

**SEWER SYSTEM
DESIGN REPORT**

**TALKING ROCK
PHASE 10, 12, & 13**

Prepared for:

Harvard Investments
17700 North Pacesetter Way
Scottsdale, Arizona 85255

Prepared By:

Shephard-Wesnitzer, Inc.
221 North Marina Street, Suite 102
Prescott, Arizona 86301
Phone: (928) 541-0443

SWI Job #s
05495, 05512, & 05513

January 2006

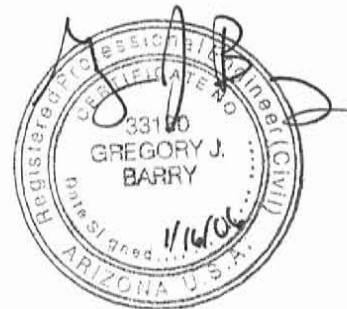


TABLE OF CONTENTS

INTRODUCTION	3
SYSTEM ANALYSIS	3
CONCLUSIONS.....	7
REFERENCES	7

APPENDICES

Appendix A – Site Map

Appendix B – Sewer Analysis & Modeling Results (LPS, Gravity, & Force Mains)

Appendix C – Sewer System Layout and Zones

Appendix D – Grinder Pump Details

Appendix E – Lift Station Pump Curves & Details

Appendix F – Sewer Service Agreement

EXHIBITS

Exhibit A – Sewer Master Plan



INTRODUCTION

General Description

The Talking Rock Ranch (TRR) Subdivision consists of residential and recreational facilities. This planned area development (PAD) was approved by the Yavapai County Board of Supervisors on October 6, 1999 and Amended on May 8, 2000. It is being developed in multiple phases. This report is provided for Phases 10, 12, and 13.

Talking Rock Ranch encompasses about 3,500 acres of undeveloped and newly developed land that slopes towards Inscription Canyon. The site, divided by Williamson Valley Road, consists of forested areas with slopes ranging from gentle to near vertical.

Project Location

The project site (Phases 10, 12, and 13) is located in the northern half of Section 15, Township 16 North, Range 3 West, Gila and Salt River Base and Meridian, Yavapai County, Arizona. The project is generally located in the Southern portion of Williamson Valley and lies to the east of Williamson Valley Road. See Appendix "A" for site map.

The site is surrounded by unsubdivided land of Talking Rock to the west and northeast, golf course tracts to the west and Phase 9 of Talking Rock to the south. Surrounding land use is single family dwellings with 1 to 5 acre lots. Average lot density within the TRR community is 2.3 acres and 2.7 persons per dwelling unit.

SYSTEM ANALYSIS

Low Pressure Sewer

The manufacturer of choice for the pressure sewer system is Model SGPC-AU, 1hp submersible grinder pump by Crane/Barnes Pumps. These systems use a traditional simplex pump within a fiberglass basin at each residence. Data sheets for the proposed pump configuration are included in Appendix "D". The impact of this type of system on the wastewater treatment plant will be minimal and consistent with other systems designed for previous phases of Talking Rock Ranch.

The pressure sewer piping analysis was performed utilizing spreadsheet and EPANet hydraulic modeling software. The spreadsheet computed line velocities and head losses in a tabular format. Several assumptions and system parameters were utilized in the analysis as shown below. The system was broken up into zones as shown in Appendix "C".

MODELING ASSUMPTIONS

Individual pumping rate	11.0-16.0	gpm
Service Elevation Range	4937-5003	ft
Max. probable pump cores operating simultaneously ⁽¹⁾	No. of pumps connected	Max. number running
	1	1
	2-3	2
	4-9	3
	10-18	4
	19-30	5
	31-50	6
	51-80	7

(1) Taken from Environment One Corporation, L.P. Sewer System Design Assistant

The velocity and friction head loss were calculated for pumps in simultaneous operation within the system. Based on the number of pumps proposed for this project and the chart above, one pump for each home, a maximum of seven (7) pumps on average will run simultaneously within a series of zones. Pressure sewer pipes were sized to create minimum flow velocities of 2.5 to 3.0 feet per second to keep solids in suspension. The analysis used a design flow of 270 gallons/day/housing unit and typical pump flow rate of 11.0 to 16.0 gallons/minute/housing unit. A Hazen-Williams C-Value of 140 was used for the pressure sewer system pipe.

Phase 10 consists of 117 lots with a total of 103 submersible grinder pumps, 14 lots will be serviced by gravity connections. Phase 12 consists of 86 lots with a total of 60 submersible grinder pumps and 26 lots will be serviced by gravity connections. Phase 13 has a total of 32 lots and all serviced with submersible grinder pumps.

The highest head encountered within the sewer system is 112 feet (Meriah Lane - Zone 25) which is below 138 feet, the maximum range of the selected pump. Average pressures throughout the system range between 16 and 48 psi. Due to this pressure, schedule 40 PVC pipe with test pressure of 150 psi is acceptable. The pump curve for the selected pump is included in Appendix "D".

Flushing connections for the pressure system will be located at the terminal end of each main, at intersections, at changes in pipe diameter, and at any sharp changes in direction. Intermittent spacing of inline flushing stations will be a maximum of 1,500 feet per the manufacture. Air release valves will be placed at high points in the system to prevent air build-up.

Gravity Sewer

Gravity sewers were analyzed using Haestad Methods SewerCAD, version 5.6. The modeling software uses the Manning's formula to calculate friction losses for open channel flow. Manning's N values of 0.013 were used for all sewers in the model. Design flows for the gravity sewers were calculated based on ADEQ minimum flows of 100 gallons/day/capita with a peaking factor of 3. Peak design flows will be conveyed adequately using 8" sewers and maximum depths were less than 50% of the pipe capacity. All sewer lines will be 8" SDR-35 PVC with slopes ranging from 0.33% to 4.08%. Modeling results for the SewerCAD model are included in Appendix "B". Below is a summary for the gravity sewers within phases 10 and 12;

Location	Length (linear feet)
Chloe Trail	534
Meem Lane	1,085
Double Adobe Road	423
Silent Moon Lane	3,045
Meriah Lane	859
Kenobi Trail	615
Total	6,561

Silent Moon Lane Lift Station

A sewage lift station with duplex pumping is required near the intersection of Double Adobe Road and Silent Moon Lane. Based on the incoming flowrates, the pump station is capable of pumping 205 gpm at 86 ft TDH, with the largest pump out of service. A hydraulic analysis was completed for the lift station and force main. The force main will exit the lift station as a 4" line until it reaches Double Adobe Road, where it connects to a 4" force main from phases 17-19 and then becomes 6" which ultimately discharges into an existing manhole in Talking Rock Ranch Road. The pump curves and lift station details are included in Appendix "E". The lift station will be equipped with submersible non-clog pumps capable of passing a 3" sphere, an odor control unit, stub outs for future aeration system, alternating pump controls, level float switches, alarms, an automatic transfer switch, and a standby generator.

Existing Lift Station

The existing lift station is located adjacent to the maintenance building off Talking Rock Ranch Road and is the primary lift station for the subdivision, pumping 100 percent of the wastewater from Talking Rock to the Inscription Canyon Ranch WWTP (ICR WWTP). Based on submittal information supplied by the contractor who built the lift

station, the station is equipped with two (2) F.E. Myers model 4VE200M4-43 submersible non-clog wastewater pumps with the following criteria for each pump:

Design Flow	150 gpm
Design Head	115 ft.
Sphere Size	3 in.
Efficiency	35.1%
Motor Horsepower	20.0 hp
Motor Speed	1750 rpm
Electrical	3 Phase, 460 Volts
Cable Length	25 ft.

The pumps listed above are installed in duplex configuration in an 8 ft diameter wet well, with an external valve box. The lift station pumps have 4" discharge piping which increases to the 8" force main downstream of the valve box. The force main extends approximately 7,950 feet to the ICR WWTP, ranging in elevation from 4,933 feet at the lift station to 5,000 feet at the WWTP.

Currently, flowrates to the lift station are minimal, only receiving wastewater from the Golf Pro Shop (Ranch Compound), the maintenance facility, and less than 50 private residences throughout the subdivision in phases 1, 2, 4, and 27. The expected wastewater flows to the lift station with a 2.5 peaking factor is estimated to be less than 30 gpm (43,200 gpd), which is within the capabilities of 1 pump with the second pump out of service.

As the subdivision continues to expand, the lift station will require improvements as future infrastructure contributes more wastewater to the system. The most critical improvement, not associated with added demand, is backup power. Currently, the lift station does not have a secondary power supply as required by A.A.C. R18-9-E301-D5g. A standby generator should be installed as soon as possible and electrical equipment modified to support the addition. The standby generator for the existing lift station should be a self contained unit capable of handling a load of 250 KW. This capacity should be adequate to serve the existing pumps along with the added future pumps.

Another improvement required within the next 6 months to a year is the addition of a magnetic flow meter to accurately record wastewater flows going to the ICR WWTP. The third major improvement will consist of adding additional pumping to the lift station, either in a separate wet well or modifying the existing one. It is unknown of the exact time to install additional pumping due to uncertainties of lot development, but it is estimated that current conditions will handle flows from up to 300 dwelling units, the Ranch Compound, and the maintenance facility. Development should be closely monitored to ensure the additional pumping is installed when needed.

CONCLUSIONS

The pressure sewer utilizing the 1 hp grinder pumps by Crane/Barnes is the preferred system based on the mountainous terrain characteristics of the site and consistency with other Talking Rock Ranch phases. Gravity sewers will also be utilized throughout the new phases as described above. The length of the low pressure mains and the number of units served dictate the need for a sewage lift station on Silent Moon Lane.

This system will serve 235 single-family lots with a combination of gravity and pressure sewer lines constructed of SDR 35 and schedule 40 PVC pipe.

REFERENCES

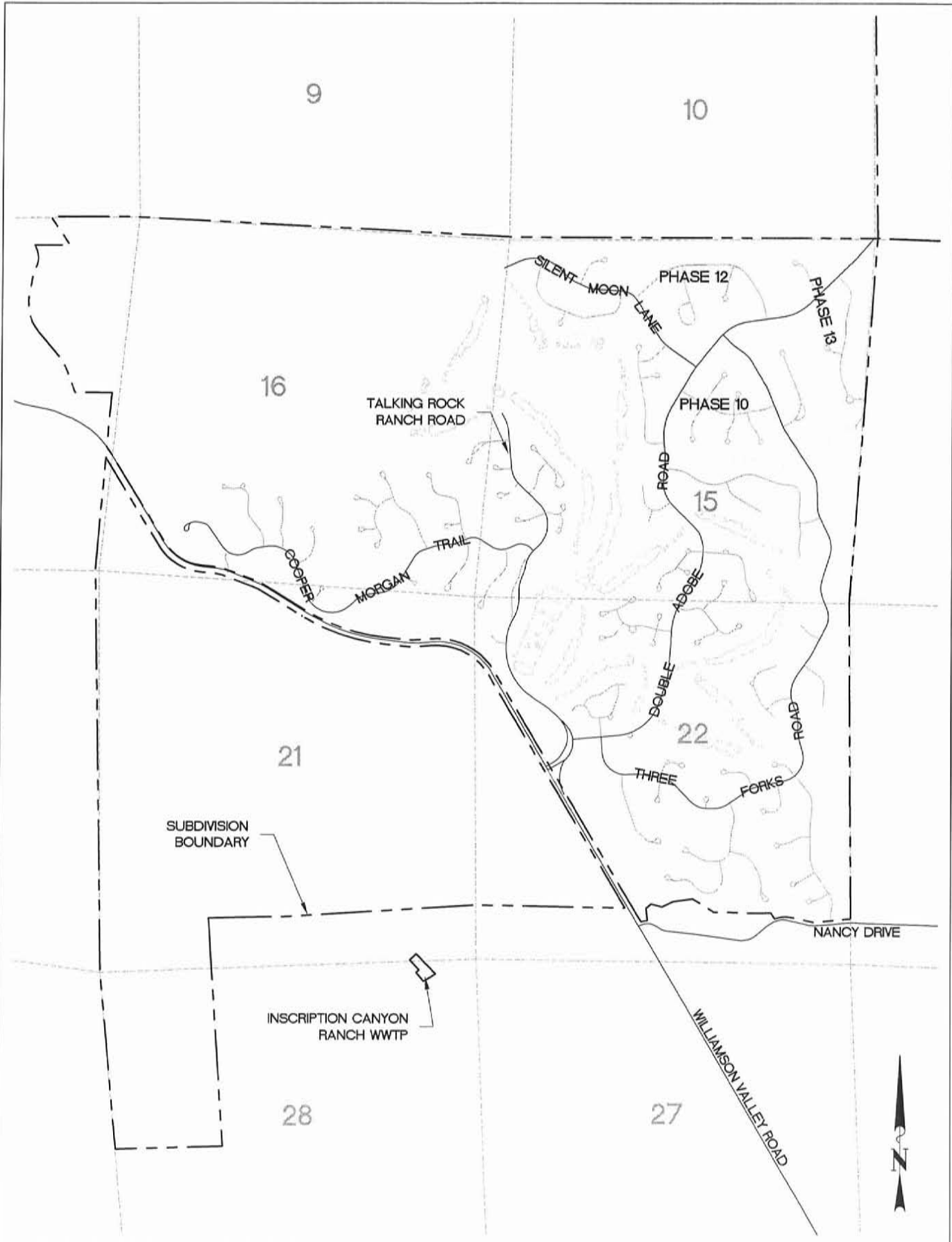
ADEQ Bulletin No. 11: Minimum Requirements for Design, Submission of Plans and Specifications of Sewage Works.

EPANet v. 2.0 by USEPA

E-One Low Pressure Sewer System Design Assistant, v.5.0

APPENDIX A

SITE MAP



SHEPHARD - WESNITZER, INC.
 CIVIL ENGINEERING AND SURVEYING
 221 NORTH MARINA STREET, SUITE 102
 PRESCOTT, AZ 86301
 (928) 541-0443

JOB NO:	05495
DATE:	DEC 2005
SCALE:	1"=2000'
DRAWN:	BH
DESIGN:	
CHECKED:	GB

TALKING ROCK YAVAPAI COUNTY
 PHASE 10, 12, & 13 ARIZONA

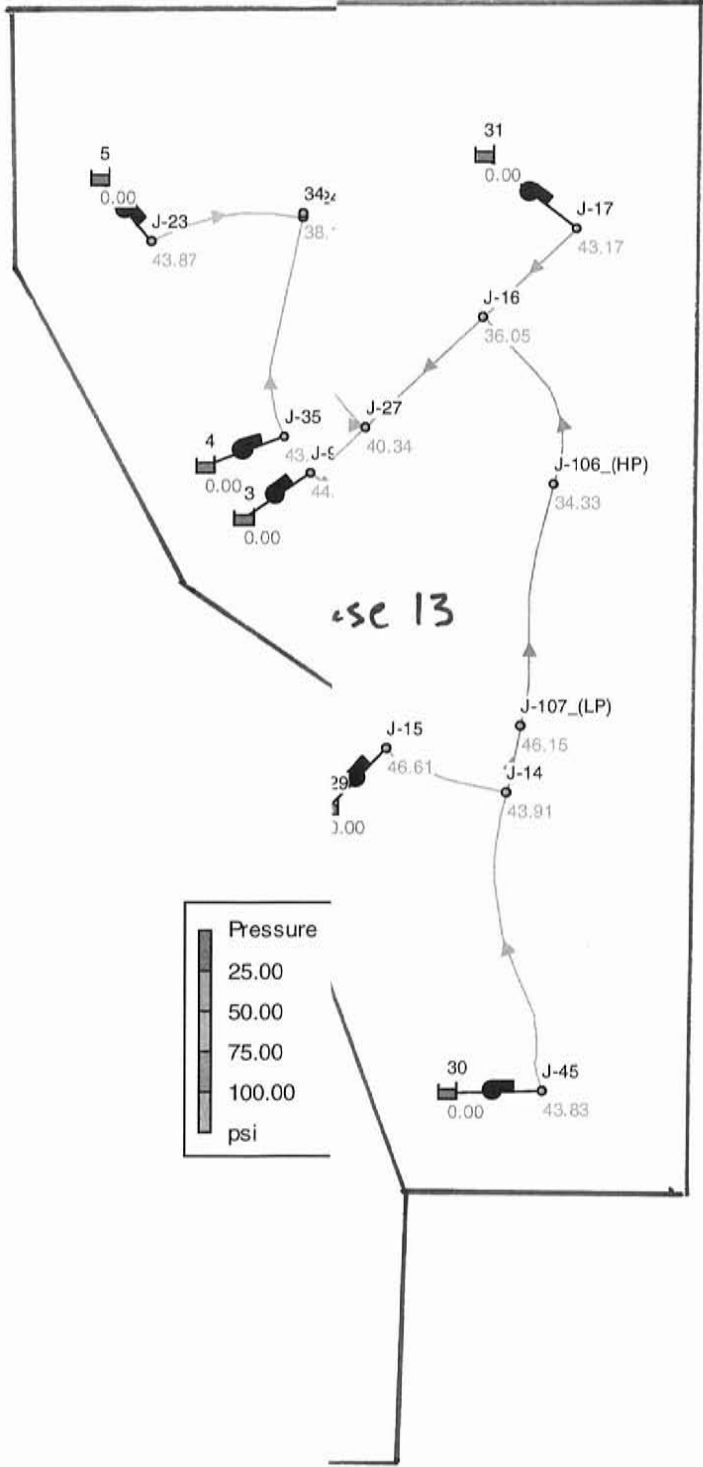
**APPENDIX A
 VICINITY MAP**

SHEET
1
 OF 1

APPENDIX B

SEWER ANALYSIS & MODELING RESULTS

LOW PRESSURE SEWER



```

*****
*                               E P A N E T                               *
*                               Hydraulic and Water Quality                *
*                               Analysis for Pipe Networks                  *
*                               Version 2.0                                *
*****

```

Input File: Talking Rock-LPS-ph10-12-13 -1hp pumps.net

Project: Talking Rock Phases 10, 12, and 13 Low Pressure Sewer System
 Scenario: Base w/ 1 hp pumps
 Date: 12/14/05 04:43:15 PM

Link - Node Table:

Link ID	Start Node	End Node	Length ft	Diameter in
P-33	J-22	J-11	510.0	2.04
P-23	J-45	J-14	759.0	2.04
P-24	J-14	J-15	318.0	2.04
P-25	J-27	J-42	677.0	2.04
P-27	J-16	J-17	317.0	1.59
P-14	J-7	J-8	240.0	1.59
P-31	J-24	J-35	625	2.04
P-30	J-11	J-12	365.0	1.59
P-1	J-18	J-49	1313.0	2.44
P-32	J-5	J-6	205.0	1.59
P-8	J-13	J-7	300.0	2.04
P-28	J-27	J-16	399.0	2.44
P-7	J-19	J-47	887.01	2.04
P-17	J-19	J-30	422.34	2.44
P-6	J-28	J-29	413.65	2.04
P-3	J-38	J-39	593.0	2.04
P-15	J-9	J-7	254.0	2.44
P-20	J-41	J-29	625.63	3.03
P-5	J-44	J-25	743.0	2.04
P-38	J-1	J-2	69.57	1.59
P-29	J-26_(LP)	J-27	522.0	3.03
P-22	J-25	J-26_(LP)	398.0	3.03
P-10	J-34	J-18	493.0	1.59
P-18	J-3	J-4	158.0	1.59
P-2	J-20	J-21	350.0	2.04
P-11	J-32	J-21	461.0	2.04
P-9	J-10	J-9	274.0	2.04
P-4	J-39	J-40	600.0	2.04
P-12	J-33	J-9	501.49	2.44
P-80	J-99_(LP)	J-6	289	1.59
P-81	J-48	J-100_(LP)	615.0	2.44
P-82	J-100_(LP)	J-6	502.0	2.44
P-83	J-37	J-101_(LP)	202.02	1.59
P-84	J-101_(LP)	J-1	348.12	1.59
P-85	J-43	J-102_(LP)	377.0	2.44

Link - Node Table: (continued)

Link ID	Start Node	End Node	Length ft	Diameter in	
P-86	J-102_(LP)	J-4	491.0	2.44	
P-87	J-4	J-103_(LP)	167.0	2.44	
P-88	J-103_(LP)	J-46	661.0	2.44	
P-89	J-18	J-104_(LP)	57.0	2.44	
P-90	J-104_(LP)	J-19	273.37	2.44	
P-91	J-29	J-105_(LP)	298.10	3.03	
P-92	J-105_(LP)	J-25	412.0	3.03	
P-94	J-106_(HP)	J-16	487.0	2.44	
P-93	J-14	J-107_(LP)	166.0	2.44	
P-95	J-107_(LP)	J-106_(HP)	605.0	2.44	
31	J-1	J-36	772.62	2.44	
33	J-11	32	548.28	2.44	
35	J-23	34	386.93	2.04	
1	1	J-100_(LP)	#N/A	#N/A	Pump
2	2	J-5	#N/A	#N/A	Pump
3	3	J-99_(LP)	#N/A	#N/A	Pump
4	4	J-35	#N/A	#N/A	Pump
5	5	J-23	#N/A	#N/A	Pump
6	6	J-10	#N/A	#N/A	Pump
7	9	J-9	#N/A	#N/A	Pump
8	8	J-8	#N/A	#N/A	Pump
9	7	J-13	#N/A	#N/A	Pump
10	13	J-103_(LP)	#N/A	#N/A	Pump
11	12	J-3	#N/A	#N/A	Pump
12	11	J-102_(LP)	#N/A	#N/A	Pump
13	10	J-43	#N/A	#N/A	Pump
14	14	J-40	#N/A	#N/A	Pump
15	15	J-38	#N/A	#N/A	Pump
16	16	J-20	#N/A	#N/A	Pump
17	17	J-32	#N/A	#N/A	Pump
18	18	J-47	#N/A	#N/A	Pump
19	20	J-49	#N/A	#N/A	Pump
20	19	J-34	#N/A	#N/A	Pump
21	22	J-12	#N/A	#N/A	Pump
22	21	J-22	#N/A	#N/A	Pump
23	23	J-11	#N/A	#N/A	Pump
24	25	J-37	#N/A	#N/A	Pump
25	24	J-2	#N/A	#N/A	Pump
26	26	J-44	#N/A	#N/A	Pump
27	27	J-28	#N/A	#N/A	Pump
28	28	J-42	#N/A	#N/A	Pump
29	30	J-45	#N/A	#N/A	Pump
30	29	J-15	#N/A	#N/A	Pump
32	31	J-17	#N/A	#N/A	Pump
34	33	J-1	#N/A	#N/A	Pump

Page 3 Project: Talking Rock Phases 10, 12, and 13 Low Pressure Sewer System
 Energy Usage:

Pump	Usage Factor	Avg. Effic.	Kw-hr /Mgal	Avg. Kw	Peak Kw	Cost /day
1	100.00	75.00	403.06	0.54	0.54	0.00
2	100.00	75.00	440.77	0.28	0.28	0.00
3	100.00	75.00	427.70	0.28	0.28	0.00
4	100.00	75.00	418.65	0.83	0.83	0.00
5	100.00	75.00	418.65	0.83	0.83	0.00
6	100.00	75.00	436.10	0.28	0.28	0.00
7	100.00	75.00	424.55	0.28	0.28	0.00
8	100.00	75.00	422.42	0.28	0.28	0.00
9	100.00	75.00	391.50	0.27	0.27	0.00
10	100.00	75.00	405.21	0.27	0.27	0.00
11	100.00	75.00	405.82	0.27	0.27	0.00
12	100.00	75.00	437.10	0.28	0.28	0.00
13	100.00	75.00	426.45	0.28	0.28	0.00
14	100.00	75.00	426.21	0.83	0.83	0.00
15	100.00	75.00	411.08	0.82	0.82	0.00
16	100.00	75.00	425.33	0.83	0.83	0.00
17	100.00	75.00	411.96	0.82	0.82	0.00
18	100.00	75.00	393.50	0.27	0.27	0.00
19	100.00	75.00	461.64	0.86	0.86	0.00
20	100.00	75.00	308.52	0.23	0.23	0.00
21	100.00	75.00	423.16	0.28	0.28	0.00
22	100.00	75.00	434.08	0.56	0.56	0.00
23	100.00	75.00	383.26	0.27	0.27	0.00
24	100.00	75.00	423.20	0.28	0.28	0.00
25	100.00	75.00	424.58	0.28	0.28	0.00
26	100.00	75.00	462.47	0.57	0.57	0.00
27	100.00	75.00	271.06	0.21	0.21	0.00
28	100.00	75.00	447.39	0.28	0.28	0.00
29	100.00	75.00	417.84	0.55	0.55	0.00
30	100.00	75.00	446.44	0.28	0.28	0.00
32	100.00	75.00	412.30	0.27	0.27	0.00
34	100.00	75.00	413.40	0.55	0.55	0.00
Demand Charge:						0.00
Total Cost:						0.00

Node Results:

Node ID	Demand GPM	Head ft	Pressure psi	Quality
J-33	44.00	5059.58	40.08	0.00
J-49	0.00	5075.43	48.36	0.00
J-28	0.00	5032.84	28.82	0.00
J-15	0.00	5067.79	46.61	0.00
J-20	0.00	5082.74	44.43	0.00
J-1	0.00	5043.89	43.50	0.00

Page 4 Project: Talking Rock Phases 10, 12, and 13 Low Pressure
 Sewer System
 Node Results: (continued)

Node ID	Demand GPM	Head ft	Pressure psi	Quality
J-21	66.00	5075.06	37.84	0.00
J-26_(LP)	0.00	5044.93	44.60	0.00
J-2	0.00	5044.56	44.65	0.00
J-16	0.00	5055.45	36.05	0.00
J-7	0.00	5068.71	43.68	0.00
J-10	0.00	5068.32	45.63	0.00
J-32	0.00	5085.54	43.22	0.00
J-29	0.00	5031.16	30.86	0.00
J-18	0.00	5064.53	33.22	0.00
J-42	0.00	5051.02	47.10	0.00
J-44	0.00	5048.63	48.66	0.00
J-38	0.00	5077.33	43.13	0.00
J-14	0.00	5066.93	43.91	0.00
J-37	0.00	5049.23	44.55	0.00
J-6	0.00	5070.04	39.45	0.00
J-48	44.00	5058.13	33.41	0.00
J-35	0.00	5074.14	43.74	0.00
J-22	0.00	5067.84	45.51	0.00
J-43	0.00	5073.01	44.80	0.00
J-27	0.00	5049.19	40.34	0.00
J-36	44.00	5031.60	15.57	0.00
J-30	55.00	5049.20	26.26	0.00
J-45	0.00	5074.95	43.83	0.00
J-41	88.00	5018.64	20.11	0.00
J-17	0.00	5058.62	43.17	0.00
J-47	0.00	5062.13	41.14	0.00
J-23	0.00	5093.14	43.87	0.00
J-11	0.00	5062.68	40.25	0.00
J-12	0.00	5066.22	44.55	0.00
J-19	0.00	5059.36	31.72	0.00
J-40	0.00	5076.95	44.87	0.00
J-3	0.00	5072.08	42.63	0.00
J-46	44.00	5058.41	34.07	0.00
J-24	33.00	5060.18	27.65	0.00
J-5	0.00	5071.93	46.11	0.00
J-8	0.00	5071.05	44.13	0.00
J-25	0.00	5041.68	35.49	0.00
J-13	0.00	5069.65	41.10	0.00
J-34	0.00	5070.80	32.43	0.00
J-39	66.00	5063.82	34.76	0.00
J-9	0.00	5067.56	44.39	0.00
J-4	0.00	5070.47	42.28	0.00
J-99_(LP)	0.00	5072.81	44.76	0.00
J-100_(LP)	0.00	5067.91	42.17	0.00
J-101_(LP)	0.00	5047.27	45.31	0.00
J-102_(LP)	0.00	5072.56	45.86	0.00
J-103_(LP)	0.00	5068.93	42.43	0.00

Node Results: (continued)

Node ID	Demand GPM	Head ft	Pressure psi	Quality
J-104_(LP)	0.00	5063.64	33.66	0.00
J-105_(LP)	0.00	5035.58	35.84	0.00
J-106_(HP)	0.00	5059.90	34.33	0.00
J-107_(LP)	0.00	5065.42	46.15	0.00
32	44.00	5053.95	25.24	0.00
34	33.00	5084.50	38.17	0.00
1	-22.49	4971.50	0.00	0.00 Reservoir
2	-10.65	4966.50	0.00	0.00 Reservoir
3	-10.86	4970.50	0.00	0.00 Reservoir
4	-33.00	4974.00	0.00	0.00 Reservoir
5	-33.00	4993.00	0.00	0.00 Reservoir
6	-10.72	4964.00	0.00	0.00 Reservoir
7	-11.43	4976.00	0.00	0.00 Reservoir
8	-10.94	4970.00	0.00	0.00 Reservoir
9	-10.91	4966.00	0.00	0.00 Reservoir
10	-10.88	4971.00	0.00	0.00 Reservoir
11	-10.71	4968.00	0.00	0.00 Reservoir
12	-11.20	4975.00	0.00	0.00 Reservoir
13	-11.21	4972.00	0.00	0.00 Reservoir
14	-32.64	4975.00	0.00	0.00 Reservoir
15	-33.36	4979.00	0.00	0.00 Reservoir
16	-32.68	4981.00	0.00	0.00 Reservoir
17	-33.32	4987.00	0.00	0.00 Reservoir
18	-11.40	4968.00	0.00	0.00 Reservoir
19	-12.64	4997.00	0.00	0.00 Reservoir
20	-30.96	4965.00	0.00	0.00 Reservoir
21	-21.51	4964.00	0.00	0.00 Reservoir
22	-10.93	4965.00	0.00	0.00 Reservoir
23	-11.56	4971.00	0.00	0.00 Reservoir
24	-10.91	4943.00	0.00	0.00 Reservoir
25	-10.93	4948.00	0.00	0.00 Reservoir
26	-20.62	4938.00	0.00	0.00 Reservoir
27	-13.15	4968.00	0.00	0.00 Reservoir
28	-10.55	4944.00	0.00	0.00 Reservoir
29	-10.56	4961.00	0.00	0.00 Reservoir
30	-22.03	4975.00	0.00	0.00 Reservoir
31	-11.10	4960.00	0.00	0.00 Reservoir
33	-22.17	4945.00	0.00	0.00 Reservoir

Link Results:

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
P-33	21.51	2.11	10.11	Open
P-23	22.03	2.16	10.57	Open
P-24	-10.56	1.04	2.71	Open
P-25	-10.55	1.04	2.70	Open
P-27	-11.10	1.79	10.00	Open
P-14	-10.94	1.77	9.74	Open
P-31	-33.00	3.24	22.34	Open
P-30	-10.93	1.77	9.71	Open
P-1	-30.96	2.12	8.30	Open
P-32	10.65	1.72	9.26	Open
P-8	11.43	1.12	3.13	Open
P-28	-43.69	3.00	15.70	Open
P-7	-11.40	1.12	3.12	Open
P-17	55.00	3.77	24.05	Open
P-6	13.15	1.29	4.07	Open
P-3	33.36	3.27	22.79	Open
P-15	-22.37	1.53	4.54	Open
P-20	-88.00	3.92	20.00	Open
P-5	20.62	2.02	9.35	Open
P-38	-10.91	1.76	9.68	Open
P-29	-54.23	2.41	8.16	Open
P-22	-54.23	2.41	8.16	Open
P-10	12.64	2.04	12.72	Open
P-18	11.20	1.81	10.17	Open
P-2	32.68	3.21	21.94	Open
P-11	33.32	3.27	22.74	Open
P-9	10.72	1.05	2.79	Open
P-4	-32.64	3.20	21.89	Open
P-12	-44.00	3.02	15.91	Open
P-80	10.86	1.75	9.60	Open
P-81	-44.00	3.02	15.91	Open
P-82	-21.51	1.48	4.23	Open
P-83	10.93	1.77	9.71	Open
P-84	10.93	1.77	9.71	Open
P-85	10.88	0.75	1.20	Open
P-86	21.59	1.48	4.25	Open
P-87	32.79	2.25	9.23	Open
P-88	44.00	3.02	15.91	Open
P-89	43.60	2.99	15.64	Open
P-90	43.60	2.99	15.65	Open
P-91	-74.85	3.33	14.82	Open
P-92	-74.85	3.33	14.82	Open
P-94	32.59	2.24	9.12	Open
P-93	32.59	2.24	9.12	Open
P-95	32.59	2.24	9.12	Open
31	44.00	3.02	15.91	Open
33	44.00	3.02	15.91	Open

Link Results: (continued)

Link ID	Flow GPM	Velocity fps	Unit Headloss ft/Kft	Status
35	33.00	3.24	22.34	Open
1	22.49	0.00	-96.41	Open Pump
2	10.65	0.00	-105.43	Open Pump
3	10.86	0.00	-102.31	Open Pump
4	33.00	0.00	-100.14	Open Pump
5	33.00	0.00	-100.14	Open Pump
6	10.72	0.00	-104.32	Open Pump
7	10.91	0.00	-101.56	Open Pump
8	10.94	0.00	-101.05	Open Pump
9	11.43	0.00	-93.65	Open Pump
10	11.21	0.00	-96.93	Open Pump
11	11.20	0.00	-97.08	Open Pump
12	10.71	0.00	-104.56	Open Pump
13	10.88	0.00	-102.01	Open Pump
14	32.64	0.00	-101.95	Open Pump
15	33.36	0.00	-98.33	Open Pump
16	32.68	0.00	-101.74	Open Pump
17	33.32	0.00	-98.54	Open Pump
18	11.40	0.00	-94.13	Open Pump
19	30.96	0.00	-110.43	Open Pump
20	12.64	0.00	-73.80	Open Pump
21	10.93	0.00	-101.22	Open Pump
22	21.51	0.00	-103.84	Open Pump
23	11.56	0.00	-91.68	Open Pump
24	10.93	0.00	-101.23	Open Pump
25	10.91	0.00	-101.56	Open Pump
26	20.62	0.00	-110.63	Open Pump
27	13.15	0.00	-64.84	Open Pump
28	10.55	0.00	-107.02	Open Pump
29	22.03	0.00	-99.95	Open Pump
30	10.56	0.00	-106.79	Open Pump
32	11.10	0.00	-98.62	Open Pump
34	22.17	0.00	-98.89	Open Pump

By: BH Date: Oct. 2005 **PRESSURE SEWER SYSTEM** Project: Talking Rock Phase 10, 12, and 13
 Pipe: SCH. 40 PVC **HYDRAULIC ANALYSIS**
 Prepared for: Harvard Investments SWI Proj. No.: 05495, 05512, and 05513
 Checked By: G. Barry Sheet No. 1 of 1 Rev.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
ZONE NUMBER	NO. OF PUMPS	ACCUM. TOTAL	CORE PUMPS-ON	MAXIMUM FLOW (gpm)	PIPE SIZE (in)	INT. DIA (in)	INT. AREA (ft ²)	MAXIMUM VELOCITY (fps)	LENGTH (ft)	note	FRICTION LOSS (ft/100 ft)	FRICTION LOSS TOTAL (ft)	SUM FRICTION LOSS (ft)	MAXIMUM MAIN ELEV. (ft)	MINIMUM PUMP ELEV. (ft)	ELEV. DIFF. (ft)	MAXIMUM TOTAL HEAD (ft)	VELOCITY ≥ 3 fps	TOTAL HEAD ≤ 200 ft
1	14	14	4	44	2 1/2	2.44	0.0325	3.02	1314		1.30	17.1	17.1	4995	4959	36	53.1	YES	YES
2	3	3	2	22	1 1/2	1.59	0.0138	3.56	494		2.92	14.4	14.4	4996	4996	0	14.4	YES	YES
3	3	20	5	55	2 1/2	2.44	0.0325	3.77	331		1.94	6.4	37.9	4996	4982	14	51.9	YES	YES
4	6	6	3	33	2	2.04	0.0227	3.24	887		1.82	16.1	16.1	4996	4971	25	41.1	YES	YES
5	1	27	5	55	2 1/2	2.44	0.0325	3.77	423		1.94	8.2	62.3	4996	4985	11	73.3	YES	YES
6	6	6	3	33	2	2.04	0.0227	3.24	351		1.82	6.4	6.4	4996	4981	15	21.4	YES	YES
7	8	8	3	33	2	2.04	0.0227	3.24	454		1.82	8.3	8.3	4996	4985	11	19.3	YES	YES
8	9	9	3	33	2	2.04	0.0227	3.24	600		1.82	10.9	10.9	4991	4973	18	28.9	YES	YES
9	9	9	3	33	2	2.04	0.0227	3.24	594		1.82	10.8	10.8	4991	4979	12	22.8	YES	YES
10	10	10	4	44	2 1/2	2.44	0.0325	3.02	859		1.30	11.2	11.2	4987	4968	19	30.2	YES	YES
11	1	1	1	11	1 1/2	1.59	0.0138	1.78	157		1.78	2.8	9.8	4987	4977	10	19.8	NO	YES
12	7	18	4	44	2 1/2	2.44	0.0325	3.02	717		1.30	9.3	30.3	4987	4968	19	49.3	YES	YES
13	3	3	2	22	1 1/2	1.59	0.0138	3.56	241		2.92	7.0	7.0	4976	4970	6	13.0	YES	YES
14	6	6	3	33	2	2.04	0.0227	3.24	300		1.82	5.5	5.5	4976	4973	3	8.5	YES	YES
15	2	11	4	44	2 1/2	2.44	0.0325	3.02	254		1.30	3.3	15.8	4976	4970	6	21.8	YES	YES
16	4	4	3	33	2	2.04	0.0227	3.24	274		1.82	5.0	5.0	4976	4967	9	14.0	YES	YES
17	2	17	4	44	2 1/2	2.44	0.0325	3.02	502		1.30	6.5	27.3	4976	4972	4	31.3	YES	YES
18	6	6	3	33	2	2.04	0.0227	3.24	759		1.82	13.8	13.8	4987	4968	19	32.8	YES	YES
19	6	6	3	33	2	2.04	0.0227	3.24	319		1.82	5.8	5.8	4987	4957	30	35.8	YES	YES
20	7	19	5	55	2 1/2	2.44	0.0325	3.77	1268		1.94	24.6	44.2	4987	4964	23	67.2	YES	YES
21	2	2	2	22	1 1/2	1.59	0.0138	3.56	318		2.92	9.3	9.3	4980	4958	22	31.3	YES	YES
22	1	22	5	55	2 1/2	2.44	0.0325	3.77	400		1.94	7.8	51.3	4980	4956	24	85.3	YES	YES
23	6	6	3	33	2	2.04	0.0227	3.24	667		1.82	12.1	12.1	4980	4937	43	55.1	YES	YES
24	5	33	6	66	3	3.02	0.0497	2.96	914		0.95	8.7	82.1	4980	4946	34	116.1	NO	YES
25	7	7	3	33	2	2.04	0.0227	3.24	733		1.82	13.3	13.3	4980	4938	42	55.3	YES	YES
26	4	44	6	66	3	3.02	0.0497	2.96	717		0.95	6.8	102.2	4980	4950	30	132.2	NO	YES
27	3	3	2	22	1 1/2	1.59	0.0138	3.56	424		2.92	12.4	12.4	4980	4961	19	31.4	YES	YES
28	5	52	7	77	3	3.02	0.0497	3.45	628		1.25	7.9	122.5	4980	4966	14	136.5	YES	YES
29	1	1	1	11	1 1/2	1.59	0.0138	1.78	70		1.78	1.2	1.2	5002	4943	59	60.2	NO	YES
30	3	3	2	22	1 1/2	1.59	0.0138	3.56	551		2.92	16.1	16.1	5002	4946	56	72.1	YES	YES
31	6	10	4	44	2 1/2	2.44	0.0325	3.02	775		1.30	10.1	27.4	5002	4957	45	72.4	YES	YES
32	4	4	3	33	2	2.04	0.0227	3.24	510		1.82	9.3	9.3	5002	4961	41	50.3	YES	YES
33	3	3	2	22	1 1/2	1.59	0.0138	3.56	366		2.92	10.7	10.7	5002	4971	31	41.7	YES	YES
34	3	10	4	44	2 1/2	2.44	0.0325	3.02	550		1.30	7.2	27.1	5002	4971	31	58.1	YES	YES
35	3	3	2	22	1 1/2	1.59	0.0138	3.56	289		2.92	8.4	8.4	4989	4964	25	33.4	YES	YES
36	3	3	2	22	1 1/2	1.59	0.0138	3.56	206		2.92	6.0	6.0	4989	4960	29	35.0	YES	YES
37	11	17	4	44	2 1/2	2.44	0.0325	3.02	1118		1.30	14.5	29.0	4989	4967	22	51.0	YES	YES
38	6	6	3	33	2	2.04	0.0227	3.24	625		1.82	11.4	11.4	5003	4966	37	48.4	YES	YES
39	5	5	3	33	2	2.04	0.0227	3.24	382		1.82	7.0	7.0	5003	4970	33	40.0	YES	YES

GRAVITY SEWER

Scenario: Peak

Gravity Pipe Report

Label	Upstream Node	Upstream Invert Elevation (ft)	Downstream Node	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	Bend Angle (degrees)	Length (ft)	Material	Section Size	Total Flow (gpd)	Design Capacity (gpd)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Depth In (ft)	Depth Out (ft)	Average Velocity (ft/s)
P-0	MH-1	4,965.10	LIFT STATIO	4,964.83	0.003434	0.00	78.63	PVC	8 inch	190,350.00	457,640.96	4,965.40	4,965.08	0.30	0.25	1.94
P-1	MH-2	4,966.33	MH-1	4,965.20	0.003392	90.00	333.09	PVC	8 inch	76,140.00	454,878.66	4,966.51	4,965.40	0.18	0.20	1.50
P-2	MH-3	4,966.75	MH-2	4,966.43	0.003384	3.59	94.57	PVC	8 inch	73,710.00	454,292.36	4,966.93	4,966.58	0.18	0.15	1.48
P-3	MH-4	4,967.10	MH-3	4,966.85	0.003404	6.37	73.45	PVC	8 inch	59,940.00	455,628.88	4,967.26	4,966.99	0.16	0.14	1.40
P-4	MH-5	4,967.73	MH-4	4,967.20	0.003412	8.68	155.33	PVC	8 inch	59,130.00	456,191.73	4,967.89	4,967.34	0.16	0.14	1.39
P-5	MH-6	4,974.39	MH-5	4,967.83	0.011952	5.90	548.84	PVC	8 inch	55,890.00	853,819.72	4,974.52	4,967.95	0.13	0.12	2.14
P-6	MH-7	4,975.68	MH-6	4,974.49	0.018976	3.80	62.71	PVC	8 inch	54,270.00	1,075,826.46	4,975.81	4,974.59	0.13	0.10	2.49
P-7	MH-8	4,978.33	MH-7	4,975.78	0.019844	18.98	128.50	PVC	8 inch	33,210.00	1,100,159.53	4,978.43	4,975.86	0.10	0.08	2.19
P-8	MH-9	4,980.76	MH-8	4,978.43	0.019741	23.10	118.03	PVC	8 inch	33,210.00	1,097,283.62	4,980.86	4,978.51	0.10	0.08	2.18
P-9	MH-10	4,989.66	MH-9	4,980.86	0.019705	10.78	446.58	PVC	8 inch	18,630.00	1,096,298.55	4,989.74	4,980.92	0.08	0.06	1.83
P-10	MH-11	4,991.86	MH-10	4,989.76	0.011003	20.89	190.86	PVC	8 inch	17,010.00	819,198.84	4,991.93	4,989.83	0.07	0.07	1.45
P-11	MH-12	4,992.49	MH-11	4,991.96	0.003422	0.00	154.86	PVC	8 inch	11,340.00	456,883.47	4,992.56	4,992.02	0.07	0.06	0.86
P-12	MH-13	4,993.41	MH-12	4,992.59	0.003386	20.85	242.19	PVC	8 inch	10,530.00	454,428.92	4,993.48	4,992.65	0.07	0.06	0.83
P-13	MH-14	4,994.00	MH-13	4,993.51	0.003399	7.18	144.15	PVC	8 inch	9,720.00	455,331.67	4,994.07	4,993.56	0.07	0.05	0.82
P-14	MH-15	4,994.63	MH-14	4,994.10	0.003399	18.10	155.92	PVC	8 inch	8,100.00	455,327.79	4,994.69	4,994.15	0.06	0.05	0.77
P-16	MH-16	4,989.81	MH-15	4,975.78	0.026093	81.49	537.70	PVC	8 inch	19,440.00	1,261,525.28	4,989.89	4,975.84	0.08	0.06	2.05
P-17	MH-17	4,992.93	MH-16	4,989.91	0.019853	11.63	152.12	PVC	8 inch	17,010.00	1,100,392.07	4,993.00	4,989.97	0.07	0.06	1.79
P-18	MH-18	4,993.60	MH-17	4,993.03	0.003373	15.54	169.00	PVC	8 inch	16,200.00	453,556.31	4,993.69	4,993.10	0.09	0.07	0.95
P-19	MH-19	5,002.37	MH-18	4,991.96	0.042843	90.00	242.98	PVC	8 inch	4,860.00	1,616,505.70	5,002.41	4,991.99	0.04	0.03	1.59
P-20	MH-20	5,002.83	MH-19	5,002.47	0.003428	11.94	105.01	PVC	8 inch	3,240.00	457,270.37	5,002.87	5,002.50	0.04	0.03	0.59
P-21	MH-21	5,003.29	MH-20	5,002.93	0.003428	28.41	105.01	PVC	8 inch	1,620.00	457,270.37	5,003.32	5,002.95	0.03	0.02	0.47
P-22	CO-2	5,004.02	MH-21	5,003.39	0.003883	11.94	162.23	PVC	8 inch	1,620.00	486,678.13	5,004.05	5,003.41	0.03	0.02	0.49
P-23	MH-23	4,969.66	MH-21	4,969.07	0.005023	90.00	117.45	PVC	8 inch	114,210.00	553,524.23	4,969.87	4,969.26	0.21	0.19	1.93
P-24	MH-24	4,971.64	MH-23	4,969.76	0.028245	87.47	66.56	PVC	8 inch	72,090.00	1,312,530.51	4,971.79	4,969.87	0.15	0.11	3.12
P-25	MH-25	4,977.15	MH-24	4,971.74	0.015184	2.37	356.30	PVC	8 inch	72,090.00	962,338.50	4,977.30	4,971.86	0.15	0.12	2.51
P-26	MH-26	4,979.73	MH-25	4,977.25	0.010355	90.00	239.49	PVC	8 inch	55,080.00	794,729.42	4,979.86	4,977.37	0.13	0.12	2.02
P-27	MH-27	4,981.83	MH-26	4,979.83	0.013084	1.82	153.09	PVC	8 inch	55,080.00	892,644.90	4,981.96	4,979.94	0.13	0.11	2.19
P-28	MH-28	4,982.96	MH-27	4,981.93	0.012793	0.00	80.51	PVC	8 inch	40,500.00	883,345.98	4,983.07	4,982.03	0.11	0.10	1.99
P-29	MH-29	4,984.90	MH-28	4,983.06	0.012259	6.10	150.09	PVC	8 inch	40,500.00	864,709.39	4,985.01	4,983.16	0.11	0.10	1.96
P-30	MH-30	4,985.51	MH-29	4,985.00	0.003398	12.20	150.09	PVC	8 inch	39,690.00	455,246.22	4,985.64	4,985.11	0.13	0.11	1.24
P-31	MH-31	4,985.97	MH-30	4,985.61	0.003429	10.37	105.00	PVC	8 inch	39,690.00	457,292.14	4,986.10	4,985.72	0.13	0.11	1.24
P-32	MH-32	4,986.58	MH-31	4,986.07	0.003391	10.37	150.40	PVC	8 inch	28,350.00	454,776.81	4,986.69	4,986.16	0.11	0.09	1.12
P-33	MH-33	4,986.87	MH-32	4,986.68	0.003362	6.68	56.51	PVC	8 inch	28,350.00	452,846.78	4,986.98	4,986.77	0.11	0.09	1.12
P-34	MH-34	4,991.02	MH-33	4,986.97	0.033075	90.00	122.45	PVC	8 inch	6,480.00	1,420,316.91	4,991.06	4,987.00	0.04	0.03	1.59
P-35	MH-35	4,991.41	MH-34	4,991.12	0.003466	11.72	83.67	PVC	8 inch	5,670.00	459,781.25	4,991.46	4,991.16	0.05	0.04	0.70

Scenario: Peak

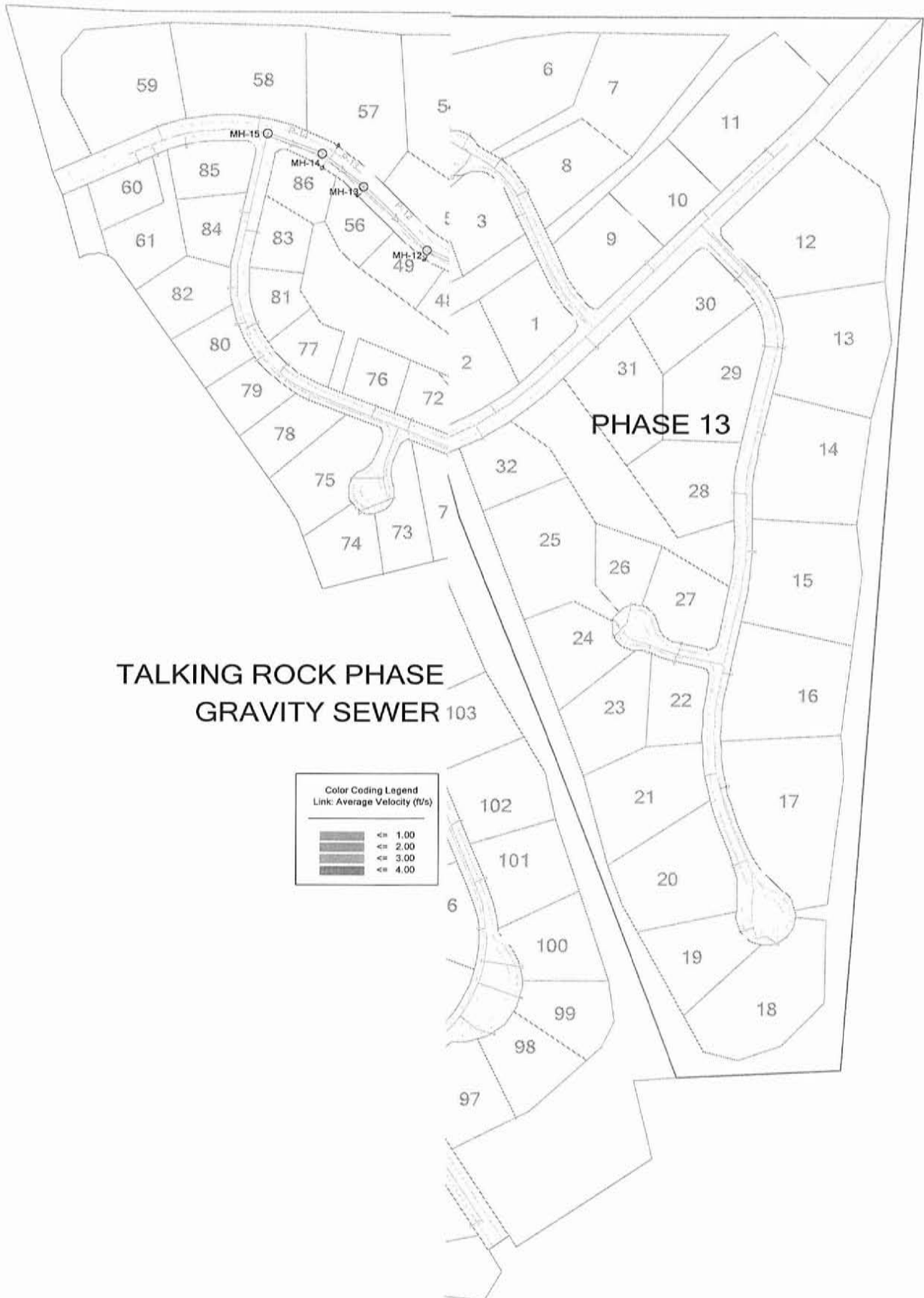
Gravity Pipe Report

Label	Upstream Node	Upstream Invert Elevation (ft)	Downstream Node	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	Bend Angle (degrees)	Length (ft)	Material	Section Size	Total Flow (gpd)	Design Capacity (gpd)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Depth In (ft)	Depth Out (ft)	Average Velocity (ft/s)
P-36	MH-36	4,991.99	MH-35	4,991.51	0.003418	11.72	140.42	PVC	8 inch	5,670.00	456,607.75	4,992.04	4,991.55	0.05	0.04	0.69
P-37	CO-1	4,992.73	MH-36	4,992.09	0.003412	22.30	187.55	PVC	8 inch	3,240.00	456,213.98	4,992.77	4,992.12	0.04	0.03	0.59

Scenario: Peak

Manhole Report

Label	Ground Elevation (ft)	Rim Elevation (ft)	Sump Elevation (ft)	Sanitary Load Type	Total Flow (gpd)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
CO-1	5,000.16	5,000.16	4,992.73	Base Load	3,240.00	4,992.77	4,992.77
CO-2	5,011.78	5,011.78	5,004.02	Base Load	1,620.00	5,004.05	5,004.05
MH-1	4,978.13	4,978.13	4,965.10	<None>	190,350.00	4,965.40	4,965.40
MH-2	4,976.49	4,976.49	4,966.33	Base Load	76,140.00	4,966.51	4,966.51
MH-3	4,976.25	4,976.25	4,966.75	Base Load	73,710.00	4,966.93	4,966.93
MH-4	4,976.23	4,976.23	4,967.10	Base Load	59,940.00	4,967.26	4,967.26
MH-5	4,976.67	4,976.67	4,967.73	Base Load	59,130.00	4,967.89	4,967.89
MH-6	4,983.54	4,983.54	4,974.39	Base Load	55,890.00	4,974.52	4,974.52
MH-7	4,984.88	4,984.88	4,975.68	Base Load	54,270.00	4,975.81	4,975.81
MH-8	4,987.82	4,987.82	4,978.33	<None>	33,210.00	4,978.43	4,978.43
MH-9	4,990.49	4,990.49	4,980.76	Base Load	33,210.00	4,980.86	4,980.86
MH-10	4,998.48	4,998.48	4,989.66	Base Load	18,630.00	4,989.74	4,989.74
MH-11	5,001.45	5,001.45	4,991.86	Base Load	17,010.00	4,991.93	4,991.93
MH-12	5,003.07	5,003.07	4,992.49	Base Load	11,340.00	4,992.56	4,992.56
MH-13	5,004.12	5,004.12	4,993.41	Base Load	10,530.00	4,993.48	4,993.48
MH-14	5,003.87	5,003.87	4,994.00	Base Load	9,720.00	4,994.07	4,994.07
MH-15	5,002.85	5,002.85	4,994.63	Base Load	8,100.00	4,994.69	4,994.69
MH-16	4,997.88	4,997.88	4,989.81	Base Load	19,440.00	4,989.89	4,989.89
MH-17	5,002.16	5,002.16	4,992.93	Base Load	17,010.00	4,993.00	4,993.00
MH-18	5,001.16	5,001.16	4,993.60	Base Load	16,200.00	4,993.69	4,993.69
MH-19	5,011.12	5,011.12	5,002.37	Base Load	4,860.00	5,002.41	5,002.41
MH-20	5,010.33	5,010.33	5,002.83	Base Load	3,240.00	5,002.87	5,002.87
MH-21	5,010.65	5,010.65	5,003.29	<None>	1,620.00	5,003.32	5,003.32
MH-23	4,979.14	4,979.14	4,969.66	Base Load	114,210.00	4,969.87	4,969.87
MH-24	4,980.79	4,980.79	4,971.64	<None>	72,090.00	4,971.79	4,971.79
MH-25	4,986.85	4,986.85	4,977.15	Base Load	72,090.00	4,977.30	4,977.30
MH-26	4,988.83	4,988.83	4,979.73	<None>	55,080.00	4,979.86	4,979.86
MH-27	4,990.88	4,990.88	4,981.83	Base Load	55,080.00	4,981.96	4,981.96
MH-28	4,991.96	4,991.96	4,982.96	<None>	40,500.00	4,983.07	4,983.07
MH-29	4,993.95	4,993.95	4,984.90	Base Load	40,500.00	4,985.01	4,985.01
MH-30	4,995.34	4,995.34	4,985.51	<None>	39,690.00	4,985.64	4,985.64
MH-31	4,995.75	4,995.75	4,985.97	Base Load	39,690.00	4,986.10	4,986.10
MH-32	4,995.55	4,995.55	4,986.58	<None>	28,350.00	4,986.69	4,986.69
MH-33	4,995.07	4,995.07	4,986.87	Base Load	28,350.00	4,986.98	4,986.98
MH-34	4,998.68	4,998.68	4,991.02	Base Load	6,480.00	4,991.06	4,991.06
MH-35	5,001.04	5,001.04	4,991.41	<None>	5,670.00	4,991.46	4,991.46
MH-36	5,001.14	5,001.14	4,991.99	Base Load	5,670.00	4,992.04	4,992.04



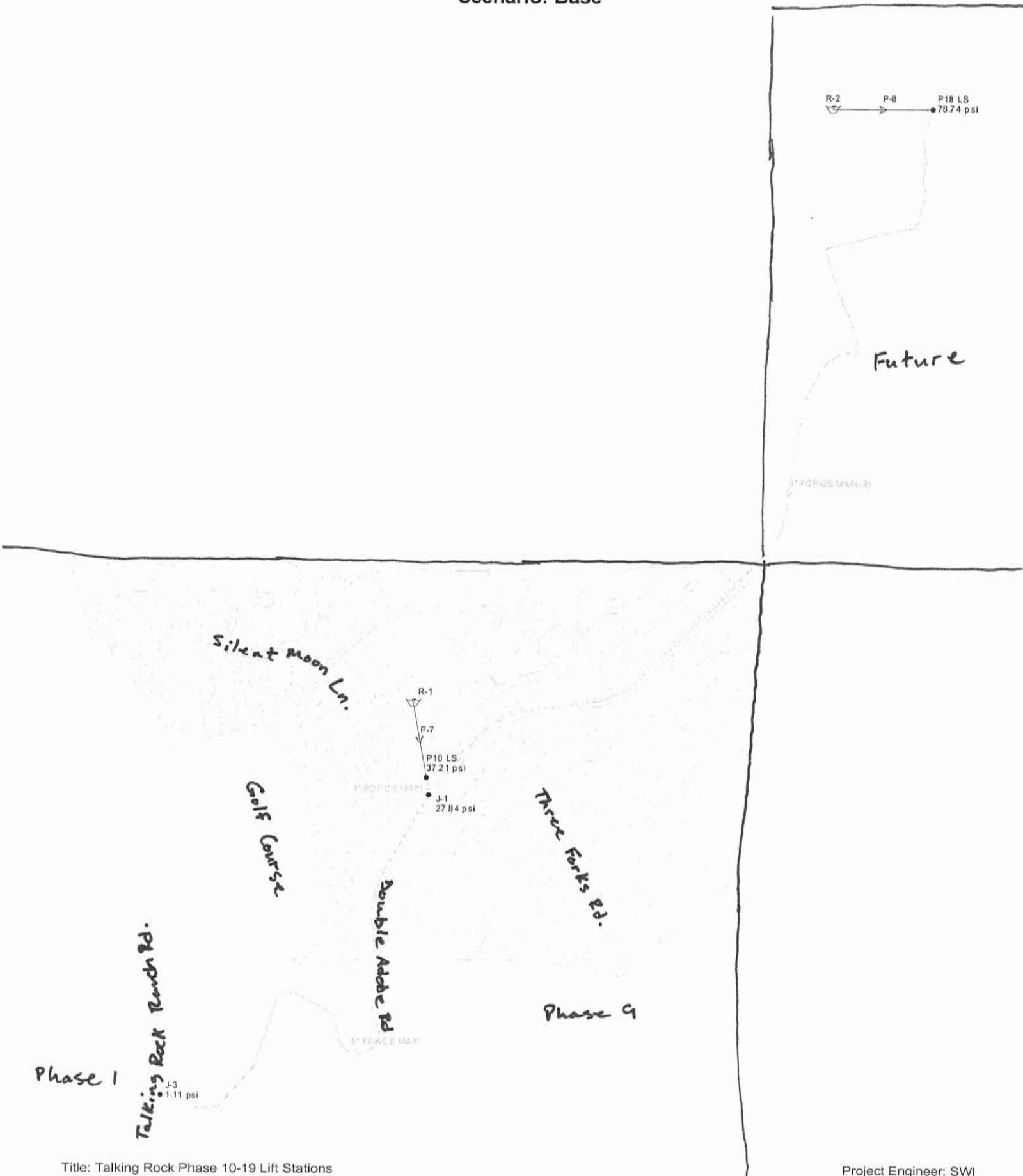
TALKING ROCK PHASE
GRAVITY SEWER

Color Coding Legend
Link: Average Velocity (ft/s)

[Pattern 1]	<= 1.00
[Pattern 2]	<= 2.00
[Pattern 3]	<= 3.00
[Pattern 4]	<= 4.00

SEWER FORCE MAINS

Scenario: Base



Scenario: Base
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand Calculated (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	4,973.00	Zone	Demand	0.00	Fixed	0.00	5,037.36	27.84
J-3	4,984.00	Zone	Demand	320.00	Fixed	320.00	4,986.55	1.11
P10 LS	4,956.00	Zone	Demand	0.00	Fixed	0.00	5,042.00	37.21
P18 LS	4,930.00	Zone	Demand	0.00	Fixed	0.00	5,112.00	78.74

**Scenario: Base
Steady State Analysis
Pipe Report**

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Initial Status	Discharge (gpm)	Velocity (ft/s)	Upstream Hydraulic Grade (ft)	Downstream Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	User Defined Length?
4" FORCE	176.00	4.06	PVC	130.0	Open	-204.84	5.08	5,037.36	5,042.00	4.64	26.38	false
4" FORCE	8,222.00	4.06	PVC	130.0	Open	-115.16	2.85	5,037.36	5,112.00	74.64	9.08	false
6" FORCE	4,954.00	5.84	PVC	130.0	Open	-320.00	3.83	4,986.55	5,037.36	50.80	10.26	false
P-7	1.00	24.00	PVC	150.0	Open	204.84	0.15	5,042.00	5,042.00	0.00	0.00	true
P-8	1.00	24.00	PVC	150.0	Open	115.16	0.08	5,112.00	5,112.00	0.00	0.00	true

APPENDIX C

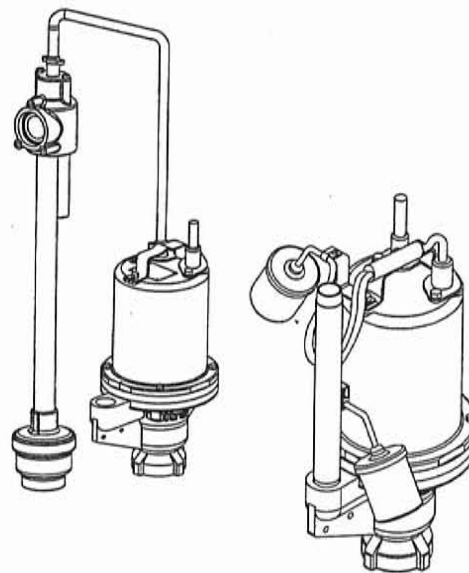
SEWER SYSTEM LAYOUT & ZONES

APPENDIX D

GRINDER PUMP DETAILS

Specifications:

DISCHARGE	1¼" NPT, Vertical
LIQUID TEMPERATURE	104°F (40°C) Continuous
MOTOR HOUSING	Cast Iron ASTM A-48, Class 30.
SEAL PLATE	Cast Iron ASTM A-48, Class 30.
SUCTION SPACER	Cast Iron ASTM A-48, Class 30.
SUCTION HOUSING	Cast Iron ASTM A-48, Class 30.
PUMP ROTOR	Hard chrome plated 400 series Stainless steel
PUMP STATOR:	
<i>Design</i>	Double Helix
<i>Material</i>	Buna-N
SHREDDING RING	Hardened 440C Stainless Steel Rockwell® C-55.
CUTTER	Hardened 440C Stainless Steel, Rockwell® C-55.
SHAFT	416 Stainless Steel
SQUARE RINGS	Buna-N
HARDWARE	300 Series Stainless Steel
PAINT	Air Dry Enamel.
SEAL:	
<i>Design</i>	Single Mechanical
<i>Material</i>	Rotating Faces - Carbon Stationary Faces - Ceramic Elastomer - Buna-N Hardware -300 Series Stainless
CORD ENTRY	15 ft. (4.5m) Std. Cord. Custom Molded Quick Connect, for Sealing and Strain Relief.
CORD <i>Automatic</i>	CSA/UL Approved 12/5 Type SOW
UPPER BEARING:	
<i>Design</i>	Single Row, Ball, Oil Lubricated
<i>Load</i>	Radial
LOWER BEARING:	
<i>Design</i>	Single Row, Ball, Oil Lubrication
<i>Load</i>	Radial & Thrust
MOTOR:	
<i>Design</i>	Oil-Filled, Squirrel Cage Induction
<i>Insulation</i>	Class B
<i>Type</i>	Permanent Split Capacitor (PSC) Includes overload Protection In the motor
LEVEL CONTROL:	
<i>AUF Series</i>	On/Off & Alarm wide angle, PVC Mechanical normally open, Integral to pump. Custom molded quick connect for sealing and strain relief
<i>AUE Series</i>	SOLD SEPARATELY (See Accessory Section F page 23) Model ESPS-150, Environmentally sealed pressure switch with CPVC housing, Buna diaphragm, Custom molded quick connect for sealing and strain relief
OPTIONAL EQUIPMENT	Seal Material, Additional cord, Moveable Fitting



Series: SGPC-AU 1HP, 1750RPM, 60Hz with Level Control



CSA 108 - File No. LR16567
UL 778
"AUF" series pump NOT UL or
CSA listed

NRTLIC

DESCRIPTION:

THE GRINDER PUMP IS DESIGNED TO
REDUCE DOMESTIC SEWAGE TO A FINELY
GROUND SLURRY.

Models SGPC-AU

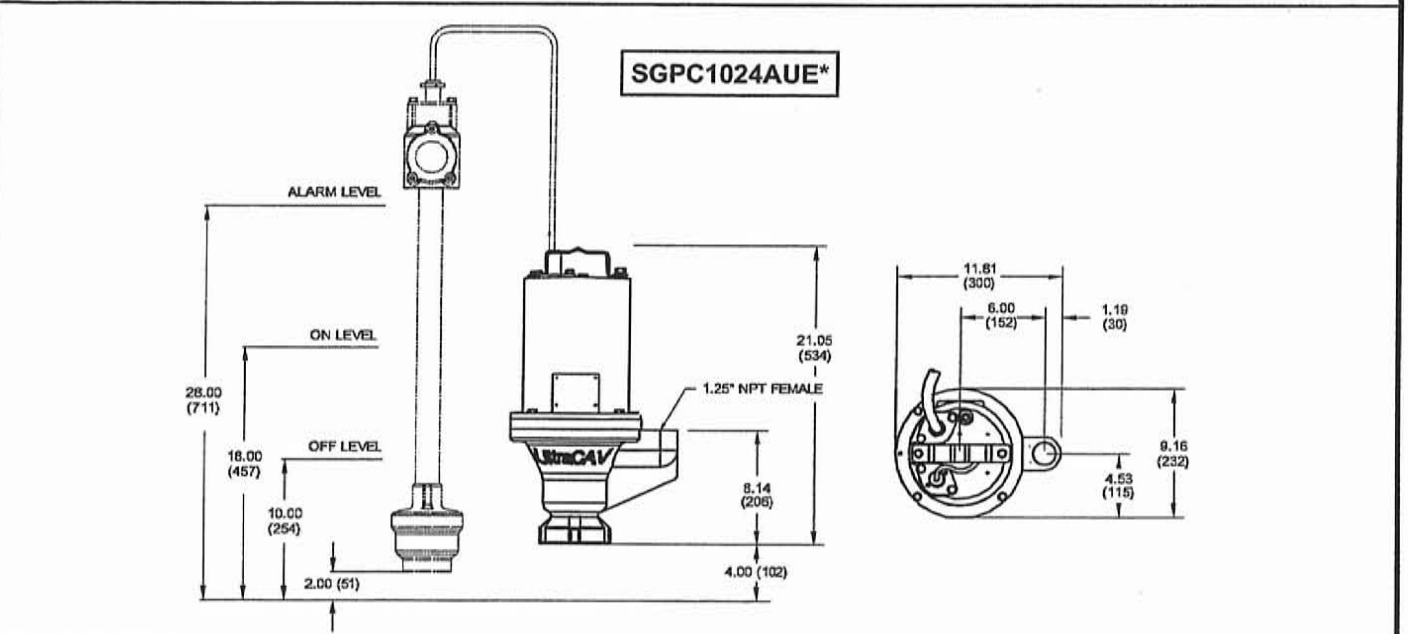
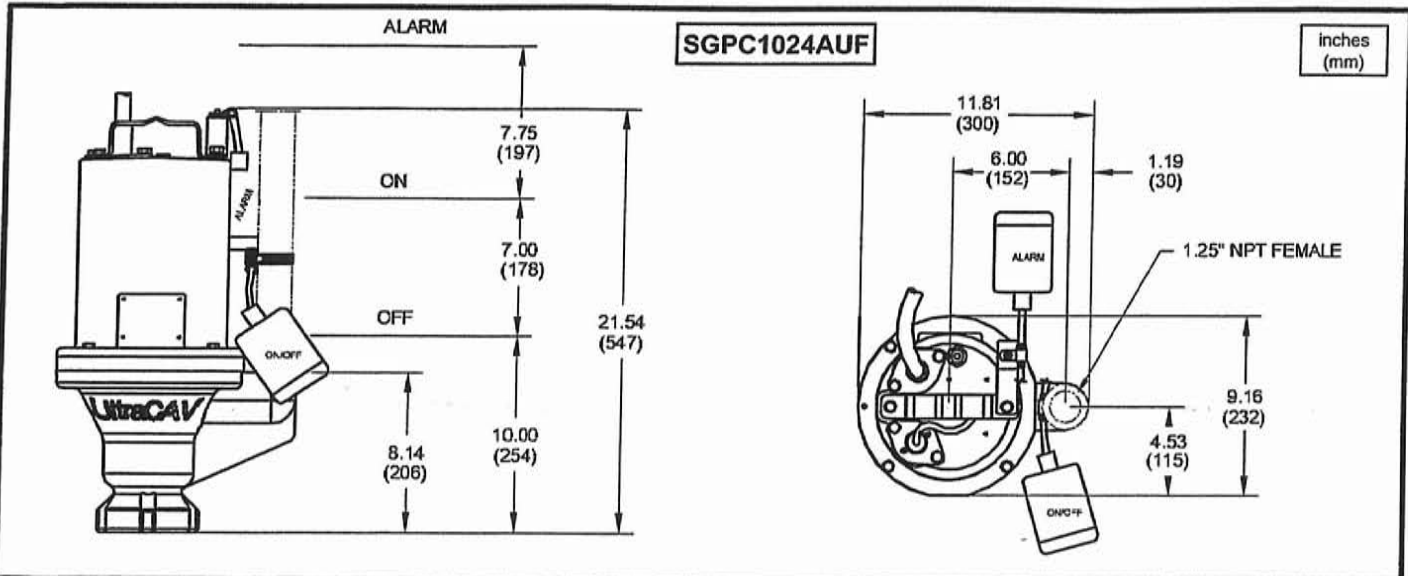
Progressing Cavity
with Level Control



www.cranepumps.com

Submersible Grinder Pumps

PS-014



MODEL NO	PART NO	HP	VOLT	PH/Hz	RPM (Nom)	NEMA START CODE	FULL LOAD AMPS	LOCKED ROTOR AMPS	CORD SIZE	CORD TYPE	CORD O.D. ± .02 (.5) in (mm)
SGPC1024AUF	116891	1	240	1 / 60	1750	D	9.2	17.5	12/5	SOW	.71 (18)
SGPC1024AUE*	116895	1	240	1 / 60	1750	D	9.2	17.5	12/5	SOW	.71 (18)

(*) ESPS Level Control Sold Separately, See Accessory Section F page 23.

IMPORTANT !

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

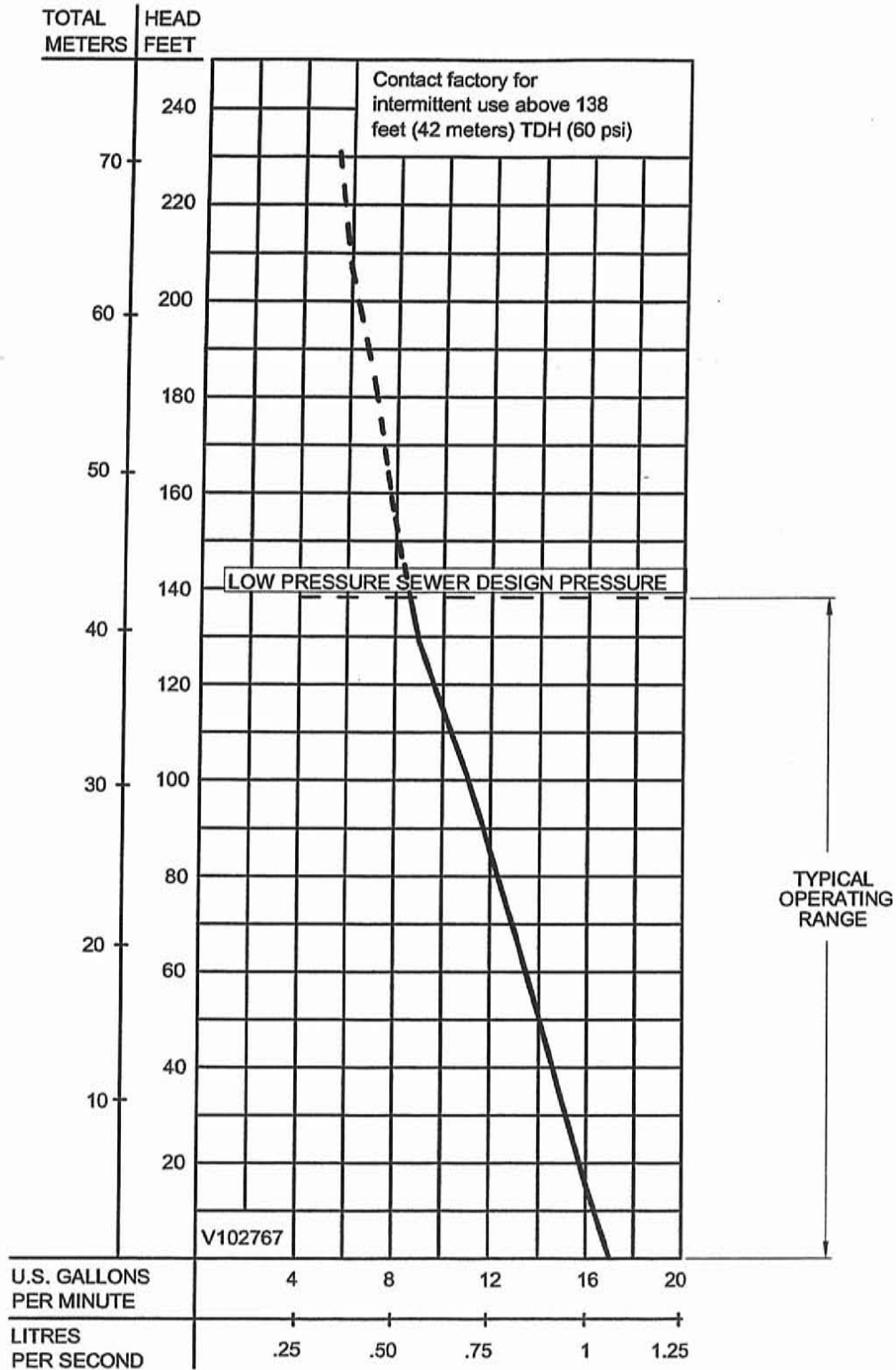
SECTION A
PAGE 30
DATE 11/03



A Crane Co. Company

PUMPS & SYSTEMS

USA: (937) 778-8947 • Canada: (905) 457-6223 • International: (937) 615-3598

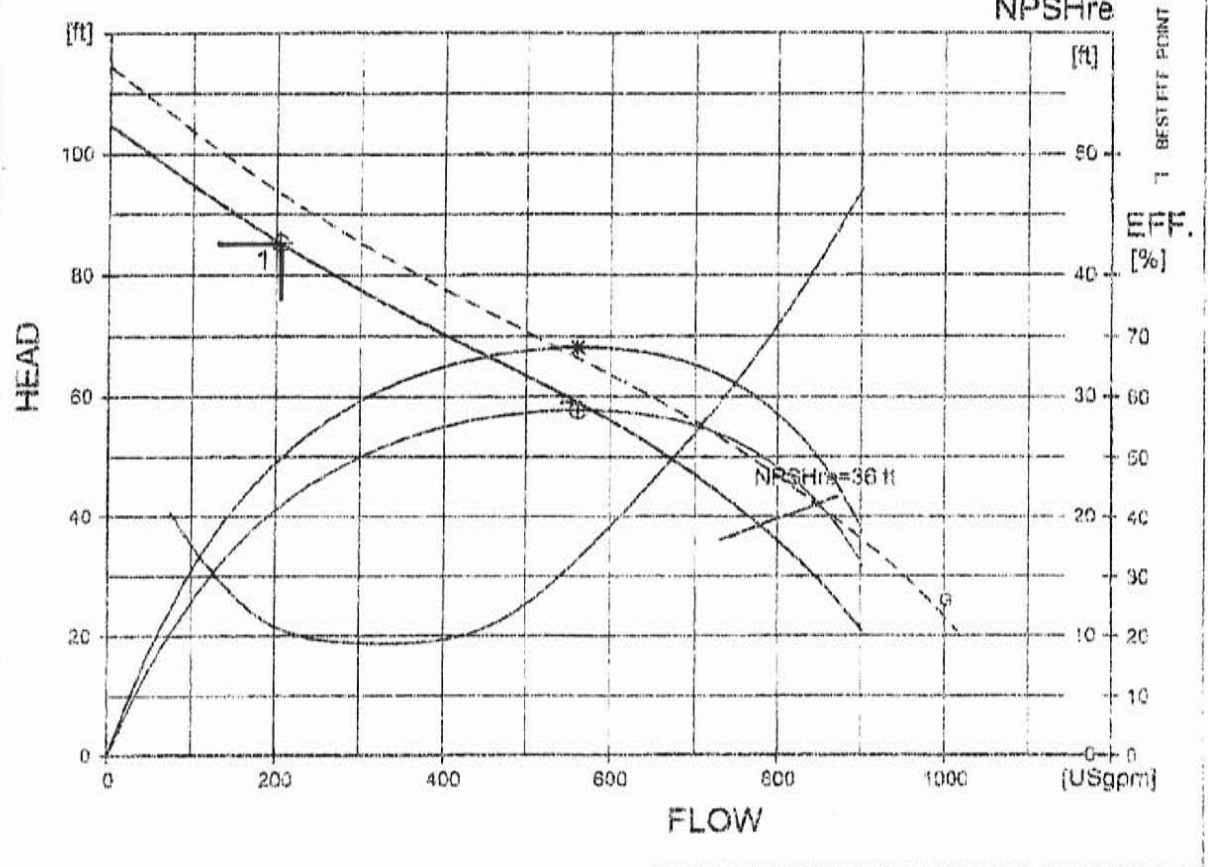
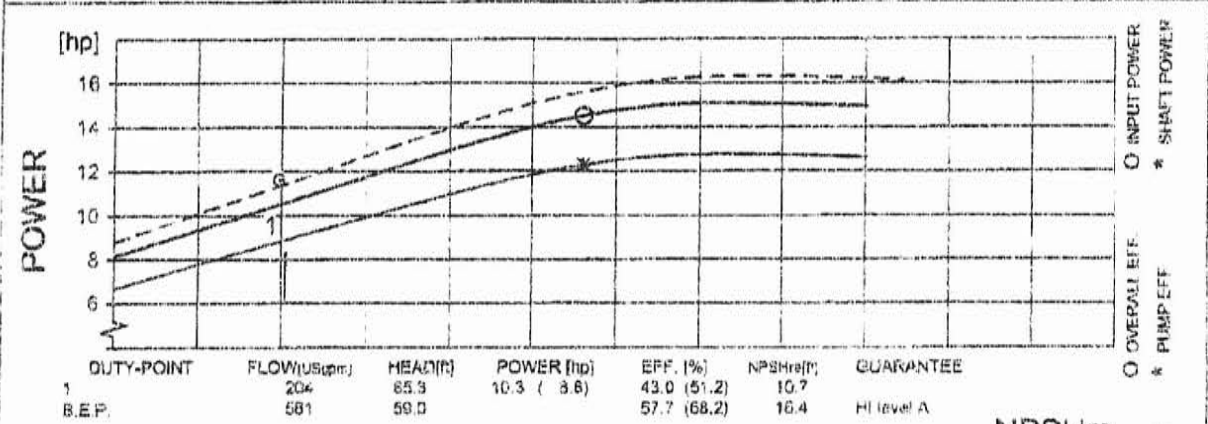


Testing is performed with water, specific gravity 1.0 @ 68° F @ (20°C), other fluids may vary performance

APPENDIX E

LIFT STATION DETAILS

FLYGT		PERFORMANCE CURVE			PRODUCT	TYPE
					CP3152.181	HT
DATE	PROJECT	CURVE NO			ISSUE	
2005-12-07		63-488-00-3855			2	
POWER FACTOR	1/4-LOAD	3/4-LOAD	1/2-LOAD	RATED POWER	15 hp	
	0.85	0.81	0.72	STARTING CURRENT	114 A	
EFFICIENCY	83.5 %	84.5 %	83.5 %	RATED CURRENT	20 A	
MOTOR DATA				RATED SPEED	1745 rpm	
COMMENTS	INLET/OUTLET			TOT.MOM.OF	FREQ.	PHASES
	- / 4 inch			INERTIA ...	60 Hz	3
	IMP. THROUGHLET			NO. OF	VOLTAGE	460 V
	3.0 inch			BLADES	1	POLES
				GEARTYPE	RATIO	

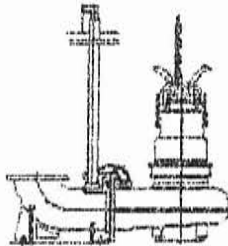


FLYPS3.1.2.0 (20050224)

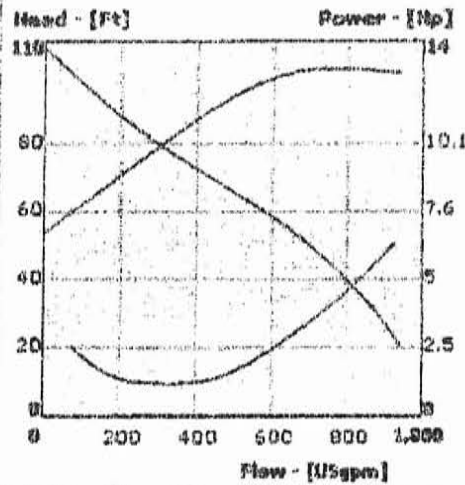
NPSH_{req} = NPSH3% + min. operational margin
 Performance with clear water and ambient temp 40 °C
 GUARANTEE BETWEEN LIMITS (G) ACC. TO
HI level A

PRODUCT: CP 3152 HT

Product picture



Curves Enlarge



Pump Data

Curve id: 63-488-00-3855 Impeller: 488 Poles: 4 - pole Motor: 25-15-4AA Frequency: 60 Hz

Motor Data

Rated output power Hp (kW)	Ø	Nominal voltage (V)	Full load current (A)	Locked rotor current (A)	Locked rotor kVA	Locked rotor code letter kVA/HP	Poles/rpm
20 (14.9)	3	460	26	142	113	G	4/1750
20 (14.9)	3	230	51	285	113	G	4/1750

Pump motor Hp	Efficiency			Power factor		
	100% load	75% load	50% load	100% load	75% load	50% load
20	87	87	86	0.84	0.79	0.69

Cable Data

HP	Cables	Volts	Max. length (ft)	Cable size/Nominal OD	Conductors (In one cable)	Type	Part number
20	1	230 460	170 570	#6/3-2-1-GC 1.22"-(31.0mm)	(3) 6 AWG (PWR) (2) 10 AWG (CTRL) (1) 8 AWG (GND) (1) 10 AWG (GC)	STD	942109

Available Discharge Connection Outlet Size

Outlet Drilled Flange 6", 4"

Warm Liquid Data

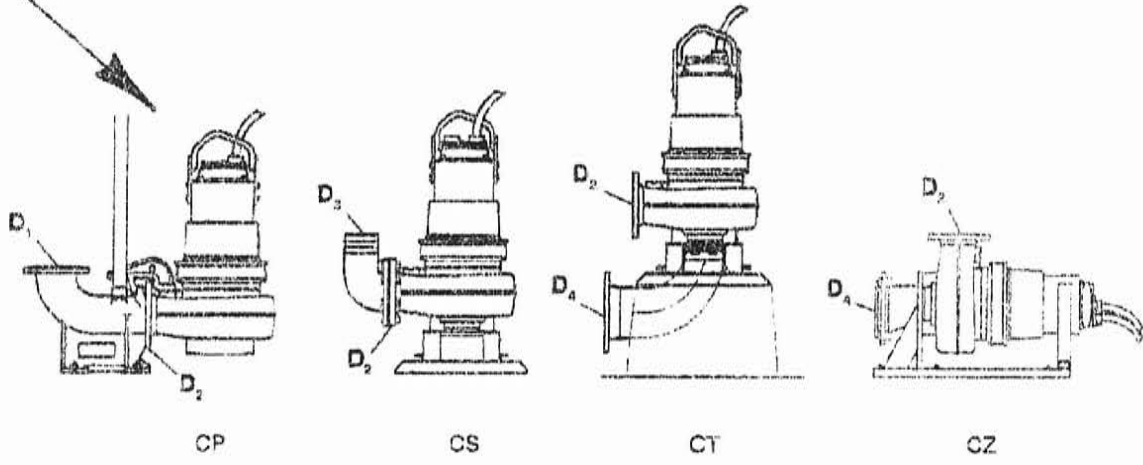
Rtd. Amb. Temp.	Rtd. Curr.(1)	Rtd. Curr.(2)	De-rated Shaft Power
70° C / 158° F	24 A	49 A	18.9 Hp
90° C / 194° F	19 A	39 A	14 Hp

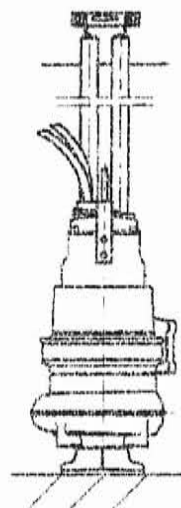
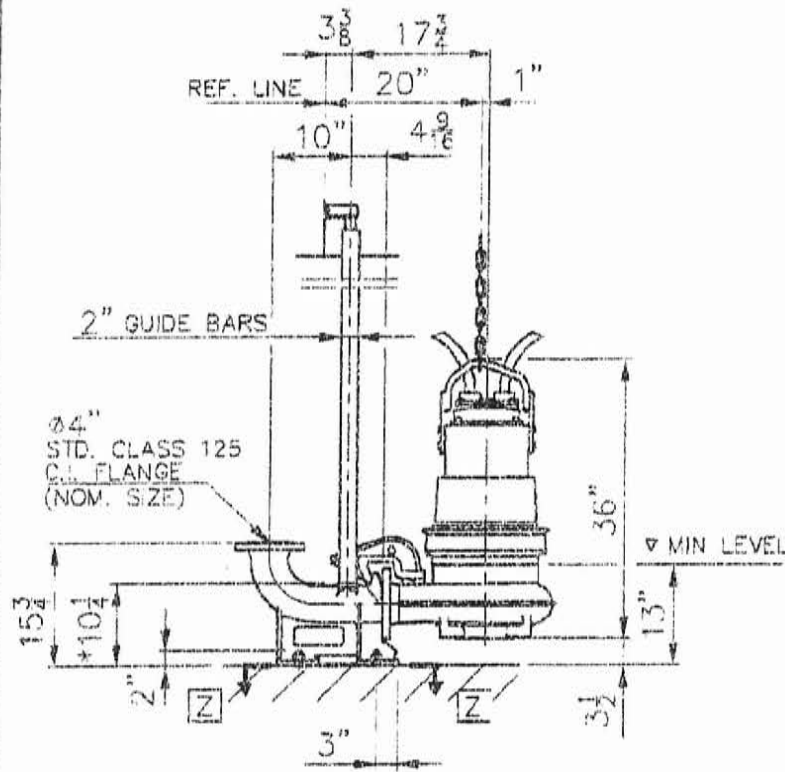
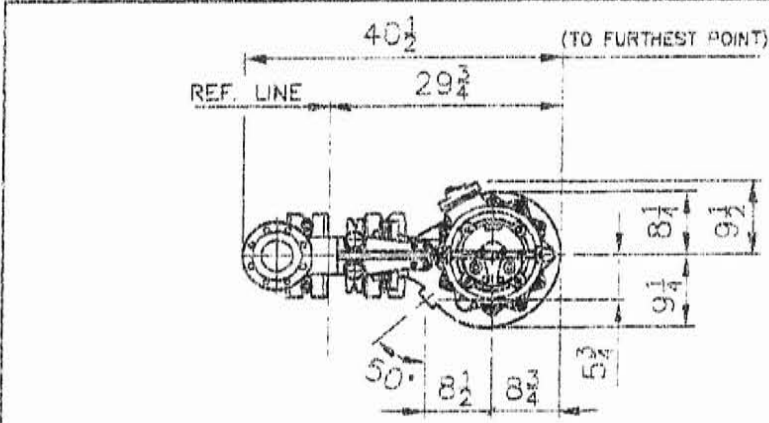
C-3152

 **Impeller/Motor/Nominal Sizes** Issued: 12/04 Supersedes: 11/00

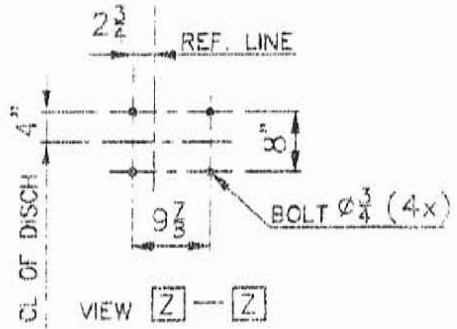
PUMP MODEL	IMPELLER CODE	HP RATING				VAC	D1	D2	D3	D4
		CP	CS	CT	CZ					
3152 3Ø	267 SH 268 SH 269 SH	23	--	23	23	200 230/460 575	4"	4"	--	6"
	432 MT 434 MT	20	20	20	20		8" or 8"	6"	8"	8"
	436 MT 452 HT	15 23	15 --	15 23	15 23		4" or 6"	4" or 6"	-- 8"	6"
	454 HT	20, 23	20, 23	20, 23	20, 23		4" or 6"	4" or 6"	8"	6"
	487 HT 488 HT	15, 20	15, 20	15, 20	15, 20		4" or 6"	4" or 6"	4" 6"	6"
	620 LT 622 LT 624 LT	14	14	14	14		10" or 12"	10"	10"	12"

LT= High volume MT= Standard HT= High Head SH= Super High Head





Ø4" STD. CLASS 125 C.I. FLANGE (NOM. SIZE)



* DIMENSION TO ENDS OF GUIDE BARS

Weight (lbs)	
Pump	Disch
600	80

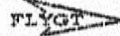
Dimensional drwg
CP 3152 S-H, H
4" / 4"

Drawn by: Kics
Checked by: JCC
Date: 8/20/23
Reg # 5399
539 17 00 C

AUTOCAD DRAWING

Generic Duplex Lift Station Layout

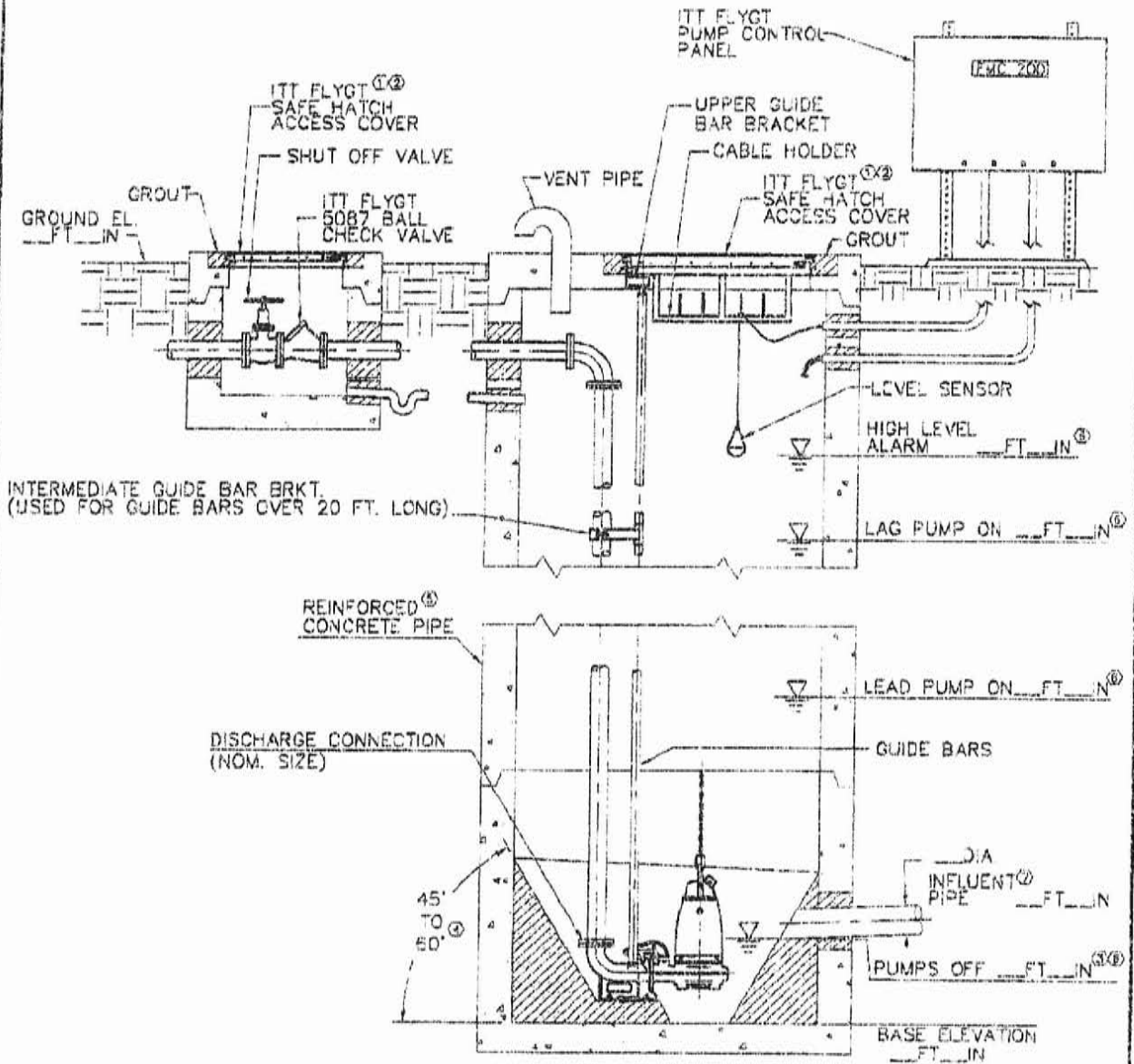
e-Catalog



Lift Station Guide Lines

Iss. loc: 9/05

Supersedes: 5/05

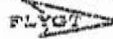


⊙ NOTES:

1. COVER SHOWN IS A STANDARD DUTY SAFE HATCH WITH ANGLE FRAME. FOR DIMENSIONS ON ACCESS COVERS WITH SAFE HATCH OR WITHOUT SAFE HATCH AS WELL AS HEAVY DUTY OR OTHER TYPES, CONSULT ITT FLYGT.
2. INSTALL ACCESS COVERS PER MANUFACTURER'S INSTRUCTIONS.
3. MIN. LIQUID LEVEL MUST NOT FALL BELOW TOP OF VOLUTE.
4. 60° RECOMMENDED.
5. OTHER MATERIALS AVAILABLE. CONSULT ITT FLYGT.
6. ITT FLYGT LIQUID LEVEL CONTROL MONITORING SYSTEM.
7. GOOD DESIGN PRACTICE DICTATES THAT INFLUENT PIPE ELEVATIONS HIGHER THAN LWL SHOULD BE AVOIDED DUE TO RISK OF AIR ENTRAINMENT, UNLESS SPECIAL ARRANGEMENTS ARE MADE.

CP-3152

e-Catalog



Lift Station Dimensions

Issued: 7/05

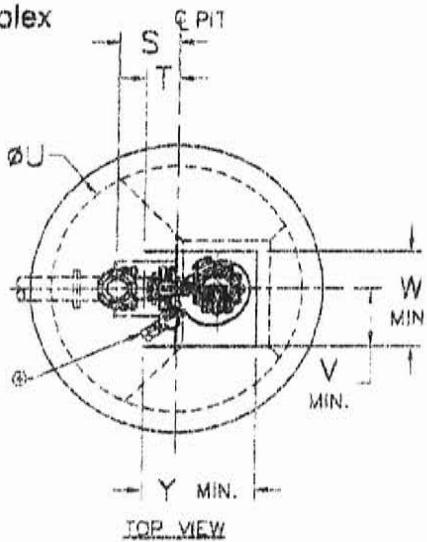
Supersedes: 5/05

NOTES:

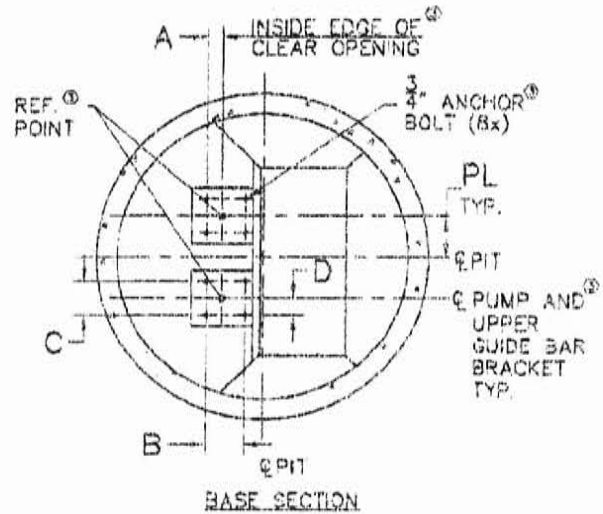
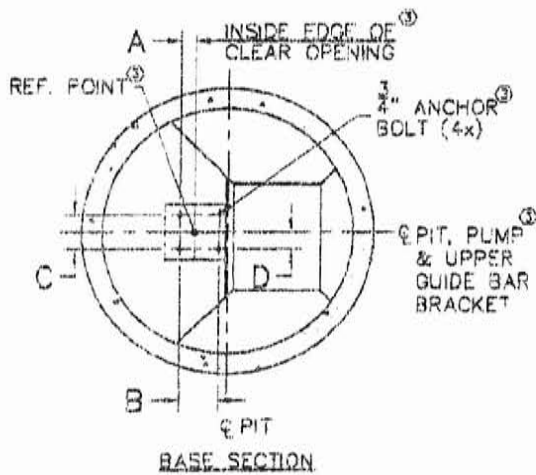
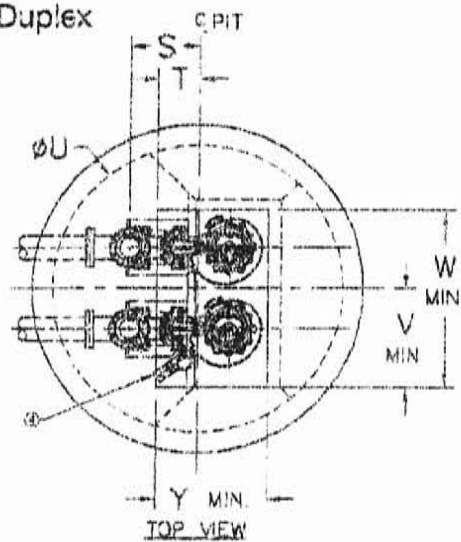
1. CONFIGURATION AND DIMS. SHOWN ARE SUGGESTED REQUIREMENTS ONLY. ALL DETAILS, INCLUDING SIZING OF PIT, TYPE, LOCATION AND ARRANGEMENT OF VALVES AND PIPING, ETC. ARE TO BE SPECIFIED BY THE CONSULTING ENGINEER AND ARE SUBJECT TO THEIR APPROVAL.
2. REFERENCE GENERIC DUPLEX LIFT STATION LAYOUT FOR ELEVATION VIEW.

3. LOCATE ANCHOR BOLTS USING INSIDE EDGE OF CLEAR OPENING AND PUMP CENTERLINE AS REFERENCE POINT. BOLT LOCATIONS MUST BE HELD TO MAINTAIN EXACT POSITION OF PUMP TO CLEAR OPENING.
4. ITT FLYGT MIX-FLUSH VALVE.

Simplex



Duplex



ALL DIMENSIONS ARE IN INCHES

NOM. SIZE	VERSION	SIMPLEX										DUPLEX						
		A	B	C	D	S	T	U	V	W	Y	S	T	U	PL	V	W	Y
4"	SH/HT	23	9 1/2	8	4	19 1/2	13 1/2	7 1/2	17	26	31	16 1/2	10 1/2	7 1/2	11	28	50	31
4"	HT	23	9 1/2	8	4	19 1/2	13 1/2	7 1/2	17	26	31	16 1/2	10 1/2	7 1/2	11	28	50	31
6"	HT	41	11	10	5	17	9 1/2	7 1/2	15	27	31	13 1/2	5 1/2	7 1/2	11	27	49	31
6"	MT	41	11	10	5	17	9 1/2	7 1/2	17	28	32	19 1/2	12	8 1/2	12	29	52	32
8"	MT	51	11	10	5	14 1/2	5 1/2	7 1/2	18	29	32	16 1/2	7 1/2	8 1/2	12	30	53	32
10"	LT	14 1/2	19 1/2	10	5	23 1/2	13	9 1/2	16 1/2	35 1/2	40	18 1/2	7 1/2	9 1/2	15	31 1/2	65 1/2	40
12"	LT	9 1/2	19 1/2	19 1/2	9 1/2	20 1/2	7	9 1/2	15 1/2	35 1/2	40	15 1/2	1 1/2	9 1/2	15	31 1/2	65	40

APPENDIX F

SEWER SERVICE AGREEMENT

YAVAPAI COUNTY ENVIRONMENTAL SERVICES
500 S MARINA STREET, PRESCOTT, AZ 86301

WATER SERVICE AGREEMENT AND SEWER SERVICE AGREEMENT
To be filled out and signed, where appropriate, and submitted with application.

WATER SERVICE AGREEMENT-An unconditional agreement which is effective this date has been made between the owners of:

TALKING ROCK

NAME OF SUBDIVISION

and the I.C.R. WATER USERS ASSOCIATION, Inc.
NAME OF PUBLIC WATER SUPPLY OR MUNICIPALITY

To provide water service to each and every lot in accordance with the design shown on the attached plats of the subdivision.

The undersigned hereby agrees to inspect this project during construction to assure compliance with plans and specifications approved by the Yavapai County Environmental Services (YCES), and upon completion shall be responsible for maintaining the system.

Date: _____ Name _____
TYPE OR PRINT SIGNATURE

Title _____

Address _____

City _____

SEWER SERVICE AGREEMENT- An unconditional agreement has been made between the owners of:

TALKING ROCK

NAME OF SUBDIVISION

and the I.C.R. SANITARY DISTRICT
NAME OF WASTEWATER AUTHORITY OR MUNICIPALITY

To provide sewer service to each and every lot in accordance with the design shown on the attached plats of the subdivision.

The undersign hereby agrees to inspect this project during the construction to assure compliance with plans and specifications approved by the Yavapai County Environmental Service (YCES), and upon completion shall be responsible for maintaining and operating the system.

Date: August 10 2005 Name DRYNE TAYLOR
TYPE OR PRINT SIGNATURE

Title BOARD CHAIRMEN

Address 5630 W. INSCRIPTION CANYON DR

City PRESCOTT AZ 86305

EXHIBITS

APPENDIX A

SITE MAP

APPENDIX B

SEWER ANALYSIS & MODELING RESULTS

APPENDIX C

SEWER SYSTEM LAYOUT & ZONES

APPENDIX D

GRINDER PUMP DETAILS

APPENDIX E

LIFT STATION DETAILS

APPENDIX F

SEWER SERVICE AGREEMENT