

... Fire Protection by Computer Design

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

Job Name : 134 Washington Ave Area 1
Building : NEW
Location : 134 WASHINGTON AVE. PORTLAND, MAINE
System : 1 WET
Contract : 15040
Data File : 134 Washington Ave. Area 1.WXF

Hydraulic Design Information Sheet

Name - WASHINGTON AVE. APARTMENTS AREA 1 Date - 5-27-15
 Location - 134 WASHINGTON AVE. PORTLAND, MAINE
 Building - NEW System No. - 1 WET
 Contractor - SPRINKLER SYSTEMS INC. Contract No. - 15040
 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	- 2 HEADS	System Type	Sprinkler/Nozzle
	Density	- .05	(X) Wet	Make RELIABLE
D	Area Per Sprinkler	- 324	() Dry	Model F1RES44
E	Elevation at Highest Outlet	- 112	() 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 - 39.18 Press Required - 49.045 AT BASE
 Summary C-Factor Used: 150 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 05-23-15		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 - 72.0'		

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.
134 Washington Ave Area 1

Page 2
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
Abbrev.	Name																				
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.
134 Washington Ave Area 1

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Date

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
1	112.0	4.4	18.7	na	19.03	0.05	324	18.7
1A	112.0		19.31	na				
1B	102.0		24.28	na				
1C	91.75		29.94	na				
1D	81.5		36.23	na				
2	112.0	4.4	20.98	na	20.16	0.05	324	18.7
3	112.0		21.78	na				
4	112.0		21.91	na				
5	112.0		22.38	na				
6	112.0		22.89	na				
A	112.0		23.5	na				
B	102.0		28.11	na				
C	91.75		32.84	na				
D	81.0		38.17	na				
E	81.0		38.24	na				
1E	81.0		38.29	na				
TOR	81.0		38.39	na				
BKFL	77.0		43.18	na				
BASE	72.19		49.04	na				
1000	72.0		49.16	na				
TEST	72.0		49.16	na				

The maximum velocity is 6.79 and it occurs in the pipe between nodes 2 and 3

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
134 Washington Ave Area 1

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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	*****
1 to 1A	19.03	1.101 150.0	T	9.563 0.0	0.250 9.562	18.700 0.0		K Factor = 4.40	
1A to 1B	19.03	0.0621 1.101 150.0		0.0 0.0	9.812 0.0	0.609 4.331		Vel = 6.41	
1B to 1C	19.03	0.0620 1.101 150.0		0.0 0.0	10.250 0.0	19.309 4.439		Vel = 6.41	
1C to 1D	19.03	0.0620 1.101 150.0	T	9.563 0.0	10.250 9.562	24.276 4.439		Vel = 6.41	
1D to 1E	19.03	0.0621 1.101 150.0	2E T	7.65 9.563	12.500 17.212	29.944 4.439		Vel = 6.41	
1E to 1F	19.03	0.0252 1.442 120.0	4E T	14.864 7.432	51.000 22.296	36.227 0.217		Vel = 3.74	
1F to 2	19.03	0.0 19.03		0.0	73.296	1.846 38.290		K Factor = 3.08	
2 to 3	20.16	1.101 150.0	T	9.563 0.0	2.000 9.562	20.984 0.0		K Factor = 4.40	
3 to 4	20.16	0.0690 1.442 120.0		0.0 0.0	11.562 0.0	0.798 0.0		Vel = 6.79	
4 to 5	20.16	0.0280 1.442 120.0		0.0 0.0	4.500 0.0	21.782 0.0		Vel = 3.96	
5 to 6	20.16	0.0281 1.442 120.0		0.0 0.0	4.500 0.0	0.126 0.0		Vel = 3.96	
6 to A	20.16	0.0281 1.442 120.0		0.0 0.0	18.000 0.0	22.385 0.0		Vel = 3.96	
A to B	20.16	0.0281 1.442 120.0	3E	11.148 0.0	10.500 11.148	22.890 0.0		Vel = 3.96	
B to C	20.16	0.0281 1.442 120.0		0.0 0.0	10.250 0.0	23.496 4.331		Vel = 3.96	
C to D	20.16	0.0280 1.442 120.0		0.0 0.0	10.250 0.0	28.115 4.439		Vel = 3.96	
D to E	20.16	0.0280 1.442 120.0	E T	3.716 7.432	12.750 11.148	32.841 4.656		Vel = 3.96	
E to 1E	20.16	0.0039 2.157 120.0	T	12.307 0.0	7.000 12.307	38.167 0.0		Vel = 1.77	
1E to 1F	20.16	0.0039 2.157 120.0		0.0 0.0	12.000 0.0	38.243 0.0		Vel = 1.77	

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
134 Washington Ave Area 1

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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	*****
1E	19.02	2.157	E	6.153	1.500	38.290			
to		120.0		0.0	6.153	0.0			
TOR	39.18	0.0136		0.0	7.653	0.104		Vel = 3.44	
TOR	0.0	2.635	Bvcb	6.864	4.000	38.394			
to		120.0	Fsp	0.0	6.864	4.732		** Fixed Loss = 3	
BKFL	39.18	0.0051		0.0	10.864	0.055		Vel = 2.31	
BKFL	0.0	4.26	Zac	0.0	1.000	43.181			
to		120.0		0.0	0.0	5.863		** Fixed Loss = 3.78	
BASE	39.18	0.0010		0.0	1.000	0.001		Vel = 0.88	
BASE	0.0	4.1	E	14.534	25.000	49.045			
to		140.0	T	29.067	46.508	0.082			
1000	39.18	0.0004	G	2.907	71.508	0.032		Vel = 0.95	
1000	0.0	16.41		0.0	100.000	49.159			
to		140.0		0.0	0.0	0.0			
TEST	39.18	0.0		0.0	100.000	0.0		Vel = 0.06	
	0.0								
	39.18					49.159		K Factor = 5.59	

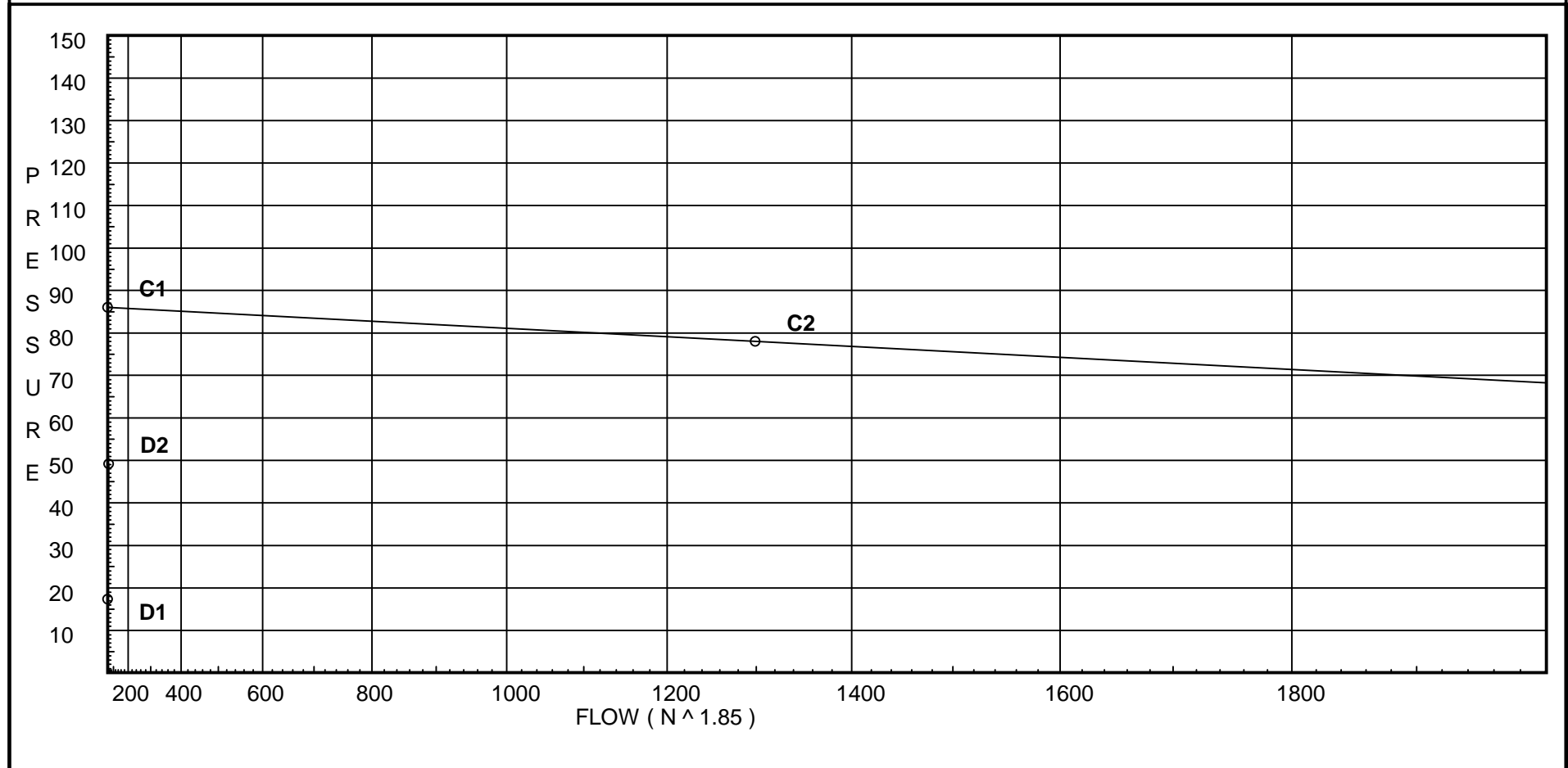
Water Supply Curve C

SPRINKLER SYSTEMS INC.
134 Washington Ave Area 1

Page 6
Date

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

Demand:
D1 - Elevation : 17.324
D2 - System Flow : 39.183
D2 - System Pressure : 49.159
Hose (Demand) : _____
D3 - System Demand : 39.183
Safety Margin : 36.829



Hydraulic Design Information Sheet

Name - WASHINGTON AVE. APARTMENTS AREA 2 Date - 5-27-15
 Location - 134 WASHINGTON AVE. PORTLAND, MAINE
 Building - NEW System No. - 1 WET
 Contractor - SPRINKLER SYSTEMS INC. Contract No. - 15040
 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 - 3 HEADS	System Type	Sprinkler/Nozzle
	Density - .05	(X) Wet	Make RELIABLE
D	Area Per Sprinkler - 324	() Dry	Model F1RES49
E	Elevation at Highest Outlet - 112	() 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 - 52.45 Press Required - 51.062 AT BASE
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 05-23-15		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 - 72.0'		

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.
134 Washington Ave Area 2

Page 8
Date

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
ARM2	112.0	4.9	12.5	na	17.32	0.05	324	12.0
ARM3	112.0	4.9	13.73	na	18.16	0.05	324	12.0
ARM1	112.0	4.9	12.0	na	16.97	0.05	324	12.0
4	112.0		13.34	na				
5	112.0		13.69	na				
6	112.0		15.04	na				
A	112.0		18.6	na				
B	102.0		24.62	na				
C	91.75		30.74	na				
D	81.0		39.33	na				
E	81.0		39.78	na				
1E	81.0		40.05	na				
TOR	81.0		40.23	na				
BKFL	77.0		45.06	na				
BASE	72.19		51.06	na				
1000	72.0		51.2	na				
TEST	72.0		51.2	na				

The maximum velocity is 10.3 and it occurs in the pipe between nodes 6 and A

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
134 Washington Ave 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	*****
ARM2 to 5	17.32 17.32	1.049 120.0 0.0998	2E T	4.0 5.0 0.0	3.000 9.000 12.000	12.495 0.0 1.197			K Factor = 4.90	
	0.0 17.32									
						13.692			K Factor = 4.68	
ARM3 to 6	18.16 18.16	1.049 120.0 0.1088	2E T	4.0 5.0 0.0	3.000 9.000 12.000	13.734 0.0 1.306			K Factor = 4.90	
	0.0 18.16									
						15.040			K Factor = 4.68	
ARM1 to 4	16.97 16.97	1.049 120.0 0.0961	2E T	4.0 5.0 0.0	5.000 9.000 14.000	12.000 0.0 1.345			K Factor = 4.90	
4 to 5	0.0 16.97	1.442 120.0 0.0204		0.0 0.0 0.0	17.000 0.0 17.000	13.345 0.0 0.347				Vel = 6.30
5 to 6	17.32 34.29	1.442 120.0 0.0749		0.0 0.0 0.0	18.000 0.0 18.000	13.692 0.0 1.348				Vel = 3.33
6 to A	18.16 52.45	1.442 120.0 0.1645	3E	11.148 0.0 0.0	10.500 11.148 21.648	15.040 0.0 3.561				Vel = 6.74
A to B	0.0 52.45	1.442 120.0 0.1645		0.0 0.0 0.0	10.250 0.0 10.250	18.601 4.331 1.686				Vel = 10.30
B to C	0.0 52.45	1.442 120.0 0.1645		0.0 0.0 0.0	10.250 0.0 10.250	24.618 4.439 1.686				Vel = 10.30
C to D	0.0 52.45	1.442 120.0 0.1644	E T	3.716 7.432 0.0	12.750 11.148 23.898	30.743 4.656 3.930				Vel = 10.30
D to E	0.0 52.45	2.157 120.0 0.0232	T	12.307 0.0 0.0	7.000 12.307 19.307	39.329 0.0 0.447				Vel = 4.61
E to 1E	0.0 52.45	2.157 120.0 0.0232		0.0 0.0 0.0	12.000 0.0 12.000	39.776 0.0 0.278				Vel = 4.61
1E to TOR	0.0 52.45	2.157 120.0 0.0231	E	6.153 0.0 0.0	1.500 6.153 7.653	40.054 0.0 0.177				Vel = 4.61
TOR to BKFL	0.0 52.45	2.635 120.0 0.0087	Bvcb Fsp	6.864 0.0 0.0	4.000 6.864 10.864	40.231 4.732 0.095			** Fixed Loss = 3	Vel = 3.09
BKFL to BASE	0.0 52.45	4.26 120.0 0.0010	Zac	0.0 0.0 0.0	1.000 0.0 1.000	45.058 6.003 0.001			** Fixed Loss = 3.92	Vel = 1.18

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
134 Washington Ave 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	*****
BASE	0.0	4.1	E	14.534	25.000	51.062			
to		140.0	T	29.067	46.508	0.082			
1000	52.45	0.0008	G	2.907	71.508	0.055		Vel = 1.27	
1000	0.0	16.41		0.0	100.000	51.199			
to		140.0		0.0	0.0	0.0			
TEST	52.45	0.0		0.0	100.000	0.0		Vel = 0.08	
	0.0								
	52.45					51.199		K Factor = 7.33	

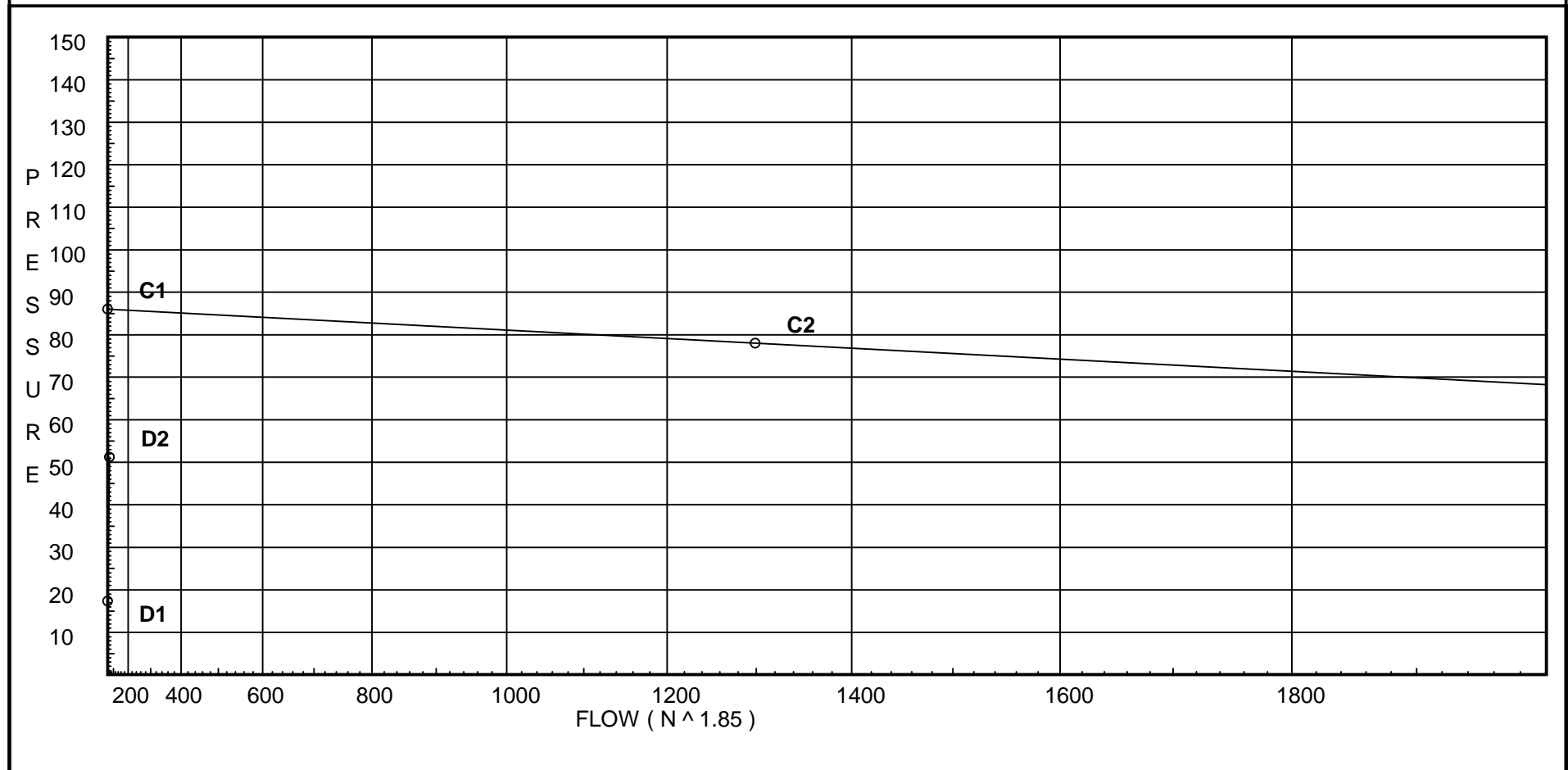
Water Supply Curve C

SPRINKLER SYSTEMS INC.
134 Washington Ave 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 : 17.324
D2 - System Flow : 52.454
D2 - System Pressure : 51.199
Hose (Demand) : _____
D3 - System Demand : 52.454
Safety Margin : 34.780



Hydraulic Design Information Sheet

Name - WASHINGTON AVE. APARTMENTS AREA 3 Date - 5-27-15
 Location - 134 WASHINGTON AVE. PORTLAND, MAINE
 Building - NEW System No. - 1 WET
 Contractor - SPRINKLER SYSTEMS INC. Contract No. - 15040
 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 - 2 HEADS	System Type	Sprinkler/Nozzle
	Density - .10	(X) Wet	Make RELIABLE
D	Area Per Sprinkler - 150	() Dry	Model F1FR56
E	Elevation at Highest Outlet - 112	() 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 - 0		

N Note

Calculation Flow Required - 31.59 Press Required - 43.130 AT BASE
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 05-23-15		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 - 72.0'		

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.
134 Washington Ave Area 3

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Date

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
12	112.0	5.6	7.17	na	15.0	0.1	150	7.0
12A	112.0		7.84	na				
12B	102.0		12.96	na				
12C	91.75		18.37	na				
11	112.0	5.6	8.78	na	16.59	0.1	150	7.0
11A	112.0		9.59	na				
11B	102.0		14.86	na				
11C	91.75		20.71	na				
STI	91.75		21.35	na				
C	91.75		26.09	na				
D	81.0		32.28	na				
E	81.0		32.46	na				
1E	81.0		32.57	na				
TOR	81.0		32.64	na				
BKFL	77.0		37.41	na				
BASE	72.19		43.13	na				
1000	72.0		43.23	na				
TEST	72.0		43.23	na				

The maximum velocity is 6.21 and it occurs in the pipe between nodes STI and C

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
134 Washington Ave Area 3

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Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
12 to 12A	15.00 15.0	1.049 120.0 0.0763	T 0.0	5.0 0.0	3.750 5.000	7.175 0.0		K Factor = 5.60	
12A to 12B	0.0 15.0	1.049 120.0 0.0765	0.0 0.0	0.0 0.0	10.250 0.0	7.843 4.331			Vel = 5.57
12B to 12C	0.0 15.0	1.049 120.0 0.0765	E 0.0	2.0 0.0	10.750 2.000	12.958 4.439			Vel = 5.57
12C to STI	0.0 15.0	1.049 120.0 0.0764	4E 2T 0.0	8.0 10.0 0.0	21.000 18.000 39.000	18.372 0.0 2.980			Vel = 5.57
	0.0 15.00					21.352		K Factor = 3.25	
11 to 11A	16.59 16.59	1.049 120.0 0.0922	T 0.0	5.0 0.0	3.750 5.000	8.781 0.0		K Factor = 5.60	
11A to 11B	0.0 16.59	1.049 120.0 0.0921	0.0 0.0	0.0 0.0	10.250 0.0	9.588 4.331			Vel = 6.16
11B to 11C	0.0 16.59	1.049 120.0 0.0921	T 0.0	5.0 0.0	10.250 5.000	14.863 4.439			Vel = 6.16
11C to STI	0.0 16.59	1.049 120.0 0.0921	0.0 0.0	0.0 0.0	7.000 0.0	20.707 0.0			Vel = 6.16
STI to C	15.00 31.59	1.442 120.0 0.0644	5E 0.0	18.58 0.0	55.000 18.580	21.352 0.0			Vel = 6.21
C to D	0.0 31.59	1.442 120.0 0.0644	E T 0.0	3.716 7.432 0.0	12.750 11.148 23.898	26.090 4.656 1.538			Vel = 6.21
D to E	0.0 31.59	2.157 120.0 0.0091	T 0.0	12.307 0.0	7.000 12.307	32.284 0.0			Vel = 2.77
E to 1E	0.0 31.59	2.157 120.0 0.0091	0.0 0.0	0.0 0.0	12.000 0.0	32.459 0.0			Vel = 2.77
1E to TOR	0.0 31.59	2.157 120.0 0.0090	E 0.0	6.153 0.0	1.500 6.153	32.568 0.0			Vel = 2.77
TOR to BKFL	0.0 31.59	2.635 120.0 0.0035	Bvcb Fsp 0.0	6.864 0.0	4.000 6.864	32.637 4.732		** Fixed Loss = 3	Vel = 1.86
BKFL to BASE	0.0 31.59	4.26 120.0 0.0	Zac 0.0	0.0 0.0	1.000 0.0	37.407 5.723		** Fixed Loss = 3.64	Vel = 0.71

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
134 Washington Ave 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	*****
BASE	0.0	4.1	E	14.534	25.000	43.130			
to		140.0	T	29.067	46.508	0.082			
1000	31.59	0.0003	G	2.907	71.508	0.022		Vel = 0.77	
1000	0.0	16.41		0.0	100.000	43.234			
to		140.0		0.0	0.0	0.0			
TEST	31.59	0.0		0.0	100.000	0.0		Vel = 0.05	
	0.0								
	31.59					43.234		K Factor = 4.80	

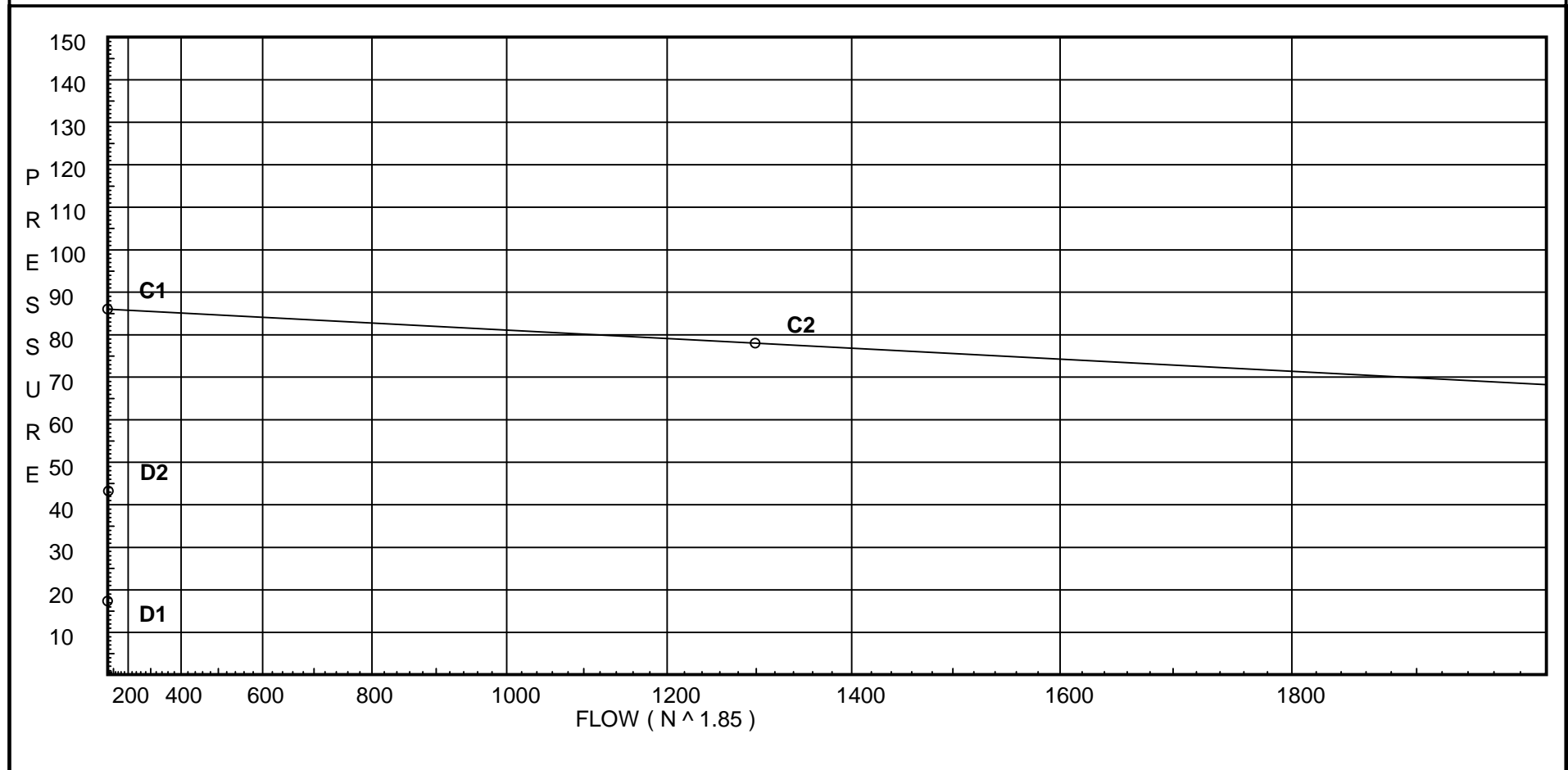
Water Supply Curve C

SPRINKLER SYSTEMS INC.
134 Washington Ave 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 : 17.324
D2 - System Flow : 31.595
D2 - System Pressure : 43.234
Hose (Demand) : _____
D3 - System Demand : 31.595
Safety Margin : 42.758



Hydraulic Design Information Sheet

Name - WASHINGTON AVE. APARTMENTS AREA 4 Date - 5-27-15
 Location - 134 WASHINGTON AVE. PORTLAND, MAINE
 Building - NEW System No. - 1 WET
 Contractor - SPRINKLER SYSTEMS INC. Contract No. - 15040
 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 - 900	System Type	Sprinkler/Nozzle
	Density - .10	(X) Wet	Make RELIABLE
D	Area Per Sprinkler - 196	() Dry	Model F1FR56
E	Elevation at Highest Outlet - 81	() 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 - 0		

N Note

Calculation Flow Required - 199.01 Press Required - 51.527 AT BASE
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 05-23-15		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 - 72.0'		

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
	() 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.
134 Washington Ave Area 4

Page 18
Date

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
TYP	0.0	5.6	12.25	na	19.6	0.1	196	7.0
61	81.0	5.6	21.27	na	25.83	0.1	196	7.0
60	81.0	5.6	20.93	na	25.62	0.1	196	7.0
62	81.0		21.85	na				
ARM1	81.0	5.6	14.89	na	21.61	0.1	196	7.0
55	81.0	K = K @ DROP	13.0	na	19.6			
56	81.0	K = K @ DROP	13.32	na	19.84			
57	81.0	K = K @ DROP	14.49	na	20.69			
58	81.0		16.39	na				
51	81.0	K = K @ DROP	15.64	na	21.49			
52	81.0	K = K @ DROP	15.93	na	21.69			
53	81.0	K = K @ DROP	17.34	na	22.63			
54	81.0		20.76	na				
59	81.0		21.13	na				
63	81.0		23.19	na				
D	81.0		30.64	na				
E	81.0		35.9	na				
1E	81.0		39.18	na				
TOR	81.0		41.26	na				
BKFL	77.0		47.11	na				
BASE	72.19		51.8	na				
1000	72.0		52.53	na				
TEST	72.0		52.53	na				

The maximum velocity is 17.47 and it occurs in the pipe between nodes 63 and D

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
134 Washington Ave 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 DROP	19.60 19.6	1.049 120.0 0.1253	T	5.0 0.0 0.0	1.000 5.000 6.000	12.250 0.0 0.752			K Factor = 5.60	
	0.0 19.60						13.002		K Factor = 5.44	
61 to 62	25.83 25.83	1.442 120.0 0.0443	E T	3.716 7.432 0.0	2.000 11.148 13.148	21.272 0.0 0.583			K Factor = 5.60	
	0.0 25.83						21.855		K Factor = 5.53	
60 to 62	25.62 25.62	1.442 120.0 0.0437	E T	3.716 7.432 0.0	10.000 11.148 21.148	20.931 0.0 0.924			K Factor = 5.60	
62 to 63	25.83 51.45	1.442 120.0 0.1587	T	7.432 0.0 0.0	1.000 7.432 8.432	21.855 0.0 1.338				Vel = 10.11
	0.0 51.45						23.193		K Factor = 10.68	
ARM1 to 58	21.61 21.61	1.049 120.0 0.1502	E T	2.0 5.0 0.0	3.000 7.000 10.000	14.890 0.0 1.502			K Factor = 5.60	
	0.0 21.61						16.392		K Factor = 5.34	
55 to 56	19.60 19.6	1.442 120.0 0.0267		0.0 0.0 0.0	12.000 0.0 12.000	13.002 0.0 0.320			K Factor @ node DROP	Vel = 3.85
56 to 57	19.84 39.44	1.442 120.0 0.0970		0.0 0.0 0.0	12.000 0.0 12.000	13.322 0.0 1.164			K Factor @ node DROP	Vel = 7.75
57 to 58	20.69 60.13	1.442 120.0 0.2118		0.0 0.0 0.0	9.000 0.0 9.000	14.486 0.0 1.906			K Factor @ node DROP	Vel = 11.81
58 to 59	21.61 81.74	1.442 120.0 0.3736	T	7.432 0.0 0.0	5.250 7.432 12.682	16.392 0.0 4.738				Vel = 16.06
	0.0 81.74						21.130		K Factor = 17.78	
51 to 52	21.49 21.49	1.442 120.0 0.0317		0.0 0.0 0.0	9.250 0.0 9.250	15.637 0.0 0.293			K Factor @ node DROP	Vel = 4.22
52 to 53	21.70 43.19	1.442 120.0 0.1148		0.0 0.0 0.0	12.250 0.0 12.250	15.930 0.0 1.406			K Factor @ node DROP	Vel = 8.48
53 to 54	22.63 65.82	1.442 120.0 0.2503	T	7.432 0.0 0.0	6.250 7.432 13.682	17.336 0.0 3.424			K Factor @ node DROP	Vel = 12.93

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
134 Washington Ave Area 4

Page 20
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	*****
54	0.0	2.157		0.0	10.500	20.760				
to		120.0		0.0	0.0	0.0				
59	65.82	0.0352		0.0	10.500	0.370		Vel =	5.78	
59	81.74	2.157	E	6.153	7.000	21.130				
to		120.0		0.0	6.153	0.0				
63	147.56	0.1568		0.0	13.153	2.063		Vel =	12.96	
63	51.45	2.157	2E	12.307	15.000	23.193				
to		120.0		0.0	12.307	0.0				
D	199.01	0.2727		0.0	27.307	7.447		Vel =	17.47	
D	0.0	2.157	T	12.307	7.000	30.640				
to		120.0		0.0	12.307	0.0				
E	199.01	0.2727		0.0	19.307	5.265		Vel =	17.47	
E	0.0	2.157		0.0	12.000	35.905				
to		120.0		0.0	0.0	0.0				
1E	199.01	0.2728		0.0	12.000	3.273		Vel =	17.47	
1E	0.0	2.157	E	6.153	1.500	39.178				
to		120.0		0.0	6.153	0.0				
TOR	199.01	0.2727		0.0	7.653	2.087		Vel =	17.47	
TOR	0.0	2.635	Bvcb	6.864	4.000	41.265				
to		120.0	Fsp	0.0	6.864	4.732		** Fixed Loss = 3		
BKFL	199.01	0.1029		0.0	10.864	1.118		Vel =	11.71	
BKFL	0.0	4.26	Zac	0.0	1.000	47.115				
to		120.0		0.0	0.0	4.677		** Fixed Loss = 2.594		
BASE	199.01	0.0100		0.0	1.000	0.010		Vel =	4.48	
BASE	0.0	4.1	E	14.534	25.000	51.802				
to		140.0	T	29.067	46.508	0.082				
1000	199.01	0.0090	G	2.907	71.508	0.642		Vel =	4.84	
1000	0.0	16.41		0.0	100.000	52.526				
to		140.0		0.0	0.0	0.0				
TEST	199.01	0.0		0.0	100.000	0.002		Vel =	0.30	
	0.0									
	199.01					52.528		K Factor =	27.46	

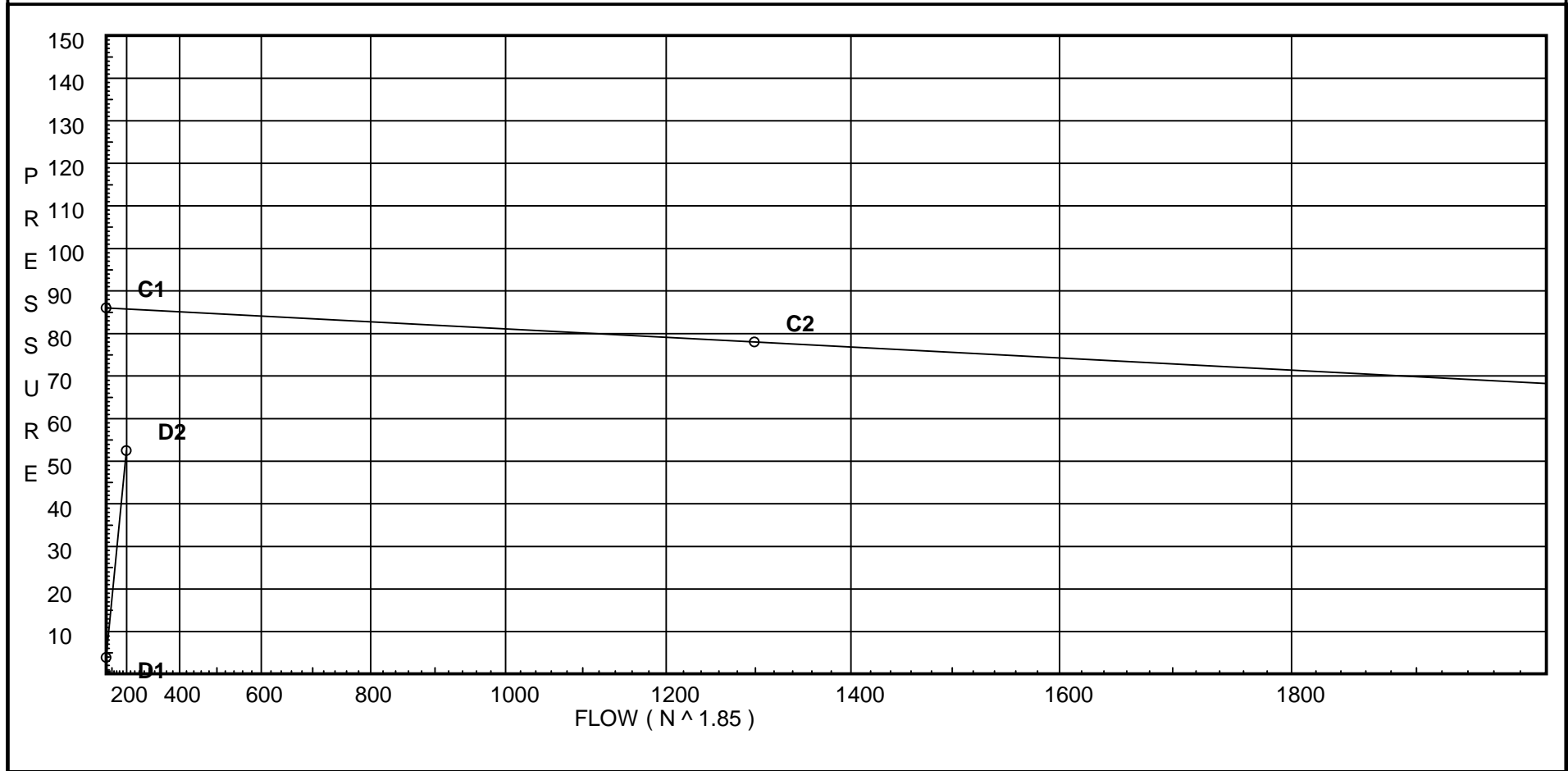
Water Supply Curve C

SPRINKLER SYSTEMS INC.
134 Washington Ave Area 4

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Date

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

Demand:
D1 - Elevation : 3.898
D2 - System Flow : 199.006
D2 - System Pressure : 52.528
Hose (Demand) : _____
D3 - System Demand : 199.006
Safety Margin : 33.224



Hydraulic Design Information Sheet

Name - WASHINGTON AVE. APARTMENTS AREA 5 Date - 5-27-15
 Location - 134 WASHINGTON AVE. PORTLAND, MAINE
 Building - NEW System No. - 1 WET
 Contractor - SPRINKLER SYSTEMS INC. Contract No. - 15040
 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	- 900	System Type	Sprinkler/Nozzle
	Density	- .15	(X) Wet	Make RELIABLE
D	Area Per Sprinkler	- 120	() Dry	Model F1FR56
E	Elevation at Highest Outlet	- 71.250	() 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	- 0		

N Note

Calculation Flow Required - 212.82 Press Required - 69.304 AT BASE
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 05-23-15		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 - 72.0'		

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
	() 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.
134 Washington Ave Area 5

Page 23
Date

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
TYP	0.0	5.6	9.0	na	16.8	0.1	168	7.0
87	71.25	5.6	12.99	na	20.18	0.1	168	7.0
87T	70.0		15.4	na				
88	70.0	5.6	15.41	na	21.98	0.15	120	7.0
89	70.0	5.6	15.72	na	22.21	0.15	120	7.0
90	70.0	5.6	16.4	na	22.68	0.15	120	7.0
91	70.0	5.6	17.99	na	23.75	0.15	120	7.0
81	71.25	5.6	9.0	na	16.8	0.1	168	7.0
82	71.25	K = K @ DROP	9.99	na	17.17			
82T	70.0		15.35	na				
83	70.0	5.6	15.45	na	22.01	0.1	120	7.0
84	70.0	5.6	16.24	na	22.57	0.1	120	7.0
85	70.0	5.6	17.55	na	23.46	0.1	120	7.0
86	70.0		21.12	na				
92	70.0		22.15	na				
93	70.0		24.66	na				
94	81.0		29.3	na				
54	81.0		30.77	na				
59	81.0		34.01	na				
63	81.0		38.07	na				
D	81.0		46.5	na				
E	81.0		52.47	na				
1E	81.0		56.17	na				
TOR	81.0		58.53	na				
BKFL	77.0		64.53	na				
BASE	72.19		69.3	na				
1000	72.0		70.11	na				
TEST	72.0		70.11	na				

The maximum velocity is 18.69 and it occurs in the pipe between nodes 92 and 93

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
134 Washington Ave 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	16.80 16.8	1.049 120.0 0.0943	T	5.0 0.0 0.0	1.000 5.000 6.000	9.000 0.0 0.566			K Factor = 5.60	
	0.0 16.80					9.566			K Factor = 5.43	
87 to 87T	20.18 20.18	1.101 150.0 0.0692	3E T	11.475 9.563 0.0	6.000 21.037 27.037	12.987 0.541 1.871			K Factor = 5.60	
87T to 88	0.0 20.18	1.682 120.0 0.0130		0.0 0.0 0.0	1.000 0.0 1.000	15.399 0.0 0.013			Vel = 2.91	
88 to 89	21.99 42.17	1.682 120.0 0.0520		0.0 0.0 0.0	6.000 0.0 6.000	15.412 0.0 0.312			K Factor = 5.60	
89 to 90	22.20 64.37	1.682 120.0 0.1135		0.0 0.0 0.0	6.000 0.0 6.000	15.724 0.0 0.681			K Factor = 5.60	
90 to 91	22.68 87.05	1.682 120.0 0.1984		0.0 0.0 0.0	8.000 0.0 8.000	16.405 0.0 1.587			K Factor = 5.60	
91 to 92	23.76 110.81	1.682 120.0 0.3099	T	9.9 0.0 0.0	3.500 9.900 13.400	17.992 0.0 4.153			K Factor = 5.60	
	0.0 110.81					22.145			K Factor = 23.55	
81 to 82	16.80 16.8	1.101 150.0 0.0493	2E	7.65 0.0 0.0	12.500 7.650 20.150	9.000 0.0 0.993			K Factor = 5.60	
82 to 82T	17.17 33.97	1.101 150.0 0.1813	3E T	11.475 9.563 0.0	5.500 21.037 26.537	9.993 0.541 4.812			K Factor @ node DROP	
82T to 83	0.0 33.97	1.682 120.0 0.0347		0.0 0.0 0.0	3.000 0.0 3.000	15.346 0.0 0.104			Vel = 4.90	
83 to 84	22.01 55.98	1.682 120.0 0.0877		0.0 0.0 0.0	9.000 0.0 9.000	15.450 0.0 0.789			K Factor = 5.60	
84 to 85	22.57 78.55	1.682 120.0 0.1640		0.0 0.0 0.0	8.000 0.0 8.000	16.239 0.0 1.312			K Factor = 5.60	
85 to 86	23.46 102.01	1.682 120.0 0.2660	T	9.9 0.0 0.0	3.500 9.900 13.400	17.551 0.0 3.565			K Factor = 5.60	
86 to 92	0.0 102.01	2.157 120.0 0.0792		0.0 0.0 0.0	13.000 0.0 13.000	21.116 0.0 1.029			Vel = 14.73	
									Vel = 8.96	

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
134 Washington Ave Area 5

Page 25
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	*****
92	110.81	2.157	E	6.153	2.000	22.145			
to		120.0		0.0	6.153	0.0			
93	212.82	0.3088		0.0	8.153	2.518		Vel = 18.69	
93	0.0	2.157	E	6.153	12.000	24.663			
to		120.0	T	12.307	18.460	-4.764			
94	212.82	0.3087		0.0	30.460	9.404		Vel = 18.69	
94	0.0	2.157		0.0	4.750	29.303			
to		120.0		0.0	0.0	0.0			
54	212.82	0.3088		0.0	4.750	1.467		Vel = 18.69	
54	0.0	2.157		0.0	10.500	30.770			
to		120.0		0.0	0.0	0.0			
59	212.82	0.3088		0.0	10.500	3.242		Vel = 18.69	
59	0.0	2.157	E	6.153	7.000	34.012			
to		120.0		0.0	6.153	0.0			
63	212.82	0.3088		0.0	13.153	4.061		Vel = 18.69	
63	0.0	2.157	2E	12.307	15.000	38.073			
to		120.0		0.0	12.307	0.0			
D	212.82	0.3087		0.0	27.307	8.431		Vel = 18.69	
D	0.0	2.157	T	12.307	7.000	46.504			
to		120.0		0.0	12.307	0.0			
E	212.82	0.3087		0.0	19.307	5.961		Vel = 18.69	
E	0.0	2.157		0.0	12.000	52.465			
to		120.0		0.0	0.0	0.0			
1E	212.82	0.3088		0.0	12.000	3.705		Vel = 18.69	
1E	0.0	2.157	E	6.153	1.500	56.170			
to		120.0		0.0	6.153	0.0			
TOR	212.82	0.3088		0.0	7.653	2.363		Vel = 18.69	
TOR	0.0	2.635	Bvcb	6.864	4.000	58.533			
to		120.0	Fsp	0.0	6.864	4.732		** Fixed Loss = 3	
BKFL	212.82	0.1165		0.0	10.864	1.266		Vel = 12.52	
BKFL	0.0	4.26	Zac	0.0	1.000	64.531			
to		120.0		0.0	0.0	4.761		** Fixed Loss = 2.678	
BASE	212.82	0.0120		0.0	1.000	0.012		Vel = 4.79	
BASE	0.0	4.1	E	14.534	25.000	69.304			
to		140.0	T	29.067	46.508	0.082			
1000	212.82	0.0102	G	2.907	71.508	0.727		Vel = 5.17	
1000	0.0	16.41		0.0	100.000	70.113			
to		140.0		0.0	0.0	0.0			
TEST	212.82	0.0		0.0	100.000	0.001		Vel = 0.32	
	0.0								
	212.82					70.114		K Factor = 25.42	

Water Supply Curve C

SPRINKLER SYSTEMS INC.
134 Washington Ave Area 5

Page 26
Date

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

Demand:
D1 - Elevation : -0.325
D2 - System Flow : 212.817
D2 - System Pressure : 70.114
Hose (Demand) : _____
D3 - System Demand : 212.817
Safety Margin : 15.604

