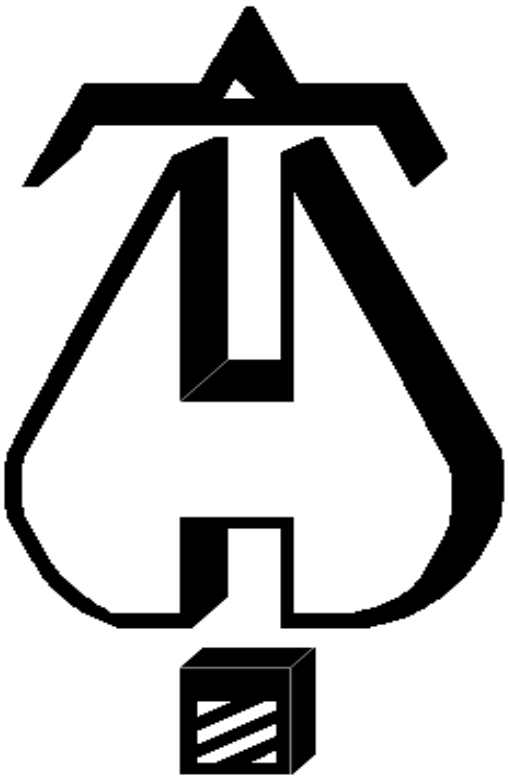

. . . Fire Protection by Computer Design

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

| | | |
|---|---|---|
| Job Name | : | 100 Commercial Street Dry Systems Area 1 |
| Building | : | Existing |
| Location | : | 100 Commercial Street Portland, Maine |
| System | : | 2 Dry |
| Contract | : | 15-095 |
| Data File | : | 100 Commercial Street Dry System Area 1.WXF |

## Hydraulic Design Information Sheet

Name - 100 Commercial Street Date - 11-16-15
Location - 100 Commercial Street Portland, Maine
Building - Existing System No. - 2 Dry
Contractor - Sprinkler Systems Inc. Contract No. - 15-095
Calculated By - CDS Drawing No. - 1-3 of 3
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height - varies
Occupancy - Office Building

SYSTEM DESIGN

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

| | | | |
|---|---|---|---|
| Area of Sprinkler Operation | - 1950 | System Type | Sprinkler/Nozzle |
| Density | - .15 | ( ) Wet | Make Reliable |
| Area Per Sprinkler | - 130 | (X) Dry | Model F1FR56 |
| Elevation at Highest Outlet | - 105.500 | ( ) 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 | - 250 | | |

Note

Calculation Summary: Flow Required - 360.26 Press Required - 65.618 AT BASE
C-Factor Used: 120 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 | - 48 | Elev. | - | | Well |
| Flow | - 1162 | | | | Proof Flow |
| Elevation | - 100.0' | | | | |

Location - ON SITE

Source of Information - OWNER AND WATER DISTRICT

COMMODITY STORAGE RACK

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:

Fitting Legend

| Abbrev. | Name | ½ | ¾ | 1 | 1¼ | 1½ | 2 | 2½ | 3 | 3½ | 4 | 5 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bvcb | B Fly Vic 705W | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 5 | 0 | 12 | 12 | 8 | 11 | 12 | 14 | 0 | 0 | 0 | 0 | 0 |
| E | NFPA 13 90' Standard Elbow | 1 | 2 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 12 | 14 | 18 | 22 | 27 | 35 | 40 | 45 | 50 | 61 |
| 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 |

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.

| Node No. | Elevation | K-Fact | Pt Actual | Pn | Flow Actual | Density | Area | Press Req. |
|---|---|---|---|---|---|---|---|---|
| TYP | 0.0 | 5.6 | 12.13 | na | 19.5 | 0.15 | 130 | 7.0 |
| ARM1 | 105.5 | 5.6 | 22.92 | na | 26.81 | 0.15 | 130 | 7.0 |
| 119 | 105.5 | 5.6 | 22.08 | na | 26.31 | 0.15 | 130 | 7.0 |
| 118 | 105.5 | 5.6 | 21.98 | na | 26.26 | 0.15 | 130 | 7.0 |
| 116 | 105.5 | 5.6 | 21.82 | na | 26.16 | 0.15 | 130 | 7.0 |
| 115 | 105.5 | 5.6 | 21.73 | na | 26.1 | 0.15 | 130 | 7.0 |
| 117 | 105.5 | | 24.71 | na | | | | |
| 120 | 105.5 | | 25.0 | na | | | | |
| 107 | 105.5 | K = K @ SPRG | 15.37 | na | 19.55 | | | |
| 108 | 105.5 | K = K @ SPRG | 15.51 | na | 19.64 | | | |
| 109 | 105.5 | K = K @ SPRG | 16.01 | na | 19.95 | | | |
| 110 | 105.5 | K = K @ SPRG | 17.08 | na | 20.61 | | | |
| 111 | 105.5 | K = K @ SPRG | 18.93 | na | 21.7 | | | |
| 101 | 105.5 | K = K @ SPRG | 15.29 | na | 19.5 | | | |
| 102 | 105.5 | K = K @ SPRG | 15.43 | na | 19.59 | | | |
| 103 | 105.5 | K = K @ SPRG | 15.92 | na | 19.9 | | | |
| 104 | 105.5 | K = K @ SPRG | 16.99 | na | 20.55 | | | |
| 105 | 105.5 | K = K @ SPRG | 18.83 | na | 21.64 | | | |
| 106 | 105.5 | | 23.0 | na | | | | |
| 112 | 105.5 | | 23.12 | na | | | | |
| 114 | 105.5 | | 25.6 | na | | | | |
| 121 | 105.5 | | 26.69 | na | | | | |
| 122 | 105.5 | K = K @ SPRG | 27.2 | na | 26.0 | | | |
| 123 | 105.5 | | 35.22 | na | | | | |
| 124 | 105.5 | | 45.63 | na | | | | |
| 125 | 105.5 | | 49.04 | na | | | | |
| TDR | 105.5 | | 52.63 | na | | | | |
| BDR | 101.5 | | 59.58 | na | | | | |
| BWR | 101.5 | | 59.67 | na | | | | |
| BKFL | 101.5 | | 59.76 | na | | | | |
| BASE | 100.0 | | 65.62 | na | | | | |
| HOSE | 100.0 | | 66.05 | na | 250.0 | | | |
| TEST | 100.0 | | 67.18 | na | | | | |

The maximum velocity is 14.65 and it occurs in the pipe between nodes 111 and 112

| 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 | 19.50 | 1.049 | T | 5.0 | 1.500 | 12.125 | | K Factor = 5.60 |
| to | | 120.0 | Eql | 19.0 | 24.000 | 0.0 | | |
| SPRG | 19.5 | 0.1242 | | 0.0 | 25.500 | 3.167 | | Vel = 7.24 |
| | 0.0 | | | | | | | |
| | 19.50 | | | | | 15.292 | | K Factor = 4.99 |
| ARM1 | 26.81 | 1.049 | E | 2.0 | 5.000 | 22.915 | | K Factor = 5.60 |
| to | | 120.0 | T | 5.0 | 7.000 | 0.0 | | |
| 114 | 26.81 | 0.2238 | | 0.0 | 12.000 | 2.685 | | Vel = 9.95 |
| | 0.0 | | | | | | | |
| | 26.81 | | | | | 25.600 | | K Factor = 5.30 |
| 119 | 26.31 | 1.049 | E | 2.0 | 6.500 | 22.078 | | K Factor = 5.60 |
| to | | 120.0 | T | 5.0 | 7.000 | 0.0 | | |
| 120 | 26.31 | 0.2161 | | 0.0 | 13.500 | 2.918 | | Vel = 9.77 |
| | 0.0 | | | | | | | |
| | 26.31 | | | | | 24.996 | | K Factor = 5.26 |
| 118 | 26.26 | 1.049 | E | 2.0 | 7.000 | 21.982 | | K Factor = 5.60 |
| to | | 120.0 | T | 5.0 | 7.000 | 0.0 | | |
| 120 | 26.26 | 0.2153 | | 0.0 | 14.000 | 3.014 | | Vel = 9.75 |
| | 0.0 | | | | | | | |
| | 26.26 | | | | | 24.996 | | K Factor = 5.25 |
| 116 | 26.16 | 1.049 | E | 2.0 | 6.500 | 21.822 | | K Factor = 5.60 |
| to | | 120.0 | T | 5.0 | 7.000 | 0.0 | | |
| 117 | 26.16 | 0.2138 | | 0.0 | 13.500 | 2.886 | | Vel = 9.71 |
| | 0.0 | | | | | | | |
| | 26.16 | | | | | 24.708 | | K Factor = 5.26 |
| 115 | 26.10 | 1.049 | E | 2.0 | 7.000 | 21.727 | | K Factor = 5.60 |
| to | | 120.0 | T | 5.0 | 7.000 | 0.0 | | |
| 117 | 26.1 | 0.2129 | | 0.0 | 14.000 | 2.981 | | Vel = 9.69 |
| 117 | 26.16 | 2.157 | | 0.0 | 12.500 | 24.708 | | |
| to | | 120.0 | | 0.0 | 0.0 | 0.0 | | |
| 120 | 52.26 | 0.0230 | | 0.0 | 12.500 | 0.288 | | Vel = 4.59 |
| 120 | 52.57 | 2.157 | T | 12.307 | 8.000 | 24.996 | | |
| to | | 120.0 | | 0.0 | 12.307 | 0.0 | | |
| 121 | 104.83 | 0.0833 | | 0.0 | 20.307 | 1.692 | | Vel = 9.20 |
| | 0.0 | | | | | | | |
| | 104.83 | | | | | 26.688 | | K Factor = 20.29 |
| 107 | 19.55 | 1.682 | | 0.0 | 11.000 | 15.372 | | K Factor @ node SPRG |
| to | | 120.0 | | 0.0 | 0.0 | 0.0 | | |
| 108 | 19.55 | 0.0125 | | 0.0 | 11.000 | 0.138 | | Vel = 2.82 |
| 108 | 19.64 | 1.682 | | 0.0 | 11.000 | 15.510 | | K Factor @ node SPRG |
| to | | 120.0 | | 0.0 | 0.0 | 0.0 | | |
| 109 | 39.19 | 0.0453 | | 0.0 | 11.000 | 0.498 | | Vel = 5.66 |
| 109 | 19.95 | 1.682 | | 0.0 | 11.000 | 16.008 | | K Factor @ node SPRG |
| to | | 120.0 | | 0.0 | 0.0 | 0.0 | | |
| 110 | 59.14 | 0.0971 | | 0.0 | 11.000 | 1.068 | | Vel = 8.54 |

| Hyd. Ref. Point | Qa Qt | Dia. "C" Pf/Ft | Fitting or Eqv. | Ln. | Pipe Ftng's Total | Pt Pe Pf | Pt Pv Pn | ******* Notes ****** |
|---|---|---|---|---|---|---|---|---|
| 110 | 20.61 | 1.682 | | 0.0 | 11.000 | 17.076 | | K Factor @ node SPRG |
| to | | 120.0 | | 0.0 | 0.0 | 0.0 | | |
| 111 | 79.75 | 0.1686 | | 0.0 | 11.000 | 1.855 | | Vel = 11.52 |
| 111 | 21.69 | 1.682 | T | 9.9 | 6.000 | 18.931 | | K Factor @ node SPRG |
| to | | 120.0 | | 0.0 | 9.900 | 0.0 | | |
| 112 | 101.44 | 0.2633 | | 0.0 | 15.900 | 4.186 | | Vel = 14.65 |
| | 0.0 | | | | | | | |
| | 101.44 | | | | | 23.117 | | K Factor = 21.10 |
| 101 | 19.50 | 1.682 | | 0.0 | 11.000 | 15.292 | | K Factor @ node SPRG |
| to | | 120.0 | | 0.0 | 0.0 | 0.0 | | |
| 102 | 19.5 | 0.0125 | | 0.0 | 11.000 | 0.137 | | Vel = 2.82 |
| 102 | 19.59 | 1.682 | | 0.0 | 11.000 | 15.429 | | K Factor @ node SPRG |
| to | | 120.0 | | 0.0 | 0.0 | 0.0 | | |
| 103 | 39.09 | 0.0451 | | 0.0 | 11.000 | 0.496 | | Vel = 5.64 |
| 103 | 19.90 | 1.682 | | 0.0 | 11.000 | 15.925 | | K Factor @ node SPRG |
| to | | 120.0 | | 0.0 | 0.0 | 0.0 | | |
| 104 | 58.99 | 0.0965 | | 0.0 | 11.000 | 1.062 | | Vel = 8.52 |
| 104 | 20.55 | 1.682 | | 0.0 | 11.000 | 16.987 | | K Factor @ node SPRG |
| to | | 120.0 | | 0.0 | 0.0 | 0.0 | | |
| 105 | 79.54 | 0.1679 | | 0.0 | 11.000 | 1.847 | | Vel = 11.48 |
| 105 | 21.64 | 1.682 | T | 9.9 | 6.000 | 18.834 | | K Factor @ node SPRG |
| to | | 120.0 | | 0.0 | 9.900 | 0.0 | | |
| 106 | 101.18 | 0.2619 | | 0.0 | 15.900 | 4.165 | | Vel = 14.61 |
| 106 | 0.0 | 3.26 | | 0.0 | 11.250 | 22.999 | | |
| to | | 120.0 | | 0.0 | 0.0 | 0.0 | | |
| 112 | 101.18 | 0.0105 | | 0.0 | 11.250 | 0.118 | | Vel = 3.89 |
| 112 | 101.44 | 3.26 | 2E | 18.815 | 47.000 | 23.117 | | |
| to | | 120.0 | | 0.0 | 18.815 | 0.0 | | |
| 114 | 202.62 | 0.0377 | | 0.0 | 65.815 | 2.483 | | Vel = 7.79 |
| 114 | 26.81 | 3.26 | E | 9.408 | 13.500 | 25.600 | | |
| to | | 120.0 | | 0.0 | 9.408 | 0.0 | | |
| 121 | 229.43 | 0.0475 | | 0.0 | 22.908 | 1.088 | | Vel = 8.82 |
| 121 | 104.83 | 3.26 | | 0.0 | 5.330 | 26.688 | | |
| to | | 120.0 | | 0.0 | 0.0 | 0.0 | | |
| 122 | 334.26 | 0.0951 | | 0.0 | 5.330 | 0.507 | | Vel = 12.85 |
| 122 | 26.00 | 3.26 | 2T | 40.319 | 33.000 | 27.195 | | K Factor @ node SPRG |
| to | | 120.0 | | 0.0 | 40.319 | 0.0 | | |
| 123 | 360.26 | 0.1094 | | 0.0 | 73.319 | 8.021 | | Vel = 13.85 |
| 123 | 0.0 | 3.26 | T | 20.159 | 75.000 | 35.216 | | |
| to | | 120.0 | | 0.0 | 20.159 | 0.0 | | |
| 124 | 360.26 | 0.1094 | | 0.0 | 95.159 | 10.411 | | Vel = 13.85 |
| 124 | 0.0 | 3.26 | T | 20.159 | 11.000 | 45.627 | | |
| to | | 120.0 | | 0.0 | 20.159 | 0.0 | | |
| 125 | 360.26 | 0.1094 | | 0.0 | 31.159 | 3.409 | | Vel = 13.85 |
| 125 | 0.0 | 3.26 | 2E | 18.815 | 14.000 | 49.036 | | |
| to | | 120.0 | | 0.0 | 18.815 | 0.0 | | |
| TDR | 360.26 | 0.1094 | | 0.0 | 32.815 | 3.590 | | Vel = 13.85 |

| Hyd. Ref. Point | Qa Qt | Dia. "C" Pf/Ft | Fitting or Eqv. | Ln. | Pipe Ftng's Total | Pt Pe Pf | Pt Pv Pn | ******* Notes ****** |
|---|---|---|---|---|---|---|---|---|
| TDR | 0.0 | 3.26 | Bvcb | 6.72 | 2.000 | 52.626 | | |
| to | | 120.0 | T | 20.159 | 45.694 | 1.732 | | |
| BDR | 360.26 | 0.1094 | Eql | 18.815 | 47.694 | 5.219 | | Vel = 13.85 |
| BDR | 0.0 | 4.26 | | 0.0 | 3.000 | 59.577 | | |
| to | | 120.0 | | 0.0 | 0.0 | 0.0 | | |
| BWR | 360.26 | 0.0297 | | 0.0 | 3.000 | 0.089 | | Vel = 8.11 |
| BWR | 0.0 | 4.26 | | 0.0 | 3.000 | 59.666 | | |
| to | | 120.0 | | 0.0 | 0.0 | 0.0 | | |
| BKFL | 360.26 | 0.0297 | | 0.0 | 3.000 | 0.089 | | Vel = 8.11 |
| BKFL | 0.0 | 4.026 | 3E | 30.0 | 1.000 | 59.755 | | |
| to | | 120.0 | | 0.0 | 30.000 | 4.650 | | * * Fixed Loss = 4 |
| BASE | 360.26 | 0.0391 | | 0.0 | 31.000 | 1.213 | | Vel = 9.08 |
| BASE | 0.0 | 6.16 | G | 4.304 | 50.000 | 65.618 | | |
| to | | 140.0 | T | 43.037 | 67.425 | 0.0 | | |
| HOSE | 360.26 | 0.0037 | E | 20.084 | 117.425 | 0.436 | | Vel = 3.88 |
| HOSE | 250.00 | 8.27 | | 0.0 | 480.000 | 66.054 | | Qa = 250 |
| to | | 140.0 | | 0.0 | 0.0 | 0.0 | | |
| TEST | 610.26 | 0.0023 | | 0.0 | 480.000 | 1.124 | | Vel = 3.64 |
| | 0.0 | | | | | | | |
| | 610.26 | | | | | 67.178 | | K Factor = 74.46 |

City Water Supply:
C1 - Static Pressure : 110
C2 - Residual Pressure: 48
C2 - Residual Flow : 1162

Demand:
D1 - Elevation : 2.382
D2 - System Flow : 360.265
D2 - System Pressure : 67.178
Hose ( Demand ) : 250
D3 - System Demand : 610.265
Safety Margin : 23.986