



... 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 : 660 CONGRESS STREET 3RD FLOOR RESIDENTIAL
Drawing : FP-01
Location : 3RD FLOOR RESIDENTIAL
Remote Area : #3
Contract :
Data File : 3RD FLOOR RES NEW UNDERGROUND.WXF

HYDRAULIC CALCULATIONS
for

Project name: 660 CONGRESS STREET 3RD FLOOR RESIDENTIAL
Location: 3RD FLOOR RESIDENTIAL
Drawing no: FP-01
Date: 8-12-14

Design

Remote area number: #3
Remote area location: 3RD FLOOR LIVING AND DINING AREA 309
Occupancy classification: RESIDENTIAL / LIGHT HAZARD
Density: .1 - Gpm/SqFt
Area of application: 4 HEAD - SqFt
Coverage per sprinkler: 256 - SqFt
Type of sprinklers calculated: RESIDENTIAL PENDENTS AND HSW
No. of sprinklers calculated: 4
In-rack demand: N/A - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 207 - GPM @ 60 - Psi
Type of system: WET SYSTEM NFPA 13
Volume of dry or preaction system: N/A - Gal

Water supply information

Date: 8-8-2014
Location: TEST HYDRANT ACROSS THE STREET FROM SITE
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.)

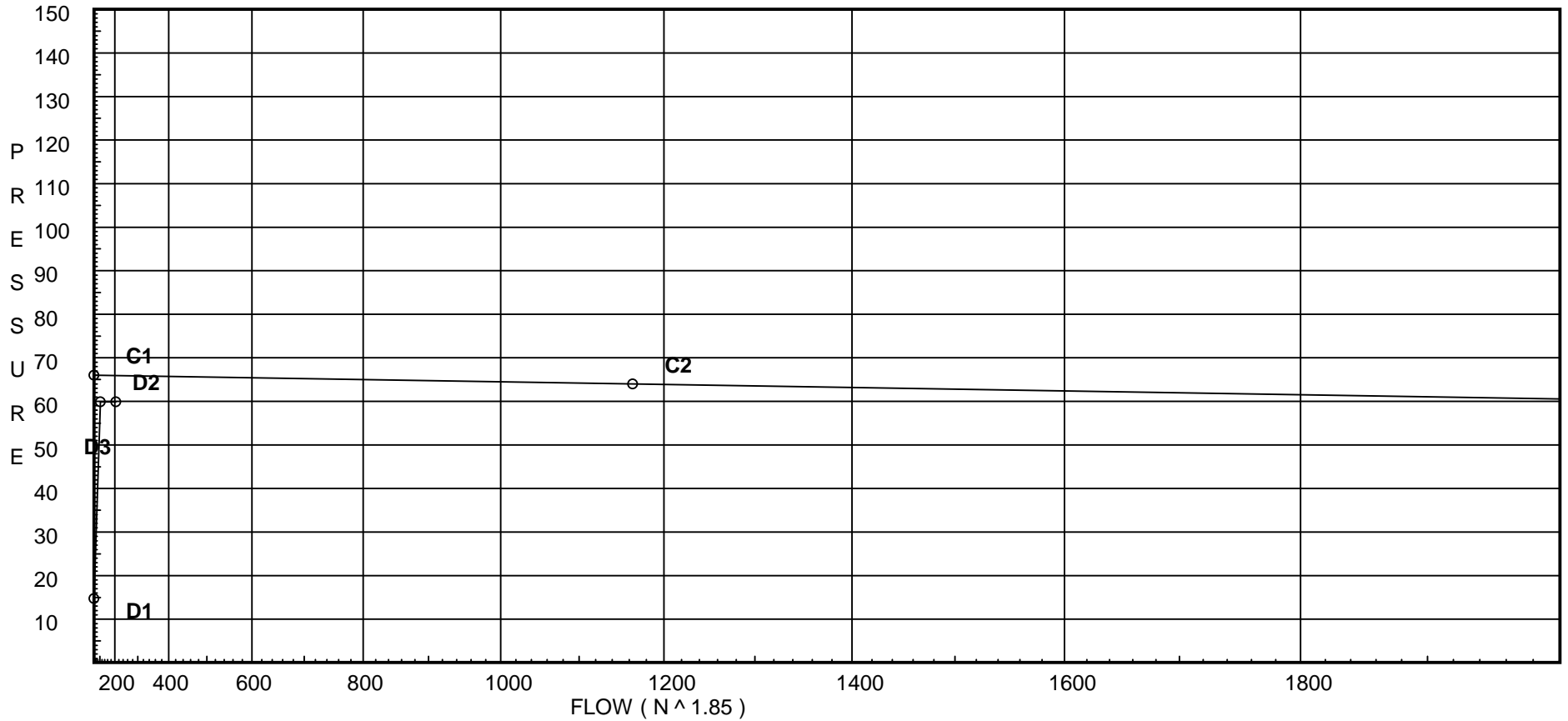
Water Supply Curve (C)

HIGH TECH FIRE PROTECTION
660 CONGRESS STREET 3RD FLOOR RESIDENTIAL

Page 2
Date 8-12-14

City Water Supply:
C1 - Static Pressure : 66
C2 - Residual Pressure: 64
C2 - Residual Flow : 1164

Demand:
D1 - Elevation : 14.725
D2 - System Flow : 106.654
D2 - System Pressure : 59.890
Hose (Demand) : 100
D3 - System Demand : 206.654
Safety Margin : 6.028



Fittings Used Summary

HIGH TECH FIRE PROTECTION
660 CONGRESS STREET 3RD FLOOR RESIDENTIAL

Page 3
Date 8-12-14

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
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
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'EI 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' EI 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
Zia	Wilkins 350	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
660 CONGRESS STREET 3RD FLOOR RESIDENTIAL

Page 4
Date 8-12-14

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
DP1	-1.0	5.8	19.48	na	25.6	0.1	256	7.6
300	40.0	5.8	19.48	na	25.6	0.1	256	11.9
301	40.0	5.8	20.67	na	26.37	0.1	256	11.9
302	40.0		21.39	na				
303	41.0		22.06	na				
310	41.5	K = K @ EQ01	21.07	na	26.34			
311	41.5		22.38	na				
312	41.0		23.45	na				
305	41.0		24.36	na				
320	41.0	K = K @ EQ01	24.41	na	28.35			
321	41.0		25.67	na				
322	41.0		27.69	na				
323	41.0		32.0	na				
324	21.0		43.19	na				
325	21.0		43.52	na				
326	8.0		49.63	na				
TO2	8.0		51.24	na				
BO2	3.0		57.35	na				
BASE	0.0		62.41	na				
H1	0.0		62.44	na				
H2	0.0		62.44	na	100.0			
TEST	6.0		59.89	na				

The maximum velocity is 12.53 and it occurs in the pipe between nodes 305 and 321

Final Calculations - Hazen-Williams

HIGH TECH FIRE PROTECTION
660 CONGRESS STREET 3RD FLOOR RESIDENTIAL

Page 5
Date 8-12-14

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	25.60 25.6	1.101 150.0 0.1074	1N	7.0 0.0 0.0	1.000 7.000 8.000	19.482 -0.433 0.859			K Factor = 5.80 Vel = 8.63	
	0.0 25.60						19.908		K Factor = 5.74	
300 to 302	25.60 25.6	1.101 150.0 0.1074	1O	5.0 0.0 0.0	12.750 5.000 17.750	19.482 0.0 1.906			K Factor = 5.80 Vel = 8.63	
	0.0 25.60						21.388		K Factor = 5.54	
301 to 302	26.37 26.37	1.101 150.0 0.1135	1O	5.0 0.0 0.0	1.300 5.000 6.300	20.673 0.0 0.715			K Factor = 5.80 Vel = 8.89	
302 to 303	25.60 51.97	1.394 150.0 0.1262	1N	8.0 0.0 0.0	0.750 8.000 8.750	21.388 -0.433 1.104			Vel = 10.92	
303 to 305	0.0 51.97	1.394 150.0 0.1262	1O	6.0 0.0 0.0	12.200 6.000 18.200	22.059 0.0 2.297			Vel = 10.92	
	0.0 51.97						24.356		K Factor = 10.53	
310 to 311	26.34 26.34	1.101 150.0 0.1132	1N	7.0 0.0 0.0	4.600 7.000 11.600	21.071 0.0 1.313			K Factor @ node EQ01 Vel = 8.88	
311 to 312	0.0 26.34	1.101 150.0 0.1132	1N	7.0 0.0 0.0	0.500 7.000 7.500	22.384 0.217 0.849			Vel = 8.88	
312 to 305	0.0 26.34	1.101 150.0 0.1132	1N	7.0 0.0 0.0	1.000 7.000 8.000	23.450 0.0 0.906			Vel = 8.88	
305 to 321	51.97 78.31	1.598 150.0 0.1385		0.0 0.0 0.0	9.500 0.0 9.500	24.356 0.0 1.316			Vel = 12.53	
	0.0 78.31						25.672		K Factor = 15.46	
320 to 321	28.35 28.35	1.101 150.0 0.1297	1O	5.0 0.0 0.0	4.750 5.000 9.750	24.407 0.0 1.265			K Factor @ node EQ01 Vel = 9.55	
321 to 322	78.30 106.65	2.003 150.0 0.0816	1O	10.0 0.0 0.0	14.750 10.000 24.750	25.672 0.0 2.020			Vel = 10.86	
322 to 323	0.0 106.65	2.003 150.0 0.0817	2N	22.0 0.0 0.0	30.700 22.000 52.700	27.692 0.0 4.303			Vel = 10.86	
323 to 324	0.0 106.65	2.003 150.0 0.0816	1N	11.0 0.0 0.0	20.000 11.000 31.000	31.995 8.662 2.531			Vel = 10.86	
324 to 325	0.0 106.65	2.635 150.0 0.0215	1N	12.0 0.0 0.0	3.500 12.000 15.500	43.188 0.0 0.333			Vel = 6.27	

Final Calculations - Hazen-Williams

HIGH TECH FIRE PROTECTION
660 CONGRESS STREET 3RD FLOOR RESIDENTIAL

Page 6
Date 8-12-14

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
325 to 326	0.0 106.65	2.635 150.0 0.0215	1E 0.0	12.447 0.0	10.000 12.446	43.521 5.630			
				0.0	22.446	0.482	Vel =	6.27	
326 to TO2	0.0 106.65	2.635 120.0 0.0325	4V 0.0	23.613 0.0	25.900 23.613	49.633 0.0			
				0.0	49.513	1.607	Vel =	6.27	
TO2 to BO2	0.0 106.65	2.635 120.0 0.0324	1Fsp 1B 1T	0.0 9.61 16.474	3.000 26.084 29.084	51.240 5.166 0.943		* Fixed loss = 3	
							Vel =	6.27	
BO2 to BASE	0.0 106.65	4.26 120.0 0.0032	1Zia 1E	0.0 13.167	2.000 13.167	57.349 5.011		* Fixed loss = 3.712	
				0.0	15.167	0.048	Vel =	2.40	
BASE to H1	0.0 106.65	6.16 140.0 0.0004	2F 1G 1T	20.084 4.304 43.037	20.000 67.425 87.425	62.408 0.0 0.034			
							Vel =	1.15	
H1 to H2	0.0 106.65	16.32 100.0 0.0	1T	87.173 0.0	70.000 87.174	62.442 0.0			
				0.0	157.174	0.001	Vel =	0.16	
H2 to TEST	100.00 206.65	6.16 140.0 0.0013	1G 1E	4.304 20.084	10.000 24.388	62.443 -2.599		Qa = 100	
				0.0	34.388	0.046	Vel =	2.22	
	0.0 206.65					59.890	K Factor =	26.70	