

... Fire Protection by Computer Design

SPRINKLER SYSTEMS INC.
4 AVON STREET
P O BOX 1285
LEWISTON, ME. 04243
207-782-0104

Job Name : 89 Anderson Street Wet System Area 1
Building : NEW
Location : 89 ANDERSON STREET PORTLAND, MAINE
System : 1 WET
Contract : 15-126
Data File : 89 Anderson Street Wet System Area 1.WXF

Hydraulic Design Information Sheet

Name - 89 ANDERSON STREET APARTMENTS Date - 3/17/16
 Location - 89 ANDERSON STREET PORTLAND, MAINE
 Building - NEW System No. - 1 WET
 Contractor - SPRINKLER SYSTEMS INC Contract No. - 15-126
 Calculated By - CDS Drawing No. - 1-3 OF 3
 Construction: (X) Combustible () Non-Combustible Ceiling Height - VARIES
 Occupancy - APARTMENTS

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

S Other NFPA 13R
 T Specific Ruling

Made By Date

M	Area of Sprinkler Operation	- 4 HEADS	System Type	Sprinkler/Nozzle
	Density	- .05	(X) Wet	Make RELIABLE
D	Area Per Sprinkler	- 324	() Dry	Model F1RES44
E	Elevation at Highest Outlet	- 143	() Deluge	Size 3/8" X 1/2"
S	Hose Allowance - Inside	- 0	() Preaction	K-Factor 4.4
I	Rack Sprinkler Allowance	- 0	() Other	Temp.Rat.155 DEG.
G	Hose Allowance - Outside	- 0		

N Note

Calculation Flow Required - 80.69 Press Required - 69.547 AT BASE
 Summary C-Factor Used: 150 Overhead 150 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 5-23-15		Cap. -
T	Time of Test - AM	Rated Cap.-	Elev.-
E	Static Press - 86	@ Press -	
R	Residual Press - 78	Elev. -	Well
	Flow - 1299		Proof Flow
S	Elevation - 160.0'		

U Location - ON SITE

P Source of Information - OWNER AND WATER DISTRICT

C	Commodity	Class	Location
O	Storage Ht.	Area	Aisle W.
M	Storage Method: Solid Piled	% Palletized	% Rack
M	() 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:

Fittings Used Summary

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 1

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Date

Fitting Legend		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
Bvcb	B Fly Vic 705W	0	0	0	0	0	0	5	5	0	12	12	8	11	12	14	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
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	0	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
Zac	Ames 2000SS	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

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 1

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
TYP	0.0	4.9	12.03	na	17.0	0.05	324	12.03
31	143.0	4.4	19.3	na	19.33	0.05	324	18.7
32	143.0	4.4	18.7	na	19.03	0.05	324	18.7
33	143.0		19.98	na				
34	133.25		30.42	na				
35	133.25		35.31	na				
36	133.25		40.66	na				
3F	133.25		46.75	na				
9	143.0	K = K @ DROP 4.4	21.1	na	21.99	0.05	324	18.7
8	143.0		21.39	na	20.35			
10	143.0		22.92	na				
11	143.0		26.89	na				
12	143.0		35.67	na				
13	143.0		35.89	na				
14	143.0		36.72	na				
15	143.0		37.56	na				
18	143.0		39.23	na				
21	143.0		39.86	na				
22	143.0	42.52	na					
A	143.0		42.97	na				
B	133.25		47.35	na				
C	123.0		52.31	na				
D	123.0		52.84	na				
E	111.5		58.19	na				
TWR1	111.5		58.53	na				
BWR1	104.0		65.0	na				
H	104.0		65.05	na				
BKFL	103.5		65.27	na				
BASE	100.0		69.55	na				
HOSE	100.0		69.83	na				
TEST	160.0		43.84	na				

The maximum velocity is 14.27 and it occurs in the pipe between nodes 10 and 11

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 1

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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	*****
TYP to DROP	17.00 17.0	1.049 120.0 0.0963	T 5.0 0.0 0.0	1.000 5.000 6.000	12.030 0.0 0.578		K Factor = 4.90		
	0.0 17.00					12.608	K Factor = 4.79		
31 to 33	19.33 19.33	1.101 150.0 0.0639	T 9.563 0.0 0.0	1.000 9.562 10.562	19.305 0.0 0.675		K Factor = 4.40		
	0.0 19.33					19.980	K Factor = 4.32		
32 to 33	19.03 19.03	1.101 150.0 0.0621	2T 19.125 0.0 0.0	1.500 19.126 20.626	18.700 0.0 1.280		K Factor = 4.40		
33 to 34	19.33 38.36	1.101 150.0 0.2270	E 3.825 T 9.563 0.0	14.000 13.387 27.387	19.980 4.223 6.216		Vel = 12.93		
34 to 35	0.0 38.36	1.101 150.0 0.2270	T 9.563 0.0 0.0	12.000 9.562 21.562	30.419 0.0 4.895		Vel = 12.93		
35 to 36	0.0 38.36	1.101 150.0 0.2270	T 9.563 0.0 0.0	14.000 9.562 23.562	35.314 0.0 5.349		Vel = 12.93		
36 to 3F	0.0 38.36	1.682 120.0 0.0436	E 4.95 T 9.9 0.0	125.000 14.850 139.850	40.663 0.0 6.091		Vel = 5.54		
3F to B	0.0 38.36	1.682 120.0 0.0435	T 9.9 0.0 0.0	3.750 9.900 13.650	46.754 0.0 0.594		Vel = 5.54		
	0.0 38.36					47.348	K Factor = 5.57		
9 to 10	21.99 21.99	1.101 120.0 0.1225	E 2.531 T 6.328 0.0	6.000 8.859 14.859	21.103 0.0 1.820		K Factor @ node DROP		
	0.0 21.99					22.923	K Factor = 4.59		
8 to 10	20.35 20.35	1.101 150.0 0.0702	E 3.825 T 9.563 0.0	8.500 13.387 21.887	21.386 0.0 1.537		K Factor = 4.40		
10 to 11	21.99 42.34	1.101 150.0 0.2724	T 9.563 0.0 0.0	5.000 9.562 14.562	22.923 0.0 3.967		Vel = 14.27		
11 to 12	0.0 42.34	1.101 150.0 0.2724	T 9.563 2E 7.65 0.0	15.000 17.212 32.212	26.890 0.0 8.776		Vel = 14.27		
12 to 13	0.0 42.34	1.682 120.0 0.0522	0.0 0.0 0.0	4.250 0.0 4.250	35.666 0.0 0.222		Vel = 6.11		

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 1

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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	*****
13	0.0	1.682		16.000	35.888				
to		120.0	0.0	0.0	0.0				
14	42.34	0.0523	0.0	16.000	0.837		Vel = 6.11		
14	0.0	1.682		16.000	36.725				
to		120.0	0.0	0.0	0.0				
15	42.34	0.0522	0.0	16.000	0.836		Vel = 6.11		
15	0.0	1.682		32.000	37.561				
to		120.0	0.0	0.0	0.0				
18	42.34	0.0523	0.0	32.000	1.673		Vel = 6.11		
18	0.0	1.682		12.000	39.234				
to		120.0	0.0	0.0	0.0				
21	42.34	0.0522	0.0	12.000	0.627		Vel = 6.11		
21	0.0	1.682	E 4.95	36.000	39.861				
to		120.0	T 9.9	14.850	0.0				
22	42.34	0.0523	0.0	50.850	2.658		Vel = 6.11		
22	0.0	1.682	E 4.95	3.750	42.519				
to		120.0	0.0	4.950	0.0				
A	42.34	0.0523	0.0	8.700	0.455		Vel = 6.11		
A	0.0	2.157		9.750	42.974				
to		120.0	0.0	0.0	4.223				
B	42.34	0.0155	0.0	9.750	0.151		Vel = 3.72		
B	38.35	2.157		10.250	47.348				
to		120.0	0.0	0.0	4.439				
C	80.69	0.0514	0.0	10.250	0.527		Vel = 7.08		
C	0.0	2.157		10.250	52.314				
to		120.0	0.0	0.0	0.0				
D	80.69	0.0513	0.0	10.250	0.526		Vel = 7.08		
D	0.0	2.157	E 6.153	1.000	52.840				
to		120.0	0.0	6.153	4.981				
E	80.69	0.0513	0.0	7.153	0.367		Vel = 7.08		
E	0.0	3.26	4E 37.631	12.000	58.188				
to		120.0	0.0	37.631	0.0				
TWR1	80.69	0.0069	0.0	49.631	0.341		Vel = 3.10		
TWR1	0.0	3.26	Fsp 0.0	5.500	58.529				
to		120.0	Bvcb 6.72	26.879	6.248		* * Fixed Loss = 3		
BWR1	80.69	0.0069	T 20.159	32.379	0.223		Vel = 3.10		
BWR1	0.0	4.26	T 26.334	2.000	65.000				
to		120.0	0.0	26.334	0.0				
H	80.69	0.0019	0.0	28.334	0.053		Vel = 1.82		
H	0.0	4.26		0.500	65.053				
to		120.0	0.0	0.0	0.217				
BKFL	80.69	0.0	0.0	0.500	0.0		Vel = 1.82		
BKFL	0.0	4.026	Zac 0.0	0.500	65.270				
to		120.0	0.0	0.0	4.276		* * Fixed Loss = 2.76		
BASE	80.69	0.0020	0.0	0.500	0.001		Vel = 2.03		

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
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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	*****
BASE	0.0	4.07	2E	31.864	115.000	69.547			
to		150.0	T	31.864	66.914	0.0			
HOSE	80.69	0.0015	G	3.186	181.914	0.281		Vel = 1.99	
HOSE	0.0	20.57		0.0	685.000	69.828			
to		140.0		0.0	0.0	-25.986			
TEST	80.69	0.0		0.0	685.000	0.0		Vel = 0.08	
	0.0								
	80.69					43.842		K Factor = 12.19	

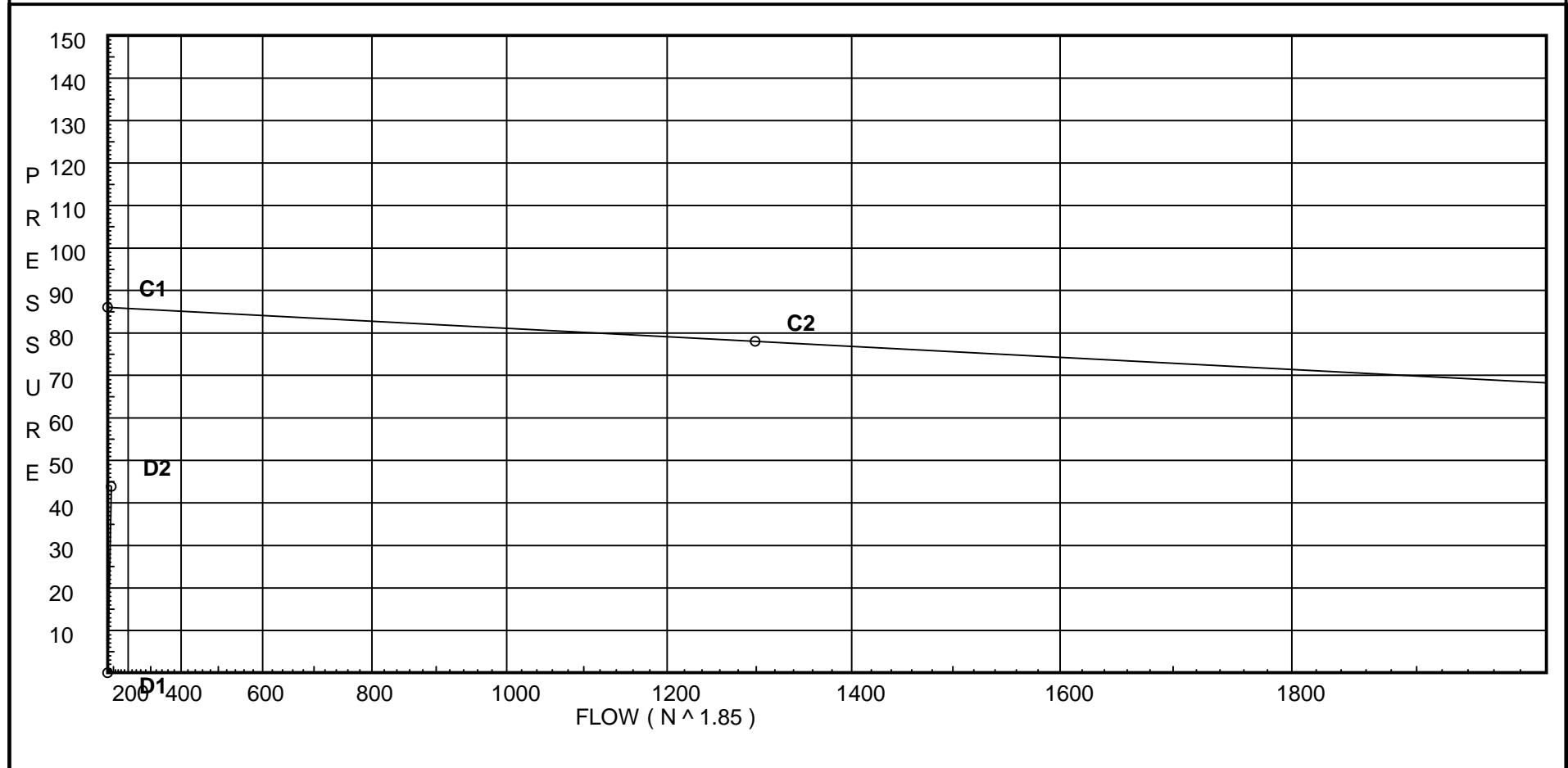
Water Supply Curve C

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 1

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Date

City Water Supply:
C1 - Static Pressure : 86
C2 - Residual Pressure: 78
C2 - Residual Flow : 1299

Demand:
D1 - Elevation : -7.363
D2 - System Flow : 80.695
D2 - System Pressure : 43.842
Hose (Demand) : _____
D3 - System Demand : 80.695
Safety Margin : 42.111



Hydraulic Design Information Sheet

Name - 89 ANDERSON STREET APARTMENTS AREA 2 Date - 3/17/16
 Location - 89 ANDERSON STREET PORTLAND, MAINE
 Building - NEW System No. - 1 WET
 Contractor - SPRINKLER SYSTEMS INC Contract No. - 15-126
 Calculated By - CDS Drawing No. - 1-3 OF 3
 Construction: (X) Combustible () Non-Combustible Ceiling Height - VARIES
 Occupancy - APARTMENTS

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

S Other NFPA 13R
 T Specific Ruling

Made By Date

M	Area of Sprinkler Operation - 4 HEADS	System Type	Sprinkler/Nozzle
	Density - .05	(X) Wet	Make RELIABLE
D	Area Per Sprinkler - 324	() Dry	Model F1RES49
E	Elevation at Highest Outlet - 143	() Deluge	Size 7/16" X 1/2"
S	Hose Allowance - Inside - 0	() Preaction	K-Factor 4.9
I	Rack Sprinkler Allowance - 0	() Other	Temp.Rat.155 DEG.
G	Hose Allowance - Outside - 0		

N Note

Calculation Flow Required - 69.70 Press Required - 55.149 AT BASE
 Summary C-Factor Used: 120 Overhead 150 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 5-23-15		Cap. -
T	Time of Test - AM	Rated Cap.-	Elev.-
E	Static Press - 86	@ Press -	
R	Residual Press - 78	Elev. -	Well
	Flow - 1299		Proof Flow
S	Elevation - 160.0'		

U Location - ON SITE

P Source of Information - OWNER AND WATER DISTRICT

C	Commodity	Class	Location
O	Storage Ht.	Area	Aisle W.
M	Storage Method: Solid Piled	% Palletized	% Rack
M	() 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:

Pressure / Flow Summary - STANDARD

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 2

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Date

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
TYP	0.0	4.9	12.03	na	17.0	0.05	324	12.03
1	143.0	K = K @ ARM	12.9	na	17.0			
7	143.0		12.9	na				
12	143.0		12.97	na				
13	143.0	K = K @ ARM	13.02	na	17.07			
14	143.0	K = K @ ARM	13.57	na	17.44			
15	143.0	K = K @ ARM	14.78	na	18.19			
18	143.0		18.98	na				
21	143.0		20.56	na				
22	143.0		27.25	na				
A	143.0		28.39	na				
B	133.25		32.99	na				
C	123.0		37.84	na				
D	123.0		38.24	na				
E	111.5		43.5	na				
TWR1	111.5		43.76	na				
BWR1	104.0		50.18	na				
H	104.0		50.22	na				
BKFL	103.5		50.43	na				
BASE	100.0		55.15	na				
HOSE	100.0		55.36	na				
TEST	160.0		29.38	na				

The maximum velocity is 10.06 and it occurs in the pipe between nodes 15 and 18

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 2

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Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
TYP	17.00	1.049	E	2.0	2.000	12.030			K Factor = 4.90	
to		120.0	T	5.0	7.000	0.0				
ARM	17.0	0.0963		0.0	9.000	0.867			Vel = 6.31	
	0.0									
	17.00					12.897			K Factor = 4.73	
1	17.00	1.682		0.0	0.500	12.897			K Factor @ node ARM	
to		120.0		0.0	0.0	0.0				
7	17.0	0.0080		0.0	0.500	0.004			Vel = 2.45	
7	0.0	1.682		0.0	7.500	12.901				
to		120.0		0.0	0.0	0.0				
12	17.0	0.0097		0.0	7.500	0.073			Vel = 2.45	
12	0.0	1.682		0.0	4.250	12.974				
to		120.0		0.0	0.0	0.0				
13	17.0	0.0096		0.0	4.250	0.041			Vel = 2.45	
13	17.07	1.682		0.0	16.000	13.015			K Factor @ node ARM	
to		120.0		0.0	0.0	0.0				
14	34.07	0.0349		0.0	16.000	0.559			Vel = 4.92	
14	17.43	1.682		0.0	16.000	13.574			K Factor @ node ARM	
to		120.0		0.0	0.0	0.0				
15	51.5	0.0752		0.0	16.000	1.203			Vel = 7.44	
15	18.20	1.682		0.0	32.000	14.777			K Factor @ node ARM	
to		120.0		0.0	0.0	0.0				
18	69.7	0.1315		0.0	32.000	4.207			Vel = 10.06	
18	0.0	1.682		0.0	12.000	18.984				
to		120.0		0.0	0.0	0.0				
21	69.7	0.1314		0.0	12.000	1.577			Vel = 10.06	
21	0.0	1.682	E	4.95	36.000	20.561				
to		120.0	T	9.9	14.850	0.0				
22	69.7	0.1315		0.0	50.850	6.685			Vel = 10.06	
22	0.0	1.682	E	4.95	3.750	27.246				
to		120.0		0.0	4.950	0.0				
A	69.7	0.1315		0.0	8.700	1.144			Vel = 10.06	
A	0.0	2.157		0.0	9.750	28.390				
to		120.0		0.0	0.0	4.223				
B	69.7	0.0392		0.0	9.750	0.382			Vel = 6.12	
B	0.0	2.157		0.0	10.250	32.995				
to		120.0		0.0	0.0	4.439				
C	69.7	0.0391		0.0	10.250	0.401			Vel = 6.12	
C	0.0	2.157		0.0	10.250	37.835				
to		120.0		0.0	0.0	0.0				
D	69.7	0.0391		0.0	10.250	0.401			Vel = 6.12	
D	0.0	2.157	E	6.153	1.000	38.236				
to		120.0		0.0	6.153	4.981				
E	69.7	0.0391		0.0	7.153	0.280			Vel = 6.12	
E	0.0	3.26	4E	37.631	12.000	43.497				
to		120.0		0.0	37.631	0.0				
TWR1	69.7	0.0052		0.0	49.631	0.260			Vel = 2.68	

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 2

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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	*****
TWR1	0.0	3.26	Fsp	0.0	5.500	43.757			
to		120.0	Bvcb	6.72	26.879	6.248		** Fixed Loss = 3	
BWR1	69.7	0.0053	T	20.159	32.379	0.170		Vel = 2.68	
BWR1	0.0	4.26	T	26.334	2.000	50.175			
to		120.0		0.0	26.334	0.0			
H	69.7	0.0014		0.0	28.334	0.040		Vel = 1.57	
H	0.0	4.26		0.0	0.500	50.215			
to		120.0		0.0	0.0	0.217			
BKFL	69.7	0.0020		0.0	0.500	0.001		Vel = 1.57	
BKFL	0.0	4.026	Zac	0.0	0.500	50.433			
to		120.0		0.0	0.0	4.716		** Fixed Loss = 3.2	
BASE	69.7	0.0		0.0	0.500	0.0		Vel = 1.76	
BASE	0.0	4.07	2E	31.864	115.000	55.149			
to		150.0	T	31.864	66.914	0.0			
HOSE	69.7	0.0012	G	3.186	181.914	0.214		Vel = 1.72	
HOSE	0.0	20.57		0.0	685.000	55.363			
to		140.0		0.0	0.0	-25.986			
TEST	69.7	0.0		0.0	685.000	0.001		Vel = 0.07	
	0.0								
	69.70					29.378		K Factor = 12.86	

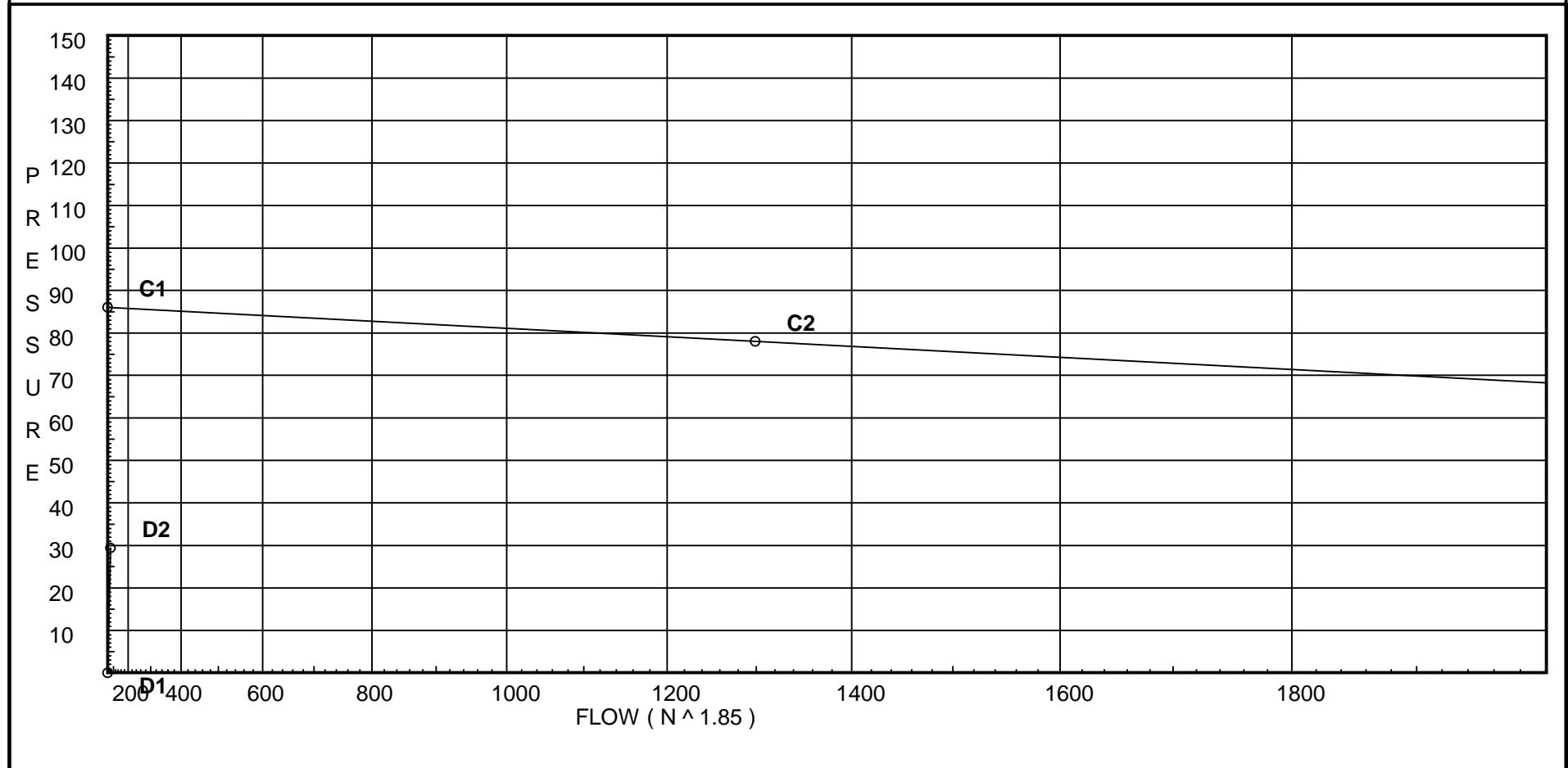
Water Supply Curve C

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 2

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Date

City Water Supply:
C1 - Static Pressure : 86
C2 - Residual Pressure: 78
C2 - Residual Flow : 1299

Demand:
D1 - Elevation : -7.363
D2 - System Flow : 69.696
D2 - System Pressure : 29.378
Hose (Demand) : _____
D3 - System Demand : 69.696
Safety Margin : 56.586



Hydraulic Design Information Sheet

Name - 89 ANDERSON STREET APARTMENTS AREA 3 Date - 3/17/16
 Location - 89 ANDERSON STREET PORTLAND, MAINE
 Building - NEW System No. - 1 WET
 Contractor - SPRINKLER SYSTEMS INC Contract No. - 15-126
 Calculated By - CDS Drawing No. - 1-3 OF 3
 Construction: (X) Combustible () Non-Combustible Ceiling Height - VARIES
 Occupancy - APARTMENTS

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

S Other NFPA 13R

T Specific Ruling Made By Date

		System Type	Sprinkler/Nozzle
M	Area of Sprinkler Operation - 4 HEADS	(X) Wet	Make RELIABLE
D	Density - .05	() Dry	Model F1RES44
E	Area Per Sprinkler - 324	() Deluge	Size 3/8" X 1/2"
S	Elevation at Highest Outlet - 143	() Preaction	K-Factor 4.4
I	Hose Allowance - Inside - 0	() Other	Temp.Rat.155 DEG.
G	Rack Sprinkler Allowance - 0		
N	Hose Allowance - Outside - 0		

Note

Calculation Flow Required - 62.03 Press Required - 77.191 AT BASE
 Summary C-Factor Used: 150 Overhead 150 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 5-23-15		Cap. -
T	Time of Test - AM	Rated Cap.-	Elev.-
E	Static Press - 86	@ Press -	
R	Residual Press - 78	Elev. -	Well
S	Flow - 1299		Proof Flow
U	Elevation - 160.0'		

P Location - ON SITE

L Source of Information - OWNER AND WATER DISTRICT

C	Commodity	Class	Location
O	Storage Ht.	Area	Aisle W.
M	Storage Method:	%	Palletized % Rack
M	() 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:

Pressure / Flow Summary - STANDARD

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 3

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Date

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
TYP	0.0	4.9	12.03	na	17.0	0.05	324	12.03
4	143.0	4.4	21.02	na	20.18	0.05	324	18.7
2	143.0	4.4	18.7	na	19.03	0.05	324	18.7
3	143.0		20.85	na				
5	143.0		21.57	na				
6	143.0	K = K @ DROP	22.75	na	22.83			
7	143.0		34.88	na				
12	143.0		35.67	na				
13	143.0		36.12	na				
14	143.0		37.82	na				
15	143.0		39.51	na				
18	143.0		42.9	na				
21	143.0		44.18	na				
22	143.0		49.57	na				
A	143.0		50.49	na				
B	133.25		55.02	na				
C	123.0		59.78	na				
D	123.0		60.1	na				
E	111.5		65.31	na				
TWR1	111.5		65.52	na				
BWR1	104.0		71.9	na				
H	104.0		71.94	na				
BKFL	103.5		72.15	na				
BASE	100.0		77.19	na				
HOSE	100.0		77.36	na				
TEST	160.0		51.38	na				

The maximum velocity is 20.9 and it occurs in the pipe between nodes 6 and 7

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 3

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Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
TYP to DROP	17.00 17.0	1.049 120.0 0.0963	T	5.0 0.0 0.0	1.000 5.000 6.000	12.030 0.0 0.578			K Factor = 4.90	
	0.0 17.00									
						12.608			K Factor = 4.79	
4 to 5	20.18 20.18	1.101 150.0 0.0691	E	3.825 0.0 0.0	4.000 3.825 7.825	21.025 0.0 0.541			K Factor = 4.40	
	0.0 20.18									
						21.566			K Factor = 4.35	
2 to 3	19.03 19.03	1.101 150.0 0.0620	2T	19.125 0.0 0.0	15.500 19.126 34.626	18.700 0.0 2.148			K Factor = 4.40	
3 to 5	0.0 19.03	1.101 150.0 0.0621	T	9.563 0.0 0.0	2.000 9.562 11.562	20.848 0.0 0.718				Vel = 6.41
5 to 6	20.17 39.2	1.101 150.0 0.2362		0.0 0.0 0.0	5.000 0.0 5.000	21.566 0.0 1.181				Vel = 13.21
6 to 7	22.83 62.03	1.101 150.0 0.5523	T 2E	9.563 7.65 0.0	4.750 17.212 21.962	22.747 0.0 12.130			K Factor @ node DROP	Vel = 20.90
7 to 12	0.0 62.03	1.682 120.0 0.1060		0.0 0.0 0.0	7.500 0.0 7.500	34.877 0.0 0.795				Vel = 8.96
12 to 13	0.0 62.03	1.682 120.0 0.1059		0.0 0.0 0.0	4.250 0.0 4.250	35.672 0.0 0.450				Vel = 8.96
13 to 14	0.0 62.03	1.682 120.0 0.1060		0.0 0.0 0.0	16.000 0.0 16.000	36.122 0.0 1.696				Vel = 8.96
14 to 15	0.0 62.03	1.682 120.0 0.1060		0.0 0.0 0.0	16.000 0.0 16.000	37.818 0.0 1.696				Vel = 8.96
15 to 18	0.0 62.03	1.682 120.0 0.1060		0.0 0.0 0.0	32.000 0.0 32.000	39.514 0.0 3.391				Vel = 8.96
18 to 21	0.0 62.03	1.682 120.0 0.1060		0.0 0.0 0.0	12.000 0.0 12.000	42.905 0.0 1.272				Vel = 8.96
21 to 22	0.0 62.03	1.682 120.0 0.1060	E T	4.95 9.9 0.0	36.000 14.850 50.850	44.177 0.0 5.388				Vel = 8.96
22 to A	0.0 62.03	1.682 120.0 0.1060	E	4.95 0.0 0.0	3.750 4.950 8.700	49.565 0.0 0.922				Vel = 8.96

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 3

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Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
A	0.0	2.157		0.0	9.750	50.487				
to		120.0		0.0	0.0	4.223				
B	62.03	0.0316		0.0	9.750	0.308		Vel =	5.45	
B	0.0	2.157		0.0	10.250	55.018				
to		120.0		0.0	0.0	4.439				
C	62.03	0.0315		0.0	10.250	0.323		Vel =	5.45	
C	0.0	2.157		0.0	10.250	59.780				
to		120.0		0.0	0.0	0.0				
D	62.03	0.0316		0.0	10.250	0.324		Vel =	5.45	
D	0.0	2.157	E	6.153	1.000	60.104				
to		120.0		0.0	6.153	4.981				
E	62.03	0.0315		0.0	7.153	0.225		Vel =	5.45	
E	0.0	3.26	4E	37.631	12.000	65.310				
to		120.0		0.0	37.631	0.0				
TWR1	62.03	0.0042		0.0	49.631	0.210		Vel =	2.38	
TWR1	0.0	3.26	Fsp	0.0	5.500	65.520				
to		120.0	Bvcb	6.72	26.879	6.248		** Fixed Loss = 3		
BWR1	62.03	0.0042	T	20.159	32.379	0.137		Vel =	2.38	
BWR1	0.0	4.26	T	26.334	2.000	71.905				
to		120.0		0.0	26.334	0.0				
H	62.03	0.0012		0.0	28.334	0.033		Vel =	1.40	
H	0.0	4.26		0.0	0.500	71.938				
to		120.0		0.0	0.0	0.217				
BKFL	62.03	0.0		0.0	0.500	0.0		Vel =	1.40	
BKFL	0.0	4.026	Zac	0.0	0.500	72.155				
to		120.0		0.0	0.0	5.036		** Fixed Loss = 3.52		
BASE	62.03	0.0		0.0	0.500	0.0		Vel =	1.56	
BASE	0.0	4.07	2E	31.864	115.000	77.191				
to		150.0	T	31.864	66.914	0.0				
HOSE	62.03	0.0010	G	3.186	181.914	0.173		Vel =	1.53	
HOSE	0.0	20.57		0.0	685.000	77.364				
to		140.0		0.0	0.0	-25.986				
TEST	62.03	0.0		0.0	685.000	0.0		Vel =	0.06	
	0.0									
	62.03					51.378		K Factor =	8.65	

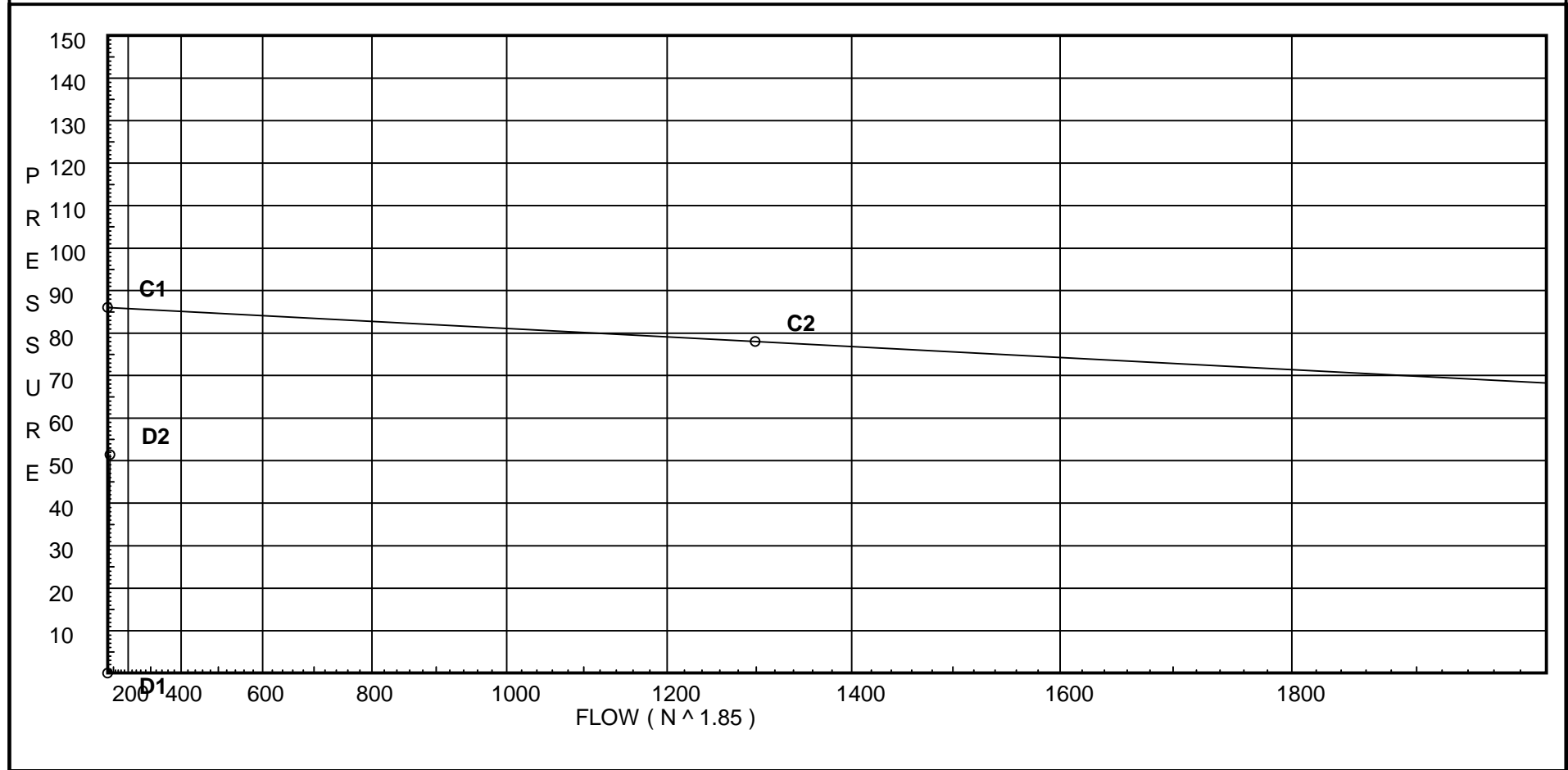
Water Supply Curve C

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 3

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Date

City Water Supply:
C1 - Static Pressure : 86
C2 - Residual Pressure: 78
C2 - Residual Flow : 1299

Demand:
D1 - Elevation : -7.363
D2 - System Flow : 62.031
D2 - System Pressure : 51.378
Hose (Demand) : _____
D3 - System Demand : 62.031
Safety Margin : 34.593



Hydraulic Design Information Sheet

Name - 89 ANDERSON STREET APARTMENTS AREA 4 Date - 3/17/16
 Location - 89 ANDERSON STREET PORTLAND, MAINE
 Building - NEW System No. - 1 WET
 Contractor - SPRINKLER SYSTEMS INC Contract No. - 15-126
 Calculated By - CDS Drawing No. - 1-3 OF 3
 Construction: (X) Combustible () Non-Combustible Ceiling Height - VARIES
 Occupancy - APARTMENTS

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

S Other NFPA 13R
 T Specific Ruling

Made By Date

M	Area of Sprinkler Operation - 4 HEADS	System Type	Sprinkler/Nozzle
	Density - .15	(X) Wet	Make RELIABLE
D	Area Per Sprinkler - 130	() Dry	Model F1FR56
E	Elevation at Highest Outlet - 143	() Deluge	Size 1/2" X 1/2"
S	Hose Allowance - Inside - 0	() Preaction	K-Factor 5.6
I	Rack Sprinkler Allowance - 0	() Other	Temp.Rat.200 DEG.
G	Hose Allowance - Outside - 0		

N Note

Calculation Flow Required - 80.04 Press Required - 62.715 AT BASE
 Summary C-Factor Used: 120 Overhead 150 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 5-23-15		Cap. -
T	Time of Test - AM	Rated Cap.-	Elev.-
E	Static Press - 86	@ Press -	
R	Residual Press - 78	Elev. -	Well
	Flow - 1299		Proof Flow
S	Elevation - 160.0'		

U Location - ON SITE

P Source of Information - OWNER AND WATER DISTRICT

C	Commodity	Class	Location
O	Storage Ht.	Area	Aisle W.
M	Storage Method: Solid Piled	% Palletized	% Rack
M	() 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:

Pressure / Flow Summary - STANDARD

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 4

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Date

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
TYP	0.0	5.6	12.13	na	19.5	0.15	130	7.0
19	143.0	5.6	12.22	na	19.58	0.15	130	7.0
20	143.0	K = K @ ARM	14.22	na	20.35			
16	143.0	5.6	12.13	na	19.5	0.15	130	7.0
17	143.0	5.6	13.55	na	20.62	0.15	130	7.0
18	143.0		25.11	na				
21	143.0		25.68	na				
22	143.0		34.31	na				
A	143.0		35.79	na				
B	133.25		40.51	na				
C	123.0		45.46	na				
D	123.0		45.98	na				
E	111.5		51.32	na				
TWR1	111.5		51.66	na				
BWR1	104.0		58.13	na				
H	104.0		58.18	na				
BKFL	103.5		58.4	na				
BASE	100.0		62.71	na				
HOSE	100.0		62.99	na				
TEST	160.0		37.01	na				

The maximum velocity is 14.89 and it occurs in the pipe between nodes 17 and 18

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 4

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Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
TYP to ARM	19.50 19.5	1.049 120.0 0.1243	T	5.0 0.0 0.0	2.500 5.000 7.500	12.125 0.0 0.932			K Factor = 5.60	
	0.0 19.50									
19 to 20	19.58 19.58	1.049 120.0 0.1251	E	2.0 0.0 0.0	14.000 2.000 16.000	12.220 0.0 2.002			K Factor = 5.60	
20 to 21	20.35 39.93	1.049 120.0 0.4676	T	5.0 0.0 0.0	19.500 5.000 24.500	14.222 0.0 11.455			K Factor @ node ARM	
	0.0 39.93									
16 to 17	19.50 19.5	1.049 120.0 0.1242		0.0 0.0 0.0	11.500 0.0 11.500	12.125 0.0 1.428			K Factor = 5.60	
17 to 18	20.62 40.12	1.049 120.0 0.4717	T	5.0 0.0 0.0	19.500 5.000 24.500	13.553 0.0 11.556			K Factor = 5.60	
18 to 21	0.0 40.12	1.682 120.0 0.0473		0.0 0.0 0.0	12.000 0.0 12.000	25.109 0.0 0.568				Vel = 5.79
21 to 22	39.92 80.04	1.682 120.0 0.1698	E T	4.95 9.9 0.0	36.000 14.850 50.850	25.677 0.0 8.636				Vel = 11.56
22 to A	0.0 80.04	1.682 120.0 0.1698	E	4.95 0.0 0.0	3.750 4.950 8.700	34.313 0.0 1.477				Vel = 11.56
A to B	0.0 80.04	2.157 120.0 0.0506		0.0 0.0 0.0	9.750 0.0 9.750	35.790 4.223 0.493				Vel = 7.03
B to C	0.0 80.04	2.157 120.0 0.0506		0.0 0.0 0.0	10.250 0.0 10.250	40.506 4.439 0.519				Vel = 7.03
C to D	0.0 80.04	2.157 120.0 0.0505		0.0 0.0 0.0	10.250 0.0 10.250	45.464 0.0 0.518				Vel = 7.03
D to E	0.0 80.04	2.157 120.0 0.0506	E	6.153 0.0 0.0	1.000 6.153 7.153	45.982 4.981 0.362				Vel = 7.03
E to TWR1	0.0 80.04	3.26 120.0 0.0068	4E	37.631 0.0 0.0	12.000 37.631 49.631	51.325 0.0 0.336				Vel = 3.08
TWR1 to BWR1	0.0 80.04	3.26 120.0 0.0068	Fsp Bvcb T	0.0 6.72 20.159	5.500 26.879 32.379	51.661 6.248 0.219			* * Fixed Loss = 3	Vel = 3.08

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 4

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Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
BWR1	0.0	4.26	T	26.334	2.000	58.128			
to		120.0		0.0	26.334	0.0			
H	80.04	0.0018		0.0	28.334	0.052		Vel = 1.80	
H	0.0	4.26		0.0	0.500	58.180			
to		120.0		0.0	0.0	0.217			
BKFL	80.04	0.0020		0.0	0.500	0.001		Vel = 1.80	
BKFL	0.0	4.026	Zac	0.0	0.500	58.398			
to		120.0		0.0	0.0	4.316		** Fixed Loss = 2.8	
BASE	80.04	0.0020		0.0	0.500	0.001		Vel = 2.02	
BASE	0.0	4.07	2E	31.864	115.000	62.715			
to		150.0	T	31.864	66.914	0.0			
HOSE	80.04	0.0015	G	3.186	181.914	0.276		Vel = 1.97	
HOSE	0.0	20.57		0.0	685.000	62.991			
to		140.0		0.0	0.0	-25.986			
TEST	80.04	0.0		0.0	685.000	0.001		Vel = 0.08	
	0.0								
	80.04					37.006		K Factor = 13.16	

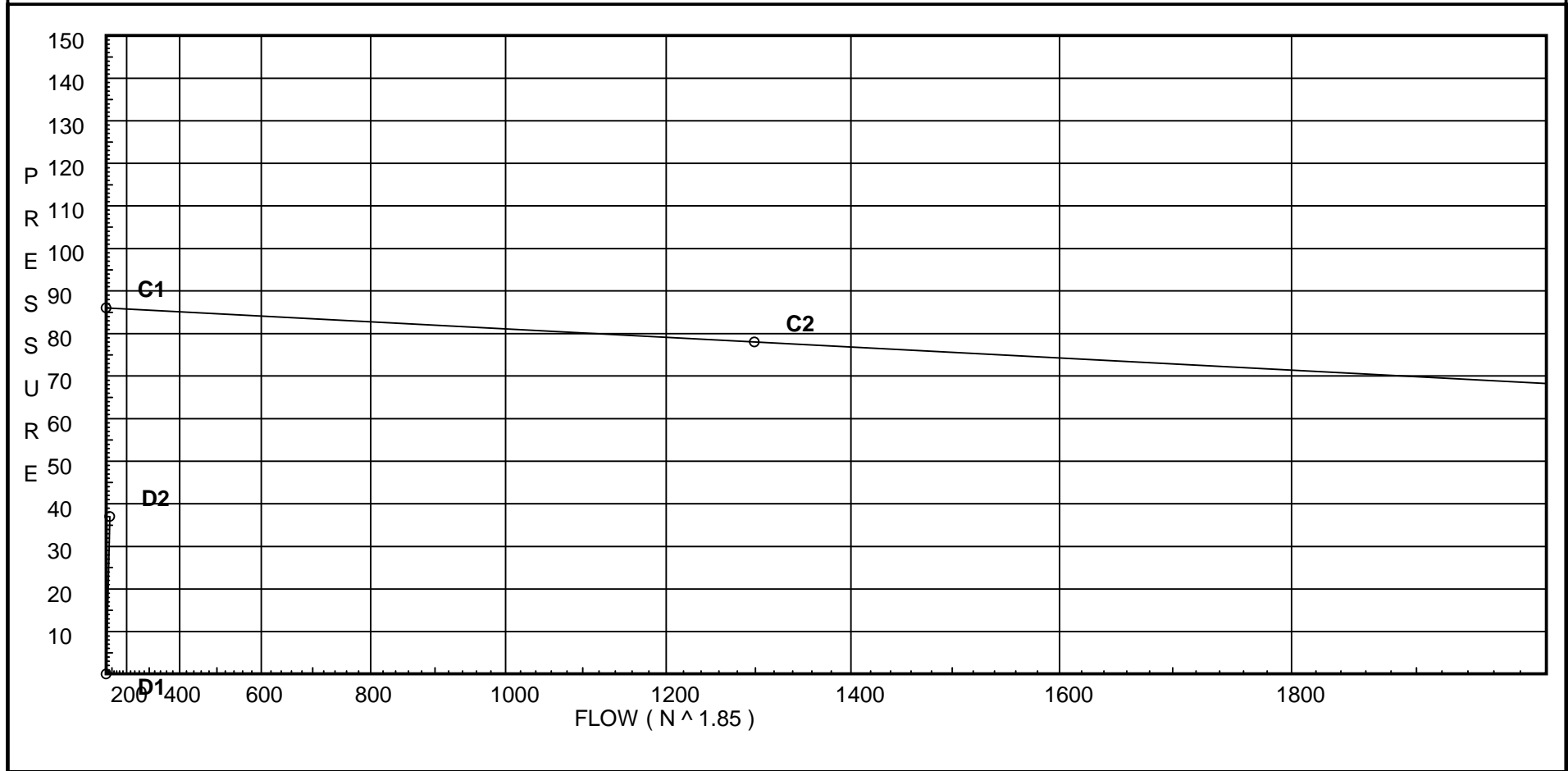
Water Supply Curve C

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 4

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City Water Supply:
C1 - Static Pressure : 86
C2 - Residual Pressure: 78
C2 - Residual Flow : 1299

Demand:
D1 - Elevation : -7.363
D2 - System Flow : 80.044
D2 - System Pressure : 37.006
Hose (Demand) : _____
D3 - System Demand : 80.044
Safety Margin : 48.948



Hydraulic Design Information Sheet

Name - 89 ANDERSON STREET APARTMENTS AREA 5 Date - 3/17/16
 Location - 89 ANDERSON STREET PORTLAND, MAINE
 Building - NEW System No. - 1 WET
 Contractor - SPRINKLER SYSTEMS INC Contract No. - 15-126
 Calculated By - CDS Drawing No. - 1-3 OF 3
 Construction: (X) Combustible () Non-Combustible Ceiling Height - VARIES
 Occupancy - RETAIL

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

S Other NFPA 13R
 T Specific Ruling

Made By Date

M	Area of Sprinkler Operation	- 923	System Type	Sprinkler/Nozzle
	Density	- .20	(X) Wet	Make RELIABLE
D	Area Per Sprinkler	- 130	() Dry	Model F1FR56
E	Elevation at Highest Outlet	- 111.500	() Deluge	Size 1/2" X 1/2"
S	Hose Allowance - Inside	- 0	() Preaction	K-Factor 5.6
I	Rack Sprinkler Allowance	- 0	() Other	Temp.Rat.155 DEG.
G	Hose Allowance - Outside	- 250		

N Note

Calculation Flow Required - 369.60 Press Required - 78.038 AT BASE
 Summary C-Factor Used: 120 Overhead 150 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 5-23-15		Cap. -
T	Time of Test - AM	Rated Cap.-	Elev.-
E	Static Press - 86	@ Press -	
R	Residual Press - 78	Elev. -	Well
	Flow - 1299		Proof Flow
S	Elevation - 160.0'		

U Location - ON SITE

P Source of Information - OWNER AND WATER DISTRICT

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

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

E Horizontal Barriers Provided:

Pressure / Flow Summary - STANDARD

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 5

Page 23
Date

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
TYP	0.0	5.6	21.56	na	26.0	0.2	130	7.0
TYP1	0.0	5.6	21.56	na	26.0	0.2	130	7.0
ARM1	111.5	5.6	21.56	na	26.0	0.2	130	7.0
114	111.5	K = K @ DROP	44.89	na	36.46			
115	111.5		45.38	na				
107	111.5	K = K @ DROP	24.49	na	26.93			
108	111.5		24.52	na				
109	111.5	K = K @ DROP	25.15	na	27.29			
110	111.5	K = K @ DROP	26.85	na	28.2			
111	111.5	K = K @ DROP	29.83	na	29.72			
112	111.5	K = K @ DROP	34.49	na	31.96			
101	111.5	K = K @ DROP	33.37	na	31.44			
102	111.5	K = K @ DROP	33.67	na	31.58			
103	111.5	K = K @ DROP	34.76	na	32.09			
104	111.5	K = K @ DROP	37.1	na	33.15			
105	111.5		41.63	na				
106	111.5	K = K @ ARM	41.96	na	34.77			
113	111.5		42.99	na				
116	111.5		45.42	na				
117	111.5		51.43	na				
E	111.5		56.11	na				
TWR1	111.5		61.8	na				
BWR1	104.0		71.77	na				
H	104.0		72.65	na				
BKFL	103.5		72.88	na				
BASE	100.0		78.04	na				
HOSE	100.0		82.72	na	250.0			
TEST	160.0		56.76	na				

The maximum velocity is 24.56 and it occurs in the pipe between nodes 112 and 113

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 5

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Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
TYP to DROP	26.00 26.0	1.049 120.0 0.2115	T	5.0 0.0 0.0	1.000 5.000 6.000	21.556 0.0 1.269			K Factor = 5.60	
	0.0 26.00								22.825	K Factor = 5.44
TYP1 to ARM	26.00 26.0	1.049 120.0 0.2114	E T	2.0 5.0 0.0	2.000 7.000 9.000	21.556 0.0 1.903			K Factor = 5.60	
	0.0 26.00								23.459	K Factor = 5.37
ARM1 to 108	26.00 26.0	1.049 120.0 0.2114	2E T	4.0 5.0 0.0	5.000 9.000 14.000	21.556 0.0 2.960			K Factor = 5.60	
	0.0 26.00								24.516	K Factor = 5.25
114 to 115	36.46 36.46	1.682 120.0 0.0396	T	9.9 0.0 0.0	2.500 9.900 12.400	44.889 0.0 0.491			K Factor @ node DROP	
										Vel = 5.26
115 to 116	0.0 36.46	3.26 120.0 0.0016	T	20.159 0.0 0.0	3.000 20.159 23.159	45.380 0.0 0.037				Vel = 1.40
	0.0 36.46								45.417	K Factor = 5.41
107 to 108	26.93 26.93	1.682 120.0 0.0220		0.0 0.0 0.0	1.000 0.0 1.000	24.494 0.0 0.022			K Factor @ node DROP	
										Vel = 3.89
108 to 109	26.00 52.93	1.682 120.0 0.0790		0.0 0.0 0.0	8.000 0.0 8.000	24.516 0.0 0.632				Vel = 7.64
109 to 110	27.30 80.23	1.682 120.0 0.1706		0.0 0.0 0.0	10.000 0.0 10.000	25.148 0.0 1.706			K Factor @ node DROP	
										Vel = 11.58
110 to 111	28.20 108.43	1.682 120.0 0.2978		0.0 0.0 0.0	10.000 0.0 10.000	26.854 0.0 2.978			K Factor @ node DROP	
										Vel = 15.66
111 to 112	29.72 138.15	1.682 120.0 0.4661		0.0 0.0 0.0	10.000 0.0 10.000	29.832 0.0 4.661			K Factor @ node DROP	
										Vel = 19.95
112 to 113	31.96 170.11	1.682 120.0 0.6851	T	9.9 0.0 0.0	2.500 9.900 12.400	34.493 0.0 8.495			K Factor @ node DROP	
	0.0 170.11								42.988	K Factor = 25.95
101 to 102	31.44 31.44	1.682 120.0 0.0301		0.0 0.0 0.0	10.000 0.0 10.000	33.372 0.0 0.301			K Factor @ node DROP	
										Vel = 4.54

Final Calculations - Hazen-Williams

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89 Anderson Street Wet System Area 5

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
102 to 103	31.58 63.02	1.682 120.0 0.1091		10.000 0.0 10.000	33.673 0.0 1.091			K Factor @ node DROP Vel = 9.10	
103 to 104	32.09 95.11	1.682 120.0 0.2337		10.000 0.0 10.000	34.764 0.0 2.337			K Factor @ node DROP Vel = 13.73	
104 to 105	33.14 128.25	1.682 120.0 0.4062	T	9.9 0.0 11.150	1.250 9.900 4.529	37.101 0.0		K Factor @ node DROP Vel = 18.52	
105 to 106	0.0 128.25	3.26 120.0 0.0162	E	9.408 0.0 0.0	11.000 9.408 20.408	41.630 0.0 0.331		Vel = 4.93	
106 to 113	34.78 163.03	3.26 120.0 0.0252	3E	28.223 0.0 0.0	12.500 28.223 40.723	41.961 0.0 1.027		K Factor @ node ARM Vel = 6.27	
113 to 116	170.11 333.14	3.26 120.0 0.0947	T	20.159 0.0 0.0	5.500 20.159 25.659	42.988 0.0 2.429		Vel = 12.81	
116 to 117	36.46 369.6	3.26 120.0 0.1147	E	9.408 0.0 0.0	43.000 9.408 52.408	45.417 0.0 6.012		Vel = 14.21	
117 to E	0.0 369.6	3.26 120.0 0.1147	2E	18.815 0.0 0.0	22.000 18.815 40.815	51.429 0.0 4.681		Vel = 14.21	
E to TWR1	0.0 369.6	3.26 120.0 0.1147	4E	37.631 0.0 0.0	12.000 37.631 49.631	56.110 0.0 5.694		Vel = 14.21	
TWR1 to BWR1	0.0 369.6	3.26 120.0 0.1147	Fsp Bvcb T	0.0 6.72 20.159	5.500 26.879 32.379	61.804 6.248 3.714		* * Fixed Loss = 3 Vel = 14.21	
BWR1 to H	0.0 369.6	4.26 120.0 0.0312	T	26.334 0.0 0.0	2.000 26.334 28.334	71.766 0.0 0.883		Vel = 8.32	
H to BKFL	0.0 369.6	4.26 120.0 0.0300		0.0 0.0 0.0	0.500 0.0 0.500	72.649 0.217 0.015		Vel = 8.32	
BKFL to BASE	0.0 369.6	4.026 120.0 0.0420	Zac	0.0 0.0 0.0	0.500 0.0 0.500	72.881 5.136 0.021		* * Fixed Loss = 3.62 Vel = 9.31	
BASE to HOSE	0.0 369.6	4.07 150.0 0.0258	2E T G	31.864 31.864 3.186	115.000 66.914 181.914	78.038 0.0 4.686		Vel = 9.11	
HOSE to TEST	250.00 619.6	20.57 140.0 0.0		0.0 0.0 0.0	685.000 0.0 685.000	82.724 -25.986 0.019		Qa = 250 Vel = 0.60	

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 5

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Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
	0.0 619.60					56.757		K Factor = 82.24	

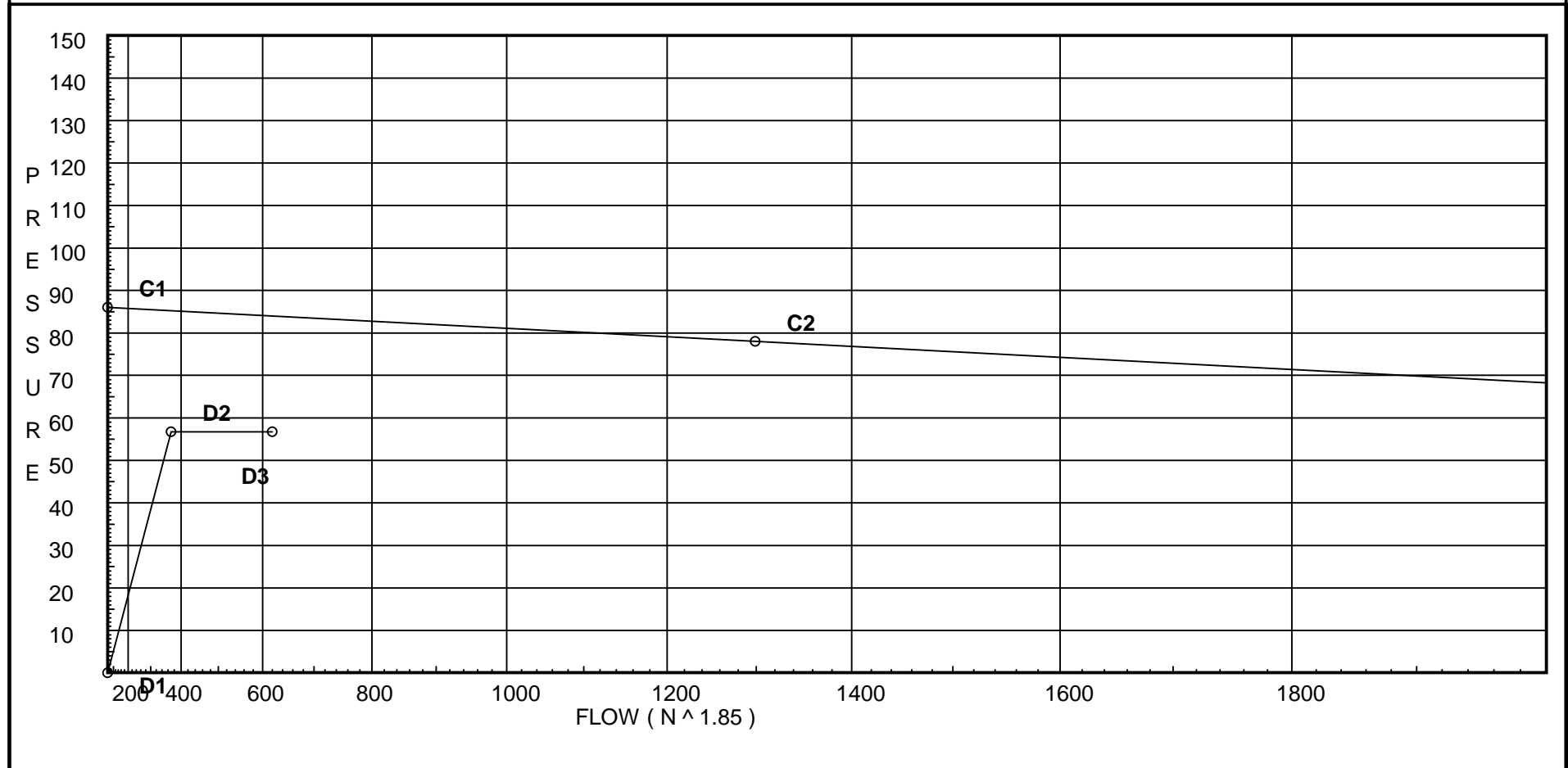
Water Supply Curve C

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 5

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City Water Supply:
C1 - Static Pressure : 86
C2 - Residual Pressure: 78
C2 - Residual Flow : 1299

Demand:
D1 - Elevation : -21.005
D2 - System Flow : 369.602
D2 - System Pressure : 56.757
Hose (Demand) : 250
D3 - System Demand : 619.602
Safety Margin : 27.209



Hydraulic Design Information Sheet

Name - 89 ANDERSON STREET APARTMENTS AREA 6 Date - 3/17/16
 Location - 89 ANDERSON STREET PORTLAND, MAINE
 Building - NEW System No. - 1 WET
 Contractor - SPRINKLER SYSTEMS INC Contract No. - 15-126
 Calculated By - CDS Drawing No. - 1-3 OF 3
 Construction: (X) Combustible () Non-Combustible Ceiling Height - VARIES
 Occupancy - APARTMENTS

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

S Other NFPA 13R
 T Specific Ruling

Made By Date

M	Area of Sprinkler Operation	- 4 HEADS	System Type	Sprinkler/Nozzle
	Density	- .05	(X) Wet	Make RELIABLE
D	Area Per Sprinkler	- 324	() Dry	Model F1RES49
E	Elevation at Highest Outlet	- 133.250	() Deluge	Size 7/16" X 1/2"
S	Hose Allowance - Inside	- 0	() Preaction	K-Factor 4.9
I	Rack Sprinkler Allowance	- 0	() Other	Temp.Rat.155 DEG.
G	Hose Allowance - Outside	- 0		

N Note

Calculation Flow Required - 75.86 Press Required - 67.031 AT BASE
 Summary C-Factor Used: 150 Overhead 150 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 5-23-15		Cap. -
T	Time of Test - AM	Rated Cap.-	Elev.-
E	Static Press - 86	@ Press -	
R	Residual Press - 78	Elev. -	Well
	Flow - 1299		Proof Flow
S	Elevation - 160.0'		

U Location - ON SITE

P Source of Information - OWNER AND WATER DISTRICT

C	Commodity	Class	Location
O	Storage Ht.	Area	Aisle W.
M	Storage Method:	% Palletized	% Rack
M	() 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:

Pressure / Flow Summary - STANDARD

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 6

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
TYP	0.0	4.9	12.03	na	17.0	0.05	324	12.03
44	133.25	4.9	13.06	na	17.71	0.05	324	12.03
43	133.25	4.9	12.68	na	17.45	0.05	324	12.03
41	133.25	4.9	12.03	na	17.0	0.05	324	12.03
42	133.25		13.19	na				
45	133.25		13.9	na				
46	133.25		21.94	na				
47	133.25	K = K @ DROP	24.54	na	23.71			
48	133.25		36.62	na				
3F	133.25		42.75	na				
B	133.25		44.85	na				
C	123.0		49.76	na				
D	123.0		50.23	na				
E	111.5		55.54	na				
TWR1	111.5		55.84	na				
BWR1	104.0		62.29	na				
H	104.0		62.34	na				
BKFL	103.5		62.55	na				
BASE	100.0		67.03	na				
HOSE	100.0		67.28	na				
TEST	160.0		41.3	na				

The maximum velocity is 25.56 and it occurs in the pipe between nodes 47 and 48

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 6

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Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
TYP to DROP	17.00 17.0	1.049 120.0 0.0963	T 5.0 0.0	1.000 5.000 6.000	12.030 0.0 0.578			K Factor = 4.90 Vel = 6.31	
	0.0 17.00					12.608		K Factor = 4.79	
44 to 45	17.71 17.71	1.101 150.0 0.0543	E T 3.825 9.563 0.0	2.000 13.387 15.387	13.064 0.0 0.836			K Factor = 4.90 Vel = 5.97	
	0.0 17.71					13.900		K Factor = 4.75	
43 to 45	17.45 17.45	1.101 150.0 0.0529	E T 3.825 9.563 0.0	9.750 13.387 23.137	12.677 0.0 1.223			K Factor = 4.90 Vel = 5.88	
	0.0 17.45					13.900		K Factor = 4.68	
41 to 42	17.00 17.0	1.101 150.0 0.0504	E T 3.825 9.563 0.0	9.750 13.387 23.137	12.030 0.0 1.165			K Factor = 4.90 Vel = 5.73	
42 to 45	0.0 17.0	1.101 150.0 0.0504		0.0 0.0 14.000	13.195 0.0 0.705			Vel = 5.73	
45 to 46	35.15 52.15	1.101 150.0 0.4007	T 9.563 0.0	10.500 9.562 20.062	13.900 0.0 8.039			Vel = 17.57	
46 to 47	0.0 52.15	1.101 150.0 0.4006		0.0 0.0 6.500	21.939 0.0 2.604			Vel = 17.57	
47 to 48	23.71 75.86	1.101 150.0 0.8016	T 9.563 0.0	5.500 9.562 15.062	24.543 0.0 12.073			K Factor @ node DROP Vel = 25.56	
48 to 3F	0.0 75.86	1.682 120.0 0.1538	T 9.9 0.0	30.000 9.900 39.900	36.616 0.0 6.137			Vel = 10.95	
3F to B	0.0 75.86	1.682 120.0 0.1538	T 9.9 0.0	3.750 9.900 13.650	42.753 0.0 2.099			Vel = 10.95	
B to C	0.0 75.86	2.157 120.0 0.0459		0.0 0.0 10.250	44.852 4.439 0.470			Vel = 6.66	
C to D	0.0 75.86	2.157 120.0 0.0458		0.0 0.0 10.250	49.761 0.0 0.469			Vel = 6.66	
D to E	0.0 75.86	2.157 120.0 0.0457	E 6.153 0.0	1.000 6.153 7.153	50.230 4.981 0.327			Vel = 6.66	

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 6

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Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
E to TWR1	0.0 75.86	3.26 120.0 0.0061	4E 37.631 0.0 0.0	12.000 37.631 49.631	55.538 0.0 0.305		Vel = 2.92		
TWR1 to BWR1	0.0 75.86	3.26 120.0 0.0061	Fsp 0.0 6.72 T 20.159	5.500 26.879 32.379	55.843 6.248 0.198		** Fixed Loss = 3 Vel = 2.92		
BWR1 to H	0.0 75.86	4.26 120.0 0.0017	T 26.334 0.0 0.0	2.000 26.334 28.334	62.289 0.0 0.048		Vel = 1.71		
H to BKFL	0.0 75.86	4.26 120.0 0.0	0.0 0.0 0.0	0.500 0.0 0.500	62.337 0.217 0.0		Vel = 1.71		
BKFL to BASE	0.0 75.86	4.026 120.0 0.0020	Zac 0.0 0.0 0.0	0.500 0.0 0.500	62.554 4.476 0.001		** Fixed Loss = 2.96 Vel = 1.91		
BASE to HOSE	0.0 75.86	4.07 150.0 0.0014	2E 31.864 T 31.864 G 3.186	115.000 66.914 181.914	67.031 0.0 0.250		Vel = 1.87		
HOSE to TEST	0.0 75.86	20.57 140.0 0.0	0.0 0.0 0.0	685.000 0.0 685.000	67.281 -25.986 0.001		Vel = 0.07		
	0.0 75.86				41.296		K Factor = 11.80		

Water Supply Curve C

SPRINKLER SYSTEMS INC.
89 Anderson Street Wet System Area 6

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Date

City Water Supply:
C1 - Static Pressure : 86
C2 - Residual Pressure: 78
C2 - Residual Flow : 1299

Demand:
D1 - Elevation : -11.585
D2 - System Flow : 75.864
D2 - System Pressure : 41.296
Hose (Demand) : _____
D3 - System Demand : 75.864
Safety Margin : 44.663

