

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

Residential Fire Protection  
64 Daggett Hill Rd.  
Greene, ME 04236  
(207)946-343

Job Name : 93 SAINT LAWRENCE STREET BLDG  
Building : WOOD STRUCTURE  
Location : GARAGE  
System : 2 (DRY)  
Contract : C16014  
Data File : 93 ST LAWRENCE ST- GARAGE DRY- HYD CALC.WXF

Hydraulic Design Information Sheet

Name - 93 ST LAWRENCE STREET Date - 4/18/2016  
 Location - GARAGE  
 Building - WOOD STRUCTURE System No. - 2 (DRY)  
 Contractor - RESIDENTIAL FIRE PROTECTION Contract No. - C16014  
 Calculated By - T. PRAY Drawing No. - 1 OF 2  
 Construction: (X) Combustible ( ) Non-Combustible Ceiling Height - 8'-3.5"  
 Occupancy - CAR GARAGE

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	- 825	System Type	Sprinkler/Nozzle
	Density	- .15	( ) Wet	Make VIKING
D	Area Per Sprinkler	- 130	(X) Dry	Model VK300
E	Elevation at Highest Outlet	- 107.79	( ) Deluge	Size 1/2"
S	Hose Allowance - Inside	-	( ) Preaction	K-Factor 5.6
I	Rack Sprinkler Allowance	-	( ) Other	Temp.Rat.200
G	Hose Allowance - Outside	- 250		

N Note

Calculation Flow Required - 429.3 Press Required - 47.75 AT TEST  
 Summary C-Factor Used: 100 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 4/30/2014		Cap. -
T	Time of Test - N/A	Rated Cap.-	Elev.-
E	Static Press - 50	@ Press -	
R	Residual Press - 44	Elev. -	Well
S	Flow - 919		Proof Flow
U	Elevation - 100		

P Location - TEST HYDRANT LOCATED ON THE CORNER OF MONUMENT ST. AND ST LAWRENCE  
 P ST., SEE PLOT PLAN  
 L Source of Information - PORTLAND WATER DISTRICT  
 Y

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:

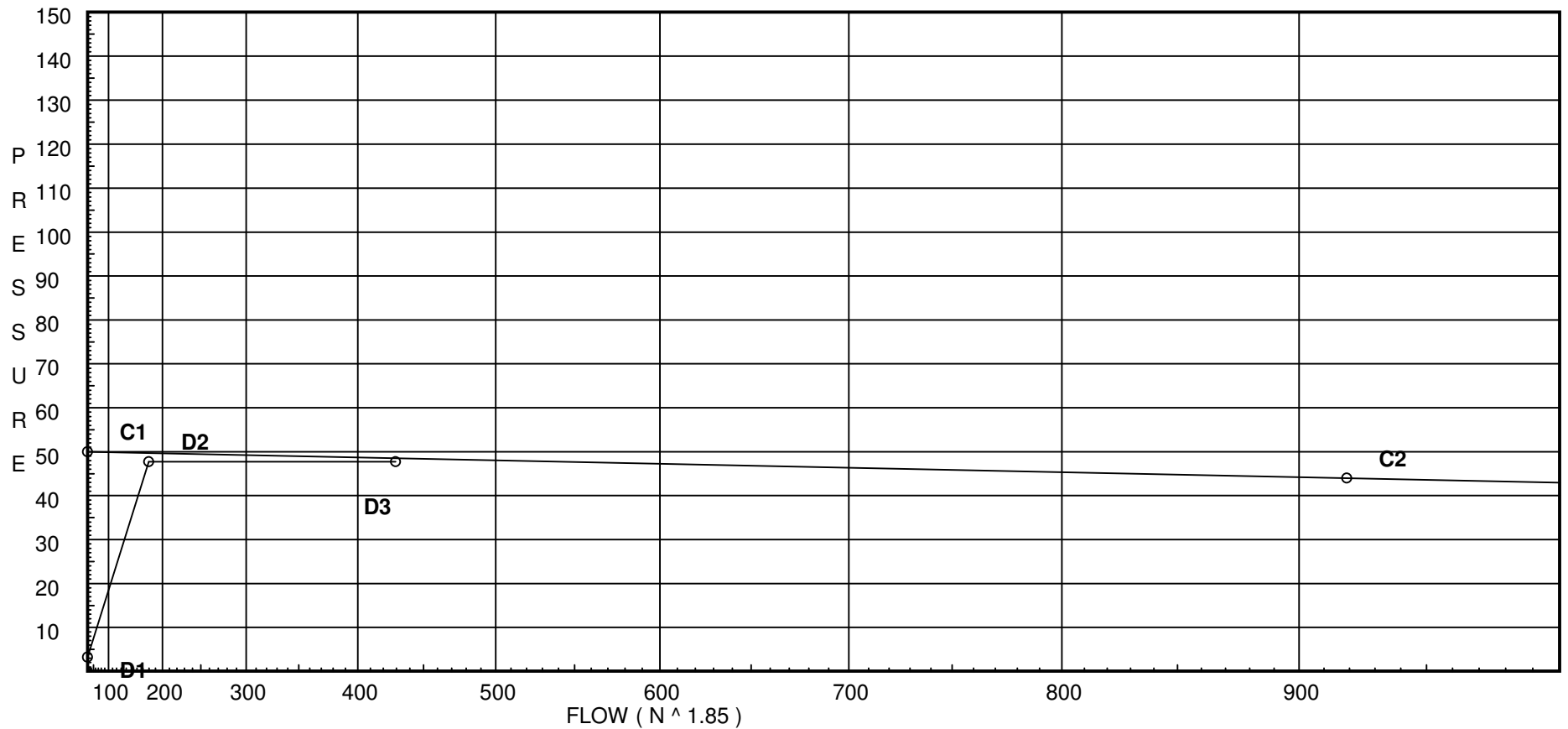
# Water Supply Curve (C)

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City Water Supply:  
C1 - Static Pressure : 50  
C2 - Residual Pressure: 44  
C2 - Residual Flow : 919

Demand:  
D1 - Elevation : 3.248  
D2 - System Flow : 179.304  
D2 - System Pressure : 47.750  
Hose ( Adj City ) : \_\_\_\_\_  
Hose ( Demand ) : 250  
D3 - System Demand : 429.304  
Safety Margin : 0.782



# Fittings Used Summary

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## 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
B	Generic Butterfly Valve	0	0	0	0	0	0	7	10	0	12	9	10	12	19	21	0	0	0	0	0
D	Generic Dry Pipe Valve	0	0	0	0	0	0	9.5	17	0	28	0	47	0	0	0	0	0	0	0	0
E	90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
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
J	90'Tee-Branch Grv Vic #20	0	0	4.5	6	8	8.5	10.8	13	17	16	21	25	33	41	50	65	78	88	98	120
L	Long Turn Elbow	1	1	2	2	2	3	4	5	5	6	8	9	13	16	18	24	27	30	34	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

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
1	107.79	5.6	13.56	na	20.62	0.15	130	7.0
2	107.79	5.6	15.49	na	22.04	0.15	130	7.0
3	107.79	5.6	17.44	na	23.38	0.15	130	7.0
4	107.79	5.6	21.81	na	26.15	0.15	130	7.0
4A	107.79		24.39	na				
5	107.5	5.6	12.13	na	19.5	0.15	130	7.0
6	107.5	5.6	13.38	na	20.48	0.15	130	7.0
7	107.5	5.6	14.96	na	21.66	0.15	130	7.0
8	107.5	5.6	20.67	na	25.46	0.15	130	7.0
70	107.5		14.69	na				
71	107.5		16.41	na				
72	107.5		22.31	na				
73	107.5		25.14	na				
TOR1	109.17		31.46	na				
DPV	104.5		34.24	na				
BOR1	102.08		38.79	na				
BOR	102.08		39.0	na				
BFP	102.08		40.63	na				
6UG	101.0		47.15	na				
TEST	100.0		47.75	na	250.0			

The maximum velocity is 14.53 and it occurs in the pipe between nodes 4 and 4A

# Final Calculations - Hazen-Williams

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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	20.62	1.049		0.0	10.000	13.560			K Factor = 5.60	
to		100		0.0	0.0	0.0				
2	20.62	0.1930		0.0	10.000	1.930			Vel = 7.65	
2	22.04	1.38		0.0	10.000	15.490			K Factor = 5.60	
to		100		0.0	0.0	0.0				
3	42.66	0.1948		0.0	10.000	1.948			Vel = 9.15	
3	23.39	1.38		0.0	10.000	17.438			K Factor = 5.60	
to		100		0.0	0.0	0.0				
4	66.05	0.4371		0.0	10.000	4.371			Vel = 14.17	
4	26.15	1.61	1T	5.71	1.040	21.809			K Factor = 5.60	
to		100		0.0	5.710	0.0				
4A	92.2	0.3825		0.0	6.750	2.582			Vel = 14.53	
4A	0.0	2.469	1J	7.708	5.290	24.391				
to		100		0.0	7.708	0.126				
73	92.2	0.0476		0.0	12.998	0.619			Vel = 6.18	
	0.0									
	92.20					25.136			K Factor = 18.39	
5	19.50	1.049	1E	1.427	13.290	12.125			K Factor = 5.60	
to		100		0.0	1.427	0.0				
70	19.5	0.1740		0.0	14.717	2.561			Vel = 7.24	
	0.0									
	19.50					14.686			K Factor = 5.09	
6	20.48	1.049	1T	3.568	3.290	13.379			K Factor = 5.60	
to		100		0.0	3.568	0.0				
70	20.48	0.1906		0.0	6.858	1.307			Vel = 7.60	
	0.0									
	20.48					14.686			K Factor = 5.34	
7	21.66	1.049	1T	3.568	3.290	14.964			K Factor = 5.60	
to		100		0.0	3.568	0.0				
71	21.66	0.2113		0.0	6.858	1.449			Vel = 8.04	
	0.0									
	21.66					16.413			K Factor = 5.35	
8	25.46	1.049	1E	1.427	4.330	20.669			K Factor = 5.60	
to		100		0.0	1.427	0.0				
72	25.46	0.2850		0.0	5.757	1.641			Vel = 9.45	
	0.0									
	25.46					22.310			K Factor = 5.39	
70	39.98	1.38		0.0	10.000	14.686				
to		100		0.0	0.0	0.0				
71	39.98	0.1727		0.0	10.000	1.727			Vel = 8.58	
71	21.67	1.38	1T	4.282	11.040	16.413				
to		100		0.0	4.282	0.0				
72	61.65	0.3849		0.0	15.322	5.897			Vel = 13.22	
72	25.46	1.61	1T	5.71	2.500	22.310				
to		100		0.0	5.710	0.0				
73	87.11	0.3442		0.0	8.210	2.826			Vel = 13.73	
73	92.19	2.469	4E	17.129	26.050	25.136				
to		100		0.0	17.129	-0.723				
TOR1	179.3	0.1632		0.0	43.179	7.047			Vel = 12.02	

# Final Calculations - Standard

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Hyd. Ref. Point	Qa  Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
TOR1	0.0	2.469		4.670		31.460			
to		100		0.0		2.023			
DPV	179.3	0.1630		4.670		0.761		Vel = 12.02	
DPV	0.0	2.469	1D 9.5	1.500		34.244			
to		120	1B 7.0	28.500		1.048			
BOR1	179.3	0.1165	1T 12.0	30.000		3.495		Vel = 12.02	
BOR1	0.0	2.635		2.500		38.787			
to		120		0.0		0.0			
BOR	179.3	0.0848		2.500		0.212		Vel = 10.55	
BOR	0.0	2.469	2E 12.0	2.000		38.999			
to		120		12.000		0.0			
BFP	179.3	0.1164		14.000		1.630		Vel = 12.02	
BFP	0.0	2.469	1I 6.0	3.000		40.629			
to		120		6.000		5.468		* Fixed loss = 5	
6UG	179.3	0.1164		9.000		1.048		Vel = 12.02	
6UG	0.0	6.16	2L 25.822	95.000		47.145			
to		140	1G 4.304	73.163		0.433			
TEST	179.3	0.0010	1T 43.037	168.163		0.172		Vel = 1.93	
	250.00							Qa = 250.00	
	429.30					47.750		K Factor = 62.13	