

. . . Fire Protection by Computer Design

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

Job Name : SALVATION ARMY DINNING HALL
Drawing : 1 OF 1
Location : PORTLAND, ME.
Remote Area : 1
Contract : 5659
Data File : KITCHEN-DINING HALL CALC..WXF

HYDRAULIC CALCULATIONS
for

Project name: SALVATION ARMY DINNING HALL

Location: PORTLAND, ME.

Drawing no: 1 OF 1

Date: 8/1/17

Design

Remote area number: 1

Remote area location: KITCHEN/DINING

Occupancy classification: LIGHT HAZZARD/ OHI

Density: .1/ .15 - Gpm/SqFt

Area of application: 1,638 - SqFt

Coverage per sprinkler: 130/225 - SqFt

Type of sprinklers calculated: RELIABLE F1FR56 200* K=5.6 STANDARD RESPONSE

No. of sprinklers calculated: 17

In-rack demand: - GPM

Hose streams: 250 - GPM

Total water required (including hose streams): 647.778 - GPM @ 75.544 - Psi

Type of system: WET

Volume of dry or preaction system: - Gal

Water supply information

Date: 11/2/2016

Location: 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: ERIC MELANSON

Authority having jurisdiction: STATE FIRE MARSHAL

Notes: (Include peaking information or gridded systems here.)

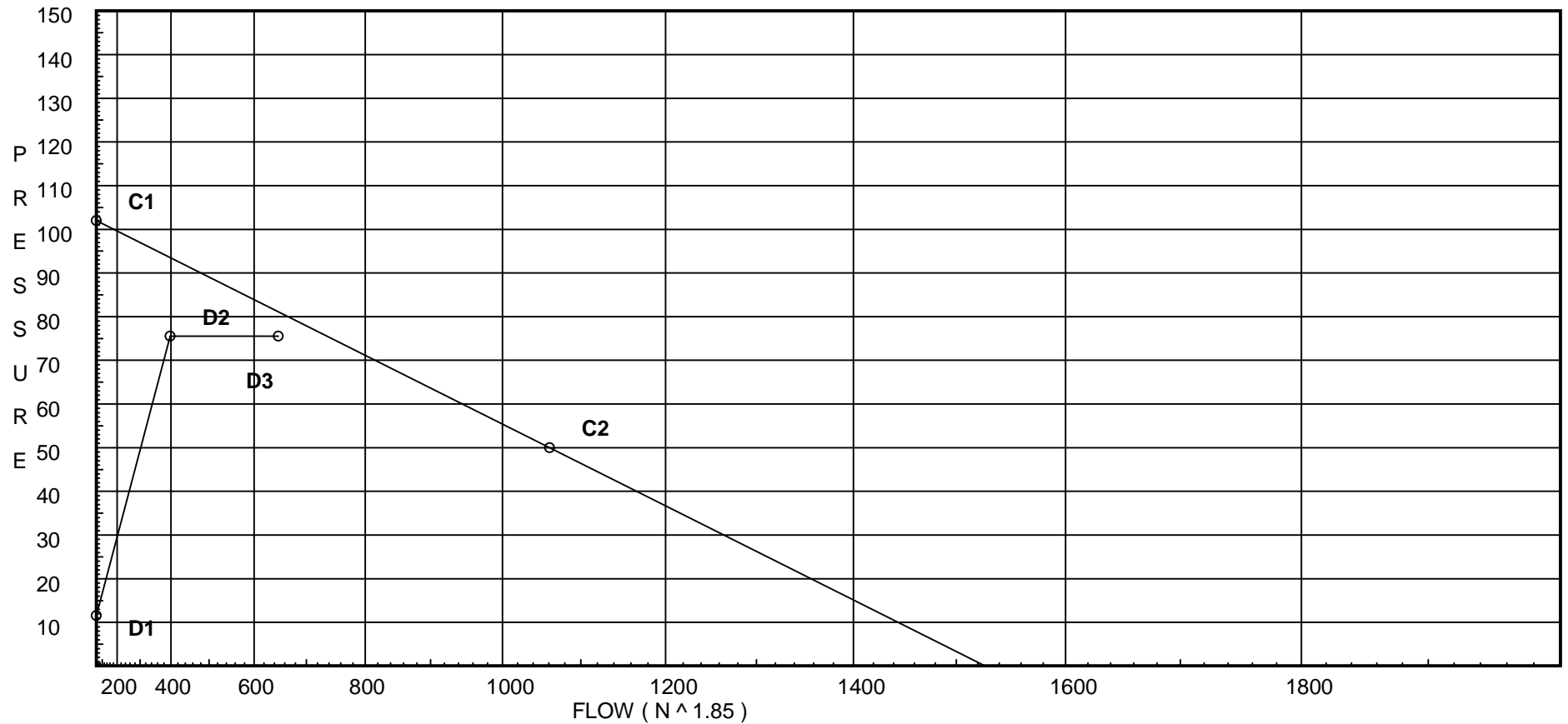
Water Supply Curve C

EASTERN FIRE PROTECTION
SALVATION ARMY DINNING HALL

Page 2
Date 8/1/17

City Water Supply:
C1 - Static Pressure : 102
C2 - Residual Pressure: 50
C2 - Residual Flow : 1061

Demand:
D1 - Elevation : 11.551
D2 - System Flow : 397.778
D2 - System Pressure : 75.544
Hose (Demand) : 250
D3 - System Demand : 647.778
Safety Margin : 5.584



Fittings Used Summary

EASTERN FIRE PROTECTION
SALVATION ARMY DINNING HALL

Page 3
Date 8/1/17

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
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
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' EII Firelock #001	0	0	0	0	0	3.5	4.3	5	0	6.8	8.5	10	13	0	0	0	0	0	0	0

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	102.0	50	1061.0	81.128	647.78	75.544

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
HEAD	0.0	5.6	12.13	19.5	
1	110.0	4.09	29.79	22.35	K=K @ FLEX
2	110.0	4.09	30.27	22.53	K=K @ FLEX
2A	110.67		34.33		
3	116.67	5.6	16.14	22.5	
4	116.67	5.6	16.65	22.85	
5	110.0	5.6	20.74	25.5	
6	110.67		22.11		
7	110.0	4.09	23.81	19.98	K=K @ FLEX
8	110.0	4.09	28.26	21.77	K=K @ FLEX
9	110.67		34.34		
10	116.96	5.6	18.83	24.3	
11	116.96	5.6	19.42	24.68	
12	110.0	4.09	27.43	21.45	K=K @ FLEX
13	110.0	4.09	29.85	22.37	K=K @ FLEX
14	110.67		34.61		
15	110.0	4.09	33.91	23.84	K=K @ FLEX
16	110.67		34.79		
17	110.0	5.6	28.7	30.0	
18	110.67		30.03		
19	110.0	4.09	29.58	22.27	K=K @ FLEX
20	110.67		30.22		
21	110.0	4.09	32.03	23.17	K=K @ FLEX
22	110.67		35.43		
23	110.0	4.09	34.28	23.97	K=K @ FLEX
24	110.0	4.09	35.07	24.25	K=K @ FLEX
25	110.67		36.18		
26	103.167		48.14		
BFP	102.83		56.55		
BASE	100.0		68.03		
MAIN	100.0		71.15	250.0	
TEST	90.0		75.54		

Final Calculations - Hazen-Williams - 2007

EASTERN FIRE PROTECTION
SALVATION ARMY DINNING HALL

Page 5
Date 8/1/17

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	*****
HEAD to FLEX	0 0	5.60	19.50 19.5	1 1.049	E T 0.0	2.0 5.0 0.0	78.000 7.000 85.000	120	12.125 0.0 10.555	Vel = 7.24	
FLEX			0.0 19.50						22.680	K Factor = 4.09	
1 to 2	110 110	4.09	22.35 22.35	1 1.049		0.0 0.0 0.0	3.000 0.0 3.000	120	29.790 0.0 0.479	K = K @ FLEX Vel = 8.30	
2 to 2A	110 110.670	4.09	22.53 44.88	1 1.049	T 0.0	5.0 0.0 0.0	2.500 5.000 7.500	120	30.269 -0.290 4.353	K = K @ FLEX Vel = 16.66	
2A to 9	110.670 110.670		0.0 44.88	3 3.26		0.0 0.0 0.0	4.290 0.0 4.290	120	34.332 0.0 0.010	Vel = 1.73	
9			0.0 44.88						34.342	K Factor = 7.66	
3 to 4	116.670 116.670	5.60	22.50 22.5	1.25 1.442		0.0 0.0 0.0	14.750 0.0 14.750	120	16.143 0.0 0.507	Vel = 4.42	
4 to 6	116.670 110.670	5.60	22.85 45.35	1.25 1.442	2l	7.432 0.0 0.0	15.333 7.432 22.765	120	16.650 2.599 2.860	Vel = 8.91	
6			0.0 45.35						22.109	K Factor = 9.64	
5 to 6	110 110.670	5.60	25.50 25.5	1 1.049	T 0.0	5.0 0.0 0.0	3.125 5.000 8.125	120	20.741 -0.290 1.658	Vel = 9.47	
6 to 7	110.670 110		45.35 70.85	1.25 1.442		0.0 0.0 0.0	4.920 0.0 4.920	120	22.109 0.290 1.411	Vel = 13.92	
7 to 8	110 110	4.09	19.98 90.83	1.25 1.442		0.0 0.0 0.0	9.790 0.0 9.790	120	23.810 0.0 4.447	K = K @ FLEX Vel = 17.84	
8 to 9	110 110.670	4.09	21.77 112.6	1.25 1.442	T 0.0	7.432 0.0 0.0	2.000 7.432 9.432	120	28.257 -0.290 6.375	K = K @ FLEX Vel = 22.12	
9 to 14	110.670 110.670		44.88 157.48	3 3.26		0.0 0.0 0.0	11.375 0.0 11.375	120	34.342 0.0 0.269	Vel = 6.05	
14			0.0 157.48						34.611	K Factor = 26.77	
10 to 11	116.960 116.960	5.60	24.30 24.3	1.25 1.442		0.0 0.0 0.0	14.750 0.0 14.750	120	18.831 0.0 0.585	Vel = 4.77	
11 to 12	116.960 110	5.60	24.68 48.98	1.25 1.442	3l	11.148 0.0 0.0	23.375 11.148 34.523	120	19.416 3.014 5.001	Vel = 9.62	
12 to 13	110 110	4.09	21.44 70.42	1.25 1.442		0.0 0.0 0.0	8.540 0.0 8.540	120	27.431 0.0 2.423	K = K @ FLEX Vel = 13.83	

Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION
SALVATION ARMY DINNING HALL

Page 6
Date 8/1/17

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	*****
13 to 14	110 110.670	4.09	22.37 92.79	1.25 1.442	T 0.0	7.432 7.432	120	29.854 -0.290		K = K @ FLEX	
14 to 16	110.670 110.670		157.48 250.27	3 3.26	0.0 0.0	3.170 3.170	120	34.611 0.0		Vel = 18.23	
16			0.0 250.27					34.788		K Factor = 42.43	
15 to 16	110 110.670	4.09	23.84 23.84	1 1.049	T 0.0	5.0 5.000	120	33.907 -0.290		K = K @ FLEX	
16 to 22	110.670 110.670		250.27 274.11	3 3.26	0.0 0.0	9.670 9.670	120	34.788 0.0		Vel = 8.85	
22			0.0 274.11					35.426		K Factor = 46.05	
17 to 18	110 110.670	5.60	30.00 30.0	1 1.049	T 0.0	5.0 5.000	120	28.698 -0.290		Vel = 11.14	
18 to 20	110.670 110.670		0.0 30.0	1.25 1.442	0.0 0.0	3.375 3.375	120	30.027 0.0		Vel = 5.89	
20			0.0 30.00					30.224		K Factor = 5.46	
19 to 20	110 110.670	4.09	22.27 22.27	1 1.049	T 0.0	5.0 5.000	120	29.582 -0.290		K = K @ FLEX	
20 to 21	110.670 110		30.00 52.27	1.25 1.442	0.0 0.0	9.290 9.290	120	30.224 0.290		Vel = 8.27	
21 to 22	110 110.670	4.09	23.17 75.44	1.25 1.442	T 0.0	7.432 7.432	120	32.033 -0.290		Vel = 10.27	
22 to 25	110.670 110.670		274.12 349.56	3 3.26	0.0 0.0	7.290 7.290	120	35.426 0.0		Vel = 14.82	
25			0.0 349.56					36.180		K Factor = 58.11	
23 to 24	110 110	4.09	23.97 23.97	1.25 1.442	2I 0.0	7.432 7.432	120	34.278 0.0		K = K @ FLEX	
24 to 25	110 110.670	4.09	24.25 48.22	1.25 1.442	T 0.0	7.432 7.432	120	35.072 -0.290		Vel = 4.71	
25 to 26	110.670 103.167		349.56 397.78	3 3.26	3V T 0.0	20.159 20.159 66.313	120	36.180 3.250 8.713		Vel = 9.47	
26								0.1314		Vel = 15.29	

Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION
SALVATION ARMY DINNING HALL

Page 7
Date 8/1/17

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	*****
26 to BFP	103.167 102.830		0.0 397.78	3 3.26	3V T	20.159 20.159 0.0	22.530 40.318 62.848	120 0.146 8.259		Vel = 15.29	
BFP to BASE	102.830 100		0.0 397.78	3 3.26	V	6.72 0.0 0.0	2.830 6.720 9.550	120 56.548 10.226 1.255		** Fixed Loss = 9 Vel = 15.29	
BASE to MAIN	100 100		0.0 397.78	4 4.1	G E T	2.907 14.534 29.067	50.000 46.508 96.508	140 0.0 3.122		Vel = 9.67	
MAIN to TEST	100 90	H250	250.00 647.78	16 16.41	T	166.859 0.0 0.0	500.000 166.860 666.860	140 71.151 4.331 0.062		Vel = 0.98	
TEST			0.0 647.78					75.544		K Factor = 74.53	