Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 01/28/16

. . . Fire Protection by Computer Design

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

Job Name	:	23 Emerson Street Area 1
Building	:	EXISTING RENOVATED
Location	:	23 EMERSON STREET PORTLAND, MAINE
System	:	1 WET
Contract	:	15-157
Data File	:	23 Emerson Street Area 1.WXF

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 1

Reviewed for Code Compliance
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Hydraulic Design Information Sheet

Name - 23 EMERSON STREET
Date - 12-
Location - 23 EMERSON STREET PORTLAND, MAINE
Building - EXISTING RENOVATED
System No. - 1 WET
Contractor - SPRINKLER SYSTEMS INC.
Contract No. - 15-
Calculated By - CDS
Drawing No. - 1-1
Construction: (X) Combustible ( ) Non-Combustible
Ceiling Height - VARIES
Occupancy - APARTMENTS

SYSTEM

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

DESIGN

Area of Sprinkler Operation	- 4 HEADS	System Type	Sprinkler/Nozzle
Density	- .15	(X) Wet	Make RELIABLE
Area Per Sprinkler	- 110	( ) Dry	Model F1FR56
Elevation at Highest Outlet	- 137	( ) Deluge	Size 1/2" X 1/2"
Hose Allowance - Inside	- 0	( ) Preaction	K-Factor 5.6
Rack Sprinkler Allowance	- 0	( ) Other	Temp.Rat.200 DEG.
Hose Allowance - Outside	- 0		

Note

Calculation Summary: Flow Required - 70.27 Press Required - 55.222 AT BASE
C-Factor Used: 120 Overhead 150 Underground

WATER SUPPLY

Water Flow Test:		Pump Data:		Tank or Reservoir:
Date of Test	- 11-25-15			Cap. -
Time of Test	- AM	Rated Cap.-		Elev.-
Static Press	- 68	@ Press	-	
Residual Press	- 65	Elev.	-	Well
Flow	- 150			Proof Flow
Elevation	- 91.5'			

Location - ON SITE

Source of Information - OWNER AND WATER DISTRICT

COMMODITY STORAGE

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

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

Flue Spacing Clearance:Storage to Ceiling
Longitudinal Transverse

Horizontal Barriers Provided:

Fittings Used Summary

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 1

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Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	1	4
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	2	1
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	3
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	6	21

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.
23 Emerson Street Area 1

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density		
4	137.0	5.6	9.22	na	17.01	0.15		
1	137.0	5.6	8.68	na	16.5	0.15		
2	137.0		10.32	na				
3	137.0	5.6	10.35	na	18.02	0.15		
5	137.0		10.38	na				
6	137.0	5.6	11.21	na	18.75	0.15	110	7.0
8	137.0		11.31	na				
9	137.0		12.77	na				
11	137.0		12.87	na				
12	137.0		14.34	na				
14	137.0		14.44	na				
17	137.0		15.24	na				
18	137.0		16.33	na				
19	129.75		19.87	na				
20	119.75		24.84	na				
21	119.75		25.6	na				
22	109.75		30.33	na				
23	98.5		36.57	na				
24	98.5		37.62	na				
TOR	98.5		37.93	na				
BKFL	92.5		43.76	na				
BASE	91.5		55.22	na				
1000	91.5		56.43	na				
2000	91.5		58.73	na				
TEST	91.5		58.76	na				

The maximum velocity is 10.51 and it occurs in the pipe between nodes BASE and 1000

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 1

Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 01/28/16

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	**
4	17.01	1.049	T	5.0	7.000	9.222		K Factor = 5.60
to		120.0		0.0	5.000	0.0		
5	17.01	0.0964		0.0	12.000	1.157		Vel = 6.31
	0.0							
	17.01					10.379		K Factor = 5.28
1	16.50	1.049	2E	4.0	9.000	8.681		K Factor = 5.60
to		120.0	T	5.0	9.000	0.0		
2	16.5	0.0912		0.0	18.000	1.641		Vel = 6.13
2	0.0	1.682		0.0	3.250	10.322		
to		120.0		0.0	0.0	0.0		
3	16.5	0.0092		0.0	3.250	0.030		Vel = 2.38
3	18.02	1.682		0.0	0.750	10.352		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
5	34.52	0.0360		0.0	0.750	0.027		Vel = 4.98
5	17.00	1.682		0.0	11.000	10.379		
to		120.0		0.0	0.0	0.0		
6	51.52	0.0752		0.0	11.000	0.827		Vel = 7.44
6	18.75	1.682		0.0	0.750	11.206		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
8	70.27	0.1333		0.0	0.750	0.100		Vel = 10.15
8	0.0	1.682		0.0	11.000	11.306		
to		120.0		0.0	0.0	0.0		
9	70.27	0.1335		0.0	11.000	1.468		Vel = 10.15
9	0.0	1.682		0.0	0.750	12.774		
to		120.0		0.0	0.0	0.0		
11	70.27	0.1333		0.0	0.750	0.100		Vel = 10.15
11	0.0	1.682		0.0	11.000	12.874		
to		120.0		0.0	0.0	0.0		
12	70.27	0.1335		0.0	11.000	1.469		Vel = 10.15
12	0.0	1.682		0.0	0.750	14.343		
to		120.0		0.0	0.0	0.0		
14	70.27	0.1333		0.0	0.750	0.100		Vel = 10.15
14	0.0	1.682	E	4.95	1.000	14.443		
to		120.0		0.0	4.950	0.0		
17	70.27	0.1334		0.0	5.950	0.794		Vel = 10.15
17	0.0	2.157	3E	18.46	9.000	15.237		
to		120.0		0.0	18.460	0.0		
18	70.27	0.0397		0.0	27.460	1.091		Vel = 6.17
18	0.0	2.157		0.0	10.000	16.328		
to		120.0		0.0	0.0	3.140		
19	70.27	0.0398		0.0	10.000	0.398		Vel = 6.17
19	0.0	2.157	E	6.153	10.000	19.866		
to		120.0		0.0	6.153	4.331		
20	70.27	0.0397		0.0	16.153	0.642		Vel = 6.17
20	0.0	2.157	E	6.153	13.000	24.839		
to		120.0		0.0	6.153	0.0		
21	70.27	0.0397		0.0	19.153	0.761		Vel = 6.17

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
23 Emerson 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	**
21	0.0	2.157		0.0	10.000	25.600		
to		120.0		0.0	0.0	4.331		
22	70.27	0.0398		0.0	10.000	0.398		Vel = 6.17
22	0.0	2.157	E	6.153	16.000	30.329		
to		120.0	T	12.307	18.460	4.872		
23	70.27	0.0398		0.0	34.460	1.370		Vel = 6.17
23	0.0	2.157	E	6.153	8.000	36.571		
to		120.0	T	12.307	18.460	0.0		
24	70.27	0.0398		0.0	26.460	1.052		Vel = 6.17
24	0.0	2.157	E	6.153	1.500	37.623		
to		120.0		0.0	6.153	0.0		
TOR	70.27	0.0397		0.0	7.653	0.304		Vel = 6.17
TOR	0.0	2.157	Fsp	0.0	6.000	37.927		
to		120.0		0.0	0.0	5.599		* * Fixed Loss = 3
BKFL	70.27	0.0397		0.0	6.000	0.238		Vel = 6.17
BKFL	0.0	2.067		0.0	0.500	43.764		
to		120.0		0.0	0.0	11.433		* * Fixed Loss = 11
BASE	70.27	0.0500		0.0	0.500	0.025		Vel = 6.72
BASE	0.0	1.653	E	2.544	10.000	55.222		
to		150.0		0.0	2.544	0.0		
1000	70.27	0.0961		0.0	12.544	1.206		Vel = 10.51
1000	0.0	1.959	T	11.635	42.000	56.428		
to		150.0	G	1.164	12.799	0.0		
2000	70.27	0.0420		0.0	54.799	2.303		Vel = 7.48
2000	0.0	6.16		0.0	150.000	58.731		
to		140.0		0.0	0.0	0.0		
TEST	70.27	0.0002		0.0	150.000	0.027		Vel = 0.76
	0.0							
	70.27					58.758		K Factor = 9.17

Water Supply Curve C

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 1

City Water Supply:
C1 - Static Pressure : 68
C2 - Residual Pressure: 65
C2 - Residual Flow : 150

Demand:
D1 - Ele
D2 - Sy
D2 - Sy
Hose (
D3 - Sy
Safety Margin : 8.504

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SPRINKLER SYSTEMS INC.
23 Emerson Street Area 2

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 01/28/16

Hydraulic Design Information Sheet

Name - 23 EMERSON STREET AREA 2 Date - 12-
Location - 23 EMERSON STREET PORTLAND, MAINE
Building - EXISTING RENOVATED System No. - 1 WET
Contractor - SPRINKLER SYSTEMS INC. Contract No. - 15-
Calculated By - CDS Drawing No. - 1-1
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height - VARIES
Occupancy - APARTMENTS

SYSTEM

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

DESIGN

Area of Sprinkler Operation	- 3 HEADS	System Type	Sprinkler/Nozzle
Density	- .05	(X) Wet	Make RELIABLE
Area Per Sprinkler	- 324	( ) Dry	Model F1RES49
Elevation at Highest Outlet	- 129.750	( ) Deluge	Size 7/16" X 1/2"
Hose Allowance - Inside	- 0	( ) Preaction	K-Factor 4.9
Rack Sprinkler Allowance	- 0	( ) Other	Temp.Rat.155 DEG.
Hose Allowance - Outside	- 0		

Note

Calculation Summary: Flow Required - 50.15 Press Required - 50.643 AT BASE
C-Factor Used: 120 Overhead 150 Underground

WATER SUPPLY

Water Flow Test:		Pump Data:		Tank or Reservoir:
Date of Test	- 11-25-15			Cap. -
Time of Test	- AM	Rated Cap.-		Elev.-
Static Press	- 68	@ Press	-	
Residual Press	- 65	Elev.	-	Well
Flow	- 150			Proof Flow
Elevation	- 91.5'			

Location - ON SITE

Source of Information - OWNER AND WATER DISTRICT

COMMODITY STORAGE

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

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

Flue Spacing Clearance:Storage to Ceiling
Longitudinal Transverse

Horizontal Barriers Provided:

Pressure / Flow Summary - STANDARD

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 2

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Date: 01/28/16

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density
TYP	0.0	4.9	12.0	na	16.97	0.05
39	129.75	4.4	13.3	na	16.05	0.05
40	129.75		14.34	na		
41	119.75		19.54	na		
42	109.75		24.73	na		
35	129.75	K = K @ DROP	12.74	na	17.08	
36	129.75		13.42	na		
37	119.75		18.72	na		
38	109.75		24.03	na		
31	129.75	K = K @ DROP	12.65	na	17.02	
32	129.75		13.33	na		
33	119.75		18.63	na		
34	109.75		23.92	na		
53	98.5		30.92	na		
54	98.5		31.04	na		
55	98.5		31.55	na		
56	98.5		33.14	na		
24	98.5		33.31	na		
TOR	98.5		33.47	na		
BKFL	92.5		39.2	na		
BASE	91.5		50.64	na		
1000	91.5		51.29	na		
2000	91.5		52.52	na		
TEST	91.5		52.54	na		

The maximum velocity is 7.5 and it occurs in the pipe between nodes BASE and 1000

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 2

Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 01/28/16

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	**
TYP	16.97	1.049	T	5.0	1.000	12.000		K Factor = 4.90
to		120.0		0.0	5.000	0.0		
DROP	16.97	0.0960		0.0	6.000	0.576		Vel = 6.30
	0.0							
	16.97					12.576		K Factor = 4.79
39	16.05	1.049	E	2.0	5.000	13.300		K Factor = 4.40
to		120.0	T	5.0	7.000	0.0		
40	16.05	0.0866		0.0	12.000	1.039		Vel = 5.96
40	0.0	1.049		0.0	10.000	14.339		
to		120.0		0.0	0.0	4.331		
41	16.05	0.0866		0.0	10.000	0.866		Vel = 5.96
41	0.0	1.049		0.0	10.000	19.536		
to		120.0		0.0	0.0	4.331		
42	16.05	0.0866		0.0	10.000	0.866		Vel = 5.96
42	0.0	1.049	E	2.0	15.500	24.733		
to		120.0	T	5.0	7.000	4.872		
55	16.05	0.0866		0.0	22.500	1.948		Vel = 5.96
	0.0							
	16.05					31.553		K Factor = 2.86
35	17.08	1.049	T	5.0	2.000	12.738		K Factor @ node DROP
to		120.0		0.0	5.000	0.0		
36	17.08	0.0973		0.0	7.000	0.681		Vel = 6.34
36	0.0	1.049		0.0	10.000	13.419		
to		120.0		0.0	0.0	4.331		
37	17.08	0.0972		0.0	10.000	0.972		Vel = 6.34
37	0.0	1.049		0.0	10.000	18.722		
to		120.0		0.0	0.0	4.331		
38	17.08	0.0972		0.0	10.000	0.972		Vel = 6.34
38	0.0	1.049	E	2.0	15.000	24.025		
to		120.0	T	5.0	7.000	4.872		
54	17.08	0.0972		0.0	22.000	2.139		Vel = 6.34
	0.0							
	17.08					31.036		K Factor = 3.07
31	17.02	1.049	T	5.0	2.000	12.652		K Factor @ node DROP
to		120.0		0.0	5.000	0.0		
32	17.02	0.0966		0.0	7.000	0.676		Vel = 6.32
32	0.0	1.049		0.0	10.000	13.328		
to		120.0		0.0	0.0	4.331		
33	17.02	0.0966		0.0	10.000	0.966		Vel = 6.32
33	0.0	1.049		0.0	10.000	18.625		
to		120.0		0.0	0.0	4.331		
34	17.02	0.0966		0.0	10.000	0.966		Vel = 6.32
34	0.0	1.049	E	2.0	15.000	23.922		
to		120.0	T	5.0	7.000	4.872		
53	17.02	0.0966		0.0	22.000	2.126		Vel = 6.32

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
23 Emerson 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	**
53	0.0	1.682		0.0	12.000	30.920		
to		120.0		0.0	0.0	0.0		
54	17.02	0.0097		0.0	12.000	0.116		Vel = 2.46
54	17.09	1.682		0.0	14.750	31.036		
to		120.0		0.0	0.0	0.0		
55	34.11	0.0351		0.0	14.750	0.517		Vel = 4.93
55	16.04	1.682	T	9.9	12.250	31.553		
to		120.0		0.0	9.900	0.0		
56	50.15	0.0715		0.0	22.150	1.584		Vel = 7.24
56	0.0	2.157		0.0	8.000	33.137		
to		120.0		0.0	0.0	0.0		
24	50.15	0.0214		0.0	8.000	0.171		Vel = 4.40
24	0.0	2.157	E	6.153	1.500	33.308		
to		120.0		0.0	6.153	0.0		
TOR	50.15	0.0213		0.0	7.653	0.163		Vel = 4.40
TOR	0.0	2.157	Fsp	0.0	6.000	33.471		
to		120.0		0.0	0.0	5.599		* * Fixed Loss = 3
BKFL	50.15	0.0212		0.0	6.000	0.127		Vel = 4.40
BKFL	0.0	2.067		0.0	0.500	39.197		
to		120.0		0.0	0.0	11.433		* * Fixed Loss = 11
BASE	50.15	0.0260		0.0	0.500	0.013		Vel = 4.79
BASE	0.0	1.653	E	2.544	10.000	50.643		
to		150.0		0.0	2.544	0.0		
1000	50.15	0.0516		0.0	12.544	0.647		Vel = 7.50
1000	0.0	1.959	T	11.635	42.000	51.290		
to		150.0	G	1.164	12.799	0.0		
2000	50.15	0.0225		0.0	54.799	1.234		Vel = 5.34
2000	0.0	6.16		0.0	150.000	52.524		
to		140.0		0.0	0.0	0.0		
TEST	50.15	0.0001		0.0	150.000	0.015		Vel = 0.54
	0.0							
	50.15					52.539		K Factor = 6.92

Water Supply Curve C

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 2

City Water Supply:
C1 - Static Pressure : 68
C2 - Residual Pressure: 65
C2 - Residual Flow : 150

Demand:
D1 - Ele
D2 - Sy
D2 - Sy
Hose (
D3 - Sy
Safety Margin : 15.066

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 01/28/16

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 3

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 01/28/16

Hydraulic Design Information Sheet

Name - 23 EMERSON STREET AREA 3 Date - 12-
Location - 23 EMERSON STREET PORTLAND, MAINE
Building - EXISTING RENOVATED System No. - 1 WET
Contractor - SPRINKLER SYSTEMS INC. Contract No. - 15-
Calculated By - CDS Drawing No. - 1-1
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height - VARIES
Occupancy - APARTMENTS

SYSTEM

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

DESIGN

Area of Sprinkler Operation	- 3 HEADS	System Type	Sprinkler/Nozzle
Density	- .10	(X) Wet	Make RELIABLE
Area Per Sprinkler	- 168	( ) Dry	Model F1FR56
Elevation at Highest Outlet	- 118.750	( ) Deluge	Size 1/2" X 1/2"
Hose Allowance - Inside	- 0	( ) Preaction	K-Factor 5.6
Rack Sprinkler Allowance	- 0	( ) Other	Temp.Rat.200 DEG.
Hose Allowance - Outside	- 0		

Note

Calculation Summary: Flow Required - 51.06 Press Required - 47.018 AT BASE
C-Factor Used: 120 Overhead 150 Underground

WATER SUPPLY

Water Flow Test:		Pump Data:		Tank or Reservoir:
Date of Test	- 11-25-15			Cap. -
Time of Test	- AM	Rated Cap.-		Elev.-
Static Press	- 68	@ Press	-	
Residual Press	- 65	Elev.	-	Well
Flow	- 150			Proof Flow
Elevation	- 91.5			

Location - ON SITE

Source of Information - OWNER AND WATER DISTRICT

COMMODITY STORAGE

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

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

Flue Spacing Clearance:Storage to Ceiling
Longitudinal Transverse

Horizontal Barriers Provided:

Pressure / Flow Summary - STANDARD

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 3

Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 01/28/16

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density
A1	118.75	5.6	9.0	na	16.8	0.1
A2	118.75	5.6	9.15	na	16.94	0.1
A3	118.75	5.6	9.58	na	17.33	0.1
A4	118.75		10.95	na		
A5	108.75		16.02	na		
AFTI	98.5		25.47	na		
57	98.5		25.58	na		
58	98.5		26.28	na		
59	98.5		26.32	na		
23	98.5		29.09	na		
24	98.5		29.67	na		
TOR	98.5		29.84	na		
BKFL	92.5		35.57	na		
BASE	91.5		47.02	na		
1000	91.5		47.69	na		
2000	91.5		48.96	na		
TEST	91.5		48.98	na		

The maximum velocity is 7.63 and it occurs in the pipe between nodes BASE and 1000

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 3

Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 01/28/16

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	**
A1	16.80	1.682	E	4.95	10.500	9.000		K Factor = 5.60
to		120.0		0.0	4.950	0.0		
A2	16.8	0.0094		0.0	15.450	0.146		Vel = 2.43
A2	16.94	1.682		0.0	12.500	9.146		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
A3	33.74	0.0343		0.0	12.500	0.429		Vel = 4.87
A3	17.32	1.682	E	4.95	3.750	9.575		K Factor = 5.60
to		120.0	T	9.9	14.850	0.0		
A4	51.06	0.0740		0.0	18.600	1.376		Vel = 7.37
A4	0.0	1.682		0.0	10.000	10.951		
to		120.0		0.0	0.0	4.331		
A5	51.06	0.0739		0.0	10.000	0.739		Vel = 7.37
A5	0.0	1.682	Ball	3.094	25.000	16.021		
to		120.0	4E	19.799	42.692	4.439		
AFTI	51.06	0.0740	2T	19.799	67.692	5.006		Vel = 7.37
AFTI	0.0	1.682		0.0	1.500	25.466		
to		120.0		0.0	0.0	0.0		
57	51.06	0.0740		0.0	1.500	0.111		Vel = 7.37
57	0.0	1.682		0.0	9.500	25.577		
to		120.0		0.0	0.0	0.0		
58	51.06	0.0739		0.0	9.500	0.702		Vel = 7.37
58	0.0	1.682		0.0	0.500	26.279		
to		120.0		0.0	0.0	0.0		
59	51.06	0.0740		0.0	0.500	0.037		Vel = 7.37
59	0.0	1.682		0.0	37.500	26.316		
to		120.0		0.0	0.0	0.0		
23	51.06	0.0739		0.0	37.500	2.773		Vel = 7.37
23	0.0	2.157	E	6.153	8.000	29.089		
to		120.0	T	12.307	18.460	0.0		
24	51.06	0.0220		0.0	26.460	0.583		Vel = 4.48
24	0.0	2.157	E	6.153	1.500	29.672		
to		120.0		0.0	6.153	0.0		
TOR	51.06	0.0220		0.0	7.653	0.168		Vel = 4.48
TOR	0.0	2.157	Fsp	0.0	6.000	29.840		
to		120.0		0.0	0.0	5.599		* * Fixed Loss = 3
BKFL	51.06	0.0220		0.0	6.000	0.132		Vel = 4.48
BKFL	0.0	2.067		0.0	0.500	35.571		
to		120.0		0.0	0.0	11.433		* * Fixed Loss = 11
BASE	51.06	0.0280		0.0	0.500	0.014		Vel = 4.88
BASE	0.0	1.653	E	2.544	10.000	47.018		
to		150.0		0.0	2.544	0.0		
1000	51.06	0.0533		0.0	12.544	0.668		Vel = 7.63
1000	0.0	1.959	T	11.635	42.000	47.686		
to		150.0	G	1.164	12.799	0.0		
2000	51.06	0.0233		0.0	54.799	1.276		Vel = 5.44

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 3

Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 01/28/16

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	**
2000	0.0	6.16		0.0	150.000	48.962		
to		140.0		0.0	0.0	0.0		
TEST	51.06	0.0001		0.0	150.000	0.015		Vel = 0.55
	0.0							
	51.06					48.977		K Factor = 7.30

Water Supply Curve C

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 3

Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 01/28/16

City Water Supply:
C1 - Static Pressure : 68
C2 - Residual Pressure: 65
C2 - Residual Flow : 150

Demand:
D1 - Ele
D2 - Sy
D2 - Sy
Hose (
D3 - Sy
Safety Margin : 18.614

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 4

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 01/28/16

Hydraulic Design Information Sheet

Name - 23 EMERSON STREET AREA 4 Date - 12-
Location - 23 EMERSON STREET PORTLAND, MAINE
Building - EXISTING RENOVATED System No. - 1 WET
Contractor - SPRINKLER SYSTEMS INC. Contract No. - 15-
Calculated By - CDS Drawing No. - 1-1
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height - VARIES
Occupancy - APARTMENTS

SYSTEM

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

DESIGN

Area of Sprinkler Operation	- 4 HEADS	System Type	Sprinkler/Nozzle
Density	- .15	(X) Wet	Make RELIABLE
Area Per Sprinkler	- 130	( ) Dry	Model F1FR56
Elevation at Highest Outlet	- 98.500	( ) Deluge	Size 1/2" X 1/2"
Hose Allowance - Inside	- 0	( ) Preaction	K-Factor 5.6
Rack Sprinkler Allowance	- 0	( ) Other	Temp.Rat.200 DEG.
Hose Allowance - Outside	- 0		

Note

Calculation Summary: Flow Required - 78.76 Press Required - 32.435 AT BASE
C-Factor Used: 120 Overhead 150 Underground

WATER SUPPLY

Water Flow Test:		Pump Data:		Tank or Reservoir:
Date of Test	- 11-25-15			Cap. -
Time of Test	- AM	Rated Cap.-		Elev.-
Static Press	- 68	@ Press	-	
Residual Press	- 65	Elev.	-	Well
Flow	- 150			Proof Flow
Elevation	- 91.5			

Location - ON SITE

Source of Information - OWNER AND WATER DISTRICT

COMMODITY STORAGE

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

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

Flue Spacing Clearance:Storage to Ceiling
Longitudinal Transverse

Horizontal Barriers Provided:

Pressure / Flow Summary - STANDARD

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 4

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Date: 01/28/16

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density		
51	98.5	5.6	12.13	na	19.5	0.15		
52	98.5	5.6	12.25	na	19.6	0.15		
53	98.5		12.39	na				
54	98.5		12.93	na				
55	98.5		13.6	na				
56	98.5		14.6	na				
57	98.5	5.6	12.47	na	19.78	0.15	130	7.0
58	98.5		12.59	na				
59	98.5	5.6	12.6	na	19.88	0.15	130	7.0
23	98.5		14.34	na				
24	98.5		14.7	na				
TOR	98.5		15.08	na				
BKFL	92.5		20.97	na				
BASE	91.5		32.43	na				
1000	91.5		33.92	na				
2000	91.5		36.77	na				
TEST	91.5		36.8	na				

The maximum velocity is 11.77 and it occurs in the pipe between nodes BASE and 1000

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 4

Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 01/28/16

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	**
51	19.50	1.682		0.0	10.250	12.125		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
52	19.5	0.0125		0.0	10.250	0.128		Vel = 2.82
52	19.60	1.682		0.0	3.000	12.253		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
53	39.1	0.0450		0.0	3.000	0.135		Vel = 5.65
53	0.0	1.682		0.0	12.000	12.388		
to		120.0		0.0	0.0	0.0		
54	39.1	0.0452		0.0	12.000	0.542		Vel = 5.65
54	0.0	1.682		0.0	14.750	12.930		
to		120.0		0.0	0.0	0.0		
55	39.1	0.0452		0.0	14.750	0.666		Vel = 5.65
55	0.0	1.682	T	9.9	12.250	13.596		
to		120.0		0.0	9.900	0.0		
56	39.1	0.0451		0.0	22.150	0.999		Vel = 5.65
56	0.0	2.157		0.0	8.000	14.595		
to		120.0		0.0	0.0	0.0		
24	39.1	0.0135		0.0	8.000	0.108		Vel = 3.43
	0.0							
	39.10					14.703		K Factor = 10.20
57	19.78	1.682		0.0	9.500	12.473		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
58	19.78	0.0127		0.0	9.500	0.121		Vel = 2.86
58	0.0	1.682		0.0	0.500	12.594		
to		120.0		0.0	0.0	0.0		
59	19.78	0.0140		0.0	0.500	0.007		Vel = 2.86
59	19.88	1.682		0.0	37.500	12.601		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
23	39.66	0.0463		0.0	37.500	1.737		Vel = 5.73
23	0.0	2.157	E	6.153	8.000	14.338		
to		120.0	T	12.307	18.460	0.0		
24	39.66	0.0138		0.0	26.460	0.365		Vel = 3.48
24	39.10	2.157	E	6.153	1.500	14.703		
to		120.0		0.0	6.153	0.0		
TOR	78.76	0.0490		0.0	7.653	0.375		Vel = 6.92
TOR	0.0	2.157	Fsp	0.0	6.000	15.078		
to		120.0		0.0	0.0	5.599		* * Fixed Loss = 3
BKFL	78.76	0.0492		0.0	6.000	0.295		Vel = 6.92
BKFL	0.0	2.067		0.0	0.500	20.972		
to		120.0		0.0	0.0	11.433		* * Fixed Loss = 11
BASE	78.76	0.0600		0.0	0.500	0.030		Vel = 7.53
BASE	0.0	1.653	E	2.544	10.000	32.435		
to		150.0		0.0	2.544	0.0		
1000	78.76	0.1187		0.0	12.544	1.489		Vel = 11.77
1000	0.0	1.959	T	11.635	42.000	33.924		
to		150.0	G	1.164	12.799	0.0		
2000	78.76	0.0519		0.0	54.799	2.845		Vel = 8.38

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 4

Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 01/28/16

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	**
2000	0.0	6.16		0.0	150.000	36.769		
to		140.0		0.0	0.0	0.0		
TEST	78.76	0.0002		0.0	150.000	0.033		Vel = 0.85
	0.0							
	78.76					36.802		K Factor = 12.98

Water Supply Curve C

SPRINKLER SYSTEMS INC.
23 Emerson Street Area 4

Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 01/28/16

City Water Supply:
C1 - Static Pressure : 68
C2 - Residual Pressure: 65
C2 - Residual Flow : 150

Demand:
D1 - Ele
D2 - Sy
D2 - Sy
Hose (
D3 - Sy
Safety Margin : 30.287