CIVIL AND SURVEY



ENGINEERING

Water Basis of Design Report For 4417 Saddlebag Trail Scottsdale, Arizona 85251



April 2021

Prepared by: Hunter Engineering, Inc. 10450 North 74th Street, #200 Scottsdale, AZ 85258

WATER BASIS OF DESIGN REPORT FOR 4417 SADDLEBAG TRAIL SCOTTSDALE, ARIZONA 85251

PREPARED FOR

AV3 DESIGN STUDIO PO BOX 16792 PHOENIX, AZ 85011

PREPARED BY

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H.E. PROJECT NO. ARTI012

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TABLE OF CONTENTS

SECTION TITLE

PAGE

1.0	Introduction	1
2.0	Existing Conditions	1
3.0	Proposed Water Distribution System	1
4.0	Conclusion	2
5.0	References	2

FIGURES <u>TITLE</u>

LOCATION

1	Vicinity Map	Appendix A
2	Conceptual Plan	Appendix A

APPENDIX TITLE

A	Figures
В	Calculations and Data
С	Fire Hydrant Flow Test Results
D	References



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1.0 INTRODUCTION

This water basis of design report has been prepared under a contract from AV3 Design Studio, developer of the 4417 Saddlebag Trail project. The purpose of this report is to provide a final water analysis, required by the City of Scottsdale, to support this development. Preparation of this report has been done according to the procedures detailed in Chapter 6 of the *City of Scottsdale Design Standards & Policies Manual dated January, 2018 (CSDSPM) (Reference 1).*

This development project is located near the intersection of Camelback Road & Saddle Trail within the City of Scottsdale, Maricopa County, Arizona. The proposed project is located within an existing fully developed commercial site. The existing parcel is bound by commercial developments to the north and south, public alley to the east and North Saddlebag Road to the west. The site is specifically located in Lot 12 of "Camelback Park Plaza" book 86 of maps, page 13, office of recorder, Maricopa County, Arizona. Figure 1, in Appendix A, illustrates the location of the project site in relation to the City of Scottsdale street system. Access to the site is provided from Saddlebag Trail.

The development proposes the construction of a new three-story mixed used building. Site improvements will include construction mostly of the building with minimal sidewalk/hardscape and landscape areas and supporting infrastructure including water, sewer and fire line service. The overall project site is approximately 0.05 ac. Figure 2 illustrates the proposed improvements for the project.

2.0 EXISTING CONDITIONS

The proposed project is located on a commercial developed parcel. There is an existing 6" ACP public water line that runs across the N. Saddlebag Trail on the west side of the building. There is an existing domestic water service to the site. The size is not shown on the city quarter section maps.

3.0 PROPOSED WATER DISTRIBUTION SYSTEM

The new building, will connect to the existing 6" ACP on North Saddlebag Trail for a new domestic and fire service. See Water Exhibit located in the appendix.

Figure 6.1-2 in the City of Scottsdale *Design Standards & Policies Manual* was used to calculate the Average Day Demand (ADD). Per Table 6.1-2, 0.8 gallons per day (gpd) per square feet for commercial use and 446.3 per unit for Resort Hotel use was used to be conservative. The Maximum Day Demand is 2.0 times the ADD, and the Peak Hour Demand (PHD) is 3.5 times the ADD. See Appendix B for a summary of these calculations.

The proposed building is a total or 5,550 square feet. The building will be type V-B construction. Per the 2006 International Fire Code, the minimum base fire flow rate is 2,000

gallons per minute (GPM) with an allowed 50% reduction for sprinklered buildings but not below the minimum 1,500 GPM. A fire flow of 1,500 GPM is used for the site analysis. Per City of Scottsdale, pressure requirements, minimum acceptable design pressures are 30 psi at the hydrant under design fire flow requirements and minimum residual pressure 50 psi at highest finished floor for domestic demand. The required and the calculated fire flows are tabulated below.

Building	Construction Type	Building Area (sf)	Minimum Required Fire Flow for Buildings Table B105.1		Min Fire Flow w/ 50% Sprinkler Reduction	Lowest Available Pressure (psi)	Model Node
Total	V-B	5,712	2,000 gpm		1,500	82.40	J2

A City of Scottsdale fire flow test was completed on February 4, 2021, by Arizona Flow Testing, LLC. This test data was used to model the proposed system using WaterCad, a pipe network analysis program by Haestad Methods. A reservoir and pump was added to the model near the flow test location to simulate pressure versus flow curve. Note that the pipes PX-1 and PX-2 connecting the pumps and reservoirs are not a part of the system and are oversized to 120-inches to minimize system losses. Pipes and junctions were added to the network model matching the pipe sizes, materials and elevations of the proposed and existing system.

The fire flow model was set up such that full fire flow demand was taken out of the main node adjacent to the site. The lowest resultant pressure based upon the required fire flow was calculated to be 82.40 psi, at J-2. Results and data from the WaterCAD is shown in Appendix B.

4.0 CONCLUSIONS

Based on the results of this study, it can be concluded that:

• The existing public water system is adequate to support this development.

5.0 **REFERENCES**

1) City of Scottsdale Design Standard & Policies Manual, January 2018.

APPENDIX A FIGURES





FIGURE 1







APPENDIX B CALCULATIONS AND DATA SHEET

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Project:	4417 SADDLEBAG TRAIL
Project Number:	ARTI012
City:	Scottsdale
Area Building:	0.05 AC

DOMESTIC DEMAND SUMMARY (PER CITY OF SCOTTSDALE DESIGN STANDARD AND POLICIES MANUAL, JULY 2018)

Site	Site Use	Building Area (sf) and Resort (unit)	Average Day Demand (gpd) Gross Bldg Area (sf) per Table 6-1.2 Average Day	Average Day Demand (ADD)	Max Day Demand (MDD) (ADD*2.0)	Average Day Demand (ADD)	Max Day Demand (MDD) (ADD*2.0)	Peak Hour Demand (PHD) (ADD*3.0)
			Water Demands	(gpd)	(gpd)	(gpm)	(gpm)	(gpm)
1st Floor	Commercial	1,850	0.8 per sf	1,480	2,960	1.0	2.1	3.1
2nd & 3rd Floor	Residential	1	446.3 per sf	446	893	0.3	0.6	0.9
			Total:	1,926	3,853	1.3	2.7	4.0

FIRE FLOW SUMMARY

Building	Construction Type	Building Area (sf)	Minimum Required Fire Flow for Buildings Table B105.1 2006 International Fire Code	Min Fire Flow w/ 50% Sprinkler Reduction	Lowest Available Pressure (psi)	Model Node	Sprinkler Reduction Required	Building Sprinklered
Total	V-B	5,550	2,000 gpm	1,500	94.20	J2	NO	YES
	Total:	5,550						

* Minimum acceptable design pressures are 40 psi under Peak Hour demands and 20 psi under Max Day + Fire Flow demands.



Scenario: Peak Steady State Analysis Junction Report

Label	Elevation (ft)	Zone	Туре	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,265.00	Zone	Demand	0.00	Fixed	0.00	1,505.24	103.94
J-2	1,266.00	Zone	Demand	4.00	Fixed	4.00	1,505.24	103.51

Scenario: Fire Steady State Analysis Junction Report

Label	Elevation (ft)	Zone	Туре	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,265.00	Zone	Demand	0.00	Fixed	0.00	1,484.09	94.79
J-2	1,266.00	Zone	Demand	1,504.00	Fixed	1,504.00	1,456.45	82.40

Scenario: Static Steady State Analysis Junction Report

Label	Elevation (ft)	Zone	Туре	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	
J-1	1,265.00	Zone	Demand	0.00	Fixed	0.00	1,505.24	103.94	= 104 psi matches hydrant test
J-2	1,266.00	Zone	Demand	0.00	Fixed	0.00	1,505.24	103.51	

Scenario: Residual Steady State Analysis Junction Report

Label	Elevation (ft)	Zone	Туре	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	
J-1 J-2	1,265.00 1,266.00	Zone Zone	Demand Demand	2,751.00 0.00	Fixed Fixed	2,751.00 0.00	1,440.56 1,440.56	75.96 75.52	= 76 psi matches hydrant test

Scenario: Test Steady State Analysis Junction Report

Lab	el Elevation (ft)	Zone	Туре	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)	
J-1	1,265.00	Zone	Demand	4,980.00	Fixed	4,980.00	1,311.20	19.99	= 20 psi matches hydrant test
J-2	1,266.00	Zone	Demand	0.00	Fixed	0.00	1,311.20	19.56	

Detailed Report for Pump: PMP-1

Scenario Summary								
Scenario	Test							
Active Topology Alternative	Base-Active Top	ology						
Physical Alternative	Base-Physical							
Demand Alternative	Demand-Test							
Initial Settings Alternative	Base-Initial Settir	ngs						
Operational Alternative	Base-Operationa	I						
Age Alternative	Base-Age Alterna	ative						
Constituent Alternative	Base-Constituent	-Constituent						
Trace Alternative	Base-Trace Alter	native						
Fire Flow Alternative	Base-Fire Flow							
Capital Cost Alternative	Base-Capital Cos	st						
Energy Cost Alternative	Base-Energy Cos	st						
User Data Alternative	Base-User Data							
Global Adjustments Summary	,							
Demand	<none></none>	Roughr	less	<none></none>				
Geometric Summary								
X	6,252.57 ft	Upstrea	am Pipe	PX-1				
Y Elevation	7,114.37 ft 1.265.00 ft	Downst	ream Pipe	PX-2				
	,							
Pump Definition Summary								
Pump Definition	Default Pump De	finition						
Initial Status								
Initial Pump Status	On	Initial R	elative Speed F	acto 1.00				
	011	india in						
Calculate	d Results Summa	ry						
Time Control Intake Discha	rgeDischarge Pump	Relative Ca	alculated					
(hr) Status Pump Pum	ip (gpm) Head	Speed	Water					
(ft) (ft)		I	(Hp)					
0.00 On .265.00 1.311.	20 4.980.00 46.20	1.00	58.09					
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		Pu 1 (Dala	mp Head C	urve				
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0.0	L		Discharge		000			
			(gpm)					

Project Engineer: Larrv Talbott Water

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6000.0

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Detailed Report for Reservoir: R-1

Scenario Summary							
Scenario	Test						
Active Topology Alternative	Base-Active Topolo	ду					
Physical Alternative	Base-Physical						
Demand Alternative	Demand-Test						
Initial Settings Alternative	Base-Initial Settings						
Operational Alternative	Base-Operational						
Age Alternative	Base-Age Alternativ	e					
Constituent Alternative	Base-Constituent						
Trace Alternative	Base-Trace Alternat	tive					
Fire Flow Alternative	Base-Fire Flow						
Capital Cost Alternative	Base-Capital Cost						
Energy Cost Alternative	Base-Energy Cost						
User Data Alternative	Base-User Data						
Clobal Adjustments Summer /							
Global Adjustments Summary							
Demand	<none></none>	Roughness	<none></none>				
Geometric Summan/							

	,		
X	6,285.23 ft	Elevation	1,265.00 ft
Y	7,114.37 ft	Zone	Zone

Calculated Results Summary							
Time (hr) H	Calculated ydraulic Grade (ft)	Inflow (gpm)	Outflow (gpm)				
0.00	1,265.00 4	,980.00	,980.00				

APPENDIX C FIRE HYDRANT FLOW TEST

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Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name: Project Address: Arizona Flow Tes Client Project No Flow Test Permit Date and time flo Data is current an Conducted by: Witnessed by:	sting Project No.: .: t No.: ow test conducted: nd reliable until:	ARTI012 4417 North Sa 21052 ARTI012 C64385 February 4, 202 Floyd Vaugha Chris Mendez	addlebag Trail, Scottsda 021 at 7:45 AM 1 n – Arizona Flow Testir –City of Scottsdale-Ins	ale, Arizona 85251 ng, LLC (480-250-8154) pector (602-9028-9046)
Raw Test Data			Data with 32 PSI S	<u>afety Factor</u>	
Static Pressure: (Measured in pot	104.0 PS unds per square inch)	SI	Static Pressure: (Measured in pound	72.0 PSI ds per square inch)	Scottsdale requires a maximum Static
Residual Pressur (Measured in pot	e: 76.0 PS unds per square inch)	I	Residual Pressure: (Measured in pound	44.0 PSI ds per square inch)	Pressure of 72 PSI for AFES Design.
Pitot Pressure: (Measured in pot	41.0 PS unds per square inch)	I	Distance between h	ydrants: Approx. 380 Fe	eet
Diffuser Orifice D (Measured in inc	Diameter: 4 Inch Pollard I hes)	Diffuser	Main size: Not Pro	ovided	
Coefficient of Dif	fuser: 0.9				
Flowing GPM: (Measured in gal	2,75 lons per minute)	1 GPM	Flowing GPM:	2,751 GF	PM
GPM @ 20 PSI:	4,98	0 GPM	GPM @ 20 PSI:	3,844 GF	PM
Flow Test Locat	ion	Nort	h 🕇		
East Indian Plaza North Saddlebag Trail East Shoeman Lane	Untitled Map			Press	ure Fire Hydrant Project Site
	Google at the			4417 Flov	North Saddlebag Trail w Fire Hydrant

Arizona Flow Testing LLC 480-250-8154 www.azflowtest.com floyd@azflowtest.com

APPENDIX D REFERENCES

> HUNTER ENGINEERING



DESIGN STANDARDS & POLICIES MANUAL





- d. Pipe flow velocity in feet per second (fps)
- e. Each pipe segment's head loss rate (ft. /1,000ft or psi/ft.)
- f. PRVs: Upstream and downstream pressures (psi or HGL elevation)
- g. Tanks: Inflow and outflow (gpm)
- h. Shows all units for the values presented or provide a legend on the diagram page that indicates the units used

AVERAGE DAY WATER DEMANDS (1) IN GALLONS PER DAY (GPD) ⁽²⁾ IN GALLONS PER MINUTE (GPM) ⁽²⁾⁽³⁾ Land Use Total Inside Use Outside Total Use Inside Outside Units Use Use Use Use Residential Demand per Dwelling Unit < 2 dwelling unit 208.9 276.7 0.30 0.69 485.6 0.39 per per acre (DU/ac) unit 2 – 2.9 DU/ac 276.7 470.4 0.27 193.7 0.39 0.66 per unit 3 – 7.9 DU/ac 175.9 72.3 248.2 0.25 0.11 0.36 per unit 227.6 0.33 8 – 11.9 DU/ac 155.3 72.3 0.22 0.11 per unit 12 – 22 DU/ac 72.3 0.33 155.3 227.6 0.22 0.11 per unit 30 0.27 High Density 155.3 185.3 0.22 0.05 per Condominium unit (condo) 401.7 44.6 0.56 0.07 Resort Hotel 446.3 0.63 per (includes site room amenities) Service and Employment 1.2 0.1 1.3 1.67E-03 1.39E-04 1.81E-03 per Restaurant square foot (sq.ft.) Commercial/ 0.7 0.1 0.8 9.73E-04 1.39E-04 1.11E-03 per Retail sq.ft. Commercial High 0.5 0.1 0.6 6.95E-04 1.39E-04 8.34E-04 per Rise sq.ft.

670

670

AVERAGE DAY WAT	ER DEM	ANDS ⁽¹⁾					
IN GALLONS PER D	AY (GPD)	(2)		IN GALLON	IS PER MINU	TE (GPM) ⁽²⁾	(3)
Office	0.5	0.1	0.6	6.95E-04	1.39E-04	8.34E-04	per sq.fl

1340

0.94

0.94

1.88

per acre

Industrial	873	154	1027	1.22	0.22	1.44	per acre
Research and Development	1092	192	1284	1.52	0.27	1.79	per acre
Special Use Areas							
Natural Area Open Space	0	0	0	0.0	0.0	0.0	per acre
Developed Open Space – Parks	0	1786	1786	0.0	2.49	2.49	per acre
Developed Open Space – Golf Course	0	4285	4285	0.0	5.96	5.96	per acre

Notes:

Institutional

(1) These values shall not be used directly for service line or water meter sizing.

(2) Gallon per day values are provided for reference only. The instantaneous gallon per minute flow rates presented are intended for use in the required hydraulic modeling scenarios. The gpm values assume a 12-hour active water use period per 24-hour day. In large or specialty developments or master plans the hydraulic analysis criteria and parameters should be discussed with the Water Resources Department. Seasonal peaking should also be considered. Upon review, the Water Resources Department reserves the right to designate flows to be used in hydraulic modeling scenarios that may be different from those presented here.

(3) The hydraulic modeling peaking factors used in select modeling scenarios are to be applied to the gpm values shown here. Max day and peak hour peaking factors can be found in Section 6-1.404.

FIGURE 6-1.2 AVERAGE DAY WATER DEMANDS