

. . . Fire Protection by Computer Design

Hampshire Fire Protection
8 North Wentworth Ave
Londonderry NH, 03053
432-8221

Job Name : EVOLUTION ROCKS PORTLAND
Building : 1
Location : UPPER ROOF
System : 1
Contract : 4480 CME
Data File : 4480 CME - UPPER ROOF.WXF

Hydraulic Design Information Sheet

Name - EVOLUTION ROCKS PORTLAND Date - 1/22/2014
 Location - UPPER ROOF
 Building - 1 System No. - 1
 Contractor - FLYNN CONSTRUCTION Contract No. - 4480 CME
 Calculated By - CRAIG SIDER Drawing No. - 2
 Construction: () Combustible (X) Non-Combustible Ceiling Height - 42'-2"
 Occupancy - LIGHT HAZARD

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	- 0.1	(X) Wet	Make RELIABLE
D	Area Per Sprinkler	- 158	() Dry	Model F1FR56
E	Elevation at Highest Outlet	- 41.167	() Deluge	Size 1/2"
S	Hose Allowance - Inside	-	() Preaction	K-Factor 5.6
I	Rack Sprinkler Allowance	-	() Other	Temp.Rat.155°
G	Hose Allowance - Outside	- 100		

N Note

Calculation Flow Required - 295.5 Press Required - 62.9
 Summary C-Factor Used: 120 Overhead 120 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 5/2/2013		Cap. -
T	Time of Test - N/A	Rated Cap.-	Elev.-
E	Static Press - 72	@ Press -	
R	Residual Press - 70	Elev. -	Well
	Flow - 1255		Proof Flow
S	Elevation - -5		

P Location - HYDRANT 01318

L Source of Information - PORTLAND WATER DEPARTMENT

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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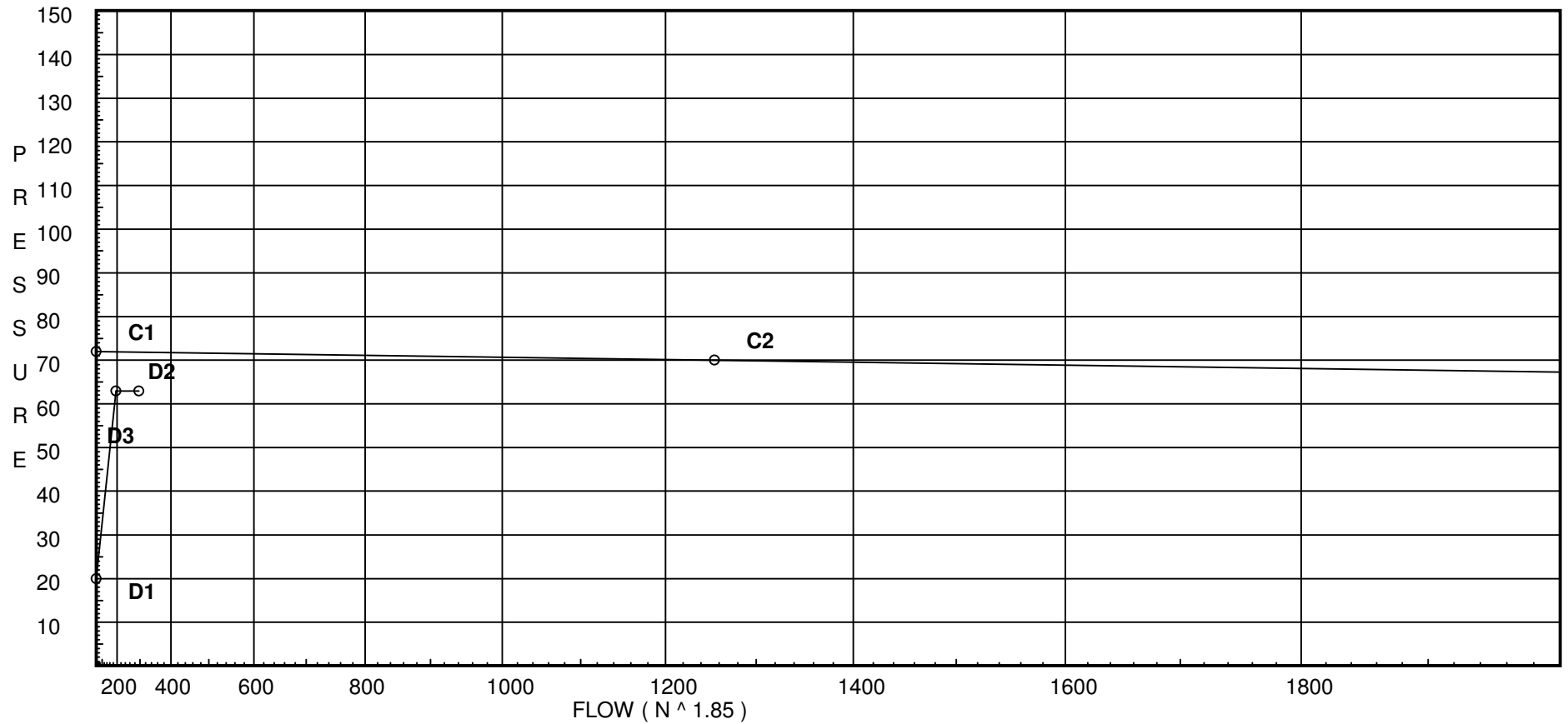
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City Water Supply:

C1 - Static Pressure : 72
C2 - Residual Pressure: 70
C2 - Residual Flow : 1255

Demand:

D1 - Elevation : 19.995
D2 - System Flow : 195.507
D2 - System Pressure : 62.946
Hose (Demand) : 100
D3 - System Demand : 295.507
Safety Margin : 8.916



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
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
H	45' Grvd-Vic Elbow #11	0	0	1	1.5	2	2	3	3	3.5	3.5	4.5	5	6.5	8.5	10	18	20	23	25	30
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
V	90' Ell Firelock #001	0	0	0	3	4	3.5	4.3	5	0	6.8	8.5	10	13	0	0	0	0	0	0	0
X	90'Tee-BranchFirelock002	0	0	0	0	0	8.5	10.8	13	0	16	21	25	33	0	0	0	0	0	0	0
Zca	Colt C200 Horz 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.

Pressure / Flow Summary - STANDARD

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
H201	41.167	5.6	7.0	na	14.82	0.1	71	7.0
H202	41.167	5.6	7.24	na	15.06	0.1	133	7.0
H203	41.167	5.6	8.48	na	16.31	0.1	133	7.0
H204	41.167	5.6	11.27	na	18.8	0.1	133	7.0
H205	41.167		16.51	na				
201	41.167		18.3	na				
H206	41.167	5.6	7.04	na	14.86	0.1	71	7.0
H207	41.167	5.6	7.28	na	15.11	0.1	133	7.0
H208	41.167	5.6	8.53	na	16.36	0.1	133	7.0
H209	41.167	5.6	11.34	na	18.86	0.1	133	7.0
H210	41.167		16.61	na				
202	41.167		18.41	na				
H211	41.167	5.6	13.88	na	20.86	0.1	137	7.0
H212	41.167	5.6	14.55	na	21.36	0.1	137	7.0
H213	41.167	5.6	17.02	na	23.1	0.1	162	7.0
203	41.167		18.83	na				
A2	39.333		21.36	na				
B2	39.333		21.48	na				
C2	39.333		21.91	na				
K	39.333		37.56	na				
TOR	39.333		37.85	na				
BOR	3.0		54.14	na				
FLG	-5.0		61.79	na				
TEST	-5.0		62.95	na	100.0			

The maximum velocity is 12.83 and it occurs in the pipe between nodes H213 and 203

Final Calculations - Hazen-Williams - 2007

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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	*****
* LINE 1										
H201	14.82	1.442	1T	7.432	7.500	7.000			K Factor = 5.60	
to		120.0		0.0	7.432	0.0				
H202	14.82	0.0159		0.0	14.932	0.237			Vel = 2.91	
H202	15.06	1.442	1T	7.432	14.000	7.237			K Factor = 5.60	
to		120.0		0.0	7.432	0.0				
H203	29.88	0.0580		0.0	21.432	1.244			Vel = 5.87	
H203	16.31	1.442	1T	7.432	14.000	8.481			K Factor = 5.60	
to		120.0		0.0	7.432	0.0				
H204	46.19	0.1300		0.0	21.432	2.786			Vel = 9.07	
H204	18.80	1.442	1T	7.432	14.000	11.267			K Factor = 5.60	
to		120.0		0.0	7.432	0.0				
H205	64.99	0.2445		0.0	21.432	5.240			Vel = 12.77	
H205	0.0	1.442	1E	3.716	3.625	16.507				
to		120.0		0.0	3.716	0.0				
201	64.99	0.2445		0.0	7.341	1.795			Vel = 12.77	
201	0.0	1.442	1T	7.432	1.833	18.302				
to		120.0		0.0	7.432	0.794				
A2	64.99	0.2445		0.0	9.265	2.265			Vel = 12.77	
	0.0									
	64.99					21.361			K Factor = 14.06	
* LIEN 2										
H206	14.86	1.442	1T	7.432	7.500	7.044			K Factor = 5.60	
to		120.0		0.0	7.432	0.0				
H207	14.86	0.0160		0.0	14.932	0.239			Vel = 2.92	
H207	15.12	1.442	1T	7.432	14.000	7.283			K Factor = 5.60	
to		120.0		0.0	7.432	0.0				
H208	29.98	0.0584		0.0	21.432	1.252			Vel = 5.89	
H208	16.36	1.442	1T	7.432	14.000	8.535			K Factor = 5.60	
to		120.0		0.0	7.432	0.0				
H209	46.34	0.1307		0.0	21.432	2.802			Vel = 9.10	
H209	18.85	1.442	1T	7.432	14.000	11.337			K Factor = 5.60	
to		120.0		0.0	7.432	0.0				
H210	65.19	0.2459		0.0	21.432	5.270			Vel = 12.81	
H210	0.0	1.442	1E	3.716	3.625	16.607				
to		120.0		0.0	3.716	0.0				
202	65.19	0.2459		0.0	7.341	1.805			Vel = 12.81	
202	0.0	1.442	1T	7.432	1.833	18.412				
to		120.0		0.0	7.432	0.794				
B2	65.19	0.2459		0.0	9.265	2.278			Vel = 12.81	
	0.0									
	65.19					21.484			K Factor = 14.06	
* LINE 3										
H211	20.86	1.442	1T	7.432	15.000	13.881			K Factor = 5.60	
to		120.0		0.0	7.432	0.0				
H212	20.86	0.0299		0.0	22.432	0.670			Vel = 4.10	
H212	21.37	1.442	1T	7.432	15.000	14.551			K Factor = 5.60	
to		120.0		0.0	7.432	0.0				
H213	42.23	0.1101		0.0	22.432	2.470			Vel = 8.30	

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	*****
H213 to 203	23.10 65.33	1.442 120.0 0.2468	1E	3.716 0.0	3.625 3.716	17.021 0.0			K Factor = 5.60	
203 to C2	0.0 65.33	1.442 120.0 0.2468	1T	7.432 0.0	1.833 7.432	18.833 0.794			Vel = 12.83	
	0.0 65.33					21.914			K Factor = 13.96	
*MAIN										
A2 to B2	64.99 64.99	2.635 120.0 0.0129		0.0 0.0	9.500 0.0	21.361 0.0			Vel = 3.82	
B2 to C2	65.19 130.18	2.635 120.0 0.0469		0.0 0.0	9.167 0.0	21.484 0.0			Vel = 7.66	
C2 to K	65.33 195.51	2.635 120.0 0.0996	1V 1X	5.903 14.827	136.417 20.730	21.914 0.0			Vel = 11.50	
K to TOR	0.0 195.51	2.635 120.0 0.0998		0.0 0.0	2.917 0.0	37.560 0.0			Vel = 11.50	
	0.0 195.51					37.851			K Factor = 31.78	
*RISER										
TOR to BOR	195.51 195.51	4.26 120.0 0.0096	1X	21.067 0.0	36.333 21.067	37.851 15.736			Vel = 4.40	
BOR to FLG	0.0 195.51	4.26 120.0 0.0096	1V 1Zca	8.954 0.0	4.000 8.954	54.137 7.526			** Fixed Loss = 4.061	
FLG to TEST	0.0 195.51	7.981 100.0 0.0006	1H 1G 1T	4.639 2.855	1800.000 32.473	61.788 0.0			Vel = 1.25	
	100.00 295.51					62.946			Qa = 100.00 K Factor = 37.25	