

... 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 : Hilton Garden Inn Addition Portland Jetport 2nd above coverage
Drawing : FP-02
Location : 145 Jetport Boulevard Portland
Remote Area : 2A
Contract : 053013-1
Data File : second floor above cov unit 201-203-205.WXF

HYDRAULIC CALCULATIONS
for

Project name: Hilton Garden Inn Addition 2nd floor unit 201-203
Location: 145 Jetport Boulevard Portland
Drawing no: FP-02
Date: 10/15/13

Design

Remote area number: 2A
Remote area location: SECOND FLOOR UNIT 201-203-205 ABOVE CEILING COV
Occupancy classification: RESIDENTIAL / LIGHT HAZARD
Density: .1 - Gpm/SqFt
Area of application: 1000 - SqFt
Coverage per sprinkler: 256 - SqFt
Type of sprinklers calculated: CONCEALED SPACE UPRIGHT
No. of sprinklers calculated: 6
In-rack demand: N/A - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 256 - GPM @ 65 - Psi
Type of system: WET
Volume of dry or preaction system: N/A - Gal

Water supply information

Date: 10/31/2013
Location: Test hydrant in front of addition entrance
Source: Portland Water District

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.)

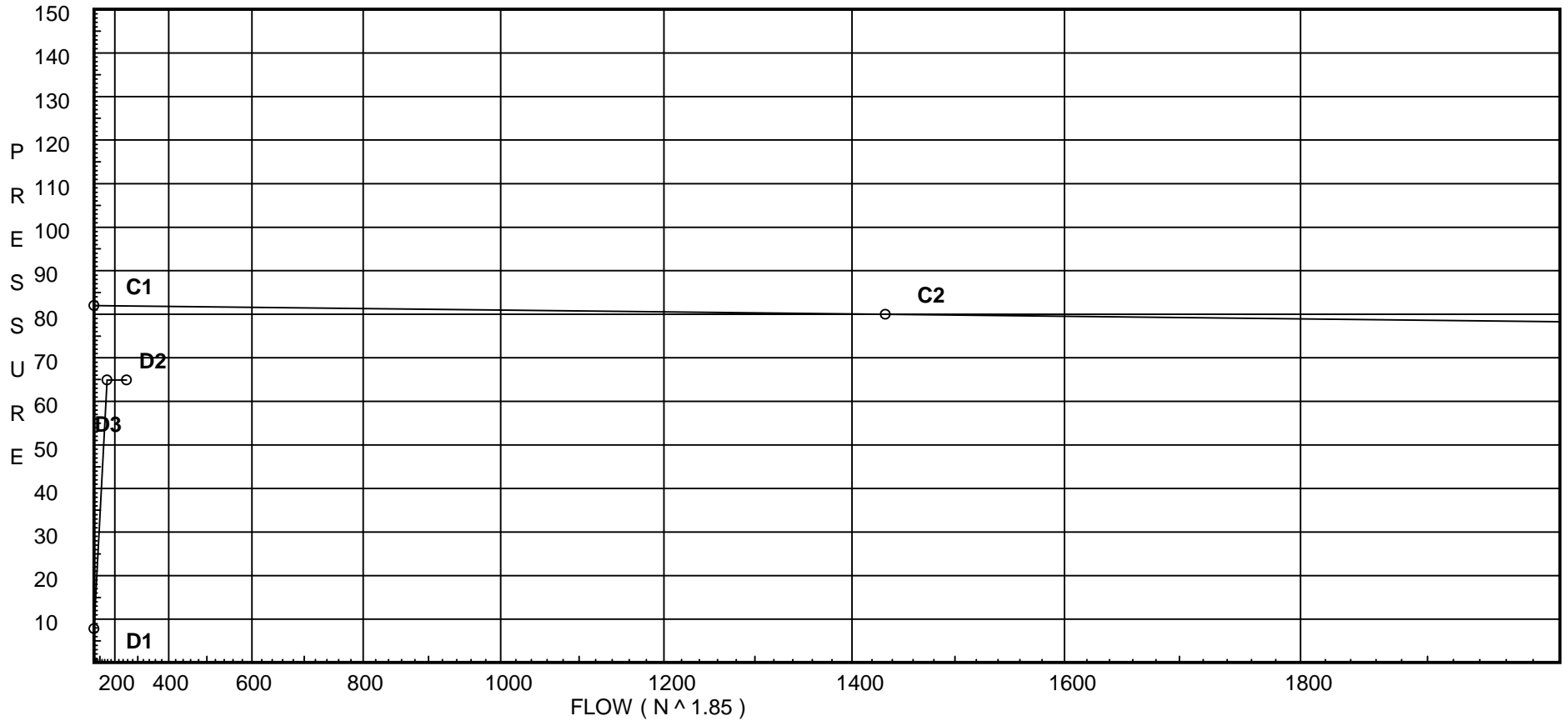
Water Supply Curve (C)

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City Water Supply:
C1 - Static Pressure : 82
C2 - Residual Pressure: 80
C2 - Residual Flow : 1433

Demand:
D1 - Elevation : 7.796
D2 - System Flow : 155.878
D2 - System Pressure : 64.870
Hose (Demand) : 100
D3 - System Demand : 255.878
Safety Margin : 17.047



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
Bvcb	B Fly Vic 705W	0	0	0	0	0	0	5	5	0	12	12	8	11	12	14	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	0	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	0	3.5	4.3	5	0	6.8	8.5	10	13	0	0	0	0	0	0	0

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	5.6	20.9	na	25.6	0.1	256	7.0
200	20.0	K = K @ EQ01	22.56	na	25.6			
205	20.0	K = K @ EQ01	22.85	na	25.76			
210	20.0	K = K @ EQ01	23.73	na	26.25			
220	20.0	K = K @ EQ01	23.02	na	25.86			
221	20.0		23.15	na				
225	20.0	K = K @ EQ01	23.2	na	25.96			
226	20.0		23.44	na				
230	20.0	K = K @ EQ01	24.09	na	26.45			
231	20.0		24.34	na				
BA	20.0		27.69	na				
BB	20.0		28.36	na				
BC	20.0		30.79	na				
BD	20.0		41.78	na				
AJ	20.0		49.69	na				
AK	10.0		54.14	na				
AL	10.0		55.07	na				
AM	10.0		55.13	na				
TOW	10.0		57.53	na				
BOW	3.0		64.04	na				
BASE	0.0		65.48	na				
HOSE	0.0		65.71	na	100.0			
TEST	2.0		64.87	na				

The maximum velocity is 13.69 and it occurs in the pipe between nodes BB and BC

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	*****
DP1 to EQ01	25.60 25.6	1.049 120.0 0.2055	1T	5.0 0.0 0.0	1.000 5.000 6.000	20.898 0.433 1.233			K Factor = 5.60 Vel = 9.50	
	0.0 25.60						22.564		K Factor = 5.39	
200 to 205	25.60 25.6	1.682 120.0 0.0206		0.0 0.0 0.0	13.800 0.0 13.800	22.564 0.0 0.284			K Factor @ node EQ01 Vel = 3.70	
205 to 210	25.76 51.36	1.682 120.0 0.0747		0.0 0.0 0.0	11.800 0.0 11.800	22.848 0.0 0.882			K Factor @ node EQ01 Vel = 7.42	
210 to BA	26.25 77.61	1.682 120.0 0.1604	1T	9.9 0.0 0.0	14.800 9.900 24.700	23.730 0.0 3.963			K Factor @ node EQ01 Vel = 11.21	
	0.0 77.61						27.693		K Factor = 14.75	
220 to 221	25.86 25.86	1.682 120.0 0.0209	1E	4.95 0.0 0.0	1.500 4.950 6.450	23.016 0.0 0.135			K Factor @ node EQ01 Vel = 3.73	
221 to 226	0.0 25.86	1.682 120.0 0.0210		0.0 0.0 0.0	13.800 0.0 13.800	23.151 0.0 0.290			 Vel = 3.73	
	0.0 25.86						23.441		K Factor = 5.34	
225 to 226	25.96 25.96	1.682 120.0 0.0211	1T	9.9 0.0 0.0	1.500 9.900 11.400	23.200 0.0 0.241			K Factor @ node EQ01 Vel = 3.75	
226 to 231	25.85 51.81	1.682 120.0 0.0759		0.0 0.0 0.0	11.800 0.0 11.800	23.441 0.0 0.896			 Vel = 7.48	
	0.0 51.81						24.337		K Factor = 10.50	
230 to 231	26.45 26.45	1.682 120.0 0.0218	1T	9.9 0.0 0.0	1.500 9.900 11.400	24.088 0.0 0.249			K Factor @ node EQ01 Vel = 3.82	
231 to BB	51.81 78.26	1.682 120.0 0.1630	1T	9.9 0.0 0.0	14.800 9.900 24.700	24.337 0.0 4.025			 Vel = 11.30	
	0.0 78.26						28.362		K Factor = 14.70	
BA to BB	77.61 77.61	2.157 120.0 0.0478		0.0 0.0 0.0	14.000 0.0 14.000	27.693 0.0 0.669			 Vel = 6.81	
BB to BC	78.27 155.88	2.157 120.0 0.1735		0.0 0.0 0.0	14.000 0.0 14.000	28.362 0.0 2.429			 Vel = 13.69	
BC to BD	0.0 155.88	2.157 120.0 0.1736	1T	12.307 0.0 0.0	51.000 12.307 63.307	30.791 0.0 10.988			 Vel = 13.69	

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	*****
BD to AJ	0.0 155.88	2.157 120.0 0.1736	1B 1V 1T 1Fsp	7.384 4.307 12.307 0.0	4.300 23.998 28.298	41.779 3.000 4.912		* Fixed loss = 3 Vel = 13.69		
AJ to AK	0.0 155.88	4.26 120.0 0.0063	1V	8.954 0.0	10.000 8.954	49.691 4.331		Vel = 3.51		
AK to AL	0.0 155.88	4.26 120.0 0.0063	5V	44.768 0.0	103.000 44.768	54.141 0.0		Vel = 3.51		
AL to AM	0.0 155.88	4.26 120.0 0.0062	1V	8.954 0.0	0.500 8.954	55.074 0.0		Vel = 3.51		
AM to TOW	0.0 155.88	4.26 120.0 0.0063	11V 2F	98.49 10.534 0.0	270.000 109.024 379.024	55.133 0.0 2.392		Vel = 3.51		
TOW to BOW	0.0 155.88	4.26 120.0 0.0063	1Bvcb 1Fsp 1T 1S	15.8 0.0 26.334 28.968	6.000 71.102 77.102	57.525 6.032 0.487		* Fixed loss = 3 Vel = 3.51		
BOW to BASE	0.0 155.88	4.26 120.0 0.0063	1G 1E	2.633 13.167 0.0	6.000 15.800 21.800	64.044 1.299 0.137		Vel = 3.51		
BASE to HOSE	0.0 155.88	6.16 140.0 0.0008	1G 2E 1T	4.304 40.168 43.037	200.000 87.509 287.509	65.480 0.0 0.227		Vel = 1.68		
HOSE to TEST	100.00 255.88	12.34 140.0 0.0001	1G 1E 1T	9.377 42.195 93.767	300.000 145.339 445.339	65.707 -0.866 0.029		Qa = 100 Vel = 0.69		
	0.0 255.88					64.870		K Factor = 31.77		