

Fire Sprinkler Hydraulic Calculations

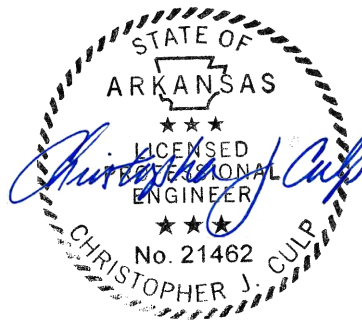
For

Bu-cee's

Benton, AR

REV #3 - APRIL 24, 2025

2450001433



4/24/2025





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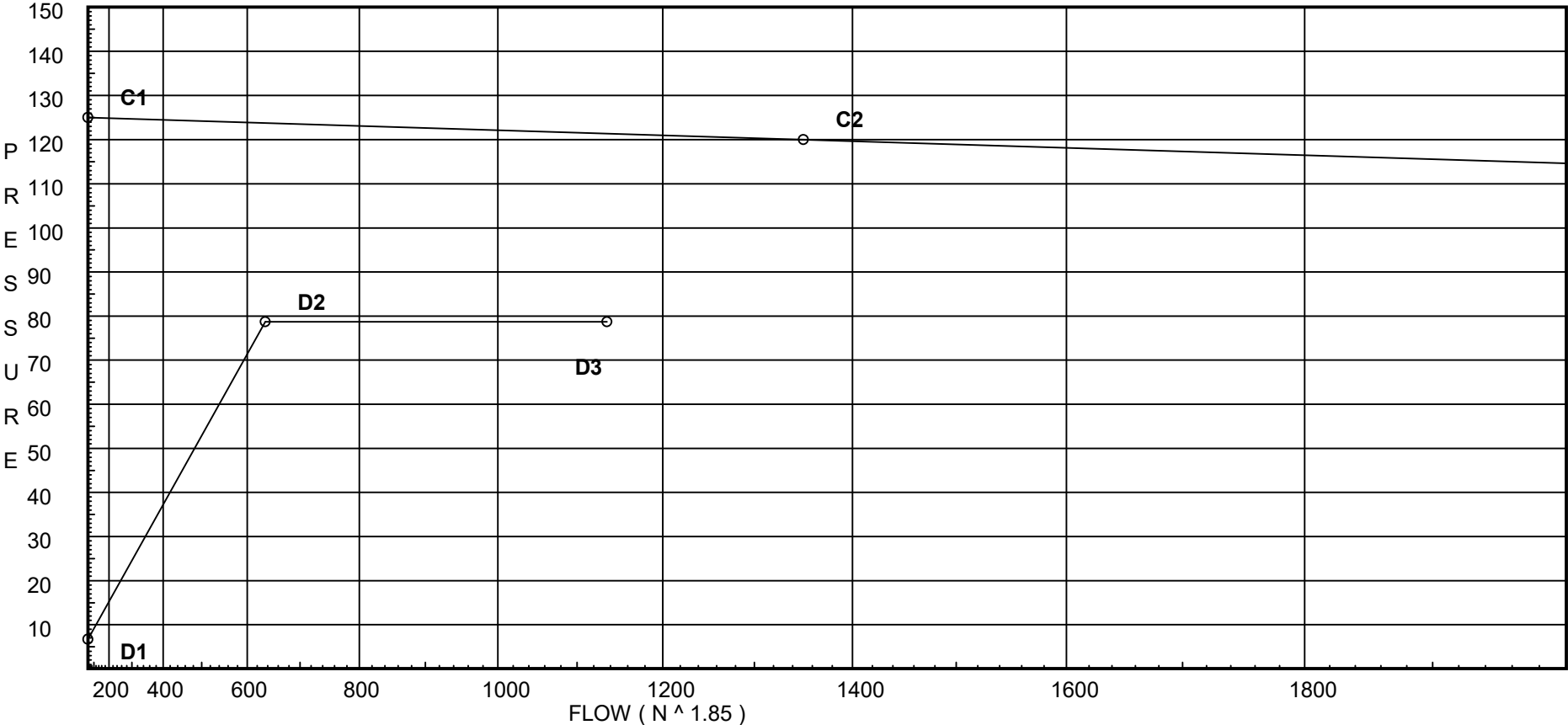
HENDERSON ENGINEERS
8345 LENEXA DR. SUITE #300
LENEXA, KS 66214
913-742-500

Job Name : Bucees - BENTON AR - System 1 RA A
Building :
Location : SALES FLOOR
System : SYSTEM 1 RA A
Contract : 2450001433
Data File : Bucees - BENTON AR - System 1 RA A.WXF

Water Supply Curve

City Water Supply:
C1 - Static Pressure : 125
C2 - Residual Pressure: 120
C2 - Residual Flow : 1351

Demand:
D1 - Elevation : 6.726
D2 - System Flow : 635.66
D2 - System Pressure : 78.679
Hose (Demand) : 500
D3 - System Demand : 1135.66
Safety Margin : 42.694



Fittings Used Summary

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Fitting Legend																					
Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Avc	Alarm Vic 751	0	0	0	0	3	9	8	17	0	21	0	22	50	0	0	0	0	0	0	0
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																			
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.

Flow Summary - NFPA

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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>
SRC	125.0	120	1351.0	121.374	1135.66	78.679

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
A21	13.11	5.6	21.56	26.0	0.2	130
TA21	14.58		23.1			
TA20	14.58		23.25			
TA19	14.58		24.13			
1103	14.58		37.61			
1104	14.58		41.44			
1105	14.58		42.25			
1106	14.58		43.09			
1107	14.58		43.86			
1108	14.58		44.95			
1109	14.58		45.75			
1110	14.58		46.6			
1111	14.58		47.97			
1112	17.58		47.42			
1113	17.58		47.55			
1114	17.58		47.74			
1115	17.58		47.79			
1116	17.58		48.05			
1117	17.58		48.17			
1118	17.58		48.19			
1119	17.58		48.36			
1120	17.58		48.38			
1121	17.58		48.51			
1122	17.58		48.51			
1123	17.58		48.87			
1126	17.58		49.28			
1127	17.58		49.43			
1128	17.58		49.46			
1129	17.58		49.47			
1130	17.58		49.47			
128A	17.58		50.85			
1321	17.58		52.68			
321T	17.58		54.06			
1322	17.58		54.14			
TR1	17.58		56.04			
BR1	3.0	64.61		100.0		
BR2	3.0	64.62				
FLG	1.0	65.61				
UG4	-2.42	67.56				
UG2	-2.42	68.86				
UG1	-2.42	78.38				
SRC	-2.42	78.68				

Flow Summary - NFPA

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NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node		Notes
A22	13.11	5.6	21.58	26.01	0.2	130
TA22	14.58		23.12			
TA23	14.58		23.6			
TA24	14.58		25.03			
1303	14.58		39.58			
1304	14.58		40.66			
1305	14.58		41.6			
1306	14.58		42.47			
1307	14.58		43.2			
1308	14.58		44.11			
1309	14.58		44.7			
1310	14.58		45.25			
1311	14.58		48.32			
1312	17.58		49.85			
1313	17.58		49.93			
1314	17.58		50.18			
1315	17.58		50.33			
1316	17.58		50.58			
1317	17.58		50.94			
1318	17.58		51.2			
1319	17.58		51.66			
1320	17.58		52.21			
A20	13.11	5.6	21.7	26.08	0.2	130
A23	13.11	5.6	22.02	26.28	0.2	130
A19	13.11	5.6	22.51	26.57	0.2	130
A24	13.11	5.6	23.32	27.05	0.2	130
1102	14.58		37.15			
1101	14.58		36.94			
1100	14.58		36.89			
TA01	14.58		24.33			
TA02	14.58		23.37			
TA03	14.58		23.16			
TA04	14.58		23.17			
TA05	14.58		23.62			
TA06	14.58		24.99			
1300	14.58		38.72			
1301	14.58		38.79			
1302	14.58		39.06			
A03	13.11	5.6	21.83	26.17	0.2	130
A04	13.11	5.6	21.85	26.18	0.2	130
A02	13.11	5.6	22.03	26.29	0.2	130
A05	13.11	5.6	22.26	26.42	0.2	130
A01	13.11	5.6	22.91	26.81	0.2	130
A06	13.11	5.6	23.53	27.16	0.2	130
A09	13.11	5.6	21.85	26.18	0.2	130
TA09	14.58		23.2			
TA08	14.58		23.42			
TA07	14.58		24.37			
A10	13.11	5.6	21.86	26.19	0.2	130
TA10	14.58		23.22			
TA11	14.58		23.66			

Flow Summary - NFPA

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NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node		Notes
TA12	14.58		25.04			
A08	13.11	5.6	22.05	26.29	0.2	130
A11	13.11	5.6	22.27	26.43	0.2	130
A07	13.11	5.6	22.93	26.81	0.2	130
A12	13.11	5.6	23.54	27.17	0.2	130
A15	13.11	5.6	21.99	26.26	0.2	130
TA15	14.58		23.36			
TA14	14.58		23.57			
TA13	14.58		24.53			
A16	13.11	5.6	22.01	26.27	0.2	130
TA16	14.58		23.37			
TA17	14.58		23.82			
TA18	14.58		25.21			
A14	13.11	5.6	22.19	26.38	0.2	130
A17	13.11	5.6	22.42	26.52	0.2	130
A13	13.11	5.6	23.07	26.9	0.2	130
A18	13.11	5.6	23.7	27.26	0.2	130
T311	17.58		47.06			
HY1	-2.42		67.56	400.0		
UG3	-2.42		68.75			
115A	17.58		48.09			
TB01	17.58		47.87			
TB02	17.58		47.9			
TB03	17.58		47.93			
TB04	17.58		47.96			
TB05	17.58		47.99			
TB06	17.58		48.03			
TB07	17.58		48.32			
TB08	17.58		48.43			
TB09	17.58		48.54			
TB10	17.58		48.64			
TB11	17.58		48.75			
TB12	17.58		48.86			
TB13	17.58		48.45			
TB14	17.58		48.56			
TB15	17.58		48.67			
TB16	17.58		48.77			
TB17	17.58		48.88			
TB18	17.58		48.99			

Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
A21 to TA21	13.11 14.58	5.60	26.00 26.0	1 1.049	E T	2.0 5.0	3.300 7.000 10.300	120 0.2115	21.556 -0.637 2.178			
TA21 to TA20	14.58 14.58		-6.63 19.37	1.5 1.61			10.000 10.000	120 0.0153	23.097 0.0 0.153	Vel =	9.65	
TA20 to TA19	14.58 14.58		26.09 45.46	1.5 1.61			12.000 12.000	120 0.0738	23.250 0.0 0.885	Vel =		
TA19 to 1103	14.58 14.58		26.56 72.02	1.5 1.61	2E T	8.0 8.0	61.930 16.000 77.930	120 0.1729	24.135 0.0 13.471	Vel =		
1103 to 1104	14.58 14.58		222.70 294.72	3 3.26	2E	18.815	32.050 18.815 50.865	120 0.0755	37.606 0.0 3.839	Vel =		
1104 to 1105	14.58 14.58		10.29 305.01	3 3.26			10.000 10.000	120 0.0804	41.445 0.0 0.804	Vel =		
1105 to 1106	14.58 14.58		9.33 314.34	3 3.26			9.860 9.860	120 0.0850	42.249 0.0 0.838	Vel =		
1106 to 1107	14.58 14.58		9.06 323.4	3 3.26			8.640 8.640	120 0.0896	43.087 0.0 0.774	Vel =		
1107 to 1108	14.58 14.58		9.44 332.84	3 3.26			11.500 11.500	120 0.0945	43.861 0.0 1.087	Vel =		
1108 to 1109	14.58 14.58		10.70 343.54	3 3.26			8.000 8.000	120 0.1001	44.948 0.0 0.801	Vel =		
1109 to 1110	14.58 14.58		12.06 355.6	3 3.26			7.920 7.920	120 0.1068	45.749 0.0 0.846	Vel =		
1110 to 1111	14.58 14.58		13.82 369.42	3 3.26	E	9.408	2.610 9.408 12.018	120 0.1146	46.595 0.0 1.377	Vel =		
1111 to 1112	14.58 17.58		0.0 369.42	4 4.26	E	13.167	10.790 13.167 23.957	120 0.0311	47.972 -1.299 0.746	Vel =		
1112 to 1113	17.58 17.58		15.50 384.92	4 4.26			3.760 3.760	120 0.0335	47.419 0.0 0.126	Vel =		
1113 to 1114	17.58 17.58		-25.22 359.7	4 4.26			6.600 6.600	120 0.0297	47.545 0.0 0.196	Vel =		
1114 to 1115	17.58 17.58		0.0 359.7	4 4.26			1.550 1.550	120 0.0297	47.741 0.0 0.046	Vel =		
1115 to 1116	17.58 17.58		-17.99 341.71	4 4.26			9.810 9.810	120 0.0270	47.787 0.0 0.265	Vel =		

Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1116 to 1117	17.58 17.58		-34.76 306.95	4 4.26		5.330 5.330	120 0.0220	48.052 0.0 0.117		Vel = 6.91	
1117 to 1118	17.58 17.58		0.0 306.95	4 4.26		0.790 0.790	120 0.0228	48.169 0.0 0.018		Vel = 6.91	
1118 to 1119	17.58 17.58		-34.55 272.4	4 4.26		9.960 9.960	120 0.0177	48.187 0.0 0.176		Vel = 6.13	
1119 to 1120	17.58 17.58		0.0 272.4	4 4.26		0.750 0.750	120 0.0187	48.363 0.0 0.014		Vel = 6.13	
1120 to 1121	17.58 17.58		-33.76 238.64	4 4.26		9.440 9.440	120 0.0139	48.377 0.0 0.131		Vel = 5.37	
1121 to 1122	17.58 17.58		-38.86 199.78	4 4.26		0.560 0.560	120 0.0089	48.508 0.0 0.005		Vel = 4.50	
1122 to 1123	17.58 17.58		0.0 199.78	4 4.26	T 26.334	9.430 26.334 35.764	120 0.0100	48.513 0.0 0.357		Vel = 4.50	
1123 to 1126	17.58 17.58		0.0 199.78	4 4.26		40.830 40.830	120 0.0100	48.870 0.0 0.408		Vel = 4.50	
1126 to 1127	17.58 17.58		-37.73 162.05	4 4.26	E 13.167	8.590 13.167 21.757	120 0.0068	49.278 0.0 0.148		Vel = 3.65	
1127 to 1128	17.58 17.58		-43.21 118.84	4 4.26		8.000 8.000	120 0.0038	49.426 0.0 0.030		Vel = 2.68	
1128 to 1129	17.58 17.58		-46.04 72.8	4 4.26		10.000 10.000	120 0.0016	49.456 0.0 0.016		Vel = 1.64	
1129 to 1130	17.58 17.58		-39.03 33.77	4 4.26		0.670 0.670	120 0	49.472 0.0 0.0		Vel = 0.76	
1130 to 128A	17.58 17.58		0.0 33.77	2 2.157	2E 12.307 2T 24.613	97.780 36.920 134.700	120 0.0102	49.472 0.0 1.380		Vel = 2.96	
128A to 1321	17.58 17.58		39.03 72.8	2 2.157	E 6.153 T 12.307	24.630 18.460 43.090	120 0.0424	50.852 0.0 1.829		Vel = 6.39	
1321 to 321T	17.58 17.58		562.86 635.66	4 4.26	E 13.167	3.060 13.167 16.227	120 0.0850	52.681 0.0 1.379		Vel = 14.31	
321T to 1322	17.58 17.58		0.0 635.66	6 6.357		6.620 6.620	120 0.0121	54.060 0.0 0.080		Vel = 6.43	
1322 to TR1	17.58 17.58		0.0 635.66	6 6.357		156.770 156.770	120 0.0121	54.140 0.0 1.897		Vel = 6.43	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TR1 to BR1	17.58 3		0.0 635.66	6 6.357	E Fsp Avc B T 17.603 0.0 27.661 12.573 37.72	8.410 95.557 103.967	120 0.0121	56.037 7.315 1.258		* * Fixed Loss = 1 Vel = 6.43	
BR1 to BR2	3 3	H100	100.00 735.66	8 8.249		2.320 2.320	120 0.0043	64.610 0.0 0.010		Vel = 4.42	
BR2 to FLG	3 1		0.0 735.66	8 8.249	E 21.141	7.600 21.141 28.741	120 0.0045	64.620 0.866 0.128		Vel = 4.42	
FLG to UG4	1 -2.42		0.0 735.66	8 8.27	E T 28.468 55.354	57.120 83.822 140.942	140 0.0033	65.614 1.481 0.467		Vel = 4.39	
UG4 to UG2	-2.42 -2.42		0.16 735.82	8 8.27		392.280 392.280	140 0.0033	67.562 0.0 1.300		Vel = 4.39	
UG2 to UG1	-2.42 -2.42		399.84 1135.66	8 8.27	8E T 227.744 55.354	462.900 283.098 745.998	140 0.0074	68.862 4.000 5.514		* * Fixed Loss = 4 Vel = 6.78	
UG1 to SRC	-2.42 -2.42		0.0 1135.66	12 12.34		287.990 287.990	140 0.0011	78.376 0.0 0.303		Vel = 3.05	
SRC			0.0 1135.66					78.679		K Factor = 128.03	
A22 to TA22	13.11 14.58	5.60	26.01 26.01	1 1.049	E T 2.0 5.0	3.300 7.000 10.300	120 0.2117	21.579 -0.637 2.180		Vel = 9.66	
TA22 to TA23	14.58 14.58		6.63 32.64	1.5 1.61		12.000 12.000	120 0.0400	23.122 0.0 0.480		Vel = 5.14	
TA23 to TA24	14.58 14.58		26.28 58.92	1.5 1.61		11.980 11.980	120 0.1193	23.602 0.0 1.429		Vel = 9.29	
TA24 to 1303	14.58 14.58		27.05 85.97	1.5 1.61	T 8.0	52.650 8.000 60.650	120 0.2398	25.031 0.0 14.545		Vel = 13.55	
1303 to 1304	14.58 14.58		254.97 340.94	3 3.26		11.000 11.000	120 0.0988	39.576 0.0 1.087		Vel = 13.10	
1304 to 1305	14.58 14.58		-10.29 330.65	3 3.26		10.000 10.000	120 0.0934	40.663 0.0 0.934		Vel = 12.71	
1305 to 1306	14.58 14.58		-9.33 321.32	3 3.26		9.860 9.860	120 0.0885	41.597 0.0 0.873		Vel = 12.35	
1306 to 1307	14.58 14.58		-9.06 312.26	3 3.26		8.640 8.640	120 0.0839	42.470 0.0 0.725		Vel = 12.00	

Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1307 to 1308	14.58 14.58		-9.43 302.83	3 3.26		11.500 11.500	120 0.0794	43.195 0.0 0.913		Vel = 11.64	
1308 to 1309	14.58 14.58		-10.70 292.13	3 3.26		8.000 8.000	120 0.0742	44.108 0.0 0.594		Vel = 11.23	
1309 to 1310	14.58 14.58		-12.06 280.07	3 3.26		7.920 7.920	120 0.0686	44.702 0.0 0.543		Vel = 10.77	
1310 to 1311	14.58 14.58		-13.83 266.24	3 3.26	2E 18.815	30.400 18.815 49.215	120 0.0625	45.245 0.0 3.077		Vel = 10.23	
1311 to 1312	14.58 17.58		-15.50 250.74	3 3.26	3E 28.223	22.340 28.223 50.563	120 0.0560	48.322 -1.299 2.829		Vel = 9.64	
1312 to 1313	17.58 17.58		0.0 250.74	4 4.26		4.990 4.990	120 0.0152	49.852 0.0 0.076		Vel = 5.64	
1313 to 1314	17.58 17.58		43.21 293.95	4 4.26		12.310 12.310	120 0.0205	49.928 0.0 0.252		Vel = 6.62	
1314 to 1315	17.58 17.58		34.77 328.72	4 4.26		6.120 6.120	120 0.0250	50.180 0.0 0.153		Vel = 7.40	
1315 to 1316	17.58 17.58		34.54 363.26	4 4.26		8.230 8.230	120 0.0303	50.333 0.0 0.249		Vel = 8.18	
1316 to 1317	17.58 17.58		33.77 397.03	4 4.26		10.040 10.040	120 0.0356	50.582 0.0 0.357		Vel = 8.94	
1317 to 1318	17.58 17.58		38.85 435.88	4 4.26		6.060 6.060	120 0.0422	50.939 0.0 0.256		Vel = 9.81	
1318 to 1319	17.58 17.58		37.74 473.62	4 4.26		9.490 9.490	120 0.0493	51.195 0.0 0.468		Vel = 10.66	
1319 to 1320	17.58 17.58		43.21 516.83	4 4.26		9.460 9.460	120 0.0579	51.663 0.0 0.548		Vel = 11.63	
1320 to 1321	17.58 17.58		46.03 562.86	4 4.26		6.920 6.920	120 0.0679	52.211 0.0 0.470		Vel = 12.67	
1321			0.0 562.86					52.681		K Factor = 77.55	
A20 to TA20	13.11 14.58	5.60	26.08 26.08	1 1.049	E T 2.0 5.0	3.300 7.000 10.300	120 0.2128	21.695 -0.637 2.192		Vel = 9.68	
TA20			0.0 26.08					23.250		K Factor = 5.41	

Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
A23 to TA23	13.11 14.58	5.60	26.28 26.28	1 1.049	E T 2.0 5.0	3.300 7.000 10.300	120 0.2156	22.018 -0.637 2.221		Vel = 9.76	
TA23			0.0 26.28					23.602		K Factor = 5.41	
A19 to TA19	13.11 14.58	5.60	26.57 26.57	1 1.049	E T 2.0 5.0	3.300 7.000 10.300	120 0.2201	22.505 -0.637 2.267		Vel = 9.86	
TA19			0.0 26.57					24.135		K Factor = 5.41	
A24 to TA24	13.11 14.58	5.60	27.05 27.05	1 1.049	E T 2.0 5.0	3.300 7.000 10.300	120 0.2275	23.325 -0.637 2.343		Vel = 10.04	
TA24			0.0 27.05					25.031		K Factor = 5.41	
TA21 to TA22	14.58 14.58		6.63 6.63	1.5 1.61		12.010 12.010	120 0.0021	23.097 0.0 0.025		Vel = 1.04	
TA22			0.0 6.63					23.122		K Factor = 1.38	
1103 to 1102	14.58 14.58		-222.70 -222.7	3 3.26		10.090 10.090	120 -0.0449	37.606 0.0 -0.453		Vel = 8.56	
1102 to 1101	14.58 14.58		74.35 -148.35	3 3.26		10.000 10.000	120 -0.0212	37.153 0.0 -0.212		Vel = 5.70	
1101 to 1100	14.58 14.58		74.18 -74.17	3 3.26		8.500 8.500	120 -0.0059	36.941 0.0 -0.050		Vel = 2.85	
1100 to TA01	14.58 14.58		0.0 -74.17	1.5 1.61	T 8.0	60.840 8.000 68.840	120 -0.1825	36.891 0.0 -12.565		Vel = 11.69	
TA01 to TA02	14.58 14.58		26.81 -47.36	1.5 1.61		12.000 12.000	120 -0.0796	24.326 0.0 -0.955		Vel = 7.46	
TA02 to TA03	14.58 14.58		26.28 -21.08	1.5 1.61		12.000 12.000	120 -0.0178	23.371 0.0 -0.214		Vel = 3.32	
TA03 to TA04	14.58 14.58		26.17 5.09	1.5 1.61		12.000 12.000	120 0.0013	23.157 0.0 0.016		Vel = 0.80	
TA04 to TA05	14.58 14.58		26.17 31.26	1.5 1.61		12.000 12.000	120 0.0369	23.173 0.0 0.443		Vel = 4.93	
TA05 to TA06	14.58 14.58		26.42 57.68	1.5 1.61		12.000 12.000	120 0.1146	23.616 0.0 1.375		Vel = 9.09	
TA06 to 1300	14.58 14.58		27.17 84.85	1.5 1.61	T 8.0	50.650 8.000 58.650	120 0.2341	24.991 0.0 13.730		Vel = 13.37	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA A

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1300 to 1301	14.58 14.58		0.0 84.85	3 3.26		8.500 8.500	120 0.0075	38.721 0.0 0.064		Vel = 3.26	
1301 to 1302	14.58 14.58		84.89 169.74	3 3.26		10.000 10.000	120 0.0272	38.785 0.0 0.272		Vel = 6.52	
1302 to 1303	14.58 14.58		85.24 254.98	3 3.26		9.000 9.000	120 0.0577	39.057 0.0 0.519		Vel = 9.80	
1303			0.0 254.98					39.576		K Factor = 40.53	
A03 to TA03	13.11 14.58	5.60	26.17 26.17	1 1.049	E T 2.0 5.0	2.160 7.000 9.160	120 0.2140	21.834 -0.637 1.960		Vel = 9.71	
TA03			0.0 26.17					23.157		K Factor = 5.44	
A04 to TA04	13.11 14.58	5.60	26.18 26.18	1 1.049	E T 2.0 5.0	2.160 7.000 9.160	120 0.2142	21.848 -0.637 1.962		Vel = 9.72	
TA04			0.0 26.18					23.173		K Factor = 5.44	
A02 to TA02	13.11 14.58	5.60	26.28 26.28	1 1.049	E T 2.0 5.0	2.160 7.000 9.160	120 0.2158	22.031 -0.637 1.977		Vel = 9.76	
TA02			0.0 26.28					23.371		K Factor = 5.44	
A05 to TA05	13.11 14.58	5.60	26.42 26.42	1 1.049	E T 2.0 5.0	2.160 7.000 9.160	120 0.2179	22.257 -0.637 1.996		Vel = 9.81	
TA05			0.0 26.42					23.616		K Factor = 5.44	
A01 to TA01	13.11 14.58	5.60	26.81 26.81	1 1.049	E T 2.0 5.0	2.160 7.000 9.160	120 0.2237	22.914 -0.637 2.049		Vel = 9.95	
TA01			0.0 26.81					24.326		K Factor = 5.44	
A06 to TA06	13.11 14.58	5.60	27.16 27.16	1 1.049	E T 2.0 5.0	2.160 7.000 9.160	120 0.2293	23.528 -0.637 2.100		Vel = 10.08	
TA06			0.0 27.16					24.991		K Factor = 5.43	
A09 to TA09	13.11 14.58	5.60	26.18 26.18	1 1.049	E T 2.0 5.0	2.300 7.000 9.300	120 0.2141	21.850 -0.637 1.991		Vel = 9.72	
TA09 to TA08	14.58 14.58		-5.11 21.07	1.5 1.61		12.000 12.000	120 0.0178	23.204 0.0 0.214		Vel = 3.32	
TA08 to TA07	14.58 14.58		26.29 47.36	1.5 1.61		12.000 12.000	120 0.0796	23.418 0.0 0.955		Vel = 7.46	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA A

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TA07 to 1101	14.58 14.58		26.82 74.18	1.5 1.61	T	8.0	60.840 8.000 68.840	120 0.1826	24.373 0.0 12.568		Vel = 11.69	
1101			0.0 74.18						36.941		K Factor = 12.20	
A10 to TA10	13.11 14.58	5.60	26.19 26.19	1 1.049	E T	2.0 5.0	2.300 7.000 9.300	120 0.2143	21.864 -0.637 1.993		Vel = 9.72	
TA10 to TA11	14.58 14.58		5.10 31.29	1.5 1.61			12.000 12.000	120 0.0370	23.220 0.0 0.444		Vel = 4.93	
TA11 to TA12	14.58 14.58		26.43 57.72	1.5 1.61			12.000 12.000	120 0.1148	23.664 0.0 1.377		Vel = 9.10	
TA12 to 1301	14.58 14.58		27.17 84.89	1.5 1.61	T	8.0	50.650 8.000 58.650	120 0.2343	25.041 0.0 13.744		Vel = 13.38	
1301			0.0 84.89						38.785		K Factor = 13.63	
A08 to TA08	13.11 14.58	5.60	26.29 26.29	1 1.049	E T	2.0 5.0	2.300 7.000 9.300	120 0.2159	22.047 -0.637 2.008		Vel = 9.76	
TA08			0.0 26.29						23.418		K Factor = 5.43	
A11 to TA11	13.11 14.58	5.60	26.43 26.43	1 1.049	E T	2.0 5.0	2.300 7.000 9.300	120 0.2180	22.274 -0.637 2.027		Vel = 9.81	
TA11			0.0 26.43						23.664		K Factor = 5.43	
A07 to TA07	13.11 14.58	5.60	26.81 26.81	1 1.049	E T	2.0 5.0	2.300 7.000 9.300	120 0.2239	22.928 -0.637 2.082		Vel = 9.95	
TA07			0.0 26.81						24.373		K Factor = 5.43	
A12 to TA12	13.11 14.58	5.60	27.17 27.17	1 1.049	E T	2.0 5.0	2.300 7.000 9.300	120 0.2295	23.544 -0.637 2.134		Vel = 10.09	
TA12			0.0 27.17						25.041		K Factor = 5.43	
TA09 to TA10	14.58 14.58		5.11 5.11	1.5 1.61			12.000 12.000	120 0.0013	23.204 0.0 0.016		Vel = 0.81	
TA10			0.0 5.11						23.220		K Factor = 1.06	
A15 to TA15	13.11 14.58	5.60	26.26 26.26	1 1.049	E T	2.0 5.0	2.300 7.000 9.300	120 0.2154	21.992 -0.637 2.003		Vel = 9.75	
TA15 to TA14	14.58 14.58		-5.19 21.07	1.5 1.61			12.000 12.000	120 0.0178	23.358 0.0 0.214		Vel = 3.32	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA A

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TA14 to TA13	14.58 14.58		26.38 47.45	1.5 1.61			12.000 12.000	120 0.0798	23.572 0.0 0.958		Vel = 7.48	
TA13 to 1102	14.58 14.58		26.90 74.35	1.5 1.61	T	8.0	60.840 8.000 68.840	120 0.1834	24.530 0.0 12.623		Vel = 11.72	
1102			0.0 74.35						37.153		K Factor = 12.20	
A16 to TA16	13.11 14.58	5.60	26.27 26.27	1 1.049	E T	2.0 5.0	2.300 7.000 9.300	120 0.2156	22.006 -0.637 2.005		Vel = 9.75	
TA16 to TA17	14.58 14.58		5.19 31.46	1.5 1.61			12.000 12.000	120 0.0373	23.374 0.0 0.448		Vel = 4.96	
TA17 to TA18	14.58 14.58		26.51 57.97	1.5 1.61			12.000 12.000	120 0.1158	23.822 0.0 1.389		Vel = 9.14	
TA18 to 1302	14.58 14.58		27.27 85.24	1.5 1.61	T	8.0	50.650 8.000 58.650	120 0.2361	25.211 0.0 13.846		Vel = 13.43	
1302			0.0 85.24						39.057		K Factor = 13.64	
A14 to TA14	13.11 14.58	5.60	26.38 26.38	1 1.049	E T	2.0 5.0	2.300 7.000 9.300	120 0.2172	22.189 -0.637 2.020		Vel = 9.79	
TA14			0.0 26.38						23.572		K Factor = 5.43	
A17 to TA17	13.11 14.58	5.60	26.52 26.52	1 1.049	E T	2.0 5.0	2.300 7.000 9.300	120 0.2192	22.420 -0.637 2.039		Vel = 9.84	
TA17			0.0 26.52						23.822		K Factor = 5.43	
A13 to TA13	13.11 14.58	5.60	26.90 26.9	1 1.049	E T	2.0 5.0	2.300 7.000 9.300	120 0.2252	23.073 -0.637 2.094		Vel = 9.99	
TA13			0.0 26.90						24.530		K Factor = 5.43	
A18 to TA18	13.11 14.58	5.60	27.26 27.26	1 1.049	E T	2.0 5.0	2.300 7.000 9.300	120 0.2309	23.701 -0.637 2.147		Vel = 10.12	
TA18			0.0 27.26						25.211		K Factor = 5.43	
TA15 to TA16	14.58 14.58		5.19 5.19	1.5 1.61			12.000 12.000	120 0.0013	23.358 0.0 0.016		Vel = 0.82	
TA16			0.0 5.19						23.374		K Factor = 1.07	
1304 to 1104	14.58 14.58		10.29 10.29	1.5 1.61	2T	16.0	149.360 16.000 165.360	120 0.0047	40.663 0.0 0.782		Vel = 1.62	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA A

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1104			0.0 10.29					41.445		K Factor = 1.60	
1305 to 1105	14.58 14.58		9.33 9.33	1.5 1.61	2T	16.0	149.350 16.000 165.350	120 0.0 0.0039	41.597 0.0 0.652		Vel = 1.47
1105			0.0 9.33					42.249		K Factor = 1.44	
1306 to 1106	14.58 14.58		9.06 9.06	1.5 1.61	2T	16.0	149.350 16.000 165.350	120 0.0 0.0037	42.470 0.0 0.617		Vel = 1.43
1106			0.0 9.06					43.087		K Factor = 1.38	
1307 to 1107	14.58 14.58		9.44 9.44	1.5 1.61	2T	16.0	149.350 16.000 165.350	120 0.0 0.0040	43.195 0.0 0.666		Vel = 1.49
1107			0.0 9.44					43.861		K Factor = 1.43	
1308 to 1108	14.58 14.58		10.70 10.7	1.5 1.61	2T	16.0	149.350 16.000 165.350	120 0.0 0.0051	44.108 0.0 0.840		Vel = 1.69
1108			0.0 10.70					44.948		K Factor = 1.60	
1309 to 1109	14.58 14.58		12.06 12.06	1.5 1.61	2T	16.0	149.360 16.000 165.360	120 0.0 0.0063	44.702 0.0 1.047		Vel = 1.90
1109			0.0 12.06					45.749		K Factor = 1.78	
1310 to 1110	14.58 14.58		13.83 13.83	1.5 1.61	2T	16.0	149.350 16.000 165.350	120 0.0 0.0082	45.245 0.0 1.350		Vel = 2.18
1110			0.0 13.83					46.595		K Factor = 2.03	
1311 to T311	14.58 17.58		15.50 15.5	2 2.157	T	12.307	3.000 12.307 15.307	120 -1.299 0.0024	48.322 -1.299 0.037		Vel = 1.36
T311 to 1112	17.58 17.58		0.0 15.5	2 2.157	E T	6.153 12.307	129.370 18.460 147.830	120 0.0 0.0024	47.060 0.0 0.359		Vel = 1.36
1112			0.0 15.50					47.419		K Factor = 2.25	
UG4 to HY1	-2.42 -2.42		-0.16 -0.16	8 8.27	2E	56.936	152.180 56.936 209.116	140 0 0	67.562 0.0 0.0		Vel = 0
HY1 to UG3	-2.42 -2.42	H400	400.00 399.84	8 8.27	3E	85.404	1024.600 85.404 1110.004	140 0.0 0.0011	67.562 0.0 1.190		Vel = 2.39
UG3 to UG2	-2.42 -2.42		0.0 399.84	8 8.27	T	55.354	47.000 55.354 102.354	140 0.0 0.0011	68.752 0.0 0.110		Vel = 2.39

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA A

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
UG2			0.0 399.84					68.862		K Factor = 48.18	
1113 to 115A	17.58 17.58		25.22 25.22	2 2.157	T E 12.307 6.153	73.420 18.460 91.880	120 0.0060	47.545 0.0 0.549		Vel = 2.21	
115A to 1313	17.58 17.58		18.00 43.22	2 2.157	2T 2E 24.613 12.307	76.510 36.920 113.430	120 0.0162	48.094 0.0 1.834		Vel = 3.79	
1313			0.0 43.22					49.928		K Factor = 6.12	
1115 to TB01	17.58 17.58		17.99 17.99	2 2.157	T 12.307	12.520 12.307 24.827	120 0.0032	47.787 0.0 0.079		Vel = 1.58	
TB01 to TB02	17.58 17.58		0.0 17.99	2 2.157		10.000 10.000	120 0.0032	47.866 0.0 0.032		Vel = 1.58	
TB02 to TB03	17.58 17.58		0.0 17.99	2 2.157		10.000 10.000	120 0.0032	47.898 0.0 0.032		Vel = 1.58	
TB03 to TB04	17.58 17.58		0.0 17.99	2 2.157		10.000 10.000	120 0.0032	47.930 0.0 0.032		Vel = 1.58	
TB04 to TB05	17.58 17.58		0.0 17.99	2 2.157		10.000 10.000	120 0.0032	47.962 0.0 0.032		Vel = 1.58	
TB05 to TB06	17.58 17.58		0.0 17.99	2 2.157		10.000 10.000	120 0.0032	47.994 0.0 0.032		Vel = 1.58	
TB06 to 115A	17.58 17.58		0.0 17.99	2 2.157	E 6.153	15.080 6.153 21.233	120 0.0032	48.026 0.0 0.068		Vel = 1.58	
115A			0.0 17.99					48.094		K Factor = 2.59	
1116 to TB07	17.58 17.58		34.76 34.76	2 2.157	T 12.307	12.520 12.307 24.827	120 0.0108	48.052 0.0 0.268		Vel = 3.05	
TB07 to TB08	17.58 17.58		0.0 34.76	2 2.157		10.000 10.000	120 0.0108	48.320 0.0 0.108		Vel = 3.05	
TB08 to TB09	17.58 17.58		0.0 34.76	2 2.157		10.000 10.000	120 0.0108	48.428 0.0 0.108		Vel = 3.05	
TB09 to TB10	17.58 17.58		0.0 34.76	2 2.157		10.000 10.000	120 0.0108	48.536 0.0 0.108		Vel = 3.05	
TB10 to TB11	17.58 17.58		0.0 34.76	2 2.157		10.000 10.000	120 0.0108	48.644 0.0 0.108		Vel = 3.05	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA A

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Date

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TB11 to TB12	17.58 17.58		0.0 34.76	2 2.157		10.000 10.000	120 0.0108	48.752 0.0 0.108		Vel = 3.05	
TB12 to 1314	17.58 17.58		0.0 34.76	2 2.157	4E T 24.613 12.307	85.090 36.920 122.010	120 0.0108	48.860 0.0 1.320		Vel = 3.05	
1314			0.0 34.76					50.180		K Factor = 4.91	
1118 to TB13	17.58 17.58		34.55 34.55	2 2.157	T 12.307	12.520 12.307 24.827	120 0.0107	48.187 0.0 0.265		Vel = 3.03	
TB13 to TB14	17.58 17.58		0.0 34.55	2 2.157		10.000 10.000	120 0.0107	48.452 0.0 0.107		Vel = 3.03	
TB14 to TB15	17.58 17.58		0.0 34.55	2 2.157		10.000 10.000	120 0.0107	48.559 0.0 0.107		Vel = 3.03	
TB15 to TB16	17.58 17.58		0.0 34.55	2 2.157		10.000 10.000	120 0.0107	48.666 0.0 0.107		Vel = 3.03	
TB16 to TB17	17.58 17.58		0.0 34.55	2 2.157		10.000 10.000	120 0.0107	48.773 0.0 0.107		Vel = 3.03	
TB17 to TB18	17.58 17.58		0.0 34.55	2 2.157		10.000 10.000	120 0.0106	48.880 0.0 0.106		Vel = 3.03	
TB18 to 1315	17.58 17.58		0.0 34.55	2 2.157	4E T 24.613 12.307	89.090 36.920 126.010	120 0.0107	48.986 0.0 1.347		Vel = 3.03	
1315			0.0 34.55					50.333		K Factor = 4.87	
1120 to 1316	17.58 17.58		33.76 33.76	2 2.157	2T 6E 24.613 36.92	153.740 61.533 215.273	120 0.0102	48.377 0.0 2.205		Vel = 2.96	
1316			0.0 33.76					50.582		K Factor = 4.75	
1121 to 1317	17.58 17.58		38.85 38.85	2 2.157	2T 2E 24.613 12.307	146.150 36.920 183.070	120 0.0133	48.508 0.0 2.431		Vel = 3.41	
1317			0.0 38.85					50.939		K Factor = 5.44	
1126 to 1318	17.58 17.58		37.74 37.74	2 2.157	2T 3E 24.613 18.46	109.250 43.073 152.323	120 0.0126	49.278 0.0 1.917		Vel = 3.31	
1318			0.0 37.74					51.195		K Factor = 5.27	
1127 to 1319	17.58 17.58		43.21 43.21	2 2.157	2T 2E 24.613 12.307	101.470 36.920 138.390	120 0.0162	49.426 0.0 2.237		Vel = 3.79	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA A

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1319			0.0 43.21					51.663		K Factor = 6.01	
1128 to 1320	17.58 17.58		46.03	2	2T 4E 24.613 24.613	102.350 49.226 151.576	120	49.456 0.0 2.755		Vel = 4.04	
1320			0.0 46.03					52.211		K Factor = 6.37	
1129 to 128A	17.58 17.58		39.03	2	2T 24.613	78.460 24.613 103.073	120	49.472 0.0 1.380		Vel = 3.43	
128A			0.0 39.03					50.852		K Factor = 5.47	



HENDERSON ENGINEERS

HENDERSON ENGINEERS
8345 LENEXA DR. SUITE #300
LENEXA, KS 66214
913-742-500

Job Name : Bucees - BENTON AR - System 1 RA B
Building :
Location : CONVENIENCE STORAGE
System : SYSTEM 1 RA B
Contract : 2450001433
Data File : Bucees - BENTON AR - System 1 RA B.WXF

Water Supply Curve

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA B

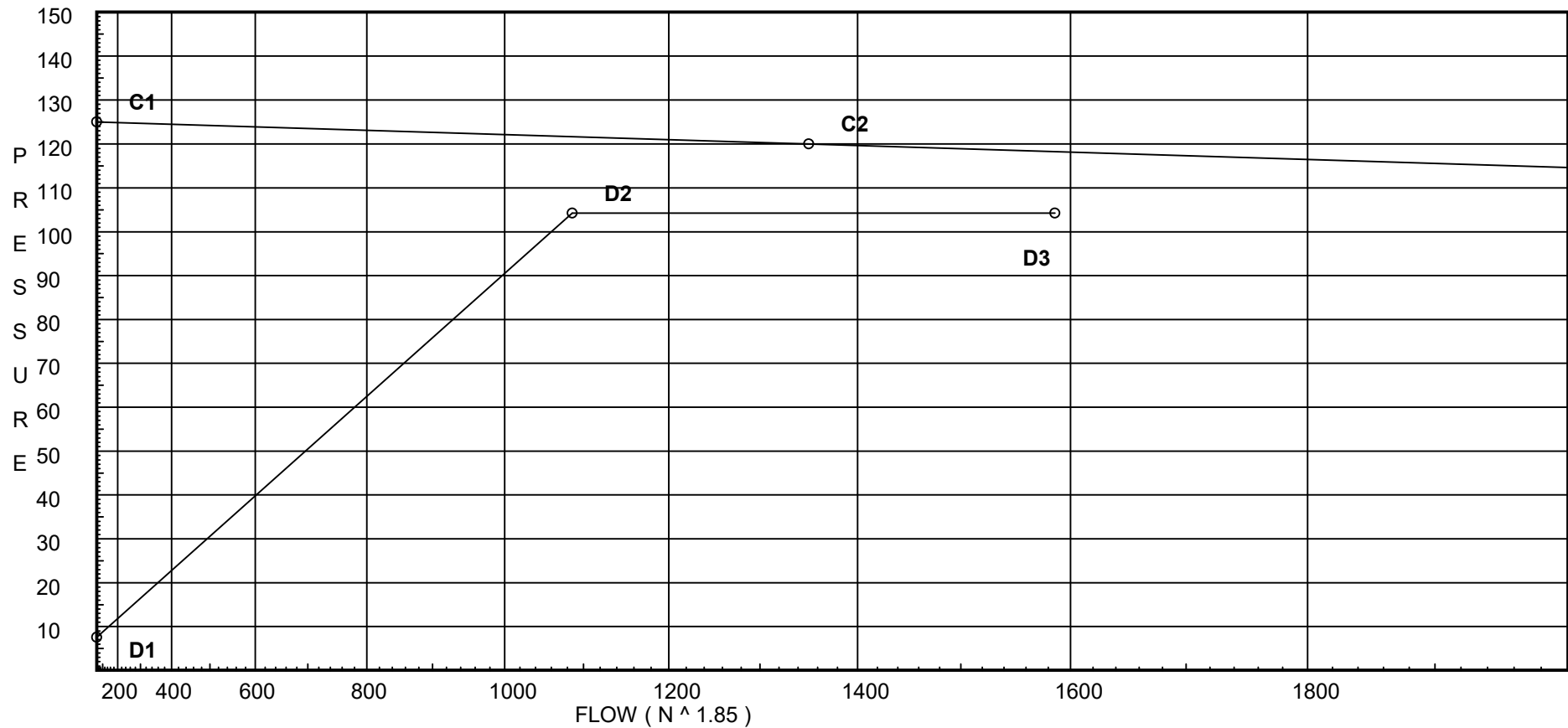
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City Water Supply:

C1 - Static Pressure : 125
C2 - Residual Pressure: 120
C2 - Residual Flow : 1351

Demand:

D1 - Elevation : 7.592
D2 - System Flow : 1086.07
D2 - System Pressure : 104.280
Hose (Demand) : 500
D3 - System Demand : 1586.07
Safety Margin : 13.992



Fittings Used Summary

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA B

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Fitting Legend																					
Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Avc	Alarm Vic 751	0	0	0	0	3	9	8	17	0	21	0	22	50	0	0	0	0	0	0	0
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																			
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.

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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>
SRC	125.0	120	1351.0	118.272	1586.07	104.28

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>	
B16	15.11	11.2	28.0	59.26	0.45	100
TB16	17.58		39.55			
TB15	17.58		39.7			
TB14	17.58		40.46			
TB13	17.58		42.29			
1118	17.58		50.53			
1119	17.58		51.06			
1120	17.58		51.1			
1121	17.58		51.48			
1122	17.58		51.5			
1123	17.58		52.55			
1126	17.58		53.74			
1127	17.58		54.17			
1128	17.58		54.26			
1129	17.58		54.3			
1130	17.58		54.3			
128A	17.58		58.26			
1321	17.58		63.51			
321T	17.58		67.22			
1322	17.58		67.44			
TR1	17.58		72.55			
BR1	3.0		83.25	100.0		
BR2	3.0		83.28			
FLG	1.0		84.45			
UG4	-2.42		87.06			
UG2	-2.42		89.49			
UG1	-2.42		103.72			
SRC	-2.42		104.28			
B17	15.11	11.2	28.02	59.29	0.45	100
TB17	17.58		39.58			
TB18	17.58		40.06			
1315	17.58		57.38			
1316	17.58		58.0			
1317	17.58		58.91			
1318	17.58		59.57			
1319	17.58		60.8			
1320	17.58		62.25			
B15	15.11	11.2	28.1	59.37	0.45	100
B18	15.11	11.2	28.36	59.65	0.45	100
B14	15.11	11.2	28.64	59.94	0.45	100
B13	15.11	11.2	29.93	61.28	0.45	100
1117	17.58		50.52			

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NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
1116	17.58		50.43			
1115	17.58		50.42			
1114	17.58		50.43			
1113	17.58		50.47			
1112	17.58		50.51			
1111	14.58		51.97			
1110	14.58		52.26			
1109	14.58		52.41			
1108	14.58		52.53			
1107	14.58		52.66			
1106	14.58		52.73			
1105	14.58		52.79			
1104	14.58		52.83			
1103	14.58		52.96			
1102	14.58		52.97			
1101	14.58		52.98			
1100	14.58		52.98			
TA01	14.58		53.4			
TA02	14.58		53.47			
TA03	14.58		53.54			
TA04	14.58		53.62			
TA05	14.58		53.69			
TA06	14.58		53.76			
1300	14.58		54.12			
1301	14.58		54.12			
1302	14.58		54.12			
1303	14.58		54.14			
1304	14.58		54.17			
1305	14.58		54.21			
1306	14.58		54.27			
1307	14.58		54.34			
1308	14.58		54.47			
1309	14.58		54.59			
1310	14.58		54.74			
1311	14.58		55.93			
1312	17.58		56.75			
1313	17.58		56.8			
1314	17.58		57.1			
B10	15.11	11.2	28.01	59.27	0.45	100
TB10	17.58		39.56			
TB09	17.58		39.7			
TB08	17.58		40.45			
TB07	17.58		42.25			
B11	15.11	11.2	28.03	59.3	0.45	100
TB11	17.58		39.6			
TB12	17.58		40.09			
B09	15.11	11.2	28.1	59.38	0.45	100
B12	15.11	11.2	28.38	59.67	0.45	100
B08	15.11	11.2	28.64	59.93	0.45	100
B07	15.11	11.2	29.91	61.25	0.45	100
B04	15.11	11.2	29.65	60.98	0.45	100

Flow Summary - NFPA

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NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
TB04	17.58		41.89			
TB05	17.58		42.08			
TB06	17.58		42.96			
115A	17.58		47.3			
B03	15.11	11.2	29.66	61.0	0.45	100
TB03	17.58		41.9			
TB02	17.58		42.35			
TB01	17.58		43.7			
B05	15.11	11.2	29.78	61.12	0.45	100
B02	15.11	11.2	29.98	61.32	0.45	100
B06	15.11	11.2	30.41	61.76	0.45	100
B01	15.11	11.2	30.93	62.29	0.45	100
T311	17.58		54.24			
TA19	14.58		53.43			
TA20	14.58		53.5			
TA21	14.58		53.56			
TA22	14.58		53.63			
TA23	14.58		53.7			
TA24	14.58		53.77			
TA13	14.58		53.4			
TA14	14.58		53.47			
TA15	14.58		53.54			
TA16	14.58		53.62			
TA17	14.58		53.69			
TA18	14.58		53.76			
TA07	14.58		53.4			
TA08	14.58		53.47			
TA09	14.58		53.54			
TA10	14.58		53.62			
TA11	14.58		53.69			
TA12	14.58		53.76			
HY1	-2.42		87.1	400.0		
UG3	-2.42		89.29			

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
B16 to TB16	15.11 17.58	11.20	59.26 59.26	1 1.049	T 2E	5.0 4.0	4.000 9.000 13.000	120 0.9708	28.000 -1.070 12.621			
										Vel =	22.00	
TB16 to TB15	17.58 17.58		-18.45 40.81	2 2.157			10.000 10.000	120 0.0146	39.551 0.0 0.146		Vel =	3.58
TB15 to TB14	17.58 17.58		59.37 100.18	2 2.157			10.000 10.000	120 0.0766	39.697 0.0 0.766		Vel =	8.80
TB14 to TB13	17.58 17.58		59.95 160.13	2 2.157			10.000 10.000	120 0.1824	40.463 0.0 1.824		Vel =	14.06
TB13 to 1118	17.58 17.58		61.27 221.4	2 2.157	T	12.307	12.520 12.307 24.827	120 0.3322	42.287 0.0 8.247		Vel =	19.44
1118 to 1119	17.58 17.58		269.33 490.73	4 4.26			9.960 9.960	120 0.0527	50.534 0.0 0.525		Vel =	11.05
1119 to 1120	17.58 17.58		0.0 490.73	4 4.26			0.750 0.750	120 0.0520	51.059 0.0 0.039		Vel =	11.05
1120 to 1121	17.58 17.58		-62.55 428.18	4 4.26			9.440 9.440	120 0.0409	51.098 0.0 0.386		Vel =	9.64
1121 to 1122	17.58 17.58		-71.04 357.14	4 4.26			0.560 0.560	120 0.0304	51.484 0.0 0.017		Vel =	8.04
1122 to 1123	17.58 17.58		0.0 357.14	4 4.26	T	26.334	9.430 26.334 35.764	120 0.0292	51.501 0.0 1.046		Vel =	8.04
1123 to 1126	17.58 17.58		0.0 357.14	4 4.26			40.830 40.830	120 0.0293	52.547 0.0 1.195		Vel =	8.04
1126 to 1127	17.58 17.58		-68.84 288.3	4 4.26	E	13.167	8.590 13.167 21.757	120 0.0197	53.742 0.0 0.428		Vel =	6.49
1127 to 1128	17.58 17.58		-77.73 210.57	4 4.26			8.000 8.000	120 0.0110	54.170 0.0 0.088		Vel =	4.74
1128 to 1129	17.58 17.58		-81.89 128.68	4 4.26			10.000 10.000	120 0.0044	54.258 0.0 0.044		Vel =	2.90
1129 to 1130	17.58 17.58		-68.99 59.69	4 4.26			0.670 0.670	120 0.0015	54.302 0.0 0.001		Vel =	1.34
1130 to 128A	17.58 17.58		0.0 59.69	2 2.157	2E 2T	12.307 24.613	97.780 36.920 134.700	120 0.0294	54.303 0.0 3.959		Vel =	5.24
128A to 1321	17.58 17.58		68.99 128.68	2 2.157	E T	6.153 12.307	24.630 18.460 43.090	120 0.1217	58.262 0.0 5.246		Vel =	11.30

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1321 to 321T	17.58 17.58		957.39 1086.07	4 4.26	E 13.167	3.060 13.167	120	63.508 0.0			
321T to 1322	17.58 17.58		0.0 1086.07	6 6.357		6.620 6.620	120	67.223 0.0	Vel = 24.45		
1322 to TR1	17.58 17.58		0.0 1086.07	6 6.357		156.770 156.770	120	67.439 0.0	Vel = 10.98		
TR1 to BR1	17.58 3		0.0 1086.07	6 6.357	E Fsp Avc B T 17.603 0.0 27.661 12.573 37.72	8.410 95.557 103.967	120	72.549 7.315 3.388	* * Fixed Loss = 1 Vel = 10.98		
BR1 to BR2	3 3	H100	100.00 1186.07	8 8.249		2.320 2.320	120	83.252 0.0			
BR2 to FLG	3 1		0.0 1186.07	8 8.249	E 21.141	7.600 21.141	120	83.278 0.866	Vel = 7.12		
FLG to UG4	1 -2.42		0.0 1186.07	8 8.27	E T 28.468 55.354	57.120 83.822	140	84.454 1.481	Vel = 7.12		
UG4 to UG2	-2.42 -2.42		-155.26 1030.81	8 8.27		392.280 392.280	140	87.064 0.0	Vel = 7.08		
UG2 to UG1	-2.42 -2.42		555.26 1586.07	8 8.27	8E T 227.744 55.354	462.900 283.098	140	89.488 4.000	* * Fixed Loss = 4 Vel = 9.47		
UG1 to SRC	-2.42 -2.42		0.0 1586.07	12 12.34		287.990 287.990	140	103.718 0.0	Vel = 4.25		
SRC			0.0 1586.07					104.280	K Factor = 155.32		
B17 to TB17	15.11 17.58	11.20	59.29 59.29	1 1.049	T 2E 5.0 4.0	4.000 9.000	120	28.024 -1.070			
TB17 to TB18	17.58 17.58		18.45 77.74	2 2.157		10.000 10.000	120	39.585 0.0	Vel = 22.01		
TB18 to 1315	17.58 17.58		59.65 137.39	2 2.157	4E T 24.613 12.307	89.090 36.920	120	40.064 0.0	Vel = 6.83		
1315 to 1316	17.58 17.58		457.94 595.33	4 4.26		8.230 8.230	120	57.379 0.0	Vel = 12.06		
1316 to 1317	17.58 17.58		62.56 657.89	4 4.26		10.040 10.040	120	57.999 0.0	Vel = 13.40		
							0.0905	0.909	Vel = 14.81		

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1317 to 1318	17.58 17.58		71.03 728.92	4 4.26		6.060 6.060	120 0.1096	58.908 0.0 0.664		Vel = 16.41	
1318 to 1319	17.58 17.58		68.85 797.77	4 4.26		9.490 9.490	120 0.1294	59.572 0.0 1.228		Vel = 17.96	
1319 to 1320	17.58 17.58		77.73 875.5	4 4.26		9.460 9.460	120 0.1536	60.800 0.0 1.453		Vel = 19.71	
1320 to 1321	17.58 17.58		81.88 957.38	4 4.26		6.920 6.920	120 0.1814	62.253 0.0 1.255		Vel = 21.55	
1321			0.0 957.38					63.508		K Factor = 120.14	
B15 to TB15	15.11 17.58	11.20	59.37 59.37	1 1.049	T 2E 4.0	4.000 9.000 13.000	120 0.9742	28.103 -1.070 12.664		Vel = 22.04	
TB15			0.0 59.37					39.697		K Factor = 9.42	
B18 to TB18	15.11 17.58	11.20	59.65 59.65	1 1.049	T 2E 4.0	4.000 9.000 13.000	120 0.9825	28.362 -1.070 12.772		Vel = 22.14	
TB18			0.0 59.65					40.064		K Factor = 9.42	
B14 to TB14	15.11 17.58	11.20	59.94 59.94	1 1.049	T 2E 4.0	4.000 9.000 13.000	120 0.9915	28.644 -1.070 12.889		Vel = 22.25	
TB14			0.0 59.94					40.463		K Factor = 9.42	
B13 to TB13	15.11 17.58	11.20	61.28 61.28	1 1.049	T 2E 4.0	4.000 9.000 13.000	120 1.0327	29.932 -1.070 13.425		Vel = 22.75	
TB13			0.0 61.28					42.287		K Factor = 9.42	
TB16 to TB17	17.58 17.58		18.45 18.45	2 2.157		10.000 10.000	120 0.0034	39.551 0.0 0.034		Vel = 1.62	
TB17			0.0 18.45					39.585		K Factor = 2.93	
1118 to 1117	17.58 17.58		-269.33 -269.33	4 4.26		0.790 0.790	120 -0.0177	50.534 0.0 -0.014		Vel = 6.06	
1117 to 1116	17.58 17.58		0.0 -269.33	4 4.26		5.330 5.330	120 -0.0173	50.520 0.0 -0.092		Vel = 6.06	
1116 to 1115	17.58 17.58		220.34 -48.99	4 4.26		9.810 9.810	120 -0.0007	50.428 0.0 -0.007		Vel = 1.10	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1115 to 1114	17.58 17.58		198.26 149.27	4 4.26		1.550 1.550	120 0.0058	50.421 0.0 0.009		Vel = 3.36	
1114 to 1113	17.58 17.58		0.0 149.27	4 4.26		6.600 6.600	120 0.0058	50.430 0.0 0.038		Vel = 3.36	
1113 to 1112	17.58 17.58		65.07 214.34	4 4.26		3.760 3.760	120 0.0114	50.468 0.0 0.043		Vel = 4.82	
1112 to 1111	17.58 14.58		-54.97 159.37	4 4.26	E 13.167	10.790 13.167 23.957	120 0.0066	50.511 1.299 0.158		Vel = 3.59	
1111 to 1110	14.58 14.58		0.0 159.37	3 3.26	E 9.408	2.610 9.408 12.018	120 0.0242	51.968 0.0 0.291		Vel = 6.13	
1110 to 1109	14.58 14.58		-19.21 140.16	3 3.26		7.920 7.920	120 0.0191	52.259 0.0 0.151		Vel = 5.39	
1109 to 1108	14.58 14.58		-17.91 122.25	3 3.26		8.000 8.000	120 0.0148	52.410 0.0 0.118		Vel = 4.70	
1108 to 1107	14.58 14.58		-16.82 105.43	3 3.26		11.500 11.500	120 0.0113	52.528 0.0 0.130		Vel = 4.05	
1107 to 1106	14.58 14.58		-15.57 89.86	3 3.26		8.640 8.640	120 0.0083	52.658 0.0 0.072		Vel = 3.45	
1106 to 1105	14.58 14.58		-14.83 75.03	3 3.26		9.860 9.860	120 0.0060	52.730 0.0 0.059		Vel = 2.88	
1105 to 1104	14.58 14.58		-14.19 60.84	3 3.26		10.000 10.000	120 0.0041	52.789 0.0 0.041		Vel = 2.34	
1104 to 1103	14.58 14.58		-13.75 47.09	3 3.26	2E 18.815	32.050 18.815 50.865	120 0.0025	52.830 0.0 0.129		Vel = 1.81	
1103 to 1102	14.58 14.58		-11.71 35.38	3 3.26		10.090 10.090	120 0.0015	52.959 0.0 0.015		Vel = 1.36	
1102 to 1101	14.58 14.58		-11.85 23.53	3 3.26		10.000 10.000	120 0.0007	52.974 0.0 0.007		Vel = 0.90	
1101 to 1100	14.58 14.58		-11.78 11.75	3 3.26		8.500 8.500	120 0.0002	52.981 0.0 0.002		Vel = 0.45	
1100 to TA01	14.58 14.58		0.0 11.75	1.5 1.61	T 8.0	60.840 8.000 68.840	120 0.0060	52.983 0.0 0.416		Vel = 1.85	
TA01 to TA02	14.58 14.58		0.0 11.75	1.5 1.61		12.000 12.000	120 0.0061	53.399 0.0 0.073		Vel = 1.85	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TA02 to TA03	14.58 14.58		0.0 11.75	1.5 1.61		12.000 12.000	120 0.0060	53.472 0.0 0.072		Vel = 1.85	
TA03 to TA04	14.58 14.58		0.0 11.75	1.5 1.61		12.000 12.000	120 0.0060	53.544 0.0 0.072		Vel = 1.85	
TA04 to TA05	14.58 14.58		0.0 11.75	1.5 1.61		12.000 12.000	120 0.0061	53.616 0.0 0.073		Vel = 1.85	
TA05 to TA06	14.58 14.58		0.0 11.75	1.5 1.61		12.000 12.000	120 0.0061	53.689 0.0 0.073		Vel = 1.85	
TA06 to 1300	14.58 14.58		0.0 11.75	1.5 1.61	T 8.0	50.650 8.000 58.650	120 0.0060	53.762 0.0 0.354		Vel = 1.85	
1300 to 1301	14.58 14.58		0.0 11.75	3 3.26		8.500 8.500	120 0.0002	54.116 0.0 0.002		Vel = 0.45	
1301 to 1302	14.58 14.58		11.78 23.53	3 3.26		10.000 10.000	120 0.0007	54.118 0.0 0.007		Vel = 0.90	
1302 to 1303	14.58 14.58		11.85 35.38	3 3.26		9.000 9.000	120 0.0014	54.125 0.0 0.013		Vel = 1.36	
1303 to 1304	14.58 14.58		11.71 47.09	3 3.26		11.000 11.000	120 0.0025	54.138 0.0 0.028		Vel = 1.81	
1304 to 1305	14.58 14.58		13.75 60.84	3 3.26		10.000 10.000	120 0.0041	54.166 0.0 0.041		Vel = 2.34	
1305 to 1306	14.58 14.58		14.19 75.03	3 3.26		9.860 9.860	120 0.0060	54.207 0.0 0.059		Vel = 2.88	
1306 to 1307	14.58 14.58		14.83 89.86	3 3.26		8.640 8.640	120 0.0083	54.266 0.0 0.072		Vel = 3.45	
1307 to 1308	14.58 14.58		15.57 105.43	3 3.26		11.500 11.500	120 0.0113	54.338 0.0 0.130		Vel = 4.05	
1308 to 1309	14.58 14.58		16.82 122.25	3 3.26		8.000 8.000	120 0.0148	54.468 0.0 0.118		Vel = 4.70	
1309 to 1310	14.58 14.58		17.91 140.16	3 3.26		7.920 7.920	120 0.0192	54.586 0.0 0.152		Vel = 5.39	
1310 to 1311	14.58 14.58		19.21 159.37	3 3.26	2E 18.815	30.400 18.815 49.215	120 0.0242	54.738 0.0 1.190		Vel = 6.13	
1311 to 1312	14.58 17.58		54.97 214.34	3 3.26	3E 28.223	22.340 28.223 50.563	120 0.0419	55.928 -1.299 2.117		Vel = 8.24	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA B

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1312 to 1313	17.58 17.58		0.0 214.34	4 4.26			4.990 4.990	120 0.0112	56.746 0.056		Vel = 4.82	
1313 to 1314	17.58 17.58		105.15 319.49	4 4.26			12.310 12.310	120 0.0239	56.802 0.294		Vel = 7.19	
1314 to 1315	17.58 17.58		138.45 457.94	4 4.26			6.120 6.120	120 0.0462	57.096 0.283		Vel = 10.31	
1315			0.0 457.94						57.379		K Factor = 60.45	
B10 to TB10	15.11 17.58	11.20	59.27 59.27	1 1.049	T 2E	5.0 4.0	4.000 9.000 13.000	120 0.9711	28.007 -1.070 12.624		Vel = 22.00	
TB10 to TB09	17.58 17.58		-19.49 39.78	2 2.157			10.000 10.000	120 0.0139	39.561 0.139		Vel = 3.49	
TB09 to TB08	17.58 17.58		59.38 99.16	2 2.157			10.000 10.000	120 0.0751	39.700 0.751		Vel = 8.71	
TB08 to TB07	17.58 17.58		59.93 159.09	2 2.157			10.000 10.000	120 0.1803	40.451 1.803		Vel = 13.97	
TB07 to 1116	17.58 17.58		61.25 220.34	2 2.157	T	12.307	12.520 12.307 24.827	120 0.3292	42.254 0.0 8.174		Vel = 19.35	
1116			0.0 220.34						50.428		K Factor = 31.03	
B11 to TB11	15.11 17.58	11.20	59.30 59.3	1 1.049	T 2E	5.0 4.0	4.000 9.000 13.000	120 0.9719	28.033 -1.070 12.635		Vel = 22.01	
TB11 to TB12	17.58 17.58		19.49 78.79	2 2.157			10.000 10.000	120 0.0491	39.598 0.491		Vel = 6.92	
TB12 to 1314	17.58 17.58		59.66 138.45	2 2.157	4E T	24.613 12.307	85.090 36.920 122.010	120 0.1394	40.089 0.0 17.007		Vel = 12.16	
1314			0.0 138.45						57.096		K Factor = 18.32	
B09 to TB09	15.11 17.58	11.20	59.38 59.38	1 1.049	T 2E	5.0 4.0	4.000 9.000 13.000	120 0.9742	28.105 -1.070 12.665		Vel = 22.04	
TB09			0.0 59.38						39.700		K Factor = 9.42	
B12 to TB12	15.11 17.58	11.20	59.67 59.67	1 1.049	T 2E	5.0 4.0	4.000 9.000 13.000	120 0.9830	28.380 -1.070 12.779		Vel = 22.15	
			0.0									

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS

Bucees - BENTON AR - System 1 RA B

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TB12			59.67						40.089		K Factor = 9.42	
B08 to TB08	15.11 17.58	11.20	59.93 59.93	1 1.049	T 2E	5.0 4.0	4.000 9.000 13.000	120 0.9912	28.635 -1.070 12.886			Vel = 22.25
TB08			0.0 59.93						40.451		K Factor = 9.42	
B07 to TB07	15.11 17.58	11.20	61.25 61.25	1 1.049	T 2E	5.0 4.0	4.000 9.000 13.000	120 1.0320	29.908 -1.070 13.416			Vel = 22.74
TB07			0.0 61.25						42.254		K Factor = 9.42	
TB10 to TB11	17.58 17.58		19.49 19.49	2 2.157			10.000 10.000	120 0.0037	39.561 0.0 0.037			Vel = 1.71
TB11			0.0 19.49						39.598		K Factor = 3.10	
B04 to TB04	15.11 17.58	11.20	60.98 60.98	1 1.049	T 2E	5.0 4.0	4.000 9.000 13.000	120 1.0236	29.648 -1.070 13.307			Vel = 22.64
TB04 to TB05	17.58 17.58		-13.65 47.33	2 2.157			10.000 10.000	120 0.0191	41.885 0.0 0.191			Vel = 4.16
TB05 to TB06	17.58 17.58		61.12 108.45	2 2.157			10.000 10.000	120 0.0888	42.076 0.0 0.888			Vel = 9.52
TB06 to 115A	17.58 17.58		61.76 170.21	2 2.157	E	6.153	15.080 6.153 21.233	120 0.2042	42.964 0.0 4.336			Vel = 14.94
115A to 1313	17.58 17.58		-65.07 105.14	2 2.157	2T 2E	24.613 12.307	76.510 36.920 113.430	120 0.0838	47.300 0.0 9.502			Vel = 9.23
1313			0.0 105.14						56.802		K Factor = 13.95	
B03 to TB03	15.11 17.58	11.20	61.00 61.0	1 1.049	2E T	4.0 5.0	4.000 9.000 13.000	120 1.0240	29.662 -1.070 13.312			Vel = 22.64
TB03 to TB02	17.58 17.58		13.65 74.65	2 2.157			10.000 10.000	120 0.0445	41.904 0.0 0.445			Vel = 6.55
TB02 to TB01	17.58 17.58		61.32 135.97	2 2.157			10.000 10.000	120 0.1348	42.349 0.0 1.348			Vel = 11.94
TB01 to 1115	17.58 17.58		62.29 198.26	2 2.157	T	12.307	12.520 12.307 24.827	120 0.2708	43.697 0.0 6.724			Vel = 17.41
1115			0.0 198.26						50.421		K Factor = 27.92	
B05 to TB05	15.11 17.58	11.20	61.12 61.12	1 1.049	T 2E	5.0 4.0	4.000 9.000 13.000	120 1.0279	29.783 -1.070 13.363			Vel = 22.69

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA B

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TB05			0.0 61.12					42.076		K Factor = 9.42	
B02 to TB02	15.11 17.58	11.20	61.32 61.32	1 1.049	T 2E 5.0 4.0	4.000 9.000 13.000	120 1.0341	29.976 -1.070 13.443		Vel = 22.76	
TB02			0.0 61.32					42.349		K Factor = 9.42	
B06 to TB06	15.11 17.58	11.20	61.76 61.76	1 1.049	T 2E 5.0 4.0	4.000 9.000 13.000	120 1.0480	30.410 -1.070 13.624		Vel = 22.93	
TB06			0.0 61.76					42.964		K Factor = 9.42	
B01 to TB01	15.11 17.58	11.20	62.29 62.29	1 1.049	T 2E 5.0 4.0	4.000 9.000 13.000	120 1.0645	30.929 -1.070 13.838		Vel = 23.12	
TB01			0.0 62.29					43.697		K Factor = 9.42	
TB04 to TB03	17.58 17.58		13.66 13.66	2 2.157		10.000 10.000	120 0.0019	41.885 0.0 0.019		Vel = 1.20	
TB03			0.0 13.66					41.904		K Factor = 2.11	
115A to 1113	17.58 17.58		65.07 65.07	2 2.157	E T 6.153 12.307	73.420 18.460 91.880	120 0.0345	47.300 0.0 3.168		Vel = 5.71	
1113			0.0 65.07					50.468		K Factor = 9.16	
1112 to T311	17.58 17.58		54.98 54.98	2 2.157	T E 12.307 6.153	129.370 18.460 147.830	120 0.0252	50.511 0.0 3.732		Vel = 4.83	
T311 to 1311	17.58 14.58		0.0 54.98	2 2.157	T 12.307	3.000 12.307 15.307	120 0.0252	54.243 1.299 0.386		Vel = 4.83	
1311			0.0 54.98					55.928		K Factor = 7.35	
1110 to 1310	14.58 14.58		19.21 19.21	1.5 1.61	2T 16.0	149.350 16.000 165.350	120 0.0150	52.259 0.0 2.479		Vel = 3.03	
1310			0.0 19.21					54.738		K Factor = 2.60	
1120 to 1316	17.58 17.58		62.56 62.56	2 2.157	2T 6E 24.613 36.92	153.740 61.533 215.273	120 0.0321	51.098 0.0 6.901		Vel = 5.49	
1316			0.0 62.56					57.999		K Factor = 8.21	
1109 to 1309	14.58 14.58		17.90 17.9	1.5 1.61	2T 16.0	149.360 16.000 165.360	120 0.0132	52.410 0.0 2.176		Vel = 2.82	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA B

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1309			0.0 17.90					54.586		K Factor = 2.42	
1108 to 1308	14.58 14.58		16.82 16.82	1.5 1.61	2T 16.0	149.350 16.000 165.350	120 0.0117	52.528 0.0 1.940		Vel = 2.65	
1308			0.0 16.82					54.468		K Factor = 2.28	
1107 to 1307	14.58 14.58		15.57 15.57	1.5 1.61	2T 16.0	149.350 16.000 165.350	120 0.0102	52.658 0.0 1.680		Vel = 2.45	
1307			0.0 15.57					54.338		K Factor = 2.11	
1106 to 1306	14.58 14.58		14.83 14.83	1.5 1.61	2T 16.0	149.350 16.000 165.350	120 0.0093	52.730 0.0 1.536		Vel = 2.34	
1306			0.0 14.83					54.266		K Factor = 2.01	
1121 to 1317	17.58 17.58		71.03 71.03	2 2.157	2T 2E 24.613 12.307	146.150 36.920 183.070	120 0.0406	51.484 0.0 7.424		Vel = 6.24	
1317			0.0 71.03					58.908		K Factor = 9.25	
1105 to 1305	14.58 14.58		14.20 14.2	1.5 1.61	2T 16.0	149.350 16.000 165.350	120 0.0086	52.789 0.0 1.418		Vel = 2.24	
1305			0.0 14.20					54.207		K Factor = 1.93	
1104 to 1304	14.58 14.58		13.75 13.75	1.5 1.61	2T 16.0	149.360 16.000 165.360	120 0.0081	52.830 0.0 1.336		Vel = 2.17	
1304			0.0 13.75					54.166		K Factor = 1.87	
1103 to TA19	14.58 14.58		11.71 11.71	1.5 1.61	T 2E 8.0 8.0	61.930 16.000 77.930	120 0.0060	52.959 0.0 0.467		Vel = 1.85	
TA19 to TA20	14.58 14.58		0.0 11.71	1.5 1.61		12.000 12.000	120 0.0060	53.426 0.0 0.072		Vel = 1.85	
TA20 to TA21	14.58 14.58		0.0 11.71	1.5 1.61		10.000 10.000	120 0.0060	53.498 0.0 0.060		Vel = 1.85	
TA21 to TA22	14.58 14.58		0.0 11.71	1.5 1.61		12.010 12.010	120 0.0060	53.558 0.0 0.072		Vel = 1.85	
TA22 to TA23	14.58 14.58		0.0 11.71	1.5 1.61		12.000 12.000	120 0.0060	53.630 0.0 0.072		Vel = 1.85	
TA23 to TA24	14.58 14.58		0.0 11.71	1.5 1.61		11.980 11.980	120 0.0060	53.702 0.0 0.072		Vel = 1.85	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA B

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TA24 to 1303	14.58 14.58		0.0 11.71	1.5 1.61	T	8.0	52.650 8.000 60.650	120 0.0060	53.774 0.0 0.364	Vel = 1.85	
1303			0.0 11.71					54.138	K Factor = 1.59		
1102 to TA13	14.58 14.58		11.85 11.85	1.5 1.61	T	8.0	60.840 8.000 68.840	120 0.0061	52.974 0.0 0.423	Vel = 1.87	
TA13 to TA14	14.58 14.58		0.0 11.85	1.5 1.61			12.000 12.000	120 0.0061	53.397 0.0 0.073	Vel = 1.87	
TA14 to TA15	14.58 14.58		0.0 11.85	1.5 1.61			12.000 12.000	120 0.0062	53.470 0.0 0.074	Vel = 1.87	
TA15 to TA16	14.58 14.58		0.0 11.85	1.5 1.61			12.000 12.000	120 0.0062	53.544 0.0 0.074	Vel = 1.87	
TA16 to TA17	14.58 14.58		0.0 11.85	1.5 1.61			12.000 12.000	120 0.0061	53.618 0.0 0.073	Vel = 1.87	
TA17 to TA18	14.58 14.58		0.0 11.85	1.5 1.61			12.000 12.000	120 0.0062	53.691 0.0 0.074	Vel = 1.87	
TA18 to 1302	14.58 14.58		0.0 11.85	1.5 1.61	T	8.0	50.650 8.000 58.650	120 0.0061	53.765 0.0 0.360	Vel = 1.87	
1302			0.0 11.85					54.125	K Factor = 1.61		
1101 to TA07	14.58 14.58		11.77 11.77	1.5 1.61	T	8.0	60.840 8.000 68.840	120 0.0061	52.981 0.0 0.417	Vel = 1.85	
TA07 to TA08	14.58 14.58		0.0 11.77	1.5 1.61			12.000 12.000	120 0.0061	53.398 0.0 0.073	Vel = 1.85	
TA08 to TA09	14.58 14.58		0.0 11.77	1.5 1.61			12.000 12.000	120 0.0061	53.471 0.0 0.073	Vel = 1.85	
TA09 to TA10	14.58 14.58		0.0 11.77	1.5 1.61			12.000 12.000	120 0.0061	53.544 0.0 0.073	Vel = 1.85	
TA10 to TA11	14.58 14.58		0.0 11.77	1.5 1.61			12.000 12.000	120 0.0060	53.617 0.0 0.072	Vel = 1.85	
TA11 to TA12	14.58 14.58		0.0 11.77	1.5 1.61			12.000 12.000	120 0.0061	53.689 0.0 0.073	Vel = 1.85	
TA12 to 1301	14.58 14.58		0.0 11.77	1.5 1.61	T	8.0	50.650 8.000 58.650	120 0.0061	53.762 0.0 0.356	Vel = 1.85	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA B

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1301			0.0 11.77					54.118		K Factor = 1.60	
1126 to 1318	17.58 17.58		68.85 68.85	2 2.157	2T 3E 24.613 18.46	109.250 43.073 152.323	120 0.0383	53.742 0.0 5.830		Vel = 6.04	
1318			0.0 68.85					59.572		K Factor = 8.92	
1127 to 1319	17.58 17.58		77.73 77.73	2 2.157	2T 2E 24.613 12.307	101.470 36.920 138.390	120 0.0479	54.170 0.0 6.630		Vel = 6.82	
1319			0.0 77.73					60.800		K Factor = 9.97	
1128 to 1320	17.58 17.58		81.88 81.88	2 2.157	2T 4E 24.613 24.613	102.350 49.226 151.576	120 0.0527	54.258 0.0 7.995		Vel = 7.19	
1320			0.0 81.88					62.253		K Factor = 10.38	
1129 to 128A	17.58 17.58		68.99 68.99	2 2.157	2T 24.613	78.460 24.613 103.073	120 0.0384	54.302 0.0 3.960		Vel = 6.06	
128A			0.0 68.99					58.262		K Factor = 9.04	
UG4 to HY1	-2.42 -2.42		155.26 155.26	8 8.27	2E 56.936	152.180 56.936 209.116	140 0.0002	87.064 0.0 0.039		Vel = 0.93	
HY1 to UG3	-2.42 -2.42	H400	400.00	8	3E 85.404	1024.600 85.404 1110.004	140 0.0020	87.103 0.0 2.183		Vel = 3.32	
UG3 to UG2	-2.42 -2.42		0.0 555.26	8 8.27	T 55.354	47.000 55.354 102.354	140 0.0020	89.286 0.0 0.202		Vel = 3.32	
UG2			0.0 555.26					89.488		K Factor = 58.70	



HENDERSON
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HENDERSON ENGINEERS
8345 LENEXA DR. SUITE #300
LENEXA, KS 66214
913-742-500

Job Name : Bucees - BENTON AR - System 1 RA C
Building :
Location : ICE ROOM / TOOL ROOM
System : SYSTEM 1 RA C
Contract : 2450001433
Data File : Bucees - BENTON AR - System 1 RA C.WXF

Water Supply Curve

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA C

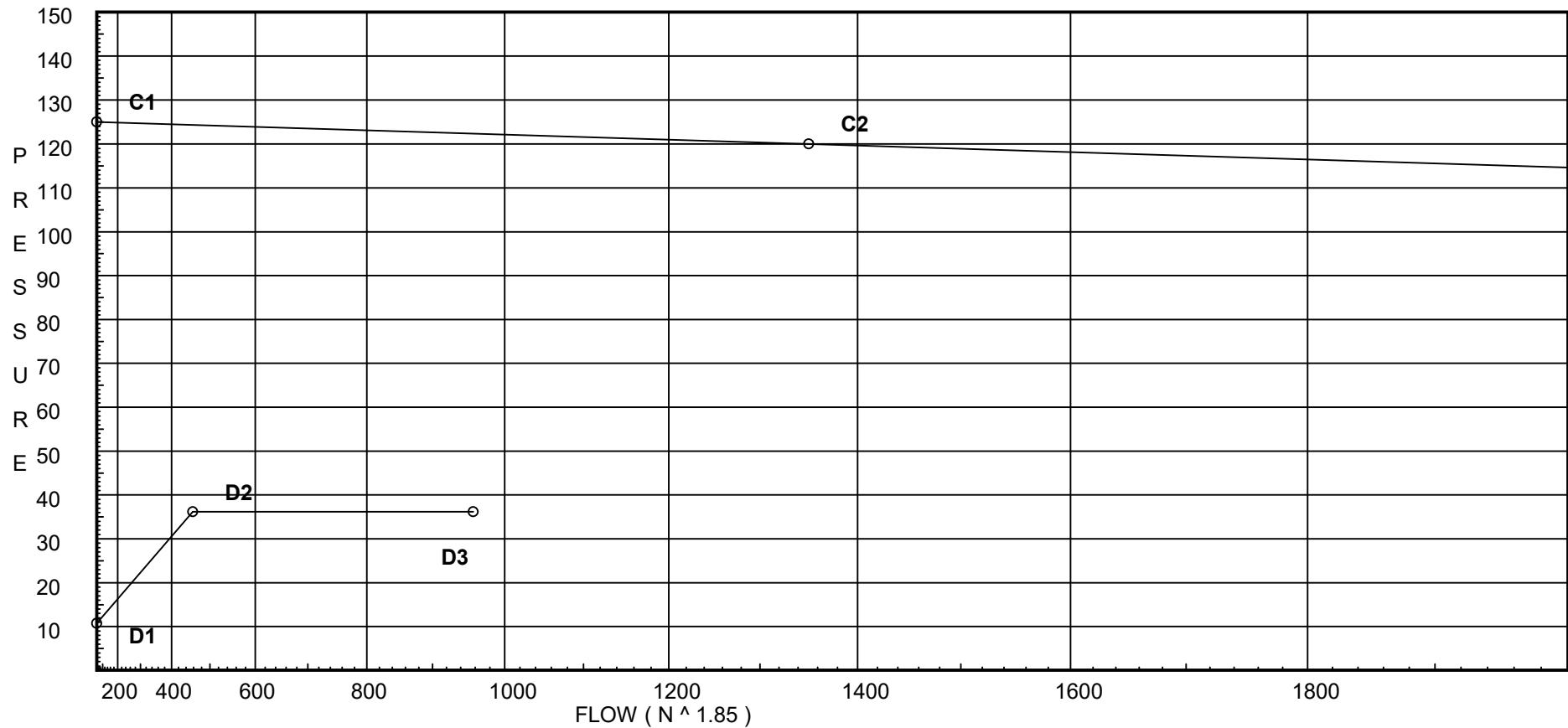
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City Water Supply:

C1 - Static Pressure : 125
C2 - Residual Pressure: 120
C2 - Residual Flow : 1351

Demand:

D1 - Elevation : 10.776
D2 - System Flow : 457.368
D2 - System Pressure : 36.196
Hose (Demand) : 500
D3 - System Demand : 957.368
Safety Margin : 86.160



Fittings Used Summary

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA C

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Fitting Legend																					
Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Avc	Alarm Vic 751	0	0	0	0	3	9	8	17	0	21	0	22	50	0	0	0	0	0	0	0
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																			
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.

Flow Summary - NFPA

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Bucees - BENTON AR - System 1 RA C

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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>
SRC	125.0	120	1351.0	122.356	957.37	36.196

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>	
C01	22.46	11.2	7.17	30.0	0.3	100
C02	22.46	11.2	7.24	30.15	0.3	100
C03	22.47	11.2	7.49	30.66	0.3	100
T117	22.46		8.31			
1117	17.58		11.52			
1116	17.58		11.56			
1115	17.58		11.61			
1114	17.58		11.62			
1113	17.58		11.64			
1112	17.58		11.66			
1111	14.58		13.0			
1110	14.58		13.07			
1109	14.58		13.11			
1108	14.58		13.14			
1107	14.58		13.18			
1106	14.58		13.2			
1105	14.58		13.21			
1104	14.58		13.22			
1103	14.58		13.26			
1102	14.58		13.26			
1101	14.58		13.26			
1100	14.58		13.26			
TA01	14.58		13.37			
TA02	14.58		13.39			
TA03	14.58		13.41			
TA04	14.58		13.43			
TA05	14.58		13.45			
TA06	14.58		13.47			
1300	14.58		13.56			
1301	14.58		13.56			
1302	14.58		13.56			
1303	14.58		13.56			
1304	14.58		13.57			
1305	14.58		13.58			
1306	14.58		13.6			
1307	14.58		13.62			
1308	14.58		13.65			
1309	14.58		13.68			
1310	14.58		13.72			
1311	14.58		14.03			
1312	17.58		13.29			
1313	17.58		13.3			

Flow Summary - NFPA

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA C

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Date

NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
1314	17.58		13.37			
1315	17.58		13.42			
1316	17.58		13.5			
1317	17.58		13.64			
1318	17.58		13.75			
1319	17.58		13.96			
1320	17.58		14.23			
1321	17.58		14.48			
321T	17.58		15.23			
1322	17.58		15.27			
TR1	17.58		16.3			
BR1	3.0		24.3	100.0		
BR2	3.0		24.31			
FLG	1.0		25.25			
UG4	-2.42		27.01			
UG2	-2.42		27.95			
UG1	-2.42		35.98			
SRC	-2.42		36.2			
C07	22.24	11.2	7.22	30.1	0.3	100
C08	22.24	11.2	7.29	30.25	0.3	100
C09	22.24	11.2	7.55	30.77	0.3	100
T122	22.24		8.36			
1122	17.58		11.47			
1121	17.58		11.47			
1120	17.58		11.48			
1119	17.58		11.48			
1118	17.58		11.52			
C04	22.24	11.2	7.23	30.12	0.3	100
C05	22.24	11.2	7.3	30.26	0.3	100
C06	22.24	11.2	7.56	30.79	0.3	100
T119	22.23		8.38			
C10	22.46	11.2	7.24	30.13	0.3	100
C11	22.46	11.2	7.31	30.27	0.3	100
C12	22.46	11.2	7.56	30.8	0.3	100
T124	22.46		8.09			
1124	17.58		11.31			
1123	17.58		11.47			
1126	17.58		11.82			
1127	17.58		11.94			
1128	17.58		11.97			
1129	17.58		11.98			
1130	17.58		11.98			
128A	17.58		13.05			
C13	22.42	11.2	7.56	30.8	0.3	100
C14	22.5	11.2	7.6	30.87	0.3	100
C15	22.5	11.2	7.86	31.41	0.3	100
T125	22.5		8.41			
1125	17.58		11.28			
T311	17.58		12.63			
HY1	-2.42		27.0	400.0		
UG3	-2.42		27.87			

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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>
TB13	17.58		11.75		
TB14	17.58		11.85		
TB15	17.58		11.94		
TB16	17.58		12.04		
TB17	17.58		12.13		
TB18	17.58		12.23		
TB07	17.58		11.79		
TB08	17.58		11.88		
TB09	17.58		11.97		
TB10	17.58		12.06		
TB11	17.58		12.16		
TB12	17.58		12.25		
TB01	17.58		11.7		
TB02	17.58		11.73		
TB03	17.58		11.77		
TB04	17.58		11.8		
TB05	17.58		11.83		
TB06	17.58		11.87		
115A	17.58		11.94		
TA19	14.58		13.38		
TA20	14.58		13.4		
TA21	14.58		13.41		
TA22	14.58		13.43		
TA23	14.58		13.45		
TA24	14.58		13.47		
TA13	14.58		13.37		
TA14	14.58		13.39		
TA15	14.58		13.41		
TA16	14.58		13.43		
TA17	14.58		13.45		
TA18	14.58		13.47		
TA07	14.58		13.37		
TA08	14.58		13.39		
TA09	14.58		13.41		
TA10	14.58		13.43		
TA11	14.58		13.45		
TA12	14.58		13.47		

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
C01 to C02	22.46 22.46	11.20	30.00 30.0	2 2.157			8.500 8.500	120 0.0082	7.175 0.070		Vel = 2.63	
C02 to C03	22.46 22.47	11.20	30.15 60.15	2 2.157			8.500 8.500	120 0.0298	7.245 -0.004 0.253		Vel = 5.28	
C03 to T117	22.47 22.46	11.20	30.66 90.81	2 2.157	E	6.153	6.540 6.153 12.693	120 0.0639	7.494 0.004 0.811		Vel = 7.97	
T117 to 1117	22.46 17.58		0.0 90.81	2 2.157	T	12.307	4.870 12.307 17.177	120 0.0639	8.309 2.114 1.097		Vel = 7.97	
1117 to 1116	17.58 17.58		81.81 172.62	4 4.26			5.330 5.330	120 0.0075	11.520 0.0 0.040		Vel = 3.89	
1116 to 1115	17.58 17.58		-31.84 140.78	4 4.26			9.810 9.810	120 0.0052	11.560 0.0 0.051		Vel = 3.17	
1115 to 1114	17.58 17.58		-18.71 122.07	4 4.26			1.550 1.550	120 0.0045	11.611 0.0 0.007		Vel = 2.75	
1114 to 1113	17.58 17.58		0.0 122.07	4 4.26			6.600 6.600	120 0.0039	11.618 0.0 0.026		Vel = 2.75	
1113 to 1112	17.58 17.58		-18.11 103.96	4 4.26			3.760 3.760	120 0.0029	11.644 0.0 0.011		Vel = 2.34	
1112 to 1111	17.58 14.58		-26.66 77.3	4 4.26	E	13.167	10.790 13.167 23.957	120 0.0018	11.655 1.299 0.042		Vel = 1.74	
1111 to 1110	14.58 14.58		0.0 77.3	3 3.26	E	9.408	2.610 9.408 12.018	120 0.0063	12.996 0.0 0.076		Vel = 2.97	
1110 to 1109	14.58 14.58		-9.32 67.98	3 3.26			7.920 7.920	120 0.0051	13.072 0.0 0.040		Vel = 2.61	
1109 to 1108	14.58 14.58		-8.68 59.3	3 3.26			8.000 8.000	120 0.0039	13.112 0.0 0.031		Vel = 2.28	
1108 to 1107	14.58 14.58		-8.16 51.14	3 3.26			11.500 11.500	120 0.0030	13.143 0.0 0.034		Vel = 1.97	
1107 to 1106	14.58 14.58		-7.55 43.59	3 3.26			8.640 8.640	120 0.0022	13.177 0.0 0.019		Vel = 1.68	
1106 to 1105	14.58 14.58		-7.20 36.39	3 3.26			9.860 9.860	120 0.0015	13.196 0.0 0.015		Vel = 1.40	
1105 to 1104	14.58 14.58		-6.88 29.51	3 3.26			10.000 10.000	120 0.0011	13.211 0.0 0.011		Vel = 1.13	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1104 to 1103	14.58 14.58		-6.67 22.84	3 3.26	2E	18.815 18.815	120 0.0007	13.222 0.0 0.034		Vel = 0.88	
1103 to 1102	14.58 14.58		-5.68 17.16	3 3.26		10.090 10.090	120 0.0004	13.256 0.0 0.004		Vel = 0.66	
1102 to 1101	14.58 14.58		-5.75 11.41	3 3.26		10.000 10.000	120 0.0002	13.260 0.0 0.002		Vel = 0.44	
1101 to 1100	14.58 14.58		-5.71 5.7	3 3.26		8.500 8.500	120 0	13.262 0.0 0.0		Vel = 0.22	
1100 to TA01	14.58 14.58		0.0 5.7	1.5 1.61	T	8.0 60.840 8.000	120 0.0016	13.262 0.0 0.109		Vel = 0.90	
TA01 to TA02	14.58 14.58		0.0 5.7	1.5 1.61		12.000 12.000	120 0.0016	13.371 0.0 0.019		Vel = 0.90	
TA02 to TA03	14.58 14.58		0.0 5.7	1.5 1.61		12.000 12.000	120 0.0016	13.390 0.0 0.019		Vel = 0.90	
TA03 to TA04	14.58 14.58		0.0 5.7	1.5 1.61		12.000 12.000	120 0.0016	13.409 0.0 0.019		Vel = 0.90	
TA04 to TA05	14.58 14.58		0.0 5.7	1.5 1.61		12.000 12.000	120 0.0016	13.428 0.0 0.019		Vel = 0.90	
TA05 to TA06	14.58 14.58		0.0 5.7	1.5 1.61		12.000 12.000	120 0.0016	13.447 0.0 0.019		Vel = 0.90	
TA06 to 1300	14.58 14.58		0.0 5.7	1.5 1.61	T	8.0 50.650 8.000	120 0.0016	13.466 0.0 0.093		Vel = 0.90	
1300 to 1301	14.58 14.58		0.0 5.7	3 3.26		8.500 8.500	120 0.0001	13.559 0.0 0.001		Vel = 0.22	
1301 to 1302	14.58 14.58		5.71 11.41	3 3.26		10.000 10.000	120 0.0002	13.560 0.0 0.002		Vel = 0.44	
1302 to 1303	14.58 14.58		5.75 17.16	3 3.26		9.000 9.000	120 0.0003	13.562 0.0 0.003		Vel = 0.66	
1303 to 1304	14.58 14.58		5.68 22.84	3 3.26		11.000 11.000	120 0.0006	13.565 0.0 0.007		Vel = 0.88	
1304 to 1305	14.58 14.58		6.67 29.51	3 3.26		10.000 10.000	120 0.0011	13.572 0.0 0.011		Vel = 1.13	
1305 to 1306	14.58 14.58		6.88 36.39	3 3.26		9.860 9.860	120 0.0015	13.583 0.0 0.015		Vel = 1.40	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1306 to 1307	14.58 14.58		7.20 43.59	3 3.26		8.640 8.640	120 0.0023	13.598 0.0 0.020		Vel = 1.68	
1307 to 1308	14.58 14.58		7.55 51.14	3 3.26		11.500 11.500	120 0.0030	13.618 0.0 0.034		Vel = 1.97	
1308 to 1309	14.58 14.58		8.16 59.3	3 3.26		8.000 8.000	120 0.0039	13.652 0.0 0.031		Vel = 2.28	
1309 to 1310	14.58 14.58		8.68 67.98	3 3.26		7.920 7.920	120 0.0049	13.683 0.0 0.039		Vel = 2.61	
1310 to 1311	14.58 14.58		9.32 77.3	3 3.26	2E 18.815	30.400 18.815 49.215	120 0.0063	13.722 0.0 0.312		Vel = 2.97	
1311 to 1312	14.58 17.58		26.66 103.96	3 3.26	3E 28.223	22.340 28.223 50.563	120 0.0110	14.034 -1.299 0.555		Vel = 4.00	
1312 to 1313	17.58 17.58		0.0 103.96	4 4.26		4.990 4.990	120 0.0030	13.290 0.0 0.015		Vel = 2.34	
1313 to 1314	17.58 17.58		36.82 140.78	4 4.26		12.310 12.310	120 0.0052	13.305 0.0 0.064		Vel = 3.17	
1314 to 1315	17.58 17.58		31.84 172.62	4 4.26		6.120 6.120	120 0.0077	13.369 0.0 0.047		Vel = 3.89	
1315 to 1316	17.58 17.58		32.33 204.95	4 4.26		8.230 8.230	120 0.0104	13.416 0.0 0.086		Vel = 4.61	
1316 to 1317	17.58 17.58		32.20 237.15	4 4.26		10.040 10.040	120 0.0137	13.502 0.0 0.138		Vel = 5.34	
1317 to 1318	17.58 17.58		36.50 273.65	4 4.26		6.060 6.060	120 0.0178	13.640 0.0 0.108		Vel = 6.16	
1318 to 1319	17.58 17.58		37.84 311.49	4 4.26		9.490 9.490	120 0.0228	13.748 0.0 0.216		Vel = 7.01	
1319 to 1320	17.58 17.58		40.89 352.38	4 4.26		9.460 9.460	120 0.0285	13.964 0.0 0.270		Vel = 7.93	
1320 to 1321	17.58 17.58		41.42 393.8	4 4.26		6.920 6.920	120 0.0350	14.234 0.0 0.242		Vel = 8.86	
1321 to 321T	17.58 17.58		63.57 457.37	4 4.26	E 13.167	3.060 13.167 16.227	120 0.0462	14.476 0.0 0.750		Vel = 10.30	
321T to 1322	17.58 17.58		0.0 457.37	6 6.357		6.620 6.620	120 0.0066	15.226 0.0 0.044		Vel = 4.62	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1322 to TR1	17.58 17.58		0.0 457.37	6 6.357		156.770 156.770	120 0.0066	15.270 0.0 1.032			
TR1 to BR1	17.58 3		0.0 457.37	6 6.357	E Fsp Avc B T 17.603 0.0 27.661 12.573 37.72	8.410 95.557 103.967	120 0.0066	16.302 7.315 0.684		* * Fixed Loss = 1 Vel = 4.62	
BR1 to BR2	3 3	H100	100.00 557.37	8 8.249		2.320 2.320	120 0.0026	24.301 0.0 0.006			Vel = 3.35
BR2 to FLG	3 1		0.0 557.37	8 8.249	E 21.141	7.600 21.141 28.741	120 0.0027	24.307 0.866 0.077			Vel = 3.35
FLG to UG4	1 -2.42		0.0 557.37	8 8.27	E T 28.468 55.354	57.120 83.822 140.942	140 0.0020	25.250 1.481 0.279			Vel = 3.33
UG4 to UG2	-2.42 -2.42		62.04 619.41	8 8.27		392.280 392.280	140 0.0024	27.010 0.0 0.945			Vel = 3.70
UG2 to UG1	-2.42 -2.42		337.96 957.37	8 8.27	8E T 227.744 55.354	462.900 283.098 745.998	140 0.0054	27.955 4.000 4.020		* * Fixed Loss = 4 Vel = 5.72	
UG1 to SRC	-2.42 -2.42		0.0 957.37	12 12.34		287.990 287.990	140 0.0008	35.975 0.0 0.221			Vel = 2.57
SRC			0.0 957.37					36.196		K Factor = 159.13	
C07 to C08	22.24 22.24	11.20	30.10 30.1	2 2.157		8.500 8.500	120 0.0084	7.222 0.0 0.071			Vel = 2.64
C08 to C09	22.24 22.24	11.20	30.25 60.35	2 2.157		8.500 8.500	120 0.0300	7.293 0.0 0.255			Vel = 5.30
C09 to T122	22.24 22.24	11.20	30.77 91.12	2 2.157	E 6.153	6.540 6.153 12.693	120 0.0643	7.548 0.0 0.816			Vel = 8.00
T122 to 1122	22.24 17.58		0.0 91.12	2 2.157	T 12.307	4.660 12.307 16.967	120 0.0642	8.364 2.018 1.090			Vel = 8.00
1122 to 1121	17.58 17.58		0.55 91.67	4 4.26		0.560 0.560	120 0.0036	11.472 0.0 0.002			Vel = 2.06
1121 to 1120	17.58 17.58		-36.50 55.17	4 4.26		9.440 9.440	120 0.0008	11.474 0.0 0.008			Vel = 1.24
1120 to 1119	17.58 17.58		-32.20 22.97	4 4.26		0.750 0.750	120 0.0013	11.482 0.0 0.001			Vel = 0.52

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1119 to 1118	17.58 17.58		91.17 114.14	4 4.26			9.960 9.960	120 0.0035	11.483 0.0 0.035		Vel = 2.57	
1118 to 1117	17.58 17.58		-32.32 81.82	4 4.26			0.790 0.790	120 0.0025	11.518 0.0 0.002		Vel = 1.84	
1117			0.0 81.82						11.520		K Factor = 24.11	
C04 to C05	22.24 22.24	11.20	30.12 30.12	2 2.157			8.500 8.500	120 0.0082	7.231 0.0 0.070		Vel = 2.64	
C05 to C06	22.24 22.24	11.20	30.26 60.38	2 2.157			8.500 8.500	120 0.0301	7.301 0.0 0.256		Vel = 5.30	
C06 to T119	22.24 22.23	11.20	30.79 91.17	2 2.157	E	6.153	6.540 6.153 12.693	120 0.0644	7.557 0.004 0.817		Vel = 8.00	
T119 to 1119	22.23 17.58		0.0 91.17	2 2.157	T	12.307	4.650 12.307 16.957	120 0.0643	8.378 2.014 1.091		Vel = 8.00	
1119			0.0 91.17						11.483		K Factor = 26.90	
C10 to C11	22.46 22.46	11.20	30.13 30.13	2 2.157			8.500 8.500	120 0.0082	7.236 0.0 0.070		Vel = 2.65	
C11 to C12	22.46 22.46	11.20	30.27 60.4	2 2.157			8.500 8.500	120 0.0301	7.306 0.0 0.256		Vel = 5.30	
C12 to T124	22.46 22.46	11.20	30.80 91.2	2 2.157	E	6.153	2.040 6.153 8.193	120 0.0643	7.562 0.0 0.527		Vel = 8.01	
T124 to 1124	22.46 17.58		0.0 91.2	2 2.157	T	12.307	4.880 12.307 17.187	120 0.0644	8.089 2.114 1.106		Vel = 8.01	
1124 to 1123	17.58 17.58		93.08 184.28	4 4.26	E	13.167	5.820 13.167 18.987	120 0.0086	11.309 0.0 0.163		Vel = 4.15	
1123 to 1126	17.58 17.58		-0.56 183.72	4 4.26			40.830 40.830	120 0.0086	11.472 0.0 0.350		Vel = 4.14	
1126 to 1127	17.58 17.58		-37.84 145.88	4 4.26	E	13.167	8.590 13.167 21.757	120 0.0056	11.822 0.0 0.121		Vel = 3.28	
1127 to 1128	17.58 17.58		-40.89 104.99	4 4.26			8.000 8.000	120 0.0030	11.943 0.0 0.024		Vel = 2.36	
1128 to 1129	17.58 17.58		-41.43 63.56	4 4.26			10.000 10.000	120 0.0012	11.967 0.0 0.012		Vel = 1.43	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1129 to 1130	17.58 17.58		-34.07 29.49	4 4.26		0.670 0.670	120 0.0015	11.979 0.0			
1130 to 128A	17.58 17.58		0.0 29.49	2 2.157	2E 2T 12.307 24.613	97.780 36.920 134.700	120 0.0080	11.980 0.0 1.074		Vel = 0.66	
128A to 1321	17.58 17.58		34.07 63.56	2 2.157	E T 6.153 12.307	24.630 18.460 43.090	120 0.0330	13.054 0.0 1.422		Vel = 2.59	
1321			0.0 63.56					14.476		K Factor = 16.71	
C13 to C14	22.42 22.5	11.20	30.80 30.8	2 2.157		8.500 8.500	120 0.0087	7.560 -0.035 0.074		Vel = 2.70	
C14 to C15	22.5 22.5	11.20	30.87 61.67	2 2.157		8.500 8.500	120 0.0313	7.599 0.0 0.266		Vel = 5.41	
C15 to T125	22.5 22.5	11.20	31.41 93.08	2 2.157	E 6.153	2.040 6.153 8.193	120 0.0668	7.865 0.0 0.547		Vel = 8.17	
T125 to 1125	22.5 17.58		0.0 93.08	2 2.157	E 6.153	4.910 6.153 11.063	120 0.0669	8.412 2.131 0.740		Vel = 8.17	
1125 to 1124	17.58 17.58		0.0 93.08	4 4.26		10.750 10.750	120 0.0024	11.283 0.0 0.026		Vel = 2.10	
1124			0.0 93.08					11.309		K Factor = 27.68	
1123 to 1122	17.58 17.58		0.56 0.56	4 4.26	T 26.334	9.430 26.334 35.764	120 0	11.472 0.0 0.0		Vel = 0.01	
1122			0.0 0.56					11.472		K Factor = 0.17	
1311 to T311	14.58 17.58		-26.66 -26.66	2 2.157	T 12.307	3.000 12.307 15.307	120 -0.0066	14.034 -1.299 -0.101		Vel = 2.34	
T311 to 1112	17.58 17.58		0.0 -26.66	2 2.157	E T 6.153 12.307	129.370 18.460 147.830	120 -0.0066	12.634 0.0 -0.979		Vel = 2.34	
1112			0.0 -26.66					11.655		K Factor = -7.81	
UG4 to HY1	-2.42 -2.42		-62.04 -62.04	8 8.27	2E 56.936	152.180 56.936 209.116	140 0	27.010 0.0 -0.007		Vel = 0.37	
HY1 to UG3	-2.42 -2.42	H400	400.00 337.96	8 8.27	3E 85.404	1024.600 85.404 1110.004	140 0.0008	27.003 0.0 0.871		Vel = 2.02	
UG3 to UG2	-2.42 -2.42		0.0 337.96	8 8.27	T 55.354	47.000 55.354 102.354	140 0.0008	27.874 0.0 0.081		Vel = 2.02	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
UG2			0.0 337.96					27.955		K Factor = 63.92	
1121 to 1317	17.58 17.58		36.50 36.5	2 2.157	2T 2E 24.613 12.307	146.150 36.920 183.070	120 0.0118	11.474 0.0 2.166		Vel = 3.20	
1317			0.0 36.50					13.640		K Factor = 9.88	
1120 to 1316	17.58 17.58		32.20 32.2	2 2.157	2T 6E 24.613 36.92	153.740 61.533 215.273	120 0.0094	11.482 0.0 2.020		Vel = 2.83	
1316			0.0 32.20					13.502		K Factor = 8.76	
1118 to TB13	17.58 17.58		32.33 32.33	2 2.157	T 12.307	12.520 12.307 24.827	120 0.0095	11.518 0.0 0.235		Vel = 2.84	
TB13 to TB14	17.58 17.58		0.0 32.33	2 2.157		10.000 10.000	120 0.0094	11.753 0.0 0.094		Vel = 2.84	
TB14 to TB15	17.58 17.58		0.0 32.33	2 2.157		10.000 10.000	120 0.0095	11.847 0.0 0.095		Vel = 2.84	
TB15 to TB16	17.58 17.58		0.0 32.33	2 2.157		10.000 10.000	120 0.0094	11.942 0.0 0.094		Vel = 2.84	
TB16 to TB17	17.58 17.58		0.0 32.33	2 2.157		10.000 10.000	120 0.0095	12.036 0.0 0.095		Vel = 2.84	
TB17 to TB18	17.58 17.58		0.0 32.33	2 2.157		10.000 10.000	120 0.0094	12.131 0.0 0.094		Vel = 2.84	
TB18 to 1315	17.58 17.58		0.0 32.33	2 2.157	4E T 24.613 12.307	89.090 36.920 126.010	120 0.0095	12.225 0.0 1.191		Vel = 2.84	
1315			0.0 32.33					13.416		K Factor = 8.83	
1116 to TB07	17.58 17.58		31.84 31.84	2 2.157	T 12.307	12.520 12.307 24.827	120 0.0092	11.560 0.0 0.228		Vel = 2.80	
TB07 to TB08	17.58 17.58		0.0 31.84	2 2.157		10.000 10.000	120 0.0092	11.788 0.0 0.092		Vel = 2.80	
TB08 to TB09	17.58 17.58		0.0 31.84	2 2.157		10.000 10.000	120 0.0092	11.880 0.0 0.092		Vel = 2.80	
TB09 to TB10	17.58 17.58		0.0 31.84	2 2.157		10.000 10.000	120 0.0092	11.972 0.0 0.092		Vel = 2.80	
TB10 to TB11	17.58 17.58		0.0 31.84	2 2.157		10.000 10.000	120 0.0092	12.064 0.0 0.092		Vel = 2.80	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA C

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TB11 to TB12	17.58 17.58		0.0 31.84	2 2.157		10.000 10.000	120 0.0092	12.156 0.0 0.092		Vel = 2.80	
TB12 to 1314	17.58 17.58		0.0 31.84	2 2.157	4E T 24.613 12.307	85.090 36.920 122.010	120 0.0092	12.248 0.0 1.121		Vel = 2.80	
1314			0.0 31.84					13.369		K Factor = 8.71	
1115 to TB01	17.58 17.58		18.71 18.71	2 2.157	T 12.307	12.520 12.307 24.827	120 0.0035	11.611 0.0 0.086		Vel = 1.64	
TB01 to TB02	17.58 17.58		0.0 18.71	2 2.157		10.000 10.000	120 0.0034	11.697 0.0 0.034		Vel = 1.64	
TB02 to TB03	17.58 17.58		0.0 18.71	2 2.157		10.000 10.000	120 0.0034	11.731 0.0 0.034		Vel = 1.64	
TB03 to TB04	17.58 17.58		0.0 18.71	2 2.157		10.000 10.000	120 0.0035	11.765 0.0 0.035		Vel = 1.64	
TB04 to TB05	17.58 17.58		0.0 18.71	2 2.157		10.000 10.000	120 0.0034	11.800 0.0 0.034		Vel = 1.64	
TB05 to TB06	17.58 17.58		0.0 18.71	2 2.157		10.000 10.000	120 0.0034	11.834 0.0 0.034		Vel = 1.64	
TB06 to 115A	17.58 17.58		0.0 18.71	2 2.157	E 6.153	15.080 6.153 21.233	120 0.0034	11.868 0.0 0.073		Vel = 1.64	
115A to 1313	17.58 17.58		18.11 36.82	2 2.157	2T 2E 24.613 12.307	76.510 36.920 113.430	120 0.0120	11.941 0.0 1.364		Vel = 3.23	
1313			0.0 36.82					13.305		K Factor = 10.09	
1113 to 115A	17.58 17.58		18.11 18.11	2 2.157	T E 12.307 6.153	73.420 18.460 91.880	120 0.0032	11.644 0.0 0.297		Vel = 1.59	
115A			0.0 18.11					11.941		K Factor = 5.24	
1110 to 1310	14.58 14.58		9.32 9.32	1.5 1.61	2T 16.0	149.350 16.000 165.350	120 0.0039	13.072 0.0 0.650		Vel = 1.47	
1310			0.0 9.32					13.722		K Factor = 2.52	
1109 to 1309	14.58 14.58		8.68 8.68	1.5 1.61	2T 16.0	149.360 16.000 165.360	120 0.0035	13.112 0.0 0.571		Vel = 1.37	
			0.0								

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA C

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1309			8.68					13.683	K Factor =	2.35	
1126 to 1318	17.58 17.58		37.84 37.84	2 2.157	2T 3E 24.613 18.46	109.250 43.073 152.323	120 0.0126	11.822 0.0 1.926			
1318			0.0 37.84					13.748	K Factor =	10.21	
1108 to 1308	14.58 14.58		8.16 8.16	1.5 1.61	2T 16.0	149.350 16.000 165.350	120 0.0031	13.143 0.0 0.509			
1308			0.0 8.16					13.652	K Factor =	2.21	
1107 to 1307	14.58 14.58		7.55 7.55	1.5 1.61	2T 16.0	149.350 16.000 165.350	120 0.0027	13.177 0.0 0.441			
1307			0.0 7.55					13.618	K Factor =	2.05	
1106 to 1306	14.58 14.58		7.19 7.19	1.5 1.61	2T 16.0	149.350 16.000 165.350	120 0.0024	13.196 0.0 0.402			
1306			0.0 7.19					13.598	K Factor =	1.95	
1105 to 1305	14.58 14.58		6.89 6.89	1.5 1.61	2T 16.0	149.350 16.000 165.350	120 0.0022	13.211 0.0 0.372			
1305			0.0 6.89					13.583	K Factor =	1.87	
1104 to 1304	14.58 14.58		6.67 6.67	1.5 1.61	2T 16.0	149.360 16.000 165.360	120 0.0021	13.222 0.0 0.350			
1304			0.0 6.67					13.572	K Factor =	1.81	
1127 to 1319	17.58 17.58		40.89 40.89	2 2.157	2T 2E 24.613 12.307	101.470 36.920 138.390	120 0.0146	11.943 0.0 2.021			
1319			0.0 40.89					13.964	K Factor =	10.94	
1103 to TA19	14.58 14.58		5.68 5.68	1.5 1.61	T 2E 8.0 8.0	61.930 16.000 77.930	120 0.0016	13.256 0.0 0.122			
TA19 to TA20	14.58 14.58		0.0 5.68	1.5 1.61		12.000 12.000	120 0.0016	13.378 0.0 0.019			
TA20 to TA21	14.58 14.58		0.0 5.68	1.5 1.61		10.000 10.000	120 0.0016	13.397 0.0 0.016			
TA21 to TA22	14.58 14.58		0.0 5.68	1.5 1.61		12.010 12.010	120 0.0016	13.413 0.0 0.019			

Final Calculations : Hazen-Williams

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Bucees - BENTON AR - System 1 RA C

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TA22 to TA23	14.58 14.58		0.0 5.68	1.5 1.61		12.000 12.000	120 0.0016	13.432 0.0 0.019		Vel = 0.90	
TA23 to TA24	14.58 14.58		0.0 5.68	1.5 1.61		11.980 11.980	120 0.0016	13.451 0.0 0.019		Vel = 0.90	
TA24 to 1303	14.58 14.58		0.0 5.68	1.5 1.61	T 8.0	52.650 8.000 60.650	120 0.0016	13.470 0.0 0.095		Vel = 0.90	
1303			0.0 5.68					13.565		K Factor = 1.54	
1102 to TA13	14.58 14.58		5.75 5.75	1.5 1.61	T 8.0	60.840 8.000 68.840	120 0.0016	13.260 0.0 0.111		Vel = 0.91	
TA13 to TA14	14.58 14.58		0.0 5.75	1.5 1.61		12.000 12.000	120 0.0016	13.371 0.0 0.019		Vel = 0.91	
TA14 to TA15	14.58 14.58		0.0 5.75	1.5 1.61		12.000 12.000	120 0.0016	13.390 0.0 0.019		Vel = 0.91	
TA15 to TA16	14.58 14.58		0.0 5.75	1.5 1.61		12.000 12.000	120 0.0016	13.409 0.0 0.019		Vel = 0.91	
TA16 to TA17	14.58 14.58		0.0 5.75	1.5 1.61		12.000 12.000	120 0.0017	13.428 0.0 0.020		Vel = 0.91	
TA17 to TA18	14.58 14.58		0.0 5.75	1.5 1.61		12.000 12.000	120 0.0016	13.448 0.0 0.019		Vel = 0.91	
TA18 to 1302	14.58 14.58		0.0 5.75	1.5 1.61	T 8.0	50.650 8.000 58.650	120 0.0016	13.467 0.0 0.095		Vel = 0.91	
1302			0.0 5.75					13.562		K Factor = 1.56	
1101 to TA07	14.58 14.58		5.71 5.71	1.5 1.61	T 8.0	60.840 8.000 68.840	120 0.0016	13.262 0.0 0.109		Vel = 0.90	
TA07 to TA08	14.58 14.58		0.0 5.71	1.5 1.61		12.000 12.000	120 0.0016	13.371 0.0 0.019		Vel = 0.90	
TA08 to TA09	14.58 14.58		0.0 5.71	1.5 1.61		12.000 12.000	120 0.0016	13.390 0.0 0.019		Vel = 0.90	
TA09 to TA10	14.58 14.58		0.0 5.71	1.5 1.61		12.000 12.000	120 0.0016	13.409 0.0 0.019		Vel = 0.90	
TA10 to TA11	14.58 14.58		0.0 5.71	1.5 1.61		12.000 12.000	120 0.0016	13.428 0.0 0.019		Vel = 0.90	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA C

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TA11 to TA12	14.58 14.58		0.0 5.71	1.5 1.61			12.000 12.000	120 0.0016	13.447 0.0 0.019		Vel = 0.90	
TA12 to 1301	14.58 14.58		0.0 5.71	1.5 1.61	T	8.0	50.650 8.000 58.650	120 0.0016	13.466 0.0 0.094		Vel = 0.90	
1301			0.0 5.71						13.560		K Factor = 1.55	
1128 to 1320	17.58 17.58		41.42 41.42	2 2.157	2T 4E	24.613 24.613	102.350 49.226 151.576	120 0.0150	11.967 0.0 2.267		Vel = 3.64	
1320			0.0 41.42						14.234		K Factor = 10.98	
1129 to 128A	17.58 17.58		34.08 34.08	2 2.157	2T	24.613	78.460 24.613 103.073	120 0.0104	11.979 0.0 1.075		Vel = 2.99	
128A			0.0 34.08						13.054		K Factor = 9.43	



HENDERSON ENGINEERS

HENDERSON ENGINEERS
8345 LENEXA DR. SUITE #300
LENEXA, KS 66214
913-742-500

Job Name : Bucees -BENTON AR - System 1 RA D
Building :
Location : COMPACTOR ENCLOSURE
System : SYSTEM 1 RA D
Contract : 2450001433
Data File : Bucees -BENTON AR - System 1 RA D.WXF

Water Supply Curve

HENDERSON ENGINEERS
Bucees -BENTON AR - System 1 RA D

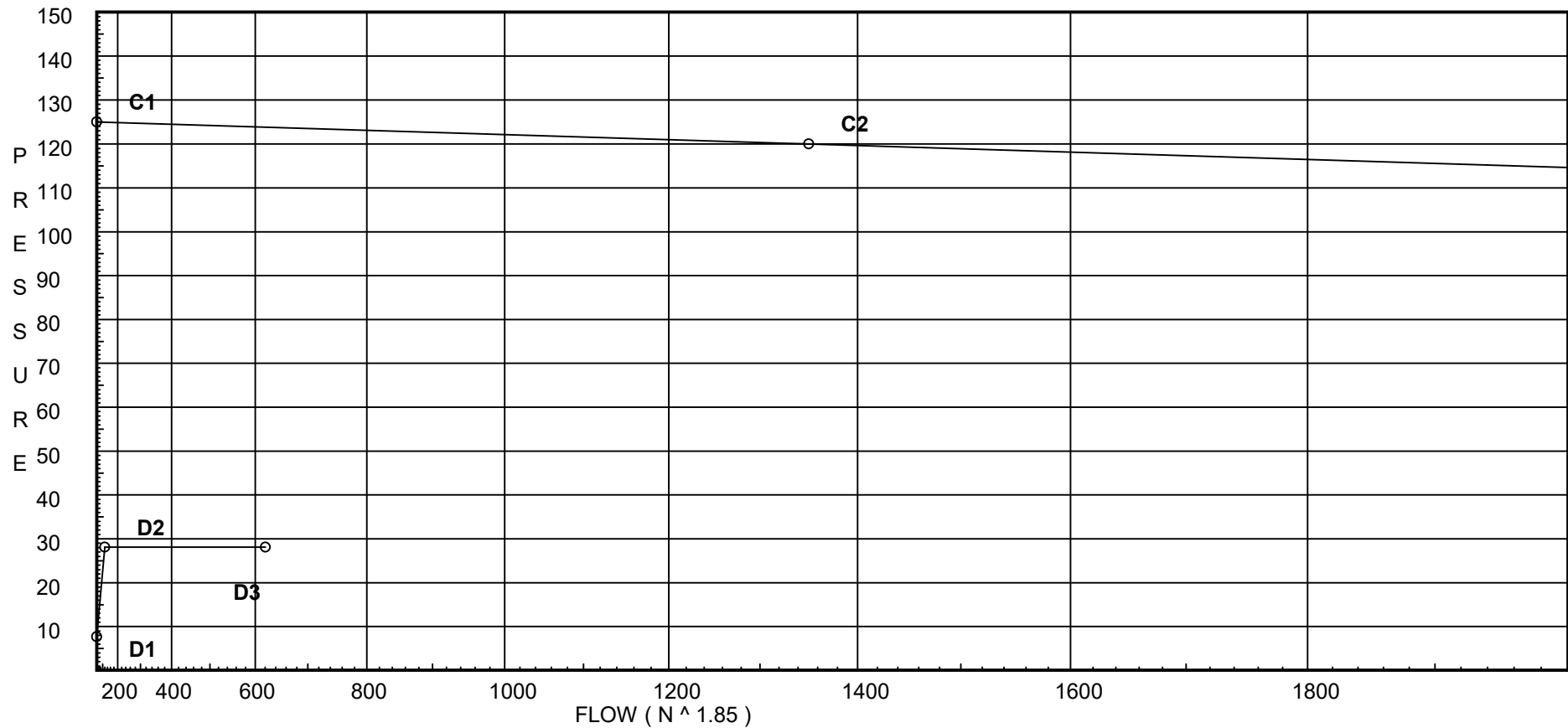
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City Water Supply:

C1 - Static Pressure : 125
C2 - Residual Pressure: 120
C2 - Residual Flow : 1351

Demand:

D1 - Elevation : 7.701
D2 - System Flow : 120.535
D2 - System Pressure : 28.118
Hose (Demand) : 500
D3 - System Demand : 620.535
Safety Margin : 95.697



Fittings Used Summary

HENDERSON ENGINEERS
Bucees -BENTON AR - System 1 RA D

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Fitting Legend																					
Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Avc	Alarm Vic 751	0	0	0	0	3	9	8	17	0	21	0	22	50	0	0	0	0	0	0	0
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
Dvk	Dry Viking F1								3		5		49								
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																			
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.

Flow Summary - NFPA

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Bucees -BENTON AR - System 1 RA D

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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>
SRC	125.0	120	1351.0	123.815	620.54	28.118

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>	
D04	15.36	5.6	12.76	20.0	0.2	100
D05	15.36	5.6	12.92	20.13	0.2	100
1200	15.36		13.61			
1201	15.36		13.63			
1202	15.36		13.7			
1203	20.67		11.87			
DT1	20.67		11.88			
DBR	15.26		14.37			
DRE	15.26		14.65			
DRF	17.58		13.65			
1130	17.58		13.76			
1129	17.58		13.76			
1128	17.58		13.78			
1127	17.58		13.8			
1126	17.58		13.83			
123A	17.58		13.87			
1123	17.58		13.88			
1122	17.58		13.91			
1121	17.58		13.91			
1120	17.58		13.92			
1119	17.58		13.92			
1118	17.58		13.93			
1117	17.58		13.93			
1116	17.58		13.93			
1115	17.58		13.93			
1114	17.58		13.93			
1113	17.58		13.94			
1112	17.58		13.94			
1111	14.58		15.24			
1110	14.58		15.24			
1109	14.58		15.24			
1108	14.58		15.25			
1107	14.58		15.25			
1106	14.58		15.25			
1105	14.58		15.25			
1104	14.58		15.25			
1103	14.58		15.25			
1102	14.58		15.25			
1101	14.58		15.25			
1100	14.58		15.25			
TA01	14.58		15.26			
TA02	14.58		15.26			

Flow Summary - NFPA

HENDERSON ENGINEERS
Bucees -BENTON AR - System 1 RA D

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NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
TA03	14.58		15.26			
TA04	14.58		15.26			
TA05	14.58		15.26			
TA06	14.58		15.26			
1300	14.58		15.27			
1301	14.58		15.27			
1302	14.58		15.27			
1303	14.58		15.27			
1304	14.58		15.27			
1305	14.58		15.27			
1306	14.58		15.27			
1307	14.58		15.27			
1308	14.58		15.28			
1309	14.58		15.28			
1310	14.58		15.28			
1311	14.58		15.3			
1312	17.58		14.03			
1313	17.58		14.03			
1314	17.58		14.03			
1315	17.58		14.04			
1316	17.58		14.04			
1317	17.58		14.05			
1318	17.58		14.06			
1319	17.58		14.07			
1320	17.58		14.09			
1321	17.58		14.11			
321T	17.58		14.17			
1322	17.58		14.18			
TR1	17.58		14.26			
BR1	3.0		21.64			
BR2	3.0		21.64			
FLG	1.0		22.51			
UG4	-2.42		24.0			
UG2	-2.42		24.03			
UG1	-2.42		28.11			
SRC	-2.42		28.12	500.0		
D09	15.36	5.6	12.77	20.01	0.2	100
D10	15.36	5.6	12.93	20.14	0.2	100
D12	15.36	5.6	12.84	20.06	0.2	100
D13	15.36	5.6	13.0	20.19	0.2	100
128A	17.58		13.91			
TB13	17.58		13.94			
TB14	17.58		13.95			
TB15	17.58		13.95			
TB16	17.58		13.96			
TB17	17.58		13.96			
TB18	17.58		13.97			
TB07	17.58		13.94			
TB08	17.58		13.95			
TB09	17.58		13.95			
TB10	17.58		13.96			

Flow Summary - NFPA

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Bucees -BENTON AR - System 1 RA D

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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>
TB11	17.58		13.96		
TB12	17.58		13.97		
TB01	17.58		13.94		
TB02	17.58		13.94		
TB03	17.58		13.94		
TB04	17.58		13.94		
TB05	17.58		13.95		
TB06	17.58		13.95		
115A	17.58		13.95		
T311	17.58		13.99		
TA19	14.58		15.26		
TA20	14.58		15.26		
TA21	14.58		15.26		
TA22	14.58		15.26		
TA23	14.58		15.26		
TA24	14.58		15.26		
TA13	14.58		15.26		
TA14	14.58		15.26		
TA15	14.58		15.26		
TA16	14.58		15.26		
TA17	14.58		15.26		
TA18	14.58		15.26		
TA07	14.58		15.26		
TA08	14.58		15.26		
TA09	14.58		15.26		
TA10	14.58		15.26		
TA11	14.58		15.26		
TA12	14.58		15.26		
HY1	-2.42		24.01		
UG3	-2.42		24.02		

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees -BENTON AR - System 1 RA D

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
D04 to D05	15.36 15.36	5.60	20.00 20.0	1.5 1.61			10.000 10.000	120 0.0162	12.755 0.0 0.162		Vel = 3.15	
D05 to 1200	15.36 15.36	5.60	20.13 40.13	1.5 1.61	T	8.0	3.890 8.000 11.890	120 0.0585	12.917 0.0 0.696		Vel = 6.32	
1200 to 1201	15.36 15.36		0.0 40.13	3 3.26			10.000 10.000	120 0.0019	13.613 0.0 0.019		Vel = 1.54	
1201 to 1202	15.36 15.36		40.15 80.28	3 3.26			10.000 10.000	120 0.0068	13.632 0.0 0.068		Vel = 3.09	
1202 to 1203	15.36 20.67		40.26 120.54	3 3.26	2E	18.815	13.590 18.815 32.405	120 0.0144	13.700 -2.300 0.468		Vel = 4.63	
1203 to DT1	20.67 20.67		0.0 120.54	4 4.26			1.850 1.850	120 0.0038	11.868 0.0 0.007		Vel = 2.71	
DT1 to DBR	20.67 15.26		0.0 120.54	4 4.26	T Dvk	26.334 6.584	5.410 32.918 38.328	120 0.0039	11.875 2.343 0.151		Vel = 2.71	
DBR to DRE	15.26 15.26		0.0 120.54	3 3.26	2E	18.815	0.670 18.815 19.485	120 0.0144	14.369 0.0 0.281		Vel = 4.63	
DRE to DRF	15.26 17.58		0.0 120.54	4 4.26			2.320 2.320	120 0.0039	14.650 -1.005 0.009		Vel = 2.71	
DRF to 1130	17.58 17.58		0.0 120.54	4 4.26	E	13.167	12.670 13.167 25.837	120 0.0039	13.654 0.0 0.102		Vel = 2.71	
1130 to 1129	17.58 17.58		-10.26 110.28	4 4.26			0.670 0.670	120 0.0030	13.756 0.0 0.002		Vel = 2.48	
1129 to 1128	17.58 17.58		-11.76 98.52	4 4.26			10.000 10.000	120 0.0027	13.758 0.0 0.027		Vel = 2.22	
1128 to 1127	17.58 17.58		-14.00 84.52	4 4.26			8.000 8.000	120 0.0020	13.785 0.0 0.016		Vel = 1.90	
1127 to 1126	17.58 17.58		-13.74 70.78	4 4.26	E	13.167	8.590 13.167 21.757	120 0.0015	13.801 0.0 0.032		Vel = 1.59	
1126 to 123A	17.58 17.58		-11.81 58.97	4 4.26			38.300 38.300	120 0.0010	13.833 0.0 0.040		Vel = 1.33	
123A to 1123	17.58 17.58		0.0 58.97	4 4.26			2.530 2.530	120 0.0012	13.873 0.0 0.003		Vel = 1.33	
1123 to 1122	17.58 17.58		0.0 58.97	4 4.26	T	26.334	9.430 26.334 35.764	120 0.0010	13.876 0.0 0.037		Vel = 1.33	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1122 to 1121	17.58 17.58		0.0 58.97	4 4.26		0.560 0.560	120 0.0018	13.913 0.0 0.001		Vel = 1.33	
1121 to 1120	17.58 17.58		-8.18 50.79	4 4.26		9.440 9.440	120 0.0007	13.914 0.0 0.007		Vel = 1.14	
1120 to 1119	17.58 17.58		-7.02 43.77	4 4.26		0.750 0.750	120 0.0013	13.921 0.0 0.001		Vel = 0.99	
1119 to 1118	17.58 17.58		0.0 43.77	4 4.26		9.960 9.960	120 0.0005	13.922 0.0 0.005		Vel = 0.99	
1118 to 1117	17.58 17.58		-6.91 36.86	4 4.26		0.790 0.790	120 0.0013	13.927 0.0 0.001		Vel = 0.83	
1117 to 1116	17.58 17.58		0.0 36.86	4 4.26		5.330 5.330	120 0.0004	13.928 0.0 0.002		Vel = 0.83	
1116 to 1115	17.58 17.58		-6.80 30.06	4 4.26		9.810 9.810	120 0.0003	13.930 0.0 0.003		Vel = 0.68	
1115 to 1114	17.58 17.58		-3.99 26.07	4 4.26		1.550 1.550	120 0	13.933 0.0 0.0		Vel = 0.59	
1114 to 1113	17.58 17.58		0.0 26.07	4 4.26		6.600 6.600	120 0.0003	13.933 0.0 0.002		Vel = 0.59	
1113 to 1112	17.58 17.58		-3.87 22.2	4 4.26		3.760 3.760	120 0.0003	13.935 0.0 0.001		Vel = 0.50	
1112 to 1111	17.58 14.58		-5.70 16.5	4 4.26	E 13.167	10.790 13.167 23.957	120 0.0001	13.936 1.299 0.002		Vel = 0.37	
1111 to 1110	14.58 14.58		0.0 16.5	3 3.26	E 9.408	2.610 9.408 12.018	120 0.0004	15.237 0.0 0.005		Vel = 0.63	
1110 to 1109	14.58 14.58		-1.98 14.52	3 3.26		7.920 7.920	120 0.0003	15.242 0.0 0.002		Vel = 0.56	
1109 to 1108	14.58 14.58		-1.86 12.66	3 3.26		8.000 8.000	120 0.0002	15.244 0.0 0.002		Vel = 0.49	
1108 to 1107	14.58 14.58		-1.74 10.92	3 3.26		11.500 11.500	120 0.0002	15.246 0.0 0.002		Vel = 0.42	
1107 to 1106	14.58 14.58		-1.61 9.31	3 3.26		8.640 8.640	120 0.0001	15.248 0.0 0.001		Vel = 0.36	
1106 to 1105	14.58 14.58		-1.54 7.77	3 3.26		9.860 9.860	120 0.0001	15.249 0.0 0.001		Vel = 0.30	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1105 to 1104	14.58 14.58		-1.47 6.3	3 3.26			10.000 10.000	120 0	15.250 0.0		Vel = 0.24	
1104 to 1103	14.58 14.58		-1.42 4.88	3 3.26	2E	18.815	32.050 18.815 50.865	120 0	15.250 0.0 0.002		Vel = 0.19	
1103 to 1102	14.58 14.58		-1.22 3.66	3 3.26			10.090 10.090	120 0	15.252 0.0		Vel = 0.14	
1102 to 1101	14.58 14.58		-1.22 2.44	3 3.26			10.000 10.000	120 0	15.252 0.0		Vel = 0.09	
1101 to 1100	14.58 14.58		-1.22 1.22	3 3.26			8.500 8.500	120 0.0001	15.252 0.0 0.001		Vel = 0.05	
1100 to TA01	14.58 14.58		0.0 1.22	1.5 1.61	T	8.0	60.840 8.000 68.840	120 0.0001	15.253 0.0 0.006		Vel = 0.19	
TA01 to TA02	14.58 14.58		0.0 1.22	1.5 1.61			12.000 12.000	120 0.0001	15.259 0.0 0.001		Vel = 0.19	
TA02 to TA03	14.58 14.58		0.0 1.22	1.5 1.61			12.000 12.000	120 0.0001	15.260 0.0 0.001		Vel = 0.19	
TA03 to TA04	14.58 14.58		0.0 1.22	1.5 1.61			12.000 12.000	120 0.0001	15.261 0.0 0.001		Vel = 0.19	
TA04 to TA05	14.58 14.58		0.0 1.22	1.5 1.61			12.000 12.000	120 0.0001	15.262 0.0 0.001		Vel = 0.19	
TA05 to TA06	14.58 14.58		0.0 1.22	1.5 1.61			12.000 12.000	120 0.0001	15.263 0.0 0.001		Vel = 0.19	
TA06 to 1300	14.58 14.58		0.0 1.22	1.5 1.61	T	8.0	50.650 8.000 58.650	120 0.0001	15.264 0.0 0.006		Vel = 0.19	
1300 to 1301	14.58 14.58		0.0 1.22	3 3.26			8.500 8.500	120 0	15.270 0.0		Vel = 0.05	
1301 to 1302	14.58 14.58		1.22 2.44	3 3.26			10.000 10.000	120 0	15.270 0.0		Vel = 0.09	
1302 to 1303	14.58 14.58		1.22 3.66	3 3.26			9.000 9.000	120 0	15.270 0.0		Vel = 0.14	
1303 to 1304	14.58 14.58		1.22 4.88	3 3.26			11.000 11.000	120 0	15.270 0.0		Vel = 0.19	
1304 to 1305	14.58 14.58		1.42 6.3	3 3.26			10.000 10.000	120 0.0001	15.270 0.0 0.001		Vel = 0.24	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1305 to 1306	14.58 14.58		1.47 7.77	3 3.26		9.860 9.860	120 0.0001	15.271 0.0 0.001		Vel = 0.30	
1306 to 1307	14.58 14.58		1.54 9.31	3 3.26		8.640 8.640	120 0.0001	15.272 0.0 0.001		Vel = 0.36	
1307 to 1308	14.58 14.58		1.61 10.92	3 3.26		11.500 11.500	120 0.0002	15.273 0.0 0.002		Vel = 0.42	
1308 to 1309	14.58 14.58		1.74 12.66	3 3.26		8.000 8.000	120 0.0002	15.275 0.0 0.002		Vel = 0.49	
1309 to 1310	14.58 14.58		1.86 14.52	3 3.26		7.920 7.920	120 0.0003	15.277 0.0 0.002		Vel = 0.56	
1310 to 1311	14.58 14.58		1.98 16.5	3 3.26	2E 18.815	30.400 18.815 49.215	120 0.0004	15.279 0.0 0.018		Vel = 0.63	
1311 to 1312	14.58 17.58		5.70 22.2	3 3.26	3E 28.223	22.340 28.223 50.563	120 0.0006	15.297 -1.299 0.032		Vel = 0.85	
1312 to 1313	17.58 17.58		0.0 22.2	4 4.26		4.990 4.990	120 0	14.030 0.0 0.0		Vel = 0.50	
1313 to 1314	17.58 17.58		7.86 30.06	4 4.26		12.310 12.310	120 0.0003	14.030 0.0 0.004		Vel = 0.68	
1314 to 1315	17.58 17.58		6.80 36.86	4 4.26		6.120 6.120	120 0.0005	14.034 0.0 0.003		Vel = 0.83	
1315 to 1316	17.58 17.58		6.91 43.77	4 4.26		8.230 8.230	120 0.0006	14.037 0.0 0.005		Vel = 0.99	
1316 to 1317	17.58 17.58		7.02 50.79	4 4.26		10.040 10.040	120 0.0008	14.042 0.0 0.008		Vel = 1.14	
1317 to 1318	17.58 17.58		8.18 58.97	4 4.26		6.060 6.060	120 0.0010	14.050 0.0 0.006		Vel = 1.33	
1318 to 1319	17.58 17.58		11.81 70.78	4 4.26		9.490 9.490	120 0.0015	14.056 0.0 0.014		Vel = 1.59	
1319 to 1320	17.58 17.58		13.74 84.52	4 4.26		9.460 9.460	120 0.0020	14.070 0.0 0.019		Vel = 1.90	
1320 to 1321	17.58 17.58		14.00 98.52	4 4.26		6.920 6.920	120 0.0027	14.089 0.0 0.019		Vel = 2.22	
1321 to 321T	17.58 17.58		22.02 120.54	4 4.26	E 13.167	3.060 13.167 16.227	120 0.0039	14.108 0.0 0.064		Vel = 2.71	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
321T to 1322	17.58 17.58		0.0 120.54	6 6.357			6.620 6.620	120 0.0005	14.172 0.0 0.003			
1322 to TR1	17.58 17.58		0.0 120.54	6 6.357			156.770 156.770	120 0.0006	14.175 0.0 0.088		Vel = 1.22	
TR1 to BR1	17.58 3		0.0 120.54	6 6.357	E Fsp Avc B T	17.603 0.0 27.661 12.573 37.72	8.410 95.557 103.967	120 0.0005	14.263 7.315 0.057		** Fixed Loss = 1 Vel = 1.22	
BR1 to BR2	3 3		0.0 120.54	8 8.249			2.320 2.320	120 0.0004	21.635 0.0 0.001		Vel = 0.72	
BR2 to FLG	3 1		0.0 120.54	8 8.249	E	21.141	7.600 21.141 28.741	120 0.0001	21.636 0.866 0.004		Vel = 0.72	
FLG to UG4	1 -2.42		0.0 120.54	8 8.27	E T	28.468 55.354	57.120 83.822 140.942	140 0.0001	22.506 1.481 0.017		Vel = 0.72	
UG4 to UG2	-2.42 -2.42		-40.11 80.43	8 8.27			392.280 392.280	140 0.0001	24.004 0.0 0.022		Vel = 0.48	
UG2 to UG1	-2.42 -2.42		40.11 120.54	8 8.27	8E 4T	227.744 221.418	462.900 283.098 745.998	140 0.0001	24.026 4.000 0.087		** Fixed Loss = 4 Vel = 0.72	
UG1 to SRC	-2.42 -2.42		0.0 120.54	12 12.34			287.990 287.990	140 0	28.113 0.0 0.005		Vel = 0.32	
SRC			500.00 620.54						28.118		Qa = 500.00 K Factor = 117.02	
D09 to D10	15.36 15.36	5.60	20.01 20.01	1.5 1.61			10.000 10.000	120 0.0162	12.773 0.0 0.162		Vel = 3.15	
D10 to 1201	15.36 15.36	5.60	20.14 40.15	1.5 1.61	T	8.0	3.890 8.000 11.890	120 0.0586	12.935 0.0 0.697		Vel = 6.33	
1201			0.0 40.15						13.632		K Factor = 10.87	
D12 to D13	15.36 15.36	5.60	20.06 20.06	1.5 1.61			10.000 10.000	120 0.0162	12.837 0.0 0.162		Vel = 3.16	
D13 to 1202	15.36 15.36	5.60	20.19 40.25	1.5 1.61	T	8.0	3.890 8.000 11.890	120 0.0590	12.999 0.0 0.701		Vel = 6.34	
1202			0.0 40.25						13.700		K Factor = 10.87	
1130 to 128A	17.58 17.58		10.26 10.26	2 2.157	2E 2T	12.307 24.613	97.780 36.920 134.700	120 0.0011	13.756 0.0 0.152		Vel = 0.90	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
128A to 1321	17.58 17.58		11.76 22.02	2 2.157	E T 6.153 12.307	24.630 18.460 43.090	120 0.0046	13.908 0.0 0.200			
			0.0 22.02						Vel =	1.93	
1321								14.108	K Factor =	5.86	
1129 to 128A	17.58 17.58		11.76 11.76	2 2.157	2T 24.613	78.460 24.613 103.073	120 0.0015	13.758 0.0 0.150			
			0.0 11.76						Vel =	1.03	
128A								13.908	K Factor =	3.15	
1128 to 1320	17.58 17.58		14.00 14.0	2 2.157	2T 4E 24.613 24.613	102.350 49.226 151.576	120 0.0020	13.785 0.0 0.304			
			0.0 14.00						Vel =	1.23	
1320								14.089	K Factor =	3.73	
1127 to 1319	17.58 17.58		13.75 13.75	2 2.157	2T 2E 24.613 12.307	101.470 36.920 138.390	120 0.0019	13.801 0.0 0.269			
			0.0 13.75						Vel =	1.21	
1319								14.070	K Factor =	3.67	
1126 to 1318	17.58 17.58		11.80 11.8	2 2.157	2T 3E 24.613 18.46	109.250 43.073 152.323	120 0.0015	13.833 0.0 0.223			
			0.0 11.80						Vel =	1.04	
1318								14.056	K Factor =	3.15	
1121 to 1317	17.58 17.58		8.18 8.18	2 2.157	2T 2E 24.613 12.307	146.150 36.920 183.070	120 0.0007	13.914 0.0 0.136			
			0.0 8.18						Vel =	0.72	
1317								14.050	K Factor =	2.18	
1120 to 1316	17.58 17.58		7.02 7.02	2 2.157	2T 6E 24.613 36.92	153.740 61.533 215.273	120 0.0006	13.921 0.0 0.121			
			0.0 7.02						Vel =	0.62	
1316								14.042	K Factor =	1.87	
1118 to TB13	17.58 17.58		6.91 6.91	2 2.157	T 12.307	12.520 12.307 24.827	120 0.0006	13.927 0.0 0.014			
			0.0	2		10.000	120	13.941 0.0	Vel =	0.61	
TB13 to TB14	17.58 17.58		0.0 6.91	2 2.157		10.000	0.0005	0.005	Vel =	0.61	
			0.0	2		10.000	120	13.946 0.0			
TB14 to TB15	17.58 17.58		6.91 0.0	2 2.157		10.000	0.0006	0.006	Vel =	0.61	
			0.0	2		10.000	120	13.952 0.0			
TB15 to TB16	17.58 17.58		6.91 0.0	2 2.157		10.000	0.0005	0.005	Vel =	0.61	
			0.0	2		10.000	120	13.957 0.0			
TB16 to TB17	17.58 17.58		6.91 6.91	2 2.157		10.000	0.0006	0.006	Vel =	0.61	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TB17 to TB18	17.58 17.58		0.0 6.91	2 2.157		10.000 10.000	120 0.0005	13.963 0.0 0.005		Vel = 0.61	
TB18 to 1315	17.58 17.58		0.0 6.91	2 2.157	4E T 24.613 12.307	89.090 36.920 126.010	120 0.0005	13.968 0.0 0.069		Vel = 0.61	
1315			0.0 6.91					14.037		K Factor = 1.84	
1116 to TB07	17.58 17.58		6.80 6.8	2 2.157	T 12.307	12.520 12.307 24.827	120 0.0005	13.930 0.0 0.013		Vel = 0.60	
TB07 to TB08	17.58 17.58		0.0 6.8	2 2.157		10.000 10.000	120 0.0005	13.943 0.0 0.005		Vel = 0.60	
TB08 to TB09	17.58 17.58		0.0 6.8	2 2.157		10.000 10.000	120 0.0006	13.948 0.0 0.006		Vel = 0.60	
TB09 to TB10	17.58 17.58		0.0 6.8	2 2.157		10.000 10.000	120 0.0005	13.954 0.0 0.005		Vel = 0.60	
TB10 to TB11	17.58 17.58		0.0 6.8	2 2.157		10.000 10.000	120 0.0005	13.959 0.0 0.005		Vel = 0.60	
TB11 to TB12	17.58 17.58		0.0 6.8	2 2.157		10.000 10.000	120 0.0006	13.964 0.0 0.006		Vel = 0.60	
TB12 to 1314	17.58 17.58		0.0 6.8	2 2.157	4E T 24.613 12.307	85.090 36.920 122.010	120 0.0005	13.970 0.0 0.064		Vel = 0.60	
1314			0.0 6.80					14.034		K Factor = 1.82	
1115 to TB01	17.58 17.58		3.99 3.99	2 2.157	T 12.307	12.520 12.307 24.827	120 0.0002	13.933 0.0 0.005		Vel = 0.35	
TB01 to TB02	17.58 17.58		0.0 3.99	2 2.157		10.000 10.000	120 0.0002	13.938 0.0 0.002		Vel = 0.35	
TB02 to TB03	17.58 17.58		0.0 3.99	2 2.157		10.000 10.000	120 0.0002	13.940 0.0 0.002		Vel = 0.35	
TB03 to TB04	17.58 17.58		0.0 3.99	2 2.157		10.000 10.000	120 0.0002	13.942 0.0 0.002		Vel = 0.35	
TB04 to TB05	17.58 17.58		0.0 3.99	2 2.157		10.000 10.000	120 0.0002	13.944 0.0 0.002		Vel = 0.35	
TB05 to TB06	17.58 17.58		0.0 3.99	2 2.157		10.000 10.000	120 0.0002	13.946 0.0 0.002		Vel = 0.35	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TB06 to 115A	17.58 17.58		0.0 3.99	2 2.157	E	6.153 21.233	120 0.0002	13.948 0.0 0.004		Vel = 0.35	
115A to 1313	17.58 17.58		3.87 7.86	2 2.157	2T 2E	24.613 12.307 113.430	120 0.0007	13.952 0.0 0.078		Vel = 0.69	
1313			0.0 7.86					14.030		K Factor = 2.10	
1113 to 115A	17.58 17.58		3.87 3.87	2 2.157	T E	12.307 6.153 91.880	120 0.0002	13.935 0.0 0.017		Vel = 0.34	
115A			0.0 3.87					13.952		K Factor = 1.04	
1112 to T311	17.58 17.58		5.69 5.69	2 2.157	T E	12.307 6.153 147.830	120 0.0004	13.936 0.0 0.056		Vel = 0.50	
T311 to 1311	17.58 14.58		0.0 5.69	2 2.157	T	12.307 3.000 12.307 15.307	120 0.0004	13.992 1.299 0.006		Vel = 0.50	
1311			0.0 5.69					15.297		K Factor = 1.45	
1110 to 1310	14.58 14.58		1.99 1.99	1.5 1.61	2T	16.0 149.350 16.000 165.350	120 0.0002	15.242 0.0 0.037		Vel = 0.31	
1310			0.0 1.99					15.279		K Factor = 0.51	
1109 to 1309	14.58 14.58		1.85 1.85	1.5 1.61	2T	16.0 149.360 16.000 165.360	120 0.0002	15.244 0.0 0.033		Vel = 0.29	
1309			0.0 1.85					15.277		K Factor = 0.47	
1108 to 1308	14.58 14.58		1.74 1.74	1.5 1.61	2T	16.0 149.350 16.000 165.350	120 0.0002	15.246 0.0 0.029		Vel = 0.27	
1308			0.0 1.74					15.275		K Factor = 0.45	
1107 to 1307	14.58 14.58		1.61 1.61	1.5 1.61	2T	16.0 149.350 16.000 165.350	120 0.0002	15.248 0.0 0.025		Vel = 0.25	
1307			0.0 1.61					15.273		K Factor = 0.41	
1106 to 1306	14.58 14.58		1.54 1.54	1.5 1.61	2T	16.0 149.350 16.000 165.350	120 0.0001	15.249 0.0 0.023		Vel = 0.24	
1306			0.0 1.54					15.272		K Factor = 0.39	
1105 to 1305	14.58 14.58		1.47 1.47	1.5 1.61	2T	16.0 149.350 16.000 165.350	120 0.0001	15.250 0.0 0.021		Vel = 0.23	

Final Calculations : Hazen-Williams

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Bucees -BENTON AR - System 1 RA D

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1305			0.0 1.47						15.271		K Factor = 0.38	
1104 to 1304	14.58 14.58		1.42 1.42	1.5 1.61	2T	16.0	149.360 16.000 165.360	120 0.0001	15.250 0.0 0.020		Vel = 0.22	
1304			0.0 1.42						15.270		K Factor = 0.36	
1103 to TA19	14.58 14.58		1.21 1.21	1.5 1.61	T 2E	8.0 8.0	61.930 16.000 77.930	120 0.0001	15.252 0.0 0.007		Vel = 0.19	
TA19 to TA20	14.58 14.58		0.0 1.21	1.5 1.61			12.000 12.000	120 0.0001	15.259 0.0 0.001		Vel = 0.19	
TA20 to TA21	14.58 14.58		0.0 1.21	1.5 1.61			10.000 10.000	120 0.0001	15.260 0.0 0.001		Vel = 0.19	
TA21 to TA22	14.58 14.58		0.0 1.21	1.5 1.61			12.010 12.010	120 0.0001	15.261 0.0 0.001		Vel = 0.19	
TA22 to TA23	14.58 14.58		0.0 1.21	1.5 1.61			12.000 12.000	120 0.0001	15.262 0.0 0.001		Vel = 0.19	
TA23 to TA24	14.58 14.58		0.0 1.21	1.5 1.61			11.980 11.980	120 0.0001	15.263 0.0 0.001		Vel = 0.19	
TA24 to 1303	14.58 14.58		0.0 1.21	1.5 1.61	T	8.0	52.650 8.000 60.650	120 0.0001	15.264 0.0 0.006		Vel = 0.19	
1303			0.0 1.21						15.270		K Factor = 0.31	
1102 to TA13	14.58 14.58		1.23 1.23	1.5 1.61	T	8.0	60.840 8.000 68.840	120 0.0001	15.252 0.0 0.007		Vel = 0.19	
TA13 to TA14	14.58 14.58		0.0 1.23	1.5 1.61			12.000 12.000	120 0.0001	15.259 0.0 0.001		Vel = 0.19	
TA14 to TA15	14.58 14.58		0.0 1.23	1.5 1.61			12.000 12.000	120 0.0001	15.260 0.0 0.001		Vel = 0.19	
TA15 to TA16	14.58 14.58		0.0 1.23	1.5 1.61			12.000 12.000	120 0.0001	15.261 0.0 0.001		Vel = 0.19	
TA16 to TA17	14.58 14.58		0.0 1.23	1.5 1.61			12.000 12.000	120 0.0001	15.262 0.0 0.001		Vel = 0.19	
TA17 to TA18	14.58 14.58		0.0 1.23	1.5 1.61			12.000 12.000	120 0.0001	15.263 0.0 0.001		Vel = 0.19	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees -BENTON AR - System 1 RA D

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TA18 to 1302	14.58 14.58		0.0 1.23	1.5 1.61	T	8.0	50.650 8.000 58.650	120 0.0001	15.264 0.0 0.006		Vel = 0.19	
1302			0.0 1.23						15.270		K Factor = 0.31	
1101 to TA07	14.58 14.58		1.22 1.22	1.5 1.61	T	8.0	60.840 8.000 68.840	120 0.0001	15.252 0.0 0.007		Vel = 0.19	
TA07 to TA08	14.58 14.58		0.0 1.22	1.5 1.61			12.000 12.000	120 0.0001	15.259 0.0 0.001		Vel = 0.19	
TA08 to TA09	14.58 14.58		0.0 1.22	1.5 1.61			12.000 12.000	120 0.0001	15.260 0.0 0.001		Vel = 0.19	
TA09 to TA10	14.58 14.58		0.0 1.22	1.5 1.61			12.000 12.000	120 0.0001	15.261 0.0 0.001		Vel = 0.19	
TA10 to TA11	14.58 14.58		0.0 1.22	1.5 1.61			12.000 12.000	120 0.0001	15.262 0.0 0.001		Vel = 0.19	
TA11 to TA12	14.58 14.58		0.0 1.22	1.5 1.61			12.000 12.000	120 0.0001	15.263 0.0 0.001		Vel = 0.19	
TA12 to 1301	14.58 14.58		0.0 1.22	1.5 1.61	T	8.0	50.650 8.000 58.650	120 0.0001	15.264 0.0 0.006		Vel = 0.19	
1301			0.0 1.22						15.270		K Factor = 0.31	
UG4 to HY1	-2.42 -2.42		40.10 40.1	8 8.27	2E	56.936	152.180 56.936 209.116	140 0	24.004 0.0 0.003		Vel = 0.24	
HY1 to UG3	-2.42 -2.42		0.0 40.1	8 8.27	3E	85.404	1024.600 85.404 1110.004	140 0	24.007 0.0 0.017		Vel = 0.24	
UG3 to UG2	-2.42 -2.42		0.0 40.1	8 8.27	T	55.354	47.000 55.354 102.354	140 0	24.024 0.0 0.002		Vel = 0.24	
UG2			0.0 40.10						24.026		K Factor = 8.18	



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HENDERSON ENGINEERS
8345 LENEXA DR. SUITE #300
LENEXA, KS 66214
913-742-500

Job Name : Bucees - BENTON AR - System 2 RA E
Building :
Location : SALES FLOOR
System : SYSTEM 2 RA E
Contract : 2450001433
Data File : Bucees - BENTON AR - System 2 RA E.WXF

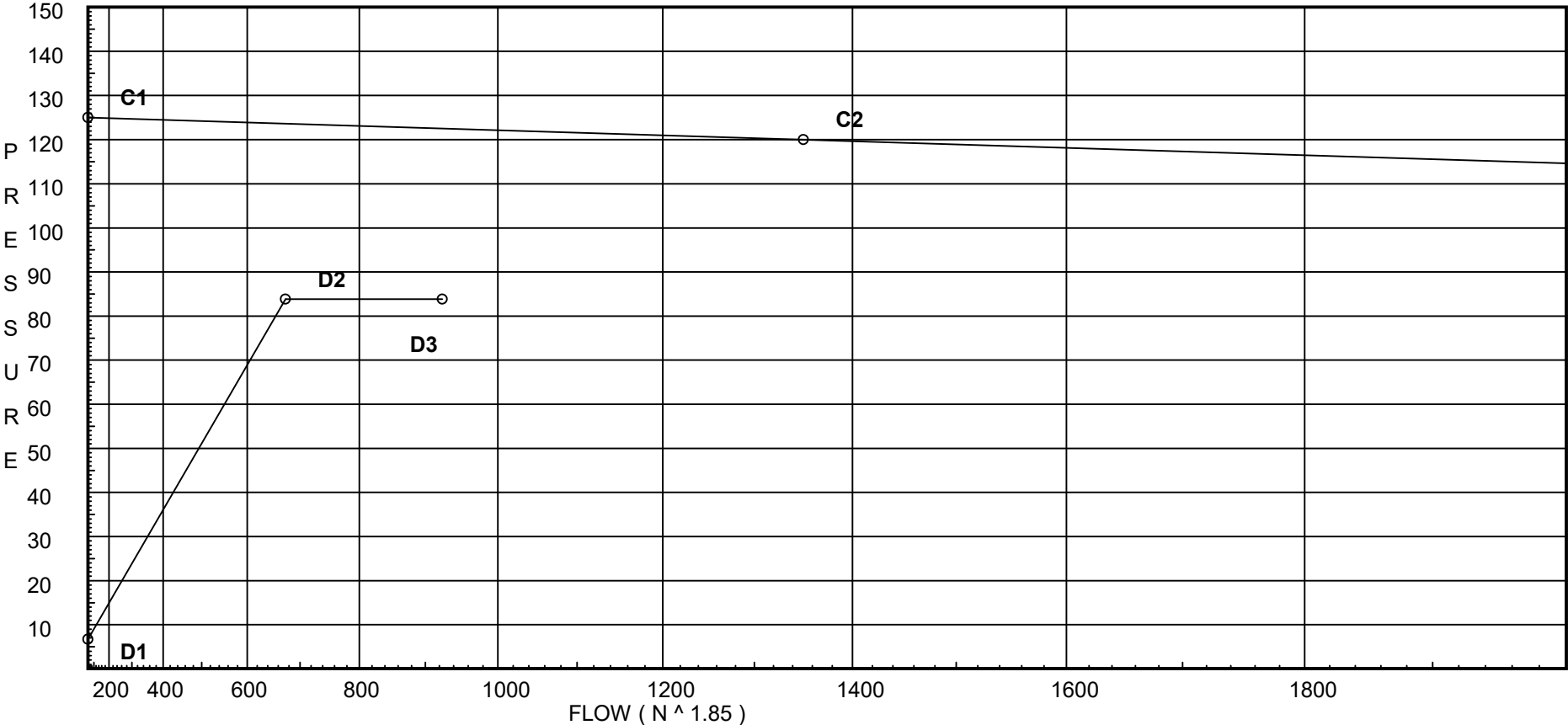
Water Supply Curve

HENDERSON ENGINEERS
Bucees - BENTON AR - System 2 RA E

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City Water Supply:
C1 - Static Pressure : 125
C2 - Residual Pressure: 120
C2 - Residual Flow : 1351

Demand:
D1 - Elevation : 6.726
D2 - System Flow : 673.87
D2 - System Pressure : 83.815
Hose (Demand) : 250
D3 - System Demand : 923.87
Safety Margin : 38.709



Fittings Used Summary

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Bucees - BENTON AR - System 2 RA E

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Fitting Legend																					
Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Avc	Alarm Vic 751	0	0	0	0	3	9	8	17	0	21	0	22	50	0	0	0	0	0	0	0
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																			
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.

Flow Summary - NFPA

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Bucees - BENTON AR - System 2 RA E

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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>
SRC	125.0	120	1351.0	122.525	923.87	83.815

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>	
E18	13.11	5.6	21.56	26.0	0.2	130
T518	16.0		26.86			
T517	16.0		27.16			
T516	16.0		29.57			
2403	16.0		45.3			
2404	16.0		46.01			
2405	16.0		46.85			
2406	16.0		47.54			
2407	16.0		48.02			
2408	16.0		48.59			
2409	16.0		48.92			
2410	16.0		49.19			
2411	16.0		49.45			
2412	16.0		49.57			
2415	16.0		50.93			
2416	16.0		51.38			
2507	16.0		58.54			
2506	16.0		58.55			
2505	16.0		58.55			
2504	16.0		58.53			
2503	16.0		58.44			
2502	16.0		58.3			
2501	16.0		57.92			
2500	16.0		57.9			
T601	16.0		57.54			
T602	16.0		57.33			
T603	16.0		57.12			
T604	16.0		56.92			
T605	16.0		56.71			
T606	16.0		56.5			
2614	16.0		55.39			
2615	16.0		55.88			
2616	16.0		57.7			
2617	16.0		59.47			
2618	16.0		60.07			
2619	16.0		60.56			
2620	16.0		61.08			
2621	16.0		63.6			
TR2	16.0		63.93			
BR2	3.0		71.94	100.0		
FLG	1.0		72.95			
UG4	-2.42		74.94			

Flow Summary - NFPA

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Bucees - BENTON AR - System 2 RA E

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NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node		Notes
UG2	-2.42		75.84			
UG1	-2.42		83.61			
SRC	-2.42		83.82			
E19	13.11	5.6	21.56	26.0	0.2	130
T519	16.0		26.86			
T520	16.0		27.13			
T521	16.0		29.67			
2603	16.0		50.78			
2604	16.0		51.04			
2605	16.0		51.36			
2606	16.0		51.71			
2607	16.0		52.02			
2608	16.0		52.52			
2609	16.0		52.89			
2610	16.0		53.3			
2611	16.0		53.86			
2612	16.0		54.24			
2613	16.0		54.75			
E20	13.11	5.6	21.77	26.13	0.2	130
E17	13.11	5.6	21.79	26.14	0.2	130
E16	13.11	5.6	23.67	27.25	0.2	130
E21	13.11	5.6	23.75	27.29	0.2	130
2402	16.0		44.94			
2401	16.0		44.77			
2400	16.0		44.73			
T501	16.0		35.87			
T502	16.0		35.28			
T503	16.0		35.25			
T504	16.0		35.5			
T505	16.0		36.66			
2600	16.0		49.78			
2601	16.0		49.79			
2602	16.0		49.86			
E08	13.11	5.6	28.14	29.71	0.2	130
T508	16.0		35.28			
T509	16.0		35.52			
T510	16.0		36.68			
E07	13.11	5.6	28.16	29.72	0.2	130
T507	16.0		35.3			
T506	16.0		35.9			
E09	13.11	5.6	28.33	29.81	0.2	130
E06	13.11	5.6	28.63	29.96	0.2	130
E10	13.11	5.6	29.24	30.28	0.2	130
E03	13.11	5.6	28.12	29.7	0.2	130
E02	13.11	5.6	28.14	29.71	0.2	130
E04	13.11	5.6	28.31	29.8	0.2	130
E01	13.11	5.6	28.61	29.95	0.2	130
E05	13.11	5.6	29.22	30.27	0.2	130
E13	13.11	5.6	28.22	29.75	0.2	130
T513	16.0		35.37			
T514	16.0		35.62			

Flow Summary - NFPA

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Bucees - BENTON AR - System 2 RA E

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NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node		Notes
T515	16.0		36.77			
E12	13.11	5.6	28.24	29.76	0.2	130
T512	16.0		35.4			
T511	16.0		36.01			
E14	13.11	5.6	28.41	29.85	0.2	130
E11	13.11	5.6	28.71	30.01	0.2	130
E15	13.11	5.6	29.31	30.32	0.2	130
E22	13.11	5.6	35.23	33.24	0.2	130
T522	16.0		44.3			
E23	13.11	5.6	35.24	33.24	0.2	130
T523	16.0		44.32			
412A	16.0		52.77			
T612	16.0		56.78			
T611	16.0		56.95			
T610	16.0		57.12			
T609	16.0		57.29			
T608	16.0		57.46			
T607	16.0		57.63			
T618	16.0		57.93			
T617	16.0		57.98			
T616	16.0		58.03			
T615	16.0		58.08			
T614	16.0		58.14			
T613	16.0		58.18			
2508	16.0		58.54			
R508	22.54		56.58			
R622	22.54		59.86			
2622	16.0		63.57			
R506	22.17		56.31			
R620	22.17		57.97			
HY1	-2.42		74.99	150.0		
UG3	-2.42		75.77			

Final Calculations : Hazen-Williams

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Bucees - BENTON AR - System 2 RA E

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
E18 to T518	13.11 16	5.60	26.00 26.0	1 1.049	E T 2.0 5.0	24.000 7.000 31.000	120 0.2115	21.556 -1.252 6.555			
T518 to T517	16 16		-0.68 25.32	1.5 1.61		12.000 12.000	120 0.0250	26.859 0.0 0.300	Vel =	9.65	
T517 to T516	16 16		26.14 51.46	1.5 1.61	4E 16.0	9.970 16.000 25.970	120 0.0928	27.159 0.0 2.410	Vel =	8.11	
T516 to 2403	16 16		27.25 78.71	1.5 1.61	4E T 16.0 8.0	53.220 24.000 77.220	120 0.2037	29.569 0.0 15.732	Vel =	12.40	
2403 to 2404	16 16		200.24 278.95	3 3.26		10.330 10.330	120 0.0682	45.301 0.0 0.704	Vel =	10.72	
2404 to 2405	16 16		27.37 306.32	3 3.26		10.400 10.400	120 0.0811	46.005 0.0 0.843	Vel =	11.77	
2405 to 2406	16 16		-24.53 281.79	3 3.26		10.000 10.000	120 0.0694	46.848 0.0 0.694	Vel =	10.83	
2406 to 2407	16 16		-23.50 258.29	3 3.26		8.000 8.000	120 0.0591	47.542 0.0 0.473	Vel =	9.93	
2407 to 2408	16 16		-23.00 235.29	3 3.26		11.600 11.600	120 0.0497	48.015 0.0 0.577	Vel =	9.04	
2408 to 2409	16 16		-22.74 212.55	3 3.26		8.000 8.000	120 0.0412	48.592 0.0 0.330	Vel =	8.17	
2409 to 2410	16 16		-22.89 189.66	3 3.26		8.000 8.000	120 0.0334	48.922 0.0 0.267	Vel =	7.29	
2410 to 2411	16 16		-23.33 166.33	3 3.26		9.920 9.920	120 0.0262	49.189 0.0 0.260	Vel =	6.39	
2411 to 2412	16 16		-24.23 142.1	3 3.26		6.140 6.140	120 0.0195	49.449 0.0 0.120	Vel =	5.46	
2412 to 2415	16 16		-35.41 106.69	3 3.26	2E 18.815	99.030 18.815 117.845	120 0.0115	49.569 0.0 1.357	Vel =	4.10	
2415 to 2416	16 16		0.0 106.69	3 3.26	2E 18.815	20.310 18.815 39.125	120 0.0115	50.926 0.0 0.451	Vel =	4.10	
2416 to 2507	16 16		0.0 106.69	2 2.157	2T 24.613	58.570 24.613 83.183	120 0.0861	51.377 0.0 7.159	Vel =	9.37	
2507 to 2506	16 16		-65.41 41.28	3 3.26		7.140 7.140	120 0.0020	58.536 0.0 0.014	Vel =	1.59	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 2 RA E

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
2506 to 2505	16 16		-45.26 -3.98	3 3.26		7.650 7.650	120 0	58.550 0.0			
2505 to 2504	16 16		-44.26 -48.24	3 3.26		8.450 8.450	120 -0.0027	58.550 0.0		Vel =	0.15 1.85
2504 to 2503	16 16		-38.30 -86.54	3 3.26		11.750 11.750	120 -0.0078	58.527 0.0		Vel =	3.33
2503 to 2502	16 16		-30.91 -117.45	3 3.26		10.000 10.000	120 -0.0137	58.435 0.0		Vel =	4.51
2502 to 2501	16 16		23.31 -94.14	3 3.26	2E 18.815	22.600 18.815 41.415	120 -0.0092	58.298 0.0		Vel =	3.62
2501 to 2500	16 16		44.41 -49.73	3 3.26		8.390 8.390	120 -0.0027	57.919 0.0		Vel =	1.91
2500 to T601	16 16		0.0 -49.73	2 2.157	T 12.307	4.460 12.307 16.767	120 -0.0210	57.896 0.0		Vel =	4.37
T601 to T602	16 16		0.0 -49.73	2 2.157		10.000 10.000	120 -0.0209	57.544 0.0		Vel =	4.37
T602 to T603	16 16		0.0 -49.73	2 2.157		10.000 10.000	120 -0.0210	57.335 0.0		Vel =	4.37
T603 to T604	16 16		0.0 -49.73	2 2.157		10.000 10.000	120 -0.0210	57.125 0.0		Vel =	4.37
T604 to T605	16 16		0.0 -49.73	2 2.157		10.000 10.000	120 -0.0209	56.915 0.0		Vel =	4.37
T605 to T606	16 16		0.0 -49.73	2 2.157		10.000 10.000	120 -0.0210	56.706 0.0		Vel =	4.37
T606 to 2614	16 16		0.0 -49.73	2 2.157	2E T 12.307 12.307	28.130 24.614 52.744	120 -0.0210	56.496 0.0		Vel =	4.37
2614 to 2615	16 16		567.18 517.45	4 4.26		8.520 8.520	120 0.0581	55.390 0.0		Vel =	11.65
2615 to 2616	16 16		-44.41 473.04	4 4.26	2E 26.334	10.560 26.334 36.894	120 0.0492	55.885 0.0		Vel =	10.65
2616 to 2617	16 16		-23.31 449.73	4 4.26	2E 26.334	13.170 26.334 39.504	120 0.0448	57.700 0.0		Vel =	10.12
2617 to 2618	16 16		30.92 480.65	4 4.26		11.750 11.750	120 0.0507	59.470 0.0		Vel =	10.82

Final Calculations : Hazen-Williams

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Bucees - BENTON AR - System 2 RA E

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
2618 to 2619	16 16		38.30 518.95	4 4.26		8.460 8.460	120 0.0584	60.066 0.0 0.494		Vel = 11.68	
2619 to 2620	16 16		44.25 563.2	4 4.26		7.650 7.650	120 0.0680	60.560 0.0 0.520		Vel = 12.68	
2620 to 2621	16 16		45.26 608.46	4 4.26	T 26.334	5.860 26.334 32.194	120 0.0784	61.080 0.0 2.523		Vel = 13.70	
2621 to TR2	16 16		65.41 673.87	6 6.357		24.240 24.240	120 0.0135	63.603 0.0 0.327		Vel = 6.81	
TR2 to BR2	16 3		0.0 673.87	6 6.357	E Fsp 17.603 0.0 Avc 27.661 B 12.573 T 37.72	6.830 95.557 102.387	120 0.0135	63.930 6.630 1.380	** Fixed Loss = 1	Vel = 6.81	
BR2 to FLG	3 1	H100	100.00 773.87	8 8.249	E	21.141 7.600 21.141 28.741	120 0.0049	71.940 0.866 0.141		Vel = 4.65	
FLG to UG4	1 -2.42		0.0 773.87	8 8.27	E T	28.468 55.354 83.822 140.942	140 0.0036	72.947 1.481 0.513		Vel = 4.62	
UG4 to UG2	-2.42 -2.42		-169.38 604.49	8 8.27		392.280 392.280	140 0.0023	74.941 0.0 0.903		Vel = 3.61	
UG2 to UG1	-2.42 -2.42		319.38 923.87	8 8.27	8E T	227.744 55.354 283.098 745.998	140 0.0050	75.844 4.000 3.764	** Fixed Loss = 4	Vel = 5.52	
UG1 to SRC	-2.42 -2.42		0.0 923.87	12 12.34		287.990 287.990	140 0.0007	83.608 0.0 0.207		Vel = 2.48	
SRC			0.0 923.87					83.815	K Factor = 100.91		
E19 to T519	13.11 16	5.60	26.00 26.0	1 1.049	E T	24.000 7.000 31.000	120 0.2115	21.556 -1.252 6.555		Vel = 9.65	
T519 to T520	16 16		0.68 26.68	1.5 1.61		10.000 10.000	120 0.0276	26.859 0.0 0.276		Vel = 4.20	
T520 to T521	16 16		26.13 52.81	1.5 1.61	4E	16.0 9.990 16.000 25.990	120 0.0973	27.135 0.0 2.530		Vel = 8.32	
T521 to 2603	16 16		27.29 80.1	1.5 1.61	4E T	16.0 8.0 76.360 24.000 100.360	120 0.2104	29.665 0.0 21.120		Vel = 12.62	
2603 to 2604	16 16		248.34 328.44	4 4.26		10.330 10.330	120 0.0251	50.785 0.0 0.259		Vel = 7.39	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
2604 to 2605	16 16		39.11 367.55	4 4.26		10.390 10.390	120 0.0308	51.044 0.0 0.320		Vel = 8.27	
2605 to 2606	16 16		24.53 392.08	4 4.26		10.000 10.000	120 0.0348	51.364 0.0 0.348		Vel = 8.83	
2606 to 2607	16 16		23.50 415.58	4 4.26		8.000 8.000	120 0.0388	51.712 0.0 0.310		Vel = 9.35	
2607 to 2608	16 16		23.00 438.58	4 4.26		11.600 11.600	120 0.0428	52.022 0.0 0.496		Vel = 9.87	
2608 to 2609	16 16		22.74 461.32	4 4.26		8.000 8.000	120 0.0470	52.518 0.0 0.376		Vel = 10.38	
2609 to 2610	16 16		22.89 484.21	4 4.26		8.000 8.000	120 0.0514	52.894 0.0 0.411		Vel = 10.90	
2610 to 2611	16 16		23.33 507.54	4 4.26		9.920 9.920	120 0.0560	53.305 0.0 0.556		Vel = 11.42	
2611 to 2612	16 16		24.23 531.77	4 4.26		6.140 6.140	120 0.0611	53.861 0.0 0.375		Vel = 11.97	
2612 to 2613	16 16		16.98 548.75	4 4.26		8.000 8.000	120 0.0648	54.236 0.0 0.518		Vel = 12.35	
2613 to 2614	16 16		18.43 567.18	4 4.26		9.240 9.240	120 0.0688	54.754 0.0 0.636		Vel = 12.77	
2614			0.0 567.18					55.390		K Factor = 76.21	
E20 to T520	13.11 16	5.60	26.13 26.13	1 1.049	E T 2.0 5.0	24.000 7.000 31.000	120 0.2134	21.771 -1.252 6.616		Vel = 9.70	
T520			0.0 26.13					27.135		K Factor = 5.02	
E17 to T517	13.11 16	5.60	26.14 26.14	1 1.049	E T 2.0 5.0	24.000 7.000 31.000	120 0.2136	21.790 -1.252 6.621		Vel = 9.70	
T517			0.0 26.14					27.159		K Factor = 5.02	
T518 to T519	16 16		0.68 0.68	1.5 1.61		12.000 12.000	120 0	26.859 0.0 0.0		Vel = 0.11	
T519			0.0 0.68					26.859		K Factor = 0.13	
E16 to T516	13.11 16	5.60	27.25 27.25	1 1.049	E T 2.0 5.0	24.000 7.000 31.000	120 0.2306	23.673 -1.252 7.148		Vel = 10.12	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
T516			0.0 27.25					29.569		K Factor = 5.01	
E21 to T521	13.11 16	5.60	27.29	1	E T	2.0 5.0	24.000 7.000	120	23.748 -1.252		
			27.29	1.049			31.000	0.2313	7.169	Vel = 10.13	
T521			0.0 27.29					29.665		K Factor = 5.01	
2403 to 2402	16 16		-200.25	3			9.670	120	45.301 0.0		
			-200.25	3.26			9.670	-0.0369	-0.357	Vel = 7.70	
2402 to 2401	16 16		66.96	3			10.000	120	44.944 0.0		
			-133.29	3.26			10.000	-0.0174	-0.174	Vel = 5.12	
2401 to 2400	16 16		66.67	3			8.500	120	44.770 0.0		
			-66.62	3.26			8.500	-0.0048	-0.041	Vel = 2.56	
2400 to T501	16 16		0.0	1.5	T	8.0	51.180 8.000	120	44.729 0.0		
			-66.62	1.61			59.180	-0.1496	-8.855	Vel = 10.50	
T501 to T502	16 16		29.96	1.5			12.000	120	35.874 0.0		
			-36.66	1.61			12.000	-0.0496	-0.595	Vel = 5.78	
T502 to T503	16 16		29.71	1.5			12.000	120	35.279 0.0		
			-6.95	1.61			12.000	-0.0022	-0.027	Vel = 1.10	
T503 to T504	16 16		29.69	1.5			12.000	120	35.252 0.0		
			22.74	1.61			12.000	0.0205	0.246	Vel = 3.58	
T504 to T505	16 16		29.80	1.5			12.000	120	35.498 0.0		
			52.54	1.61			12.000	0.0964	1.157	Vel = 8.28	
T505 to 2600	16 16		30.27	1.5	T	8.0	50.620 8.000	120	36.655 0.0		
			82.81	1.61			58.620	0.2238	13.120	Vel = 13.05	
2600 to 2601	16 16		0.0	4			8.500	120	49.775 0.0		
			82.81	4.26			8.500	0.0020	0.017	Vel = 1.86	
2601 to 2602	16 16		82.80	4			10.000	120	49.792 0.0		
			165.61	4.26			10.000	0.0071	0.071	Vel = 3.73	
2602 to 2603	16 16		82.73	4	2E	26.334	35.410 26.334	120	49.863 0.0		
			248.34	4.26			61.744	0.0149	0.922	Vel = 5.59	
2603			0.0 248.34					50.785		K Factor = 34.85	
E08 to T508	13.11 16	5.60	29.71	1	E T	2.0 5.0	24.000 7.000	120	28.140 -1.252		
			29.71	1.049			31.000	0.2705	8.387	Vel = 11.03	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
T508 to T509	16 16		-7.00 22.71	1.5 1.61			12.000 12.000	120 0.0204	35.275 0.0 0.245		Vel = 3.58	
T509 to T510	16 16		29.81 52.52	1.5 1.61			12.000 12.000	120 0.0964	35.520 0.0 1.157		Vel = 8.28	
T510 to 2601	16 16		30.28 82.8	1.5 1.61	T	8.0	50.620 8.000 58.620	120 0.2237	36.677 0.0 13.115		Vel = 13.05	
2601			0.0 82.80						49.792		K Factor = 11.73	
E07 to T507	13.11 16	5.60	29.72 29.72	1 1.049	E T	2.0 5.0	24.000 7.000 31.000	120 0.2707	28.162 -1.252 8.393		Vel = 11.03	
T507 to T506	16 16		7.00 36.72	1.5 1.61			12.000 12.000	120 0.0497	35.303 0.0 0.596		Vel = 5.79	
T506 to 2401	16 16		29.96 66.68	1.5 1.61	T	8.0	51.180 8.000 59.180	120 0.1499	35.899 0.0 8.871		Vel = 10.51	
2401			0.0 66.68						44.770		K Factor = 9.97	
E09 to T509	13.11 16	5.60	29.81 29.81	1 1.049	E T	2.0 5.0	24.000 7.000 31.000	120 0.2723	28.332 -1.252 8.440		Vel = 11.07	
T509			0.0 29.81						35.520		K Factor = 5.00	
E06 to T506	13.11 16	5.60	29.96 29.96	1 1.049	E T	2.0 5.0	24.000 7.000 31.000	120 0.2749	28.629 -1.252 8.522		Vel = 11.12	
T506			0.0 29.96						35.899		K Factor = 5.00	
E10 to T510	13.11 16	5.60	30.28 30.28	1 1.049	E T	2.0 5.0	24.000 7.000 31.000	120 0.2803	29.239 -1.252 8.690		Vel = 11.24	
T510			0.0 30.28						36.677		K Factor = 5.00	
T508 to T507	16 16		7.00 7.0	1.5 1.61			12.000 12.000	120 0.0023	35.275 0.0 0.028		Vel = 1.10	
T507			0.0 7.00						35.303		K Factor = 1.18	
E03 to T503	13.11 16	5.60	29.70 29.7	1 1.049	E T	2.0 5.0	24.000 7.000 31.000	120 0.2704	28.122 -1.252 8.382		Vel = 11.03	
T503			0.0 29.70						35.252		K Factor = 5.00	
E02 to T502	13.11 16	5.60	29.71 29.71	1 1.049	E T	2.0 5.0	24.000 7.000 31.000	120 0.2706	28.143 -1.252 8.388		Vel = 11.03	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
T502			0.0 29.71						35.279		K Factor = 5.00	
E04 to T504	13.11 16	5.60	29.80 29.8	1 1.049	E T	2.0 5.0	24.000 7.000 31.000	120 0.2721	28.314 -1.252 8.436		Vel = 11.06	
T504			0.0 29.80						35.498		K Factor = 5.00	
E01 to T501	13.11 16	5.60	29.95 29.95	1 1.049	E T	2.0 5.0	24.000 7.000 31.000	120 0.2747	28.609 -1.252 8.517		Vel = 11.12	
T501			0.0 29.95						35.874		K Factor = 5.00	
E05 to T505	13.11 16	5.60	30.27 30.27	1 1.049	E T	2.0 5.0	24.000 7.000 31.000	120 0.2802	29.222 -1.252 8.685		Vel = 11.24	
T505			0.0 30.27						36.655		K Factor = 5.00	
E13 to T513	13.11 16	5.60	29.75 29.75	1 1.049	E T	2.0 5.0	24.000 7.000 31.000	120 0.2713	28.217 -1.252 8.409		Vel = 11.04	
T513 to T514	16 16		-7.19 22.56	1.5 1.61			12.000 12.000	120 0.0202	35.374 0.0 0.242		Vel = 3.56	
T514 to T515	16 16		29.85 52.41	1.5 1.61			12.000 12.000	120 0.0960	35.616 0.0 1.152		Vel = 8.26	
T515 to 2602	16 16		30.32 82.73	1.5 1.61	T	8.0	50.620 8.000 58.620	120 0.2234	36.768 0.0 13.095		Vel = 13.04	
2602			0.0 82.73						49.863		K Factor = 11.72	
E12 to T512	13.11 16	5.60	29.76 29.76	1 1.049	E T	2.0 5.0	24.000 7.000 31.000	120 0.2715	28.240 -1.252 8.415		Vel = 11.05	
T512 to T511	16 16		7.18 36.94	1.5 1.61			12.000 12.000	120 0.0502	35.403 0.0 0.603		Vel = 5.82	
T511 to 2402	16 16		30.01 66.95	1.5 1.61	T	8.0	51.180 8.000 59.180	120 0.1510	36.006 0.0 8.938		Vel = 10.55	
2402			0.0 66.95						44.944		K Factor = 9.99	
E14 to T514	13.11 16	5.60	29.85 29.85	1 1.049	E T	2.0 5.0	24.000 7.000 31.000	120 0.2729	28.407 -1.252 8.461		Vel = 11.08	
T514			0.0 29.85						35.616		K Factor = 5.00	
E11 to T511	13.11 16	5.60	30.01 30.01	1 1.049	E T	2.0 5.0	24.000 7.000 31.000	120 0.2756	28.713 -1.252 8.545		Vel = 11.14	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
T511			0.0 30.01						36.006		K Factor = 5.00	
E15 to T515	13.11 16	5.60	30.32	1	E T	2.0 5.0	24.000 7.000 31.000	120	29.310 -1.252 8.710		Vel = 11.26	
T515			0.0 30.32						36.768		K Factor = 5.00	
T513 to T512	16 16		7.19	1.5			12.000	120	35.374 0.0		Vel = 1.13	
T512			0.0 7.19						35.403		K Factor = 1.21	
E22 to T522	13.11 16	5.60	33.24	1	E T	2.0 5.0	24.000 7.000 31.000	120	35.226 -1.252 10.324		Vel = 12.34	
T522 to 2404	16 16		-5.87	1.5	T	8.0	51.180 8.000 59.180	120	44.298 0.0 1.707		Vel = 4.31	
2404			0.0 27.37						46.005		K Factor = 4.04	
E23 to T523	13.11 16	5.60	33.24	1	E T	2.0 5.0	24.000 7.000 31.000	120	35.241 -1.252 10.329		Vel = 12.34	
T523 to 2604	16 16		5.88	1.5	T	8.0	112.370 8.000 120.370	120	44.318 0.0 6.726		Vel = 6.17	
2604			0.0 39.12						51.044		K Factor = 5.48	
T522 to T523	16 16		5.87	1.5			12.000	120	44.298 0.0		Vel = 0.93	
T523			0.0 5.87						44.318		K Factor = 0.88	
2405 to 2605	16 16		24.53	1.5	2T	16.0	175.550 16.000 191.550	120	46.848 0.0 4.516		Vel = 3.87	
2605			0.0 24.53						51.364		K Factor = 3.42	
2406 to 2606	16 16		23.50	1.5	2T	16.0	175.550 16.000 191.550	120	47.542 0.0 4.170		Vel = 3.70	
2606			0.0 23.50						51.712		K Factor = 3.27	
2407 to 2607	16 16		23.00	1.5	2T	16.0	175.550 16.000 191.550	120	48.015 0.0 4.007		Vel = 3.62	
2607			0.0 23.00						52.022		K Factor = 3.19	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
2408 to 2608	16 16		22.74 22.74	1.5 1.61	2T 16.0	175.550 16.000 191.550	120 0.0205	48.592 0.0 3.926		Vel = 3.58	
2608			0.0 22.74					52.518		K Factor = 3.14	
2409 to 2609	16 16		22.89 22.89	1.5 1.61	2T 16.0	175.550 16.000 191.550	120 0.0207	48.922 0.0 3.972		Vel = 3.61	
2609			0.0 22.89					52.894		K Factor = 3.15	
2410 to 2610	16 16		23.33 23.33	1.5 1.61	2T 16.0	175.550 16.000 191.550	120 0.0215	49.189 0.0 4.116		Vel = 3.68	
2610			0.0 23.33					53.305		K Factor = 3.20	
2411 to 2611	16 16		24.23 24.23	1.5 1.61	2T 16.0	175.540 16.000 191.540	120 0.0230	49.449 0.0 4.412		Vel = 3.82	
2611			0.0 24.23					53.861		K Factor = 3.30	
2412 to 412A	16 16		35.41 35.41	1.5 1.61	T 8.0	60.890 8.000 68.890	120 0.0465	49.569 0.0 3.203		Vel = 5.58	
412A to 2613	16 16		-16.98 18.43	1.5 1.61	2T E 4.0	122.650 20.000 142.650	120 0.0139	52.772 0.0 1.982		Vel = 2.90	
2613			0.0 18.43					54.754		K Factor = 2.49	
412A to 2612	16 16		16.98 16.98	1.5 1.61	T 8.0	114.650 8.000 122.650	120 0.0119	52.772 0.0 1.464		Vel = 2.68	
2612			0.0 16.98					54.236		K Factor = 2.31	
2615 to T612	16 16		44.41 44.41	2 2.157	T 2E 12.307 12.307	28.250 24.614 52.864	120 0.0170	55.885 0.0 0.899		Vel = 3.90	
T612 to T611	16 16		0.0 44.41	2 2.157		10.000 10.000	120 0.0170	56.784 0.0 0.170		Vel = 3.90	
T611 to T610	16 16		0.0 44.41	2 2.157		10.000 10.000	120 0.0170	56.954 0.0 0.170		Vel = 3.90	
T610 to T609	16 16		0.0 44.41	2 2.157		10.000 10.000	120 0.0170	57.124 0.0 0.170		Vel = 3.90	
T609 to T608	16 16		0.0 44.41	2 2.157		10.000 10.000	120 0.0170	57.294 0.0 0.170		Vel = 3.90	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
T608 to T607	16 16		0.0 44.41	2 2.157		10.000 10.000	120 0.0170	57.464 0.0 0.170		Vel =	3.90
T607 to 2501	16 16		0.0 44.41	2 2.157	T 12.307	4.460 12.307 16.767	120 0.0170	57.634 0.0 0.285		Vel =	3.90
2501			0.0 44.41					57.919		K Factor =	5.84
2616 to T618	16 16		23.31 23.31	2 2.157	T 12.307	32.120 12.307 44.427	120 0.0052	57.700 0.0 0.229		Vel =	2.05
T618 to T617	16 16		0.0 23.31	2 2.157		10.000 10.000	120 0.0052	57.929 0.0 0.052		Vel =	2.05
T617 to T616	16 16		0.0 23.31	2 2.157		10.000 10.000	120 0.0052	57.981 0.0 0.052		Vel =	2.05
T616 to T615	16 16		0.0 23.31	2 2.157		10.000 10.000	120 0.0051	58.033 0.0 0.051		Vel =	2.05
T615 to T614	16 16		0.0 23.31	2 2.157		10.000 10.000	120 0.0052	58.084 0.0 0.052		Vel =	2.05
T614 to T613	16 16		0.0 23.31	2 2.157		8.000 8.000	120 0.0051	58.136 0.0 0.041		Vel =	2.05
T613 to 2502	16 16		0.0 23.31	2 2.157	T 12.307	11.070 12.307 23.377	120 0.0052	58.177 0.0 0.121		Vel =	2.05
2502			0.0 23.31					58.298		K Factor =	3.05
2503 to 2617	16 16		30.91 30.91	2 2.157	2T 24.613	94.350 24.613 118.963	120 0.0087	58.435 0.0 1.035		Vel =	2.71
2617			0.0 30.91					59.470		K Factor =	4.01
2504 to 2618	16 16		38.30 38.3	2 2.157	2T 24.613	94.350 24.613 118.963	120 0.0129	58.527 0.0 1.539		Vel =	3.36
2618			0.0 38.30					60.066		K Factor =	4.94
2507 to 2508	16 16		65.41 65.41	3 3.26		1.110 1.110	120 0.0045	58.536 0.0 0.005		Vel =	2.51
2508 to R508	16 22.54		0.0 65.41	2 2.157	E T 6.153 12.307	6.540 18.460 25.000	120 0.0348	58.541 -2.832 0.870		Vel =	5.74
R508 to R622	22.54 22.54		0.0 65.41	2 2.157		94.370 94.370	120 0.0348	56.579 0.0 3.285		Vel =	5.74

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
R622 to 2622	22.54 16		0.0 65.41	2 2.157	E T 6.153 12.307	6.540 18.460 25.000	120 0.0348	59.864 2.832 0.871		Vel = 5.74	
2622 to 2621	16 16		0.0 65.41	4 4.26	T 26.334	2.390 26.334 28.724	120 0.0013	63.567 0.0 0.036		Vel = 1.47	
2621			0.0 65.41					63.603		K Factor = 8.20	
2505 to 2619	16 16		44.25 44.25	2 2.157	2T 24.613	94.360 24.613 118.973	120 0.0169	58.550 0.0 2.010		Vel = 3.89	
2619			0.0 44.25					60.560		K Factor = 5.69	
2506 to R506	16 22.17		45.26 45.26	2 2.157	E T 6.153 12.307	6.170 18.460 24.630	120 0.0176	58.550 -2.672 0.433		Vel = 3.97	
R506 to R620	22.17 22.17		0.0 45.26	2 2.157		94.370 94.370	120 0.0176	56.311 0.0 1.663		Vel = 3.97	
R620 to 2620	22.17 16		0.0 45.26	2 2.157	E T 6.153 12.307	6.170 18.460 24.630	120 0.0176	57.974 2.672 0.434		Vel = 3.97	
2620			0.0 45.26					61.080		K Factor = 5.79	
UG4 to HY1	-2.42 -2.42		169.38 169.38	8 8.27	2E 56.936	152.180 56.936 209.116	140 0.0002	74.941 0.0 0.046		Vel = 1.01	
HY1 to UG3	-2.42 -2.42	H150	150.00 319.38	8 8.27	3E 85.404	1024.600 85.404 1110.004	140 0.0007	74.987 0.0 0.785		Vel = 1.91	
UG3 to UG2	-2.42 -2.42		0.0 319.38	8 8.27	T 55.354	47.000 55.354 102.354	140 0.0007	75.772 0.0 0.072		Vel = 1.91	
UG2			0.0 319.38					75.844		K Factor = 36.67	



HENDERSON
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HENDERSON ENGINEERS
8345 LENEXA DR. SUITE #300
LENEXA, KS 66214
913-742-500

Job Name : Bucees - BENTON AR - System 2 RA F
Building :
Location : MERCHANDISE STORAGE
System : SYSTEM 2 RA F
Contract : 2450001433
Data File : Bucees - BENTON AR - System 2 RA F.WXF

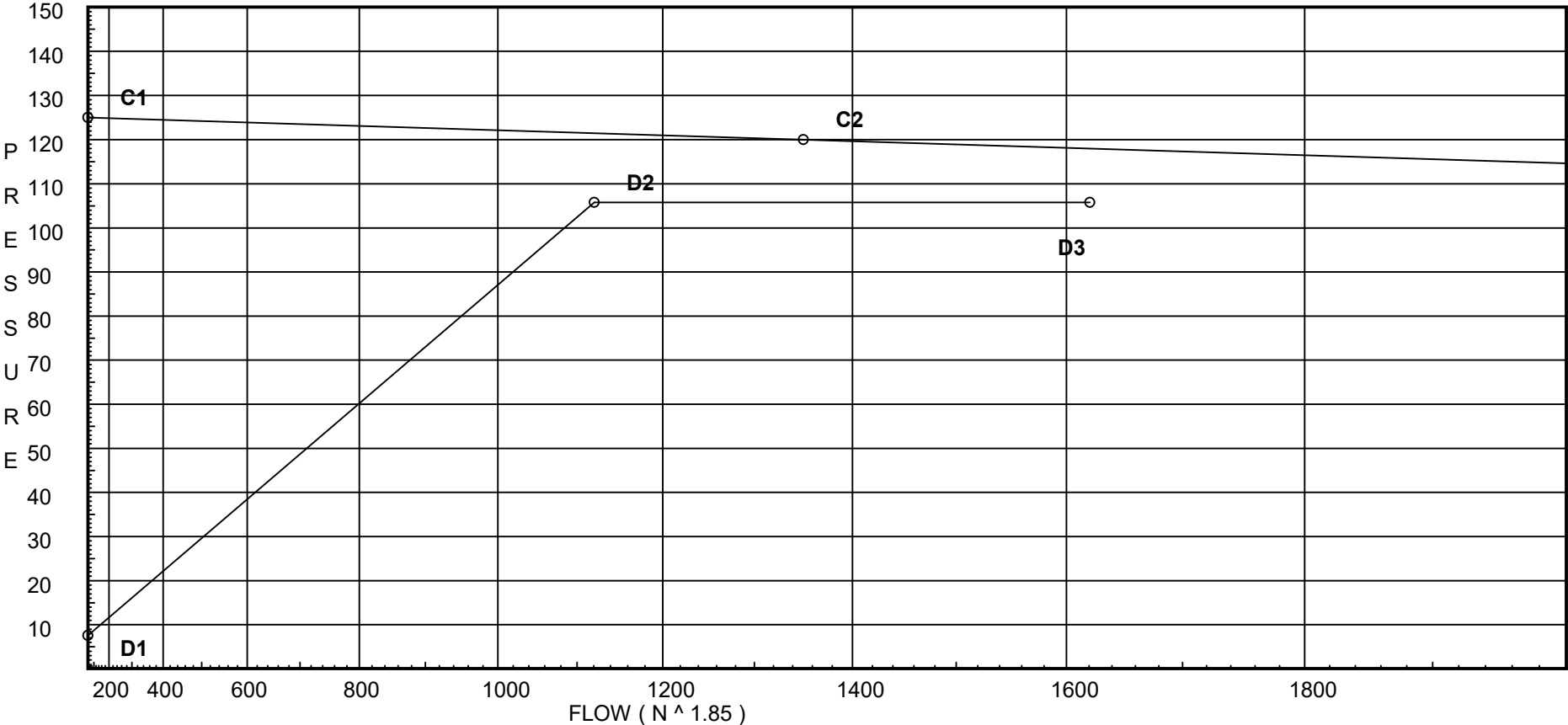
Water Supply Curve

HENDERSON ENGINEERS
Bucees - BENTON AR - System 2 RA F

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City Water Supply:
C1 - Static Pressure : 125
C2 - Residual Pressure: 120
C2 - Residual Flow : 1351

Demand:
D1 - Elevation : 7.584
D2 - System Flow : 1120.72
D2 - System Pressure : 105.787
Hose (Demand) : 500
D3 - System Demand : 1620.72
Safety Margin : 12.211



Fittings Used Summary

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Bucees - BENTON AR - System 2 RA F

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Fitting Legend																					
Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Avc	Alarm Vic 751	0	0	0	0	3	9	8	17	0	21	0	22	50	0	0	0	0	0	0	0
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																			
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.

Flow Summary - NFPA

HENDERSON ENGINEERS
Bucees - BENTON AR - System 2 RA F

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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>
SRC	125.0	120	1351.0	117.998	1620.72	105.787

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>	
F09	15.09	11.2	30.05	61.39	0.45	100
T609	16.0		43.13			
T608	16.0		43.35			
T607	16.0		44.3			
2501	16.0		47.89			
2502	16.0		52.18			
2503	16.0		54.41			
2504	16.0		56.21			
2505	16.0		57.03			
2506	16.0		57.43			
2507	16.0		57.58			
2508	16.0		57.59			
R508	22.54		57.44			
R622	22.54		67.54			
2622	16.0		73.05			
2621	16.0		73.16			
TR2	16.0		74.0			
BR2	3.0	11.2	84.16	100.0		
FLG	1.0		85.36			
UG4	-2.42		88.03			
UG2	-2.42		90.55			
UG1	-2.42		105.2			
SRC	-2.42		105.79			
F10	15.09		28.0	59.26	0.45	100
T610	16.0		43.14			
T611	16.0		43.53			
T612	16.0		44.8			
2615	16.0		58.55			
2616	16.0		59.99			
2617	16.0		63.19			
2618	16.0		64.43			
2619	16.0		65.57			
2620	16.0		66.82			
F08	15.09	11.2	30.2	61.55	0.45	100
F11	15.09	11.2	30.33	61.69	0.45	100
F07	15.09	11.2	30.88	62.23	0.45	100
F12	15.09	11.2	31.23	62.59	0.45	100
2500	16.0		47.65			
T601	16.0		44.05			
T602	16.0		43.1			
T603	16.0		42.88			
T604	16.0		42.89			

Flow Summary - NFPA

HENDERSON ENGINEERS
Bucees - BENTON AR - System 2 RA F

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NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
T605	16.0		43.3			
T606	16.0		44.58			
2614	16.0		58.44			
F03	15.09	11.2	29.87	61.22	0.45	100
F04	15.09	11.2	29.88	61.22	0.45	100
F02	15.09	11.2	30.03	61.38	0.45	100
F05	15.09	11.2	30.17	61.52	0.45	100
F01	15.09	11.2	30.7	62.06	0.45	100
F06	15.09	11.2	31.08	62.44	0.45	100
2613	16.0		58.44			
2612	16.0		58.44			
2611	16.0		58.44			
2610	16.0		58.43			
2609	16.0		58.43			
2608	16.0		58.43			
2607	16.0		58.43			
2606	16.0		58.43			
2605	16.0		58.43			
2604	16.0		58.43			
2603	16.0		58.43			
2602	16.0		58.43			
2601	16.0		58.43			
2600	16.0		58.43			
T505	16.0		58.42			
T504	16.0		58.41			
T503	16.0		58.41			
T502	16.0		58.41			
T501	16.0		58.41			
2400	16.0		58.39			
2401	16.0		58.39			
2402	16.0		58.39			
2403	16.0		58.39			
2404	16.0		58.39			
2405	16.0		58.39			
2406	16.0		58.39			
2407	16.0		58.38			
2408	16.0		58.38			
2409	16.0		58.38			
2410	16.0		58.37			
2411	16.0		58.37			
2412	16.0		58.36			
2415	16.0		58.24			
2416	16.0		58.2			
F15	15.11	11.2	31.93	63.28	0.45	100
T615	16.0		45.79			
T614	16.0		46.03			
T613	16.0		46.84			
R16	15.11	11.2	31.93	63.29	0.45	100
T616	16.0		45.8			
T617	16.0		46.23			
T618	16.0		47.6			

Flow Summary - NFPA

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Bucees - BENTON AR - System 2 RA F

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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>	
F14	15.11	11.2	32.09	63.45	0.45	100
F17	15.11	11.2	32.24	63.59	0.45	100
F13	15.11	11.2	32.67	64.02	0.45	100
F18	15.11	11.2	33.2	64.54	0.45	100
R506	22.17		56.37			
R620	22.17		62.54			
HY1	-2.42		88.07	400.0		
UG3	-2.42		90.34			
412A	16.0		58.41			
T522	16.0		58.4			
T523	16.0		58.4			
T516	16.0		58.4			
T517	16.0		58.41			
T518	16.0		58.41			
T519	16.0		58.41			
T520	16.0		58.41			
T521	16.0		58.42			
T511	16.0		58.4			
T512	16.0		58.41			
T513	16.0		58.41			
T514	16.0		58.41			
T515	16.0		58.42			
T506	16.0		58.41			
T507	16.0		58.41			
T508	16.0		58.41			
T509	16.0		58.41			
T510	16.0		58.42			

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS

Bucees - BENTON AR - System 2 RA F

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
F09 to T609	15.09 16	11.20	61.39 61.39	1 1.049	2E T 4.0 5.0	4.000 9.000 13.000	120	30.049 -0.394 13.473		Vel = 22.79	
T609 to T608	16 16		-10.44 50.95	2 2.157		10.000 10.000	120	43.128 0.0 0.219		Vel = 4.47	
T608 to T607	16 16		61.55 112.5	2 2.157		10.000 10.000	120	43.347 0.0 0.949		Vel = 9.88	
T607 to 2501	16 16		62.24 174.74	2 2.157	T 12.307	4.460 12.307 16.767	120	44.296 0.0 3.595		Vel = 15.34	
2501 to 2502	16 16		174.78 349.52	3 3.26	2E 18.815	22.600 18.815 41.415	120	47.891 0.0 4.284		Vel = 13.43	
2502 to 2503	16 16		180.72 530.24	3 3.26		10.000 10.000	120	52.175 0.0 2.237		Vel = 20.38	
2503 to 2504	16 16		-98.15 432.09	3 3.26		11.750 11.750	120	54.412 0.0 1.799		Vel = 16.61	
2504 to 2505	16 16		-94.77 337.32	3 3.26		8.450 8.450	120	56.211 0.0 0.819		Vel = 12.97	
2505 to 2506	16 16		-96.69 240.63	3 3.26		7.650 7.650	120	57.030 0.0 0.396		Vel = 9.25	
2506 to 2507	16 16		-92.00 148.63	3 3.26		7.140 7.140	120	57.426 0.0 0.152		Vel = 5.71	
2507 to 2508	16 16		-28.59 120.04	3 3.26		1.110 1.110	120	57.578 0.0 0.016		Vel = 4.61	
2508 to R508	16 22.54		0.0 120.04	2 2.157	E T 6.153 12.307	6.540 18.460 25.000	120	57.594 -2.832 2.676		Vel = 10.54	
R508 to R622	22.54 22.54		0.0 120.04	2 2.157		94.370 94.370	120	57.438 0.0 10.101		Vel = 10.54	
R622 to 2622	22.54 16		0.0 120.04	2 2.157	E T 6.153 12.307	6.540 18.460 25.000	120	67.539 2.832 2.677		Vel = 10.54	
2622 to 2621	16 16		0.0 120.04	4 4.26	T 26.334	2.390 26.334 28.724	120	73.048 0.0 0.112		Vel = 2.70	
2621 to TR2	16 16		1000.68 1120.72	6 6.357		24.240 24.240	120	73.160 0.0 0.837		Vel = 11.33	
TR2 to BR2	16 3		0.0 1120.72	6 6.357	E Fsp Avc 17.603 0.0 27.661	6.830 95.557 102.387	120	73.997 6.630 3.537		** Fixed Loss = 1 Vel = 11.33	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS

Bucees - BENTON AR - System 2 RA F

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
					B T	12.573 37.72						
BR2 to FLG	3 1	H100	100.00 1220.72	8 8.249	E	21.141	7.600 21.141 28.741	120 0.0114	84.164 0.866 0.328		Vel = 7.33	
FLG to UG4	1 -2.42		0.0 1220.72	8 8.27	E T	28.468 55.354	57.120 83.822 140.942	140 0.0085	85.358 1.481 1.191		Vel = 7.29	
UG4 to UG2	-2.42 -2.42		-167.06 1053.66	8 8.27			392.280 392.280	140 0.0064	88.030 0.0 2.524		Vel = 6.29	
UG2 to UG1	-2.42 -2.42		567.06 1620.72	8 8.27	8E T	227.744 55.354	462.900 283.098 745.998	140 0.0143	90.554 4.000 10.647		* * Fixed Loss = 4 Vel = 9.68	
UG1 to SRC	-2.42 -2.42		0.0 1620.72	12 12.34			287.990 287.990	140 0.0020	105.201 0.0 0.586		Vel = 4.35	
SRC			0.0 1620.72						105.787		K Factor = 157.58	
F10 to T610	15.09 16	11.20	59.26 59.26	1 1.049	2E T	4.0 5.0	7.000 9.000 16.000	120 0.9708	28.000 -0.394 15.533		Vel = 22.00	
T610 to T611	16 16		10.45 69.71	2 2.157			10.000 10.000	120 0.0392	43.139 0.0 0.392		Vel = 6.12	
T611 to T612	16 16		61.68 131.39	2 2.157			10.000 10.000	120 0.1265	43.531 0.0 1.265		Vel = 11.54	
T612 to 2615	16 16		62.59 193.98	2 2.157	2E T	12.307 12.307	28.250 24.614 52.864	120 0.2601	44.796 0.0 13.751		Vel = 17.03	
2615 to 2616	16 16		223.64 417.62	4 4.26	2E	26.334	10.560 26.334 36.894	120 0.0391	58.547 0.0 1.441		Vel = 9.40	
2616 to 2617	16 16		201.45 619.07	4 4.26	2E	26.334	13.170 26.334 39.504	120 0.0810	59.988 0.0 3.198		Vel = 13.94	
2617 to 2618	16 16		98.15 717.22	4 4.26			11.750 11.750	120 0.1062	63.186 0.0 1.248		Vel = 16.14	
2618 to 2619	16 16		94.76 811.98	4 4.26			8.460 8.460	120 0.1337	64.434 0.0 1.131		Vel = 18.28	
2619 to 2620	16 16		96.70 908.68	4 4.26			7.650 7.650	120 0.1647	65.565 0.0 1.260		Vel = 20.45	
2620 to 2621	16 16		92.00 1000.68	4 4.26	T	26.334	5.860 26.334 32.194	120 0.1968	66.825 0.0 6.335		Vel = 22.53	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 2 RA F

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
2621			0.0 1000.68					73.160		K Factor = 116.99	
F08 to T608	15.09 16	11.20	61.55 61.55	1 1.049	2E T 4.0 5.0	4.000 9.000 13.000	120 1.0413	30.204 -0.394 13.537		Vel = 22.85	
T608			0.0 61.55					43.347		K Factor = 9.35	
F11 to T611	15.09 16	11.20	61.69 61.69	1 1.049	2E T 4.0 5.0	4.000 9.000 13.000	120 1.0455	30.334 -0.394 13.591		Vel = 22.90	
T611			0.0 61.69					43.531		K Factor = 9.35	
F07 to T607	15.09 16	11.20	62.23 62.23	1 1.049	2E T 4.0 5.0	4.000 9.000 13.000	120 1.0627	30.875 -0.394 13.815		Vel = 23.10	
T607			0.0 62.23					44.296		K Factor = 9.35	
F12 to T612	15.09 16	11.20	62.59 62.59	1 1.049	2E T 4.0 5.0	4.000 9.000 13.000	120 1.0739	31.229 -0.394 13.961		Vel = 23.24	
T612			0.0 62.59					44.796		K Factor = 9.35	
T609 to T610	16 16		10.44 10.44	2 2.157		10.000 10.000	120 0.0011	43.128 0.011		Vel = 0.92	
T610			0.0 10.44					43.139		K Factor = 1.59	
2501 to 2500	16 16		-174.78 -174.78	3 3.26		8.390 8.390	120 -0.0287	47.891 0.0 -0.241		Vel = 6.72	
2500 to T601	16 16		0.0 -174.78	2 2.157	T 12.307	4.460 12.307 16.767	120 -0.2145	47.650 0.0 -3.596		Vel = 15.35	
T601 to T602	16 16		62.06 -112.72	2 2.157		10.000 10.000	120 -0.0953	44.054 0.0 -0.953		Vel = 9.90	
T602 to T603	16 16		61.38 -51.34	2 2.157		10.000 10.000	120 -0.0222	43.101 0.0 -0.222		Vel = 4.51	
T603 to T604	16 16		61.21 9.87	2 2.157		10.000 10.000	120 0.0011	42.879 0.0 0.011		Vel = 0.87	
T604 to T605	16 16		61.23 71.1	2 2.157		10.000 10.000	120 0.0406	42.890 0.0 0.406		Vel = 6.24	
T605 to T606	16 16		61.51 132.61	2 2.157		10.000 10.000	120 0.1287	43.296 0.0 1.287		Vel = 11.64	

Final Calculations : Hazen-Williams

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Bucees - BENTON AR - System 2 RA F

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
T606 to 2614	16 16		62.44 195.05	2 2.157	2E T 12.307 12.307	28.130 24.614 52.744	120 0.2628	44.583 0.0 13.859		Vel = 17.13	
2614 to 2615	16 16		28.59 223.64	4 4.26		8.520 8.520	120 0.0123	58.442 0.0 0.105		Vel = 5.03	
2615			0.0 223.64					58.547		K Factor = 29.23	
F03 to T603	15.09 16	11.20	61.22 61.22	1 1.049	2E T 4.0 5.0	4.000 9.000 13.000	120 1.0308	29.873 -0.394 13.400		Vel = 22.73	
T603			0.0 61.22					42.879		K Factor = 9.35	
F04 to T604	15.09 16	11.20	61.22 61.22	1 1.049	2E T 4.0 5.0	4.000 9.000 13.000	120 1.0311	29.880 -0.394 13.404		Vel = 22.73	
T604			0.0 61.22					42.890		K Factor = 9.35	
F02 to T602	15.09 16	11.20	61.38 61.38	1 1.049	2E T 4.0 5.0	4.000 9.000 13.000	120 1.0358	30.030 -0.394 13.465		Vel = 22.79	
T602			0.0 61.38					43.101		K Factor = 9.35	
F05 to T605	15.09 16	11.20	61.52 61.52	1 1.049	2E T 4.0 5.0	4.000 9.000 13.000	120 1.0402	30.168 -0.394 13.522		Vel = 22.84	
T605			0.0 61.52					43.296		K Factor = 9.35	
F01 to T601	15.09 16	11.20	62.06 62.06	1 1.049	2E T 4.0 5.0	4.000 9.000 13.000	120 1.0572	30.704 -0.394 13.744		Vel = 23.04	
T601			0.0 62.06					44.054		K Factor = 9.35	
F06 to T606	15.09 16	11.20	62.44 62.44	1 1.049	2E T 4.0 5.0	4.000 9.000 13.000	120 1.0692	31.078 -0.394 13.899		Vel = 23.18	
T606			0.0 62.44					44.583		K Factor = 9.35	
2614 to 2613	16 16		-28.59 -28.59	4 4.26		9.240 9.240	120 -0.0002	58.442 0.0 -0.002		Vel = 0.64	
2613 to 2612	16 16		1.82 -26.77	4 4.26		8.000 8.000	120 -0.0002	58.440 0.0 -0.002		Vel = 0.60	
2612 to 2611	16 16		1.90 -24.87	4 4.26		6.140 6.140	120 -0.0003	58.438 0.0 -0.002		Vel = 0.56	
2611 to 2610	16 16		2.56 -22.31	4 4.26		9.920 9.920	120 -0.0001	58.436 0.0 -0.001		Vel = 0.50	

Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
2610 to 2609	16 16		2.39 -19.92	4 4.26		8.000 8.000	120 -0.0001	58.435 0.0 -0.001		Vel = 0.45	
2609 to 2608	16 16		2.27 -17.65	4 4.26		8.000 8.000	120 -0.0001	58.434 0.0 -0.001		Vel = 0.40	
2608 to 2607	16 16		2.19 -15.46	4 4.26		11.600 11.600	120 -0.0001	58.433 0.0 -0.001		Vel = 0.35	
2607 to 2606	16 16		2.07 -13.39	4 4.26		8.000 8.000	120 -0.0001	58.432 0.0 -0.001		Vel = 0.30	
2606 to 2605	16 16		2.01 -11.38	4 4.26		10.000 10.000	120 -0.0001	58.431 0.0 -0.001		Vel = 0.26	
2605 to 2604	16 16		1.95 -9.43	4 4.26		10.390 10.390	120 0	58.430 0.0 0.0		Vel = 0.21	
2604 to 2603	16 16		1.90 -7.53	4 4.26		10.330 10.330	120 0	58.430 0.0 0.0		Vel = 0.17	
2603 to 2602	16 16		1.58 -5.95	4 4.26	2E 26.334	35.410 26.334 61.744	120 0	58.430 0.0 -0.001		Vel = 0.13	
2602 to 2601	16 16		1.99 -3.96	4 4.26		10.000 10.000	120 0	58.429 0.0 0.0		Vel = 0.09	
2601 to 2600	16 16		1.98 -1.98	4 4.26		8.500 8.500	120 0	58.429 0.0 0.0		Vel = 0.04	
2600 to T505	16 16		0.0 -1.98	1.5 1.61	T 8.0	50.620 8.000 58.620	120 -0.0002	58.429 0.0 -0.013		Vel = 0.31	
T505 to T504	16 16		0.0 -1.98	1.5 1.61		12.000 12.000	120 -0.0002	58.416 0.0 -0.003		Vel = 0.31	
T504 to T503	16 16		0.0 -1.98	1.5 1.61		12.000 12.000	120 -0.0002	58.413 0.0 -0.003		Vel = 0.31	
T503 to T502	16 16		0.0 -1.98	1.5 1.61		12.000 12.000	120 -0.0002	58.410 0.0 -0.002		Vel = 0.31	
T502 to T501	16 16		0.0 -1.98	1.5 1.61		12.000 12.000	120 -0.0002	58.408 0.0 -0.003		Vel = 0.31	
T501 to 2400	16 16		0.0 -1.98	1.5 1.61	T 8.0	51.180 8.000 59.180	120 -0.0002	58.405 0.0 -0.013		Vel = 0.31	
2400 to 2401	16 16		0.0 -1.98	3 3.26		8.500 8.500	120 0	58.392 0.0 0.0		Vel = 0.08	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS

Bucees - BENTON AR - System 2 RA F

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
2401 to 2402	16 16		-1.98 -3.96	3 3.26		10.000 10.000	120 0	58.392 0.0			
2402 to 2403	16 16		-1.99 -5.95	3 3.26		9.670 9.670	120 -0.0001	58.392 0.0		Vel = 0.15	
2403 to 2404	16 16		-1.58 -7.53	3 3.26		10.330 10.330	120 -0.0001	58.391 0.0		Vel = 0.23	
2404 to 2405	16 16		-1.90 -9.43	3 3.26		10.400 10.400	120 -0.0001	58.390 0.0		Vel = 0.29	
2405 to 2406	16 16		-1.95 -11.38	3 3.26		10.000 10.000	120 -0.0002	58.389 0.0		Vel = 0.36	
2406 to 2407	16 16		-2.01 -13.39	3 3.26		8.000 8.000	120 -0.0002	58.387 0.0		Vel = 0.44	
2407 to 2408	16 16		-2.07 -15.46	3 3.26		11.600 11.600	120 -0.0003	58.385 0.0		Vel = 0.51	
2408 to 2409	16 16		-2.19 -17.65	3 3.26		8.000 8.000	120 -0.0004	58.381 0.0		Vel = 0.59	
2409 to 2410	16 16		-2.27 -19.92	3 3.26		8.000 8.000	120 -0.0005	58.378 0.0		Vel = 0.68	
2410 to 2411	16 16		-2.39 -22.31	3 3.26		9.920 9.920	120 -0.0006	58.374 0.0		Vel = 0.77	
2411 to 2412	16 16		-2.56 -24.87	3 3.26		6.140 6.140	120 -0.0008	58.368 0.0		Vel = 0.86	
2412 to 2415	16 16		-3.72 -28.59	3 3.26	2E	18.815 117.845	120 -0.0010	58.363 0.0		Vel = 0.96	
2415 to 2416	16 16		0.0 -28.59	3 3.26	2E	18.815 39.125	120 -0.0010	58.244 0.0		Vel = 1.10	
2416 to 2507	16 16		0.0 -28.59	2 2.157	2T	24.613 83.183	120 -0.0075	58.205 0.0		Vel = 1.10	
2507			0.0 -28.59					57.578		Vel = 2.51	
F15 to T615	15.11 16	11.20	63.28 63.28	1 1.049	2E T	4.0 5.0	120 1.0961	31.926 -0.385		K Factor = -3.77	
T615 to T614	16 16		-10.02 53.26	2 2.157		10.000 10.000	120 0.0238	45.790 0.0		Vel = 23.49	
								0.238		Vel = 4.68	

Final Calculations : Hazen-Williams

HENDERSON ENGINEERS
Bucees - BENTON AR - System 2 RA F

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
T614 to T613	16 16		63.45 116.71	2 2.157			8.000 8.000	120 0.1016	46.028 0.0 0.813		Vel = 10.25	
T613 to 2502	16 16		64.01 180.72	2 2.157	T	12.307	11.070 12.307 23.377	120 0.2282	46.841 0.0 5.334		Vel = 15.87	
2502			0.0 180.72						52.175		K Factor = 25.02	
R16 to T616	15.11 16	11.20	63.29 63.29	1 1.049	2E T	4.0 5.0	4.000 9.000 13.000	120 1.0963	31.934 -0.385 14.252		Vel = 23.49	
T616 to T617	16 16		10.03 73.32	2 2.157			10.000 10.000	120 0.0430	45.801 0.0 0.430		Vel = 6.44	
T617 to T618	16 16		63.59 136.91	2 2.157			10.000 10.000	120 0.1365	46.231 0.0 1.365		Vel = 12.02	
T618 to 2616	16 16		64.54 201.45	2 2.157	T	12.307	32.120 12.307 44.427	120 0.2789	47.596 0.0 12.392		Vel = 17.69	
2616			0.0 201.45						59.988		K Factor = 26.01	
F14 to T614	15.11 16	11.20	63.45 63.45	1 1.049	2E T	4.0 5.0	4.000 9.000 13.000	120 1.1015	32.094 -0.385 14.319		Vel = 23.55	
T614			0.0 63.45						46.028		K Factor = 9.35	
F17 to T617	15.11 16	11.20	63.59 63.59	1 1.049	2E T	4.0 5.0	4.000 9.000 13.000	120 1.1060	32.238 -0.385 14.378		Vel = 23.61	
T617			0.0 63.59						46.231		K Factor = 9.35	
F13 to T613	15.11 16	11.20	64.02 64.02	1 1.049	2E T	4.0 5.0	4.000 9.000 13.000	120 1.1197	32.670 -0.385 14.556		Vel = 23.77	
T613			0.0 64.02						46.841		K Factor = 9.35	
F18 to T618	15.11 16	11.20	64.54 64.54	1 1.049	2E T	4.0 5.0	4.000 9.000 13.000	120 1.1366	33.205 -0.385 14.776		Vel = 23.96	
T618			0.0 64.54						47.596		K Factor = 9.35	
T615 to T616	16 16		10.03 10.03	2 2.157			10.000 10.000	120 0.0011	45.790 0.0 0.011		Vel = 0.88	
T616			0.0 10.03						45.801		K Factor = 1.48	
2503 to 2617	16 16		98.15 98.15	2 2.157	2T	24.613	94.350 24.613 118.963	120 0.0738	54.412 0.0 8.774		Vel = 8.62	

Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
2617			0.0 98.15					63.186		K Factor = 12.35	
2504 to 2618	16 16		94.77 94.77	2 2.157	2T 24.613	94.350 24.613 118.963	120 0.0691	56.211 0.0 8.223		Vel = 8.32	
2618			0.0 94.77					64.434		K Factor = 11.81	
2505 to 2619	16 16		96.69 96.69	2 2.157	2T 24.613	94.360 24.613 118.973	120 0.0717	57.030 0.0 8.535		Vel = 8.49	
2619			0.0 96.69					65.565		K Factor = 11.94	
2506 to R506	16 22.17		92.00 92.0	2 2.157	E T 6.153 12.307	6.170 18.460 24.630	120 0.0654	57.426 -2.672 1.612		Vel = 8.08	
R506 to R620	22.17 22.17		0.0 92.0	2 2.157		94.370 94.370	120 0.0654	56.366 0.0 6.175		Vel = 8.08	
R620 to 2620	22.17 16		0.0 92.0	2 2.157	E T 6.153 12.307	6.170 18.460 24.630	120 0.0654	62.541 2.672 1.612		Vel = 8.08	
2620			0.0 92.00					66.825		K Factor = 11.25	
UG4 to HY1	-2.42 -2.42		167.06 167.06	8 8.27	2E	56.936 56.936 209.116	140 0.0002	88.030 0.0 0.044		Vel = 1.00	
HY1 to UG3	-2.42 -2.42	H400	400.00 567.06	8 8.27	3E	85.404 1024.600 85.404 1110.004	140 0.0020	88.074 0.0 2.270		Vel = 3.39	
UG3 to UG2	-2.42 -2.42		0.0 567.06	8 8.27	T	55.354 47.000 55.354 102.354	140 0.0021	90.344 0.0 0.210		Vel = 3.39	
UG2			0.0 567.06					90.554		K Factor = 59.59	
2412 to 412A	16 16		3.72 3.72	1.5 1.61	T	8.0 60.890 8.000 68.890	120 0.0007	58.363 0.0 0.049		Vel = 0.59	
412A to 2613	16 16		-1.90 1.82	1.5 1.61	2T E 16.0 4.0	122.650 20.000 142.650	120 0.0002	58.412 0.0 0.028		Vel = 0.29	
2613			0.0 1.82					58.440		K Factor = 0.24	
412A to 2612	16 16		1.90 1.9	1.5 1.61	T	8.0 114.650 8.000 122.650	120 0.0002	58.412 0.0 0.026		Vel = 0.30	
2612			0.0 1.90					58.438		K Factor = 0.25	
2411 to 2611	16 16		2.56 2.56	1.5 1.61	2T	16.0 175.540 16.000 191.540	120 0.0004	58.368 0.0 0.068		Vel = 0.40	

Final Calculations : Hazen-Williams

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Bucees - BENTON AR - System 2 RA F

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
2611			0.0 2.56					58.436		K Factor = 0.33	
2410 to 2610	16 16		2.39 2.39	1.5 1.61	2T 16.0	175.550 16.000 191.550	120 0.0003	58.374 0.0 0.061		Vel = 0.38	
2610			0.0 2.39					58.435		K Factor = 0.31	
2409 to 2609	16 16		2.28 2.28	1.5 1.61	2T 16.0	175.550 16.000 191.550	120 0.0003	58.378 0.0 0.056		Vel = 0.36	
2609			0.0 2.28					58.434		K Factor = 0.30	
2408 to 2608	16 16		2.18 2.18	1.5 1.61	2T 16.0	175.550 16.000 191.550	120 0.0003	58.381 0.0 0.052		Vel = 0.34	
2608			0.0 2.18					58.433		K Factor = 0.29	
2407 to 2607	16 16		2.07 2.07	1.5 1.61	2T 16.0	175.550 16.000 191.550	120 0.0002	58.385 0.0 0.047		Vel = 0.33	
2607			0.0 2.07					58.432		K Factor = 0.27	
2406 to 2606	16 16		2.01 2.01	1.5 1.61	2T 16.0	175.550 16.000 191.550	120 0.0002	58.387 0.0 0.044		Vel = 0.32	
2606			0.0 2.01					58.431		K Factor = 0.26	
2405 to 2605	16 16		1.95 1.95	1.5 1.61	2T 16.0	175.550 16.000 191.550	120 0.0002	58.389 0.0 0.041		Vel = 0.31	
2605			0.0 1.95					58.430		K Factor = 0.26	
2404 to T522	16 16		1.91 1.91	1.5 1.61	T 8.0	51.180 8.000 59.180	120 0.0002	58.390 0.0 0.012		Vel = 0.30	
T522 to T523	16 16		0.0 1.91	1.5 1.61		12.000 12.000	120 0.0002	58.402 0.0 0.003		Vel = 0.30	
T523 to 2604	16 16		0.0 1.91	1.5 1.61	T 8.0	112.370 8.000 120.370	120 0.0002	58.405 0.0 0.025		Vel = 0.30	
2604			0.0 1.91					58.430		K Factor = 0.25	
2403 to T516	16 16		1.58 1.58	1.5 1.61	T 4E 16.0	53.220 24.000 77.220	120 0.0001	58.391 0.0 0.011		Vel = 0.25	
T516 to T517	16 16		0.0 1.58	1.5 1.61	4E 16.0	9.970 16.000 25.970	120 0.0002	58.402 0.0 0.004		Vel = 0.25	

Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
T517 to T518	16 16		0.0 1.58	1.5 1.61		12.000 12.000	120 0.0002	58.406 0.0 0.002		Vel = 0.25	
T518 to T519	16 16		0.0 1.58	1.5 1.61		12.000 12.000	120 0.0002	58.408 0.0 0.002		Vel = 0.25	
T519 to T520	16 16		0.0 1.58	1.5 1.61		10.000 10.000	120 0.0001	58.410 0.0 0.001		Vel = 0.25	
T520 to T521	16 16		0.0 1.58	1.5 1.61	4E 16.0	9.990 16.000 25.990	120 0.0002	58.411 0.0 0.004		Vel = 0.25	
T521 to 2603	16 16		0.0 1.58	1.5 1.61	4E T 8.0	76.360 24.000 100.360	120 0.0001	58.415 0.0 0.015		Vel = 0.25	
2603			0.0 1.58					58.430		K Factor = 0.21	
2402 to T511	16 16		1.99 1.99	1.5 1.61	T 8.0	51.180 8.000 59.180	120 0.0002	58.392 0.0 0.013		Vel = 0.31	
T511 to T512	16 16		0.0 1.99	1.5 1.61		12.000 12.000	120 0.0002	58.405 0.0 0.003		Vel = 0.31	
T512 to T513	16 16		0.0 1.99	1.5 1.61		12.000 12.000	120 0.0002	58.408 0.0 0.002		Vel = 0.31	
T513 to T514	16 16		0.0 1.99	1.5 1.61		12.000 12.000	120 0.0002	58.410 0.0 0.003		Vel = 0.31	
T514 to T515	16 16		0.0 1.99	1.5 1.61		12.000 12.000	120 0.0002	58.413 0.0 0.003		Vel = 0.31	
T515 to 2602	16 16		0.0 1.99	1.5 1.61	T 8.0	50.620 8.000 58.620	120 0.0002	58.416 0.0 0.013		Vel = 0.31	
2602			0.0 1.99					58.429		K Factor = 0.26	
2401 to T506	16 16		1.98 1.98	1.5 1.61	T 8.0	51.180 8.000 59.180	120 0.0002	58.392 0.0 0.013		Vel = 0.31	
T506 to T507	16 16		0.0 1.98	1.5 1.61		12.000 12.000	120 0.0002	58.405 0.0 0.003		Vel = 0.31	
T507 to T508	16 16		0.0 1.98	1.5 1.61		12.000 12.000	120 0.0002	58.408 0.0 0.002		Vel = 0.31	
T508 to T509	16 16		0.0 1.98	1.5 1.61		12.000 12.000	120 0.0002	58.410 0.0 0.003		Vel = 0.31	

Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
T509 to T510	16 16		0.0 1.98	1.5 1.61			12.000 12.000	120 0.0002	58.413 0.0 0.003		Vel = 0.31	
T510 to 2601	16 16		0.0 1.98	1.5 1.61	T	8.0	50.620 8.000 58.620	120 0.0002	58.416 0.0 0.013		Vel = 0.31	
2601			0.0 1.98						58.429		K Factor = 0.26	



HENDERSON ENGINEERS

HENDERSON ENGINEERS
8345 LENEXA DR. SUITE #300
LENEXA, KS 66214
913-742-500

Job Name : Bucees - BENTON AR - System 1 RA G
Building :
Location : UNDER TH ECHILLE RPLATFORM
System : SYSTEM 1 RA G
Contract : 2450001433
Data File : Bucees - BENTON AR - System 1 RA G.WXF

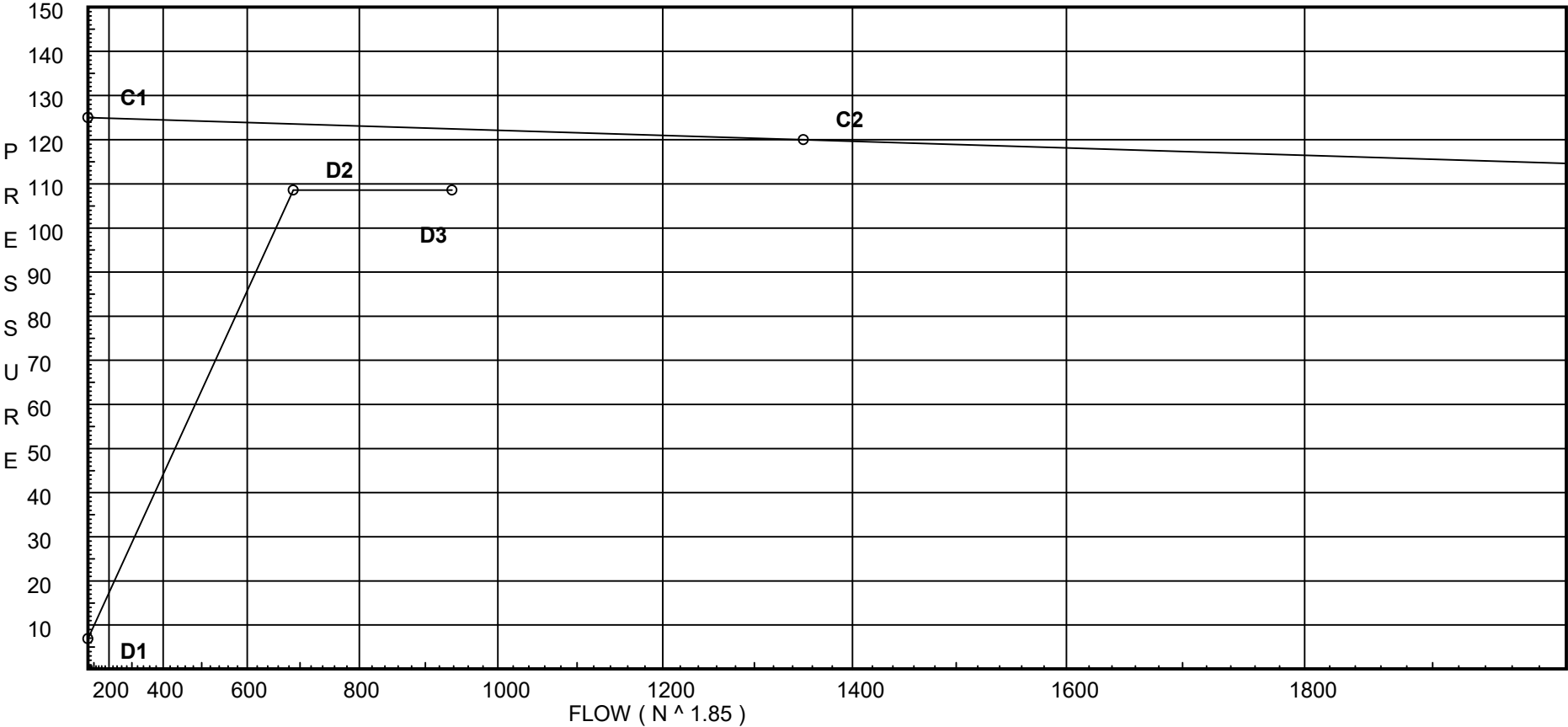
Water Supply Curve

HENDERSON ENGINEERS
Bucees - BENTON AR - System 1 RA G

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City Water Supply:
C1 - Static Pressure : 125
C2 - Residual Pressure: 120
C2 - Residual Flow : 1351

Demand:
D1 - Elevation : 6.930
D2 - System Flow : 687.715
D2 - System Pressure : 108.593
Hose (Demand) : 250
D3 - System Demand : 937.715
Safety Margin : 13.863



Fittings Used Summary

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Bucees - BENTON AR - System 1 RA G

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Fitting Legend																					
Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Avc	Alarm Vic 751	0	0	0	0	3	9	8	17	0	21	0	22	50	0	0	0	0	0	0	0
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
Dvk	Dry Viking F1								3		5		49								
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																			
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.

Flow Summary - NFPA

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Bucees - BENTON AR - System 1 RA G

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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>
SRC	125.0	120	1351.0	122.456	937.72	108.593

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>	
G04	13.58	25.2	20.0	112.7	0.01	100
G05	13.54	25.2	20.36	113.72	0.01	100
G06	13.5	25.2	21.66	117.27	0.01	100
1402	11.66		36.73			
1401	11.66		60.59			
DT1	20.67		64.4			
DBR	15.26		70.51			
DRE	15.26		73.3			
DRF	17.58		72.52			
1130	17.58		75.06			
1129	17.58		75.12			
1128	17.58		75.8			
1127	17.58		76.2			
1126	17.58		77.0			
123A	17.58		78.01			
1123	17.58		78.07			
1122	17.58		79.01			
1121	17.58		79.02			
1120	17.58		79.21			
1119	17.58		79.22			
1118	17.58		79.37			
1117	17.58		79.38			
1116	17.58		79.44			
1115	17.58		79.51			
1114	17.58		79.52			
1113	17.58		79.56			
1112	17.58		79.58			
1111	14.58		80.94			
1110	14.58		81.05			
1109	14.58		81.1			
1108	14.58		81.15			
1107	14.58		81.2			
1106	14.58		81.22			
1105	14.58		81.25			
1104	14.58		81.26			
1103	14.58		81.31			
1102	14.58		81.32			
1101	14.58		81.32			
1100	14.58		81.32			
TA01	14.58		81.48			
TA02	14.58		81.5			
TA03	14.58		81.53			

Flow Summary - NFPA

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Bucees - BENTON AR - System 1 RA G

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NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
TA04	14.58		81.56			
TA05	14.58		81.59			
TA06	14.58		81.61			
1300	14.58		81.75			
1301	14.58		81.75			
1302	14.58		81.75			
1303	14.58		81.76			
1304	14.58		81.77			
1305	14.58		81.78			
1306	14.58		81.8			
1307	14.58		81.83			
1308	14.58		81.88			
1309	14.58		81.93			
1310	14.58		81.98			
1311	14.58		82.43			
1312	17.58		81.93			
1313	17.58		81.95			
1314	17.58		82.05			
1315	17.58		82.11			
1316	17.58		82.24			
1317	17.58		82.44			
1318	17.58		82.6			
1319	17.58		82.95			
1320	17.58		83.43			
1321	17.58		83.9			
321T	17.58		85.49			
1322	17.58		85.58			
TR1	17.58		87.78			
BR1	3.0		96.55	100.0		
BR2	3.0		96.56			
FLG	1.0		97.57			
UG4	-2.42		99.58			
UG2	-2.42		100.51			
UG1	-2.42		108.38			
SRC	-2.42		108.59			
1403	11.66		35.52			
G03	13.48	25.2	21.72	117.46	0.01	100
G02	13.52	25.2	20.4	113.82	0.01	100
G01	13.57	25.2	20.02	112.75	0.01	100
128A	17.58		78.88			
TB13	17.58		79.71			
TB14	17.58		79.85			
TB15	17.58		79.98			
TB16	17.58		80.12			
TB17	17.58		80.26			
TB18	17.58		80.39			
TB07	17.58		79.77			
TB08	17.58		79.9			
TB09	17.58		80.03			
TB10	17.58		80.17			
TB11	17.58		80.3			

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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>
TB12	17.58		80.43		
TB01	17.58		79.64		
TB02	17.58		79.69		
TB03	17.58		79.74		
TB04	17.58		79.79		
TB05	17.58		79.84		
TB06	17.58		79.88		
115A	17.58		79.99		
T311	17.58		80.99		
TA19	14.58		81.49		
TA20	14.58		81.51		
TA21	14.58		81.54		
TA22	14.58		81.56		
TA23	14.58		81.59		
TA24	14.58		81.62		
TA13	14.58		81.48		
TA14	14.58		81.5		
TA15	14.58		81.53		
TA16	14.58		81.56		
TA17	14.58		81.59		
TA18	14.58		81.62		
TA07	14.58		81.48		
TA08	14.58		81.5		
TA09	14.58		81.53		
TA10	14.58		81.56		
TA11	14.58		81.59		
TA12	14.58		81.61		
HY1	-2.42		99.63	150.0	
UG3	-2.42		100.44		

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
G04 to G05	13.58 13.54	25.20	112.70 112.7	2.5 2.635		9.670 9.670	120 0.0360	20.000 0.017 0.348		Vel = 6.63	
G05 to G06	13.54 13.5	25.20	113.72 226.42	2.5 2.635		9.750 9.750	120 0.1307	20.365 0.017 1.274		Vel = 13.32	
G06 to 1402	13.5 11.66	25.20	117.27 343.69	2.5 2.635	3E T 24.711 16.474	9.330 41.185 50.515	120 0.2827	21.656 0.797 14.281		Vel = 20.22	
1402 to 1401	11.66 11.66		344.03 687.72	3 3.26	T 20.159	45.770 20.159 65.929	120 0.3618	36.734 0.0 23.854		Vel = 26.43	
1401 to DT1	11.66 20.67		0.0 687.72	4 4.26	3E 39.501	38.990 39.501 78.491	120 0.0983	60.588 -3.902 7.717		Vel = 15.48	
DT1 to DBR	20.67 15.26		0.0 687.72	4 4.26	T Dvk 26.334 6.584	5.410 32.918 38.328	120 0.0983	64.403 2.343 3.769		Vel = 15.48	
DBR to DRE	15.26 15.26		0.0 687.72	4 4.26	2E Eq 26.334 1.317	0.670 27.651 28.321	120 0.0983	70.515 0.0 2.784		Vel = 15.48	
DRE to DRF	15.26 17.58		0.0 687.72	4 4.26		2.320 2.320	120 0.0987	73.299 -1.005 0.229		Vel = 15.48	
DRF to 1130	17.58 17.58		0.0 687.72	4 4.26	E 13.167	12.670 13.167 25.837	120 0.0983	72.523 0.0 2.540		Vel = 15.48	
1130 to 1129	17.58 17.58		-58.53 629.19	4 4.26		0.670 0.670	120 0.0836	75.063 0.0 0.056		Vel = 14.16	
1129 to 1128	17.58 17.58		-67.09 562.1	4 4.26		10.000 10.000	120 0.0677	75.119 0.0 0.677		Vel = 12.65	
1128 to 1127	17.58 17.58		-79.85 482.25	4 4.26		8.000 8.000	120 0.0510	75.796 0.0 0.408		Vel = 10.86	
1127 to 1126	17.58 17.58		-78.44 403.81	4 4.26	E 13.167	8.590 13.167 21.757	120 0.0367	76.204 0.0 0.798		Vel = 9.09	
1126 to 123A	17.58 17.58		-67.33 336.48	4 4.26		38.300 38.300	120 0.0262	77.002 0.0 1.004		Vel = 7.57	
123A to 1123	17.58 17.58		0.0 336.48	4 4.26		2.530 2.530	120 0.0261	78.006 0.0 0.066		Vel = 7.57	
1123 to 1122	17.58 17.58		0.0 336.48	4 4.26	T 26.334	9.430 26.334 35.764	120 0.0262	78.072 0.0 0.937		Vel = 7.57	
1122 to 1121	17.58 17.58		0.0 336.48	4 4.26		0.560 0.560	120 0.0268	79.009 0.0 0.015		Vel = 7.57	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1121 to 1120	17.58 17.58		-46.68 289.8	4 4.26		9.440 9.440	120 0.0199	79.024 0.0 0.188		Vel = 6.52	
1120 to 1119	17.58 17.58		-40.07 249.73	4 4.26		0.750 0.750	120 0.0147	79.212 0.0 0.011		Vel = 5.62	
1119 to 1118	17.58 17.58		0.0 249.73	4 4.26		9.960 9.960	120 0.0151	79.223 0.0 0.150		Vel = 5.62	
1118 to 1117	17.58 17.58		-39.43 210.3	4 4.26		0.790 0.790	120 0.0114	79.373 0.0 0.009		Vel = 4.73	
1117 to 1116	17.58 17.58		0.0 210.3	4 4.26		5.330 5.330	120 0.0109	79.382 0.0 0.058		Vel = 4.73	
1116 to 1115	17.58 17.58		-38.80 171.5	4 4.26		9.810 9.810	120 0.0075	79.440 0.0 0.074		Vel = 3.86	
1115 to 1114	17.58 17.58		-22.78 148.72	4 4.26		1.550 1.550	120 0.0058	79.514 0.0 0.009		Vel = 3.35	
1114 to 1113	17.58 17.58		0.0 148.72	4 4.26		6.600 6.600	120 0.0058	79.523 0.0 0.038		Vel = 3.35	
1113 to 1112	17.58 17.58		-22.07 126.65	4 4.26		3.760 3.760	120 0.0045	79.561 0.0 0.017		Vel = 2.85	
1112 to 1111	17.58 14.58		-32.48 94.17	4 4.26	E 13.167	10.790 13.167 23.957	120 0.0025	79.578 1.299 0.059		Vel = 2.12	
1111 to 1110	14.58 14.58		0.0 94.17	3 3.26	E 9.408	2.610 9.408 12.018	120 0.0092	80.936 0.0 0.110		Vel = 3.62	
1110 to 1109	14.58 14.58		-11.35 82.82	3 3.26		7.920 7.920	120 0.0072	81.046 0.0 0.057		Vel = 3.18	
1109 to 1108	14.58 14.58		-10.58 72.24	3 3.26		8.000 8.000	120 0.0056	81.103 0.0 0.045		Vel = 2.78	
1108 to 1107	14.58 14.58		-9.94 62.3	3 3.26		11.500 11.500	120 0.0043	81.148 0.0 0.049		Vel = 2.39	
1107 to 1106	14.58 14.58		-9.20 53.1	3 3.26		8.640 8.640	120 0.0031	81.197 0.0 0.027		Vel = 2.04	
1106 to 1105	14.58 14.58		-8.76 44.34	3 3.26		9.860 9.860	120 0.0023	81.224 0.0 0.023		Vel = 1.70	
1105 to 1104	14.58 14.58		-8.39 35.95	3 3.26		10.000 10.000	120 0.0015	81.247 0.0 0.015		Vel = 1.38	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1104 to 1103	14.58 14.58		-8.13 27.82	3 3.26	2E	18.815 50.865	120 0.0010	81.262 0.0 0.049		Vel = 1.07	
1103 to 1102	14.58 14.58		-6.92 20.9	3 3.26		10.090 10.090	120 0.0006	81.311 0.0 0.006		Vel = 0.80	
1102 to 1101	14.58 14.58		-7.00 13.9	3 3.26		10.000 10.000	120 0.0002	81.317 0.0 0.002		Vel = 0.53	
1101 to 1100	14.58 14.58		-6.95 6.95	3 3.26		8.500 8.500	120 0.0001	81.319 0.0 0.001		Vel = 0.27	
1100 to TA01	14.58 14.58		0.0 6.95	1.5 1.61	T	8.0 60.840 8.000 68.840	120 0.0023	81.320 0.0 0.157		Vel = 1.10	
TA01 to TA02	14.58 14.58		0.0 6.95	1.5 1.61		12.000 12.000	120 0.0022	81.477 0.0 0.027		Vel = 1.10	
TA02 to TA03	14.58 14.58		0.0 6.95	1.5 1.61		12.000 12.000	120 0.0023	81.504 0.0 0.028		Vel = 1.10	
TA03 to TA04	14.58 14.58		0.0 6.95	1.5 1.61		12.000 12.000	120 0.0022	81.532 0.0 0.027		Vel = 1.10	
TA04 to TA05	14.58 14.58		0.0 6.95	1.5 1.61		12.000 12.000	120 0.0023	81.559 0.0 0.028		Vel = 1.10	
TA05 to TA06	14.58 14.58		0.0 6.95	1.5 1.61		12.000 12.000	120 0.0022	81.587 0.0 0.027		Vel = 1.10	
TA06 to 1300	14.58 14.58		0.0 6.95	1.5 1.61	T	8.0 50.650 8.000 58.650	120 0.0023	81.614 0.0 0.134		Vel = 1.10	
1300 to 1301	14.58 14.58		0.0 6.95	3 3.26		8.500 8.500	120 0.0001	81.748 0.0 0.001		Vel = 0.27	
1301 to 1302	14.58 14.58		6.95 13.9	3 3.26		10.000 10.000	120 0.0002	81.749 0.0 0.002		Vel = 0.53	
1302 to 1303	14.58 14.58		7.00 20.9	3 3.26		9.000 9.000	120 0.0006	81.751 0.0 0.005		Vel = 0.80	
1303 to 1304	14.58 14.58		6.92 27.82	3 3.26		11.000 11.000	120 0.0010	81.756 0.0 0.011		Vel = 1.07	
1304 to 1305	14.58 14.58		8.13 35.95	3 3.26		10.000 10.000	120 0.0015	81.767 0.0 0.015		Vel = 1.38	
1305 to 1306	14.58 14.58		8.39 44.34	3 3.26		9.860 9.860	120 0.0023	81.782 0.0 0.023		Vel = 1.70	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1306 to 1307	14.58 14.58		8.76 53.1	3 3.26		8.640 8.640	120 0.0031	81.805 0.0 0.027		Vel = 2.04	
1307 to 1308	14.58 14.58		9.20 62.3	3 3.26		11.500 11.500	120 0.0043	81.832 0.0 0.049		Vel = 2.39	
1308 to 1309	14.58 14.58		9.94 72.24	3 3.26		8.000 8.000	120 0.0056	81.881 0.0 0.045		Vel = 2.78	
1309 to 1310	14.58 14.58		10.58 82.82	3 3.26		7.920 7.920	120 0.0072	81.926 0.0 0.057		Vel = 3.18	
1310 to 1311	14.58 14.58		11.35 94.17	3 3.26	2E 18.815	30.400 18.815 49.215	120 0.0091	81.983 0.0 0.450		Vel = 3.62	
1311 to 1312	14.58 17.58		32.48 126.65	3 3.26	3E 28.223	22.340 28.223 50.563	120 0.0158	82.433 -1.299 0.799		Vel = 4.87	
1312 to 1313	17.58 17.58		0.0 126.65	4 4.26		4.990 4.990	120 0.0044	81.933 0.0 0.022		Vel = 2.85	
1313 to 1314	17.58 17.58		44.85 171.5	4 4.26		12.310 12.310	120 0.0075	81.955 0.0 0.092		Vel = 3.86	
1314 to 1315	17.58 17.58		38.80 210.3	4 4.26		6.120 6.120	120 0.0109	82.047 0.0 0.067		Vel = 4.73	
1315 to 1316	17.58 17.58		39.43 249.73	4 4.26		8.230 8.230	120 0.0152	82.114 0.0 0.125		Vel = 5.62	
1316 to 1317	17.58 17.58		40.07 289.8	4 4.26		10.040 10.040	120 0.0198	82.239 0.0 0.199		Vel = 6.52	
1317 to 1318	17.58 17.58		46.68 336.48	4 4.26		6.060 6.060	120 0.0262	82.438 0.0 0.159		Vel = 7.57	
1318 to 1319	17.58 17.58		67.33 403.81	4 4.26		9.490 9.490	120 0.0368	82.597 0.0 0.349		Vel = 9.09	
1319 to 1320	17.58 17.58		78.44 482.25	4 4.26		9.460 9.460	120 0.0510	82.946 0.0 0.482		Vel = 10.86	
1320 to 1321	17.58 17.58		79.85 562.1	4 4.26		6.920 6.920	120 0.0676	83.428 0.0 0.468		Vel = 12.65	
1321 to 321T	17.58 17.58		125.62 687.72	4 4.26	E 13.167	3.060 13.167 16.227	120 0.0984	83.896 0.0 1.596		Vel = 15.48	
321T to 1322	17.58 17.58		0.0 687.72	6 6.357		6.620 6.620	120 0.0139	85.492 0.0 0.092		Vel = 6.95	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1322 to TR1	17.58 17.58		0.0 687.72	6 6.357			156.770 156.770	120 0.0140	85.584 0.0 2.195			
TR1 to BR1	17.58 3		0.0 687.72	6 6.357	E Fsp Avc B T	17.603 0.0 27.661 12.573 37.72	8.410 95.557 103.967	120 0.0140	87.779 7.315 1.454		* * Fixed Loss = 1 Vel = 6.95	
BR1 to BR2	3 3	H100	100.00 787.72	8 8.249			2.320 2.320	120 0.0052	96.548 0.0 0.012		Vel = 4.73	
BR2 to FLG	3 1		0.0 787.72	8 8.249	E	21.141	7.600 21.141 28.741	120 0.0051	96.560 0.866 0.146		Vel = 4.73	
FLG to UG4	1 -2.42		0.0 787.72	8 8.27	E T	28.468 55.354	57.120 83.822 140.942	140 0.0038	97.572 1.481 0.529		Vel = 4.70	
UG4 to UG2	-2.42 -2.42		-174.03 613.69	8 8.27			392.280 392.280	140 0.0024	99.582 0.0 0.929		Vel = 3.67	
UG2 to UG1	-2.42 -2.42		324.03 937.72	8 8.27	8E 4T	227.744 221.418	462.900 283.098 745.998	140 0.0052	100.511 4.000 3.869		* * Fixed Loss = 4 Vel = 5.60	
UG1 to SRC	-2.42 -2.42		0.0 937.72	12 12.34			287.990 287.990	140 0.0007	108.380 0.0 0.213		Vel = 2.52	
SRC			0.0 937.72						108.593		K Factor = 89.99	
1402 to 1403	11.66 11.66		-344.03 -344.03	3 3.26			12.080 12.080	120 -0.1004	36.734 0.0 -1.213		Vel = 13.22	
1403 to G03	11.66 13.48		0.0 -344.03	2.5 2.635	3E T	24.711 16.474	4.740 41.185 45.925	120 -0.2832	35.521 -0.788 -13.008		Vel = 20.24	
G03 to G02	13.48 13.52	25.20	117.46 -226.57	2.5 2.635			10.000 10.000	120 -0.1308	21.725 -0.017 -1.308		Vel = 13.33	
G02 to G01	13.52 13.57	25.20	113.82 -112.75	2.5 2.635			10.000 10.000	120 -0.0360	20.400 -0.022 -0.360		Vel = 6.63	
G01			25.20 -87.55						20.018		Qa = 25.20 K Factor = -19.57	
1130 to 128A	17.58 17.58		58.52 58.52	2 2.157	2E 2T	12.307 24.613	97.780 36.920 134.700	120 0.0283	75.063 0.0 3.817		Vel = 5.14	
128A to 1321	17.58 17.58		67.10 125.62	2 2.157	E T	6.153 12.307	24.630 18.460 43.090	120 0.1164	78.880 0.0 5.016		Vel = 11.03	
			0.0									

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1321			125.62					83.896		K Factor = 13.71	
1129 to 128A	17.58 17.58		67.09 67.09	2 2.157	2T 24.613	78.460 24.613 103.073	120 0.0365	75.119 0.0 3.761		Vel = 5.89	
128A			0.0 67.09					78.880		K Factor = 7.55	
1128 to 1320	17.58 17.58		79.85 79.85	2 2.157	2T 4E 24.613 24.613	102.350 49.226 151.576	120 0.0504	75.796 0.0 7.632		Vel = 7.01	
1320			0.0 79.85					83.428		K Factor = 8.74	
1127 to 1319	17.58 17.58		78.44 78.44	2 2.157	2T 2E 24.613 12.307	101.470 36.920 138.390	120 0.0487	76.204 0.0 6.742		Vel = 6.89	
1319			0.0 78.44					82.946		K Factor = 8.61	
1126 to 1318	17.58 17.58		67.33 67.33	2 2.157	2T 3E 24.613 18.46	109.250 43.073 152.323	120 0.0367	77.002 0.0 5.595		Vel = 5.91	
1318			0.0 67.33					82.597		K Factor = 7.41	
1121 to 1317	17.58 17.58		46.68 46.68	2 2.157	2T 2E 24.613 12.307	146.150 36.920 183.070	120 0.0186	79.024 0.0 3.414		Vel = 4.10	
1317			0.0 46.68					82.438		K Factor = 5.14	
1120 to 1316	17.58 17.58		40.07 40.07	2 2.157	2T 6E 24.613 36.92	153.740 61.533 215.273	120 0.0141	79.212 0.0 3.027		Vel = 3.52	
1316			0.0 40.07					82.239		K Factor = 4.42	
1118 to TB13	17.58 17.58		39.43 39.43	2 2.157	T 12.307	12.520 12.307 24.827	120 0.0137	79.373 0.0 0.339		Vel = 3.46	
TB13 to TB14	17.58 17.58		0.0 39.43	2 2.157		10.000 10.000	120 0.0136	79.712 0.0 0.136		Vel = 3.46	
TB14 to TB15	17.58 17.58		0.0 39.43	2 2.157		10.000 10.000	120 0.0137	79.848 0.0 0.137		Vel = 3.46	
TB15 to TB16	17.58 17.58		0.0 39.43	2 2.157		10.000 10.000	120 0.0137	79.985 0.0 0.137		Vel = 3.46	
TB16 to TB17	17.58 17.58		0.0 39.43	2 2.157		10.000 10.000	120 0.0136	80.122 0.0 0.136		Vel = 3.46	
TB17 to TB18	17.58 17.58		0.0 39.43	2 2.157		10.000 10.000	120 0.0136	80.258 0.0 0.136		Vel = 3.46	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TB18 to 1315	17.58 17.58		0.0 39.43	2 2.157	4E T 12.307	89.090 36.920 126.010	120 0.0136	80.394 0.0 1.720		Vel = 3.46	
1315			0.0 39.43					82.114		K Factor = 4.35	
1116 to TB07	17.58 17.58		38.79 38.79	2 2.157	T 12.307	12.520 12.307 24.827	120 0.0133	79.440 0.0 0.329		Vel = 3.41	
TB07 to TB08	17.58 17.58		0.0 38.79	2 2.157		10.000 10.000	120 0.0133	79.769 0.0 0.133		Vel = 3.41	
TB08 to TB09	17.58 17.58		0.0 38.79	2 2.157		10.000 10.000	120 0.0132	79.902 0.0 0.132		Vel = 3.41	
TB09 to TB10	17.58 17.58		0.0 38.79	2 2.157		10.000 10.000	120 0.0132	80.034 0.0 0.132		Vel = 3.41	
TB10 to TB11	17.58 17.58		0.0 38.79	2 2.157		10.000 10.000	120 0.0133	80.166 0.0 0.133		Vel = 3.41	
TB11 to TB12	17.58 17.58		0.0 38.79	2 2.157		10.000 10.000	120 0.0132	80.299 0.0 0.132		Vel = 3.41	
TB12 to 1314	17.58 17.58		0.0 38.79	2 2.157	4E T 12.307	85.090 36.920 122.010	120 0.0132	80.431 0.0 1.616		Vel = 3.41	
1314			0.0 38.79					82.047		K Factor = 4.28	
1115 to TB01	17.58 17.58		22.79 22.79	2 2.157	T 12.307	12.520 12.307 24.827	120 0.0050	79.514 0.0 0.123		Vel = 2.00	
TB01 to TB02	17.58 17.58		0.0 22.79	2 2.157		10.000 10.000	120 0.0050	79.637 0.0 0.050		Vel = 2.00	
TB02 to TB03	17.58 17.58		0.0 22.79	2 2.157		10.000 10.000	120 0.0049	79.687 0.0 0.049		Vel = 2.00	
TB03 to TB04	17.58 17.58		0.0 22.79	2 2.157		10.000 10.000	120 0.0050	79.736 0.0 0.050		Vel = 2.00	
TB04 to TB05	17.58 17.58		0.0 22.79	2 2.157		10.000 10.000	120 0.0049	79.786 0.0 0.049		Vel = 2.00	
TB05 to TB06	17.58 17.58		0.0 22.79	2 2.157		10.000 10.000	120 0.0050	79.835 0.0 0.050		Vel = 2.00	
TB06 to 115A	17.58 17.58		0.0 22.79	2 2.157	E 6.153	15.080 6.153 21.233	120 0.0049	79.885 0.0 0.105		Vel = 2.00	

Final Calculations : Hazen-Williams

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Bucees - BENTON AR - System 1 RA G

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
115A to 1313	17.58 17.58		22.06 44.85	2 2.157	2T 2E 12.307	76.510 36.920 113.430	120 0.0173	79.990 0.0 1.965		Vel = 3.94	
1313			0.0 44.85					81.955		K Factor = 4.95	
1113 to 115A	17.58 17.58		22.06 22.06	2 2.157	T E 6.153	73.420 18.460 91.880	120 0.0047	79.561 0.0 0.429		Vel = 1.94	
115A			0.0 22.06					79.990		K Factor = 2.47	
1112 to T311	17.58 17.58		32.48 32.48	2 2.157	T E 6.153	129.370 18.460 147.830	120 0.0095	79.578 0.0 1.409		Vel = 2.85	
T311 to 1311	17.58 14.58		0.0 32.48	2 2.157	T 6.153	3.000 12.307 15.307	120 0.0096	80.987 1.299 0.147		Vel = 2.85	
1311			0.0 32.48					82.433		K Factor = 3.58	
1110 to 1310	14.58 14.58		11.35 11.35	1.5 1.61	2T 16.0	149.350 16.000 165.350	120 0.0057	81.046 0.0 0.937		Vel = 1.79	
1310			0.0 11.35					81.983		K Factor = 1.25	
1109 to 1309	14.58 14.58		10.58 10.58	1.5 1.61	2T 16.0	149.360 16.000 165.360	120 0.0050	81.103 0.0 0.823		Vel = 1.67	
1309			0.0 10.58					81.926		K Factor = 1.17	
1108 to 1308	14.58 14.58		9.94 9.94	1.5 1.61	2T 16.0	149.350 16.000 165.350	120 0.0044	81.148 0.0 0.733		Vel = 1.57	
1308			0.0 9.94					81.881		K Factor = 1.10	
1107 to 1307	14.58 14.58		9.20 9.2	1.5 1.61	2T 16.0	149.350 16.000 165.350	120 0.0038	81.197 0.0 0.635		Vel = 1.45	
1307			0.0 9.20					81.832		K Factor = 1.02	
1106 to 1306	14.58 14.58		8.76 8.76	1.5 1.61	2T 16.0	149.350 16.000 165.350	120 0.0035	81.224 0.0 0.581		Vel = 1.38	
1306			0.0 8.76					81.805		K Factor = 0.97	
1105 to 1305	14.58 14.58		8.39 8.39	1.5 1.61	2T 16.0	149.350 16.000 165.350	120 0.0032	81.247 0.0 0.535		Vel = 1.32	
1305			0.0 8.39					81.782		K Factor = 0.93	

Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1104 to 1304	14.58 14.58		8.13 8.13	1.5 1.61	2T 16.0	149.360 16.000 165.360	120 0.0031	81.262 0.0 0.505		Vel = 1.28	
1304			0.0 8.13					81.767		K Factor = 0.90	
1103 to TA19	14.58 14.58		6.92 6.92	1.5 1.61	T 2E 8.0 8.0	61.930 16.000 77.930	120 0.0023	81.311 0.0 0.177		Vel = 1.09	
TA19 to TA20	14.58 14.58		0.0 6.92	1.5 1.61		12.000 12.000	120 0.0022	81.488 0.0 0.027		Vel = 1.09	
TA20 to TA21	14.58 14.58		0.0 6.92	1.5 1.61		10.000 10.000	120 0.0022	81.515 0.0 0.022		Vel = 1.09	
TA21 to TA22	14.58 14.58		0.0 6.92	1.5 1.61		12.010 12.010	120 0.0023	81.537 0.0 0.028		Vel = 1.09	
TA22 to TA23	14.58 14.58		0.0 6.92	1.5 1.61		12.000 12.000	120 0.0022	81.565 0.0 0.027		Vel = 1.09	
TA23 to TA24	14.58 14.58		0.0 6.92	1.5 1.61		11.980 11.980	120 0.0023	81.592 0.0 0.027		Vel = 1.09	
TA24 to 1303	14.58 14.58		0.0 6.92	1.5 1.61	T 8.0	52.650 8.000 60.650	120 0.0023	81.619 0.0 0.137		Vel = 1.09	
1303			0.0 6.92					81.756		K Factor = 0.77	
1102 to TA13	14.58 14.58		7.00 7.0	1.5 1.61	T 8.0	60.840 8.000 68.840	120 0.0023	81.317 0.0 0.159		Vel = 1.10	
TA13 to TA14	14.58 14.58		0.0 7.0	1.5 1.61		12.000 12.000	120 0.0023	81.476 0.0 0.028		Vel = 1.10	
TA14 to TA15	14.58 14.58		0.0 7.0	1.5 1.61		12.000 12.000	120 0.0023	81.504 0.0 0.028		Vel = 1.10	
TA15 to TA16	14.58 14.58		0.0 7.0	1.5 1.61		12.000 12.000	120 0.0023	81.532 0.0 0.028		Vel = 1.10	
TA16 to TA17	14.58 14.58		0.0 7.0	1.5 1.61		12.000 12.000	120 0.0023	81.560 0.0 0.028		Vel = 1.10	
TA17 to TA18	14.58 14.58		0.0 7.0	1.5 1.61		12.000 12.000	120 0.0022	81.588 0.0 0.027		Vel = 1.10	
TA18 to 1302	14.58 14.58		0.0 7.0	1.5 1.61	T 8.0	50.650 8.000 58.650	120 0.0023	81.615 0.0 0.136		Vel = 1.10	

Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1302			0.0 7.00					81.751		K Factor = 0.77	
1101 to TA07	14.58 14.58		6.96 6.96	1.5 1.61	T	8.0 60.840 8.000 68.840	120 0.0023	81.319 0.0 0.158		Vel = 1.10	
TA07 to TA08	14.58 14.58		0.0 6.96	1.5 1.61		12.000 12.000	120 0.0022	81.477 0.0 0.027		Vel = 1.10	
TA08 to TA09	14.58 14.58		0.0 6.96	1.5 1.61		12.000 12.000	120 0.0023	81.504 0.0 0.028		Vel = 1.10	
TA09 to TA10	14.58 14.58		0.0 6.96	1.5 1.61		12.000 12.000	120 0.0022	81.532 0.0 0.027		Vel = 1.10	
TA10 to TA11	14.58 14.58		0.0 6.96	1.5 1.61		12.000 12.000	120 0.0023	81.559 0.0 0.028		Vel = 1.10	
TA11 to TA12	14.58 14.58		0.0 6.96	1.5 1.61		12.000 12.000	120 0.0022	81.587 0.0 0.027		Vel = 1.10	
TA12 to 1301	14.58 14.58		0.0 6.96	1.5 1.61	T	8.0 50.650 8.000 58.650	120 0.0023	81.614 0.0 0.135		Vel = 1.10	
1301			0.0 6.96					81.749		K Factor = 0.77	
UG4 to HY1	-2.42 -2.42		174.03 174.03	8 8.27	2E	56.936 152.180 56.936 209.116	140 0.0002	99.582 0.0 0.048		Vel = 1.04	
HY1 to UG3	-2.42 -2.42	H150	150.00 324.03	8 8.27	3E	85.404 1024.600 85.404 1110.004	140 0.0007	99.630 0.0 0.807		Vel = 1.94	
UG3 to UG2	-2.42 -2.42		0.0 324.03	8 8.27	T	55.354 47.000 55.354 102.354	140 0.0007	100.437 0.0 0.074		Vel = 1.94	
UG2			0.0 324.03					100.511		K Factor = 32.32	



HENDERSON ENGINEERS

HENDERSON ENGINEERS
8345 LENEXA DR. SUITE #300
LENEXA, KS 66214
913.742.500

Job Name : Bucces - BENTON AR - System 1 RA H
Building :
Location : BEVERAGE COOLER
System : SYSTEM 1 RA H
Contract : 2450001433
Data File : Bucees - BENTON AR - System 1 RA H.WXF

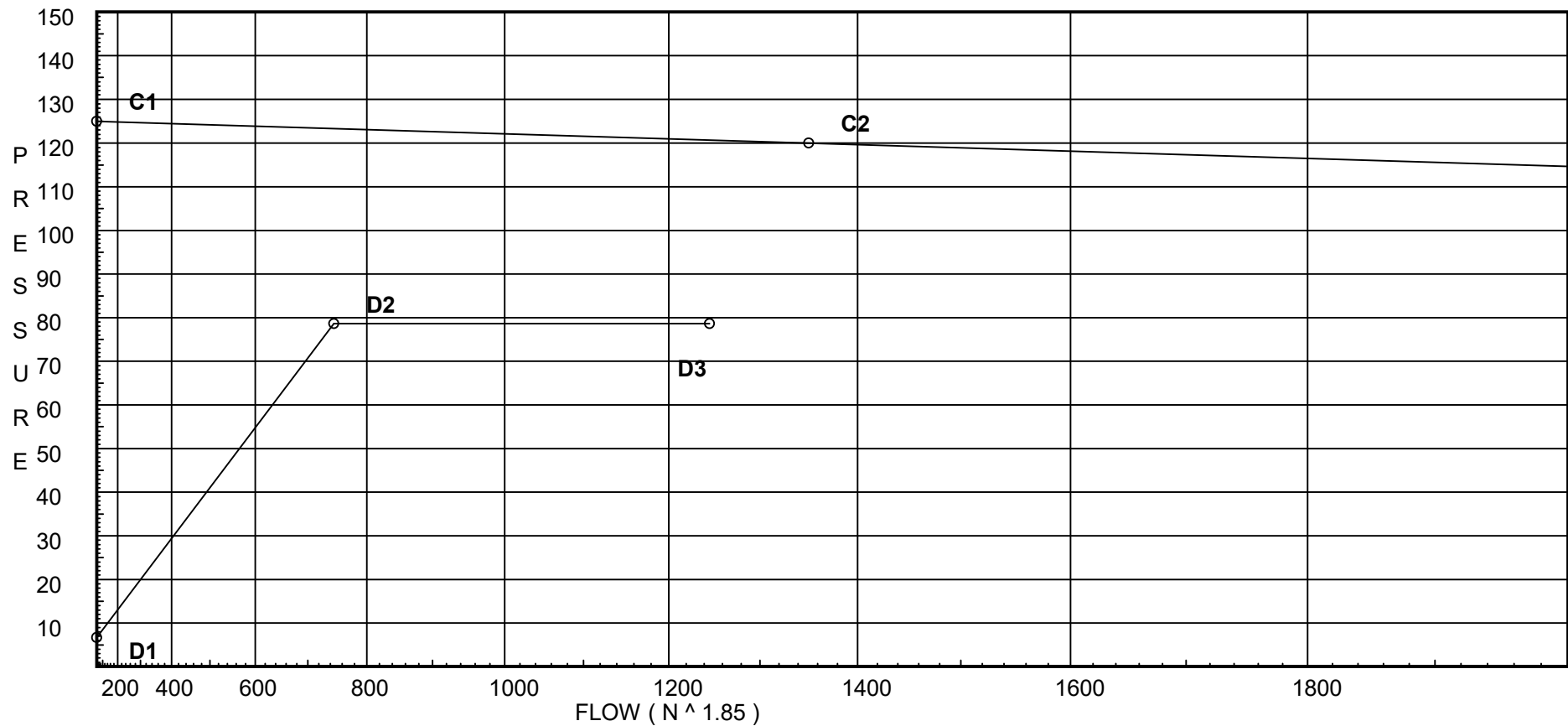
Water Supply Curve

HENDERSON ENGINEERS
Bucces - BENTON AR - System 1 RA H

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City Water Supply:
C1 - Static Pressure : 125
C2 - Residual Pressure: 120
C2 - Residual Flow : 1351

Demand:
D1 - Elevation : 6.726
D2 - System Flow : 745.78
D2 - System Pressure : 78.653
Hose (Demand) : 400
D3 - System Demand : 1245.78
Safety Margin : 42.044
Hose (Demand) : 100



Fittings Used Summary

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Bucces - BENTON AR - System 1 RA H

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Fitting Legend																					
Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Avc	Alarm Vic 751	0	0	0	0	3	9	8	17	0	21	0	22	50	0	0	0	0	0	0	0
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																			
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.

Flow Summary - NFPA

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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>
SRC	125.0	120	1351.0	120.696	1245.78	78.653

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>	
A21	13.11	11.2	7.0	29.63	0.2	130
TA21	14.58		9.01			
TA20	14.58		9.2			
TA19	14.58		10.34			
1103	14.58		28.21			
6	14.58		33.11			
1104	14.58		33.28			
11	14.58		33.95			
1105	14.58		34.34			
13	14.58		34.82			
1106	14.58		35.47			
1107	14.58		36.48			
1108	14.58		37.88			
1109	14.58		38.93			
1110	14.58		40.1			
18	17.58		42.26			
1112	17.58		42.59			
1113	17.58		42.75			
1114	17.58		43.01			
1115	17.58		43.07			
1116	17.58		43.42			
1117	17.58		43.57			
1118	17.58		43.6			
1119	17.58		43.83			
1120	17.58		43.85			
1121	17.58		44.02			
1122	17.58		44.03			
1123	17.58		44.5			
123A	17.58		44.53			
1126	17.58		45.04			
1127	17.58		45.23			
1128	17.58		45.28			
1129	17.58		45.3			
1130	17.58		45.3			
128A	17.58		47.13			
1321	17.58		49.56			
321T	17.58		51.41			
1322	17.58		51.52			

Flow Summary - NFPA

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NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
TR1	17.58		54.07			
BR1	3.0		63.08	100.0		
BR2	3.0		63.09			
FLG	1.0		64.12			
UG4	-2.42		66.21			
UG2	-2.42		67.75			
UG1	-2.42		78.29			
SRC	-2.42		78.65			
A22	13.11	11.2	7.02	29.68	0.2	130
TA22	14.58		9.04			
TA23	14.58		9.66			
TA24	14.58		11.52			
1303	14.58		30.82			
1304	14.58		32.28			
1305	14.58		33.55			
1306	14.58		34.77			
1307	14.58		35.76			
1308	14.58		37.01			
1309	14.58		37.84			
1310	14.58		38.67			
1311	14.58		43.04			
1312	17.58		45.72			
1313	17.58		45.83			
1314	17.58		46.18			
1315	17.58		46.39			
1316	17.58		46.73			
1317	17.58		47.21			
1318	17.58		47.56			
1319	17.58		48.19			
1320	17.58		48.93			
A20	13.11	11.2	7.14	29.93	0.2	130
A23	13.11	11.2	7.48	30.63	0.2	130
A19	13.11	11.2	7.98	31.64	0.2	130
A24	13.11	11.2	8.86	33.34	0.2	130
1102	14.58		27.6			
1101	14.58		27.32			
1100	14.58		27.26			
TA01	14.58		10.56			
TA02	14.58		9.34			
TA03	14.58		9.07			
TA04	14.58		9.09			
TA05	14.58		9.66			
TA06	14.58		11.46			
1300	14.58		29.65			
1301	14.58		29.73			
1302	14.58		30.1			
A03	13.11	11.2	7.08	29.81	0.2	130
A04	13.11	11.2	7.1	29.84	0.2	130

Flow Summary - NFPA

HENDERSON ENGINEERS
Bucces - BENTON AR - System 1 RA H

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NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node		Notes
A02	13.11	11.2	7.28	30.23	0.2	130
A05	13.11	11.2	7.53	30.73	0.2	130
A01	13.11	11.2	8.19	32.06	0.2	130
A06	13.11	11.2	8.87	33.35	0.2	130
A09	13.11	11.2	7.14	29.93	0.2	130
TA09	14.58		8.98			
TA08	14.58		9.25			
TA07	14.58		10.47			
A10	13.11	11.2	7.16	29.97	0.2	130
TA10	14.58		9.0			
TA11	14.58		9.57			
TA12	14.58		11.38			
A08	13.11	11.2	7.35	30.36	0.2	130
A11	13.11	11.2	7.6	30.87	0.2	130
A07	13.11	11.2	8.28	32.23	0.2	130
A12	13.11	11.2	8.97	33.54	0.2	130
A15	13.11	11.2	7.23	30.11	0.2	130
TA15	14.58		9.09			
TA14	14.58		9.36			
TA13	14.58		10.6			
A16	13.11	11.2	7.24	30.14	0.2	130
TA16	14.58		9.11			
TA17	14.58		9.69			
TA18	14.58		11.52			
A14	13.11	11.2	7.43	30.54	0.2	130
A17	13.11	11.2	7.69	31.05	0.2	130
A13	13.11	11.2	8.37	32.41	0.2	130
A18	13.11	11.2	9.08	33.75	0.2	130
T311	17.58		41.82			
HY1	-2.42		66.21	400.0		
UG3	-2.42		67.62			
115A	17.58		43.46			
TB01	17.58		43.17			
TB02	17.58		43.21			
TB03	17.58		43.25			
TB04	17.58		43.29			
TB05	17.58		43.34			
TB06	17.58		43.38			
TB07	17.58		43.77			
TB08	17.58		43.91			
TB09	17.58		44.05			
TB10	17.58		44.19			
TB11	17.58		44.33			
TB12	17.58		44.47			
TB13	17.58		43.94			
TB14	17.58		44.08			
TB15	17.58		44.22			
TB16	17.58		44.36			

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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>
TB17	17.58		44.5		
TB18	17.58		44.64		

Final Calculations : Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
A21 to TA21	13.11 14.58	11.20	29.63 29.63	1 1.049	E T 2.0 5.0	2.830 7.000 9.830	120 0.2694	7.000 -0.637 2.648		Vel = 11.00	
TA21 to TA20	14.58 14.58		-7.64 21.99	1.5 1.61		10.000 10.000	120 0.0192	9.011 0.0 0.192		Vel = 3.47	
TA20 to TA19	14.58 14.58		29.93 51.92	1.5 1.61		12.000 12.000	120 0.0943	9.203 0.0 1.132		Vel = 8.18	
TA19 to 1103	14.58 14.58		31.64 83.56	1.5 1.61	2E T 8.0 8.0	62.550 16.000 78.550	120 0.2276	10.335 0.0 17.877		Vel = 13.17	
1103 to 6	14.58 14.58		259.49 343.05	3 3.26	2E 18.815	30.160 18.815 48.975	120 0.0999	28.212 0.0 4.894		Vel = 13.19	
6 to 1104	14.58 14.58		0.0 343.05	3 3.26		1.720 1.720	120 0.1000	33.106 0.0 0.172		Vel = 13.19	
1104 to 11	14.58 14.58		11.77 354.82	3 3.26		6.280 6.280	120 0.1064	33.278 0.0 0.668		Vel = 13.64	
11 to 1105	14.58 14.58		0.0 354.82	3 3.26		3.720 3.720	120 0.1065	33.946 0.0 0.396		Vel = 13.64	
1105 to 13	14.58 14.58		10.36 365.18	3 3.26		4.280 4.280	120 0.1121	34.342 0.0 0.480		Vel = 14.04	
13 to 1106	14.58 14.58		0.0 365.18	3 3.26		5.750 5.750	120 0.1122	34.822 0.0 0.645		Vel = 14.04	
1106 to 1107	14.58 14.58		9.72 374.9	3 3.26		8.640 8.640	120 0.1177	35.467 0.0 1.017		Vel = 14.41	
1107 to 1108	14.58 14.58		9.87 384.77	3 3.26		11.330 11.330	120 0.1236	36.484 0.0 1.400		Vel = 14.79	
1108 to 1109	14.58 14.58		10.97 395.74	3 3.26		8.000 8.000	120 0.1302	37.884 0.0 1.042		Vel = 15.21	
1109 to 1110	14.58 14.58		12.33 408.07	3 3.26		8.560 8.560	120 0.1377	38.926 0.0 1.179		Vel = 15.69	
1110 to 18	14.58 17.58		14.33 422.4	3 3.26	2E 18.815	4.690 18.815 23.505	120 0.1468	40.105 -1.299 3.451		Vel = 16.24	
18 to 1112	17.58 17.58		0.0 422.4	4 4.26		8.240 8.240	120 0.0399	42.257 0.0 0.329		Vel = 9.51	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1112 to 1113	17.58 17.58		23.48 445.88	4 4.26			3.760 3.760	120 0.0441	42.586 0.0 0.166		Vel = 10.04	
1113 to 1114	17.58 17.58		-29.02 416.86	4 4.26			6.600 6.600	120 0.0389	42.752 0.0 0.257		Vel = 9.38	
1114 to 1115	17.58 17.58		0.0 416.86	4 4.26			1.550 1.550	120 0.0387	43.009 0.0 0.060		Vel = 9.38	
1115 to 1116	17.58 17.58		-20.58 396.28	4 4.26			9.810 9.810	120 0.0355	43.069 0.0 0.348		Vel = 8.92	
1116 to 1117	17.58 17.58		-40.01 356.27	4 4.26			5.330 5.330	120 0.0291	43.417 0.0 0.155		Vel = 8.02	
1117 to 1118	17.58 17.58		0.0 356.27	4 4.26			0.790 0.790	120 0.0304	43.572 0.0 0.024		Vel = 8.02	
1118 to 1119	17.58 17.58		-39.81 316.46	4 4.26			9.960 9.960	120 0.0233	43.596 0.0 0.232		Vel = 7.12	
1119 to 1120	17.58 17.58		0.0 316.46	4 4.26			0.750 0.750	120 0.0240	43.828 0.0 0.018		Vel = 7.12	
1120 to 1121	17.58 17.58		-39.00 277.46	4 4.26			9.440 9.440	120 0.0183	43.846 0.0 0.173		Vel = 6.25	
1121 to 1122	17.58 17.58		-45.01 232.45	4 4.26			0.560 0.560	120 0.0125	44.019 0.0 0.007		Vel = 5.23	
1122 to 1123	17.58 17.58		0.0 232.45	4 4.26	T	26.334	9.430 26.334 35.764	120 0.0132	44.026 0.0 0.473		Vel = 5.23	
1123 to 123A	17.58 17.58		0.0 232.45	4 4.26			2.530 2.530	120 0.0134	44.499 0.0 0.034		Vel = 5.23	
123A to 1126	17.58 17.58		0.0 232.45	4 4.26			38.300 38.300	120 0.0132	44.533 0.0 0.506		Vel = 5.23	
1126 to 1127	17.58 17.58		-43.73 188.72	4 4.26	E	13.167	8.590 13.167 21.757	120 0.0090	45.039 0.0 0.195		Vel = 4.25	
1127 to 1128	17.58 17.58		-50.22 138.5	4 4.26			8.000 8.000	120 0.0051	45.234 0.0 0.041		Vel = 3.12	
1128 to 1129	17.58 17.58		-53.61 84.89	4 4.26			10.000 10.000	120 0.0021	45.275 0.0 0.021		Vel = 1.91	

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1129 to 1130	17.58 17.58		-45.51 39.38	4 4.26			0.670 0.670	120 0	45.296 0.0			
1130 to 128A	17.58 17.58		0.0 39.38	2 2.157	2E 2T	12.307 24.613	97.780 36.920	120 0.0136	45.296 1.834		Vel = 0.89	
128A to 1321	17.58 17.58		45.51 84.89	2 2.157	E T	6.153 12.307	24.630 18.460	120 0.0564	47.130 2.430		Vel = 3.46	
1321 to 321T	17.58 17.58		660.89 745.78	4 4.26	E	13.167	3.060 13.167	120 0.1142	49.560 1.853		Vel = 7.45	
321T to 1322	17.58 17.58		0.0 745.78	6 6.357			6.620 6.620	120 0.0163	51.413 0.108		Vel = 16.79	
1322 to TR1	17.58 17.58		0.0 745.78	6 6.357			156.770 156.770	120 0.0163	51.521 2.549		Vel = 7.54	
TR1 to BR1	17.58 3		0.0 745.78	6 6.357	E Fsp Avc B T	17.603 0.0 27.661 12.573 37.72	8.410 95.557 103.967	120 0.0163	54.070 7.315 1.690		** Fixed Loss = 1 Vel = 7.54	
BR1 to BR2	3 3	H100	100.00 845.78	8 8.249			2.320 2.320	120 0.0060	63.075 0.014		Vel = 5.08	
BR2 to FLG	3 1		0.0 845.78	8 8.249	E	21.141	7.600 21.141	120 0.0058	63.089 0.866		Vel = 5.08	
FLG to UG4	1 -2.42		0.0 845.78	8 8.27	E T	28.468 55.354	57.120 83.822	140 0.0043	64.121 1.481		Vel = 5.05	
UG4 to UG2	-2.42 -2.42		-38.32 807.46	8 8.27			392.280 392.280	140 0.0039	66.206 1.543		Vel = 4.82	
UG2 to UG1	-2.42 -2.42		438.32 1245.78	8 8.27	8E 4T	227.744 221.418	462.900 283.098	140 0.0088	67.749 4.000		** Fixed Loss = 4 Vel = 7.44	
UG1 to SRC	-2.42 -2.42		0.0 1245.78	12 12.34			287.990 287.990	140 0.0013	78.293 0.360		Vel = 3.34	
SRC			0.0 1245.78						78.653		K Factor = 140.47	
A22 to TA22	13.11 14.58	11.20	29.68 29.68	1 1.049	E T	2.0 5.0	2.830 7.000 9.830	120 0.2702	7.024 -0.637 2.656		Vel = 11.02	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TA22 to TA23	14.58 14.58		7.65 37.33	1.5 1.61			12.000 12.000	120 0.0512	9.043 0.0 0.615		Vel = 5.88	
TA23 to TA24	14.58 14.58		30.63 67.96	1.5 1.61			11.980 11.980	120 0.1553	9.658 0.0 1.861		Vel = 10.71	
TA24 to 1303	14.58 14.58		33.34 101.3	1.5 1.61	T	8.0	51.410 8.000 59.410	120 0.3249	11.519 0.0 19.305		Vel = 15.96	
1303 to 1304	14.58 14.58		301.43 402.73	3 3.26			10.830 10.830	120 0.1344	30.824 0.0 1.456		Vel = 15.48	
1304 to 1305	14.58 14.58		-11.77 390.96	3 3.26			10.000 10.000	120 0.1273	32.280 0.0 1.273		Vel = 15.03	
1305 to 1306	14.58 14.58		-10.36 380.6	3 3.26			10.020 10.020	120 0.1211	33.553 0.0 1.213		Vel = 14.63	
1306 to 1307	14.58 14.58		-9.72 370.88	3 3.26			8.640 8.640	120 0.1155	34.766 0.0 0.998		Vel = 14.26	
1307 to 1308	14.58 14.58		-9.87 361.01	3 3.26			11.330 11.330	120 0.1098	35.764 0.0 1.244		Vel = 13.88	
1308 to 1309	14.58 14.58		-10.97 350.04	3 3.26			8.000 8.000	120 0.1038	37.008 0.0 0.830		Vel = 13.45	
1309 to 1310	14.58 14.58		-12.34 337.7	3 3.26			8.560 8.560	120 0.0971	37.838 0.0 0.831		Vel = 12.98	
1310 to 1311	14.58 14.58		-14.32 323.38	3 3.26	2E	18.815	29.930 18.815 48.745	120 0.0896	38.669 0.0 4.367		Vel = 12.43	
1311 to 1312	14.58 17.58		-23.48 299.9	3 3.26	3E	28.223	22.960 28.223 51.183	120 0.0779	43.036 -1.299 3.988		Vel = 11.53	
1312 to 1313	17.58 17.58		0.0 299.9	4 4.26			4.990 4.990	120 0.0210	45.725 0.0 0.105		Vel = 6.75	
1313 to 1314	17.58 17.58		49.60 349.5	4 4.26			12.310 12.310	120 0.0281	45.830 0.0 0.346		Vel = 7.87	
1314 to 1315	17.58 17.58		40.00 389.5	4 4.26			6.120 6.120	120 0.0345	46.176 0.0 0.211		Vel = 8.77	
1315 to 1316	17.58 17.58		39.82 429.32	4 4.26			8.230 8.230	120 0.0411	46.387 0.0 0.338		Vel = 9.66	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1316 to 1317	17.58 17.58		39.00 468.32	4 4.26			10.040 10.040	120 0.0483	46.725 0.0 0.485		Vel = 10.54	
1317 to 1318	17.58 17.58		45.01 513.33	4 4.26			6.060 6.060	120 0.0573	47.210 0.0 0.347		Vel = 11.55	
1318 to 1319	17.58 17.58		43.73 557.06	4 4.26			9.490 9.490	120 0.0666	47.557 0.0 0.632		Vel = 12.54	
1319 to 1320	17.58 17.58		50.21 607.27	4 4.26			9.460 9.460	120 0.0781	48.189 0.0 0.739		Vel = 13.67	
1320 to 1321	17.58 17.58		53.62 660.89	4 4.26			6.920 6.920	120 0.0913	48.928 0.0 0.632		Vel = 14.88	
1321			0.0 660.89						49.560		K Factor = 93.88	
A20 to TA20	13.11 14.58	11.20	29.93 29.93	1 1.049	E T	2.0 5.0	2.830 7.000 9.830	120 0.2744	7.143 -0.637 2.697		Vel = 11.11	
TA20			0.0 29.93						9.203		K Factor = 9.87	
A23 to TA23	13.11 14.58	11.20	30.63 30.63	1 1.049	E T	2.0 5.0	2.830 7.000 9.830	120 0.2864	7.480 -0.637 2.815		Vel = 11.37	
TA23			0.0 30.63						9.658		K Factor = 9.86	
A19 to TA19	13.11 14.58	11.20	31.64 31.64	1 1.049	E T	2.0 5.0	2.830 7.000 9.830	120 0.3041	7.983 -0.637 2.989		Vel = 11.75	
TA19			0.0 31.64						10.335		K Factor = 9.84	
A24 to TA24	13.11 14.58	11.20	33.34 33.34	1 1.049	E T	2.0 5.0	2.830 7.000 9.830	120 0.3351	8.862 -0.637 3.294		Vel = 12.38	
TA24			0.0 33.34						11.519		K Factor = 9.82	
TA21 to TA22	14.58 14.58		7.65 7.65	1.5 1.61			12.010 12.010	120 0.0027	9.011 0.0 0.032		Vel = 1.21	
TA22			0.0 7.65						9.043		K Factor = 2.54	
1103 to 1102	14.58 14.58		-259.49 -259.49	3 3.26			10.250 10.250	120 -0.0596	28.212 0.0 -0.611		Vel = 9.97	
1102 to 1101	14.58 14.58		86.92 -172.57	3 3.26			10.000 10.000	120 -0.0281	27.601 0.0 -0.281		Vel = 6.63	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1101 to 1100	14.58 14.58		86.49 -86.08	3 3.26			8.340 8.340	120 -0.0077	27.320 0.0 -0.064		Vel = 3.31	
1100 to TA01	14.58 14.58		0.0 -86.08	1.5 1.61	T	8.0	61.460 8.000 69.460	120 -0.2404	27.256 0.0 -16.700		Vel = 13.57	
TA01 to TA02	14.58 14.58		32.06 -54.02	1.5 1.61			12.000 12.000	120 -0.1015	10.556 0.0 -1.218		Vel = 8.51	
TA02 to TA03	14.58 14.58		30.23 -23.79	1.5 1.61			12.000 12.000	120 -0.0223	9.338 0.0 -0.268		Vel = 3.75	
TA03 to TA04	14.58 14.58		29.81 6.02	1.5 1.61			12.000 12.000	120 0.0018	9.070 0.0 0.021		Vel = 0.95	
TA04 to TA05	14.58 14.58		29.84 35.86	1.5 1.61			12.000 12.000	120 0.0476	9.091 0.0 0.571		Vel = 5.65	
TA05 to TA06	14.58 14.58		30.73 66.59	1.5 1.61			12.000 12.000	120 0.1495	9.662 0.0 1.794		Vel = 10.49	
TA06 to 1300	14.58 14.58		33.35 99.94	1.5 1.61	T	8.0	49.410 8.000 57.410	120 0.3169	11.456 0.0 18.192		Vel = 15.75	
1300 to 1301	14.58 14.58		0.0 99.94	3 3.26			8.330 8.330	120 0.0102	29.648 0.0 0.085		Vel = 3.84	
1301 to 1302	14.58 14.58		100.41 200.35	3 3.26			10.000 10.000	120 0.0370	29.733 0.0 0.370		Vel = 7.70	
1302 to 1303	14.58 14.58		101.07 301.42	3 3.26			9.170 9.170	120 0.0786	30.103 0.0 0.721		Vel = 11.59	
1303			0.0 301.42						30.824		K Factor = 54.29	
A03 to TA03	13.11 14.58	11.20	29.81 29.81	1 1.049	E T	2.0 5.0	2.630 7.000 9.630	120 0.2723	7.085 -0.637 2.622		Vel = 11.07	
TA03			0.0 29.81						9.070		K Factor = 9.90	
A04 to TA04	13.11 14.58	11.20	29.84 29.84	1 1.049	E T	2.0 5.0	2.630 7.000 9.630	120 0.2729	7.100 -0.637 2.628		Vel = 11.08	
TA04			0.0 29.84						9.091		K Factor = 9.90	
A02 to TA02	13.11 14.58	11.20	30.23 30.23	1 1.049	E T	2.0 5.0	2.630 7.000 9.630	120 0.2794	7.284 -0.637 2.691		Vel = 11.22	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TA02			0.0 30.23						9.338		K Factor = 9.89	
A05 to TA05	13.11 14.58	11.20	30.73	1	E T	2.0 5.0	2.630 7.000 9.630	120	7.526 -0.637		Vel = 11.41	
TA05			0.0 30.73						9.662		K Factor = 9.89	
A01 to TA01	13.11 14.58	11.20	32.06	1	E T	2.0 5.0	2.630 7.000 9.630	120	8.193 -0.637		Vel = 11.90	
TA01			0.0 32.06						10.556		K Factor = 9.87	
A06 to TA06	13.11 14.58	11.20	33.35	1	E T	2.0 5.0	2.630 7.000 9.630	120	8.866 -0.637		Vel = 12.38	
TA06			0.0 33.35						11.456		K Factor = 9.85	
A09 to TA09	13.11 14.58	11.20	29.93	1	E T	2.0 5.0	2.000 7.000 9.000	120	7.143 -0.637		Vel = 11.11	
TA09	14.58		-6.03	1.5			12.000	120	8.976			
to TA08	14.58		23.9	1.61			12.000	0.0225	0.270		Vel = 3.77	
TA08	14.58		30.36	1.5			12.000	120	9.246			
to TA07	14.58		54.26	1.61			12.000	0.1023	1.228		Vel = 8.55	
TA07	14.58		32.23	1.5	T	8.0	61.460 8.000	120	10.474 0.0			
to 1101	14.58		86.49	1.61			69.460	0.2425	16.846		Vel = 13.63	
1101			0.0 86.49						27.320		K Factor = 16.55	
A10 to TA10	13.11 14.58	11.20	29.97	1	E T	2.0 5.0	2.000 7.000 9.000	120	7.159 -0.637		Vel = 11.13	
TA10	14.58		6.03	1.5			12.000	120	8.997			
to TA11	14.58		36.0	1.61			12.000	0.0480	0.576		Vel = 5.67	
TA11	14.58		30.87	1.5			12.000	120	9.573			
to TA12	14.58		66.87	1.61			12.000	0.1507	1.808		Vel = 10.54	
TA12	14.58		33.54	1.5	T	8.0	49.410 8.000	120	11.381 0.0			
to 1301	14.58		100.41	1.61			57.410	0.3197	18.352		Vel = 15.82	
1301			0.0 100.41						29.733		K Factor = 18.41	
A08 to TA08	13.11 14.58	11.20	30.36	1	E T	2.0 5.0	2.000 7.000 9.000	120	7.348 -0.637		Vel = 11.27	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TA08			0.0 30.36						9.246		K Factor = 9.98	
A11 to TA11	13.11 14.58	11.20	30.87	1	E T	2.0 5.0	2.000 7.000 9.000	120	7.595 -0.637		Vel = 11.46	
TA11			0.0 30.87						9.573		K Factor = 9.98	
A07 to TA07	13.11 14.58	11.20	32.23	1	E T	2.0 5.0	2.000 7.000 9.000	120	8.280 -0.637		Vel = 11.96	
TA07			0.0 32.23						10.474		K Factor = 9.96	
A12 to TA12	13.11 14.58	11.20	33.54	1	E T	2.0 5.0	2.000 7.000 9.000	120	8.969 -0.637		Vel = 12.45	
TA12			0.0 33.54						11.381		K Factor = 9.94	
TA09 to TA10	14.58 14.58		6.03	1.5			12.000	120	8.976 0.0		Vel = 0.95	
TA10			0.0 6.03						8.997		K Factor = 2.01	
A15 to TA15	13.11 14.58	11.20	30.11	1	E T	2.0 5.0	2.000 7.000 9.000	120	7.228 -0.637		Vel = 11.18	
TA15	14.58		-6.13	1.5			12.000	120	9.088 0.0			
TA14	14.58		23.98	1.61			12.000	0.0226	0.271		Vel = 3.78	
TA14 to TA13	14.58 14.58		30.53	1.5			12.000	120	9.359 0.0			
TA13	14.58		54.51	1.61			12.000	0.1032	1.239		Vel = 8.59	
TA13 to 1102	14.58 14.58		32.41	1.5	T	8.0	61.460 8.000 69.460	120	10.598 0.0		Vel = 13.70	
1102			0.0 86.92						27.601		K Factor = 16.54	
A16 to TA16	13.11 14.58	11.20	30.14	1	E T	2.0 5.0	2.000 7.000 9.000	120	7.244 -0.637		Vel = 11.19	
TA16	14.58		30.14	1.049				0.2780	2.502			
TA16 to TA17	14.58 14.58		6.14	1.5			12.000	120	9.109 0.0		Vel = 5.72	
TA17	14.58		36.28	1.61			12.000	0.0487	0.584			
TA17 to TA18	14.58 14.58		31.05	1.5			12.000	120	9.693 0.0			
TA18	14.58		67.33	1.61			12.000	0.1526	1.831		Vel = 10.61	
TA18 to 1302	14.58 14.58		33.75	1.5	T	8.0	49.410 8.000 57.410	120	11.524 0.0		Vel = 15.93	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1302			0.0 101.08						30.103		K Factor = 18.42	
A14 to TA14	13.11 14.58	11.20	30.54 30.54	1 1.049	E T	2.0 5.0	2.000 7.000 9.000	120 0.2848	7.433 -0.637 2.563		Vel = 11.34	
TA14			0.0 30.54						9.359		K Factor = 9.98	
A17 to TA17	13.11 14.58	11.20	31.05 31.05	1 1.049	E T	2.0 5.0	2.000 7.000 9.000	120 0.2937	7.687 -0.637 2.643		Vel = 11.53	
TA17			0.0 31.05						9.693		K Factor = 9.97	
A13 to TA13	13.11 14.58	11.20	32.41 32.41	1 1.049	E T	2.0 5.0	2.000 7.000 9.000	120 0.3179	8.374 -0.637 2.861		Vel = 12.03	
TA13			0.0 32.41						10.598		K Factor = 9.96	
A18 to TA18	13.11 14.58	11.20	33.75 33.75	1 1.049	E T	2.0 5.0	2.000 7.000 9.000	120 0.3426	9.078 -0.637 3.083		Vel = 12.53	
TA18			0.0 33.75						11.524		K Factor = 9.94	
TA15 to TA16	14.58 14.58		6.14 6.14	1.5 1.61			12.000 12.000	120 0.0018	9.088 0.0 0.021		Vel = 0.97	
TA16			0.0 6.14						9.109		K Factor = 2.03	
1304 to 1104	14.58 14.58		11.77 11.77	1.5 1.61	2T	16.0	148.740 16.000 164.740	120 0.0061	32.280 0.0 0.998		Vel = 1.85	
1104			0.0 11.77						33.278		K Factor = 2.04	
1305 to 1105	14.58 14.58		10.36 10.36	1.5 1.61	2T	16.0	148.740 16.000 164.740	120 0.0048	33.553 0.0 0.789		Vel = 1.63	
1105			0.0 10.36						34.342		K Factor = 1.77	
1306 to 1106	14.58 14.58		9.72 9.72	1.5 1.61	2T	16.0	148.740 16.000 164.740	120 0.0043	34.766 0.0 0.701		Vel = 1.53	
1106			0.0 9.72						35.467		K Factor = 1.63	
1307 to 1107	14.58 14.58		9.87 9.87	1.5 1.61	2T	16.0	148.740 16.000 164.740	120 0.0044	35.764 0.0 0.720		Vel = 1.56	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
1107			0.0 9.87						36.484		K Factor = 1.63	
1308 to 1108	14.58 14.58		10.97 10.97	1.5 1.61	2T	16.0	148.740 16.000 164.740	120 0.0053	37.008 0.0 0.876		Vel = 1.73	
1108			0.0 10.97						37.884		K Factor = 1.78	
1309 to 1109	14.58 14.58		12.33 12.33	1.5 1.61	2T	16.0	148.740 16.000 164.740	120 0.0066	37.838 0.0 1.088		Vel = 1.94	
1109			0.0 12.33						38.926		K Factor = 1.98	
1310 to 1110	14.58 14.58		14.33 14.33	1.5 1.61	2T	16.0	148.740 16.000 164.740	120 0.0087	38.669 0.0 1.436		Vel = 2.26	
1110			0.0 14.33						40.105		K Factor = 2.26	
1311 to T311	14.58 17.58		23.48 23.48	2 2.157	T	12.307	3.000 12.307 15.307	120 0.0052	43.036 -1.299 0.079		Vel = 2.06	
T311 to 1112	17.58 17.58		0.0 23.48	2 2.157	E T	6.153 12.307	128.750 18.460 147.210	120 0.0052	41.816 0.0 0.770		Vel = 2.06	
1112			0.0 23.48						42.586		K Factor = 3.60	
UG4 to HY1	-2.42 -2.42		38.32 38.32	8 8.27	2E	56.936	152.180 56.936 209.116	140 0	66.206 0.0 0.003		Vel = 0.23	
HY1 to UG3	-2.42 -2.42	H400	400.00 438.32	8 8.27	3E	85.404	1024.600 85.404 1110.004	140 0.0013	66.209 0.0 1.410		Vel = 2.62	
UG3 to UG2	-2.42 -2.42		0.0 438.32	8 8.27	T	55.354	47.000 55.354 102.354	140 0.0013	67.619 0.0 0.130		Vel = 2.62	
UG2			0.0 438.32						67.749		K Factor = 53.25	
1113 to 115A	17.58 17.58		29.02 29.02	2 2.157	T E	12.307	73.420 18.460 91.880	120 0.0077	42.752 0.0 0.711		Vel = 2.55	
115A to 1313	17.58 17.58		20.58 49.6	2 2.157	2T 2E	24.613 12.307	76.510 36.920 113.430	120 0.0209	43.463 0.0 2.367		Vel = 4.35	
1313			0.0 49.60						45.830		K Factor = 7.33	
1115 to TB01	17.58 17.58		20.58 20.58	2 2.157	T	12.307	12.520 12.307 24.827	120 0.0041	43.069 0.0 0.102		Vel = 1.81	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TB01 to TB02	17.58 17.58		0.0 20.58	2 2.157		10.000 10.000	120 0.0041	43.171 0.0 0.041		Vel = 1.81	
TB02 to TB03	17.58 17.58		0.0 20.58	2 2.157		10.000 10.000	120 0.0041	43.212 0.0 0.041		Vel = 1.81	
TB03 to TB04	17.58 17.58		0.0 20.58	2 2.157		10.000 10.000	120 0.0041	43.253 0.0 0.041		Vel = 1.81	
TB04 to TB05	17.58 17.58		0.0 20.58	2 2.157		10.000 10.000	120 0.0041	43.294 0.0 0.041		Vel = 1.81	
TB05 to TB06	17.58 17.58		0.0 20.58	2 2.157		10.000 10.000	120 0.0041	43.335 0.0 0.041		Vel = 1.81	
TB06 to 115A	17.58 17.58		0.0 20.58	2 2.157	E 6.153	15.080 6.153 21.233	120 0.0041	43.376 0.0 0.087		Vel = 1.81	
115A to 1116			0.0 20.58					43.463		K Factor = 3.12	
TB07 to TB08	17.58 17.58		40.00 40.0	2 2.157	T 12.307	12.520 12.307 24.827	120 0.0140	43.417 0.0 0.348		Vel = 3.51	
TB08 to TB09	17.58 17.58		0.0 40.0	2 2.157		10.000 10.000	120 0.0140	43.765 0.0 0.140		Vel = 3.51	
TB09 to TB10	17.58 17.58		0.0 40.0	2 2.157		10.000 10.000	120 0.0141	43.905 0.0 0.141		Vel = 3.51	
TB10 to TB11	17.58 17.58		0.0 40.0	2 2.157		10.000 10.000	120 0.0140	44.046 0.0 0.140		Vel = 3.51	
TB11 to TB12	17.58 17.58		0.0 40.0	2 2.157		10.000 10.000	120 0.0140	44.186 0.0 0.140		Vel = 3.51	
TB12 to 1314	17.58 17.58		0.0 40.0	2 2.157	4E T 24.613 12.307	85.090 36.920 122.010	120 0.0140	44.466 0.0 1.710		Vel = 3.51	
1314 to 1118			0.0 40.00					46.176		K Factor = 5.89	
TB13	17.58		39.82	2	T 12.307	12.520 12.307 24.827	120 0.0139	43.596 0.0 0.344		Vel = 3.50	

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Equiv Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TB13 to TB14	17.58 17.58		0.0 39.82	2 2.157		10.000 10.000	120 0.0140	43.940 0.0 0.140		Vel = 3.50	
TB14 to TB15	17.58 17.58		0.0 39.82	2 2.157		10.000 10.000	120 0.0138	44.080 0.0 0.138		Vel = 3.50	
TB15 to TB16	17.58 17.58		0.0 39.82	2 2.157		10.000 10.000	120 0.0139	44.218 0.0 0.139		Vel = 3.50	
TB16 to TB17	17.58 17.58		0.0 39.82	2 2.157		10.000 10.000	120 0.0139	44.357 0.0 0.139		Vel = 3.50	
TB17 to TB18	17.58 17.58		0.0 39.82	2 2.157		10.000 10.000	120 0.0139	44.496 0.0 0.139		Vel = 3.50	
TB18 to 1315	17.58 17.58		0.0 39.82	2 2.157	4E T 24.613 12.307	89.090 36.920 126.010	120 0.0139	44.635 0.0 1.752		Vel = 3.50	
1315			0.0 39.82					46.387		K Factor = 5.85	
1120 to 1316	17.58 17.58		39.00 39.0	2 2.157	2T 6E 24.613 36.92	153.740 61.533 215.273	120 0.0134	43.846 0.0 2.879		Vel = 3.42	
1316			0.0 39.00					46.725		K Factor = 5.71	
1121 to 1317	17.58 17.58		45.00 45.0	2 2.157	2T 2E 24.613 12.307	146.150 36.920 183.070	120 0.0174	44.019 0.0 3.191		Vel = 3.95	
1317			0.0 45.00					47.210		K Factor = 6.55	
1126 to 1318	17.58 17.58		43.73 43.73	2 2.157	2T 3E 24.613 18.46	109.250 43.073 152.323	120 0.0165	45.039 0.0 2.518		Vel = 3.84	
1318			0.0 43.73					47.557		K Factor = 6.34	
1127 to 1319	17.58 17.58		50.22 50.22	2 2.157	2T 2E 24.613 12.307	101.470 36.920 138.390	120 0.0214	45.234 0.0 2.955		Vel = 4.41	
1319			0.0 50.22					48.189		K Factor = 7.23	
1128 to 1320	17.58 17.58		53.61 53.61	2 2.157	2T 4E 24.613 24.613	102.350 49.226 151.576	120 0.0241	45.275 0.0 3.653		Vel = 4.71	
1320			0.0 53.61					48.928		K Factor = 7.66	
1129 to 128A	17.58 17.58		45.51 45.51	2 2.157	2T 24.613	78.460 24.613 103.073	120 0.0178	45.296 0.0 1.834		Vel = 4.00	

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Node1	Elev1	K	Qa	Nom	Fitting or	Pipe	CFact	Pt			
to						Ftns		Pe	*****	Notes	*****
Node2	Elev2	Fact	Qt	Act	Equiv	Len	Pf/Ft	Pf			
128A			0.0 45.51					47.130		K Factor =	6.63