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 1
Remote area location: 5th Floor Room 502-504
Occupancy classification: Light Hazard
Density: 0.10 gpm./ft.2
Area of application: 4 remote sprinklers
Coverage per sprinkler: 153 sq.ft. maximum
Type of sprinklers calculated: Residential Concealed Sidewall
No. of sprinklers calculated: 4
In rack demand: 0 gpm.
Hose streams: 100 gpm. outside + 0 gpm. inside
Total water required (including hose streams): 169.16 gpm at 34.74 psi [17.2 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

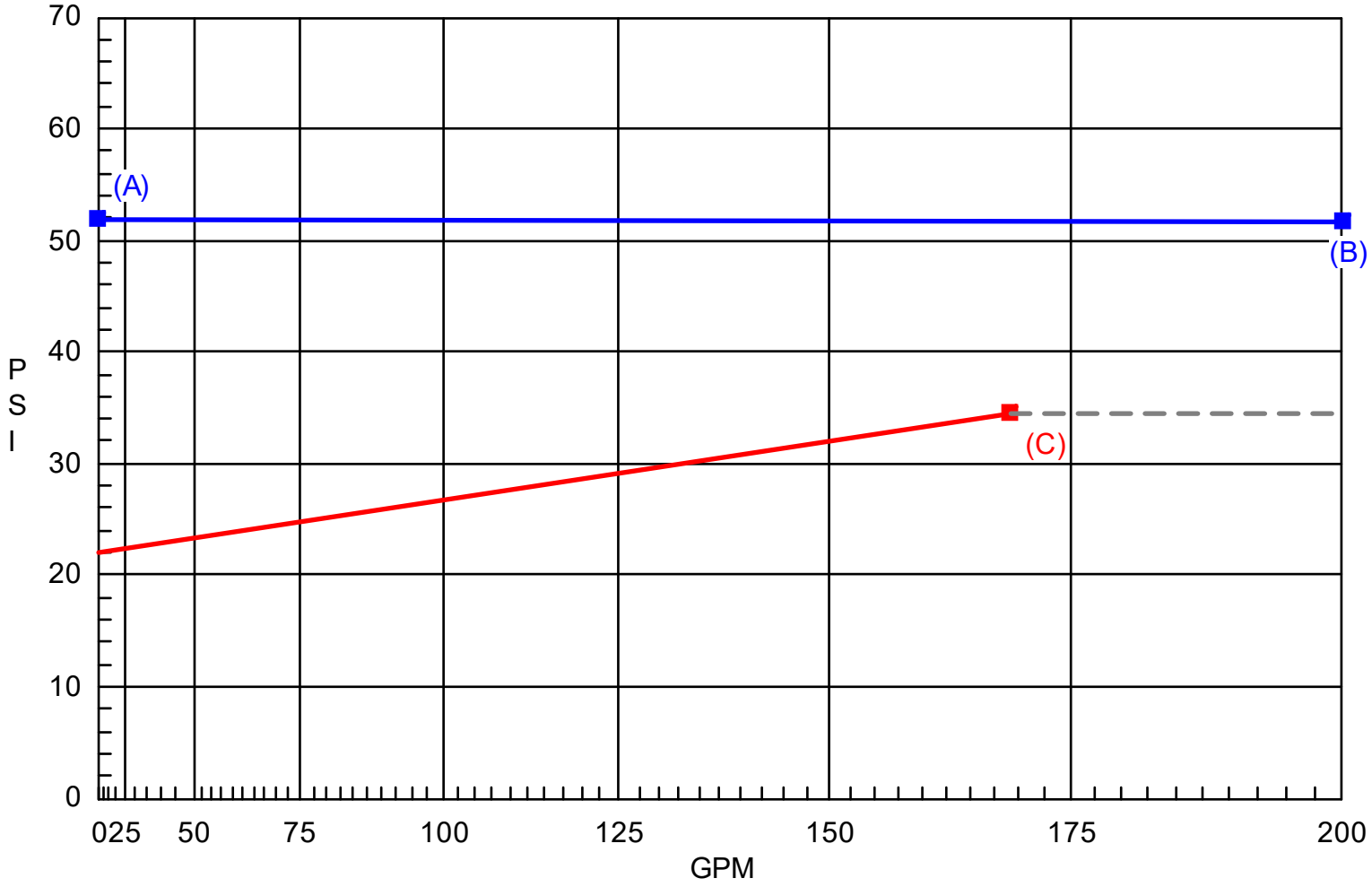
Contractor: Discount Fire Protection, LLC.
4 Red Bluff Court
Mansfield, TX. 76063

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) 169.2 gpm at 34.74 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	169.16	34.74

Node Analysis

Node Tag	Elev [ft]	Type	Pressure [psi]	Discharge [gpm]
CTY	1.000	source	34.740	-169.161
M01	-4.000	ref	36.760	100.000
AT1	51.333	ref	18.305	0.000
AB1	44.000	ref	32.036	0.000
AP1	44.000	ref	47.607	0.000
AP5	44.000	ref	95.170	0.000
AT2	51.333	ref	25.112	0.000
AB2	44.000	ref	42.578	0.000
AP6	44.000	ref	95.625	0.000
AP7	44.000	ref	97.281	0.000
AP8	44.000	ref	107.595	0.000
AP9	40.667	ref	114.088	0.000
Z12	40.667	ref	114.589	0.000
Z13	20.333	ref	123.422	0.000
Z14	13.667	ref	126.318	0.000
ZP1	13.667	ref	126.485	0.000
TR2	13.667	ref	126.550	0.000
BR2	2.000	ref	131.655	0.000
BR1	2.000	ref	131.660	0.000
SOP	2.000	ref	29.814	0.000
BOR	2.000	ref	34.156	0.000
101	52.333	K=4.20	15.350	16.455
102	52.333	K=4.20	13.270	15.300
103	52.333	K=4.20	21.269	19.370
104	52.333	K=4.20	18.441	18.036

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
101	52.333	4.2	q= 16.455	0.75	1PE=14.092	1.167		Pt= 15.350	Mat="1-CPVC"
			Q= -16.455	0.874	1PTS=2.013	16.105	C=150	Pe= -0.433	
AT1	51.333					17.272	0.146	Pf= -2.522	
AT1	51.333		q= 0.000	0.75	1PE=14.092	7.333		Pt= 18.305	Mat="1-CPVC"
			Q= -31.755	0.874		14.092	C=150	Pe= -3.175	
AB1	44.000					21.425	0.493	Pf=-10.556	
AB1	44.000		q= 0.000	0.75	1PE=14.092	15.500		Pt= 32.036	Mat="1-CPVC"
			Q= -31.755	0.874	1PTS=2.013	16.105	C=150	Pe= 0.000	
AP1	44.000					31.605	0.493	Pf=-15.571	
AP1	44.000		q= 0.000	0.75	1PTR=6.039	16.833		Pt= 47.607	Mat="1-CPVC"
			Q= -69.161	0.874		6.039	C=150	Pe= 0.000	
AP5	44.000					22.873	2.079	Pf=-47.563	
102	52.333	4.2	q= 15.300	0.75	2PE=28.184	1.833		Pt= 13.270	Mat="1-CPVC"
			Q= -15.300	0.874	1PTR=6.039	34.224	C=150	Pe= -0.433	
AT1	51.333					36.057	0.128	Pf= -4.601	
103	52.333	4.2	q= 19.370	0.75	1PE=14.092	1.167		Pt= 21.269	Mat="1-CPVC"
			Q= -19.370	0.874	1PTS=2.013	16.105	C=150	Pe= -0.433	
AT2	51.333					17.272	0.197	Pf= -3.410	
AT2	51.333		q= 0.000	0.75	1PE=14.092	7.333		Pt= 25.112	Mat="1-CPVC"
			Q= -37.405	0.874		14.092	C=150	Pe= -3.175	
AB2	44.000					21.425	0.667	Pf=-14.291	
AB2	44.000		q= 0.000	0.75	1PTR=6.039	1.500		Pt= 42.578	Mat="1-CPVC"
			Q= -37.405	0.874		6.039	C=150	Pe= 0.000	
AP1	44.000					7.539	0.667	Pf= -5.029	
104	52.333	4.2	q= 18.036	0.75	2PE=28.184	1.833		Pt= 18.441	Mat="1-CPVC"
			Q= -18.036	0.874	1PTR=6.039	34.224	C=150	Pe= -0.433	
AT2	51.333					36.057	0.173	Pf= -6.238	
AP5	44.000		q= 0.000	2		12.417		Pt= 95.170	Mat="1-CPVC"
			Q= -69.161	2.003		0.000	C=150	Pe= 0.000	
AP6	44.000					12.417	0.037	Pf= -0.455	
AP6	44.000		q= 0.000	2	1PTR=12.965	32.250		Pt= 95.625	Mat="1-CPVC"
			Q= -69.161	2.003		12.965	C=150	Pe= 0.000	
AP7	44.000					45.215	0.037	Pf= -1.657	
AP7	44.000		q= 0.000	2	1PE=14.261	267.250		Pt= 97.281	Mat="1-CPVC"
			Q= -69.161	2.003		14.261	C=150	Pe= 0.000	
AP8	44.000					281.511	0.037	Pf=-10.314	
AP8	44.000		q= 0.000	2	3E=18.294	7.500		Pt=107.595	Mat="1-WLML"
			Q= -69.161	2.153	1C=13.416	45.125	C=120	Pe= -1.443	Pdev=-3.0 psi
AP9	40.667				1B=7.318	52.625	0.039	Pf= -2.050	
					1E=6.098				
AP9	40.667		q= 0.000	2	1T=12.196	0.667		Pt=114.088	Mat="1-WLML"
			Q= -69.161	2.153		12.196	C=120	Pe= 0.000	
Z12	40.667					12.863	0.039	Pf= -0.501	
Z12	40.667		q= 0.000	4		20.333		Pt=114.589	Mat="1-WL10"
			Q= -69.161	4.26		0.000	C=120	Pe= -8.804	
Z13	20.333					20.333	0.001	Pf= -0.029	

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
Z13	20.333		q= 0.000	4		6.667		Pt=123.422	Mat="1-WL10"
			Q= -69.161	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	50.750		Pt=126.318	Mat="1-WL10"
			Q= -69.161	4.26	1B=15.800	68.469	C=120	Pe= 0.000	
ZP1	13.667				1T=26.334	119.219	0.001	Pf= -0.167	
ZP1	13.667		q= 0.000	4	1T=26.334	19.500		Pt=126.485	Mat="1-WL10"
			Q= -69.161	4.26		26.334	C=120	Pe= 0.000	
TR2	13.667					45.834	0.001	Pf= -0.064	
TR2	13.667		q= 0.000	4	1T=26.334	11.667		Pt=126.550	Mat="1-WL10"
			Q= -69.161	4.26		26.334	C=120	Pe= -5.052	
BR2	2.000					38.001	0.001	Pf= -0.053	
BR2	2.000		q= 0.000	3		1.000		Pt=131.655	Mat="1-WL10"
			Q= -69.161	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=131.660	Mat="1-WL10"
			Q= -69.161	3.26	1C=21.503	33.599	C=120	Pe= 0.000	Pdev=102.05 psi
SOP	2.000				1E=9.408	40.099	0.005	Pf= -0.207	
SOP	2.000		q= 0.000	3	1E=9.408	5.000		Pt= 29.814	Mat="1-WL10"
			Q= -69.161	3.26		9.408	C=120	Pe= 0.000	Pdev=-4.27 psi
BOR	2.000					14.408	0.005	Pf= -0.074	
BOR	2.000		q= 0.000	6	1E=14.000	10.000		Pt= 34.156	Mat="S40"
			Q= -69.161	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= 36.760	Mat="1-PVC"
			Q=-169.161	6.08	1E=21.411	71.880	C=150	Pe= 2.165	
CTY	1.000				1T=45.881	167.880	0.001	Pf= -0.144	

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