

AFT Fathom Model

General

Title: AFT Fathom Model

Analysis run on: 12/5/2011 4:46:30 PM

Application version: AFT Fathom Version 7.0 (2008.02.22)

Input File: H:\Projects\University of Wisconsin\10723-00 Platteville Master Plan\Mechanical\Flow Modeling\Flow Modeling AFT Files 12-2-11\Chilled Water\UWP Chilled Water Phase 3.fth

Execution Time= 0.28 seconds

Total Number Of Head/Pressure Iterations= 0

Total Number Of Flow Iterations= 2

Total Number Of Temperature Iterations= 0

Number Of Pipes= 153

Number Of Junctions= 138

Matrix Method= Gaussian Elimination

Pressure/Head Tolerance= 0.0001 relative change

Flow Rate Tolerance= 0.0001 relative change

Flow Relaxation= (Automatic)

Pressure Relaxation= (Automatic)

Constant Fluid Property Model

Fluid Database: AFT Standard

Fluid: Water at 1 atm

Max Fluid Temperature Data= 212 deg. F

Min Fluid Temperature Data= 32 deg. F

Temperature= 40 deg. F

Density= 62.42849 lbm/ft³

Viscosity= 3.74836 lbm/hr-ft

Vapor Pressure= 0.12037 psia

Viscosity Model= Newtonian

Atmospheric Pressure= 1 atm

Gravitational Acceleration= 1 g

Turbulent Flow Above Reynolds Number= 4000

Laminar Flow Below Reynolds Number= 2300

Total Inflow= 2.001 gal/min

Total Outflow= 2.003 gal/min

Maximum Pressure is 75.58 psia at Junction 152 Outlet

Minimum Pressure is 12.70 psia at Junction 152 Inlet

Pump Summary

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Jct	Name	Vol. Flow (gal/min)	Mass Flow (lbm/sec)	dP (ft. H2O std.)	dH (feet)	Overall Efficiency (Percent)	Speed (Percent)	Overall Power (hp)	BEP (gal/min)	% of BEP (Percent)	NPSHA (feet)	NPSHR (feet)
12	Russell Hall Chilled Water Plant Pump	2,400	333.8	136.9	136.9	100.0	N/A	83.09	N/A	N/A	33.71	N/A
152	F1 Chiller Plant Pump	5,142	715.2	145.0	145.0	100.0	N/A	188.57	N/A	N/A	29.73	N/A

Valve Summary

Jct	Name	Valve Type	Vol. Flow (gal/min)	Mass Flow (lbm/sec)	dP Stag. (ft. H2O std.)	dH (feet)	P Inlet Static (psia)	Cv	K	Valve State
26	Karrmann Library Load	FCV	230.00	31.99	46.8023	46.8019	56.90	51.08	398.2004	Open
27	Karrmann Library Head Loss	PDCV	230.00	31.99	46.0004	46.0000	36.60	51.53	391.3778	Open
58	Center for the Arts Head Loss	PDCV	584.00	81.23	46.0004	46.0000	43.37	130.83	60.7052	Open
59	Center for the Arts Load	FCV	584.00	81.23	14.2827	14.2825	49.57	234.79	18.8484	Open
62	Russell Hall Head Loss	PDCV	704.00	97.92	46.0004	46.0000	34.93	157.71	119.9717	Open
63	Russell Hall Load	FCV	704.00	97.92	53.9835	53.9830	58.34	145.59	140.7922	Open
72	Boebel Hall Head Loss	PDCV	584.00	81.23	46.0004	46.0000	35.67	130.83	60.7052	Open
73	Boebel Hall Load	FCV	584.00	81.23	49.9617	49.9613	57.55	125.54	189.3539	Open
90	Ullsvik Hall Load	FCV	548.00	76.22	0.3271	0.3271	46.54	1,455.95	0.4259	Open
91	Ullsvik Center Head Loss	PDCV	548.00	76.22	46.0004	46.0000	46.39	122.77	59.8953	Open
96	Ullrich Hall Head Loss	PDCV	150.00	20.86	46.0004	46.0000	42.56	33.60	195.8364	Open
97	Ullrich Hall Load	FCV	150.00	20.86	19.0970	19.0969	50.84	52.15	81.3014	Open
100	Art Building Load	FCV	96.00	13.35	18.1581	18.1579	50.70	34.23	188.7304	Open
101	Art Building Head Loss	PDCV	96.00	13.35	46.0004	46.0000	42.82	21.51	478.1162	Open
108	Doudna Hall Load	FCV	404.00	56.19	28.1498	28.1495	52.75	115.70	77.6251	Open
109	Doudna Hall Head Loss	PDCV	404.00	56.19	46.0004	46.0000	40.54	90.51	126.8496	Open
112	Pioneer Student Center/S9/S10 Load	FCV	938.00	130.47	46.4271	46.4267	56.60	209.17	68.2070	Open
113	Pioneer Student Center/S9/S10 Head Loss	PDCV	938.00	130.47	46.0004	46.0000	36.47	210.14	67.5801	Open
120	A7 Load	FCV	460.00	63.98	14.1355	14.1354	49.66	185.90	30.0667	Open
121	A7 Head Loss	PDCV	460.00	63.98	46.0004	46.0000	43.53	103.05	97.8445	Open
132	Williams Fieldhouse Load	FCV	434.00	60.37	58.1734	58.1729	59.26	86.46	139.0065	Open
133	Williams Fieldhouse Head Loss	PDCV	434.00	60.37	46.0004	46.0000	34.04	97.23	109.9189	Open
136	AR1/AR2 Load	FCV	248.00	34.49	59.0408	59.0403	59.57	49.04	432.0551	Open
137	AR1/AR2 Head Loss	PDCV	248.00	34.49	46.0004	46.0000	33.97	55.56	336.6267	Open
146	Ottensman Hall Load	FCV	900.00	125.18	46.0571	46.0568	56.55	201.50	73.4979	Open
147	Ottensman Hall Head Loss	PDCV	900.00	125.18	46.0004	46.0000	36.57	201.62	73.4073	Open
150	A2 Head Loss	PDCV	746.00	103.76	46.0004	46.0000	36.09	167.12	106.8431	Open
151	A2 Load	FCV	746.00	103.76	48.6746	48.6742	57.20	162.47	113.0545	Open
164	A1 Load	FCV	514.00	71.49	33.4236	33.4234	53.80	135.09	56.9401	Open

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Jct	Name	Valve Type	Vol. Flow (gal/min)	Mass Flow (lbm/sec)	dP Stag. (ft. H2O std.)	dH (feet)	P Inlet Static (psia)	Cv	K	Valve State
165	A1 Head Loss	PDCV	514.00	71.49	46.0004	46.0000	39.30	115.15	78.3656	Open
166	Russell Hall Chilled Water Plant Head Loss	PDCV	2,398.00	333.54	35.0003	35.0000	73.63	615.87	37.5955	Open
167	F1 Chiller Plant Head Loss	PDCV	5,142.00	715.21	35.0003	35.0000	75.55	1,320.61	49.5156	Open

Pipe Output Table

Pipe	Name	Pipe Nominal Size	Length (feet)	Vol. Flow Rate (gal/min)	Velocity (feet/sec)	dP Stag. Total (ft. H2O std.)	P Stag. In (ft. H2O std. (g))	P Stag. Out (ft. H2O std. (g))	P Static In (ft. H2O std. (g))	P Static Out (ft. H2O std. (g))	dP Static Total (ft. H2O std.)
10	R	12 inch	69.000	1,694.00	5.468	0.494506	101.0562	100.56171	100.5916	100.0971	0.494506
11	S 12"	12 inch	42.000	1,694.00	5.468	0.301003	100.5001	100.19911	100.0355	99.7345	0.301003
12	S 12"	12 inch	60.000	1,694.00	5.468	0.430005	100.1375	99.70753	99.6730	99.2430	0.430005
13	S 12"	12 inch	21.000	1,694.00	5.468	0.150502	99.6459	99.49545	99.1814	99.0309	0.150502
14	S 12"	12 inch	62.000	1,694.00	5.468	0.444338	99.4339	98.98952	98.9693	98.5249	0.444338
15	S 12"	12 inch	27.000	720.00	2.324	0.041256	98.5975	98.55628	98.5136	98.4724	0.041256
16	S 12"	12 inch	109.000	720.00	2.324	0.166551	98.5334	98.36688	98.4495	98.2830	0.166551
17	S 12"	12 inch	22.000	720.00	2.324	0.033616	98.3512	98.31754	98.2672	98.2336	0.033616
19	Pipe	12 inch	69.000	1,694.00	5.468	0.494506	1.5380	1.04350	1.0734	0.5789	0.494506
21	R 12"	12 inch	22.000	720.00	2.324	0.033616	3.7897	3.75603	3.7057	3.6721	0.033616
22	R 12"	12 inch	109.000	720.00	2.324	0.166551	3.7403	3.57377	3.6564	3.4898	0.166551
23	R 12"	12 inch	27.000	720.00	2.324	0.041256	3.5509	3.50966	3.4670	3.4257	0.041256
24	R 12"	12 inch	62.000	1,694.00	5.468	0.444338	3.1102	2.66585	2.6456	2.2013	0.444338
25	R 12"	12 inch	21.000	1,694.00	5.468	0.150502	2.6043	2.45376	2.1397	1.9892	0.150502
26	R 12"	12 inch	42.000	1,694.00	5.468	0.301003	1.9006	1.59959	1.4360	1.1350	0.301003
27	R 12"	12 inch	60.000	1,694.00	5.468	0.430005	2.3922	1.96217	1.9276	1.4976	0.430005
28	S 6"	6 inch	22.000	230.00	2.750	0.100324	97.9257	97.82542	97.8082	97.7079	0.100324
29	R 6"	6 inch	22.000	230.00	2.750	0.100323	4.2818	4.18146	4.1642	4.0639	0.100323
30	S 6"	6 inch	35.000	230.00	2.750	0.159607	97.8078	97.64816	97.6902	97.5306	0.159607
31	R 6"	6 inch	35.000	230.00	2.750	0.159607	4.4590	4.29943	4.3415	4.1819	0.159607
32	S 6"	6 inch	38.000	230.00	2.750	0.173288	97.6305	97.45721	97.5130	97.3397	0.173288
33	R 6"	6 inch	38.000	230.00	2.750	0.173288	4.6500	4.47669	4.5324	4.3592	0.173288
35	Pipe	6 inch	1.000	230.00	2.750	0.004560	50.6549	50.65037	50.5374	50.5328	0.004560
37	S 10"	10 inch	209.000	1,782.00	8.090	3.736978	97.9257	94.18877	96.9087	93.1717	3.736978
38	R 10"	10 inch	209.000	1,782.00	8.090	3.736978	7.9184	4.18146	6.9014	3.1644	3.736978
39	S 10"	10 inch	87.000	1,782.00	8.090	1.555584	93.9894	92.43385	92.9724	91.4168	1.555584
40	R 10"	10 inch	87.000	1,782.00	8.090	1.555584	9.6734	8.11777	8.6563	7.1008	1.555584
41	S 10"	10 inch	172.000	1,782.00	8.090	3.075408	92.2345	89.15910	91.2175	88.1421	3.075408

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Pipe	Name	Pipe Nominal Size	Length (feet)	Vol. Flow Rate (gal/min)	Velocity (feet/sec)	dP Stag. Total (ft. H2O std.)	P Stag. In (ft. H2O std. (g))	P Stag. Out (ft. H2O std. (g))	P Static In (ft. H2O std. (g))	P Static Out (ft. H2O std. (g))	dP Static Total (ft. H2O std.)
42	R 10"	10 inch	172.000	1,782.00	8.090	3.075408	12.9481	9.87269	11.9311	8.8557	3.075408
50	S 10"	10 inch	64.000	1,378.00	6.256	0.717356	89.1591	88.44174	88.5509	87.8336	0.717356
52	R 10"	10 inch	64.000	1,378.00	6.256	0.717356	13.6655	12.94810	13.0573	12.3399	0.717356
53	S 10"	10 inch	30.000	1,378.00	6.256	0.336261	88.3574	88.02110	87.7492	87.4129	0.336261
54	R 10"	10 inch	30.000	1,378.00	6.256	0.336261	14.0861	13.74984	13.4779	13.1417	0.336261
56	S 10"	10 inch	48.000	1,378.00	6.256	0.538017	87.9367	87.39870	87.3286	86.7905	0.538017
57	S 10"	10 inch	20.000	1,378.00	6.256	0.224174	15.0171	14.79288	14.4089	14.1847	0.224174
59	S 10"	10 inch	85.000	1,378.00	6.256	0.952739	16.0542	15.10144	15.4460	14.4933	0.952739
60	R 10"	10 inch	85.000	1,378.00	6.256	0.952739	87.0058	86.05302	86.3976	85.4449	0.952739
61	S 6"	6 inch	116.000	584.00	6.983	2.827904	19.4471	16.61924	18.6894	15.8615	2.827904
62	R 6"	6 inch	116.000	584.00	6.983	2.827904	85.4880	82.66006	84.7302	81.9023	2.827904
63	Pipe	6 inch	1.000	584.00	6.983	0.024378	66.9247	66.90028	66.1669	66.1425	0.024378
64	S 6"	6 inch	50.000	584.00	6.983	1.218924	20.8999	19.68097	20.1421	18.9232	1.218924
65	R 6"	6 inch	50.000	584.00	6.983	1.218924	82.4262	81.20731	81.6685	80.4495	1.218924
66	Pipe	12 inch	70.000	2,398.00	7.740	0.943495	1.0435	0.10000	0.1125	-0.8310	0.943495
67	Pipe	12 inch	1.000	2,400.00	7.746	0.013499	137.0135	137.00000	136.0810	136.0675	0.013499
69	Pipe	8 inch	1.000	704.00	4.967	0.009607	1.0531	1.04350	0.6697	0.6601	0.009607
70	Pipe	8 inch	1.000	704.00	4.967	0.009606	101.0562	101.04661	100.6728	100.6632	0.009606
71	Pipe	8 inch	1.000	704.00	4.967	0.009606	47.0631	47.05349	46.6797	46.6701	0.009606
72	S 12"	12 inch	150.000	2,230.00	7.198	1.771567	100.3786	98.60707	99.5736	97.8020	1.771567
73	R 12"	12 inch	150.000	2,230.00	7.198	1.771567	3.6449	1.87332	2.8398	1.0682	1.771567
74	R 12"	12 inch	10.000	2,230.00	7.198	0.118104	1.7666	1.64849	0.9615	0.8434	0.118104
75	S 12"	12 inch	10.000	2,230.00	7.198	0.118104	100.6035	100.48537	99.7984	99.6803	0.118104
76	R 8"	8 inch	67.000	584.00	4.120	0.459384	2.1079	1.64849	1.8440	1.3846	0.459384
77	S 8"	8 inch	67.000	584.00	4.120	0.459384	100.6035	100.14408	100.3396	99.8802	0.459384
78	R 8"	8 inch	75.000	584.00	4.120	0.514235	2.6592	2.14500	2.3954	1.8811	0.514235
79	S 8"	8 inch	75.000	584.00	4.120	0.514235	100.1070	99.59273	99.8431	99.3289	0.514235
81	S 8"	8 inch	14.000	584.00	4.120	0.095991	99.2152	99.11921	98.9513	98.8554	0.095991
83	S 8"	8 inch	42.000	584.00	4.120	0.287972	99.5556	99.26764	99.2918	99.0038	0.287972
84	R 8"	8 inch	42.000	584.00	4.120	0.287972	2.9843	2.69636	2.7205	2.4325	0.287972
85	R 8"	8 inch	14.000	584.00	4.120	0.095991	3.1328	3.03676	2.8689	2.7729	0.095991
86	Pipe	10 inch	20.000	1,378.00	6.256	0.224174	87.3143	87.09014	86.7062	86.4820	0.224174
87	Pipe	10 inch	48.000	1,378.00	6.256	0.538017	14.7085	14.17048	14.1003	13.5623	0.538017
88	Pipe	12 inch	1.000	2,400.00	7.746	0.013499	0.1000	0.08650	-0.8325	-0.8460	0.013499
91	Pipe	6 inch	1.000	584.00	6.983	0.024378	49.1575	49.13314	48.3998	48.3754	0.024378
92	Pipe	6 inch	5.000	548.00	7.030	0.128686	16.7479	16.61924	15.9799	15.8512	0.128686
93	Pipe	6 inch	5.000	548.00	7.030	0.128687	85.4880	85.35928	84.7199	84.5913	0.128687

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Pipe	Name	Pipe Nominal Size	Length (feet)	Vol. Flow Rate (gal/min)	Velocity (feet/sec)	dP Stag. Total (ft. H2O std.)	P Stag. In (ft. H2O std. (g))	P Stag. Out (ft. H2O std. (g))	P Static In (ft. H2O std. (g))	P Static Out (ft. H2O std. (g))	dP Static Total (ft. H2O std.)
94	Pipe	6 inch	12.000	548.00	7.030	0.308848	17.2701	16.96127	16.5021	16.1933	0.308848
95	Pipe	6 inch	12.000	548.00	7.030	0.308848	85.1459	84.83707	84.3779	84.0691	0.308848
96	Pipe	6 inch	186.000	548.00	7.030	4.787142	22.2706	17.48347	21.5026	16.7155	4.787142
97	Pipe	6 inch	186.000	548.00	7.030	4.787142	84.6237	79.83659	83.8557	79.0686	4.787142
98	Pipe	6 inch	178.000	548.00	7.030	4.581244	79.6715	75.09023	78.9035	74.3222	4.581244
99	Pipe	6 inch	178.000	548.00	7.030	4.581244	27.0170	22.43573	26.2490	21.6677	4.581244
100	Pipe	6 inch	27.000	548.00	7.030	0.694908	74.9251	74.23019	74.1571	73.4622	0.694908
101	Pipe	6 inch	27.000	548.00	7.030	0.694908	27.8770	27.18210	27.1090	26.4141	0.694908
102	Pipe	6 inch	1.000	548.00	7.030	0.025737	73.9031	73.87740	73.1351	73.1094	0.025737
103	Pipe	10 inch	72.000	1,132.00	5.139	0.565060	86.0530	85.48796	85.6426	85.0776	0.565060
104	Pipe	10 inch	72.000	1,132.00	5.139	0.565060	16.6192	16.05418	16.2088	15.6438	0.565060
105	Pipe	4 inch	66.000	246.00	6.376	2.172903	86.0530	83.88012	85.4213	83.2484	2.172903
106	Pipe	4 inch	66.000	246.00	6.376	2.172903	18.2271	16.05418	17.5953	15.4224	2.172903
107	Pipe	4 inch	20.000	150.00	3.888	0.271027	18.4981	18.22708	18.2632	17.9922	0.271027
108	Pipe	4 inch	20.000	150.00	3.888	0.271026	83.8801	83.60909	83.6452	83.3742	0.271026
109	Pipe	4 inch	1.000	150.00	3.888	0.013551	64.5120	64.49850	64.2772	64.2636	0.013551
110	Pipe	4 inch	103.000	96.00	2.488	0.629598	18.8567	18.22708	18.7605	18.1309	0.629598
111	Pipe	4 inch	103.000	96.00	2.488	0.629598	83.8801	83.25052	83.7839	83.1543	0.629598
112	Pipe	4 inch	1.000	96.00	2.488	0.006113	64.9778	64.97170	64.8816	64.8755	0.006113
113	Pipe	4 inch	15.000	96.00	2.488	0.091689	83.2276	83.13589	83.1314	83.0397	0.091689
114	Pipe	4 inch	15.000	96.00	2.488	0.091689	18.9713	18.87962	18.8751	18.7834	0.091689
115	Pipe	6 inch	5.000	404.00	4.831	0.062686	13.0108	12.94810	12.6481	12.5855	0.062686
116	Pipe	6 inch	5.000	404.00	4.831	0.062687	89.1591	89.09641	88.7965	88.7338	0.062687
117	Pipe	6 inch	46.000	404.00	4.831	0.576716	13.6420	13.06525	13.2793	12.7026	0.576716
118	Pipe	6 inch	46.000	404.00	4.831	0.576716	89.0419	88.46523	88.6793	88.1026	0.576716
119	Pipe	6 inch	1.000	404.00	4.831	0.012537	59.9852	59.97265	59.6226	59.6100	0.012537
120	Pipe	6 inch	22.000	404.00	4.831	0.275821	88.4108	88.13494	88.0481	87.7723	0.275821
121	Pipe	6 inch	22.000	404.00	4.831	0.275821	13.9723	13.69644	13.6096	13.3338	0.275821
122	Pipe	12 inch	66.000	1,292.00	4.170	0.289527	98.6071	98.31754	98.3368	98.0473	0.289527
123	Pipe	12 inch	33.000	1,292.00	4.170	0.144764	3.7897	3.64489	3.5194	3.3746	0.144764
124	Pipe	8 inch	78.000	938.00	6.618	1.259255	98.6071	97.34782	97.9264	96.6671	1.259255
125	Pipe	8 inch	78.000	938.00	6.618	1.259257	4.9041	3.64489	4.2235	2.9642	1.259257
126	Pipe	8 inch	1.000	938.00	6.618	0.016144	50.9207	50.90453	50.2400	50.2239	0.016144
127	S 12"	12 inch	40.000	2,012.00	6.494	0.391807	98.3175	97.92574	97.6622	97.2704	0.391807
128	R 12"	12 inch	40.000	2,012.00	6.494	0.391807	4.1815	3.78965	3.5261	3.1343	0.391807
129	Pipe	6 inch	335.000	460.00	5.500	5.307213	98.9895	93.68231	98.5194	93.2122	5.307213
130	Pipe	6 inch	335.000	460.00	5.500	5.307212	8.4174	3.11019	7.9473	2.6401	5.307212

AFT Fathom Model

Pipe	Name	Pipe Nominal Size	Length (feet)	Vol. Flow Rate (gal/min)	Velocity (feet/sec)	dP Stag. Total (ft. H2O std.)	P Stag. In (ft. H2O std. (g))	P Stag. Out (ft. H2O std. (g))	P Static In (ft. H2O std. (g))	P Static Out (ft. H2O std. (g))	dP Static Total (ft. H2O std.)
131	Pipe	6 inch	750.000	460.00	5.500	11.881821	93.5826	81.70074	93.1124	81.2306	11.881821
132	Pipe	6 inch	750.000	460.00	5.500	11.881821	20.3990	8.51715	19.9288	8.0470	11.881821
133	Pipe	6 inch	1.000	460.00	5.500	0.015842	66.9902	66.97438	66.5201	66.5042	0.015842
134	Pipe	6 inch	30.000	460.00	5.500	0.475273	81.6010	81.12571	81.1308	80.6556	0.475273
135	Pipe	6 inch	30.000	460.00	5.500	0.475273	20.9740	20.49872	20.5039	20.0286	0.475273
136	Pipe	16 inch	92.000	2,814.00	5.767	0.554767	101.1582	100.60347	100.6413	100.0866	0.554767
137	Pipe	16 inch	92.000	2,814.00	5.767	0.554767	1.6485	1.09372	1.1316	0.5768	0.554767
138	Pipe	16 inch	260.000	2,814.00	5.767	1.567821	1.0271	-0.54070	0.5102	-1.0576	1.567821
139	Pipe	16 inch	260.000	2,814.00	5.767	1.567821	102.7927	101.22484	102.2758	100.7079	1.567821
140	Pipe	20 inch	301.000	4,460.00	5.850	1.430315	104.2230	102.79266	103.6912	102.2609	1.430315
141	Pipe	20 inch	301.000	4,460.00	5.850	1.430315	-0.5407	-1.97101	-1.0725	-2.5028	1.430315
142	Pipe	20 inch	7.000	4,460.00	5.850	0.033263	104.3469	104.31362	103.8151	103.7818	0.033263
143	Pipe	20 inch	7.000	4,460.00	5.850	0.033263	-2.0617	-2.09492	-2.5934	-2.6267	0.033263
144	Pipe	6 inch	79.000	434.00	5.189	1.126898	104.3469	103.21999	103.9284	102.8015	1.126898
145	Pipe	6 inch	79.000	434.00	5.189	1.126899	-0.9680	-2.09492	-1.3865	-2.5134	1.126899
146	Pipe	6 inch	1.000	434.00	5.189	0.014265	45.0466	45.03237	44.6281	44.6139	0.014265
147	Pipe	20 inch	157.000	4,894.00	6.419	0.883682	105.2306	104.34689	104.5903	103.7066	0.883682
148	Pipe	20 inch	157.000	4,894.00	6.419	0.883682	-2.0949	-2.97860	-2.7352	-3.6189	0.883682
149	Pipe	6 inch	303.000	248.00	2.965	1.581385	105.2306	103.64919	105.0939	103.5125	1.581385
150	Pipe	6 inch	303.000	248.00	2.965	1.581386	-1.3972	-2.97860	-1.5339	-3.1153	1.581386
151	Pipe	6 inch	1.000	248.00	2.965	0.005219	44.6084	44.60318	44.4717	44.4665	0.005219
152	Pipe	20 inch	73.000	5,142.00	6.744	0.449665	105.6802	105.23057	104.9734	104.5237	0.449665
153	Pipe	20 inch	73.000	5,142.00	6.744	0.449664	-2.9786	-3.42827	-3.6855	-4.1351	0.449664
154	Pipe	20 inch	46.000	5,142.00	6.744	0.283350	106.0841	105.80072	105.3772	105.0939	0.283350
155	Pipe	20 inch	56.000	5,142.00	6.744	0.344948	-3.5488	-3.89371	-4.2556	-4.6006	0.344948
157	Pipe	12 inch	380.000	1,646.00	5.313	2.584984	102.7927	100.20768	102.3540	99.7690	2.584984
158	Pipe	12 inch	380.000	1,646.00	5.313	2.584984	2.0443	-0.54070	1.6057	-0.9793	2.584984
159	Pipe	8 inch	118.000	900.00	6.350	1.767518	100.2077	98.44016	99.5810	97.8135	1.767518
160	Pipe	8 inch	118.000	900.00	6.350	1.767520	3.8118	2.04429	3.1852	1.4176	1.767520
161	Pipe	8 inch	1.000	900.00	6.350	0.014979	51.1051	51.09012	50.4785	50.4635	0.014979
162	Pipe	8 inch	77.000	900.00	6.350	1.153381	98.3156	97.16224	97.6890	96.5356	1.153381
163	Pipe	8 inch	77.000	900.00	6.350	1.153381	5.0897	3.93635	4.4631	3.3097	1.153381
164	Pipe	8 inch	143.000	746.00	5.263	1.525289	3.5696	2.04429	3.1390	1.6137	1.525289
165	Pipe	8 inch	143.000	746.00	5.263	1.525288	100.2077	98.68239	99.7771	98.2518	1.525288
166	Pipe	8 inch	1.000	746.00	5.263	0.010666	49.7942	49.78352	49.3637	49.3530	0.010666
167	Pipe	8 inch	12.000	746.00	5.263	0.127996	98.5968	98.46882	98.1663	98.0383	0.127996
168	Pipe	8 inch	12.000	746.00	5.263	0.127996	3.7831	3.65514	3.3526	3.2246	0.127996

AFT Fathom Model

Pipe	Name	Pipe Nominal Size	Length (feet)	Vol. Flow Rate (gal/min)	Velocity (feet/sec)	dP Stag. Total (ft. H2O std.)	P Stag. In (ft. H2O std. (g))	P Stag. Out (ft. H2O std. (g))	P Static In (ft. H2O std. (g))	P Static Out (ft. H2O std. (g))	dP Static Total (ft. H2O std.)
169	Pipe	12 inch	60.000	2,398.00	7.740	0.808711	101.8649	101.05621	100.9340	100.1252	0.808711
170	R 12"	12 inch	62.000	1,234.00	3.983	0.250296	3.3605	3.11019	3.1140	2.8637	0.250296
171	S 12"	12 inch	62.000	1,234.00	3.983	0.250296	98.9895	98.73922	98.7430	98.4927	0.250296
172	Pipe	6 inch	98.000	514.00	6.146	1.896961	98.5975	96.70058	98.0106	96.1136	1.896961
173	Pipe	6 inch	98.000	514.00	6.146	1.896962	5.4066	3.50966	4.8196	2.9227	1.896962
174	R 12"	12 inch	27.000	1,234.00	3.983	0.109000	3.5097	3.40066	3.2631	3.1541	0.109000
175	S 12"	12 inch	27.000	1,234.00	3.983	0.109000	98.7065	98.59754	98.4600	98.3510	0.109000
176	Pipe	6 inch	245.000	514.00	6.146	4.742404	96.6124	91.87001	96.0254	91.2830	4.742404
177	Pipe	6 inch	245.000	514.00	6.146	4.742404	10.2372	5.49479	9.6502	4.9078	4.742404
178	Pipe	6 inch	1.000	514.00	6.146	0.019357	57.3517	57.33229	56.7647	56.7453	0.019357
179	Pipe	6 inch	52.000	514.00	6.146	1.006551	91.7818	90.77529	91.1949	90.1883	1.006551
180	Pipe	6 inch	52.000	514.00	6.146	1.006551	11.3319	10.32536	10.7449	9.7384	1.006551
181	Pipe	12 inch	10.000	2,398.00	7.740	0.134785	137.0000	136.86522	136.0690	135.9342	0.134785
183	Pipe	20 inch	10.000	5,142.00	6.744	0.061598	141.1460	141.08437	140.4391	140.3775	0.061598

All Junction Table

Jct	Name	P Static In (ft. H2O std. (g))	P Static Out (ft. H2O std. (g))	P Stag. In (ft. H2O std. (g))	P Stag. Out (ft. H2O std. (g))	Vol. Flow Rate Thru Jct (gal/min)	dP Stag. Total (ft. H2O std.)	dP Static Total (ft. H2O std.)
3	Bend	1.4976	1.4360	1.96217	1.9006	1,694.00	0.06158	0.061585
4	Bend	1.1350	1.0734	1.59959	1.5380	1,694.00	0.06158	0.061585
5	Bend	1.9892	1.9276	2.45376	2.3922	1,694.00	0.06158	0.061585
6	Bend	2.2013	2.1397	2.66585	2.6043	1,694.00	0.06158	0.061585
7	Bend	3.1541	3.1140	3.40066	3.3605	1,234.00	0.04017	0.040170
8	Bend	3.4898	3.4670	3.57377	3.5509	720.00	0.02286	0.022855
9	Bend	3.6721	3.6564	3.75603	3.7403	720.00	0.01572	0.015715
10	Tee or Wye	3.4984	3.4984	3.78965	3.7897	N/A	0.00000	0.000000
11	Tee or Wye	3.6626	3.6626	4.18146	4.1815	N/A	0.00000	0.000000
12	Russell Hall Chilled Water Plant Pump	-0.8460	136.0810	0.08650	137.0135	2,400.00	-136.92700	-136.927002
13	Bend	100.0971	100.0355	100.56171	100.5001	1,694.00	0.06158	0.061585
14	Bend	99.7345	99.6730	100.19911	100.1375	1,694.00	0.06158	0.061585
15	Bend	99.2430	99.1814	99.70753	99.6459	1,694.00	0.06158	0.061585
16	Bend	99.0309	98.9693	99.49545	99.4339	1,694.00	0.06158	0.061585
17	Bend	98.4724	98.4495	98.55628	98.5334	720.00	0.02286	0.022855
18	Bend	98.2830	98.2672	98.36688	98.3512	720.00	0.01572	0.015715
19	Tee or Wye	98.0263	98.0263	98.31754	98.3175	N/A	0.00000	0.000000

AFT Fathom Model

Jct	Name	P Static In (ft. H2O std. (g))	P Static Out (ft. H2O std. (g))	P Stag. In (ft. H2O std. (g))	P Stag. Out (ft. H2O std. (g))	Vol. Flow Rate Thru Jct (gal/min)	dP Stag. Total (ft. H2O std.)	dP Static Total (ft. H2O std.)
20	Tee or Wye	97.4069	97.4069	97.92574	97.9257	N/A	0.00000	0.000000
21	Bend	98.4927	98.4600	98.73922	98.7065	1,234.00	0.03268	0.032680
22	Bend	97.7079	97.6902	97.82542	97.8078	230.00	0.01765	0.017654
23	Bend	4.1819	4.1642	4.29943	4.2818	230.00	0.01765	0.017654
24	Bend	97.5306	97.5130	97.64816	97.6305	230.00	0.01765	0.017654
25	Bend	4.3592	4.3415	4.47669	4.4590	230.00	0.01765	0.017654
26	Karrmann Library Load	97.3397	50.5374	97.45721	50.6549	230.00	46.80228	46.802284
27	Karrmann Library Head Loss	50.5328	4.5324	50.65037	4.6500	230.00	46.00039	46.000389
28	Bend	7.1008	6.9014	8.11777	7.9184	1,782.00	0.19934	0.199336
29	Bend	93.1717	92.9724	94.18877	93.9894	1,782.00	0.19934	0.199336
30	Bend	91.4168	91.2175	92.43385	92.2345	1,782.00	0.19934	0.199336
31	Bend	8.8557	8.6563	9.87269	9.6734	1,782.00	0.19934	0.199336
40	Bend	13.1417	13.0573	13.74984	13.6655	1,378.00	0.08438	0.084383
41	Bend	87.8336	87.7492	88.44174	88.3574	1,378.00	0.08438	0.084383
42	Bend	87.4129	87.3286	88.02110	87.9367	1,378.00	0.08438	0.084383
43	Bend	13.5623	13.4779	14.17048	14.0861	1,378.00	0.08438	0.084383
45	Bend	86.7905	86.7062	87.39870	87.3143	1,378.00	0.08438	0.084383
52	Bend	86.4820	86.3976	87.09014	87.0058	1,378.00	0.08438	0.084383
53	Bend	14.4933	14.4089	15.10144	15.0171	1,378.00	0.08438	0.084383
56	Bend	18.9232	18.6894	19.68097	19.4471	584.00	0.23382	0.233822
57	Bend	81.9023	81.6685	82.66006	82.4262	584.00	0.23382	0.233822
58	Center for the Arts Head Loss	66.1425	20.1421	66.90028	20.8999	584.00	46.00039	46.000389
59	Center for the Arts Load	80.4495	66.1669	81.20731	66.9247	584.00	14.28265	14.282654
60	Branch	0.4731	0.4731	1.04350	1.0435	N/A	0.00000	0.000000
61	Branch	100.4858	100.4858	101.05621	101.0562	N/A	0.00000	0.000000
62	Russell Hall Head Loss	46.6701	0.6697	47.05349	1.0531	704.00	46.00039	46.000389
63	Russell Hall Load	100.6632	46.6797	101.04661	47.0631	704.00	53.98351	53.983505
64	Bend	1.0682	0.9615	1.87332	1.7666	2,230.00	0.10672	0.106723
65	Bend	99.6803	99.5736	100.48537	100.3786	2,230.00	0.10672	0.106723
68	Bend	1.8811	1.8440	2.14500	2.1079	584.00	0.03712	0.037122
69	Bend	99.8802	99.8431	100.14408	100.1070	584.00	0.03712	0.037122
70	Bend	2.4325	2.3954	2.69636	2.6592	584.00	0.03712	0.037122
71	Bend	99.3289	99.2918	99.59273	99.5556	584.00	0.03712	0.037122
72	Boebel Hall Head Loss	48.3754	2.8689	49.13314	3.1328	584.00	46.00039	45.506477
73	Boebel Hall Load	98.8554	48.3998	99.11921	49.1575	584.00	49.96169	50.455601
74	Bend	2.7729	2.7205	3.03676	2.9843	584.00	0.05244	0.052437
75	Bend	99.0038	98.9513	99.26764	99.2152	584.00	0.05244	0.052437

AFT Fathom Model

Jct	Name	P Static In (ft. H2O std. (g))	P Static Out (ft. H2O std. (g))	P Stag. In (ft. H2O std. (g))	P Stag. Out (ft. H2O std. (g))	Vol. Flow Rate Thru Jct (gal/min)	dP Stag. Total (ft. H2O std.)	dP Static Total (ft. H2O std.)
76	Bend	14.1847	14.1003	14.79288	14.7085	1,378.00	0.08438	0.084383
79	Assigned Pressure	-0.8317	-0.8317	0.10000	0.1000	N/A	0.00000	0.001554
80	Tee or Wye	15.9859	15.9859	16.61924	16.6192	N/A	0.00000	0.000000
81	Bend	16.1933	15.9799	16.96127	16.7479	548.00	0.21335	0.213349
82	Bend	84.5913	84.3779	85.35928	85.1459	548.00	0.21335	0.213349
83	Tee or Wye	84.8546	84.8546	85.48796	85.4880	N/A	0.00000	0.000000
84	Bend	16.7155	16.5021	17.48347	17.2701	548.00	0.21335	0.213349
85	Bend	84.0691	83.8557	84.83707	84.6237	548.00	0.21335	0.213349
86	Bend	79.0686	78.9035	79.83659	79.6715	548.00	0.16512	0.165121
87	Bend	21.6677	21.5026	22.43573	22.2706	548.00	0.16512	0.165121
88	Bend	26.4141	26.2490	27.18210	27.0170	548.00	0.16512	0.165121
89	Bend	74.3222	74.1571	75.09023	74.9251	548.00	0.16512	0.165121
90	Ullsvik Hall Load	73.4622	73.1351	74.23019	73.9031	548.00	0.32706	0.327058
91	Ullsvik Center Head Loss	73.1094	27.1090	73.87740	27.8770	548.00	46.00039	46.000389
92	Tee or Wye	15.5089	15.5089	16.05418	16.0542	N/A	0.00000	0.000000
93	Tee or Wye	85.5077	85.5077	86.05302	86.0530	N/A	0.00000	0.000000
94	Tee or Wye	83.5993	83.5993	83.88012	83.8801	N/A	0.00000	0.000000
95	Tee or Wye	17.9463	17.9463	18.22708	18.2271	N/A	0.00000	0.000000
96	Ullrich Hall Head LOss	64.2636	18.2632	64.49850	18.4981	150.00	46.00039	46.000389
97	Ullrich Hall Load	83.3742	64.2772	83.60909	64.5120	150.00	19.09704	19.097042
98	Bend	18.7834	18.7605	18.87962	18.8567	96.00	0.02294	0.022939
99	Bend	83.1543	83.1314	83.25052	83.2276	96.00	0.02294	0.022939
100	Art Building Load	83.0397	64.8816	83.13589	64.9778	96.00	18.15808	18.158079
101	Art Building Head Loss	64.8755	18.8751	64.97170	18.9713	96.00	46.00039	46.000389
102	Tee or Wye	88.5242	88.5242	89.15910	89.1591	N/A	0.00000	0.000000
103	Tee or Wye	12.3131	12.3131	12.94810	12.9481	N/A	0.00000	0.000000
104	Bend	88.7338	88.6793	89.09641	89.0419	404.00	0.05447	0.054468
105	Bend	12.7026	12.6481	13.06525	13.0108	404.00	0.05447	0.054468
106	Bend	88.1026	88.0481	88.46523	88.4108	404.00	0.05447	0.054468
107	Bend	13.3338	13.2793	13.69644	13.6420	404.00	0.05447	0.054468
108	Doudna Hall Load	87.7723	59.6226	88.13494	59.9852	404.00	28.14975	28.149754
109	Doudna Hall Head Loss	59.6100	13.6096	59.97265	13.9723	404.00	46.00039	46.000389
110	Tee or Wye	3.0863	3.0863	3.64489	3.6449	N/A	0.00000	0.000000
111	Tee or Wye	98.0485	98.0485	98.60707	98.6071	N/A	0.00000	0.000000
112	Pioneer Student Center/S9/S10 Load	96.6671	50.2400	97.34782	50.9207	938.00	46.42714	46.427143
113	Pioneer Student Center/S9/S10 Head Loss	50.2239	4.2235	50.90453	4.9041	938.00	46.00039	46.000389
116	Bend	93.2122	93.1124	93.68231	93.5826	460.00	0.09975	0.099749

AFT Fathom Model

Jct	Name	P Static In (ft. H2O std. (g))	P Static Out (ft. H2O std. (g))	P Stag. In (ft. H2O std. (g))	P Stag. Out (ft. H2O std. (g))	Vol. Flow Rate Thru Jct (gal/min)	dP Stag. Total (ft. H2O std.)	dP Static Total (ft. H2O std.)
117	Bend	8.0470	7.9473	8.51715	8.4174	460.00	0.09975	0.099749
118	Bend	81.2306	81.1308	81.70074	81.6010	460.00	0.09975	0.099749
119	Bend	20.0286	19.9288	20.49872	20.3990	460.00	0.09975	0.099749
120	A7 Load	80.6556	66.5201	81.12571	66.9902	460.00	14.13549	14.135487
121	A7 Head Loss	66.5042	20.5039	66.97438	20.9740	460.00	46.00039	46.000389
122	Tee or Wye	1.1444	1.1444	1.64849	1.6485	N/A	0.00000	0.000000
123	Tee or Wye	100.0994	100.0994	100.60347	100.6035	N/A	0.00000	0.000000
124	Bend	0.5768	0.5102	1.09372	1.0271	2,814.00	0.06660	0.066598
125	Bend	100.7079	100.6413	101.22484	101.1582	2,814.00	0.06660	0.066598
126	Tee or Wye	-1.0356	-1.0356	-0.54070	-0.5407	N/A	0.00000	0.000000
127	Tee or Wye	102.2978	102.2978	102.79266	102.7927	N/A	0.00000	0.000000
128	Bend	-2.5028	-2.5934	-1.97101	-2.0617	4,460.00	0.09065	0.090650
129	Bend	103.7818	103.6912	104.31362	104.2230	4,460.00	0.09065	0.090650
130	Tee or Wye	103.8206	103.8206	104.34689	104.3469	N/A	0.00000	0.000000
131	Tee or Wye	-2.6212	-2.6212	-2.09492	-2.0949	N/A	0.00000	0.000000
132	Williams Fieldhouse Load	102.8015	44.6281	103.21999	45.0466	434.00	58.17336	58.173355
133	Williams Fieldhouse Head Loss	44.6139	-1.3865	45.03237	-0.9680	434.00	46.00039	46.000389
134	Tee or Wye	-3.4278	-3.4278	-2.97860	-2.9786	N/A	0.00000	0.000000
135	Tee or Wye	104.7814	104.7814	105.23057	105.2306	N/A	0.00000	0.000000
136	AR1/AR2 Load	103.5125	44.4717	103.64919	44.6084	248.00	59.04079	59.040791
137	AR1/AR2 Head Loss	44.4665	-1.5339	44.60318	-1.3972	248.00	46.00039	46.000389
138	Bend	-4.1351	-4.2556	-3.42827	-3.5488	5,142.00	0.12049	0.120493
139	Bend	105.0939	104.9734	105.80072	105.6802	5,142.00	0.12049	0.120493
142	Tee or Wye	1.5496	1.5496	2.04429	2.0443	N/A	0.00000	0.000000
143	Tee or Wye	99.7130	99.7130	100.20768	100.2077	N/A	0.00000	0.000000
144	Bend	3.3097	3.1852	3.93635	3.8118	900.00	0.12454	0.124538
145	Bend	97.8135	97.6890	98.44016	98.3156	900.00	0.12454	0.124538
146	Ottensman Hall Load	96.5356	50.4785	97.16224	51.1051	900.00	46.05714	46.057140
147	Ottensman Hall Head Loss	50.4635	4.4631	51.09012	5.0897	900.00	46.00039	46.000389
148	Bend	3.2246	3.1390	3.65514	3.5696	746.00	0.08556	0.085565
149	Bend	98.2518	98.1663	98.68239	98.5968	746.00	0.08556	0.085565
150	A2 Head Loss	49.3530	3.3526	49.78352	3.7831	746.00	46.00039	46.000389
151	A2 Load	98.0383	49.3637	98.46882	49.7942	746.00	48.67463	48.674629
152	F1 Chiller Plant Pump	-4.6006	140.4391	-3.89371	141.1460	5,142.00	-145.03967	-145.039673
155	Assigned Pressure	136.0683	136.0683	137.00000	137.0000	N/A	0.00000	-0.001554
156	Tee or Wye	98.6035	98.6035	98.98952	98.9895	N/A	0.00000	0.000000
157	Tee or Wye	2.7242	2.7242	3.11019	3.1102	N/A	0.00000	0.000000

AFT Fathom Model

Jct	Name	P Static In (ft. H2O std. (g))	P Static Out (ft. H2O std. (g))	P Stag. In (ft. H2O std. (g))	P Stag. Out (ft. H2O std. (g))	Vol. Flow Rate Thru Jct (gal/min)	dP Stag. Total (ft. H2O std.)	dP Static Total (ft. H2O std.)
158	Tee or Wye	3.2419	3.2419	3.50966	3.5097	N/A	0.00000	0.000000
159	Tee or Wye	98.3298	98.3298	98.59754	98.5975	N/A	0.00000	0.000000
160	Bend	4.9078	4.8196	5.49479	5.4066	514.00	0.08817	0.088167
161	Bend	96.1136	96.0254	96.70058	96.6124	514.00	0.08817	0.088167
162	Bend	91.2830	91.1949	91.87001	91.7818	514.00	0.08817	0.088167
163	Bend	9.7384	9.6502	10.32536	10.2372	514.00	0.08817	0.088167
164	A1 Load	90.1883	56.7647	90.77529	57.3517	514.00	33.42364	33.423641
165	A1 Head Loss	56.7453	10.7449	57.33229	11.3319	514.00	46.00039	46.000389
166	Russell Hall Chilled Water Plant Head Loss	135.9342	100.9340	136.86522	101.8649	2,398.00	35.00029	35.000294
167	F1 Chiller Plant Head Loss	140.3775	105.3772	141.08437	106.0841	5,142.00	35.00030	35.000298