



FINAL WATER AND WASTEWATER BASIS OF DESIGN REPORT

FOR

ASHLER HILLS PARK  
SCOTTSDALE, ARIZONA  
51-DR-2021

Prepared For:

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**FINAL Basis of Design Report**

- APPROVED
- APPROVED AS NOTED
- REVISE AND RESUBMIT



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 rrahman DATE 5/16/2022

Prepared By:

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Include the original and all subsequent submittal revision dates.  
DSPM 6-1.202 C



April 2022  
HILGARTWILSON Project No. 2299

**FINAL WATER REPORT  
FOR  
*Ashler Hills Park*  
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**APPENDICES**

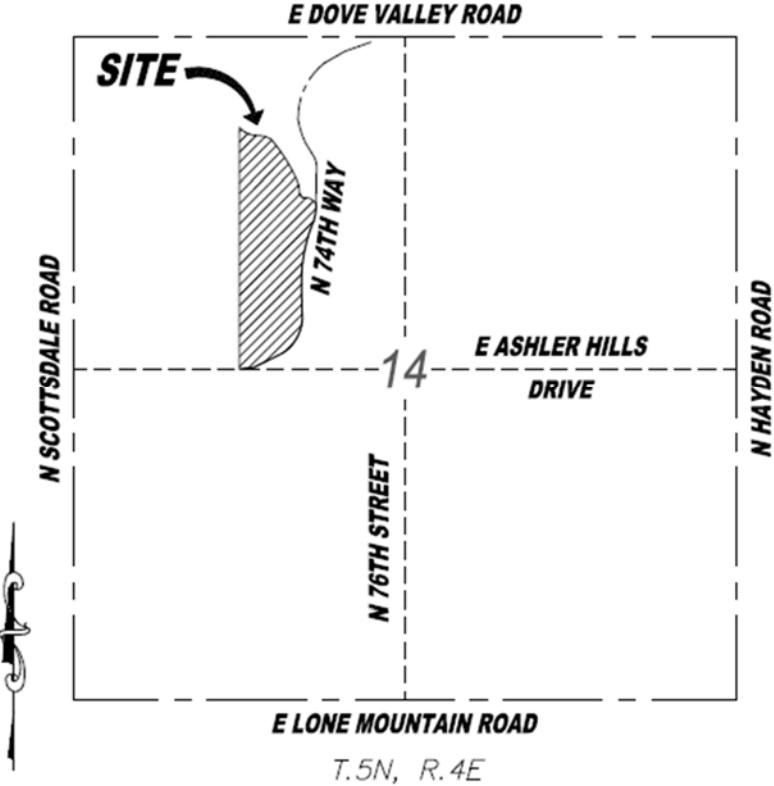
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1.0 INTRODUCTION

1.1 Background and Project Location

The Project is located in Scottsdale, Arizona within a portion of the northwest quarter of Section 14 in Township 5 North, Range 4 East of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. This is within Scottsdale quarter section 56-45. The following Vicinity Map illustrates the location of The Project:



Currently the Project area is undeveloped and consists of open desert. It is bound by a single-family subdivision (Sevano Village) to the north, commercial development to the west, Ashler Hills Drive to the south and 74<sup>th</sup> Way to the east.

1.2 General Description

The Project parcel number is APN 216-51-098 and is an approximate 17.00-acre site that is proposed to be a new neighborhood park. Approximately 14 acres will be developed at this time and the remaining we be left undisturbed. According to the Maricopa County Assessor’s website, this parcel is zoned as R-5. The project will include a public restroom facility, playground area, open turf area, lighted sport courts, shade structures, and an entry feature leading to a parking lot. There will also be associated walkways, trails, security lighting, and irrigation. The site will consist of only one vehicular entrance from the south off North 74<sup>th</sup> Way. There will be an entry bridge

from the parking lot to the park which will allow for pedestrian access over the existing wash.

### 1.3 Purpose of Report

The purpose of this Water and Sewer Basis of Design Report is to identify and evaluate the proposed water and sewer system infrastructure for serving Ashler Hills Park in accordance with the City of Scottsdale Design Standards. This report discusses the existing water and sewer infrastructure within the Project vicinity and identifies anticipated water and sewer demands. It also identifies anticipated water and sewer line sizes and alignments.

## 2.0 DESIGN CRITERIA

### 2.1 Land Use

Ashler Hills Park is categorized as a developed open space park on approximately 17 acres. The developed area of the park is approximately 14 acres with the remain area being left as undeveloped desert.

### 2.2 City of Scottsdale Design Criteria

The water system infrastructure for the project is designed in accordance with the criteria established by the City of Scottsdale Design Standards & Policy Manual, Chapter 6. The sewer system infrastructure is design in accordance with Arizona Administrative Code R18-9-E323, Table 1. A summary of the design criteria is shown in Table 1.

TABLE 1		
WATER DEMAND DESIGN CRITERIA		
Design Criteria	Value	Units
Average Day		
Developed Site Area	14	Acres
Average Day Demand – Developed Open Space Parks	2.49	gallons per minute per acre
Maximum Day		
Maximum Day Peaking Factor	2	peaking factor
Maximum Day Demand	4.98	gallons per minute per acre
Peak Hour		
Peak Hour Factor	3.5	peaking factor
Peak Hour Demand	8.72	gallons per minute per acre
SEWER DEMAND DESIGN CRITERIA		
Design Criteria	Value	Units
Average Day		
Park with picnic and flush toilets only	70	Parking Stalls
Average Day Demand	0.06	gallons per minute per parking stall
Peak Day		
Peak Day Peaking Factor	4.5	peaking factor
Peak Day Demand	0.27	gallons per minute per parking stall

### 3.0 PROPOSED WATER AND SEWER DEMANDS

#### 3.1 Domestic Water Demand Calculations

Anticipated water demands for Ashler Hills Park have been calculated in accordance with the design criteria listed in Table 1. A summary of the total water demands for the Project is presented in Table 2 below.

$$\text{Average Day Demand} = 14 \text{ acres} * 2.49 \frac{\text{gpm}}{\text{acre}} = \mathbf{34.86 \text{ gpm}}$$

$$\text{Maximum Day Demand} = 14 \text{ acres} * 4.98 \frac{\text{gpm}}{\text{acre}} = \mathbf{69.72 \text{ gpm}}$$

$$\text{Peak Hour Demand} = 14 \text{ acres} * 8.72 \frac{\text{gpm}}{\text{acre}} = \mathbf{122.08 \text{ gpm}}$$

TABLE 2			
TOTAL WATER DEMAND SUMMARY			
Land Use	Average Day Demand	Max Day Demand	Peak Hour Demand
	gpm	gpm	gpm
Developed Open Space - Parks	34.86	69.72	122.08

#### 3.2 Fire Demand Calculations

The fire hydrant demand will be provided off from the existing public water system in 74<sup>th</sup> Way. The fire flow demand is estimated based on the area and construction type of the main demanding buildings as follow:

$$\text{Gross Area} = 1550 \text{ ft}^2$$

*Building Type: V- A with NFPA 13 sprinkler system*

*Fire Flow Required = 1500 gpm (2015 IFC and City of Scottsdale Minimum)*

*Total Design Fire Flow = Fire Demand + Max Day Demand*

$$\text{Total Design Flow} = 1500 \text{ gpm} + 69.72 \text{ gpm} = \mathbf{1569.72 \text{ gpm}}$$

### 3.3 Sewer Demand Calculations

Anticipated sewer demands for Ashler Hills Park have been calculated in accordance with the design criteria listed in Table 1. A summary of the total sewer demands for the Project is presented in Table 3 below.

$$\text{Average Daily Flow} = 70 \text{ parking stalls} * 0.06 \frac{\text{gpm}}{\text{Parking stall}} = 4.2 \text{ gpm} = 0.0112 \text{ cfs}$$

$$\text{Peak Daily Flow} = 70 \text{ parking stalls} * 0.27 \frac{\text{gpm}}{\text{Parking stall}} = 18.9 \text{ gpm} = 0.0506 \text{ cfs}$$

TABLE 3 TOTAL SEWER DEMAND SUMMARY				
Land Use	Average Day Demand		Peak Hour Demand	
	gpm	cfs	gpm	cfs
Developed Open Space - Parks	4.2	0.0112	18.9	0.0506

Manning's Formula (assumed 6" pipe(private sewer service) flowing full at 1% slope)

#### Capacity

$$Q = \frac{1.49}{n} * R^{\frac{2}{3}} * S^{\frac{1}{2}} * A$$

Where,

$$Q = \text{flow rate} \left( \frac{\text{ft}^3}{\text{second}} \right)$$

$$n = \text{roughness coefficient} = 0.013$$

$$R = \text{hydraulic radius} = 0.125 \text{ ft}$$

$$S = \text{slope} = 0.01 \frac{\text{ft}}{\text{ft}}$$

$$A = \text{flow area} = 0.1936 \text{ ft}^2$$

$$Q = \frac{1.49}{0.013} * 0.125^{\frac{2}{3}} * 0.01^{\frac{1}{2}} * 0.1936 = 0.5626 \frac{\text{ft}^3}{\text{s}}$$

#### Velocity

$$V = \frac{1.49}{n} * R^{\frac{2}{3}} * S^{\frac{1}{2}}$$

$$V = \frac{1.49}{0.013} * 0.125^{\frac{2}{3}} * 0.01^{\frac{1}{2}} = 2.86 \frac{\text{ft}}{\text{s}}$$

$$V = \frac{1.49}{0.013} * 0.125^{\frac{2}{3}} * 0.01^{\frac{1}{2}} = 2.86 \frac{\text{ft}}{\text{s}}$$

Capacity Check

0.0506 per Table 3

$$Q_{required} = 0.01996 \frac{ft^3}{s}$$
$$Q_{provided} = 0.5626 \frac{ft^3}{s}$$

$Q_{provided} > Q_{required}$  , so the proposed 6" private system has capacity

#### 4.0 WATER SYSTEM INFRASTRUCTURE

Shall be reduced pressure principle backflow preventer per SRC Section 49-62.

##### 4.1 Existing Water System Infrastructure

Existing water infrastructure in the Project vicinity includes an 8" DIP water main adjacent to the south and east sides of the site along N 74<sup>th</sup> Way. There is also a 12" DIP water main that exists west of the site that serves the neighboring commercial plaza. There are no water lines that run within the bounds of the Property, according to the Water and Sewer QS Map 56-45 provided by the City of Scottsdale

##### 4.2 Proposed Water System Improvements

As shown in Appendix A, the project will consist of a single water service line coming from the existing 8" public water main on 74<sup>th</sup> Way connecting directly to the restroom building. The restroom is the only building on the site that will require water service. This line will be private and will not require any easements. A water meter and backflow prevention system will be installed with the water service line. We anticipate needing a 1" meter however final sizing will be done by the plumbing engineer at final design stage. In addition we anticipated the need for a 2" landscape water service to service the park landscape water needs. This service will be installed adjacent to the domestic water service in order to limit the amount of street cuts. See Appendix A for Preliminary Utility Plan.

A flow test was conducted on October 21, 2021 by EJ Flow Testing. The flow test resulted in 3,065 gpm of available flow at 20 psi. Based on a 10% safety factor resulted in a residual pressure of 37 psi at 1,501 gpm. See Appendix B for Fire Flow Results.

The development is only proposing water service connection therefore a model was not prepared. We have provided calculated the available pressure at the service connection based on the demand. This was done based on the fire flow test results using the 10% safety factor. The result can be found in Appendix B and the summary of the result is as follows:

Average Day Demand of 34.86 gpm = Residual Pressure of 46.99 psi

Max Day Demand of 69.72 gpm = Residual Pressure of 46.96 psi

Peak Hour Demand of 122.08 gpm = Residual Pressure of 46.90 psi

Fire Flow + Max Day Demand of 1569.72 gpm = Residual Pressure of 36.17 psi

## 5.0 SEWER SYSTEM INFRASTRUCTURE

### 5.1 Existing Sewer System Infrastructure

Existing sewer infrastructure in the Project vicinity includes an existing 8" PVC public sewer main within 74<sup>th</sup> Way that runs adjacent to the south and east borders of the site. There does not appear to be any sewer services within the site, according to the Water and Sewer QS Map 56-45 provided by the City of Scottsdale. See Appendix A for Water and Sewer QS Map 56-45.

### 5.2 Proposed Sewer System Improvements

As shown in Appendix A, the project will consist of a single 6" private sewer service line. This service will tie into the existing 8" public sewer line on 74<sup>th</sup> Way via a new manhole. It will connect directly to the restroom building. Since the rim of the proposed manhole at the tap-in location is higher compared to the finished floor of the restroom, a backwater valve will be required to be installed in an onsite sewer manhole. We looked at an alternative route to avoid a backwater valve. This route would have required crossing the 404 wash to the south. In setting the sewer pipe at the minimum required depth for scour the sewer would have been below the connection to the public sewer. This would have required an ejector pump at the south end of the site. In addition to the high cost of this route an Army Corp Nationwide Permit for the sewer crossing the wash would have been required. Based on these factors we were directed to go with the gravity connection to the east even though a backwater valve will be required. See Appendix A for Preliminary Utility Plan.

## 6.0 REFERENCES

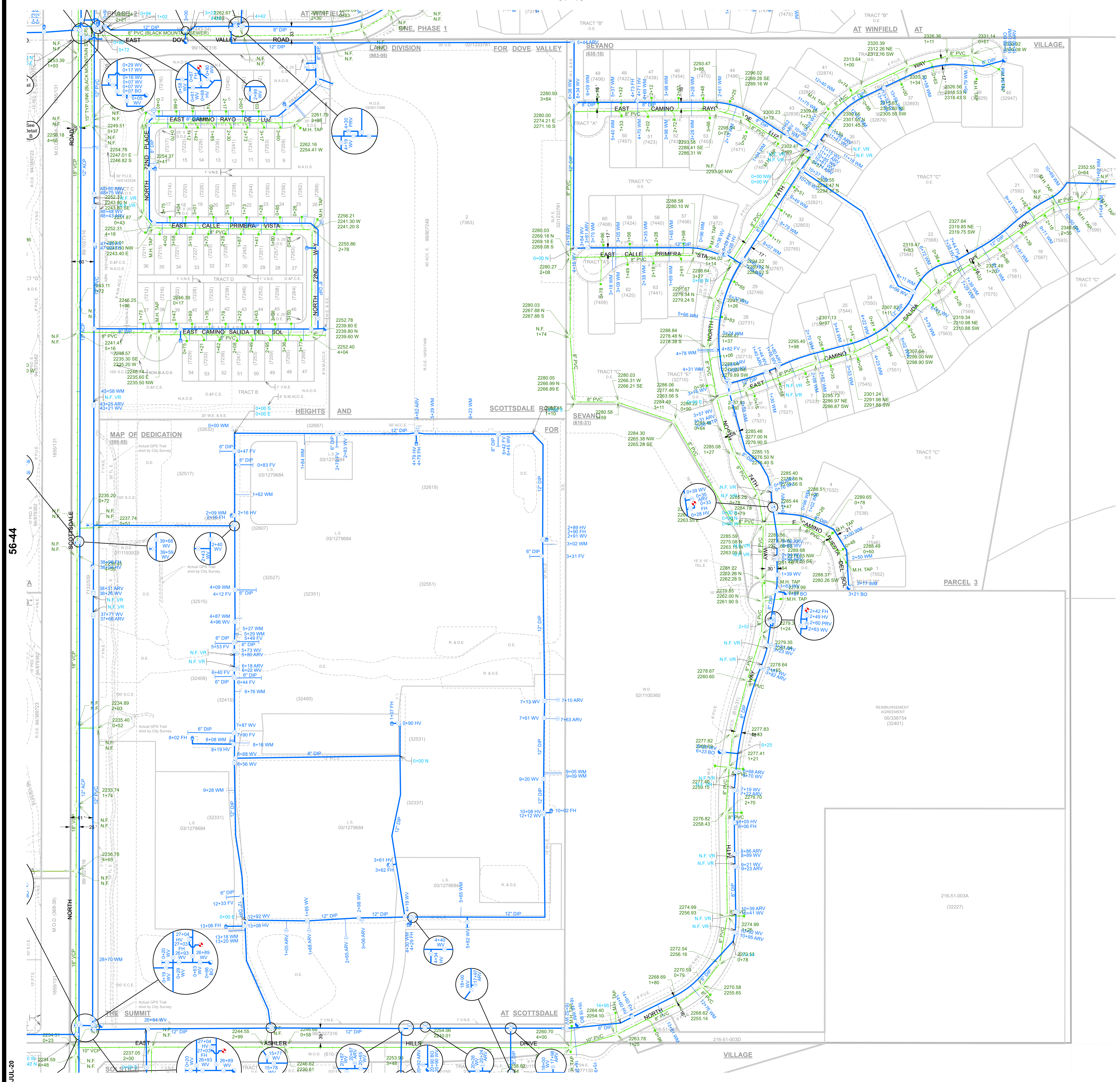
City of Scottsdale Engineering Department (2021). Design Standards & Procedures Manual.

2015 International Fire Code, Appendix B, Fire-Flow Requirements for Building



## APPENDIX A

### QS MAP AND PRELIMINARY UTILITY PLAN

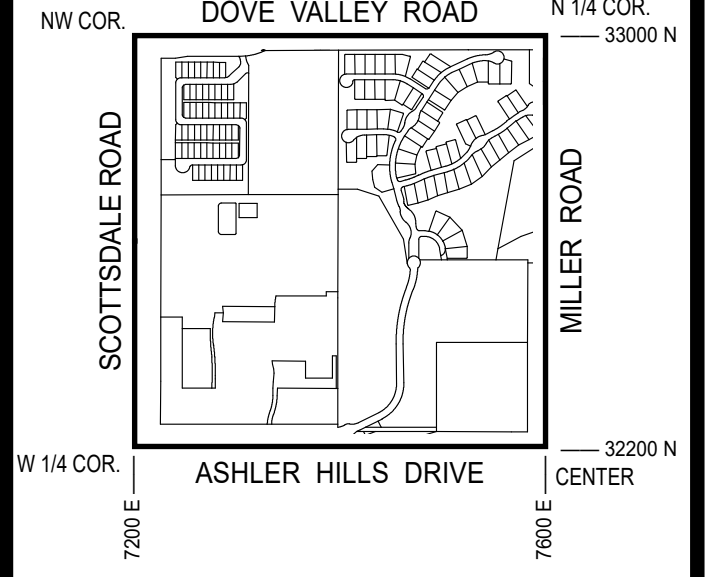


**GENERAL NOTES:**  
 \* THIS IS A COMPUTER GENERATED DRAWING. FOR ANY REVISIONS PLEASE CONTACT THE CITY OF SCOTTSDALE GIS DEPARTMENT AT (480) 312-7792.  
 \* THE SECTION LINE BEARING AND DISTANCES ARE BASED ON THE CITY OF SCOTTSDALE GPS SURVEY OF SEPTEMBER, 1991. BEARINGS ARE NAD 83 GRID AND DISTANCES ARE FLATTENED TO GROUND. WHERE NO CORNER WAS FOUND THE DIMENSIONS ARE GIVEN TO CALCULATED SECTION CORNERS AND ARE NOTED AS 'CALCULATED' ON THE MAP.

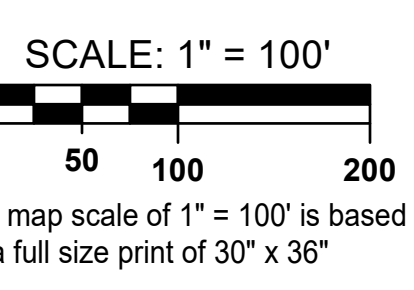
**LEGEND:**

- Water Valve
- Non-potable Water Valve
- Fire Hydrant
- Water Blowoff
- Water Main Reducer
- Water Sample Station
- Water Air Release Valve
- Non-potable Water Air Release Valve
- Water Pressure Reducing Valve
- Water Vault
- Water Manhole
- Non-Potable Water Manhole
- Water Pump
- Water Main
- Non-Potable Water Main
- Fire Line
- Water Service
- Non-Scottsdale Water Main
- Sewer Manhole
- Sewer Cleanout
- Sewer Lift Station
- Sewer Treatment Plant
- Sewer Main - Gravity
- Sewer Main - Force
- Non-Scottsdale Sewer Main
- Sewer Service

**VICINITY MAP**



**NORTH**



**WATER & SEWER**  
 QUARTER SECTION MAP  
**56-45**  
 NW 1/4 SEC. 14 T5N R4E

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 THE CITY OF SCOTTSDALE

56-44

56-46

26-JUL-20

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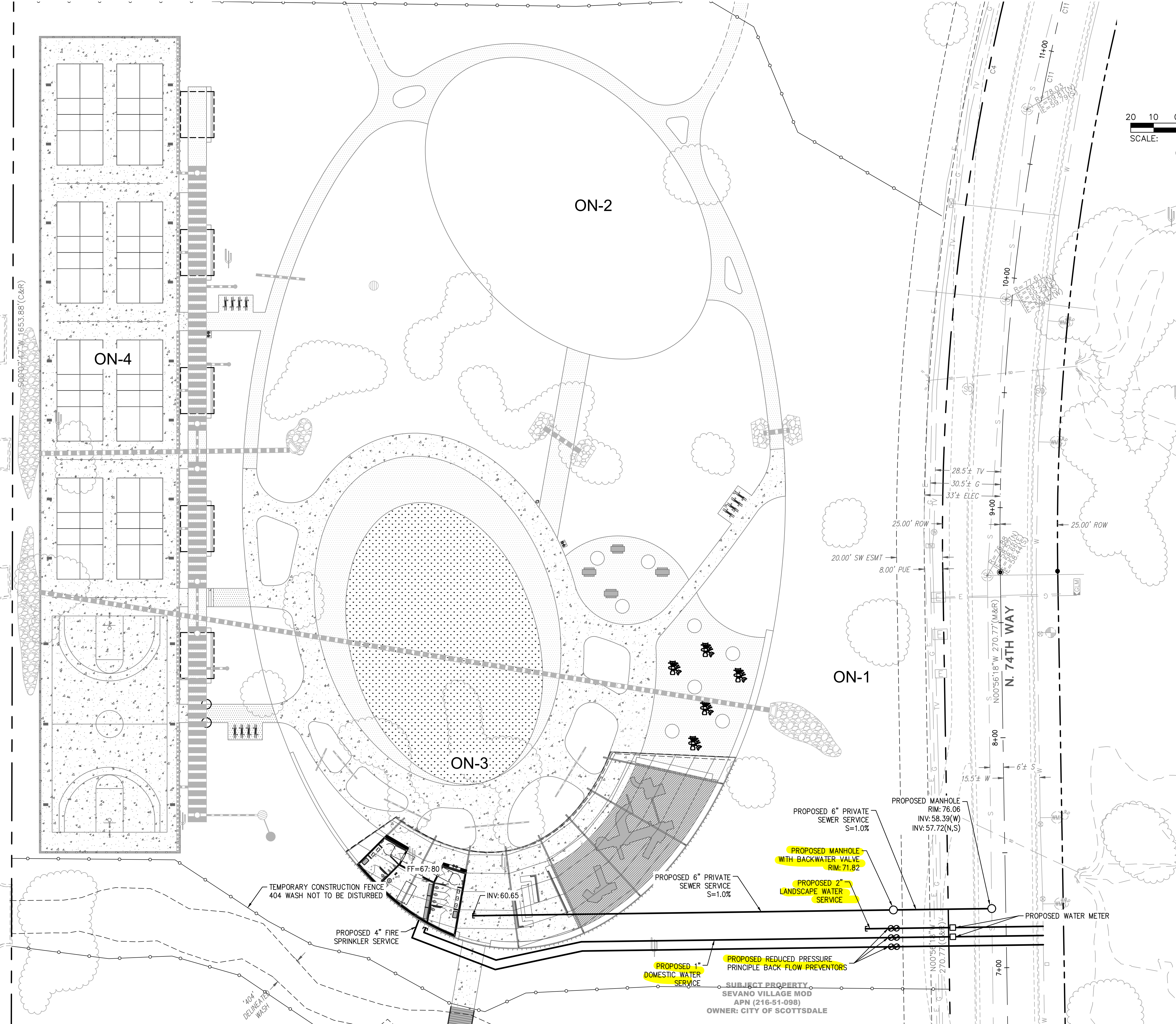
APN (216-51-0908)  
OWNER: TARGET CORPORATION  
NOT A PART

MH

AX

MH

MH



**FLOOR**  
associates

1425 N. First Street  
Second Floor  
Phoenix, AZ 85004

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602.462.1427 F

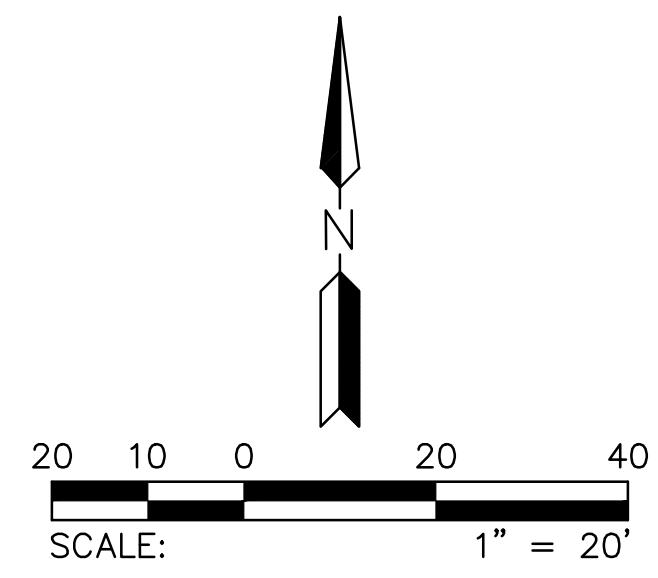
OWNER  
CITY OF SCOTTSDALE  
CONTACT: BRAD WALLDORF, PE  
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**HILGARTWILSON**

CERTIFICATION

LESLIE J. KLAND  
31695  
ARIZONA PROFESSIONAL ENGINEER



**ASHLER HILLS PARK**  
ASHLER HILLS DRIVE & NORTH 74TH WAY  
SCOTTSDALE, ARIZONA

PROJECT NO.	20027	
DRAWN BY	ME	
CHECKED BY	JK	
SUBMITTAL NO.	DATE	ISSUED FOR
	4.6.2022	DRB

ISSUED FOR  
**DEVELOPMENT REVIEW BOARD**

SHEET TITLE  
**C2.0**



**APPENDIX B**  
**FIRE FLOW TEST RESULTS**



# Flow Test Summary

Project Name: EJFT 21440 - Ashler Hills Park  
Project Address: Ashler Hills Road and 74th Way, Scottsdale, AZ 85266  
Date of Flow Test: 2021-10-21  
Time of Flow Test: 8:50 AM  
Data Reliable Until: 2022-04-21  
Conducted By: Steven S., Eder C. & Caleb C. (EJ Flow Tests) 602.999.7637  
Witnessed By: Tyler Bishop (City of Scottsdale) 480.276.6658  
City Forces Contacted: City of Scottsdale (480.276.6658)

## Raw Flow Test Data

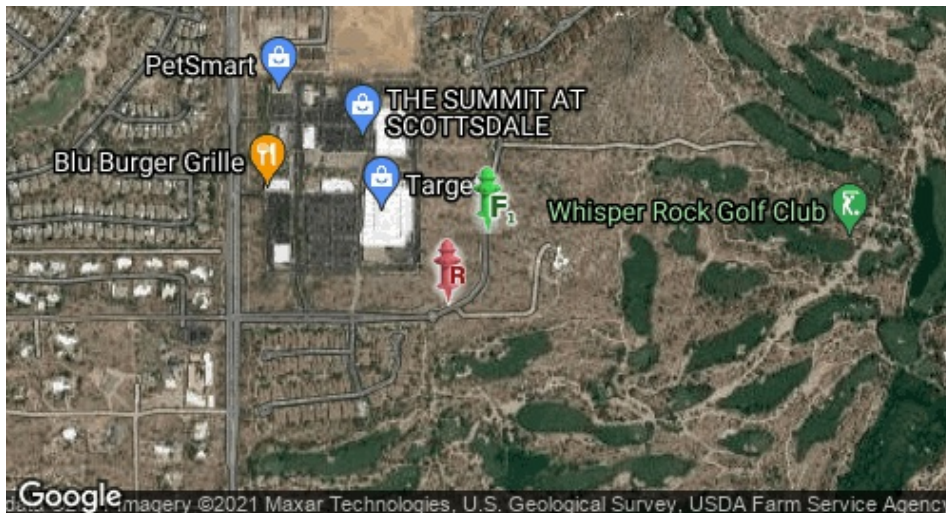
Static Pressure: 50.0 PSI  
Residual Pressure: 42.0 PSI  
Flowing GPM: 1,501  
GPM @ 20 PSI: 3,065


## Data with a 10 % Safety Factor

Static Pressure: 45.0 PSI  
Residual Pressure: 37.0 PSI  
Flowing GPM: 1,501  
GPM @ 20 PSI: 2,778

## Hydrant F<sub>1</sub>

Pitot Pressure (1): 20 PSI  
Coefficient of Discharge (1): 0.9  
Hydrant Orifice Diameter (1): 2.5 inches  
Pitot Pressure (2): 20 PSI  
Coefficient of Discharge (2): 0.9  
Hydrant Orifice Diameter (2): 2.5 inches



 Static-Residual Hydrant

 Flow Hydrant

Distance Between F<sub>1</sub> and R  
574 ft (measured linearly)

Static-Residual Elevation  
2267 ft (above sea level)

Flow Hydrant (F<sub>1</sub>) Elevation  
2277 ft (above sea level)

Elevation & distance values are approximate

## Static-Residual Hydrant



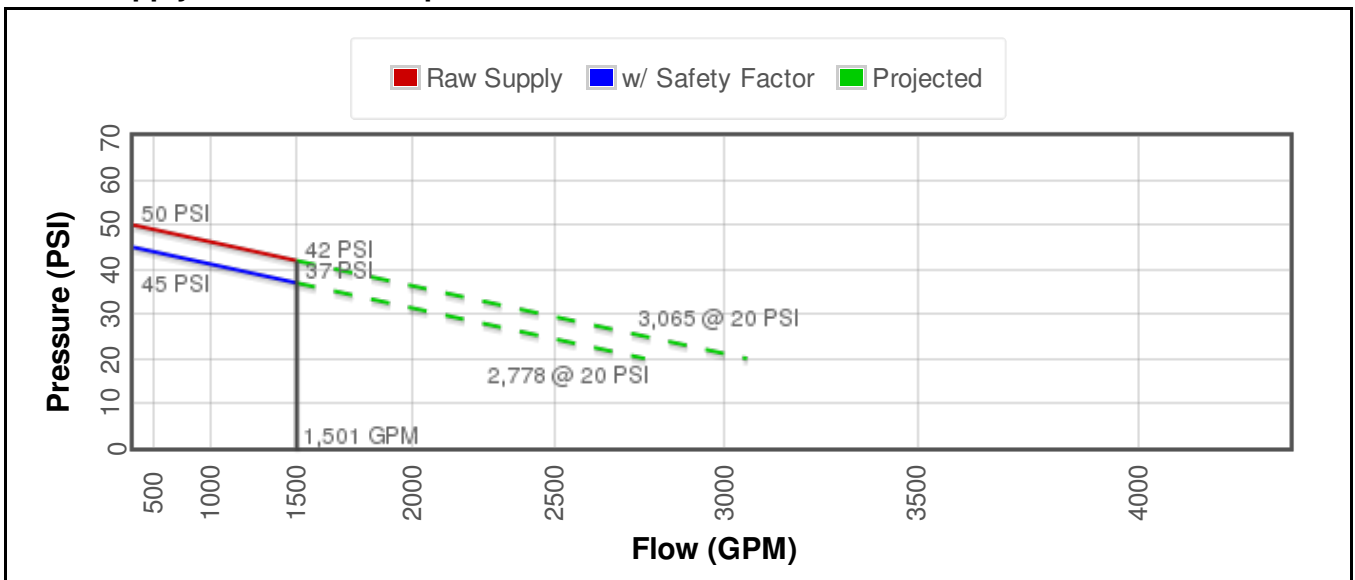
## Flow Hydrant (only hydrant F1 shown for clarity)



## Approximate Project Site



## Water Supply Curve N<sup>1.85</sup> Graph



# Average Day Demand

- [PACKAGED ENCLOSURES](#)
- [PUMPS](#)
- [APPS](#)
- [BLOG](#)
- [CONTACT](#)



## Logarithmic Graph of Water Supply

Summary: This app provides a  $N^{1.85}$  logarithmic graph based on NFPA 291 recommendations. We also offer a blank PDF logarithmic flow test sheet.

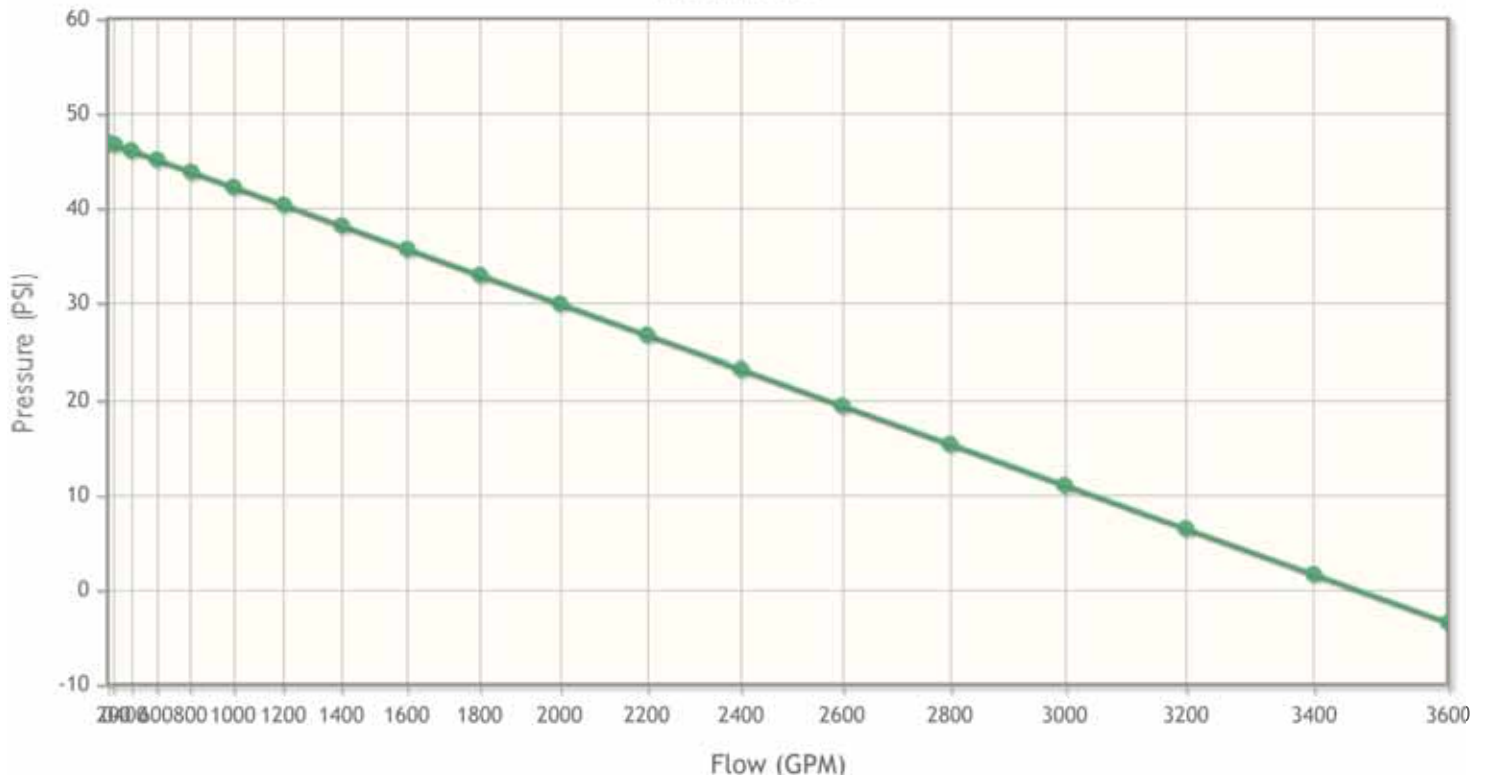
## Graph Points

47	Static Pressure
37	Residual Pressure
1501	Residual Flow

## Data Points

Flow	Pressure
34.86	46.991

Flow Test



# Max Day Demand

- [PACKAGED ENCLOSURES](#)
- [PUMPS](#)
- [APPS](#)
- [BLOG](#)
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## Logarithmic Graph of Water Supply

Summary: This app provides a  $N^{1.85}$  logarithmic graph based on NFPA 291 recommendations. We also offer a blank PDF logarithmic flow test sheet.

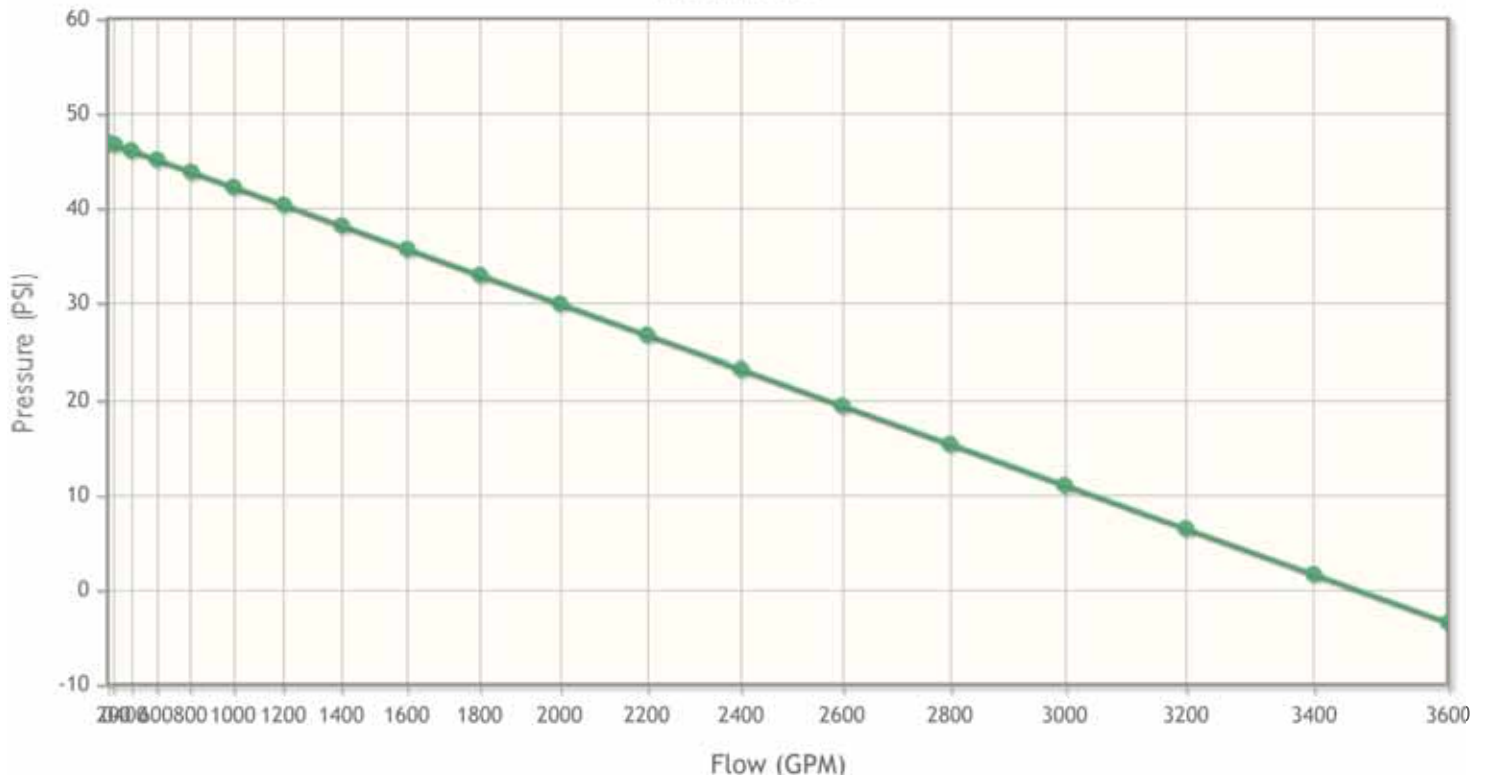
## Graph Points

- 47 Static Pressure
- 37 Residual Pressure
- 1501 Residual Flow

## Data Points

Flow	Pressure
69.72	46.966

Flow Test





# Peak Hour Demand

- [PACKAGED ENCLOSURES](#)
- [PUMPS](#)
- [APPS](#)
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## Logarithmic Graph of Water Supply

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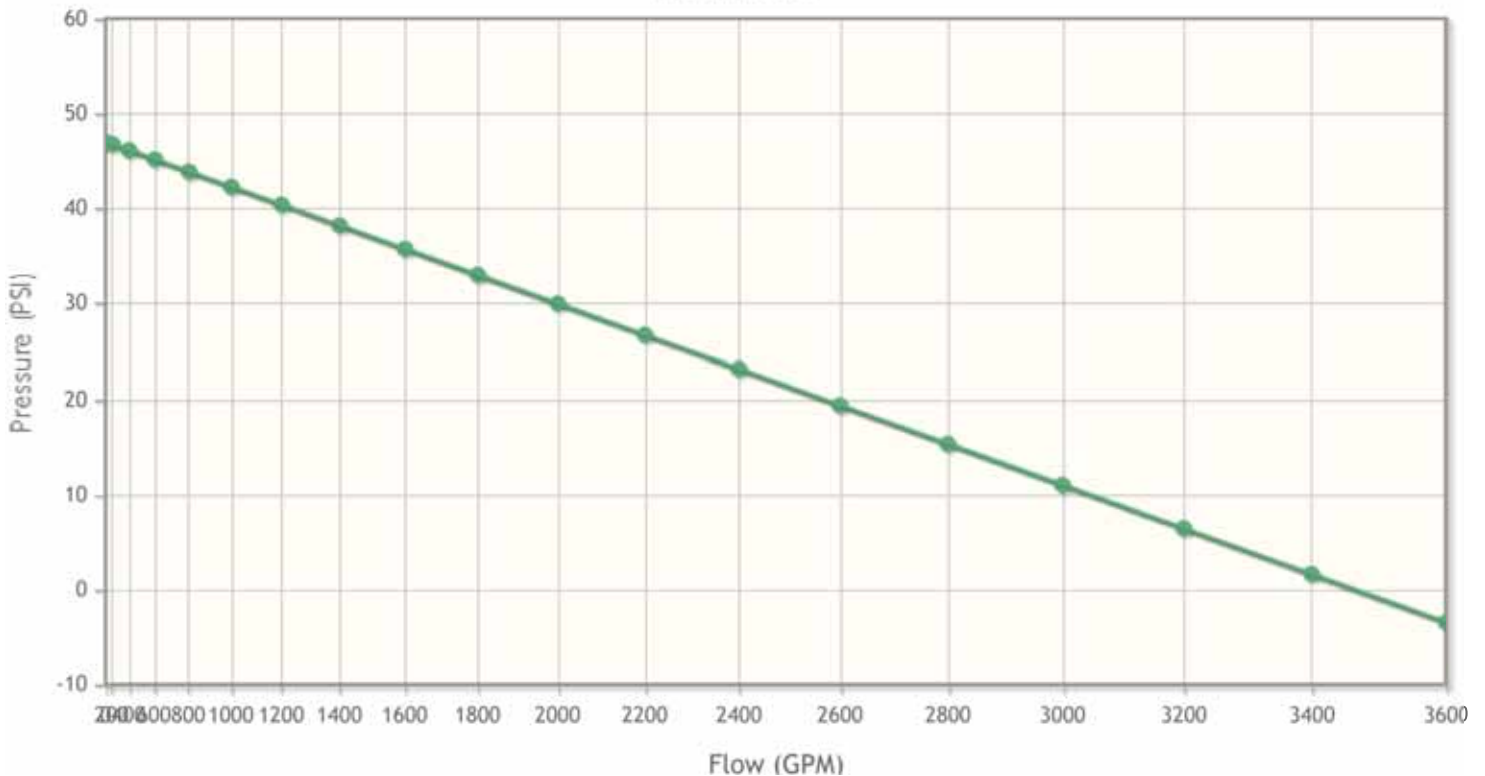
## Graph Points

47	Static Pressure
37	Residual Pressure
1501	Residual Flow

## Data Points

Flow	Pressure
122.08	46.904

Flow Test



# Fire Flow + Max Day Demand

- [PACKAGED ENCLOSURES](#)
- [PUMPS](#)
- [APPS](#)
- [BLOG](#)
- [CONTACT](#)



## Logarithmic Graph of Water Supply

Summary: This app provides a  $N^{1.85}$  logarithmic graph based on NFPA 291 recommendations. We also offer a blank PDF logarithmic flow test sheet.

## Graph Points

47	Static Pressure
37	Residual Pressure
1501	Residual Flow

## Data Points

Flow	Pressure
1569.72	36.137

Flow Test

