



**... 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 3rd hsw  
Drawing : FP-02  
Location : 145 Jetport Boulevard Portland  
Remote Area : 3A  
Contract : 053013-1  
Data File : third floor hsw unit 314.WXF

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**HYDRAULIC CALCULATIONS**  
*for*

**Project name:** Hilton Garden Inn Addition 3rd hsw guest room 314  
**Location:** 145 Jetport Boulevard Portland  
**Drawing no:** FP-02  
**Date:** 10/15/13

**Design**

**Remote area number:** 3A  
**Remote area location:** THIRD FLOOR UNIT 314 & 312  
**Occupancy classification:** RESIDENTIAL / LIGHT HAZARD  
**Density:** .1 - Gpm/SqFt  
**Area of application:** 4 HEAD - SqFt  
**Coverage per sprinkler:** 320 - SqFt  
**Type of sprinklers calculated:** RESIDENTIAL HORIZONTAL SIDEWALL  
**No. of sprinklers calculated:** 4  
**In-rack demand:** N/A - GPM  
**Hose streams:** 100 - GPM  
**Total water required (including hose streams):** 231 - GPM @ 71 - 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)

High Tech Fire Protection  
Hilton Garden Inn Addition Portland Jetport 3rd hsw

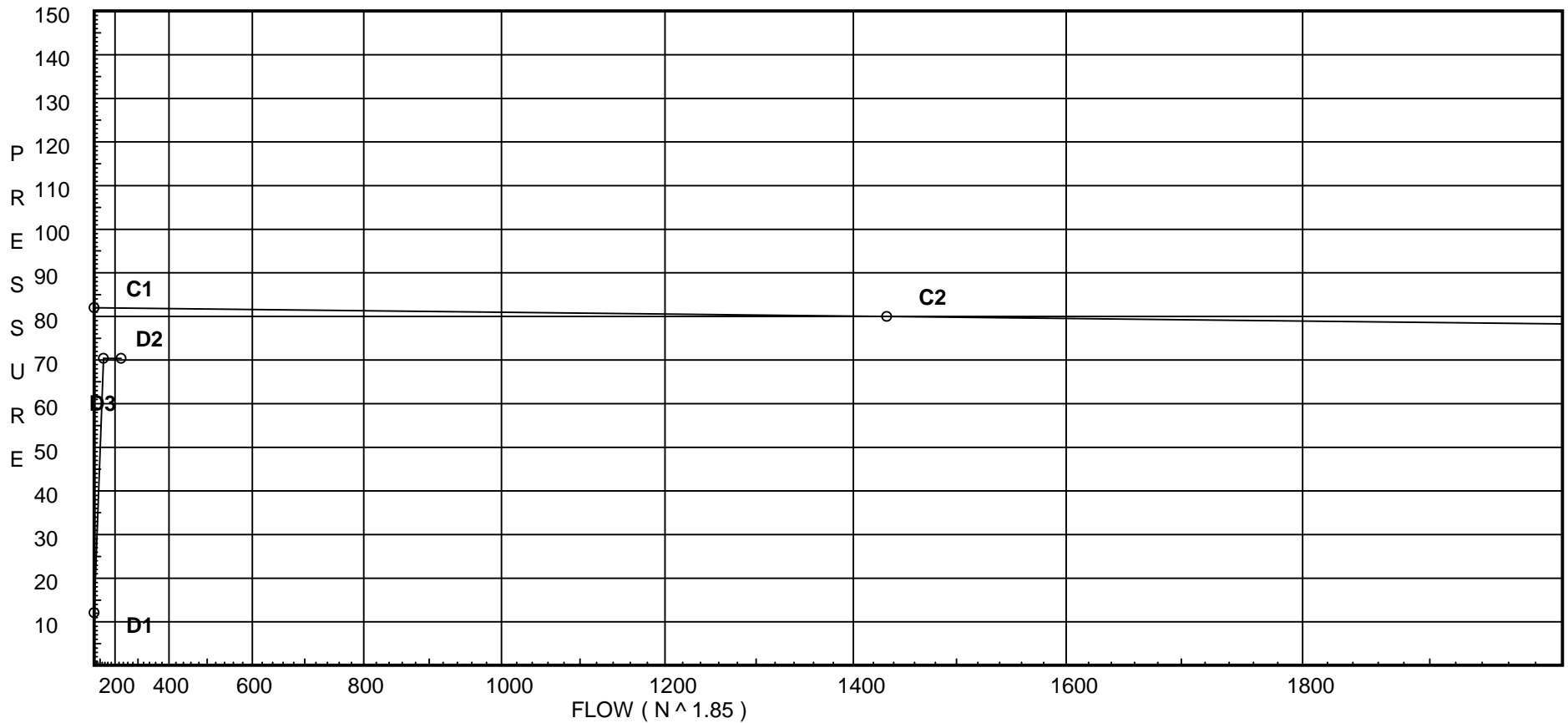
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## City Water Supply:

C1 - Static Pressure : 82  
C2 - Residual Pressure: 80  
C2 - Residual Flow : 1433

## Demand:

D1 - Elevation : 12.127  
D2 - System Flow : 130.495  
D2 - System Pressure : 70.386  
Hose ( Demand ) : 100  
D3 - System Demand : 230.495  
Safety Margin : 11.546



# 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
Bvca	B Fly Vic 705						6	6	7		8	12	14	16	18	19					
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.
300	30.0	5.8	30.89	na	32.24	0.1	320	20.1
301	30.0		33.1	na				
305	30.0	5.8	31.66	na	32.63	0.1	320	20.1
310	30.0	5.8	30.44	na	32.0	0.1	320	20.1
311	30.0		32.3	na				
315	30.0	5.8	33.61	na	33.62	0.1	320	20.1
316	30.0		35.65	na				
AA	30.0		35.41	na				
AB	30.0		35.43	na				
AC	30.0		35.45	na				
AD	30.0		36.13	na				
AE	30.0		36.59	na				
AF	30.0		36.99	na				
AG	30.0		38.97	na				
AH	30.0		46.72	na				
AI	30.0		52.06	na				
AJ	20.0		56.43	na				
AK	10.0		60.85	na				
AL	10.0		61.52	na				
AM	10.0		61.56	na				
TOW	10.0		63.28	na				
BOW	3.0		69.67	na				
BASE	0.0		71.06	na				
HOSE	0.0		71.23	na	100.0			
TEST	2.0		70.39	na				

The maximum velocity is 13.86 and it occurs in the pipe between nodes 311 and AC

# 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	*****
300 to 301	32.24	1.049 120.0	1E	2.0 0.0	5.000 2.000	30.894 0.0			K Factor = 5.80	
	32.24	0.3147		0.0	7.000	2.203			Vel = 11.97	
301 to AA	0.0	1.38 120.0	2E 1T	6.0 6.0	16.000 12.000	33.097 0.0				
	32.24	0.0828		0.0	28.000	2.318			Vel = 6.92	
	0.0 32.24					35.415			K Factor = 5.42	
305 to 311	32.63	1.049 120.0		0.0 0.0	2.000 0.0	31.659 0.0			K Factor = 5.80	
	32.63	0.3220		0.0	2.000	0.644			Vel = 12.11	
	0.0 32.63					32.303			K Factor = 5.74	
310 to 311	32.00	1.049 120.0	1T	5.0 0.0	1.000 5.000	30.440 0.0			K Factor = 5.80	
	32.0	0.3105		0.0	6.000	1.863			Vel = 11.88	
311 to AC	32.63	1.38 120.0	1T	6.0 0.0	4.500 6.000	32.303 0.0				
	64.63	0.2997		0.0	10.500	3.147			Vel = 13.86	
	0.0 64.63					35.450			K Factor = 10.85	
315 to 316	33.62	1.049 120.0	1T	5.0 0.0	1.000 5.000	33.607 0.0			K Factor = 5.80	
	33.62	0.3402		0.0	6.000	2.041			Vel = 12.48	
316 to AE	0.0	1.38 120.0	1T	6.0 0.0	4.500 6.000	35.648 0.0				
	33.62	0.0895		0.0	10.500	0.940			Vel = 7.21	
	0.0 33.62					36.588			K Factor = 5.56	
AA to AB	32.24	2.157 120.0		0.0 0.0	2.100 0.0	35.415 0.0				
	32.24	0.0090		0.0	2.100	0.019			Vel = 2.83	
AB to AC	0.0	2.157 120.0		0.0 0.0	1.700 0.0	35.434 0.0				
	32.24	0.0094		0.0	1.700	0.016			Vel = 2.83	
AC to AD	64.63	2.157 120.0		0.0 0.0	9.500 0.0	35.450 0.0				
	96.87	0.0720		0.0	9.500	0.684			Vel = 8.51	
AD to AE	0.0	2.157 120.0		0.0 0.0	6.300 0.0	36.134 0.0				
	96.87	0.0721		0.0	6.300	0.454			Vel = 8.51	
AE to AF	33.63	2.157 120.0		0.0 0.0	3.200 0.0	36.588 0.0				
	130.5	0.1250		0.0	3.200	0.400			Vel = 11.46	
AF to AG	0.0	2.157 120.0		0.0 0.0	15.900 0.0	36.988 0.0				
	130.5	0.1249		0.0	15.900	1.986			Vel = 11.46	
AG to AH	0.0	2.157 120.0	1T	12.307 0.0	49.700 12.307	38.974 0.0				
	130.5	0.1249		0.0	62.007	7.746			Vel = 11.46	

# 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	*****
AH to AI	0.0 130.5	2.157 120.0 0.1249	1V 1Bvca 1Fsp	4.307 7.384 0.0	7.000 11.691 18.691	46.720 3.000 2.335		* Fixed loss = 3 Vel = 11.46	
AI to AJ	0.0 130.5	4.26 120.0 0.0046		0.0 0.0 0.0	10.000 0.0 10.000	52.055 4.331 0.046		Vel = 2.94	
AJ to AK	0.0 130.5	4.26 120.0 0.0045	1V	8.954 0.0 0.0	10.000 8.954 18.954	56.432 4.331 0.086		Vel = 2.94	
AK to AL	0.0 130.5	4.26 120.0 0.0045	5V	44.768 0.0 0.0	103.000 44.768 147.768	60.849 0.0 0.671		Vel = 2.94	
AL to AM	0.0 130.5	4.26 120.0 0.0045	1V	8.954 0.0 0.0	0.500 8.954 9.454	61.520 0.0 0.043		Vel = 2.94	
AM to TOW	0.0 130.5	4.26 120.0 0.0045	11V 2F	98.49 10.534 0.0	270.000 109.024 379.024	61.563 0.0 1.721		Vel = 2.94	
TOW to BOW	0.0 130.5	4.26 120.0 0.0045	1Bvcb 1Fsp 1T 1S	15.8 0.0 26.334 28.968	6.000 71.102 77.102	63.284 6.032 0.350		* Fixed loss = 3 Vel = 2.94	
BOW to BASE	0.0 130.5	4.26 120.0 0.0046	1G 1E	2.633 13.167 0.0	6.000 15.800 21.800	69.666 1.299 0.100		Vel = 2.94	
BASE to HOSE	0.0 130.5	6.16 140.0 0.0006	1G 2E 1T	4.304 40.168 43.037	200.000 87.509 287.509	71.065 0.0 0.163		Vel = 1.40	
HOSE to TEST	100.00 230.5	12.34 140.0 0.0001	1G 1E 1T	9.377 42.195 93.767	300.000 145.339 445.339	71.228 -0.866 0.024		Qa = 100 Vel = 0.62	
	0.0 230.50					70.386		K Factor = 27.47	