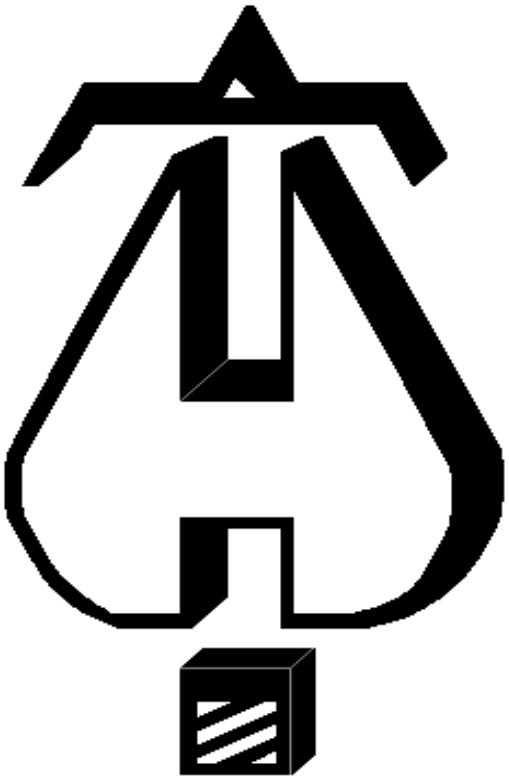


. . . Fire Protection by Computer Design

HIGH TECH FIRE PROTECTION
84 HACKETT MILLS ROAD
P.O. BOX 156
POLAND, ME 04274
207-998-2551

Job Name	:	16 MIDDLE STREET 1ST FLOOR FUTURE TENANT SPACE #3
Drawing	:	FP-01
Location	:	1ST FLOOR
Remote Area	:	#3
Contract	:	062216-2
Data File	:	1ST FLOOR FUTURE TENANT SPACE.WXF

HYDRAULIC CALCULATIONS
for

Project name: 16 MIDDLE STREET 1ST FLOOR FUTURE TENANT SPACE
Location: 1ST FLOOR
Drawing no: FP-01
Date: 7/26/17

Design

Remote area number: #3
Remote area location: 1ST FLOOR FUTURE MERCHANTILE TENANT SPACE
Occupancy classification: ORDINARY HAZARD GROUP 2
Density: .2 - Gpm/SqFt
Area of application: 1500 - SqFt
Coverage per sprinkler: 120 - SqFt
Type of sprinklers calculated: QUICK RESPONSE UPRIGHT
No. of sprinklers calculated: 13
In-rack demand: N/A - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 575.861 - GPM @ 85.1653 - Psi
Type of system: WET NFPA 13
Volume of dry or preaction system: N/A - Gal

Water supply information

Date: 10-14-2016
Location: CORNER OF THAMES AND INDIA STREET
Source: PORTLAND WATER DISTRICT

Name of contractor: HIGH TECH FIRE PROTECTION
Address: 84 HACKETT MILLS ROAD / P.O. BOX 156 / POLAND, ME 04274
Phone number: 207-998-2551
Name of designer: ED POULIN
Authority having jurisdiction: STATE OF MAINE / CITY OF PORTLAND
Notes: (Include peaking information or gridded systems here.)

Water Supply Curve (C)

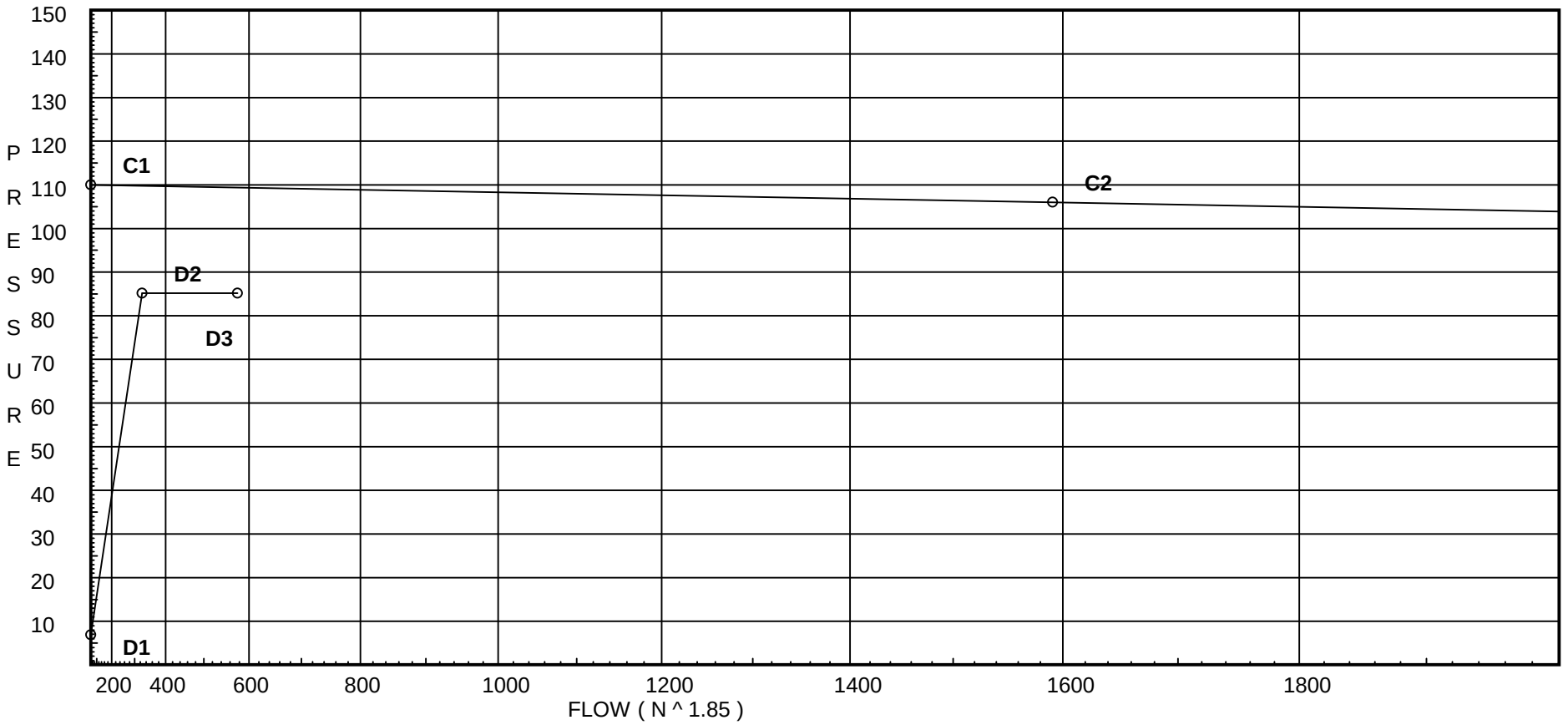
HIGH TECH FIRE PROTECTION
16 MIDDLE STREET 1ST FLOOR FUTURE TENANT SPACE #3

Date 7/26/17

City Water Supply:
- C1 - Static Pressure : 110
- C2 - Residual Pressure: 106
- C2 - Residual Flow : 1591

Demand:

D1 - Elevation	:	6.930
D2 - System Flow	:	325.861
D2 - System Pressure	:	85.165
Hose (Demand)	:	250
D3 - System Demand	:	575.861
Safety Margin	:	24.224



Fittings Used Summary

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
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
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
V	90' Ell Firelock #001	0	0	0	0	3.5	3.5	4.3	5	0	6.8	8.5	10	13	0	0	0	0	0	0	0
X	90'Tee-BranchFirelock002	0	0	0	0	8	8.5	10.8	13	0	16	21	25	33	0	0	0	0	0	0	0
Zib	Wilkins 350A	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

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
100	10.0	5.6	18.37	na	24.0	0.2	120	7.0
101	10.0	5.6	18.55	na	24.12	0.2	120	7.0
102	10.0	5.6	19.21	na	24.55	0.2	120	7.0
110	10.0	5.6	21.4	na	25.91	0.2	120	7.0
120	10.0	5.6	18.66	na	24.19	0.2	120	7.0
121	10.0	5.6	18.84	na	24.31	0.2	120	7.0
122	10.0	5.6	19.51	na	24.74	0.2	120	7.0
130	10.0	5.6	21.74	na	26.11	0.2	120	7.0
140	10.0	5.6	19.7	na	24.86	0.2	120	7.0
141	10.0	5.6	19.9	na	24.98	0.2	120	7.0
142	10.0	5.6	20.61	na	25.42	0.2	120	7.0
150	10.0	5.6	22.02	na	26.28	0.2	120	7.0
151	10.0	5.6	22.24	na	26.41	0.2	120	7.0
BA	10.0		21.67	na				
BB	10.0		22.01	na				
BC	10.0		23.23	na				
BD	10.0		51.32	na				
BE	10.0		68.29	na				
TOW	10.0		68.54	na				
BOW	4.0		75.15	na				
BASE	0.0		81.23	na				
H1	0.0		81.88	na				
H2	0.0		82.26	na				
H3	0.0		82.31	na	250.0			
TEST	-6.0		85.17	na				

The maximum velocity is 19.17 and it occurs in the pipe between nodes BC and BD

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
100	24.00	1.682		0.0	10.000	18.367		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
101	24.0	0.0183		0.0	10.000	0.183		Vel = 3.47
101	24.12	1.682		0.0	10.000	18.550		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
102	48.12	0.0663		0.0	10.000	0.663		Vel = 6.95
102	24.55	1.682	1T	9.9	7.400	19.213		K Factor = 5.60
to		120.0		0.0	9.900	0.0		
BA	72.67	0.1420		0.0	17.300	2.457		Vel = 10.49
	0.0							
	72.67					21.670		K Factor = 15.61
110	25.91	1.682	1T	9.9	2.750	21.403		K Factor = 5.60
to		120.0		0.0	9.900	0.0		
BA	25.91	0.0211		0.0	12.650	0.267		Vel = 3.74
	0.0							
	25.91					21.670		K Factor = 5.57
120	24.19	1.682		0.0	10.000	18.656		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
121	24.19	0.0186		0.0	10.000	0.186		Vel = 3.49
121	24.31	1.682		0.0	10.000	18.842		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
122	48.5	0.0672		0.0	10.000	0.672		Vel = 7.00
122	24.73	1.682	1T	9.9	7.400	19.514		K Factor = 5.60
to		120.0		0.0	9.900	0.0		
BB	73.23	0.1440		0.0	17.300	2.492		Vel = 10.57
	0.0							
	73.23					22.006		K Factor = 15.61
130	26.11	1.682	1T	9.9	2.750	21.736		K Factor = 5.60
to		120.0		0.0	9.900	0.0		
BB	26.11	0.0213		0.0	12.650	0.270		Vel = 3.77
	0.0							
	26.11					22.006		K Factor = 5.57
140	24.86	1.682		0.0	10.000	19.704		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
141	24.86	0.0196		0.0	10.000	0.196		Vel = 3.59
141	24.98	1.682		0.0	10.000	19.900		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
142	49.84	0.0707		0.0	10.000	0.707		Vel = 7.20
142	25.42	1.682	1T	9.9	7.400	20.607		K Factor = 5.60
to		120.0		0.0	9.900	0.0		
BC	75.26	0.1515		0.0	17.300	2.621		Vel = 10.87
	0.0							
	75.26					23.228		K Factor = 15.62
150	26.28	1.682		0.0	10.000	22.021		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
151	26.28	0.0216		0.0	10.000	0.216		Vel = 3.79
151	26.41	1.682	1T	9.9	2.750	22.237		K Factor = 5.60
to		120.0		0.0	9.900	0.0		
BC	52.69	0.0783		0.0	12.650	0.991		Vel = 7.61

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
	0.0							
	52.69					23.228		K Factor = 10.93
BA	98.57	2.635		0.0	12.000	21.670		
to		120.0		0.0	0.0	0.0		
BB	98.57	0.0280		0.0	12.000	0.336		Vel = 5.80
BB	99.34	2.635		0.0	12.000	22.006		
to		120.0		0.0	0.0	0.0		
BC	197.91	0.1018		0.0	12.000	1.222		Vel = 11.64
BC	127.95	2.635	2X	29.654	80.000	23.228		
to		120.0		0.0	29.654	0.0		
BD	325.86	0.2562		0.0	109.654	28.092		Vel = 19.17
BD	0.0	2.635	1Fsp	0.0	1.000	51.320		
to		120.0	1B	9.61	53.541	3.000		* Fixed loss = 3
BE	325.86	0.2562	1E	8.237	54.541	13.973		Vel = 19.17
			1S	19.22				
			1T	16.474				
BE	0.0	4.26	1V	8.954	1.000	68.293		
to		120.0		0.0	8.954	0.0		
TOW	325.86	0.0247		0.0	9.954	0.246		Vel = 7.34
TOW	0.0	4.26	1B	15.8	4.000	68.539		
to		120.0	1Fsp	0.0	36.867	5.599		* Fixed loss = 3
BOW	325.86	0.0247	1X	21.067	40.867	1.009		Vel = 7.34
BOW	0.0	4.26	1Zib	0.0	3.000	75.147		
to		120.0	1X	21.067	21.067	5.486		* Fixed loss = 3.753
BASE	325.86	0.0247		0.0	24.067	0.594		Vel = 7.34
BASE	0.0	6.16	2E	40.168	125.000	81.227		
to		140.0	1T	43.037	87.509	0.0		
H1	325.86	0.0031	1G	4.304	212.509	0.654		Vel = 3.51
H1	0.0	8.27	1T	55.354	460.000	81.881		
to		140.0		0.0	55.354	0.0		
H2	325.86	0.0007		0.0	515.354	0.379		Vel = 1.95
H2	0.0	12.34	1T	93.767	360.000	82.260		
to		140.0		0.0	93.767	0.0		
H3	325.86	0.0001		0.0	453.767	0.047		Vel = 0.87
H3	250.00	6.16	1E	20.084	5.000	82.307		Qa = 250
to		140.0	1G	4.304	24.388	2.599		
TEST	575.86	0.0088		0.0	29.388	0.259		Vel = 6.20
	0.0							
	575.86					85.165		K Factor = 62.40