



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

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

Job Name : 123 Washington Ave Distillery Area  
Building : 1  
Location : 123 Washington Ave  
System : 3  
Contract : 061417-1  
Data File : Distillery.WXF

**HYDRAULIC CALCULATIONS**  
**for**

**Project name:** 123 Washington Ave Distillery Area  
**Location:** 123 Washington Ave  
**Drawing no:** 1  
**Date:** 4/6/2017

**Design**

**Remote area number:** 3  
**Remote area location:** Distillery  
**Occupancy classification:** Ordinary Group 2  
**Density:** .20 - Gpm/SqFt  
**Area of application:** 1100 - SqFt  
**Coverage per sprinkler:** 130 - SqFt  
**Type of sprinklers calculated:** Commercial Uprights  
**No. of sprinklers calculated:** 13  
**In-rack demand:** - GPM  
**Hose streams:** 250 - GPM  
**Total water required (including hose streams):** 584.203 - GPM @ 69.6237 - Psi  
**Type of system:** NFPA 13 Wet  
**Volume of dry or preaction system:** N/A - Gal

**Water supply information**

**Date:** 08/25/16  
**Location:** Corner of Fox Street and Washington Ave  
**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.)**

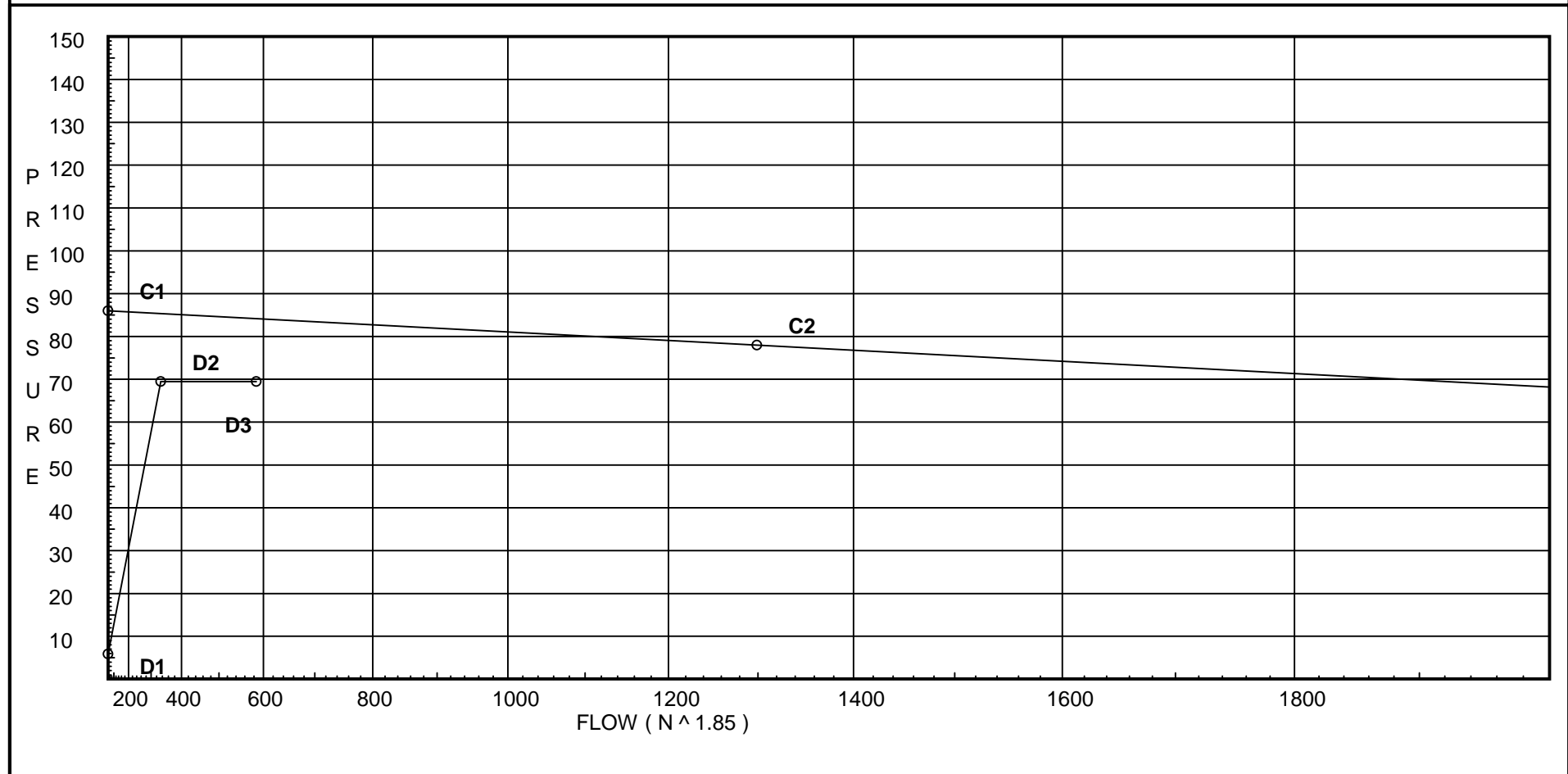
# Water Supply Curve (C)

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City Water Supply:  
C1 - Static Pressure : 86  
C2 - Residual Pressure: 78  
C2 - Residual Flow : 1299

Demand:  
D1 - Elevation : 5.847  
D2 - System Flow : 334.717  
D2 - System Pressure : 69.451  
Hose ( Demand ) : 250  
D3 - System Demand : 584.717  
Safety Margin : 14.722



# 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	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' EII 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
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.
N1	13.5	5.6	18.37	na	24.0	0.2	120	0.7
N2	13.5	5.6	18.54	na	24.11	0.2	120	0.7
N3	13.5	5.6	19.13	na	24.49	0.2	120	0.7
N4	13.5	5.6	20.45	na	25.32	0.2	120	0.7
N5	13.5	5.6	22.77	na	26.72	0.2	120	0.7
N7	13.5	5.6	20.86	na	25.58	0.2	110	7.0
N8	13.5	5.6	21.05	na	25.7	0.2	110	7.0
N9	13.5	5.6	21.72	na	26.1	0.2	110	7.0
N10	13.5	5.6	23.21	na	26.98	0.2	110	7.0
N12	13.5	5.6	21.41	na	25.91	0.2	110	7.0
N13	13.5	5.6	21.61	na	26.03	0.2	110	7.0
N14	13.5	5.6	22.29	na	26.44	0.2	110	7.0
N15	13.5	5.6	23.81	na	27.33	0.2	110	7.0
N6	13.5		31.79	na				
N11	13.5		32.31	na				
N16	13.5		33.13	na				
L14	13.5		41.01	na				
TOR	3.0		55.88	na				
TOV	1.0		60.75	na				
BOV	-6.0		71.55	na				
UG1	-6.0		71.64	na				
UG2	-6.0		71.83	na				
UG3	-6.0		71.89	na				
TEST	0.0		69.45	na	250.0			

The maximum velocity is 19.69 and it occurs in the pipe between nodes N16 and L14

# Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftgng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
N1	24.00	1.682		0.0	9.200	18.367			K Factor = 5.60	
to		120.0		0.0	0.0	0.0				
N2	24.0	0.0184		0.0	9.200	0.169			Vel = 3.47	
N2	24.11	1.682		0.0	9.000	18.536			K Factor = 5.60	
to		120.0		0.0	0.0	0.0				
N3	48.11	0.0662		0.0	9.000	0.596			Vel = 6.95	
N3	24.49	1.682		0.0	9.300	19.132			K Factor = 5.60	
to		120.0		0.0	0.0	0.0				
N4	72.6	0.1417		0.0	9.300	1.318			Vel = 10.48	
N4	25.33	1.682		0.0	9.400	20.450			K Factor = 5.60	
to		120.0		0.0	0.0	0.0				
N5	97.93	0.2467		0.0	9.400	2.319			Vel = 14.14	
N5	26.72	1.682	1T	9.9	13.500	22.769			K Factor = 5.60	
to		120.0		0.0	9.900	0.0				
N6	124.65	0.3854		0.0	23.400	9.018			Vel = 18.00	
	0.0									
	124.65					31.787			K Factor = 22.11	
N7	25.58	1.682		0.0	9.200	20.864			K Factor = 5.60	
to		120.0		0.0	0.0	0.0				
N8	25.58	0.0207		0.0	9.200	0.190			Vel = 3.69	
N8	25.69	1.682		0.0	9.000	21.054			K Factor = 5.60	
to		120.0		0.0	0.0	0.0				
N9	51.27	0.0744		0.0	9.000	0.670			Vel = 7.40	
N9	26.11	1.682		0.0	9.300	21.724			K Factor = 5.60	
to		120.0		0.0	0.0	0.0				
N10	77.38	0.1596		0.0	9.300	1.484			Vel = 11.17	
N10	26.97	1.682	1T	9.9	22.900	23.208			K Factor = 5.60	
to		120.0		0.0	9.900	0.0				
N11	104.35	0.2774		0.0	32.800	9.099			Vel = 15.07	
	0.0									
	104.35					32.307			K Factor = 18.36	
N12	25.91	1.682		0.0	9.200	21.414			K Factor = 5.60	
to		120.0		0.0	0.0	0.0				
N13	25.91	0.0211		0.0	9.200	0.194			Vel = 3.74	
N13	26.03	1.682		0.0	9.000	21.608			K Factor = 5.60	
to		120.0		0.0	0.0	0.0				
N14	51.94	0.0762		0.0	9.000	0.686			Vel = 7.50	
N14	26.45	1.682		0.0	9.300	22.294			K Factor = 5.60	
to		120.0		0.0	0.0	0.0				
N15	78.39	0.1634		0.0	9.300	1.520			Vel = 11.32	
N15	27.32	1.682	1T	9.9	22.900	23.814			K Factor = 5.60	
to		120.0		0.0	9.900	0.0				
N16	105.71	0.2841		0.0	32.800	9.320			Vel = 15.26	
	0.0									
	105.71					33.134			K Factor = 18.36	
N6	124.65	2.635		0.0	12.000	31.787				
to		120.0		0.0	0.0	0.0				
N11	124.65	0.0433		0.0	12.000	0.520			Vel = 7.33	

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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	*****
N11	104.35	2.635		0.0	6.200	32.307				
to		120.0		0.0	0.0	0.0				
N16	229.0	0.1334		0.0	6.200	0.827		Vel = 13.47		
N16	105.72	2.635	1T	16.474	12.800	33.134				
to		120.0		0.0	16.474	0.0				
L14	334.72	0.2692		0.0	29.274	7.881		Vel = 19.69		
L14	0.0	3.26	3V	20.159	87.900	41.015				
to		120.0		0.0	20.159	4.548				
TOR	334.72	0.0955		0.0	108.059	10.317		Vel = 12.87		
TOR	0.0	3.26	1Fsp	0.0	10.500	55.880				
to		120.0		0.0	0.0	3.866		* Fixed loss = 3		
TOV	334.72	0.0955		0.0	10.500	1.003		Vel = 12.87		
TOV	0.0	3.26	1Zia	0.0	2.000	60.749				
to		120.0		0.0	0.0	10.614		* Fixed loss = 7.583		
BOV	334.72	0.0955		0.0	2.000	0.191		Vel = 12.87		
BOV	0.0	6.16	1E	20.084	7.000	71.554				
to		140.0		0.0	20.084	0.0				
UG1	334.72	0.0032		0.0	27.084	0.088		Vel = 3.60		
UG1	0.0	6.16	1T	43.037	10.000	71.642				
to		140.0	1G	4.304	47.341	0.0				
UG2	334.72	0.0032		0.0	57.341	0.186		Vel = 3.60		
UG2	0.0	8.27	1T	55.354	25.000	71.828				
to		140.0		0.0	55.354	0.0				
UG3	334.72	0.0008		0.0	80.354	0.062		Vel = 2.00		
UG3	0.0	6.16	1E	20.084	25.000	71.890				
to		140.0	1G	4.304	24.388	-2.599				
TEST	334.72	0.0032		0.0	49.388	0.160		Vel = 3.60		
	250.00							Qa = 250.00		
	584.72					69.451		K Factor = 70.16		