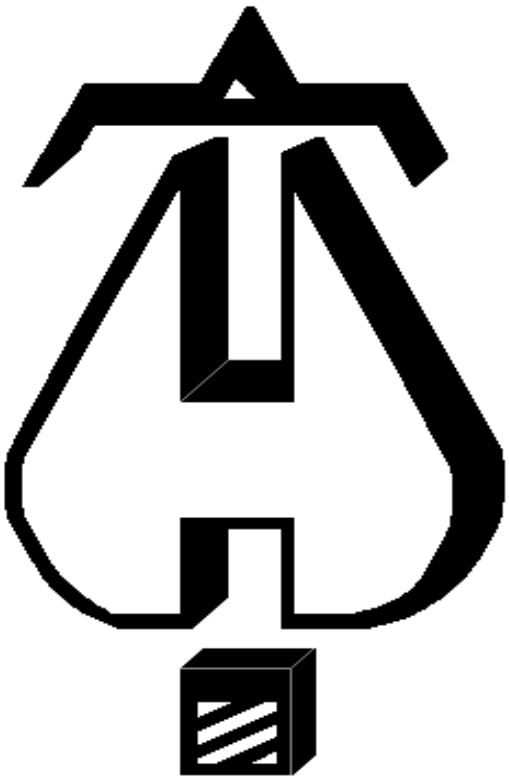


. . . Fire Protection by Computer Design

High Tech Fire Protection
PO Box 156
Minot, ME 04258
(207) 998-2551

Job Name	:	Third Floor Calc.
Building	:	Maine Wharf
Location	:	68 Commercial Street
System	:	NFPA 13
Contract	:	021414-1
Data File	:	Third Floor Calc.wxf

Hydraulic Design Information Sheet

Name - Third Floor Calc. Date - 03/26/2014
Location - 68 Commercial Street
Building - Maine Wharf System No. - NFPA 13
Contractor - High Tech Fire Protection Contract No. - 021414-1
Calculated By - Jeremy A Foss Drawing No. - FP-1.2
Construction: ( ) Combustible (X) Non-Combustible Ceiling Height - Varies
Occupancy - TBD - Future Tenant

SYSTEM DESIGN

(X) NFPA 13 ( ) Lt. Haz. Ord.Haz.Gp. ( ) 1 (X) 2 ( ) 3 ( ) Ex.Haz.
( ) NFPA 231 ( ) NFPA 231C ( ) Figure Curve
Other
Specific Ruling Made By Date

Area of Sprinkler Operation - 1950	System Type	Sprinkler/Nozzle
Density - .2	(X) Wet	Make Globe
Area Per Sprinkler - 120	( ) Dry	Model GL5615
Elevation at Highest Outlet - 47.500	( ) Deluge	Size 1/2"
Hose Allowance - Inside -	( ) Preaction	K-Factor 5.6
Rack Sprinkler Allowance -	( ) Other	Temp.Rat.155
Hose Allowance - Outside - 250		

Note

Calculation Summary — Flow Required - 809; Press Required - 92; C-Factor Used: 120; Overhead 140; Underground

WATER SUPPLY

Water Flow Test:	Pump Data:	Tank or Reservoir:
Date of Test - 05/11/2013		Cap. -
Time of Test -	Rated Cap.-	Elev.-
Static Press - 108	@ Press -	
Residual Press - 102	Elev. -	Well
Flow - 1537		Proof Flow
Elevation - -3		

Location - Test Hydrant Located at Corner of Commercial and Maple Streets

Source of Information - Brian Johnson of the Portland Water District

COMMODITY STORAGE

Commodity Class Location
Storage Ht. Area Aisle W.
Storage Method: Solid Piled % Palletized % Rack

( ) Single Row	( ) Conven. Pallet	( ) Auto. Storage	( ) Encap.
( ) Double Row	( ) Slave Pallet	( ) Solid Shelf	( ) Non
( ) Mult. Row		( ) Open Shelf	

RACK STORAGE

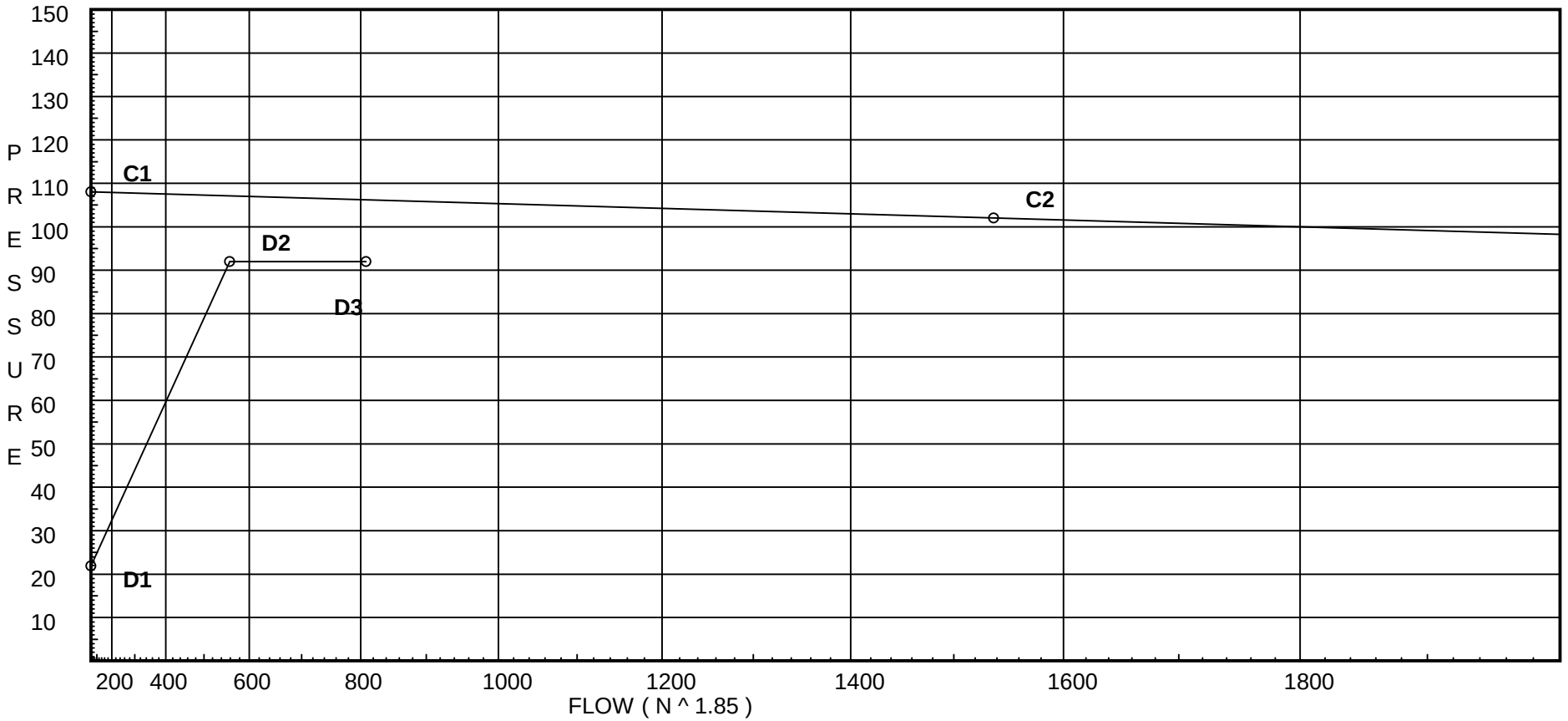
Flue Spacing Clearance:Storage to Ceiling
Longitudinal Transverse

Horizontal Barriers Provided:

City Water Supply:
- C1 - Static Pressure : 108
- C2 - Residual Pressure: 102
- C2 - Residual Flow : 1537

Demand:

D1 - Elevation	:	21.872
D2 - System Flow	:	558.623
D2 - System Pressure	:	91.996
Hose (Demand)	:	250
D3 - System Demand	:	808.623
Safety Margin	:	14.175



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	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
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
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	1	1	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
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

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.

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
DP1	0.5	5.6	18.37	na	24.0	0.2	120	7.0
DP2	0.5	5.6	18.37	na	24.0	0.2	120	7.0
201	44.0	K = K @ EQ01	25.34	na	27.3			
202	44.0	K = K @ EQ01	25.4	na	27.33			
203	44.0	K = K @ EQ01	25.65	na	27.46			
204	44.0	K = K @ EQ01	26.18	na	27.75			
205	44.0	K = K @ EQ01	27.24	na	28.3			
A1	44.0		27.35	na				
206	47.5	K = K @ EQ02	19.04	na	24.0			
A3	47.5		21.87	na				
207	47.5	K = K @ EQ01	21.88	na	25.37			
208	47.5	K = K @ EQ01	22.07	na	25.47			
209	47.5	K = K @ EQ01	22.51	na	25.73			
210	47.5	K = K @ EQ01	23.28	na	26.17			
211	47.5	K = K @ EQ01	24.71	na	26.96			
A4	47.5		24.82	na				
212	47.5	K = K @ EQ02	19.11	na	24.04			
A6	47.5		22.02	na				
213	47.5	K = K @ EQ01	22.03	na	25.45			
214	47.5	K = K @ EQ01	22.22	na	25.56			
215	47.5	K = K @ EQ01	22.67	na	25.82			
216	47.5	K = K @ EQ01	23.44	na	26.26			
217	47.5	K = K @ EQ01	24.88	na	27.05			
A7	47.5		24.99	na				
218	44.0	K = K @ EQ01	26.63	na	27.99			
219	44.0	K = K @ EQ01	26.7	na	28.02			
220	44.0	K = K @ EQ01	26.96	na	28.16			
221	44.0	K = K @ EQ01	27.51	na	28.45			
A9	44.0		28.75	na				
A2	40.5		31.06	na				
A5	40.5		31.11	na				
A8	40.5		31.3	na				
A10	40.5		31.77	na				
A11	40.5		32.49	na				
A12	39.5		34.4	na				
A13	39.5		43.57	na				
A14	27.0		50.42	na				
A15	27.0		62.98	na				
BF1	27.0		63.91	na				
BF2	18.0		78.41	na				
BF3	-2.0		87.41	na				
BF4	-2.0		89.47	na				
BF5	-3.0		91.31	na				
TEST	-3.0		92.0	na	250.0			

The maximum velocity is 13.54 and it occurs in the pipe between nodes A7 and A8

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	24.00	1.049	1T	5.0	0.500	18.367		K Factor = 5.60
to		120.0		0.0	5.000	0.217		
EQ01	24.0	0.1824		0.0	5.500	1.003		Vel = 8.91
	0.0							
	24.00					19.587		K Factor = 5.42
DP2	24.00	1.049	1E	2.0	0.500	18.367		K Factor = 5.60
to		120.0		0.0	2.000	0.217		
EQ02	24.0	0.1824		0.0	2.500	0.456		Vel = 8.91
	0.0							
	24.00					19.040		K Factor = 5.50
201	27.30	2.157		0.0	9.000	25.335		K Factor @ node EQ01
to		120.0		0.0	0.0	0.0		
202	27.3	0.0070		0.0	9.000	0.063		Vel = 2.40
202	27.32	2.157		0.0	10.000	25.398		K Factor @ node EQ01
to		120.0		0.0	0.0	0.0		
203	54.62	0.0249		0.0	10.000	0.249		Vel = 4.80
203	27.47	2.157		0.0	10.000	25.647		K Factor @ node EQ01
to		120.0		0.0	0.0	0.0		
204	82.09	0.0530		0.0	10.000	0.530		Vel = 7.21
204	27.74	2.157	1X	10.461	2.500	26.177		K Factor @ node EQ01
to		120.0		0.0	10.461	0.0		
A1	109.83	0.0908		0.0	12.961	1.177		Vel = 9.64
	0.0							
	109.83					27.354		K Factor = 21.00
205	28.30	2.157	1X	10.461	5.500	27.236		K Factor @ node EQ01
to		120.0		0.0	10.461	0.0		
A1	28.3	0.0074		0.0	15.961	0.118		Vel = 2.48
A1	109.83	2.157	1T	12.307	3.500	27.354		
to		120.0		0.0	12.307	1.516		
A2	138.13	0.1388		0.0	15.807	2.194		Vel = 12.13
	0.0							
	138.13					31.064		K Factor = 24.78
206	24.00	1.049	1E	2.0	8.500	19.040		K Factor @ node EQ02
to		120.0	1T	5.0	7.000	0.0		
A3	24.0	0.1823		0.0	15.500	2.826		Vel = 8.91
A3	0.0	2.157		0.0	2.500	21.866		
to		120.0		0.0	0.0	0.0		
207	24.0	0.0056		0.0	2.500	0.014		Vel = 2.11
207	25.37	2.157		0.0	9.000	21.880		K Factor @ node EQ01
to		120.0		0.0	0.0	0.0		
208	49.37	0.0207		0.0	9.000	0.186		Vel = 4.33
208	25.47	2.157		0.0	10.000	22.066		K Factor @ node EQ01
to		120.0		0.0	0.0	0.0		
209	74.84	0.0446		0.0	10.000	0.446		Vel = 6.57
209	25.73	2.157		0.0	10.000	22.512		K Factor @ node EQ01
to		120.0		0.0	0.0	0.0		
210	100.57	0.0772		0.0	10.000	0.772		Vel = 8.83

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
210	26.17	2.157	1X	10.461	2.500	23.284		K Factor @ node EQ01
to		120.0		0.0	10.461	0.0		
A4	126.74	0.1184		0.0	12.961	1.534		Vel = 11.13
	0.0							
	126.74					24.818		K Factor = 25.44
211	26.96	2.157	1X	10.461	5.500	24.710		K Factor @ node EQ01
to		120.0		0.0	10.461	0.0		
A4	26.96	0.0068		0.0	15.961	0.108		Vel = 2.37
A4	126.73	2.157	1T	12.307	7.000	24.818		
to		120.0		0.0	12.307	3.032		
A5	153.69	0.1691		0.0	19.307	3.264		Vel = 13.49
	0.0							
	153.69					31.114		K Factor = 27.55
212	24.04	1.049	1E	2.0	8.900	19.110		K Factor @ node EQ02
to		120.0	1T	5.0	7.000	0.0		
A6	24.04	0.1830		0.0	15.900	2.909		Vel = 8.92
A6	0.0	2.157		0.0	2.500	22.019		
to		120.0		0.0	0.0	0.0		
213	24.04	0.0056		0.0	2.500	0.014		Vel = 2.11
213	25.46	2.157		0.0	9.000	22.033		K Factor @ node EQ01
to		120.0		0.0	0.0	0.0		
214	49.5	0.0208		0.0	9.000	0.187		Vel = 4.35
214	25.56	2.157		0.0	10.000	22.220		K Factor @ node EQ01
to		120.0		0.0	0.0	0.0		
215	75.06	0.0449		0.0	10.000	0.449		Vel = 6.59
215	25.82	2.157		0.0	10.000	22.669		K Factor @ node EQ01
to		120.0		0.0	0.0	0.0		
216	100.88	0.0776		0.0	10.000	0.776		Vel = 8.86
216	26.26	2.157	1X	10.461	2.500	23.445		K Factor @ node EQ01
to		120.0		0.0	10.461	0.0		
A7	127.14	0.1190		0.0	12.961	1.543		Vel = 11.16
	0.0							
	127.14					24.988		K Factor = 25.43
217	27.05	2.157	1X	10.461	5.500	24.879		K Factor @ node EQ01
to		120.0		0.0	10.461	0.0		
A7	27.05	0.0068		0.0	15.961	0.109		Vel = 2.37
A7	127.14	2.157	1T	12.307	7.000	24.988		
to		120.0		0.0	12.307	3.032		
A8	154.19	0.1700		0.0	19.307	3.283		Vel = 13.54
	0.0							
	154.19					31.303		K Factor = 27.56
218	27.99	2.157		0.0	9.000	26.633		K Factor @ node EQ01
to		120.0		0.0	0.0	0.0		
219	27.99	0.0073		0.0	9.000	0.066		Vel = 2.46
219	28.02	2.157		0.0	10.000	26.699		K Factor @ node EQ01
to		120.0		0.0	0.0	0.0		
220	56.01	0.0261		0.0	10.000	0.261		Vel = 4.92

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
220	28.15	2.157		0.0	10.000	26.960		K Factor @ node EQ01
to		120.0		0.0	0.0	0.0		
221	84.16	0.0555		0.0	10.000	0.555		Vel = 7.39
221	28.45	2.157	1X	10.461	2.500	27.515		K Factor @ node EQ01
to		120.0		0.0	10.461	0.0		
A9	112.61	0.0951		0.0	12.961	1.233		Vel = 9.89
A9	0.0	2.157	1T	12.307	3.500	28.748		
to		120.0		0.0	12.307	1.516		
A10	112.61	0.0951		0.0	15.807	1.503		Vel = 9.89
	0.0							
	112.61					31.767		K Factor = 19.98
A2	138.13	4.26		0.0	10.000	31.064		
to		120.0		0.0	0.0	0.0		
A5	138.13	0.0050		0.0	10.000	0.050		Vel = 3.11
A5	153.70	4.26		0.0	9.400	31.114		
to		120.0		0.0	0.0	0.0		
A8	291.83	0.0201		0.0	9.400	0.189		Vel = 6.57
A8	154.18	4.26		0.0	10.500	31.303		
to		120.0		0.0	0.0	0.0		
A10	446.01	0.0442		0.0	10.500	0.464		Vel = 10.04
A10	112.61	4.26	1V	8.954	1.900	31.767		
to		120.0		0.0	8.954	0.0		
A11	558.62	0.0669		0.0	10.854	0.726		Vel = 12.57
A11	0.0	4.26	1X	21.067	1.000	32.493		
to		120.0		0.0	21.067	0.433		
A12	558.62	0.0669		0.0	22.067	1.477		Vel = 12.57
A12	0.0	4.26	2V	17.907	119.000	34.403		
to		120.0		0.0	17.907	0.0		
A13	558.62	0.0669		0.0	136.907	9.163		Vel = 12.57
A13	0.0	4.26	1V	8.954	12.500	43.566		
to		120.0		0.0	8.954	5.414		
A14	558.62	0.0669		0.0	21.454	1.435		Vel = 12.57
A14	0.0	4.26	3V	26.861	44.900	50.415		
to		120.0	1T	26.334	97.963	3.000		* Fixed loss = 3
A15	558.62	0.0669	1S	28.968	142.863	9.562		Vel = 12.57
			1Fsp	0.0				
			1B	15.8				
A15	0.0	4.26	1V	8.954	5.000	62.977		
to		120.0		0.0	8.954	0.0		
BF1	558.62	0.0669		0.0	13.954	0.934		Vel = 12.57
BF1	0.0	4.26	1Fsp	0.0	9.000	63.911		
to		120.0		0.0	0.0	13.898		* Fixed loss = 10
BF2	558.62	0.0669		0.0	9.000	0.602		Vel = 12.57
BF2	0.0	6.16	1E	20.084	20.000	78.411		
to		140.0		0.0	20.084	8.662		
BF3	558.62	0.0084		0.0	40.084	0.335		Vel = 6.01

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
BF3	0.0	6.16	1G	4.304	200.000	87.408		
to		140.0	1T	43.037	47.341	0.0		
BF4	558.62	0.0083		0.0	247.341	2.065		Vel = 6.01
BF4	0.0	12.24	5F	52.392	2500.000	89.473		
to		100.0		0.0	52.392	0.433		
BF5	558.62	0.0005		0.0	2552.392	1.402		Vel = 1.52
BF5	0.0	6.16	1E	20.084	15.000	91.308		
to		140.0	1G	4.304	67.425	0.0		
TEST	558.62	0.0083	1T	43.037	82.425	0.688		Vel = 6.01
	250.00							Qa = 250.00
	808.62					91.996		K Factor = 84.31