CONCEPTUAL MASTER
POTABLE WATER SYSTEM REPORT
FOR
McDOWELL MOUNTAIN BACK BOWL

January 25, 2005
WP# 042054

Prepared for
Crown Community Development
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1 0 INTRODUCTION

1 1 General Background and Project History

The *McDowell Mountain Back Bowl* (herein referred to as the *Back Bowl*), 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

The *Back Bowl* 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 121 lots ranging in size from 2 to 3 acres and a Clubhouse 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 the *Back Bowl* to approximately 400 acres 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 30-acre parcel located in the middle of the southern ½ portion of Section 11

This *Conceptual Master Water System Report for McDowell Mountain Back Bowl* 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 McDowell Mountain Back Bowl* 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 *Back Bowl* 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

7 Dead-end lines shall not be longer than 1,200 feet in length

8 Water mains shall be extended across all frontages upon development of a property if an approved source is within 660 feet

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 121 low-density residential dwelling units and 10,000 s f of commercial land use (5,000 s f clubhouse plus 5,000 s f lawn area) Option 2 includes 146 low-density residential dwelling units and 10,000 s f of commercial 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 clubhouse site 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	67,806	47	135,612	94	237,321	165
Option 2	79,956	56	159,912	111	279,846	194

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 that is currently under construction Additional on-site water production or storage facilities are not required

The primary water supply will be provided by the Zone 13 waterlines that extend southerly 1 mile from the Zone 13 BPS along 114th Street, easterly about ½-mile along Dynamite Boulevard to 118th Street, and 1¾ miles southerly along 118th Street to the point of connection to the Granite Ridge development In order to provide the water supply to the *Back Bowl*, 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 water easement along the north side of the Happy Valley Road alignment (State Land) from the 120th Street alignment to the project site has recently been submitted to the State Land Department Additional coordination would 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 within a dedicated tract, located on the south side of Alameda Road in the Sonoran Crest development, before the west entrance into the *Back Bowl* 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 2 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 the *Back Bowl* 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 internalized within local roadways 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 Please refer to Plate 4 – *Option1 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

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 2,960 It is our understanding that the hydraulic grade line of 2,960 is representative of Zone 13 pressures within the project and surrounding areas 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 CONCLUSIONS

Based on the analysis of the water distribution system required to provide potable water service to the *McDowell Mountain Back Bowl*, the following conclusions can be made

1 The Conceptual Master Water System for the *Back Bowl* 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 two (2) Zone 13 water sources, 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 121 proposed residential dwelling units for Option 1 and 146 proposed residential dwelling units for Option 2, in addition to approximately 10,000 sq ft of proposed Clubhouse facilities

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

APPENDIX A

OPTION 1:

Water Demand Calculations

Project *McDowell Mountain Back Bowl*
Location *City of Scottsdale, Arizona*
Date *13-Jan-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	2 732	5	486			2,430	1 7	4,860	3 4	8,505	5 9
J-20	2 705	8	486			3,888	2 7	7,776	5 4	13,608	9 5
J-30	2,708	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	2,720										
J-120	2,745										
J-140	2,722	7	486			3,402	2 4	6,804	4 7	11 907	8 3
J-150	2,793	4	486			1,944	1 4	3,888	2 7	6,804	4 7
J-160	2 773	6	486			2,916	2 0	5 832	4 1	10 206	7 1
J-170	2,812	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	2 750	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	2 728	6	486			2,916	2 0	5,832	4 1	10,206	7 1
J-250	2,700										
J-260	2,728	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	2,700										
J-300	2 745	10	486			4,860	3 4	9,720	6 8	17,010	11 8
J-310[1]	2 775	2	486	10,000	0 9	9,972	6 9	19,944	13 9	34,902	24 2
J-320	2,758	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	2,695	4	486			1,944	1 4	3,888	2 7	6,804	4 7
J-350	2,700	2	486			972	0 7	1,944	1 4	3,402	2 4
J-360	2 740										
J-370	2 782										
Total		***121***		***10,000***		***67,806***	***47***	***135,612***	***94***	***237,321***	***165***

Notes
(1) 10,00 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

Scenario Option 1 Average-Day
Steady State Analysis
Junction Report

Label	Elevation (ft)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	2 732	11 8	2 960	98 6
J-20	2,705	7 1	2,960	110 3
J-30	2 707	4 7	2,960	109 4
J-50	2,743	4 7	2 960	93 9
J-80	2 747	7 1	2 960	92 1
J-110	2,719	0 0	2,960	104 3
J-120	2,745	0 0	2 960	93 0
J-140	2 722	10 6	2,960	102 9
J-150	2 785	1 2	2 960	75 7
J-160	2,773	8 3	2,960	80 9
J-170	2 830	7 1	2 960	56 2
J-200	2,800	5 9	2 960	69 2
J-210	2,760	8 3	2 960	86 5
J-220	2,783	10 6	2,960	76 5
J-240	2 728	7 1	2,960	100 3
J-250	2 695	7 1	2 830	58 4
J-260	2 728	5 9	2,960	100 3
J-270	2 782	7 1	2,960	77 0
J-280	2 730	0 0	2,960	99 5
J-290	2 700	0 0	2 960	112 5
J-300	2 733	0 0	2,960	98 2
J-310	2,748	5 9	2,960	91 7
J-320	2 767	4 7	2 960	83 5
J-330	2,765	1 7	2 960	84 3
J-340	2 745	3 5	2 830	36 8
J-350	2 750	2 4	2 830	34 6
J-360	2,822	4 7	2,960	59 7
J-370	2 695	2 4	2 960	114 6

Scenario. Option 1 Average-Day
Steady State Analysis
Pipe Report

Label	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	807	8	Ductile Iron	130	32 0	2,959 96	2,959 94	0 20	0 03	0 03
P-30	1,092	8	Ductile Iron	130	-5 2	2,959 93	2,959 93	0 03	0 00	0 00
P-60	763	8	Ductile Iron	130	-1 8	2 959 93	2 959 93	0 01	0 00	0 00
P-90	504	8	Ductile Iron	130	-6 5	2,959 93	2,959 94	0 04	0 00	0 00
P-160	427	8	Ductile Iron	130	2 2	2,959 93	2,959 93	0 01	0 00	0 00
P-170	597	8	Ductile Iron	130	9 9	2,959 93	2,959 93	0 06	0 00	0 00
P-200	764	8	Ductile Iron	130	-6 2	2,959 95	2,959 95	0 04	0 00	0 00
P-210	1 484	8	Ductile Iron	130	7 1	2 959 95	2,959 95	0 05	0 00	0 00
P-250	1,089	8	Ductile Iron	130	24 8	2 959 95	2 959 93	0 16	0 02	0 02
P-270	774	8	Ductile Iron	130	18 9	2 959 93	2,959 92	0 12	0 01	0 01
P-280	1,047	8	Ductile Iron	130	8 3	2,959 92	2,959 92	0 05	0 00	0 00
P-290	50	12	Ductile Iron	130	107 9	2 960 00	2,960 00	0 31	0 04	0 00
P-300	711	8	Ductile Iron	130	14 9	2 959 94	2 959 93	0 09	0 01	0 01
P-320	137	8	Ductile Iron	130	13 0	2 959 93	2,959 93	0 08	0 01	0 00
P-330	395	8	Ductile Iron	130	10 0	2,959 94	2,959 93	0 06	0 00	0 00
P-340	93	8	Ductile Iron	130	-13 0	2,830 04	2 830 04	0 08	0 01	0 00
P-350	594	8	Ductile Iron	130	8 1	2,959 94	2,959 93	0 05	0 00	0 00
P-360	230	8	Ductile Iron	130	-15 9	2,959 95	2,959 95	0 10	0 01	0 00
P-370	15 000	16	Ductile Iron	130	-32 0	2,959 98	2,960 00	0 05	0 00	0 02
P-380	5 400	12	Ductile Iron	130	32 0	2,959 98	2,959 96	0 09	0 00	0 02
P-390	900	8	Ductile Iron	130	0 0	2,959 93	2 959 93	0 00	0 00	0 00
P-400	1 011	8	Ductile Iron	130	18 3	2,959 94	2,959 93	0 12	0 01	0 01
P-410	974	8	Ductile Iron	130	-3 8	2 959 95	2,959 95	0 02	0 00	0 00
P-420	410	8	Ductile Iron	130	-24 3	2 959 94	2,959 95	0 15	0 02	0 01
P-430	589	12	Ductile Iron	130	0 0	2,959 95	2,959 95	0 00	0 00	0 00
P-440	1 137	6	Ductile Iron	130	-1 7	2,959 95	2 959 95	0 02	0 00	0 00
P-470	529	12	Ductile Iron	130	107 9	2,960 00	2 959 98	0 31	0 04	0 02
P-480	305	8	Ductile Iron	130	3 5	2,830 04	2,830 04	0 02	0 00	0 00
P-490	829	8	Ductile Iron	130	-30 3	2 959 95	2,959 98	0 19	0 03	0 02
P-500	728	8	Ductile Iron	130	2 4	2,830 04	2 830 04	0 02	0 00	0 00
P-510	1 343	8	Ductile Iron	130	-21 7	2,959 94	2,959 96	0 14	0 02	0 02
P-520	416	8	Ductile Iron	130	16 1	2,959 96	2,959 95	0 10	0 01	0 00
P-530	1 052	12	Ductile Iron	130	72 9	2,959 98	2 959 96	0 21	0 02	0 02
P-540	675	12	Ductile Iron	130	-32 7	2,959 95	2,959 96	0 09	0 00	0 00

Scenario Option 1 Average-Day
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-10	2,960	Zone - 13	-32 0	2 960 00
R-20	2 960	Zone - 13	-107 9	2,960 00

Scenario: Option 1 Average-Day
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	13 0	2 959 93	2,830 04	129 88

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

Label	Elevation (ft)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	2 732	3 4	2,960	98 6
J-20	2,705	5 4	2 960	110 3
J-30	2,707	3 4	2 960	109 4
J-50	2 743	0 7	2,960	93 9
J-80	2 747	4 7	2,960	92 1
J-110	2,719	0 0	2 960	104 3
J-120	2,745	0 0	2 960	93 0
J-140	2 722	4 7	2,960	103 0
J-150	2 785	2 7	2 960	75 7
J-160	2 773	4 1	2 960	80 9
J-170	2,830	6 8	2 960	56 2
J-200	2,800	4 7	2 960	69 2
J-210	2,760	5 4	2 960	86 5
J-220	2 783	6 1	2,960	76 6
J-240	2,728	4 1	2 960	100 4
J-250	2 695	0 0	2,830	58 4
J-260	2 728	3 4	2 960	100 4
J-270	2,782	4 7	2 960	77 0
J-280	2 730	0 0	2,960	99 5
J-290	2,700	0 0	2 960	112 5
J-300	2,733	6 8	2,960	98 2
J-310	2 748	13 9	2 960	91 7
J-320	2,767	2 0	2 960	83 5
J-330	2 765	3 4	2,960	84 4
J-340	2,745	2 7	2 830	36 8
J-350	2 750	1 4	2 830	34 6
J-360	2 822	0 0	2 960	59 7
J-370	2,695	0 0	2 960	114 6

Scenario: Option 1 Maximum-Day
Steady State Analysis
Pipe Report

Label	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	807	8	Ductile Iron	130	21 0	2,959 98	2,959 97	0 13	0 01	0 01
P-30	1 092	8	Ductile Iron	130	-0 1	2 959 97	2,959 97	0 00	0 00	0 00
P-60	763	8	Ductile Iron	130	4 2	2 959 97	2,959 97	0 03	0 00	0 00
P-90	504	8	Ductile Iron	130	-3 2	2,959 97	2,959 97	0 02	0 00	0 00
P-160	427	8	Ductile Iron	130	1 9	2,959 97	2,959 97	0 01	0 00	0 00
P-170	597	8	Ductile Iron	130	3 5	2,959 97	2 959 97	0 02	0 00	0 00
P-200	764	8	Ductile Iron	130	-3 1	2 959 98	2,959 98	0 02	0 00	0 00
P-210	1 484	8	Ductile Iron	130	6 8	2,959 97	2,959 97	0 04	0 00	0 00
P-250	1 089	8	Ductile Iron	130	16 2	2,959 98	2 959 97	0 10	0 01	0 01
P 270	774	8	Ductile Iron	130	11 5	2,959 97	2 959 96	0 07	0 00	0 00
P-280	1 047	8	Ductile Iron	130	5 4	2 959 96	2,959 96	0 03	0 00	0 00
P-290	50	12	Ductile Iron	130	73 2	2 960 00	2 960 00	0 21	0 02	0 00
P-300	711	8	Ductile Iron	130	9 3	2,959 97	2,959 97	0 06	0 00	0 00
P-320	137	8	Ductile Iron	130	4 1	2,959 97	2,959 97	0 03	0 00	0 00
P-330	395	8	Ductile Iron	130	7 6	2,959 97	2,959 97	0 05	0 00	0 00
P-340	93	8	Ductile Iron	130	-4 1	2 830 04	2,830 04	0 03	0 00	0 00
P-350	594	8	Ductile Iron	130	5 3	2,959 97	2,959 97	0 03	0 00	0 00
P-360	230	8	Ductile Iron	130	-14 9	2,959 97	2,959 98	0 09	0 01	0 00
P-370	15,000	16	Ductile Iron	130	-21 0	2,959 99	2,960 00	0 03	0 00	0 01
P-380	5 400	12	Ductile Iron	130	21 0	2 959 99	2,959 98	0 06	0 00	0 01
P-390	900	8	Ductile Iron	130	-6 8	2 959 97	2,959 97	0 04	0 00	0 00
P-400	1 011	8	Ductile Iron	130	6 3	2,959 97	2,959 97	0 04	0 00	0 00
P-410	974	8	Ductile Iron	130	-3 2	2 959 98	2,959 98	0 02	0 00	0 00
P-420	410	8	Ductile Iron	130	-20 2	2 959 97	2,959 98	0 13	0 01	0 01
P-430	589	12	Ductile Iron	130	0 0	2 959 98	2,959 98	0 00	0 00	0 00
P-440	1 137	6	Ductile Iron	130	-3 4	2,959 97	2,959 97	0 04	0 00	0 00
P-470	529	12	Ductile Iron	130	73 2	2,960 00	2,959 99	0 21	0 02	0 01
P-480	305	8	Ductile Iron	130	2 7	2,830 04	2,830 04	0 02	0 00	0 00
P-490	829	8	Ductile Iron	130	-22 0	2,959 98	2,959 99	0 14	0 02	0 01
P-500	728	8	Ductile Iron	130	1 4	2 830 04	2 830 04	0 01	0 00	0 00
P-510	1,343	8	Ductile Iron	130	-13 2	2,959 97	2,959 98	0 08	0 01	0 01
P-520	416	8	Ductile Iron	130	12 6	2,959 98	2,959 98	0 08	0 01	0 00
P-530	1 052	12	Ductile Iron	130	51 2	2,959 99	2,959 98	0 15	0 01	0 01
P-540	675	12	Ductile Iron	130	-25 4	2 959 98	2 959 98	0 07	0 00	0 00

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

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-10	2 960	Zone - 13	-21 0	2,960 00
R-20	2 960	Zone - 13	-73 2	2 960 00

Scenario Option 1 Maximum-Day
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	4 1	2 959 97	2,830 04	129 92

Scenario Option 1 Peak-Hour
Steady State Analysis
Junction Report

Label	Elevation (ft)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	2,732	5 9	2,960	98 6
J-20	2,705	9 4	2,960	110 3
J-30	2,707	5 9	2,960	109 4
J-50	2 743	1 2	2 960	93 8
J-80	2,747	8 3	2,960	92 1
J-110	2,719	0 0	2,960	104 3
J-120	2,745	0 0	2 960	93 0
J-140	2 722	8 3	2 960	102 9
J-150	2 785	4 7	2,960	75 7
J-160	2,773	7 1	2 960	80 9
J-170	2,830	11 8	2 960	56 2
J-200	2 800	8 3	2 960	69 2
J-210	2,760	9 4	2,960	86 5
J-220	2,783	10 6	2 960	76 5
J-240	2 728	7 1	2,960	100 3
J-250	2 695	0 0	2,830	58 4
J-260	2,728	5 9	2,960	100 3
J-270	2,782	8 3	2 960	77 0
J-280	2,730	0 0	2 960	99 5
J-290	2,700	0 0	2 960	112 5
J-300	2 733	11 8	2 960	98 2
J-310	2 748	24 2	2,960	91 7
J-320	2,767	3 5	2,960	83 5
J-330	2 765	5 9	2 960	84 3
J-340	2,745	4 7	2 830	36 8
J-350	2 750	2 4	2,830	34 6
J-360	2,822	0 0	2 960	59 7
J-370	2,695	0 0	2,960	114 6

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

Label	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	807	8	Ductile Iron	130	36 7	2,959 95	2,959 92	0 23	0 04	0 03
P-30	1 092	8	Ductile Iron	130	-0 3	2,959 91	2,959 91	0 00	0 00	0 00
P-60	763	8	Ductile Iron	130	7 4	2,959 91	2 959 91	0 05	0 00	0 00
P-90	504	8	Ductile Iron	130	-5 6	2,959 91	2,959 91	0 04	0 00	0 00
P-160	427	8	Ductile Iron	130	3 4	2,959 91	2 959 91	0 02	0 00	0 00
P-170	597	8	Ductile Iron	130	6 2	2,959 91	2,959 91	0 04	0 00	0 00
P-200	764	8	Ductile Iron	130	-5 4	2 959 93	2,959 93	0 03	0 00	0 00
P-210	1,484	8	Ductile Iron	130	11 8	2,959 93	2,959 92	0 08	0 00	0 01
P-250	1 089	8	Ductile Iron	130	28 4	2,959 93	2,959 90	0 18	0 02	0 03
P-270	774	8	Ductile Iron	130	20 1	2,959 90	2 959 89	0 13	0 01	0 01
P-280	1 047	8	Ductile Iron	130	9 4	2,959 89	2,959 89	0 06	0 00	0 00
P-290	50	12	Ductile Iron	130	128 1	2,960 00	2,960 00	0 36	0 06	0 00
P-300	711	8	Ductile Iron	130	16 3	2 959 92	2,959 91	0 10	0 01	0 01
P-320	137	8	Ductile Iron	130	7 1	2,959 91	2,959 91	0 05	0 00	0 00
P-330	395	8	Ductile Iron	130	13 3	2,959 92	2,959 91	0 08	0 01	0 00
P-340	93	8	Ductile Iron	130	-7 1	2 830 04	2,830 04	0 05	0 00	0 00
P-350	594	8	Ductile Iron	130	9 3	2 959 91	2 959 91	0 06	0 00	0 00
P-360	230	8	Ductile Iron	130	-26 0	2 959 93	2,959 93	0 17	0 02	0 00
P-370	15 000	16	Ductile Iron	130	-36 7	2,959 98	2 960 00	0 06	0 00	0 02
P-380	5 400	12	Ductile Iron	130	36 7	2,959 98	2 959 95	0 10	0 01	0 03
P-390	900	8	Ductile Iron	130	-11 8	2,959 91	2 959 91	0 08	0 00	0 00
P-400	1 011	8	Ductile Iron	130	11 1	2,959 92	2 959 91	0 07	0 00	0 00
P-410	974	8	Ductile Iron	130	-5 6	2,959 93	2 959 93	0 04	0 00	0 00
P-420	410	8	Ductile Iron	130	-35 3	2,959 92	2 959 93	0 23	0 04	0 02
P-430	589	12	Ductile Iron	130	0 0	2,959 93	2 959 93	0 00	0 00	0 00
P-440	1 137	6	Ductile Iron	130	-5 9	2 959 92	2,959 93	0 07	0 01	0 01
P-470	529	12	Ductile Iron	130	128 1	2 960 00	2,959 97	0 36	0 06	0 03
P-480	305	8	Ductile Iron	130	4 7	2,830 04	2,830 04	0 03	0 00	0 00
P-490	829	8	Ductile Iron	130	-38 5	2 959 93	2,959 97	0 25	0 04	0 04
P-500	728	8	Ductile Iron	130	2 4	2,830 04	2,830 04	0 02	0 00	0 00
P-510	1 343	8	Ductile Iron	130	-23 2	2,959 91	2,959 94	0 15	0 02	0 02
P-520	416	8	Ductile Iron	130	22 1	2,959 94	2 959 93	0 14	0 02	0 01
P-530	1 052	12	Ductile Iron	130	89 7	2,959 97	2,959 94	0 25	0 03	0 03
P-540	675	12	Ductile Iron	130	-44 4	2,959 93	2,959 94	0 13	0 01	0 01

Scenario Option 1 Peak-Hour
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-10	2 960	Zone - 13	-36 7	2 960 00
R-20	2,960	Zone - 13	-128 1	2 960 00

Scenario. Option 1 Peak-Hour
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	2,959 91	2 830 04	129 87

Scenario. Option 1 Maximum-Day + Fire Flow
Fire Flow Analysis
Fire Flow Report

Label	Elevation (ft)	Zone	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	2,732	Zone - 13	true	500 0	503 4	603 4	98 6	2,959 97	97 0	56 0	J-170
J-20	2,705	Zone - 13	true	500 0	505 4	605 4	110 3	2,959 97	108 3	56 0	J-170
J-30	2,707	Zone - 13	true	500 0	503 4	603 4	109 4	2,959 97	107 6	56 0	J-170
J-50	2,743	Zone - 13	true	500 0	500 7	600 7	93 9	2,959 97	92 2	56 0	J-170
J-80	2,747	Zone - 13	true	500 0	504 7	604 7	92 1	2,959 97	90 9	56 0	J-170
J-110	2 719	Zone - 13	true	500 0	500 0	600 0	104 3	2,960 00	104 2	56 2	J-170
J-120	2,745	Zone - 13	true	500 0	500 0	600 0	93 0	2,959 98	92 2	55 9	J-170
J-140	2,722	Zone - 13	true	500 0	504 7	604 7	103 0	2,959 97	101 6	56 0	J-170
J-150	2,785	Zone - 13	true	500 0	502 7	602 7	75 7	2,959 98	75 0	55 7	J-170
J-160	2,773	Zone - 13	true	500 0	504 1	604 0	80 9	2,959 98	79 8	55 2	J-170
J-170	2 830	Zone - 13	true	500 0	506 8	606 7	56 2	2,959 97	49 8	59 5	J-360
J-200	2 800	Zone - 13	true	500 0	504 7	604 7	69 2	2,959 97	65 0	55 7	J-170
J-210	2,760	Zone - 13	true	500 0	505 4	605 4	86 5	2,959 96	76 6	55 7	J-170
J-220	2 783	Zone - 13	true	500 0	506 1	606 1	76 6	2,959 96	69 9	55 7	J-170
J-240	2 728	Zone - 13	true	500 0	504 1	604 0	100 4	2,959 97	99 0	56 0	J-170
J-250	2,695	Zone - 12	true	500 0	500 0	600 0	58 4	2 830 04	58 1	34 3	J-350
J 260	2 728	Zone - 13	true	500 0	503 4	603 4	100 4	2,959 97	98 9	56 0	J-170
J-270	2 782	Zone - 13	true	500 0	504 7	604 7	77 0	2,959 97	75 2	54 4	J-170
J-280	2,730	Zone - 13	true	500 0	500 0	600 0	99 5	2,959 98	98 1	56 1	J-170
J-290	2 700	Zone - 13	true	500 0	500 0	600 0	112 5	2,959 99	111 6	56 2	J-170
J-300	2,733	Zone - 13	true	500 0	506 8	606 7	98 2	2,959 97	93 7	56 0	J-170
J-310	2,748	Zone - 13	true	500 0	513 9	613 8	91 7	2 959 97	90 6	55 9	J-170
J-320	2,767	Zone - 13	true	1,500 0	1,502 0	1,602 0	83 5	2,959 98	80 2	54 4	J-170
J-330	2 765	Zone - 13	true	500 0	503 4	603 4	84 4	2,959 97	68 2	54 4	J-170
J-340	2 745	Zone - 12	true	500 0	502 7	602 7	36 8	2 830 04	35 6	34 3	J-350
J-350	2 750	Zone - 12	true	500 0	501 4	601 3	34 6	2,830 04	32 2	36 5	J-340
J-360	2 822	Zone - 13	true	500 0	500 0	600 0	59 7	2,959 99	59 5	56 0	J-170
J-370	2 695	Zone - 13	true	1 500 0	1 500 0	1 600 0	114 6	2,959 98	112 1	54 4	J-170

APPENDIX B

OPTION 2:

Water Demand Calculations

Project *McDowell Mountain Back Bowl*
Location *City of Scottsdale, Arizona*
Date *13-Jan-05*
References *City of Scottsdale Design Standards and Policy Manual*

Project Number 042054
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	2,732	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	2,743	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	2,783	3	486			1,458	1 0	2,916	2 0	5,103	3 5
J-110	2 719										
J-120	2,745										
J-140	2,722	9	486			4,374	3 0	8,748	6 1	15,309	10 6
J-150	2,785	1	486			486	0 3	972	0 7	1,701	1 2
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	2,797	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	2,688	4	486			1,944	1 4	3,888	2 7	6,804	4 7
J-240	2,728	6	486			2,916	2 0	5,832	4 1	10,206	7 1
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	2,782	8	486			3,888	2 7	7,776	5 4	13,608	9 5
J-280	2,730										
J-290	2,700										
J-300	2 733										
J-310	2 748	5	486			2,430	1 7	4,860	3 4	8,505	5 9
J-320	2 767	4	486			1,944	1 4	3,888	2 7	6,804	4 7
J-330 [1]	2,760	1	486	10,000	0 9	9,486	6 6	18 972	13 2	33,201	23 1
J-340	2 745	3	486			1,458	1 0	2,916	2 0	5,103	3 5
J-350	2,750	2	486			972	0 7	1,944	1 4	3,402	2 4
J-360	2 822	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	2,817										
	Total	***146***		***10,000***		***79,956***	***56***	***159,912***	***111***	***279,846***	***194***

Notes
(1) 10 00 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

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

Label	Elevation (ft)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	2,732 00	3 4	2,960	98 6
J-20	2 705 00	2 0	2,960	110 3
J-30	2 707 00	1 4	2,960	109 5
J-40	2 640 00	2 4	2 830	82 2
J-50	2,743 00	1 4	2 960	93 9
J-80	2,747 00	2 0	2 960	92 1
J-100	2 783 00	1 0	2 960	76 6
J-110	2 719 00	0 0	2,960	104 3
J-120	2 745 00	0 0	2 960	93 0
J-140	2 722 00	3 0	2 960	103 0
J-150	2,785 00	0 3	2,960	75 7
J-160	2 773 00	2 4	2 960	80 9
J-170	2 830 00	3 4	2 960	56 2
J-180	2 810 00	2 0	2 960	64 9
J-190	2,797 00	0 7	2 960	70 5
J-200	2 800 00	1 7	2 960	69 2
J-210	2 760 00	2 4	2 960	86 5
J-220	2 783 00	3 0	2,960	76 6
J-230	2,688 00	1 4	2,830	61 5
J-240	2,728 00	2 0	2 960	100 4
J-250	2 695 00	2 0	2,830	58 4
J-260	2 728 00	1 7	2 960	100 4
J-270	2,782 00	2 7	2 960	77 0
J-280	2 730 00	0 0	2,960	99 5
J-290	2 700 00	0 0	2,960	112 5
J-300	2 733 00	0 0	2 960	98 2
J-310	2,748 00	1 7	2 960	91 7
J-320	2 767 00	1 4	2,960	83 5
J-330	2 760 00	6 6	2,960	86 5
J-340	2 745 00	1 0	2,960	93 0
J-350	2 750 00	0 7	2,960	90 9
J-360	2,822 00	1 4	2,960	59 7
J-370	2 695 00	0 7	2 830	58 4
J-380	2 817 00	0 0	2,960	61 9

Scenario Option 2 Average-Day
Steady State Analysis
Pipe Report

Label	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	1 215 00	8 0	Ductile Iron	130 0	12 0	2,959 99	2,959 99	0 08	0 01	0 01
P-30	1,093 00	8 0	Ductile Iron	130 0	-3 5	2 959 99	2,959 99	0 02	0 00	0 00
P-40	1 490 00	8 0	Ductile Iron	130 0	-2 0	2 830 04	2 830 04	0 01	0 00	0 00
P-60	763 00	8 0	Ductile Iron	130 0	1 6	2,959 99	2,959 99	0 01	0 00	0 00
P-90	504 00	8 0	Ductile Iron	130 0	-3 1	2,959 99	2,959 99	0 02	0 00	0 00
P-150	625 00	12 0	Ductile Iron	130 0	0 0	2,959 99	2,959 99	0 00	0 00	0 00
P-160	427 00	8 0	Ductile Iron	130 0	2 1	2,959 99	2,959 99	0 01	0 00	0 00
P-170	595 00	8 0	Ductile Iron	130 0	4 8	2,959 99	2,959 99	0 03	0 00	0 00
P-190	958 00	8 0	Ductile Iron	130 0	1 3	2 959 99	2,959 99	0 01	0 00	0 00
P-200	773 00	8 0	Ductile Iron	130 0	-2 4	2,959 99	2,959 99	0 02	0 00	0 00
P-210	1,076 00	8 0	Ductile Iron	130 0	4 4	2,959 99	2,959 99	0 03	0 00	0 00
P-220	1 257 00	8 0	Ductile Iron	130 0	1 1	2,959 99	2,959 99	0 01	0 00	0 00
P-230	770 00	8 0	Ductile Iron	130 0	-4 5	2,959 99	2,959 99	0 03	0 00	0 00
P-240	200 00	8 0	Ductile Iron	130 0	10 1	2 959 99	2 959 99	0 06	0 00	0 00
P-250	896 00	8 0	Ductile Iron	130 0	4 9	2,959 99	2,959 99	0 03	0 00	0 00
P-260	472 00	8 0	Ductile Iron	130 0	-3 5	2,959 99	2,959 99	0 02	0 00	0 00
P-270	774 00	8 0	Ductile Iron	130 0	5 4	2,959 99	2,959 99	0 03	0 00	0 00
P-280	1,035 00	8 0	Ductile Iron	130 0	2 4	2,959 99	2,959 99	0 02	0 00	0 00
P-290	50 00	12 0	Ductile Iron	130 0	43 6	2,960 00	2,960 00	0 12	0 01	0 00
P-300	719 00	8 0	Ductile Iron	130 0	4 9	2,959 99	2,959 99	0 03	0 00	0 00
P-310	1,814 00	8 0	Ductile Iron	130 0	4 4	2,830 04	2,830 04	0 03	0 00	0 00
P-320	93 00	8 0	Ductile Iron	130 0	6 4	2,959 99	2,959 99	0 04	0 00	0 00
P-330	395 00	8 0	Ductile Iron	130 0	-7 0	2,959 99	2,959 99	0 04	0 00	0 00
P-340	464 00	8 0	Ductile Iron	130 0	-6 4	2,830 04	2,830 04	0 04	0 00	0 00
P-350	594 00	8 0	Ductile Iron	130 0	3 7	2,959 99	2,959 99	0 02	0 00	0 00
P-360	234 00	8 0	Ductile Iron	130 0	-8 5	2,959 99	2,959 99	0 05	0 00	0 00
P-370	15 000 00	16 0	Ductile Iron	130 0	-12 0	2,960 00	2,960 00	0 02	0 00	0 00
P-380	5,400 00	12 0	Ductile Iron	130 0	12 0	2,960 00	2,959 99	0 03	0 00	0 00
P-400	413 00	12 0	Ductile Iron	130 0	43 6	2,960 00	2,960 00	0 12	0 01	0 00
P-410	901 00	8 0	Ductile Iron	130 0	13 2	2 960 00	2,959 99	0 08	0 01	0 01
P-460	1 137 00	8 0	Ductile Iron	130 0	1 4	2,959 99	2,959 99	0 01	0 00	0 00
P-480	1 018 00	8 0	Ductile Iron	130 0	-5 8	2 959 99	2,959 99	0 04	0 00	0 00
P-490	431 00	8 0	Ductile Iron	130 0	-12 4	2 959 99	2,959 99	0 08	0 01	0 00
P-500	322 00	8 0	Ductile Iron	130 0	3 4	2 959 99	2,959 99	0 02	0 00	0 00
P-510	597 00	8 0	Ductile Iron	130 0	1 7	2,959 99	2,959 99	0 01	0 00	0 00

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

Label	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-520	606 00	8 0	Ductile Iron	130 0	-1 0	2,959 99	2 959 99	0 01	0 00	0 00
P-530	684 00	8 0	Ductile Iron	130 0	1 4	2,959 99	2,959 99	0 01	0 00	0 00
P-550	206 00	8 0	Ductile Iron	130 0	-0 0	2 830 04	2,830 04	0 00	0 00	0 00
P-560	517 00	8 0	Ductile Iron	130 0	-0 7	2,830 04	2,830 04	0 00	0 00	0 00
P-580	1,344 00	8 0	Ductile Iron	130 0	-8 9	2,959 99	2,959 99	0 06	0 00	0 00
P-590	417 00	8 0	Ductile Iron	130 0	6 8	2,959 99	2 959 99	0 04	0 00	0 00
P-600	1 246 00	12 0	Ductile Iron	130 0	30 4	2,960 00	2,959 99	0 09	0 00	0 00
P-610	651 00	12 0	Ductile Iron	130 0	-14 7	2,959 99	2,959 99	0 04	0 00	0 00
P-620	138 00	8 0	Ductile Iron	130 0	0 0	2,959 99	2,959 99	0 00	0 00	0 00

Scenario. Option 2 Average-Day
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-10	2,960 00	Zone - 13	-12 0	2 960 00
R-20	2,960 00	Zone - 13	-43 6	2,960 00

Scenario: Option 2 Average-Day
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	2,959 99	2 830 04	129 94
PRV-2	2 688 00	2,830 00	6 0	0 00	Active	Closed	0 0	2,830 04	2,959 99	0 00

Scenario Option 2 Maximum-Day
Steady State Analysis
Junction Report

Label	Elevation (ft)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	2,732 00	6 8	2 960	98 6
J-20	2 705 00	4 1	2,960	110 3
J-30	2,707 00	2 7	2 960	109 4
J-40	2 640 00	4 7	2,830	82 2
J-50	2,743 00	2 7	2,960	93 9
J-80	2,747 00	4 1	2 960	92 1
J-100	2 783 00	2 0	2,960	76 6
J-110	2 719 00	0 0	2 960	104 3
J-120	2,745 00	0 0	2 960	93 0
J-140	2 722 00	6 1	2,960	103 0
J-150	2 785 00	0 7	2 960	75 7
J-160	2 773 00	4 7	2 960	80 9
J-170	2 830 00	6 8	2 960	56 2
J-180	2,810 00	4 1	2,960	64 9
J-190	2 797 00	1 4	2 960	70 5
J-200	2,800 00	3 4	2,960	69 2
J-210	2,760 00	4 7	2 960	86 5
J-220	2,783 00	6 1	2,960	76 6
J-230	2 688 00	2 7	2 830	61 5
J-240	2,728 00	4 1	2,960	100 4
J-250	2 695 00	4 1	2 830	58 4
J-260	2,728 00	3 4	2,960	100 4
J-270	2 782 00	5 4	2 960	77 0
J-280	2 730 00	0 0	2 960	99 5
J-290	2,700 00	0 0	2,960	112 5
J-300	2 733 00	0 0	2 960	98 2
J-310	2,748 00	3 4	2 960	91 7
J-320	2 767 00	2 7	2 960	83 5
J-330	2,760 00	13 2	2 960	86 5
J-340	2 745 00	2 0	2 960	93 0
J-350	2,750 00	1 4	2,960	90 8
J-360	2 822 00	2 7	2 960	59 7
J-370	2 695 00	1 4	2,830	58 4
J-380	2 817 00	0 0	2,960	61 9

Scenario Option 2 Maximum-Day
Steady State Analysis
Pipe Report

Label	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	1 215 00	8 0	Ductile Iron	130 0	23 9	2,959 98	2,959 96	0 15	0 02	0 02
P-30	1 093 00	8 0	Ductile Iron	130 0	-7 0	2,959 95	2,959 95	0 04	0 00	0 00
P-40	1 490 00	8 0	Ductile Iron	130 0	-4 0	2,830 04	2,830 04	0 03	0 00	0 00
P-60	763 00	8 0	Ductile Iron	130 0	3 2	2 959 96	2,959 95	0 02	0 00	0 00
P-90	504 00	8 0	Ductile Iron	130 0	-6 2	2,959 95	2,959 96	0 04	0 00	0 00
P-150	625 00	12 0	Ductile Iron	130 0	0 0	2,959 97	2,959 97	0 00	0 00	0 00
P-160	427 00	8 0	Ductile Iron	130 0	4 1	2,959 95	2,959 95	0 03	0 00	0 00
P-170	595 00	8 0	Ductile Iron	130 0	9 7	2,959 95	2,959 95	0 06	0 00	0 00
P-190	958 00	8 0	Ductile Iron	130 0	2 5	2,959 97	2,959 97	0 02	0 00	0 00
P-200	773 00	8 0	Ductile Iron	130 0	-4 7	2 959 97	2,959 97	0 03	0 00	0 00
P-210	1,076 00	8 0	Ductile Iron	130 0	8 9	2,959 97	2,959 96	0 06	0 00	0 00
P-220	1 257 00	8 0	Ductile Iron	130 0	2 1	2,959 96	2 959 96	0 01	0 00	0 00
P-230	770 00	8 0	Ductile Iron	130 0	-9 0	2,959 96	2,959 96	0 06	0 00	0 00
P-240	200 00	8 0	Ductile Iron	130 0	20 2	2,959 97	2 959 96	0 13	0 01	0 00
P-250	896 00	8 0	Ductile Iron	130 0	9 9	2,959 96	2,959 96	0 06	0 00	0 00
P-260	472 00	8 0	Ductile Iron	130 0	-7 0	2,959 96	2,959 96	0 04	0 00	0 00
P-270	774 00	8 0	Ductile Iron	130 0	10 8	2,959 96	2,959 96	0 07	0 00	0 00
P-280	1 035 00	8 0	Ductile Iron	130 0	4 7	2,959 96	2,959 96	0 03	0 00	0 00
P-290	50 00	12 0	Ductile Iron	130 0	87 1	2 960 00	2,960 00	0 25	0 03	0 00
P-300	719 00	8 0	Ductile Iron	130 0	9 9	2,959 95	2,959 95	0 06	0 00	0 00
P-310	1,814 00	8 0	Ductile Iron	130 0	8 8	2,830 04	2,830 04	0 06	0 00	0 01
P-320	93 00	8 0	Ductile Iron	130 0	12 8	2,959 95	2 959 95	0 08	0 01	0 00
P-330	395 00	8 0	Ductile Iron	130 0	-13 9	2,959 95	2,959 96	0 09	0 01	0 00
P-340	464 00	8 0	Ductile Iron	130 0	-12 8	2,830 04	2,830 04	0 08	0 01	0 00
P-350	594 00	8 0	Ductile Iron	130 0	7 5	2,959 96	2,959 95	0 05	0 00	0 00
P-360	234 00	8 0	Ductile Iron	130 0	-17 0	2,959 97	2,959 97	0 11	0 01	0 00
P-370	15 000 00	16 0	Ductile Iron	130 0	-23 9	2 959 99	2,960 00	0 04	0 00	0 01
P-380	5,400 00	12 0	Ductile Iron	130 0	23 9	2,959 99	2,959 98	0 07	0 00	0 01
P-400	413 00	12 0	Ductile Iron	130 0	87 1	2,960 00	2,959 99	0 25	0 03	0 01
P-410	901 00	8 0	Ductile Iron	130 0	26 4	2 959 99	2,959 97	0 17	0 02	0 02
P-460	1 137 00	8 0	Ductile Iron	130 0	2 7	2,959 97	2 959 97	0 02	0 00	0 00
P-480	1 018 00	8 0	Ductile Iron	130 0	-11 6	2,959 95	2,959 96	0 07	0 00	0 00
P-490	431 00	8 0	Ductile Iron	130 0	-24 8	2,959 96	2 959 97	0 16	0 02	0 01
P-500	322 00	8 0	Ductile Iron	130 0	6 8	2,959 95	2 959 95	0 04	0 00	0 00
P-510	597 00	8 0	Ductile Iron	130 0	3 4	2,959 95	2 959 95	0 02	0 00	0 00

Label	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 520	606 00	8 0	Ductile Iron	130 0	-2 0	2,959 95	2 959 95	0 01	0 00	0 00
P-530	684 00	8 0	Ductile Iron	130 0	2 7	2,959 96	2 959 96	0 02	0 00	0 00
P-550	206 00	8 0	Ductile Iron	130 0	-0 0	2,830 04	2 830 04	0 00	0 00	0 00
P-560	517 00	8 0	Ductile Iron	130 0	-1 4	2,830 04	2,830 04	0 01	0 00	0 00
P-580	1 344 00	8 0	Ductile Iron	130 0	-17 8	2,959 96	2,959 97	0 11	0 01	0 01
P-590	417 00	8 0	Ductile Iron	130 0	13 6	2 959 97	2 959 97	0 09	0 01	0 00
P-600	1 246 00	12 0	Ductile Iron	130 0	60 8	2 959 99	2,959 97	0 17	0 01	0 02
P-610	651 00	12 0	Ductile Iron	130 0	-29 4	2,959 97	2,959 97	0 08	0 00	0 00
P-620	138 00	8 0	Ductile Iron	130 0	0 0	2,959 95	2,959 95	0 00	0 00	0 00

Scenario Option 2 Maximum-Day
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-10	2,960 00	Zone - 13	-23 9	2 960 00
R-20	2,960 00	Zone - 13	-87 1	2,960 00

Scenario Option 2 Maximum-Day
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	2,959 95	2 830 04	129 90
PRV-2	2,688 00	2,830 00	6 0	0 00	Active	Closed	0 0	2,830 04	2 959 95	0 00

Scenario Option 2 Peak-Hour
Steady State Analysis
Junction Report

Label	Elevation (ft)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	2 732 00	11 8	2,960	98 6
J-20	2 705 00	7 1	2,960	110 3
J-30	2 707 00	4 7	2 960	109 4
J-40	2,640 00	8 3	2 830	82 2
J-50	2 743 00	4 7	2,960	93 8
J-80	2,747 00	7 1	2 960	92 1
J-100	2,783 00	3 5	2 960	76 5
J-110	2,719 00	0 0	2,960	104 3
J-120	2 745 00	0 0	2 960	93 0
J-140	2,722 00	10 6	2,960	102 9
J-150	2 785 00	1 2	2 960	75 7
J-160	2,773 00	8 3	2,960	80 9
J-170	2 830 00	11 8	2 960	56 2
J-180	2 810 00	7 1	2 960	64 9
J-190	2,797 00	2 4	2,960	70 5
J-200	2 800 00	5 9	2 960	69 2
J-210	2,760 00	8 3	2 960	86 5
J-220	2,783 00	10 6	2,960	76 5
J-230	2 688 00	4 7	2,830	61 4
J-240	2 728 00	7 1	2 960	100 3
J-250	2,695 00	7 1	2,830	58 4
J-260	2,728 00	5 9	2,960	100 3
J-270	2 782 00	9 4	2 960	77 0
J-280	2,730 00	0 0	2,960	99 5
J-290	2 700 00	0 0	2 960	112 5
J-300	2 733 00	0 0	2 960	98 2
J-310	2 748 00	5 9	2 960	91 7
J-320	2 767 00	4 7	2 960	83 5
J-330	2 760 00	23 1	2 960	86 5
J-340	2,745 00	3 5	2 960	93 0
J-350	2 750 00	2 4	2,960	90 8
J-360	2 822 00	4 7	2,960	59 7
J-370	2 695 00	2 4	2 830	58 4
J-380	2 817 00	0 0	2 960	61 8

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

Label	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	1,215 00	8 0	Ductile Iron	130 0	41 8	2 959 94	2 959 87	0 27	0 05	0 06
P-30	1 093 00	8 0	Ductile Iron	130 0	-12 2	2 959 86	2,959 86	0 08	0 01	0 01
P-40	1 490 00	8 0	Ductile Iron	130 0	-7 1	2,830 02	2,830 02	0 05	0 00	0 00
P-60	763 00	8 0	Ductile Iron	130 0	5 6	2,959 87	2,959 87	0 04	0 00	0 00
P-90	504 00	8 0	Ductile Iron	130 0	-10 9	2,959 87	2 959 87	0 07	0 00	0 00
P-150	625 00	12 0	Ductile Iron	130 0	0 0	2,959 91	2,959 91	0 00	0 00	0 00
P-160	427 00	8 0	Ductile Iron	130 0	7 2	2,959 87	2,959 87	0 05	0 00	0 00
P-170	595 00	8 0	Ductile Iron	130 0	16 9	2 959 87	2,959 86	0 11	0 01	0 01
P-190	958 00	8 0	Ductile Iron	130 0	4 4	2 959 91	2,959 91	0 03	0 00	0 00
P-200	773 00	8 0	Ductile Iron	130 0	-8 2	2,959 91	2,959 91	0 05	0 00	0 00
P-210	1 076 00	8 0	Ductile Iron	130 0	15 5	2,959 90	2 959 89	0 10	0 01	0 01
P-220	1 257 00	8 0	Ductile Iron	130 0	3 7	2,959 89	2 959 89	0 02	0 00	0 00
P-230	770 00	8 0	Ductile Iron	130 0	-15 7	2,959 89	2,959 90	0 10	0 01	0 01
P-240	200 00	8 0	Ductile Iron	130 0	35 3	2,959 91	2 959 90	0 23	0 04	0 01
P-250	896 00	8 0	Ductile Iron	130 0	17 3	2,959 90	2,959 89	0 11	0 01	0 01
P-260	472 00	8 0	Ductile Iron	130 0	-12 3	2,959 89	2 959 89	0 08	0 01	0 00
P-270	774 00	8 0	Ductile Iron	130 0	18 9	2,959 89	2,959 88	0 12	0 01	0 01
P-280	1 035 00	8 0	Ductile Iron	130 0	8 3	2,959 88	2,959 88	0 05	0 00	0 00
P-290	50 00	12 0	Ductile Iron	130 0	152 5	2,960 00	2,960 00	0 43	0 08	0 00
P-300	719 00	8 0	Ductile Iron	130 0	17 3	2 959 87	2,959 86	0 11	0 01	0 01
P-310	1 814 00	8 0	Ductile Iron	130 0	15 4	2,830 04	2 830 02	0 10	0 01	0 01
P-320	93 00	8 0	Ductile Iron	130 0	22 4	2,959 86	2,959 86	0 14	0 02	0 00
P-330	395 00	8 0	Ductile Iron	130 0	-24 4	2,959 87	2,959 87	0 16	0 02	0 01
P-340	464 00	8 0	Ductile Iron	130 0	-22 4	2 830 04	2 830 04	0 14	0 02	0 01
P-350	594 00	8 0	Ductile Iron	130 0	13 1	2,959 87	2,959 87	0 08	0 01	0 00
P-360	234 00	8 0	Ductile Iron	130 0	-29 7	2,959 90	2,959 91	0 19	0 03	0 01
P 370	15 000 00	16 0	Ductile Iron	130 0	-41 8	2,959 97	2,960 00	0 07	0 00	0 03
P-380	5 400 00	12 0	Ductile Iron	130 0	41 8	2,959 97	2 959 94	0 12	0 01	0 04
P-400	413 00	12 0	Ductile Iron	130 0	152 5	2 960 00	2 959 96	0 43	0 08	0 03
P-410	901 00	8 0	Ductile Iron	130 0	46 2	2 959 96	2 959 91	0 29	0 06	0 06
P-460	1 137 00	8 0	Ductile Iron	130 0	4 7	2,959 90	2 959 90	0 03	0 00	0 00
P-480	1 018 00	8 0	Ductile Iron	130 0	-20 4	2 959 87	2 959 88	0 13	0 01	0 01
P-490	431 00	8 0	Ductile Iron	130 0	-43 4	2,959 88	2 959 91	0 28	0 05	0 02
P-500	322 00	8 0	Ductile Iron	130 0	11 8	2 959 87	2,959 87	0 08	0 00	0 00
P-510	597 00	8 0	Ductile Iron	130 0	5 9	2,959 87	2 959 87	0 04	0 00	0 00

Scenario Option 2 Peak-Hour
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Zone	Inflow (gpm)	Calculated Hydraulic Grade (ft)
R-10	2,960 00	Zone - 13	-41 8	2,960 00
R-20	2 960 00	Zone - 13	-152 5	2 960 00

Scenario: Option 2 Peak-Hour
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	2 959 86	2 830 04	129 81
PRV-2	2,688 00	2 830 00	6 0	0 00	Active	Closed	0 0	2 830 02	2,959 86	0 00

Scenario Option 2Maximum-Day + Fire Flow
Fire Flow Analysis
Fire Flow Report

Label	Elevation (ft)	Zone	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	2,732 00	Zone - 13	true	500 0	506 8	606 7	95 0	2,951 60	90 1	53 0	J-170
J-20	2 705 00	Zone - 13	true	500 0	504 7	604 7	103 7	2,944 57	95 7	52 9	J-170
J-30	2 707 00	Zone - 13	true	500 0	504 1	604 0	104 9	2,949 35	98 2	52 8	J-170
J-40	2,640 00	Zone - 12	true	500 0	1,005 9	1,105 9	63 6	2,787 10	38 5	11 3	J-370
J-50	2 743 00	Zone - 13	true	500 0	507 4	607 4	90 5	2,952 12	86 0	52 9	J-170
J-80	2,747 00	Zone - 13	true	500 0	504 7	604 7	88 9	2,952 52	85 2	52 8	J-170
J-100	2,783 00	Zone - 13	true	1,500 0	1,500 0	1,600 0	74 6	2,955 49	67 7	48 9	J-170
J-110	2 719 00	Zone - 13	true	500 0	500 0	600 0	104 2	2,959 81	104 1	54 0	J-170
J-120	2,745 00	Zone - 13	true	500 0	500 0	600 0	91 1	2,955 49	88 8	52 4	J-170
J-140	2 722 00	Zone - 13	true	500 0	506 8	606 7	99 5	2,952 00	95 0	52 7	J-170
J-150	2 785 00	Zone - 13	true	500 0	500 0	600 0	73 8	2,955 46	71 6	52 1	J-170
J-160	2,773 00	Zone - 13	true	500 0	505 4	605 4	79 1	2,955 93	76 8	51 9	J-170
J-170	2 830 00	Zone - 13	true	500 0	507 4	607 4	54 1	2 954 98	50 1	54 2	J-360
J-180	2 810 00	Zone - 13	true	500 0	1 008 3	1,108 3	62 4	2,954 15	58 4	51 1	J-170
J-190	2,797 00	Zone - 13	true	500 0	504 1	604 0	68 3	2,954 90	65 2	51 6	J-170
J-200	2,800 00	Zone - 13	true	500 0	505 4	605 4	66 8	2,954 37	62 8	51 2	J-170
J-210	2 760 00	Zone - 13	true	500 0	505 4	605 4	84 1	2 954 37	74 5	51 2	J-170
J-220	2 783 00	Zone - 13	true	500 0	505 4	605 4	74 1	2,954 37	67 7	51 2	J-170
J-230	2 688 00	Zone - 12	true	500 0	1 009 4	1 109 4	39 5	2 779 25	3 5	0 5	J-370
J-240	2,728 00	Zone - 13	true	500 0	504 1	604 0	95 7	2,949 09	89 2	53 0	J-170
J-250	2 695 00	Zone - 12	true	500 0	502 7	602 7	54 6	2 821 26	49 5	31 3	J-370
J-260	2,728 00	Zone - 13	true	500 0	504 1	604 0	97 0	2,952 21	92 7	52 8	J-170
J-270	2,782 00	Zone - 13	true	500 0	506 8	606 7	75 2	2,955 75	72 2	51 4	J-170
J-280	2 730 00	Zone - 13	true	500 0	500 0	600 0	97 7	2,955 72	93 3	53 4	J-170
J-290	2 700 00	Zone - 13	true	500 0	500 0	600 0	111 7	2,958 26	109 2	53 8	J-170
J-300	2 733 00	Zone - 13	true	500 0	500 0	600 0	97 5	2,958 27	96 7	53 4	J-170
J-310	2 748 00	Zone - 13	true	500 0	503 4	603 4	88 3	2,952 12	81 1	52 9	J-170
J-320	2,767 00	Zone - 13	true	500 0	502 7	602 7	81 7	2,955 75	75 2	51 4	J-170
J-330	2 760 00	Zone - 13	true	500 0	513 2	613 2	84 1	2,954 40	80 6	52 6	J-170
J-340	2 745 00	Zone - 13	true	500 0	502 0	602 0	89 6	2,952 12	82 4	52 9	J-170
J-350	2,750 00	Zone - 13	true	500 0	501 4	601 3	87 4	2,952 12	82 0	52 9	J-170
J-360	2,822 00	Zone - 13	true	500 0	502 7	602 7	57 3	2,954 37	51 2	51 2	J-170
J-370	2,695 00	Zone - 12	true	500 0	501 4	584 5	36 5	2,779 25	-0 0	4 5	J-230
J-380	2 817 00	Zone - 13	true	1 500 0	1 500 0	1,600 0	60 0	2 955 76	54 2	49 0	J-170

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!!!

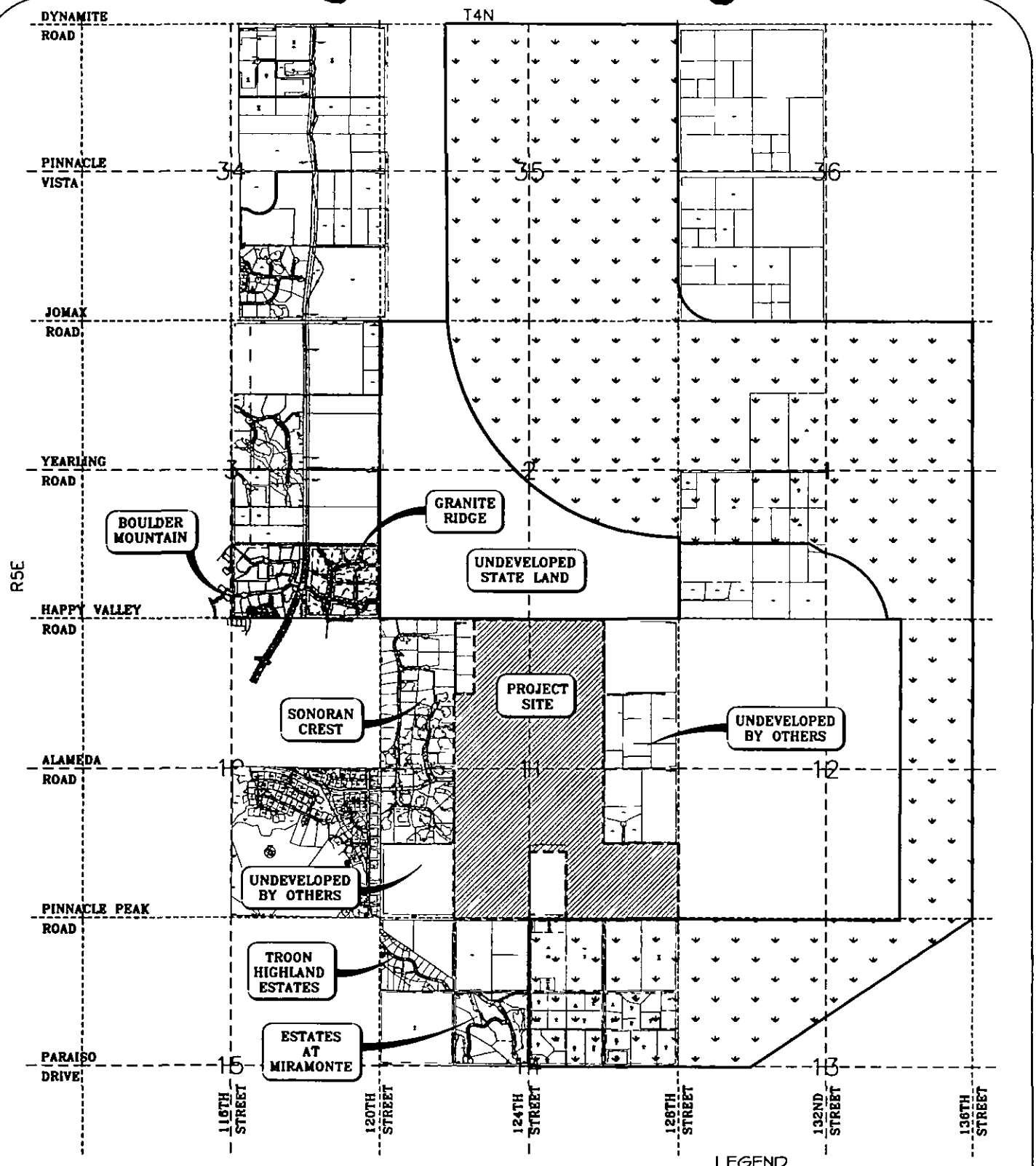
sv

Table C.2-1: Elevation Ranges for Existing and Future Service Zones

Service Zone (Sub-Zone(s))	Planning Zone	Range of Ground Elevation Within Zone (ft)		Range (ft)
1	Southern	1180	1280	100
1A	Southern	1250	1330	80
2A	Southern	1280	1330	50
2 (2E)	Central	1330	1440	110
3 (3W, 3C, 3E)	Central	1440	1550	110
4E (4E-A , 4E-B)	Central	1550	1650	100
5E	Central	1650	1750	100
6E	Central	1750	1934	184
7E	Central	1934	2065	131
8E	Central	2065	2200	135
4	Northern	1510	1650	140
5	Northern	1650	1790	140
6 (5E-A, 5E-B, 6A, 6B, 6C)	Northern	1790	1920	130
7 (7W, 7H, 7DCR, 7MMR)	Northern	1920	2050	130
8 (8W-A, 8W-B, 8A, 8B, 8C, 8DCR)	Northern	2050	2180	130
9 (9A, 9B, 9C, 9D, 9W, 9W-A, 9DCR)	Northern	2180	2310	130
10 (10A, 10B, 10C, 10W-B, 10W, 10DCR)	Northern	2310	2440	130
11 (11E, 11L, 11DCR, 11LT)	Northern	2440	2570	130
12 (12A, 12B, 12E, 12DCR)	Northern	2570	2700	130
13 (13N)	Northern	2700	2830	130
14 (14N)	Northern	2830	2960	130

PLATE 1

Vicinity Map



CROWN COMMUNITY DEVELOPMENT
A Harvey Chown Company

McDOWELL MOUNTAIN BACK BOWL

Plate 1
Vicinity Map"

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Hydrologists
Land Surveyors
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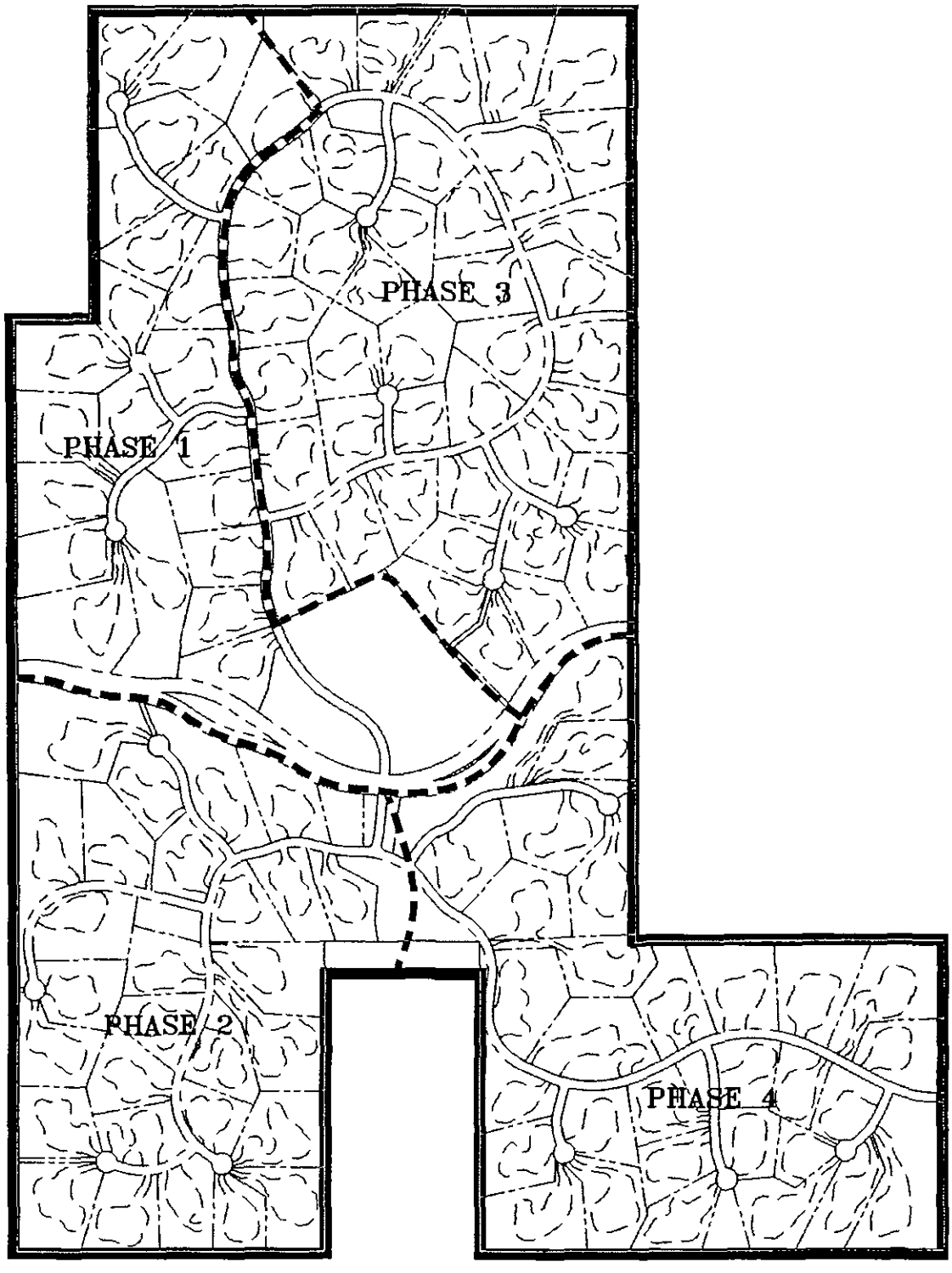
01/07/05

PLATE 1A

Phasing Map



700 0 350 700

1 inch = 700 ft

CROWN COMMUNITY DEVELOPMENT
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McDOWELL MOUNTAIN BACK BOWL

Plate 1A

"Phasing Map"

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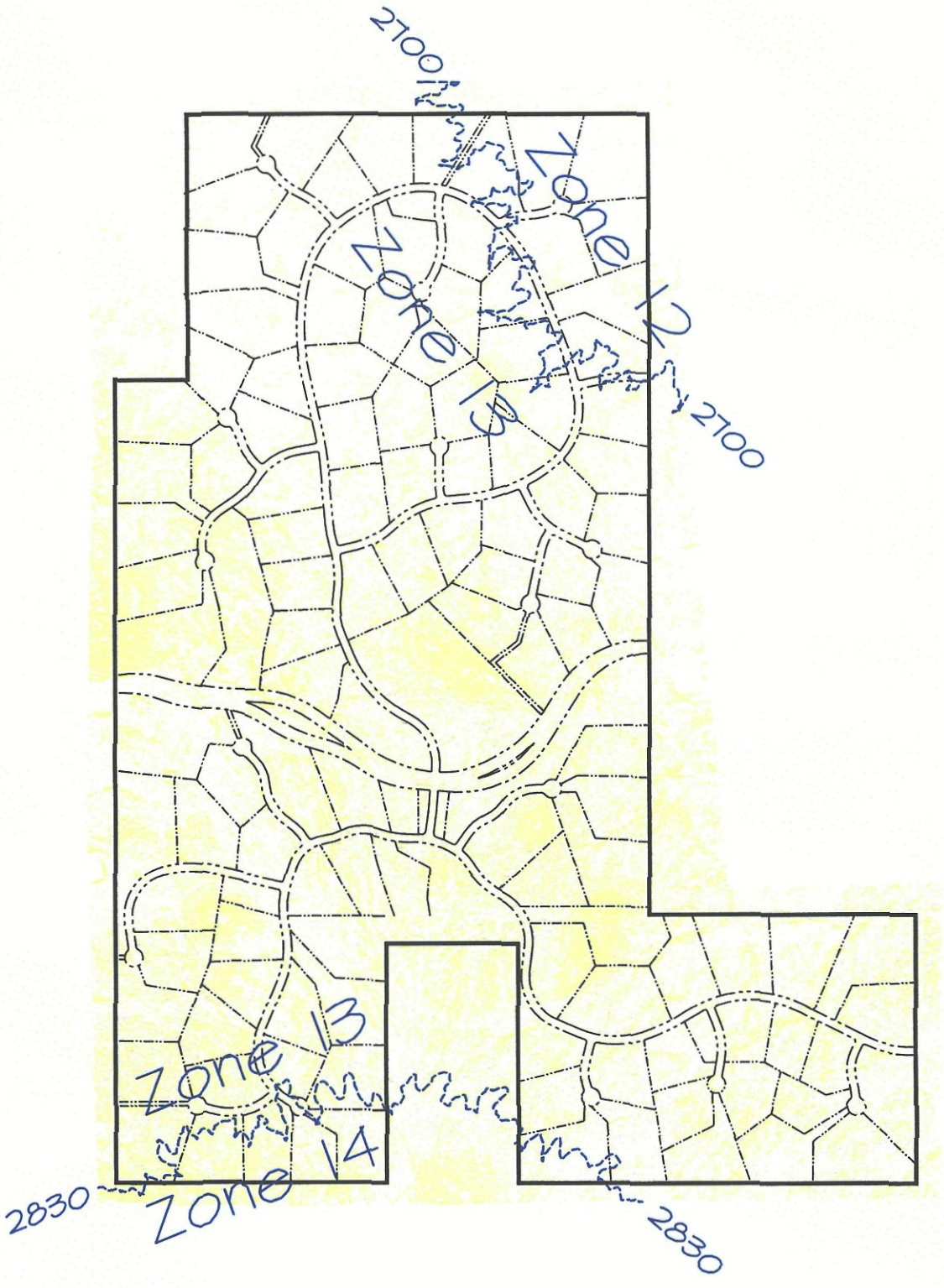
PLATE 2

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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McDowell Mountain Back Bowl

Plate 2

"On-site Water Pressure Zones"

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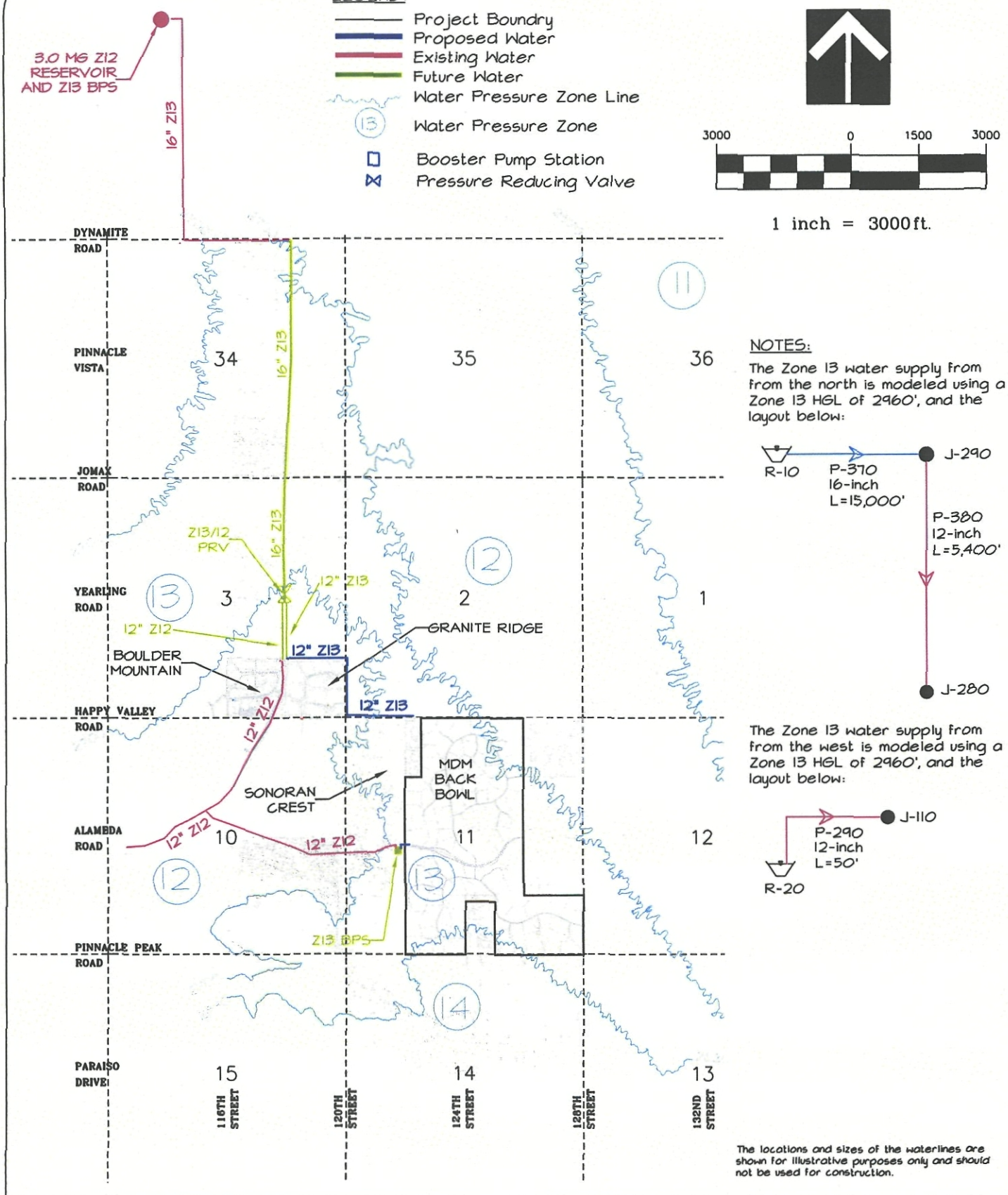
PLATE 3

Off-Site Master Potable Water System



NOTES:

The Zone 13 water supply from from the north is modeled using a Zone 13 HGL of 2960', and the layout below:

The Zone 13 water supply from from the west is modeled using a Zone 13 HGL of 2960', and the layout below:

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

CROWN COMMUNITY DEVELOPMENT
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McDOWELL MOUNTAIN BACK BOWL

Plate 3

"Off-Site Master Potable Water System"

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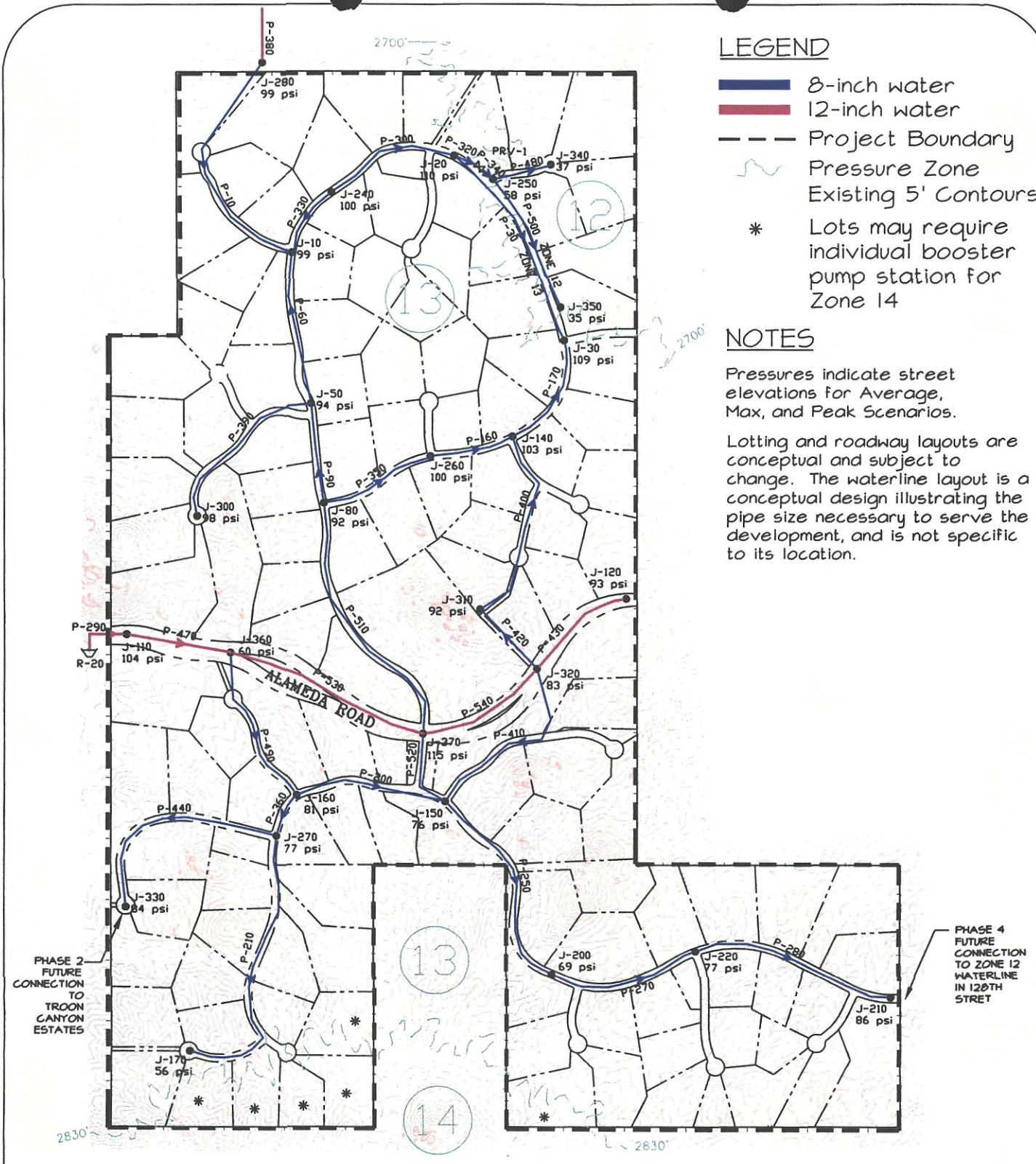
PLATE 4

Option 1: On-Site Master Potable Water Distribution System



CROWN COMMUNITY DEVELOPMENT
A Henry Crown Company

McDOWELL MOUNTAIN BACK BOWL

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

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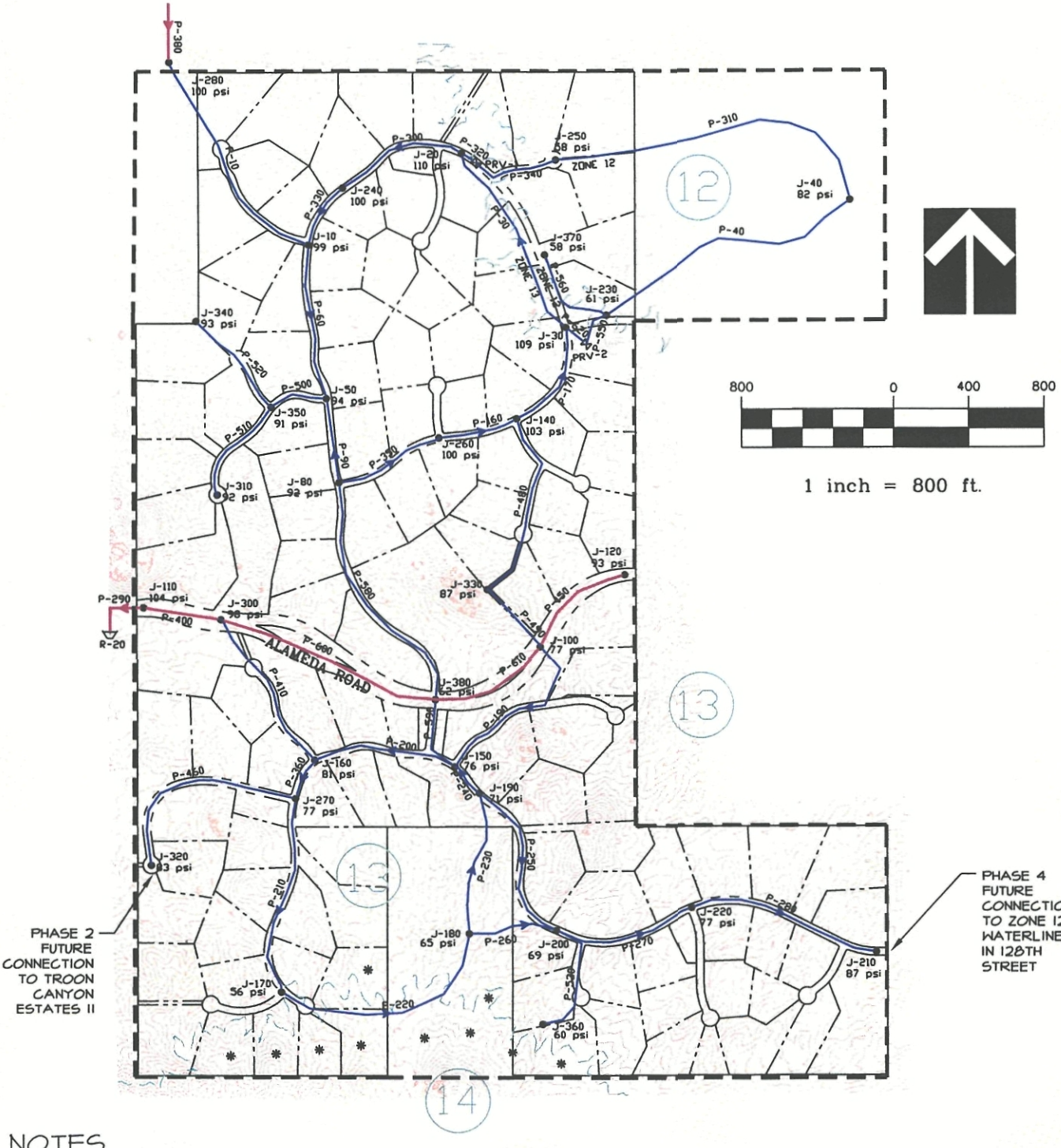
PLATE 5

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

CROWN COMMUNITY DEVELOPMENT
A Henry Crown Company

McDOWELL MOUNTAIN BACK BOWL

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

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