

**... Fire Protection by Computer Design**

High Tech Fire Protection  
84 Hackett Mills Rd  
PO Box 156  
Poland, ME, 04274  
207-998-2551

Job Name : BAYSIDE BOWL  
Building : 2  
Location : 58 Alder Street  
System : 1  
Contract : 033116-2  
Data File : Dry Calc.WXF

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**HYDRAULIC CALCULATIONS**  
*for*

**Project name:** BAYSIDE BOWL  
**Location:** 58 Alder Street  
**Drawing no:** 2  
**Date:** 10-7-16

**Design**

**Remote area number:** 1  
**Remote area location:** Roof Top Bar  
**Occupancy classification:** Light Hazard  
**Density:** .1 - Gpm/SqFt  
**Area of application:** 460 - SqFt  
**Coverage per sprinkler:** 196 - SqFt  
**Type of sprinklers calculated:** QR Uprights  
**No. of sprinklers calculated:** 8  
**In-rack demand:** - GPM  
**Hose streams:** 100 - GPM  
**Total water required (including hose streams):** 272 - GPM @ 90 - Psi  
**Type of system:** NFPA 13 Wet  
**Volume of dry or preaction system:** - Gal

**Water supply information**

**Date:** 10/28/2014  
**Location:** Corner of Kennebec St and Preble St  
**Source:** Portland Water District

**Name of contractor:** High Tech Fire Protection  
**Address:** 84 Hackett Mills Rd / PO Box 156 / Poland, ME, 04274  
**Phone number:** 207-998-2551  
**Name of designer:** Ed Pennell  
**Authority having jurisdiction:** Portland Fire Department  
**Notes: (Include peaking information or gridded systems here.)**

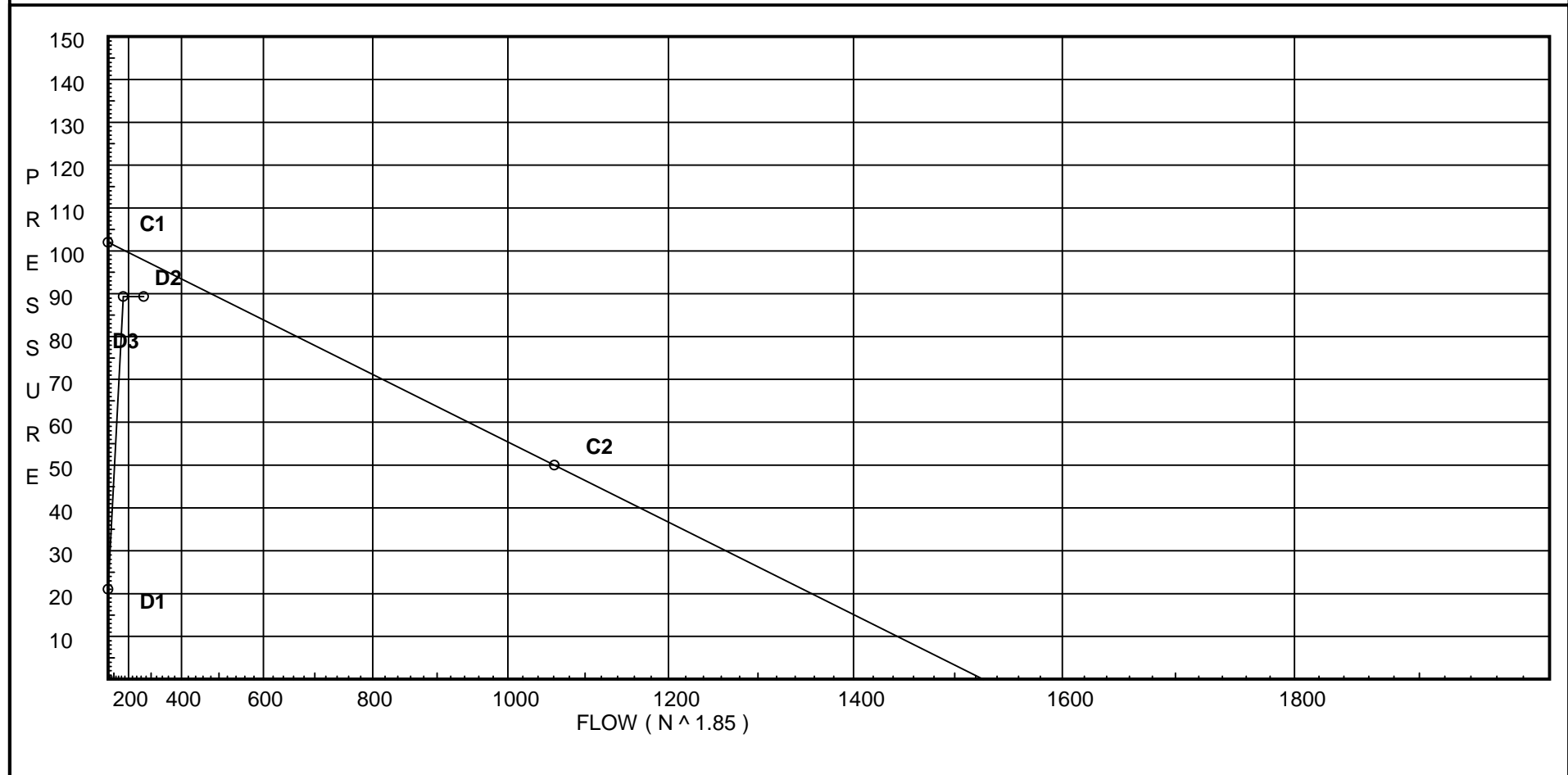
# Water Supply Curve (C)

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City Water Supply:  
C1 - Static Pressure : 102  
C2 - Residual Pressure: 50  
C2 - Residual Flow : 1061

Demand:  
D1 - Elevation : 21.049  
D2 - System Flow : 171.067  
D2 - System Pressure : 89.319  
Hose ( Demand ) : 100  
D3 - System Demand : 271.067  
Safety Margin : 8.516



# Fittings Used Summary

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## Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	5.5	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
Dvc	Dry Vic 768 NXT					3	9	8	17		21		22	50							
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	0	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

## 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.
D1	48.6	5.6	12.25	na	19.6	0.1	196	7.0
D2	48.6	5.6	14.32	na	21.19	0.1	196	7.0
D3	48.6		19.34	na				
P*	0.0		33.3	na				
D4	48.6	5.6	12.41	na	19.73	0.1	196	7.0
D5	48.6	5.6	14.51	na	21.33	0.1	196	7.0
D6	48.6		19.59	na				
D7	48.6	5.6	14.5	na	21.32	0.1	196	7.0
D8	48.6	5.6	16.23	na	22.56	0.1	196	7.0
D9	48.6		21.12	na				
D10	48.6	5.6	15.48	na	22.03	0.1	196	7.0
D11	48.6	5.6	17.32	na	23.3	0.1	196	7.0
D12	48.6		22.52	na				
D13	48.6		25.88	na				
D14	40.6		37.62	na				
D15	40.6		38.61	na				
D16	37.6		43.07	na				
W17	17.4		63.12	na				
W18	17.4		65.15	na				
W19	17.4		74.16	na				
W20	6.6		78.91	na				
W21	6.6		78.94	na				
TOR	1.0		81.38	na				
BOR	-1.0		89.26	na				
UG1	-1.0		89.34	na				
UG2	-1.0		89.61	na				
UG3	-1.0		89.72	na				
TEST	0.0		89.32	na	100.0			

The maximum velocity is 16.83 and it occurs in the pipe between nodes D11 and D12

# 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	*****
D1 to D2	19.60 19.6	1.049 100.0 0.1757		0.0 0.0 0.0	11.800 0.0 11.800	12.250 0.0 2.073			K Factor = 5.60 Vel = 7.28	
D2 to D3	21.19 40.79	1.049 100.0 0.6816	1T	3.568 0.0 0.0	3.800 3.568 7.368	14.323 0.0 5.022			K Factor = 5.60 Vel = 15.14	
D3 to D6	0.0 40.79	2.157 100.0 0.0203		0.0 0.0 0.0	12.000 0.0 12.000	19.345 0.0 0.244			Vel = 3.58	
	0.0 40.79					19.589			K Factor = 9.22	
D4 to D5	19.73 19.73	1.049 100.0 0.1778		0.0 0.0 0.0	11.800 0.0 11.800	12.409 0.0 2.098			K Factor = 5.60 Vel = 7.32	
D5 to D6	21.33 41.06	1.049 100.0 0.6897	1T	3.568 0.0 0.0	3.800 3.568 7.368	14.507 0.0 5.082			K Factor = 5.60 Vel = 15.24	
D6 to D9	40.79 81.85	2.157 100.0 0.0739	1T	8.783 0.0 0.0	12.000 8.783 20.783	19.589 0.0 1.535			Vel = 7.19	
	0.0 81.85					21.124			K Factor = 17.81	
D7 to D8	21.32 21.32	1.049 120.0 0.1465		0.0 0.0 0.0	11.800 0.0 11.800	14.496 0.0 1.729			K Factor = 5.60 Vel = 7.91	
D8 to D9	22.56 43.88	1.049 120.0 0.5567	1T	5.0 0.0 0.0	3.800 5.000 8.800	16.225 0.0 4.899			K Factor = 5.60 Vel = 16.29	
D9 to D12	81.85 125.73	2.157 120.0 0.1167		0.0 0.0 0.0	12.000 0.0 12.000	21.124 0.0 1.400			Vel = 11.04	
	0.0 125.73					22.524			K Factor = 26.49	
D10 to D11	22.03 22.03	1.049 120.0 0.1556		0.0 0.0 0.0	11.800 0.0 11.800	15.482 0.0 1.836			K Factor = 5.60 Vel = 8.18	
D11 to D12	23.31 45.34	1.049 120.0 0.5916	1T	5.0 0.0 0.0	3.800 5.000 8.800	17.318 0.0 5.206			K Factor = 5.60 Vel = 16.83	
D12 to D13	125.73 171.07	2.157 120.0 0.2061	1V	4.307 0.0 0.0	12.000 4.307 16.307	22.524 0.0 3.361			Vel = 15.02	
D13 to D14	0.0 171.07	2.157 100.0 0.2888	1X 1Dvc 1B	7.466 7.905 5.27	8.000 20.640 28.640	25.885 3.465 8.272			Vel = 15.02	
D14 to D15	0.0 171.07	2.157 120.0 0.2062	1V	4.307 0.0 0.0	0.500 4.307 4.807	37.622 0.0 0.991			Vel = 15.02	

# 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	*****
D15 to D16	0.0 171.07	2.157 120.0 0.2062	1T	12.307 0.0	3.000 12.307	38.613 1.299				
				0.0	15.307	3.156		Vel = 15.02		
D16 to W17	0.0 171.07	2.635 120.0 0.0778	1X	14.827 0.0	130.500 14.827	43.068 8.749				
				0.0	145.327	11.301		Vel = 10.06		
W17 to W18	0.0 171.07	2.635 120.0 0.0778	1V	5.903 0.0	20.200 5.903	63.118 0.0				
				0.0	26.103	2.030		Vel = 10.06		
W18 to W19	0.0 171.07	2.635 120.0 0.0778	1T 2X	16.474 29.654	69.800 46.128	65.148 0.0				
				0.0	115.928	9.016		Vel = 10.06		
W19 to W20	0.0 171.07	6.357 120.0 0.0011	2E	35.205 0.0	33.300 35.205	74.164 4.677				
				0.0	68.505	0.073		Vel = 1.73		
W20 to W21	0.0 171.07	6.357 120.0 0.0011	1V	12.573 0.0	11.500 12.573	78.914 0.0				
				0.0	24.073	0.026		Vel = 1.73		
W21 to TOR	0.0 171.07	6.357 120.0 0.0011	1V	12.573 0.0	4.750 12.573	78.940 2.425				
				0.0	17.323	0.019		Vel = 1.73		
TOR to BOR	0.0 171.07	6.357 120.0 0.0011	1Fsp	0.0 0.0	5.600 0.0	81.384 7.866			* Fixed loss = 7	
				0.0	5.600	0.006		Vel = 1.73		
BOR to UG1	0.0 171.07	6.16 140.0 0.0009	1E 1G 1T	20.084 4.304	22.000 67.425	89.256 0.0				
				43.037	89.425	0.084		Vel = 1.84		
UG1 to UG2	0.0 171.07	6.16 140.0 0.0009	1T	43.037 0.0	250.000 43.037	89.340 0.0				
				0.0	293.037	0.274		Vel = 1.84		
UG2 to UG3	0.0 171.07	6.16 140.0 0.0009	1T	43.037 0.0	75.000 43.037	89.614 0.0				
				0.0	118.037	0.110		Vel = 1.84		
UG3 to TEST	0.0 171.07	6.16 140.0 0.0010	1E 1G	20.084 4.304	5.000 24.388	89.724 -0.433				
				0.0	29.388	0.028		Vel = 1.84		
	100.00 271.07							Qa = 100.00 K Factor = 28.68		
						89.319				