



Engineering & Consulting

ENGINEERS | CONSULTANTS | ANALYSTS | ASSESSORS

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Job Name : WM 2403 - Puyallup WA
Building :
Location :
System :
Contract :
Data File : PUYALLUP Area 1 02.WXF

Water Supply Curve

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City Water Supply:

C1 - Static Pressure : 43
C2 - Residual Pressure: 37
C2 - Residual Flow : 1839

City Water Adjusted to Pump Inlet for Pf - Elev - Hose Flow

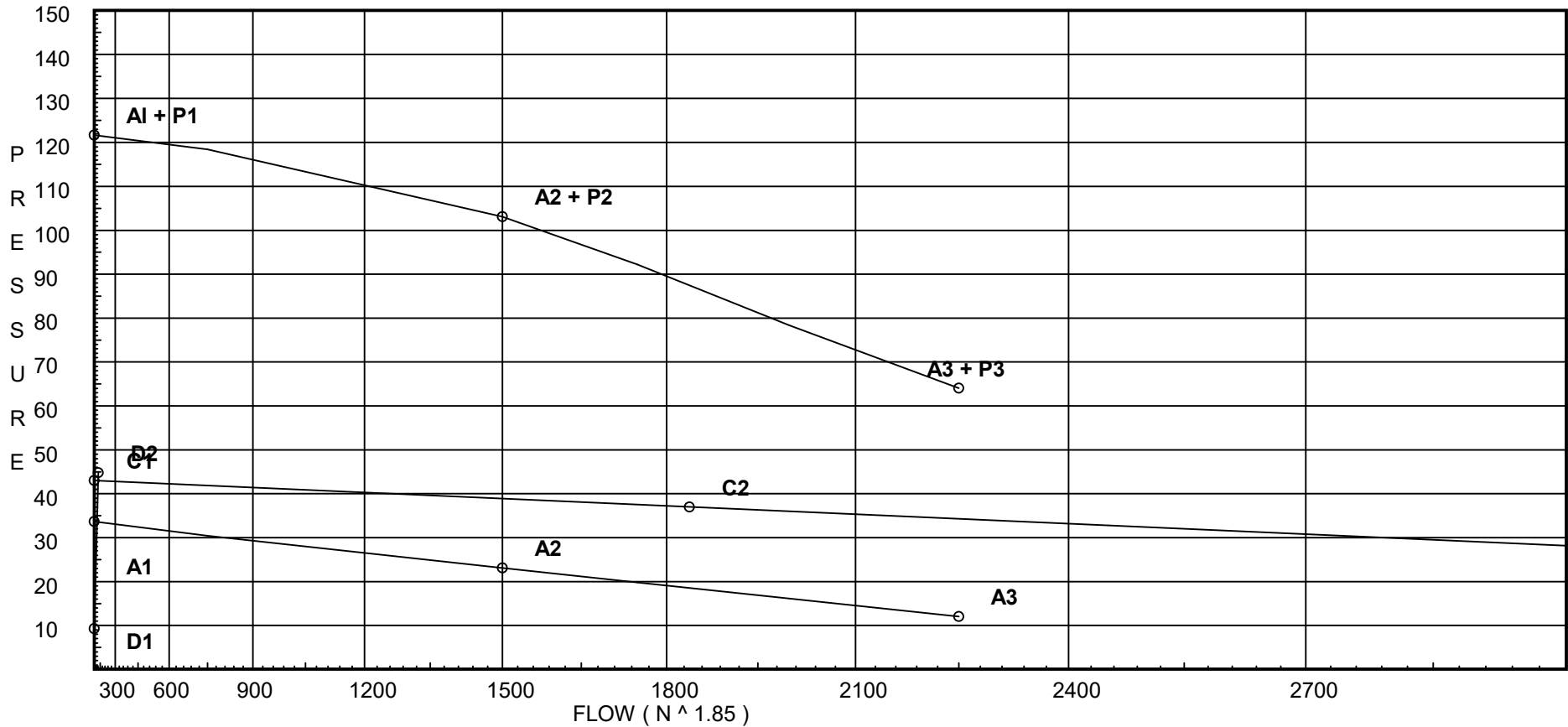
A1 - Adjusted Static: 33.685
A2 - Adj Resid : 23.069 @ 1500
A3 - Adj Resid : 12.041 @ 2250

Pump Data:

P1 - Pump Churn Pressure : 88
P2 - Pump Rated Pressure : 80
P2 - Pump Rated Flow : 1500
P3 - Pump Pressure @ Max Flow : 52
P3 - Pump Max Flow : 2250
City Residual Flow @ 0 = 5332.31
City Residual Flow @ 20 = 3802.14
City Water @ 150% of Pump = 34.29

Demand:

D1 - Elevation : 9.277
D2 - System Flow : 122.981
D2 - System Pressure : 44.768
Hose (Demand) : _____
D3 - System Demand : 122.981
Hose (Adj City) : 250
Safety Margin : 76.700



Fittings Used Summary

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Fitting Legend

Abbrev.	Name	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

Units Summary

Diameter Units Inches
 Length Units Feet
 Flow Units US Gallons per Minute
 Pressure Units Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

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>
PO	See Information on Pump Curve			121.468	122.98	44.768
TEST	43.0	37	1839.0	42.686	372.98	42.686

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>
1	16.42	11.2	30.0	61.34	0.1 100
2	16.42	11.2	30.28	61.64	0.1 100
3	16.42		31.32		
5	16.42		33.42		
4	16.42		33.42		
6	14.5		35.89		
7	14.5		35.94		
8	14.5		35.99		
9	14.5		36.05		
10	19.36		34.3		
11	19.36		34.38		
12	19.36		34.48		
13	19.36		34.51		
14	19.36		34.55		
15	19.36		34.58		
16	19.36		34.6		
17	19.36		34.62		
18	19.36		34.65		
19	19.36		34.66		
20	19.36		34.68		
21	19.36		34.69		
22	19.36		34.7		
23	19.36		34.71		
24	19.36		34.72		
25	19.36		34.72		
26	19.36		34.72		
27	19.36		34.73		
28	19.36		34.73		
29	19.36		34.73		
30	19.36		34.82		
31	19.36		34.82		
32	19.36		34.82		
33	19.36		34.82		
34	19.36		34.82		
35	19.36		34.82		
36	19.36		34.82		
37	19.36		34.82		
38	19.36		34.83		
39	17.28		36.15		
40	4.0		42.93		
41	4.0		42.94		

Flow Summary - NFPA

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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>
42	4.0		43.0		
43	2.0		43.88		
44	2.0		43.9		
PO	0.0		44.77		
PI	0.0		33.47		
45	2.0		32.62		
46	2.0		32.63		
47	-5.0		35.66		
TEST	-5.0		42.69	250.0	
48	16.42		35.11		
49	16.42		35.11		
50	16.42		35.11		
52	16.42		35.11		
51	16.42		35.11		
53	16.42		35.16		
54	16.42		35.16		
55	16.42		35.16		
57	16.42		35.16		
56	16.42		35.16		
58	19.36		34.57		
59	19.36		34.57		
60	19.36		34.6		
61	19.36		34.61		
62	19.36		34.63		
63	19.36		34.64		
64	19.36		34.66		
65	19.36		34.68		
66	19.36		34.7		
67	19.36		34.72		
68	19.36		34.74		
69	19.36		34.76		

Final Calculations : Hazen-Williams

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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	*****
1 to 2	16.420 16.420	11.20	61.34	2			7.500	120	30.000 0.0			
			61.34	2.067			7.500	0.0380	0.285	Vel =	5.86	
2 to 3	16.420 16.42	11.20	61.64	2			7.500	120	30.285 0.0			
			122.98	2.067			7.500	0.1379	1.034	Vel =	11.76	
3 to 4	16.42 16.42		0.0	2	T	10.0	5.250 10.000	120	31.319 0.0			
			122.98	2.067			15.250	0.1378	2.101	Vel =	11.76	
4 to 4			0.0 122.98						33.420	K Factor =	21.27	
5 to 4	16.42 16.42	.0	0.0	2	T	10.0	2.250 10.000	120	33.420 0.0			
			0.0	2.067			12.250	0	0.0	Vel =	0	
4 to 6	16.42 14.5		122.98	2	T	10.0	1.920 10.000	120	33.420 0.832			
			122.98	2.067			11.920	0.1377	1.641	Vel =	11.76	
6 to 7	14.5 14.5		0.0	4			11.580	120	35.893 0.0			
			122.98	4.26			11.580	0.0041	0.047	Vel =	2.77	
7 to 8	14.5 14.5		0.0	4			11.580	120	35.940 0.0			
			122.98	4.26			11.580	0.0041	0.048	Vel =	2.77	
8 to 9	14.5 14.5		0.0	4			15.530	120	35.988 0.0			
			122.98	4.26			15.530	0.0041	0.063	Vel =	2.77	
9 to 10	14.5 19.36		0.0	4	T 2E	26.334 26.334	34.500 52.668	120	36.051 -2.105			
			122.98	4.26			87.168	0.0041	0.355	Vel =	2.77	
10 to 11	19.36 19.36		-33.43	3			9.000	120	34.301 0.0			
			89.55	3.26			9.000	0.0083	0.075	Vel =	3.44	
11 to 12	19.36 19.36		-28.21	3			24.160	120	34.376 0.0			
			61.34	3.26			24.160	0.0041	0.100	Vel =	2.36	
12 to 13	19.36 19.36		-4.24	3			9.190	120	34.476 0.0			
			57.1	3.26			9.190	0.0036	0.033	Vel =	2.19	
13 to 14	19.36 19.36		-3.82	3			11.820	120	34.509 0.0			
			53.28	3.26			11.820	0.0032	0.038	Vel =	2.05	
14 to 15	19.36 19.36		-3.36	3			10.720	120	34.547 0.0			
			49.92	3.26			10.720	0.0028	0.030	Vel =	1.92	
15 to 16	19.36 19.36		-3.05	3			10.940	120	34.577 0.0			
			46.87	3.26			10.940	0.0025	0.027	Vel =	1.80	
16 to 17	19.36 19.36		-2.80	3			9.170	120	34.604 0.0			
			44.07	3.26			9.170	0.0023	0.021	Vel =	1.69	

Final Calculations : Hazen-Williams

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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	*****
17 to 18	19.36 19.36		-2.69 41.38	3 3.26			9.850 9.850	120 0.0020	34.625 0.0 0.020		Vel = 1.59	
18 to 19	19.36 19.36		-2.67 38.71	3 3.26			9.850 9.850	120 0.0017	34.645 0.0 0.017		Vel = 1.49	
19 to 20	19.36 19.36		-2.74 35.97	3 3.26			9.690 9.690	120 0.0015	34.662 0.0 0.015		Vel = 1.38	
20 to 21	19.36 19.36		-2.89 33.08	3 3.26			11.470 11.470	120 0.0013	34.677 0.0 0.015		Vel = 1.27	
21 to 22	19.36 19.36		-3.17 29.91	3 3.26			9.500 9.500	120 0.0011	34.692 0.0 0.010		Vel = 1.15	
22 to 23	19.36 19.36		-4.19 25.72	3 3.26			10.580 10.580	120 0.0009	34.702 0.0 0.009		Vel = 0.99	
23 to 24	19.36 19.36		-3.98 21.74	3 3.26			11.600 11.600	120 0.0006	34.711 0.0 0.007		Vel = 0.84	
24 to 25	19.36 19.36		-3.80 17.94	3 3.26			9.630 9.630	120 0.0004	34.718 0.0 0.004		Vel = 0.69	
25 to 26	19.36 19.36		-3.68 14.26	3 3.26			10.680 10.680	120 0.0003	34.722 0.0 0.003		Vel = 0.55	
26 to 27	19.36 19.36		-3.61 10.65	3 3.26			9.270 9.270	120 0.0002	34.725 0.0 0.002		Vel = 0.41	
27 to 28	19.36 19.36		-3.56 7.09	3 3.26			9.410 9.410	120 0.0001	34.727 0.0 0.001		Vel = 0.27	
28 to 29	19.36 19.36		-3.55 3.54	3 3.26			7.660 7.660	120 0	34.728 0.0 0.0		Vel = 0.14	
29 to 30	19.36 19.36		0.0 3.54	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0007	34.728 0.0 0.087		Vel = 0.56	
30 to 31	19.36 19.36		0.0 3.54	4 4.26			7.660 7.660	120 0	34.815 0.0 0.0		Vel = 0.08	
31 to 32	19.36 19.36		3.55 7.09	4 4.26			9.410 9.410	120 0	34.815 0.0 0.0		Vel = 0.16	
32 to 33	19.36 19.36		3.56 10.65	4 4.26			9.270 9.270	120 0.0001	34.815 0.0 0.001		Vel = 0.24	

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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	*****
33 to 34	19.36 19.36		3.61 14.26	4 4.26			10.680 10.680	120 0.0001	34.816 0.0 0.001			Vel = 0.32
34 to 35	19.36 19.36		3.68 17.94	4 4.26			9.630 9.630	120 0.0001	34.817 0.0 0.001			Vel = 0.40
35 to 36	19.36 19.36		3.80 21.74	4 4.26			11.600 11.600	120 0.0002	34.818 0.0 0.002			Vel = 0.49
36 to 37	19.36 19.360		3.98 25.72	4 4.26			10.580 10.580	120 0.0002	34.820 0.0 0.002			Vel = 0.58
37 to 38	19.360 19.36		4.19 29.91	4 4.26	T	26.334	7.500 26.334 33.834	120 0.0003	34.822 0.0 0.010			Vel = 0.67
38 to 39	19.36 17.28		93.07 122.98	6 6.357	7E	123.219	596.400 123.219 719.619	120 0.0006	34.832 0.901 0.417			Vel = 1.24
39 to 40	17.28 4		0.0 122.98	6 6.357	T G Fsp	37.72 3.772 0.0	13.280 41.492 54.772	120 0.0006	36.150 6.752 0.031		** Fixed Loss = 1	Vel = 1.24
40 to 41	4 4		0.0 122.98	6 6.357			2.520 2.520	120 0.0008	42.933 0.0 0.002			Vel = 1.24
41 to 42	4 4		0.0 122.98	4 4.26	E	13.167	3.740 13.167 16.907	120 0.0041	42.935 0.0 0.069			Vel = 2.77
42 to 43	4 2		0.0 122.98	8 8.249	3E	63.423	18.940 63.423 82.363	120 0.0002	43.004 0.866 0.013			Vel = 0.74
43 to 44	2 2		0.0 122.98	8 8.249	E B S	21.141 14.094 52.853	7.160 88.088 95.248	120 0.0002	43.883 0.0 0.016			Vel = 0.74
44 to PO	2 0		0.0 122.98	8 8.249	E	21.141	1.490 21.141 22.631	120 0.0001	43.899 0.866 0.003			Vel = 0.74
PO			0.0 122.98						44.768		K Factor = 18.38	
System Demand Pressure									44.768			
Safety Margin									76.700			
Continuation Pressure									121.468			
Pressure @ Pump Outlet									121.468			
Pressure From Pump Curve									-87.999			
Pressure @ Pump Inlet									33.469			
PI to 45	0 2		0.0 122.98	8 8.249	3E	63.423	22.030 63.423 85.453	120 0.0002	33.469 -0.866 0.014			Vel = 0.74
45 to 46	2 2		0.0 122.98	8 8.249	2E G	42.282 4.698	2.350 46.980 49.330	120 0.0002	32.617 0.0 0.008			Vel = 0.74

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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	*****
46 to 47	2 -5		0.0 122.98	8 8.249	E	21.141	7.000 21.141 28.141	120 0.0001	32.625 3.032 0.004			Vel = 0.74
47 to TEST	-5 -5		0.0 122.98	8 8.27	E	28.468	180.000 28.468 208.468	140 0.0001	35.661 7.000 0.025			* * Fixed Loss = 7 Vel = 0.73
TEST			250.00 372.98						42.686			Qa = 250.00 K Factor = 57.09
48 to 49	16.42 16.42	.0	0.0	2			7.500	120	35.109 0.0			Vel = 0
49 to 50	16.42 16.42	.0	0.0	2			7.500	120	35.109 0.0			Vel = 0
50 to 51	16.42 16.42	.0	0.0	2	T	10.0	5.250 10.000 15.250	120	35.109 0.0			Vel = 0
51			0.0 0.0						35.109			K Factor = 0
52 to 51	16.42 16.42	.0	0.0	2	T	10.0	2.250 10.000 12.250	120	35.109 0.0			Vel = 0
51 to 7	16.42 14.5	.0	0.0	2	T	10.0	1.920 10.000 11.920	120	35.109 0.832 0.0			Vel = 0
7			0.0 0.0						35.941			K Factor = 0
53 to 54	16.42 16.42	.0	0.0	2			7.500	120	35.156 0.0			Vel = 0
54 to 55	16.42 16.42	.0	0.0	2			7.500	120	35.156 0.0			Vel = 0
55 to 56	16.42 16.42	.0	0.0	2	T	10.0	5.250 10.000 15.250	120	35.156 0.0			Vel = 0
56			0.0 0.0						35.156			K Factor = 0
57 to 56	16.42 16.42	.0	0.0	2	T	10.0	2.250 10.000 12.250	120	35.156 0.0			Vel = 0
56 to 8	16.42 14.5	.0	0.0	2	T	10.0	1.920 10.000 11.920	120	35.156 0.832 0.0			Vel = 0
8			0.0 0.0						35.988			K Factor = 0
10 to 58	19.36 19.36		33.43 33.43	3 3.068	2T	30.0	117.190 30.000 147.190	120 0.0018	34.301 0.0 0.266			Vel = 1.45

Final Calculations : Hazen-Williams

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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	*****
58 to 59	19.36 19.36		0.0 33.43	4 4.26			9.000 9.000	120 0.0003	34.567 0.0 0.003			Vel = 0.75
59 to 60	19.36 19.36		28.21 61.64	4 4.26			24.160 24.160	120 0.0012	34.570 0.0 0.028			Vel = 1.39
60 to 61	19.36 19.36		4.24 65.88	4 4.26			9.190 9.190	120 0.0012	34.598 0.0 0.011			Vel = 1.48
61 to 62	19.36 19.36		3.82 69.7	4 4.26			11.820 11.820	120 0.0014	34.609 0.0 0.017			Vel = 1.57
62 to 63	19.36 19.36		3.37 73.07	4 4.26			10.720 10.720	120 0.0016	34.626 0.0 0.017			Vel = 1.64
63 to 64	19.36 19.36		3.04 76.11	4 4.26			10.940 10.940	120 0.0016	34.643 0.0 0.018			Vel = 1.71
64 to 65	19.36 19.36		2.80 78.91	4 4.26			9.170 9.170	120 0.0019	34.661 0.0 0.017			Vel = 1.78
65 to 66	19.36 19.36		2.69 81.6	4 4.26			9.850 9.850	120 0.0018	34.678 0.0 0.018			Vel = 1.84
66 to 67	19.36 19.36		2.67 84.27	4 4.26			9.850 9.850	120 0.0020	34.696 0.0 0.020			Vel = 1.90
67 to 68	19.36 19.36		2.74 87.01	4 4.26			9.690 9.690	120 0.0022	34.716 0.0 0.021			Vel = 1.96
68 to 69	19.36 19.36		2.89 89.9	4 4.26			11.470 11.470	120 0.0023	34.737 0.0 0.026			Vel = 2.02
69 to 38	19.36 19.36		3.17 93.07	4 4.26	T	26.334	2.000 26.334 28.334	120 0.0024	34.763 0.0 0.069			Vel = 2.09
38			0.0 93.07						34.832			K Factor = 15.77
11 to 59	19.36 19.36		28.22 28.22	3 3.068	2T	30.0	117.190 30.000 147.190	120 0.0013	34.376 0.0 0.194			Vel = 1.22
59			0.0 28.22						34.570			K Factor = 4.80
12 to 60	19.36 19.36		4.24 4.24	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0009	34.476 0.0 0.122			Vel = 0.67
60			0.0 4.24						34.598			K Factor = 0.72

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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	*****
13 to 61	19.36 19.36		3.82 3.82	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0008	34.509 0.0 0.100		Vel = 0.60	
61			0.0 3.82						34.609		K Factor = 0.65	
14 to 62	19.36 19.36		3.37 3.37	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0006	34.547 0.0 0.079		Vel = 0.53	
62			0.0 3.37						34.626		K Factor = 0.57	
15 to 63	19.36 19.36		3.04 3.04	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0005	34.577 0.0 0.066		Vel = 0.48	
63			0.0 3.04						34.643		K Factor = 0.52	
16 to 64	19.36 19.36		2.80 2.8	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0004	34.604 0.0 0.057		Vel = 0.44	
64			0.0 2.80						34.661		K Factor = 0.48	
17 to 65	19.36 19.36		2.69 2.69	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0004	34.625 0.0 0.053		Vel = 0.42	
65			0.0 2.69						34.678		K Factor = 0.46	
18 to 66	19.36 19.36		2.67 2.67	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0004	34.645 0.0 0.051		Vel = 0.42	
66			0.0 2.67						34.696		K Factor = 0.45	
19 to 67	19.36 19.36		2.74 2.74	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0004	34.662 0.0 0.054		Vel = 0.43	
67			0.0 2.74						34.716		K Factor = 0.47	
20 to 68	19.36 19.36		2.89 2.89	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0005	34.677 0.0 0.060		Vel = 0.46	
68			0.0 2.89						34.737		K Factor = 0.49	
21 to 69	19.36 19.36		3.17 3.17	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0005	34.692 0.0 0.071		Vel = 0.50	
69			0.0 3.17						34.763		K Factor = 0.54	
22 to 37	19.36 19.360		4.19 4.19	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0009	34.702 0.0 0.120		Vel = 0.66	

Final Calculations : Hazen-Williams

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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	*****
			0.0 4.19						34.822		K Factor = 0.71	
23 to 36	19.36 19.36		3.98 3.98	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0008	34.711 0.0 0.109		Vel = 0.63	
			0.0 3.98						34.820		K Factor = 0.67	
24 to 35	19.36 19.36		3.80 3.8	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0008	34.718 0.0 0.100		Vel = 0.60	
			0.0 3.80						34.818		K Factor = 0.64	
25 to 34	19.36 19.36		3.69 3.69	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0007	34.722 0.0 0.095		Vel = 0.58	
			0.0 3.69						34.817		K Factor = 0.63	
26 to 33	19.36 19.36		3.61 3.61	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0007	34.725 0.0 0.091		Vel = 0.57	
			0.0 3.61						34.816		K Factor = 0.61	
27 to 32	19.36 19.36		3.56 3.56	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0007	34.727 0.0 0.088		Vel = 0.56	
			0.0 3.56						34.815		K Factor = 0.60	
28 to 31	19.36 19.36		3.54 3.54	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0007	34.728 0.0 0.087		Vel = 0.56	
			0.0 3.54						34.815		K Factor = 0.60	



Engineering & Consulting

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Job Name : WM 2403 - Puyallup WA
Building :
Location :
System :
Contract :
Data File : PUYALLUP Area 1 12.WXF

Water Supply Curve

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City Water Supply:

C1 - Static Pressure : 43
C2 - Residual Pressure: 37
C2 - Residual Flow : 1839

City Water Adjusted to Pump Inlet for Pf - Elev - Hose Flow

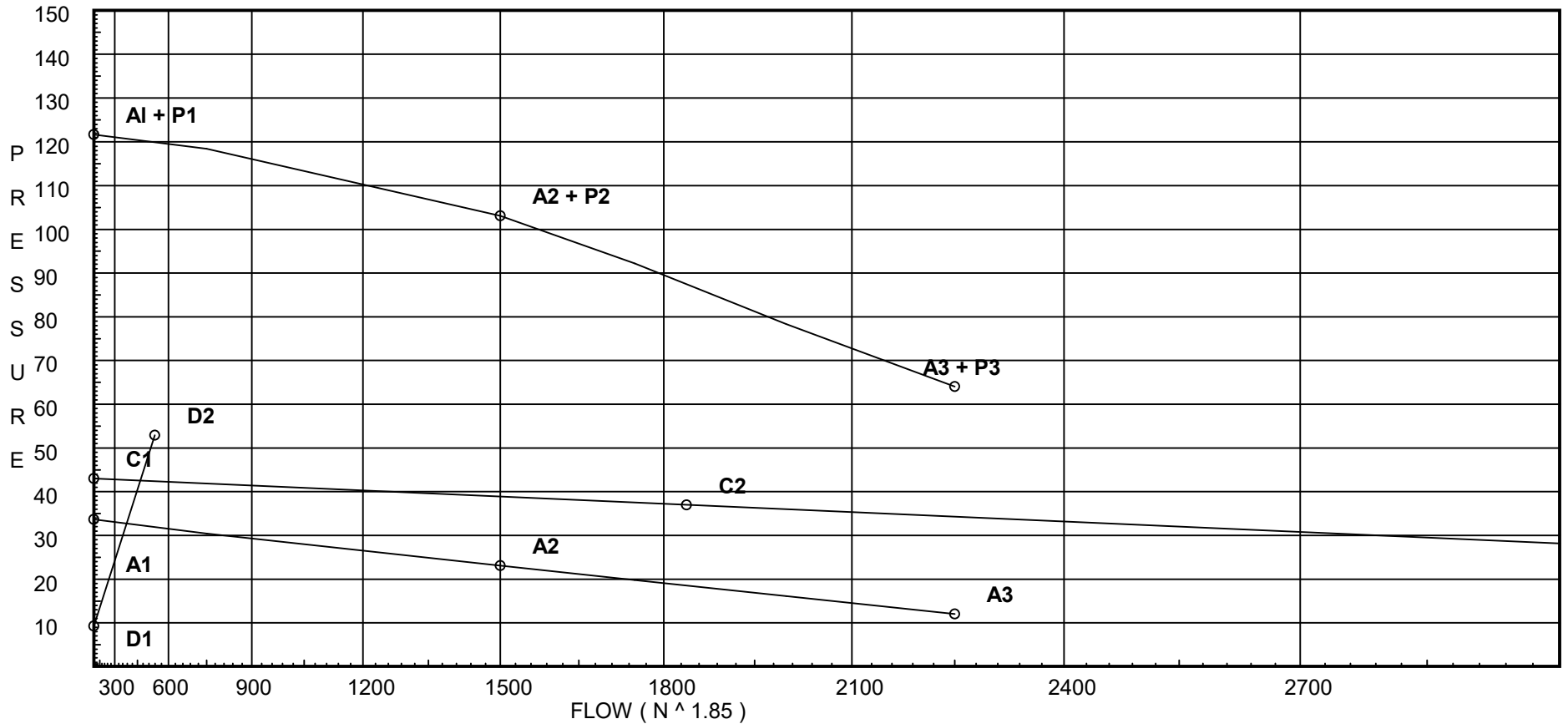
A1 - Adjusted Static: 33.685
A2 - Adj Resid : 23.069 @ 1500
A3 - Adj Resid : 12.041 @ 2250

Pump Data:

P1 - Pump Churn Pressure : 88
P2 - Pump Rated Pressure : 80
P2 - Pump Rated Flow : 1500
P3 - Pump Pressure @ Max Flow : 52
P3 - Pump Max Flow : 2250
City Residual Flow @ 0 = 5332.31
City Residual Flow @ 20 = 3802.14
City Water @ 150% of Pump = 34.29

Demand:

D1 - Elevation : 9.277
D2 - System Flow : 537.945
D2 - System Pressure : 52.904
Hose (Demand) : _____
D3 - System Demand : 537.945
Hose (Adj City) : 250
Safety Margin : 66.881



Fittings Used Summary

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Fitting Legend

Abbrev.	Name	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

Units Summary

Diameter Units Inches
 Length Units Feet
 Flow Units US Gallons per Minute
 Pressure Units Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Flow Summary - NFPA

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SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
PO	See Information on Pump Curve			119.785	537.95	52.904
TEST	43.0	37	1839.0	41.749	787.94	41.749

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
1	16.42	11.2	15.0	43.38	0.1 100
2	16.42	11.2	15.15	43.59	0.1 100
3	16.42	11.2	15.7	44.37	0.1 100
5	16.42	11.2	17.78	47.23	0.1 100
4	16.42		18.07		
6	14.5		22.17		
7	14.5		22.27		
8	14.5		22.61		
9	14.5		23.58		
10	19.36		26.91		
11	19.36		28.06		
12	19.36		29.59		
13	19.36		30.1		
14	19.36		30.68		
15	19.36		31.15		
16	19.36		31.57		
17	19.36		31.88		
18	19.36		32.18		
19	19.36		32.45		
20	19.36		32.68		
21	19.36		32.91		
22	19.36		33.07		
23	19.36		33.21		
24	19.36		33.31		
25	19.36		33.38		
26	19.36		33.42		
27	19.36		33.45		
28	19.36		33.46		
29	19.36		33.46		
30	19.36		34.8		
31	19.36		34.8		
32	19.36		34.8		
33	19.36		34.81		
34	19.36		34.82		
35	19.36		34.84		
36	19.36		34.87		
37	19.36		34.91		
38	19.36		35.06		
39	17.28		42.36		
40	4.0		49.59		
41	4.0		49.62		

Flow Summary - NFPA

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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>	
42	4.0		50.67			
43	2.0		51.74			
44	2.0		51.98			
PO	0.0		52.9			
PI	0.0		31.79			
45	2.0		31.14			
46	2.0		31.26			
47	-5.0		34.36			
TEST	-5.0		41.75	250.0		
48	16.42	11.2	15.07	43.48	0.1	100
49	16.42	11.2	15.22	43.69	0.1	100
50	16.42	11.2	15.76	44.47	0.1	100
52	16.42	11.2	17.86	47.33	0.1	100
51	16.42		18.15			
53	16.42	11.2	15.31	43.83	0.1	100
54	16.42	11.2	15.46	44.04	0.1	100
55	16.42	11.2	16.02	44.83	0.1	100
57	16.42	11.2	18.14	47.71	0.1	100
56	16.42		18.44			
58	19.36		30.99			
59	19.36		31.04			
60	19.36		31.46			
61	19.36		31.64			
62	19.36		31.9			
63	19.36		32.16			
64	19.36		32.44			
65	19.36		32.69			
66	19.36		32.98			
67	19.36		33.28			
68	19.36		33.6			
69	19.36		34.0			

Final Calculations : Hazen-Williams

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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	*****
1 to 2	16.42 16.42	11.20	43.38	2			7.500	120	15.000 0.0			
			43.38	2.067			7.500	0.0200	0.150	Vel =	4.15	
2 to 3	16.42 16.42	11.20	43.59	2			7.500	120	15.150 0.0			
			86.97	2.067			7.500	0.0727	0.545	Vel =	8.32	
3 to 4	16.42 16.42	11.20	44.37	2	T	10.0	5.250 10.000	120	15.695 0.0			
			131.34	2.067			15.250	0.1555	2.372	Vel =	12.56	
4			0.0 131.34						18.067	K Factor =	30.90	
5 to 4	16.42 16.42	11.20	47.23	2	T	10.0	2.250 10.000	120	17.780 0.0			
			47.23	2.067			12.250	0.0234	0.287	Vel =	4.52	
4 to 6	16.42 14.5		131.34	2	T	10.0	1.920 10.000	120	18.067 0.832			
			178.57	2.067			11.920	0.2747	3.274	Vel =	17.07	
6 to 7	14.5 14.5		0.0	4			11.580	120	22.173 0.0			
			178.57	4.26			11.580	0.0081	0.094	Vel =	4.02	
7 to 8	14.5 14.5		178.97	4			11.580	120	22.267 0.0			
			357.54	4.26			11.580	0.0293	0.339	Vel =	8.05	
8 to 9	14.5 14.5		180.41	4			15.530	120	22.606 0.0			
			537.95	4.26			15.530	0.0625	0.970	Vel =	12.11	
9 to 10	14.5 19.36		0.0	4	T 2E	26.334 26.334	34.500 52.668	120	23.576 -2.105			
			537.95	4.26			87.168	0.0624	5.440	Vel =	12.11	
10 to 11	19.36 19.36		-146.23	3			9.000	120	26.911 0.0			
			391.72	3.26			9.000	0.1278	1.150	Vel =	15.06	
11 to 12	19.36 19.36		-123.42	3			24.160	120	28.061 0.0			
			268.3	3.26			24.160	0.0634	1.532	Vel =	10.31	
12 to 13	19.36 19.36		-18.54	3			9.190	120	29.593 0.0			
			249.76	3.26			9.190	0.0556	0.511	Vel =	9.60	
13 to 14	19.36 19.36		-16.70	3			11.820	120	30.104 0.0			
			233.06	3.26			11.820	0.0488	0.577	Vel =	8.96	
14 to 15	19.36 19.36		-14.72	3			10.720	120	30.681 0.0			
			218.34	3.26			10.720	0.0434	0.465	Vel =	8.39	
15 to 16	19.36 19.36		-13.30	3			10.940	120	31.146 0.0			
			205.04	3.26			10.940	0.0386	0.422	Vel =	7.88	
16 to 17	19.36 19.36		-12.27	3			9.170	120	31.568 0.0			
			192.77	3.26			9.170	0.0344	0.315	Vel =	7.41	

Final Calculations : Hazen-Williams

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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	*****
17 to 18	19.36 19.36		-11.78 180.99	3 3.26			9.850 9.850	120 0.0307	31.883 0.0 0.302		Vel = 6.96	
18 to 19	19.36 19.36		-11.66 169.33	3 3.26			9.850 9.850	120 0.0270	32.185 0.0 0.266		Vel = 6.51	
19 to 20	19.36 19.36		-11.98 157.35	3 3.26			9.690 9.690	120 0.0236	32.451 0.0 0.229		Vel = 6.05	
20 to 21	19.36 19.36		-12.65 144.7	3 3.26			11.470 11.470	120 0.0202	32.680 0.0 0.232		Vel = 5.56	
21 to 22	19.36 19.36		-13.86 130.84	3 3.26			9.500 9.500	120 0.0168	32.912 0.0 0.160		Vel = 5.03	
22 to 23	19.36 19.36		-18.34 112.5	3 3.26			10.580 10.580	120 0.0127	33.072 0.0 0.134		Vel = 4.32	
23 to 24	19.36 19.360		-17.40 95.1	3 3.26			11.600 11.600	120 0.0093	33.206 0.0 0.108		Vel = 3.66	
24 to 25	19.360 19.36		-16.60 78.5	3 3.26			9.630 9.630	120 0.0065	33.314 0.0 0.063		Vel = 3.02	
25 to 26	19.36 19.36		-16.13 62.37	3 3.26			10.680 10.680	120 0.0043	33.377 0.0 0.046		Vel = 2.40	
26 to 27	19.36 19.36		-15.78 46.59	3 3.26			9.270 9.270	120 0.0025	33.423 0.0 0.023		Vel = 1.79	
27 to 28	19.36 19.36		-15.59 31.0	3 3.26			9.410 9.410	120 0.0012	33.446 0.0 0.011		Vel = 1.19	
28 to 29	19.36 19.36		-15.51 15.49	3 3.26			7.660 7.660	120 0.0003	33.457 0.0 0.002		Vel = 0.60	
29 to 30	19.36 19.36		0.0 15.49	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0101	33.459 0.0 1.341		Vel = 2.44	
30 to 31	19.36 19.36		0.0 15.49	4 4.26			7.660 7.660	120 0.0001	34.800 0.0 0.001		Vel = 0.35	
31 to 32	19.36 19.36		15.51 31.0	4 4.26			9.410 9.410	120 0.0003	34.801 0.0 0.003		Vel = 0.70	
32 to 33	19.36 19.36		15.59 46.59	4 4.26			9.270 9.270	120 0.0006	34.804 0.0 0.006		Vel = 1.05	

Final Calculations : Hazen-Williams

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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	*****
33 to 34	19.36 19.36		15.78 62.37	4 4.26			10.680 10.680	120 0.0012	34.810 0.0 0.013			Vel = 1.40
34 to 35	19.36 19.36		16.13 78.5	4 4.26			9.630 9.630	120 0.0018	34.823 0.0 0.017			Vel = 1.77
35 to 36	19.36 19.36		16.60 95.1	4 4.26			11.600 11.600	120 0.0025	34.840 0.0 0.029			Vel = 2.14
36 to 37	19.36 19.360		17.40 112.5	4 4.26			10.580 10.580	120 0.0035	34.869 0.0 0.037			Vel = 2.53
37 to 38	19.360 19.36		18.34 130.84	4 4.26	T	26.334	7.500 26.334 33.834	120 0.0046	34.906 0.0 0.154			Vel = 2.95
38 to 39	19.36 17.28		407.11 537.95	6 6.357	7E	123.219	596.400 123.219 719.619	120 0.0089	35.060 0.901 6.394			Vel = 5.44
39 to 40	17.28 4		0.0 537.95	6 6.357	T G Fsp	37.72 3.772 0.0	13.280 41.492 54.772	120 0.0089	42.355 6.752 0.486		** Fixed Loss = 1	Vel = 5.44
40 to 41	4 4		0.0 537.95	6 6.357			2.520 2.520	120 0.0091	49.593 0.0 0.023			Vel = 5.44
41 to 42	4 4		0.0 537.95	4 4.26	E	13.167	3.740 13.167 16.907	120 0.0624	49.616 0.0 1.055			Vel = 12.11
42 to 43	4 2		0.0 537.95	8 8.249	3E	63.423	18.940 63.423 82.363	120 0.0025	50.671 0.866 0.206			Vel = 3.23
43 to 44	2 2		0.0 537.95	8 8.249	E B S	21.141 14.094 52.853	7.160 88.088 95.248	120 0.0025	51.743 0.0 0.238			Vel = 3.23
44 to PO	2 0		0.0 537.95	8 8.249	E	21.141	1.490 21.141 22.631	120 0.0025	51.981 0.866 0.057			Vel = 3.23
PO			0.0 537.95						52.904		K Factor = 73.96	
System Demand Pressure									52.904			
Safety Margin									66.881			
Continuation Pressure									119.785			
Pressure @ Pump Outlet									119.785			
Pressure From Pump Curve									-87.995			
Pressure @ Pump Inlet									31.790			
PI to 45	0 2		0.0 537.95	8 8.249	3E	63.423	22.030 63.423 85.453	120 0.0025	31.790 -0.866 0.213			Vel = 3.23
45 to 46	2 2		0.0 537.95	8 8.249	2E G	42.282 4.698	2.350 46.980 49.330	120 0.0025	31.137 0.0 0.124			Vel = 3.23

Final Calculations : Hazen-Williams

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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	*****
46 to 47	2 -5		0.0 537.95	8 8.249	E	21.141	7.000 21.141 28.141	120 0.0025	31.261 3.032 0.069			Vel = 3.23
47 to TEST	-5 -5		0.0 537.95	8 8.27	E	28.468	180.000 28.468 208.468	140 0.0019	34.362 7.000 0.387			* * Fixed Loss = 7 Vel = 3.21
TEST			250.00 787.95						41.749			Qa = 250.00 K Factor = 121.95
48 to 49	16.42 16.42	11.20	43.48	2 2.067			7.500 7.500	120 0.0200	15.068 0.0 0.150			Vel = 4.16
49 to 50	16.42 16.42	11.20	43.69	2 2.067			7.500 7.500	120 0.0729	15.218 0.0 0.547			Vel = 8.33
50 to 51	16.42 16.42	11.20	44.47	2 2.067	T	10.0	5.250 10.000 15.250	120 0.1563	15.765 0.0 2.383			Vel = 12.59
51			0.0 131.64						18.148			K Factor = 30.90
52 to 51	16.42 16.42	11.20	47.33	2 2.067	T	10.0	2.250 10.000 12.250	120 0.0236	17.859 0.0 0.289			Vel = 4.53
51 to 7	16.42 14.5		131.64	2 2.067	T	10.0	1.920 10.000 11.920	120 0.2758	18.148 0.832 3.287			Vel = 17.11
7			0.0 178.97						22.267			K Factor = 37.93
53 to 54	16.42 16.42	11.20	43.83	2 2.067			7.500 7.500	120 0.0204	15.312 0.0 0.153			Vel = 4.19
54 to 55	16.42 16.42	11.20	44.04	2 2.067			7.500 7.500	120 0.0740	15.465 0.0 0.555			Vel = 8.40
55 to 56	16.42 16.42	11.20	44.83	2 2.067	T	10.0	5.250 10.000 15.250	120 0.1586	16.020 0.0 2.418			Vel = 12.69
56			0.0 132.70						18.438			K Factor = 30.90
57 to 56	16.42 16.42	11.20	47.71	2 2.067	T	10.0	2.250 10.000 12.250	120 0.0239	18.145 0.0 0.293			Vel = 4.56
56 to 8	16.42 14.5		132.70	2 2.067	T	10.0	1.920 10.000 11.920	120 0.2799	18.438 0.832 3.336			Vel = 17.25
8			0.0 180.41						22.606			K Factor = 37.94
10 to 58	19.36 19.36		146.22	3 3.068	2T	30.0	117.190 30.000 147.190	120 0.0277	26.911 0.0 4.082			Vel = 6.35

Final Calculations : Hazen-Williams

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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	*****
58 to 59	19.36 19.36		0.0 146.22	4 4.26			9.000 9.000	120 0.0057	30.993 0.0 0.051			Vel = 3.29
59 to 60	19.36 19.36		123.42 269.64	4 4.26			24.160 24.160	120 0.0174	31.044 0.0 0.420			Vel = 6.07
60 to 61	19.36 19.36		18.54 288.18	4 4.26			9.190 9.190	120 0.0196	31.464 0.0 0.180			Vel = 6.49
61 to 62	19.36 19.36		16.70 304.88	4 4.26			11.820 11.820	120 0.0218	31.644 0.0 0.258			Vel = 6.86
62 to 63	19.36 19.36		14.72 319.6	4 4.26			10.720 10.720	120 0.0239	31.902 0.0 0.256			Vel = 7.19
63 to 64	19.36 19.36		13.31 332.91	4 4.26			10.940 10.940	120 0.0257	32.158 0.0 0.281			Vel = 7.49
64 to 65	19.36 19.36		12.27 345.18	4 4.26			9.170 9.170	120 0.0275	32.439 0.0 0.252			Vel = 7.77
65 to 66	19.36 19.36		11.77 356.95	4 4.26			9.850 9.850	120 0.0292	32.691 0.0 0.288			Vel = 8.03
66 to 67	19.36 19.36		11.67 368.62	4 4.26			9.850 9.850	120 0.0310	32.979 0.0 0.305			Vel = 8.30
67 to 68	19.36 19.36		11.97 380.59	4 4.26			9.690 9.690	120 0.0329	33.284 0.0 0.319			Vel = 8.57
68 to 69	19.36 19.36		12.65 393.24	4 4.26			11.470 11.470	120 0.0350	33.603 0.0 0.401			Vel = 8.85
69 to 38	19.36 19.36		13.86 407.1	4 4.26	T	26.334	2.000 26.334 28.334	120 0.0373	34.004 0.0 1.056			Vel = 9.16
38			0.0 407.10						35.060			K Factor = 68.75
11 to 59	19.36 19.36		123.42 123.42	3 3.068	2T	30.0	117.190 30.000 147.190	120 0.0203	28.061 0.0 2.983			Vel = 5.36
59			0.0 123.42						31.044			K Factor = 22.15
12 to 60	19.36 19.36		18.54 18.54	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0140	29.593 0.0 1.871			Vel = 2.92
60			0.0 18.54						31.464			K Factor = 3.31

Final Calculations : Hazen-Williams

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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	*****
13 to 61	19.36 19.36		16.70 16.7	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0116	30.104 0.0 1.540		Vel = 2.63	
61			0.0 16.70						31.644		K Factor = 2.97	
14 to 62	19.36 19.36		14.72 14.72	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0092	30.681 0.0 1.221		Vel = 2.32	
62			0.0 14.72						31.902		K Factor = 2.61	
15 to 63	19.36 19.36		13.30 13.3	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0076	31.146 0.0 1.012		Vel = 2.10	
63			0.0 13.30						32.158		K Factor = 2.35	
16 to 64	19.36 19.36		12.27 12.27	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0065	31.568 0.0 0.871		Vel = 1.93	
64			0.0 12.27						32.439		K Factor = 2.15	
17 to 65	19.36 19.36		11.78 11.78	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0061	31.883 0.0 0.808		Vel = 1.86	
65			0.0 11.78						32.691		K Factor = 2.06	
18 to 66	19.36 19.36		11.67 11.67	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0060	32.185 0.0 0.794		Vel = 1.84	
66			0.0 11.67						32.979		K Factor = 2.03	
19 to 67	19.36 19.36		11.97 11.97	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0063	32.451 0.0 0.833		Vel = 1.89	
67			0.0 11.97						33.284		K Factor = 2.07	
20 to 68	19.36 19.36		12.65 12.65	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0069	32.680 0.0 0.923		Vel = 1.99	
68			0.0 12.65						33.603		K Factor = 2.18	
21 to 69	19.36 19.36		13.86 13.86	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0082	32.912 0.0 1.092		Vel = 2.18	
69			0.0 13.86						34.004		K Factor = 2.38	
22 to 37	19.36 19.360		18.34 18.34	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0138	33.072 0.0 1.834		Vel = 2.89	

Final Calculations : Hazen-Williams

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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	*****
			0.0 18.34						34.906		K Factor = 3.10	
23 to 36	19.36 19.36		17.40 17.4	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0125	33.206 0.0 1.663		Vel = 2.74	
			0.0 17.40						34.869		K Factor = 2.95	
24 to 35	19.360 19.36		16.60 16.6	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0115	33.314 0.0 1.526		Vel = 2.62	
			0.0 16.60						34.840		K Factor = 2.81	
25 to 34	19.36 19.36		16.13 16.13	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0109	33.377 0.0 1.446		Vel = 2.54	
			0.0 16.13						34.823		K Factor = 2.73	
26 to 33	19.36 19.36		15.78 15.78	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0104	33.423 0.0 1.387		Vel = 2.49	
			0.0 15.78						34.810		K Factor = 2.67	
27 to 32	19.36 19.36		15.60 15.6	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0102	33.446 0.0 1.358		Vel = 2.46	
			0.0 15.60						34.804		K Factor = 2.64	
28 to 31	19.36 19.36		15.51 15.51	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0101	33.457 0.0 1.344		Vel = 2.44	
			0.0 15.51						34.801		K Factor = 2.63	



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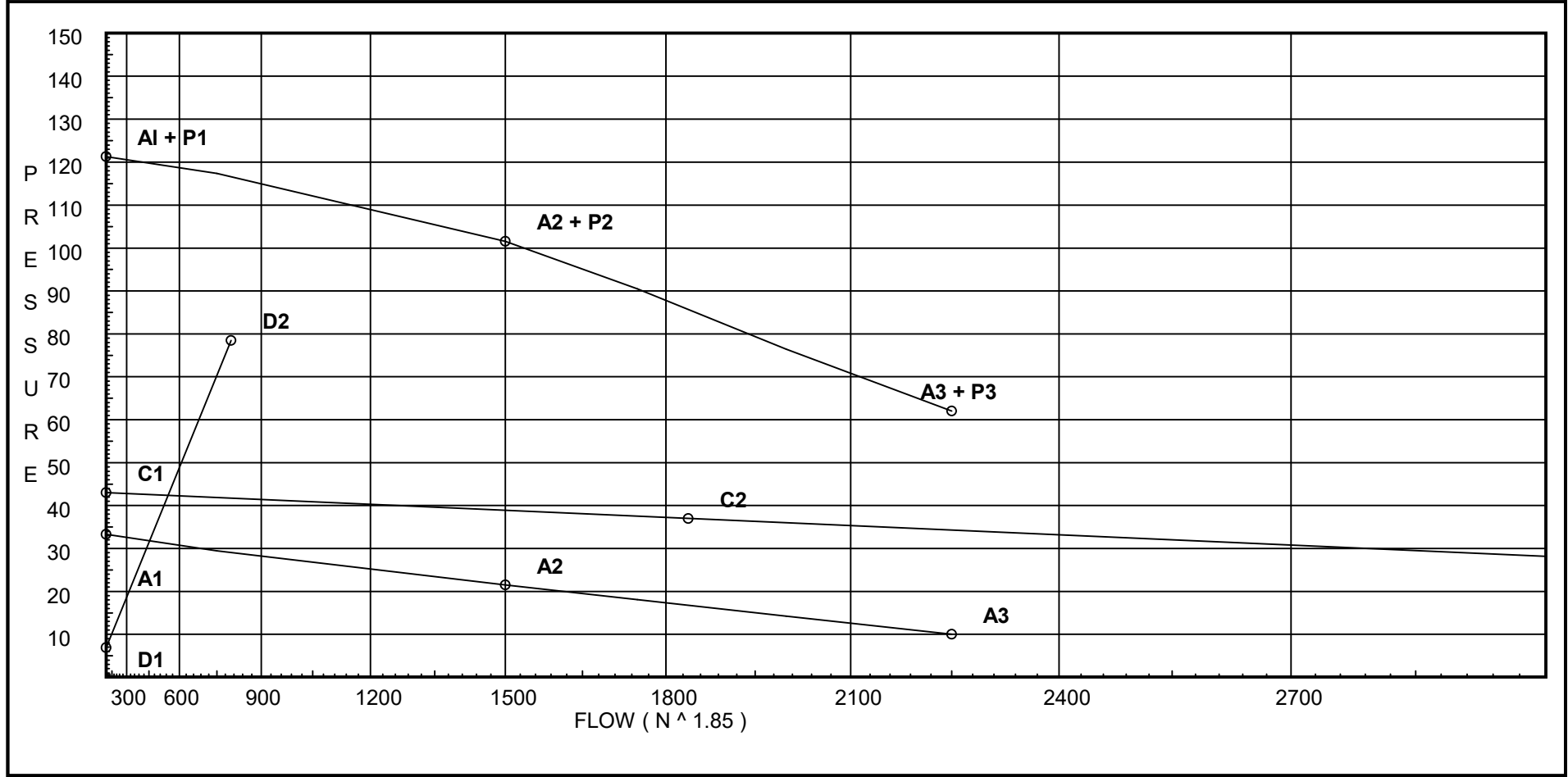
Job Name : WM 2403 - Puyallup WA
Building :
Location :
System :
Contract :
Data File : PUYALLUP Area 2.WXF

Water Supply Curve

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City Water Supply: C1 - Static Pressure : 43 C2 - Residual Pressure: 37 C2 - Residual Flow : 1839 City Water Adjusted to Pump Inlet for Pf - Elev - Hose Flow A1 - Adjusted Static: 33.295 A2 - Adj Resid : 21.535 @ 1500 A3 - Adj Resid : 9.999 @ 2250	Pump Data: P1 - Pump Churn Pressure : 88 P2 - Pump Rated Pressure : 80 P2 - Pump Rated Flow : 1500 P3 - Pump Pressure @ Max Flow : 52 P3 - Pump Max Flow : 2250 City Residual Flow @ 0 = 5332.31 City Residual Flow @ 20 = 3802.14 City Water @ 150% of Pump = 34.29	Demand: D1 - Elevation : 6.930 D2 - System Flow : 800.22 D2 - System Pressure : 78.445 Hose (Demand) : _____ D3 - System Demand : 800.22 Hose (Adj City) : 500 Safety Margin : 38.174
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Fittings Used Summary

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Fitting Legend

Abbrev.	Name	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

Units Summary

Diameter Units Inches
 Length Units Feet
 Flow Units US Gallons per Minute
 Pressure Units Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

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>
PO	See Information on Pump Curve			116.619	800.22	78.445
TEST	43.0	37	1839.0	39.841	1300.22	39.841

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>
70	11.0	11	13.22	40.0	100
71	14.5		14.29		
72	14.5		18.27		
73	14.5		18.52		
74	14.5		21.32	355.0	
6	14.5		21.38		
75	14.5		21.73		
7	14.5		22.11		
76	14.5		22.28		
8	14.5		23.25		
77	14.5		23.52		
9	14.5		25.2		
10	19.36		34.44		
11	19.36		36.83		
12	19.36		40.03		
13	19.36		41.09		
14	19.36		42.3		
15	19.36		43.26		
16	19.36		44.14		
17	19.36		44.8		
18	19.36		45.43		
19	19.36		45.99		
20	19.36		46.46		
21	19.36		46.95		
22	19.36		47.28		
23	19.36		47.56		
24	19.36		47.79		
25	19.36		47.92		
26	19.36		48.01		
27	19.36		48.06		
28	19.36		48.08		
29	19.36		48.09		
30	19.36		50.88		
31	19.36		50.88		
32	19.36		50.89		
33	19.36		50.9		
34	19.36		50.93		
35	19.36		50.97		
36	19.36		51.03		
37	19.36		51.1		
38	19.36		51.42		

Flow Summary - NFPA

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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>	
78	17.44		55.94			
39	17.28		65.66			
40	4.0		73.42			
41	4.0		73.47			
42	4.0		75.67			
43	2.0		76.96			
44	2.0		77.46			
PO	0.0		78.44			
PI	0.0		29.02			
45	2.0		28.6			
46	2.0		28.86			
47	-5.0		32.03			
TEST	-5.0		39.84	500.0		
79	11.0	11	15.44	43.22	0.4	100
80	11.0	11	16.54	44.73	0.4	100
81	14.5		18.2			
82	11.0	11	14.71	42.19	0.4	100
83	14.5		16.04			
84	14.5		18.33			
85	14.5		18.41			
86	14.5		18.9			
87	11.0	11	15.34	43.09	0.4	100
88	11.0	11	15.73	43.63	0.4	100
89	11.0	11	17.17	45.58	0.4	100
90	14.5		20.73			
91	11.0	11	18.56	47.38	0.4	100
92	14.5		20.57			
93	11.0	11	18.08	46.78	0.4	100
94	14.5		21.89			
95	11.0	11	19.53	48.62	0.4	100
96	14.5		21.72			
58	19.36		42.95			
59	19.36		43.05			
60	19.36		43.93			
61	19.36		44.3			
62	19.36		44.84			
63	19.36		45.37			
64	19.36		45.96			
65	19.36		46.48			
66	19.36		47.09			
67	19.36		47.72			
68	19.36		48.39			
69	19.36		49.22			

Final Calculations : Hazen-Williams

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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	*****
70 to 71	11 14.5	11.00	40.00 40.0	1 1.049	E	2.0	3.500 2.000 5.500	120	13.223 -1.516 2.581		Vel = 14.85	
71 to 72	14.5 14.5		0.0 40.0	1 1.049	T	5.0	3.480 5.000 8.480	120	14.288 0.0 3.978		Vel = 14.85	
72 to 73	14.5 14.5		44.74 84.74	2 2.067			3.750 3.750	120	18.266 0.0 0.259		Vel = 8.10	
73 to 74	14.5 14.5		43.22 127.96	2 2.067	T	10.0	8.840 10.000 18.840	120	18.525 0.0 2.793		Vel = 12.23	
74 to 6	14.5 14.5	+ 355.00	355.00 482.96	4 4.26			1.230 1.230	120	21.318 0.0 0.063		Vel = 10.87	
6 to 75	14.5 14.5		0.0 482.96	4 4.26			6.770 6.770	120	21.381 0.0 0.346		Vel = 10.87	
75 to 7	14.5 14.5		128.90 611.86	4 4.26			4.810 4.810	120	21.727 0.0 0.381		Vel = 13.77	
7 to 76	14.5 14.5		0.0 611.86	4 4.26			2.180 2.180	120	22.108 0.0 0.173		Vel = 13.77	
76 to 8	14.5 14.5		92.97 704.83	4 4.26			9.400 9.400	120	22.281 0.0 0.967		Vel = 15.87	
8 to 77	14.5 14.5		0.0 704.83	4 4.26			2.600 2.600	120	23.248 0.0 0.268		Vel = 15.87	
77 to 9	14.5 14.5		95.39 800.22	4 4.26			12.930 12.930	120	23.516 0.0 1.682		Vel = 18.01	
9 to 10	14.5 19.36		0.0 800.22	4 4.26	T 2E	26.334 26.334	34.500 52.668 87.168	120	25.198 -2.105 11.343		Vel = 18.01	
10 to 11	19.36 19.36		-217.51 582.71	3 3.26			9.000 9.000	120	34.436 0.0 2.397		Vel = 22.40	
11 to 12	19.36 19.36		-183.59 399.12	3 3.26			24.160 24.160	120	36.833 0.0 3.194		Vel = 15.34	
12 to 13	19.36 19.36		-27.59 371.53	3 3.26			9.190 9.190	120	40.027 0.0 1.065		Vel = 14.28	
13 to 14	19.36 19.36		-24.83 346.7	3 3.26			11.820 11.820	120	41.092 0.0 1.204		Vel = 13.33	

Final Calculations : Hazen-Williams

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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	*****
14 to 15	19.36 19.36		-21.91 324.79	3 3.26			10.720 10.720	120 0.0903	42.296 0.0 0.968			Vel = 12.48
15 to 16	19.36 19.36		-19.79 305.0	3 3.26			10.940 10.940	120 0.0804	43.264 0.0 0.880			Vel = 11.72
16 to 17	19.36 19.36		-18.24 286.76	3 3.26			9.170 9.170	120 0.0718	44.144 0.0 0.658			Vel = 11.02
17 to 18	19.36 19.36		-17.52 269.24	3 3.26			9.850 9.850	120 0.0638	44.802 0.0 0.628			Vel = 10.35
18 to 19	19.36 19.36		-17.36 251.88	3 3.26			9.850 9.850	120 0.0564	45.430 0.0 0.556			Vel = 9.68
19 to 20	19.36 19.36		-17.81 234.07	3 3.26			9.690 9.690	120 0.0493	45.986 0.0 0.478			Vel = 9.00
20 to 21	19.36 19.36		-18.82 215.25	3 3.26			11.470 11.470	120 0.0422	46.464 0.0 0.484			Vel = 8.27
21 to 22	19.36 19.36		-20.61 194.64	3 3.26			9.500 9.500	120 0.0349	46.948 0.0 0.332			Vel = 7.48
22 to 23	19.36 19.36		-27.29 167.35	3 3.26			10.580 10.580	120 0.0266	47.280 0.0 0.281			Vel = 6.43
23 to 24	19.36 19.36		-25.88 141.47	3 3.26			11.600 11.600	120 0.0194	47.561 0.0 0.225			Vel = 5.44
24 to 25	19.36 19.36		-24.70 116.77	3 3.26			9.630 9.630	120 0.0136	47.786 0.0 0.131			Vel = 4.49
25 to 26	19.36 19.36		-23.99 92.78	3 3.26			10.680 10.680	120 0.0089	47.917 0.0 0.095			Vel = 3.57
26 to 27	19.36 19.36		-23.47 69.31	3 3.26			9.270 9.270	120 0.0052	48.012 0.0 0.048			Vel = 2.66
27 to 28	19.36 19.36		-23.20 46.11	3 3.26			9.410 9.410	120 0.0024	48.060 0.0 0.023			Vel = 1.77
28 to 29	19.36 19.36		-23.07 23.04	3 3.26			7.660 7.660	120 0.0007	48.083 0.0 0.005			Vel = 0.89
29 to 30	19.36 19.36		0.0 23.04	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0210	48.088 0.0 2.796			Vel = 3.63

Final Calculations : Hazen-Williams

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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	*****
30 to 31	19.36 19.36		0.0 23.04	4 4.26			7.660 7.660	120 0.0001	50.884 0.0 0.001			Vel = 0.52
31 to 32	19.36 19.36		23.07 46.11	4 4.26			9.410 9.410	120 0.0006	50.885 0.0 0.006			Vel = 1.04
32 to 33	19.36 19.36		23.20 69.31	4 4.26			9.270 9.270	120 0.0014	50.891 0.0 0.013			Vel = 1.56
33 to 34	19.36 19.36		23.47 92.78	4 4.26			10.680 10.680	120 0.0024	50.904 0.0 0.026			Vel = 2.09
34 to 35	19.36 19.36		23.99 116.77	4 4.26			9.630 9.630	120 0.0037	50.930 0.0 0.036			Vel = 2.63
35 to 36	19.36 19.36		24.70 141.47	4 4.26			11.600 11.600	120 0.0053	50.966 0.0 0.061			Vel = 3.18
36 to 37	19.36 19.36		25.88 167.35	4 4.26			10.580 10.580	120 0.0072	51.027 0.0 0.076			Vel = 3.77
37 to 38	19.36 19.36		27.29 194.64	4 4.26	T	26.334	7.500 26.334 33.834	120 0.0095	51.103 0.0 0.322			Vel = 4.38
38 to 78	19.36 17.44		605.58 800.22	6 6.357	E	17.603	181.220 17.603 198.823	120 0.0185	51.425 0.832 3.683			Vel = 8.09
78 to 39	17.44 17.28		0.0 800.22	6 6.357	6E	105.616	415.180 105.616 520.796	120 0.0185	55.940 0.069 9.648			Vel = 8.09
39 to 40	17.28 4		0.0 800.22	6 6.357	T G Fsp	37.72 3.772 0.0	13.280 41.492 54.772	120 0.0185	65.657 6.752 1.014		** Fixed Loss = 1	Vel = 8.09
40 to 41	4 4		0.0 800.22	6 6.357			2.520 2.520	120 0.0187	73.423 0.0 0.047			Vel = 8.09
41 to 42	4 4		0.0 800.22	4 4.26	E	13.167	3.740 13.167 16.907	120 0.1301	73.470 0.0 2.200			Vel = 18.01
42 to 43	4 2		0.0 800.22	8 8.249	3E	63.423	18.940 63.423 82.363	120 0.0052	75.670 0.866 0.429			Vel = 4.80
43 to 44	2 2		0.0 800.22	8 8.249	E B S	21.141 14.094 52.853	7.160 88.088 95.248	120 0.0052	76.965 0.0 0.496			Vel = 4.80
44 to PO	2 0		0.0 800.22	8 8.249	E	21.141	1.490 21.141 22.631	120 0.0052	77.461 0.866 0.118			Vel = 4.80

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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	*****
PO			0.0 800.22					78.445		K Factor = 90.35	
System Demand Pressure								78.445			
Safety Margin								38.174			
Continuation Pressure								116.619			
Pressure @ Pump Outlet								116.619			
Pressure From Pump Curve								-87.599			
Pressure @ Pump Inlet								29.020			
PI	0		0.0	8	3E	63.423	22.030	120	29.020		
to							63.423		-0.866		
45	2		800.22	8.249			85.453	0.0052	0.445	Vel = 4.80	
45	2		0.0	8	2E	42.282	2.350	120	28.599		
to					G	4.698	46.980		0.0		
46	2		800.22	8.249			49.330	0.0052	0.257	Vel = 4.80	
46	2		0.0	8	E	21.141	7.000	120	28.856		
to							21.141		3.032		
47	-5		800.22	8.249			28.141	0.0052	0.146	Vel = 4.80	
47	-5		0.0	8	E	28.468	180.000	140	32.034		
to							28.468		7.000	** Fixed Loss = 7	
TEST	-5		800.22	8.27			208.468	0.0039	0.806	Vel = 4.78	
TEST			500.00 1300.22						39.840	Qa = 500.00 K Factor = 206.00	
79	11	11.00	43.22	1	T	5.0	3.500	120	15.439		
to							5.000		-1.516		
73	14.5		43.22	1.049			8.500	0.5414	4.602	Vel = 16.04	
73			0.0 43.22						18.525	K Factor = 10.04	
80	11	11.00	44.74	1	E	2.0	3.500	120	16.539		
to							2.000		-1.516		
81	14.5		44.74	1.049			5.500	0.5771	3.174	Vel = 16.61	
81	14.5		0.0	2			3.250	120	18.197		
to									0.0		
72	14.5		44.74	2.067			3.250	0.0212	0.069	Vel = 4.28	
72			0.0 44.74						18.266	K Factor = 10.47	
82	11	11.00	42.19	1	E	2.0	3.500	120	14.712		
to							2.000		-1.516		
83	14.5		42.19	1.049			5.500	0.5176	2.847	Vel = 15.66	
83	14.5		0.0	1	E	2.0	2.410	120	16.043		
to							2.000		0.0		
84	14.5		42.19	1.049			4.410	0.5179	2.284	Vel = 15.66	
84	14.5		0.0	2			4.140	120	18.327		
to									0.0		
85	14.5		42.19	2.067			4.140	0.0191	0.079	Vel = 4.03	
85	14.5		43.09	2			7.000	120	18.406		
to									0.0		
86	14.5		85.28	2.067			7.000	0.0700	0.490	Vel = 8.15	

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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	*****
86 to 75	14.5 14.5		43.63 128.91	2 2.067	T 10.0	8.840 10.000 18.840	120 0.1503	18.896 0.0 2.831		Vel = 12.33	
75			0.0 128.91					21.727		K Factor = 27.66	
87 to 85	11 14.5	11.00	43.09 43.09	1 1.049	T 5.0	3.500 5.000 8.500	120 0.5385	15.345 -1.516 4.577		Vel = 16.00	
85			0.0 43.09					18.406		K Factor = 10.04	
88 to 86	11 14.5	11.00	43.63 43.63	1 1.049	T 5.0	3.500 5.000 8.500	120 0.5509	15.729 -1.516 4.683		Vel = 16.20	
86			0.0 43.63					18.896		K Factor = 10.04	
89 to 90	11 14.5	11.00	45.58 45.58	1 1.049	T 5.0	3.500 5.000 8.500	120 0.5974	17.172 -1.516 5.078		Vel = 16.92	
90 to 76	14.5 14.5		47.39 92.97	2 2.067	T 10.0	8.840 10.000 18.840	120 0.0821	20.734 0.0 1.547		Vel = 8.89	
76			0.0 92.97					22.281		K Factor = 19.70	
91 to 92	11 14.5	11.00	47.38 47.38	1 1.049	E 2.0	3.500 2.000 5.500	120 0.6418	18.555 -1.516 3.530		Vel = 17.59	
92 to 90	14.5 14.5		0.0 47.38	2 2.067		7.000 7.000	120 0.0236	20.569 0.0 0.165		Vel = 4.53	
90			0.0 47.38					20.734		K Factor = 10.41	
93 to 94	11 14.5	11.00	46.78 46.78	1 1.049	T 5.0	3.500 5.000 8.500	120 0.6266	18.083 -1.516 5.326		Vel = 17.37	
94 to 77	14.5 14.5		48.61 95.39	2 2.067	T 10.0	8.840 10.000 18.840	120 0.0861	21.893 0.0 1.623		Vel = 9.12	
77			0.0 95.39					23.516		K Factor = 19.67	
95 to 96	11 14.5	11.00	48.62 48.62	1 1.049	E 2.0	3.500 2.000 5.500	120 0.6731	19.534 -1.516 3.702		Vel = 18.05	
96 to 94	14.5 14.5		0.0 48.62	2 2.067		7.000 7.000	120 0.0247	21.720 0.0 0.173		Vel = 4.65	
94			0.0 48.62					21.893		K Factor = 10.39	

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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	*****
10 to 58	19.36 19.36		217.52 217.52	3 3.068	2T	30.0	117.190 30.000 147.190	120 0.0578	34.436 0.0 8.510		Vel = 9.44	
58 to 59	19.36 19.36		0.0 217.52	4 4.26			9.000 9.000	120 0.0117	42.946 0.0 0.105		Vel = 4.90	
59 to 60	19.36 19.36		183.59 401.11	4 4.26			24.160 24.160	120 0.0363	43.051 0.0 0.876		Vel = 9.03	
60 to 61	19.36 19.36		27.58 428.69	4 4.26			9.190 9.190	120 0.0410	43.927 0.0 0.377		Vel = 9.65	
61 to 62	19.36 19.36		24.84 453.53	4 4.26			11.820 11.820	120 0.0455	44.304 0.0 0.538		Vel = 10.21	
62 to 63	19.36 19.36		21.90 475.43	4 4.26			10.720 10.720	120 0.0496	44.842 0.0 0.532		Vel = 10.70	
63 to 64	19.36 19.36		19.79 495.22	4 4.26			10.940 10.940	120 0.0536	45.374 0.0 0.586		Vel = 11.15	
64 to 65	19.36 19.36		18.25 513.47	4 4.26			9.170 9.170	120 0.0573	45.960 0.0 0.525		Vel = 11.56	
65 to 66	19.36 19.36		17.51 530.98	4 4.26			9.850 9.850	120 0.0610	46.485 0.0 0.601		Vel = 11.95	
66 to 67	19.36 19.36		17.36 548.34	4 4.26			9.850 9.850	120 0.0646	47.086 0.0 0.636		Vel = 12.34	
67 to 68	19.36 19.36		17.81 566.15	4 4.26			9.690 9.690	120 0.0686	47.722 0.0 0.665		Vel = 12.74	
68 to 69	19.36 19.36		18.82 584.97	4 4.26			11.470 11.470	120 0.0729	48.387 0.0 0.836		Vel = 13.17	
69 to 38	19.36 19.36		20.62 605.59	4 4.26	T	26.334	2.000 26.334 28.334	120 0.0777	49.223 0.0 2.202		Vel = 13.63	
38			0.0 605.59						51.425		K Factor = 84.45	
11 to 59	19.36 19.36		183.59 183.59	3 3.068	2T	30.0	117.190 30.000 147.190	120 0.0422	36.833 0.0 6.218		Vel = 7.97	
59			0.0 183.59						43.051		K Factor = 27.98	
12 to 60	19.36 19.36		27.58 27.58	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0293	40.027 0.0 3.900		Vel = 4.35	

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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	*****
60			0.0 27.58						43.927		K Factor = 4.16	
13 to 61	19.36 19.36		24.84 24.84	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0241	41.092 0.0 3.212		Vel = 3.91	
61			0.0 24.84						44.304		K Factor = 3.73	
14 to 62	19.36 19.36		21.90 21.9	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0191	42.296 0.0 2.546		Vel = 3.45	
62			0.0 21.90						44.842		K Factor = 3.27	
15 to 63	19.36 19.36		19.79 19.79	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0158	43.264 0.0 2.110		Vel = 3.12	
63			0.0 19.79						45.374		K Factor = 2.94	
16 to 64	19.36 19.36		18.25 18.25	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0136	44.144 0.0 1.816		Vel = 2.88	
64			0.0 18.25						45.960		K Factor = 2.69	
17 to 65	19.36 19.36		17.52 17.52	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0126	44.802 0.0 1.683		Vel = 2.76	
65			0.0 17.52						46.485		K Factor = 2.57	
18 to 66	19.36 19.36		17.36 17.36	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0124	45.430 0.0 1.656		Vel = 2.74	
66			0.0 17.36						47.086		K Factor = 2.53	
19 to 67	19.36 19.36		17.81 17.81	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0130	45.986 0.0 1.736		Vel = 2.81	
67			0.0 17.81						47.722		K Factor = 2.58	
20 to 68	19.36 19.36		18.82 18.82	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0144	46.464 0.0 1.923		Vel = 2.97	
68			0.0 18.82						48.387		K Factor = 2.71	
21 to 69	19.36 19.36		20.61 20.61	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0171	46.948 0.0 2.275		Vel = 3.25	
69			0.0 20.61						49.223		K Factor = 2.94	

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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	*****
22 to 37	19.36 19.36		27.29 27.29	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0287	47.280 0.0 3.823		Vel = 4.30	
37			0.0 27.29						51.103		K Factor = 3.82	
23 to 36	19.36 19.36		25.88 25.88	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0260	47.561 0.0 3.466		Vel = 4.08	
36			0.0 25.88						51.027		K Factor = 3.62	
24 to 35	19.36 19.36		24.70 24.7	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0239	47.786 0.0 3.180		Vel = 3.89	
35			0.0 24.70						50.966		K Factor = 3.46	
25 to 34	19.36 19.36		23.99 23.99	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0226	47.917 0.0 3.013		Vel = 3.78	
34			0.0 23.99						50.930		K Factor = 3.36	
26 to 33	19.36 19.36		23.47 23.47	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0217	48.012 0.0 2.892		Vel = 3.70	
33			0.0 23.47						50.904		K Factor = 3.29	
27 to 32	19.36 19.36		23.20 23.2	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0213	48.060 0.0 2.831		Vel = 3.66	
32			0.0 23.20						50.891		K Factor = 3.25	
28 to 31	19.36 19.36		23.07 23.07	1.5 1.61	2T	16.0	117.190 16.000 133.190	120 0.0210	48.083 0.0 2.802		Vel = 3.64	
31			0.0 23.07						50.885		K Factor = 3.23	