

... Fire Protection by Computer Design

EASTERN FIRE PROTECTION
170 KITTY HAWK AVE
AUBURN, ME 04210
207-784-1507

Job Name : 62 INDIA ST. 2ND. FLOOR WET SYSTEM
Drawing : 2 OF 3
Location : PORTLAND, ME.
Remote Area : 3
Contract : 5583-SP-17
Data File : 62 INDIA ST. 2ND FL. RES. STG. CALC..WXF

HYDRAULIC CALCULATIONS
for

Project name: 62 INDIA ST. 2ND. FLOOR WET SYSTEM
Location: PORTLAND, ME.
Drawing no: 2 OF 3
Date: 6/7/17

Design

Remote area number: 3
Remote area location: RESIDENTIAL STORAGE
Occupancy classification: LIGHT HAZARD
Density: .15 - Gpm/SqFt
Area of application: 909 - SqFt
Coverage per sprinkler: 171 - SqFt
Type of sprinklers calculated: RELIABLE 4.4 DRY HS/ 5.6 CONCEALD PENDENT
No. of sprinklers calculated: 4
In-rack demand: - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 406.232 - GPM @ 67.315 - Psi
Type of system: WET
Volume of dry or preaction system: - Gal

Water supply information

Date: 7/6/16
Location: NEWBURY ST. PORTLAND, ME.
Source: PORTLAND WATER DISTRICT

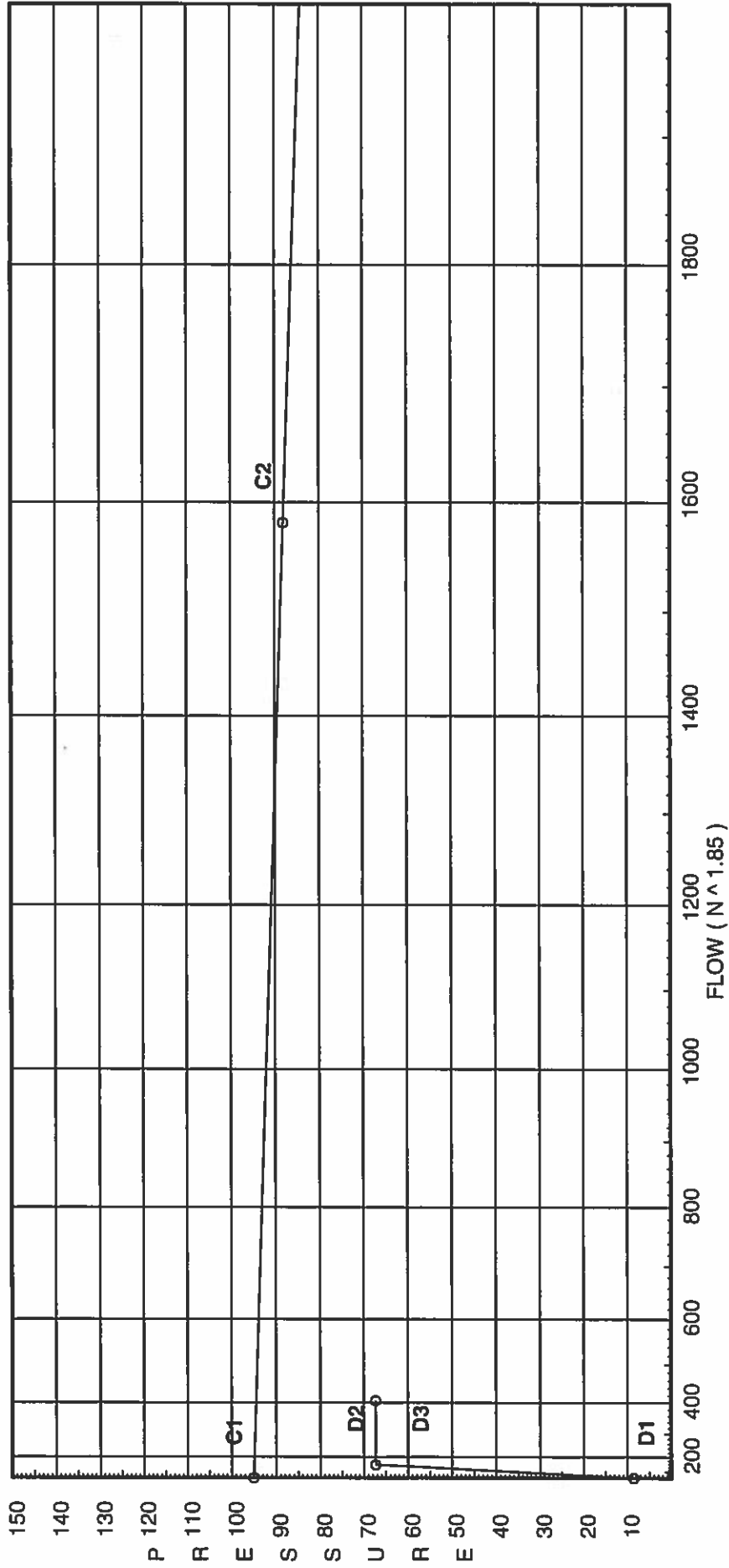
Name of contractor: EASTERN FIRE PROTECTION
Address: 170 KITTY HAWK AVE / / AUBURN, ME 04210
Phone number: 207-784-1507
Name of designer: EWM
Authority having jurisdiction: MAINE FIRE MARSHAL
Notes: (Include peaking information or gridded systems here.) REMOTE AREA REDUCED PER NFPA 13 (2016) SECTION (11.2.3.2.3.1)

Water Supply Curve C

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City Water Supply:
C1 - Static Pressure : 95
C2 - Residual Pressure: 88
C2 - Residual Flow : 1582

Demand:
D1 - Elevation : 8.528
D2 - System Flow : 156.232
D2 - System Pressure : 67.316
Hose (Demand) : 250
D3 - System Demand : 406.232
Safety Margin : 27.119



Fittings Used Summary

EASTERN FIRE PROTECTION
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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	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0	
E	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61	
Fsp	Fitting generates a Fixed Loss Based on Flow																				
G	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13	
I	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40	
J	0	0	4.5	6	8	8.5	10.8	13	17	16	21	25	33	41	50	65	78	88	98	120	
N*	0	7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0	
O*	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0	
S	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65	71	81	91	101	121	
T	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.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	95.0	88	1582.0	94.434	406.23	67.316

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
HEAD1	0.0	5.6	8.68	16.5	
SIDE1	0.0	5.6	7.0	14.82	
210	54.19	5.44	9.18	16.5	K=K @ LIN1
211	55.19		9.06		
212	54.19	5.44	9.31	16.61	K=K @ LIN1
213	55.19		9.19		
214	54.19	5.44	9.75	17.0	K=K @ LIN1
215	55.19		9.65		
217	55.19	5.41	9.85	16.98	K=K @ LIN2
217A	55.19		10.4		
216	55.19		10.42		
218	54.19	5.44	9.83	17.07	K=K @ LIN1
219	54.19	5.44	9.96	17.18	K=K @ LIN1
220	54.19	5.44	10.45	17.6	K=K @ LIN1
221	55.19		10.84		
222	48.94	5.44	11.53	18.49	K=K @ LIN1
223	54.19	5.44	11.93	18.81	K=K @ LIN1
224	55.19		11.97		
225	55.19		12.96		
205	55.19		14.06		
206	55.19		37.74		
207	55.19		48.46		
114	44.44		53.36		
TOR1	44.44		54.37		
HDR1	37.5		57.87		
BASE	34.5		67.23		
TEST	34.5		67.32	250.0	

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	*****
HEAD1 to LIN1	0 0	5.60	16.50 16.5	1 1.101	T	9.563 0.0 0.0	1.000 9.562 10.562	150 0.0477	8.681 0.0 0.504			Vel = 5.56
LIN1			0.0 16.50						9.185		K Factor = 5.44	
SIDE1 to LIN2	0 0	5.60	14.82 14.82	1 1.049	T	5.0 0.0 0.0	1.750 5.000 6.750	120 0.0747	7.000 0.0 0.504			Vel = 5.50
LIN2			0.0 14.82						7.504		K Factor = 5.41	
210 to 211	54.190 55.190	5.44	16.50 16.5	1 1.101	O	5.0 0.0 0.0	1.460 5.000 6.460	150 0.0477	9.185 -0.433 0.308		K = K @ LIN1	Vel = 5.56
211 to 213	55.190 55.190		0.0 16.5	1.25 1.394		0.0 0.0 0.0	8.375 0.0 8.375	150 0.0150	9.060 0.0 0.126			Vel = 3.47
213			0.0 16.50						9.186		K Factor = 5.44	
212 to 213	54.190 55.190	5.44	16.61 16.61	1 1.101	O	5.0 0.0 0.0	1.460 5.000 6.460	150 0.0481	9.308 -0.433 0.311		K = K @ LIN1	Vel = 5.60
213 to 215	55.190 55.190		16.50 33.11	1.25 1.394		0.0 0.0 0.0	8.375 0.0 8.375	150 0.0548	9.186 0.0 0.459			Vel = 6.96
215			0.0 33.11						9.645		K Factor = 10.66	
214 to 215	54.190 55.190	5.44	17.00 17.0	1 1.101	O	5.0 0.0 0.0	1.460 5.000 6.460	150 0.0503	9.753 -0.433 0.325		K = K @ LIN1	Vel = 5.73
215 to 216	55.190 55.190		33.11 50.11	1.25 1.394	O	6.0 0.0 0.0	0.580 6.000 6.580	150 0.1179	9.645 0.0 0.776			Vel = 10.53
216			0.0 50.11						10.421		K Factor = 15.52	
217 to 217A	55.190 55.190	5.41	16.98 16.98	1 1.101	N	7.0 0.0 0.0	3.960 7.000 10.960	150 0.0503	9.851 0.0 0.551		K = K @ LIN2	Vel = 5.72
217A to 216	55.190 55.190		0.0 16.98	2 2.003		0.0 0.0 0.0	7.080 0.0 7.080	150 0.0027	10.402 0.0 0.019			Vel = 1.73
216 to 221	55.190 55.190		50.11 67.09	2 2.003		0.0 0.0 0.0	12.170 0.0 12.170	150 0.0347	10.421 0.0 0.422			Vel = 6.83
221			0.0 67.09						10.843		K Factor = 20.37	
218 to 219	54.190 54.190	5.44	17.07 17.07	1.25 1.394		0.0 0.0 0.0	8.375 0.0 8.375	150 0.0161	9.826 0.0 0.135		K = K @ LIN1	Vel = 3.59

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 *****
219 to 220	54.190 54.190	5.44	17.18 34.25	1.25 1.394		0.0 0.0	8.375 0.0	150	9.961 0.0	K = K @ LIN1
220 to 221	54.190 55.190	5.44	17.60 51.85	1.25 1.394	O	6.0 0.0	0.580 6.000	150	10.449 -0.433	K = K @ LIN1
221 to 225	55.190 55.190		67.09 118.94	2	O	10.0 0.0	11.210 10.000	150	10.843 0.0	Vel = 10.90
225 to 222	55.190 48.940		0.0 118.94						12.961	Vel = 12.11
222 to 224	48.940 55.190	5.44	18.49 18.49	1	5N	35.0 0.0	18.500 35.000	150	11.533 -2.707	K Factor = 33.04
224 to 223	55.190 54.190		0.0 18.49						11.974	K = K @ LIN1
223 to 224	54.190 55.190	5.44	18.81 18.81	1	O	5.0 0.0	2.830 5.000	150	11.932 -0.433	K Factor = 5.34
224 to 225	55.190 55.190		18.49 37.3	1		0.0 0.0	4.580 0.0	150	11.974 0.0	Vel = 6.34
225 to 205	55.190 55.190		118.93 156.23	2		0.0 0.0	6.625 6.625	150	12.961 0.0	Vel = 12.57
205 to 206	55.190 55.190		0.0 156.23	2	2N O	22.0 10.0	111.140 32.000	150	14.057 0.0	Vel = 15.91
206 to 207	55.190 55.190		0.0 156.23	2	B I S Fsp	7.384 4.307 12.307 13.537	6.790 37.535 44.325 0.0	120	37.739 3.000 7.726	Vel = 15.91
207 to 114	55.190 44.440		0.0 156.23	4	T	26.334 0.0	10.750 26.334	120	48.465 4.656	** Fixed Loss = 3
114 to TOR1	44.440 44.440		0.0 156.23	4	B 3I J	15.8 27.651 21.067	95.360 64.518 159.878	120	53.356 0.0 1.013	Vel = 3.52
TOR1 to HDR1	44.440 37.500		0.0 156.23	4	B S T	15.8 28.968 26.334	6.940 71.102 78.042	120	54.369 3.006 0.494	Vel = 3.52
HDR1 to BASE	37.500 34.500		0.0 156.23	4		0.0 0.0	9.250 0.0	120	57.869 9.299	** Fixed Loss = 8
BASE to TEST	34.500 34.500		0.0 156.23	6	E T 2G	20.084 43.037 8.607	40.000 71.728 111.728	140	67.227 0.0 0.089	Vel = 3.52
TEST	34.500		156.23	6.16		8.607	111.728	0.0008	0.089	Vel = 1.68

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	*****
TEST			250.00 406.23									Qa = 250.00 K Factor = 49.51