

... Fire Protection by Computer Design

EASTERN FIRE PROTECTION
AUBURN, MAINE
207-784-1507

Job Name : BUTLER SCHOOL APARTMENTS
Building : 3 OF 3
Location : PORTLAND, MAINE
System : ATTIC
Contract : 5305
Data File : 5305 Butler School Apts- Attic.WXF

HYDRAULIC CALCULATIONS
for

Project name: BUTLER SCHOOL APARTMENT
Location: PORTLAND, MAINE
Drawing no: 3 OF 3
Date: 6/1/2015

Design

Remote area number: ATTIC
Remote area location: ATTIC
Occupancy classification: ORDINARY HAZARD GROUP I
Density: .15 - Gpm/SqFt
Area of application: 2535 - SqFt
Coverage per sprinkler: 100 - SqFt
Type of sprinklers calculated: RELIABLE F1FR UPRIGHT K5.6
No. of sprinklers calculated: 33
In-rack demand: - GPM
Hose streams: 0 - GPM
Total water required (including hose streams): 552.894 - GPM @ 41.062 - Psi
Type of system: WET
Volume of dry or preaction system: - Gal

Water supply information

Date: 4-28-15
Location: SEE PLOT PLAN
Source: PORTLAND WATER DISTRICT

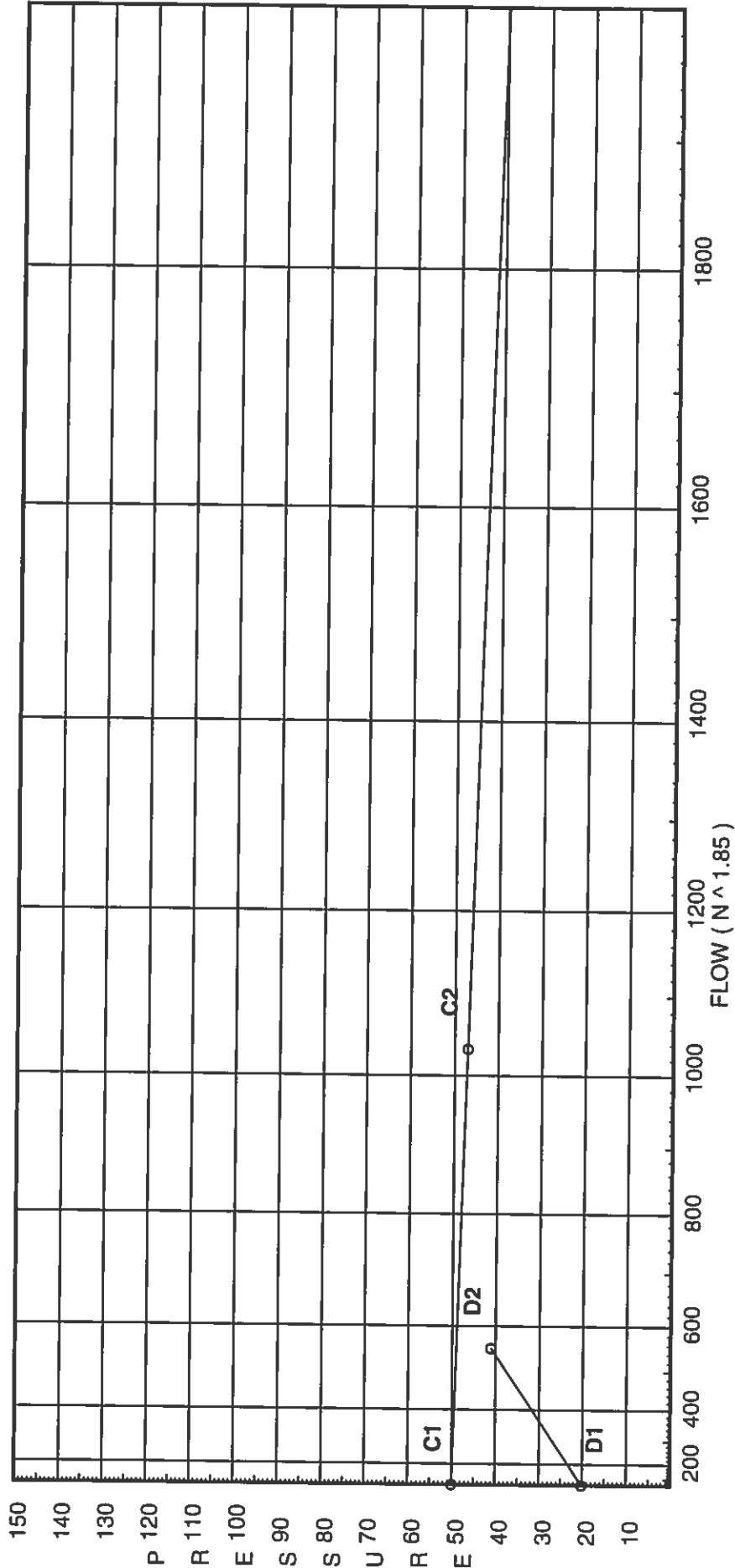
Name of contractor: EASTERN FIRE PROTECTION
Address: AUBURN, MAINE
Phone number: 207-784-1507
Name of designer: G.DUSSAULT
Authority having jurisdiction: MAINE STATE FIRE MARSHAL
Notes: (Include peaking information or gridded systems here.)

City Water Supply:

C1 - Static Pressure : 50
C2 - Residual Pressure: 47
C2 - Residual Flow : 1034

Demand:

D1 - Elevation : 20.139
D2 - System Flow : 552.894
D2 - System Pressure : 41.062
Hose (Demand) :
D3 - System Demand : 552.894
Safety Margin : 7.995



Fittings Used Summary

EASTERN FIRE PROTECTION
BUTLER SCHOOL APARTMENTS

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
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
Dge Dry Gem DPV-1							2.2	4.9		8.9		22								
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
I 90' Grnd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
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
U 45' Ell Firelock #003	0	0	0	0	0	1.8	2.2	2.6	0	3.4	4.2	5	5	0	0	0	0	0	0	0
V 90' Ell Firelock #001	0	0	0	0	0	3.5	4.3	5	0	6.8	8.5	10	13	0	0	0	0	0	0	0
Zca Colt C200 Horz Bull																				

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.

SUPPLY ANALYSIS

<i>Node at Source</i>	<i>Static Pressure</i>	<i>Residual Pressure</i>	<i>Flow</i>	<i>Available Pressure</i>	<i>Total Demand</i>	<i>Required Pressure</i>
TEST	50.0	47	1034.0	49.058	552.89	41.062

NODE ANALYSIS

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>
SP01	0.0	5.6	7.17	15.0	
SP02	0.0	5.6	7.17	15.0	
500	135.5	5.6	8.7	16.52	
501	135.5	5.6	8.75	16.57	
502	135.5	5.6	8.89	16.7	
503	135.5	5.6	9.18	16.97	
504	135.5	5.6	9.68	17.42	
505	135.5	5.42	11.13	18.08	K=K @ EQ01
506	135.5	5.14	12.23	17.97	K=K @ EQ02
507	135.5	5.42	14.5	20.63	K=K @ EQ01
550	135.5		14.57		
508	143.75	5.6	7.58	15.42	
509	143.75	5.6	7.63	15.47	
510	143.75	5.6	7.75	15.59	
511	143.75	5.6	8.0	15.84	
512	143.75	5.6	8.39	16.22	
513	143.75	5.6	8.98	16.78	
514	143.75	5.6	10.26	17.93	
515	143.75	5.6	10.29	17.97	
552	143.75		10.47		
516	148.5	5.6	7.17	15.0	
517	148.5	5.6	7.21	15.03	
518	148.5	5.6	7.31	15.14	
519	148.5	5.6	7.52	15.35	
520	148.5	5.6	7.77	15.61	
521	148.5	5.6	7.8	15.64	
522	148.5	5.6	7.92	15.76	
554	148.5		8.21		
532	137.0	5.6	13.59	20.64	
533	137.0	5.6	13.65	20.69	
534	137.0	5.6	7.58	15.42	
535	137.0	5.6	7.61	15.45	
536	137.0	5.6	7.77	15.61	
537	137.0	5.6	8.03	15.87	
538	137.0	5.6	8.47	16.29	
539	137.0	5.6	9.14	16.93	
540	137.0	5.6	9.99	17.7	
541	137.0	5.6	11.15	18.7	
556	137.0		13.87		

NODE ANALYSIS (cont.)

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>
551	131.5		17.61		
553	131.5		17.68		
555	131.5		17.9		
557	131.5		18.41		
574	131.5		20.37		
575	131.5		21.15		
DPV	125.5		24.11		
BOR2	120.5		26.76		
175	117.0		28.43		
75	98.0		36.75		
TOR	98.0		38.48		
BASE	92.0		44.43		
TEST	102.0		41.06		

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	*****
SP01 to EQ01	0 0	5.60	15.00 15.0	1 1.049	T	3.568 0.0 0.0	1.000 3.568 4.568	100	7.175 0.0 0.489		Vel = 5.57
EQ01			0.0 15.00						7.664	K Factor = 5.42	
SP02 to EQ02	0 0	5.60	15.00 15.0	1 1.049	T	3.568 0.0 0.0	9.000 3.568 12.568	100	7.175 0.0 1.346		Vel = 5.57
EQ02			0.0 15.00						8.521	K Factor = 5.14	
500 to 501	135.500 135.500	5.60	16.52 16.52	2 2.067	E	3.568 0.0 0.0	7.000 3.568 10.568	100	8.705 0.0 0.050		Vel = 1.58
501 to 502	135.500 135.500	5.60	16.57 33.09	2 2.067		0.0 0.0 0.0	8.000 0.0 8.000	100	8.755 0.0 0.136		Vel = 3.16
502 to 503	135.500 135.500	5.60	16.70 49.79	2 2.067		0.0 0.0 0.0	8.000 0.0 8.000	100	8.891 0.0 0.290		Vel = 4.76
503 to 504	135.500 135.500	5.60	16.97 66.76	2 2.067		0.0 0.0 0.0	8.000 0.0 8.000	100	9.181 0.0 0.498		Vel = 6.38
504 to 505	135.500 135.500	5.60	17.42 84.18	2 2.067	2E	7.137 0.0 0.0	8.000 7.137 15.137	100	9.679 0.0 1.449		Vel = 8.05
505 to 506	135.500 135.500	5.42	18.08 102.26	2 2.067		0.0 0.0 0.0	8.000 0.0 8.000	100	11.128 0.0 1.098	K = K @ EQ01	Vel = 9.78
506 to 550	135.500 135.500	5.14	17.96 120.22	2 2.067	T	7.137 0.0 0.0	5.500 7.137 12.637	100	12.226 0.0 2.339	K = K @ EQ02	Vel = 11.49
550			0.0 120.22						14.565	K Factor = 31.50	
507 to 550	135.500 135.500	5.42	20.63 20.63	2 2.067	T	7.137 0.0 0.0	2.500 7.137 9.637	100	14.497 0.0 0.068	K = K @ EQ01	Vel = 1.97
550 to 551	135.500 131.500		120.22 140.85	2.5 2.469	T	8.564 0.0 0.0	4.000 8.564 12.564	100	14.565 1.732 1.312		Vel = 9.44
551			0.0 140.85						17.609	K Factor = 33.57	
508 to 509	143.750 143.750	5.60	15.42 15.42	2 2.067	E	3.568 0.0 0.0	7.000 3.568 10.568	100	7.583 0.0 0.044		Vel = 1.47
509 to 510	143.750 143.750	5.60	15.47 30.89	2 2.067		0.0 0.0 0.0	8.000 0.0 8.000	100	7.627 0.0 0.120		Vel = 2.95

Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION
BUTLER SCHOOL APARTMENTS

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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	*****
510 to 511	143.750 143.750	5.60	15.58 46.47	2 2.067	0.0 0.0	8.000 0.0	100 0.0319	7.747 0.0		Vel = 4.44	
511 to 512	143.750 143.750	5.60	15.84 62.31	2 2.067	0.0 0.0	7.000 0.0	100 0.0549	8.002 0.0		Vel = 5.96	
512 to 513	143.750 143.750	5.60	16.22 78.53	2 2.067	0.0 0.0	7.000 0.0	100 0.0841	8.386 0.0		Vel = 7.51	
513 to 552	143.750 143.750	5.60	16.78 95.31	2 2.067	T 7.137 0.0	5.250 7.137	100 0.1205	8.975 0.0		Vel = 9.11	
552			0.0 95.31					10.468		K Factor = 29.46	
514 to 515	143.750 143.750	5.60	17.93 17.93	2 2.067	0.0 0.0	6.500 6.500	100 0.0055	10.256 0.0		Vel = 1.71	
515 to 552	143.750 143.750	5.60	17.97 35.9	2 2.067	T 7.137 0.0	1.750 7.137	100 0.0198	10.292 0.0		Vel = 3.43	
552 to 553	143.750 131.500		95.31 131.21	2.5 2.469	T 8.564 0.0	12.250 8.564	100 0.0916	10.468 5.305		Vel = 8.79	
553			0.0 131.21					17.679		K Factor = 31.21	
516 to 517	148.500 148.500	5.60	15.00 15.0	2 2.067	0.0 0.0	8.000 8.000	100 0.0039	7.175 0.0		Vel = 1.43	
517 to 518	148.500 148.500	5.60	15.03 30.03	2 2.067	0.0 0.0	7.000 0.0	100 0.0143	7.206 0.0		Vel = 2.87	
518 to 519	148.500 148.500	5.60	15.14 45.17	2 2.067	0.0 0.0	7.000 0.0	100 0.0303	7.306 0.0		Vel = 4.32	
519 to 554	148.500 148.500	5.60	15.35 60.52	2 2.067	T 7.137 0.0	6.250 7.137	100 0.0520	7.518 0.0		Vel = 5.79	
554			0.0 60.52					8.214		K Factor = 21.12	
520 to 521	148.500 148.500	5.60	15.61 15.61	2 2.067	0.0 0.0	8.000 8.000	100 0.0042	7.768 0.0		Vel = 1.49	
521 to 522	148.500 148.500	5.60	15.64 31.25	2 2.067	0.0 0.0	8.000 8.000	100 0.0152	7.802 0.0		Vel = 2.99	

Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION
BUTLER SCHOOL APARTMENTS

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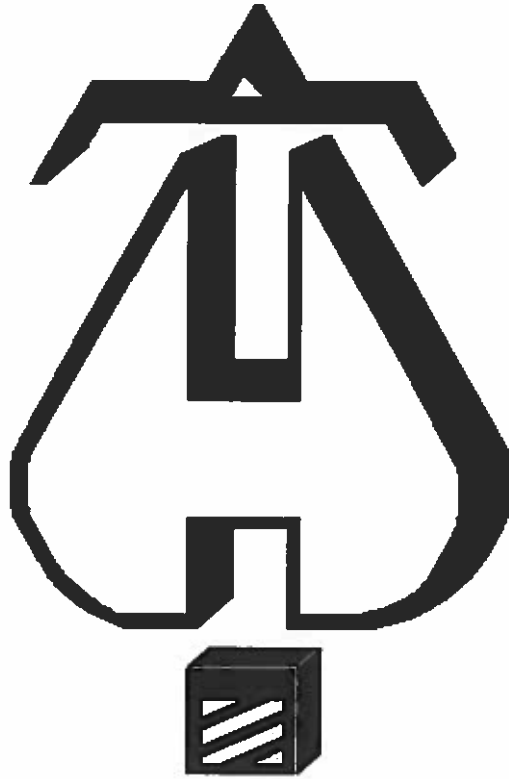
Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
522 to 554	148.500 148.500	5.60	15.76 47.01	2 2.067	T	7.137 0.0	1.750 7.137	100	7.924 0.0			
554 to 555	148.500 131.500		60.53 107.54	2.5 2.469	2E T	8.564 8.564 0.0	19.500 17.128 36.628	100	8.214 7.363 2.321	Vel = 4.49		
555			0.0 107.54						17.898		K Factor = 25.42	
532 to 533	137 137	5.60	20.64 20.64	2 2.067		0.0 0.0	8.000 0.0	100	13.588 0.0			
533 to 556	137 137	5.60	20.69 41.33	2 2.067	T	7.137 0.0	1.750 7.137	100	13.645 0.0	Vel = 1.97		
556			0.0 41.33						13.873		K Factor = 11.10	
534 to 535	137 137	5.60	15.42 15.42	2 2.067		0.0 0.0	8.000 0.0	100	7.580 0.0			
535 to 536	137 137	5.60	15.45 30.87	2 2.067	E	3.568 0.0	7.000 3.568	100	7.613 0.0	Vel = 1.47		
536 to 537	137 137	5.60	15.61 46.48	2 2.067		0.0 0.0	8.000 0.0	100	7.771 0.0	Vel = 2.95		
537 to 538	137 137	5.60	15.87 62.35	2 2.067		0.0 0.0	8.000 0.0	100	8.026 0.0	Vel = 4.44		
538 to 539	137 137	5.60	16.29 78.64	2 2.067		0.0 0.0	8.000 0.0	100	8.466 0.0	Vel = 5.96		
539 to 540	137 137	5.60	16.93 95.57	2 2.067		0.0 0.0	7.000 0.0	100	9.141 0.0	Vel = 7.52		
540 to 541	137 137	5.60	17.70 113.27	2 2.067		0.0 0.0	7.000 0.0	100	9.989 0.0	Vel = 9.14		
541 to 556	137 137	5.60	18.70 131.97	2 2.067	T	7.137 0.0	5.250 7.137	100	11.149 0.0	Vel = 10.83		
556 to 557	137 131.500		41.33 173.3	2.5 2.469	T	8.564 0.0	5.500 8.564	100	13.873 2.382	Vel = 12.62		
557			0.0 173.30			0.0	14.064	0.1532	2.155	Vel = 11.61		
									18.410		K Factor = 40.39	

Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION
BUTLER SCHOOL APARTMENTS

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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	*****
551 to 553	131.500 131.500		140.85 140.85	4 4.26		0.0 0.0	9.500 0.0	100	17.609 0.0			
553 to 555	131.500 131.500		131.21 272.06	4 4.26		0.0 0.0	8.830 8.830	100	17.679 0.219		Vel = 3.17	
555 to 557	131.500 131.500		107.54 379.6	4 4.26		0.0 0.0	11.170 11.170	100	17.898 0.512		Vel = 6.12	
557 to 574	131.500 131.500		173.29 552.89	4 4.26	T	18.795 0.0	2.500 18.795	100	18.410 0.0		Vel = 8.54	
574 to 575	131.500 131.500		0.0 552.89	6 6.357	2U T	8.974 26.921	23.500 35.895	100	20.370 0.0		Vel = 12.45	
575 to DPV	131.500 125.500		0.0 552.89	6 6.357	Dge	19.742 0.0	8.000 19.741	100	21.148 2.599		Vel = 5.59	
DPV to BOR2	125.500 120.500		0.0 552.89	6 6.357	B T	12.573 37.72	2.000 50.293	120	24.109 2.166		Vel = 5.59	
BOR2 to 175	120.500 117		0.0 552.89	6 6.357	I	12.573 0.0	4.000 12.573	120	26.764 1.516		Vel = 5.59	
175 to 75	117 98		0.0 552.89	6 6.357		0.0 0.0	9.500 0.0	120	28.434 8.229		Vel = 5.59	
75 to TOR	98 98		0.0 552.89	6 6.357	2T 3I	75.44 37.72	72.000 113.160	120	36.752 0.0		Vel = 5.59	
TOR to BASE	98 92		0.0 552.89	6 6.357	2V Zca	25.147 0.0	10.000 25.147	120	38.483 5.620		*** Fixed Loss = 3.021	
BASE to TEST	92 102		0.0 552.89	6 6.16	E G T	20.084 4.304 43.037	50.000 67.425 117.425	140	44.431 -4.331 0.962		Vel = 5.59	
TEST			0.0 552.89						41.062		K Factor = 86.28	



... Fire Protection by Computer Design

EASTERN FIRE PROTECTION
AUBURN, MAINE
207-784-1507

Job Name : BUTLER SCHOOL APARTMENTS
Building : WOOD FRAME
Location : PORTLAND, MAINE
System : 1
Contract : 5305
Data File : 5305 Butler School Apts 3rd fl.WXF

HYDRAULIC DESIGN INFORMATION SHEET

Name - BUTLER SCHOOL APARTMENTS Date - 6-15-15
Location - PORTLAND, MAINE
Building - WOOD FRAME System No. - 1
Contractor - EASTERN FIRE PROTECTION Contract No. - 5305
Calculated By - G.DUSSAULT Drawing No. - 3 OF 3
Construction: (X) Combustible () Non-Combustible Ceiling Height 8'
OCCUPANCY - DWELLING UNIT

S Type of Calculation: () NFPA 13 Residential (X) NFPA 13R () NFPA 13D
Y Number of Sprinklers Flowing: () 1 () 2 (X) 4 ()
S () Other
T () Specific Ruling Made by Date
E
M Listed Flow at Start Point - 16 Gpm System Type
Listed Pres. at Start Point - 13.3 Psi () Wet () Dry
D MAXIMUM LISTED SPACING 16 x 16 () Deluge () PreAction
E Domestic Flow Added - 0 Gpm Sprinkler or Nozzle
S Additional Flow Added - 0 Gpm Make RELIABLE Model FIRES44
I Elevation at Highest Outlet - 126' Feet Size 1/2" K-Factor 4.4
G Note: Temperature Rating 155
N

Calculation Gpm Required 71.118 Psi Required 44.825 At Test
Summary C-Factor Used: Overhead 120 Underground 140

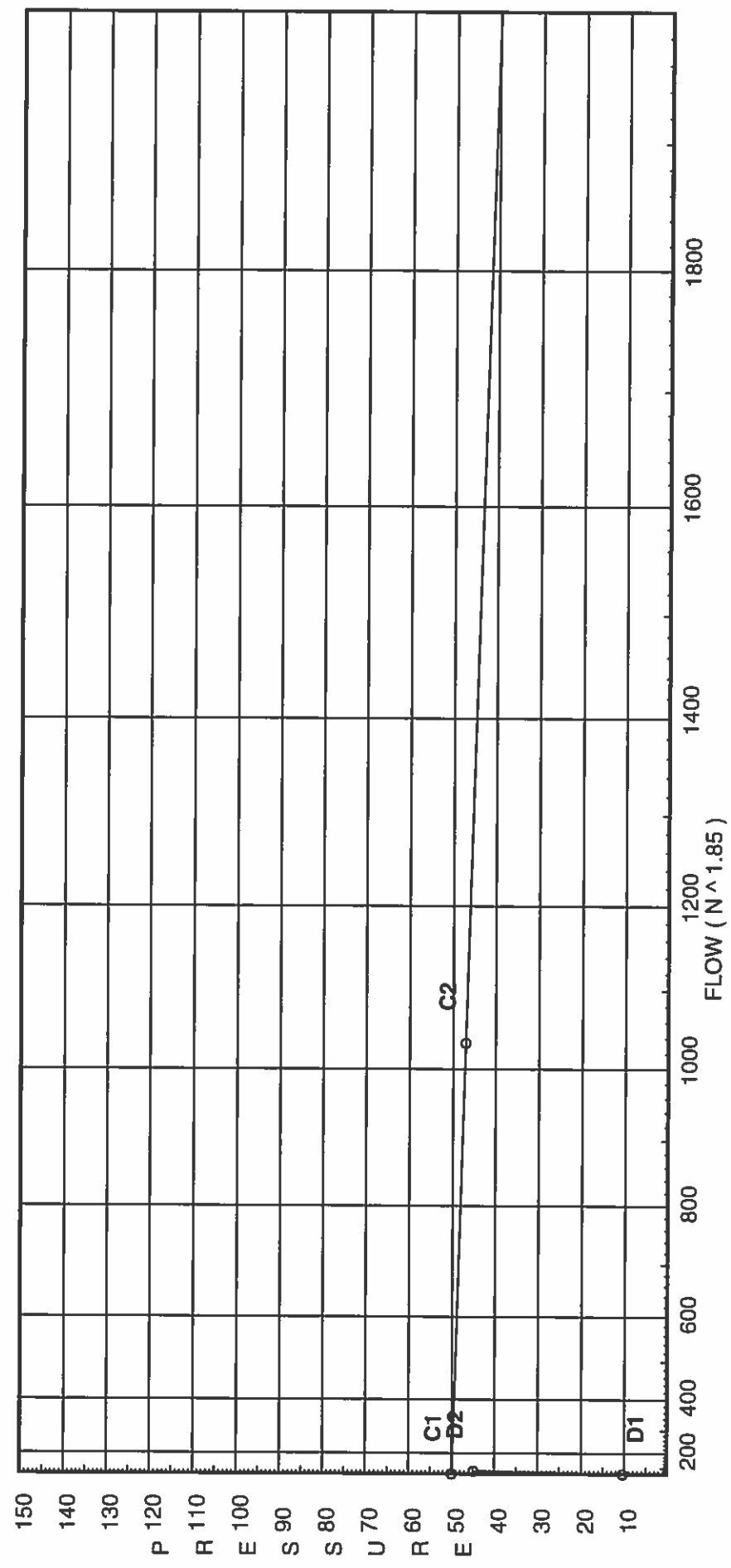
W Water Flow Test: Pump Data: Tank or Reservoir:
A Date of Test - 4-28-15 Rated Cap. Cap.
T Time of Test - 12:30 PM @ Psi Elev.
E Static (Psi) - 50 Elev.
R Residual (Psi) - 47 Other Well
Flow (Gpm) - 1034 Proof Flow Gpm
S Elevation - 102
P Location: SEE PLOT PLAN
P
L Source of Information: PORTLAND WATER DISTRICT
Y

water supply curve C

EASTERN FIRE PROTECTION
 BUTLER SCHOOL APARTMENTS

City Water Supply:
 C1 - Static Pressure : 50
 C2 - Residual Pressure: 47
 C2 - Residual Flow : 1034

Demand:
 D1 - Elevation : 10.394
 D2 - System Flow : 71.118
 D2 - System Pressure : 44.825
 Hose (Demand) : 71.118
 D3 - System Demand : 5.154
 Safety Margin : 5.154



Fittings Used Summary

EASTERN FIRE PROTECTION
BUTLER SCHOOL APARTMENTS

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 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
I 90' Grnd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
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
V 90' Ell Firelock #001	0	0	0	0	0	3.5	4.3	5	0	6.8	8.5	10	13	0	0	0	0	0	0	0
Zca Coll C200 Horz Butt	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.

SUPPLY ANALYSIS

<i>Node at Source</i>	<i>Static Pressure</i>	<i>Residual Pressure</i>	<i>Flow</i>	<i>Available Pressure</i>	<i>Total Demand</i>	<i>Required Pressure</i>
TEST	50.0	47	1034.0	49.979	71.12	44.825

NODE ANALYSIS

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>
300	126.0	4.4	13.3	16.05	
301	126.0	4.4	14.2	16.58	
302	126.0		17.85		
303	126.0	4.4	19.29	19.32	
304	126.0		20.02		
305	126.0	4.4	18.97	19.17	
306	126.0		21.2		
307	126.0		21.29		
350	126.0		21.18		
351	126.0		21.52		
352	126.0		27.32		
375	126.0		27.84		
BOR2	120.5		30.62		
175	117.0		32.14		
75	98.0		40.37		
TOR	98.0		40.41		
BASE	92.0		49.13		
TEST	102.0		44.82		

EASTERN FIRE PROTECTION
BUTLER SCHOOL APARTMENTS

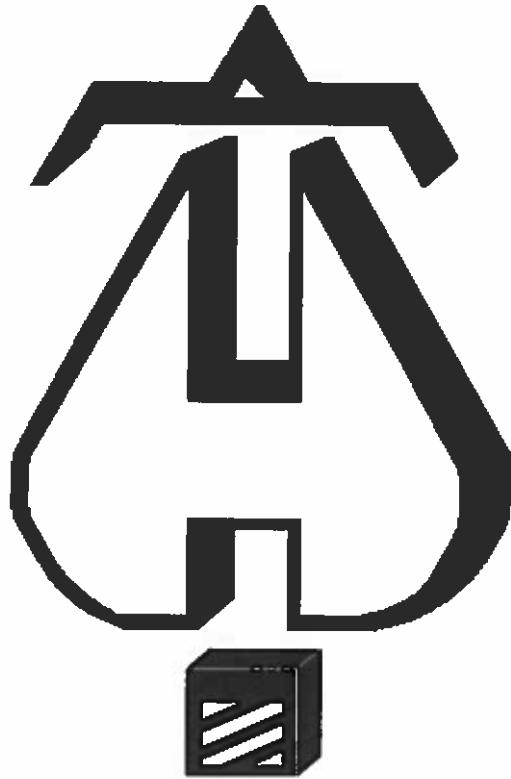
Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
300 to 301	126 126	4.40	16.05	1		0.0	10.417	120	13.300			
			16.05	1.049		0.0	0.0		0.0			
						0.0	10.417	0.0866	0.902	Vel =	5.96	
301 to 302	126 126	4.40	16.58	1	E	2.0	9.330	120	14.202			
						0.0	2.000		0.0			
			32.63	1.049		0.0	11.330	0.3218	3.646	Vel =	12.11	
302 to 304	126 126		0.0	1.25	2E	6.0	19.667	120	17.848			
						0.0	6.000		0.0			
			32.63	1.38		0.0	25.667	0.0847	2.173	Vel =	7.00	
			0.0									
304			32.63						20.021	K Factor =	7.29	
303 to 304	126 126	4.40	19.32	1	T	5.0	1.000	120	19.288			
						0.0	5.000		0.0			
			19.32	1.049		0.0	6.000	0.1222	0.733	Vel =	7.17	
304 to 350	126 126		32.63	1.5	T	8.0	4.250	120	20.021			
						0.0	8.000		0.0			
			51.95	1.61		0.0	12.250	0.0944	1.157	Vel =	8.19	
			0.0									
350			51.95						21.178	K Factor =	11.29	
305 to 306	126 126	4.40	19.17	1	E T	2.0	11.500	120	18.975			
						5.0	7.000		0.0			
			19.17	1.049		0.0	18.500	0.1203	2.225	Vel =	7.12	
306 to 307	126 126		0.0	1.25		0.0	2.830	120	21.200			
						0.0	0.0		0.0			
			19.17	1.38		0.0	2.830	0.0314	0.089	Vel =	4.11	
307 to 351	126 126		0.0	1.5	T	8.0	7.330	120	21.289			
						0.0	8.000		0.0			
			19.17	1.61		0.0	15.330	0.0149	0.229	Vel =	3.02	
			0.0									
351			19.17						21.518	K Factor =	4.13	
350 to 351	126 126		51.95	2	I	3.5	8.667	120	21.178			
						0.0	3.500		0.0			
			51.95	2.067		0.0	12.167	0.0279	0.340	Vel =	4.97	
351 to 352	126 126		19.17	2	4I T	14.0	92.000	120	21.518			
						10.0	24.000		0.0			
			71.12	2.067		0.0	116.000	0.0500	5.802	Vel =	6.80	
352 to 375	126 126		0.0	2.5	T	12.0	12.500	120	27.320			
						0.0	12.000		0.0			
			71.12	2.469		0.0	24.500	0.0211	0.516	Vel =	4.77	
375 to BOR2	126 120.500		0.0	2.5	T	12.0	7.000	120	27.836			
						0.0	12.000		2.382			
			71.12	2.469		0.0	19.000	0.0211	0.400	Vel =	4.77	
BOR2 to 175	120.500 117		0.0	6	I	12.573	4.000	120	30.618			
						0.0	12.573		1.516			
			71.12	6.357		0.0	16.573	0.0002	0.003	Vel =	0.72	

Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION
BUTLER SCHOOL APARTMENTS

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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	*****
175 to 75	117 98		0.0 71.12	6 6.357		0.0 0.0 9.500	120 0.0002	32.137 8.229 0.002			Vel = 0.72
75 to TOR	98 98		0.0 71.12	6 6.357	2T 3I 75.44 37.72 0.0	72.000 113.160 185.160	120 0.0002	40.368 0.0 0.039			Vel = 0.72
TOR to BASE	98 92		0.0 71.12	6 6.357	2V Zca 25.147 0.0 0.0	10.000 25.147 35.147	120 0.0002	40.407 8.720 0.007		** Fixed Loss = 6.121	Vel = 0.72
BASE to TEST	92 102		0.0 71.12	6 6.16	E G 20.084 4.304 43.037	50.000 67.425 117.425	140 0.0002	49.134 -4.331 0.022			Vel = 0.77
TEST			0.0 71.12					44.825			K Factor = 10.62



Fire Protection by Computer Design

EASTERN FIRE PROTECTION
AUBURN, MAINE
207-784-1507

Job Name : BUTLER SCHOOL APARTMENTS
Building :
Location : PORTLAND, MAINE
System : 1
Contract : 5305
Data File : 5305 Butler School Apts 3rd fl AREA 2.WXF

HYDRAULIC DESIGN INFORMATION SHEET

Name - BUTLER SCHOOL APARTMENTS Date - 6-15-15
Location - PORTLAND, MAINE
Building - System No. - 1
Contractor - EASTERN FIRE PROTECTION Contract No. - 5305
Calculated By - G.DUSSAULT Drawing No. - 3 OF 3
Construction: (X) Combustible () Non-Combustible Ceiling Height
OCCUPANCY - DWELLING UNIT

S Type of Calculation: () NFPA 13 Residential (X) NFPA 13R () NFPA 13D
Y Number of Sprinklers Flowing: () 1 () 2 (X) 4 ()
S () Other
T () Specific Ruling Made by Date
E
M Listed Flow at Start Point - 16 Gpm System Type
Listed Pres. at Start Point - 13.3 Psi (X) Wet () Dry
D MAXIMUM LISTED SPACING 16 x 16 () Deluge () PreAction
E Domestic Flow Added - 0 Gpm Sprinkler or Nozzle
S Additional Flow Added - 0 Gpm Make RELIABLE Model F1RES44
I Elevation at Highest Outlet - 124.50 Feet Size 1/2" K-Factor 4.4
G Note: Temperature Rating 155
N

Calculation Gpm Required 66.12 Psi Required At Test
Summary C-Factor Used: Overhead 120 Underground 140

W Water Flow Test: Pump Data: Tank or Reservoir:
A Date of Test - 4-28-15 Rated Cap. Cap.
T Time of Test - 12:30 PM @ Psi Elev.
E Static (Psi) - 50 Elev.
R Residual (Psi) - 47 Other Well
Flow (Gpm) - 1034 Proof Flow Gpm
S Elevation - 102

P Location: SEE PLOT PLAN

P
L Source of Information: PORTLAND WATER DISTRICT
Y

Water Supply Curve C

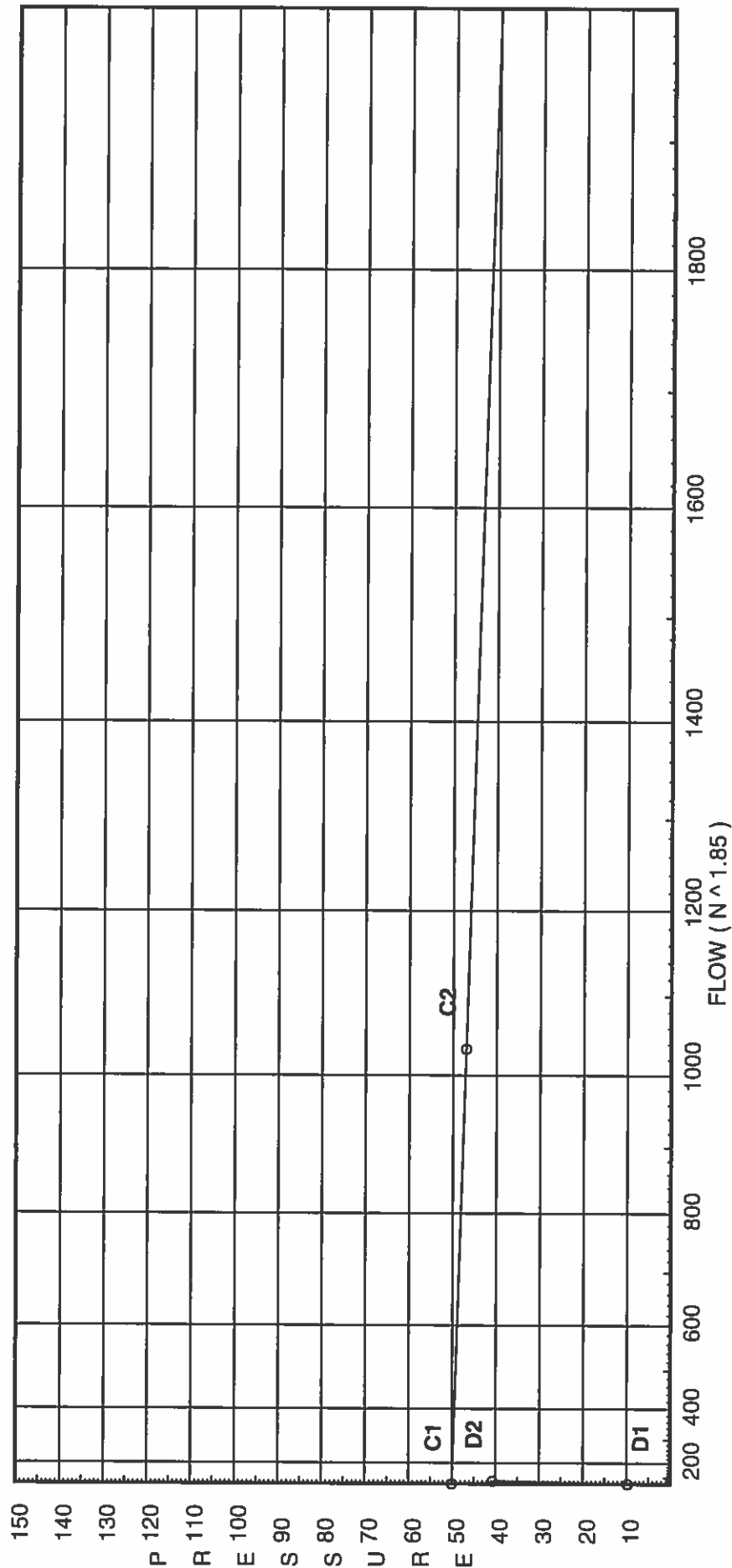
EASTERN FIRE PROTECTION
 BUTLER SCHOOL APARTMENTS

City Water Supply:

C1 - Static Pressure : 50
 C2 - Residual Pressure: 47
 C2 - Residual Flow : 1034

Demand:

D1 - Elevation : 9.745
 D2 - System Flow : 66.368
 D2 - System Pressure : 40.663
 Hose (Demand) :
 D3 - System Demand : 66.368
 Safety Margin : 9.318



Fittings Used Summary

EASTERN FIRE PROTECTION
BUTLER SCHOOL APARTMENTS

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	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
I	90' Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
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
V	90' Ell Firelock #001	0	0	0	0	0	3.5	4.3	5	0	6.8	8.5	10	13	0	0	0	0	0	0	0
Zca	Coll C200 Horz Butt	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.

SUPPLY ANALYSIS

<i>Node at Source</i>	<i>Static Pressure</i>	<i>Residual Pressure</i>	<i>Flow</i>	<i>Available Pressure</i>	<i>Total Demand</i>	<i>Required Pressure</i>
TEST	50.0	47	1034.0	49.981	66.37	40.663

NODE ANALYSIS

<i>Node Tag</i>	<i>Elevation</i>	<i>Node Type</i>	<i>Pressure at Node</i>	<i>Discharge at Node</i>	<i>Notes</i>
310	124.5	4.4	13.3	16.05	
311	124.5		14.67		
312	124.5	4.4	14.37	16.68	
313	124.5		14.93		
314	124.5	4.4	15.2	17.15	
315	124.5		15.78		
316	124.5	4.4	14.04	16.49	
317	124.5		16.45		
355	124.5		16.68		
380	124.5		19.04		
280	124.5		19.43		
180	115.5		23.75		
74	117.0		23.72		
75	98.0		36.3		
TOR	98.0		36.33		
BASE	92.0		44.98		
TEST	102.0		40.66		

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Fng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
310 to 311	124.500 124.500	4.40	16.05 16.05	1 1.049	E T	2.0 5.0 0.0	8.830 7.000 15.830	120 0.0866	13.300 0.0 1.371			Vel = 5.96
311 to 313	124.500 124.500		0.0 16.05	1.25 1.38	2E	6.0 0.0 0.0	5.500 6.000 11.500	120 0.0227	14.671 0.0 0.261			Vel = 3.44
313			0.0 16.05						14.932			K Factor = 4.15
312 to 313	124.500 124.500	4.40	16.68 16.68	1 1.049	T	5.0 0.0 0.0	1.000 5.000 6.000	120 0.0930	14.374 0.0 0.558			Vel = 6.19
313 to 315	124.500 124.500		16.05 32.73	1.25 1.38		0.0 0.0 0.0	10.000 0.0 10.000	120 0.0852	14.932 0.0 0.852			Vel = 7.02
315			0.0 32.73						15.784			K Factor = 8.24
314 to 315	124.500 124.500	4.40	17.15 17.15	1 1.049	T	5.0 0.0 0.0	1.000 5.000 6.000	120 0.0980	15.196 0.0 0.588			Vel = 6.37
315 to 355	124.500 124.500		32.73 49.88	1.5 1.61	T	8.0 0.0 0.0	2.250 8.000 10.250	120 0.0876	15.784 0.0 0.898			Vel = 7.86
355			0.0 49.88						16.682			K Factor = 12.21
316 to 317	124.500 124.500	4.40	16.49 16.49	1 1.049	2E T	4.0 5.0 0.0	17.500 9.000 26.500	120 0.0910	14.042 0.0 2.412			Vel = 6.12
317 to 355	124.500 124.500		0.0 16.49	1.25 1.38		0.0 0.0 0.0	9.500 0.0 9.500	120 0.0240	16.454 0.0 0.228			Vel = 3.54
355 to 380	124.500 124.500		49.88 66.37	2 2.067	3E T	15.0 10.0 0.0	28.500 25.000 53.500	120 0.0440	16.682 0.0 2.354			Vel = 6.35
380 to 280	124.500 124.500		0.0 66.37	2 2.067		0.0 0.0 0.0	9.000 0.0 9.000	120 0.0440	19.036 0.0 0.396			Vel = 6.35
280 to 180	124.500 115.500		0.0 66.37	2 2.067		0.0 0.0 0.0	9.500 0.0 9.500	120 0.0440	19.432 3.898 0.418			Vel = 6.35
180 to 74	115.500 117		0.0 66.37	2 2.067	E	5.0 0.0 0.0	9.000 5.000 14.000	120 0.0441	23.748 -0.650 0.617			Vel = 6.35
74 to 75	117 98		0.0 66.37	2 2.067	4I 2T	14.0 20.0 0.0	65.000 34.000 99.000	120 0.0440	23.715 8.229 4.357			Vel = 6.35

Final Calculations - Hazen-Williams

EASTERN FIRE PROTECTION
 BUTLER SCHOOL APARTMENTS

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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	*****
75 to TOR	98 98		0.0 66.37	6 6.357	2T 2I	75.44 25.147 0.0	44.000 100.587 144.587	120 0.0002	36.301 0.0 0.027		Vel = 0.67	
TOR to BASE	98 92		0.0 66.37	6 6.357	2V Zca	25.147 0.0 0.0	10.000 25.147 35.147	120 0.0002	36.328 8.641 0.006		** Fixed Loss = 6.042 Vel = 0.67	
BASE to TEST	92 102		0.0 66.37	6 6.16	E G T	20.084 4.304 43.037	50.000 67.425 117.425	140 0.0002	44.975 -4.331 0.019		Vel = 0.71	
TEST			0.0 66.37						40.663		K Factor = 10.41	