

. . . Fire Protection by Computer Design

HAMPSHIRE FIRE PROTECTION
8 N. WENTWORTH AVE.
LONDONDERRY, NH 03053
603-432-8221

Job Name : YORK STREET, 5TH FLOOR
Building : 2016
Location : YORK STREET, PORTLAND, ME
System : 5TH
Contract : 4833CME
Data File : YS5TH.wxf

Hydraulic Design Information Sheet

Name - YORK STREET Date - 8-17-16
 Location - YORK STREET, PORTLAND, ME
 Building - 2016 System No. - 5TH
 Contractor - OPECHEE Contract No. - 4833CME
 Calculated By - BENOIT Drawing No. - 7
 Construction: () Combustible (X) Non-Combustible Ceiling Height - 8-0
 Occupancy - DWELLING UNITS

S (X) NFPA 13 (X) Lt. Haz. Ord.Haz.Gp. () 1 () 2 () 3 () Ex.Haz.
 Y () NFPA 231 () NFPA 231C () Figure Curve

S Other

T Specific Ruling Made By Date

M	Area of Sprinkler Operation	- 1500	System Type	Sprinkler/Nozzle
	Density	- .1	(X) Wet	Make RELIABLE
D	Area Per Sprinkler	- 224	() Dry	Model F1-FR
E	Elevation at Highest Outlet	- 53	() Deluge	Size 1/2
S	Hose Allowance - Inside	- 0	() Preaction	K-Factor 5.6
I	Rack Sprinkler Allowance	- 0	() Other	Temp.Rat.155
G	Hose Allowance - Outside	- 100		

N Note

Calculation Flow Required - 402.4 Press Required - 90.4 AT TEST
 Summary C-Factor Used: 150 Overhead 150 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 7-13-16		Cap. -
T	Time of Test - 6:00 AM	Rated Cap.-	Elev.-
E	Static Press - 100	@ Press -	
R	Residual Press - 98	Elev. -	Well
	Flow - 1047		Proof Flow
S	Elevation - 0		

U Location - SEE SITE PLAN

P Source of Information - PORTLAND WATER MEANS DEPT.

C	Commodity	Class	Location
O	Storage Ht.	Area	Aisle W.
M	Storage Method:	%	Palletized % Rack
	() Single Row	() Conven. Pallet	() Auto. Storage () Encap.
S	() Double Row	() Slave Pallet	() Solid Shelf () Non
T	() Mult. Row		() Open Shelf

R K Flue Spacing Clearance:Storage to Ceiling
 A Longitudinal Transverse

G Horizontal Barriers Provided:

Water Supply Curve C

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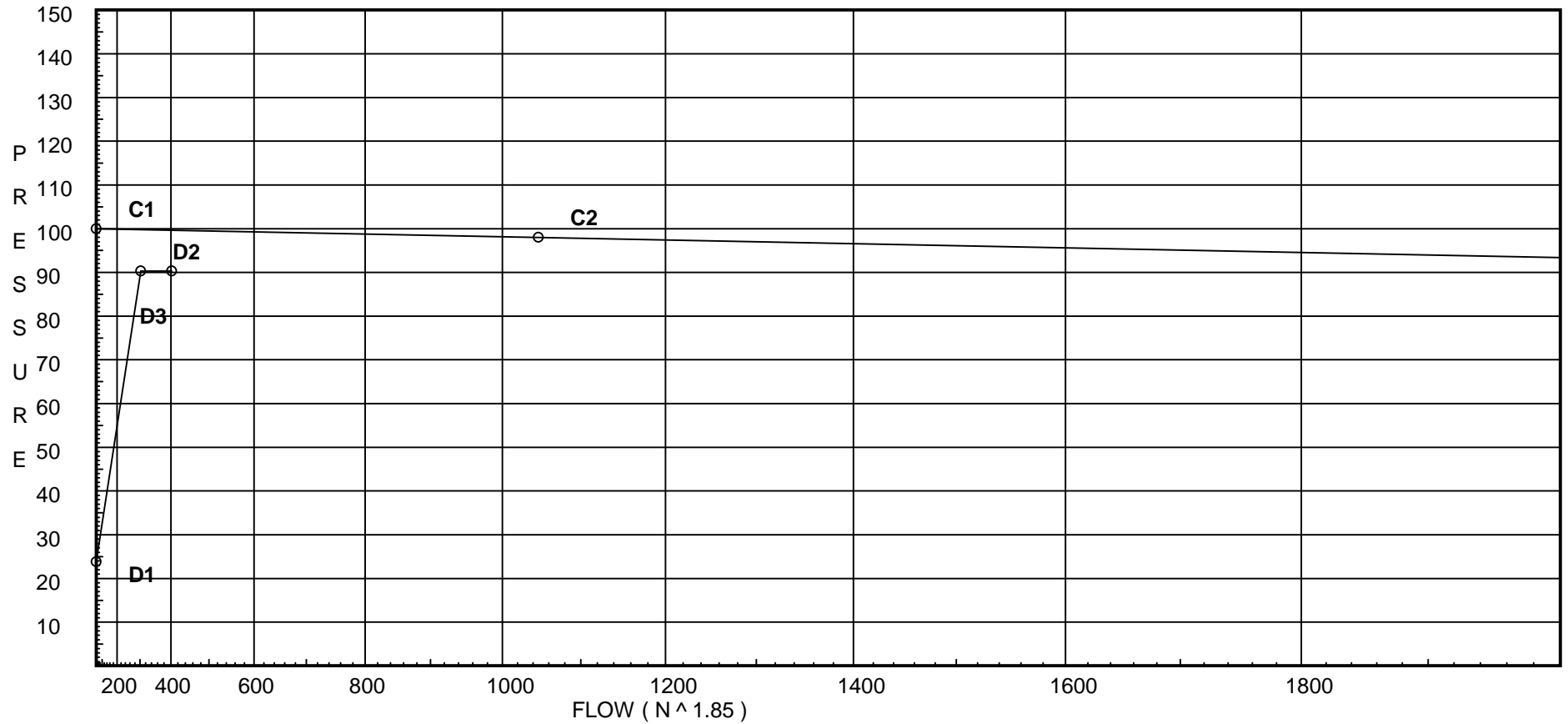
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City Water Supply:

C1 - Static Pressure : 100
C2 - Residual Pressure: 98
C2 - Residual Flow : 1047

Demand:

D1 - Elevation : 23.820
D2 - System Flow : 302.346
D2 - System Pressure : 90.340
Hose (Demand) : 100
D3 - System Demand : 402.346
Safety Margin : 9.320



Fittings Used Summary

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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
B	NFPA 13 Butterfly Valve	0	0	2.25	2	2.5	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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
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
I	90' Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
J	90'Tee-Branch Grv Vic #20	0	0	4.5	6	8	8.5	10.8	13	17	16	21	25	33	41	50	65	78	88	98	120
N *	CPVC 90'El Harvel-Spears		7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O *	CPVC Tee - Branch	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
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

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.

Pressure / Flow Summary - STANDARD

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
1	53.0	5.6	12.08	na	19.46	0.1	148	7.0
3	53.0	5.6	14.04	na	20.98	0.1	148	7.0
4	53.0	5.6	16.82	na	22.97	0.1	148	7.0
2	53.0	5.6	13.18	na	20.33	0.1	148	7.0
3T	53.0		14.49	na				
4T	53.0		17.35	na				
5	53.0	5.6	16.0	na	22.4	0.1	224	16.0
6	53.0	5.6	16.68	na	22.87	0.1	148	7.0
7	53.0	5.6	17.88	na	23.68	0.1	158	8.0
5T	53.0		17.01	na				
6T	53.0		17.21	na				
7T	53.0		18.53	na				
8	53.0	5.6	19.93	na	25.0	0.1	148	7.0
9	53.0	5.6	20.2	na	25.17	0.1	148	7.0
10	53.0	5.6	17.45	na	23.4	0.1	148	7.0
11	53.0	5.6	18.69	na	24.21	0.1	148	7.0
11T	53.0		19.32	na				
12	53.0	5.6	20.5	na	25.35	0.1	148	7.0
13	53.0	5.6	22.44	na	26.53	0.1	148	7.0
A	53.0		19.0	na				
B	53.0		19.68	na				
C	53.0		21.02	na				
D	53.0		23.57	na				
E	53.0		24.04	na				
F	53.0		39.48	na				
FF	53.0		52.15	na				
5FC	53.0		57.22	na				
S3	48.5		59.23	na				
SB	11.5		77.33	na				
SC	11.5		77.53	na				
TOR	11.5		78.85	na				
BOR	2.0		83.98	na				
BF1	2.0		84.06	na				
BF2	2.0		88.08	na				
FLG	1.0		88.53	na				
HOSE	0.0		89.05	na	100.0			
TEST	-2.0		90.34	na				

The maximum velocity is 30.78 and it occurs in the pipe between nodes E and F

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
1 to 2	19.46 19.46	1.101 150.0 0.0647	N	7.0 0.0 0.0	10.000 7.000 17.000	12.077 0.0 1.100			K Factor = 5.60	
	0.0 19.46						13.177		K Factor = 5.36	
3 to 3T	20.98 20.98	1.101 150.0 0.0743	O	5.0 0.0 0.0	1.000 5.000 6.000	14.039 0.0 0.446			K Factor = 5.60	
	0.0 20.98						14.485		K Factor = 5.51	
4 to 4T	22.97 22.97	1.101 150.0 0.0878	O	5.0 0.0 0.0	1.000 5.000 6.000	16.823 0.0 0.527			K Factor = 5.60	
	0.0 22.97						17.350		K Factor = 5.51	
2 to 3T	39.79 39.79	1.394 150.0 0.0769	N	8.0 0.0 0.0	9.000 8.000 17.000	13.177 0.0 1.308			K Factor = 5.60	
3T to 4T	20.98 60.77	1.394 150.0 0.1685		0.0 0.0 0.0	17.000 0.0 17.000	14.485 0.0 2.865				Vel = 12.77
4T to A	22.97 83.74	1.598 150.0 0.1569	O	8.0 0.0 0.0	2.500 8.000 10.500	17.350 0.0 1.647				Vel = 13.40
	0.0 83.74						18.997		K Factor = 19.21	
5 to 5T	22.40 22.4	1.101 150.0 0.0839	O	5.0 0.0 0.0	7.000 5.000 12.000	16.000 0.0 1.007			K Factor = 5.60	
	0.0 22.40						17.007		K Factor = 5.43	
6 to 6T	22.87 22.87	1.101 150.0 0.0872	O	5.0 0.0 0.0	1.000 5.000 6.000	16.683 0.0 0.523			K Factor = 5.60	
	0.0 22.87						17.206		K Factor = 5.51	
7 to 7T	23.68 23.68	1.101 150.0 0.0930	O	5.0 0.0 0.0	2.000 5.000 7.000	17.875 0.0 0.651			K Factor = 5.60	
	0.0 23.68						18.526		K Factor = 5.50	
5T to 6T	22.40 22.4	1.394 150.0 0.0265		0.0 0.0 0.0	7.500 0.0 7.500	17.007 0.0 0.199				Vel = 4.71
6T to 7T	22.87 45.27	1.394 150.0 0.0978		0.0 0.0 0.0	13.500 0.0 13.500	17.206 0.0 1.320				Vel = 9.52

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftg's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
7T	23.68	1.598	O	8.0	2.500	18.526				
to		150.0		0.0	8.000	0.0				
B	68.95	0.1094		0.0	10.500	1.149		Vel = 11.03		
	0.0									
	68.95					19.675		K Factor = 15.54		
8	25.00	1.394		0.0	8.000	19.935		K Factor = 5.60		
to		150.0		0.0	0.0	0.0				
9	25.0	0.0326		0.0	8.000	0.261		Vel = 5.26		
9	25.17	1.394	O	6.0	1.000	20.196		K Factor = 5.60		
to		150.0		0.0	6.000	0.0				
C	50.17	0.1181		0.0	7.000	0.827		Vel = 10.55		
	0.0									
	50.17					21.023		K Factor = 10.94		
10	23.40	1.101	N	7.0	13.500	17.455		K Factor = 5.60		
to		150.0		0.0	7.000	0.0				
11T	23.4	0.0909		0.0	20.500	1.864		Vel = 7.89		
	0.0									
	23.40					19.319		K Factor = 5.32		
11	24.21	1.101	O	5.0	1.500	18.689		K Factor = 5.60		
to		150.0		0.0	5.000	0.0				
11T	24.21	0.0969		0.0	6.500	0.630		Vel = 8.16		
11T	23.40	1.394		0.0	11.000	19.319				
to		150.0		0.0	0.0	0.0				
12	47.61	0.1073		0.0	11.000	1.180		Vel = 10.01		
12	25.35	1.394	O	6.0	7.000	20.499		K Factor = 5.60		
to		150.0		0.0	6.000	0.0				
D	72.96	0.2363		0.0	13.000	3.072		Vel = 15.34		
	0.0									
	72.96					23.571		K Factor = 15.03		
13	26.53	1.101	N	7.0	2.000	22.438		K Factor = 5.60		
to		150.0	O	5.0	12.000	0.0				
E	26.53	0.1148		0.0	14.000	1.607		Vel = 8.94		
	0.0									
	26.53					24.045		K Factor = 5.41		
A	83.74	2.003		0.0	13.000	18.997				
to		150.0		0.0	0.0	0.0				
B	83.74	0.0522		0.0	13.000	0.678		Vel = 8.53		
B	68.95	2.003		0.0	8.500	19.675				
to		150.0		0.0	0.0	0.0				
C	152.69	0.1586		0.0	8.500	1.348		Vel = 15.55		
C	50.17	2.003		0.0	9.500	21.023				
to		150.0		0.0	0.0	0.0				
D	202.86	0.2682		0.0	9.500	2.548		Vel = 20.65		
D	72.96	2.003		0.0	1.000	23.571				
to		150.0		0.0	0.0	0.0				
E	275.82	0.4740		0.0	1.000	0.474		Vel = 28.08		
E	26.53	2.003	O	10.0	17.500	24.045				
to		150.0		0.0	10.000	0.0				
F	302.35	0.5612		0.0	27.500	15.433		Vel = 30.78		

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
F to FF	0.0 302.35	3.26 150.0 0.0524	2N	26.0 0.0 0.0	216.000 26.000 242.000	39.478 0.0 12.669			Vel = 11.62	
FF to 5FC	0.0 302.35	3.26 120.0 0.0791	I J S B	6.72 17.471 21.503 13.44	5.000 59.134 64.134	52.147 0.0 5.073		Vel = 11.62		
5FC to S3	0.0 302.35	4.26 120.0 0.0217		0.0 0.0 0.0	3.000 0.0 3.000	57.220 1.949 0.065		Vel = 6.81		
S3 to SB	0.0 302.35	4.26 120.0 0.0215	2I J B	18.434 21.067 15.8	41.000 55.301 96.301	59.234 16.025 2.070		Vel = 6.81		
SB to SC	0.0 302.35	4.26 120.0 0.0215		0.0 0.0 0.0	9.500 0.0 9.500	77.329 0.0 0.204		Vel = 6.81		
SC to TOR	0.0 302.35	4.26 120.0 0.0215	2I	18.434 0.0 0.0	43.000 18.434 61.434	77.533 0.0 1.321		Vel = 6.81		
TOR to BOR	0.0 302.35	4.26 120.0 0.0215	B J	15.8 21.067 0.0	10.000 36.867 46.867	78.854 4.114 1.007		Vel = 6.81		
BOR to BF1	0.0 302.35	4.26 120.0 0.0215		0.0 0.0 0.0	4.000 0.0 4.000	83.975 0.0 0.086		Vel = 6.81		
BF1 to BF2	0.0 302.35	4.26 120.0 0.0220		0.0 0.0 0.0	1.000 0.0 1.000	84.061 4.000 0.022		** Fixed Loss = 4 Vel = 6.81		
BF2 to FLG	0.0 302.35	8.27 140.0 0.0006	E	28.468 0.0 0.0	1.000 28.468 29.468	88.083 0.433 0.019		Vel = 1.81		
FLG to HOSE	0.0 302.35	8.27 140.0 0.0006	E 2G T	28.468 12.652 55.354	30.000 96.474 126.474	88.535 0.433 0.081		Vel = 1.81		
HOSE to TEST	100.00 402.35	8.27 140.0 0.0011	T G	55.354 6.326 0.0	330.000 61.680 391.680	89.049 0.866 0.425		Qa = 100 Vel = 2.40		
	0.0 402.35					90.340		K Factor = 42.33		