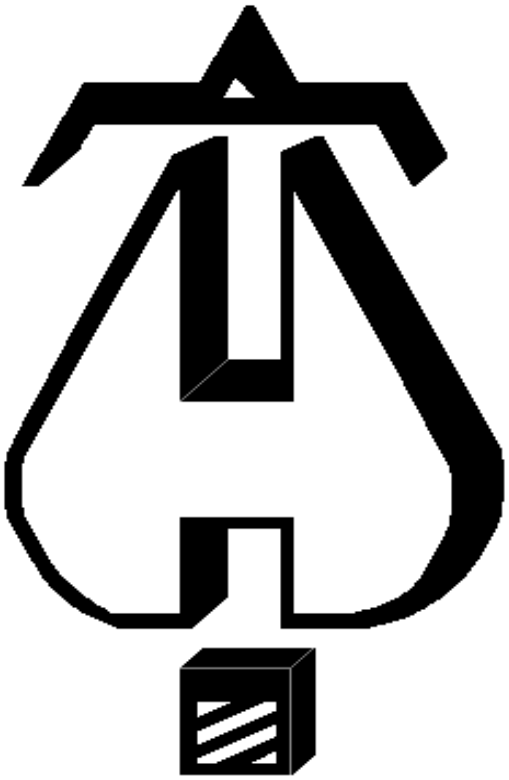


. . . Fire Protection by Computer Design

HIGH TECH FIRE PROTECTION
84 HACKETT MILLS ROAD
P.O. BOX 156
POLAND, ME 04274
207-998-2551

Job Name	:	West Attic
Drawing	:	FP-03
Location	:	NATHAN CLIFFORD RESIDENCE
Remote Area	:	#4
Contract	:	020714-1
Data File	:	West Attic.WXF

HYDRAULIC CALCULATIONS
for

Project name: West Attic
Location: NATHAN CLIFFORD RESIDENCE
Drawing no: FP-03
Date: 4/29/14

Design

Remote area number: #4
Remote area location: WEST ATTIC
Occupancy classification: LIGHT HAZARD
Density: .1 - Gpm/SqFt
Area of application: 1950 - SqFt
Coverage per sprinkler: 130 - SqFt
Type of sprinklers calculated: QUICK RESPONSE UPRIGHTS
No. of sprinklers calculated: 18
In-rack demand: N/A - GPM
Hose streams: 0 - GPM
Total water required (including hose streams): 297 - GPM @ 71 - Psi
Type of system: DRY SYSTEM
Volume of dry or preaction system: 250 - Gal

Water supply information

Date: 4-30-14
Location: TEST HYDRANT ON FALMOUTH ST. IN FRONT OF BUILDING
Source: PORTLAND WATER DISTRICT

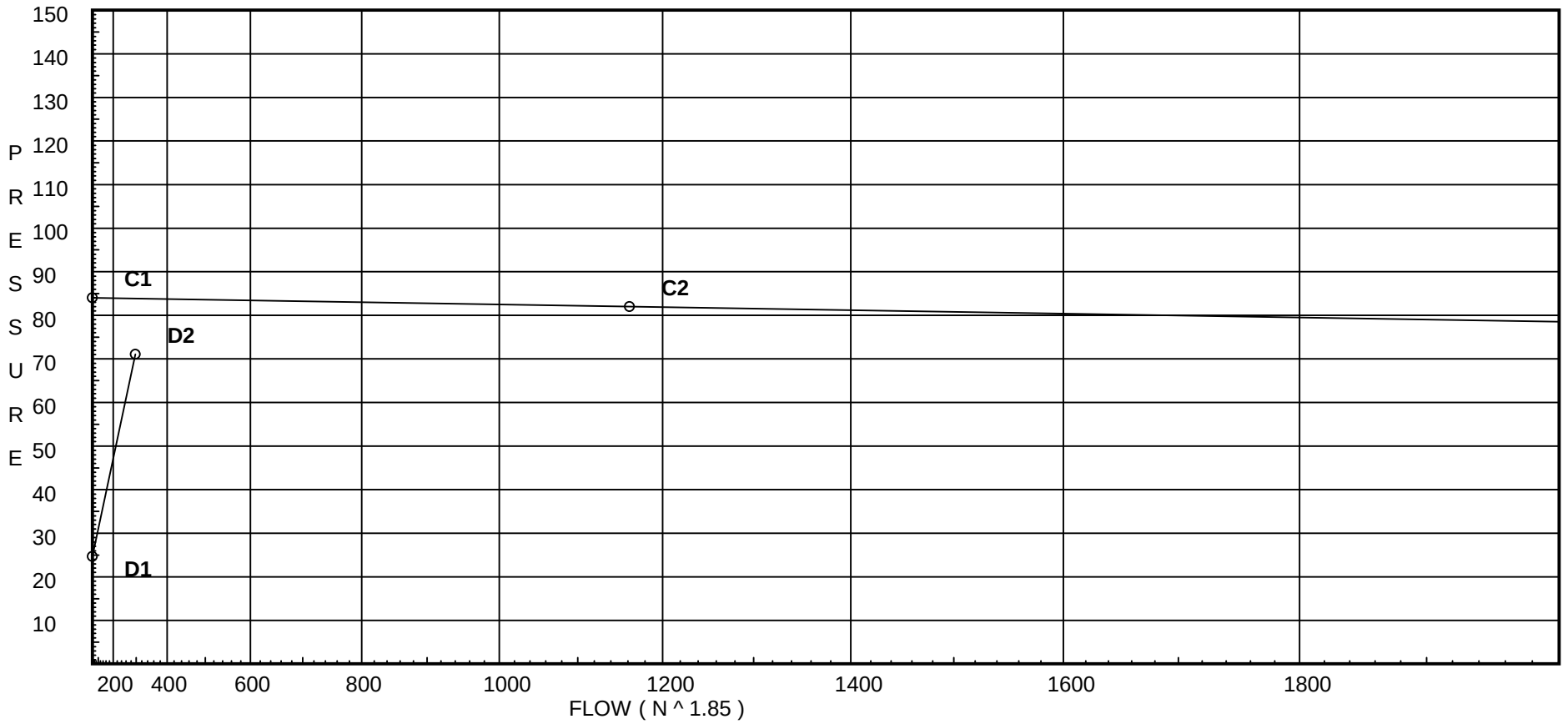
Name of contractor: HIGH TECH FIRE PROTECTION
Address: 84 HACKETT MILLS ROAD / P.O. BOX 156 / POLAND, ME 04274
Phone number: 207-998-2551
Name of designer: ED POULIN
Authority having jurisdiction: STATE OF MAINE / CITY OF PORTLAND
Notes: (Include peaking information or gridded systems here.)

Water Supply Curve (C)

HIGH TECH FIRE PROTECTION
West Attic

City Water Supply:
- C1 - Static Pressure : 84
- C2 - Residual Pressure: 82
- C2 - Residual Flow : 1162

Demand:
- D1 - Elevation : 24.687
- D2 - System Flow : 296.561
- D2 - System Pressure : 71.050
- Hose (Demand) :
- D3 - System Demand : 296.561
- Safety Margin : 12.791



Fittings Used Summary

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	0	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
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	0	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	0	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.
500	69.0	5.6	7.78	na	15.62	0.1	130	7.0
501	69.0	5.6	7.92	na	15.76	0.1	130	7.0
502	69.0	5.6	8.43	na	16.26	0.1	130	7.0
510	69.0	5.6	8.28	na	16.11	0.1	130	7.0
511	69.0	5.6	8.43	na	16.26	0.1	130	7.0
512	69.0	5.6	8.96	na	16.77	0.1	130	7.0
513	69.0		9.93	na				
520	69.0	5.6	8.6	na	16.42	0.1	130	7.0
521	69.0	5.6	8.75	na	16.57	0.1	130	7.0
522	69.0	5.6	9.31	na	17.09	0.1	130	7.0
523	69.0		10.31	na				
524	69.0		10.92	na				
525	64.0		13.98	na				
530	69.0	5.6	7.07	na	14.89	0.1	130	7.0
531	69.0	5.6	7.19	na	15.02	0.1	130	7.0
532	69.0	5.6	7.65	na	15.49	0.1	130	7.0
540	69.0	5.6	7.0	na	14.82	0.1	130	7.0
541	69.0	5.6	7.13	na	14.95	0.1	130	7.0
542	69.0	5.6	7.58	na	15.42	0.1	130	7.0
543	69.0		9.02	na				
544	64.0		14.79	na				
550	69.0	5.6	12.0	na	19.4	0.1	130	7.0
551	69.0	5.6	12.2	na	19.56	0.1	130	7.0
552	69.0	5.6	12.96	na	20.16	0.1	130	7.0
553	69.0		14.33	na				
554	69.0		14.97	na				
555	64.0		18.77	na				
545	64.0		19.23	na				
4D	64.0		32.73	na				
1D	10.0		62.98	na				
TOD	10.0		64.75	na				
BOD	3.0		69.4	na				
BASE	3.0		70.1	na				
UG	0.0		75.32	na				
HS1	0.0		76.09	na				
HS2	0.0		76.13	na				
TEST	12.0		71.05	na				

The maximum velocity is 13.97 and it occurs in the pipe between nodes 544 and 545

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
500	15.62	1.682		0.0	12.000	7.783		K Factor = 5.60
to		100.0		0.0	0.0	0.0		
501	15.62	0.0116		0.0	12.000	0.139		Vel = 2.26
501	15.77	1.682		0.0	12.000	7.922		K Factor = 5.60
to		100.0		0.0	0.0	0.0		
502	31.39	0.0421		0.0	12.000	0.505		Vel = 4.53
502	16.25	1.682	1E	3.533	13.000	8.427		K Factor = 5.60
to		100.0		0.0	3.533	0.0		
513	47.64	0.0912		0.0	16.533	1.507		Vel = 6.88
	0.0							
	47.64					9.934		K Factor = 15.12
510	16.11	1.682		0.0	12.000	8.281		K Factor = 5.60
to		100.0		0.0	0.0	0.0		
511	16.11	0.0122		0.0	12.000	0.147		Vel = 2.33
511	16.26	1.682		0.0	12.000	8.428		K Factor = 5.60
to		100.0		0.0	0.0	0.0		
512	32.37	0.0446		0.0	12.000	0.535		Vel = 4.67
512	16.77	1.682	1T	7.065	3.000	8.963		K Factor = 5.60
to		100.0		0.0	7.066	0.0		
513	49.14	0.0965		0.0	10.066	0.971		Vel = 7.10
513	47.64	2.635		0.0	10.000	9.934		
to		100.0		0.0	0.0	0.0		
523	96.78	0.0380		0.0	10.000	0.380		Vel = 5.69
	0.0							
	96.78					10.314		K Factor = 30.14
520	16.42	1.682		0.0	12.000	8.601		K Factor = 5.60
to		100.0		0.0	0.0	0.0		
521	16.42	0.0127		0.0	12.000	0.153		Vel = 2.37
521	16.57	1.682		0.0	12.000	8.754		K Factor = 5.60
to		100.0		0.0	0.0	0.0		
522	32.99	0.0462		0.0	12.000	0.554		Vel = 4.76
522	17.09	1.682	1T	7.065	3.000	9.308		K Factor = 5.60
to		100.0		0.0	7.066	0.0		
523	50.08	0.0999		0.0	10.066	1.006		Vel = 7.23
523	96.78	2.635	1E	5.879	1.500	10.314		
to		100.0		0.0	5.879	0.0		
524	146.86	0.0821		0.0	7.379	0.606		Vel = 8.64
524	0.0	2.635	1E	5.879	5.000	10.920		
to		100.0		0.0	5.879	2.166		
525	146.86	0.0822		0.0	10.879	0.894		Vel = 8.64
525	0.0	2.635		0.0	9.900	13.980		
to		100.0		0.0	0.0	0.0		
544	146.86	0.0821		0.0	9.900	0.813		Vel = 8.64
	0.0							
	146.86					14.793		K Factor = 38.18
530	14.89	1.682		0.0	12.000	7.066		K Factor = 5.60
to		100.0		0.0	0.0	0.0		
531	14.89	0.0106		0.0	12.000	0.127		Vel = 2.15

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
531	15.01	1.682		0.0	12.000	7.193		K Factor = 5.60
to		100.0		0.0	0.0	0.0		
532	29.9	0.0385		0.0	12.000	0.462		Vel = 4.32
532	15.50	1.682	1E	3.533	5.750	7.655		K Factor = 5.60
to		100.0	1T	7.065	10.599	0.0		
543	45.4	0.0834		0.0	16.349	1.363		Vel = 6.56
	0.0							
	45.40					9.018		K Factor = 15.12
540	14.82	1.682		0.0	12.000	7.000		K Factor = 5.60
to		100.0		0.0	0.0	0.0		
541	14.82	0.0105		0.0	12.000	0.126		Vel = 2.14
541	14.95	1.682		0.0	12.000	7.126		K Factor = 5.60
to		100.0		0.0	0.0	0.0		
542	29.77	0.0382		0.0	12.000	0.458		Vel = 4.30
542	15.42	1.682	1E	3.533	6.750	7.584		K Factor = 5.60
to		100.0	1T	7.065	10.599	0.0		
543	45.19	0.0827		0.0	17.349	1.434		Vel = 6.52
543	45.40	1.682	1T	7.065	5.000	9.018		
to		100.0		0.0	7.066	2.166		
544	90.59	0.2991		0.0	12.066	3.609		Vel = 13.08
544	146.85	2.635	2V	8.426	3.200	14.793		
to		100.0	1X	10.582	19.009	0.0		
545	237.44	0.1999		0.0	22.209	4.439		Vel = 13.97
	0.0							
	237.44					19.232		K Factor = 54.14
550	19.40	1.682		0.0	12.000	11.997		K Factor = 5.60
to		100.0		0.0	0.0	0.0		
551	19.4	0.0173		0.0	12.000	0.208		Vel = 2.80
551	19.56	1.682		0.0	12.000	12.205		K Factor = 5.60
to		100.0		0.0	0.0	0.0		
552	38.96	0.0628		0.0	12.000	0.753		Vel = 5.63
552	20.16	1.682	1T	7.065	3.000	12.958		K Factor = 5.60
to		100.0		0.0	7.066	0.0		
553	59.12	0.1359		0.0	10.066	1.368		Vel = 8.54
553	0.0	1.682	1E	3.533	1.200	14.326		
to		100.0		0.0	3.533	0.0		
554	59.12	0.1359		0.0	4.733	0.643		Vel = 8.54
554	0.0	1.682	1T	7.065	5.000	14.969		
to		100.0		0.0	7.066	2.166		
555	59.12	0.1358		0.0	12.066	1.639		Vel = 8.54
555	0.0	2.635	2V	8.426	11.000	18.774		
to		100.0	1X	10.582	19.009	0.0		
545	59.12	0.0153		0.0	30.009	0.458		Vel = 3.48
545	237.44	3.26	4V	19.184	107.000	19.232		
to		100.0		0.0	19.184	0.0		
4D	296.56	0.1069		0.0	126.184	13.495		Vel = 11.40
4D	0.0	3.26	4V	19.184	45.000	32.727		
to		100.0		0.0	19.184	23.387		
1D	296.56	0.1070		0.0	64.184	6.865		Vel = 11.40

Final Calculations - Hazen-Williams

HIGH TECH FIRE PROTECTION
West Attic

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
1D	0.0	4.26	2V	12.78	48.000	62.979		
to		100.0		0.0	12.780	0.0		
TOD	296.56	0.0291		0.0	60.780	1.766		Vel = 6.68
TOD	0.0	4.26	1Dvc	19.734	6.000	64.745		
to		100.0	1T	18.795	49.806	3.032		
BOD	296.56	0.0291	1B	11.277	55.806	1.622		Vel = 6.68
BOD	0.0	4.26	1V	8.954	4.000	69.399		
to		120.0	1X	21.067	30.021	0.0		
BASE	296.56	0.0207		0.0	34.021	0.705		Vel = 6.68
BASE	0.0	4.26	1V	8.954	1.000	70.104		
to		120.0	1Zia	0.0	8.954	5.008		* Fixed loss = 3.709
UG	296.56	0.0208		0.0	9.954	0.207		Vel = 6.68
UG	0.0	6.16	2E	40.168	210.000	75.319		
to		140.0	1T	43.037	87.509	0.0		
HS1	296.56	0.0026	1G	4.304	297.509	0.770		Vel = 3.19
HS1	0.0	8.23	1T	29.011	10.000	76.089		
to		100.0		0.0	29.010	0.0		
HS2	296.56	0.0012		0.0	39.010	0.046		Vel = 1.79
HS2	0.0	6.14	1G	2.273	10.000	76.135		
to		100.0	1E	10.608	12.881	-5.197		
TEST	296.56	0.0049		0.0	22.881	0.112		Vel = 3.21
	0.0							
	296.56					71.050		K Factor = 35.18