

... Fire Protection by Computer Design

EASTERN FIRE PROTECTION
170 KITTYHAWK AVE.
P.O. BOX 1390
AUBURN, MAINE 04210
207-784-1507

Job Name : NORTH EAST AIR
Drawing : 1 OF 2
Location : 1011 WESTBROOK RD. PORTLAND, ME
Remote Area : 2
Contract : 5443
Data File : northeast air roof calc - NEW water data.WXF

HYDRAULIC CALCULATIONS
for

Project name: NORTHEAST AIR
Location: 1011 WESTBROOK RD. PORTLAND, ME
Drawing no: 1 OF 2
Date: 4/15/16

Design

Remote area number: 2
Remote area location: UPPER FLOOR
Occupancy classification: LIGHT HAZARD
Density: .1 - Gpm/SqFt
Area of application: 1599 - SqFt
Coverage per sprinkler: 170 - SqFt
Type of sprinklers calculated: RELIABLE F1FR56 BRASS UPRIGHT
No. of sprinklers calculated: 10
In-rack demand: - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 299.36 - GPM @ 67.628 - Psi
Type of system: WET
Volume of dry or preaction system: - Gal

Water supply information

Date: 09-12-2011
Location: HYDRANT #01345 LOCATED ACROSS FROM JOBSITE
Source: PORTLAND WATER DISTRICT

Name of contractor: EASTERN FIRE PROTECTION
Address: 170 KITTYHAWK AVE. / P.O. BOX 1390 / AUBURN, MAINE 04210
Phone number: 207-784-1507
Name of designer: ROBERT PETERS
Authority having jurisdiction: STATE FIRE MARHSAL
Notes: (Include peaking information or gridded systems here.)

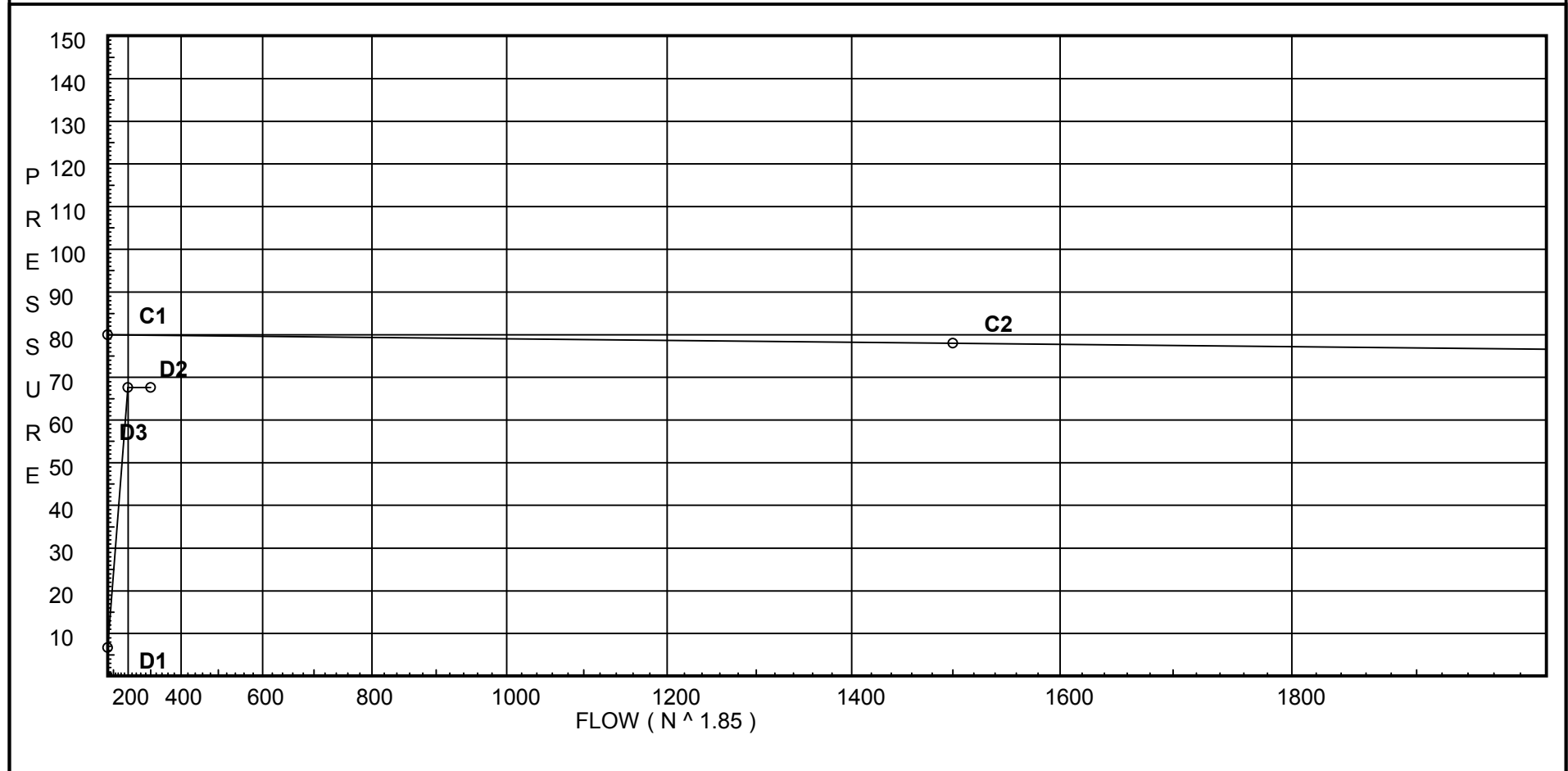
Water Supply Curve C

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City Water Supply:
C1 - Static Pressure : 80
C2 - Residual Pressure: 78
C2 - Residual Flow : 1500

Demand:
D1 - Elevation : 6.713
D2 - System Flow : 199.36
D2 - System Pressure : 67.628
Hose (Demand) : 100
D3 - System Demand : 299.36
Safety Margin : 12.270



Fittings Used Summary

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Fitting Legend		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
Abbrev.	Name																				
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
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.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	80.0	78	1500.0	79.899	299.36	67.628

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
7	83.5	5.6	9.22	17.0	
8	83.5	5.6	10.11	17.81	
1	83.5	5.6	11.37	18.89	
2	83.5	5.6	14.19	21.1	
3	83.5	5.6	9.28	17.06	
4	83.5	5.6	10.56	18.2	
5	83.5	5.6	11.86	19.28	
6	83.5	5.6	14.76	21.51	
9	83.5	5.6	18.45	24.05	
10	83.5	5.6	19.09	24.47	
A	83.5		17.25		
B	83.5		17.91		
C	83.5		20.46		
D	83.5		20.85		
E	82.333		38.54		
F	82.333		56.32		
G	85.917		55.06		
H	85.917		55.3		
TOR	85.917		55.46		
BFP	63.167		65.35		
BASE	59.917		70.98		
TEST	68.0		67.63	100.0	

Final Calculations - Hazen-Williams - 2007

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
7 to 8	83.500 83.500	5.60	17.00 17.0	1 1.049		0.0 0.0	9.292 0.0	120 0.0963	9.216 0.0 0.895		Vel = 6.31	
8 to 1	83.500 83.500	5.60	17.81 34.81	1.25 1.38		0.0 0.0	13.250 13.250	120 0.0954	10.111 0.0 1.264		Vel = 7.47	
1 to 2	83.500 83.500	5.60	18.88 53.69	1.25 1.38		0.0 0.0	13.250 13.250	120 0.2127	11.375 0.0 2.818		Vel = 11.52	
2 to A	83.500 83.500	5.60	21.10 74.79	1.25 1.38	T	6.0 0.0	1.792 6.000 7.792	120 0.3927	14.193 0.0 3.060		Vel = 16.04	
A			0.0 74.79						17.253		K Factor = 18.01	
3 to 4	83.500 83.500	5.60	17.06 17.06	1 1.049		0.0 0.0	13.250 13.250	120 0.0969	9.277 0.0 1.284		Vel = 6.33	
4 to 5	83.500 83.500	5.60	18.19 35.25	1.25 1.38		0.0 0.0	13.250 13.250	120 0.0977	10.561 0.0 1.294		Vel = 7.56	
5 to 6	83.500 83.500	5.60	19.29 54.54	1.25 1.38		0.0 0.0	13.250 13.250	120 0.2189	11.855 0.0 2.901		Vel = 11.70	
6 to B	83.500 83.500	5.60	21.51 76.05	1.25 1.38	T	6.0 0.0	1.792 6.000 7.792	120 0.4050	14.756 0.0 3.156		Vel = 16.31	
B			0.0 76.05						17.912		K Factor = 17.97	
9 to 10	83.500 83.500	5.60	24.05 24.05	1.25 1.38		0.0 0.0	13.250 13.250	120 0.0482	18.451 0.0 0.638		Vel = 5.16	
10 to C	83.500 83.500	5.60	24.47 48.52	1.25 1.38	T	6.0 0.0	1.792 6.000 7.792	120 0.1763	19.089 0.0 1.374		Vel = 10.41	
C			0.0 48.52						20.463		K Factor = 10.73	
A to B	83.500 83.500		74.79 74.79	2 2.067		0.0 0.0	12.000 12.000	120 0.0549	17.253 0.0 0.659		Vel = 7.15	
B to D	83.500 83.500		76.05 150.84	2 2.067	J	8.5 0.0	6.125 8.500 14.625	120 0.2010	17.912 0.0 2.940		Vel = 14.42	
D			0.0 150.84						20.852		K Factor = 33.03	
C to D	83.500 83.500		48.52 48.52	2 2.067	J	8.5 0.0	7.250 8.500 15.750	120 0.0247	20.463 0.0 0.389		Vel = 4.64	

Final Calculations - Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv. Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
D to E	83.500 82.333		150.84 199.36	2 2.067	2I J 7.0 8.5 0.0	35.542 15.500 51.042	120 0.3367	20.852 0.505 17.187		Vel = 19.06	
E to F	82.333 82.333		0.0 199.36	2 2.157	3I J 12.922 10.461 0.0	41.583 23.383 64.966	120 0.2736	38.544 0.0 17.776		Vel = 17.50	
F to G	82.333 85.917		0.0 199.36	4 4.26	J 21.067 0.0	8.000 21.067 29.067	120 0.0099	56.320 -1.552 0.288		Vel = 4.49	
G to H	85.917 85.917		0.0 199.36	4 4.26	4 0.0 0.0	24.500 0.0 24.500	120 0.0100	55.056 0.0 0.244		Vel = 4.49	
H to TOR	85.917 85.917		0.0 199.36	6 6.357	2I 25.147 0.0	90.208 25.147 115.355	120 0.0014	55.300 0.0 0.164		Vel = 2.02	
TOR to BFP	85.917 63.167		0.0 199.36	6 6.357	6 0.0 0.0	22.750 0.0 22.750	120 0.0014	55.464 9.853 0.032		Vel = 2.02	
BFP to BASE	63.167 59.917		0.0 199.36	6 6.357	Zcb 0.0 0.0	3.250 0.0 3.250	120 0.0012	65.349 5.624 0.004		** Fixed Loss = 4.216 Vel = 2.02	
BASE to TEST	59.917 68		0.0 199.36	6 6.16	G E 4.304 20.084 43.037	55.000 67.425 122.425	140 0.0012	70.977 -3.501 0.152		Vel = 2.15	
TEST			100.00 299.36					67.628		Qa = 100.00 K Factor = 36.40	