Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 05/27/17

. . . Fire Protection by Computer Design

Sprinkler Systems Inc.
2-4 Avon Street
P. O. Box 1285
Lewiston, Maine 04243
207-782-0104

Job Name	:	136 Commercial Street Area 3
Building	:	Existing
Location	:	136 Commercial Street Portland, Maine
System	:	1 WET
Contract	:	15-142
Data File	:	136 Commercial Street Area 3 SEG.WXF

CITY OF PORTLAND, MAINE
Reviewed for Code Compliance
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Hydraulic Design Information Sheet

Name - 136 Commercial Street Area 3 Date - 12-23-2016
Location - 136 Commercial Street Portland, Maine
Building - Existing System No. - 1 WET
Contractor - Sprinkler Systems Inc Contract No. - 15-142
Calculated By - Scott E. Garland Drawing No. - 1-3 of TBD
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height - VARIES
Occupancy - 5th Floor Unit - Light Hazard

SYSTEM

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

DESIGN

Area of Sprinkler Operation	- 900	System Type	Sprinkler/Nozzle
Density	- .10	(X) Wet	Make RELIABLE
Area Per Sprinkler	- 148.162	( ) Dry	Model F1FR56
Elevation at Highest Outlet	- 159.875	( ) Deluge	Size 1/2" X 1/2"
Hose Allowance - Inside	- 0	( ) Preaction	K-Factor 5.6
Rack Sprinkler Allowance	- 0	( ) Other	Temp.Rat.155 DEG.
Hose Allowance - Outside	- 100		

Note Design Area #3 - 5th Floor Unit

Calculation Summary: Flow Required - 300.82 Press Required - 88.826 AT BASE
C-Factor Used: 120 Overhead 140 Underground

WATER SUPPLY

Water Flow Test:
Date of Test - 10/06/15
Time of Test - AM
Static Press - 110
Residual Press - 102
Flow - 1162
Elevation - 100.0'

Pump Data:
Rated Cap.-
@ Press -
Elev. -

Tank or Reservoir:
Cap. -
Elev.-

Well
Proof Flow

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.
136 Commercial Street Area 3

Page
Date

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Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16			
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
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
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.
136 Commercial Street Area 3

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	
TYP	0.0	11.2	7.2	na	30.05	0.1	300	7.2
TYP1	0.0	5.6	7.0	na	14.82	0.1	148.162	7.0
TYP2	0.0	5.6	7.0	na	14.82	0.1	148.162	7.0
TYP3	0.0	5.6	7.0	na	14.82	0.1	148.162	7.0
TYP4	0.0	5.6	7.0	na	14.82	0.1	148.162	7.0
TYP5	0.0	5.6	7.0	na	14.82	0.1	148.162	7.0
TYP6	0.0	5.6	7.0	na	14.82	0.1	148.162	7.0
101	158.958	K = K @ DROP	10.9	na	35.45			
102	158.958	K = K @ DROP	10.96	na	35.54			
ZA	158.958		14.34	na				
ZB	158.875		20.95	na				
103	159.875	K = K @ DRP1	11.57	na	18.49			
104	159.875	K = K @ DRP2	11.7	na	18.0			
105	159.875	K = K @ DRP1	16.75	na	22.25			
ZCT	159.875		20.49	na				
ZC	158.875		26.65	na				
106	159.875	K = K @ DRP3	18.29	na	22.87			
107	159.875	K = K @ DRP4	19.84	na	23.61			
ZD	158.875		27.06	na				
108	158.875	K = K @ DRP5	27.47	na	27.58			
109	159.875	K = K @ DRP1	7.43	na	14.82			
110	159.875	K = K @ DRP1	8.02	na	15.39			
111	159.875	K = K @ DRP1	9.83	na	17.04			
112	159.875	K = K @ DRP1	7.87	na	15.25			
ZG	159.875		9.62	na				
113	159.875	K = K @ DRP1	9.77	na	16.99			
114	159.875	K = K @ DRP6	10.72	na	17.55			
ZET	159.875		14.94	na				
ZE	158.875		29.88	na				
ZF	159.875		47.51	na				
A	118.25		67.52	na				
B	118.25		68.44	na				
C	118.25		69.38	na				
D	104.0		76.15	na				
TOR	106.0		79.96	na				
BKFL	104.0		83.87	na				
BASE	100.0		88.83	na				
HOSE	100.0		89.14	na	100.0			
1000	100.0		89.28	na				
2000	100.0		89.34	na				
TEST	100.0		89.85	na				

The maximum velocity is 36.03 and it occurs in the pipe between nodes ZET and ZE

Final Calculations - Hazen-Williams

Sprinkler Systems Inc.
136 Commercial Street Area 3

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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	******* Not
TYP	30.05	1.101	E	3.825	0.583	7.200		K Factor = 11.20
to		150.0		0.0	3.825	0.0		
DROP	30.05	0.1445		0.0	4.408	0.637		Vel = 10.13
	0.0							
	30.05					7.837		K Factor = 10.73
TYP1	14.82	1.049	T	5.0	0.750	7.000		K Factor = 5.60
to		120.0		0.0	5.000	0.0		
DRP1	14.82	0.0748		0.0	5.750	0.430		Vel = 5.50
	0.0							
	14.82					7.430		K Factor = 5.44
TYP2	14.82	1.049	2E	4.0	3.458	7.000		K Factor = 5.60
to		120.0	T	5.0	9.000	0.0		
DRP2	14.82	0.0747		0.0	12.458	0.931		Vel = 5.50
	0.0							
	14.82					7.931		K Factor = 5.26
TYP3	14.82	1.049	3E	6.0	3.083	7.000		K Factor = 5.60
to		120.0		0.0	6.000	0.0		
DRP3	14.82	0.0748		0.0	9.083	0.679		Vel = 5.50
	0.0							
	14.82					7.679		K Factor = 5.35
TYP4	14.82	1.049	2E	4.0	1.917	7.000		K Factor = 5.60
to		120.0	T	5.0	9.000	0.0		
DRP4	14.82	0.0747		0.0	10.917	0.816		Vel = 5.50
	0.0							
	14.82					7.816		K Factor = 5.30
TYP5	14.82	1.049	2E	4.0	3.417	7.000		K Factor = 5.60
to		120.0	T	5.0	9.000	0.0		
DRP5	14.82	0.0747		0.0	12.417	0.928		Vel = 5.50
	0.0							
	14.82					7.928		K Factor = 5.26
TYP6	14.82	1.049	E	2.0	1.542	7.000		K Factor = 5.60
to		120.0	T	5.0	7.000	0.0		
DRP6	14.82	0.0747		0.0	8.542	0.638		Vel = 5.50
	0.0							
	14.82					7.638		K Factor = 5.36
101	35.45	1.101	T	9.563	7.958	10.902		K Factor @ node DROP
to		150.0		0.0	9.562	0.0		
ZA	35.45	0.1961		0.0	17.520	3.436		Vel = 11.95
	0.0							
	35.45					14.338		K Factor = 9.36
102	35.54	1.101	T	9.563	7.583	10.959		K Factor @ node DROP
to		150.0		0.0	9.562	0.0		
ZA	35.54	0.1971		0.0	17.145	3.379		Vel = 11.98
	0.0							
	35.54					14.338		K Factor = 9.39
ZA	70.98	1.101	2E	7.65	1.625	14.338		
to		150.0		0.0	7.650	0.036		
ZB	70.98	0.7088		0.0	9.275	6.574		Vel = 23.92

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Not
ZB	0.0	1.049	E	2.0	2.209	20.948		
to		120.0		0.0	2.000	0.0		
ZC	70.98	1.3557		0.0	4.209	5.706		Vel = 26.35
	0.0							
	70.98					26.654		K Factor = 13.75
103	18.49	1.049		0.0	1.125	11.574		K Factor @ node DRP1
to		120.0		0.0	0.0	0.0		
104	18.49	0.1129		0.0	1.125	0.127		Vel = 6.86
104	18.00	1.049	T	5.0	17.209	11.701		K Factor @ node DRP2
to		120.0		0.0	5.000	0.0		
ZCT	36.49	0.3958		0.0	22.209	8.790		Vel = 13.55
	0.0							
	36.49					20.491		K Factor = 8.06
105	22.25	1.049	T	5.0	18.625	16.748		K Factor @ node DRP1
to		120.0		0.0	5.000	0.0		
ZCT	22.25	0.1584		0.0	23.625	3.743		Vel = 8.26
	0.0							
	22.25					20.491		K Factor = 4.92
ZCT	58.73	1.049	T	5.0	1.000	20.491		
to		120.0		0.0	5.000	0.433		
ZC	58.73	0.9550		0.0	6.000	5.730		Vel = 21.80
ZC	70.99	2.157		0.0	3.292	26.654		
to		120.0		0.0	0.0	0.0		
ZD	129.72	0.1233		0.0	3.292	0.406		Vel = 11.39
	0.0							
	129.72					27.060		K Factor = 24.94
106	22.87	1.049		0.0	9.292	18.292		K Factor @ node DRP3
to		120.0		0.0	0.0	0.0		
107	22.87	0.1668		0.0	9.292	1.550		Vel = 8.49
107	23.61	1.049	E	2.0	3.958	19.842		K Factor @ node DRP4
to		120.0	T	5.0	7.000	0.433		
ZD	46.48	0.6192		0.0	10.958	6.785		Vel = 17.25
	0.0							
	46.48					27.060		K Factor = 8.94
ZD	176.19	2.157		0.0	1.875	27.060		
to		120.0		0.0	0.0	0.0		
108	176.19	0.2176		0.0	1.875	0.408		Vel = 15.47
108	27.58	2.157		0.0	8.458	27.468		K Factor @ node DRP5
to		120.0		0.0	0.0	0.0		
ZE	203.77	0.2849		0.0	8.458	2.410		Vel = 17.89
	0.0							
	203.77					29.878		K Factor = 37.28
109	14.82	1.049		0.0	7.875	7.430		K Factor @ node DRP1
to		120.0		0.0	0.0	0.0		
110	14.82	0.0747		0.0	7.875	0.588		Vel = 5.50
110	15.39	1.049		0.0	6.500	8.018		K Factor @ node DRP1
to		120.0		0.0	0.0	0.0		
111	30.21	0.2791		0.0	6.500	1.814		Vel = 11.21

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Not
111	17.04	1.049	T	5.0	3.000	9.832		K Factor @ node DRP1
to		120.0		0.0	5.000	0.0		
ZET	47.25	0.6385		0.0	8.000	5.108		Vel = 17.54
	0.0							
	47.25					14.940		K Factor = 12.22
112	15.25	1.049	3E	6.0	11.209	7.870		K Factor @ node DRP1
to		120.0	T	5.0	11.000	0.0		
ZG	15.25	0.0788		0.0	22.209	1.750		Vel = 5.66
ZG	0.0	1.049		0.0	1.958	9.620		
to		120.0		0.0	0.0	0.0		
113	15.25	0.0787		0.0	1.958	0.154		Vel = 5.66
113	16.99	1.049		0.0	3.000	9.774		K Factor @ node DRP1
to		120.0		0.0	0.0	0.0		
114	32.24	0.3150		0.0	3.000	0.945		Vel = 11.97
114	17.55	1.049	T	5.0	1.000	10.719		K Factor @ node DRP6
to		120.0		0.0	5.000	0.0		
ZET	49.79	0.7035		0.0	6.000	4.221		Vel = 18.48
	0.0							
	49.79					14.940		K Factor = 12.88
ZET	97.05	1.049	T	5.0	1.000	14.940		
to		120.0		0.0	5.000	0.433		
ZE	97.05	2.4175		0.0	6.000	14.505		Vel = 36.03
	0.0							
	97.05					29.878		K Factor = 17.75
ZE	300.82	2.157	3E	18.46	9.917	29.878		
to		120.0	F	2.461	20.921	-0.433		
ZF	300.82	0.5857		0.0	30.838	18.062		Vel = 26.41
ZF	0.0	4.26	3E	39.501	43.417	47.507		
to		120.0	2F	10.534	50.035	18.028		
A	300.82	0.0213		0.0	93.452	1.990		Vel = 6.77
A	0.0	4.26	E	13.167	3.500	67.525		
to		120.0	T	26.334	39.501	0.0		
B	300.82	0.0213		0.0	43.001	0.916		Vel = 6.77
B	0.0	4.26	2E	26.334	18.000	68.441		
to		120.0		0.0	26.334	0.0		
C	300.82	0.0213		0.0	44.334	0.944		Vel = 6.77
C	0.0	4.26	E	13.167	14.500	69.385		
to		120.0		0.0	13.167	6.172		
D	300.82	0.0213		0.0	27.667	0.589		Vel = 6.77
D	0.0	4.26	10E	131.671	62.000	76.146		
to		120.0	T	26.334	158.005	-0.866		
TOR	300.82	0.0213		0.0	220.005	4.685		Vel = 6.77
TOR	0.0	4.26	Fsp	0.0	2.000	79.965		
to		120.0		0.0	0.0	3.866		* * Fixed Loss = 3
BKFL	300.82	0.0210		0.0	2.000	0.042		Vel = 6.77
BKFL	0.0	4.026	Zac	0.0	0.500	83.873		
to		120.0		0.0	0.0	4.938		* * Fixed Loss = 3.206
BASE	300.82	0.0300		0.0	0.500	0.015		Vel = 7.58

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Not
BASE	0.0	6.16	E	20.084	50.000	88.826		
to		140.0	T	43.037	67.425	0.0		
HOSE	300.82	0.0027	G	4.304	117.425	0.312		Vel = 3.24
HOSE	100.00	8.27	T	55.354	75.000	89.138		Qa = 100
to		140.0		0.0	55.354	0.0		
1000	400.82	0.0011		0.0	130.354	0.140		Vel = 2.39
1000	0.0	12.34	F	20.316	270.000	89.278		
to		140.0	T	93.767	114.083	0.0		
2000	400.82	0.0002		0.0	384.083	0.059		Vel = 1.08
2000	0.0	8.27		0.0	480.000	89.337		
to		140.0		0.0	0.0	0.0		
TEST	400.82	0.0011		0.0	480.000	0.517		Vel = 2.39
	0.0							
	400.82					89.854		K Factor = 42.28

Water Supply Curve C

Sprinkler Systems Inc.
136 Commercial Street Area 3

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City Water Supply:
- C1 - Static Pressure : 110
- C2 - Residual Pressure: 102
- C2 - Residual Flow : 1162

Demand:
- D1 - Elevation : 25.932
- D2 - System Flow : 300.82
- D2 - System Pressure : 89.854
- Hose (Demand) : 100
- D3 - System Demand : 400.82
- Safety Margin : 19.030

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Sprinkler Systems Inc.
2-4 Avon Street
P. O. Box 1285
Lewiston, Maine 04243
207-782-0104

Job Name	:	136 Commercial Street Area 3
Building	:	Existing
Location	:	136 Commercial Street Portland, Maine
System	:	1 WET
Contract	:	15-142
Data File	:	136 Commercial Street Area 4 SEG.WXF

CITY OF PORTLAND, MAINE
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Hydraulic Design Information Sheet

Name - 136 Commercial Street Area 4 Date - 12-23-2016
Location - 136 Commercial Street Portland, Maine
Building - Existing System No. - 1 WET
Contractor - Sprinkler Systems Inc Contract No. - 15-142
Calculated By - Scott E. Garland Drawing No. - 1-3 of TBD
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height - VARIES
Occupancy - 5th Floor Unit - Light Hazard

SYSTEM

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

DESIGN

Area of Sprinkler Operation	- LRG ROOM	System Type	Sprinkler/Nozzle
Density	- .10	(X) Wet	Make RELIABLE
Area Per Sprinkler	- 148.162	( ) Dry	Model F1FR56
Elevation at Highest Outlet	- 165.833	( ) Deluge	Size 1/2" X 1/2"
Hose Allowance - Inside	- 0	( ) Preaction	K-Factor 5.6
Rack Sprinkler Allowance	- 0	( ) Other	Temp.Rat.155 DEG.
Hose Allowance - Outside	- 100		

Note Design Area #4 - 5th Floor Master Bedroom

Calculation Summary: Flow Required - 200.826 Press Required - 86.220 AT BASE OF RISER
C-Factor Used: 150 Overhead 140 Underground

WATER SUPPLY

Water Flow Test:		Pump Data:		Tank or Reservoir:
Date of Test	- 10/06/15			Cap. -
Time of Test	- AM	Rated Cap.-		Elev.-
Static Press	- 110	@ Press	-	
Residual Press	- 102	Elev.	-	Well
Flow	- 1162			Proof Flow
Elevation	- 100.0'			

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.
136 Commercial Street Area 3

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Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16			
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
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
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.
136 Commercial Street Area 3

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	
TYP	0.0	5.6	7.0	na	14.82	0.1	148.167	7.0
TYP1	0.0	5.6	7.0	na	14.82	0.1	148.162	7.0
TYP2	0.0	5.6	7.0	na	14.82	0.1	148.162	7.0
TYP3	0.0	5.6	7.0	na	14.82	0.1	148.162	7.0
121	161.042	K = K @ DROP	8.99	na	16.33			
122	161.042	K = K @ DROP	8.28	na	15.67			
ZH	161.042		9.03	na				
123	161.042	K = K @ DRP1	9.93	na	17.09			
124	161.042	K = K @ DROP	10.17	na	17.37			
ZJT	161.042		12.9	na				
ZJ	158.25		16.55	na				
ZK	158.25		16.88	na				
125	165.833	K = K @ DRP3	7.43	na	14.82			
126	165.833	K = K @ DRP3	7.95	na	15.33			
ZLT	165.833		10.36	na				
ZL	158.25		17.14	na				
127	158.25	K = K @ DRP2	17.39	na	21.94			
ZM	158.25		19.21	na				
128	165.833	K = K @ DRP3	11.42	na	18.37			
129	165.833	K = K @ DRP3	12.44	na	19.17			
ZN	160.792		23.03	na				
130	160.292	K = K @ DRP3	16.33	na	21.97			
131	160.292	K = K @ DRP3	17.57	na	22.78			
ZR	160.292		19.32	na				
ZQT	160.292		20.96	na				
ZQ	158.125		26.03	na				
ZP	160.792		25.92	na				
ZS	160.792		32.69	na				
ZT	158.875		50.78	na				
A	118.25		69.3	na				
B	118.25		69.74	na				
C	118.25		70.19	na				
D	104.0		76.64	na				
TOR	106.0		77.99	na				
BKFL	104.0		81.88	na				
BASE	100.0		86.22	na				
HOSE	100.0		86.37	na	100.0			
1000	100.0		86.45	na				
2000	100.0		86.48	na				
TEST	100.0		86.79	na				

The maximum velocity is 18.68 and it occurs in the pipe between nodes ZM and ZN

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	******* Not
TYP	14.82	1.101	T	9.563	0.750	7.000		K Factor = 5.60
to		150.0		0.0	9.562	0.0		
DROP	14.82	0.0391		0.0	10.312	0.403		Vel = 4.99
	0.0							
	14.82					7.403		K Factor = 5.45
TYP1	14.82	1.101	T	9.563	2.417	7.000		K Factor = 5.60
to		150.0		0.0	9.562	0.0		
DRP1	14.82	0.0391		0.0	11.979	0.468		Vel = 4.99
	0.0							
	14.82					7.468		K Factor = 5.42
TYP2	14.82	1.049	2E	4.0	3.458	7.000		K Factor = 5.60
to		120.0	T	5.0	9.000	0.0		
DRP2	14.82	0.0747		0.0	12.458	0.931		Vel = 5.50
	0.0							
	14.82					7.931		K Factor = 5.26
TYP3	14.82	1.049	T	5.0	0.750	7.000		K Factor = 5.60
to		120.0		0.0	5.000	0.0		
DRP3	14.82	0.0748		0.0	5.750	0.430		Vel = 5.50
	0.0							
	14.82					7.430		K Factor = 5.44
121	16.33	1.101		0.0	0.750	8.993		K Factor @ node DROP
to		150.0		0.0	0.0	0.0		
ZH	16.33	0.0467		0.0	0.750	0.035		Vel = 5.50
	0.0							
	16.33					9.028		K Factor = 5.43
122	15.67	1.101	E	3.825	3.958	8.277		K Factor @ node DROP
to		150.0	T	9.563	13.387	0.0		
ZH	15.67	0.0433		0.0	17.345	0.751		Vel = 5.28
	0.0							
	15.67					9.028		K Factor = 5.22
ZH	32.00	1.101		0.0	5.583	9.028		
to		150.0		0.0	0.0	0.0		
123	32.0	0.1623		0.0	5.583	0.906		Vel = 10.78
123	17.09	1.101		0.0	0.667	9.934		K Factor @ node DRP1
to		150.0		0.0	0.0	0.0		
124	49.09	0.3583		0.0	0.667	0.239		Vel = 16.54
124	17.36	1.394	T	9.523	4.167	10.173		K Factor @ node DROP
to		150.0		0.0	9.523	0.0		
ZJT	66.45	0.1988		0.0	13.690	2.722		Vel = 13.97
ZJT	0.0	1.394	T	9.523	2.792	12.895		
to		150.0		0.0	9.523	1.209		
ZJ	66.45	0.1989		0.0	12.315	2.449		Vel = 13.97
ZJ	0.0	1.682		0.0	4.125	16.553		
to		150.0		0.0	0.0	0.0		
ZK	66.45	0.0798		0.0	4.125	0.329		Vel = 9.59
ZK	0.0	1.682		0.0	3.292	16.882		
to		150.0		0.0	0.0	0.0		
ZL	66.45	0.0796		0.0	3.292	0.262		Vel = 9.59

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Not
	0.0							
	66.45					17.144		K Factor = 16.05
125	14.82	1.049		0.0	7.000	7.430		K Factor @ node DRP3
to		120.0		0.0	0.0	0.0		
126	14.82	0.0746		0.0	7.000	0.522		Vel = 5.50
126	15.32	1.049	T	5.0	3.667	7.952		K Factor @ node DRP3
to		120.0		0.0	5.000	0.0		
ZLT	30.14	0.2781		0.0	8.667	2.410		Vel = 11.19
ZLT	0.0	1.049	T	5.0	7.583	10.362		
to		120.0		0.0	5.000	3.284		
ZL	30.14	0.2780		0.0	12.583	3.498		Vel = 11.19
	0.0							
	30.14					17.144		K Factor = 7.28
ZL	96.60	1.682		0.0	1.542	17.144		
to		150.0		0.0	0.0	0.0		
127	96.6	0.1589		0.0	1.542	0.245		Vel = 13.95
127	21.94	1.682		0.0	7.833	17.389		K Factor @ node DRP2
to		150.0		0.0	0.0	0.0		
ZM	118.54	0.2325		0.0	7.833	1.821		Vel = 17.12
ZM	0.0	1.61	2E	8.0	3.333	19.210		
to		120.0		0.0	8.000	-1.101		
ZN	118.54	0.4346		0.0	11.333	4.925		Vel = 18.68
	0.0							
	118.54					23.034		K Factor = 24.70
128	18.37	1.049		0.0	9.209	11.416		K Factor @ node DRP3
to		120.0		0.0	0.0	0.0		
129	18.37	0.1111		0.0	9.209	1.023		Vel = 6.82
129	19.17	1.049	E	2.0	13.167	12.439		K Factor @ node DRP3
to		120.0	T	5.0	7.000	2.183		
ZN	37.54	0.4171		0.0	20.167	8.412		Vel = 13.94
	0.0							
	37.54					23.034		K Factor = 7.82
ZN	156.08	2.157	T	12.307	4.292	23.034		
to		120.0		0.0	12.307	0.0		
ZP	156.08	0.1739		0.0	16.599	2.887		Vel = 13.70
	0.0							
	156.08					25.921		K Factor = 30.66
130	21.97	1.049		0.0	7.958	16.334		K Factor @ node DRP3
to		120.0		0.0	0.0	0.0		
131	21.97	0.1548		0.0	7.958	1.232		Vel = 8.16
131	22.78	1.049		0.0	3.042	17.566		K Factor @ node DRP3
to		120.0		0.0	0.0	0.0		
ZR	44.75	0.5773		0.0	3.042	1.756		Vel = 16.61
ZR	0.0	1.049	E	2.0	0.833	19.322		
to		120.0		0.0	2.000	0.0		
ZQT	44.75	0.5775		0.0	2.833	1.636		Vel = 16.61
ZQT	0.0	1.049	T	5.0	2.167	20.958		
to		120.0		0.0	5.000	0.939		
ZQ	44.75	0.5772		0.0	7.167	4.137		Vel = 16.61

Final Calculations - Hazen-Williams

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ZQ	0.0	1.610	2E	8.0	6.542	26.034		
to		120.0		0.0	8.000	-1.155		
ZP	44.75	0.0717		0.0	14.542	1.042		Vel = 7.05
	0.0							
	44.75					25.921		K Factor = 8.79
ZP	200.83	2.157	T	12.307	12.083	25.921		
to		120.0		0.0	12.307	0.0		
ZS	200.83	0.2774		0.0	24.390	6.765		Vel = 17.63
ZS	0.0	2.157	3E	18.46	19.167	32.686		
to		120.0	2T	24.613	43.073	0.830		
ZT	200.83	0.2773		0.0	62.240	17.262		Vel = 17.63
ZT	0.0	4.26	3E	39.501	42.417	50.778		
to		120.0	2F	10.534	50.035	17.595		
A	200.83	0.0101		0.0	92.452	0.932		Vel = 4.52
A	0.0	4.26	E	13.167	3.500	69.305		
to		120.0	T	26.334	39.501	0.0		
B	200.83	0.0101		0.0	43.001	0.433		Vel = 4.52
B	0.0	4.26	2E	26.334	18.000	69.738		
to		120.0		0.0	26.334	0.0		
C	200.83	0.0101		0.0	44.334	0.448		Vel = 4.52
C	0.0	4.26	E	13.167	14.500	70.186		
to		120.0		0.0	13.167	6.172		
D	200.83	0.0100		0.0	27.667	0.278		Vel = 4.52
D	0.0	4.26	10E	131.671	62.000	76.636		
to		120.0	T	26.334	158.005	-0.866		
TOR	200.83	0.0101		0.0	220.005	2.219		Vel = 4.52
TOR	0.0	4.26	Fsp	0.0	2.000	77.989		
to		120.0		0.0	0.0	3.866		* * Fixed Loss = 3
BKFL	200.83	0.0100		0.0	2.000	0.020		Vel = 4.52
BKFL	0.0	4.026	Zac	0.0	0.500	81.875		
to		120.0		0.0	0.0	4.338		* * Fixed Loss = 2.606
BASE	200.83	0.0140		0.0	0.500	0.007		Vel = 5.06
BASE	0.0	6.16	E	20.084	50.000	86.220		
to		140.0	T	43.037	67.425	0.0		
HOSE	200.83	0.0013	G	4.304	117.425	0.148		Vel = 2.16
HOSE	100.00	8.27	T	55.354	75.000	86.368		Qa = 100
to		140.0		0.0	55.354	0.0		
1000	300.83	0.0006		0.0	130.354	0.082		Vel = 1.80
1000	0.0	12.34	F	20.316	270.000	86.450		
to		140.0	T	93.767	114.083	0.0		
2000	300.83	0.0001		0.0	384.083	0.035		Vel = 0.81
2000	0.0	8.27		0.0	480.000	86.485		
to		140.0		0.0	0.0	0.0		
TEST	300.83	0.0006		0.0	480.000	0.304		Vel = 1.80
	0.0							
	300.83					86.789		K Factor = 32.29

Water Supply Curve C

Sprinkler Systems Inc.
136 Commercial Street Area 3

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City Water Supply:
- C1 - Static Pressure : 110
- C2 - Residual Pressure: 102
- C2 - Residual Flow : 1162

Demand:
- D1 - Elevation : 28.512
- D2 - System Flow : 200.826
- D2 - System Pressure : 86.789
- Hose (Demand) : 100
- D3 - System Demand : 300.826
- Safety Margin : 22.554