



# Water System Hydraulic Model Summary Report

*Prepared for:*  
City of Warrenton, Oregon



*Prepared by:*

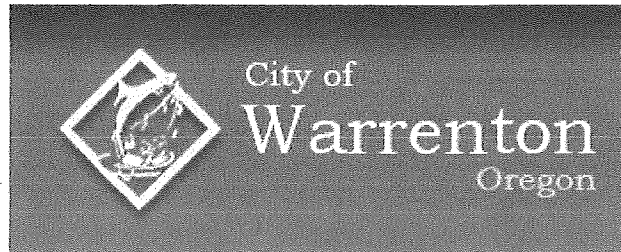
**WHPacific**

9755 SW Barnes Road  
Suite 300  
Portland, OR 97226  
503.626.0455 p  
503.526.0775 f  
[www.whpacific.com](http://www.whpacific.com)

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# WHPacific

9755 SW Barnes Road, Suite 300  
Portland, Oregon 97225  
503.626.0455

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- APPENDIX B..... SYSTEM CALIBRATION PLAN & DATA SUMMARY
- APPENDIX C..... MODEL OUTPUT



## ACRONYMS AND ABBREVIATIONS

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AD	Average Day Demand
AVE	Avenue
BBER	Bureau of Business and Economic Research
BLVD	Boulevard
DR	Drive
EPS	Extended Period Simulation
FT	Feet
GIS	Geographic Information System
GPCD	Gallons Per Capita per Day
GPM	Gallons per Minute
HGL	Hydraulic Grade Line
HR	Hour
IN	Inch
LN	Lane
MG	Million Gallon
MGD	Million Gallons per Day
PD	Peak Day Demand
PH	Peak Hour Demand
PRV	Pressure Reducing Valve
PSI	Pounds per Square Inch
R1	Reservoir #1
R2	Reservoir #2
R3	Reservoir #3
R4	Reservoir #4
RD	Road
S	Second
SCADA	Supervisory Control and Data Acquisition
ST	Street

## I. INTRODUCTION

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### A. OBJECTIVE AND OVERVIEW

The objective of this project is to develop a current system computer hydraulic model for the Warrenton water system. Previously a water system computer model was developed by CH2M Hill as a component of the 1997 Water System Master Plan (updated in 1998). Initially the intent was to utilize the previous computer model as a starting point and provide verification and update effort under this modeling project. The previous computer model however was not available for use; therefore this modeling effort was developed from the "ground floor up" in terms of inputting existing system information from the City provided record drawings (as-builts) and system operations personnel input.

Following development of the initial computer model pipe network, field flow testing was conducted and utilized to calibrate the computer model so that computer modeling results match the actual field flow conditions, as best as possible. Analyses will be then conducted under various system demand conditions to identify the ability of the system to perform acceptably based on fire protection & peak day flow requirements. For conditions where the system is not able to meet the desired service criteria, recommendations for system improvements/upgrades will be provided.

Following completion of the hydraulic model development and submittal of this summary report, the City will be provided a copy of the hydraulic modeling software for their use in updating and maintaining the model and for system analysis to support operations and capital program planning. Additionally, the data collected and used for development of this computer hydraulic model is also intended to provide a starting point for the City of Warrenton future development of a water system Asset Management Plan.

### B. AUTHORIZATION

This report represents the final submittal and summary presentation of the hydraulic analysis performed for the City of Warrenton water system. The work was authorized and is in compliance with the agreement dated November 12, 2009 between the City of Warrenton and WHPacific, Inc.

### C. FINAL REPORT PRESENTATION

This summary report is presented in a single volume. The report includes the body of the report text and Appendix A, Figures and Tables; Appendix B, System Calibration Testing and Results; and Appendix C, Model Output Data.

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#### D. EXISTING SYSTEM & SERVICE AREA OVERVIEW

The Warrenton water system receives its water supply from the Warrenton Water Treatment Plant (WTP) located at the far south end of the water transmission and distribution system. The treatment plant is supplied by several surface water sources. The current plant capacity is 6 MGD, and the plant was designed to accommodate a future easy expansion to 8 MGD by adding additional treatment module(s). For purposes of this hydraulic analysis there is no attempt to analyze or determine the adequacy of the water supply sources or the treatment facilities with respect to current and/or future water system supply requirements. A more in depth consideration of water supply sources, and the adequacy with respect to providing for future supply requirements would be addressed by a future Water System Master Plan, that would complement this hydraulic analysis.

Treated water is stored in an on-site 3.5 million gallon ground storage reservoir where it then feeds a system supply transmission line and pressure reducing valve (PRV). The transmission facilities downstream of the PRV provide the subsequent transport of water supply to system customers. System customers include providing bulk water supply to several smaller distribution systems, as well as to the metered service accounts, and City of Warrenton municipal facilities (many of which are not currently metered). No attempt is made to identify or analyze the distribution systems that are not operated or maintained by the City of Warrenton (ie Gearhart water distribution system).

The current Warrenton water system includes two reservoirs, the Clatsop Plains open reservoir and the Harbor Street ground storage tank (Blue Tank). Currently both reservoirs provide for water storage in the event of a fire. The Clatsop Plains reservoir is at an elevation such that it will not provide supply to the transmission/distribution system unless the system pressures drop to a level that will not occur unless there is a fire demand placed on the system. The Harbor Street tank is set to provide supplemental supply via booster pumps if the system pressures drop to a point indicating a fire event. The Clatsop Plains reservoir is scheduled to be abandoned after the new South Reservoir, currently under construction, is placed in service sometime in the spring of 2011. Additionally, the Harbor Street reservoir and booster pumps are scheduled to be abandoned in the short term future pending completion of some additional transmission line improvements. For these reasons, the system configuration and the analyses performed do not include either the Clatsop Plains reservoir or the Harbor Street reservoir, but do include the new South Reservoir.

It is not apparent that the Warrenton water system has a precisely defined service area. A review of Google Earth elevations suggests that the highest service elevation (not including the single property at the top of Perkins Road) is at approximately 92' located west of SW Ridge Road, south of SW 9<sup>th</sup> Street. The significant majority of services are below 50' in elevation. The implication of these existing system service elevations is that for all current service conditions other than during a possible fire event, the

Warrenton water system customers will realize very good service pressures. Fire protection considerations are presented and discussed in Section IV of this summary report.

It is recommended that the City of Warrenton consider defining a formal service area boundary, to be defined in part by a maximum elevation such that acceptable service pressures are provided to all system customers.

## II. POPULATION PROJECTIONS AND SYSTEM DEMANDS

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### A. METERING RECORDS

WHPacific was able to obtain billing records from the City of Warrenton from August 2008 to July 2010. This information was received in PDF format. WHPacific converted this information into an excel format that could be utilized to both import addresses into the GIS database and also calculate an average demand for each meter contained within the billing report.

Once information was converted to a workable Excel file, the monthly consumption for each meter was determined. While most of the records provided information for all 24 months, there were some that did not and needed an adjustment to obtain a correct average demand. If a meter was out of service or the account had been suspended or cancelled, a zero reading was placed for those months. If an account had a negative or zero consumption for a particular month, then the average of all positive consumption for that record over the 24 month period was input for that particular month.

Table II-1 lists the highest demand water users for the Warrenton water system.

**TABLE II-1. WARRENTON HIGH DEMAND WATER USERS**

User	Average Demand (gpm)	Total Average Consumption per month (gallons)
City of Gearhart	192.71	8,325,000
Pacific Coast Seafood	107.38	4,639,000
Warrenton Lumber Co.	31.02	1,340,000
Fort Stevens State Park	19.06	823,500
Oregon Military Department	16.25	702,000
Bio - Oregon	14.57	629,500
Point Adams Packing	10.52	454,500
Glenwood Village	10.22	441,500

Once the average demands were calculated for each meter, the meters locations were imported into GIS and loaded into the model. Water meter locations for the City of

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Warrenton can be seen on Figure II-2. Loading demands into the model in this manner provides for a realistic and accurate geographic distribution of system demands.

**B. POPULATION ESTIMATES USING CENSUS BLOCKS**

Census blocks for North West Oregon were obtained from the U.S. Census website. The census blocks contained total population for each Census Block. Census Blocks in the vicinity of the City of Warrenton are illustrated by Figure II-1. The census blocks and the water service area boundaries do not align exactly with each other; therefore to just include users of the Warrenton System, the metering records were utilized. It was assumed that if a meter location was within a census block then the current population of the entire census block would be served by the Warrenton water distribution system. This is illustrated by Figure II-2. On this basis, the estimated service area population for year 2000 is 6,269. The City of Warrenton’s Comprehensive plan calls out a population growth rate of 1.8%; which is the basis for calculating future population estimates. These population estimates are provided in Table II-2.

**TABLE II-2. POPULATION ESTIMATES**

<b>Year</b>	<b>Census Block Estimate of City of Warrenton Water Distribution System Population</b>	<b>City of Warrenton Population Calculated in Comprehensive Plan</b>
2000	6,269	4,096
2006	6,977	4,503
2010	7,493	-
2015	8,192	-
2017	8,490	5,449
2020	8,957	-
2025	9,792	-
2027	10,148	6,481
2030	10,706	-

It needs to be noted that the population estimates for Warrenton provided by the referenced comprehensive plan are less than the above estimated water distribution system service populations. This is largely explained by the fact that the Warrenton

water system serves significant areas outside the City limits of Warrenton; including Gearhart.

**C. AVERAGE DAY DEMAND**

Based on the estimated population served and known water use, average day per capita demands can be calculated.

WHPacific obtained two years worth of Water Treatment Plant production totals from August 2008 to July 2010. This data was entered into an excel spreadsheet and total annual water production for two years was calculated. For purposes of this hydraulic modeling effort the two years are defined as follows:

- 2009: August 2008 to July 2009, and
- 2010: August 2009 to July 2010.

Average Day Demands were calculated by dividing the total annual water production of the Water Treatment Plant by 365 days. Table II-3 presents a summary of the average day production for the last two years.

**TABLE II-3. SUMMARY OF AVERAGE DAY DEMAND**

	<b>YR 2009</b>	<b>YR 2010</b>	<b>AVERAGE</b>
Average Day Demand	1.86 MG	1.77 MG	1.82 MG

Currently the water stored in the Clatsop Plains reservoir and the Harbor Drive Reservoir is not provided to the distribution system on a daily basis, but rather is utilized solely as emergency fire protection storage. The City maintains a constant flow through these reservoirs in order to maintain acceptable water quality for this stored water in the event that there is a fire and the water enters the distribution system. This "quality maintenance water" is then allowed to overflow and drain, so there is no additional beneficial use of this water; and therefore it does not represent a normal system demand. Since the Clatsop Plains Reservoir will be taken out of service with the construction of the new South Reservoir and the Harbor St. Tank will also be taken off-line soon; average day demands will therefore be calculated with this known water loss subtracted from the total (measured by Warrenton staff as 360,000 gallons per day). Table II-4 presents the revised average day demand.

**TABLE II-4. SUMMARY OF AVERAGE DAY DEMAND MINUS WATER LOSS AT RESERVOIRS**

	YR 2009	YR 2010	AVERAGE
Average Day Demand	1.50 MG	1.41 MG	1.46 MG

The average per capita demand was calculated for the base year of 2010 by averaging the Water Treatment Plant production totals for the years 2009 to 2010 as seen in Table II-4 and dividing by the total population projection for the year 2010. Table II-5 below presents the resulting average per capita daily demand for the base year 2010 that will be utilized for the system hydraulic modeling.

**TABLE II-5. SUMMARY OF AVERAGE PER CAPITA DAILY CONSUMPTION**

Year	Average Per Capita Demand (GPCD)
2010	194.85 [195 gpcd rounded]

**D. PEAK DAY DEMAND**

WHPacific received SCADA System Data printouts from September 2008 to October 2009 showing outflow from the Treatment Plant in fifteen minute time increments.

For determination of estimated Peak Day production WHPacific utilized a total of five days that looked to have the highest outflow based on SCADA records. These five days became the basis for the diurnal demand profile calculation and was used to compute estimated peak hour demands.

WHPacific also obtained daily production records and monthly consumption records from the City of Warrenton from August 2008 to July 2010. These production and consumption records became the basis for computing the peak day demands and were utilized in computing peak day and peak hour peaking factors.

All water supply enters the Warrenton System from the Treatment Plant. As previously noted, the Clatsop Plains reservoir and the Harbor St. tank overflow continuously, losing 360,000 gpd. To obtain a more realistic consumption number, the water loss at these two reservoirs was subtracted from the total production total. Production totals minus water loss at the two reservoirs for two years worth of record is illustrated by Figure II-3. Figure II-3 illustrates several peak days during the two years of record. The five highest production dates are shown with July 2, 2009 as the highest Peak Day. Peak Day data is summarized in Table II-6.



**TABLE II-6. PEAK DAY PRODUCTION**

Date	Production (gpm)	Production (mgd)	Comments
September 25, 2008	1,944	2.80	
<b>July 2, 2009</b>	<b>2,076</b>	<b>2.99</b>	<b>Peak Day Production</b>
July 3, 2009	1,972	2.84	
July 4, 2009	1,979	2.85	
July 5, 2009	1,868	2.69	

#### E. DIURNAL DEMAND PROFILE DEVELOPMENT

To calculate the system diurnal demand profile, WHPacific utilized SCADA records of the production leaving the Water Treatment Plant. SCADA records were provided for 5 total days. Each day of record was looked at on a basis of 15 minute increments and averaged together to produce the system diurnal demand profile. The diurnal demand profile trend shows that Warrenton exhibits a morning peak at 7am followed by a drop in demand over the course of the day before another peak that occurs between 7 and 9 pm. The diurnal demand profiles for August 10, 2008, June 26, 2009, July 20, 2009, July 27, 2009, and July 28, 2009 are shown on Figures II-4, II-5, II-6, II-7, and II-8. The average diurnal demand pattern is presented on Figure II-9.

This final profile pattern was further normalized and then adjusted to fit the Peak Day Demand consumption rate calculated for July 2, 2009. The resulting Diurnal Demand Profile includes Peak Hour Demand magnitudes and allows calculations for determining Peak Day to Average Day peaking factor (2.05) and the Peak Hour to Average Day peaking factor (2.99).

#### F. CURRENT AND FUTURE DEMANDS 2010-2030 WITH CALCULATED PEAKING FACTORS

Table II-7 below presents the existing and future Average Day (AD), Peak Day (PD), and Peak Hour (PH) demands, and selected peaking factors that will be utilized in the City of Warrenton Hydraulic Model.

**TABLE II-7. EXISTING AND FUTURE AD, PD, PH DEMANDS AND PEAKING FACTORS**

<b>Year</b>	<b>Average Day Demand (AD) [gpm, mgd]</b>	<b>Peak Day Demand (ADx2.05=PD) [gpm, mgd]</b>	<b>Peak Day to Average Day Peaking Factor (PD/AD)</b>	<b>Peak Hour Demand (ADx2.99=PH) [gpm, mgd]</b>	<b>Peak Hour to Average Day Peaking Factor (PH/AD)</b>
2009	1,014; <b>1.46</b>	2,076; <b>2.99</b>	2.05	3,035; <b>4.37</b>	2.99
2010	1,032; <b>1.49</b>	2,118; <b>3.05</b>	2.05	3,097; <b>4.46</b>	2.99
2015	1,129; <b>1.63</b>	2,319; <b>3.34</b>	2.05	3,382; <b>4.87</b>	2.99
2020	1,234; <b>1.78</b>	2,535; <b>3.65</b>	2.05	3,694; <b>5.32</b>	2.99
2025	1,349; <b>1.94</b>	2,764; <b>3.98</b>	2.05	4,028; <b>5.80</b>	2.99
2030	1,475; <b>2.12</b>	3,021; <b>4.35</b>	2.05	4,403; <b>6.34</b>	2.99

### III. MAPPING, GIS DATABASE AND HYDRAULIC MODEL DEVELOPMENT

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#### A. INTRODUCTION

WHPacific used H2OMap Water hydraulic modeling software, published by MWH Soft for this hydraulic model. The following paragraphs describe the data development and process for integrating into the water model.

#### B. HYDRAULIC MODEL DEVELOPMENT

##### 1. System As-Built Verification

The City of Warrenton provided as-built information and the 1998 Water Master Plan for identification of pipes within their system. WHPacific incorporated this information and also marked up maps with additional information during a couple of sit down sessions with City staff. A GIS database has been prepared for the available system pipeline information and will be provided to the City as a separate project deliverable. It is recommended that the City update this database as new system information becomes available; and that any changes or updates are incorporated into the hydraulic model to keep it up to date.

##### 2. Base Mapping

Aerial photography was obtained from the USDA for the entire area of Clatsop County. This aerial photography was in the NAD\_83 State Plane Oregon North projection and was utilized as the base mapping for the hydraulic model. Pipes obtained from as-built information were rectified to street locations utilizing this base mapping.

##### 3. GIS Database

Contour information, roadway names, and census block information was obtained from the USGS and utilized in the hydraulic model. The contour information was utilized to assign elevations to the pipes, the roadway names was utilized to help identify locations of provided as-built information and the Census block information was utilized to calculate system per capita demands.

The as-built information, base mapping, and GIS database information was utilized to create the City of Warrenton system schematic presented by Figure III-1. This figure provides a geographic location of all system facilities and the current system service area. Elevation information for the water system facilities is illustrated by the City of Warrenton Water System Schematic presented by Figure III-2. This figure also suggests realistic elevation limitations for the Warrenton water system service area.

## C. HYDRAULIC MODEL CALIBRATION

### 1. Calibration Plan and Testing

With input from City staff, WHPacific developed the plan for water system calibration testing. A copy of the calibration plan is included in Appendix B for reference.

WHPacific conducted calibration testing during the night and early morning hours of October 27<sup>th</sup> and 28<sup>th</sup>, 2010. The tests were conducted to obtain system flow rates and pressure data to calibrate the hydraulic model. The testing included 6 flow testing stations throughout the system where a fire hydrant was opened to place a demand on the system and the flow rate was measured for both the 2-1/2" hose connection and the 4-1/2" steamer connection. During flow testing, static and residual pressures were monitored and simultaneously recorded at 10 fire hydrant locations; 5 locations with digital pressure recorders and 5 manned with City and WHPacific staff distributed throughout the system. Flow rates were measured with a hand-held pitot gage equipped with a glycerin filled pressure gage. Testing locations are shown on Appendix B, Figure 1 included with the Calibration Plan.

### 2. Calibration Methodology

The methodology utilized to calibrate the hydraulic model consisted of adjusting the overall system demand in the model to match the actual demand determined for the system during the testing period, adjusting the model PRV setting to match readings recorded during testing, loading the model with the flow testing and pressure monitoring station locations, and running hydraulic simulations to duplicate the field test conditions with the model. Model results for the test simulations were evaluated against the measured pressures at the test pressure locations. The model was then fine-tuned so that the modeled and field measured residual pressures matched as closely as could be reasonably achieved.

During calibration, the model was adjusted to simulate field conditions by closing pipes to simulate closed valves, and varying pipe diameters & friction C-factors to increase or decrease headloss for a particular section of pipe. In some instances, model demands were strategically increased at a particular point to simulate potential pipeline leaks. Model calibration for a particular test was considered complete when the predicted model pressure was within 5 psi +/- of the field observations. While most locations were able to meet the criteria, some tests were not able to meet the 5 psi +/- calibration criteria likely due to less than desirable test conditions.

It must be noted that the Harbor Street tank was intended to be shut off from the system during the period of the calibration testing. Subsequent to the calibration test it was discovered that the Harbor Street tank isolation from the system did not happen; with the resulting consequence that hydraulic model calibration is more challenging and

less accurate.

### 3. Test Alpha

Test Alpha, located on Manion Dr. and Malarkey Ln, had measured flow rates of 1,036 gpm and 1,537 gpm for the hose and steamer connections respectively. An adjacent fire hydrant was pressure test station Golf. As shown on Appendix B, Figure 2. WHPacific recommends that the City verify the valve status within the adjacent residential neighborhood and also recommends that the City check for potential leak near the pressure test station Golf. These actions were simulated in the model to facilitate a reasonable calibration. It was determined from City Staff that the pump at the Harbor St. Tank turned on during the calibration testing and recorded a run time of 30 minutes. However, the exact time this pump turned on cannot be determined. WHPacific attempted to mimic this pump and Test Alpha results indicate that the pumps did not start during this test. Final calibration results are within  $\pm 7$  psi of field measurements as shown in Table III-1.

**TABLE III-1 – CALIBRATION RESULTS FOR TEST ALPHA**

Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
ALPHA – STATIC	GOLF	74	78	+4	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	64	70	+6	12" line on SW 9th Ave Closed in model
	INDIAN	91	89	-2	pump at Harbor St. is not flowing
	JULIET	88	87	-1	pump at Harbor St. is not flowing
	KILO	72	77	+5	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	86	87	+1	pump at Harbor St. is not flowing
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	69	72	+3	
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	89	85	-4	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	86	87	+1	
	WARRENTON PRV PRESSURE RECORDER	92	92	0	

Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
ALPHA – FLOW 1 (1,036 GPM)	GOLF	52	49	-3	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	62	63	+1	12" line on SW 9th Ave Closed in model
	INDIAN	89	82	-7	pump at Harbor St. is not flowing
	JULIET	85	80	-5	pump at Harbor St. is not flowing
	KILO	70	70	0	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	84	81	-3	pump at Harbor St. is not flowing
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	67	65	-2	
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	85	79	-6	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	85	84	-1	
	WARRENTON PRV PRESSURE RECORDER	92	92	0	
ALPHA – FLOW 2 (1,537 GPM)	GOLF	28	32	+4	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	54	59	+5	12" line on SW 9th Ave Closed in model
	INDIAN	82	78	-4	pump at Harbor St. is not flowing
	JULIET	79	77	-2	pump at Harbor St. is not flowing
	KILO	64	66	+2	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	78	77	-1	pump at Harbor St. is not flowing
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	62	61	-1	

Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	79	75	-4	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	82	82	0	
	WARRENTON PRV PRESSURE RECORDER	92	92	0	

#### 4. Test Bravo

Test Bravo, located on Ridge Rd. and SW Long Lake Dr., had measured flow rates of 1,062 gpm and 1,440 gpm for the hose and steamer connections respectively. An adjacent fire hydrant was pressure test station Hotel. As illustrated by Appendix B, Figure 3. WHPacific recommends that the City verify the status of valves along SW 9<sup>th</sup> St. It was necessary to close this line in the model to facilitate a reasonable calibration. Additionally, it was determined from City Staff that the pump at the Harbor St. Tank turned on during the calibration testing and recorded a run time of 30 minutes. However, the exact time this pump turned on cannot be determined. WHPacific attempted to mimic this pump and Test Bravo results indicate that the pumps did not start during this test. Final calibration results are within  $\pm 7$  psi of field measurements as shown in Table III-2.

**TABLE III-2 – CALIBRATION RESULTS FOR TEST BRAVO**

Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
BRAVO – STATIC	GOLF	75	78	+3	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	64	70	+6	12" line on SW 9th Ave Closed in model
	INDIAN	92	89	-3	pump at Harbor St. is not flowing
	JULIET	88	87	-1	pump at Harbor St. is not flowing
	KILO	72	77	+5	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	87	87	0	pump at Harbor St. is not flowing

Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	70	72	+2	
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	88	85	-3	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	86	87	+1	
	WARRENTON PRV PRESSURE RECORDER	92	92	0	
BRAVO – FLOW 1 (1,062 GPM)	GOLF	62	68	+6	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	40	36	-4	12" line on SW 9th Ave Closed in model
	INDIAN	78	74	-4	pump at Harbor St. is not flowing
	JULIET	75	73	-2	pump at Harbor St. is not flowing
	KILO	59	63	+4	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	71	68	-3	pump at Harbor St. is not flowing
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	63	59	-4	
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	77	71	-6	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	85	84	-1	
	WARRENTON PRV PRESSURE RECORDER	92	92	0	
BRAVO – FLOW 2 (1,440 GPM)	GOLF	60	64	+4	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	15	15	0	12" line on SW 9th Ave Closed in model
	INDIAN	66	67	+1	pump at Harbor St. is not flowing



Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
	JULIET	64	66	+2	pump at Harbor St. is not flowing
	KILO	49	56	+7	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	63	58	-5	pump at Harbor St. is not flowing
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	54	52	-2	
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	66	64	-2	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	81	82	+1	
	WARRENTON PRV PRESSURE RECORDER	91	92	+1	

## 5. Test Charlie

Test Charlie, located on Iredale St. and Pacific Dr., had measured flow rates of 1,139 gpm and 1,721 gpm for the hose and steamer connections respectively. An adjacent fire hydrant was pressure test station Pacific Dr. and Lake Dr. Pressure Recorder. It was determined from City Staff that the pump at the Harbor St. Tank turned on during the calibration testing and recorded a run time of 30 minutes. However, the exact time this pump turned on cannot be determined. WHPacific attempted to mimic this pump and Test Charlie results indicate that the pumps did not start during this test. Final calibration results are within  $\pm 8$  psi of field measurements as shown in Table III-3.

**TABLE III-3 – CALIBRATION RESULTS FOR TEST CHARLIE**

Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
CHARLIE – STATIC	GOLF	74	78	+3	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	64	70	+6	12" line on SW 9th Ave Closed in model

Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
	INDIAN	92	89	-3	pump at Harbor St. is not flowing
	JULIET	88	87	-1	pump at Harbor St. is not flowing
	KILO	72	77	+5	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	87	87	0	pump at Harbor St. is not flowing
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	70	72	+2	
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	89	85	-4	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	86	87	+1	
	WARRENTON PRV PRESSURE RECORDER	92	92	0	
CHARLIE - FLOW 1 (1,139 GPM)	GOLF	64	67	+3	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	46	50	+4	12" line on SW 9th Ave Closed in model
	INDIAN	74	71	-3	pump at Harbor St. is not flowing
	JULIET	74	71	-3	pump at Harbor St. is not flowing
	KILO	57	61	+4	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	52	51	-1	pump at Harbor St. is not flowing
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	60	57	-3	
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	73	69	-4	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	83	83	0	

Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
	WARRENTON PRV PRESSURE RECORDER	92	92	0	
CHARLIE - FLOW 2 (1,721 GPM)	GOLF	60	61	+1	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	36	35	-1	12" line on SW 9th Ave Closed in model
	INDIAN	63	59	-4	pump at Harbor St. is not flowing
	JULIET	64	59	-5	pump at Harbor St. is not flowing
	KILO	48	49	+1	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	26	18	-8	pump at Harbor St. is not flowing
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	54	47	-7	
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	64	57	-7	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	82	80	-2	
	WARRENTON PRV PRESSURE RECORDER	92	92	0	

## 6. Test Delta

Test Delta, located NW Warrenton Dr. and NW 9<sup>th</sup> St., had measured flow rates of 1,188 gpm and 2,111 gpm for the hose and steamer connections respectively. An adjacent fire hydrant was pressure test station Indian. It was determined from City Staff that the pump at the Harbor St. Tank turned on during the calibration testing and recorded a run time of 30 minutes. However, the exact time this pump turned on cannot be determined. WHPacific attempted to mimic this pump and Test Delta results indicate that the pumps did not start during this test. Final calibration results are within  $\pm 9$  psi of field measurements as shown in Table III-4.

**TABLE III-4 – CALIBRATION RESULTS FOR TEST DELTA**

Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
DELTA – STATIC	GOLF	79	78	-1	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	68	70	+2	12" line on SW 9th Ave Closed in model
	INDIAN	96	87	-9	pump at Harbor St. is not flowing
	JULIET	91	87	-4	pump at Harbor St. is not flowing
	KILO	75	77	+2	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	90	87	-3	pump at Harbor St. is not flowing
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	72	72	0	
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	89	85	-4	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	87	87	0	
	WARRENTON PRV PRESSURE RECORDER	92	92	0	
DELTA – FLOW 1 (1,139 GPM)	GOLF	62	67	+5	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	46	53	+7	12" line on SW 9th Ave Closed in model
	INDIAN	68	69	+1	pump at Harbor St. is not flowing
	JULIET	70	70	0	pump at Harbor St. is not flowing
	KILO	54	60	+6	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	66	68	+2	pump at Harbor St. is not flowing
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	58	57	-1	

Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	69	67	-2	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	83	83	0	
	WARRENTON PRV PRESSURE RECORDER	92	92	0	
DELTA – FLOW 2 (1,721 GPM)	GOLF	54	60	+6	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	32	37	+5	12" line on SW 9th Ave Closed in model
	INDIAN	48	49	+1	pump at Harbor St. is not flowing
	JULIET	57	54	-3	pump at Harbor St. is not flowing
	KILO	42	44	+1	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	45	48	-8	pump at Harbor St. is not flowing
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	43	43	-7	
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	56	51	-5	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	78	79	-2	
	WARRENTON PRV PRESSURE RECORDER	90	92	0	

## 7. Test Echo

Test Echo, located just North of Fred Meyer on Neptune, had measured flow rates of 1,278 gpm and 3,222 gpm for the hose and steamer connections respectively. An adjacent fire hydrant was pressure test station Juliet. It was determined from City Staff that the pump at the Harbor St. Tank turned on during the calibration testing and recorded a run time of 30 minutes. However, the exact time this pump turned on cannot be determined. WHPacific attempted to mimic this pump and Test Echo results indicate

that the pumps started during this test when the steamer connection was opened. Final calibration results are within  $\pm 9$  psi of field measurements as shown in Table III-5.

**TABLE III-5 – CALIBRATION RESULTS FOR TEST ECHO**

Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
ECHO – STATIC	GOLF	76	78	+2	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	64	70	+6	12" line on SW 9th Ave Closed in model
	INDIAN	92	89	-3	pump at Harbor St. is not flowing
	JULIET	88	87	-1	pump at Harbor St. is not flowing
	KILO	73	77	+4	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	86	87	+1	pump at Harbor St. is not flowing
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	67	72	+5	
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	83	85	+2	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	85	87	+2	
	WARRENTON PRV PRESSURE RECORDER	92	92	0	
ECHO – FLOW 1 (1,278 GPM)	GOLF	62	66	+4	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	48	53	+5	12" line on SW 9th Ave Closed in model
	INDIAN	72	70	-2	pump at Harbor St. is not flowing
	JULIET	64	63	-1	pump at Harbor St. is not flowing
	KILO	53	57	+4	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	69	68	-1	pump at Harbor St. is not flowing

Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	54	55	+1	
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	69	66	-3	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	81	83	+2	
	WARRENTON PRV PRESSURE RECORDER	91	92	+1	
ECHO – FLOW 2 (3,222 GPM)	GOLF	60	61	+1	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	44	43	-1	12" line on SW 9th Ave Closed in model
	INDIAN	68	61	-7	Pumps at Harbor St. Flowing 1,276gpm at a TDH of 104ft (assumes 2 pumps operating)
	JULIET	60	51	-9	Pumps at Harbor St. Flowing 1,276gpm at a TDH of 104ft (assumes 2 pumps operating)
	KILO	50	48	-2	Pumps at Harbor St. Flowing 1,276gpm at a TDH of 104ft (assumes 2 pumps operating)
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	67	60	-7	Pumps at Harbor St. Flowing 1,276gpm at a TDH of 104ft (assumes 2 pumps operating)
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	52	47	-5	
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	66	57	-9	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	81	80	-1	
	WARRENTON PRV PRESSURE RECORDER	91	92	+1	

## 8. Test Foxtrot

Test Foxtrot, located at the intersection of SE 19<sup>th</sup> St. and Ensign Ln., had measured flow rates of 1,139 gpm and 2,243 gpm for the hose and steamer connections respectively. An adjacent fire hydrant was pressure test station Kilo. It was determined from City Staff that the pump at the Harbor St. Tank turned on during the calibration testing and recorded a run time of 30 minutes. However, the exact time this pump turned on cannot be determined. WHPacific attempted to mimic this pump and Test Foxtrot results indicate that the pumps started during this test when the steamer connection was opened. Final calibration results are within  $\pm 13$  psi of field measurements as shown in Table III-6.

**TABLE III-6 – CALIBRATION RESULTS FOR TEST FOXTROT**

Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
FOXTROT – STATIC	GOLF	78	78	0	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	65	70	+5	12" line on SW 9th Ave Closed in model
	INDIAN	94	89	-5	pump at Harbor St. is not flowing
	JULIET	90	87	-3	pump at Harbor St. is not flowing
	KILO	74	77	+3	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	87	87	0	pump at Harbor St. is not flowing
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	70	72	+2	
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	89	85	-4	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	86	87	+1	
	WARRENTON PRV PRESSURE RECORDER	92	92	0	
FOXTROT – FLOW 1 (1,139 GPM)	GOLF	60	67	+7	A leak of 400 gpm induced in the vicinity of Pressure Station Golf



Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
	HOTEL	45	54	+9	12" line on SW 9th Ave Closed in model
	INDIAN	71	72	+1	pump at Harbor St. is not flowing
	JULIET	67	70	+3	pump at Harbor St. is not flowing
	KILO	51	60	+9	pump at Harbor St. is not flowing
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	70	71	+1	pump at Harbor St. is not flowing
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	56	57	+1	
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	71	69	-2	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	82	83	+1	
	WARRENTON PRV PRESSURE RECORDER	92	92	0	
FOXTROT - FLOW 2 (2,243 GPM)	GOLF	58	60	+2	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	HOTEL	34	38	+4	12" line on SW 9th Ave Closed in model
	INDIAN	60	55	-5	pump at Harbor St. flowing 225gpm at 104TDH
	JULIET	66	53	-13	pump at Harbor St. flowing 225gpm at 104TDH
	KILO	38	42	+4	pump at Harbor St. flowing 225gpm at 104TDH
	PACIFIC DR. AND LAKE DR. PRESSURE RECORDER	57	54	-3	pump at Harbor St. flowing 225gpm at 104TDH
	COLUMBIA BEACH LN AND HIGHWAY 104 PRESSURE RECORDER	45	43	-2	

Test No.	Pressure Location	Field Pressure Reading	Model Pressure Reading	Delta Pressure (psi)	Comments
	3 <sup>RD</sup> AND MAIN PRESSURE RECORDER	54	52	-2	
	DELMOOR LOOP AND LOWNSBURY PRESSURE RECORDER	79	79	0	
	WARRENTON PRV PRESSURE RECORDER	91	92	+1	

## 9. Summary of Calibration Recommendations

The hydraulic model calibration was significantly complicated due to the fact that the Harbor Street tank and the associated booster pump station were not taken off-line for the period of the testing. Additionally, information regarding the pump curves and the pressure settings for primary and secondary pump starting is not available. Consequently it was necessary to make an estimate that would facilitate calibrating the model as best as possible under the circumstances.

The system calibration effort provides recommendations to the City for field verification and correction of noted items summarized as follows:

- Verify valve status (possible closed valves) within residential neighborhood in the vicinity of Test Station Alpha as shown on Appendix B, Figure 2.
- Investigate potential leaks of buried transmission lines within the residential neighborhood in the vicinity of Test Station Alpha as shown on Appendix B, Figure 2. [a 400 gpm demand was placed in the model on a 8-inch waterline located on Manion Dr.];
- Verify valve status (possible closed valves) on SW 9<sup>th</sup> St. between Ridge Rd. and SW Juniper Ave., as shown on Appendix B, Figure 3;

The hydraulic model has been adjusted to reflect calibration findings and requested system corrections. The model is now ready for conducting hydraulic analysis of existing and future system conditions.

## IV. EXISTING WATER DISTRIBUTION SYSTEM ANALYSIS

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### A. SYSTEM CRITERIA

With respect to identifying needed system upgrades, it is necessary to establish criteria for replacement or parallel waterlines. When system capacity increases are required, the criteria for upgrading existing transmission and distribution lines were provided by the City and are summarized as follows:

- Waterlines 10-inch diameter and smaller will be identified as remove and replace, as opposed to installing a parallel line where capacity increases are needed.
- Transmission and distribution lines 12-inch diameter and larger will remain in place and additional parallel lines will be identified where additional capacity is required.

It should be noted that actual future system upgrades and improvements will depend, in part, on line condition and other considerations not considered by this hydraulic model.

### B. EXISTING SYSTEM AVERAGE DAY, PEAK DAY, AND PEAK HOUR STEADY STATE ANALYSIS

WHPacific performed hydraulic analysis of the existing system under steady state conditions for year 2010 Average Day, Peak Day, and Peak Hour demands to identify potential low pressure areas in the existing water system. The system has been configured so that the system supply PRV is set to 92 psi, the South Reservoir is online and set at 80% full level, the South Reservoir booster pump station is online and set at a flow of 2,000 gpm and a TDH of 36 ft., and the Harbor St. Tank is offline. System static pressures are desired to be between 40 psi minimum and 100 psi maximum for the system (full reservoir). Peak Day and Peak Hour pressures should be between 30 psi minimum and 100 psi maximum. Results from the Average Day, Peak Day, and Peak Hour Steady State Analysis can be seen in Table IV-1. It should be noted that the hydraulic analyses were performed with the South Reservoir at an 80% full level.

**TABLE IV-1 - AVERAGE DAY, PEAK DAY, AND PEAK HOUR STEADY STATE ANALYSIS RESULTS WITHOUT REVISING THE PRESSURE ZONE BOUNDARIES**

Pressure Zone	Static Pressure (psi)		Average Day (psi)		Peak Day (psi)		Peak Hour (psi)	
	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
City of Warrenton Pressure Zone	68	96	60	92	57	92	54	92

The provided static pressures are based on elevations of the controlling South Reservoir and the HGL settings of the pressure reducing station.

It needs to be noted that there is an existing service condition that falls outside the boundaries identified by Table IV-1. The existing service provided to a residence at the top of Perkins Lane is not able to receive a standard service connection due to the elevation estimated at approximately 250 feet. This service requires a private booster pump to receive service as the service elevation is higher than the water system's ability to serve. There are effectively no water system improvement options that would provide for a standard service connection to this location.

### C. FIRE FLOW ANALYSIS

The underlying system requirement for fire protection to be provided by the Warrenton water system is for a minimum of 1,000 gpm to be available to all service areas. For areas requiring more than 1,000 gpm, specific "Fire Protection Areas" have been identified with area specific flow requirements. The Fire Protection Areas and the recommended fire flow requirements for these areas have been discussed and concurred with by City public works staff. Figures IV-1 through Figure IV-8 illustrate 11 Fire Demand Areas throughout the system and the associated recommended fire flow requirement. Additionally there are four water supply connection points where the Warrenton provides bulk water delivery to other users. The following discussion identifies an assumed fire flow requirement at the bulk water point of delivery. All areas of the system not specifically identified require a minimum 1,000 gpm capability. All fire flow analyses are performed based on maintaining a minimum 20 psi residual pressure capability throughout the water transmission distribution system. The following discussion presents each Fire Demand Area along with a discussion of recommended system improvements if the system is not currently able to provide the recommended flow requirements. System improvement recommendations have a unique identifier for the text descriptions that corresponds to a like identifier on Figures IV-1 through Figure IV-8.

#### 1. System Wide 1,000 gpm Fire Flow

The system wide minimum fire flow requirement is 1,000 gpm. Analysis shows that the Warrenton system cannot supply this minimum requirement system wide. The primary condition that results in less than minimum fire protection capability is long lengths of small diameter dead end lines. As a general "rule of thumb" dead end lines should be avoided whenever possible; and any line that services a fire hydrant should be a minimum 6-inch diameter. The following recommended system upgrades are necessary to increase fire flow capability to at least 1,000 gpm. Small diameter lines that have a length less than 500 ft where the adjacent transmission/distribution line can provide 1,000 gpm fire flow were not identified for upsizing based on fire protection

needs. To meet the minimum 1,000 gpm flow requirement system wide the following improvements are recommended:

1. Remove and replace the 6 in. line with an 8 in line and the 4 in line with an 8 in line from the intersection of Dellmoor Loop and Old Bog Rd. to the intersection of W Lake Acres Dr. and Seales Rd. as shown on Figure IV-3. Remove and replace the 2 in. line with an 8 in. line from the intersection of W Lake Acres Dr. and Seales Rd. to a point approximately 500 ft short of the end of the line on Seales Rd. as shown on Figure IV-11. The length of this improvement is 2,970 ft. It can be noted that the existing system can effectively provide only 59 gpm 500 ft from the end of the 2in. line and 445 gpm at the intersection of Dellmoor Loop and Seales Rd.
2. Remove and replace the 4 in. line with a 6 in. line from the intersection of Sunset Beach Rd. and Sunset Lake Rd south through the subdivision loop as shown on Figure IV-4. The length of this improvement is 2,350 ft. It can be noted that the existing system can effectively provide only 401 gpm at the end of East Rd.
3. Remove and replace the 6 in. line with an 8 in. line from the north end of Lewis Rd. to the point of the existing fire hydrants located on the north end of both unnamed dead end roads as shown on Figure IV-4. The length of this improvement is 2,900 ft. It can be noted that the existing system can effectively provide only 590 gpm at the west end of this subdivision.
4. Currently there is no fire protection being provided directly from the waterline on Turlay Road. Adding a fire hydrant to this line in the future will require removing and replacing the 4 in. line with 6 in. within Turlay Rd as illustrated on Figure IV-4. The length of this improvement is approximately 1,000 ft. It can be noted that the existing system can effectively provide only 309 gpm at the end of the existing line in Turlay Road.
5. Remove and replace the 6 in. line with an 8 in. line from the intersection of Perkins Ln and Oregon Coast Highway to the intersection of Deerfield Ln. and Oregon Coast Highway as illustrated on Figure IV-5. The length of this improvement is 300 ft.
6. Remove and replace the 4 in. line with a 6 in. line on Deerfield Ln. as illustrated on Figure IV-5. Prior to completing this improvement, improvement #5 listed above must be completed. The length of this improvement is 800 ft. It can be noted that the existing system can provide only 470 gpm at the end of the existing line in Deerfield Ln.
7. Remove and replace the 4 in. line with a 6 in. line on Cheri Ln. as illustrated on Figure IV-5. Prior to completing this improvement, improvement #5 listed above must be completed. The length of this improvement is 900 ft. It can be noted that the existing system can provide only 445 gpm at the end of the existing line

in Cheri Ln.

8. Perkins Ln. presents a difficult situation from a fire protection standpoint, due to the very long dead end 6-inch and 4-inch line as illustrated on Figure IV-5. An analysis performed for the current dead end line that indicates a current capability of 342 gpm at the point of the 6 to 4 inch transition. Upgrading the line size to provide a 1,000 gpm capability would require expensive improvements that would also result in large volumes of water becoming stale before reaching the point of use. Under the current configuration, to provide 1,000 gpm fire flow capability to this line, a replacement 12 in. line would be required; or alternatively a looped 10-inch/8-inch line connecting to the existing system north of Perkins Lane. Due to the unique nature of this service configuration, no specific improvement recommendations are provided at this time.
9. There is existing development on Rainbows End Lane that does not currently have adequate fire protection. The existing Warrenton system provides a 12" line to the City limits on Dolphin Road. From the City limits a private 4" waterline continues south in Dolphin Road and then north on Rainbows End Road as illustrated on Figure IV-5. The existing system fire flow capability is 3,100 gpm at the end of the 12" line in Dolphin Road and 226 gpm at the end of the 4" line on Rainbows End Lane. Provision of the recommended 1,000 gpm fire flow capability to the existing development serviced by the private 4" line would require upsizing the private line.
10. Install a new 6 in. line from the intersection NE Skipanon Dr. and NE 1<sup>st</sup>. St. to the intersection of NE Skipanon Dr. and Warrenton-Astoria Hwy to complete the loop as shown on Figure IV-6. The length of this improvement is 660 ft.
11. Install a new 6 in. line in 12<sup>th</sup> Ct. from the intersection with Lake Dr. to the intersection with King Salmon Pl. to complete the loop as shown on Figure IV-8. The length of this improvement is 230 ft. It can be noted that the existing system can provide only 388 gpm at the end of the end of King Salmon Place.

## 2. Gearhart System Supply Connection Point #1

Connection Point #1 is the south connection point between the City of Warrenton System to the Gearhart System as illustrated on Figure IV-1. Since Warrenton only provides water supply and not metered service or fire protection to Gearhart the fire flow analysis was run based on the Warrenton system ability to provide a fire flow of 2,000 gpm to the Gearhart system while still maintaining a minimum 20 psi residual pressure throughout the Warrenton System. Analysis shows that the Warrenton system can adequately supply 2,000 gpm capability to this connection point and no system improvements are required.

### 3. Gearhart System Supply Connection Point #2

Connection Point #2 is the north connection point from the City of Warrenton System to the Gearhart System as illustrated on Figure IV-2. Since Warrenton only provides water supply and not metered service or fire protection to Gearhart the fire flow analysis was run based on the Warrenton system ability to provide a fire flow of 2,000 gpm to the Gearhart system while still maintaining a minimum 20 psi residual pressure throughout the Warrenton System. Analysis shows that the Warrenton system can adequately supply 2,000 gpm capability to this connection point and no system improvements are required.

### 4. Camp Rilea Connection Point

The connection location from the City of Warrenton System to Camp Rilea at Patriot Way is illustrated on Figure IV-4. Since Warrenton provides only a metered service and does not have responsibility for the system inside Camp Rilea, the fire flow analysis was run based on the Warrenton system ability to provide a fire flow of 2,500 gpm to Camp Rilea while still maintaining a minimum 20 psi residual pressure throughout the Warrenton System. Analysis shows that the Warrenton system can adequately supply 2,500 gpm capability to this connection point and no system improvements are required. It should be noted that if the Warrenton water system is expected, at some point in the future, to provide significant fire flow capability to Camp Rilea, the existing 6-inch line in Patriot Way will need to be upgraded.

### 5. Fire Demand Area #1 – 2,000 gpm

Fire Demand Area #1 identifies the area occupied by the Seaside Christian Church as illustrated on Figure IV-2. The recommended minimum flow capability for this site is 2,000 gpm. Analysis shows that the Warrenton system can adequately supply fire protection to this area and no system improvements are required.

### 6. Fire Demand Area #2 – 2,500 gpm

Fire Demand Area #2 identifies a small commercial area along Highway 101 just south of Sunset Beach Road as illustrated on Figure IV-3. The recommended minimum flow capability for this area is 2,500 gpm. Analysis shows that the Warrenton system can adequately supply fire protection to this area and no system improvements are required.

### 7. Fire Demand Area #3 – 3,500 gpm

Fire Demand Area #3 identifies a significant commercial area as illustrated on

Figure IV-5, Figure IV-6, and Figure IV-7. The recommended fire flow capability for this area is 3,500 gpm. Analysis shows that the current Warrenton system cannot supply this level of fire protection to this area. To achieve a 3,500 gpm capability for fire protection in this area the following improvements are recommended:

12. Remove and replace the 6 in. line with a 10 in. line from the intersection of SE 6<sup>th</sup> Ave and Marlin Dr. to the intersection of Marlin Dr. and E Harbor Street as illustrated on Figure IV-7. The length of this improvement is 1,900 ft. It can be noted that the existing system can effectively provide 2,133 gpm at this location on Marlin Drive.
13. Remove and replace the existing 8 in. line with a 10 in. line from the intersection of SE 6<sup>th</sup> St. and Marlin Dr. to the southeast and west sides of the commercial building (Fred Myers) as illustrated on Figure IV-7. The length of this improvement is 1,500 ft. It can be noted that the existing system can effectively provide approximately 2,700 gpm at the southeast and west sides of the commercial building (Fred Myers).
14. Install a new 10-inch line to complete the waterline loop on the east side of the commercial building (Fred Myers) as illustrated on Figure IV-7. The length of this improvement is 350 ft. It can be noted that the existing system can effectively supply 2,363 gpm and 2,707 gpm at the dead end lines on the north (12") and southeast (8") sides of the Fred Myers commercial building.
15. Install a new 10-inch line to complete the loop running east from the east side of the Fred Myers commercial building across the bridge over Holbrook Slough as shown on Figure IV-7. The length of this improvement is 320 ft. It can be noted that the existing system can effectively supply 2,707 and 1,665gpm at the dead end lines located on the east side of the Fred Myers commercial building (12") and on the east side of the bridge across Holbrook Slough (8").
16. Remove and replace the 8 in. line with a 10 in. line from the east side of Holbrook Slough through the parking lot to Harbor St. as shown on Figure IV-7. The length of this improvement is 1,100 ft. It can be noted that the existing system can effectively provide 1,665 gpm at the dead end line on the east side of Holbrook Slough.
17. Remove and replace the 8 in. line with a 10 in. line on E. Harbor Street as shown on Figure IV-7. The length of this improvement is 1,100 ft. It can be noted that the existing system can effectively provide 2,395 on Harbor Street at this location.

#### 8. Fire Demand Area #4 – 2,500 gpm

Fire Demand Area #4 identifies South Jetty High School as illustrated on Figure IV-5. The recommended minimum flow for this area is 2,500 gpm. Analysis shows that the Warrenton system can adequately supply fire protection to this area and no system improvements are required.



#### 9. Fire Demand Area #5 – 2,500 gpm

Fire Demand Area #5 identifies the commercial and school area along South Main Ave. and an adjacent section of the Warrenton Astoria Hwy. as illustrated on Figure IV-5, and Figure IV-6. The recommended minimum flow for this area is 2,500 gpm. Analysis shows that the current Warrenton system cannot adequately supply this level of fire protection to this area. To provide the recommended fire flow capability to this area the following improvements are recommended:

18. Remove and replace the existing 4 in. line with an 8 in. line from the intersection of SE 3<sup>rd</sup> St. and S. Main Ave. to the point of a connection to the existing 6-inch line in Anchor Ave. as illustrated by Figure IV-6. The length of this improvement is approximately 800 ft. It can be noted that the existing system can provide 1,259 gpm at the intersection of SW 3<sup>rd</sup> Street and SE Anchor Avenue.
19. Whiskey Road is just outside the indicated boundary of the Area 5 fire Demand Area, and is currently serviced by two dead end 8-inch lines. These lines should be connected with a new 6-inch or 8-inch line to complete the loop which will require approximately 200 feet of new line extension as illustrated on Figure IV-5. It can be noted that the existing system can provide 2,128 gpm at the end of the dead end lines, so the looping connection may not be needed for fire protection; however it will aid with maintaining system water circulation.
20. NE Heron Ave. adjacent to the marina is currently serviced by a dead end 6-inch line that can provide 875 gpm fire protection capability at the end of the line as illustrated on Figure IV-6. Ideally when the property to the east develops, this line can be looped to King Ave. with a tie back to the facilities in Harbor Street. The improvement requirements will be dependent on the nature of the proposed development and any requirements for upgrading capabilities for the development along Heron Ave. If increased capability for Heron Ave. is required prior to the ability to loop the line, the dead end 6-inch can be upgraded to an 8-inch line with fire hydrants added at appropriate locations.

#### 10. Fire Demand Area #6 – 3,500 gpm

Fire Demand Area #6 identifies the seafood packing area as illustrated on Figure IV-6. The recommended flow capability for this area is 3,500 gpm. Analysis shows that the Warrenton system can adequately supply fire protection to this area and no system improvements are required.

#### 11. Fire Demand Area #7 – 2,000 gpm

Fire Demand Area #7 identifies development supporting the Astoria Regional Airport as illustrated on Figure IV-7. The recommended flow capability for this area is

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2,000 gpm. Analysis shows that the Warrenton system can adequately supply fire protection to this area and no system improvements are required.

12. Fire Demand Area #8 – 2,000 gpm

Fire Demand Area #8 identifies the Warrenton Church – The Nazarene as illustrated on Figure IV-6. The recommended minimum flow capability for this area is 2,000 gpm. Analysis shows that the Warrenton system can adequately supply fire protection to this area and no system improvements are required.

13. Fire Demand Area #9 – 3,500 gpm

Fire Demand Area #9 identifies the Lumber Yard as illustrated on Figure IV-8. The recommended flow capability for this area is 3,500 gpm. Analysis shows that the current Warrenton system cannot adequately supply this level of fire protection to this area. The existing system can effectively provide 2,209 gpm at the intersection of NW Warrenton Dr. and NW 13<sup>th</sup> St. To provide the recommended flow capability to this area the following improvements are recommended:

21. Extend the 18 in. transmission line from the intersection of NW 13<sup>th</sup> St. and the walking trail to the intersection of NW Warrenton Dr. and NW 14<sup>th</sup> St. as illustrated on Figure IV-8. The length of this improvement is 2,200 ft.
22. Remove and replace the 10 in. line with a 12 in. line from the intersection of NW Warrenton Dr. and NW 7<sup>th</sup> Street. to the intersection of NW Warrenton Dr. and NW 14<sup>th</sup> St. as shown on Figure IV-8. The length of this improvement is 4,250 ft.

14. Fire Demand Area #10 – 2,000 gpm

Fire Demand Area #10 identifies the neighborhood commercial and school area as illustrated on Figure IV-8. The recommended minimum flow capability for this area is 2,000 gpm. Analysis shows that the current Warrenton system cannot adequately supply this level of fire protection to this area. It can be noted that the existing system can provide 1,138 gpm at the intersection of Ridge Rd. and Pacific Dr. To provide the recommended flow capability to this area, improvements for Fire Demand Area #9 must be completed along with the following additional improvement:

23. Extend the 18 in. transmission line from the intersection of NW Warrenton Dr. and NW 14<sup>th</sup> St. to the intersection of Lake Dr. and Pacific Dr. as illustrated on Figure IV-8. The length of this improvement is 8,000 ft.

#### 15. Fire Demand Area #11 – 2,500 gpm

Fire Demand Area #11 identifies the commercial area west of Pacific Drive/Ridge Road as illustrated on Figure IV-8. The recommended flow capability for this area is 2,500 gpm. The actual line sizes for the system serving this area are not known; however, based on an assumption of 8-inch lines, analysis shows that the current system cannot adequately supply this level of fire protection to this area. With the assumed 8-inch lines, the existing system can provide 1,061 gpm at the intersection of 3<sup>rd</sup> Ave. and Tye St. To provide the recommended flow capability to this area, improvements for Fire Flow Area #10 must be completed along with an upgrade of the line within Pacific Drive west of Ridge Road. The specific recommendations for system upgrade at this location will require an accurate understanding of the existing line sizes and locations and therefore no specific recommendations will be made at this point.

#### 16. KOA Campground Connection Point

This system connection point provides City water service to the internal system and facilities serving the KOA Campground as illustrated on Figure IV-8. The recommended minimum flow capability to this area is 2,000 gpm. Analysis shows that the current Warrenton system cannot supply this level of fire protection to this area. The existing system can effectively provide 1,121 gpm at the north end of the KOA location. To meet the recommended flow requirement for this area, recommendation for Fire Flow Area #10 must be completed along with the following recommendations:

24. Remove and replace the existing 8 in. line with a 10 in. line from the intersection of Lake Dr. and Pacific Dr. to the KOA Campground system connection point as illustrated on Figure IV-8. The length of this improvement is approximately 4,400 ft.

#### D. EXTENDED PERIOD SIMULATION (EPS) ANALYSIS

EPS Analyses were conducted for Peak Day Demand conditions utilizing the diurnal demand profile shown on Figure II-9. These simulations were run over a period of 168 hours or 1 week to determine how the system would react under consecutive Peak Day Demand conditions.

The initial EPS simulation was executed with the following facility configurations. The hydraulic model is configured such that WTP Clearwell has a steady level representing constant supply sufficient to meet Peak Day Demand. The PRV has a setting of 92 psi or a HGL of 234 ft. The South Reservoir is configured initially with no Pump Station supplying water to it to see how the system would react under year 2010 peak day conditions. Figure IV-9 shows the South Reservoir level with no pump station supply water to the reservoir under consecutive peak day conditions. As can be seen in Figure IV-9, the level in the South Reservoir stays at about 20 ft or about half full and

there is not enough available hydraulic grade to reach overflow elevation. To maintain an overflow level, the pump station must be brought on line for the South Reservoir water level to reach overflow.

Based on the current project, the pump station will have a capacity of 2,000 gpm at a TDH of 36 ft. The model has a pump station set point that has the pump station start when the level in the South Reservoir reaches 31ft and stops when the level in the South Reservoir reaches 38ft. The City will determine the actual set points and pumping times for the pump station once it's in service based on electricity rates, and system operation.

WHPacific settled on the start and stop levels for the pump station based on the following information. Average Day and Peak Day demands that were entered into the model system wide were utilized to determine the demand that the South Reservoir supplies. Once that demand was calculated, the total demand for a 24 hour period was calculated, the total level drop in the Reservoir per day was calculated and the pump time needed to replenish that level drop was calculated. This information can be seen in Table IV-2.

**TABLE IV-2 – SOUTH RESERVOIR DEMAND SUPPLIED AND PUMP STATION REQUIREMENTS**

	<b>Average Demand (gpm)</b>	<b>Demand seen at Reservoir per day (gal)</b>	<b>Reservoir drop (ft per day)</b>	<b>pump run time to replenish reservoir (hr)</b>
2010 Average Day	656.82	946,000	10.30	7.88
2010 Peak Day	1348.28	1,942,000	21.15	16.18
2030 Average Day	938.72	1,352,000	14.73	11.26
2030 Peak Day	1922.83	2,769,000	30.16	23.07

Year 2030 Average Day Demand has a Reservoir level drop of 14.73 ft. WHPacific wanted the pump station to start and stop two times per day so a level drop of 7 ft was determined to be control set point.

The EPS simulation for 2010 Peak Day was rerun with the pump station online at the above mentioned set point. Figure IV-10 shows the pump station operation. As can be seen from this figure, the pumps flow at approximately 1,900 gpm for a total of 17 hours to replenish the 7 ft Reservoir drop under year 2010 Peak Day demands. Figure IV-11 shows the level of the South Reservoir with the Pump Station on-line. As can be seen from this figure, the South Reservoir operates in a uniform fashion with the pumps starting when the level in the Reservoir drops below 31 feet and stops when the level in the Reservoir reaches 38ft.

Results from the EPS simulation show that under 2010 Peak Day Demand Conditions there are no low pressure problems within the system. Therefore there are no recommendations for improved piping based on the EPS simulation.

The computer model is a representation of the actual system conditions. It is recommended that the City have SCADA capabilities at both the pump station and reservoir and keep detailed records of this information that can be utilized within the model. The SCADA data can be utilized to compare the field condition and operation of both the reservoir and pump station to the model results and adjust the model as needed to develop a comprehensive and complete hydraulic model of the system.

## V. RECOMMENDATIONS

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This hydraulic model and analysis can and should be used as a basis for proceeding with continuing improvement efforts for the Warrenton water system. Areas for continuing improvements would include:

- The fire protection system improvements identified by this report should be prioritized and programmed for future design and construction as the City is able to identify and secure funding for these important system upgrades.
- As system modifications and additions are completed and placed into service, the City should make sure that this information is integrated into the computer hydraulic model so that future analysis activities reflect the actual system capabilities and limitations.
- This hydraulic analysis can serve as the basis for proceeding with a water system master plan that would provide the complete picture regarding the future requirements for the City of Warrenton water supply.

**REFERENCES**

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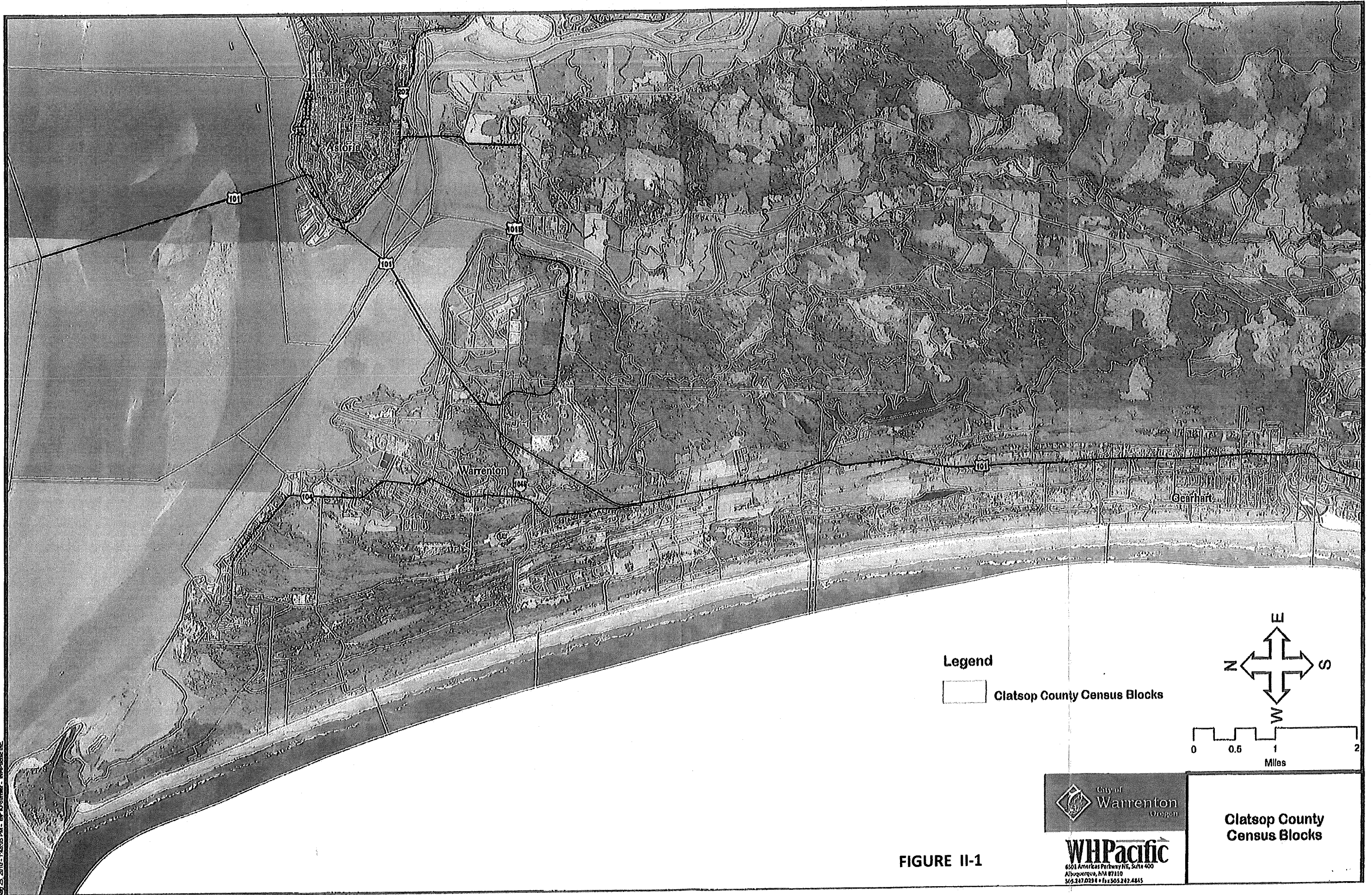
Water System Master Plan Report, dated June 1998, prepared by CH2M Hill.

# APPENDIX A

## Figures

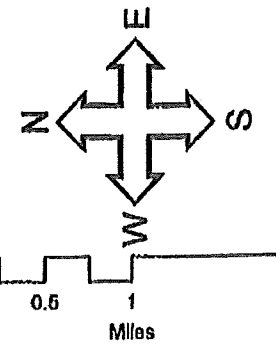


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Legend

Clatsop County Census Blocks



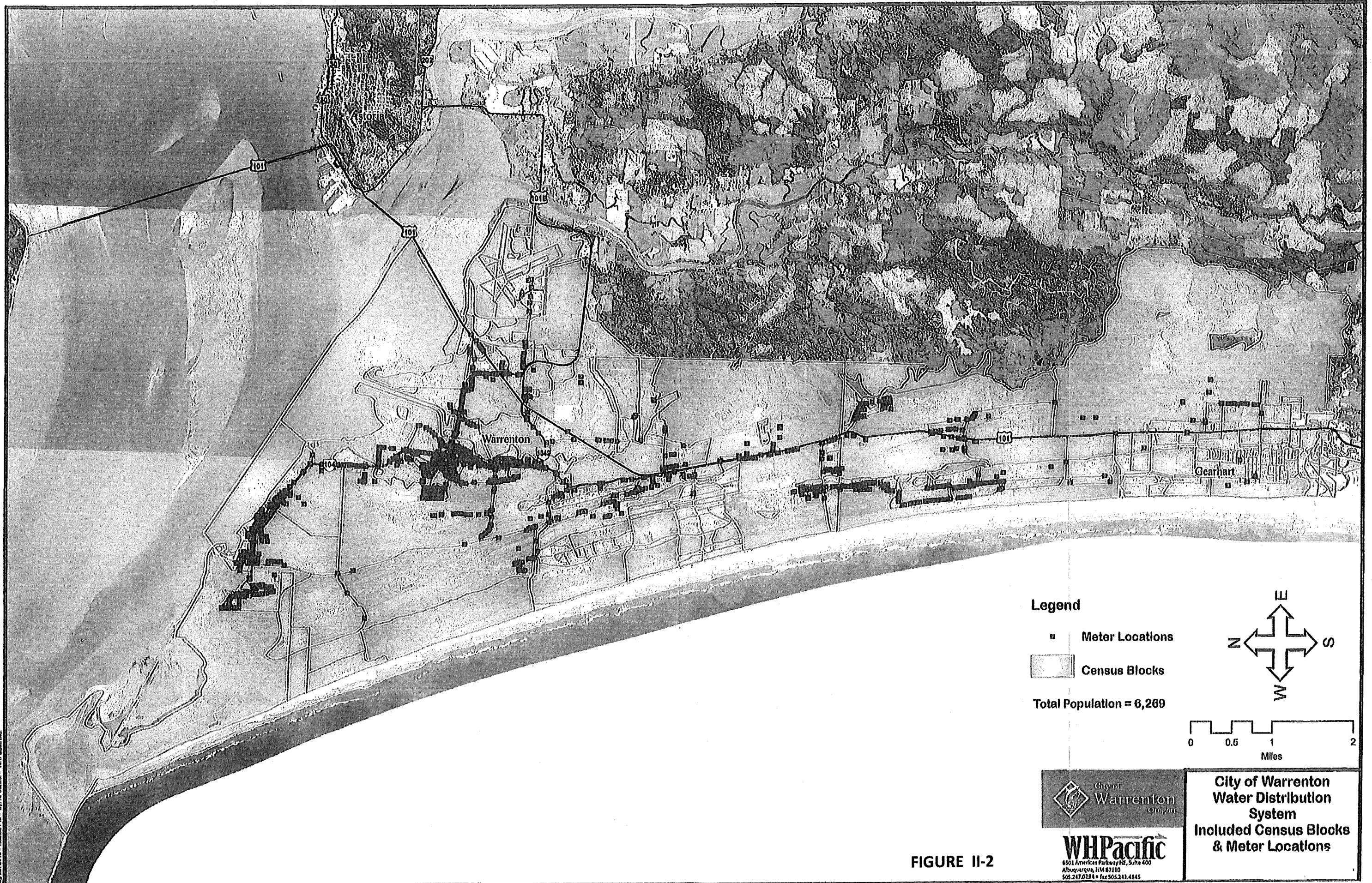
City of Warrenton  
Oregon

**WHPacific**  
6501 Americas Parkway NE, Suite 400  
Albuquerque, NM 87110  
505.247.0294 • Fax 505.242.4845

Clatsop County  
Census Blocks

FIGURE II-1

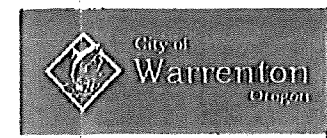
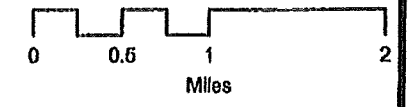
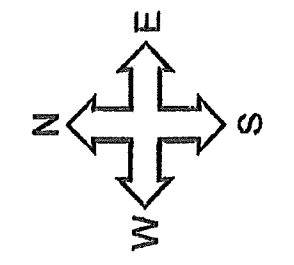
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**Legend**

- Meter Locations
- ▭ Census Blocks

Total Population = 6,269



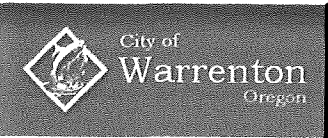
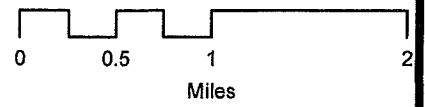
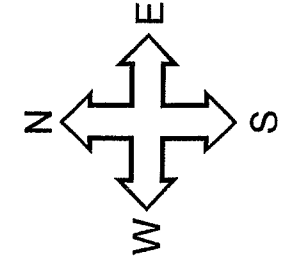
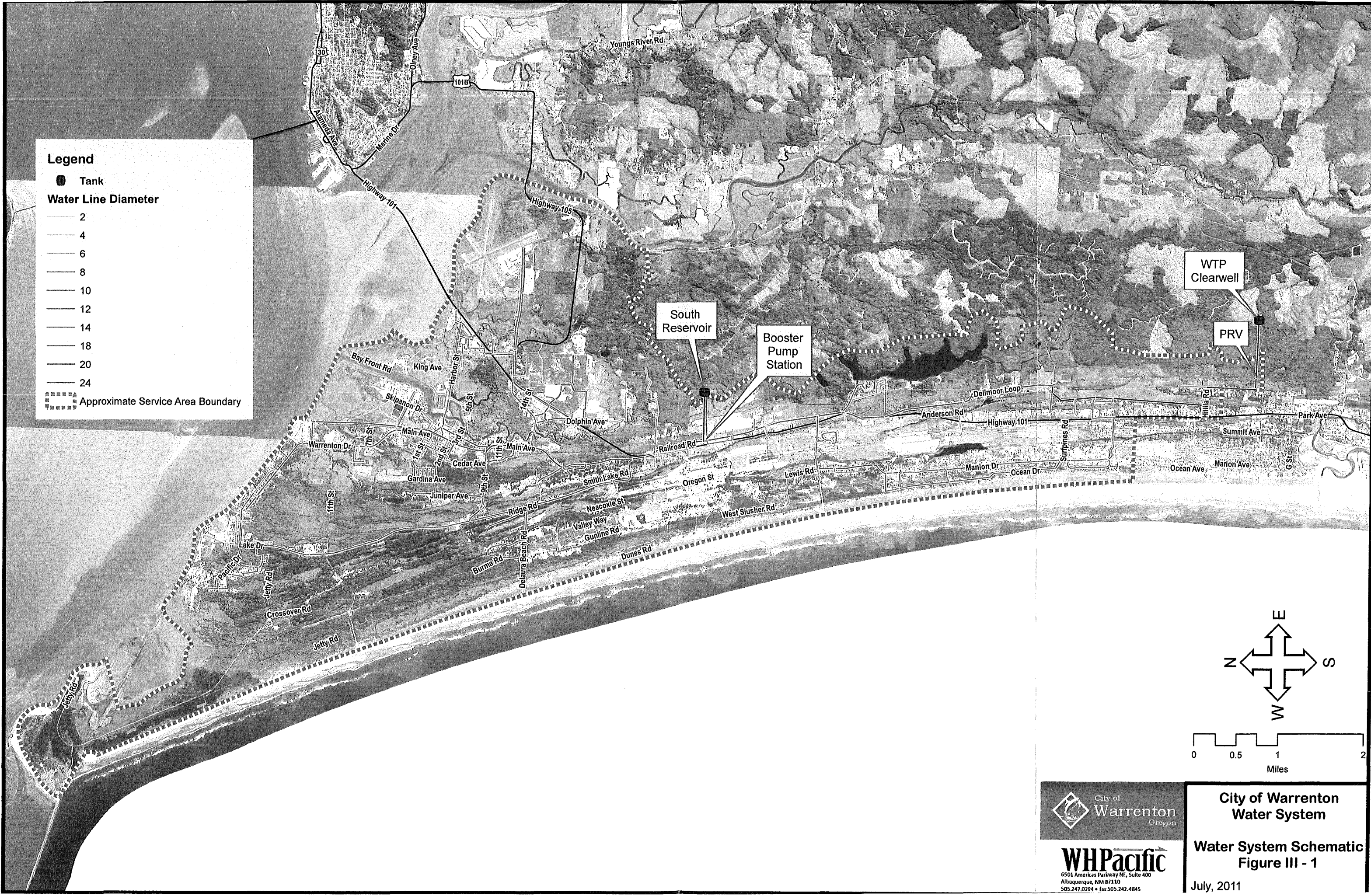
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6301 Americas Parkway NE, Suite 400  
Albuquerque, NM 87110  
505.217.0194 • Fax 505.241.4665

**City of Warrenton  
Water Distribution  
System  
Included Census Blocks  
& Meter Locations**

**FIGURE II-2**

**Legend**

- Tank
- Water Line Diameter**
- 2
- 4
- 6
- 8
- 10
- 12
- 14
- 18
- 20
- 24
- ⋯ Approximate Service Area Boundary



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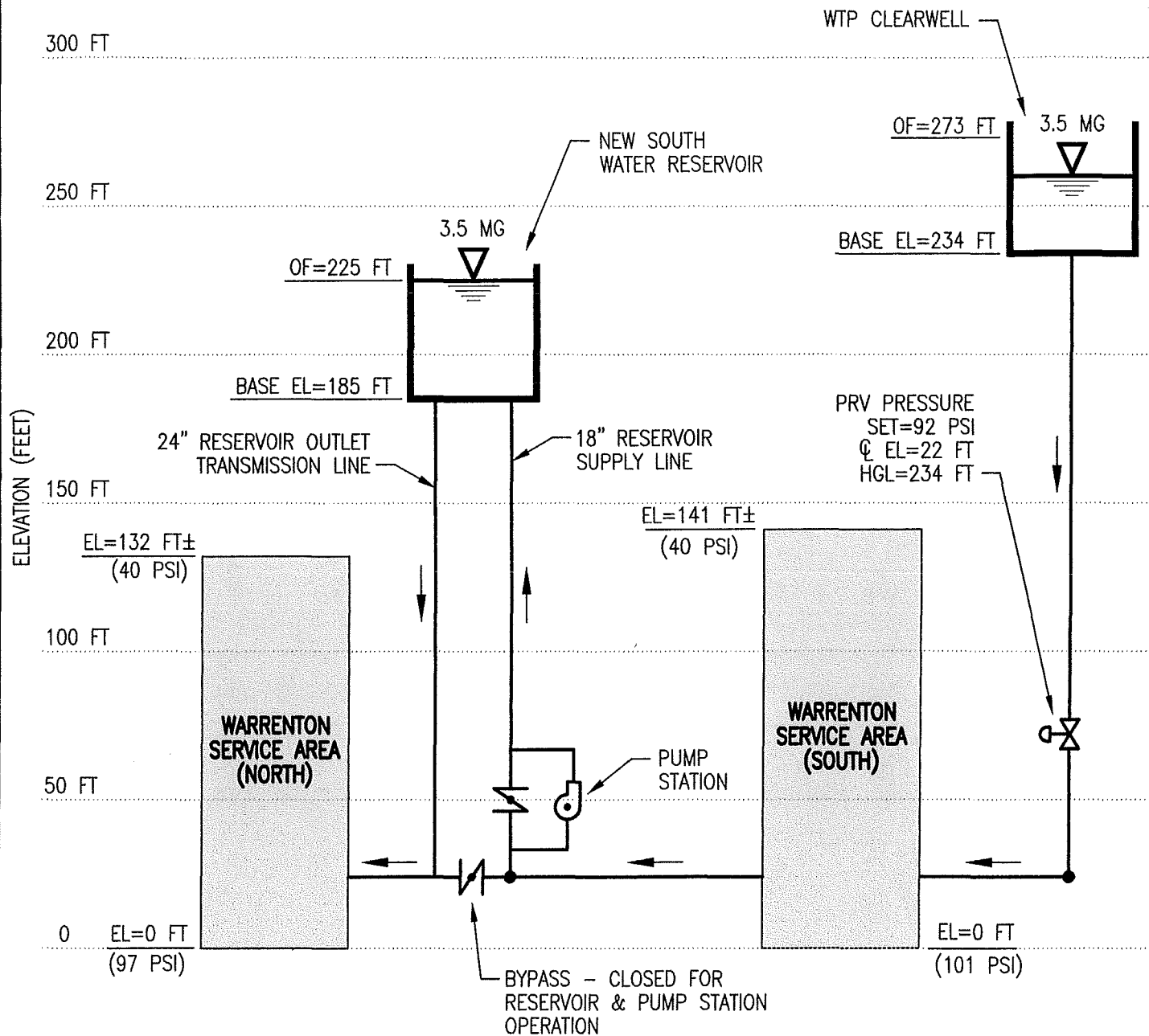
**City of Warrenton  
Water System**

**Water System Schematic  
Figure III - 1**

July, 2011

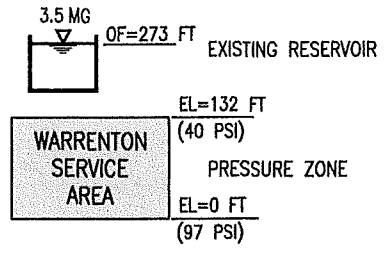
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# CITY OF WARRENTON WATER SYSTEM HYDRAULIC PROFILE



### LEGEND

- BOOSTER PUMP STATION
- EXISTING TRANSMISSION SYSTEM
- PRESSURE REDUCING VALVE
- BUTTERFLY VALVE
- CHECK VALVE



### ABBREVIATIONS

- EL = ELEVATION
- HGL = HYDRAULIC GRADE LINE
- MG = MILLION GALLONS
- OF = OVERFLOW ELEVATION
- PRV = PRESSURE REDUCING VALVE
- PSI = POUNDS PER SQUARE INCH
- WTP = WATER TREATMENT PLANT



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**FIGURE III-2**

**WHPacific**  
CITY OF WARRENTON  
WATER SYSTEM HYDRAULIC PROFILE

## Total Production at Treatment Plant Minus Water Loss at Clatsop Plains Reservoir and Harbor St. Tank (360,000 gpd)

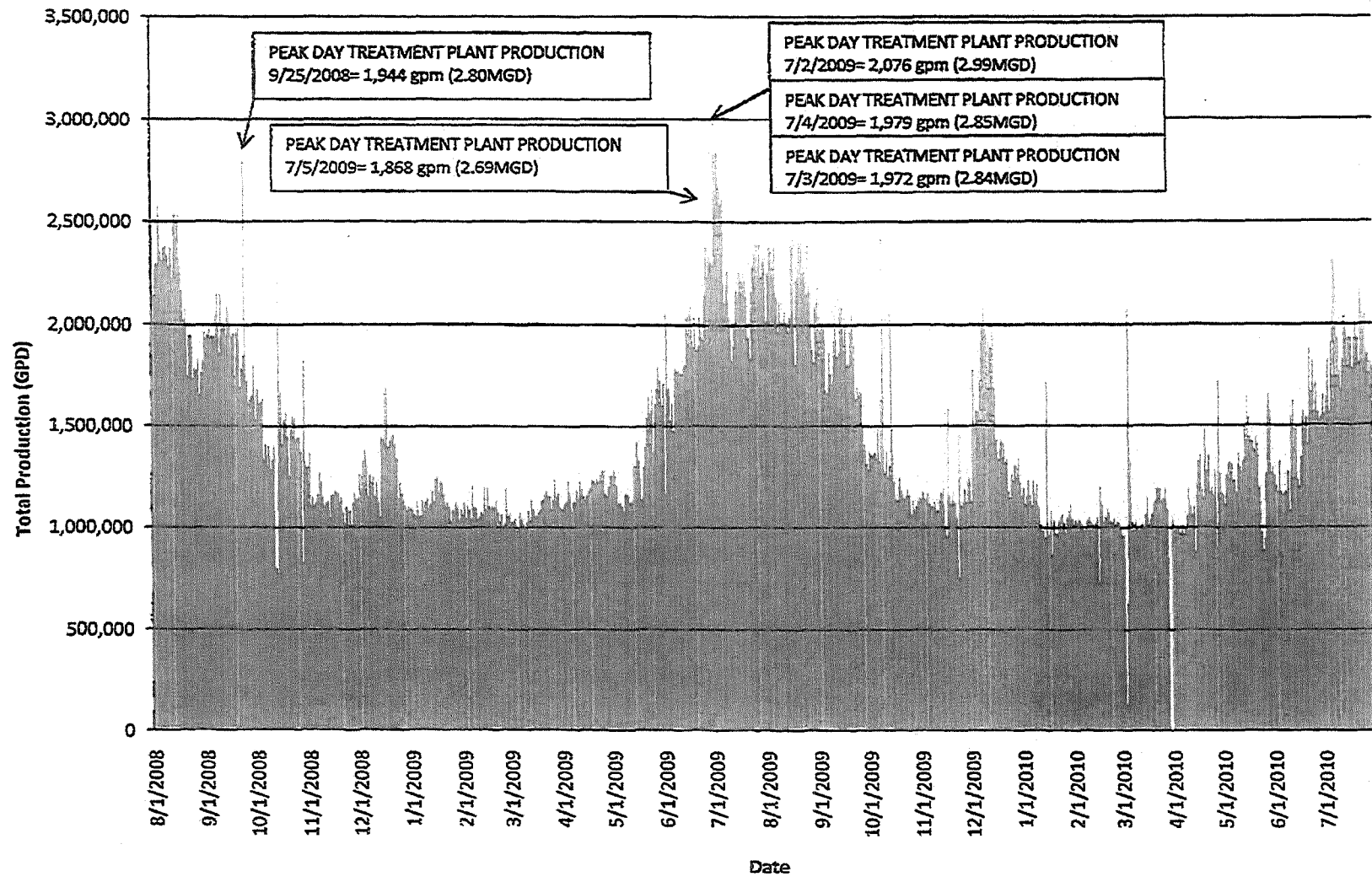


FIGURE II-3

# Diurnal Demand Profile (August 10, 2008)

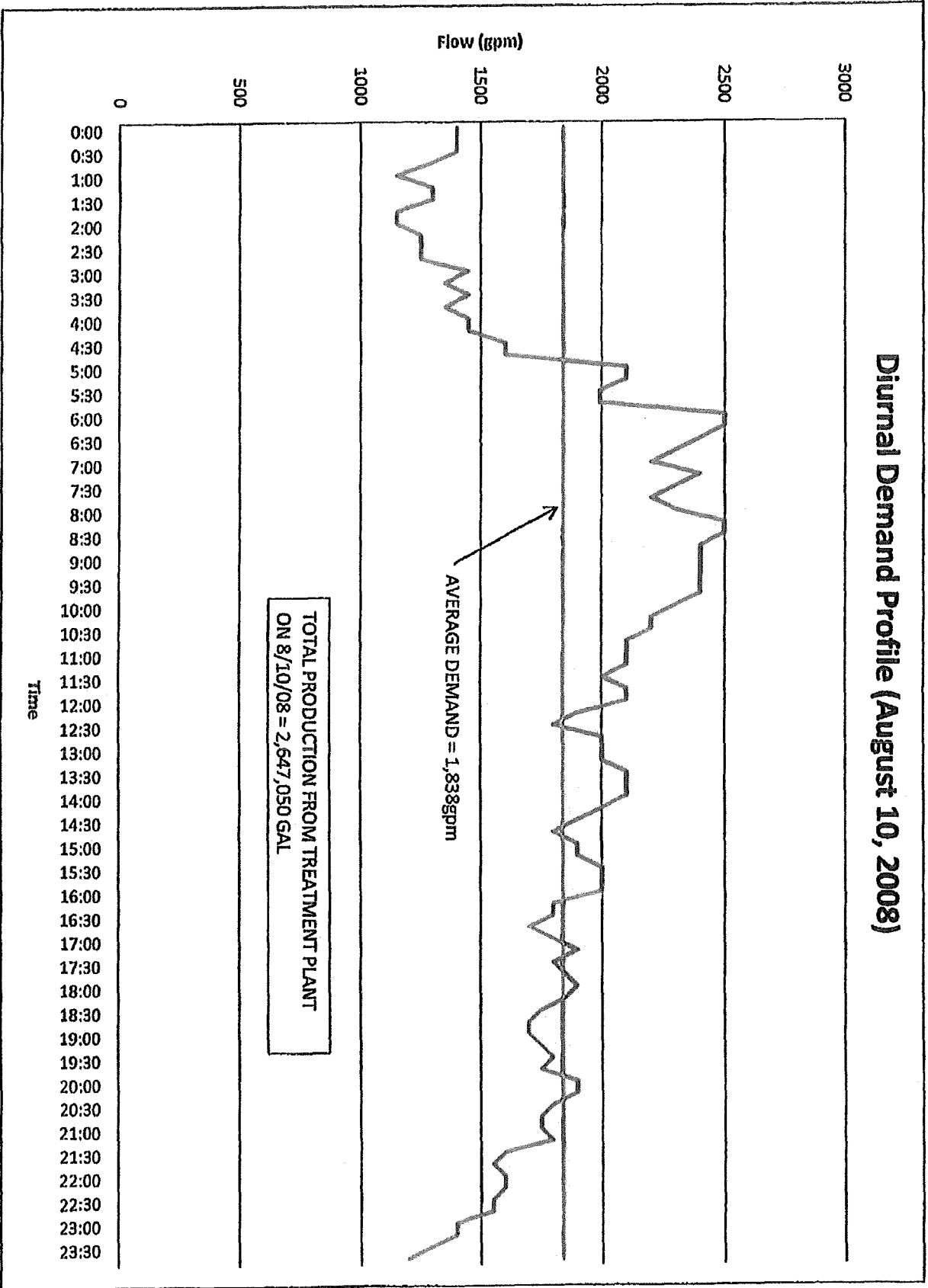


FIGURE II-4

# Diurnal Demand Profile (June 26, 2009)

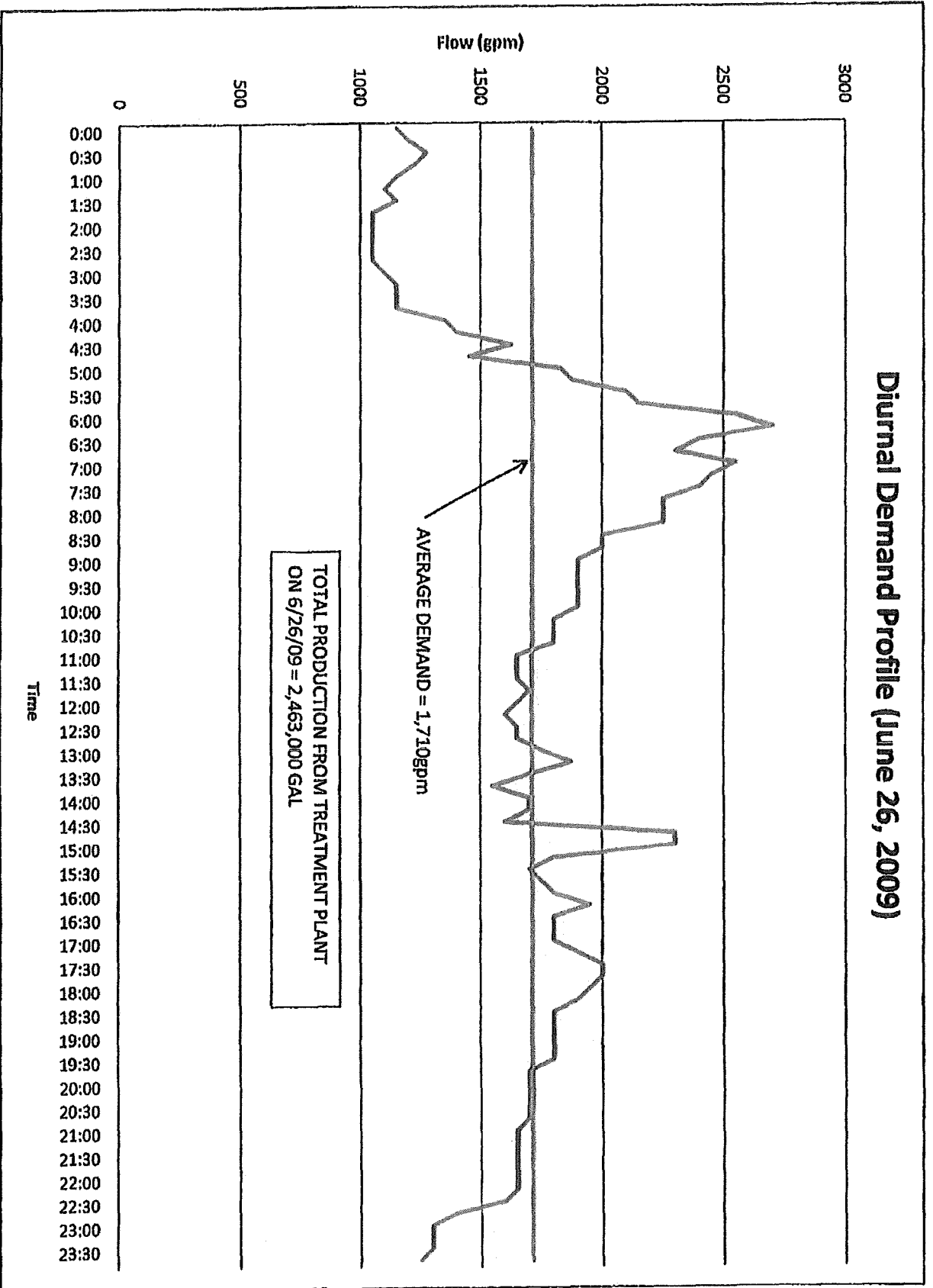


FIGURE II-5

### Diurnal Demand Profile (July 20, 2009)

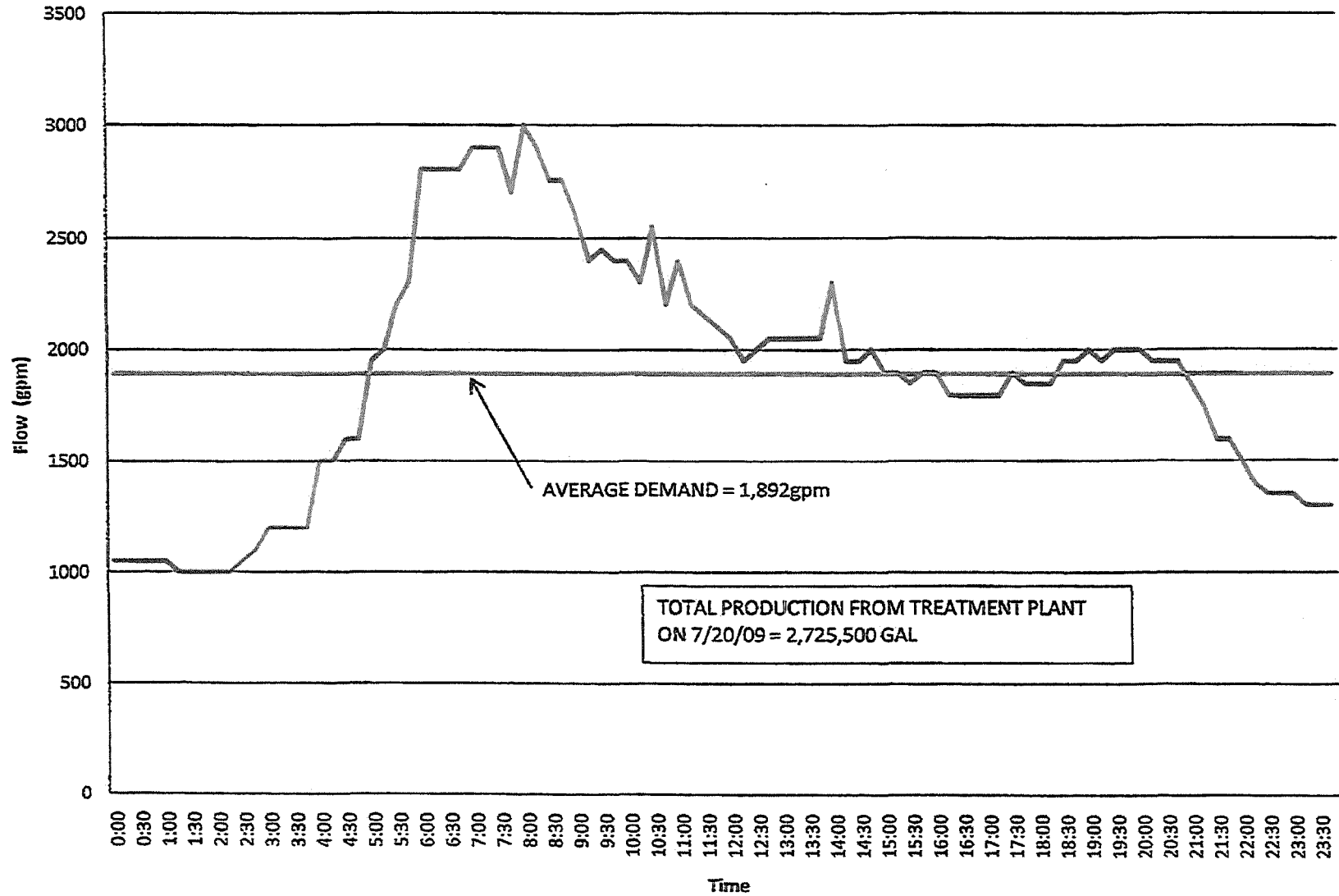


FIGURE II-6



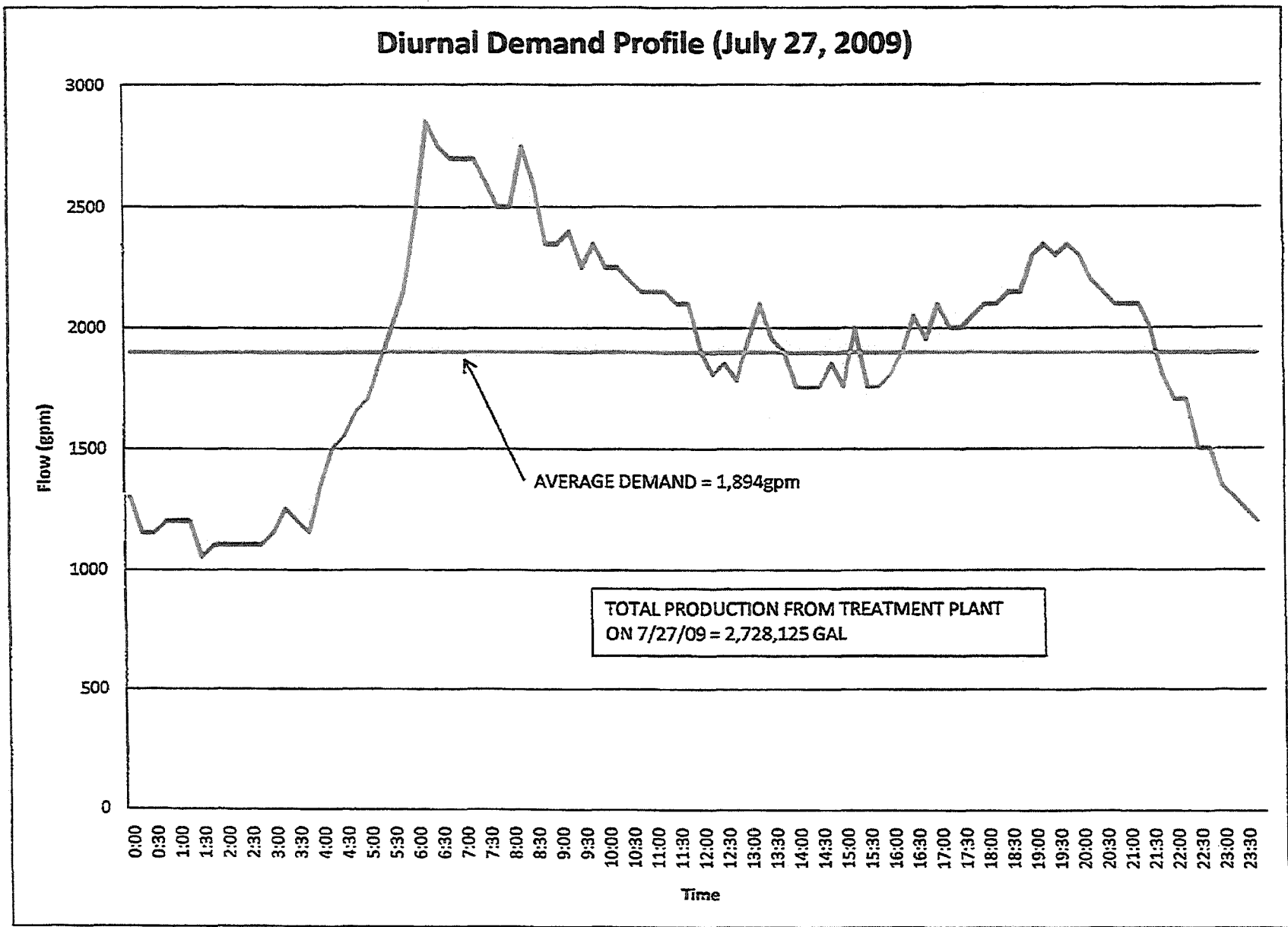


FIGURE II-7

### Diurnal Demand Profile (July 28, 2009)

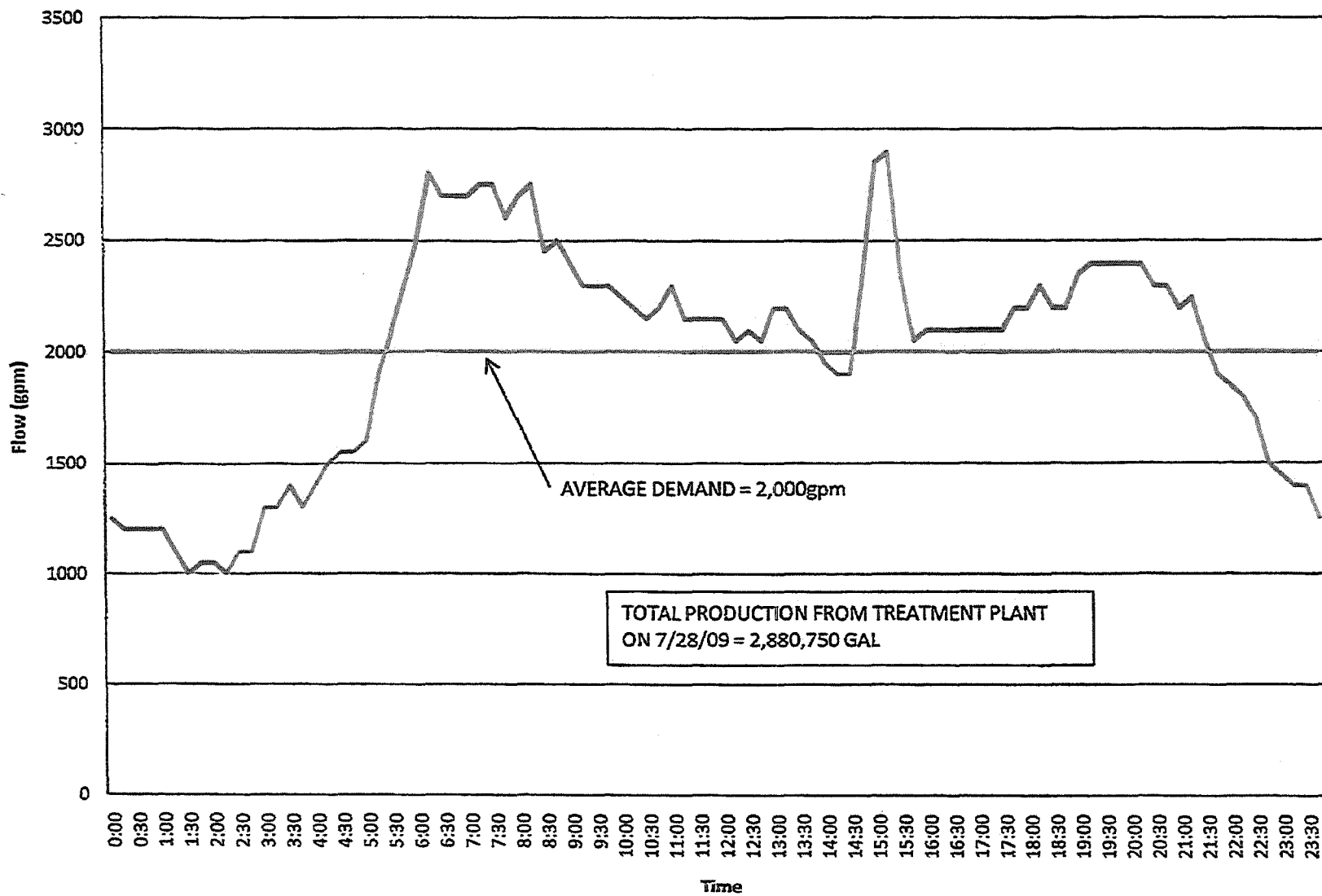


FIGURE II-8

### Peak Day Diurnal Demand Profile Based on July 2, 2009 Peak Day

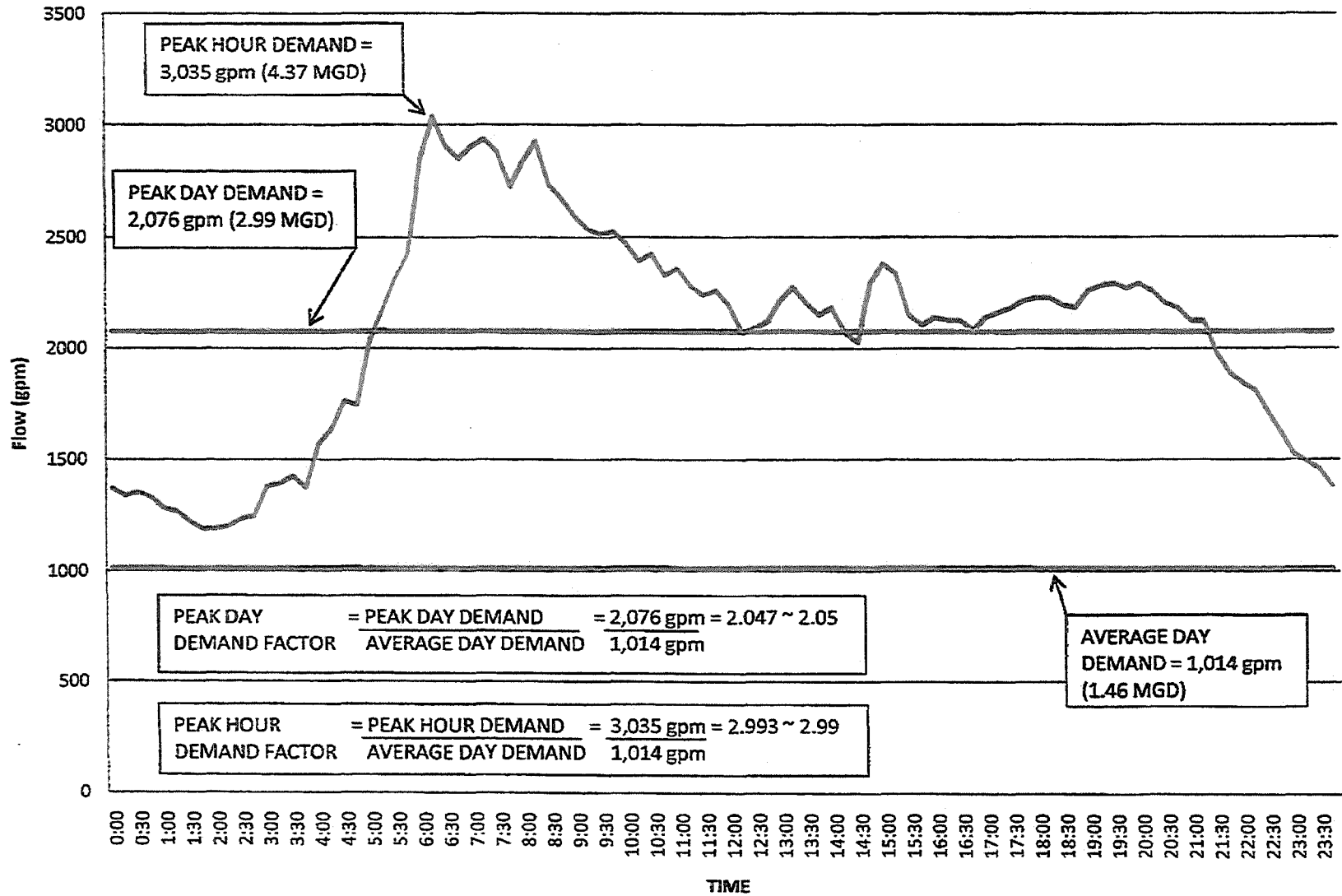


FIGURE II-9

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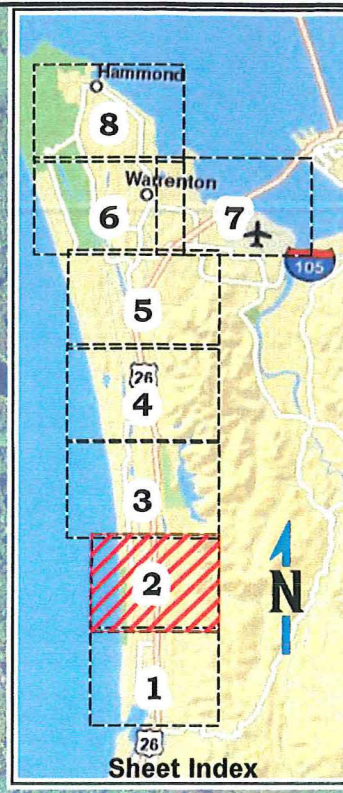
**Legend**

- Junction
- ⬮ 6" Hydrant
- Connection Points
- Tank
- 8" New Water Line
- - - 8" Remove & Replace Water Line
- 6" Existing Water Lines

**Service Area Notes:**

- All system service areas require minimum 1000 gpm capability.
- Outlined areas are recommended to have the identified higher fire flow capability.

- Area 1
- Area 2
- Area 3
- Area 4
- Area 5
- Area 6
- Area 7
- Area 8
- Area 9
- Area 10
- Area 11
- Camp Rilea
- Gearhart Service Area
- KOA Campground



City of Warrenton Oregon

**WHPacific**

**Fire Protection Areas & System Improvement Recommendations**

**Figure IV**  
**July, 2011**  
**Sheet 2 of 8**

0 500 1,000 2,000 Feet

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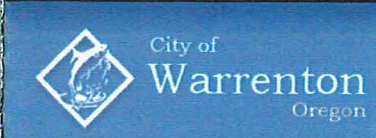
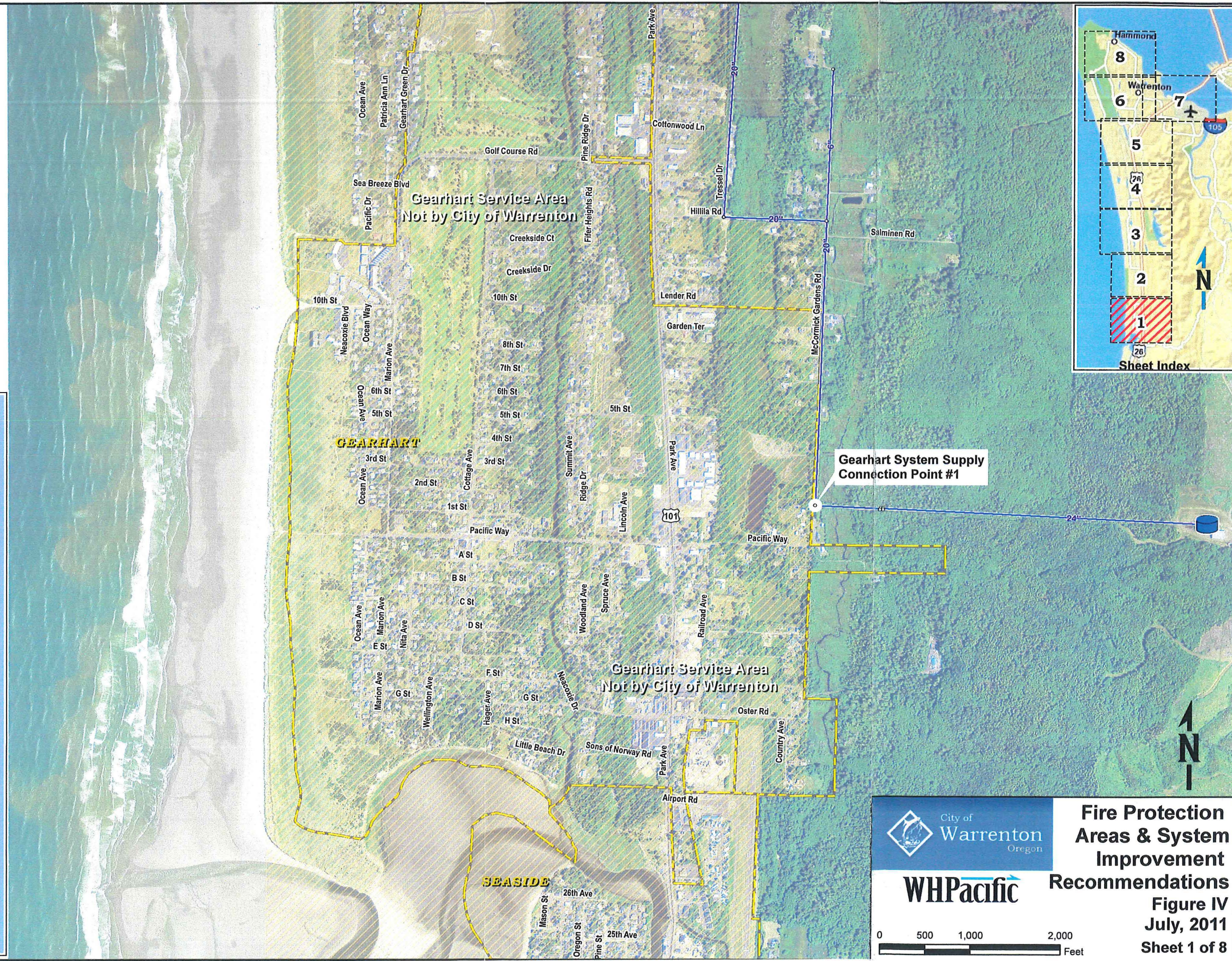
### Legend

- Junction
- ⊕ 6" Hydrant
- Connection Points
- Tank
- 8" --- New Water Line
- - - 8" - - - Remove & Replace Water Line
- 6" — Existing Water Lines

### Service Area Notes:

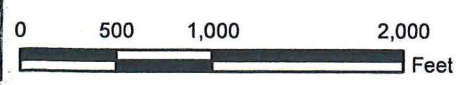
- All system service areas require minimum 1000 gpm capability.
- Outlined areas are recommended to have the identified higher fire flow capability.

- Area 1
- Area 2
- Area 3
- Area 4
- Area 5
- Area 6
- Area 7
- Area 8
- Area 9
- Area 10
- Area 11
- Camp Rilea
- Gearhart Service Area
- KOA Campground



## Fire Protection Areas & System Improvement Recommendations

Figure IV  
 July, 2011  
 Sheet 1 of 8



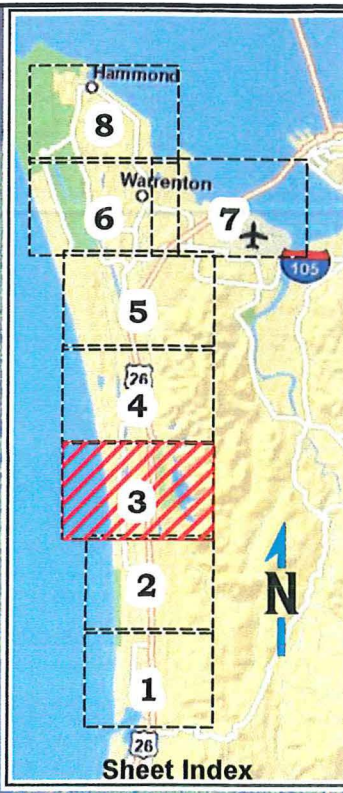
### Legend

- Junction
- ⊕ 6" Hydrant
- Connection Points
- Tank
- 8" --- New Water Line
- 8" - Remove & Replace Water Line
- 6" — Existing Water Lines

### Service Area Notes:

- All system service areas require minimum 1000 gpm capability.
- Outlined areas are recommended to have the identified higher fire flow capability.

Area 1
Area 2
Area 3
Area 4
Area 5
Area 6
Area 7
Area 8
Area 9
Area 10
Area 11
Camp Rilea
Gearhart Service Area
KOA Campground



City of  
**Warrenton**  
Oregon

## Fire Protection Areas & System Improvement Recommendations

**Figure IV**  
July, 2011  
Sheet 3 of 8

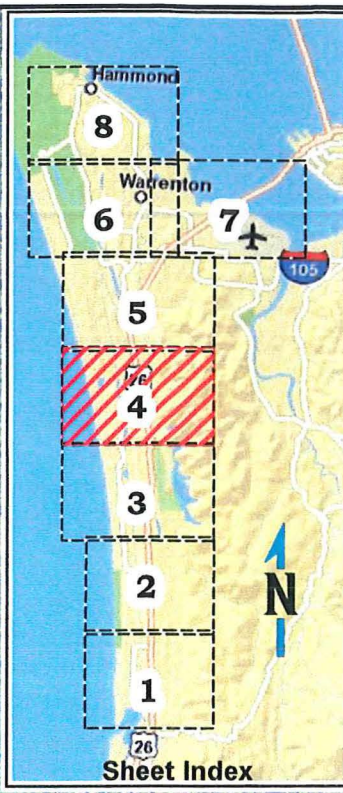


- Legend**
- Junction
  - ⊕ 6" Hydrant
  - Connection Points
  - Tank
  - 8" --- New Water Line
  - - - 8" - - - Remove & Replace Water Line
  - 6" — Existing Water Lines

**Service Area Notes:**

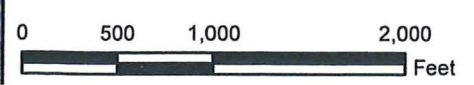
1. All system service areas require minimum 1000 gpm capability.
2. Outlined areas are recommended to have the identified higher fire flow capability.

- Area 1
- Area 2
- Area 3
- Area 4
- Area 5
- Area 6
- Area 7
- Area 8
- Area 9
- Area 10
- Area 11
- Camp Rilea
- Gearhart Service Area
- KOA Campground

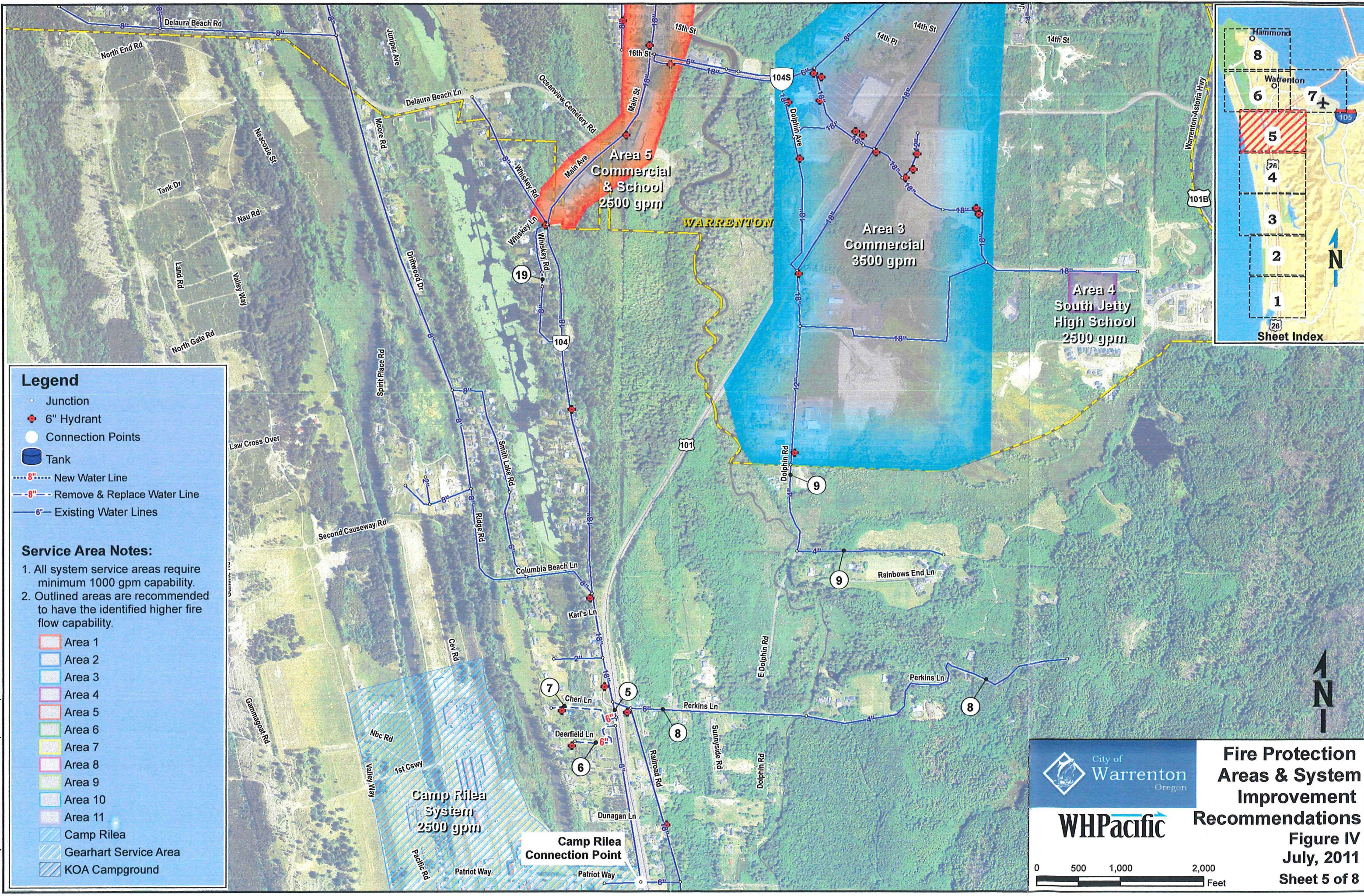


**Fire Protection Areas & System Improvement Recommendations**

**Figure IV**  
July, 2011  
Sheet 4 of 8



Author: K.Fournier  
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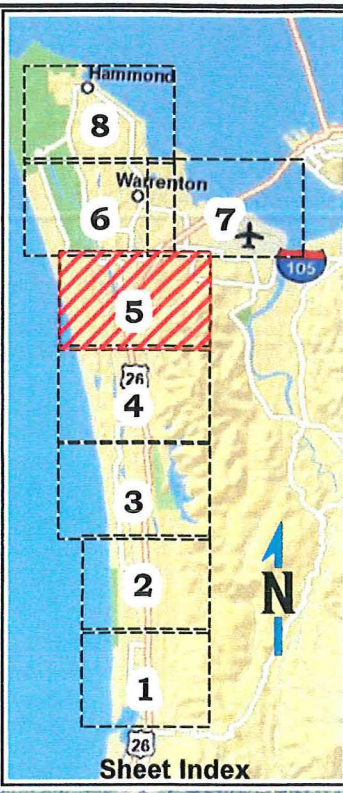
**Legend**

- Junction
- ⊕ 6" Hydrant
- Connection Points
- Tank
- 8" New Water Line
- - - 8" Remove & Replace Water Line
- 6" Existing Water Lines

**Service Area Notes:**

- All system service areas require minimum 1000 gpm capability.
- Outlined areas are recommended to have the identified higher fire flow capability.

- Area 1
- Area 2
- Area 3
- Area 4
- Area 5
- Area 6
- Area 7
- Area 8
- Area 9
- Area 10
- Area 11
- Camp Rilea
- Gearhart Service Area
- KOA Campground

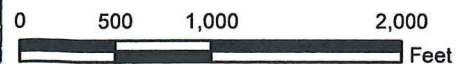


City of Warrenton Oregon

**WHPacific**

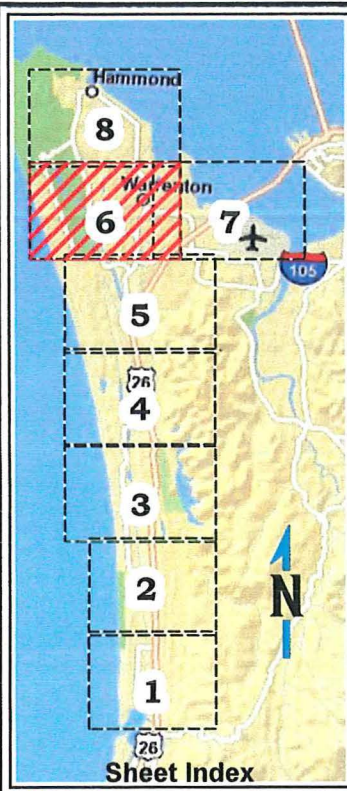
**Fire Protection Areas & System Improvements Recommendations**

Figure IV  
July, 2011  
Sheet 5 of 8



Author: K. Pournelle  
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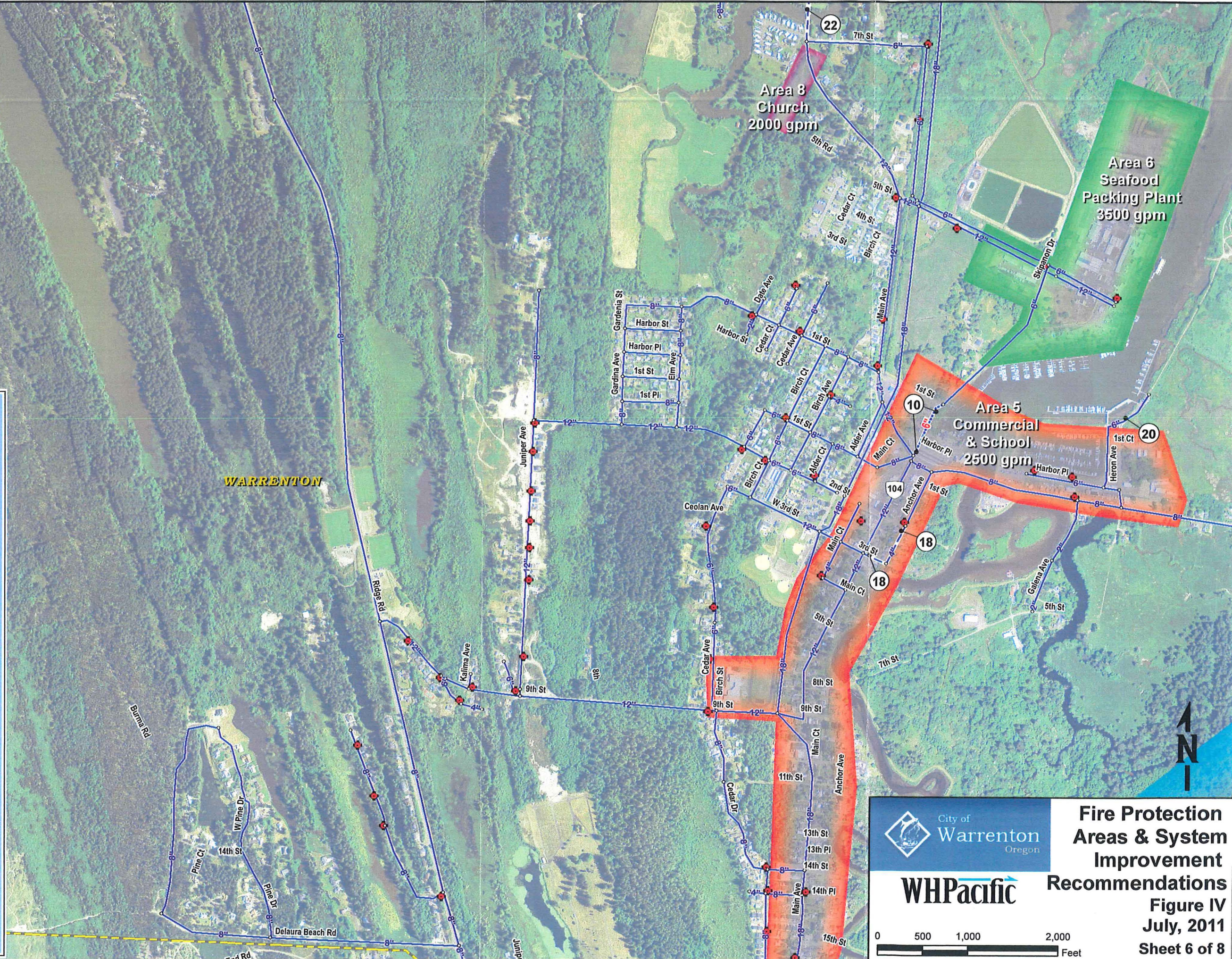
**Legend**

- Junction
- 6" Hydrant
- Connection Points
- Tank
- 8" New Water Line
- - - 8" Remove & Replace Water Line
- 6" Existing Water Lines

**Service Area Notes:**

1. All system service areas require minimum 1000 gpm capability.
2. Outlined areas are recommended to have the identified higher fire flow capability.

- Area 1
- Area 2
- Area 3
- Area 4
- Area 5
- Area 6
- Area 7
- Area 8
- Area 9
- Area 10
- Area 11
- Camp Rilea
- Gearhart Service Area
- KOA Campground



City of Warrenton Oregon

WHPacific

0 500 1,000 2,000 Feet

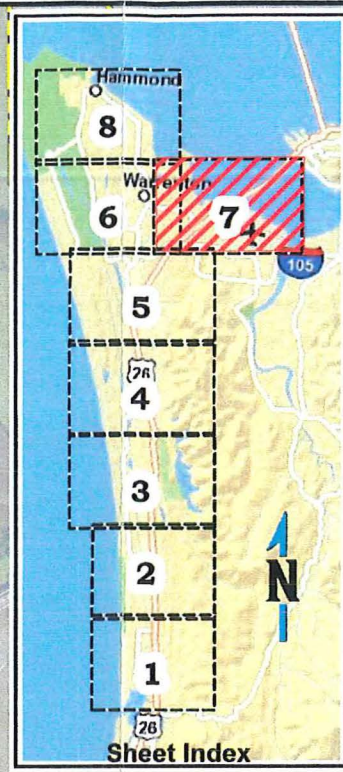
**Fire Protection Areas & System Improvement Recommendations**

**Figure IV**

**July, 2011**

**Sheet 6 of 8**

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Path: P:\City of Warrenton\035889\GIS\Maps\CoWImpBase6.mxd



**Legend**

- Junction
- ⊕ 6" Hydrant
- Connection Points
- ⊕ Tank
- 8" New Water Line
- - - 8" Remove & Replace Water Line
- 6" Existing Water Lines

**Service Area Notes:**

- All system service areas require minimum 1000 gpm capability.
- Outlined areas are recommended to have the identified higher fire flow capability.

- Area 1
- Area 2
- Area 3
- Area 4
- Area 5
- Area 6
- Area 7
- Area 8
- Area 9
- Area 10
- Area 11
- Camp Rilea
- Gearhart Service Area
- KOA Campground

City of Warrenton Oregon

**WHPacific**

**Fire Protection Areas & System Improvement Recommendations**

Figure IV  
 July, 2011  
 Sheet 7 of 8

0 500 1,000 2,000 Feet

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**Legend**

- Junction
- ⊕ 6" Hydrant
- Connection Points
- Tank
- 8" --- New Water Line
- - - 8" - - - Remove & Replace Water Line
- 6" — Existing Water Lines

**Service Area Notes:**

1. All system service areas require minimum 1000 gpm capability.
2. Outlined areas are recommended to have the identified higher fire flow capability.

- Area 1
- Area 2
- Area 3
- Area 4
- Area 5
- Area 6
- Area 7
- Area 8
- Area 9
- Area 10
- Area 11
- Camp Rilea
- Gearhart Service Area
- KOA Campground

City of Warrenton Oregon

**WHPacific**

**Fire Protection Areas & System Improvement Recommendations**

Figure IV  
 July, 2011  
 Sheet 8 of 8

0 500 1,000 2,000 Feet

# YEAR 2010 PEAK DAY SOUTH RESERVOIR LEVEL [2010PD]

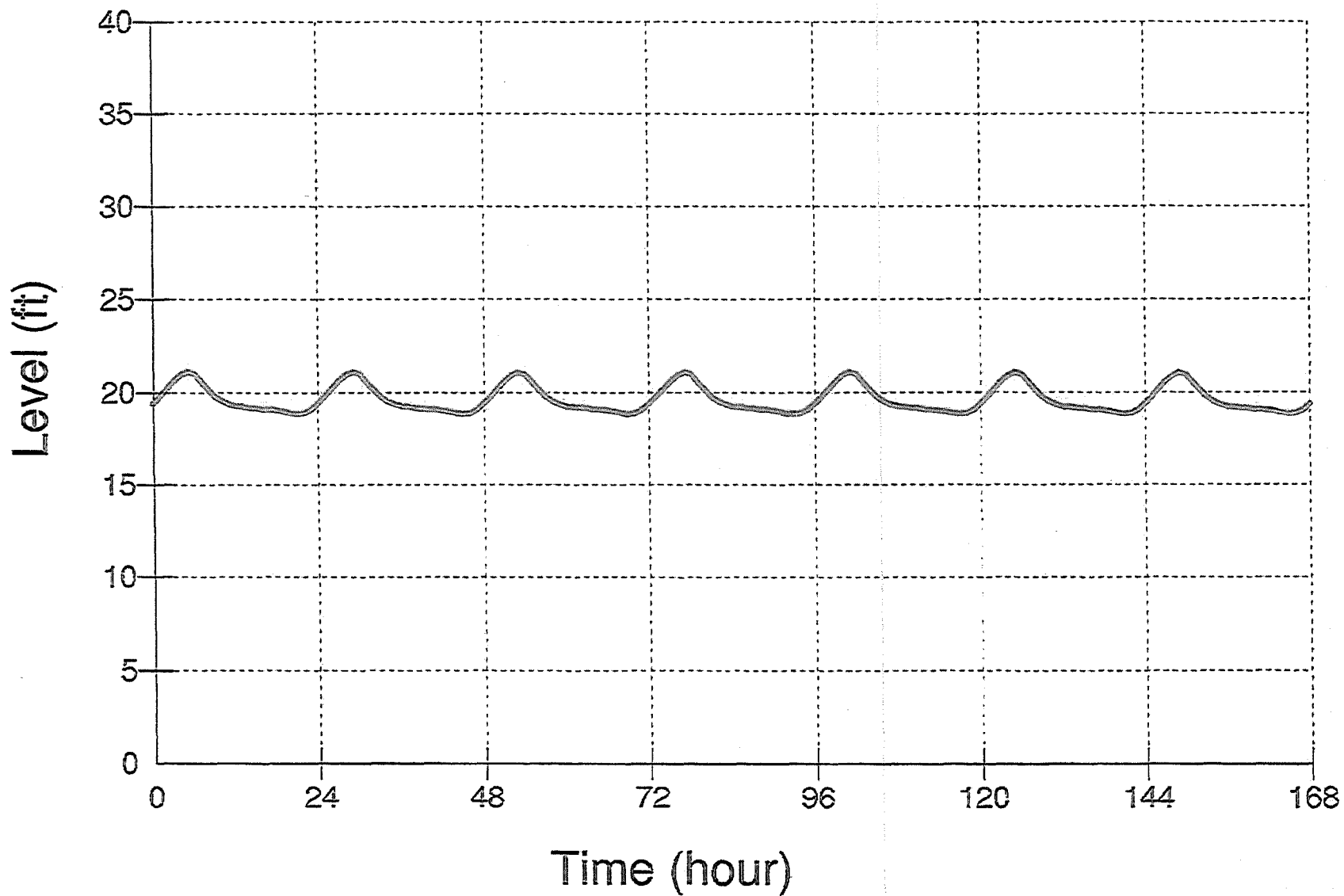


FIGURE IV-9

# YEAR 2010 PEAK DAY PUMP STATION OPERATION [2010PD]

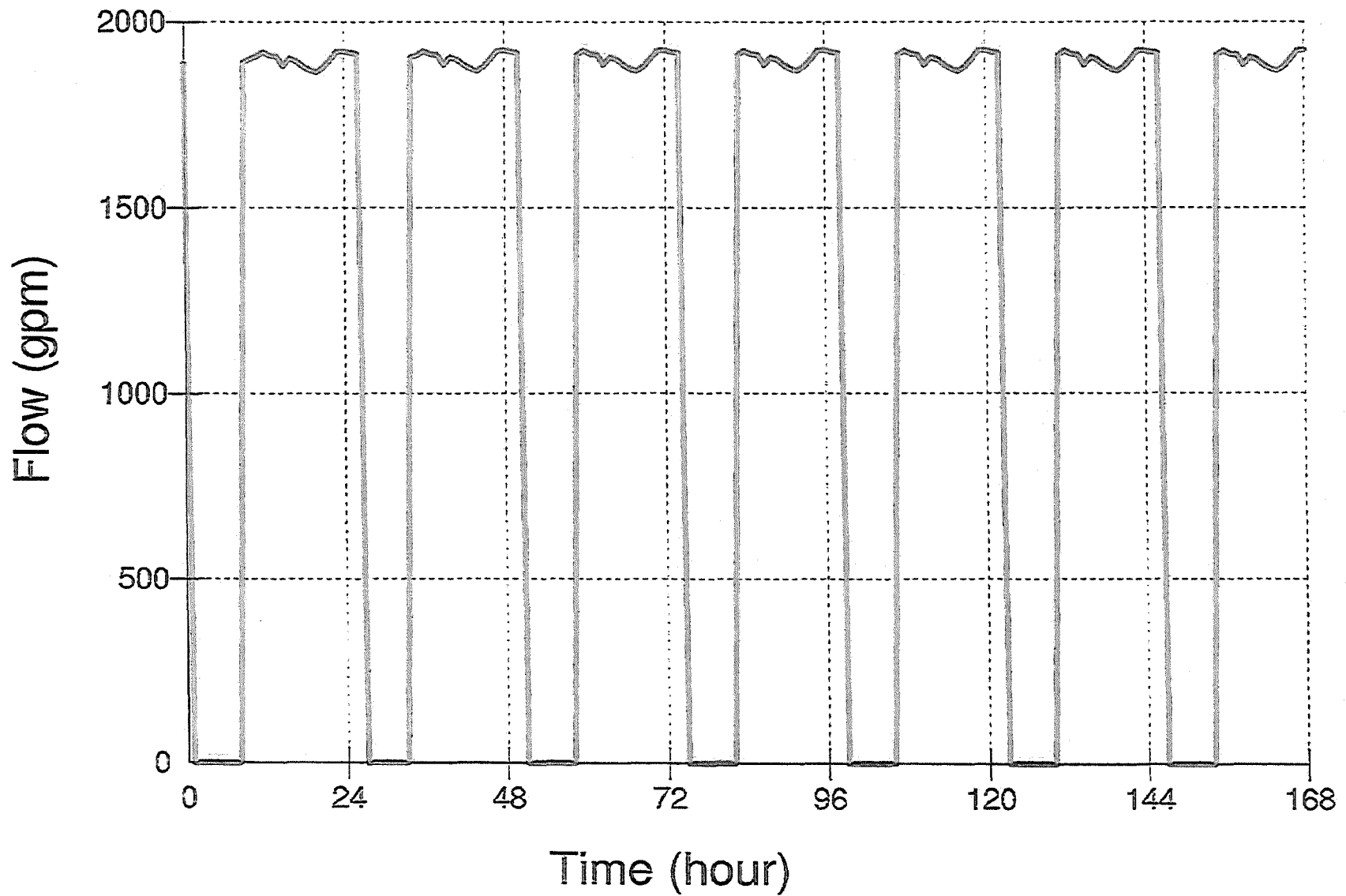


FIGURE IV-10

# YEAR 2010 PEAK DAY SOUTH RESERVOIR LEVEL [2010PD]

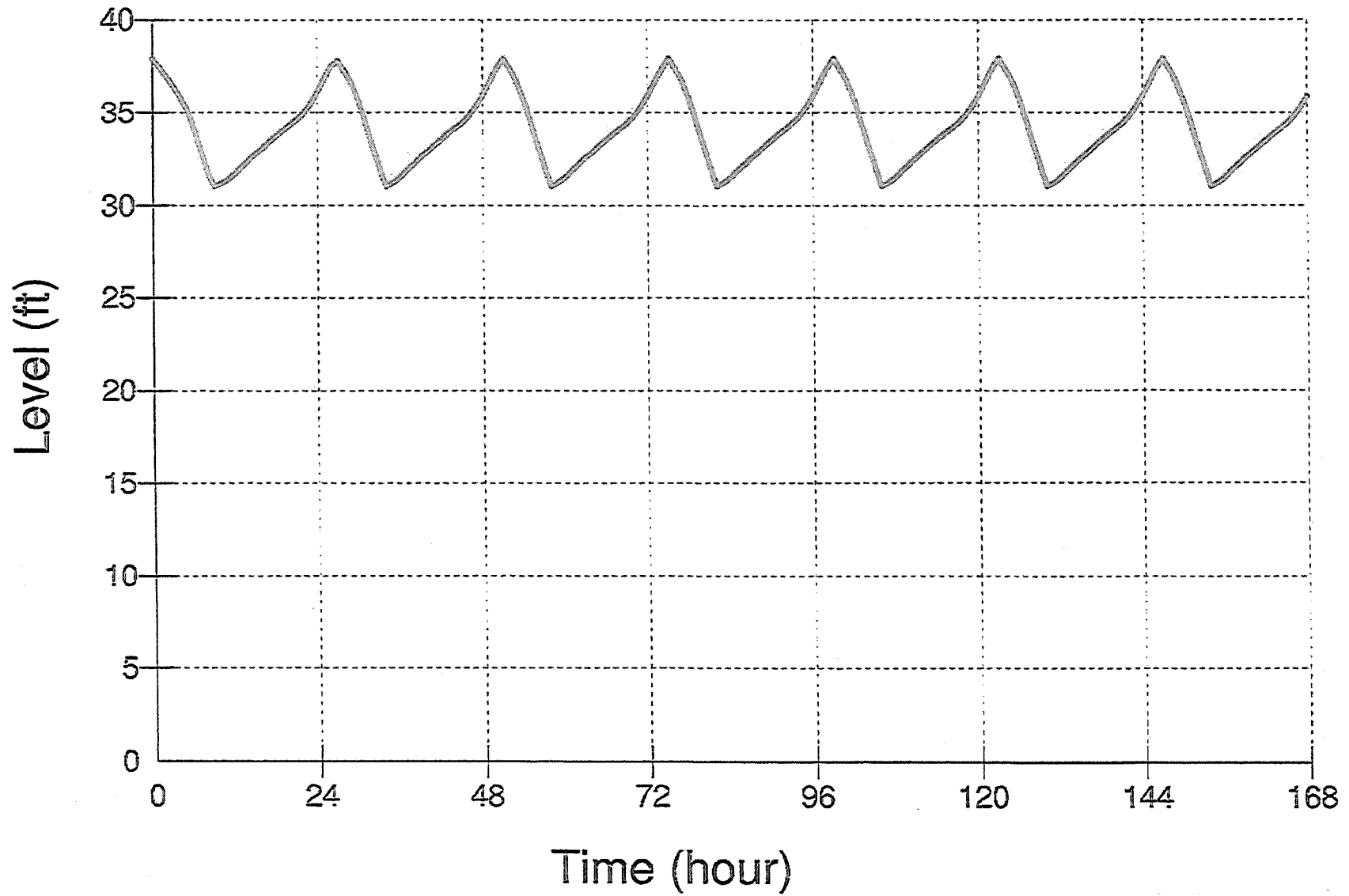


FIGURE IV-11

# APPENDIX B

## System Calibration Plan and Data Summary

**CITY OF WARRENTON HYDRAULIC MODEL  
WATER DISTRIBUTION SYSTEM FIELD CALIBRATION PLAN  
WHPACIFIC PROJECT NUMBER 035889**

**DATE: October 18, 2010**

**I. OBJECTIVE**

The procedure presented herein will be utilized to obtain pressure and flow information for the Warrenton water distribution system. The information will be obtained via field measurements and will be utilized to calibrate the computer model so that the computer simulations approximate the observed field conditions. Once the computer model results closely match the measured field conditions, the model will be ready for performing computer simulations.

**II. TESTING PROCEDURE OVERVIEW AND EQUIPMENT**

Field measurements will be performed late at night when the demand on the system is at its lowest. The actual tests (i.e. the opening of a particular fire hydrant to measure flow rate and simultaneous pressure measurements at several hydrants distributed throughout the system) will be performed between 10:00 pm and 5 am, approximately. For purposes of understanding the following discussion, a “flow hydrant” is used to flow water during the calibration testing, and a “pressure hydrant” is used to record static and residual pressures for each of the flow tests. Before the field testing begins, the following system preparation needs to be accomplished:

- Ensure that the water treatment plant reservoir level is full before the beginning of the calibration test.
- The Reservoir at the Water Treatment Plant will operate normally, but SCADA Level Control System needs to be modified to record the tank level at 1 minute intervals for the duration of the tests.
- Shut-down flow into and out of the Clatsop Reservoir and Harbor St. Tank.
- The PRV will operate normally. A digital pressure recorder will be installed to record pressures downstream of the PRV station during the test. The pressure recorder should be set to record at 30 second intervals.
- Shut-Down any automated parks irrigation systems.

Once the system preparation has been completed, the field testing procedures will occur by:

- Record static pressures at each of the 5 “pressure hydrant” locations before each “flow hydrant” is opened.
- Open 2-1/2” fire hydrant connection, wait a period of time until the pressure readings have stabilized throughout the system; then simultaneously record the flow rate (single “flow hydrant”) and pressures at a specified time. Pressures are recorded at all 5 “pressure hydrant” locations.



- Open 4-1/2” fire hydrant connection, wait a period of time until the pressure readings have stabilized throughout the system; then simultaneously record the flow rate (single “flow hydrant” and pressures at a specified time. Pressures are recorded at all 5 “pressure hydrant” locations.
- When deemed necessary, utilize the City provided hydrant diffuser.

Equipment set-up for pressure monitoring stations will consist of installing digital pressure recorders set to log pressures at 30 second intervals (at 4 un-manned hydrants & the PRV station) and installing tapped fire hydrant caps for 5 manned “pressure hydrants” at specific locations throughout the City water system. The tapped fire hydrant caps will be fitted with pressure gages and the pressure gages will be monitored by one person at each location. Pressure recorders will remain in place for the duration of the tests. The same nine (9) pressure monitoring stations will be used for each of the flow tests.

Equipment set-up for flow measurements will consist of a pitot gage and when deemed necessary by the City, a hydrant diffuser. A specific single “flow hydrant” will be opened and the flow measured concurrent with the pressure measurements at pressure monitoring stations. The location of the fire hydrant to be operated will change for each flow test.

During the tests, personnel will be provided with recording forms specific to the tests. Personnel will maintain radio contact at all times to allow for the simultaneous recording of pressure and flow data.

### III. TESTING STATION LOCATIONS

The following descriptions define the identification call out and location of the PRESSURE (P) and FLOW (F) FIRE HYDRANT STATIONS. Approximately six flow tests will be performed. This number may be adjusted as necessary to fit field conditions.

1. ALPHA-F Fire Hydrant located approximately at the intersection of Manion Dr. and Horizon Ln. Flow rates at this hydrant will be measured with a pitot gage.
2. BRAVO-F Fire Hydrant located at the intersection of Ridge Rd and Delaura Beach Ln. Flow rates at this hydrant will be measured with a pitot gage.
3. CHARLIE-F Fire Hydrant located on Pacific Dr. between King Salmon St and Iredale Dr. Flow rates at this hydrant will be measured with a pitot gage.
4. DELTA-F Fire Hydrant located on Fort Stevens Highway between NW 7<sup>th</sup> St. and NW 9<sup>th</sup> St. Flow rates at this hydrant will be measured with a pitot gage.
5. ECHO-F Fire Hydrant located in the parking lot of the Fred Meyer Store. Flow rates at this hydrant will be measured with a pitot gage.

- 6.FOXTROT-F Fire Hydrant located on Ensign Ln between Highway 101 and SE 19<sup>th</sup> St. This fire hydrant will be fitted with a tapped cap and pressure gage to measure static and residual pressures.
- 7.GOLF-P Fire Hydrant located approximately at the intersection of Manion Dr. and Horizon Ln. This fire hydrant will be fitted with a tapped cap and pressure gage to measure static and residual pressures.
- 8.HOTEL-P Fire Hydrant located at the intersection of Ridge Rd and Delaura Beach Ln. This fire hydrant will be fitted with a tapped cap and pressure gage to measure static and residual pressures.
9. INDIAN-P Fire Hydrant located on Fort Stevens Highway between NW 7<sup>th</sup> St. and NW 9<sup>th</sup> St.. This fire hydrant will be fitted with a tapped cap and pressure gage to measure static and residual pressures.
10. JULIET-P Fire Hydrant located in the parking lot of the Fred Meyer Store. This fire hydrant will be fitted with a tapped cap and pressure gage to measure static and residual pressures.
11. KILO – P Fire Hydrant located on Ensign Ln between Highway 101 and SE 19<sup>th</sup> St. This fire hydrant will be fitted with a tapped cap and pressure gage to measure static and residual pressures.

#### **IV. FIELD TESTING**

The tests will consist of recording system pressures under both static (no fire hydrants flowing) and residual conditions (fire hydrants flowing) for a flow test at each of the “flow hydrant” locations. During these tests, system pressures at each PRESSURE HYDRANT STATION and flow rates at the test FLOW HYDRANT STATION will be recorded.

##### **A. PROCEDURES**

Before the field testing begins, the following system preparation needs to be accomplished:

- Ensure that the water treatment plant reservoir level is full before the beginning of the calibration test.
- The Finish Flow Reservoir at the Water Treatment Plant will operate normally, but SCADA Level Control System needs to be modified to record tank levels at 30 second intervals for the duration of the tests.
- Shut-down flow into and out of the Clatsop Reservoir and Harbor St. Tank.

- The PRV will operate normally. A digital pressure recorder will be installed to record pressures downstream of the PRV during the test. The pressure recorder should be set to record at 30 second intervals.
- Shut-Down automated parks irrigation systems.
- Install one digital pressure recorder, set to record system pressure at 30 second intervals, at each of the following four fire hydrant locations:
  - Approximately the intersection of Lounsberry Ln and Dellmoor Loop
  - Approximately the intersection of Fort Stevens Highway and Columbia Beach Lane
  - Approximately the intersection of Lake Dr. and Fort Stevens Highway
  - Approximately the intersection of SW 2<sup>nd</sup> St. and S Main Ave.
- Install tapped fire hydrant caps with pressure gages at the following stations to permit recording static and residual pressures for each flow test:
  - GOLF
  - HOTEL
  - INDIAN
  - JULIET
  - KILO

Once the system preparation has taken place, the field testing will proceed by flowing hydrants 1 at a time at the following locations:

- ALPHA
- BRAVO
- CHARLIE
- DELTA
- ECHO
- FOXTROT

During each flow test:

- Record static pressures at each hydrant location before a flow hydrant is opened.
- Open 2-1/2" fire hydrant connection, wait a period of time until the pressure readings have stabilized throughout the system and simultaneously record the flow rate and pressures at a specified time. Pressures will be recorded at all "pressure hydrant" locations.
- Open 4-1/2" fire hydrant connection, wait a period of time until the pressure readings have stabilized throughout the system and simultaneously record the flow rate and pressures at a specified time. Pressures will be recorded at all "pressure hydrant" locations.
- When deemed necessary, utilized City provided hydrant diffuser.

**B. PERSONNEL REQUIRED (4 City of Warrenton, 2 WHPacific – ABQ, 2 WHPacific - Portland)**

5 people to read “pressure hydrant” pressure gages (3 City of Warrenton, 2 WHPacific Portland Office).

3 people to operate fire hydrants, obtain pitot gage readings and measure pressures at adjacent hydrants for each tests (1 City of Warrenton, 2 WHPacific ABQ Office)

**C. SYSTEM EQUIPMENT**

5 pressure gages with 4 ½" dial (provided by WHPacific).

5 Digital Pressure Recorders (3 provided by WHPacific and 2 provided by City of Warrenton).

1 pitot gage (provided by WHPacific).

1 hydrant diffuser (provided by City of Warrenton).

Fire hydrant valve wrenches – 6 total (provided by City of Warrenton).

Miscellaneous tools for installing/removing pressure gages (provided by WHPacific and City of Warrenton).

6 radios (provided by City of Warrenton). Radios must allow communications with all personnel during the testing.

5 tapped fire hydrant caps (provided by WHPacific)

**V. SAFETY PLAN**

The following safety procedures and equipment are an integral part of the field testing work.

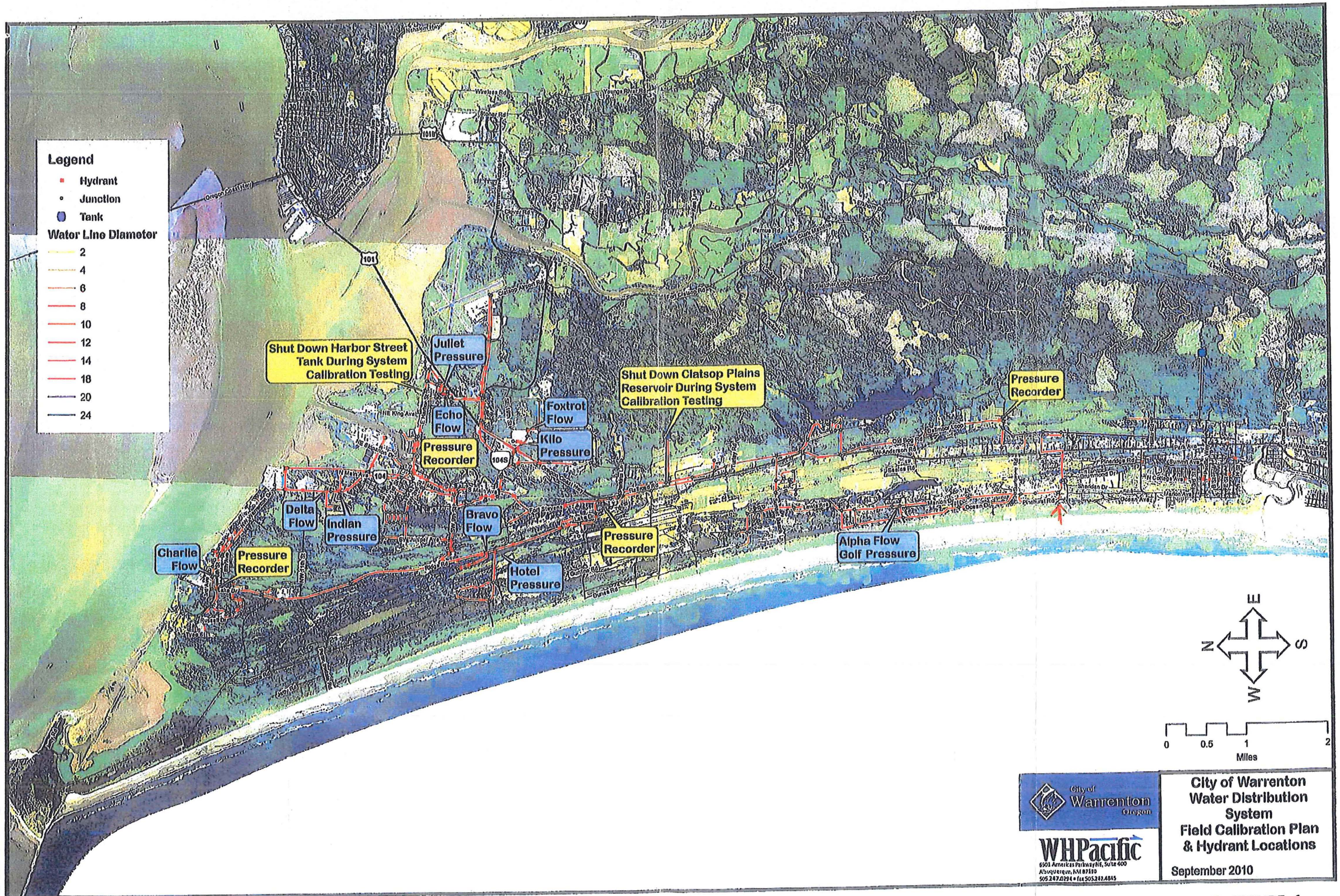
**A. EQUIPMENT (For all personnel participating in the testing)**

1. Hard hats
2. Safety vests
3. Safety shoes
4. Safety glasses
5. Flashlights
6. Radios
7. Clipboards
8. Traffic Cones

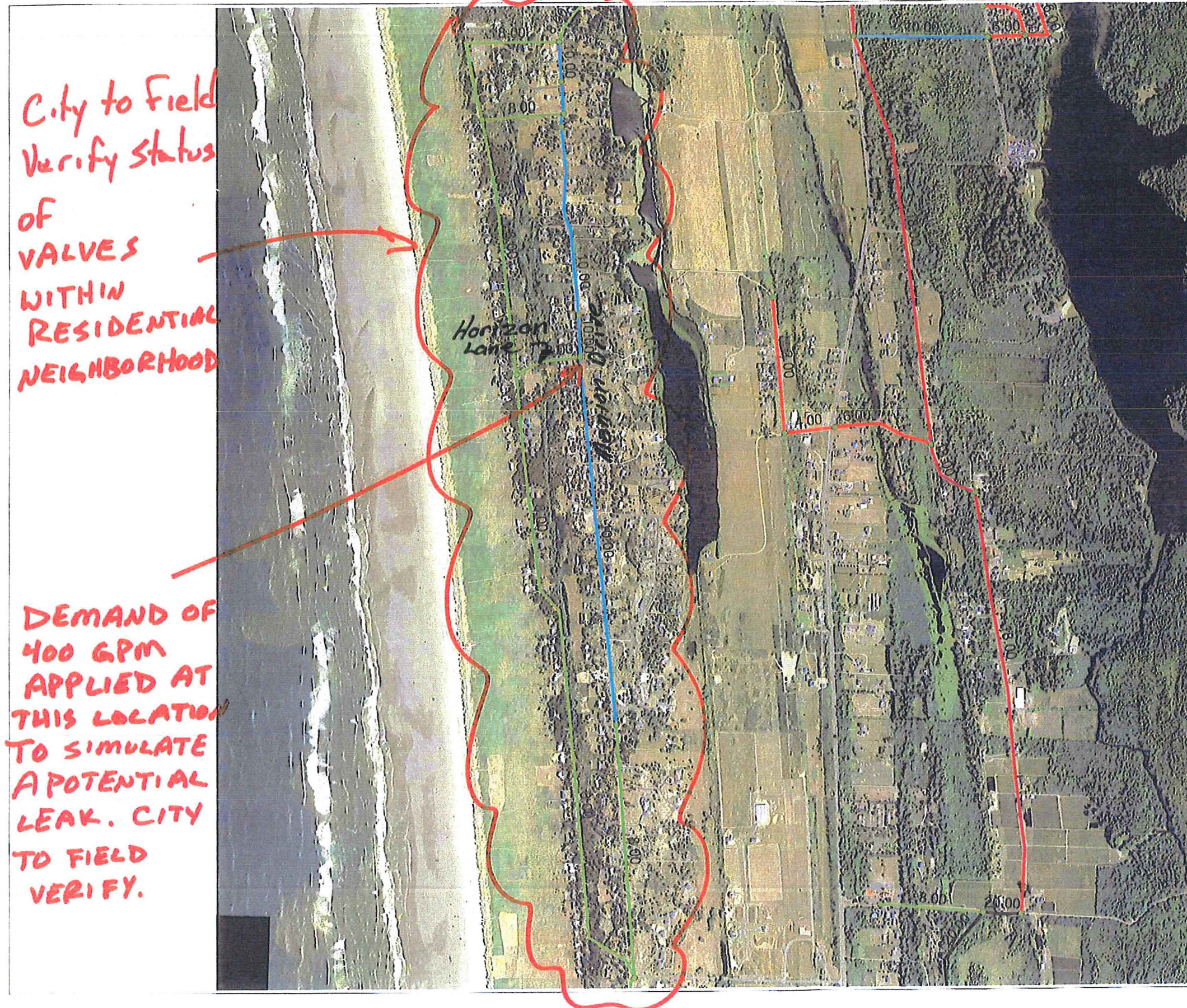
**B. PROCEDURE**

1. Safety equipment shall be worn at all times.
2. All valve and fire hydrant operations shall be performed by City of Warrenton personnel per City standard procedures.
3. Determine direction of fire hydrant flow stream and ensure that private/public property will not be severely damaged. City of Warrenton will advise if selected fire hydrants are not adequate or present problems.
4. Prior to removing fire hydrant cap, ensure hydrant is shut-off.
5. Open and close fire hydrant valves slowly and fully to prevent damage to waterlines.
6. In case of emergency, contact 911. The nearest Hospital is Columbia Memorial Hospital located at 2111 Exchange Street, Astoria, OR
7. Public Notification: Issue a public notice ahead of the test to make Police, Fire Department, residents and businesses aware that testing will take place, water flows will be on streets and water may be cloudy or colored for a short time.

Map Document: Pathy of Warrenton\GIS\Projects\Warrenton\_FWC\Calb.mxd  
Sep 01, 2010 - 12:42:05 PM - By: KFORUM - WHPacific, Inc.



APPENDIX B, FIGURE 1



City to Field  
Verify Status  
of  
VALVES  
WITHIN  
RESIDENTIAL  
NEIGHBORHOOD

DEMAND OF  
400 GPM  
APPLIED AT  
THIS LOCATION  
TO SIMULATE  
A POTENTIAL  
LEAK. CITY  
TO FIELD  
VERIFY.



**JUNCTION (MOTYPE)**

- Active
- Domain

**TANK (MOTYPE)**

- ⊕ Active Tank
- ⊖ Domain Tank
- ⊕ Active Reservoir
- ⊖ Domain Reservoir

**PIPE (VALUE)**

- less than 6.22
- 6.22 ~ 8.44
- 8.44 ~ 10.66
- 10.66 ~ 12.88
- 12.88 ~ 15.11
- 15.11 ~ 17.33
- 17.33 ~ 19.55
- 19.55 ~ 21.77
- greater than 21.77

**PUMP (MOTYPE)**

- ⚡ Active
- ⚡ Domain

**VALVE (MOTYPE)**

- ⚡ Active
- ⚡ Domain

APPENDIX B, FIGURE 2



**JUNCTION (MOTYPE)**

- Active
- Domain

**TANK (MOTYPE)**

- Active Tank
- Domain Tank
- ▭ Active Réservoir
- ▭ Domain Reservoir

**PIPE (VALUE)**

- less than 6.22
- 6.22 ~ 8.44
- 8.44 ~ 10.66
- 10.66 ~ 12.88
- 12.88 ~ 15.11
- 15.11 ~ 17.33
- 17.33 ~ 19.55
- 19.55 ~ 21.77
- greater than 21.77

**PUMP (MOTYPE)**

- ⚡ Active
- ⚡ Domain

**VALVE (MOTYPE)**

- ⚡ Active
- ⚡ Domain

CITY TO FIELD VERIFY STATUS OF VALVES ALONG SW 9TH ST. BETWEEN RIDGE RD AND JUNIPER AVE.

APPENDIX B, FIGURE 3



CITY OF WARRENTON WATER SYSTEM - CLEAR WELL REDUCED ZONE

System Calibration Spreadsheet  
 Prepared by: Roy Gallea

TEST NO.	STATION LOCATION	MEASURED HEADLOSS RELATIVE TO CLEAR WELL PRV				CALCULATED HEADLOSS RELATIVE TO CLEAR WELL PRV			RATIO HLM/HLC	DELTA PRES (PSI)	COMMENTS
		STA ELEV (FT)	STA PRES (PSI)	STA HGL (FT)	HLM (FT)	CALC PRES (PSI)	CALC HGL (FT)	HLC (FT)			
ALPHA-S	NO FLOW	0	GALLONS								
J-858	J-860; GOLF	30.5	74	201.2	33.3	77.9	210.3	24.2	1.38	-3.9	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	64	208.6	25.9	69.6	221.5	13.0	1.99	-5.6	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	91	226.9	7.6	88.6	221.4	13.2	0.58	2.4	pump at Harbor St. is not flowing
	J-872; JULIET	23	88	226.0	8.5	86.9	223.6	10.9	0.78	1.1	pump at Harbor St. is not flowing
	J-430; KILO	45	72	211.1	23.4	76.6	221.7	12.8	1.82	-4.6	pump at Harbor St. is not flowing
	J-110; WHP 1	19.32	86	217.7	16.8	87.4	220.9	13.6	1.23	-1.4	pump at Harbor St. is not flowing
	J-168; WHP 2	57.16	69	216.3	18.2	71.6	222.4	12.2	1.50	-2.6	
	J-136; WHP 3	25	89	230.3	4.2	85.2	221.5	13.1	0.32	3.8	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	86	227.0	7.5	87.2	229.9	4.6	1.62	-1.2	
	J-212; COW 2	22	92	234.2	0.3	92.0	234.2	0.3	1.00	0.0	
	CLEAR WELL PRV HGL			234.52							
ALPHA-1	Q=1,036 GPM	5,180	GALLONS								
J-858	J-860; GOLF	30.5	52	150.5	84.1	48.9	143.4	91.2	0.92	3.1	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	62	204.0	30.5	63.0	206.4	28.1	1.08	-1.0	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	89	222.3	12.2	82.0	206.2	28.3	0.43	7.0	pump at Harbor St. is not flowing
	J-872; JULIET	23	85	219.1	15.4	80.4	208.4	26.1	0.59	4.6	pump at Harbor St. is not flowing
	J-430; KILO	45	70	206.5	28.0	70.0	206.5	28.1	1.00	0.0	pump at Harbor St. is not flowing
	J-110; WHP 1	19.32	84	213.1	21.4	80.8	205.7	28.8	0.74	3.2	pump at Harbor St. is not flowing
	J-168; WHP 2	57.16	67	211.7	22.8	65.0	207.2	27.4	0.83	2.0	
	J-136; WHP 3	25	88	228.0	6.5	78.6	206.3	28.3	0.23	9.4	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	85	224.7	9.8	83.9	222.3	12.3	0.80	1.1	
	J-212; COW 2	22	92	234.2	0.3	92.0	234.2	0.3	1.00	0.0	
	CLEAR WELL PRV HGL			234.52							
ALPHA-2	Q=1,537 GPM	7,685	GALLONS								
J-858	J-860; GOLF	30.5	28	95.1	139.4	31.9	104.1	130.4	1.07	-3.9	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	54	185.6	48.9	59.3	197.7	36.8	1.33	-5.3	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	82	206.2	28.3	78.3	197.5	37.0	0.77	3.8	pump at Harbor St. is not flowing
	J-872; JULIET	23	79	205.3	29.3	76.6	199.7	34.8	0.84	2.4	pump at Harbor St. is not flowing
	J-430; KILO	45	64	192.6	41.9	66.3	197.8	36.7	1.14	-2.3	pump at Harbor St. is not flowing
	J-110; WHP 1	19.32	78	199.3	35.3	77.1	197.1	37.4	0.94	1.0	pump at Harbor St. is not flowing
	J-168; WHP 2	57.16	62	200.2	34.3	61.3	198.5	36.0	0.95	0.7	
	J-136; WHP 3	25	84	218.8	15.7	74.8	197.6	36.9	0.43	9.2	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	82	217.8	16.7	81.9	217.5	17.1	0.98	0.2	
	J-212; COW 2	22	92	234.2	0.3	92.0	234.2	0.3	1.00	0.0	
	CLEAR WELL PRV HGL			234.52							

CITY OF WARRENTON WATER SYSTEM - CLEAR WELL REDUCED ZONE

System Calibration Spreadsheet  
 Prepared by: Roy Gallea

TEST NO.	STATION LOCATION	MEASURED HEADLOSS RELATIVE TO CLEAR WELL PRV				CALCULATED HEADLOSS RELATIVE TO CLEAR WELL PRV			RATIO HLM/HLC	DELTA PRES (PSI)	COMMENTS
		STA ELEV (FT)	STA PRES (PSI)	STA HGL (FT)	HLM (FT)	CALC PRES (PSI)	CALC HGL (FT)	HLC (FT)			
BRAVO-S NO FLOW		0 GALLONS									
J-344	J-860; GOLF	30.5	75	203.5	31.0	77.9	210.3	24.2	1.28	-2.9	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	64	208.6	25.9	69.6	221.5	13.0	1.99	-5.6	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	92	229.2	5.3	88.6	221.4	13.2	0.40	3.4	pump at Harbor St. is not flowing
	J-872; JULIET	22	88	225.0	9.5	86.9	222.6	11.9	0.80	1.1	pump at Harbor St. is not flowing
	J-430; KILO	45	72	211.1	23.4	76.6	221.7	12.8	1.82	-4.6	pump at Harbor St. is not flowing
	J-110; WHP 1	19.32	87	220.0	14.5	87.4	220.9	13.6	1.06	-0.4	pump at Harbor St. is not flowing
	J-168; WHP 2	57.16	70	218.7	15.9	71.6	222.4	12.2	1.31	-1.6	
	J-136; WHP 3	25	89	230.3	4.2	85.2	221.5	13.1	0.32	3.8	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	86	227.0	7.5	87.2	229.9	4.6	1.62	-1.2	
	J-212; COW 2	22	92	234.2	0.3	92.0	234.2	0.3	1.00	0.0	
CLEAR WELL PRV HGL				234.52							
BRAVO-1 Q=1,062 GPM		5,310 GALLONS									
J-344	J-860; GOLF	30.5	62	173.5	61.0	68.2	187.8	46.7	1.31	-6.2	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	40	153.3	81.2	36.0	144.1	90.4	0.90	4.0	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	78	196.9	37.6	74.2	188.3	46.2	0.81	3.8	pump at Harbor St. is not flowing
	J-872; JULIET	22	75	195.0	39.5	73.0	190.4	44.1	0.90	2.0	pump at Harbor St. is not flowing
	J-430; KILO	45	59	181.1	53.4	62.7	189.6	44.9	1.19	-3.7	pump at Harbor St. is not flowing
	J-110; WHP 1	19.32	71	183.1	51.4	67.9	176.0	58.5	0.88	3.1	pump at Harbor St. is not flowing
	J-168; WHP 2	57.16	63	202.5	32.0	58.5	192.1	42.4	0.76	4.5	
	J-136; WHP 3	25	85	221.1	13.4	71.0	188.8	45.7	0.29	14.0	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	85	224.7	9.8	83.5	221.2	13.3	0.74	1.5	
	J-212; COW 2	22	92	234.2	0.3	92.0	234.2	0.3	1.00	0.0	
CLEAR WELL PRV HGL				234.52							
BRAVO-2 Q=1,440 GPM		7,200 GALLONS									
J-344	J-860; GOLF	30.5	60	168.9	63.3	63.5	177.0	55.2	1.15	-3.5	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	15	95.6	136.6	14.9	95.4	136.8	1.00	0.1	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	66	169.3	62.9	67.2	172.0	60.2	1.05	-1.2	pump at Harbor St. is not flowing
	J-872; JULIET	22	64	169.6	62.6	66.2	174.6	57.6	1.09	-2.2	pump at Harbor St. is not flowing
	J-430; KILO	45	49	158.0	74.2	55.9	173.9	58.3	1.27	-6.9	pump at Harbor St. is not flowing
	J-110; WHP 1	19.32	63	164.7	67.5	57.8	152.7	79.5	0.85	5.2	pump at Harbor St. is not flowing
	J-168; WHP 2	57.16	54	181.7	50.5	52.1	177.3	54.9	0.92	1.9	
	J-136; WHP 3	25	74	195.7	36.5	64.0	172.7	59.5	0.61	10.0	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	81	215.5	16.7	81.7	217.1	15.1	1.11	-0.7	
	J-212; COW 2	22	91	231.9	0.3	92.0	234.2	-2.0	-0.13	-1.0	
CLEAR WELL PRV HGL				232.21							

CITY OF WARRENTON WATER SYSTEM - CLEAR WELL REDUCED ZONE

System Calibration Spreadsheet  
 Prepared by: Roy Gallea

TEST NO.	STATION LOCATION	MEASURED HEADLOSS RELATIVE TO CLEAR WELL PRV				CALCULATED HEADLOSS RELATIVE TO CLEAR WELL PRV			RATIO HLM/HLC	DELTA PRES (PSI)	COMMENTS
		STA ELEV (FT)	STA PRES (PSI)	STA HGL (FT)	HLM (FT)	CALC PRES (PSI)	CALC HGL (FT)	HLC (FT)			
CHARLIE-S		NO FLOW									
		0 GALLONS									
J-716	J-860; GOLF	30.5	74	201.2	33.3	77.9	210.3	24.2	1.38	-3.9	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	64	208.6	25.9	69.6	221.5	13.0	1.99	-5.6	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	92	229.2	5.3	88.6	221.4	13.2	0.40	3.4	pump at Harbor St. is not flowing
	J-872; JULIET	22	88	225.0	9.5	86.9	222.6	11.9	0.80	1.1	pump at Harbor St. is not flowing
	J-430; KILO	45	72	211.1	23.4	76.6	221.7	12.8	1.82	-4.6	pump at Harbor St. is not flowing
	J-110; WHP 1	19.32	87	220.0	14.5	87.4	220.9	13.6	1.06	-0.4	pump at Harbor St. is not flowing
	J-168; WHP 2	57.16	70	218.7	15.9	71.6	222.4	12.2	1.31	-1.6	
	J-136; WHP 3	25	89	230.3	4.2	85.2	221.5	13.1	0.32	3.8	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	86	227.0	7.5	87.2	229.9	4.6	1.62	-1.2	
	J-212; COW 2	22	92	234.2	0.3	92.0	234.2	0.3	1.00	0.0	
		CLEAR WELL PRV HGL				234.52					
CHARLIE-1		Q=1,139 GPM									
		5,695 GALLONS									
J-716	J-860; GOLF	30.5	64	178.1	56.4	67.3	185.7	48.8	1.16	-3.3	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	46	167.1	67.4	50.2	176.9	57.6	1.17	-4.2	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	74	187.7	46.8	71.4	181.7	52.8	0.89	2.6	pump at Harbor St. is not flowing
	J-872; JULIET	22	74	192.7	41.8	70.9	185.7	48.9	0.86	3.1	pump at Harbor St. is not flowing
	J-430; KILO	45	57	176.5	58.0	60.7	185.0	49.5	1.17	-3.7	pump at Harbor St. is not flowing
	J-110; WHP 1	19.32	52	139.3	95.2	50.9	136.8	97.7	0.97	1.1	pump at Harbor St. is not flowing
	J-168; WHP 2	57.16	60	195.6	38.9	57.3	189.3	45.2	0.86	2.7	
	J-136; WHP 3	25	80	209.6	25.0	68.7	183.5	51.0	0.49	11.3	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	83	220.1	14.4	83.1	220.4	14.1	1.02	-0.1	
	J-212; COW 2	22	92	234.2	0.3	92.0	234.2	0.3	1.00	0.0	
		CLEAR WELL PRV HGL				234.52					
CHARLIE-2		Q=1,721 GPM									
		8,605 GALLONS									
J-716	J-860; GOLF	30.5	60	168.9	65.6	60.8	170.7	63.8	1.03	-0.8	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	36	144.1	90.5	35.2	142.3	92.3	0.98	0.8	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	63	162.3	72.2	58.8	152.5	82.0	0.88	4.3	pump at Harbor St. is not flowing
	J-872; JULIET	22	64	169.6	64.9	59.4	159.0	75.6	0.86	4.6	pump at Harbor St. is not flowing
	J-430; KILO	45	48	155.7	78.8	49.2	158.5	76.0	1.04	-1.2	pump at Harbor St. is not flowing
	J-110; WHP 1	19.32	26	79.3	155.2	18.2	61.3	173.3	0.90	7.8	pump at Harbor St. is not flowing
	J-168; WHP 2	57.16	54	181.7	52.8	47.0	165.6	68.9	0.77	7.0	
	J-136; WHP 3	25	73	193.4	41.1	56.7	155.9	78.6	0.52	16.3	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	82	217.8	16.7	80.3	213.8	20.7	0.81	1.7	
	J-212; COW 2	22	92	234.2	0.3	92.0	234.2	0.3	1.00	0.0	
		CLEAR WELL PRV HGL				234.52					

CITY OF WARRENTON WATER SYSTEM - CLEAR WELL REDUCED ZONE

System Calibration Spreadsheet  
 Prepared by: Roy Gallea

TEST NO.	STATION LOCATION	MEASURED HEADLOSS RELATIVE TO CLEAR WELL PRV				CALCULATED HEADLOSS RELATIVE TO CLEAR WELL PRV			RATIO HLM/HLC	DELTA PRES (PSI)	COMMENTS
		STA ELEV (FT)	STA PRES (PSI)	STA HGL (FT)	HLM (FT)	CALC PRES (PSI)	CALC HGL (FT)	HLC (FT)			
DELTA-S		NO FLOW									
		0 GALLONS									
J-690	J-860; GOLF	30.5	79	212.8	21.8	77.9	210.3	24.2	0.90	1.1	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	68	217.9	16.6	69.6	221.5	13.0	1.28	-1.6	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	96	238.5	-4.0	88.6	221.4	13.2	-0.30	7.4	pump at Harbor St. is not flowing
	J-872; JULIET	22	91	231.9	2.6	86.9	222.6	11.9	0.22	4.1	pump at Harbor St. is not flowing
	J-430; KILO	45	75	218.0	16.5	76.6	221.7	12.8	1.28	-1.6	pump at Harbor St. is not flowing
	J-110; WHP 1	19.32	90	227.0	7.6	87.4	220.9	13.6	0.56	2.6	pump at Harbor St. is not flowing
	J-168; WHP 2	57.16	72	223.3	11.3	71.6	222.4	12.2	0.93	0.4	
	J-136; WHP 3	25	89	230.3	4.2	85.2	221.5	13.1	0.32	3.8	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	87	229.3	5.2	87.2	229.9	4.6	1.12	-0.2	
	J-212; COW 2	22	92	234.2	0.3	92.0	234.2	0.3	1.00	0.0	
		CLEAR WELL PRV HGL				234.52					
DELTA-1		Q=1,188 GPM									
		5,940 GALLONS									
J-690	J-860; GOLF	30.5	62	173.5	61.0	66.7	184.4	50.1	1.22	-4.7	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	46	167.1	67.4	52.6	182.3	52.2	1.29	-6.6	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	68	173.9	60.6	69.0	176.2	58.3	1.04	-1.0	pump at Harbor St. is not flowing
	J-872; JULIET	22	70	183.5	51.0	69.7	182.9	51.6	0.99	0.3	pump at Harbor St. is not flowing
	J-430; KILO	45	54	169.6	64.9	59.5	182.3	52.2	1.24	-5.5	pump at Harbor St. is not flowing
	J-110; WHP 1	19.32	66	171.6	62.9	67.8	175.6	58.9	1.07	-1.8	pump at Harbor St. is not flowing
	J-168; WHP 2	57.16	58	191.0	43.6	56.5	187.4	47.1	0.92	1.5	
	J-136; WHP 3	25	80	209.6	25.0	67.4	180.4	54.1	0.46	12.6	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	83	220.1	14.4	82.9	219.9	14.6	0.99	0.1	
	J-212; COW 2	22	92	234.2	0.3	92.0	234.2	0.3	1.00	0.0	
		CLEAR WELL PRV HGL				234.52					
DELTA-2		Q=2,111 GPM									
		10,555 GALLONS									
J-690	J-860; GOLF	30.5	54	155.1	74.8	59.6	168.0	61.9	1.21	-5.6	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	32	134.8	95.1	36.8	145.9	84.0	1.13	-4.8	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	48	127.7	102.2	49.2	130.5	99.4	1.03	-1.2	Field Personnel noticed gauge bouncing between 44 and 50 psi rapidly
	J-872; JULIET	22	57	153.5	76.4	54.1	146.8	83.1	0.92	2.9	pump at Harbor St. flowing 123gpm at 106TDH
	J-430; KILO	45	42	141.9	88.0	43.8	146.0	83.9	1.05	-1.8	pump at Harbor St. flowing 123gpm at 106TDH
	J-110; WHP 1	19.32	45	123.1	106.8	48.3	130.7	99.2	1.08	-3.3	pump at Harbor St. flowing 123gpm at 106TDH
	J-168; WHP 2	57.16	43	156.4	73.5	42.8	155.9	74.0	0.99	0.2	
	J-136; WHP 3	25	59	161.1	68.8	50.6	141.7	88.2	0.78	8.4	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	78	208.6	21.3	79.0	210.9	19.0	1.12	-1.0	
	J-212; COW 2	22	90	229.6	0.3	92.0	234.2	-4.3	-0.06	-2.0	
		CLEAR WELL PRV HGL				229.90					

CITY OF WARRENTON WATER SYSTEM - CLEAR WELL REDUCED ZONE

System Calibration Spreadsheet  
 Prepared by: Roy Gallea

TEST NO.	STATION LOCATION	MEASURED HEADLOSS RELATIVE TO CLEAR WELL PRV				CALCULATED HEADLOSS RELATIVE TO CLEAR WELL PRV			RATIO HLM/HLC	DELTA PRES (PSI)	COMMENTS
		STA ELEV (FT)	STA PRES (PSI)	STA HGL (FT)	HLM (FT)	CALC PRES (PSI)	CALC HGL (FT)	HLC (FT)			
ECHO-S NO FLOW		0 GALLONS									
J-366	J-860; GOLF	30.5	76	205.8	28.7	77.9	210.3	24.2	1.18	-1.9	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	64	208.6	25.9	69.6	221.5	13.0	1.99	-5.6	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	92	229.2	5.3	86.6	221.4	13.2	0.40	3.4	pump at Harbor St. is not flowing
	J-872; JULIET	22	88	225.0	9.5	86.9	222.6	11.9	0.80	1.1	pump at Harbor St. is not flowing
	J-430; KILO	45	73	213.4	21.1	76.6	221.7	12.8	1.64	-3.6	pump at Harbor St. is not flowing
	J-110; WHP 1	19.32	86	217.7	16.8	87.4	220.9	13.6	1.23	-1.4	pump at Harbor St. is not flowing
	J-168; WHP 2	57.16	67	211.7	22.8	71.6	222.4	12.2	1.87	-4.6	
	J-136; WHP 3	25	85	221.1	13.4	85.2	221.5	13.1	1.03	-0.2	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	85	224.7	9.8	87.2	229.9	4.6	2.12	-2.2	
	J-212; COW 2	22	92	234.2	0.3	92.0	234.2	0.3	1.00	0.0	
	CLEAR WELL PRV HGL			234.52							
ECHO-1 Q=1,278 GPM		6,390 GALLONS									
J-366	J-860; GOLF	30.5	62	173.5	58.7	65.6	181.8	50.4	1.16	-3.6	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	48	171.7	60.5	52.8	182.8	49.4	1.22	-4.8	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	72	183.1	49.1	69.5	177.3	54.9	0.89	2.5	pump at Harbor St. is not flowing
	J-872; JULIET	22	64	169.6	62.6	63.0	167.4	64.8	0.97	1.0	pump at Harbor St. is not flowing
	J-430; KILO	45	53	167.3	64.9	57.4	177.4	54.8	1.18	-4.4	pump at Harbor St. is not flowing
	J-110; WHP 1	19.32	69	178.5	53.7	68.3	177.0	55.2	0.97	0.7	pump at Harbor St. is not flowing
	J-168; WHP 2	57.16	54	181.7	50.5	54.9	183.9	48.3	1.04	-0.9	
	J-136; WHP 3	25	73	193.4	38.8	66.1	177.5	54.7	0.71	6.9	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	81	215.5	16.7	82.5	219.0	13.2	1.26	-1.5	
	J-212; COW 2	22	91	231.9	0.3	92.0	234.2	-2.0	-0.13	-1.0	
	CLEAR WELL PRV HGL			232.21							
ECHO-2 Q=3,222 GPM		16,110 GALLONS									
J-366	J-860; GOLF	30.5	60	168.9	63.3	60.8	170.8	61.4	1.03	-0.8	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	44	162.5	69.7	43.4	161.0	71.2	0.96	0.6	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	68	173.9	58.3	60.7	157.1	75.1	0.78	7.3	Pumps at Harbor St. Flowing 1,276gpm at a TDH of 104ft
	J-872; JULIET	22	60	160.4	71.8	51.0	139.6	92.6	0.78	9.0	Pumps at Harbor St. Flowing 1,276gpm at a TDH of 104ft
	J-430; KILO	45	50	160.4	71.9	48.4	156.7	75.5	0.95	1.6	Pumps at Harbor St. Flowing 1,276gpm at a TDH of 104ft
	J-110; WHP 1	19.32	67	173.9	58.3	59.7	157.0	75.2	0.78	7.3	Pumps at Harbor St. Flowing 1,276gpm at a TDH of 104ft
	J-168; WHP 2	57.16	52	177.1	55.1	47.3	166.3	65.9	0.84	4.7	
	J-136; WHP 3	25	70	186.5	45.7	57.3	157.2	75.0	0.61	12.7	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	81	215.5	16.7	80.4	214.1	18.1	0.92	0.6	
	J-212; COW 2	22	91	231.9	0.3	92.0	234.2	-2.0	-0.13	-1.0	
	CLEAR WELL PRV HGL			232.21							

CITY OF WARRENTON WATER SYSTEM - CLEAR WELL REDUCED ZONE

System Calibration Spreadsheet  
 Prepared by: Roy Gallea

TEST NO.	STATION LOCATION	MEASURED HEADLOSS RELATIVE TO CLEAR WELL PRV				CALCULATED HEADLOSS RELATIVE TO CLEAR WELL PRV			RATIO HLM/HLC	DELTA PRES (PSI)	COMMENTS
		STA ELEV (FT)	STA PRES (PSI)	STA HGL (FT)	HLM (FT)	CALC PRES (PSI)	CALC HGL (FT)	HLC (FT)			
		0 GALLONS									
FOXTROT-S J-428	NO FLOW J-860; GOLF	30.5	78	210.4	24.1	77.9	210.3	24.2	0.99	0.1	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	65	211.0	23.6	69.6	221.5	13.0	1.82	-4.6	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	94	233.9	0.7	88.6	221.4	13.2	0.05	5.4	pump at Harbor St. is not flowing
	J-872; JULIET	22	90	229.6	4.9	86.9	222.6	11.9	0.41	3.1	pump at Harbor St. is not flowing
	J-430; KILO	45	74	215.7	18.8	76.6	221.7	12.8	1.46	-2.6	pump at Harbor St. is not flowing
	J-110; WHP 1	19.32	87	220.0	14.5	87.4	220.9	13.6	1.06	-0.4	pump at Harbor St. is not flowing
	J-168; WHP 2	57.16	70	218.7	15.9	71.6	222.4	12.2	1.31	-1.6	
	J-136; WHP 3	25	89	230.3	4.2	85.2	221.5	13.1	0.32	3.8	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	86	227.0	7.5	87.2	229.9	4.6	1.62	-1.2	
	J-212; COW 2	22	92	234.2	0.3	92.0	234.2	0.3	1.00	0.0	
	CLEAR WELL PRV HGL			234.52							
		5,695 GALLONS									
FOXTROT-1 J-428	Q=1,139 GPM J-860; GOLF	30.5	60	168.9	65.6	67.3	185.7	48.8	1.34	-7.3	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	45	164.8	69.7	54.2	186.0	48.5	1.44	-9.2	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	71	180.8	53.7	72.4	183.9	50.6	1.06	-1.4	pump at Harbor St. is not flowing
	J-872; JULIET	22	67	176.6	58.0	70.4	184.3	50.2	1.15	-3.4	pump at Harbor St. is not flowing
	J-430; KILO	45	51	162.7	71.9	59.9	183.1	51.4	1.40	-8.9	pump at Harbor St. is not flowing
	J-110; WHP 1	19.32	70	180.8	53.7	71.3	183.7	50.8	1.06	-1.3	pump at Harbor St. is not flowing
	J-168; WHP 2	57.16	56	186.4	48.2	57.3	189.3	45.2	1.06	-1.3	
	J-136; WHP 3	25	75	198.0	36.5	68.9	184.0	50.5	0.72	6.1	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	82	217.8	16.7	83.1	220.4	14.1	1.19	-1.1	
	J-212; COW 2	22	92	234.2	0.3	92.0	234.2	0.3	1.00	0.0	
	CLEAR WELL PRV HGL			234.52							
		11,215 GALLONS									
FOXTROT-2 J-428	Q=2,243 GPM J-860; GOLF	30.5	58	164.3	67.9	59.5	167.8	64.4	1.05	-1.5	A leak of 400 gpm induced in the vicinity of Pressure Station Golf
	J-666; HOTEL	61	34	139.4	92.8	38.3	149.3	82.9	1.12	-4.3	12" line on SW 9th Ave Closed in model
	J-122; INDIAN	17	60	155.4	76.8	55.4	144.8	87.4	0.88	4.6	pump at Harbor St. flowing 225gpm at 104TDH
	J-872; JULIET	22	66	174.3	57.9	53.3	145.0	87.2	0.66	12.7	pump at Harbor St. flowing 225gpm at 104TDH
	J-430; KILO	45	38	132.7	99.5	42.0	141.9	90.3	1.10	-4.0	pump at Harbor St. flowing 225gpm at 104TDH
	J-110; WHP 1	19.32	57	150.8	81.4	54.4	144.7	87.5	0.93	2.6	pump at Harbor St. flowing 225gpm at 104TDH
	J-168; WHP 2	57.16	45	161.0	71.2	42.6	155.4	76.8	0.93	2.4	
	J-136; WHP 3	25	63	170.3	61.9	51.9	144.8	87.4	0.71	11.1	Field results indicate that WHP3 was damaged and providing wrong pressures due to higher HGL than nodes upstream
	J-226; COW 1	28.64	79	210.9	21.3	79.0	210.8	21.4	0.99	0.0	
	J-212; COW 2	22	91	231.9	0.3	92.0	234.2	-2.0	-0.13	-1.0	
	CLEAR WELL PRV HGL			232.21							

# APPENDIX C

## Model Output

- Steady State Analysis, Average Day Demand, Existing System, Full System Report
- Steady State Analysis, Peak Day Demand, Existing System, Full System Report
- Steady State Analysis, Peak Hour Demand, Existing System, Full System Report

**AVERAGE DAY DEMAND**



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*****
***                H2OMAP Water GIS                ***
***                Comprehensive Analysis of          ***
***                Water Distribution Piping Network  ***
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Input Data File ..... P:\CITY OF
WARRENTON\035889\STUDY\DATA\MODEL\WATER_MODEL_010711.OUT\SCENARIO\2010ADD\~INP
Number of Junctions..... 364
Number of Reservoirs..... 1
Number of Tanks ..... 1
Number of Pipes ..... 424
Number of Pumps ..... 2
Number of Valves ..... 2
Headloss Formula ..... Hazen-williams
Hydraulic Timestep ..... 1.00 hrs
Hydraulic Accuracy ..... 0.001000
Status Check Frequency ..... 2
Maximum Trials Checked ..... 10
Damping Limit Threshold ..... 0.000000
Maximum Trials ..... 40
Quality Analysis ..... None
Specific Gravity ..... 1.00
Relative Kinematic Viscosity ..... 1.00
Relative Chemical Diffusivity ..... 1.00
Demand Multiplier ..... 1.00
Total Duration ..... 0.00 hrs
Reporting Criteria:

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No Nodes  
No Links

Analysis began Wed Jul 27 11:59:47 2011

Hydraulic Status:

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0:00:00: Pump PMP-5005 changed by Tank T-7002 control
0:00:00: Balanced after 7 trials
          Total Supplied: 2406.45 gpm
          Total Demanded: 1032.00 gpm
          Total Stored: 1374.45 gpm
0:00:00: Reservoir T-7000 is emptying
0:00:00: Tank T-7002 is filling at 32.00 ft
0:00:00: Pump PMP-5005 closed
0:00:00: PRV V-9009 closed

```

Analysis ended Wed Jul 27 12:01:27 2011

2010 Average Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	J-628	0.12	129.50	216.33	37.62
2	J-144	2.00	76.50	214.87	59.96
3	J-516	0.00	74.66	215.12	60.86
4	J-510	0.00	74.37	215.12	60.99
5	J-420	6.84	72.01	215.12	62.01
6	J-330	0.37	69.43	214.87	63.02
7	J-554	1.38	51.51	199.19	63.99
8	J-100	9.33	55.59	204.81	64.66
9	J-666	3.81	61.00	215.05	66.75
10	J-542	9.90	53.00	207.10	66.77
11	J-92	4.83	52.03	206.30	66.84
12	J-540	0.00	51.74	207.73	67.59
13	J-536	1.34	52.58	208.63	67.61
14	J-498	0.23	58.93	215.11	67.67
15	J-344	2.07	57.46	215.02	68.27
16	J-462	0.00	29.00	186.83	68.39
17	J-460	0.00	29.00	187.05	68.48
18	J-228	0.25	29.00	187.32	68.60
19	J-608	0.90	40.28	199.19	68.86
20	J-168	0.48	57.16	216.07	68.86
21	J-664	0.00	56.46	215.46	68.90
22	J-418	0.00	55.26	215.12	69.27
23	J-670	1.12	55.00	215.05	69.35
24	J-496	0.83	55.00	215.11	69.37
25	J-660	1.44	55.09	215.66	69.57
26	J-626	2.24	29.00	189.71	69.64
27	J-624	0.00	31.15	191.99	69.69
28	J-788	0.00	25.90	186.83	69.73
29	J-198	1.79	53.26	214.85	70.02
30	J-210	37.53	52.18	214.11	70.17
31	J-740	2.42	52.05	214.09	70.21
32	J-662	0.00	53.01	215.66	70.47
33	J-622	1.12	28.98	191.99	70.63
34	J-560	0.13	35.48	198.89	70.80
35	J-78	5.95	37.64	201.44	70.98
36	J-620	14.57	29.00	192.98	71.05
37	J-616	1.43	28.94	193.09	71.13
38	J-552	1.05	34.76	199.56	71.41
39	J-426	0.00	49.82	215.12	71.62
40	J-118	1.65	49.19	214.87	71.79
41	J-618	0.68	27.21	193.09	71.87

2010 Average Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
42	J-648	0.00	48.94	215.79	72.30
43	J-886	0.00	25.90	193.09	72.44
44	J-650	0.25	48.42	215.79	72.52
45	J-668	1.69	45.78	215.05	73.35
46	J-592	1.81	40.75	210.31	73.47
47	J-568	0.00	29.00	198.65	73.51
48	J-572	0.00	29.00	198.65	73.51
49	J-566	0.92	29.00	198.65	73.51
50	J-570	0.00	29.00	198.65	73.51
51	J-564	3.33	29.00	198.65	73.51
52	J-602	1.87	29.50	199.19	73.53
53	J-204	0.00	44.56	214.44	73.61
54	J-562	0.31	29.00	198.88	73.61
55	J-556	1.86	29.00	198.88	73.61
56	J-672	10.24	45.14	215.05	73.62
57	J-538	0.00	37.89	207.81	73.63
58	J-324	0.00	44.94	214.87	73.63
59	J-90	14.62	33.00	202.95	73.64
60	J-742	0.76	44.12	214.09	73.65
61	J-430	0.00	45.00	215.12	73.71
62	J-606	0.00	29.00	199.19	73.75
63	J-74	2.88	29.00	199.20	73.75
64	J-604	1.23	28.72	199.19	73.87
65	J-76	0.24	28.70	199.19	73.87
66	J-550	2.78	29.00	199.56	73.90
67	J-598	0.00	28.15	199.19	74.11
68	J-600	0.15	27.91	199.19	74.22
69	J-860	0.00	30.50	201.89	74.26
70	J-578	0.00	28.96	200.45	74.31
71	J-80	0.55	30.03	201.84	74.44
72	J-518	0.00	43.26	215.12	74.46
73	J-558	0.74	27.00	198.88	74.48
74	J-72	0.45	26.24	198.20	74.51
75	J-858	0.00	29.50	201.66	74.60
76	J-744	0.00	41.49	214.09	74.79
77	J-68	0.00	31.00	203.69	74.83
78	J-594	0.85	37.40	210.25	74.90
79	J-876	0.00	37.40	210.27	74.91
80	J-582	0.33	27.00	200.25	75.07
81	J-586	5.80	27.00	200.25	75.07
82	J-878	0.00	25.90	199.19	75.09

2010 Average Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
83	J-880	0.00	25.90	199.19	75.09
84	J-882	0.00	25.90	199.19	75.09
85	J-884	0.00	25.90	199.19	75.09
86	J-104	6.17	26.83	200.25	75.14
87	J-574	0.34	27.00	200.44	75.15
88	J-576	0.19	27.00	200.45	75.16
89	J-580	0.97	27.00	200.45	75.16
90	J-84	3.54	30.03	203.50	75.16
91	J-428	0.00	41.41	215.12	75.27
92	J-98	2.90	29.00	202.75	75.28
93	J-70	0.00	26.26	200.22	75.38
94	J-596	1.62	35.97	210.32	75.55
95	J-88	2.08	28.01	202.95	75.80
96	J-470	0.17	29.00	204.57	76.08
97	J-584	0.00	27.43	203.36	76.23
98	J-588	1.94	27.00	203.42	76.44
99	J-102	0.40	27.00	203.65	76.54
100	J-610	0.00	22.44	199.19	76.59
101	J-106	1.09	26.37	203.45	76.73
102	J-652	1.24	37.83	215.76	77.10
103	J-546	0.00	41.79	219.94	77.19
104	J-614	0.00	20.93	199.19	77.24
105	J-658	0.52	35.96	215.12	77.63
106	J-612	0.00	19.59	199.19	77.82
107	J-748	0.00	33.00	214.09	78.47
108	J-478	6.13	33.92	215.12	78.51
109	J-548	0.00	37.21	218.63	78.61
110	J-500	0.60	33.62	215.11	78.64
111	J-424	0.05	32.88	215.12	78.97
112	J-342	0.20	31.80	214.87	79.32
113	J-590	3.51	27.00	210.33	79.43
114	J-50	0.30	29.19	212.79	79.56
115	J-512	0.00	31.00	214.87	79.67
116	J-246	0.10	31.00	215.12	79.78
117	J-86	3.65	27.00	211.46	79.93
118	J-248	0.67	30.18	214.87	80.03
119	J-468	2.39	15.50	200.43	80.13
120	J-644	0.69	30.91	216.19	80.28
121	J-746	6.13	28.75	214.09	80.31
122	J-350	5.71	29.57	215.04	80.37
123	J-318	0.17	29.32	215.12	80.51

2010 Average Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
124	J-200	2.89	29.00	214.84	80.53
125	J-178	0.43	29.00	214.85	80.53
126	J-340	0.00	29.00	214.87	80.54
127	J-284	4.71	29.00	215.00	80.59
128	J-364	0.00	29.00	215.00	80.60
129	J-346	0.00	29.00	215.02	80.60
130	J-360	0.00	29.00	215.05	80.61
131	J-482	2.53	29.00	215.11	80.64
132	J-176	21.72	30.38	216.49	80.64
133	J-654	1.42	29.00	215.12	80.64
134	J-440	2.91	28.73	214.96	80.69
135	J-642	0.16	29.96	216.20	80.70
136	J-630	0.40	30.26	216.52	80.71
137	J-354	1.47	28.74	215.04	80.72
138	J-352	1.97	28.56	215.06	80.81
139	J-172	2.49	29.08	215.71	80.87
140	J-164	7.63	28.80	215.46	80.88
141	J-752	0.00	27.43	214.11	80.89
142	J-526	2.94	29.64	216.33	80.89
143	J-458	0.05	28.41	215.10	80.89
144	J-348	1.31	28.28	215.02	80.91
145	J-646	0.79	29.00	215.79	80.94
146	J-414	0.58	27.23	214.09	80.97
147	J-138	10.40	27.78	214.91	81.08
148	J-238	0.00	26.96	214.09	81.08
149	J-250	0.00	27.87	215.00	81.09
150	J-252	0.00	27.84	215.00	81.10
151	J-254	0.09	27.75	215.00	81.14
152	J-150	0.52	27.81	215.10	81.16
153	J-334	1.91	27.57	214.87	81.16
154	J-638	0.00	29.00	216.31	81.16
155	J-256	0.00	27.65	215.00	81.18
156	J-368	6.19	27.63	215.00	81.19
157	J-502	0.08	27.56	215.10	81.26
158	J-174	0.19	29.00	216.68	81.32
159	J-240	0.00	26.36	214.09	81.35
160	J-192	1.77	27.00	214.83	81.39
161	J-94	0.00	29.00	216.86	81.40
162	J-202	0.58	27.88	215.76	81.41
163	J-182	3.02	26.92	214.83	81.42
164	J-410	1.62	26.17	214.09	81.43

2010 Average Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
165	J-544	0.27	31.98	219.94	81.45
166	J-314	0.00	27.15	215.12	81.45
167	J-180	0.00	26.87	214.84	81.45
168	J-750	0.06	26.09	214.11	81.47
169	J-416	0.44	27.04	215.12	81.49
170	J-508	0.00	26.98	215.10	81.51
171	J-412	1.35	25.90	214.09	81.54
172	J-170	3.28	27.64	215.90	81.57
173	J-166	2.16	27.12	215.46	81.61
174	J-504	1.47	26.72	215.10	81.63
175	J-528	1.21	27.81	216.33	81.69
176	J-236	0.00	25.55	214.09	81.69
177	J-142	0.37	26.27	214.84	81.70
178	J-82	8.08	13.20	201.85	81.74
179	J-234	4.83	25.31	214.09	81.80
180	J-338	0.00	26.06	214.87	81.81
181	J-802	1.04	25.90	214.80	81.85
182	J-800	1.04	25.90	214.81	81.85
183	J-408	1.42	25.19	214.09	81.85
184	J-770	0.99	25.90	214.81	81.86
185	J-792	1.04	25.90	214.82	81.86
186	J-794	1.04	25.90	214.82	81.86
187	J-760	2.57	25.90	214.82	81.86
188	J-798	1.04	25.90	214.82	81.86
189	J-796	1.04	25.90	214.82	81.86
190	J-754	3.07	25.90	214.82	81.86
191	J-806	0.59	25.90	214.82	81.86
192	J-804	0.58	25.90	214.82	81.86
193	J-766	2.48	25.90	214.82	81.86
194	J-778	3.20	25.90	214.82	81.86
195	J-776	1.34	25.90	214.82	81.86
196	J-810	1.13	25.90	214.82	81.86
197	J-808	0.00	25.90	214.82	81.86
198	J-814	3.27	25.90	214.83	81.86
199	J-812	0.00	25.90	214.83	81.86
200	J-780	3.32	25.90	214.83	81.86
201	J-834	8.21	25.90	214.83	81.86
202	J-832	0.00	25.90	214.83	81.86
203	J-816	3.27	25.90	214.84	81.87
204	J-786	10.62	25.90	214.84	81.87
205	J-830	0.00	25.90	214.84	81.87

2010 Average Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
206	J-134	5.15	25.90	214.84	81.87
207	J-828	1.13	25.90	214.84	81.87
208	J-826	0.00	25.90	214.84	81.87
209	J-818	0.00	25.90	214.85	81.87
210	J-824	0.00	25.90	214.85	81.87
211	J-822	0.00	25.90	214.86	81.88
212	J-820	0.00	25.90	214.88	81.89
213	J-836	0.00	25.90	214.88	81.89
214	J-840	0.00	25.90	214.88	81.89
215	J-838	0.00	25.90	214.88	81.89
216	J-196	0.58	25.80	214.83	81.91
217	J-842	0.00	25.90	214.96	81.92
218	J-844	0.00	25.90	214.96	81.92
219	J-506	1.39	26.04	215.10	81.92
220	J-846	0.00	25.90	214.98	81.93
221	J-848	0.00	25.90	215.01	81.94
222	J-640	0.00	27.15	216.30	81.96
223	J-850	0.00	25.90	215.09	81.98
224	J-852	0.00	25.90	215.09	81.98
225	J-854	0.00	25.90	215.09	81.98
226	J-856	0.00	25.90	215.09	81.98
227	J-636	0.00	27.00	216.31	82.03
228	J-632	0.35	27.00	216.32	82.03
229	J-634	1.44	27.00	216.32	82.03
230	J-188	1.38	25.46	214.83	82.05
231	J-66	0.00	29.13	218.63	82.11
232	J-406	0.00	24.51	214.09	82.14
233	J-312	1.21	24.51	214.10	82.15
234	J-226	0.06	28.64	218.27	82.16
235	J-442	5.25	25.25	214.91	82.18
236	J-244	0.00	24.32	214.10	82.23
237	J-140	1.30	25.00	214.83	82.25
238	J-184	0.79	25.00	214.83	82.25
239	J-186	1.41	25.00	214.83	82.25
240	J-190	1.07	25.00	214.83	82.25
241	J-194	1.64	25.00	214.83	82.26
242	J-136	6.51	25.00	214.84	82.26
243	J-356	0.00	25.18	215.05	82.27
244	J-336	0.00	24.94	214.87	82.30
245	J-456	1.01	24.89	214.82	82.30
246	J-432	3.11	24.86	214.81	82.30

**2010 Average Day Steady State Analysis Junction Report**

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
247	J-298	0.00	24.10	214.10	82.33
248	J-366	0.00	25.00	215.01	82.33
249	J-398	0.00	24.07	214.09	82.34
250	J-448	1.37	24.65	214.82	82.40
251	J-446	2.58	24.47	214.82	82.48
252	J-290	0.00	24.70	215.09	82.50
253	J-656	0.38	24.69	215.12	82.51
254	J-396	1.06	23.65	214.09	82.52
255	J-322	0.36	24.50	215.13	82.60
256	J-64	1.84	30.27	220.95	82.62
257	J-524	0.40	24.21	215.10	82.71
258	J-866	0.00	24.00	215.00	82.76
259	J-532	0.00	31.04	222.10	82.79
260	J-296	2.32	23.01	214.10	82.80
261	J-288	6.41	23.99	215.09	82.80
262	J-310	0.00	23.00	214.10	82.80
263	J-132	16.47	23.62	214.83	82.85
264	J-242	0.21	22.80	214.10	82.89
265	J-450	1.61	23.38	214.82	82.95
266	J-376	1.88	23.41	215.07	83.05
267	J-862	0.00	23.00	215.01	83.20
268	J-292	0.18	23.00	215.01	83.20
269	J-370	0.00	22.94	215.05	83.24
270	J-372	0.00	22.81	215.05	83.30
271	J-152	8.19	22.86	215.13	83.31
272	J-466	0.00	29.00	221.34	83.34
273	J-404	1.53	21.49	214.09	83.45
274	J-266	0.22	22.37	215.03	83.48
275	J-374	0.00	22.33	215.05	83.51
276	J-126	0.95	22.07	214.81	83.52
277	J-148	2.64	22.23	215.00	83.53
278	J-278	0.58	22.13	215.04	83.59
279	J-264	0.00	22.07	215.02	83.60
280	J-870	0.00	22.00	215.00	83.63
281	J-394	0.78	21.00	214.09	83.67
282	J-868	0.00	21.90	215.00	83.67
283	J-864	0.00	21.90	215.00	83.67
284	J-534	168.26	28.95	222.10	83.69
285	J-682	0.00	21.83	215.12	83.75
286	J-130	0.09	21.36	214.71	83.78
287	J-400	0.70	20.70	214.09	83.80



2010 Average Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
288	J-464	0.00	29.00	222.52	83.85
289	J-280	1.50	21.43	215.02	83.88
290	J-444	2.04	21.00	214.82	83.98
291	J-392	3.24	20.15	214.09	84.03
292	J-872	0.00	21.00	215.01	84.06
293	J-282	4.31	21.00	215.01	84.06
294	J-300	0.00	20.07	214.10	84.07
295	J-380	0.00	20.71	214.90	84.14
296	J-736	0.10	19.62	214.10	84.27
297	J-110	2.61	19.32	214.10	84.40
298	J-302	0.00	20.13	215.00	84.44
299	J-146	7.82	20.10	214.99	84.44
300	J-378	4.84	19.55	214.90	84.64
301	J-730	0.48	18.70	214.10	84.67
302	J-154	0.55	19.43	215.10	84.79
303	J-488	0.39	19.00	215.10	84.97
304	J-120	18.33	18.54	214.74	85.01
305	J-390	1.06	17.81	214.09	85.05
306	J-790	0.00	25.90	222.52	85.19
307	J-128	93.19	17.74	214.52	85.27
308	J-382	0.03	17.89	214.71	85.28
309	J-316	0.08	18.23	215.12	85.31
310	J-522	0.77	17.78	214.71	85.33
311	J-386	0.00	17.77	214.71	85.34
312	J-674	0.21	17.81	214.90	85.40
313	J-738	0.00	17.00	214.10	85.40
314	J-436	0.00	17.58	214.71	85.42
315	J-732	3.59	16.75	214.10	85.51
316	J-520	0.00	17.30	214.74	85.55
317	J-124	93.19	17.00	214.50	85.57
318	J-686	0.00	17.00	214.70	85.66
319	J-122	1.73	17.00	214.71	85.67
320	J-676	0.00	17.15	214.90	85.69
321	J-692	2.83	16.90	214.69	85.70
322	J-722	4.50	15.83	214.12	85.92
323	J-714	0.37	15.62	214.14	86.02
324	J-734	0.04	15.34	214.10	86.12
325	J-276	1.17	15.38	214.19	86.14
326	J-724	0.43	14.85	214.11	86.34
327	J-216	0.00	34.99	234.32	86.37
328	J-688	0.00	15.00	214.70	86.53

2010 Average Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
329	J-362	0.00	14.96	214.74	86.56
330	J-206	4.46	29.00	228.90	86.62
331	J-114	1.62	14.22	214.71	86.87
332	J-728	0.27	13.20	214.11	87.06
333	J-678	0.46	13.70	214.90	87.18
334	J-716	1.21	12.72	214.14	87.27
335	J-358	0.00	13.00	215.05	87.55
336	J-726	0.00	12.04	214.11	87.56
337	J-690	3.47	12.38	214.69	87.66
338	J-272	0.15	11.70	214.19	87.74
339	J-268	0.93	11.24	214.19	87.94
340	J-718	0.00	11.18	214.13	87.94
341	J-530	0.93	27.00	230.24	88.06
342	J-208	3.00	27.00	230.24	88.06
343	J-720	1.01	10.85	214.13	88.08
344	J-490	0.00	10.75	214.18	88.15
345	J-116	2.35	11.00	214.62	88.23
346	J-712	2.04	10.08	214.18	88.43
347	J-112	0.00	10.27	214.74	88.60
348	J-704	3.10	9.66	214.21	88.63
349	J-698	21.07	9.00	214.37	88.99
350	J-706	2.09	8.39	214.19	89.17
351	J-492	0.00	7.71	214.18	89.46
352	J-708	12.84	7.43	214.18	89.59
353	J-388	6.05	7.65	214.56	89.66
354	J-38	66.90	27.00	233.95	89.67
355	J-710	8.44	6.98	214.30	89.83
356	J-694	0.23	6.98	214.46	89.90
357	J-700	0.46	6.80	214.36	89.94
358	J-494	0.21	6.81	214.56	90.02
359	J-702	0.00	5.90	214.36	90.33
360	J-696	0.00	5.00	214.46	90.76
361	J-680	0.00	5.13	215.13	90.99
362	J-212	0.00	22.00	234.32	92.00
363	J-218	0.00	36.81	498.18	199.91
364	J-214	0.00	22.00	498.18	206.33

2010 Average Day Steady State Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
1	P-1003	J-462	J-788	25.07	14.00	120.00	0.00	0.00	0.00	Open	0
2	P-903	J-700	J-702	264.90	6.00	120.00	0.00	0.00	0.00	Open	0
3	P-509	J-372	J-374	222.30	8.00	120.00	0.00	0.00	0.00	Open	0
4	P-507	J-370	J-372	185.76	8.00	120.00	0.00	0.00	0.00	Open	0
5	P-499	J-282	J-366	243.70	12.00	120.00	0.00	0.00	0.00	Open	0
6	P-489	J-356	J-360	178.34	4.00	120.00	0.00	0.00	0.00	Open	0
7	P-485	J-356	J-358	764.78	8.00	120.00	0.00	0.00	0.00	Open	0
8	P-915	J-712	J-492	414.72	6.00	120.00	0.00	0.00	0.00	Open	0
9	P-203	J-516	J-518	586.69	12.00	120.00	0.00	0.00	0.00	Open	0
10	P-835	J-636	J-638	885.83	4.00	120.00	0.00	0.00	0.00	Open	0
11	P-473	J-346	J-348	1,124.23	8.00	120.00	0.00	0.00	0.00	Open	0
12	P-469	J-340	J-338	242.33	4.00	120.00	0.00	0.00	0.00	Open	0
13	P-467	J-512	J-340	291.15	6.00	120.00	0.00	0.00	0.00	Open	0
14	P-461	J-336	J-334	167.78	6.00	120.00	0.00	0.00	0.00	Open	0
15	P-897	J-694	J-696	595.50	8.00	120.00	0.00	0.00	0.00	Open	0
16	P-735	J-544	J-546	1,413.60	6.00	120.00	0.00	0.00	0.00	Open	0
17	P-451	J-330	J-324	403.58	6.00	120.00	0.00	0.00	0.00	Open	0
18	P-445	J-460	J-466	50.96	18.00	120.00	0.00	0.00	0.00	Closed	0
19	P-423	J-310	J-296	203.20	4.00	120.00	0.00	0.00	0.00	Open	0
20	P-757	J-566	J-570	1,161.68	8.00	120.00	0.00	0.00	0.00	Open	0
21	P-759	J-566	J-568	385.29	8.00	120.00	0.00	0.00	0.00	Open	0
22	P-403	J-298	J-296	146.38	6.00	120.00	0.00	0.00	0.00	Open	0
23	P-401	J-300	J-298	200.48	6.00	120.00	0.00	0.00	0.00	Open	0
24	P-961	J-750	J-752	1,007.13	8.00	120.00	0.00	0.00	0.00	Open	0
25	P-761	J-570	J-572	924.79	8.00	120.00	0.00	0.00	0.00	Open	0
26	P-123	J-94	J-228	206.36	18.00	120.00	0.00	0.00	0.00	Closed	0
27	P-955	J-742	J-744	150.78	6.00	120.00	0.00	0.00	0.00	Open	0
28	P-395	J-290	J-288	250.43	8.00	120.00	0.00	0.00	0.00	Open	0
29	P-891	J-688	J-686	631.61	2.00	120.00	0.00	0.00	0.00	Open	0
30	P-119	J-66	J-548	1,242.91	8.00	120.00	0.00	0.00	0.00	Open	0
31	P-819	J-626	J-228	2,036.45	8.00	120.00	0.00	0.00	0.00	Closed	0
32	P-815	J-622	J-624	664.34	6.00	120.00	0.00	0.00	0.00	Open	0
33	P-875	J-674	J-676	864.91	6.00	120.00	0.00	0.00	0.00	Open	0
34	P-311	J-212	J-214	40.00	12.00	120.00	0.00	0.00	0.00	Closed	0
35	P-181	J-522	J-436	860.77	6.00	120.00	0.00	0.00	0.00	Open	0

2010 Average Day Steady State Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
36	P-881	J-682	J-416	984.87	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
37	P-199	J-342	J-512	76.16	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
38	P-299	J-216	J-218	40.00	24.00	120.00	0.00	0.00	0.00	0.00	Closed	0
39	P-193	J-322	J-680	878.02	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
40	P-857	J-660	J-662	857.82	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
41	P-945	J-734	J-738	463.33	4.00	120.00	0.00	0.00	0.00	0.00	Open	0
42	P-1077	J-842	J-844	529.47	4.00	120.00	0.00	0.00	0.00	0.00	Open	0
43	P-859	J-664	J-164	661.56	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
44	P-1109	J-864	J-866	367.08	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
45	P-797	J-604	J-606	564.86	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
46	P-879	J-680	J-682	145.46	6.00	120.00	0.00	0.00	0.00	0.00	Closed	0
47	P-1087	J-850	J-852	818.55	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
48	P-1089	J-854	J-856	419.02	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
49	P-353	J-254	J-256	322.44	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
50	P-793	J-602	J-598	299.16	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
51	P-297	J-212	J-216	15.00	24.00	120.00	0.00	0.00	0.00	0.00	Open	0
52	P-803	J-610	J-880	741.87	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
53	P-805	J-610	J-882	1,405.42	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
54	P-1005	J-790	J-464	24.44	10.00	120.00	0.00	0.00	0.00	0.00	Open	0
55	P-1113	J-870	J-302	208.46	10.00	120.00	0.00	0.00	0.00	0.00	Open	0
56	P-629	J-882	J-884	376.45	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
57	P-719	J-534	J-532	1,282.21	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
58	P-301	J-218	J-214	13.80	24.00	120.00	0.00	0.00	0.00	0.00	Open	0
59	P-801	J-76	J-610	1,222.42	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
60	P-957	J-746	J-748	196.34	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
61	P-627	J-880	J-614	200.31	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
62	P-631	J-884	J-612	261.65	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
63	P-769	J-576	J-578	528.07	2.00	120.00	0.00	0.00	0.00	0.00	Open	0
64	P-1071	J-838	J-840	597.20	2.00	120.00	0.00	0.00	0.00	0.00	Open	0
65	P-1069	J-836	J-838	740.50	2.00	120.00	0.00	0.00	0.00	0.00	Open	0
66	P-349	J-250	J-252	288.14	10.00	120.00	0.09	0.00	0.00	0.00	Open	0
67	P-941	J-732	J-734	235.08	6.00	120.00	0.04	0.00	0.00	0.00	Open	0
68	P-269	J-508	J-488	2,841.76	18.00	120.00	0.39	0.00	0.00	0.00	Open	0
69	P-351	J-252	J-254	366.93	8.00	120.00	0.09	0.00	0.00	0.00	Open	0
70	P-251	J-186	J-188	620.75	8.00	120.00	0.09	0.00	0.00	0.00	Open	0

2010 Average Day Steady State Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
71	P-271	J-522	J-130	1,980.63	6.00	120.00	0.09	0.00	0.00	0.00	Open	0
72	P-289	J-388	J-494	310.74	6.00	120.00	0.13	0.00	0.00	0.00	Open	0
73	P-87	J-76	J-604	490.34	8.00	120.00	-0.24	0.00	0.00	0.00	Open	0
74	P-795	J-604	J-600	259.36	6.00	120.00	0.15	0.00	0.00	0.00	Open	0
75	P-121	J-388	J-494	355.21	4.00	120.00	0.08	0.00	0.00	0.00	Open	0
76	P-867	J-668	J-670	2,429.15	8.00	120.00	0.30	0.00	0.00	0.00	Open	0
77	P-249	J-190	J-192	623.12	8.00	120.00	0.37	0.00	0.00	0.00	Open	0
78	P-309	J-502	J-508	3,601.22	18.00	120.00	1.90	0.00	0.00	0.00	Open	0
79	P-943	J-732	J-736	423.31	4.00	120.00	0.10	0.00	0.00	0.00	Open	0
80	P-197	J-150	J-504	218.19	8.00	120.00	0.42	0.00	0.00	0.00	Open	0
81	P-229	J-178	J-198	1,434.39	8.00	120.00	-0.43	0.00	0.00	0.00	Open	0
82	P-319	J-504	J-506	3,601.67	8.00	120.00	0.43	0.00	0.00	0.00	Open	0
83	P-933	J-724	J-726	514.68	6.00	120.00	0.27	0.00	0.00	0.00	Open	0
84	P-821	J-528	J-628	3,771.32	4.00	120.00	0.12	0.00	0.00	0.00	Open	0
85	P-267	J-506	J-154	2,880.03	8.00	120.00	0.55	0.00	0.00	0.00	Open	0
86	P-923	J-716	J-714	561.13	6.00	120.00	0.37	0.00	0.00	0.00	Open	0
87	P-339	J-458	J-502	210.09	18.00	120.00	3.46	0.00	0.00	0.00	Open	0
88	P-863	J-670	J-672	2,519.67	8.00	120.00	-0.82	0.01	0.00	0.00	Open	0
89	P-873	J-674	J-678	1,274.66	6.00	120.00	0.46	0.01	0.00	0.00	Open	0
90	P-951	J-742	J-746	202.20	8.00	120.00	0.83	0.01	0.00	0.00	Open	0
91	P-749	J-562	J-558	274.54	4.00	120.00	0.21	0.01	0.00	0.00	Open	0
92	P-307	J-500	J-498	735.42	4.00	120.00	0.23	0.01	0.00	0.00	Open	0
93	P-755	J-564	J-566	542.56	8.00	120.00	0.92	0.01	0.00	0.00	Open	0
94	P-849	J-246	J-654	1,654.14	12.00	120.00	2.32	0.01	0.00	0.00	Open	0
95	P-551	J-390	J-392	514.03	8.00	120.00	-1.06	0.01	0.00	0.00	Open	0
96	P-517	J-378	J-380	194.57	6.00	120.00	0.67	0.01	0.00	0.00	Open	0
97	P-871	J-380	J-674	179.56	6.00	120.00	0.67	0.01	0.00	0.00	Open	0
98	P-543	J-404	J-410	492.49	8.00	120.00	-1.19	0.01	0.00	0.00	Open	0
99	P-573	J-314	J-478	1,840.37	18.00	120.00	6.13	0.01	0.00	0.00	Open	0
100	P-569	J-430	J-428	460.71	18.00	120.00	-6.59	0.01	0.00	0.00	Open	0
101	P-575	J-420	J-516	495.69	18.00	120.00	-6.59	0.01	0.00	0.00	Open	0
102	P-207	J-428	J-314	627.05	18.00	120.00	-6.59	0.01	0.00	0.00	Open	0
103	P-201	J-516	J-430	627.96	18.00	120.00	-6.59	0.01	0.00	0.00	Open	0
104	P-475	J-344	J-348	1,179.10	8.00	120.00	1.31	0.01	0.00	0.00	Open	0
105	P-833	J-634	J-632	803.71	4.00	120.00	0.35	0.01	0.00	0.00	Open	0

2010 Average Day Steady State Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
106	P-263	J-502	J-504	100.04	8.00	120.00	1.48	0.01	0.00	0.00	Open	0
107	P-843	J-646	J-648	525.22	8.00	120.00	1.49	0.01	0.00	0.00	Open	0
108	P-275	J-508	J-506	116.47	8.00	120.00	1.51	0.01	0.00	0.00	Open	0
109	P-523	J-386	J-522	1,613.48	6.00	120.00	0.86	0.01	0.00	0.00	Open	0
110	P-525	J-382	J-386	68.70	6.00	120.00	0.86	0.01	0.00	0.00	Open	0
111	P-237	J-182	J-184	613.29	8.00	120.00	1.55	0.01	0.00	0.00	Open	0
112	P-147	J-114	J-382	1,663.70	6.00	120.00	0.89	0.01	0.00	0.00	Open	0
113	P-947	J-740	J-742	275.87	8.00	120.00	1.59	0.01	0.00	0.00	Open	0
114	P-799	J-602	J-878	834.29	6.00	120.00	0.90	0.01	0.00	0.00	Open	0
115	P-625	J-878	J-608	367.48	6.00	120.00	0.90	0.01	0.00	0.00	Open	0
116	P-791	J-604	J-602	406.12	8.00	120.00	-1.62	0.01	0.00	0.00	Open	0
117	P-715	J-208	J-530	1,685.12	6.00	120.00	0.93	0.01	0.00	0.00	Open	0
118	P-1011	J-754	J-798	451.15	6.00	120.00	1.04	0.01	0.00	0.00	Open	0
119	P-1009	J-760	J-794	349.76	6.00	120.00	1.04	0.01	0.00	0.00	Open	0
120	P-1013	J-754	J-796	301.20	6.00	120.00	1.04	0.01	0.00	0.00	Open	0
121	P-1007	J-760	J-792	643.22	6.00	120.00	1.04	0.01	0.00	0.00	Open	0
122	P-561	J-418	J-416	726.21	18.00	120.00	9.38	0.01	0.00	0.00	Open	0
123	P-1035	J-816	J-786	310.31	12.00	120.00	-4.20	0.01	0.00	0.00	Open	0
124	P-739	J-550	J-552	1,620.93	6.00	120.00	1.05	0.01	0.00	0.00	Open	0
125	P-1051	J-826	J-136	284.30	18.00	120.00	-9.88	0.01	0.00	0.00	Open	0
126	P-385	J-284	J-368	800.49	8.00	120.00	1.99	0.01	0.00	0.00	Open	0
127	P-865	J-672	J-668	1,265.14	8.00	120.00	1.99	0.01	0.00	0.00	Open	0
128	P-1025	J-808	J-810	275.10	6.00	120.00	1.13	0.01	0.00	0.00	Open	0
129	P-549	J-392	J-394	614.55	8.00	120.00	-2.03	0.01	0.00	0.00	Open	0
130	P-379	J-272	J-276	618.28	6.00	120.00	1.17	0.01	0.00	0.00	Open	0
131	P-853	J-656	J-658	1,752.17	4.00	120.00	0.52	0.01	0.00	0.00	Open	0
132	P-747	J-556	J-562	660.27	4.00	120.00	0.52	0.01	0.00	0.00	Open	0
133	P-751	J-556	J-558	695.33	4.00	120.00	0.53	0.01	0.00	0.00	Open	0
134	P-209	J-164	J-166	1,772.56	8.00	120.00	2.16	0.01	0.00	0.00	Open	0
135	P-531	J-392	J-396	452.00	8.00	120.00	-2.27	0.01	0.00	0.00	Open	0
136	P-247	J-194	J-196	623.55	8.00	120.00	2.31	0.01	0.00	0.00	Open	0
137	P-375	J-268	J-272	119.33	6.00	120.00	1.32	0.01	0.00	0.00	Open	0
138	P-1023	J-804	J-806	258.68	4.00	120.00	0.59	0.02	0.00	0.00	Open	0
139	P-135	J-526	J-528	2,105.49	6.00	120.00	1.33	0.02	0.00	0.00	Open	0
140	P-167	J-134	J-826	262.34	18.00	120.00	-12.23	0.02	0.00	0.00	Open	0

2010 Average Day Steady State Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
141	P-741	J-74	J-554	704.40	6.00	120.00	1.38	0.02	0.00	0.00	Open	0
142	P-303	J-496	J-482	106.04	8.00	120.00	2.46	0.02	0.00	0.00	Open	0
143	P-425	J-246	J-314	3,055.77	18.00	120.00	12.72	0.02	0.00	0.00	Open	0
144	P-501	J-368	J-148	1,108.46	8.00	120.00	2.64	0.02	0.00	0.00	Open	0
145	P-809	J-616	J-886	1,478.15	4.00	120.00	0.68	0.02	0.00	0.00	Open	0
146	P-633	J-886	J-618	502.36	4.00	120.00	0.68	0.02	0.00	0.00	Open	0
147	P-965	J-760	J-444	277.69	8.00	120.00	2.78	0.02	0.00	0.00	Open	0
148	P-547	J-394	J-400	633.06	8.00	120.00	-2.81	0.02	0.00	0.00	Open	0
149	P-545	J-410	J-412	738.66	8.00	120.00	-2.81	0.02	0.00	0.00	Open	0
150	P-893	J-690	J-692	1,636.61	8.00	120.00	2.83	0.02	0.00	0.00	Open	0
151	P-429	J-316	J-246	668.34	18.00	120.00	15.14	0.02	0.00	0.00	Open	0
152	P-495	J-870	J-868	84.39	12.00	120.00	-6.93	0.02	0.00	0.00	Open	0
153	P-325	J-238	J-240	244.40	8.00	120.00	3.17	0.02	0.00	0.00	Open	0
154	P-323	J-238	J-236	403.98	8.00	120.00	-3.17	0.02	0.00	0.00	Open	0
155	P-321	J-236	J-234	277.61	8.00	120.00	-3.17	0.02	0.00	0.00	Open	0
156	P-533	J-396	J-414	248.25	8.00	120.00	-3.33	0.02	0.00	0.00	Open	0
157	P-539	J-400	J-404	353.65	8.00	120.00	-3.51	0.02	0.00	0.00	Open	0
158	P-405	J-296	J-242	219.36	8.00	120.00	-3.53	0.02	0.00	0.00	Open	0
159	P-851	J-654	J-656	1,063.58	4.00	120.00	0.90	0.02	0.00	0.00	Open	0
160	P-537	J-398	J-404	67.88	8.00	120.00	-3.91	0.02	0.00	0.00	Open	0
161	P-535	J-414	J-398	398.88	8.00	120.00	-3.91	0.02	0.00	0.00	Open	0
162	P-981	J-776	J-778	273.26	8.00	120.00	3.98	0.03	0.00	0.00	Open	0
163	P-845	J-648	J-650	329.98	2.00	120.00	0.25	0.03	0.00	0.00	Open	0
164	P-927	J-718	J-720	275.02	4.00	120.00	1.01	0.03	0.00	0.00	Open	0
165	P-949	J-412	J-740	1,297.64	8.00	120.00	-4.16	0.03	0.00	0.00	Open	0
166	P-557	J-420	J-316	1,714.78	18.00	120.00	-21.75	0.03	0.00	0.00	Open	0
167	P-935	J-726	J-728	237.84	2.00	120.00	0.27	0.03	0.00	0.00	Open	0
168	P-503	J-250	J-368	46.30	10.00	120.00	6.84	0.03	0.00	0.00	Open	0
169	P-789	J-602	J-74	1,048.14	8.00	120.00	-4.39	0.03	0.00	0.00	Open	0
170	P-347	J-250	J-364	808.56	10.00	120.00	-6.93	0.03	0.00	0.00	Open	0
171	P-493	J-364	J-870	386.42	10.00	120.00	-6.93	0.03	0.00	0.00	Open	0
172	P-149	J-122	J-114	1,337.35	6.00	120.00	2.51	0.03	0.00	0.00	Open	0
173	P-1057	J-826	J-828	469.06	4.00	120.00	1.13	0.03	0.00	0.00	Open	0
174	P-1099	J-110	J-730	310.08	8.00	120.00	-4.57	0.03	0.00	0.00	Open	0
175	P-1115	J-862	J-872	439.89	8.00	120.00	4.71	0.03	0.00	0.00	Open	0

2010 Average Day Steady State Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
176	P-1117	J-872	J-848	691.05	8.00	120.00	4.71	0.03	0.00	0.00	Open	0
177	P-175	J-142	J-816	783.21	12.00	120.00	10.66	0.03	0.00	0.00	Open	0
178	P-421	J-296	J-312	942.24	4.00	120.00	1.21	0.03	0.00	0.00	Open	0
179	P-327	J-240	J-234	397.92	8.00	120.00	-5.00	0.03	0.00	0.00	Open	0
180	P-343	J-118	J-248	950.75	12.00	120.00	-11.32	0.03	0.00	0.00	Open	0
181	P-153	J-120	J-520	226.44	12.00	120.00	11.66	0.03	0.00	0.00	Open	0
182	P-775	J-586	J-582	469.58	2.00	120.00	0.33	0.03	0.00	0.01	Open	0
183	P-953	J-746	J-408	1,084.64	8.00	120.00	-5.30	0.03	0.00	0.00	Open	0
184	P-345	J-248	J-342	54.13	12.00	120.00	-11.99	0.03	0.00	0.00	Open	0
185	P-443	J-446	J-776	282.13	8.00	120.00	5.36	0.03	0.00	0.00	Open	0
186	P-465	J-342	J-334	286.59	12.00	120.00	-12.19	0.03	0.00	0.00	Open	0
187	P-767	J-576	J-574	792.44	2.00	120.00	0.34	0.03	0.01	0.01	Open	0
188	P-869	J-672	J-666	2,094.07	12.00	120.00	-13.05	0.04	0.00	0.00	Open	0
189	P-773	J-104	J-586	1,815.05	8.00	120.00	6.13	0.04	0.00	0.00	Open	0
190	P-459	J-334	J-144	572.10	12.00	120.00	-14.10	0.04	0.00	0.00	Open	0
191	P-233	J-182	J-140	872.24	8.00	120.00	6.46	0.04	0.00	0.00	Open	0
192	P-1061	J-834	J-832	658.30	6.00	120.00	-3.65	0.04	0.00	0.00	Open	0
193	P-989	J-778	J-456	312.62	8.00	120.00	6.49	0.04	0.00	0.00	Open	0
194	P-939	J-730	J-732	412.71	6.00	120.00	3.73	0.04	0.00	0.00	Open	0
195	P-1111	J-868	J-284	374.45	8.00	120.00	6.70	0.04	0.00	0.00	Open	0
196	P-563	J-424	J-316	1,692.28	18.00	120.00	36.96	0.05	0.00	0.00	Open	0
197	P-963	J-754	J-760	277.03	8.00	120.00	7.43	0.05	0.00	0.00	Open	0
198	P-783	J-590	J-596	1,221.12	6.00	120.00	4.28	0.05	0.00	0.00	Open	0
199	P-145	J-110	J-242	1,041.13	8.00	120.00	7.67	0.05	0.00	0.00	Open	0
200	P-265	J-406	J-408	757.52	8.00	120.00	-7.76	0.05	0.00	0.00	Open	0
201	P-541	J-404	J-406	298.17	8.00	120.00	-7.76	0.05	0.00	0.00	Open	0
202	P-305	J-500	J-150	1,422.16	8.00	120.00	8.05	0.05	0.00	0.00	Open	0
203	P-553	J-240	J-740	538.92	8.00	120.00	8.17	0.05	0.00	0.00	Open	0
204	P-765	J-580	J-576	97.88	2.00	120.00	0.53	0.05	0.00	0.02	Open	0
205	P-335	J-482	J-500	112.08	8.00	120.00	8.88	0.06	0.00	0.00	Open	0
206	P-555	J-416	J-482	2,970.66	8.00	120.00	8.94	0.06	0.01	0.00	Open	0
207	P-329	J-242	J-750	1,958.63	8.00	120.00	-9.06	0.06	0.01	0.00	Open	0
208	P-959	J-750	J-210	1,384.29	8.00	120.00	-9.12	0.06	0.00	0.00	Open	0
209	P-931	J-724	J-722	257.58	6.00	120.00	-5.54	0.06	0.00	0.01	Open	0
210	P-877	J-510	J-420	136.23	18.00	120.00	50.47	0.06	0.00	0.00	Open	0



2010 Average Day Steady State Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
211	P-559	J-418	J-510	424.33	18.00	120.00	50.47	0.06	0.00	0.00	Open	0
212	P-491	J-362	J-520	5,235.35	18.00	120.00	-50.86	0.06	0.01	0.00	Open	0
213	P-1095	J-362	J-112	122.03	18.00	120.00	50.86	0.06	0.00	0.00	Open	0
214	P-1027	J-808	J-778	456.42	6.00	120.00	5.71	0.06	0.00	0.01	Open	0
215	P-437	J-456	J-448	256.16	8.00	120.00	-10.17	0.06	0.00	0.00	Open	0
216	P-261	J-180	J-142	609.97	12.00	120.00	23.21	0.07	0.00	0.00	Open	0
217	P-785	J-596	J-592	615.70	4.00	120.00	2.66	0.07	0.01	0.01	Open	0
218	P-253	J-182	J-186	261.51	8.00	120.00	-11.02	0.07	0.00	0.01	Open	0
219	P-109	J-88	J-90	804.99	8.00	120.00	11.03	0.07	0.00	0.01	Open	0
220	P-839	J-642	J-644	583.52	2.00	120.00	0.69	0.07	0.01	0.03	Open	0
221	P-239	J-184	J-188	268.41	8.00	120.00	-11.22	0.07	0.00	0.01	Open	0
222	P-433	J-448	J-450	419.97	8.00	120.00	-11.54	0.07	0.00	0.01	Open	0
223	P-745	J-560	J-556	696.26	4.00	120.00	2.91	0.07	0.01	0.01	Open	0
224	P-1021	J-804	J-770	481.22	6.00	120.00	6.62	0.08	0.00	0.01	Open	0
225	P-565	J-418	J-426	77.81	18.00	120.00	-59.86	0.08	0.00	0.00	Open	0
226	P-567	J-424	J-426	469.48	18.00	120.00	59.86	0.08	0.00	0.00	Open	0
227	P-235	J-140	J-184	263.88	8.00	120.00	-11.98	0.08	0.00	0.01	Open	0
228	P-1029	J-808	J-812	287.74	6.00	120.00	-6.84	0.08	0.00	0.01	Open	0
229	P-245	J-196	J-142	273.62	8.00	120.00	-12.18	0.08	0.00	0.01	Open	0
230	P-241	J-188	J-192	268.63	8.00	120.00	-12.51	0.08	0.00	0.01	Open	0
231	P-255	J-186	J-190	268.74	8.00	120.00	-12.53	0.08	0.00	0.01	Open	0
232	P-967	J-766	J-754	278.88	8.00	120.00	12.58	0.08	0.00	0.01	Open	0
233	P-1085	J-854	J-150	1,074.01	6.00	120.00	-7.11	0.08	0.01	0.01	Open	0
234	P-393	J-288	J-850	527.35	6.00	120.00	-7.11	0.08	0.00	0.01	Open	0
235	P-1083	J-850	J-854	267.64	6.00	120.00	-7.11	0.08	0.00	0.01	Open	0
236	P-177	J-524	J-458	2,035.75	18.00	120.00	-65.16	0.08	0.01	0.00	Open	0
237	P-333	J-244	J-242	558.54	8.00	120.00	-13.00	0.08	0.00	0.01	Open	0
238	P-331	J-234	J-244	408.38	8.00	120.00	-13.00	0.08	0.00	0.01	Open	0
239	P-427	J-444	J-446	918.56	8.00	120.00	-13.51	0.09	0.01	0.01	Open	0
240	P-293	J-496	J-458	1,531.63	18.00	120.00	68.67	0.09	0.00	0.00	Open	0
241	P-623	J-876	J-594	491.77	2.00	120.00	0.85	0.09	0.02	0.04	Open	0
242	P-787	J-592	J-876	1,138.12	2.00	120.00	0.85	0.09	0.04	0.04	Open	0
243	P-1031	J-812	J-776	467.65	6.00	120.00	7.75	0.09	0.00	0.01	Open	0
244	P-1019	J-776	J-804	448.26	6.00	120.00	7.79	0.09	0.00	0.01	Open	0
245	P-1055	J-824	J-826	443.98	4.00	120.00	3.48	0.09	0.01	0.02	Open	0

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ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
246	P-1053	J-822	J-824	279.93	4.00	120.00	3.48	0.09	0.00	0.02	Open	0
247	P-243	J-192	J-196	256.54	8.00	120.00	-13.91	0.09	0.00	0.01	Open	0
248	P-257	J-190	J-194	276.33	8.00	120.00	-13.96	0.09	0.00	0.01	Open	0
249	P-441	J-420	J-496	2,959.39	18.00	120.00	71.97	0.09	0.01	0.00	Open	0
250	P-979	J-770	J-444	282.00	8.00	120.00	-14.24	0.09	0.00	0.01	Open	0
251	P-529	J-408	J-110	1,191.29	8.00	120.00	-14.48	0.09	0.01	0.01	Open	0
252	P-1063	J-832	J-830	467.12	4.00	120.00	-3.65	0.09	0.01	0.02	Open	0
253	P-1065	J-830	J-136	284.46	4.00	120.00	-3.65	0.09	0.00	0.02	Open	0
254	P-481	J-350	J-354	411.42	8.00	120.00	14.66	0.09	0.00	0.01	Open	0
255	P-1037	J-446	J-814	274.85	6.00	120.00	-8.32	0.09	0.00	0.01	Open	0
256	P-273	J-200	J-134	850.45	12.00	120.00	-33.35	0.09	0.00	0.01	Open	0
257	P-415	J-442	J-138	676.55	12.00	120.00	-34.73	0.10	0.00	0.01	Open	0
258	P-1107	J-864	J-862	733.30	12.00	120.00	-34.84	0.10	0.00	0.01	Open	0
259	P-387	J-868	J-864	38.02	12.00	120.00	-34.84	0.10	0.00	0.01	Open	0
260	P-937	J-724	J-730	761.31	6.00	120.00	8.78	0.10	0.01	0.01	Open	0
261	P-521	J-456	J-126	662.33	8.00	120.00	15.65	0.10	0.01	0.01	Open	0
262	P-929	J-718	J-724	664.53	4.00	120.00	3.94	0.10	0.01	0.02	Open	0
263	P-1017	J-766	J-802	246.51	2.00	120.00	1.04	0.11	0.01	0.05	Open	0
264	P-1015	J-766	J-800	193.58	2.00	120.00	1.04	0.11	0.01	0.05	Open	0
265	P-173	J-140	J-766	890.11	8.00	120.00	17.14	0.11	0.01	0.01	Open	0
266	P-1105	J-862	J-282	179.96	12.00	120.00	-39.55	0.11	0.00	0.01	Open	0
267	P-917	J-712	J-706	1,156.25	8.00	120.00	-17.59	0.11	0.01	0.01	Open	0
268	P-259	J-194	J-180	256.55	8.00	120.00	-17.92	0.11	0.00	0.01	Open	0
269	P-231	J-198	J-180	975.70	12.00	120.00	41.13	0.12	0.01	0.01	Open	0
270	P-993	J-200	J-786	449.40	12.00	120.00	42.53	0.12	0.00	0.01	Open	0
271	P-431	J-318	J-424	706.43	18.00	120.00	96.87	0.12	0.00	0.01	Open	0
272	P-205	J-318	J-322	1,608.19	18.00	120.00	-97.04	0.12	0.01	0.01	Open	0
273	P-901	J-698	J-700	153.97	8.00	120.00	19.23	0.12	0.00	0.01	Open	0
274	P-435	J-322	J-152	54.76	18.00	120.00	-97.40	0.12	0.00	0.01	Open	0
275	P-449	J-330	J-198	2,969.16	12.00	120.00	43.35	0.12	0.03	0.01	Open	0
276	P-1079	J-842	J-846	498.55	4.00	120.00	-4.83	0.12	0.02	0.03	Open	0
277	P-1081	J-846	J-848	851.27	4.00	120.00	-4.83	0.12	0.03	0.03	Open	0
278	P-463	J-330	J-144	75.48	12.00	120.00	-43.72	0.12	0.00	0.01	Open	0
279	P-389	J-282	J-292	542.03	12.00	120.00	-43.86	0.12	0.00	0.01	Open	0
280	P-399	J-292	J-264	184.07	12.00	120.00	-44.04	0.12	0.00	0.01	Open	0

2010 Average Day Steady State Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
281	P-925	J-716	J-718	268.76	4.00	120.00	4.95	0.13	0.01	0.03	Open	0
282	P-847	J-648	J-652	380.26	2.00	120.00	1.24	0.13	0.03	0.08	Open	0
283	P-417	J-432	J-770	384.91	8.00	120.00	-19.87	0.13	0.01	0.01	Open	0
284	P-921	J-722	J-110	776.17	8.00	120.00	20.19	0.13	0.01	0.02	Open	0
285	P-1039	J-814	J-816	464.71	6.00	120.00	-11.59	0.13	0.01	0.02	Open	0
286	P-187	J-146	J-868	1,071.58	8.00	120.00	-21.21	0.14	0.02	0.02	Open	0
287	P-341	J-490	J-268	210.12	8.00	120.00	-21.21	0.14	0.00	0.02	Open	0
288	P-1047	J-820	J-442	983.00	6.00	120.00	-12.07	0.14	0.02	0.02	Open	0
289	P-1045	J-818	J-820	1,551.26	6.00	120.00	-12.07	0.14	0.04	0.02	Open	0
290	P-1043	J-200	J-818	274.34	6.00	120.00	-12.07	0.14	0.01	0.02	Open	0
291	P-93	J-82	J-80	991.47	8.00	120.00	22.00	0.14	0.02	0.02	Open	0
292	P-909	J-706	J-708	200.14	6.00	120.00	12.84	0.15	0.01	0.03	Open	0
293	P-1041	J-446	J-786	489.26	6.00	120.00	-13.12	0.15	0.01	0.03	Open	0
294	P-371	J-268	J-704	1,060.41	8.00	120.00	-23.46	0.15	0.02	0.02	Open	0
295	P-217	J-172	J-202	1,608.64	8.00	100.00	-23.92	0.15	0.05	0.03	Open	0
296	P-161	J-126	J-450	688.05	12.00	120.00	-56.11	0.16	0.01	0.01	Open	0
297	P-183	J-132	J-834	254.91	8.00	120.00	-25.27	0.16	0.01	0.02	Open	0
298	P-151	J-120	J-122	2,074.32	12.00	120.00	57.58	0.16	0.03	0.01	Open	0
299	P-1033	J-812	J-786	267.53	6.00	120.00	-14.59	0.17	0.01	0.03	Open	0
300	P-439	J-144	J-442	2,179.60	12.00	120.00	-59.83	0.17	0.03	0.02	Open	0
301	P-165	J-132	J-136	1,145.83	12.00	120.00	-60.46	0.17	0.02	0.02	Open	0
302	P-1059	J-834	J-836	1,661.06	8.00	120.00	-29.83	0.19	0.05	0.03	Open	0
303	P-1067	J-836	J-378	496.73	8.00	120.00	-29.83	0.19	0.02	0.03	Open	0
304	P-143	J-116	J-690	2,704.50	10.00	120.00	-47.04	0.19	0.07	0.02	Open	0
305	P-919	J-716	J-722	676.87	8.00	120.00	30.24	0.19	0.02	0.03	Open	0
306	P-189	J-848	J-146	465.42	6.00	120.00	17.12	0.19	0.02	0.05	Open	0
307	P-1073	J-842	J-146	653.03	8.00	120.00	-30.51	0.19	0.02	0.03	Open	0
308	P-1075	J-848	J-280	364.88	6.00	120.00	-17.24	0.20	0.02	0.05	Open	0
309	P-419	J-450	J-132	64.15	12.00	120.00	-69.26	0.20	0.00	0.02	Open	0
310	P-101	J-70	J-104	917.22	8.00	120.00	-30.96	0.20	0.03	0.03	Open	0
311	P-519	J-432	J-126	330.77	12.00	120.00	-70.81	0.20	0.01	0.02	Open	0
312	P-483	J-354	J-356	266.39	8.00	120.00	-32.14	0.21	0.01	0.04	Open	0
313	P-487	J-352	J-356	407.48	8.00	120.00	32.14	0.21	0.01	0.04	Open	0
314	P-103	J-68	J-102	1,616.39	10.00	120.00	50.23	0.21	0.05	0.03	Open	0
315	P-383	J-280	J-266	200.24	6.00	120.00	-18.74	0.21	0.01	0.05	Open	0

2010 Average Day Steady State Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
316	P-911	J-700	J-710	1,163.14	6.00	120.00	18.77	0.21	0.06	0.05	Open	0
317	P-367	J-266	J-278	49.90	6.00	120.00	-18.96	0.22	0.00	0.06	Open	0
318	P-889	J-690	J-688	286.15	10.00	120.00	-53.34	0.22	0.01	0.03	Open	0
319	P-887	J-688	J-122	591.42	10.00	120.00	-53.34	0.22	0.02	0.03	Open	0
320	P-381	J-278	J-376	504.79	6.00	120.00	-19.54	0.22	0.03	0.06	Open	0
321	P-515	J-378	J-842	1,468.10	8.00	120.00	-35.34	0.23	0.06	0.04	Open	0
322	P-133	J-84	J-106	722.42	6.00	120.00	19.90	0.23	0.04	0.06	Open	0
323	P-1049	J-822	J-136	452.53	12.00	120.00	80.50	0.23	0.01	0.03	Open	0
324	P-219	J-172	J-646	1,198.87	8.00	100.00	-35.79	0.23	0.07	0.06	Open	0
325	P-137	J-712	J-716	819.54	8.00	120.00	36.77	0.23	0.04	0.05	Open	0
326	P-571	J-118	J-344	3,077.18	8.00	120.00	-36.98	0.24	0.15	0.05	Open	0
327	P-171	J-138	J-822	1,820.98	12.00	120.00	83.98	0.24	0.05	0.03	Open	0
328	P-287	J-490	J-712	128.04	6.00	120.00	21.21	0.24	0.01	0.07	Open	0
329	P-841	J-646	J-170	1,555.36	8.00	100.00	-38.07	0.24	0.11	0.07	Open	0
330	P-511	J-376	J-288	285.10	6.00	120.00	-21.42	0.24	0.02	0.07	Open	0
331	P-225	J-176	J-630	433.29	6.00	120.00	-21.72	0.25	0.03	0.07	Open	0
332	P-157	J-120	J-432	1,941.03	12.00	120.00	-87.57	0.25	0.06	0.03	Open	0
333	P-907	J-704	J-706	269.92	6.00	120.00	22.19	0.25	0.02	0.07	Open	0
334	P-861	J-666	J-344	615.55	8.00	120.00	40.36	0.26	0.03	0.06	Open	0
335	P-913	J-710	J-706	856.65	4.00	120.00	10.33	0.26	0.11	0.13	Open	0
336	P-159	J-128	J-124	728.80	12.00	120.00	93.19	0.26	0.03	0.04	Open	0
337	P-411	J-440	J-442	802.27	8.00	120.00	42.42	0.27	0.05	0.06	Open	0
338	P-779	J-588	J-584	701.70	6.00	120.00	24.45	0.28	0.06	0.09	Open	0
339	P-277	J-170	J-202	1,083.34	6.00	100.00	24.50	0.28	0.14	0.13	Open	0
340	P-513	J-288	J-370	533.54	8.00	120.00	44.04	0.28	0.03	0.07	Open	0
341	P-505	J-264	J-370	557.37	8.00	120.00	-44.04	0.28	0.04	0.07	Open	0
342	P-827	J-640	J-636	188.62	6.00	120.00	-25.03	0.28	0.02	0.09	Open	0
343	P-829	J-636	J-634	103.56	6.00	120.00	-25.03	0.28	0.01	0.09	Open	0
344	P-991	J-780	J-520	3,348.46	18.00	120.00	225.57	0.28	0.09	0.03	Open	0
345	P-163	J-134	J-780	496.26	18.00	120.00	228.89	0.29	0.01	0.03	Open	0
346	P-413	J-354	J-440	1,187.11	8.00	120.00	45.33	0.29	0.08	0.07	Open	0
347	P-285	J-210	J-204	4,495.72	8.00	120.00	-46.65	0.30	0.33	0.07	Open	0
348	P-279	J-204	J-118	5,953.37	8.00	120.00	-46.65	0.30	0.43	0.07	Open	0
349	P-777	J-84	J-588	759.44	6.00	120.00	26.39	0.30	0.08	0.10	Open	0
350	P-831	J-634	J-630	1,888.66	6.00	120.00	-26.82	0.30	0.20	0.11	Open	0

2010 Average Day Steady State Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
351	P-905	J-704	J-698	1,996.10	8.00	120.00	-48.75	0.31	0.16	0.08	Open	0
352	P-169	J-134	J-138	2,062.45	18.00	120.00	-255.16	0.32	0.07	0.03	Open	0
353	P-141	J-116	J-112	1,369.73	8.00	120.00	-50.86	0.32	0.12	0.09	Open	0
354	P-899	J-698	J-694	1,106.50	10.00	120.00	-89.06	0.36	0.09	0.08	Open	0
355	P-895	J-694	J-388	1,244.78	10.00	120.00	-89.29	0.36	0.10	0.08	Open	0
356	P-471	J-172	J-666	4,465.74	8.00	100.00	57.22	0.37	0.66	0.15	Open	0
357	P-811	J-616	J-620	425.58	4.00	120.00	14.57	0.37	0.10	0.25	Open	0
358	P-527	J-388	J-116	663.25	10.00	120.00	-95.55	0.39	0.06	0.09	Open	0
359	P-155	J-524	J-288	87.18	8.00	120.00	64.76	0.41	0.01	0.13	Open	0
360	P-215	J-170	J-168	917.03	8.00	100.00	-65.85	0.42	0.18	0.19	Open	0
361	P-291	T-7002	J-94	3,083.27	24.00	120.00	651.12	0.46	0.14	0.05	Open	0
362	P-771	J-584	J-106	244.17	4.00	120.00	-18.81	0.48	0.10	0.40	Open	0
363	P-227	J-350	J-138	1,874.44	18.00	120.00	384.27	0.48	0.13	0.07	Open	0
364	P-477	J-350	J-352	275.47	18.00	120.00	-404.64	0.51	0.02	0.08	Open	0
365	P-91	J-78	J-82	2,075.30	8.00	120.00	-80.23	0.51	0.41	0.20	Open	0
366	P-195	J-520	J-128	1,699.50	12.00	120.00	186.38	0.53	0.22	0.13	Open	0
367	P-479	J-152	J-352	788.90	18.00	120.00	438.75	0.55	0.07	0.09	Open	0
368	P-823	J-630	J-174	474.09	6.00	120.00	-48.94	0.56	0.15	0.32	Open	0
369	P-129	J-102	J-84	446.68	6.00	120.00	49.83	0.57	0.15	0.33	Open	0
370	P-1093	J-860	J-80	159.30	8.00	120.00	104.23	0.67	0.05	0.32	Open	0
371	P-111	J-98	J-860	2,277.96	8.00	110.00	104.23	0.67	0.86	0.38	Open	0
372	P-125	J-98	J-90	505.19	8.00	110.00	-107.13	0.68	0.20	0.40	Open	0
373	P-211	J-164	J-152	2,479.91	18.00	120.00	544.34	0.69	0.33	0.13	Open	0
374	P-855	J-660	J-164	1,425.12	18.00	120.00	554.13	0.70	0.19	0.14	Open	0
375	P-213	J-168	J-660	3,044.72	18.00	120.00	555.57	0.70	0.42	0.14	Open	0
376	P-113	J-82	J-88	3,076.46	8.00	120.00	-110.31	0.70	1.10	0.36	Open	0
377	P-117	J-90	J-100	4,406.63	8.00	110.00	-110.73	0.71	1.86	0.42	Open	0
378	P-753	J-564	J-72	1,565.99	10.00	120.00	177.81	0.73	0.46	0.29	Open	0
379	P-743	J-560	J-564	784.16	10.00	120.00	182.06	0.74	0.24	0.30	Open	0
380	P-825	J-640	J-526	225.26	18.00	120.00	-597.72	0.75	0.04	0.16	Open	0
381	P-85	J-74	J-560	968.59	10.00	120.00	185.10	0.76	0.30	0.31	Open	0
382	P-139	J-526	J-174	2,159.29	18.00	120.00	-601.99	0.76	0.34	0.16	Open	0
383	P-127	J-100	J-92	3,032.35	8.00	110.00	-120.06	0.77	1.49	0.49	Open	0
384	P-725	J-536	J-538	1,867.93	8.00	120.00	122.82	0.78	0.81	0.44	Open	0
385	P-727	J-538	J-542	1,629.98	8.00	120.00	122.82	0.78	0.71	0.44	Open	0

2010 Average Day Steady State Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
386	P-837	J-642	J-168	774.69	18.00	120.00	621.90	0.78	0.13	0.17	Open	0
387	P-221	J-640	J-642	539.62	18.00	120.00	622.75	0.79	0.09	0.17	Open	0
388	P-115	J-470	J-88	3,684.51	8.00	120.00	123.42	0.79	1.62	0.44	Open	0
389	P-373	J-470	J-92	3,915.33	8.00	120.00	-123.59	0.79	1.73	0.44	Open	0
390	P-737	J-550	J-74	1,066.09	10.00	120.00	193.75	0.79	0.36	0.34	Open	0
391	P-1091	J-858	J-80	392.39	8.00	120.00	-125.69	0.80	0.18	0.45	Open	0
392	P-95	J-78	J-858	471.92	8.00	120.00	-125.69	0.80	0.21	0.45	Open	0
393	P-89	J-468	J-550	2,449.59	10.00	120.00	197.58	0.81	0.87	0.35	Open	0
394	P-223	J-174	J-94	1,001.87	18.00	120.00	-651.12	0.82	0.18	0.18	Open	0
395	P-729	J-540	J-542	1,018.27	8.00	110.00	135.56	0.87	0.63	0.61	Open	0
396	P-723	J-536	J-540	1,461.43	8.00	110.00	135.56	0.87	0.90	0.61	Open	0
397	P-131	J-104	J-584	1,681.02	4.00	120.00	-43.26	1.10	3.10	1.85	Open	0
398	P-457	J-78	J-468	943.27	8.00	120.00	199.97	1.28	1.01	1.07	Open	0
399	P-731	J-542	J-92	424.34	8.00	110.00	248.48	1.59	0.80	1.89	Open	0
400	P-721	J-50	J-536	922.49	8.00	120.00	259.72	1.66	4.17	4.52	Open	0
401	P-79	J-64	J-50	4,667.32	8.00	120.00	260.02	1.66	8.16	1.75	Open	0
402	P-295	J-214	T-7000	3,571.89	24.00	120.00	-2,406.45	1.71	1.82	0.51	Open	0
403	P-77	J-38	J-212	726.19	24.00	120.00	-2,406.45	1.71	0.37	0.51	Open	0
404	P-83	J-66	J-544	1,640.19	20.00	120.00	-1,900.77	1.94	1.32	0.80	Open	0
405	P-313	J-226	J-66	452.97	20.00	120.00	-1,900.77	1.94	0.36	0.80	Open	0
406	P-733	J-544	J-64	1,258.06	20.00	120.00	-1,901.04	1.94	1.01	0.80	Open	0
407	P-81	J-64	J-534	1,123.26	20.00	120.00	-2,162.90	2.21	1.14	1.02	Open	0
408	P-763	J-580	J-70	181.66	18.00	120.00	1,837.54	2.32	0.23	1.26	Open	0
409	P-99	J-68	J-580	2,571.55	18.00	120.00	1,839.04	2.32	3.24	1.26	Open	0
410	P-97	J-72	J-70	1,560.84	18.00	120.00	-1,868.50	2.36	2.03	1.30	Open	0
411	P-717	J-534	J-206	5,813.69	20.00	120.00	-2,331.16	2.38	6.81	1.17	Open	0
412	P-107	J-68	J-590	5,006.43	18.00	120.00	-1,889.27	2.38	6.63	1.33	Open	0
413	P-281	J-206	J-208	1,135.06	20.00	120.00	-2,335.62	2.39	1.33	1.17	Open	0
414	P-283	J-208	J-38	3,153.09	20.00	120.00	-2,339.55	2.39	3.72	1.18	Open	0
415	P-781	J-590	J-86	852.42	18.00	120.00	-1,897.06	2.39	1.14	1.34	Open	0
416	P-105	J-226	J-86	5,076.32	18.00	120.00	1,900.71	2.40	6.80	1.34	Open	0
417	P-447	J-466	T-7002	2,880.68	18.00	120.00	2,025.57	2.55	4.34	1.51	Open	0
418	P-317	J-228	J-460	177.68	18.00	120.00	2,025.57	2.55	0.27	1.51	Open	0
419	P-817	J-626	J-228	1,589.15	18.00	120.00	2,025.82	2.55	2.40	1.51	Open	0
420	P-813	J-622	J-626	1,509.87	18.00	120.00	2,028.06	2.56	2.28	1.51	Open	0

2010 Average Day Steady State Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
421	P-807	J-616	J-622	723.55	18.00	120.00	2,029.18	2.56	1.09	1.51	Open	0
422	P-315	J-72	J-616	3,326.05	18.00	120.00	2,045.86	2.58	5.11	1.54	Open	0
423	P-453	J-460	J-462	43.37	14.00	120.00	2,025.57	4.22	0.22	5.13	Open	0
424	P-455	J-464	J-466	44.45	10.00	120.00	2,025.57	8.27	1.17	26.41	Open	0

**2010 Average Day Steady State Analysis Tank Report**



	ID	Flow (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	% Full (%)	Volume (MG)	Level (ft)
1	<input type="checkbox"/> T-7000	-2,406.45	500.00	500.00	0.00	100.00	0.00	0.00
2	<input type="checkbox"/> T-7002	1,374.45	185.00	217.00	13.87	79.95	2.93	32.00



**2010 Average Day Steady State Analysis Valve Report**

	<b>ID</b>	<b>From Node</b>	<b>To Node</b>	<b>Diameter (in)</b>	<b>Flow (gpm)</b>	<b>Velocity (ft/s)</b>	<b>Headloss (ft)</b>	<b>Status</b>	<b>Setting</b>
<b>1</b>	<input type="checkbox"/> <b>9007</b>	<b>J-214</b>	<b>J-212</b>	<b>12.00</b>	<b>2,406.45</b>	<b>6.83</b>	<b>263.85</b>	<b>Active</b>	<b>92.00</b>
<b>2</b>	<input type="checkbox"/> <b>V-9009</b>	<b>J-50</b>	<b>J-536</b>	<b>6.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>Closed</b>	<b>50.00</b>

**2010 Average Day Steady State Analysis Pump Report**

	<b>ID</b>	<b>From Node</b>	<b>To Node</b>	<b>Flow (gpm)</b>	<b>Head Gain (ft)</b>	<b>Status</b>	<b>Setting</b>	<b>Avail.NPSH (ft)</b>	<b>Cavitation Index</b>
<b>1</b>	 <b>PMP-5001</b>	<b>J-462</b>	<b>J-464</b>	<b>2,025.57</b>	<b>35.69</b>	<b>Open</b>	<b>1.00</b>	<b>190.96</b>	<b>0.00</b>
<b>2</b>	 <b>PMP-5005</b>	<b>J-788</b>	<b>J-790</b>	<b>0.00</b>	<b>0.00</b>	<b>Closed</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

**PEAK DAY DEMAND**

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*****
***                H2OMAP Water GIS                ***
***                Comprehensive Analysis of          ***
***                Water Distribution Piping Network   ***
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Input Data File ..... P:\CITY OF
WARRENTON\035889\STUDY\DATA\MODEL\WATER_MODEL_010711.OUT\SCENARIO\2010PD\~INP
Number of Junctions..... 364
Number of Reservoirs..... 1
Number of Tanks ..... 1
Number of Pipes ..... 424
Number of Pumps ..... 2
Number of Valves ..... 2
Headloss Formula ..... Hazen-williams
Hydraulic Timestep ..... 1.00 hrs
Hydraulic Accuracy ..... 0.001000
Status Check Frequency ..... 2
Maximum Trials Checked ..... 10
Damping Limit Threshold ..... 0.000000
Maximum Trials ..... 40
Quality Analysis ..... None
Specific Gravity ..... 1.00
Relative Kinematic Viscosity ..... 1.00
Relative Chemical Diffusivity ..... 1.00
Demand Multiplier ..... 1.00
Total Duration ..... 0.00 hrs
Reporting Criteria:

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No Nodes  
No Links

Analysis began Wed Jul 27 12:12:12 2011

Hydraulic Status:

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0:00:00: Pump PMP-5005 changed by Tank T-7002 control
0:00:00: Balanced after 6 trials
          Total Supplied: 2706.68 gpm
          Total Demanded: 2117.98 gpm
          Total Stored: 588.52 gpm
0:00:00: Reservoir T-7000 is emptying
0:00:00: Tank T-7002 is filling at 32.00 ft
0:00:00: Pump PMP-5005 closed
0:00:00: PRV V-9009 closed

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Analysis ended Wed Jul 27 12:14:26 2011

2010 Peak Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	J-628	0.26	129.50	214.46	36.81
2	J-144	4.11	76.50	208.94	57.39
3	J-516	0.00	74.66	209.87	58.59
4	J-510	0.00	74.37	209.87	58.71
5	J-420	14.03	72.01	209.87	59.73
6	J-330	0.77	69.43	208.94	60.45
7	J-554	2.84	51.51	196.05	62.63
8	J-100	19.14	55.59	200.27	62.69
9	J-666	7.82	61.00	209.61	64.39
10	J-542	20.31	53.00	202.71	64.87
11	J-92	9.91	52.03	201.86	64.92
12	J-498	0.48	58.93	209.83	65.39
13	J-540	0.00	51.74	203.42	65.72
14	J-536	2.76	52.58	204.44	65.80
15	J-344	4.25	57.46	209.49	65.87
16	J-210	76.96	52.18	206.06	66.68
17	J-740	4.97	52.05	205.98	66.70
18	J-670	2.31	55.00	209.61	66.99
19	J-418	0.00	55.26	209.87	66.99
20	J-664	0.00	56.46	211.17	67.04
21	J-496	1.71	55.00	209.83	67.09
22	J-198	3.68	53.26	208.84	67.41
23	J-608	1.86	40.28	196.04	67.49
24	J-462	0.00	29.00	185.14	67.65
25	J-168	0.99	57.16	213.49	67.74
26	J-460	0.00	29.00	185.34	67.74
27	J-228	0.52	29.00	185.58	67.85
28	J-660	2.96	55.09	211.91	67.95
29	J-624	0.00	31.15	189.85	68.76
30	J-626	4.60	29.00	187.77	68.79
31	J-662	0.00	53.01	211.91	68.85
32	J-788	0.00	25.90	185.14	69.00
33	J-118	3.39	49.19	208.94	69.22
34	J-78	12.21	37.64	197.44	69.24
35	J-426	0.00	49.82	209.87	69.35
36	J-560	0.28	35.48	195.90	69.51
37	J-622	2.31	28.98	189.85	69.70
38	J-620	29.88	29.00	190.45	69.96
39	J-552	2.16	34.76	196.26	69.98
40	J-742	1.57	44.12	205.98	70.13
41	J-616	2.94	28.94	190.85	70.15

2010 Peak Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
42	J-204	0.00	44.56	207.30	70.51
43	J-648	0.00	48.94	212.41	70.83
44	J-618	1.40	27.21	190.84	70.90
45	J-668	3.47	45.78	209.61	70.99
46	J-650	0.52	48.42	212.40	71.05
47	J-324	0.00	44.94	208.94	71.06
48	J-672	21.00	45.14	209.61	71.26
49	J-744	0.00	41.49	205.98	71.28
50	J-430	0.00	45.00	209.87	71.44
51	J-886	0.00	25.90	190.84	71.47
52	J-90	29.98	33.00	198.58	71.74
53	J-538	0.00	37.89	203.52	71.77
54	J-602	3.84	29.50	196.04	72.16
55	J-518	0.00	43.26	209.87	72.19
56	J-570	0.00	29.00	195.79	72.27
57	J-572	0.00	29.00	195.79	72.27
58	J-568	0.00	29.00	195.79	72.27
59	J-566	1.90	29.00	195.79	72.27
60	J-564	6.84	29.00	195.79	72.27
61	J-562	0.65	29.00	195.86	72.30
62	J-556	3.82	29.00	195.87	72.30
63	J-592	3.72	40.75	207.73	72.35
64	J-606	0.00	29.00	196.04	72.38
65	J-74	5.91	29.00	196.05	72.38
66	J-860	0.00	30.50	197.76	72.47
67	J-550	5.71	29.00	196.26	72.47
68	J-604	2.53	28.72	196.04	72.50
69	J-76	0.50	28.70	196.04	72.51
70	J-80	1.14	30.03	197.72	72.66
71	J-598	0.00	28.15	196.04	72.75
72	J-858	0.00	29.50	197.59	72.83
73	J-600	0.32	27.91	196.04	72.85
74	J-428	0.00	41.41	209.87	72.99
75	J-578	0.00	28.96	197.82	73.17
76	J-558	1.53	27.00	195.86	73.17
77	J-72	0.93	26.24	195.60	73.38
78	J-98	5.96	29.00	198.41	73.41
79	J-68	0.00	31.00	201.08	73.69
80	J-594	1.75	37.40	207.50	73.70
81	J-878	0.00	25.90	196.04	73.72
82	J-882	0.00	25.90	196.04	73.72

2010 Peak Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
83	J-884	0.00	25.90	196.04	73.72
84	J-880	0.00	25.90	196.04	73.72
85	J-876	0.00	37.40	207.57	73.73
86	J-88	4.27	28.01	198.59	73.91
87	J-582	0.69	27.00	197.59	73.91
88	J-586	11.90	27.00	197.60	73.92
89	J-104	12.66	26.83	197.61	74.00
90	J-84	7.27	30.03	200.83	74.01
91	J-574	0.71	27.00	197.80	74.01
92	J-576	0.40	27.00	197.82	74.02
93	J-580	2.00	27.00	197.83	74.02
94	J-470	0.36	29.00	200.17	74.17
95	J-70	0.00	26.26	197.60	74.24
96	J-596	3.33	35.97	207.76	74.43
97	J-748	0.00	33.00	205.98	74.95
98	J-584	0.00	27.43	200.68	75.07
99	J-610	0.00	22.44	196.04	75.22
100	J-588	3.99	27.00	200.74	75.28
101	J-658	1.08	35.96	209.86	75.35
102	J-102	0.83	27.00	201.02	75.40
103	J-106	2.24	26.37	200.78	75.57
104	J-652	2.55	37.83	212.30	75.60
105	J-614	0.00	20.93	196.04	75.88
106	J-546	0.00	41.79	217.59	76.18
107	J-478	12.58	33.92	209.87	76.24
108	J-500	1.24	33.62	209.83	76.35
109	J-612	0.00	19.59	196.04	76.46
110	J-424	0.11	32.88	209.88	76.69
111	J-342	0.42	31.80	208.94	76.75
112	J-746	12.58	28.75	205.98	76.80
113	J-512	0.00	31.00	208.94	77.10
114	J-752	0.00	27.43	206.04	77.40
115	J-414	1.20	27.23	205.98	77.45
116	J-248	1.38	30.18	208.94	77.46
117	J-246	0.22	31.00	209.87	77.50
118	J-238	0.00	26.96	205.99	77.57
119	J-548	0.00	37.21	216.25	77.58
120	J-240	0.00	26.36	205.99	77.83
121	J-410	3.33	26.17	205.98	77.91
122	J-200	5.93	29.00	208.82	77.92
123	J-178	0.89	29.00	208.84	77.92

2010 Peak Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
124	J-340	0.00	29.00	208.94	77.97
125	J-750	0.13	26.09	206.04	77.97
126	J-350	11.72	29.57	209.58	78.00
127	J-50	0.63	29.19	209.25	78.02
128	J-412	2.78	25.90	205.98	78.03
129	J-284	9.67	29.00	209.43	78.18
130	J-364	0.00	29.00	209.44	78.18
131	J-236	0.00	25.55	205.99	78.18
132	J-346	0.00	29.00	209.48	78.20
133	J-440	5.98	28.73	209.26	78.22
134	J-318	0.36	29.32	209.89	78.24
135	J-360	0.00	29.00	209.60	78.26
136	J-234	9.91	25.31	205.99	78.29
137	J-590	7.21	27.00	207.77	78.33
138	J-408	2.92	25.19	205.99	78.34
139	J-354	3.02	28.74	209.57	78.35
140	J-482	5.20	29.00	209.83	78.36
141	J-654	2.92	29.00	209.87	78.37
142	J-352	4.05	28.56	209.66	78.47
143	J-348	2.70	28.28	209.48	78.51
144	J-468	4.91	15.50	196.79	78.55
145	J-138	21.33	27.78	209.09	78.56
146	J-334	3.93	27.57	208.94	78.59
147	J-458	0.11	28.41	209.82	78.60
148	J-406	0.00	24.51	205.98	78.63
149	J-312	2.49	24.51	206.01	78.64
150	J-250	0.00	27.87	209.43	78.67
151	J-252	0.00	27.84	209.43	78.69
152	J-244	0.00	24.32	206.00	78.72
153	J-254	0.19	27.75	209.43	78.72
154	J-256	0.00	27.65	209.43	78.76
155	J-192	3.64	27.00	208.79	78.77
156	J-368	12.70	27.63	209.43	78.77
157	J-182	6.20	26.92	208.78	78.80
158	J-398	0.00	24.07	205.98	78.82
159	J-298	0.00	24.10	206.02	78.82
160	J-86	7.49	27.00	208.93	78.83
161	J-180	0.00	26.87	208.81	78.84
162	J-150	1.08	27.81	209.82	78.87
163	J-502	0.17	27.56	209.82	78.97
164	J-396	2.18	23.65	205.98	79.00



2010 Peak Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
165	J-164	15.65	28.80	211.17	79.02
166	J-142	0.77	26.27	208.80	79.09
167	J-314	0.00	27.15	209.87	79.17
168	J-802	2.14	25.90	208.68	79.20
169	J-800	2.14	25.90	208.69	79.20
170	J-770	2.04	25.90	208.72	79.21
171	J-792	2.14	25.90	208.72	79.22
172	J-794	2.14	25.90	208.72	79.22
173	J-760	5.28	25.90	208.73	79.22
174	J-416	0.91	27.04	209.87	79.22
175	J-798	2.14	25.90	208.73	79.22
176	J-796	2.14	25.90	208.73	79.22
177	J-754	6.30	25.90	208.73	79.22
178	J-806	1.22	25.90	208.73	79.22
179	J-804	1.20	25.90	208.73	79.22
180	J-766	5.09	25.90	208.73	79.22
181	J-508	0.00	26.98	209.82	79.22
182	J-778	6.57	25.90	208.75	79.23
183	J-776	2.76	25.90	208.75	79.23
184	J-810	2.33	25.90	208.76	79.23
185	J-808	0.00	25.90	208.76	79.23
186	J-814	6.71	25.90	208.76	79.23
187	J-812	0.00	25.90	208.77	79.24
188	J-338	0.00	26.06	208.94	79.24
189	J-780	6.82	25.90	208.78	79.24
190	J-834	16.84	25.90	208.79	79.24
191	J-832	0.00	25.90	208.79	79.25
192	J-816	6.71	25.90	208.80	79.25
193	J-786	21.78	25.90	208.80	79.25
194	J-830	0.00	25.90	208.82	79.26
195	J-828	2.33	25.90	208.83	79.26
196	J-134	10.57	25.90	208.83	79.26
197	J-826	0.00	25.90	208.83	79.27
198	J-818	0.00	25.90	208.84	79.27
199	J-824	0.00	25.90	208.86	79.28
200	J-822	0.00	25.90	208.88	79.29
201	J-196	1.20	25.80	208.80	79.29
202	J-296	4.77	23.01	206.02	79.30
203	J-310	0.00	23.00	206.02	79.30
204	J-644	1.42	30.91	213.93	79.30
205	J-172	5.11	29.08	212.13	79.31

2010 Peak Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
206	J-820	0.00	25.90	208.98	79.33
207	J-840	0.00	25.90	208.99	79.33
208	J-836	0.00	25.90	208.99	79.33
209	J-838	0.00	25.90	208.99	79.33
210	J-504	3.02	26.72	209.82	79.34
211	J-242	0.44	22.80	206.02	79.39
212	J-188	2.84	25.46	208.78	79.43
213	J-842	0.00	25.90	209.29	79.46
214	J-844	0.00	25.90	209.29	79.46
215	J-646	1.63	29.00	212.41	79.47
216	J-846	0.00	25.90	209.35	79.49
217	J-848	0.00	25.90	209.45	79.53
218	J-140	2.68	25.00	208.77	79.63
219	J-506	2.86	26.04	209.82	79.63
220	J-184	1.63	25.00	208.78	79.63
221	J-186	2.90	25.00	208.78	79.63
222	J-190	2.20	25.00	208.79	79.64
223	J-194	3.37	25.00	208.80	79.64
224	J-442	10.77	25.25	209.07	79.65
225	J-136	13.36	25.00	208.83	79.66
226	J-432	6.39	24.86	208.69	79.66
227	J-456	2.08	24.89	208.75	79.67
228	J-852	0.00	25.90	209.77	79.67
229	J-850	0.00	25.90	209.77	79.67
230	J-856	0.00	25.90	209.78	79.68
231	J-854	0.00	25.90	209.78	79.68
232	J-336	0.00	24.94	208.94	79.73
233	J-642	0.34	29.96	213.99	79.74
234	J-166	4.44	27.12	211.17	79.75
235	J-448	2.82	24.65	208.75	79.77
236	J-446	5.30	24.47	208.75	79.85
237	J-202	1.20	27.88	212.31	79.91
238	J-356	0.00	25.18	209.60	79.91
239	J-366	0.00	25.00	209.46	79.93
240	J-404	3.15	21.49	205.98	79.94
241	J-82	16.57	13.20	197.72	79.95
242	J-176	44.54	30.38	215.08	80.03
243	J-526	6.04	29.64	214.47	80.08
244	J-630	0.83	30.26	215.19	80.13
245	J-394	1.61	21.00	205.98	80.15
246	J-290	0.00	24.70	209.75	80.19

2010 Peak Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
247	J-132	33.77	23.62	208.76	80.22
248	J-656	0.79	24.69	209.86	80.24
249	J-170	6.73	27.64	212.82	80.24
250	J-400	1.45	20.70	205.98	80.28
251	J-450	3.31	23.38	208.76	80.32
252	J-638	0.00	29.00	214.40	80.33
253	J-322	0.75	24.50	209.92	80.34
254	J-866	0.00	24.00	209.44	80.35
255	J-524	0.83	24.21	209.80	80.41
256	J-544	0.56	31.98	217.59	80.43
257	J-288	13.15	23.99	209.75	80.49
258	J-392	6.65	20.15	205.98	80.52
259	J-300	0.00	20.07	206.02	80.57
260	J-376	3.86	23.41	209.68	80.71
261	J-736	0.22	19.62	206.02	80.77
262	J-862	0.00	23.00	209.45	80.79
263	J-292	0.38	23.00	209.48	80.80
264	J-126	1.96	22.07	208.72	80.88
265	J-528	2.49	27.81	214.46	80.88
266	J-370	0.00	22.94	209.62	80.89
267	J-110	5.36	19.32	206.03	80.90
268	J-174	0.40	29.00	215.77	80.93
269	J-372	0.00	22.81	209.62	80.95
270	J-130	0.19	21.36	208.33	81.02
271	J-152	16.80	22.86	209.93	81.05
272	J-66	0.00	29.13	216.25	81.08
273	J-640	0.00	27.15	214.33	81.11
274	J-266	0.46	22.37	209.55	81.11
275	J-148	5.42	22.23	209.43	81.11
276	J-226	0.13	28.64	215.88	81.13
277	J-374	0.00	22.33	209.62	81.15
278	J-730	0.99	18.70	206.03	81.17
279	J-636	0.00	27.00	214.40	81.20
280	J-264	0.00	22.07	209.48	81.21
281	J-278	1.20	22.13	209.57	81.22
282	J-632	0.73	27.00	214.44	81.22
283	J-634	2.96	27.00	214.44	81.22
284	J-870	0.00	22.00	209.44	81.22
285	J-94	0.00	29.00	216.47	81.23
286	J-868	0.00	21.90	209.44	81.26
287	J-864	0.00	21.90	209.44	81.26

2010 Peak Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
288	J-444	4.19	21.00	208.72	81.34
289	J-682	0.00	21.83	209.87	81.48
290	J-280	3.09	21.43	209.51	81.50
291	J-390	2.18	17.81	205.98	81.53
292	J-380	0.00	20.71	209.04	81.61
293	J-64	3.78	30.27	218.63	81.61
294	J-872	0.00	21.00	209.45	81.66
295	J-282	8.85	21.00	209.46	81.66
296	J-532	0.00	31.04	219.81	81.80
297	J-738	0.00	17.00	206.02	81.90
298	J-146	16.04	20.10	209.37	82.01
299	J-732	7.37	16.75	206.02	82.01
300	J-302	0.00	20.13	209.44	82.03
301	J-378	9.93	19.55	209.04	82.11
302	J-128	191.06	17.74	207.62	82.27
303	J-120	37.59	18.54	208.46	82.29
304	J-722	9.24	15.83	206.07	82.43
305	J-154	1.14	19.43	209.82	82.49
306	J-382	0.07	17.89	208.33	82.52
307	J-124	191.06	17.00	207.52	82.55
308	J-714	0.77	15.62	206.16	82.56
309	J-522	1.59	17.78	208.33	82.56
310	J-386	0.00	17.77	208.33	82.57
311	J-734	0.09	15.34	206.02	82.62
312	J-436	0.00	17.58	208.33	82.65
313	J-488	0.81	19.00	209.82	82.68
314	J-534	344.95	28.95	219.81	82.70
315	J-276	2.41	15.38	206.35	82.74
316	J-520	0.00	17.30	208.46	82.83
317	J-724	0.89	14.85	206.07	82.85
318	J-674	0.44	17.81	209.04	82.86
319	J-686	0.00	17.00	208.27	82.88
320	J-692	5.81	16.90	208.23	82.90
321	J-122	3.56	17.00	208.34	82.91
322	J-316	0.17	18.23	209.87	83.04
323	J-676	0.00	17.15	209.04	83.15
324	J-466	0.00	29.00	220.95	83.17
325	J-728	0.56	13.20	206.06	83.57
326	J-464	0.00	29.00	222.02	83.64
327	J-688	0.00	15.00	208.27	83.74
328	J-716	2.49	12.72	206.16	83.82

2010 Peak Day Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
329	J-362	0.00	14.96	208.42	83.83
330	J-726	0.00	12.04	206.07	84.07
331	J-114	3.33	14.22	208.33	84.11
332	J-272	0.32	11.70	206.35	84.34
333	J-718	0.00	11.18	206.12	84.47
334	J-268	1.92	11.24	206.35	84.54
335	J-720	2.08	10.85	206.12	84.61
336	J-678	0.95	13.70	209.04	84.64
337	J-490	0.00	10.75	206.33	84.75
338	J-690	7.12	12.38	208.24	84.86
339	J-790	0.00	25.90	222.02	84.98
340	J-712	4.19	10.08	206.30	85.02
341	J-358	0.00	13.00	209.60	85.19
342	J-704	6.37	9.66	206.43	85.26
343	J-116	4.83	11.00	207.98	85.35
344	J-706	4.29	8.39	206.35	85.78
345	J-698	43.20	9.00	207.03	85.80
346	J-112	0.00	10.27	208.42	85.86
347	J-492	0.00	7.71	206.30	86.05
348	J-206	9.15	29.00	227.86	86.17
349	J-708	26.33	7.43	206.33	86.19
350	J-216	0.00	34.99	234.32	86.37
351	J-710	17.31	6.98	206.78	86.57
352	J-388	12.41	7.65	207.75	86.70
353	J-700	0.95	6.80	207.02	86.75
354	J-694	0.48	6.98	207.37	86.83
355	J-494	0.44	6.81	207.75	87.07
356	J-702	0.00	5.90	207.02	87.15
357	J-696	0.00	5.00	207.37	87.68
358	J-530	1.92	27.00	229.44	87.72
359	J-208	6.16	27.00	229.44	87.72
360	J-680	0.00	5.13	209.92	88.74
361	J-38	137.16	27.00	233.86	89.63
362	J-212	0.00	22.00	234.32	92.00
363	J-218	0.00	36.81	497.73	199.72
364	J-214	0.00	22.00	497.73	206.13

2010 Peak Day Steady State Analysis Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
1	P-1003	J-462	J-788	25.07	14.00	120.00	0.00	0.00	0.00	0.00	Open	0
2	P-859	J-664	J-164	661.56	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
3	P-627	J-880	J-614	200.31	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
4	P-629	J-882	J-884	376.45	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
5	P-509	J-372	J-374	222.30	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
6	P-507	J-370	J-372	185.76	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
7	P-631	J-884	J-612	261.65	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
8	P-203	J-516	J-518	586.69	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
9	P-1113	J-870	J-302	208.46	10.00	120.00	0.00	0.00	0.00	0.00	Open	0
10	P-199	J-342	J-512	76.16	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
11	P-819	J-626	J-228	2,036.45	8.00	120.00	0.00	0.00	0.00	0.00	Closed	0
12	P-805	J-610	J-882	1,405.42	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
13	P-473	J-346	J-348	1,124.23	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
14	P-469	J-340	J-338	242.33	4.00	120.00	0.00	0.00	0.00	0.00	Open	0
15	P-467	J-512	J-340	291.15	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
16	P-193	J-322	J-680	878.02	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
17	P-451	J-330	J-324	403.58	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
18	P-445	J-460	J-466	50.96	18.00	120.00	0.00	0.00	0.00	0.00	Closed	0
19	P-757	J-566	J-570	1,161.68	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
20	P-759	J-566	J-568	385.29	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
21	P-891	J-688	J-686	631.61	2.00	120.00	0.00	0.00	0.00	0.00	Open	0
22	P-761	J-570	J-572	924.79	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
23	P-769	J-576	J-578	528.07	2.00	120.00	0.00	0.00	0.00	0.00	Open	0
24	P-803	J-610	J-880	741.87	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
25	P-801	J-76	J-610	1,222.42	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
26	P-879	J-680	J-682	145.46	6.00	120.00	0.00	0.00	0.00	0.00	Closed	0
27	P-395	J-290	J-288	250.43	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
28	P-857	J-660	J-662	857.82	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
29	P-123	J-94	J-228	206.36	18.00	120.00	0.00	0.00	0.00	0.00	Closed	0
30	P-299	J-216	J-218	40.00	24.00	120.00	0.00	0.00	0.00	0.00	Closed	0
31	P-119	J-66	J-548	1,242.91	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
32	P-311	J-212	J-214	40.00	12.00	120.00	0.00	0.00	0.00	0.00	Closed	0
33	P-797	J-604	J-606	564.86	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
34	P-957	J-746	J-748	196.34	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
35	P-301	J-218	J-214	13.80	24.00	120.00	0.00	0.00	0.00	0.00	Open	0

2010 Peak Day Steady State Analysis Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kt)	Status	Flow Reversal Count
36	P-955	J-742	J-744	150.78	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
37	P-793	J-602	J-598	299.16	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
38	P-881	J-682	J-416	984.87	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
39	P-961	J-750	J-752	1,007.13	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
40	P-297	J-212	J-216	15.00	24.00	120.00	0.00	0.00	0.00	0.00	Open	0
41	P-401	J-300	J-298	200.48	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
42	P-181	J-522	J-436	860.77	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
43	P-403	J-298	J-296	146.38	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
44	P-461	J-336	J-334	167.78	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
45	P-735	J-544	J-546	1,413.60	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
46	P-815	J-622	J-624	664.34	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
47	P-1087	J-850	J-852	818.55	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
48	P-1089	J-854	J-856	419.02	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
49	P-719	J-534	J-532	1,282.21	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
50	P-485	J-356	J-358	764.78	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
51	P-897	J-694	J-696	595.50	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
52	P-499	J-282	J-366	243.70	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
53	P-1005	J-790	J-464	24.44	10.00	120.00	0.00	0.00	0.00	0.00	Open	0
54	P-1109	J-864	J-866	367.08	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
55	P-353	J-254	J-256	322.44	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
56	P-915	J-712	J-492	414.72	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
57	P-903	J-700	J-702	264.90	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
58	P-489	J-356	J-360	178.34	4.00	120.00	0.00	0.00	0.00	0.00	Open	0
59	P-423	J-310	J-296	203.20	4.00	120.00	0.00	0.00	0.00	0.00	Open	0
60	P-835	J-636	J-638	885.83	4.00	120.00	0.00	0.00	0.00	0.00	Open	0
61	P-945	J-734	J-738	463.33	4.00	120.00	0.00	0.00	0.00	0.00	Open	0
62	P-875	J-674	J-676	864.91	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
63	P-1077	J-842	J-844	529.47	4.00	120.00	0.00	0.00	0.00	0.00	Open	0
64	P-1071	J-838	J-840	597.20	2.00	120.00	0.00	0.00	0.00	0.00	Open	0
65	P-1069	J-836	J-838	740.50	2.00	120.00	0.00	0.00	0.00	0.00	Open	0
66	P-349	J-250	J-252	288.14	10.00	120.00	0.19	0.00	0.00	0.00	Open	0
67	P-269	J-508	J-488	2,841.76	18.00	120.00	0.81	0.00	0.00	0.00	Open	0
68	P-941	J-732	J-734	235.08	6.00	120.00	0.09	0.00	0.00	0.00	Open	0
69	P-251	J-186	J-188	620.75	8.00	120.00	0.19	0.00	0.00	0.00	Open	0
70	P-351	J-252	J-254	366.93	8.00	120.00	0.19	0.00	0.00	0.00	Open	0

2010 Peak Day Steady State Analysis Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
71	P-271	J-522	J-130	1,980.63	6.00	120.00	0.19	0.00	0.00	0.00	Open	0
72	P-289	J-388	J-494	310.74	6.00	120.00	0.28	0.00	0.00	0.00	Open	0
73	P-87	J-76	J-604	490.34	8.00	120.00	-0.50	0.00	0.00	0.00	Open	0
74	P-795	J-604	J-600	259.36	6.00	120.00	0.32	0.00	0.00	0.00	Open	0
75	P-121	J-388	J-494	355.21	4.00	120.00	0.16	0.00	0.00	0.00	Open	0
76	P-249	J-190	J-192	623.12	8.00	120.00	0.75	0.00	0.00	0.00	Open	0
77	P-309	J-502	J-508	3,601.22	18.00	120.00	3.90	0.00	0.00	0.00	Open	0
78	P-867	J-668	J-670	2,429.15	8.00	120.00	0.78	0.00	0.00	0.00	Open	0
79	P-197	J-150	J-504	218.19	8.00	120.00	0.86	0.01	0.00	0.00	Open	0
80	P-943	J-732	J-736	423.31	4.00	120.00	0.22	0.01	0.00	0.00	Open	0
81	P-229	J-178	J-198	1,434.39	8.00	120.00	-0.89	0.01	0.00	0.00	Open	0
82	P-319	J-504	J-506	3,601.67	8.00	120.00	0.91	0.01	0.00	0.00	Open	0
83	P-933	J-724	J-726	514.68	6.00	120.00	0.56	0.01	0.00	0.00	Open	0
84	P-821	J-528	J-628	3,771.32	4.00	120.00	0.26	0.01	0.00	0.00	Open	0
85	P-267	J-506	J-154	2,880.03	8.00	120.00	1.14	0.01	0.00	0.00	Open	0
86	P-923	J-716	J-714	561.13	6.00	120.00	0.77	0.01	0.00	0.00	Open	0
87	P-339	J-458	J-502	210.09	18.00	120.00	7.15	0.01	0.00	0.00	Open	0
88	P-863	J-670	J-672	2,519.67	8.00	120.00	-1.53	0.01	0.00	0.00	Open	0
89	P-951	J-742	J-746	202.20	8.00	120.00	1.69	0.01	0.00	0.00	Open	0
90	P-873	J-674	J-678	1,274.66	6.00	120.00	0.95	0.01	0.00	0.00	Open	0
91	P-749	J-562	J-558	274.54	4.00	120.00	0.43	0.01	0.00	0.00	Open	0
92	P-755	J-564	J-566	542.56	8.00	120.00	1.90	0.01	0.00	0.00	Open	0
93	P-307	J-500	J-498	735.42	4.00	120.00	0.48	0.01	0.00	0.00	Open	0
94	P-849	J-246	J-654	1,654.14	12.00	120.00	4.79	0.01	0.00	0.00	Open	0
95	P-551	J-390	J-392	514.03	8.00	120.00	-2.18	0.01	0.00	0.00	Open	0
96	P-543	J-404	J-410	492.49	8.00	120.00	-2.46	0.02	0.00	0.00	Open	0
97	P-871	J-380	J-674	179.56	6.00	120.00	1.39	0.02	0.00	0.00	Open	0
98	P-517	J-378	J-380	194.57	6.00	120.00	1.39	0.02	0.00	0.00	Open	0
99	P-573	J-314	J-478	1,840.37	18.00	120.00	12.58	0.02	0.00	0.00	Open	0
100	P-569	J-430	J-428	460.71	18.00	120.00	-13.53	0.02	0.00	0.00	Open	0
101	P-575	J-420	J-516	495.69	18.00	120.00	-13.53	0.02	0.00	0.00	Open	0
102	P-207	J-428	J-314	627.05	18.00	120.00	-13.53	0.02	0.00	0.00	Open	0
103	P-201	J-516	J-430	627.96	18.00	120.00	-13.53	0.02	0.00	0.00	Open	0
104	P-475	J-344	J-348	1,179.10	8.00	120.00	2.70	0.02	0.00	0.00	Open	0
105	P-833	J-634	J-632	803.71	4.00	120.00	0.73	0.02	0.00	0.00	Open	0



2010 Peak Day Steady State Analysis Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
106	P-843	J-646	J-648	525.22	8.00	120.00	3.07	0.02	0.00	0.00	Open	0
107	P-263	J-502	J-504	100.04	8.00	120.00	3.08	0.02	0.00	0.00	Open	0
108	P-275	J-508	J-506	116.47	8.00	120.00	3.09	0.02	0.00	0.00	Open	0
109	P-523	J-386	J-522	1,613.48	6.00	120.00	1.78	0.02	0.00	0.00	Open	0
110	P-525	J-382	J-386	68.70	6.00	120.00	1.78	0.02	0.00	0.00	Open	0
111	P-237	J-182	J-184	613.29	8.00	120.00	3.18	0.02	0.00	0.00	Open	0
112	P-947	J-740	J-742	275.87	8.00	120.00	3.26	0.02	0.00	0.00	Open	0
113	P-147	J-114	J-382	1,663.70	6.00	120.00	1.85	0.02	0.00	0.00	Open	0
114	P-625	J-878	J-608	367.48	6.00	120.00	1.86	0.02	0.00	0.00	Open	0
115	P-799	J-602	J-878	834.29	6.00	120.00	1.86	0.02	0.00	0.00	Open	0
116	P-791	J-604	J-602	406.12	8.00	120.00	-3.35	0.02	0.00	0.00	Open	0
117	P-715	J-208	J-530	1,685.12	6.00	120.00	1.92	0.02	0.00	0.00	Open	0
118	P-1009	J-760	J-794	349.76	6.00	120.00	2.14	0.02	0.00	0.00	Open	0
119	P-1011	J-754	J-798	451.15	6.00	120.00	2.14	0.02	0.00	0.00	Open	0
120	P-1007	J-760	J-792	643.22	6.00	120.00	2.14	0.02	0.00	0.00	Open	0
121	P-1013	J-754	J-796	301.20	6.00	120.00	2.14	0.02	0.00	0.00	Open	0
122	P-561	J-418	J-416	726.21	18.00	120.00	19.28	0.02	0.00	0.00	Open	0
123	P-739	J-550	J-552	1,620.93	6.00	120.00	2.16	0.02	0.00	0.00	Open	0
124	P-1035	J-816	J-786	310.31	12.00	120.00	-8.75	0.02	0.00	0.00	Open	0
125	P-1051	J-826	J-136	284.30	18.00	120.00	-20.41	0.03	0.00	0.00	Open	0
126	P-385	J-284	J-368	800.49	8.00	120.00	4.08	0.03	0.00	0.00	Open	0
127	P-1025	J-808	J-810	275.10	6.00	120.00	2.33	0.03	0.00	0.00	Open	0
128	P-549	J-392	J-394	614.55	8.00	120.00	-4.17	0.03	0.00	0.00	Open	0
129	P-865	J-672	J-668	1,265.14	8.00	120.00	4.25	0.03	0.00	0.00	Open	0
130	P-379	J-272	J-276	618.28	6.00	120.00	2.41	0.03	0.00	0.00	Open	0
131	P-853	J-656	J-658	1,752.17	4.00	120.00	1.08	0.03	0.00	0.00	Open	0
132	P-747	J-556	J-562	660.27	4.00	120.00	1.08	0.03	0.00	0.00	Open	0
133	P-751	J-556	J-558	695.33	4.00	120.00	1.09	0.03	0.00	0.00	Open	0
134	P-209	J-164	J-166	1,772.56	8.00	120.00	4.44	0.03	0.00	0.00	Open	0
135	P-531	J-392	J-396	452.00	8.00	120.00	-4.66	0.03	0.00	0.00	Open	0
136	P-247	J-194	J-196	623.55	8.00	120.00	4.74	0.03	0.00	0.00	Open	0
137	P-375	J-268	J-272	119.33	6.00	120.00	2.73	0.03	0.00	0.00	Open	0
138	P-1023	J-804	J-806	258.68	4.00	120.00	1.22	0.03	0.00	0.00	Open	0
139	P-135	J-526	J-528	2,105.49	6.00	120.00	2.75	0.03	0.00	0.00	Open	0
140	P-167	J-134	J-826	262.34	18.00	120.00	-25.22	0.03	0.00	0.00	Open	0

2010 Peak Day Steady State Analysis Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
141	P-741	J-74	J-554	704.40	6.00	120.00	2.84	0.03	0.00	0.00	Open	0
142	P-303	J-496	J-482	106.04	8.00	120.00	5.07	0.03	0.00	0.00	Open	0
143	P-425	J-246	J-314	3,055.77	18.00	120.00	26.11	0.03	0.00	0.00	Open	0
144	P-501	J-368	J-148	1,108.46	8.00	120.00	5.42	0.03	0.00	0.00	Open	0
145	P-809	J-616	J-886	1,478.15	4.00	120.00	1.40	0.04	0.00	0.00	Open	0
146	P-633	J-886	J-618	502.36	4.00	120.00	1.40	0.04	0.00	0.00	Open	0
147	P-965	J-760	J-444	277.69	8.00	120.00	5.66	0.04	0.00	0.00	Open	0
148	P-547	J-394	J-400	633.06	8.00	120.00	-5.78	0.04	0.00	0.00	Open	0
149	P-545	J-410	J-412	738.66	8.00	120.00	-5.79	0.04	0.00	0.00	Open	0
150	P-893	J-690	J-692	1,636.61	8.00	120.00	5.81	0.04	0.00	0.00	Open	0
151	P-429	J-316	J-246	668.34	18.00	120.00	31.11	0.04	0.00	0.00	Open	0
152	P-495	J-870	J-868	84.39	12.00	120.00	-14.24	0.04	0.00	0.00	Open	0
153	P-323	J-238	J-236	403.98	8.00	120.00	-6.52	0.04	0.00	0.00	Open	0
154	P-325	J-238	J-240	244.40	8.00	120.00	6.52	0.04	0.00	0.00	Open	0
155	P-321	J-236	J-234	277.61	8.00	120.00	-6.52	0.04	0.00	0.00	Open	0
156	P-533	J-396	J-414	248.25	8.00	120.00	-6.85	0.04	0.00	0.00	Open	0
157	P-539	J-400	J-404	353.65	8.00	120.00	-7.23	0.05	0.00	0.00	Open	0
158	P-405	J-296	J-242	219.36	8.00	120.00	-7.26	0.05	0.00	0.00	Open	0
159	P-851	J-654	J-656	1,063.58	4.00	120.00	1.87	0.05	0.01	0.01	Open	0
160	P-535	J-414	J-398	398.88	8.00	120.00	-8.04	0.05	0.00	0.00	Open	0
161	P-537	J-398	J-404	67.88	8.00	120.00	-8.04	0.05	0.00	0.00	Open	0
162	P-981	J-776	J-778	273.26	8.00	120.00	8.19	0.05	0.00	0.00	Open	0
163	P-927	J-718	J-720	275.02	4.00	120.00	2.08	0.05	0.00	0.01	Open	0
164	P-845	J-648	J-650	329.98	2.00	120.00	0.52	0.05	0.01	0.02	Open	0
165	P-949	J-412	J-740	1,297.64	8.00	120.00	-8.57	0.05	0.00	0.00	Open	0
166	P-557	J-420	J-316	1,714.78	18.00	120.00	-44.66	0.06	0.00	0.00	Open	0
167	P-503	J-250	J-368	46.30	10.00	120.00	14.04	0.06	0.00	0.00	Open	0
168	P-935	J-726	J-728	237.84	2.00	120.00	0.56	0.06	0.00	0.02	Open	0
169	P-789	J-602	J-74	1,048.14	8.00	120.00	-9.05	0.06	0.00	0.00	Open	0
170	P-493	J-364	J-870	386.42	10.00	120.00	-14.24	0.06	0.00	0.00	Open	0
171	P-347	J-250	J-364	808.56	10.00	120.00	-14.24	0.06	0.00	0.00	Open	0
172	P-149	J-122	J-114	1,337.35	6.00	120.00	5.19	0.06	0.01	0.01	Open	0
173	P-1057	J-826	J-828	469.06	4.00	120.00	2.33	0.06	0.00	0.01	Open	0
174	P-1099	J-110	J-730	310.08	8.00	120.00	-9.36	0.06	0.00	0.00	Open	0
175	P-1115	J-862	J-872	439.89	8.00	120.00	9.68	0.06	0.00	0.00	Open	0

2010 Peak Day Steady State Analysis Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
176	P-1117	J-872	J-848	691.05	8.00	120.00	9.68	0.06	0.00	0.00	Open	0
177	P-175	J-142	J-816	783.21	12.00	120.00	21.77	0.06	0.00	0.00	Open	0
178	P-421	J-296	J-312	942.24	4.00	120.00	2.49	0.06	0.01	0.01	Open	0
179	P-327	J-240	J-234	397.92	8.00	120.00	-10.29	0.07	0.00	0.00	Open	0
180	P-343	J-118	J-248	950.75	12.00	120.00	-23.28	0.07	0.00	0.00	Open	0
181	P-153	J-120	J-520	226.44	12.00	120.00	23.73	0.07	0.00	0.00	Open	0
182	P-953	J-746	J-408	1,084.64	8.00	120.00	-10.88	0.07	0.01	0.00	Open	0
183	P-345	J-248	J-342	54.13	12.00	120.00	-24.67	0.07	0.00	0.00	Open	0
184	P-775	J-586	J-582	469.58	2.00	120.00	0.69	0.07	0.01	0.03	Open	0
185	P-443	J-446	J-776	282.13	8.00	120.00	11.02	0.07	0.00	0.01	Open	0
186	P-465	J-342	J-334	286.59	12.00	120.00	-25.09	0.07	0.00	0.00	Open	0
187	P-767	J-576	J-574	792.44	2.00	120.00	0.71	0.07	0.02	0.03	Open	0
188	P-869	J-672	J-666	2,094.07	12.00	120.00	-26.78	0.08	0.01	0.00	Open	0
189	P-1061	J-834	J-832	658.30	6.00	120.00	-7.08	0.08	0.01	0.01	Open	0
190	P-773	J-104	J-586	1,815.05	8.00	120.00	12.59	0.08	0.01	0.01	Open	0
191	P-459	J-334	J-144	572.10	12.00	120.00	-29.01	0.08	0.00	0.00	Open	0
192	P-233	J-182	J-140	872.24	8.00	120.00	13.26	0.08	0.01	0.01	Open	0
193	P-989	J-778	J-456	312.62	8.00	120.00	13.35	0.09	0.00	0.01	Open	0
194	P-939	J-730	J-732	412.71	6.00	120.00	7.68	0.09	0.00	0.01	Open	0
195	P-1111	J-868	J-284	374.45	8.00	120.00	13.75	0.09	0.00	0.01	Open	0
196	P-93	J-82	J-80	991.47	8.00	120.00	14.68	0.09	0.01	0.01	Open	0
197	P-563	J-424	J-316	1,692.28	18.00	120.00	75.94	0.10	0.01	0.00	Open	0
198	P-963	J-754	J-760	277.03	8.00	120.00	15.22	0.10	0.00	0.01	Open	0
199	P-783	J-590	J-596	1,221.12	6.00	120.00	8.80	0.10	0.02	0.01	Open	0
200	P-145	J-110	J-242	1,041.13	8.00	120.00	15.72	0.10	0.01	0.01	Open	0
201	P-541	J-404	J-406	298.17	8.00	120.00	-15.95	0.10	0.00	0.01	Open	0
202	P-265	J-406	J-408	757.52	8.00	120.00	-15.95	0.10	0.01	0.01	Open	0
203	P-305	J-500	J-150	1,422.16	8.00	120.00	16.52	0.11	0.02	0.01	Open	0
204	P-553	J-240	J-740	538.92	8.00	120.00	16.81	0.11	0.01	0.01	Open	0
205	P-765	J-580	J-576	97.88	2.00	120.00	1.11	0.11	0.01	0.06	Open	0
206	P-101	J-70	J-104	917.22	8.00	120.00	-17.79	0.11	0.01	0.01	Open	0
207	P-335	J-482	J-500	112.08	8.00	120.00	18.24	0.12	0.00	0.01	Open	0
208	P-555	J-416	J-482	2,970.66	8.00	120.00	18.37	0.12	0.04	0.01	Open	0
209	P-329	J-242	J-750	1,958.63	8.00	120.00	-18.69	0.12	0.03	0.01	Open	0
210	P-959	J-750	J-210	1,384.29	8.00	120.00	-18.83	0.12	0.02	0.01	Open	0

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ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
211	P-931	J-724	J-722	257.58	6.00	120.00	-11.39	0.13	0.01	0.02	Open	0
212	P-877	J-510	J-420	136.23	18.00	120.00	103.67	0.13	0.00	0.01	Open	0
213	P-559	J-418	J-510	424.33	18.00	120.00	103.67	0.13	0.00	0.01	Open	0
214	P-491	J-362	J-520	5,235.35	18.00	120.00	-104.42	0.13	0.03	0.01	Open	0
215	P-1095	J-362	J-112	122.03	18.00	120.00	104.42	0.13	0.00	0.01	Open	0
216	P-109	J-88	J-90	804.99	8.00	120.00	20.71	0.13	0.01	0.02	Open	0
217	P-437	J-456	J-448	256.16	8.00	120.00	-20.83	0.13	0.00	0.02	Open	0
218	P-1027	J-808	J-778	456.42	6.00	120.00	11.73	0.13	0.01	0.02	Open	0
219	P-261	J-180	J-142	609.97	12.00	120.00	47.59	0.14	0.01	0.01	Open	0
220	P-785	J-596	J-592	615.70	4.00	120.00	5.47	0.14	0.02	0.04	Open	0
221	P-253	J-182	J-186	261.51	8.00	120.00	-22.64	0.14	0.00	0.02	Open	0
222	P-839	J-642	J-644	583.52	2.00	120.00	1.42	0.15	0.06	0.10	Open	0
223	P-239	J-184	J-188	268.41	8.00	120.00	-23.05	0.15	0.01	0.02	Open	0
224	P-433	J-448	J-450	419.97	8.00	120.00	-23.65	0.15	0.01	0.02	Open	0
225	P-745	J-560	J-556	696.26	4.00	120.00	6.00	0.15	0.03	0.05	Open	0
226	P-1021	J-804	J-770	481.22	6.00	120.00	13.58	0.15	0.01	0.03	Open	0
227	P-565	J-418	J-426	77.81	18.00	120.00	-122.96	0.16	0.00	0.01	Open	0
228	P-567	J-424	J-426	469.48	18.00	120.00	122.96	0.16	0.00	0.01	Open	0
229	P-235	J-140	J-184	263.88	8.00	120.00	-24.60	0.16	0.01	0.02	Open	0
230	P-1029	J-808	J-812	287.74	6.00	120.00	-14.06	0.16	0.01	0.03	Open	0
231	P-245	J-196	J-142	273.62	8.00	120.00	-25.05	0.16	0.01	0.02	Open	0
232	P-241	J-188	J-192	268.63	8.00	120.00	-25.70	0.16	0.01	0.02	Open	0
233	P-255	J-186	J-190	268.74	8.00	120.00	-25.73	0.16	0.01	0.02	Open	0
234	P-967	J-766	J-754	278.88	8.00	120.00	25.81	0.16	0.01	0.02	Open	0
235	P-393	J-288	J-850	527.35	6.00	120.00	-14.59	0.17	0.02	0.03	Open	0
236	P-1083	J-850	J-854	267.64	6.00	120.00	-14.59	0.17	0.01	0.03	Open	0
237	P-1085	J-854	J-150	1,074.01	6.00	120.00	-14.59	0.17	0.04	0.03	Open	0
238	P-177	J-524	J-458	2,035.75	18.00	120.00	-133.79	0.17	0.02	0.01	Open	0
239	P-331	J-234	J-244	408.38	8.00	120.00	-26.72	0.17	0.01	0.03	Open	0
240	P-333	J-244	J-242	558.54	8.00	120.00	-26.72	0.17	0.01	0.03	Open	0
241	P-427	J-444	J-446	918.56	8.00	120.00	-27.73	0.18	0.03	0.03	Open	0
242	P-293	J-496	J-458	1,531.63	18.00	120.00	141.05	0.18	0.02	0.01	Open	0
243	P-787	J-592	J-876	1,138.12	2.00	120.00	1.75	0.18	0.16	0.14	Open	0
244	P-623	J-876	J-594	491.77	2.00	120.00	1.75	0.18	0.07	0.14	Open	0
245	P-1031	J-812	J-776	467.65	6.00	120.00	15.93	0.18	0.02	0.04	Open	0

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ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
246	P-1063	J-832	J-830	467.12	4.00	120.00	-7.08	0.18	0.03	0.06	Open	0
247	P-1065	J-830	J-136	284.46	4.00	120.00	-7.08	0.18	0.02	0.06	Open	0
248	P-1019	J-776	J-804	448.26	6.00	120.00	16.00	0.18	0.02	0.04	Open	0
249	P-1055	J-824	J-826	443.98	4.00	120.00	7.13	0.18	0.03	0.07	Open	0
250	P-1053	J-822	J-824	279.93	4.00	120.00	7.13	0.18	0.02	0.07	Open	0
251	P-243	J-192	J-196	256.54	8.00	120.00	-28.59	0.18	0.01	0.03	Open	0
252	P-257	J-190	J-194	276.33	8.00	120.00	-28.69	0.18	0.01	0.03	Open	0
253	P-979	J-770	J-444	282.00	8.00	120.00	-29.20	0.19	0.01	0.03	Open	0
254	P-441	J-420	J-496	2,959.39	18.00	120.00	147.83	0.19	0.04	0.01	Open	0
255	P-529	J-408	J-110	1,191.29	8.00	120.00	-29.76	0.19	0.04	0.03	Open	0
256	P-481	J-350	J-354	411.42	8.00	120.00	30.09	0.19	0.01	0.03	Open	0
257	P-1037	J-446	J-814	274.85	6.00	120.00	-17.10	0.19	0.01	0.05	Open	0
258	P-273	J-200	J-134	850.45	12.00	120.00	-68.62	0.19	0.02	0.02	Open	0
259	P-415	J-442	J-138	676.55	12.00	120.00	-71.34	0.20	0.01	0.02	Open	0
260	P-387	J-868	J-864	38.02	12.00	120.00	-71.52	0.20	0.00	0.02	Open	0
261	P-1107	J-864	J-862	733.30	12.00	120.00	-71.52	0.20	0.02	0.02	Open	0
262	P-937	J-724	J-730	761.31	6.00	120.00	18.03	0.20	0.04	0.05	Open	0
263	P-521	J-456	J-126	662.33	8.00	120.00	32.10	0.20	0.02	0.04	Open	0
264	P-929	J-718	J-724	664.53	4.00	120.00	8.09	0.21	0.06	0.08	Open	0
265	P-1015	J-766	J-800	193.58	2.00	120.00	2.14	0.22	0.04	0.21	Open	0
266	P-1017	J-766	J-802	246.51	2.00	120.00	2.14	0.22	0.05	0.21	Open	0
267	P-173	J-140	J-766	890.11	8.00	120.00	35.19	0.22	0.04	0.04	Open	0
268	P-1105	J-862	J-282	179.96	12.00	120.00	-81.19	0.23	0.01	0.03	Open	0
269	P-917	J-712	J-706	1,156.25	8.00	120.00	-36.16	0.23	0.05	0.05	Open	0
270	P-103	J-68	J-102	1,616.39	10.00	120.00	57.36	0.23	0.06	0.04	Open	0
271	P-259	J-194	J-180	256.55	8.00	120.00	-36.80	0.23	0.01	0.05	Open	0
272	P-231	J-198	J-180	975.70	12.00	120.00	84.39	0.24	0.03	0.03	Open	0
273	P-133	J-84	J-106	722.42	6.00	120.00	21.23	0.24	0.05	0.07	Open	0
274	P-993	J-200	J-786	449.40	12.00	120.00	87.47	0.25	0.01	0.03	Open	0
275	P-431	J-318	J-424	706.43	18.00	120.00	199.01	0.25	0.01	0.02	Open	0
276	P-205	J-318	J-322	1,608.19	18.00	120.00	-199.37	0.25	0.03	0.02	Open	0
277	P-901	J-698	J-700	153.97	8.00	120.00	39.50	0.25	0.01	0.05	Open	0
278	P-435	J-322	J-152	54.76	18.00	120.00	-200.11	0.25	0.00	0.02	Open	0
279	P-449	J-330	J-198	2,969.16	12.00	120.00	88.96	0.25	0.10	0.03	Open	0
280	P-1081	J-846	J-848	851.27	4.00	120.00	-9.92	0.25	0.10	0.12	Open	0

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281	P-1079	J-842	J-846	498.55	4.00	120.00	-9.92	0.25	0.06	0.12	Open	0
282	P-463	J-330	J-144	75.48	12.00	120.00	-89.73	0.25	0.00	0.03	Open	0
283	P-389	J-282	J-292	542.03	12.00	120.00	-90.04	0.26	0.02	0.03	Open	0
284	P-399	J-292	J-264	184.07	12.00	120.00	-90.42	0.26	0.01	0.03	Open	0
285	P-925	J-716	J-718	268.76	4.00	120.00	10.17	0.26	0.03	0.13	Open	0
286	P-417	J-432	J-770	384.91	8.00	120.00	-40.74	0.26	0.02	0.06	Open	0
287	P-847	J-648	J-652	380.26	2.00	120.00	2.55	0.26	0.11	0.29	Open	0
288	P-921	J-722	J-110	776.17	8.00	120.00	41.48	0.26	0.05	0.06	Open	0
289	P-1039	J-814	J-816	464.71	6.00	120.00	-23.81	0.27	0.04	0.08	Open	0
290	P-779	J-588	J-584	701.70	6.00	120.00	24.04	0.27	0.06	0.09	Open	0
291	P-187	J-146	J-868	1,071.58	8.00	120.00	-43.54	0.28	0.07	0.06	Open	0
292	P-341	J-490	J-268	210.12	8.00	120.00	-43.57	0.28	0.01	0.06	Open	0
293	P-1043	J-200	J-818	274.34	6.00	120.00	-24.78	0.28	0.03	0.09	Open	0
294	P-1045	J-818	J-820	1,551.26	6.00	120.00	-24.78	0.28	0.14	0.09	Open	0
295	P-1047	J-820	J-442	983.00	6.00	120.00	-24.78	0.28	0.09	0.09	Open	0
296	P-909	J-706	J-708	200.14	6.00	120.00	26.33	0.30	0.02	0.10	Open	0
297	P-1041	J-446	J-786	489.26	6.00	120.00	-26.95	0.31	0.05	0.11	Open	0
298	P-371	J-268	J-704	1,060.41	8.00	120.00	-48.21	0.31	0.08	0.08	Open	0
299	P-217	J-172	J-202	1,608.64	8.00	100.00	-49.10	0.31	0.18	0.11	Open	0
300	P-777	J-84	J-588	759.44	6.00	120.00	28.03	0.32	0.09	0.11	Open	0
301	P-161	J-126	J-450	688.05	12.00	120.00	-115.07	0.33	0.04	0.05	Open	0
302	P-183	J-132	J-834	254.91	8.00	120.00	-51.45	0.33	0.02	0.09	Open	0
303	P-151	J-120	J-122	2,074.32	12.00	120.00	118.25	0.34	0.12	0.06	Open	0
304	P-1033	J-812	J-786	267.53	6.00	120.00	-29.98	0.34	0.03	0.13	Open	0
305	P-439	J-144	J-442	2,179.60	12.00	120.00	-122.85	0.35	0.13	0.06	Open	0
306	P-165	J-132	J-136	1,145.83	12.00	120.00	-124.35	0.35	0.07	0.06	Open	0
307	P-1059	J-834	J-836	1,661.06	8.00	120.00	-61.21	0.39	0.20	0.12	Open	0
308	P-1067	J-836	J-378	496.73	8.00	120.00	-61.21	0.39	0.06	0.12	Open	0
309	P-143	J-116	J-690	2,704.50	10.00	120.00	-96.58	0.39	0.25	0.09	Open	0
310	P-919	J-716	J-722	676.87	8.00	120.00	62.11	0.40	0.08	0.12	Open	0
311	P-189	J-848	J-146	465.42	6.00	120.00	35.13	0.40	0.08	0.17	Open	0
312	P-1073	J-842	J-146	653.03	8.00	120.00	-62.62	0.40	0.08	0.13	Open	0
313	P-1075	J-848	J-280	364.88	6.00	120.00	-35.37	0.40	0.06	0.18	Open	0
314	P-419	J-450	J-132	64.15	12.00	120.00	-142.03	0.40	0.01	0.08	Open	0
315	P-519	J-432	J-126	330.77	12.00	120.00	-145.21	0.41	0.03	0.08	Open	0

2010 Peak Day Steady State Analysis Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
316	P-91	J-78	J-82	2,075.30	8.00	120.00	-65.61	0.42	0.28	0.14	Open	0
317	P-483	J-354	J-356	266.39	8.00	120.00	-65.97	0.42	0.04	0.14	Open	0
318	P-487	J-352	J-356	407.48	8.00	120.00	65.97	0.42	0.06	0.14	Open	0
319	P-383	J-280	J-266	200.24	6.00	120.00	-38.45	0.44	0.04	0.21	Open	0
320	P-911	J-700	J-710	1,163.14	6.00	120.00	38.54	0.44	0.24	0.21	Open	0
321	P-367	J-266	J-278	49.90	6.00	120.00	-38.91	0.44	0.01	0.21	Open	0
322	P-889	J-690	J-688	286.15	10.00	120.00	-109.51	0.45	0.03	0.12	Open	0
323	P-887	J-688	J-122	591.42	10.00	120.00	-109.51	0.45	0.07	0.12	Open	0
324	P-753	J-564	J-72	1,565.99	10.00	120.00	111.38	0.45	0.19	0.12	Open	0
325	P-381	J-278	J-376	504.79	6.00	120.00	-40.11	0.46	0.11	0.22	Open	0
326	P-515	J-378	J-842	1,468.10	8.00	120.00	-72.54	0.46	0.24	0.16	Open	0
327	P-1049	J-822	J-136	452.53	12.00	120.00	165.20	0.47	0.05	0.10	Open	0
328	P-219	J-172	J-646	1,198.87	8.00	100.00	-73.46	0.47	0.28	0.24	Open	0
329	P-137	J-712	J-716	819.54	8.00	120.00	75.54	0.48	0.15	0.18	Open	0
330	P-571	J-118	J-344	3,077.18	8.00	120.00	-75.89	0.48	0.55	0.18	Open	0
331	P-771	J-584	J-106	244.17	4.00	120.00	-18.99	0.48	0.10	0.40	Open	0
332	P-171	J-138	J-822	1,820.98	12.00	120.00	172.33	0.49	0.21	0.11	Open	0
333	P-743	J-560	J-564	784.16	10.00	120.00	120.12	0.49	0.11	0.14	Open	0
334	P-287	J-490	J-712	128.04	6.00	120.00	43.57	0.49	0.03	0.26	Open	0
335	P-841	J-646	J-170	1,555.36	8.00	100.00	-78.17	0.50	0.41	0.26	Open	0
336	P-511	J-376	J-288	285.10	6.00	120.00	-43.98	0.50	0.08	0.26	Open	0
337	P-225	J-176	J-630	433.29	6.00	120.00	-44.54	0.51	0.12	0.27	Open	0
338	P-157	J-120	J-432	1,941.03	12.00	120.00	-179.57	0.51	0.24	0.12	Open	0
339	P-85	J-74	J-560	968.59	10.00	120.00	126.39	0.52	0.15	0.16	Open	0
340	P-907	J-704	J-706	269.92	6.00	120.00	45.56	0.52	0.08	0.28	Open	0
341	P-861	J-666	J-344	615.55	8.00	120.00	82.84	0.53	0.13	0.21	Open	0
342	P-159	J-128	J-124	728.80	12.00	120.00	191.06	0.54	0.10	0.14	Open	0
343	P-913	J-710	J-706	856.65	4.00	120.00	21.23	0.54	0.42	0.49	Open	0
344	P-411	J-440	J-442	802.27	8.00	120.00	87.06	0.56	0.18	0.23	Open	0
345	P-277	J-170	J-202	1,083.34	6.00	100.00	50.30	0.57	0.51	0.47	Open	0
346	P-111	J-98	J-860	2,277.96	8.00	110.00	90.03	0.57	0.66	0.29	Open	0
347	P-1093	J-860	J-80	159.30	8.00	120.00	90.03	0.57	0.04	0.25	Open	0
348	P-513	J-288	J-370	533.54	8.00	120.00	90.42	0.58	0.13	0.25	Open	0
349	P-505	J-264	J-370	557.37	8.00	120.00	-90.42	0.58	0.14	0.25	Open	0
350	P-827	J-640	J-636	188.62	6.00	120.00	-51.38	0.58	0.07	0.35	Open	0

2010 Peak Day Steady State Analysis Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
351	P-829	J-636	J-634	103.56	6.00	120.00	-51.38	0.58	0.04	0.35	Open	0
352	P-991	J-780	J-520	3,348.46	18.00	120.00	462.81	0.58	0.33	0.10	Open	0
353	P-737	J-550	J-74	1,066.09	10.00	120.00	144.19	0.59	0.21	0.20	Open	0
354	P-163	J-134	J-780	496.26	18.00	120.00	469.63	0.59	0.05	0.10	Open	0
355	P-413	J-354	J-440	1,187.11	8.00	120.00	93.03	0.59	0.31	0.26	Open	0
356	P-279	J-204	J-118	5,953.37	8.00	120.00	-95.78	0.61	1.64	0.28	Open	0
357	P-285	J-210	J-204	4,495.72	8.00	120.00	-95.78	0.61	1.24	0.28	Open	0
358	P-125	J-98	J-90	505.19	8.00	110.00	-95.99	0.61	0.16	0.32	Open	0
359	P-113	J-82	J-88	3,076.46	8.00	120.00	-96.86	0.62	0.86	0.28	Open	0
360	P-89	J-468	J-550	2,449.59	10.00	120.00	152.06	0.62	0.53	0.22	Open	0
361	P-831	J-634	J-630	1,888.66	6.00	120.00	-55.07	0.62	0.76	0.40	Open	0
362	P-905	J-704	J-698	1,996.10	8.00	120.00	-100.13	0.64	0.60	0.30	Open	0
363	P-129	J-102	J-84	446.68	6.00	120.00	56.53	0.64	0.19	0.42	Open	0
364	P-169	J-134	J-138	2,062.45	18.00	120.00	-523.60	0.66	0.25	0.12	Open	0
365	P-1091	J-858	J-80	392.39	8.00	120.00	-103.57	0.66	0.12	0.32	Open	0
366	P-95	J-78	J-858	471.92	8.00	120.00	-103.57	0.66	0.15	0.32	Open	0
367	P-141	J-116	J-112	1,369.73	8.00	120.00	-104.42	0.67	0.44	0.32	Open	0
368	P-117	J-90	J-100	4,406.63	8.00	110.00	-105.26	0.67	1.70	0.38	Open	0
369	P-899	J-698	J-694	1,106.50	10.00	120.00	-182.83	0.75	0.34	0.31	Open	0
370	P-895	J-694	J-388	1,244.78	10.00	120.00	-183.32	0.75	0.38	0.31	Open	0
371	P-471	J-172	J-666	4,465.74	8.00	100.00	117.45	0.75	2.51	0.56	Open	0
372	P-811	J-616	J-620	425.58	4.00	120.00	29.88	0.76	0.40	0.93	Open	0
373	P-115	J-470	J-88	3,684.51	8.00	120.00	121.84	0.78	1.58	0.43	Open	0
374	P-373	J-470	J-92	3,915.33	8.00	120.00	-122.20	0.78	1.69	0.43	Open	0
375	P-127	J-100	J-92	3,032.35	8.00	110.00	-124.40	0.79	1.59	0.52	Open	0
376	P-527	J-388	J-116	663.25	10.00	120.00	-196.17	0.80	0.23	0.35	Open	0
377	P-727	J-538	J-542	1,629.98	8.00	120.00	131.58	0.84	0.81	0.50	Open	0
378	P-725	J-536	J-538	1,867.93	8.00	120.00	131.58	0.84	0.92	0.50	Open	0
379	P-155	J-524	J-288	87.18	8.00	120.00	132.96	0.85	0.04	0.50	Open	0
380	P-215	J-170	J-168	917.03	8.00	100.00	-135.20	0.86	0.67	0.73	Open	0
381	P-723	J-536	J-540	1,461.43	8.00	110.00	145.23	0.93	1.02	0.70	Open	0
382	P-729	J-540	J-542	1,018.27	8.00	110.00	145.23	0.93	0.71	0.70	Open	0
383	P-291	T-7002	J-94	3,083.27	24.00	120.00	1,336.58	0.95	0.53	0.17	Open	0
384	P-227	J-350	J-138	1,874.44	18.00	120.00	788.60	0.99	0.49	0.26	Open	0
385	P-457	J-78	J-468	943.27	8.00	120.00	156.97	1.00	0.65	0.69	Open	0



2010 Peak Day Steady State Analysis Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kt)	Status	Flow Reversal Count	
386	P-477	J-350	J-352	275.47	18.00	120.00	-830.41	1.05	0.08	0.29	Open	0
387	P-195	J-520	J-128	1,699.50	12.00	120.00	382.12	1.08	0.84	0.49	Open	0
388	P-131	J-104	J-584	1,681.02	4.00	120.00	-43.03	1.10	3.07	1.83	Open	0
389	P-479	J-152	J-352	788.90	18.00	120.00	900.42	1.14	0.26	0.34	Open	0
390	P-823	J-630	J-174	474.09	6.00	120.00	-100.44	1.14	0.58	1.22	Open	0
391	P-211	J-164	J-152	2,479.91	18.00	120.00	1,117.34	1.41	1.24	0.50	Open	0
392	P-855	J-660	J-164	1,425.12	18.00	120.00	1,137.43	1.43	0.74	0.52	Open	0
393	P-213	J-168	J-660	3,044.72	18.00	120.00	1,140.39	1.44	1.58	0.52	Open	0
394	P-825	J-640	J-526	225.26	18.00	120.00	-1,226.96	1.55	0.13	0.60	Open	0
395	P-139	J-526	J-174	2,159.29	18.00	120.00	-1,235.75	1.56	1.30	0.60	Open	0
396	P-837	J-642	J-168	774.69	18.00	120.00	1,276.58	1.61	0.50	0.64	Open	0
397	P-221	J-640	J-642	539.62	18.00	120.00	1,278.34	1.61	0.35	0.64	Open	0
398	P-731	J-542	J-92	424.34	8.00	110.00	256.51	1.64	0.85	2.00	Open	0
399	P-223	J-174	J-94	1,001.87	18.00	120.00	-1,336.58	1.69	0.70	0.70	Open	0
400	P-721	J-50	J-536	922.49	8.00	120.00	279.57	1.78	4.81	5.22	Open	0
401	P-79	J-64	J-50	4,667.32	8.00	120.00	280.19	1.79	9.37	2.01	Open	0
402	P-77	J-38	J-212	726.19	24.00	120.00	-2,706.51	1.92	0.46	0.64	Open	0
403	P-295	J-214	T-7000	3,571.89	24.00	120.00	-2,706.68	1.92	2.27	0.64	Open	0
404	P-83	J-66	J-544	1,640.19	20.00	120.00	-1,922.62	1.96	1.34	0.82	Open	0
405	P-313	J-226	J-66	452.97	20.00	120.00	-1,922.62	1.96	0.37	0.82	Open	0
406	P-733	J-544	J-64	1,258.06	20.00	120.00	-1,923.19	1.96	1.03	0.82	Open	0
407	P-81	J-64	J-534	1,123.26	20.00	120.00	-2,207.16	2.25	1.19	1.06	Open	0
408	P-763	J-580	J-70	181.66	18.00	120.00	1,838.52	2.32	0.23	1.26	Open	0
409	P-99	J-68	J-580	2,571.55	18.00	120.00	1,841.62	2.32	3.25	1.26	Open	0
410	P-97	J-72	J-70	1,560.84	18.00	120.00	-1,856.31	2.34	2.00	1.28	Open	0
411	P-107	J-68	J-590	5,006.43	18.00	120.00	-1,898.99	2.39	6.70	1.34	Open	0
412	P-781	J-590	J-86	852.42	18.00	120.00	-1,915.00	2.41	1.16	1.36	Open	0
413	P-105	J-226	J-86	5,076.32	18.00	120.00	1,922.49	2.42	6.95	1.37	Open	0
414	P-447	J-466	T-7002	2,880.68	18.00	120.00	1,925.10	2.43	3.95	1.37	Open	0
415	P-317	J-228	J-460	177.68	18.00	120.00	1,925.10	2.43	0.24	1.37	Open	0
416	P-817	J-626	J-228	1,589.15	18.00	120.00	1,925.63	2.43	2.18	1.37	Open	0
417	P-813	J-622	J-626	1,509.87	18.00	120.00	1,930.23	2.43	2.08	1.38	Open	0
418	P-807	J-616	J-622	723.55	18.00	120.00	1,932.54	2.44	1.00	1.38	Open	0
419	P-315	J-72	J-616	3,326.05	18.00	120.00	1,966.76	2.48	4.75	1.43	Open	0
420	P-717	J-534	J-206	5,813.69	20.00	120.00	-2,552.12	2.61	8.05	1.38	Open	0

2010 Peak Day Steady State Analysis Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
421	P-281	J-206	J-208	1,135.06	20.00	120.00	-2,561.27	2.62	1.58	1.39	Open	0
422	P-283	J-208	J-38	3,153.09	20.00	120.00	-2,569.34	2.62	4.42	1.40	Open	0
423	P-453	J-460	J-462	43.37	14.00	120.00	1,925.10	4.01	0.20	4.67	Open	0
424	P-455	J-464	J-466	44.45	10.00	120.00	1,925.10	7.86	1.07	24.03	Open	0



**2010 Peak Day Steady State Analysis Tank Report**

	ID	Flow (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	% Full (%)	Volume (MG)	Level (ft)
1	<input type="checkbox"/> T-7000	-2,706.68	500.00	500.00	0.00	100.00	0.00	0.00
2	<input type="checkbox"/> T-7002	588.52	185.00	217.00	13.87	79.95	2.93	32.00

**2010 Peak Day Steady State Analysis Valve Report**

	<b>ID</b>	<b>From Node</b>	<b>To Node</b>	<b>Diameter (in)</b>	<b>Flow (gpm)</b>	<b>Velocity (ft/s)</b>	<b>Headloss (ft)</b>	<b>Status</b>	<b>Setting</b>
<b>1</b>	<input type="checkbox"/> <b>9007</b>	<b>J-214</b>	<b>J-212</b>	<b>12.00</b>	<b>2,706.68</b>	<b>7.68</b>	<b>263.41</b>	<b>Active</b>	<b>92.00</b>
<b>2</b>	<input type="checkbox"/> <b>V-9009</b>	<b>J-50</b>	<b>J-536</b>	<b>6.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>Closed</b>	<b>50.00</b>

**2010 Peak Day Steady State Analysis Pump Report**

	ID	From Node	To Node	Flow (gpm)	Head Gain (ft)	Status	Setting	Avail.NPSH (ft)	Cavitation Index
1	 PMP-5001	J-462	J-464	1,925.10	36.88	Open	1.00	189.27	0.00
2	 PMP-5005	J-788	J-790	0.00	0.00	Closed	0.00	0.00	0.00

**PEAK HOUR DEMAND**

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*****
***                H2OMAP Water GIS                ***
***                Comprehensive Analysis of          ***
***                Water Distribution Piping Network   ***
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Input Data File ..... P:\CITY OF
WARRENTON\035889\STUDY\DATA\MODEL\WATER_MODEL_010711.OUT\SCENARIO\2010PH\~INP
Number of Junctions..... 364
Number of Reservoirs..... 1
Number of Tanks ..... 1
Number of Pipes ..... 424
Number of Pumps ..... 2
Number of Valves ..... 2
Headloss Formula ..... Hazen-Williams
Hydraulic Timestep ..... 1.00 hrs
Hydraulic Accuracy ..... 0.001000
Status Check Frequency ..... 2
Maximum Trials Checked ..... 10
Damping Limit Threshold ..... 0.000000
Maximum Trials ..... 40
Quality Analysis ..... None
Specific Gravity ..... 1.00
Relative Kinematic Viscosity ..... 1.00
Relative Chemical Diffusivity ..... 1.00
Demand Multiplier ..... 1.00
Total Duration ..... 0.00 hrs
Reporting Criteria:

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No Nodes  
No Links

Analysis began Wed Jul 27 12:23:29 2011

Hydraulic Status:

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0:00:00: Pump PMP-5005 changed by Tank T-7002 control
0:00:00: Balanced after 6 trials
          Total Supplied: 2970.69 gpm
          Total Demanded: 3096.87 gpm
          Total Stored:   -126.35 gpm
0:00:00: Reservoir T-7000 is emptying
0:00:00: Tank T-7002 is emptying at 32.00 ft
0:00:00: Pump PMP-5005 closed
0:00:00: PRV V-9009 closed

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Analysis ended Wed Jul 27 12:25:10 2011

2010 Peak Hour Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
1	J-628	0.40	129.50	211.87	35.69
2	J-144	6.03	76.50	200.70	53.82
3	J-516	0.00	74.66	202.57	55.43
4	J-510	0.00	74.37	202.58	55.55
5	J-420	20.50	72.01	202.57	56.57
6	J-330	1.15	69.43	200.70	56.88
7	J-100	27.95	55.59	196.40	61.01
8	J-666	11.44	61.00	202.06	61.12
9	J-554	4.18	51.51	193.33	61.45
10	J-740	7.29	52.05	194.71	61.81
11	J-210	112.26	52.18	194.87	61.83
12	J-498	0.73	58.93	202.50	62.21
13	J-344	6.24	57.46	201.80	62.54
14	J-542	29.65	53.00	198.92	63.23
15	J-92	14.49	52.03	198.04	63.27
16	J-670	3.40	55.00	202.04	63.71
17	J-198	5.40	53.26	200.50	63.80
18	J-418	0.00	55.26	202.58	63.83
19	J-496	2.53	55.00	202.50	63.91
20	J-540	0.00	51.74	199.69	64.11
21	J-536	4.06	52.58	200.81	64.23
22	J-664	0.00	56.46	205.20	64.45
23	J-742	2.32	44.12	194.71	65.25
24	J-118	4.98	49.19	200.69	65.64
25	J-660	4.36	55.09	206.69	65.69
26	J-168	1.49	57.16	209.90	66.18
27	J-426	0.00	49.82	202.58	66.19
28	J-204	0.00	44.56	197.37	66.21
29	J-608	2.74	40.28	193.33	66.32
30	J-744	0.00	41.49	194.71	66.39
31	J-662	0.00	53.01	206.69	66.59
32	J-462	0.00	29.00	183.60	66.99
33	J-460	0.00	29.00	183.78	67.07
34	J-228	0.79	29.00	184.01	67.16
35	J-324	0.00	44.94	200.70	67.49
36	J-668	5.10	45.78	202.04	67.71
37	J-78	17.84	37.64	194.08	67.79
38	J-624	0.00	31.15	187.89	67.91
39	J-672	30.67	45.14	202.05	67.99
40	J-626	6.75	29.00	185.99	68.02
41	J-430	0.00	45.00	202.57	68.28



2010 Peak Hour Steady State Analysis Junction Report

	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
42	J-788	0.00	25.90	183.60	68.33
43	J-560	0.43	35.48	193.28	68.37
44	J-552	3.19	34.76	193.43	68.75
45	J-648	0.00	48.94	207.71	68.80
46	J-622	3.40	28.98	187.89	68.86
47	J-620	43.61	29.00	188.00	68.90
48	J-650	0.79	48.42	207.70	69.02
49	J-518	0.00	43.26	202.57	69.03
50	J-616	4.33	28.94	188.80	69.27
51	J-428	0.00	41.41	202.58	69.83
52	J-618	2.08	27.21	188.79	70.01
53	J-748	0.00	33.00	194.71	70.07
54	J-90	43.76	33.00	194.89	70.15
55	J-538	0.00	37.89	199.80	70.15
56	J-886	0.00	25.90	188.79	70.58
57	J-860	0.00	30.50	194.29	70.97
58	J-602	5.64	29.50	193.33	70.99
59	J-562	0.97	29.00	193.21	71.15
60	J-556	5.61	29.00	193.22	71.15
61	J-80	1.69	30.03	194.26	71.16
62	J-568	0.00	29.00	193.25	71.17
63	J-570	0.00	29.00	193.25	71.17
64	J-572	0.00	29.00	193.25	71.17
65	J-566	2.80	29.00	193.25	71.17
66	J-564	10.01	29.00	193.25	71.17
67	J-606	0.00	29.00	193.33	71.20
68	J-74	8.66	29.00	193.33	71.21
69	J-550	8.36	29.00	193.43	71.25
70	J-592	5.46	40.75	205.33	71.31
71	J-604	3.73	28.72	193.33	71.32
72	J-76	0.76	28.70	193.33	71.33
73	J-858	0.00	29.50	194.18	71.36
74	J-598	0.00	28.15	193.33	71.57
75	J-600	0.49	27.91	193.33	71.68
76	J-98	8.72	29.00	194.76	71.82
77	J-746	18.38	28.75	194.71	71.91
78	J-558	2.26	27.00	193.21	72.02
79	J-578	0.00	28.96	195.40	72.12
80	J-658	1.60	35.96	202.56	72.19
81	J-88	6.27	28.01	194.91	72.32
82	J-72	1.40	26.24	193.21	72.35

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	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
83	J-752	0.00	27.43	194.83	72.54
84	J-470	0.55	29.00	196.42	72.54
85	J-878	0.00	25.90	193.33	72.55
86	J-882	0.00	25.90	193.33	72.55
87	J-884	0.00	25.90	193.33	72.55
88	J-880	0.00	25.90	193.33	72.55
89	J-594	2.59	37.40	204.85	72.55
90	J-414	1.78	27.23	194.70	72.56
91	J-876	0.00	37.40	204.99	72.62
92	J-68	0.00	31.00	198.67	72.65
93	J-238	0.00	26.96	194.73	72.69
94	J-582	1.03	27.00	195.14	72.86
95	J-586	17.39	27.00	195.17	72.87
96	J-84	10.63	30.03	198.37	72.94
97	J-574	1.06	27.00	195.36	72.95
98	J-104	18.50	26.83	195.19	72.95
99	J-240	0.00	26.36	194.73	72.95
100	J-576	0.61	27.00	195.40	72.97
101	J-580	2.95	27.00	195.42	72.97
102	J-410	4.89	26.17	194.70	73.03
103	J-478	18.38	33.92	202.57	73.08
104	J-750	0.22	26.09	194.83	73.12
105	J-412	4.09	25.90	194.70	73.14
106	J-500	1.84	33.62	202.50	73.17
107	J-342	0.64	31.80	200.69	73.18
108	J-70	0.00	26.26	195.19	73.20
109	J-236	0.00	25.55	194.73	73.30
110	J-596	4.89	35.97	205.38	73.40
111	J-234	14.49	25.31	194.73	73.41
112	J-408	4.30	25.19	194.72	73.46
113	J-652	3.76	37.83	207.49	73.51
114	J-512	0.00	31.00	200.69	73.53
115	J-424	0.19	32.88	202.59	73.54
116	J-406	0.00	24.51	194.71	73.75
117	J-312	3.67	24.51	194.76	73.77
118	J-244	0.00	24.32	194.75	73.85
119	J-248	2.05	30.18	200.69	73.88
120	J-398	0.00	24.07	194.70	73.93
121	J-298	0.00	24.10	194.78	73.95
122	J-584	0.00	27.43	198.22	74.00
123	J-610	0.00	22.44	193.33	74.04

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ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	
124	J-396	3.22	23.65	194.70	74.11
125	J-588	5.85	27.00	198.28	74.21
126	J-200	8.69	29.00	200.45	74.29
127	J-178	1.34	29.00	200.50	74.31
128	J-246	0.34	31.00	202.58	74.34
129	J-102	1.24	27.00	198.60	74.35
130	J-340	0.00	29.00	200.69	74.39
131	J-296	6.99	23.01	194.78	74.43
132	J-310	0.00	23.00	194.78	74.43
133	J-106	3.31	26.37	198.32	74.50
134	J-242	0.67	22.80	194.78	74.52
135	J-614	0.00	20.93	193.33	74.70
136	J-350	17.12	29.57	201.99	74.71
137	J-440	8.75	28.73	201.34	74.79
138	J-284	14.13	29.00	201.69	74.83
139	J-364	0.00	29.00	201.70	74.83
140	J-346	0.00	29.00	201.80	74.87
141	J-360	0.00	29.00	202.04	74.98
142	J-334	5.76	27.57	200.70	75.02
143	J-404	4.62	21.49	194.70	75.05
144	J-138	31.15	27.78	201.00	75.05
145	J-354	4.45	28.74	201.97	75.06
146	J-318	0.55	29.32	202.62	75.09
147	J-192	5.34	27.00	200.40	75.13
148	J-182	9.08	26.92	200.37	75.16
149	J-482	7.61	29.00	202.50	75.18
150	J-348	3.97	28.28	201.80	75.18
151	J-180	0.00	26.87	200.44	75.21
152	J-654	4.30	29.00	202.58	75.21
153	J-352	5.94	28.56	202.15	75.22
154	J-546	0.00	41.79	215.40	75.22
155	J-394	2.38	21.00	194.70	75.26
156	J-612	0.00	19.59	193.33	75.28
157	J-250	0.00	27.87	201.69	75.32
158	J-252	0.00	27.84	201.69	75.33
159	J-254	0.31	27.75	201.69	75.37
160	J-400	2.14	20.70	194.70	75.39
161	J-256	0.00	27.65	201.69	75.41
162	J-458	0.19	28.41	202.47	75.42
163	J-368	18.56	27.63	201.69	75.42
164	J-142	1.15	26.27	200.42	75.46

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	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
165	J-802	3.16	25.90	200.18	75.51
166	J-800	3.16	25.90	200.20	75.52
167	J-770	3.01	25.90	200.25	75.54
168	J-792	3.16	25.90	200.26	75.55
169	J-794	3.16	25.90	200.26	75.55
170	J-760	7.73	25.90	200.26	75.55
171	J-798	3.16	25.90	200.27	75.55
172	J-796	3.16	25.90	200.27	75.55
173	J-754	9.23	25.90	200.27	75.55
174	J-806	1.81	25.90	200.27	75.56
175	J-804	1.78	25.90	200.27	75.56
176	J-766	7.47	25.90	200.28	75.56
177	J-778	9.62	25.90	200.31	75.57
178	J-776	4.06	25.90	200.31	75.57
179	J-810	3.43	25.90	200.33	75.58
180	J-808	0.00	25.90	200.33	75.58
181	J-814	9.83	25.90	200.34	75.58
182	J-812	0.00	25.90	200.35	75.59
183	J-780	9.98	25.90	200.38	75.60
184	J-834	24.60	25.90	200.39	75.60
185	J-832	0.00	25.90	200.40	75.61
186	J-816	9.83	25.90	200.42	75.62
187	J-786	31.80	25.90	200.42	75.62
188	J-392	9.74	20.15	194.70	75.63
189	J-830	0.00	25.90	200.45	75.63
190	J-828	3.43	25.90	200.48	75.64
191	J-134	15.45	25.90	200.49	75.65
192	J-826	0.00	25.90	200.49	75.65
193	J-818	0.00	25.90	200.50	75.65
194	J-196	1.78	25.80	200.41	75.66
195	J-338	0.00	26.06	200.69	75.67
196	J-824	0.00	25.90	200.54	75.67
197	J-150	1.60	27.81	202.47	75.68
198	J-822	0.00	25.90	200.58	75.69
199	J-300	0.00	20.07	194.78	75.70
200	J-820	0.00	25.90	200.79	75.78
201	J-840	0.00	25.90	200.79	75.78
202	J-838	0.00	25.90	200.79	75.78
203	J-836	0.00	25.90	200.79	75.78
204	J-502	0.28	27.56	202.47	75.79
205	J-188	4.18	25.46	200.38	75.79

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ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	
206	J-736	0.34	19.62	194.79	75.90
207	J-432	9.35	24.86	200.20	75.98
208	J-140	3.94	25.00	200.36	75.98
209	J-184	2.41	25.00	200.37	75.99
210	J-186	4.27	25.00	200.38	75.99
211	J-190	3.25	25.00	200.40	76.00
212	J-194	4.95	25.00	200.41	76.01
213	J-456	3.07	24.89	200.31	76.01
214	J-314	0.00	27.15	202.58	76.01
215	J-110	7.85	19.32	194.80	76.04
216	J-136	19.51	25.00	200.49	76.04
217	J-508	0.00	26.98	202.47	76.04
218	J-844	0.00	25.90	201.40	76.04
219	J-842	0.00	25.90	201.40	76.04
220	J-416	1.37	27.04	202.58	76.06
221	J-846	0.00	25.90	201.52	76.10
222	J-448	4.15	24.65	200.31	76.12
223	J-442	15.75	25.25	200.97	76.14
224	J-504	4.45	26.72	202.47	76.15
225	J-336	0.00	24.94	200.70	76.16
226	J-848	0.00	25.90	201.73	76.19
227	J-446	7.76	24.47	200.31	76.19
228	J-730	1.49	18.70	194.80	76.31
229	J-164	22.86	28.80	205.20	76.44
230	J-506	4.21	26.04	202.47	76.45
231	J-852	0.00	25.90	202.38	76.47
232	J-850	0.00	25.90	202.38	76.47
233	J-854	0.00	25.90	202.40	76.48
234	J-856	0.00	25.90	202.40	76.48
235	J-132	49.30	23.62	200.34	76.57
236	J-366	0.00	25.00	201.74	76.58
237	J-548	0.00	37.21	214.03	76.62
238	J-356	0.00	25.18	202.04	76.63
239	J-390	3.22	17.81	194.70	76.65
240	J-50	0.94	29.19	206.12	76.67
241	J-450	4.86	23.38	200.33	76.67
242	J-290	0.00	24.70	202.34	76.97
243	J-866	0.00	24.00	201.70	77.00
244	J-738	0.00	17.00	194.79	77.04
245	J-656	1.18	24.69	202.57	77.07
246	J-732	10.78	16.75	194.79	77.15

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	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
247	J-172	7.50	29.08	207.14	77.15
248	J-166	6.51	27.12	205.20	77.16
249	J-130	0.31	21.36	199.47	77.18
250	J-322	1.12	24.50	202.69	77.21
251	J-126	2.89	22.07	200.26	77.21
252	J-468	7.20	15.50	193.72	77.22
253	J-524	1.25	24.21	202.43	77.22
254	J-288	19.22	23.99	202.34	77.28
255	J-590	10.54	27.00	205.41	77.31
256	J-646	2.41	29.00	207.71	77.44
257	J-862	0.00	23.00	201.73	77.45
258	J-376	5.67	23.41	202.19	77.46
259	J-292	0.58	23.00	201.78	77.47
260	J-722	13.50	15.83	194.89	77.59
261	J-370	0.00	22.94	202.07	77.62
262	J-444	6.15	21.00	200.26	77.67
263	J-372	0.00	22.81	202.07	77.68
264	J-714	1.15	15.62	195.06	77.75
265	J-734	0.16	15.34	194.79	77.76
266	J-148	7.94	22.23	201.69	77.76
267	J-266	0.70	22.37	201.94	77.81
268	J-86	10.96	27.00	206.58	77.81
269	J-202	1.78	27.88	207.50	77.83
270	J-870	0.00	22.00	201.70	77.86
271	J-264	0.00	22.07	201.79	77.88
272	J-374	0.00	22.33	202.07	77.88
273	J-868	0.00	21.90	201.70	77.91
274	J-864	0.00	21.90	201.70	77.91
275	J-152	24.54	22.86	202.69	77.92
276	J-278	1.78	22.13	201.96	77.92
277	J-644	2.11	30.91	210.79	77.94
278	J-724	1.34	14.85	194.88	78.01
279	J-276	3.55	15.38	195.45	78.02
280	J-380	0.00	20.71	200.91	78.08
281	J-128	278.69	17.74	198.03	78.12
282	J-280	4.54	21.43	201.86	78.18
283	J-872	0.00	21.00	201.73	78.31
284	J-282	12.94	21.00	201.74	78.32
285	J-682	0.00	21.83	202.58	78.32
286	J-124	278.69	17.00	197.83	78.35
287	J-170	9.86	27.64	208.54	78.39

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	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
288	J-642	0.52	29.96	210.90	78.40
289	J-82	24.21	13.20	194.26	78.45
290	J-120	54.86	18.54	199.72	78.51
291	J-378	14.52	19.55	200.91	78.58
292	J-146	23.43	20.10	201.56	78.63
293	J-302	0.00	20.13	201.70	78.68
294	J-382	0.13	17.89	199.47	78.68
295	J-728	0.85	13.20	194.87	78.72
296	J-522	2.35	17.78	199.47	78.72
297	J-386	0.00	17.77	199.47	78.73
298	J-436	0.00	17.58	199.47	78.81
299	J-526	8.84	29.64	211.88	78.96
300	J-716	3.67	12.72	195.06	79.01
301	J-686	0.00	17.00	199.34	79.01
302	J-692	8.51	16.90	199.27	79.02
303	J-520	0.00	17.30	199.72	79.04
304	J-122	5.22	17.00	199.49	79.07
305	J-176	64.99	30.38	213.11	79.18
306	J-638	0.00	29.00	211.74	79.18
307	J-726	0.00	12.04	194.88	79.22
308	J-154	1.69	19.43	202.47	79.31
309	J-630	1.25	30.26	213.34	79.33
310	J-674	0.67	17.81	200.91	79.34
311	J-544	0.85	31.98	215.40	79.47
312	J-488	1.21	19.00	202.47	79.50
313	J-272	0.49	11.70	195.45	79.62
314	J-676	0.00	17.15	200.91	79.62
315	J-718	0.00	11.18	194.99	79.65
316	J-528	3.67	27.81	211.87	79.75
317	J-720	3.07	10.85	194.99	79.79
318	J-268	2.83	11.24	195.45	79.82
319	J-688	0.00	15.00	199.34	79.88
320	J-316	0.28	18.23	202.58	79.88
321	J-640	0.00	27.15	211.60	79.92
322	J-490	0.00	10.75	195.42	80.02
323	J-362	0.00	14.96	199.66	80.03
324	J-636	0.00	27.00	211.74	80.05
325	J-632	1.09	27.00	211.81	80.08
326	J-634	4.36	27.00	211.81	80.08
327	J-66	0.00	29.13	214.03	80.12
328	J-226	0.22	28.64	213.65	80.17

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	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)
329	J-114	4.89	14.22	199.47	80.27
330	J-712	6.15	10.08	195.36	80.28
331	J-174	0.61	29.00	214.51	80.38
332	J-704	9.32	9.66	195.62	80.57
333	J-64	5.55	30.27	216.44	80.67
334	J-532	0.00	31.04	217.67	80.87
335	J-690	10.43	12.38	199.28	80.98
336	J-94	0.00	29.00	215.93	81.00
337	J-706	6.30	8.39	195.46	81.06
338	J-678	1.43	13.70	200.91	81.12
339	J-492	0.00	7.71	195.36	81.30
340	J-116	7.08	11.00	198.76	81.36
341	J-698	63.05	9.00	196.83	81.38
342	J-708	38.44	7.43	195.42	81.46
343	J-534	503.15	28.95	217.67	81.77
344	J-358	0.00	13.00	202.04	81.91
345	J-710	25.29	6.98	196.32	82.04
346	J-112	0.00	10.27	199.66	82.06
347	J-700	1.43	6.80	196.81	82.33
348	J-694	0.73	6.98	197.51	82.56
349	J-388	18.14	7.65	198.29	82.61
350	J-702	0.00	5.90	196.81	82.72
351	J-494	0.67	6.81	198.29	82.97
352	J-466	0.00	29.00	220.59	83.02
353	J-696	0.00	5.00	197.51	83.42
354	J-464	0.00	29.00	221.57	83.44
355	J-790	0.00	25.90	221.57	84.78
356	J-680	0.00	5.13	202.69	85.60
357	J-206	13.39	29.00	226.88	85.74
358	J-216	0.00	34.99	234.32	86.37
359	J-530	2.83	27.00	228.69	87.39
360	J-208	9.02	27.00	228.69	87.39
361	J-38	200.08	27.00	233.78	89.60
362	J-212	0.00	22.00	234.32	92.00
363	J-218	0.00	36.81	497.30	199.53
364	J-214	0.00	22.00	497.30	205.95



2010 Peak Hour Steady State Analysis Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
1	P-629	J-882	J-884	376.45	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
2	P-123	J-94	J-228	206.36	18.00	120.00	0.00	0.00	0.00	0.00	Closed	0
3	P-897	J-694	J-696	595.50	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
4	P-631	J-884	J-612	261.65	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
5	P-891	J-688	J-686	631.61	2.00	120.00	0.00	0.00	0.00	0.00	Open	0
6	P-881	J-682	J-416	984.87	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
7	P-509	J-372	J-374	222.30	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
8	P-879	J-680	J-682	145.46	6.00	120.00	0.00	0.00	0.00	0.00	Closed	0
9	P-1087	J-850	J-852	818.55	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
10	P-875	J-674	J-676	864.91	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
11	P-199	J-342	J-512	76.16	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
12	P-469	J-340	J-338	242.33	4.00	120.00	0.00	0.00	0.00	0.00	Open	0
13	P-467	J-512	J-340	291.15	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
14	P-1077	J-842	J-844	529.47	4.00	120.00	0.00	0.00	0.00	0.00	Open	0
15	P-203	J-516	J-518	586.69	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
16	P-1071	J-838	J-840	597.20	2.00	120.00	0.00	0.00	0.00	0.00	Open	0
17	P-1069	J-836	J-838	740.50	2.00	120.00	0.00	0.00	0.00	0.00	Open	0
18	P-445	J-460	J-466	50.96	18.00	120.00	0.00	0.00	0.00	0.00	Closed	0
19	P-819	J-626	J-228	2,036.45	8.00	120.00	0.00	0.00	0.00	0.00	Closed	0
20	P-815	J-622	J-624	664.34	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
21	P-805	J-610	J-882	1,405.42	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
22	P-793	J-602	J-598	299.16	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
23	P-299	J-216	J-218	40.00	24.00	120.00	0.00	0.00	0.00	0.00	Closed	0
24	P-311	J-212	J-214	40.00	12.00	120.00	0.00	0.00	0.00	0.00	Closed	0
25	P-1109	J-864	J-866	367.08	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
26	P-961	J-750	J-752	1,007.13	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
27	P-797	J-604	J-606	564.86	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
28	P-301	J-218	J-214	13.80	24.00	120.00	0.00	0.00	0.00	0.00	Open	0
29	P-353	J-254	J-256	322.44	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
30	P-297	J-212	J-216	15.00	24.00	120.00	0.00	0.00	0.00	0.00	Open	0
31	P-395	J-290	J-288	250.43	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
32	P-957	J-746	J-748	196.34	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
33	P-401	J-300	J-298	200.48	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
34	P-403	J-298	J-296	146.38	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
35	P-1003	J-462	J-788	25.07	14.00	120.00	0.00	0.00	0.00	0.00	Open	0

2010 Peak Hour Steady State Analysis Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
36	P-955	J-742	J-744	150.78	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
37	P-761	J-570	J-572	924.79	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
38	P-857	J-660	J-662	857.82	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
39	P-451	J-330	J-324	403.58	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
40	P-859	J-664	J-164	661.56	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
41	P-759	J-566	J-568	385.29	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
42	P-757	J-566	J-570	1,161.68	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
43	P-473	J-346	J-348	1,124.23	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
44	P-193	J-322	J-680	878.02	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
45	P-181	J-522	J-436	860.77	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
46	P-485	J-356	J-358	764.78	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
47	P-499	J-282	J-366	243.70	12.00	120.00	0.00	0.00	0.00	0.00	Open	0
48	P-1089	J-854	J-856	419.02	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
49	P-507	J-370	J-372	185.76	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
50	P-735	J-544	J-546	1,413.60	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
51	P-719	J-534	J-532	1,282.21	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
52	P-627	J-880	J-614	200.31	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
53	P-903	J-700	J-702	264.90	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
54	P-1005	J-790	J-464	24.44	10.00	120.00	0.00	0.00	0.00	0.00	Open	0
55	P-119	J-66	J-548	1,242.91	8.00	120.00	0.00	0.00	0.00	0.00	Open	0
56	P-803	J-610	J-880	741.87	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
57	P-1113	J-870	J-302	208.46	10.00	120.00	0.00	0.00	0.00	0.00	Open	0
58	P-801	J-76	J-610	1,222.42	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
59	P-945	J-734	J-738	463.33	4.00	120.00	0.00	0.00	0.00	0.00	Open	0
60	P-461	J-336	J-334	167.78	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
61	P-489	J-356	J-360	178.34	4.00	120.00	0.00	0.00	0.00	0.00	Open	0
62	P-915	J-712	J-492	414.72	6.00	120.00	0.00	0.00	0.00	0.00	Open	0
63	P-423	J-310	J-296	203.20	4.00	120.00	0.00	0.00	0.00	0.00	Open	0
64	P-835	J-636	J-638	885.83	4.00	120.00	0.00	0.00	0.00	0.00	Open	0
65	P-769	J-576	J-578	528.07	2.00	120.00	0.00	0.00	0.00	0.00	Open	0
66	P-867	J-668	J-670	2,429.15	8.00	120.00	0.12	0.00	0.00	0.00	Open	0
67	P-349	J-250	J-252	288.14	10.00	120.00	0.31	0.00	0.00	0.00	Open	0
68	P-269	J-508	J-488	2,841.76	18.00	120.00	1.21	0.00	0.00	0.00	Open	0
69	P-941	J-732	J-734	235.08	6.00	120.00	0.16	0.00	0.00	0.00	Open	0
70	P-251	J-186	J-188	620.75	8.00	120.00	0.29	0.00	0.00	0.00	Open	0

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	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
71	P-351	J-252	J-254	366.93	8.00	120.00	0.31	0.00	0.00	0.00	Open	0
72	P-271	J-522	J-130	1,980.63	6.00	120.00	0.31	0.00	0.00	0.00	Open	0
73	P-87	J-76	J-604	490.34	8.00	120.00	-0.76	0.00	0.00	0.00	Open	0
74	P-121	J-388	J-494	355.21	4.00	120.00	0.19	0.00	0.00	0.00	Open	0
75	P-289	J-388	J-494	310.74	6.00	120.00	0.48	0.01	0.00	0.00	Open	0
76	P-795	J-604	J-600	259.36	6.00	120.00	0.49	0.01	0.00	0.00	Open	0
77	P-249	J-190	J-192	623.12	8.00	120.00	1.08	0.01	0.00	0.00	Open	0
78	P-319	J-504	J-506	3,601.67	8.00	120.00	1.09	0.01	0.00	0.00	Open	0
79	P-309	J-502	J-508	3,601.22	18.00	120.00	6.02	0.01	0.00	0.00	Open	0
80	P-197	J-150	J-504	218.19	8.00	120.00	1.24	0.01	0.00	0.00	Open	0
81	P-229	J-178	J-198	1,434.39	8.00	120.00	-1.34	0.01	0.00	0.00	Open	0
82	P-943	J-732	J-736	423.31	4.00	120.00	0.34	0.01	0.00	0.00	Open	0
83	P-933	J-724	J-726	514.68	6.00	120.00	0.85	0.01	0.00	0.00	Open	0
84	P-821	J-528	J-628	3,771.32	4.00	120.00	0.40	0.01	0.00	0.00	Open	0
85	P-267	J-506	J-154	2,880.03	8.00	120.00	1.69	0.01	0.00	0.00	Open	0
86	P-923	J-716	J-714	561.13	6.00	120.00	1.15	0.01	0.00	0.00	Open	0
87	P-339	J-458	J-502	210.09	18.00	120.00	10.59	0.01	0.00	0.00	Open	0
88	P-951	J-742	J-746	202.20	8.00	120.00	2.47	0.02	0.00	0.00	Open	0
89	P-873	J-674	J-678	1,274.66	6.00	120.00	1.43	0.02	0.00	0.00	Open	0
90	P-749	J-562	J-558	274.54	4.00	120.00	0.64	0.02	0.00	0.00	Open	0
91	P-755	J-564	J-566	542.56	8.00	120.00	2.80	0.02	0.00	0.00	Open	0
92	P-307	J-500	J-498	735.42	4.00	120.00	0.73	0.02	0.00	0.00	Open	0
93	P-849	J-246	J-654	1,654.14	12.00	120.00	7.08	0.02	0.00	0.00	Open	0
94	P-551	J-390	J-392	514.03	8.00	120.00	-3.22	0.02	0.00	0.00	Open	0
95	P-863	J-670	J-672	2,519.67	8.00	120.00	-3.28	0.02	0.00	0.00	Open	0
96	P-573	J-314	J-478	1,840.37	18.00	120.00	18.38	0.02	0.00	0.00	Open	0
97	P-543	J-404	J-410	492.49	8.00	120.00	-3.67	0.02	0.00	0.00	Open	0
98	P-517	J-378	J-380	194.57	6.00	120.00	2.09	0.02	0.00	0.00	Open	0
99	P-871	J-380	J-674	179.56	6.00	120.00	2.09	0.02	0.00	0.00	Open	0
100	P-575	J-420	J-516	495.69	18.00	120.00	-19.82	0.02	0.00	0.00	Open	0
101	P-207	J-428	J-314	627.05	18.00	120.00	-19.82	0.02	0.00	0.00	Open	0
102	P-569	J-430	J-428	460.71	18.00	120.00	-19.82	0.02	0.00	0.00	Open	0
103	P-201	J-516	J-430	627.96	18.00	120.00	-19.82	0.02	0.00	0.00	Open	0
104	P-475	J-344	J-348	1,179.10	8.00	120.00	3.97	0.03	0.00	0.00	Open	0
105	P-263	J-502	J-504	100.04	8.00	120.00	4.30	0.03	0.00	0.00	Open	0

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ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
106	P-833	J-634	J-632	803.71	4.00	120.00	1.09	0.03	0.00	0.00	Open	0
107	P-843	J-646	J-648	525.22	8.00	120.00	4.55	0.03	0.00	0.00	Open	0
108	P-237	J-182	J-184	613.29	8.00	120.00	4.66	0.03	0.00	0.00	Open	0
109	P-523	J-386	J-522	1,613.48	6.00	120.00	2.66	0.03	0.00	0.00	Open	0
110	P-525	J-382	J-386	68.70	6.00	120.00	2.66	0.03	0.00	0.00	Open	0
111	P-947	J-740	J-742	275.87	8.00	120.00	4.80	0.03	0.00	0.00	Open	0
112	P-275	J-508	J-506	116.47	8.00	120.00	4.81	0.03	0.00	0.00	Open	0
113	P-799	J-602	J-878	834.29	6.00	120.00	2.74	0.03	0.00	0.00	Open	0
114	P-625	J-878	J-608	367.48	6.00	120.00	2.74	0.03	0.00	0.00	Open	0
115	P-147	J-114	J-382	1,663.70	6.00	120.00	2.79	0.03	0.00	0.00	Open	0
116	P-791	J-604	J-602	406.12	8.00	120.00	-4.97	0.03	0.00	0.00	Open	0
117	P-715	J-208	J-530	1,685.12	6.00	120.00	2.83	0.03	0.00	0.00	Open	0
118	P-865	J-672	J-668	1,265.14	8.00	120.00	5.22	0.03	0.00	0.00	Open	0
119	P-561	J-418	J-416	726.21	18.00	120.00	28.27	0.04	0.00	0.00	Open	0
120	P-1009	J-760	J-794	349.76	6.00	120.00	3.16	0.04	0.00	0.00	Open	0
121	P-1011	J-754	J-798	451.15	6.00	120.00	3.16	0.04	0.00	0.00	Open	0
122	P-1013	J-754	J-796	301.20	6.00	120.00	3.16	0.04	0.00	0.00	Open	0
123	P-1007	J-760	J-792	643.22	6.00	120.00	3.16	0.04	0.00	0.00	Open	0
124	P-739	J-550	J-552	1,620.93	6.00	120.00	3.19	0.04	0.00	0.00	Open	0
125	P-101	J-70	J-104	917.22	8.00	120.00	-5.77	0.04	0.00	0.00	Open	0
126	P-1035	J-816	J-786	310.31	12.00	120.00	-13.21	0.04	0.00	0.00	Open	0
127	P-1051	J-826	J-136	284.30	18.00	120.00	-29.93	0.04	0.00	0.00	Open	0
128	P-385	J-284	J-368	800.49	8.00	120.00	5.98	0.04	0.00	0.00	Open	0
129	P-1025	J-808	J-810	275.10	6.00	120.00	3.43	0.04	0.00	0.00	Open	0
130	P-549	J-392	J-394	614.55	8.00	120.00	-6.12	0.04	0.00	0.00	Open	0
131	P-379	J-272	J-276	618.28	6.00	120.00	3.55	0.04	0.00	0.00	Open	0
132	P-853	J-656	J-658	1,752.17	4.00	120.00	1.60	0.04	0.01	0.00	Open	0
133	P-747	J-556	J-562	660.27	4.00	120.00	1.61	0.04	0.00	0.00	Open	0
134	P-751	J-556	J-558	695.33	4.00	120.00	1.62	0.04	0.00	0.00	Open	0
135	P-209	J-164	J-166	1,772.56	8.00	120.00	6.51	0.04	0.00	0.00	Open	0
136	P-531	J-392	J-396	452.00	8.00	120.00	-6.84	0.04	0.00	0.00	Open	0
137	P-247	J-194	J-196	623.55	8.00	120.00	6.89	0.04	0.00	0.00	Open	0
138	P-375	J-268	J-272	119.33	6.00	120.00	4.04	0.05	0.00	0.00	Open	0
139	P-135	J-526	J-528	2,105.49	6.00	120.00	4.07	0.05	0.01	0.00	Open	0
140	P-1023	J-804	J-806	258.68	4.00	120.00	1.81	0.05	0.00	0.01	Open	0

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141	P-167	J-134	J-826	262.34	18.00	120.00	-36.93	0.05	0.00	0.00	Open	0
142	P-741	J-74	J-554	704.40	6.00	120.00	4.18	0.05	0.00	0.00	Open	0
143	P-303	J-496	J-482	106.04	8.00	120.00	7.47	0.05	0.00	0.00	Open	0
144	P-425	J-246	J-314	3,055.77	18.00	120.00	38.19	0.05	0.00	0.00	Open	0
145	P-93	J-82	J-80	991.47	8.00	120.00	7.79	0.05	0.00	0.00	Open	0
146	P-501	J-368	J-148	1,108.46	8.00	120.00	7.94	0.05	0.00	0.00	Open	0
147	P-965	J-760	J-444	277.69	8.00	120.00	8.09	0.05	0.00	0.00	Open	0
148	P-633	J-886	J-618	502.36	4.00	120.00	2.08	0.05	0.00	0.01	Open	0
149	P-809	J-616	J-886	1,478.15	4.00	120.00	2.08	0.05	0.01	0.01	Open	0
150	P-547	J-394	J-400	633.06	8.00	120.00	-8.50	0.05	0.00	0.00	Open	0
151	P-893	J-690	J-692	1,636.61	8.00	120.00	8.51	0.05	0.01	0.00	Open	0
152	P-545	J-410	J-412	738.66	8.00	120.00	-8.57	0.05	0.00	0.00	Open	0
153	P-429	J-316	J-246	668.34	18.00	120.00	45.61	0.06	0.00	0.00	Open	0
154	P-495	J-870	J-868	84.39	12.00	120.00	-20.83	0.06	0.00	0.00	Open	0
155	P-325	J-238	J-240	244.40	8.00	120.00	9.60	0.06	0.00	0.00	Open	0
156	P-323	J-238	J-236	403.98	8.00	120.00	-9.60	0.06	0.00	0.00	Open	0
157	P-321	J-236	J-234	277.61	8.00	120.00	-9.60	0.06	0.00	0.00	Open	0
158	P-533	J-396	J-414	248.25	8.00	120.00	-10.06	0.06	0.00	0.00	Open	0
159	P-539	J-400	J-404	353.65	8.00	120.00	-10.64	0.07	0.00	0.00	Open	0
160	P-405	J-296	J-242	219.36	8.00	120.00	-10.66	0.07	0.00	0.00	Open	0
161	P-851	J-654	J-656	1,063.58	4.00	120.00	2.78	0.07	0.01	0.01	Open	0
162	P-535	J-414	J-398	398.88	8.00	120.00	-11.84	0.08	0.00	0.01	Open	0
163	P-537	J-398	J-404	67.88	8.00	120.00	-11.84	0.08	0.00	0.01	Open	0
164	P-981	J-776	J-778	273.26	8.00	120.00	11.93	0.08	0.00	0.01	Open	0
165	P-927	J-718	J-720	275.02	4.00	120.00	3.07	0.08	0.00	0.01	Open	0
166	P-845	J-648	J-650	329.98	2.00	120.00	0.79	0.08	0.01	0.03	Open	0
167	P-949	J-412	J-740	1,297.64	8.00	120.00	-12.65	0.08	0.01	0.01	Open	0
168	P-557	J-420	J-316	1,714.78	18.00	120.00	-65.38	0.08	0.00	0.00	Open	0
169	P-503	J-250	J-368	46.30	10.00	120.00	20.53	0.08	0.00	0.01	Open	0
170	P-347	J-250	J-364	808.56	10.00	120.00	-20.83	0.09	0.00	0.01	Open	0
171	P-493	J-364	J-870	386.42	10.00	120.00	-20.83	0.09	0.00	0.01	Open	0
172	P-789	J-602	J-74	1,048.14	8.00	120.00	-13.36	0.09	0.01	0.01	Open	0
173	P-935	J-726	J-728	237.84	2.00	120.00	0.85	0.09	0.01	0.04	Open	0
174	P-1099	J-110	J-730	310.08	8.00	120.00	-13.63	0.09	0.00	0.01	Open	0
175	P-149	J-122	J-114	1,337.35	6.00	120.00	7.69	0.09	0.01	0.01	Open	0

2010 Peak Hour Steady State Analysis Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
176	P-1057	J-826	J-828	469.06	4.00	120.00	3.43	0.09	0.01	0.02	Open	0
177	P-175	J-142	J-816	783.21	12.00	120.00	31.47	0.09	0.00	0.00	Open	0
178	P-1117	J-872	J-848	691.05	8.00	120.00	14.17	0.09	0.01	0.01	Open	0
179	P-1115	J-862	J-872	439.89	8.00	120.00	14.17	0.09	0.00	0.01	Open	0
180	P-421	J-296	J-312	942.24	4.00	120.00	3.67	0.09	0.02	0.02	Open	0
181	P-327	J-240	J-234	397.92	8.00	120.00	-15.14	0.10	0.00	0.01	Open	0
182	P-153	J-120	J-520	226.44	12.00	120.00	34.07	0.10	0.00	0.01	Open	0
183	P-343	J-118	J-248	950.75	12.00	120.00	-34.19	0.10	0.01	0.01	Open	0
184	P-953	J-746	J-408	1,084.64	8.00	120.00	-15.90	0.10	0.01	0.01	Open	0
185	P-443	J-446	J-776	282.13	8.00	120.00	16.10	0.10	0.00	0.01	Open	0
186	P-345	J-248	J-342	54.13	12.00	120.00	-36.24	0.10	0.00	0.01	Open	0
187	P-465	J-342	J-334	286.59	12.00	120.00	-36.88	0.10	0.00	0.01	Open	0
188	P-775	J-586	J-582	469.58	2.00	120.00	1.03	0.10	0.02	0.05	Open	0
189	P-767	J-576	J-574	792.44	2.00	120.00	1.06	0.11	0.04	0.06	Open	0
190	P-869	J-672	J-666	2,094.07	12.00	120.00	-39.17	0.11	0.02	0.01	Open	0
191	P-1061	J-834	J-832	658.30	6.00	120.00	-9.81	0.11	0.01	0.02	Open	0
192	P-773	J-104	J-586	1,815.05	8.00	120.00	18.42	0.12	0.02	0.01	Open	0
193	P-459	J-334	J-144	572.10	12.00	120.00	-42.64	0.12	0.00	0.01	Open	0
194	P-233	J-182	J-140	872.24	8.00	120.00	19.41	0.12	0.01	0.01	Open	0
195	P-989	J-778	J-456	312.62	8.00	120.00	19.46	0.12	0.00	0.01	Open	0
196	P-939	J-730	J-732	412.71	6.00	120.00	11.28	0.13	0.01	0.02	Open	0
197	P-1111	J-868	J-284	374.45	8.00	120.00	20.11	0.13	0.01	0.02	Open	0
198	P-563	J-424	J-316	1,692.28	18.00	120.00	111.27	0.14	0.01	0.01	Open	0
199	P-963	J-754	J-760	277.03	8.00	120.00	22.14	0.14	0.01	0.02	Open	0
200	P-145	J-110	J-242	1,041.13	8.00	120.00	22.88	0.15	0.02	0.02	Open	0
201	P-783	J-590	J-596	1,221.12	6.00	120.00	12.95	0.15	0.03	0.03	Open	0
202	P-541	J-404	J-406	298.17	8.00	120.00	-23.44	0.15	0.01	0.02	Open	0
203	P-265	J-406	J-408	757.52	8.00	120.00	-23.44	0.15	0.02	0.02	Open	0
204	P-305	J-500	J-150	1,422.16	8.00	120.00	24.19	0.15	0.03	0.02	Open	0
205	P-553	J-240	J-740	538.92	8.00	120.00	24.73	0.16	0.01	0.02	Open	0
206	P-765	J-580	J-576	97.88	2.00	120.00	1.66	0.17	0.01	0.13	Open	0
207	P-335	J-482	J-500	112.08	8.00	120.00	26.76	0.17	0.00	0.03	Open	0
208	P-555	J-416	J-482	2,970.66	8.00	120.00	26.91	0.17	0.08	0.03	Open	0
209	P-329	J-242	J-750	1,958.63	8.00	120.00	-27.67	0.18	0.05	0.03	Open	0
210	P-959	J-750	J-210	1,384.29	8.00	120.00	-27.89	0.18	0.04	0.03	Open	0

2010 Peak Hour Steady State Analysis Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
211	P-109	J-88	J-90	804.99	8.00	120.00	29.25	0.19	0.02	0.03	Open	0
212	P-931	J-724	J-722	257.58	6.00	120.00	-16.73	0.19	0.01	0.04	Open	0
213	P-877	J-510	J-420	136.23	18.00	120.00	151.85	0.19	0.00	0.01	Open	0
214	P-559	J-418	J-510	424.33	18.00	120.00	151.85	0.19	0.01	0.01	Open	0
215	P-491	J-362	J-520	5,235.35	18.00	120.00	-152.84	0.19	0.07	0.01	Open	0
216	P-1095	J-362	J-112	122.03	18.00	120.00	152.84	0.19	0.00	0.01	Open	0
217	P-437	J-456	J-448	256.16	8.00	120.00	-30.47	0.19	0.01	0.03	Open	0
218	P-1027	J-808	J-778	456.42	6.00	120.00	17.15	0.19	0.02	0.05	Open	0
219	P-753	J-564	J-72	1,565.99	10.00	120.00	48.06	0.20	0.04	0.03	Open	0
220	P-261	J-180	J-142	609.97	12.00	120.00	69.41	0.20	0.01	0.02	Open	0
221	P-785	J-596	J-592	615.70	4.00	120.00	8.05	0.21	0.05	0.08	Open	0
222	P-253	J-182	J-186	261.51	8.00	120.00	-33.15	0.21	0.01	0.04	Open	0
223	P-239	J-184	J-188	268.41	8.00	120.00	-33.76	0.22	0.01	0.04	Open	0
224	P-839	J-642	J-644	583.52	2.00	120.00	2.11	0.22	0.12	0.20	Open	0
225	P-433	J-448	J-450	419.97	8.00	120.00	-34.61	0.22	0.02	0.04	Open	0
226	P-1021	J-804	J-770	481.22	6.00	120.00	19.82	0.22	0.03	0.06	Open	0
227	P-745	J-560	J-556	696.26	4.00	120.00	8.84	0.23	0.07	0.10	Open	0
228	P-565	J-418	J-426	77.81	18.00	120.00	-180.13	0.23	0.00	0.02	Open	0
229	P-567	J-424	J-426	469.48	18.00	120.00	180.13	0.23	0.01	0.02	Open	0
230	P-235	J-140	J-184	263.88	8.00	120.00	-36.00	0.23	0.01	0.04	Open	0
231	P-1029	J-808	J-812	287.74	6.00	120.00	-20.58	0.23	0.02	0.06	Open	0
232	P-245	J-196	J-142	273.62	8.00	120.00	-36.80	0.23	0.01	0.05	Open	0
233	P-241	J-188	J-192	268.63	8.00	120.00	-37.65	0.24	0.01	0.05	Open	0
234	P-967	J-766	J-754	278.88	8.00	120.00	37.69	0.24	0.01	0.05	Open	0
235	P-255	J-186	J-190	268.74	8.00	120.00	-37.70	0.24	0.01	0.05	Open	0
236	P-1083	J-850	J-854	267.64	6.00	120.00	-21.35	0.24	0.02	0.07	Open	0
237	P-393	J-288	J-850	527.35	6.00	120.00	-21.35	0.24	0.04	0.07	Open	0
238	P-1085	J-854	J-150	1,074.01	6.00	120.00	-21.35	0.24	0.07	0.07	Open	0
239	P-177	J-524	J-458	2,035.75	18.00	120.00	-195.76	0.25	0.04	0.02	Open	0
240	P-743	J-560	J-564	784.16	10.00	120.00	60.86	0.25	0.03	0.04	Open	0
241	P-331	J-234	J-244	408.38	8.00	120.00	-39.23	0.25	0.02	0.05	Open	0
242	P-333	J-244	J-242	558.54	8.00	120.00	-39.23	0.25	0.03	0.05	Open	0
243	P-1065	J-830	J-136	284.46	4.00	120.00	-9.81	0.25	0.03	0.12	Open	0
244	P-1063	J-832	J-830	467.12	4.00	120.00	-9.81	0.25	0.06	0.12	Open	0
245	P-133	J-84	J-106	722.42	6.00	120.00	22.40	0.25	0.05	0.08	Open	0

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246	P-427	J-444	J-446	918.56	8.00	120.00	-40.60	0.26	0.05	0.06	Open	0
247	P-103	J-68	J-102	1,616.39	10.00	120.00	63.72	0.26	0.07	0.04	Open	0
248	P-293	J-496	J-458	1,531.63	18.00	120.00	206.55	0.26	0.03	0.02	Open	0
249	P-1031	J-812	J-776	467.65	6.00	120.00	23.31	0.26	0.04	0.08	Open	0
250	P-787	J-592	J-876	1,138.12	2.00	120.00	2.59	0.26	0.33	0.29	Open	0
251	P-623	J-876	J-594	491.77	2.00	120.00	2.59	0.26	0.14	0.29	Open	0
252	P-1019	J-776	J-804	448.26	6.00	120.00	23.42	0.27	0.04	0.08	Open	0
253	P-1055	J-824	J-826	443.98	4.00	120.00	10.43	0.27	0.06	0.13	Open	0
254	P-1053	J-822	J-824	279.93	4.00	120.00	10.43	0.27	0.04	0.13	Open	0
255	P-243	J-192	J-196	256.54	8.00	120.00	-41.91	0.27	0.02	0.06	Open	0
256	P-779	J-588	J-584	701.70	6.00	120.00	23.59	0.27	0.06	0.08	Open	0
257	P-257	J-190	J-194	276.33	8.00	120.00	-42.03	0.27	0.02	0.06	Open	0
258	P-979	J-770	J-444	282.00	8.00	120.00	-42.54	0.27	0.02	0.06	Open	0
259	P-441	J-420	J-496	2,959.39	18.00	120.00	216.54	0.27	0.07	0.02	Open	0
260	P-529	J-408	J-110	1,191.29	8.00	120.00	-43.64	0.28	0.08	0.06	Open	0
261	P-481	J-350	J-354	411.42	8.00	120.00	44.02	0.28	0.03	0.07	Open	0
262	P-1037	J-446	J-814	274.85	6.00	120.00	-25.02	0.28	0.03	0.09	Open	0
263	P-273	J-200	J-134	850.45	12.00	120.00	-100.81	0.29	0.04	0.04	Open	0
264	P-85	J-74	J-560	968.59	10.00	120.00	70.13	0.29	0.05	0.05	Open	0
265	P-415	J-442	J-138	676.55	12.00	120.00	-104.53	0.30	0.03	0.04	Open	0
266	P-387	J-868	J-864	38.02	12.00	120.00	-104.59	0.30	0.00	0.04	Open	0
267	P-1107	J-864	J-862	733.30	12.00	120.00	-104.59	0.30	0.03	0.04	Open	0
268	P-521	J-456	J-126	662.33	8.00	120.00	46.86	0.30	0.05	0.07	Open	0
269	P-937	J-724	J-730	761.31	6.00	120.00	26.40	0.30	0.08	0.10	Open	0
270	P-929	J-718	J-724	664.53	4.00	120.00	11.85	0.30	0.11	0.17	Open	0
271	P-1015	J-766	J-800	193.58	2.00	120.00	3.16	0.32	0.08	0.42	Open	0
272	P-1017	J-766	J-802	246.51	2.00	120.00	3.16	0.32	0.10	0.42	Open	0
273	P-91	J-78	J-82	2,075.30	8.00	120.00	-51.28	0.33	0.18	0.09	Open	0
274	P-173	J-140	J-766	890.11	8.00	120.00	51.47	0.33	0.08	0.09	Open	0
275	P-777	J-84	J-588	759.44	6.00	120.00	29.44	0.33	0.10	0.13	Open	0
276	P-1105	J-862	J-282	179.96	12.00	120.00	-118.76	0.34	0.01	0.06	Open	0
277	P-917	J-712	J-706	1,156.25	8.00	120.00	-53.06	0.34	0.11	0.09	Open	0
278	P-259	J-194	J-180	256.55	8.00	120.00	-53.87	0.34	0.02	0.09	Open	0
279	P-231	J-198	J-180	975.70	12.00	120.00	123.29	0.35	0.06	0.06	Open	0
280	P-993	J-200	J-786	449.40	12.00	120.00	128.34	0.36	0.03	0.07	Open	0



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281	P-431	J-318	J-424	706.43	18.00	120.00	291.58	0.37	0.03	0.04	Open	0
282	P-205	J-318	J-322	1,608.19	18.00	120.00	-292.13	0.37	0.07	0.04	Open	0
283	P-449	J-330	J-198	2,969.16	12.00	120.00	130.02	0.37	0.20	0.07	Open	0
284	P-901	J-698	J-700	153.97	8.00	120.00	57.82	0.37	0.02	0.11	Open	0
285	P-435	J-322	J-152	54.76	18.00	120.00	-293.25	0.37	0.00	0.04	Open	0
286	P-1081	J-846	J-848	851.27	4.00	120.00	-14.50	0.37	0.21	0.24	Open	0
287	P-1079	J-842	J-846	498.55	4.00	120.00	-14.50	0.37	0.12	0.24	Open	0
288	P-463	J-330	J-144	75.48	12.00	120.00	-131.17	0.37	0.01	0.07	Open	0
289	P-389	J-282	J-292	542.03	12.00	120.00	-131.69	0.37	0.04	0.07	Open	0
290	P-399	J-292	J-264	184.07	12.00	120.00	-132.27	0.38	0.01	0.07	Open	0
291	P-417	J-432	J-770	384.91	8.00	120.00	-59.35	0.38	0.04	0.11	Open	0
292	P-925	J-716	J-718	268.76	4.00	120.00	14.92	0.38	0.07	0.26	Open	0
293	P-847	J-648	J-652	380.26	2.00	120.00	3.76	0.38	0.22	0.59	Open	0
294	P-921	J-722	J-110	776.17	8.00	120.00	60.74	0.39	0.09	0.12	Open	0
295	P-737	J-550	J-74	1,066.09	10.00	120.00	96.33	0.39	0.10	0.09	Open	0
296	P-1039	J-814	J-816	464.71	6.00	120.00	-34.85	0.40	0.08	0.17	Open	0
297	P-187	J-146	J-868	1,071.58	8.00	120.00	-63.65	0.41	0.14	0.13	Open	0
298	P-341	J-490	J-268	210.12	8.00	120.00	-63.80	0.41	0.03	0.13	Open	0
299	P-1043	J-200	J-818	274.34	6.00	120.00	-36.23	0.41	0.05	0.18	Open	0
300	P-1045	J-818	J-820	1,551.26	6.00	120.00	-36.23	0.41	0.29	0.18	Open	0
301	P-1047	J-820	J-442	983.00	6.00	120.00	-36.23	0.41	0.18	0.18	Open	0
302	P-909	J-706	J-708	200.14	6.00	120.00	38.44	0.44	0.04	0.21	Open	0
303	P-89	J-468	J-550	2,449.59	10.00	120.00	107.88	0.44	0.28	0.12	Open	0
304	P-1041	J-446	J-786	489.26	6.00	120.00	-39.44	0.45	0.11	0.22	Open	0
305	P-371	J-268	J-704	1,060.41	8.00	120.00	-70.67	0.45	0.17	0.16	Open	0
306	P-217	J-172	J-202	1,608.64	8.00	100.00	-71.82	0.46	0.36	0.23	Open	0
307	P-183	J-132	J-834	254.91	8.00	120.00	-74.67	0.48	0.04	0.17	Open	0
308	P-161	J-126	J-450	688.05	12.00	120.00	-168.13	0.48	0.07	0.11	Open	0
309	P-1093	J-860	J-80	159.30	8.00	120.00	75.54	0.48	0.03	0.18	Open	0
310	P-111	J-98	J-860	2,277.96	8.00	110.00	75.54	0.48	0.47	0.21	Open	0
311	P-771	J-584	J-106	244.17	4.00	120.00	-19.10	0.49	0.10	0.41	Open	0
312	P-151	J-120	J-122	2,074.32	12.00	120.00	173.17	0.49	0.24	0.11	Open	0
313	P-1033	J-812	J-786	267.53	6.00	120.00	-43.88	0.50	0.07	0.26	Open	0
314	P-439	J-144	J-442	2,179.60	12.00	120.00	-179.84	0.51	0.27	0.12	Open	0
315	P-165	J-132	J-136	1,145.83	12.00	120.00	-182.24	0.52	0.14	0.13	Open	0

2010 Peak Hour Steady State Analysis Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
316	P-95	J-78	J-858	471.92	8.00	120.00	-81.64	0.52	0.10	0.20	Open	0
317	P-1091	J-858	J-80	392.39	8.00	120.00	-81.64	0.52	0.08	0.20	Open	0
318	P-113	J-82	J-88	3,076.46	8.00	120.00	-83.28	0.53	0.65	0.21	Open	0
319	P-125	J-98	J-90	505.19	8.00	110.00	-84.26	0.54	0.13	0.25	Open	0
320	P-1059	J-834	J-836	1,661.06	8.00	120.00	-89.45	0.57	0.40	0.24	Open	0
321	P-1067	J-836	J-378	496.73	8.00	120.00	-89.45	0.57	0.12	0.24	Open	0
322	P-143	J-116	J-690	2,704.50	10.00	120.00	-141.33	0.58	0.52	0.19	Open	0
323	P-919	J-716	J-722	676.87	8.00	120.00	90.98	0.58	0.17	0.25	Open	0
324	P-189	J-848	J-146	465.42	6.00	120.00	51.36	0.58	0.16	0.35	Open	0
325	P-1073	J-842	J-146	653.03	8.00	120.00	-91.57	0.58	0.17	0.25	Open	0
326	P-1075	J-848	J-280	364.88	6.00	120.00	-51.69	0.59	0.13	0.36	Open	0
327	P-419	J-450	J-132	64.15	12.00	120.00	-207.61	0.59	0.01	0.16	Open	0
328	P-519	J-432	J-126	330.77	12.00	120.00	-212.10	0.60	0.06	0.17	Open	0
329	P-483	J-354	J-356	266.39	8.00	120.00	-96.46	0.62	0.07	0.28	Open	0
330	P-487	J-352	J-356	407.48	8.00	120.00	96.46	0.62	0.11	0.28	Open	0
331	P-117	J-90	J-100	4,406.63	8.00	110.00	-98.77	0.63	1.51	0.34	Open	0
332	P-383	J-280	J-266	200.24	6.00	120.00	-56.22	0.64	0.08	0.42	Open	0
333	P-911	J-700	J-710	1,163.14	6.00	120.00	56.40	0.64	0.49	0.42	Open	0
334	P-367	J-266	J-278	49.90	6.00	120.00	-56.92	0.65	0.02	0.43	Open	0
335	P-889	J-690	J-688	286.15	10.00	120.00	-160.26	0.65	0.07	0.24	Open	0
336	P-887	J-688	J-122	591.42	10.00	120.00	-160.26	0.65	0.14	0.24	Open	0
337	P-381	J-278	J-376	504.79	6.00	120.00	-58.70	0.67	0.23	0.45	Open	0
338	P-515	J-378	J-842	1,468.10	8.00	120.00	-106.07	0.68	0.49	0.33	Open	0
339	P-1049	J-822	J-136	452.53	12.00	120.00	241.50	0.69	0.10	0.21	Open	0
340	P-219	J-172	J-646	1,198.87	8.00	100.00	-107.44	0.69	0.57	0.48	Open	0
341	P-137	J-712	J-716	819.54	8.00	120.00	110.72	0.71	0.29	0.36	Open	0
342	P-571	J-118	J-344	3,077.18	8.00	120.00	-110.95	0.71	1.11	0.36	Open	0
343	P-129	J-102	J-84	446.68	6.00	120.00	62.48	0.71	0.23	0.51	Open	0
344	P-171	J-138	J-822	1,820.98	12.00	120.00	251.93	0.71	0.42	0.23	Open	0
345	P-287	J-490	J-712	128.04	6.00	120.00	63.80	0.72	0.07	0.53	Open	0
346	P-841	J-646	J-170	1,555.36	8.00	100.00	-114.40	0.73	0.83	0.54	Open	0
347	P-511	J-376	J-288	285.10	6.00	120.00	-64.38	0.73	0.15	0.53	Open	0
348	P-457	J-78	J-468	943.27	8.00	120.00	115.07	0.73	0.36	0.39	Open	0
349	P-225	J-176	J-630	433.29	6.00	120.00	-64.99	0.74	0.24	0.54	Open	0
350	P-157	J-120	J-432	1,941.03	12.00	120.00	-262.10	0.74	0.48	0.25	Open	0

2010 Peak Hour Steady State Analysis Pipe Report

ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count	
351	P-907	J-704	J-706	269.92	6.00	120.00	66.69	0.76	0.15	0.57	Open	0
352	P-115	J-470	J-88	3,684.51	8.00	120.00	118.80	0.76	1.51	0.41	Open	0
353	P-373	J-470	J-92	3,915.33	8.00	120.00	-119.35	0.76	1.62	0.41	Open	0
354	P-861	J-666	J-344	615.55	8.00	120.00	121.15	0.77	0.26	0.42	Open	0
355	P-159	J-128	J-124	728.80	12.00	120.00	278.69	0.79	0.20	0.28	Open	0
356	P-913	J-710	J-706	856.65	4.00	120.00	31.11	0.79	0.86	1.00	Open	0
357	P-127	J-100	J-92	3,032.35	8.00	110.00	-126.72	0.81	1.65	0.54	Open	0
358	P-411	J-440	J-442	802.27	8.00	120.00	127.29	0.81	0.37	0.47	Open	0
359	P-277	J-170	J-202	1,083.34	6.00	100.00	73.60	0.84	1.04	0.96	Open	0
360	P-505	J-264	J-370	557.37	8.00	120.00	-132.27	0.84	0.28	0.50	Open	0
361	P-513	J-288	J-370	533.54	8.00	120.00	132.27	0.84	0.27	0.50	Open	0
362	P-991	J-780	J-520	3,348.46	18.00	120.00	676.14	0.85	0.66	0.20	Open	0
363	P-827	J-640	J-636	188.62	6.00	120.00	-75.16	0.85	0.13	0.71	Open	0
364	P-829	J-636	J-634	103.56	6.00	120.00	-75.16	0.85	0.07	0.71	Open	0
365	P-163	J-134	J-780	496.26	18.00	120.00	686.12	0.87	0.10	0.20	Open	0
366	P-413	J-354	J-440	1,187.11	8.00	120.00	136.04	0.87	0.63	0.53	Open	0
367	P-727	J-538	J-542	1,629.98	8.00	120.00	137.95	0.88	0.88	0.54	Open	0
368	P-725	J-536	J-538	1,867.93	8.00	120.00	137.95	0.88	1.01	0.54	Open	0
369	P-279	J-204	J-118	5,953.37	8.00	120.00	-140.15	0.89	3.31	0.56	Open	0
370	P-285	J-210	J-204	4,495.72	8.00	120.00	-140.15	0.89	2.50	0.56	Open	0
371	P-831	J-634	J-630	1,888.66	6.00	120.00	-80.60	0.91	1.53	0.81	Open	0
372	P-905	J-704	J-698	1,996.10	8.00	120.00	-146.68	0.94	1.21	0.61	Open	0
373	P-169	J-134	J-138	2,062.45	18.00	120.00	-765.44	0.97	0.51	0.25	Open	0
374	P-723	J-536	J-540	1,461.43	8.00	110.00	152.26	0.97	1.11	0.76	Open	0
375	P-729	J-540	J-542	1,018.27	8.00	110.00	152.26	0.97	0.78	0.76	Open	0
376	P-141	J-116	J-112	1,369.73	8.00	120.00	-152.84	0.98	0.90	0.65	Open	0
377	P-131	J-104	J-584	1,681.02	4.00	120.00	-42.69	1.09	3.03	1.80	Open	0
378	P-899	J-698	J-694	1,106.50	10.00	120.00	-267.55	1.09	0.69	0.62	Open	0
379	P-895	J-694	J-388	1,244.78	10.00	120.00	-268.28	1.10	0.78	0.62	Open	0
380	P-471	J-172	J-666	4,465.74	8.00	100.00	171.77	1.10	5.08	1.14	Open	0
381	P-811	J-616	J-620	425.58	4.00	120.00	43.61	1.11	0.80	1.87	Open	0
382	P-527	J-388	J-116	663.25	10.00	120.00	-287.09	1.17	0.47	0.71	Open	0
383	P-155	J-524	J-288	87.18	8.00	120.00	194.52	1.24	0.09	1.02	Open	0
384	P-215	J-170	J-168	917.03	8.00	100.00	-197.86	1.26	1.35	1.48	Open	0
385	P-291	T-7002	J-94	3,083.27	24.00	120.00	1,955.27	1.39	1.07	0.35	Open	0

2010 Peak Hour Steady State Analysis Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
386	P-227	J-350	J-138	1,874.44	18.00	120.00	1,153.04	1.45	1.00	0.53	Open	0
387	P-477	J-350	J-352	275.47	18.00	120.00	-1,214.18	1.53	0.16	0.58	Open	0
388	P-195	J-520	J-128	1,699.50	12.00	120.00	557.38	1.58	1.69	1.00	Open	0
389	P-479	J-152	J-352	788.90	18.00	120.00	1,316.58	1.66	0.54	0.68	Open	0
390	P-731	J-542	J-92	424.34	8.00	110.00	260.56	1.66	0.87	2.06	Open	0
391	P-823	J-630	J-174	474.09	6.00	120.00	-146.84	1.67	1.17	2.46	Open	0
392	P-721	J-50	J-536	922.49	8.00	120.00	294.27	1.88	5.31	5.76	Open	0
393	P-79	J-64	J-50	4,667.32	8.00	120.00	295.20	1.88	10.32	2.21	Open	0
394	P-313	J-226	J-66	452.97	20.00	120.00	-1,940.46	1.98	0.38	0.83	Open	0
395	P-83	J-66	J-544	1,640.19	20.00	120.00	-1,940.46	1.98	1.37	0.83	Open	0
396	P-733	J-544	J-64	1,258.06	20.00	120.00	-1,941.31	1.98	1.05	0.83	Open	0
397	P-211	J-164	J-152	2,479.91	18.00	120.00	1,634.37	2.06	2.51	1.01	Open	0
398	P-855	J-660	J-164	1,425.12	18.00	120.00	1,663.74	2.10	1.49	1.05	Open	0
399	P-213	J-168	J-660	3,044.72	18.00	120.00	1,668.10	2.10	3.20	1.05	Open	0
400	P-77	J-38	J-212	726.19	24.00	120.00	-2,970.53	2.11	0.55	0.75	Open	0
401	P-295	J-214	T-7000	3,571.89	24.00	120.00	-2,970.69	2.11	2.70	0.75	Open	0
402	P-825	J-640	J-526	225.26	18.00	120.00	-1,794.92	2.26	0.27	1.21	Open	0
403	P-139	J-526	J-174	2,159.29	18.00	120.00	-1,807.82	2.28	2.64	1.22	Open	0
404	P-81	J-64	J-534	1,123.26	20.00	120.00	-2,242.07	2.29	1.22	1.09	Open	0
405	P-447	J-466	T-7002	2,880.68	18.00	120.00	1,828.93	2.31	3.59	1.25	Open	0
406	P-317	J-228	J-460	177.68	18.00	120.00	1,828.93	2.31	0.22	1.25	Open	0
407	P-817	J-626	J-228	1,589.15	18.00	120.00	1,829.72	2.31	1.98	1.25	Open	0
408	P-813	J-622	J-626	1,509.87	18.00	120.00	1,836.46	2.32	1.90	1.26	Open	0
409	P-763	J-580	J-70	181.66	18.00	120.00	1,837.46	2.32	0.23	1.26	Open	0
410	P-807	J-616	J-622	723.55	18.00	120.00	1,839.86	2.32	0.91	1.26	Open	0
411	P-99	J-68	J-580	2,571.55	18.00	120.00	1,842.07	2.32	3.25	1.26	Open	0
412	P-97	J-72	J-70	1,560.84	18.00	120.00	-1,843.23	2.32	1.98	1.27	Open	0
413	P-837	J-642	J-168	774.69	18.00	120.00	1,867.45	2.35	1.00	1.30	Open	0
414	P-221	J-640	J-642	539.62	18.00	120.00	1,870.08	2.36	0.70	1.30	Open	0
415	P-315	J-72	J-616	3,326.05	18.00	120.00	1,889.89	2.38	4.41	1.33	Open	0
416	P-107	J-68	J-590	5,006.43	18.00	120.00	-1,905.79	2.40	6.74	1.35	Open	0
417	P-781	J-590	J-86	852.42	18.00	120.00	-1,929.28	2.43	1.17	1.38	Open	0
418	P-105	J-226	J-86	5,076.32	18.00	120.00	1,940.24	2.45	7.07	1.39	Open	0
419	P-223	J-174	J-94	1,001.87	18.00	120.00	-1,955.27	2.47	1.41	1.41	Open	0
420	P-717	J-534	J-206	5,813.69	20.00	120.00	-2,745.21	2.80	9.21	1.58	Open	0

2010 Peak Hour Steady State Analysis Pipe Report

	ID	From Node	To Node	Length (ft)	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Flow Reversal Count
421	P-281	J-206	J-208	1,135.06	20.00	120.00	-2,758.60	2.82	1.81	1.60	Open	0
422	P-283	J-208	J-38	3,153.09	20.00	120.00	-2,770.45	2.83	5.08	1.61	Open	0
423	P-453	J-460	J-462	43.37	14.00	120.00	1,828.93	3.81	0.18	4.24	Open	0
424	P-455	J-464	J-466	44.45	10.00	120.00	1,828.93	7.47	0.97	21.86	Open	0

**2010 Peak Hour Steady State Analysis Tank Report**

	ID	Flow (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	% Full (%)	Volume (MG)	Level (ft)
1	<input type="checkbox"/> T-7000	-2,970.69	500.00	500.00	0.00	100.00	0.00	0.00
2	<input type="checkbox"/> T-7002	-126.35	185.00	217.00	13.87	79.95	2.93	32.00

**2010 Peak Hour Steady State Analysis Valve Report**

	ID	From Node	To Node	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Status	Setting
1	<input type="checkbox"/> 9007	J-214	J-212	12.00	2,970.69	8.43	262.98	Active	92.00
2	<input type="checkbox"/> V-9009	J-50	J-536	6.00	0.00	0.00	0.00	Closed	50.00

**2010 Peak Hour Steady State Analysis Pump Report**

	ID	From Node	To Node	Flow (gpm)	Head Gain (ft)	Status	Setting	Avail.NPSH (ft)	Cavitation Index
1	<input type="checkbox"/> PMP-5001	J-462	J-464	1,828.93	37.97	Open	1.00	187.73	0.00
2	<input type="checkbox"/> PMP-5005	J-788	J-790	0.00	0.00	Closed	0.00	0.00	0.00