

## BASIS OF DESIGN REPORT FOR WATER

Key Essentials Hanger | 16060 N. 82<sup>nd</sup> Street, Scottsdale, AZ 85260

**OWNER/DEVELOPER:** DPA Architects, Inc.  
 3719 N. 75<sup>th</sup> Street, Suite 105  
 Scottsdale, AZ 85251  
 John S. Szafran

**CONTACT:** JMC Engineering, PLLC  
 7315 N 16th Street, Suite 101  
 Phoenix, Arizona 85020  
 Joseph M. Cirone, P.E.  
 Phone: (602) 374-4148



### PROJECT DESCRIPTION:

The proposed development is located at the southwest corner (SWC) of E. Paradise Lane and N. 82<sup>nd</sup> Street within the corporate limits of the City of Scottsdale. The development will consist of the construction of a new Hangar Building with concrete parking areas, concrete staging areas, associated landscape areas, and appurtenant facilities. There is an existing 12-Polyvinyl Chloride (PVC) waterline within N. 82<sup>nd</sup> Street west of the site and an existing fire hydrant located across N 82<sup>nd</sup> Street adjacent to the site. The proposed system shall include one (1) new 1.5-inch domestic water service connection, one (1) new 1-inch landscape service and meter, and one (1) new 6-inch fireline connection with backflow and remote FDC.

**FINAL Basis of Design Report**

APPROVED

APPROVED AS NOTED

REVISE AND RESUBMIT

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** RSacks

**DATE** 2/7/2023

N.T.S.

**Figure 1. Vicinity Map**

In the future a fixture count is a better way of estimating water demand

### WATER DEMAND AND PRODUCTION CRITERIA

Building Area:	13,944-sf
Property Area:	47,175-sf (1.08-ac)
Land Use:	Industrial <sup>1</sup>
Average Day Demand:	1,027-gal/day/acre (Industrial) <sup>1</sup>
Max Day Demand:	2 x Average Day Demand (Industrial) <sup>2</sup>
Minimum Fire Flow (FF) Demand:	1,500 gal/min <sup>3</sup>
Building Construction Type:	II-B
Required Fire Flow (FF) Demand:	25%(2,500-gpm) <sup>4,5</sup>
Max Day + Fire Flow Demand:	= MDD + FF <sup>3</sup>

<sup>1</sup> Source: City of Scottsdale Design Standards and Policies Manual. Chapter 6 - Water; Section 6-1, Figure 6.1-2.

<sup>2</sup> Source: City of Scottsdale Design Standards and Policies Manual. Chapter 6 - Water; Section 6-1.404.

<sup>3</sup> Source: City of Scottsdale Design Standards and Policies Manual. Chapter 6 - Water; Section 6-1.501

<sup>4</sup> Source: International Fire Code 2018; Appendix B, Table B105.1 (Building Construction Type V-B).

<sup>5</sup> A reduction in required fire-flow of 75 percent, as approved, is allowed when the building is equipped with an approved automatic sprinkler systems.

<sup>6</sup> Source: City of Scottsdale Design Standards and Policies Manual. Chapter 6 - Water; Section 6-1.416, Figure 6.1-4.

### WATER DESIGN FLOWS

$$\text{Average Day Demand} = 1,027 \frac{\text{gpd}}{\text{acre}} (1.08 \text{ ac}) = 1,109.2 \text{ gpd} = 0.77 \text{ gpm}$$

$$\text{Max Day Demand} = 2.0(1,109.2 \text{ gpd}) = 2,218.3 \text{ gpd} = 1.54 \text{ gpm}$$

$$\text{Required Fire Flow} = (2,500 \text{ gpm})(1 - 0.75) = 625 \text{ gpm}$$

$$\text{Minimum Fire Flow} = 1,500 \text{ gpm}$$

$$\text{Max Day Demand} + \text{Fire Flow} = (1.54 \text{ gpm}) + (1,500 \text{ gpm}) = 1,501.5 \text{ gpm}$$

### FIRE FLOW TEST:

Pressure data for the existing system was obtained via a public fire hydrant flow test (Complex, Port Size 4”), conducted by Arizona Flow Testing LLC. See **Attachment 1** for fire flow test results. The pressure hydrant and flow hydrant were located on N 82<sup>nd</sup> Street. The flow test data includes a static pressure of 63-psi, a residual pressure of 53-psi, a flowing gpm of 2,354-gpm, and an available flow of 5,174 gpm at 20-psi. All reported data includes a 10% safety factor.

### METHODOLOGY:

The proposed network for the site was modeled using “WaterCAD Version 8i” by Haestad Methods to document and analyze system flows and pressures when Maximum Day plus Fire Flow demands are applied. A Hazen-Williams “C” Coefficient of 150 was used to model the proposed and existing PVC waterlines.

A reservoir (R-1) with an elevation set to the static head was used in the water model to simulate conditions for the Average Day Flow, Maximum Day Flow, and Maximum Day plus Fire Flow demands. The head or reservoir elevation for the Max Day Flow with Fire Demand was interpolated from the Hydrant Flow Test Report. The reservoir elevations input into the system were calculated by adding the approximate elevation of the residual hydrant location plus the system head (pressure) (**Attachment 1**).

All Average Day Flow, Maximum Day Flow and Max Day and Fire-flow demand were assigned to node J-3 (**Attachment 2**).

The fire-flow area was calculated by totaling the floor areas for all floors within the largest of all buildings located onsite (13,944 sf total). This calculated area was then used to reference the IFC 2018 for the corresponding fire-flow demand per fire-flow calculation area and building construction type.

**SUMMARY:**

Table 4, below, summarizes the results of the hydraulic analysis conducted using the WaterCAD software. For more detailed result tables and a network diagram of the proposed system, refer to **Attachment 2** of this report.

<b>Table 4: Hydraulic Water Results</b>			
	<b>Proposed System</b>	<b>City of Scottsdale Design Criteria</b>	<b>Criteria met (Y/N)</b>
<b>Maximum Headloss (Max Day):</b>	0.001-ft/1000-ft	10-ft/1000-ft	Y
<b>Maximum Static Pressure (Max Day):</b>	63-psi	120-psi	Y
<b>Minimum Residual Pressure (Max Day):</b>	62-psi	50-psi	Y
<b>Minimum Pressure (Max Day + FF):</b>	50-psi	30-psi	Y

According to the system model hydraulic results, the water distribution system for Key Essentials Hangar is designed in compliance with the City of Scottsdale Design Standards and Policies Manual 2018 and the International Fire Code 2018.

**REFERENCES:**

- 1) City of Scottsdale. *Design Standards and Policies Manual*, Chapter 6-“Water.” August 2018.
- 2) Maricopa Association of Governments *Uniform Standard Specifications for Public Works Construction* and Standard Details 2012.
- 3) International Code Council. *International Fire Code*, 2018.
- 4) International Code Council. *International Plumbing Code*, 2018.

**ATTACHMENTS:**

- Attachment 1: Fire Flow Test Results*
- Attachment 2: WaterCAD Model*
- Attachment 3: Preliminary Grading & Utility Plan*



Key Essentials Hanger  
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November 2022

## **ATTACHMENT 1**

### Fire Flow Test Results

# Arizona Flow Testing LLC

## HYDRANT FLOW TEST REPORT

Project Name: Key Essential Hangar  
Project Address: 16060 North 82<sup>nd</sup> Street, Scottsdale, Arizona, 85260  
Client Project No.: JMC 0140  
Arizona Flow Testing Project No.: 22736  
Flow Test Permit No.: C70439  
Date and time flow test conducted: October 20, 2022 at 7:45 AM  
Data is current and reliable until: April 20, 2023  
Conducted by: Floyd Vaughan-Az Flow Testing, LLC (480-250-8154)  
Witnessed by: Chris Mendez - City of Scottsdale-Inspector (602-9028-9046)

### Raw Test Data

Static Pressure: **70.0 PSI**  
(Measured in pounds per square inch)

Residual Pressure: **60.0 PSI**  
(Measured in pounds per square inch)

Pitot Pressure: **30.0 PSI**  
(Measured in pounds per square inch)  
+

Diffuser Orifice Diameter: One 4-inch Pollard Diffuser  
(Measured in inches)

Coefficient of Diffuser: 0.9

Flowing GPM: **2,354 GPM**  
(Measured in gallons per minute)

GPM @ 20 PSI: **5,613 GPM**

### Data with 10% Safety Factor

Static Pressure: **63.0 PSI**  
(Measured in pounds per square inch)

Residual Pressure: **53.0 PSI**  
(Measured in pounds per square inch)

Approx. distance between hydrants: 340 Feet

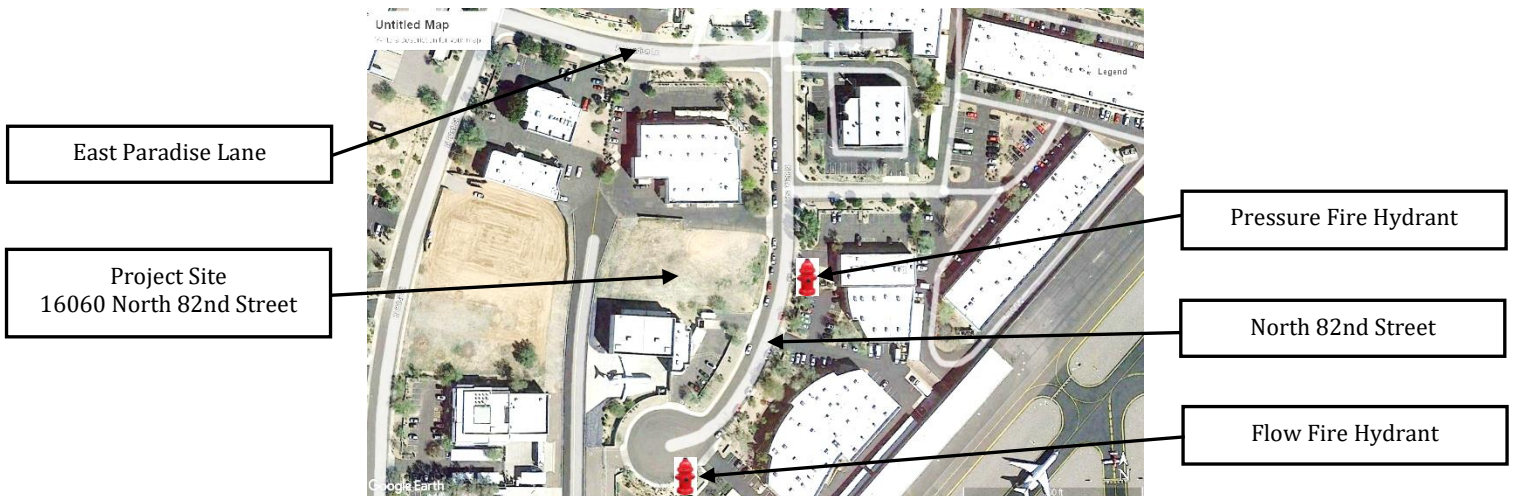
Main size: Not Provided

Flowing GPM: **2,354 GPM**

GPM @ 20 PSI: **5,174 GPM**

### Flow Test Location

North ↑



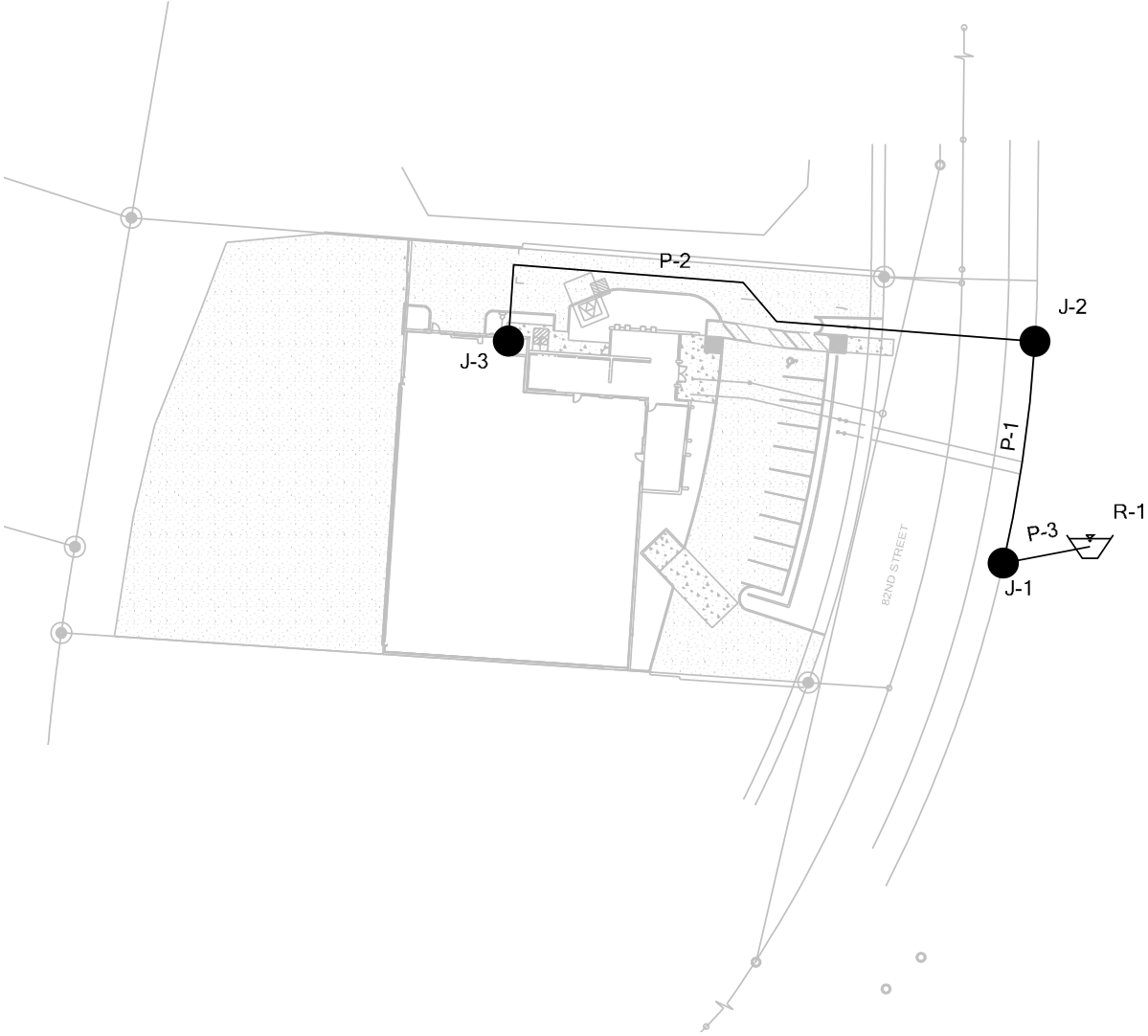


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## **ATTACHMENT 2**

WaterCAD Model

**Scenario: Base**



### Reservoir FlexTable: Average Day Demand

Label	Elevation (ft)	Hydraulic Grade (ft)	Flow (In net) (gpm)	Flow (Out net) (gpm)	Hydraulic Grade Pattern
R-1	1,655.32	1,655.32	-1	1	Fixed

### Junction FlexTable: Average Day Demand

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	1,509.96	0	1,655.32	63
J-2	1,510.82	0	1,655.32	63
J-3	1,511.00	1	1,655.32	62

### Pipe FlexTable: Average Day Demand

Label	Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
P-1	86	J-1	J-2	12.0	PVC	150.0	1	0.00	0.000
P-2	238	J-2	J-3	6.0	PVC	150.0	1	0.01	0.000
P-3	1	R-1	J-1	100.0	PVC	150.0	1	0.00	0.000

### Reservoir FlexTable: Maximum Day Demand

Label	Elevation (ft)	Hydraulic Grade (ft)	Flow (In net) (gpm)	Flow (Out net) (gpm)	Hydraulic Grade Pattern
R-1	1,655.32	1,655.32	-2	2	Fixed

### Junction FlexTable: Maximum Day Demand

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	1,509.96	0	1,655.32	63
J-2	1,510.82	0	1,655.32	63
J-3	1,511.00	2	1,655.32	62

### Pipe FlexTable: Maximum Day Demand

Label	Start Node	Stop Node	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
P-1	J-1	J-2	86	12.0	PVC	150.0	2	0.00	0.000
P-2	J-2	J-3	238	6.0	PVC	150.0	2	0.02	0.001
P-3	R-1	J-1	1	100.0	PVC	150.0	2	0.00	0.000

### Reservoir FlexTable: FF + MDD

Label	Elevation (ft)	Hydraulic Grade (ft)	Flow (In net) (gpm)	Flow (Out net) (gpm)	Hydraulic Grade Pattern
R-1	1,655.32	1,655.32	-1,502	1,502	Fixed

### Junction FlexTable: FF + MDD

Label	Elevation (ft)	Demand (gpm)	Hydraulic Grade (ft)	Pressure (psi)
J-1	1,509.96	0	1,655.32	63
J-2	1,510.82	0	1,654.96	62
J-3	1,511.00	1,502	1,626.23	50

### Pipe FlexTable: FF + MDD

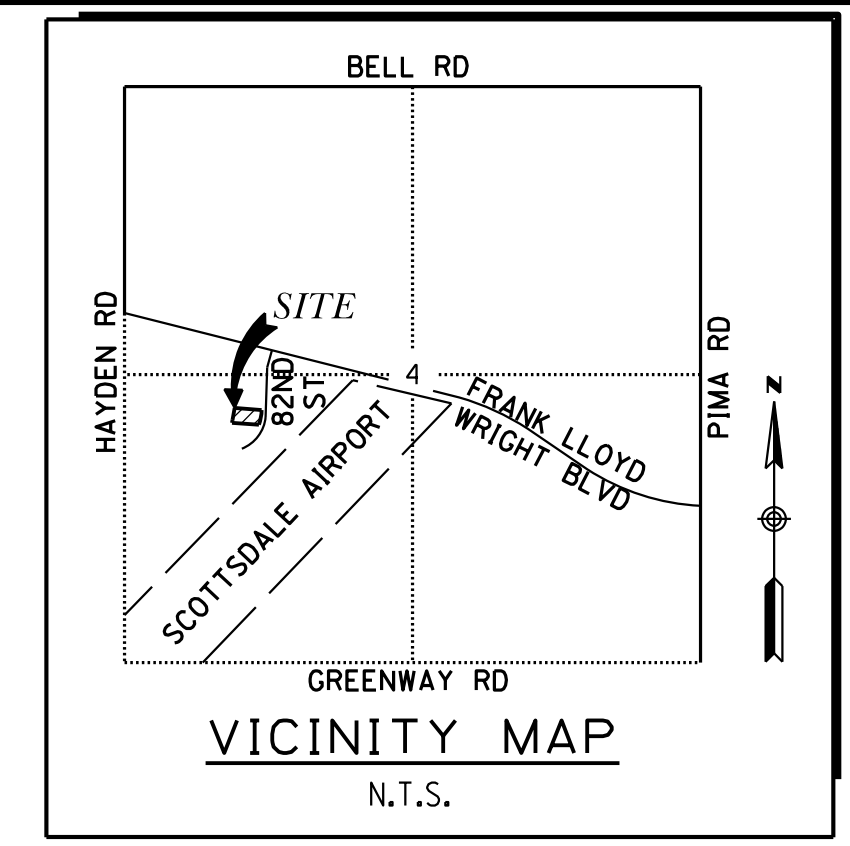
Label	Length (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Velocity (ft/s)	Headloss Gradient (ft/1000ft)
P-1	86	J-1	J-2	12.0	PVC	150.0	1,502	4.26	4.129
P-2	238	J-2	J-3	6.0	PVC	150.0	1,502	17.04	120.801
P-3	1	R-1	J-1	100.0	PVC	150.0	1,502	0.06	0.000



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### **ATTACHMENT 3**

Preliminary Grading & Utility Plan



**KEY ESSENTIALS HANGAR**  
 16060 N. 82ND ST, SCOTTSDALE, AZ 85260  
 PRELIMINARY GRADING & DRAINAGE PLAN

**ENGINEER:**

JMC ENGINEERING, PLLC  
 7315 N 16TH STREET, SUITE 101  
 PHOENIX, AZ 85020  
 CONTACT: JOSEPH M. CIRONE, P.E.  
 PHONE: (602) 374-4148  
 EMAIL: JMCIRONE@JMC-ENG.COM

**ARCHITECT:**

DPA ARCHITECTS, INC  
 3719 N 75TH STREET, SUITE 105  
 SCOTTSDALE, AZ 85251  
 CONTACT: JOHN S. ZAFRAN  
 EMAIL: JSSZAFRAN@DPAARCHITECTS.COM

**ADDRESS:**

16060 N 82ND ST  
 SCOTTSDALE, AZ 85260

**LEGAL DESCRIPTION:**

A PORTION OF THE SOUTHWEST QUARTER OF SECTION 1, TOWNSHIP 3 NORTH, RANGE 4 EAST OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA

**APN NUMBERS:**

215-48-005R

**BASIS OF BEARING:**

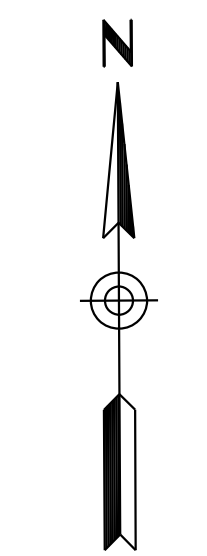
EAST QUARTER CORNER OF SECTION 1, BEING GDACS POINT NUMBER 26006-21 HAVING AN ELEVATION OF 1523.687, NAVD83 DATUM PER THE MCDOT SURVEY DATA SHEET AVAILABLE ONLINE. THE BENCHMARK MONUMENT IS DESCRIBED AS A SET 5/8" RB W/ 2" MARICOPA COUNTY AL CAP FL STAMPED "T3N R4E R5E 1/4 21 2005 RLS 21782".

**LEGEND:**

- PROPERTY LINE
- ROADWAY CENTERLINE
- SAWCUT LINE
- SETBACK LINE
- EASEMENT
- (X) NO. PARKING SPACES
- (H) HANDICAP PARKING
- (C) CONCRETE
- (FH) EXISTING FIRE HYDRANT
- (S.M.H.) EXISTING SEWER MANHOLE
- 8" W (PVC) EXISTING WATER LINE
- 8" S (VCP) EXISTING SEWER LINE
- E EXISTING ELECTRIC LINE
- G EXISTING GAS LINE
- DIRECTION OF FLOW & SLOPE
- P=XX.XX PROPOSED PAVEMENT ELEVATION
- TC=XX.XX PROPOSED TOP OF CURB ELEVATION
- G=XX.XX PROPOSED GUTTER ELEVATION
- C=XX.XX PROPOSED CONCRETE ELEVATION
- FL=XX.XX PROPOSED FLOWLINE ELEVATION
- FF=XX.XX FINISH FLOOR ELEVATION
- GB GRADE BREAK
- (O) PROPOSED UNDERGROUND RETENTION STORAGE TANK
- PROPOSED STORM DRAIN
- (O) PROPOSED STORM DRAIN MANHOLE
- (O) PROPOSED GRATED AREA DRAIN
- (O) PROPOSED ADS NYLOPLAST INLINE DRAIN WITH SOLID COVER
- (O) PROPOSED ROOF DRAIN CLEANOUT
- (O) PROPOSED DRYWELL
- (O) PROPOSED CATCH BASIN
- PROPOSED TRENCH DRAIN
- DRAINAGE AREA DELINEATION
- 1P DRAINAGE AREA ID

**KEY NOTES:**

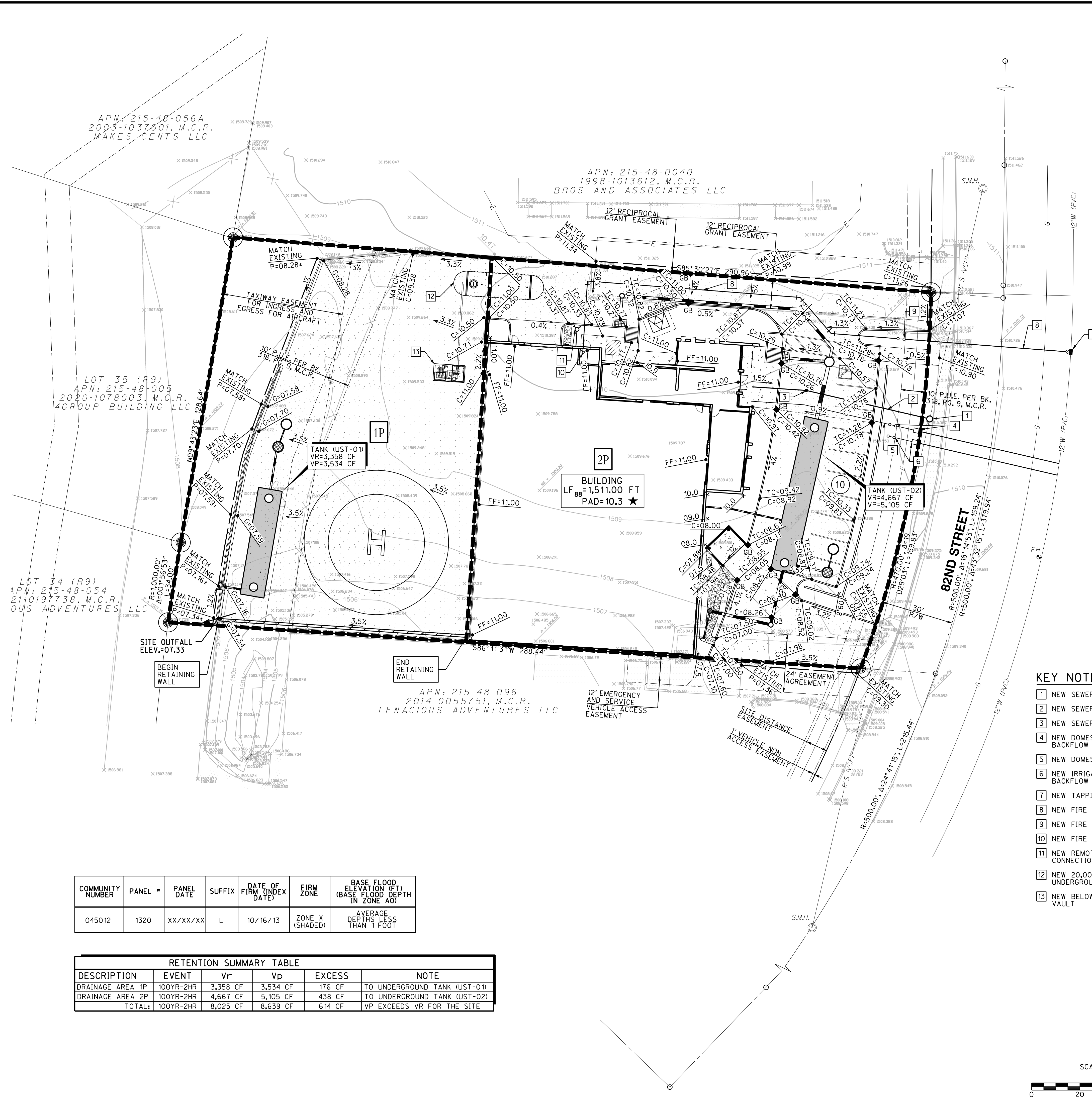
- 1 NEW SEWER MANHOLE
- 2 NEW SEWER SERVICE
- 3 NEW SEWER CLEANOUT
- 4 NEW DOMESTIC WATER METER & BACKFLOW
- 5 NEW DOMESTIC WATER SERVICE
- 6 NEW IRRIGATION METER, SERVICE & BACKFLOW
- 7 NEW TAPPING SLEEVE
- 8 NEW FIRE SERVICE
- 9 NEW FIRE LINE BACKFLOW
- 10 NEW FIRE RISER
- 11 NEW REMOTE FIRE DEPARTMENT CONNECTION (FDC)
- 12 NEW 20,000 GALLON JET-A UNDERGROUND FUEL TANK
- 13 NEW BELOW GROUND EQUIPMENT VAULT



**NOTE:**  
 VERIFY PAD GRADE WITH FINAL BUILDING PLANS



REVISIONS		
NO.	DESCRIPTION	DATE



APN: 215-48-056A  
 2003-1037001, M.C.R.  
 MAKES CENTS LLC

APN: 215-48-0040  
 1998-1013612, M.C.R.  
 BROS AND ASSOCIATES LLC

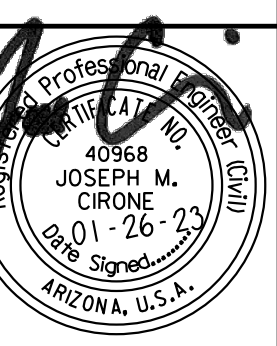
LOT 35 (R9)  
 APN: 215-48-005  
 2020-1078003, M.C.R.  
 4GROUP BUILDING LLC

LOT 34 (R9)  
 APN: 215-48-054  
 21-0197738, M.C.R.  
 OUS ADVENTURES LLC

APN: 215-48-096  
 2014-0055751, M.C.R.  
 TENACIOUS ADVENTURES LLC

COMMUNITY NUMBER	PANEL #	PANEL DATE	SUFFIX	DATE OF FIRM (INDEX DATE)	FIRM ZONE	BASE FLOOD ELEVATION (FT) (BASE FLOOD DEPTH IN ZONE A0)
045012	1320	XX/XX/XX	L	10/16/13	ZONE X (SHADED)	AVERAGE DEPTHS LESS THAN 1 FOOT

RETENTION SUMMARY TABLE						
DESCRIPTION	EVENT	Vr	Vp	EXCESS	NOTE	
DRAINAGE AREA 1P	100YR-2HR	3,358 CF	3,534 CF	176 CF	TO UNDERGROUND TANK (UST-01)	
DRAINAGE AREA 2P	100YR-2HR	4,667 CF	5,105 CF	438 CF	TO UNDERGROUND TANK (UST-02)	
TOTAL:	100YR-2HR	8,025 CF	8,639 CF	614 CF	VP EXCEEDS VR FOR THE SITE	



Expires: 6-30-2025

7315 N 16TH STREET  
 SUITE 101  
 PHOENIX, AZ 85020  
 JMCIRONE@JMC-ENG.COM

**JMC ENGINEERING**  
 DESIGNED: JMC/HFF  
 DRAWN: MJR  
 PROJECT NO: 0140  
 DATE: 26-JAN-2023  
 COPYRIGHT 2023  
 JMC ENGINEERING