



... 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 : 17 Chestnut Street 1st floor updated water info
Drawing : FP-01
Location : 1st Floor Office Space
Remote Area : #1
Contract :
Data File : 1st floor calc.WXF

HYDRAULIC CALCULATIONS
for

Project name: 17 Chestnut Street 1st floor
Location: 1st Floor Office Space
Drawing no: FP-01
Date: 7-7-16

Design

Remote area number: #1
Remote area location: 1st floor offices
Occupancy classification: Light Hazard
Density: .1 - Gpm/SqFt
Area of application: 900 - SqFt
Coverage per sprinkler: 256 / 225 - SqFt
Type of sprinklers calculated: Extended Coverage HSW and Standard Pendants
No. of sprinklers calculated: 5
In-rack demand: n/a - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 246 - GPM @ 62 - Psi
Type of system: Wet NFPA 13
Volume of dry or preaction system: n/a - Gal

Water supply information

Date: 07-06-16
Location: Corner of Cumberland and Chestnut 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
17 Chestnut Street 1st floor updated water info

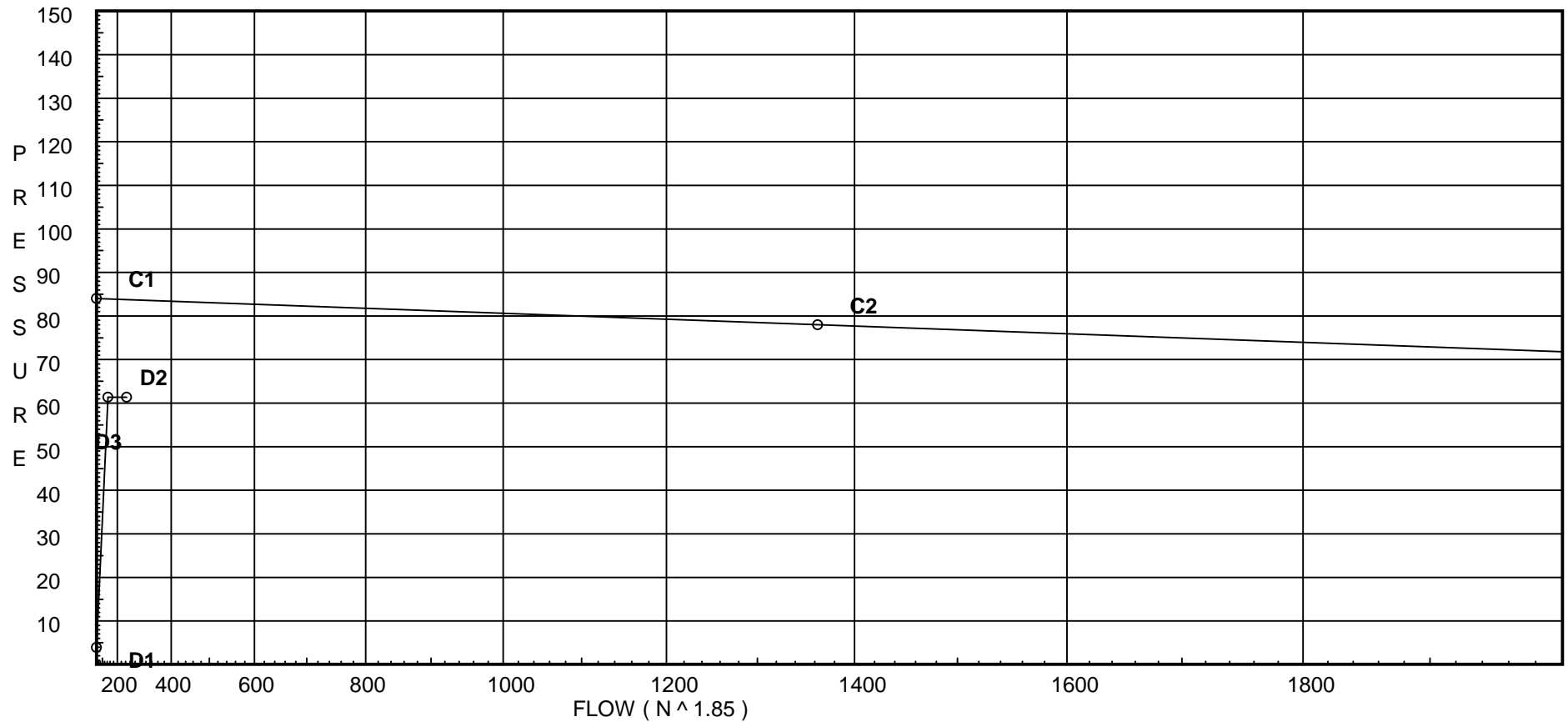
Page 2
Date 7-7-16

City Water Supply:

C1 - Static Pressure : 84
C2 - Residual Pressure: 78
C2 - Residual Flow : 1363

Demand:

D1 - Elevation : 3.898
D2 - System Flow : 145.193
D2 - System Pressure : 61.322
Hose (Demand) : 100
D3 - System Demand : 245.193
Safety Margin : 22.426



Fittings Used Summary

HIGH TECH FIRE PROTECTION
17 Chestnut Street 1st floor updated water info

Page 3
Date 7-7-16

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
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
N *	CPVC 90'Eil Harvel-Spears		7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O *	CPVC Tee - Branch	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
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' Eil 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	8.5	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

HIGH TECH FIRE PROTECTION
 17 Chestnut Street 1st floor updated water info

Page 4
 Date 7-7-16

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
DP1	-1.0	5.6	16.14	na	22.5	0.1	225	7.0
DP2	-1.0	5.6	16.14	na	22.5	0.1	225	7.0
100	10.0	8	15.06	na	31.05	0.1	256	10.6
105	10.0	K = K @ EQ01	16.94	na	22.5			
CA	10.0		16.98	na				
110	10.0	K = K @ EQ02	21.76	na	25.63			
CB	10.0		21.82	na				
115	10.0	8	20.94	na	36.61	0.1	256	10.6
CC	10.0		22.51	na				
120	10.0	K = K @ EQ01	28.92	na	29.4			
CD	10.0		29.34	na				
CE	10.0		34.82	na				
CF	10.0		36.83	na				
CG	10.0		38.92	na				
CH	8.0		40.73	na				
CI	8.0		43.44	na				
AG	0.0		47.7	na				
TOR	0.0		48.64	na				
BOR	0.0		52.15	na				
BASE	-5.0		63.17	na				
H1	-5.0		63.43	na				
H2	-1.0		61.97	na	100.0			
TEST	1.0		61.32	na				

The maximum velocity is 31.14 and it occurs in the pipe between nodes CE and CF

Final Calculations - Hazen-Williams

HIGH TECH FIRE PROTECTION
17 Chestnut Street 1st floor updated water info

Page 5
Date 7-7-16

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
DP1 to EQ01	22.50 22.5	1.101 150.0 0.0846	2N	14.0 0.0 0.0	0.500 14.000 14.500	16.143 -0.433 1.227			K Factor = 5.60 Vel = 7.58	
	0.0 22.50						16.937		K Factor = 5.47	
DP2 to EQ02	22.50 22.5	1.101 150.0 0.0846	1N 1O	7.0 5.0 0.0	0.500 12.000 12.500	16.143 -0.433 1.058			K Factor = 5.60 Vel = 7.58	
	0.0 22.50						16.768		K Factor = 5.49	
100 to CA	31.05 31.05	1.101 150.0 0.1535	1O	5.0 0.0 0.0	7.500 5.000 12.500	15.060 0.0 1.919			K Factor = 8.00 Vel = 10.46	
	0.0 31.05						16.979		K Factor = 7.54	
105 to CA	22.50 22.5	1.101 150.0 0.0840		0.0 0.0 0.0	0.500 0.0 0.500	16.937 0.0 0.042			K Factor @ node EQ01 Vel = 7.58	
CA to CB	31.05 53.55	1.101 150.0 0.4208		0.0 0.0 0.0	11.500 0.0 11.500	16.979 0.0 4.839			Vel = 18.05	
	0.0 53.55						21.818		K Factor = 11.46	
110 to CB	25.63 25.63	1.101 150.0 0.1080		0.0 0.0 0.0	0.500 0.0 0.500	21.764 0.0 0.054			K Factor @ node EQ02 Vel = 8.64	
CB to CC	53.55 79.18	1.394 150.0 0.2748		0.0 0.0 0.0	2.500 0.0 2.500	21.818 0.0 0.687			Vel = 16.64	
	0.0 79.18						22.505		K Factor = 16.69	
115 to CC	36.61 36.61	1.101 150.0 0.2083		0.0 0.0 0.0	7.500 0.0 7.500	20.943 0.0 1.562			K Factor = 8.00 Vel = 12.34	
CC to CD	79.18 115.79	1.394 150.0 0.5554	1O	6.0 0.0 0.0	6.300 6.000 12.300	22.505 0.0 6.832			Vel = 24.34	
	0.0 115.79						29.337		K Factor = 21.38	
120 to CD	29.40 29.4	1.101 150.0 0.1390		0.0 0.0 0.0	3.000 0.0 3.000	28.920 0.0 0.417			K Factor @ node EQ01 Vel = 9.91	
CD to CE	115.79 145.19	1.394 150.0 0.8440		0.0 0.0 0.0	6.500 0.0 6.500	29.337 0.0 5.486			Vel = 30.52	
CE to CF	0.0 145.19	1.38 120.0 1.3400		0.0 0.0 0.0	1.500 0.0 1.500	34.823 0.0 2.010			Vel = 31.14	

Final Calculations - Hazen-Williams

HIGH TECH FIRE PROTECTION
17 Chestnut Street 1st floor updated water info

Page 6
Date 7-7-16

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
CF	0.0	2.157	1V	4.307	9.400	36.833				
to		120.0		0.0	4.307	0.0				
CG	145.19	0.1522		0.0	13.707	2.086		Vel = 12.75		
CG	0.0	2.157	1V	4.307	1.900	38.919				
to		120.0		0.0	4.307	0.866				
CH	145.19	0.1522		0.0	6.207	0.945		Vel = 12.75		
CH	0.0	2.157	1T	12.307	5.500	40.730				
to		120.0		0.0	12.307	0.0				
CI	145.19	0.1522		0.0	17.807	2.710		Vel = 12.75		
CI	0.0	2.635	1V	5.903	8.000	43.440				
to		120.0		0.0	5.903	3.465				
AG	145.19	0.0574		0.0	13.903	0.798		Vel = 8.54		
AG	0.0	2.635	1X	14.827	1.500	47.703				
to		120.0		0.0	14.827	0.0				
TOR	145.19	0.0575		0.0	16.327	0.938		Vel = 8.54		
TOR	0.0	2.635	1Fsp	0.0	3.000	48.641				
to		120.0	1V	5.903	5.903	3.000		* Fixed loss = 3		
BOR	145.19	0.0574		0.0	8.903	0.511		Vel = 8.54		
BOR	0.0	2.635	1E	8.237	1.000	52.152				
to		120.0	1Zib	0.0	8.237	10.486		* Fixed loss = 8.32		
BASE	145.19	0.0574		0.0	9.237	0.530		Vel = 8.54		
BASE	0.0	4.1	1G	2.907	20.000	63.168				
to		140.0	1T	29.067	31.974	0.0				
H1	145.19	0.0050		0.0	51.974	0.260		Vel = 3.53		
H1	0.0	6.14	1T	22.732	185.000	63.428				
to		100.0		0.0	22.732	-1.732				
H2	145.19	0.0013		0.0	207.732	0.272		Vel = 1.57		
H2	100.00	8.23	1G	3.316	220.000	61.968		Qa = 100		
to		100.0	1E	14.92	47.246	-0.866				
TEST	245.19	0.0008	1T	29.011	267.246	0.220		Vel = 1.48		
	0.0									
	245.19					61.322		K Factor = 31.31		