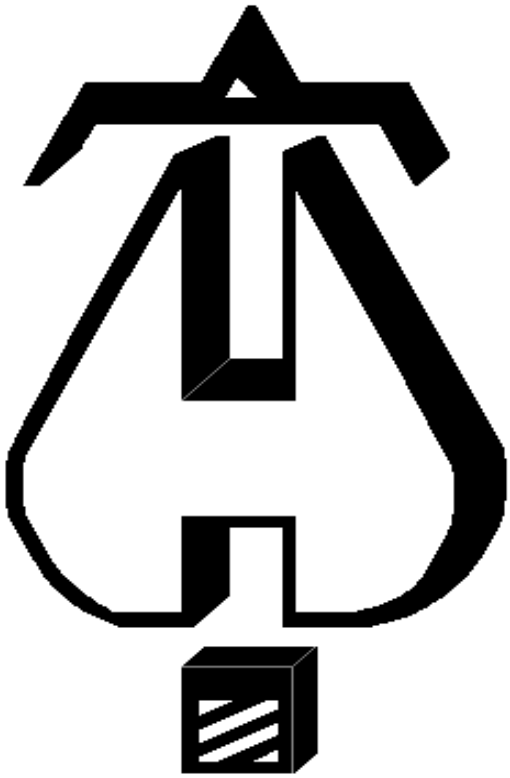


. . . Fire Protection by Computer Design

Eastern Fire Protection
170 Kitty Hawk Ave.
P.O. Box 1390
Auburn, Maine, 04211
207-784-1507

Job Name	:	MAINE EYE CENTER SECOND FLOOR PROOF CALCULATION
Drawing	:	2 OF 2
Location	:	161 MARGINAL WAY, PORTLAND, MAINE
Remote Area	:	TWO
Contract	:	5501-16
Data File	:	MAINE EYE SECOND FLOOR PROOF SUBMITTAL .WXF

HYDRAULIC CALCULATIONS
for

Project name: MAINE EYE CENTER SECOND FLOOR PROOF CALCULATION
Location: 161 MARGINAL WAY, PORTLAND, MAINE
Drawing no: 2 OF 2
Date: 7/26/16

Design

Remote area number: TWO
Remote area location: SECOND FLOOR
Occupancy classification: LIGHT
Density: .10 - Gpm/SqFt
Area of application: 1112 - SqFt
Coverage per sprinkler: 148 - SqFt
Type of sprinklers calculated: 1/2" K=5.6 RELIABE F1FR CHROME PENDENT
No. of sprinklers calculated: 12
In-rack demand: - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 351.25 - GPM @ 102.87 - Psi
Type of system: WET
Volume of dry or preaction system: - Gal

Water supply information

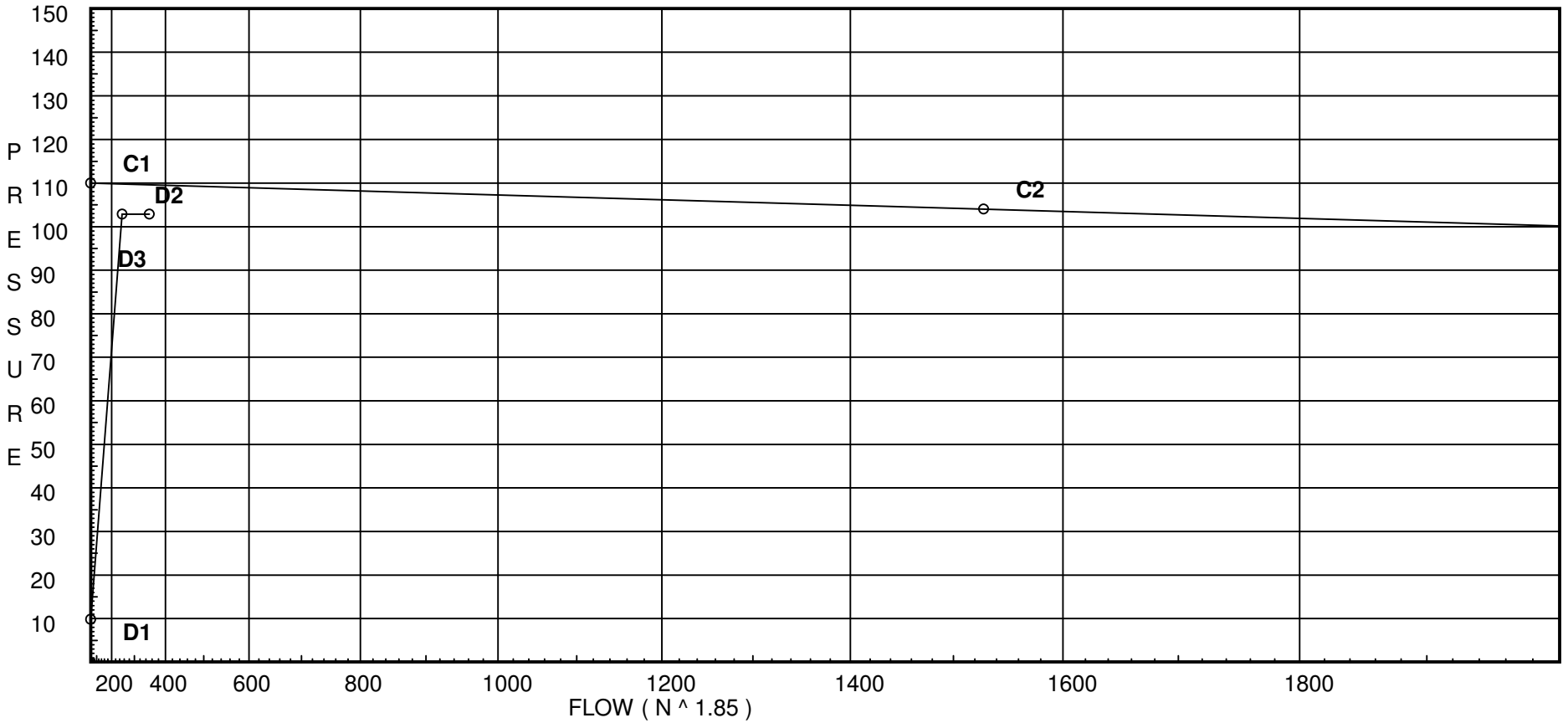
Date: 5/31/2016
Location: HYDRANT LOCATED ON MARGINAL WAY
Source: PORTLAND WATER DISTRICT

Name of contractor: Eastern Fire Protection
Address: 170 Kitty Hawk Ave. / P.O. Box 1390 / Auburn, Maine, 04211
Phone number: 207-784-1507
Name of designer: WAF
Authority having jurisdiction: STATE FIRE MARSHAL, PORTLAND FIRE DEPARTMENT
Notes: (Include peaking information or gridded systems here.)
NOTE: REMOTE AREA MODIFIED PER NFPA 13 SECTION 11.2.3.2.3.1

City Water Supply:
- C1 - Static Pressure : 110
- C2 - Residual Pressure: 104
- C2 - Residual Flow : 1528

Demand:

D1 - Elevation	: 9.818
D2 - System Flow	: 251.253
D2 - System Pressure	: 102.874
Hose (Demand)	: 100
D3 - System Demand	: 351.253
Safety Margin	: 6.731



Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	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
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
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
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	110.0	104	1528.0	109.605	351.25	102.874

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
D1	0.0	5.6	7.0	14.82	
200	122.67	4.06	13.35	14.82	K=K @ L1
201	122.67	4.06	13.98	15.16	K=K @ L1
202	122.67	4.06	16.82	16.63	K=K @ L1
203	122.67	4.06	24.14	19.92	K=K @ L1
205	122.67	4.06	28.94	21.81	K=K @ L1
204	122.67	4.06	31.03	22.59	K=K @ L1
207	122.67	4.06	17.95	17.18	K=K @ L1
208	122.67	4.06	18.78	17.57	K=K @ L1
209	122.67	4.06	23.12	19.5	K=K @ L1
210	122.67	4.06	33.01	23.3	K=K @ L1
211	122.67		40.46		
213	122.67	4.06	58.04	30.89	K=K @ L1
214	122.67	4.06	61.78	31.87	K=K @ L1
215	122.67		63.01		
212	122.67		58.07		
216	122.67		64.74		
217	122.67		68.19		
114	109.0		79.01		
A	109.0		81.23		
TOR	109.0		83.62		
B1	109.0		93.69		
BASE	101.0		102.14		
TEST	100.0		102.87	100.0	

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 ******
D1	0	5.60	14.82	1	E	2.0	78.000	120	7.000	
to					T	5.0	7.000		0.0	
L1	0		14.82	1.049		0.0	85.000	0.0747	6.350	Vel = 5.50
			0.0							
L1			14.82						13.350	K Factor = 4.06
200	122.670	4.06	14.82	1		0.0	8.460	120	13.350	K = K @ L1
to						0.0	0.0		0.0	
201	122.670		14.82	1.049		0.0	8.460	0.0747	0.632	Vel = 5.50
201	122.670	4.06	15.16	1		0.0	10.330	120	13.982	K = K @ L1
to						0.0	0.0		0.0	
202	122.670		29.98	1.049		0.0	10.330	0.2751	2.842	Vel = 11.13
202	122.670	4.06	16.63	1	2E	4.0	7.750	120	16.824	K = K @ L1
to						0.0	4.000		0.0	
203	122.670		46.61	1.049		0.0	11.750	0.6226	7.316	Vel = 17.30
203	122.670	4.06	19.93	1.25	T	6.0	9.170	120	24.140	K = K @ L1
to						0.0	6.000		0.0	
205	122.670		66.54	1.38		0.0	15.170	0.3163	4.798	Vel = 14.27
205	122.670	4.06	21.81	1.25		0.0	3.920	120	28.938	K = K @ L1
to						0.0	0.0		0.0	
204	122.670		88.35	1.38		0.0	3.920	0.5344	2.095	Vel = 18.95
204	122.670	4.06	22.59	1.25	T	6.0	5.580	120	31.033	K = K @ L1
to						0.0	6.000		0.0	
211	122.670		110.94	1.38		0.0	11.580	0.8144	9.431	Vel = 23.80
			0.0							
211			110.94						40.464	K Factor = 17.44
207	122.670	4.06	17.18	1		0.0	8.460	120	17.948	K = K @ L1
to						0.0	0.0		0.0	
208	122.670		17.18	1.049		0.0	8.460	0.0982	0.831	Vel = 6.38
208	122.670	4.06	17.57	1		0.0	12.000	120	18.779	K = K @ L1
to						0.0	0.0		0.0	
209	122.670		34.75	1.049		0.0	12.000	0.3616	4.339	Vel = 12.90
209	122.670	4.06	19.50	1		0.0	12.000	120	23.118	K = K @ L1
to						0.0	0.0		0.0	
210	122.670		54.25	1.049		0.0	12.000	0.8243	9.892	Vel = 20.14
210	122.670	4.06	23.30	1.25	2T	12.0	5.750	120	33.010	K = K @ L1
to						0.0	12.000		0.0	
211	122.670		77.55	1.38		0.0	17.750	0.4199	7.454	Vel = 16.63
211	122.670		110.94	2	E	6.153	40.610	120	40.464	
to					2T	24.613	30.766		0.0	
212	122.670		188.49	2.157		0.0	71.376	0.2466	17.604	Vel = 16.55
			0.0							
212			188.49						58.068	K Factor = 24.74
213	122.670	4.06	30.89	1	T	5.0	7.870	120	58.038	K = K @ L1
to						0.0	5.000		0.0	
214	122.670		30.89	1.049		0.0	12.870	0.2909	3.744	Vel = 11.47

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 ******
214	122.670	4.06	31.88	2	T	10.0	20.960	120	61.782	K = K @ L1
to						0.0	10.000		0.0	
215	122.670		62.77	2.067		0.0	30.960	0.0397	1.229	Vel = 6.00
215	122.670		0.0	2	T	10.0	33.580	120	63.011	
to						0.0	10.000		0.0	
216	122.670		62.77	2.067		0.0	43.580	0.0397	1.730	Vel = 6.00
			0.0							
216			62.77						64.741	K Factor = 7.80
212	122.670		188.49	2.5	I	8.237	47.000	120	58.068	
to					T	16.474	24.711		0.0	
216	122.670		188.49	2.635		0.0	71.711	0.0931	6.673	Vel = 11.09
216	122.670		62.76	2.5	T	16.474	5.330	120	64.741	
to						0.0	16.474		0.0	
217	122.670		251.25	2.635		0.0	21.804	0.1584	3.453	Vel = 14.78
217	122.670		0.0	3	3I	20.159	32.000	120	68.194	
to					2J	34.943	55.102		5.920	
114	109		251.25	3.26		0.0	87.102	0.0562	4.893	Vel = 9.66
114	109		0.0	3	2I	13.44	26.170	120	79.007	
to						0.0	13.440		0.0	
A	109		251.25	3.26		0.0	39.610	0.0562	2.225	Vel = 9.66
A	109		0.0	3	2I	13.44	11.580	120	81.232	
to					J	17.471	30.911		0.0	
TOR	109		251.25	3.26		0.0	42.491	0.0562	2.386	Vel = 9.66
TOR	109		0.0	3	B	13.44	104.120	120	83.618	
to					6I	40.319	75.262		0.0	
B1	109		251.25	3.26	S	21.503	179.382	0.0562	10.076	Vel = 9.66
B1	109		0.0	4	I	9.217	8.000	120	93.694	
to					Zcb	0.0	9.217		8.179	* * Fixed Loss = 4.714
BASE	101		251.25	4.26		0.0	17.217	0.0153	0.263	Vel = 5.66
BASE	101		0.0	6	L	12.911	100.000	140	102.136	
to					G	4.304	60.252		0.433	
TEST	100		251.25	6.16	T	43.037	160.252	0.0019	0.305	Vel = 2.70
			100.00							Qa = 100.00
TEST			351.25						102.874	K Factor = 34.63