CONCEPTUAL MASTER POTABLE WATER SYSTEM REPORT FOR SERENO CANYON

October 28, 2005
WP# 042054.15

Prepared for:
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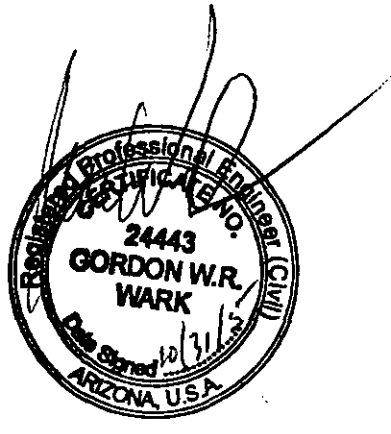

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CONCEPTUAL MASTER POTABLE WATER SYSTEM REPORT FOR SERENO CANYON

Accepted for
CITY OF SCOTTSDALE
WATER RESOURCES DEPT
9388 E SAN SALVADOR DR
SCOTTSDALE, AZ 85258
By Doug Mann
12.13.05
(See comments)

WOOD/PATEL

City of Scottsdale
Water Resources Department

Basis of Design Review Comments

Project: Sereno Canyon

Engineer: Wood/Patel

Date: January 27, 2006

Action: FYI – Attach to accepted reports

Conceptual Master Potable Water System Report comments:

1. If Ranch Gate Road is extended to 128th, utilities should be coordinated or roadway cross-section designed to allow for future utility installation.
2. Appendix D referenced on page 7 is not included in the report.
3. Recommend that as improvement plans are developed the developer meet with Water Resources to establish which items will be included in a credit agreement, applied toward over sizing, applicable for payback, or have been collected as in-lieu funding.
4. The Zone 12/13 Reservoir design report shows a 2914 hydraulic grade at Jomax and 118th with a greater flow than you assumed in the 16-inch pipe. Your report shows a hydraulic grade of 2974 in this area that is about 26 psi higher than the Zone 12/13 report. The new booster pump station (#145) will help to maintain onsite pressures.
5. Plate 4, Option 1 is to include a line from the cul-de-sac off pipe 390 to the northwest property line for a future connection to the adjacent property. A stub to the property line shall be included off node J-310. A water line will be installed along the 128th Street frontage to this project.

Conceptual Master Wastewater System Report comments:

6. Any downstream capacity issues associated with the ultimate build out will be addressed in the City's master plan as a system deficiency.
7. I don't follow why there are options 1 and 2 associated with the ultimate build out.
8. There are some issues with the conceptual pump scenarios that we can resolve with the design report for the lift station.

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APPENDICES

PLATES

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1.0 INTRODUCTION

1.1 General Background and Project History

Sereno Canyon is located at the eastern edge of the City of Scottsdale, Maricopa County, Arizona, within a portion of Section 11, Township 4 North, Range 5 East. The site is currently an assemblage of undeveloped parcels bound to the west by the existing Sonoran Crest Development (122nd Street alignment), to the east by the 128th Street alignment, to the north by the Happy Valley Road alignment, and to the south by the McDowell Mountain Sonoran Preserve. Access to the development is planned from the west via the ½ -mile section roadway, Alameda Road. Plate 1 provides a vicinity map for the project and surrounding areas.

Sereno Canyon is a 330-acre residential custom lot sub-division, nestled at the northern base of the McDowell Mountains. The development is planned in four (4) phases and includes approximately 122 lots ranging in size from 2 to 3 acres and an 11-acre Community Center with amenities such as jacuzzis, pools, water falls, and restaurant facilities. Interpretive trails and scattered pocket parks with water features will also be incorporated into the site plan. Plate 1A provides a phasing map for the project.

Crown Community Development has considered expanding Sereno Canyon to approximately 400 acres (146 lots) which would include the acquisition of the 40-acre parcel located at the northeast ¼ of Section 11, four (4) 2.5-acre parcels located at the northeast boundary of Sonoran Crest, and the 20-acre parcel located in the middle of the southern ½ portion of Section 11.

This *Conceptual Master Water System Report for Sereno Canyon* is prepared as two options: Option 1 which represents the proposed 330-acre development, and Option 2 which includes the potential expansion (400-acre development). Land use information is provided by LVA, January 6, 2004.

1.2 Scope of Water Report

The intent of the *Conceptual Master Water System Report for Sereno Canyon* is to identify the locations and sizes of the proposed water infrastructure needed to provide potable water service to the development for Options 1 and 2. The components of the water infrastructure discussed throughout this report include on-site and off-site distribution lines, booster pumping stations, and pressure reducing valves. This report also presents the water modeling results for the average-day, maximum-day, maximum-day plus fire flow, and peak-hour scenarios for Options 1 and 2.

1.3 Topographic Conditions

Topography on the site slopes from the south to the northeast and the northwest. Slopes vary, with the majority in the 3 to 5 percent range, and some minor portions being much steeper. Steeper slopes (5% and greater) are associated with the southern portion of the subject site. Gentler slopes (3% or less) are located within the northern portion of the subject site.

The subject site is located in water Pressure Zones 12, 13 and 14, with the majority of the site lying within water Pressure Zone 13. Plate 2 – *On-Site Water Pressure Zones* identifies the water pressure zone boundaries within the site.

2.0 DESIGN REQUIREMENTS

The water demand and system criteria established for the Sereno Canyon development is consistent with the requirements established in the *City of Scottsdale Design Standards and Policy Manual (DSPM)*. Average-day water demands are referenced from Figure 4.1-3 in the DSPM. Please refer to Appendix C – *References* for a copy of this figure. The following is a summary of the major criteria utilized:

1. The average water demand for a residential dwelling unit with a density less than (2) dwelling units per acre is 486 gallons per day (gpd).
2. The average water demand for a commercial facility is 0.90 gpd per square foot.
3. The maximum day demand is 2.0 times the average day demand.
4. The peak hour demand is 3.5 times the average day demand.
5. The fire flow demand for residential land use is 500 gallons per minute (gpm), and for commercial land use is 1,500 gpm.
6. Mile and ½ mile alignments shall be minimum 12-inch in diameter with the exception of pipe lines in West Dynamite Corridor.
7. Dead-end lines shall not be longer than 1,200 feet in length.
8. Water mains shall be extended across all frontages of the development.
9. The residual water pressures and head loss criteria utilized is provided below:

	Average-Day (AD)	Maximum-Day (MD)	Peak-Hour (PH)	Maximum-Day + Fire Flow (MD+FF)
Minimum Pressure (psi)	50	50	50	30
Maximum Pressure (psi)	120	120	120	120
Maximum Head Loss (ft/1,000ft)	-	8	10	-

3.0 WATER DEMAND CALCULATIONS

For Option 1, the potable water demand calculations include 122 low-density residential dwelling units and 10,000 s.f. of Community Center (5,000 s.f. Community Center plus 5,000 s.f. lawn area). Option 2 includes 146 low-density residential dwelling units and 10,000 s.f. of non-residential land use. To be conservative, the average-day water demand of 0.90 gpd/s.f. is used for the entire 10,000 s.f. Community Center. Preliminary information regarding the clubhouse and amenities are found under Appendix C – *References.* Additional landscape demands are not included at this time.

The potable water demand calculations for Options 1 and 2 are found under Appendices A and B, respectively. Table 3.1-1 summarizes these calculations.

Table 3.1-1 Water Demand Calculations

	ADD		MDD		PHD	
	gpd	gpm	gpd	gpm	gpd	gpm
Option 1	68,292	47	136,584	95	239,022	166
Option 2	79,956	56	159,912	111	279,846	195

4.0 GENERAL PLAN FOR OFF-SITE POTABLE WATER SYSTEM

Although the majority of the subject site for Options 1 and 2 lie within water Pressure Zone 13, there are portions that fall within Zone 12 and Zone 14. The off-site plan for the potable water system for Options 1 and 2 consist of extending two (2) off-site Zone 13 water sources to the development to service the Zone 13 properties. Zone 12 properties will be serviced through on-site pressure reducing stations. The minor portions of the overall project site lying within Pressure Zone 14 can be served by individual booster pumping stations, since the pressure in the street is above 50 psi. Please refer to Section 5.0 of this report for the on-site potable water systems for Zones 12 through 14.

The primary water source and storage for the development is the 3.0 million gallon Zone 12 reservoir and Zone 13 BPS at 114th Street and Dixileta Drive. Additionally, a 15,000-gallon receiving tank is proposed near the Zone 13BPS at Alameda Road.

The primary water supply will be provided by the Zone 13 waterlines that extend southerly from the Zone 13 BPS along 114th Street to Morning Vista Road, easterly along Morning Vista Road to 118th Street, southerly along 118th Street to the point of connection to the Granite Ridge development. In order to provide the water supply to Sereno Canyon, a 12-inch Zone 13 waterline is proposed in this master plan to extend from this point ¼ mile easterly within the right-of-way on the northern boundary of Granite Ridge to the 120th Street alignment, ¼ mile southerly along the western boundary of State Land to the Happy Valley Road alignment, and approximately ¼ mile easterly to the project site. Please refer to Plate 2 – *Off-Site Master Water System* for the locations of these waterlines.

An application for a public utility easement (PUE) along the north side of the Happy Valley Road alignment (State Land) and the 120th Street alignment to the project site has recently been submitted to the State Land Department (App#16-108745 and #16-108746). Additional coordination will be required with the State Land to obtain water easements for the remaining portions of the proposed 12-inch Zone 13 waterline discussed above.

The secondary Zone 13 water supply will be provided by the Zone 13 BPS proposed to be constructed by Sereno Canyon, within a dedicated tract, located on the south side of Alameda Road in the Sonoran Crest development, before the west entrance into the Sereno Canyon. A 12-inch Zone 13 waterline is proposed in this master plan to extend from the BPS along Alameda Road to the project site. Please refer to Plate 3 for the location of the BPS and proposed waterline.

5.0 GENERAL PLAN FOR ON-SITE POTABLE WATER SYSTEM

The proposed conceptual master potable water distribution system for Options 1 and 2 of Sereno Canyon consist of 12-inch and 8-inch Zone 13 waterlines, Zone 12/13 pressure reducing valve (PRV) stations(s), and 8-inch Zone 12 waterlines.

A 12-inch Zone 13 waterline is proposed along Alameda Road, per the City of Scottsdale's Integrated Master Water Plan. Based on the site plan configuration, this 12-inch line may be extended to 128th Street for a possible future Zone 13 loop. The 8-inch Zone 13 waterlines will branch from the 12-inch main and extend/loop into the minor roadways to provide service to the properties within water Pressure Zone 13.

The Zone 12 properties situated at the northeast corner of the property will be serviced from the Zone 13 distribution system through PRVs. For the development Option 1, one (1) Zone 12/13 PRV and 8-inch waterlines would be required for service to the Zone 12 properties. For development Option 2, two (2) Zone 12/13 PRV stations and 8-inch waterlines would be required to serve the Zone 12 properties. Please note that an 8-inch Zone 12 loop may be utilized in lieu of the second Zone 12/13 PRV in the event of construction of the Zone 12 line and PRV along 128th Street by others. Please refer to Plate 4 – *Option 1: On-Site Conceptual Master Potable Water Distribution System* and Plate 5 – *Option 2: On-Site Conceptual Master Potable Water Distribution System* for the locations of the Zone 12 waterlines and PRVs.

The Zone 14 properties situated in the southern portion of the property may require individual booster pumping stations, although pressures along the street during normal working conditions are just above the 50-psi minimum. Please refer to Plates 4 and 5 for the lots situated in Pressure Zone 14.

The on-site distribution system is designed to provide the average-day, maximum-day, and peak-hour demands to the development within the required pressure range of 50 psi – 120 psi. Fire flows are supplied at pressures exceeding the 30-psi minimum under maximum-day scenario.

6.0 DESIGN METHODOLOGY

The computer network analysis for the water distribution system was performed using the Water CAD Water Distribution Model (version 6.5). A Hazen-Williams "C" factor of 130 was used for the analysis. Plates 4 and 5 illustrate the general locations, sizes, and node labels for the Water CAD distribution pipes and service junctions.

The two (2) Zone 13 water sources that feed the proposed development are modeled using reservoirs with a hydraulic grade line of 2,974. The offsite Zone 13 water source that feeds the development from the north is modeled using a reservoir with a hydraulic grade line of 2,960 [Zone 13 BPS HGL]. The head losses are estimated in the model by including the approximate length of the waterline from the Zone 13 BPS to the proposed development. The second Zone 13 water source, Zone 13 BPS south of Alameda Road, west of the proposed development, is modeled to supply maximum-day demand to the proposed development at a design discharge of 1,000 gpm and a head of 249 ft. The same pump curve is used for both Options 1 and 2. The design of BPS in this model is preliminary and a detailed design report for the BPS will be provided with the actual design. Please note that the 12-inch waterline connecting to the 12-inch waterlines along Alameda Road and 128th Street [P-570 (Option 1), P-620 (Option 2)] is closed, as it is a future connection. Please refer to Plate 3 – *Off-Site Master Potable Water System* for an illustration of how the Zone 13 supply is modeled.

The hydraulic profile for water Pressure Zones 12, 13, and 14 are taken from Table C.2-1 in the *City of Scottsdale's Integrated Water Master Plan*. Please refer to Appendix D – *References* for a copy of this table.

The WaterCAD network is designed based on the design criteria discussed in Section 2.0 of this report. Results of the model analysis for Option 1 and Option 2 during average-day, maximum-day, maximum-day plus fire flow, and peak-hour scenarios are found under Appendices B and C, respectively.

7.0 PAYBACK ELIGIBLE WATER INFRASTRUCTURE

The following proposed water infrastructure is eligible for payback, impact fee credit and oversizing agreements with the city of Scottsdale and the adjacent benefiting properties. Applications will be submitted for all payback agreements, followed by impact fee credit eligibility and oversizing allowances.

- 16-inch Zone 13 waterline along 118th Street from Dynamite Road to the Granite Ridge Development.
- 12-inch Zone 13 waterline from Granite Ridge Development to the proposed development.
- Zone 12/13 BPS south of Alameda Road and west of the proposed development.
- 8-inch and 12-inch Zone 13 waterline along 128th Street.

The Sereno Canyon community will explore every opportunity to utilize the funds available through an oversizing agreement with the City of Scottsdale for oversizing the water infrastructure. Further, the community will apply for impact fee credit and payback agreements. The community will also seek to utilize any "in lieu of" funds by adjacent properties that have collected, or are soon to be collected, by the City.

Sereno Canyon may also try to form a community facilities district (CFD) to fund the construction and upsizing of the water infrastructure.

A detailed report will be provided as required, identifying the options sought by Sereno Canyon and the water infrastructure eligible for any of the above alternatives.

8.0 CONCLUSIONS

Based on the analysis of the water distribution system required to provide potable water service to Sereno Canyon, the following conclusions can be made:

1. The Conceptual Master Water System for Sereno Canyon will operate in three (3) pressure zones and will maintain approximate service pressures at the street between 50 psi and 120 psi.
2. The water demand and system criteria are consistent the *City of Scottsdale's Design Standards and Policy Manual.*
3. The proposed water infrastructure is consistent with the *City of Scottsdale's Integrated Master Water Plan.*
4. Potable water will be supplied to the development by a Zone 13 BPS, a Zone 13 offsite water source, Zone 12/13 pressure reducing valve stations, individual booster pump stations, and a network of 12-inch and 8-inch distribution lines.
5. The proposed water system infrastructure provides potable water service to 122 proposed residential dwelling units for Option 1 and 146 proposed residential dwelling units for Option 2, in addition to approximately 10,000 s.f. of proposed Community Center.
6. The results provided by the water system modeling during average-day, maximum-day, maximum-day plus fire flow, and peak-hour conditions are compliant with the water system criteria outlined in this report.
7. The water infrastructure that may be eligible for payback, impact fee credit and oversizing agreements is outlined in this report.

APPENDIX A

OPTION 1:

Water Demand Calculations

Project: *Sereno Canyon*
Location: *City of Scottsdale, Arizona*
Date: *31-Oct-05*
References: *City of Scottsdale Design Standards and Policy Manual*

Project Number: 042054.06
Project Engineer: Gordon Wark, P.E

		RESIDENTIAL		NON-RESIDENTIAL		AVERAGE DAY DEMAND		MAXIMUM DAY DEMAND		PEAK HOUR DEMAND	
WATERCAD NODE	ELEV.	DWELLING UNIT < 2 du/acre	ADD/ UNIT (GPD)	AREA (SQ.FT.)	ADD/ SQ.FT. (GPD)	(GPD)	(GPM)	(GPD)	(GPM)	(GPD)	(GPM)
J-10	2,735	5	486			2,430	1.7	4,860	3.4	8,505	5.9
J-20	2,706	8	486			3,888	2.7	7,776	5.4	13,608	9.5
J-30	2,707	5	486			2,430	1.7	4,860	3.4	8,505	5.9
J-50	2,743	1	486			486	0.3	972	0.7	1,701	1.2
J-80	2,747	7	486			3,402	2.4	6,804	4.7	11,907	8.3
J-110	2,719										
J-120	2,760										
J-140	2,725	7	486			3,402	2.4	6,804	4.7	11,907	8.3
J-150	2,780	5	486			2,430	1.7	4,860	3.4	8,505	5.9
J-160	2,773	6	486			2,916	2.0	5,832	4.1	10,206	7.1
J-170	2,825	10	486			4,860	3.4	9,720	6.8	17,010	11.8
J-200	2,800	7	486			3,402	2.4	6,804	4.7	11,907	8.3
J-210	2,760	8	486			3,888	2.7	7,776	5.4	13,608	9.5
J-220	2,783	9	486			4,374	3.0	8,748	6.1	15,309	10.6
J-240	2,735	6	486			2,916	2.0	5,832	4.1	10,206	7.1
J-250	2,702										
J-260	2,730	5	486			2,430	1.7	4,860	3.4	8,505	5.9
J-270	2,782	7	486			3,402	2.4	6,804	4.7	11,907	8.3
J-280	2,730										
J-290	2,720										
J-300	2,748	10	486			4,860	3.4	9,720	6.8	17,010	11.8
J-310	2,745	2	486			972	0.7	1,944	1.4	3,402	2.4
J-320	2,765	3	486			1,458	1.0	2,916	2.0	5,103	3.5
J-330	2,765	5	486			2,430	1.7	4,860	3.4	8,505	5.9
J-340	2,685	4	486			1,944	1.4	3,888	2.7	6,804	4.7
J-350	2,698	2	486			972	0.7	1,944	1.4	3,402	2.4
J-360	2,735										
J-370[1]	2,765			10,000	0.9	9,000	6.3	18,000	12.5	31,500	21.9
J-380	2,780										
J-390	2,733										
Total		***122***		***10,000***		***68,292***	***47***	***136,584***	***95***	***239,022***	***166***

Notes:
(1) 10,000 square feet = 5,000 sq.ft. Clubhouse plus 5,000 sq.ft. lawn area. Reference: E-mail from Steven Voss (located under Appendix C).

OPTION 1:

WaterCAD Modeling Results

Fire Flow Analysis
Fire Flow Report

Label	Elevation (ft)	Zone	Phase	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Pressure (psi)	Calculated Hydraulic Grade (ft)	Calculated Residual Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction
J-10	2,735	Zone - 13		true	500.0	503.4	603.4	104	2,974.51	101	63	J-170
J-20	2,706	Zone - 13		true	500.0	505.4	605.4	116	2,974.51	113	62	J-170
J-30	2,707	Zone - 13		true	500.0	503.4	603.4	116	2,974.59	112	62	J-170
J-50	2,743	Zone - 13		true	500.0	500.7	600.7	100	2,974.58	97	62	J-170
J-80	2,747	Zone - 13		true	500.0	504.7	604.7	98	2,974.64	95	62	J-170
J-110	2,719	Zone - 13		true	500.0	500.0	600.0	111	2,974.86	108	62	J-170
J-120	2,760	Zone - 13		true	500.0	500.0	600.0	93	2,974.74	88	62	J-170
J-140	2,725	Zone - 13		true	500.0	504.7	604.7	108	2,974.63	104	62	J-170
J-150	2,780	Zone - 13		true	500.0	502.7	602.7	84	2,974.75	81	62	J-170
J-160	2,773	Zone - 13		true	500.0	504.1	604.0	87	2,974.76	84	61	J-170
J-170	2,825	Zone - 13		true	500.0	506.8	606.7	65	2,974.76	57	73	J-200
J-200	2,800	Zone - 13		true	500.0	504.7	604.7	76	2,974.74	69	62	J-170
J-210	2,760	Zone - 13		true	500.0	505.4	605.4	93	2,974.73	80	62	J-170
J-220	2,783	Zone - 13		true	500.0	506.1	606.1	83	2,974.73	74	62	J-170
J-240	2,735	Zone - 13		true	500.0	504.1	604.0	104	2,974.48	101	63	J-170
J-250	2,702	Zone - 12		true	500.0	500.0	600.0	55	2,830.04	55	57	J-350
J-260	2,730	Zone - 13		true	500.0	503.4	603.4	106	2,974.64	100	62	J-170
J-270	2,782	Zone - 13		true	500.0	504.7	604.7	83	2,974.76	79	61	J-170
J-280	2,730	Zone - 13		true	500.0	500.0	600.0	106	2,974.26	104	64	J-170
J-290	2,720	Zone - 13		true	500.0	500.0	600.0	110	2,974.12	109	64	J-170
J-300	2,748	Zone - 13		true	500.0	506.8	606.7	98	2,974.57	92	62	J-170
J-310	2,745	Zone - 13		true	500.0	513.9	613.8	99	2,974.73	96	62	J-170
J-320	2,765	Zone - 13		true	1,500.0	1,502.0	1,602.0	91	2,974.74	73	48	J-170
J-330	2,765	Zone - 13		true	500.0	503.4	603.4	91	2,974.76	72	61	J-170
J-340	2,685	Zone - 12		true	500.0	502.7	602.7	63	2,830.04	60	55	J-250
J-350	2,698	Zone - 12		true	500.0	501.4	601.3	57	2,830.04	55	55	J-250
J-360	2,735	Zone - 13		true	500.0	500.0	600.0	104	2,974.81	101	62	J-170
J-370	2,765	Zone - 13		true	1,500.0	1,500.0	1,600.0	91	2,974.76	74	48	J-170
J-380	2,780	Zone - 13		true	500.0	500.0	600.0	84	2,974.73	70	62	J-170
J-390	2,733	Zone - 13		true	500.0	500.0	600.0	105	2,974.73	92	62	J-170

Scenario: Option 1 Average-D
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	2,735	Zone - 13	1.7	2,974.82	104
J-20	2,706	Zone - 13	2.7	2,974.84	116
J-30	2,707	Zone - 13	1.7	2,974.95	116
J-50	2,743	Zone - 13	0.3	2,974.92	100
J-80	2,747	Zone - 13	2.4	2,974.99	99
J-110	2,719	Zone - 13	0.0	2,975.21	111
J-120	2,760	Zone - 13	0.0	2,975.11	93
J-140	2,725	Zone - 13	2.4	2,975.00	108
J-150	2,780	Zone - 13	1.7	2,975.12	84
J-160	2,773	Zone - 13	2.0	2,975.14	87
J-170	2,825	Zone - 13	3.4	2,975.14	65
J-200	2,800	Zone - 13	2.4	2,975.12	76
J-210	2,760	Zone - 13	2.7	2,975.12	93
J-220	2,783	Zone - 13	3.0	2,975.12	83
J-240	2,735	Zone - 13	2.0	2,974.78	104
J-250	2,702	Zone - 12	0.0	2,830.04	55
J-260	2,730	Zone - 13	1.7	2,974.99	106
J-270	2,782	Zone - 13	2.4	2,975.14	84
J-280	2,730	Zone - 13	0.0	2,974.43	106
J-290	2,720	Zone - 13	0.0	2,974.20	110
J-300	2,748	Zone - 13	3.4	2,974.92	98
J-310	2,745	Zone - 13	0.7	2,975.11	100
J-320	2,765	Zone - 13	1.0	2,975.11	91
J-330	2,765	Zone - 13	1.7	2,975.14	91
J-340	2,685	Zone - 12	1.4	2,830.04	63
J-350	2,698	Zone - 12	0.7	2,830.04	57
J-360	2,735	Zone - 13	0.0	2,975.17	104
J-370	2,765	Zone - 13	6.2	2,975.13	91
J-380	2,780	Zone - 13	0.0	2,975.12	84
J-390	2,733	Zone - 13	0.0	2,975.12	105

Scenario: Option 1 Maximum-D
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-20	2,706	Zone - 13	5.4	2,974.51	116
J-30	2,707	Zone - 13	3.4	2,974.59	116
J-50	2,743	Zone - 13	0.7	2,974.57	100
J-80	2,747	Zone - 13	4.7	2,974.63	98
J-110	2,719	Zone - 13	0.0	2,974.86	111
J-120	2,760	Zone - 13	0.0	2,974.73	93
J-140	2,725	Zone - 13	4.7	2,974.63	108
J-150	2,780	Zone - 13	3.4	2,974.74	84
J-160	2,773	Zone - 13	4.1	2,974.76	87
J-170	2,825	Zone - 13	6.8	2,974.75	65
J-200	2,800	Zone - 13	4.7	2,974.73	76
J-210	2,760	Zone - 13	5.4	2,974.73	93
J-220	2,783	Zone - 13	6.1	2,974.73	83
J-240	2,735	Zone - 13	4.1	2,974.48	104
J-250	2,702	Zone - 12	0.0	2,830.04	55
J-260	2,730	Zone - 13	3.4	2,974.63	106
J-270	2,782	Zone - 13	4.7	2,974.76	83
J-280	2,730	Zone - 13	0.0	2,974.26	106
J-290	2,720	Zone - 13	0.0	2,974.12	110
J-300	2,748	Zone - 13	6.8	2,974.57	98
J-310	2,745	Zone - 13	1.4	2,974.73	99
J-330	2,765	Zone - 13	3.4	2,974.75	91
J-360	2,735	Zone - 13	0.0	2,974.80	104
J-320	2,765	Zone - 13	2.0	2,974.73	91
J-340	2,685	Zone - 12	2.7	2,830.04	63
J-350	2,698	Zone - 12	1.4	2,830.04	57
J-370	2,765	Zone - 13	12.5	2,974.75	91
J-380	2,780	Zone - 13	0.0	2,974.73	84
J-390	2,733	Zone - 13	0.0	2,974.73	105
J-10	2,735	Zone - 13	3.4	2,974.50	104

Scenario: Option 1 Peak-Hou
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-20	2,706	Zone - 13	9.4	2,974.12	116
J-30	2,707	Zone - 13	5.9	2,974.16	116
J-50	2,743	Zone - 13	1.2	2,974.15	100
J-80	2,747	Zone - 13	8.3	2,974.19	98
J-110	2,719	Zone - 13	0.0	2,974.41	111
J-120	2,760	Zone - 13	0.0	2,974.26	93
J-140	2,725	Zone - 13	8.3	2,974.18	108
J-150	2,780	Zone - 13	5.9	2,974.27	84
J-160	2,773	Zone - 13	7.1	2,974.28	87
J-170	2,825	Zone - 13	11.8	2,974.27	65
J-200	2,800	Zone - 13	8.3	2,974.24	75
J-210	2,760	Zone - 13	9.4	2,974.22	93
J-220	2,783	Zone - 13	10.6	2,974.23	83
J-240	2,735	Zone - 13	7.1	2,974.11	103
J-250	2,702	Zone - 12	0.0	2,830.04	55
J-260	2,730	Zone - 13	5.9	2,974.18	106
J-270	2,782	Zone - 13	8.3	2,974.27	83
J-280	2,730	Zone - 13	0.0	2,974.06	106
J-290	2,720	Zone - 13	0.0	2,974.03	110
J-300	2,748	Zone - 13	11.8	2,974.15	98
J-310	2,745	Zone - 13	2.4	2,974.26	99
J-330	2,765	Zone - 13	5.9	2,974.26	91
J-360	2,735	Zone - 13	0.0	2,974.34	104
J-320	2,765	Zone - 13	3.5	2,974.26	91
J-340	2,685	Zone - 12	4.7	2,830.04	63
J-350	2,698	Zone - 12	2.4	2,830.04	57
J-370	2,765	Zone - 13	21.9	2,974.28	91
J-380	2,780	Zone - 13	0.0	2,974.22	84
J-390	2,733	Zone - 13	0.0	2,974.22	104
J-10	2,735	Zone - 13	5.9	2,974.12	103

Steady State Analysis
Pipe Report

Label	Initial Status	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Calculated Friction Headloss (ft)
P-10	Open	1,004	8	Ductile Iro	130	-119.0	2,974.43	2,974.78	0.76	0.35	0.36
P-30	Open	1,100	8	Ductile Iro	130	-58.0	2,974.84	2,974.95	0.37	0.09	0.10
P-60	Open	737	8	Ductile Iro	130	-69.4	2,974.82	2,974.92	0.44	0.13	0.10
P-90	Open	502	8	Ductile Iro	130	-73.1	2,974.92	2,974.99	0.47	0.14	0.07
P-170	Open	496	8	Ductile Iro	130	59.7	2,975.00	2,974.95	0.38	0.10	0.05
P-200	Open	789	8	Ductile Iro	130	-27.0	2,975.12	2,975.14	0.17	0.02	0.02
P-210	Open	1,027	8	Ductile Iro	130	3.4	2,975.14	2,975.14	0.02	0.00	0.00
P-250	Open	1,181	8	Ductile Iro	130	8.1	2,975.12	2,975.12	0.05	0.00	0.00
P-270	Open	774	8	Ductile Iro	130	5.7	2,975.12	2,975.12	0.04	0.00	0.00
P-280	Open	1,110	8	Ductile Iro	130	2.7	2,975.12	2,975.12	0.02	0.00	0.00
P-300	Open	752	8	Ductile Iro	130	-53.3	2,974.78	2,974.84	0.34	0.08	0.06
P-320	Open	137	8	Ductile Iro	130	2.0	2,974.84	2,974.84	0.01	0.00	0.00
P-330	Open	325	8	Ductile Iro	130	-67.7	2,974.78	2,974.82	0.43	0.12	0.04
P-340	Open	93	8	Ductile Iro	130	-2.0	2,830.04	2,830.04	0.01	0.00	0.00
P-350	Open	809	8	Ductile Iro	130	1.7	2,974.99	2,974.99	0.01	0.00	0.00
P-360	Open	230	8	Ductile Iro	130	-7.4	2,975.14	2,975.14	0.05	0.00	0.00
P-370	Open	16,592	16	Ductile Iro	130	119.0	2,974.20	2,974.00	0.19	0.01	0.20
P-380	Open	4,600	12	Ductile Iro	130	-119.0	2,974.20	2,974.43	0.34	0.05	0.23
P-390	Open	917	8	Ductile Iro	130	-3.4	2,974.92	2,974.92	0.02	0.00	0.00
P-400	Open	1,035	8	Ductile Iro	130	62.1	2,975.11	2,975.00	0.40	0.11	0.11
P-410	Open	506	12	Ductile Iro	130	63.8	2,975.12	2,975.11	0.18	0.02	0.01
P-420	Open	432	12	Ductile Iro	130	-62.7	2,975.11	2,975.11	0.18	0.01	0.01
P-430	Open	463	8	Ductile Iro	130	0.0	2,975.11	2,975.11	0.00	0.00	0.00
P-440	Open	1,137	6	Ductile Iro	130	-1.7	2,975.14	2,975.14	0.02	0.00	0.00
P-470	Open	467	12	Ductile Iro	130	166.4	2,975.21	2,975.17	0.47	0.09	0.04
P-480	Open	651	8	Ductile Iro	130	1.4	2,830.04	2,830.04	0.01	0.00	0.00
P-490	Open	827	8	Ductile Iro	130	-36.5	2,975.14	2,975.17	0.23	0.04	0.03
P-500	Open	728	8	Ductile Iro	130	0.7	2,830.04	2,830.04	0.00	0.00	0.00
P-510	Open	841	8	Ductile Iro	130	-77.2	2,974.99	2,975.13	0.49	0.16	0.13
P-520	Open	730	12	Ductile Iro	130	46.5	2,975.13	2,975.12	0.13	0.01	0.01
P-530	Open	768	12	Ductile Iro	130	130.0	2,975.17	2,975.13	0.37	0.06	0.04
P-550	Open	100	12	Ductile Iro	130	166.4	2,726.00	2,725.99	0.47	0.09	0.01
P-560	Open	100	12	Ductile Iro	130	166.4	2,975.22	2,975.21	0.47	0.09	0.01
P-570	Closed	2,880	12	Ductile Iro	130	0.0	2,975.11	2,975.12	0.00	0.00	0.00
P-580	Open	634	8	Ductile Iro	130	0.0	2,975.12	2,975.12	0.00	0.00	0.00

Steady State Analysis
Pipe Report

Label	Initial Status	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Calculated Friction Headloss (ft)
P-590	Open	673	12	Ductile Iro	130	-0.0	2,975.12	2,975.12	0.00	0.00	0.00

Steady State Analysis
Pipe Report

Label	Initial Status	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Calculated Friction Headloss (ft)
P-30	Open	1,100	8	Ductile Iro	130	-50.1	2,974.51	2,974.59	0.32	0.07	0.08
P-90	Open	502	8	Ductile Iro	130	-65.1	2,974.57	2,974.63	0.42	0.12	0.06
P-170	Open	496	8	Ductile Iro	130	53.5	2,974.63	2,974.59	0.34	0.08	0.04
P-200	Open	789	8	Ductile Iro	130	-24.9	2,974.74	2,974.76	0.16	0.02	0.02
P-210	Open	1,027	8	Ductile Iro	130	6.8	2,974.76	2,974.75	0.04	0.00	0.00
P-250	Open	1,181	8	Ductile Iro	130	16.2	2,974.74	2,974.73	0.10	0.01	0.01
P-270	Open	774	8	Ductile Iro	130	11.5	2,974.73	2,974.73	0.07	0.00	0.00
P-280	Open	1,110	8	Ductile Iro	130	5.4	2,974.73	2,974.73	0.03	0.00	0.00
P-300	Open	752	8	Ductile Iro	130	-40.7	2,974.48	2,974.51	0.26	0.05	0.04
P-320	Open	137	8	Ductile Iro	130	4.1	2,974.51	2,974.51	0.03	0.00	0.00
P-340	Open	93	8	Ductile Iro	130	-4.1	2,830.04	2,830.04	0.03	0.00	0.00
P-350	Open	809	8	Ductile Iro	130	3.4	2,974.63	2,974.63	0.02	0.00	0.00
P-360	Open	230	8	Ductile Iro	130	-14.9	2,974.76	2,974.76	0.09	0.01	0.00
P-370	Open	16,592	16	Ductile Iro	130	91.0	2,974.12	2,974.00	0.15	0.01	0.12
P-380	Open	4,600	12	Ductile Iro	130	-91.0	2,974.12	2,974.26	0.26	0.03	0.14
P-390	Open	917	8	Ductile Iro	130	-6.8	2,974.57	2,974.57	0.04	0.00	0.00
P-400	Open	1,035	8	Ductile Iro	130	58.2	2,974.73	2,974.63	0.37	0.09	0.10
P-440	Open	1,137	6	Ductile Iro	130	-3.4	2,974.75	2,974.76	0.04	0.00	0.00
P-470	Open	467	12	Ductile Iro	130	185.8	2,974.86	2,974.80	0.53	0.11	0.05
P-490	Open	827	8	Ductile Iro	130	-43.8	2,974.76	2,974.80	0.28	0.06	0.05
P-420	Open	432	12	Ductile Iro	130	-59.6	2,974.73	2,974.73	0.17	0.01	0.01
P-410	Open	506	12	Ductile Iro	130	61.6	2,974.74	2,974.73	0.17	0.01	0.01
P-430	Open	463	8	Ductile Iro	130	0.0	2,974.73	2,974.73	0.00	0.00	0.00
P-480	Open	651	8	Ductile Iro	130	2.7	2,830.04	2,830.04	0.02	0.00	0.00
P-500	Open	728	8	Ductile Iro	130	1.4	2,830.04	2,830.04	0.01	0.00	0.00
P-510	Open	841	8	Ductile Iro	130	-73.2	2,974.63	2,974.75	0.47	0.14	0.12
P-520	Open	730	12	Ductile Iro	130	56.3	2,974.75	2,974.74	0.16	0.01	0.01
P-530	Open	768	12	Ductile Iro	130	142.0	2,974.80	2,974.75	0.40	0.07	0.05
P-550	Open	100	12	Ductile Iro	130	185.8	2,726.00	2,725.99	0.53	0.11	0.01
P-560	Open	100	12	Ductile Iro	130	185.8	2,974.87	2,974.86	0.53	0.11	0.01
P-580	Open	634	8	Ductile Iro	130	0.0	2,974.73	2,974.73	0.00	0.00	0.00
P-570	Closed	2,880	12	Ductile Iro	130	0.0	2,974.73	2,974.73	0.00	0.00	0.00
P-590	Open	673	12	Ductile Iro	130	0.0	2,974.73	2,974.73	0.00	0.00	0.00
P-330	Open	325	8	Ductile Iro	130	-54.3	2,974.48	2,974.50	0.35	0.08	0.03
P-60	Open	737	8	Ductile Iro	130	-57.7	2,974.50	2,974.57	0.37	0.09	0.07

Steady State Analysis
Pipe Report

Label	Initial Status	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Calculated Friction Headloss (ft)
P-10	Open	1,004	8	Ductile Iro	130	-91.0	2,974.26	2,974.48	0.58	0.22	0.22

Steady State Analysis
Pipe Report

Label	Initial Status	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Calculated Friction Headloss (ft)
P-30	Open	1,100	8	Ductile Iro	130	-34.8	2,974.12	2,974.16	0.22	0.04	0.04
P-90	Open	502	8	Ductile Iro	130	-49.4	2,974.15	2,974.19	0.32	0.07	0.04
P-170	Open	496	8	Ductile Iro	130	40.7	2,974.18	2,974.16	0.26	0.05	0.02
P-200	Open	789	8	Ductile Iro	130	-19.6	2,974.27	2,974.28	0.13	0.01	0.01
P-210	Open	1,027	8	Ductile Iro	130	11.8	2,974.27	2,974.27	0.08	0.00	0.01
P-250	Open	1,181	8	Ductile Iro	130	28.4	2,974.27	2,974.24	0.18	0.02	0.03
P-270	Open	774	8	Ductile Iro	130	20.1	2,974.24	2,974.23	0.13	0.01	0.01
P-280	Open	1,110	8	Ductile Iro	130	9.5	2,974.23	2,974.22	0.06	0.00	0.00
P-300	Open	752	8	Ductile Iro	130	-18.3	2,974.11	2,974.12	0.12	0.01	0.01
P-320	Open	137	8	Ductile Iro	130	7.1	2,974.12	2,974.12	0.05	0.00	0.00
P-340	Open	93	8	Ductile Iro	130	-7.1	2,830.04	2,830.04	0.05	0.00	0.00
P-350	Open	809	8	Ductile Iro	130	5.9	2,974.19	2,974.18	0.04	0.00	0.00
P-360	Open	230	8	Ductile Iro	130	-26.0	2,974.27	2,974.28	0.17	0.02	0.00
P-370	Open	16,592	16	Ductile Iro	130	41.7	2,974.03	2,974.00	0.07	0.00	0.03
P-380	Open	4,600	12	Ductile Iro	130	-41.7	2,974.03	2,974.06	0.12	0.01	0.03
P-390	Open	917	8	Ductile Iro	130	-11.8	2,974.15	2,974.15	0.08	0.00	0.00
P-400	Open	1,035	8	Ductile Iro	130	49.0	2,974.26	2,974.18	0.31	0.07	0.07
P-440	Open	1,137	6	Ductile Iro	130	-5.9	2,974.26	2,974.27	0.07	0.01	0.01
P-470	Open	467	12	Ductile Iro	130	207.7	2,974.41	2,974.34	0.59	0.14	0.06
P-490	Open	827	8	Ductile Iro	130	-52.7	2,974.28	2,974.34	0.34	0.08	0.06
P-420	Open	432	12	Ductile Iro	130	-51.3	2,974.26	2,974.26	0.15	0.01	0.00
P-410	Open	506	12	Ductile Iro	130	54.9	2,974.27	2,974.26	0.16	0.01	0.01
P-430	Open	463	8	Ductile Iro	130	0.0	2,974.26	2,974.26	0.00	0.00	0.00
P-480	Open	651	8	Ductile Iro	130	4.7	2,830.04	2,830.04	0.03	0.00	0.00
P-500	Open	728	8	Ductile Iro	130	2.4	2,830.04	2,830.04	0.02	0.00	0.00
P-510	Open	841	8	Ductile Iro	130	-63.6	2,974.19	2,974.28	0.41	0.11	0.09
P-520	Open	730	12	Ductile Iro	130	69.5	2,974.28	2,974.27	0.20	0.02	0.01
P-530	Open	768	12	Ductile Iro	130	155.0	2,974.34	2,974.28	0.44	0.08	0.06
P-550	Open	100	12	Ductile Iro	130	207.7	2,726.00	2,725.99	0.59	0.14	0.01
P-560	Open	100	12	Ductile Iro	130	207.7	2,974.42	2,974.41	0.59	0.14	0.01
P-580	Open	634	8	Ductile Iro	130	0.0	2,974.22	2,974.22	0.00	0.00	0.00
P-570	Closed	2,880	12	Ductile Iro	130	0.0	2,974.26	2,974.22	0.00	0.00	0.00
P-590	Open	673	12	Ductile Iro	130	0.0	2,974.22	2,974.22	0.00	0.00	0.00
P-330	Open	325	8	Ductile Iro	130	-30.5	2,974.11	2,974.12	0.19	0.03	0.01
P-60	Open	737	8	Ductile Iro	130	-36.4	2,974.12	2,974.15	0.23	0.04	0.03

Steady State Analysis
Pipe Report

Label	Initial Status	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Calculated Friction Headloss (ft)
P-10	Open	1,004	8	Ductile Iro	130	-41.7	2,974.06	2,974.11	0.27	0.05	0.05

Steady State Analysis
Pump Report

Label	Elevation (ft)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Pump Head (ft)	Calculated Water Power (Hp)	Pump Definition
PMP-1	2,720	On	2,725.99	2,975.22	166.4	249.23	10.47	Pump Definition - 1

Steady State Analysis
Pump Report

Label	Elevation (ft)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Pump Head (ft)	Calculated Water Power (Hp)	Pump Definition
PMP-1	2,720	On	2,725.99	2,974.87	185.8	248.88	11.68	Pump Definition - 1

Steady State Analysis
Pump Report

Label	Elevation (ft)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Pump Head (ft)	Calculated Water Power (Hp)	Pump Definition
PMP-1	2,720	On	2,725.99	2,974.42	207.7	248.43	13.03	Pump Definition - 1

Scenario: Option 1 Average-Da
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-10	2,974	Zone - 13	119.0	2,974.00

Scenario: Option 1 Maximum-Da
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-10	2,974	Zone - 13	91.0	2,974.00

Scenario: Option 1 Peak-Hour
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-10	2,974	Zone - 13	41.7	2,974.00

Steady State Analysis
Tank Report

Label	Zone	Base Elevation (ft)	Minimum Elevation (ft)	Initial HGL (ft)	Maximum Elevation (ft)	Tank Diameter (ft)	Inflow (gpm)	Current Status	Calculated Hydraulic Grade (ft)	Calculated Percent Full (%)
T-1	Zone - 12	2,720	2,720	2,726	2,727	20.00	-166.4	Draining	2,726.00	85.7

Steady State Analysis
Tank Report

Label	Zone	Base Elevation (ft)	Minimum Elevation (ft)	Initial HGL (ft)	Maximum Elevation (ft)	Tank Diameter (ft)	Inflow (gpm)	Current Status	Calculated Hydraulic Grade (ft)	Calculated Percent Full (%)
T-1	Zone - 12	2,720	2,720	2,726	2,727	20.00	-185.8	Draining	2,726.00	85.7

Steady State Analysis
Tank Report

Label	Zone	Base Elevation (ft)	Minimum Elevation (ft)	Initial HGL (ft)	Maximum Elevation (ft)	Tank Diameter (ft)	Inflow (gpm)	Current Status	Calculated Hydraulic Grade (ft)	Calculated Percent Full (%)
T-1	Zone - 12	2,720	2,720	2,726	2,727	20.00	-207.7	Draining	2,726.00	85.7

Steady State Analysis
Valve Report

Label	Elevation (ft)	Initial HGL (ft)	Diameter (in)	Minor Loss Coefficient	Initial Valve Status	Control Status	Discharge (gpm)	From HGL (ft)	To HGL (ft)	Headloss (ft)
PRV-1	2,705	2,830.00	6	0.00	Active	Throttling	7.1	2,974.12	2,830.04	144.08

APPENDIX B

OPTION 2:

Water Demand Calculations

Project: *Sereno Canyon*
Location: *City of Scottsdale, Arizona*
Date: *31-Oct-05*
References: *City of Scottsdale Design Standards and Policy Manual*

Project Number: 042054.15
Project Engineer: Gordon Wark, P.E

		RESIDENTIAL		NON-RESIDENTIAL		AVERAGE DAY DEMAND		MAXIMUM DAY DEMAND		PEAK HOUR DEMAND	
WATERCAD NODE	ELEV.	DWELLING UNIT < 2 du/acre	ADD/ UNIT (GPD)	AREA (AC.)	ADD/ AC. (GPD)	(GPD)	(GPM)	(GPD)	(GPM)	(GPD)	(GPM)
J-10	2,735	10	486			4,860	3.4	9,720	6.8	17,010	11.8
J-20	2,705	6	486			2,916	2.0	5,832	4.1	10,206	7.1
J-30	2,707	4	486			1,944	1.4	3,888	2.7	6,804	4.7
J-40	2,640	7	486			3,402	2.4	6,804	4.7	11,907	8.3
J-50	2,745	4	486			1,944	1.4	3,888	2.7	6,804	4.7
J-80	2,747	6	486			2,916	2.0	5,832	4.1	10,206	7.1
J-100	2,767	3	486			1,458	1.0	2,916	2.0	5,103	3.5
J-110	2,719										
J-120	2,760										
J-140	2,725	9	486			4,374	3.0	8,748	6.1	15,309	10.6
J-150	2,780	2	486			972	0.7	1,944	1.4	3,402	2.4
J-160	2,773	7	486			3,402	2.4	6,804	4.7	11,907	8.3
J-170	2,830	10	486			4,860	3.4	9,720	6.8	17,010	11.8
J-180	2,810	6	486			2,916	2.0	5,832	4.1	10,206	7.1
J-190	2,788	2	486			972	0.7	1,944	1.4	3,402	2.4
J-200	2,800	5	486			2,430	1.7	4,860	3.4	8,505	5.9
J-210	2,760	7	486			3,402	2.4	6,804	4.7	11,907	8.3
J-220	2,783	9	486			4,374	3.0	8,748	6.1	15,309	10.6
J-230	2,695	4	486			1,944	1.4	3,888	2.7	6,804	4.7
J-240	2,735	5	486			2,430	1.7	4,860	3.4	8,505	5.9
J-250	2,695	6	486			2,916	2.0	5,832	4.1	10,206	7.1
J-260	2,728	5	486			2,430	1.7	4,860	3.4	8,505	5.9
J-270	2,780	8	486			3,888	2.7	7,776	5.4	13,608	9.5
J-280	2,730										
J-290	2,750										
J-300	2,735										
J-310	2,750	5	486			2,430	1.7	4,860	3.4	8,505	5.9
J-320	2,755	4	486			1,944	1.4	3,888	2.7	6,804	4.7
J-330 (1)	2,745	1	486			486	0.3	972	0.7	1,701	1.2
J-340	2,745	3	486			1,458	1.0	2,916	2.0	5,103	3.5
J-350	2,753	2	486			972	0.7	1,944	1.4	3,402	2.4
J-360	2,814	4	486			1,944	1.4	3,888	2.7	6,804	4.7
J-370	2,695	2	486			972	0.7	1,944	1.4	3,402	2.4
J-380	2,767			10,000	0.9	9,000	6.3	18,000	12.5	31,500	21.9
J-390	2,781										
J-400	2,730										
	Total	***146***		***10,000***		***79,956***	***56***	***159,912***	***111***	***279,846***	***194***

Notes:
(1) 10,000 square feet = 5,000 sq.ft. Clubhouse plus 5,000 sq.ft. lawn area. Reference: E-mail from Steven Voss (located under Appendix C).

OPTION 2:

WaterCAD Modeling Results

Fire Flow Analysis
Fire Flow Report

Label	Elevation (ft)	Zone	Phase	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Pressure (psi)	Calculated Hydraulic Grade (ft)	Calculated Residual Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction
J-10	2,735.00	Zone - 13		true	500.0	506.8	606.7	104	2,974.24	100	60	J-170
J-20	2,705.00	Zone - 13		true	500.0	504.7	604.7	116	2,974.24	113	60	J-170
J-30	2,707.00	Zone - 13		true	500.0	504.1	604.0	116	2,974.29	111	60	J-170
J-40	2,640.00	Zone - 12		true	500.0	505.9	605.9	82	2,830.03	74	50	J-370
J-50	2,745.00	Zone - 13		true	500.0	507.4	607.4	99	2,974.28	95	60	J-170
J-80	2,747.00	Zone - 13		true	500.0	504.7	604.7	98	2,974.33	94	60	J-170
J-100	2,767.00	Zone - 13		true	1,500.0	1,500.0	1,600.0	90	2,974.41	70	43	J-170
J-110	2,719.00	Zone - 13		true	500.0	500.0	600.0	111	2,974.54	107	59	J-170
J-120	2,760.00	Zone - 13		true	500.0	500.0	600.0	93	2,974.41	88	59	J-170
J-140	2,725.00	Zone - 13		true	500.0	506.8	606.7	108	2,974.33	104	59	J-170
J-150	2,780.00	Zone - 13		true	500.0	500.0	600.0	84	2,974.42	81	59	J-170
J-160	2,773.00	Zone - 13		true	500.0	505.4	605.4	87	2,974.43	83	59	J-170
J-170	2,830.00	Zone - 13		true	500.0	507.4	607.4	62	2,974.42	57	65	J-360
J-180	2,810.00	Zone - 13		true	500.0	504.0	604.0	71	2,974.41	66	58	J-170
J-190	2,788.00	Zone - 13		true	500.0	504.1	604.0	81	2,974.42	77	59	J-170
J-200	2,800.00	Zone - 13		true	500.0	505.4	605.4	75	2,974.41	70	58	J-170
J-210	2,760.00	Zone - 13		true	500.0	505.4	605.4	93	2,974.41	82	58	J-170
J-220	2,783.00	Zone - 13		true	500.0	505.4	605.4	83	2,974.41	75	58	J-170
J-230	2,695.00	Zone - 12		true	500.0	502.7	602.7	58	2,830.03	45	45	J-370
J-240	2,735.00	Zone - 13		true	500.0	504.1	604.0	104	2,974.22	100	60	J-170
J-250	2,695.00	Zone - 12		true	500.0	502.7	602.7	58	2,830.04	57	57	J-370
J-260	2,728.00	Zone - 13		true	500.0	504.1	604.0	107	2,974.33	100	60	J-170
J-270	2,780.00	Zone - 13		true	500.0	506.8	606.7	84	2,974.43	80	58	J-170
J-280	2,730.00	Zone - 13		true	500.0	500.0	600.0	106	2,974.12	104	61	J-170
J-290	2,750.00	Zone - 13		true	500.0	500.0	600.0	97	2,974.06	96	62	J-170
J-300	2,735.00	Zone - 13		true	500.0	500.0	600.0	104	2,974.48	100	59	J-170
J-310	2,750.00	Zone - 13		true	500.0	503.4	603.4	97	2,974.28	90	60	J-170
J-320	2,755.00	Zone - 13		true	500.0	502.7	602.7	95	2,974.43	87	58	J-170
J-330	2,745.00	Zone - 13		true	500.0	513.2	613.2	99	2,974.41	96	59	J-170
J-340	2,745.00	Zone - 13		true	500.0	502.0	602.0	99	2,974.28	93	60	J-170
J-350	2,753.00	Zone - 13		true	500.0	501.4	601.3	96	2,974.28	91	60	J-170
J-360	2,814.00	Zone - 13		true	500.0	502.7	602.7	69	2,974.41	63	58	J-170
J-370	2,695.00	Zone - 12		true	500.0	501.4	601.3	58	2,830.03	44	45	J-230
J-380	2,767.00	Zone - 13		true	1,500.0	1,500.0	1,600.0	90	2,974.44	71	44	J-170
J-390	2,781.00	Zone - 13		true	500.0	500.0	600.0	84	2,974.41	71	58	J-170

Fire Flow Analysis

Fire Flow Report

Label	Elevation (ft)	Zone	Phase	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Pressure (psi)	Calculated Hydraulic Grade (ft)	Calculated Residual Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction
J-400	2,730.00	Zone - 13		true	500.0	500.0	600.0	106	2,974.41	94	58	J-170

Scenario: Option 2 Average-Day
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	2,735.00	Zone - 13	3.4	2,974.68	104
J-20	2,705.00	Zone - 13	2.0	2,974.69	117
J-30	2,707.00	Zone - 13	1.4	2,974.78	116
J-40	2,640.00	Zone - 12	2.4	2,830.04	82
J-50	2,745.00	Zone - 13	1.4	2,974.76	99
J-80	2,747.00	Zone - 13	2.0	2,974.83	99
J-100	2,767.00	Zone - 13	1.0	2,974.93	90
J-110	2,719.00	Zone - 13	0.0	2,975.03	111
J-120	2,760.00	Zone - 13	0.0	2,974.93	93
J-140	2,725.00	Zone - 13	3.0	2,974.83	108
J-150	2,780.00	Zone - 13	0.7	2,974.94	84
J-160	2,773.00	Zone - 13	2.4	2,974.95	87
J-170	2,830.00	Zone - 13	3.4	2,974.95	63
J-180	2,810.00	Zone - 13	2.0	2,974.94	71
J-190	2,788.00	Zone - 13	0.7	2,974.94	81
J-200	2,800.00	Zone - 13	1.7	2,974.94	76
J-210	2,760.00	Zone - 13	2.4	2,974.94	93
J-220	2,783.00	Zone - 13	3.0	2,974.94	83
J-230	2,695.00	Zone - 12	1.4	2,830.04	58
J-240	2,735.00	Zone - 13	1.7	2,974.65	104
J-250	2,695.00	Zone - 12	2.0	2,830.04	58
J-260	2,728.00	Zone - 13	1.7	2,974.83	107
J-270	2,780.00	Zone - 13	2.7	2,974.95	84
J-280	2,730.00	Zone - 13	0.0	2,974.34	106
J-290	2,750.00	Zone - 13	0.0	2,974.16	97
J-300	2,735.00	Zone - 13	0.0	2,974.99	104
J-310	2,750.00	Zone - 13	1.7	2,974.76	97
J-320	2,755.00	Zone - 13	1.4	2,974.95	95
J-330	2,745.00	Zone - 13	0.3	2,974.93	99
J-340	2,745.00	Zone - 13	1.0	2,974.76	99
J-350	2,753.00	Zone - 13	0.7	2,974.76	96
J-360	2,814.00	Zone - 13	1.4	2,974.94	70
J-370	2,695.00	Zone - 12	0.7	2,830.04	58
J-380	2,767.00	Zone - 13	6.2	2,974.95	90
J-390	2,781.00	Zone - 13	0.0	2,974.94	84
J-400	2,730.00	Zone - 13	0.0	2,974.94	106

Scenario: Option 2 Maximum-Da
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	2,735.00	Zone - 13	6.8	2,974.31	104
J-20	2,705.00	Zone - 13	4.1	2,974.31	117
J-30	2,707.00	Zone - 13	2.7	2,974.38	116
J-40	2,640.00	Zone - 12	4.7	2,830.04	82
J-50	2,745.00	Zone - 13	2.7	2,974.37	99
J-80	2,747.00	Zone - 13	4.1	2,974.42	98
J-100	2,767.00	Zone - 13	2.0	2,974.50	90
J-110	2,719.00	Zone - 13	0.0	2,974.62	111
J-120	2,760.00	Zone - 13	0.0	2,974.50	93
J-140	2,725.00	Zone - 13	6.1	2,974.41	108
J-150	2,780.00	Zone - 13	1.4	2,974.51	84
J-160	2,773.00	Zone - 13	4.7	2,974.52	87
J-170	2,830.00	Zone - 13	6.8	2,974.51	63
J-180	2,810.00	Zone - 13	4.1	2,974.50	71
J-190	2,788.00	Zone - 13	1.4	2,974.51	81
J-200	2,800.00	Zone - 13	3.4	2,974.50	75
J-210	2,760.00	Zone - 13	4.7	2,974.50	93
J-220	2,783.00	Zone - 13	6.1	2,974.50	83
J-230	2,695.00	Zone - 12	2.7	2,830.03	58
J-240	2,735.00	Zone - 13	3.4	2,974.29	104
J-250	2,695.00	Zone - 12	4.1	2,830.04	58
J-260	2,728.00	Zone - 13	3.4	2,974.42	107
J-270	2,780.00	Zone - 13	5.4	2,974.51	84
J-280	2,730.00	Zone - 13	0.0	2,974.16	106
J-290	2,750.00	Zone - 13	0.0	2,974.07	97
J-300	2,735.00	Zone - 13	0.0	2,974.57	104
J-310	2,750.00	Zone - 13	3.4	2,974.37	97
J-320	2,755.00	Zone - 13	2.7	2,974.51	95
J-330	2,745.00	Zone - 13	0.7	2,974.50	99
J-340	2,745.00	Zone - 13	2.0	2,974.37	99
J-350	2,753.00	Zone - 13	1.4	2,974.37	96
J-360	2,814.00	Zone - 13	2.7	2,974.50	69
J-370	2,695.00	Zone - 12	1.4	2,830.03	58
J-380	2,767.00	Zone - 13	12.5	2,974.52	90
J-390	2,781.00	Zone - 13	0.0	2,974.50	84
J-400	2,730.00	Zone - 13	0.0	2,974.50	106

Scenario: Option 2 Peak-Hour
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	2,735.00	Zone - 13	11.8	2,974.00	103
J-20	2,705.00	Zone - 13	7.1	2,974.00	116
J-30	2,707.00	Zone - 13	4.7	2,974.02	116
J-40	2,640.00	Zone - 12	8.3	2,830.02	82
J-50	2,745.00	Zone - 13	4.7	2,974.02	99
J-80	2,747.00	Zone - 13	7.1	2,974.04	98
J-100	2,767.00	Zone - 13	3.5	2,974.09	90
J-110	2,719.00	Zone - 13	0.0	2,974.22	110
J-120	2,760.00	Zone - 13	0.0	2,974.09	93
J-140	2,725.00	Zone - 13	10.6	2,974.04	108
J-150	2,780.00	Zone - 13	2.4	2,974.09	84
J-160	2,773.00	Zone - 13	8.3	2,974.10	87
J-170	2,830.00	Zone - 13	11.8	2,974.07	62
J-180	2,810.00	Zone - 13	7.1	2,974.07	71
J-190	2,788.00	Zone - 13	2.4	2,974.09	81
J-200	2,800.00	Zone - 13	5.9	2,974.07	75
J-210	2,760.00	Zone - 13	8.3	2,974.05	93
J-220	2,783.00	Zone - 13	10.6	2,974.06	83
J-230	2,695.00	Zone - 12	4.7	2,830.02	58
J-240	2,735.00	Zone - 13	5.9	2,974.00	103
J-250	2,695.00	Zone - 12	7.1	2,830.04	58
J-260	2,728.00	Zone - 13	5.9	2,974.04	106
J-270	2,780.00	Zone - 13	9.4	2,974.09	84
J-280	2,730.00	Zone - 13	0.0	2,974.00	106
J-290	2,750.00	Zone - 13	0.0	2,974.00	97
J-300	2,735.00	Zone - 13	0.0	2,974.16	103
J-310	2,750.00	Zone - 13	5.9	2,974.01	97
J-320	2,755.00	Zone - 13	4.7	2,974.09	95
J-330	2,745.00	Zone - 13	1.2	2,974.09	99
J-340	2,745.00	Zone - 13	3.5	2,974.01	99
J-350	2,753.00	Zone - 13	2.4	2,974.01	96
J-360	2,814.00	Zone - 13	4.7	2,974.07	69
J-370	2,695.00	Zone - 12	2.4	2,830.02	58
J-380	2,767.00	Zone - 13	21.9	2,974.11	90
J-390	2,781.00	Zone - 13	0.0	2,974.05	84
J-400	2,730.00	Zone - 13	0.0	2,974.05	106

Steady State Analysis
Pipe Report

Label	Initial Status	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Calculated Friction Headloss (ft)
P-10	Open	1,072.00	8.0	Ductile Iro	130.0	-105.5	2,974.34	2,974.65	0.67	0.28	0.30
P-30	Open	1,083.00	8.0	Ductile Iro	130.0	-54.8	2,974.69	2,974.78	0.35	0.08	0.09
P-40	Open	1,490.00	8.0	Ductile Iro	130.0	-2.0	2,830.04	2,830.04	0.01	0.00	0.00
P-60	Open	734.00	8.0	Ductile Iro	130.0	-64.2	2,974.68	2,974.76	0.41	0.11	0.08
P-90	Open	495.00	8.0	Ductile Iro	130.0	-69.0	2,974.76	2,974.83	0.44	0.13	0.06
P-150	Open	471.00	8.0	Ductile Iro	130.0	0.0	2,974.93	2,974.93	0.00	0.00	0.00
P-170	Open	521.00	8.0	Ductile Iro	130.0	56.1	2,974.83	2,974.78	0.36	0.09	0.05
P-190	Open	508.00	12.0	Ductile Iro	130.0	-60.5	2,974.93	2,974.94	0.17	0.01	0.01
P-200	Open	791.00	8.0	Ductile Iro	130.0	-20.3	2,974.94	2,974.95	0.13	0.01	0.01
P-210	Open	1,061.00	8.0	Ductile Iro	130.0	11.3	2,974.95	2,974.95	0.07	0.00	0.00
P-220	Open	1,505.00	8.0	Ductile Iro	130.0	8.0	2,974.95	2,974.94	0.05	0.00	0.00
P-240	Open	292.00	8.0	Ductile Iro	130.0	3.2	2,974.94	2,974.94	0.02	0.00	0.00
P-250	Open	894.00	8.0	Ductile Iro	130.0	2.5	2,974.94	2,974.94	0.02	0.00	0.00
P-260	Open	472.00	8.0	Ductile Iro	130.0	-5.9	2,974.94	2,974.94	0.04	0.00	0.00
P-270	Open	774.00	8.0	Ductile Iro	130.0	5.4	2,974.94	2,974.94	0.03	0.00	0.00
P-280	Open	1,123.00	8.0	Ductile Iro	130.0	2.4	2,974.94	2,974.94	0.02	0.00	0.00
P-300	Open	748.00	8.0	Ductile Iro	130.0	-46.4	2,974.65	2,974.69	0.30	0.06	0.05
P-310	Open	2,220.00	8.0	Ductile Iro	130.0	4.4	2,830.04	2,830.04	0.03	0.00	0.00
P-320	Open	93.00	8.0	Ductile Iro	130.0	6.4	2,974.69	2,974.69	0.04	0.00	0.00
P-330	Open	337.00	8.0	Ductile Iro	130.0	-60.9	2,974.65	2,974.68	0.39	0.10	0.03
P-340	Open	471.00	8.0	Ductile Iro	130.0	-6.4	2,830.04	2,830.04	0.04	0.00	0.00
P-350	Open	817.00	8.0	Ductile Iro	130.0	1.7	2,974.83	2,974.83	0.01	0.00	0.00
P-360	Open	239.00	8.0	Ductile Iro	130.0	-15.4	2,974.95	2,974.95	0.10	0.01	0.00
P-370	Open	16,592.00	16.0	Ductile Iro	130.0	105.5	2,974.16	2,974.00	0.17	0.01	0.16
P-380	Open	4,600.00	12.0	Ductile Iro	130.0	-105.5	2,974.16	2,974.34	0.30	0.04	0.18
P-400	Open	501.00	12.0	Ductile Iro	130.0	161.1	2,975.03	2,974.99	0.46	0.09	0.04
P-410	Open	835.00	8.0	Ductile Iro	130.0	38.0	2,974.99	2,974.95	0.24	0.04	0.04
P-460	Open	1,127.00	8.0	Ductile Iro	130.0	1.4	2,974.95	2,974.95	0.01	0.00	0.00
P-480	Open	1,014.00	8.0	Ductile Iro	130.0	-59.2	2,974.83	2,974.93	0.38	0.10	0.10
P-490	Open	445.00	12.0	Ductile Iro	130.0	-59.5	2,974.93	2,974.93	0.17	0.01	0.01
P-500	Open	294.00	8.0	Ductile Iro	130.0	3.4	2,974.76	2,974.76	0.02	0.00	0.00
P-510	Open	560.00	8.0	Ductile Iro	130.0	1.7	2,974.76	2,974.76	0.01	0.00	0.00
P-520	Open	606.00	8.0	Ductile Iro	130.0	-1.0	2,974.76	2,974.76	0.01	0.00	0.00
P-530	Open	451.00	8.0	Ductile Iro	130.0	1.4	2,974.94	2,974.94	0.01	0.00	0.00
P-550	Open	206.00	8.0	Ductile Iro	130.0	-0.0	2,830.04	2,830.04	0.00	0.00	0.00

Steady State Analysis
Pipe Report

Label	Initial Status	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Calculated Friction Headloss (ft)
P-560	Open	517.00	8.0	Ductile Iro	130.0	-0.7	2,830.04	2,830.04	0.00	0.00	0.00
P-580	Open	841.00	8.0	Ductile Iro	130.0	-72.7	2,974.83	2,974.95	0.46	0.14	0.12
P-590	Open	742.00	12.0	Ductile Iro	130.0	44.1	2,974.95	2,974.94	0.13	0.01	0.01
P-600	Open	774.00	12.0	Ductile Iro	130.0	123.0	2,974.99	2,974.95	0.35	0.05	0.04
P-620	Open	138.00	8.0	Ductile Iro	130.0	0.0	2,974.78	2,974.78	0.00	0.00	0.00
P-630	Open	100.00	12.0	Ductile Iro	130.0	161.1	2,726.00	2,725.99	0.46	0.09	0.01
P-640	Open	22.00	12.0	Ductile Iro	130.0	161.1	2,975.03	2,975.03	0.46	0.09	0.00
P-650	Open	678.00	12.0	Ductile Iro	130.0	-0.0	2,974.94	2,974.94	0.00	0.00	0.00
P-660	Open	666.00	8.0	Ductile Iro	130.0	0.0	2,974.94	2,974.94	0.00	0.00	0.00
P-670	Closed	2,899.00	12.0	Ductile Iro	130.0	0.0	2,974.94	2,974.93	0.00	0.00	0.00

Steady State Analysis
Pipe Report

Label	Initial Status	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Calculated Friction Headloss (ft)
P-10	Open	1,072.00	8.0	Ductile Iro	130.0	-69.1	2,974.16	2,974.29	0.44	0.13	0.14
P-30	Open	1,083.00	8.0	Ductile Iro	130.0	-45.7	2,974.31	2,974.38	0.29	0.06	0.07
P-40	Open	1,490.00	8.0	Ductile Iro	130.0	-4.0	2,830.03	2,830.04	0.03	0.00	0.00
P-60	Open	734.00	8.0	Ductile Iro	130.0	-50.4	2,974.31	2,974.37	0.32	0.07	0.05
P-90	Open	495.00	8.0	Ductile Iro	130.0	-59.8	2,974.37	2,974.42	0.38	0.10	0.05
P-150	Open	471.00	8.0	Ductile Iro	130.0	0.0	2,974.50	2,974.50	0.00	0.00	0.00
P-170	Open	521.00	8.0	Ductile Iro	130.0	48.4	2,974.41	2,974.38	0.31	0.07	0.03
P-190	Open	508.00	12.0	Ductile Iro	130.0	-57.2	2,974.50	2,974.51	0.16	0.01	0.01
P-200	Open	791.00	8.0	Ductile Iro	130.0	-17.6	2,974.51	2,974.52	0.11	0.01	0.01
P-210	Open	1,061.00	8.0	Ductile Iro	130.0	14.6	2,974.51	2,974.51	0.09	0.01	0.01
P-220	Open	1,505.00	8.0	Ductile Iro	130.0	7.9	2,974.51	2,974.50	0.05	0.00	0.00
P-240	Open	292.00	8.0	Ductile Iro	130.0	14.4	2,974.51	2,974.51	0.09	0.01	0.00
P-250	Open	894.00	8.0	Ductile Iro	130.0	13.1	2,974.51	2,974.50	0.08	0.01	0.01
P-260	Open	472.00	8.0	Ductile Iro	130.0	-3.8	2,974.50	2,974.50	0.02	0.00	0.00
P-270	Open	774.00	8.0	Ductile Iro	130.0	10.8	2,974.50	2,974.50	0.07	0.00	0.00
P-280	Open	1,123.00	8.0	Ductile Iro	130.0	4.7	2,974.50	2,974.50	0.03	0.00	0.00
P-300	Open	748.00	8.0	Ductile Iro	130.0	-28.8	2,974.29	2,974.31	0.18	0.03	0.02
P-310	Open	2,220.00	8.0	Ductile Iro	130.0	8.8	2,830.04	2,830.04	0.06	0.00	0.01
P-320	Open	93.00	8.0	Ductile Iro	130.0	12.8	2,974.31	2,974.31	0.08	0.01	0.00
P-330	Open	337.00	8.0	Ductile Iro	130.0	-43.6	2,974.29	2,974.31	0.28	0.06	0.02
P-340	Open	471.00	8.0	Ductile Iro	130.0	-12.8	2,830.04	2,830.04	0.08	0.01	0.00
P-350	Open	817.00	8.0	Ductile Iro	130.0	3.4	2,974.42	2,974.42	0.02	0.00	0.00
P-360	Open	239.00	8.0	Ductile Iro	130.0	-22.7	2,974.51	2,974.52	0.15	0.02	0.00
P-370	Open	16,592.00	16.0	Ductile Iro	130.0	69.1	2,974.07	2,974.00	0.11	0.00	0.07
P-380	Open	4,600.00	12.0	Ductile Iro	130.0	-69.1	2,974.07	2,974.16	0.20	0.02	0.08
P-400	Open	501.00	12.0	Ductile Iro	130.0	180.1	2,974.62	2,974.57	0.51	0.11	0.05
P-410	Open	835.00	8.0	Ductile Iro	130.0	45.0	2,974.57	2,974.52	0.29	0.06	0.05
P-460	Open	1,127.00	8.0	Ductile Iro	130.0	2.7	2,974.51	2,974.51	0.02	0.00	0.00
P-480	Open	1,014.00	8.0	Ductile Iro	130.0	-54.5	2,974.41	2,974.50	0.35	0.08	0.08
P-490	Open	445.00	12.0	Ductile Iro	130.0	-55.1	2,974.50	2,974.50	0.16	0.01	0.01
P-500	Open	294.00	8.0	Ductile Iro	130.0	6.8	2,974.37	2,974.37	0.04	0.00	0.00
P-510	Open	560.00	8.0	Ductile Iro	130.0	3.4	2,974.37	2,974.37	0.02	0.00	0.00
P-520	Open	606.00	8.0	Ductile Iro	130.0	-2.0	2,974.37	2,974.37	0.01	0.00	0.00
P-530	Open	451.00	8.0	Ductile Iro	130.0	2.7	2,974.50	2,974.50	0.02	0.00	0.00
P-550	Open	206.00	8.0	Ductile Iro	130.0	-0.0	2,830.03	2,830.03	0.00	0.00	0.00

Steady State Analysis
Pipe Report

Label	Initial Status	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Calculated Friction Headloss (ft)
P-560	Open	517.00	8.0	Ductile Iro	130.0	-1.4	2,830.03	2,830.03	0.01	0.00	0.00
P-580	Open	841.00	8.0	Ductile Iro	130.0	-67.3	2,974.42	2,974.52	0.43	0.12	0.10
P-590	Open	742.00	12.0	Ductile Iro	130.0	55.4	2,974.52	2,974.51	0.16	0.01	0.01
P-600	Open	774.00	12.0	Ductile Iro	130.0	135.1	2,974.57	2,974.52	0.38	0.06	0.05
P-620	Open	138.00	8.0	Ductile Iro	130.0	0.0	2,974.38	2,974.38	0.00	0.00	0.00
P-630	Open	100.00	12.0	Ductile Iro	130.0	180.1	2,726.00	2,725.99	0.51	0.10	0.01
P-640	Open	22.00	12.0	Ductile Iro	130.0	180.1	2,974.62	2,974.62	0.51	0.11	0.00
P-650	Open	678.00	12.0	Ductile Iro	130.0	0.0	2,974.50	2,974.50	0.00	0.00	0.00
P-660	Open	666.00	8.0	Ductile Iro	130.0	0.0	2,974.50	2,974.50	0.00	0.00	0.00
P-670	Closed	2,899.00	12.0	Ductile Iro	130.0	0.0	2,974.50	2,974.50	0.00	0.00	0.00

[redacted] Scenario: Option 2 Peak-Hour
Steady State Analysis
Pipe Report

Label	Initial Status	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Calculated Friction Headloss (ft)
P-10	Open	1,072.00	8.0	Ductile Iro	130.0	-2.4	2,974.00	2,974.00	0.02	0.00	0.00
P-30	Open	1,083.00	8.0	Ductile Iro	130.0	-25.6	2,974.00	2,974.02	0.16	0.02	0.02
P-40	Open	1,490.00	8.0	Ductile Iro	130.0	-7.1	2,830.02	2,830.02	0.05	0.00	0.00
P-60	Open	734.00	8.0	Ductile Iro	130.0	-24.1	2,974.00	2,974.02	0.15	0.02	0.01
P-90	Open	495.00	8.0	Ductile Iro	130.0	-40.6	2,974.02	2,974.04	0.26	0.05	0.02
P-150	Open	471.00	8.0	Ductile Iro	130.0	0.0	2,974.09	2,974.09	0.00	0.00	0.00
P-170	Open	521.00	8.0	Ductile Iro	130.0	30.4	2,974.04	2,974.02	0.19	0.03	0.01
P-190	Open	508.00	12.0	Ductile Iro	130.0	-45.7	2,974.09	2,974.09	0.13	0.01	0.00
P-200	Open	791.00	8.0	Ductile Iro	130.0	-8.7	2,974.09	2,974.10	0.06	0.00	0.00
P-210	Open	1,061.00	8.0	Ductile Iro	130.0	21.5	2,974.09	2,974.07	0.14	0.01	0.02
P-220	Open	1,505.00	8.0	Ductile Iro	130.0	9.7	2,974.07	2,974.07	0.06	0.00	0.01
P-240	Open	292.00	8.0	Ductile Iro	130.0	29.3	2,974.09	2,974.09	0.19	0.03	0.01
P-250	Open	894.00	8.0	Ductile Iro	130.0	26.9	2,974.09	2,974.07	0.17	0.02	0.02
P-260	Open	472.00	8.0	Ductile Iro	130.0	-2.6	2,974.07	2,974.07	0.02	0.00	0.00
P-270	Open	774.00	8.0	Ductile Iro	130.0	18.9	2,974.07	2,974.06	0.12	0.01	0.01
P-280	Open	1,123.00	8.0	Ductile Iro	130.0	8.3	2,974.06	2,974.05	0.05	0.00	0.00
P-300	Open	748.00	8.0	Ductile Iro	130.0	3.9	2,974.00	2,974.00	0.02	0.00	0.00
P-310	Open	2,220.00	8.0	Ductile Iro	130.0	15.4	2,830.04	2,830.02	0.10	0.01	0.02
P-320	Open	93.00	8.0	Ductile Iro	130.0	22.4	2,974.00	2,974.00	0.14	0.02	0.00
P-330	Open	337.00	8.0	Ductile Iro	130.0	-12.2	2,974.00	2,974.00	0.08	0.01	0.00
P-340	Open	471.00	8.0	Ductile Iro	130.0	-22.4	2,830.04	2,830.04	0.14	0.02	0.01
P-350	Open	817.00	8.0	Ductile Iro	130.0	5.9	2,974.04	2,974.04	0.04	0.00	0.00
P-360	Open	239.00	8.0	Ductile Iro	130.0	-35.7	2,974.09	2,974.10	0.23	0.04	0.01
P-370	Open	16,592.00	16.0	Ductile Iro	130.0	2.4	2,974.00	2,974.00	0.00	0.00	0.00
P-380	Open	4,600.00	12.0	Ductile Iro	130.0	-2.4	2,974.00	2,974.00	0.01	0.00	0.00
P-400	Open	501.00	12.0	Ductile Iro	130.0	196.8	2,974.22	2,974.16	0.56	0.12	0.06
P-410	Open	835.00	8.0	Ductile Iro	130.0	52.6	2,974.16	2,974.10	0.34	0.08	0.07
P-460	Open	1,127.00	8.0	Ductile Iro	130.0	4.7	2,974.09	2,974.09	0.03	0.00	0.00
P-480	Open	1,014.00	8.0	Ductile Iro	130.0	-41.0	2,974.04	2,974.09	0.26	0.05	0.05
P-490	Open	445.00	12.0	Ductile Iro	130.0	-42.2	2,974.09	2,974.09	0.12	0.01	0.00
P-500	Open	294.00	8.0	Ductile Iro	130.0	11.8	2,974.02	2,974.01	0.08	0.00	0.00
P-510	Open	560.00	8.0	Ductile Iro	130.0	5.9	2,974.01	2,974.01	0.04	0.00	0.00
P-520	Open	606.00	8.0	Ductile Iro	130.0	-3.5	2,974.01	2,974.01	0.02	0.00	0.00
P-530	Open	451.00	8.0	Ductile Iro	130.0	4.7	2,974.07	2,974.07	0.03	0.00	0.00
P-550	Open	206.00	8.0	Ductile Iro	130.0	-0.0	2,830.02	2,830.02	0.00	0.00	0.00

Steady State Analysis
Pipe Report

Label	Initial Status	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)	Calculated Friction Headloss (ft)
P-560	Open	517.00	8.0	Ductile Iro	130.0	-2.4	2,830.02	2,830.02	0.02	0.00	0.00
P-580	Open	841.00	8.0	Ductile Iro	130.0	-53.6	2,974.04	2,974.11	0.34	0.08	0.07
P-590	Open	742.00	12.0	Ductile Iro	130.0	68.7	2,974.11	2,974.09	0.19	0.02	0.01
P-600	Open	774.00	12.0	Ductile Iro	130.0	144.2	2,974.16	2,974.11	0.41	0.07	0.05
P-620	Open	138.00	8.0	Ductile Iro	130.0	0.0	2,974.02	2,974.02	0.00	0.00	0.00
P-630	Open	100.00	12.0	Ductile Iro	130.0	196.8	2,726.00	2,725.99	0.56	0.12	0.01
P-640	Open	22.00	12.0	Ductile Iro	130.0	196.8	2,974.23	2,974.22	0.56	0.12	0.00
P-650	Open	678.00	12.0	Ductile Iro	130.0	0.0	2,974.05	2,974.05	0.00	0.00	0.00
P-660	Open	666.00	8.0	Ductile Iro	130.0	0.0	2,974.05	2,974.05	0.00	0.00	0.00
P-670	Closed	2,899.00	12.0	Ductile Iro	130.0	0.0	2,974.05	2,974.09	0.00	0.00	0.00

Steady State Analysis
Pump Report

Label	Elevation (ft)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Pump Head (ft)	Calculated Water Power (Hp)	Pump Definition
PMP-1	2,720.00	On	2,725.99	2,975.03	161.1	249.04	10.13	Pump Definition - 1

Steady State Analysis
Pump Report

Label	Elevation (ft)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Pump Head (ft)	Calculated Water Power (Hp)	Pump Definition
PMP-1	2,720.00	On	2,725.99	2,974.62	180.1	248.63	11.31	Pump Definition - 1

Steady State Analysis
Pump Report

Label	Elevation (ft)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Pump Head (ft)	Calculated Water Power (Hp)	Pump Definition
PMP-1	2,720.00	On	2,725.99	2,974.23	196.8	248.24	12.33	Pump Definition - 1

Scenario: Option 2 Average-D
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-10	2,974.00	Zone - 13	105.5	2,974.00

Scenario: Option 2 Maximum-D
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-10	2,974.00	Zone - 13	69.1	2,974.00

Scenario: Option 2 Peak-Hou
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-10	2,974.00	Zone - 13	2.4	2,974.00

Steady State Analysis
Tank Report

Label	Zone	Base Elevation (ft)	Minimum Elevation (ft)	Initial HGL (ft)	Maximum Elevation (ft)	Tank Diameter (ft)	Inflow (gpm)	Current Status	Calculated Hydraulic Grade (ft)	Calculated Percent Full (%)
T-1	Zone - 12	2,720.00	2,720.00	2,726.00	2,727.00	20.00	-161.1	Draining	2,726.00	85.7

Steady State Analysis
Tank Report

Label	Zone	Base Elevation (ft)	Minimum Elevation (ft)	Initial HGL (ft)	Maximum Elevation (ft)	Tank Diameter (ft)	Inflow (gpm)	Current Status	Calculated Hydraulic Grade (ft)	Calculated Percent Full (%)
T-1	Zone - 12	2,720.00	2,720.00	2,726.00	2,727.00	20.00	-180.1	Draining	2,726.00	85.7

Steady State Analysis
Tank Report

Label	Zone	Base Elevation (ft)	Minimum Elevation (ft)	Initial HGL (ft)	Maximum Elevation (ft)	Tank Diameter (ft)	Inflow (gpm)	Current Status	Calculated Hydraulic Grade (ft)	Calculated Percent Full (%)
T-1	Zone - 12	2,720.00	2,720.00	2,726.00	2,727.00	20.00	-196.8	Draining	2,726.00	85.7

Steady State Analysis
Valve Report

Label	Elevation (ft)	Initial HGL (ft)	Diameter (in)	Minor Loss Coefficient	Initial Valve Status	Control Status	Discharge (gpm)	From HGL (ft)	To HGL (ft)	Headloss (ft)
PRV-1	2,705.00	2,830.00	6.0	0.00	Active	Throttling	6.4	2,974.69	2,830.04	144.65
PRV-2	2,705.00	2,830.00	6.0	0.00	Active	Closed	0.0	2,830.04	2,974.78	0.00

Steady State Analysis
Valve Report

Label	Elevation (ft)	Initial HGL (ft)	Diameter (in)	Minor Loss Coefficient	Initial Valve Status	Control Status	Discharge (gpm)	From HGL (ft)	To HGL (ft)	Headloss (ft)
PRV-1	2,705.00	2,830.00	6.0	0.00	Active	Throttling	12.8	2,974.31	2,830.04	144.27
PRV-2	2,705.00	2,830.00	6.0	0.00	Active	Closed	0.0	2,830.03	2,974.38	0.00

Steady State Analysis
Valve Report

Label	Elevation (ft)	Initial HGL (ft)	Diameter (in)	Minor Loss Coefficient	Initial Valve Status	Control Status	Discharge (gpm)	From HGL (ft)	To HGL (ft)	Headloss (ft)
PRV-1	2,705.00	2,830.00	6.0	0.00	Active	Throttling	22.4	2,974.00	2,830.04	143.95
PRV-2	2,705.00	2,830.00	6.0	0.00	Active	Closed	0.0	2,830.02	2,974.02	0.00

APPENDIX C

References

From: Steven Voss [mailto:sjvoss@lvadesign.com]
Sent: Thursday, January 06, 2005 1:30 PM
To: Don Sock
Subject: Fw: Crown

Don:
The clubouse is still being sized. It will have 2 restrooms with showers, a small kitchen and a water feature. I would estimate 5000 sq.ft. for now. The rest of the program is below...
thx!
steven

----- Original Message -----
From: Steven Voss
To: Alex Stedman ; Joe Young
Sent: Tuesday, November 30, 2004 11:35 AM
Subject: Crown

Alex and Joe:

The program for the Clubhouse are is as follows:

Clubhouse
Parking
Water Features (Cascading between Jacuzzi and Lap Pool down to club with water kept separate)
Jacuzzis (2-3)
Patios
Lap Pool
Ramada
Lawn area (5,000 s.f.)
Interpretive Trail connecting to the project trails
Outdoor Massage area
Parking with an additional 30 spaces beyond requirements
Tot Lot
Water falls...

Pocket Parks:

Seating
Interpretive Signage
Water features (like at desert highlands)
Shade

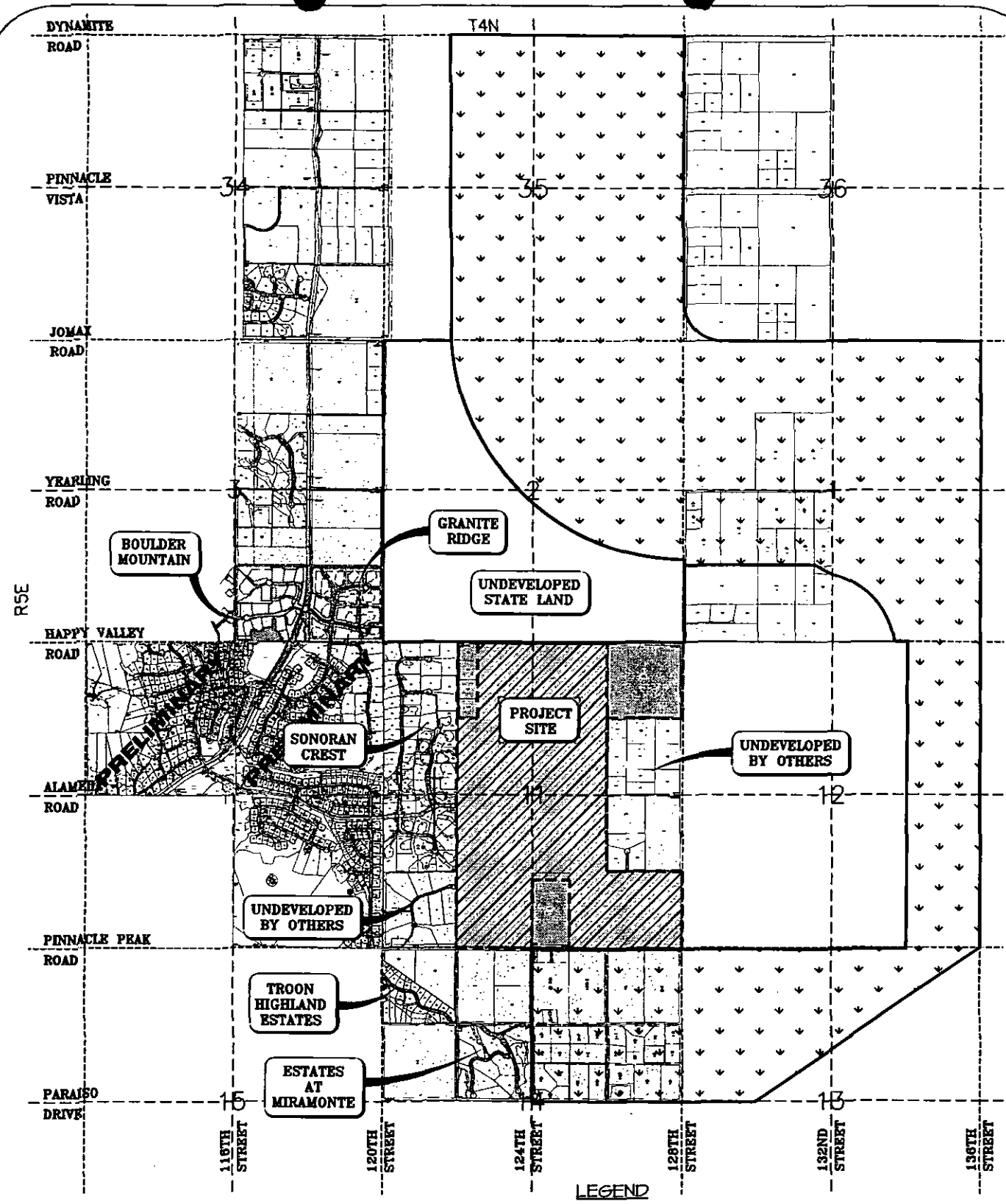
Alex: Please check into whether we can get individual mail delivery to each home at the street or not.

Thanks!!!

sv

PLATE 1

Vicinity Map



CROWN COMMUNITY DEVELOPMENT
A Harvey Chaves Company

SERENO CANYON

Plate 1

"Vicinity Map"

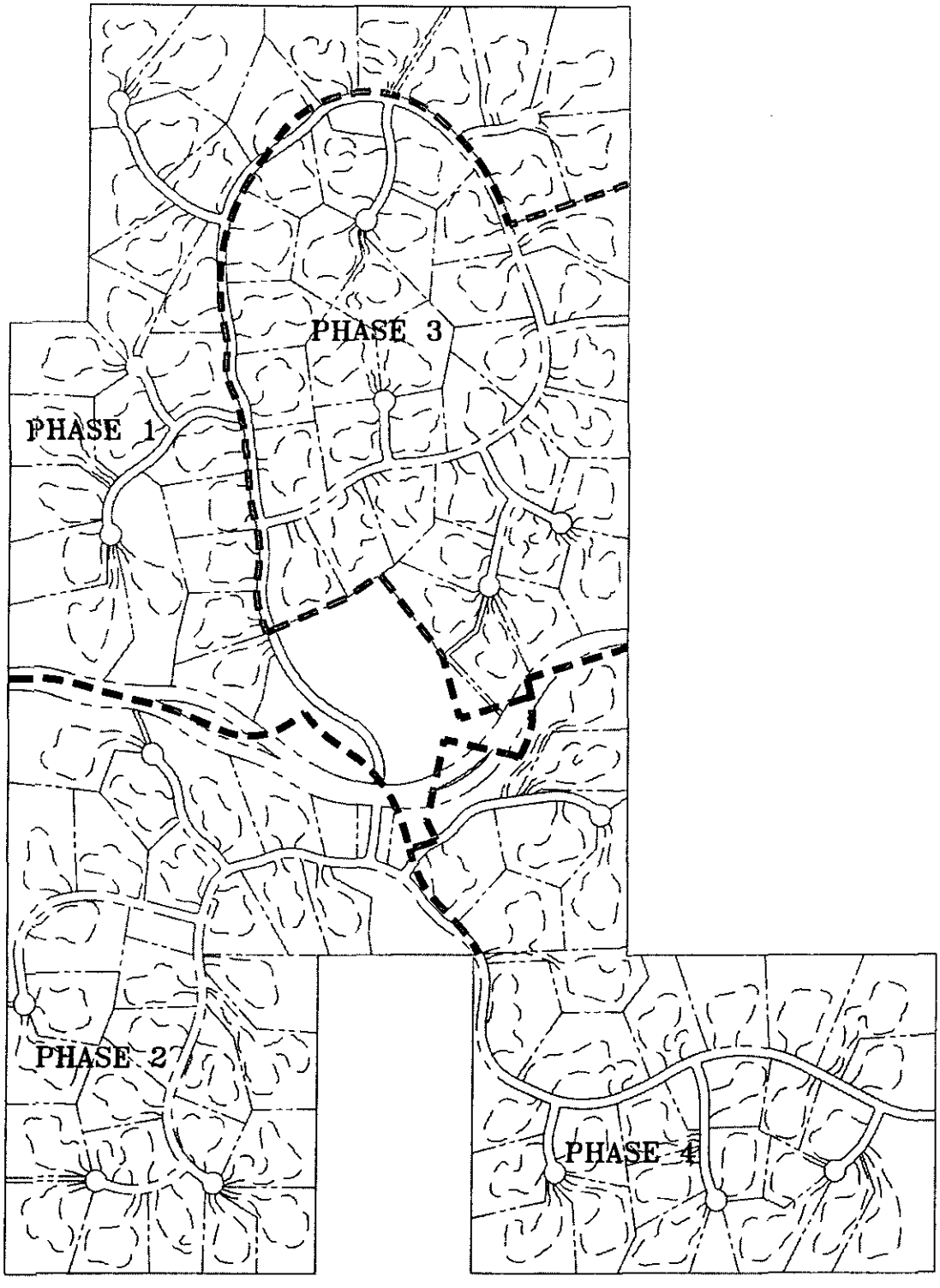
WOOD/PATEL ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors
(602) 335-8500

N:\2004\042054\Dwg\Exhibits\MASTER PLAN\Water MP\Plate 1 Vicinity Map.dwg

4/27/05

PLATE 1A

Phasing Map



700 0 350 700

1 inch = 700 ft.

CROWN
COMMUNITY DEVELOPMENT
A Henry Crown Company

SERENO CANYON

Plate 1A

"Phasing Map"

WOOD/PATEL
ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors
(602) 335-8500

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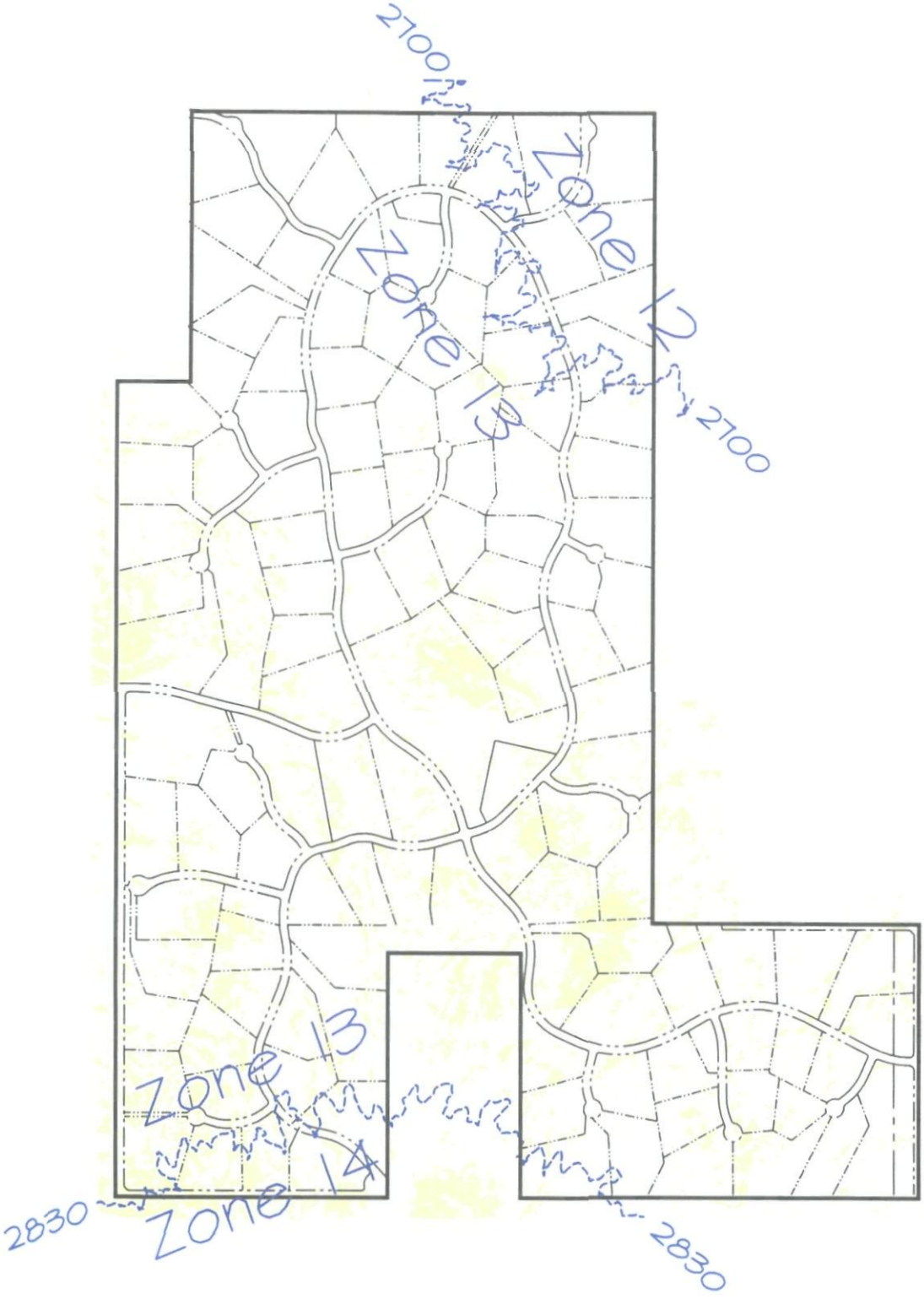
04/29/05

PLATE 2

On-Site Water Pressure Zones



400 0 400 400

1 inch = 800 ft.

LEGEND

PRESSURE ZONE BOUNDARY

EXISTING 1-FOOT CONTOURS

EXISTING 5-FOOT CONTOURS

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Plate 2

"On-site Water Pressure Zones"

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Hydrologists
Land Surveyors
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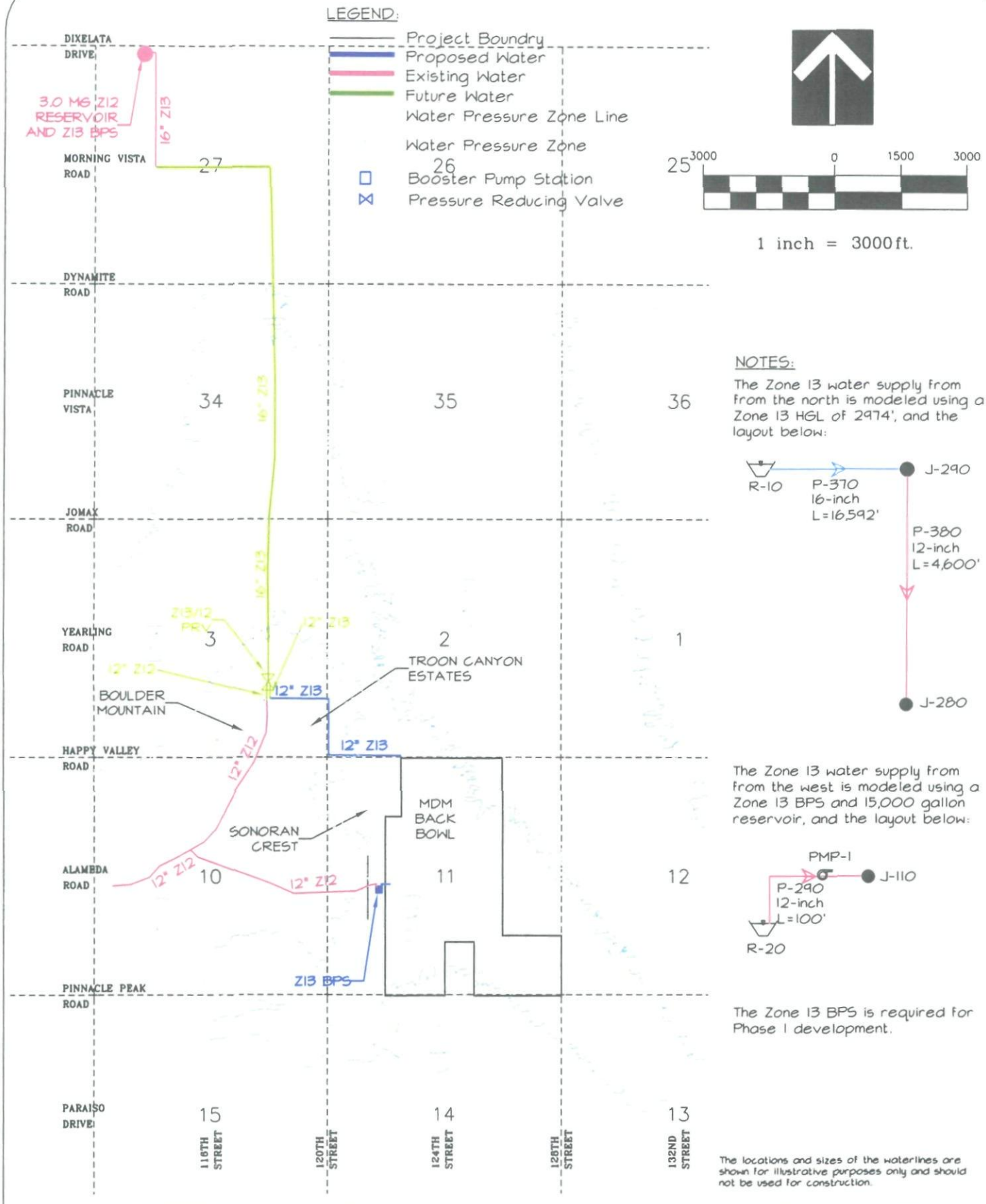
N:\2004\042054\Dwg\Exhibits\MASTER PLAN\Water MP\Plate 2 Water Pressure Zones.dwg

10/31/05

PLATE 3

Off-Site Master Potable Water System



NOTES:

The Zone 13 water supply from from the north is modeled using a Zone 13 HGL of 2974', and the layout below:

The Zone 13 water supply from from the west is modeled using a Zone 13 BPS and 15,000 gallon reservoir, and the layout below:

The Zone 13 BPS is required for Phase I development.

The locations and sizes of the waterlines are shown for illustrative purposes only and should not be used for construction.

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Plate 3

"Off-Site Master Potable Water System"

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10/31/05

PLATE 4

Option 1:
On-Site Master Potable Water Distribution System

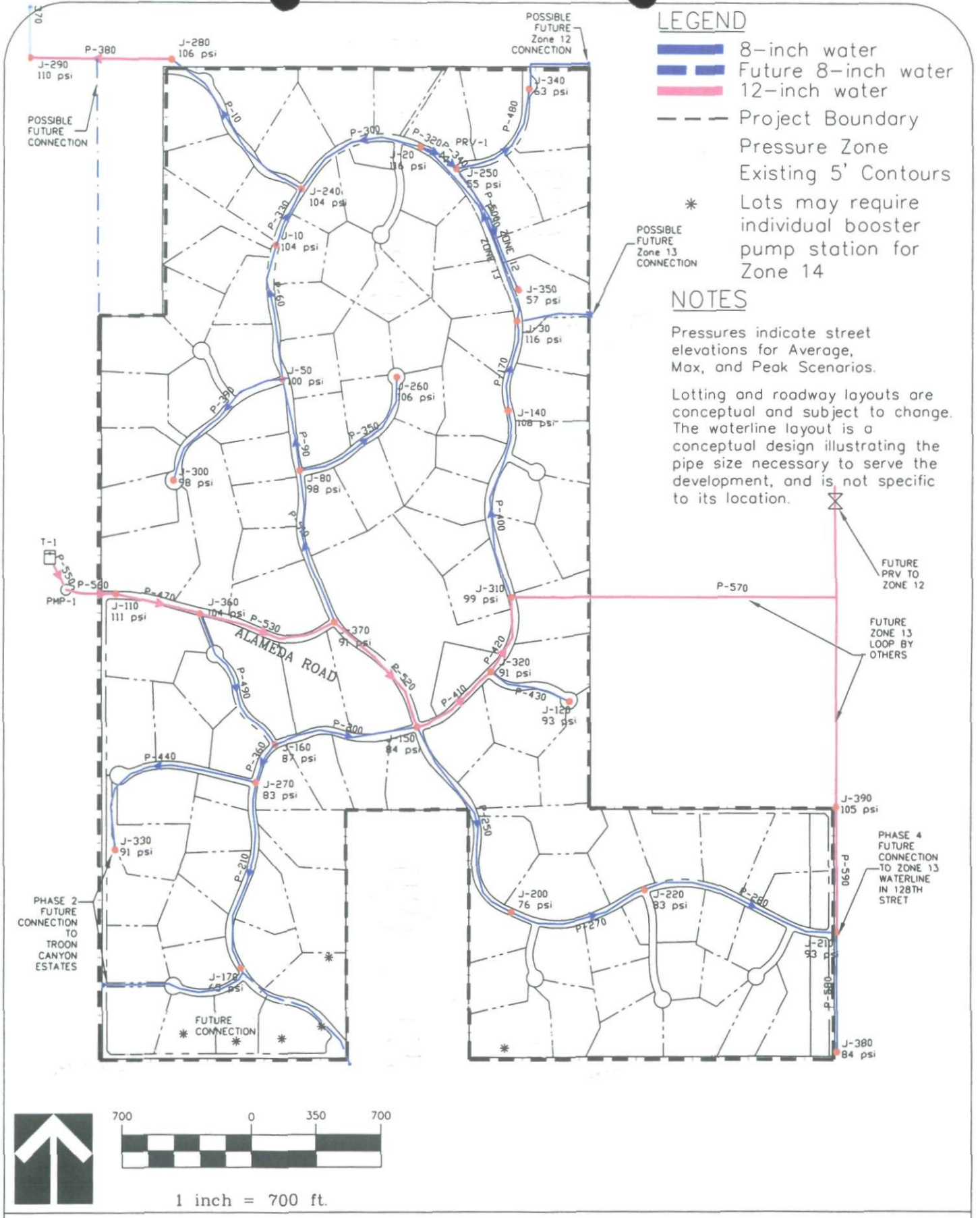

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Plate 4 Option 1
Conceptual On-Site Master Potable Water Distribution System

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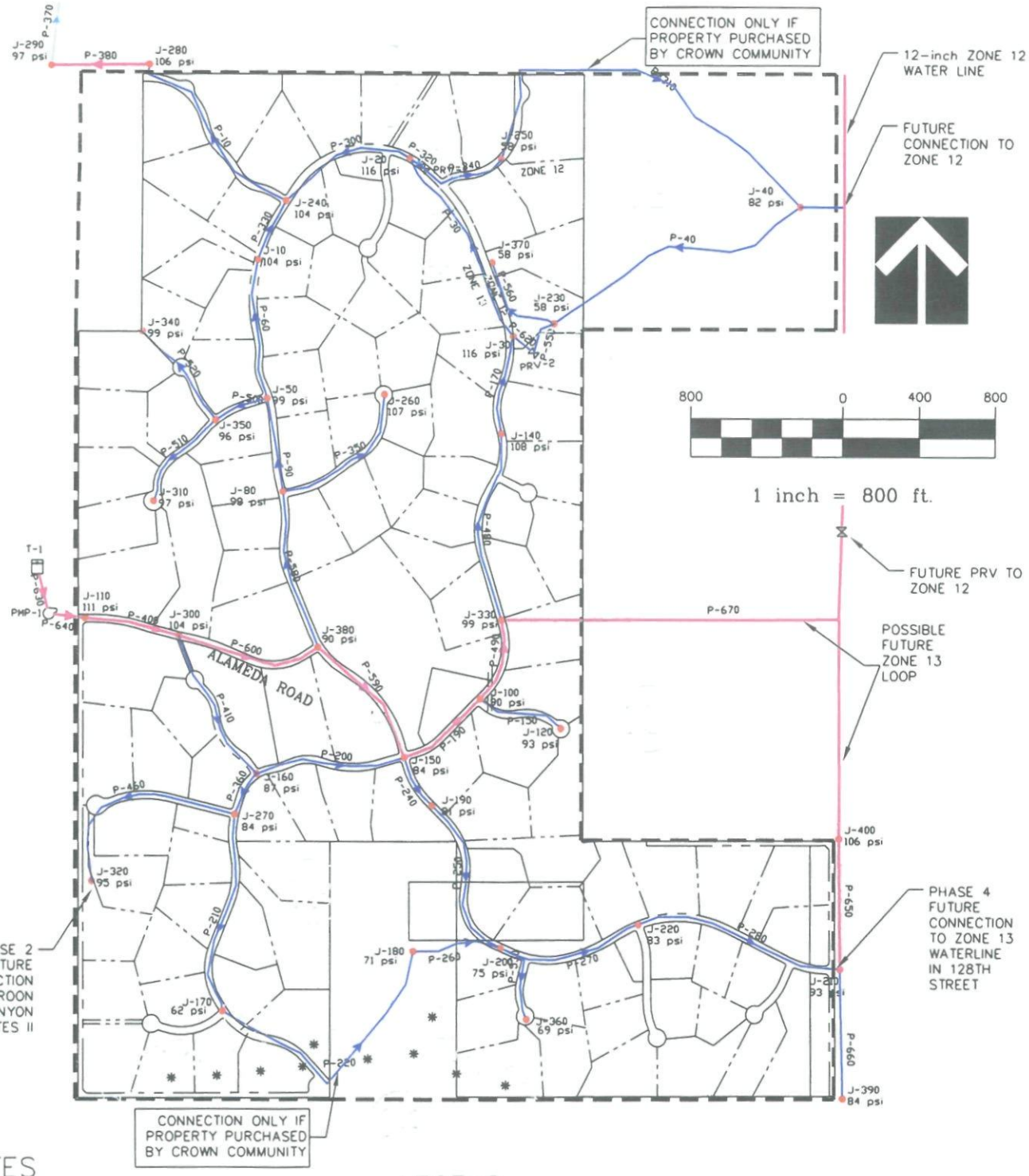
PLATE 5

Option 2:
On-Site Master Potable Water Distribution System



NOTES

Pressures indicate street elevations for Average, Max, and Peak Scenarios.

Lotting and roadway layouts are conceptual and subject to change. The waterline layout is a conceptual design illustrating the pipe size necessary to serve the development, and is not specific to its location.

LEGEND

- 8-inch water
- 12-inch water
- Project Boundary
- Pressure Zone
- Existing 5' Contours

* Lots may require individual booster pump station for Zone 14

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Plate 5 Option 2
Conceptual On-Site Master Potable Water Distribution System

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WOOD/PATEL

LAND DEVELOPMENT • WATER RESOURCES • WATER/WASTEWATER • TRANSPORTATION/TRAFFIC • SURVEYING • CONSTRUCTION MANAGEMENT

Darrel E. Wood, P.E., R.L.S.
Ashok C. Patel, P.E., R.L.S., CFM
Gordon W. R. Wark, P.E.
James S. Campbell, P.E.
Thomas R. Gettings, R.L.S.
Timothy A. Huval, P.E.
Michael T. Young, P.E.
Peter Hemingway, P.E.
Jeffrey R. Minch, P.E.
Robert D. Gofonia, P.E., R.L.S.
Patrick W. Marum, P.E.

April 11, 2007

Mr. Don Hadder, Sr.
Planning Director
City of Scottsdale
7447 East Indian School Road
Suite 300
Scottsdale, AZ 85251

Phone: (480) 312-2352
Fax: (480) 312-2672
Email: dhadder@scottsdaleaz.gov

Re: **Sereno Canyon – Community Center**
Potable Water System Planning Concept Verification
WP# 072965

Dear Mr. Hadder:

The purpose of this letter is to provide potable water system planning concept verification in conjunction with the Sereno Canyon Community Center Development Review Board application. The Sereno Canyon Community Center is located within Tract E of the Sereno Canyon Phase 1 Subdivision. The potable water requirements for this tract are addressed in the approved *Conceptual Master Potable Water System Report for Sereno Canyon*. Section 3.0 of this report shows the potable water demands for this site were based on a 10,000 s.f. Community Center (5,000 s.f. building and 5,000 s.f. lawn). This concept is still valid with the current plan for the Community Center as it is currently planned with a 1,700 s.f. building and a smaller low-water use landscape area. A copy of the approved *Conceptual Master Potable Water System Report for Sereno Canyon* has been included with this application package.

I am available to answer any questions you may have regarding this matter.

Sincerely,

WOOD, PATEL & ASSOCIATES, INC.

MISSION: CLIENT SERVICE™

Registered Professional Engineer (Civil) CERTIFICATE NO. 24021 MICHAEL J. SAMER Date Signed 4/11/07 ARIZONA, U.S.A.

Michael J. Samer, P.E., R.L.S.
Project Manager

MJS/km

Enclosure(s)

Y:\WP\General Correspondence\072965 Sereno Canyon Community Center Water System Concept Verification Letter d

113-DR-2005#2
5/15/2007