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CIVIL AND SURVEY

Water Design Report
For
Paseo De Las Flores
7300 Via Paseo Del Sur

Scottsdale, Arizona

EXPIRES: 9/30/18

Accepted for
Water Resources
Doug Mann
5-25-16

May 2016

Prepared by:
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10450 North 74th Street, Suite 200
Scottsdale, AZ 85258

8-DR-2016
5/25/2016

WATER DESIGN REPORT
FOR

PASEO DE LAS FLORES
7300 VIA PASEO DEL SUR

SCOTTSDALE, ARIZONA

PREPARED FOR
LGE CORPORATION
740 N. 52ND STREET, SUITE 200
PHOENIX, ARIZONA 85018
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H.E. PROJECT NO. LGEC202

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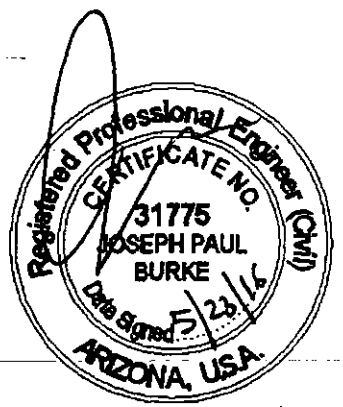


EXPIRES: 9/30/18

1.0 INTRODUCTION

This water report has been prepared under a contract with LGE Corporation, the developer of the Paseo De Las Flores, mixed use development, a project located at 7300 Via Paseo Del Sur in Scottsdale, Arizona. The project consists of the demolition of an existing building and the development of two new buildings with parking, landscaping, utilities and drainage facilities. Building A is a 6,735 SF one-story building for restaurant/retail use. Building B is a 21,313 SF two-story building with retail/restaurant use on the first floor and office use on the second floor. The net site area is approximately 2.65 acres.

The site is specifically located within a portion of the southwest quarter of Section 1, Township 2 North, Range 4 East of the Gila and Sand River Base and Meridian, Maricopa County, Arizona. The proposed access to the site will be provided via Paseo Del Sur and Hayden Road. . Figure 1, in Appendix A, illustrates the location of the project site in relation to the City of Scottsdale street system.

2.0 EXISTING SITE CONDITIONS

The site is currently developed with an existing single-story stucco building that was used for church facilities with parking. The site is bordered by park area to the north, Paseo Del Sur roadway to the east, an apartment development to the south and Hayden Road to the west.

3.0 EXISTING WATER DISTRIBUTION SYSTEM

There is an existing 8-inch ACP water main in the east side of Paseo Del Sur fronting the site and an existing 8-inch ACP water main in the center of Hayden Road also fronting the site. These two water mains are looped via a 10-inch water main in E. McCormick Road and an 8-inch water main in E. Via De La Entrada Road. There is an existing 2-inch water meter adjacent to the site at Hayden Road that may be available for this development. There is an existing 2-inch water meter and backflow device adjacent to the site on Via Paseo Del Sur that also may be available for this development. Refer to the Conceptual Utility Plan located in the Back Pocket of this report.

4.0 PROPOSED DOMESTIC WATER DEMAND

The average day, maximum day and peak hour demands for this development were derived using unit flow requirements out of the City of Scottsdale Design Standards & Policies Manual for Water, Figure 6.1-2. Refer to Appendix D in this report. Average Day Demand (ADD), Maximum Day Demand (MDD) and Peak Hour Demand (PHD) for domestic water usage for each building are identified below and in a spreadsheet located in Appendix B. Maximum Day Demand is 2 times the ADD and Peak Hour Demand is 4 times the ADD.

TABLE 1 – Domestic Water Demand						
Junction Node	I.D.	Building use	Average Day Demand (ADD) GPD	Maximum Day Demand (MDD) GPM	Peak Hour Demand (PHD) GPM	Pressure @ PHD (PSI)*
J-3	Building A	Retail/Restaurant	8,694	12	24	86.11
J-8	Building B	Retail/Restaurant /Office	16,566	23	46	85.75

*this is the static pressure at the junction node during a non-fire scenario.

5.0 PROPOSED FIRE FLOW DEMAND

The proposed system was modeled using WATERCAD, a pipe network analysis program by Haestad Methods. A reservoir and pump were added to the model near the hydrant flow test location to simulate the pressure versus flow curve. The model has been calibrated to match the results of the hydrant test. Note that the pipe (Model pipes connecting the pump and reservoir are not a part of the system and are oversized to 120-inch to minimize system losses. Pipes and junctions were added to the network model matching the pipe sizes, materials and elevations of the proposed system.

The model is completed as a closed system without extensive information from the entire city pipe network, which is not feasible for the requirements of this report. A closed system is conservative having one point source of water supply and pressure whereas the existing system can have multiple supply sources feeding the pipe network surrounding the development. The flow test should be representative of the demand adjacent properties have on the system. The hydrant flow test results reflect the time and location of the test. Refer to Appendix C for Fire Flow Test results.

Per the International Fire Code (IFC), the maximum fire flow is based on the construction type of the building and its square footage. The larger of the two buildings has an area of 21,313 SF. The building type is V-B. This requires a fire flow of 4,000 GPM be achieved at a minimum pressure of 20 PSI. The proposed building will be sprinklered. Therefore, a 50% reduction in the fire flow requirement may be applied. This reduces the required fire flow to 2,000 GPM. This may be achieved by drawing 1,000 GPM each from two fire hydrants near the building. Results from the WaterCAD analysis are summarized below with calculations and detailed results in Appendix B.

TABLE 2 – Fire Flow Demand				
Junction Node	Node Location	Fire Flow Required (GPM)	Available Fire Flow (GPM)	Minimum Pressure (PSI)
J-5	Hydrant north of bldg. A	2,000	2,735.6	30
J-7	Hydrant south of bldg. B	2,000	2,653.0	30

J3
J8

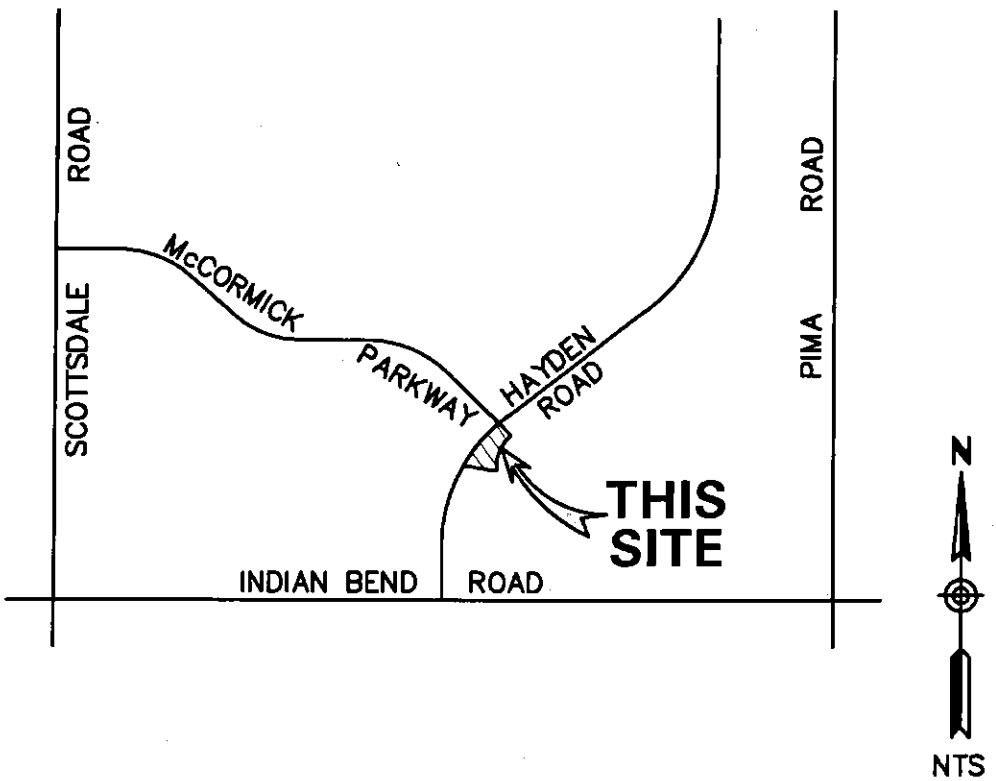
Ref Hyd. calcs.

5.0 CONCLUSIONS

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

- The proposed water network meets the requirements to support this development.
- Results of the WaterCAD model indicate that the proposed water network does provide the needed fire flow and pressure to service this development.
- All domestic water lines and firelines shall be privately owned and maintained.

APPENDIX A
FIGURES



VICINITY MAP
FIGURE 1

APPENDIX B
CALCULATIONS AND DATA SHEET

Project: Paseo De Las Flores
Project Number: LGEC202
City: Scottsdale
Date: 5/20/2016

Building Area Total= 28,020 sf

PROJECTED MAXIMUM DOMESTIC WATER DEMANDS

I.D.	Land Use	Building Area sf	Average Daily Flows by Land Use Table 6. 1-2 Avg Daily Flows Design Standards Manual For Water and Wastewater Systems		Average Daily Flow (ADF) gpd	Average Daily Flow (ADF) gpm	Maximum Daily Flow (ADF * 2) gpm	Peak Flow (ADF * 4) gpm
Building A	**Restaurant**	6,688	1.3	gals per s.f.	8,694	6.0	12	24
Building B	**Office**	11,098	0.6	gals per s.f.	6,659	4.6	9.2	18.4
	Retail	6,815	0.8	gals per s.f.	5,452	3.8	7.6	15.2
	Restaurant	3,419	1.3	gals per s.f.	4,445	3.1	6.2	12.4
	TOTAL:	**28,020**			**25,250**	**17.5**	**35.0**	**70.0**

FIRE FLOW SUMMARY

I.D.	Proposed Building Type	Building Area squate feet	Estimated Construction Type	Minimum Required Fire Flow, Table B105.1 2003 Internation Fire Code	50% Sprinklered Fire Flow	Building Sprinklered
				(gpm)	(gpm)	
Building A	Commercial	6,735	V-B	2,250	1,125	YES
Building B	Commercial	21,313	V-B	4,000	2,000	YES
	Total	28,048				

Scenario: Peak Flow

Scenario: Peak Flow
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand Calculated (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,292.00	Zone	Demand	0.00	Fixed	0.00	1,490.52	85.89
J-2	1,291.50	Zone	Demand	0.00	Fixed	0.00	1,490.52	86.11
J-3	1,291.50	Zone	Demand	24.00	Fixed	24.00	1,490.52	86.11
J-4	1,289.50	Zone	Demand	0.00	Fixed	0.00	1,490.52	86.97
J-5	1,291.00	Zone	Demand	0.00	Fixed	0.00	1,490.52	86.32
J-6	1,290.00	Zone	Demand	0.00	Fixed	0.00	1,490.51	86.75
J-7	1,291.00	Zone	Demand	0.00	Fixed	0.00	1,490.51	86.32
J-8	1,290.00	Zone	Demand	46.00	Fixed	46.00	1,490.51	86.75
J-9	1,290.00	Zone	Demand	0.00	Fixed	0.00	1,490.51	86.75
J-10	1,291.00	Zone	Demand	0.00	Fixed	0.00	1,490.52	86.32
J-11	1,291.50	Zone	Demand	0.00	Fixed	0.00	1,490.52	86.11

Scenario: Public Fire
Fire Flow Analysis
Fire Flow Report

Label	Zone	Fire Flow Iterations	Fire Flow Balanced?	Satisfies Fire Flow Constraints?	Needed Fire Flow (gpm)	Available Fire Flow (gpm)	Total Flow Needed (gpm)	Total Flow Available (gpm)	Residual Pressure (psi)	Calculated Residual Pressure (psi)	Minimum Zone Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction
J-1	Zone	3	true	true	2,000.00	2,811.25	2,000.00	2,811.25	30.00	30.00	30.00	30.22	J-11
J-2	Zone	3	true	true	2,000.00	2,774.66	2,000.00	2,774.66	30.00	30.00	30.00	30.00	J-11
J-3	Zone	3	true	true	2,000.00	2,723.64	2,012.00	2,735.64	30.00	30.00	30.00	30.03	J-11
J-4	Zone	3	true	true	2,000.00	2,682.37	2,000.00	2,682.37	30.00	30.00	30.00	30.00	J-5
J-5	Zone	3	true	true	2,000.00	2,631.18	2,000.00	2,631.18	30.00	30.00	30.00	31.78	J-6
J-6	Zone	3	true	true	2,000.00	2,624.95	2,000.00	2,624.95	30.00	30.00	30.00	30.58	J-7
J-7	Zone	3	true	true	2,000.00	2,616.28	2,000.00	2,616.28	30.00	30.00	30.00	31.00	J-8
J-8	Zone	3	true	true	2,000.00	2,630.01	2,023.00	2,653.01	30.00	30.04	30.00	30.00	J-7
J-9	Zone	3	true	true	2,000.00	2,636.23	2,000.00	2,636.23	30.00	30.00	30.00	30.25	J-7
J-10	Zone	3	true	true	2,000.00	2,660.48	2,000.00	2,660.48	30.00	30.00	30.00	31.19	J-7
J-11	Zone	3	true	true	2,000.00	2,714.24	2,000.00	2,714.24	30.00	30.00	30.00	30.44	J-3

Scenario: Peak Flow
Steady State Analysis
Pipe Report

Label	Length (ft)	Diameter (in)	Material	Hazen-Williams C	Check Valve?	Minor Loss Coefficient	Control Status	Discharge (gpm)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)
P-1	10.00	120.0	Ductile Iron	130.0	false	0.00	Open	70.00	1,292.00	1,292.00	0.00	0.00
P-2	10.00	120.0	Ductile Iron	130.0	false	0.00	Open	70.00	1,490.52	1,490.52	0.00	0.00
P-3	33.00	8.0	Asbestos Cem	140.0	false	0.00	Open	70.00	1,490.52	1,490.52	0.00	0.12
P-4	69.00	8.0	PVC	150.0	false	0.00	Open	42.23	1,490.52	1,490.52	0.00	0.04
P-5	17.00	8.0	PVC	150.0	false	0.00	Open	18.23	1,490.52	1,490.52	0.00	0.01
P-6	135.00	8.0	PVC	150.0	false	0.00	Open	18.23	1,490.52	1,490.52	0.00	0.01
P-7	153.00	8.0	PVC	150.0	false	0.00	Open	18.23	1,490.52	1,490.52	0.00	0.01
P-8	208.00	8.0	PVC	150.0	false	0.00	Open	18.23	1,490.52	1,490.51	0.00	0.01
P-9	105.00	8.0	PVC	150.0	false	0.00	Open	18.23	1,490.51	1,490.51	0.00	0.01
P-10	50.00	8.0	PVC	150.0	false	0.00	Open	18.23	1,490.51	1,490.51	0.00	0.01
P-11	46.00	8.0	PVC	150.0	false	0.00	Open	-27.77	1,490.51	1,490.51	0.00	0.02
P-12	173.00	8.0	PVC	150.0	false	0.00	Open	-27.77	1,490.51	1,490.52	0.00	0.02
P-13	209.00	8.0	Asbestos Cem	140.0	false	0.00	Open	-27.77	1,490.52	1,490.52	0.00	0.02

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	FIRE HYDRANTS
Active Topology Alternative	Base-Active Topology
Physical Alternative	Base-Physical
Demand Alternative	FIRE HYDRANTS
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	Fire Flow-FIRE HYDRANTS
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	703,286.86 ft	Upstream Pipe	P-1
Y	925,402.52 ft	Downstream Pipe	P-2
Elevation	1,292.00 ft		

Pump Definition Summary	
Pump Definition	Default Pump Definition

Initial Status			
Initial Pump Status	On	Initial Relative Speed Factor	1.00

Calculated Results Summary

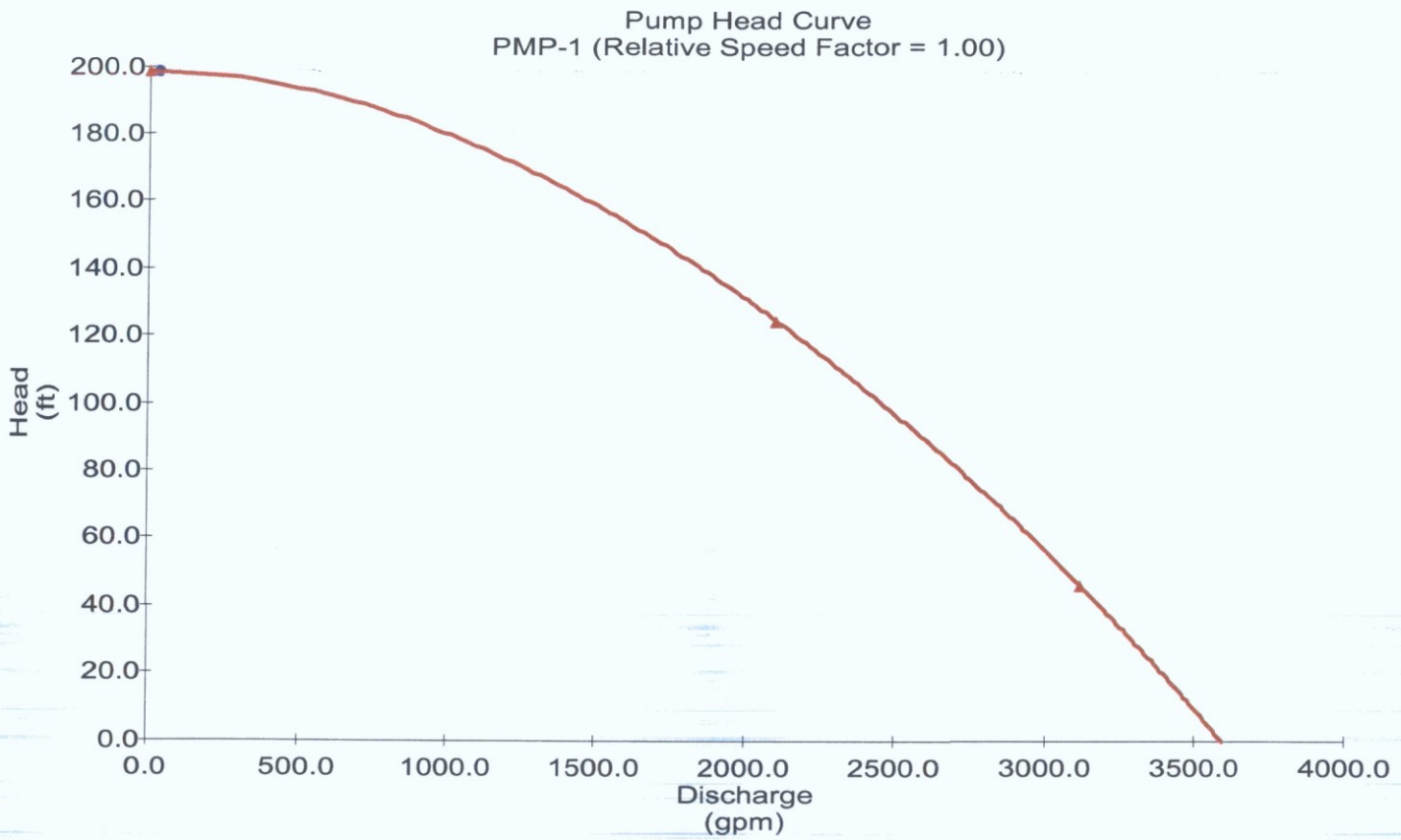
Time (hr)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Pump Head (ft)	Relative Speed	Calculated Water Power (Hp)
0.00	On	1,292.00	1,490.62	35.00	198.62	1.00	1.76

0 198.66

2104 124.74

3111 46.20

Detailed Report for Pump: PMP-1



Scenario: Model Test 1
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand Calculated (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,292.00	Zone	Demand	0.00	Fixed	0.00	1,490.66	85.95
J-2	1,291.50	Zone	Demand	0.00	Fixed	0.00	1,490.66	86.17
J-3	1,291.50	Zone	Demand	0.00	Fixed	0.00	1,490.66	86.17
J-4	1,289.50	Zone	Demand	0.00	Fixed	0.00	1,490.66	87.03
J-5	1,291.00	Zone	Demand	0.00	Fixed	0.00	1,490.66	86.38
J-6	1,290.00	Zone	Demand	0.00	Fixed	0.00	1,490.66	86.82
J-7	1,291.00	Zone	Demand	0.00	Fixed	0.00	1,490.66	86.38
J-8	1,290.00	Zone	Demand	0.00	Fixed	0.00	1,490.66	86.82
J-9	1,290.00	Zone	Demand	0.00	Fixed	0.00	1,490.66	86.82
J-10	1,291.00	Zone	Demand	0.00	Fixed	0.00	1,490.66	86.38
J-11	1,291.50	Zone	Demand	0.00	Fixed	0.00	1,490.66	86.17

Scenario: Model Test 2
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,292.00	Zone	Demand	2,104.00	Fixed	2,104.00	1,416.74	53.97
J-2	1,291.50	Zone	Demand	0.00	Fixed	0.00	1,416.74	54.19
J-3	1,291.50	Zone	Demand	0.00	Fixed	0.00	1,416.74	54.19
J-4	1,289.50	Zone	Demand	0.00	Fixed	0.00	1,416.74	55.05
J-5	1,291.00	Zone	Demand	0.00	Fixed	0.00	1,416.74	54.40
J-6	1,290.00	Zone	Demand	0.00	Fixed	0.00	1,416.74	54.83
J-7	1,291.00	Zone	Demand	0.00	Fixed	0.00	1,416.74	54.40
J-8	1,290.00	Zone	Demand	0.00	Fixed	0.00	1,416.74	54.83
J-9	1,290.00	Zone	Demand	0.00	Fixed	0.00	1,416.74	54.83
J-10	1,291.00	Zone	Demand	0.00	Fixed	0.00	1,416.74	54.40
J-11	1,291.50	Zone	Demand	0.00	Fixed	0.00	1,416.74	54.19

Scenario: Model Test 3
Steady State Analysis
Junction Report

Label	Elevation (ft)	Zone	Type	Base Flow (gpm)	Pattern	Demand Calculated (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-1	1,292.00	Zone	Demand	3,111.00	Fixed	3,111.00	1,338.20	19.99
J-2	1,291.50	Zone	Demand	0.00	Fixed	0.00	1,338.20	20.20
J-3	1,291.50	Zone	Demand	0.00	Fixed	0.00	1,338.20	20.20
J-4	1,289.50	Zone	Demand	0.00	Fixed	0.00	1,338.20	21.07
J-5	1,291.00	Zone	Demand	0.00	Fixed	0.00	1,338.20	20.42
J-6	1,290.00	Zone	Demand	0.00	Fixed	0.00	1,338.20	20.85
J-7	1,291.00	Zone	Demand	0.00	Fixed	0.00	1,338.20	20.42
J-8	1,290.00	Zone	Demand	0.00	Fixed	0.00	1,338.20	20.85
J-9	1,290.00	Zone	Demand	0.00	Fixed	0.00	1,338.20	20.85
J-10	1,291.00	Zone	Demand	0.00	Fixed	0.00	1,338.20	20.42
J-11	1,291.50	Zone	Demand	0.00	Fixed	0.00	1,338.20	20.20

APPENDIX C
FIRE HYDRANT TEST

ALLIANCE FIRE PROTECTION CO.

Phone: (480) 966-9178 Fax: (480) 967-9191
2114 East Cedar Street • Tempe, Arizona 85281
E-mail Address: afpc@afpc.com

AZ Lic. C-16 58130
AZ Lic. L-16 74007
NV Lic. C-41a 30135

FIRE HYDRANT FLOW TEST

Name: Paseo de las Flores
7300 Via Paseo Del Sur
Scottsdale, AZ

Date: 01/14/16
Time: 9:00 AM
Report #
Tech: Gus Piombi

Static Hydrant: Flowing Hydrant:

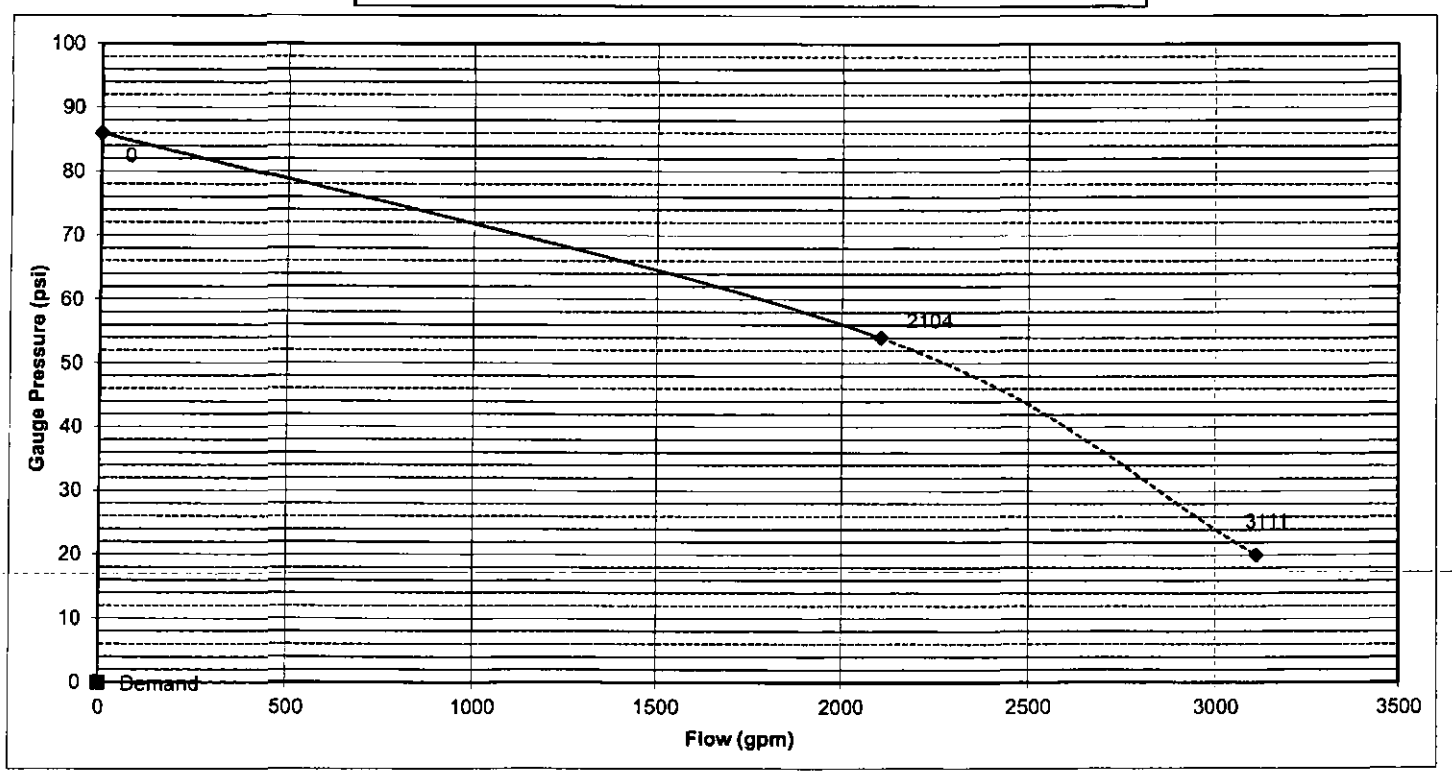
Elevation: 0 Elevation: 0

Dist. Between Hydrants: 400 ft
Type of Supply: City Main

Diameter of Main: 8"
Static Pressure: 86.0
Residual Pressure: 54.0
Pump Present: NO
Tank Present: NO
Req. GPM: Req. PSI:

Hydrant:	1	2	3	4
Outlet Diameter:	4.0			
Pitot Reading:	24.0			
Coeff:	0.900			
Discharge GPM:	2104	0	0	0

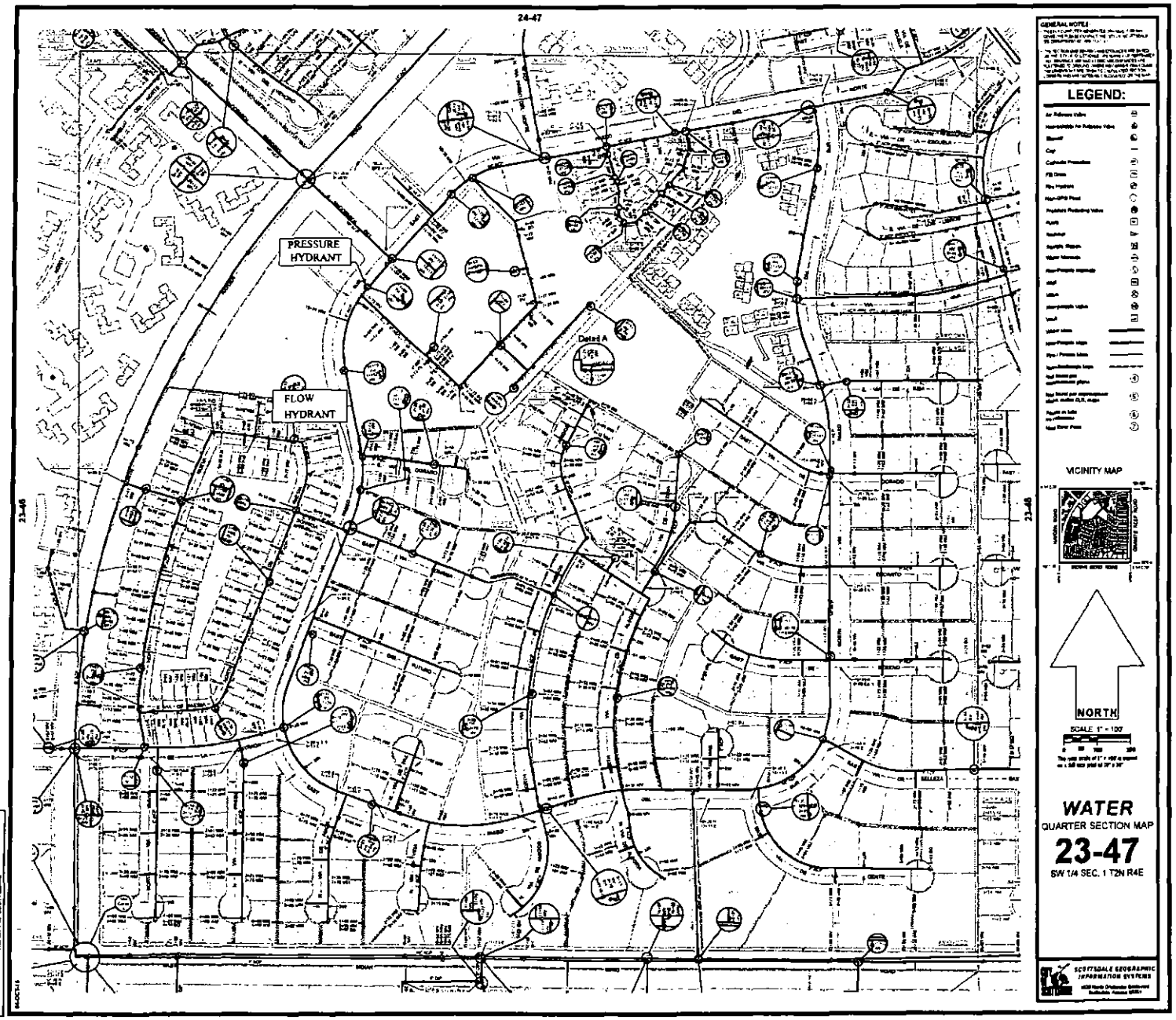
Static pressure of	86	psi @	0	gpm
Residual pressure of	54	psi @	2104	gpm
Available flow @	20	psi @	3111	gpm



Comments:

NOTES:

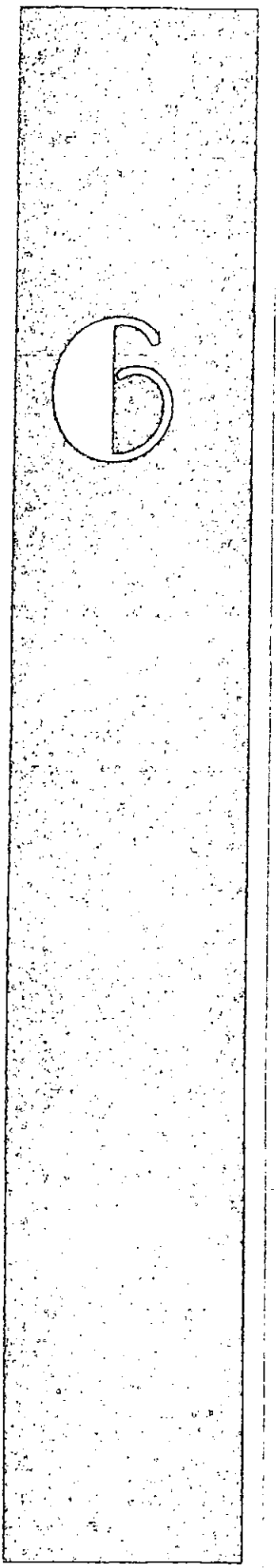
1. Flowing hydrant is assumed to be on a circulating main or downstream of the pressure test hydrant on a dead-end system.
2. Flow analysis assumes a gravity flow system with no distribution pumps and having no demand, other than the test
3. The distance between hydrants, elevations & main diameters are for information only.


24-47
23-46
23-46
PRESSURE HYDRANT
FLOW HYDRANT
Detail A
LEGEND:
VICINITY MAP
NORTH
SCALE: 1" = 100'
WATER
QUARTER SECTION MAP
23-47
SW 1/4 SEC. 1 T2N R4E
SCOTTSDALE GEOGRAPHIC INFORMATION SYSTEMS

APPENDIX D
REFERENCE INFORMATION

Chapter 6

WATER



This chapter provides ordinance, policy, and standards establishing design criteria for constructing and modifying water systems to be owned and operated by the city. It provides guidance on agreements, design report preparation, transmission and distribution systems, fire protection and final plans preparation.

5. Show in calculations that the minimum water pressure requirements are met at the highest proposed finish floor elevation (with and without fire flow).

AVERAGE DAY WATER DEMANDS				
Land Use	**Inside Use**	**Outside Use**	**Total Use**	
Residential Demand per Dwelling Unit:				
< 2 DU/ac	208.9	276.7	485.6	per unit
2 – 2.9 DU/ac	193.7	276.7	470.4	per unit
3 – 7.9 DU/ac	175.9	72.3	248.2	per unit
8 – 11.9 DU/ac	155.3	72.3	227.6	per unit
12 – 22 DU/ac	155.3	72.3	227.6	per unit
High Density Condominium	155.3	30	185.3	per unit
Resort Hotel (includes site amenities)	401.7	44.6	446.3	per room
Service and Employment:				
Restaurant	1.2	0.1	1.3	per sq.ft.
Commercial/Retail	0.7	0.1	0.8	per sq.ft.
Commercial High Rise	0.5	0.1	0.6	per sq.ft.
Office	0.5	0.1	0.6	per sq.ft.
Institutional	670	670	1340	per acre
Industrial	873	154	1027	per acre
Research and Development	1092	192	1284	per acre
Special Use Areas:				
Natural Area Open Space	0	0	0	per acre
Developed Open Space – Parks	0	1786	1786	per acre
Developed Open Space – Golf Course	0	4285	4285	per acre

FIGURE 6.1-2 AVERAGE DAY WATER DEMANDS IN GALLONS PER DAY

6. Pipes and nodes - ID, demand, pressure, elevation, hydraulic grades, length, status, diameter, velocity, headloss / 1000 ft.
7. Reservoirs and pumps - ID, elevation, hydraulic grade, inflow, outflow.
8. PRVs - ID, elevation, upstream and downstream hydraulic grade.
9. Include diagrams clearly showing all water pipe and node references.
10. Pay particular attention to water demand factors used for restaurants or specialty developments.
11. Use scour analysis where surface flows exceed 500 cubic feet per second (cfs).

F. Summary

1. Provide a summary of the proposed water improvements stating that all the city's design standards and policies have been met or indicate any variance or exception. Note why the developer is requesting any variance or exception.
2. Include a brief project schedule indicating the proposed start and completion of the developments improvements.

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

FIRE FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons/minute)[c]	FLOW DURATON (hours)
Type 1A and IB[b]	Type 11A and IIIA[b]	Type IV and V-A[b]	Type IIB and IIIB[b]	Type V-B[b]		
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
97,7091-112,700	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	40,601-45,400	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] The minimum required fire flow shall be allowed to be reduced by 25 percent for Group R.

[b] Types of construction are based on the *International Building Code*

[c] Measured at 20 psi.

SPECIFICATION SHEET

FEBCO

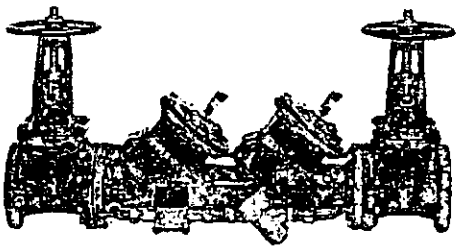
MASTER series

MasterSeries® 856

Double Check Detector Assemblies

Size: 2½" - 10" (65mm - 250mm)

The FEBCO Master Series® 856 Double Check Detector Assemblies are designed for Non-Health Hazard Fire Sprinkler Systems.
End Connections – Flanged ANSI B16.1, Class 125



Model 856 Double Check Detector Assembly
U.S. Patent No. 4,989,635

Pressure – Temperature

Temperature Range:	32°F to 140°F (0°C to 60°C)
Max. Working Pressure:	175psi (12.1 bar)
Hydrostatic Test Press:	350psi (24.1 bar)

Materials

Main Valve Body:	Ductile iron Grade 65-45-12
Coating:	Fusion epoxy coated internal and external AWWA C550-90
Shutoff Valves:	OS&Y resilient wedge gate valves AWWA C509
Trim:	Bronze Alloy C83600
Elastomer Discs:	EPDM
Spring:	Stainless steel
Clamp:	AWWA C606 (10" only, 250mm)

Approvals – Standards

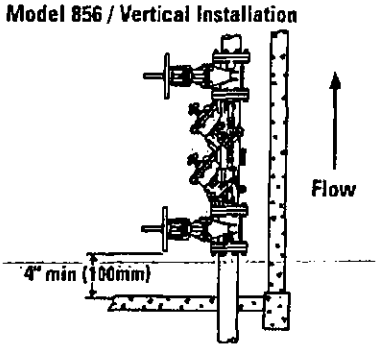
- Approved by the Foundation for Cross-connection Control and Hydraulic Research at the University of Southern California. - 2½" - 8" (65 - 200mm)
- ANSI/AWWA (C510) - 2½" - 8" (10" Horizontal)

ASSE 1048 2½" - 8" (65 - 200mm) 10" Horiz. (250mm)

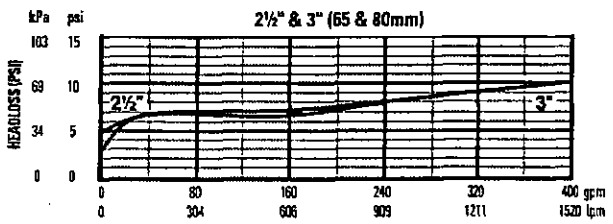
CSA B64.5

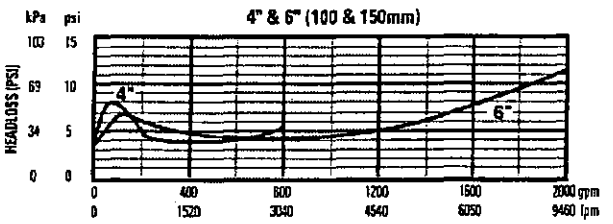
c UL us CLASSIFIED — FM Approved — 2½" - 8" (65 - 200mm)

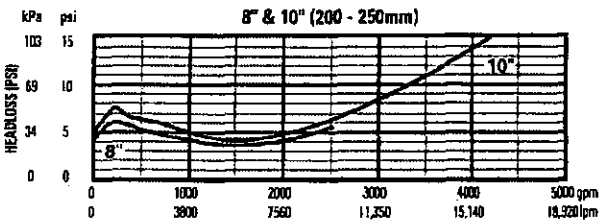
Model 856 / Vertical Installation



Capacity







IMPORTANT: INQUIRE WITH GOVERNING AUTHORITIES FOR LOCAL INSTALLATION REQUIREMENTS

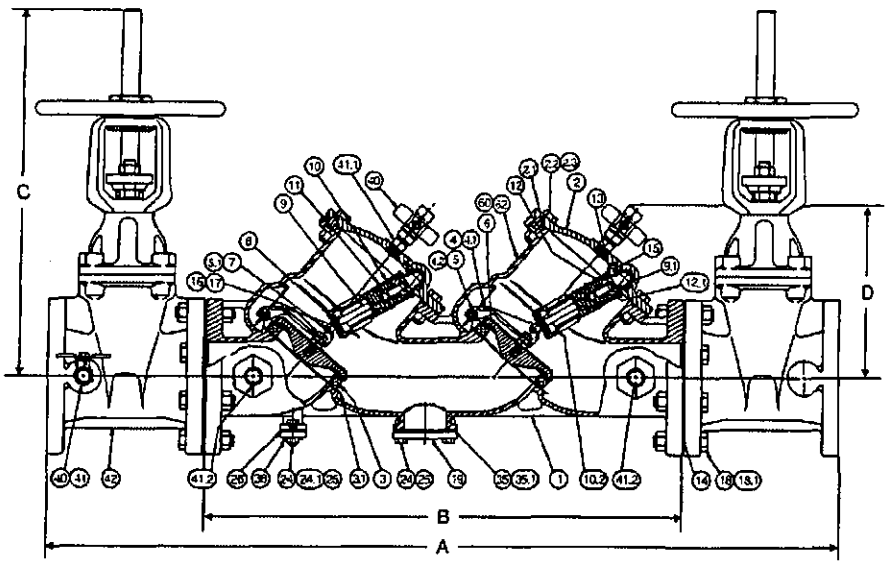
Job Name _____ Contractor _____

Job Location _____ Approval _____

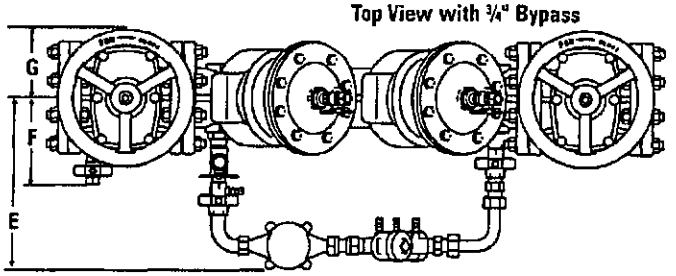
Engineer _____ Contractor's P.O. No. _____

Approval _____ Representative _____

Model 856 / Materials of Construction



Top View with ¾" Bypass



ITEM	DESCRIPTION	MATERIAL
1	Body	A536 GR 65-45-12
2	Cover	A536 GR 65-45-12
2.1	O-Ring	EPDM ASTM D2000
2.2	Cap Screw	Plated Steel
2.3	Hex Nut	Plated Steel
3	Seat Ring	B584 Alloy C83600
3.1	Gasket	EPDM ASTM D2000
4	Arm	B584 Alloy C83600
4.1	Bushing-Swing Pin	Acetal Resin
4.2	Swing Pin	304 SS
5	Retaining Clip	302 SS
6	Check Disk Assy	EPDM Coated GR, 45 Ductile Iron with type 304SS stem
7	Load Pin	304 SS
8	Lwr Spring Retnr	B584 Alloy C83600
9	Spring Stem	304 SS
9.1	Elastic Stop Jam Nut	18-8 SS
10	Spring	A313 Type 631 SS
10.2	Spring Shim 2nd Check	Acetal Resin
11	Spring Guide	B130 Alloy C22000
12	Upr Spring Retnr	B584 Alloy C83600
12.1	Bushing-Spr. Stem	Acetal Resin
13	Pivot Bearing	B585 Alloy C83600
14	Flange Gasket	Rubber/Fabric
15	Bearing Socket	Acetal Resin
16	Hex Jam Nut	18-8 SS
17	Washer	302 SS
18	Flange Nut	Plated Steel
18.1	Flange Nut	Plated Steel
24	RV Mtg Bolt	Plated Steel
24.1	Washer	Plated Steel
25	Nut	Plated Steel
26	Gasket	EPDM
35	O-ring	EPDM ASTM D2000
35.1	O-Ring	EPDM ASTM D2000
36	Cover	B584 Alloy C83600
40	Ball Valve	B584 Alloy C84400
41	Nipple	Brass
41.1	Nipple	Brass
41.2	Nipple	Brass
42	Gate Valve (NRS)	AWWA C509
60	Identification Plate	B36 Alloy C26000
62	Drive Screw	Stainless Steel
70	Clamp	AWWA C606 (10" Only)

Dimensions – Weights

Size: 2½" - 10" (65 - 250mm)

SIZE (DN)		DIMENSIONS															
		A		B		C*		D		E		F		G		OS&Y	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kg.
2½	65	40¾	1035	25½	648	16⅜	416	10	254	13⅜	340	7⅛	181	4½	114	218	98.9
3	80	41⅞	1064	25⅝	651	22¼	565	10	254	13⅜	340	7⅜	187	4½	114	228	103.5
4	100	46¼	1175	28	711	23¼	591	10⅛	257	14	356	8⅛	206	5½	140	327	148.3
6	150	56	1422	34¾	883	30⅛	765	12¾	324	15	381	9⅞	251	6½	165	509	230.9
8	200	65	1651	41¾	1061	37¾	959	15⅜	397	15¾	400	11⅛	283	7	178	789	357.9
10	250	72⅝	1845	46⅜	1178	48	1219	15⅝	397	15¾	400	12⅜	314	9	229	909	412.3

* With OS&Y Gate Valves (Full Open)
Note: Dimensions shown are nominal. Allowances must be made for normal manufacturing tolerances.

FEBCO®

ISO 9001-2000 CERTIFIED

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