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OR CCB NO. 1045

Reviewed for Code Compliance - 08/18/2023 3:43:54 PM
Permit Number 23-01679-01

FIRE PROTECTION HYDRAULIC CALCULATIONS SUBMITTAL FOR

WILCO EUGENE

10:50:16 AM

4818 W 11TH AVE
EUGENE, OR

Date: 4/20/2023

Job# SC1388

Andy Shuck
Fire Protection Design

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Received by City of Eugene: 10_FP_Wilco_Eugene_Hydraulic_Calculations - 05/15/2023

CALCULATION SUMMARY

Project Name : Wilco Eugene

Project Location: West 11th & Willow Creek

Contract No. : SC1388

City: Eugene, OR

Design Areas

Design Area Name	Calc. Mode (Model)	Occupancy	Area of Application	Total Water	Pressure @ Source	Min. Density	Min. Pressure	Min. Flow	Calculated Heads	Hose Streams	Margin To Source
			(ft ²)	(gpm)	(psi)	(gpm/ft ²)	(psi)	(gpm)	#	(gpm)	(psi)
1	Demand (HW)	Ordinary 2	2552	934.4	Required 80.6	0.2	15.2	21.8	26	250	10.7

HYDRAULIC CALCULATIONS for

Job Information

Project Name : Wilco Eugene

Contract No. : SC1388

City: Eugene, OR

Project Location: West 11th & Willow Creek

Date: 3/28/2023

Contractor Information

Name of Contractor: Omlid & Swinney

Address: 610 30th St.

City: Springfield, Oregon 97478

Phone Number: (541) 741-1775

E-mail: andrew.shuck@omlidandswinney.us

Name of Designer: Andy Shuck

Authority Having Jurisdiction: City of Eugene

Design

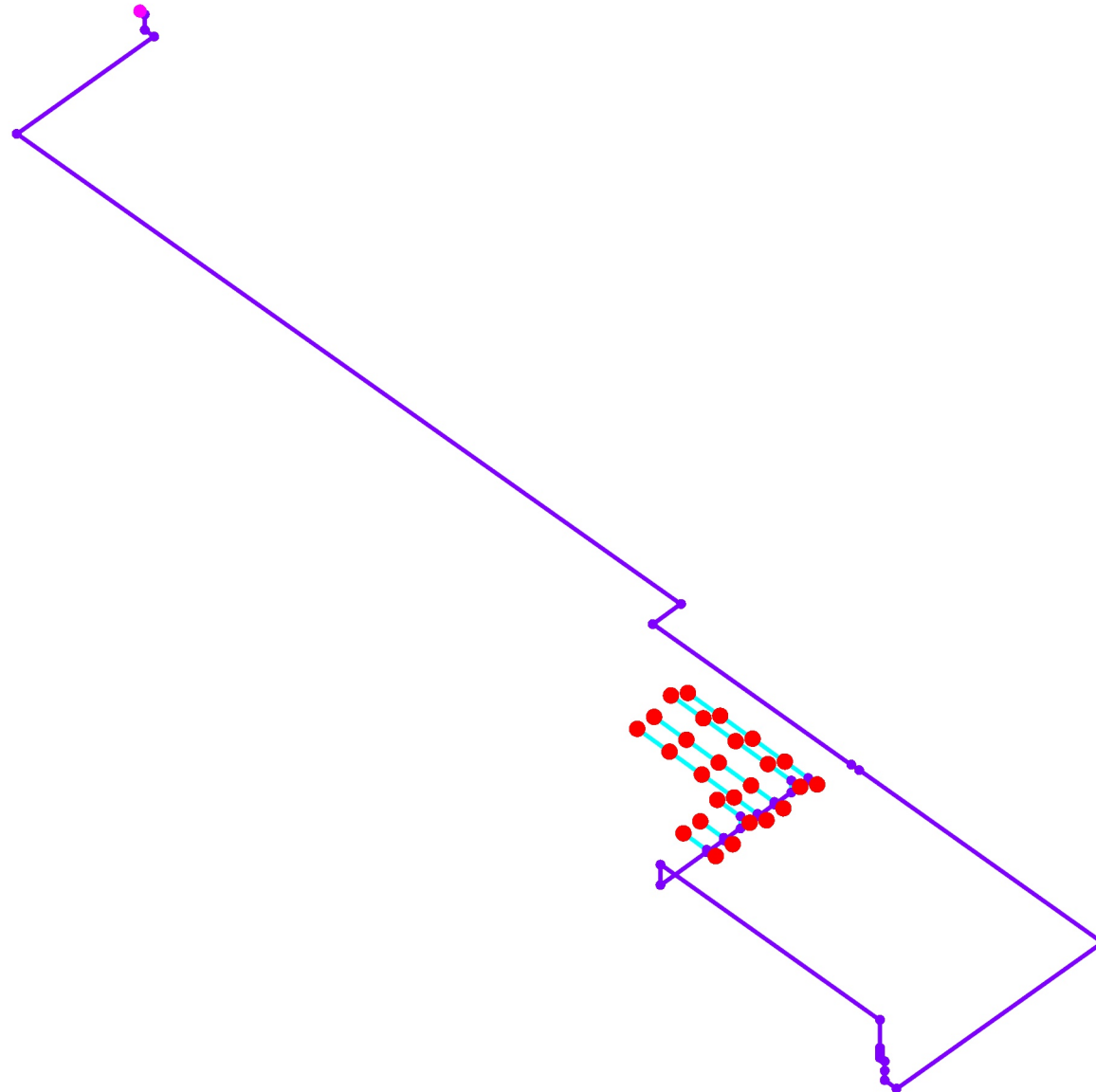
Remote Area Name	1
Remote Area Location	Garden Center
Occupancy Classification	Ordinary 2
Density (gpm/ft ²)	0.2
Area of Application (ft ²)	2552
Coverage per Sprinkler (ft ²)	109
Number of Calculated Sprinklers	26
In-Rack Demand (gpm)	0
Special Heads	
Hose Streams (gpm)	250
Total Water Required (incl. Hose Streams) (gpm)	934.4
Required Pressure at Source (psi)	80.6
Type of System	Dry
Volume - Downstream DPV (gal)	466.4 gal

Water Supply Information

Date	2/25/2022
Location	Hydrant 10476 11th & Willow Creek
Source	W1

Notes

**Diagram for Design Area : 1
(Optimized Hvdraulic Simplified)**



Hydraulic Analysis for : 1**Calculation Info**

Calculation Mode
 Hydraulic Model
 Fluid Name
 Fluid Weight, (lb/ft³)
 Fluid Dynamic Viscosity, (lb·s/ft²)

Demand
 Hazen-Williams
 Water @ 60F (15.6C)
 N/A for Hazen-Williams calculation.
 N/A for Hazen-Williams calculation.

Water Supply Parameters

Supply 1 : W1

Flow (gpm)	Pressure (psi)
0	92.1
1500	90

Supply Analysis

Node at Source	Static Pressure (psi)	Residual Pressure (psi)	Flow (gpm)	Available Pressure (psi)	Total Demand (gpm)	Required Pressure (psi)
W1	92.1	90	1500	91.2	934.4	80.6

Hoses

Inside Hose Flow / Standpipe Demand (gpm)

Outside Hose Flow (gpm)

Additional Outside Hose Flow (gpm)

250

Other (custom defined) Hose Flow (gpm)

Total Hose Flow (gpm)

250

Sprinklers

Ovehead Sprinkler Flow (gpm)

684.4

InRack Sprinkler Flow (gpm)

0

Other (custom defined) Sprinkler Flow (gpm)

0

Total Sprinkler Flow (gpm)

684.4

Other

Required Margin of Safety (psi)

0

W1 - Pressure (psi)

80.6

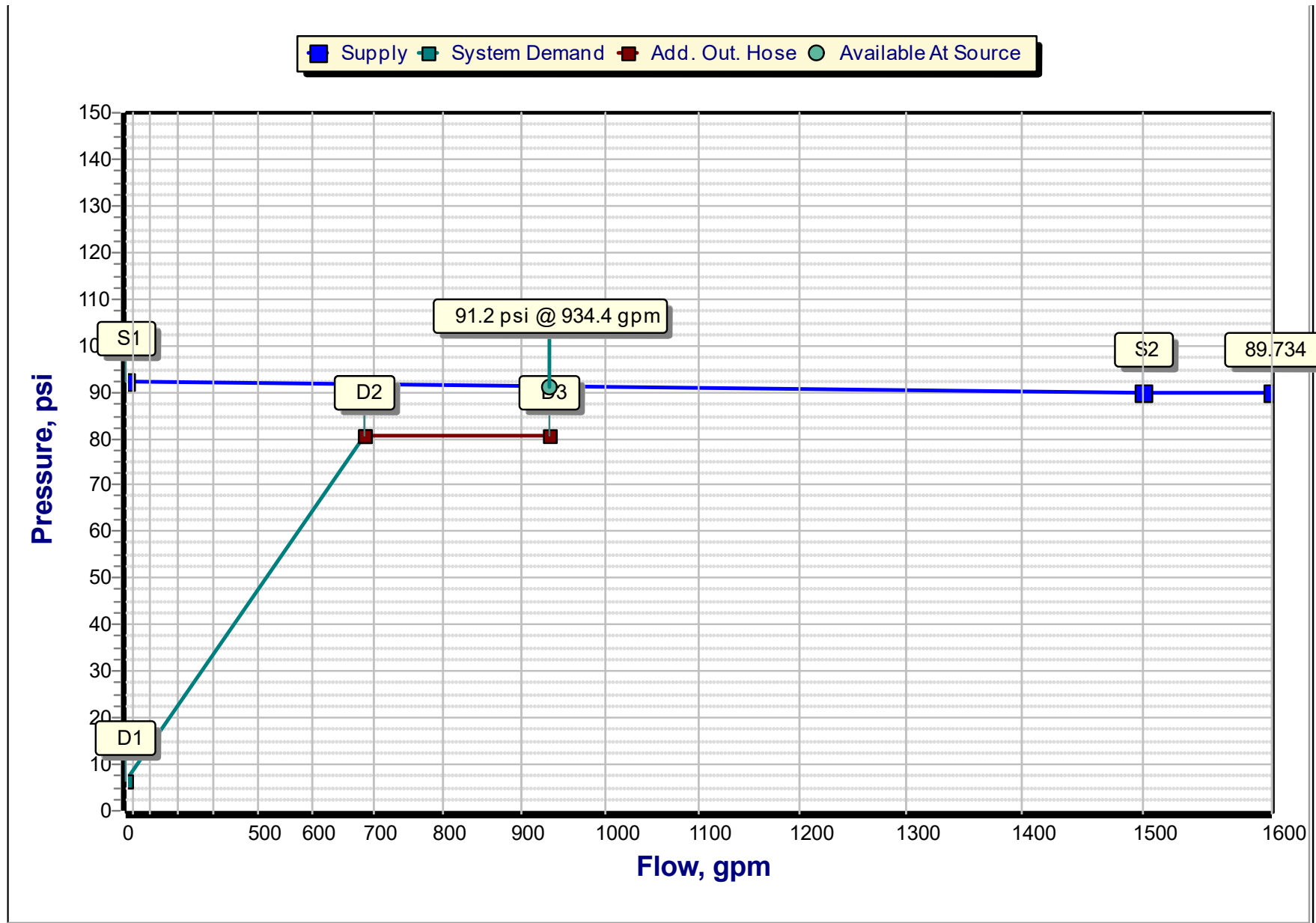
W1 - Flow (gpm)

684.4

Demand w/o System Pump(s)

N/A

Hydraulic Analysis for : 1



Hydraulic Analysis for : 1

Graph Labels

Label	Description	Values	
		Flow (gpm)	Pressure (psi)
S1	Supply point #1 - Static	0	92.1
S2	Supply point #2 - Residual	1500	90
D1	Elevation Pressure	0	6.6
D2	System Demand	684.4	80.6
D3	System Demand + Add.Out.Hose	934.4	80.6

Curve Intersections & Safety Margins

Curve Name	Intersection		Safety Margin	
	Pressure (psi)	Flow (gpm)	Pressure (psi)	@ Flow (gpm)
Supply	91.5	737.4	10.7	934.4

Open Heads

Head Ref.	Head Type	Coverage	K-Factor	Required			Calculated		
				Density	Flow	Pressure	Density	Flow	Pressure
		(ft ²)	(gpm/psi ^{1/2})	(gpm/ft ²)	(gpm)	(psi)	(gpm/ft ²)	(gpm)	(psi)
S1	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.214	23.3	17.3
S10	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.209	22.8	16.5
S11	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.224	24.4	19
S12	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.225	24.5	19.2
S13	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.238	25.9	21.5
S14	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.223	24.3	18.8
S15	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.239	26	21.6
S16	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.24	26.2	21.8
S17	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.274	29.9	28.5
S18	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.288	31.4	31.5
S19	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.292	31.8	32.2
S2	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.2	21.8	15.2
S20	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.266	29	26.8

S21	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.249	27.2	23.6
S22	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.267	29.1	27
S23	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.268	29.2	27.3
S24	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.275	30	28.7
S25	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.289	31.5	31.7
S26	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.293	31.9	32.5
S3	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.214	23.4	17.4
S4	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.216	23.5	17.6
S5	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.216	23.5	17.6
S6	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.202	22	15.4
S7	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.216	23.6	17.8
S8	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.218	23.7	17.9
S9	Overhead Sprinkler	109	5.6	0.2	21.8	15.2	0.223	24.3	18.8

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
S2 16.42	Overhead Sprinkler HEAD	5.6 Open	21.8 0	109 0.2	15.2 -6.6	15.2 21.8
S6 16.42	Overhead Sprinkler HEAD	5.6 Open	22 0.2	109 0.202	15.4 -6.6	15.2 21.8
S10 16.42	Overhead Sprinkler HEAD	5.6 Open	22.8 1	109 0.209	16.5 -6.6	15.2 21.8
S1 12.42	Overhead Sprinkler HEAD	5.6 Open	23.3 1.5	109 0.214	17.3 -4.7	15.2 21.8
S3 12.42	Overhead Sprinkler HEAD	5.6 Open	23.4 1.6	109 0.214	17.4 -4.7	15.2 21.8
S4 12.42	Overhead Sprinkler HEAD	5.6 Open	23.5 1.7	109 0.216	17.6 -4.7	15.2 21.8
S5 12.42	Overhead Sprinkler HEAD	5.6 Open	23.5 1.7	109 0.216	17.6 -4.7	15.2 21.8
S7 12.42	Overhead Sprinkler HEAD	5.6 Open	23.6 1.8	109 0.216	17.8 -4.7	15.2 21.8
S8 12.42	Overhead Sprinkler HEAD	5.6 Open	23.7 1.9	109 0.218	17.9 -4.7	15.2 21.8
S14 16.42	Overhead Sprinkler HEAD	5.6 Open	24.3 2.5	109 0.223	18.8 -6.6	15.2 21.8
S9 12.42	Overhead Sprinkler HEAD	5.6 Open	24.3 2.5	109 0.223	18.8 -4.7	15.2 21.8
S11 12.42	Overhead Sprinkler HEAD	5.6 Open	24.4 2.6	109 0.224	19 -4.7	15.2 21.8
S12 12.42	Overhead Sprinkler HEAD	5.6 Open	24.5 2.7	109 0.225	19.2 -4.7	15.2 21.8
S13 12.42	Overhead Sprinkler HEAD	5.6 Open	25.9 4.1	109 0.238	21.5 -4.7	15.2 21.8
S15 12.42	Overhead Sprinkler HEAD	5.6 Open	26 4.2	109 0.239	21.6 -4.7	15.2 21.8
S16 12.42	Overhead Sprinkler HEAD	5.6 Open	26.2 4.4	109 0.24	21.8 -4.7	15.2 21.8
S21 16.42	Overhead Sprinkler HEAD	5.6 Open	27.2 5.4	109 0.249	23.6 -6.6	15.2 21.8
S20 12.42	Overhead Sprinkler HEAD	5.6 Open	29 7.2	109 0.266	26.8 -4.7	15.2 21.8
S22 12.42	Overhead Sprinkler HEAD	5.6 Open	29.1 7.3	109 0.267	27 -4.7	15.2 21.8
S23 12.42	Overhead Sprinkler HEAD	5.6 Open	29.2 7.4	109 0.268	27.3 -4.7	15.2 21.8
S17 16.42	Overhead Sprinkler HEAD	5.6 Open	29.9 8.1	109 0.274	28.5 -6.6	15.2 21.8
S24 16.42	Overhead Sprinkler HEAD	5.6 Open	30 8.2	109 0.275	28.7 -6.6	15.2 21.8
S18 12.42	Overhead Sprinkler HEAD	5.6 Open	31.4 9.6	109 0.288	31.5 -4.7	15.2 21.8
S25 12.42	Overhead Sprinkler HEAD	5.6 Open	31.5 9.7	109 0.289	31.7 -4.7	15.2 21.8
S19 12.42	Overhead Sprinkler HEAD	5.6 Open	31.8 10	109 0.292	32.2 -4.7	15.2 21.8

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
S26 12.42	Overhead Sprinkler HEAD	5.6 Open	31.9 10.1	109 0.293	32.5 -4.7	15.2 21.8
063 16.42	Node NODE				23.9 -6.6	
059 12.42	Node NODE				27.2 -4.7	
067 12.42	Node NODE				27.4 -4.7	
071 12.42	Node NODE				27.7 -4.7	
075 16.42	Node NODE				29.2 -6.6	
082 12.42	Node NODE				32.2 -4.7	
664 11.38	Node NODE				32.2 -4.2	
663 11.38	Node NODE				32.2 -4.2	
662 11.38	Node NODE				32.4 -4.2	
661 11.38	Node NODE				32.7 -4.2	
004 12.42	Node NODE				33 -4.7	
660 11.38	Node NODE				33.2 -4.2	
659 11.38	Node NODE				33.9 -4.2	
008 11.38	Node NODE				34.7 -4.2	
011 11.38	Node NODE				38.7 -4.2	
016-O 8.2	Node NODE				58.7 -2.7	
016-I 7.05	Node NODE				62.9 -2.2	
017-O 5.76	Node NODE				63.6 -1.5	
017-I 5.38	Node NODE				64.8 -1.4	
055 0	Node NODE				71.9 1.2	
024-O -4	Node NODE				76.6 3.1	
W1 2.5	Supply SUPPLY		-684.4		80.6 0	
024-I -4	Node NODE				81.3 3.1	
027 -4	Node NODE				83 3.1	

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
029 -4	Node NODE				83 3.1	
031 -4	Node NODE				83 3.1	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 1

S2 S6	16.42 16.42	5.6 5.6	21.8 21.8	1.5 1.68		13.63 0 13.63	100 0.0215	15.2 0 0.3	
S6 S10	16.42 16.42	5.6 5.6	22 43.8	1.5 1.68		13.63 0 13.63	100 0.0784	15.4 0 1.1	
S10 S14	16.42 16.42	5.6 5.6	22.8 66.6	1.5 1.68		13.63 0 13.63	100 0.17	16.5 0 2.3	
S14 063	16.42 16.42	5.6	24.3 90.9	1.5 1.68	1x(us.Tee-Br)=7.02	9.84 7.02 16.85	100 0.3026	18.8 0 5.1	
063 663	16.42 11.38		27.2 118.1	1.5 1.68	1x(us.Tee-Br)=7.02	5.04 7.02 12.06	100 0.4914	23.9 2.2 5.9	
663 662	11.38 11.38		126.1 244.2	4 4.26		7.13 0 7.13	100 0.0203	32.2 0 0.1	
662 661	11.38 11.38		126.5 370.6	4 4.26		7.13 0 7.13	100 0.044	32.4 0 0.3	
661 660	11.38 11.38		127.1 497.7	4 4.26		7.13 0 7.13	100 0.076	32.7 0 0.5	
660 659	11.38 11.38		59.9 557.7	4 4.26		7.13 0 7.13	100 0.0938	33.2 0 0.7	
659 008	11.38 11.38		63 620.6	4 4.26		7.13 0 7.13	100 0.1144	33.9 0 0.8	
008 011	11.38 11.38		63.7 684.4	4 4.26	1x(us.90)=9.39	19.54 9.39 28.93	100 0.137	34.7 0 4	
011 016-O	11.38 8.2		0 684.4	4 4.31	1x(us.90)=9.94 1x(us.Tee-Br)=19.87	112.99 29.81 142.8	100 0.1295	38.7 1.4 18.5	
016-O 016-I	8.2 7.05		0 684.4	4 0		1.15 0 1.15	100 3.1899	58.7 0.5 3.7	Reliable Model D ***
016-I 017-O	7.05 5.76		0 684.4	4 4.31		1.3 0 1.3	120 0.0924	62.9 0.6 0.1	
017-O 017-I	5.76 5.38		0 684.4	4 0		0.38 0 0.38	2.767	63.6 0.2 1.1	Butterfly ***
017-I 055	5.38 0		0 684.4	4 4.31	1x(us.Tee-Br)=27.87 1x(us.90)=13.94	7.38 41.81 49.19	120 0.0924	64.8 2.3 4.5	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 1

055 024-O	0 -4		0 684.4	6 6.4	3x(us.90)=72.58	198.78 72.58 271.36	140 0.0101	71.9 1.7 2.7	
024-O 024-I	-4 -4		0 684.4	6 0		3.34 0 3.34	1.4069	76.6 0 4.7	Wilkins 350 ADA ***
024-I 027	-4 -4		0 684.4	6 6.4	1x(us.Tee-Br)=51.84 1x(us.90)=24.19	95.71 76.04 171.75	140 0.0101	81.3 0 1.7	
027 029	-4 -4		0 684.4	20 18.5		280.17 0 280.17	140 0.0001	83 0 0.0	
029 031	-4 -4		0 684.4	24 20.5		58 0 58	140 0.0000	83 0 0	
031 W1	-4 2.5		0 684.4	6 6.4	2x(us.90)=48.39	12.5 48.39 60.89	140 0.0101	83 -2.8 0.6	
W1								80.6	

Path No: 2

S1 S5	12.42 12.42	5.6 5.6	23.3 23.3	1.5 1.68		13.63 0 13.63	100 0.0243	17.3 0 0.3	
S5 S9	12.42 12.42	5.6 5.6	23.5 46.8	1.5 1.68		13.63 0 13.63	100 0.0886	17.6 0 1.2	
S9 S13	12.42 12.42	5.6 5.6	24.3 71.1	1.5 1.68		13.63 0 13.63	100 0.1923	18.8 0 2.6	
S13 059	12.42 12.42	5.6	25.9 97.1	1.5 1.68	1x(us.Tee-Br)=7.02	9.84 7.02 16.85	100 0.342	21.5 0 5.8	
059 664	12.42 11.38		29 126.1	1.5 1.68	1x(us.Tee-Br)=7.02	1.04 7.02 8.06	100 0.5551	27.2 0.5 4.5	
664 663	11.38 11.38		0 126.1	4 4.26		7.13 0 7.13	100 0.006	32.2 0 0.0	
663								32.2	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 3

S3 S7	12.42 12.42	5.6 5.6	23.4 23.4	1.5 1.68		13.63 0 13.63	100 0.0245	17.4 0 0.3	
S7 S11	12.42 12.42	5.6 5.6	23.6 47	1.5 1.68		13.63 0 13.63	100 0.0891	17.8 0 1.2	
S11 S15	12.42 12.42	5.6 5.6	24.4 71.4	1.5 1.68		13.63 0 13.63	100 0.1934	19 0 2.6	
S15 067	12.42 12.42	5.6	26 97.4	1.5 1.68	1x(us.Tee-Br)=7.02	9.84 7.02 16.85	100 0.344	21.6 0 5.8	
067 662	12.42 11.38		29.1 126.5	1.5 1.68	1x(us.Tee-Br)=7.02	1.04 7.02 8.06	100 0.5582	27.4 0.5 4.5	
662								32.4	

Path No: 4

S4 S8	12.42 12.42	5.6 5.6	23.5 23.5	1.5 1.68		13.63 0 13.63	100 0.0247	17.6 0 0.3	
S8 S12	12.42 12.42	5.6 5.6	23.7 47.2	1.5 1.68		13.63 0 13.63	100 0.09	17.9 0 1.2	
S12 S16	12.42 12.42	5.6 5.6	24.5 71.7	1.5 1.68		13.63 0 13.63	100 0.1952	19.2 0 2.7	
S16 071	12.42 12.42	5.6	26.2 97.9	1.5 1.68	1x(us.Tee-Br)=7.02	9.84 7.02 16.85	100 0.3472	21.8 0 5.9	
071 661	12.42 11.38		29.2 127.1	1.5 1.68	1x(us.Tee-Br)=7.02	1.04 7.02 8.06	100 0.5634	27.7 0.5 4.5	
661								32.7	

Path No: 5

S21 063	16.42 16.42	5.6	27.2 27.2	1.5 1.68	1x(us.Tee-Br)=7.02	3.79 7.02 10.81	100 0.0324	23.6 0 0.4	
063								23.9	

Path No: 6

S20 059	12.42 12.42	5.6	29 29	1.5 1.68	1x(us.Tee-Br)=7.02	3.79 7.02 10.81	100 0.0365	26.8 0 0.4	
059								27.2	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 7

S22 067	12.42 12.42	5.6	29.1 29.1	1.5 1.68	1x(us.Tee-Br)=7.02	3.79 7.02 10.81	100 0.0367	27 0 0.4	
067									27.4

Path No: 8

S23 071	12.42 12.42	5.6	29.2 29.2	1.5 1.68	1x(us.Tee-Br)=7.02	3.79 7.02 10.81	100 0.0371	27.3 0 0.4	
071									27.7

Path No: 9

S17 075	16.42 16.42	5.6	29.9 29.9	1.5 1.68	1x(us.Tee-Br)=7.02	9.84 7.02 16.85	100 0.0386	28.5 0 0.7	
075 660	16.42 11.38		30 59.9	1.5 1.68	1x(us.Tee-Br)=7.02	5.04 7.02 12.06	100 0.14	29.2 2.2 1.7	
660									33.2

Path No: 10

S24 075	16.42 16.42	5.6	30 30	1.5 1.68	1x(us.Tee-Br)=7.02	3.79 7.02 10.81	100 0.0389	28.7 0 0.4	
075									29.2

Path No: 11

S18 082	12.42 12.42	5.6	31.4 31.4	1.5 1.68	1x(us.Tee-Br)=7.02	9.84 7.02 16.85	100 0.0423	31.5 0 0.7	
082 659	12.42 11.38		31.5 63	1.5 1.68	1x(us.Tee-Br)=7.02	1.04 7.02 8.06	100 0.1534	32.2 0.5 1.2	
659									33.9

Path No: 12

S25 082	12.42 12.42	5.6	31.5 31.5	1.5 1.68	1x(us.Tee-Br)=7.02	3.79 7.02 10.81	100 0.0426	31.7 0 0.5	
082									32.2

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 13

S19 004	12.42 12.42	5.6	31.8 31.8	1.5 1.68	1x(us.Tee-Br)=7.02	9.84 7.02 16.85	100 0.0433	32.2 0 0.7	
004 008	12.42 11.38		31.9 63.7	1.5 1.68	1x(us.Tee-Br)=7.02	1.04 7.02 8.06	100 0.1568	33 0.5 1.3	
008								34.7	

Path No: 14

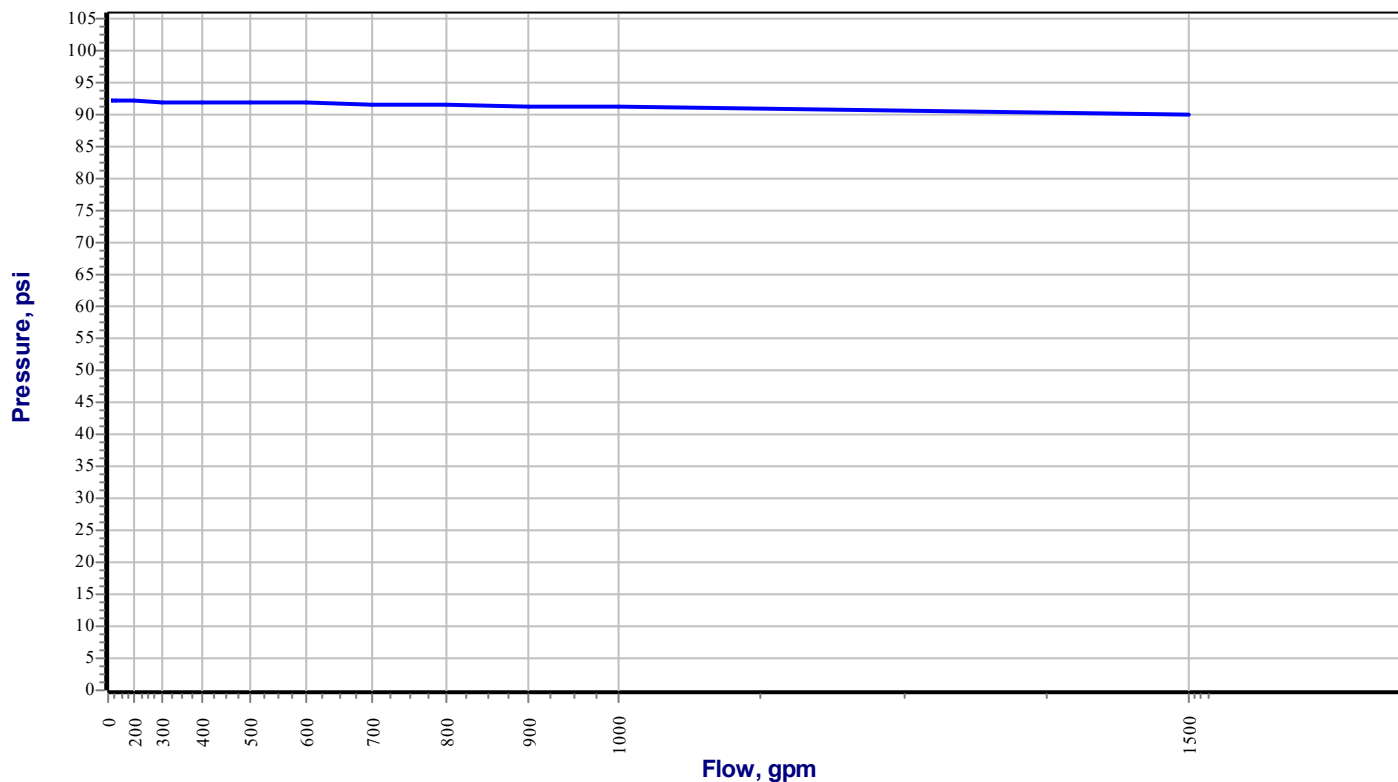
S26 004	12.42 12.42	5.6	31.9 31.9	1.5 1.68	1x(us.Tee-Br)=7.02	3.79 7.02 10.81	100 0.0436	32.5 0 0.5	
004								33	

* Pressures are balanced to a high degree of accuracy. Values may vary by 0.1 psi due to display rounding.

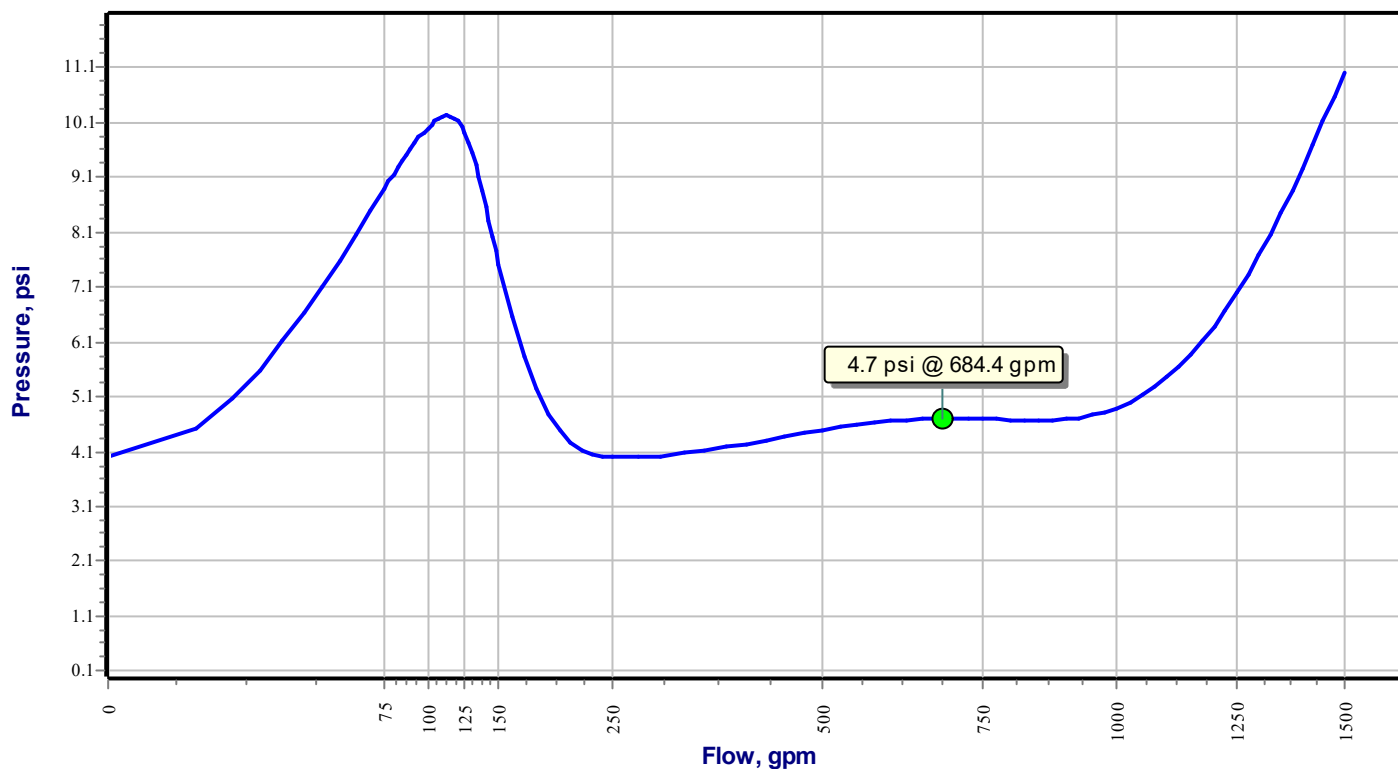
* Maximum Velocity of 18.4 ft/s occurs in the following pipe(s): (661-071)

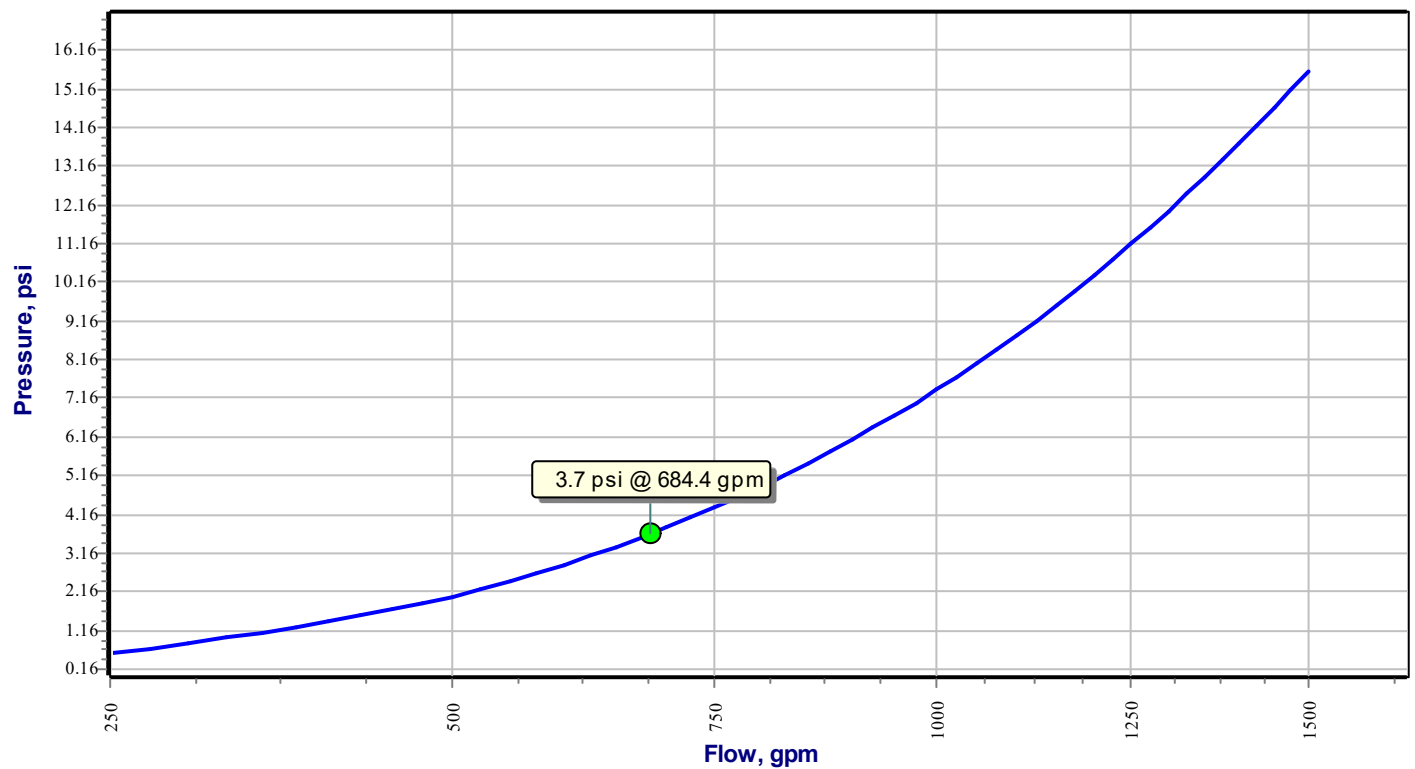
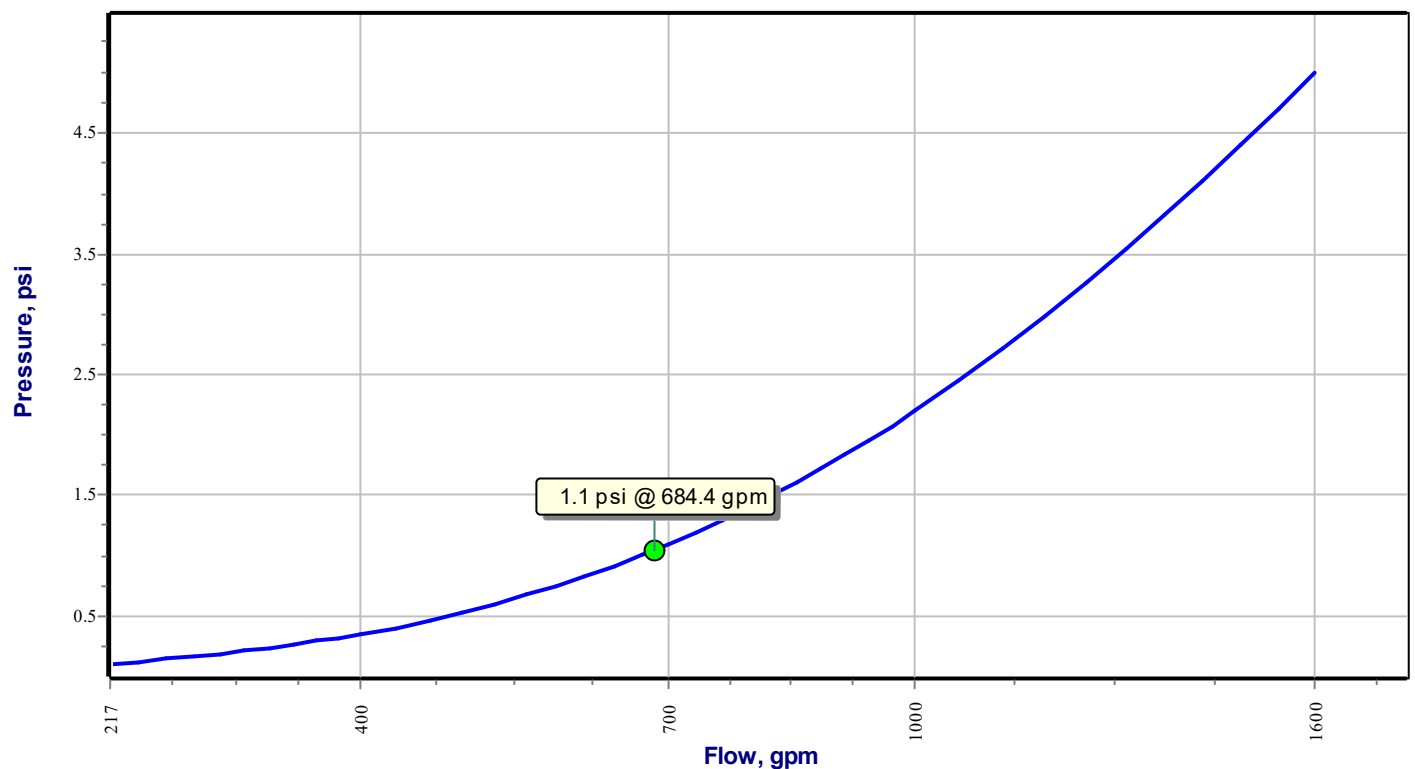
*** Device pressure loss (gain in the case of pumps) is calculated from the device's curve. If the device curve is printed with this report, it will appear below. The length of the device as shown in the table above comes from the CAD drawing. The friction loss per unit of length is calculated based upon the length and the curve-based loss/gain value. Internal ID and C Factor values are irrelevant as the device is not represented as an addition to any pipe, but is an individual item whose loss/gain is based solely on the curve data.

Pressure vs. Flow Function
Design Area: 1; Supply Ref.: W1; Supply Name:W1



Pressure Loss Function
Design Area: 1; BFP Ref.: 992 (Wilkins 350 ADA, Size = 6); Inlet Node: 024-I; Outlet Node: 024-O



Pressure Loss Function**Design Area: 1; DPV Ref.: 991 (Reliable Model D, Size = 4); Inlet Node: 016-I; Outlet Node: 016-O****Pressure Loss Function****Design Area: 1; Valve Ref.: 990 (Butterfly, Size = 4); Inlet Node: 017-I; Outlet Node: 017-O**

CALCULATION SUMMARY

Project Name : Wilco Eugene

Project Location: West 11th & Willow Creek

Contract No. : SC1388

City: Eugene, OR

Design Areas

Design Area Name	Calc. Mode (Model)	Occupancy	Area of Application	Total Water	Pressure @ Source	Min. Density	Min. Pressure	Min. Flow	Calculated Heads	Hose Streams	Margin To Source
			(ft ²)	(gpm)	(psi)	(gpm/ft ²)	(psi)	(gpm)	#	(gpm)	(psi)
2	Demand (HW)	Ordinary 2	624	378.7	Required 65	0.2	14.1	21	6	250	26.9

HYDRAULIC CALCULATIONS for

Job Information

Project Name : Wilco Eugene

Contract No. : SC1388

City: Eugene, OR

Project Location: West 11th & Willow Creek

Date: 3/28/2023

Contractor Information

Name of Contractor: Omlid & Swinney

Address: 610 30th St.

City: Springfield, Oregon 97478

Phone Number: (541) 741-1775

E-mail: andrew.shuck@omlidandswinney.us

Name of Designer: Andy Shuck

Authority Having Jurisdiction: City of Eugene

Design

Remote Area Name	2
Remote Area Location	Load-Out
Occupancy Classification	Ordinary 2
Density (gpm/ft ²)	0.2
Area of Application (ft ²)	624
Coverage per Sprinkler (ft ²)	105
Number of Calculated Sprinklers	6
In-Rack Demand (gpm)	0
Special Heads	
Hose Streams (gpm)	250
Total Water Required (incl. Hose Streams) (gpm)	378.7
Required Pressure at Source (psi)	65
Type of System	Dry
Volume - Downstream DPV (gal)	466.4 gal

Water Supply Information

Date	2/25/2022
Location	Hydrant 10476 11th & Willow Creek
Source	W1

Notes

Hydraulic Analysis for : 2

Calculation Info

Calculation Mode	Demand
Hydraulic Model	Hazen-Williams
Fluid Name	Water @ 60F (15.6C)
Fluid Weight, (lb/ft ³)	N/A for Hazen-Williams calculation.
Fluid Dynamic Viscosity, (lb·s/ft ²)	N/A for Hazen-Williams calculation.

Water Supply Parameters

Supply 1 : W1

Flow (gpm)	Pressure (psi)
0	92.1
1500	90

Supply Analysis

Node at Source	Static Pressure (psi)	Residual Pressure (psi)	Flow (gpm)	Available Pressure (psi)	Total Demand (gpm)	Required Pressure (psi)
W1	92.1	90	1500	91.9	378.7	65

Hoses

Inside Hose Flow / Standpipe Demand (gpm)

Outside Hose Flow (gpm)

Additional Outside Hose Flow (gpm) 250

Other (custom defined) Hose Flow (gpm)

Total Hose Flow (gpm) 250

Sprinklers

Ovehead Sprinkler Flow (gpm) 128.7

InRack Sprinkler Flow (gpm) 0

Other (custom defined) Sprinkler Flow (gpm) 0

Total Sprinkler Flow (gpm) 128.7

Other

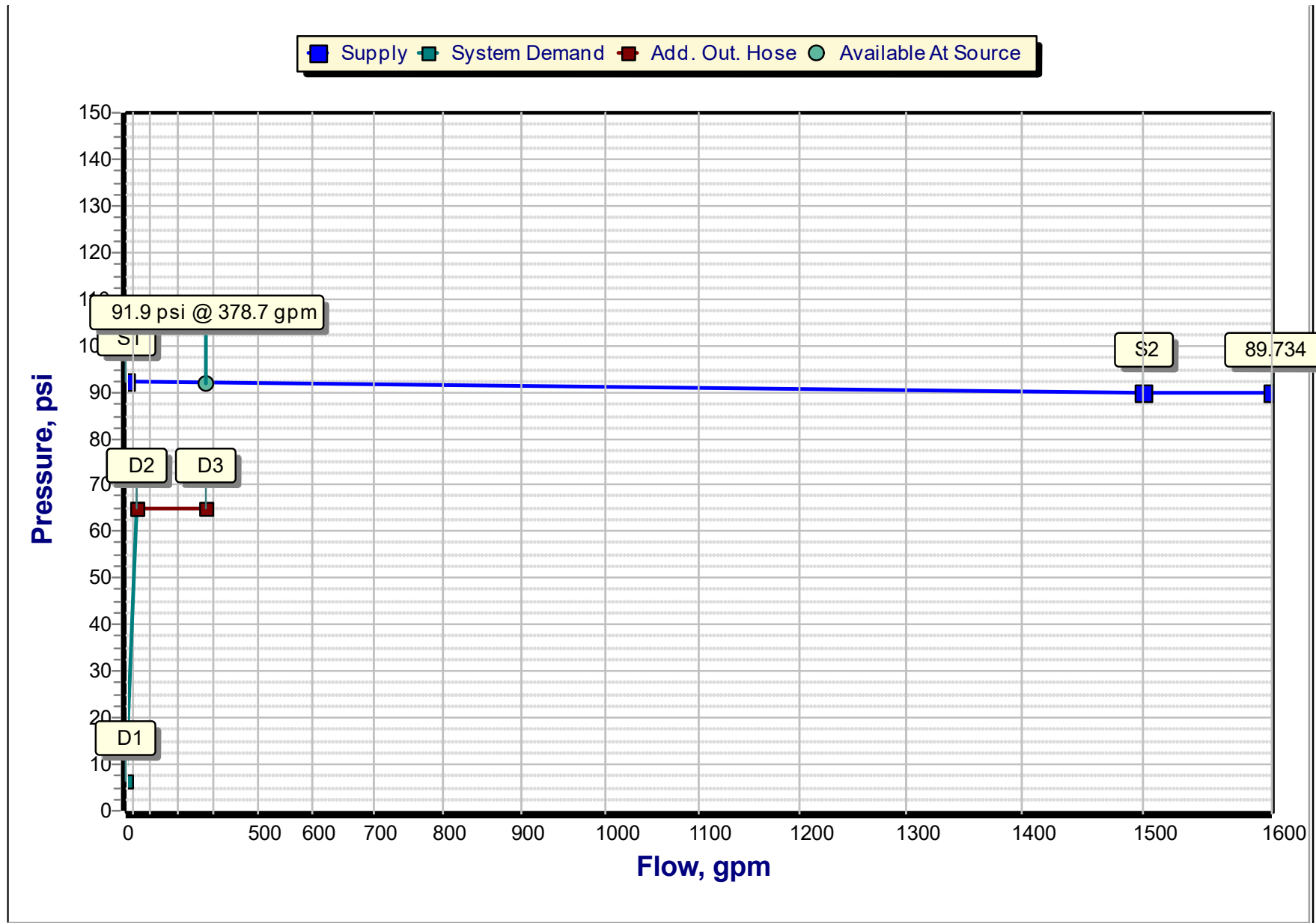
Required Margin of Safety (psi) 0

W1 - Pressure (psi) 65

W1 - Flow (gpm) 128.7

Demand w/o System Pump(s) N/A

Hydraulic Analysis for : 2



Hydraulic Analysis for : 2

Graph Labels

Label	Description	Values	
		Flow (gpm)	Pressure (psi)
S1	Supply point #1 - Static	0	92.1
S2	Supply point #2 - Residual	1500	90
D1	Elevation Pressure	0	6.2
D2	System Demand	128.7	65
D3	System Demand + Add.Out.Hose	378.7	65

Curve Intersections & Safety Margins

Curve Name	Intersection		Safety Margin	
	Pressure (psi)	Flow (gpm)	Pressure (psi)	@ Flow (gpm)
Supply	92.1	158	26.9	378.7

Open Heads

Head Ref.	Head Type	Coverage	K-Factor	Required			Calculated		
				Density	Flow	Pressure	Density	Flow	Pressure
		(ft²)	(gpm/psi½)	(gpm/ft²)	(gpm)	(psi)	(gpm/ft²)	(gpm)	(psi)
S27	Overhead Sprinkler	105	5.6	0.2	21	14.1	0.2	21	14.1
S28	Overhead Sprinkler	105	5.6	0.2	21	14.1	0.202	21.2	14.3
S29	Overhead Sprinkler	105	5.6	0.2	21	14.1	0.207	21.8	15.1
S30	Overhead Sprinkler	105	5.6	0.2	21	14.1	0.203	21.3	14.4
S31	Overhead Sprinkler	105	5.6	0.2	21	14.1	0.204	21.5	14.7
S32	Overhead Sprinkler	105	5.6	0.2	21	14.1	0.21	22.1	15.5

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
S27 15.67	Overhead Sprinkler HEAD	5.6 Open	21 0	105 0.2	14.1 -6.2	14.1 21
S28 15.67	Overhead Sprinkler HEAD	5.6 Open	21.2 0.2	105 0.202	14.3 -6.2	14.1 21
S30 15.67	Overhead Sprinkler HEAD	5.6 Open	21.3 0.3	105 0.203	14.4 -6.2	14.1 21
S31 15.67	Overhead Sprinkler HEAD	5.6 Open	21.5 0.5	105 0.204	14.7 -6.2	14.1 21
S29 15.67	Overhead Sprinkler HEAD	5.6 Open	21.8 0.8	105 0.207	15.1 -6.2	14.1 21
S32 15.67	Overhead Sprinkler HEAD	5.6 Open	22.1 1.1	105 0.21	15.5 -6.2	14.1 21
026 18.79	Node NODE				13.5 -7.7	
028 18.79	Node NODE				13.7 -7.7	
722 18.79	Node NODE				13.9 -7.7	
723 18.79	Node NODE				14.1 -7.7	
023 18.79	Node NODE				14.3 -7.7	
021 18.79	Node NODE				14.6 -7.7	
030 18.79	Node NODE				14.6 -7.7	
720 18.79	Node NODE				14.7 -7.7	
718 18.79	Node NODE				15 -7.7	
001 18.79	Node NODE				15 -7.7	
018 18.79	Node NODE				15.5 -7.7	
002 18.79	Node NODE				15.9 -7.7	
012 17.79	Node NODE				19.6 -7.2	
006 17.79	Node NODE				20.1 -7.2	
009 17.79	Node NODE				20.6 -7.2	
065 20	Node NODE				44.9 -8.3	
016-O 8.2	Node NODE				52 -2.7	
016-I 7.05	Node NODE				52.7 -2.2	
017-O 5.76	Node NODE				53.3 -1.5	

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
017-I 5.38	Node NODE				53.6 -1.4	
055 0	Node NODE				56.3 1.2	
024-O -4	Node NODE				58.3 3.1	
W1 2.5	Supply SUPPLY		-128.7		65 0	
024-I -4	Node NODE				68 3.1	
027 -4	Node NODE				68.1 3.1	
029 -4	Node NODE				68.1 3.1	
031 -4	Node NODE				68.1 3.1	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 1

S27 026	15.67 18.79	5.6	21 21	1 1.049	1x(us.90)=1.43	3.13 1.43 4.55	100 0.1989	14.1 -1.4 0.9	
026 023	18.79 18.79		0 21	1 1.083	1x(us.Tee-Br)=4.16	0.71 4.16 4.87	100 0.1703	13.5 0 0.8	
023 021	18.79 18.79		0 21	1.25 1.53		8 0 8	100 0.0317	14.3 0 0.3	
021 018	18.79 18.79		21.2 42.2	1.25 1.53		8 0 8	100 0.1151	14.6 0 0.9	
018 012	18.79 17.79		21.8 63.9	1.25 1.53	1x(us.Tee-Br)=7.07 1x(us.90)=3.54	3.96 10.61 14.56	100 0.2489	15.5 0.4 3.6	
012 009	17.79 17.79		0 63.9	2 2.203	1x(us.Tee-Br)=9.72	13.58 9.72 23.31	100 0.0422	19.6 0 1	
009 065	17.79 20		64.8 128.7	2 2.203	2x(us.90)=9.72	154.58 9.72 164.31	100 0.1541	20.6 -1 25.3	
065 016-O	20 8.2		0 128.7	4 4.31	2x(us.90)=19.87	241.68 19.87 261.55	100 0.0059	44.9 5.1 1.5	
016-O 016-I	8.2 7.05		0 128.7	4 0		1.15 0 1.15	0.1856	52 0.5 0.2	Reliable Model D ***
016-I 017-O	7.05 5.76		0 128.7	4 4.31		1.3 0 1.3	120 0.0042	52.7 0.6 0	
017-O 017-I	5.76 5.38		0 128.7	4 0		0.38 0 0.38	0.1108	53.3 0.2 0.0	Butterfly ***
017-I 055	5.38 0		0 128.7	4 4.31	1x(us.Tee-Br)=27.87 1x(us.90)=13.94	7.38 41.81 49.19	120 0.0042	53.6 2.3 0.2	
055 024-O	0 -4		0 128.7	6 6.4	3x(us.90)=72.58	198.78 72.58 271.36	140 0.0005	56.3 1.7 0.1	
024-O 024-I	-4 -4		0 128.7	6 0		3.34 0 3.34	2.8859	58.3 0 9.6	Wilkins 350 ADA ***
024-I 027	-4 -4		0 128.7	6 6.4	1x(us.Tee-Br)=51.84 1x(us.90)=24.19	95.71 76.04 171.75	140 0.0005	68 0 0.1	
027 029	-4 -4		0 128.7	20 18.5		280.17 0 280.17	140 0	68.1 0 0	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 1

029	-4		0	24		58	140	68.1	
031	-4		128.7	20.5		0	0	0	
						58		0	
031	-4		0	6	2x(us.90)=48.39	12.5	140	68.1	
W1	2.5		128.7	6.4		48.39	0.0005	-2.8	
						60.89		0.0	
W1								65	

Path No: 2

S28	15.67	5.6	21.2	1	1x(us.90)=1.43	3.13	100	14.3	
028	18.79		21.2	1.049		1.43	0.2019	-1.4	
						4.55		0.9	
028	18.79		0	1	1x(us.Tee-Br)=4.16	0.71	100	13.7	
021	18.79		21.2	1.083		4.16	0.1729	0	
						4.87		0.8	
021								14.6	

Path No: 3

S30	15.67	5.6	21.3	1	1x(us.90)=1.43	3.13	100	14.4	
722	18.79		21.3	1.049		1.43	0.2039	-1.4	
						4.55		0.9	
722	18.79		0	1	1x(us.Tee-Br)=4.16	0.71	100	13.9	
720	18.79		21.3	1.083		4.16	0.1746	0	
						4.87		0.9	
720	18.79		0	1.25		8	100	14.7	
718	18.79		21.3	1.53		0	0.0324	0	
						8		0.3	
718	18.79		21.5	1.25		8	100	15	
002	18.79		42.7	1.53		0	0.118	0	
						8		0.9	
002	18.79		22.1	1.25	1x(us.Tee-Br)=7.07	3.96	100	15.9	
006	17.79		64.8	1.53	1x(us.90)=3.54	10.61	0.2551	0.4	
						14.56		3.7	
006	17.79		0	2	1x(us.Tee-Br)=9.72	0.5	100	20.1	
009	17.79		64.8	2.203		9.72	0.0432	0	
						10.22		0.4	
009								20.6	

Path No: 4

S31	15.67	5.6	21.5	1	1x(us.90)=1.43	3.13	100	14.7	
723	18.79		21.5	1.049		1.43	0.2069	-1.4	
						4.55		0.9	
723	18.79		0	1	1x(us.Tee-Br)=4.16	0.71	100	14.1	
718	18.79		21.5	1.083		4.16	0.1772	0	
						4.87		0.9	
718								15	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 5

S29 030	15.67 18.79	5.6	21.8 21.8	1 1.049	1x(us.90)=1.43	3.13 1.43 4.55	100 0.2127	15.1 -1.4 1	
030 018	18.79 18.79		0 21.8	1 1.083	1x(us.Tee-Br)=4.16	0.71 4.16 4.87	100 0.1821	14.6 0 0.9	
018								15.5	

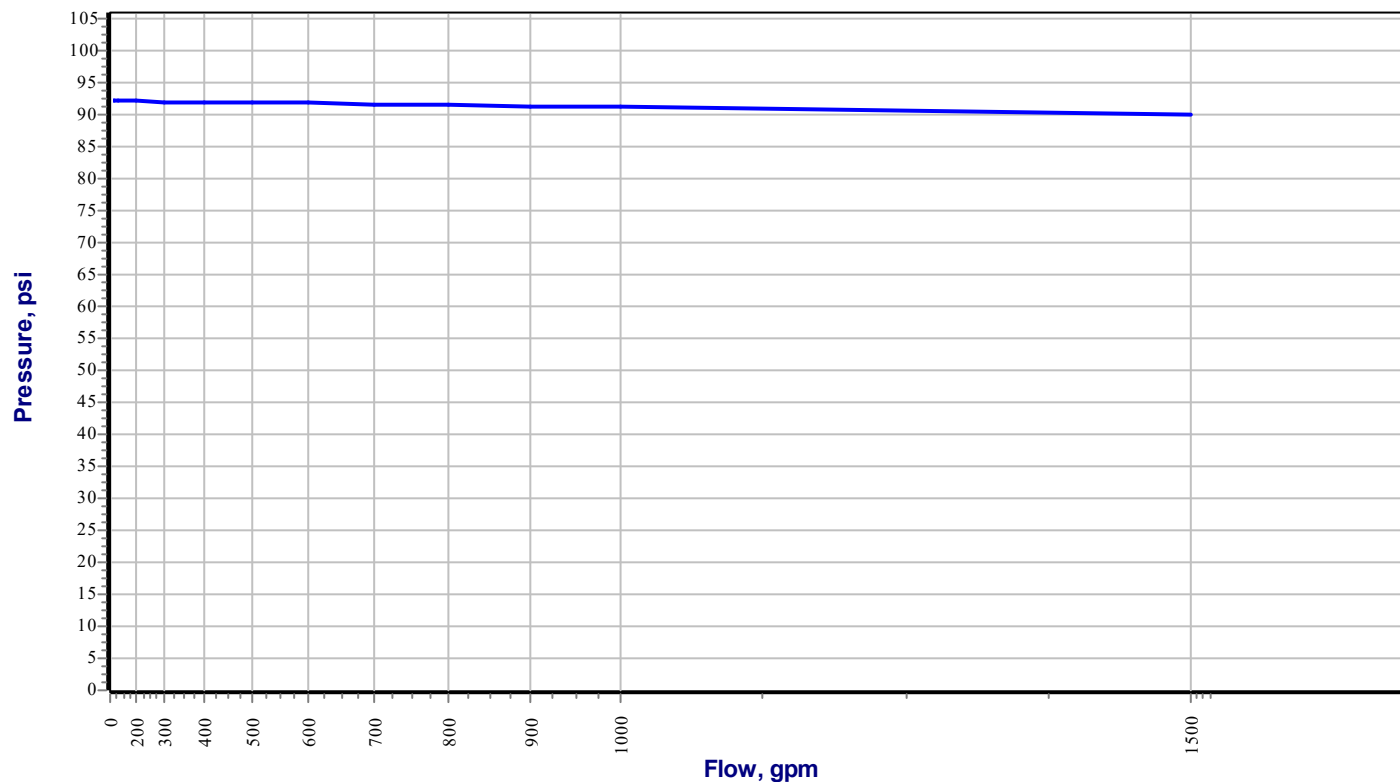
Path No: 6

S32 001	15.67 18.79	5.6	22.1 22.1	1 1.049	1x(us.90)=1.43	3.13 1.43 4.55	100 0.218	15.5 -1.4 1	
001 002	18.79 18.79		0 22.1	1 1.083	1x(us.Tee-Br)=4.16	0.71 4.16 4.87	100 0.1866	15 0 0.9	
002								15.9	

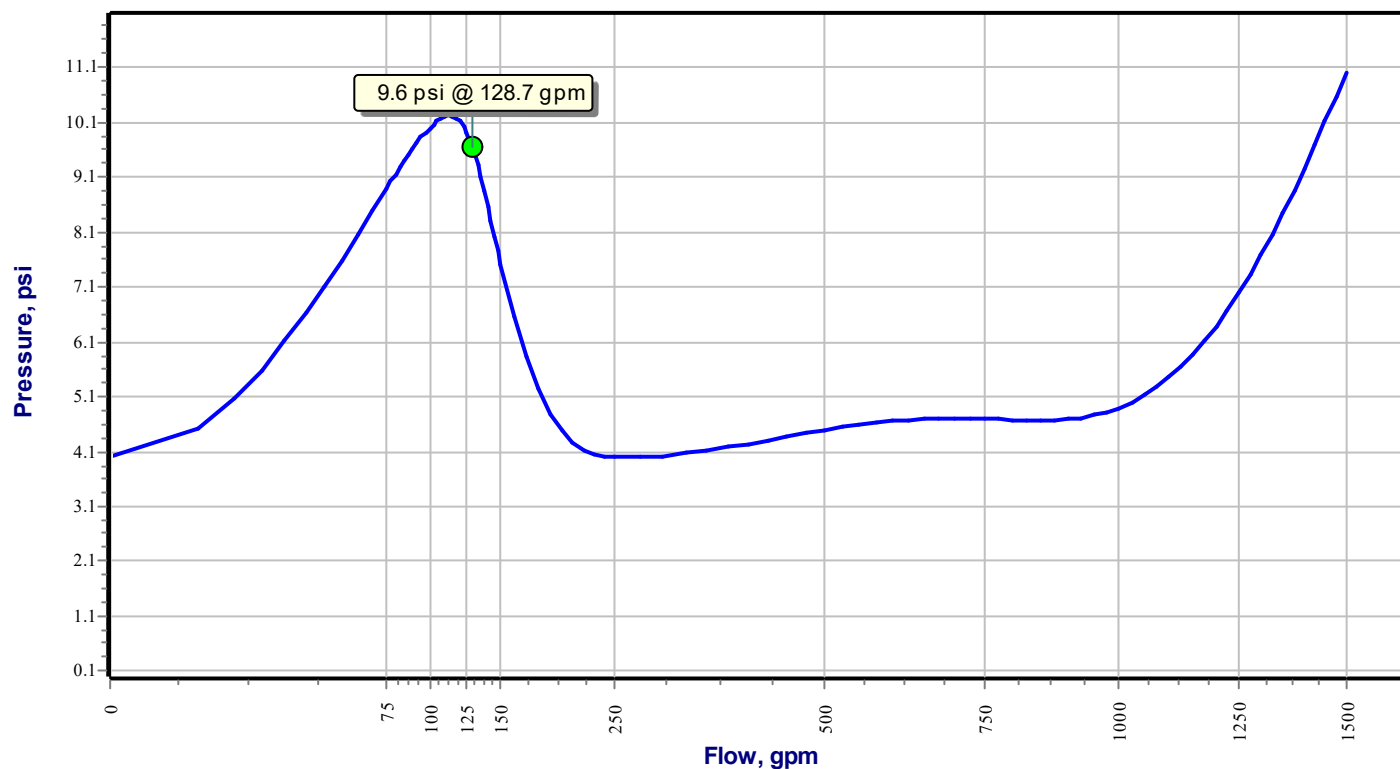
- * Pressures are balanced to a high degree of accuracy. Values may vary by 0.1 psi due to display rounding.
- * Maximum Velocity of 11.31 ft/s occurs in the following pipe(s): (006-002)

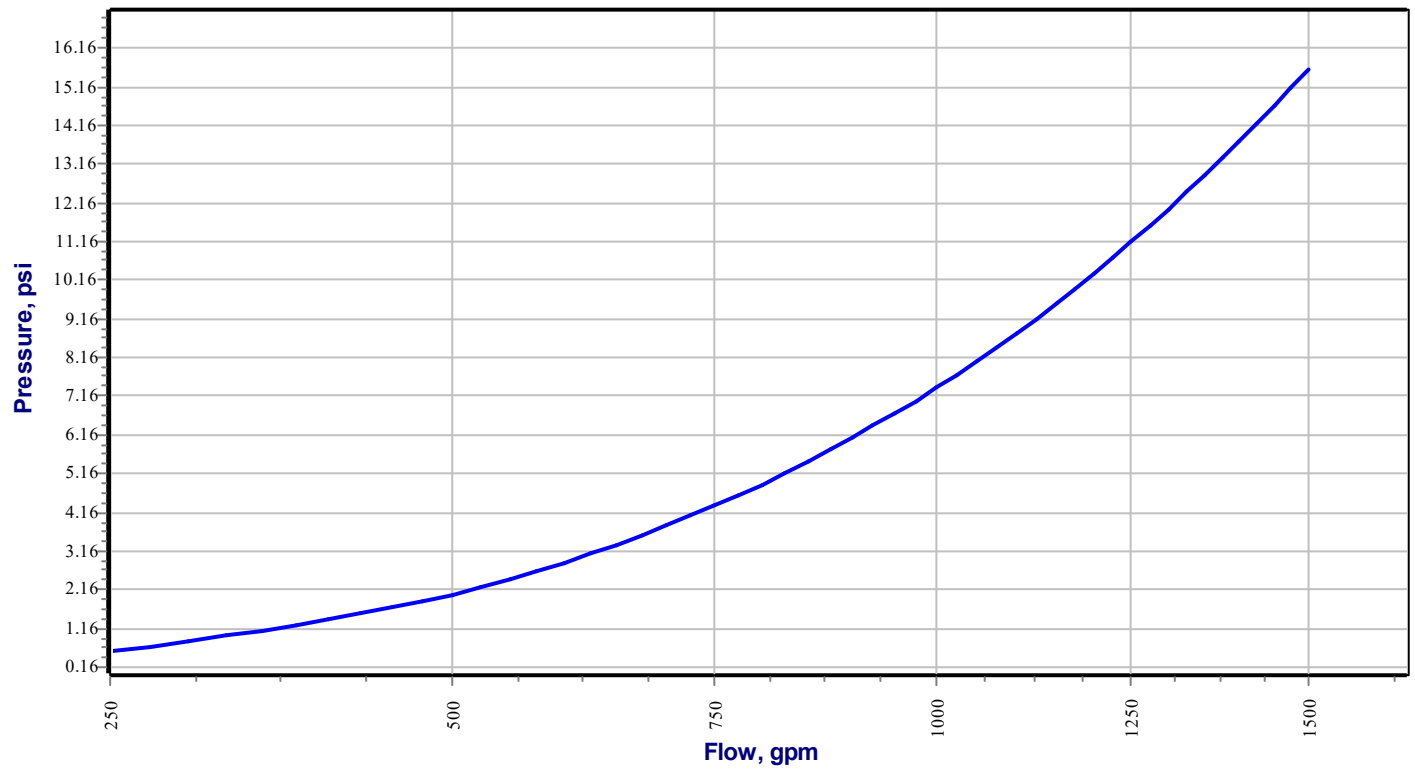
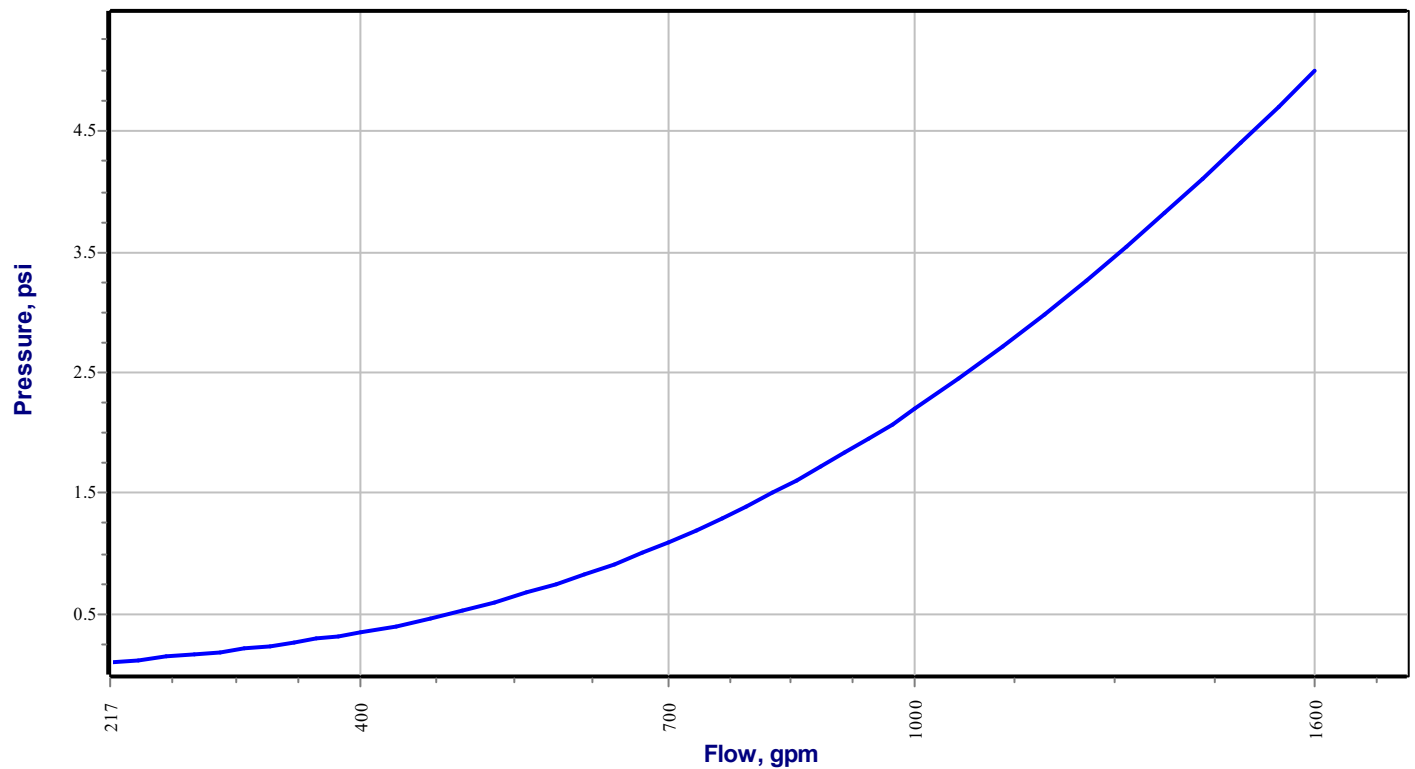
*** Device pressure loss (gain in the case of pumps) is calculated from the device's curve. If the device curve is printed with this report, it will appear below. The length of the device as shown in the table above comes from the CAD drawing. The friction loss per unit of length is calculated based upon the length and the curve-based loss/gain value. Internal ID and C Factor values are irrelevant as the device is not represented as an addition to any pipe, but is an individual item whose loss/gain is based solely on the curve data.

Pressure vs. Flow Function
Design Area: 2; Supply Ref.: W1; Supply Name:W1



Pressure Loss Function
Design Area: 2; BFP Ref.: 992 (Wilkins 350 ADA, Size = 6); Inlet Node: 024-I; Outlet Node: 024-O



Pressure Loss Function**Design Area: 2; DPV Ref.: 991 (Reliable Model D, Size = 4); Inlet Node: 016-I; Outlet Node: 016-O****Pressure Loss Function****Design Area: 2; Valve Ref.: 990 (Butterfly, Size = 4); Inlet Node: 017-I; Outlet Node: 017-O**

CALCULATION SUMMARY

Project Name : Wilco Eugene

Project Location: West 11th & Willow Creek

Contract No. : SC1388

City: Eugene, OR

Design Areas

Design Area Name	Calc. Mode (Model)	Occupancy	Area of Application	Total Water	Pressure @ Source	Min. Density	Min. Pressure	Min. Flow	Calculated Heads	Hose Streams	Margin To Source
			(ft ²)	(gpm)	(psi)	(gpm/ft ²)	(psi)	(gpm)	#	(gpm)	(psi)
3	Demand (HW)	Ordinary 2	1750	782	Required 83.2	0.2	19.9	25	20	250	8.2

HYDRAULIC CALCULATIONS for

Job Information

Project Name : Wilco Eugene

Contract No. : SC1388

City: Eugene, OR

Project Location: West 11th & Willow Creek

Date: 3/28/2023

Contractor Information

Name of Contractor: Omlid & Swinney

Address: 610 30th St.

City: Springfield, Oregon 97478

Phone Number: (541) 741-1775

E-mail: andrew.shuck@omlidandswinney.us

Name of Designer: Andy Shuck

Authority Having Jurisdiction: City of Eugene

Design

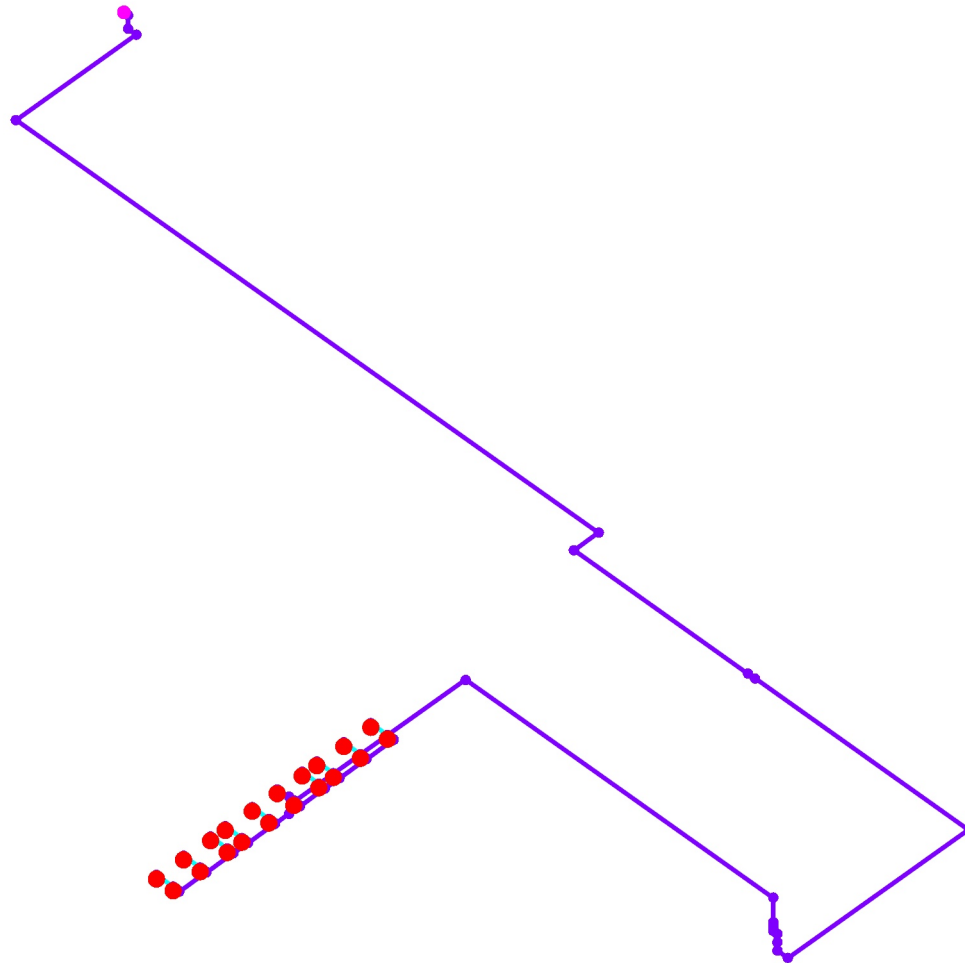
Remote Area Name	3
Remote Area Location	Vestibule/Entrances
Occupancy Classification	Ordinary 2
Density (gpm/ft ²)	0.2
Area of Application (ft ²)	1750
Coverage per Sprinkler (ft ²)	125
Number of Calculated Sprinklers	20
In-Rack Demand (gpm)	0
Special Heads	
Hose Streams (gpm)	250
Total Water Required (incl. Hose Streams) (gpm)	782
Required Pressure at Source (psi)	83.2
Type of System	Dry
Volume - Downstream DPV (gal)	466.4 gal

Water Supply Information

Date	2/25/2022
Location	Hydrant 10476 11th & Willow Creek
Source	W1

Notes

**Diagram for Design Area : 3
(Optimized Hvdraulic Simplified)**



Hydraulic Analysis for : 3

Calculation Info

Calculation Mode	Demand
Hydraulic Model	Hazen-Williams
Fluid Name	Water @ 60F (15.6C)
Fluid Weight, (lb/ft ³)	N/A for Hazen-Williams calculation.
Fluid Dynamic Viscosity, (lb·s/ft ²)	N/A for Hazen-Williams calculation.

Water Supply Parameters

Supply 1 : W1

Flow (gpm)	Pressure (psi)
0	92.1
1500	90

Supply Analysis

Node at Source	Static Pressure (psi)	Residual Pressure (psi)	Flow (gpm)	Available Pressure (psi)	Total Demand (gpm)	Required Pressure (psi)
W1	92.1	90	1500	91.5	782	83.2

Hoses

Inside Hose Flow / Standpipe Demand (gpm)

Outside Hose Flow (gpm)

Additional Outside Hose Flow (gpm) 250

Other (custom defined) Hose Flow (gpm)

Total Hose Flow (gpm) 250

Sprinklers

Ovehead Sprinkler Flow (gpm) 532

InRack Sprinkler Flow (gpm) 0

Other (custom defined) Sprinkler Flow (gpm) 0

Total Sprinkler Flow (gpm) 532

Other

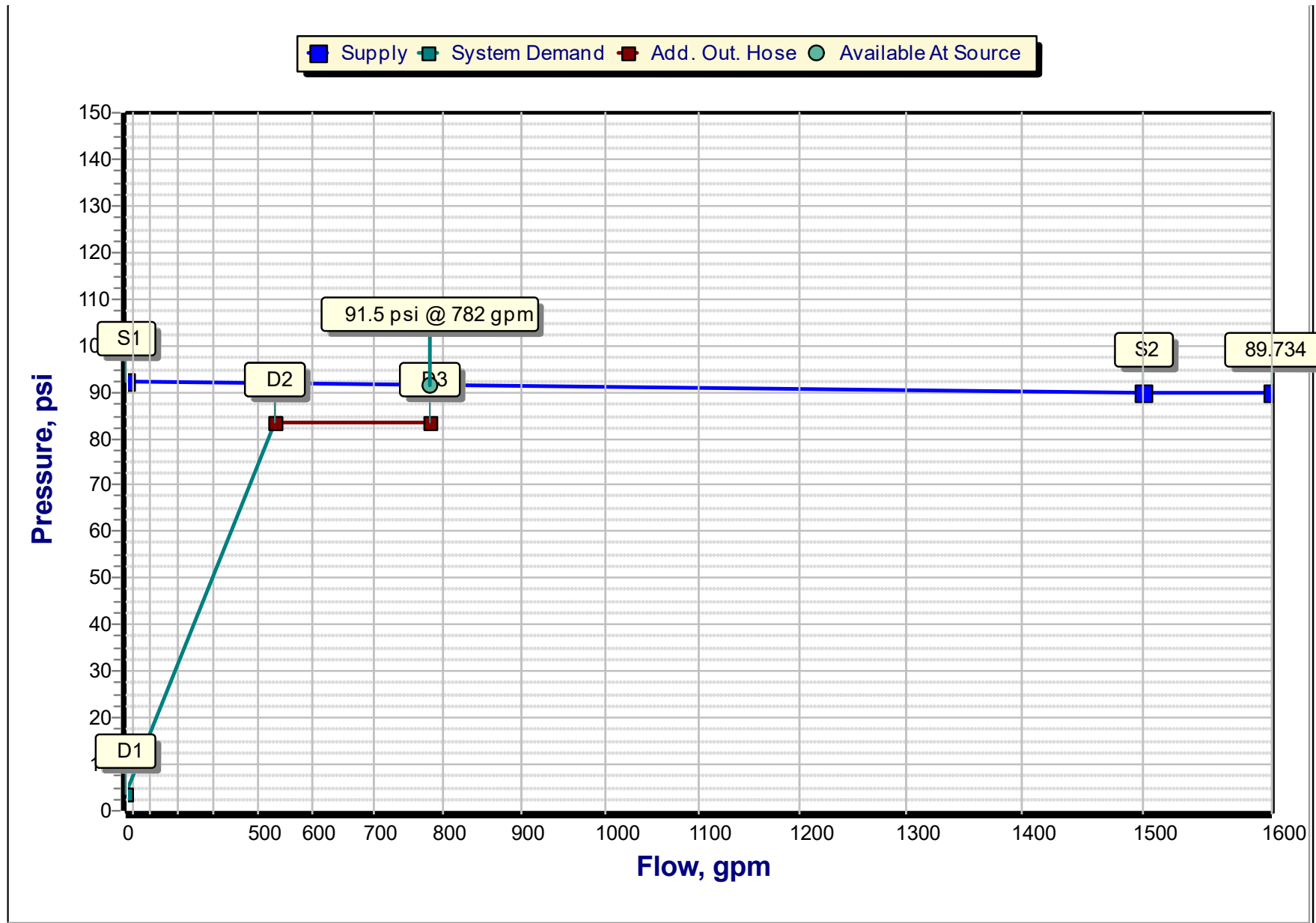
Required Margin of Safety (psi) 0

W1 - Pressure (psi) 83.2

W1 - Flow (gpm) 532

Demand w/o System Pump(s) N/A

Hydraulic Analysis for : 3



Hydraulic Analysis for : 3**Graph Labels**

Label	Description	Values	
		Flow (gpm)	Pressure (psi)
S1	Supply point #1 - Static	0	92.1
S2	Supply point #2 - Residual	1500	90
D1	Elevation Pressure	0	3.5
D2	System Demand	532	83.2
D3	System Demand + Add.Out.Hose	782	83.2

Curve Intersections & Safety Margins

Curve Name	Intersection		Safety Margin	
	Pressure (psi)	Flow (gpm)	Pressure (psi)	@ Flow (gpm)
Supply	91.8	562	8.2	782

Open Heads

Head Ref.	Head Type	Coverage	K-Factor	Required			Calculated		
				Density	Flow	Pressure	Density	Flow	Pressure
		(ft²)	(gpm/psi½)	(gpm/ft²)	(gpm)	(psi)	(gpm/ft²)	(gpm)	(psi)
S33	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.2	25	19.9
S34	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.202	25.2	20.3
S35	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.201	25.2	20.2
S36	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.203	25.4	20.6
S37	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.207	25.8	21.3
S38	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.208	26.1	21.6
S39	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.213	26.6	22.5
S40	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.214	26.8	22.9
S41	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.231	28.9	26.6
S42	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.233	29.1	27
S43	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.233	29.2	27.1
S44	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.235	29.4	27.5
S45	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.216	27	23.3

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Drawings\Wilco_EUG.dwg

S46	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.218	27.2	23.7
S47	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.21	26.3	22
S48	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.212	26.5	22.3
S49	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.205	25.6	20.9
S50	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.206	25.8	21.2
S51	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.203	25.4	20.6
S52	Overhead Sprinkler	125	5.6	0.2	25	19.9	0.205	25.6	20.9

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
S33 10	Overhead Sprinkler HEAD	5.6 Open	25 0	125 0.2	19.9 -3.5	19.9 25
S35 10	Overhead Sprinkler HEAD	5.6 Open	25.2 0.2	125 0.201	20.2 -3.5	19.9 25
S34 10	Overhead Sprinkler HEAD	5.6 Open	25.2 0.2	125 0.202	20.3 -3.5	19.9 25
S36 10	Overhead Sprinkler HEAD	5.6 Open	25.4 0.4	125 0.203	20.6 -3.5	19.9 25
S51 10	Overhead Sprinkler HEAD	5.6 Open	25.4 0.4	125 0.203	20.6 -3.5	19.9 25
S49 10	Overhead Sprinkler HEAD	5.6 Open	25.6 0.6	125 0.205	20.9 -3.5	19.9 25
S52 10	Overhead Sprinkler HEAD	5.6 Open	25.6 0.6	125 0.205	20.9 -3.5	19.9 25
S50 10	Overhead Sprinkler HEAD	5.6 Open	25.8 0.8	125 0.206	21.2 -3.5	19.9 25
S37 10	Overhead Sprinkler HEAD	5.6 Open	25.8 0.8	125 0.207	21.3 -3.5	19.9 25
S38 10	Overhead Sprinkler HEAD	5.6 Open	26.1 1.1	125 0.208	21.6 -3.5	19.9 25
S47 10	Overhead Sprinkler HEAD	5.6 Open	26.3 1.3	125 0.21	22 -3.5	19.9 25
S48 10	Overhead Sprinkler HEAD	5.6 Open	26.5 1.5	125 0.212	22.3 -3.5	19.9 25
S39 10	Overhead Sprinkler HEAD	5.6 Open	26.6 1.6	125 0.213	22.5 -3.5	19.9 25
S40 10	Overhead Sprinkler HEAD	5.6 Open	26.8 1.8	125 0.214	22.9 -3.5	19.9 25
S45 10	Overhead Sprinkler HEAD	5.6 Open	27 2	125 0.216	23.3 -3.5	19.9 25
S46 10	Overhead Sprinkler HEAD	5.6 Open	27.2 2.2	125 0.218	23.7 -3.5	19.9 25
S41 10	Overhead Sprinkler HEAD	5.6 Open	28.9 3.9	125 0.231	26.6 -3.5	19.9 25
S42 10	Overhead Sprinkler HEAD	5.6 Open	29.1 4.1	125 0.233	27 -3.5	19.9 25
S43 10	Overhead Sprinkler HEAD	5.6 Open	29.2 4.2	125 0.233	27.1 -3.5	19.9 25
S44 10	Overhead Sprinkler HEAD	5.6 Open	29.4 4.4	125 0.235	27.5 -3.5	19.9 25
880 12	Node NODE				20.5 -4.5	
864 12	Node NODE				20.8 -4.5	
003 12	Node NODE				20.9 -4.5	
866 12	Node NODE				21.2 -4.5	
049 12	Node NODE				21.2 -4.5	

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
070 12	Node NODE				21.5 -4.5	
051 12	Node NODE				21.6 -4.5	
073 12	Node NODE				21.9 -4.5	
854 12	Node NODE				22 -4.5	
856 12	Node NODE				22.3 -4.5	
083 12	Node NODE				22.7 -4.5	
123 12	Node NODE				23.1 -4.5	
007 11.67	Node NODE				23.2 -4.3	
845 12	Node NODE				23.3 -4.5	
039 11.67	Node NODE				23.6 -4.3	
844 12	Node NODE				23.7 -4.5	
046 11.67	Node NODE				24 -4.3	
088 12	Node NODE				24.1 -4.5	
043 11.67	Node NODE				24.4 -4.3	
087 12	Node NODE				24.5 -4.5	
041 11.67	Node NODE				24.8 -4.3	
042 11.67	Node NODE				25.7 -4.3	
025 11.67	Node NODE				26.3 -4.3	
035 11.67	Node NODE				27.2 -4.3	
841 12	Node NODE				27.6 -4.5	
840 12	Node NODE				28.1 -4.5	
092 12	Node NODE				28.2 -4.5	
091 12	Node NODE				28.7 -4.5	
032 11.67	Node NODE				31.1 -4.3	
034 11.67	Node NODE				31.8 -4.3	

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
033 11.67	Node NODE				40.7 -4.3	
016-O 8.2	Node NODE				66.9 -2.7	
016-I 7.05	Node NODE				69.8 -2.2	
017-O 5.76	Node NODE				70.4 -1.5	
017-I 5.38	Node NODE				71.3 -1.4	
055 0	Node NODE				76.7 1.2	
024-O -4	Node NODE				80.3 3.1	
W1 2.5	Supply SUPPLY		-532		83.2 0	
024-I -4	Node NODE				84.8 3.1	
027 -4	Node NODE				85.9 3.1	
029 -4	Node NODE				85.9 3.1	
031 -4	Node NODE				85.9 3.1	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 1

S33 880	10 12	5.6	25 25	1 1.049	1x(us.Tee-Br)=3.56	2 3.56 5.56	100 0.2748	19.9 -0.9 1.5	
880 003	12 12		0 25	1.25 1.53		8 0 8	100 0.0437	20.5 0 0.3	
003 007	12 11.67		25.2 50.2	1.25 1.53	1x(us.Tee-Br)=7.07 1x(us.90)=3.54	3.25 10.61 13.86	100 0.159	20.9 0.1 2.2	
007 039	11.67 11.67		0 50.2	2 2.203		13 0 13	100 0.0269	23.2 0 0.4	
039 041	11.67 11.67		50.6 100.8	2 2.203		13 0 13	100 0.0979	23.6 0 1.3	
041 025	11.67 11.67		51.9 152.7	2 2.203		7 0 7	100 0.2113	24.8 0 1.5	
025 032	11.67 11.67		53.4 206.1	2 2.203		13 0 13	100 0.3683	26.3 0 4.8	
032 033	11.67 11.67		58 264	2 2.203	1x(us.Tee-Br)=9.72	6.76 9.72 16.48	100 0.5828	31.1 0 9.6	
033 016-O	11.67 8.2		268 532	4 4.31	3x(us.90)=29.81 1x(us.Tee-Br)=19.87	252.84 49.69 302.53	100 0.0812	40.7 1.5 24.6	
016-O 016-I	8.2 7.05		0 532	4 0		1.15 0 1.15	1.9998	66.9 0.5 2.3	Reliable Model D ***
016-I 017-O	7.05 5.76		0 532	4 4.31		1.3 0 1.3	120 0.0579	69.8 0.6 0.1	
017-O 017-I	5.76 5.38		0 532	4 0		0.38 0 0.38	1.6619	70.4 0.2 0.6	Butterfly ***
017-I 055	5.38 0		0 532	4 4.31	1x(us.Tee-Br)=27.87 1x(us.90)=13.94	7.38 41.81 49.19	120 0.0579	71.3 2.3 2.8	
055 024-O	0 -4		0 532	6 6.4	3x(us.90)=72.58	198.78 72.58 271.36	140 0.0064	76.7 1.7 1.7	
024-O 024-I	-4 -4		0 532	6 0		3.34 0 3.34	1.365	80.3 0 4.6	Wilkins 350 ADA ***
024-I 027	-4 -4		0 532	6 6.4	1x(us.Tee-Br)=51.84 1x(us.90)=24.19	95.71 76.04 171.75	140 0.0064	84.8 0 1.1	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 1

027	-4		0	20		280.17	140	85.9	
029	-4		532	18.5		0	0.0000	0	
						280.17		0.0	
029	-4		0	24		58	140	85.9	
031	-4		532	20.5		0	0.0000	0	
						58		0	
031	-4		0	6	2x(us.90)=48.39	12.5	140	85.9	
W1	2.5		532	6.4		48.39	0.0064	-2.8	
						60.89		0.4	
W1								83.2	

Path No: 2

S35	10	5.6	25.2	1	1x(us.Tee-Br)=3.56	2	100	20.2	
864	12		25.2	1.049		3.56	0.2785	-0.9	
						5.56		1.5	
864	12		0	1.25		8	100	20.8	
866	12		25.2	1.53		0	0.0443	0	
						8		0.4	
866	12		25.4	1.25	1x(us.Tee-Br)=7.07	3.25	100	21.2	
039	11.67		50.6	1.53	1x(us.90)=3.54	10.61	0.1612	0.1	
						13.86		2.2	
039								23.6	

Path No: 3

S34	10	5.6	25.2	1	1x(us.Tee-Br)=3.56	2	100	20.3	
003	12		25.2	1.049		3.56	0.2789	-0.9	
						5.56		1.6	
003								20.9	

Path No: 4

S36	10	5.6	25.4	1	1x(us.Tee-Br)=3.56	2	100	20.6	
866	12		25.4	1.049		3.56	0.2827	-0.9	
						5.56		1.6	
866								21.2	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 5

S51 049	10 12	5.6	25.4 25.4	1 1.049	1x(us.Tee-Br)=3.56	2 3.56 5.56	100 0.2831	20.6 -0.9 1.6	
049 051	12 12		0 25.4	1.25 1.53		8 0 8	100 0.045	21.2 0 0.4	
051 046	12 11.67		25.6 51	1.25 1.53	1x(us.Tee-Br)=7.07 1x(us.90)=3.54	3.25 10.61 13.86	100 0.1639	21.6 0.1 2.3	
046 043	11.67 11.67		0 51	2 2.203		13 0 13	100 0.0278	24 0 0.4	
043 042	11.67 11.67		51.4 102.4	2 2.203		13 0 13	100 0.1009	24.4 0 1.3	
042 035	11.67 11.67		52.7 155.2	2 2.203		7 0 7	100 0.2177	25.7 0 1.5	
035 034	11.67 11.67		54.3 209.4	2 2.203		12 0 12	100 0.3794	27.2 0 4.6	
034 033	11.67 11.67		58.6 268	2 2.203	1x(us.Tee-Br)=9.72	5.24 9.72 14.97	100 0.599	31.8 0 9	
033								40.7	

Path No: 6

S49 070	10 12	5.6	25.6 25.6	1 1.049	1x(us.Tee-Br)=3.56	2 3.56 5.56	100 0.287	20.9 -0.9 1.6	
070 073	12 12		0 25.6	1.25 1.53		8 0 8	100 0.0457	21.5 0 0.4	
073 043	12 11.67		25.8 51.4	1.25 1.53	1x(us.Tee-Br)=7.07 1x(us.90)=3.54	3.25 10.61 13.86	100 0.1661	21.9 0.1 2.3	
043								24.4	

Path No: 7

S52 051	10 12	5.6	25.6 25.6	1 1.049	1x(us.Tee-Br)=3.56	2 3.56 5.56	100 0.2874	20.9 -0.9 1.6	
051								21.6	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 8

S50 073	10 12	5.6	25.8 25.8	1 1.049	1x(us.Tee-Br)=3.56	2 3.56 5.56	100 0.2913	21.2 -0.9 1.6	
073								21.9	

Path No: 9

S37 854	10 12	5.6	25.8 25.8	1 1.049	1x(us.Tee-Br)=3.56	2 3.56 5.56	100 0.2921	21.3 -0.9 1.6	
854 856	12 12		0 25.8	1.25 1.53		8 0 8	100 0.0465	22 0 0.4	
856 041	12 11.67		26.1 51.9	1.25 1.53	1x(us.Tee-Br)=7.07 1x(us.90)=3.54	3.25 10.61 13.86	100 0.1691	22.3 0.1 2.3	
041								24.8	

Path No: 10

S38 856	10 12	5.6	26.1 26.1	1 1.049	1x(us.Tee-Br)=3.56	2 3.56 5.56	100 0.2965	21.6 -0.9 1.7	
856								22.3	

Path No: 11

S47 083	10 12	5.6	26.3 26.3	1 1.049	1x(us.Tee-Br)=3.56	2 3.56 5.56	100 0.301	22 -0.9 1.7	
083 123	12 12		0 26.3	1.25 1.53		8 0 8	100 0.0479	22.7 0 0.4	
123 042	12 11.67		26.5 52.7	1.25 1.53	1x(us.Tee-Br)=7.07 1x(us.90)=3.54	3.25 10.61 13.86	100 0.1742	23.1 0.1 2.4	
042								25.7	

Path No: 12

S48 123	10 12	5.6	26.5 26.5	1 1.049	1x(us.Tee-Br)=3.56	2 3.56 5.56	100 0.3055	22.3 -0.9 1.7	
123								23.1	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 13

S39 845	10 12	5.6	26.6 26.6	1 1.049	1x(us.Tee-Br)=3.56	2 3.56 5.56	100 0.3079	22.5 -0.9 1.7	
845 844	12 12		0 26.6	1.25 1.53		8 0 8	100 0.049	23.3 0 0.4	
844 025	12 11.67		26.8 53.4	1.25 1.53	1x(us.Tee-Br)=7.07 1x(us.90)=3.54	3.25 10.61 13.86	100 0.1782	23.7 0.1 2.5	
025								26.3	

Path No: 14

S40 844	10 12	5.6	26.8 26.8	1 1.049	1x(us.Tee-Br)=3.56	2 3.56 5.56	100 0.3126	22.9 -0.9 1.7	
844								23.7	

Path No: 15

S45 088	10 12	5.6	27 27	1 1.049	1x(us.Tee-Br)=3.56	2 3.56 5.56	100 0.3172	23.3 -0.9 1.8	
088 087	12 12		0 27	1.25 1.53		8 0 8	100 0.0505	24.1 0 0.4	
087 035	12 11.67		27.2 54.3	1.25 1.53	1x(us.Tee-Br)=7.07 1x(us.90)=3.54	3.25 10.61 13.86	100 0.1836	24.5 0.1 2.5	
035								27.2	

Path No: 16

S46 087	10 12	5.6	27.2 27.2	1 1.049	1x(us.Tee-Br)=3.56	2 3.56 5.56	100 0.322	23.7 -0.9 1.8	
087								24.5	

Path No: 17

S41 841	10 12	5.6	28.9 28.9	1 1.049	1x(us.Tee-Br)=3.56	2 3.56 5.56	100 0.3586	26.6 -0.9 2	
841 840	12 12		0 28.9	1.25 1.53		8 0 8	100 0.0571	27.6 0 0.5	
840 032	12 11.67		29.1 58	1.25 1.53	1x(us.Tee-Br)=7.07 1x(us.90)=3.54	3.25 10.61 13.86	100 0.2075	28.1 0.1 2.9	
032								31.1	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 18

S42	10	5.6	29.1	1	1x(us.Tee-Br)=3.56	2	100	27	
840	12		29.1	1.049		3.56	0.364	-0.9	
						5.56		2	
840								28.1	

Path No: 19

S43	10	5.6	29.2	1	1x(us.Tee-Br)=3.56	2	100	27.1	
092	12		29.2	1.049		3.56	0.3654	-0.9	
						5.56		2	
092	12		0	1.25		8	100	28.2	
091	12		29.2	1.53		0	0.0581	0	
						8		0.5	
091	12		29.4	1.25	1x(us.Tee-Br)=7.07	3.25	100	28.7	
034	11.67		58.6	1.53	1x(us.90)=3.54	10.61	0.2114	0.1	
						13.86		2.9	
034								31.8	

Path No: 20

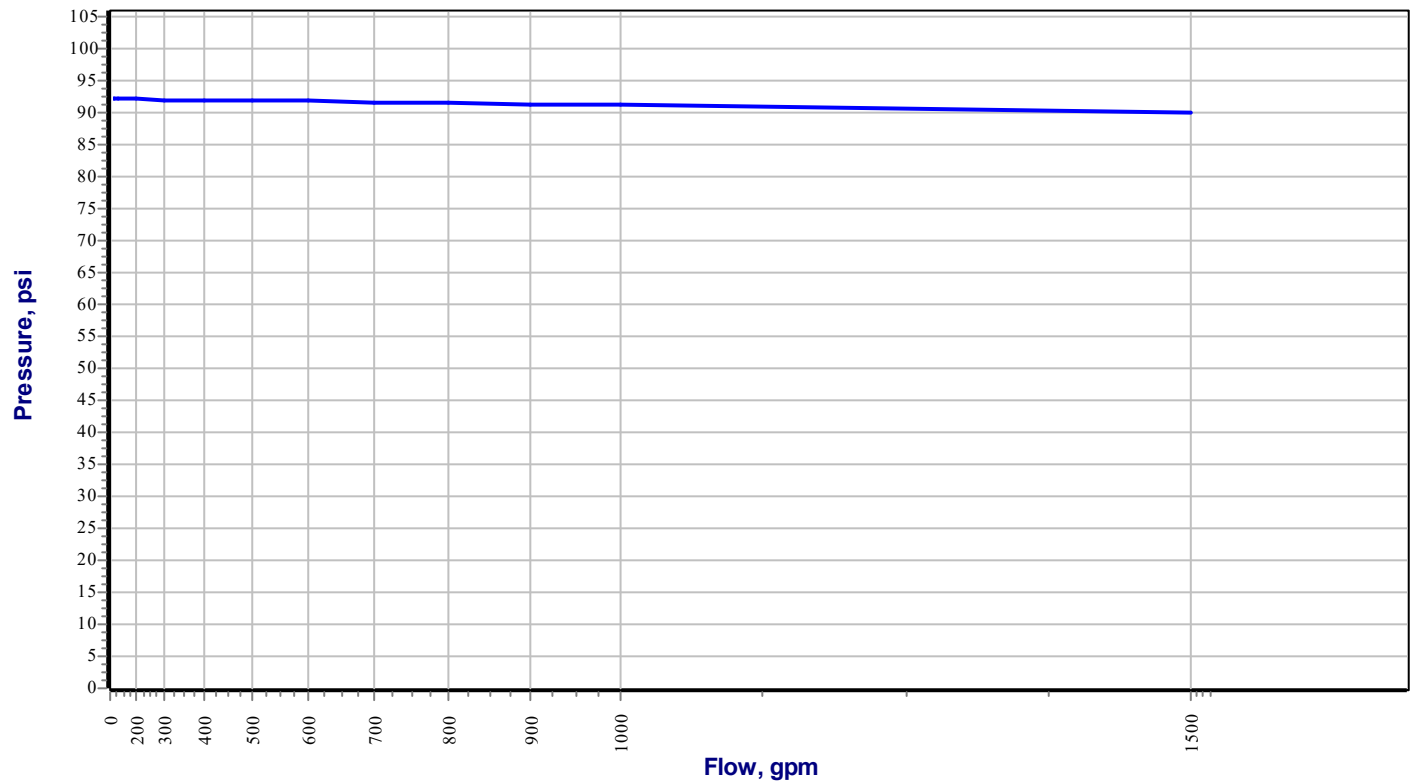
S44	10	5.6	29.4	1	1x(us.Tee-Br)=3.56	2	100	27.5	
091	12		29.4	1.049		3.56	0.3708	-0.9	
						5.56		2.1	
091								28.7	

* Pressures are balanced to a high degree of accuracy. Values may vary by 0.1 psi due to display rounding.

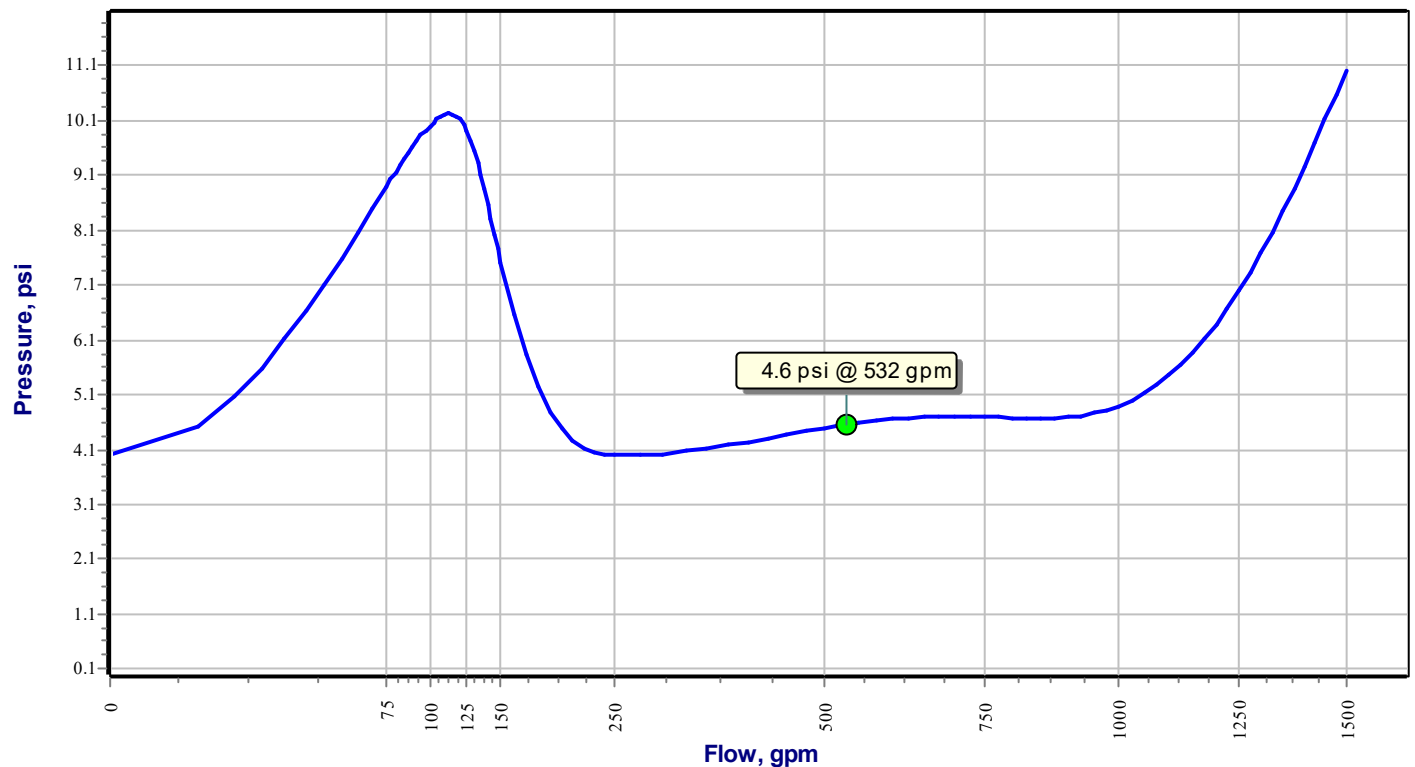
* Maximum Velocity of 22.55 ft/s occurs in the following pipe(s): (033-034)

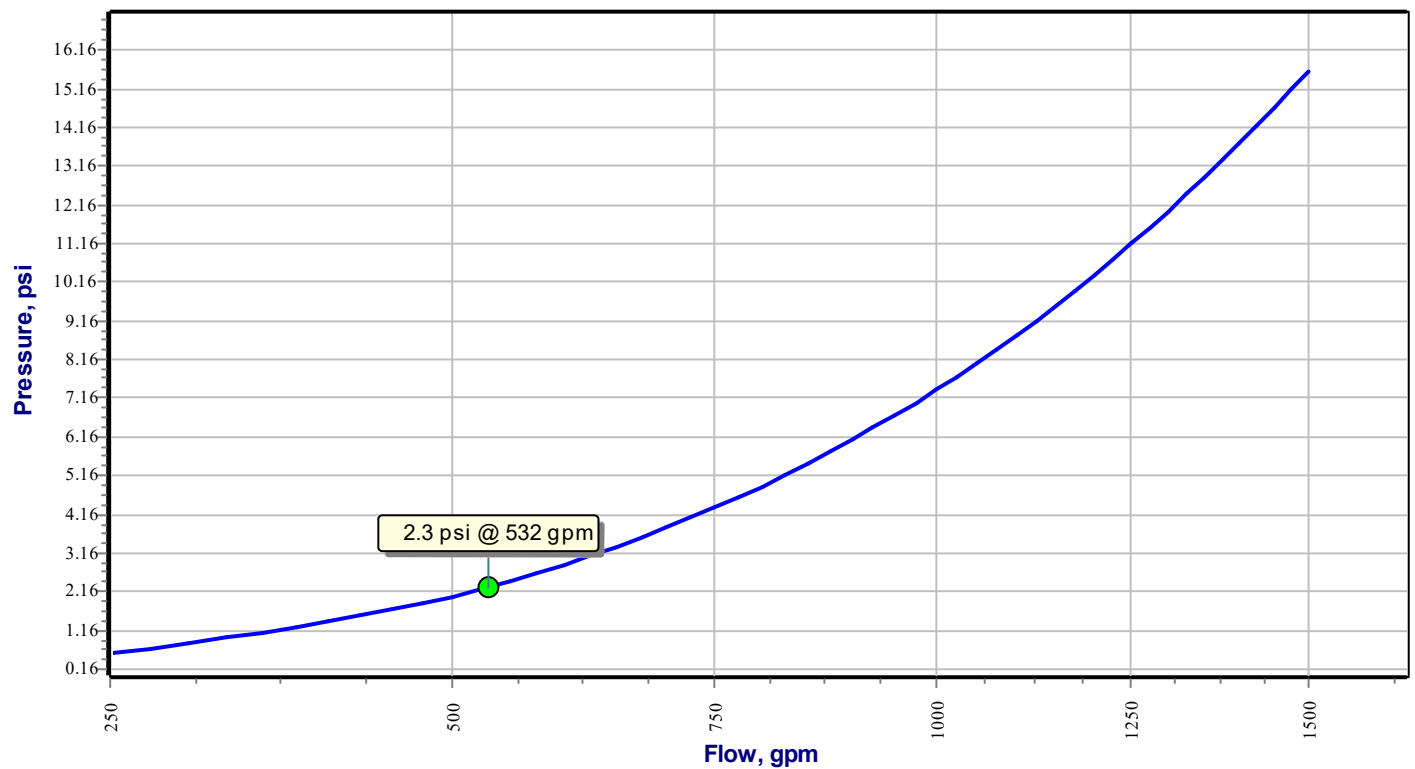
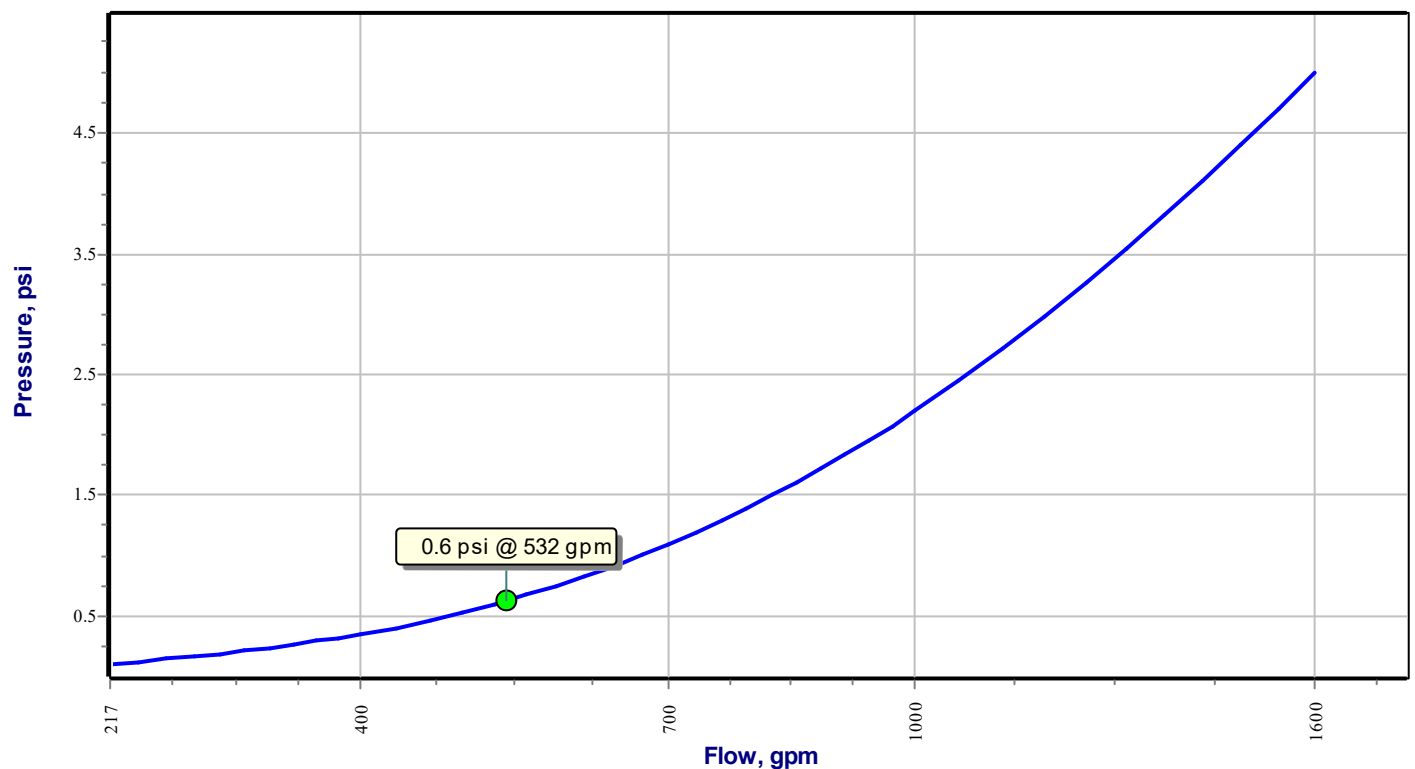
*** Device pressure loss (gain in the case of pumps) is calculated from the device's curve. If the device curve is printed with this report, it will appear below. The length of the device as shown in the table above comes from the CAD drawing. The friction loss per unit of length is calculated based upon the length and the curve-based loss/gain value. Internal ID and C Factor values are irrelevant as the device is not represented as an addition to any pipe, but is an individual item whose loss/gain is based solely on the curve data.

Pressure vs. Flow Function
Design Area: 3; Supply Ref.: W1; Supply Name:W1



Pressure Loss Function
Design Area: 3; BFP Ref.: 992 (Wilkins 350 ADA, Size = 6); Inlet Node: 024-I; Outlet Node: 024-O



Pressure Loss Function**Design Area: 3; DPV Ref.: 991 (Reliable Model D, Size = 4); Inlet Node: 016-I; Outlet Node: 016-O****Pressure Loss Function****Design Area: 3; Valve Ref.: 990 (Butterfly, Size = 4); Inlet Node: 017-I; Outlet Node: 017-O**

CALCULATION SUMMARY

Project Name : Wilco Eugene

Project Location: West 11th & Willow Creek

Contract No. : SC1388

City: Eugene, OR

Design Areas

Design Area Name	Calc. Mode (Model)	Occupancy	Area of Application	Total Water	Pressure @ Source	Min. Density	Min. Pressure	Min. Flow	Calculated Heads	Hose Streams	Margin To Source
			(ft ²)	(gpm)	(psi)	(gpm/ft ²)	(psi)	(gpm)	#	(gpm)	(psi)
6	Demand (HW)	Ordinary 2	1568	708.3	Required 65.3	0.2	21.6	26	17	250	26.3

HYDRAULIC CALCULATIONS for

Job Information

Project Name : Wilco Eugene

Contract No. : SC1388

City: Eugene, OR

Project Location: West 11th & Willow Creek

Date: 3/28/2023

Contractor Information

Name of Contractor: Omlid & Swinney

Address: 610 30th St.

City: Springfield, Oregon 97478

Phone Number: (541) 741-1775

E-mail: andrew.shuck@omlidandswinney.us

Name of Designer: Andy Shuck

Authority Having Jurisdiction: City of Eugene

Design

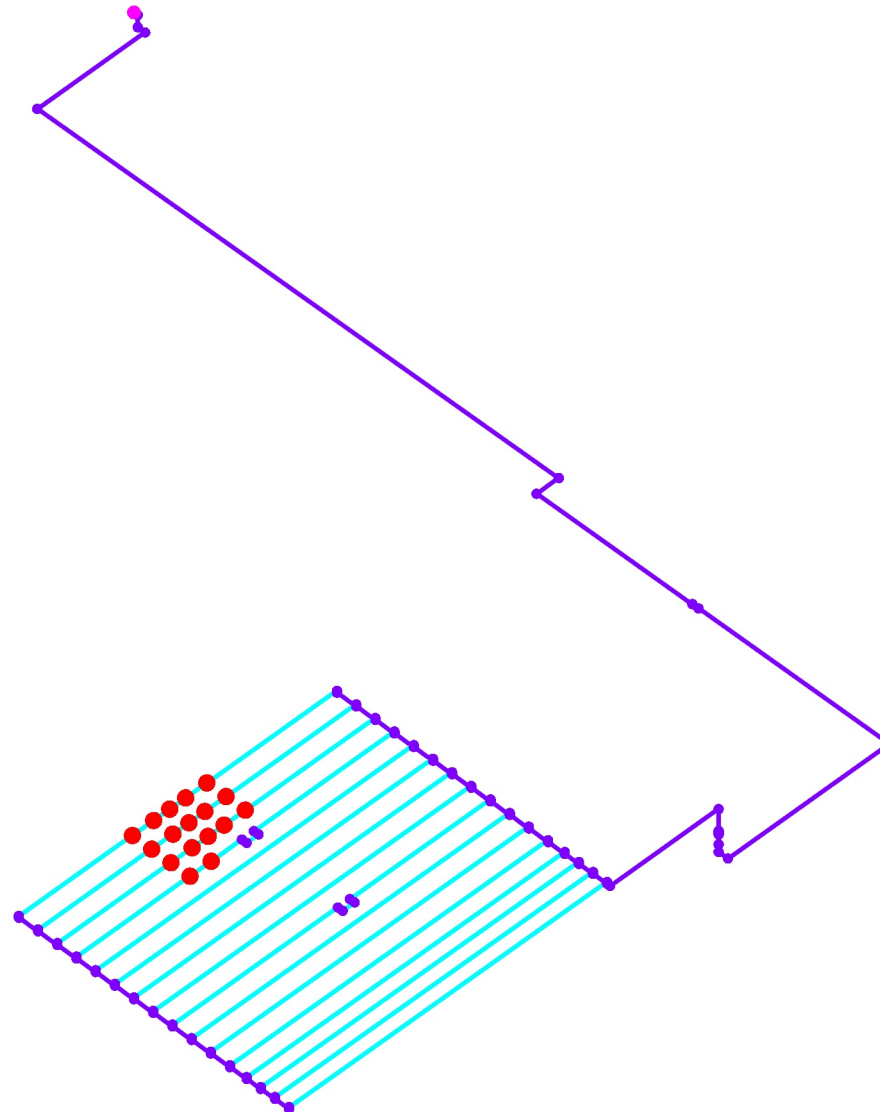
Remote Area Name	6
Remote Area Location	Retail
Occupancy Classification	Ordinary 2
Density (gpm/ft ²)	0.2
Area of Application (ft ²)	1568
Coverage per Sprinkler (ft ²)	130
Number of Calculated Sprinklers	17
In-Rack Demand (gpm)	0
Special Heads	
Hose Streams (gpm)	250
Total Water Required (incl. Hose Streams) (gpm)	708.3
Required Pressure at Source (psi)	65.3
Type of System	Wet
Volume - Entire System (gal)	5918.5 gal

Water Supply Information

Date	2/25/2022
Location	Hydrant 10476 11th & Willow Creek
Source	W1

Notes

**Diagram for Design Area : 6
(Optimized Hvdraulic Simplified)**



Hydraulic Analysis for : 6**Calculation Info**

Calculation Mode
 Hydraulic Model
 Fluid Name
 Fluid Weight, (lb/ft³)
 Fluid Dynamic Viscosity, (lb·s/ft²)

Demand
 Hazen-Williams
 Water @ 60F (15.6C)
 N/A for Hazen-Williams calculation.
 N/A for Hazen-Williams calculation.

Water Supply Parameters

Supply 1 : W1

Flow (gpm)	Pressure (psi)
0	92.1
1500	90

Supply Analysis

Node at Source	Static Pressure (psi)	Residual Pressure (psi)	Flow (gpm)	Available Pressure (psi)	Total Demand (gpm)	Required Pressure (psi)
W1	92.1	90	1500	91.6	708.3	65.3

Hoses

Inside Hose Flow / Standpipe Demand (gpm)

Outside Hose Flow (gpm)

Additional Outside Hose Flow (gpm) 250

Other (custom defined) Hose Flow (gpm)

Total Hose Flow (gpm) 250**Sprinklers**

Ovehead Sprinkler Flow (gpm) 458.3

InRack Sprinkler Flow (gpm) 0

Other (custom defined) Sprinkler Flow (gpm) 0

Total Sprinkler Flow (gpm) 458.3**Other**

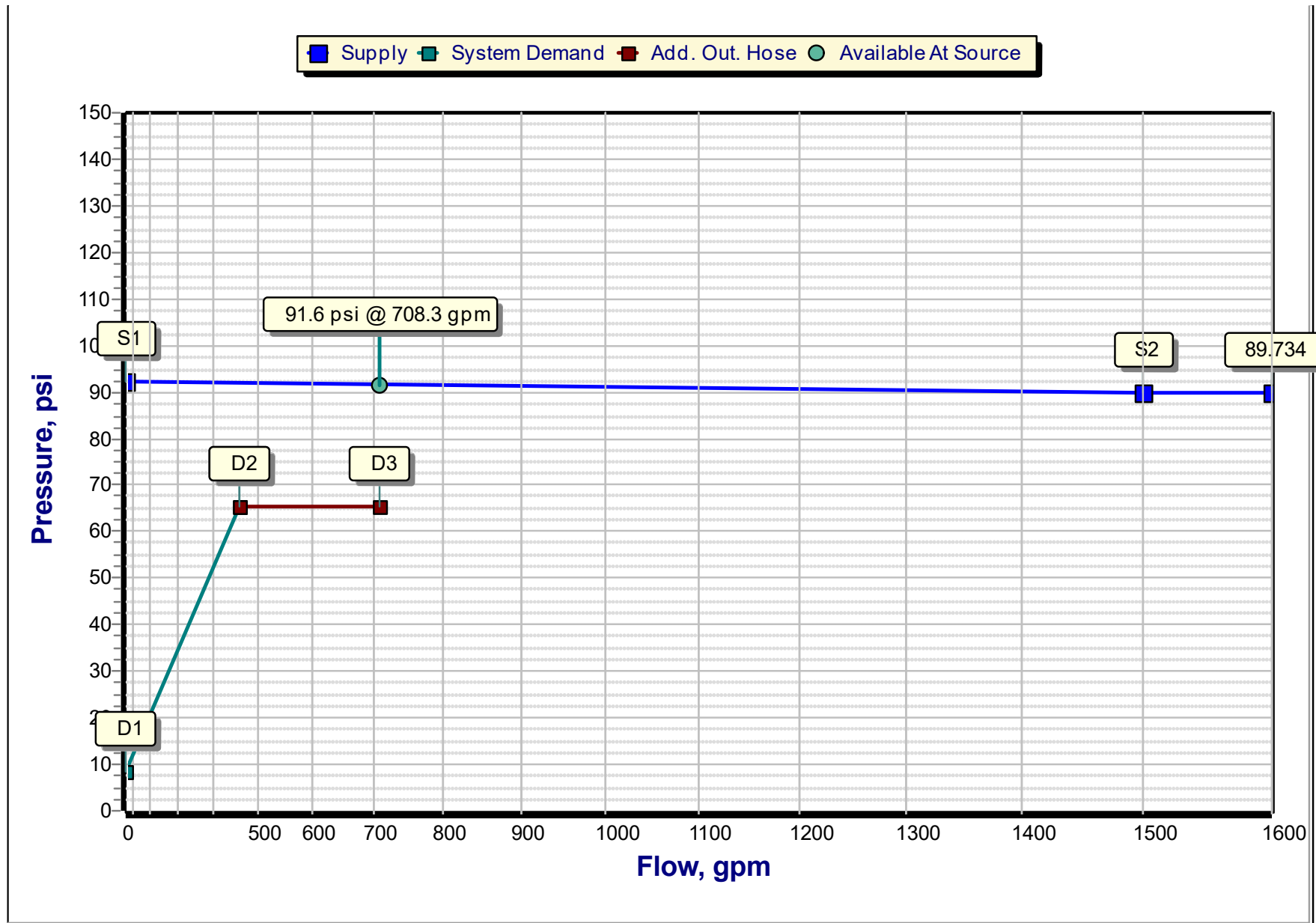
Required Margin of Safety (psi) 0

W1 - Pressure (psi) 65.3

W1 - Flow (gpm) 458.3

Demand w/o System Pump(s) N/A

Hydraulic Analysis for : 6



Hydraulic Analysis for : 6

Graph Labels

Label	Description	Values	
		Flow (gpm)	Pressure (psi)
S1	Supply point #1 - Static	0	92.1
S2	Supply point #2 - Residual	1500	90
D1	Elevation Pressure	0	8.3
D2	System Demand	458.3	65.3
D3	System Demand + Add.Out.Hose	708.3	65.3

Curve Intersections & Safety Margins

Curve Name	Intersection		Safety Margin	
	Pressure (psi)	Flow (gpm)	Pressure (psi)	@ Flow (gpm)
Supply	91.8	563.2	26.3	708.3

Open Heads

Head Ref.	Head Type	Coverage	K-Factor	Required			Calculated		
				Density	Flow	Pressure	Density	Flow	Pressure
		(ft²)	(gpm/psi½)	(gpm/ft²)	(gpm)	(psi)	(gpm/ft²)	(gpm)	(psi)
S101	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.204	26.5	22.3
S102	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.204	26.5	22.3
S103	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.204	26.5	22.4
S104	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.248	32.2	33.2
S105	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.2	26	21.6
S106	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.2	26	21.6
S107	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.201	26.1	21.7
S108	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.248	32.2	33.2
S109	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.2	26	21.6
S110	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.2	26	21.6
S111	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.2	26	21.6
S112	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.201	26.1	21.7
S113	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.201	26.1	21.7

S114	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.201	26.1	21.7
S115	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.205	26.6	22.6
S116	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.205	26.6	22.6
S117	Overhead Sprinkler	130	5.6	0.2	26	21.6	0.205	26.7	22.6

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
S109 20	Overhead Sprinkler HEAD	5.6 Open	26 0	130 0.2	21.6 -8.3	21.6 26
S110 20	Overhead Sprinkler HEAD	5.6 Open	26 0	130 0.2	21.6 -8.3	21.6 26
S105 20	Overhead Sprinkler HEAD	5.6 Open	26 0.0	130 0.2	21.6 -8.3	21.6 26
S106 20	Overhead Sprinkler HEAD	5.6 Open	26 0.0	130 0.2	21.6 -8.3	21.6 26
S111 20	Overhead Sprinkler HEAD	5.6 Open	26 0.0	130 0.2	21.6 -8.3	21.6 26
S112 20	Overhead Sprinkler HEAD	5.6 Open	26.1 0.1	130 0.201	21.7 -8.3	21.6 26
S113 20	Overhead Sprinkler HEAD	5.6 Open	26.1 0.1	130 0.201	21.7 -8.3	21.6 26
S107 20	Overhead Sprinkler HEAD	5.6 Open	26.1 0.1	130 0.201	21.7 -8.3	21.6 26
S114 20	Overhead Sprinkler HEAD	5.6 Open	26.1 0.1	130 0.201	21.7 -8.3	21.6 26
S101 20	Overhead Sprinkler HEAD	5.6 Open	26.5 0.5	130 0.204	22.3 -8.3	21.6 26
S102 20	Overhead Sprinkler HEAD	5.6 Open	26.5 0.5	130 0.204	22.3 -8.3	21.6 26
S103 20	Overhead Sprinkler HEAD	5.6 Open	26.5 0.5	130 0.204	22.4 -8.3	21.6 26
S115 20	Overhead Sprinkler HEAD	5.6 Open	26.6 0.6	130 0.205	22.6 -8.3	21.6 26
S116 20	Overhead Sprinkler HEAD	5.6 Open	26.6 0.6	130 0.205	22.6 -8.3	21.6 26
S117 20	Overhead Sprinkler HEAD	5.6 Open	26.7 0.7	130 0.205	22.6 -8.3	21.6 26
S104 20	Overhead Sprinkler HEAD	5.6 Open	32.2 6.2	130 0.248	33.2 -8.3	21.6 26
S108 20	Overhead Sprinkler HEAD	5.6 Open	32.2 6.2	130 0.248	33.2 -8.3	21.6 26
116 19	Node NODE				36.9 -7.8	
115 19	Node NODE				36.9 -7.8	
114 19	Node NODE				37.1 -7.8	
113 19	Node NODE				37.4 -7.8	
112 19	Node NODE				37.8 -7.8	
111 19	Node NODE				38.2 -7.8	
110 19	Node NODE				38.5 -7.8	
109 19	Node NODE				38.7 -7.8	

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
108 19	Node NODE				38.9 -7.8	
107 19	Node NODE				39.1 -7.8	
106 19	Node NODE				39.2 -7.8	
105 19	Node NODE				39.3 -7.8	
104 19	Node NODE				39.4 -7.8	
103 19	Node NODE				39.4 -7.8	
102 19	Node NODE				39.4 -7.8	
101 19	Node NODE				39.4 -7.8	
144 19	Node NODE				41.2 -7.8	
145 19	Node NODE				41.2 -7.8	
146 19	Node NODE				41.3 -7.8	
147 19	Node NODE				41.4 -7.8	
148 19	Node NODE				41.5 -7.8	
080 19	Node NODE				41.7 -7.8	
081 19	Node NODE				41.9 -7.8	
084 19	Node NODE				42 -7.8	
086 19	Node NODE				42.3 -7.8	
089 19	Node NODE				42.5 -7.8	
090 19	Node NODE				42.8 -7.8	
093 19	Node NODE				43.1 -7.8	
095 19	Node NODE				43.3 -7.8	
096 19	Node NODE				43.6 -7.8	
097 19	Node NODE				43.9 -7.8	
098 19	Node NODE				44.2 -7.8	
626-O 7.26	Node NODE				54.1 -2.3	

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
626-I 6.77	Node NODE				54.8 -2	
627-O 6.43	Node NODE				55 -1.9	
627-I 5.47	Node NODE				56.8 -1.4	
055 0	Node NODE				59.6 1.2	
024-O -4	Node NODE				62.8 3.1	
W1 2.5	Supply SUPPLY		-458.3		65.3 0	
024-I -4	Node NODE				67.2 3.1	
027 -4	Node NODE				68.1 3.1	
029 -4	Node NODE				68.1 3.1	
031 -4	Node NODE				68.1 3.1	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 1

S109 S112	20 20	5.6 5.6	26 15.6	1.25 1.53		8.58 0 8.58	120 0.013	21.6 0 0.1	
S112 S115	20 20	5.6 5.6	26.1 41.6	1.25 1.53		11.33 0 11.33	120 0.0802	21.7 0 0.9	
S115 144	20 19	5.6	26.6 68.2	1.25 1.53	2x(us.Tee-Br)=19.83	70.92 19.83 90.75	120 0.2003	22.6 0.4 18.2	
144 145	19 19		0 68.2	4 4.31		10.33 0 10.33	120 0.0013	41.2 0 0.0	
145 146	19 19		68.2 136.5	4 4.31		10.33 0 10.33	120 0.0047	41.2 0 0.0	
146 147	19 19		68.2 204.7	4 4.31		10.25 0 10.25	120 0.0099	41.3 0 0.1	
147 148	19 19		33.6 238.2	4 4.31		10.33 0 10.33	120 0.0131	41.4 0 0.1	
148 080	19 19		18.2 256.5	4 4.31		10.33 0 10.33	120 0.015	41.5 0 0.2	
080 081	19 19		17.7 274.1	4 4.31		10.25 0 10.25	120 0.017	41.7 0 0.2	
081 084	19 19		17.3 291.5	4 4.31		10.33 0 10.33	120 0.019	41.9 0 0.2	
084 086	19 19		17.2 308.6	4 4.31		10.33 0 10.33	120 0.0211	42 0 0.2	
086 089	19 19		16.2 324.9	4 4.31		10.33 0 10.33	120 0.0232	42.3 0 0.2	
089 090	19 19		17.4 342.3	4 4.31		10.25 0 10.25	120 0.0256	42.5 0 0.3	
090 093	19 19		17.8 360.1	4 4.31		10.33 0 10.33	120 0.0281	42.8 0 0.3	
093 095	19 19		18.3 378.4	4 4.31		8.96 0 8.96	120 0.0308	43.1 0 0.3	
095 096	19 19		18.9 397.3	4 4.31		7.58 0 7.58	120 0.0337	43.3 0 0.3	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 1

096	19		19.5	4		7.58	120	43.6	
097	19		416.8	4.31		0	0.0369	0	
						7.58		0.3	
097	19		20.1	4		7.58	120	43.9	
098	19		436.9	4.31		0	0.0402	0	
						7.58		0.3	
098	19		21.4	4	2x(us.90)=27.87	71.61	120	44.2	
626-O	7.26		458.3	4.31		27.87	0.044	5.1	
						99.49		4.4	
626-O	7.26		0	4		0.49		54.1	Butterfly
626-I	6.77		458.3	0		0	0.9511	0.2	***
						0.49		0.5	
626-I	6.77		0	4		0.34	120	54.8	
627-O	6.43		458.3	4.31		0	0.044	0.1	
						0.34		0.0	
627-O	6.43		0	4		0.96		55	CV-1 FR
627-I	5.47		458.3	0		0	1.4461	0.4	Check
						0.96		1.4	***
627-I	5.47		0	4		5.47	120	56.8	
055	0		458.3	4.31		0	0.044	2.4	
						5.47		0.2	
055	0		0	6	3x(us.90)=72.58	198.78	140	59.6	
024-O	-4		458.3	6.4		72.58	0.0048	1.7	
						271.36		1.3	
024-O	-4		0	6		3.34		62.8	Wilkins 350
024-I	-4		458.3	0		0	1.315	0	ADA
						3.34		4.4	***
024-I	-4		0	6	1x(us.Tee-Br)=51.84	95.71	140	67.2	
027	-4		458.3	6.4	1x(us.90)=24.19	76.04	0.0048	0	
						171.75		0.8	
027	-4		0	20		280.17	140	68.1	
029	-4		458.3	18.5		0	0.0000	0	
						280.17		0	
029	-4		0	24		58	140	68.1	
031	-4		458.3	20.5		0	0.0000	0	
						58		0	
031	-4		0	6	2x(us.90)=48.39	12.5	140	68.1	
W1	2.5		458.3	6.4		48.39	0.0048	-2.8	
						60.89		0.3	
W1								65.3	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 2

S109 S105	20 20	5.6 5.6	26 10.4	1.25 1.53		8.63 0 8.63	120 0.0062	21.6 0 0.1	
S105 S101	20 20	5.6 5.6	26 36.5	1.25 1.53		11.38 0 11.38	120 0.0628	21.6 0 0.7	
S101 116	20 19	5.6	26.5 62.9	1.25 1.53	2x(us.Tee-Br)=19.83	62 19.83 81.83	120 0.1724	22.3 0.4 14.1	
116 115	19 19		0 62.9	3 3.314		10.33 0 10.33	120 0.004	36.9 0 0.0	
115 114	19 19		63 125.9	3 3.314		10.33 0 10.33	120 0.0144	36.9 0 0.1	
114 113	19 19		63.2 189.1	3 3.314		10.25 0 10.25	120 0.0307	37.1 0 0.3	
113 112	19 19		30.9 220	3 3.314		10.33 0 10.33	120 0.0406	37.4 0 0.4	
112 111	19 19		-18.2 201.8	3 3.314		10.33 0 10.33	120 0.0346	37.8 0 0.4	
111 110	19 19		-17.7 184.1	3 3.314		10.25 0 10.25	120 0.0292	38.2 0 0.3	
110 109	19 19		-17.3 166.8	3 3.314		10.33 0 10.33	120 0.0243	38.5 0 0.3	
109 108	19 19		-17.2 149.6	3 3.314		10.33 0 10.33	120 0.0199	38.7 0 0.2	
108 107	19 19		-16.2 133.4	3 3.314		10.33 0 10.33	120 0.0161	38.9 0 0.2	
107 106	19 19		-17.4 116	3 3.314		10.25 0 10.25	120 0.0124	39.1 0 0.1	
106 105	19 19		-17.8 98.2	3 3.314		10.33 0 10.33	120 0.0091	39.2 0 0.1	
105 104	19 19		-18.3 79.9	3 3.314		8.96 0 8.96	120 0.0062	39.3 0 0.1	
104 103	19 19		-18.9 61	3 3.314		7.58 0 7.58	120 0.0038	39.4 0 0.0	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 2

103 102	19 19		-19.5 41.5	3 3.314		7.58 0 7.58	120 0.0019	39.4 0 0.0	
102 101	19 19		-20.1 21.4	3 3.314	1x(us.Tee-Br)=21.84	7.58 21.84 29.42	120 0.0005	39.4 0 0.0	
101 098	19 19		0 21.4	1.25 1.53	3x(us.Tee-Br)=29.75	172.83 29.75 202.58	120 0.0233	39.4 0 4.7	
098								44.2	

Path No: 3

S110 S113	20 20	5.6 5.6	26 15.5	1.25 1.53		8.58 0 8.58	120 0.0129	21.6 0 0.1	
S113 S116	20 20	5.6 5.6	26.1 41.6	1.25 1.53		11.33 0 11.33	120 0.0801	21.7 0 0.9	
S116 145	20 19	5.6	26.6 68.2	1.25 1.53	2x(us.Tee-Br)=19.83	70.92 19.83 90.75	120 0.2002	22.6 0.4 18.2	
145								41.2	

Path No: 4

S110 S106	20 20	5.6 5.6	26 10.5	1.25 1.53		8.63 0 8.63	120 0.0062	21.6 0 0.1	
S106 S102	20 20	5.6 5.6	26 36.5	1.25 1.53		11.38 0 11.38	120 0.0629	21.6 0 0.7	
S102 115	20 19	5.6	26.5 63	1.25 1.53	2x(us.Tee-Br)=19.83	62 19.83 81.83	120 0.1727	22.3 0.4 14.1	
115								36.9	

Path No: 5

S111 S114	20 20	5.6 5.6	26 15.4	1.25 1.53		8.58 0 8.58	120 0.0128	21.6 0 0.1	
S114 S117	20 20	5.6 5.6	26.1 41.6	1.25 1.53		11.33 0 11.33	120 0.08	21.7 0 0.9	
S117 146	20 19	5.6	26.7 68.2	1.25 1.53	2x(us.Tee-Br)=19.83	70.92 19.83 90.75	120 0.2001	22.6 0.4 18.2	
146								41.3	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 6

S111	20	5.6	26	1.25		8.63	120	21.6	
S107	20	5.6	10.6	1.53		0	0.0064	0	
						8.63		0.1	
S107	20	5.6	26.1	1.25		11.38	120	21.7	
S103	20	5.6	36.7	1.53		0	0.0634	0	
						11.38		0.7	
S103	20	5.6	26.5	1.25	2x(us.Tee-Br)=19.83	62	120	22.4	
114	19		63.2	1.53		19.83	0.1737	0.4	
						81.83		14.2	
114								37.1	

Path No: 7

S104	20	5.6	32.2	1.25	2x(us.Tee-Br)=19.83	62	120	33.2	
113	19		30.9	1.53		19.83	0.0463	0.4	
						81.83		3.8	
113								37.4	

Path No: 8

S104	20	5.6	32.2	1.25		11.38	120	33.2	
S108	20	5.6	1.3	1.53		0	0.0001	0	
						11.38		0	
S108	20	5.6	32.2	1.25	2x(us.Tee-Br)=19.83	104.54	120	33.2	
147	19		33.6	1.53	4x(us.90)=19.83	39.67	0.0538	0.4	
						144.21		7.8	
147								41.4	

Path No: 9

112	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	37.8	
148	19		18.2	1.53		39.67	0.0174	0	
						212.5		3.7	
148								41.5	

Path No: 10

111	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	38.2	
080	19		17.7	1.53		39.67	0.0164	0	
						212.5		3.5	
080								41.7	

Path No: 11

110	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	38.5	
081	19		17.3	1.53		39.67	0.0158	0	
						212.5		3.4	
081								41.9	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 12

109	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	38.7	
084	19		17.2	1.53		39.67	0.0156	0	
						212.5		3.3	
084								42	

Path No: 13

108	19		0	1.25	4x(us.Tee-Br)=39.67	177.92	120	38.9	
086	19		16.2	1.53	4x(us.90)=19.83	59.5	0.014	0	
						237.42		3.3	
086								42.3	

Path No: 14

107	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	39.1	
089	19		17.4	1.53		39.67	0.016	0	
						212.5		3.4	
089								42.5	

Path No: 15

106	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	39.2	
090	19		17.8	1.53		39.67	0.0166	0	
						212.5		3.5	
090								42.8	

Path No: 16

105	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	39.3	
093	19		18.3	1.53		39.67	0.0175	0	
						212.5		3.7	
093								43.1	

Path No: 17

104	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	39.4	
095	19		18.9	1.53		39.67	0.0186	0	
						212.5		3.9	
095								43.3	

Path No: 18

103	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	39.4	
096	19		19.5	1.53		39.67	0.0196	0	
						212.5		4.2	
096								43.6	

Path No: 19

102	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	39.4	
097	19		20.1	1.53		39.67	0.0209	0	
						212.5		4.4	
097								43.9	

PIPE INFORMATION

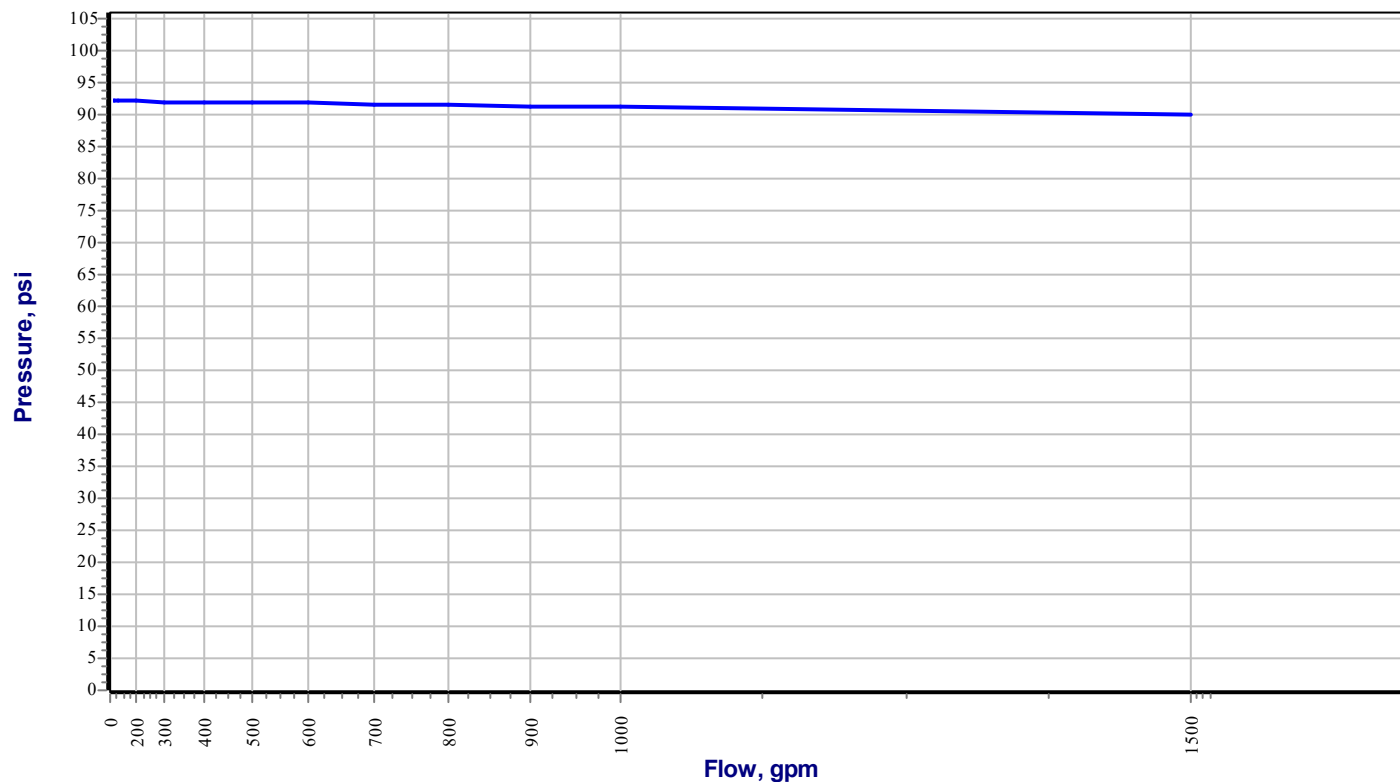
Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

* Pressures are balanced to a high degree of accuracy. Values may vary by 0.1 psi due to display rounding.

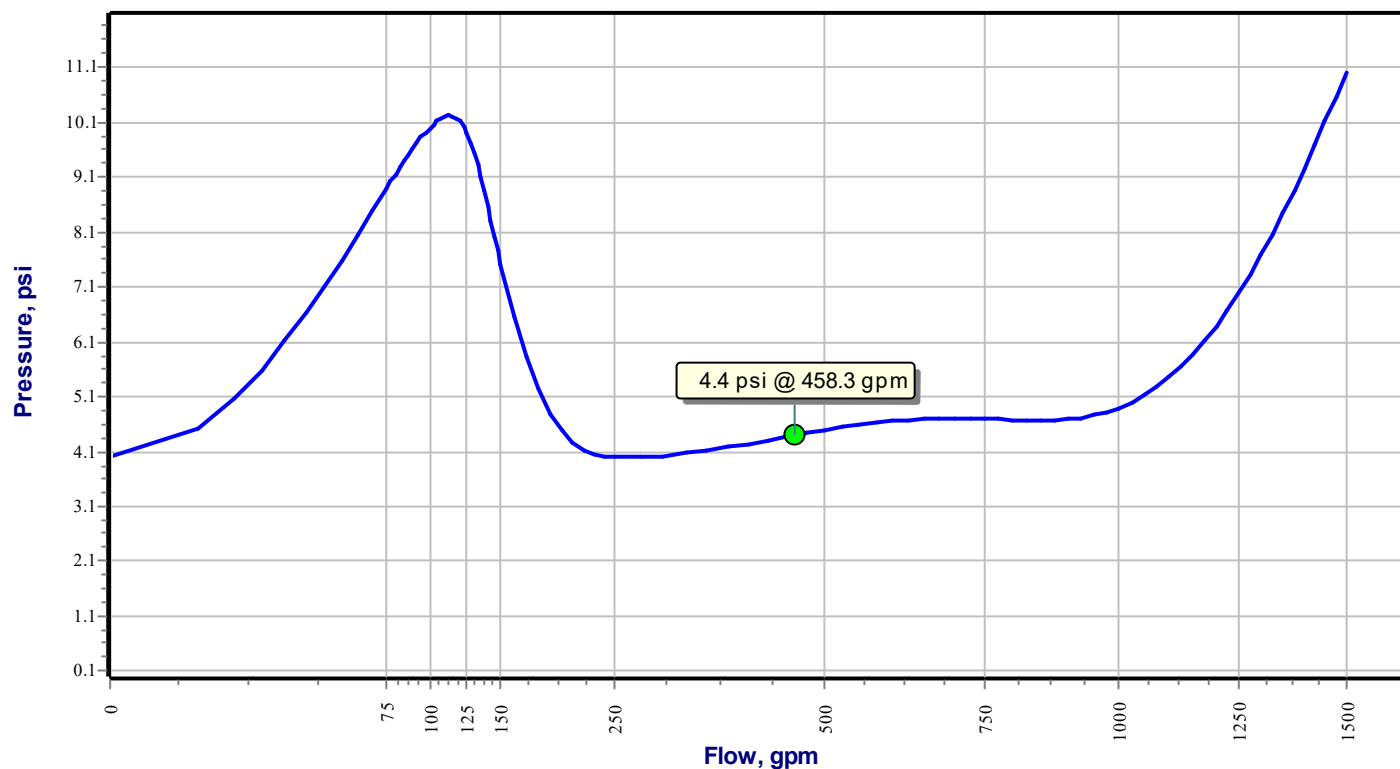
* Maximum Velocity of 11.91 ft/s occurs in the following pipe(s): (144-S115), (145-S116)

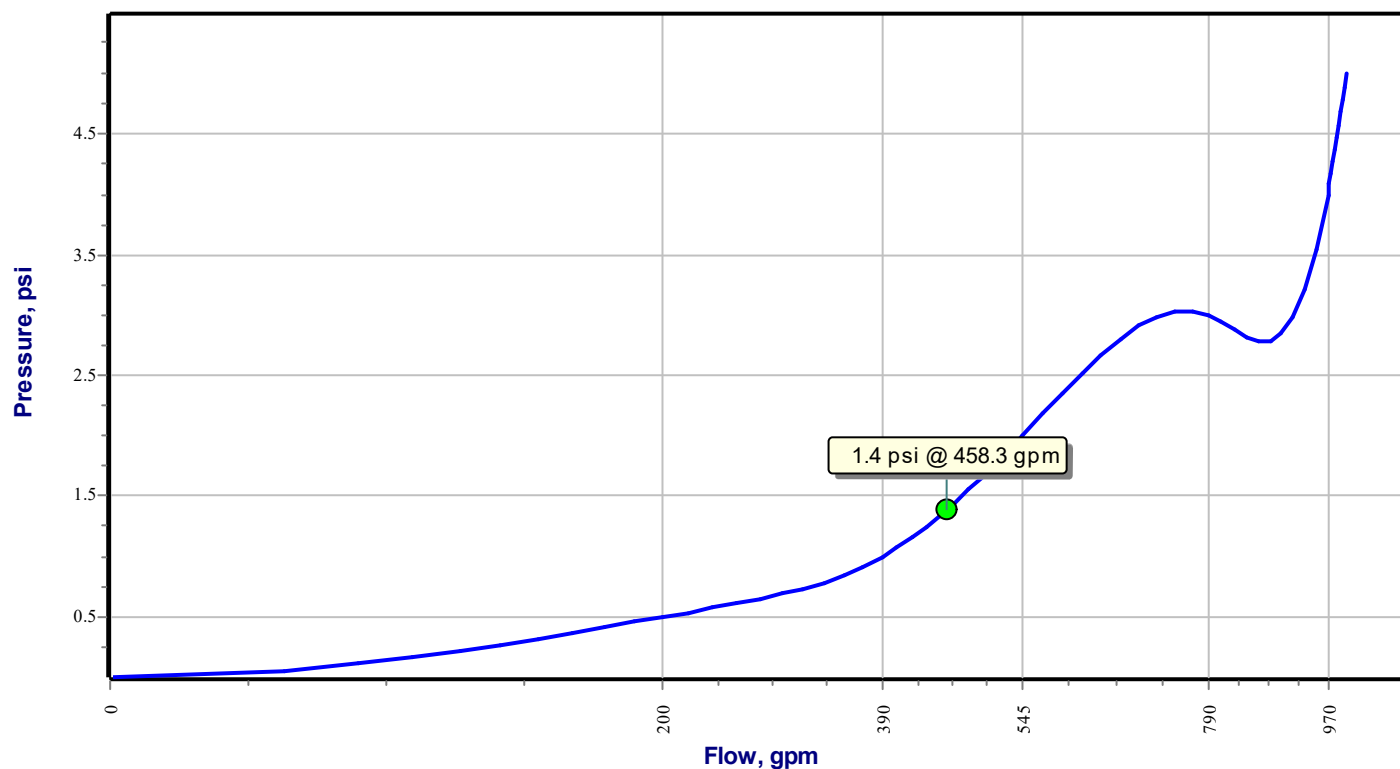
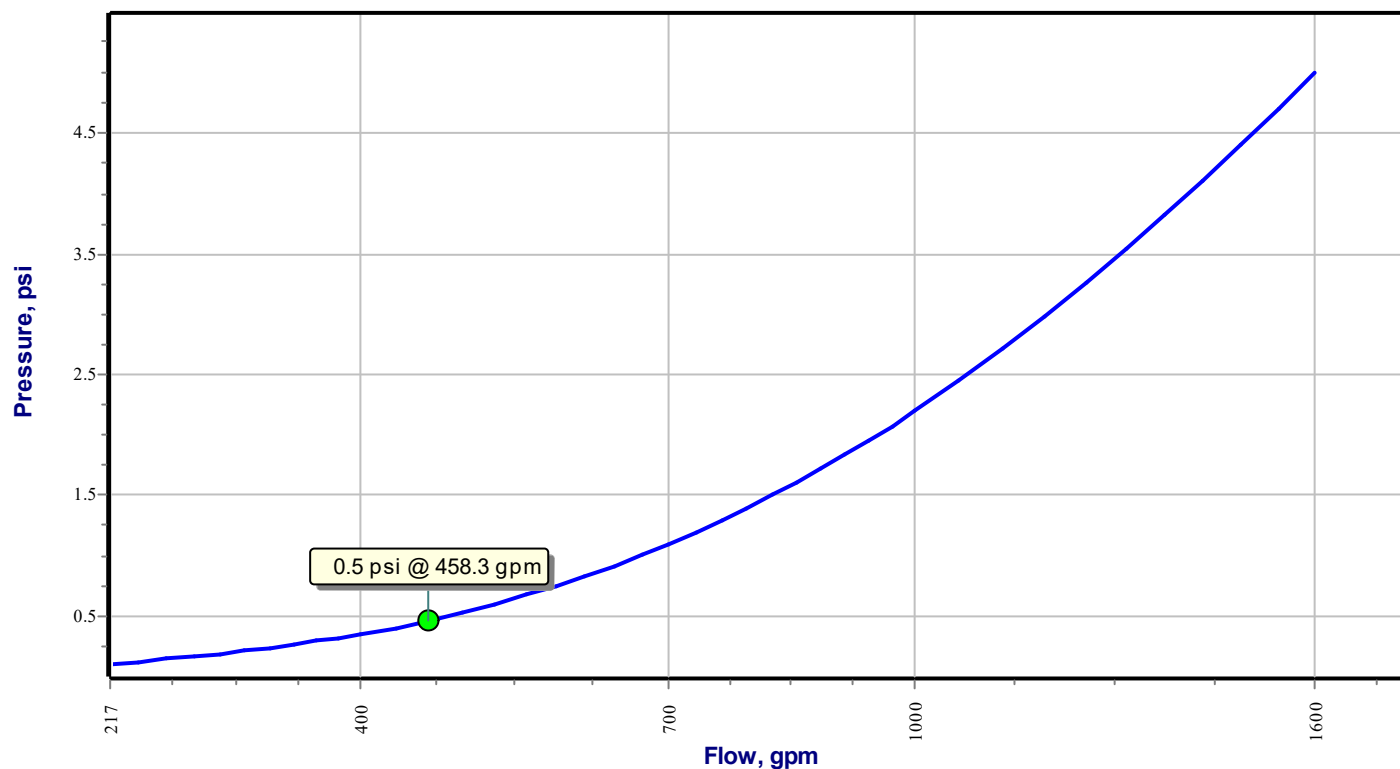
*** Device pressure loss (gain in the case of pumps) is calculated from the device's curve. If the device curve is printed with this report, it will appear below. The length of the device as shown in the table above comes from the CAD drawing. The friction loss per unit of length is calculated based upon the length and the curve-based loss/gain value. Internal ID and C Factor values are irrelevant as the device is not represented as an addition to any pipe, but is an individual item whose loss/gain is based solely on the curve data.

Pressure vs. Flow Function
Design Area: 6; Supply Ref.: W1; Supply Name:W1



Pressure Loss Function
Design Area: 6; BFP Ref.: 992 (Wilkins 350 ADA, Size = 6); Inlet Node: 024-I; Outlet Node: 024-O



Pressure Loss Function**Design Area: 6; Valve Ref.: 990 (CV-1 FR Check, Size = 4); Inlet Node: 627-I; Outlet Node: 627-O****Pressure Loss Function****Design Area: 6; Valve Ref.: 991 (Butterfly, Size = 4); Inlet Node: 626-I; Outlet Node: 626-O**

CALCULATION SUMMARY

Project Name : Wilco Eugene

Project Location: West 11th & Willow Creek

Contract No. : SC1388

City: Eugene, OR

Design Areas

Design Area Name	Calc. Mode (Model)	Occupancy	Area of Application	Total Water	Pressure @ Source	Min. Density	Min. Pressure	Min. Flow	Calculated Heads	Hose Streams	Margin To Source
			(ft ²)	(gpm)	(psi)	(gpm/ft ²)	(psi)	(gpm)	#	(gpm)	(psi)
4	Demand (HW)	Class IV Warehouse	2041	1242.6	Required 70.6	0.341	7.2	30	24	500	20

HYDRAULIC CALCULATIONS for

Job Information

Project Name : Wilco Eugene

Contract No. : SC1388

City: Eugene, OR

Project Location: West 11th & Willow Creek

Date: 3/28/2023

Contractor Information

Name of Contractor: Omlid & Swinney

Address: 610 30th St.

City: Springfield, Oregon 97478

Phone Number: (541) 741-1775

E-mail: andrew.shuck@omlidandswinney.us

Name of Designer: Andy Shuck

Authority Having Jurisdiction: City of Eugene

Design

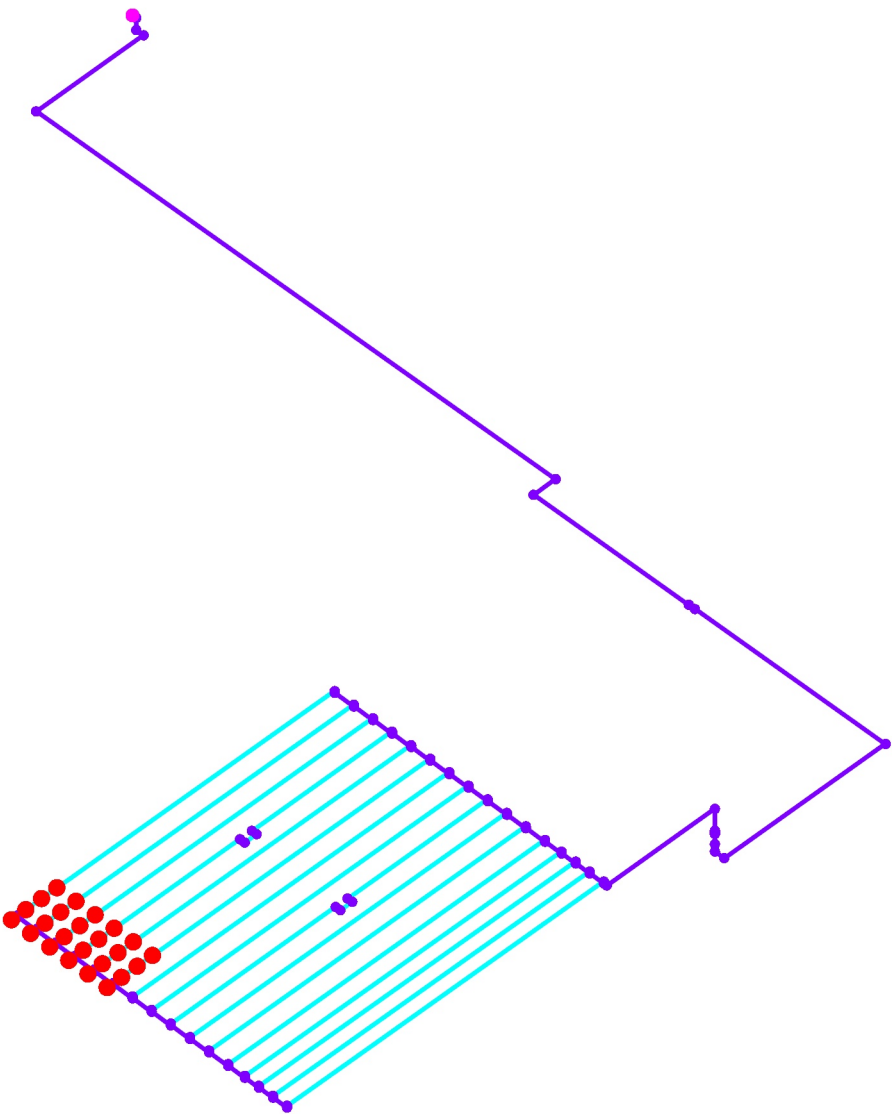
Remote Area Name	4
Remote Area Location	Warehouse
Occupancy Classification	Class IV Warehouse
Density (gpm/ft ²)	0.341
Area of Application (ft ²)	2041
Coverage per Sprinkler (ft ²)	88
Number of Calculated Sprinklers	24
In-Rack Demand (gpm)	0
Special Heads	
Hose Streams (gpm)	500
Total Water Required (incl. Hose Streams) (gpm)	1242.6
Required Pressure at Source (psi)	70.6
Type of System	Wet
Volume - Entire System (gal)	5920.5 gal

Water Supply Information

Date	2/25/2022
Location	Hydrant 10476 11th & Willow Creek
Source	W1

Notes

Diagram for Design Area : 4
(Optimized Hvdraulic Simplified)



Hydraulic Analysis for : 4

Calculation Info

Calculation Mode	Demand
Hydraulic Model	Hazen-Williams
Fluid Name	Water @ 60F (15.6C)
Fluid Weight, (lb/ft ³)	N/A for Hazen-Williams calculation.
Fluid Dynamic Viscosity, (lb·s/ft ²)	N/A for Hazen-Williams calculation.

Water Supply Parameters

Supply 1 : W1

Flow (gpm)	Pressure (psi)
0	92.1
1500	90

Supply Analysis

Node at Source	Static Pressure (psi)	Residual Pressure (psi)	Flow (gpm)	Available Pressure (psi)	Total Demand (gpm)	Required Pressure (psi)
W1	92.1	90	1500	90.6	1242.6	70.6

Hoses

Inside Hose Flow / Standpipe Demand (gpm)

Outside Hose Flow (gpm)

Additional Outside Hose Flow (gpm) 500

Other (custom defined) Hose Flow (gpm)

Total Hose Flow (gpm) 500

Sprinklers

Ovehead Sprinkler Flow (gpm) 742.6

InRack Sprinkler Flow (gpm) 0

Other (custom defined) Sprinkler Flow (gpm) 0

Total Sprinkler Flow (gpm) 742.6

Other

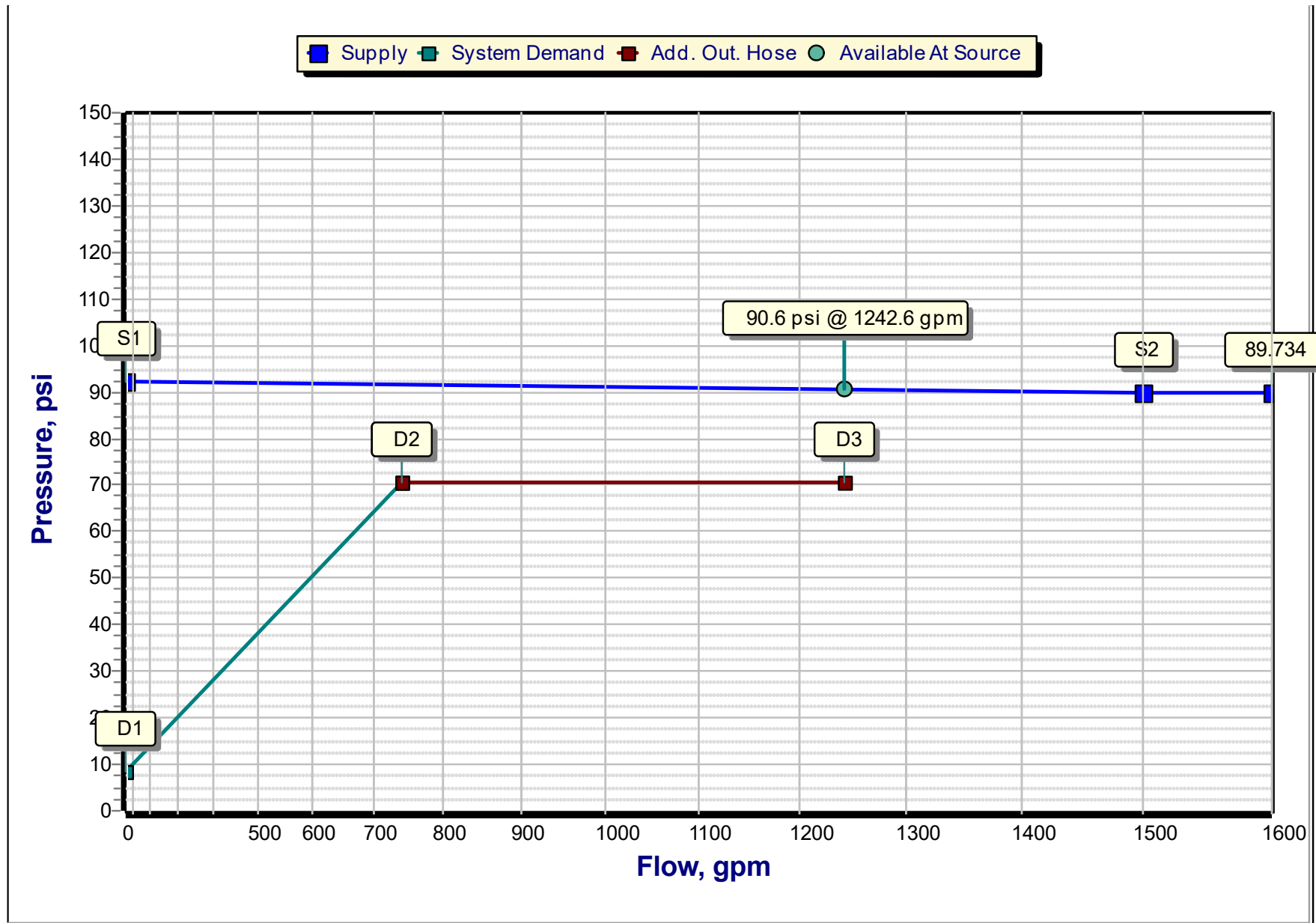
Required Margin of Safety (psi) 0

W1 - Pressure (psi) 70.6

W1 - Flow (gpm) 742.6

Demand w/o System Pump(s) N/A

Hydraulic Analysis for : 4



Hydraulic Analysis for : 4**Graph Labels**

Label	Description	Values	
		Flow (gpm)	Pressure (psi)
S1	Supply point #1 - Static	0	92.1
S2	Supply point #2 - Residual	1500	90
D1	Elevation Pressure	0	8.3
D2	System Demand	742.6	70.6
D3	System Demand + Add.Out.Hose	1242.6	70.6

Curve Intersections & Safety Margins

Curve Name	Intersection		Safety Margin	
	Pressure (psi)	Flow (gpm)	Pressure (psi)	@ Flow (gpm)
Supply	91.3	867.2	20	1242.6

Open Heads

Head Ref.	Head Type	Coverage	K-Factor	Required			Calculated		
				Density	Flow	Pressure	Density	Flow	Pressure
		(ft ²)	(gpm/psi ^{1/2})	(gpm/ft ²)	(gpm)	(psi)	(gpm/ft ²)	(gpm)	(psi)
S53	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.347	30.5	7.4
S54	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.341	30	7.2
S55	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.341	30	7.2
S56	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.347	30.5	7.4
S57	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.347	30.6	7.4
S58	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.342	30.1	7.2
S59	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.341	30	7.2
S60	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.347	30.6	7.4
S61	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.35	30.8	7.5
S62	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.344	30.3	7.3
S63	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.343	30.2	7.3
S64	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.349	30.7	7.5
S65	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.352	31	7.7

S66	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.343	30.2	7.3
S67	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.342	30.1	7.2
S68	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.347	30.5	7.4
S69	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.364	32	8.2
S70	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.356	31.3	7.8
S71	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.355	31.2	7.8
S72	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.36	31.7	8
S73	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.377	33.2	8.8
S74	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.367	32.3	8.3
S75	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.366	32.2	8.3
S76	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.37	32.6	8.5

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
S55 20	Overhead Sprinkler HEAD	11.2 Open	30 1.8	88 0.341	7.2 -8.3	7.2 28.2
S54 20	Overhead Sprinkler HEAD	11.2 Open	30 1.9	88 0.341	7.2 -8.3	7.2 28.2
S59 20	Overhead Sprinkler HEAD	11.2 Open	30 1.9	88 0.341	7.2 -8.3	7.2 28.2
S58 20	Overhead Sprinkler HEAD	11.2 Open	30.1 1.9	88 0.342	7.2 -8.3	7.2 28.2
S67 20	Overhead Sprinkler HEAD	11.2 Open	30.1 2	88 0.342	7.2 -8.3	7.2 28.2
S66 20	Overhead Sprinkler HEAD	11.2 Open	30.2 2	88 0.343	7.3 -8.3	7.2 28.2
S63 20	Overhead Sprinkler HEAD	11.2 Open	30.2 2.1	88 0.343	7.3 -8.3	7.2 28.2
S62 20	Overhead Sprinkler HEAD	11.2 Open	30.3 2.1	88 0.344	7.3 -8.3	7.2 28.2
S53 20	Overhead Sprinkler HEAD	11.2 Open	30.5 2.3	88 0.347	7.4 -8.3	7.2 28.2
S68 20	Overhead Sprinkler HEAD	11.2 Open	30.5 2.3	88 0.347	7.4 -8.3	7.2 28.2
S56 20	Overhead Sprinkler HEAD	11.2 Open	30.5 2.4	88 0.347	7.4 -8.3	7.2 28.2
S57 20	Overhead Sprinkler HEAD	11.2 Open	30.6 2.4	88 0.347	7.4 -8.3	7.2 28.2
S60 20	Overhead Sprinkler HEAD	11.2 Open	30.6 2.4	88 0.347	7.4 -8.3	7.2 28.2
S64 20	Overhead Sprinkler HEAD	11.2 Open	30.7 2.6	88 0.349	7.5 -8.3	7.2 28.2
S61 20	Overhead Sprinkler HEAD	11.2 Open	30.8 2.6	88 0.35	7.5 -8.3	7.2 28.2
S65 20	Overhead Sprinkler HEAD	11.2 Open	31 2.9	88 0.352	7.7 -8.3	7.2 28.2
S71 20	Overhead Sprinkler HEAD	11.2 Open	31.2 3.1	88 0.355	7.8 -8.3	7.2 28.2
S70 20	Overhead Sprinkler HEAD	11.2 Open	31.3 3.1	88 0.356	7.8 -8.3	7.2 28.2
S72 20	Overhead Sprinkler HEAD	11.2 Open	31.7 3.5	88 0.36	8 -8.3	7.2 28.2
S69 20	Overhead Sprinkler HEAD	11.2 Open	32 3.9	88 0.364	8.2 -8.3	7.2 28.2
S75 20	Overhead Sprinkler HEAD	11.2 Open	32.2 4	88 0.366	8.3 -8.3	7.2 28.2
S74 20	Overhead Sprinkler HEAD	11.2 Open	32.3 4.1	88 0.367	8.3 -8.3	7.2 28.2
S76 20	Overhead Sprinkler HEAD	11.2 Open	32.6 4.4	88 0.37	8.5 -8.3	7.2 28.2
S73 20	Overhead Sprinkler HEAD	11.2 Open	33.2 5	88 0.377	8.8 -8.3	7.2 28.2
118 20	Node NODE				8 -8.3	

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
280 20	Node NODE				8 -8.3	
248 20	Node NODE				8.2 -8.3	
202 20	Node NODE				8.3 -8.3	
166 20	Node NODE				8.8 -8.3	
010 20	Node NODE				9.5 -8.3	
116 19	Node NODE				10.5 -7.8	
115 19	Node NODE				10.6 -7.8	
114 19	Node NODE				10.7 -7.8	
113 19	Node NODE				11.1 -7.8	
112 19	Node NODE				11.7 -7.8	
111 19	Node NODE				12.6 -7.8	
110 19	Node NODE				14 -7.8	
109 19	Node NODE				15.1 -7.8	
108 19	Node NODE				16 -7.8	
107 19	Node NODE				16.7 -7.8	
106 19	Node NODE				17.2 -7.8	
105 19	Node NODE				17.6 -7.8	
104 19	Node NODE				17.8 -7.8	
103 19	Node NODE				17.9 -7.8	
102 19	Node NODE				18 -7.8	
101 19	Node NODE				18.1 -7.8	
144 19	Node NODE				31.2 -7.8	
145 19	Node NODE				31.2 -7.8	
146 19	Node NODE				31.2 -7.8	
147 19	Node NODE				31.3 -7.8	

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
148 19	Node NODE				31.4 -7.8	
080 19	Node NODE				31.6 -7.8	
081 19	Node NODE				31.8 -7.8	
084 19	Node NODE				32.1 -7.8	
086 19	Node NODE				32.5 -7.8	
089 19	Node NODE				32.9 -7.8	
090 19	Node NODE				33.4 -7.8	
093 19	Node NODE				34 -7.8	
095 19	Node NODE				34.6 -7.8	
096 19	Node NODE				35.2 -7.8	
097 19	Node NODE				35.8 -7.8	
098 19	Node NODE				36.6 -7.8	
626-O 7.26	Node NODE				52.8 -2.3	
626-I 6.77	Node NODE				54.3 -2	
627-O 6.43	Node NODE				54.5 -1.9	
627-I 5.47	Node NODE				58 -1.4	
055 0	Node NODE				61.1 1.2	
024-O -4	Node NODE				66.2 3.1	
W1 2.5	Supply SUPPLY		-742.6		70.6 0	
024-I -4	Node NODE				70.9 3.1	
027 -4	Node NODE				72.9 3.1	
029 -4	Node NODE				73 3.1	
031 -4	Node NODE				73 3.1	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 1

S55 S56	20 20	11.2 11.2	30 24.9	1.25 1.53		8.25 0 8.25	120 0.031	7.2 0 0.3	
S56 144	20 19	11.2	30.5 55.4	1.25 1.53	2x(us.Tee-Br)=19.83	150.83 19.83 170.67	120 0.1363	7.4 0.4 23.3	
144 145	19 19		0 55.4	4 4.31		10.33 0 10.33	120 0.0009	31.2 0 0	
145 146	19 19		55.4 110.8	4 4.31		10.33 0 10.33	120 0.0032	31.2 0 0.0	
146 147	19 19		55.3 166.2	4 4.31		10.25 0 10.25	120 0.0067	31.2 0 0.1	
147 148	19 19		51.6 217.8	4 4.31		10.33 0 10.33	120 0.0111	31.3 0 0.1	
148 080	19 19		55 272.8	4 4.31		10.33 0 10.33	120 0.0168	31.4 0 0.2	
080 081	19 19		54.6 327.4	4 4.31		10.25 0 10.25	120 0.0236	31.6 0 0.2	
081 084	19 19		42.7 370	4 4.31		10.33 0 10.33	120 0.0296	31.8 0 0.3	
084 086	19 19		41.6 411.7	4 4.31		10.33 0 10.33	120 0.036	32.1 0 0.4	
086 089	19 19		38.5 450.2	4 4.31		10.33 0 10.33	120 0.0425	32.5 0 0.4	
089 090	19 19		40.6 490.7	4 4.31		10.25 0 10.25	120 0.0499	32.9 0 0.5	
090 093	19 19		40.5 531.3	4 4.31		10.33 0 10.33	120 0.0578	33.4 0 0.6	
093 095	19 19		40.8 572.1	4 4.31		8.96 0 8.96	120 0.0663	34 0 0.6	
095 096	19 19		41.3 613.4	4 4.31		7.58 0 7.58	120 0.0754	34.6 0 0.6	
096 097	19 19		41.9 655.3	4 4.31		7.58 0 7.58	120 0.0852	35.2 0 0.6	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 1

097	19		42.7	4		7.58	120	35.8	
098	19		697.9	4.31		0	0.0958	0	
						7.58		0.7	
098	19		44.7	4	2x(us.90)=27.87	71.61	120	36.6	
626-O	7.26		742.6	4.31		27.87	0.1074	5.1	
						99.49		10.7	
626-O	7.26		0	4		0.49		52.8	Butterfly
626-I	6.77		742.6	0		0	2.5331	0.2	***
						0.49		1.2	
626-I	6.77		0	4		0.34	120	54.3	
627-O	6.43		742.6	4.31		0	0.1074	0.1	
						0.34		0.0	
627-O	6.43		0	4		0.96		54.5	CV-1 FR
627-I	5.47		742.6	0		0	3.1666	0.4	Check
						0.96		3	***
627-I	5.47		0	4		5.47	120	58	
055	0		742.6	4.31		0	0.1074	2.4	
						5.47		0.6	
055	0		0	6	3x(us.90)=72.58	198.78	140	61.1	
024-O	-4		742.6	6.4		72.58	0.0118	1.7	
						271.36		3.2	
024-O	-4		0	6		3.34		66.2	Wilkins 350
024-I	-4		742.6	0		0	1.4062	0	ADA
						3.34		4.7	***
024-I	-4		0	6	1x(us.Tee-Br)=51.84	95.71	140	70.9	
027	-4		742.6	6.4	1x(us.90)=24.19	76.04	0.0118	0	
						171.75		2	
027	-4		0	20		280.17	140	72.9	
029	-4		742.6	18.5		0	0.0001	0	
						280.17		0.0	
029	-4		0	24		58	140	73	
031	-4		742.6	20.5		0	0.0000	0	
						58		0	
031	-4		0	6	2x(us.90)=48.39	12.5	140	73	
W1	2.5		742.6	6.4		48.39	0.0118	-2.8	
						60.89		0.7	
W1								70.6	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 2

S55 S54	20 20	11.2 11.2	30 5.1	1.25 1.53		8.46 0 8.46	120 0.0016	7.2 0 0.0	
S54 118	20 20	11.2	30 35.1	1.25 1.53	1x(us.Tee-Br)=9.92	4.29 9.92 14.21	120 0.0585	7.2 0 0.8	
118 116	20 19		30.5 65.6	1.25 1.53	1x(us.Tee-Br)=9.92	1 9.92 10.92	120 0.1862	8 0.4 2	
116 115	19 19		0 65.6	3 3.314		10.33 0 10.33	120 0.0043	10.5 0 0.0	
115 114	19 19		65.8 131.4	3 3.314		10.33 0 10.33	120 0.0156	10.6 0 0.2	
114 113	19 19		66.6 198	3 3.314		10.25 0 10.25	120 0.0334	10.7 0 0.3	
113 112	19 19		70.2 268.3	3 3.314		10.33 0 10.33	120 0.0586	11.1 0 0.6	
112 111	19 19		71.3 339.5	3 3.314		10.33 0 10.33	120 0.0907	11.7 0 0.9	
111 110	19 19		75.7 415.2	3 3.314		10.25 0 10.25	120 0.1316	12.6 0 1.3	
110 109	19 19		-42.7 372.5	3 3.314		10.33 0 10.33	120 0.1077	14 0 1.1	
109 108	19 19		-41.6 330.9	3 3.314		10.33 0 10.33	120 0.0865	15.1 0 0.9	
108 107	19 19		-38.5 292.4	3 3.314		10.33 0 10.33	120 0.0688	16 0 0.7	
107 106	19 19		-40.6 251.8	3 3.314		10.25 0 10.25	120 0.0521	16.7 0 0.5	
106 105	19 19		-40.5 211.3	3 3.314		10.33 0 10.33	120 0.0377	17.2 0 0.4	
105 104	19 19		-40.8 170.5	3 3.314		8.96 0 8.96	120 0.0253	17.6 0 0.2	
104 103	19 19		-41.3 129.2	3 3.314		7.58 0 7.58	120 0.0152	17.8 0 0.1	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 2

103 102	19 19		-41.9 87.3	3 3.314		7.58 0 7.58	120 0.0073	17.9 0 0.1	
102 101	19 19		-42.7 44.7	3 3.314	1x(us.Tee-Br)=21.84	7.58 21.84 29.42	120 0.0021	18 0 0.1	
101 098	19 19		0 44.7	1.25 1.53	3x(us.Tee-Br)=29.75	172.83 29.75 202.58	120 0.0913	18.1 0 18.5	
098								36.6	

Path No: 3

S59 S60	20 20	11.2 11.2	30 24.8	1.25 1.53		8.25 0 8.25	120 0.0308	7.2 0 0.3	
S60 145	20 19	11.2	30.6 55.4	1.25 1.53	2x(us.Tee-Br)=19.83	150.83 19.83 170.67	120 0.1362	7.4 0.4 23.2	
145								31.2	

Path No: 4

S59 S58	20 20	11.2 11.2	30 5.2	1.25 1.53		8.46 0 8.46	120 0.0017	7.2 0 0.0	
S58 280	20 20	11.2	30.1 35.3	1.25 1.53	1x(us.Tee-Br)=9.92	4.29 9.92 14.21	120 0.059	7.2 0 0.8	
280 115	20 19		30.6 65.8	1.25 1.53	1x(us.Tee-Br)=9.92	1 9.92 10.92	120 0.1874	8 0.4 2	
115								10.6	

Path No: 5

S67 S68	20 20	11.2 11.2	30.1 21.1	1.25 1.53		8.25 0 8.25	120 0.0228	7.2 0 0.2	
S68 147	20 19	11.2	30.5 51.6	1.25 1.53	2x(us.Tee-Br)=19.83 4x(us.90)=19.83	155.92 39.67 195.59	120 0.1195	7.4 0.4 23.4	
147								31.3	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 6

S67 S66	20 20	11.2 11.2	30.1 9	1.25 1.53		8.46 0 8.46	120 0.0047	7.2 0 0.0	
S66 202	20 20	11.2	30.2 39.2	1.25 1.53	1x(us.Tee-Br)=9.92	4.29 9.92 14.21	120 0.0717	7.3 0 1	
202 113	20 19		31 70.2	1.25 1.53	1x(us.Tee-Br)=9.92	1 9.92 10.92	120 0.2112	8.3 0.4 2.3	
113								11.1	

Path No: 7

S63 S64	20 20	11.2 11.2	30.2 24.6	1.25 1.53		8.25 0 8.25	120 0.0303	7.3 0 0.2	
S64 146	20 19	11.2	30.7 55.3	1.25 1.53	2x(us.Tee-Br)=19.83	150.83 19.83 170.67	120 0.1359	7.5 0.4 23.2	
146								31.2	

Path No: 8

S63 S62	20 20	11.2 11.2	30.2 5.6	1.25 1.53		8.46 0 8.46	120 0.002	7.3 0 0.0	
S62 248	20 20	11.2	30.3 35.9	1.25 1.53	1x(us.Tee-Br)=9.92	4.29 9.92 14.21	120 0.0608	7.3 0 0.9	
248 114	20 19		30.8 66.6	1.25 1.53	1x(us.Tee-Br)=9.92	1 9.92 10.92	120 0.1917	8.2 0.4 2.1	
114								10.7	

Path No: 9

S53 118	20 20	11.2	30.5 30.5	1.25 1.53	1x(us.Tee-Br)=9.92	3.46 9.92 13.38	120 0.0451	7.4 0 0.6	
118								8	

Path No: 10

S57 280	20 20	11.2	30.6 30.6	1.25 1.53	1x(us.Tee-Br)=9.92	3.46 9.92 13.38	120 0.0452	7.4 0 0.6	
280								8	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 11

S61	20	11.2	30.8	1.25	1x(us.Tee-Br)=9.92	3.46	120	7.5	
248	20		30.8	1.53		9.92	0.0458	0	
						13.38		0.6	
248								8.2	

Path No: 12

S65	20	11.2	31	1.25	1x(us.Tee-Br)=9.92	3.46	120	7.7	
202	20		31	1.53		9.92	0.0465	0	
						13.38		0.6	
202								8.3	

Path No: 13

S71	20	11.2	31.2	1.25		8.25	120	7.8	
S72	20	11.2	23.3	1.53		0	0.0273	0	
						8.25		0.2	
S72	20	11.2	31.7	1.25	2x(us.Tee-Br)=19.83	150.83	120	8	
148	19		55	1.53		19.83	0.1342	0.4	
						170.67		22.9	
148								31.4	

Path No: 14

S71	20	11.2	31.2	1.25		8.46	120	7.8	
S70	20	11.2	8	1.53		0	0.0037	0	
						8.46		0.0	
S70	20	11.2	31.3	1.25	1x(us.Tee-Br)=9.92	4.29	120	7.8	
166	20		39.3	1.53		9.92	0.0719	0	
						14.21		1	
166	20		32	1.25	1x(us.Tee-Br)=9.92	1	120	8.8	
112	19		71.3	1.53		9.92	0.2171	0.4	
						10.92		2.4	
112								11.7	

Path No: 15

S69	20	11.2	32	1.25	1x(us.Tee-Br)=9.92	3.46	120	8.2	
166	20		32	1.53		9.92	0.0493	0	
						13.38		0.7	
166								8.8	

Path No: 16

S75	20	11.2	32.2	1.25		8.25	120	8.3	
S76	20	11.2	22	1.53		0	0.0246	0	
						8.25		0.2	
S76	20	11.2	32.6	1.25	2x(us.Tee-Br)=19.83	150.83	120	8.5	
080	19		54.6	1.53		19.83	0.1325	0.4	
						170.67		22.6	
080								31.6	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 17

S75 S74	20 20	11.2 11.2	32.2 10.2	1.25 1.53		8.46 0 8.46	120 0.0059	8.3 0 0.0	
S74 010	20 20	11.2	32.3 42.5	1.25 1.53	1x(us.Tee-Br)=9.92	4.29 9.92 14.21	120 0.0832	8.3 0 1.2	
010 111	20 19		33.2 75.7	1.25 1.53	1x(us.Tee-Br)=9.92	1 9.92 10.92	120 0.2425	9.5 0.4 2.6	
111								12.6	

Path No: 18

S73 010	20 20	11.2	33.2 33.2	1.25 1.53	1x(us.Tee-Br)=9.92	3.46 9.92 13.38	120 0.0527	8.8 0 0.7	
010								9.5	

Path No: 19

110 081	19 19		0 42.7	1.25 1.53	4x(us.Tee-Br)=39.67	172.83 39.67 212.5	120 0.0839	14 0 17.8	
081								31.8	

Path No: 20

109 084	19 19		0 41.6	1.25 1.53	4x(us.Tee-Br)=39.67	172.83 39.67 212.5	120 0.0801	15.1 0 17	
084								32.1	

Path No: 21

108 086	19 19		0 38.5	1.25 1.53	4x(us.Tee-Br)=39.67 4x(us.90)=19.83	177.92 59.5 237.42	120 0.0695	16 0 16.5	
086								32.5	

Path No: 22

107 089	19 19		0 40.6	1.25 1.53	4x(us.Tee-Br)=39.67	172.83 39.67 212.5	120 0.0764	16.7 0 16.2	
089								32.9	

Path No: 23

106 090	19 19		0 40.5	1.25 1.53	4x(us.Tee-Br)=39.67	172.83 39.67 212.5	120 0.0763	17.2 0 16.2	
090								33.4	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 24

105	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	17.6	
093	19		40.8	1.53		39.67	0.0773	0	
						212.5		16.4	
093								34	

Path No: 25

104	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	17.8	
095	19		41.3	1.53		39.67	0.079	0	
						212.5		16.8	
095								34.6	

Path No: 26

103	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	17.9	
096	19		41.9	1.53		39.67	0.0811	0	
						212.5		17.2	
096								35.2	

Path No: 27

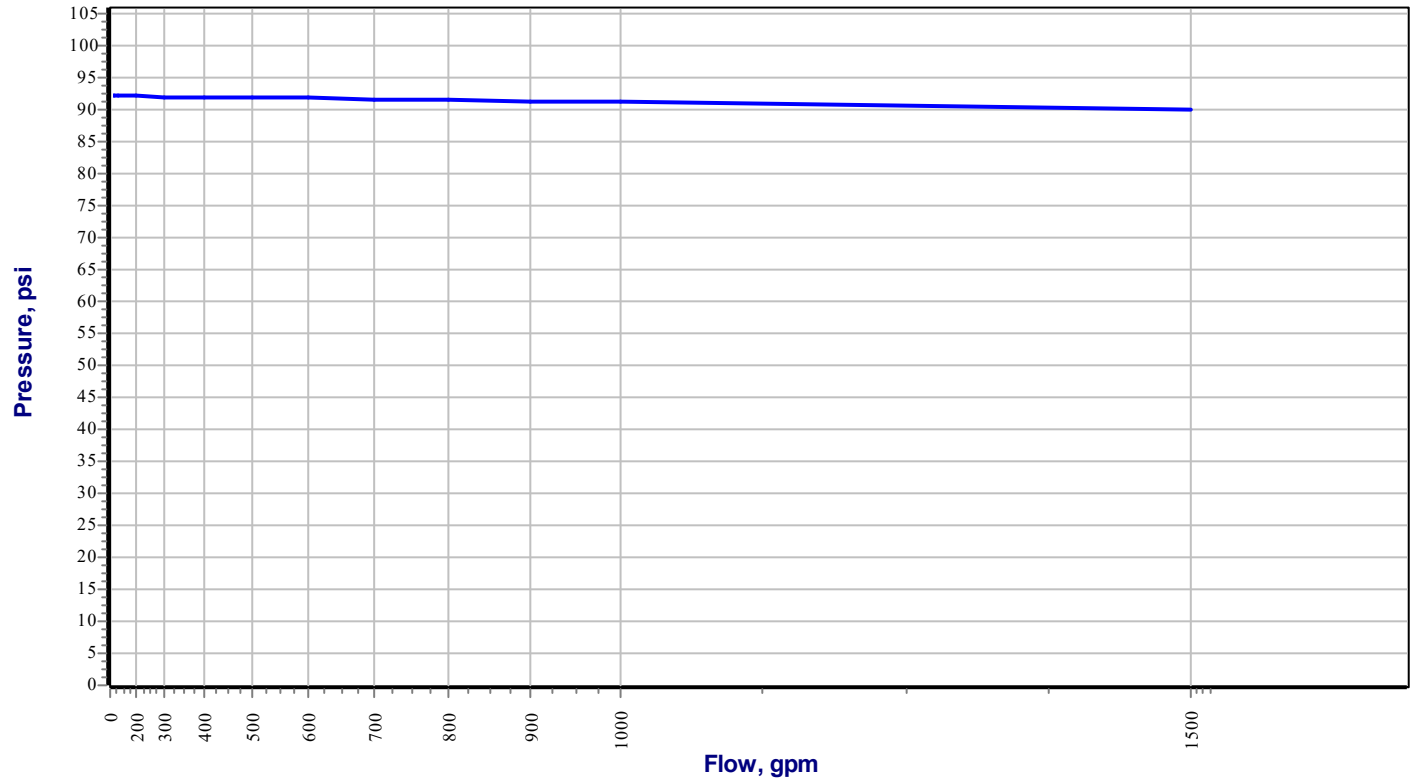
102	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	18	
097	19		42.7	1.53		39.67	0.0839	0	
						212.5		17.8	
097								35.8	

* Pressures are balanced to a high degree of accuracy. Values may vary by 0.1 psi due to display rounding.

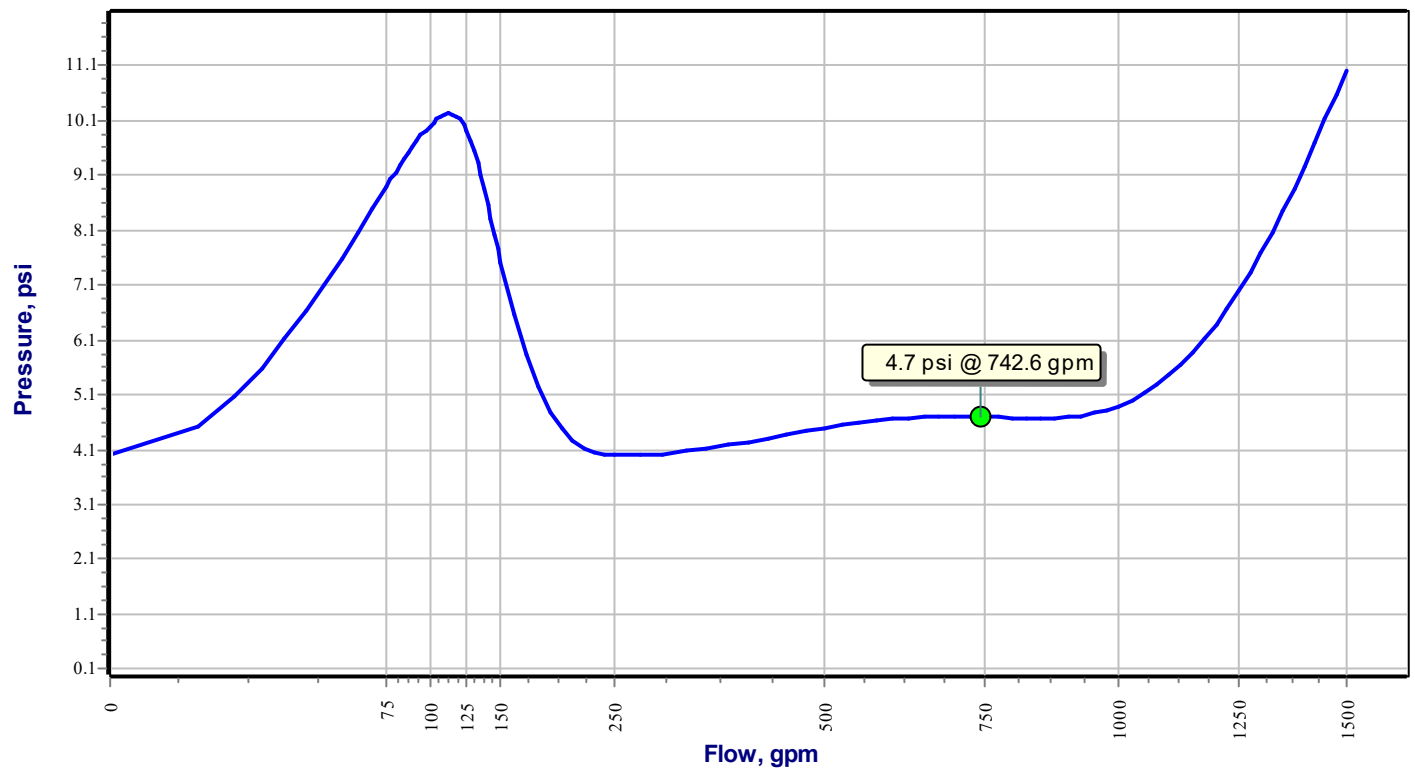
* Maximum Velocity of 16.33 ft/s occurs in the following pipe(s): (626-O-098), (627-O-626-I), (055-627-I)

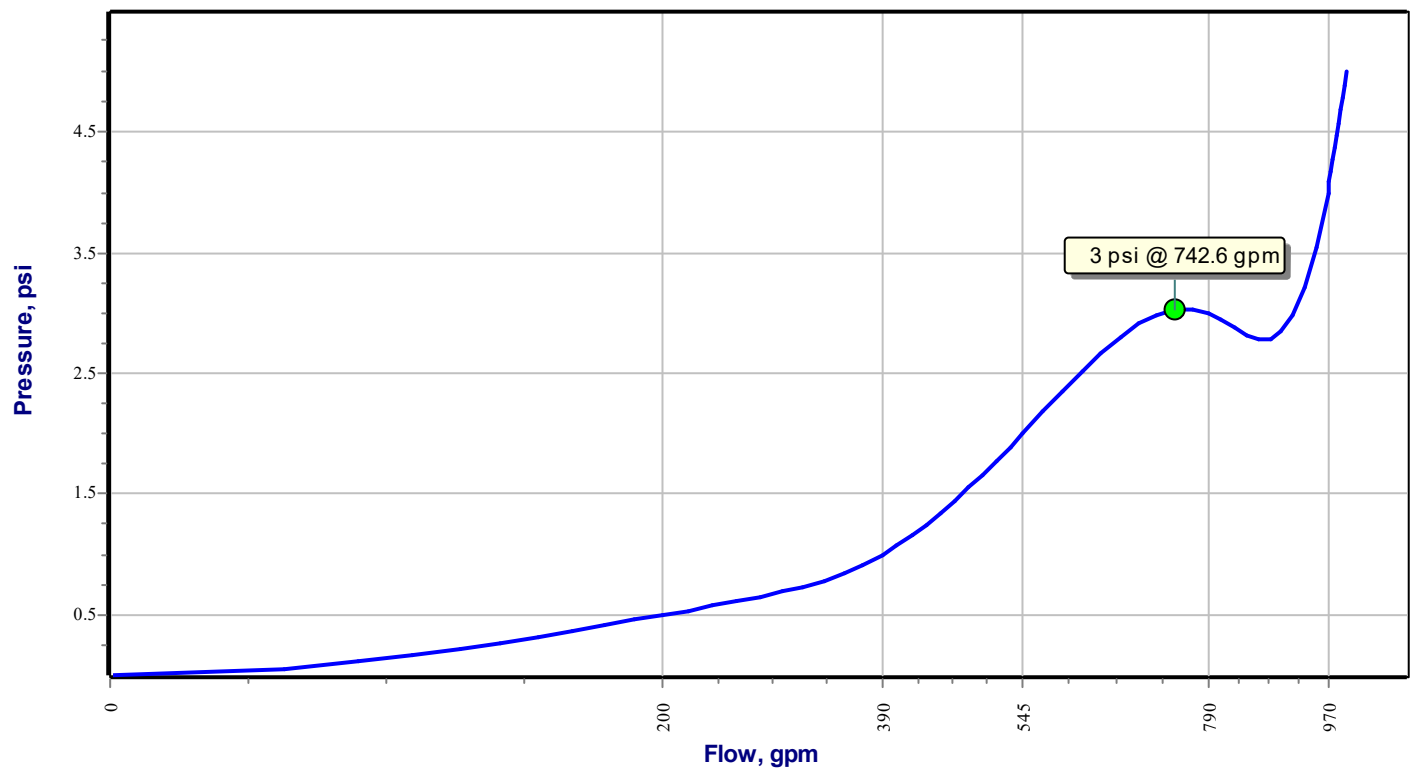
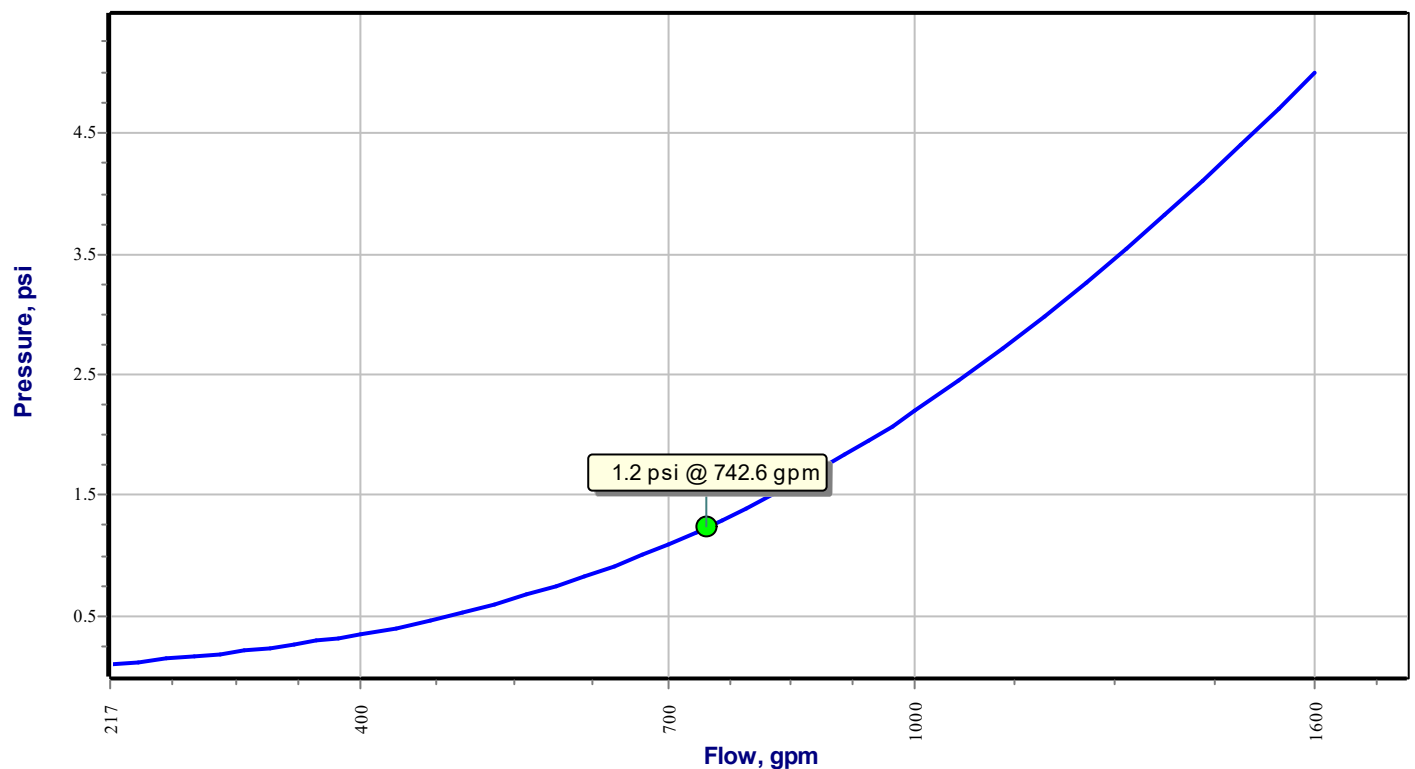
*** Device pressure loss (gain in the case of pumps) is calculated from the device's curve. If the device curve is printed with this report, it will appear below. The length of the device as shown in the table above comes from the CAD drawing. The friction loss per unit of length is calculated based upon the length and the curve-based loss/gain value. Internal ID and C Factor values are irrelevant as the device is not represented as an addition to any pipe, but is an individual item whose loss/gain is based solely on the curve data.

Pressure vs. Flow Function
Design Area: 4; Supply Ref.: W1; Supply Name:W1



Pressure Loss Function
Design Area: 4; BFP Ref.: 992 (Wilkins 350 ADA, Size = 6); Inlet Node: 024-I; Outlet Node: 024-O



Pressure Loss Function**Design Area: 4; Valve Ref.: 990 (CV-1 FR Check, Size = 4); Inlet Node: 627-I; Outlet Node: 627-O****Pressure Loss Function****Design Area: 4; Valve Ref.: 991 (Butterfly, Size = 4); Inlet Node: 626-I; Outlet Node: 626-O**

CALCULATION SUMMARY

Project Name : Wilco Eugene

Project Location: West 11th & Willow Creek

Contract No. : SC1388

City: Eugene, OR

Design Areas

Design Area Name	Calc. Mode (Model)	Occupancy	Area of Application	Total Water	Pressure @ Source	Min. Density	Min. Pressure	Min. Flow	Calculated Heads	Hose Streams	Margin To Source
			(ft²)	(gpm)	(psi)	(gpm/ft²)	(psi)	(gpm)	#	(gpm)	(psi)
5	Demand (HW)	Class IV Warehouse	2052	1271.4	Required 81.6	0.341	7.2	30	24	500	8.9

HYDRAULIC CALCULATIONS for

Job Information

Project Name : Wilco Eugene

Contract No. : SC1388

City: Eugene, OR

Project Location: West 11th & Willow Creek

Date: 3/28/2023

Contractor Information

Name of Contractor: Omlid & Swinney

Address: 610 30th St.

City: Springfield, Oregon 97478

Phone Number: (541) 741-1775

E-mail: andrew.shuck@omlidandswinney.us

Name of Designer: Andy Shuck

Authority Having Jurisdiction: City of Eugene

Design

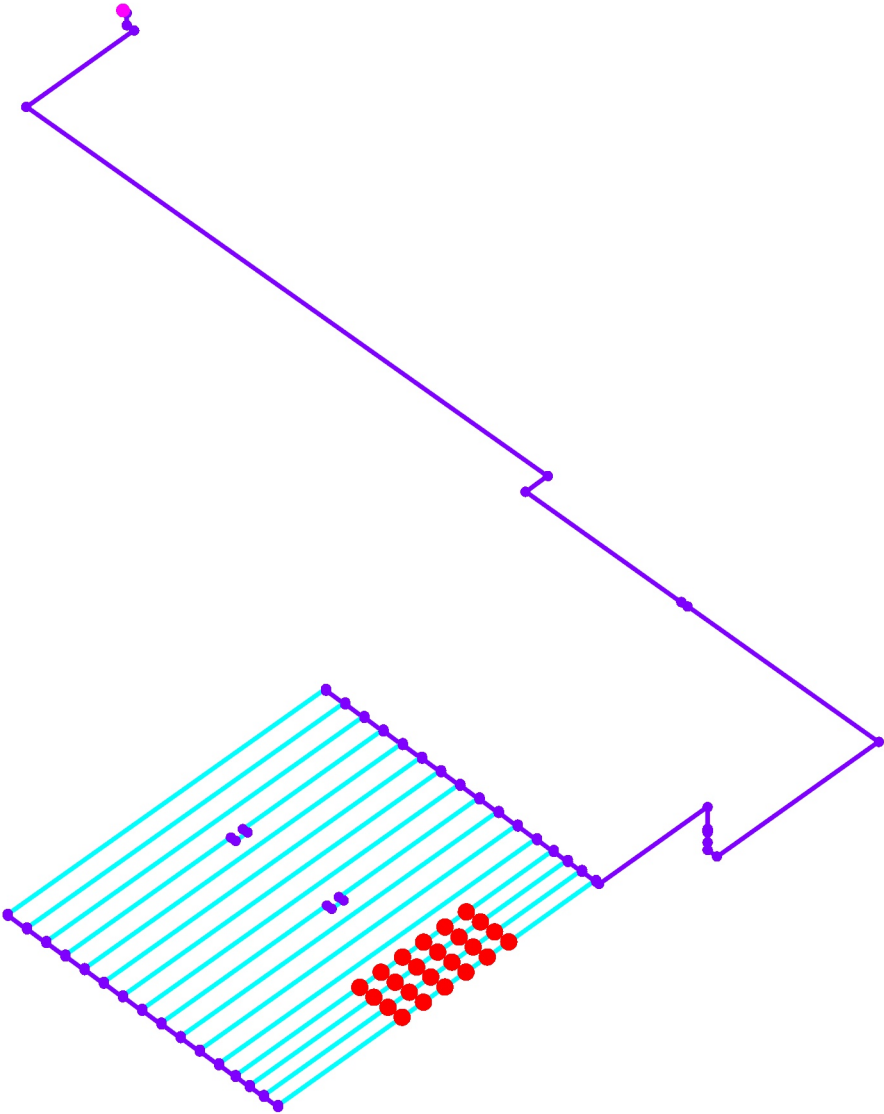
Remote Area Name	5
Remote Area Location	Warehouse
Occupancy Classification	Class IV Warehouse
Density (gpm/ft ²)	0.341
Area of Application (ft ²)	2052
Coverage per Sprinkler (ft ²)	88
Number of Calculated Sprinklers	24
In-Rack Demand (gpm)	0
Special Heads	
Hose Streams (gpm)	500
Total Water Required (incl. Hose Streams) (gpm)	1271.4
Required Pressure at Source (psi)	81.6
Type of System	Wet
Volume - Entire System (gal)	5918.5 gal

Water Supply Information

Date	2/25/2022
Location	Hydrant 10476 11th & Willow Creek
Source	W1

Notes

**Diagram for Design Area : 5
(Optimized Hvdraulic Simplified)**



Hydraulic Analysis for : 5

Calculation Info

Calculation Mode	Demand
Hydraulic Model	Hazen-Williams
Fluid Name	Water @ 60F (15.6C)
Fluid Weight, (lb/ft ³)	N/A for Hazen-Williams calculation.
Fluid Dynamic Viscosity, (lb·s/ft ²)	N/A for Hazen-Williams calculation.

Water Supply Parameters

Supply 1 : W1

Flow (gpm)	Pressure (psi)
0	92.1
1500	90

Supply Analysis

Node at Source	Static Pressure (psi)	Residual Pressure (psi)	Flow (gpm)	Available Pressure (psi)	Total Demand (gpm)	Required Pressure (psi)
W1	92.1	90	1500	90.6	1271.4	81.6

Hoses

Inside Hose Flow / Standpipe Demand (gpm)

Outside Hose Flow (gpm)

Additional Outside Hose Flow (gpm) 500

Other (custom defined) Hose Flow (gpm)

Total Hose Flow (gpm) 500

Sprinklers

Ovehead Sprinkler Flow (gpm) 771.4

InRack Sprinkler Flow (gpm) 0

Other (custom defined) Sprinkler Flow (gpm) 0

Total Sprinkler Flow (gpm) 771.4

Other

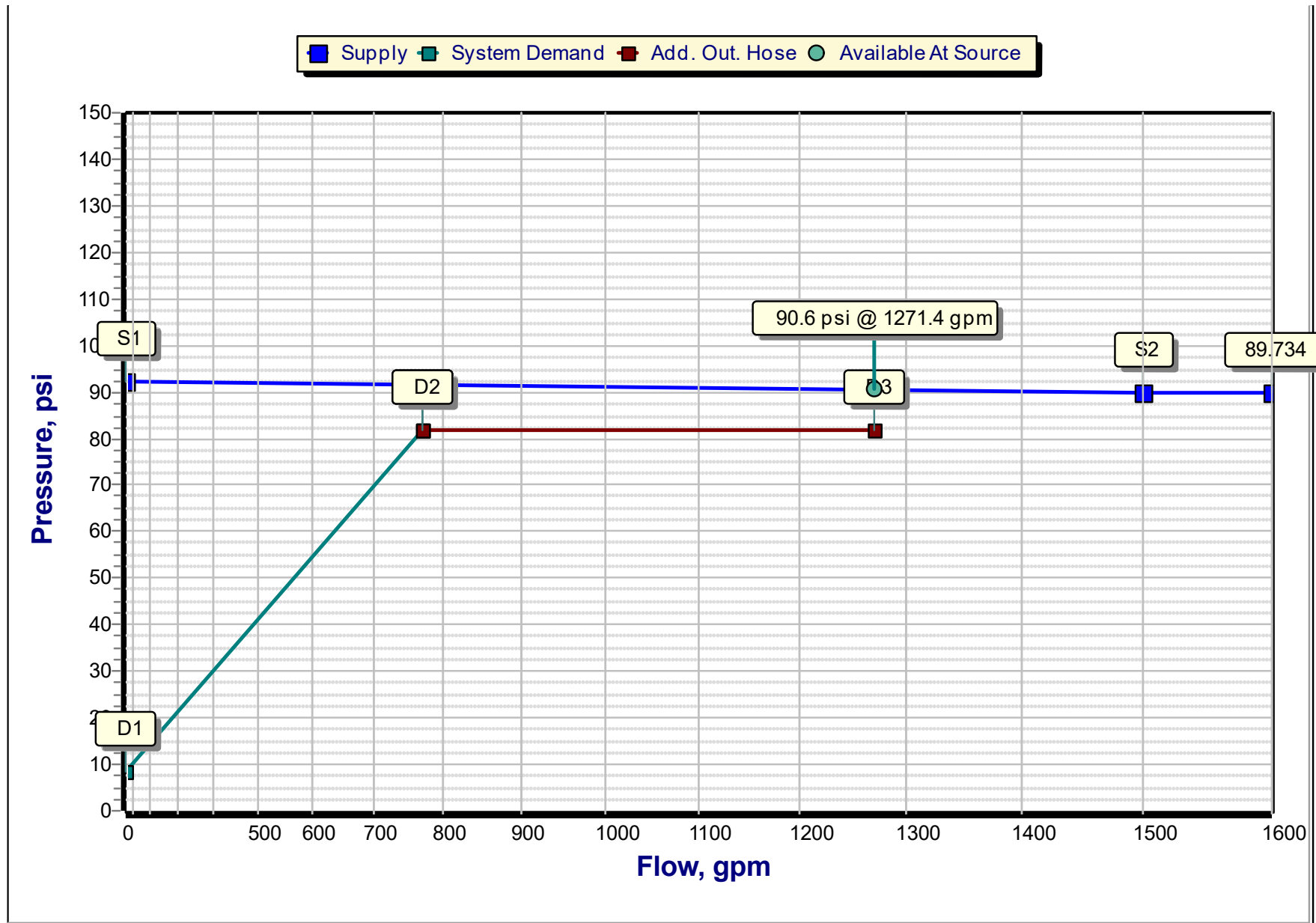
Required Margin of Safety (psi) 0

W1 - Pressure (psi) 81.6

W1 - Flow (gpm) 771.4

Demand w/o System Pump(s) N/A

Hydraulic Analysis for : 5



Hydraulic Analysis for : 5**Graph Labels**

Label	Description	Values	
		Flow (gpm)	Pressure (psi)
S1	Supply point #1 - Static	0	92.1
S2	Supply point #2 - Residual	1500	90
D1	Elevation Pressure	0	8.3
D2	System Demand	771.4	81.6
D3	System Demand + Add.Out.Hose	1271.4	81.6

Curve Intersections & Safety Margins

Curve Name	Intersection		Safety Margin	
	Pressure (psi)	Flow (gpm)	Pressure (psi)	@ Flow (gpm)
Supply	91.4	825.3	8.9	1271.4

Open Heads

Head Ref.	Head Type	Coverage	K-Factor	Required			Calculated		
				Density	Flow	Pressure	Density	Flow	Pressure
		(ft²)	(gpm/psi½)	(gpm/ft²)	(gpm)	(psi)	(gpm/ft²)	(gpm)	(psi)
S100	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.425	37.4	11.1
S77	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.373	32.9	8.6
S78	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.372	32.8	8.6
S79	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.372	32.8	8.6
S80	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.373	32.8	8.6
S81	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.346	30.4	7.4
S82	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.345	30.4	7.4
S83	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.346	30.4	7.4
S84	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.347	30.5	7.4
S85	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.341	30	7.2
S86	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.341	30	7.2
S87	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.341	30	7.2
S88	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.343	30.1	7.2

S89	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.343	30.2	7.3
S90	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.343	30.2	7.3
S91	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.344	30.2	7.3
S92	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.345	30.4	7.3
S93	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.365	32.1	8.2
S94	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.365	32.1	8.2
S95	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.366	32.2	8.3
S96	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.368	32.3	8.3
S97	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.42	37	10.9
S98	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.421	37	10.9
S99	Overhead Sprinkler	88	11.2	0.32	28.2	7.2	0.422	37.2	11

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
S86 20	Overhead Sprinkler HEAD	11.2 Open	30 1.8	88 0.341	7.2 -8.3	7.2 28.2
S85 20	Overhead Sprinkler HEAD	11.2 Open	30 1.9	88 0.341	7.2 -8.3	7.2 28.2
S87 20	Overhead Sprinkler HEAD	11.2 Open	30 1.9	88 0.341	7.2 -8.3	7.2 28.2
S88 20	Overhead Sprinkler HEAD	11.2 Open	30.1 2	88 0.343	7.2 -8.3	7.2 28.2
S90 20	Overhead Sprinkler HEAD	11.2 Open	30.2 2	88 0.343	7.3 -8.3	7.2 28.2
S89 20	Overhead Sprinkler HEAD	11.2 Open	30.2 2	88 0.343	7.3 -8.3	7.2 28.2
S91 20	Overhead Sprinkler HEAD	11.2 Open	30.2 2.1	88 0.344	7.3 -8.3	7.2 28.2
S92 20	Overhead Sprinkler HEAD	11.2 Open	30.4 2.2	88 0.345	7.3 -8.3	7.2 28.2
S82 20	Overhead Sprinkler HEAD	11.2 Open	30.4 2.2	88 0.345	7.4 -8.3	7.2 28.2
S83 20	Overhead Sprinkler HEAD	11.2 Open	30.4 2.3	88 0.346	7.4 -8.3	7.2 28.2
S81 20	Overhead Sprinkler HEAD	11.2 Open	30.4 2.3	88 0.346	7.4 -8.3	7.2 28.2
S84 20	Overhead Sprinkler HEAD	11.2 Open	30.5 2.4	88 0.347	7.4 -8.3	7.2 28.2
S93 20	Overhead Sprinkler HEAD	11.2 Open	32.1 3.9	88 0.365	8.2 -8.3	7.2 28.2
S94 20	Overhead Sprinkler HEAD	11.2 Open	32.1 3.9	88 0.365	8.2 -8.3	7.2 28.2
S95 20	Overhead Sprinkler HEAD	11.2 Open	32.2 4	88 0.366	8.3 -8.3	7.2 28.2
S96 20	Overhead Sprinkler HEAD	11.2 Open	32.3 4.2	88 0.368	8.3 -8.3	7.2 28.2
S78 20	Overhead Sprinkler HEAD	11.2 Open	32.8 4.6	88 0.372	8.6 -8.3	7.2 28.2
S79 20	Overhead Sprinkler HEAD	11.2 Open	32.8 4.6	88 0.372	8.6 -8.3	7.2 28.2
S80 20	Overhead Sprinkler HEAD	11.2 Open	32.8 4.7	88 0.373	8.6 -8.3	7.2 28.2
S77 20	Overhead Sprinkler HEAD	11.2 Open	32.9 4.7	88 0.373	8.6 -8.3	7.2 28.2
S97 20	Overhead Sprinkler HEAD	11.2 Open	37 8.8	88 0.42	10.9 -8.3	7.2 28.2
S98 20	Overhead Sprinkler HEAD	11.2 Open	37 8.9	88 0.421	10.9 -8.3	7.2 28.2
S99 20	Overhead Sprinkler HEAD	11.2 Open	37.2 9	88 0.422	11 -8.3	7.2 28.2
S100 20	Overhead Sprinkler HEAD	11.2 Open	37.4 9.2	88 0.425	11.1 -8.3	7.2 28.2
101 19	Node NODE				32.8 -7.8	

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
102 19	Node NODE				32.9 -7.8	
103 19	Node NODE				33.1 -7.8	
104 19	Node NODE				33.4 -7.8	
105 19	Node NODE				34.2 -7.8	
106 19	Node NODE				34.9 -7.8	
107 19	Node NODE				35.4 -7.8	
108 19	Node NODE				35.9 -7.8	
109 19	Node NODE				36.3 -7.8	
110 19	Node NODE				36.6 -7.8	
111 19	Node NODE				36.8 -7.8	
112 19	Node NODE				36.9 -7.8	
113 19	Node NODE				37 -7.8	
114 19	Node NODE				37.1 -7.8	
115 19	Node NODE				37.1 -7.8	
116 19	Node NODE				37.1 -7.8	
144 19	Node NODE				43.8 -7.8	
145 19	Node NODE				43.8 -7.8	
146 19	Node NODE				43.8 -7.8	
147 19	Node NODE				43.8 -7.8	
148 19	Node NODE				43.9 -7.8	
080 19	Node NODE				43.9 -7.8	
081 19	Node NODE				44 -7.8	
084 19	Node NODE				44 -7.8	
086 19	Node NODE				44.1 -7.8	
089 19	Node NODE				44.3 -7.8	

Node Data

Node# Elev	Type Hgroup	K-Fact. Open/Closed	Discharge Overdischarge	Coverage Density	Tot. Pres. Elev. Pres.	Req. Pres. Req. Discharge
ft		gpm/psi ^{1/2}	gpm gpm	ft ² gpm/ft ²	psi psi	psi gpm
090 19	Node NODE				44.4 -7.8	
093 19	Node NODE				44.6 -7.8	
095 19	Node NODE				44.8 -7.8	
096 19	Node NODE				45.1 -7.8	
097 19	Node NODE				45.6 -7.8	
098 19	Node NODE				46.2 -7.8	
626-O 7.26	Node NODE				63.3 -2.3	
626-I 6.77	Node NODE				64.8 -2	
627-O 6.43	Node NODE				65 -1.9	
627-I 5.47	Node NODE				68.5 -1.4	
055 0	Node NODE				71.7 1.2	
024-O -4	Node NODE				77.1 3.1	
W1 2.5	Supply SUPPLY		-771.4		81.6 0	
024-I -4	Node NODE				81.8 3.1	
027 -4	Node NODE				83.9 3.1	
029 -4	Node NODE				84 3.1	
031 -4	Node NODE				84 3.1	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 1

S86	20	11.2	30	1.25		11.5	120	7.2	
S82	20	11.2	17.8	1.53		0	0.0166	0	
						11.5		0.2	
S82	20	11.2	30.4	1.25		11.46	120	7.4	
S78	20	11.2	48.1	1.53		0	0.105	0	
						11.46		1.2	
S78	20	11.2	32.8	1.25	2x(us.Tee-Br)=19.83	67.63	120	8.6	
103	19		80.9	1.53		19.83	0.2747	0.4	
						87.46		24	
103	19		161.1	3		7.58	120	33.1	
104	19		242	3.314		0	0.0484	0	
						7.58		0.4	
104	19		81.5	3		8.96	120	33.4	
105	19		323.5	3.314		0	0.0829	0	
						8.96		0.7	
105	19		-32	3		10.33	120	34.2	
106	19		291.5	3.314		0	0.0684	0	
						10.33		0.7	
106	19		-30.5	3		10.25	120	34.9	
107	19		261.1	3.314		0	0.0557	0	
						10.25		0.6	
107	19		-29.2	3		10.33	120	35.4	
108	19		231.9	3.314		0	0.0448	0	
						10.33		0.5	
108	19		-26.5	3		10.33	120	35.9	
109	19		205.4	3.314		0	0.0358	0	
						10.33		0.4	
109	19		-27.2	3		10.33	120	36.3	
110	19		178.2	3.314		0	0.0275	0	
						10.33		0.3	
110	19		-26.5	3		10.25	120	36.6	
111	19		151.7	3.314		0	0.0204	0	
						10.25		0.2	
111	19		-26	3		10.33	120	36.8	
112	19		125.7	3.314		0	0.0144	0	
						10.33		0.1	
112	19		-25.6	3		10.33	120	36.9	
113	19		100	3.314		0	0.0094	0	
						10.33		0.1	
113	19		-23.9	3		10.25	120	37	
114	19		76.1	3.314		0	0.0057	0	
						10.25		0.1	
114	19		-25.2	3		10.33	120	37.1	
115	19		50.9	3.314		0	0.0027	0	
						10.33		0.0	
115	19		-25.2	3	1x(us.Tee-Br)=21.84	10.33	120	37.1	
116	19		25.8	3.314		21.84	0.0008	0	
						32.17		0.0	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 1

116 144	19 19		0 25.8	1.25 1.53	3x(us.Tee-Br)=29.75	172.83 29.75 202.58	120 0.033	37.1 0 6.7	
144 145	19 19		0 25.8	4 4.31		10.33 0 10.33	120 0.0002	43.8 0 0	
145 146	19 19		25.2 50.9	4 4.31		10.33 0 10.33	120 0.0008	43.8 0 0	
146 147	19 19		25.2 76.1	4 4.31		10.25 0 10.25	120 0.0016	43.8 0 0.0	
147 148	19 19		23.9 100	4 4.31		10.33 0 10.33	120 0.0026	43.8 0 0.0	
148 080	19 19		25.6 125.7	4 4.31		10.33 0 10.33	120 0.004	43.9 0 0.0	
080 081	19 19		26 151.7	4 4.31		10.25 0 10.25	120 0.0057	43.9 0 0.1	
081 084	19 19		26.5 178.2	4 4.31		10.33 0 10.33	120 0.0076	44 0 0.1	
084 086	19 19		27.2 205.4	4 4.31		10.33 0 10.33	120 0.0099	44 0 0.1	
086 089	19 19		26.5 231.9	4 4.31		10.33 0 10.33	120 0.0124	44.1 0 0.1	
089 090	19 19		29.2 261.1	4 4.31		10.25 0 10.25	120 0.0155	44.3 0 0.2	
090 093	19 19		30.5 291.5	4 4.31		10.33 0 10.33	120 0.019	44.4 0 0.2	
093 095	19 19		32 323.5	4 4.31		8.96 0 8.96	120 0.0231	44.6 0 0.2	
095 096	19 19		111.1 434.6	4 4.31		7.58 0 7.58	120 0.0398	44.8 0 0.3	
096 097	19 19		111.5 546.1	4 4.31		7.58 0 7.58	120 0.0608	45.1 0 0.5	
097 098	19 19		112.2 658.3	4 4.31		7.58 0 7.58	120 0.086	45.6 0 0.7	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 1

098 626-O	19 7.26		113.1 771.4	4 4.31	2x(us.90)=27.87	71.61 27.87 99.49	120 0.1153	46.2 5.1 11.5	
626-O 626-I	7.26 6.77		0 771.4	4 0		0.49 0 0.49	2.7314	63.3 0.2 1.3	Butterfly ***
626-I 627-O	6.77 6.43		0 771.4	4 4.31		0.34 0 0.34	120 0.1153	64.8 0.1 0.0	
627-O 627-I	6.43 5.47		0 771.4	4 0		0.96 0 0.96	3.1652	65 0.4 3	CV-1 FR Check ***
627-I 055	5.47 0		0 771.4	4 4.31		5.47 0 5.47	120 0.1153	68.5 2.4 0.6	
055 024-O	0 -4		0 771.4	6 6.4	3x(us.90)=72.58	198.78 72.58 271.36	140 0.0126	71.7 1.7 3.4	
024-O 024-I	-4 -4		0 771.4	6 0		3.34 0 3.34	1.4034	77.1 0 4.7	Wilkins 350 ADA ***
024-I 027	-4 -4		0 771.4	6 6.4	1x(us.Tee-Br)=51.84 1x(us.90)=24.19	95.71 76.04 171.75	140 0.0126	81.8 0 2.2	
027 029	-4 -4		0 771.4	20 18.5		280.17 0 280.17	140 0.0001	83.9 0 0.0	
029 031	-4 -4		0 771.4	24 20.5		58 0 58	140 0.0000	84 0 0	
031 W1	-4 2.5		0 771.4	6 6.4	2x(us.90)=48.39	12.5 48.39 60.89	140 0.0126	84 -2.8 0.8	
W1								81.6	

Path No: 2

S86 S90	20 20	11.2 11.2	30 12.2	1.25 1.53		11.33 0 11.33	120 0.0083	7.2 0 0.1	
S90 S94	20 20	11.2 11.2	30.2 42.4	1.25 1.53		11.46 0 11.46	120 0.083	7.3 0 1	
S94 S98	20 20	11.2 11.2	32.1 74.5	1.25 1.53		11.5 0 11.5	120 0.2358	8.2 0 2.7	
S98 096	20 19	11.2	37 111.5	1.25 1.53	2x(us.Tee-Br)=19.83	47.96 19.83 67.79	120 0.4976	10.9 0.4 33.7	
096								45.1	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 3

S85	20	11.2	30	1.25		11.5	120	7.2	
S81	20	11.2	18.2	1.53		0	0.0173	0	
						11.5		0.2	
S81	20	11.2	30.4	1.25		11.46	120	7.4	
S77	20	11.2	48.6	1.53		0	0.107	0	
						11.46		1.2	
S77	20	11.2	32.9	1.25	2x(us.Tee-Br)=19.83	67.63	120	8.6	
104	19		81.5	1.53		19.83	0.2783	0.4	
						87.46		24.3	
104								33.4	

Path No: 4

S85	20	11.2	30	1.25		11.33	120	7.2	
S89	20	11.2	11.8	1.53		0	0.0078	0	
						11.33		0.1	
S89	20	11.2	30.2	1.25		11.46	120	7.3	
S93	20	11.2	42	1.53		0	0.0816	0	
						11.46		0.9	
S93	20	11.2	32.1	1.25		11.5	120	8.2	
S97	20	11.2	74.1	1.53		0	0.2333	0	
						11.5		2.7	
S97	20	11.2	37	1.25	2x(us.Tee-Br)=19.83	47.96	120	10.9	
095	19		111.1	1.53		19.83	0.4937	0.4	
						67.79		33.5	
095								44.8	

Path No: 5

S87	20	11.2	30	1.25		11.5	120	7.2	
S83	20	11.2	17.4	1.53		0	0.016	0	
						11.5		0.2	
S83	20	11.2	30.4	1.25		11.46	120	7.4	
S79	20	11.2	47.8	1.53		0	0.1037	0	
						11.46		1.2	
S79	20	11.2	32.8	1.25	2x(us.Tee-Br)=19.83	67.63	120	8.6	
102	19		80.6	1.53		19.83	0.2727	0.4	
						87.46		23.8	
102	19		80.5	3		7.58	120	32.9	
103	19		161.1	3.314		0	0.0228	0	
						7.58		0.2	
103								33.1	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 6

S87 S91	20 20	11.2 11.2	30 12.6	1.25 1.53		11.33 0 11.33	120 0.0088	7.2 0 0.1	
S91 S95	20 20	11.2 11.2	30.2 42.9	1.25 1.53		11.46 0 11.46	120 0.0847	7.3 0 1	
S95 S99	20 20	11.2 11.2	32.2 75.1	1.25 1.53		11.5 0 11.5	120 0.2389	8.3 0 2.7	
S99 097	20 19	11.2	37.2 112.2	1.25 1.53	2x(us.Tee-Br)=19.83	47.96 19.83 67.79	120 0.5032	11 0.4 34.1	
097								45.6	

Path No: 7

S88 S84	20 20	11.2 11.2	30.1 17.1	1.25 1.53		11.5 0 11.5	120 0.0154	7.2 0 0.2	
S84 S80	20 20	11.2 11.2	30.5 47.6	1.25 1.53		11.46 0 11.46	120 0.1028	7.4 0 1.2	
S80 101	20 19	11.2	32.8 80.5	1.25 1.53	2x(us.Tee-Br)=19.83	67.63 19.83 87.46	120 0.2717	8.6 0.4 23.8	
101 102	19 19		0 80.5	3 3.314		7.58 0 7.58	120 0.0063	32.8 0 0.0	
102								32.9	

Path No: 8

S88 S92	20 20	11.2 11.2	30.1 13	1.25 1.53		11.33 0 11.33	120 0.0094	7.2 0 0.1	
S92 S96	20 20	11.2 11.2	30.4 43.4	1.25 1.53		11.46 0 11.46	120 0.0867	7.3 0 1	
S96 S100	20 20	11.2 11.2	32.3 75.8	1.25 1.53		11.5 0 11.5	120 0.2431	8.3 0 2.8	
S100 098	20 19	11.2	37.4 113.1	1.25 1.53	2x(us.Tee-Br)=19.83	47.96 19.83 67.79	120 0.5109	11.1 0.4 34.6	
098								46.2	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 9

105	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	34.2	
093	19		32	1.53		39.67	0.0492	0	
						212.5		10.5	
093								44.6	

Path No: 10

106	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	34.9	
090	19		30.5	1.53		39.67	0.045	0	
						212.5		9.6	
090								44.4	

Path No: 11

107	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	35.4	
089	19		29.2	1.53		39.67	0.0415	0	
						212.5		8.8	
089								44.3	

Path No: 12

108	19		0	1.25	4x(us.Tee-Br)=39.67	177.92	120	35.9	
086	19		26.5	1.53	4x(us.90)=19.83	59.5	0.0347	0	
						237.42		8.2	
086								44.1	

Path No: 13

109	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	36.3	
084	19		27.2	1.53		39.67	0.0365	0	
						212.5		7.8	
084								44	

Path No: 14

110	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	36.6	
081	19		26.5	1.53		39.67	0.0348	0	
						212.5		7.4	
081								44	

Path No: 15

111	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	36.8	
080	19		26	1.53		39.67	0.0335	0	
						212.5		7.1	
080								43.9	

Path No: 16

112	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	36.9	
148	19		25.6	1.53		39.67	0.0327	0	
						212.5		6.9	
148								43.9	

PIPE INFORMATION

Node 1 Node 2	Elev 1 Elev 2	K-Factor 1 K-Factor 2	Flow added (q) Total flow (Q)	Nominal ID Actual ID	Fittings quantity x (name) = length	L F T	C Factor Pf per ft	total (Pt) elev (Pe) frict (Pf)	NOTES
	(ft)	(gpm/psi ^{1/2})	(gpm)	(in)	(ft)	(ft)	(psi)	(psi)	

Path No: 17

113	19		0	1.25	4x(us.Tee-Br)=39.67	177.92	120	37	
147	19		23.9	1.53	4x(us.90)=19.83	59.5	0.0287	0	
						237.42		6.8	
147									43.8

Path No: 18

114	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	37.1	
146	19		25.2	1.53		39.67	0.0317	0	
						212.5		6.7	
146									43.8

Path No: 19

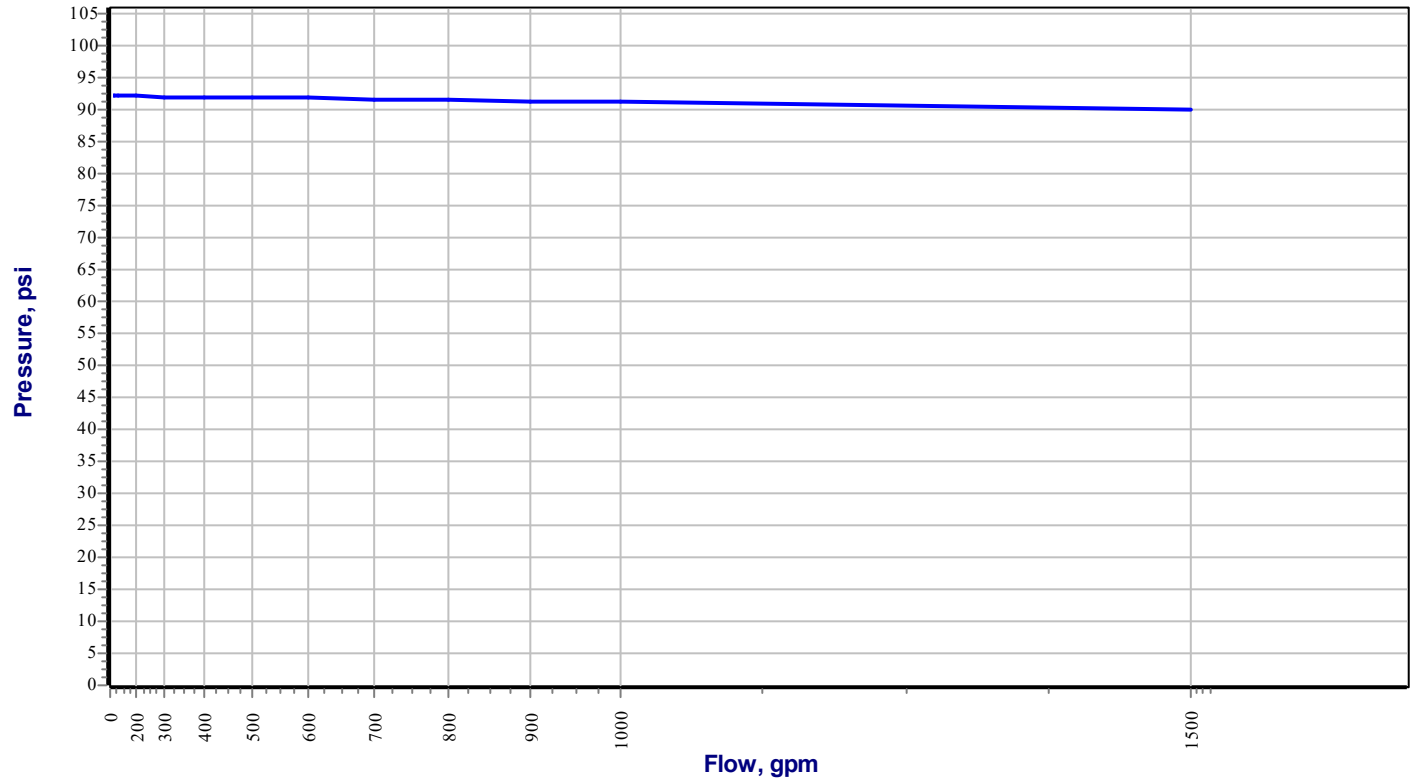
115	19		0	1.25	4x(us.Tee-Br)=39.67	172.83	120	37.1	
145	19		25.2	1.53		39.67	0.0315	0	
						212.5		6.7	
145									43.8

* Pressures are balanced to a high degree of accuracy. Values may vary by 0.1 psi due to display rounding.

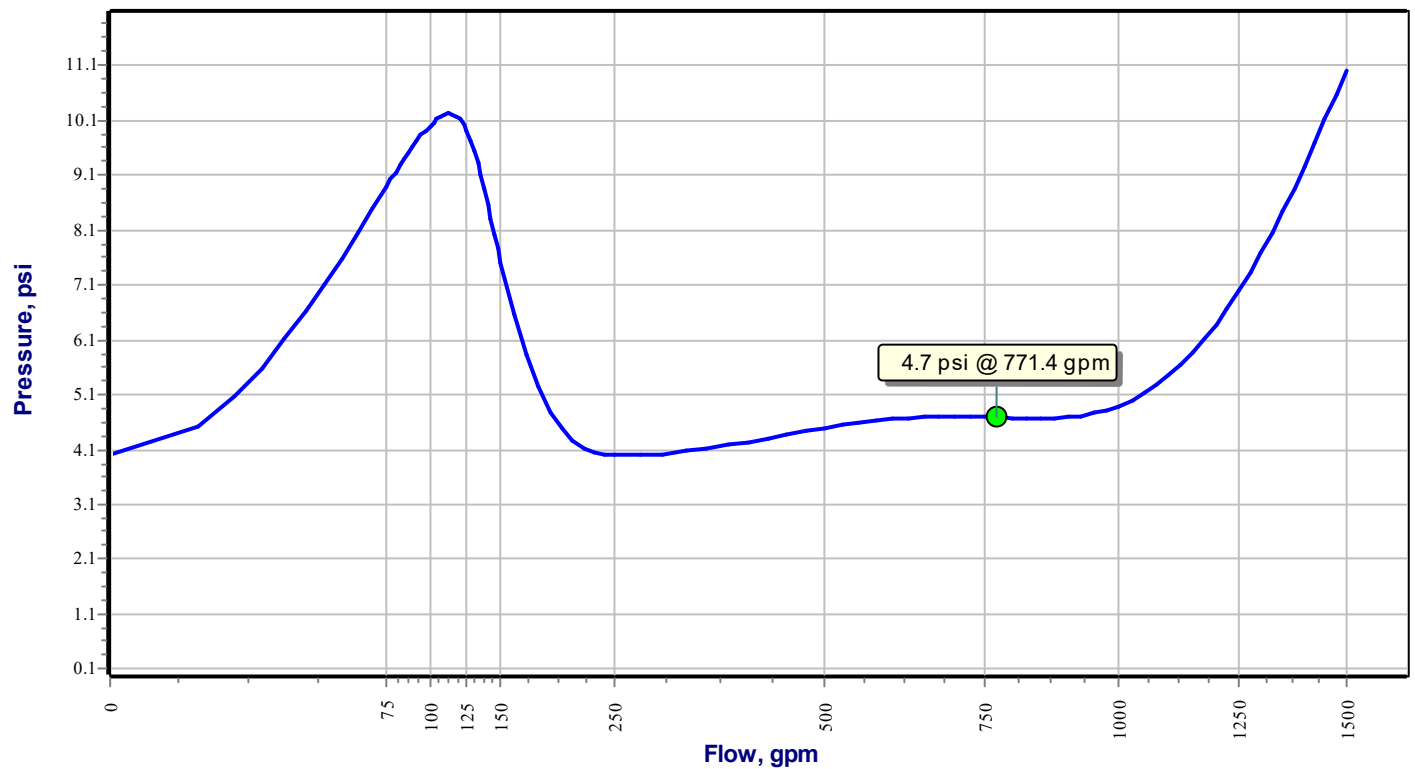
* Maximum Velocity of 19.74 ft/s occurs in the following pipe(s): (098-S100)

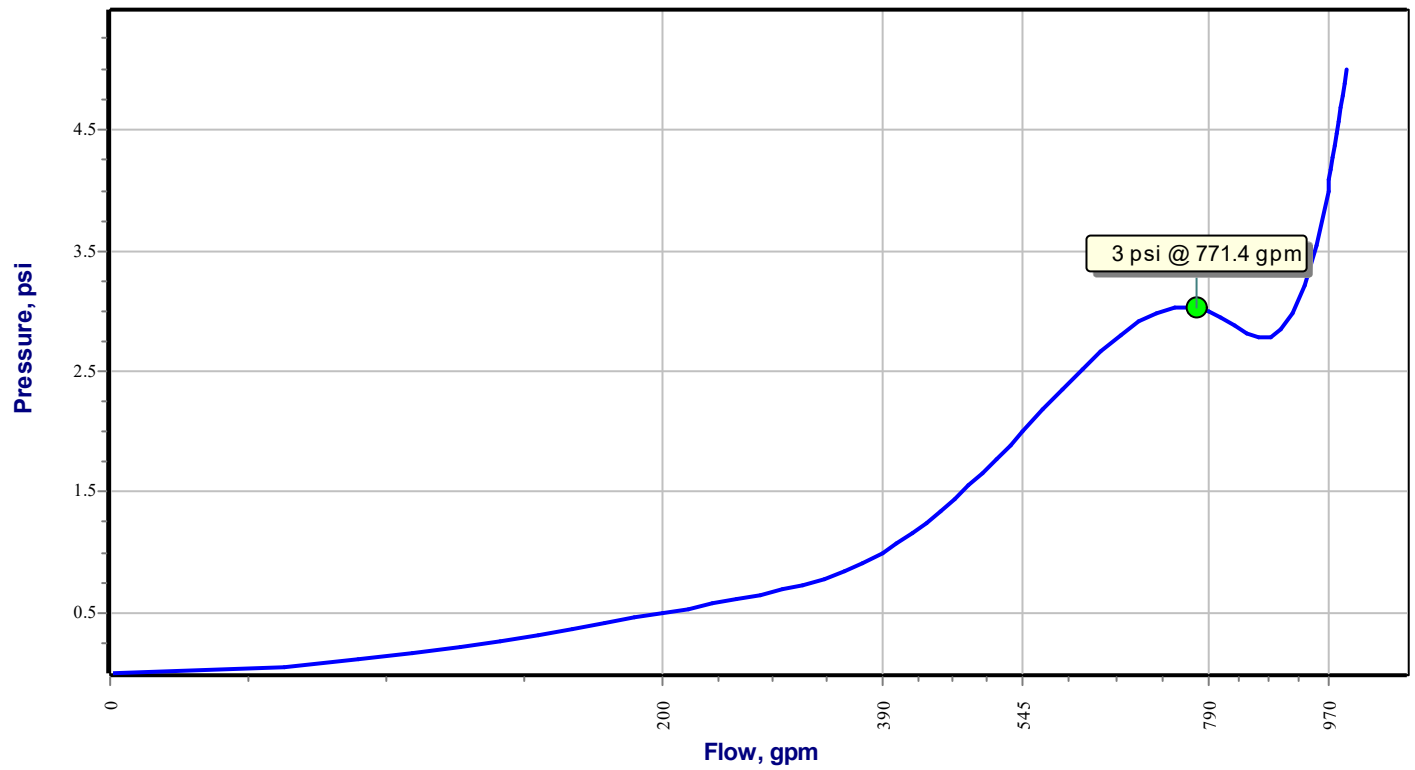
*** Device pressure loss (gain in the case of pumps) is calculated from the device's curve. If the device curve is printed with this report, it will appear below. The length of the device as shown in the table above comes from the CAD drawing. The friction loss per unit of length is calculated based upon the length and the curve-based loss/gain value. Internal ID and C Factor values are irrelevant as the device is not represented as an addition to any pipe, but is an individual item whose loss/gain is based solely on the curve data.

Pressure vs. Flow Function
Design Area: 5; Supply Ref.: W1; Supply Name:W1



Pressure Loss Function
Design Area: 5; BFP Ref.: 992 (Wilkins 350 ADA, Size = 6); Inlet Node: 024-I; Outlet Node: 024-O



Pressure Loss Function**Design Area: 5; Valve Ref.: 990 (CV-1 FR Check, Size = 4); Inlet Node: 627-I; Outlet Node: 627-O****Pressure Loss Function****Design Area: 5; Valve Ref.: 991 (Butterfly, Size = 4); Inlet Node: 626-I; Outlet Node: 626-O**