Hydraulic Calculations
for

Project: Homewood Suites
3500 South Meridian
Puyallup, WA. 98373
Drawing no.: FS-9
Date: 3/3/2024

Design

Remote area number:	Area 2
Remote area location:	5th Floor Corridor
Occupancy classification:	Light Hazard
Density:	0.10 gpm./ft.2
Area of application:	5 remote sprinklers
Coverage per sprinkler:	130 sq.ft. maximum
Type of sprinklers calculated:	Residential Concealed Sidewall
No. of sprinklers calculated:	5
In rack demand:	0 gpm.
Hose streams:	100 gpm. outside + 0 gpm. inside
Total water required (including hose streams):	166.49 gpm at -42.99 psi [94.92 psi safety margin]
Type of system:	wet pipe
Volume of dry or preaction system:	

Water Supply Information

Date: 01-26-2024
Location: 3601 9th Street Southwest
Source: Fruitland Mutual Water Company

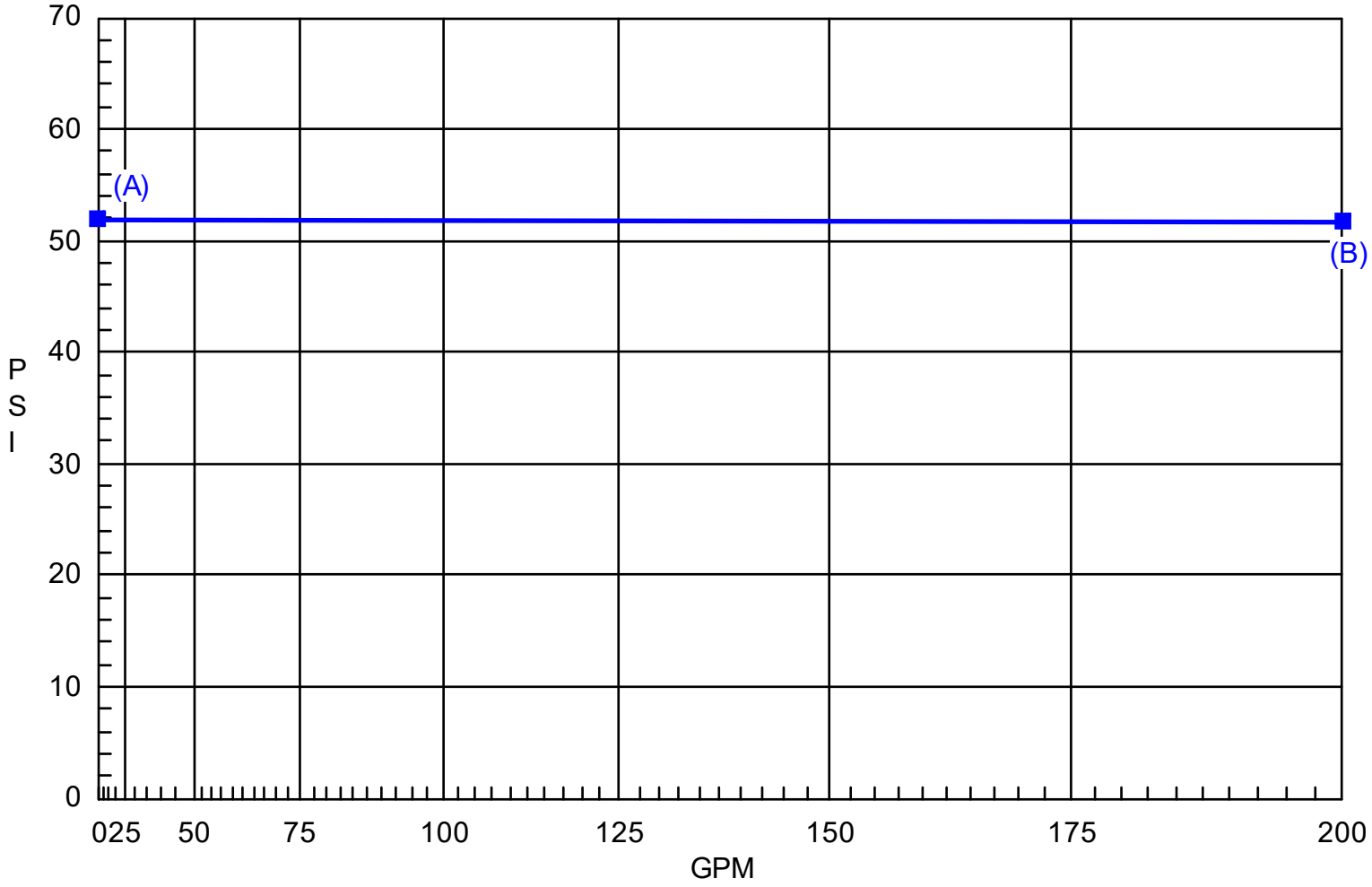
Contractor: Discount Fire Protection, LLC.
4 Red Bluff Court
Mansfield, TX. 76063

Name of designer: Timothy McBride
Authority having jurisdiction:

Notes

Pdev at node BOR to SOP - 3" AMEs 3000SS Backflow Preventer

Hydraulic Demand Graph



Water Source:
A) 52 psi Static
B) 200 gpm at 51.91 psi

Demand at Source:
C) 166.5 gpm at -42.99 psi

Supply Analysis

Node at	Static Pressure [psi]	Residual Pressure [psi]	Flow [gpm]	Available Pressure [psi]	Total Demand [gpm]	Required Pressure [psi]
CTY	52.0	51.0	754.0	51.94	166.49	-42.99

Node Analysis

Node Tag	Elev [ft]	Type	Pressure [psi]	Discharge [gpm]
CTY	1.000	source	-42.986	-166.488
M01	-4.000	ref	-40.961	100.000
AT3	52.333	ref	10.942	0.000
AB3	44.000	ref	16.668	0.000
AP2	44.000	ref	18.115	0.000
AT4	52.333	ref	11.517	0.000
BT4	44.000	ref	17.346	0.000
AP3	44.000	ref	18.143	0.000
AT5	52.333	ref	11.081	0.000
BT5	44.000	ref	16.832	0.000
AP4	44.000	ref	18.241	0.000
AT6	52.333	ref	12.437	0.000
BT6	44.000	ref	17.575	0.000
AT7	52.333	ref	11.273	0.000
BT7	44.000	ref	17.058	0.000
AP5	44.000	ref	18.430	0.000
AP6	44.000	ref	18.740	0.000
AP7	44.000	ref	20.280	0.000
AP8	44.000	ref	29.869	0.000
AP9	40.667	ref	36.218	0.000
Z12	40.667	ref	36.683	0.000
Z13	20.333	ref	45.514	0.000
Z14	13.667	ref	48.410	0.000
ZP1	13.667	ref	48.564	0.000
TR2	13.667	ref	48.624	0.000
BR2	2.000	ref	53.725	0.000
BR1	2.000	ref	53.730	0.000
SOP	2.000	ref	-48.098	0.000
BOR	2.000	ref	-43.565	0.000
201	52.333	K=4.20	9.580	13.000
202	52.333	K=4.20	10.089	13.340
203	52.333	K=4.20	9.703	13.083
204	52.333	K=4.20	10.902	13.868
205	52.333	K=4.20	9.873	13.197

Pipe Information

negative pipe flow (Q) indicates flow is from node 2 towards node 1

Node 1 / Node 2	Elev [ft]	K-factor	Discharge & Flow [gpm]	Nom i.d. [in]	Fittings num & length [ft]	L [ft] F [ft] T [ft]	C factor psi/ft	total (Pt) elev (Pe) frict (Pf)	Notes
201	52.333	4.2	q= 13.000	0.75	1PE=14.092	0.333		Pt= 9.580	Mat="1-CPVC"
			Q= -13.000	0.874		14.092	C=150	Pe= 0.000	
AT3	52.333					14.425	0.094	Pf= -1.362	
AT3	52.333		q= 0.000	0.75	1PE=14.092	8.333		Pt= 10.942	Mat="1-CPVC"
			Q= -13.000	0.874		14.092	C=150	Pe= -3.608	
AB3	44.000					22.425	0.094	Pf= -2.117	
AB3	44.000		q= 0.000	0.75	2PTR=12.079	3.250		Pt= 16.668	Mat="1-CPVC"
			Q= -13.000	0.874		12.079	C=150	Pe= 0.000	
AP2	44.000					15.329	0.094	Pf= -1.447	
202	52.333	4.2	q= 13.340	0.75	1PE=14.092	0.333		Pt= 10.089	Mat="1-CPVC"
			Q= -13.340	0.874		14.092	C=150	Pe= 0.000	
AT4	52.333					14.425	0.099	Pf= -1.429	
AT4	52.333		q= 0.000	0.75	1PE=14.092	8.333		Pt= 11.517	Mat="1-CPVC"
			Q= -13.340	0.874		14.092	C=150	Pe= -3.608	
BT4	44.000					22.425	0.099	Pf= -2.221	
BT4	44.000		q= 0.000	0.75	1PTR=6.039	2.000		Pt= 17.346	Mat="1-CPVC"
			Q= -13.340	0.874		6.039	C=150	Pe= 0.000	
AP3	44.000					8.039	0.099	Pf= -0.796	
203	52.333	4.2	q= 13.083	0.75	1PE=14.092	0.333		Pt= 9.703	Mat="1-CPVC"
			Q= -13.083	0.874		14.092	C=150	Pe= 0.000	
AT5	52.333					14.425	0.096	Pf= -1.378	
AT5	52.333		q= 0.000	0.75	1PE=14.092	8.333		Pt= 11.081	Mat="1-CPVC"
			Q= -13.083	0.874		14.092	C=150	Pe= -3.608	
BT5	44.000					22.425	0.096	Pf= -2.142	
BT5	44.000		q= 0.000	0.75	2PTR=12.079	2.667		Pt= 16.832	Mat="1-CPVC"
			Q= -13.083	0.874		12.079	C=150	Pe= 0.000	
AP4	44.000					14.746	0.096	Pf= -1.409	
204	52.333	4.2	q= 13.868	0.75	1PE=14.092	0.333		Pt= 10.902	Mat="1-CPVC"
			Q= -13.868	0.874		14.092	C=150	Pe= 0.000	
AT6	52.333					14.425	0.106	Pf= -1.535	
AT6	52.333		q= 0.000	0.75	1PTR=6.039	8.333		Pt= 12.437	Mat="1-CPVC"
			Q= -13.868	0.874		6.039	C=150	Pe= -3.608	
BT6	44.000					14.373	0.106	Pf= -1.529	
BT6	44.000		q= 0.000	0.75	1PTR=6.039	2.000		Pt= 17.575	Mat="1-CPVC"
			Q= -13.868	0.874		6.039	C=150	Pe= 0.000	
AP5	44.000					8.039	0.106	Pf= -0.855	
205	52.333	4.2	q= 13.197	0.75	1PE=14.092	0.333		Pt= 9.873	Mat="1-CPVC"
			Q= -13.197	0.874		14.092	C=150	Pe= 0.000	
AT7	52.333					14.425	0.097	Pf= -1.400	
AT7	52.333		q= 0.000	0.75	1PE=14.092	8.333		Pt= 11.273	Mat="1-CPVC"
			Q= -13.197	0.874		14.092	C=150	Pe= -3.608	
BT7	44.000					22.425	0.097	Pf= -2.177	
BT7	44.000		q= 0.000	0.75	2PTR=12.079	5.250		Pt= 17.058	Mat="1-CPVC"
			Q= -13.197	0.874		12.079	C=150	Pe= 0.000	
AP6	44.000					17.329	0.097	Pf= -1.682	

Pipe Information, cont.

Node 1 Node 2	Elev [ft]	K-factor	Discharge & Flow [gpm]	Nom i.d. [in]	Fittings num & length [ft]	L [ft] F [ft] T [ft]	C factor psi/ft	total (Pt) elev (Pe) frict (Pf)	Notes
AP2	44.000		q= 0.000	2	1PTS=1.296	15.250		Pt= 18.115	Mat="1-CPVC"
			Q= -13.000	2.003		1.296	C=150	Pe= 0.000	
AP3	44.000					16.546	0.002	Pf= -0.028	
AP3	44.000		q= 0.000	2	1PTS=1.296	14.667		Pt= 18.143	Mat="1-CPVC"
			Q= -26.340	2.003		1.296	C=150	Pe= 0.000	
AP4	44.000					15.963	0.006	Pf= -0.098	
AP4	44.000		q= 0.000	2	1PTS=1.296	13.333		Pt= 18.241	Mat="1-CPVC"
			Q= -39.423	2.003		1.296	C=150	Pe= 0.000	
AP5	44.000					14.630	0.013	Pf= -0.189	
AP5	44.000		q= 0.000	2	1PTS=1.296	12.417		Pt= 18.430	Mat="1-CPVC"
			Q= -53.291	2.003		1.296	C=150	Pe= 0.000	
AP6	44.000					13.713	0.023	Pf= -0.310	
AP6	44.000		q= 0.000	2	1PTR=12.965	32.250		Pt= 18.740	Mat="1-CPVC"
			Q= -66.488	2.003		12.965	C=150	Pe= 0.000	
AP7	44.000					45.215	0.034	Pf= -1.540	
AP7	44.000		q= 0.000	2	1PE=14.261	267.250		Pt= 20.280	Mat="1-CPVC"
			Q= -66.488	2.003		14.261	C=150	Pe= 0.000	
AP8	44.000					281.511	0.034	Pf= -9.589	
AP8	44.000		q= 0.000	2	3E=18.294	7.500		Pt= 29.869	Mat="1-WLML"
			Q= -66.488	2.153	1C=13.416	45.125	C=120	Pe= -1.443	Pdev=-3.0 psi
AP9	40.667				1B=7.318	52.625	0.036	Pf= -1.905	
					1E=6.098				
AP9	40.667		q= 0.000	2	1T=12.196	0.667		Pt= 36.218	Mat="1-WLML"
			Q= -66.488	2.153		12.196	C=120	Pe= 0.000	
Z12	40.667					12.863	0.036	Pf= -0.466	
Z12	40.667		q= 0.000	4		20.333		Pt= 36.683	Mat="1-WL10"
			Q= -66.488	4.26		0.000	C=120	Pe= -8.804	
Z13	20.333					20.333	0.001	Pf= -0.027	
Z13	20.333		q= 0.000	4		6.667		Pt= 45.514	Mat="1-WL10"
			Q= -66.488	4.26		0.000	C=120	Pe= -2.887	
Z14	13.667					6.667	0.001	Pf= -0.009	
Z14	13.667		q= 0.000	4	2E=26.334	50.167		Pt= 48.410	Mat="1-WL10"
			Q= -66.488	4.26	1B=15.800	68.469	C=120	Pe= 0.000	
ZP1	13.667				1T=26.334	118.635	0.001	Pf= -0.155	
ZP1	13.667		q= 0.000	4	1T=26.334	19.500		Pt= 48.564	Mat="1-WL10"
			Q= -66.488	4.26		26.334	C=120	Pe= 0.000	
TR2	13.667					45.834	0.001	Pf= -0.060	
TR2	13.667		q= 0.000	4	1T=26.334	11.667		Pt= 48.624	Mat="1-WL10"
			Q= -66.488	4.26		26.334	C=120	Pe= -5.052	
BR2	2.000					38.001	0.001	Pf= -0.050	
BR2	2.000		q= 0.000	3		1.000		Pt= 53.725	Mat="1-WL10"
			Q= -66.488	3.26		0.000	C=120	Pe= 0.000	
BR1	2.000					1.000	0.005	Pf= -0.005	
BR1	2.000		q= 0.000	3	2G=2.688	6.500		Pt= 53.730	Mat="1-WL10"
			Q= -66.488	3.26	1C=21.503	33.599	C=120	Pe= 0.000	Pdev=102.02 psi
SOP	2.000				1E=9.408	40.099	0.005	Pf= -0.193	

Pipe Information, cont.

Node 1 Node 2	Elev [ft]	K-factor	Discharge & Flow [gpm]	Nom i.d. [in]	Fittings num & length [ft]	L [ft] F [ft] T [ft]	C factor psi/ft	total (Pt) elev (Pe) frict (Pf)	Notes
SOP	2.000		q= 0.000	3	1E=9.408	5.000		Pt=-48.098	Mat="1-WL10"
			Q= -66.488	3.26		9.408	C=120	Pe= 0.000	Pdev=-4.46 psi
BOR	2.000					14.408	0.005	Pf= -0.069	
BOR	2.000		q= 0.000	6	1E=14.000	10.000		Pt=-43.565	Mat="S40"
			Q= -66.488	6.065		14.000	C=120	Pe= -2.598	
M01	-4.000					24.000	0.000	Pf= -0.006	
M01	-4.000		q= 100.000	6	1G=4.588	96.000		Pt=-40.961	Mat="1-PVC"
			Q=-166.488	6.08	1E=21.411	71.880	C=150	Pe= 2.165	
CTY	1.000				1T=45.881	167.880	0.001	Pf= -0.140	

Material Codes

Pipe Material

S40 - Schedule 40 Steel
1-PVC - PVC C900 Underround Pipe
1-CPVC - Blazemaster
1-WL10 - Wheatland's schedule 10
1-WLML - Wheatland's MLT

Fittings

B - Butterfly Valve
C - Check Valve
E - Standard 90 degree elbow
G - Gate Valve
T - Tee - Flow turn 90 degrees
PE - CPVC 90 degree elbow
PTR - CPVC Tee - Flow turn 90 degree
PTS - CPVC Tee - Flow straight thru path