Water Basis of Design Report
For
Hayden and McDowell

Scottsdale, ARIZONA

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 11/9/2021

Address comments below and herein on the submitted improvement plans:
1) The existing fire hydrant should be within an easement. Relocate to be within easement or extend easement.
2) On Western property place horizontal elbow after meter and BFP. Should be straight run to and through meter.
3) Confirm with fire plan review the need and/or location of external FDC (not called out on utility plan)

PREPARED BY:

Larson Engineering, Inc.
6380 E. Thomas Road, Suite 300
Scottsdale, AZ 85251
480.212.4200
www.larsonengr.com

October 15, 2021

Prepared by: MH

Larson

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Appendix:

Utility Plan

Calculations

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Introduction

The proposed Hayden and McDowell Commercial (The Project) is located at 8101 E McDowell Road in Scottsdale, Arizona. The parcel number for this project is 131-09-002N. The Project consists of adding two new buildings, curbing, refuse container and landscaping. The buildings are 2,400 square feet and 4,000 square feet in size. The Project is located just east of the intersection of Hayden Road at McDowell Road. See Location Map below:

The Project will not alter the existing zoning, which is C-3. The surrounding area at his locations is commercial businesses and consists of commercial services and offices. The new buildings will remain consistent with the City of Scottsdale's general plan.

Design Documentation

Water Design Flows are based on criteria provided in the City of Scottsdale's Design Standards & Policies Manual Chapter 6 dated 2018. Specifically, the criteria used are as follows:

- Building Square Feet 2,400 SF

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This should be about 62psi per fire flow test, acceptable>30.OK

- Demand Bldg (interior + exterior) 4,000 SF
- Pressure at Fire Flow 6.2 GPM
- Fire Flow Requirement 75.0 PSI
- Scottsdale Pressure Zone 1,500 GPM
- Pipe Material 1N/S

2” Copper (Domestic)
6” D.I.P. (Fire)

Water Calculations are attached in the Appendix. Existing service line size, meter and building supply sizes will need to be verified and if needed upgraded and identified prior to final plan approval. The site proposes to install a domestic connection, an FDC and a fire sprinkler line for each building. See the attached Utility Plan in the Appendix for details.

Existing Conditions

The Project will not alter the existing zoning, which is C-3. The existing building was a commercial building and this Project will also be restaurants.

There is an existing 8” water line on the south side of Commerce Court. See attached Water Exhibit for reference. The site will be adding 2 water meters, tap and backflow preventer. Due to the preliminary stage of this project the exact size of utilities and meters will be determined. If the meters and preventers are not adequate size they will be upgraded.

The fire line will propose a 6-inch Ductile Iron Pipe for the fire sprinkler system.

Proposed Conditions

The attached Water Exhibit shows the tie in locations for the domestic water and fire sprinkler system. This Project proposes to connect to the existing line with 2 inch Copper pipe, see the attached Water Exhibit. This Project lies in the City of Scottsdale’s Zone 1 Water Pressure Zone Map. The ground elevations associated with this pressure zone are 1250 feet to 1330 feet. All maintenance of the private onsite system is the responsibility of the owner.

Calculations

Based on the attached calculations, the projected pressure and flow will meet the building’s needs. The proposed Water distribution system is designed to provide adequate capacity to serve the proposed Project.

Summary

The Proposed Water Distribution System has been analyzed to ensure all City of Scottsdale Design Standards and Policies Manual Chapter 6 requirements are being met. Figure 6.1-2 of that manual provided the water demand and peaking factors included in the analysis and stated

in this report. The Appendix includes calculations of pressure loss, the hydrant flow test and a water exhibit showing proposed water and fire line.

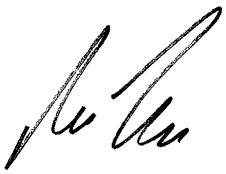
The Project is expected to be completed in 2022.

Enclosed is a set of drawings and spreadsheets which summarize the design and capacity of the system. The spreadsheets show the use, maximum occupancy, average daily flow rate and peak flow rates for the project. This project is proposed to start as soon as approval is obtained and completed within 6 months. Please refer to the attached Water exhibit for layout of the lines and connections.

Thank you for your prompt review of the proposed water collection system.

Sincerely,

Larson Engineering, Inc.



Mike Hreha, P.E.
Land Development Manager

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Utility Plan

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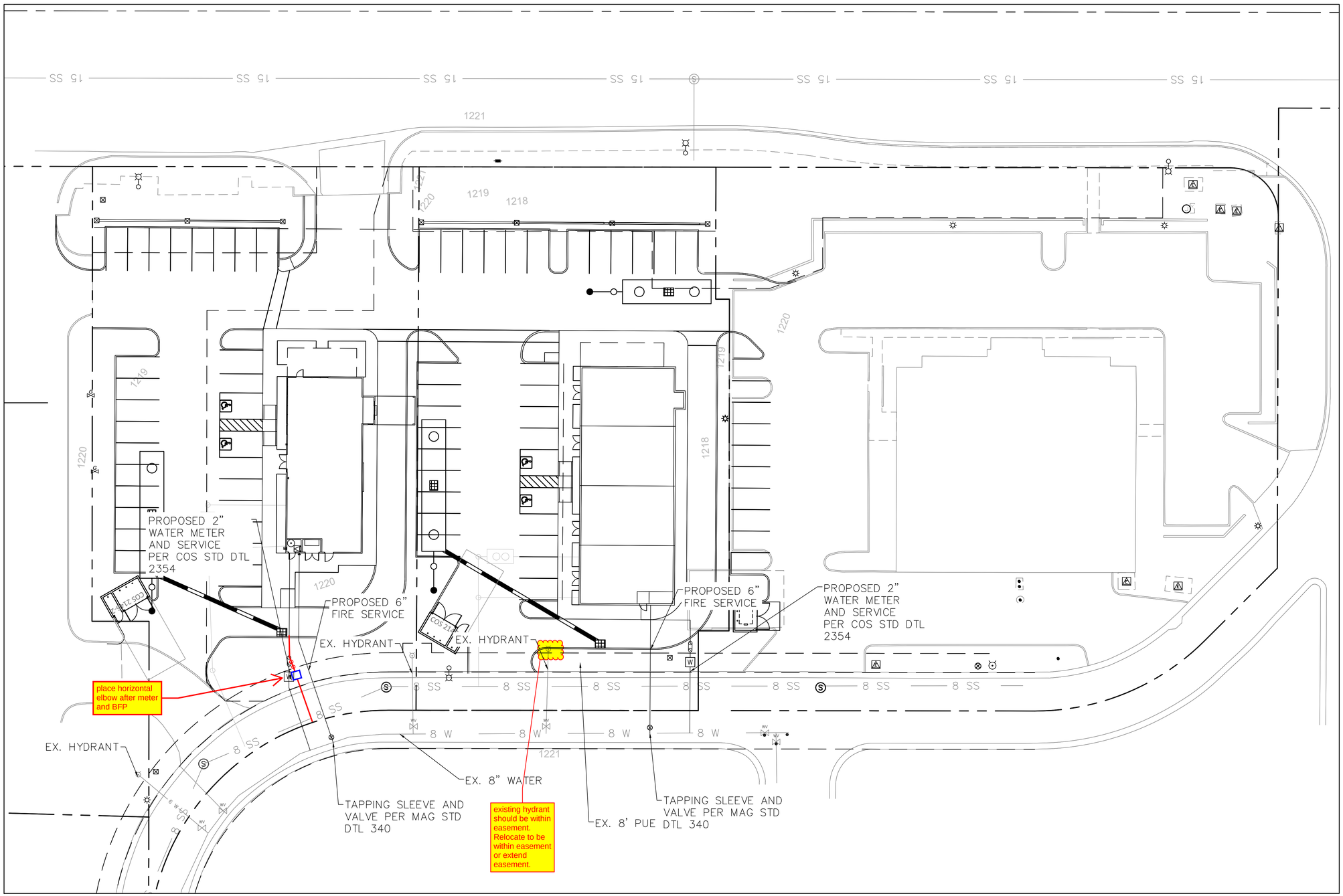

20 0 20 40

1"=20'

GRAPHIC SCALE

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Contact Arizona 811 at least two full working days before you begin excavation

ARIZONA811

Call 811 or click Arizona811.com

IRKAA
ARCHITECTS INC
2231 EAST THOMAS ROAD, PHOENIX, ARIZONA 85016
602-955-3900
RKAA.com

Registered Professional Engineer (Civil)
CERTIFICATE NO.
MICHAEL HREHA
Date Signed 10/20/2021
ARIZONA, U.S.A.
EXPIRES 06/30/2022

NOTICE OF ALTERNATE BILLING OR PAYMENT CYCLE: THIS CONTRACT MAY ALLOW THE OWNER TO REQUIRE THE CONTRACTOR TO ALTERNATE THE BILLING OR PAYMENT CYCLES OTHER THAN THIRTY DAYS. THIS CONTRACT MAY ALLOW OWNER TO MAKE PAYMENT ON SOME ALTERNATIVE SCHEDULE AFTER CERTIFICATION AND APPROVAL OF BILLING AND SUBMITTAL OF SUPPORTING DOCUMENTATION. BILLING CYCLE APPLICABLE TO THE PROJECT IS AVAILABLE FROM OWNER OR DESIGNATED AGENT.

MCDOWELL - HAYDEN RETAIL
8101 E MCDOWELL ROAD SCOTTSDALE AZ 85257
E OF SEC OF MCDOWELL RD AND HAYDEN RD
DATE: 07-15-2021 (PRELIMINARY)

PRELIMINARY
WATER PLAN

design by: --
drawn by: --
checked by: --

C3

project: **18107.00**

32-DR-2021_V2
10/20/2021

CALCULATIONS

Larson Engineering, Inc.
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Flow Test Summary

Project Name:	EJFT 21395 - Hayden & McDowell
Project Address:	Hayden Rd & McDowell Rd, Scottsdale, AZ 85257
Date of Flow Test:	2021-09-24
Time of Flow Test:	6:55 AM
Data Reliable Until:	2022-03-24
Conducted By:	Eder Cueva & Steven Saethre (EJ Flow Tests) 602.999.7637
Witnessed By:	Ray Padilla (City of Scottsdale) 602.541.0586
City Forces Contacted:	City of Scottsdale (602.541.0586)
Permit Number:	C66367

Note Scottsdale requires a max static pressure of 72 psi for safety factor.

Raw Flow Test Data

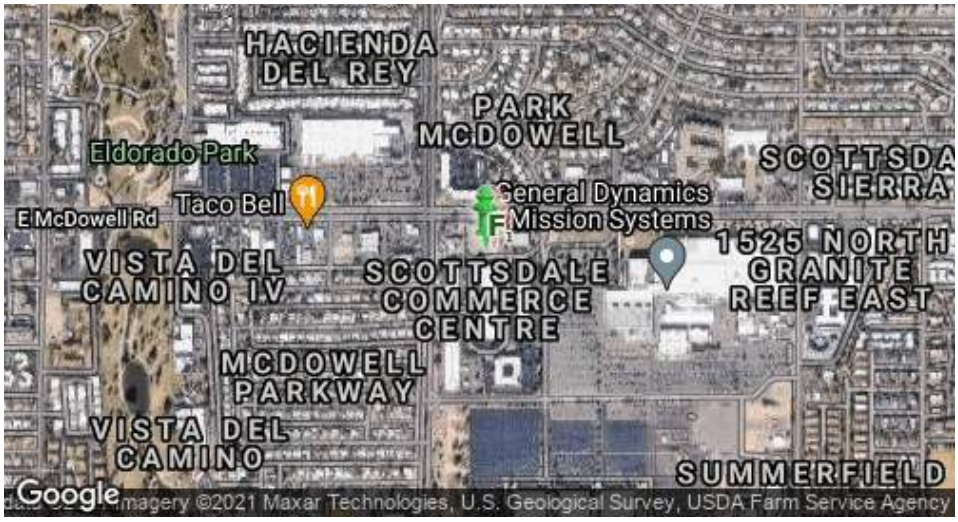
Static Pressure:	98.0 PSI
Residual Pressure:	75.0 PSI
Flowing GPM:	2,419
GPM @ 20 PSI:	4,678

Data with a 26 PSI Safety Factor

Static Pressure:	72.0 PSI
Residual Pressure:	49.0 PSI
Flowing GPM:	2,419
GPM @ 20 PSI:	3,758

Hydrant F_1

Pitot Pressure (1): 46 PSI
Coefficient of Discharge (1): 0.9
Hydrant Orifice Diameter (1): 4 inches
Additional Coefficient 0.83 on orifice #1



Static-Residual Hydrant

Flow Hydrant

Distance Between F_1 and R
56 ft (measured linearly)

Static-Residual Elevation
1223 ft (above sea level)

Flow Hydrant (F_1) Elevation
1222 ft (above sea level)

Elevation & distance values are approximate

EJ Flow Tests, LLC
21505 North 78th Ave. | Suite 130 | Peoria, Arizona 85382 | (602) 999-7637 |
John L. Echeverri | NICET Level IV 78493 SME | C-16 FP Contractor ROC 271705 AZ | NFPA CFPS 1915
www.flowtestsummary.com

32-DR-2021_V2
10/20/2021

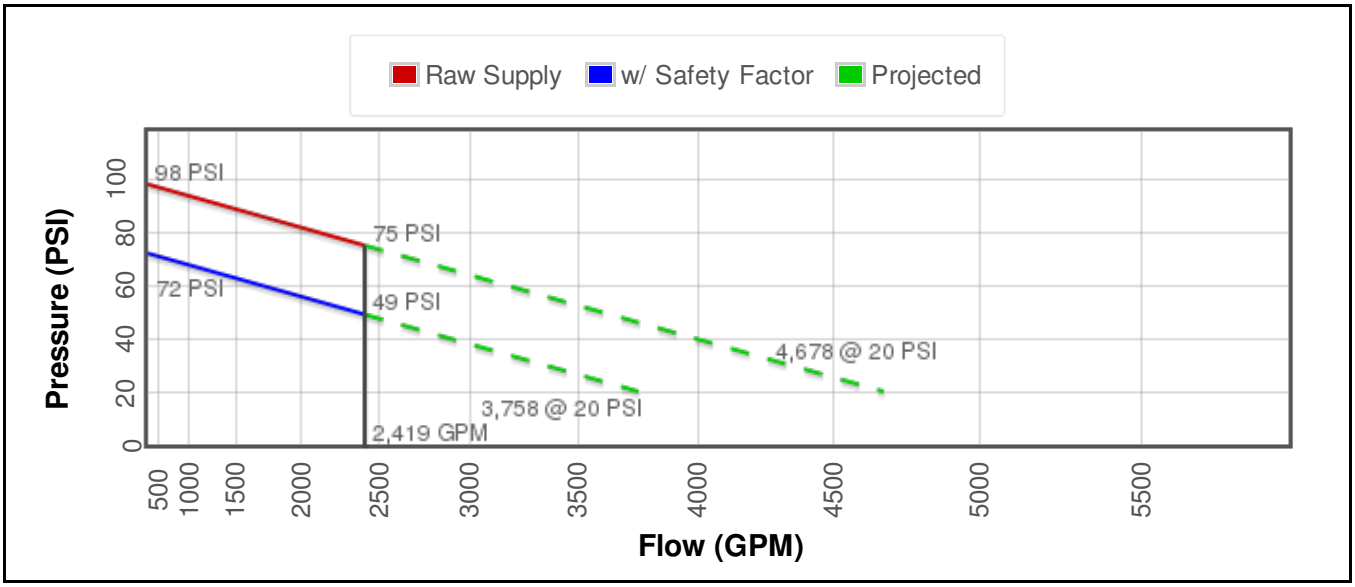
Flow Test Summary

Static-Residual Hydrant

Flow Hydrant (only hydrant F1 shown for clarity)

Approximate Project Site

Water Supply Curve $N^{1.85}$ Graph



SECTION B105 FIRE-FLOW REQUIREMENTS FOR BUILDINGS

B105.1 One- and two-family dwellings.
The minimum fire-flow and flow duration requirements for one- and two-family *dwellings* having a fire-flow calculation area that does not exceed 3,600 square feet (344.5 m^2) shall be 1,000 gallons per minute (3785.4 L/min) for 1 hour. Fire-flow and flow duration for *dwellings* having a fire-flow calculation area in excess of 3,600 square feet (344.5m^2) shall not be less than that specified in Table B105.1.

Exception: A reduction in required fire-flow of 50 percent, as *approved*, is allowed when the building is equipped with an *approved automatic sprinkler system*.

TABLE B105.1 MINIMUM REQUIRED FIRE-FLOW AND FLOW DURATION FOR BUILDINGS

FIRE-FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons per minute)[b]	FLOW DURATION (hours)
Type IA and IB[a]	Type IIA and IIIA[a]	Type IV and V-A[a]	Type IIB and IIIB[a]	Type V-B[a]		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	2
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	3
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	4
—	—	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
—	—	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
—	—	135,501-145,800	97,901-106,800	60,201-64,800	6,750	
—	—	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
—	—	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
—	—	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
—	—	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
—	—	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.
a. Types of construction are based on the *International Building Code*.
b. Measured at 20 psi residual pressure.

Hayden and McDowell Water Calculations											
Description	**Bldg Sqft**	***Demand (GPM/SF)**	**Demand Bldg + Exterior (GPM)**	**Max Day Demand (GPM)**	**Peak Day Demand (GPM)**	**Residual Pressure (P.S.I.)**	****2" Meter Loss**	****Backflow Pressure Loss**	**Friction Loss (P.S.I.)**	**Total Pressure Loss (P.S.I.)**	**Peak Hour (P.S.I.)**
Commercial Building	4,000	0.00181	7.2	14.5	43.4	62	0.1000	4	16.8	20.9	41.1
*Based on City of Scottsdale Design and Engineering Manual Chapter 6											

Hayden and McDowell Water + Fire Flow							
Description	**Bldg Sqft**	**Max Day Demand (GPM)**	***Fire Flow Requirement (GPM)**	**Max Day Demand + Fire Flow Requirement (GPM)**	**Peak Day Demand (GPM)**	**Peak Day + Fire Flow Demand (GPM)**	**Hydrant Flow Test Results (GPM)**
Commercial Building	4,000	14.5	1,500	1,514.5	43.4	1,543.4	4,678
*Per IFC 2015 Table B105.1 (2)							

$f = 0.2083\ (100 / c)^{1.852}\ q^{1.852} / d_h^{4.8655}$

where

f = friction head loss in feet of water per 100 feet of pipe (ft_{h20}/100 ft pipe)

c = Hazen-Williams roughness constant — 140 Copper

q = volume flow (gal/min)

dh = inside hydraulic diameter (inches) — 2*radius — 1.5

Hayden and McDowell Water Calculations											
Description	**Bldg Sqft**	***Demand (GPM/SF)**	**Demand Bldg + Exterior (GPM)**	**Max Day Demand (GPM)**	**Peak Day Demand (GPM)**	**Residual Pressure (P.S.I.)**	****2" Meter Loss**	****Backflow Pressure Loss**	**Friction Loss (P.S.I.)**	**Total Pressure Loss (P.S.I.)**	**Peak Hour (P.S.I.)**
Commercial Building	2,400	0.00181	4.3	8.7	26.1	62	0.1000	4	6.5	10.6	51.4
*Based on City of Scottsdale Design and Engineering Manual Chapter 6											

Hayden and McDowell Water + Fire Flow							
Description	**Bldg Sqft**	**Max Day Demand (GPM)**	***Fire Flow Requirement (GPM)**	**Max Day Demand + Fire Flow Requirement (GPM)**	**Peak Day Demand (GPM)**	**Peak Day + Fire Flow Demand (GPM)**	**Hydrant Flow Test Results (GPM)**
Commercial Building	2,400	8.7	1,500	1,508.7	26.1	1,526.1	4,678
*Per IFC 2015 Table B105.1 (2)							

$f = 0.2083\ (100 / c)^{1.852}\ q^{1.852} / d_h^{4.8655}$

where

f = friction head loss in feet of water per 100 feet of pipe (ft_{h20}/100 ft pipe)

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