HUNTER
ENGINEERING
CIVIL AND SURVEY

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

FINAL Basis of Design Report

- ☐ APPROVED
- ☑ APPROVED AS NOTED
- ☐ REVISE AND RESUBMIT

CITY OF SCOTTSDALE
SCOTTSDALE WATER
9379 E San Salvador Dr.
Scottsdale, AZ 85258

Disclaimer: If approved; the approval is granted under the condition that the final construction documents submitted for city review will match the information herein. Any subsequent changes in the water or sewer design that materially impact design criteria or standards will require re-analysis, re-submittal, and approval of a revised basis of design report prior to the plan review submission.; this approval is not a guarantee of construction document acceptance.
For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY ldillon **DATE** 4/6/2021

Registered Professional Engineer (Civil)
CERTIFICATE NO. 42104
LARRY M. TALBOTT
Date Signed 2/15/21
ARIZONA U.S.A

February 2021

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

Address following comments on improvement plan submittal:
1) DS&PM 6-1.417, C: When the location of a backflow preventer cannot be accommodated adjacent to
the meter, the designer shall:
Request permission from the Water Resources Department to separate the
meter from the backflow preventer. Backfill the water line between the meter box and the backflow preventer with1-sack controlled low strength material (CLSM) per MAG, Section 728. CLSM shall be placed to the full width of the trench and to 6 inches above top of pipe. Only if written justification is provided as to why the BFP cannot be directly adjacent to the water meter will Water Resources allow CLSM backfill.
2) DS&PM 6-1.416: Buildings with mixed uses should consider a separate meter and be separately plumbed for each type of use. Scottsdale's sewer billing structure supports separate metering for each of the user codes described in SRC Sec. 49-141(g). In the event separate use metering is not provided, sewer billing will be applied at the higher use rate applicable to that building. Developers should consider the economic benefits of separate metering.
3.) Verify with fire plan review staff the NFPA sprinkler systems required for the different building uses. Confirm proposed water/fire lines are in conformance.

7-DR-2021
2/23/21

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

LARRY TALBOTT
HUNTER ENGINEERING, Inc.
10450 NORTH 74TH STREET, #200
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H.E. PROJECT NO. ARTI012

HUNTER
ENGINEERING

TABLE OF CONTENTS

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 2006 International Fire Code		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

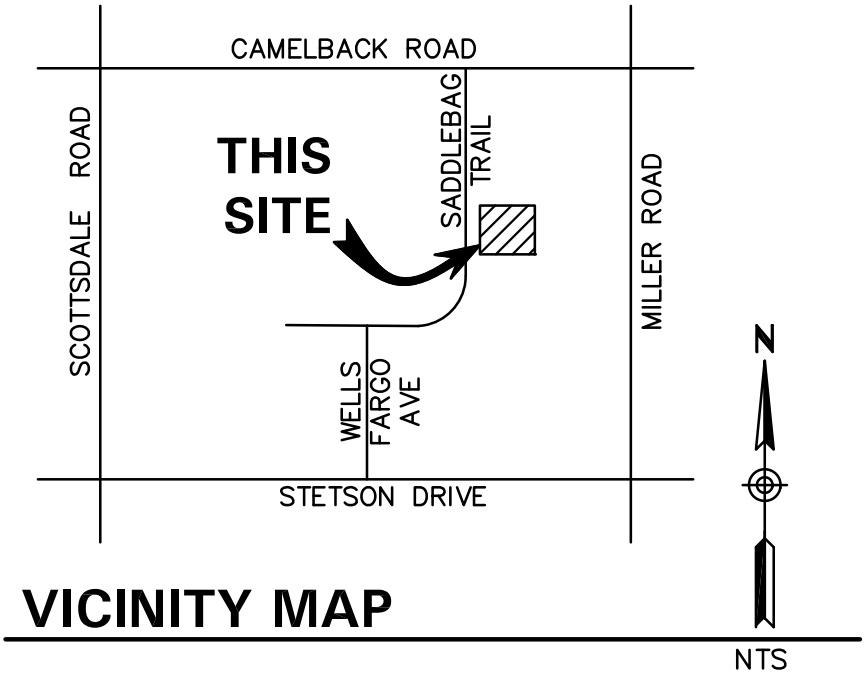
Based on the results of this study, it can be concluded that:

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

5.0 REFERENCES

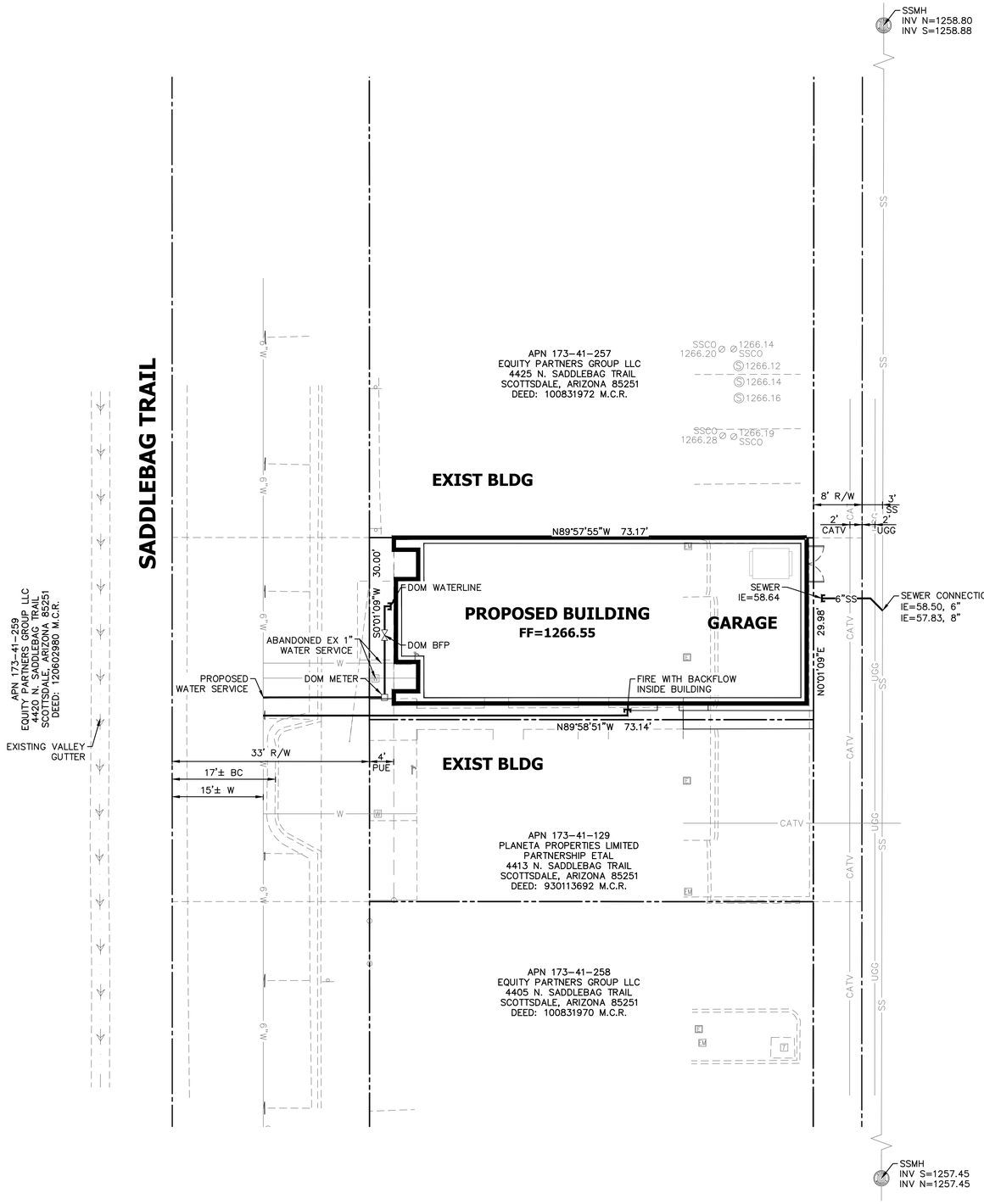
1) City of Scottsdale Design Standard & Policies Manual, January 2018.

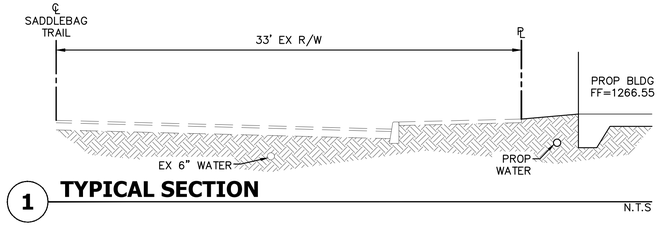
APPENDIX A
FIGURES



VICINITY MAP

FIGURE 1





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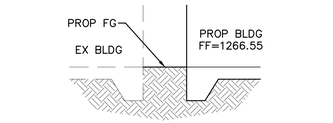

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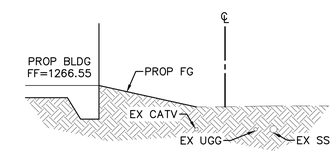

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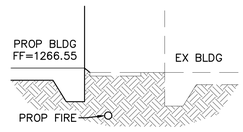

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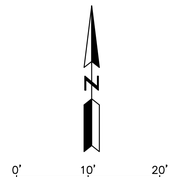

NO.	DATE	REVISION	BY

PURPOSE: **CONCEPTUAL SUBMITTAL**

DESIGN BY: LT
DRAWN BY: DFK
CHECKED BY: LT

HUNTER ENGINEERING
CIVIL AND SURVEY
10450 NORTH 74TH STREET, SUITE 200
SCOTTSDALE, AZ 85258
T 480 991 3985
F 480 991 3986

Registered Professional Engineer
CERTIFICATE NO.
42104
LARRY M. TALBOTT
Date Signed 02/09/21
ARIZONA U.S.A.

CONCEPTUAL UTILITY PLAN FOR NEW LIVE/WORK TOWNHOUSE 4417 SADDLEBAG TRAIL SCOTTSDALE, ARIZONA

CONTACT ARIZONA 811 AT LEAST 2 FULL WORKING DAYS BEFORE YOU BEGIN EXCAVATION
AR ZONA811 BLUE STAKE, INC.
CALL 811 OR CLICK ARIZONA811.COM

THESE PLANS ARE NOT APPROVED FOR CONSTRUCTION WITHOUT AN APPROVED SIGNATURE FROM THE GOVERNING MUNICIPALITY.

PROJECT NAME: NEW LIVE/ WORK TOWNHOUSE

HE NO.: ARTI012
SCALE: 1"=10'

SHEET: **C2**

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2/23/21

APPENDIX B
CALCULATIONS AND DATA SHEET

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)*

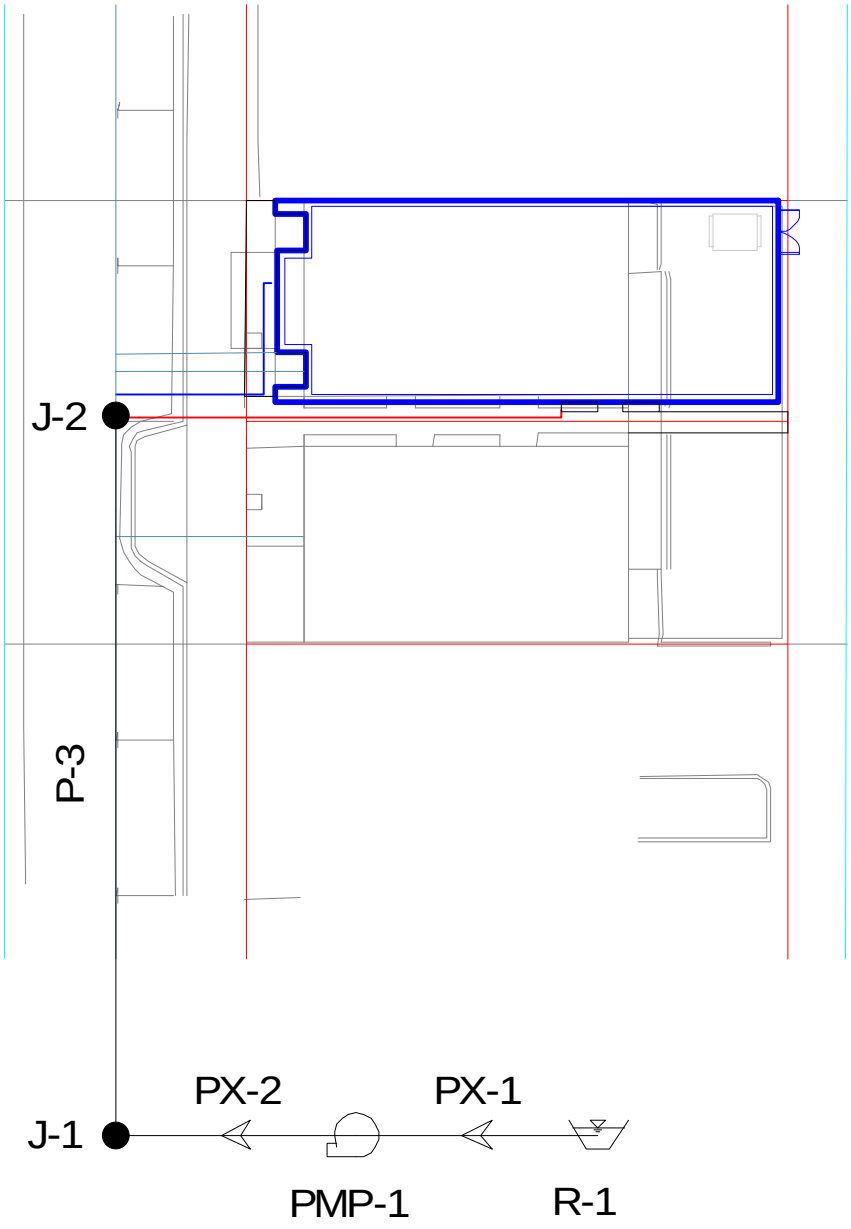
Site	Site Use	Building Area (sf) and Resort (unit)	Average Day Demand (gpd) Gross Bldg Area (sf) per Table 6-1.2 Average Day Water Demands	Average Day Demand (ADD) (gpd)	Max Day Demand (MDD) (ADD*2.0) (gpd)	Average Day Demand (ADD) (gpm)	Max Day Demand (MDD) (ADD*2.0) (gpm)	Peak Hour Demand (PHD) (ADD*3.0) (gpm)
1st Floor	Commercial	1,850	0.8 per sf	1,480	2,960	1.0	2.1	3.1
2nd & 3rd Floor	Restaurant	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: Test



Scenario: Peak
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	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	>50 psi

Scenario: Fire
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	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	> 30 psi

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Scenario: Static
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	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	

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Scenario: Residual
Steady State Analysis
Junction Report

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

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Scenario: Test
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	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	

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Detailed Report for Pump: PMP-1

Scenario Summary	
Scenario	Test
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	Demand-Test
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Capital Cost Alternative	Base-Capital Cost
Energy Cost Alternative	Base-Energy Cost
User Data Alternative	Base-User Data

Global Adjustments Summary			
Demand	<None>	Roughness	<None>

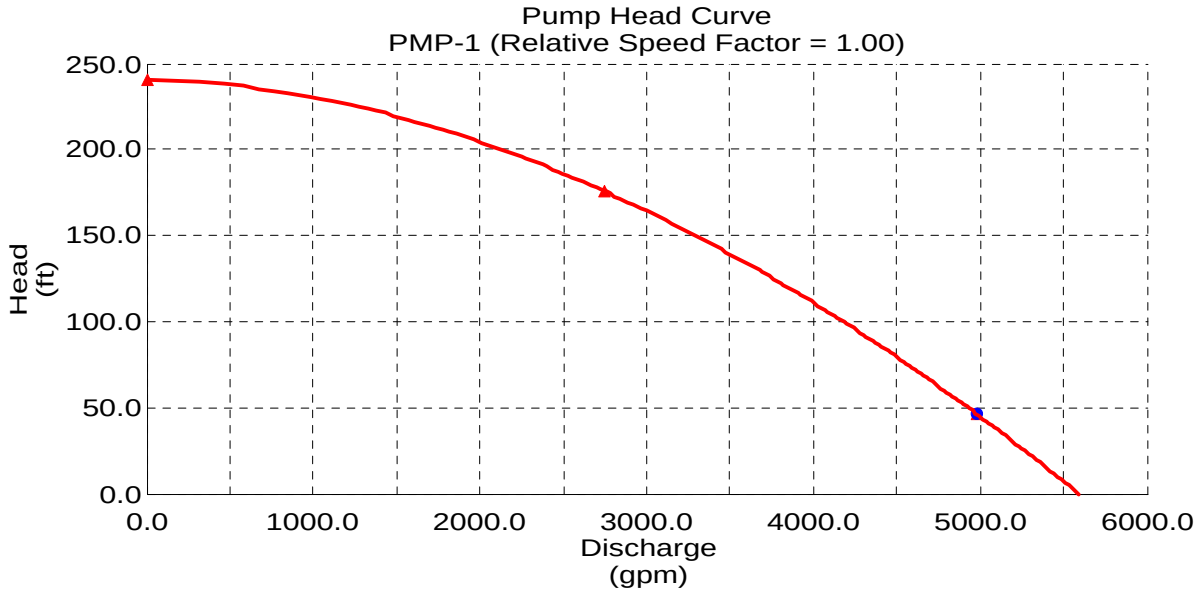
Geometric Summary			
X	6,252.57 ft	Upstream Pipe	PX-1
Y	7,114.37 ft	Downstream Pipe	PX-2
Elevation	1,265.00 ft		

Pump Definition Summary	
Pump Definition	Default Pump Definition

Initial Status			
Initial Pump Status	On	Initial Relative Speed Facto	1.00

Calculated Results Summary

Time (hr)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Pump Head (ft)	Relative Speed	Calculated Water Power (Hp)
0.00	On	,265.00	1,311.20	4,980.00	46.20	1.00	58.09



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Detailed Report for Reservoir: R-1

Scenario Summary	
Scenario	Test
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	Demand-Test
Initial Settings Alternative	Base-Initial Settings
Operational Alternative	Base-Operational
Age Alternative	Base-Age Alternative
Constituent Alternative	Base-Constituent
Trace Alternative	Base-Trace Alternative
Fire Flow Alternative	Base-Fire Flow
Capital Cost Alternative	Base-Capital Cost
Energy Cost Alternative	Base-Energy Cost
User Data Alternative	Base-User Data

Global Adjustments Summary			
Demand	<None>	Roughness	<None>

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

Calculated Results Summary

Time (hr)	Calculated Hydraulic Grade (ft)	Inflow (gpm)	Outflow (gpm)
0.00	1,265.00	4,980.00	,980.00

APPENDIX C
FIRE HYDRANT FLOW TEST

Arizona Flow Testing LLC

HYDRANT FLOW TEST REPORT

Project Name:	ARTI012
Project Address:	4417 North Saddlebag Trail, Scottsdale, Arizona 85251
Arizona Flow Testing Project No.:	21052
Client Project No.:	ARTI012
Flow Test Permit No.:	C64385
Date and time flow test conducted:	February 4, 2021 at 7:45 AM
Data is current and reliable until:	August 4, 2021
Conducted by:	Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)
Witnessed by:	Chris Mendez –City of Scottsdale-Inspector (602-9028-9046)

Raw Test Data

Static Pressure: **104.0 PSI**
(Measured in pounds per square inch)

Residual Pressure: **76.0 PSI**
(Measured in pounds per square inch)

Pitot Pressure: **41.0 PSI**
(Measured in pounds per square inch)

Diffuser Orifice Diameter: 4 Inch Pollard Diffuser
(Measured in inches)

Coefficient of Diffuser: 0.9

Flowing GPM**:** **2,751 GPM**
(Measured in gallons per minute)

GPM @ 20 PSI: **4,980 GPM**

Data with 32 PSI Safety Factor

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

Residual Pressure: **44.0 PSI**
(Measured in pounds per square inch)

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

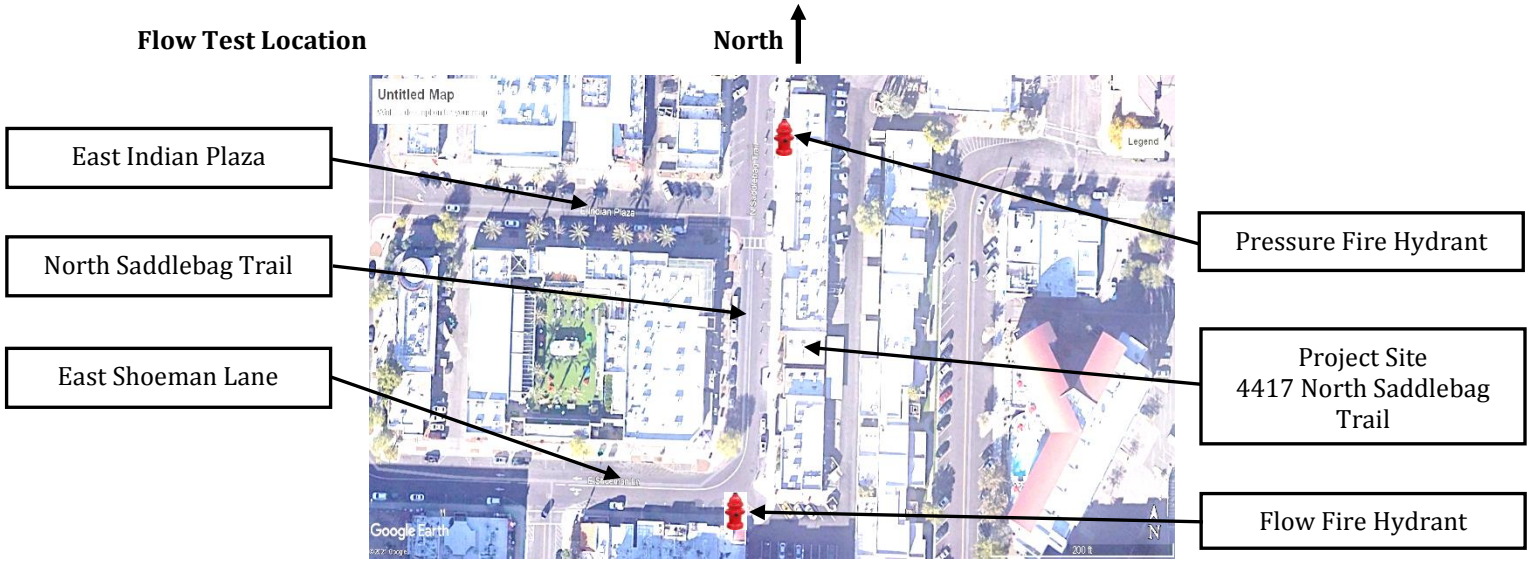
Distance between hydrants: Approx. 380 Feet

Main size: Not Provided

Flowing GPM: **2,751 GPM**

GPM @ 20 PSI**:** **3,844 GPM**

Flow Test Location **North**



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APPENDIX D
REFERENCES

CITY OF SCOTTSDALE

DESIGN STANDARDS & POLICIES MANUAL

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

AVERAGE DAY WATER DEMANDS [1]							
IN GALLONS PER DAY (GPD) [2]				IN GALLONS PER MINUTE (GPM) [2][3]			
Office	0.5	0.1	0.6	6.95E-04	1.39E-04	8.34E-04	per sq.ft.
Institutional	670	670	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:
(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