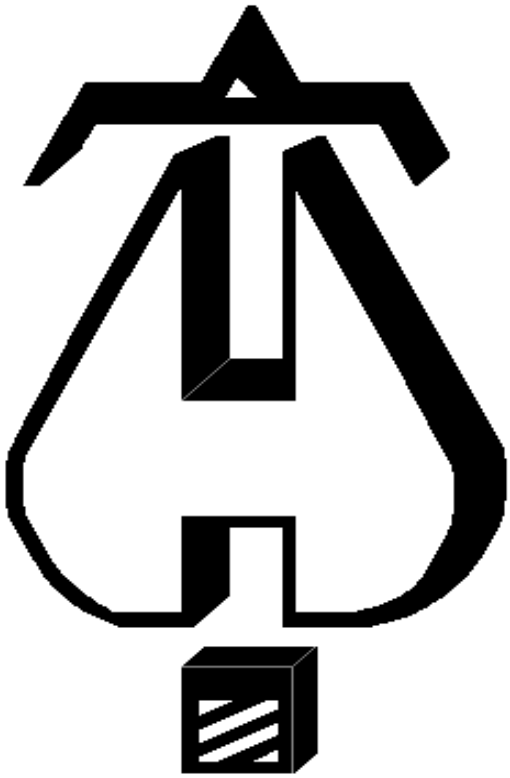


. . . Fire Protection by Computer Design

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

Job Name	:	443 Congress Street Bldg
Building	:	STEEL/ CONCRETE STRUCTURE
Location	:	7TH FLOOR
System	:	1
Contract	:	C17009
Data File	:	443 Congress St Bldg-7th Flr Hyd Calc.WXF

Hydraulic Design Information Sheet

Name - 443 CONGRESS ST BLDG — Date - 5/10/2017
Location - 7TH FLOOR
Building - STEEL/ CONCRETE STRUCTURE — System No. - 1
Contractor - RESIDENTIAL FIRE PROTECTION — Contract No. - C17009
Calculated By - T. PRAY — Drawing No. - 1 OF 2
Construction: ( ) Combustible (X) Non-Combustible — Ceiling Height - 9'-11"
Occupancy - RESIDENTIAL APARTMENTS

SYSTEM DESIGN

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

Area of Sprinkler Operation - 4 SPRK'S	System Type	Sprinkler/Nozzle	
Density - .0508	(X) Wet	Make VIKING	
Area Per Sprinkler - 256	( ) Dry	Model VK486	
Elevation at Highest Outlet - 77.58	( ) Deluge	Size 7/16"	
Hose Allowance - Inside - 50	( ) Preaction	K-Factor 4.0	
Rack Sprinkler Allowance -	( ) Other	Temp.Rat.155	
Hose Allowance - Outside - 50			

Note

Calculation Summary — Flow Required - 108.91 Press Required - 73.95 AT BOR; C-Factor Used: 150 Overhead 140 Underground

WATER SUPPLY

Water Flow Test:	Pump Data:	Tank or Reservoir:
Date of Test - 7/6/2016		Cap. -
Time of Test - N/A	Rated Cap.-	Elev.-
Static Press - 84	@ Press -	
Residual Press - 78	Elev. -	Well
Flow - 1363		Proof Flow
Elevation - -17.0'		

Location - HYDRANTS ARE LOCATED ON CUMBERLAND AVE BEHIND BLDG, SEE PLOT PLAN

Source of Information - PORTLAND WATER DISTRICT

COMMODITY STORAGE

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

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

Flue Spacing — Clearance:Storage to Ceiling
Longitudinal — Transverse

Horizontal Barriers Provided:

Water Supply Curve (C)

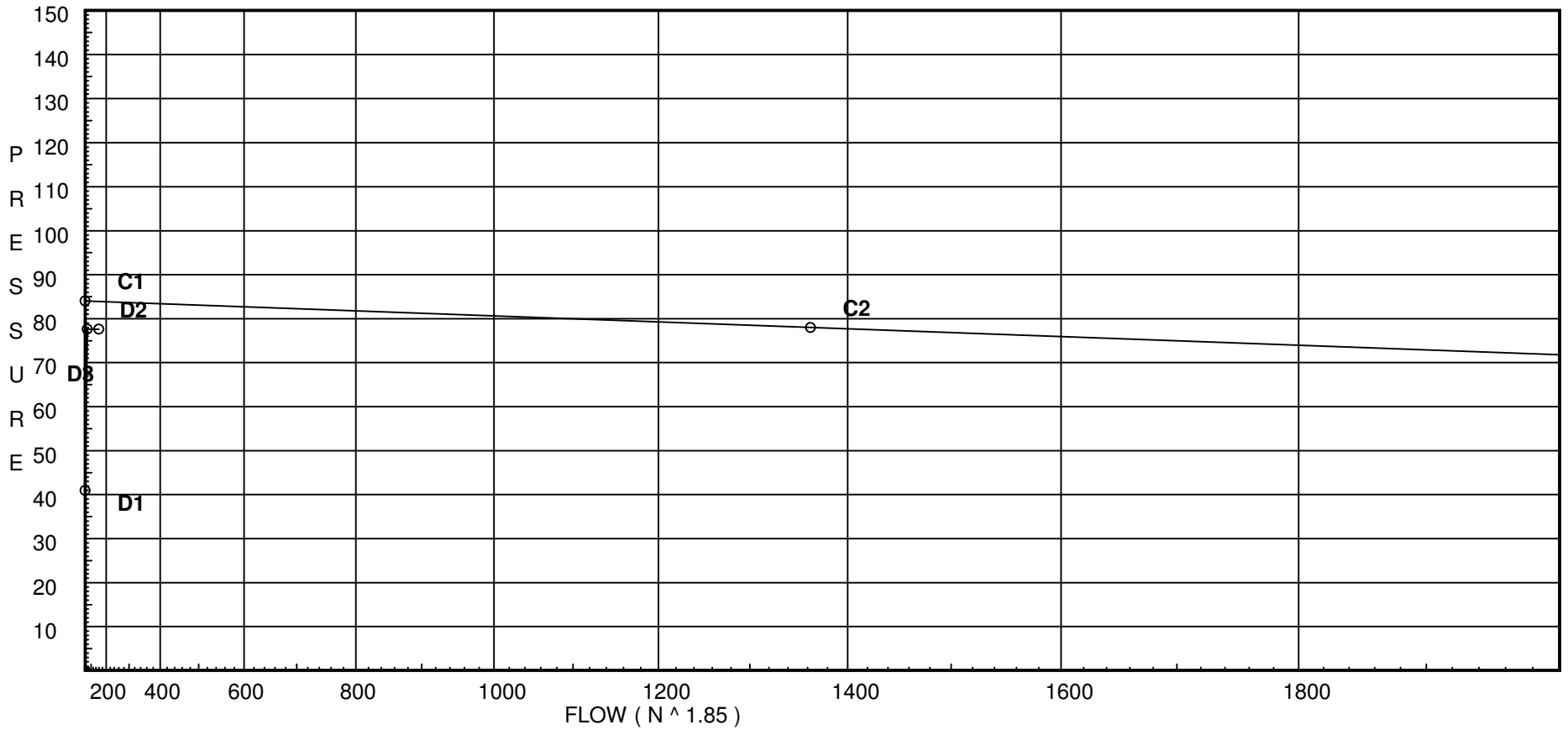
Residential Fire Protection
443 Congress Street Bldg

Date 5/10/2017

City Water Supply:
- C1 - Static Pressure : 84
- C2 - Residual Pressure: 78
- C2 - Residual Flow : 1363

Demand:

D1 - Elevation	:	40.963
D2 - System Flow	:	58.909
D2 - System Pressure	:	77.611
Hose (Adj City)	:	_____
Hose (Demand)	:	100
D3 - System Demand	:	158.909
Safety Margin	:	6.276



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
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
L	Long Turn Elbow	1	1	2	2	2	3	4	5	5	6	8	9	13	16	18	24	27	30	34	40
N	CPVC 90'Ell Harvel-Spears	7	7	7	8	9	11	12	13	0	0	0	0	0	0	0	0	0	0	0	0
O	CPVC Tee - Branch	3	3	5	6	8	10	12	15	0	0	0	0	0	0	0	0	0	0	0	0
R	CPVC Coupling Tee - Run	1	1	1	1	1	1	2	2	0	0	0	0	0	0	0	0	0	0	0	0
S	Generic Swing Check Valve	4	5	5	7	9	11	14	16	19	22	27	32	45	55	65	76	87	98	109	130
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
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
Z	Generic Flow Switch	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61

Pressure / Flow Summary - STANDARD

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
1	77.58	4	10.6	na	13.02	0.0508	256	10.6
2	76.17	4.9	11.39	na	16.54	0.0508	256	7.0
10	76.75		12.42	na				
3	77.58	4	12.91	na	14.37	0.0508	256	10.6
11	76.75		14.82	na				
4	77.58	4	14.02	na	14.98	0.0508	256	10.6
12	76.75		16.91	na				
13	76.75		24.28	na				
14	76.75		28.08	na				
15	76.75		29.31	na				
16	76.75		32.05	na				
HSV	76.75		32.05	na	50.0			
TOR	-2.0		66.89	na				
BOR	-9.0		73.95	na				
CITY	-9.0		73.99	na	50.0			
TEST	-17.0		77.61	na				

The maximum velocity is 15.81 and it occurs in the pipe between nodes 10 and 11

Final Calculations - Hazen-Williams

Residential Fire Protection
443 Congress Street Bldg

Date 5/10/2017

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
1	13.02	0.874	1N	7.0	5.370	10.600		K Factor = 4.00
to		150	1O	3.0	10.000	0.359		
10	13.02	0.0947		0.0	15.370	1.456		Vel = 6.96
	0.0							
	13.02					12.415		K Factor = 3.70
2	16.54	0.874	1N	7.0	0.670	11.389		K Factor = 4.90
to		150	1R	1.0	8.000	-0.251		
10	16.54	0.1473		0.0	8.670	1.277		Vel = 8.85
10	13.02	0.874	1R	1.0	4.580	12.415		
to		150		0.0	1.000	0.0		
11	29.56	0.4315		0.0	5.580	2.408		Vel = 15.81
	0.0							
	29.56					14.823		K Factor = 7.68
3	14.37	0.874	1N	7.0	3.670	12.910		K Factor = 4.00
to		150	1O	3.0	10.000	0.359		
11	14.37	0.1137		0.0	13.670	1.554		Vel = 7.68
11	29.56	1.101	2R	2.0	5.170	14.823		
to		150		0.0	2.000	0.0		
12	43.93	0.2918		0.0	7.170	2.092		Vel = 14.80
	0.0							
	43.93					16.915		K Factor = 10.68
4	14.98	0.874	2N	14.0	3.670	14.020		K Factor = 4.00
to		150	1O	3.0	17.000	0.359		
12	14.98	0.1227		0.0	20.670	2.536		Vel = 8.01
12	43.93	1.598	14R	14.0	52.040	16.915		
to		150	3O	24.0	38.000	0.0		
13	58.91	0.0818		0.0	90.040	7.366		Vel = 9.42
13	0.0	1.598	4R	4.0	34.500	24.281		
to		150	1O	8.0	12.000	0.0		
14	58.91	0.0818		0.0	46.500	3.804		Vel = 9.42
14	0.0	1.61	2R	2.0	4.500	28.085		
to		150	1N	9.0	11.000	0.0		
15	58.91	0.0788		0.0	15.500	1.222		Vel = 9.28
15	0.0	1.61	1Z	6.044	3.000	29.307		
to		150	1S	13.6	31.733	0.0		
16	58.91	0.0789	1T	12.089	34.733	2.740		Vel = 9.28
16	0.0	4.26		0.0	4.000	32.047		
to		120		0.0	0.0	0.0		
HSV	58.91	0.0010		0.0	4.000	0.004		Vel = 1.33
HSV	50.00	4.26	8V	71.629	100.000	32.051		Qa = 50
to		120	1X	21.067	124.297	34.107		
TOR	108.91	0.0033	1T	26.334	224.297	0.729		Vel = 2.45
			1F	5.267				
TOR	0.0	4.26	1F	5.267	5.000	66.887		
to		120		0.0	5.267	7.032		* Fixed loss = 4
BOR	108.91	0.0032		0.0	10.267	0.033		Vel = 2.45
BOR	0.0	6.16	2L	25.822	20.000	73.952		
to		140	1G	4.304	73.163	0.0		
CITY	108.91	0.0004	1T	43.037	93.163	0.038		Vel = 1.17

Final Calculations - Standard

Residential Fire Protection
443 Congress Street Bldg

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*******	Notes	******
CITY	50.00	8.27	1T	55.354	750.000	73.990		Qa = 50		
to		140		0.0	55.354	3.465				
TEST	158.91	0.0002		0.0	805.354	0.156		Vel = 0.95		
	0.0									
	158.91					77.611		K Factor = 18.04		