

. . . 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 : BELOW MEZZANINE
System : 1
Contract : 4480 CME
Data File : 4480 CME - MEZZANINE.WXF

Hydraulic Design Information Sheet

Name - EVOLUTION ROCKS PORTLAND Date - 1/22/2014
 Location - BELOW MEZZANINE
 Building - 1 System No. - 1
 Contractor - FLYNN CONSTRUCTION Contract No. - 4480 CME
 Calculated By - CRAIG SIDER Drawing No. - 3
 Construction: () Combustible (X) Non-Combustible Ceiling Height - 12'-0"
 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	- 900	System Type	Sprinkler/Nozzle
	Density	- 0.1	(X) Wet	Make RELIABLE
D	Area Per Sprinkler	- 171	() Dry	Model F1FR56
E	Elevation at Highest Outlet	- 11	() 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 - 326.4 Press Required - 62.3
 Summary C-Factor Used: 120 Overhead 140 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

Hampshire Fire Protection
EVOLUTION ROCKS PORTLAND

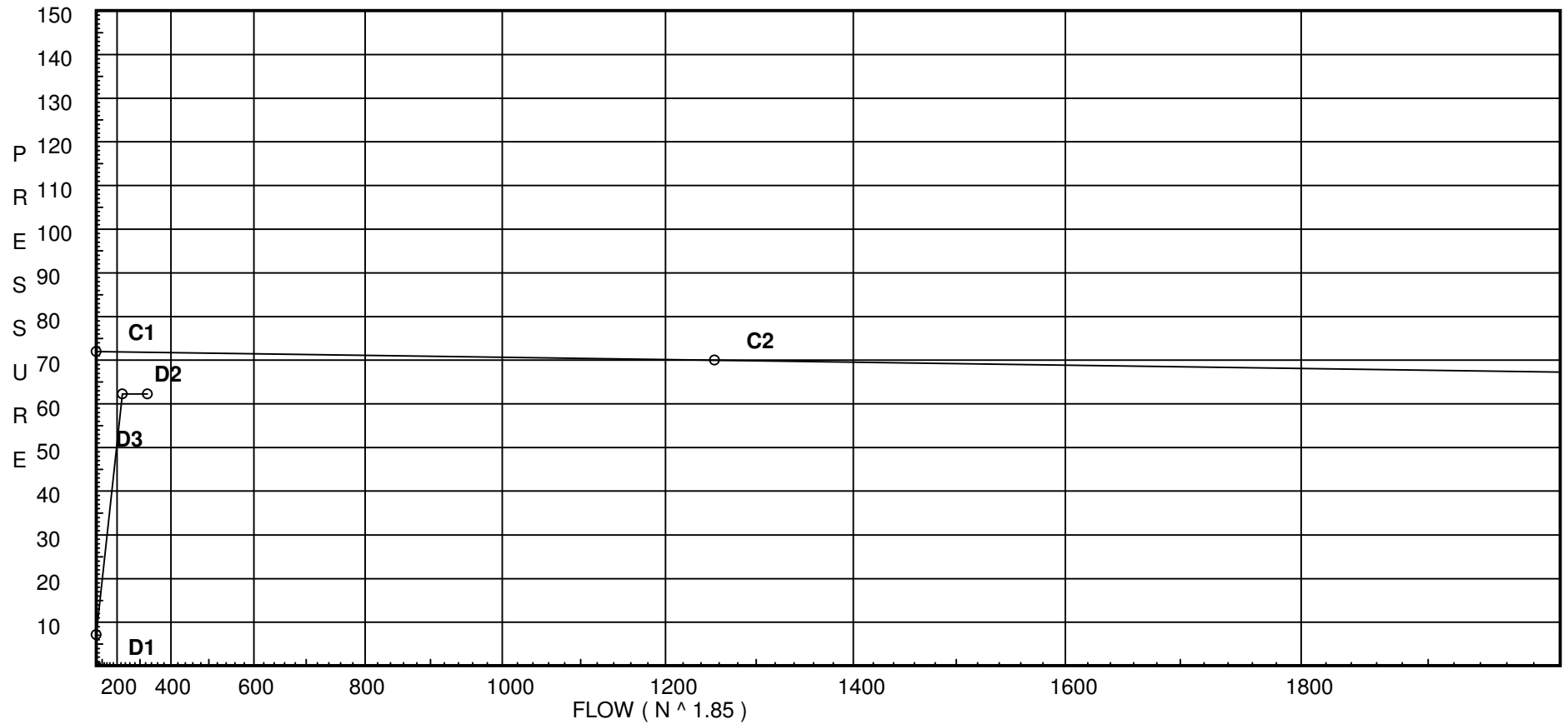
Page 2
Date 1/22/2014

City Water Supply:

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

Demand:

D1 - Elevation : 7.146
D2 - System Flow : 226.433
D2 - System Pressure : 62.251
Hose (Demand) : 100
D3 - System Demand : 326.433
Safety Margin : 9.584



Fittings Used Summary

Hampshire Fire Protection
EVOLUTION ROCKS PORTLAND

Page 3
Date 1/22/2014

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

Hampshire Fire Protection
EVOLUTION ROCKS PORTLAND

Page 4
Date 1/22/2014

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
H301	11.5	5.6	8.35	na	16.18	0.1	89	7.0
H302	11.5	5.6	9.32	na	17.1	0.1	171	7.0
H303	11.5	5.6	15.33	na	21.93	0.1	169	7.0
H304	11.5	5.6	11.74	na	19.19	0.1	171	7.0
H305	11.5	5.6	12.89	na	20.11	0.1	98	7.0
H306	11.5	5.6	20.83	na	25.56	0.1	81	7.0
311	11.5		21.32	na				
H307	11.5	5.6	23.19	na	26.96	0.1	94	7.0
307	11.5		25.07	na				
H308	11.5	5.6	17.68	na	23.55	0.1	60	7.0
H309	11.5	5.6	20.31	na	25.24	0.1	104	7.0
H310	11.5	5.6	29.88	na	30.61	0.1	141	7.0
A3	11.5		35.59	na				
B3	11.5		35.79	na				
C3	11.5		36.64	na				
D3	29.167		30.12	na				
A	29.167		32.28	na				
B	29.167		32.72	na				
C	29.167		33.14	na				
D	29.167		33.65	na				
E	29.167		34.07	na				
F	29.167		34.57	na				
G	29.167		35.0	na				
H	39.333		34.57	na				
J	39.333		35.36	na				
K	39.333		36.81	na				
TOR	39.333		36.94	na				
BOR	3.0		53.4	na				
FLG	-5.0		61.55	na				
TEST	-5.0		62.25	na	100.0			

The maximum velocity is 23.17 and it occurs in the pipe between nodes 307 and A3

Final Calculations - Hazen-Williams - 2007

Hampshire Fire Protection
EVOLUTION ROCKS PORTLAND

Page 5
Date 1/22/2014

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
*LINE 1									
H301	16.18	1.049	1E 2.0	9.083	8.350			K Factor = 5.60	
to		120.0	0.0	2.000	0.0				
H302	16.18	0.0879	0.0	11.083	0.974			Vel = 6.01	
H302	17.10	1.049	1T 5.0	13.000	9.324			K Factor = 5.60	
to		120.0	0.0	5.000	0.0				
H303	33.28	0.3339	0.0	18.000	6.010			Vel = 12.35	
H303	21.93	1.38	1E 3.0	11.750	15.334			K Factor = 5.60	
to		120.0	2T 12.0	15.000	0.0				
311	55.21	0.2240	0.0	26.750	5.991			Vel = 11.84	
	0.0								
	55.21				21.325			K Factor = 11.96	
H304	19.19	1.049	1E 2.0	7.500	11.744			K Factor = 5.60	
to		120.0	0.0	2.000	0.0				
H305	19.19	0.1206	0.0	9.500	1.146			Vel = 7.12	
H305	20.11	1.049	2E 4.0	8.500	12.890			K Factor = 5.60	
to		120.0	1T 5.0	9.000	0.0				
H306	39.3	0.4539	0.0	17.500	7.944			Vel = 14.59	
H306	25.56	1.38	0.0	1.625	20.834			K Factor = 5.60	
to		120.0	0.0	0.0	0.0				
311	64.86	0.3022	0.0	1.625	0.491			Vel = 13.91	
311	55.21	1.61	0.0	8.417	21.325				
to		120.0	0.0	0.0	0.0				
307	120.07	0.4449	0.0	8.417	3.745			Vel = 18.92	
	0.0								
	120.07				25.070			K Factor = 23.98	
H307	26.96	1.049	1E 2.0	1.333	23.186			K Factor = 5.60	
to		120.0	1T 5.0	7.000	0.0				
307	26.96	0.2261	0.0	8.333	1.884			Vel = 10.01	
307	120.07	1.61	1T 8.0	8.250	25.070				
to		120.0	0.0	8.000	0.0				
A3	147.03	0.6473	0.0	16.250	10.519			Vel = 23.17	
	0.0								
	147.03				35.589			K Factor = 24.65	
* LINE 2									
H308	23.55	1.049	2E 4.0	10.958	17.682			K Factor = 5.60	
to		120.0	0.0	4.000	0.0				
H309	23.55	0.1760	0.0	14.958	2.633			Vel = 8.74	
H309	25.24	1.049	1T 5.0	9.125	20.315			K Factor = 5.60	
to		120.0	0.0	5.000	0.0				
H310	48.79	0.6774	0.0	14.125	9.568			Vel = 18.11	
H310	30.61	1.38	2T 12.0	1.458	29.883			K Factor = 5.60	
to		120.0	0.0	12.000	0.0				
B3	79.4	0.4386	0.0	13.458	5.903			Vel = 17.03	
	0.0								
	79.40				35.786			K Factor = 13.27	
*MAIN									

Final Calculations - Hazen-Williams

Hampshire Fire Protection
EVOLUTION ROCKS PORTLAND

Page 6
Date 1/22/2014

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
A3	147.03	3.26		0.0	9.458	35.589				
to		120.0		0.0	0.0	0.0				
B3	147.03	0.0208		0.0	9.458	0.197		Vel =	5.65	
B3	79.40	3.26	1V	6.72	11.625	35.786				
to		120.0		0.0	6.720	0.0				
C3	226.43	0.0463		0.0	18.345	0.850		Vel =	8.70	
C3	0.0	3.26	1V	6.72	17.667	36.636				
to		120.0		0.0	6.720	-7.652				
D3	226.43	0.0464		0.0	24.387	1.131		Vel =	8.70	
D3	0.0	3.26	1V	6.72	40.000	30.115				
to		120.0		0.0	6.720	0.0				
A	226.43	0.0463		0.0	46.720	2.165		Vel =	8.70	
A	0.0	3.26		0.0	9.500	32.280				
to		120.0		0.0	0.0	0.0				
B	226.43	0.0463		0.0	9.500	0.440		Vel =	8.70	
B	0.0	3.26		0.0	9.167	32.720				
to		120.0		0.0	0.0	0.0				
C	226.43	0.0464		0.0	9.167	0.425		Vel =	8.70	
C	0.0	3.26		0.0	10.833	33.145				
to		120.0		0.0	0.0	0.0				
D	226.43	0.0463		0.0	10.833	0.502		Vel =	8.70	
D	0.0	3.26		0.0	9.167	33.647				
to		120.0		0.0	0.0	0.0				
E	226.43	0.0464		0.0	9.167	0.425		Vel =	8.70	
E	0.0	3.26		0.0	10.833	34.072				
to		120.0		0.0	0.0	0.0				
F	226.43	0.0463		0.0	10.833	0.502		Vel =	8.70	
F	0.0	3.26		0.0	9.167	34.574				
to		120.0		0.0	0.0	0.0				
G	226.43	0.0463		0.0	9.167	0.424		Vel =	8.70	
G	0.0	3.26	2V	13.44	72.417	34.998				
to		120.0		0.0	13.440	-4.403				
H	226.43	0.0463		0.0	85.857	3.979		Vel =	8.70	
H	0.0	3.26	1V	6.72	10.167	34.574				
to		120.0		0.0	6.720	0.0				
J	226.43	0.0463		0.0	16.887	0.782		Vel =	8.70	
J	0.0	3.26	1X	17.471	9.792	35.356				
to		120.0	1Eq	4.032	21.503	0.0				
K	226.43	0.0463		0.0	31.295	1.450		Vel =	8.70	
K	0.0	3.26		0.0	2.917	36.806				
to		120.0		0.0	0.0	0.0				
TOR	226.43	0.0463		0.0	2.917	0.135		Vel =	8.70	
	0.0									
	226.43					36.941		K Factor =	37.25	
*RISER										
TOR	226.43	4.26	1X	21.067	36.333	36.941				
to		120.0		0.0	21.067	15.736				
BOR	226.43	0.0126		0.0	57.400	0.723		Vel =	5.10	

Final Calculations - Hazen-Williams

Hampshire Fire Protection
EVOLUTION ROCKS PORTLAND

Page 7
Date 1/22/2014

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
BOR	0.0	4.26	1V	8.954	4.000	53.400			
to		120.0	1Zca	0.0	8.954	7.987		** Fixed Loss = 4.522	
FLG	226.43	0.0126		0.0	12.954	0.163		Vel = 5.10	
FLG	0.0	8.27	1H	10.28	1800.000	61.550			
to		140.0	1G	6.326	71.960	0.0			
TEST	226.43	0.0004	1T	55.354	1871.960	0.701		Vel = 1.35	
	100.00							Qa = 100.00	
	326.43					62.251		K Factor = 41.37	