

Job Name : City of Lee's summit - Fire Station #5
Address : 801 MO Hwy 150 - Lee's summit, MO 64082

Date : 2/16/2023

Sprinkler Contractor : Aegis Fire Protections, LLC

Area Info :

Calculation Summary :

<u>Area #1</u> : 1 st Floor
<u>Area #2</u> : 2 nd Floor
<u>Area #3</u> : Apparatus Bay

Water Supply :

Flow Test :

Date : 9-20-2022

Static : 81 PSI

Residual : 60 PSI

Flow : 1875 GPM

Elevation : Same as 1st F.F.

Location of Flow Test : City Main in SW Regata Dr.

Source of Flow Test : City of Lee's Summit

Notes :



Flow Test 9/20/22 8:20 AM

Static PSI = 81
Residual PSI = 75

Static PSI = 82
Residual PSI = 60
Flow GPM = 1875

SW LEMANS LN

SW REGATTA DR

14274

14275

OKT-146 EHH

OKT-167 EHH

Flow Test 9/20/22 8:20 AM

Static PSI = 81
Residual PSI = 75

Static PSI = 82
Residual PSI = 60
Flow GPM = 1875

SW LEMANS LN

SW REGATTA DR

14274

14275

OKT-146 EHH

OKT-167 EHH

Flow Test 9/20/22 8:20 AM

Static PSI = 81
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OKT-146 EHH

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SW REGATTA DR

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OKT-146 EHH

OKT-167 EHH

Job Name : City of Lee's summit - Fire Station #5
Address : 801 MO Hwy 150 - Lee's summit, MO 64082

Date : 2/16/2023
Sprinkler Contractor : Aegis Fire Protections, LLC

Area Info : Area #1 - 1st Floor
Area Design : Per NFPA-13, 2016
System Type : Wet System

Design Criteria :
Density: 0.10 gpm/sq. ft. Operating Area: 920 sq. ft.
Max. Area Per Sprinkler: 225 Total Sprinklers Operating: 10 Sprinkler K Factor: 5.6
Outside Hose Allowance:100

Calculation Summary :

GPM Required :204.08	PSI Required :69.66	@ Base of Riser
GPM Required :304.08	PSI Required :70.25	@ Connection to City Main

Area Safety Margin: 10.0 PSI 12 %

Notes :

Water Supply Curve

Lee's Summit Fire Stations 5 - Area #1

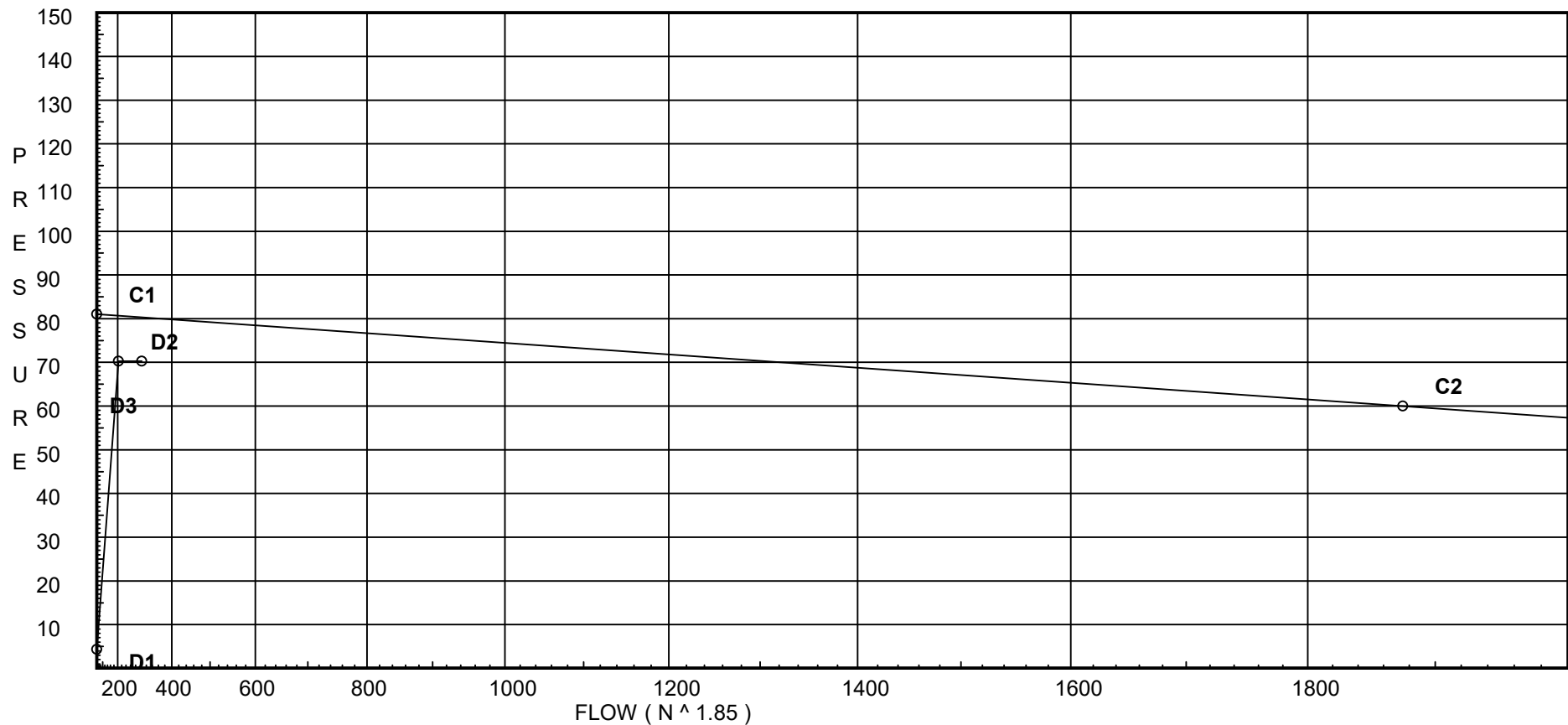
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City Water Supply:

C1 - Static Pressure : 81
C2 - Residual Pressure: 60
C2 - Residual Flow : 1875

Demand:

D1 - Elevation : 4.331
D2 - System Flow : 204.077
D2 - System Pressure : 70.250
Hose (Demand) : 100
D3 - System Demand : 304.077
Safety Margin : 10.024



Fittings Used Summary

Lee's Summit Fire Stations 5 - Area #1

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Fitting Legend

Abbrev.	Name	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14	16	18	20	24
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Zcb	Colt C200 Vert Butt	Fitting generates a Fixed Loss Based on Flow																			

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Flow Summary - NFPA

Lee's Summit Fire Stations 5 - Area #1

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Date**SUPPLY ANALYSIS**

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	81.0	60	1875.0	80.274	304.08	70.25

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
DP01	9.0	5.6	8.68	16.5	0.1	165
EQ01	10.5		8.62			
SP02	11.5	5.6	8.16	16.0	0.1	160
EQ02	10.5		9.11			
H102	10.5	5.62	10.48	18.19		K=K @ EQ01
H103	10.5	5.62	11.41	18.98		K=K @ EQ01
H104	10.5	5.62	13.59	20.71		K=K @ EQ01
H101	10.5	5.3	11.03	17.6		K=K @ EQ02
102	10.5		11.18			
103	10.5		12.24			
104	10.5		14.56			
H105	10.5	5.62	15.83	22.35		K=K @ EQ01
105	10.5		16.95			
H106	9.0	5.6	13.91	20.89	0.1	150
106	10.5		16.79			
H107	10.0	5.6	12.76	20.0	0.1	200
107	10.5		15.79			
H108	10.0	5.6	14.58	21.38	0.1	200
H109	10.5	5.3	17.72	22.31		K=K @ EQ02
H110	9.0	5.6	14.96	21.66	0.1	200
110	10.5		18.08			
B1	10.5		17.61			
B2	10.5		18.16			
B3	10.5		18.35			
B4	10.5		18.49			
B5	10.5		19.3			
B6	10.5		19.76			
B7	10.5		35.39			
B8	10.5		36.59			
B9	21.33		33.96			
B10	21.33		37.3			
B11	21.33		37.81			
B12	20.21		46.01			
B13	20.21		47.41			
B14	20.21		48.81			
B15	20.21		53.13			
B16	12.0		57.38			
TR5	12.0		57.95			
BF5	4.0		65.08			
UG5	1.0		69.66			
HOSE	0.0		70.25	100.0		
TEST	0.0		70.25			

Final Calculations : Hazen-Williams

Lee's Summit Fire Stations 5 - Area #1

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
DP01 to EQ01	9 10.5	5.60	16.50 16.5	1 1.049	T	5.0 5.000 6.500	120 0.0912	8.681 -0.650 0.593		Vel = 6.13	
EQ01			0.0 16.50					8.624		K Factor = 5.62	
SP02 to EQ02	11.5 10.5	5.60	16.00 16.0	1 1.049	T	5.0 1.000 5.000 6.000	120 0.0862	8.163 0.433 0.517		Vel = 5.94	
EQ02			0.0 16.00					9.113		K Factor = 5.30	
H102 to 102	10.5 10.5	5.62	18.19 18.19	1 1.049	T	5.0 1.410 5.000 6.410	120 0.1090	10.478 0.0 0.699		K = K @ EQ01 Vel = 6.75	
102			0.0 18.19					11.177		K Factor = 5.44	
H103 to 103	10.5 10.5	5.62	18.98 18.98	1 1.049	T	5.0 2.000 5.000 7.000	120 0.1183	11.414 0.0 0.828		K = K @ EQ01 Vel = 7.05	
103			0.0 18.98					12.242		K Factor = 5.42	
H104 to 104	10.5 10.5	5.62	20.71 20.71	1 1.049	T	5.0 2.000 5.000 7.000	120 0.1389	13.586 0.0 0.972		K = K @ EQ01 Vel = 7.69	
104			0.0 20.71					14.558		K Factor = 5.43	
H101 to 102	10.5 10.5	5.3	17.60 17.6	1.25 1.442		6.780 6.780	120 0.0218	11.029 0.0 0.148		K = K @ EQ02 Vel = 3.46	
102 to 103	10.5 10.5		18.19 35.79	1.25 1.442	E	3.716 9.410 3.716 13.126	120 0.0811	11.177 0.0 1.065		Vel = 7.03	
103 to 104	10.5 10.5		18.98 54.77	1.25 1.442		13.000 13.000	120 0.1782	12.242 0.0 2.316		Vel = 10.76	
104 to B1	10.5 10.5		20.71 75.48	1.25 1.442	T	7.432 2.030 7.432 9.462	120 0.3224	14.558 0.0 3.051		Vel = 14.83	
B1			0.0 75.48					17.609		K Factor = 17.99	
H105 to 105	10.5 10.5	5.62	22.36 22.36	1 1.049	T	5.0 2.000 5.000 7.000	120 0.1599	15.831 0.0 1.119		K = K @ EQ01 Vel = 8.30	
105 to B1	10.5 10.5		0.0 22.36	1.25 1.442	T	7.432 11.970 7.432 19.402	120 0.0340	16.950 0.0 0.659		Vel = 4.39	
B1			0.0 22.36					17.609		K Factor = 5.33	

Final Calculations : Hazen-Williams

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Lee's Summit Fire Stations 5 - Area #1

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
H106 to 106	9 10.5	5.60	20.89 20.89	1 1.049	E	2.0 23.000 2.000 25.000	120 0.1410	13.912 -0.650 3.526		Vel = 7.75	
106 to B2	10.5 10.5		0.0 20.89	1 1.049	T	5.0 4.740 5.000 9.740	120 0.1410	16.788 0.0 1.373		Vel = 7.75	
B2			0.0 20.89					18.161		K Factor = 4.90	
H107 to 107	10 10.5	5.60	20.00 20.0	1 1.049	E	2.0 23.000 2.000 25.000	120 0.1302	12.755 -0.217 3.254		Vel = 7.42	
107 to B3	10.5 10.5		0.0 20.0	1 1.049	T	5.0 14.640 5.000 19.640	120 0.1301	15.792 0.0 2.556		Vel = 7.42	
B3			0.0 20.00					18.348		K Factor = 4.67	
H108 to B4	10 10.5	5.60	21.38 21.38	1 1.049	T	5.0 23.000 5.000 28.000	120 0.1473	14.580 -0.217 4.125		Vel = 7.94	
B4			0.0 21.38					18.488		K Factor = 4.97	
H109 to B5	10.5 10.5	5.3	22.31 22.31	1 1.049	T	5.0 4.930 5.000 9.930	120 0.1593	17.721 0.0 1.582		K = K @ EQ02 Vel = 8.28	
B5			0.0 22.31					19.303		K Factor = 5.08	
H110 to 110	9 10.5	5.60	21.66 21.66	1 1.049	E	2.0 23.000 2.000 25.000	120 0.1508	14.960 -0.650 3.770		Vel = 8.04	
110 to B6	10.5 10.5		0.0 21.66	1 1.049	T	5.0 6.140 5.000 11.140	120 0.1508	18.080 0.0 1.680		Vel = 8.04	
B6			0.0 21.66					19.760		K Factor = 4.87	
B1 to B2	10.5 10.5		97.84 97.84	2 2.157		7.530 7.530	120 0.0733	17.609 0.0 0.552		Vel = 8.59	
B2 to B3	10.5 10.5		20.88 118.72	2 2.157		1.780 1.780	120 0.1051	18.161 0.0 0.187		Vel = 10.42	
B3 to B4	10.5 10.5		20.00 138.72	2 2.157		1.000 1.000	120 0.1400	18.348 0.0 0.140		Vel = 12.18	
B4 to B5	10.5 10.5		21.39 160.11	2 2.157		4.470 4.470	120 0.1823	18.488 0.0 0.815		Vel = 14.06	
B5 to B6	10.5 10.5		22.31 182.42	2 2.157		1.970 1.970	120 0.2320	19.303 0.0 0.457		Vel = 16.02	

Final Calculations : Hazen-Williams

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Lee's Summit Fire Stations 5 - Area #1

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
B6 to B7	10.5 10.5		21.66 204.08	2 2.157	T	12.307 12.307 54.717	120 0.2857	19.760 0.0 15.633		Vel = 17.92	
B7 to B8	10.5 10.5		0.0 204.08	2.5 2.635	E	8.237 2.850 8.237 11.087	120 0.1078	35.393 0.0 1.195		Vel = 12.01	
B8 to B9	10.5 21.33		0.0 204.08	2.5 2.635	E	8.237 10.850 8.237 19.087	120 0.1078	36.588 -4.690 2.057		Vel = 12.01	
B9 to B10	21.33 21.33		0.0 204.08	2.5 2.635	E T	8.237 6.360 16.474 24.711 31.071	120 0.1078	33.955 0.0 3.349		Vel = 12.01	
B10 to B11	21.33 21.33		0.0 204.08	2.5 2.635		4.690 4.690	120 0.1079	37.304 0.0 0.506		Vel = 12.01	
B11 to B12	21.33 20.21		0.0 204.08	2.5 2.635	5E	41.186 30.390 41.186 71.576	120 0.1078	37.810 0.485 7.715		Vel = 12.01	
B12 to B13	20.21 20.21		0.0 204.08	2.5 2.635		13.000 13.000	120 0.1078	46.010 0.0 1.401		Vel = 12.01	
B13 to B14	20.21 20.21		0.0 204.08	2.5 2.635		13.000 13.000	120 0.1078	47.411 0.0 1.401		Vel = 12.01	
B14 to B15	20.21 20.21		0.0 204.08	2.5 2.635	E	8.237 31.830 8.237 40.067	120 0.1078	48.812 0.0 4.319		Vel = 12.01	
B15 to B16	20.21 12		0.0 204.08	3 3.26	E	9.408 8.600 9.408 18.008	120 0.0382	53.131 3.556 0.688		Vel = 7.84	
B16 to TR5	12 12		0.0 204.08	3 3.26	E	9.408 5.680 9.408 15.088	120 0.0382	57.375 0.0 0.577		Vel = 7.84	
TR5 to BF5	12 4		0.0 204.08	3 3.26	E Fsp	9.408 8.000 0.0 9.408 17.408	120 0.0382	57.952 6.465 0.665	** Fixed Loss = 3	Vel = 7.84	
BF5 to UG5	4 1		0.0 204.08	3 3.26	Zcb	0.0 3.000	120 0.0383	65.082 4.465 0.115	** Fixed Loss = 3.166	Vel = 7.84	
UG5 to HOSE	1 0		0.0 204.08	6 6.16	G E T	4.304 20.084 43.037	50.000 67.425 117.425	140 0.0013	69.662 0.433 0.152	Vel = 2.20	
HOSE to TEST	0 0	H100	100.00 304.08	6 6.16		1.000 1.000	140 0.0030	70.247 0.0 0.003		Vel = 3.27	
TEST			0.0 304.08					70.250		K Factor = 36.28	

Job Name : City of Lee's summit - Fire Station #5
Address : 801 MO Hwy 150 - Lee's summit, MO 64082

Date : 2/16/2023
Sprinkler Contractor : Aegis Fire Protections, LLC

Area Info : Area #2 - 2nd Floor
Area Design : Per NFPA-13, 2016
System Type : Wet System

Design Criteria :
Density: 0.10 gpm/sq. ft. Operating Area: 920 sq. ft.
Max. Area Per Sprinkler: 225 Total Sprinklers Operating: 23 Sprinkler K Factor: 5.6
Outside Hose Allowance:100

Calculation Summary :

GPM Required :249.61	PSI Required :65.46	@ Base of Riser
GPM Required :349.61	PSI Required :66.12	@ Connection to City Main

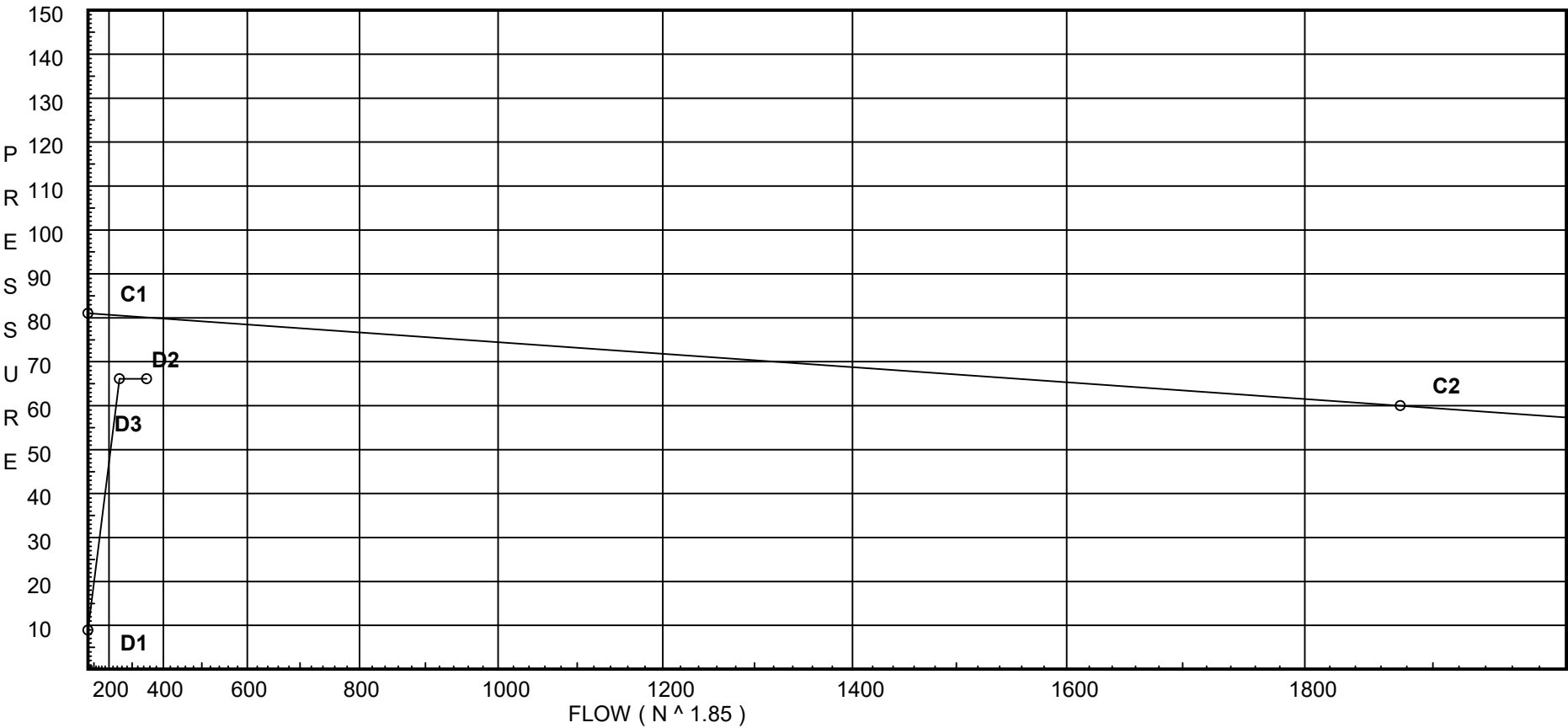
Area Safety Margin: 13.9 PSI 17 %

Notes :

Water Supply Curve

City Water Supply:
C1 - Static Pressure : 81
C2 - Residual Pressure: 60
C2 - Residual Flow : 1875

Demand:
D1 - Elevation : 8.944
D2 - System Flow : 249.61
D2 - System Pressure : 66.122
Hose (Demand) : 100
D3 - System Demand : 349.61
Safety Margin : 13.939



Fittings Used Summary

Lee's Summit Fire Stations 5 - Area #2

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Fitting Legend

Abbrev.	Name	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14	16	18	20	24
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Zcb	Colt C200 Vert Butt	Fitting generates a Fixed Loss Based on Flow																			

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Flow Summary - NFPA

Lee's Summit Fire Stations 5 - Area #2

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SUPPLY ANALYSIS

<i>Node at Source</i>	<i>Static Pressure</i>	<i>Residual Pressure</i>	<i>Flow</i>	<i>Available Pressure</i>	<i>Total Demand</i>	<i>Required Pressure</i>
TEST	81.0	60	1875.0	80.061	349.61	66.122

NODE ANALYSIS

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>		<i>Notes</i>
DP01	20.92	5.6	15.43	22.0	0.1	220
EQ01	21.92		15.47			
H201	20.65	5.6	10.07	17.77	0.1	170
H202	20.65	5.6	10.14	17.84	0.1	170
H203	20.65	5.6	10.35	18.01	0.1	170
H204	20.65	5.6	10.92	18.51	0.1	170
H205	20.65	5.6	11.41	18.92	0.1	170
H206	20.65	5.6	13.02	20.21	0.1	170
201	21.33		12.7			
202	21.33		12.8			
203	21.33		13.05			
204	21.33		13.79			
205	21.33		14.41			
206	21.33		16.44			
H207	20.65	5.6	13.32	20.44	0.1	180
H208	20.65	5.6	13.44	20.53	0.1	180
H209	20.65	5.6	15.45	22.01	0.1	180
207	21.33		16.82			
208	21.33		16.98			
209	21.33		19.5			
H210	20.65	5.6	10.33	18.0	0.1	180
H211	20.65	5.6	10.51	18.16	0.1	180
H212	20.65	5.6	11.29	18.82	0.1	180
H213	20.65	5.6	13.28	20.41	0.1	180
210	21.33		13.04			
211	21.33		13.26			
212	21.33		14.25			
213	21.33		16.77			
BX1	21.33		24.78			
BX2	21.33		24.98			
B10	21.33		25.22			
B11	21.33		25.59			
B12	20.21		37.28			
B13	20.21		39.31			
B14	20.21		41.34			
B15	20.21		47.61			
B16	12.0		52.17			
TR5	12.0		53.01			
BF5	4.0		60.44			
UG5	1.0		65.46			
HOSE	0.0		66.12	100.0		
TEST	0.0		66.12			

Final Calculations : Hazen-Williams

Lee's Summit Fire Stations 5 - Area #2

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
DP01 to EQ01	20.92 21.92	5.60	22.00 22.0	1 1.049	E 2.0	1.000 2.000 3.000	120 0.1550	15.434 -0.433 0.465		Vel = 8.17	
EQ01			0.0 22.00					15.466		K Factor = 5.59	
H201 to 201	20.650 21.33	5.60	17.77 17.77	1 1.049	T 5.0	23.000 5.000 28.000	120 0.1046	10.067 -0.295 2.928		Vel = 6.60	
201			0.0 17.77					12.700		K Factor = 4.99	
H202 to 202	20.650 21.33	5.60	17.84 17.84	1 1.049	T 5.0	23.000 5.000 28.000	120 0.1053	10.143 -0.295 2.949		Vel = 6.62	
202			0.0 17.84					12.797		K Factor = 4.99	
H203 to 203	20.650 21.33	5.60	18.01 18.01	1 1.049	T 5.0	23.000 5.000 28.000	120 0.1072	10.345 -0.295 3.003		Vel = 6.69	
203			0.0 18.01					13.053		K Factor = 4.98	
H204 to 204	20.650 21.33	5.60	18.51 18.51	1 1.049	T 5.0	23.000 5.000 28.000	120 0.1128	10.924 -0.295 3.158		Vel = 6.87	
204			0.0 18.51					13.787		K Factor = 4.99	
H205 to 205	20.650 21.33	5.60	18.92 18.92	1 1.049	T 5.0	23.000 5.000 28.000	120 0.1174	11.413 -0.295 3.288		Vel = 7.02	
205			0.0 18.92					14.406		K Factor = 4.98	
H206 to 206	20.650 21.33	5.60	20.21 20.21	1 1.049	T 5.0	23.000 5.000 28.000	120 0.1326	13.019 -0.295 3.714		Vel = 7.50	
206			0.0 20.21					16.438		K Factor = 4.98	
201 to 202	21.33 21.33		17.77 17.77	1.5 1.682		9.180 9.180	120 0.0106	12.700 0.0 0.097		Vel = 2.57	
202 to 203	21.33 21.33		17.83 35.6	1.5 1.682		6.750 6.750	120 0.0379	12.797 0.0 0.256		Vel = 5.14	
203 to 204	21.33 21.33		18.02 53.62	1.5 1.682		9.070 9.070	120 0.0809	13.053 0.0 0.734		Vel = 7.74	
204 to 205	21.33 21.33		18.50 72.12	1.5 1.682		4.420 4.420	120 0.1400	13.787 0.0 0.619		Vel = 10.41	

Final Calculations : Hazen-Williams

Lee's Summit Fire Stations 5 - Area #2

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
205 to 206	21.33 21.33		18.92 91.04	1.5 1.682		9.430 9.430	120 0.2155	14.406 0.0 2.032		Vel = 13.15	
206 to BX1	21.33 21.33		20.21 111.25	1.5 1.682	T 9.9	16.830 9.900 26.730	120 0.3123	16.438 0.0 8.347		Vel = 16.06	
BX1			0.0 111.25					24.785		K Factor = 22.35	
H207 to 207	20.650 21.33	5.60	20.44 20.44	1 1.049	T 5.0	23.000 5.000 28.000	120 0.1355	13.321 -0.295 3.794		Vel = 7.59	
207			0.0 20.44					16.820		K Factor = 4.98	
H208 to 208	20.650 21.33	5.60	20.53 20.53	1 1.049	T 5.0	23.000 5.000 28.000	120 0.1366	13.445 -0.295 3.826		Vel = 7.62	
208			0.0 20.53					16.976		K Factor = 4.98	
H209 to 209	20.650 21.33	5.60	22.01 22.01	1 1.049	T 5.0	23.000 5.000 28.000	120 0.1554	15.446 -0.295 4.350		Vel = 8.17	
209			0.0 22.01					19.501		K Factor = 4.98	
207 to 208	21.33 21.33		20.44 20.44	1.25 1.442		5.420 5.420	120 0.0288	16.820 0.0 0.156		Vel = 4.02	
208 to 209	21.33 21.33		20.53 40.97	1.25 1.442		24.250 24.250	120 0.1041	16.976 0.0 2.525		Vel = 8.05	
209 to BX2	21.33 21.33		22.01 62.98	1.25 1.442	T 7.432	16.310 7.432 23.742	120 0.2307	19.501 0.0 5.477		Vel = 12.37	
BX2			0.0 62.98					24.978		K Factor = 12.60	
H210 to 210	20.650 21.33	5.60	18.00 18.0	1 1.049	T 5.0	23.000 5.000 28.000	120 0.1071	10.332 -0.295 2.999		Vel = 6.68	
210			0.0 18.00					13.036		K Factor = 4.99	
H211 to 211	20.650 21.33	5.60	18.16 18.16	1 1.049	T 5.0	23.000 5.000 28.000	120 0.1088	10.511 -0.295 3.047		Vel = 6.74	
211			0.0 18.16					13.263		K Factor = 4.99	
H212 to 212	20.650 21.33	5.60	18.82 18.82	1 1.049	T 5.0	23.000 5.000 28.000	120 0.1163	11.293 -0.295 3.256		Vel = 6.99	

Final Calculations : Hazen-Williams

Lee's Summit Fire Stations 5 - Area #2

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
212			0.0 18.82					14.254		K Factor = 4.98	
H213 to 213	20.650 21.33	5.60	20.41	1	T 5.0	23.000 5.000 28.000	120	13.278 -0.295 3.783		Vel = 7.58	
213			0.0 20.41					16.766		K Factor = 4.98	
210 to 211	21.33 21.33		18.00	1.25		10.000	120	13.036 0.0		Vel = 3.54	
211 to 212	21.33 21.33		18.16	1.25		12.000	120	13.263 0.0		Vel = 7.10	
212 to 213	21.33 21.33		18.81	1.25		14.000	120	14.254 0.0		Vel = 10.80	
213 to B11	21.33 21.33		54.97	1.442		14.000	0.1794	2.512		Vel = 14.81	
B11			0.0 75.38					25.593		K Factor = 14.90	
BX1 to BX2	21.33 21.33		111.25	2.5		5.500	120	24.785 0.0		Vel = 6.55	
BX2 to B10	21.33 21.33		62.98	2.5		2.960	120	24.978 0.0		Vel = 10.25	
B10 to B11	21.33 21.33		174.23	2.635		2.960	0.0804	0.238		Vel = 10.25	
B11 to B12	21.33 20.21		75.38	2.5	5E 41.186	30.390 41.186 71.576	120	25.593 0.485 11.199		Vel = 14.69	
B12 to B13	20.21 20.21		0.0	2.5		13.000	120	37.277 0.0		Vel = 14.69	
B13 to B14	20.21 20.21		249.61	2.635		13.000	0.1565	2.034		Vel = 14.69	
B14 to B15	20.21 20.21		0.0	2.5	E 8.237	31.830 8.237 40.067	120	41.345 0.0		Vel = 14.69	
B15 to B16	20.21 12		249.61	2.635		8.600 9.408 18.008	120	47.613 3.556 0.999		Vel = 9.59	
B16 to TR5	12 12		0.0	3	E 9.408	5.680 9.408 15.088	120	52.168 0.0 0.838		Vel = 9.59	

Final Calculations : Hazen-Williams

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Lee's Summit Fire Stations 5 - Area #2

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TR5 to BF5	12 4		0.0 249.61	3 3.26	E Fsp	9.408 0.0	8.000 9.408	120 0.0554	53.006 6.465		* * Fixed Loss = 3	
BF5 to UG5	4 1		0.0 249.61	3 3.26	Zcb	0.0	3.000 3.000	120 0.0557	60.436 4.861		* * Fixed Loss = 3.562	
UG5 to HOSE	1 0		0.0 249.61	6 6.16	G E T	4.304 20.084 43.037	50.000 67.425 117.425	140 0.0019	65.464 0.433 0.221		Vel = 2.69	
HOSE to TEST	0 0	H100	100.00 349.61	6 6.16			1.000 1.000	140 0.0040	66.118 0.0 0.004		Vel = 3.76	
TEST			0.0 349.61						66.122		K Factor = 42.99	

Job Name : City of Lee's summit - Fire Station #5
Address : 801 MO Hwy 150 - Lee's summit, MO 64082

Date : 2/16/2023
Sprinkler Contractor : Aegis Fire Protections, LLC

Area Info : Area #3 - Apparatus Bay
Area Design : Per NFPA-13, 2016
System Type : Wet System

Design Criteria :
Density: 0.15 gpm/sq. ft. Operating Area: 1500 sq. ft.
Max. Area Per Sprinkler: 130 Total Sprinklers Operating: 14 Sprinkler K Factor: 5.6
Outside Hose Allowance: 250

Calculation Summary :

GPM Required :327.84	PSI Required :67.45	@ Base of Riser
GPM Required :577.84	PSI Required :68.26	@ Connection to City Main

Area Safety Margin: 10.3 PSI 13 %

Notes :

Water Supply Curve

Lee's Summit Fire Stations 5 - Area #3

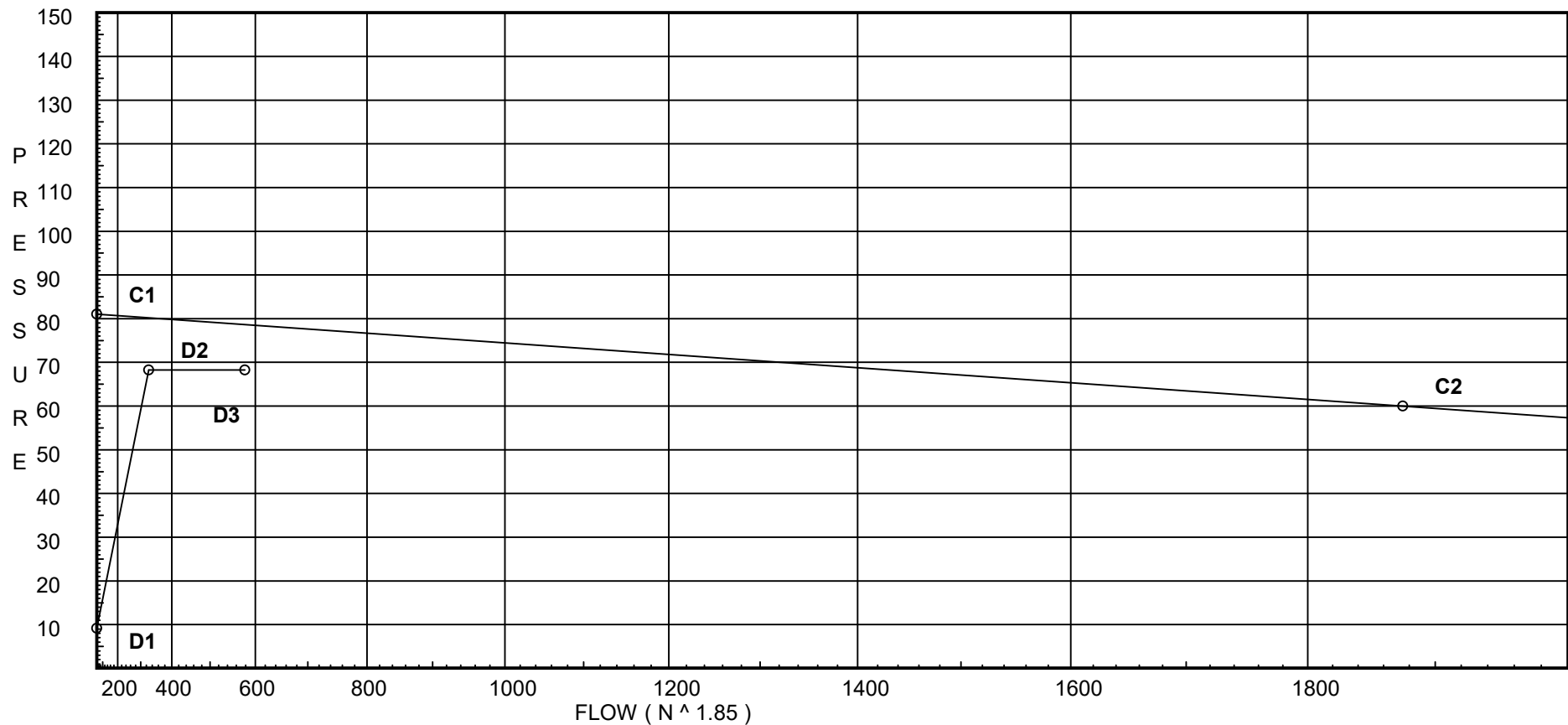
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City Water Supply:

C1 - Static Pressure : 81
C2 - Residual Pressure: 60
C2 - Residual Flow : 1875

Demand:

D1 - Elevation : 9.186
D2 - System Flow : 327.838
D2 - System Pressure : 68.266
Hose (Demand) : 250
D3 - System Demand : 577.838
Safety Margin : 10.355



Fittings Used Summary

Lee's Summit Fire Stations 5 - Area #3

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Fitting Legend

Abbrev.	Name	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14	16	18	20	24
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Zcb	Colt C200 Vert Butt	Fitting generates a Fixed Loss Based on Flow																			

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Flow Summary - NFPA

Lee's Summit Fire Stations 5 - Area #3

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SUPPLY ANALYSIS

<i>Node at Source</i>	<i>Static Pressure</i>	<i>Residual Pressure</i>	<i>Flow</i>	<i>Available Pressure</i>	<i>Total Demand</i>	<i>Required Pressure</i>
TEST	81.0	60	1875.0	78.62	577.84	68.266

NODE ANALYSIS

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>	
H301	21.21	5.6	11.57	19.05	0.15	127
H302	21.21	5.6	11.8	19.24	0.15	127
H303	21.21	5.6	12.58	19.86	0.15	127
H304	21.21	5.6	14.47	21.3	0.15	127
H305	21.21	5.6	17.48	23.42	0.15	130
H306	21.21	5.6	25.21	28.12	0.15	130
R1	21.21		25.73			
H307	21.21	5.6	11.8	19.24	0.15	127
H308	21.21	5.6	12.03	19.42	0.15	127
H309	21.21	5.6	12.83	20.06	0.15	127
H310	21.21	5.6	14.75	21.51	0.15	127
H311	21.21	5.6	17.82	23.64	0.15	130
H312	21.21	5.6	25.69	28.38	0.15	130
R2	21.21		26.21			
H313	21.21	5.6	33.13	32.23	0.15	130
H314	21.21	5.6	33.42	32.37	0.15	130
R3	21.21		34.09			
B12	20.21		33.7			
B13	20.21		34.32			
B14	20.21		36.56			
B15	20.21		46.94			
B16	12.0		52.15			
TR5	12.0		53.54			
BF5	4.0		61.6			
UG5	1.0		67.46			
HOSE	0.0		68.26	250.0		
TEST	0.0		68.27			

Final Calculations : Hazen-Williams

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Lee's Summit Fire Stations 5 - Area #3

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
H301 to H302	21.21 21.21	5.60	19.05 19.05	1.25 1.442			9.000 9.000	120 0.0252	11.572 0.0 0.227		Vel = 3.74	
H302 to H303	21.21 21.21	5.60	19.24 38.29	1.25 1.442			8.500 8.500	120 0.0919	11.799 0.0 0.781		Vel = 7.52	
H303 to H304	21.21 21.21	5.60	19.86 58.15	1.25 1.442			9.500 9.500	120 0.1991	12.580 0.0 1.891		Vel = 11.42	
H304 to H305	21.21 21.21	5.60	21.30 79.45	1.25 1.442			8.500 8.500	120 0.3546	14.471 0.0 3.014		Vel = 15.61	
H305 to R1	21.21 21.21	5.60	23.42 102.87	1.25 1.442	T	7.432	6.990 7.432 14.422	120 0.5717	17.485 0.0 8.245		Vel = 20.21	
R1			0.0 102.87						25.730		K Factor = 20.28	
H306 to R1	21.21 21.21	5.60	28.12 28.12	1.25 1.442	T	7.432	2.510 7.432 9.942	120 0.0519	25.214 0.0 0.516		Vel = 5.52	
R1			0.0 28.12						25.730		K Factor = 5.54	
R1 to B12	21.21 20.21		130.99 130.99	1.25 1.442	T	7.432	1.000 7.432 8.432	120 0.8941	25.730 0.433 7.539		Vel = 25.73	
B12			0.0 130.99						33.702		K Factor = 22.56	
H307 to H308	21.21 21.21	5.60	19.24 19.24	1.25 1.442			9.000 9.000	120 0.0257	11.800 0.0 0.231		Vel = 3.78	
H308 to H309	21.21 21.21	5.60	19.42 38.66	1.25 1.442			8.500 8.500	120 0.0935	12.031 0.0 0.795		Vel = 7.59	
H309 to H310	21.21 21.21	5.60	20.06 58.72	1.25 1.442			9.500 9.500	120 0.2026	12.826 0.0 1.925		Vel = 11.54	
H310 to H311	21.21 21.21	5.60	21.50 80.22	1.25 1.442			8.500 8.500	120 0.3609	14.751 0.0 3.068		Vel = 15.76	
H311 to R2	21.21 21.21	5.60	23.64 103.86	1.25 1.442	T	7.432	6.990 7.432 14.422	120 0.5820	17.819 0.0 8.394		Vel = 20.40	
R2			0.0 103.86						26.213		K Factor = 20.29	
H312 to R2	21.21 21.21	5.60	28.38 28.38	1.25 1.442	T	7.432	2.510 7.432 9.942	120 0.0528	25.688 0.0 0.525		Vel = 5.58	
			0.0									

Final Calculations : Hazen-Williams

Lee's Summit Fire Stations 5 - Area #3

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
R2			28.38					26.213		K Factor = 5.54	
R2 to B13	21.21 20.21		132.24 132.24	1.25 1.442	T	7.432	1.000 7.432 8.432	120 0.433 7.673		Vel = 25.98	
B13			0.0 132.24					34.319		K Factor = 22.57	
H313 to R3	21.21 21.21	5.60	32.23 32.23	1.25 1.442	T	7.432	6.990 7.432 14.422	120 0.0 0.963		Vel = 6.33	
R3			0.0 32.23					34.091		K Factor = 5.52	
H314 to R3	21.21 21.21	5.60	32.37 32.37	1.25 1.442	T	7.432	2.510 7.432 9.942	120 0.0 0.670		Vel = 6.36	
R3			0.0 32.37					34.091		K Factor = 5.54	
R3 to B14	21.21 20.21		64.61 64.61	1.25 1.442	T	7.432	1.000 7.432 8.432	120 0.433 2.039		Vel = 12.69	
B14			0.0 64.61					36.563		K Factor = 10.69	
B12 to B13	20.21 20.21		130.99 130.99	2.5 2.635			13.000 13.000	120 0.0475 0.617		Vel = 7.71	
B13 to B14	20.21 20.21		132.24 263.23	2.5 2.635			13.000 13.000	120 0.1726 2.244		Vel = 15.49	
B14 to B15	20.21 20.21		64.61 327.84	2.5 2.635	E	8.237	31.830 8.237 40.067	120 0.0 10.380		Vel = 19.29	
B15 to B16	20.21 12		0.0 327.84	3 3.26	E	9.408	8.600 9.408 18.008	120 3.556 1.655		Vel = 12.60	
B16 to TR5	12 12		0.0 327.84	3 3.26	E	9.408	5.680 9.408 15.088	120 0.0 1.386		Vel = 12.60	
TR5 to BF5	12 4		0.0 327.84	3 3.26	E Fsp	9.408 0.0	8.000 9.408 17.408	120 6.465 1.600		* * Fixed Loss = 3 Vel = 12.60	
BF5 to UG5	4 1		0.0 327.84	3 3.26	Zcb	0.0	3.000 3.000	120 0.0917 0.275		* * Fixed Loss = 4.278 Vel = 12.60	
UG5 to HOSE	1 0		0.0 327.84	6 6.16	G E T	4.304 20.084 43.037	50.000 67.425 117.425	140 0.433 0.366		Vel = 3.53	
HOSE to TEST	0 0	H250	250.00 577.84	6 6.16			1.000 1.000	140 0.0090 0.009		Vel = 6.22	

Final Calculations : Hazen-Williams

Lee's Summit Fire Stations 5 - Area #3										Page 6							
										Date							
Node1	Elev1	K	Qa	Nom	Fitting		Pipe	CFact	Pt	*****	Notes	*****					
to					or		Ftngs		Pe								
Node2	Elev2	Fact	Qt	Act	Equiv	Len	Total	Pf/Ft	Pf								
			0.0														
TEST			577.84					68.266		K Factor = 69.94							