



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

Residential Fire Protection  
64 Daggett Hill Rd.  
Greene, ME 04236  
946-3473

Job Name : 33 HAMPSHIRE ST APT BLDG  
Building : WOOD STRUCTURE  
Location : BASEMENT  
System : 1  
Contract : 18002  
Data File : 33 HAMPSHIRE ST APT-HYD CALC-BASEMENT.WXF

Hydraulic Design Information Sheet

Name - 33 HAMPSHIRE STREET APT'S Date - 2/12/2018  
 Location - BASEMENT  
 Building - WOOD STRUCTURE System No. - 1  
 Contractor - RESIDENTIAL FIRE PROTECTION Contract No. - 18002  
 Calculated By - T. PRAY Drawing No. - 1 OF 1  
 Construction: (X) Combustible ( ) Non-Combustible Ceiling Height - 5'-11"  
 Occupancy - BASEMENT SPACE

S (X) NFPA 13 ( ) Lt. Haz. Ord.Haz.Gp. (X) 1 ( ) 2 ( ) 3 ( ) Ex.Haz.  
 Y ( ) NFPA 231 ( ) NFPA 231C ( ) Figure Curve

S Other

T Specific Ruling Made By Date

M	Area of Sprinkler Operation	- 940	System Type	Sprinkler/Nozzle
	Density	- .15	(X) Wet	Make VIKING
D	Area Per Sprinkler	- 100	( ) Dry	Model VK302
E	Elevation at Highest Outlet	- -.71	( ) Deluge	Size 1/2"
S	Hose Allowance - Inside	-	( ) Preaction	K-Factor 5.6
I	Rack Sprinkler Allowance	-	( ) Other	Temp.Rat.155
G	Hose Allowance - Outside	- 250		

N Note DESIGN AREA REDUCED FOR "QR" SPRINKLERS

Calculation Flow Required - 204.39 Press Required - 52.12 AT BOR  
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 10/4/2016		Cap. -
T	Time of Test - N/A	Rated Cap.-	Elev.-
E	Static Press - 95	@ Press -	
R	Residual Press - 91	Elev. -	Well
S	Flow - 1519		Proof Flow
U	Elevation - 0.0'		

P Location - HYDRANTS ARE LOCATED NEAREST TO THE SITE, SEE PLOT PLAN

L Source of Information - PORTLAND WATER DISTRICT

C	Commodity	Class	Location
O	Storage Ht.	Area	Aisle W.
M	Storage Method:	%	Palletized % Rack
	( ) Single Row	( ) Conven. Pallet	( ) Auto. Storage ( ) Encap.
S	( ) Double Row	( ) Slave Pallet	( ) Solid Shelf ( ) Non
T	( ) Mult. Row		( ) Open Shelf

R K Flue Spacing Clearance:Storage to Ceiling  
 A Longitudinal Transverse

E Horizontal Barriers Provided:

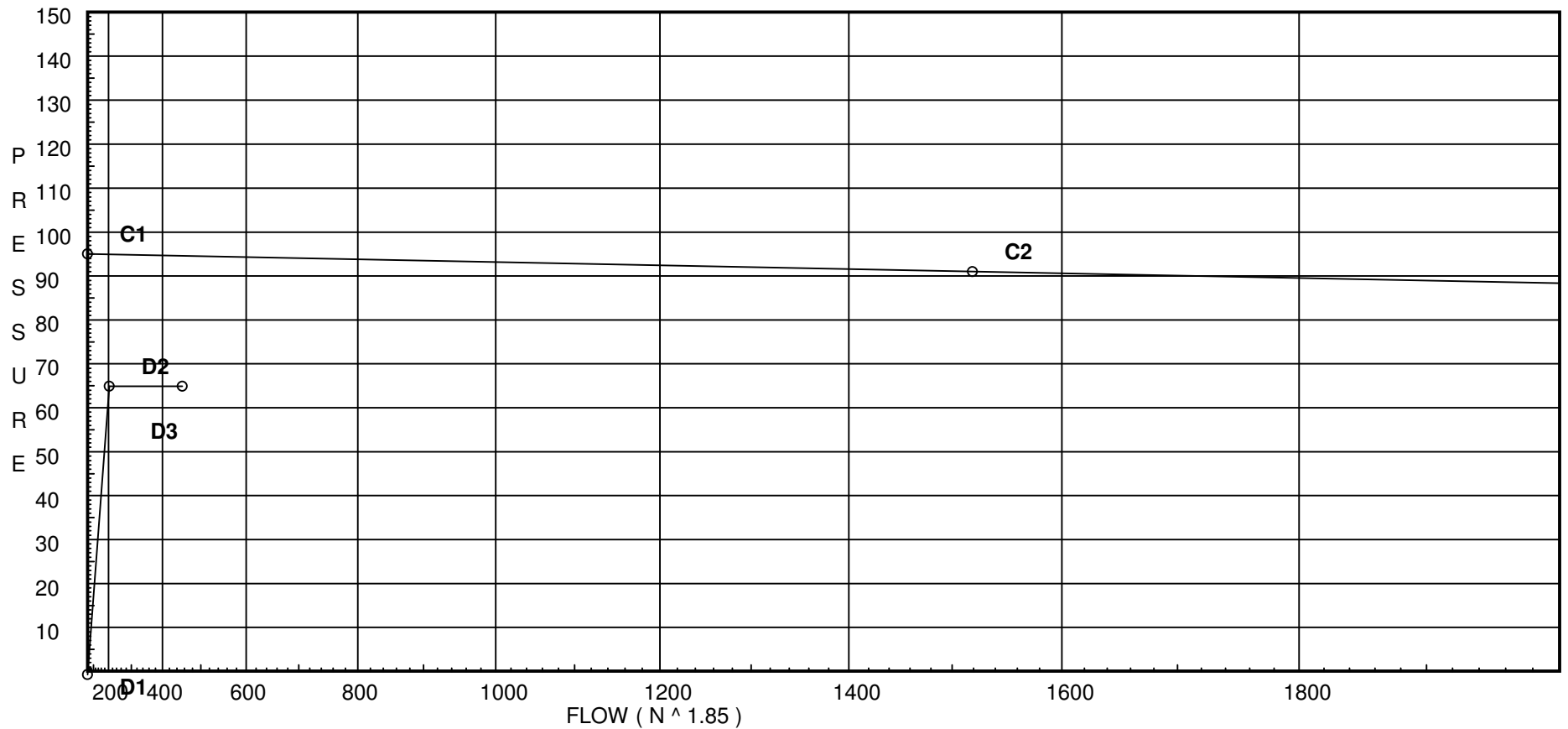
# Water Supply Curve (C)

Residential Fire Protection  
33 HAMPSHIRE ST APT BLDG

Page 2  
Date 2/8/2018

City Water Supply:  
C1 - Static Pressure : 95  
C2 - Residual Pressure: 91  
C2 - Residual Flow : 1519

Demand:  
D1 - Elevation : -0.741  
D2 - System Flow : 204.39  
D2 - System Pressure : 64.882  
Hose ( Adj City ) : \_\_\_\_\_  
Hose ( Demand ) : 250  
D3 - System Demand : 454.39  
Safety Margin : 29.689



# Fittings Used Summary

Residential Fire Protection  
33 HAMPSHIRE ST APT BLDG

Page 3  
Date 2/8/2018

## 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	90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
F	45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
G	Generic Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
I	90' Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
T	90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

# Pressure / Flow Summary - STANDARD

Residential Fire Protection  
33 HAMPSHIRE ST APT BLDG

Page 4  
Date 2/8/2018

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
50	-0.71	5.6	7.17	na	15.0	0.15	100	7.0
51	-0.71	5.6	7.2	na	15.02	0.15	100	7.0
60	-0.71		7.88	na				
70	-1.42		9.76	na				
52	-0.71	5.6	7.82	na	15.66	0.15	100	7.0
53	-0.71	5.6	7.84	na	15.68	0.15	100	7.0
61	-0.71		8.58	na				
53A	-0.71	5.6	9.94	na	17.66	0.15	100	7.0
71	-1.42		10.59	na				
71A	-1.42		11.44	na				
54	-0.71	5.6	8.19	na	16.03	0.15	100	7.0
55	-0.71	5.6	8.86	na	16.67	0.15	100	7.0
56	-0.71	5.6	11.04	na	18.61	0.15	100	7.0
62	-0.71		11.67	na				
72	-1.42		16.22	na				
57	-0.71	5.6	16.85	na	22.99	0.15	100	7.0
73	-1.42		19.5	na				
58	-0.71	5.6	17.86	na	23.67	0.15	100	7.0
74	-0.71		18.83	na				
75	-1.42		21.08	na				
59	-0.71	5.6	23.95	na	27.41	0.15	100	7.0
76	-1.42		27.92	na				
TOR	-1.42		52.12	na				
BOR	-4.62		66.83	na				
TEST	1.0		64.88	na	250.0			

The maximum velocity is 32.21 and it occurs in the pipe between nodes 76 and TOR

# Final Calculations - Hazen-Williams

Residential Fire Protection  
33 HAMPSHIRE ST APT BLDG

Page 5  
Date 2/8/2018

Hyd. Ref. Point	Qa  Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
50 to 60	15.00 15.0	1.049 120 0.0764	1T	5.0 0.0 0.0	4.250 5.000 9.250	7.175 0.0 0.707			K Factor = 5.60 Vel = 5.57	
	0.0 15.00						7.882		K Factor = 5.34	
51 to 60	15.02 15.02	1.049 120 0.0767	1T	5.0 0.0 0.0	3.920 5.000 8.920	7.198 0.0 0.684			K Factor = 5.60 Vel = 5.58	
60 to 70	15.00 30.02	1.049 120 0.2758	1T	5.0 0.0 0.0	0.710 5.000 5.710	7.882 0.308 1.575			Vel = 11.14	
70 to 71	0.0 30.02	1.38 120 0.0726		0.0 0.0 0.0	11.420 0.0 11.420	9.765 0.0 0.829			Vel = 6.44	
	0.0 30.02						10.594		K Factor = 9.22	
52 to 61	15.66 15.66	1.049 120 0.0828	1T	5.0 0.0 0.0	4.170 5.000 9.170	7.821 0.0 0.759			K Factor = 5.60 Vel = 5.81	
	0.0 15.66						8.580		K Factor = 5.35	
53 to 61	15.68 15.68	1.049 120 0.0830	1T	5.0 0.0 0.0	3.920 5.000 8.920	7.840 0.0 0.740			K Factor = 5.60 Vel = 5.82	
61 to 71	15.66 31.34	1.049 120 0.2988	1T	5.0 0.0 0.0	0.710 5.000 5.710	8.580 0.308 1.706			Vel = 11.63	
	0.0 31.34						10.594		K Factor = 9.63	
53A to 71A	17.66 17.66	1.049 120 0.1034	1E 1T	2.0 5.0 0.0	4.580 7.000 11.580	9.940 0.308 1.197			K Factor = 5.60 Vel = 6.56	
	0.0 17.66						11.445		K Factor = 5.22	
71 to 71A	61.37 61.37	1.38 120 0.2723		0.0 0.0 0.0	3.125 0.0 3.125	10.594 0.0 0.851			Vel = 13.16	
71A to 72	17.65 79.02	1.61 120 0.2052	2E	8.0 0.0 0.0	15.290 8.000 23.290	11.445 0.0 4.779			Vel = 12.45	
	0.0 79.02						16.224		K Factor = 19.62	
54 to 55	16.03 16.03	1.049 120 0.0864		0.0 0.0 0.0	7.710 0.0 7.710	8.192 0.0 0.666			K Factor = 5.60 Vel = 5.95	
55 to 62	16.66 32.69	1.049 120 0.3231	1T	5.0 0.0 0.0	3.710 5.000 8.710	8.858 0.0 2.814			K Factor = 5.60 Vel = 12.14	

# Final Calculations - Standard

Residential Fire Protection  
33 HAMPSHIRE ST APT BLDG

Page 6  
Date 2/8/2018

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
	0.0 32.69						11.672		K Factor = 9.57	
56 to 62	18.61	1.049 120 0.1140	1T	5.0 0.0 0.0	0.500 5.000 5.500	11.045 0.0 0.627			K Factor = 5.60 Vel = 6.91	
62 to 72	32.70	1.049 120 0.7433	1T	5.0 0.0 0.0	0.710 5.000 5.710	11.672 0.308 4.244			Vel = 19.05	
72 to 73	79.02	1.61 120 0.5179		0.0 0.0 0.0	6.330 0.0 6.330	16.224 0.0 3.278			Vel = 20.54	
	0.0 130.33						19.502		K Factor = 29.51	
57 to 73	22.99	1.049 120 0.1683	1E 1T	2.0 5.0 0.0	6.920 7.000 13.920	16.851 0.308 2.343			K Factor = 5.60 Vel = 8.53	
73 to 75	130.33	1.61 120 0.6996		0.0 0.0 0.0	2.250 0.0 2.250	19.502 0.0 1.574			Vel = 24.16	
	0.0 153.32						21.076		K Factor = 33.40	
58 to 74	23.67	1.049 120 0.1777		0.0 0.0 0.0	5.420 0.0 5.420	17.865 0.0 0.963			K Factor = 5.60 Vel = 8.79	
74 to 75	0.0	1.049 120 0.1777	1E 1T	2.0 5.0 0.0	3.920 7.000 10.920	18.828 0.308 1.940			Vel = 8.79	
75 to 76	153.31	1.61 120 0.9123		0.0 0.0 0.0	7.500 0.0 7.500	21.076 0.0 6.842			Vel = 27.89	
	0.0 176.98						27.918		K Factor = 33.50	
59 to 76	27.41	1.049 120 0.2330	1E 1T	2.0 5.0 0.0	8.710 7.000 15.710	23.949 0.308 3.661			K Factor = 5.60 Vel = 10.18	
76 to TOR	176.98	1.61 120 1.1906	2I	8.0 0.0 0.0	12.330 8.000 20.330	27.918 0.0 24.204			Vel = 32.21	
TOR to BOR	0.0	2.067 120 0.3527	2I 1F	7.0 2.0 0.0	6.080 9.000 15.080	52.122 9.386 5.318			* Fixed loss = 8 Vel = 19.54	
BOR to TEST	0.0	4.1 140 0.0094	1G 1T	2.907 29.067 0.0	20.000 31.974 51.974	66.826 -2.434 0.490			Vel = 4.97	
	250.00 454.39						64.882		Qa = 250.00 K Factor = 56.41	