

. . . Fire Protection by Computer Design

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

Job Name : YORK STREET, LOWER LEVEL
Building : 2016
Location : YORK STREET, PORTLAND, ME
System : LWR
Contract : 4833CME
Data File : YSLWR.wxf

Hydraulic Design Information Sheet

Name - YORK STREET Date - 8-17-16
 Location - YORK STREET, PORTLAND, ME
 Building - 2016 System No. - LWR
 Contractor - OPECHEE Contract No. - 4833CME
 Calculated By - BENOIT Drawing No. - 3
 Construction: () Combustible (X) Non-Combustible Ceiling Height - 14'
 Occupancy - FUTURE RETAIL

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

S Other

T Specific Ruling Made By Date

M	Area of Sprinkler Operation	- 975	System Type	Sprinkler/Nozzle
	Density	- .2	(X) Wet	Make RELIABLE
D	Area Per Sprinkler	- 120	() Dry	Model F1-FR
E	Elevation at Highest Outlet	- 11.500	() Deluge	Size 1/2
S	Hose Allowance - Inside	- 0	() Preaction	K-Factor 5.6
I	Rack Sprinkler Allowance	- 0	() Other	Temp.Rat.200
G	Hose Allowance - Outside	- 250		

N Note 35% QR HEAD REDUCTION TAKEN

Calculation Flow Required - 476.9 Press Required - 86.3 AT TEST
 Summary C-Factor Used: 120 Overhead 140 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
S	Flow - 1047		Proof Flow
U	Elevation - 0		

P Location - SEE SITE PLAN

L 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

E Horizontal Barriers Provided:

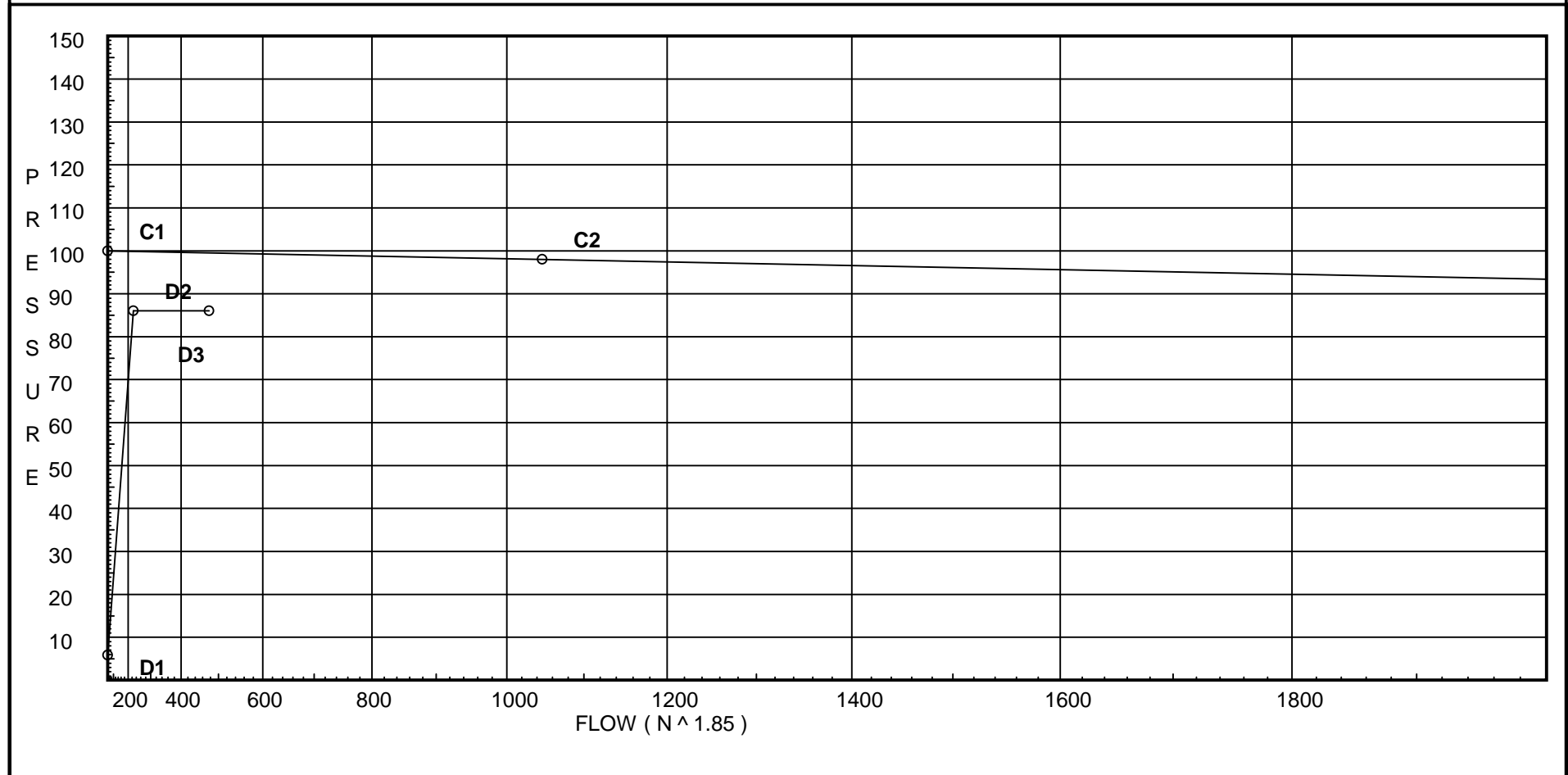
Water Supply Curve C

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City Water Supply:
C1 - Static Pressure : 100
C2 - Residual Pressure: 98
C2 - Residual Flow : 1047

Demand:
D1 - Elevation : 5.847
D2 - System Flow : 226.916
D2 - System Pressure : 86.025
Hose (Demand) : 250
D3 - System Demand : 476.916
Safety Margin : 13.508



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
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.
14	11.5	5.6	18.4	na	24.02	0.2	120	18.4
15	11.5	5.6	18.57	na	24.13	0.2	120	18.4
16	11.5	5.6	19.2	na	24.54	0.2	120	18.4
17	11.5	5.6	20.55	na	25.39	0.2	120	18.4
18	11.5	5.6	18.63	na	24.17	0.2	120	18.4
19	11.5	5.6	18.81	na	24.29	0.2	120	18.4
20	11.5	5.6	19.45	na	24.7	0.2	120	18.4
21	11.5	5.6	20.81	na	25.55	0.2	120	18.4
26	11.5	5.6	28.94	na	30.13	0.2	120	18.4
G	11.5		28.2	na				
H	11.5		28.55	na				
I	11.5		29.81	na				
LFC	7.5		73.1	na				
SB	11.5		72.52	na				
SC	11.5		72.64	na				
TOR	11.5		73.88	na				
BOR	2.0		78.59	na				
BF1	2.0		78.64	na				
BF2	2.0		83.65	na				
FLG	1.0		84.1	na				
HOSE	0.0		84.58	na	250.0			
TEST	-2.0		86.02	na				

The maximum velocity is 14.25 and it occurs in the pipe between nodes 21 and H

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	*****
14	24.02	1.682		9.500	18.400				
to		120.0	0.0	0.0	0.0				
15	24.02	0.0183		9.500	0.174			K Factor = 5.60	
15	24.14	1.682		9.500	18.574				
to		120.0	0.0	0.0	0.0				
16	48.16	0.0663		9.500	0.630			Vel = 3.47	
16	24.54	1.682		9.500	19.204				
to		120.0	0.0	0.0	0.0				
17	72.7	0.1421		9.500	1.350			Vel = 6.95	
17	25.39	1.682	J	9.9	21.000	20.554			
to		120.0		0.0	9.900	0.0			
G	98.09	0.2474		0.0	30.900	7.644		K Factor = 5.60	
	0.0								
	98.09					28.198		Vel = 14.16	
18	24.17	1.682		9.500	18.633			K Factor = 18.47	
to		120.0	0.0	0.0	0.0				
19	24.17	0.0185		9.500	0.176				
19	24.29	1.682		9.500	18.809				
to		120.0	0.0	0.0	0.0				
20	48.46	0.0672		9.500	0.638			Vel = 3.49	
20	24.69	1.682		9.500	19.447				
to		120.0	0.0	0.0	0.0				
21	73.15	0.1438		9.500	1.366			Vel = 7.00	
21	25.55	1.682	J	9.9	21.000	20.813			
to		120.0		0.0	9.900	0.0			
H	98.7	0.2503		0.0	30.900	7.733		K Factor = 5.60	
	0.0								
	98.70					28.546		Vel = 14.25	
26	30.13	1.682	J	9.9	21.000	28.944		K Factor = 18.47	
to		120.0		0.0	9.900	0.0			
I	30.13	0.0279		0.0	30.900	0.861			
	0.0								
	30.13					29.805		Vel = 4.35	
G	98.09	2.635		0.0	12.500	28.198			
to		120.0	0.0	0.0	0.0				
H	98.09	0.0278		0.0	12.500	0.348		Vel = 5.77	
H	98.70	2.635		0.0	12.500	28.546			
to		120.0	0.0	0.0	0.0				
I	196.79	0.1007		0.0	12.500	1.259		Vel = 11.58	
I	30.13	2.635	5I	41.186	232.000	29.805			
to		120.0	J	14.827	84.843	1.732			
LFC	226.92	0.1312	S	19.22	316.843	41.558		Vel = 13.35	
			B	9.61					
LFC	0.0	4.26	3I	27.651	27.000	73.095			
to		120.0	J	21.067	64.518	-1.732			
SB	226.92	0.0126	B	15.8	91.518	1.157		Vel = 5.11	
SB	0.0	4.26		0.0	9.500	72.520			
to		120.0	0.0	0.0	0.0				
SC	226.92	0.0126		0.0	9.500	0.120		Vel = 5.11	

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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	*****
SC	0.0	4.26	2I	18.434	43.000	72.640				
to		120.0	J	21.067	55.301	0.0				
TOR	226.92	0.0126	B	15.8	98.301	1.242		Vel =	5.11	
TOR	0.0	4.26	B	15.8	10.000	73.882				
to		120.0	J	21.067	36.867	4.114				
BOR	226.92	0.0127		0.0	46.867	0.593		Vel =	5.11	
BOR	0.0	4.26		0.0	4.000	78.589				
to		120.0		0.0	0.0	0.0				
BF1	226.92	0.0127		0.0	4.000	0.051		Vel =	5.11	
BF1	0.0	4.26		0.0	1.000	78.640				
to		120.0		0.0	0.0	5.000		** Fixed Loss = 5		
BF2	226.92	0.0120		0.0	1.000	0.012		Vel =	5.11	
BF2	0.0	8.27	E	28.468	1.000	83.652				
to		140.0		0.0	28.468	0.433				
FLG	226.92	0.0004		0.0	29.468	0.011		Vel =	1.36	
FLG	0.0	8.27	E	28.468	30.000	84.096				
to		140.0	2G	12.652	96.474	0.433				
HOSE	226.92	0.0004	T	55.354	126.474	0.048		Vel =	1.36	
HOSE	250.00	8.27	T	55.354	330.000	84.577		Qa =	250	
to		140.0	G	6.326	61.680	0.866				
TEST	476.92	0.0015		0.0	391.680	0.582		Vel =	2.85	
	0.0									
	476.92					86.025		K Factor =	51.42	