



Reviewed for Code Compliance
Inspections Division
Approved with Conditions

Date: 07/21/17

Uponor

AquaSAFE™ FIRE SAFETY SYSTEM

Uponor
5925 148th Street West

Apple Valley, MN 55124
800-321-4739

Job Name : REQUIA RESIDENCE - Two Head Calculation (H.11 & H.6)
Drawing : RESIDENTIAL
Location : 47 PAMELA ROAD - LOT 35 PORTLAND ME 04103
Remote Area : 1
Contract : 21929F
Data File : 21929F Requia.wx2



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HYDRAULIC DESIGN INFORMATION SHEET

Name - REQUIA RESIDENCE Date - 3/15/17
Location - PORTLAND ME 04103
Building - RESIDENTIAL System No. - 1
Contractor - MARK NIGRO SERVICES Contract No. - 21929F
Calculated By - BRENT KOTULA SET IV Drawing No. - 1
Construction: (X) Combustible () Non-Combustible Ceiling Height VARIES
OCCUPANCY - RESIDENTIAL

S Type of Calculation: ()NFPA 13 Residential ()NFPA 13R (X)NFPA 13D
Y Number of Sprinklers Flowing: ()1 (X)2 ()4 ()
S ()Other
T ()Specific Ruling Made by Date
E
M Listed Flow at Start Point - 13 Gpm System Type
Listed Pres. at Start Point - 7.04 Psi (X) Wet () Dry
D MAXIMUM LISTED SPACING 16 x 16 () Deluge () PreAction
E Domestic Flow Added - 0 Gpm Sprinkler or Nozzle
S Additional Flow Added - Gpm Make SENJU Model RC-RES
I Elevation at Highest Outlet - 119 Feet Size 7/16 K-Factor 4.9
G Note: Temperature Rating 162
N

Calculation Gpm Required 26.1039 Psi Required 53.25 At Ref Pt STR
Summary C-Factor Used: Overhead 150 Underground 150

W Water Flow Test: Pump Data:
A Date of Test - x Rated Cap.
T Time of Test - x @ Psi
E Static (Psi) - 60 Elev.
R Residual (Psi) - 55 Other
Flow (Gpm) - 300
S Elevation - 95

P Location: STREET
P
L Source of Information: CONTRACTOR
Y

Water Supply Curve C

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 REQUIA RESIDENCE - Two Head Calculation (H.11 & H.6)

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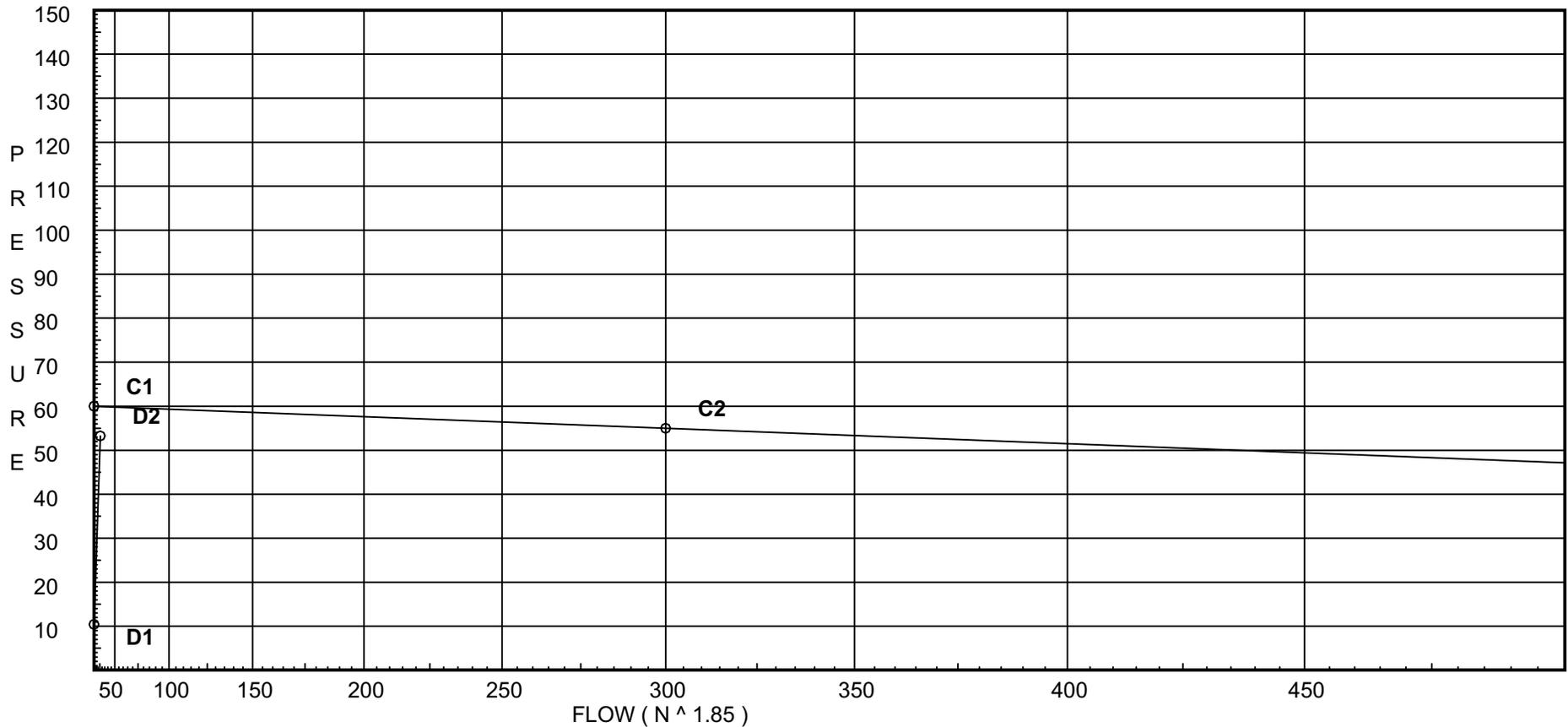


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City Water Supply:
 C1 - Static Pressure : 60
 C2 - Residual Pressure: 55
 C2 - Residual Flow : 300

Demand:
 D1 - Elevation : 10.394
 D2 - System Flow : 26.104
 D2 - System Pressure : 53.250
 Hose (Demand) :
 D3 - System Demand : 26.104
 Safety Margin : 6.696



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			
E	90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
G	Generic Gate Valve	1	1	1	1	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T	90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Utb *	Aquapex Tee - Branch	2	17	14	9	12	17	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utr *	Aquapex Tee - Run	1	2	2	4	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Units Summary

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

Flow Summary - NFPA 2007

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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>
STR	60.0	55	300.0	59.945	26.1	53.25

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>
H.11	119.0	4.9	7.04	13.0	
H.8	119.0		11.45		
H.9	119.0		12.82		
H.5	119.0		14.2		
H.7	119.0		17.51		
T.34	119.0		25.49		
T.46	109.0		30.84		
T.52	99.0		37.48		
T.51	99.0		37.73		
S.1	94.0		41.61		
MTR	95.0		45.94		
STR	95.0		53.25		
H.6	119.0	4.9	7.15	13.1	
H.1	119.0		15.14		
H.2	119.0		21.45		
T.32	119.0		25.24		
T.40	109.0		30.83		
T.30	119.0		25.52		
H.3	119.0		25.59		
T.31	119.0		25.73		
H.10	119.0		25.93		
T.33	119.0		26.27		
T.41	109.0		30.65		
T.42	109.0		31.17		
T.54	99.0		35.76		
T.55	99.0		36.71		
H.25	99.0		36.84		
T.53	99.0		37.41		
H.13	119.0		25.83		
H.14	119.0		25.9		
T.35	119.0		26.27		
T.48	109.0		30.65		
H.21	109.0		30.86		
T.49	109.0		31.21		
T.60	99.0		35.66		
H.29	99.0		36.09		
T.56	99.0		36.45		
T.57	99.0		36.49		
H.26	99.0		36.62		
H.23	99.0		36.92		
H.4	119.0		26.27		
H.12	119.0		26.27		

Flow Summary - NFPA 2007

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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>
H.16	109.0		30.65		
H.17	109.0		30.65		
T.39	109.0		30.87		
H.15	109.0		30.96		
T.37	109.0		30.98		
H.18	109.0		31.04		
T.43	109.0		31.08		
T.47	109.0		30.87		
H.22	109.0		31.05		
H.19	109.0		30.87		
T.45	109.0		30.87		
T.44	109.0		30.87		
H.20	109.0		30.87		
T.59	99.0		35.69		
H.28	99.0		35.7		
H.24	99.0		35.72		
H.27	99.0		36.47		

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftg's Total	Pt Pe Pf	Pt Pv Pn	*****	Not
H.11 to H.8	11.56	0.671 150.0		0.0 0.0	16.000 0.0	7.040 0.0			K Factor = 4.90
H.8 to H.9	11.56	0.2754		0.0	16.000	4.407			Vel = 10.49
H.8 to H.9	0.0	0.671 150.0	Utr	2.0 0.0	3.000 2.000	11.447 0.0			
H.9 to H.5	11.56	0.2754		0.0	5.000	1.377			Vel = 10.49
H.9 to H.5	0.0	0.671 150.0	Utr	2.0 0.0	3.000 2.000	12.824 0.0			
H.5 to H.7	11.56	0.2754		0.0	5.000	1.377			Vel = 10.49
H.5 to H.7	0.0	0.671 150.0	Utr	2.0 0.0	10.000 2.000	14.201 0.0			
H.7 to T.34	11.56	0.2754		0.0	12.000	3.305			Vel = 10.49
H.7 to T.34	0.0	0.671 150.0	Utb	17.0 0.0	12.000 17.000	17.506 0.0			
T.34 to T.46	11.56	0.2754		0.0	29.000	7.988			Vel = 10.49
T.34 to T.46	-2.00	0.862 150.0	Utr	2.0 0.0	15.800 2.000	25.494 4.331			
T.46 to T.52	9.56	0.0572		0.0	17.800	1.019			Vel = 5.26
T.46 to T.52	-1.39	0.862 150.0	Utb	17.0 0.0	39.800 14.000	30.844 4.331			
T.52 to T.51	8.17	0.0428		0.0	53.800	2.300			Vel = 4.49
T.52 to T.51	7.16	1.054 150.0	Utr	4.0 0.0	1.000 4.000	37.475 0.0			
T.51 to S.1	15.33	0.0514		0.0	5.000	0.257			Vel = 5.64
T.51 to S.1	10.77	1.054 150.0	Utr T	4.0 2.44	6.000 6.440	37.732 2.166			
S.1 to MTR	26.1	0.1378		0.0	12.440	1.714			Vel = 9.60
S.1 to MTR	0.0	0.995 150.0	2E	4.673 0.0	5.000 4.673	41.612 2.567			** Fixed Loss = 3
MTR to STR	26.1	0.1823		0.0	9.673	1.763			Vel = 10.77
MTR to STR	0.0	0.911 150.0	E T	1.521 3.801	20.000 6.082	45.942 0.0			
STR to 0.0	26.1	0.2802	G	0.76	26.082	7.308			Vel = 12.85
0.0 to 26.10	0.0					53.250			K Factor = 3.58
H.11 to H.6	1.44	0.671 150.0	Utr	2.0 0.0	17.000 2.000	7.040 0.0			Vel = 1.31
H.6 to H.1	13.10	0.0058		0.0	19.000	0.110			K Factor = 4.90
H.6 to H.1	13.10	0.671 150.0	Utr	2.0 0.0	17.000 2.000	7.150 0.0			
H.1 to H.2	14.54	0.4207		0.0	19.000	7.993			Vel = 13.19
H.1 to H.2	0.0	0.671 150.0	Utr	2.0 0.0	13.000 2.000	15.143 0.0			
H.2 to T.32	14.54	0.4207		0.0	15.000	6.310			Vel = 13.19
H.2 to T.32	0.0	0.671 150.0	Utr	2.0 0.0	7.000 2.000	21.453 0.0			
T.32 to T.40	14.54	0.4207		0.0	9.000	3.786			Vel = 13.19
T.32 to T.40	-2.32	0.862 150.0	Utr	2.0 0.0	12.000 2.000	25.239 4.331			
T.40	12.22	0.0901		0.0	14.000	1.261			Vel = 6.72

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftn'g's Total	Pt Pe Pf	Pt Pv Pn	*****	Not	Date:
T.40 to T.51	-1.44 10.78	0.862 150.0 0.0714	Utb 0.0 0.0	17.0 14.000 36.000	30.831 4.331 2.570				07/21/17
	0.0 10.78					37.732			Vel = 5.93 K Factor = 1.75
T.32 to T.30	2.32 2.32	0.671 150.0 0.0141	Utb 0.0 0.0	17.0 17.000 20.000	25.239 0.0 0.281				Vel = 2.10
T.30 to H.3	0.0 2.32	0.671 150.0 0.0142	Utr 0.0 0.0	2.0 2.000 5.000	25.520 0.0 0.071				Vel = 2.10
H.3 to T.31	0.0 2.32	0.671 150.0 0.0141	Utr 0.0 0.0	2.0 2.000 10.000	25.591 0.0 0.141				Vel = 2.10
T.31 to H.10	0.0 2.32	0.671 150.0 0.0141	Utr 0.0 0.0	2.0 2.000 14.000	25.732 0.0 0.197				Vel = 2.10
H.10 to T.33	0.0 2.32	0.671 150.0 0.0140	Utb 0.0 0.0	17.0 17.000 24.000	25.929 0.0 0.337				Vel = 2.10
T.33 to T.41	0.01 2.33	0.862 150.0 0.0042	0.0 0.0 0.0	12.000 0.0 12.000	26.266 4.331 0.051				Vel = 1.28
T.41 to T.42	0.02 2.35	0.671 150.0 0.0145	2Utb 0.0 0.0	34.0 34.000 36.000	30.648 0.0 0.521				Vel = 2.13
T.42 to T.54	1.29 3.64	0.862 150.0 0.0096	0.0 0.0 0.0	27.000 0.0 27.000	31.169 4.331 0.258				Vel = 2.00
T.54 to T.55	0.62 4.26	0.671 150.0 0.0435	Utr Utb 0.0	2.0 17.0 19.000 22.000	35.758 0.0 0.956				Vel = 3.87
T.55 to H.25	0.0 4.26	0.671 150.0 0.0433	0.0 0.0 0.0	3.000 0.0 3.000	36.714 0.0 0.130				Vel = 3.87
H.25 to T.53	0.0 4.26	0.671 150.0 0.0434	Utr 0.0 0.0	2.0 2.000 13.000	36.844 0.0 0.564				Vel = 3.87
T.53 to T.52	2.90 7.16	1.054 150.0 0.0126	0.0 0.0 0.0	5.329 0.0 5.329	37.408 0.0 0.067				Vel = 2.63
	0.0 7.16					37.475			K Factor = 1.17
T.34 to H.13	2.00 2.0	0.671 150.0 0.0107	Utb Utr 0.0	17.0 2.0 31.000	25.494 0.0 0.333				Vel = 1.81
H.13 to H.14	0.0 2.0	0.671 150.0 0.0107	0.0 0.0 0.0	7.000 0.0 7.000	25.827 0.0 0.075				Vel = 1.81

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftn'g's Total	Pt Pe Pf	Pt Pv Pn	*****	Not
H.14 to T.35	0.0 2.0	0.671 150.0 0.0107	Utb 17.0 Utr 2.0	15.000 19.000 34.000	25.902 0.0 0.364		Vel = 1.81	
T.35 to T.48	-0.01 1.99	0.862 150.0 0.0031	0.0 0.0	16.000 0.0 16.000	26.266 4.331 0.050		Vel = 1.09	
T.48 to H.21	-0.03 1.96	0.671 150.0 0.0104	Utb 17.0 Utr 2.0	1.000 19.000 20.000	30.647 0.0 0.208		Vel = 1.78	
H.21 to T.49	0.0 1.96	0.671 150.0 0.0104	Utb 17.0 0.0	17.000 17.000 34.000	30.855 0.0 0.352		Vel = 1.78	
T.49 to T.60	1.56 3.52	0.862 150.0 0.0090	0.0 0.0	14.000 0.0 14.000	31.207 4.331 0.126		Vel = 1.94	
T.60 to H.29	-0.62 2.9	0.671 150.0 0.0212	Utb 17.0 0.0	3.000 17.000 20.000	35.664 0.0 0.425		Vel = 2.63	
H.29 to T.56	0.0 2.9	0.671 150.0 0.0212	Utr 2.0 0.0	15.000 2.000 17.000	36.089 0.0 0.361		Vel = 2.63	
T.56 to T.57	-0.53 2.37	0.671 150.0 0.0150	Utr 2.0 0.0	1.000 2.000 3.000	36.450 0.0 0.045		Vel = 2.15	
T.57 to H.26	0.53 2.9	0.671 150.0 0.0212	Utr 2.0 0.0	4.000 2.000 6.000	36.495 0.0 0.127		Vel = 2.63	
H.26 to H.23	0.0 2.9	0.671 150.0 0.0213	Utr 2.0 0.0	12.000 2.000 14.000	36.622 0.0 0.298		Vel = 2.63	
H.23 to T.53	0.0 2.9	0.671 150.0 0.0212	Utb 17.0 Utr 2.0	4.000 19.000 23.000	36.920 0.0 0.488		Vel = 2.63	
	0.0 2.90				37.408		K Factor = 0.47	
T.33 to H.4	-0.01 -0.01	0.671 150.0 0.0	Utb 17.0 Utr 2.0	5.000 19.000 24.000	26.266 0.0 0.0		Vel = 0.01	
H.4 to H.12	0.0 -0.01	0.671 150.0 0.0	Utr 2.0 0.0	14.000 2.000 16.000	26.266 0.0 0.0		Vel = 0.01	
H.12 to T.35	0.0 -0.01	0.671 150.0 0.0	Utb 17.0 0.0	3.000 17.000 20.000	26.266 0.0 0.0		Vel = 0.01	
	0.0 -0.01				26.266		K Factor = 0	
T.48 to H.16	0.02 0.02	0.671 150.0 0.0	Utb 17.0 0.0	20.000 17.000 37.000	30.647 0.0 0.0		Vel = 0.02	

Final Calculations - Hazen-Williams

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H.16 to H.17	0.0 0.02	0.671 150.0	Utr	2.0 0.0	11.000 2.000	30.647 0.0			Vel = 0.02
H.17 to T.41	0.0 0.02	0.671 150.0	Utb Utr	17.0 2.0	2.000 19.000	30.648 0.0			Vel = 0.02
	0.0 0.02					30.648			K Factor = 0
T.40 to T.39	1.44 1.44	0.862 150.0	Utb	17.0 0.0	5.839 14.000	30.831 0.0			Vel = 0.79
T.39 to H.15	-0.15 1.29	0.671 150.0	Utb	17.0 0.0	3.000 17.000	30.866 0.0			Vel = 1.17
H.15 to T.37	0.0 1.29	0.671 150.0	Utr	2.0 0.0	1.000 2.000	30.960 0.0			Vel = 1.17
T.37 to H.18	0.0 1.29	0.671 150.0	Utr	2.0 0.0	11.000 2.000	30.975 0.0			Vel = 1.17
H.18 to T.43	0.0 1.29	0.671 150.0	Utr	2.0 0.0	7.000 2.000	31.036 0.0			Vel = 1.17
T.43 to T.42	0.0 1.29	0.671 150.0	Utb	17.0 0.0	2.000 17.000	31.079 0.0			Vel = 1.17
	0.0 1.29					31.169			K Factor = 0.23
T.46 to T.47	1.39 1.39	0.862 150.0	Utb	17.0 0.0	3.000 14.000	30.844 0.0			Vel = 0.76
T.47 to H.22	0.16 1.55	0.671 150.0	Utb Utr	17.0 2.0	7.000 19.000	30.872 0.0			Vel = 1.41
H.22 to T.49	0.0 1.55	0.671 150.0	Utb	17.0 0.0	7.000 17.000	31.046 0.0			Vel = 1.41
	0.0 1.55					31.207			K Factor = 0.28
T.39 to H.19	0.16 0.16	0.671 150.0	Utb Utr	17.0 2.0	6.000 19.000	30.866 0.0			Vel = 0.15
H.19 to T.45	0.0 0.16	0.671 150.0	Utr	2.0 0.0	4.000 2.000	30.868 0.0			Vel = 0.15
T.45 to T.44	-0.03 0.13	0.671 150.0	Utr	2.0 0.0	1.000 2.000	30.869 0.0			Vel = 0.12

Final Calculations - Hazen-Williams

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T.44 to T.47	0.03 0.16	0.671 150.0	Utb 0.0	17.0 0.0	7.000 17.000	30.869 0.0		Vel = 0.15
	0.0 0.16					30.872		K Factor = 0.03
T.45 to H.20	0.03	0.671 150.0	Utb Utr	17.0 2.0	5.000 19.000	30.869 0.0		Vel = 0.03
H.20 to T.44	0.03	0.671 150.0	Utb 0.0	17.0 0.0	4.000 17.000	30.869 0.0		Vel = 0.03
	0.0 0.03					30.869		K Factor = 0.01
T.60 to T.59	0.62	0.671 150.0	Utb 0.0	17.0 0.0	1.000 17.000	35.664 0.0		Vel = 0.56
T.59 to H.28	0.62	0.0012	0.0	0.0	18.000	0.022		Vel = 0.56
H.28 to H.24	0.0 0.62	0.671 150.0	Utr 0.0	2.0 0.0	10.000 2.000	35.686 0.0		Vel = 0.56
H.24 to T.54	0.62	0.0012	0.0	0.0	12.000	0.015		Vel = 0.56
	0.0 0.62					35.701 0.0		Vel = 0.56
H.24 to T.54	0.0 0.62	0.671 150.0	Utb Utr	17.0 2.0	8.000 19.000	35.725 0.0		Vel = 0.56
	0.62	0.0012	0.0	0.0	27.000	0.033		Vel = 0.56
	0.0 0.62					35.758		K Factor = 0.10
T.56 to H.27	0.52	0.671 150.0	Utb 0.0	17.0 0.0	6.000 17.000	36.450 0.0		Vel = 0.47
H.27 to T.57	0.52	0.0009	0.0	0.0	23.000	0.021		Vel = 0.47
	0.0 0.52	0.671 150.0	Utb Utr	17.0 2.0	7.000 19.000	36.471 0.0		Vel = 0.47
	0.52	0.0009	0.0	0.0	26.000	0.024		Vel = 0.47
	0.0 0.52					36.495		K Factor = 0.09