



... Fire Protection by Computer Design

DEAN & ALLYN, INC.
32 LEWISTON ROAD BUILDING 1C
P.O. BOX 709
GRAY, ME 04039
207-657-5646

Job Name : 129 MORNING STREET
Building : 129 Morning Street
Location : 3RD FLOOR - Portland, Maine
System : WX3
Contract : C770
Data File : CALC.WX3

Hydraulic Design Information Sheet

Name - 129 Morning Street Date - 4/7/08
 Location - 3RD FLOOR - Portland, Maine
 Building - 129 Morning Street System No. - WX3
 Contractor - Dean & Allyn, Inc Contract No. - C770
 Calculated By - James R White Drawing No. - 1 OF 1
 Construction: (X) Combustible () Non-Combustible Ceiling Height - 8'-0"
 Occupancy - RESIDENTIAL APARTMENTS

S () NFPA 13 () Lt. Haz. Ord.Haz.Gp. () 1 () 2 () 3 () Ex.Haz.
 Y () NFPA 231 () NFPA 231C () Figure Curve

S Other NFPA 13 R

T Specific Ruling Made By Date

| M | Area of Sprinkler Operation | - 4 HEADS | System Type | Sprinkler/Nozzle |
|---|-----------------------------|-----------|---------------|--------------------|
| | Density | - .05 | (X) Wet | Make TYCO |
| D | Area Per Sprinkler | - 256/75 | () Dry | Model TY2596 |
| E | Elevation at Highest Outlet | - 36'-0" | () Deluge | Size 1/2" |
| S | Hose Allowance - Inside | - 0 | () Preaction | K-Factor 4.2 |
| I | Rack Sprinkler Allowance | - 0 | () Other | Temp.Rat.155 DEGRE |
| G | Hose Allowance - Outside | - 0 | | |

N Note SAFETY MARGIN = 9.52 LBS PSI

Calculation Flow Required - 60.23 Press Required - 62.46
 Summary C-Factor Used: 120 Overhead 150 Underground

| W | Water Flow Test: | Pump Data: | Tank or Reservoir: |
|---|------------------------|-------------|--------------------|
| A | Date of Test - 9/26/06 | | Cap. - |
| T | Time of Test - | Rated Cap.- | Elev.- |
| E | Static Press - 72 | @ Press - | |
| R | Residual Press - 68 | Elev. - | Well |
| | Flow - 903 | | Proof Flow |
| S | Elevation - 6 | | |

U Location - HYDRANT # 413

P Source of Information - PORTLAND WATER DISTRICT

Y

| 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

G Horizontal Barriers Provided:
 E

Fittings Used Summary

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Fitting Legend

| Abbrev. | Name | 1/2 | 3/4 | 1 | 1 1/4 | 1 1/2 | 2 | 2 1/2 | 3 | 3 1/2 | 4 | 5 | 6 | 8 | 10 | 12 | 14 | 16 | 18 | 20 | 24 |
|---------|---------------------------|--|-----|---|-------|-------|----|-------|----|-------|----|----|----|----|----|----|----|----|----|-----|-----|
| E | 90' Standard Elbow | 2 | 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 | Generic Gate Valve | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 10 | 11 | 13 |
| S | Generic Swing Check Valve | 4 | 5 | 5 | 7 | 9 | 11 | 14 | 16 | 19 | 22 | 27 | 32 | 45 | 55 | 65 | 76 | 87 | 98 | 109 | 130 |
| T | 90' Flow thru Tee | 3 | 4 | 5 | 6 | 8 | 10 | 12 | 15 | 17 | 20 | 25 | 30 | 35 | 50 | 60 | 71 | 81 | 91 | 101 | 121 |
| Zaa | Ames 2000B | 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

Pressure / Flow Summary - STANDARD

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| Node No. | Elevation | K-Fact | Pt Actual | Pn | Flow Actual | Density | Area | Press Req. |
|----------|-----------|--------|-----------|----|-------------|---------|------|------------|
| D201 | 36.0 | 4.2 | 14.5 | na | 15.99 | 0.05 | 140 | 14.5 |
| D202 | 36.0 | 4.2 | 12.79 | na | 15.02 | 0.05 | 140 | 9.6 |
| D203 | 36.0 | 4.2 | 12.17 | na | 14.65 | 0.05 | 140 | 9.6 |
| D204 | 36.0 | 4.2 | 12.02 | na | 14.56 | 0.05 | 140 | 9.6 |
| 40 | 37.0 | | 12.02 | na | | | | |
| 39 | 37.0 | | 12.58 | na | | | | |
| 38 | 37.0 | | 14.33 | na | | | | |
| 33 | 37.0 | | 11.96 | na | | | | |
| 34 | 37.0 | | 12.27 | na | | | | |
| 35 | 37.0 | | 12.46 | na | | | | |
| 36 | 37.0 | | 13.39 | na | | | | |
| 37 | 37.0 | | 15.48 | na | | | | |
| 8 | 6.5 | | 33.32 | na | | | | |
| 9 | 6.5 | | 40.02 | na | | | | |
| 10 | 6.5 | | 41.26 | na | | | | |
| 11 | 6.5 | | 41.89 | na | | | | |
| 12 | 6.5 | | 42.29 | na | | | | |
| 13 | 6.5 | | 42.55 | na | | | | |
| 14 | 6.5 | | 42.79 | na | | | | |
| 15 | 6.5 | | 43.26 | na | | | | |
| 16 | 6.5 | | 43.65 | na | | | | |
| 17 | 6.5 | | 45.44 | na | | | | |
| 18 | 6.5 | | 45.77 | na | | | | |
| TOR | 6.5 | | 48.92 | na | | | | |
| BOR | 6.5 | | 55.23 | na | | | | |
| 19 | 6.5 | | 55.49 | na | | | | |
| TEST | 6.0 | | 62.46 | na | | | | |

The maximum velocity is 10.85 and it occurs in the pipe between nodes 35 and 36

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 | ***** | Notes | ***** |
|-----------------------|----------------|------------------------|-----------------------|-------------------|---------------------------|---------------------------|----------------|-------|-------------------------------|-------|
| D201 to 38 | 15.99 15.99 | 1.049 120 0.0860 | 1E | 2.0 0.0 0.0 | 1.000 2.000 3.000 | 14.500 -0.433 0.258 | | | K Factor = 4.20 Vel = 5.94 | |
| | 0.0 15.99 | | | | | 14.325 | | | K Factor = 4.22 | |
| D202 to 39 | 15.02 15.02 | 1.049 120 0.0767 | 1E | 2.0 0.0 0.0 | 1.000 2.000 3.000 | 12.785 -0.433 0.230 | | | K Factor = 4.20 Vel = 5.58 | |
| | 0.0 15.02 | | | | | 12.582 | | | K Factor = 4.23 | |
| D203 to 33 | 14.65 14.65 | 1.049 120 0.0730 | 1E | 2.0 0.0 0.0 | 1.000 2.000 3.000 | 12.174 -0.433 0.219 | | | K Factor = 4.20 Vel = 5.44 | |
| | 0.0 14.65 | | | | | 11.960 | | | K Factor = 4.24 | |
| D204 to 40 | 14.56 14.56 | 1.049 120 0.0723 | 1T | 5.0 0.0 0.0 | 1.000 5.000 6.000 | 12.022 -0.433 0.434 | | | K Factor = 4.20 Vel = 5.41 | |
| | 0.0 14.56 | | | | | 12.023 | | | K Factor = 4.20 | |
| 40 to 35 | 14.56 14.56 | 1.049 120 0.0725 | 1T | 5.0 0.0 0.0 | 1.000 5.000 6.000 | 12.023 0.0 0.435 | | | Vel = 5.41 | |
| | 0.0 14.56 | | | | | 12.458 | | | K Factor = 4.13 | |
| 39 to 36 | 15.02 15.02 | 1.049 120 0.0766 | 1T | 5.0 0.0 0.0 | 5.500 5.000 10.500 | 12.582 0.0 0.804 | | | Vel = 5.58 | |
| | 0.0 15.02 | | | | | 13.386 | | | K Factor = 4.11 | |
| 38 to 37 | 15.99 15.99 | 1.049 120 0.0861 | 1E | 2.0 0.0 0.0 | 11.410 2.000 13.410 | 14.325 0.0 1.154 | | | Vel = 5.94 | |
| | 0.0 15.99 | | | | | 15.479 | | | K Factor = 4.06 | |
| 33 to 34 | 14.65 14.65 | 1.049 120 0.0734 | | 0.0 0.0 0.0 | 4.250 0.0 4.250 | 11.960 0.0 0.312 | | | Vel = 5.44 | |
| 34 to 35 | 0.0 14.65 | 1.049 120 0.0732 | | 0.0 0.0 0.0 | 2.540 0.0 2.540 | 12.272 0.0 0.186 | | | Vel = 5.44 | |
| 35 to 36 | 14.57 29.22 | 1.049 120 0.2621 | | 0.0 0.0 0.0 | 3.540 0.0 3.540 | 12.458 0.0 0.928 | | | Vel = 10.85 | |
| 36 to 37 | 15.01 44.23 | 1.38 120 0.1487 | 1T | 6.0 0.0 0.0 | 8.080 6.000 14.080 | 13.386 0.0 2.093 | | | Vel = 9.49 | |

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 | ***** | Notes | ***** |
|-----------------------|----------------|------------------------|-----------------------|--------------------|----------------------------|---------------------------|----------------|-----------------------------------|-------|-------|
| 37 to 8 | 16.00 60.23 | 1.61 120 0.1242 | 1E 1T | 4.0 8.0 0.0 | 25.330 12.000 37.330 | 15.479 13.210 4.635 | | Vel = 9.49 | | |
| 8 to 9 | 0.0 60.23 | 1.61 120 0.1242 | 4E | 16.0 0.0 0.0 | 37.910 16.000 53.910 | 33.324 0.0 6.694 | | Vel = 9.49 | | |
| 9 to 10 | 0.0 60.23 | 1.61 120 0.1242 | 1E | 4.0 0.0 0.0 | 6.000 4.000 10.000 | 40.018 0.0 1.242 | | Vel = 9.49 | | |
| 10 to 11 | 0.0 60.23 | 2.067 120 0.0368 | 1E 1S | 5.0 11.0 0.0 | 1.000 16.000 17.000 | 41.260 0.0 0.625 | | Vel = 5.76 | | |
| 11 to 12 | 0.0 60.23 | 2.067 120 0.0368 | 1E | 5.0 0.0 0.0 | 6.000 5.000 11.000 | 41.885 0.0 0.405 | | Vel = 5.76 | | |
| 12 to 13 | 0.0 60.23 | 2.067 120 0.0367 | 1E 1G | 5.0 1.0 0.0 | 1.000 6.000 7.000 | 42.290 0.0 0.257 | | Vel = 5.76 | | |
| 13 to 14 | 0.0 60.23 | 2.067 120 0.0368 | 1E | 5.0 0.0 0.0 | 1.500 5.000 6.500 | 42.547 0.0 0.239 | | Vel = 5.76 | | |
| 14 to 15 | 0.0 60.23 | 2.067 120 0.0368 | 1T | 10.0 0.0 0.0 | 2.830 10.000 12.830 | 42.786 0.0 0.472 | | Vel = 5.76 | | |
| 15 to 16 | 0.0 60.23 | 2.067 120 0.0368 | 1T | 10.0 0.0 0.0 | 0.750 10.000 10.750 | 43.258 0.0 0.396 | | Vel = 5.76 | | |
| 16 to 17 | 0.0 60.23 | 2.067 120 0.0368 | 2E | 10.0 0.0 0.0 | 38.660 10.000 48.660 | 43.654 0.0 1.789 | | Vel = 5.76 | | |
| 17 to 18 | 0.0 60.23 | 2.067 120 0.0368 | 1E | 5.0 0.0 0.0 | 3.910 5.000 8.910 | 45.443 0.0 0.328 | | Vel = 5.76 | | |
| 18 to TOR | 0.0 60.23 | 2.067 120 0.0366 | 1Fsp | 0.0 0.0 0.0 | 4.042 0.0 4.042 | 45.771 3.000 0.148 | | * Fixed loss = 3 Vel = 5.76 | | |
| TOR to BOR | 0.0 60.23 | 2.067 120 0.0368 | 1E 1Zaa | 5.0 0.0 0.0 | 10.500 5.000 15.500 | 48.919 5.740 0.571 | | * Fixed loss = 5.74 Vel = 5.76 | | |
| BOR to 19 | 0.0 60.23 | 2.067 120 0.0367 | 1E | 5.0 0.0 0.0 | 2.000 5.000 7.000 | 55.230 0.0 0.257 | | Vel = 5.76 | | |
| 19 to TEST | 0.0 60.23 | 1.985 150 0.0296 | | 0.0 0.0 0.0 | 227.870 0.0 227.870 | 55.487 0.217 6.754 | | Vel = 6.24 | | |
| | 0.0 60.23 | | | | | 62.458 | | K Factor = 7.62 | | |

Water Supply Curve (C)

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City Water Supply:
C1 - Static Pressure : 72
C2 - Residual Pressure: 68
C2 - Residual Flow : 903

Demand:
D1 - Elevation : 12.993
D2 - System Flow : 60.228
D2 - System Pressure : 62.458
Hose (Adj City) : _____
Hose (Demand) : _____
D3 - System Demand : 60.228
Safety Margin : 9.515

