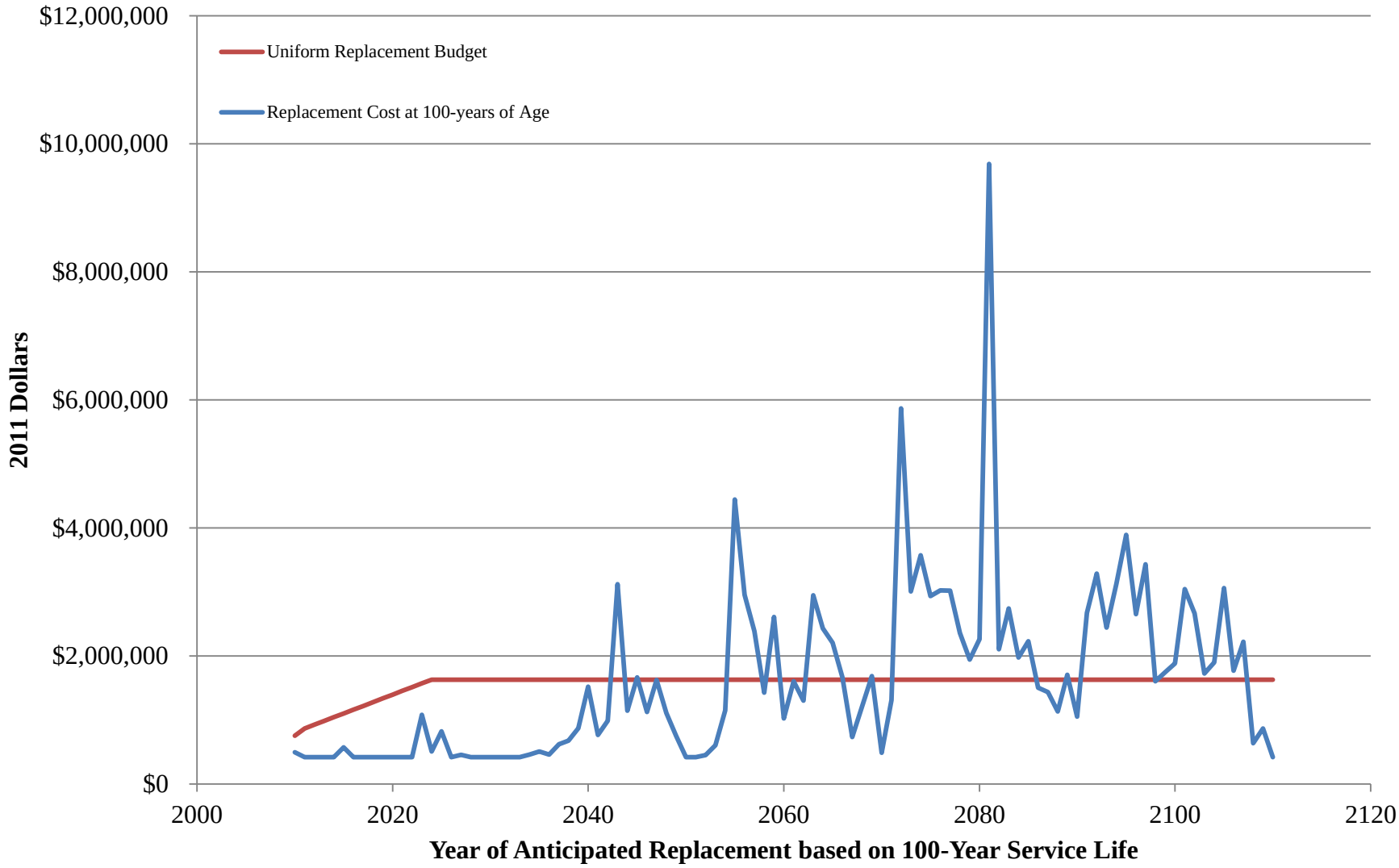
The total cost to replace all of the pipes in the Spanish Fork Collection system would be approximately $163 million based on 2011 construction costs. For the purposes of this evaluation, BC&A recommends that Spanish Fork assume a 100-year system service life. This is probably not unreasonable given the observed performance of historic sewer collection systems and the expected design lives of new materials. To replace 1 percent of the collection system every year (or 100 percent every 100-years), it would cost approximately $1.63 million/year in 2011 dollars.

Figure 8-1 indicates two approaches for system renewal of a hypothetical system that began to be installed around the year 1910. Note that many sewer collection systems in Utah County began to be installed around this time. The first approach assumes that the pipe is replaced at approximately 100-years of age. Based on this approach, replacement costs would be as low as $500,000/year up until approximately the year 2030 when the amount of pipes reaching 100-years of age begins to increase. Note that replacement costs using this approach mimic the development pattern from the previous 100-years. This approach keeps annual renewal costs low initially, but these costs begin to grow rapidly as the overall system progressively ages.

The uniform approach presented in Figure 8-1 assumes that the City either replaces aging pipes on an annual basis or establishes a depreciation fund (or sinking fund) that invests sufficient capital so that pipes may be replaced when they have reached the end of their service life. BC&A recommends this approach for system renewal because the service life of many pipes in the system may fail before reaching 100-years of age, leading to costly emergency repairs. Assuming Spanish Fork City's development history is similar to the history shown in Figure 8-1, the City should not expect to see significant deterioration of its wastewater collection system in the near future. However, to prevent long-term increases in the cost of system renewal or system failures, the City should begin establishing a depreciation fund or committing to rehabilitation projects soon.

In reality, it will not be necessary to completely replace all system components every 100 years because of new rehabilitation technologies (e.g. sliplining, cast-in-place pipe, etc.). Rehabilitation costs are much lower than replacement costs (20% to 60% depending on pipe diameter). If the City were able to rehabilitate all of its system components once every 100 years (instead of replacements components), it could reduce its annual renewal budget to about $0.5 million/year. It is generally not possible to rehabilitate all system components due to either

Figure 8-1
Hypothetical Wastewater Collection System
Replacement at 100-years of Age vs. Uniform Replacement on Annual Basis



condition or capacity concerns. Some components are so far deteriorated that rehabilitation techniques are inadequate and the components must be replaced. Others require upsizing which also necessitates replacement.

To account for the limitations on rehabilitation, BC&A proposes a renewal budget for Spanish Fork City based on a combination of rehabilitation and replacement as shown in Table 8-1. This table shows a comparison of the required annual renewal budgets based on both replacement and rehabilitation with some assumptions about the percentage of the collection system that can be rehabilitated. In most cases, larger diameter pipelines can be rehabilitated while smaller diameter pipelines will need to be replaced. Based on the table, BC&A recommends Spanish Fork City budget about $800,000 annually (based on 2011 dollars) for system renewal.

Table 8-1
Required System Renewal Budgets for Various Rehabilitation/Replacement Scenarios

Diameter (in)	Length (ft)	Percent Replaced	Percent Rehabilitated	Replacement Costs	Rehabilitation Cost
6	104,332	100	0	$20,913,276	$0
8	410,338	25	75	$21,645,310	$12,310,129
10	39,192	25	75	$2,184,952	$1,308,032
12	50,858	25	75	$2,987,894	$1,869,023
15	40,672	25	75	$2,531,809	$1,860,727
18	7,913	25	75	$577,651	$474,781
21	12,938	25	75	$1,004,341	$970,378
24	15,453	25	75	$1,271,043	$1,390,807
30	16,794	0	100	$0	$3,022,887
36	11,828	0	100	$0	$2,957,108
Total	710,318			$53,116,276	$26,163,873
Total / 100 Years				$531,163	$261,639
Total Annual Renewal Budget					**$792,801**

As the PACP coding results of the City's collection system accumulate, it may be possible to re-evaluate the estimated service life of system pipes based on observed deterioration rates. If the data indicates that the service life of system pipes will be longer than 100-years, the annual renewal budget could be reduced. Conversely, if the calculated service life of system pipes is less than 100-years, a larger renewal budget may be required.

Lift Stations

Lift Stations also represent a significant cost in the City's collection system. Unlike gravity collection mains, lift stations require frequent maintenance and have a much shorter service life than service mains. The replacement value of the City's lift stations is estimated at approximately $2.0 million. The expected service life of a lift station is approximately 40 years, after which, significant rehabilitation or replacement is likely required. Lift station pumps have an even shorter service life of approximately 20 years. Based on these estimates, the City should

be spending approximately $54,500/year on lift station rehabilitation. This may include saving funds for future rehabilitation of wet wells, pump replacement, or control repairs.

Wastewater Treatment Plant

The City's Wastewater Treatment Plant is one of the most expensive parts of its wastewater system. Based on data provided by Aqua Engineering, estimated costs for wastewater treatment plant improvements are approximately $7,860,000 over the next 20 years. Therefore the City should be saving approximately $400,000 per year to provide sufficient funds for treatment plant improvements. Table 8-2 shows the total renewal costs that should be spent or saved every year for system rehabilitation and/or replacement.

Table 8-2
Required System Renewal Budgets for Various System Components

System Component	Renewal Cost
Collection System	$800,000
Lift Stations	$54,500
Wastewater Treatment Plant	$400,000
Total	$1,254,500

Planning Costs

This report, the associated recommendations, and the Capital Facilities Plan should be updated to about every 5 years, or more frequently, depending on how and where the City has developed and proposed or adopted zoning or land use changes. We would also recommend the existing conditions model be updated on an ongoing basis, as development occurs in Spanish Fork City. Regular updates to the model will allow the City to analyze the impact of development on the City's wastewater facilities. The costs associated with updates to this report, model updates, and other analyzes associated with this report are anticipated by Spanish Fork City to be about $15,000 per year.

SYSTEM RENEWAL PRIORITIES

Because of limited funding, it may be necessary to prioritize initial system rehabilitation activities based on the potential consequence of various pipes. The following criteria may aid Spanish Fork City personnel in identifying pipes that are most critical based on their relative importance in the Spanish Fork City collection system:

- **Sewer Flow Rate** – Flow rate in a sewer pipe is the single most important indicator of the importance of a pipe. In most situations, the higher the flow rate, the larger the area that pipe serves. Bypass pumping cost, the risk of property damage, environmental and regulatory consequences, the cost of pipe replacement, and problems from sewage backing up in the system are all greater for larger flow rates. In a worst case scenario, if a pipe collapses or becomes blocked (due to corrosion or a natural disaster) and surcharging in the pipeline results in wastewater flows in basements and the street, there is a greater health hazard to the public with a larger wastewater flow rate.

- **Road Type** – There is a direct connection between the density of traffic and the cost and time associated with maintenance and repairs on sewer pipes. Thus, pipelines in high traffic areas must be considered more critical than similarly sized pipelines in lower traffic areas. For example, the cost of failure for pipes under I-15 would be much higher than equivalent sized pipes in residential streets or open space areas.
- **Pipe Depth** - The depth of the pipe can have a significant impact on the cost of repairs and rehabilitation of sewer pipe. Extensions on backhoes, very wide trenches, possible dewatering, etc. make repairs and maintenance much more expensive and time consuming on deeper pipes. As a result, deep pipelines should be considered higher priority than their similarly sized shallow counterparts.

CHAPTER 9
12-YEAR CAPITAL FACILITY PLAN

The purpose of this chapter is to summarize Spanish Fork City personnel estimates of the timing of various capital projects described in Chapter 6, 7, and 8. BC&A did not participate in the development of the schedule of projects.

COLLECTION SYSTEM PROJECTS

Only two collection system improvements will be required within the next 12-years. Project 1 an 2 are described in further detail as part of Chapter 6. Table 9-1 lists these projects and their associated costs.

Table 9-1
12-Year Collection System Improvements

Proj. No.	Proj. Description	Total Cost (2011 Dollars)	Percent Attributable to Future Growth	Design Condition Existing Peak Flow (gpm)	Design Condition Buildout Peak Flow (gpm)	Projected Year of Required Completion
2.2	Redundant Siphon	$115,000	60%	2,800	5,500	FY2012
1.2	Williams Lane	$578,000	100%	1,800	3,500	FY2016
2.1	1850 N to WWTP	$845,000	100%	2,800	5,500	FY2018

WASTEWATER TREATMENT PLANT PROJECTS

Several treatment plant improvements will be required within the next 12-years. Table 9-2 lists these projects and their associated costs.

Table 9-2
12-Year Wastewater Treatment Plant Improvements

Proj. No.	Proj. Description	Total Cost (2011 Dollars)	Percent Attributable to Future Growth	Projected Year of Required Completion
--	Purchase Land for Future Regional Treatment Plant	$1,300,000	100%	FY2018
1.1	Primary Mechanism Replace.	$140,000	0%	FY2013
1.3	New Auto. Tran. Switch & Backup Gen	$10,000	0%	FY2013
1.4	Convert Chlorine Cont Basin-UV	$1,000,000	25%	FY2020-2023
2.1	New STM Aerotor	$2,600,000	100%	FY2020-2023
2.2	90-Foot Final Clarifier	$700,000	100%	FY2020-2023
2.3	Headworks Upgrade	$200,000	100%	FY2020-2023

PLANNING PROJECTS

As discussed in Chapter 8, Spanish Fork City personnel estimate annual costs associated with planning documents to be approximately $15,000 per year.

AQUA ENGINEERING, INC.

533 WEST 2600 SOUTH SUITE 275, BOUNTIFUL, UTAH 84010

TECHNICAL MEMORANDUM

TO: CHRIS THOMPSON

FROM: BRAD RASMUSSEN

SUBJECT: SIPHON AND DIGESTER COST ATTRIBUTED TO GROWTH

DATE: APRIL 9, 2012

CC: FILE

The costs associated with the siphon project and digester project can be attributed to current customers and future users.

The new digester allows the treatment facility operators to take down any of the existing digesters for cleaning, repair or maintenance. Without the new digester it was impossible to meet the digestion treatment requirements when the big digester was taken off line for an extended period of time. The digesters typically are cleaned every 3-5 years and this process takes somewhere between 30 and 60 days. During the cleaning the digester is down and cannot be used. Once the digester is put back on line it will take about 30 days for the process to function normally. It is estimated that the valued of the new digester to the existing community is about 20% of the cost. The other 80 % of the cost associated with the new digester should be assigned to new growth.

The siphon project increased the capacity of the wastewater flow that could cross the railroad tracks. The existing siphon is still in use and could handle the flow from existing customers 99% of the time. The new siphon will increase the line capacity for additional growth on the new line. It is assumed that the new siphon should be assigned to growth based on a 99% usage and only 1% would be used by existing customers.

Summary
Digester - 80% to new growth 20% to existing customers.
Siphon - 99% to new growth and 1% to existing customers.

APPENDIX A
FLOW METER FIGURES

Figure M1
Observed Flow at Flow Meter 1 vs. Hydraulic Model Simulation
(Treatment Plant Flows)

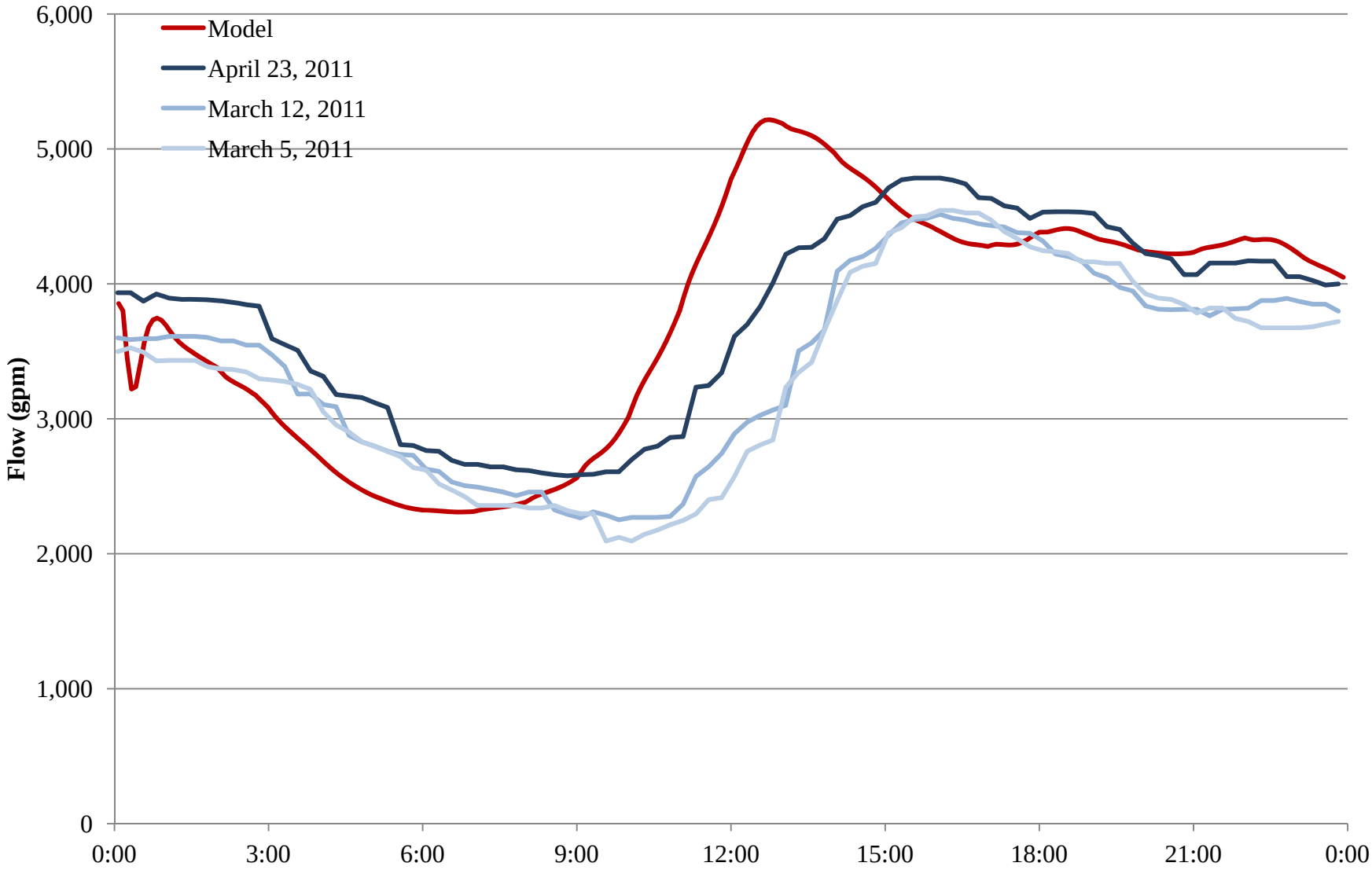
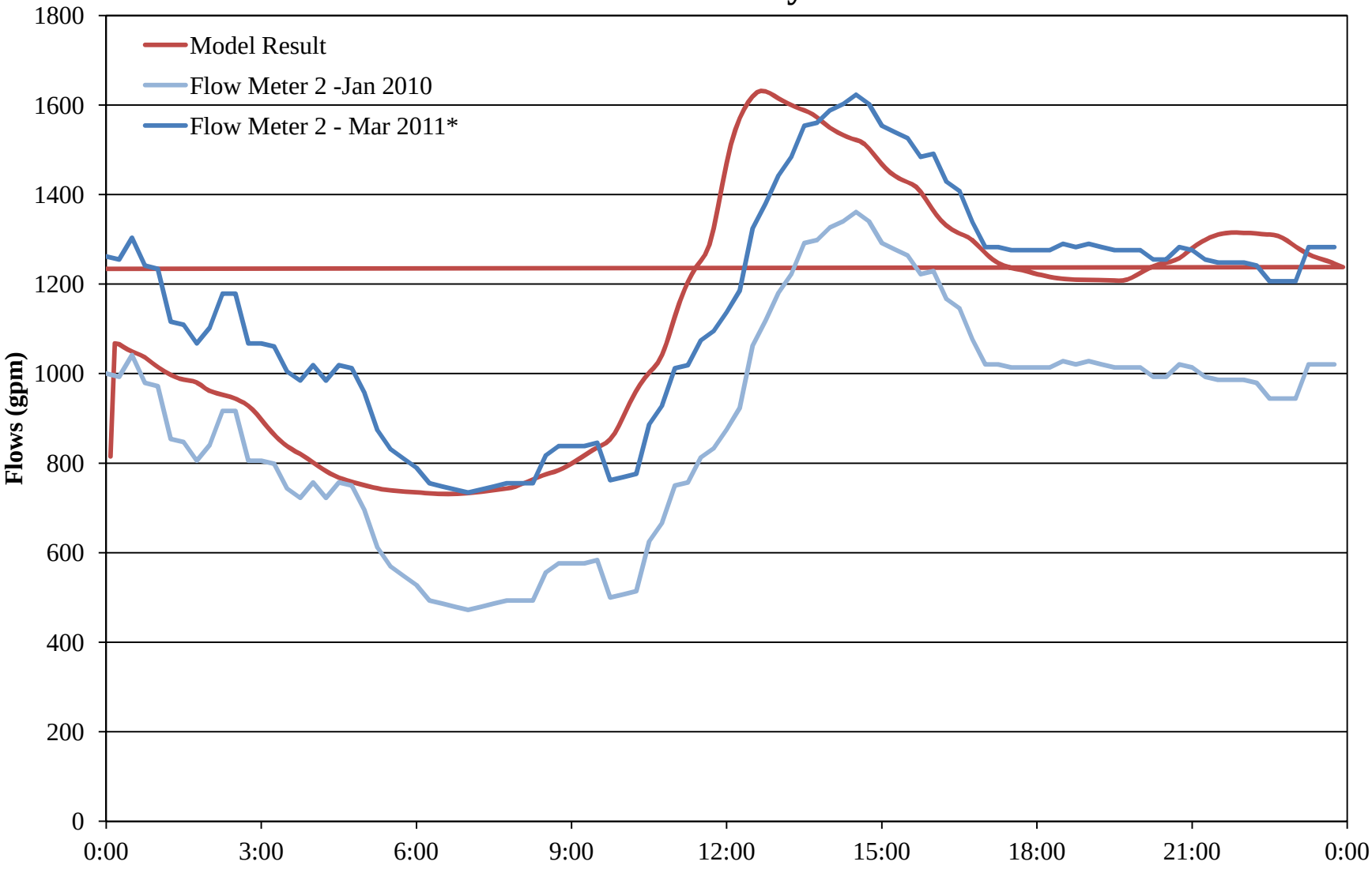


Figure M2
Observed Flow at Flow Meter 2 vs. Hydraulic Model Simulation



*Infiltration adjusted to reflect March 2011 conditions.

Figure M3
Observed Flow at Flow Meter 3 vs. Hydraulic Model Simulation

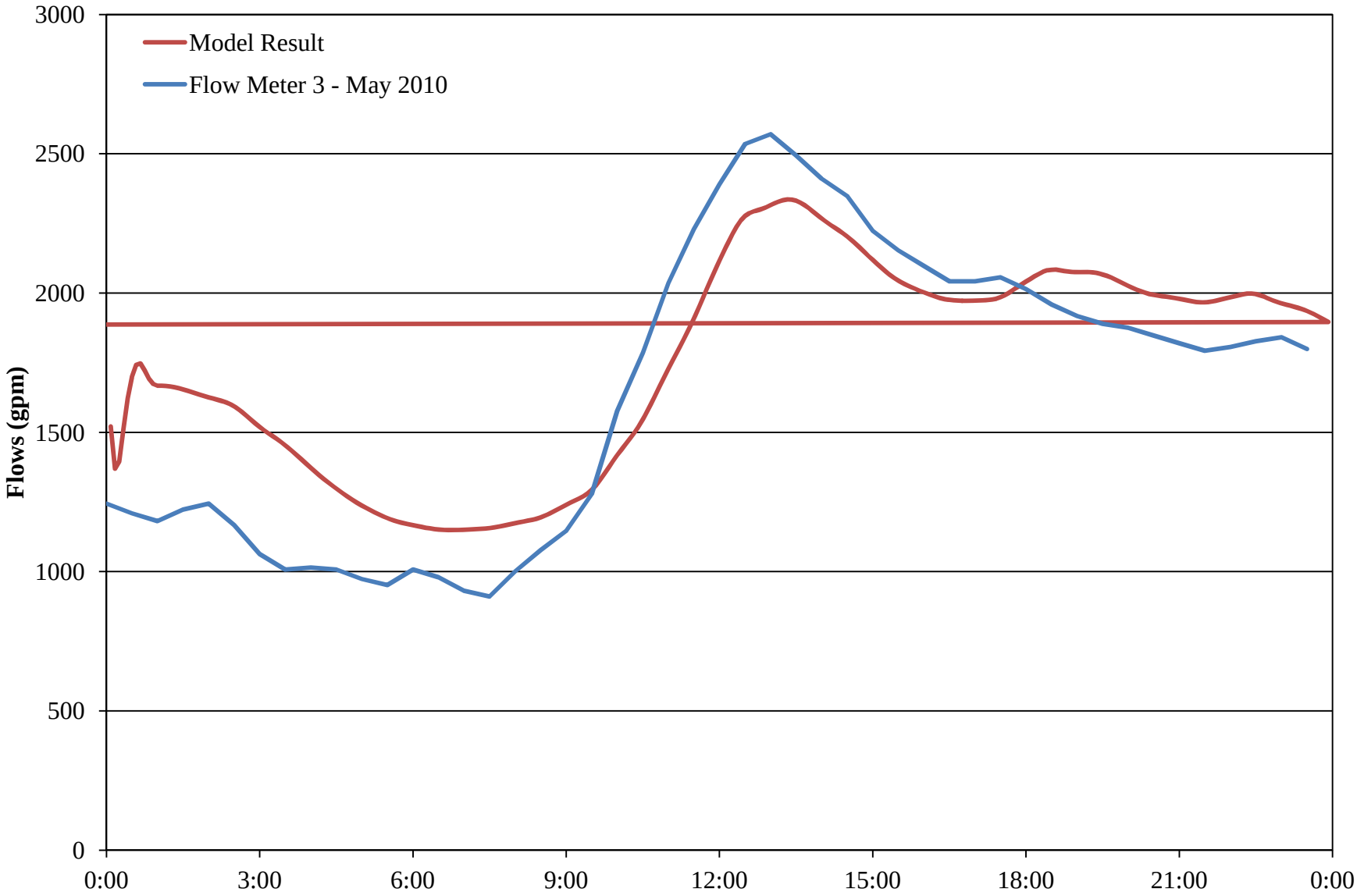


Figure M4
Observed Flow at Flow Meter 4 vs. Hydraulic Model Simulation

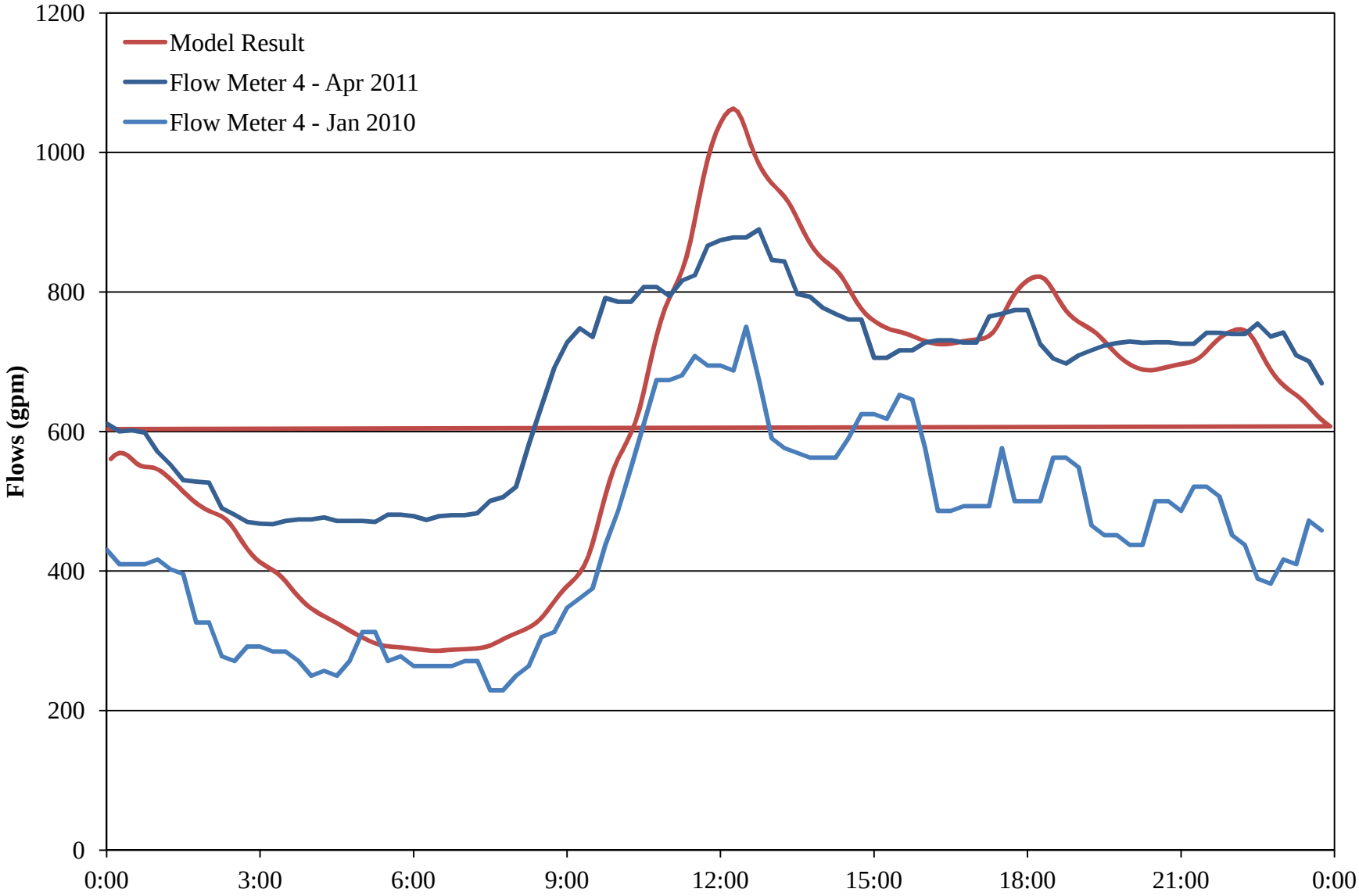
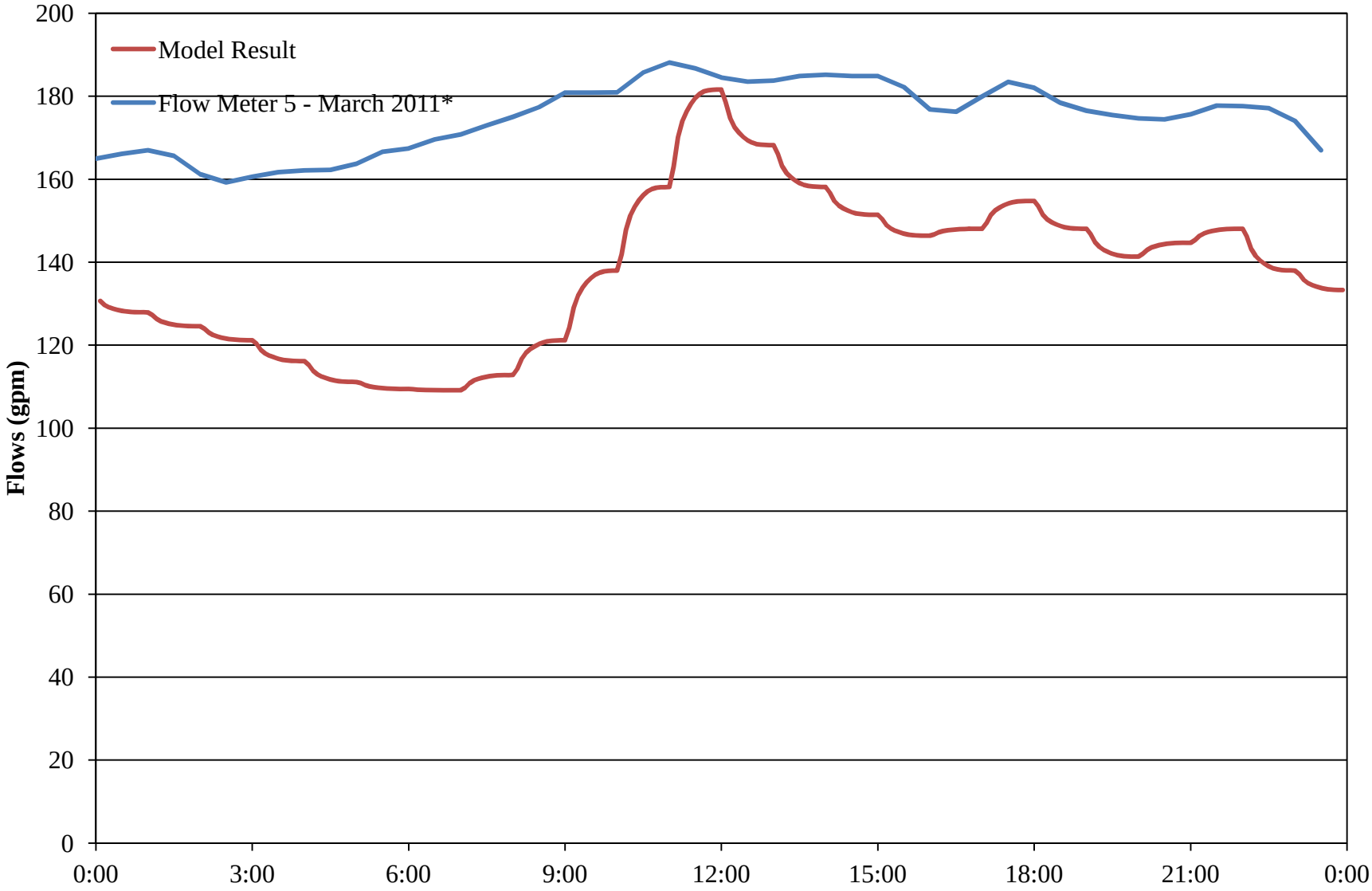


Figure M5
Observed Flow at Flow Meter 5 vs. Hydraulic Model Simulation



*Originally flow monitored in August 2010. Infiltration adjusted to reflect March 2011 conditions.

Figure M6
Observed Flow at Flow Meter 6 vs. Hydraulic Model Simulation

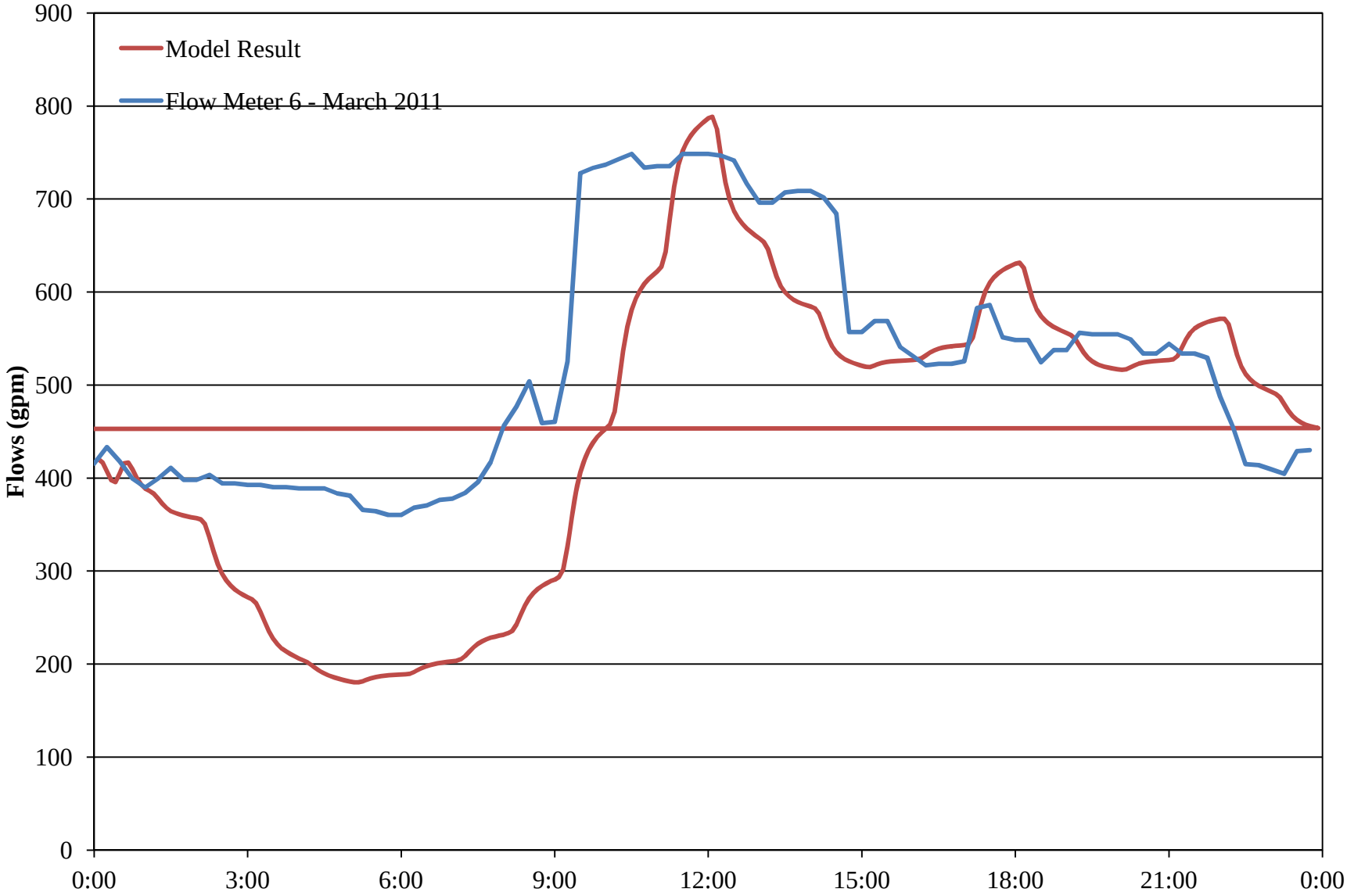


Figure M7-A
Observed Flow at Flow Meter 7A vs. Hydraulic Model Simulation

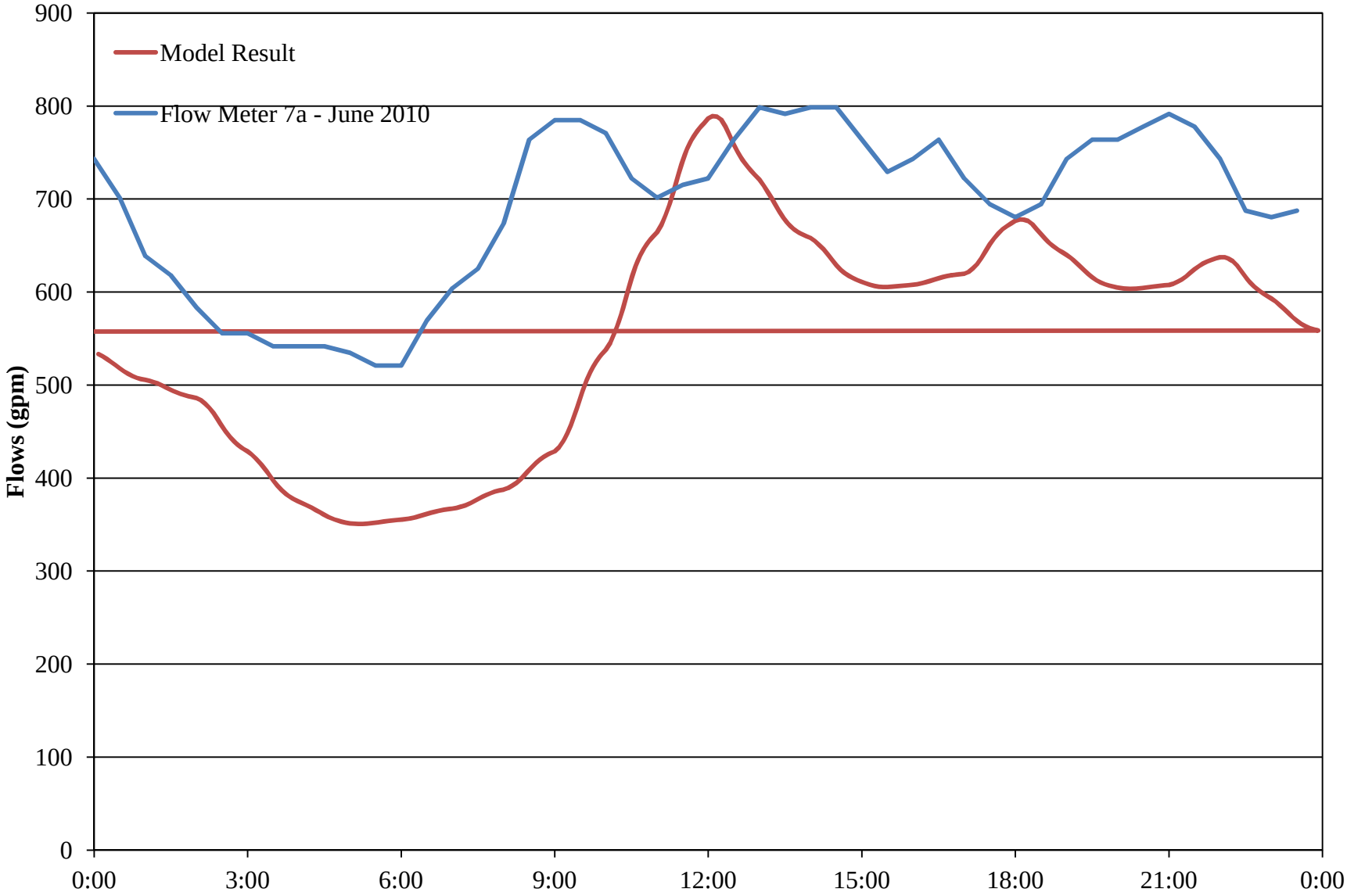


Figure M7-B
Observed Flow at Flow Meter 7B vs. Hydraulic Model Simulation

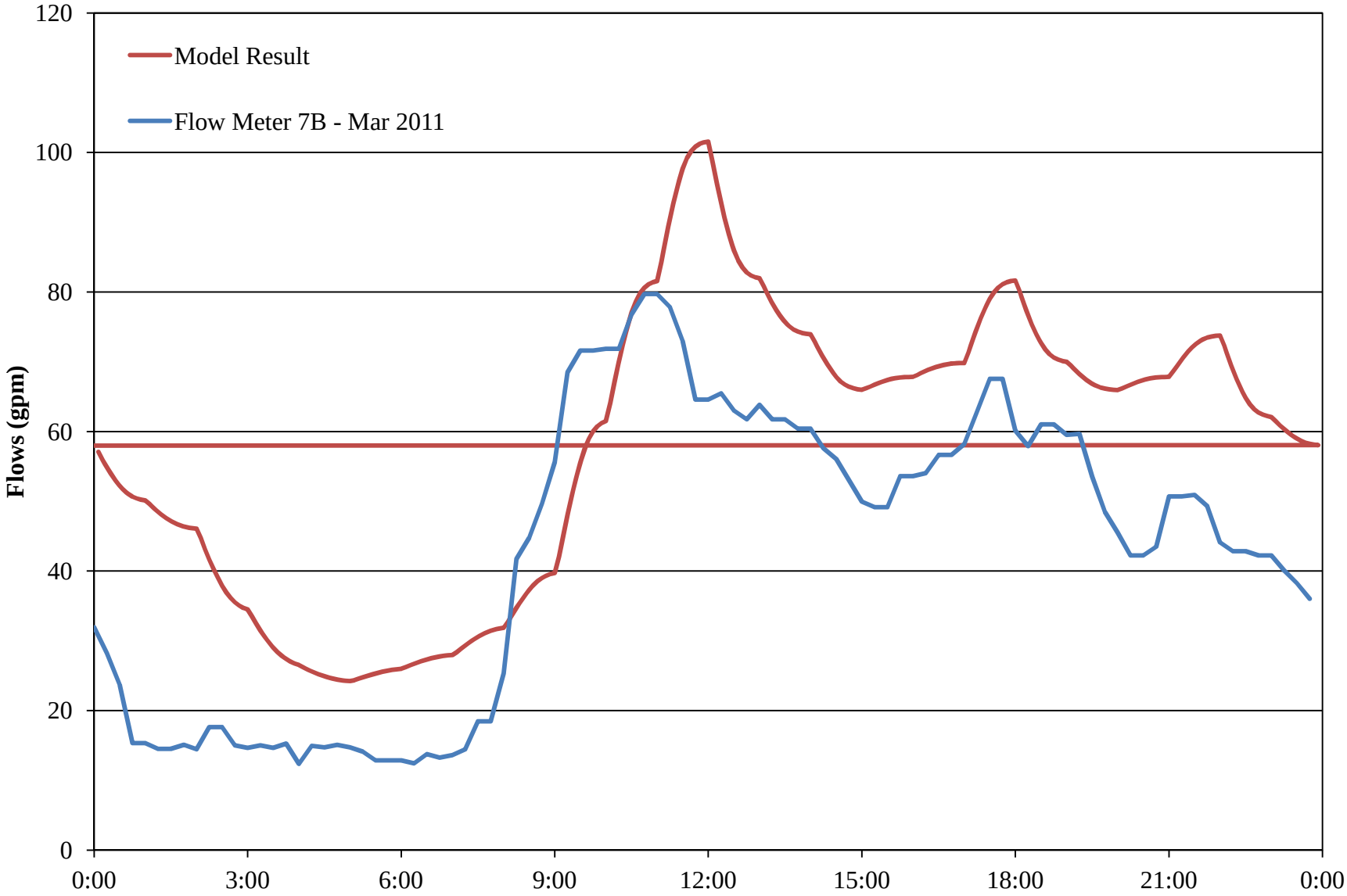
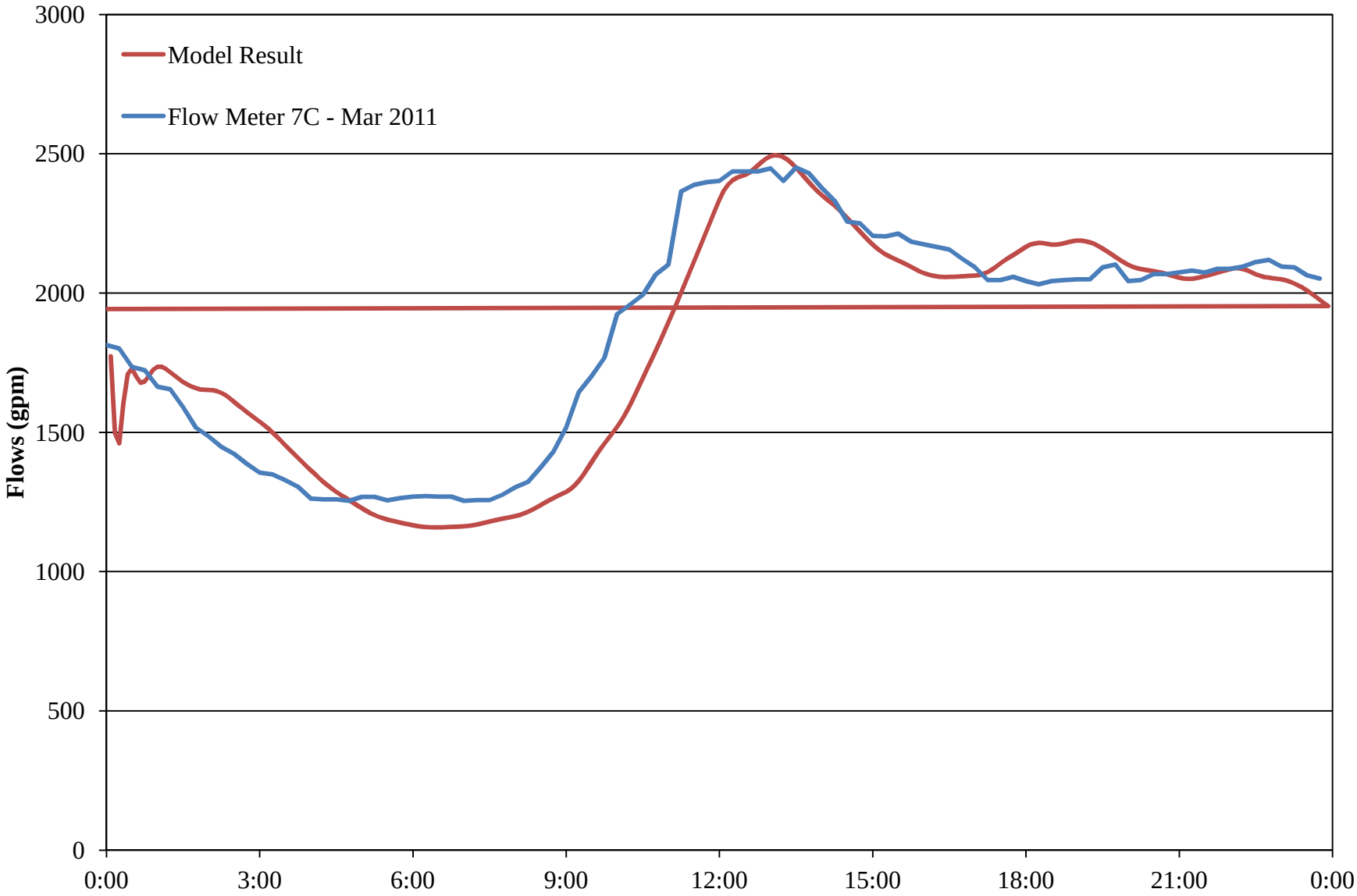


Figure M7-C
Observed Flow at Flow Meter 7C vs. Hydraulic Model Simulation



Meter M8
Observed Flow at Flow Meter 8 vs. Hydraulic Model Simulation

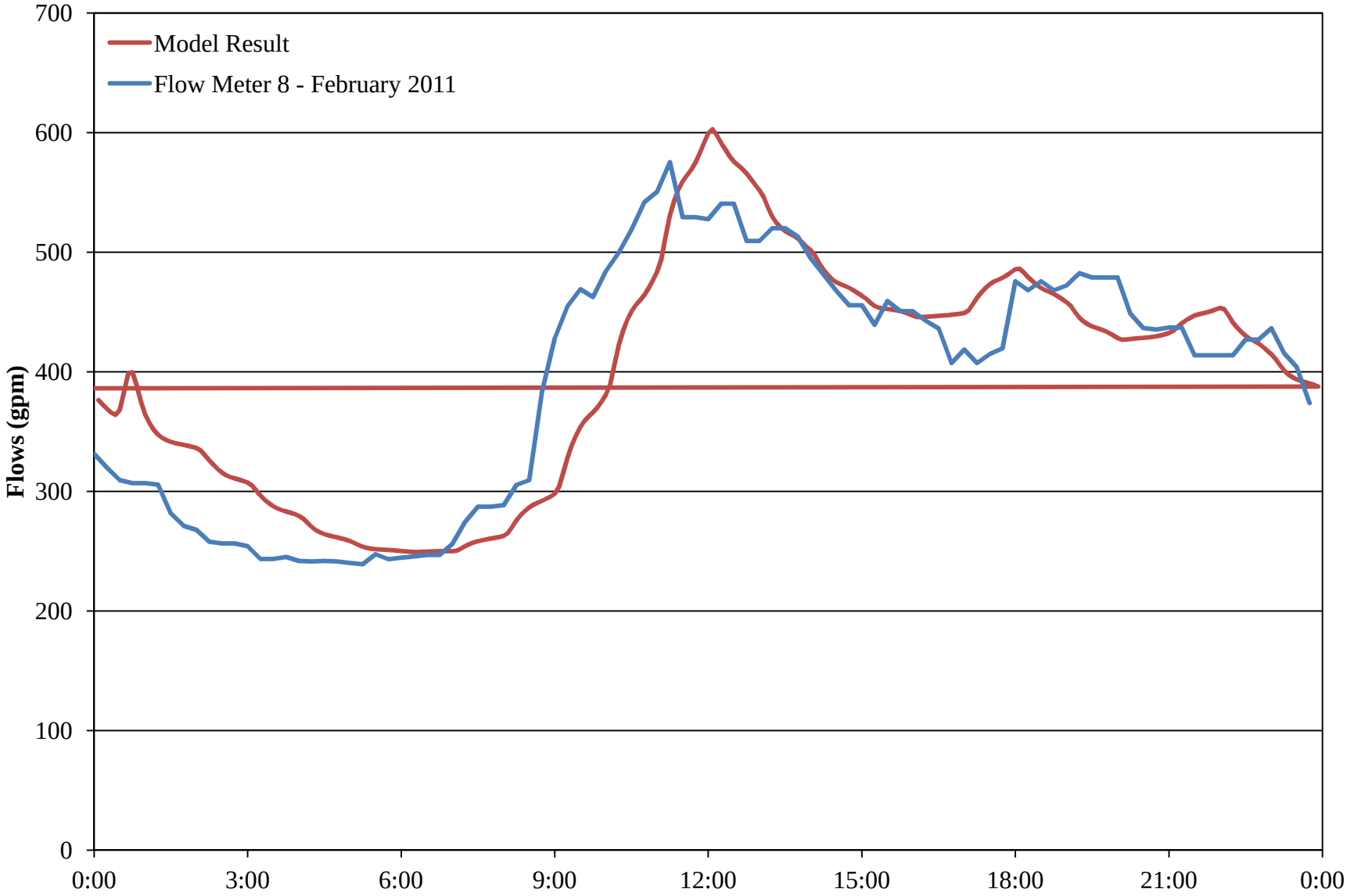


Figure M9
Observed Flow at Flow Meter 9 vs. Hydraulic Model Simulation

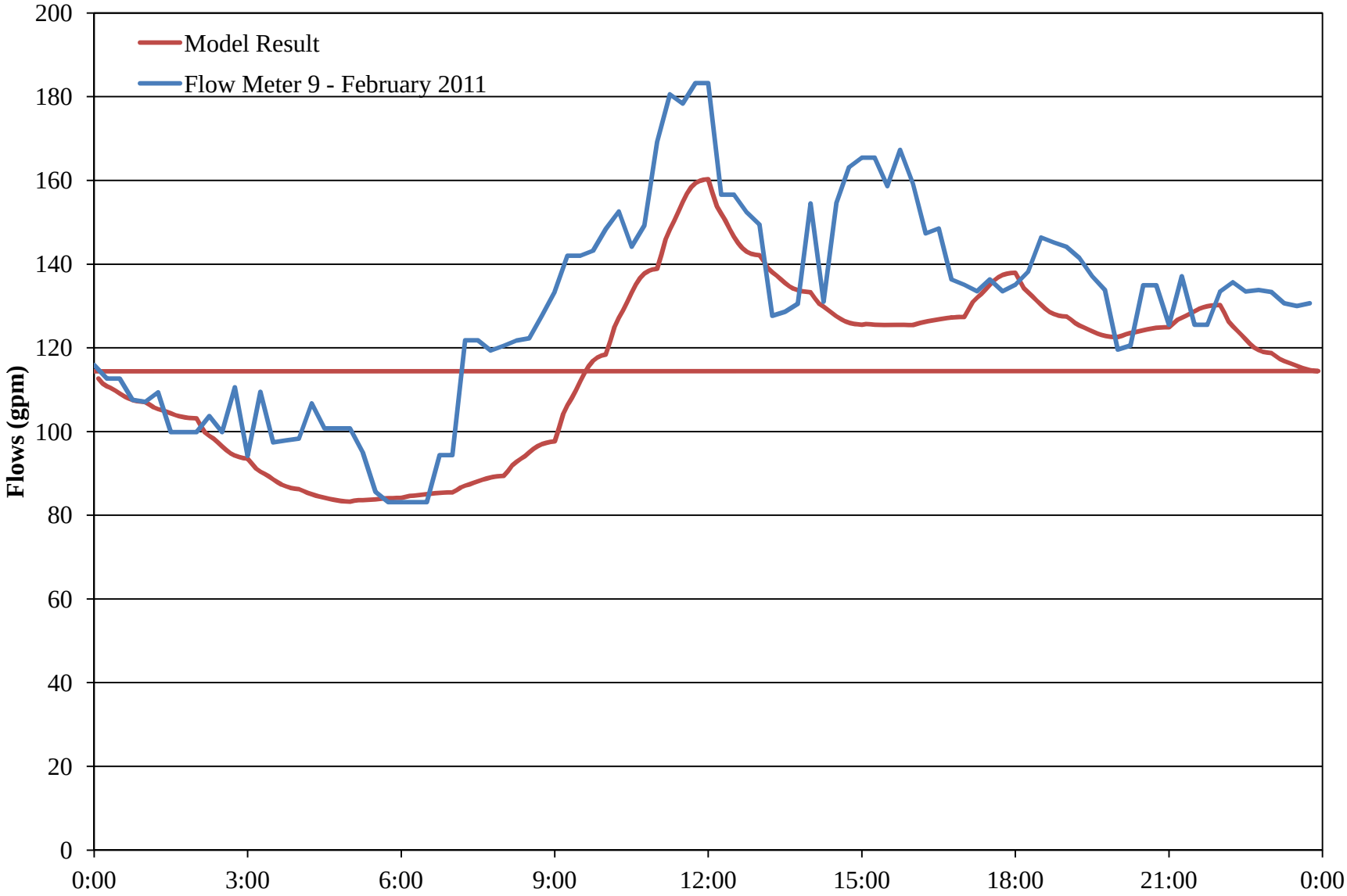


Figure M10
Observed Flow at Flow Meter 10 vs. Hydraulic Model Simulation

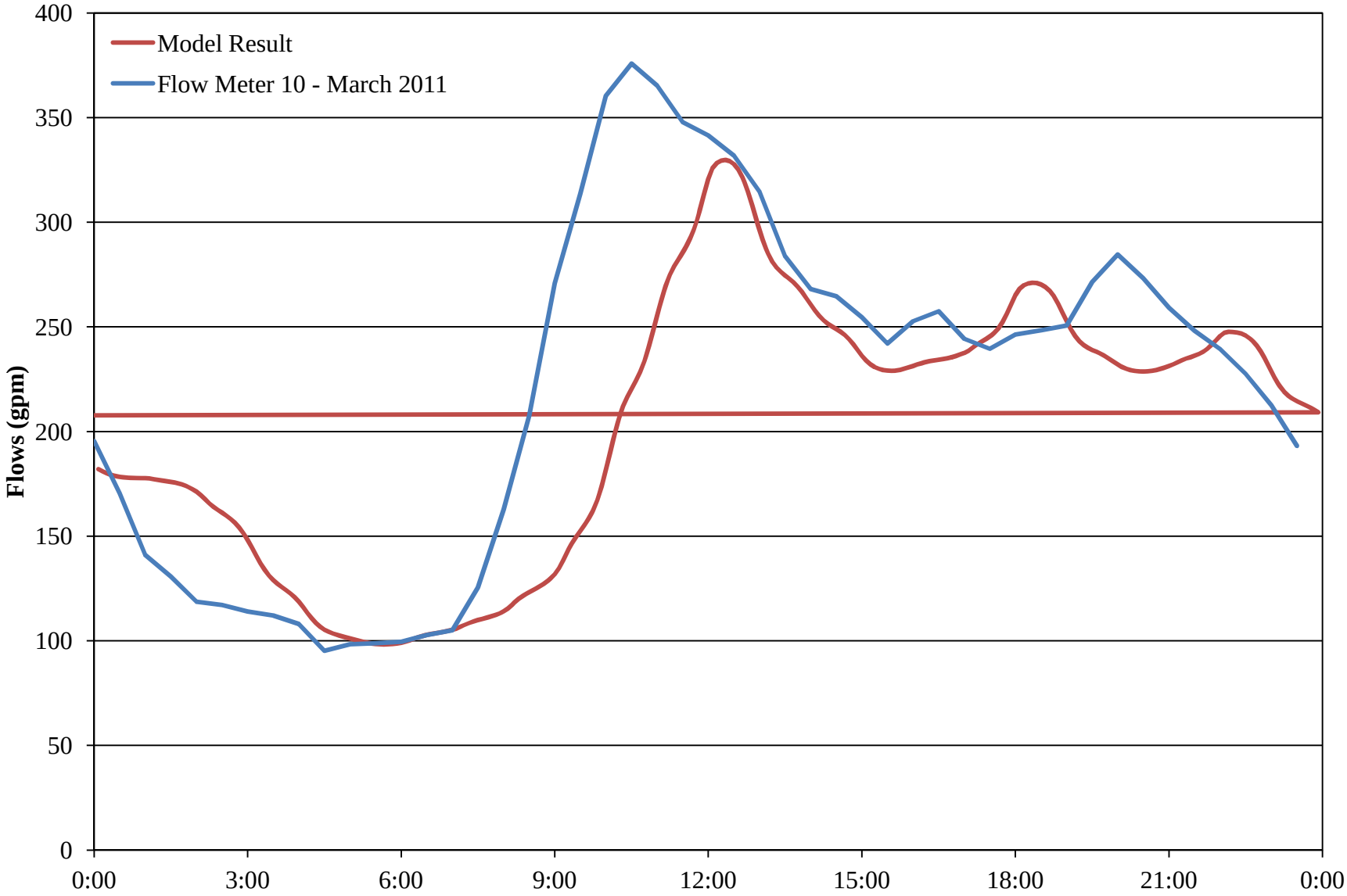


Figure M11
Observed Flow at Flow Meter 11 vs. Hydraulic Model Simulation

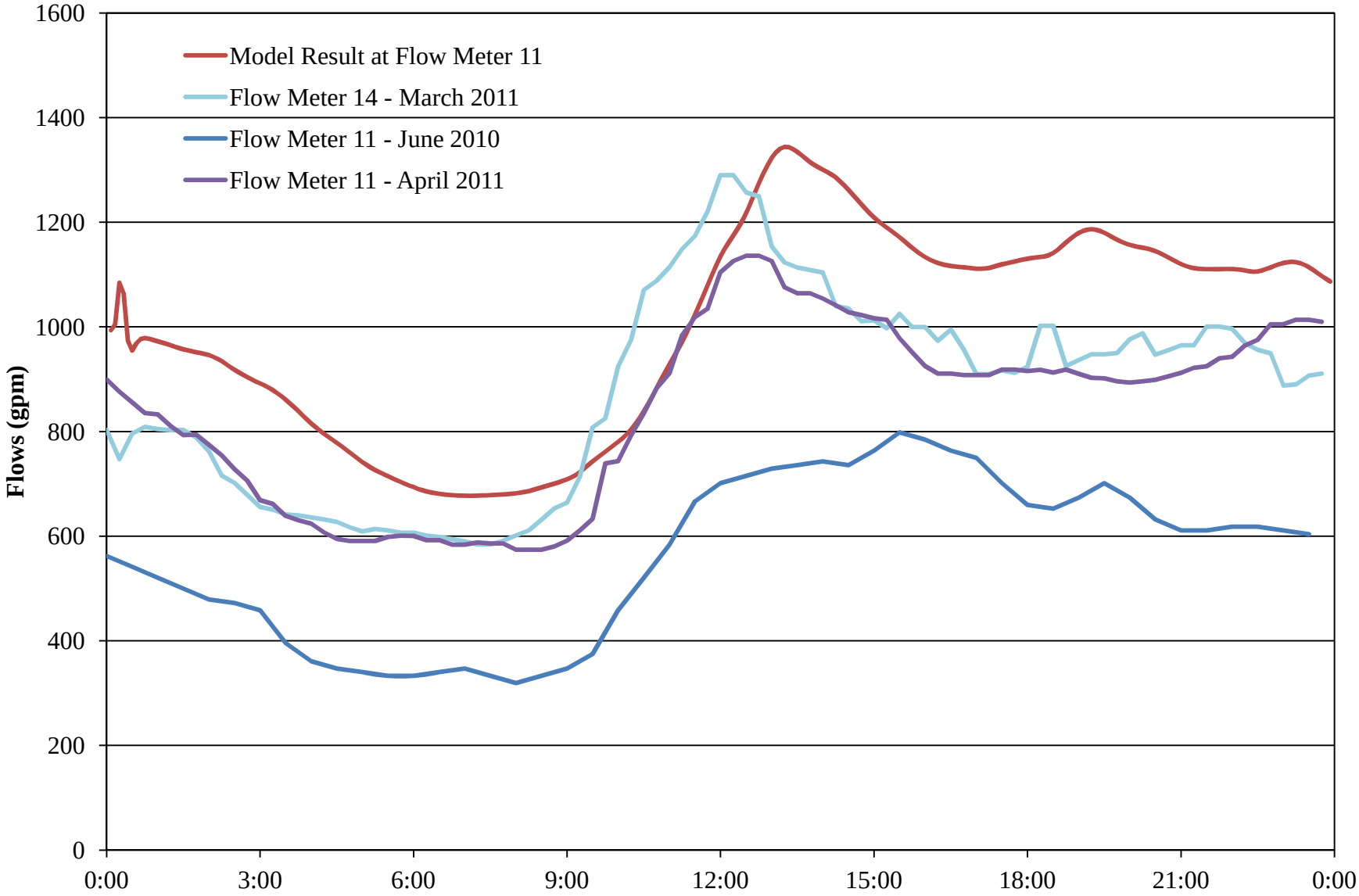
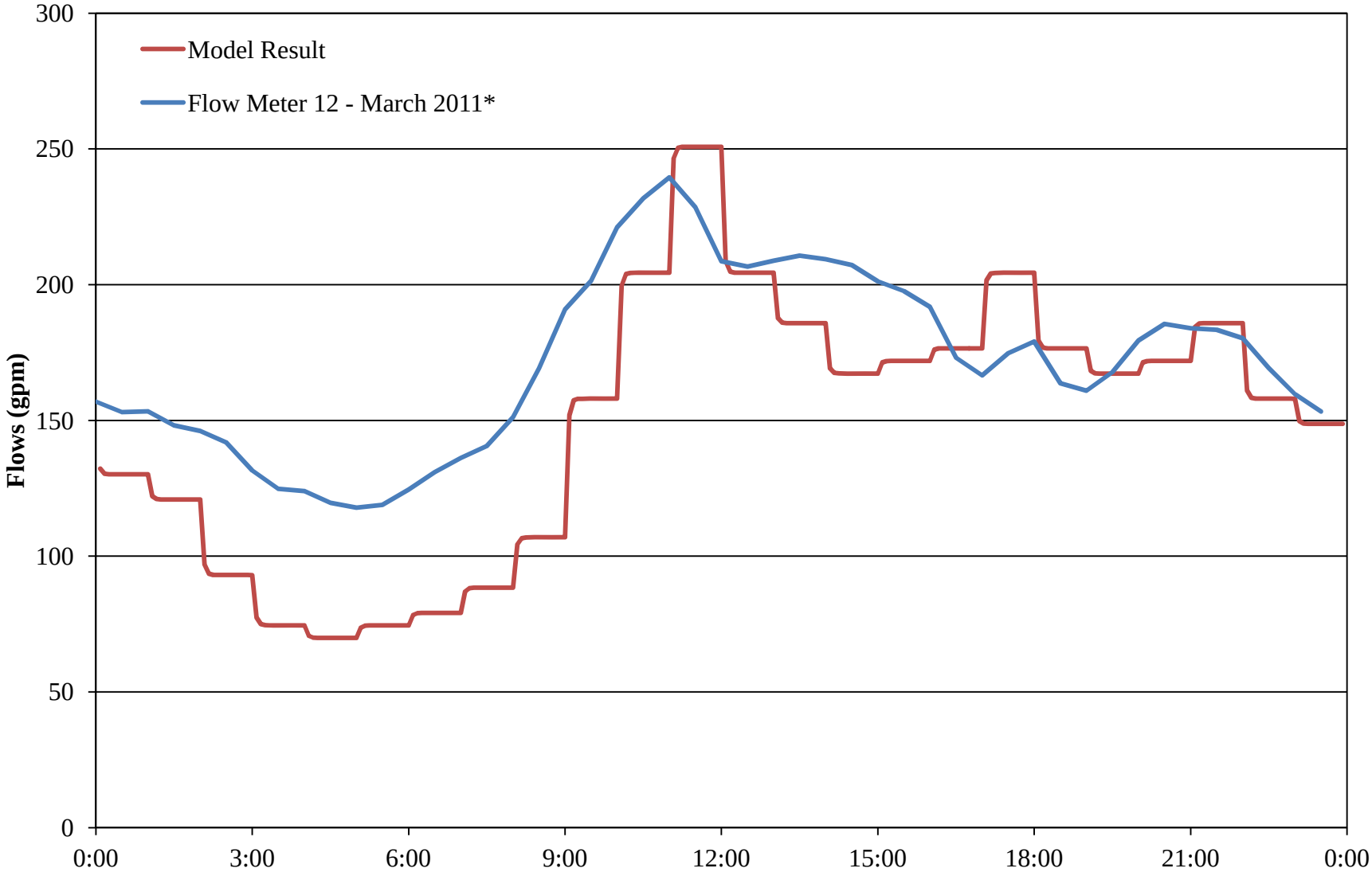


Figure M12
Observed Flow at Flow Meter 12 vs. Hydraulic Model Simulation



*Originally flow monitored in September 2010. Infiltration adjusted to reflect March 2011 conditions.

Figure M13
Observed Flow at Flow Meter 13 vs. Hydraulic Model Simulation

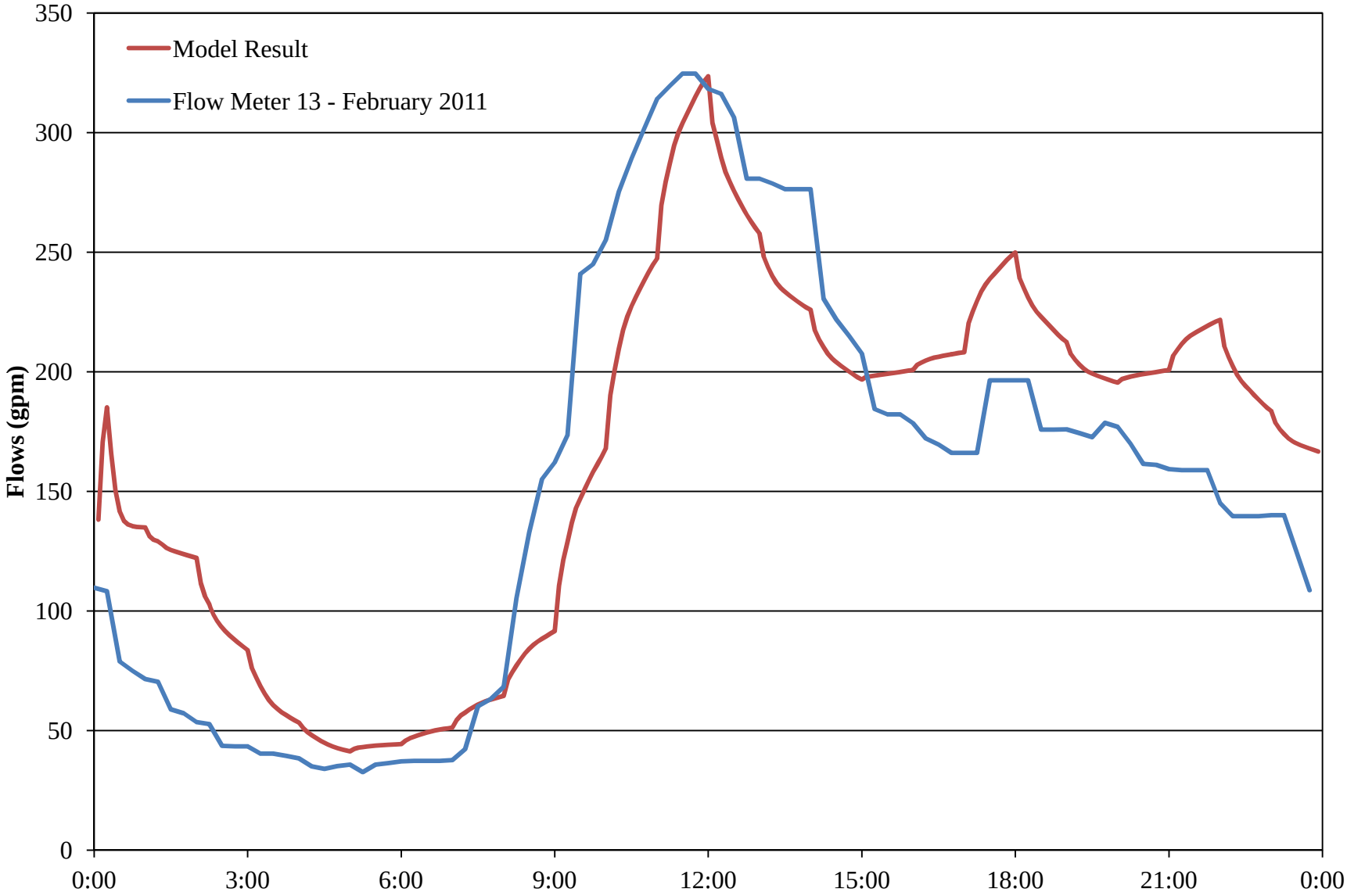


Figure M14
Observed Flow at Flow Meter 14 vs. Hydraulic Model Simulation

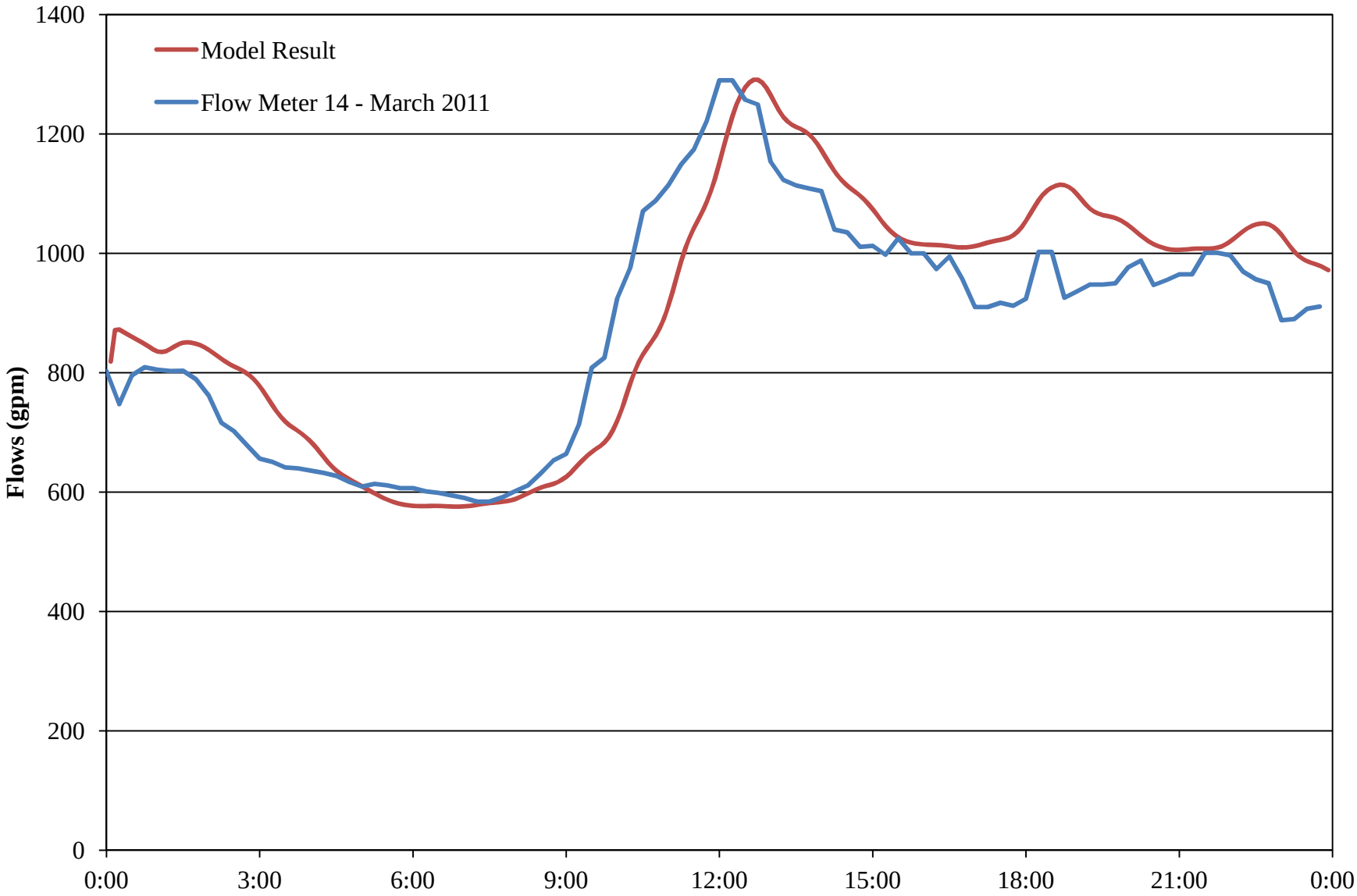


Figure M15
Observed Flow at Flow Meter M15 vs. Hydraulic Model Simulation

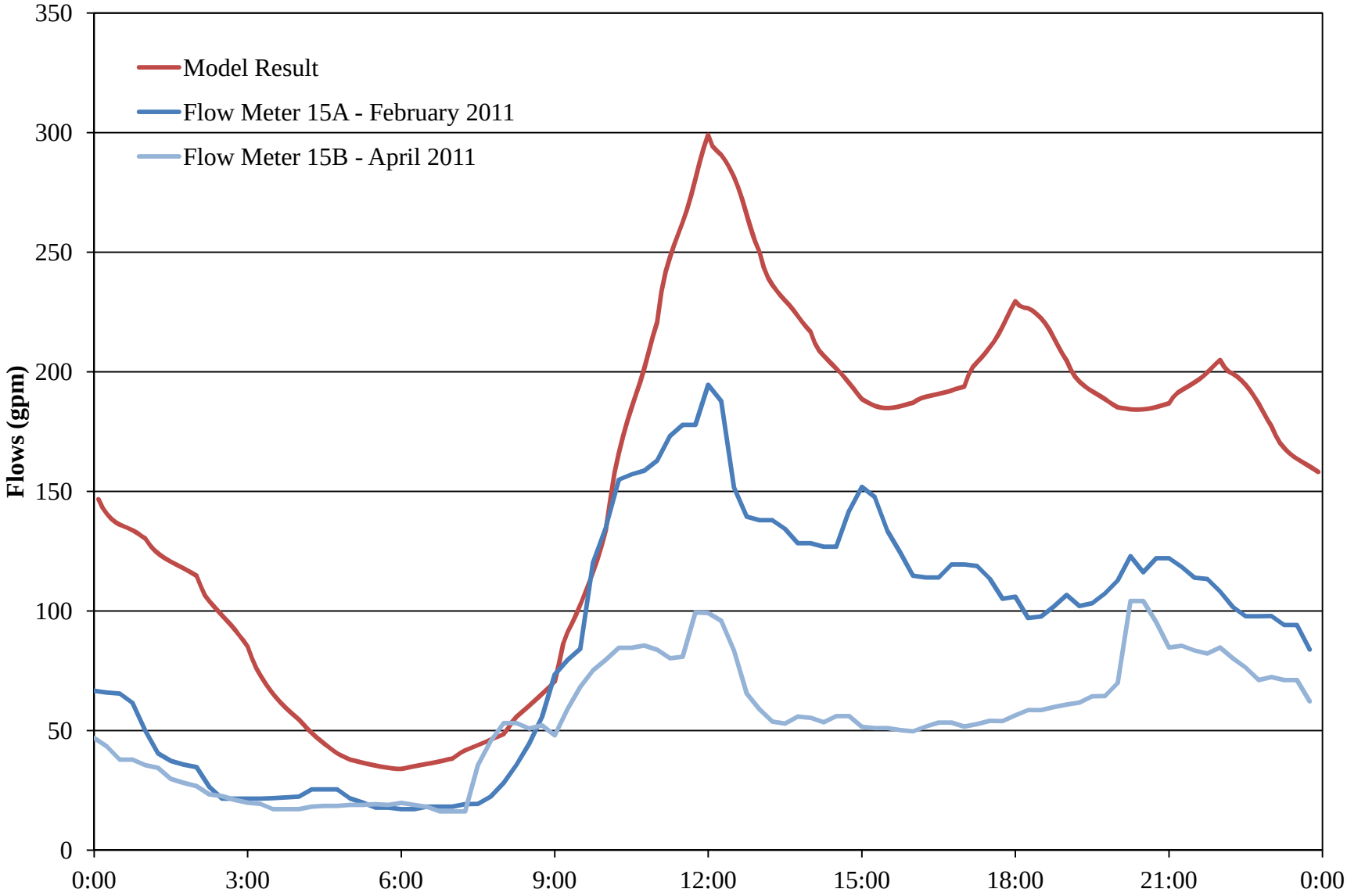


Figure M16
Observed Flow at Flow Meter 16 vs. Hydraulic Model Simulation

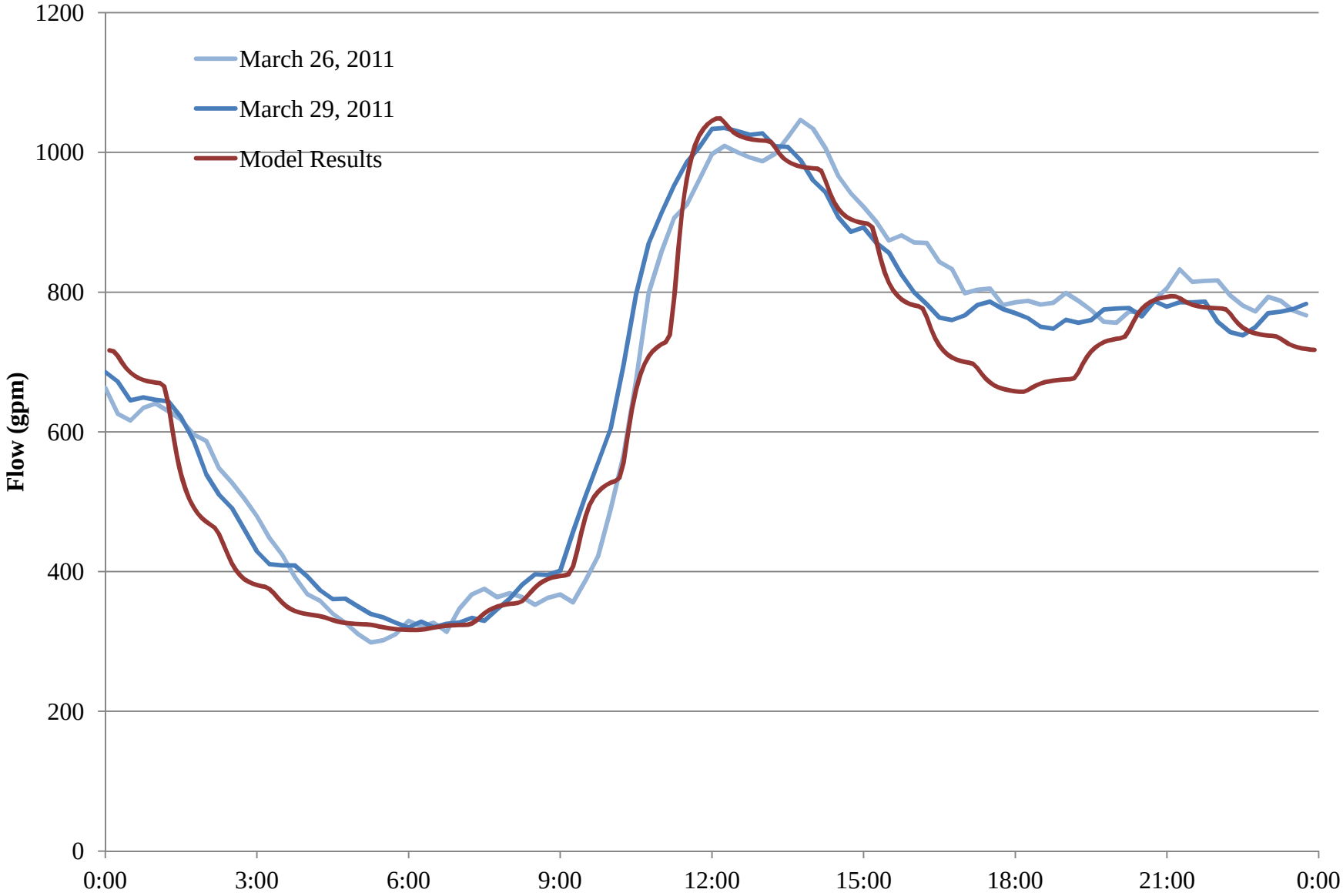


Figure
Observed Flow at Mapleton Meter vs. Hydraulic Model Simulation

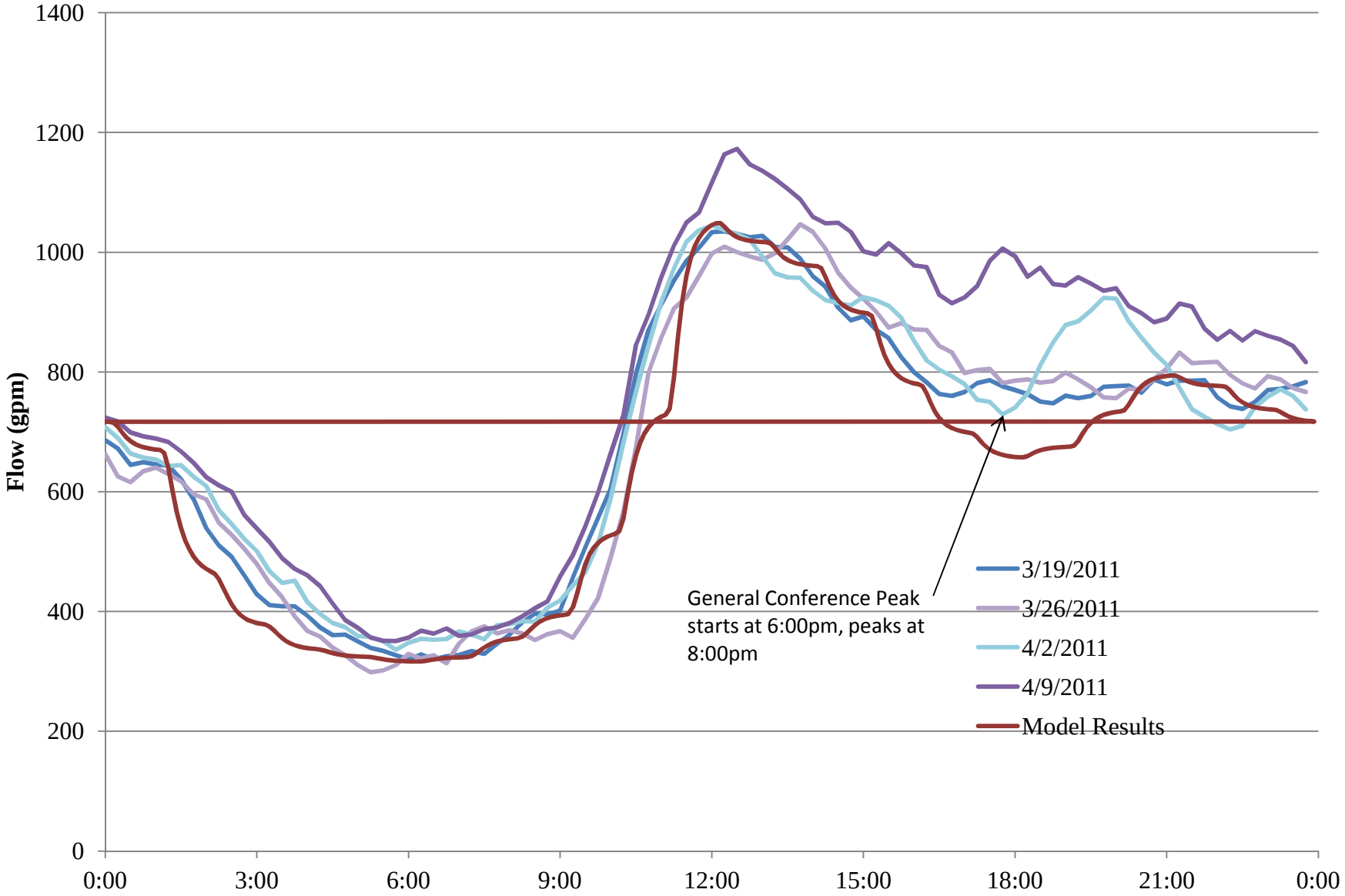


Figure - Mapleton Saturday
Observed Flow at Mapleton Meter vs. Hydraulic Model Simulation

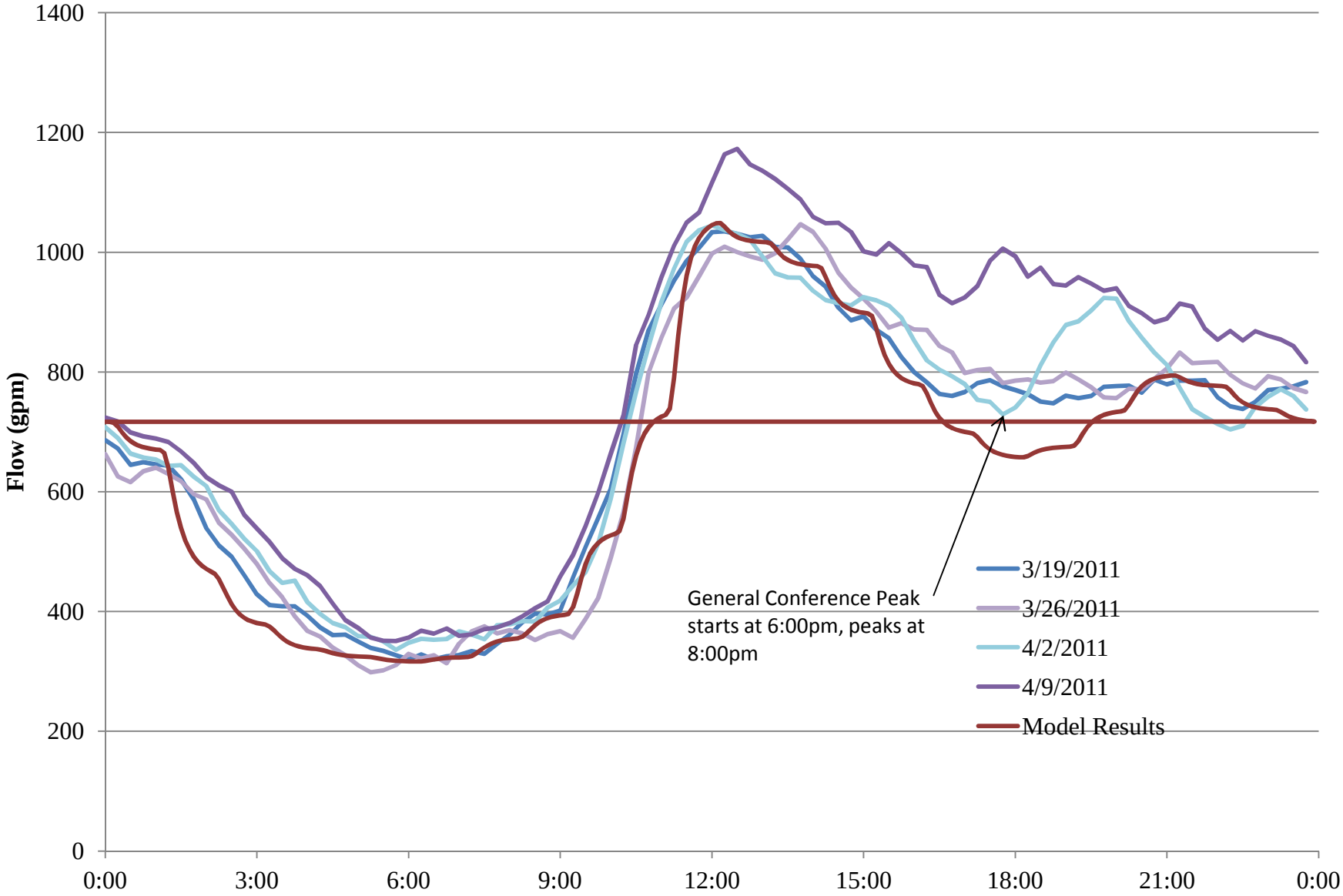
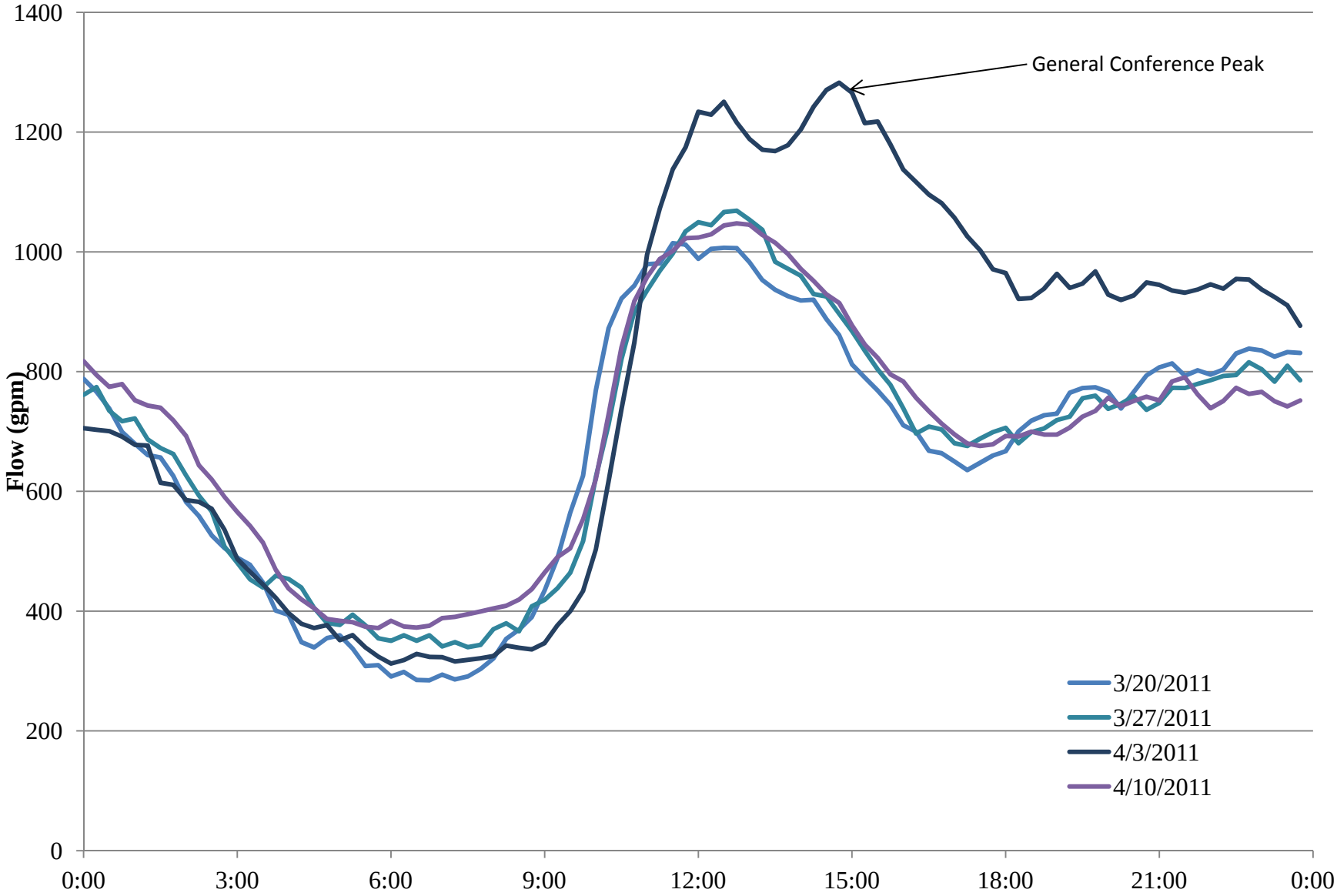
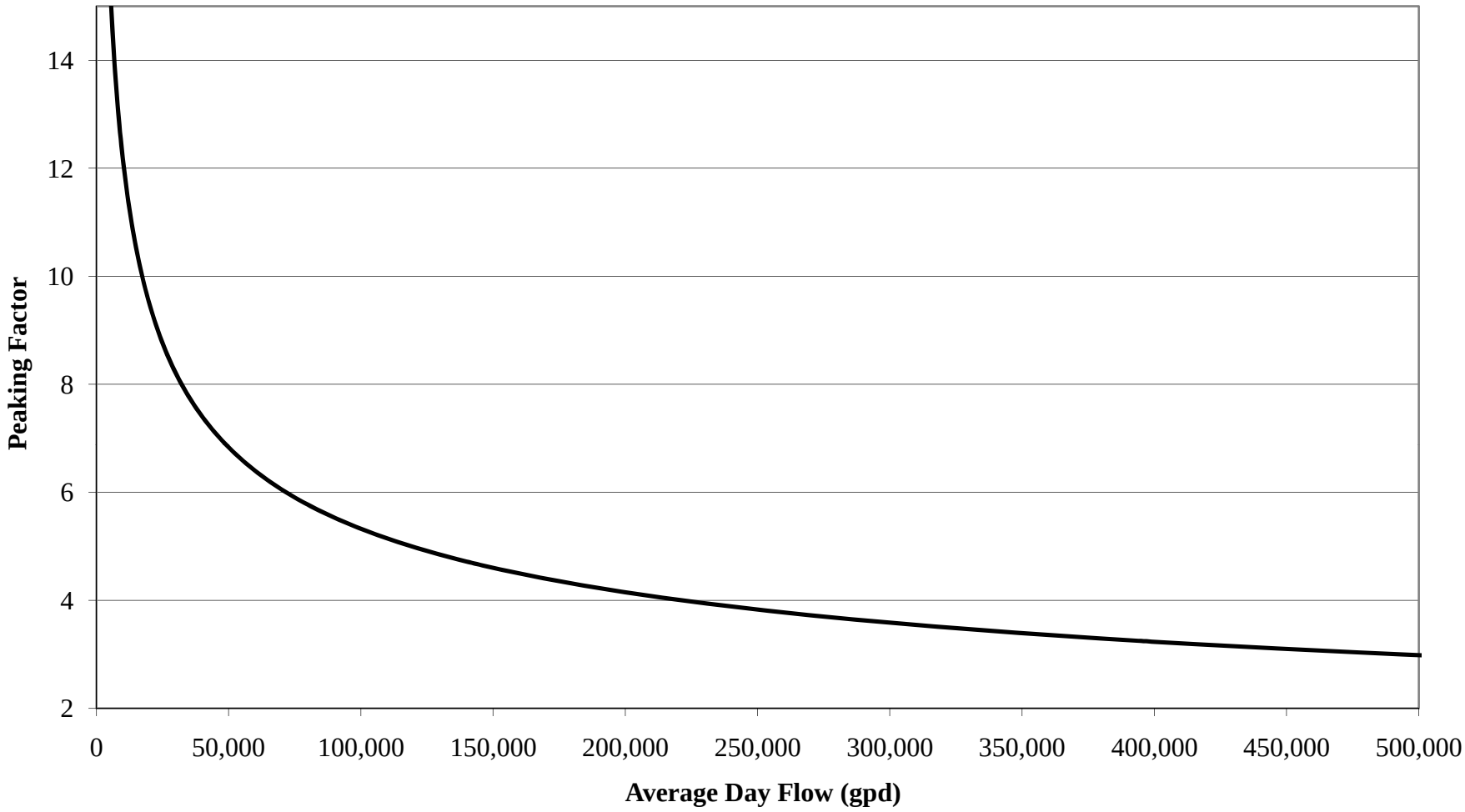


Figure - Mapleton Sunday
Observed Flow at Mapleton Meter



APPENDIX B
SMALL AREA PEAKING FACTOR

Figure
Small Area Instantaneous Peaking Factor



APPENDIX C
INTERLOCAL AGREEMENTS

INTERLOCAL AGREEMENT ALLOWING SEWAGE AND WASTEWATER FROM PORTIONS OF SPANISH FORK TO FLOW TO THE SALEM WASTEWATER TREATMENT PLANT

THIS AGREEMENT (the "Agreement"), is made and entered into by and between SPANISH FORK CITY (Spanish Fork) 40 South Main, Spanish Fork, Utah 84660 and SALEM CITY (Salem) 30 West 100 South, P.O. Box 901 Salem City, Utah 84653, both entities are political subdivisions of the State of Utah.

WITNESSETH

WHEREAS, Spanish Fork and Salem each presently own a system for the collection and disposal of wastewater sewage; and

WHEREAS, In the future, the cities will have a common boundary along State Road 164 (Utah County 8000 South Street), with the area located north of SR 164 being in Spanish Fork and the area south of SR 164 being in Salem; and

WHEREAS, As each city grows toward each other, there is an area located both north and south of SR 164 which cannot be sewered by gravity flow to either City's wastewater treatment plant; and

WHEREAS, It makes economic sense for the Cities to cooperate in the collection and disposal of wastewater sewage in the area where sewage cannot gravity flow to a treatment plant; and

WHEREAS, The Salem Wastewater Treatment Facility is in close proximity to the area and currently has excess capacity; and

WHEREAS, in order to achieve operational economies, the Cities desire to enter into this Agreement to provide for each City's use of the Salem wastewater treatment plant to sewer the area adjacent to SR 164, as shown on Exhibit A and incorporated herein by this reference; and

WHEREAS, a cooperative effort from each City to provide for the sewage collection and treatment needs of the citizens is a basic underlying goal of the Cities to this Agreement;

NOW, THEREFORE, be it mutually covenanted and agreed as follows:

SECTION ONE
PURPOSE

The purpose of this Agreement is to provide for: (i) the use, operation and maintenance of the Salem Wastewater Treatment Facility for the mutual benefit of the Cities; and (ii) the establishment of a system for sharing the costs and expenses related to the use, operation and maintenance of the Facility.

SECTION TWO
SCOPE OF SERVICE

Salem shall contract with a developer to construct and install a sewer lift station in the approximate location shown on Exhibit A. The sewer lift station will pump collected wastewater to the Salem Wastewater Treatment Plant. The sewer lift station will service the area identified

in Exhibit A, some of which is or will be in Salem and some of which is or will be in Spanish Fork. Salem will own the lift station and be responsible for its operation and maintenance. Spanish Fork shall pay a user fee, as set forth herein for the opportunity to use the lift station and wastewater treatment facility.

SECTION THREE
FEES

For each new residential unit or equivalent residential unit (ERU) in Spanish Fork connected to the wastewater collection system feeding the sewer lift station identified in Exhibit A, Spanish Fork agrees to pay to Salem an impact fee in the amount of the Salem City sewer impact fee in place at the time of connection. Until notified otherwise, the current fee is $1,615.00 per ERU. Spanish Fork agrees to collect the impact fee amount when a building permit is issued. Payment shall be remitted within thirty-days (30) of collection by Spanish Fork. Nothing herein shall preclude Spanish Fork from assessing its own impact fee based upon the impact to its facilities. Spanish Fork shall be obligated to notify Salem monthly of all new building permits issued during that month within the Spanish Fork area of Exhibit A.

Spanish Fork agrees to pay Salem a monthly usage fee of twenty-four dollars ($24.00) per ERU connection. This fee is based upon the average cost for a Salem City resident. The monthly fee shall reflect the average cost of a Salem resident, rounded up to the nearest whole dollar. Payment shall be remitted to Salem monthly. Spanish Fork shall be responsible to remit payment for the number of connections that are being served each month to Salem on or before the 25th day of each month. Spanish Fork agrees to allow Salem, at Salem's expense, to inspect and verify the number of active accounts.

The parties understand and agree that the impact fee and the monthly service fee are subject to change by the Salem City Council. Salem shall be obligated to notify Spanish Fork of any changes, in the same manner it notifies its own residents. The new charges shall be effective and applicable for Spanish Fork at the same time they are effective and applicable for Salem residents.

SECTION FOUR
OPERATION AND MAINTENANCE

Salem shall own and operate the lift station and the wastewater service mains, laterals, and collection lines located inside its municipal limits and outside its limits in unincorporated areas within its Comprehensive General Plan area. Salem is responsible for all of the costs, including capital costs, operation costs, and maintenance costs of the lift station and lines owned by it.

Spanish Fork shall own the wastewater service mains, laterals, and collection lines located inside its municipal limits and outside its limits in unincorporated areas within its Comprehensive General Plan area. Spanish Fork is responsible for all of the costs, including capital costs, operation costs, and maintenance costs of the lines owned by it.

SECTION FIVE
CAPACITY AND GROWTH LIMITS

Salem City allocates 400 units to Spanish Fork City, within the Exhibit A area, which are allowed to flow to the Salem Wastewater Treatment Facility. A unit is the amount of discharge made by a typical residential user within Salem City. For commercial or industrial users, a residential equivalent shall be calculated and used. If Salem's growth ends up being faster than

that of Spanish Fork, it has the capability to call back some portion of the 400 units. The exact number and timing shall be subject to availability and negotiation. When the Salem Wastewater Treatment Facility begins to reach capacity, the parties will jointly seek a way to increase capacity at the Wastewater Treatment Facility, provided Salem may veto any proposal which would cause it to incur financial expenditures. Expansion costs will be shared by the parties on a pro-rata basis, or as they may otherwise agree, in writing. Spanish Fork will notify Salem of any proposed industrial or commercial user which may impact the functioning or capacity of the wastewater treatment facility. Spanish Fork will also notify Salem of any applications for plat approval, which will use any portion of the 400 allocated units.

Each City may designate up to three individuals to represent it in any discussions about increasing capacity or of approving new projects.

SECTION SIX
EFFECTIVE DATE, TERM AND DURATION

This Agreement shall be effective on the date it is signed by the parties, and shall continue for a period of fifty (50) years, unless sooner terminated as provided herein.

SECTION SEVEN
FILING OF AGREEMENT

A copy of this Agreement shall be placed on file in the Office of the City Recorder of each City and shall remain on file for public inspection during the term of this Agreement.

SECTION EIGHT
NOTICE OF DEFAULT; CORRECTIVE ACTION

The failure of any party to comply with each and every term and condition of this Agreement shall constitute a breach of this Agreement. The defaulting party shall have thirty (30) days after receipt of written notice from the other party of any breach to correct the conditions specified in the notice, or if the corrections cannot be made within the thirty (30) day period, within a reasonable time if corrective action is commenced within thirty (30) days after receipt of the notice.

SECTION NINE
RIGHTS AND REMEDIES

In the event of any breach hereunder and after the lapse of the cure period as per Section Seven above, the non-breaching party shall have all the rights and remedies available under the laws of the State of Utah. The rights and remedies of the parties hereto shall not be mutually exclusive, but shall be cumulative in all respects. The respective rights and obligations of the parties hereunder shall be enforceable in equity as well as at law or otherwise.

SECTION TEN
GOVERNING LAW, JURISDICTION, AND VENUE

All questions with respect to the construction of this Agreement and all rights and liabilities of the parties shall be governed by the laws of the State of Utah. Jurisdiction and venue for the enforcement of this Agreement shall be found in the courts of Utah County, State of Utah.

SECTION ELEVEN
COSTS OF ENFORCEMENT

In the event of a breach of this Agreement, the non-breaching party shall be entitled to recover from the breaching party all of the non-breaching party's costs (including, but not limited to, courts fees and expert witness costs and attorneys fees associated with the enforcement of this Agreement.

SECTION TWELVE
NOTICE

Any written notice which must or may be given relating to this Agreement shall be sufficient if mailed postage prepaid, certified mail, in the United States mail addressed to a party at the address given above. Notice shall be mailed to the attention of the City Mayor at the above address. Either party shall notify the other to designate a different address for mailing.

SECTION THIRTEEN
TERMINATION

Any party may terminate this Agreement after the initial term at any time by giving the other party at least one year prior written notice of the same.

SECTION FOURTEEN
GENERAL PROVISIONS

A. **Severability.** In the event that any condition, covenant, or other provision herein contained is held to be invalid or void by any court of competent jurisdiction, the same shall be deemed severable from the remainder of this Agreement and shall in no way affect any other covenant or condition herein contained. If such condition, covenant, or other provision shall be deemed invalid due to its scope or breadth, such provision shall be deemed valid to the extent of the scope or breadth permitted by law.

B. **Entire Agreement.** This Agreement contains the entire agreement between the parties. No promise, representation, warranty, or covenant not included in this Agreement has been or is relied upon by the parties. All prior understandings, negotiations, or agreements are merged herein and superseded hereby.

C. **Amendments.** This Agreement may be modified only by a writing signed by each of the parties hereto.

D. **Covenants and Conditions.** Each provision of this Agreement performable by each City shall be deemed to be both a covenant and a condition.

E. **Not Assignable.** This Agreement is specific to the parties hereto and is therefore not assignable.

F. **Binding Effect.** This Agreement shall bind the parties and their respective successors.

G. **Captions.** The captions to the various Sections of this Agreement are for convenience and ease of reference only and do not define, limit, augment, or describe the scope,

content, or intent of this Agreement or any part or parts of this Agreement.

H. **Time.** Time is of the essence of each term, provision, and covenant of this Agreement.

I. **Counterparts.** This Agreement may be executed in two or more counterparts, each of which shall be deemed an original, but all of which shall constitute one and the same instrument.

J. **Gender and Number.** The singular number includes the plural whenever the context so indicates. The neuter gender includes the feminine and masculine, the masculine includes the feminine and neuter, and the feminine includes the masculine and neuter, and each includes corporation, limited liability company, partnership, or other legal entity when the context so requires. The word "person" means person or persons or other entity or entities or any combination of persons and entities.

K. **Waiver or Forbearance.** No delay or omission in the exercise of any right or remedy by any party hereto shall impair such right or remedy or be construed as a waiver. Any waiver of any breach must be in writing and shall not be a waiver of any other breach concerning the same or any other provision of this Agreement.

L. **No Partnership, Joint Venture, or Third Party Rights.** Except as specifically set forth herein, nothing in this Agreement shall be construed as creating any partnership, joint venture, or business arrangement among the parties hereto, nor any rights or benefits to third parties.

IN WITNESS WHEREOF, the parties have signed and executed this AGREEMENT, after resolutions duly and lawfully passed, on the dates listed below.

DATED this ____ day of July, 2011.

SPANISH FORK CITY by:

_____
G. WAYNE ANDERSEN, Mayor

Attest:

_____
KENT R. CLARK, City Recorder

Approved as to form:

_____
Special City Attorney

SALEM CITY by:

_____

JONATHAN F. COPE, Mayor

Attest:

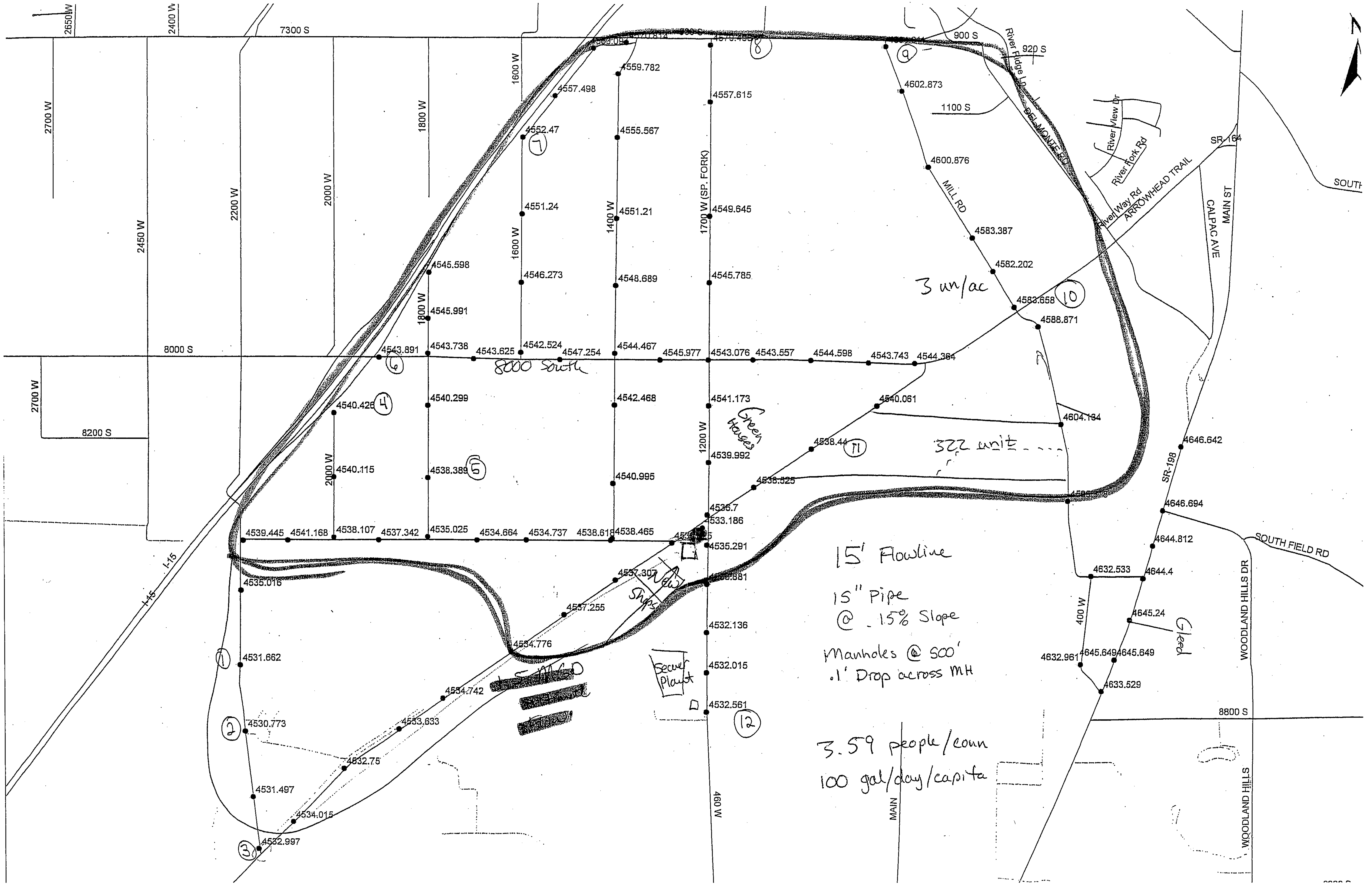
_____

JEFFREY D. NIELSON, City Recorder

Approved as to form:

_____

Special City Attorney


15' Flowline
15" Pipe
@ .15% Slope
Manholes @ 500'
.1' Drop across MH
3.59 people/conn
100 gal/day/capita
3 un/ac
322 unit
Green Houses
New Shops
Sewer Plant
Gleed
8000 South
7300 S
8000 S
8200 S
8800 S
900 S
920 S
1100 S
2650W
2400 W
2700 W
2450 W
2200 W
2000 W
1800 W
1600 W
1400 W
1700 W (SP. FORK)
1200 W
460 W
400 W
MAIN
MAIN ST
CALPAC AVE
SR-164
SR-198
I-15
ARROWHEAD TRAIL
River Way Rd
River Fork Rd
River View Dr
River Ridge Ln
DEL MONTE RD
MILL RD
SOUTH FIELD RD
WOODLAND HILLS DR
WOODLAND HILLS
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4557.615
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4545.785
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4543.891
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4542.524
4547.254
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4604.134
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4644.4
4645.24
4632.961
4645.649
4633.529

INTER-LOCAL AGREEMENT FOR CONSTRUCTION, USE, . AND MAINTENANCE OF JOINT WASTEWATER FACILITY

This Agreement (the "Agreement") is made and entered into this 5th day of April, 1995, by and between Spanish Fork City, a municipal corporation of the State of Utah ("Spanish Fork") and Mapleton City, a municipal corporation of the State of Utah ("Mapleton"). The parties to this Agreement are sometimes referred to collectively herein as the "Communities" and separately as a "Community".

WITNESSETH

WHEREAS, Spanish Fork presently owns a system for the collection and disposal of wastewater sewage; and

WHEREAS, in order to achieve certain operational economies, the Communities desire to enter into this Agreement to provide for the terms of use, operation and maintenance of the wastewater treatment facility and any other joint treatment plant or facilities that may be constructed in the future; and

WHEREAS, a cooperative effort from each party to provide for the sewage collection and treatment needs of the citizens is a basic underlying goal of each of the parties to this Agreement;

NOW THEREFORE, in consideration of the mutual covenants and agreements contained herein and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties agree as follows:

ARTICLE I

DEFINITIONS

For the purposes of this Agreement the following terms shall have the respective meanings set forth below except where the context indicates otherwise:

1. ACT means the Inter-Local Cooperation Act, Utah Code Annotated, Section 11-13-1 et. seq., (1953 as amended).

2. AGREEMENT means this document.

3. ANNUAL BUDGET means the annual budget for the use, operation and maintenance for the Facility for each fiscal year. The Annual Budget shall specify the projected operation and maintenance expenses for the Facility for the relevant fiscal year and any costs for repairs or improvements to the Facility to be accomplished during the fiscal year. The first Annual Budget shall relate to the period of time from the date that the wastewater from Mapleton begins to be transported to the Facility to and including the next June 30th, even though the first Annual Budget may relate to a period of less than twelve (12) months.

4. BILLING PERIOD means a monthly period commencing on the first day of each month during the term of this Agreement, to and including the last day of that month.

5. CAPITAL COSTS means future costs and expenses incurred in any expansion of the Facility including but not limited to all costs of construction, construction period interest costs, costs of architects and engineers, and other similar costs and expenses incurred by way of expansion to the Facility.

6. SPANISH FORK means Spanish Fork City, a municipal corporation and body politic located in Utah County, Utah.

7. CODE means the official compilation published and known as the Utah Code Annotated, 1953 as amended.

8. COLLECTION SYSTEM means the wastewater collector and interceptor pipeline system of each City which is owned and operated, or will be owned and operated exclusively by that City, separate and apart from the Facility, including service laterals, manholes, pump stations, flow-measuring devices and related appurtenances excluding the joint trunk line

9. CITY OR CITIES means Spanish Fork or Mapleton respectively or in the plural.

10. MAPLETON means Mapleton City, a municipal corporation and body politic located in Utah County, State of Utah.

11. FACILITY means collectively the existing wastewater treatment plant owned and operated by Spanish Fork, including all screens, chambers, pumps, clarifiers, filters, digesters, basins, interconnecting pipes, outfall line, joint trunk line, transfer structures, and other equipment and facilities.

12. FISCAL YEAR means a period of twelve (12) consecutive months commencing on July 1st and ending on June 30th of the following year.

13. GOVERNING BODY means the duly elected mayor and city council.

14. OPERATION AND MAINTENANCE EXPENSES means with respect to the Facility and joint trunk line, all expenses reasonably incurred in connection with the operation and maintenance of the Facility and joint trunk line including:

a. Repairs and replacements of all existing equipment, buildings, and facilities necessary to keep the Facility in efficient operating condition;

b. Costs incurred in preparing operating reports and other reports as may be required herein;

c. Premiums on insurance for the Facility required herein;

d. Actual costs incurred by Spanish Fork City in carrying out the duties and responsibilities specified in this Agreement, including all wages, overtime, third-party contract expenses for equipment and other special services, employee benefits, general office overhead, administrative expenses and vehicle mileage, provided however that Spanish Fork City costs to be included in Operation and Maintenance Expenses shall only be those fairly attributable to the operation of the Facility, and not include costs attributable to any Collection System.

e. Generally all expenses, exclusive of depreciation, which under generally accepted accounting principles are properly allocated to operation and manintenance of the Facility, but only such expenses as are reasonable and necessary to the efficient operation and maintenance of the Facility shall be included.

15. ORDINANCE means a legislative enactment by a Governing Body of the City.

16. JOINT TRUNK LINE means that collection line running from the west side of the DRGW Railroad to the connection with the existing facility owned by Spanish Fork City.

17. PLANT CAPACITY means total volume of the Spanish Fork Treatment Plant, which the plant is capable of processing, currently 5.0 million gallons per day, average daily flow.

18. JOINT TRUNK LINE CAPACITY means the total volume of sewage capable of being transported to the treatment facility through the joint trunk line.

ARTICLE II

PURPOSE AND TERM OF AGREEMENT

2.1 Purpose. the purpose of this Agreement is to provide for: (i) the use, operation and maintenance of the Facility for the mutual benefit of the Cities; (ii) to provide for an Advisory Group to give recommendations regarding the operation and maintenance of the Facility, and to make recommendations regarding the expansion and replacement of the Facility; and (iii) the establishment of a system for sharing the costs and expenses related to the use, operation and maintenance of the Facility.

2.2 Term of Contract. This Contract shall be in full force and continue in effect for 50 years.

ARTICLE III

OWNERSHIP OF FACILITIES AND PURCHASE OF CAPACITY

3.1 Ownership of Various Facilities. Spanish Fork will retain all ownership interests in its Collection System, the Facility, and land, which constitute the wastewater treatment plant. Mapleton will retain all ownership interest in its Collection System. Nothing herein shall be construed to grant to any City any ownership interest in property or assets of the other City.

3.2 Right to Use. Mapleton shall have the right and power during the term of this Agreement to connect its Collection System to the joint trunk line and thereby cause the sewage and wastewater from its residents and customers to be transmitted to the Facility for treatment, pursuant to the terms of this agreement.

3.3 Purchase of Capacity by Mapleton. The current capacity of the Spanish Fork treatment plant is 5.0 Million Gallons per Day (hereafter "MGD"). Mapleton is purchasing from Spanish Fork a capacity of the plant, defined as up to 0.59 MGD, measured as a daily average for the purchase price of $850,700, which price represents the negotiated price agreed upon by both cities representing the capital costs of Mapleton's capacity purchase. The purchase price shall be paid as follows:

A. $562,000 shall be paid to Spanish Fork upon connection of the Mapleton Collection system to the Joint Trunk Line.

1. Mapleton will install the joint trunk line connecting the Mapleton collection system to the Facility, which connecting line will provide a benefit and use to both cities. It is agreed, that Mapleton will pay all costs associated with the installation of the joint trunk line. Mapleton will receive a credit against the

$562,000 obligation to Spanish Fork for Spanish Fork's share of the costs of installation of the joint trunk line on the following basis:.

All costs, including engineering, inspection, easements and rights-of-way and related construction costs of installation of the joint trunk line from the point where the connecting line crosses the DRGW tracks and continuing to the connection to the existing system, shall be shared by Mapleton and Spanish Fork based on the following ratios:

Mapleton Share	56.18%
Spanish Fork Share	43.82%

2. It is estimated that the cost of installing the Mapleton-Spanish Fork connecting line will be approximately $668,200.00, and that the credit to Mapleton for Spanish Fork's share of those costs will be approximately $292,808.00. However, it is agreed that the calculation of the credit will be based on actual costs incurred and not estimates.

3. If any of the area west of the D&RGW tracks should, during the term of this agreement or any extension thereof, be annexed into Mapleton, Mapleton will reimburse Spanish Fork for Spanish Fork City's cost of the joint trunk line.

B. The balance of the purchase price, $288,700.00, will be paid by Mapleton to Spanish Fork in five (5) annual payments of $57,740.00 per year, beginning on the sixth year after the connection to the joint trunk line.

1. If Mapleton's use exceeds 0.39 MGD during the first five years, the annual payments will commence at the end of the first year in which the use exceeds 0.39 MGD.

2. If Mapleton's use does not exceed 0.39 MGD during the first five years, Mapleton will still be obligated to purchase the balance of 0.59 MGD (0.20 MGD) by making the annual payments set forth in paragraph 3.3 (B).

3. With each annual payment of $57,740.00 paid by Mapleton, Mapleton shall be deemed to have purchased an additional 0.04 MGD of capacity usage.

C. No interest shall accrue, nor be paid on any portion of the purchase price.

ARTICLE IV

EXPANSION OR ADJUSTMENTS TO CAPACITIES

4.1 Adjustments to capacities.

a. If Mapleton's wastewater needs require capacity beyond 0.59 MGD at the facility, and if Spanish Fork has additional capacity available, Spanish Fork may sell additional capacity at a price of then current replacement cost less depreciation. Depreciation shall mean the expired term of the useful life of the existing facility at actual historical cost.

b. If Mapleton's wastewater needs require capacity beyond 0.59 MGD at the facility and if Spanish Fork is not willing to sell additional capacity, the cost of expansion shall be paid solely by Mapleton and the additional capacity created will be owned by Mapleton. Spanish Fork City, at Spanish Fork City's option, may participate with Mapleton in any expansion of capacity to the facility at which time each city shall pay for the capital costs of such expansion on the same ratio of each city's capacity within the expanded portion of the plant. Mapleton shall have no financial obligation for expansion of the treatment facility, if such expansion is done based solely on Spanish Fork's need.

c. In the event expansion to the Facility is required by government regulation, each city shall pay for the capital costs of such expansion on the same ratio of each city's capacity to the total plant capacity. In the event an upgrade of the facility is required by government regulation, each city shall pay for the upgrade costs on the same ratio as each city contributes for operation and maintenance.

d. Any expansion to the facility shall be based on the Spanish Fork City 201 Facility Plan, dated November 1980, drawing number X-1 attached.

ARTICLE V

OPERATION AND MAINTENANCE OF THE FACILITY

5.1 Advisory Group. An advisory group shall be created for the purpose of discussing problems, policies, revenues, expenditures, and any other matters affecting the operation of the Facility.

a. Number of Representatives. The Advisory Group shall consist of five members, three of which shall be representatives from Spanish Fork and two from Mapleton.

b. Selecting of Advisory Group Member. Each City's members shall be selected and approved by its Governing Body.

c. Removal or Disability. Each City may remove any of its members with or without cause. Upon such removal or in the event of resignation, a successor shall be appointed for the remainder of that term, by the City who had appointed the member who is no longer serving;

5.2 Duties of Advisory Group. The conclusions, recommendations, or information emanating from a meeting of the Advisory Group shall be presented to Spanish Fork City for its consideration and use in operation, maintenance and/or improvement of the Facilities. It is understood, however, that the function of the group is to further the cooperation between the parties and to render advisory assistance, but in no way to limit the rights of ownership to the facilities set forth in Section 3 above, nor to make binding recommendations, but only advisory.

5.3 Duties and Responsibilities of Spanish Fork City. Spanish Fork City shall be the operator of the facility.

a. Management. Spanish Fork City shall have sole and exclusive responsibility for the day-to-day management of the Facility.

b. Operation and Maintenance. Spanish Fork City shall be responsible for the operation and maintenance of the Facility and shall employ competent and experienced personnel or train such personnel for the Facility and shall use best efforts to operate and maintain the Facility at all times in good repair and condition, and in such a manner that the operating efficiency thereof shall conform to the standards set by Federal, State and Local law.

c. Compliance with Laws. In operating and maintaining the Facility, Spanish Fork City shall comply in every respect with each applicable Federal, State or Local law regulating the safe, sanitary and healthful operation of the Facility, and Spanish Fork City shall make every reasonable effort to prevent a shutdown or bypass of the Facility, or an imposition of penalty by any governmental authority because of a failure to meet or otherwise comply with applicable laws and regulations. If such reasonable effort has been made, but notwithstanding, there is a penalty or requirement imposed by any authorized government authority, the penalty or cost of compliance shall be considered as part of the operation and maintenance expense of the Facility.

d. Insurance. In operating and maintaining the Facility, Spanish Fork City shall obtain and maintain insurance, including but not limited to worker's compensation insurance and public liability insurance in such amounts and to such extent it is customarily carried by other operating utilities of the same type. The cost of such insurance shall be considered an operations and maintenance expense of the Facility. In the event of any loss or

damage to any part of the Facility, insurance proceeds shall be used for the purpose of restoring or replacing the property lost or damaged.

e. Expenditures. Spanish Fork City shall use its best efforts to keep the Operation and Maintenance Expenses related to the Facility within the amounts established in the Annual Budget and shall make no expenditures or incur any obligation in excess of amounts established in the Annual Budget without revision of the budget.

f. Collections. Spanish Fork shall collect from Mapleton on a monthly basis Mapleton's proportionate share of Operation and Maintenance Expenses relating to the Facility in accordance with Article VI of this Agreement, and shall apply those payments against the budget.

g. Maintain Records. Spanish Fork City shall maintain accurate detailed records relating to the Facility, including but not limited to flow-measuring records, materials, and supplies, and payroll records for personnel employed by Spanish Fork City. Spanish Fork City shall make those records available for inspection at reasonable times to the Advisory Group and the Governing Body of Mapleton City.

h. Budget Preparation. Spanish Fork City shall prepare and provide a proposed budget for the next fiscal year by April 1st of each year. Spanish Fork City will make available, upon request, a copy of the monthly financial report for the Facility. The expenses incurred in compiling each report shall be regarded as an Operation and Maintenance Expense of the Facility.

5.4 Duties and Responsibilities of Mapleton City.

a. Sampling. Mapleton shall be responsible for sampling all water entering the joint trunk line. Samples shall take place weekly. Mapleton shall provide to Spanish Fork City a copy of the test results of each sample.

ARTICLE VI

CHARGES FOR OPERATION AND MAINTENANCE EXPENSES

6.1 Sharing of Expenses. All actual operation and maintenance expenses related to the Facility shall be paid on a monthly basis by Mapleton in a ratio determined as follows:

a. A meter will be installed where the joint trunk line crosses the DRGW railroad tracks to measure total flow from Mapleton's collection system. Mapleton will own and read this meter. Spanish Fork may check the readings for accuracy.

b. A meter has been installed at the intake to the treatment plant. Spanish Fork will own and read this meter. Mapleton may check the readings for accuracy.

c. Mapleton shall be responsible to pay to Spanish Fork for the operation of the treatment plant on the ratio of Mapleton's flow as metered at the crossing of the DRGW tracks, to the total flow, as measured at the plant intake.

6.2 Payments to Spanish Fork City. Mapleton shall pay to Spanish Fork the monthly service charge described in Section 6.1 of this Agreement within twenty (20) days after receiving the bill. Mapleton shall have the sole and exclusive right to determine a method of charging residents and customers of its own Collection System. The failure of Mapleton to collect sufficient amounts from its residents and customers shall not relieve Mapleton from its obligations to pay its proportionate share for the operation and maintenance expense of the Facility. If Mapleton fails to pay the full amount due and owing within ten (10) days after the due date thereof, the unpaid balance shall bear an interest rate of one percent (1.0%) per month until paid in full, and all subsequent payments received shall be applied first to interest and then to principal.

6.3 Breach of Agreement. In the event of a breach of this agreement, the non-breaching party shall be entitled to recover its costs and attorneys fees incurred in enforcing the terms hereof. In the event a dispute that the parties cannot amicably resolve, a court of competent jurisdiction in Utah County, or any alternative dispute resolution method agreed upon by the parties may be used to resolve the dispute.

ARTICLE VII

MISCELLANEOUS PROVISIONS

7.1 Adoption of Ordinances. Each City agrees to adopt and enforce such ordinances as are reasonably necessary to permit the purposes of this Agreement to be accomplished. Mapleton further agrees to adopt an ordinance in substantially the same format as Spanish Fork City Municipal Code section 13.32.010. et. seq. (Public Sewer System Regulations and Pretreatment Standards). Mapleton further agrees to be subject to the provisions of section 13.32.

7.2 Joint Cooperation. The Cities hereby agree to cooperate with each other in the planning for the future capital improvements to the Facility or the construction of new treatment facilities for the joint use of the Cities. The installation of such capital improvements or new treatment facilities and costs to be assumed by each city with respect thereto shall be subject to provisions of a separate written Agreement between the Cities.

7.3 Authorized Agreement. Each City hereby represents and warrants that its Governing Body has taken all action as required by law to approve this Agreement and to authorize execution of this Agreement on behalf of that Community.

7.4 Force Majeure. In case by reason of force majeure, either City shall be rendered unable wholly or in part to carry out its obligations under this Agreement, other than the obligation of each City to make the payments required under the terms hereof, then such party shall give notice and full particulars of such force majeure in writing to the other parties within a reasonable time after occurrence of the event or cause relied on, and the obligations of the party giving such notice, so far as they are affected by such force majeure, shall be suspended during the continuance of the inability then claimed, but for no longer period, and such party shall

endeavor to remove and overcome such inability with reasonable dispatch. The term "force majeure" as employed herein shall mean acts of God, strikes, lockouts, or other industrial disturbances, acts or public enemy, an order from any kind of the government of the United States or the State of Utah, insurrections, riots, epidemics, landslides, lightning, earthquakes, fire, hurricanes, storms, floods, washouts, arrests, restraint of government and people, civil disturbance, explosions, breakage, accidents to machinery or collection line, or the partial or complete inability of Spanish Fork City to treat and dispose of such wastewater on account of any other cause not reasonably within the control of Spanish Fork City.

7.5 Miscellaneous Provision.

a. This Agreement shall be governed by and construed under the laws of the State of Utah, including but not limited to the Act.

b. The Cities shall not be deemed to be partners or joint venturers in any manner in the use or operation of the Facility.

c. Spanish Fork City shall be responsible for ascertaining and overseeing compliance by the Facility with all government requirements, including in particular those of the Department of Environmental Quality and the United States Environmental Protection Agency.

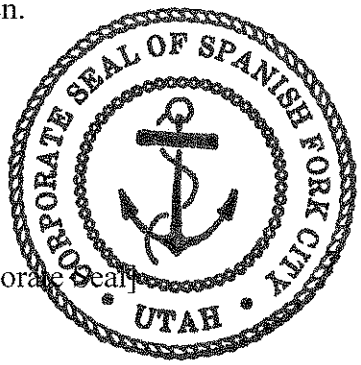
d. This Agreement may be amended from time to time by mutual written Agreement between the Cities, provided that said amendment does not jeopardize or adversely affect any notes, bonds or other instruments relating to the financing of the construction of the Facility or the Collection System of any City, and that it does not invalidate or adversely affect the operation or use of the Facility.

e. If any provision of this Agreement is determined by a court of competent jurisdiction to be void, voidable or unenforceable, the validity and enforceability of the remaining provisions of this Agreement shall not be affected thereby.

f. No City may assign its rights or duties under this Agreement without the prior written consent of the other City.

g. Spanish Fork City will maintain ownership of all treated waste water. In the event of sale or lease, the proceeds shall be used to reduce the operation and maintenance expenses at the Facility.

IN WITNESS WHEREOF, the parties have set their hands on the date and the year above written.



[Corporate Seal]

SPANISH FORK:

Marie Huff
MARIE HUFF, MAYOR

ATTEST:

Kent R. Clark
KENT CLARK, CITY RECORDER

Approval as to Form and Compliance with Utah Law.

S. Junior Baker
S. JUNIOR BAKER
SPANISH FORK ATTORNEY

[Corporate Seal]

MAPLETON CITY:

RICHARD L. MAXFIELD, MAYOR

ATTEST:

LORI BRIERLEY, CITY RECORDER

Approval as to Form and Compliance with Utah Law.

M. JAMES BRADY
MAPLETON CITY ATTORNEY

f:\mc\policy\wtrfinal.agr

MAPLETON CITY CORPORATION

VIA FAX This Date: 6/23/98

To: Dina Peterson *From:* Lori Brierley

Of: Spanish Fork City *Mapleton City Corp.*

Fax: 798-5005 *(801) 489-5657*

This transmission contains 12 *pages, including this cover sheet*

Memo: Dina - please take whatever steps necessary to put this on your council agenda. Thanks!

Send minutes 7/7 to Mapleton

LAW OFFICES
BRADFORD, BRAY & JOHNSON
389 North University Avenue
P.O. Box 432
Provo, Utah 84603

Richard D. Bradford
M. James Brady
S. Austin Johnson
James E. Bean
Kim H. Buhler

Telephone: (801) 374-6272
Facsimile: (801) 374-6282

March 6, 1998

Mayor Richard Young
Mapleton City
35 East Maple
Mapleton, Utah 84664

RE: *Mapleton Sewer - Spanish Fork Outfall*

Dear Mayor:

At the time we initially contracted with Spanish Fork City to purchase a capacity of their sewer system, a price was agreed upon requiring an initial buy-in payment of $562,000.00 to be paid by Mapleton City at the time we connected the sewer to the plant. That sewer connection was made slightly more than a year ago, but no payment has been made to Spanish Fork City for our buy-in costs.

One of the offsets to our buy-in costs is the Spanish Fork City's share of the costs of the installation of the outfall line. This is the main trunk line carrying sewage from Mapleton through Spanish Fork out to the plant. Spanish Fork City agreed to share the costs of the outfall line in that they will use the outfall line for future expansion and development of Spanish Fork City, and the line was designed to accommodate those future additions and use by Spanish Fork.

We have had some difficulty trying to calculate the Spanish Fork share of the installation costs, and therefore the deduction which is to be taken from the Mapleton City buy-in costs. With the help of Russell Brown for Mapleton City, and Richard Heap the Spanish Fork City engineer, we have been able to calculate the Spanish Fork share of the costs of the installation of the outfall line. Having that amount calculated, we can now identify the amount Mapleton City owes Spanish Fork as our initial buy-in cost.

Enclosed please find the letter prepare by Russell Brown on February 26, 1998, identifying the method of calculations and the amounts that the city engineers have agreed should be paid by Mapleton City to Spanish Fork. You will have to check with Lori to be certain, but I believe that Mapleton City has enough funds in their account to make this

payment. As counsel for Mapleton City, I would recommend that the payment be tendered to Spanish Fork City. However, first I would like authorization from the City Council to propose this form of payment to Spanish Fork City attorney so that he may review the same information with his mayor and city council. Perhaps this matter could be brought up as an item in the next city council agenda. If you have any questions, please do not hesitate to contact me.

Very truly yours,

M. JAMES BRADY
Attorney at Law

MJB:cvc
Enclosures

February 26, 1998

RB&G
ENGINEERING
INC.

M. James Brady
Bradford, Brady & Johnson
389 North University Avenue
PO Box 432
Provo, Utah 84603

RE: Mapleton - Spanish Fork Outfall

Dear Jim:

Attached is a copy of a letter I sent to Richard Heap regarding the Spanish Fork City cost of the outfall line.

I talked to Richard and he said that they were comfortable with my recommendation which is shown on sheet 5. Spanish Fork repaired work on the road that leads to their chipping facility. The cost of this work was not included in Mapleton's settlement with Mapleton. The following is Richards compilation of the cost due Spanish Fork.

Spanish Fork Cost Sheets	525,278.66
Less Cost of Road Repair	17,668.89
Spanish Fork Cost	507,609.11
Mapleton Buy in Cost	562,000.00
Less Outfall Cost	507,609.11
Due Spanish Fork	54,390.89

Please call if you have any questions.

Sincerely,

RB&G ENGINEERING, INC.

Russell O. Brown

Russell O. Brown, P.E.
rob/ar

cc: Charlie Hanna, Mapleton City

1435 WEST 820 NORTH
PROVO, UTAH 84601-1343

PROVO 801-374-5771
SALT LAKE CITY 801-521-5771

November 14, 1997

Mr. Richard Heap
Spanish Fork City Engineer
40 South Main
Spanish Fork, UT 84660

RE: Mapleton Sewer System

Dear Richard:

The contract between Mapleton and Spanish Fork requires Spanish Fork requires Spanish Fork to pay 43 percent of the cost of the sewer outfall line west of the railroad crossing on the Slant Road. An analysis of the cost is attached.

The cost is divided into two parts for the design and construction of the sewer outfall:

1. The cost of the line based on the contractors unit bid prices. This cost is tabulated on Sheet 1.
2. The cost of the claims made by Western Weltek against the project. These claims were settled in arbitration proceedings. The contractors claims are shown on Exhibit A.

Claims are shown on Exhibit A.

Claim 1: Involves two areas near K-Mart. The equipment got stuck in two marsh areas.

Claim 2: Involves the entire pipeline length. The claim is that the trench bottom was unstable and foundation stabilization was required in addition to pipe bedding.

Claim 3: The claim is for the total cost for work by Western Weltek from Station 118+00 to 122+58. It is based on a claimed condition.

Claim 4: The entire cost of the work by a subcontract from Golden State is claimed based on a changed condition. It covers work from Station 122+58 to the end, east of the project.

Claims 6 & 7: These claims are east of the tracks and are Mapleton's responsibility. This claim is for a changed condition.

The total cost of the claims are shown on Sheet 2. The claims were settled for 56.3 percent of the amount claimed.

Sheets 3, 4, and 5 are analysis of Spanish Fork's share of the cost. Sheet 3 assumes that all claims have equal weight. Sheet 4 assumes that Claim 2 would have been denied and that the settlement does not include this cost.

In my opinion neither of these assumptions are valid. The foundation material from Station 3+00 to 118+00 was clay and it would be difficult to prove that foundation stabilization was necessary. The foundation material from Station 118+00 to 149+00 was mostly fine sand and extra gravel was put under the pipe. It could be argued that it was for dewatering, but the contractor may win on a stabilization argument. Sheet 5 includes Claim 2 from Station 118+00 to 149+00 and is the one I would recommend.

Sincerely,

RB&G ENGINEERING, INC.

Russell O. Brown, P.E.
rob/bg

enclosures

cc: Mayor Peterson

Exhibit H

MAPLETON CITY SEWER OUTFALL LINE

SUMMARY OF OUTSTANDING ITEMS

05-May-97

PREPARATION FOR CLAIM FILING

ITEM	DESCRIPTION			TOTAL	COMMENTS
1	RIP-RAP HOLES		Item Total	$21,830	Ltr #033, Blue Book, Est Labor
2	PIPE BEDDING		Item Total	$143,211	Foundation Bedding, Contract Linear Foot (Item 4-17)
3	WORK FROM STATION 118+06 to 122+68				
	Equipment	$92,745			Actual Costs, See Book
	Labor	$25,775			Actual Costs, See Book
	Sub-total	$118,520			
	Mark-up	$17,778			WWI @ 15%
	Less Credit for Install Bid Items	($5,180)			
			Item Total	$131,158	
4	WORK FROM STATION 122+68 to 173+48				
	Golden States Contract	$268,689			Contract Amount less RR 20% @ $43
	WWI Site Personnel and Expenses	$30,752			15 weeks, See Labor Calc, 3-22-96
	Semper Work	$26,044			Cost from Condit's Invoice
	Sub-total	$325,492			
	Mark-up	$48,974			WWI @ 15%
	Less Credit for Install Bid Items				
	122+68 to 129+73 & 173+58 to 186+28	($24,745)			
	129+73 to 148+71 & 149+87 to 173+58	($49,322)			
			Item Total	$300,398	
	Golden States Claim	$293,305			Golden States Letter of 3/6/97
	Mark-up	$43,996			WWI @ 15%
			Item Total	$337,302	
5	RAILROAD CROSSING - A (Prior to CO-6)				
	Trench Shoring to 3-18-96	$41,671			Claim for reimb of costs prior to 3-18-96
	CC Casing	$10,670			Per Invoice
	Wire Termination	$4,780			Per Invoice
	3 Pumps - 19 Days	$1,089			Per Invoice
	Generator - 6 Days	$907			Partially paid via CO # 5
	Dewatering - Golden States	$4,838			Partially paid via CO # 5
	Deepening Pit - Golden States	$5,166			Per Invoice
	Pit Excavation - Labor	$4,384			Per Invoice
	Pit Excavation - Equipment	$4,405			Act Costs
	Railroad Inspector Services	$19,000			Act Costs
	Sub-total	$98,128			38 Days per Invoices @ $500
	Mark-up	$14,569			WWI @ 15%
	Sub-total	$113,697			
			Item Total	$113,697	
6	RAILROAD CROSSING - B (CO-6 & 7				
	Invoice # 10	$43,610			Portion of Invoice #10 regarding RR
	Invoice # 11	$252,850			
	Invoice # 13	$430,830			Note: There is no Invoice #12
	Invoice # 14	$313,396			
	Invoice # 15	$114,929			
	Invoice # 16	$234,330			
	Yet To Be Invoiced RR Inspector Svcs	$20,125			Incl GS 15%, other costs assoc. w/ RR
	Less Payments	($500,430)			35 days RR Insp, not earlier billed @ $570
					Includes Pipe and Bid Item credits
	Extra Bond Costs for CO 6 & 7 @ 1%	$14,139			
		$277,587			
			Item Total	$977,587	
7	ARBITRATION AND CLAIM COSTS				
	ENGINEERING	$20,000			Estimated
	TESTING	$8,932			Estimated
	EXTRA BOND COSTS	$10,500			@ 1% of extra lab costs above item # 6
		$39,432			
			Item Total	$39,432	
	GRAND TOTAL			$2,016,995	

SCHEDULE IV
COST WEST OF RAILROAD TRACKS

Bid Items			
4-1	36" Pipe	1291' @ $33.84	$ 43,687.44
4-2	30" Pipe	1829' @ $38.32	70,087.28
4-3	30" Pipe	1138.5' @ $33.87	38,561.00
4-4	30" Pipe	2167' @ $25.45	55,150.15
4-5	24" Pipe	499' @ $18.18	9,071.82
4-6	21" Pipe	483.5' @ $17.88	8,644.98-
4-7	21" Pipe	4217' @ $19.21	81,008.57
4-8	18" Pipe	2776' @ $19.46	54,020.96
4-9	30" D.I.	227' @ $88.80	20,157.60
4-10	5'-0 Manhole	36 @ $2928.44	105,423.84
4-11	42" Casing	86' @ $441.71	37,987.06
4-13	36" Casing	73' @ $444.75	32,466.75
4-14	36" Casing	62' @ $380.80	23,609.60
4-15	Granular Base	5090 yards @ $7.71	39,243.90
4-17	Pipe Bedding	14,808' @ $7.73	114,465.84
CHANGE ORDER NO. 1			32,290.70
EASEMENTS			44,865.00
DESIGN ENGINEERING			45,900.00
TOTAL			**$ 879,242.49**

SCHEDULE IV
WESTERN WELTEK CLAIMS

Total Claim

Claim 1-7	$1,977,563
Extra Bond 1.5%	29,663
Interest 10% 13 Months	214,170
TOTAL	$2,221,396

Settlement 1,250,000.00

1,250,000 = 56.3%
2,221,396

Claim Cost - Legal

RB&G	16,365
Lynn Larson	183,870
Sage Consultants	25,994
TOTAL	225,994

Claim 4 Covers STA 112+58-182+37

West RR Fence is STA 149+00
West of Tracks - 149+00 - 122+58 = 2642' - 44%
East of Tracks - 187+37 - 149+00 = 3337' - 56%

Claim 2 Covers STA 3+00 to 182+37

West of Tracks - 149+00 = 3+00 = 14600'
East of Tracks - 182+37 - 149+00 = 3337

SCHEDULE IV
SPANISH FORK'S COST

Claims West of Tracks

		Claim	Bond & Interest	Total
1.	Sink Holes	21,930	2,697	24,627
2.	Pipe Bedding 14,600 x 7.73	112,858	13,882	126,740
3.	118+00+0122+60	131,212	16,131	147,351
4.	639,700 x .44	281,468	34,621	316,089
				$614,807

Percent of Total Claim West of Tracks

614807 = 27.7%
2221396

Summary West of Tracks

Claim Cost Legal	225,994 x .277	62,600
Claims	614,807 x .563	346,136
Construction Cost		879,242
		1,287,978

Spanish Fork = 1,287,978 x .43 = $553,831

Assumes that in the settlement all claims have equal weight.

SCHEDULE IV
SPANISH FORK'S COST

Claims West of Tracks

		Claim	Bond & Interest	Total
1.	Sink Holes	21,930	2,697	24,627
2.	Pipe Bedding 14,600 x 7.73	0	0	0
3.	118+00+0122+60	131,212	16,131	147,351
4.	639,700 x .44	281,468	34,621	316,089
				$488,067

Percent of Total Claim West of Tracks

488067 = 22.0%
2221396

Summary West of Tracks

Claim Cost Legal	225,994 x .220	49,719
Claims	488,067 x .563	274,782
Construction Cost		879,242
		1,203,743

Spanish Fork = 1,287,978 x .43 = $517,609

Assumes that in the settlement claim No. 2 was rejected by the arbitration board and is not included in the settlement.

SCHEDULE IV
SPANISH FORK'S COST

Claims West of Tracks

		Claim	Bond & Interest	Total
1.	Sink Holes	21,930	2,697	24,627
2.	Pipe Bedding 3,100 x 7.73	23,963	2,947	26,910
3.	118+00+0122+60	131,212	16,131	147,351
4.	639,700 x .44	281,468	34,621	316,089
				$514,997

Percent of Total Claim West of Tracks

514997 = .232%
2221396

Summary West of Tracks

Claim Cost Legal	225,994 x .232	52,391
Claims	514,997 x .563	289,943
Construction Cost		879,242
		1,221,576

Spanish Fork = 1,287,978 x .43 = $525,278

Assumes that in the settlement claim 4 extends only from STA 118 to STA 182+3`.

INTER-LOCAL AGREEMENT FOR CONSTRUCTION, USE,. AND MAINTENANCE OF JOINT WASTEWATER FACILITY

This Agreement is made and entered into this 19th day of February, 2004, by and between Spanish Fork City, and Mapleton City. The parties to this Agreement are sometimes referred to collectively herein as the "Cities" and separately as a "City".

WITNESSETH

WHEREAS, Spanish Fork presently owns a system for the collection and disposal of wastewater sewage (the "System"); and

WHEREAS, Mapleton is purchasing hydrological capacity in the System pursuant to an interlocal agreement entered into between the cities on the 5th day of April, 1995; and

WHEREAS, the State of Utah, Department of Environmental Quality, has changed the discharge requirements for the System, causing the System to reach its biologic capacity prior to its hydrological capacity; and

WHEREAS, the changes to the discharge requirements have caused Mapleton to already exceed its share of the biologic capacity; and

WHEREAS, certain expansions to the System need to take place in order to expand the biologic capacity and allow for each City to have growth; and

WHEREAS, in order to achieve operational economies, the Cities desire to enter into this Agreement to provide for the expansion, terms of use, operation and maintenance of the System and any other joint treatment plant or facilities that may be constructed in the future; and

WHEREAS, a cooperative effort from each City to provide for the sewage collection and treatment needs of the citizens is a basic underlying goal of the Cities to this Agreement;

NOW THEREFORE, in consideration of the mutual covenants and agreements contained herein and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties agree as follows:

ARTICLE I DEFINITIONS

For the purposes of this Agreement the following terms shall have the respective meanings set forth below except where the context indicates otherwise:

1. ACT means the Inter-Local Cooperation Act, Utah Code Annotated §1-13-1 et. seq. (1953 as amended).
2. AGREEMENT means this document.
3. ANNUAL BUDGET means the annual budget for the use, operation and maintenance for

the Facility for each fiscal year. The Annual Budget shall specify the projected operation and maintenance expenses for the Facility for the relevant fiscal year and any costs for repairs or improvements to the Facility to be accomplished during the fiscal year.

4. BILLING PERIOD means a monthly period commencing on the first day of each month during the term of this Agreement, to and including the last day of that month.

5. CAPITAL COSTS means future costs and expenses incurred in any expansion of the Facility including but not limited to all costs of construction, construction period interest costs, costs of architects and engineers, and other similar costs and expenses incurred by way of expansion to the Facility.

6. SPANISH FORK means Spanish Fork City, a municipal corporation and body politic located in Utah County, Utah.

7. CODE means the official compilation published and known as the Utah Code Annotated (1953 as amended).

8. COLLECTION SYSTEM means the wastewater collector and interceptor pipeline system of each City which is owned and operated, or will be owned and operated exclusively by that City, separate and apart from the Facility, including service laterals, manholes, pump stations, flow-measuring devices and related appurtenances, excluding the joint trunk line

9. CITY or CITIES means Spanish Fork City or Mapleton City respectively, or both of them in the plural.

10. MAPLETON means Mapleton City, a municipal corporation and body politic located in Utah County, State of Utah.

11. FACILITY means collectively the existing wastewater treatment plant owned and operated by Spanish Fork, including all screens, chambers, pumps, clarifiers, filters, digesters, basins, interconnecting pipes, outfall line, transfer structures, and other equipment and facilities.

12. FISCAL YEAR means a period of twelve (12) consecutive months commencing on July 1st and ending on June 30th of the following year.

13. GOVERNING BODY means the duly elected mayor and city council.

14. JOINT TRUNK LINE means that collection line running from the west side of the DRGW Railroad right of way to the connection with the existing Facility owned by Spanish Fork. Mapleton owns 56.18% of the joint trunk line and Spanish Fork owns 43.82% of the joint trunk line.

15. OPERATION AND MAINTENANCE EXPENSES means with, respect to the Facility and joint trunk line, all expenses reasonably incurred in connection with the operation and maintenance of the Facility and joint trunk line including:

a. Repairs and replacements of all existing equipment, buildings, and facilities necessary to keep the Facility in efficient operating condition;

b. Costs incurred in preparing operating reports and other reports as may be required herein;

c. Premiums on insurance for the Facility required herein;

d. Actual costs incurred by Spanish Fork in carrying out the duties and responsibilities specified in this Agreement, including all wages, overtime, third-party contract expenses for equipment and other special services, employee benefits, general office overhead, administrative expenses and vehicle mileage, provided however that Spanish Fork costs to be included in

Operation and Maintenance Expenses shall only be those fairly attributable to the operation of the Facility, and not include costs attributable to any Collection System.

e. Generally all expenses, exclusive of depreciation, which under generally accepted accounting principles are properly allocated to operation and manintenance of the Facility, but only such expenses as are reasonable and necessary to the efficient operation and maintenance of the Facility shall be included.

16. ORDINANCE means a legislative enactment by a Governing Body of the City.

17. PLANT CAPACITY means the lesser of:

a. the total hydrologic volume of the Spanish Fork Treatment Plant, which the Facility is capable of processing, currently 5.0 million gallons per day, average daily flow; or

b. the total biological volume which the Facility is capable of processing, based on the regulations on contaminate discharges, as set forth in the Facility UPDES permit issued by the State of Utah.

18. JOINT TRUNK LINE CAPACITY means the total volume of sewage capable of being transported to the treatment facility through the joint trunk line.

19. PRIOR AGREEMENT means the Inter-local Agreement for Construction, Use, and Maintenance of Joint Wastewater Facility entered into between the Cities, dated April 5th, 1995.

ARTICLE II TERMINATION OF PRIOR AGREEMENT

2.1 Termination. In order to accomplish the purposes of the Cities, given the change in regulations affecting the biological capacity of the Facility, it is in the Cities' interests to terminate the Prior Agreement and replace it with this Agreement. The Prior Agreement shall be terminated upon the approval and execution of this Agreement by each City's Governing Body.

ARTICLE III JOINT TRUNK LINE

3.1 Joint Trunk Line. This Agreement does not affect the ownership interests of the Cities in the joint trunk line. Each City shall continue to own the percentage of the line as set forth in paragraph 14 of the definitions. Any O&M expenses incurred on the joint trunk line shall be paid for by the Cities in the same ratio as their ownership interest in the joint trunk line.

ARTICLE IV PURPOSE AND TERM OF AGREEMENT

4.1 Purpose. The purpose of this Agreement is to provide for: (i) the use, operation and maintenance of the Facility for the mutual benefit of the Cities; (ii) to provide for an Advisory Group to give recommendations regarding the operation and maintenance of the Facility, and to make recommendations regarding the expansion and replacement of the Facility; and (iii) the establishment of a system for sharing the costs and expenses related to the use, operation and maintenance of the Facility.

4.2 Term of Contract. This Contract shall be in full force and continue in effect for 50 years.

ARTICLE V OWNERSHIP OF FACILITIES AND PURCHASE OF CAPACITY

5.1 Ownership of Various Facilities. Subject to the provisions of paragraph 6.1(a), Spanish

Fork will retain all ownership interests in its Collection System and land, which constitute the wastewater treatment plant. Mapleton will retain all ownership interest in its Collection System. Nothing herein shall be construed to grant to any City any ownership interest in property or assets of the other City.

5.2 Right to Use. Mapleton shall have the right and power during the term of this Agreement to connect its Collection System to the joint trunk line and thereby cause the sewage and wastewater from its residents and customers to be transmitted to the Facility for treatment, pursuant to the terms of this agreement. Spanish Fork shall lease to Mapleton a 23% interest in the real estate where the Facility is located. The lease shall be effective during the term of the Agreement. Nothing herein shall be construed to grant to Mapleton an ownership interest in the land where the Facility is located. Consideration for the lease shall be the timely payment of the funds set forth in this Agreement, which the Cities acknowledge works to the benefit of each City by allowing an expansion of the Facility.

5.3 Purchase by Mapleton. Mapleton is purchasing from Spanish Fork twenty-three percent (23%) of the Facility (excluding land, but including capacity), for the purchase price of $1,038,404.00, which price represents the negotiated price agreed upon by both Cities representing the capital costs of Mapleton's purchase. Mapleton will also pay for twenty-three percent (23%) of the actual cost of increasing the biological Plant Capacity by adding filters and clarifiers to allow each City growth potential. (Mapleton's share is estimated to be $437,000.00, for a total price of $1,475,404.00). This increase in Plant Capacity will allow Spanish Fork to have a total of 9,472 residential hookups and will allow Mapleton to have a total of 2,418 residential hookups. It is anticipated that each city will have a number of commercial and/or industrial hookups in addition to the residential hookups allocated herein, based upon the existing proportion of commercial/industrial hookups to residential hookups. In the event that an unusually heavy user of sewer services desires to come into either city, the advisory committee shall review the user and determine if capacity exists and if so, how allowing that user to connect to the sewer may limit future industrial/commercial users.

5.4 Due date. The full price, including the estimated amounts, shall be paid to Spanish Fork within one hundred twenty (120) days of the date hereof. If the actual cost of the expansion of the Plant Capacity exceeds the estimate, Mapleton will pay its share of the excess to Spanish Fork within thirty (30) days of the completion of the project. If the actual cost of the expansion of the Plant Capacity is less than the estimate, Spanish Fork will refund Mapleton its share within thirty (30) days of the completion of the project.

ARTICLE VI EXCEEDING OR ADJUSTMENTS TO CAPACITIES

6.1 Adjustments to capacities. a. If Mapleton's wastewater needs require capacity beyond twenty-three percent (23%) at the Facility, the cost of expansion shall be paid solely by Mapleton and the additional capacity created will be owned by Mapleton. The ownership interests will be adjusted to reflect the new capacity. Spanish Fork City, at its option, may participate with Mapleton in any expansion of capacity to the Facility at which time each City shall pay for the capital costs of such expansion on the same ratio of each city's capacity within the expanded portion of the plant. Mapleton shall have no financial obligation for expansion of the treatment

facility, if such expansion is done based solely on Spanish Fork's need. In such event, the additional capacity created will be owned by Spanish Fork. The ownership interests will be adjusted to reflect the new capacity.

b. In the event expansion to the Facility is required by government regulation, each city shall pay for the capital costs of such expansion on the same ratio of each city's capacity to the total plant capacity. Any regulatory fines and/or penalties incurred shall be paid by the City causing the same. In the event the cause cannot be determined, the fines and/or penalties shall be paid based upon the same ratio of each city's capacity to the total plant capacity.

c. Any expansion to the facility shall be based on the Spanish Fork City 201 Facility Plan, dated November 1980, as updated from time to time, drawing number X- I.

6.2 Exceeding capacities. a. In the event Mapleton anticipates it will exceed its 23% capacity (as determined by the number of hookups approved, as set forth in paragraph 5.3), and Spanish Fork has available capacity, the parties may negotiate Mapleton's use of such excess capacity. If the capacity is exceeded without negotiating the use and price, Mapleton will be given thirty (30) days to reduce its flows so as not to exceed its capacity. If it fails to do so, liquidated damages in the amount of $5,000.00 per month shall be awarded. In addition to liquidated damages, an injunction prohibiting the issuance of additional building permits and additional connections to the sewer system shall be granted.

b. In the event Mapleton exceeds its 23% capacity (as determined by the number of hookups approved, as set forth in paragraph 4.3), and Spanish Fork has no available capacity, Mapleton will be given thirty (30) days to reduce its flows so as not to exceed its capacity. If it fails to do so, a monetary penalty in the form of liquidated damages in the amount of $5,000.00 per month shall be assessed. Each party acknowledges that exceeding Plant Capacity has far reaching and serious consequences, for which no monetary damages can readily be determined, nor which can be adequately compensated. In the event any regulatory fines and/or penalties are due as a result of Mapleton exceeding its capacities, it shall be responsible for all costs of remediation, including fines or penalties imposed, costs of labor and materials to correct the problem, and any attorneys fees incurred in defending any regulatory action.

c. Mapleton shall enjoy reciprocal rights against Spanish Fork, including liquidated damages and an injunction, as set forth in paragraphs 6.2(a) and (b), in the event Spanish Fork exceeds its 77% capacity (as determined by the number of hookups approved, as set forth in paragraph 5.3), or causes regulatory fines and/or penalties through no fault of Mapleton.

ARTICLE VII OPERATION AND MAINTENANCE OF THE FACILITY

7.1 Advisory Group. An advisory group shall be created for the purpose of monitoring the number of hookups allowed, as set forth in paragraph 5.3, discussing problems, policies, revenues, expenditures, and any other matters affecting the operation of the Facility.

a. Number of Representatives. The Advisory Group shall consist of five members, three of which shall be representatives from Spanish Fork and two from Mapleton.

b. Selecting of Advisory Group Member. Each City's members shall be selected and approved

by its Governing Body.

c. Removal or Disability. Each City may remove any of its members with or without cause. Upon such removal or in the event of resignation, a successor shall be appointed for the remainder of that term, by the City who had appointed the member who is no longer serving.

7.2 Duties of Advisory Group. The conclusions, recommendations, or information emanating from a meeting of the Advisory Group shall be presented to Spanish Fork for its consideration and use in operation, maintenance and/or improvement of the Facilities. It is understood, however, that the function of the group is to further the cooperation between the parties and to render advisory assistance, but in no way to limit the rights of ownership to the facilities set forth herein, nor to make binding recommendations, but only advisory.

7.3 Duties and Responsibilities of Spanish Fork City. Spanish Fork shall be the operator of the Facility.

a. Management. Spanish Fork shall have sole and exclusive responsibility for the day-to-day management of the Facility.

b. Operation and Maintenance. Spanish Fork shall be responsible for the operation and maintenance of the Facility and shall employ competent and experienced personnel or train such personnel for the Facility and shall use best efforts to operate and maintain the Facility at all times in good repair and condition, and in such a -manner that the operating efficiency thereof shall conform to the standards set by Federal, State and Local law.

c. Compliance with Laws. In operating and maintaining the Facility, Spanish Fork shall comply in every respect with each applicable Federal, State or Local law regulating the safe, sanitary, and healthful operation of the Facility, and Spanish Fork shall make every reasonable effort to prevent a shutdown or bypass of the Facility, or an imposition of penalty by any governmental authority because of a failure to meet or otherwise comply with applicable laws and regulations. If such reasonable effort has been made, but notwithstanding, there is a penalty or requirement imposed by any authorized government authority, the penalty or cost of compliance shall be considered as part of the operation and maintenance expense of the Facility.

d. Insurance. In operating and maintaining the Facility, Spanish Fork shall obtain and maintain insurance, including but not limited to worker's compensation insurance and public liability insurance in such amounts and to such extent it is customarily carried by other operating utilities of the same type. The cost of such insurance shall be considered an operations and maintenance expense of the Facility. In the event of any loss or damage to any part of the Facility, insurance proceeds shall be used for the purpose of restoring or replacing the property lost or damaged.

e. Expenditures. Spanish Fork shall use its best efforts to keep the Operation and Maintenance Expenses related to the Facility within the amounts established in the Annual Budget and shall make no expenditures or incur any obligation in excess of amounts established in the Annual Budget without revision of the budget.

f. Collections. Spanish Fork shall collect from Mapleton, on a monthly basis, Mapleton's proportionate share of Operation and Maintenance Expenses relating to the Facility in accordance with this Agreement, and shall apply those payments against the budget.

g. Maintain Records. Spanish Fork shall maintain accurate detailed records relating to the Facility, including but not limited to flow-measuring records, materials, and supplies, and payroll records for personnel employed by Spanish Fork City. Spanish Fork City shall make those

records available for inspection at reasonable times to the Advisory Group and the Governing Body of Mapleton.

h. Budget Preparation. Spanish Fork shall prepare and provide a proposed budget for the next fiscal year by April 1st of each year. Spanish Fork will make available, upon request, a copy of the monthly financial report for the Facility. The expenses incurred in compiling each report shall be regarded as an Operation and Maintenance expense of the Facility.

7.4 Duties and Responsibilities of Mapleton City.

a. Sampling. Mapleton shall be responaible for sampling all water entering the joint trunk line. Samples shall take place weekly. Mapleton shall provide to Spanish Fork City a copy of the test results of each sample.

ARTICLE VIII CHARGES FOR OPERATION AND MAINTENANCE EXPENSES

8.1 Sharing of Expenses. All actual operation and maintenance expenses related to the Facility shall be paid on a monthly basis by Mapleton in a ratio determined as follows:

a. A meter will be installed where the joint trunk line crosses the DRGW railroad tracks to measure total flow and contaminate strength from Mapleton's collection system. Mapleton will own and read this meter. Spanish Fork may check the readings for accuracy.

b. A meter has been installed at the intake to the treatment plant. Spanish Fork will own and read this meter. Mapleton may check the readings for accuracy.

c. Mapleton shall be responsible to pay to Spanish Fork for the operation of the treatment plant on the ratio of Mapleton's flow and contaminate strength as metered at the crossing of the DRGW tracks, to the total flow and contaminate strength, as measured at the plant intake.

8.2 Payments to Spanish Fork City. Mapleton shall pay to Spanish Fork the monthly service charge described in Section 8.1 of this Agreement within twenty (20) days after receiving the bill. Mapleton shall have the sole and exclusive right to determine a method of charging residents and customers of its own Collection System. The failure of Mapleton to collect sufficient amounts from its residents and customers shall not relieve Mapleton from its obligations to pay its proportionate share for the operation and maintenance expense of the Facility. If Mapleton fails to pay the fall amount due and owing within ten (10) days after the due date thereof, the unpaid balance shall bear an interest rate of one percent (1.0%) per month until paid in full, and all subsequent payments received shall be applied first to interest and then to principal.

8.3 Breach of Agreement. In the event of a breach of this agreement, the non- breaching party shall be entitled to recover its costs and attorneys fees incurred in enforcing the terms hereof. In the event a dispute that the parties cannot amicably resolve, a court of competent jurisdiction in Utah County, or any alternative dispute resolution method agreed upon by the parties may be used to resolve the dispute.

ARTICLE IX BUY BACK PROVISIONS

9.1 Mapleton System. a. The parties acknowledge Mapleton's significant capital contributions towards Spanish Fork's sewer system, and that Mapleton may one day need to construct its own sewer system. If Mapleton decides to construct its own sewer system within the first five years from the date of this agreement, it may terminate this agreement and receive

full reimbursement for its capital contributions, as set forth hereinafter. If Mapleton decides to construct its own sewer system beyond five years from the date of this agreement, it may terminate this agreement and negotiate with Spanish Fork the amount of reimbursement it will receive for its capital contributions, based upon the depreciation of the facilities, their condition, and value.

b. If Mapleton decides to construct its own sewer system, it may phase out of the Spanish Fork plant, but must eventually take all of its sewerage into its own system. Any such phasing may not take longer than three years. As Mapleton phases out of the Spanish Fork plant, it may make additional capacity available to Spanish Fork. Once Mapleton is no longer using its allotted capacity, in whole or in part, Spanish Fork will begin to reimburse Mapleton its contributions towards capital facilities in proportion to the amount Mapleton has reduced its allotted capacity. For example, if Mapleton reduces its use of its allotted capacity by 10%, Spanish Fork will begin to reimburse Mapleton for 10% of its investment in capital facilities.

c. Mapleton shall give one year written notice to Spanish Fork of its intent to construct its own sewer system and terminate this agreement.

d. Unless otherwise agreed to by the parties, the reimbursement period shall be five years and shall commence 30 days from the date Mapleton makes additional capacity available. Spanish Fork will make a down payment of 50% and pay the balance in five annual installments. Upon reimbursement being made, Mapleton will relinquish its ownership interest in the Facility and Spanish Fork will become the owner of the Facility.

e. No interest will accrue on any money owed to Mapleton by Spanish Fork during the reimbursement period.

ARTICLE X MISCELLANEOUS PROVISIONS

10.1 Adoption of Ordinances. Each City agrees to adopt and enforce such ordinances as are reasonably necessary to permit the purposes of this Agreement to be accomplished. Mapleton further agrees to maintain an ordinance in substantially the same format as Spanish Fork City Municipal Code section 13.32.010. et. seq. (Public Sewer System Regulations and Pretreatment Standards). Mapleton further agrees to be subject to the provisions of §13.32.010. et seq. (Public Sewer System Regulations and Pretreatment Standards. Mapleton further agrees to be subject to the provisions of §13.32.

10.2 Joint Cooperation. The Cities hereby agree to cooperate with each other in the planning for the future capital improvements to the Facility or the construction of new treatment facilities for the joint use of the Cities. The installation of such capital improvements or new treatment facilities and costs to be assumed by each city with respect thereto shall be subject to provisions of a separate written Agreement between the Cities.

10.3 Authorized Agreement. Each City hereby represents and warrants that its Governing Body has taken all action as required by law to approve this Agreement and to authorize execution of this Agreement on behalf of that City.

10.4 Force Majeure. In case by reason of force majeure, either City shall be rendered unable wholly or in part to carry out its obligations under this Agreement, other than the obligation of each City to make the payments required under the terms hereof, then such party shall give notice and full particulars of such force majeure in writing to the other party within a reasonable time

after occurrence of the event or cause relied on, and the obligations of the party giving such notice, so far as they are affected by such force majeure, shall be suspended during the continuance of the inability then claimed, but for no longer period, and such party shall endeavor to remove and overcome such inability with reasonable dispatch. The term "force majeure" as employed herein shall mean acts of God, strikes, lockouts, or other industrial disturbances, acts or public enemy, an order from any kind of the government of the United States or the State of Utah, insurrections, riots, epidemics, landslides, lightning, earthquakes, fire, hurricanes, storms, floods, washouts, arrests, restraint of government and people, civil disturbance, explosions, breakage, accidents to machinery or collection line, or the partial or complete inability of Spanish Fork to treat and dispose of such wastewater on account of any other cause not reasonably within the control of Spanish Fork.

10.5 Miscellaneous Provisions. a. This Agreement shall be governed by and construed under the laws of the State of Utah, including but not limited to the Act.

b. The Cities shall not be deemed to be partners or joint venturers in any manner in the use or operation of the Facility.

c. Spanish Fork shall be responsible for ascertaining and overseeing compliance by the Facility with all government requirements, including in particular those of the Department of Environmental Quality and the United States Environmental Protection Agency.

d. This Agreement may be amended from time to time by mutual written Agreement between the Cities, provided that said amendment does not jeopardize or adversely affect any notes, bonds or other instruments relating to the financing of the construction of the Facility or the Collection System of either City, and that it does not invalidate or adversely affect the operation or use of the Facility.

e. If any provision of this Agreement is determined by a court of competent jurisdiction to be void, voidable, or unenforceable, the validity and enforceability of the remaining provisions of this Agreement shall not be affected thereby.

f. No City may assign its rights or duties under this Agreement without the prior written consent of the other City.

g. Spanish Fork will maintain ownership of all treated waste water. In the event of sale or lease, the proceeds shall be used to reduce the operation and maintenance expenses at the Facility.

IN WITNESS WHEREOF, the parties have set their hands on the date and the year above written.

SPANISH FORK CITY by:

Dale R. Barney

DALE R. BARNEY, Mayor

Attest:

Kent R. Clark

Kent R. Clark, City Recorder

CORPORATE SEAL OF SPANISH FORK CITY UTAH

Approval as to form and compliance with Utah law:

S. Junior Baker, City Attorney

MAPLETON CITY by:

DEAN ALLAN, Mayor

Attest:

Debbie Walser, City Recorder

Approval as to form and compliance with Utah law:

Gordon Duval, City Attorney

MAPLETON CITY CORPORATION

May 31, 2005

Spanish Fork City
Dave Oyler, City Manager
40 South Main
Spanish Fork, Utah 84660

RE: Spanish Fork/Mapleton City Sewer Interlocal Agreement
Phase II

Dear Dave:

I am pleased to confirm that the City Council has now formally approved the Second Phase Interlocal Agreement for the further upgrade of the Spanish Fork Wastewater Treatment Plant and I accordingly enclose a signed copy, thereof, for your information.

Perhaps, at an appropriate time, we can discuss the arrangements for passing over the initial upfront payments to finance the initial costs associated with the expansion scheme.

Yours sincerely,

Bob

R.P. Bradshaw
City Administrator

RPB/dw

Enc: Interlocal Agreement Phase II

LEASE

THIS LEASE made this 19th day of February, 2004, between Spanish Fork City, a municipality of the State of Utah, hereinafter referred to as **LANDLORD** and Mapleton City, a municipality of the State of Utah, hereinafter referred to as **TENANT**.

1. Property Leased. Landlord does hereby lease unto Tenant real property located at approximately 175 E. 2160 N., Spanish Fork, Utah, representing the land on which the Spanish Fork Wastewater Treatment Facility lies.

2. Term. The term of this lease shall be until the interlocal agreement for joint use of the Spanish Fork Wastewater Treatment Facility between the parties is terminated.

3. Consideration. No rental payment shall be made, but Mapleton shall be required to timely make the payments due under the interlocal agreement for its capital and expansion purchases and its share of operation and maintenance expenses. The parties acknowledge that those payments represent adequate consideration as Landlord is benefitted by being able to expand the Wastewater Facility for the use of its residents.

4. Use of Leased Premises. Mapleton shall make no use of the property other than as a wastewater treatment facility and in accordance with the interlocal agreement between the parties.

5. Maintenance of the Premises. Operation and maintenance of the property shall be conducted by Landlord. Costs related to the wastewater treatment facility shall be allocated as set forth in the interlocal agreement between the parties.

6. Assignability. This lease is unique to the parties and may not be assigned.

7. Default. In the event the interlocal agreement is in default, then this lease agreement shall also be deemed to be in default.

8. Termination. This lease terminates simultaneously with the termination of the interlocal agreement.

IN WITNESS WHEREOF, this lease has been executed in duplicate the day and year first above written.

SPANISH FORK CITY by:

Dale R. Barney

DALE R. BARNEY, Mayor

Attest:

Kent R. Clark

KENT R. CLARK, City Recorder

MAPLETON CITY by:

Dean L. Allen

DEAN ALLEN, Mayor

Attest:

Debbie Walser

DEBBIE WALSER, City Recorder

ADDENDUM CONTRACT

Addendum to the Interlocal Agreement for Construction, Use, and Maintenance of Joint Wastewater Facility Contract between Spanish Fork City and Mapleton City dated the 19th day of February 2004.

RECITALS

WHEREAS, Spanish Fork and Mapleton Cities entered into an Interlocal Agreement for the joint use of the Spanish Fork Wastewater Treatment Plant on the 19th day of February, 2004 (the Contract); and

WHEREAS, the Contract limits each City to a specific number of residential hookups to the system to prevent discharges to the system from exceeding the system capacity; and

WHEREAS, each City has allocated its maximum number of hookups, meeting the system's capacity; and

WHEREAS, the Contract anticipates expansion of the plant and cooperation in planning future capital projects; and

WHEREAS, the parties desire to expand the capacity of the plant and enter this addendum to the Contract in order to define the rights and responsibilities of each of the parties hereto;

NOW THEREFORE, the parties hereby contract, convent, and agree as follows:

AGREEMENT

ARTICLE I RULES OF CONSTRUCTION

The parties intend this addendum to supplement and not replace the Contract of February 19, 2004. Therefore, except as specifically set forth herein or necessarily implied hereby, the terms and conditions of the Contract of February 19, 2004 shall remain in full force and effect.

ARTICLE II DEFINITIONS

The parties adopt the definitions used in the Contract of February 19, 2004.

THIS ADDENDUM means this document, modifying The Contract of February 19, 2004.

THE CONTRACT means the Interlocal Agreement for Construction, Use and Maintenance of Joint Wastewater Facility between Spanish Fork and Mapleton dated February 19, 2004.

THE PROJECT means expanding plant capacity by adding a grid system, digester, and converting a secondary clarifier to a primary clarifier.

ARTICLE III EXPANSION PROJECT

The Cities agree to cooperate and participate together to expand the plant capacity by construction of the following project:

Adding a grid system and digester, and converting one of the secondary clarifiers to a primary clarifier.

Upon the completion of the expansion project, each City will maintain its same ratio of ownership and plant capacity of 77% /23% as set forth in the Contract.

ARTICLE IV NEW CAPACITIES

Paragraph 5.3 of The Contract is amended to reflect the new capacities available to each city upon completion of The Project. Spanish Fork City will be allowed 12.,362 residential hookups and Mapleton City will be allowed 3,156 residential hookups. It is anticipated that each city will have a number of commercial and/or industrial hookups in addition to the residential hookups allocated herein, based upon the existing proportion of commercial/industrial hookups to residential hookups. In the event that an unusually heavy user of sewer services desires to come

into either city, the advisory committee shall review the user and determine if capacity exists and if so, how allowing that user to connect to the sewer may limit future industrial/commercial users.

ARTICLE V FUNDING

The parties estimate the cost of the project to be 4.39 million dollars. The Cities will ultimately share the actual cost of the project in the same ratio as their interest in the plant capacity (77%/23%). However, in order to accelerate the timing of the project, Mapleton will contribute $1.75 million towards the project. The difference between 23% of the actual cost of the project and the $1.75 million contributed by Mapleton will be considered a loan to Spanish Fork City from Mapleton City. (Based on the current estimate, the loan amount would be $740,300.00, but which number will very upward or downward depending on the actual construction costs). Spanish Fork City will contribute the balance of its share as costs for the project come due. At the conclusion of the project, an exhibit will be added to this addendum indicating the actual costs, each cities total share, and the actual loan amount Spanish Fork is to repay Mapleton. Spanish Fork shall be obligated to repay its loan from Mapleton over five years, which obligation will bear no interest. Payment shall be equally divided over the five years, with the first payment due one year after completion of the project and final acceptance by the Cities, with a like amount paid each year thereafter for four additional, successive years.

ARTICLE VI CONSTRUCTION MANAGEMENT

Spanish Fork will place the project for bid, following its purchasing policy and state law. Mapleton shall be entitled to have a representative present at each stage of the designs/bid proceedings and to participate in pre-construction and construction meetings.

DATED this 17 day of May, 2005.

SPANISH FORK CITY by:

Dale R. Barney
DALE R. BARNEY, Mayor

Attest:

Kent R. Clark
KENT R. CLARK, City Recorder

MAPLETON CITY by:

Dean L. Allen
DEAN ALLEN, Mayor

Attest:

Debbie Walser
DEBBIE WALSER, City Recorder

AMENDED AND RESTATED INTER-LOCAL AGREEMENT FOR CONSTRUCTION, USE, AND MAINTENANCE OF JOINT WASTEWATER FACILITY

This Agreement is made and entered into this 17th day of May, 2011, by and between Spanish Fork City, and Mapleton City. The parties to this Agreement are sometimes referred to collectively herein as the "Cities" and separately as a "City".

WITNESSETH

WHEREAS, the Cities hereto entered into an inter-local agreement for the use and maintenance of a joint wastewater facility on the 19th day of February, 2004, which agreement was supplemented by that Addendum Contract dated the 17th day of May, 2005; and

WHEREAS, pursuant to the terms of the agreements referred to, the Cities jointly own a system for the collection and disposal of wastewater sewage (the "System"); and

WHEREAS, pursuant to the terms of the agreements referred to, Spanish Fork owns the real property the plant is located on and owns 77% of the plant capacity, while Mapleton owns 23% of the plant capacity; and

WHEREAS, the Cities each have an established number of residential connections which can use the plant without causing the plant to exceed its capacity; and

WHEREAS, the Cities have negotiated the transfer of properties from Spanish Fork to Mapleton by way of a boundary line adjustment; and

WHEREAS, based upon the boundary line adjustment, the capacities for each city and the compensation to be paid therefore needs to be adjusted and agreed upon; and

WHEREAS, a cooperative effort from each City to provide for the sewage collection and treatment needs of the citizens is a basic underlying goal of the Cities to this Agreement;

NOW THEREFORE, in consideration of the mutual covenants and agreements contained herein and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties agree as follows:

ARTICLE I DEFINITIONS

For the purposes of this Agreement the following terms shall have the respective meanings set forth below except where the context indicates otherwise:

1. ACT means the Inter-Local Cooperation Act, Utah Code Annotated §1-13-1 et. seq. (1953 as amended).

2. AGREEMENT means this document.
3. ANNUAL BUDGET means the annual budget for the use, operation and maintenance for
the Facility for each fiscal year. The Annual Budget shall specify the projected operation and maintenance expenses for the Facility for the relevant fiscal year and any costs for repairs or improvements to the Facility to be accomplished during the fiscal year.
4. BILLING PERIOD means a monthly period commencing on the first day of each month during the term of this Agreement, to and including the last day of that month.
5. CAPITAL COSTS means future costs and expenses incurred in any expansion of the Facility including but not limited to all costs of construction, construction period interest costs, costs of architects and engineers, and other similar costs and expenses incurred by way of expansion to the Facility.
6. SPANISH FORK means Spanish Fork City, a municipal corporation and body politic located in Utah County, Utah.
7. CODE means the official compilation published and known as the Utah Code Annotated (1953 as amended).
8. COLLECTION SYSTEM means the wastewater collector and interceptor pipeline system of each City which is owned and operated, or will be owned and operated exclusively by that City, separate and apart from the Facility, including service laterals, manholes, pump stations, flow-measuring devices and related appurtenances, excluding the joint trunk line
9. CITY or CITIES means Spanish Fork City or Mapleton City respectively, or both of them in the plural.
10. MAPLETON means Mapleton City, a municipal corporation and body politic located in Utah County, State of Utah.
11. FACILITY means collectively the existing wastewater treatment plant owned and operated by the Cities, including all screens, chambers, pumps, clarifiers, filters, digesters, basins, interconnecting pipes, outfall line, transfer structures, and other equipment and facilities.
12. FISCAL YEAR means a period of twelve (12) consecutive months commencing on July 1st and ending on June 30th of the following year.
13. GOVERNING BODY means the duly elected mayor and city council.
14. JOINT TRUNK LINE means that collection line running from the west side of the DRGW Railroad right of way to the connection with the existing Facility owned by Spanish Fork. Mapleton owns 76% of the joint trunk line and Spanish Fork owns 24% of the joint trunk line.
15. OPERATION AND MAINTENANCE EXPENSES means with, respect to the Facility and joint trunk line, all expenses reasonably incurred in connection with the operation and maintenance of the Facility and joint trunk line including:

a. Repairs and replacements of all existing equipment, buildings, and facilities necessary to keep the Facility in efficient operating condition;

b. Costs incurred in preparing operating reports and other reports as may be required herein;

c. Premiums on insurance for the Facility required herein;

d. Actual costs incurred by Spanish Fork in carrying out the duties and

responsibilities specified in this Agreement, including all wages, overtime, third-party contract expenses for equipment and other special services, employee benefits, general office overhead, administrative expenses and vehicle mileage, provided however that Spanish Fork costs to be included in Operation and Maintenance Expenses shall only be those fairly attributable to the operation of the Facility, and not include costs attributable to any Collection System.

e. Generally all expenses, exclusive of depreciation, which under generally accepted accounting principles are properly allocated to operation and maintenance of the Facility, but only such expenses as are reasonable and necessary to the efficient operation and maintenance of the Facility shall be included.

16. ORDINANCE means a legislative enactment by a Governing Body of the City.

17. PLANT CAPACITY means the lesser of:

a. the total hydrologic volume of the Spanish Fork Treatment Plant, which the Facility is capable of processing, currently 5.0 million gallons per day, average daily flow; or

b. the total biological volume which the Facility is capable of processing, based on the regulations on contaminate discharges, as set forth in the Facility UPDES permit issued by the State of Utah.

18. JOINT TRUNK LINE CAPACITY means the total volume of sewage capable of being transported to the treatment facility through the joint trunk line.

19. PRIOR AGREEMENT means the Inter-local Agreement for Construction, Use, and Maintenance of Joint Wastewater Facility entered into between the Cities, dated February 19th, 2004, as supplemented by that Addendum Contract entered into between the Cities, dated May 2005.

ARTICLE II TERMINATION OF PRIOR AGREEMENT

2.1 Termination. In order to accomplish the purposes of the Cities, given the change in boundaries of the Cities, it is in the Cities' interests to terminate the Prior Agreement and replace it with this Agreement. The Prior Agreement shall be terminated upon the approval and execution of this Agreement by each City's Governing Body.

ARTICLE III JOINT TRUNK LINE

3.1 Joint Trunk Line. This Agreement affects the ownership interests of the Cities in the joint trunk line to reflect the percentages set forth in paragraph 14 the definitions. Any O&M expenses incurred on the joint trunk line shall be paid for by the Cities in the same ratio as their ownership interest in the joint trunk line.

ARTICLE IV PURPOSE AND TERM OF AGREEMENT

4.1 Purpose. The purpose of this Agreement is to provide for: (i) the use, operation and maintenance of the Facility for the mutual benefit of the Cities; (ii) to provide for an Advisory Group to give recommendations regarding the operation and maintenance of the Facility, and to make recommendations regarding the expansion and replacement of the Facility; and (iii) the establishment of a system for sharing the costs and expenses related to the use, operation and maintenance of the Facility.

4.2 Term of Contract. This Contract shall be in full force and continue in effect for 50

years, unless terminated earlier by mutual agreement of the parties.

ARTICLE V OWNERSHIP OF FACILITIES AND PURCHASE OF CAPACITY

5.1 Ownership of Various Facilities. Subject to the provisions of paragraph 6.1(a), Spanish Fork will retain all ownership interests in its Collection System and land, which constitute the wastewater treatment plant. Mapleton will retain all ownership interest in its Collection System. Nothing herein shall be construed to grant to any City any ownership interest in property or assets of the other City.

5.2 Right to Use. Mapleton shall have the right and power during the term of this Agreement to connect its Collection System to the joint trunk line and thereby cause the sewage and wastewater from its residents and customers to be transmitted to the Facility for treatment, pursuant to the terms of this agreement. Spanish Fork shall lease to Mapleton a 26.4% interest in the real estate where the Facility is located. The lease shall be effective during the term of the Agreement. Nothing herein shall be construed to grant to Mapleton an ownership interest in the land where the Facility is located. Consideration for the lease shall be the timely payment of the funds set forth in this Agreement, which the Cities acknowledge works to the benefit of each City by allowing an expansion of the Facility.

5.3 Purchase by Mapleton. Mapleton is purchasing from Spanish Fork an additional three and four tenths percent (3.4%) of the Facility (excluding land, but including capacity), for the purchase price of $2,850,000.00, which will increase, incrementally, Mapleton's overall capacity in the Facility to twenty six and four tenths percent (26.4%) as payments are made. This adjustment in ownership ratios will allow Spanish Fork to have a total of 11,417 residential hookups and will allow Mapleton to have a total of 4,006 residential hookups, representing an increase of 850 residential hookups. It is anticipated that each city will have a number of commercial and/or industrial hookups in addition to the residential hookups allocated herein, based upon the existing proportion of commercial/industrial hookups to residential hookups. In the event that an unusually heavy user of sewer services desires to come into either city, the advisory committee shall review the user and determine if capacity exists and if so, how allowing that user to connect to the sewer may limit future industrial/commercial users.

5.4 Due date. Fifty thousand dollars ($50,000.00) of the purchase price shall be due upon the completion of the boundary adjustment between the Cities. Thereafter, three thousand three hundred fifty-two dollars and ninety-four cents ($3,352.94) shall be due for each connection to the sewer system within the area being adjusted. Mapleton shall pay said sum prior to recording any plat, or prior to issuing any building permit if a plat is not required. Any balance owing as of April 1, 2026 shall be paid in full on or before April 30, 2026.

ARTICLE VI EXCEEDING OR ADJUSTMENTS TO CAPACITIES

6.1 Adjustments to capacities. a. If Mapleton's wastewater needs require capacity beyond twenty six and four tenths percent (26.4%) at the Facility, the cost of expansion shall be paid solely by Mapleton and the additional capacity created will be owned by Mapleton. The ownership interests will be adjusted to reflect the new capacity. Spanish Fork City, at its option, may participate with Mapleton in any expansion of capacity to

the Facility at which time each City shall pay for the capital costs of such expansion on the same ratio of each city's capacity within the expanded portion of the plant. Mapleton shall have no financial obligation for expansion of the treatment facility, if such expansion is done based solely on Spanish Fork's need. In such event, the additional capacity created will be owned by Spanish Fork. The ownership interests will be adjusted to reflect the new capacity.

b. In the event expansion to the Facility is required by government regulation, each city shall pay for the capital costs of such expansion on the same ratio of each city's capacity to the total plant capacity. Any regulatory fines and/or penalties incurred shall be paid by the City causing the same. In the event the cause cannot be determined, the fines and/or penalties shall be paid based upon the same ratio of each city's capacity to the total plant capacity.

c. Any expansion to the facility shall be based on the Spanish Fork City 201 Facility Plan, dated November 1980, as updated from time to time, drawing number X- I.

6.2 Exceeding capacities. a. In the event Mapleton anticipates it will exceed its 26.4% capacity (as determined by the number of hookups approved, as set forth in paragraph 5.3), and Spanish Fork has available capacity, the parties may negotiate Mapleton's use of such excess capacity. If the capacity is exceeded without negotiating the use and price, Mapleton will be given thirty (30) days to reduce its flows so as not to exceed its capacity. If it fails to do so, liquidated damages in the amount of $5,000.00 per month shall be awarded. In addition to liquidated damages, an injunction prohibiting the issuance of additional building permits and additional connections to the sewer system shall be granted.

b. In the event Mapleton exceeds its 26.4% capacity (as determined by the number of hookups approved, as set forth in paragraph 4.3), and Spanish Fork has no available capacity, Mapleton will be given thirty (30) days to reduce its flows so as not to exceed its capacity. If it fails to do so, a monetary penalty in the form of liquidated damages in the amount of $5,000.00 per month shall be assessed. Each party acknowledges that exceeding Plant Capacity has far reaching and serious consequences, for which no monetary damages can readily be determined, nor which can be adequately compensated. In the event any regulatory fines and/or penalties are due as a result of Mapleton exceeding its capacities, it shall be responsible for all costs of remediation, including fines or penalties imposed, costs of labor and materials to correct the problem, and any attorneys fees incurred in defending any regulatory action.

c. Mapleton shall enjoy reciprocal rights against Spanish Fork, including liquidated damages and an injunction, as set forth in paragraphs 6.2(a) and (b), in the event Spanish Fork exceeds its 73.6% capacity (as determined by the number of hookups approved, as set forth in paragraph 5.3), or causes regulatory fines and/or penalties through no fault of Mapleton.

ARTICLE VII OPERATION AND MAINTENANCE OF THE FACILITY

7.1 Advisory Group. An advisory group shall be created for the purpose of monitoring the number of hookups allowed, as set forth in paragraph 5.3, discussing problems, policies, revenues, expenditures, and any other matters affecting the operation of the Facility.

a. Number of Representatives. The Advisory Group shall consist of five members, three of which shall be representatives from Spanish Fork and two from Mapleton.
b. Selecting of Advisory Group Member. Each City's members shall be selected and approved
by its Governing Body.
c. Removal or Disability. Each City may remove any of its members with or without cause. Upon such removal or in the event of resignation, a successor shall be appointed for the remainder of that term, by the City who had appointed the member who is no longer serving.
7.2 Duties of Advisory Group. The conclusions, recommendations, or information emanating from a meeting of the Advisory Group shall be presented to Spanish Fork for its consideration and use in operation, maintenance and/or improvement of the Facilities. It is understood, however, that the function of the group is to further the cooperation between the parties and to render advisory assistance, but in no way to limit the rights of ownership to the facilities set forth herein, nor to make binding recommendations, but only advisory.
7.3 Duties and Responsibilities of Spanish Fork City. Spanish Fork shall be the operator of the Facility.
a. Management. Spanish Fork shall have sole and exclusive responsibility for the day-to-day management of the Facility.
b. Operation and Maintenance. Spanish Fork shall be responsible for the operation and maintenance of the Facility and shall employ competent and experienced personnel or train such personnel for the Facility and shall use best efforts to operate and maintain the Facility at all times in good repair and condition, and in such a -manner that the operating efficiency thereof shall conform to the standards set by Federal, State and Local law.
c. Compliance with Laws. In operating and maintaining the Facility, Spanish Fork shall comply in every respect with each applicable Federal, State or Local law regulating the safe, sanitary, and healthful operation of the Facility, and Spanish Fork shall make every reasonable effort to prevent a shutdown or bypass of the Facility, or an imposition of penalty by any governmental authority because of a failure to meet or otherwise comply with applicable laws and regulations. If such reasonable effort has been made, but notwithstanding, there is a penalty or requirement imposed by any authorized government authority, the penalty or cost of compliance shall be considered as part of the operation and maintenance expense of the Facility. d. Insurance. In operating and maintaining the Facility, Spanish Fork shall obtain and maintain insurance, including but not limited to worker's compensation insurance and public liability insurance in such amounts and to such extent it is customarily carried by other operating utilities of the same type. The cost of such insurance shall be considered an operations and maintenance expense of the Facility. In the event of any loss or damage to any part of the Facility, insurance proceeds shall be used for the purpose of restoring or replacing the property lost or damaged.
e. Expenditures. Spanish Fork shall use its best efforts to keep the Operation and Maintenance Expenses related to the Facility within the amounts established in the Annual Budget and shall make no expenditures or incur any obligation in excess of

amounts established in the Annual Budget without revision of the budget.
f. Collections. Spanish Fork shall collect from Mapleton, on a monthly basis, Mapleton's proportionate share of Operation and Maintenance Expenses relating to the Facility in accordance with this Agreement, and shall apply those payments against the budget.
g. Maintain Records. Spanish Fork shall maintain accurate detailed records relating to the Facility, including but not limited to flow-measuring records, materials, and supplies, and payroll records for personnel employed by Spanish Fork City. Spanish Fork City shall make those records available for inspection at reasonable times to the Advisory Group and the Governing Body of Mapleton.
h. Budget Preparation. Spanish Fork shall prepare and provide a proposed budget for the next fiscal year by April 1st of each year. Spanish Fork will make available, upon request, a copy of the monthly financial report for the Facility. The expenses incurred in compiling each report shall be regarded as an Operation and Maintenance expense of the Facility.
7.4 Duties and Responsibilities of Mapleton City.
a. Sampling. Mapleton shall be responaible for sampling all water entering the joint trunk line. Samples shall take place weekly. Mapleton shall provide to Spanish Fork City a copy of the test results of each sample.

ARTICLE VIII CHARGES FOR OPERATION AND MAINTENANCE EXPENSES

8.1 Sharing of Expenses. All actual operation and maintenance expenses related to the Facility shall be paid on a monthly basis by Mapleton in a ratio determined as follows:
a. A meter will be installed where the joint trunk line crosses the DRGW railroad tracks to measure total flow and contaminate strength from Mapleton's collection system. Mapleton will own and read this meter. Spanish Fork may check the readings for accuracy.
b. A meter has been installed at the intake to the treatment plant. Spanish Fork will own and read this meter. Mapleton may check the readings for accuracy.
c. Mapleton shall be responsible to pay to Spanish Fork for the operation of the treatment plant on the ratio of Mapleton's flow and contaminate strength as metered at the crossing of the DRGW tracks, to the total flow and contaminate strength, as measured at the plant intake.
8.2 Payments to Spanish Fork City. Mapleton shall pay to Spanish Fork the monthly service charge described in Section 8.1 of this Agreement within twenty (20) days after receiving the bill. Mapleton shall have the sole and exclusive right to determine a method of charging residents and customers of its own Collection System. The failure of Mapleton to collect sufficient amounts from its residents and customers shall not relieve Mapleton from its obligations to pay its proportionate share for the operation and maintenance expense of the Facility. If Mapleton fails to pay the full amount due and owing within ten (10) days after the due date thereof, the unpaid balance shall bear an interest rate of one percent (1.0%) per month until paid in full, and all subsequent payments received shall be applied first to interest and then to principal.
8.3 Breach of Agreement. In the event of a breach of this agreement, the non-

breaching party shall be entitled to recover its costs and attorneys fees incurred in enforcing the terms hereof. In the event a dispute that the parties cannot amicably resolve, a court of competent jurisdiction in Utah County, or any alternative dispute resolution method agreed upon by the parties may be used to resolve the dispute.

ARTICLE IX BUY BACK PROVISIONS

9.1 Mapleton System. a. The parties acknowledge Mapleton's significant capital contributions towards Spanish Fork's sewer system, and that Mapleton may one day need to construct its own sewer system. If Mapleton decides to construct its own sewer system, it may terminate this agreement and negotiate with Spanish Fork the amount of reimbursement it will receive for its capital contributions, based upon the depreciation of the facilities, their condition, and value.

b. If Mapleton decides to construct its own sewer system, it may phase out of the Spanish Fork plant, but must eventually take all of its sewerage into its own system. Any such phasing may not take longer than three years. As Mapleton phases out of the Spanish Fork plant, it may make additional capacity available to Spanish Fork. Once Mapleton is no longer using its allotted capacity, in whole or in part, Spanish Fork will begin to reimburse Mapleton its contributions towards capital facilities in proportion to the amount Mapleton has reduced its allotted capacity. For example, if Mapleton reduces its use of its allotted capacity by 10%, Spanish Fork will begin to reimburse Mapleton for 10% of its investment in capital facilities.

c. Mapleton shall give one year written notice to Spanish Fork of its intent to construct its own sewer system and terminate this agreement.

d. Unless otherwise agreed to by the parties, the reimbursement period shall be five years and shall commence 30 days from the date Mapleton makes additional capacity available. Spanish Fork will make a down payment of 50% and pay the balance in five annual installments. Upon reimbursement being made, Mapleton will relinquish its ownership interest in the Facility and Spanish Fork will become the owner of the Facility.

e. No interest will accrue on any money owed to Mapleton by Spanish Fork during the reimbursement period.

ARTICLE X MISCELLANEOUS PROVISIONS

10.1 Adoption of Ordinances. Each City agrees to adopt and enforce such ordinances as are reasonably necessary to permit the purposes of this Agreement to be accomplished. Mapleton further agrees to maintain an ordinance in substantially the same format as Spanish Fork City Municipal Code section 13.32.010. et. seq. (Public Sewer System Regulations and Pretreatment Standards). Mapleton further agrees to be subject to the provisions of §13.32.010. et seq. (Public Sewer System Regulations and Pretreatment Standards. Mapleton further agrees to be subject to the provisions of Chapter 32 of Title 13.

10.2 Joint Cooperation. The Cities hereby agree to cooperate with each other in the planning for the future capital improvements to the Facility or the construction of new treatment facilities for the joint use of the Cities. The installation of such capital improvements or new treatment facilities and costs to be assumed by each city with respect thereto shall be subject to provisions of a separate written Agreement between

the Cities.

10.3 Authorized Agreement. Each City hereby represents and warrants that its Governing Body has taken all action as required by law to approve this Agreement and to authorize execution of this Agreement on behalf of that City.

10.4 Force Majeure. In case by reason of force majeure, either City shall be rendered unable wholly or in part to carry out its obligations under this Agreement, other than the obligation of each City to make the payments required under the terms hereof, then such party shall give notice and full particulars of such force majeure in writing to the other party within a reasonable time after occurrence of the event or cause relied on, and the obligations of the party giving such notice, so far as they are affected by such force majeure, shall be suspended during the continuance of the inability then claimed, but for no longer period, and such party shall
endeavor to remove and overcome such inability with reasonable dispatch. The term "force majeure" as employed herein shall mean acts of God, strikes, lockouts, or other industrial disturbances, acts or public enemy, an order from any kind of the government of the United States or the State of Utah, insurrections, riots, epidemics, landslides, lightning, earthquakes, fire, hurricanes, storms, floods, washouts, arrests, restraint of government and people, civil disturbance, explosions, breakage, accidents to machinery or collection line, or the partial or complete inability of Spanish Fork to treat and dispose of such wastewater on account of any other cause not reasonably within the control of Spanish Fork.

10.5 Miscellaneous Provisions. a. This Agreement shall be governed by and construed under the laws of the State of Utah.

b. The Cities shall not be deemed to be partners or joint venturers in any manner in the use or operation of the Facility.

c. Spanish Fork shall be responsible for ascertaining and overseeing compliance by the Facility with all government requirements, including in particular those of the Department of Environmental Quality and the United States Environmental Protection Agency.

d. This Agreement may be amended from time to time by mutual written Agreement between the Cities, provided that said amendment does not jeopardize or adversely affect any notes, bonds or other instruments relating to the financing of the construction of the Facility or the Collection System of either City, and that it does not invalidate or adversely affect the operation or use of the Facility.

e. If any provision of this Agreement is determined by a court of competent jurisdiction to be void, voidable, or unenforceable, the validity and enforceability of the remaining provisions of this Agreement shall not be affected thereby.

f. No City may assign its rights or duties under this Agreement without the prior written consent of the other City.

g. Spanish Fork will maintain ownership of all treated waste water. In the event of sale or lease,
the proceeds shall be used to reduce the operation and maintenance expenses at the Facility.

IN WITNESS WHEREOF, the parties have set their hands on the date and the year above written.

SPANISH FORK CITY by:

G. WAYNE ANDERSEN, Mayor

Attest:

Kent R. Clark, City Recorder

Approval as to form and compliance with Utah law:

S. Junior Baker, City Attorney

MAPLETON CITY by:

BRIAN WALL, Mayor

Attest:

Camille Brown, City Recorder

Approval as to form and compliance with Utah law:

Eric T. Johnson, City Attorney

APPENDIX D
LIFT STATION DATA

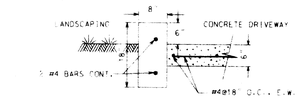
Location	Pump #	Brand	Model	Serial	Flow (gpm)	Size (in)	RPM	Power (hp)	Amp	Elevation Head (ft)	Total Head (ft)
Industrial Lift Station	2 Pumps	Aurora	614a	97-20019-2	600	6x6x12b	1150			40	55
Jail Lift Station	1	Flyght	NT 3171 HT	3171.181-0640051 453			1755	7.4	40	45	
				3171.181-0766							
	2	Flyght	NT 3171 HT	3171.181-0640052 453			1755	7.4	40	45	
				3171.181-0766							
Spanish Fields Lift Station	1	Flyght	NT 3127 MT	3171.180-0460752 439			1755	7.4		25	
				3171.180-7904							
	2	Flyght	NT 3127 MT	3171.181-0840792 439			1755	7.4		25	
				3171.181-2677							

INDUSTRIAL PARK LIFTSTATION

SPANISH FORK CITY

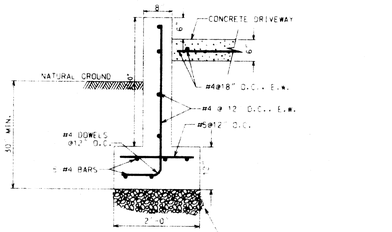
1996

HALL ENGINEERING
1445 NORTH MAIN, SPANISH FORK, UTAH 84660



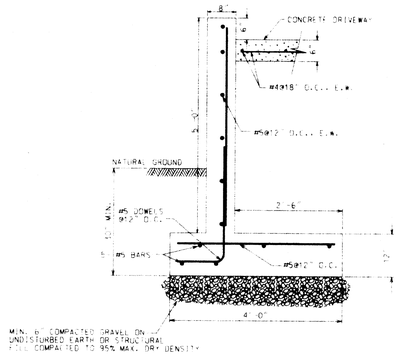
CURB WALL DETAIL

NTS



DETAIL B-B

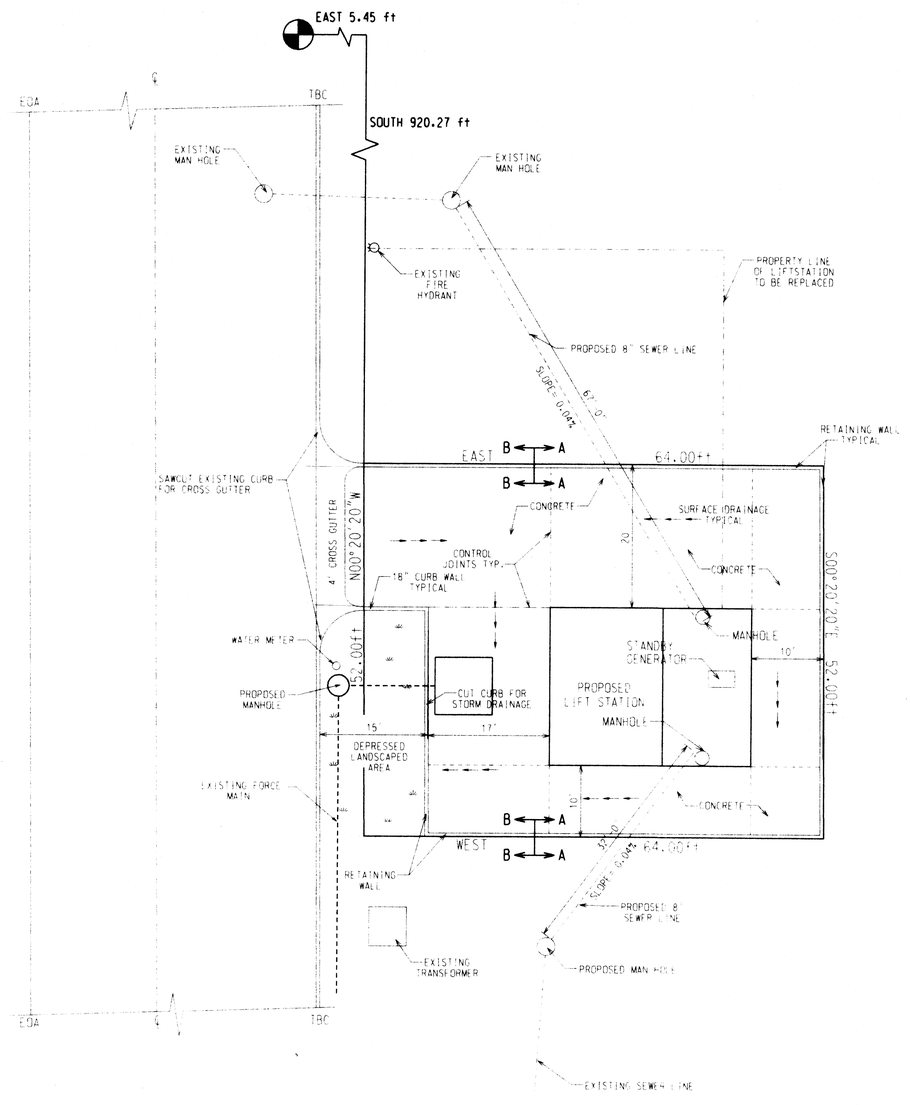
NTS



DETAIL A-A

NTS

NW SECTION 7
T8S. R3E. S.L.B. & M.



GENERAL NOTES

1. GENERAL CONTRACTOR SHALL BE RESPONSIBLE TO MAINTAIN EXISTING LIFTSTATION IN SERVICE DURING CONSTRUCTION AFTER WHICH CONTRACTOR TO REMOVE EXISTING LIFTSTATION. PUMPS TO BE SALVAGED TO SPANISH FORK CITY SHOPS.

2. CONTRACTOR TO RESTORE EXISTING LIFTSTATION SITE TO MATCH GRADE OF NEIGHBORING AREA.

3. CONTRACTOR TO PROVIDE 1" SERVICE WITH WATER METER ASSEMBLY AS PER SPANISH FORK CITY STANDARDS FOR POTABLE WATER TO LIFTSTATION.

4. ALL POTABLE WATER LINES IN LIFTSTATION SHALL BE COPPER. LAVATORY SHALL BE MOUNTED KHOLER MODEL K-2849 OR APPROVED EQUIVALENT. LAVATORY FAUCETS SHALL BE MOEN 8400 OR APPROVED EQUIVALENT. WATER HEATERS SHALL BE A.O. SMITH ENERGY SAVER LOWBOY MODEL ELJF-6 OR APPROVED EQUIVALENT. ALL SINK DRAINS SHALL RETURN TO BASEMENT SUMP.

5. EXISTING RTU SYSTEM: MAINTAIN EXISTING RTU SYSTEM IN SERVICE UNTIL NEW SYSTEM IS COMPLETE AND READY FOR SERVICE. DISABLE SYSTEM ONLY TO MAKE SWITCHOVERS AND CONNECTIONS. OBTAIN PERMISSION FROM THE OWNER AND ENGINEER AT LEAST 24 HOURS BEFORE PARTIALLY OR COMPLETELY DISABLING SYSTEM. MINIMIZE OUTAGE DURATION.

6. EXISTING ELECTRICAL SERVICE: MAINTAIN EXISTING SYSTEM IN SERVICE UNTIL NEW SYSTEM IS COMPLETE AND READY FOR SERVICE. IF NEEDED DURING CONSTRUCTION REMOVE AND RELOCATE EXISTING ELECTRICAL SERVICE OR UNDERGROUND FEEDER INSTALLATIONS TO ACCOMODATE NEW CONSTRUCTION. PROVIDE TEMPORARY WIRING AND CONNECTIONS TO MAINTAIN EXISTING SYSTEMS IN SERVICE IF ON ENERGIZED EQUIPMENT OR CIRCUITS, USE PERSONNEL EXPERIENCED IN SUCH OPERATIONS.

7. VERIFY THAT ABANDONED WIRING AND EQUIPMENT SERVE ONLY ABANDONED FACILITIES. REMOVE ALL ABANDONED WIRING AND CONDUIT. DISCONNECT AND REMOVE ELECTRICAL DEVICES AND EQUIPMENT SERVING UTILIZATION EQUIPMENT THAT HAS BEEN REMOVED. DISCONNECT AND REMOVE ABANDONED PANELBOARDS AND DISTRIBUTION EQUIPMENT.

8. CLEAN AND REPAIR EXISTING MATERIALS AND EQUIPMENT WHICH REMAIN OR ARE TO BE REUSED. RETURN ALL EXISTING MATERIALS TO OWNER.

DRAWING INDEX

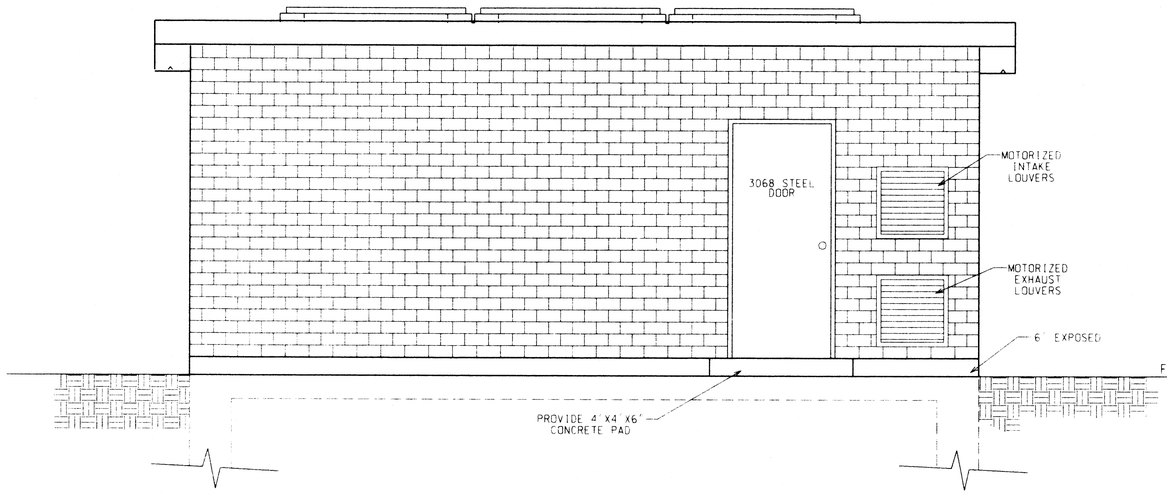
REVISION	DATE	BY

HALL ENGINEERING
CONSULTING ENGINEERS
1445 NORTH MAIN SPANISH FORK, UTAH 84660 (801) 798-2550

INDUSTRIAL PARK LIFT STATION

SITE PLAN

DESIGNED BY	CHECKED BY	DRAWN BY
IGP	JHJ	IGP
DATE: 7-96	PROJECT #:	SCALE: 1"=10'
DRAWING #: SH-2	SHEET #: 2 OF 13	



WEST ELEVATION

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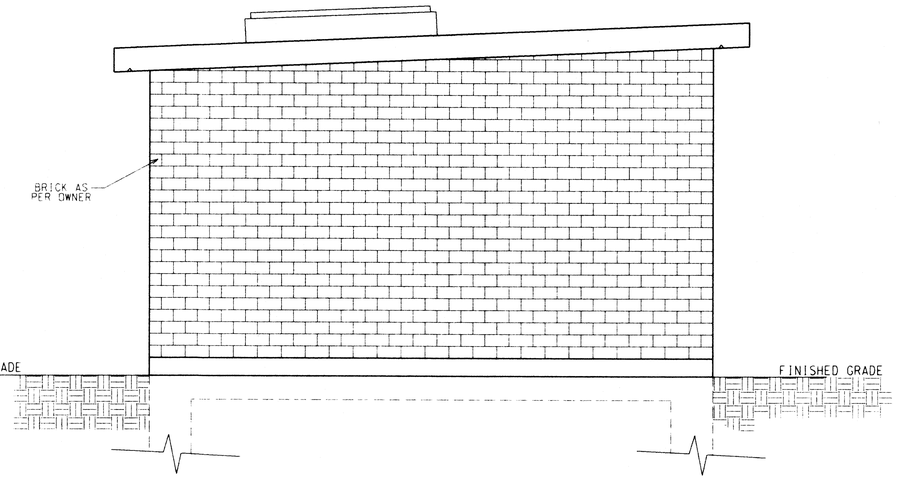

NORTH ELEVATION

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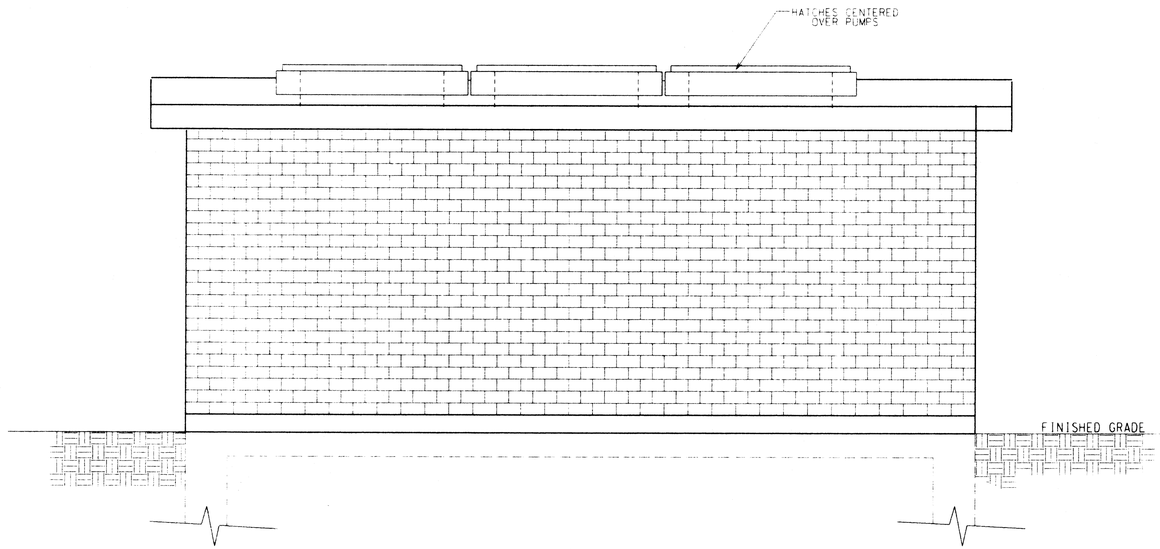

EAST ELEVATION

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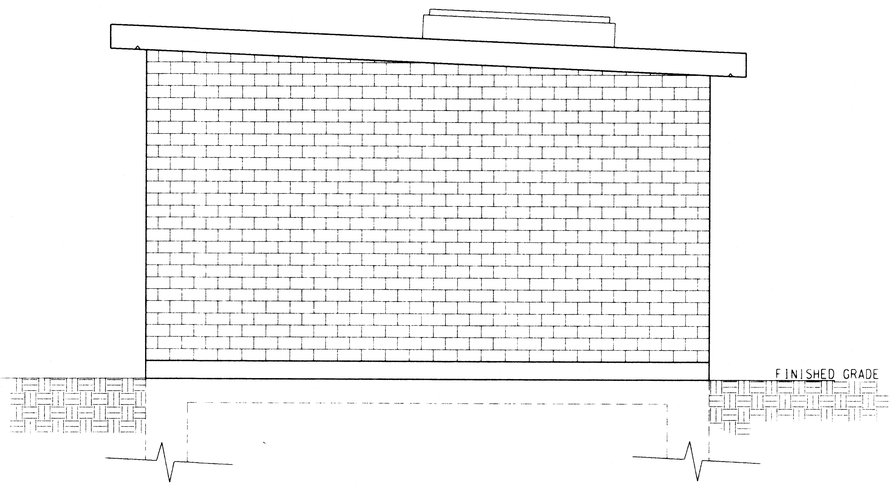


SOUTH ELEVATION

SCALE: 1/2" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER 4870 BRUCE B. HALL STATE OF UTAH

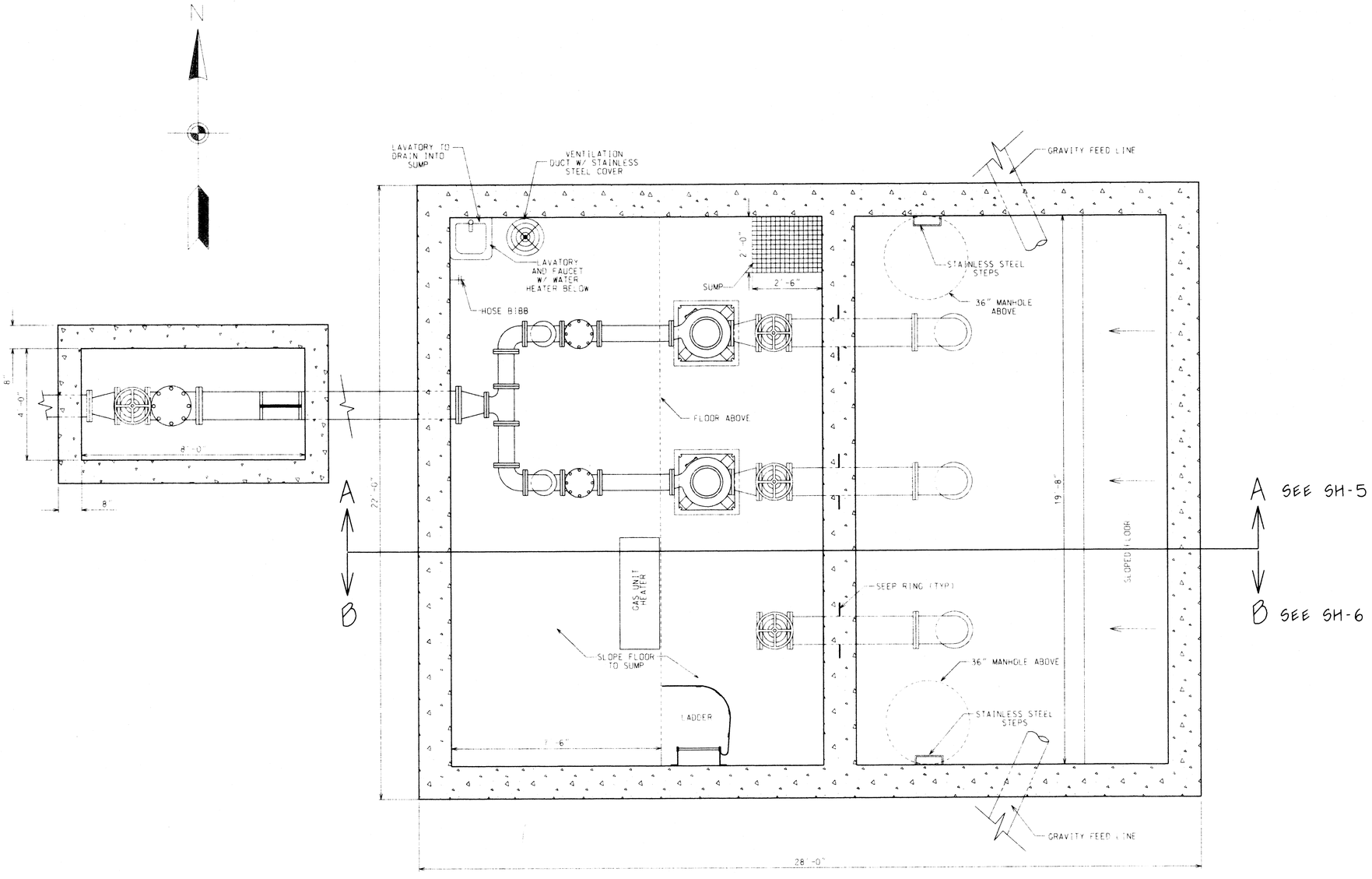
REVISION	DATE	BY

HALL ENGINEERING
CONSULTING ENGINEERS
1445 NORTH MAIN SPANISH FORK, UTAH 84660 (801) 798-2550

INDUSTRIAL PARK LIFTSTATION

ELEVATIONS

DESIGNED BY	CHECKED BY	DRAWN BY
BBH	IGP	CRP
DATE	PROJECT #	SCALE
7-96		NOTED
DRAWING #	SHEET #	
SH-3	3 OF 13	



LOWER FLOOR

SCALE: 1/2" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER 4870 BRUCE B. HALL STATE OF UTAH

REVISION	DATE	BY

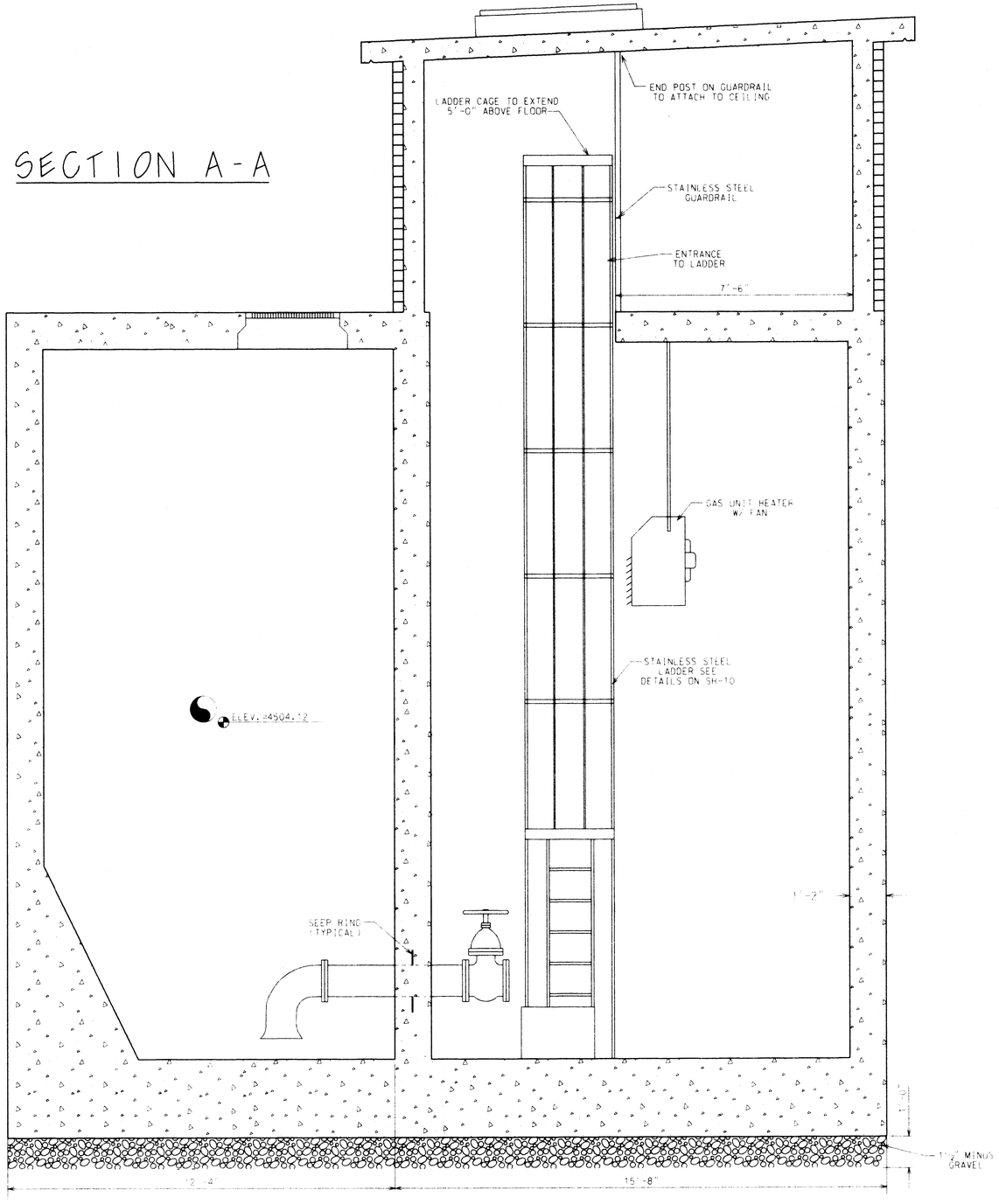
HALL ENGINEERING
CONSULTING ENGINEERS
1445 NORTH MAIN SPANISH FORK, UTAH 84660 (801) 798-2550

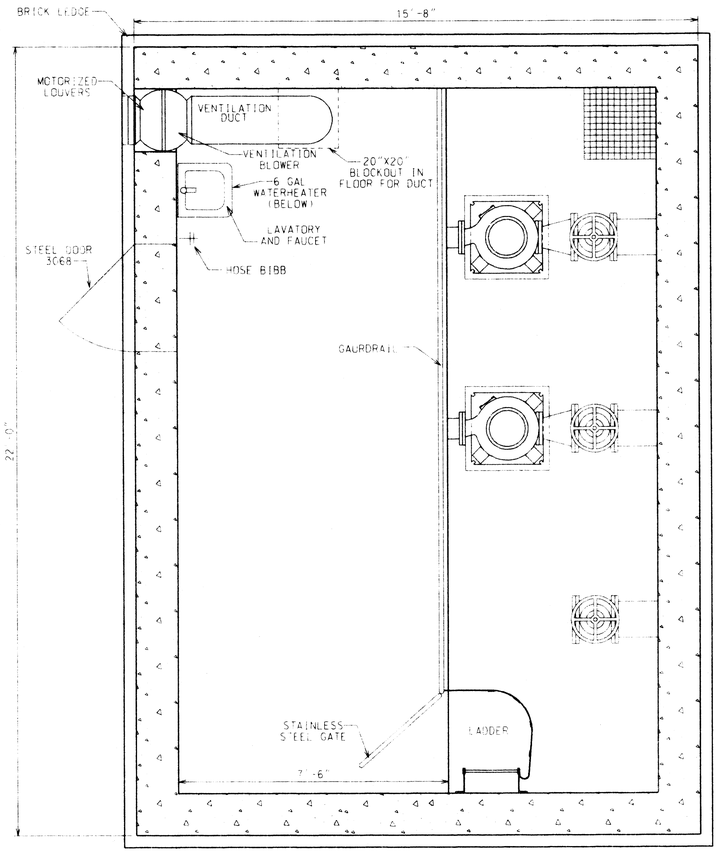
INDUSTRIAL PARK LIFT STATION

PLAN VIEW- LOWER FLOOR

DESIGNED BY	CHECKED BY	DRAWN BY
BBH	IGP	SDP
DATE	PROJECT #	SCALE
7-96		NOTED
DRAWING #	SHEET #	
SH-4	4 OF 13	

SECTION A-A





UPPER FLOOR

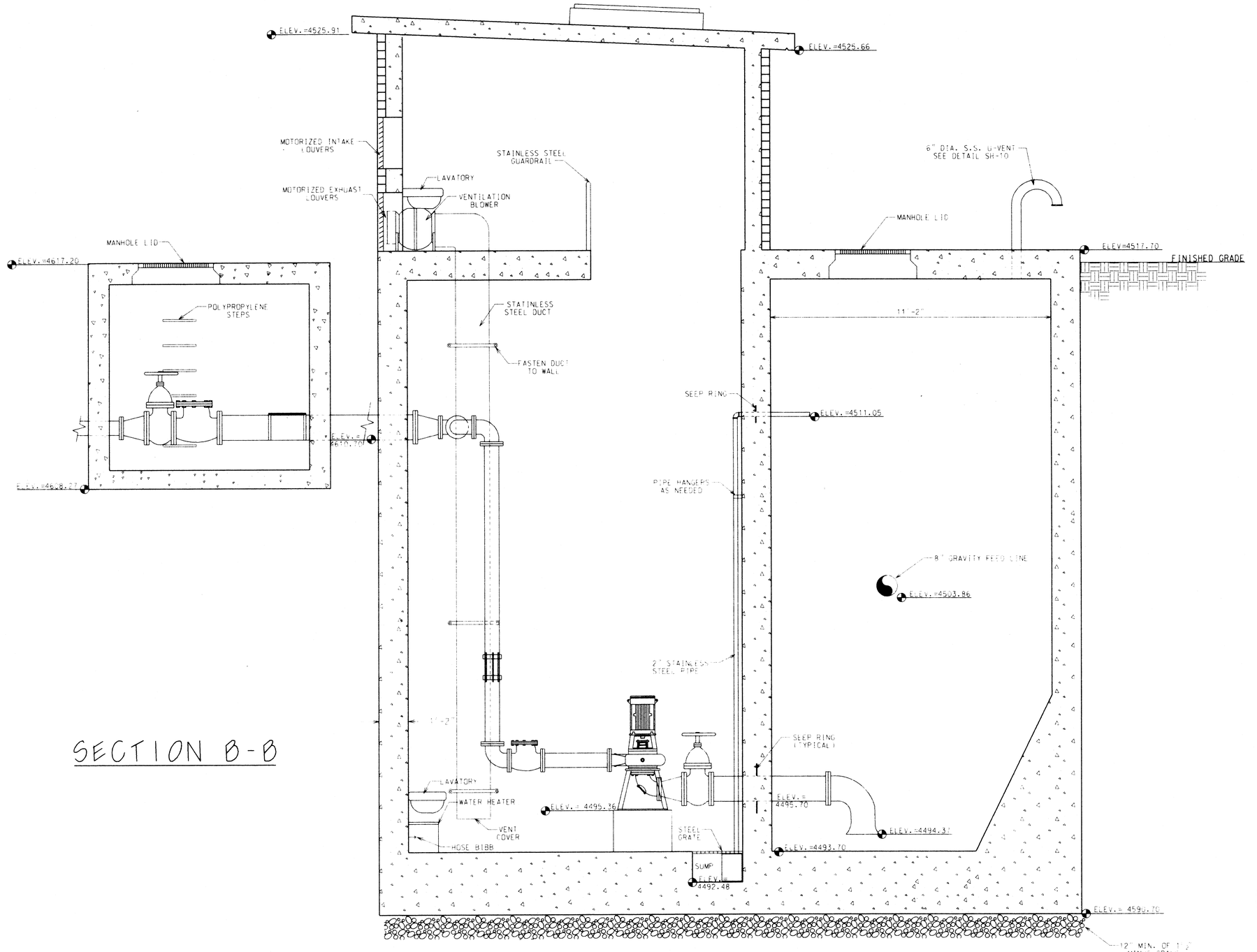
REVISION	DATE	BY

HALL ENGINEERING
CONSULTING ENGINEERS
1445 NORTH MAIN SPANISH FORK, UTAH 84660 (801) 798-2550

INDUSTRIAL PARK LIFTSTATION

SECTION VIEW A-A/ UPPER FLOOR PLAN

DESIGNED BY BBH	CHECKED BY IGP	DRAWN BY SDP	
DATE 7-96	PROJECT #	SCALE NOTED	
DRAWING # SH-5	SHEET # 5 OF 13		



SECTION B-B

REGISTERED PROFESSIONAL ENGINEER 4870 BRUCE B. HALL STATE OF UTAH

REVISION	DATE	BY

HALL ENGINEERING

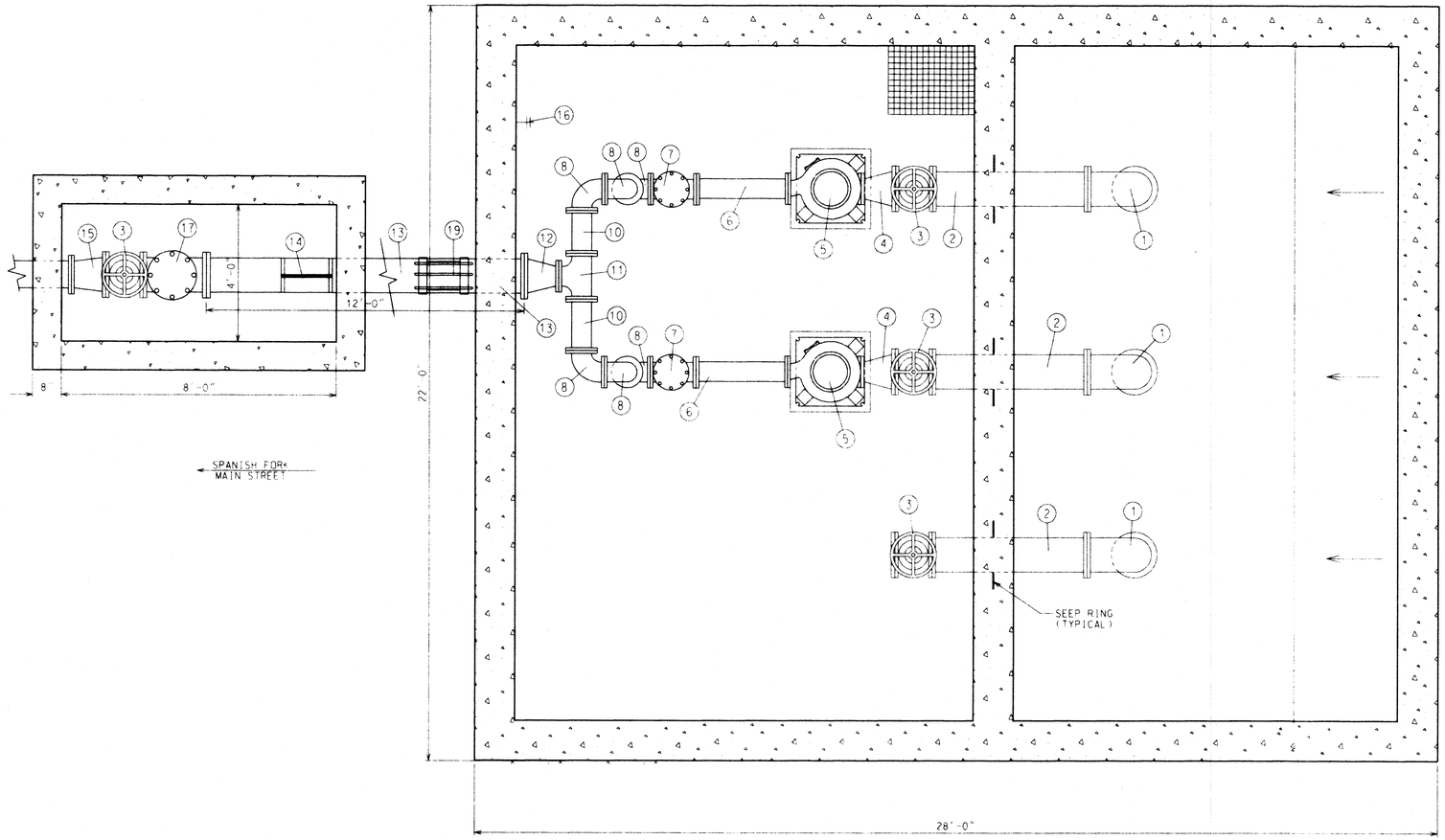
CONSULTING ENGINEERS

1445 NORTH MAIN SPANISH FORK, UTAH 84660 (801) 798-2550

INDUSTRIAL PARK LIFT STATION

PROFILE VIEW

DESIGNED BY	CHECKED BY	DRAWN BY
BBH	IGP	SDP/CRP
DATE	PROJECT #	SCALE
6-96		NOTED
DRAWING #	SHEET #	
SH-6	6 OF 13	



Valve & Piping Schedule

No.	DESCRIPTION	SIZE	FITTING
1	90 DEGREE LONG RADIUS BEND W/FLARED END	10"	FLG
2	SPOOL- LENGTH=4'-6"	10"	FLG
3	GATE VALVE W/HAND OPERATOR	10"	FLG
4	REDUCER	10" X 6"	FLG
5	PUMP (BY OWNER)		FLG
6	SPOOL- LENGTH =32"	6"	FLG
7	HORIZONTAL SWING CHECK VALVE	6"	FLG
8	90 DEGREE BEND	6"	FLG
9	SPOOL- LENGTH AS REQUIRED	6"	FLGXPE
10	SPOOL- LENGTH= 18"	6"	FLG
11	TEE	6"	FLG
12	REDUCER	6" X 10"	FLG
13	SPOOL- LENGTH AS REQUIRED	10"	FLGXPE
14	FLOW METER (BY OWNER)		
15	REDUCER	10" X 8"	FLG
16	HOSE BIBB	¾"	THD
17	HORIZONTAL SWING CHECK VALVE	10"	FLG
18	DRESSER COUPLING	6"	
19	DRESSER COUPLING	10"	

LOWER FLOOR

SCALE: 1/2" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER
4870
BRUCE B. HALL
STATE OF UTAH

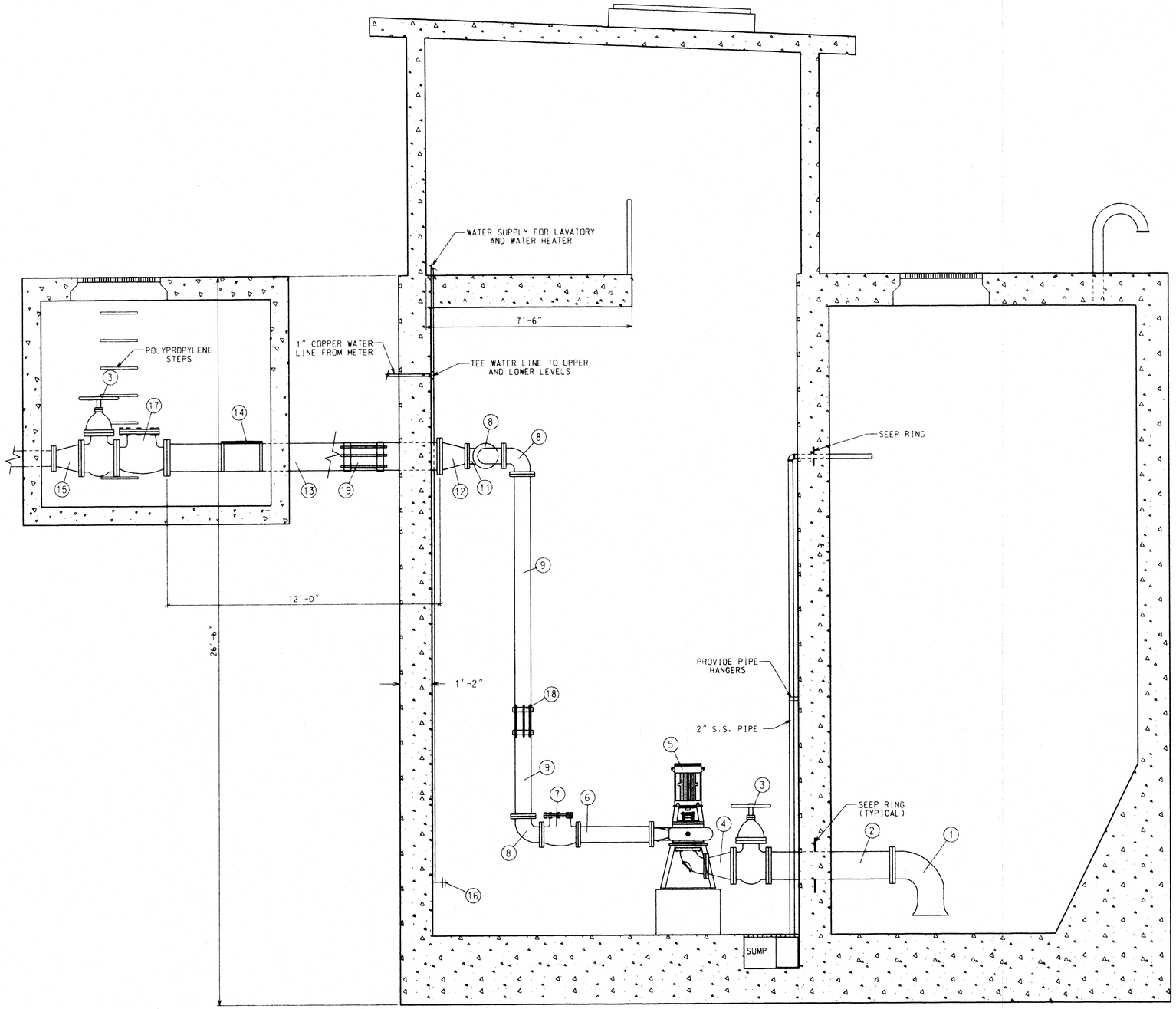
REVISION	DATE	BY

HALL ENGINEERING
CONSULTING ENGINEERS
1445 NORTH MAIN SPANISH FORK, UTAH 84660 (801) 798-2550

INDUSTRIAL PARK LIFT STATION

PIPING SCHEDULE - PLAN VIEW

DESIGNED BY	CHECKED BY	DRAWN BY
BBH	IGP	SDP
DATE: 6-96	PROJECT #:	SCALE: NOTED
DRAWING #: SH-7	SHEET #: 7 OF 13	



Valve & Piping Schedule

No.	DESCRIPTION	SIZE	FITTING
1	90 DEGREE LONG RADIUS BEND W/ FLARED END	10"	FLG
2	SPOOL- LENGTH-4'-6"	10"	FLG
3	GATE VALVE W/HAND OPERATOR	10"	FLG
4	REDUCER	10" X 6"	FLG
5	PUMP (BY OWNER)		FLG
6	SPOOL- LENGTH- 32"	6"	FLG
7	HORIZONTAL SWING CHECK VALVE	6"	FLG
8	90 DEGREE BEND	6"	FLG
9	SPOOL- LENGTH AS REQUIRED	6"	FLGXPE
10	SPOOL- LENGTH- 18"	6"	FLG
11	TEE	6"	FLG
12	REDUCER	6" X 10"	FLG
13	SPOOL- LENGTH AS REQUIRED	10"	FLGXPE
14	FLOW METER (BY OWNER)		
15	REDUCER	10" X 8"	FLG
16	HOSE BIBB	¾"	THD
17	HORIZONTAL SWING CHECK VALVE	10"	FLG
18	DRESSER COUPLING	6"	
19	DRESSER COUPLING	10"	

PIPING SCHEDULE

SCALE: 1/2" = 1'-0"

REGISTERED PROFESSIONAL ENGINEER 4870 BRUCE B. HALL STATE OF UTAH

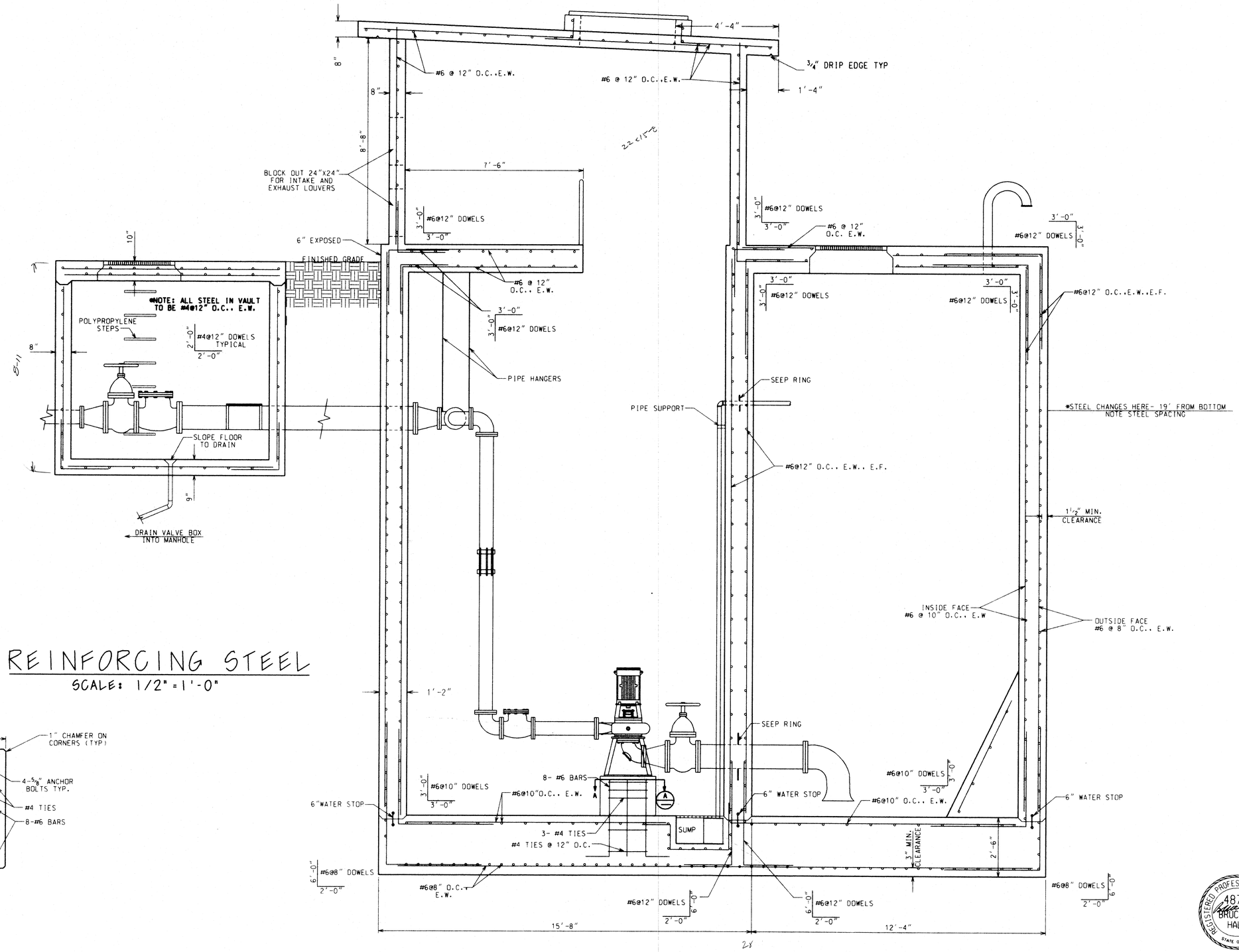
REVISION	DATE	BY

HALL ENGINEERING
CONSULTING ENGINEERS
1445 NORTH MAIN SPANISH FORK, UTAH 84660 (801) 798-2550

INDUSTRIAL PARK LIFT STATION

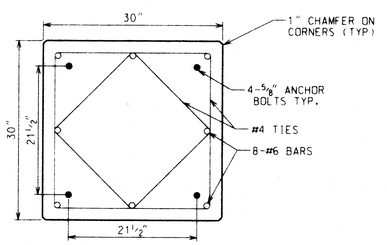
PIPING SCHEDULE - PROFILE VIEW

DESIGNED BY BBH	CHECKED BY IGP	DRAWN BY SDP/CRP
DATE 6-96	PROJECT #	SCALE NOTED
DRAWING # SH-8	SHEET # 8 OF 13	



REINFORCING STEEL

SCALE: 1/2" = 1'-0"



DETAIL A-A

SCALE: 1"=1'-0"

REVISION	DATE	BY

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CONSULTING ENGINEERS
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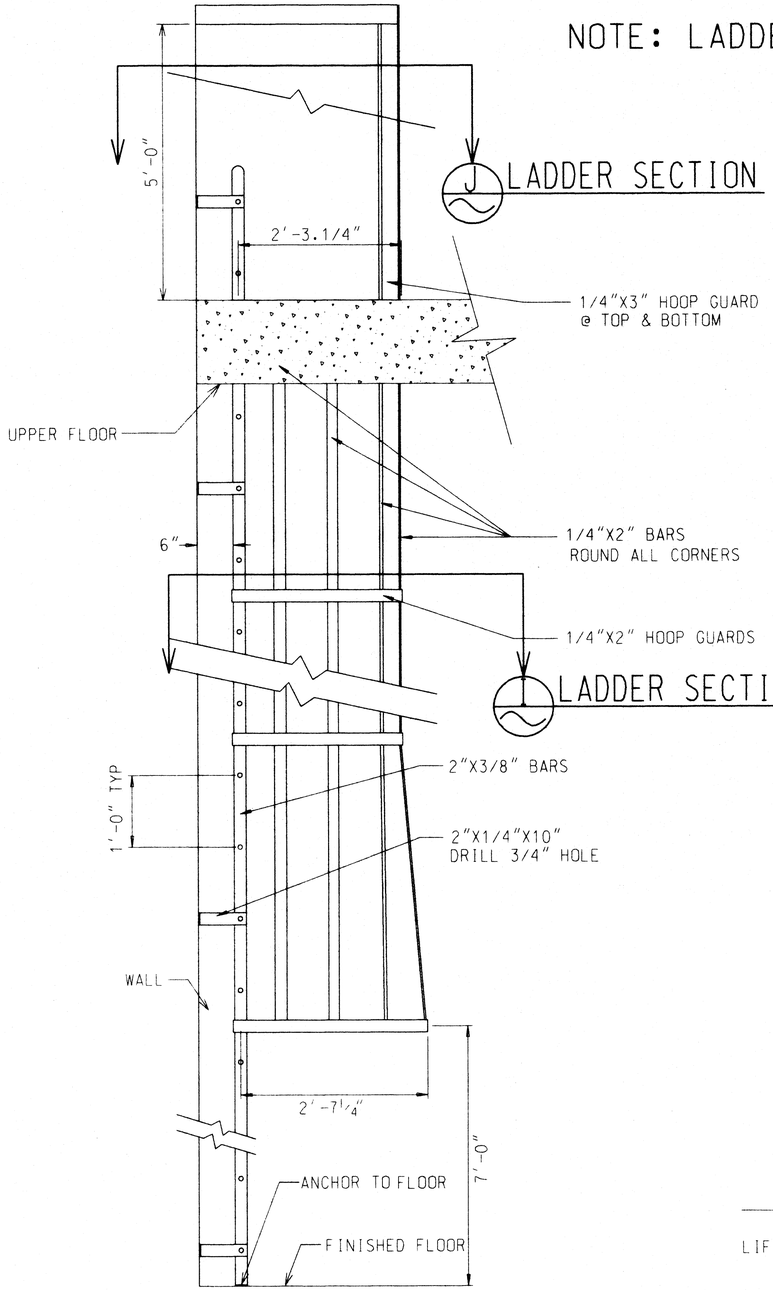
INDUSTRIAL PARK LIFT STATION

REINFORCING STEEL

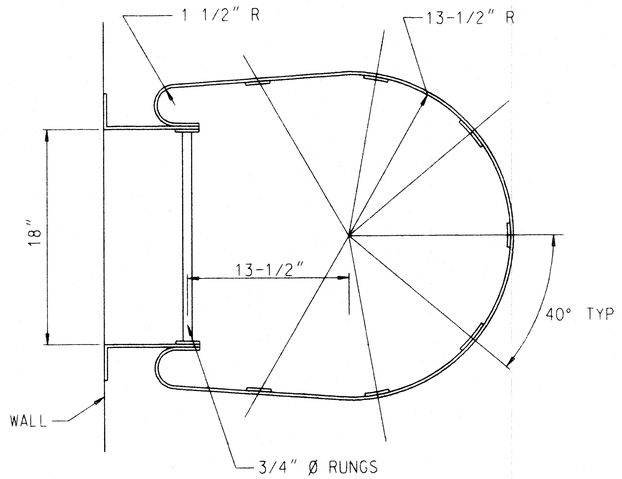
DESIGNED BY	CHECKED BY	DRAWN BY
BBH	IGP	SDP
DATE	PROJECT #	SCALE
7-96		NOTED
DRAWING #	SHEET #	
SH-9		9 OF 13

REGISTERED PROFESSIONAL ENGINEER 4870 BRUCE B. HALL STATE OF UTAH

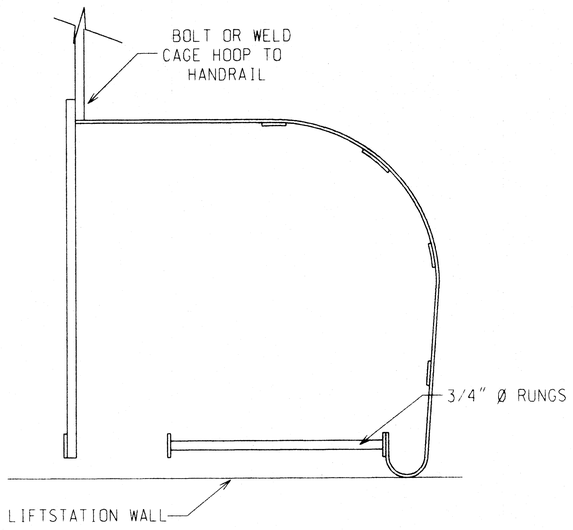
NOTE: LADDER TO BE STAINLESS STEEL



J LADDER SECTION

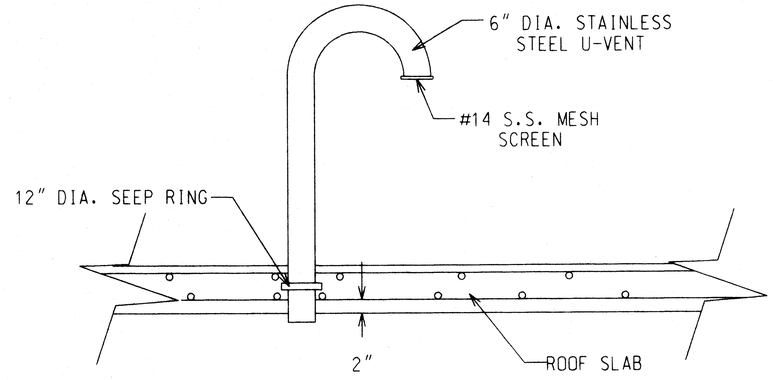


I LADDER SECTION
SCALE:1/2"=1'-0"

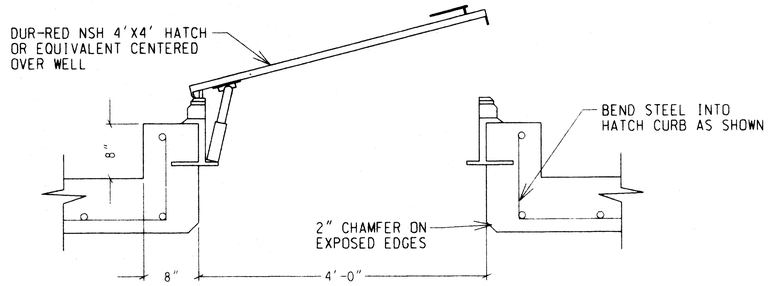


J LADDER SECTION
SCALE:1/2"=1'-0"

H LADDER DETAIL
SCALE:1/4"=1'-0"



E SH-6 6" U-VENT
NTS



HATCH DETAIL
SCALE:1/2"=1'-0"

REGISTERED PROFESSIONAL ENGINEER 4870 BRUCE B. HALL STATE OF UTAH

REVISION	DATE	BY

HALL ENGINEERING
CONSULTING ENGINEERS
765 NORTH MAIN SPANISH FORK, UTAH 84660 (801) 798-2550

INDUSTRIAL PARK LIFT STATION

LADDER, HATCH AND VENT DETAILS

DESIGNED BY	CHECKED BY	DRAWN BY
BBH	IGP	SDP
DATE: 7-96	PROJECT #:	SCALE: NOTED
DRAWING #: SH-10	SHEET #: 10 OF 13	

CONDUIT CONDUCTORS SCHEDULE

TYPE	AMP.	COND SIZE	CONDUCTOR QUAN.	SIZE	INSUL.
212	20	3/4	2	12	THHN
312	20	3/4	3	12	THHN
412	20	3/4	4	12	THHN
20	30	3/4	2	10	THHN
30	30	3/4	3	10	THHN
40	30	3/4	4	10	THHN
28	50	3/4	2	8	THHN
38	50	3/4	3	8	THHN
48	50	1	4	8	THHN
26	65	1	2	6	THHN
36	65	1	3	6	THHN
46	65	1	4	6	THHN
34	85	1	3	4	THHN
44	85	1 1/4	4	4	THHN
32	115	1 1/4	3	2	THHN
42	115	1 1/2	4	2	THHN
31	130	1 1/4	3	1	THHN

PROVIDE GROUNDING CONDUCTORS AS REQUIRED BY NEC 250-95.

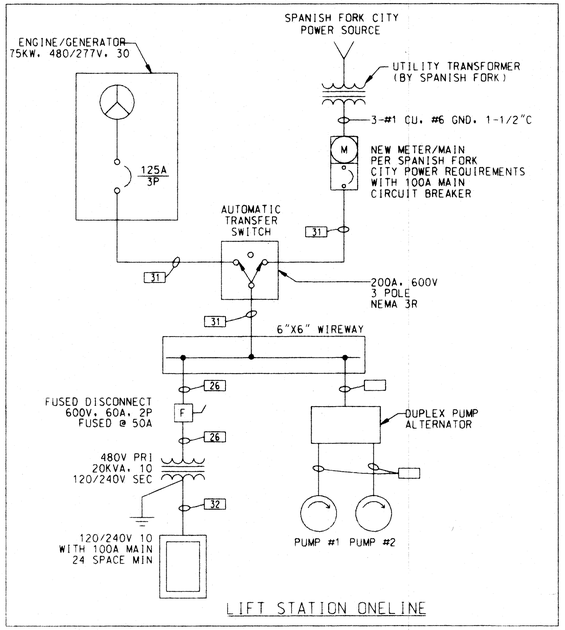
NOT ALL CONDUCTORS/CONDUITS ARE USED ON THIS PROJECT.

EQUIPMENT SCHEDULE

SYM	DESCRIPTION	VOLT/PH	STARTER	HP/WATT	FLA
EF-1	EXHAUST FAN	120V/1PH	NEMA 1 FVNR	1/3HP	7.2
SP-1	SUMP PUMP	120V/1PH	INCLUDED	1300W	11
HF-1	HEATER FAN	120V/1PH	INCLUDED	360W	3
DA-1	DUPLEX ALTERNATOR	480V/3PH	NEMA SIZE 2		42
WH-1	WATER HEATER	240V/1PH	N/A	2500W	10.4
WH-2	WATER HEATER	240V/1PH	N/A	2500W	10.4
ML-1	MOTORIZED LOUVER	120V/1PH	N/A	800W	7.2
ML-2	MOTORIZED LOUVER	120V/1PH	N/A	800W	7.2

FIXTURE SCHEDULE

SYM	MANUFACTURER DESCRIPTION	NAME	CATALOG NUMBER	V/A	TYPE	MOUNTING	REMARKS
F1	FLUORESCENT SURFACE MOUNT 2-TUBE	LITHONIA	LB-232-120-EB	75	2-F32T8	CEILING	ELECTRONIC BALLAST
F2	OUTSIDE WALL-PAK	LITHONIA	TWL-355-120-DBL	40	35W HPS	WALL	PHOTOCELL & SWITCH OPERATED.
F3	WALL MOUNT	LITHONIA	VR4C	115	100W MH	WALL	



LIFT STATION ONELINE

GENERAL NOTES:

1. VERIFY ALL EQUIPMENT DIMENSIONS AND LOCATIONS BEFORE BEGINNING ROUGH-IN. CONSULT ALL APPLICABLE CONTRACT DRAWINGS AND SHOP DRAWINGS TO INSURE NEC CODE CLEARANCES REQUIRED AROUND ALL ELECTRICAL EQUIPMENT.
2. CONTRACTOR SHALL VERIFY ALL ELECTRICAL LOADS (VOLTAGE, PHASE, CONNECTION REQUIREMENTS, ETC.) OF EQUIPMENT FURNISHED BEFORE BEGINNING ROUGH-IN.
3. SEE APPLICABLE SHOP DRAWINGS FOR ROUGH-IN LOCATION OF ALL EQUIPMENT, WIRING DEVICES, ETC.
4. THE ELECTRICAL CONTRACTOR SHALL NOTIFY AND COOPERATE WITH THE MECHANICAL CONTRACTOR SUCH THAT NO PIPING, OR EQUIPMENT FOREIGN TO THE OPERATION OF THE ELECTRICAL EQUIPMENT SHALL BE PERMITTED TO BE INSTALLED IN, ENTER OR PASS THROUGH ELECTRICAL ROOMS OR SPACES; OR ABOVE OR BELOW ELECTRICAL EQUIPMENT IN OTHER AREAS.
5. ALL PENETRATIONS OF FLOORS, WALLS AND CEILINGS SHALL BE SEALED WITH APPROVED MATERIAL.
6. FOR PACKAGE EQUIPMENT PROVIDED ON THE PROJECT, SOME CONDUITS AND WIRES ARE SHOWN ON THE DRAWINGS, BUT IT IS EXPECTED THAT SOME ADDITIONAL CONDUITS AND WIRES MAY BE REQUIRED BY EQUIPMENT MANUFACTURERS TO COMPLETE INSTALLATION. IT IS INCUMBENT UPON THE GENERAL CONTRACTOR TO COORDINATE THIS REQUIREMENT WITH HIS SUBCONTRACTORS TO MAKE SURE THAT EQUIPMENT SUPPLIER PROVIDED ALL NECESSARY ELECTRICAL INFORMATION TO ELECTRICAL SUBCONTRACTOR FOR INCLUSION WHETHER SHOWN OR NOT SHOWN ON THE DRAWINGS.
7. IF OTHER THAN FIRST NAMED EQUIPMENT IS USED, IT SHALL BE CAREFULLY CHECKED FOR ELECTRICAL REQUIREMENTS AND CONTROL REQUIREMENTS OF ALTERNATE EQUIPMENT. SHOULD CHANGES OR ADDITIONS OCCUR IN ELECTRICAL WORK, OR THE WORK OF OTHER CONTRACTORS BE REVISED BY THE ALTERNATE EQUIPMENT, THE COST OF ALL CHANGES SHALL BE BORNE BY THE ELECTRICAL CONTRACTOR.

LEGEND

CONDUIT
- CONDUIT BELOW FLOOR OR GRADE
- SOLID CONDUIT IN CEILING OR WALL
- CAPPED CONDUIT
- CONDUIT STUBUP
- CONDUIT BELOW SLAB
- CIRCUIT HOMERUN
- LIQUIDTIGHT FLEXIBLE METAL CONDUIT

FIXTURES
- 1 X 4 FLUORESCENT
- WALL MOUNTED HID

RECEPTACLES
- DUPLEX RECEPTACLE (120V)
- WP DUPLEX RECEPTACLE (120V) W/ WEATHERPROOF ENCLOSURE AND GROUND FAULT CIRCUIT INTERRUPTER

GENERAL
- DETAIL CALLOUT
- EQUIPMENT CALLOUT
- REFERENCE NOTE CALLOUT

WIRING DEVICES
- ELECTRICAL CONNECTION
- JUNCTION BOX
- THERMOSTAT

SWITCHES:
- S SINGLE POLE TOGGLE

DISCONNECTS:
- PANELBOARD
- F FUSED DISCONNECT

ONE-LINE SYMBOLS
- GENERATOR
- M METER/MAIN SOCKET
- CIRCUIT BREAKER
- TRANSFORMER
- XXX WIRE CONDUCTOR SIZE
- GROUND
- HP HP MOTOR

HVAC
- F EXHAUST FAN MOTOR
- THERMOSTAT SWITCH
- HAND OFF AUTO THREE POSITION SELECTOR SWITCH
- M MOTORIZED LOUVER
- ULTRASONIC LEVEL SENSOR

SCHEMATIC SYMBOLS
- M EXHAUST FAN COIL
- R1 RELAY
- R FLOW INDICATOR
- LEVEL SWITCH
- FUSE
- OVERLOAD
- NORMALLY OPENED
- NORMALLY CLOSED

PANEL SCHEDULE "A"

LOCATION: LIFT STATION
DIMENSIONS:
MOUNTING: SURFACE
FEED: TOP

TYPE: NEMA: 1

100 AMPS M.L.O.
100 M.C.B.
10,000 A.I.C.

VOLTS: 120/240
PHASE: 1
WIRES: 3

X ISOLATED GROUND BUS
BONDED GROUND BUS
INTEGRAL SURGE PROTECTION

BRKR A	P	DESCRIPTION	WIRE SIZE	LTS	DEVICES CO	MIS	CIRCUIT WATTS	NO	PHASE LOADS A	B	C	NO	CIRCUIT WATTS	DEVICES LTS	CO	MIS	WIRE SIZE	DESCRIPTION	BRKR A	P
20	1	EF-1	20		1		800	1	1000			2	200		1		212	RTU CONTROLS	20	1
20	1	HEATER FAN	212		1		360	3		1660		4	1300		1		212	SUMP PUMP	20	1
20	1	RECEPTACLES	212	4			800	5	2050			6	1250		1		212	WH-1	20	2
20	1	LIGHTS	212	8			600	7		1850		8	1250		-		-	-	-	-
20	1	FLOW DISPLAY	212		1		200	9	1450			10	1250		1		212	WH-2	20	2
20	1	ML-1, ML-2	212		2		1600	11		2850		12	1250		-		-	-	-	-
20	1	BATT.-CHARGER & INSTR.	212		1		1200	13	3000			14	1800		1		212	FUEL TANK HEATER	20	1
20	1	ENGINE BLOCK HEATER	212		1		1800	15		1800		16						SPARE	20	1
20	1	SPARE						17	0			18						SPACE		
20	1	SPARE						19		0		20						SPACE		
		SPARE						21	0			22						SPACE		
		SPACE						23		0		24						SPACE		
					TOTALS:				7500	8160										

TOTAL LOAD: 15,660 WATTS
TOTAL AMPS: 65.3 AMPS
DESIGN LOAD (125%): 19,575 WATTS
DESIGN AMPS (125%): 81.6 AMPS

REGISTERED PROFESSIONAL ENGINEER 4870 Bruce B Hall STATE OF UTAH

HPE INCORPORATED
HEGERHORST POWER ENGINEERING INCORPORATED
92 SOUTH STATE ROAD
LINDON, UTAH 84042
(801) 785-7455
FAX (801) 785-2415

REGISTERED PROFESSIONAL ENGINEER NO. 86-171214-2202 KEITH B. HEGERHORST STATE OF UTAH

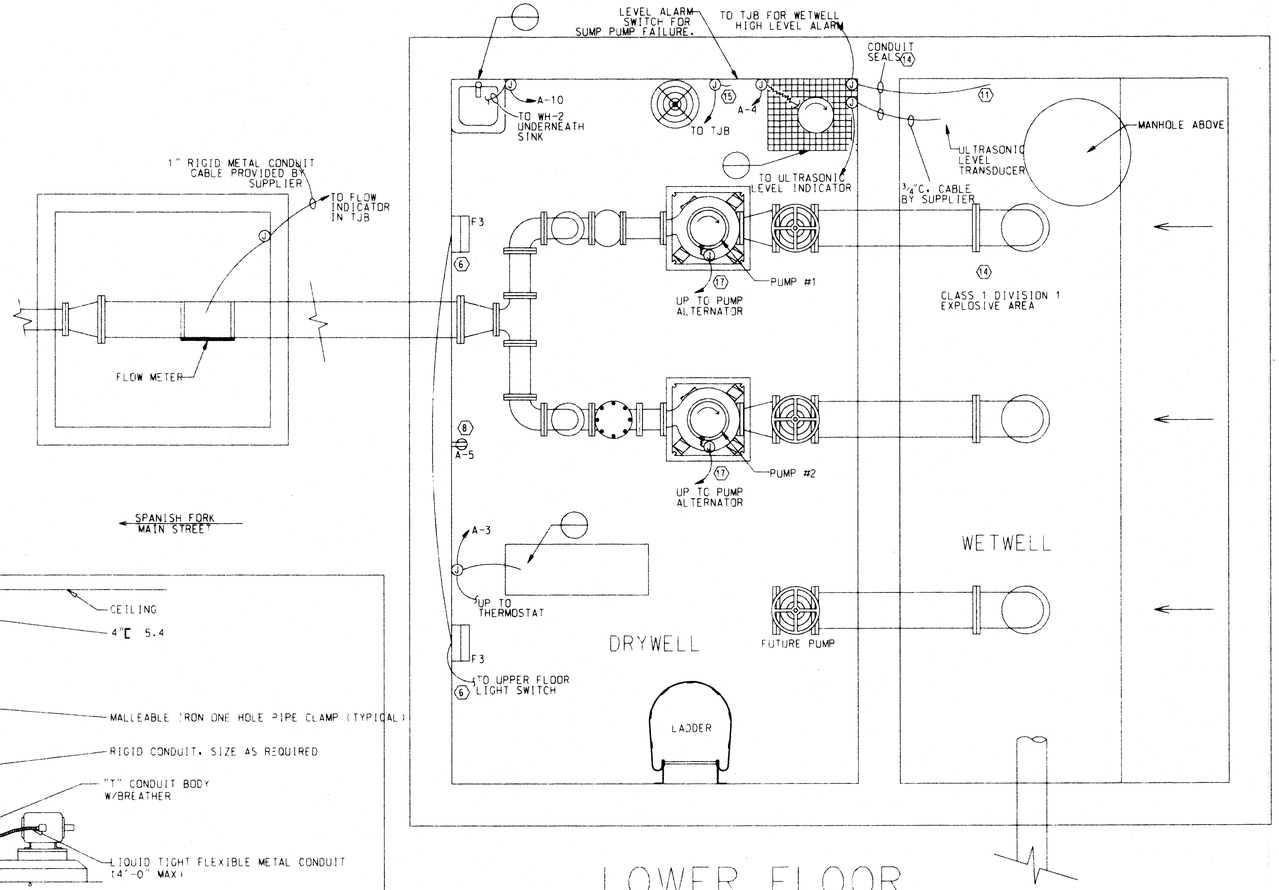
REVISION	DATE	BY

HALL ENGINEERING
CONSULTING ENGINEERS
1445 NORTH MAIN SPANISH FORK, UTAH 84660 (801) 798-2550

INDUSTRIAL PARK LIFTSTATION

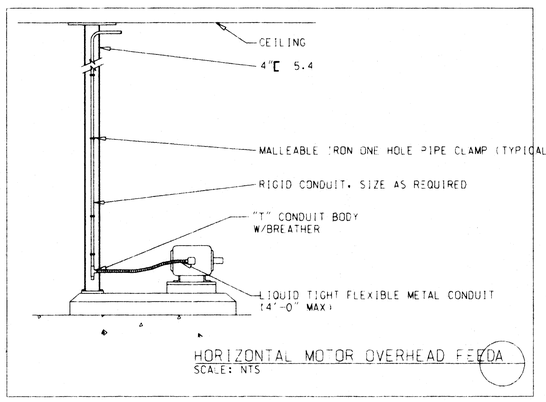
ONE LINE DIAGRAM

DESIGNED BY	CHECKED BY	DRAWN BY
AH	KH	JT
DATE: 7-16-96	PROJECT #: 96006	SCALE: NO SCALE
DRAWING #: E1	SHEET #: 11 OF 13	



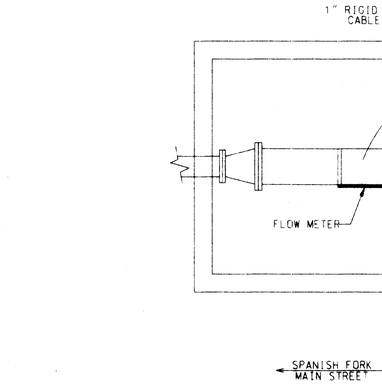
LOWER FLOOR

SCALE: 1/2"=1'0"



HORIZONTAL MOTOR OVERHEAD FEED

SCALE: NTS



CONDUIT PENETRATION DETAIL B

AT NEW WALL OR SLAB

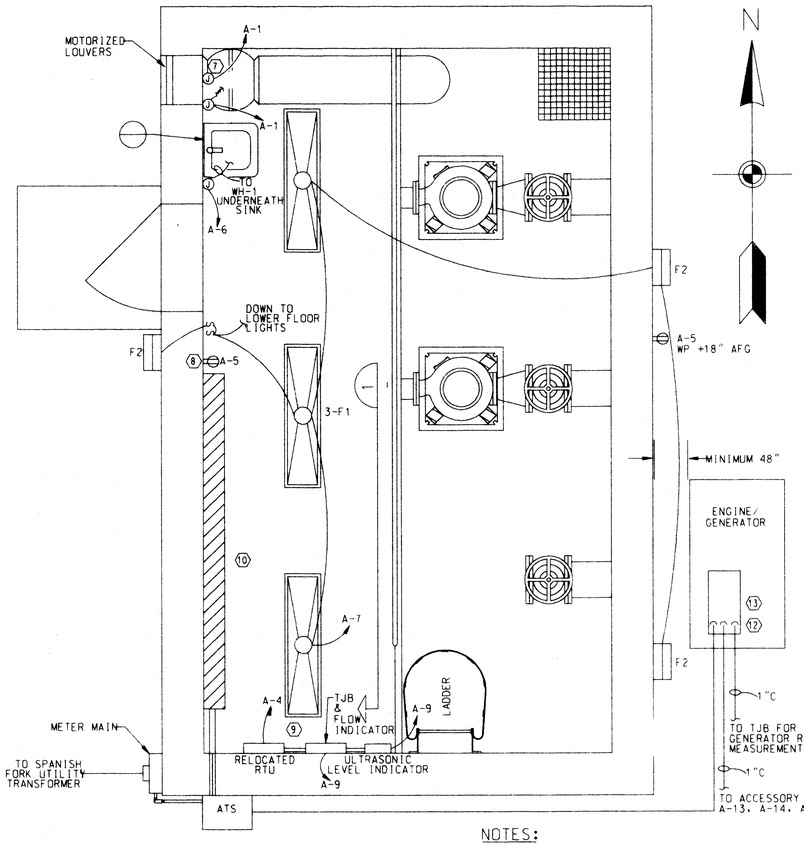
SCALE: NTS

TYPICAL CONDUIT RACK DETAIL

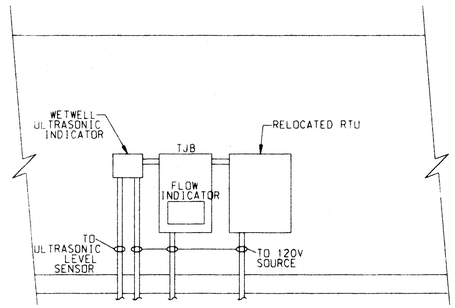
SCALE: NTS

ELEVATION 1

NO SCALE



UPPER FLOOR



ELEVATION 2

NO SCALE

NOTES:

1. LEVEL SWITCH LOCATIONS TO BE DETERMINED BY ENGINEER DURING CONSTRUCTION.
2. PROVIDE APPROVED PHASE FAILER, UNDER/OVER VOLTAGE AND MOTOR SURGE PROTECTION FOR PUMP MOTORS.
3. STAGGER START MOTORS BY 5 SECONDS TO MINIMIZE HIGH INRUSH CURRENT.
4. CONTRACTOR SHALL PROVIDE APPROPRIATE SEALS FROM PUMP MOTOR TO DUPLEX ALTERNATOR.
5. COORDINATE MOUNTING HEIGHT AND LOCATION OF ALL RECEPTACLES AND SWITCHES WITH OWNER PRIOR TO INSTALLATION.
6. COORDINATE WALL LIGHT LOCATION WITH GENERAL CONTRACTOR TO AVOID PLACING LIGHTS DIRECTLY BEHIND GAS HEATER.
7. INSTALL J-BOX TO FEED TWO MOTORIZED LOUVERS.
8. INSTALL RECEPTACLES +36" ABOVE FINISHED FLOOR (TYP).
9. SEE ELEVATION 2.
10. ACTUAL ELECTRICAL EQUIPMENT DIMENSIONS MAY VARY FROM EQUIPMENT DIMENSIONS SHOWN IN PLANS.
11. INSTALL A LEVEL TIP SWITCH FOR HIGH LEVEL ALARM. ROUTE CONDUCTORS TO TJB.
12. ENGINE/GENERATOR SHALL INCLUDE RUN TIME MEASUREMENT CAPABILITIES.
13. COORDINATE WITH ENGINE/GENERATOR SUPPLIER FOR EXACT STUB-UP LOCATIONS AND SIZE OF CEMENT PAD FOR ENGINE/GENERATOR.
14. PROVIDE APPROPRIATE CONDUIT SEALS APPROVED FOR CLASS 1 DIVISION 1 HAZARDOUS AREA.
15. SEE DETAIL D ON DRAWING E3.
16. SEE DETAIL E ON SHEET E3 FOR LABELING EQUIPMENT.
17. SEE DETAIL A.
18. FOR CONDUIT PENETRATION SEE DETAIL B.
19. PROVIDE ADEQUATE SUPPORT FOR ALL CONDUITS. SEE DETAIL C.
20. SEE DETAIL F.

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REGISTERED PROFESSIONAL ENGINEER No. 161214-2202 KEITH B. HEGERHORST STATE OF UTAH

REVISION	DATE	BY

HALL ENGINEERING

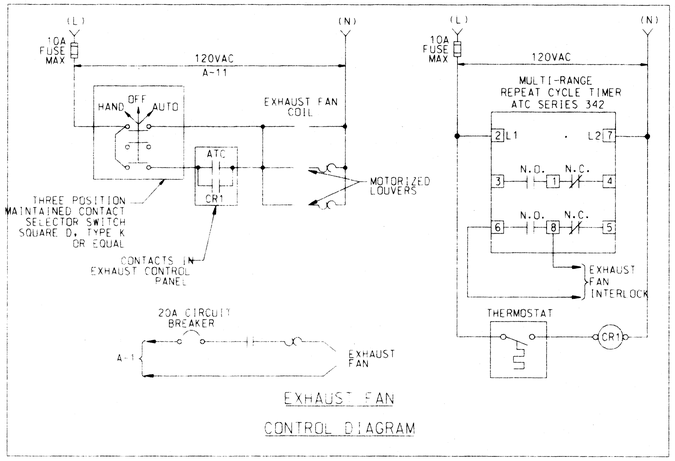
CONSULTING ENGINEERS

1445 NORTH MAIN SPANISH FORK, UTAH 84660 (801) 798-2550

INDUSTRIAL PARK LIFTSTATION

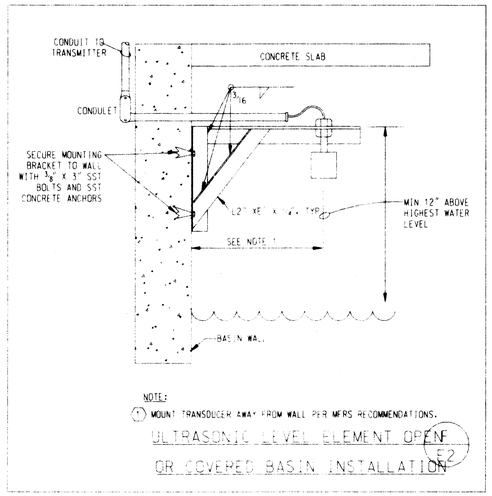
ELECTRICAL FLOOR PLAN

DESIGNED BY	CHECKED BY	DRAWN BY
AH	KH	JT
DATE: 7-16-96	PROJECT #: 96006	SCALE: 1/2"=1'
DRAWING #: E2	SHEET #: 12 OF 13	



EXHAUST FAN

CONTROL DIAGRAM



NOTE:

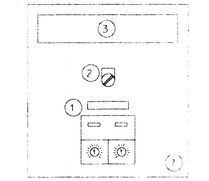
(1) MOUNT TRANSDUCER AWAY FROM WALL PER MFRS RECOMMENDATIONS.

ULTRASONIC LEVEL ELEMENT OPEN OR COVERED BASIN INSTALLATION

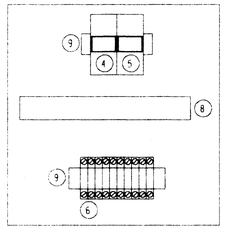
E2

EQUIPMENT SCHEDULE, EXHAUST CONTROL PANEL

IDENT NO.	DEVICE TYPE	ENGRAVING	COLOR	REMARKS
(1)	MULTI-RANGE REPEAT CYCLE	EXHAUST FAN TIMER	N/A	AUTOMATIC TIMING & CONTROLS 342
(2)	SELECTOR SWITCH	HAND-OFF-AUTO	BLACK	SQUARE D, TYPE K
(3)	NAMEPLATE	EXHAUST CONTROL PANEL	BLACK	-
(4)	CONTROL RELAY	CR1	N/A	SQUARE D, TYPE R
(5)	CONTROL RELAY	SPARE	N/A	SQUARE D, TYPE R
(6)	TERMINAL BLOCK	-	N/A	ENTRELEC, M4/6
(7)	ELECTRICAL ENCLOSURE	-	N/A	HOFFMAN
(8)	PLASTIC WIREWAY	-	-	-
(9)	DIN MOUNTING RAIL	-	-	-

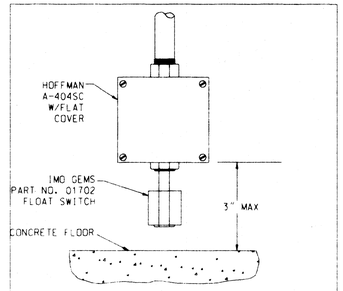


EXHAUST CONTROL PANEL



INTERIOR (SUB PANEL)

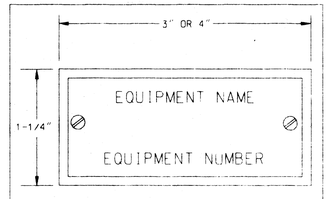
EXHAUST CONTROL



FLOOR HIGH WATER ALARM (1) E2

LEVEL SWITCH

SCALE: NTS



NOTES:

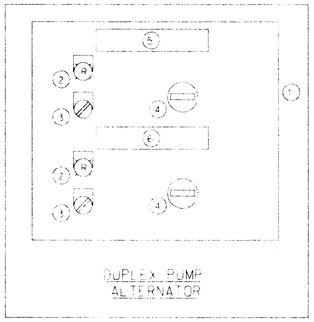
1. ALL LETTERS TO BE 1/4 UNLESS NOTED OTHERWISE.
2. ALL NAMEPLATES TO BE MOUNTED ON THE VERTICAL CENTERLINE OF THE CUBICAL OR DEVICE.
3. ATTACH ALL NAMEPLATES WITH STAINLESS STEEL SCREWS.
4. PROVIDE BLANK NAMEPLATES FOR ALL SPARE AND FUTURE DEVICES.

NAMEPLATE DETAIL (2) E2

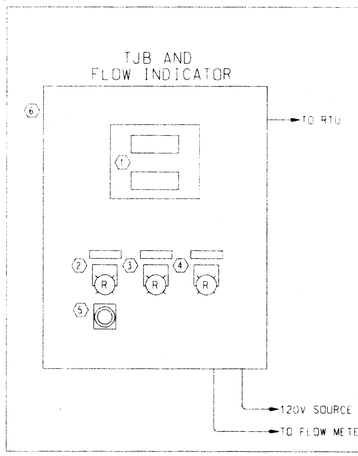
SCALE: NTS

EQUIPMENT SCHEDULE, DUPLEX PUMP ALTERNATOR CONTROL PANEL

IDENT NO.	DEVICE TYPE	ENGRAVING	COLOR	REMARKS
(1)	DUPLEX PUMP CONTROLLER	-	N/A	SQUARE D, 8941
(2)	INDICATOR LIGHT	PUMP ON	RED	SQUARE D, TYPE K
(3)	SELECTOR SWITCH	HAND-OFF-AUTO	BLACK	SQUARE D, TYPE R
(4)	ELAPSED TIME COUNTER	TOTAL RUNNING HOURS	BLACK	TIME TOTALIZER HK SERIES
(5)	NAMEPLATE	PUMP #1	BLACK	-
(6)	NAMEPLATE	PUMP #2	BLACK	-



DUPLEX PUMP ALTERNATOR

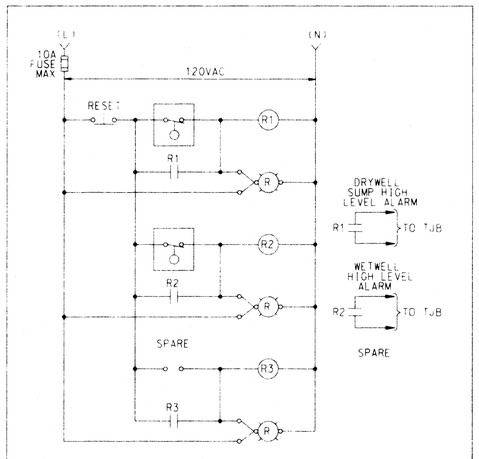


	DEVICE TYPE	ENGRAVING	COLOR	REMARKS
(1)	FLOW INDICATOR	GPM (TOP LABEL) TOTAL (BOTTOM LABEL)	N/A	CONTROLOTRON 990N
(2)	INDICATOR LIGHT	WETWELL HIGH LEVEL ALARM	WHITE	SQUARE D, TYPE K
(3)	INDICATOR LIGHT	DRYWELL SUMP HIGH LEVEL ALARM	WHITE	SQUARE D, TYPE K
(4)	INDICATOR LIGHT	SPARE	WHITE	SQUARE D, TYPE K
(5)	PUSH BUTTON MOMENTARY	ALARM OFF	RED	SQUARE D, TYPE K
(6)	ELECTRICAL ENCLOSURE	-	N/A	HOFFMAN

NOTES:

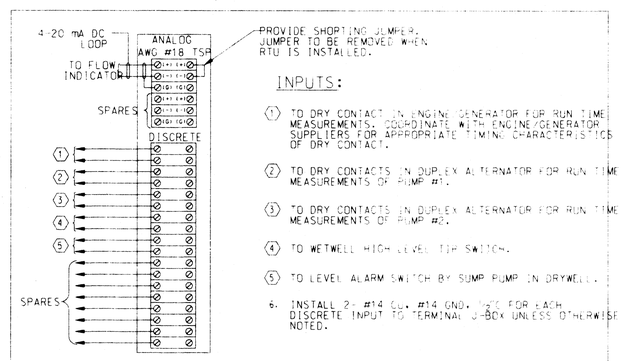
FLOW INDICATOR SHALL BE MOUNTED FLUSH WITH TJB PANEL DOOR. IT SHALL DISPLAY THE CURRENT GPM OF SEWAGE BEING PUMPED. FLOW INDICATOR SHALL CONTAIN A TOTALIZER COUNTER THAT DISPLAYS TOTAL SEWAGE PUMPED.

PROVIDE AND INSTALL THE NECESSARY RELAYS INSIDE TJB TO INITIATE AND MAINTAIN HIGH LEVEL ALARM SIGNALS TO RTU UNTIL ALARM IS RELEASED BY PRESSING THE "ALARM OFF" PUSH BUTTON ON TJB. EITHER THE WETWELL HIGH LEVEL TIP SWITCH OR THE DRYWELL SUMP HIGH LEVEL ALARM SWITCH SHALL INITIATE HIGH LEVEL ALARM.



HIGH LEVEL ALARM

CONTROL DIAGRAM



INPUTS:

(1) TO DRY CONTACT IN ENGINE GENERATOR FOR RUN TIME MEASUREMENTS. COORDINATE WITH ENGINE/GENERATOR SUPPLIERS FOR APPROPRIATE TIMING CHARACTERISTICS OF DRY CONTACT.

(2) TO DRY CONTACTS IN DUPLEX ALTERNATOR FOR RUN TIME MEASUREMENTS OF PUMP #1.

(3) TO DRY CONTACTS IN DUPLEX ALTERNATOR FOR RUN TIME MEASUREMENTS OF PUMP #2.

(4) TO WETWELL HIGH LEVEL TIP SWITCH.

(5) TO LEVEL ALARM SWITCH BY SUMP PUMP IN DRYWELL.

6. INSTALL 2 - #14 GA. #14 GND. PER FOR EACH DISCRETE INPUT TO TERMINAL J-BOX UNLESS OTHERWISE NOTED.

TERMINAL STRIP IN TJB

HPE INCORPORATED

HEGERHORST 92 SOUTH STATE ROAD
POWER ENGINEERING INCORPORATED
(INDON, UTAH 84042
(801) 785-7455
FAX (801) 785-2415

REVISION	DATE	BY

HALL ENGINEERING
CONSULTING ENGINEERS
1445 NORTH MAIN SPANISH FORK, UTAH 84660 (801) 798-2550

INDUSTRIAL PARK LIFTSTATION

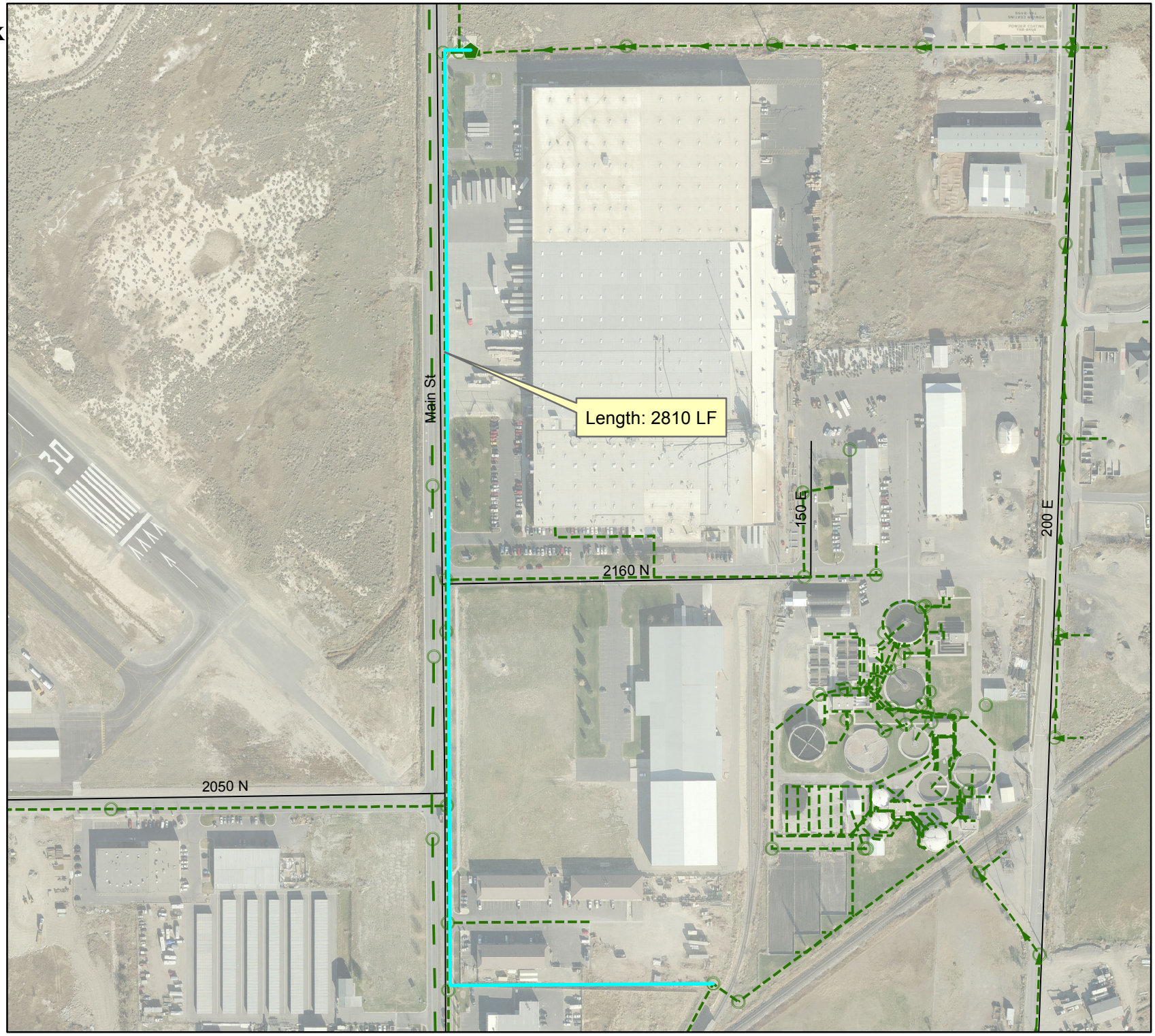
DETAILS, CONTROL DIAGRAM

DESIGNED BY	CHECKED BY	DRAWN BY
AH	KH	JT
DATE: 7-16-96	PROJECT #: 96006	SCALE: NO SCALE
DRAWING #: E3	SHEET #: 13 OF 13	

Industrial Park Force Main

1 Inch = 300 Feet

0 50100 200 300 Feet



17 January 2011

Spanish Fork City
40 South Main Street
Spanish Fork, UT 84660
(801) 798-5000

Performance Curves for the 610 Series

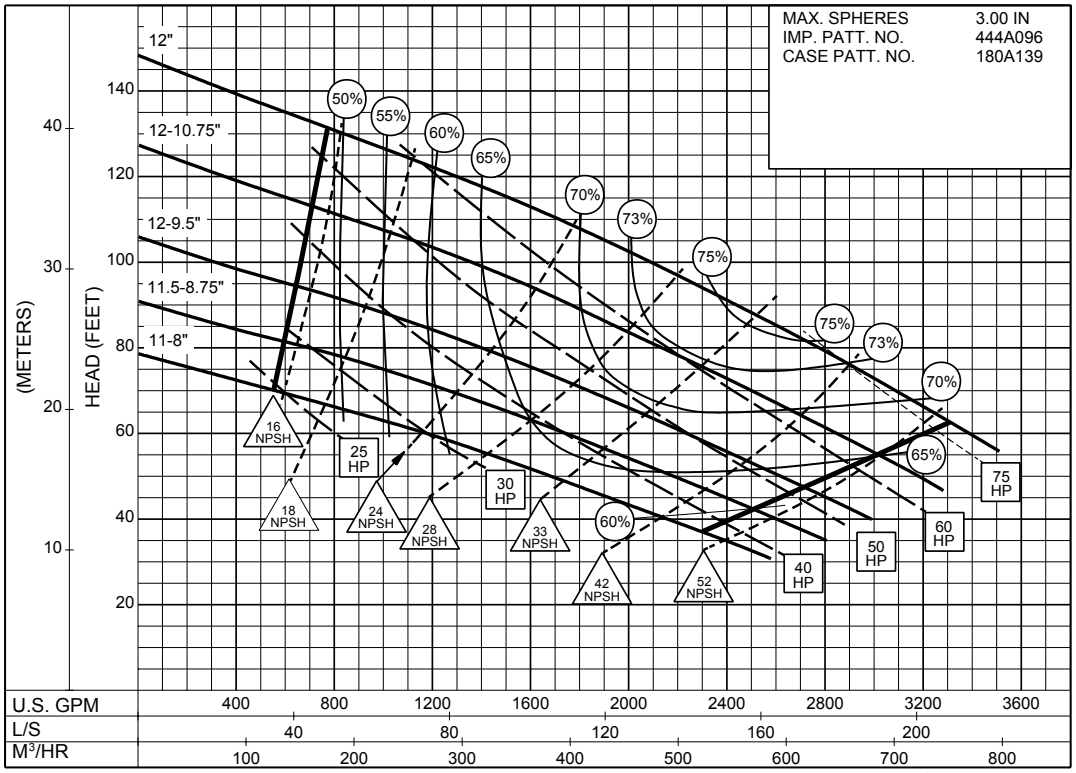
MODEL/SIZE	R.P.M.	CATALOG PAGE	PDF PAGE
6 x 6 x 12	1750/1150	401	2
6 x 6 x 12B	1750/1150	402	3
6 x 6 x 12B	875/700	403	4
6 x 6 x 12	875/700	404	5
6 x 8 x 15	1750/1150	405	6
6 x 8 x 15	875/700	406	7
6 x 8 x 15	580	407	8
6 x 8 x 18	1150/875	408	9
6 x 8 x 18	700/580	409	10
8 x 8 x 15A	1150/875	410	11
8 x 8 x 15A	700/580	411	12
8 x 10 x 18	1150/875	412	13
8 x 10 x 18	700/580	413	14
8 x 10 x 22	875/700	414	15
8 x 10 x 22	580	415	16
10 x 10 x 15	1150/875	416	17
10 x 10 x 15	700/580	417	18
10 x 10 x 22	1175	418	19
10 x 12 x 22	875/700	419	20
10 x 12 x 22	580	420	21
12 x 12 x 22	1175	421	22
12 x 14 x 22A	875/700	422	23
12 x 14 x 22A	580	423	24
12 x 14 x 22B	875/700	424	25
12 x 14 x 22B	580	425	26
14 x 14 x 22A	1175	426	27
16 x 16 x 20	875/700	427	28
16 x 16 x 20	585/500	428	29
16 x 16 x 28	875/700	429	30
16 x 16 x 28	585	430	31
18 x 18 x 28	700/585	431	32
18 x 18 x 28	500	432	33
20 x 20 x 28	700/585	433	34
20 x 20 x 28	500	434	35

6 x 6 x 12
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 408
Dated March 1983

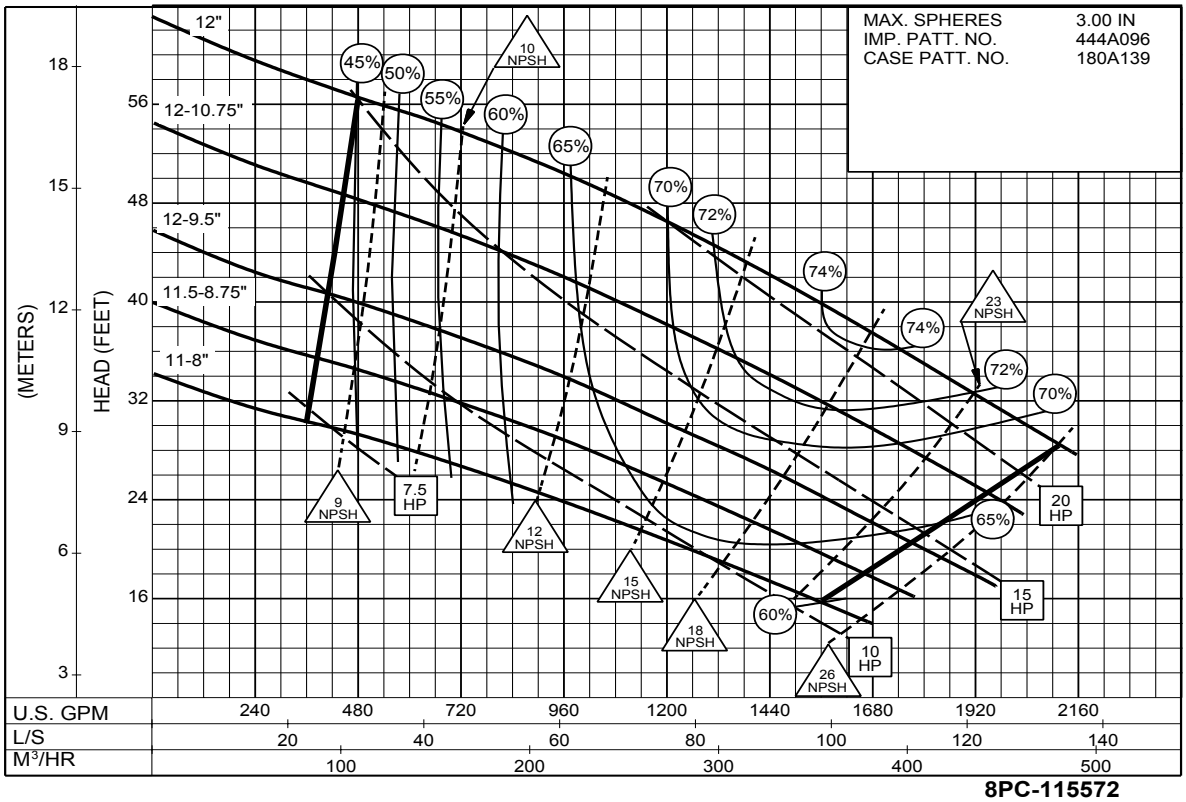
SIZE : 6x6x12 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 1750**



8PC-115571

1750 RPM

SIZE : 6x6x12 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 1150**



8PC-115572

1150 RPM

AURORA®
Pentair Pump Group

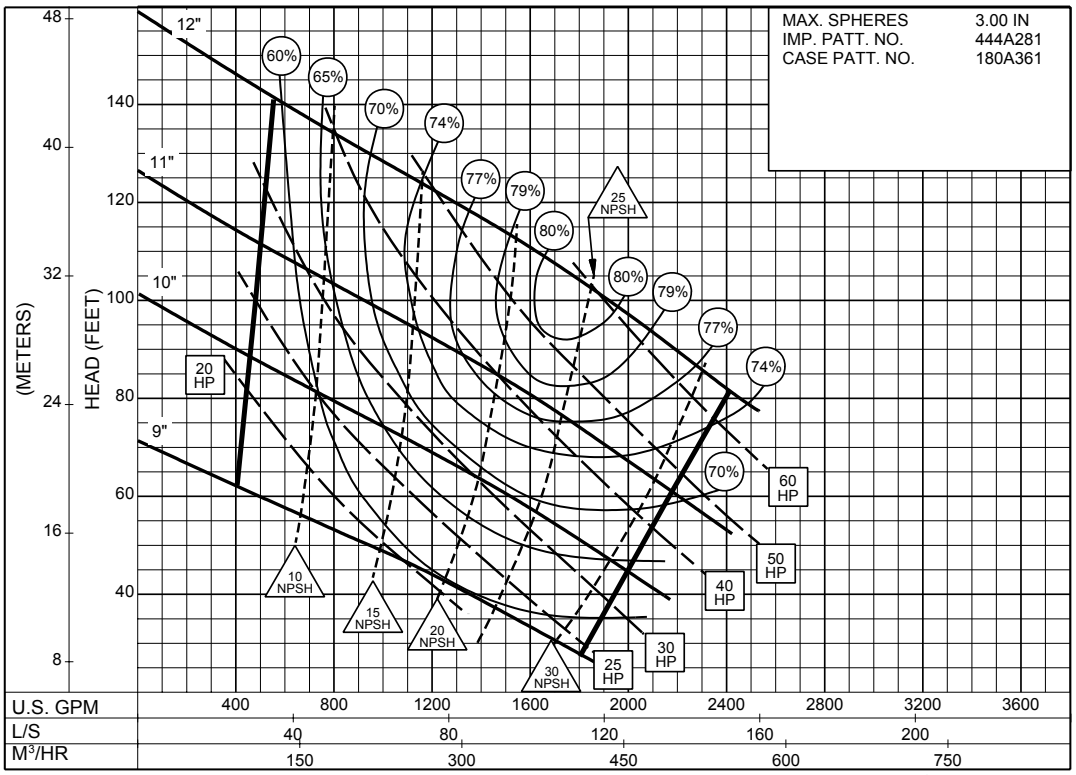
Supersedes Section 610 Page 408A
Dated May 1991

6 x 6 x 12B
SERIES 610

ENCLOSED IMPELLER

1750 RPM

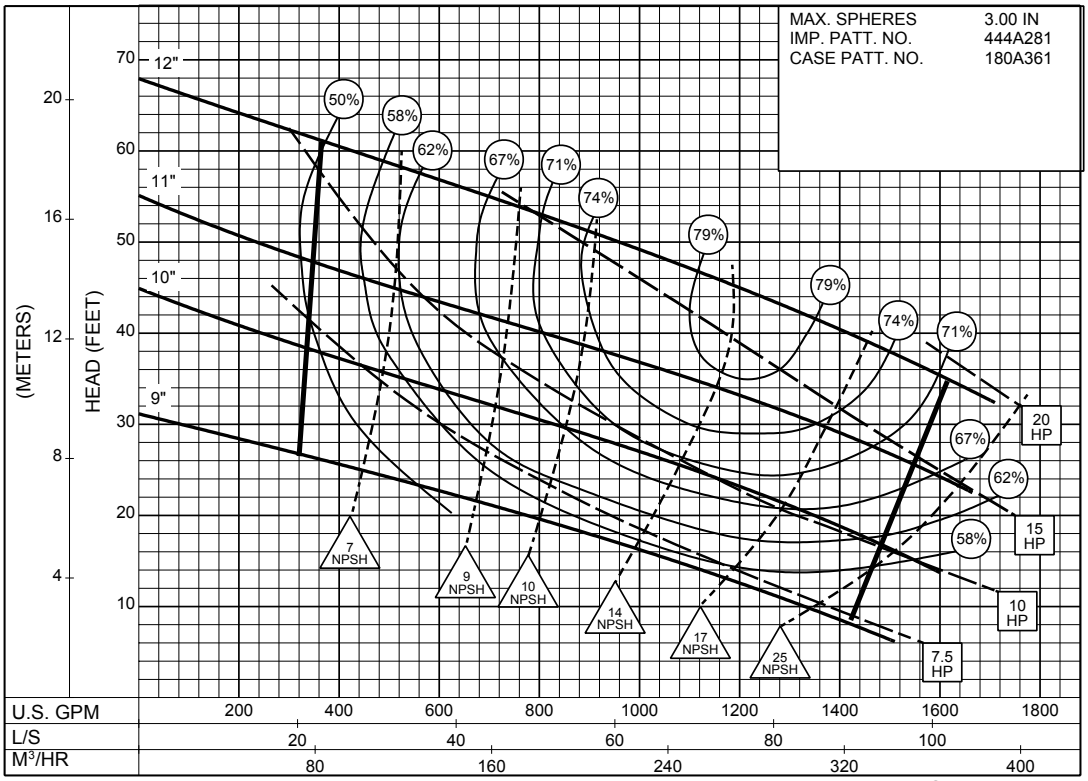
SIZE : 6x6x12B **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 1750**



8PC-144962

1150 RPM

SIZE : 6x6x12B **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 1150**



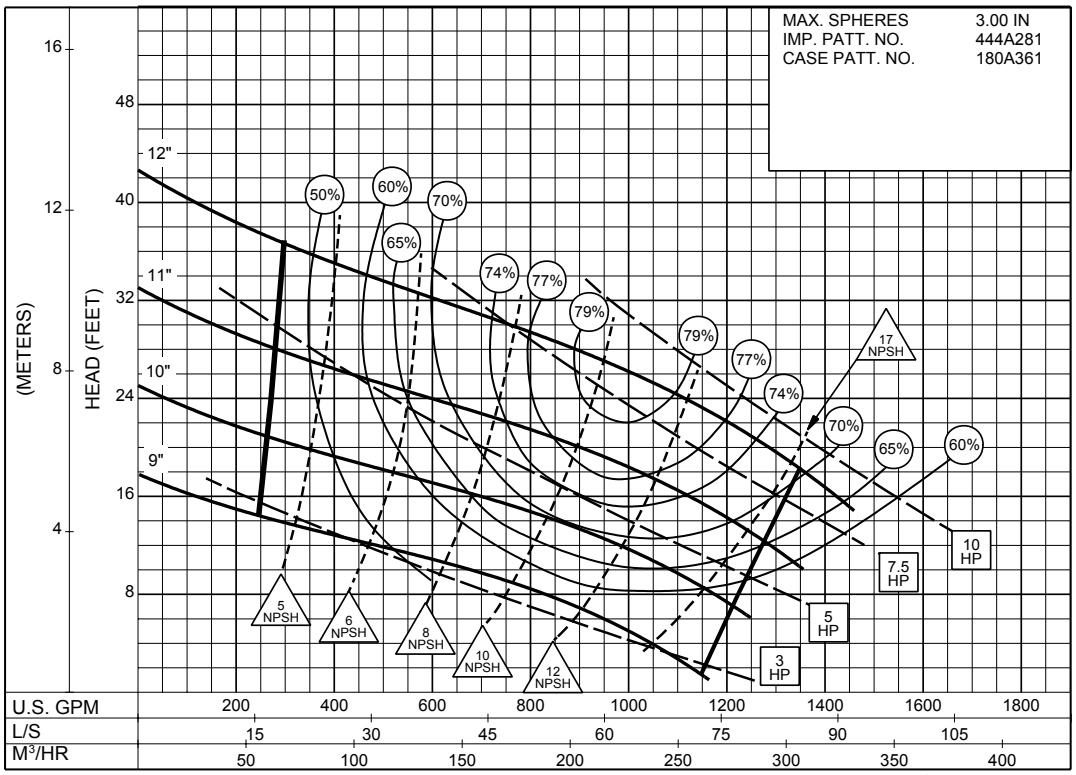
8PC-151595

6 x 6 x 12B
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 408B
Dated March 1987

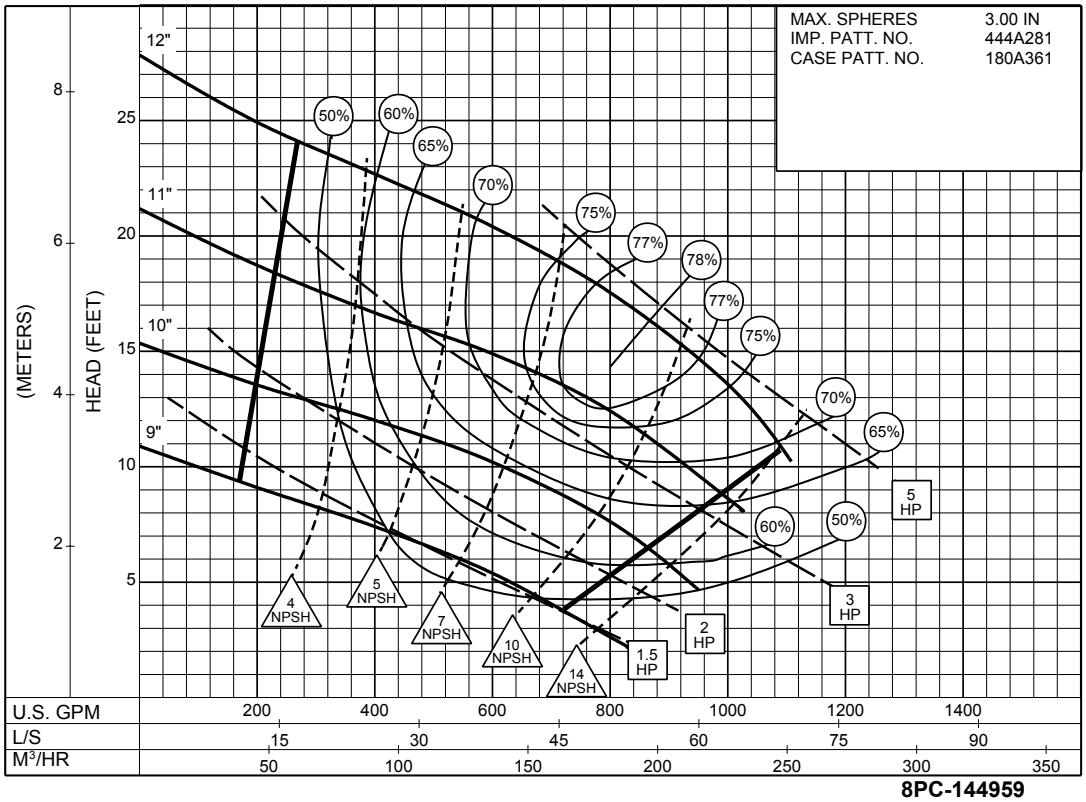
SIZE : 6x6x12B **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 875**



8PC-144960

875 RPM

SIZE : 6x6x12B **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 700**



8PC-144959

700 RPM

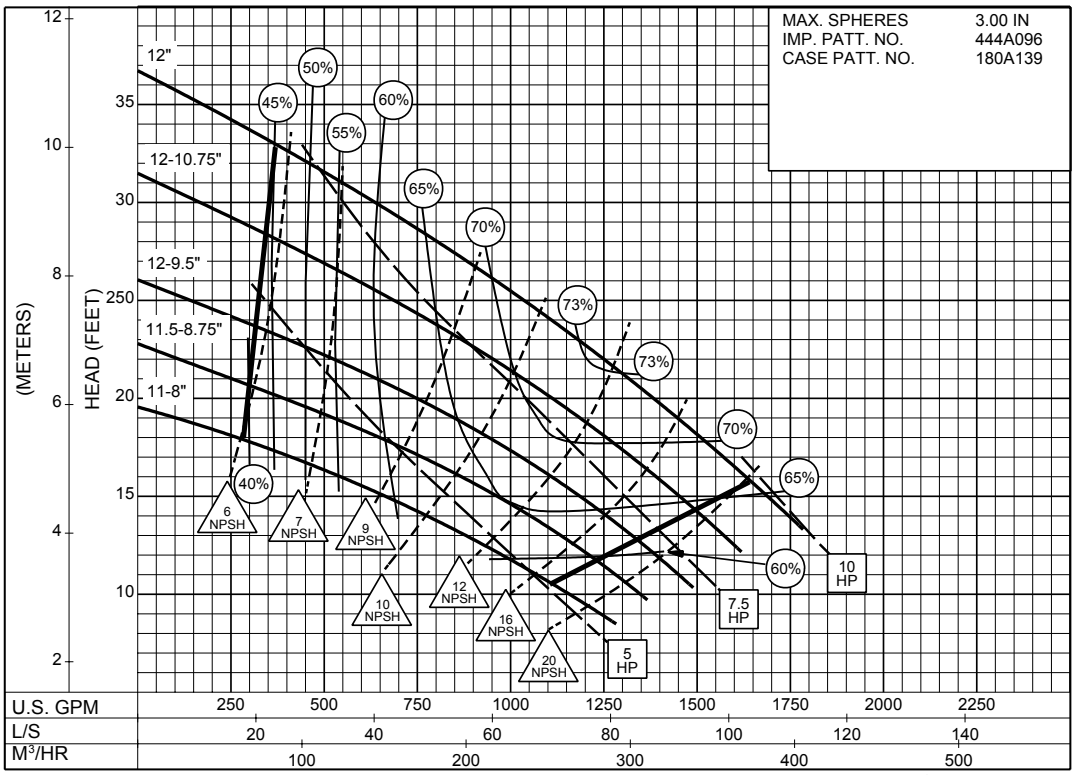
AURORA®
Pentair Pump Group

Supersedes Section 610 Page 409
Dated March 1983

6 x 6 x 12
SERIES 610
ENCLOSED IMPELLER

875 RPM

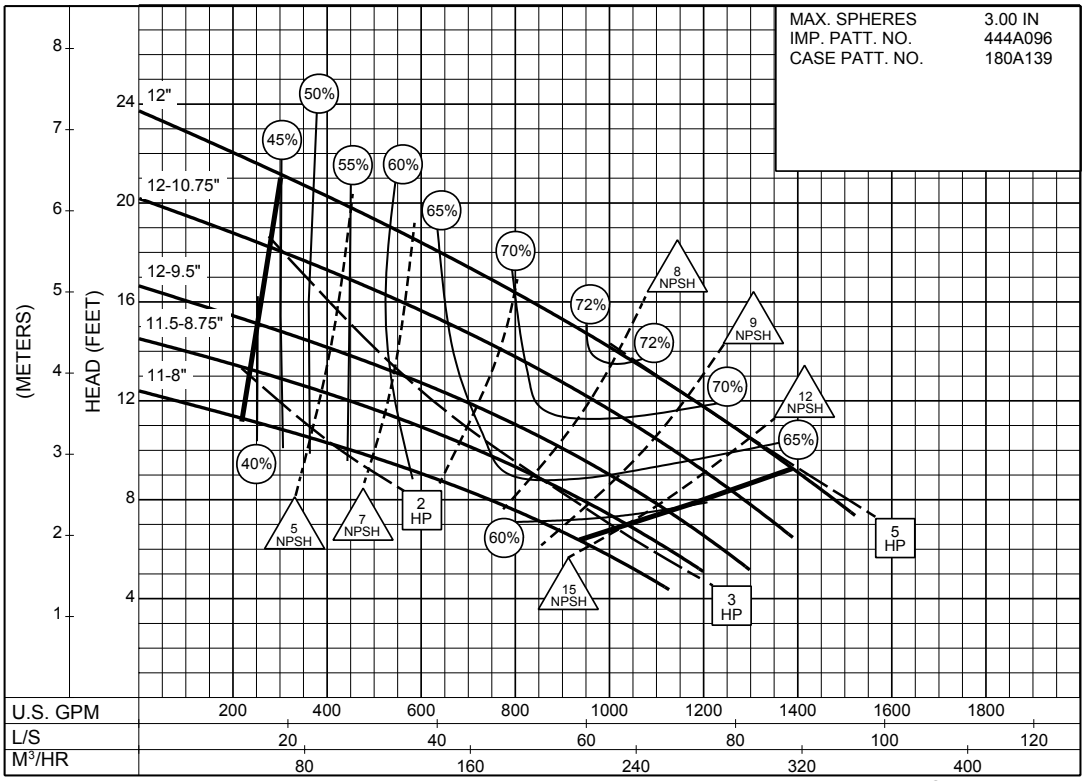
SIZE : 6x6x12 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 875**



8PC-115573

700 RPM

SIZE : 6x6x12 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 700**



8PC-115574

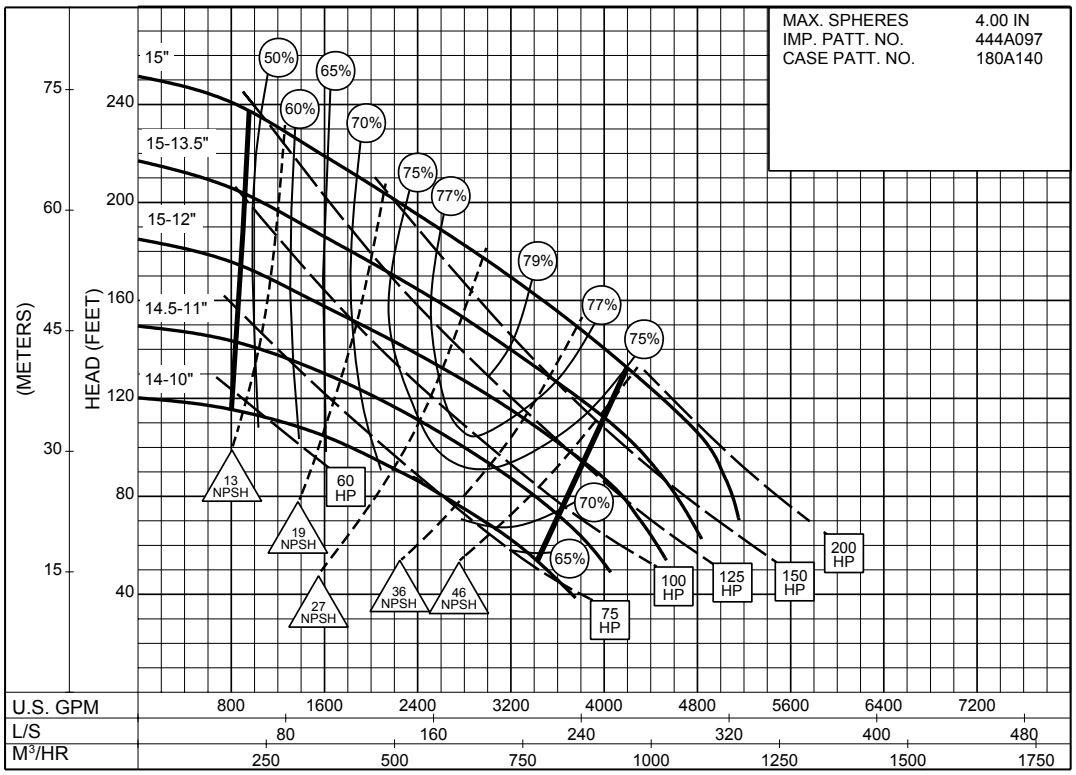
AURORA®
Pentair Pump Group

6 x 8 x 15
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 410
Dated March 1983

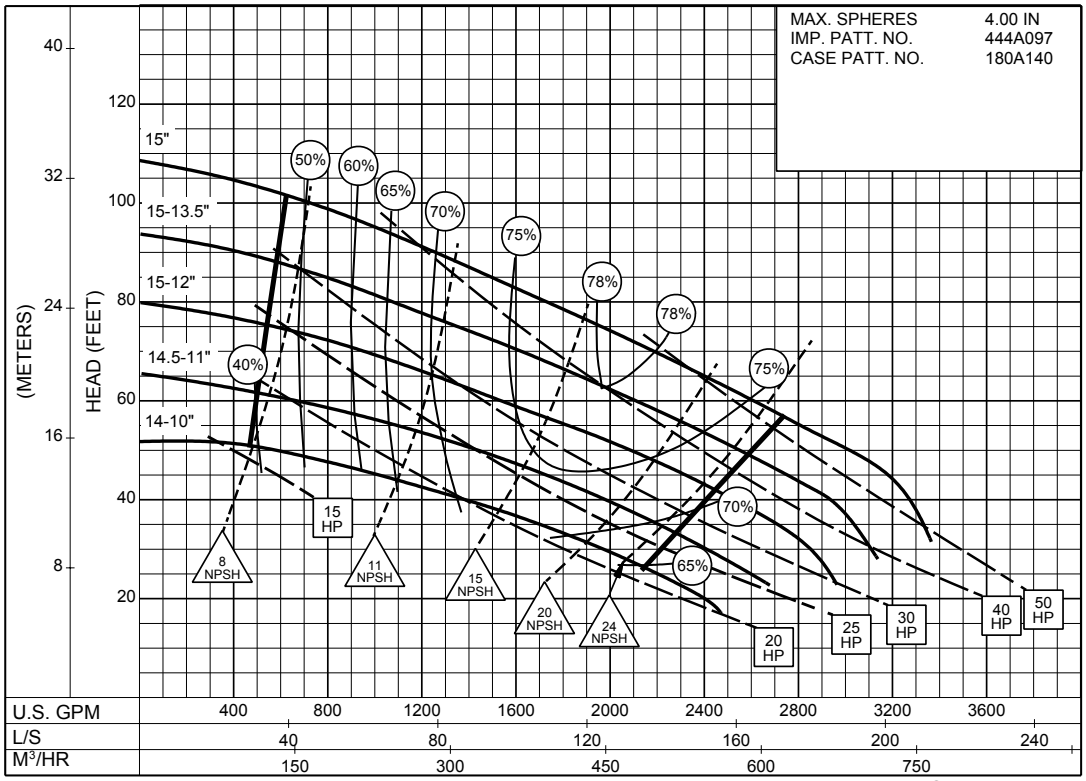
SIZE : 6x8x15 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 1750**



8PC-115575

1750 RPM

SIZE : 6x8x15 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 1150**



8PC-115576

1150 RPM

AURORA®
Pentair Pump Group

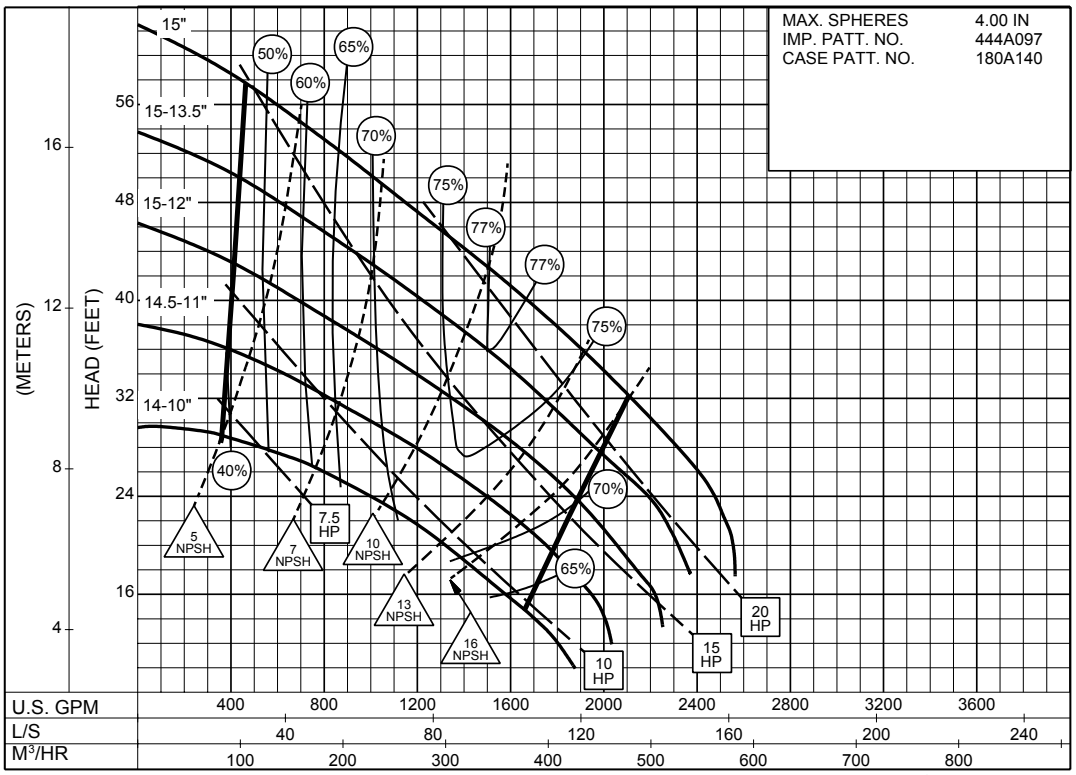
Supersedes Section 610 Page 411
Dated March 1983

6 x 8 x 15
SERIES 610

ENCLOSED IMPELLER

875 RPM

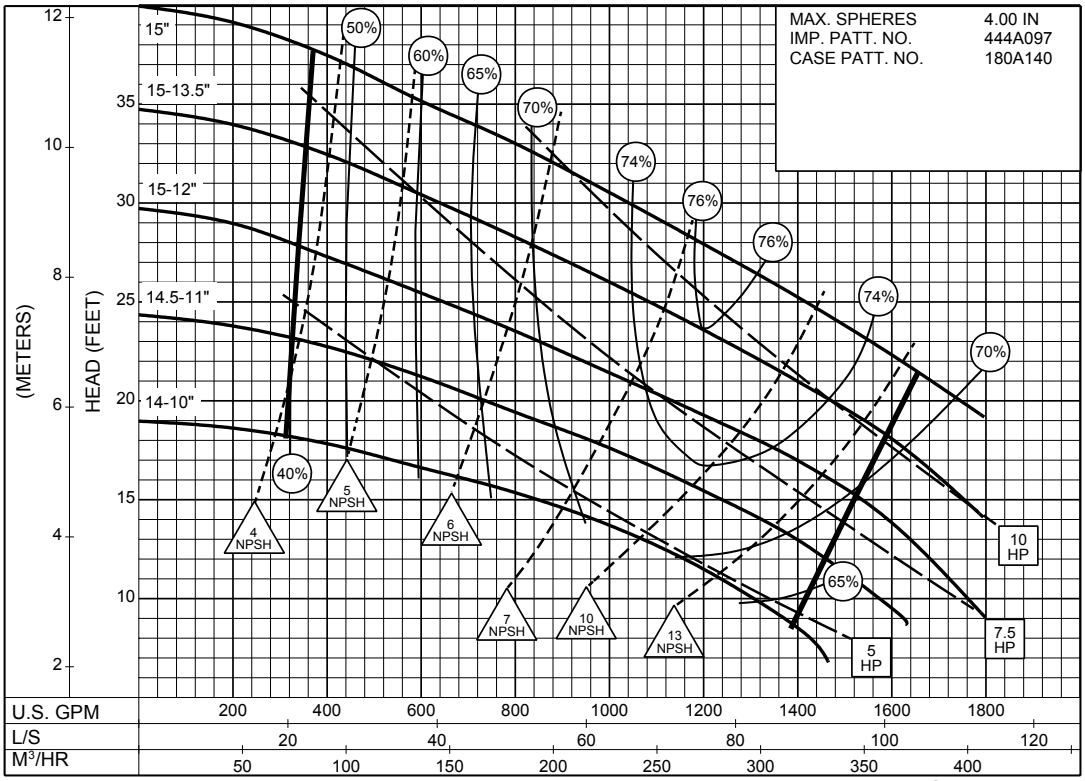
SIZE : 6x8x15 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 875**



8PC-115577

700 RPM

SIZE : 6x8x15 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 700**



8PC-115578

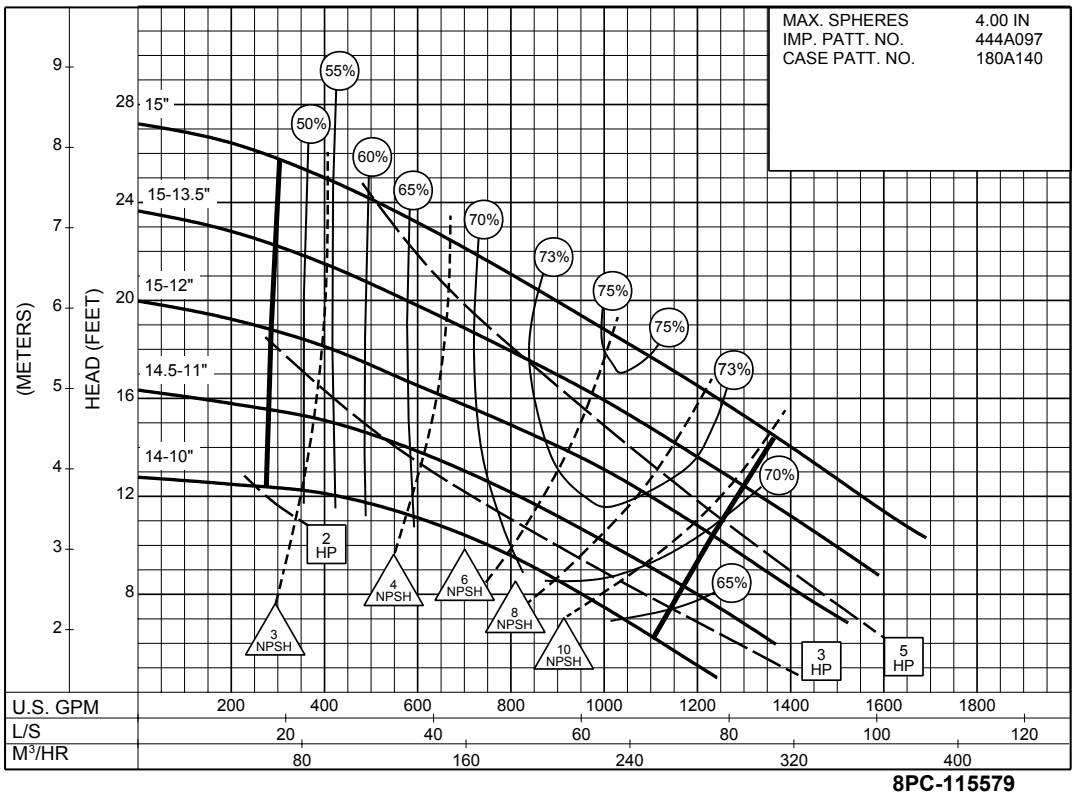
AURORA®
Pentair Pump Group

6 x 8 x 15
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 412
Dated March 1983

SIZE : 6x8x15 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 580**



8PC-115579

580 RPM

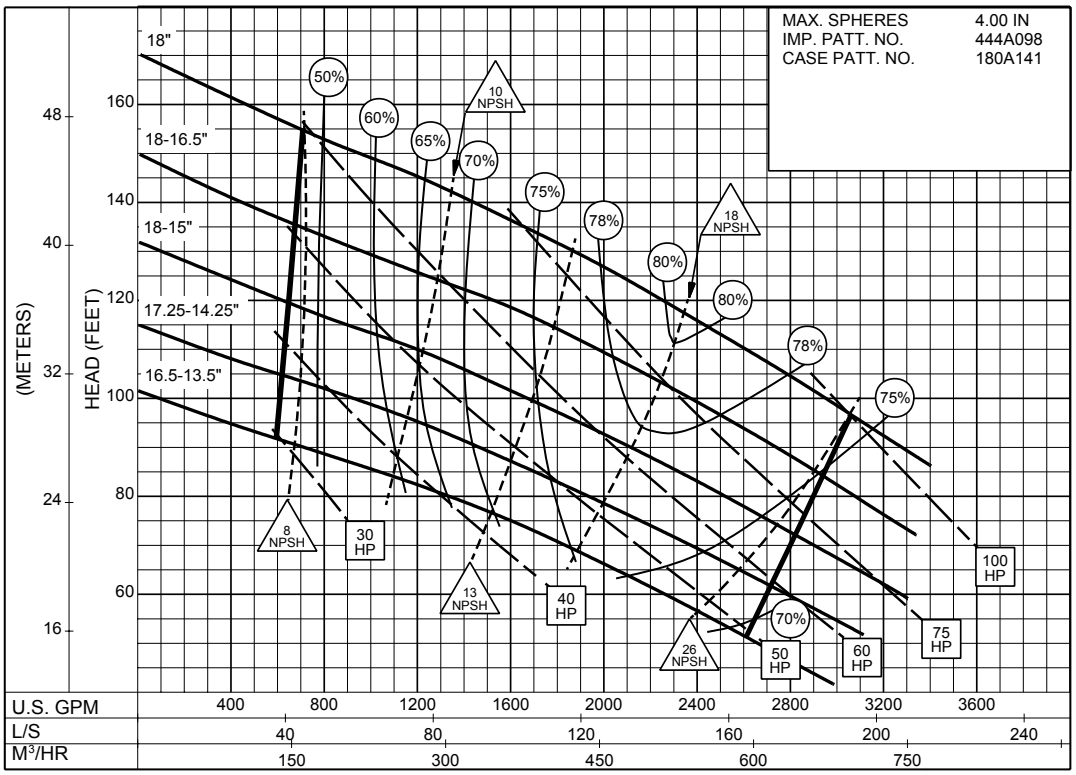
Supersedes Section 610 Page 413
Dated March 1983

6 x 8 x 18
SERIES 610

ENCLOSED IMPELLER

1150 RPM

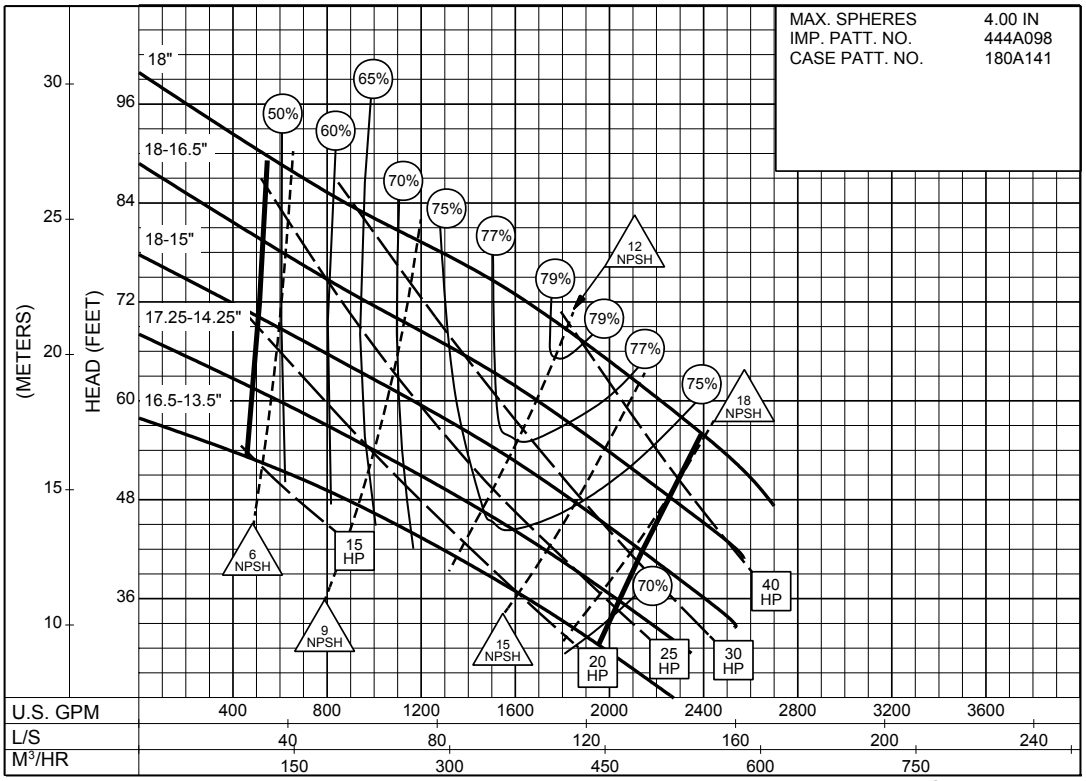
SIZE : 6x8x18 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 1150**



8PC-115580

875 RPM

SIZE : 6x8x18 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 875**



8PC-115581

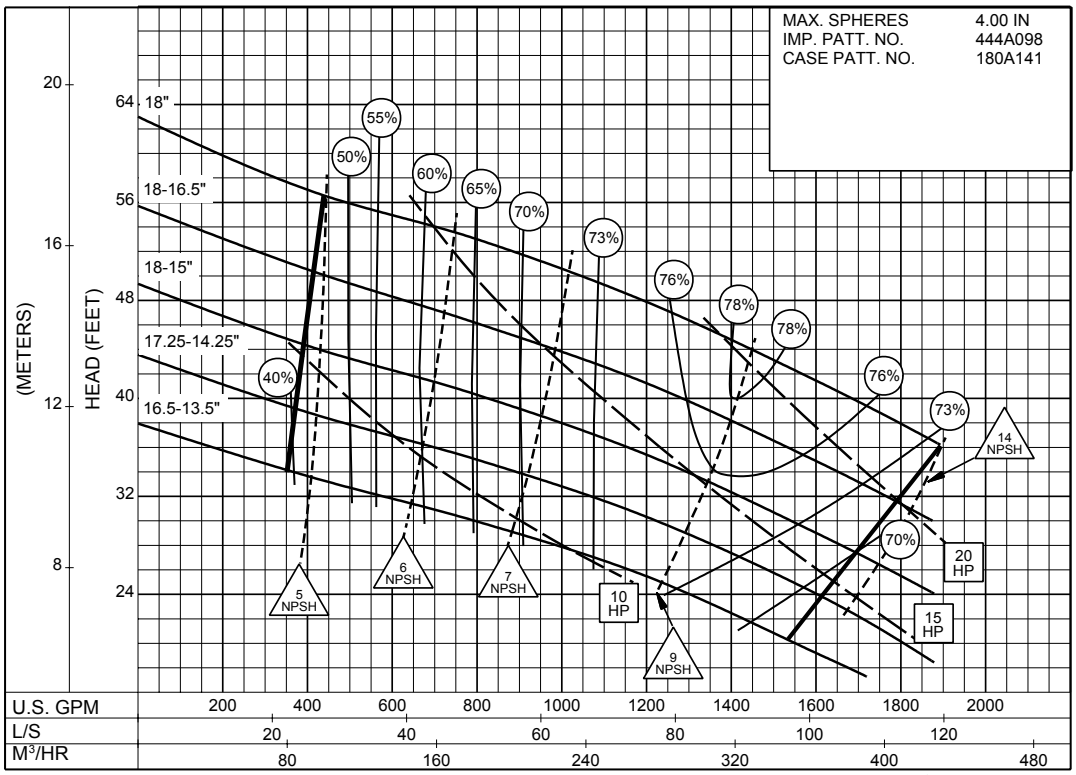
AURORA®
Pentair Pump Group

6 x 8 x 18
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 414
Dated May 1991

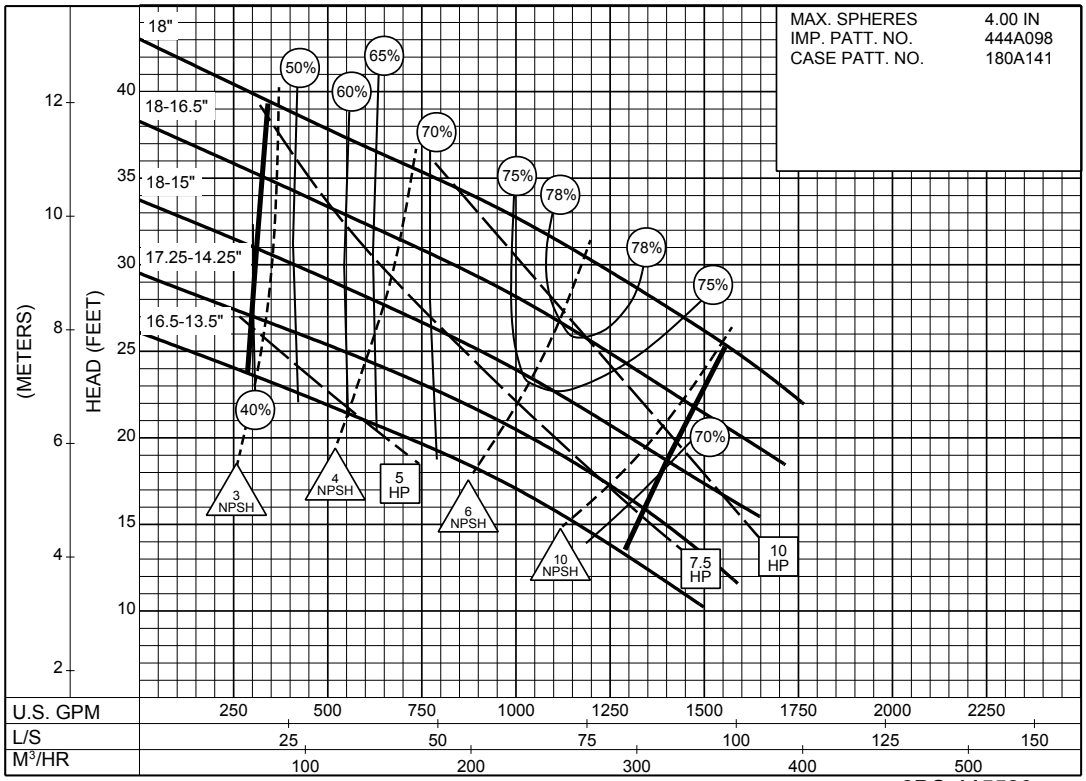
SIZE : 6x8x18 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 700**



8PC-115582

700 RPM

SIZE : 6x8x18 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 580**



8PC-115583

580 RPM

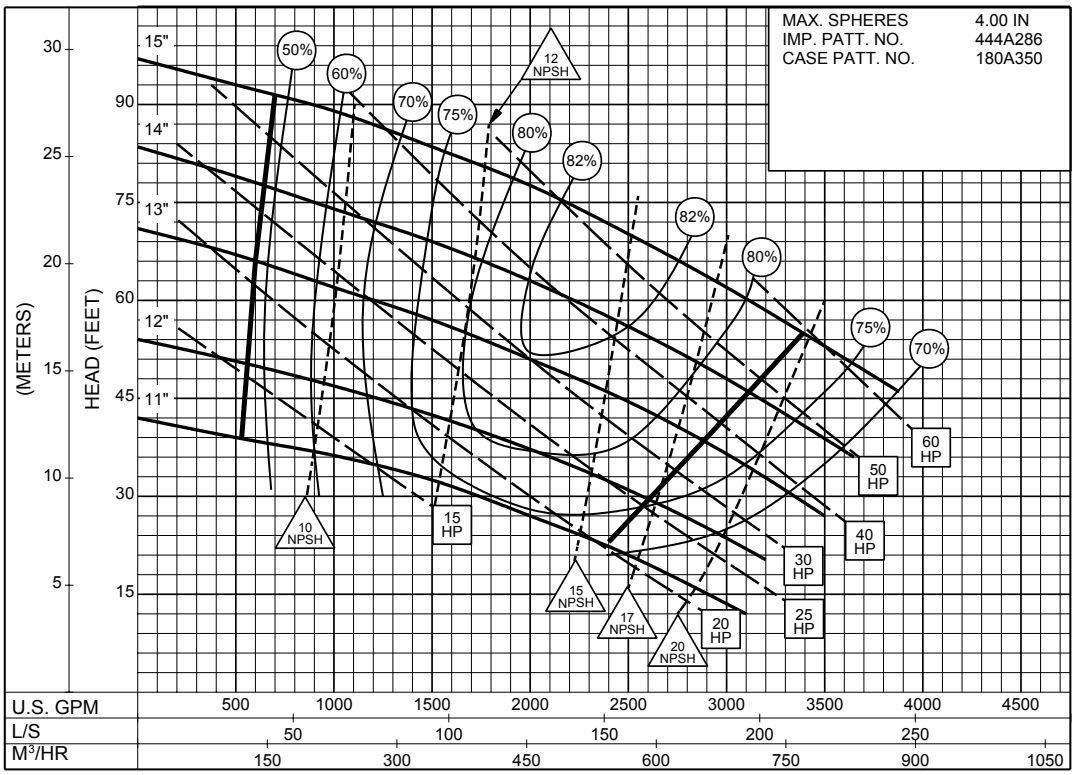
AURORA®
Pentair Pump Group

8 x 8 x 15A
SERIES 610

ENCLOSED IMPELLER

1150 RPM

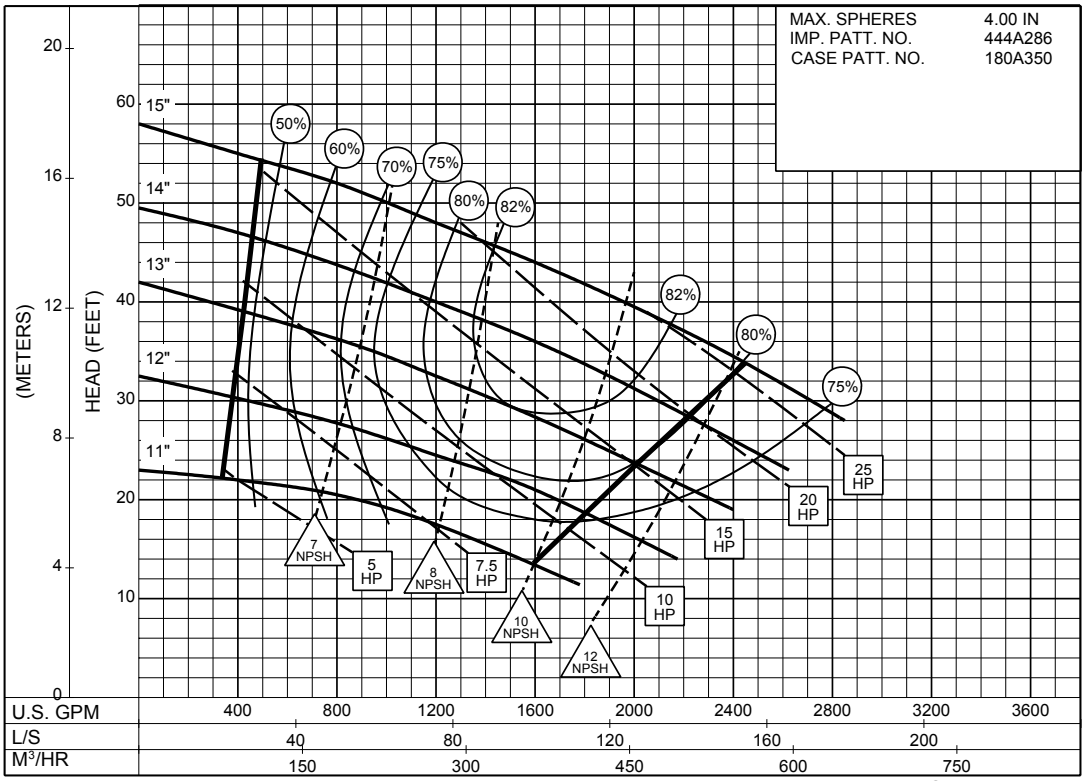
SIZE : 8x8x15A **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 1150**



8PC-142576

875 RPM

SIZE : 8x8x15A **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 875**



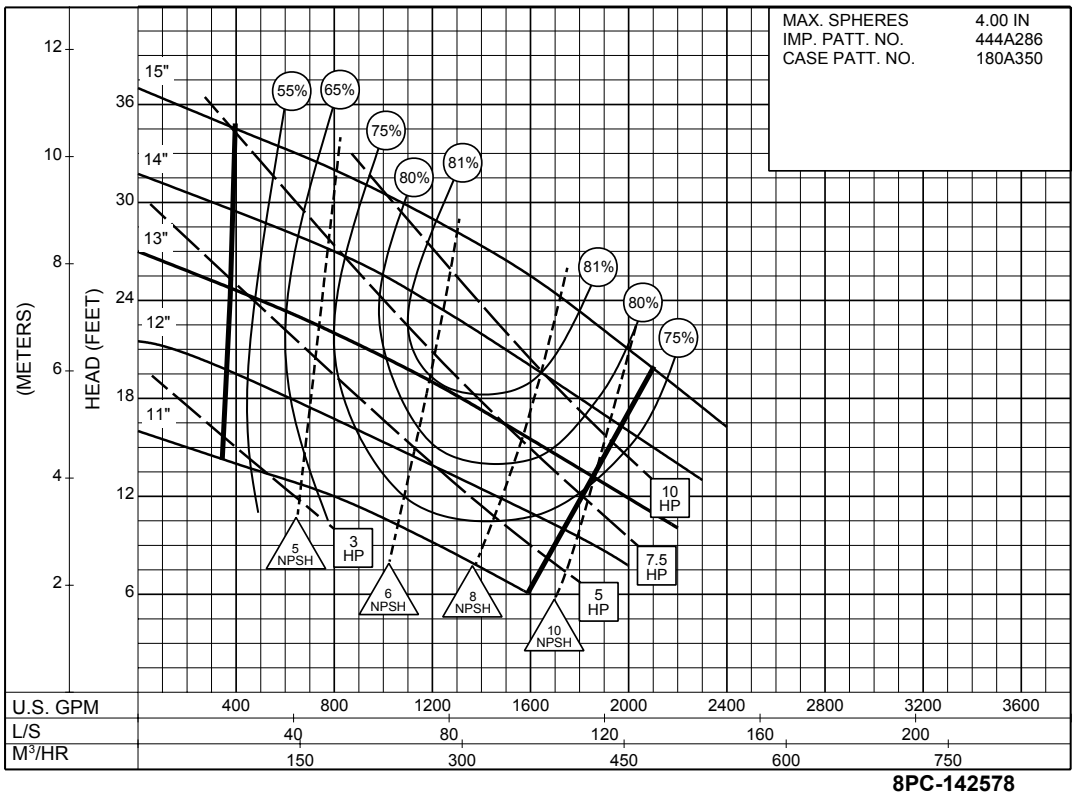
8PC-142577

8 x 8 x 15A
SERIES 610

ENCLOSED IMPELLER

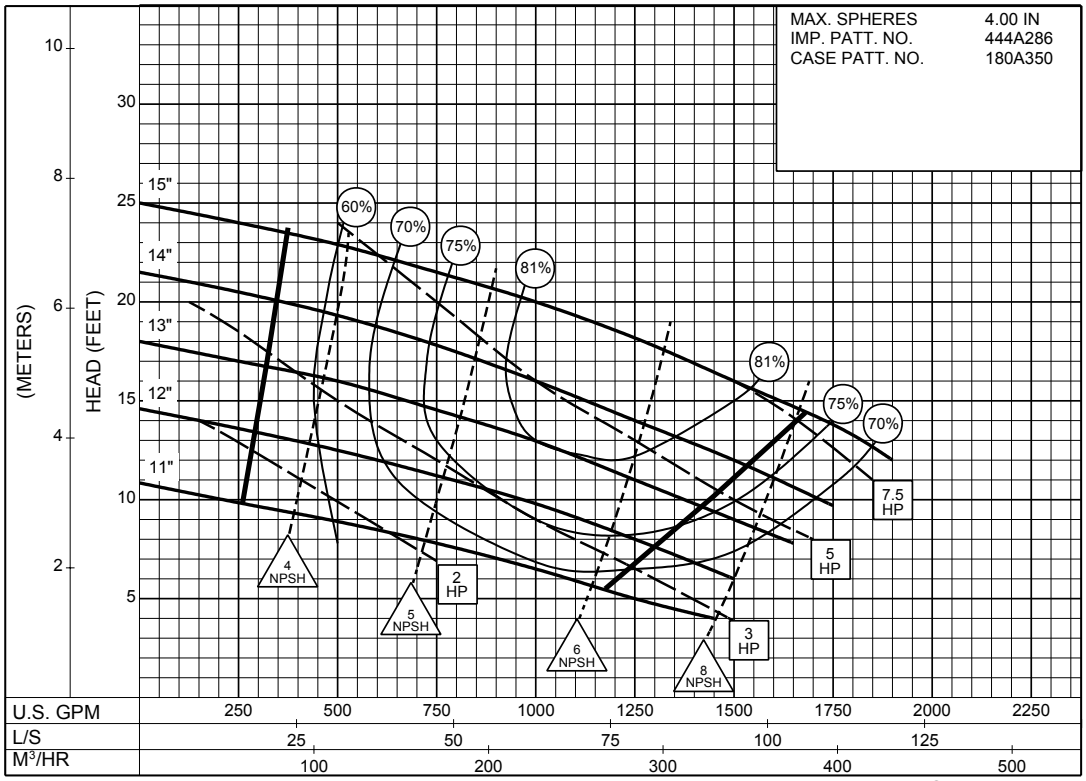
Supersedes Section 610 Page 416A
Dated August 1985

SIZE : 8x8x15A **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 700**



8PC-142578

SIZE : 8x8x15A **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 580**



8PC-142579

700 RPM

580 RPM

AURORA®
Pentair Pump Group

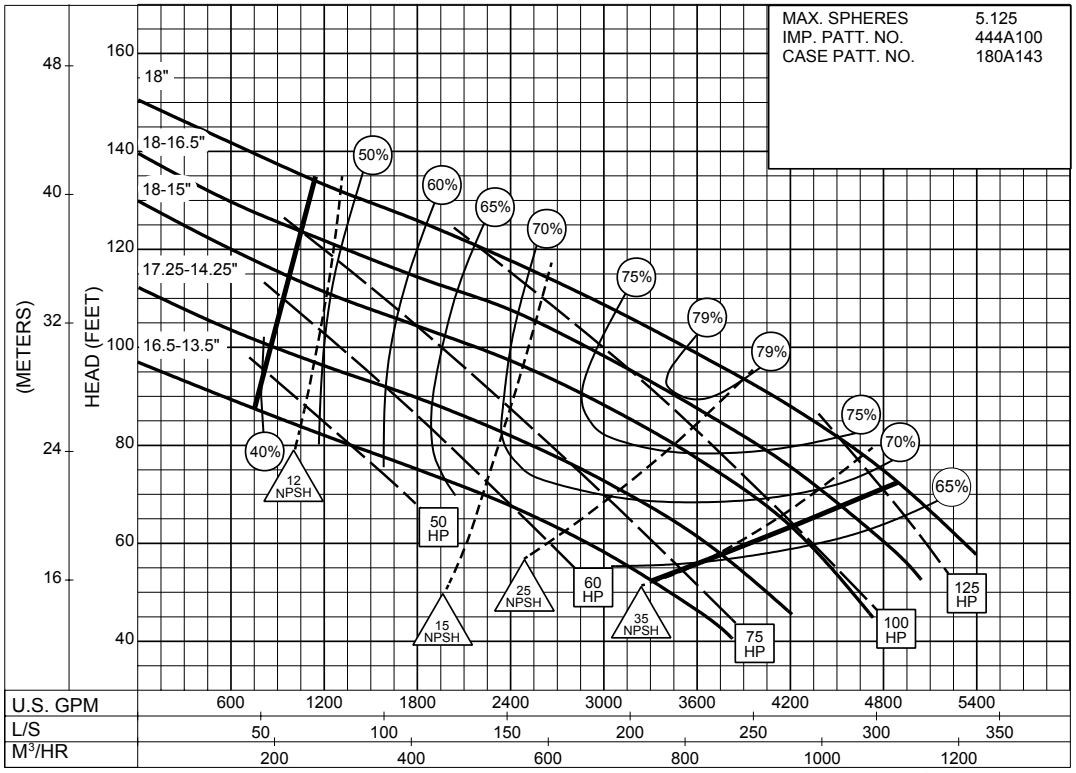
Supersedes Section 610 Page 417
Dated March 1983

8 x 10 x 18
SERIES 610

ENCLOSED IMPELLER

1150 RPM

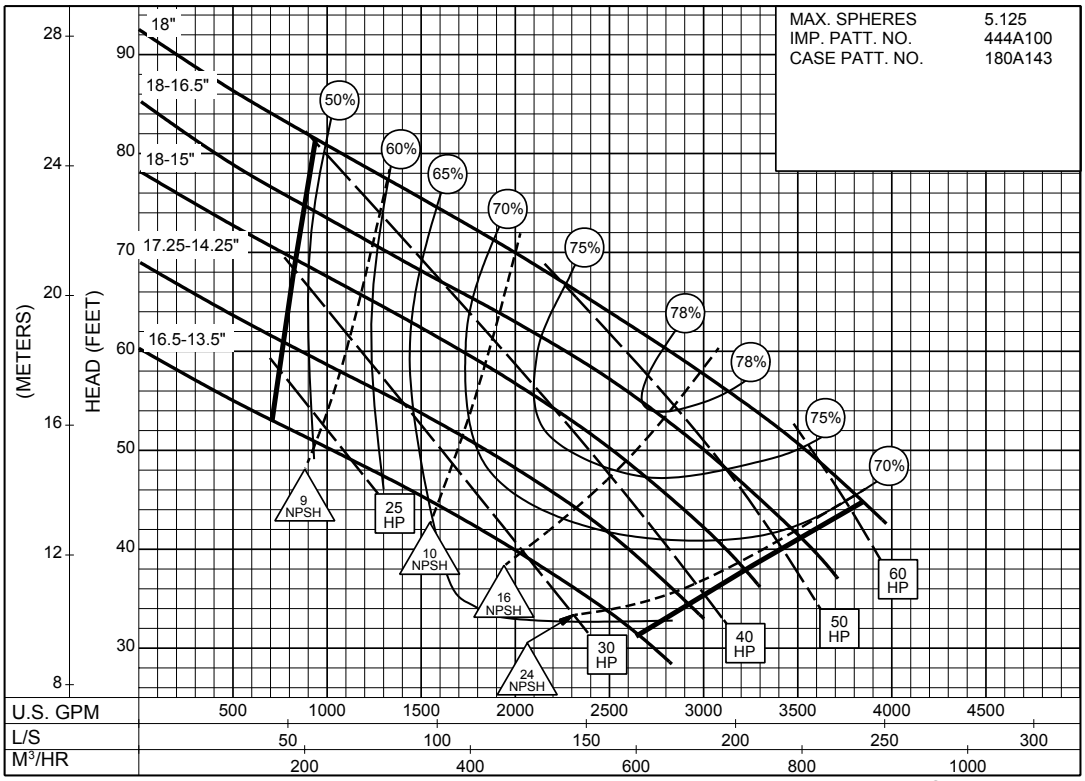
SIZE : 8x10x18 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 1150**



8PC-115588

875 RPM

SIZE : 8x10x18 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 875**



8PC-115589

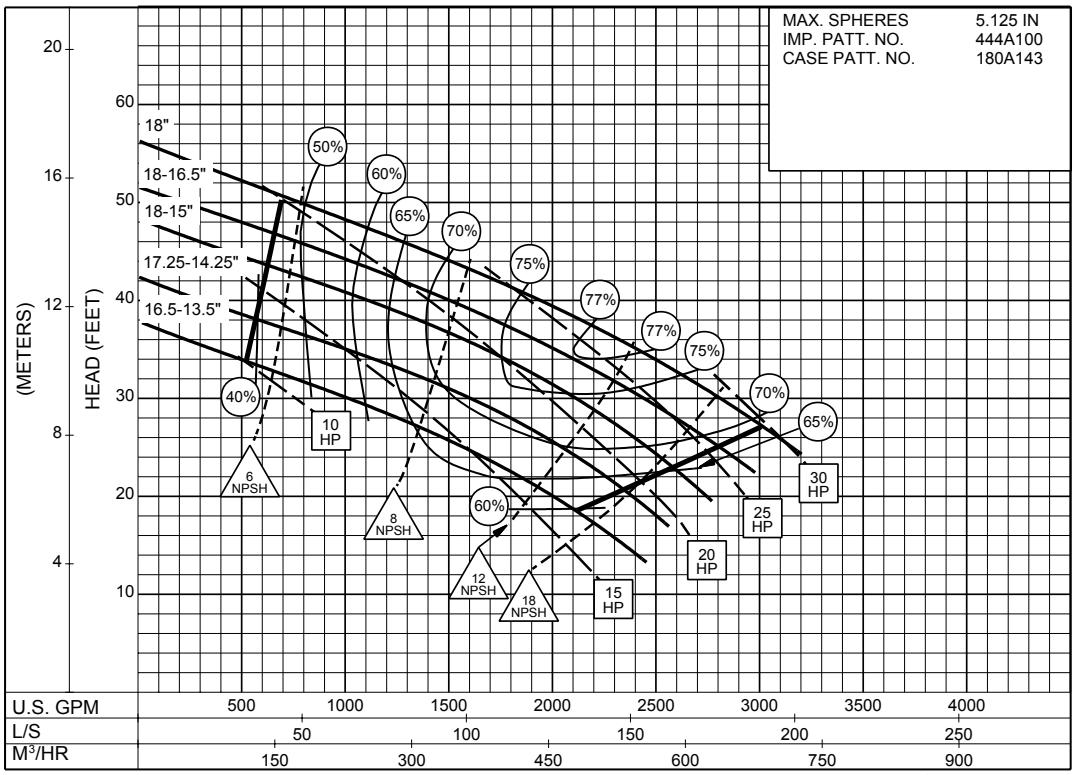
AURORA®
Pentair Pump Group

8 x 10 x 18
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 418
Dated March 1983

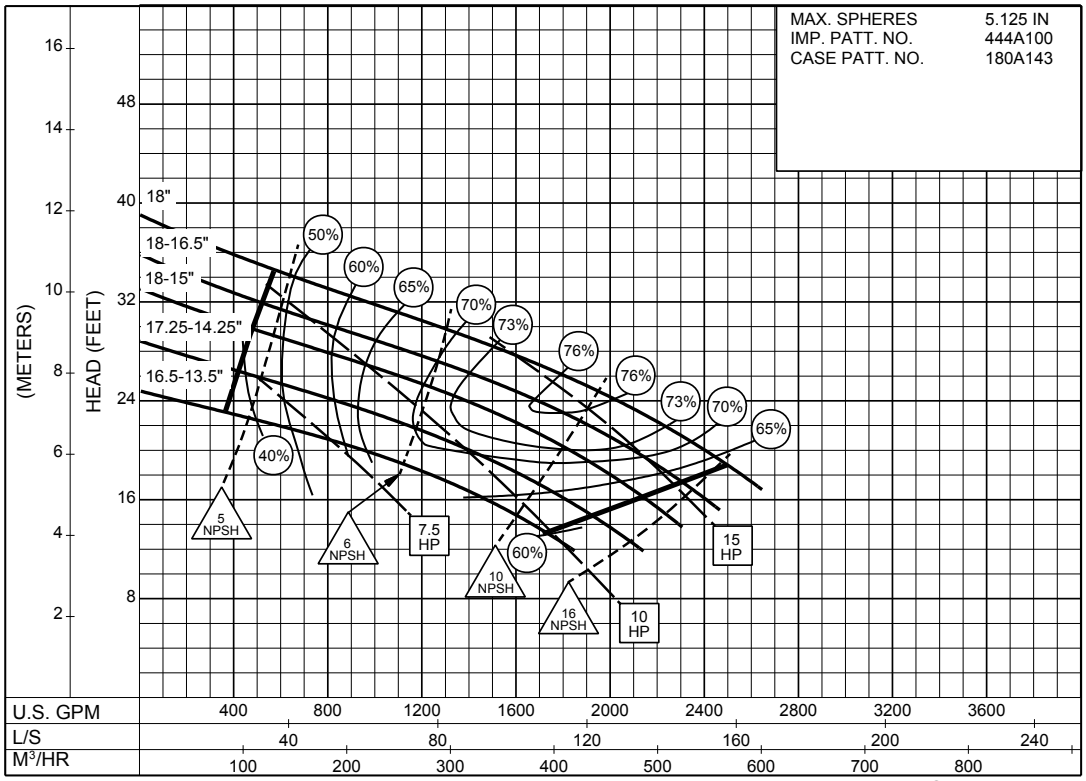
SIZE : 8x10x18 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 700**



8PC-115590

700 RPM

SIZE : 8x10x18 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 580**



8PC-115591

580 RPM

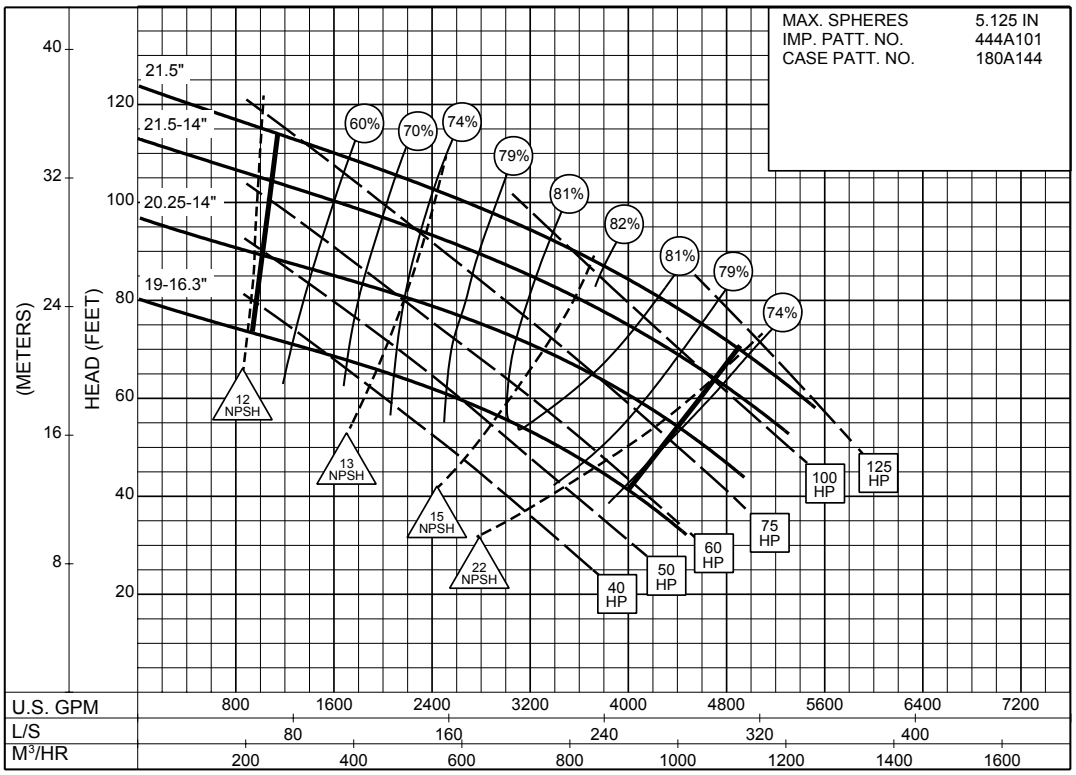
AURORA®
Pentair Pump Group

8 x 10 x 22
SERIES 610

ENCLOSED IMPELLER

875 RPM

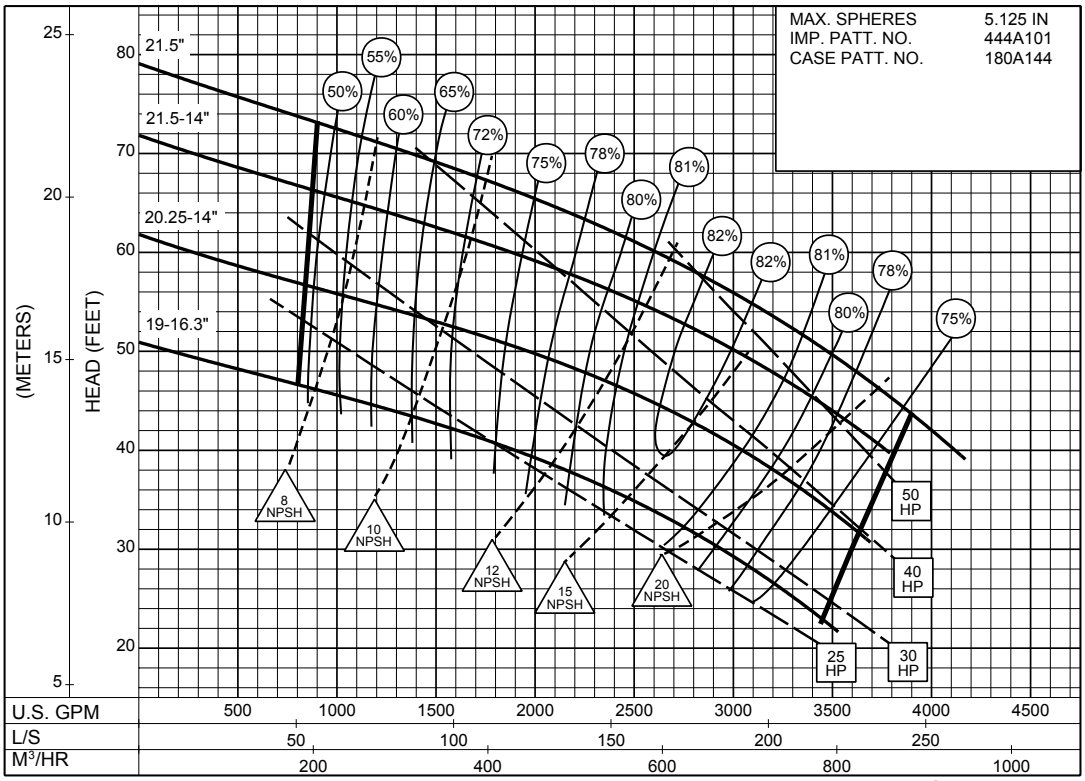
SIZE : 8x10x22 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 875**



8PC-115592B

700 RPM

SIZE : 8x10x22 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 700**



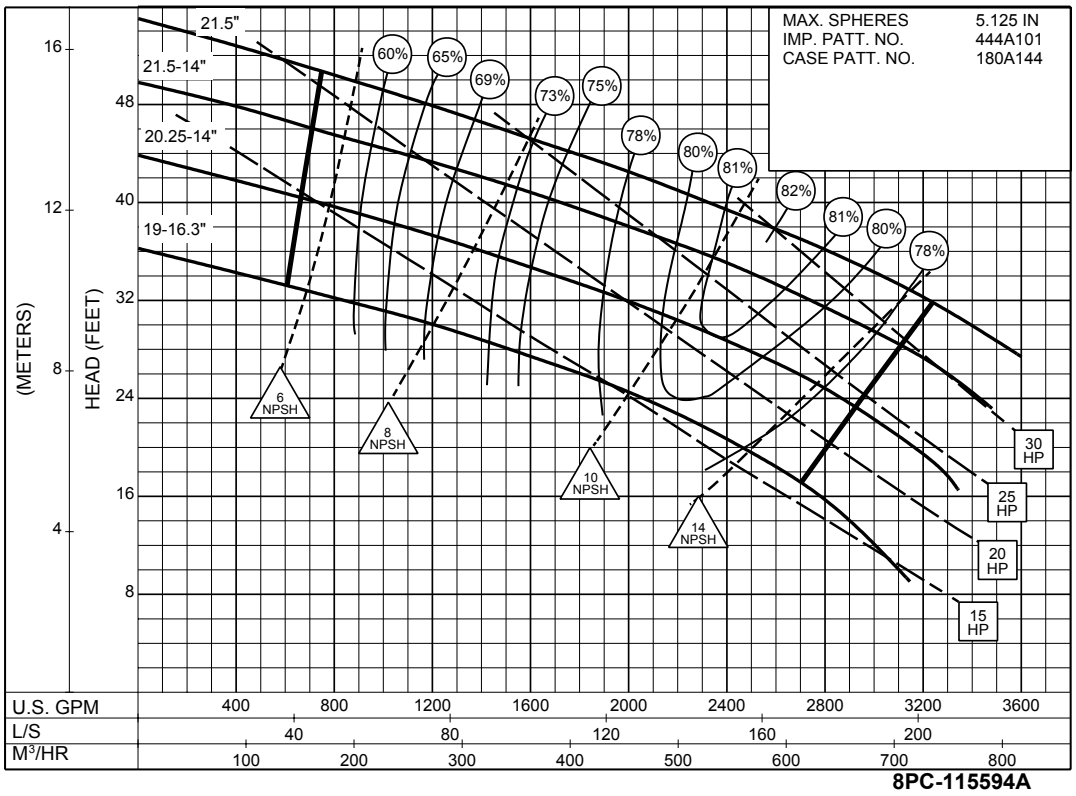
8PC-115593A

8 x 10 x 22
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 420
Dated March 1987

SIZE : 8x10x22 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 580**



8PC-115594A

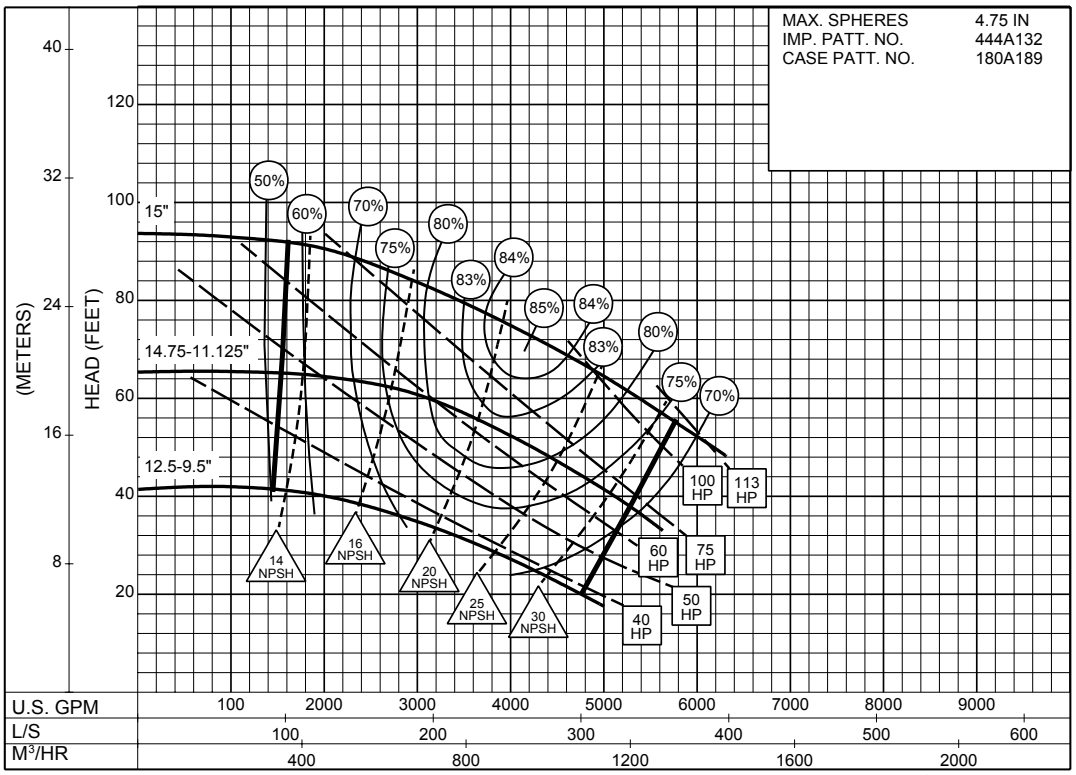
580 RPM

10 x 10 x 15
SERIES 610

ENCLOSED IMPELLER

1150 RPM

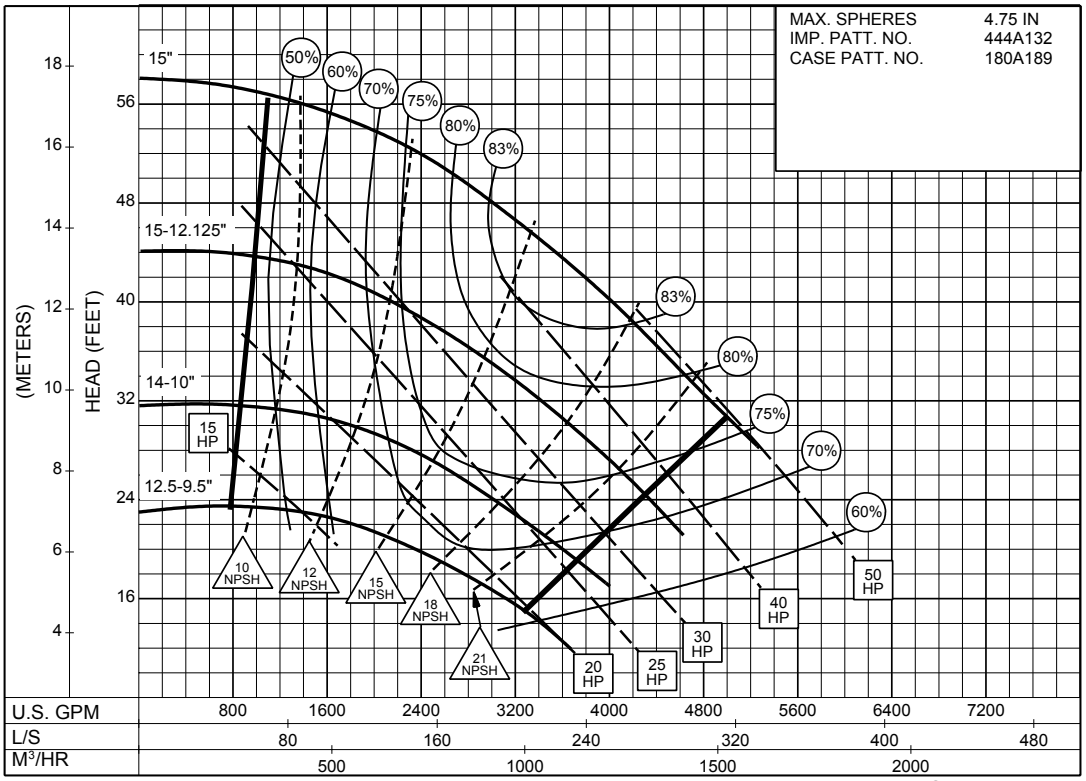
SIZE : 10x10x15 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 1150**



8PC-126742

875 RPM

SIZE : 10x10x15 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 875**



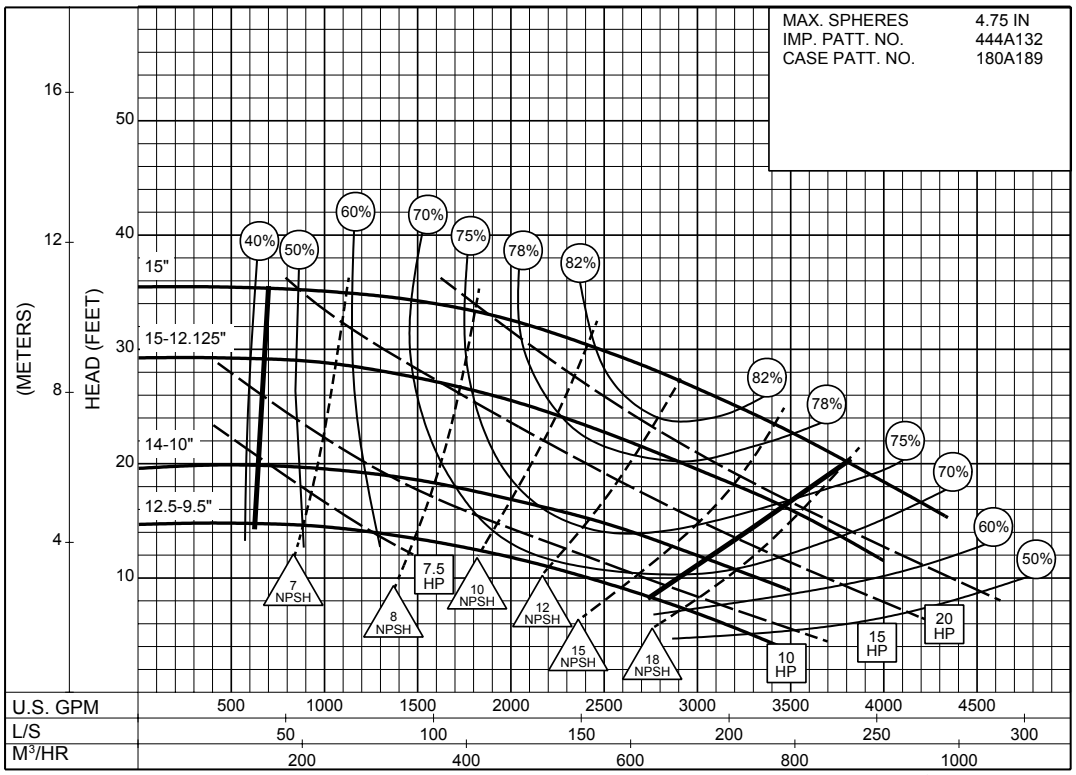
8PC-116809

10 x 10 x 15
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 422
Dated March 1983

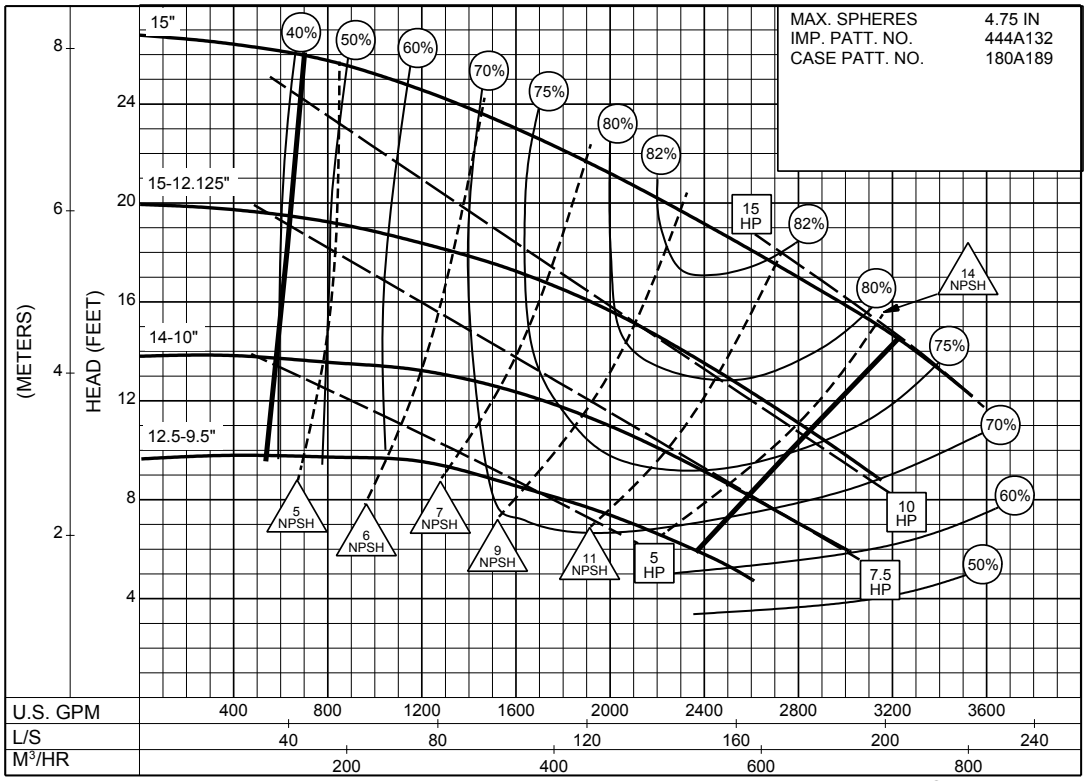
SIZE : 10x10x15 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 700**



8PC-116810

700 RPM

SIZE : 10x10x15 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 580**



8PC-116811

580 RPM

AURORA®
Pentair Pump Group

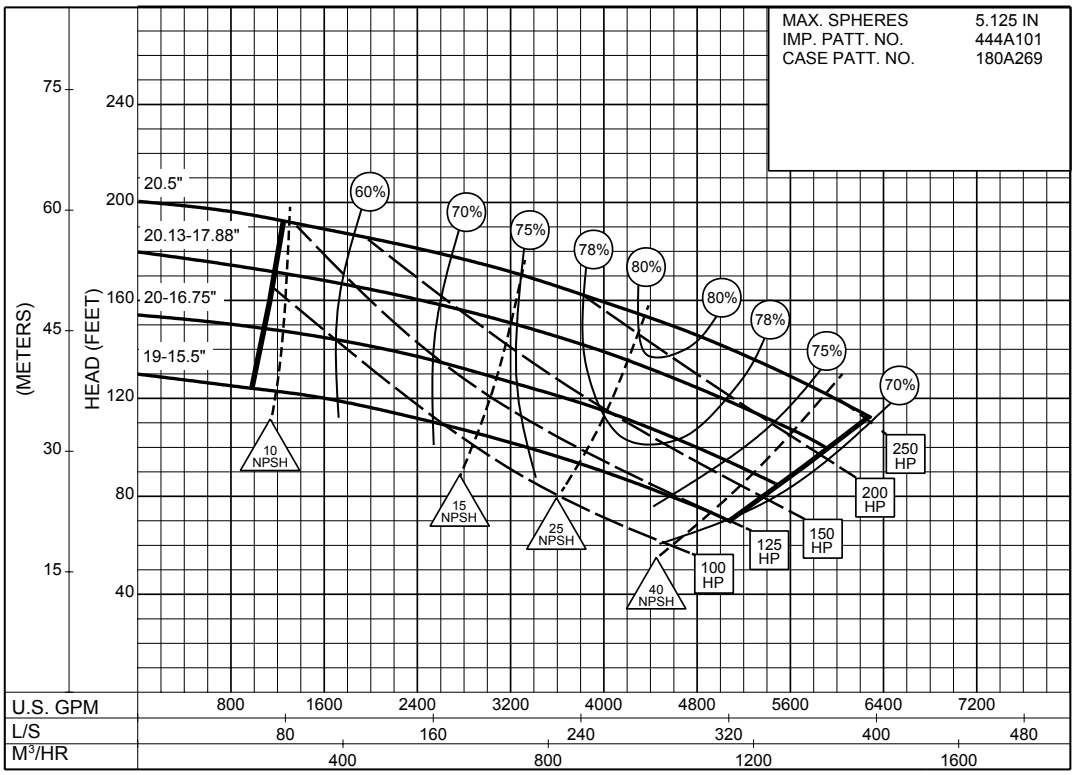
Supersedes Section 610 Page 422A
Dated March 1983

10 x 10 x 22
SERIES 610

ENCLOSED IMPELLER

1175
RPM

SIZE : 10x10x22 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 1175**



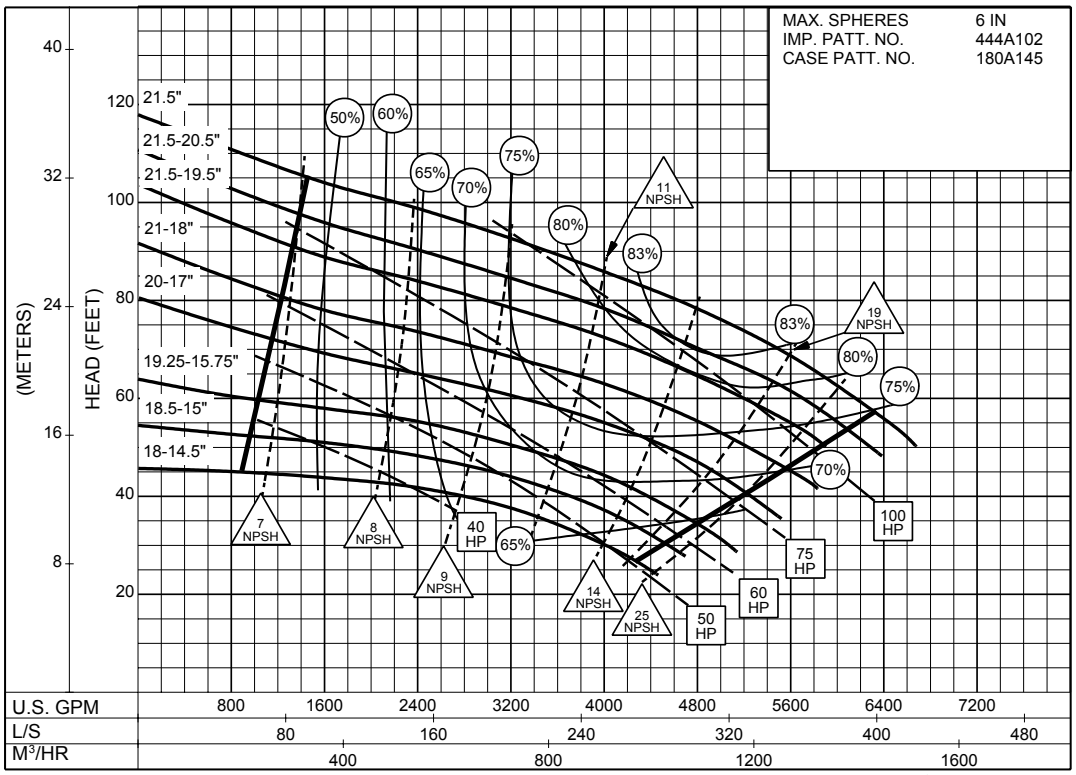
8PC-134351

10 x 12 x 22
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 423
Dated March 1983

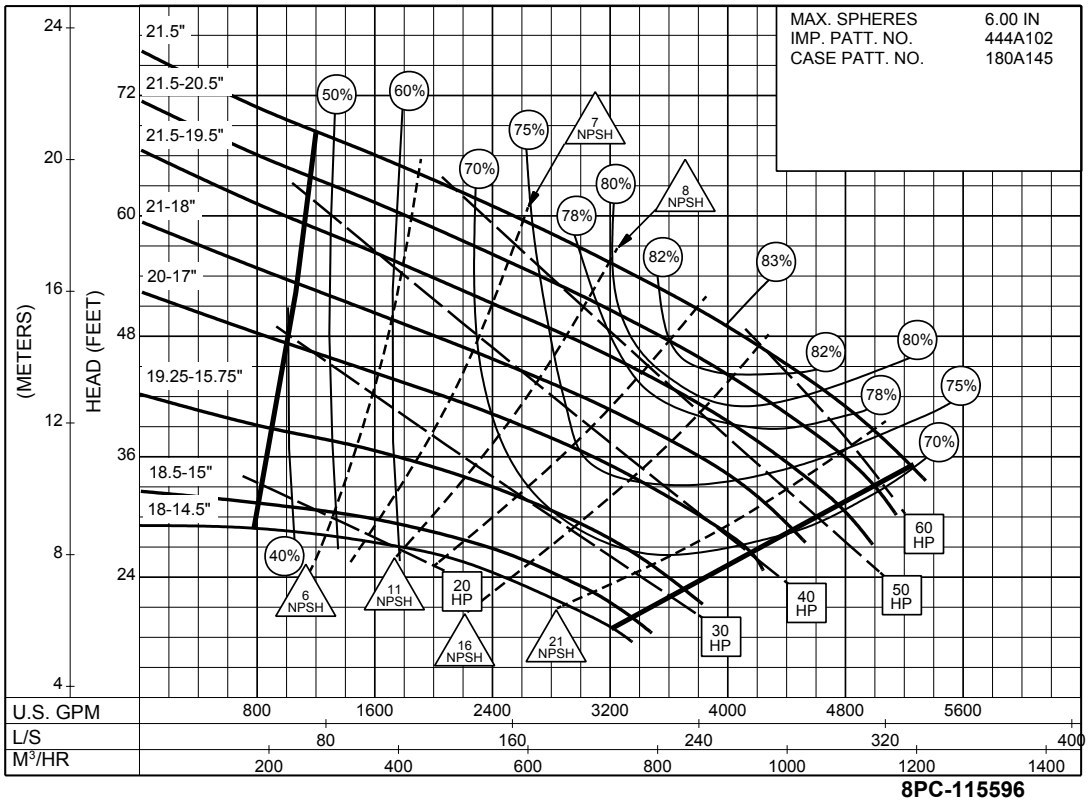
SIZE : 10x12x22 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 875**



8PC-115595

875 RPM

SIZE : 10x12x22 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 700**



8PC-115596

700 RPM

AURORA®
Pentair Pump Group

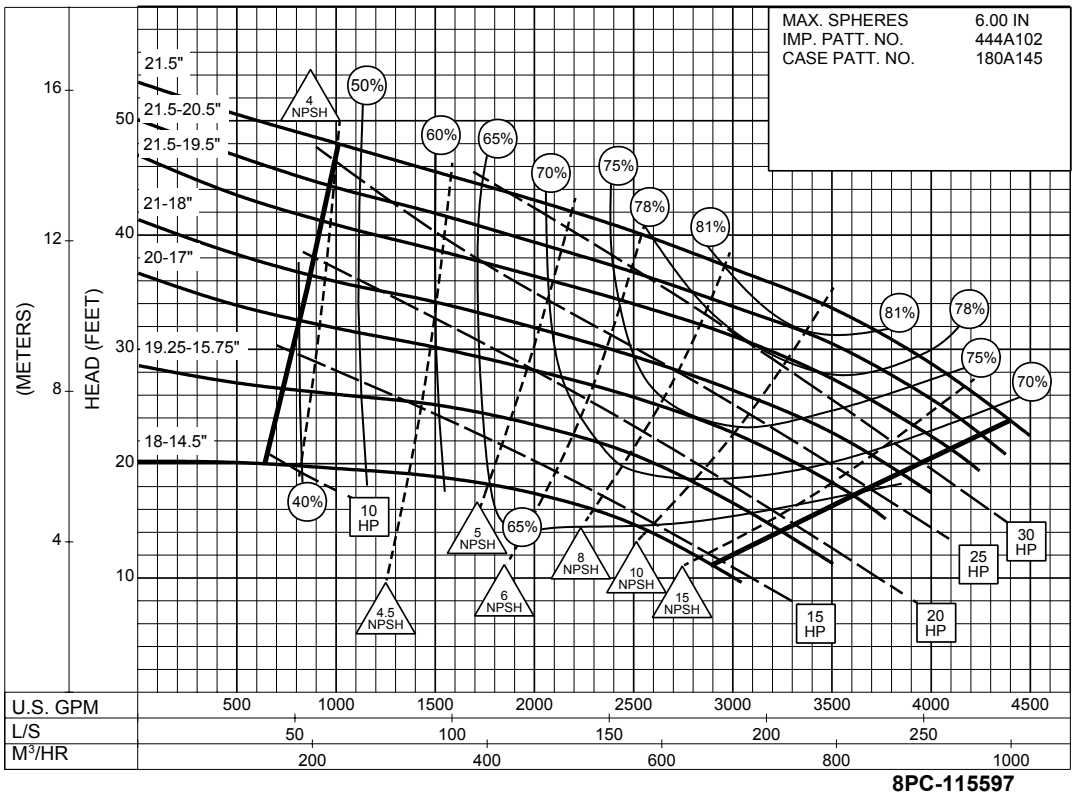
Supersedes Section 610 Page 424
Dated March 1983

10 x 12 x 22
SERIES 610

ENCLOSED IMPELLER

580
RPM

SIZE : 10x12x22 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 580**



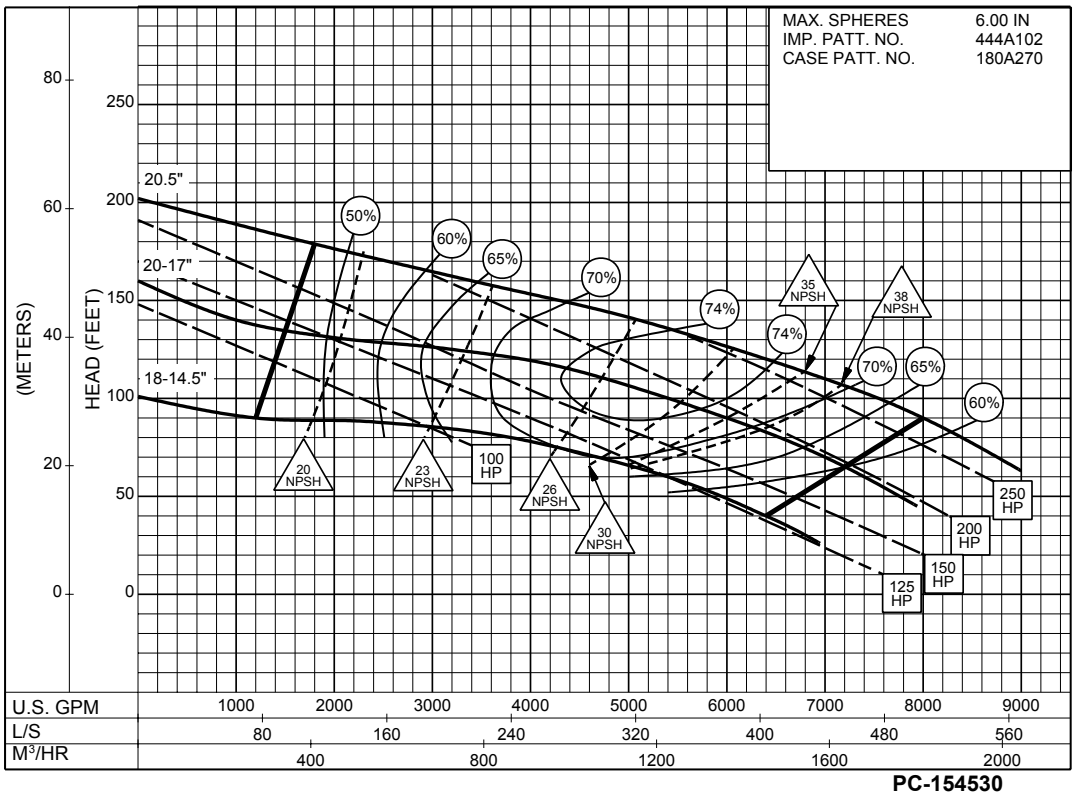
8PC-115597

12 x 12 x 22
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 424A
Dated November 1992

SIZE : 12x12x22 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 1175**



PC-154530

1175 RPM

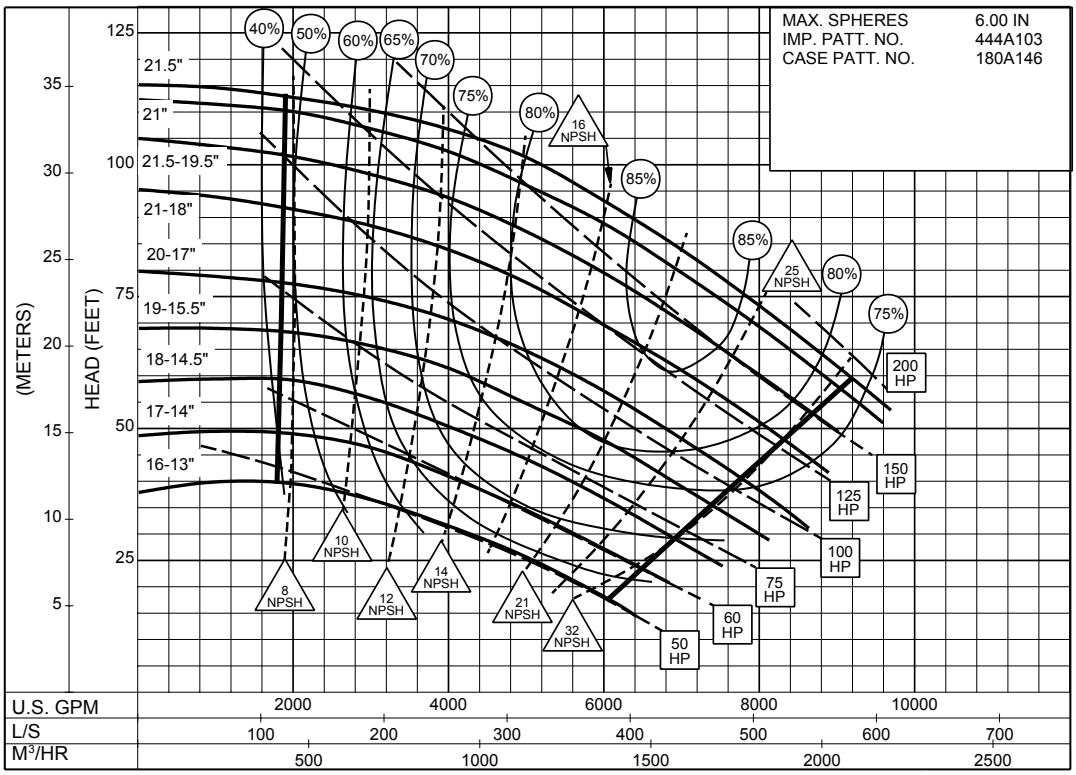
Supersedes Section 610 Page 425
Dated March 1983

12 x 14 x 22A
SERIES 610

ENCLOSED IMPELLER

875 RPM

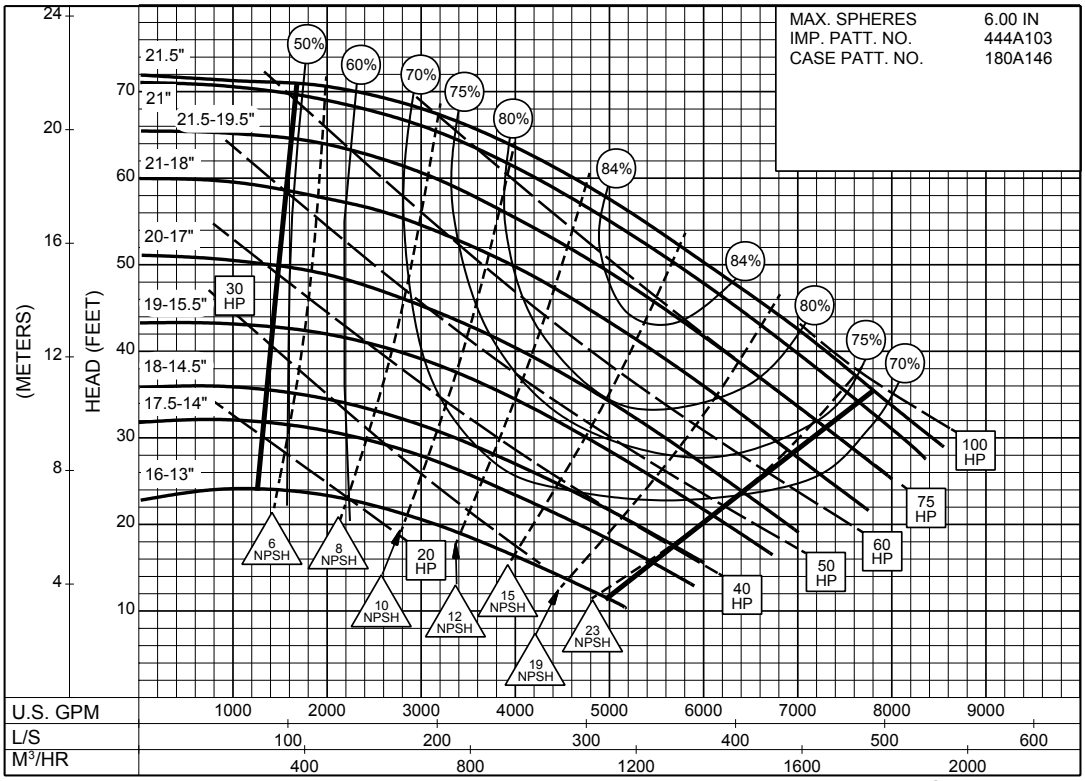
SIZE : 12x14x22A TYPE : 610 IMPELLER : Enclosed R. P. M. : 875



8PC-126830

700 RPM

SIZE : 12x14x22A TYPE : 610 IMPELLER : Enclosed R. P. M. : 700



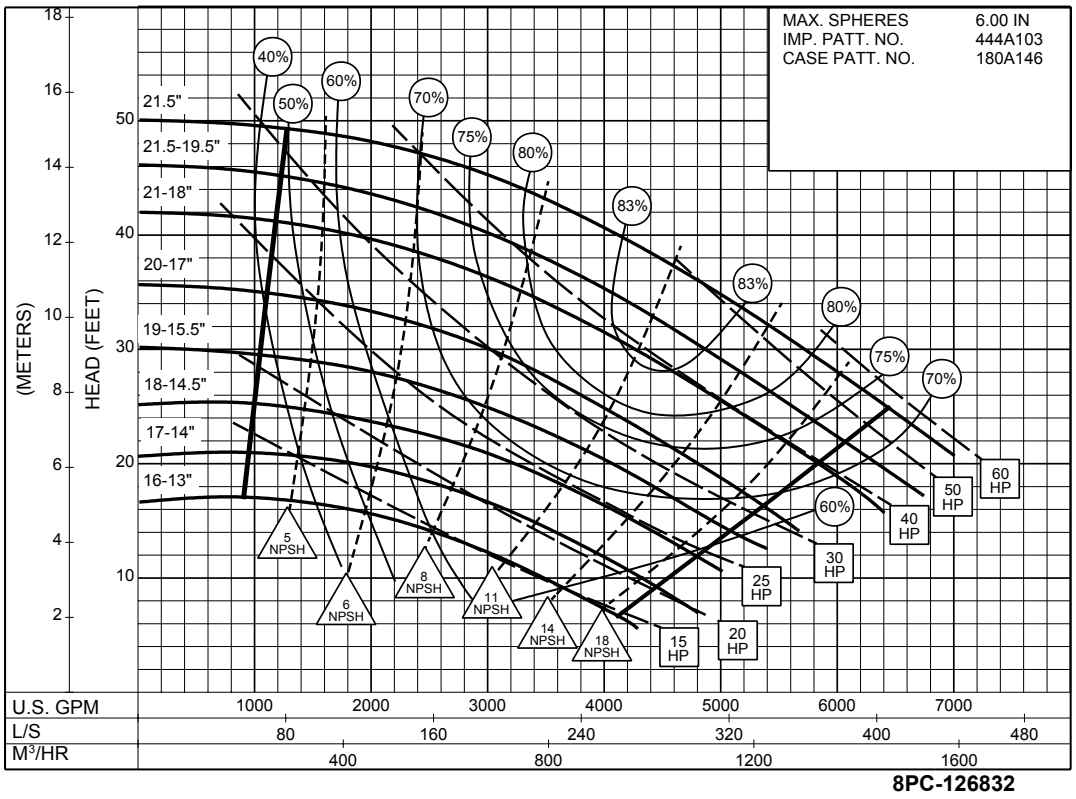
8PC-126831

12 x 14 x 22A
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 426
Dated March 1983

SIZE : 12x14x22A **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 580**



8PC-126832

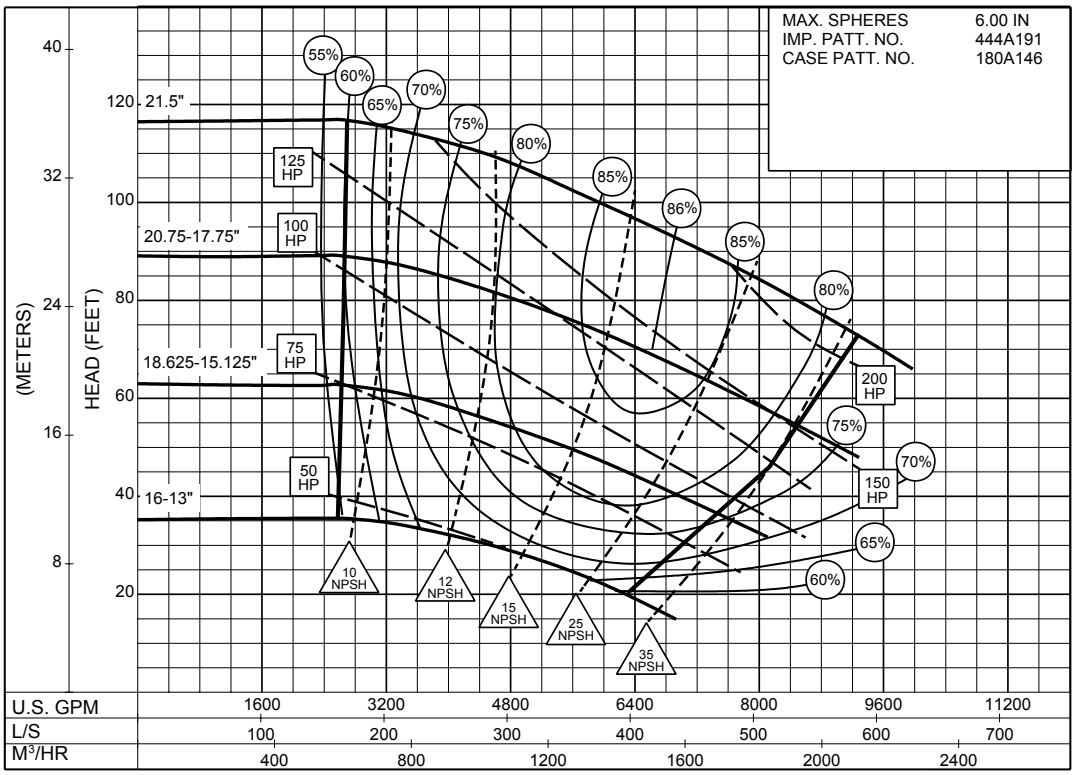
580 RPM

12 x 14 x 22B
SERIES 610

ENCLOSED IMPELLER

875 RPM

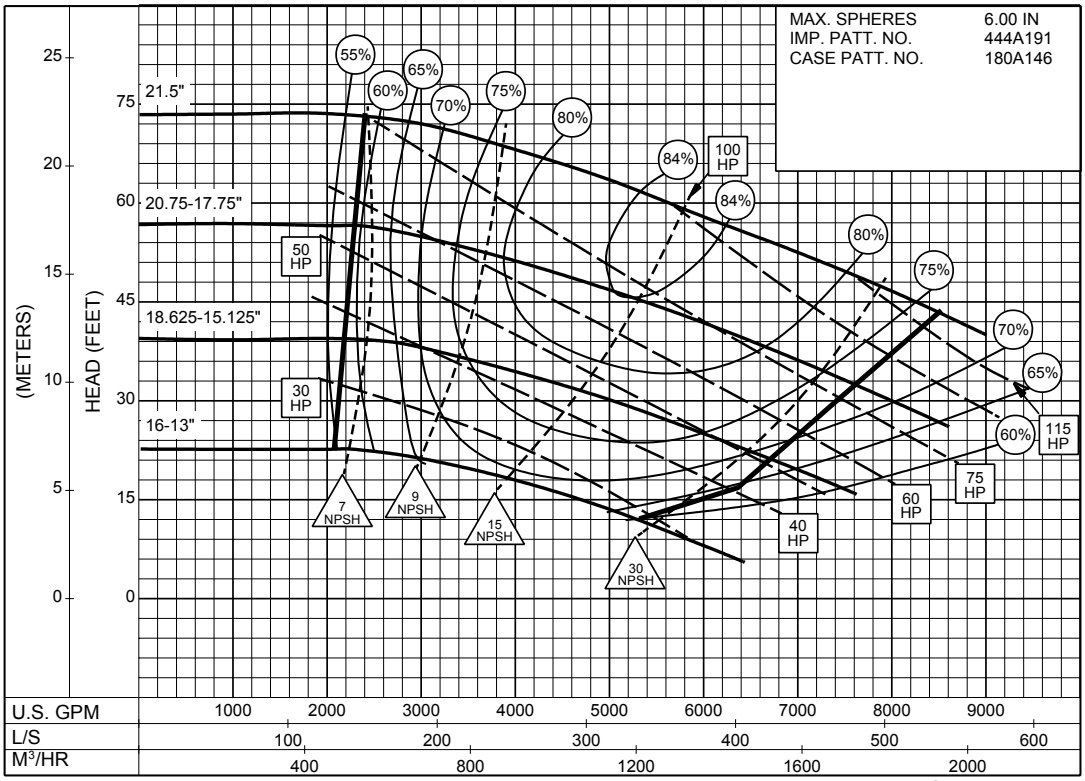
SIZE : 12x14x22B **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 875**



8PC-132458

700 RPM

SIZE : 12x14x22B **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 700**



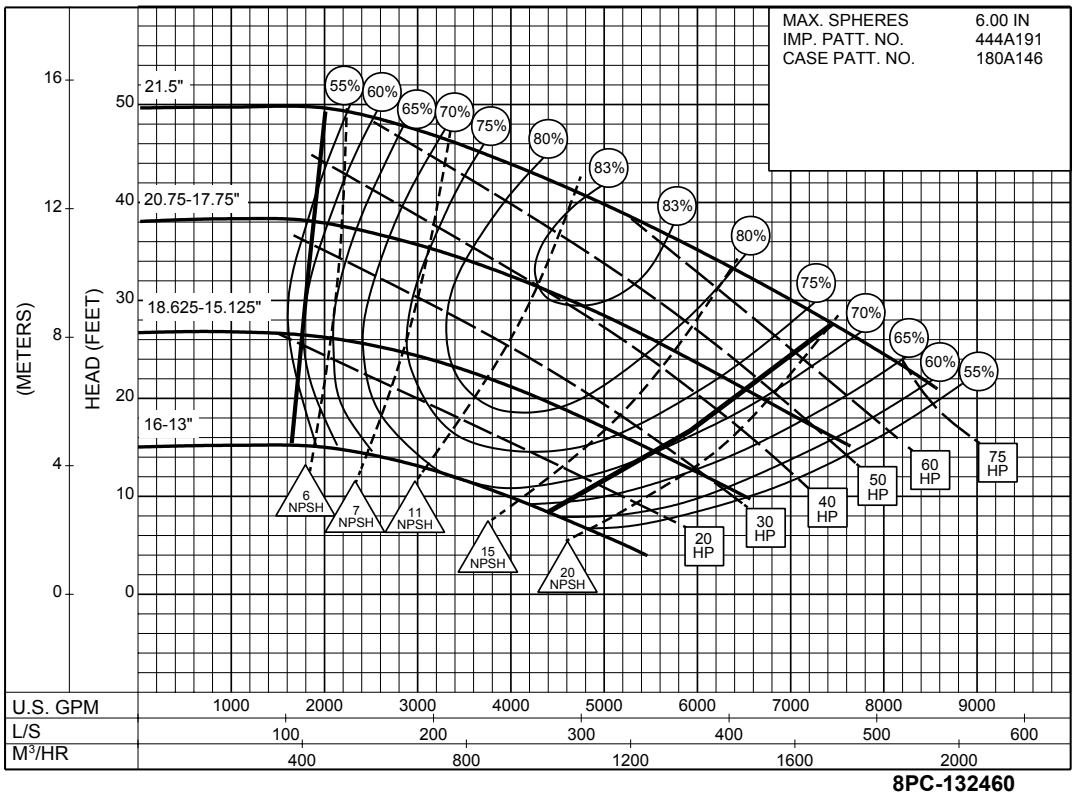
8PC-132459

12 x 14 x 22B
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 428
Dated March 1983

SIZE : 12x14x22B **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 580**



8PC-132460

580 RPM

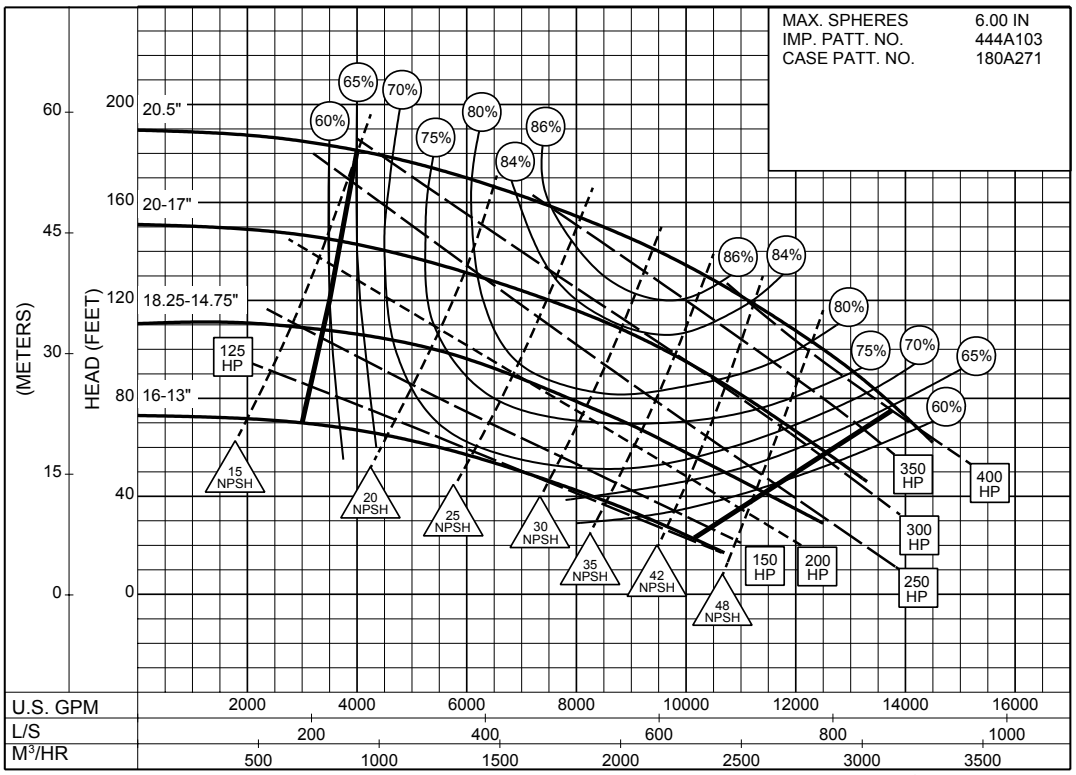
Supersedes Section 610 Page 429
Dated September 1992

14 x 14 x 22A
SERIES 610

ENCLOSED IMPELLER

1175
RPM

SIZE : 14x14x22A **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 1175**



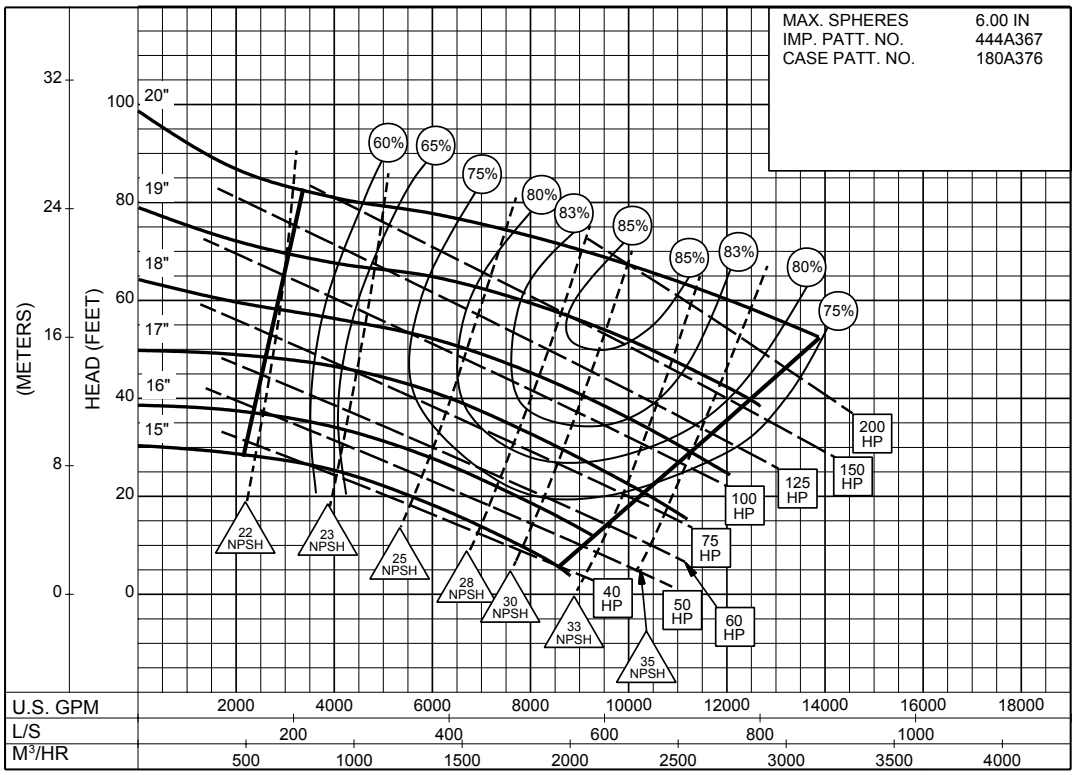
PC-150828

16 x 16 x 20
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 431
Dated October 1992

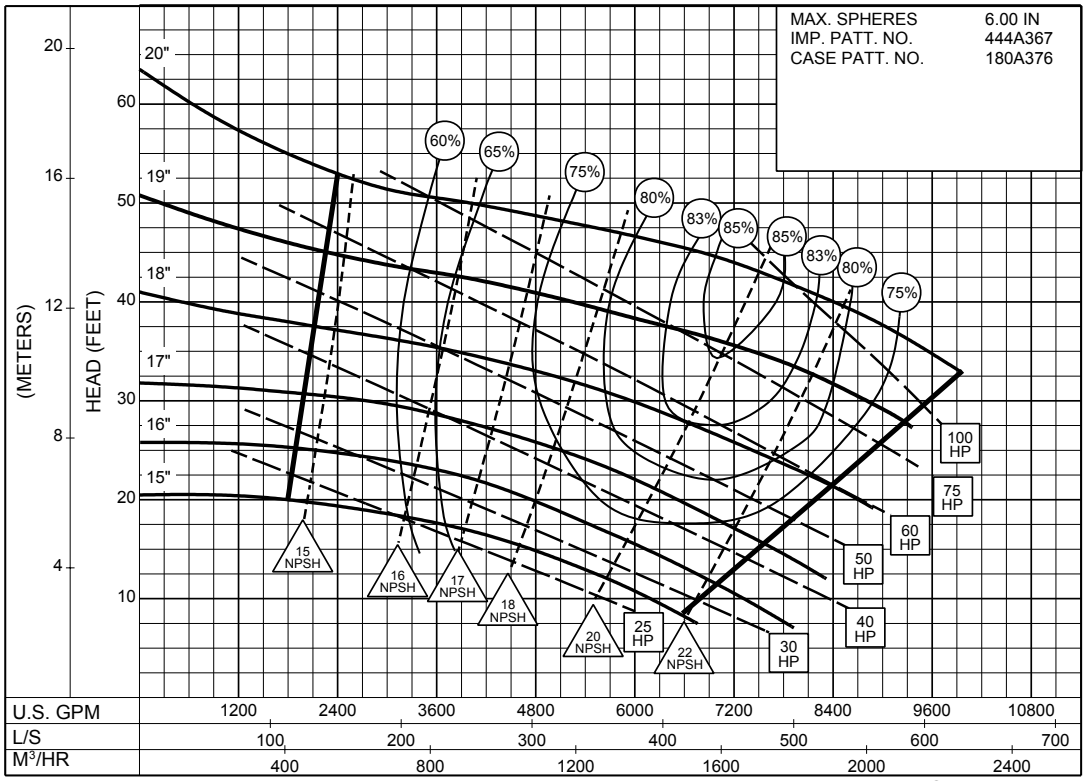
SIZE : 16x16x20 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 875**



8PC-152485

875 RPM

SIZE : 16x16x20 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 700**



8PC-152486

700 RPM

AURORA®
Pentair Pump Group

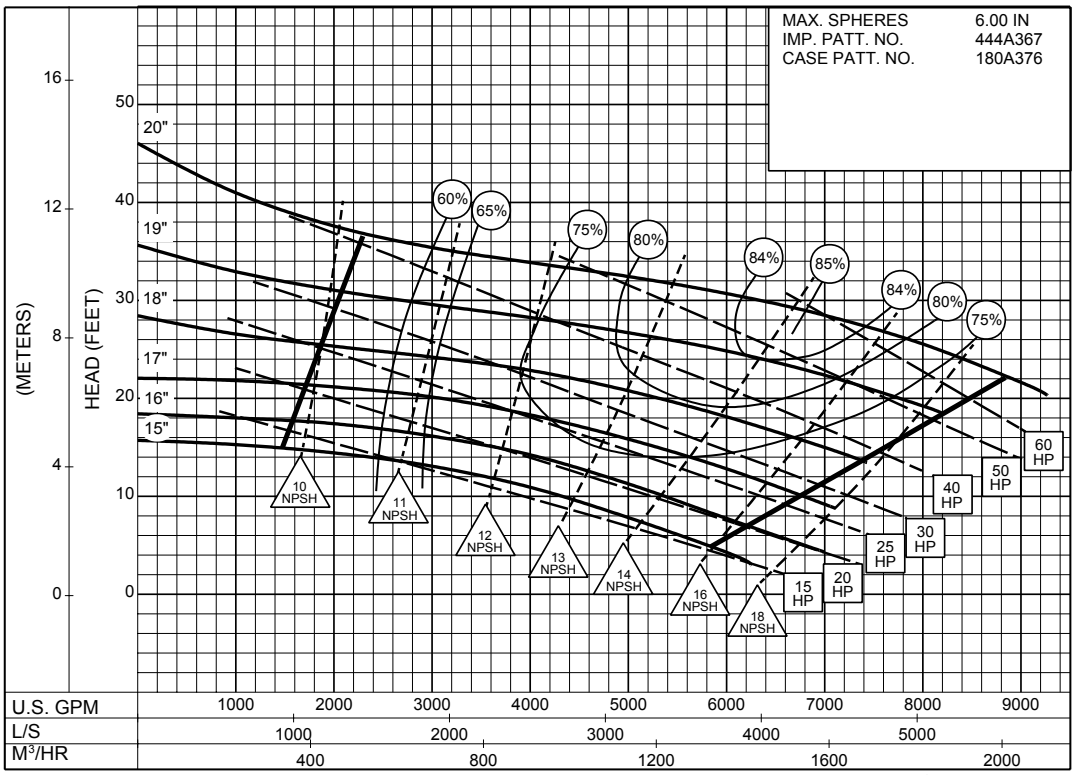
Supersedes Section 610 Page 432
Dated October 1992

16 x 16 x 20
SERIES 610

ENCLOSED IMPELLER

585 RPM

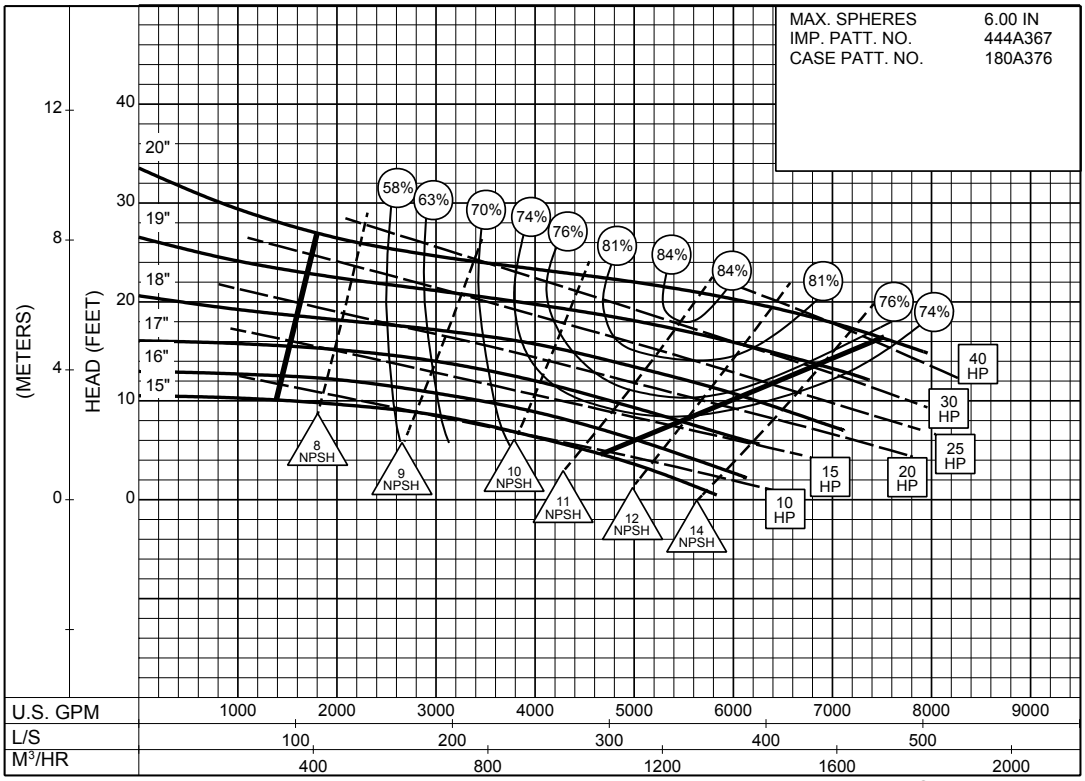
SIZE : 16x16x20 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 585**



8PC-152487

500 RPM

SIZE : 16x16x20 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 500**



PC-152488

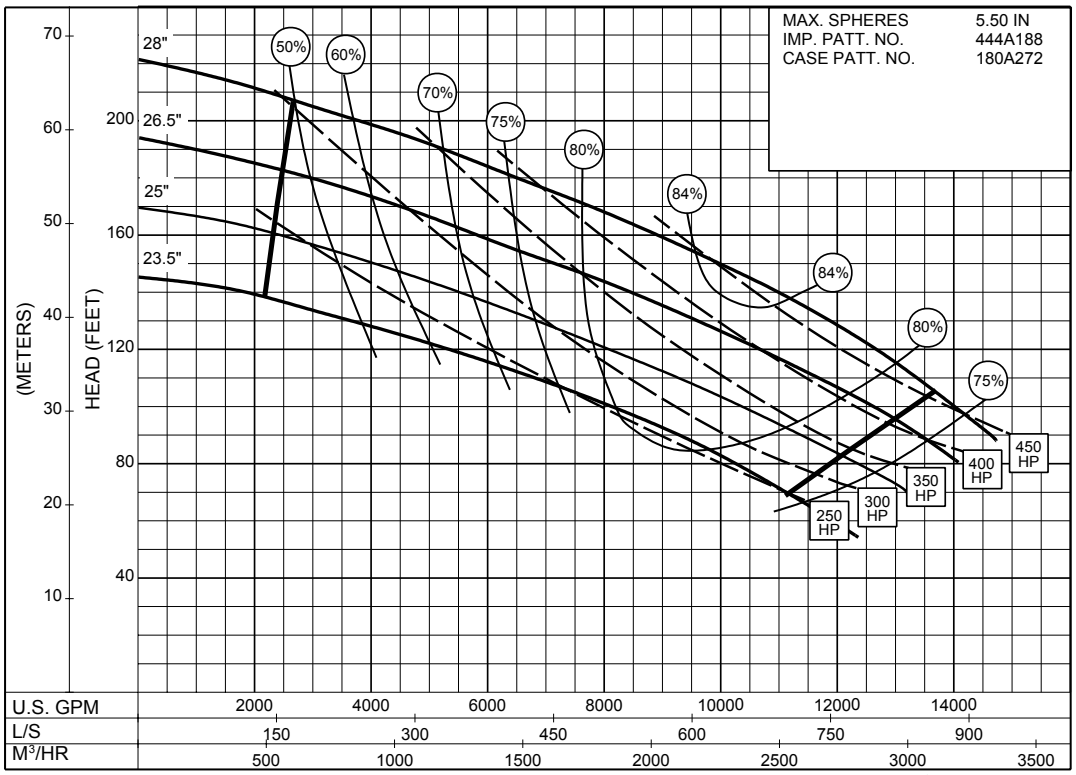
AURORA®
Pentair Pump Group

16 x 16 x 28
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 435
Dated April 2001

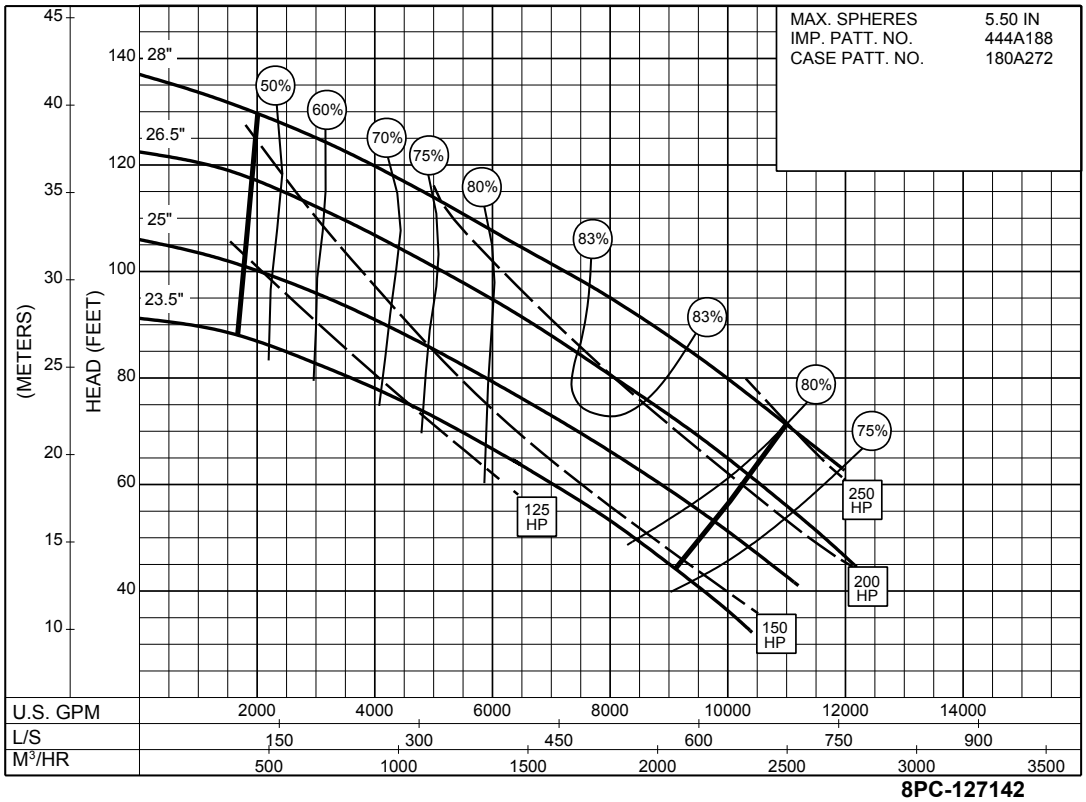
SIZE : 16x16x28 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 875**



8PC-127141

875 RPM

SIZE : 16x16x28 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 700**



8PC-127142

700 RPM

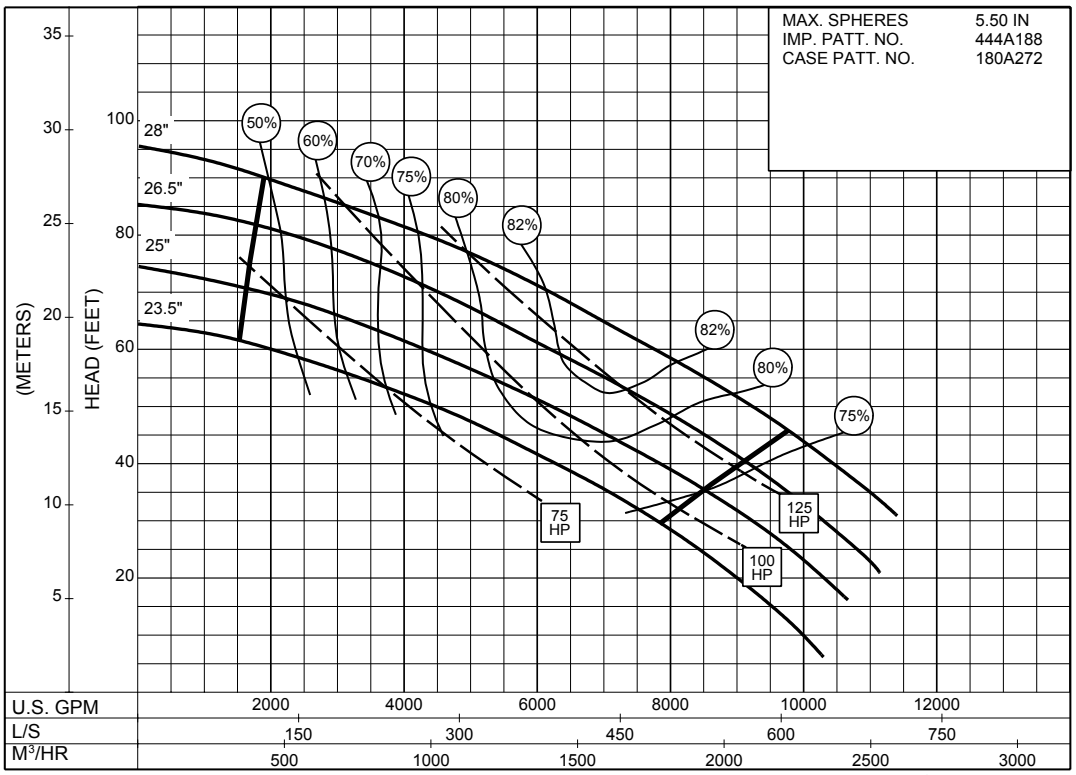
AURORA®
Pentair Pump Group

16 x 16 x 28
SERIES 610

ENCLOSED IMPELLER

585
RPM

SIZE : 16x16x28 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 585**



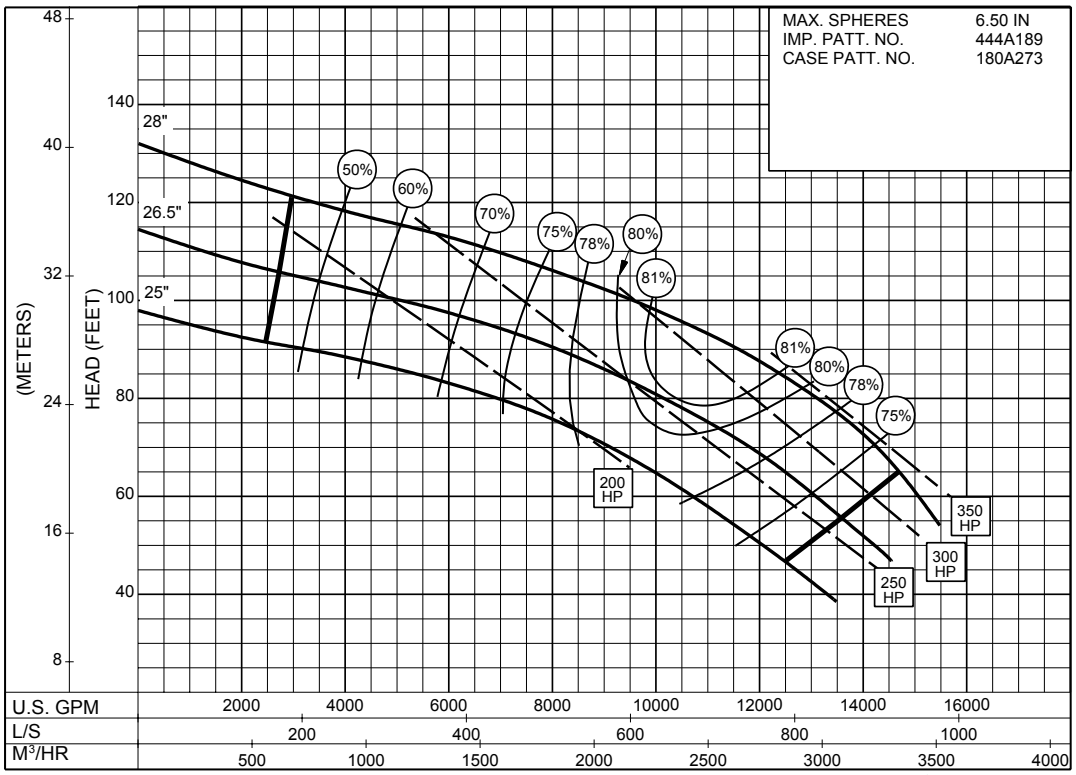
8PC-127143

18 x 18 x 28
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 437
Dated May 1980

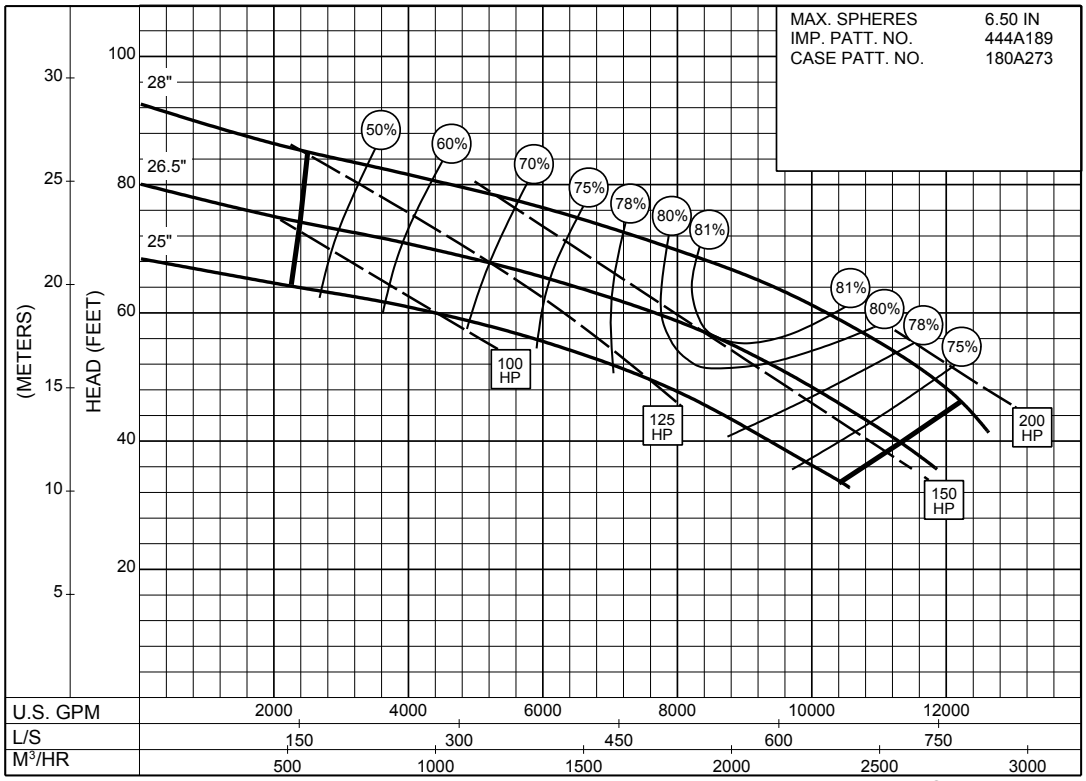
SIZE : 18x18x28 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 700**



8PC-127144

700 RPM

SIZE : 18x18x28 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 585**



8PC-127145

585 RPM

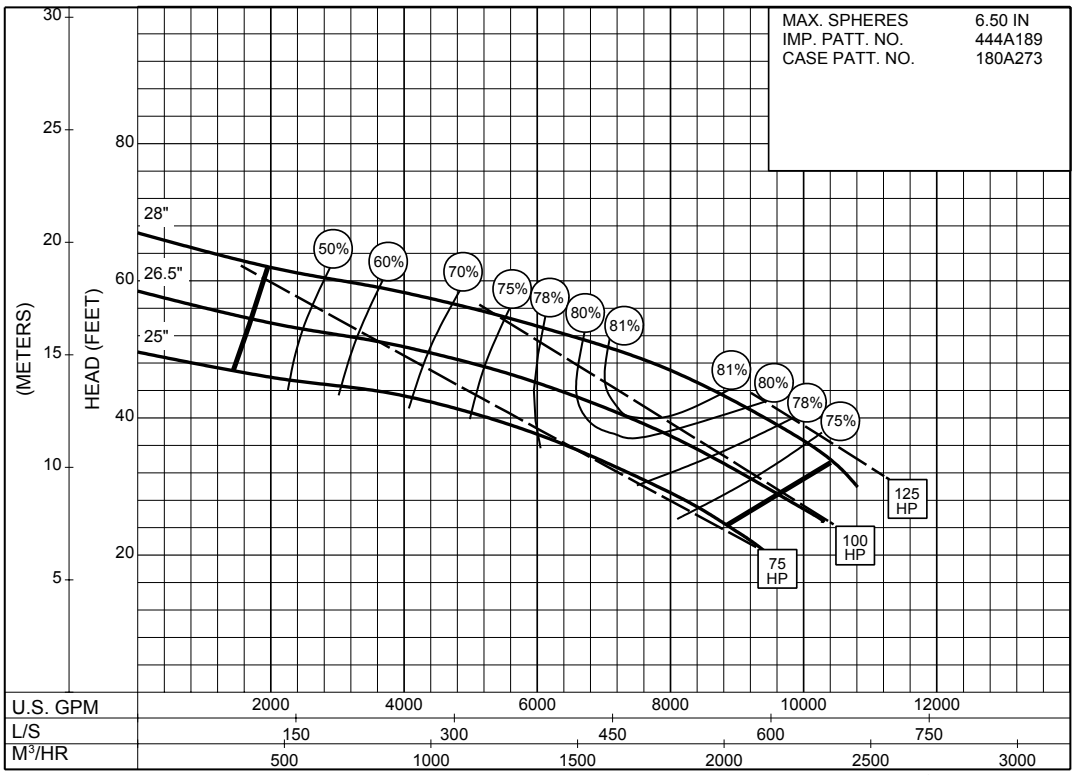
AURORA®
Pentair Pump Group

18 x 18 x 28
SERIES 610

ENCLOSED IMPELLER

500
RPM

SIZE : 18x18x28 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 500**



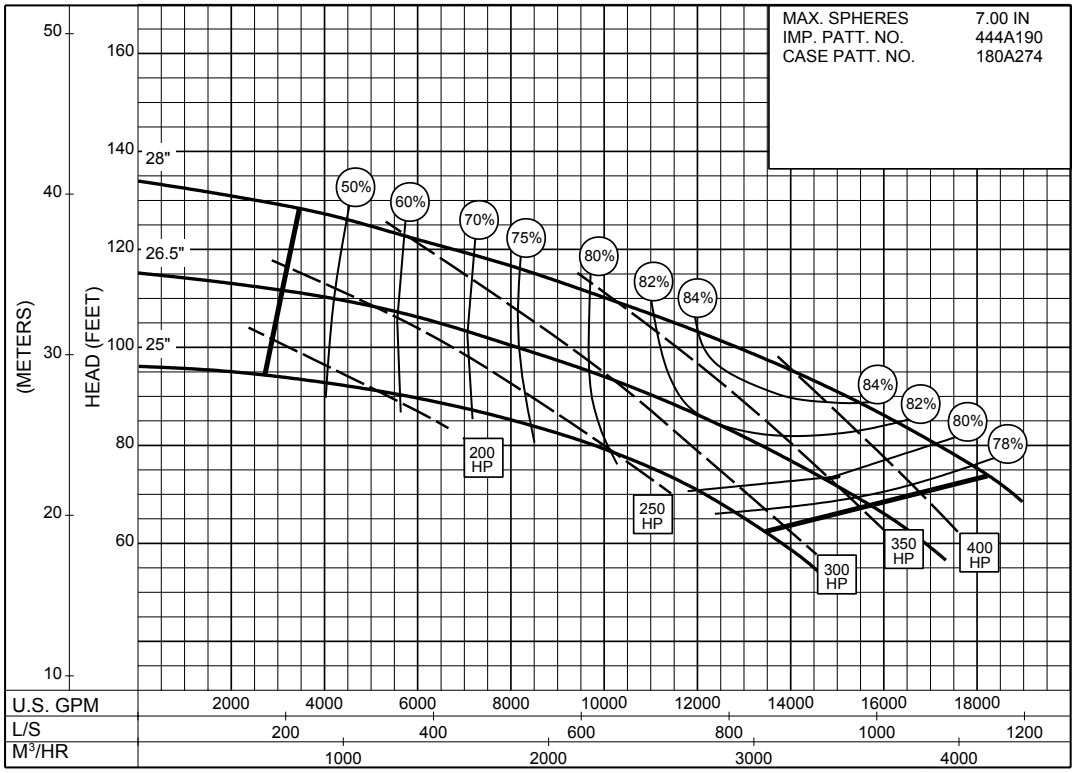
8PC-127146

20 x 20 x 28
SERIES 610

ENCLOSED IMPELLER

Supersedes Section 610 Page 439
Dated May 1980

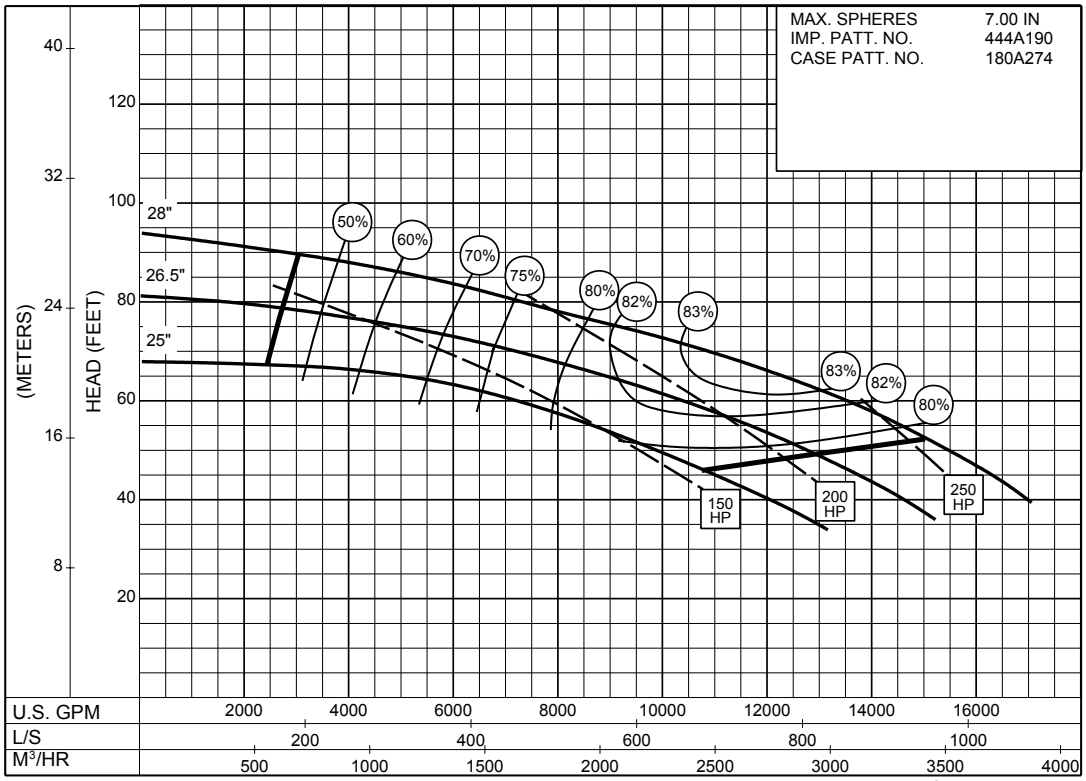
SIZE : 20x20x28 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 700**



8PC-127147

700 RPM

SIZE : 20x20x28 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 585**



8PC-127148

585 RPM

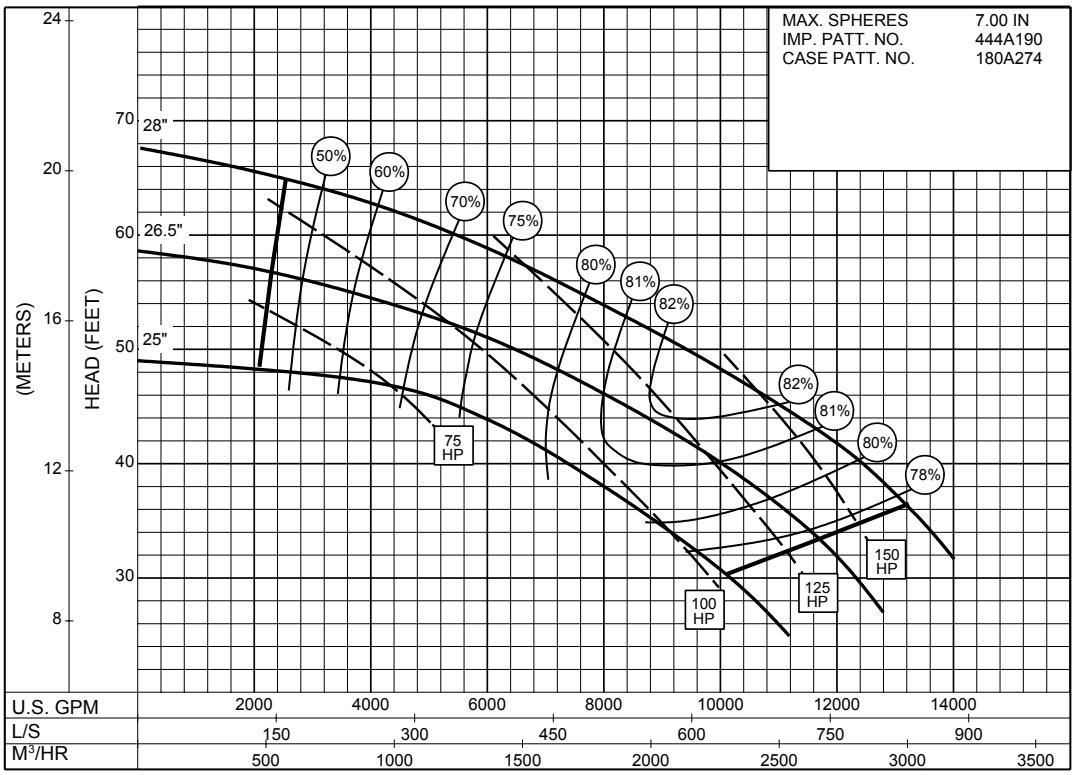
AURORA®
Pentair Pump Group

20 x 20 x 28
SERIES 610

ENCLOSED IMPELLER

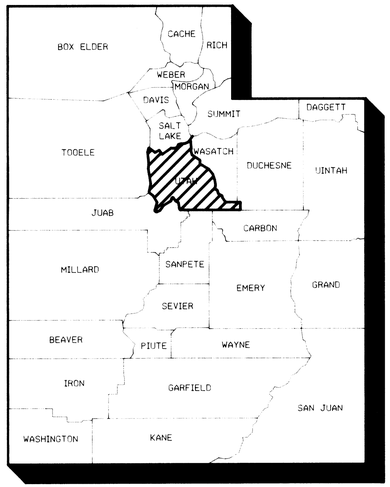
500
RPM

SIZE : 20x20x28 **TYPE : 610** **IMPELLER : Enclosed** **R. P. M. : 500**

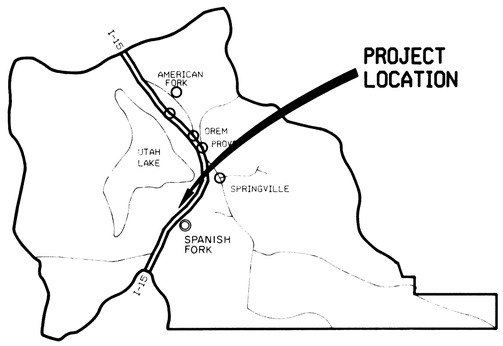


8PC-127149

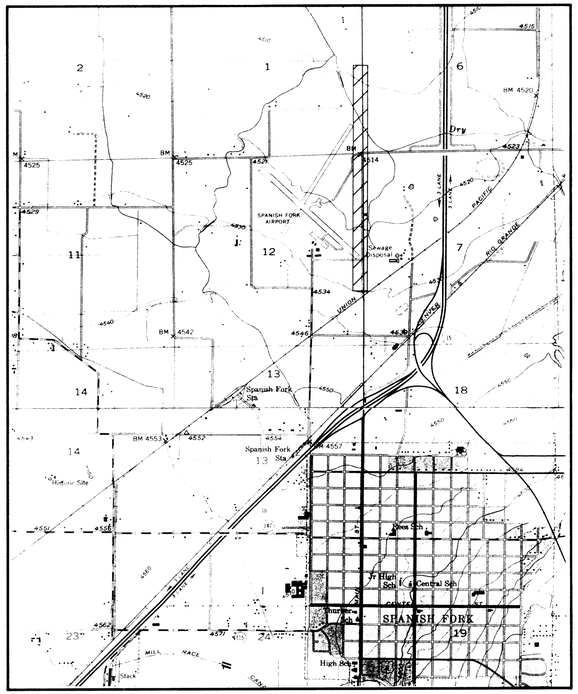
UTAH COUNTY SECURITY CENTER
SEWAGE LIFT STATION
SPANISH FORK, UTAH



STATE OF UTAH



UTAH COUNTY



LOCATION MAP

INDEX OF SHEETS

SHEET	DESCRIPTION
C-1	COVER SHEET
C-2	SITE PLAN
C-3	SEWAGE LIFT STATION
C-4	PLAN & PROFILE (6" FORCE MAIN)
C-5	PLAN & PROFILE (6" FORCE MAIN)
C-6	BUILDING ELEVATIONS

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SEAL

DATE	BY	REVISIONS

DESIGNED BY: ROBERT D. GUNNELL — DATE:
DRAWN BY: K.E., B.A. — DATE: 12/21/93
CHECKED BY: — DATE:

RB&G ENGINEERING INC.
1435 West 820 North
Provo, UT 84601-1343
801 374-5771 PROVO
801 521-5771 SALT LAKE CITY

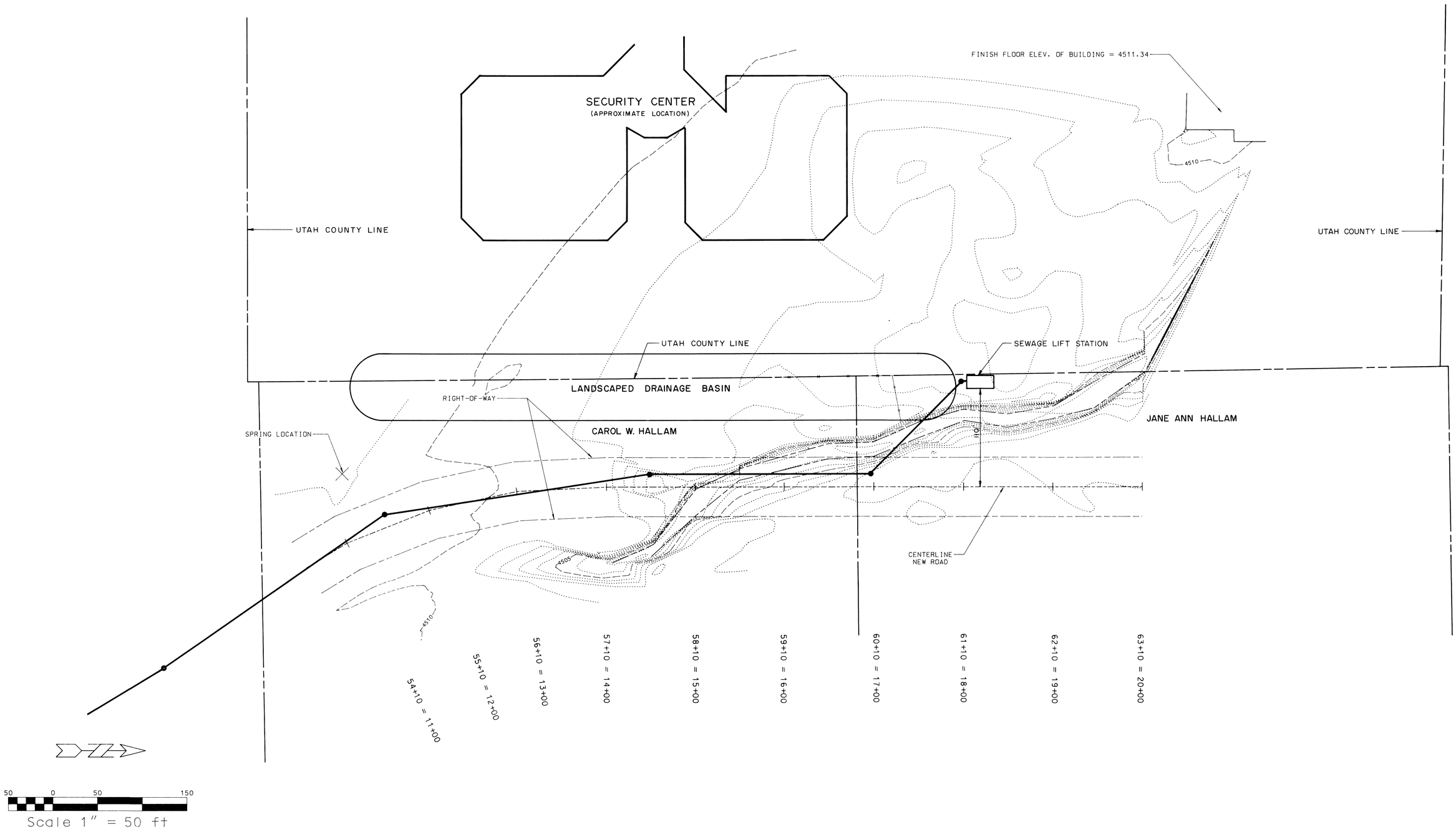
SPANISH FORK, UTAH

UTAH COUNTY SECURITY CENTER

COVER SHEET

SHEET C-1 OF SHEET(S)

File No.



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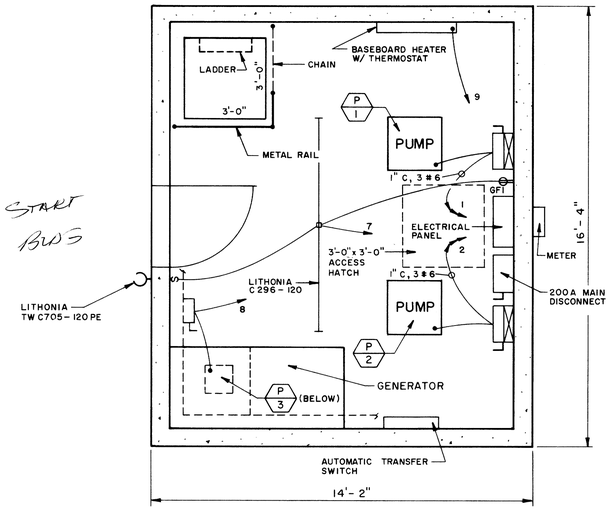
RB&G ENGINEERING INC. 1435 WEST 820 NORTH PROVO, UTAH 84601-1343 801 374-5771 PROVO 801 521-5771 SALT LAKE CITY	NO. / AUTHORIZED BY / REVISION / MADE BY / DATE	DESIGN BY ROBERT D. GUNNELL DRAWN BY BARRY ANDREASON CHECKED BY ROBERT D. GUNNELL SCALE HORIZ. 1" = 50'-0" VERT. DATE 10 DEC. 1993	UTAH COUNTY SECURITY CENTER SEWAGE LIFT STATION	SITE MAP	JOB NO. 9309.108 FILE NO. 33 SHEET C-2 OF _____ SHEETS	REV NO.

118277



START
BLDG

BUILDING ELECTRICAL FLOOR PLAN

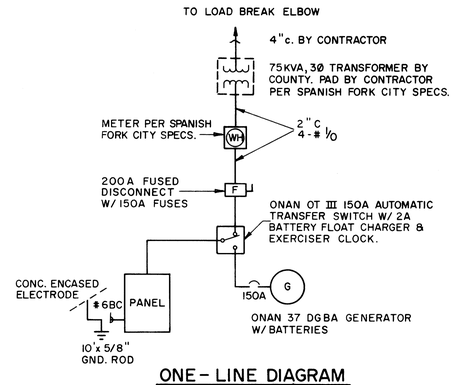
SCALE 3/8" = 1'-0"

PANEL

AMPS: 225 MAIN: LUGS ONLY VOLTS: 120/208 PHASE: 3 MOUNTING: SURFACE A/C: 10 K

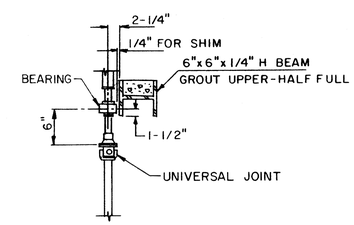
AMPS	POLE	WIRE	DESCRIPTION	CIRCUIT WATTS	NO	PHASE LOADS A	B	C	CIRCUIT NO	WATTS	DESCRIPTION	WIRE	AMPS	POLE
80	3	#6	PUMP #1	7250	1	14500			2	7250	PUMP #2	#6	80	3
--	--	#6	--	7250	3		14500		4	7250	--	#6	--	--
--	--	#6	--	7250	5			14500	6	7250	--	#6	--	--
20	1	#12	LIGHT, RECEPTABLE	340	7	1040			8	700	SUMP PUMP	#12	20	1
20	1	#12	BASEBOARD HEATER	1500	9		1500		10		SPARE		20	1
					11				12					
					13				14					
					15				16					
					17				18					
					19				20					
					21				22					
					23				24					
					25				26					
					27				28					
					29				30					
					31				32					
					33				34					
					35				36					
					37				38					
					39				40					
					41				42					
			-WATTS/PHASE			15540	16000	14500						
						130	133	121						

CONDUIT SIZE: 2" WIRE SIZE: #1/10 46040 TOTAL WATTS 128 AVG. AMPS

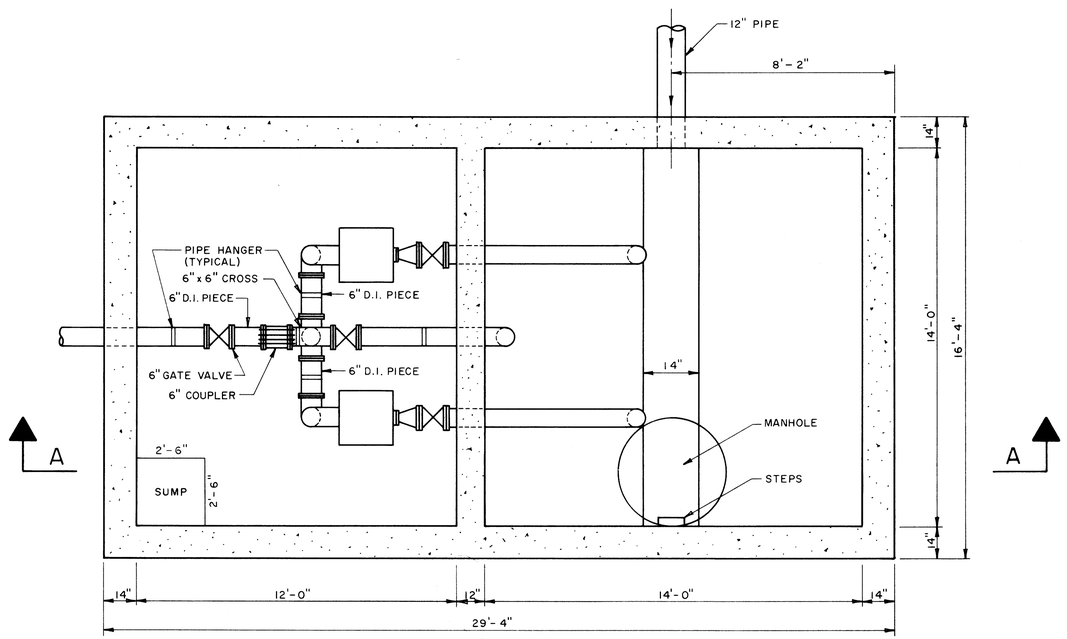


ONE - LINE DIAGRAM

N.T.S.

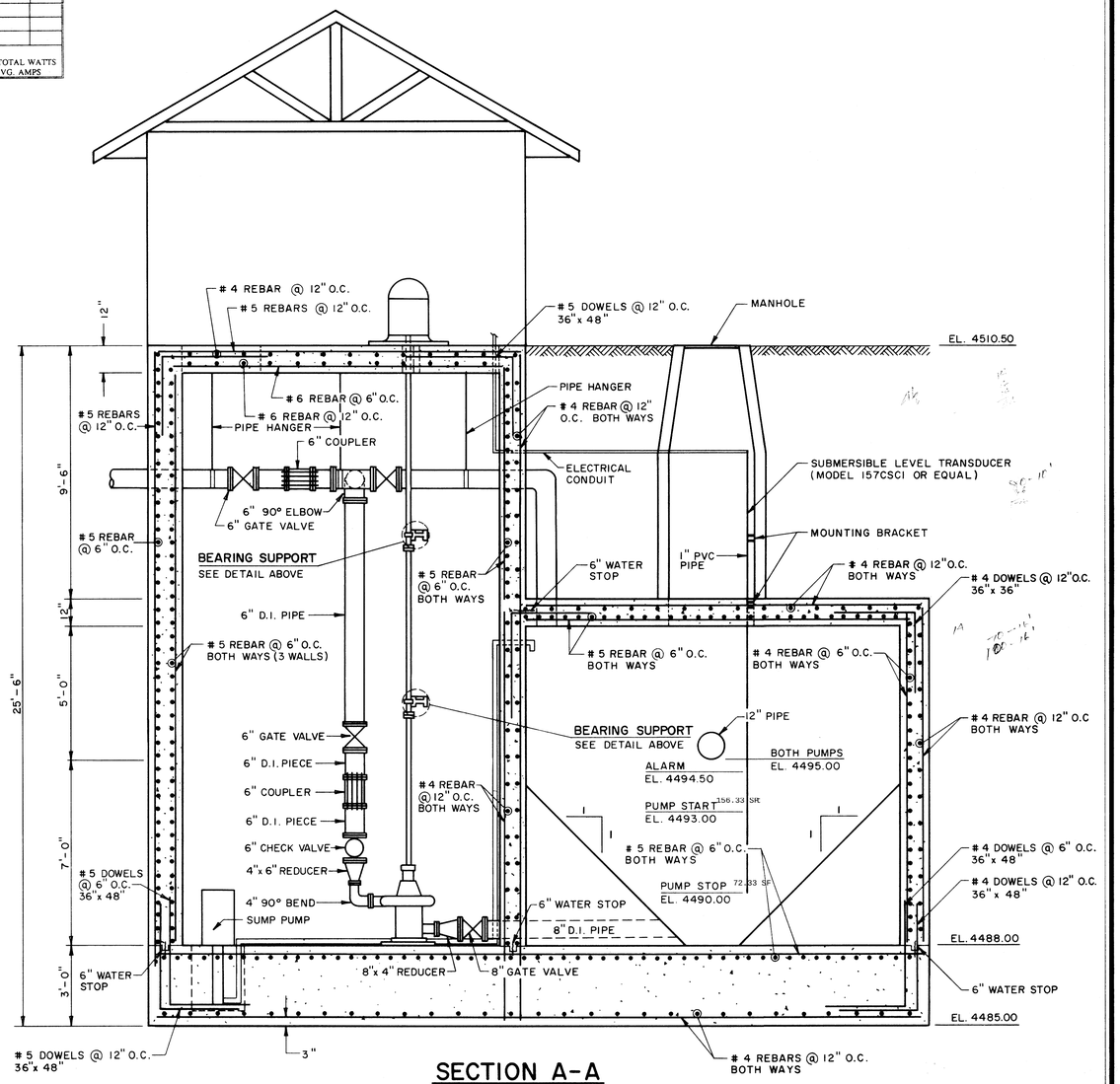


BEARING SUPPORT DETAIL



PLAN VIEW

SCALE 3/8"= 1'-0"



SECTION A-A

SCALE 3/8"= 1'-0"

263

SEAL

DATE	BY	REVISIONS

DESIGNED BY: ROBERT D. GUNNELL DATE:
DRAWN BY: DATE:
CHECKED BY: DATE:

RB&G ENGINEERING INC.
1435 West 820 North
Provo, UT 84601-1343
801 374-5771 PROVO
801 521-5771 SALT LAKE CITY

SPANISH FORK, UTAH

UTAH COUNTY SECURITY CENTER

SEWAGE LIFT STATION

SHEET C-3 OF SHEET(S)

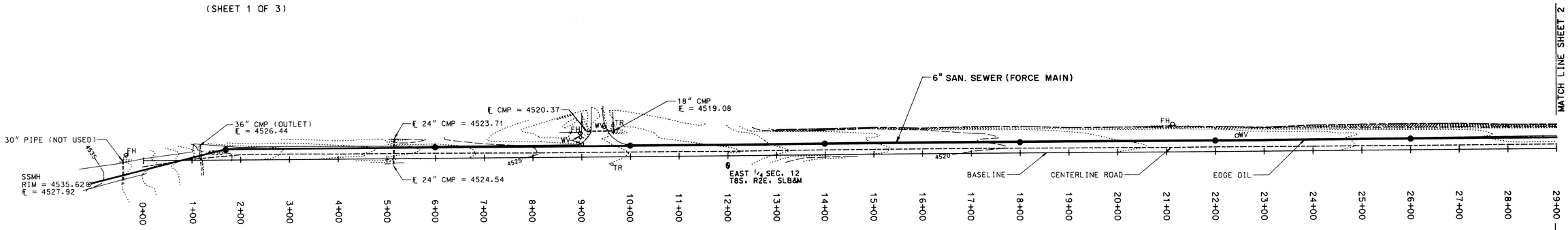
File No.

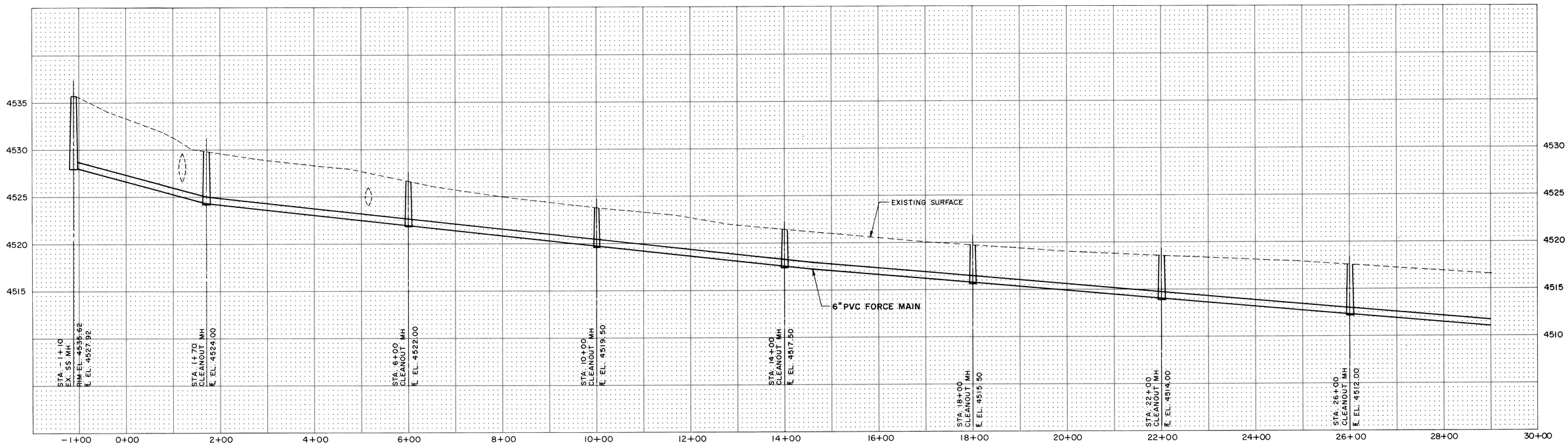
138827

100 0 100 300

Scale 1" = 100 ft

(SHEET 1 OF 3)





263

SEAL

DATE	BY	REVISIONS

DESIGNED BY: DATE:
DRAWN BY: DATE:
CHECKED BY: DATE:

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1435 West 820 North
Provo, UT 84601-1343
801 374-5771 PROVO
801 521-5771 SALT LAKE CITY

SPANISH FORK, UTAH

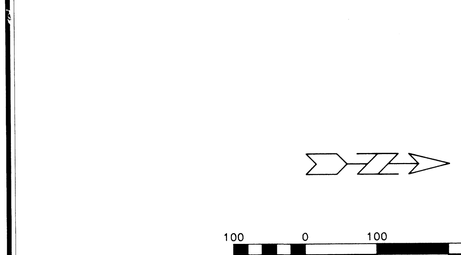
UTAH COUNTY SECURITY CENTER

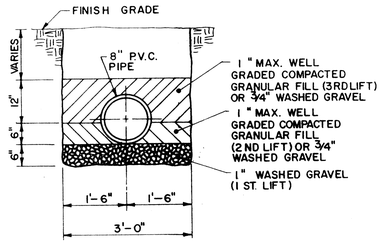
PLAN & PROFILE
6" FORCE MAIN SEWER

SHEET C-4 OF SHEET(S)

File No.

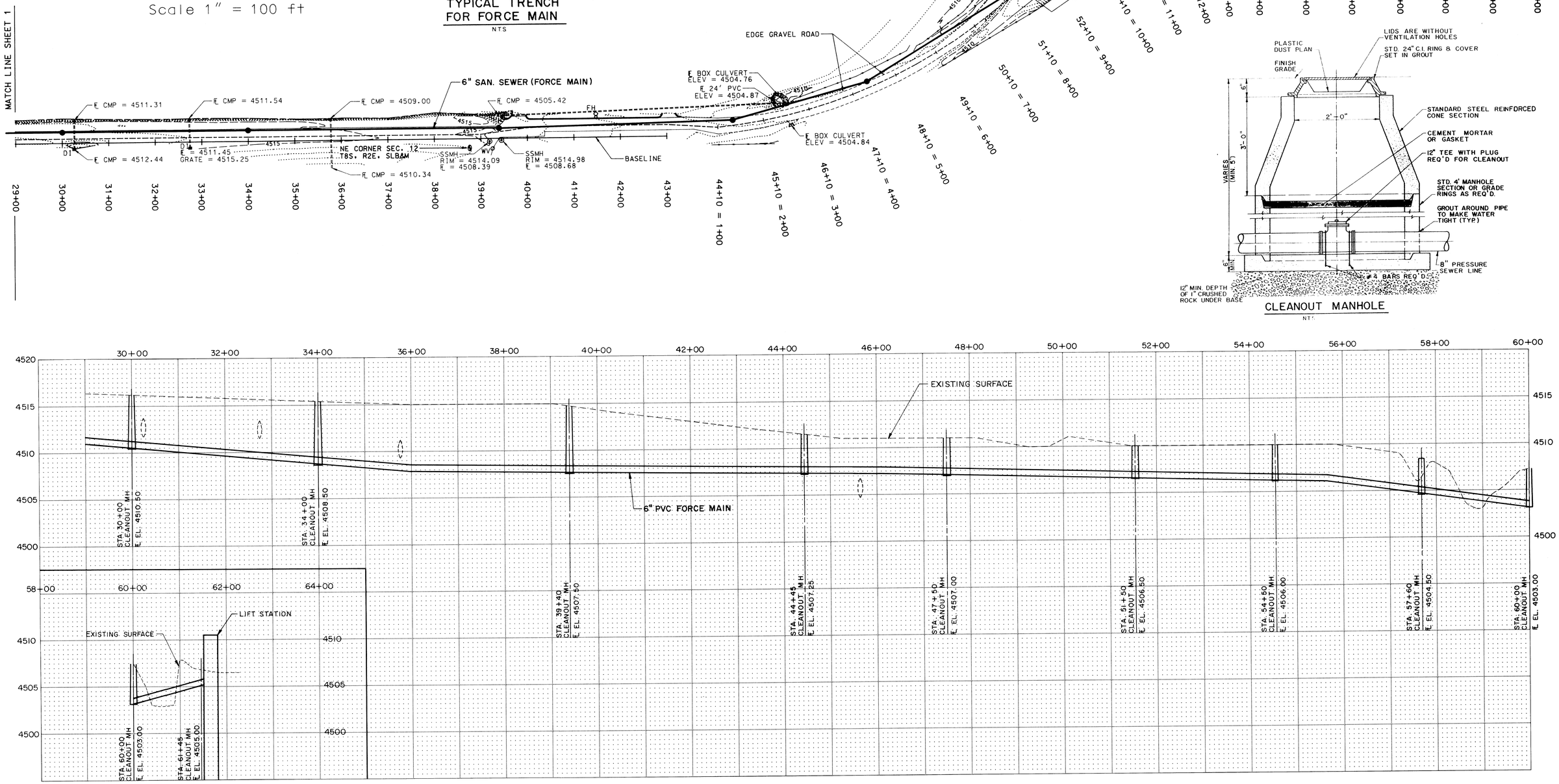
138827





TYPICAL TRENCH FOR FORCE MAIN

NTS



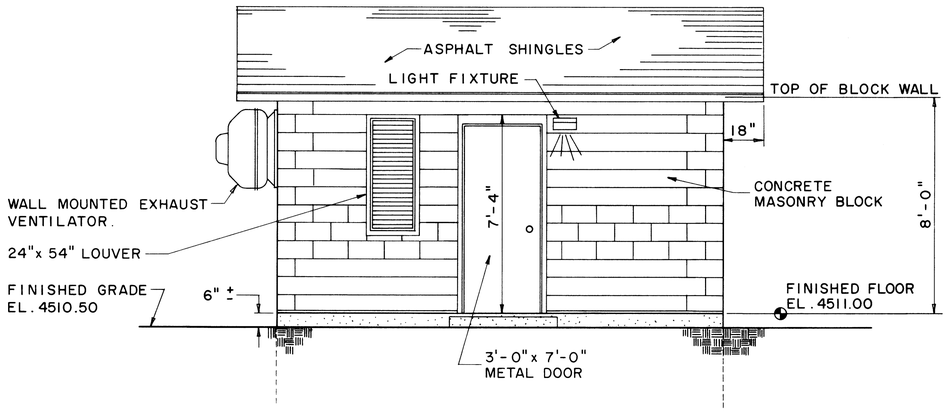
CLEANOUT MANHOLE

NTS

263

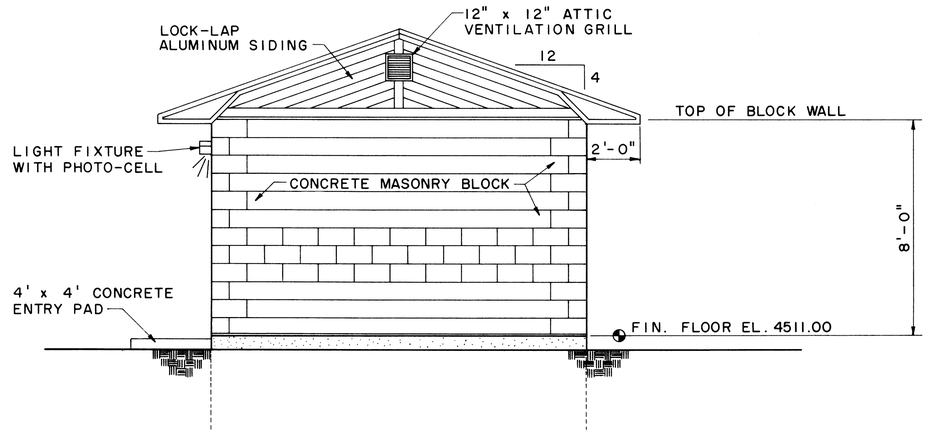
SEAL	DATE / BY / REVISIONS	DESIGNED BY: DATE: / DRAWN BY: DATE: / CHECKED BY: DATE:	RB&G ENGINEERING INC. 1435 West 820 North Provo, UT 84601-1343 801 374-5771 PROVO 801 521-5771 SALT LAKE CITY	SPANISH FORK, UTAH	UTAH COUNTY SECURITY CENTER	PLAN & PROFILE 6" FORCE MAIN SEWER	SHEET C-5 OF SHEET(S)

File No.



LIFT STATION BUILDING FRONT ELEVATION

SCALE 3/8" = 1'-0"

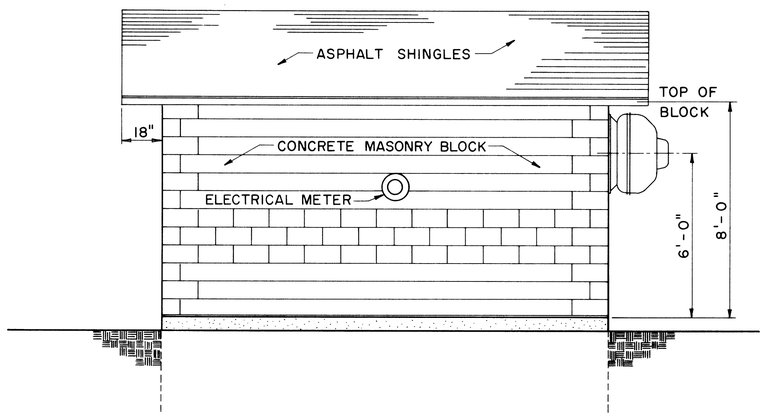


LIFT STATION BUILDING RIGHT ELEVATION

SCALE 3/8" = 1'-0"

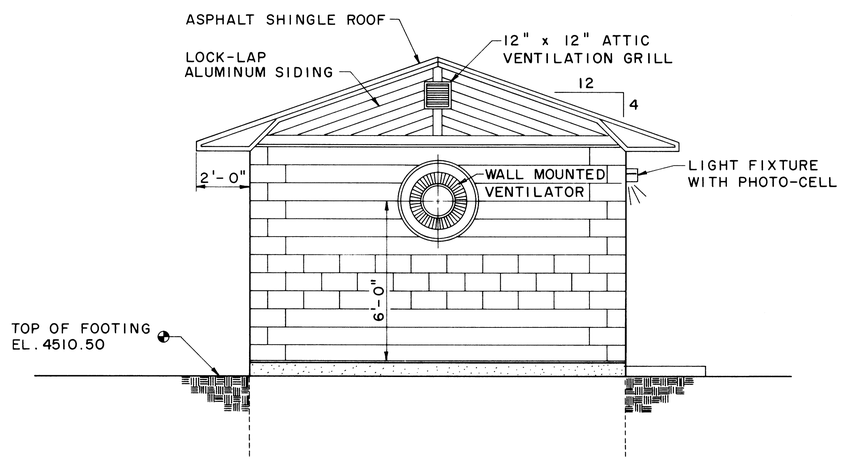
NOTE :

CONSTRUCTION TO BE WITH 8"x 8"x 16" TEXTURED SPLIT-FACE BLOCK.



LIFT STATION BUILDING BACK ELEVATION

SCALE 3/8" = 1'-0"



LIFT STATION BUILDING LEFT ELEVATION

SCALE 3/8" = 1'-0"

SEAL

DATE	BY	REVISIONS

DESIGNED BY: DATE:
DRAWN BY: DATE:
CHECKED BY: DATE:

RB&G ENGINEERING INC.
1435 West 820 North
Provo, UT 84601-1343
801 374-5771 PROVO
801 521-5771 SALT LAKE CITY

SPANISH FORK, UTAH

UTAH COUNTY SECURITY CENTER

SEWAGE LIFT STATION BUILDING ELEVATIONS

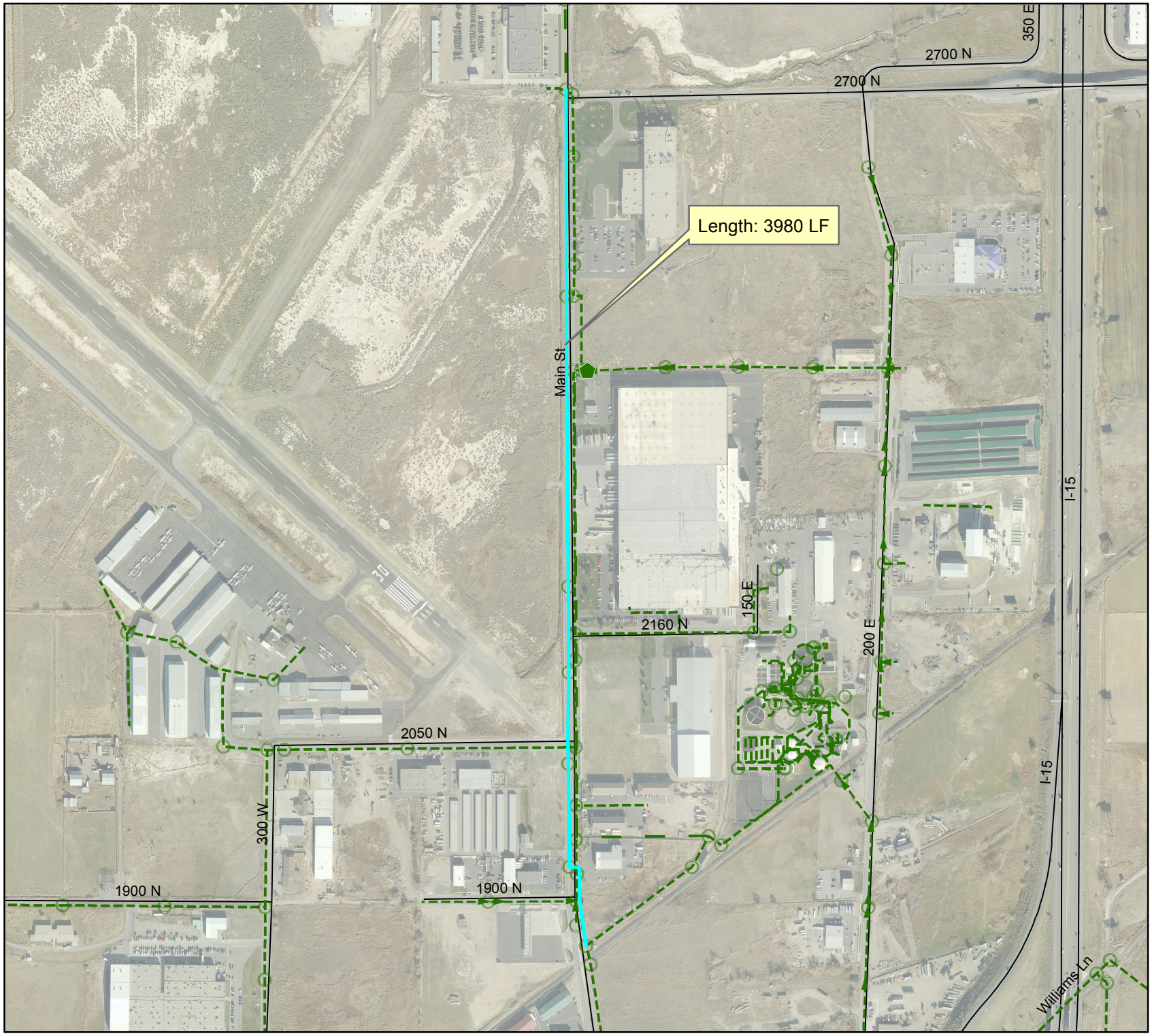
SHEET C-6 OF SHEET(S)

File No.

Justice Center Force Main

1 Inch = 600 Feet

0 200 400 600 Feet

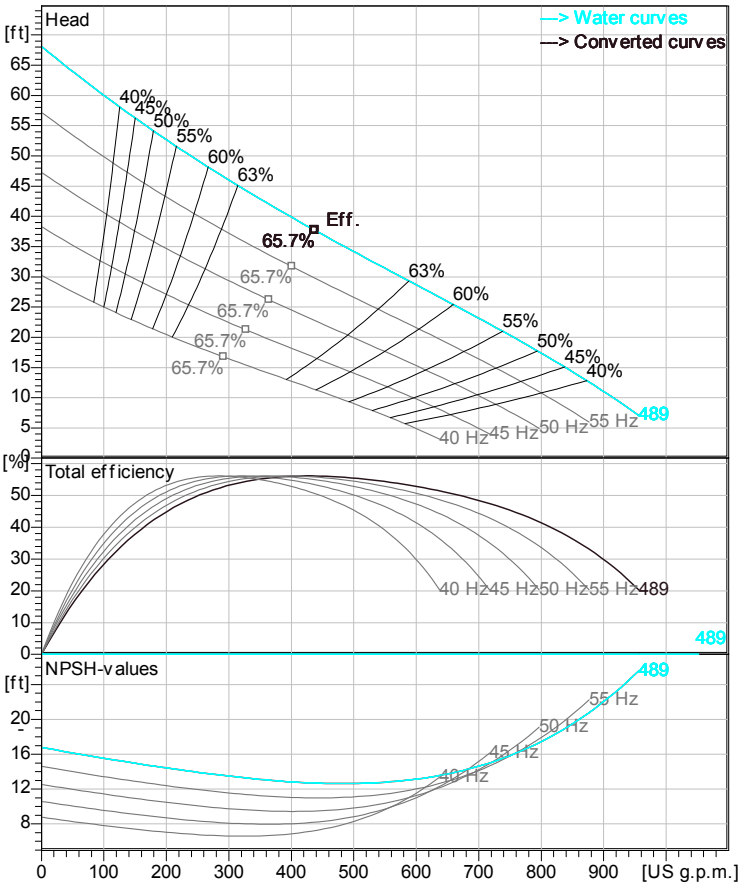


17 January 2011

Spanish Fork City
40 South Main Street
Spanish Fork, UT 84660
(801) 798-5000

NP 3127 HT 1~ 489

Technical specification



Curve according to: ISO 9906 grade 2 annex 1 or 2

Note: Picture might not correspond to the current configuration.

General

Patented self cleaning semi-open channel impeller, ideal for pumping in most waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

Impeller

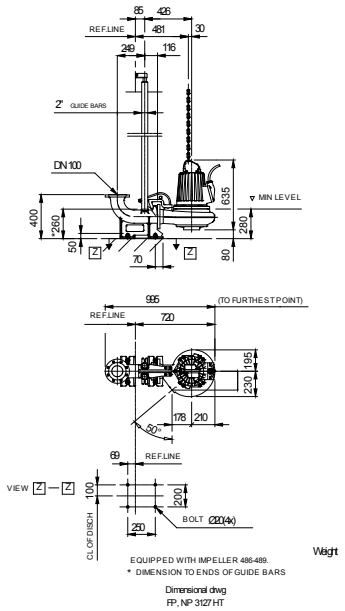
Impeller material	
Outlet diameter	$3^{15}/_{16}$"
Inlet diameter	100 mm
Impeller diameter	195 mm
Number of blades	2
Throughlet diameter	

Motor

Motor #	N3127.181 21-12-4AL-W 7,5hp
Stator variant	12
Frequency	60 Hz
Rated voltage	220 V
Number of poles	4
Phases	1~
Rated power	5.6 kW
Rated current	32 A
Starting current	65.9 A
Rated speed	1740 rpm
Power factor	
1/1 Load	0.97
3/4 Load	1
1/2 Load	0.99
Efficiency	
1/1 Load	82.5 %
3/4 Load	84.5 %
1/2 Load	83 %

Configuration

Installation: P - Semi permanent, Wet



Project	Project ID	Created by	Created on	Last update
			13.01.2011	

NP 3127 HT 1~ 489

Performance curve

Pump

Outlet diameter	$3^{15}/_{16}$"
Inlet diameter	100 mm
Impeller diameter	$7^{11}/_{16}$"
Number of blades	2
Throughlet diameter	

Motor

Motor #	N3127.181 21-12-4AL-W 7,5hp
Stator variant	12
Frequency	60 Hz
Rated voltage	220 V
Number of poles	4
Phases	1~
Rated power	5.6 kW
Rated current	32 A
Starting current	65.92 A
Rated speed	1740 rpm

Power factor	
1/1 Load	0.97
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Efficiency	
1/1 Load	82.5 %
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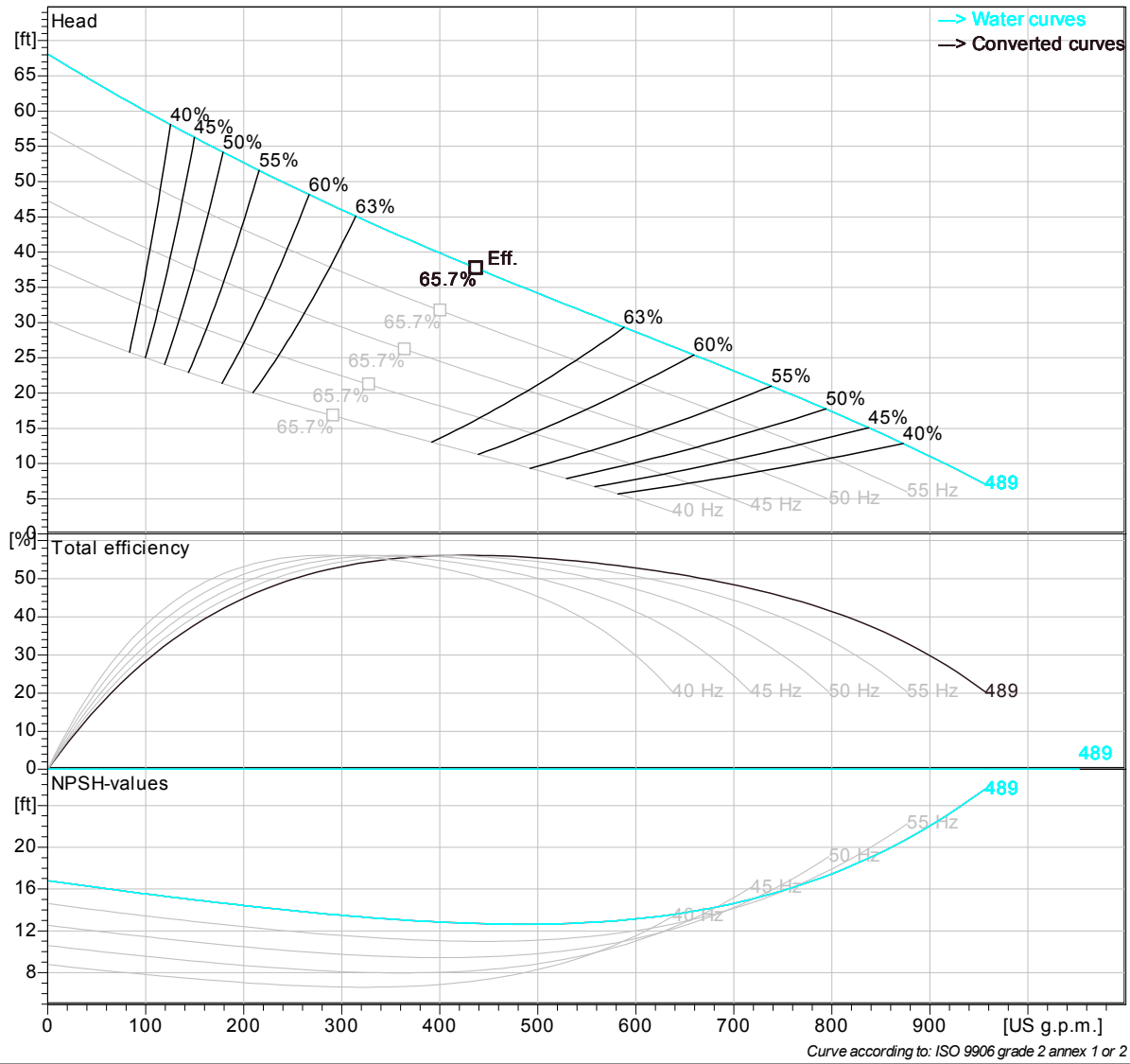
1/2 Load	83 %



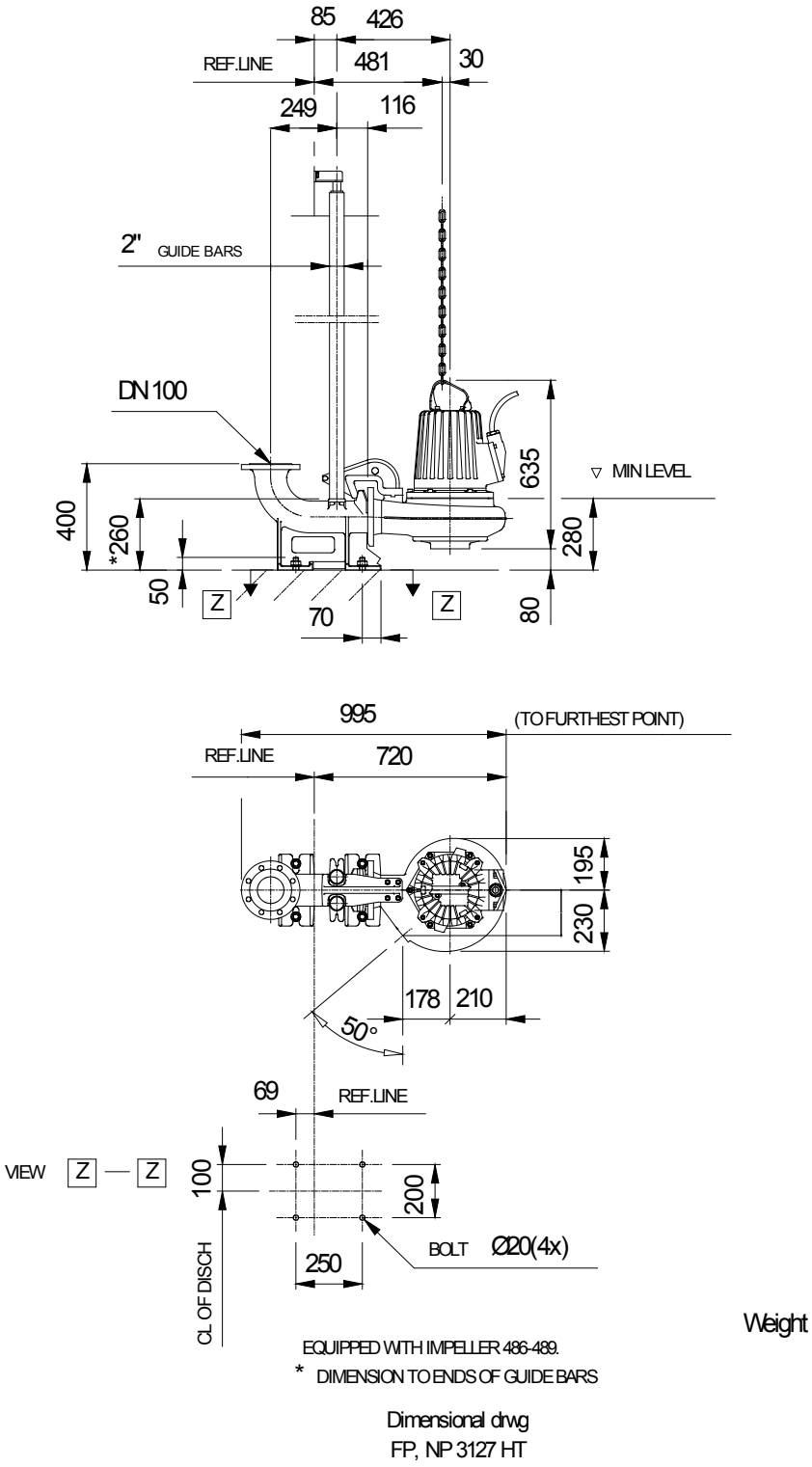
Curve according to: ISO 9906 grade 2 annex 1 or 2

0 kWh/US gal

Project	Project ID	Created by	Created on	Last update
			13.01.2011	

NP 3127 HT 1~ 489

Dimensional drawing



Weight

EQUIPPED WITH IMPELLER 486-489.

* DIMENSION TO ENDS OF GUIDE BARS

Dimensional drwg
FP, NP 3127 HT

Project	Project ID	Created by	Created on	Last update
			13.01.2011	

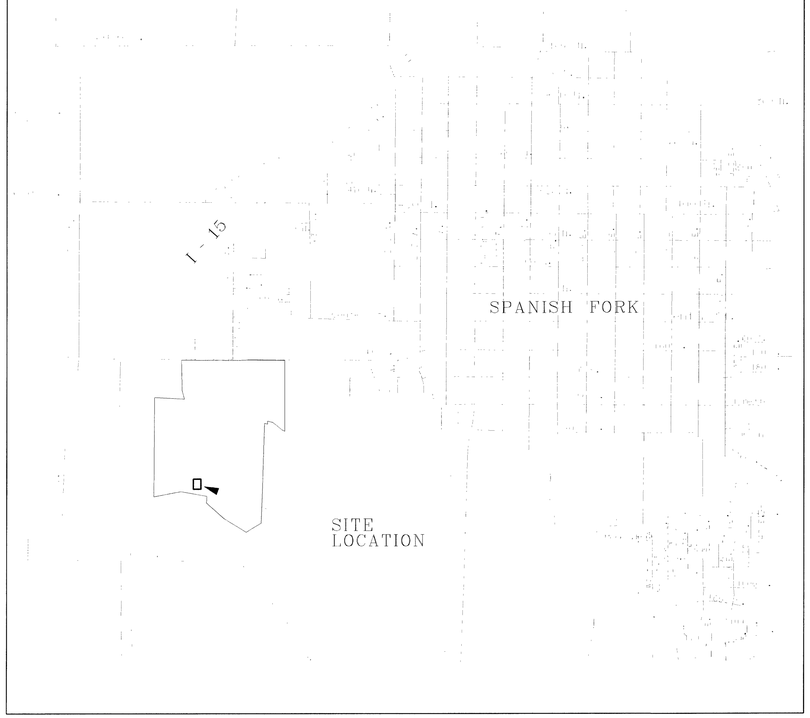
SPANISH FIELDS SUBDIVISION, SEWER LIFT STATION

SPANISH FORK, UTAH

GENERAL NOTES

1. ALL CONSTRUCTION FEATURES OF THIS PROJECT SHALL CONFORM TO UTAH PUBLIC WORKS GENERAL CONDITIONS AND STANDARD SPECIFICATIONS FOR CONSTRUCTION, 1997, AMERICAN PUBLIC WORKS ADMINISTRATION, AND TO SPANISH FORK CITY DEVELOPMENT AND CONSTRUCTION STANDARDS UNLESS OTHERWISE DIRECTED IN THESE DRAWINGS, OR BY THE ENGINEER.
2. A MINIMUM OF ONE TRAFFIC LANE MUST REMAIN OPEN AT ALL TIMES.
3. PROPER TRAFFIC CONTROL SIGNS ACCORDING TO THE MUTCD MANUAL SHALL BE PROVIDED BY THE CONTRACTOR FOR ALL WORK IN SPANISH FORK CITY STREETS.
4. CONTRACTOR IS RESPONSIBLE FOR BLUE STAKING OF ALL UTILITIES 48 HOURS PRIOR TO ANY EXCAVATION WORK.
5. IN THE EVENT THAT ANY DISCREPANCY IS FOUND BETWEEN FIELD CONDITIONS, PLANS, SPECIFICATIONS, OR FIELD STAKING, LEI CONSULTING ENGINEERS AND SURVEYORS, INC. SHOULD BE CONTACTED IMMEDIATELY AND BEFORE PROCEEDING WITH FURTHER WORK.

VICINITY MAP



CONTENTS

CITY OF SPANISH FORK

MAYOR

COUNCIL MEMBERS:

COUNCIL MEMBER

COUNCIL MEMBER

COUNCIL MEMBER

ENGINEER

LEI
Consulting Engineers and Surveyors, Inc.

3302 No. Main St.
Spanish Fork, UT 84660
801-798-0555 Fax 801-798-9393

Approved 7-7-04

CITY ENGINEER

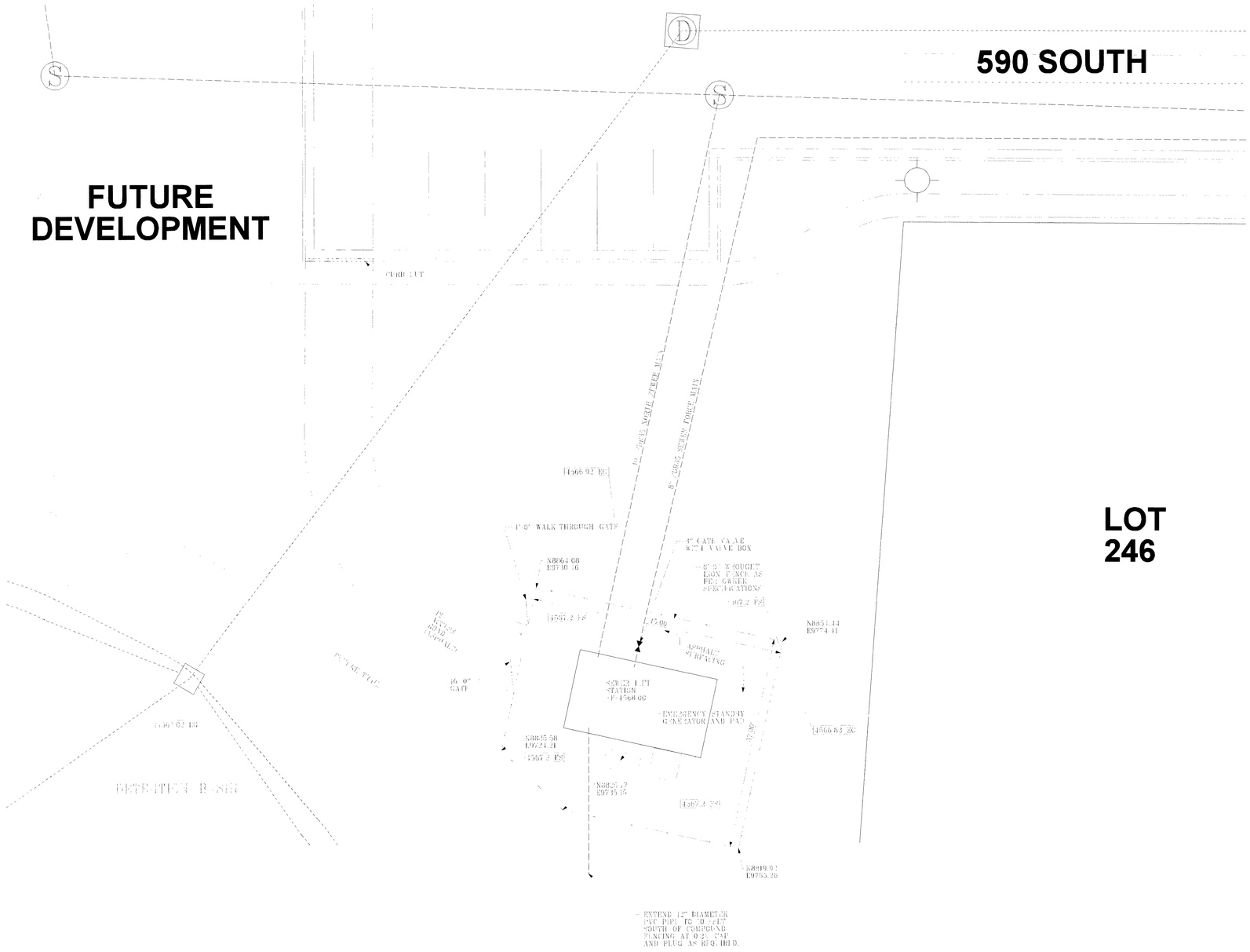
PROJECT ENGINEER
MIKE CHRISTIANSON, P.E.

7/7/04

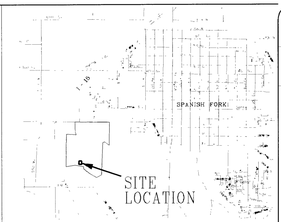
543

\Sewer Lift Station\Cover.dgn

FUTURE DEVELOPMENT



LOT 246



VICINITY MAP

NOTES

1. ALL CONSTRUCTION TO BE DONE ACCORDING TO CITY STANDARDS AND SPECIFICATIONS.
2. CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS AND LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
3. ASPHALT SURFACING TO SLOPE 2% AWAY FROM BUILDING AND COVER ENTIRE FENCED COMPOUND.
4. EMERGENCY GENERATOR SHALL BE A CATERPILLAR OLYMPIAN 8 KW GENSET WITH 60GAL FUEL TANK

LEGEND

- FRONTAGE
- LOT LINES
- BOUNDARY
- CURB & GUTTER
- CENTERLINE
- EASMENT SETBACKS
- EXISTING EDGE OF OIL
- GAS
- SEWER
- STORM DRAIN
- CULINARY WATER
- PRESSURIZED IRRIGATION
- PHASE BOUNDARY
- WATER VALVE
- STORM SUMP
- STORM DRAIN
- FIRE HYDRANT
- STREET LIGHT
- SEWER MANHOLE
- STREET SIGN
- SPEED REGULATION SIGN
- 30"X4' CURB INLET
- CATCH BASIN
- EXISTING WATER METER
- PROPOSED WATER METER
- TELEPHONE JUNC BOX
- POWER POLE
- MONUMENT
- PRE-TREATMENT BOX
- [XXXX.XX EG] EXISTING GRADE
- [XXXX.XX TBC] TBC GRADE
- [XXXX.XX FS] FINISHED SURFACE GRADE

9/4/04

REVISION	DATE	BY

Consulting Engineers and Surveyors, Inc.
3302 No. Main St.
Spanish Fork, UT 84660
801-798-0555 Fax 801-798-8393

SPANISH FIELDS SUBDIVISION, SPANISH FORK, UTAH

LIFT STATION SITE PLAN AND GRADING

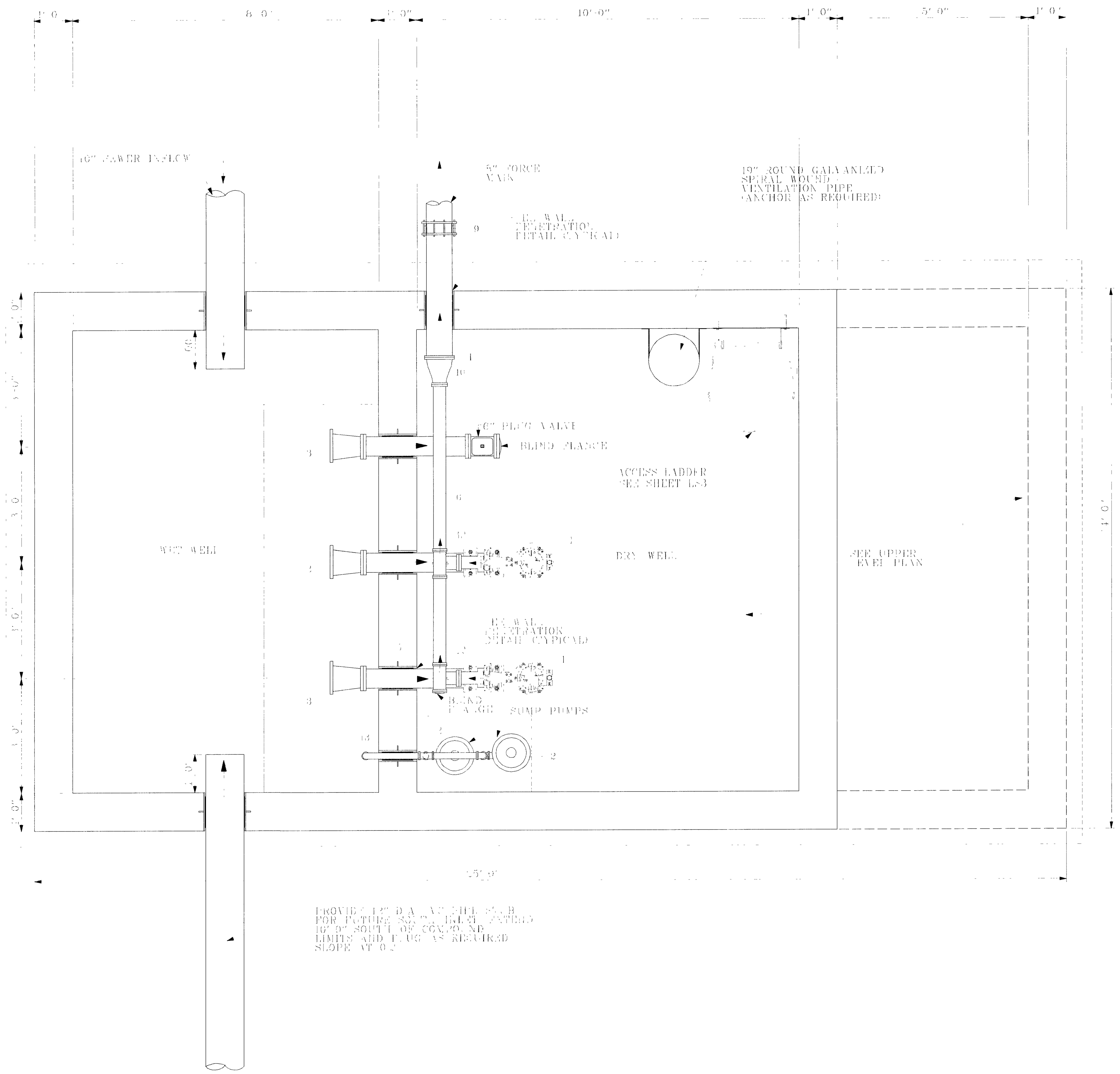
DESIGNER	MKC	PROJECT#	2003-577
DATE	6/22/2004	SCALE	1" = 10'
DRAWN BY	CIS		SHEET 1 OF 6

PAGE LS1

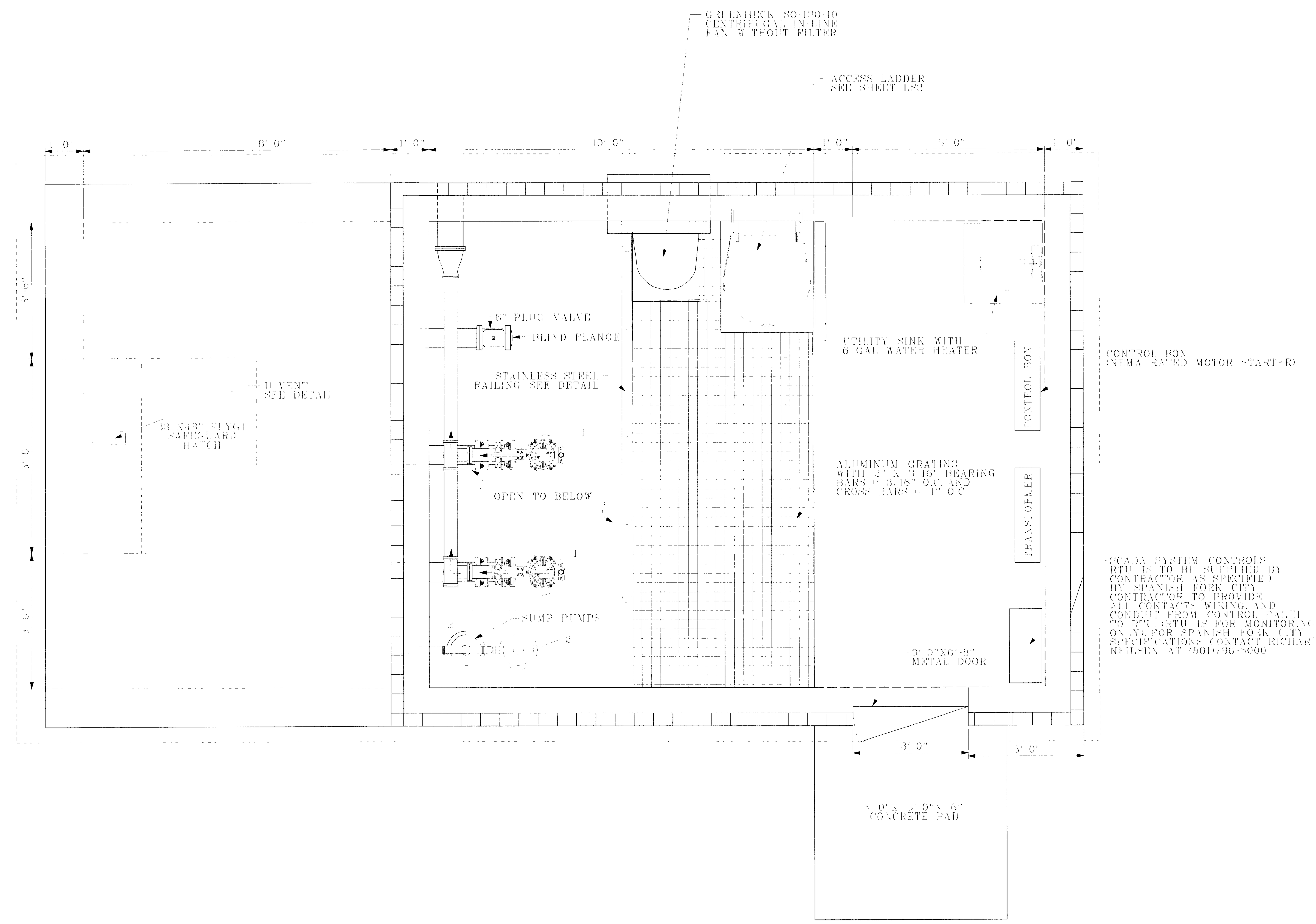
...\Siteplan.dgn

VALVE & PIPING SCHEDULE	
NO.	DESCRIPTION
1	FLYGT NT3127 18 MT W 438 IMPELLOR PUMPS
2	ZOELLER SUBMERSIBLE PUMP MODEL 267 AUTOMATIC [illegible]
3	6" X 8" ECCENTRIC REDUCER FLANGE X FLANGE
4	6" VALMATIC PLUG VALVE FLANGE X FLANGE
5	6" DIP (LENGTH AS REQUIRED) FLANGE X FLANGE
6	4" DIP (LENGTH AS REQUIRED) FLANGE X FLANGE
7	4" BALL CHECK VALVE FLANGE X FLANGE
8	4" PLUG VALVE VALMATIC FLANGE X FLANGE
9	DRESSER COUPLING
10	4"X 8" REDUCER FLANGE X FLANGE
11	8" PIPE & FITTINGS (LENGTH AS REQUIRED)
12	4"X 4" TEE
13	2" PIPE & FITTINGS (LENGTH AS REQUIRED)
14	2" CHECK VALVE
15	FLEX COUPLING
16	8" GATE VALVE & VALVE BOX

PAINT SCHEDULE PER SECTION 09900		
ITEM	PAINT	COLOR
PIPES	EPOXY	GREEN
VALVES	NONE	NONE
FLOOR	EPOXY	GRAY
WALLS	EPOXY	WHITE
CEILING	EPOXY	WHITE



WET /DRY WELL PLAN VIEW (LOWER LEVEL)



DRY WELL PLAN VIEW (UPPER LEVEL)

LEI Consulting Engineers and Surveyors, Inc.
3302 No. Main St.
Spanish Fork, UT 84660
801-798-0555 Fax 801-798-9393

SPANISH FIELDS SUBDIVISION, SEWER LIFT STATION

PLAN VIEWS

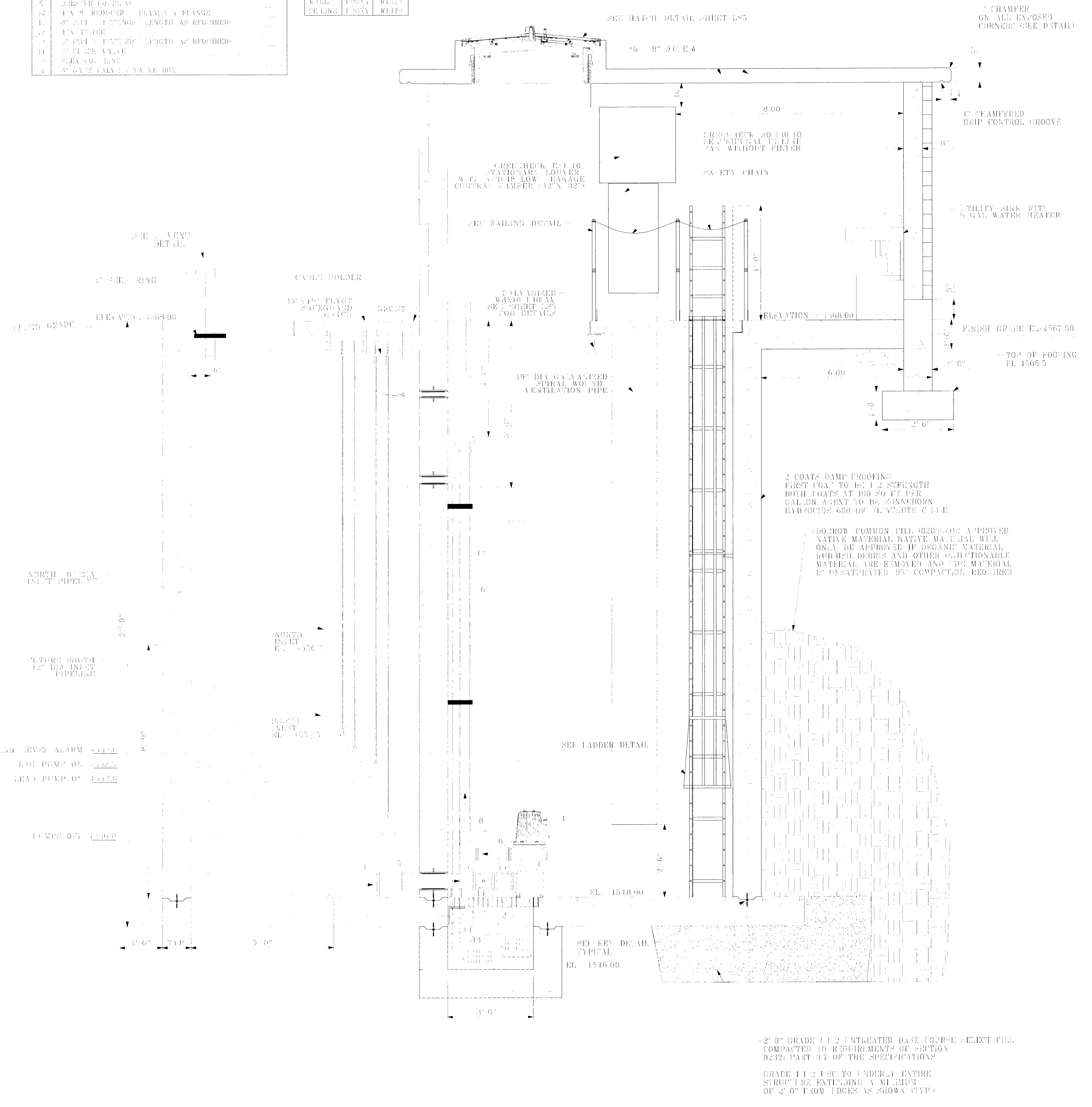
DESIGNER	MKC	PROJECT#	2003-577
DATE	6/22/2004	SCALE	1" = 2'-0"
DRAWN BY	CIS		SHEET 2 OF 6

PAGE LS2

..\SHEETS 2-5.dgn

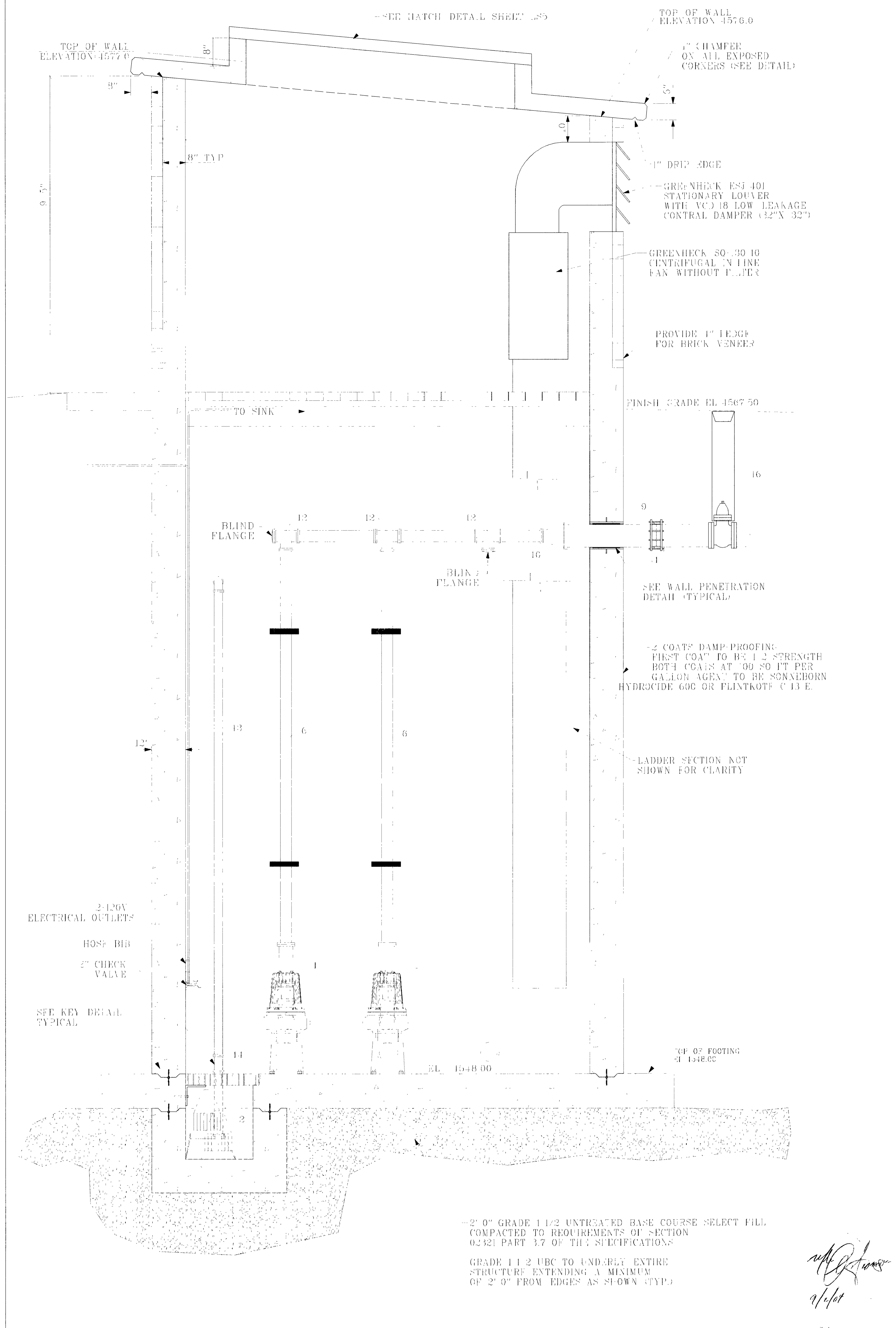
VALVE & PIPING SCHEDULE	
NO.	DESCRIPTION
1	[illegible] IMPELLOR PUMPS
2	ZOELLER SUBMERSIBLE PUMP, MODEL 267 AUTOMATIC [illegible]
3	[illegible] 8" [illegible] REDUCER FLANGE X FLANGE
4	6" [illegible] VALVE FLANGE X FLANGE
5	6" DIP LENGTH AS REQUIRED FLANGE X FLANGE
6	[illegible] DIP LENGTH AS REQUIRED FLANGE X FLANGE
7	[illegible] BALL CHECK VALVE FLANGE X FLANGE
8	[illegible] PLUG VALVE [illegible] FLANGE X FLANGE
9	DRESSER COUPLING
10	[illegible] REDUCER FLANGE X FLANGE
11	8" PIPE FITTINGS LENGTH AS REQUIRED
12	[illegible] TEE
13	[illegible] PIPE FITTINGS LENGTH AS REQUIRED
14	[illegible] CHECK VALVE
15	FLEX COUPLING
16	8" GATE VALVE & VALVE BOX

PAINT SCHEDULE PER SECTION 09900		
ITEM	PAINT	COLOR
[illegible]	EPOXY	[illegible]
VALVES	NONE	NONE
FLOOR	EPOXY	GRAY
WALLS	EPOXY	WHITE
CEILING	EPOXY	WHITE



SEE PAGE LS4 FOR STRUCTURAL DETAILS

DRY WELL FRONT VIEW



SEE PAGE LS4 FOR STRUCTURAL DETAILS

DRY WELL SIDE VIEW

Consulting Engineers and Surveyors, Inc.
3302 No. Main St.
Spanish Fork, UT 84660
801-798-0555 Fax 801-798-9393

SPANISH FIELDS SUBDIVISION, SEWER LIFT STATION

CROSS SECTIONS

DESIGNER	MKC	PROJECT#	2003-577
DATE	6/22/2004	SCALE	1" = 2'-0"
DRAWN BY	CIS		SHEET 3 OF 6

PAGE LS3

...\SHEETS 2-5.dgn

543

DRILL HOLE LOG

BORING NO.: TH-9

PROJECT: Spanish Field
CLIENT: Fieldstone Homes
LOCATION: Refer to Figure 2.
DRILLER: Ray Con
DRILL RIG: Diedrich D-120 A.T.
DEPTH TO WATER> INITIAL : 8.4 ft. AT COMPLETION :

PROJECT NO.: 03E-633
DATE: 30 Sept 2003
ELEVATION: NM
LOGGED BY: J.E.

Depth (ft.)	Graphic Log	USCS	Description	Samples	Blows/ Foot	P.L. / L.L., Water Content, N Value (10 20 30 40 50)	Dry Dens. pcf	Water Cont. %	Gravel %	Sand %	Fines %	Other Tests
		TOP	TOPSOIL: Clay, roots and organics, slightly moist, brown.									
4		CL	CLAY: Lean clay, stiff, moist, brown.		8							
		SM	SAND: Silty sand, trace gravel, loose, moist, brown.				93.5	24.8				C
8			Very moist at 8 feet.		6							
					8			21.4	1	53	46	
12			Gravelly at 13 feet.									
16		SP	SAND: Poorly graded sand, loose, wet, gray.		10							
20			Bottom at 16.5 feet.									

Notes:

Tests Key:
A = Atterberg Limits
C = Consolidation
T = Field Torvane
CBR = California Bearing Ratio
P = Percolation
UC = Unconf. Compress. Strength

Job No. 03E-633 | EARTHTEC ENGINEERING | Figure No. 11

DRILL HOLE LOG

BORING NO.: TH-10

PROJECT: Spanish Field
CLIENT: Fieldstone Homes
LOCATION: Refer to Figure 2.
DRILLER: Ray Con
DRILL RIG: Diedrich D-120 A.T.
DEPTH TO WATER> INITIAL : 8.9 ft. AT COMPLETION :

PROJECT NO.: 03E-633
DATE: 30 Sept 2003
ELEVATION: NM
LOGGED BY: J.E.

Depth (ft.)	Graphic Log	USCS	Description	Samples	Blows/ Foot	P.L. / L.L., Water Content, N Value (10 20 30 40 50)	Dry Dens. pcf	Water Cont. %	Gravel %	Sand %	Fines %	Other Tests
		TOP	TOPSOIL: Clay, roots and organics, slightly moist, brown.									
4		CL	CLAY: Lean clay, medium stiff, moist, brown.		6							
					5							
8		ML	SILT: Silt, medium stiff, moist, gray.				98.7	27.1				C
12		SP-SM	SAND: Poorly graded sand, some gravel, medium dense, wet, gray.		17							
16					20							
20			Bottom at 16.5 feet.									

Notes:

Tests Key:
A = Atterberg Limits
C = Consolidation
T = Field Torvane
CBR = California Bearing Ratio
P = Percolation
UC = Unconf. Compress. Strength

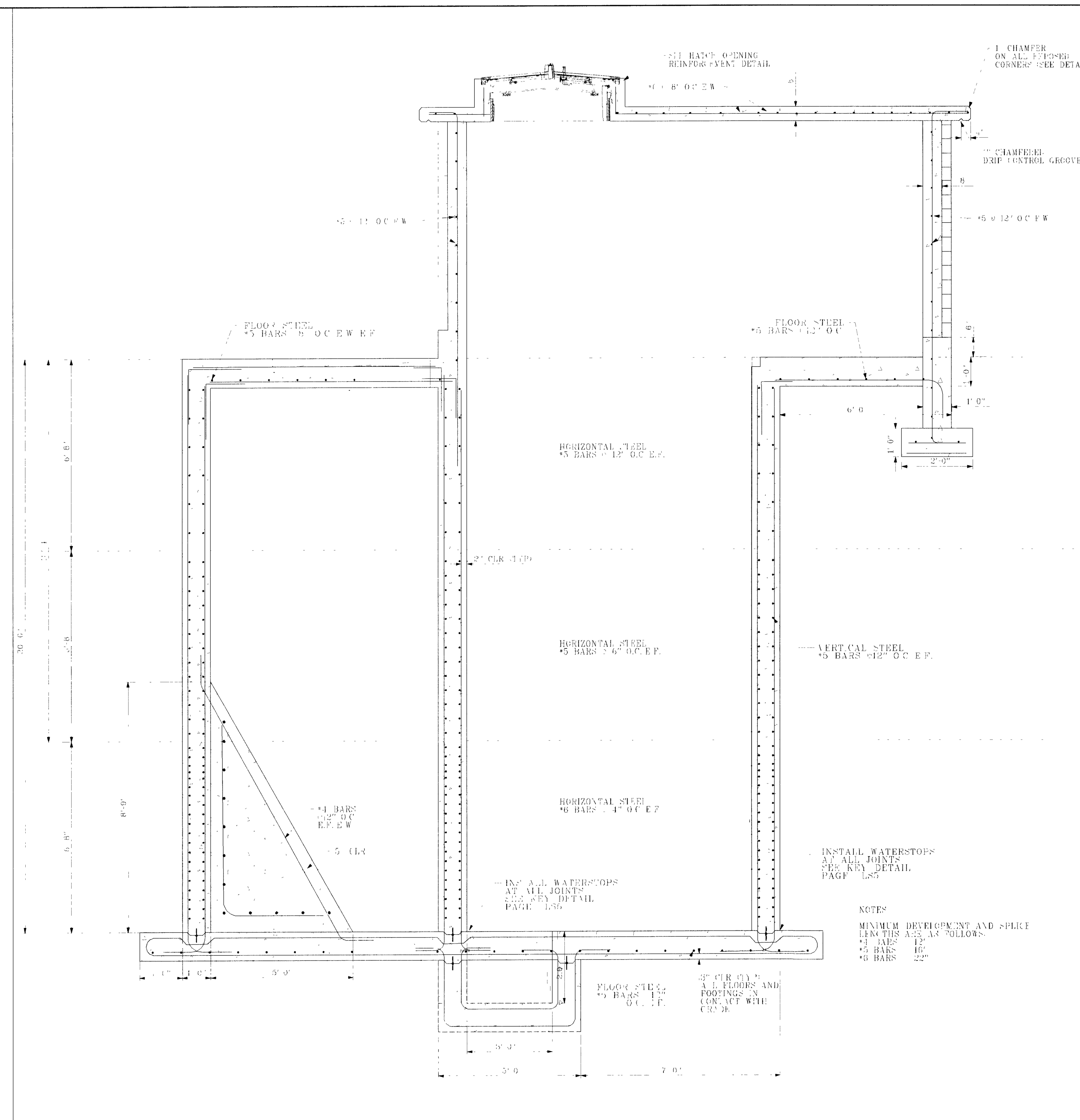
Job No. 03E-633 | EARTHTEC ENGINEERING | Figure No. 12

NOTES

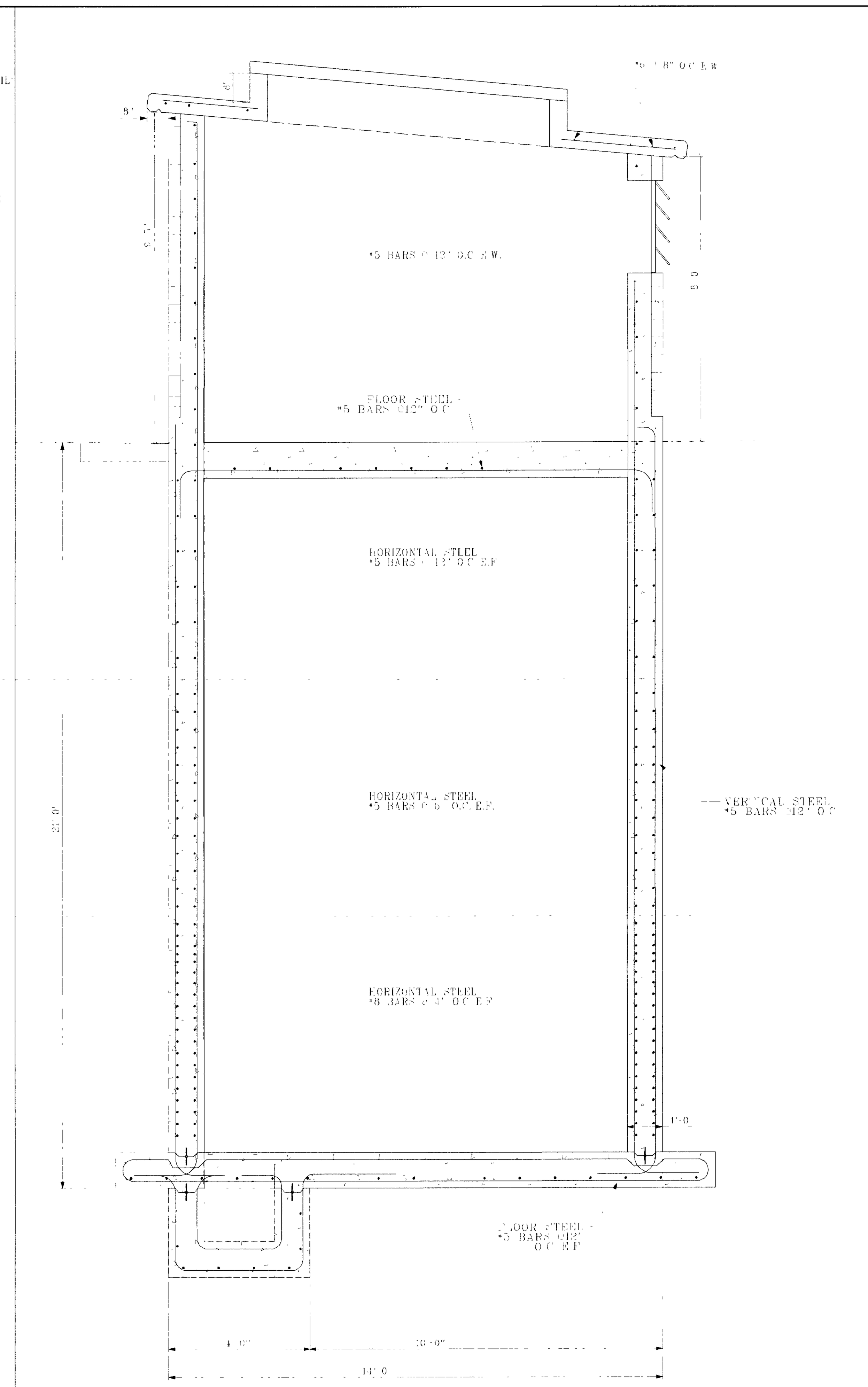
1 GEOTECHNICAL INFORMATION PROVIDED BY EARTHTEC ENGINEERING FROM A REPORT DATED OCTOBER 22 2003 THIS REPORT IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY THE COMPLETE STUDY IS AVAILABLE FOR REVIEW FROM THE ENGINEER AND OR OWNER PROSPECTIVE BIDDERS ARE ENCOURAGED TO EXAMINE THIS STUDY CLOSELY TO THOROUGHLY UNDERSTAND THE GEOTECHNICAL AND GROUNDWATER PARAMETERS INVOLVED WITH CONSTRUCTING THE LIFT STATION

2 ON MARCH 18, 2004 THE GEOTECHNICAL ENGINEER PERFORMED WATER TABLE READINGS OF OBSERVATION WELLS INSTALLED DURING THE INITIAL INVESTIGATION THE GROUND WATER DEPTH FOR TEST HOLE 9 ON MARCH 18 2004 WAS 11 FEET AND THE GROUND WATER DEPTH WAS 15 FEET FOR TEST HOLE 10

GEOTECHNICAL INVESTIGATION/DRILL HOLE INFORMATION



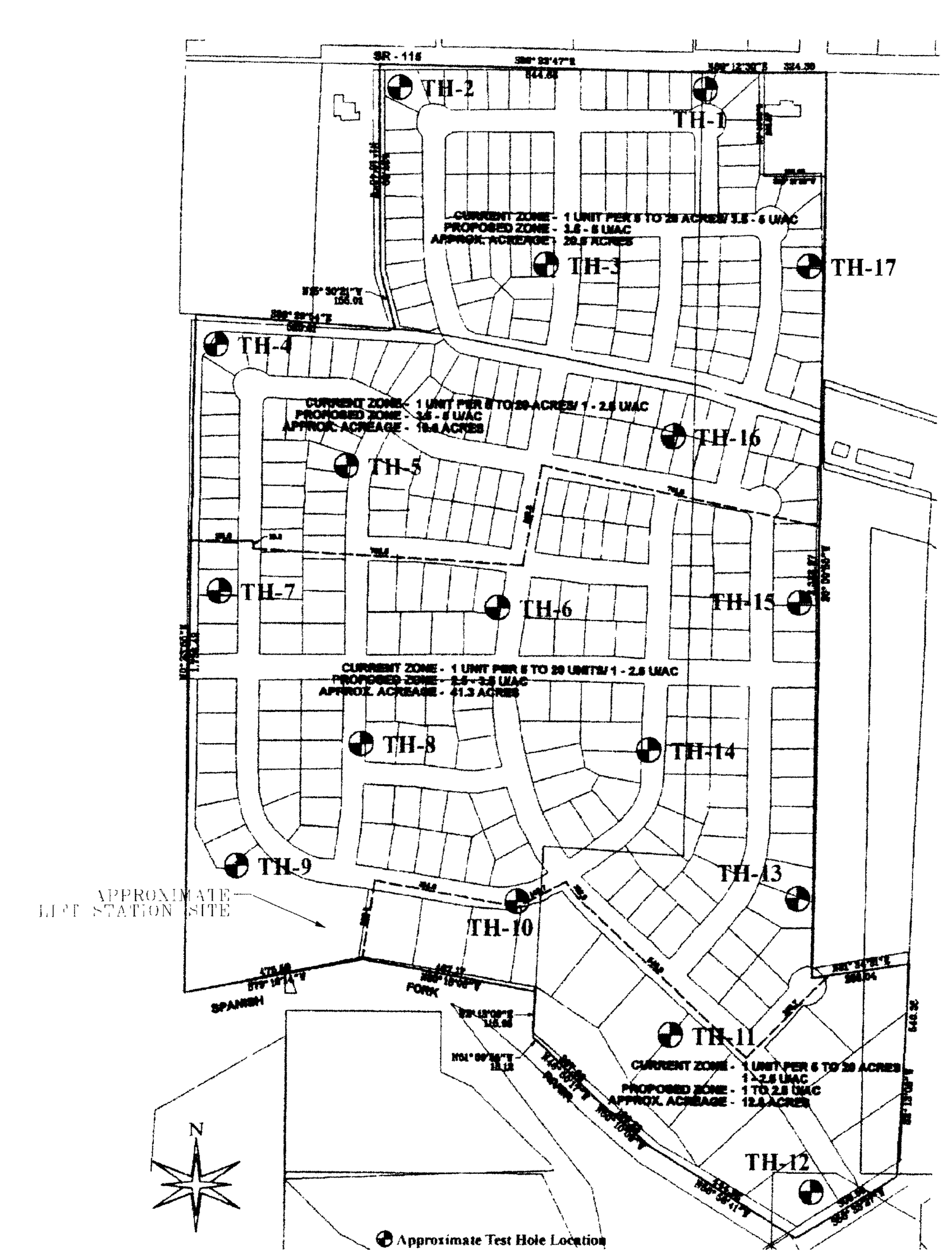
DRY WELL FRONT VIEW



DRY WELL SIDE VIEW

SITE PLAN AND LOCATION OF TEST HOLES

Earthtec



SPANISH FIELDS SUBDIVISION, SEWER LIFT STATION

STRUCTURAL REINFORCEMENT AND GEOTECHNICAL INFORMATION

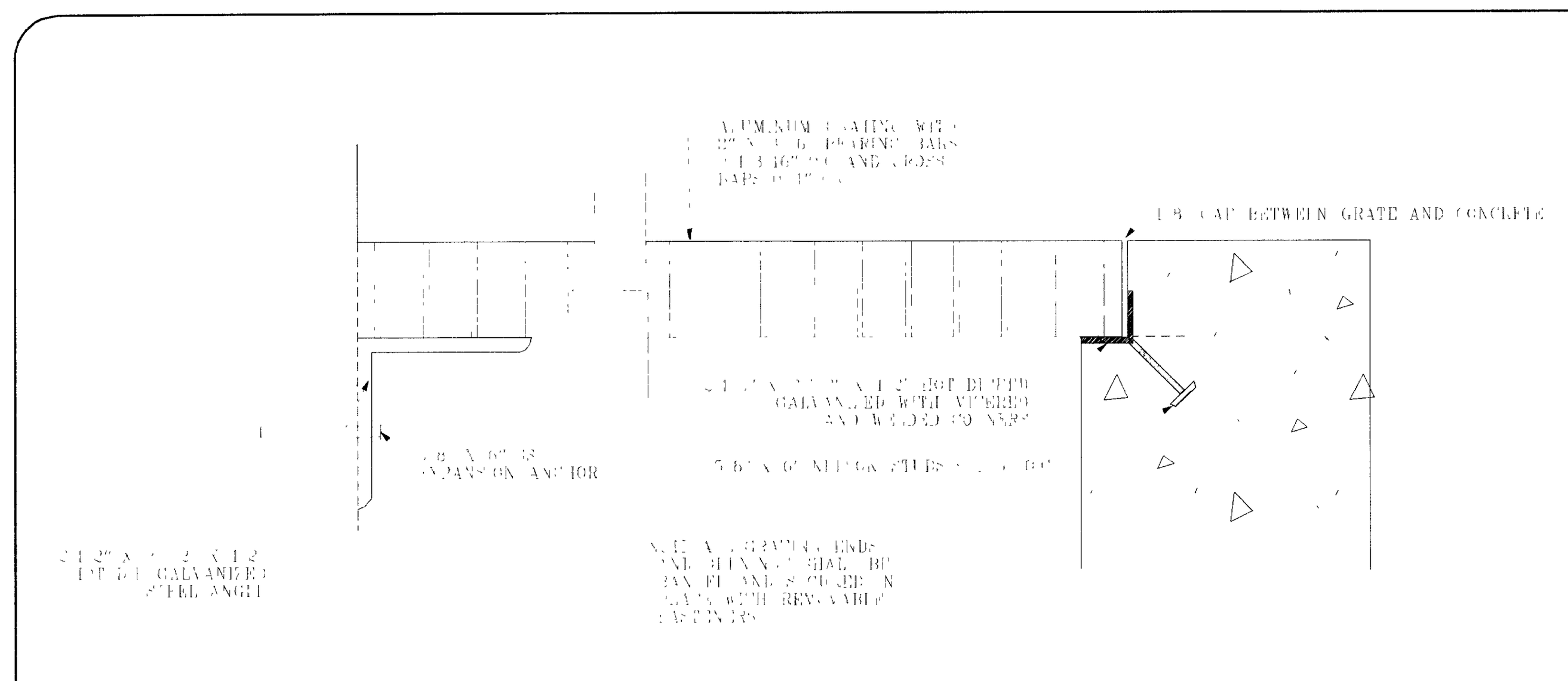
LEI Consulting Engineers and Surveyors, Inc.
3302 No. Main St.
Spanish Fork, UT 84660
801-798-0555 Fax 801-798-9393

REVISION	DATE	BY

DESIGNER	MKC	PROJECT*	2003-577
DATE	6/22/2004	SCALE	1" = 3'-0"
DRAWN BY	CIS		SHEET 4 OF 6

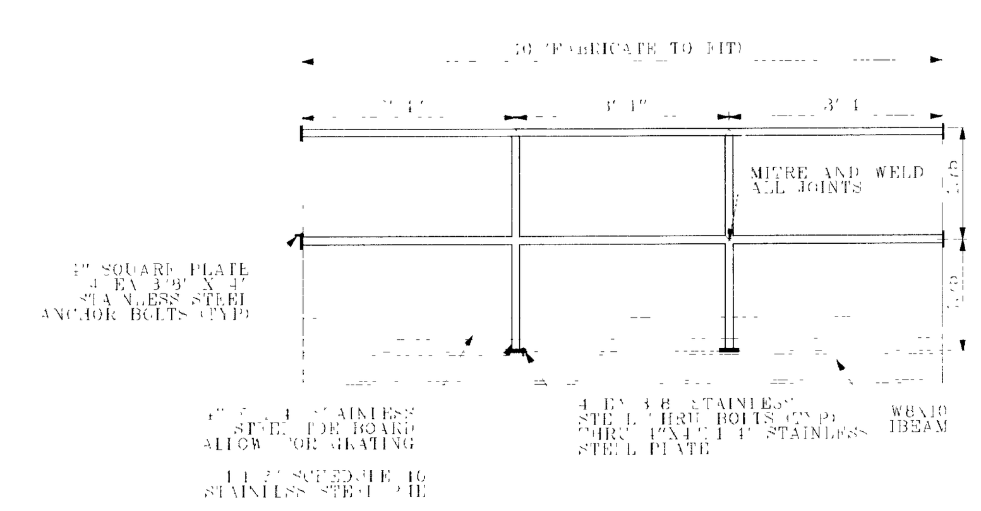
PAGE LS4

..\SHEETS 2-5.dgn

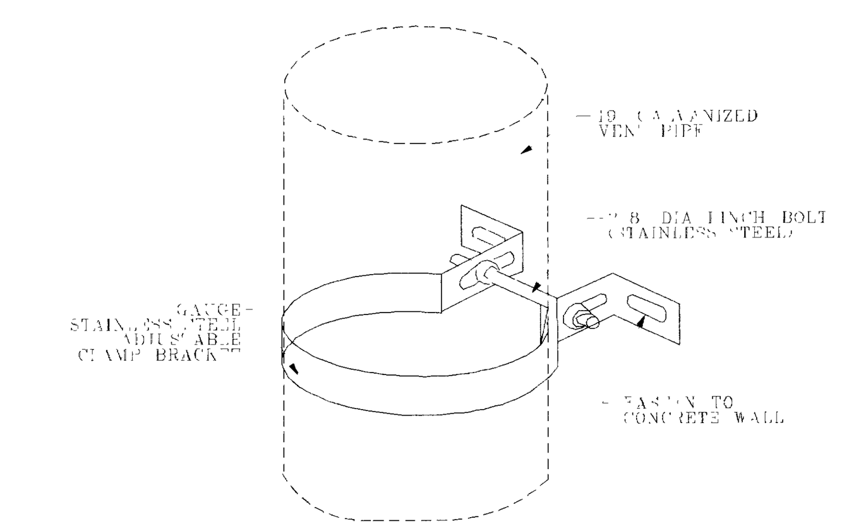


NOT TO SCALE

1 GRATING DETAILS

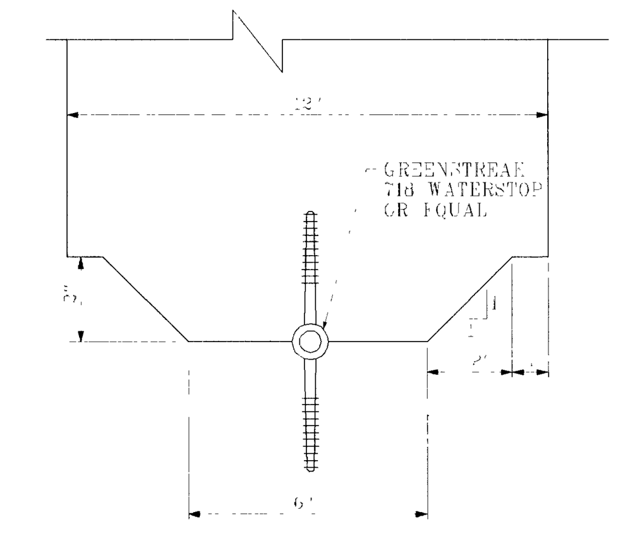


2 RAILING DETAIL 1"= 4'-0"



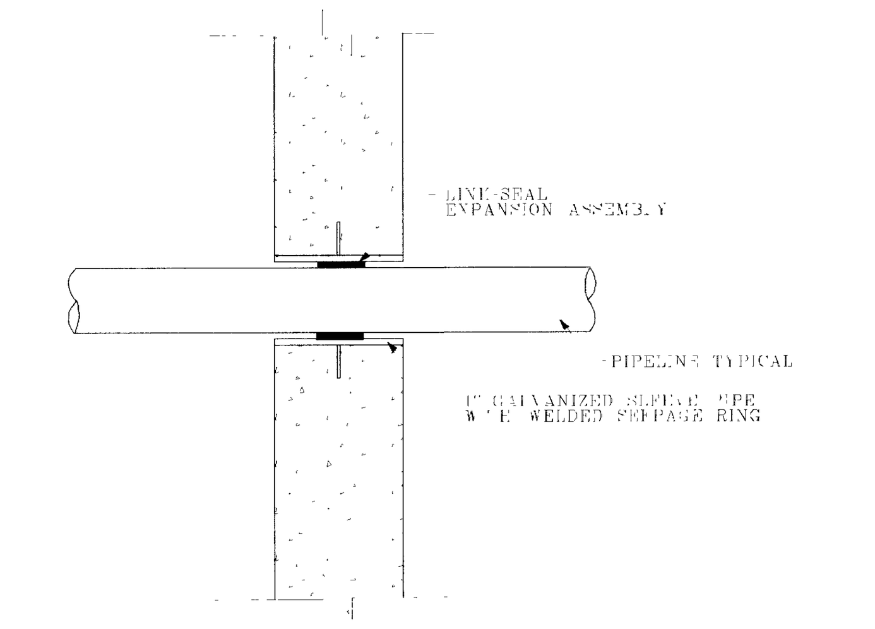
NOT TO SCALE

3 19" VENT ANCHOR DETAIL



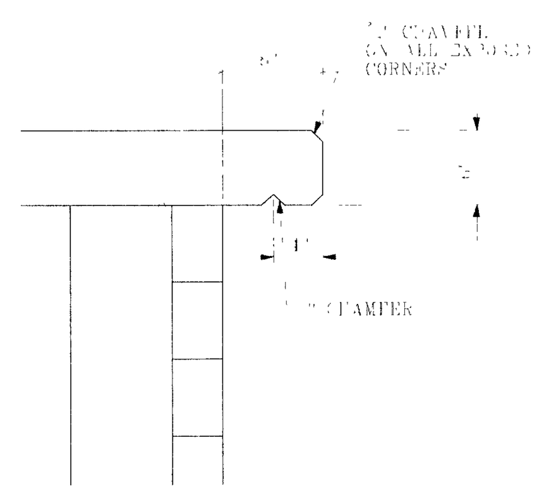
NOT TO SCALE

4 KEY DETAIL



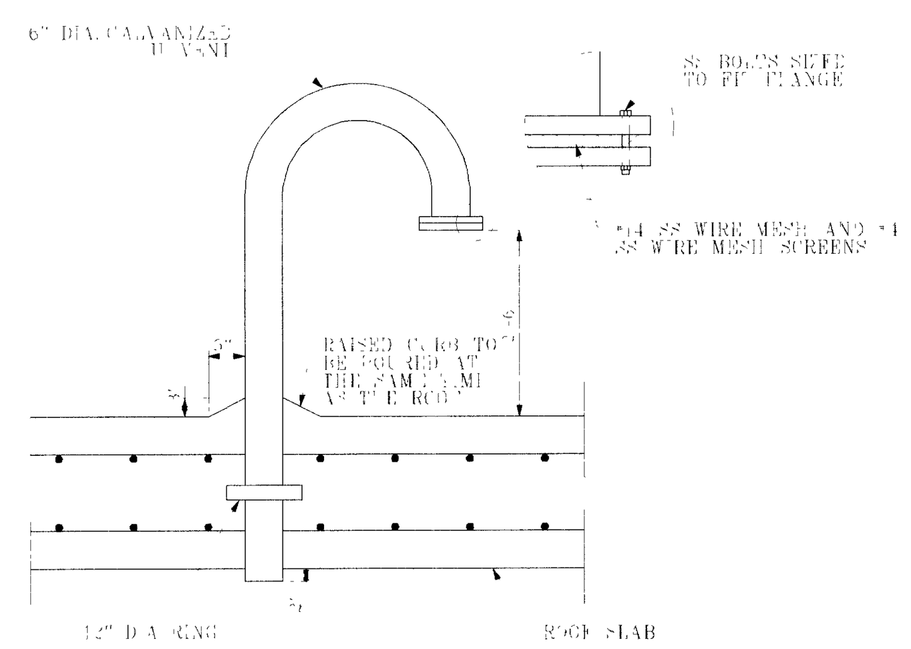
NOT TO SCALE

5 WALL PENETRATION DETAIL



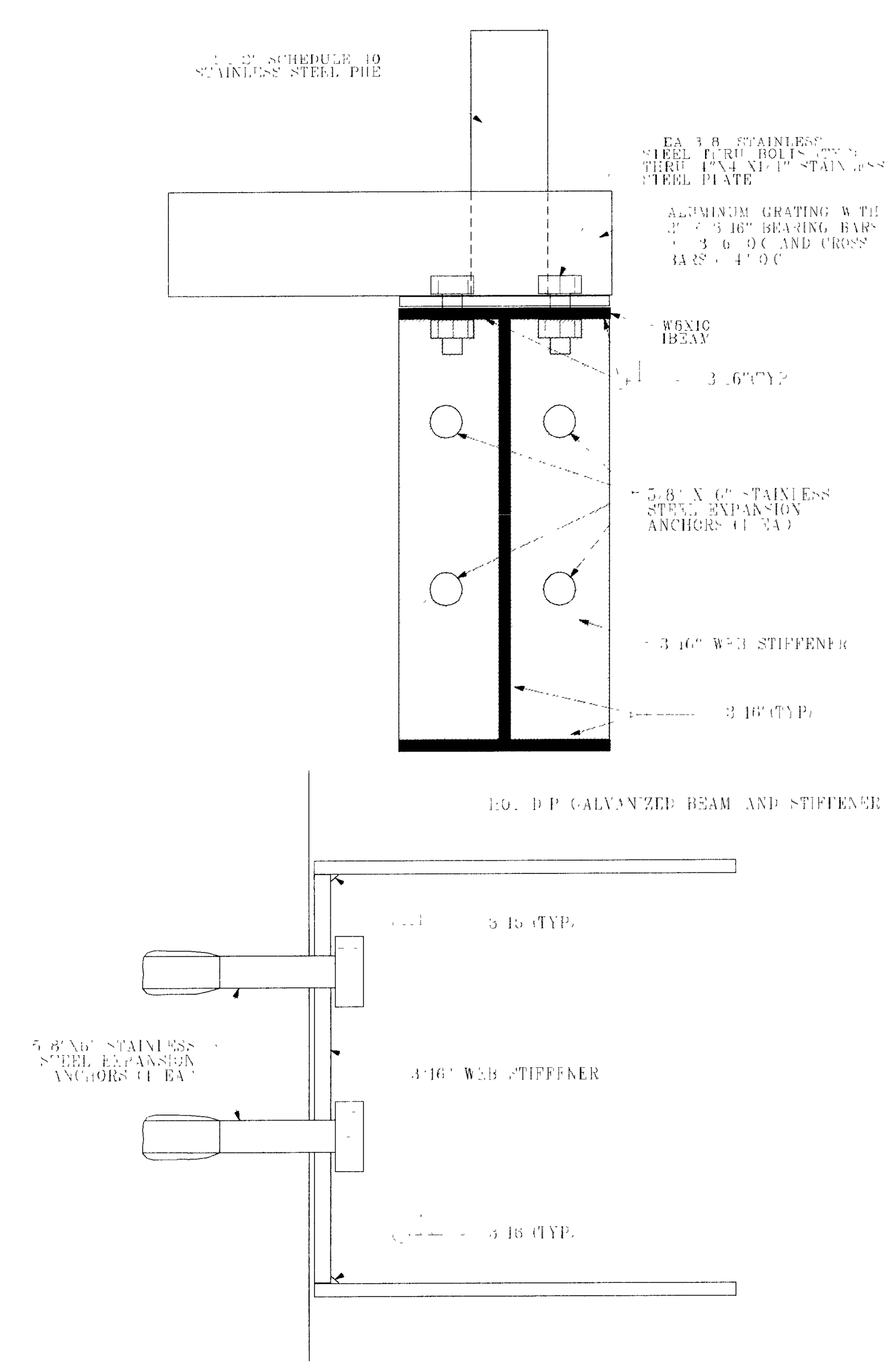
NOT TO SCALE

6 OVERHANG DETAIL



NOT TO SCALE

7 U VENT DETAIL



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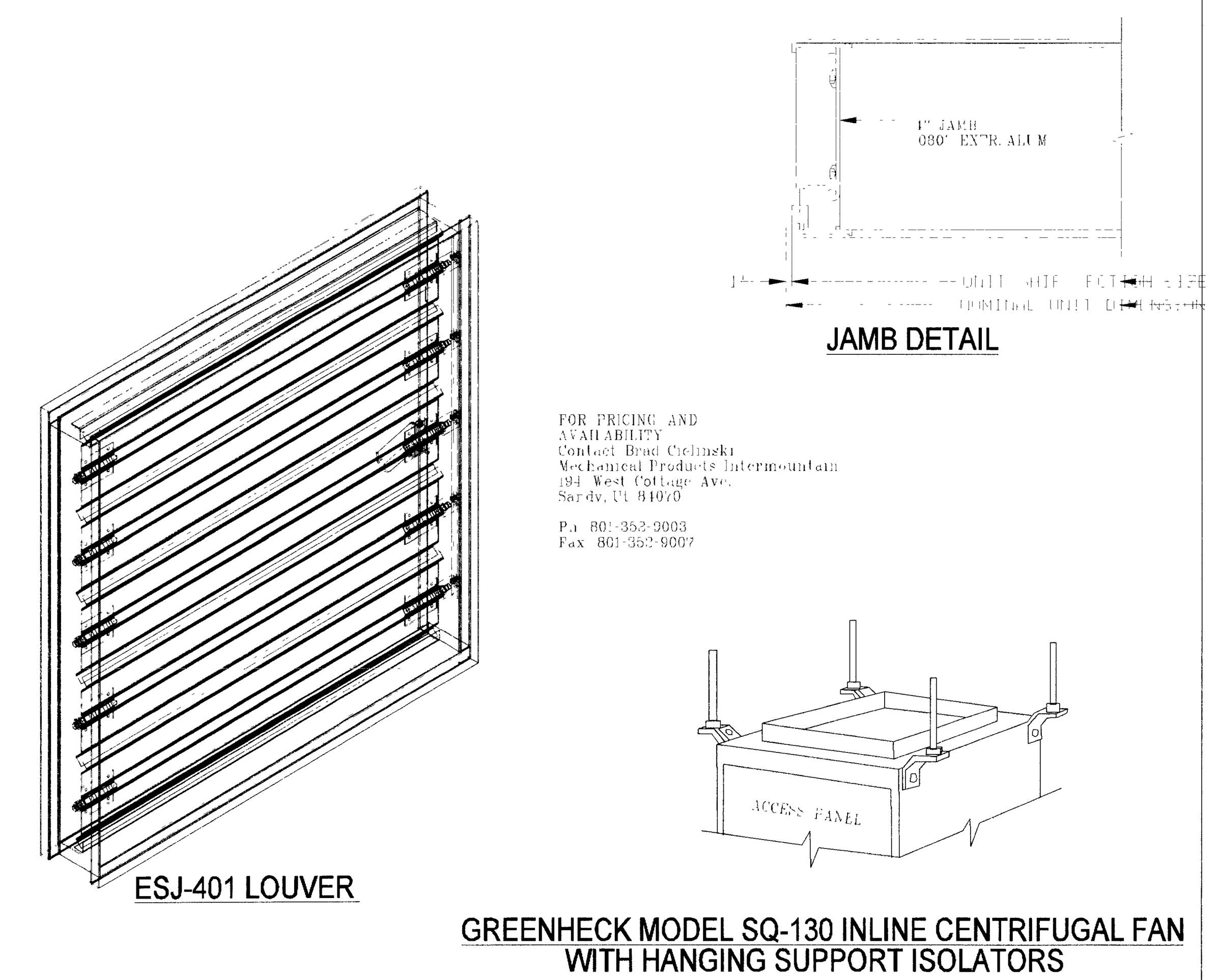
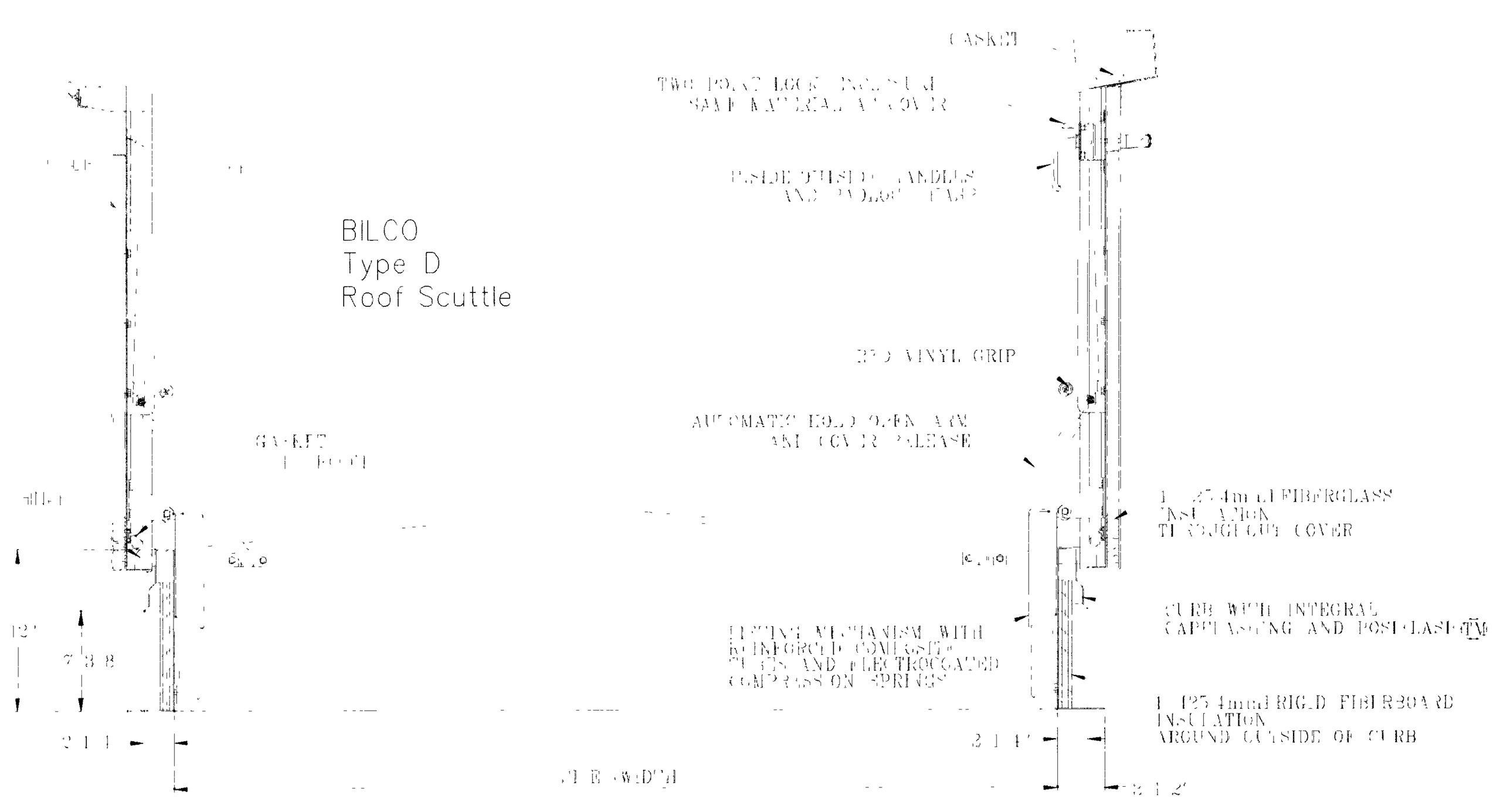


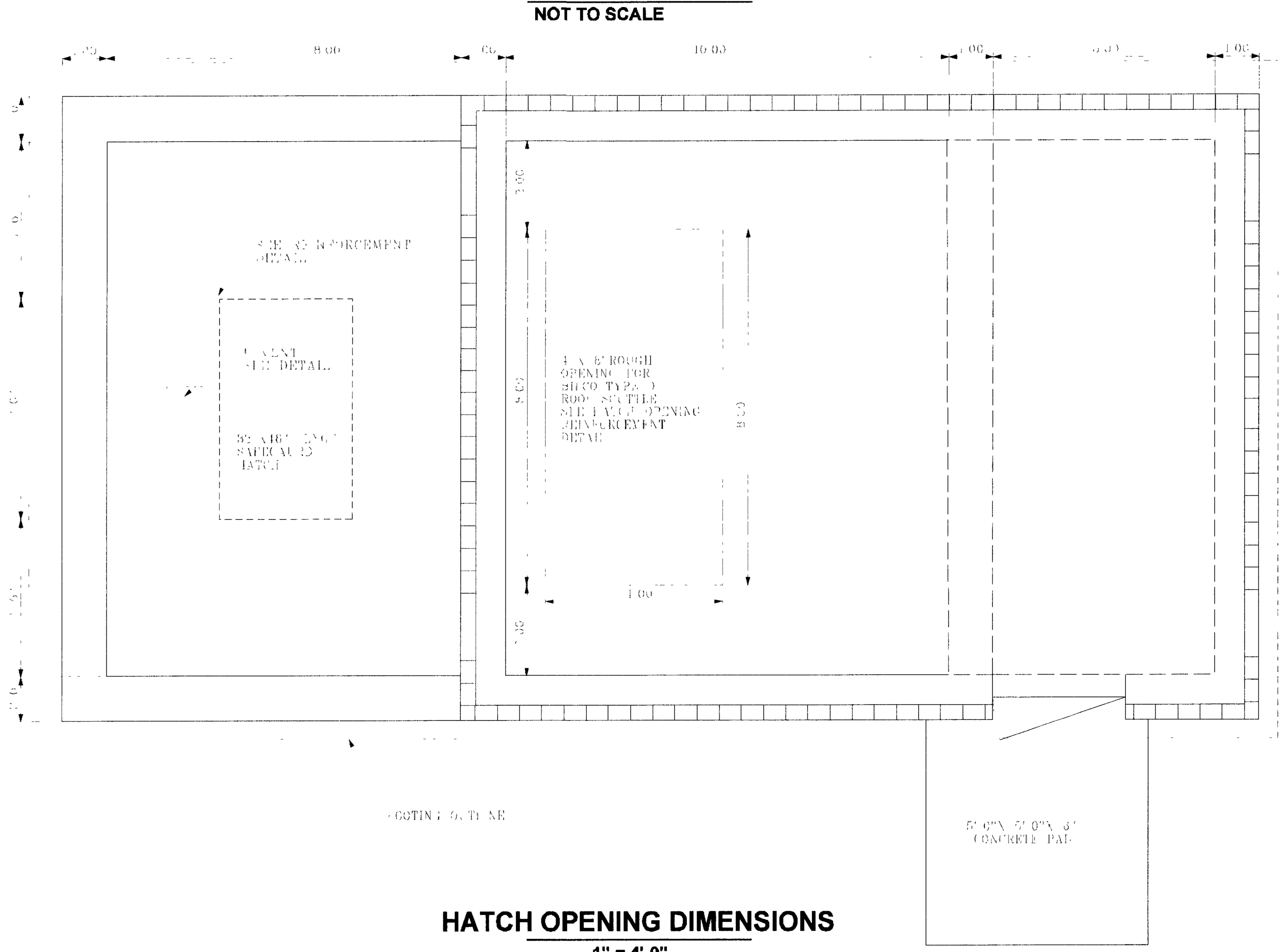
NOT TO SCALE

9 CENTRIFUGAL FAN AND VENT DETAILS



HATCH OPENING DETAIL

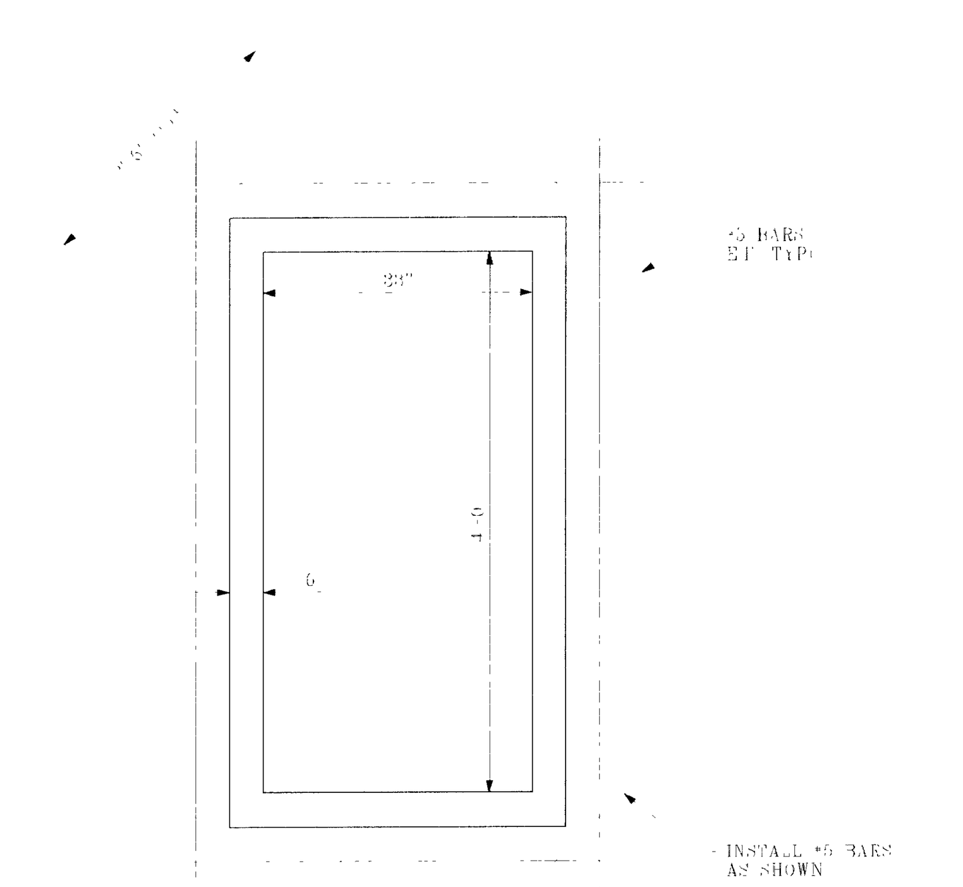
NOT TO SCALE



HATCH OPENING DIMENSIONS

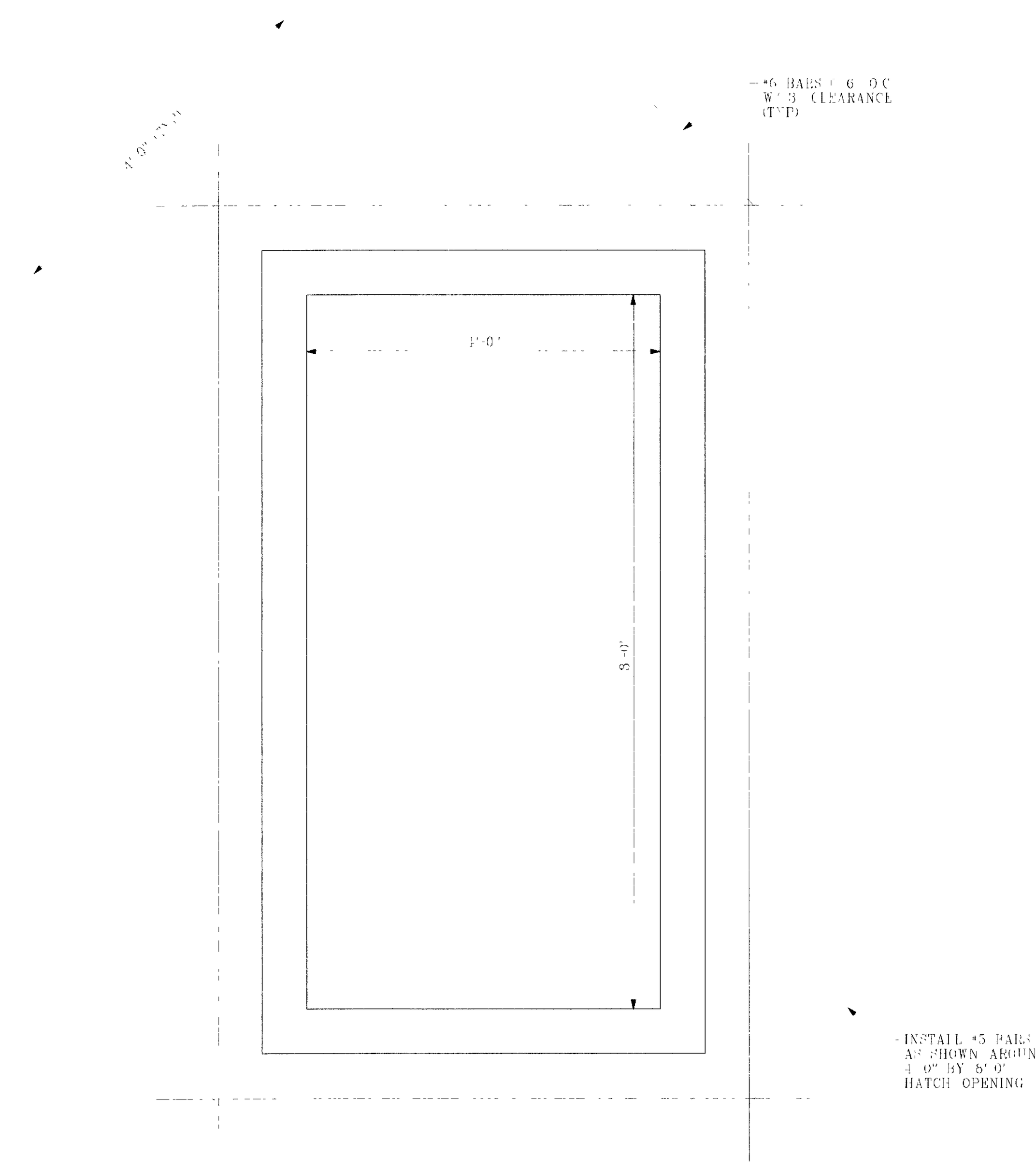
1" = 4'-0"

10 WET WELL / DRY WELL HATCH OPENINGS 1" = 4'-0"



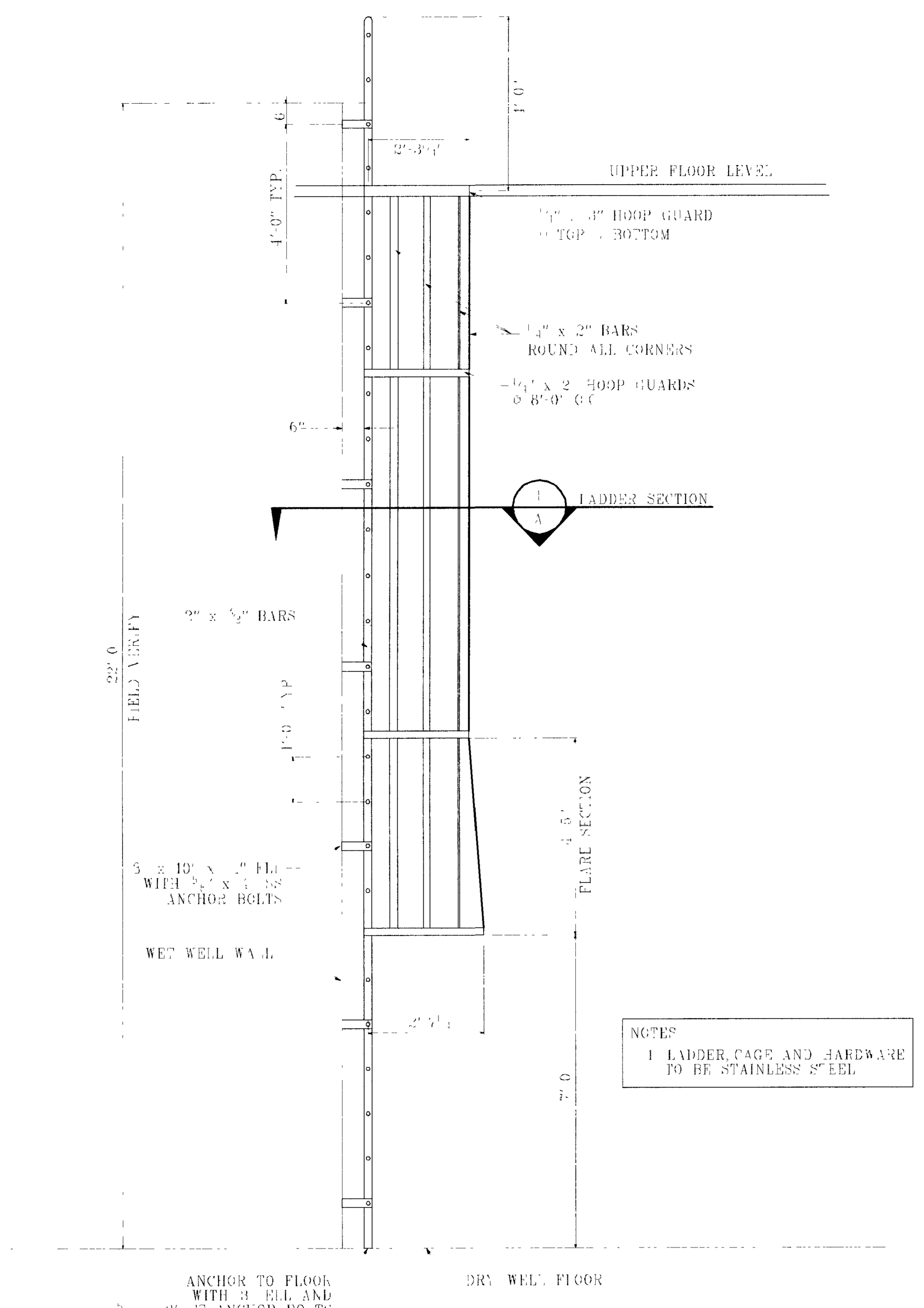
NOT TO SCALE

11 WET WELL HATCH REINFORCEMENT



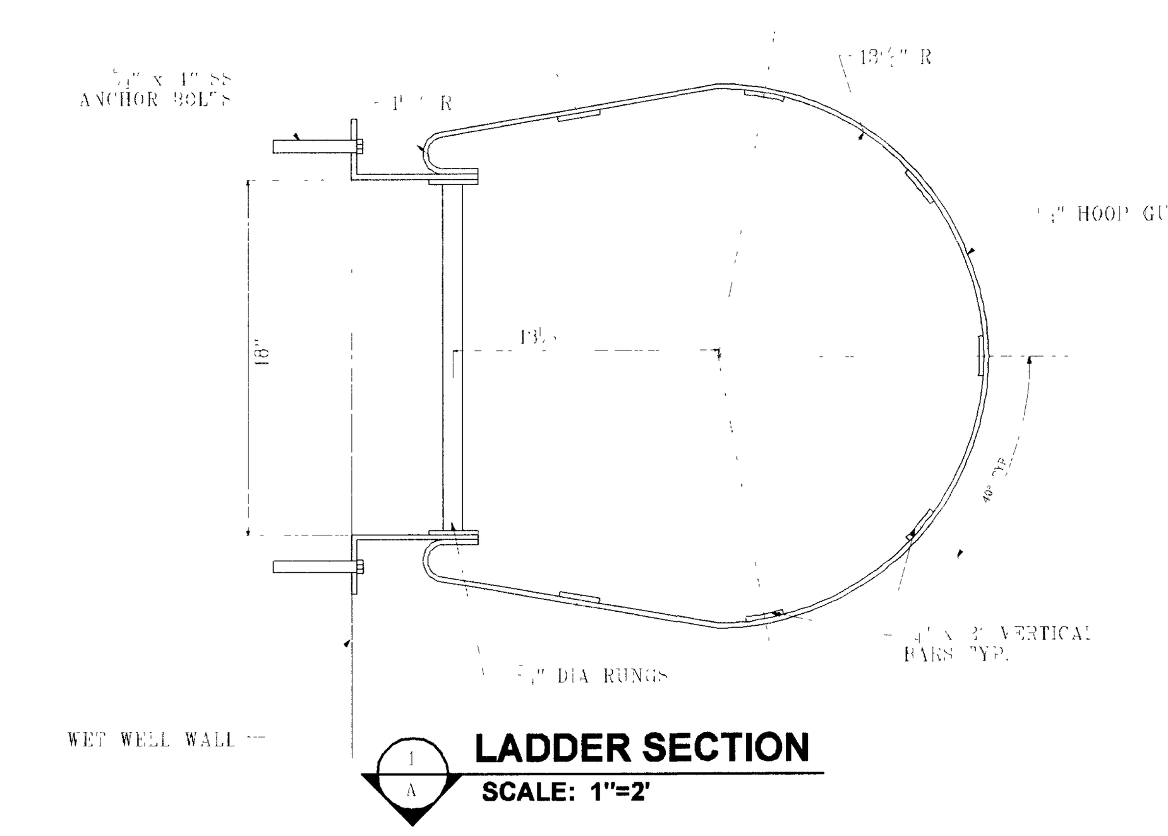
NOT TO SCALE

12 DRY WELL HATCH REINFORCEMENT



LADDER DETAIL

SCALE: 1"=2'



LADDER SECTION

SCALE: 1"=2'

13 ACCESS LADDER

REVISION | DATE | BY

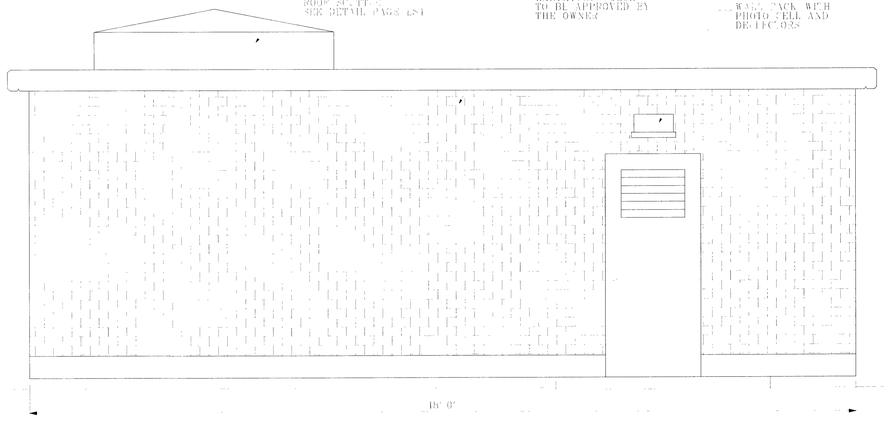
LEI
Consulting Engineers and Surveyors, Inc.
3302 No. Main St.
Spanish Fork, UT 84660
801-798-0555 Fax 801-798-9393

SPANISH FIELDS SUBDIVISION, SEWER LIFT STATION

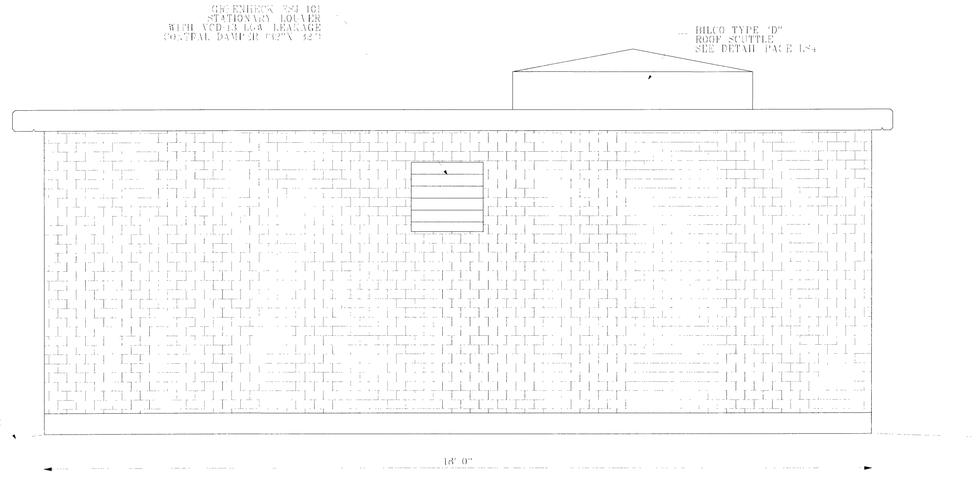
DETAILS

DESIGNER MKC
DATE 6/22/2004
DRAWN BY CIS
PROJECT# 2003-577
SCALE 1" = 3'-0"
SHEET 5 OF 6

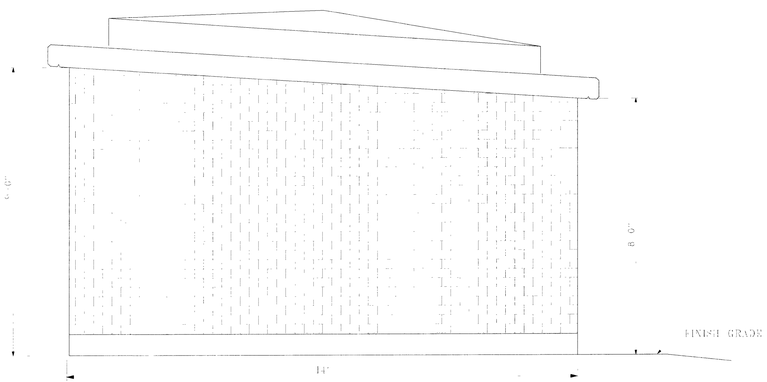
PAGE LS5



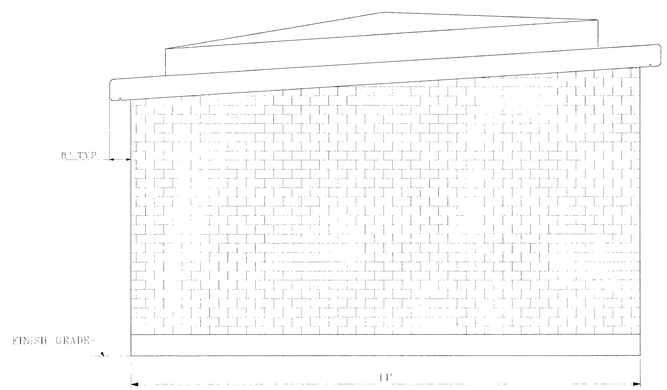
SOUTH ELEVATION



NORTH ELEVATION



WEST ELEVATION



EAST ELEVATION

REVISION | DATE | BY

3302 No. Main St.
Spanish Fork, UT 84660
801-798-0555 Fax 801-798-9393
Consulting Engineers and Surveyors, Inc.

SPANISH FIELDS SUBDIVISION, SEWER LIFT STATION

BUILDING ELEVATIONS

DESIGNER	MKC	PROJECT#	2003-577
DATE	6/22/2004	SCALE	1" = 3'-0"
DRAWN BY	CIS		SHEET 6 OF 6

PAGE
LS6

...\SHEETS 2-5.dgn

543

PANEL SCHEDULE

PANEL: A — **BUS AMPS:** 125
VOLTAGE: 480 Y / 277 **PHASE:** 3 — **MAIN OVERCURRENT DEVICE:** LUGS
MOUNTING: SURFACE **WIRE:** 4 — **MAIN OVERCURRANT AMPS:** N/A
ENCLOSURE: NEMA 1 — **MINIMUM EQUIPMENT RATING:** 18,000 AMPS (RMS-SYM)
REMARKS:

USE
E = Equipment Load
L = Lighting Load
R = Receptacle Load

BREAKER No	BREAKER AMPS	BREAKER POLE	CIRCUIT NAME	FEEDER C	FEEDER WIRE	FEEDER GRD	CKT. LOAD USE	CKT. LOAD WATTS	LOAD/PHASE (VA) ØA	ØB	ØC	CKT. LOAD WATTS	CKT. LOAD USE	FEEDER GRD	FEEDER WIRE	FEEDER C	CIRCUIT NAME	BREAKER POLE	BREAKER TRIP AMPS	BREAKER No.
1	20	2	7.5KVA TRANSFORMER	3/4"	#12	#12	E	2,984	6,684			3,700	E	#12	#12	3/4"	P-1	3	20	2
3	--	--	--	--	#12	#12	E	3,364		7,064		3,700	E	#12	#12	---	---	---	---	4
5											3,700	3,700	E	#12	#12	---	---	---	---	6
7									3,700			3,700	E	#12	#12	3/4"	P-2	3	20	8
9										3,700		3,700	E	#12	#12	---	---	---	---	10
11											3,700	3,700	E	#12	#12	---	---	---	---	12
13																				14
15	20	2	SPARE (2-POLE)																	16
17	--	--	--														SPARE	1	20	18

	ØA	ØB	ØC	LTG LCL	DEMAND
LIGHTING LOAD (VA)	0	0	0	0	0
RECEPTACLE LOAD (VA)	0	0	0		0
EQUIPMENT LOAD (VA)	10,384	10,764	7,400		28,548
TOTAL LOAD (VA)	10,384	10,764	7,400		28,548
TOTAL LOAD (AMPS):	37	39	27		34

NOTES:
1. INSULATION ON ALL CONDUCTORS TO BE THHN UNLESS NOTED OTHERWISE.
2. RECEPTACLE LOAD CALCULATED AS PER SECTION 220.13 OF THE NATIONAL ELECTRICAL CODE.

PANEL SCHEDULE

PANEL: B — **BUS AMPS:** 100
VOLTAGE: 240 / 120 **PHASE:** 1 — **MAIN OVERCURRENT DEVICE:** BREAKER
MOUNTING: SURFACE **WIRE:** 3 — **MAIN OVERCURRANT AMPS:** 50
ENCLOSURE: — **MINIMUM EQUIPMENT RATING:** 10,000 AMPS (RMS-SYM)
REMARKS:

USE
E = Equipment Load
L = Lighting Load
R = Receptacle Load

BREAKER No.	BREAKER TRIP AMPS	BREAKER POLE	CIRCUIT NAME	FEEDER C	FEEDER WIRE	FEEDER GRD	CKT. LOAD USE	CKT. LOAD WATTS	LOAD/PHASE(VA) ØA	ØB	CKT. LOAD WATTS	CKT. LOAD USE	FEEDER GRD	FEEDER WIRE	FEEDER C	CIRCUIT NAME	BREAKER POLE	BREAKER TRIP AMPS	BREAKER No.
1	20	1	EXHAUST FAN	1/2"	#12	#12	E	200	520		320	L	---	#12	1/2"	LIGHTS & RECEPTS	1	20	2
3	20	1	CONTROL PANEL	1/2"	#12	#12	E	500		1,500	1,000	E	#12	#12	1/2"	WALL HEATER	1	20	4
5	20	1	BATTERY CHRG	1/2"	#12	#12	E	100	1,600		1,500	E	#12	#12	1/2"	WATER HEATER	1	20	6
7	20	1	BLOCK HEATER	1/2"	#12	#12	E	1,000		1,864	864	E	#12	#12	1/2"	SUMP PUMP	1	20	8
9									864		864	E	#12	#12	1/2"	SUMP PUMP	1	20	10
11																			12

	ØA	ØB	LTG LCL	DEMAND
LIGHTING LOAD (VA)	320	0	80	400
RECEPTACLE LOAD (VA)	0	0		0
EQUIPMENT LOAD (VA)	2,664	3,364		6,028
TOTAL LOAD (VA)	2,984	3,364		6,428
TOTAL LOAD (AMPS):	25	28		27

NOTES:
1. ALL INSULATION ON CONDUCTORS TO BE THHN UNLESS NOTED OTHERWISE.
2. RECEPTACLE LOAD CALCULATED AS PER SECTION 220.13 OF THE NATIONAL ELECTRICAL CODE.

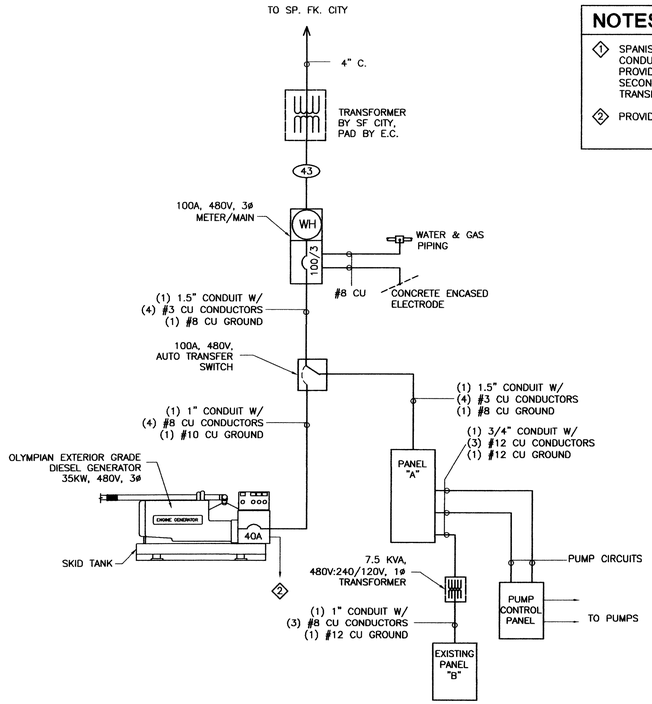
EQUIPMENT SCHEDULE

SYMBOL	DESCRIPTION	QNTY. UNITS	VOLTS	PHASE	BRKR	DISC.	FUSE	FEEDER	STARTER	HP OR VA	FLA (MCA)
P1	PUMP #1	1	480	3	20A	30A	—	#12	NEMA 2	7.5HP	13.0 FLA
P2	PUMP #2	1	480	3	20A	30A	—	#12	NEMA 2	7.5HP	13.0 FLA
P3	SUMP PUMP	1	120	1	20A	PLUG	—	#12	—	1/3HP	7.2 FLA
P4	SUMP PUMP	1	120	1	20A	PLUG	—	#12	—	1/3HP	7.2 FLA
EF1	EXHAUST FAN	1	120	1	20A	THERMAL SWITCH	—	#12	—	200W	
H1	WALL HEATER	1	120	1	20A	TSTAT	—	#12	—	1000W	
WH1	WATER HEATER	1	120	1	20A	PLUG	—	#12	—	1500W	

NOTE: VERIFY ALL EQUIPMENT LOCATIONS, QUANTITIES, AND CONNECTION REQUIREMENTS (i.e. VOLTAGE, PHASE, FLA, ETC.) WITH MECHANICAL DRAWINGS/SUBMITTALS BEFORE BEGINNING ROUGH IN.

MAXIMUM VALUES INDICATED. FINAL BREAKER/FUSE & DISCONNECT SIZE SHALL BE DETERMINED BY MANUFACTURER'S RECOMMENDATION FOR ACTUAL EQUIPMENT INSTALLED.

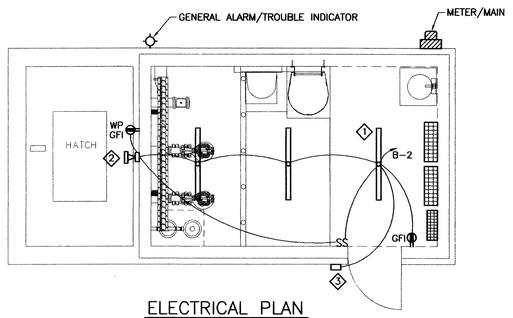
3 | SCHEDULES — SCALE: NONE



NOTES:

1. SPANISH FORK CITY TO PROVIDE AND INSTALL TRANSFORMER, PRIMARY CONDUCTORS AND MAKE ALL PRIMARY CONNECTIONS. CONTRACTOR TO PROVIDE TRANSFORMER PAD, TRENCHING, PRIMARY CONDUIT AND SECONDARY CONDUIT AND CONDUCTORS. VERIFY LOCATION OF TRANSFORMER.
2. PROVIDE BLOCK HEATER AND BATTERY CHARGING CIRCUITS AS REQUIRED.

1 | POWER RISER DIAGRAM — SCALE: NONE



KEYED NOTES:

1. COLUMBIA CS4-232-EB8 (OR EQUAL)
2. PROGRESS P5206-31 WITH 150W PAR 38 LAMP (OR EQUAL)
3. LITHONIA TWL70S120PE (OR EQUAL)

2 | LIFT STATION ELECTRICAL PLANS — SCALE: 1/4"=1'-0"

REVISION | DATE | BY

ROYAL ENGINEERING
ELECTRICAL ENGINEERS
2250 W. CENTER SPRINGVILLE, UTAH 84663 801-489-5459

SPANISH FIELDS SUBDIVISION, SPANISH FORK, UTAH

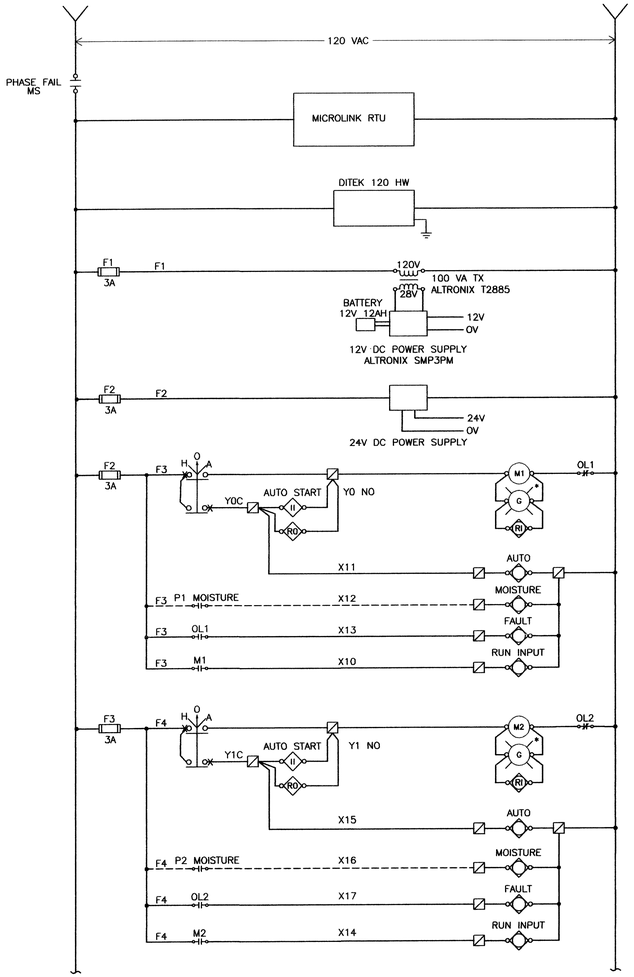
SEWER LIFT STATION

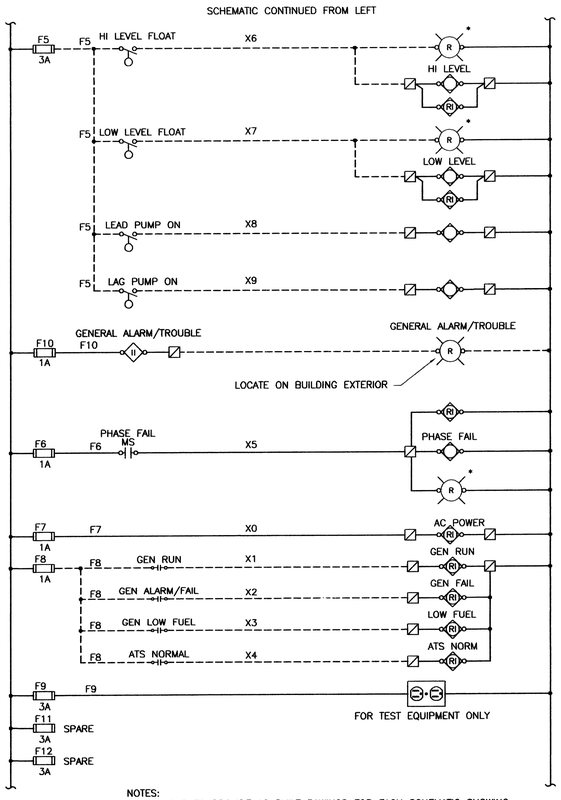
PROJECT# J04051 | SCALE AS NOTED

DESIGNER SRG | DATE 3/30/2004 | DRAWN BY SRG

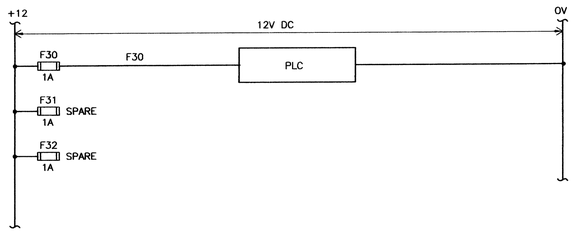
PAGE LSE1

543 Spanish Fields / Sewer Lift Sta. 4/1/04 / 4/29/04 03-577 Plat B



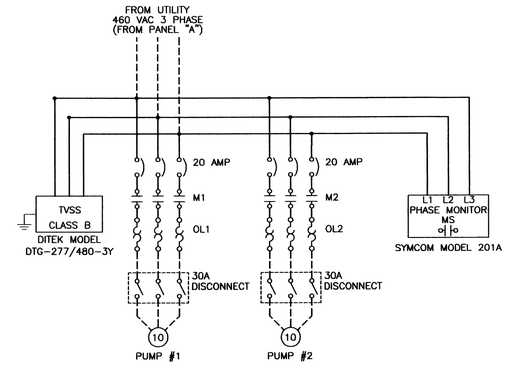


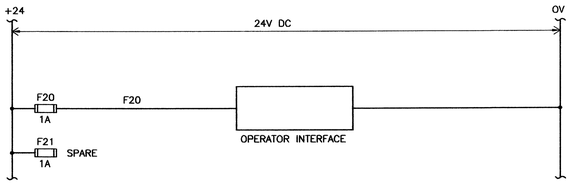
NOTES:
CONTRACTOR TO PROVIDE AS BUILT RAWINGS FOR EACH SCHEMATIC SHOWING WIRE NUMBERS, TERMINAL BLOCK NUMBERS, I/O ADDRESSES, FIELD JUNCTION BOXES AND TERMINAL BLOCKS.



12V DC SCHEMATIC

SCALE: NONE





24V DC SCHEMATIC

SCALE: NONE

LEGEND

- TERMINAL ON DEVICE
- TERMINAL IN PLC CABINET
- * DEVICE ON CONTROL PANEL
- F DEVICE IN FIELD
- o TERMINAL ON DEVICE
- PLC OUTPUT
- PLC INPUT
- RO RTU OUTPUT
- RI RTU INPUT
- FIELD WIRING
- MFG WIRING

SCADA SYSTEM PARTS

Manufacturer	Part	Part #
Automation Direct	Koyo PLC Rack	D2-06BDC1-1
Automation Direct	PLC Processor	D2-250-1
Automation Direct	120V AC Input Card	D2-16NA
Automation Direct	Relay Output Card	F2-08TRS
Automation Direct	Operator Interface text panel	EZ-220
Automation Direct	Cable For Operator Interface to PLC	EZ-2CBL
Automation Direct	Battery For PLC Processor	D2-BAT-1
Altonix	Regulated Power Supply	SMP3PM
Altonix	120V to 28V 100 VA Transformer	
Ditek	130V Surge Suppressor	DTK-120HW
Not Specific	12V 12AH Battery	Not Specific
Polyphasor	Lightning Arrestor W/N type connections	IS-B50LN-C2
Milltronics	Level Sensor	Echomax XPS-10
DITEK	120V AC Surge Suppressor	120 -HW
-	1/2" Superflex Heliax	-
Edwards Signalling	Alarm Indicator Light	52R-N5-40WH
Abbey Systems	RTU W/ internal Radio & Power Supply	MicroLink
Anchor Scientific	Float Level Switch	Roto-Float Type S
-	Antenna	-

SCALE: NONE

1 ONE-LINE DIAGRAM

REVISION | DATE | BY

ROYAL ENGINEERING
ELECTRICAL ENGINEERS
2260 W. CENTER SPRINGVILLE, UTAH 84663 801-489-5459

SPANISH FIELDS SUBDIVISION, SPANISH FORK, UTAH

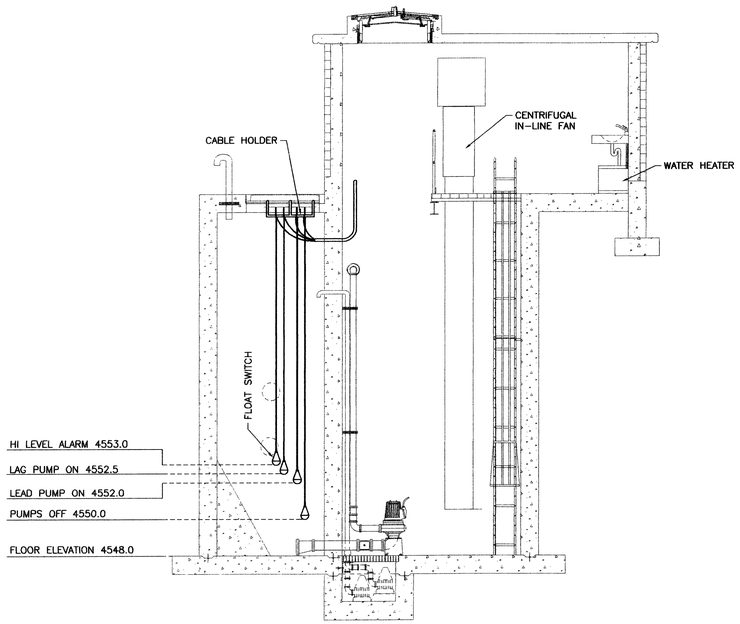
SEWER LIFT STATION

PROJECT#	SCALE	
J04051	AS NOTED	
DESIGNER	DATE	DRAWN BY
SRG	3/30/2004	SRG

PAGE LSE2

543

Spanish Fields / Sewer Lift Sta. Part B
4/1/04 / 6-25-04
03-577



SECTION

NOTES:

1) ALL HARDWARE, MOUNTING MATERIALS, NUTS, BOLTS, UNISTRUT AND FASTENERS INSIDE THE MANHOLE SHALL BE ALUMINUM OR STAINLESS STEEL.

2) ALL CONDUIT BELOW GRADE IS TO BE PVC SCHEDULE 40.

3) ALL CONDUIT RUNS FROM WET WELL SHALL HAVE SEAL OFFS IN EASILLY ACCESSABLE LOCATIONS.

4) GROUND SHALL BE BONDED TO ALL GROUND BUSSES IN PANELS, VFD'S, MOTOR STARTERS, ALL CONTROLS CABINETS, LIGHTING AND DISTRIBUTION PANEL.

5) IF IN CONDUIT, GROUND SHALL ALWAYS BE IN PVC CONDUIT, NEVER METAL CONDUIT.

6) ALL ENCLOSURES, DEVICES, AND EQUIPMENT SHALL HAVE BAKELITE LAMINATED AND ENGRAVED NAME TAGS. NAME TAGS SHALL HAVE THE EQUIPMENT NAME AND EQUIPMENT NUMBER. ALL LETTERING SHALL BE 1/4" OR LARGER UNLESS APPROVED. SEE DETAIL

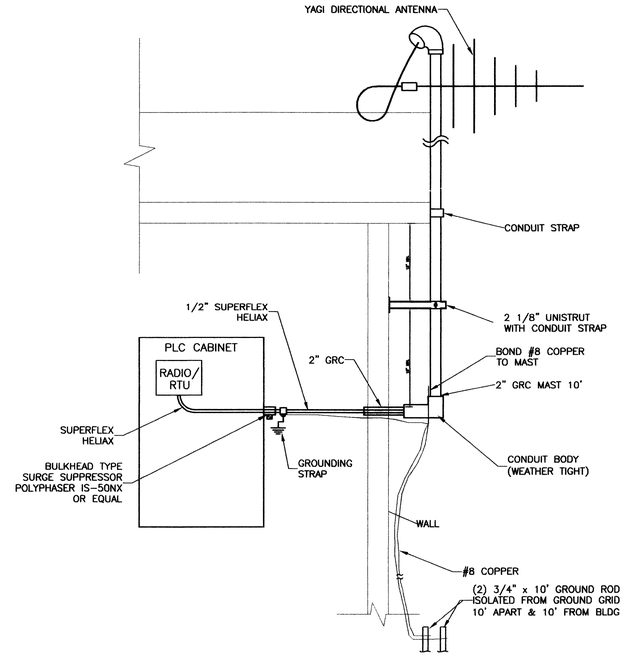
7) ALL INSTALLATIONS TO CONFORM TO NEC 2002

8) ALL WIRE SIZES TO BE PER NEC 2002, TABLE 310-16, 75 DEGREE, THHN, COPPER, UNLESS OTHERWISE NOTED ON DRAWINGS.

9) ALL WIRE SHALL BE THWN/THHN DUAL RATED.

10) CONDUIT WIRE FILL SHALL BE PER NEC 1999 APPENDIX C TABLES C1 THROUGH C12A.

11) CONDUIT SIZE SHALL BE NO SMALLER THAN 3/4".



YAGI ANTENNA INSTALLATION DETAIL

REVISION	DATE	BY

ROYAL ENGINEERING
ELECTRICAL ENGINEERS
2250 W. CENTER SPRINGVILLE, UTAH 84663 801-489-5459

SPANISH FIELDS SUBDIVISION, SPANISH FORK, UTAH

SEWER LIFT STATION

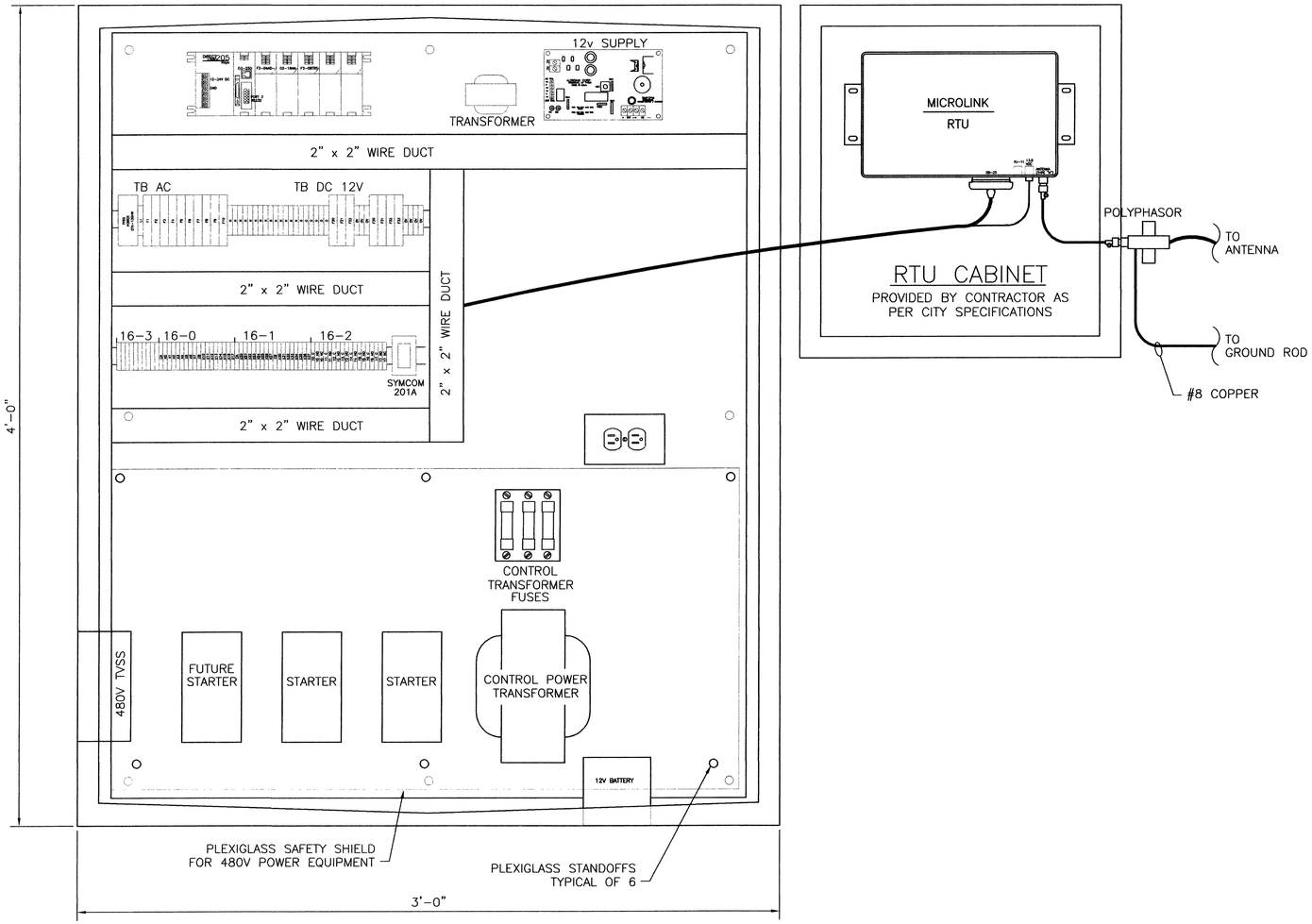
PROJECT#	J04051	DESIGNER	SRG
SCALE	AS NOTED	DATE	3/30/2004
		DRAWN BY	SRG

PAGE LSE3

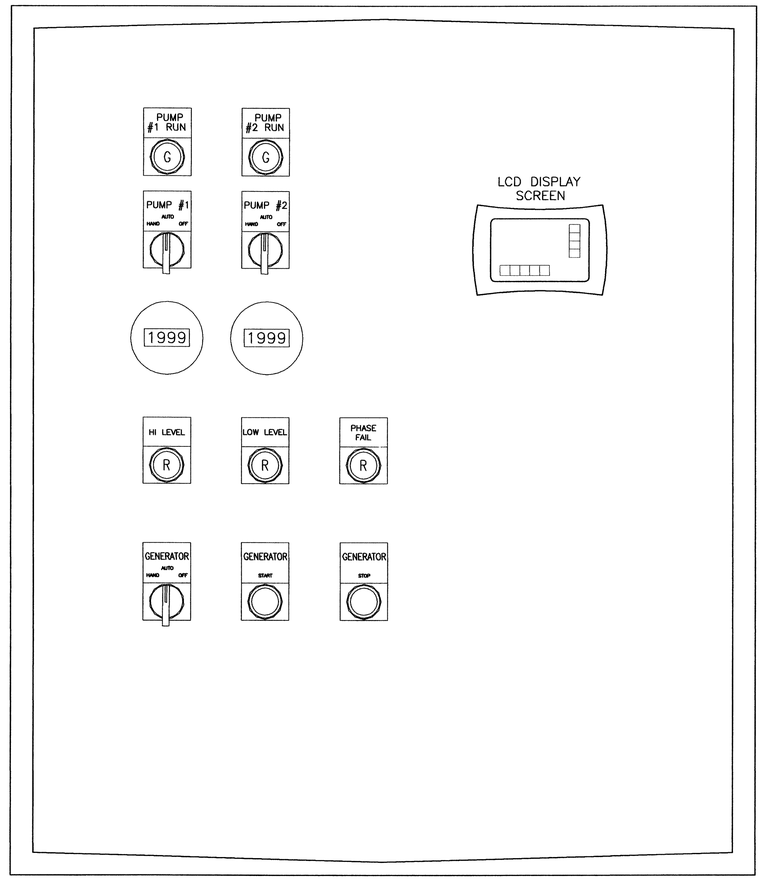
2 SECTION SCALE: NONE

1 YAGI ANTENNA INSTALLATION DETAIL SCALE: NONE

543 Spanish Fields / Sewer Lift Sta. Plat B
4/1/04 / 6-24-04 03-577



2 | CABINET LAYOUT | SCALE: NONE



1 | CONTROL SUB-PANEL FACE | SCALE: NONE

REGISTERED PROFESSIONAL ENGINEER
NO. 11013
STEVEN R. GRIFFITHS
STATE OF UTAH

REVISION | DATE | BY

ROYAL ENGINEERING
ELECTRICAL ENGINEERS
2230 W. CENTER SPRINGVILLE, UTAH 84663 801-489-5459

SPANISH FIELDS SUBDIVISION, SPANISH FORK, UTAH

SEWER LIFT STATION

PROJECT# J04051
SCALE AS NOTED
DESIGNER SRG
DATE 3/30/2004
DRAWN BY SRG

PAGE
LSE4

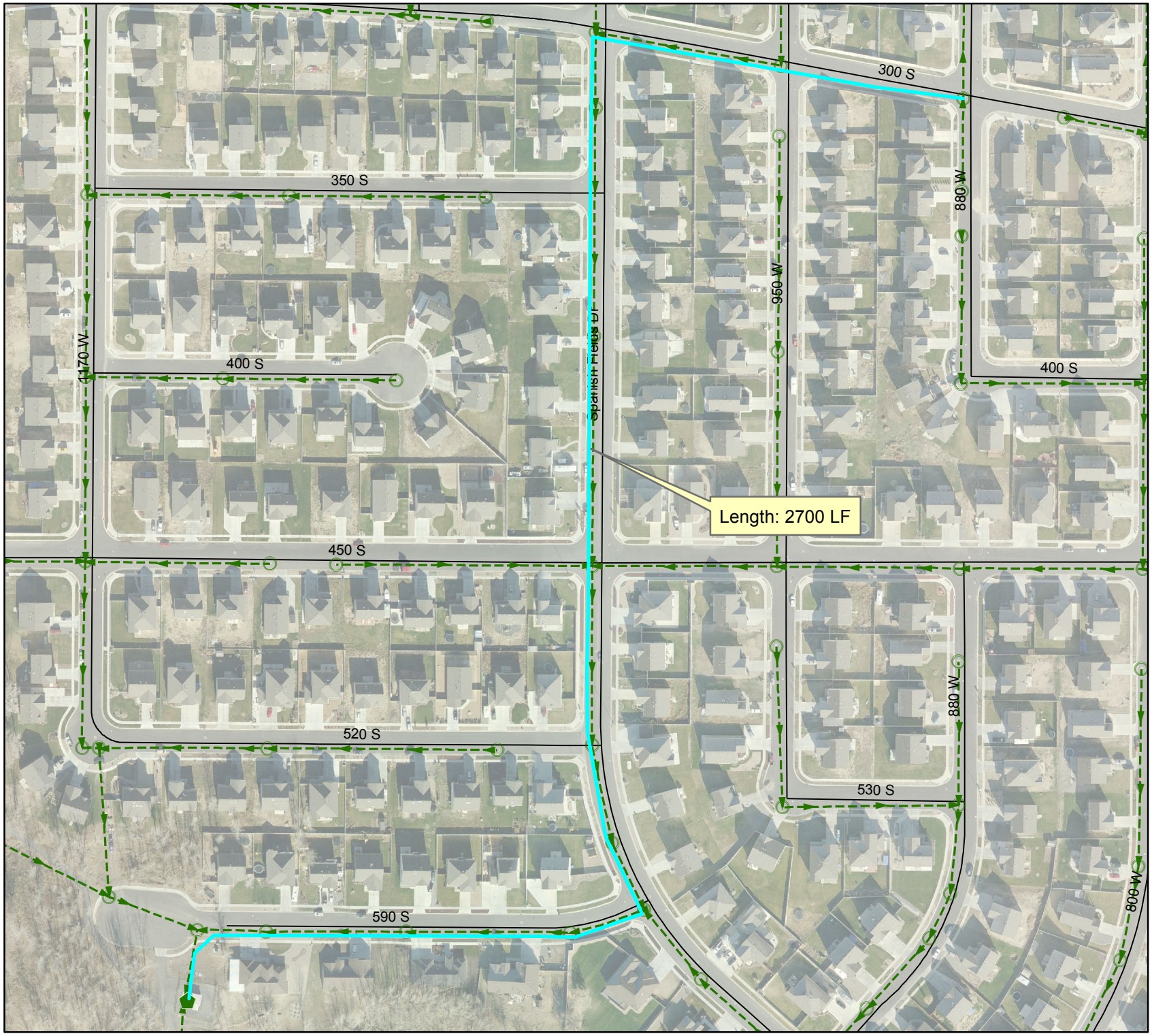
543

Spanish Fields/Sewer Lift Sta
6/28/04
03-577

Spanish Fields Force Main

1 Inch = 200 Feet

0 50 100 200 Feet

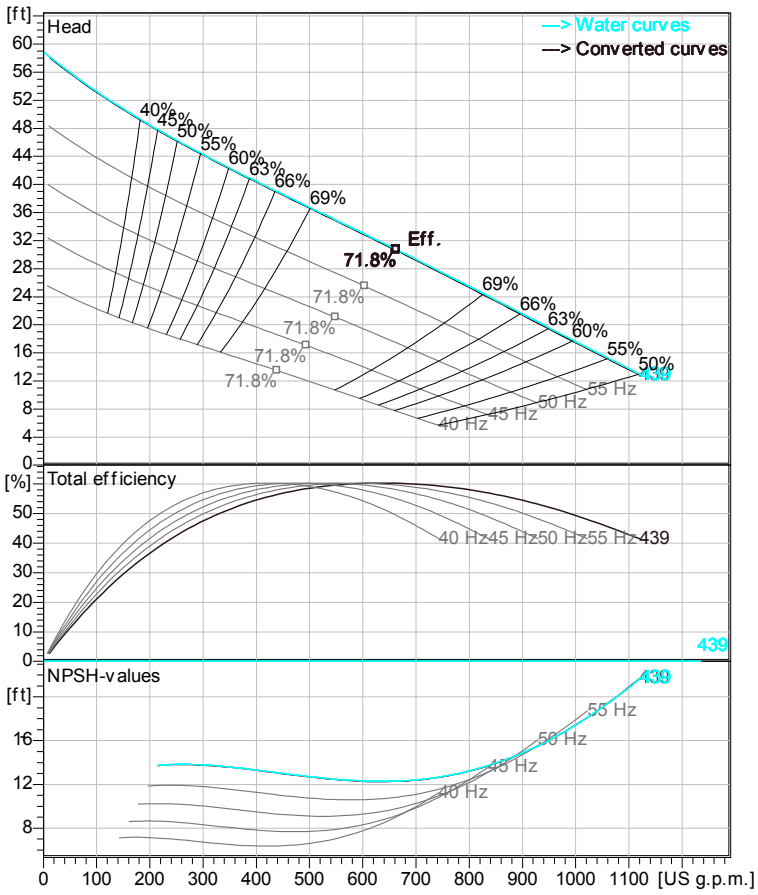


17 January 2011

Spanish Fork City
40 South Main Street
Spanish Fork, UT 84660
(801) 798-5000

NP 3127 MT 1~ 439

Technical specification



Curve according to: ISO 9906 grade 2 annex 1 or 2

Note: Picture might not correspond to the current configuration.

General

Patented self cleaning semi-open channel impeller, ideal for pumping in most waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

Impeller

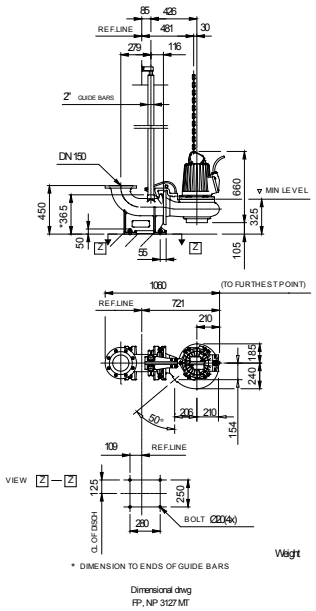
Impeller material	
Outlet diameter	$5^{7}/_{8}$"
Inlet diameter	150 mm
Impeller diameter	188 mm
Number of blades	2
Throughlet diameter	

Motor

Motor #	N3127.181 21-12-4AL-W 7,5hp
Stator variant	12
Frequency	60 Hz
Rated voltage	220 V
Number of poles	4
Phases	1~
Rated power	5.6 kW
Rated current	32 A
Starting current	65.9 A
Rated speed	1740 rpm
Power factor	
1/1 Load	0.97
3/4 Load	1
1/2 Load	0.99
Efficiency	
1/1 Load	82.5 %
3/4 Load	84.5 %
1/2 Load	83 %

Configuration

Installation: P - Semi permanent, Wet



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			13.01.2011	

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Performance curve

Pump

Outlet diameter	5 7/8"
Inlet diameter	150 mm
Impeller diameter	7 3/8"
Number of blades	2
Throughlet diameter	

Motor

Motor #	N3127.181 21-12-4AL-W 7,5hp
Stator variant	12
Frequency	60 Hz
Rated voltage	220 V
Number of poles	4
Phases	1~
Rated power	5.6 kW
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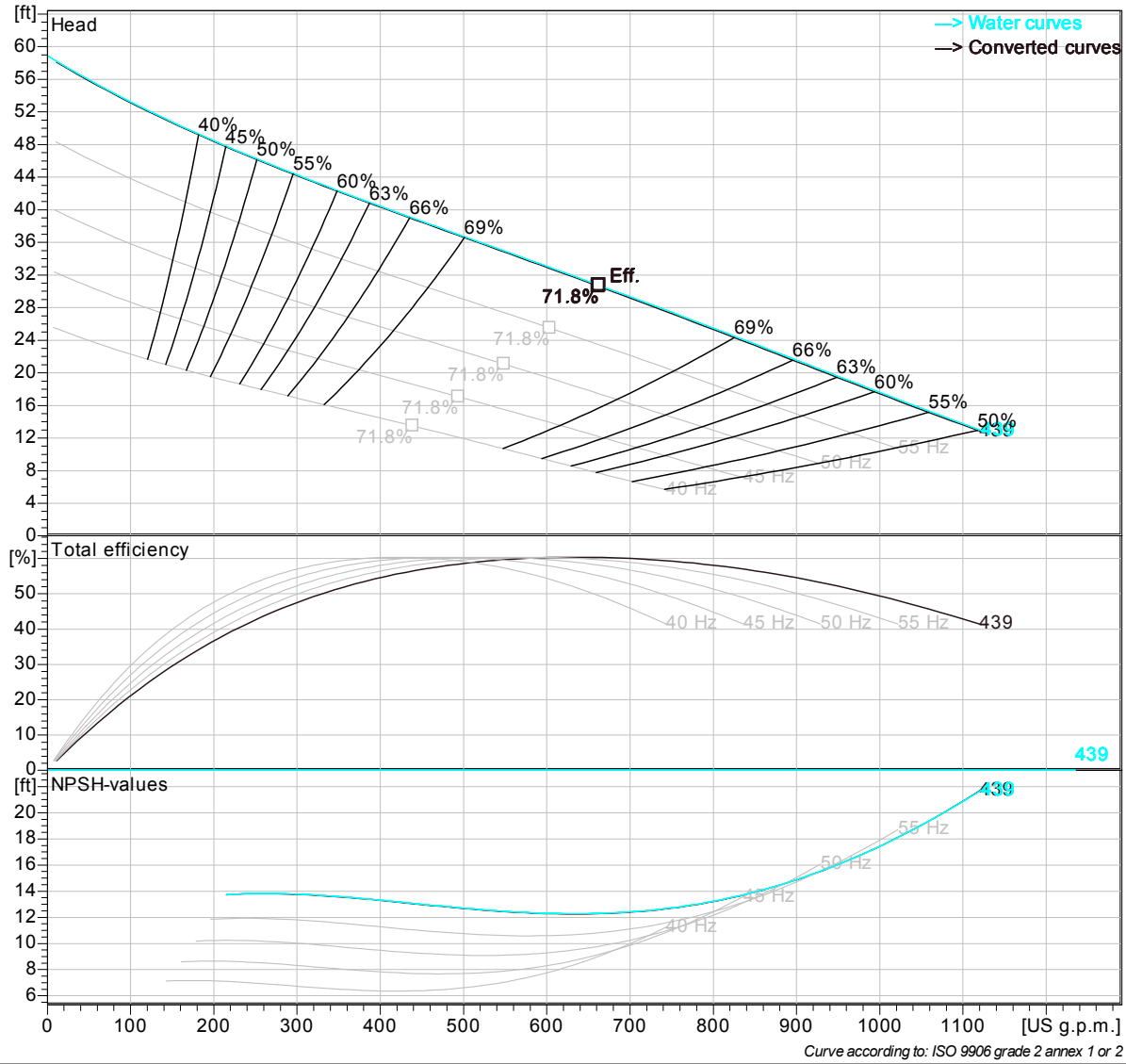

Curve according to: ISO 9906 grade 2 annex 1 or 2

0 kWh/US gal

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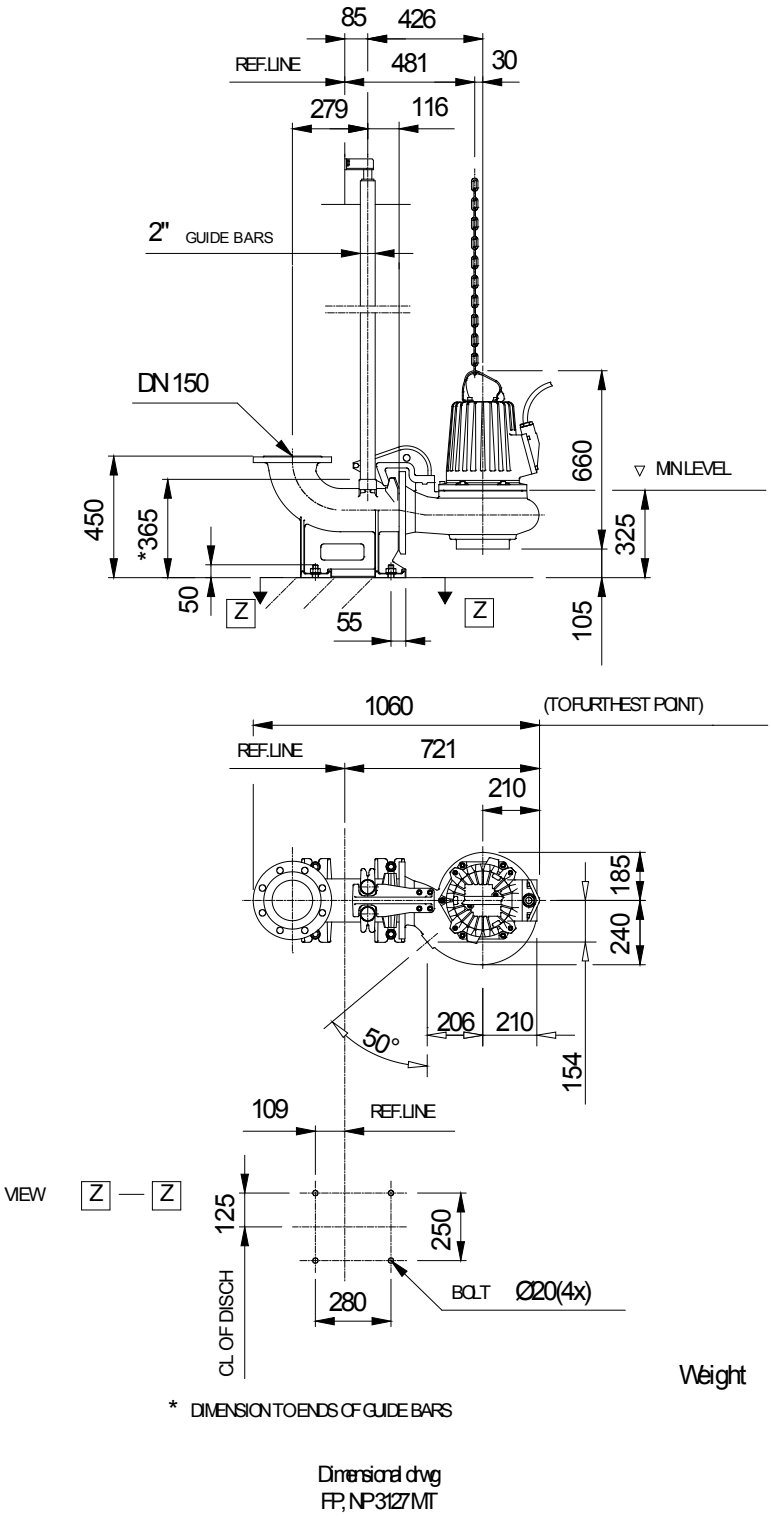
Dimensional drawing



Dimensional dwg
FP, NP3127 MT

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APPENDIX E
ELECTRONIC DATA
(ON CD)