

Uponor

AQUASAFE® Fire Safety System

Uponor
5925 148th Street West

Apple Valley, MN 55124
800-321-4739

Job Name : HELOU RESIDENCE - One Head Calculation (H.19)
Drawing : RESIDENTIAL
Location : 120 FENWAY STREET PORTLAND ME 04102
Remote Area : 1
Contract : 110812-40L
Data File : 110812-40L Helou Residence.wx1

HYDRAULIC DESIGN INFORMATION SHEET

Name - HELOU RESIDENCE Date - 8/30/11
Location - PORTLAND ME 04102
Building - RESIDENTIAL System No. - 1
Contractor - SUCCHINIS PLUMB & HEAT Contract No. - 110812-40L
Calculated By - BRENT KOTULA CET III Drawing No. - 1
Construction: (X) Combustible () Non-Combustible Ceiling Height 9'
OCCUPANCY - RESIDENTIAL

S Type of Calculation: ()NFPA 13 Residential ()NFPA 13R (X)NFPA 13D
Y Number of Sprinklers Flowing: (X)1 ()2 ()4 ()
S ()Other
T ()Specific Ruling Made by Date
E
M Listed Flow at Start Point - 17 Gpm System Type
Listed Pres. at Start Point - 12.03Psi (X) Wet () Dry
D MAXIMUM LISTED SPACING 18 x 18 () Deluge () PreAction
E Domestic Flow Added - 0 Gpm Sprinkler or Nozzle
S Additional Flow Added - Gpm Make RELIABLE Model RFC49
I Elevation at Highest Outlet - 116 Feet Size 3/8 K-Factor 4.9
G Note: Temperature Rating 155
N

Calculation Gpm Required 17 Psi Required 56.15 At Ref Pt STR
Summary C-Factor Used: Overhead 150 Underground 150

W Water Flow Test: Pump Data: Tank or Reservoir:
A Date of Test - x Rated Cap. Cap.
T Time of Test - x @ Psi Elev.
E Static (Psi) - 96 Elev.
R Residual (Psi) - 91 Other Well
Flow (Gpm) - 300 Proof Flow Gpm
S Elevation - 101

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

Water Supply Curve (C)

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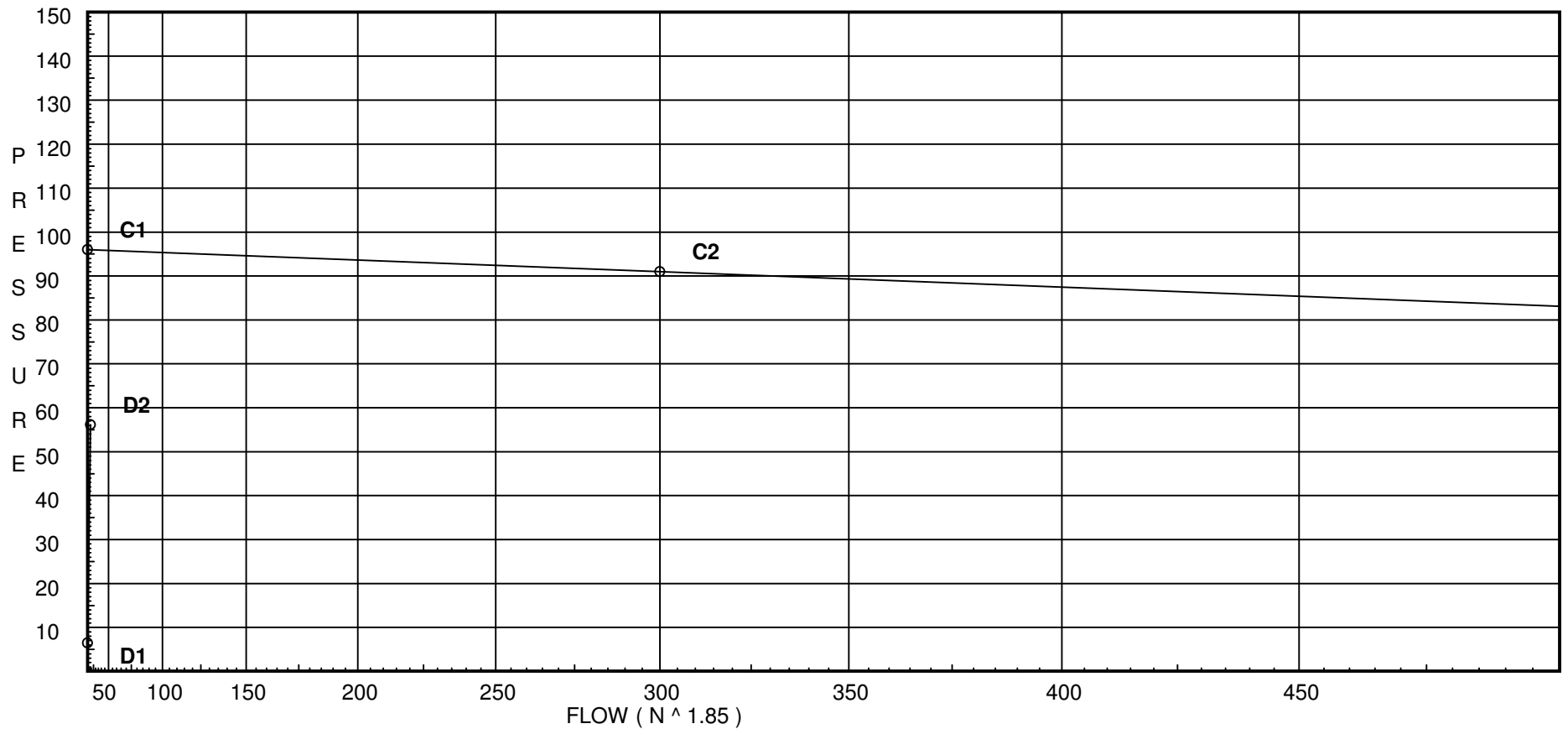
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City Water Supply:

C1 - Static Pressure : 96
C2 - Residual Pressure: 91
C2 - Residual Flow : 300

Demand:

D1 - Elevation : 6.496
D2 - System Flow : 16.9953
D2 - System Pressure : 56.146
Hose (Adj City) : _____
Hose (Demand) : _____
D3 - System Demand : 16.9953
Safety Margin : 39.829



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
E	90' Standard Elbow	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Ec	Copper 90' Ell	1	1	2	2	2.5	3.5	4	5	6	7	9	10	0	0	0	0	0	0	0	0
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	6	6	9.08	12.88	13.22	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utr	Aquapex Tee - Run	1	2	2	1.64	2.39	2.39	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	96.0	91	300.0	95.975	17.0	56.146

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.19	116.0	4.9	12.03	17.0	
T.47	116.0		12.46		
T.38	116.0		12.69		
T.55	108.0		16.33		
H.27	108.0		16.43		
T.51	108.0		16.51		
H.24	108.0		16.87		
H.22	108.0		17.34		
T.49	108.0		18.14		
T.48	108.0		18.33		
S.1	104.0		20.55		
PRV	101.0		28.43		
MTR	100.0		38.2		
STR	101.0		56.15		
T.40	116.0		12.32		
T.39	116.0		12.64		
T.56	108.0		16.33		
H.26	108.0		16.56		
T.52	108.0		16.61		
H.23	108.0		17.29		
H.21	108.0		17.93		
H.16	116.0		12.35		
H.10	116.0		12.44		
T.31	116.0		12.56		
H.7	116.0		12.6		
H.14	116.0		12.68		
T.37	116.0		12.74		
T.46	116.0		12.48		
H.17	116.0		12.58		
T.43	116.0		12.68		
T.42	116.0		12.8		
T.34	124.0		9.23		
T.35	124.0		9.24		
H.12	124.0		9.25		
H.6	124.0		9.27		
T.33	124.0		9.28		
T.45	116.0		12.69		
T.44	116.0		12.69		
H.18	116.0		12.7		
H.15	116.0		12.71		
H.8	116.0		12.72		
T.32	116.0		12.72		

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>
T.36	116.0		12.73		
H.20	116.0		12.69		
T.29	124.0		9.24		
H.3	124.0		9.24		
H.1	124.0		9.26		
T.30	124.0		9.27		
H.9	124.0		9.27		
H.13	124.0		9.28		
H.11	124.0		9.23		
H.2	124.0		9.24		
T.53	108.0		16.33		
T.50	108.0		16.33		
H.25	108.0		16.33		
H.28	108.0		16.33		

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftgng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
H.19 to T.47	8.25	0.862 150.0	1Utr	2.0 0.0	8.000 2.000	12.030 0.0			K Factor = 4.90	
T.47 to T.38	8.25 -4.25	0.0435 0.862 150.0		0.0	10.000	0.435			Vel = 4.54	
T.38 to T.55	4.0 -0.57	0.0114 0.862 150.0	2Utb	12.0 0.0	8.000 12.000	12.465 0.0			Vel = 2.20	
T.55 to H.27	3.43 0.12	0.0086 0.862 150.0	1Utb	6.0 0.0	14.000 6.000	12.693 3.465			Vel = 1.89	
H.27 to T.51	3.55 0.0	0.0092 0.862 150.0	1Utr	2.0 0.0	11.000 7.000	0.101 16.431			Vel = 1.95	
T.51 to H.24	3.55 4.29	0.0092 0.862 150.0		0.0	9.000	16.330				
H.24 to H.22	4.29 7.84	0.0396 0.862 150.0	1Utr	2.0 0.0	7.000 2.000	0.083 16.514			Vel = 1.95	
H.22 to T.49	7.84 0.0	0.0396 0.862 150.0		0.0	9.000	0.356			Vel = 4.31	
T.49 to T.48	0.0 9.16	0.862 1.245 150.0	1Utr	2.0 0.0	10.000 5.000	16.870 18.138				
T.48 to S.1	17.0 0.0	0.0276 1.245 150.0	1Ec	2.0 0.0	7.000 2.000	0.193 18.331			Vel = 4.48	
S.1 to PRV	17.0 0.0	0.0277 0.745 150.0	1T	5.492 0.0	12.000 5.492	18.331 1.732			Vel = 4.48	
PRV to MTR	17.0 0.0	0.3372 0.745 150.0	2E	3.7 0.0	1.000 3.700	20.548 6.299			* Fixed loss = 5 Vel = 12.51	
MTR to STR	17.0 0.0	0.3380 0.745 150.0		0.0	1.000	28.432			* Fixed loss = 9 Vel = 12.51	
STR	17.0	0.3373	1E 1T 1G	1.85 3.7 0.925	48.000 6.475 54.475	38.203 -0.433 18.376			Vel = 12.51	
	0.0 17.00					56.146			K Factor = 2.27	
H.19 to T.40	8.74	0.862 150.0	1Utr	2.0 0.0	4.000 2.000	12.030 0.0				
T.40 to T.39	8.74 -3.17	0.0485 0.862 150.0		0.0	6.000	0.291			Vel = 4.80	
T.39 to T.56	5.57 -1.68	0.0211 0.862 150.0	2Utb	12.0 0.0	3.000 12.000	12.321 0.0			Vel = 3.06	
T.56	3.89	0.0109	1Utb	6.0	15.000	12.637				
				0.0	6.000	3.465				
				0.0	21.000	0.228			Vel = 2.14	

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	*****	Notes	*****
T.56	-0.12	0.862		0.0	22.000	16.330				
to H.26	3.77	150.0 0.0102		0.0	0.0	0.0				
H.26	0.0	0.862	1Utr	2.0	3.000	16.555				
to T.52	3.77	150.0 0.0102		0.0	2.000	0.0				Vel = 2.07
T.52	5.39	0.862	1Utr	2.0	11.000	16.606				
to H.23	9.16	150.0 0.0528		0.0	2.000	0.0				Vel = 5.04
H.23	0.0	0.862	1Utr	2.0	10.000	17.293				
to H.21	9.16	150.0 0.0528		0.0	2.000	0.0				Vel = 5.04
H.21	0.0	0.862	1Utr	2.0	2.000	17.926				
to T.49	9.16	150.0 0.0530		0.0	2.000	0.0				Vel = 5.04
	0.0									
	9.16					18.138				K Factor = 2.15
T.40	3.18	0.862	1Utr	2.0	2.000	12.321				
to H.16	3.18	150.0 0.0075		0.0	2.000	0.0				Vel = 1.75
H.16	0.0	0.862	1Utr	2.0	10.000	12.351				
to H.10	3.18	150.0 0.0074		0.0	2.000	0.0				Vel = 1.75
H.10	0.0	0.862	1Utr	2.0	14.000	12.440				
to T.31	3.18	150.0 0.0074		0.0	2.000	0.0				Vel = 1.75
T.31	0.0	0.862	1Utr	2.0	3.000	12.559				
to H.7	3.18	150.0 0.0074		0.0	2.000	0.0				Vel = 1.75
H.7	0.0	0.862	1Utr	2.0	9.000	12.596				
to H.14	3.18	150.0 0.0075		0.0	2.000	0.0				Vel = 1.75
H.14	0.0	0.862	1Utr	2.0	6.000	12.678				
to T.37	3.18	150.0 0.0075		0.0	2.000	0.0				Vel = 1.75
T.37	1.10	0.862	2Utb	12.0	12.000	12.738				
to T.51	4.28	150.0 0.0130		0.0	12.000	3.465				Vel = 2.35
	0.0									
	4.28					16.514				K Factor = 1.05
T.47	4.25	0.862		0.0	1.000	12.465				
to T.46	4.25	150.0 0.0130		0.0	0.0	0.0				Vel = 2.34
T.46	0.0	0.862	1Utr	2.0	6.000	12.478				
to H.17	4.25	150.0 0.0127		0.0	2.000	0.0				Vel = 2.34
H.17	0.0	0.862	1Utr	2.0	6.000	12.580				
to T.43	4.25	150.0 0.0129		0.0	2.000	0.0				Vel = 2.34

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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	*****	Notes	*****
T.43	-0.91	0.862	2Utb	12.0	3.000	12.683				
to		150.0		0.0	12.000	0.0				
T.42	3.34	0.0081		0.0	15.000	0.122		Vel =	1.84	
T.42	2.04	0.862	1Utb	6.0	11.000	12.805				
to		150.0		0.0	6.000	3.465				
T.52	5.38	0.0198		0.0	17.000	0.336		Vel =	2.96	
	0.0									
	5.38					16.606		K Factor =	1.32	
T.39	1.68	0.862	1Utb	6.0	18.000	12.637				
to		150.0	1Utr	2.0	8.000	-3.465				
T.34	1.68	0.0023		0.0	26.000	0.059		Vel =	0.92	
T.34	-0.38	0.862		0.0	5.000	9.231				
to		150.0		0.0	0.0	0.0				
T.35	1.3	0.0014		0.0	5.000	0.007		Vel =	0.71	
T.35	0.0	0.862	1Utr	2.0	6.000	9.238				
to		150.0		0.0	2.000	0.0				
H.12	1.3	0.0015		0.0	8.000	0.012		Vel =	0.71	
H.12	0.0	0.862	1Utr	2.0	11.000	9.250				
to		150.0		0.0	2.000	0.0				
H.6	1.3	0.0014		0.0	13.000	0.018		Vel =	0.71	
H.6	0.0	0.862	1Utr	2.0	5.000	9.268				
to		150.0		0.0	2.000	0.0				
T.33	1.3	0.0014		0.0	7.000	0.010		Vel =	0.71	
T.33	0.74	0.862	1Utb	6.0	11.000	9.278				
to		150.0	1Utr	2.0	8.000	3.465				
T.42	2.04	0.0033		0.0	19.000	0.062		Vel =	1.12	
	0.0									
	2.04					12.805		K Factor =	0.57	
T.43	0.91	0.862	1Utr	2.0	3.000	12.683				
to		150.0		0.0	2.000	0.0				
T.45	0.91	0.0006		0.0	5.000	0.003		Vel =	0.50	
T.45	-0.12	0.862		0.0	2.000	12.686				
to		150.0		0.0	0.0	0.0				
T.44	0.79	0.0005		0.0	2.000	0.001		Vel =	0.43	
T.44	0.12	0.862	1Utr	2.0	10.000	12.687				
to		150.0		0.0	2.000	0.0				
H.18	0.91	0.0007		0.0	12.000	0.009		Vel =	0.50	
H.18	0.0	0.862	1Utr	2.0	12.000	12.696				
to		150.0		0.0	2.000	0.0				
H.15	0.91	0.0007		0.0	14.000	0.010		Vel =	0.50	
H.15	0.0	0.862	1Utr	2.0	11.000	12.706				
to		150.0		0.0	2.000	0.0				
H.8	0.91	0.0008		0.0	13.000	0.010		Vel =	0.50	
H.8	0.0	0.862	1Utr	2.0	3.000	12.716				
to		150.0		0.0	2.000	0.0				
T.32	0.91	0.0008		0.0	5.000	0.004		Vel =	0.50	
T.32	0.0	0.862	1Utr	2.0	14.000	12.720				
to		150.0		0.0	2.000	0.0				
T.36	0.91	0.0008		0.0	16.000	0.012		Vel =	0.50	

Final Calculations - Hazen-Williams

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T.36	0.20	0.862		0.0	6.000	12.732				
to T.37	1.11	150.0 0.0010		0.0	0.0 6.000	0.0 0.006			Vel = 0.61	
	0.0 1.11					12.738			K Factor = 0.31	
T.45	0.12	0.671	1Utb	6.0	3.000	12.686				
to H.20	0.12	150.0 0.0001		0.0	6.000 9.000	0.0 0.001			Vel = 0.11	
H.20	0.0	0.671	1Utr	2.0	3.000	12.687				
to T.44	0.12	150.0 0.0	1Utb	6.0	8.000 11.000	0.0 0.0			Vel = 0.11	
	0.0 0.12					12.687			K Factor = 0.03	
T.38	0.56	0.862	1Utb	6.0	18.000	12.693				
to T.29	0.56	150.0 0.0003	1Utr	2.0	8.000 26.000	-3.465 0.009			Vel = 0.31	
T.29	0.38	0.862		0.0	7.000	9.237				
to H.3	0.94	150.0 0.0007		0.0	0.0 7.000	0.0 0.005			Vel = 0.52	
H.3	0.0	0.862	1Utr	2.0	18.000	9.242				
to H.1	0.94	150.0 0.0008		0.0	2.000 20.000	0.0 0.016			Vel = 0.52	
H.1	0.0	0.862	1Utr	2.0	8.000	9.258				
to T.30	0.94	150.0 0.0008		0.0	2.000 10.000	0.0 0.008			Vel = 0.52	
T.30	-0.20	0.862	1Utr	2.0	7.000	9.266				
to H.9	0.74	150.0 0.0004		0.0	2.000 9.000	0.0 0.004			Vel = 0.41	
H.9	0.0	0.862	1Utr	2.0	7.000	9.270				
to H.13	0.74	150.0 0.0006		0.0	2.000 9.000	0.0 0.005			Vel = 0.41	
H.13	0.0	0.862		0.0	7.000	9.275				
to T.33	0.74	150.0 0.0004		0.0	0.0 7.000	0.0 0.003			Vel = 0.41	
	0.0 0.74					9.278			K Factor = 0.24	
T.34	0.38	0.862	1Utr	2.0	8.000	9.231				
to H.11	0.38	150.0 0.0002		0.0	2.000 10.000	0.0 0.002			Vel = 0.21	
H.11	0.0	0.862	1Utr	2.0	13.000	9.233				
to H.2	0.38	150.0 0.0001		0.0	2.000 15.000	0.0 0.002			Vel = 0.21	
H.2	0.0	0.862	1Utr	2.0	10.000	9.235				
to T.29	0.38	150.0 0.0002		0.0	2.000 12.000	0.0 0.002			Vel = 0.21	
	0.0 0.38					9.237			K Factor = 0.13	

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
T.30 to T.36	0.20 0.2	0.862 150.0 0.0	2Utb 12.0 0.0 0.0	13.000 12.000 25.000	9.266 3.465 0.001				
	0.0 0.20					12.732		Vel = 0.11 K Factor = 0.06	
T.56 to T.53	0.12 0.12	0.862 150.0 0.0	1Utr 2.0 0.0 0.0	5.000 2.000 7.000	16.330 0.0 0.0				
								Vel = 0.07	
T.53 to T.50	0.0 0.12	0.862 150.0 0.0	1Utr 2.0 0.0 0.0	14.000 2.000 16.000	16.330 0.0 0.0				
								Vel = 0.07	
T.50 to H.25	0.0 0.12	0.862 150.0 0.0	1Utr 2.0 0.0 0.0	2.000 2.000 4.000	16.330 0.0 0.0				
								Vel = 0.07	
H.25 to H.28	0.0 0.12	0.862 150.0 0.0	1Utr 2.0 0.0 0.0	14.000 2.000 16.000	16.330 0.0 0.0				
								Vel = 0.07	
H.28 to T.55	0.0 0.12	0.862 150.0 0.0	0.0 0.0 0.0	5.000 0.0 5.000	16.330 0.0 0.0				
	0.0 0.12					16.330		Vel = 0.07 K Factor = 0.03	