

Waikoloa Highlands Water Distribution System

Waikoloa Highlands Subdivision Waikoloa, South Kohala, Hawaii

SEPTEMBER 2006

Prepared For:

Waikoloa Mauka, LLC
120 Aspen Oak Lane
Glendale, CA 91207



R. M. TOWILL CORPORATION
SINCE 1930

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Honolulu, Hawaii 96817-4941
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(RMT ref: 1-20580-0-E)

Exhibit "52"

WAIKOLOA HIGHLANDS WATER DISTRIBUTION SYSTEM

PROJECT NAME: WAIKOLOA HIGHLANDS SUBDIVISION

LOCATION: Waikoloa, South Kohala, Hawaii

TAX MAP KEY: (3rd Div.) 6-8-02:16/6-8-03:32

ZONING: RA - 1a

PROJECT AREA: 744.4 Acres

OWNER: Waikoloa Mauka, LLC
120 Aspen Oak Lane
Glendale, CA 91207

ENGINEERING CONSULTANT: R. M. Towill Corporation
420 Waiakamilo Road, Suite 411
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DATE: September 2006

REFERENCES:

1. Waikoloa Water Master Plans, Tom Nance Water Resources Engineering, February 1991.
2. County of Hawaii Water Supply Standards, 2002.

1. INTRODUCTION

The scope of this project includes: (1) the sizing of mains for the Waikoloa Highlands subdivision and (2) the use of existing water system components for the proposed Waikoloa Highlands Water Distribution System. The Waikoloa Highlands subdivision consists of 398 lots which are located from the 980-ft to 1310-ft elevation.

An existing tank with spillway elevation of 1210 ft will be used to service a portion of the lots. Two additional tanks however, are needed to service the remaining lots. In addition to these tanks, a booster pump is required for pumping water from the 1210' tank to fill the 1370' tank, while also distributing water during transmission.

The sizing of the mains and the booster pump is based on design criteria.

2. DESIGN CRITERIA

The design criteria used for the water system analysis is listed in Table 1 and is based on the Waikoloa Water Master Plans (Ref. 1). The design criteria follows the County of Hawaii Water Supply Standards (Ref.2) with the following deviations:

1. The maximum day demand factor of 1.25 is used instead of the County's 1.5 factor. To account for losses through the system, 12% was added to the maximum flow rates.
2. The peak demand factor of 3.0 is also used instead of the County's 5.0 factor.
3. The maximum velocity restriction of 7 feet per second is used instead of the County's 6 feet per second restriction for distribution mains without fire flow.
4. The maximum velocity restriction of 10 feet per second for distribution mains with fire flow is an additional County of Hawaii standard used for this design.

Table 1. Water System Facilities Sizing Criteria

Demand Factors

- Average Day Demand = Application of the water use rates of Table 2
- Maximum Day Demand = 1.25 * Average Day Demand
- Peak Demand = 3.0 * Average Day Demand

Fire Flow

- Single Family Residential: 500 gallons per minute (gpm) for 2 hours (lots > 10,000 sq. ft.)

Service Pressures

- Minimum of 40 psi (except during fire flow)
- Maximum of 125 psi
- 20 psi at critical fire hydrant for fire flow with coincident maximum daily demand

Pipeline Sizes

- Meet minimum pressure criterion at peak flowrate with a maximum of 7.0 feet per second (fps) velocity
- Meet minimum hydrant pressure criterion at fire plus maximum daily flowrate with no velocity restriction
- Compute pipeline pressure losses using Hazen-Williams formula with:
 - C = 100 for 6" or smaller pipelines
 - C = 110 for 8" and 12" pipelines

Well Pumping Capacity

- Provide the maximum daily demand, including unmetered supply, in a 24-hour pumping day with the largest well out of service.

Reservoir

- Provide the maximum daily demand, including unmetered supply but excluding controllable common area irrigation, with no credit for well inflow.
- Meet fire flow and coincident maximum daily demand for the duration of the fire flow with the largest reservoir 3/4 full at the start and the credit for well inflow with the largest pump out of service.

3. DESIGN ANALYSIS

The Waikoloa Highlands Water Distribution System services three zones within the site. The lower zone is served by the tank at the 1210-ft elevation. This zone serves 47 lots in addition to the existing Waikoloa Village, which has an average day demand of nearly 600,000 gallons per day (gpd) (Ref. 1). The proposed distribution system of this zone is comprised of 6-inch pipes. The 1210-ft elevation tank also serves the booster pump located at the 1060-ft elevation.

The booster pump distributes water to the upper lots, in addition to supplying the 1370-ft service reservoir. In the middle service zone, 324 lots are served by the proposed 12-inch water main supplying the proposed tank at the 1370-ft elevation. The proposed tank at the 1370-ft elevation complies with the tank proposed in the Waikoloa Water Master Plans (Ref. 1). The third tank at the 1590-ft elevation also complies with the Waikoloa Water Master Plans (Ref. 1). This tank will serve the remaining 27 lots by gravity flow.

Analysis and design of the water system for this report were done using a water distribution modeling software system, WaterCAD by Haestad Methods Incorporated. This program allows the designer to develop a hydraulic model of a pressurized pipe system and was used for this report to perform the following analyses:

1. Steady-state analysis of the water system, including pipes, pumps, tanks, and reservoirs
2. Extended period simulation to analyze the system under varying supply and demand conditions
3. Fire flow analysis

The proposed distribution system shown in Figure 1 displays the nodes or pressure junctions that connect multiple pipes or are the end of a pipe segments. Demands were assigned to the nodes based on the number of lots that are being served at that particular node. The distribution of demands is listed in Table 2.

4. RESULTS

The distribution system was initially designed with 6-inch pipelines. The proposed distribution system in Figure 1 consists of a main pipeline connecting the lower tank to the booster pump and the booster pump to the tank at the 1370-ft elevation. This main line has various branches which are either cul-de-sacs or loops that service the various subdivisions within Waikoloa Highlands. The main line was tested as a 6-inch pipe and then sized up if the distribution system did not meet the minimum design criteria. The distribution was found to work with the main line as a 12-inch pipe. All of the other branches remained 6-inch pipes through-out the design process. The 12-inch main line effectively distributes water to the middle and upper sections. See Figure 2 and Figure 3 for schematics of the water system and the placement of the pressure junctions listed in Table 2.

Table 2. Distribution of Demands for Waikoloa Highlands

Node	Single Family Units	Flowrates for Design (GPD)		
		Average Day	Maximum Day	Peak
Serviced by Tank with Spillway El. = 1210 ft.				
J-2		567,360		
J-4	4	5,000	5,000	12,000
J-5	6	3,000	7,500	18,000
J-6	5	4,000	6,250	15,000
J-7	5	4,000	6,250	15,000
J-9	2	2,000	2,500	6,000
J-10	2	2,000	2,500	6,000
J-11	2	2,000	2,500	6,000
J-12	4	3,000	5,000	12,000
J-13	3	4,000	3,750	9,000
J-14	7	7,000	8,750	21,000
J-15	7	7,000	8,750	21,000
Total =	47	43,000	58,750	141,000
Serviced by Tank with Spillway El. = 1370 ft.				
J-16	8	8,000	10,000	24,000
J-17	6	6,000	7,500	18,000
J-18	6	6,000	7,500	18,000
J-19	9	9,000	11,250	27,000
J-20	9	9,000	11,250	27,000
J-21	9	9,000	11,250	27,000
J-22	25	25,000	31,250	75,000
J-23	13	13,000	16,250	39,000
J-24	16	16,000	20,000	48,000
J-25	4	4,000	5,000	12,000
J-27	7	7,000	8,750	21,000
J-28	14	14,000	17,500	42,000
J-29	6	6,000	7,500	18,000
J-30	12	12,000	15,000	36,000
J-31	9	9,000	11,250	27,000
J-32	7	7,000	8,750	21,000
J-33	13	13,000	16,250	39,000
J-34	8	8,000	10,000	24,000
J-35	7	7,000	8,750	21,000
J-36	8	8,000	10,000	24,000
J-37	9	9,000	11,250	27,000
J-38	9	9,000	11,250	27,000
J-39	16	16,000	20,000	48,000
J-40	15	15,000	18,750	45,000
J-41	14	14,000	17,500	42,000
J-42	12	12,000	15,000	36,000
J-43	10	10,000	12,500	30,000
J-46	9	9,000	11,250	27,000
J-47	5	5,000	6,250	15,000
J-48	4	4,000	5,000	12,000
J-49	15	15,000	18,750	45,000
J-50	10	10,000	12,500	30,000
Total =	324	324,000	405,000	972,000
Serviced by Tank with Spillway El. = 1590 ft.				
J-44	8	8,000	10,000	24,000
J-45	8	8,000	10,000	24,000
J-51	5	5,000	6,250	15,000
J-52	6	6,000	7,500	18,000
Total =	27	27,000	33,750	81,000

Watercad Simulation Results:

Maximum daily flow:

Under the maximum daily demand condition, analysis shows that the results satisfy the requirements set by the Waikoloa Water Master Plans (Ref.1). Velocities were well below 7 feet per second. Pressure junctions were also below the maximum allowable pressure.

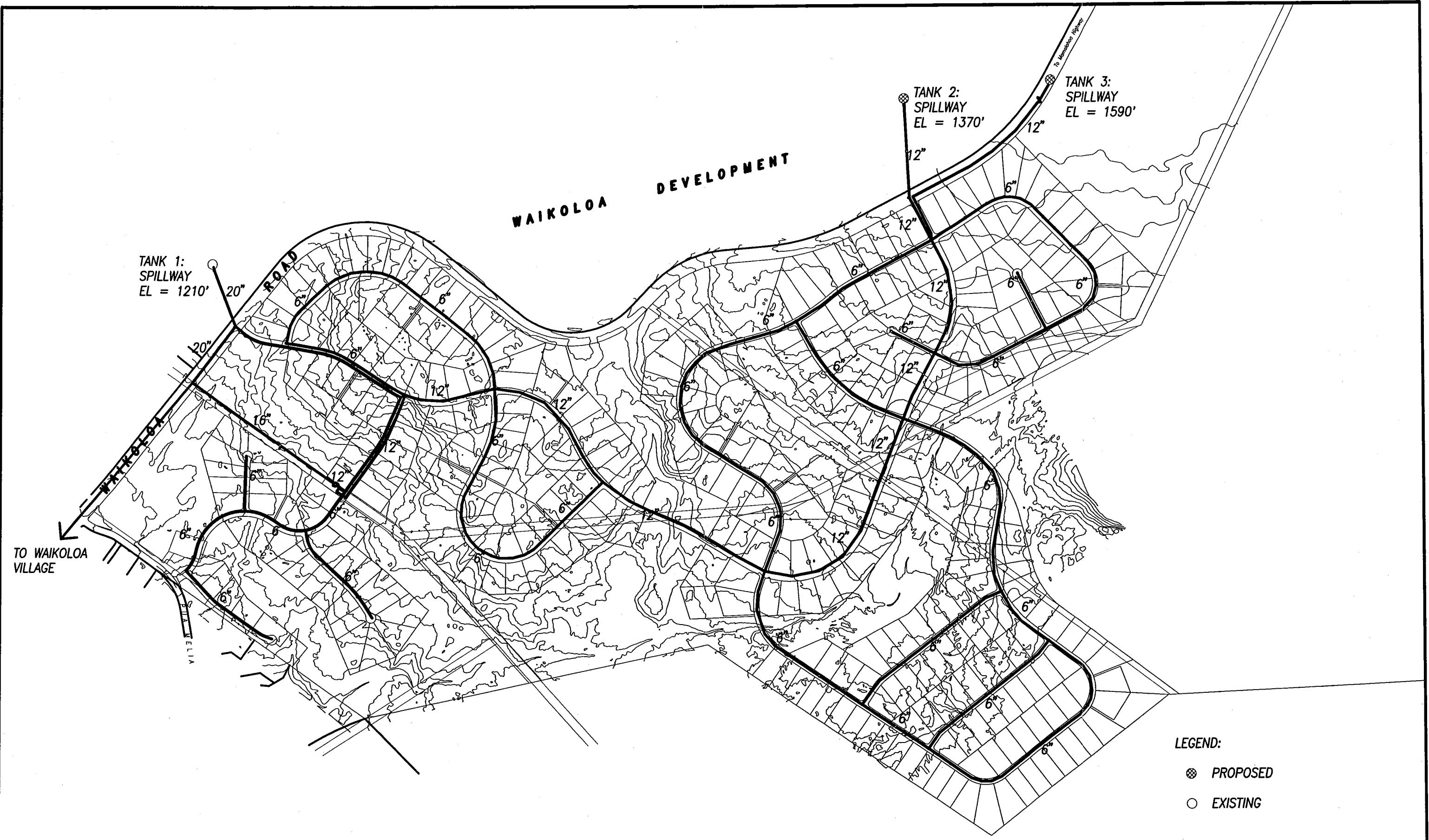
Peak hour flow:

Under this condition, all the pressure junctions are required to meet the minimum pressure of 40 psi. The analysis proved this to be the case except for a couple of junctions directly connected to the booster pump.

Fire Flow:

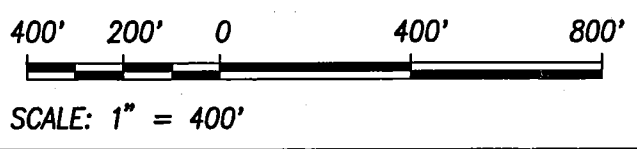
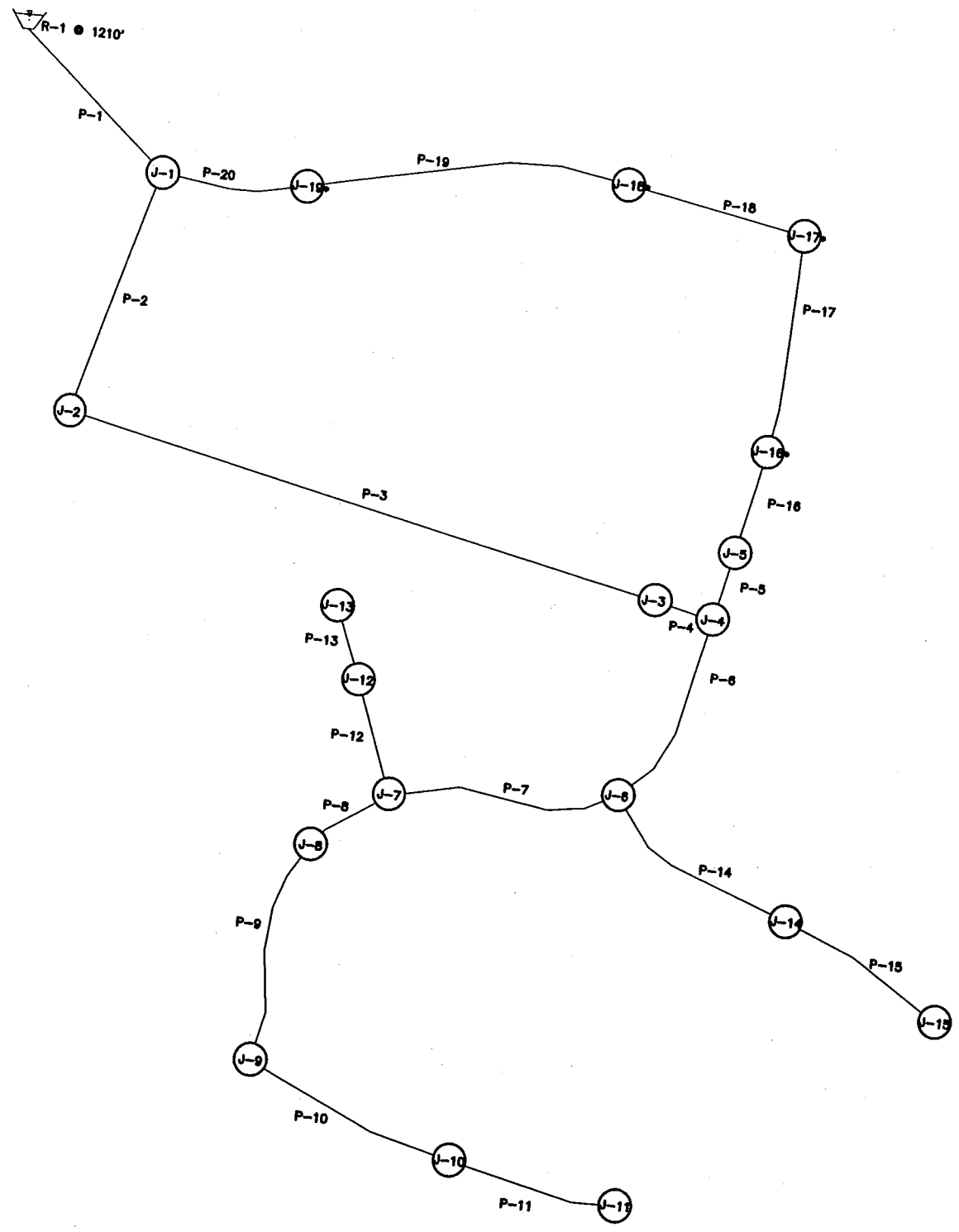
According to the Water Supply Standards (Ref. 2), under the fire flow condition, the pressure at each junction should be at least 20 psi. Fire flow conditions were simulated by applying the fire flow demand to several pressure junctions. The results proved that the water system is sufficient to handle fire flow.

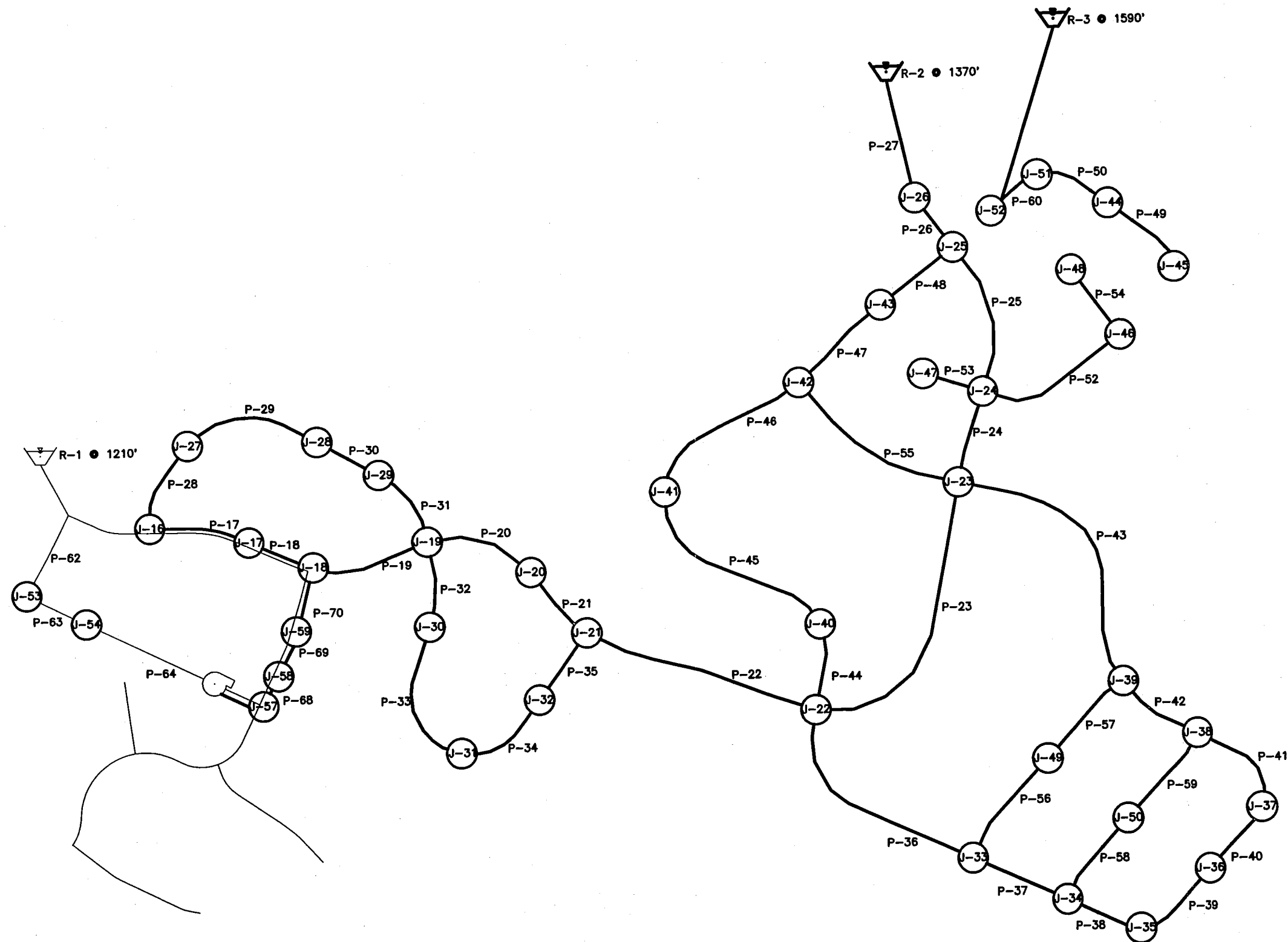
See the Appendix for calculations and results produced by WaterCAD.



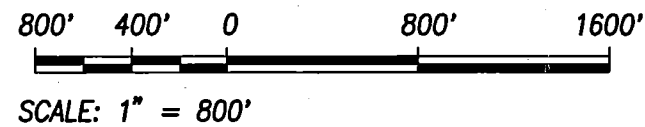
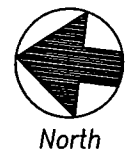
LEGEND:
 ● PROPOSED
 ○ EXISTING







Planning - Engineering - Environmental Services - Photogrammetry - Surveying - Construction Management
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Waikoloa Highlands Water Distribution System

Hydraulic Schematic of the Proposed Waikoloa Highlands System - 2

Figure
3

APPENDIX

WaterCAD Results:

Tank 1: Spillway El=1210'

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Junction Report

Label	Elevation (ft)	Type	Base Flow (gpd)	Pattern	Demand (Calculated) (gpd)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,076.00	Demand	0	Fixed	0	1,209.67	57.83
J-2	1,032.00	Demand	567,360	Fixed	567,360	1,209.63	76.85
J-3	1,059.00	Demand	0	Fixed	0	1,209.63	65.17
J-4	1,060.00	Demand	5,000	Fixed	5,000	1,209.61	64.73
J-5	1,073.00	Demand	3,000	Fixed	3,000	1,209.61	59.10
J-6	1,047.00	Demand	4,000	Fixed	4,000	1,209.55	70.33
J-7	1,022.00	Demand	4,000	Fixed	4,000	1,209.53	81.13
J-8	1,020.00	Demand	0	Fixed	0	1,209.53	82.00
J-9	998.00	Demand	2,000	Fixed	2,000	1,209.52	91.52
J-10	1,004.00	Demand	2,000	Fixed	2,000	1,209.52	88.92
J-11	1,011.00	Demand	2,000	Fixed	2,000	1,209.52	85.89
J-12	1,022.00	Demand	3,000	Fixed	3,000	1,209.52	81.13
J-13	1,038.00	Demand	4,000	Fixed	4,000	1,209.52	74.21
J-14	1,044.00	Demand	7,000	Fixed	7,000	1,209.53	71.62
J-15	1,045.00	Demand	7,000	Fixed	7,000	1,209.53	71.18
J-16*	1,060.00	Demand	2,000	Fixed	2,000	1,209.61	64.73
J-17*	1,065.00	Demand	6,000	Fixed	6,000	1,209.62	62.57
J-18*	1,075.00	Demand	6,000	Fixed	6,000	1,209.63	58.25
J-19*	1,080.00	Demand	8,000	Fixed	8,000	1,209.67	56.10

Title:

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Haestad Methods Solution Center

Watertown, CT 06795 USA

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Project Engineer:

WaterCAD v7.0 [07.00.061.00]

Page 1 of 1

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Pipe Report

Label	From Node	To Node	Length (ft)	Diameter (in)	Hazen-Williams C	Control Status	Discharge (gpd)	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-1	R-1	J-1	4,400.00	20.0	100.0	Open	632,360	0.33	0.45
P-2	J-1	J-2	600.00	20.0	100.0	Open	602,927	0.04	0.43
P-3	J-2	J-3	1,556.00	16.0	100.0	Open	35,567	0.00	0.04
P-4	J-3	J-4	158.00	6.0	100.0	Open	35,567	0.02	0.28
P-5	J-4	J-5	183.00	6.0	100.0	Open	-4,433	0.00	0.03
P-6	J-4	J-6	518.00	6.0	100.0	Open	35,000	0.06	0.28
P-7	J-6	J-7	592.00	6.0	100.0	Open	17,000	0.02	0.13
P-8	J-7	J-8	239.00	6.0	100.0	Open	6,000	0.00	0.05
P-9	J-8	J-9	576.00	6.0	100.0	Open	6,000	0.00	0.05
P-10	J-9	J-10	561.00	6.0	100.0	Open	4,000	0.00	0.03
P-11	J-10	J-11	440.00	6.0	100.0	Open	2,000	0.00	0.02
P-12	J-7	J-12	305.00	6.0	100.0	Open	7,000	0.00	0.06
P-13	J-12	J-13	197.00	6.0	100.0	Open	4,000	0.00	0.03
P-14	J-6	J-14	547.00	6.0	100.0	Open	14,000	0.01	0.11
P-15	J-14	J-15	463.00	6.0	100.0	Open	7,000	0.00	0.06
P-16	J-5	J-16*	263.00	6.0	100.0	Open	-7,433	0.00	0.06
P-17	J-16*	J-17*	551.00	6.0	100.0	Open	-9,433	0.01	0.07
P-18	J-17*	J-18*	463.00	6.0	100.0	Open	-15,433	0.01	0.12
P-19	J-18*	J-19*	817.00	6.0	100.0	Open	-21,433	0.04	0.17
P-20	J-19*	J-1	376.00	12.0	100.0	Open	-29,433	0.00	0.06

Title:

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Project Engineer:

WaterCAD v7.0 [07.00.061.00]

Page 1 of 1

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Reservoir Report

Label	Elevation (ft)	Inflow (gpd)	Calculated Hydraulic Grade (ft)
R-1	1,210.00	-632,360	1,210.00

Title:

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Bentley Systems, Inc.

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Project Engineer:

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Page 1 of 1

Scenario: Base
Extended Period Analysis: 18.00 hr / 24.00
Junction Report

Label	Elevation (ft)	Type	Base Flow (gpd)	Pattern	Demand (Calculated) (gpd)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,076.00	Demand	0	Max day	0	1,208.36	57.26
J-2	1,032.00	Demand	567,360	Max day	709,200	1,208.19	76.23
J-3	1,059.00	Demand	0	Max day	0	1,207.91	64.42
J-4	1,060.00	Demand	5,000	Max day	6,250	1,204.46	62.50
J-5	1,073.00	Demand	723,000	Composite	723,000	1,201.10	55.42
J-6	1,047.00	Demand	4,000	Max day	5,000	1,204.37	68.08
J-7	1,022.00	Demand	4,000	Max day	5,000	1,204.34	78.89
J-8	1,020.00	Demand	0	Max day	0	1,204.34	79.75
J-9	998.00	Demand	2,000	Max day	2,500	1,204.33	89.27
J-10	1,004.00	Demand	2,000	Max day	2,500	1,204.33	86.67
J-11	1,011.00	Demand	2,000	Max day	2,500	1,204.33	83.64
J-12	1,022.00	Demand	3,000	Max day	3,750	1,204.33	78.89
J-13	1,038.00	Demand	4,000	Max day	5,000	1,204.33	71.96
J-14	1,044.00	Demand	7,000	Max day	8,750	1,204.35	69.37
J-15	1,045.00	Demand	7,000	Max day	8,750	1,204.34	68.94
J-16*	1,060.00	Demand	2,000	Max day	2,500	1,201.93	61.40
J-17*	1,065.00	Demand	6,000	Max day	7,500	1,203.70	60.01
J-18*	1,075.00	Demand	6,000	Max day	7,500	1,205.30	56.37
J-19*	1,080.00	Demand	8,000	Max day	10,000	1,208.31	55.51

Title:

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Project Engineer:

WaterCAD v7.0 [07.00.061.00]

Page 1 of 1

Scenario: Base
Extended Period Analysis: 18.00 hr / 24.00
Pipe Report

Label	From Node	To Node	Length (ft)	Diameter (in)	Hazen-Williams C	Control Status	Discharge (gpd)	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-1	R-1	J-1	4,400.00	20.0	100.0	Open	1,509,700	1.64	1.07
P-2	J-1	J-2	600.00	20.0	100.0	Open	1,280,915	0.17	0.91
P-3	J-2	J-3	1,556.00	16.0	100.0	Open	571,715	0.29	0.63
P-4	J-3	J-4	158.00	6.0	100.0	Open	571,715	3.44	4.51
P-5	J-4	J-5	183.00	6.0	100.0	Open	521,715	3.37	4.11
P-6	J-4	J-6	518.00	6.0	100.0	Open	43,750	0.10	0.34
P-7	J-6	J-7	592.00	6.0	100.0	Open	21,250	0.03	0.17
P-8	J-7	J-8	239.00	6.0	100.0	Open	7,500	0.00	0.06
P-9	J-8	J-9	576.00	6.0	100.0	Open	7,500	0.00	0.06
P-10	J-9	J-10	561.00	6.0	100.0	Open	5,000	0.00	0.04
P-11	J-10	J-11	440.00	6.0	100.0	Open	2,500	0.00	0.02
P-12	J-7	J-12	305.00	6.0	100.0	Open	8,750	0.00	0.07
P-13	J-12	J-13	197.00	6.0	100.0	Open	5,000	0.00	0.04
P-14	J-6	J-14	547.00	6.0	100.0	Open	17,500	0.02	0.14
P-15	J-14	J-15	463.00	6.0	100.0	Open	8,750	0.00	0.07
P-16	J-5	J-16*	263.00	6.0	100.0	Open	-201,285	0.83	1.59
P-17	J-16*	J-17*	551.00	6.0	100.0	Open	-203,785	1.78	1.61
P-18	J-17*	J-18*	463.00	6.0	100.0	Open	-211,285	1.60	1.66
P-19	J-18*	J-19*	817.00	6.0	100.0	Open	-218,785	3.01	1.72
P-20	J-19*	J-1	376.00	12.0	100.0	Open	-228,785	0.05	0.45

Title:

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Project Engineer:

WaterCAD v7.0 [07.00.061.00]

Page 1 of 1

Scenario: Base
Extended Period Analysis: 18.00 hr / 24.00
Reservoir Report

Label	Elevation (ft)	Inflow (gpd)	Calculated Hydraulic Grade (ft)
R-1	1,210.00	-1,509,700	1,210.00

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Junction Report

Label	Elevation (ft)	Type	Base Flow (gpd)	Pattern	Demand (Calculated) (gpd)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,076.00	Demand	0	Peak	0	1,207.49	56.89
J-2	1,032.00	Demand	567,360	Peak	1,702,080	1,207.18	75.79
J-3	1,059.00	Demand	0	Peak	0	1,207.17	64.10
J-4	1,060.00	Demand	5,000	Peak	15,000	1,207.01	63.60
J-5	1,073.00	Demand	3,000	Peak	9,000	1,207.02	57.98
J-6	1,047.00	Demand	4,000	Peak	12,000	1,206.52	69.02
J-7	1,022.00	Demand	4,000	Peak	12,000	1,206.38	79.77
J-8	1,020.00	Demand	0	Peak	0	1,206.37	80.63
J-9	998.00	Demand	2,000	Peak	6,000	1,206.35	90.14
J-10	1,004.00	Demand	2,000	Peak	6,000	1,206.34	87.54
J-11	1,011.00	Demand	2,000	Peak	6,000	1,206.33	84.51
J-12	1,022.00	Demand	3,000	Peak	9,000	1,206.36	79.76
J-13	1,038.00	Demand	4,000	Peak	12,000	1,206.36	72.84
J-14	1,044.00	Demand	7,000	Peak	21,000	1,206.43	70.27
J-15	1,045.00	Demand	7,000	Peak	21,000	1,206.41	69.83
J-16*	1,060.00	Demand	2,000	Peak	6,000	1,207.03	63.61
J-17*	1,065.00	Demand	6,000	Peak	18,000	1,207.08	61.47
J-18*	1,075.00	Demand	6,000	Peak	18,000	1,207.17	57.18
J-19*	1,080.00	Demand	8,000	Peak	24,000	1,207.48	55.16

Title:

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Haestad Methods Solution Center Watertown, CT 06795 USA

+1-203-755-1666

Project Engineer:

WaterCAD v7.0 [07.00.061.00]

Page 1 of 1

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Pipe Report

Label	From Node	To Node	Length (ft)	Diameter (in)	Hazen-Williams C	Control Status	Discharge (gpd)	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-1	R-1	J-1	4,400.00	20.0	100.0	Open	1,897,080	2.51	1.35
P-2	J-1	J-2	600.00	20.0	100.0	Open	1,808,781	0.31	1.28
P-3	J-2	J-3	1,556.00	16.0	100.0	Open	106,701	0.01	0.12
P-4	J-3	J-4	158.00	6.0	100.0	Open	106,701	0.15	0.84
P-5	J-4	J-5	183.00	6.0	100.0	Open	-13,299	0.00	0.10
P-6	J-4	J-6	518.00	6.0	100.0	Open	105,000	0.49	0.83
P-7	J-6	J-7	592.00	6.0	100.0	Open	51,000	0.15	0.40
P-8	J-7	J-8	239.00	6.0	100.0	Open	18,000	0.01	0.14
P-9	J-8	J-9	576.00	6.0	100.0	Open	18,000	0.02	0.14
P-10	J-9	J-10	561.00	6.0	100.0	Open	12,000	0.01	0.09
P-11	J-10	J-11	440.00	6.0	100.0	Open	6,000	0.00	0.05
P-12	J-7	J-12	305.00	6.0	100.0	Open	21,000	0.01	0.17
P-13	J-12	J-13	197.00	6.0	100.0	Open	12,000	0.00	0.09
P-14	J-6	J-14	547.00	6.0	100.0	Open	42,000	0.09	0.33
P-15	J-14	J-15	463.00	6.0	100.0	Open	21,000	0.02	0.17
P-16	J-5	J-16*	263.00	6.0	100.0	Open	-22,299	0.01	0.18
P-17	J-16*	J-17*	551.00	6.0	100.0	Open	-28,299	0.05	0.22
P-18	J-17*	J-18*	463.00	6.0	100.0	Open	-46,299	0.10	0.36
P-19	J-18*	J-19*	817.00	6.0	100.0	Open	-64,299	0.31	0.51
P-20	J-19*	J-1	376.00	12.0	100.0	Open	-88,299	0.01	0.17

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Watertown, CT 06795 USA

+1-203-755-1666

Project Engineer:

WaterCAD v7.0 [07.00.061.00]

Page 1 of 1

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Reservoir Report

Label	Elevation (ft)	Inflow (gpd)	Calculated Hydraulic Grade (ft)
R-1	1,210.00	-1,897,080	1,210.00

WaterCAD Results:

Tank 2: Spillway El=1370'

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Junction Report

Label	Elevation (ft)	Type	Base Flow (gpd)	Pattern	Demand (Calculated) (gpd)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-16	1,090.00	Demand	8,000	Fixed	8,000	1,386.73	128.38
J-17	1,140.00	Demand	6,000	Fixed	6,000	1,387.23	106.96
J-18	1,138.00	Demand	6,000	Fixed	6,000	1,387.60	107.99
J-19	1,168.00	Demand	9,000	Fixed	9,000	1,385.46	94.08
J-20	1,160.00	Demand	9,000	Fixed	9,000	1,383.74	96.80
J-21	1,138.00	Demand	7,000	Fixed	7,000	1,382.51	105.79
J-22	1,112.00	Demand	20,000	Fixed	20,000	1,378.35	115.24
J-23	1,185.00	Demand	25,000	Fixed	25,000	1,375.27	82.32
J-24	1,208.00	Demand	9,000	Fixed	9,000	1,374.38	71.98
J-25	1,255.00	Demand	9,000	Fixed	9,000	1,373.01	51.06
J-26	1,270.00	Demand	0	Fixed	0	1,372.30	44.26
J-27	1,110.00	Demand	7,000	Fixed	7,000	1,386.32	119.55
J-28	1,183.00	Demand	13,000	Fixed	13,000	1,385.81	87.75
J-29	1,185.00	Demand	7,000	Fixed	7,000	1,385.63	86.80
J-30	1,150.00	Demand	12,000	Fixed	12,000	1,384.69	101.54
J-31	1,121.00	Demand	10,000	Fixed	10,000	1,383.57	113.60
J-32	1,127.00	Demand	8,000	Fixed	8,000	1,382.94	110.73
J-33	1,125.00	Demand	14,000	Fixed	14,000	1,376.01	108.60
J-34	1,126.00	Demand	8,000	Fixed	8,000	1,375.75	108.06
J-35	1,145.00	Demand	7,000	Fixed	7,000	1,375.71	99.82
J-36	1,170.00	Demand	7,000	Fixed	7,000	1,375.68	88.99
J-37	1,180.00	Demand	7,000	Fixed	7,000	1,375.67	84.66
J-38	1,165.00	Demand	9,000	Fixed	9,000	1,375.67	91.15
J-39	1,168.00	Demand	13,000	Fixed	13,000	1,375.65	89.84
J-40	1,131.00	Demand	10,000	Fixed	10,000	1,377.58	106.68
J-41	1,190.00	Demand	19,000	Fixed	19,000	1,375.92	80.44
J-42	1,232.00	Demand	11,000	Fixed	11,000	1,374.96	61.85
J-43	1,250.00	Demand	8,000	Fixed	8,000	1,373.82	53.57
J-45	1,260.00	Demand	6,000	Fixed	6,000	1,374.35	49.47
J-46	1,225.00	Demand	7,000	Fixed	7,000	1,374.35	64.62
J-47	1,227.00	Demand	7,000	Fixed	7,000	1,374.38	63.76
J-48	1,255.00	Demand	2,000	Fixed	2,000	1,374.35	51.64
J-49	1,145.00	Demand	11,000	Fixed	11,000	1,375.78	99.85
J-50	1,148.00	Demand	10,000	Fixed	10,000	1,375.70	98.51
J-44	1,032.00	Demand	0	Fixed	0	1,209.84	76.94
J-51	1,060.00	Demand	0	Fixed	0	1,208.65	64.31
J-52	1,060.00	Demand	0	Fixed	0	1,390.81	143.13
J-53	1,061.00	Demand	0	Fixed	0	1,390.54	142.58
J-54	1,070.00	Demand	0	Fixed	0	1,389.61	138.28

Title:

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Project Engineer:

WaterCAD v7.0 [07.00.061.00]

Page 1 of 1

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Pipe Report

Label	From Node	To Node	Length (ft)	Diameter (in)	Hazen-Williams C	Control Status	Discharge (gpd)	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-17	J-16	J-17	691.00	6.0	100.0	Open	-90,659	0.50	0.71
P-18	J-17	J-18	455.00	6.0	100.0	Open	-96,659	0.37	0.76
P-19	J-18	J-19	860.00	12.0	100.0	Open	1,095,846	2.14	2.16
P-20	J-19	J-20	794.00	12.0	100.0	Open	1,019,008	1.72	2.01
P-21	J-20	J-21	574.00	12.0	100.0	Open	1,010,008	1.23	1.99
P-22	J-21	J-22	1,671.00	12.0	100.0	Open	1,096,504	4.16	2.16
P-23	J-22	J-23	2,109.00	12.0	100.0	Open	823,295	3.09	1.62
P-24	J-23	J-24	651.00	12.0	100.0	Open	792,880	0.89	1.56
P-25	J-24	J-25	1,083.00	12.0	100.0	Open	761,880	1.37	1.50
P-26	J-25	J-26	426.00	12.0	100.0	Open	877,504	0.70	1.73
P-27	J-26	R-1	1,400.00	12.0	100.0	Open	877,504	2.30	1.73
P-28	J-16	J-27	679.00	6.0	100.0	Open	82,659	0.41	0.65
P-29	J-27	J-28	992.00	6.0	100.0	Open	75,659	0.51	0.60
P-30	J-28	J-29	482.00	6.0	100.0	Open	62,659	0.17	0.49
P-31	J-29	J-19	595.00	6.0	100.0	Open	55,659	0.17	0.44
P-32	J-19	J-30	601.00	6.0	100.0	Open	123,496	0.77	0.97
P-33	J-30	J-31	1,068.00	6.0	100.0	Open	111,496	1.13	0.88
P-34	J-31	J-32	705.00	6.0	100.0	Open	101,496	0.63	0.80
P-35	J-32	J-21	566.00	6.0	100.0	Open	93,496	0.43	0.74
P-36	J-22	J-33	1,672.00	6.0	100.0	Open	129,854	2.34	1.02
P-37	J-33	J-34	709.00	6.0	100.0	Open	62,851	0.26	0.50
P-38	J-34	J-35	552.00	6.0	100.0	Open	26,926	0.04	0.21
P-39	J-35	J-36	639.00	6.0	100.0	Open	19,926	0.03	0.16
P-40	J-36	J-37	546.00	6.0	100.0	Open	12,926	0.01	0.10
P-41	J-37	J-38	758.00	6.0	100.0	Open	5,926	0.00	0.05
P-42	J-38	J-39	630.00	6.0	100.0	Open	14,851	0.02	0.12
P-43	J-39	J-23	2,061.00	6.0	100.0	Open	43,854	0.39	0.35
P-44	J-22	J-40	606.00	6.0	100.0	Open	123,355	0.77	0.97
P-45	J-40	J-41	1,523.00	6.0	100.0	Open	113,355	1.66	0.89
P-46	J-41	J-42	1,249.00	6.0	100.0	Open	94,355	0.97	0.74
P-47	J-42	J-43	777.00	6.0	100.0	Open	132,625	1.13	1.05
P-48	J-43	J-25	631.00	6.0	100.0	Open	124,625	0.82	0.98
P-51	J-45	J-46	623.00	6.0	100.0	Open	-6,000	0.00	0.05
P-53	J-24	J-47	429.00	6.0	100.0	Open	7,000	0.00	0.06
P-54	J-46	J-48	563.00	6.0	100.0	Open	2,000	0.00	0.02
P-55	J-23	J-42	1,338.00	6.0	100.0	Open	49,270	0.31	0.39
P-52	J-46	J-24	1,107.00	6.0	100.0	Open	-15,000	0.03	0.12
P-56	J-33	J-49	859.00	6.0	100.0	Open	53,003	0.23	0.42
P-57	J-49	J-39	750.00	6.0	100.0	Open	42,003	0.13	0.33
P-58	J-34	J-50	700.00	6.0	100.0	Open	27,925	0.06	0.22
P-59	J-50	J-38	753.00	6.0	100.0	Open	17,925	0.03	0.14
P-49	R-2	J-44	654.00	20.0	100.0	Open	1,198,504	0.16	0.85
P-50	J-44	J-51	1,653.00	16.0	100.0	Open	1,198,504	1.19	1.33
P-60	J-51	PMP-1	21.00	16.0	100.0	Open	1,198,504	0.02	1.33
P-61	PMP-1	J-52	21.00	12.0	100.0	Open	1,198,504	0.06	2.36
P-62	J-52	J-53	92.00	12.0	100.0	Open	1,198,504	0.27	2.36
P-63	J-53	J-54	317.00	12.0	100.0	Open	1,198,504	0.93	2.36
P-64	J-54	J-18	688.00	12.0	100.0	Open	1,198,504	2.02	2.36

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WaterCAD v7.0 [07.00.061.00]

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Page 1 of 1

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Pump Report

Label	Elevation (ft)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpd)	Pump Head (ft)	Calculated Water Power (Hp)
PMP-1	1,060.00	On	1,208.63	1,390.88	1,198,504	182.24	38.29

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Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Reservoir Report

Label	Elevation (ft)	Inflow (gpd)	Calculated Hydraulic Grade (ft)
R-1	1,370.00	877,504	1,370.00
R-2	1,210.00	-1,198,504	1,210.00

Title:

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Page 1 of 1

Scenario: Base
Extended Period Analysis: 2.00 hr / 24.00
Junction Report

Label	Elevation (ft)	Type	Base Flow (gpd)	Pattern	Demand (Calculated) (gpd)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-16	1,090.00	Demand	8,000	Max day	10,000	1,382.00	126.33
J-17	1,140.00	Demand	6,000	Max day	7,500	1,382.53	104.93
J-18	1,138.00	Demand	6,000	Max day	7,500	1,382.93	105.97
J-19	1,168.00	Demand	9,000	Max day	11,250	1,380.78	92.06
J-20	1,160.00	Demand	9,000	Max day	11,250	1,379.08	94.79
J-21	1,138.00	Demand	7,000	Max day	8,750	1,377.88	103.79
J-22	1,112.00	Demand	20,000	Max day	25,000	1,373.84	113.29
J-23	1,185.00	Demand	25,000	Max day	31,250	1,370.90	80.43
J-24	1,208.00	Demand	9,000	Max day	11,250	1,370.04	70.11
J-25	1,255.00	Demand	9,000	Max day	11,250	1,370.04	49.77
J-26	1,270.00	Demand	0	Max day	0	1,370.03	43.28
J-27	1,110.00	Demand	7,000	Max day	8,750	1,381.58	117.50
J-28	1,183.00	Demand	13,000	Max day	16,250	1,381.08	85.70
J-29	1,185.00	Demand	7,000	Max day	8,750	1,380.92	84.77
J-30	1,150.00	Demand	12,000	Max day	15,000	1,379.99	99.50
J-31	1,121.00	Demand	10,000	Max day	12,500	1,378.86	111.57
J-32	1,127.00	Demand	8,000	Max day	10,000	1,378.27	108.71
J-33	1,125.00	Demand	14,000	Max day	17,500	1,371.38	106.60
J-34	1,126.00	Demand	8,000	Max day	10,000	1,371.12	106.05
J-35	1,145.00	Demand	7,000	Max day	8,750	1,371.08	97.81
J-36	1,170.00	Demand	7,000	Max day	8,750	1,371.06	86.99
J-37	1,180.00	Demand	7,000	Max day	8,750	1,371.05	82.66
J-38	1,165.00	Demand	9,000	Max day	11,250	1,371.05	89.15
J-39	1,168.00	Demand	13,000	Max day	16,250	1,371.05	87.85
J-40	1,131.00	Demand	10,000	Max day	12,500	1,373.12	104.75
J-41	1,190.00	Demand	19,000	Max day	23,750	1,371.63	78.58
J-42	1,232.00	Demand	11,000	Max day	13,750	1,370.87	60.08
J-43	1,250.00	Demand	8,000	Max day	10,000	1,370.36	52.08
J-45	1,260.00	Demand	726,000	Composite	727,500	1,310.06	21.66
J-46	1,225.00	Demand	7,000	Max day	8,750	1,331.27	45.98
J-47	1,227.00	Demand	7,000	Max day	8,750	1,370.04	61.89
J-48	1,255.00	Demand	2,000	Max day	2,500	1,331.27	33.00
J-49	1,145.00	Demand	11,000	Max day	13,750	1,371.16	97.85
J-50	1,148.00	Demand	10,000	Max day	12,500	1,371.07	96.51
J-44	1,032.00	Demand	0	Max day	0	1,209.84	76.94
J-51	1,060.00	Demand	0	Max day	0	1,208.63	64.30
J-52	1,060.00	Demand	0	Max day	0	1,386.19	141.13
J-53	1,061.00	Demand	0	Max day	0	1,385.92	140.58
J-54	1,070.00	Demand	0	Max day	0	1,384.97	136.27

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Project Engineer:

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Page 1 of 1

Scenario: Base
Extended Period Analysis: 2.00 hr / 24.00
Pipe Report

Label	From Node	To Node	Length (ft)	Diameter (in)	Hazen-Williams C	Control Status	Discharge (gpd)	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-17	J-16	J-17	691.00	6.0	100.0	Open	-93,617	0.53	0.74
P-18	J-17	J-18	455.00	6.0	100.0	Open	-101,117	0.40	0.80
P-19	J-18	J-19	860.00	12.0	100.0	Open	1,098,434	2.15	2.16
P-20	J-19	J-20	794.00	12.0	100.0	Open	1,010,906	1.70	1.99
P-21	J-20	J-21	574.00	12.0	100.0	Open	999,656	1.20	1.97
P-22	J-21	J-22	1,671.00	12.0	100.0	Open	1,079,551	4.04	2.13
P-23	J-22	J-23	2,109.00	12.0	100.0	Open	801,846	2.94	1.58
P-24	J-23	J-24	651.00	12.0	100.0	Open	780,253	0.86	1.54
P-25	J-24	J-25	1,083.00	12.0	100.0	Open	21,503	0.00	0.04
P-26	J-25	J-26	426.00	12.0	100.0	Open	85,801	0.01	0.17
P-27	J-26	R-1	1,400.00	12.0	100.0	Open	85,801	0.03	0.17
P-28	J-16	J-27	679.00	6.0	100.0	Open	83,617	0.42	0.66
P-29	J-27	J-28	992.00	6.0	100.0	Open	74,867	0.50	0.59
P-30	J-28	J-29	482.00	6.0	100.0	Open	58,617	0.15	0.46
P-31	J-29	J-19	595.00	6.0	100.0	Open	49,867	0.14	0.39
P-32	J-19	J-30	601.00	6.0	100.0	Open	126,146	0.80	0.99
P-33	J-30	J-31	1,068.00	6.0	100.0	Open	111,146	1.12	0.88
P-34	J-31	J-32	705.00	6.0	100.0	Open	98,646	0.59	0.78
P-35	J-32	J-21	566.00	6.0	100.0	Open	88,646	0.39	0.70
P-36	J-22	J-33	1,672.00	6.0	100.0	Open	133,344	2.46	1.05
P-37	J-33	J-34	709.00	6.0	100.0	Open	63,474	0.26	0.50
P-38	J-34	J-35	552.00	6.0	100.0	Open	26,731	0.04	0.21
P-39	J-35	J-36	639.00	6.0	100.0	Open	17,981	0.02	0.14
P-40	J-36	J-37	546.00	6.0	100.0	Open	9,231	0.01	0.07
P-41	J-37	J-38	758.00	6.0	100.0	Open	481	0.00	0.00
P-42	J-38	J-39	630.00	6.0	100.0	Open	3,474	0.00	0.03
P-43	J-39	J-23	2,061.00	6.0	100.0	Open	25,844	0.15	0.20
P-44	J-22	J-40	606.00	6.0	100.0	Open	119,362	0.73	0.94
P-45	J-40	J-41	1,523.00	6.0	100.0	Open	106,862	1.49	0.84
P-46	J-41	J-42	1,249.00	6.0	100.0	Open	83,112	0.77	0.65
P-47	J-42	J-43	777.00	6.0	100.0	Open	85,548	0.50	0.67
P-48	J-43	J-25	631.00	6.0	100.0	Open	75,548	0.32	0.60
P-51	J-45	J-46	623.00	6.0	100.0	Open	-727,500	21.21	5.73
P-53	J-24	J-47	429.00	6.0	100.0	Open	8,750	0.00	0.07
P-54	J-46	J-48	563.00	6.0	100.0	Open	2,500	0.00	0.02
P-55	J-23	J-42	1,338.00	6.0	100.0	Open	16,186	0.04	0.13
P-52	J-46	J-24	1,107.00	6.0	100.0	Open	-738,750	38.78	5.82
P-56	J-33	J-49	859.00	6.0	100.0	Open	52,369	0.22	0.41
P-57	J-49	J-39	750.00	6.0	100.0	Open	38,619	0.11	0.30
P-58	J-34	J-50	700.00	6.0	100.0	Open	26,743	0.05	0.21
P-59	J-50	J-38	753.00	6.0	100.0	Open	14,243	0.02	0.11
P-49	R-2	J-44	654.00	20.0	100.0	Open	1,207,051	0.16	0.86
P-50	J-44	J-51	1,653.00	16.0	100.0	Open	1,207,051	1.21	1.34
P-60	J-51	PMP-1	21.00	16.0	100.0	Open	1,207,051	0.02	1.34
P-61	PMP-1	J-52	21.00	12.0	100.0	Open	1,207,051	0.06	2.38
P-62	J-52	J-53	92.00	12.0	100.0	Open	1,207,051	0.27	2.38
P-63	J-53	J-54	317.00	12.0	100.0	Open	1,207,051	0.94	2.38
P-64	J-54	J-18	688.00	12.0	100.0	Open	1,207,051	2.04	2.38

Title:

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Page 1 of 1

Scenario: Base
Extended Period Analysis: 2.00 hr / 24.00
Pump Report

Label	Elevation (ft)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpd)	Pump Head (ft)	Calculated Water Power (Hp)
PMP-1	1,060.00	On	1,208.61	1,386.25	1,207,051	177.64	37.59

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Page 1 of 1

Scenario: Base
Extended Period Analysis: 2.00 hr / 24.00
Reservoir Report

Label	Elevation (ft)	Inflow (gpd)	Calculated Hydraulic Grade (ft)
R-1	1,370.00	85,801	1,370.00
R-2	1,210.00	-1,207,051	1,210.00

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Page 1 of 1

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Junction Report

Label	Elevation (ft)	Type	Base Flow (gpd)	Pattern	Demand (Calculated) (gpd)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-16	1,090.00	Demand	8,000	Peak	24,000	1,378.32	124.74
J-17	1,140.00	Demand	6,000	Peak	18,000	1,378.99	103.40
J-18	1,138.00	Demand	6,000	Peak	18,000	1,379.58	104.52
J-19	1,168.00	Demand	9,000	Peak	27,000	1,377.53	90.65
J-20	1,160.00	Demand	9,000	Peak	27,000	1,376.14	93.51
J-21	1,138.00	Demand	7,000	Peak	21,000	1,375.19	102.62
J-22	1,112.00	Demand	20,000	Peak	60,000	1,372.26	112.60
J-23	1,185.00	Demand	25,000	Peak	75,000	1,370.68	80.34
J-24	1,208.00	Demand	9,000	Peak	27,000	1,370.48	70.30
J-25	1,255.00	Demand	9,000	Peak	27,000	1,370.29	49.88
J-26	1,270.00	Demand	0	Peak	0	1,370.23	43.36
J-27	1,110.00	Demand	7,000	Peak	21,000	1,377.91	115.91
J-28	1,183.00	Demand	13,000	Peak	39,000	1,377.56	84.18
J-29	1,185.00	Demand	7,000	Peak	21,000	1,377.53	83.30
J-30	1,150.00	Demand	12,000	Peak	36,000	1,376.59	98.04
J-31	1,121.00	Demand	10,000	Peak	30,000	1,375.64	110.17
J-32	1,127.00	Demand	8,000	Peak	24,000	1,375.31	107.43
J-33	1,125.00	Demand	14,000	Peak	42,000	1,368.97	105.55
J-34	1,126.00	Demand	8,000	Peak	24,000	1,368.60	104.96
J-35	1,145.00	Demand	7,000	Peak	21,000	1,368.53	96.71
J-36	1,170.00	Demand	7,000	Peak	21,000	1,368.52	85.89
J-37	1,180.00	Demand	7,000	Peak	21,000	1,368.52	81.56
J-38	1,165.00	Demand	9,000	Peak	27,000	1,368.58	88.08
J-39	1,168.00	Demand	13,000	Peak	39,000	1,368.84	86.90
J-40	1,131.00	Demand	10,000	Peak	30,000	1,371.57	104.08
J-41	1,190.00	Demand	19,000	Peak	57,000	1,370.55	78.12
J-42	1,232.00	Demand	11,000	Peak	33,000	1,370.44	59.90
J-43	1,250.00	Demand	8,000	Peak	24,000	1,370.31	52.05
J-45	1,260.00	Demand	6,000	Peak	18,000	1,370.24	47.70
J-46	1,225.00	Demand	7,000	Peak	21,000	1,370.27	62.85
J-47	1,227.00	Demand	7,000	Peak	21,000	1,370.46	62.07
J-48	1,255.00	Demand	2,000	Peak	6,000	1,370.26	49.87
J-49	1,145.00	Demand	11,000	Peak	33,000	1,368.85	96.85
J-50	1,148.00	Demand	10,000	Peak	30,000	1,368.57	95.43
J-44	1,032.00	Demand	0	Peak	0	1,209.84	76.94
J-51	1,060.00	Demand	0	Peak	0	1,208.62	64.30
J-52	1,060.00	Demand	0	Peak	0	1,382.87	139.69
J-53	1,061.00	Demand	0	Peak	0	1,382.59	139.14
J-54	1,070.00	Demand	0	Peak	0	1,381.64	134.83

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Page 1 of 1

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Pipe Report

Label	From Node	To Node	Length (ft)	Diameter (in)	Hazen-Williams C	Control Status	Discharge (gpd)	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-17	J-16	J-17	691.00	6.0	100.0	Open	-106,561	0.67	0.84
P-18	J-17	J-18	455.00	6.0	100.0	Open	-124,561	0.59	0.98
P-19	J-18	J-19	860.00	12.0	100.0	Open	1,070,589	2.05	2.11
P-20	J-19	J-20	794.00	12.0	100.0	Open	907,433	1.39	1.79
P-21	J-20	J-21	574.00	12.0	100.0	Open	880,433	0.95	1.73
P-22	J-21	J-22	1,671.00	12.0	100.0	Open	907,151	2.93	1.79
P-23	J-22	J-23	2,109.00	12.0	100.0	Open	574,017	1.58	1.13
P-24	J-23	J-24	651.00	12.0	100.0	Open	353,921	0.20	0.70
P-25	J-24	J-25	1,083.00	12.0	100.0	Open	260,921	0.19	0.51
P-26	J-25	J-26	426.00	12.0	100.0	Open	250,151	0.07	0.49
P-27	J-26	R-1	1,400.00	12.0	100.0	Open	250,151	0.23	0.49
P-28	J-16	J-27	679.00	6.0	100.0	Open	82,561	0.41	0.65
P-29	J-27	J-28	992.00	6.0	100.0	Open	61,561	0.35	0.49
P-30	J-28	J-29	482.00	6.0	100.0	Open	22,561	0.03	0.18
P-31	J-29	J-19	595.00	6.0	100.0	Open	1,561	0.00	0.01
P-32	J-19	J-30	601.00	6.0	100.0	Open	137,717	0.94	1.09
P-33	J-30	J-31	1,068.00	6.0	100.0	Open	101,717	0.95	0.80
P-34	J-31	J-32	705.00	6.0	100.0	Open	71,717	0.33	0.57
P-35	J-32	J-21	566.00	6.0	100.0	Open	47,717	0.12	0.38
P-36	J-22	J-33	1,672.00	6.0	100.0	Open	156,219	3.30	1.23
P-37	J-33	J-34	709.00	6.0	100.0	Open	76,569	0.37	0.60
P-38	J-34	J-35	552.00	6.0	100.0	Open	34,547	0.07	0.27
P-39	J-35	J-36	639.00	6.0	100.0	Open	13,547	0.01	0.11
P-40	J-36	J-37	546.00	6.0	100.0	Open	-7,453	0.00	0.06
P-41	J-37	J-38	758.00	6.0	100.0	Open	-28,453	0.06	0.22
P-42	J-38	J-39	630.00	6.0	100.0	Open	-67,431	0.26	0.53
P-43	J-39	J-23	2,061.00	6.0	100.0	Open	-101,781	1.84	0.80
P-44	J-22	J-40	606.00	6.0	100.0	Open	116,914	0.70	0.92
P-45	J-40	J-41	1,523.00	6.0	100.0	Open	86,914	1.01	0.68
P-46	J-41	J-42	1,249.00	6.0	100.0	Open	29,914	0.12	0.24
P-47	J-42	J-43	777.00	6.0	100.0	Open	40,230	0.12	0.32
P-48	J-43	J-25	631.00	6.0	100.0	Open	16,230	0.02	0.13
P-51	J-45	J-46	623.00	6.0	100.0	Open	-18,000	0.02	0.14
P-53	J-24	J-47	429.00	6.0	100.0	Open	21,000	0.02	0.17
P-54	J-46	J-48	563.00	6.0	100.0	Open	6,000	0.00	0.05
P-55	J-23	J-42	1,338.00	6.0	100.0	Open	43,316	0.25	0.34
P-52	J-46	J-24	1,107.00	6.0	100.0	Open	-45,000	0.22	0.35
P-56	J-33	J-49	859.00	6.0	100.0	Open	37,651	0.12	0.30
P-57	J-49	J-39	750.00	6.0	100.0	Open	4,651	0.00	0.04
P-58	J-34	J-50	700.00	6.0	100.0	Open	18,021	0.03	0.14
P-59	J-50	J-38	753.00	6.0	100.0	Open	-11,979	0.01	0.09
P-49	R-2	J-44	654.00	20.0	100.0	Open	1,213,151	0.16	0.86
P-50	J-44	J-51	1,653.00	16.0	100.0	Open	1,213,151	1.22	1.34
P-60	J-51	PMP-1	21.00	16.0	100.0	Open	1,213,151	0.02	1.34
P-61	PMP-	J-52	21.00	12.0	100.0	Open	1,213,151	0.06	2.39
P-62	J-52	J-53	92.00	12.0	100.0	Open	1,213,151	0.28	2.39
P-63	J-53	J-54	317.00	12.0	100.0	Open	1,213,151	0.95	2.39
P-64	J-54	J-18	688.00	12.0	100.0	Open	1,213,151	2.06	2.39

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Page 1 of 1

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Pump Report

Label	Elevation (ft)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpd)	Pump Head (ft)	Calculated Water Power (Hp)
PMP-1	1,060.00	On	1,208.60	1,382.93	1,213,151	174.33	37.08

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Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Reservoir Report

Label	Elevation (ft)	Inflow (gpd)	Calculated Hydraulic Grade (ft)
R-1	1,370.00	250,151	1,370.00
R-2	1,210.00	-1,213,151	1,210.00

WaterCAD Results:

Tank 3: Spillway El=1590'

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Junction Report

Label	Elevation (ft)	Type	Base Flow (gpd)	Pattern	Demand (Calculated) (gpd)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-45	1,260.00	Demand	8,000	Fixed	8,000	1,589.87	142.72
J-44	1,285.00	Demand	8,000	Fixed	8,000	1,589.88	131.91
J-51	1,305.00	Demand	5,000	Fixed	5,000	1,589.90	123.26
J-52	1,290.00	Demand	6,000	Fixed	6,000	1,589.92	129.76
J-20	1,255.00	Demand	0	Fixed	0	1,589.94	144.91
J-21	1,270.00	Demand	0	Fixed	0	1,589.98	138.44

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Project Engineer:

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Page 1 of 1

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Pipe Report

Label	From Node	To Node	Length (ft)	Diameter (in)	Hazen-Williams C	Control Status	Discharge (gpd)	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-49	J-45	J-44	646.00	6.0	100.0	Open	-8,000	0.01	0.06
P-50	J-44	J-51	553.00	6.0	100.0	Open	-16,000	0.02	0.13
P-60	J-51	J-52	403.00	6.0	100.0	Open	-21,000	0.02	0.17
P-20	J-52	J-20	312.00	6.0	100.0	Open	-27,000	0.02	0.21
P-21	J-20	J-21	518.00	6.0	100.0	Open	-27,000	0.04	0.21
P-22	J-21	R-3	8,200.00	12.0	100.0	Open	-27,000	0.02	0.05

Title:

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Project Engineer:

WaterCAD v7.0 [07.00.061.00]

Page 1 of 1

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Reservoir Report

Label	Elevation (ft)	Inflow (gpd)	Calculated Hydraulic Grade (ft)
R-3	1,590.00	-27,000	1,590.00

Title:

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Project Engineer:

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Scenario: Base
Extended Period Analysis: 18.00 hr / 24.00
Junction Report

Label	Elevation (ft)	Type	Base Flow (gpd)	Pattern	Demand (Calculated) (gpd)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-45	1,260.00	Demand	8,000	Max day	10,000	1,535.22	119.08
J-44	1,285.00	Demand	8,000	Max day	10,000	1,535.23	108.26
J-51	1,305.00	Demand	725,000	Composite	726,250	1,535.25	99.62
J-52	1,290.00	Demand	6,000	Max day	7,500	1,549.64	112.33
J-20	1,255.00	Demand	0	Max day	0	1,560.98	132.38
J-21	1,270.00	Demand	0	Max day	0	1,579.81	134.04

Title:

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Project Engineer:

WaterCAD v7.0 [07.00.061.00]

Scenario: Base
Extended Period Analysis: 18.00 hr / 24.00
Pipe Report

Label	From Node	To Node	Length (ft)	Diameter (in)	Hazen-Williams C	Control Status	Discharge (gpd)	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-49	J-45	J-44	646.00	6.0	100.0	Open	-10,000	0.01	0.08
P-50	J-44	J-51	553.00	6.0	100.0	Open	-20,000	0.02	0.16
P-60	J-51	J-52	403.00	6.0	100.0	Open	-746,250	14.38	5.88
P-20	J-52	J-20	312.00	6.0	100.0	Open	-753,750	11.34	5.94
P-21	J-20	J-21	518.00	6.0	100.0	Open	-753,750	18.83	5.94
P-22	J-21	R-3	8,200.00	12.0	100.0	Open	-753,750	10.19	1.48

Scenario: Base
Extended Period Analysis: 18.00 hr / 24.00
Reservoir Report

Label	Elevation (ft)	Inflow (gpd)	Calculated Hydraulic Grade (ft)
R-3	1,590.00	-753,750	1,590.00

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Junction Report

Label	Elevation (ft)	Type	Base Flow (gpd)	Pattern	Demand (Calculated) (gpd)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-45	1,260.00	Demand	8,000	Peak	24,000	1,589.04	142.36
J-44	1,285.00	Demand	8,000	Peak	24,000	1,589.08	131.56
J-51	1,305.00	Demand	5,000	Peak	15,000	1,589.20	122.96
J-52	1,290.00	Demand	6,000	Peak	18,000	1,589.35	129.52
J-20	1,255.00	Demand	0	Peak	0	1,589.53	144.74
J-21	1,270.00	Demand	0	Peak	0	1,589.84	138.38

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Pipe Report

Label	From Node	To Node	Length (ft)	Diameter (in)	Hazen-Williams C	Control Status	Discharge (gpd)	Pressure Pipe Headloss (ft)	Velocity (ft/s)
P-49	J-45	J-44	646.00	6.0	100.0	Open	-24,000	0.04	0.19
P-50	J-44	J-51	553.00	6.0	100.0	Open	-48,000	0.12	0.38
P-60	J-51	J-52	403.00	6.0	100.0	Open	-63,000	0.15	0.50
P-20	J-52	J-20	312.00	6.0	100.0	Open	-81,000	0.18	0.64
P-21	J-20	J-21	518.00	6.0	100.0	Open	-81,000	0.30	0.64
P-22	J-21	R-3	8,200.00	12.0	100.0	Open	-81,000	0.16	0.16

Scenario: Base
Extended Period Analysis: 0.00 hr / 24.00
Reservoir Report

Label	Elevation (ft)	Inflow (gpd)	Calculated Hydraulic Grade (ft)
R-3	1,590.00	-81,000	1,590.00