

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

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

Job Name : 107 India Street Area 1  
Building : APARTMENTS  
Location : 107 INDIA STREET PORTLAND, MAINE  
System : 1 WET  
Contract : 16-025  
Data File : 107 India Street Area 1.WXF

Hydraulic Design Information Sheet

Name - 107 INDIA STREET AREA 1 Date - 05-10-16  
 Location - 107 INDIA STREET PORTLAND, MAINE  
 Building - APARTMENTS System No. - 1 WET  
 Contractor - SPRINKLER SYSTEMS INC Contract No. - 16-025  
 Calculated By - CDS Drawing No. - 1-2 OF 2  
 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	- 141.5	( ) 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 - 73.56 Press Required - 71.366 AT BASE  
 Summary C-Factor Used: 120 Overhead 150 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 05-05-16		Cap. -
T	Time of Test - AM	Rated Cap.-	Elev.-
E	Static Press - 81	@ Press -	
R	Residual Press - 71	Elev. -	Well
	Flow - 1255		Proof Flow
S	Elevation - 100.0'		

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
M		%	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:

# Fittings Used Summary

SPRINKLER SYSTEMS INC.  
107 India Street Area 1

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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
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	1	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
Zai	Ames 4000SS	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.  
107 India Street 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
16	141.5	4.4	19.07	na	19.22	0.05	256	13.3
17	141.5		20.59	na				
18	141.5		22.16	na				
19	141.5		23.52	na				
20	136.5		25.94	na				
21	136.5		26.29	na				
7	141.5	4.4	20.69	na	20.01	0.05	256	13.3
8	141.5		21.67	na				
9	141.5		22.05	na				
10	141.5		22.42	na				
12	141.5		22.85	na				
13	141.5		23.06	na				
14	136.5		25.5	na				
15	135.5		26.84	na				
22	135.5		27.16	na				
1	146.0	K = K @ DROP	12.61	na	17.0			
2	146.0	K = K @ DROP	13.11	na	17.33			
3	146.0		15.99	na				
4	136.5		22.53	na				
5	136.5		24.07	na				
6	127.0		29.01	na				
23	126.0		31.54	na				
24	126.0		33.09	na				
25	116.0		40.35	na				
26	116.0		46.15	na				
27	105.75		54.7	na				
TOR	105.75		55.15	na				
BOR	102.0		60.15	na				
BKFL	102.0		60.17	na				
BASE	100.0		71.37	na				
1000	100.0		71.39	na				
TEST	100.0		71.4	na				

The maximum velocity is 11.57 and it occurs in the pipe between nodes 2 and 3

# Final Calculations - Hazen-Williams

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107 India Street Area 1

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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	*****
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	
16 to 17	19.22	1.049 120.0 0.1209	2E	4.0 0.0 0.0	8.500 4.000 12.500	19.074 0.0 1.511			K Factor = 4.40	
17 to 18	0.0 19.22	1.049 120.0 0.1208		0.0 0.0 0.0	13.000 0.0 13.000	20.585 0.0 1.571			Vel = 7.13	
18 to 19	0.0 19.22	1.049 120.0 0.1209	T	5.0 0.0 0.0	6.250 5.000 11.250	22.156 0.0 1.360			Vel = 7.13	
19 to 20	0.0 19.22	1.38 120.0 0.0318	E	3.0 0.0 0.0	5.000 3.000 8.000	23.516 2.166 0.254			Vel = 4.12	
20 to 21	0.0 19.22	1.38 120.0 0.0318	T	6.0 0.0 0.0	5.000 6.000 11.000	25.936 0.0 0.350			Vel = 4.12	
21 to 22	0.0 19.22	1.38 120.0 0.0318	E T	3.0 6.0 0.0	5.000 9.000 14.000	26.286 0.433 0.445			Vel = 4.12	
	0.0 19.22									
						27.164			K Factor = 3.69	
7 to 8	20.01	1.049 120.0 0.1303	2E	4.0 0.0 0.0	3.500 4.000 7.500	20.692 0.0 0.977			K Factor = 4.40	
8 to 9	0.0 20.01	1.38 120.0 0.0343		0.0 0.0 0.0	11.000 0.0 11.000	21.669 0.0 0.377			Vel = 7.43	
9 to 10	0.0 20.01	1.38 120.0 0.0343		0.0 0.0 0.0	11.000 0.0 11.000	22.046 0.0 0.377			Vel = 4.29	
10 to 12	0.0 20.01	1.38 120.0 0.0342	T	6.0 0.0 0.0	6.500 6.000 12.500	22.423 0.0 0.428			Vel = 4.29	
12 to 13	0.0 20.01	1.38 120.0 0.0343	E	3.0 0.0 0.0	3.000 3.000 6.000	22.851 0.0 0.206			Vel = 4.29	
13 to 14	0.0 20.01	1.38 120.0 0.0342	E	3.0 0.0 0.0	5.000 3.000 8.000	23.057 2.166 0.274			Vel = 4.29	
14 to 15	0.0 20.01	1.38 120.0 0.0343	2E T	6.0 6.0 0.0	14.500 12.000 26.500	25.497 0.433 0.908			Vel = 4.29	

# Final Calculations - Hazen-Williams

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107 India Street 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	*****
15 to 22	0.0 20.01	1.38 120.0 0.0343	T	6.0 0.0 0.0	3.500 6.000 9.500	26.838 0.0 0.326			Vel = 4.29
22 to 24	19.22 39.23	1.38 120.0 0.1190	T	6.0 0.0 0.0	9.250 6.000 15.250	27.164 4.114 1.815			Vel = 8.41
	0.0 39.23					33.093			K Factor = 6.82
1 to 2	17.00 17.0	1.101 150.0 0.0503		0.0 0.0 0.0	10.000 0.0 10.000	12.608 0.0 0.503			K Factor @ node DROP Vel = 5.73
2 to 3	17.33 34.33	1.101 150.0 0.1849	T	9.563 0.0 0.0	6.000 9.562 15.562	13.111 0.0 2.877			K Factor @ node DROP Vel = 11.57
3 to 4	0.0 34.33	1.101 150.0 0.1849	E	3.825 0.0 0.0	9.330 3.825 13.155	15.988 4.114 2.432			Vel = 11.57
4 to 5	0.0 34.33	1.394 150.0 0.0586	2E T	9.523 9.523 0.0	7.250 19.046 26.296	22.534 0.0 1.540			Vel = 7.22
5 to 6	0.0 34.33	1.394 150.0 0.0586	E	4.762 0.0 0.0	9.250 4.761 14.011	24.074 4.114 0.821			Vel = 7.22
6 to 23	0.0 34.33	1.394 150.0 0.0586	2T E	19.046 4.762 0.0	12.000 23.808 35.808	29.009 0.433 2.098			Vel = 7.22
23 to 24	0.0 34.33	1.394 150.0 0.0586	T	9.523 0.0 0.0	17.000 9.523 26.523	31.540 0.0 1.553			Vel = 7.22
24 to 25	39.23 73.56	1.682 120.0 0.1453	T	9.9 0.0 0.0	10.250 9.900 20.150	33.093 4.331 2.927			Vel = 10.62
25 to 26	0.0 73.56	1.682 120.0 0.1453	T	9.9 0.0 0.0	30.000 9.900 39.900	40.351 0.0 5.796			Vel = 10.62
26 to 27	0.0 73.56	1.682 120.0 0.1453	E T	4.95 9.9 0.0	13.500 14.850 28.350	46.147 4.439 4.119			Vel = 10.62
27 to TOR	0.0 73.56	2.469 120.0 0.0224	E	6.0 0.0 0.0	14.000 6.000 20.000	54.705 0.0 0.448			Vel = 4.93
TOR to BOR	0.0 73.56	2.469 120.0 0.0224	T Fsp	12.0 0.0 0.0	4.500 12.000 16.500	55.153 4.624 0.369			* * Fixed Loss = 3 Vel = 4.93
BOR to BKFL	0.0 73.56	2.469 120.0 0.0230		0.0 0.0 0.0	1.000 0.0 1.000	60.146 0.0 0.023			Vel = 4.93

# Final Calculations - Hazen-Williams

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107 India Street 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	*****
BKFL to BASE	0.0 73.56	2.469 120.0 0.0220	Zai	0.0 0.0 0.0	0.500 0.0 0.500	60.169 11.186 0.011		* * Fixed Loss = 10.32 Vel = 4.93	
BASE to 1000	0.0 73.56	6.16 140.0 0.0002	E T G	20.084 43.037 4.304	60.000 67.425 127.425	71.366 0.0 0.025		Vel = 0.79	
1000 to TEST	0.0 73.56	8.27 140.0 0.0		0.0 0.0 0.0	205.000 0.0 205.000	71.391 0.0 0.010		Vel = 0.44	
	0.0 73.56					71.401		K Factor = 8.71	

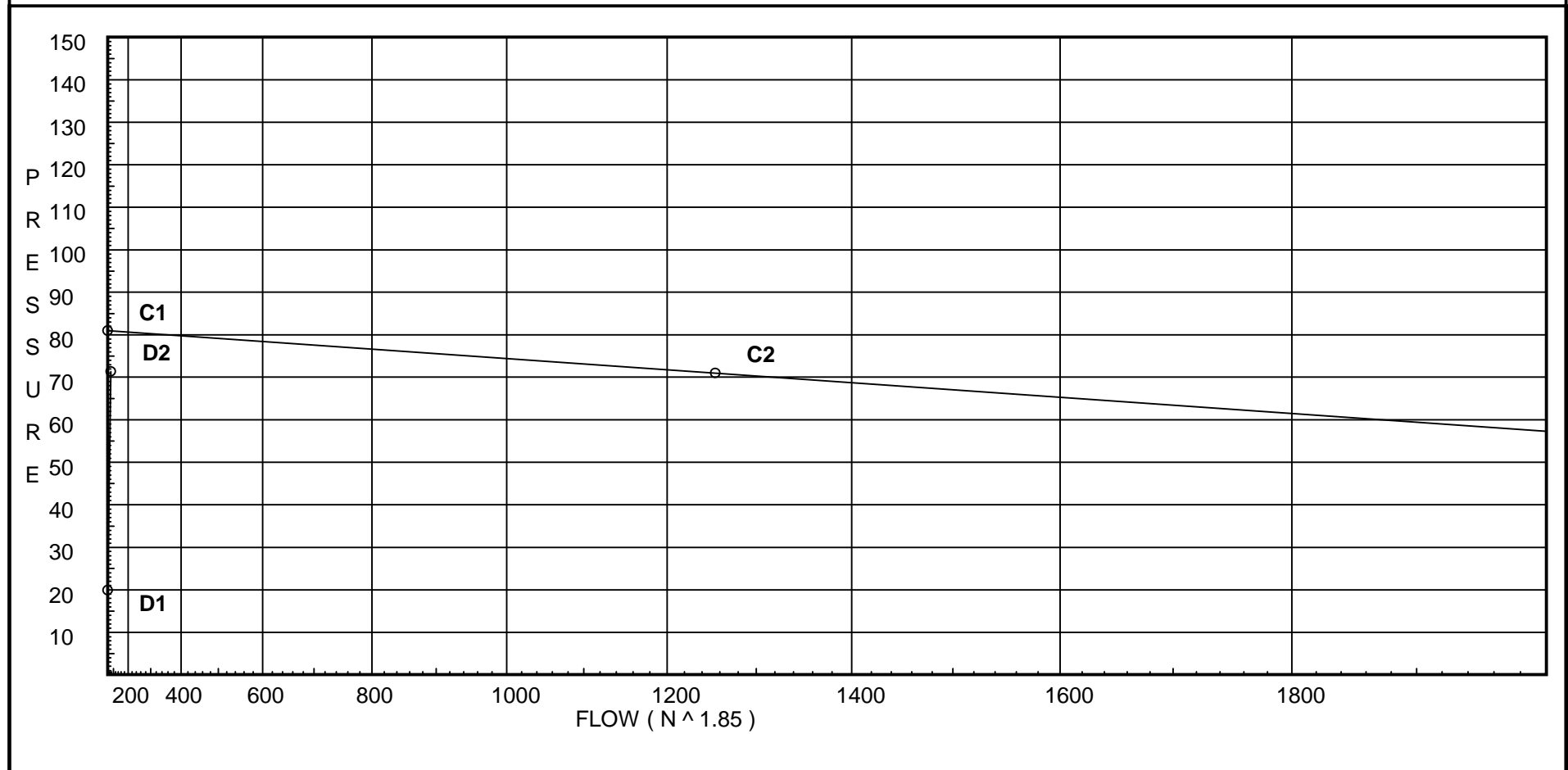
# Water Supply Curve C

SPRINKLER SYSTEMS INC.  
107 India Street Area 1

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City Water Supply:  
C1 - Static Pressure : 81  
C2 - Residual Pressure: 71  
C2 - Residual Flow : 1255

Demand:  
D1 - Elevation : 19.923  
D2 - System Flow : 73.558  
D2 - System Pressure : 71.401  
Hose ( Demand ) : \_\_\_\_\_  
D3 - System Demand : 73.558  
Safety Margin : 9.546





Hydraulic Design Information Sheet

Name - 107 INDIA STREET AREA 2 Date - 05-10-16  
 Location - 107 INDIA STREET PORTLAND, MAINE  
 Building - APARTMENTS System No. - 1 WET  
 Contractor - SPRINKLER SYSTEMS INC Contract No. - 16-025  
 Calculated By - CDS Drawing No. - 1-2 OF 2  
 Construction: (X) Combustible ( ) Non-Combustible Ceiling Height - VARIES  
 Occupancy - APARTMENTS

S ( ) NFPA 13 ( ) Lt. Haz. Ord.Haz.Gp. (X) 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 - 100	( ) Dry	Model F1FR56
E	Elevation at Highest Outlet - 141.500	( ) 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.200 DEG.
G	Hose Allowance - Outside - 0		

N Note

Calculation Flow Required - 63.41 Press Required - 71.571 AT BASE  
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 05-05-16		Cap. -
T	Time of Test - AM	Rated Cap.-	Elev.-
E	Static Press - 81	@ Press -	
R	Residual Press - 71	Elev. -	Well
	Flow - 1255		Proof Flow
S	Elevation - 100.0'		

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.  
107 India Street Area 2

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
11	141.5	5.6	9.37	na	17.14	0.15	100	7.0
8	141.5	5.6	7.17	na	15.0	0.15	100	7.0
9	141.5	5.6	7.4	na	15.23	0.15	100	7.0
10	141.5	5.6	8.2	na	16.04	0.15	100	7.0
12	141.5		10.22	na				
13	141.5		11.96	na				
14	136.5		16.44	na				
15	135.5		24.54	na				
22	135.5		27.29	na				
24	126.0		35.82	na				
25	116.0		42.37	na				
26	116.0		46.78	na				
27	105.75		54.34	na				
TOR	105.75		54.68	na				
BOR	102.0		59.59	na				
BKFL	102.0		59.61	na				
BASE	100.0		71.57	na				
1000	100.0		71.59	na				
TEST	100.0		71.6	na				

The maximum velocity is 13.6 and it occurs in the pipe between nodes 12 and 13

# Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.  
107 India Street 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	*****
11 to 12	17.14 17.14	1.049 120.0 0.0978	T	5.0 0.0 0.0	3.750 5.000 8.750	9.367 0.0 0.856			K Factor = 5.60	
	0.0 17.14						10.223		K Factor = 5.36	
8 to 9	15.00 15.0	1.38 120.0 0.0201		0.0 0.0 0.0	11.000 0.0 11.000	7.175 0.0 0.221			K Factor = 5.60	
9 to 10	15.23 30.23	1.38 120.0 0.0735		0.0 0.0 0.0	11.000 0.0 11.000	7.396 0.0 0.808			K Factor = 5.60	
10 to 12	16.04 46.27	1.38 120.0 0.1615	T	6.0 0.0 0.0	6.500 6.000 12.500	8.204 0.0 2.019			K Factor = 5.60	
12 to 13	17.14 63.41	1.38 120.0 0.2893	E	3.0 0.0 0.0	3.000 3.000 6.000	10.223 0.0 1.736				Vel = 13.60
13 to 14	0.0 63.41	1.38 120.0 0.2894	E	3.0 0.0 0.0	5.000 3.000 8.000	11.959 2.166 2.315				Vel = 13.60
14 to 15	0.0 63.41	1.38 120.0 0.2893	2E T	6.0 6.0 0.0	14.500 12.000 26.500	16.440 0.433 7.667				Vel = 13.60
15 to 22	0.0 63.41	1.38 120.0 0.2894	T	6.0 0.0 0.0	3.500 6.000 9.500	24.540 0.0 2.749				Vel = 13.60
22 to 24	0.0 63.41	1.38 120.0 0.2894	T	6.0 0.0 0.0	9.250 6.000 15.250	27.289 4.114 4.413				Vel = 13.60
24 to 25	0.0 63.41	1.682 120.0 0.1104	T	9.9 0.0 0.0	10.250 9.900 20.150	35.816 4.331 2.224				Vel = 9.16
25 to 26	0.0 63.41	1.682 120.0 0.1104	T	9.9 0.0 0.0	30.000 9.900 39.900	42.371 0.0 4.404				Vel = 9.16
26 to 27	0.0 63.41	1.682 120.0 0.1104	E T	4.95 9.9 0.0	13.500 14.850 28.350	46.775 4.439 3.130				Vel = 9.16
27 to TOR	0.0 63.41	2.469 120.0 0.0170	E	6.0 0.0 0.0	14.000 6.000 20.000	54.344 0.0 0.340				Vel = 4.25
TOR to BOR	0.0 63.41	2.469 120.0 0.0170	T Fsp	12.0 0.0 0.0	4.500 12.000 16.500	54.684 4.624 0.281			** Fixed Loss = 3	Vel = 4.25
BOR to BKFL	0.0 63.41	2.469 120.0 0.0170		0.0 0.0 0.0	1.000 0.0 1.000	59.589 0.0 0.017				Vel = 4.25

# Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.  
107 India Street 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	*****
BKFL to BASE	0.0 63.41	2.469 120.0 0.0180	Zai 0.0 0.0	0.500 0.0 0.500	59.606 11.956 0.009			* * Fixed Loss = 11.09 Vel = 4.25	
BASE to 1000	0.0 63.41	6.16 140.0 0.0001	E T G	20.084 43.037 4.304	60.000 67.425 127.425	71.571 0.0 0.019		Vel = 0.68	
1000 to TEST	0.0 63.41	8.27 140.0 0.0	0.0 0.0 0.0	205.000 0.0 205.000	71.590 0.0 0.007			Vel = 0.38	
	0.0 63.41					71.597		K Factor = 7.49	

# Water Supply Curve C

SPRINKLER SYSTEMS INC.  
107 India Street Area 2

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Date

City Water Supply:  
C1 - Static Pressure : 81  
C2 - Residual Pressure: 71  
C2 - Residual Flow : 1255

Demand:  
D1 - Elevation : 17.974  
D2 - System Flow : 63.409  
D2 - System Pressure : 71.597  
Hose ( Demand ) : \_\_\_\_\_  
D3 - System Demand : 63.409  
Safety Margin : 9.363

