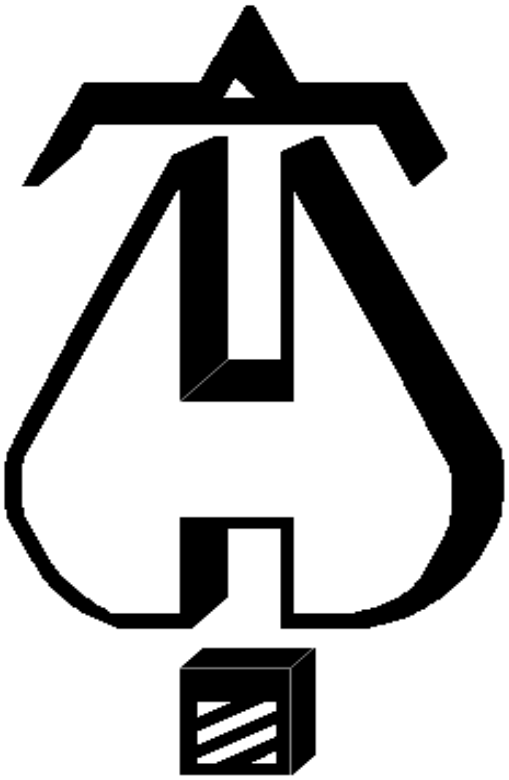

. . . Fire Protection by Computer Design

Dean and Allyn Inc
116 Lewiston Road
Gray ME, 04039
(207)657-5646

Job Name : MAINE MEDICAL CENTER
Building : PAVILION A 4.5TH FLOOR
Location : AREA 1
System : WET
Contract : C151305
Data File : C1305 4.5 rev2.WXF

Hydraulic Design Information Sheet

Name - MAINE MEDICAL CENTER
Date - 11/25/15
Location - AREA 1
Building - PAVILION A 4.5TH FLOOR
System No. - WET
Contractor - DEAN & ALLYN INC
Contract No. - C151305
Calculated By - S. COTE
Drawing No. - 1 OF 5
Construction: ( ) Combustible (X) Non-Combustible
Ceiling Height - VARIES
Occupancy - NFPA 13 ORDINARY HAZARD (FM HC-2)

SYSTEM DESIGN

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

Area of Sprinkler Operation - 2500	System Type	Sprinkler/Nozzle
Density - .15	(X) Wet	Make RELIABLE
Area Per Sprinkler - VAIRES	( ) Dry	Model F1FR56
Elevation at Highest Outlet - 56.166	( ) Deluge	Size 1/2"
Hose Allowance - Inside - -	( ) Preaction	K-Factor 5.6
Rack Sprinkler Allowance - -	( ) Other	Temp.Rat.200
Hose Allowance - Outside - 100		

Note

Calculation Summary: Flow Required - 542.144 Press Required - 165.888
C-Factor Used: 120 Overhead 140 Underground

WATER SUPPLY

Water Flow Test:	Pump Data:	Tank or Reservoir:
Date of Test - 2015		Cap. -
Time of Test - AM	Rated Cap.-	Elev.-
Static Press - 210	@ Press -	
Residual Press - 180	Elev. -	Well
Flow - 1467		Proof Flow
Elevation -		

Location -

Source of Information - DEAN & ALLYN INC FIRE PUMP TEST

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

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	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
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	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
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.

Pressure / Flow Summary - STANDARD

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
50	56.0	5.6	20.18	na	25.16	0.15	114	7.0
51	56.0	5.6	22.47	na	26.55	0.15	114	7.0
52	56.0	5.6	27.63	na	29.44	0.15	122	7.0
53	56.0	5.6	36.67	na	33.91	0.15	126	7.0
54	56.0	5.6	11.03	na	18.6	0.15	124	7.0
55	56.0	5.6	11.03	na	18.6	0.15	124	7.0
56	56.0	5.6	13.19	na	20.34	0.15	124	7.0
57	56.0	5.6	15.5	na	22.04	0.15	114	7.0
58	56.0	5.6	23.72	na	27.27	0.15	124	7.0
59	56.0	5.6	40.81	na	35.77	0.15	124	7.0
60	55.5	5.6	11.56	na	19.04	0.15	115	7.0
61	55.25	5.6	12.86	na	20.08	0.15	115	7.0
62	55.25	5.6	14.2	na	21.1	0.15	115	7.0
63	55.25	5.6	17.17	na	23.2	0.15	115	7.0
64	56.083	5.6	24.24	na	27.57	0.15	115	7.0
65	56.083	5.6	31.19	na	31.27	0.15	115	7.0
66	56.166	5.6	11.38	na	18.89	0.15	115	7.0
67	56.166	5.6	11.7	na	19.16	0.15	115	7.0
68	56.166	5.6	12.86	na	20.09	0.15	115	7.0
69	56.166	5.6	15.42	na	21.99	0.15	115	7.0
70	56.166	5.6	27.38	na	29.3	0.15	115	7.0
71	56.166	5.6	34.25	na	32.77	0.15	115	7.0
500	55.5		20.89	na				
501	55.5		23.9	na				
502	55.5		29.31	na				
503	55.5		38.79	na				
54A	53.25		13.15	na				
508	53.25		13.48	na				
509	54.333		15.39	na				
510	54.333		17.93	na				
511	54.333		26.98	na				
512	54.083		45.2	na				
507A	54.083		21.57	na				
60A	55.25		12.31	na				
515	55.25		26.62	na				
516	55.25		34.1	na				
601A	56.083		64.21	na				
517	55.333		12.89	na				
519	55.333		13.24	na				
520	55.333		14.51	na				
521	55.333		17.3	na				
522	55.333		30.32	na				
525	55.333		37.61	na				
600A	55.333		74.45	na				
518A	55.333		20.87	na				
523	55.5		21.55	na				
507	55.25		21.11	na				
524	55.25		21.08	na				
514	55.25		21.02	na				
600	54.083		82.71	na				
601	54.083		82.88	na				
603	54.083		83.9	na				
604	54.083		84.09	na				
605	54.083		84.35	na				
606	54.083		100.1	na				
607	55.625		116.67	na				
122	49.291		121.58	na				
75	-1.666		147.56	na				
TI	-3.5		157.96	na				
109	-8.5		161.11	na				
BR	-8.5		162.2	na				
TEST	-16.51		165.89	na				

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.

The maximum velocity is 28.8 and it occurs in the pipe between nodes 503 and 603

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
50	25.16	1.049	E	2.0	0.500	20.180		K Factor = 5.60
to		120.0		0.0	2.000	0.217		
500	25.16	0.1988		0.0	2.500	0.497		Vel = 9.34
	0.0							
	25.16					20.894		K Factor = 5.50
51	26.55	1.049	T	5.0	0.500	22.472		K Factor = 5.60
to		120.0		0.0	5.000	0.217		
501	26.55	0.2196		0.0	5.500	1.208		Vel = 9.86
	0.0							
	26.55					23.897		K Factor = 5.43
52	29.44	1.049	T	5.0	0.500	27.632		K Factor = 5.60
to		120.0		0.0	5.000	0.217		
502	29.44	0.2660		0.0	5.500	1.463		Vel = 10.93
	0.0							
	29.44					29.312		K Factor = 5.44
53	33.91	1.049	T	5.0	0.500	36.673		K Factor = 5.60
to		120.0		0.0	5.000	0.217		
503	33.91	0.3455		0.0	5.500	1.900		Vel = 12.59
	0.0							
	33.91					38.790		K Factor = 5.44
54	18.60	1.049	2E	4.0	4.080	11.035		K Factor = 5.60
to		120.0		0.0	4.000	1.191		
54A	18.6	0.1137		0.0	8.080	0.919		Vel = 6.90
	0.0							
	18.60					13.145		K Factor = 5.13
55	18.60	1.049	E	2.0	4.080	11.032		K Factor = 5.60
to		120.0	T	5.0	7.000	1.191		
508	18.6	0.1138		0.0	11.080	1.261		Vel = 6.90
	0.0							
	18.60					13.484		K Factor = 5.07
56	20.34	1.049	E	2.0	4.000	13.188		K Factor = 5.60
to		120.0	T	5.0	7.000	0.722		
509	20.34	0.1343		0.0	11.000	1.477		Vel = 7.55
	0.0							
	20.34					15.387		K Factor = 5.19
57	22.04	1.049	E	2.0	4.000	15.496		K Factor = 5.60
to		120.0	T	5.0	7.000	0.722		
510	22.04	0.1558		0.0	11.000	1.714		Vel = 8.18
	0.0							
	22.04					17.932		K Factor = 5.20
58	27.27	1.049	E	2.0	4.000	23.715		K Factor = 5.60
to		120.0	T	5.0	7.000	0.722		
511	27.27	0.2310		0.0	11.000	2.541		Vel = 10.12
	0.0							
	27.27					26.978		K Factor = 5.25
59	35.77	1.049	E	2.0	2.333	40.809		K Factor = 5.60
to		120.0	T	5.0	7.000	0.830		
512	35.77	0.3817		0.0	9.333	3.562		Vel = 13.28

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
	0.0							
	35.77					45.201		K Factor = 5.32
60	19.04	1.097	T	6.217	0.500	11.556		K Factor = 5.60
to		120.0		0.0	6.217	0.108		
60A	19.04	0.0956		0.0	6.717	0.642		Vel = 6.46
	0.0							
	19.04					12.306		K Factor = 5.43
61	39.12	1.442		0.0	14.000	12.860		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
62	39.12	0.0956		0.0	14.000	1.338		Vel = 7.69
62	21.10	1.442		0.0	14.000	14.198		K Factor = 5.60
to		120.0		0.0	0.0	0.0		
63	60.22	0.2123		0.0	14.000	2.972		Vel = 11.83
63	23.20	1.442	T	7.432	2.500	17.170		K Factor = 5.60
to		120.0		0.0	7.432	0.0		
514	83.42	0.3880		0.0	9.932	3.854		Vel = 16.39
	0.0							
	83.42					21.024		K Factor = 18.19
64	27.57	1.049	E	2.0	1.583	24.237		K Factor = 5.60
to		120.0	T	5.0	7.000	0.361		
515	27.57	0.2356		0.0	8.583	2.022		Vel = 10.23
	0.0							
	27.57					26.620		K Factor = 5.34
65	31.27	1.049	E	2.0	1.583	31.186		K Factor = 5.60
to		120.0	T	5.0	7.000	0.361		
516	31.27	0.2976		0.0	8.583	2.554		Vel = 11.61
	0.0							
	31.27					34.101		K Factor = 5.35
66	18.89	1.049	E	2.0	2.803	11.383		K Factor = 5.60
to		120.0	T	5.0	7.000	0.361		
517	18.89	0.1171		0.0	9.803	1.148		Vel = 7.01
	0.0							
	18.89					12.892		K Factor = 5.26
67	19.16	1.049	E	2.0	2.803	11.701		K Factor = 5.60
to		120.0	T	5.0	7.000	0.361		
519	19.16	0.1202		0.0	9.803	1.178		Vel = 7.11
	0.0							
	19.16					13.240		K Factor = 5.27
68	20.09	1.049	E	2.0	2.803	12.865		K Factor = 5.60
to		120.0	T	5.0	7.000	0.361		
520	20.09	0.1311		0.0	9.803	1.285		Vel = 7.46
	0.0							
	20.09					14.511		K Factor = 5.27
69	21.99	1.049	E	2.0	2.803	15.416		K Factor = 5.60
to		120.0	T	5.0	7.000	0.361		
521	21.99	0.1550		0.0	9.803	1.519		Vel = 8.16
	0.0							

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
	21.99					17.296		K Factor = 5.29
70	29.30	1.049	E	2.0	2.803	27.376		K Factor = 5.60
to		120.0	T	5.0	7.000	0.361		
522	29.3	0.2637		0.0	9.803	2.585		Vel = 10.88
	0.0							
	29.30					30.322		K Factor = 5.32
71	32.77	1.097	E	2.487	2.803	34.251		K Factor = 5.60
to		120.0	T	6.217	8.704	0.361		
525	32.77	0.2610		0.0	11.507	3.003		Vel = 11.12
	0.0							
	32.77					37.615		K Factor = 5.34
500	25.16	1.442	T	7.432	8.083	20.894		
to		120.0		0.0	7.432	0.0		
523	25.16	0.0422		0.0	15.515	0.655		Vel = 4.94
	0.0							
	25.16					21.549		K Factor = 5.42
501	-56.73	1.442	T	7.432	4.916	23.897		
to		120.0		0.0	7.432	0.0		
523	-56.73	-0.1902		0.0	12.348	-2.348		Vel = 11.14
	0.0							
	-56.73					21.549		K Factor = -12.22
501	83.27	1.442		0.0	14.000	23.897		
to		120.0		0.0	0.0	0.0		
502	83.27	0.3868		0.0	14.000	5.415		Vel = 16.36
502	29.44	1.442		0.0	14.000	29.312		
to		120.0		0.0	0.0	0.0		
503	112.71	0.6770		0.0	14.000	9.478		Vel = 22.14
503	33.91	1.442	E	3.716	29.250	38.790		
to		120.0	T	7.432	11.148	0.614		
603	146.62	1.1015		0.0	40.398	44.497		Vel = 28.80
	0.0							
	146.62					83.901		K Factor = 16.01
54A	18.60	1.442		0.0	14.000	13.145		
to		120.0		0.0	0.0	0.0		
508	18.6	0.0242		0.0	14.000	0.339		Vel = 3.65
508	18.60	1.442	3E	11.148	16.083	13.484		
to		120.0		0.0	11.148	-0.469		
509	37.2	0.0871		0.0	27.231	2.372		Vel = 7.31
509	20.34	1.442		0.0	13.041	15.387		
to		120.0		0.0	0.0	0.0		
510	57.54	0.1952		0.0	13.041	2.545		Vel = 11.30
510	22.04	1.442	T	7.432	2.500	17.932		
to		120.0		0.0	7.432	0.108		
507A	79.58	0.3556		0.0	9.932	3.532		Vel = 15.63
	0.0							
	79.58					21.572		K Factor = 17.13
511	-71.44	1.442	T	7.432	11.500	26.978		
to		120.0		0.0	7.432	0.108		
507A	-71.44	-0.2913		0.0	18.932	-5.514		Vel = 14.03

Final Calculations - Hazen-Williams

Dean and Allyn Inc
MAINE MEDICAL CENTER

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
	0.0							
	-71.44					21.572		K Factor = -15.38
512	-98.71	1.442	4E	14.864	19.333	45.201		
to		120.0		0.0	14.864	-0.108		
511	-98.71	-0.5297		0.0	34.197	-18.115		Vel = 19.39
	0.0							
	-98.71					26.978		K Factor = -19.00
512	134.48	1.442	T	7.432	34.000	45.201		
to		120.0		0.0	7.432	0.0		
604	134.48	0.9387		0.0	41.432	38.891		Vel = 26.42
	0.0							
	134.48					84.092		K Factor = 14.66
507A	8.15	1.442	T	7.432	0.916	21.572		
to		120.0		0.0	7.432	-0.505		
507	8.15	0.0053		0.0	8.348	0.044		Vel = 1.60
	0.0							
	8.15					21.111		K Factor = 1.77
60A	19.04	1.442	2E	7.432	14.500	12.306		
to		120.0		0.0	7.432	0.0		
61	19.04	0.0253		0.0	21.932	0.554		Vel = 3.74
	0.0							
	19.04					12.860		K Factor = 5.31
515	-71.60	1.442	T	7.432	11.500	26.620		
to		120.0		0.0	7.432	0.0		
524	-71.6	-0.2925		0.0	18.932	-5.538		Vel = 14.07
	0.0							
	-71.60					21.082		K Factor = -15.59
515	99.17	1.442		0.0	14.000	26.620		
to		120.0		0.0	0.0	0.0		
516	99.17	0.5344		0.0	14.000	7.481		Vel = 19.48
516	31.28	1.442	2E	7.432	26.916	34.101		
to		120.0		0.0	7.432	-0.361		
601A	130.45	0.8872		0.0	34.348	30.475		Vel = 25.63
601A	0.0	1.442	E	3.716	8.916	64.215		
to		120.0	T	7.432	11.148	0.866		
601	130.45	0.8872		0.0	20.064	17.801		Vel = 25.63
	0.0							
	130.45					82.882		K Factor = 14.33
517	18.89	1.442		0.0	14.000	12.892		
to		120.0		0.0	0.0	0.0		
519	18.89	0.0249		0.0	14.000	0.348		Vel = 3.71
519	19.16	1.442		0.0	14.000	13.240		
to		120.0		0.0	0.0	0.0		
520	38.05	0.0908		0.0	14.000	1.271		Vel = 7.48
520	20.09	1.442		0.0	14.000	14.511		
to		120.0		0.0	0.0	0.0		
521	58.14	0.1989		0.0	14.000	2.785		Vel = 11.42

Hyd. Ref. Point	Qa / Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
521	21.98	1.442	T	7.432	2.500	17.296		
to		120.0		0.0	7.432	0.0		
518A	80.12	0.3601		0.0	9.932	3.577		Vel = 15.74
	0.0							
	80.12					20.873		K Factor = 17.54
522	-68.52	1.442	4E	14.864	12.750	30.322		
to		120.0	T	7.432	22.296	0.0		
518A	-68.52	-0.2696		0.0	35.046	-9.449		Vel = 13.46
	0.0							
	-68.52					20.873		K Factor = -15.00
522	97.82	1.442		0.0	14.000	30.322		
to		120.0		0.0	0.0	0.0		
525	97.82	0.5209		0.0	14.000	7.293		Vel = 19.22
525	32.77	1.442	T	7.432	34.000	37.615		
to		120.0		0.0	7.432	0.0		
600A	130.59	0.8891		0.0	41.432	36.836		Vel = 25.65
600A	0.0	1.442	T	7.432	1.250	74.451		
to		120.0		0.0	7.432	0.541		
600	130.59	0.8892		0.0	8.682	7.720		Vel = 25.65
	0.0							
	130.59					82.712		K Factor = 14.36
518A	11.60	1.442	T	7.432	0.833	20.873		
to		120.0		0.0	7.432	23.965		
518	11.6	0.0100		0.0	8.265	0.083		Vel = 2.28
	0.0							
	11.60					44.921		K Factor = 1.73
523	-31.57	2.157	7E	43.073	17.375	21.549		
to		120.0		0.0	43.074	0.108		
507	-31.57	-0.0090		0.0	60.449	-0.546		Vel = 2.77
507	8.15	2.157		0.0	5.458	21.111		
to		120.0		0.0	0.0	0.0		
524	-23.42	-0.0053		0.0	5.458	-0.029		Vel = 2.06
524	-71.61	2.157		0.0	0.833	21.082		
to		120.0		0.0	0.0	0.0		
514	-95.03	-0.0696		0.0	0.833	-0.058		Vel = 8.34
514	83.43	2.157	2E	12.307	10.291	21.024		
to		120.0		0.0	12.307	23.929		
518	-11.6	-0.0014		0.0	22.598	-0.032		Vel = 1.02
	0.0							
	-11.60					44.921		K Factor = -1.73
600	130.59	3.26		0.0	10.208	82.712		
to		120.0		0.0	0.0	0.0		
601	130.59	0.0167		0.0	10.208	0.170		Vel = 5.02
601	130.45	3.26	T	20.159	4.208	82.882		
to		120.0		0.0	20.159	0.0		
605	261.04	0.0603		0.0	24.367	1.469		Vel = 10.03
	0.0							

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
	261.04					84.351		K Factor = 28.42
603	146.62	3.26		0.0	9.208	83.901		
to		120.0		0.0	0.0	0.0		
604	146.62	0.0207		0.0	9.208	0.191		Vel = 5.64
604	134.48	3.26		0.0	3.750	84.092		
to		120.0		0.0	0.0	0.0		
605	281.1	0.0691		0.0	3.750	0.259		Vel = 10.80
605	261.04	3.26	T	20.159	47.416	84.351		
to		120.0		0.0	20.159	0.0		
606	542.14	0.2330		0.0	67.575	15.747		Vel = 20.84
606	0.0	3.26	T	20.159	6.000	100.098		
to		120.0	B	13.44	55.102	2.332		* * Fixed Loss = 3
607	542.14	0.2330	S	21.503	61.102	14.238		Vel = 20.84
			Fsp	0.0				
	0.0							
	542.14					116.668		K Factor = 50.19
607	542.14	4.26	T	26.334	8.000	116.668		
to		120.0		0.0	26.334	2.743		
122	542.14	0.0633		0.0	34.334	2.174		Vel = 12.20
122	0.0	4.26	G	2.633	19.500	121.585		
to		120.0	3E	39.501	42.134	22.070		
75	542.14	0.0633		0.0	61.634	3.902		Vel = 12.20
75	0.0	4.26	8E	105.337	20.000	147.557		
to		120.0	T	26.334	131.671	0.794		
TI	542.14	0.0633		0.0	151.671	9.604		Vel = 12.20
	0.0							
	542.14					157.955		K Factor = 43.14
TI	542.14	6.065	T	30.0	57.000	157.955		
to		120.0		0.0	30.000	2.166		
109	542.14	0.0113		0.0	87.000	0.986		Vel = 6.02
109	0.0	6.065	Fsp	0.0	5.000	161.107		
to		120.0	G	3.0	3.000	1.000		* * Fixed Loss = 1
BR	542.14	0.0114		0.0	8.000	0.091		Vel = 6.02
BR	0.0	6.065	E	14.0	5.500	162.198		
to		120.0		0.0	14.000	3.469		
TEST	542.14	0.0113		0.0	19.500	0.221		Vel = 6.02
	0.0							
	542.14					165.888		K Factor = 42.09

Water Supply Curve C

Dean and Allyn Inc
MAINE MEDICAL CENTER

Date 11/25/15

City Water Supply:
- C1 - Static Pressure : 210
- C2 - Residual Pressure: 180
- C2 - Residual Flow : 1467

Demand:
- D1 - Elevation : 31.404
- D2 - System Flow : 542.144
- D2 - System Pressure : 165.888
- Hose (Demand) : _____
- D3 - System Demand : 542.144
- Safety Margin : 39.355