



. . . Fire Protection by Computer Design

Accendo Fire Protection, LLC
38 Additon Road
Greene, Maine 04236
207-946-6182

Job Name : BEDECS MOB SECOND FLOOR MOST REMOTE
Drawing : 2
Location : 1945 CONGRESS STREET PORTLAND, MAINE
Remote Area : 1
Contract : 17-1015
Data File : 1-17-1015 SECOND FLOOR MOST REMOTE.WXF

HYDRAULIC CALCULATIONS
for

Project name: BEDECS MOB
Location: 1945 CONGRESS STREET PORTLAND, MAINE
Drawing no: 2
Date: 8/22/17

Design

Remote area number: 1
Remote area location: SECOND FLOOR MOST REMOTE
Occupancy classification: LIGHT
Density: .10 - Gpm/SqFt
Area of application: 981 - SqFt
Coverage per sprinkler: 122 - SqFt
Type of sprinklers calculated: QR K5.6 1/2" BRASS UPRIGHTS
No. of sprinklers calculated: 10
In-rack demand: - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 259.484 - GPM @ 33.287 - Psi
Type of system: WET
Volume of dry or preaction system: - Gal

Water supply information

Date: 9/28/2000
Location: 150'-0" FROM THE BUILDING
Source: THE PORTLAND WATER DISTRICT

Name of contractor: ACCENDO FIRE PROTECTION LLC
Address: 38 ADDITON ROAD GREENE, MAINE 04236
Phone number: 946-6182
Name of designer: CKD
Authority having jurisdiction: SFM, PORTLAND
Notes: (Include peaking information or gridded systems here.)
REMOTE AREA REVISED PER NFPA 13 SECTION 11.2.3.2.3.1

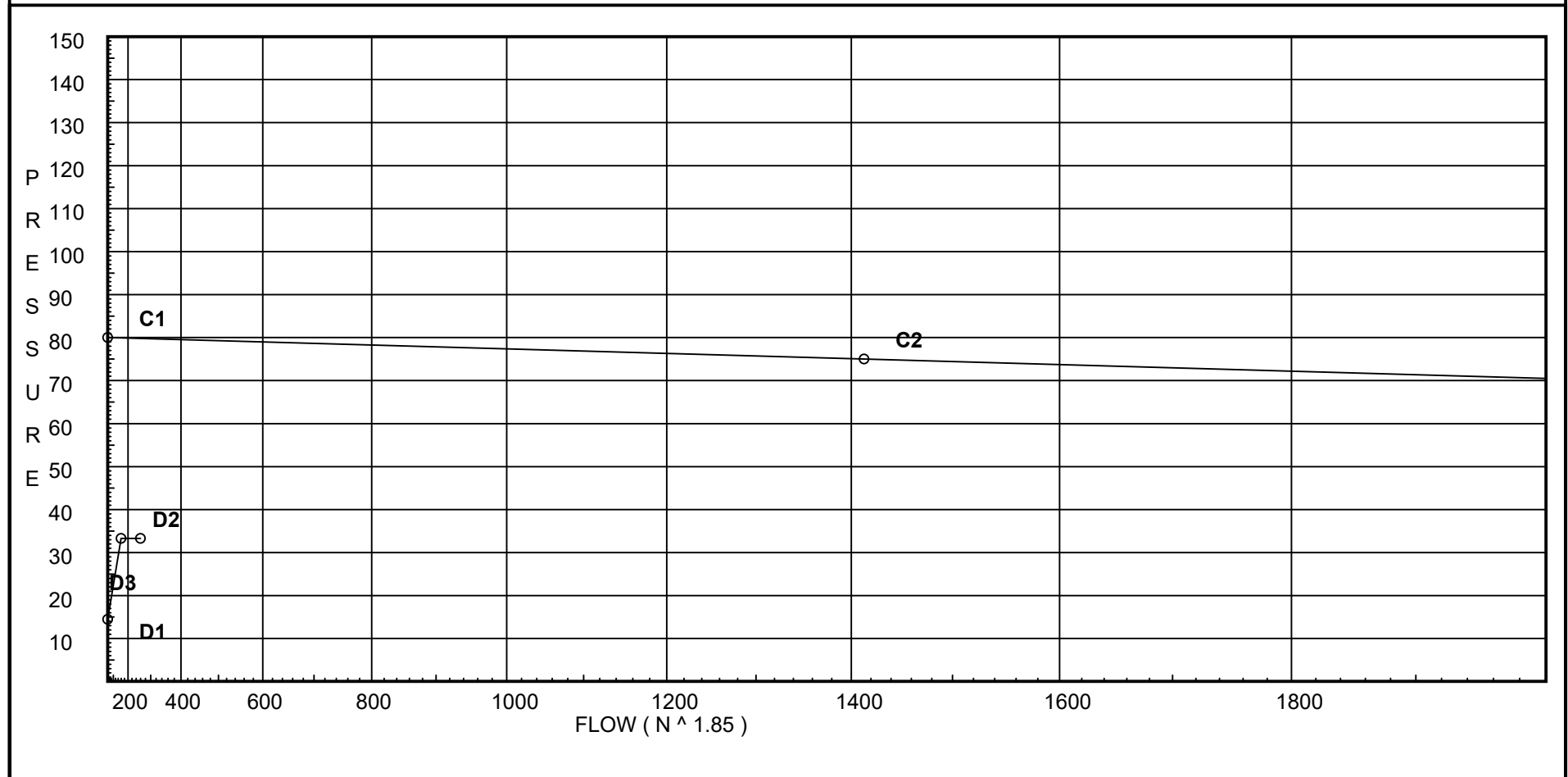
Water Supply Curve C

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City Water Supply:
C1 - Static Pressure : 80
C2 - Residual Pressure: 75
C2 - Residual Flow : 1413

Demand:
D1 - Elevation : 14.474
D2 - System Flow : 159.484
D2 - System Pressure : 33.287
Hose (Demand) : 100
D3 - System Demand : 259.484
Safety Margin : 46.495



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	0	0	0	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
L	NFPA 13 Long Turn Elbow	0.5	1	2	2	2	3	4	5	5	6	8	9	13	16	18	24	27	30	34	40
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
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.
SP1	0.0	5.6	7.0	na	14.82	0.1	148	7.0
1	131.42	K = K @ L1	7.52	na	14.82			
2	131.42	K = K @ L1	7.59	na	14.88			
3	131.42	K = K @ L1	7.81	na	15.1			
4	131.42	K = K @ L1	7.66	na	14.95			
4A	131.42		8.3	na				
5	131.42	K = K @ L1	9.5	na	16.65			
6	131.42	K = K @ L1	8.93	na	16.15			
7	131.42	K = K @ L1	9.52	na	16.66			
8	131.42	K = K @ L1	9.42	na	16.58			
9	131.42	K = K @ L1	9.49	na	16.64			
10	131.42	K = K @ L1	9.98	na	17.06			
A	131.42		10.04	na				
B	131.42		10.04	na				
C	131.42		10.04	na				
D	131.42		10.08	na				
H	131.42		10.18	na				
E	131.42		10.26	na				
F	131.42		10.31	na				
G	131.42		10.35	na				
M	131.42		10.85	na				
N	131.42		11.63	na				
Q	131.42		11.88	na				
R	108.33		22.13	na				
TOR	108.33		22.72	na				
HDR	102.0		25.78	na				
HDR1	102.0		25.97	na				
BASE	101.0		31.81	na				
TEST	98.0		33.29	na	100.0			

The maximum velocity is 8.63 and it occurs in the pipe between nodes 4A and B

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	*****
SP1 to L1	0 0	5.60	14.82 14.82	1 1.049	T 0.0	5.0 0.0 7.000	120 0.0747	7.000 0.0 0.523		Vel = 5.50	
L1			0.0 14.82					7.523		K Factor = 5.40	
1 to 2	131.420 131.420	5.4	14.82 14.82	1.5 1.682	0.0 0.0	8.370 0.0 8.370	120 0.0075	7.523 0.0 0.063		K = K @ L1 Vel = 2.14	
2 to 3	131.420 131.420	5.4	14.87 29.69	1.5 1.682	0.0 0.0	8.370 0.0 8.370	120 0.0271	7.586 0.0 0.227		K = K @ L1 Vel = 4.29	
3 to 4A	131.420 131.420	5.4	15.10 44.79	1.5 1.682	0.0 0.0	8.420 0.0 8.420	120 0.0580	7.813 0.0 0.488		K = K @ L1 Vel = 6.47	
4A			0.0 44.79					8.301		K Factor = 15.55	
4 to 4A	131.420 131.420	5.4	14.95 14.95	1 1.049	T 0.0	5.0 0.0 8.460	120 0.0759	7.659 0.0 0.642		K = K @ L1 Vel = 5.55	
4A to B	131.420 131.420		44.79 59.74	1.5 1.682	T 0.0	9.9 0.0 17.570	120 0.0989	8.301 0.0 1.737		Vel = 8.63	
B			0.0 59.74					10.038		K Factor = 18.86	
5 to A	131.420 131.420	5.4	16.65 16.65	1 1.049	T 0.0	5.0 0.0 5.830	120 0.0928	9.497 0.0 0.541		K = K @ L1 Vel = 6.18	
A			0.0 16.65					10.038		K Factor = 5.26	
6 to C	131.420 131.420	5.4	16.14 16.14	1 1.049	T 0.0	5.0 0.0 12.670	120 0.0875	8.933 0.0 1.109		K = K @ L1 Vel = 5.99	
C			0.0 16.14					10.042		K Factor = 5.09	
7 to C	131.420 131.420	5.4	16.66 16.66	1 1.049	T 0.0	5.0 0.0 5.670	120 0.0928	9.516 0.0 0.526		K = K @ L1 Vel = 6.18	
C			0.0 16.66					10.042		K Factor = 5.26	
8 to 9	131.420 131.420	5.4	16.58 16.58	1.5 1.682	0.0 0.0	8.370 0.0 8.370	120 0.0092	9.417 0.0 0.077		K = K @ L1 Vel = 2.39	
9 to D	131.420 131.420	5.4	16.64 33.22	1.5 1.682	T 0.0	9.9 0.0 17.610	120 0.0334	9.494 0.0 0.588		K = K @ L1 Vel = 4.80	
D			0.0 33.22					10.082		K Factor = 10.46	
10 to D	131.420 131.420	5.4	17.06 17.06	1.5 1.682	T 0.0	9.9 0.0 10.570	120 0.0097	9.979 0.0 0.103		K = K @ L1 Vel = 2.46	

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			0.0 17.06					10.082		K Factor = 5.37	
A to B	131.420 131.420		16.65 16.65	4 4.26	0.0 0.0	3.460 0.0	120 0	10.038 0.0		Vel = 0.37	
B to C	131.420 131.420		59.74 76.39	4 4.26	0.0 0.0	2.500 2.500	120 0.0016	10.038 0.004		Vel = 1.72	
C to D	131.420 131.420		32.81 109.2	4 4.26	0.0 0.0	12.170 0.0	120 0.0033	10.042 0.040		Vel = 2.46	
D to H	131.420 131.420		50.28 159.48	4 4.26	0.0 0.0	14.670 0.0	120 0.0066	10.082 0.097		Vel = 3.59	
H to E	131.420 131.420		0.0 159.48	4 4.26	0.0 0.0	11.920 0.0	120 0.0065	10.179 0.078		Vel = 3.59	
E to F	131.420 131.420		0.0 159.48	4 4.26	0.0 0.0	7.750 0.0	120 0.0066	10.257 0.051		Vel = 3.59	
F to G	131.420 131.420		0.0 159.48	4 4.26	0.0 0.0	6.420 6.420	120 0.0065	10.308 0.042		Vel = 3.59	
G to M	131.420 131.420		0.0 159.48	4 4.26	T 0.0	26.334 26.334	120 0.0066	10.350 0.503		Vel = 3.59	
M to N	131.420 131.420		0.0 159.48	4 4.26	B S L T 15.8 28.968 7.9 26.334	39.000 79.002 118.002	120 0.0066	10.853 0.0 0.777		Vel = 3.59	
N to Q	131.420 131.420		0.0 159.48	4 4.26	T 0.0	26.334 26.334	120 0.0066	11.630 0.250		Vel = 3.59	
Q to R	131.420 108.330		0.0 159.48	4 4.26	T 0.0	26.334 37.504	120 0.0066	11.880 10.000 0.248		Vel = 3.59	
R to TOR	108.330 108.330		0.0 159.48	4 4.26	4L 0.0	31.601 31.601	120 0.0066	22.128 0.592		Vel = 3.59	
TOR to HDR	108.330 102		0.0 159.48	4 4.26	T B 0.0	26.334 15.8 48.464	120 0.0066	22.720 2.742 0.318		Vel = 3.59	
HDR to HDR1	102 102		0.0 159.48	4 4.26	T 0.0	26.334 26.334	120 0.0066	25.780 0.187		Vel = 3.59	
HDR1 to BASE	102 101		0.0 159.48	4 4.26	E Zca 0.0	13.167 0.0	120 0.0066	25.967 5.716 0.126		** Fixed Loss = 5.283 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	*****
BASE to TEST	101 98		0.0 159.48	6 6.16	E G T	20.084 4.304 43.037	150.000 67.425 217.425	140 1.299 0.179		Vel = 1.72	
TEST			100.00 259.48					33.287		Qa = 100.00 K Factor = 44.97	