CITY OF MARICOPA
PROUD HISTORY • PROSPEROUS FUTURE

FIRE DEPARTMENT

MEMO

To: City Manager, Rick Horst
From: Assistant Fire Chief, Brad Pitassi
CC: Fire Chief Brady Leffler, Assistant City Manager, Jennifer Brown
Date: May 12, 2021
Re: MCWID Hydrant Testing

On April 22nd through 23rd, 2021, the Arizona Flow Test, LLC. company conducted a National Fire Protection Association(NFPA) compliant hydrant flow test and inspection of the Maricopa Consolidated Water Improvement District (MCWID) system. This test was witnessed by both MCWID and City of Maricopa Fire/Medical members. The results of the testing found that all but two (2) hydrants met or exceeded the minimum required fire flows per the adopted 2018 International Fire Code (IFC).

The fire hydrants were tested, verified operational by fully opening each valve, removing the caps to assure non-sticking, threads check to be in good condition, and flowed. Each hydrant test gathered the actual gallons per minute (GPM) to ensure each hydrant can produce and meet the available water supply per (IFC) needed for suppression and provide guidance for determining the required fire flow, which is based on Insurance Services Office (ISO) Method. Four hydrants were Out of Service (OOS) at the time of the test and either need replacements or awaiting parts to be repaired.

The recommended next step in the system assessment is to have MCWID's report their fire flow reserved capacity. This is to assure daily consumption use can be maintained while they still provide a water supply to meet the IFC fire flow durations that is available at all times.

Fire Flow Background Information

Fire Flow is formally defined as "the flow rate of a water supply, measured at 20 psi (138 kPa), that is available for firefighting. The city has adopted the 2018 (IFC), which identifies the minimum fire flow and flow duration for buildings in the fire code section Appendix-B. A reference table is used to calculate fire flows per building square feet, type of construction used based on the International Building Code (IBC), and flow duration per hour. Fire flow can be reduced based on the presence of a sprinkler system.

One- and two-family dwellings Group R-3 and R-4 less than 3,600 sq. ft non-sprinkled require 1,000 GPM for a 1-hour duration. Buildings other than One- and two-family dwellings Group R-3 and R-4 that are more than 3,600 sq. ft with a Type-VB identified as wood construction require a minimum of 1,500 GPM for a 2-hour duration measured at 20 psi residual.

As the building size increases by sq. ft. and the different types of construction are used, fire flows also increase. Most water suppliers cannot meet the demands of increased fire flow and duration. The fire code allows a reduction if the building is sprinkled. A 75% reduction is allowed to a sprinkled building, but the resulting fire flows cannot decrease below 1,500 GPM measured at 20 PSI.

Arizona Flow Testing LLC

HYDRANT INSPECTION REPORT

Project Name:	Maricopa Water District
Project Address:	Maricopa, Arizona
Client Project No:	Not Provided
Arizona Flow Testing Project No.:	21140
Date and Time flow test conducted:	April 22 & 23, 2021
Data is current and reliable until:	October 23, 2021
Conducted by:	F. Vaughan & D. Klinder– AZ Flow Testing, LLC (480-250-8154)
Witnessed by:	Dan Ashton & Ciara Crowley – Maricopa Fire Dept
Witnessed by:	Matt Williford – Maricopa Water District.

Static Hyd#	Flow Hyd #	Static PSI	Residual PSI	Pitot PSI	Device	GPM Flowed	Avail GPM @ 20 PSI	Time
April 22, 2021								
A1	A2	74	34	13	4 Diff	1,549	1,822	822AM
A2	A4	70	46	13	4 HM	1,356	2,015	839AM
A4	A3	64	44	14	4 HM	1,407	2,153	856AM
A3	A7	64	50	18	4 HM	1,595	2,960	921AM
B9	C11	56	47	13	4 HM	1,356	2,866	944AM
C11	C12	61	42	13	4 HM	1,356	2,054	1003AM
C4	C2	70	44	13	4 HM	1,356	1,930	1023AM
D2	D3	60	46	13	4 HM	1,356	2,390	1135AM
D3	D6	62	33	10	4 HM	1,211	1,479	1152AM
D6	D7	62	36	10	4 HM	1,211	1,569	1210PM
D7	D8	66	35	10	4 HM	1,211	1,498	1219PM
B10	B11	61	56	30	4 DIFF	2,354	7,331	142PM
B11	B12	65	30	23	4DIFF	2,061	2,360	153PM
B12	B1	65	52	18	4HM	1,595	3,119	203PM
B1	B2	74	46	13	4HM	1,356	1,933	218PM
B2	B5	65	30	16	4HM	1,504	1,723	230PM
B6	B7	68	42	18	4HM	1,595	2,221	253PM
April 23, 2021								
A7	A6	64	46	18	4 HM	1,595	2,585	833AM
A6	A5	64	50	16	4 HM	1,504	2,791	841AM
A5	B19	64	50	19	4 DIFF	1,873	3,476	848AM
B19	B20	64	54	15	4 HM	1,456	3,241	858AM
B20	B12	68	44	23	4 DIFF	2,061	2,996	907AM
B14	B15	64	60	14	4 HM	1,407	5,136	922AM
C12	C2	64	54	17	4 HM	1,550	3,450	932AM
Static Hyd#	**Flow Hyd#**	**Static PSI**	**Residual PSI**	**Pitot PSI**	**Device**	**GPM Flow**	**Avail GPM @20 PSI**	**Time**
April 23, 2021								
C2	C3	62	50	12	4 DIFF	1,489	3,147	950AM
C3	C5	60	44	15	4 HM	1,456	2,388	1000AM
C5	C1	62	48	15	4 HM	1,456	2,635	1016AM
C9	C8	70	50	15	4 HM	1,456	2,388	1024AM
D8	D11	62	32	20	4 DIFF	1,922	2,305	1045AM
D11	D12	69	55	10	4 DIFF	1,359	2,673	1056AM
D9	D10	62	50	12	4 HM	1,303	2,562	1111AM
D1	D16	62	54	15	4 HM	1,456	3,565	1119AM
D4	D5	66	32	10	4 DIFF	1,359	1,600	1130AM

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D19	**D14**	**60**	**34**	**12**	**4 DIFF**	**1,489**	**1,878**	**1141AM**
D14	**D18**	**65**	**36**	**15**	**4 DIFF**	**1,664**	**2,110**	**1151AM**
D18	**D15**	**70**	**39**	**13**	**4 DIFF**	**1,549**	**2,006**	**1200PM**

Witnesses
DAN ASTON Maricopa Fire
CIARA CROWLEY Maricopa Fire
MATT WILLIFORD Maricopa Water District

Flow devices

4 DIFF	**4 inch Pollard Diffuser**	**Coefficient**	**0.9**
4 HM	**4 inch Hose Monster**	**Coefficient**	**0.7875**

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Hydrant condition and working order.

Most hydrants were easy to operate and in good working condition.

The follow hydrants had some minor issues.

D12 Very high with trees/brush close to it.
D5 Very low. Very hard to operate
D10 Hard to operate
A3 Very low.

APPENDIX B FIRE-FLOW REQUIREMENTS FOR BUILDINGS

SECTION B105
FIRE-FLOW REQUIREMENTS FOR BUILDINGS

B105.1 One- and two-family dwellings, Group R-3 and R-4 buildings and townhouses.

The minimum *fire-flow* and flow duration requirements for one- and two-family *dwellings*, Group R-3 and R-4 buildings and *townhouses* shall be as specified in Tables B105.1(1) and B105.1(2).

TABLE B105.1(1)
REQUIRED FIRE FLOW FOR ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

FIRE-FLOW CALCULATION AREA (square feet)	AUTOMATIC SPRINKLER SYSTEM (Design Standard)	MINIMUM FIRE FLOW (gallons per minute)	FLOW DURATION (hours)
0–3,600	No automatic sprinkler system	1,000	1
3,601 and greater	No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B105.1(2) at the required fire-flow rate
0–3,600	Section 903.3.1.3 of the *International Fire Code* or Section P2904 of the *International Residential Code*	500	1/2
3,601 and greater	Section 903.3.1.3 of the *International Fire Code* or Section P2904 of the *International Residential Code*	1/2 value in Table B105.1(2)	1

For SI: 1 square foot = 0.0929 m^2, 1 gallon per minute = 3.785 L/m.

TABLE B105.1(2)
REFERENCE TABLE FOR TABLES B105.1(1) AND B105.2

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	2
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	
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	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
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	4
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	
—	—	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.

B105.2 Buildings other than one- and two-family dwellings, Group R-3 and R-4 buildings and townhouses.

The minimum *fire-flow* and flow duration for buildings other than one- and two-family *dwellings*, Group R-3 and R-4 buildings and *townhouses* shall be as specified in Tables B105.2 and B105.1(2).

TABLE B105.2
REQUIRED FIRE FLOW FOR BUILDINGS OTHER THAN ONE- AND TWO-FAMILY DWELLINGS, GROUP R-3 AND R-4 BUILDINGS AND TOWNHOUSES

AUTOMATIC SPRINKLER SYSTEM(Design Standard)	MINIMUM FIRE FLOW(gallons per minute)	FLOW DURATION (hours)
No automatic sprinkler system	Value in Table B105.1(2)	Duration in Table B105.1(2)
Section 903.3.1.1 of the *International Fire Code*	25% of the value in Table B105.1(2)[a]	Duration in Table B105.1(2) at the reduced flow rate
Section 903.3.1.2 of the *International Fire Code*	25% of the value in Table B105.1(2)[b]	Duration in Table B105.1(2) at the reduced flow rate

For SI: 1 gallon per minute = 3.785 L/m.

a. The reduced fire flow shall be not less than 1,000 gallons per minute.
b. The reduced fire flow shall be not less than 1,500 gallons per minute.

B105.3 Water supply for buildings equipped with an automatic sprinkler system.

For buildings equipped with an *approved automatic sprinkler system*, the water supply shall be capable of providing the greater of:

1. The *automatic sprinkler system* demand, including hose stream allowance.
2. The required *fire flow*.