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City of Scottsdale
Water Resources Administration
9379 E. San Salvador
Scottsdale, AZ 85258

07/17/2017

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WOOD/PATEL
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WATER MASTER PLAN /
BASIS OF DESIGN REPORT
FOR
DESERT MOUNTAIN PARCEL 19

June 27, 2017
WP# 164434

REVISE & RESUBMIT

City of Scottsdale
Water Resources Administration
9379 E. San Salvador
Scottsdale, AZ 85258

07/17/2017

Prepared for:

DM 19, LLC
4222 East Camelback Road
Suite H100
Phoenix, Arizona
Phone: (602)386-1317

Submitted To:

City of Scottsdale
Water Resources Department
9388 East San Salvador Drive
Scottsdale, Arizona 85258
Phone: (480) 312-5636

Prepared By:

Wood, Patel & Associates, Inc.
2051 West Northern Avenue
Suite 100
Phoenix, Arizona 85021
Phone: (602) 335-8500

TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 General Background and Project Location 1

1.2 Scope of Water Master Plan / Basis of Design Report 1

1.3 Full Build-Out Condition 1

2.0 DESIGN DOCUMENTATION 2

2.1 Design Criteria 2

2.2 Water Demand Design Flows 2

3.0 EXISTING CONDITIONS 3

3.1 Topographic Conditions 3

3.2 Existing Offsite Water Storage 3

3.3 Existing Pressure Zone Sources and Hydraulic Grade Lines 3

3.4 Existing Offsite Water Infrastructure 4

3.5 Existing Onsite Water Infrastructure 4

4.0 HYDRAULIC MODEL 6

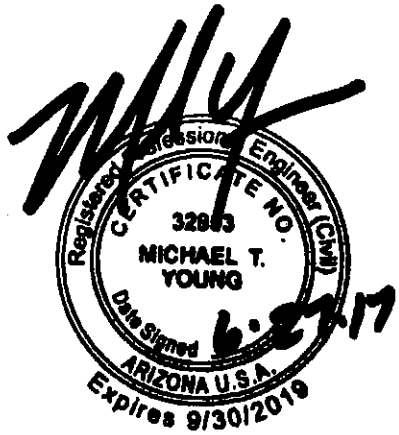
4.1 Methodology 6

4.2 Piping Layout 7

4.3 Hydraulic Modeling Results 7

5.0 CONCLUSIONS 8

6.0 REFERENCES 9



TABLES

TABLE 1	Water Distribution System Design Criteria
TABLE 2	Offsite Water Demands, Existing Condition
TABLE 3	Offsite Water Demands, Full Build-Out Condition
TABLE 4	Onsite Water Demands, Full Build-Out Condition
TABLE 5	Water Demand Design Flows by Junction Node, Existing Condition
TABLE 6	Water Demand Design Flows by Junction Node, Full Build-Out Condition
TABLE 7	Existing Water System Pressures (8949 E. Covey Trail)
TABLE 8	Existing Water System Pressures (9199 E. Happy Hollow Drive)

APPENDICES

APPENDIX A	Hydrant Flow Test Results
APPENDIX B	Hydraulic Modeling Results – Existing Condition
APPENDIX C	Hydraulic Modeling Results – Full Build-Out

EXHIBITS

EXHIBIT 1	Vicinity Map
EXHIBIT 2	Existing Groundwater Well Locations
EXHIBIT 3	Master Water Exhibit – Full Build-Out

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1.0 INTRODUCTION

1.1 General Background and Project Location

Desert Mountain Parcel 19 (Site) is an approximate 91-acre proposed residential/golf course development in the City of Scottsdale, located between Cave Creek Road and existing church development on the south, Pima Road on the west, and the existing fire station and booster pump site and Desert Mountain development to the east and north (refer to Exhibit 1 – *Vicinity Map*). The property is located within Section 31, Township 6 North, Range 5 East, of the Gila and Salt River Meridian.

The Site is planned to include an 18-hole, short-game golf course, clubhouse, and residential housing. This Water Master Plan / Basis of Design Report (Water Master Plan/BOD) Report for the Site utilizes a site plan prepared concurrently by Greey | Pickett, dated June 10, 2016.

This Water Master Plan/BOD Report has been prepared in accordance with Wood, Patel & Associates, Inc.'s (Wood/Patel) understanding of the City of Scottsdale's technical requirements for water distribution systems, as applicable for the Site.

1.2 Scope of Water Master Plan / Basis of Design Report

The purpose of this Water Master Plan/BOD Report is to determine water design flows, pipe sizes, and waterline locations, as required to provide water service to the proposed development. The required infrastructure identified includes water distribution system mains and connection points. A separate well purchase agreement and escrow instructions between DM19, LLC and City of Scottsdale is being prepared. Hydrology and hydraulics for the well system is not covered in this report.

1.3 Full Build-Out Condition

The design criteria utilized to determine water demands and pipe sizes for the Site are based on projected full build-out conditions. The previous zoning for the Site consisted of I-1 ESL, C-0 ESL, C-2 ESL, R1-7 ESL, and R1-35. The Site has since been rezoned to Residential R-4 and OS ESL. Additionally, it is our understanding the golf course will be irrigated by the existing Irrigation Water Distribution System (IWDS) non-potable waterlines per the latest *IWDS Pipeline Capacity Agreement for Desert Mountain Club, Inc.* by and between the City of Scottsdale and Desert Mountain Club, Inc.

2.0 DESIGN DOCUMENTATION

2.1 Design Criteria

For the purpose of this Water Master Plan/BOD Report, water demand design flows and pipe-sizing criteria utilized are based on Wood/Patel's understanding of the applicable water system design criteria listed in the *City of Scottsdale Design Standards & Policies Manual*, dated January 2010. Refer to Table 1 – *Water Distribution System Design Criteria* for detailed information regarding design criteria.

2.2 Water Demand Design Flows

Water demand design flows for Desert Mountain Parcel 19 were calculated using design criteria listed in Section 2.1 – *Design Criteria* and are summarized below. For detailed calculations, refer to Table 2 – *Offsite Water Demands - Existing Condition,* Table 3 – *Offsite Water Demands - Full Build-Out Condition,* and Table 4 – *Onsite Water Demands - Full Build-Out Condition.*

EXISTING OFFSITE WATER DEMANDS (ZONE 12)			
Type	**Average Daily Demand (gpm)**	**Maximum Daily Demand (gpm)**	**Peak Hour Demand (gpm)**
Existing Single-Family Residential	44.2	88.4	155.1
TOTAL	**44.2**	**88.4**	**155.1**

FULL BUILD-OUT OFFSITE WATER DEMANDS (ZONE 12)			
Type	**Average Daily Demand (gpm)**	**Maximum Daily Demand (gpm)**	**Peak Hour Demand (gpm)**
Existing Single-Family Residential	76.3	152.6	267.4
Existing Fire Station	0.5	1.0	1.8
TOTAL	**76.8**	**153.6**	**269.2**

FULL BUILD-OUT DESERT MOUNTAIN PARCEL 19 WATER DEMANDS (ZONE 12)			
Type	**Average Daily Demand (gpm)**	**Maximum Daily Demand (gpm)**	**Peak Hour Demand (gpm)**
Existing Single-Family Residential	32.6	65.2	114.3
Clubhouse	17.4	34.8	60.9
TOTAL	**50.0**	**100.0**	**175.2**

FULL BUILD-OUT DESERT MOUNTAIN PARCEL 19 AND OFFSITE WATER DEMANDS (ZONE 12)			
Type	**Average Daily Demand (gpm)**	**Maximum Daily Demand (gpm)**	**Peak Hour Demand (gpm)**
Offsite	76.8	153.6	269.2
Desert Mountain Parcel 19	50.0	100	175.2
TOTAL	**126.8**	**253.6**	**444.4**

3.0 EXISTING CONDITIONS

3.1 Topographic Conditions

The proposed project lies in the Desert Mountain planning region of the City of Scottsdale. The Site generally slopes from east to west, at approximately 3 percent. Elevations range from 2,645 feet above mean sea level (MSL) in the east, to 2,585 feet MSL in the west. The Site is covered with typical Sonoran Desert vegetation including mesquite trees, saguaro cactus, creosote, etc. In addition, existing dirt roads to access the existing onsite wells and booster pump station are located throughout the Site.

3.2 Existing Offsite Water Storage

According to the *2015 Master Water plan Update,* water is provided to the Site by Well Site #86, which is located southeasterly of the Site. Additionally, the well site has a 0.5-million gallon (MG) storage tank. The City of Scottsdale has commented that sully is more likely. Booster Pump Station #92B conveys water from Well Site 86 and Booster Pump Station #102 to Storage Facility T-90 and Zone 12. Storage facility locations are summarized below.

- Storage Facility located at Booster Pump Station #92B, with a storage capacity of 0.5 MG.
- Storage Facility T-90 located Zone 12, with a storage capacity of 0.8 MG.

3.3 Existing Pressure Zone Sources and Hydraulic Grade Lines

The Site elevations fall within City of Scottsdale Water Pressure Zone 12B, which has ground elevations ranging from 2,570 feet to 2,700 feet. Booster Pump Station #92B, elevation equal to 2,645 feet, supplies water to Tank 90 at an elevation of 3,116 feet. The hydraulic grade line (HGL) for pressure zones served directly by Tank 90 is approximately 3,116 feet. Since the HGL needed to serve Zone 12B is much lower than the HGL from Tank 90, several pressure reducing valves (PRVs) exist throughout Desert Mountain in order to provide pressures within the approved 50-120 psi. In order to serve Desert Mountain Parcel 19, a PRV may be necessary at each of the connection points.

3.4 Existing Offsite Water Infrastructure

Relevant existing water infrastructure adjacent to the Site includes the following:

Zone 11:

- 16-inch waterline along Cave Creek Road, from Pima Road to the existing Booster Pump Station (BPS) access road.
- 24-inch waterline along Cave Creek Road, from Pima Road to the existing BPS access road, and along the access road to the BPS.
- 12-inch waterline along the BPS access road, from Cave Creek Road to the 24-inch waterline extending to the BPS.

Zone 12 and Higher Zones:

- 8-inch waterline along Covey Trail
- 6-inch waterline along Happy Hollow Drive/Andora Hills Drive, between Bajada Drive and 93rd Street
- Two (2) 16-inch waterlines along Cave Creek Road, from Desert Mountain Parkway to the existing BPS access road. One (1) 16-inch waterline connects to a 12-inch waterline extending to a 24-inch waterline connected to the BPS. The second 16-inch waterline extends along the access road to the 24-inch waterline, which connects to the BPS.
- 12-inch waterline stub southeast of Happy Hollow Drive within Desert Mountain Phase 1 Unit 1. (Existing valve near Happy Hollow Drive exists, but unable to currently identify that waterline stub exists)

3.5 Existing Onsite Water Infrastructure

The Site currently has five (5) City of Scottsdale groundwater wells on site. Refer to Exhibit 2 – *Existing Groundwater Well Locations*. According to the *2015 Water Master Plan Update*, City of Scottsdale Well #85 is not currently in use due to high levels of arsenic. City of Scottsdale Wells 152, 153, 155, and 156 were drilled as part of the recharge and recovery project by Desert Mountain. Currently, Well #152 is a recovery-only well, with the capacity to recover approximately 700 gallons per minute (gpm).

Well #153 has a wall around the well site and installed electrical; however, this well is not operating, as it is not fully equipped. Well #155 has the capacity to recover 800 gpm and recharge 60 gpm. Well #156 has the capacity to recover 875 gpm and recharge 160 gpm.

It is Wood/Patel's understanding an existing 16-inch waterline from the BPS extends to Well Sites 155 and 156. Additionally, this 16-inch waterline connects to an existing 12-inch waterline that connects Well Sites 155 to 152. Furthermore, the existing onsite 16-inch waterline connects to the IWDS Pump Station #150 located near the southeastern corner of the Site. Additionally, seven (7) onsite vadose wells, which have the capacity to recharge approximately 500 gpm, are connected to the non-potable waterlines along the access road.

Additional waterline stubs and non-potable waterlines exist near the southeast corner of the Site, and along the access road to the well sites. As final design and construction documents are completed, an analysis will be completed to determine which waterlines can be utilized within final design. Additionally, utility location services will be utilized to accurately locate existing waterlines within the Site.

The following notes were provided by Maurice Tatlow (dated 7/6/2016):
"*There are only (4) groundwater wells on Parcel 19. Well 156 is not located on the parcel. The recovery rates listed are approximate since the wells have never been operated for extended periods of time before they were equipped.*

There are also two (2) drain wells located on Parcel 19. They are located between vadose wells VZ-3 and VZ-4 (drain well 1) and VZ-6 and VZ-7 (Drain Well 2). (See Exhibit 2).

City of Scottsdale Well #85 is used as a groundwater quality sampling well for the City's recharge permit.

A separate well relocation delivery and capacity agreement will impact this property."

4.0 HYDRAULIC MODEL

4.1 Methodology

WaterCAD Version 8.0, a potable water transmission and distribution system numerical modeling program by Haestad Methods, was utilized to analyze the proposed potable water system. The Site lies within the Zone 12 pressure zone in the City of Scottsdale water system.

The water system serving Zone 12 from Tank 90 has a static HGL of approximately 3,116 feet. Several PRVs exist within the Desert Mountain. The exact locations of these PRVs are shown schematically. The pressure settings for the existing PRVs were set with information obtained from the City. Based on the elevations and pressure settings for each of the PRVs, PRV #84 acts as the lead and supplies most of the water throughout the system. Refer to Exhibit 3 – *Master Water Exhibit - Full Build-Out* for waterline locations and Appendix B – *Hydraulic Modeling Results – Existing Condition* for hydraulic modeling results.

Water demands and peaking factors, described in *2010 City of Scottsdale Design Standards & Policies – Chapter 6*, were applied to the hydraulic model. Pipes were sized to accommodate modeled conditions of flow.

The following primary modeling scenarios were selected to demonstrate compliance with City of Scottsdale requirements and to analyze the proposed water system:

- Average Daily Demand
- Peak Hour Demand
- Maximum Daily Demand plus Fire Flow

The hydraulic model utilizes the Hazen-Williams equation to calculate the head losses throughout the system during the modeled scenarios. Fire flow demands were analyzed with an automatic sprinkler system that will be installed in the proposed Clubhouse. Refer to Table 1 – *Water Distribution System Design Criteria* for additional information regarding hydraulic modeling parameters and specific fire flow demands for specific buildings.

4.2 Piping Layout

Potable water service and fire protection will be provided through planned ductile iron pipe public waterlines. Proposed onsite waterlines will consist of a Zone 12 looped waterline connecting to the existing system at two (2) locations. The connections will be at the existing 8-inch waterline in Covey Trail, and the 12-inch waterline extending from Happy Hollow Drive. PRVs will be installed at the connections to reduce the pressure to acceptable values. Additionally, individual Pressure Regulators will be installed at all residences and the clubhouse to account for any pressure fluctuations within the waterline connection to Covey Trail. Additional 8-inch waterlines will be located within the proposed roadways with dead-end lines not exceeding the City of Scottsdale water standards. Refer to Exhibit 3 – *Master Water Exhibit - Full Build-Out* for waterline locations.

4.3 Hydraulic Modeling Results

The hydraulic-modeling results indicate that the onsite system is capable of delivering Average Day, Maximum Day, and Peak Hour demands with the following pressure ranges.

Scenario	Full Build-Out Pressure (psi)	
	Low	High
Average Day Demand	108.8	132.2
Max Day Demand	108.5	131.9
Peak Hour Demand	107.9	131.3
Extreme Node	J-DM-13	J-DM-5

Fire-flow results from the model indicate that available fire hydrant flows exceed the required fire flows at individual modeling nodes during Max Day Demand, while maintaining residual pressures greater than 30 psi throughout the Site at full build-out. Results from these scenarios indicate that minimum and maximum residual pressures and head losses meet the design criteria presented herein. Hydraulic-modeling results, calculations, and exhibits are provided in the attached appendices and exhibits.

5.0 CONCLUSIONS

This Desert Mountain Water Master Plan / Basis of Design Report, as presented, meets City of Scottsdale standards and requirements, and serves as a guide for construction documents associated with the planned potable-water distribution system. No critical issues were identified that would preclude the anticipated development as presented in this Master Plan report. The following highlights primary conclusions:

1. Desert Mountain Parcel 19 will be served by Pressure Zone 12B with one connection to the existing system at Covey Trail, and a second connection to the existing system extending from Happy Hollow Drive.

2. The planned potable-water system is capable of being designed in accordance with the City of Scottsdale's current water-system design criteria.

3. The hydraulic modeling results presented indicate that flow velocities, head losses, and system pressures are within the allowable range of design criteria utilized for this Water Master Plan / Basis of Design Report.

4. The *Desert Mountain Parcel 19 Water Master Plan / Basis of Design* demonstrates the sufficiency of the proposed water distribution system to serve the proposed Site in accordance with City of Scottsdale Water Standards.

5. The required infrastructure identified includes water distribution system mains and connection points. A separate well purchase agreement and escrow instructions between DM19, LLC and City of Scottsdale is being prepared.

6. The proposed golf course will be supplied by a non-potable water system through separate agreements. No potable water will be used for the golf course irrigation.

7. The *Desert Mountain Parcel 19 Water Master Plan / Basis of Design* demonstrates compliance with the City of Scottsdale's *2015 Master Water plan Update.*

8. The water system will be phased. Phase I will serve the golf clubhouse. Phase 2 will extend to Gambel Trail.

6.0 REFERENCES

1. *Design Standards & Policies Manual*. City of Scottsdale, January 2010.
2. *City of Scottsdale 2015 Master Water Plan Update*, March 2015.
3. *Bentley WaterCAD Version 8.0,* Bentley Systems Inc., December 2015.

TABLE 1

WATER DISTRIBUTION SYSTEM DESIGN CRITERIA

Project: Desert Mountain Parcel 19 **Project Number:** 164334
Location: Scottsdale, AZ **Project Engineer:** Mike Young, P.E.
References: 2010 City of Scottsdale Design Standards & Policies Manual

UNIT DAILY RESIDENTIAL WATER DEMANDS

LAND USE	AVERAGE DAY WATER DEMANDS			NOTES
	Inside Use	Outside Use	Total Use	
<2 DU/AC	208.9	276.7	485.6	
2-2.9 DU/AC	193.7	276.7	470.4	
3-7.9 DU/AC	175.9	72.3	248.2	
8-11 DU/AC	155.3	72.3	227.6	
12-22 DU/AC	155.3	72.3	227.6	

UNIT DAILY NON-RESIDENTIAL WATER DEMANDS

LAND USE	AVERAGE DAY WATER DEMANDS		NOTES
	VALUE	UNITS	
Developed Open Space -Golf Course	4285	GPD/ACRE	Demand will be supplied with a separate non-potable system.
Clubhouse	125	GPD/Person	This demand was assumed to be 25% greater than the wastewater demand.
Fire Station	60	GPD/Employee	This demand was assumed to be 25% greater than the wastewater demand per Table 1- Unit Design Flows from the Arizona Administrative Code, Title 18, Chapter 9

HYDRAULIC MODELING CRITERIA

DESCRIPTION	VALUE	UNITS	NOTES
PEAKING FACTORS			
Maximum Day Demand (MDD)	2.00	x ADD	1
Peak Hour Demand (PHD)	3.50	x ADD	1
MODELED FIRE HYDRANT FLOW (MINIMUMS)			
Residential (Less than 3,600 Square Feet)	1,000	gpm	1, 2
Clubhouse	2,000	gpm	2,3
HYDRAULICS (ON SITE)			
Minimum Residual Pressure	50	psi	1
Maximum Residual Pressure	120	psi	1
Minimum Residual Pressure, Max Day Demand + Fire Flow	30	psi	1
Maximum Pipe Headloss (Distribution Lines)	10 ft/1000 ft	-	1
Maximum Pipe Headloss (Transmission Lines)	8 ft/1000 ft	-	1
Minimum Pipe Diameter (within City of Scottsdale's county service area)	8	in	1
Maximum Dead End Length (Pipes with 8 to 12 inch diameters)	1200	ft	1
Hazen-Williams C-value	130	-	

Notes:

1. City of Scottsdale Design Standards and Policy Manual
2. 2015 International Fire Code, *Minimum Required Fire Flow and Flow Duration for Buildings*
3. The most conservative building type, Type V-B, was utilized for the fire flow requirement for the Clubhouse. As final design is completed, the fire flow requirement for the Clubhouse may need to be reevaluated.

TABLE 2

OFFSITE WATER DEMANDS,
EXISTING CONDITION

WOOD/PATEL **TABLE 2 - OFFSITE WATER DEMANDS, EXISTING CONDITION**

Project: Desert Mountain Parcel 19
Location: Scottsdale, Arizona

Proj. Number: 164334
Proj. Engineer: Mike Young, P.E.

EXISTING LAND USE AND DWELLING UNIT BREAKDOWN

Land Use	No. of Dus	Residential Acres	Non-Residential Acres	Population Density (employees/day)		Commercial/ Retail S.F.	Unit Daily Water Demand (GPD/DU, GPD/Person)		Total Avg Day (GPD)
Existing Single Family Residential	131	290	-	-	-	-	485.6	GPD/DU	63,620
Onsite Totals									**63,620**

Notes: 1) For this report only a portion of the existing water demands north and east of Desert Mountain Parcel 19 were included. Calculated water demands from the existing subdivisions Desert Mountain Phase 1 Unit 1, Gambel Quail Preserve 2, and a portion of Desert Mountain Phase 1 Unit 4 were included within this report in order to calibrate the existing water model.

* what about Demand for existing fire station? (720 gpd)

TABLE 3

OFFSITE WATER DEMANDS,
FULL BUILD-OUT CONDITION

WOOD/PATEL **TABLE 3 - OFFSITE WATER DEMANDS, FULL BUILD-OUT CONDITION**

Project: Desert Mountain Parcel 19
Location: Scottsdale, Arizona

Proj. Number: 164334
Proj. Engineer: Mike Young, P.E.

PRELIMINARY LAND USE AND DWELLING UNIT BREAKDOWN

Land Use	No. of Dus	Residential Acres	Non-Residential Acres	Population Density (Employees/day)		Commercial/ Retail S.F.	Unit Daily Water Demand (GPD/DU, GPD/Person)		Total Avg Day (GPD)
Single Family Residential	227	290	-	-	-	-	485.6	GPD/DU	110,240
Existing Fire Station	-	-	1	12	Employees	7,000	60.0	GPD/Person	720
Onsite Totals									**110,960**

Notes: 1) For this report only a portion of the water demands north and east of Desert Mountain Parcel 19 were included. Calculated water demands for the full buildout of the following subdivisions were included: Desert Mountain Phase 1 Unit 1, Gambel Quail Preserve 2, and a portion of Desert Mountain Phase 1 Unit 4.

TABLE 4

ONSITE WATER DEMANDS,
FULL BUILD-OUT CONDITION

TABLE 5

WATER DEMAND DESIGN FLOWS BY JUNCTION NODE
EXISTING CONDITION

Project: Desert Mountain Parcel 19
Location: Scottsdale, AZ
References: 2010 City of Scottsdale Design Standards & Policies Manual
Project Number: 164434
Project Engineer: Mike Young, P.E.

Existing Adjacent Desert Mountain Potable Water Demands

HYDRAULIC MODEL NODE	Water Demand Type	Zone	Existing Units	Unit Flow (GPD/Unit)	ADD (GPD)	ADD (GPM)	MDD (GPM)	PHD (GPM)	Note
Zone 12 (Existing Offsite Potable Water Demands)									
J-2EX	Residential	Zone - 12	10	485.6	4856	3.4	6.8	11.9	
J-3EX	Residential	Zone - 12	5	485.6	2428	1.7	3.4	6.0	
J-4EX	Residential	Zone - 12	15	485.6	7284	5.1	10.2	17.9	
J-5EX	Residential	Zone - 12	8	485.6	3884.8	2.7	5.4	9.5	
J-6EX	Residential	Zone - 12	3	485.6	1456.8	1.0	2.0	3.5	
J-7EX	Residential	Zone - 12	22	485.6	10683.2	7.4	14.8	25.9	
J-9EX	Residential	Zone - 12	30	485.6	14568	10.1	20.2	35.4	1
J-12EX	Residential	Zone - 12	8	485.6	3884.8	2.7	5.4	9.5	
J-14EX	Residential	Zone - 13	6	485.6	2913.6	2.0	4.0	7.0	
J-15EX	Residential	Zone - 12	7	485.6	3399.2	2.4	4.8	8.4	
J-16EX	Residential	Zone - 12	5	485.6	2428	1.7	3.4	6.0	
J-17EX	Residential	Zone - 12	3	485.6	1456.8	1.0	2.0	3.5	
J-19EX	Residential	Zone - 12	9	485.6	4370.4	3.0	6.0	10.5	
Existing Zone 12 Offsite Totals			**131**		**63,614**	**44.2**	**88.4**	**155.0**	

NOTES:
1) For this report only a portion of the existing water demands north and east of Desert Mountain Parcel 19 were included. Calculated water demands from the existing subdivisions Desert Mountain Phase 1 Unit 1, Gambel Quail Preserve 2, and a portion of Desert Mountain Phase 1 Unit 4 were included within this report in order to calibrate the existing water model.

TABLE 6

WATER DEMAND DESIGN FLOWS BY JUNCTION NODE
FULL BUILD-OUT CONDITION

Project: Desert Mountain Parcel 19
Location: Scottsdale, AZ
References: 2010 City of Scottsdale Design Standards & Policies Manual
Project Number: 164434
Project Engineer: Mike Young, P.E.

Desert Mountain

HYDRAULIC MODEL NODE	Water Demand Type	Zone	Units	Unit Flow (GPD/Unit)	ADD (GPD)	ADD (GPM)	MDD (GPM)	PHD (GPM)	Fire Flow (GPM)	Note
Zone 12 (Offsite Water Demands)										
J-2EX	Residential	Zone - 12	16	485.6	7770	5.4	10.8	18.9	1000	
J-3EX	Residential	Zone - 12	8	485.6	3885	2.7	5.4	9.5	1000	
J-4EX	Residential	Zone - 12	30	485.6	14,568	10.1	20.2	35.4	1000	
J-5EX	Residential	Zone - 12	11	485.6	5,342	3.7	7.4	13.0	1000	
J-6EX	Residential	Zone - 12	12	485.6	5,827	4.0	8.0	14.0	1000	
J-7EX	Residential	Zone - 12	36	485.6	17,482	12.1	24.2	42.4	1,000	
J-9EX	Residential	Zone - 12	55	485.6	26,708	18.5	37.0	64.8	1,000	1
J-12EX	Residential	Zone - 12	12	485.6	5,827	4.0	8.0	14.0	1,000	
J-14EX	Residential	Zone - 13	6	485.6	2,914	2.0	4.0	7.0	1,000	
J-15EX	Residential	Zone - 12	19	485.6	9,226	6.4	12.8	22.4	1,000	
J-16EX	Residential	Zone - 12	5	485.6	2,428	1.7	3.4	6.0	1,000	
J-17EX	Residential	Zone - 12	3	485.6	1,457	1.0	2.0	3.5	1,000	
J-19EX	Residential	Zone - 12	14	485.6	6,798	4.7	9.4	16.5	1,000	
J-DM-13	Existing Fire Station	Zone - 12	-	-	720	0.5	1.0	1.8	1,500	
Zone 12 Offsite Water Demand Totals			**227**		**110,952**	**76.8**	**153.6**	**269.2**		
Zone 12 (Onsite Water Demands)										
J-DM-1	Residential	Zone - 12	13	248.2	3,227	2.2	4.4	7.7	1,000	
J-DM-2	Residential	Zone - 12	14	248.2	3,475	2.4	4.8	8.4	1,000	
J-DM-3	Residential	Zone - 12	15	248.2	3,723	2.6	5.2	9.1	1,000	
J-DM-4	Residential	Zone - 12	19	248.2	4,716	3.3	6.6	11.6	1,000	
J-DM-5	Residential	Zone - 12	20	248.2	4,964	3.4	6.8	11.9	1,000	
J-DM-6	Residential	Zone - 12	25	248.2	6,205	4.3	8.6	15.1	1,000	
J-DM-7	Residential	Zone - 12	16	248.2	3,971	2.8	5.6	9.8	1,000	
J-DM-8	Residential	Zone - 12	20	248.2	4,964	3.4	6.8	11.9	1,000	
J-DM-9	Residential	Zone - 12	20	248.2	4,964	3.4	6.8	11.9	1,000	
J-DM-10	Residential	Zone - 12	17	248.2	4,219	2.9	5.8	10.2	1,000	
J-DM-11	Residential	Zone - 12	11	248.2	2,730	1.9	3.8	6.7	1,000	
J-DM-12	Clubhouse	Zone - 12	-	-	25,000	17.4	34.8	60.9	2,000	
Zone 12 Onsite Water Demand Totals			**190**		**72,160**	**50.0**	**100.0**	**175.2**		
Zone 12 Offsite and Onsite Totals					**183,112**	**126.8**	**253.6**	**444.4**		

NOTES:
1) The number of dwelling units assumes that the subdivisions Desert Mountain Phase 1 Unit 1, Gambel Quail Preserve 2, and a portion of Desert Mountain Phase 1 Unit 4 are at full build-out.

TABLE 7

EXISTING WATER SYSTEM PRESSURES
(8949 E. COVEY TRAIL)

WOOD/PATEL **TABLE 7 - EXISTING WATER SYSTEM PRESSURES (8949 E Covey Trail)**

CIVIL ENGINEERS * HYDROLOGISTS * LAND SURVEYORS * CONSTRUCTION MANAGERS

Project: Desert Mountain Parcel 19 **Proj. Number:** 164334

Location: 8949 East Covey Trail **Proj. Engineer:** Mike Young, P.E.

Date: June 9, 2016

Pressure Zone: Zone 12

Residual Hydrant		**Flow Hydrant**	
Static Pressure (psi)	114.0		
Residual Pressure (psi)	58.0 *(See Note 1)*	Flow (gpm)	1504
Calculated Flow at 30 psi	**1872 gpm**	**Calculated Flow at**	30

Sketch of Flow and Residual Hydrant:

Discharge (gpm)	psi	head (ft)
0	114	263.2
1504	58	133.9
1872	30	69.3

what was the static pressure after Test?

Note 1)Before and after the flow test, the static pressure in the system changed significantly. Additionally, during the flow test, obtaining a reasonable pressure drop was difficult. The operation of the waterline and pressure reducing valves in this area by the City of Scottsdale is unknown at this time, therefore, only the static pressure from this flow test was used in the calibration of the model.

Is this a carry over Note from Previous Test?

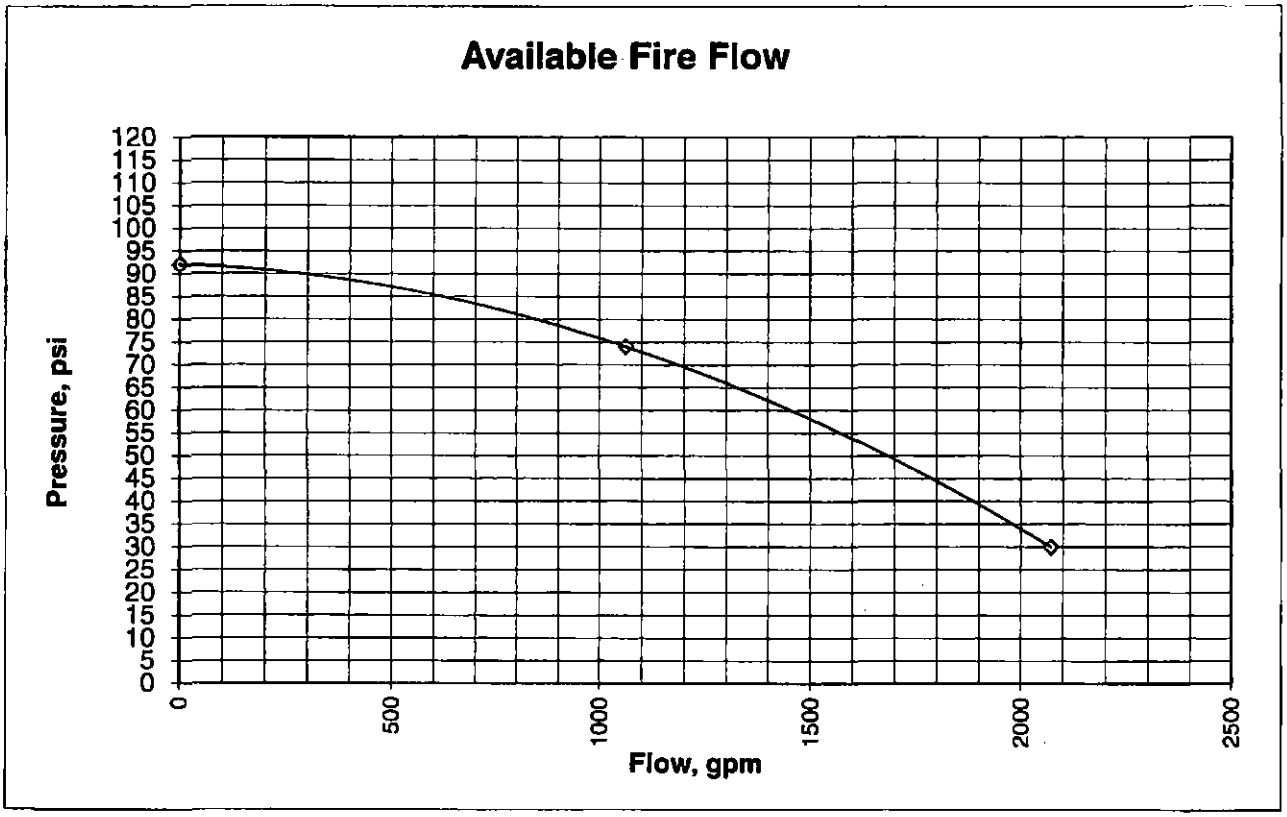
TABLE 8

EXISTING WATER SYSTEM PRESSURES
(9199 E. HAPPY HOLLOW DRIVE)

Project: Desert Mountain Parcel 19 **Proj. Number:** 164434
Location: 9199 East Happy Hollow Drive **Proj. Engineer:** Mike Young, P.E.
Date: June 9, 2016
Pressure Zone: Zone 12

Residual Hydrant		**Flow Hydrant**	
Static Pressure (psi)	92.0		
Residual Pressure (psi)	74.0	Flow (gpm)	1062
Calculated Flow at 30 psi	**2071 gpm**	**Calculated Flow at**	30

Sketch of Flow and Residual Hydrant:



Discharge (gpm)	Pressure (psi)	head (ft)
0	92	212.4
1062	74	170.9
2071	30	69.3

APPENDIX A

HYDRANT FLOW TEST RESULTS

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name:	Desert Mountain
Project Address:	North Cave Creek Road, Scottsdale, Arizona, 85251
Arizona Flow Testing Project No.:	17108
Client Project No.:	164434
Flow Test Permit No.:	C53117
Date and time flow test conducted:	May 22, 2017 at 8:00 AM
Data is current and reliable until:	November 22, 2017
Conducted by:	Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)
Witnessed by:	Jimmy Demarbiex –City of Scottsdale-Inspector (602-541-0586)

Raw Test Data

Static Pressure: **114.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **58.0 PSI**
(Measured in pounds per square inch)

Pitot Pressure: **16.0 PSI**
(Measured in pounds per square inch)

Diffuser Orifice Diameter: 4 Inch
(Measured in inches)

Coefficient of Diffuser: "Big Boy Hose Monster"

Flowing GPM: **1,504 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **1,989 GPM**

Data with 42 PSI Safety Factor

Static Pressure: **72.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **16.0 PSI**
(Measured in pounds per square inch)

Scottsdale requires a maximum Static Pressure of 72 PSI for AFES Design.

Distance between hydrants: Approx. 1,100 Feet

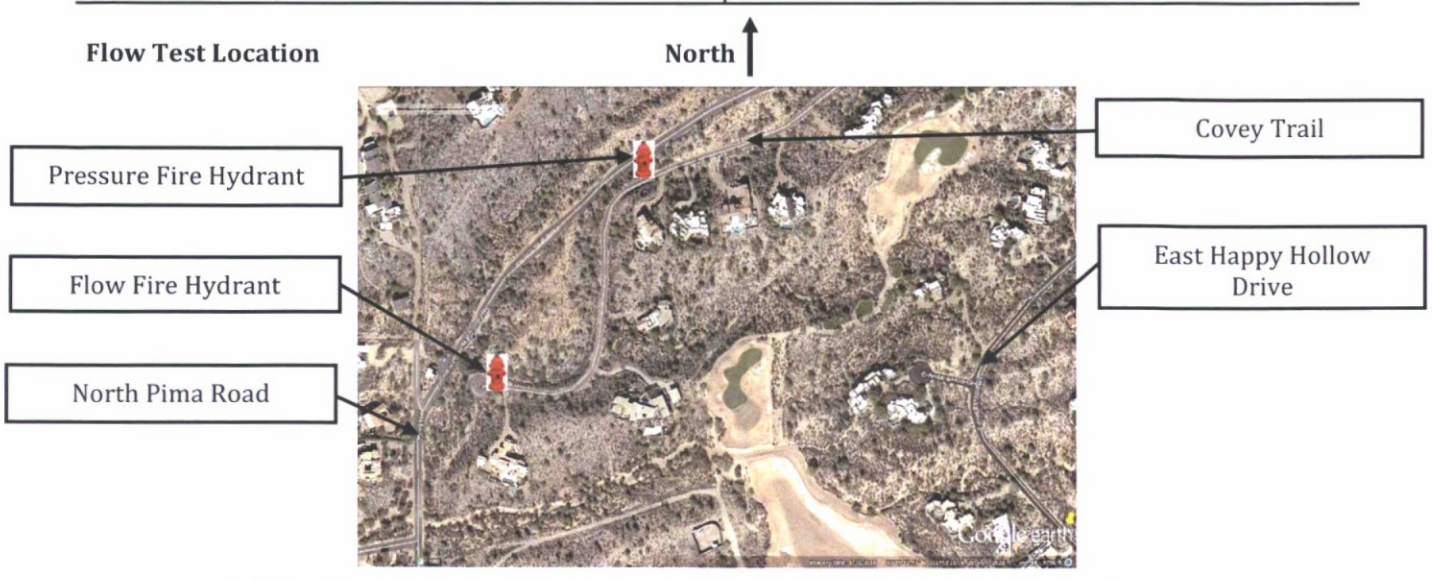
Main size: 8 Inch

Flowing GPM: **1,504 GPM**

GPM @ 20 PSI: **1,445 GPM**

Flow Test Location

North



Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT 2

Project Name:	Desert Mountain
Project Address:	North Cave Creek Road, Scottsdale, Arizona, 85251
Arizona Flow Testing Project No.:	16083
Client Project No.:	164434
Flow Test Permit No.:	C50737
Date and time flow test conducted:	June 9, 2016 at 9:00 AM
Data is current and reliable until:	December 9, 2016
Conducted by:	Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)
Witnessed by:	Jimmy Demarbiex –City of Scottsdale-Inspector (602-541-0586)

Raw Test Data

Static Pressure: **92.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **74.0 PSI**
(Measured in pounds per square inch)

Pitot Pressure: **40.0 PSI**
(Measured in pounds per square inch)

Diffuser Orifice Diameter: One (2½ inch)
(Measured in inches)

Coefficient of Diffuser: .9

Flowing GPM: **1,062 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **2,244 GPM**

Data with 20 PSI Safety Factor

Static Pressure: **72.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **54.0 PSI**
(Measured in pounds per square inch)

Scottsdale requires a maximum Static Pressure of 72 PSI for AFES Design.

Distance between hydrants: Approx. 1,200 Feet

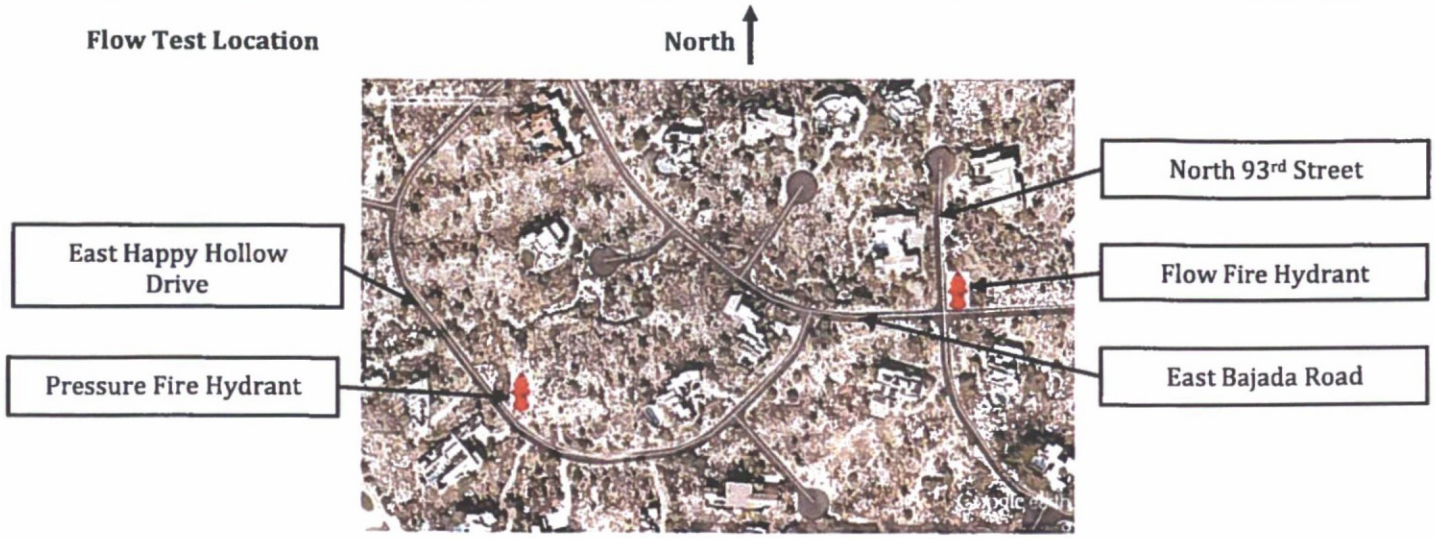
Main size: 8 Inch

Flowing GPM: **1,062 GPM**

GPM @ 20 PSI: **1,883 GPM**

Flow Test Location

North



APPENDIX B

HYDRAULIC MODELING RESULTS – EXISTING CONDITION

FlexTable: Reservoir Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Average Day Demand (Existing Condition)

ID	Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
65	Tank 90	3,116	44.2	3,116

FlexTable: Junction Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Average Day Demand (Existing Condition)

Label	Elevation (ft)	Zone	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-7EX	2,746	Zone 12	7.4	66.1	2,899
J-6EX	2,720	Zone 12	1.0	77.3	2,899
J-3EX	2,713	Zone 12	1.7	80.3	2,899
J-9EX	2,705	Zone 12	10.1	83.8	2,899
J-19EX	2,701	Zone 12	3.0	85.4	2,899
J-2EX	2,697	Zone 12	3.4	87.3	2,899
J-14EX	2,696	Zone 12	2.0	87.7	2,899
J-15EX	2,695	Zone 12	2.4	88.1	2,899
J-5EX	2,682	Zone 12	2.7	93.7	2,899
J-12BEX	2,668	Zone 12	0.0	99.8	2,899
J-12EX	2,667	Zone 12	2.7	100.2	2,899
J-4EX	2,662	Zone 12	5.1	102.4	2,899
J-52	2,651	Zone 12	0.0	107.2	2,899
J-44	2,651	Zone 12	0.0	107.3	2,899
J-16EX	2,625	Zone 12	1.7	118.4	2,899
J-17EX	2,604	Zone 12	1.0	127.5	2,899

FlexTable: Pipe Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Average Day Demand (Existing Condition)

Label	Diameter (in)	Length (ft)	Hazen-Williams C	Zone	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
P-13EX	6.0	1,219	130.0	Zone 12	11.2	0.13	0.018
P-88	12.0	639	130.0	Zone 12	44.2	0.13	0.008
P-21EX	6.0	685	130.0	Zone 12	7.1	0.08	0.008
P-83	12.0	1,244	130.0	Zone 12	25.6	0.07	0.003
P-81	6.0	2,034	130.0	Zone 12	6.0	0.07	0.006
P-27EX	6.0	776	130.0	Zone 12	5.9	0.07	0.005
P-3EX	6.0	944	130.0	Zone 12	5.8	0.07	0.005
P-17BEX	6.0	812	130.0	Zone 12	5.1	0.06	0.004
P-17AEX	6.0	109	130.0	Zone 12	5.1	0.06	0.004
P-8EX	12.0	1,062	130.0	Zone 12	15.8	0.04	0.001
P-5EX	12.0	317	130.0	Zone 12	13.6	0.04	0.001
P-28EX	6.0	1,474	130.0	Zone 12	2.9	0.03	0.002
P-6EX	6.0	611	130.0	Zone 12	2.9	0.03	0.001
P-63EX	8.0	827	130.0	Zone 12	5.1	0.03	0.001
P-18EX	6.0	1,195	130.0	Zone 12	2.4	0.03	0.001
P-74	8.0	1,303	130.0	Zone 12	2.7	0.02	0.000
P-73	8.0	2,139	130.0	Zone 12	2.7	0.02	0.000
P-1EX	6.0	1,156	130.0	Zone 12	1.2	0.01	0.000
P-DM-10	48.0	4,720	140.0	Zone 12	44.2	0.01	0.000
P-24EX	8.0	1,155	130.0	Zone 12	1.0	0.01	0.000
P-102	8.0	2,974	130.0	Zone 12	0.0	0.00	0.000
P-87	8.0	896	130.0	Zone 12	0.0	0.00	0.000
P-89	12.0	379	130.0	Zone 12	0.0	0.00	0.000
P-90	48.0	5,636	140.0	Zone 12	0.0	0.00	0.000
P-101	54.0	5,833	140.0	Zone 12	0.0	0.00	0.000

FlexTable: PRV Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Average Day Demand (Existing Condition)

ID	Label	Elevation (ft)	Diameter (Valve) (in)	Minor Loss Coefficient (Local)	Hydraulic Grade Setting (Initial) (ft)	Pressure Setting (Initial) (psi)	Flow (gpm)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)	Headloss (ft)
220	PRV-166	2,714	12.0	0.000	2,864	65.0	0.0	3,116	2,899	0.00
221	PRV-84	2,760	12.0	0.000	2,899	60.0	44.2	3,116	2,899	217.32
250	PRV-200	2,712	12.0	0.000	2,874	70.0	0.0	3,116	2,899	0.00

8" PRV 6" PRV.

FlexTable: Reservoir Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Existing FT #1 Residual Conditions

ID	Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
65	Tank 90	3,116	1,548.2	3,116

FlexTable: Junction Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Existing FT #1 Residual Conditions

Label	Elevation (ft)	Zone	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-7EX	2,746	Zone 12	7.4	65.8	2,898
J-16EX	2,625	Zone 12	1,505.7	71.4	2,790
J-15EX	2,695	Zone 12	2.4	72.9	2,864
J-14EX	2,696	Zone 12	2.0	74.7	2,869
J-6EX	2,720	Zone 12	1.0	76.9	2,898
J-9EX	2,705	Zone 12	10.1	78.4	2,886
J-3EX	2,713	Zone 12	1.7	79.9	2,898
J-17EX	2,604	Zone 12	1.0	80.5	2,790
J-44	2,651	Zone 12	0.0	82.4	2,841
J-19EX	2,701	Zone 12	3.0	84.8	2,897
J-2EX	2,697	Zone 12	3.4	86.8	2,898
J-5EX	2,682	Zone 12	2.7	93.3	2,898
J-12BEX	2,668	Zone 12	0.0	99.2	2,897
J-12EX	2,667	Zone 12	2.7	99.6	2,897
J-4EX	2,662	Zone 12	5.1	101.5	2,897
J-52	2,651	Zone 12	0.0	106.5	2,897

FlexTable: Pipe Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Existing FT #1 Residual Conditions

Label	Diameter (in)	Length (ft)	Hazen-Williams C	Zone	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
P-74	8.0	1,303	130.0	Zone 12	1,506.7	9.62	39.026
P-21EX	6.0	685	130.0	Zone 12	561.7	6.37	25.483
P-102	8.0	2,974	130.0	Zone 12	762.2	4.87	11.047
P-73	8.0	2,139	130.0	Zone 12	744.5	4.75	10.576
P-13EX	6.0	1,219	130.0	Zone 12	335.1	3.80	9.790
P-63EX	8.0	827	130.0	Zone 12	559.7	3.57	6.235
P-81	6.0	2,034	130.0	Zone 12	236.7	2.69	5.142
P-88	12.0	639	130.0	Zone 12	598.8	1.70	0.980
P-3EX	6.0	944	130.0	Zone 12	105.6	1.20	1.154
P-87	8.0	896	130.0	Zone 12	-187.2	1.19	0.820
P-27EX	6.0	776	130.0	Zone 12	72.0	0.82	0.568
P-17BEX	6.0	812	130.0	Zone 12	69.8	0.79	0.536
P-17AEX	6.0	109	130.0	Zone 12	69.8	0.79	0.534
P-28EX	6.0	1,474	130.0	Zone 12	69.0	0.78	0.525
P-18EX	6.0	1,195	130.0	Zone 12	67.1	0.76	0.498
P-83	12.0	1,244	130.0	Zone 12	256.3	0.73	0.204
P-5EX	12.0	317	130.0	Zone 12	178.1	0.51	0.104
P-8EX	12.0	1,062	130.0	Zone 12	162.2	0.46	0.087
P-6EX	6.0	611	130.0	Zone 12	21.0	0.24	0.058
P-1EX	6.0	1,156	130.0	Zone 12	19.3	0.22	0.050
P-101	54.0	5,833	140.0	Zone 12	762.2	0.11	0.001
P-DM-10	48.0	4,720	140.0	Zone 12	598.8	0.11	0.001
P-90	48.0	5,636	140.0	Zone 12	187.2	0.03	0.000
P-24EX	8.0	1,155	130.0	Zone 12	1.0	0.01	0.000
P-89	12.0	379	130.0	Zone 12	0.0	0.00	0.000

FlexTable: PRV Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Existing FT #1 Residual Conditions

ID	Label	Elevation (ft)	Diameter (Valve) (in)	Minor Loss Coefficient (Local)	Hydraulic Grade Setting (Initial) (ft)	Pressure Setting (Initial) (psi)	Flow (gpm)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)	Headloss (ft)
220	PRV-166	2,714	12.0	0.000	2,864	65.0	187.2	3,116	2,864	251.76
221	PRV-84	2,760	12.0	0.000	2,899	60.0	598.8	3,116	2,899	217.32
250	PRV-200	2,712	12.0	0.000	2,874	70.0	762.2	3,116	2,874	242.25

FlexTable: Reservoir Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Existing FT #2 Residual Conditions

ID	Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
65	Tank 90	3,116	1,106.2	3,116

FlexTable: Junction Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Existing FT #2 Residual Conditions

Label	Elevation (ft)	Zone	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-7EX	2,746	Zone 12	7.4	65.2	2,897
J-6EX	2,720	Zone 12	1.0	75.3	2,894
J-3EX	2,713	Zone 12	1.7	78.1	2,893
J-9EX	2,705	Zone 12	10.1	81.5	2,893
J-19EX	2,701	Zone 12	3.0	82.6	2,892
J-2EX	2,697	Zone 12	3.4	84.6	2,893
J-14EX	2,696	Zone 12	2.0	85.4	2,893
J-15EX	2,695	Zone 12	2.4	85.9	2,893
J-12EX	2,667	Zone 12	1,064.7	86.3	2,867
J-12BEX	2,668	Zone 12	0.0	87.2	2,870
J-5EX	2,682	Zone 12	2.7	90.9	2,892
J-52	2,651	Zone 12	0.0	94.6	2,870
J-4EX	2,662	Zone 12	5.1	98.2	2,889
J-44	2,651	Zone 12	0.0	105.1	2,893
J-16EX	2,625	Zone 12	1.7	116.2	2,893
J-17EX	2,604	Zone 12	1.0	125.2	2,893

FlexTable: Pipe Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Existing FT #2 Residual Conditions

Label	Diameter (in)	Length (ft)	Hazen-Williams C	Zone	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
P-17BEX	6.0	812	130.0	Zone 12	588.0	6.67	27.736
P-17AEX	6.0	109	130.0	Zone 12	588.0	6.67	27.737
P-18EX	6.0	1,195	130.0	Zone 12	476.7	5.41	18.811
P-88	12.0	639	130.0	Zone 12	1,106.2	3.14	3.055
P-83	12.0	1,244	130.0	Zone 12	932.6	2.65	2.227
P-5EX	12.0	317	130.0	Zone 12	775.2	2.20	1.581
P-3EX	6.0	944	130.0	Zone 12	184.5	2.09	3.243
P-8EX	12.0	1,062	130.0	Zone 12	694.0	1.97	1.289
P-13EX	6.0	1,219	130.0	Zone 12	166.2	1.89	2.673
P-27EX	6.0	776	130.0	Zone 12	151.3	1.72	2.244
P-81	6.0	2,034	130.0	Zone 12	149.0	1.69	2.184
P-28EX	6.0	1,474	130.0	Zone 12	148.3	1.68	2.163
P-6EX	6.0	611	130.0	Zone 12	86.3	0.98	0.793
P-1EX	6.0	1,156	130.0	Zone 12	84.6	0.96	0.764
P-DM-10	48.0	4,720	140.0	Zone 12	1,106.2	0.20	0.003
P-21EX	6.0	685	130.0	Zone 12	7.1	0.08	0.008
P-63EX	8.0	827	130.0	Zone 12	5.1	0.03	0.001
P-74	8.0	1,303	130.0	Zone 12	2.7	0.02	0.000
P-73	8.0	2,139	130.0	Zone 12	2.7	0.02	0.000
P-24EX	8.0	1,155	130.0	Zone 12	1.0	0.01	0.000
P-102	8.0	2,974	130.0	Zone 12	0.0	0.00	0.000
P-87	8.0	896	130.0	Zone 12	0.0	0.00	0.000
P-89	12.0	379	130.0	Zone 12	0.0	0.00	0.000
P-101	54.0	5,833	140.0	Zone 12	0.0	0.00	0.000
P-90	48.0	5,636	140.0	Zone 12	0.0	0.00	0.000

FlexTable: PRV Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Existing FT #2 Residual Conditions

ID	Label	Elevation (ft)	Diameter (Valve) (in)	Minor Loss Coefficient (Local)	Hydraulic Grade Setting (Initial) (ft)	Pressure Setting (Initial) (psi)	Flow (gpm)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)	Headloss (ft)
220	PRV-166	2,714	12.0	0.000	2,864	65.0	0.0	3,116	2,893	0.00
221	PRV-84	2,760	12.0	0.000	2,899	60.0	1,106.2	3,116	2,899	217.31
250	PRV-200	2,712	12.0	0.000	2,874	70.0	0.0	3,116	2,893	0.00

roject: Desert Mountain Parcel 19
ocation: Scottsdale, AZ
eferences:

164434
Ryan Hall, E.I.T.

ODEL CALIBRATION TO EXISTING CONDITIONS

	Static Pressure Comparison (PSI)			Residual Pressure Comparison			Model Nodes	Flow
Flow Test #	Static Pressure (Field)	Static Pressure (Model)	PSI Difference (Model-Field)	Residual Pressure (Field)	Residual Pressure (Model)	PSI Difference (Model-Field)	Pressure Node	(GPM)
1 (Covey Tr)	114	118	4	58	71	13	J-16EX	1,504
2 (Happy Hollow)	92	100	8	74	86	12	J-12EX	1,062

	Static HGL Comparison (FT)			Residual HGL Comparison			Model Nodes		Flow
Flow Test #	HGL (Field)	HGL (Model)	HGL Difference (Model-Field)	HGL (Field)	HGL (Model)	HGL Difference (Model-Field)	Elevation Node (ft)	Pressure Node	(GPM)
1 (Covey Tr)	2888.3	2899.0	10.7	2759.0	2790.0	31.0	2625	J-16EX	1,504
2 (Happy Hollow)	2879.5	2899.0	19.5	2837.9	2867.0	29.1	2667	J-12EX	1,062

Was the Model Calibrated Much
or To represent field Condn?

APPENDIX C

HYDRAULIC MODELING RESULTS – FULL BUILD-OUT

FlexTable: Reservoir Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Average Day Demand (FBO Condition)

ID	Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
65	Tank 90	3,116	126.8	3,116

Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemon Company Drive Suite 200 W
Watertown, CT 06795 USA +1-203-755-1666

FlexTable: Junction Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Average Day Demand (FBO Condition)

Label	Elevation (ft)	Zone	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-7EX	2,746	Zone 12	12.1	66.0	2,899
J-6EX	2,720	Zone 12	4.0	77.3	2,899
J-3EX	2,713	Zone 12	2.7	80.3	2,899
J-9EX	2,705	Zone 12	18.5	83.7	2,899
J-19EX	2,701	Zone 12	4.7	85.3	2,899
J-2EX	2,697	Zone 12	5.4	87.2	2,899
J-14EX	2,696	Zone 12	2.0	87.6	2,898
J-15EX	2,695	Zone 12	6.4	88.0	2,898
J-5EX	2,682	Zone 12	3.7	93.7	2,899
J-12BEX	2,668	Zone 12	0.0	99.7	2,898
J-12EX	2,667	Zone 12	4.0	100.2	2,899
J-4EX	2,662	Zone 12	10.1	102.3	2,899
J-52	2,651	Zone 12	0.0	107.1	2,898
J-44	2,651	Zone 12	0.0	107.3	2,898
J-DM-13	2,647	Zone 12	0.5	108.8	2,898
J-DM-12	2,640	Zone 12	17.4	111.8	2,898
J-DM-1	2,640	Zone 12	2.2	111.9	2,898
J-DM-2	2,629	Zone 12	2.4	116.5	2,898
J-DM-3	2,628	Zone 12	2.6	116.9	2,898
J-DM-11	2,625	Zone 12	1.9	118.2	2,898
J-16EX	2,625	Zone 12	1.7	118.3	2,898
J-DM-10	2,622	Zone 12	2.9	119.8	2,898
J-DM-7	2,621	Zone 12	2.8	120.0	2,898
J-DM-6	2,617	Zone 12	4.3	121.8	2,898
J-DM-8	2,611	Zone 12	3.4	124.4	2,898
J-17EX	2,604	Zone 12	1.0	127.4	2,898
J-DM-9	2,600	Zone 12	3.4	129.1	2,898
J-DM-4	2,600	Zone 12	3.3	129.1	2,898
J-DM-5	2,593	Zone 12	3.4	132.2	2,898

Did you incorporate New PRVs to be installed @ Connections Per Sec 4.2 - Page-7?

* Line Size @ Panel-11

- High static pr

FlexTable: Pipe Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Average Day Demand (FBO Condition)

Label	Diameter (in)	Length (ft)	Hazen-Williams C	Zone	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
P-88	12.0	639	130.0	Zone 12	126.8	0.36	0.055
P-17BEX	6.0	812	130.0	Zone 12	30.8	0.35	0.118
P-13EX	6.0	1,219	130.0	Zone 12	29.0	0.33	0.105
P-91	8.0	677	130.0	Zone 12	42.2	0.27	0.052
P-83	12.0	1,244	130.0	Zone 12	85.7	0.24	0.027
P-3EX	6.0	944	130.0	Zone 12	21.0	0.24	0.058
P-21EX	6.0	685	130.0	Zone 12	19.4	0.22	0.050
P-27EX	6.0	776	130.0	Zone 12	18.1	0.21	0.044
P-18EX	6.0	1,195	130.0	Zone 12	15.4	0.17	0.033
P-5EX	12.0	317	130.0	Zone 12	55.5	0.16	0.012
P-8EX	12.0	1,062	130.0	Zone 12	55.2	0.16	0.012
P-DM-90	8.0	357	130.0	Zone 12	24.3	0.15	0.018
P-28EX	6.0	1,474	130.0	Zone 12	13.4	0.15	0.025
P-DM-85	8.0	272	130.0	Zone 12	23.8	0.15	0.018
P-17AEX	6.0	109	130.0	Zone 12	11.4	0.13	0.018
P-89	12.0	379	130.0	Zone 12	42.2	0.12	0.007
P-63EX	8.0	827	130.0	Zone 12	17.4	0.11	0.010
P-DM-30	8.0	510	130.0	Zone 12	15.8	0.10	0.008
P-81	6.0	2,034	130.0	Zone 12	8.9	0.10	0.012
P-6EX	6.0	611	130.0	Zone 12	8.4	0.10	0.010
P-DM-35	8.0	587	130.0	Zone 12	13.4	0.09	0.006
P-DM-50	8.0	436	130.0	Zone 12	12.3	0.08	0.006
P-74	8.0	1,303	130.0	Zone 12	11.0	0.07	0.004
P-73	8.0	2,139	130.0	Zone 12	11.0	0.07	0.004
P-1EX	6.0	1,156	130.0	Zone 12	5.7	0.07	0.005
P-24EX	8.0	1,155	130.0	Zone 12	9.3	0.06	0.003
P-DM-45	8.0	840	130.0	Zone 12	8.3	0.05	0.003
P-DM-55	8.0	574	130.0	Zone 12	8.0	0.05	0.002
P-DM-80	8.0	400	130.0	Zone 12	6.4	0.04	0.001
P-DM-60	8.0	553	130.0	Zone 12	5.2	0.03	0.001
P-DM-10	48.0	4,720	140.0	Zone 12	126.8	0.02	0.000
P-DM-65	8.0	651	130.0	Zone 12	3.4	0.02	0.000
P-DM-50	8.0	567	130.0	Zone 12	3.4	0.02	0.000
P-DM-75	8.0	180	130.0	Zone 12	1.9	0.01	0.001
P-DM-70	8.0	434	130.0	Zone 12	1.6	0.01	0.001
P-DM-40	8.0	965	130.0	Zone 12	1.6	0.01	0.000
P-102	8.0	2,974	130.0	Zone 12	0.0	0.00	0.000
P-87	8.0	896	130.0	Zone 12	0.0	0.00	0.000
P-101	54.0	5,833	140.0	Zone 12	0.0	0.00	0.000
P-90	48.0	5,636	140.0	Zone 12	0.0	0.00	0.000

why? COS does not have such large pipe in C DM area.

Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemon Company Drive Suite 200 W
Watertown, CT 06795 USA +1-203-755-1666

FlexTable: PRV Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Average Day Demand (FBO Condition)

ID	Label	Elevation (ft)	Diameter (Valve) (in)	Minor Loss Coefficient (Local)	Hydraulic Grade Setting (Initial) (ft)	Pressure Setting (Initial) (psi)	Flow (gpm)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)	Headloss (ft)
220	PRV-166	2,714	12.0	0.000	2,864	65.0	0.0	3,116	2,898	0.00
221	PRV-84	2,760	12.0	0.000	2,899	60.0	126.8	3,116	2,899	217.32
250	PRV-200	2,712	12.0	0.000	2,874	70.0	0.0	3,116	2,898	0.00

FlexTable: Reservoir Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Max Day Demand (FBO Condition)

ID	Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
65	Tank 90	3,116	253.6	3,116

FlexTable: Junction Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Max Day Demand (FBO Condition)

Label	Elevation (ft)	Zone	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-7EX	2,746	Zone 12	24.2	66.0	2,899
J-6EX	2,720	Zone 12	8.0	77.2	2,898
J-3EX	2,713	Zone 12	5.4	80.2	2,898
J-9EX	2,705	Zone 12	37.0	83.5	2,898
J-19EX	2,701	Zone 12	9.4	85.2	2,898
J-2EX	2,697	Zone 12	10.8	87.1	2,898
J-14EX	2,696	Zone 12	4.0	87.4	2,898
J-15EX	2,695	Zone 12	12.8	87.8	2,898
J-5EX	2,682	Zone 12	7.4	93.6	2,898
J-12BEX	2,668	Zone 12	0.0	99.5	2,898
J-12EX	2,667	Zone 12	8.0	100.0	2,898
J-4EX	2,662	Zone 12	20.2	102.2	2,898
J-52	2,651	Zone 12	0.0	106.9	2,898
J-44	2,651	Zone 12	0.0	107.0	2,898
J-DM-13	2,647	Zone 12	1.0	108.5	2,898
J-DM-12	2,640	Zone 12	34.8	111.6	2,898
J-DM-1	2,640	Zone 12	4.4	111.6	2,898
J-DM-2	2,629	Zone 12	4.8	116.3	2,898
J-DM-3	2,628	Zone 12	5.2	116.6	2,898
J-DM-11	2,625	Zone 12	3.8	118.0	2,898
J-16EX	2,625	Zone 12	3.4	118.1	2,898
J-DM-10	2,622	Zone 12	5.8	119.5	2,898
J-DM-7	2,621	Zone 12	5.6	119.8	2,898
J-DM-6	2,617	Zone 12	8.6	121.5	2,898
J-DM-8	2,611	Zone 12	6.8	124.1	2,898
J-17EX	2,604	Zone 12	2.0	127.1	2,898
J-DM-9	2,600	Zone 12	6.8	128.9	2,898
J-DM-4	2,600	Zone 12	6.6	128.9	2,898
J-DM-5	2,593	Zone 12	6.8	131.9	2,898

FlexTable: Pipe Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Max Day Demand (FBO Condition)

Label	Diameter (in)	Length (ft)	Hazen-Williams C	Zone	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
P-88	12.0	639	130.0	Zone 12	253.6	0.72	0.200
P-17BEX	6.0	812	130.0	Zone 12	61.6	0.70	0.426
P-13EX	6.0	1,219	130.0	Zone 12	58.0	0.66	0.380
P-91	8.0	677	130.0	Zone 12	84.5	0.54	0.188
P-83	12.0	1,244	130.0	Zone 12	171.4	0.49	0.097
P-3EX	6.0	944	130.0	Zone 12	42.0	0.48	0.209
P-21EX	6.0	685	130.0	Zone 12	38.7	0.44	0.180
P-27EX	6.0	776	130.0	Zone 12	36.1	0.41	0.158
P-18EX	6.0	1,195	130.0	Zone 12	30.8	0.35	0.118
P-5EX	12.0	317	130.0	Zone 12	111.1	0.32	0.043
P-8EX	12.0	1,062	130.0	Zone 12	110.4	0.31	0.043
P-DM-90	8.0	357	130.0	Zone 12	48.5	0.31	0.067
P-28EX	6.0	1,474	130.0	Zone 12	26.7	0.30	0.091
P-DM-85	8.0	272	130.0	Zone 12	47.5	0.30	0.065
P-17AEX	6.0	109	130.0	Zone 12	22.8	0.26	0.067
P-89	12.0	379	130.0	Zone 12	84.5	0.24	0.026
P-63EX	8.0	827	130.0	Zone 12	34.7	0.22	0.036
P-DM-30	8.0	510	130.0	Zone 12	31.5	0.20	0.030
P-81	6.0	2,034	130.0	Zone 12	17.7	0.20	0.042
P-6EX	6.0	611	130.0	Zone 12	16.9	0.19	0.038
P-DM-35	8.0	587	130.0	Zone 12	26.7	0.17	0.022
P-DM-50	8.0	436	130.0	Zone 12	24.7	0.16	0.019
P-74	8.0	1,303	130.0	Zone 12	21.9	0.14	0.016
P-73	8.0	2,139	130.0	Zone 12	21.9	0.14	0.015
P-1EX	6.0	1,156	130.0	Zone 12	11.5	0.13	0.019
P-24EX	8.0	1,155	130.0	Zone 12	18.5	0.12	0.011
P-DM-45	8.0	840	130.0	Zone 12	16.5	0.11	0.009
P-DM-55	8.0	574	130.0	Zone 12	16.1	0.10	0.009
P-DM-80	8.0	400	130.0	Zone 12	12.7	0.08	0.006
P-DM-60	8.0	553	130.0	Zone 12	10.5	0.07	0.004
P-DM-10	48.0	4,720	140.0	Zone 12	253.6	0.04	0.000
P-DM-65	8.0	651	130.0	Zone 12	6.8	0.04	0.002
P-DM-50	8.0	567	130.0	Zone 12	6.8	0.04	0.002
P-DM-75	8.0	180	130.0	Zone 12	3.8	0.02	0.000
P-DM-70	8.0	434	130.0	Zone 12	3.1	0.02	0.000
P-DM-40	8.0	965	130.0	Zone 12	3.1	0.02	0.001
P-102	8.0	2,974	130.0	Zone 12	0.0	0.00	0.000
P-87	8.0	896	130.0	Zone 12	0.0	0.00	0.000
P-101	54.0	5,833	140.0	Zone 12	0.0	0.00	0.000
P-90	48.0	5,636	140.0	Zone 12	0.0	0.00	0.000

Fire Flow Node FlexTable: Fire Flow Report

DESERT MOUNTAIN PARCEL 19

Active Scenario: Max Day + FF (FBO Condition)

Label	Elevation (ft)	Satisfies FF?	Flow (Total Needed) (gpm)	Flow (Total Available) (gpm)	Press. (Calc Rsdl) (psi)	Pressure (Calc Zn Lwr Limit) (psi)	Junction w/ Min Press (Zone)
J-2EX	2,697	True	1,010.8	3,010.8	68.5	60.6	J-7EX
J-3EX	2,713	True	1,005.4	2,471.7	30.0	61.6	J-7EX
J-4EX	2,662	True	1,020.2	3,020.2	58.7	61.5	J-7EX
J-5EX	2,682	True	1,007.4	3,007.4	73.7	60.7	J-7EX
J-6EX	2,720	True	1,008.0	3,008.0	62.7	60.3	J-7EX
J-7EX	2,746	True	1,024.2	3,024.2	59.8	71.0	J-6EX
J-9EX	2,705	True	1,037.0	3,037.0	30.7	61.6	J-14EX
J-12BEX	2,668	True	1,000.0	3,000.0	46.4	49.8	J-12EX
J-12EX	2,667	True	1,008.0	3,008.0	39.0	50.7	J-12BEX
J-14EX	2,696	True	1,004.0	3,004.0	41.0	62.5	J-9EX
J-15EX	2,695	True	1,012.8	3,012.8	59.6	62.9	J-14EX
J-16EX	2,625	True	1,003.4	3,003.4	53.8	63.9	J-7EX
J-17EX	2,604	True	1,002.0	3,002.0	53.1	63.5	J-7EX
J-19EX	2,701	True	1,009.4	2,308.3	30.0	62.3	J-7EX
J-44	2,651	True	1,000.0	3,000.0	68.0	64.5	J-7EX
J-52	2,651	True	1,000.0	3,000.0	52.7	47.1	J-12BEX
J-DM-1	2,640	True	1,004.4	3,004.4	46.2	43.5	J-DM-13
J-DM-2	2,629	True	1,004.8	3,004.8	43.2	45.3	J-DM-13
J-DM-3	2,628	True	1,005.2	3,005.2	46.1	47.8	J-DM-13
J-DM-4	2,600	True	1,006.6	3,006.6	53.7	56.7	J-DM-5
J-DM-5	2,593	True	1,006.8	2,879.3	30.0	58.8	J-DM-4
J-DM-6	2,617	True	1,008.6	3,008.6	40.7	43.2	J-DM-7
J-DM-7	2,621	True	1,005.6	3,005.6	31.8	40.8	J-DM-12
J-DM-8	2,611	True	1,006.8	3,006.8	34.3	35.9	J-DM-11
J-DM-9	2,600	True	1,006.8	2,568.9	30.0	53.4	J-DM-12
J-DM-10	2,622	True	1,005.8	3,005.8	31.8	30.3	J-DM-11
J-DM-11	2,625	True	1,003.8	2,805.8	30.0	41.2	J-DM-10
J-DM-12	2,640	True	2,034.8	3,011.5	30.0	35.0	J-DM-13
J-DM-13	2,647	True	1,001.0	3,001.0	31.7	36.0	J-DM-12

Are these demands @ same time?

FlexTable: Reservoir Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Peak Hour Demand (FBO Condition)

ID	Label	Elevation (ft)	Flow (Out net) (gpm)	Hydraulic Grade (ft)
65	Tank 90	3,116	443.8	3,116

FlexTable: Junction Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Peak Hour Demand (FBO Condition)

Label	Elevation (ft)	Zone	Demand (gpm)	Pressure (psi)	Hydraulic Grade (ft)
J-7EX	2,746	Zone 12	42.3	65.9	2,898
J-6EX	2,720	Zone 12	14.0	77.0	2,898
J-3EX	2,713	Zone 12	9.4	80.0	2,898
J-9EX	2,705	Zone 12	64.8	83.1	2,897
J-19EX	2,701	Zone 12	16.5	84.9	2,898
J-14EX	2,696	Zone 12	7.0	86.8	2,897
J-2EX	2,697	Zone 12	18.9	86.9	2,898
J-15EX	2,695	Zone 12	22.4	87.2	2,897
J-5EX	2,682	Zone 12	12.9	93.4	2,898
J-12BEX	2,668	Zone 12	0.0	99.0	2,897
J-12EX	2,667	Zone 12	14.0	99.4	2,897
J-4EX	2,662	Zone 12	35.4	101.8	2,897
J-52	2,651	Zone 12	0.0	106.4	2,897
J-44	2,651	Zone 12	0.0	106.4	2,896
J-DM-13	2,647	Zone 12	1.8	107.9	2,896
J-DM-12	2,640	Zone 12	60.9	110.9	2,896
J-DM-1	2,640	Zone 12	7.7	111.0	2,896
J-DM-2	2,629	Zone 12	8.4	115.6	2,896
J-DM-3	2,628	Zone 12	9.1	116.0	2,896
J-DM-11	2,625	Zone 12	6.7	117.3	2,896
J-16EX	2,625	Zone 12	5.9	117.4	2,896
J-DM-10	2,622	Zone 12	10.2	118.9	2,896
J-DM-7	2,621	Zone 12	9.8	119.1	2,896
J-DM-6	2,617	Zone 12	15.0	120.9	2,896
J-DM-8	2,611	Zone 12	11.9	123.4	2,896
J-17EX	2,604	Zone 12	3.5	126.5	2,896
J-DM-9	2,600	Zone 12	11.9	128.2	2,896
J-DM-4	2,600	Zone 12	11.6	128.2	2,896
J-DM-5	2,593	Zone 12	11.9	131.3	2,896

FlexTable: Pipe Table

DESERT MOUNTAIN PARCEL 19

Active Scenario: Peak Hour Demand (FBO Condition)

Label	Diameter (in)	Length (ft)	Hazen-Williams C	Zone	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
P-88	12.0	639	130.0	Zone 12	443.8	1.26	0.563
P-17BEX	6.0	812	130.0	Zone 12	107.9	1.22	1.201
P-13EX	6.0	1,219	130.0	Zone 12	101.5	1.15	1.072
P-91	8.0	677	130.0	Zone 12	147.8	0.94	0.529
P-83	12.0	1,244	130.0	Zone 12	300.0	0.85	0.273
P-3EX	6.0	944	130.0	Zone 12	73.5	0.83	0.590
P-21EX	6.0	685	130.0	Zone 12	67.8	0.77	0.508
P-27EX	6.0	776	130.0	Zone 12	63.3	0.72	0.447
P-18EX	6.0	1,195	130.0	Zone 12	53.9	0.61	0.332
P-5EX	12.0	317	130.0	Zone 12	194.4	0.55	0.122
P-8EX	12.0	1,062	130.0	Zone 12	193.2	0.55	0.121
P-DM-90	8.0	357	130.0	Zone 12	84.9	0.54	0.190
P-28EX	6.0	1,474	130.0	Zone 12	46.8	0.53	0.256
P-DM-85	8.0	272	130.0	Zone 12	83.2	0.53	0.183
P-17AEX	6.0	109	130.0	Zone 12	39.9	0.45	0.191
P-89	12.0	379	130.0	Zone 12	147.8	0.42	0.073
P-63EX	8.0	827	130.0	Zone 12	60.8	0.39	0.102
P-DM-30	8.0	510	130.0	Zone 12	55.2	0.35	0.086
P-81	6.0	2,034	130.0	Zone 12	31.0	0.35	0.119
P-6EX	6.0	611	130.0	Zone 12	29.5	0.33	0.109
P-DM-35	8.0	587	130.0	Zone 12	46.8	0.30	0.063
P-DM-50	8.0	436	130.0	Zone 12	43.2	0.28	0.054
P-74	8.0	1,303	130.0	Zone 12	38.4	0.24	0.044
P-73	8.0	2,139	130.0	Zone 12	38.4	0.24	0.043
P-1EX	6.0	1,156	130.0	Zone 12	20.1	0.23	0.053
P-24EX	8.0	1,155	130.0	Zone 12	32.4	0.21	0.032
P-DM-45	8.0	840	130.0	Zone 12	28.9	0.18	0.026
P-DM-55	8.0	574	130.0	Zone 12	28.1	0.18	0.025
P-DM-80	8.0	400	130.0	Zone 12	22.3	0.14	0.016
P-DM-60	8.0	553	130.0	Zone 12	18.3	0.12	0.011
P-DM-10	48.0	4,720	140.0	Zone 12	443.8	0.08	0.001
P-DM-65	8.0	651	130.0	Zone 12	11.9	0.08	0.005
P-DM-50	8.0	567	130.0	Zone 12	11.9	0.08	0.005
P-DM-75	8.0	180	130.0	Zone 12	6.7	0.04	0.001
P-DM-70	8.0	434	130.0	Zone 12	5.5	0.03	0.001
P-DM-40	8.0	965	130.0	Zone 12	5.5	0.03	0.001
P-102	8.0	2,974	130.0	Zone 12	0.0	0.00	0.000
P-87	8.0	896	130.0	Zone 12	0.0	0.00	0.000
P-90	48.0	5,636	140.0	Zone 12	0.0	0.00	0.000
P-101	54.0	5,833	140.0	Zone 12	0.0	0.00	0.000

FlexTable: PRV Table

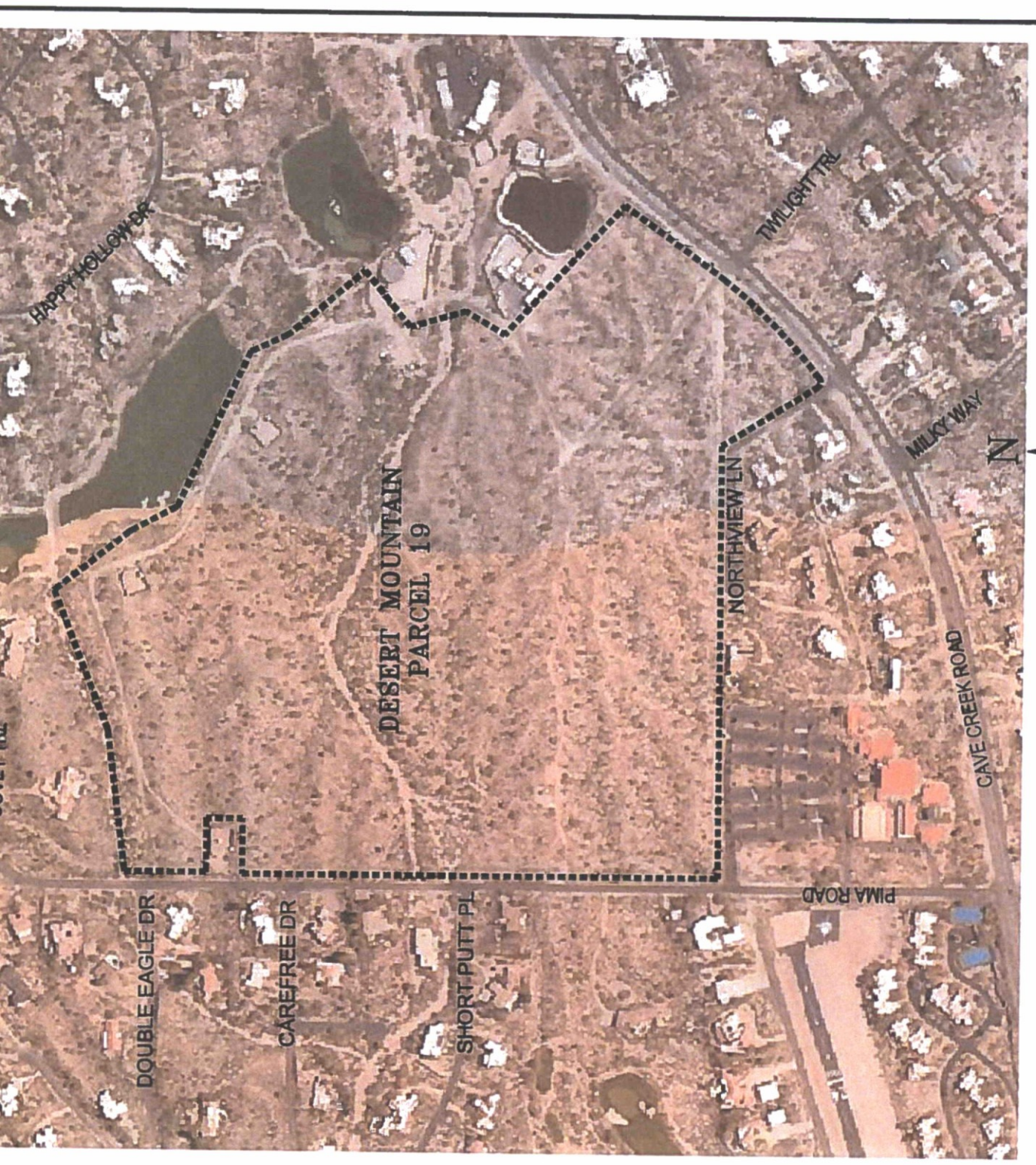
DESERT MOUNTAIN PARCEL 19

Active Scenario: Peak Hour Demand (FBO Condition)

ID	Label	Elevation (ft)	Diameter (Valve) (in)	Minor Loss Coefficient (Local)	Hydraulic Grade Setting (Initial) (ft)	Pressure Setting (Initial) (psi)	Flow (gpm)	Hydraulic Grade (From) (ft)	Hydraulic Grade (To) (ft)	Headloss (ft)
220	PRV-166	2,714	12.0	0.000	2,864	65.0	0.0	3,116	2,897	0.00
221	PRV-84	2,760	12.0	0.000	2,899	60.0	443.8	3,116	2,899	217.32
250	PRV-200	2,712	12.0	0.000	2,874	70.0	0.0	3,116	2,896	0.00

EXHIBIT 1

VICINITY MAP



DESERT MOUNTAIN

EXHIBIT 1
VICINITY MAP

WOOD/PATEL
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WWW.WOODPATEL.COM

DATE:	SCALE:	SHEET
6-13-2016	1" = 500'	
JOB NO.:	DESIGN: SM	

N

0 300 600

Horz. 1 in. = 300 ft.

NOT
FOR CONSTRUCTION OR RECORDING

WOOD/PATEL
MISSION: CLIENT SERVICE *
(602) 335-8500
WWW.WOODPATEL.COM

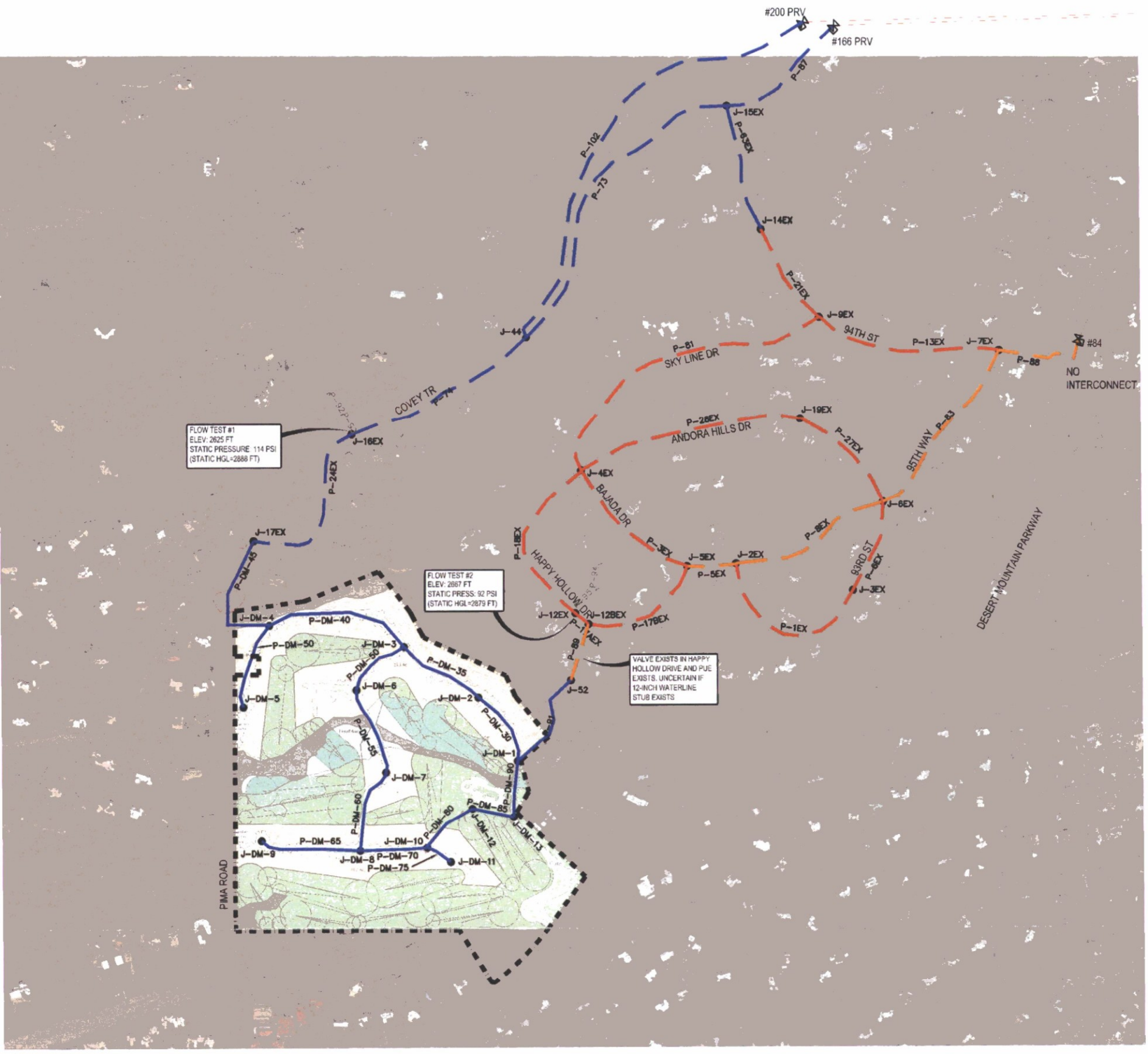
DESERT MOUNTAIN P1

EXHIBIT 2- EXISTING GROUNDWA
WELL LOCATIONS

	SCALE:	SHEET
	1" = 300'	1 OF 1
JOB NO.:	DESIGN: SM	
164434	DRAWN: SM	

EXHIBIT 3

MASTER WATER EXHIBIT – FULL BUILD-OUT



LEGEND

● J1	HYDRAULIC MODEL JUNCTION NODE
P1	HYDRAULIC MODEL PIPE
- - - -	PROPERTY BOUNDARY

PIPE DIAMETER	EXISTING	PROPOSE
6-INCHES		
8-INCHES		
12-INCHES		
16-INCHES		
24-INCHES		

N

600 1200

Horz. 1 in. = 600 ft.

NOT *FOR CONSTRUCTION OR RECORDING*

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DESERT MOUNTAIN P1

EXHIBIT 3- MASTER WATER EXHIBIT-FULL BUILD-OUT

	SCALE: 1" = 600'	SHEET 1 OF 1
JOB NO.: 164434	DESIGN: SM	
	DRAWN: SM	