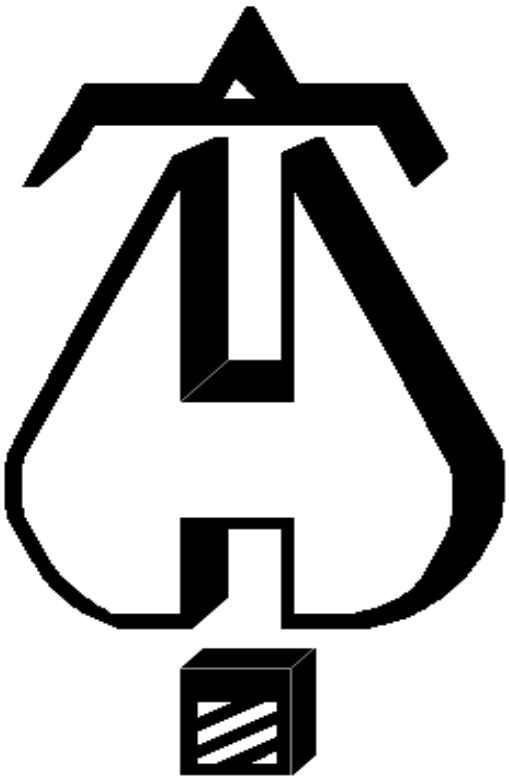


. . . Fire Protection by Computer Design

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

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

HYDRAULIC CALCULATIONS
for

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

Design

Remote area number: 1
Remote area location: 1
Occupancy classification: Light Hazard
Density: .10 - Gpm/SqFt
Area of application: 950 - SqFt
Coverage per sprinkler: 196 - SqFt
Type of sprinklers calculated: Commercial Uprights
No. of sprinklers calculated: 9
In-rack demand: - GPM
Hose streams: 100 - GPM
Total water required (including hose streams): 298.834 - GPM @ 61.7652 - Psi
Type of system: NFPA 13 wet
Volume of dry or preaction system: - Gal

Water supply information

Date: 08/25/2016
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)

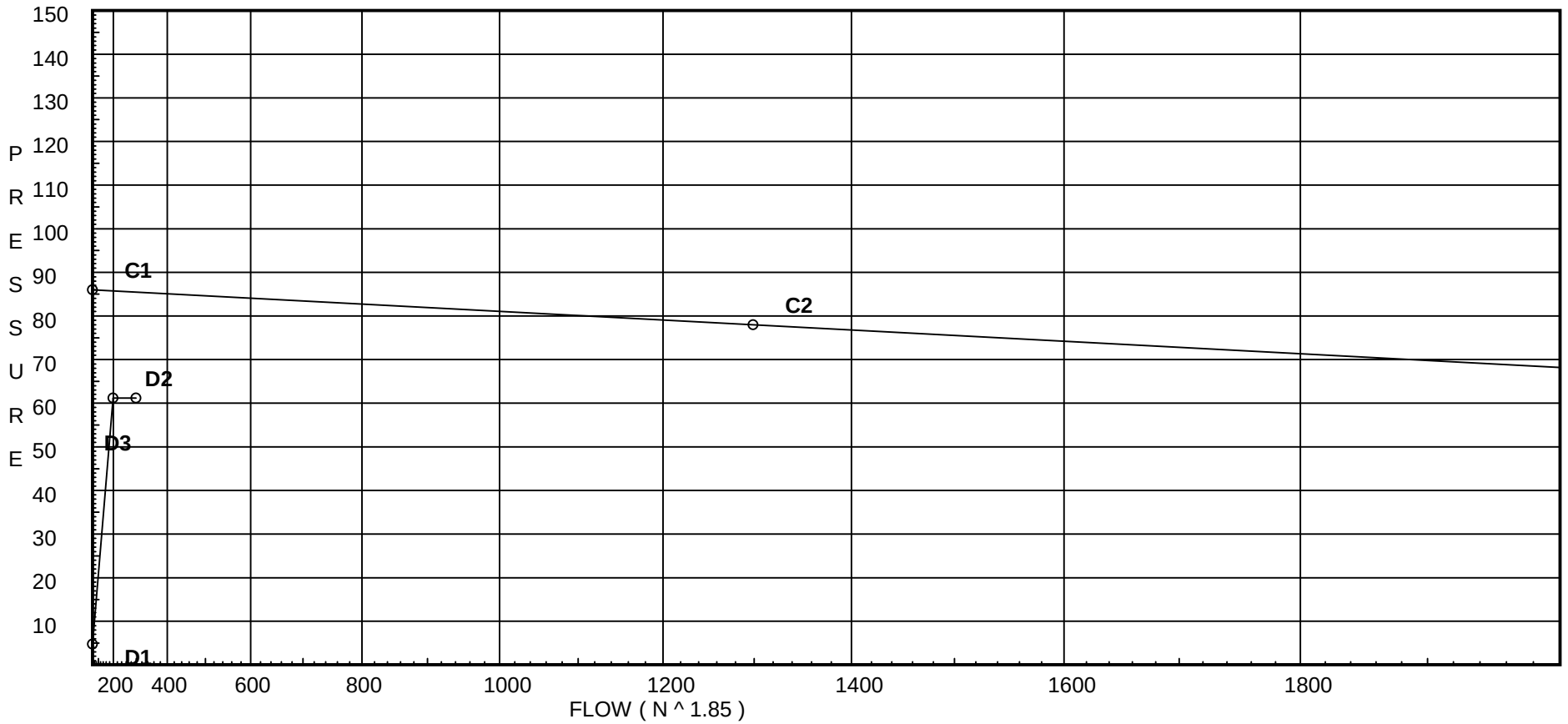
High Tech Fire Protection
123 Washington Ave Restaurant Area

Date 4/6/2017

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

Demand:

D1 - Elevation	:	4.764
D2 - System Flow	:	198.539
D2 - System Pressure	:	61.155
Hose (Demand)	:	100
D3 - System Demand	:	298.539
Safety Margin	:	24.318



Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	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' 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
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

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
L1	11.0	5.6	12.25	na	19.6	0.1	196	7.0
L2	11.0	5.6	12.3	na	19.64	0.1	196	7.0
L3	11.0	5.6	12.75	na	20.0	0.1	196	7.0
L4	11.0	5.6	13.92	na	20.89	0.1	196	7.0
L5	11.0	5.6	15.96	na	22.37	0.1	196	7.0
L6	11.0		21.23	na				
P*	0.0		17.01	na				
L7	11.0	5.6	17.49	na	23.42	0.1	196	7.0
L8	11.0	5.6	17.68	na	23.55	0.1	196	7.0
L9	11.0	5.6	18.45	na	24.05	0.1	196	7.0
L10	11.0	5.6	19.94	na	25.01	0.1	196	7.0
L11	11.0		21.57	na				
L12	11.0		32.42	na				
L13	13.5		33.24	na				
L14	13.5		41.35	na				
TOR	3.0		49.83	na				
TOV	1.0		54.08	na				
BOV	-6.0		63.56	na				
UG1	-6.0		63.6	na				
UG2	-6.0		63.67	na				
UG3	-6.0		63.69	na				
TEST	0.0		61.15	na	100.0			

The maximum velocity is 17.43 and it occurs in the pipe between nodes L11 and L12

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
L1	19.60	1.682		0.0	4.300	12.250		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
L2	19.6	0.0126		0.0	4.300	0.054		Vel = 2.83
L2	19.64	1.682		0.0	9.900	12.304		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
L3	39.24	0.0455		0.0	9.900	0.450		Vel = 5.67
L3	20.00	1.682		0.0	12.000	12.754		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
L4	59.24	0.0973		0.0	12.000	1.168		Vel = 8.55
L4	20.90	1.682		0.0	12.000	13.922		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
L5	80.14	0.1702		0.0	12.000	2.042		Vel = 11.57
L5	22.37	1.682	1T	9.9	9.700	15.964		K Factor = 5.60
to		120.0		0.0	9.900	0.0		
L6	102.51	0.2684		0.0	19.600	5.261		Vel = 14.80
L6	0.0	2.635		0.0	11.500	21.225		
to		120.0		0.0	0.0	0.0		
L11	102.51	0.0302		0.0	11.500	0.347		Vel = 6.03
	0.0							
	102.51					21.572		K Factor = 22.07
L7	23.42	1.682		0.0	11.300	17.487		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
L8	23.42	0.0175		0.0	11.300	0.198		Vel = 3.38
L8	23.55	1.682		0.0	12.000	17.685		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
L9	46.97	0.0633		0.0	12.000	0.760		Vel = 6.78
L9	24.05	1.682		0.0	11.000	18.445		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
L10	71.02	0.1361		0.0	11.000	1.497		Vel = 10.25
L10	25.01	2.157	1T	12.307	10.700	19.942		K Factor = 5.60
to		120.0		0.0	12.307	0.0		
L11	96.03	0.0708		0.0	23.007	1.630		Vel = 8.43
L11	102.51	2.157	1X	10.461	29.500	21.572		
to		120.0		0.0	10.461	0.0		
L12	198.54	0.2715		0.0	39.961	10.851		Vel = 17.43
L12	0.0	2.157	1V	4.307	2.700	32.423		
to		120.0		0.0	4.307	-1.083		
L13	198.54	0.2714		0.0	7.007	1.902		Vel = 17.43
L13	0.0	2.635	1V	5.903	56.800	33.242		
to		120.0	1T	16.474	22.377	0.0		
L14	198.54	0.1024		0.0	79.177	8.111		Vel = 11.68
L14	0.0	3.26	3V	20.159	87.900	41.353		
to		120.0		0.0	20.159	4.548		
TOR	198.54	0.0363		0.0	108.059	3.926		Vel = 7.63
TOR	0.0	3.26	1Fsp	0.0	10.700	49.827		
to		120.0		0.0	0.0	3.866		* Fixed loss = 3
TOV	198.54	0.0364		0.0	10.700	0.389		Vel = 7.63
TOV	0.0	3.26	1Zia	0.0	2.000	54.082		
to		120.0		0.0	0.0	9.411		* Fixed loss = 6.379
BOV	198.54	0.0360		0.0	2.000	0.072		Vel = 7.63

Final Calculations - Hazen-Williams

High Tech Fire Protection
123 Washington Ave Restaurant Area

Date 4/6/2017

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*******	Notes	******
BOV	0.0	6.16	1E	20.084	7.000	63.565				
to		140.0		0.0	20.084	0.0				
UG1	198.54	0.0012		0.0	27.084	0.033		Vel = 2.14		
UG1	0.0	6.16	1T	43.037	10.000	63.598				
to		140.0	1G	4.304	47.341	0.0				
UG2	198.54	0.0012		0.0	57.341	0.071		Vel = 2.14		
UG2	0.0	8.27	1T	55.354	25.000	63.669				
to		140.0		0.0	55.354	0.0				
UG3	198.54	0.0003		0.0	80.354	0.024		Vel = 1.19		
UG3	0.0	6.16	1E	20.084	25.000	63.693				
to		140.0	1G	4.304	24.388	-2.599				
TEST	198.54	0.0012		0.0	49.388	0.061		Vel = 2.14		
	100.00							Qa = 100.00		
	298.54					61.155		K Factor = 38.18		