

... Fire Protection by Computer Design

EASTERN FIRE PROTECTION
170 KITTY HAWK AVE.
AUBURN/LEWISTON IND. PARK
AUBURN, MAINE
207-784-1507

Job Name : CUMBERLAND COUNTY CIVIC CENTER EVENT LEVEL B LOADING DOCK
Drawing : 3 OF 5
Location : PORTLAND, MAINE
Remote Area : 2
Contract : 4949
Data File : 2-4949 PHASE II.WXF

HYDRAULIC CALCULATIONS
for

Project name: CUMBERLAND COUNTY CIVIC CENTER EVENT LEVEL
Location: PORTLAND, MAINE
Drawing no: 3 OF 5
Date: 4/21/13

Design

Remote area number: 2
Remote area location: 2
Occupancy classification: ORDINARY HAZARD I
Density: .15 - Gpm/SqFt
Area of application: 1500 - SqFt
Coverage per sprinkler: 115 - SqFt
Type of sprinklers calculated: 5.6K 200DEG. BRASS UPRIGHTS
No. of sprinklers calculated: 20
In-rack demand: - GPM
Hose streams: 250 - GPM
Total water required (including hose streams): 763.06 - GPM @ 141.1 - Psi
Type of system: WET
Volume of dry or preaction system: - Gal

Water supply information

Date: 9/20/2010
Location: FREE ST PORTLAND, ME
Source: FIRE SPEC. INC.

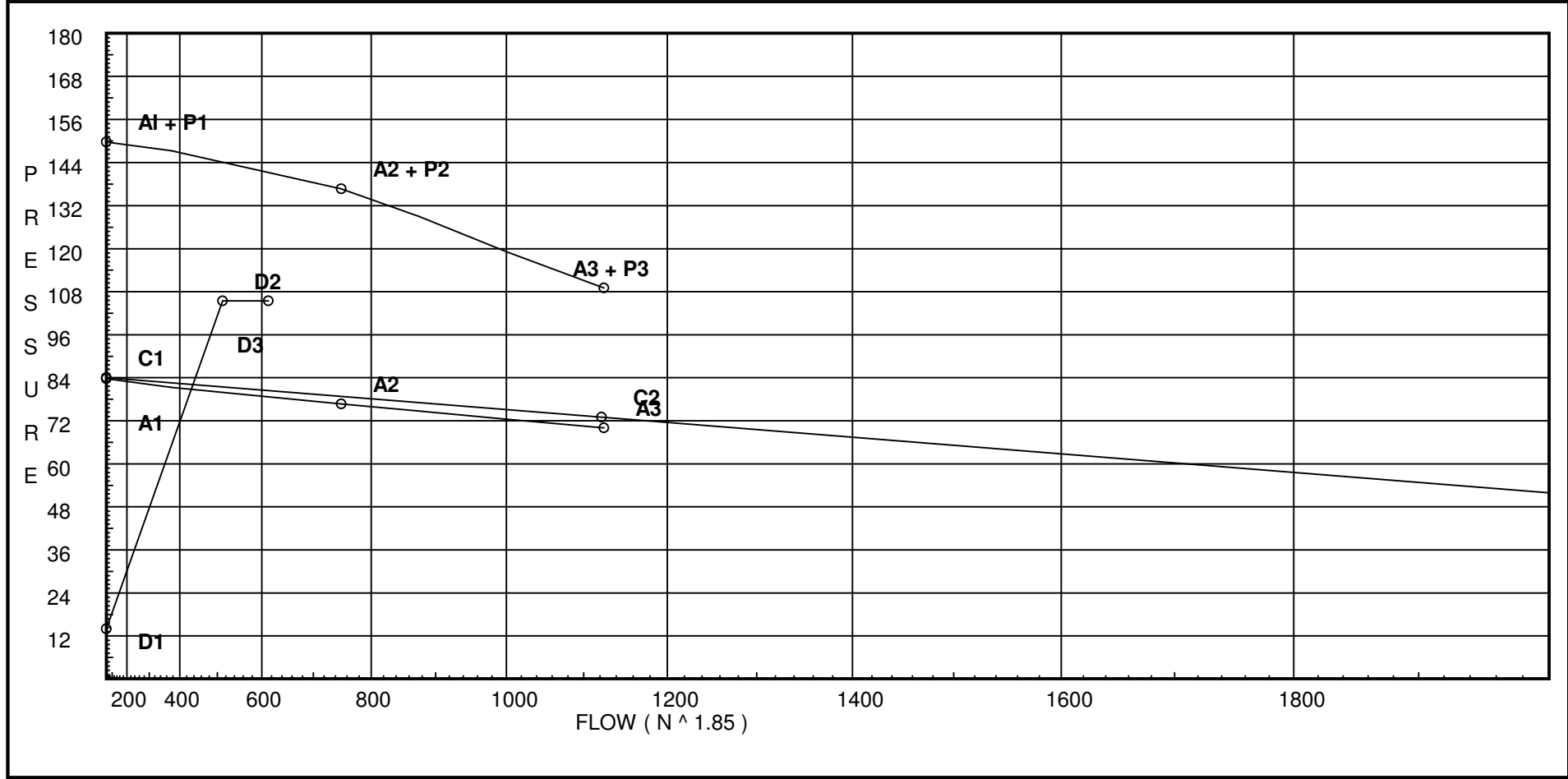
Name of contractor: EASTERN FIRE PROTECTION
Address: 170 KITTY HAWK AVE. / AUBURN/LEWISTON IND. PARK / AUBURN, MA
Phone number: 207-784-1507
Name of designer: JWD
Authority having jurisdiction: SFMO, PORTLAND FIRE DEPT.
Notes: (Include peaking information or gridded systems here.) HYDRAULICALLY REMOTE
AREA REVISED PER NFPA#13 2010 ED. SEC.11.2.3.2.3.1
TOTAL SYSTEM DEMAND INDICATED AT PUMP OUTLET (PO)

Water Supply Curve (C)

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| | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| City Water Supply: C1 - Static Pressure : 84 C2 - Residual Pressure: 73 C2 - Residual Flow : 1122 City Water Adjusted to Pump Inlet for Pf - Elev - Hose Flow A1 - Adjusted Static: 83.734 A2 - Adj Resid : 76.68 @ 750 A3 - Adj Resid : 70.056 @ 1125 | Pump Data: P1 - Pump Churn Pressure : 66 P2 - Pump Rated Pressure : 60 P2 - Pump Rated Flow : 750 P3 - Pump Pressure @ Max Flow : 39 P3 - Pump Max Flow : 1125 City Residual Flow @ 0 = 3366.89 City Residual Flow @ 20 = 2906.64 City Water @ 150% of Pump = 72.95 | Demand: D1 - Elevation : 14.024 D2 - System Flow : 513.063 D2 - System Pressure : 105.414 Hose (Demand) : 100 D3 - System Demand : 613.063 Hose (Adj City) : 150 Safety Margin : 35.772 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



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 | |
|---------|----------------------------|----------------------------------------------|-----|---|-------|-------|----|-------|------|-------|----|----|----|----|----|----|----|----|----|-----|-----|---|
| A | Alarm Rel E1 & E3 | | | | | | | 7.7 | 21.5 | | 17 | | 27 | 29 | | | | | | | | |
| B | NFPA 13 Butterfly Valve | 0 | 0 | 0 | 0 | 0 | 6 | 7 | 10 | 0 | 12 | 9 | 10 | 12 | 19 | 21 | 0 | 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 | |
| L | NFPA 13 Long Turn Elbow | 0.5 | 1 | 2 | 2 | 2 | 3 | 4 | 5 | 5 | 6 | 8 | 9 | 13 | 16 | 18 | 24 | 27 | 30 | 34 | 40 | |
| S | NFPA 13 Swing Check | 0 | 0 | 5 | 7 | 9 | 11 | 14 | 16 | 19 | 22 | 27 | 32 | 45 | 55 | 65 | | | | | | |
| 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.

SUPPLY ANALYSIS

| Node at Source | Static Pressure | Residual Pressure | Flow | Available Pressure | Total Demand | Required Pressure |
|-----------------------|-------------------------------|--------------------------|-------------|---------------------------|---------------------|--------------------------|
| PO | See Information on Pump Curve | | | | 613.06 | 105.414 |
| TEST | 84.0 | 73 | 1122.0 | 78.609 | 763.06 | 78.609 |

NODE ANALYSIS

| Node Tag | Elevation | Node Type | Pressure at Node | Discharge at Node | Notes |
|-----------------|------------------|------------------|-------------------------|--------------------------|--------------|
| DROP | 0.0 | 5.6 | 7.18 | 15.0 | |
| DR | 0.0 | 5.6 | 7.0 | 14.82 | |
| DR3 | 0.0 | 5.6 | 7.0 | 14.82 | |
| DR4 | 0.0 | 5.6 | 11.21 | 18.75 | |
| DR5 | 0.0 | 5.6 | 7.18 | 15.0 | |
| SPRG | 0.0 | 5.6 | 9.49 | 17.25 | |
| 50 | 84.21 | 5.45 | 10.03 | 17.25 | K=K @ UP |
| 51 | 84.21 | 5.45 | 10.73 | 17.84 | K=K @ UP |
| 52 | 84.21 | 5.45 | 14.41 | 20.67 | K=K @ UP |
| 72 | 84.21 | 5.45 | 25.4 | 27.45 | K=K @ UP |
| 53 | 84.21 | 5.45 | 28.23 | 28.94 | K=K @ UP |
| 54 | 84.21 | 5.45 | 27.98 | 28.81 | K=K @ UP |
| 55 | 84.21 | 5.45 | 28.09 | 28.86 | K=K @ UP |
| 61 | 76.21 | | 17.84 | | |
| 56 | 84.21 | 5.45 | 10.81 | 17.91 | K=K @ UP |
| 57 | 84.21 | 5.45 | 11.49 | 18.46 | K=K @ UP |
| 63 | 84.21 | 5.45 | 13.58 | 20.07 | K=K @ UP |
| 65 | 84.21 | 5.45 | 14.64 | 20.84 | K=K @ UP |
| 67 | 84.21 | 5.45 | 16.68 | 22.24 | K=K @ UP |
| 58 | 84.21 | | 12.32 | | |
| 62 | 84.21 | | 14.37 | | |
| 64 | 84.21 | | 14.56 | | |
| 66 | 84.21 | | 15.93 | | |
| 68 | 84.21 | | 17.54 | | |
| 69 | 84.21 | 5.45 | 27.92 | 28.77 | K=K @ UP |
| 70 | 84.21 | 5.45 | 19.85 | 24.26 | K=K @ UP |
| 71 | 84.21 | 5.45 | 22.12 | 25.62 | K=K @ UP |
| 74 | 84.21 | | 29.21 | | |
| 75 | 84.21 | | 29.34 | | |
| 76 | 84.21 | | 31.21 | | |
| 77 | 84.21 | | 34.24 | | |
| 44 | 84.21 | 5.45 | 33.97 | 31.74 | K=K @ UP |
| 45 | 84.21 | 5.45 | 35.81 | 32.59 | K=K @ UP |
| 46 | 84.21 | 5.45 | 44.28 | 36.24 | K=K @ UP |
| 47 | 84.21 | 5.45 | 33.87 | 31.7 | K=K @ UP |
| 48 | 84.21 | 5.45 | 36.31 | 32.82 | K=K @ UP |
| 49 | 84.21 | | 49.38 | | |
| 78 | 84.21 | | 46.91 | | |
| 79 | 84.21 | | 53.8 | | |
| 80 | 84.21 | | 58.35 | | |
| 81 | 84.21 | | 63.0 | | |

NODE ANALYSIS (cont.)

| Node Tag | Elevation | Node Type | Pressure at Node | Discharge at Node | Notes |
|-----------------|------------------|------------------|-----------------------------|------------------------------|--------------|
| 82 | 84.21 | | 72.13 | | |
| 83 | 84.21 | | 72.99 | | |
| CO | 59.83 | | 91.33 | | |
| K | 59.83 | | 93.1 | | |
| RT | 59.83 | | 100.76 | | |
| RB | 59.83 | | 100.8 | | |
| L | 51.83 | | 104.96 | 100.0 | |
| PO | 51.83 | | 105.41 | | |
| PI | 51.83 | | 78.61 | | |
| TEST | 51.83 | | 78.61 | 150.0 | |

Final Calculations - Hazen-Williams - 2007

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| Node1 to Node2 | Elev1 Elev2 | K Fact | Qa Qt | Nom Act | Fitting or Eqv. | Ln. | Pipe Ftng's Total | CFact Pf/Ft | Pt Pe Pf | ***** | Notes | ***** |
|----------------------|------------------|-----------|----------------|------------|-----------------------|-------------------|---------------------------|----------------|-------------------------|-------|---------------------------|-------|
| DROP to LINE | 0 0 | 5.60 | 15.00 15.0 | 1 1.049 | 1E 1T | 2.0 5.0 0.0 | 2.000 7.000 9.000 | 120 0.0764 | 7.175 0.0 0.688 | | Vel = 5.57 | |
| LINE | | | 0.0 15.00 | | | | | | 7.863 | | K Factor = 5.35 | |
| DR to LN2 | 0 0 | 5.60 | 14.82 14.82 | 1 1.049 | 1T | 5.0 0.0 0.0 | 68.000 5.000 73.000 | 120 0.0747 | 7.000 0.0 5.453 | | Vel = 5.50 | |
| LN2 | | | 0.0 14.82 | | | | | | 12.453 | | K Factor = 4.20 | |
| DR3 to LN3 | 0 0 | 5.60 | 14.82 14.82 | 1 1.049 | 1T | 5.0 0.0 0.0 | 68.000 5.000 73.000 | 120 0.0747 | 7.000 0.0 5.453 | | Vel = 5.50 | |
| LN3 | | | 0.0 14.82 | | | | | | 12.453 | | K Factor = 4.20 | |
| DR4 to LN4 | 0 0 | 5.60 | 18.75 18.75 | 1 1.049 | 1T | 5.0 0.0 0.0 | 68.000 5.000 73.000 | 120 0.1155 | 11.210 0.0 8.431 | | Vel = 6.96 | |
| LN4 | | | 0.0 18.75 | | | | | | 19.641 | | K Factor = 4.23 | |
| DR5 to LN5 | 0 0 | 5.60 | 15.00 15.0 | 1 1.049 | 1T | 5.0 0.0 0.0 | 68.000 5.000 73.000 | 120 0.0764 | 7.175 0.0 5.579 | | Vel = 5.57 | |
| LN5 | | | 0.0 15.00 | | | | | | 12.754 | | K Factor = 4.20 | |
| SPRG to UP | 0 0 | 5.60 | 17.25 17.25 | 1 1.049 | 1T | 5.0 0.0 0.0 | 0.500 5.000 5.500 | 120 0.0989 | 9.489 0.0 0.544 | | Vel = 6.40 | |
| UP | | | 0.0 17.25 | | | | | | 10.033 | | K Factor = 5.45 | |
| 50 to 51 | 84.210 84.210 | 5.45 | 17.25 17.25 | 1 1.049 | | 0.0 0.0 0.0 | 7.000 0.0 7.000 | 120 0.0990 | 10.033 0.0 0.693 | | K = K @ UP Vel = 6.40 | |
| 51 to 52 | 84.210 84.210 | 5.45 | 17.84 35.09 | 1 1.049 | | 0.0 0.0 0.0 | 10.000 0.0 10.000 | 120 0.3681 | 10.726 0.0 3.681 | | K = K @ UP Vel = 13.03 | |
| 52 to 77 | 84.210 84.210 | 5.45 | 20.67 55.76 | 1 1.049 | 2E 1T | 4.0 5.0 0.0 | 13.875 9.000 22.875 | 120 0.8672 | 14.407 0.0 19.837 | | K = K @ UP Vel = 20.70 | |
| 77 | | | 0.0 55.76 | | | | | | 34.244 | | K Factor = 9.53 | |
| 72 to 53 | 84.210 84.210 | 5.45 | 27.45 27.45 | 1 1.049 | | 0.0 0.0 0.0 | 12.125 0.0 12.125 | 120 0.2337 | 25.399 0.0 2.834 | | K = K @ UP Vel = 10.19 | |
| 53 to 77 | 84.210 84.210 | 5.45 | 28.93 56.38 | 1 1.049 | 1T | 5.0 0.0 0.0 | 1.790 5.000 6.790 | 120 0.8853 | 28.233 0.0 6.011 | | K = K @ UP Vel = 20.93 | |

Final Calculations - Hazen-Williams - 2007

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| Node1 to Node2 | Elev1 Elev2 | K Fact | Qa Qt | Nom Act | Fitting or Eqv. Ln. | Pipe Ftng's Total | CFact Pf/Ft | Pt Pe Pf | ***** | Notes | ***** |
|----------------------|------------------|-----------|--------------|------------|------------------------------|-------------------------|----------------|----------------|------------------|-----------------|-------|
| 77 | | | 0.0 56.38 | | | | | 34.244 | | K Factor = 9.63 | |
| 54 to 76 | 84.210 84.210 | 5.45 | 28.81 | 1 | 1E 1T | 2.0 5.0 | 5.625 7.000 | 120 | 27.983 0.0 | K = K @ UP | |
| | | | 28.81 | 1.049 | 0.0 | 12.625 | 0.2557 | 3.228 | | Vel = 10.70 | |
| 76 | | | 0.0 28.81 | | | | | 31.211 | | K Factor = 5.16 | |
| 55 to 76 | 84.210 84.210 | 5.45 | 28.86 | 1 | 1T | 5.0 0.0 | 7.170 5.000 | 120 | 28.089 0.0 | K = K @ UP | |
| | | | 28.86 | 1.049 | 0.0 | 12.170 | 0.2565 | 3.122 | | Vel = 10.71 | |
| 76 | | | 0.0 28.86 | | | | | 31.211 | | K Factor = 5.17 | |
| 61 to 62 | 76.210 84.210 | .0 | 0.0 | 1 | 1E 1T | 2.0 5.0 | 7.000 7.000 | 120 | 17.836 -3.465 | | |
| | | | 0.0 | 1.049 | 0.0 | 14.000 | 0 | 0.0 | | Vel = 0 | |
| 62 | | | 0.0 0.0 | | | | | 14.371 | | K Factor = 0 | |
| 56 to 58 | 84.210 84.210 | 5.45 | 17.91 | 1 | 1T | 5.0 0.0 | 9.250 5.000 | 120 | 10.810 0.0 | K = K @ UP | |
| | | | 17.91 | 1.049 | 0.0 | 14.250 | 0.1061 | 1.512 | | Vel = 6.65 | |
| 58 | | | 0.0 17.91 | | | | | 12.322 | | K Factor = 5.10 | |
| 57 to 58 | 84.210 84.210 | 5.45 | 18.46 | 1 | 1T | 5.0 0.0 | 2.420 5.000 | 120 | 11.489 0.0 | K = K @ UP | |
| | | | 18.46 | 1.049 | 0.0 | 7.420 | 0.1123 | 0.833 | | Vel = 6.85 | |
| 58 | | | 0.0 18.46 | | | | | 12.322 | | K Factor = 5.26 | |
| 63 to 64 | 84.210 84.210 | 5.45 | 20.07 | 1 | 1T | 5.0 0.0 | 2.420 5.000 | 120 | 13.584 0.0 | K = K @ UP | |
| | | | 20.07 | 1.049 | 0.0 | 7.420 | 0.1310 | 0.972 | | Vel = 7.45 | |
| 64 | | | 0.0 20.07 | | | | | 14.556 | | K Factor = 5.26 | |
| 65 to 66 | 84.210 84.210 | 5.45 | 20.84 | 1 | 1T | 5.0 0.0 | 4.170 5.000 | 120 | 14.639 0.0 | K = K @ UP | |
| | | | 20.84 | 1.049 | 0.0 | 9.170 | 0.1403 | 1.287 | | Vel = 7.74 | |
| 66 | | | 0.0 20.84 | | | | | 15.926 | | K Factor = 5.22 | |
| 67 to 68 | 84.210 84.210 | 5.45 | 22.24 | 1 | 1T | 5.0 0.0 | 0.460 5.000 | 120 | 16.678 0.0 | K = K @ UP | |
| | | | 22.24 | 1.049 | 0.0 | 5.460 | 0.1584 | 0.865 | | Vel = 8.26 | |
| 68 | | | 0.0 22.24 | | | | | 17.543 | | K Factor = 5.31 | |
| 58 to 62 | 84.210 84.210 | | 36.36 | 1 | | 0.0 0.0 | 5.210 0.0 | 120 | 12.322 0.0 | | |
| | | | 36.36 | 1.049 | 0.0 | 5.210 | 0.3933 | 2.049 | | Vel = 13.50 | |
| 62 to 64 | 84.210 84.210 | | 0.0 | 1.25 | | 0.0 0.0 | 1.790 0.0 | 120 | 14.371 0.0 | | |
| | | | 36.36 | 1.38 | 0.0 | 1.790 | 0.1034 | 0.185 | | Vel = 7.80 | |

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| Node1 to Node2 | Elev1 Elev2 | K Fact | Qa Qt | Nom Act | Fitting or Eqv. | Ln. | Pipe Ftng's Total | CFact Pf/Ft | Pt Pe Pf | ***** | Notes | ***** |
|----------------------|------------------|-----------|------------------|--------------|-----------------------|----------------------|---------------------------|----------------|-------------------------|-------|-------|---------------------------|
| 64 to 66 | 84.210 84.210 | | 20.08 56.44 | 1.25 1.38 | | 0.0 0.0 | 5.875 0.0 5.875 | 120 0.2332 | 14.556 0.0 1.370 | | | Vel = 12.11 |
| 66 to 68 | 84.210 84.210 | | 20.83 77.27 | 1.25 1.38 | | 0.0 0.0 | 3.875 0.0 3.875 | 120 0.4173 | 15.926 0.0 1.617 | | | Vel = 16.57 |
| 68 to 75 | 84.210 84.210 | | 22.25 99.52 | 1.25 1.38 | 1T | 6.0 0.0 0.0 | 11.710 6.000 17.710 | 120 0.6661 | 17.543 0.0 11.796 | | | Vel = 21.35 |
| 75 | | | 0.0 99.52 | | | | | | 29.339 | | | K Factor = 18.37 |
| 69 to 75 | 84.210 84.210 | 5.45 | 28.77 28.77 | 1 1.049 | 1T | 5.0 0.0 0.0 | 0.580 5.000 5.580 | 120 0.2550 | 27.916 0.0 1.423 | | | K = K @ UP Vel = 10.68 |
| 75 | | | 0.0 28.77 | | | | | | 29.339 | | | K Factor = 5.31 |
| 70 to 71 | 84.210 84.210 | 5.45 | 24.26 24.26 | 1 1.049 | 1E | 2.0 0.0 0.0 | 10.250 2.000 12.250 | 120 0.1860 | 19.846 0.0 2.279 | | | K = K @ UP Vel = 9.01 |
| 71 to 74 | 84.210 84.210 | 5.45 | 25.62 49.88 | 1 1.049 | 1T | 5.0 0.0 0.0 | 5.040 5.000 10.040 | 120 0.7057 | 22.125 0.0 7.085 | | | K = K @ UP Vel = 18.52 |
| 74 to 75 | 84.210 84.210 | | 0.0 49.88 | 2 2.157 | | 0.0 0.0 0.0 | 6.125 0.0 6.125 | 120 0.0211 | 29.210 0.0 0.129 | | | Vel = 4.38 |
| 75 to 76 | 84.210 84.210 | | 128.29 178.17 | 2 2.157 | | 0.0 0.0 0.0 | 8.420 0.0 8.420 | 120 0.2223 | 29.339 0.0 1.872 | | | Vel = 15.64 |
| 76 to 77 | 84.210 84.210 | | 57.67 235.84 | 2 2.157 | | 0.0 0.0 0.0 | 8.125 0.0 8.125 | 120 0.3733 | 31.211 0.0 3.033 | | | Vel = 20.71 |
| 77 to 78 | 84.210 84.210 | | 112.14 347.98 | 2 2.157 | 1T | 12.307 0.0 0.0 | 4.210 12.307 16.517 | 120 0.7668 | 34.244 0.0 12.665 | | | Vel = 30.55 |
| 78 | | | 0.0 347.98 | | | | | | 46.909 | | | K Factor = 50.81 |
| 44 to 45 | 84.210 84.210 | 5.45 | 31.74 31.74 | 1 1.049 | | 0.0 0.0 0.0 | 6.000 0.0 6.000 | 120 0.3058 | 33.973 0.0 1.835 | | | K = K @ UP Vel = 11.78 |
| 45 to 46 | 84.210 84.210 | 5.45 | 32.59 64.33 | 1 1.049 | | 0.0 0.0 0.0 | 7.500 0.0 7.500 | 120 1.1300 | 35.808 0.0 8.475 | | | K = K @ UP Vel = 23.88 |
| 46 to 49 | 84.210 84.210 | 5.45 | 36.24 100.57 | 1.25 1.38 | 1T | 6.0 0.0 0.0 | 1.500 6.000 7.500 | 120 0.6792 | 44.283 0.0 5.094 | | | K = K @ UP Vel = 21.57 |
| 49 | | | 0.0 100.57 | | | | | | 49.377 | | | K Factor = 14.31 |

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| Node1 to Node2 | Elev1 Elev2 | K Fact | Qa Qt | Nom Act | Fitting or Eqv. Ln. | Pipe Ftng's Total | CFact Pf/Ft | Pt Pe Pf | ***** | Notes | ***** |
|----------------------|------------------|-----------|------------------|------------|-------------------------------------------|---------------------------------------------------------------------|----------------|---------------------------|---------------------------------|-------|-------|
| 47 to 48 | 84.210 84.210 | 5.45 | 31.70 31.7 | 1 1.049 | | 8.000 0.0 8.000 | 120 0.3050 | 33.874 0.0 2.440 | K = K @ UP Vel = 11.77 | | |
| 48 to 49 | 84.210 84.210 | 5.45 | 32.81 64.51 | 1 1.049 | 1T 0.0 | 5.0 5.000 11.500 | 120 1.1359 | 36.314 0.0 13.063 | K = K @ UP Vel = 23.95 | | |
| 49 to 79 | 84.210 84.210 | | 100.58 165.09 | 2 2.157 | 1L 0.0 | 3.692 3.692 22.942 | 120 0.1930 | 49.377 0.0 4.428 | Vel = 14.49 | | |
| 79 | | | 0.0 165.09 | | | | | 53.805 | K Factor = 22.51 | | |
| 78 to 79 | 84.210 84.210 | | 347.98 347.98 | 3 3.26 | 4L 1T 0.0 | 26.879 20.159 47.038 67.208 | 120 0.1026 | 46.909 0.0 6.896 | Vel = 13.38 | | |
| 79 to 80 | 84.210 84.210 | | 165.08 513.06 | 4 4.26 | 3L 1T 0.0 | 23.701 26.334 50.035 79.410 | 120 0.0572 | 53.805 0.0 4.541 | Vel = 11.55 | | |
| 80 to 81 | 84.210 84.210 | | 0.0 513.06 | 4 4.26 | 3L 1T 0.0 | 23.701 26.334 50.035 81.365 | 120 0.0572 | 58.346 0.0 4.652 | Vel = 11.55 | | |
| 81 to 82 | 84.210 84.210 | | 0.0 513.06 | 4 4.26 | 9L 0.0 | 71.102 71.102 159.772 | 120 0.0572 | 62.998 0.0 9.136 | Vel = 11.55 | | |
| 82 to 83 | 84.210 84.210 | | 0.0 513.06 | 4 4.26 | | 0.0 0.0 15.000 15.000 | 120 0.0571 | 72.134 0.0 0.857 | Vel = 11.55 | | |
| 83 to CO | 84.210 59.830 | | 0.0 513.06 | 4 4.26 | 5L 1T 0.0 | 39.501 26.334 65.835 136.125 | 120 0.0572 | 72.991 10.559 7.784 | Vel = 11.55 | | |
| CO to K | 59.830 59.830 | | 0.0 513.06 | 4 4.26 | 2L 0.0 | 15.8 15.800 30.800 | 120 0.0572 | 91.334 0.0 1.761 | Vel = 11.55 | | |
| K to RT | 59.830 59.830 | | 0.0 513.06 | 4 4.26 | 1A 1G 1B 1L 1T 1Fsp 0.0 | 22.384 2.633 75.051 15.8 81.631 7.9 26.334 0.0 | 120 0.0572 | 93.095 3.000 4.668 | * Fixed loss = 3 Vel = 11.55 | | |
| RT to RB | 59.830 59.830 | | 0.0 513.06 | 6 6.357 | | 0.0 0.0 4.000 | 120 0.0080 | 100.763 0.0 0.032 | Vel = 5.19 | | |
| RB to L | 59.830 51.830 | | 0.0 513.06 | 6 6.357 | 3L 1T 0.0 | 33.948 37.72 71.668 85.668 | 120 0.0081 | 100.795 3.465 0.698 | Vel = 5.19 | | |
| L to PO | 51.830 51.830 | H100 | 100.00 613.06 | 8 8.249 | 3G 1S 2L 1T 41.108 | 14.094 5.000 52.853 138.592 30.537 143.592 | 120 0.0032 | 104.958 0.0 0.456 | Vel = 3.68 | | |

Final Calculations - Hazen-Williams - 2007

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| Node1 to Node2 | Elev1 Elev2 | K Fact | Qa Qt | Nom Act | Fitting or Eqv. Ln. | Pipe Ftng's Total | CFact Pf/Ft | Pt Pe Pf | ***** | Notes | ***** |
|--------------------------|------------------|-----------|------------------|------------|------------------------------|-------------------------|----------------|-----------------|-------|------------------|-------|
| PO | | | 0.0 613.06 | | | | | 105.414 | | K Factor = 59.71 | |
| System Demand Pressure | | | | | | | | 105.414 | | | |
| Safety Margin | | | | | | | | 35.772 | | | |
| Continuation Pressure | | | | | | | | 141.186 | | | |
| Pressure @ Pump Outlet | | | | | | | | 141.186 | | | |
| Pressure From Pump Curve | | | | | | | | -62.580 | | | |
| Pressure @ Pump Inlet | | | | | | | | 78.606 | | | |
| PI to TEST | 51.830 51.830 | | 0.0 613.06 | 8 8.249 | 0.0 0.0 | 1.000 0.0 | 120 0.0030 | 78.606 0.003 | | Vel = 3.68 | |
| | | | | | | | | | | Qa = 150.00 | |
| TEST | | | 150.00 763.06 | | | | | 78.609 | | K Factor = 86.06 | |