

**Water Final Basis of Design Report  
For  
101 & Princess Dr.  
NWC of Princess Drive and 101 Freeway  
Scottsdale, Arizona 85255**



**November 2024**

- 1<sup>st</sup> Zoning Submittal 1/15/24
- 2<sup>nd</sup> Zoning Submittal 4/29/24
- 1<sup>st</sup> DRB Submittal 4/29/24
- 3<sup>rd</sup> Zoning Submittal 7/29/24
- 2<sup>nd</sup> DRB Submittal 8/7/24

**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.

Prepared by:  
**Hunter Engineering, Inc.**  
**10450 North 74<sup>th</sup> Street, #200**  
**Scottsdale, AZ 85258**

BY rrahman

DATE 12/20/2024

WATER FINAL BASIS OF DESIGN REPORT  
FOR  
**101 & PRINCESS DR.**  
NWC OF PRINCESS DRIVE AND 101 FREEWAY  
SCOTTSDALE, ARIZONA 85255

PREPARED FOR

LGE DESIGN BUILD  
1200 NORTH 52<sup>ND</sup> STREET  
PHOENIX, AZ 85008

PREPARED BY

LARRY TALBOTT  
HUNTER ENGINEERING, INC.  
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SCOTTSDALE, AZ 85258  
(480) 991-3985

H.E. PROJECT NO. LGEC319

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## 1.0 INTRODUCTION

This water design report has been prepared under a contract from LGE Design Build, developer of the 101 & Princess Dr. 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 (Reference)*.

This development project is located along the west side of the Loop 101 Freeway just north of Princess Drive within the City of Scottsdale, Maricopa County, Arizona. The proposed project is currently four undeveloped parcels within the Perimeter Center master development.

The existing parcel is bound by existing commercial developments to the north and west, Princess Drive to the south and the Loop 101 Freeway to the east. The site is specifically located in the east half of section 36, Township 4 North, Range 4 East, of the Gila and Salt River Base and Meridian. 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 85<sup>th</sup> Street, St. John Road and the existing private drive for the existing hotel along the southwestern property boundary.

The development proposes the construction of four new distribution buildings. Site improvements will include construction of driveway entrances, a parking lot, sidewalk/hardscape, landscape areas, and supporting infrastructure including new storm water drainage system, water, sewer and fire line service. The overall project site is approximately 17 acres.

## 2.0 EXISTING CONDITIONS

The site is located in Pressure Zone 4. There is an existing 8" DIP water main along the west side of 85<sup>th</sup> Street, the north side of St. John Road and the north side of Princess Road adjacent to the site. The existing mains in 85<sup>th</sup> Street and St. John Road are available for service.

## 3.0 PROPOSED WATER DISTRIBUTION SYSTEM

A new public 8" waterline will be looped through the site within a public waterline easement. Domestic, landscape and fire services will be taken from the new public water line loop. See the Concept Utility Plans in Appendix A.

It is anticipated the proposed speculative buildings will be distribution use with two tenants and two small office components for each building. The preliminary floor plans estimated the building office areas for parking calculations based on the building configurations. Those office square footages were used for these flow calculations. The maximum allowed office area for the entire project is 20,000sf, therefore it is anticipated that each building will have around 5,000sf of office per building. Each building could have two tenants each with an estimated 2,500sf

office. The actual office areas may vary with the future the total office area being spread throughout the site as needed.

Per Figure 6-1.2 Average Day Demands in the City of Scottsdale *Design Standards & Policies Manual* a demand of 0.000834 gallons per minute per building square feet was used for the proposed office component in each building.

The distribution use in Scottsdale is considered warehouse which is considered storage to be analyzed as a commercial use for water demands. However, the site is zoned industrial and the distribution use would never generate anywhere near a commercial or retail use. For example, it is anticipated that each tenant would need four single stall bathrooms totaling eight single stall bathrooms per building. Therefore, the distribution portion of the site will be analyzed as an industrial use so the water demands more accurately reflect the anticipated use demands.

Per Figure 6-1.2 Average Day Demands in the City of Scottsdale *Design Standards & Policies Manual* a demand of 1.44 gallons per minute per acre were used for proposed industrial site. The existing four parcels will be combined into a single parcel. Therefore, there are no parcels to delineate the site acreage for the individual building domestic demands. Acreages were assumed for each building based upon the center of the drives and truck courts for modeling purposes.

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 largest proposed Buildings is 101,772 square feet and will be type V-B construction. Per the 2021 International Fire Code, the minimum base fire flow rate for a building of this size and construction type is 8,000 gallons per minute (GPM). Because this building will be protected by an approved sprinkler system, per NFPA 13, the required fire flow may be 25% of the table value, but not below 1,500 GPM. A fire flow of 2,000 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.

A fire flow test was completed on October 30<sup>th</sup>, 2023 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 were added to the model near the flow test locations to simulate pressure versus flow curve. Both hydrant tests were adjusted per the City of Scottsdale requirements. 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 2,000 gpm is taken from the hydrant noted on the city review comments between Buildings A and B. The lowest resultant pressure based upon the

required fire flow and the max day demand was calculated to be 50.59 psi. This is above the 30-psi fire flow minimum pressure. The resultant pressure for the peak flow is 62.60 psi and is greater than the minimum peak flow pressure of 50 psi. Results and data from the WaterCAD are shown in Appendix B.

#### **4.0 CONCLUSIONS**

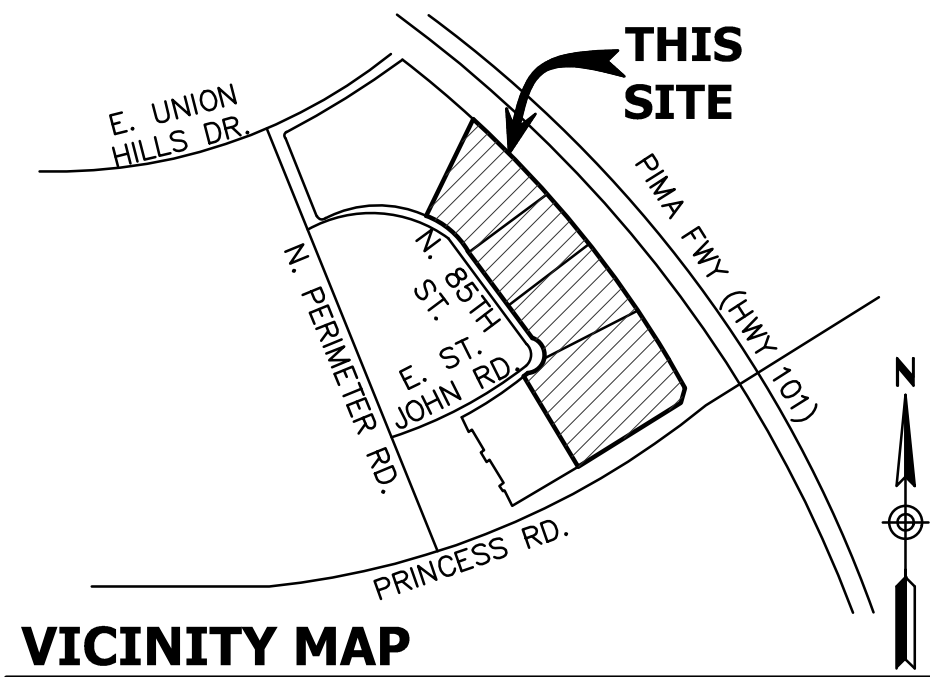
Based on the results of this study, it can be concluded that:

- The existing public water system is adequate to support this development and the existing adjacent church site to the south.

#### **5.0 REFERENCES**

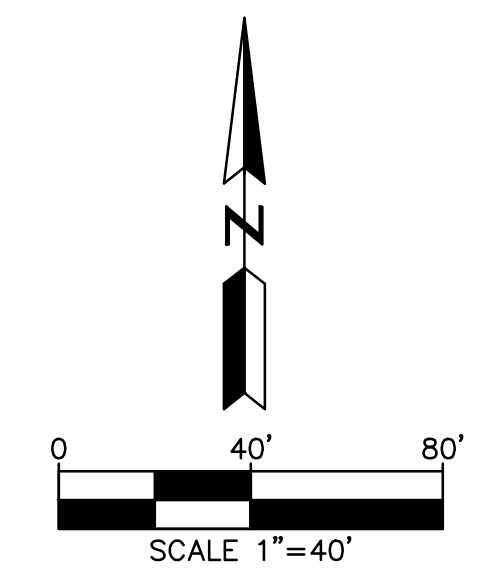
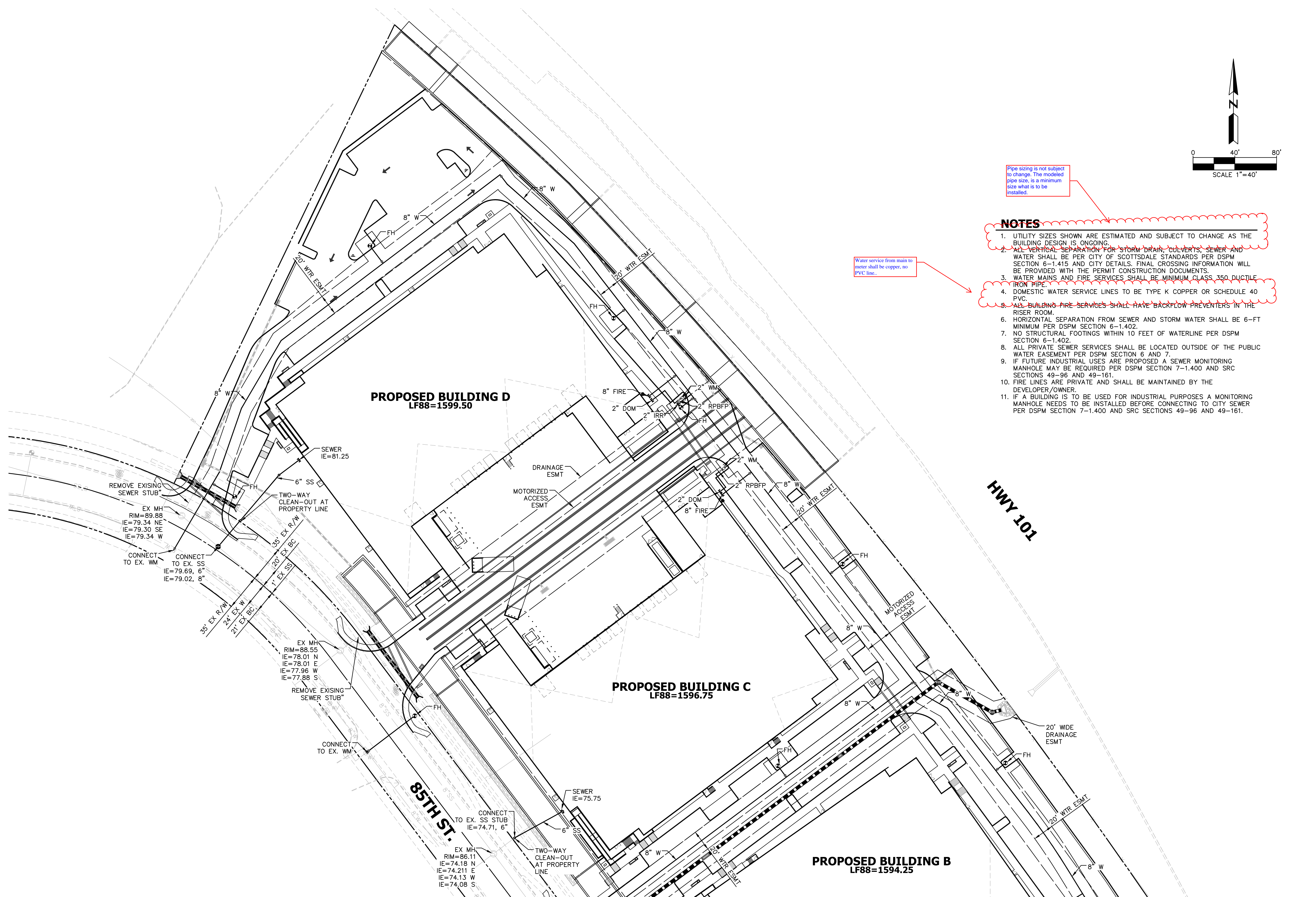
- 1) City of Scottsdale Design Standard & Policies Manual, January 2018.

**APPENDIX A**  
**FIGURES**



**VICINITY MAP**

**VICINITY MAP  
FIGURE 1**



Pipe sizing is not subject to change. The modeled pipe size, is a minimum size what is to be installed.

Water service from main to meter shall be copper, no PVC line.

**NOTES**

1. UTILITY SIZES SHOWN ARE ESTIMATED AND SUBJECT TO CHANGE AS THE BUILDING DESIGN IS ONGOING.
2. ALL VERTICAL SEPARATION FOR STORM DRAIN, CULVERTS, SEWER AND WATER SHALL BE PER CITY OF SCOTTSDALE STANDARDS PER DSPM SECTION 6-1.415 AND CITY DETAILS. FINAL CROSSING INFORMATION WILL BE PROVIDED WITH THE PERMIT CONSTRUCTION DOCUMENTS.
3. WATER MAINS AND FIRE SERVICES SHALL BE MINIMUM CLASS 350 DUCTILE IRON PIPE.
4. DOMESTIC WATER SERVICE LINES TO BE TYPE K COPPER OR SCHEDULE 40 PVC.
5. ALL BUILDING FIRE SERVICES SHALL HAVE BACKFLOW PREVENTERS IN THE RISER ROOM.
6. HORIZONTAL SEPARATION FROM SEWER AND STORM WATER SHALL BE 6-FT MINIMUM PER DSPM SECTION 6-1.402.
7. NO STRUCTURAL FOOTINGS WITHIN 10 FEET OF WATERLINE PER DSPM SECTION 6-1.402.
8. ALL PRIVATE SEWER SERVICES SHALL BE LOCATED OUTSIDE OF THE PUBLIC WATER EASEMENT PER DSPM SECTION 6 AND 7.
9. IF FUTURE INDUSTRIAL USES ARE PROPOSED A SEWER MONITORING MANHOLE MAY BE REQUIRED PER DSPM SECTION 7-1.400 AND SRC SECTIONS 49-96 AND 49-161.
10. FIRE LINES ARE PRIVATE AND SHALL BE MAINTAINED BY THE DEVELOPER/OWNER.
11. IF A BUILDING IS TO BE USED FOR INDUSTRIAL PURPOSES A MONITORING MANHOLE NEEDS TO BE INSTALLED BEFORE CONNECTING TO CITY SEWER PER DSPM SECTION 7-1.400 AND SRC SECTIONS 49-96 AND 49-161.

NO.	DATE	REVISION	BY

DESIGN BY: LT  
DRAWN BY: DC  
CHECKED BY: LT

**HUNTER**  
ENGINEERING  
CIVIL AND SURVEY  
10446 NORTH 74TH STREET  
SUITE 140  
SCOTTSDALE, AZ 85258  
P 480 991 3985



**CONCEPTUAL UTILITY PLAN  
FOR  
THE LOOP PERIMETER CENTER  
101 AND PRINCESS  
SCOTTSDALE ARIZONA**



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

**PROJECT NAME:**  
THE LOOP PERIMETER CENTER

HE NO.: LGEC319  
SCALE: 1"=40'

SHEET:  
**C4**

MATCH LINE SEE SHEET C5

MATCH LINE SEE SHEET C4

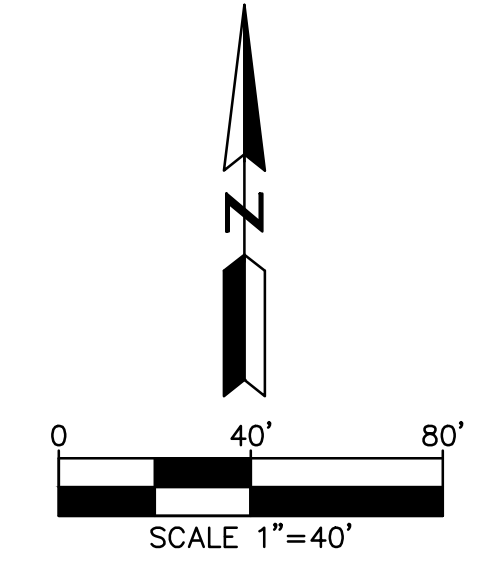
PROPOSED BUILDING B  
LF88=1594.25

PROPOSED BUILDING A  
LF88=1590.50

ST. JOHN RD.

HWY 101

PRINCESS DR.



NO.	DATE	REVISION	BY

DESIGN BY: LT  
DRAWN BY: LC  
CHECKED BY: LT

**HUNTER**  
ENGINEERING  
10446 NORTH 74TH STREET SUITE 140  
SCOTTSDALE, AZ 85288  
P 480 991 3985

CIVIL AND SURVEY



CONCEPTUAL UTILITY PLAN  
FOR  
THE LOOP PERIMETER CENTER  
101 AND PRINCESS  
SCOTTSDALE ARIZONA



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

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**C5**

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**APPENDIX B**  
**CALCULATIONS AND DATA SHEET**

Project: 101 & Princess Dr.  
 Project Number: LGEC319  
 City: Scottsdale  
 Date: 10/28/2024

**SITE DOMESTIC DEMAND SUMMARY**

Building A	101772	sf
Building B	54273	sf
Building C	55503	sf
Building D	55503	sf
Total	267051	sf

Office	Site Use	Building Area (sf)	Average Day Demand (gpm) Gross Bldg Area (sf) per Table 6-1.2 Average Day Water Demands	Average Day Demand (ADD) (gpm)	Max Day Demand (MDD) (ADD*2.0) (gpm)	Peak Hour Demand (PHD) (ADD*3.5) (gpm)
Building A	Office	5,410	0.000834 gpm per sf	4.51	9.02	15.79
Building B	Office	4,190	0.000834 gpm per sf	3.49	6.99	12.23
Building C	Office	5,124	0.000834 gpm per sf	4.27	8.55	14.96
Building D	Office	5,124	0.000834 gpm per sf	4.27	8.55	14.96
Total		19,848		16.55	33.11	57.94

Distribution Industrial	Site Use	Site Area Area (ac)	Average Day Demand (gpm) Gross Bldg Area (sf) per Table 6-1.2 Average Day Water Demands	Average Day Demand (ADD) (gpm)	Max Day Demand (MDD) (ADD*2.0) (gpm)	Peak Hour Demand (PHD) (ADD*3.5) (gpm)
Building A	Distribution	6.04	1.44 gpm per ac	8.70	17.40	30.44
Building B	Distribution	3.40	1.44 gpm per ac	4.90	9.79	17.14
Building C	Distribution	3.28	1.44 gpm per ac	4.72	9.45	16.53
Building D	Distribution	3.98	1.44 gpm per ac	5.73	11.46	20.06
Total		16.70		24.05	48.10	84.17

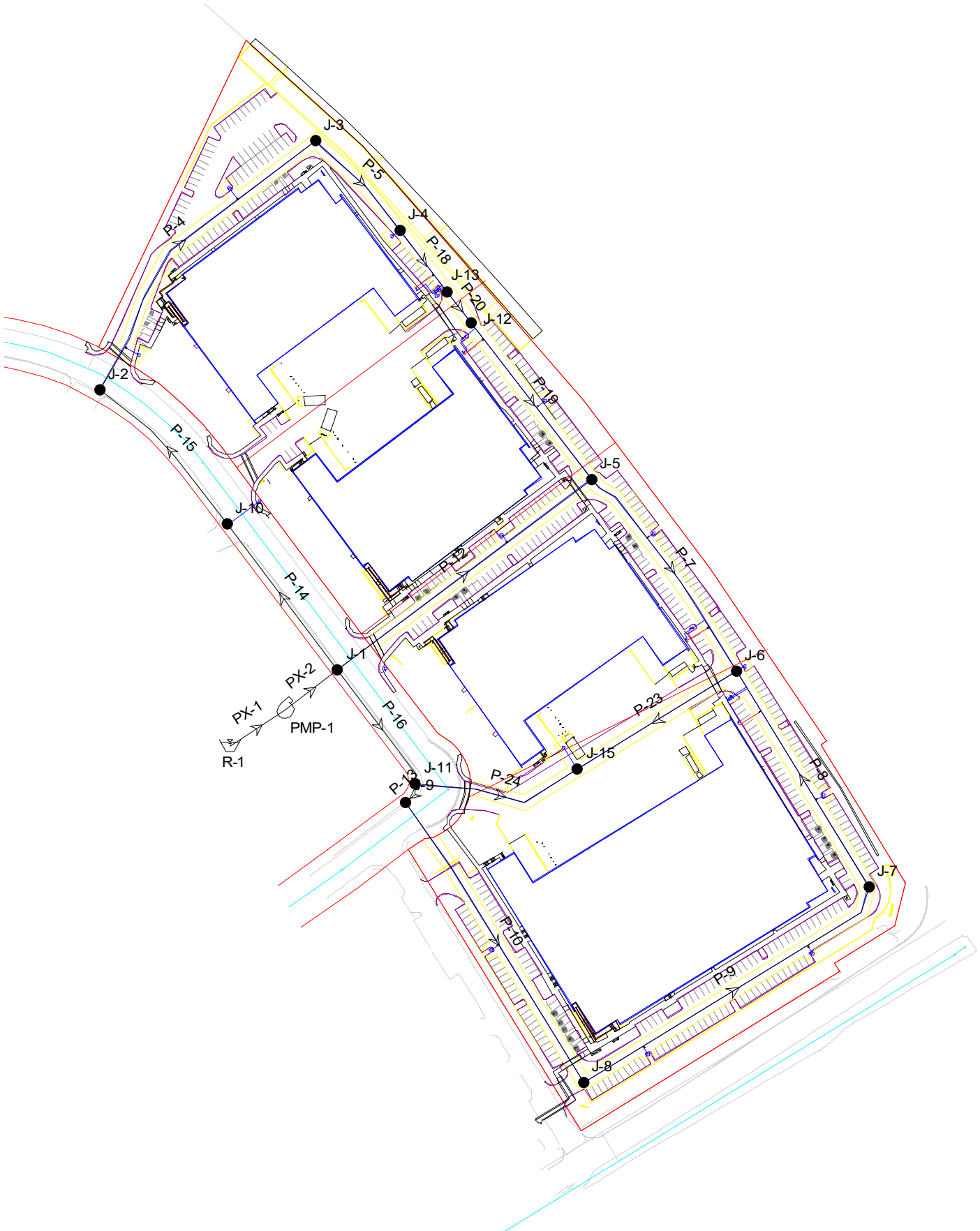
Total	Combined			40.60	81.20	142.10
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**SITE FIRE FLOW SUMMARY**

Building	Construction Type	Building Area (sf)	Minimum Required Fire Flow for Buildings Table B105.1 International Fire Code	Min Fire Flow 25% of Table Value
Building A	V-B	5,410	8,000 gpm	2,000
Building B	V-B	4,190	6,250 gpm	1,563
Building C	V-B	5,124	6,250 gpm	1,563
Building D	V-B	5,124	6,250 gpm	1,563

Not office space, these should be total building gross area for fire-flow demand.

# Scenario: Fire



**Scenario: Average  
Steady State Analysis  
Pipe Report**

Label	Length (ft)	Diameter (in)	Material	Discharge (gpm)	Hazen-Williams C	Pressure Pipe Headloss (ft)	Velocity (ft/s)
PX-1	1.00	120.0	Ductile Iro	40.60	130.0	0.00	0.00
PX-2	1.00	120.0	Ductile Iro	40.60	130.0	0.00	0.00
P-4	487.00	8.0	Ductile Iro	9.53	130.0	0.00	0.06
P-5	178.00	8.0	Ductile Iro	9.53	130.0	0.00	0.06
P-7	348.00	8.0	Ductile Iro	5.28	130.0	0.00	0.03
P-8	364.00	8.0	Ductile Iro	-6.05	130.0	0.00	0.04
P-9	505.00	8.0	Ductile Iro	-6.05	130.0	0.00	0.04
P-10	477.00	8.0	Ductile Iro	-6.05	130.0	0.00	0.04
P-12	456.00	8.0	Ductile Iro	14.76	130.0	0.00	0.09
P-14	262.00	8.0	Ductile Iro	9.53	130.0	0.00	0.06
P-15	268.00	8.0	Ductile Iro	9.53	130.0	0.00	0.06
P-13	32.00	8.0	Ductile Iro	-6.05	130.0	0.00	0.04
P-16	202.00	8.0	Ductile Iro	-16.32	130.0	0.00	0.10
P-19	284.00	8.0	Ductile Iro	-9.47	130.0	0.00	0.06
P-18	112.00	8.0	Ductile Iro	9.53	130.0	0.00	0.06
P-20	55.00	8.0	Ductile Iro	-0.47	130.0	0.00	0.00
P-23	269.00	8.0	Ductile Iro	-10.27	130.0	0.00	0.07
P-24	249.00	8.0	Ductile Iro	-10.27	130.0	0.00	0.07

**Scenario: Max Flow  
Steady State Analysis  
Pipe Report**

Label	Length (ft)	Diameter (in)	Material	Discharge (gpm)	Hazen-Williams C	Pressure Pipe Headloss (ft)	Velocity (ft/s)
PX-1	1.00	120.0	Ductile Iro	81.20	130.0	0.00	0.00
PX-2	1.00	120.0	Ductile Iro	81.20	130.0	0.00	0.00
P-4	487.00	8.0	Ductile Iro	19.05	130.0	0.01	0.12
P-5	178.00	8.0	Ductile Iro	19.05	130.0	0.00	0.12
P-7	348.00	8.0	Ductile Iro	10.56	130.0	0.00	0.07
P-8	364.00	8.0	Ductile Iro	-12.11	130.0	0.00	0.08
P-9	505.00	8.0	Ductile Iro	-12.11	130.0	0.00	0.08
P-10	477.00	8.0	Ductile Iro	-12.11	130.0	0.00	0.08
P-12	456.00	8.0	Ductile Iro	29.51	130.0	0.01	0.19
P-14	262.00	8.0	Ductile Iro	19.05	130.0	0.00	0.12
P-15	268.00	8.0	Ductile Iro	19.05	130.0	0.00	0.12
P-13	32.00	8.0	Ductile Iro	-12.11	130.0	0.00	0.08
P-16	202.00	8.0	Ductile Iro	-32.64	130.0	0.01	0.21
P-19	284.00	8.0	Ductile Iro	-18.95	130.0	0.00	0.12
P-18	112.00	8.0	Ductile Iro	19.05	130.0	0.00	0.12
P-20	55.00	8.0	Ductile Iro	-0.96	130.0	0.00	0.01
P-23	269.00	8.0	Ductile Iro	-20.53	130.0	0.00	0.13
P-24	249.00	8.0	Ductile Iro	-20.53	130.0	0.00	0.13

**Scenario: Peak  
Steady State Analysis  
Pipe Report**

Label	Length (ft)	Diameter (in)	Material	Discharge (gpm)	Hazen-Williams C	Pressure Pipe Headloss (ft)	Velocity (ft/s)
PX-1	1.00	120.0	Ductile Iro	142.11	130.0	0.00	0.00
PX-2	1.00	120.0	Ductile Iro	142.11	130.0	0.00	0.00
P-4	487.00	8.0	Ductile Iro	33.34	130.0	0.02	0.21
P-5	178.00	8.0	Ductile Iro	33.34	130.0	0.01	0.21
P-7	348.00	8.0	Ductile Iro	18.48	130.0	0.00	0.12
P-8	364.00	8.0	Ductile Iro	-21.19	130.0	0.01	0.14
P-9	505.00	8.0	Ductile Iro	-21.19	130.0	0.01	0.14
P-10	477.00	8.0	Ductile Iro	-21.19	130.0	0.01	0.14
P-12	456.00	8.0	Ductile Iro	51.65	130.0	0.03	0.33
P-14	262.00	8.0	Ductile Iro	33.34	130.0	0.01	0.21
P-15	268.00	8.0	Ductile Iro	33.34	130.0	0.01	0.21
P-13	32.00	8.0	Ductile Iro	-21.19	130.0	0.00	0.14
P-16	202.00	8.0	Ductile Iro	-57.12	130.0	0.02	0.36
P-19	284.00	8.0	Ductile Iro	-33.17	130.0	0.01	0.21
P-18	112.00	8.0	Ductile Iro	33.34	130.0	0.00	0.21
P-20	55.00	8.0	Ductile Iro	-1.68	130.0	0.00	0.01
P-23	269.00	8.0	Ductile Iro	-35.93	130.0	0.01	0.23
P-24	249.00	8.0	Ductile Iro	-35.93	130.0	0.01	0.23

**Scenario: Fire  
Steady State Analysis  
Pipe Report**

Label	Length (ft)	Diameter (in)	Material	Discharge (gpm)	Hazen-Williams C	Pressure Pipe Headloss (ft)	Velocity (ft/s)
PX-1	1.00	120.0	Ductile Iro	2,081.20	130.0	0.00	0.06
PX-2	1.00	120.0	Ductile Iro	2,081.20	130.0	0.00	0.06
P-4	487.00	8.0	Ductile Iro	278.08	130.0	0.83	1.77
P-5	178.00	8.0	Ductile Iro	278.08	130.0	0.30	1.77
P-7	348.00	8.0	Ductile Iro	782.42	130.0	4.04	4.99
P-8	364.00	8.0	Ductile Iro	-179.90	130.0	0.28	1.15
P-9	505.00	8.0	Ductile Iro	-179.90	130.0	0.38	1.15
P-10	477.00	8.0	Ductile Iro	-179.90	130.0	0.36	1.15
P-12	456.00	8.0	Ductile Iro	542.34	130.0	2.68	3.46
P-14	262.00	8.0	Ductile Iro	278.08	130.0	0.45	1.77
P-15	268.00	8.0	Ductile Iro	278.08	130.0	0.46	1.77
P-13	32.00	8.0	Ductile Iro	-179.90	130.0	0.02	1.15
P-16	202.00	8.0	Ductile Iro	-1,260.78	130.0	5.67	8.05
P-19	284.00	8.0	Ductile Iro	240.08	130.0	0.37	1.53
P-18	112.00	8.0	Ductile Iro	278.08	130.0	0.19	1.77
P-20	55.00	8.0	Ductile Iro	258.07	130.0	0.08	1.65
P-23	269.00	8.0	Ductile Iro	919.11	130.0	4.20	5.87
P-24	249.00	8.0	Ductile Iro	-1,080.89	130.0	5.25	6.90

**Scenario: Average  
Steady State Analysis  
Junction Report**

Label	Elevation (ft)	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,584.40	0.00	1,742.39	68.35
J-2	1,589.50	0.00	1,742.38	66.15
J-3	1,598.00	0.00	1,742.38	62.47
J-4	1,596.00	0.00	1,742.38	63.33
J-5	1,593.00	0.00	1,742.38	64.63
J-6	1,590.00	21.60	1,742.38	65.93
J-7	1,586.00	0.00	1,742.38	67.66
J-8	1,580.00	0.00	1,742.38	70.26
J-9	1,583.00	0.00	1,742.38	68.96
J-10	1,588.00	0.00	1,742.39	66.80
J-11	1,583.00	0.00	1,742.38	68.96
J-12	1,594.00	9.00	1,742.38	64.20
J-13	1,597.50	10.00	1,742.38	62.68
J-15	1,588.25	0.00	1,742.38	66.69

**Scenario: Max Flow  
Steady State Analysis  
Junction Report**


Label	Elevation (ft)	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,584.40	0.00	1,742.34	68.33
J-2	1,589.50	0.00	1,742.33	66.12
J-3	1,598.00	0.00	1,742.33	62.44
J-4	1,596.00	0.00	1,742.33	63.31
J-5	1,593.00	0.00	1,742.33	64.61
J-6	1,590.00	43.20	1,742.33	65.90
J-7	1,586.00	0.00	1,742.33	67.64
J-8	1,580.00	0.00	1,742.33	70.23
J-9	1,583.00	0.00	1,742.33	68.94
J-10	1,588.00	0.00	1,742.34	66.77
J-11	1,583.00	0.00	1,742.33	68.94
J-12	1,594.00	17.99	1,742.33	64.17
J-13	1,597.50	20.01	1,742.33	62.66
J-15	1,588.25	0.00	1,742.33	66.66

**Scenario: Peak  
Steady State Analysis  
Junction Report**

Label	Elevation (ft)	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,584.40	0.00	1,742.23	68.28
J-2	1,589.50	0.00	1,742.21	66.07
J-3	1,598.00	0.00	1,742.19	62.38
J-4	1,596.00	0.00	1,742.19	63.25
J-5	1,593.00	0.00	1,742.19	64.55
J-6	1,590.00	75.60	1,742.19	65.84
J-7	1,586.00	0.00	1,742.19	67.58
J-8	1,580.00	0.00	1,742.20	70.18
J-9	1,583.00	0.00	1,742.21	68.88
J-10	1,588.00	0.00	1,742.22	66.72
J-11	1,583.00	0.00	1,742.21	68.88
J-12	1,594.00	31.49	1,742.18	64.11
J-13	1,597.50	35.02	1,742.18	62.60
J-15	1,588.25	0.00	1,742.20	66.61

## Scenario: Fire Steady State Analysis Junction Report

Label	Elevation (ft)	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,584.40	0.00	1,716.66	57.22
J-2	1,589.50	0.00	1,715.76	54.63
J-3	1,598.00	0.00	1,714.92	50.59
J-4	1,596.00	0.00	1,714.62	51.32
J-5	1,593.00	0.00	1,713.98	52.34
J-6	1,590.00	43.20	1,709.94	51.89
J-7	1,586.00	0.00	1,710.22	53.74
J-8	1,580.00	0.00	1,710.61	56.51
J-9	1,583.00	0.00	1,710.97	55.37
J-10	1,588.00	0.00	1,716.21	55.47
J-11	1,583.00	0.00	1,710.99	55.38
J-12	1,594.00	17.99	1,714.35	52.07
J-13	1,597.50	20.01	1,714.43	50.59
J-15	1,588.25	2,000.00	1,705.74	50.83



Fire flow @ worst case node J-4.  
Sec 6-1.202 G 6 C

# Detailed Report for Pump: PMP-1

**Note:**

The input data may have been modified since the last calculation was performed.  
The calculated results may be outdated.

Scenario Summary	
Scenario	Max
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	Demand-Max
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

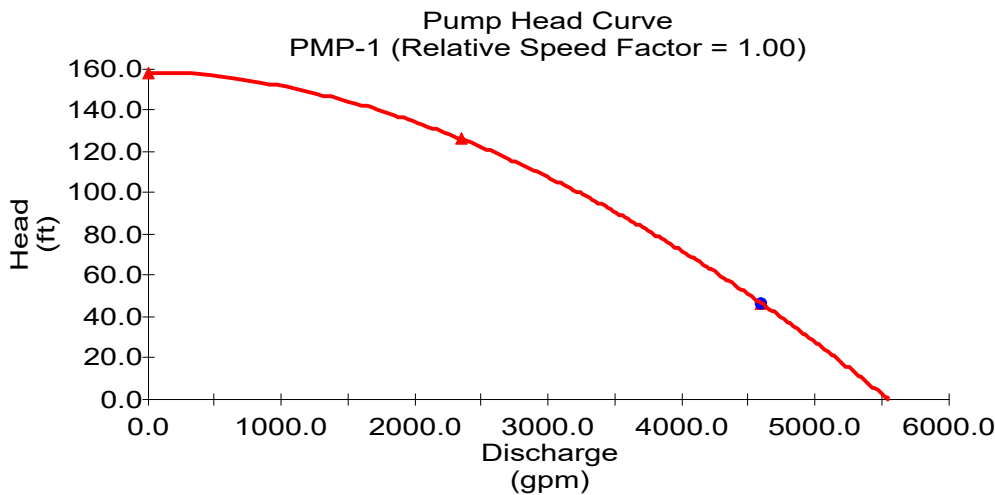
Global Adjustments Summary			
Demand	<None>	Roughness	<None>

Geometric Summary			
X	705,986.90 ft	Upstream Pipe	PX-1
Y	963,094.21 ft	Downstream Pipe	PX-2
Elevation	1,584.40 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	,584.40	1,630.60	4,599.00	46.20	1.00	53.64



## Detailed Report for Reservoir: R-1

**Note:**

The input data may have been modified since the last calculation was performed.  
 The calculated results may be outdated.

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Scenario Summary	
Scenario	Max
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	Demand-Max
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

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Global Adjustments Summary			
Demand	<None>	Roughness	<None>

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Geometric Summary			
X	705,907.51 ft	Elevation	1,584.40 ft
Y	963,043.35 ft	Zone	Zone

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Calculated Results Summary			
Time (hr)	Calculated Hydraulic Grade (ft)	Inflow (gpm)	Outflow (gpm)
0.00	1,584.40	4,599.00	,599.00

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**Scenario: Static  
Steady State Analysis  
Junction Report**

Label	Elevation (ft)	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,584.40	0.00	1,742.40	68.36
J-2	1,589.50	0.00	1,742.40	66.15
J-3	1,598.00	0.00	1,742.40	62.48
J-4	1,596.00	0.00	1,742.40	63.34
J-5	1,593.00	0.00	1,742.40	64.64
J-6	1,590.00	0.00	1,742.40	65.94
J-7	1,586.00	0.00	1,742.40	67.67
J-8	1,580.00	0.00	1,742.40	70.26
J-9	1,583.00	0.00	1,742.40	68.97
J-10	1,588.00	0.00	1,742.40	66.80
J-11	1,583.00	0.00	1,742.40	68.97
J-12	1,594.00	0.00	1,742.40	64.21
J-13	1,597.50	0.00	1,742.40	62.69
J-15	1,588.25	0.00	1,742.40	66.70

**Scenario: Residual  
Steady State Analysis  
Junction Report**

Label	Elevation (ft)	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,584.40	2,354.00	1,710.06	54.37
J-2	1,589.50	0.00	1,710.06	52.16
J-3	1,598.00	0.00	1,710.06	48.48
J-4	1,596.00	0.00	1,710.06	49.35
J-5	1,593.00	0.00	1,710.06	50.65
J-6	1,590.00	0.00	1,710.06	51.95
J-7	1,586.00	0.00	1,710.06	53.68
J-8	1,580.00	0.00	1,710.06	56.27
J-9	1,583.00	0.00	1,710.06	54.97
J-10	1,588.00	0.00	1,710.06	52.81
J-11	1,583.00	0.00	1,710.06	54.97
J-12	1,594.00	0.00	1,710.06	50.22
J-13	1,597.50	0.00	1,710.06	48.70
J-15	1,588.25	0.00	1,710.06	52.70

**Scenario: Max  
Steady State Analysis  
Junction Report**

Label	Elevation (ft)	Base Flow (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,584.40	4,599.00	1,630.60	19.99
J-2	1,589.50	0.00	1,630.60	17.78
J-3	1,598.00	0.00	1,630.60	14.10
J-4	1,596.00	0.00	1,630.60	14.97
J-5	1,593.00	0.00	1,630.60	16.27
J-6	1,590.00	0.00	1,630.60	17.57
J-7	1,586.00	0.00	1,630.60	19.30
J-8	1,580.00	0.00	1,630.60	21.89
J-9	1,583.00	0.00	1,630.60	20.59
J-10	1,588.00	0.00	1,630.60	18.43
J-11	1,583.00	0.00	1,630.60	20.59
J-12	1,594.00	0.00	1,630.60	15.84
J-13	1,597.50	0.00	1,630.60	14.32
J-15	1,588.25	0.00	1,630.60	18.32

**APPENDIX C**  
**FIRE HYDRANT FLOW TEST**

# Arizona Flow Testing LLC

## HYDRANT FLOW TEST REPORT

Project Name: 101 and Princess  
Project Address: 17791 North 85<sup>th</sup> Street, Scottsdale, Arizona  
Client Project No.: LGE 101 and Princess  
Flow Test Permit Number: C73603  
Arizona Flow Testing Project No.: 23880  
Date and Time flow test conducted: October 30, 2023 at 7:00 AM  
Data is current and reliable until: April 30, 2024  
Conducted by: Floyd Vaughan – Arizona Flow Testing, LLC (480-250-8154)  
Witnessed by: Sonny Schreiner – City of Scottsdale-Inspector (602-819-7718)

Per DSPM Section 6-1.202, An updated hydrant flow test is required if the previous applicable flow test is more than 1 year old. Water is making an exception and waiving this requirement.

### Raw Test Data

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

Residual Pressure: **62.0 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: **4,975 GPM**

### Data with 10% Safety Factor

Static Pressure: **68.4 PSI**  
(Measured in pounds per square inch)

Residual Pressure: **54.4 PSI**  
(Measured in pounds per square inch)

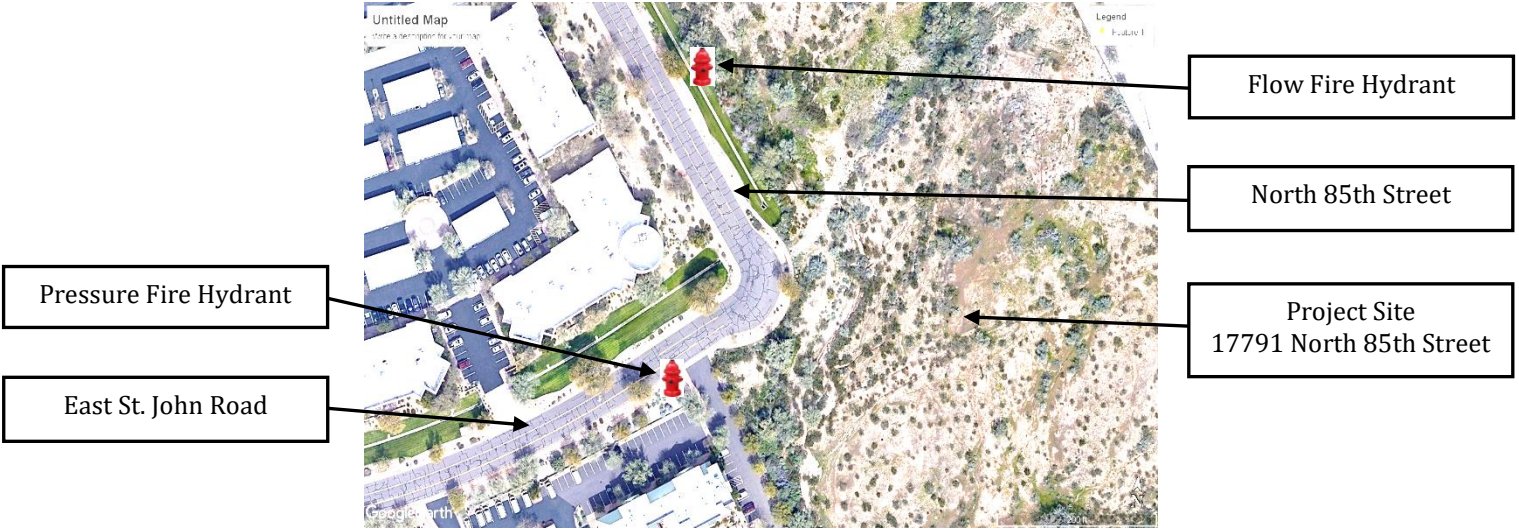
Approx. distance between hydrants: 440 Feet

Main size: Not Provided

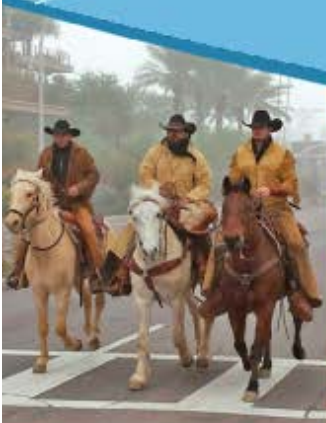
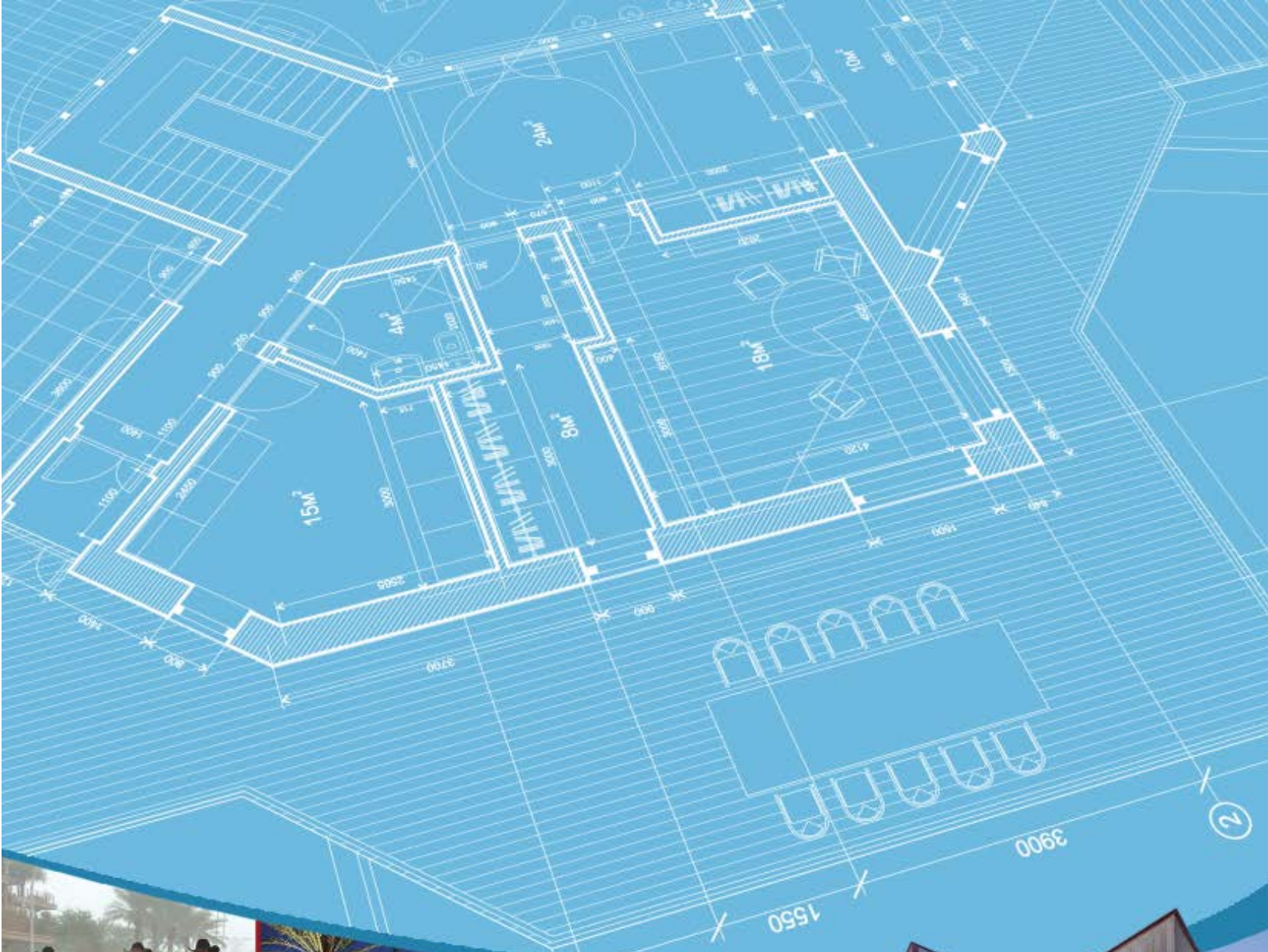
Flowing GPM: **2,354 GPM**

GPM @ 20 PSI: **4,599 GPM**

### Flow Test Location



**APPENDIX D**  
**REFERENCES**



CITY OF  
**SCOTTSDALE**

# DESIGN STANDARDS & POLICIES MANUAL

are met. The necessary process to develop the design system supply curve or grade line from the hydrant test results is described in Section 6-1.405.

3. Water demands shall generally be determined based on the unit demands in gallons per minute (gpm) listed in Figure 6-1.2, or as accepted or directed by the Water Resources Department, or as described within this chapter. The Water Resources Department reserves the right to require the use of potentially higher water demand peaking factors or directly apply demand flows for developments if deemed justified e.g. some restaurants or specialty developments.
4. Computer hydraulic modeling shall use H2ONET, WATERCAD, or EPANET software, or other Water Resource Department approved software.
5. In addition to network diagrams clearly present all inputs, details, and analysis output in organized tables.
6. Include all relevant hydraulic network diagrams listed for each of the following required hydraulic analysis scenarios:
  - a. Model Scenario 1: Average day demand in gpm at all demand nodes. (Refer to Figure 6-1.2)
  - b. Model Scenario 2: Peak hour demand in gpm at all demand nodes. (Refer to Figure 6-1.2 and Section 6-1.404 for peak hour demand)
  - c. Model Scenario 3: Maximum day demand in gpm at all demand nodes with worst case fire flow (Refer to section 6-1.501 describing fire flow determination. Refer to Figure 6-1.2 and Section 6-1.404 for maximum day demand)  
Requirements:
    - i. The determined fire flow must be applied to the single worst-case location in the proposed system where fire flow will be required. Typically, this is the furthest and/or highest point from the main water supply connection. If not clear what the worst-case fire flow demand point is, the fire flow shall be applied to each potential point in the model until the worst-case point is determined.
    - ii. A minimum of 30 pounds per square inch (psi) must be maintained at the worst-case hydrant supply line tee/tap under this condition with a simultaneous minimum of 15 psi maintained at all domestic demand nodes (i.e., at the highest finished floor elevation and post service line and appurtenances) (Refer to scenario 4 for guidance on modeling the service line up to the demand nodes).
  - d. Model Scenario 4: Maintain the minimum domestic service pressure at the worst case domestic demand node (location/elevation) under normal daily operating flow conditions termed henceforth as the *Initial Service Line Design Flow*.

Notes: A minimum of 50 psi must be maintained at the highest proposed finished floor elevation to be served, for the worst hydraulic case domestic demand node, while applying the Initial Service Line Design Flow to the node. Typically, this will be the demand node with the lowest modeled pressure in the previous scenarios. The engineer shall define the service line

details, demand node location, and determine normal daily operating hydraulic conditions/criteria as follows:

- i. Demand point location: the furthest, highest (i.e. worst case hydraulic metered node). If the service line distances and building heights are unknown, the demand node shall be located at the geometric center of the lot at elevation 12 feet above the planned finished floor elevation for single family residential. Otherwise a typical highest finished floor elevation for the development type shall be used.
- ii. Initial Service Line Design Flow: 1) Estimate the average number of water fixtures served by the subject node; 2) Use the 2015 International Plumbing Code, Appendix E, Table E103.3(2)-total load values and Table E103.3(3) to determine the normal operating flow rate; 3) Add 10 gpm minimum to the normal operating flow to account for either a hose bib or a single irrigation sprinkler zone or estimate a higher applicable intermittent or constant base flow; 4) Apply a 1.5 safety factor to the resultant total flow rate to obtain the Initial Service Line Design Flow. Note that this flow also factors into meter sizing, refer to section 6-1.416 Service Lines and Meters.
- iii. Determine the required service line and appurtenance sizing: If the sprinkler system and the domestic uses are metered through a shared meter use the greater of the resultant flow in step above, or the required fire sprinkler flow. Refer to the applicable Fire Code for sprinkler system flow and pressure requirements. Refer to section 6-1.404 Design Flows and Head Loss for design criteria on service lines.
- iv. Model pressure losses between the service tap and the demand node: Determine the losses through the water meter and the pressure reducing valve for the resultant flow and sizing from the step above. A combined 10 psi or greater loss shall be used for meter and pressure reducing valve (PRV) in scenario 4. A 5 psi or greater loss shall be used for the meter and PRV in other modeled scenarios. The service pipe friction loss portion will be per its length and diameter as included in the model.
- v. All other demand nodes in the network, other than the worst-case node shall be assigned their corresponding peak hour total use demand per Figure 6.1-2 and Section 6-1.404 during this scenario.
- vi. No fire flows are to be applied for this scenario.

#### H. Network Diagrams

1. Network Diagram 1: Describe the Physical Modeled Network  
Refer to Sections 6-1.300, 6-1.400, and 6-1.500 and their related subsections for water network design requirements.  
Present all the nodes, valves, pipes, tanks, hydrants, and pumps within the network and present the following:
  - a. Network components with IDs
  - b. Existing distributions system pipelines (label as existing) and connection to the proposed system

- c. Complete proposed water system, including:
  - d. Each/all individually metered service lines ending in a demand node
    - i. Irrigation connections with demand nodes (show both dedicated metered lines and where shared with the domestic service line post-meter)
    - ii. Fire sprinkler riser connections with demand nodes (typically dedicated connections are used for developments other than single family residential)
  - e. Elevations (ft.)
  - f. Pipe lengths (ft.)
  - g. Friction head loss coefficients used
  - h. Pipe/valve diameters (in)
  - i. Point of any changes in pipe diameter
  - j. Valve types and positions (open/closed/modulating)
  - k. Tanks: working volumes (gal), heights (ft.), diameters (ft.)
  - l. Pump curves (3-point min) or hydraulic grade line (HGL)
  - m. Note: Developments supplied from the city's water distribution system should be modeled as a pumped supply using a pump curve developed from the required hydrant test to simulate the dynamic flow vs. pressure supplied from the water distribution system. Alternatively, differing supply HGLs derived from the flow test results can be used for the different modeling scenarios.
  - n. Provide all valve, tank, pump, and system settings (levels, pressures/control set points, valve open/close/modulation rates and settings, valve coefficients, initial conditions, etc.)
  - o. Static system supply pressure (if supply is from system, develop pump curve or HGL from hydrant test)
- Shows all numerical units or provide a legend that indicates the units used
2. Network Diagram 2: Describe the Specific Demand Scenario
    - a. Label the figure with the title of specific modeling scenario
    - b. Indicate the demand (gpm) being applied to each applicable node for the scenario
    - c. Demand nodes shall include all applicable demands for the defined scenario including domestic use (indoor), irrigation (outdoor), fire sprinkler or hydrant, etc. If a node is a summation of more than one demand type describe this in a notes column in the associated tables
    - d. Provide all valve, tank, pump, or system settings that are specific to the modeling scenario
    - e. Shows all units or provide a legend that indicates the units used
  3. Network Diagram 3: Present the Scenario Analysis Results  
Label the figure with the title of the specific modeling scenario and present the following output:
    - a. Node pressures (psi or HGL elevation)
    - b. Pipe flow (gpm)
    - c. Flow direction arrows

- 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 <sup>(1)</sup>							
IN GALLONS PER DAY (GPD) <sup>(2)</sup>				IN GALLONS PER MINUTE (GPM) <sup>(2)(3)</sup>			
Land Use	Inside Use	Outside Use	Total Use	Inside Use	Outside Use	Total Use	Units
<b>Residential Demand per Dwelling Unit</b>							
< 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
<b>Service and Employment</b>							
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 <sup>(1)</sup>							
IN GALLONS PER DAY (GPD) <sup>(2)</sup>				IN GALLONS PER MINUTE (GPM) <sup>(2)(3)</sup>			
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