

**... 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 : Brick South Catering Area #2  
Drawing : FP-02 REVISED  
Location : Thompsons Point  
Remote Area : #2  
Contract :  
Data File : Catering area 2 REVISED NOT STEEL PROTECTION.WXF

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**HYDRAULIC CALCULATIONS**  
*for*

**Project name:** Brick South Catering Area #2  
**Location:** Thompsons Point  
**Drawing no:** FP-02 REVISED  
**Date:** 1-16-17

**Design**

**Remote area number:** #2  
**Remote area location:** Catering Area  
**Occupancy classification:** Ordinary Hazard 1  
**Density:** .15 - Gpm/SqFt  
**Area of application:** 1500 - SqFt  
**Coverage per sprinkler:** 120 - SqFt  
**Type of sprinklers calculated:** quick response pendent  
**No. of sprinklers calculated:** 15  
**In-rack demand:** n/a - GPM  
**Hose streams:** 250 - GPM  
**Total water required (including hose streams):** 565 - GPM @ 73 - Psi  
**Type of system:** Wet System  
**Volume of dry or preaction system:** n/a - Gal

**Water supply information**

**Date:** 9-13-15  
**Location:** Sewall Road  
**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.)**

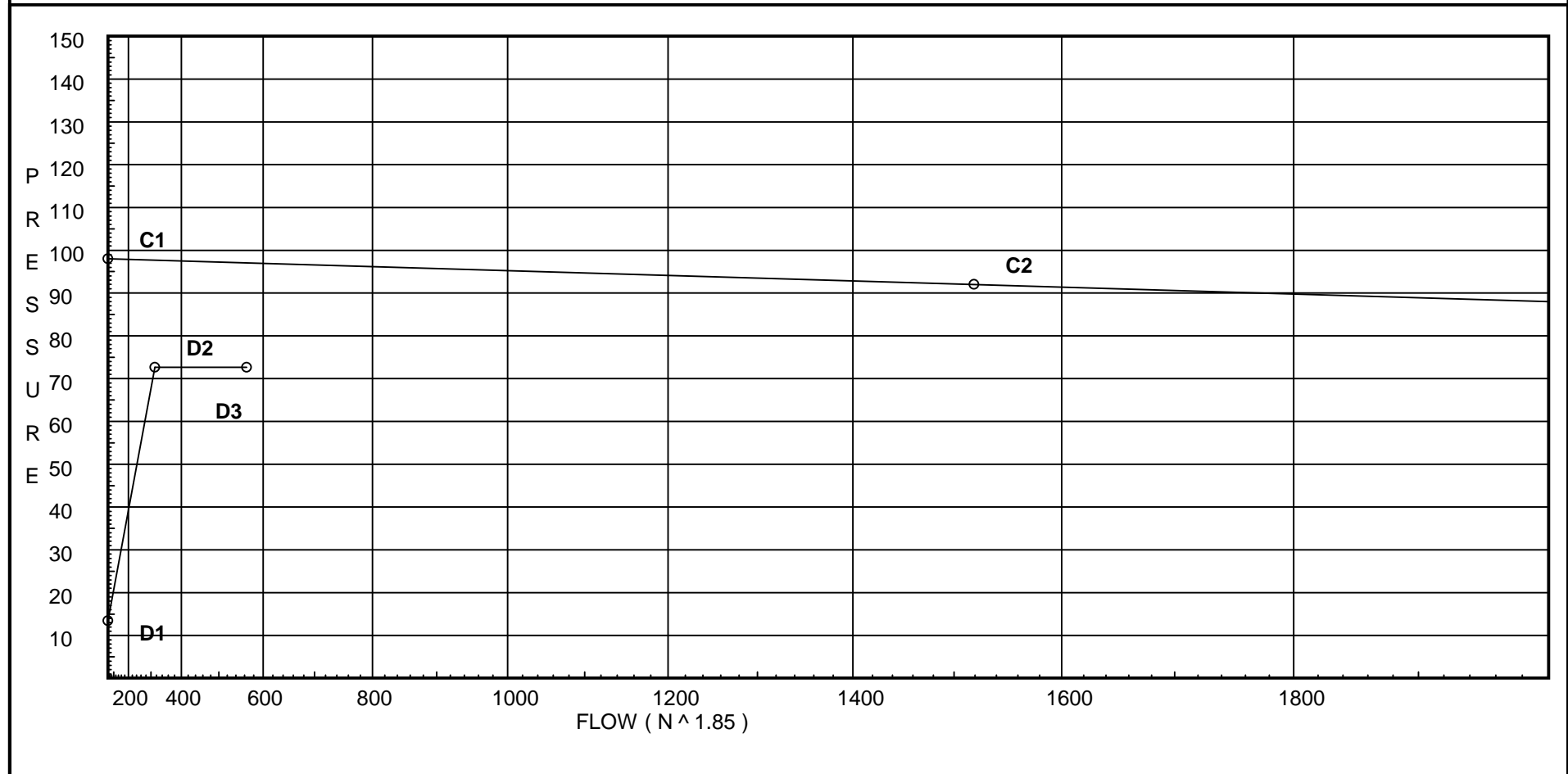
# Water Supply Curve (C)

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City Water Supply:  
C1 - Static Pressure : 98  
C2 - Residual Pressure: 92  
C2 - Residual Flow : 1519

Demand:  
D1 - Elevation : 13.426  
D2 - System Flow : 314.592  
D2 - System Pressure : 72.667  
Hose ( Demand ) : 250  
D3 - System Demand : 564.592  
Safety Margin : 24.371



# 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
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
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	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	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

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
DP1	-1.0	5.6	10.33	na	18.0	0.15	120	7.0
DP2	-1.0	5.6	10.33	na	18.0	0.15	120	7.0
100	12.0	K = K @ EQ01	10.22	na	18.0			
101	12.0	K = K @ EQ01	10.82	na	18.52			
102	12.0		11.61	na				
103	12.0	K = K @ EQ02	12.04	na	19.24			
104	12.0	K = K @ EQ02	12.91	na	19.92			
105	12.0	K = K @ EQ02	14.44	na	21.07			
106	12.0	K = K @ EQ02	16.85	na	22.76			
110	12.0	K = K @ EQ02	11.51	na	18.81			
111	12.0	K = K @ EQ02	11.63	na	18.91			
112	12.0	K = K @ EQ01	10.91	na	18.6			
113	12.0		12.61	na				
114	12.0	K = K @ EQ02	12.97	na	19.96			
115	12.0	K = K @ EQ02	14.52	na	21.13			
116	12.0	K = K @ EQ02	16.96	na	22.83			
120	12.0	K = K @ EQ02	19.89	na	24.73			
121	12.0	K = K @ EQ02	20.08	na	24.85			
122	12.0	K = K @ EQ02	20.78	na	25.27			
107	12.0		22.45	na				
117	12.0		22.62	na				
123	12.0		23.14	na				
124	12.0		32.52	na				
125	37.0		24.39	na				
126	37.0		35.81	na				
127	20.0		46.03	na				
TOR	20.0		46.68	na				
FLW	7.0		55.64	na				
BOR	0.0		62.5	na				
BASE	0.0		63.47	na				
HOSE	0.0		63.86	na	250.0			
TEST	-19.0		72.67	na				

The maximum velocity is 17.36 and it occurs in the pipe between nodes 116 and 117

# 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	18.00 18.0	1.049 120.0 0.1070	1E	2.0 0.0 0.0	1.000 2.000 3.000	10.332 -0.433 0.321			K Factor = 5.60 Vel = 6.68	
	0.0 18.00						10.220		K Factor = 5.63	
DP2 to EQ02	18.00 18.0	1.049 120.0 0.1070	1T	5.0 0.0 0.0	1.000 5.000 6.000	10.332 -0.433 0.642			K Factor = 5.60 Vel = 6.68	
	0.0 18.00						10.541		K Factor = 5.54	
100 to 102	18.00 18.0	1.049 120.0 0.1071	1T	5.0 0.0 0.0	8.000 5.000 13.000	10.220 0.0 1.392			K Factor @ node EQ01 Vel = 6.68	
	0.0 18.00						11.612		K Factor = 5.28	
101 to 102	18.52 18.52	1.049 120.0 0.1129	1T	5.0 0.0 0.0	2.000 5.000 7.000	10.822 0.0 0.790			K Factor @ node EQ01 Vel = 6.88	
102 to 103	18.00 36.52	1.682 120.0 0.0398		0.0 0.0 0.0	10.800 0.0 10.800	11.612 0.0 0.430			Vel = 5.27	
103 to 104	19.24 55.76	1.682 120.0 0.0870		0.0 0.0 0.0	10.000 0.0 10.000	12.042 0.0 0.870			K Factor @ node EQ02 Vel = 8.05	
104 to 105	19.92 75.68	1.682 120.0 0.1531		0.0 0.0 0.0	10.000 0.0 10.000	12.912 0.0 1.531			K Factor @ node EQ02 Vel = 10.93	
105 to 106	21.07 96.75	1.682 120.0 0.2412		0.0 0.0 0.0	10.000 0.0 10.000	14.443 0.0 2.412			K Factor @ node EQ02 Vel = 13.97	
106 to 107	22.76 119.51	1.682 120.0 0.3565	1T	9.9 0.0 0.0	5.800 9.900 15.700	16.855 0.0 5.597			K Factor @ node EQ02 Vel = 17.26	
	0.0 119.51						22.452		K Factor = 25.22	
110 to 111	18.81 18.81	1.682 120.0 0.0117		0.0 0.0 0.0	10.800 0.0 10.800	11.506 0.0 0.126			K Factor @ node EQ02 Vel = 2.72	
111 to 113	18.90 37.71	1.682 120.0 0.0422	1V 1X	4.331 9.9 0.0	9.000 14.231 23.231	11.632 0.0 0.981			K Factor @ node EQ02 Vel = 5.44	
	0.0 37.71						12.613		K Factor = 10.62	
112 to 113	18.60 18.6	1.049 120.0 0.1137	1E 1T	2.0 5.0 0.0	8.000 7.000 15.000	10.907 0.0 1.706			K Factor @ node EQ01 Vel = 6.90	
113 to 114	37.71 56.31	1.682 120.0 0.0885		0.0 0.0 0.0	4.000 0.0 4.000	12.613 0.0 0.354			Vel = 8.13	

# 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	*****
114 to 115	19.96 76.27	1.682 120.0 0.1554		0.0 0.0 0.0	10.000 0.0 10.000	12.967 0.0 1.554			K Factor @ node EQ02 Vel = 11.01	
115 to 116	21.13 97.4	1.682 120.0 0.2441		0.0 0.0 0.0	10.000 0.0 10.000	14.521 0.0 2.441			K Factor @ node EQ02 Vel = 14.06	
116 to 117	22.83 120.23	1.682 120.0 0.3606	1T	9.9 0.0 0.0	5.800 9.900 15.700	16.962 0.0 5.661			K Factor @ node EQ02 Vel = 17.36	
	0.0 120.23					22.623			K Factor = 25.28	
120 to 121	24.73 24.73	1.682 120.0 0.0193		0.0 0.0 0.0	10.000 0.0 10.000	19.890 0.0 0.193			K Factor @ node EQ02 Vel = 3.57	
121 to 122	24.84 49.57	1.682 120.0 0.0700		0.0 0.0 0.0	10.000 0.0 10.000	20.083 0.0 0.700			K Factor @ node EQ02 Vel = 7.16	
122 to 123	25.27 74.84	1.682 120.0 0.1500	1T	9.9 0.0 0.0	5.800 9.900 15.700	20.783 0.0 2.355			K Factor @ node EQ02 Vel = 10.81	
	0.0 74.84					23.138			K Factor = 15.56	
107 to 117	119.51 119.51	3.26 120.0 0.0142		0.0 0.0 0.0	12.000 0.0 12.000	22.452 0.0 0.171			Vel = 4.59	
117 to 123	120.24 239.75	3.26 120.0 0.0515		0.0 0.0 0.0	10.000 0.0 10.000	22.623 0.0 0.515			Vel = 9.22	
123 to 124	74.84 314.59	3.26 120.0 0.0851	3V	20.159 0.0 0.0	90.000 20.159 110.159	23.138 0.0 9.378			Vel = 12.09	
124 to 125	0.0 314.59	3.26 120.0 0.0852	1V	6.72 0.0 0.0	25.000 6.720 31.720	32.516 -10.828 2.701			Vel = 12.09	
125 to 126	0.0 314.59	3.26 120.0 0.0851	1X 1V	17.471 6.72 0.0	110.000 24.191 134.191	24.389 0.0 11.425			Vel = 12.09	
126 to 127	0.0 314.59	3.26 120.0 0.0851	1X	17.471 0.0 0.0	16.000 17.471 33.471	35.814 7.363 2.849			Vel = 12.09	
127 to TOR	0.0 314.59	3.26 120.0 0.0851	1V	6.72 0.0 0.0	1.000 6.720 7.720	46.026 0.0 0.657			Vel = 12.09	
TOR to FLW	0.0 314.59	4.26 120.0 0.0232	1Fsp	0.0 0.0 0.0	14.000 0.0 14.000	46.683 8.630 0.325			* Fixed loss = 3 Vel = 7.08	
FLW to BOR	0.0 314.59	4.26 120.0 0.0232	1Zib	0.0 0.0 0.0	5.000 0.0 5.000	55.638 6.744 0.116			* Fixed loss = 3.713 Vel = 7.08	

# 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	*****
BOR	0.0	6.16	1G 4.304	250.000	62.498				
to		140.0	2E 40.168	87.509	0.0				
BASE	314.59	0.0029	1T 43.037	337.509	0.974		Vel = 3.39		
BASE	0.0	8.27	0.0	560.000	63.472				
to		140.0	0.0	0.0	0.0				
HOSE	314.59	0.0007	0.0	560.000	0.385		Vel = 1.88		
HOSE	250.00	12.46	1G 5.275	1050.000	63.857		Qa = 250		
to		100.0	1E 23.735	81.754	8.229				
TEST	564.59	0.0005	1T 52.745	1131.754	0.581		Vel = 1.49		
	0.0								
	564.59				72.667		K Factor = 66.23		