

... Fire Protection by Computer Design

High Tech Fire Protection
84 Hackett Mills Road Poland
P.O. Box 154 Minot, ME
Poland, ME 04274
207-998-2551

Job Name : 409 CUMBERLAND AVE APARTMENT COMPLEX 4TH FLOOR CORRIDOR
Drawing : FP-03
Location : 4th Floor Corridor
Remote Area : 4C
Contract : 101513-1
Data File : Calc #4B 4th floor Corridor.WXF

HYDRAULIC CALCULATIONS
for

Project name: 409 CUMBERLAND AVE APARTMENT COMPLEX
Location: 4th Floor Corridor
Drawing no: FP-03
Date: 1-23-14

Design

Remote area number: 4C
Remote area location: 4th Floor Corridor
Occupancy classification: Light Hazard
Density: .1 - Gpm/SqFt
Area of application: 417 - SqFt
Coverage per sprinkler: 196 - SqFt
Type of sprinklers calculated: quick response residential pendent
No. of sprinklers calculated: 5
In-rack demand: n/a - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 200 - GPM @ 54 - Psi
Type of system: wet system
Volume of dry or preaction system: n/a - Gal

Water supply information

Date: 5-19-05
Location: Corner of Cumberland ave and Mechanic Street
Source: City of Portland

Name of contractor: High Tech Fire Protection
Address: 84 Hackett Mills Road Poland / P.O. Box 154 Minot, ME / Pola
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.)

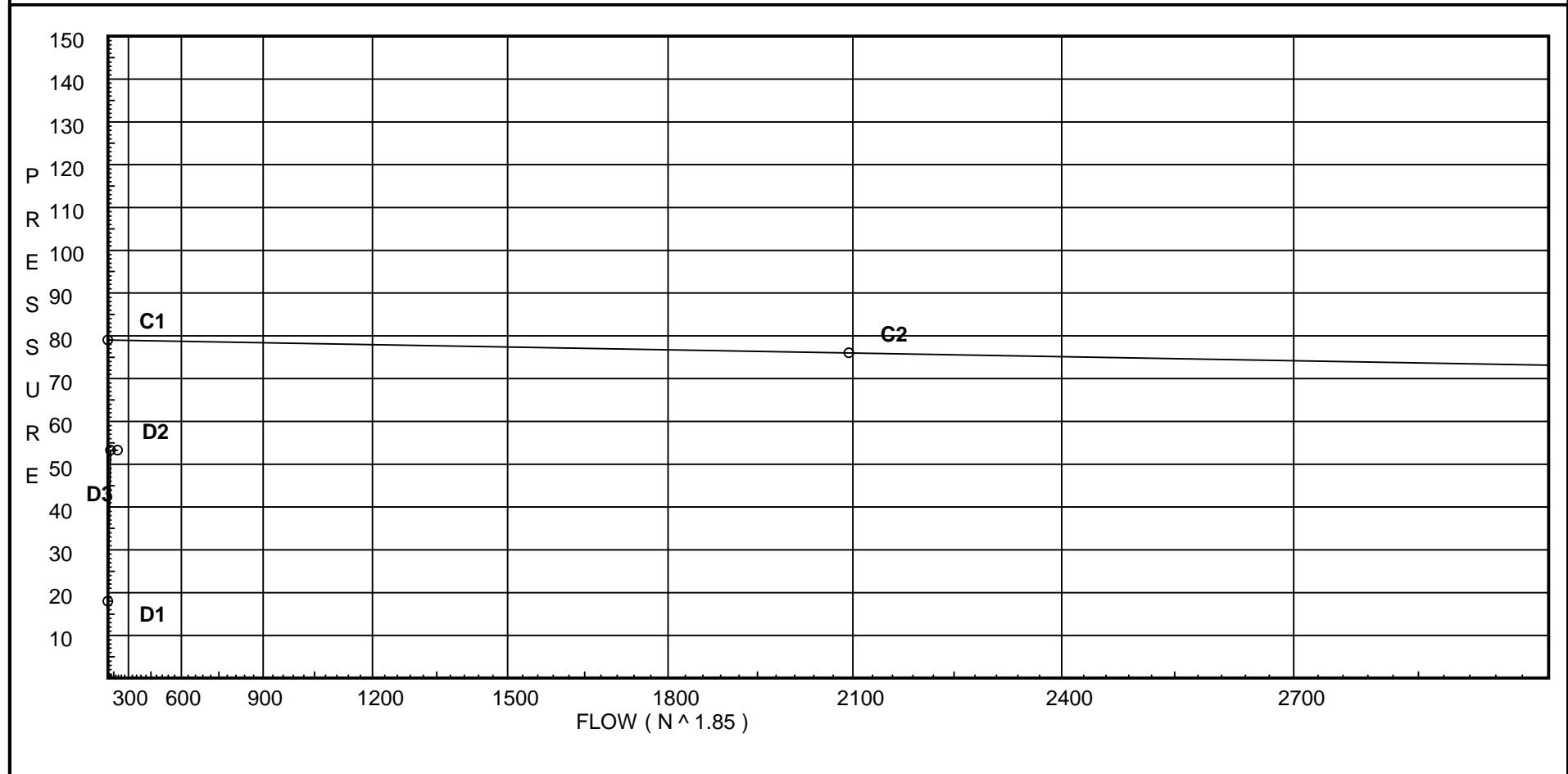
Water Supply Curve (C)

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City Water Supply:
C1 - Static Pressure : 79
C2 - Residual Pressure: 76
C2 - Residual Flow : 2094

Demand:
D1 - Elevation : 17.974
D2 - System Flow : 99.677
D2 - System Pressure : 53.311
Hose (Demand) : 100
D3 - System Demand : 199.677
Safety Margin : 25.650



Fittings Used Summary

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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
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'EII 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
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' 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
X	90'Tee-BranchFirelock002	0	0	0	0	0	8.5	10.8	13	0	16	21	25	33	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

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
DP1	-1.0	5.8	11.42	na	19.6	0.1	196	7.0
450	56.5	K = K @ EQ01	11.81	na	19.6			
402	56.5		11.83	na				
451	56.5	K = K @ EQ01	11.85	na	19.64			
414	56.5		11.92	na				
452	56.5	K = K @ EQ01	12.0	na	19.76			
453	56.5	K = K @ EQ01	12.39	na	20.08			
454	56.5	K = K @ EQ01	13.04	na	20.6			
415	56.5		18.55	na				
416	56.5		21.07	na				
SA4	8.9		48.23	na				
SA0	8.9		48.44	na				
TOR	8.9		48.66	na				
BOR	3.0		54.27	na				
BASE	0.0		59.69	na				
HS1	10.0		55.39	na				
HS2	12.0		54.57	na				
HS3	12.0		54.57	na	100.0			
TEST	15.0		53.31	na				

The maximum velocity is 10.15 and it occurs in the pipe between nodes 454 and 415

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
DP1 to EQ01	19.60 19.6	1.101 150.0 0.0655	1N 1O	7.0 5.0 0.0	0.500 12.000 12.500	11.420 -0.433 0.819			K Factor = 5.80 Vel = 6.60	
	0.0 19.60						11.806		K Factor = 5.70	
450 to 402	19.60 19.6	2.003 150.0 0.0036		0.0 0.0 0.0	5.500 0.0 5.500	11.806 0.0 0.020			K Factor @ node EQ01 Vel = 2.00	
402 to 451	0.0 19.6	2.003 150.0 0.0035		0.0 0.0 0.0	6.500 0.0 6.500	11.826 0.0 0.023			Vel = 2.00	
451 to 414	19.64 39.24	2.003 150.0 0.0127		0.0 0.0 0.0	5.600 0.0 5.600	11.849 0.0 0.071			K Factor @ node EQ01 Vel = 4.00	
414 to 452	0.0 39.24	2.003 150.0 0.0129		0.0 0.0 0.0	6.500 0.0 6.500	11.920 0.0 0.084			Vel = 4.00	
452 to 453	19.76 59.0	2.003 150.0 0.0273		0.0 0.0 0.0	14.000 0.0 14.000	12.004 0.0 0.382			K Factor @ node EQ01 Vel = 6.01	
453 to 454	20.08 79.08	2.003 150.0 0.0469		0.0 0.0 0.0	14.000 0.0 14.000	12.386 0.0 0.657			K Factor @ node EQ01 Vel = 8.05	
454 to 415	20.60 99.68	2.003 150.0 0.0720	1O	10.0 0.0 0.0	66.500 10.000 76.500	13.043 0.0 5.511			K Factor @ node EQ01 Vel = 10.15	
	0.0 99.68						18.554		K Factor = 23.14	
415 to 416	99.68 99.68	2.003 150.0 0.0721	1T	12.965 0.0 0.0	22.000 12.965 34.965	18.554 0.0 2.520			Vel = 10.15	
416 to SA4	0.0 99.68	2.157 120.0 0.0759	1B 1Fsp 1S 1T 1X	7.384 0.0 13.537 12.307 10.461	3.000 43.689 46.689	21.074 23.616 3.542			* Fixed loss = 3 Vel = 8.75	
SA4 to SA0	0.0 99.68	4.26 120.0 0.0028	3V	26.861 0.0 0.0	47.500 26.861 74.361	48.232 0.0 0.206			Vel = 2.24	
SA0 to TOR	0.0 99.68	4.26 120.0 0.0028	3V 1X	26.861 21.067 0.0	31.500 47.928 79.428	48.438 0.0 0.219			Vel = 2.24	
TOR to BOR	0.0 99.68	4.26 120.0 0.0028	1B 1Fsp	15.8 0.0 0.0	4.000 15.800 19.800	48.657 5.555 0.055			* Fixed loss = 3 Vel = 2.24	
BOR to BASE	0.0 99.68	4.26 120.0 0.0027	1T 1Zia 1E	26.334 0.0 13.167	2.000 39.501 41.501	54.267 5.308 0.114			* Fixed loss = 4.009 Vel = 2.24	

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
BASE	0.0	6.16	1G 4.304	25.000	59.689				
to		140.0	1T 43.037	67.425	-4.331				
HS1	99.68	0.0003	1E 20.084	92.425	0.032		Vel = 1.07		
HS1	0.0	6.16	1T 43.037	80.000	55.390				
to		140.0	0.0	43.037	-0.866				
HS2	99.68	0.0003	0.0	123.037	0.042		Vel = 1.07		
HS2	0.0	12.46	1T 52.745	20.000	54.566				
to		100.0	0.0	52.745	0.0				
HS3	99.68	0.0	0.0	72.745	0.002		Vel = 0.26		
HS3	100.00	6.16	1G 4.304	10.000	54.568		Qa = 100		
to		140.0	1E 20.084	24.388	-1.299				
TEST	199.68	0.0012	0.0	34.388	0.042		Vel = 2.15		
	0.0								
	199.68				53.311		K Factor = 27.35		