



AquaSAFE™ FIRE SAFETY SYSTEM

Uponor
5925 148th Street West

Apple Valley, MN 55124
800-321-4739

Job Name : Church - One Head Calculation (H.50)
Drawing : RESIDENTIAL
Location : 305 COMMERCIAL STREET PORTLAND ME
Remote Area : 1
Contract : 120322-411
Data File : 120322-41 Church.wx1

HYDRAULIC DESIGN INFORMATION SHEET

Name - Church Date - 4/1/2012
Location - PORTLAND ME
Building - RESIDENTIAL System No. - 1
Contractor - ADG BUILDERS Contract No. - 120322-411
Calculated By - DAN HUBBARD SET Drawing No. - F100
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: (X)1 ()2 ()4 ()
S ()Other
T ()Specific Ruling Made by Date
E
M Listed Flow at Start Point - 18 Gpm System Type
Listed Pres. at Start Point - 17.52Psi (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 RELIABLE Model RFC43-S2
I Elevation at Highest Outlet - 140 Feet Size 3/8 K-Factor 4.3
G Note: Temperature Rating 155
N

Calculation Gpm Required 18 Psi Required 47.95 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) - 92 Elev.
R Residual (Psi) - 87 Other Well
Flow (Gpm) - 300 Proof Flow Gpm
S Elevation - 100

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

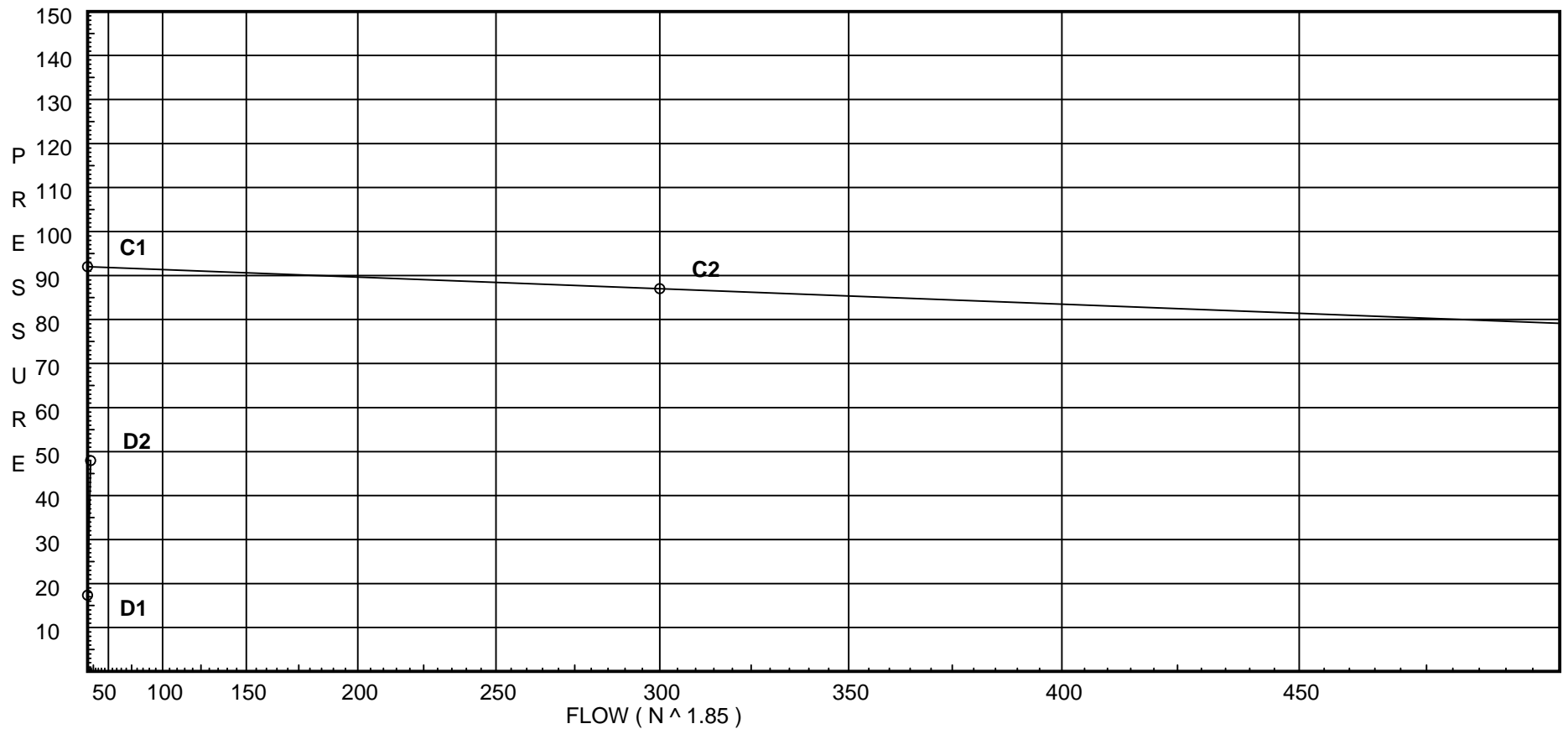
Water Supply Curve (C)

Uponor
Church - One Head Calculation (H.50)

Page 2
Date 4/5/2012

City Water Supply:
C1 - Static Pressure : 92
C2 - Residual Pressure: 87
C2 - Residual Flow : 300

Demand:
D1 - Elevation : 17.324
D2 - System Flow : 17.9985
D2 - System Pressure : 47.945
Hose (Adj City) : _____
Hose (Demand) : _____
D3 - System Demand : 17.9985
Safety Margin : 44.027



Fittings Used Summary

Uponor
Church - One Head Calculation (H.50)

Page 3
Date 4/5/2012

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	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
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
Ucp	Aquapex Coupling	1	2	2	1.63	2.88	1.63	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uel	Aquapex 90 Elbow	3	5	6	9.8	12.06	12.28	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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

Uponor
Church - One Head Calculation (H.50)

Page 4
Date 4/5/2012

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	92.0	87	300.0	91.973	18.0	47.945

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.50	140.0	4.3	17.52	18.0	
T.92	140.0		18.91		
T.90	140.0		19.89		
T.81	128.0		25.38		
T.68	118.0		29.96		
T.60	108.0		34.59		
H.2	108.0		34.94		
H.10	108.0		35.21		
T.64	108.0		35.27		
T.65	108.0		35.71		
S.1	104.0		39.47		
MTR	100.0		44.7		
STR	100.0		47.94		
H.54	140.0		18.1		
T.97	140.0		18.93		
T.99	140.0		19.86		
T.88	128.0		25.38		
T.80	118.0		29.96		
T.67	108.0		34.93		
H.51	140.0		18.91		
H.55	140.0		18.92		
T100	140.0		20.03		
H.58	140.0		20.11		
T.98	140.0		20.21		
T.87	128.0		25.71		
T.76	118.0		30.18		
T.62	108.0		34.62		
T.63	108.0		34.64		
H.9	108.0		34.71		
H.11	108.0		34.92		
H.14	108.0		35.1		
H.15	108.0		35.15		
T.89	140.0		20.03		
H.48	140.0		20.14		
T.91	140.0		20.21		
T.83	128.0		25.71		
T.70	118.0		30.2		
H.49	140.0		20.03		
H.53	140.0		20.03		
T.95	140.0		20.03		
T.96	140.0		20.03		
H.57	140.0		20.03		

NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
H.59	140.0		20.03		
H.56	140.0		20.21		
T.94	140.0		20.21		
T.93	140.0		20.21		
H.52	140.0		20.21		
T.86	128.0		25.71		
H.44	128.0		25.71		
H.41	128.0		25.71		
T.82	128.0		25.71		
H.45	128.0		25.71		
H.47	128.0		25.71		
H.43	128.0		25.71		
H.40	128.0		25.71		
H.38	128.0		25.71		
T.77	118.0		30.24		
H.33	118.0		30.26		
T.78	118.0		30.28		
T.79	118.0		30.28		
H.32	118.0		30.32		
T.75	118.0		30.33		
T.69	118.0		30.24		
H.22	118.0		30.24		
H.25	118.0		30.26		
H.24	118.0		30.27		
H.21	118.0		30.28		
H.29	118.0		30.31		
H.27	118.0		30.24		
H.28	118.0		30.24		
H.6	108.0		34.59		
H.8	108.0		34.59		
H.5	108.0		34.59		
T.61	108.0		34.6		
T.72	118.0		30.27		
T.84	128.0		25.94		
H.39	128.0		25.94		
H.46	128.0		25.94		
T.85	128.0		25.94		
T.73	118.0		30.27		
T.66	108.0		34.61		
H.13	108.0		34.61		
H.4	108.0		34.6		
H.3	108.0		34.6		
H.1	108.0		34.6		
H.7	108.0		34.6		
H.12	108.0		34.6		
H.16	108.0		34.6		
H.19	108.0		34.6		
H.18	108.0		34.6		
H.17	108.0		34.6		
T.71	118.0		30.27		
H.20	118.0		30.27		

NODE ANALYSIS (cont.)

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
H.23	118.0		30.27		
H.30	118.0		30.27		
T.74	118.0		30.27		
H.26	118.0		30.27		
H.31	118.0		30.27		
H.36	118.0		30.27		
H.37	118.0		30.27		
H.34	118.0		30.27		
H.42	128.0		25.94		
H.35	118.0		30.28		

Final Calculations - Hazen-Williams

Uponor
Church - One Head Calculation (H.50)

Page 7
Date 4/5/2012

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftg's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
H.50 to T.92	10.02	0.86 150.0 0.0631	1Utr 1Utb	2.0 6.0 0.0	14.000 8.000 22.000	17.520 0.0 1.388			K Factor = 4.30 Vel = 5.53	
T.92 to T.90	-1.03 8.99	0.86 150.0 0.0516	1Utb 1Utr	6.0 2.0 0.0	11.000 8.000 19.000	18.908 0.0 0.980			Vel = 4.97	
T.90 to T.81	-3.87 5.12	0.86 150.0 0.0183	1Ucp	2.0 0.0 0.0	14.000 2.000 16.000	19.888 5.197 0.293			Vel = 2.83	
T.81 to T.68	0.0 5.12	0.86 150.0 0.0182	1Ucp	2.0 0.0 0.0	12.000 2.000 14.000	25.378 4.331 0.255			Vel = 2.83	
T.68 to T.60	0.0 5.12	0.86 150.0 0.0182	1Utb	6.0 0.0 0.0	10.000 6.000 16.000	29.964 4.331 0.292			Vel = 2.83	
T.60 to H.2	-0.53 4.59	0.86 150.0 0.0149	1Utr	2.0 0.0 0.0	22.000 2.000 24.000	34.587 0.0 0.358			Vel = 2.54	
H.2 to H.10	0.0 4.59	0.86 150.0 0.0149	1Utr	2.0 0.0 0.0	16.000 2.000 18.000	34.945 0.0 0.268			Vel = 2.54	
H.10 to T.64	0.0 4.59	0.86 150.0 0.0150	1Utr	2.0 0.0 0.0	2.000 2.000 4.000	35.213 0.0 0.060			Vel = 2.54	
T.64 to T.65	4.70 9.29	0.86 150.0 0.0549	1Utb	6.0 0.0 0.0	2.000 6.000 8.000	35.273 0.0 0.439			Vel = 5.13	
T.65 to S.1	8.71 18.0	0.86 150.0 0.1865	1T 1Utr	2.871 2.0 0.0	6.000 4.871 10.871	35.712 1.732 2.027			Vel = 9.94	
S.1 to MTR	0.0 18.0	1.051 150.0 0.0703	2E	6.101 0.0 0.0	1.000 6.101 7.101	39.471 4.732 0.499			* Fixed loss = 3 Vel = 6.66	
MTR to STR	0.0 18.0	1.051 150.0 0.0702	1E 1T 1G	3.05 7.626 1.525	34.000 12.201 46.201	44.702 0.0 3.243			Vel = 6.66	
	0.0 18.00					47.945			K Factor = 2.60	
H.50 to H.54	7.98	0.86 150.0 0.0414	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	17.520 0.0 0.579			Vel = 4.41	
H.54 to T.97	0.0 7.98	0.86 150.0 0.0414	1Utb	6.0 0.0 0.0	14.000 6.000 20.000	18.099 0.0 0.828			Vel = 4.41	
T.97 to T.99	1.03 9.01	0.86 150.0 0.0518	1Utb	6.0 0.0 0.0	12.000 6.000 18.000	18.927 0.0 0.933			Vel = 4.98	
T.99 to T.88	-3.95 5.06	0.86 150.0 0.0179	1Ucp 1Utr	2.0 2.0 0.0	14.000 4.000 18.000	19.860 5.197 0.322			Vel = 2.79	

Final Calculations - Hazen-Williams

Uponor
Church - One Head Calculation (H.50)

Page 8
Date 4/5/2012

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.88 to T.80	0.0 5.06	0.86 150.0 0.0179	1Ucp	2.0 0.0	12.000 2.000	25.379 4.331				
				0.0	14.000	0.250		Vel =	2.79	
T.80 to T.67	0.0 5.06	0.86 150.0 0.0178		0.0 0.0	36.000 0.0	29.960 4.331				
				0.0	36.000	0.642		Vel =	2.79	
T.67 to T.65	3.65 8.71	0.86 150.0 0.0487	1Utb 1Utr	6.0 2.0 0.0	8.000 8.000 16.000	34.933 0.0 0.779				
				0.0				Vel =	4.81	
	0.0 8.71					35.712		K Factor =	1.46	
T.92 to H.51	1.03 1.03	0.86 150.0 0.0010	1Utr	2.0 0.0	1.000 2.000 3.000	18.908 0.0 0.003				
				0.0				Vel =	0.57	
H.51 to H.55	0.0 1.03	0.86 150.0 0.0009	1Utr	2.0 0.0	12.000 2.000 14.000	18.911 0.0 0.013				
				0.0				Vel =	0.57	
H.55 to T.97	0.0 1.03	0.86 150.0 0.0010	1Utr	2.0 0.0	1.000 2.000 3.000	18.924 0.0 0.003				
				0.0				Vel =	0.57	
	0.0 1.03					18.927		K Factor =	0.24	
T.99 to T100	3.95 3.95	0.86 150.0 0.0113	1Utr	2.0 0.0	13.000 2.000 15.000	19.860 0.0 0.169				
				0.0				Vel =	2.18	
T100 to H.58	0.02 3.97	0.86 150.0 0.0114	1Utb	6.0 0.0 0.0	1.000 6.000 7.000	20.029 0.0 0.080				
				0.0				Vel =	2.19	
H.58 to T.98	0.0 3.97	0.86 150.0 0.0113	1Utr	2.0 0.0	7.000 2.000 9.000	20.109 0.0 0.102				
				0.0				Vel =	2.19	
T.98 to T.87	-0.07 3.9	0.86 150.0 0.0110	1Utb	6.0 0.0	21.000 6.000 27.000	20.211 5.197 0.298				
				0.0				Vel =	2.15	
T.87 to T.76	-0.10 3.8	0.86 150.0 0.0105	1Utr	2.0 0.0	12.000 2.000 14.000	25.706 4.331 0.147				
				0.0				Vel =	2.10	
T.76 to T.62	-1.90 1.9	0.86 150.0 0.0029	1Utb 1Utr	6.0 2.0 0.0	27.000 8.000 35.000	30.184 4.331 0.103				
				0.0				Vel =	1.05	
T.62 to T.63	0.53 2.43	0.86 150.0 0.0045	1Utr	2.0 0.0	2.000 2.000 4.000	34.618 0.0 0.018				
				0.0				Vel =	1.34	
T.63 to H.9	2.27 4.7	0.86 150.0 0.0156	1Utr	2.0 0.0	3.000 2.000 5.000	34.636 0.0 0.078				
				0.0				Vel =	2.60	
H.9 to H.11	0.0 4.7	0.86 150.0 0.0155	1Utr	2.0 0.0	11.000 2.000 13.000	34.714 0.0 0.201				
				0.0				Vel =	2.60	

Final Calculations - Hazen-Williams

Uponor
Church - One Head Calculation (H.50)

Page 9
Date 4/5/2012

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
H.11 to H.14	0.0 4.7	0.86 150.0 0.0156	1Utr	2.0 0.0	10.000 2.000	34.915 0.0				
								Vel =	2.60	
H.14 to H.15	0.0 4.7	0.86 150.0 0.0153		0.0 0.0	3.000 0.0	35.102 0.0				
								Vel =	2.60	
H.15 to T.64	0.0 4.7	0.86 150.0 0.0156	1Utr	2.0 0.0	6.000 2.000	35.148 0.0				
								Vel =	2.60	
	0.0 4.70						35.273	K Factor =	0.79	
T.90 to T.89	3.86 3.86	0.86 150.0 0.0108	1Utr	2.0 0.0	11.000 2.000	19.888 0.0				
								Vel =	2.13	
T.89 to H.48	-0.02 3.84	0.86 150.0 0.0107	1Utr 1Utb	2.0 6.0	2.000 8.000	20.029 0.0				
								Vel =	2.12	
H.48 to T.91	0.0 3.84	0.86 150.0 0.0107	1Utr	2.0 0.0	5.000 2.000	20.136 0.0				
								Vel =	2.12	
T.91 to T.83	0.07 3.91	0.86 150.0 0.0111	1Utb	6.0 0.0	21.000 6.000	20.211 5.197				
								Vel =	2.16	
T.83 to T.70	0.10 4.01	0.86 150.0 0.0116	1Utr	2.0 0.0	12.000 2.000	25.707 4.331				
								Vel =	2.21	
T.70 to T.63	-1.75 2.26	0.86 150.0 0.0040	1Utb 1Utr	6.0 2.0	18.000 8.000	30.200 4.331				
								Vel =	1.25	
	0.0 2.26						34.636	K Factor =	0.38	
T.89 to H.49	0.02 0.02	0.86 150.0 0.0	1Utr	2.0 0.0	18.000 2.000	20.029 0.0				
								Vel =	0.01	
H.49 to H.53	0.0 0.02	0.86 150.0 0.0	1Utr	2.0 0.0	12.000 2.000	20.029 0.0				
								Vel =	0.01	
H.53 to T.95	0.0 0.02	0.86 150.0 0.0		0.0 0.0	3.000 0.0	20.029 0.0				
								Vel =	0.01	
T.95 to T.96	0.0 0.02	0.86 150.0 0.0	1Uel	6.0 0.0	1.000 6.000	20.029 0.0				
								Vel =	0.01	
T.96 to H.57	0.0 0.02	0.86 150.0 0.0	1Utr 1Uel	2.0 6.0	9.000 8.000	20.029 0.0				
								Vel =	0.01	
H.57 to H.59	0.0 0.02	0.86 150.0 0.0	1Utr	2.0 0.0	10.000 2.000	20.029 0.0				
								Vel =	0.01	

Final Calculations - Hazen-Williams

Uponor
Church - One Head Calculation (H.50)

Page 10
Date 4/5/2012

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
H.59 to T100	0.0 0.02	0.86 150.0 0.0		0.0 0.0 0.0	17.000 0.0 17.000	20.029 0.0 0.0				Vel = 0.01
	0.0 0.02					20.029				K Factor = 0
T.98 to H.56	0.06	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	3.000 2.000 5.000	20.211 0.0 0.0				Vel = 0.03
H.56 to T.94	0.0 0.06	0.86 150.0 0.0	1Utr 1Uel	2.0 6.0 0.0	9.000 8.000 17.000	20.211 0.0 0.0				Vel = 0.03
T.94 to T.93	0.0 0.06	0.86 150.0 0.0	1Uel	6.0 0.0 0.0	1.000 6.000 7.000	20.211 0.0 0.0				Vel = 0.03
T.93 to H.52	0.0 0.06	0.86 150.0 0.0		0.0 0.0 0.0	3.000 0.0 3.000	20.211 0.0 0.0				Vel = 0.03
H.52 to T.91	0.0 0.06	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	8.000 2.000 10.000	20.211 0.0 0.0				Vel = 0.03
	0.0 0.06					20.211				K Factor = 0.01
T.87 to T.86	0.10 0.1	0.86 150.0 0.0	2Utb	12.0 0.0 0.0	7.000 12.000 19.000	25.706 0.0 0.0				Vel = 0.06
T.86 to H.44	-0.03 0.07	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	25.706 0.0 0.0				Vel = 0.04
H.44 to H.41	0.0 0.07	0.86 150.0 0.0001	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	25.706 0.0 0.001				Vel = 0.04
H.41 to T.82	0.0 0.07	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	4.000 2.000 6.000	25.707 0.0 0.0				Vel = 0.04
T.82 to T.83	0.03 0.1	0.86 150.0 0.0	2Utb	12.0 0.0 0.0	7.000 12.000 19.000	25.707 0.0 0.0				Vel = 0.06
	0.0 0.10					25.707				K Factor = 0.02
T.86 to H.45	0.04	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	1.000 2.000 3.000	25.706 0.0 0.0				Vel = 0.02
H.45 to H.47	0.0 0.04	0.86 150.0 0.0		0.0 0.0 0.0	17.000 0.0 17.000	25.706 0.0 0.0				Vel = 0.02
H.47 to H.43	0.0 0.04	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	25.706 0.0 0.0				Vel = 0.02

Final Calculations - Hazen-Williams

Uponor
Church - One Head Calculation (H.50)

Page 11
Date 4/5/2012

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftg's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
H.43 to H.40	0.0 0.04	0.86 150.0	1Utr	2.0 0.0	17.000 2.000	25.706 0.0				
					19.000	0.001		Vel =	0.02	
H.40 to H.38	0.0 0.04	0.86 150.0	1Utr	2.0 0.0	13.000 2.000	25.707 0.0				
					15.000	0.0		Vel =	0.02	
H.38 to T.82	0.0 0.04	0.86 150.0	1Utr	2.0 0.0	5.000 2.000	25.707 0.0				
					7.000	0.0		Vel =	0.02	
	0.0 0.04					25.707		K Factor =	0.01	
T.76 to T.77	1.90 1.9	0.86 150.0	2Utb	12.0 0.0	9.000 12.000	30.184 0.0				
					21.000	0.061		Vel =	1.05	
T.77 to H.33	0.51 2.41	0.86 150.0	1Utr	2.0 0.0	1.000 2.000	30.245 0.0				
					3.000	0.014		Vel =	1.33	
H.33 to T.78	0.0 2.41	0.86 150.0	1Utr	2.0 0.0	2.000 2.000	30.259 0.0				
					4.000	0.018		Vel =	1.33	
T.78 to T.79	-0.17 2.24	0.86 150.0		0.0 0.0	1.000 0.0	30.277 0.0				
					1.000	0.004		Vel =	1.24	
T.79 to H.32	0.17 2.41	0.86 150.0	1Utr	2.0 0.0	6.000 2.000	30.281 0.0				
					8.000	0.036		Vel =	1.33	
H.32 to T.75	0.0 2.41	0.86 150.0	1Utr	2.0 0.0	1.000 2.000	30.317 0.0				
					3.000	0.013		Vel =	1.33	
T.75 to T.67	1.23 3.64	0.86 150.0	2Utb	12.0 0.0	16.000 12.000	30.330 4.331				
					28.000	0.272		Vel =	2.01	
	0.0 3.64					34.933		K Factor =	0.62	
T.70 to T.69	1.75 1.75	0.86 150.0	2Utb	12.0 0.0	2.000 12.000	30.200 0.0				
					14.000	0.035		Vel =	0.97	
T.69 to H.22	-0.51 1.24	0.86 150.0	1Utr	2.0 0.0	4.000 2.000	30.235 0.0				
					6.000	0.008		Vel =	0.68	
H.22 to H.25	0.0 1.24	0.86 150.0		0.0 0.0	14.000 0.0	30.243 0.0				
					14.000	0.019		Vel =	0.68	
H.25 to H.24	0.0 1.24	0.86 150.0	1Utr	2.0 0.0	6.000 2.000	30.262 0.0				
					8.000	0.010		Vel =	0.68	
H.24 to H.21	0.0 1.24	0.86 150.0	1Utr	2.0 0.0	8.000 2.000	30.272 0.0				
					10.000	0.013		Vel =	0.68	

Final Calculations - Hazen-Williams

Uponor
Church - One Head Calculation (H.50)

Page 12
Date 4/5/2012

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftg's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
H.21 to H.29	0.0 1.24	0.86 150.0 0.0013	1Utr 2.0 0.0	16.000 2.000	30.285 0.0			Vel = 0.68	
H.29 to T.75	0.0 1.24	0.86 150.0 0.0013	1Utr 2.0 0.0	14.000 2.000	30.309 0.0			Vel = 0.68	
	0.0 1.24				30.330			K Factor = 0.23	
T.69 to H.27	0.51 0.51	0.86 150.0 0.0003	1Utr 2.0 0.0	8.000 2.000	30.235 0.0			Vel = 0.28	
H.27 to H.28	0.0 0.51	0.86 150.0 0.0002	1Utr 2.0 0.0	11.000 2.000	30.238 0.0			Vel = 0.28	
H.28 to T.77	0.0 0.51	0.86 150.0 0.0002	1Utr 2.0 0.0	14.000 2.000	30.241 0.0			Vel = 0.28	
	0.0 0.51				30.245			K Factor = 0.09	
T.60 to H.6	0.53 0.53	0.86 150.0 0.0002	1Utr 2.0 0.0	3.000 2.000	34.587 0.0			Vel = 0.29	
H.6 to H.8	0.0 0.53	0.86 150.0 0.0003	0.0 0.0	7.000 0.0	34.588 0.0			Vel = 0.29	
H.8 to H.5	0.0 0.53	0.86 150.0 0.0003	1Utr 2.0 0.0	13.000 2.000	34.590 0.0			Vel = 0.29	
H.5 to T.61	0.0 0.53	0.86 150.0 0.0002	1Utr 2.0 0.0	14.000 2.000	34.594 0.0			Vel = 0.29	
T.61 to T.72	-0.22 0.31	0.86 150.0 0.0001	1Utr 2.0 0.0	27.000 2.000	34.598 -4.331			Vel = 0.17	
T.72 to T.84	-0.15 0.16	0.86 150.0 0.0001	1Utb 6.0 0.0	13.000 6.000	30.270 -4.331			Vel = 0.09	
T.84 to H.39	-0.11 0.05	0.86 150.0 0.0	1Utr 2.0 0.0	11.000 2.000	25.940 0.0			Vel = 0.03	
H.39 to H.46	0.0 0.05	0.86 150.0 0.0	1Utr 2.0 0.0	26.000 2.000	25.940 0.0			Vel = 0.03	
H.46 to T.85	0.0 0.05	0.86 150.0 0.0	0.0 0.0	9.000 0.0	25.940 0.0			Vel = 0.03	
T.85 to T.73	0.11 0.16	0.86 150.0 0.0	1Utb 6.0 0.0	14.000 6.000	25.940 4.331			Vel = 0.09	

Final Calculations - Hazen-Williams

Uponor
Church - One Head Calculation (H.50)

Page 13
Date 4/5/2012

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.73 to T.66	0.15 0.31	0.86 150.0	1Utb 1Utr	6.0 2.0	21.000 8.000	30.272 4.331				
		0.0001		0.0	29.000	0.003		Vel =	0.17	
T.66 to H.13	0.22 0.53	0.86 150.0	1Utr	2.0 0.0	6.000 2.000	34.606 0.0				
		0.0002		0.0	8.000	0.002		Vel =	0.29	
H.13 to T.62	0.0 0.53	0.86 150.0	1Utr	2.0 0.0	33.000 2.000	34.608 0.0				
		0.0003		0.0	35.000	0.010		Vel =	0.29	
	0.0 0.53						34.618	K Factor =	0.09	
T.61 to H.4	0.22 0.22	0.86 150.0	1Utb	6.0 0.0	2.000 6.000	34.598 0.0				
		0.0001		0.0	8.000	0.001		Vel =	0.12	
H.4 to H.3	0.0 0.22	0.86 150.0	1Utr	2.0 0.0	13.000 2.000	34.599 0.0				
		0.0001		0.0	15.000	0.001		Vel =	0.12	
H.3 to H.1	0.0 0.22	0.86 150.0	1Utr	2.0 0.0	10.000 2.000	34.600 0.0				
		0.0		0.0	12.000	0.0		Vel =	0.12	
H.1 to H.7	0.0 0.22	0.86 150.0	1Utr	2.0 0.0	17.000 2.000	34.600 0.0				
		0.0001		0.0	19.000	0.002		Vel =	0.12	
H.7 to H.12	0.0 0.22	0.86 150.0	1Utr	2.0 0.0	12.000 2.000	34.602 0.0				
		0.0		0.0	14.000	0.0		Vel =	0.12	
H.12 to H.16	0.0 0.22	0.86 150.0	1Utr	2.0 0.0	11.000 2.000	34.602 0.0				
		0.0001		0.0	13.000	0.001		Vel =	0.12	
H.16 to H.19	0.0 0.22	0.86 150.0	1Utr	2.0 0.0	14.000 2.000	34.603 0.0				
		0.0001		0.0	16.000	0.001		Vel =	0.12	
H.19 to H.18	0.0 0.22	0.86 150.0		0.0 0.0	7.000 0.0	34.604 0.0				
		0.0		0.0	7.000	0.0		Vel =	0.12	
H.18 to H.17	0.0 0.22	0.86 150.0	1Utr	2.0 0.0	15.000 2.000	34.604 0.0				
		0.0001		0.0	17.000	0.001		Vel =	0.12	
H.17 to T.66	0.0 0.22	0.86 150.0	1Utr	2.0 0.0	10.000 2.000	34.605 0.0				
		0.0001		0.0	12.000	0.001		Vel =	0.12	
	0.0 0.22						34.606	K Factor =	0.04	
T.72 to T.71	0.15 0.15	0.86 150.0	2Utb	12.0 0.0	1.000 12.000	30.270 0.0				
		0.0001		0.0	13.000	0.001		Vel =	0.08	
T.71 to H.20	-0.07 0.08	0.86 150.0	1Utr	2.0 0.0	19.000 2.000	30.271 0.0				
		0.0		0.0	21.000	0.0		Vel =	0.04	

Final Calculations - Hazen-Williams

Uponor
Church - One Head Calculation (H.50)

Page 14
Date 4/5/2012

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftn'g's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
H.20 to H.23	0.0 0.08	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	30.271 0.0 0.0			Vel = 0.04	
H.23 to H.30	0.0 0.08	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	30.271 0.0 0.0			Vel = 0.04	
H.30 to T.74	0.0 0.08	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	30.271 0.0 0.0			Vel = 0.04	
T.74 to T.73	0.07 0.15	0.86 150.0 0.0001	2Utb	12.0 0.0 0.0	4.000 12.000 16.000	30.271 0.0 0.001			Vel = 0.08	
	0.0 0.15					30.272			K Factor = 0.03	
T.71 to H.26	0.07 0.07	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	7.000 2.000 9.000	30.271 0.0 0.0			Vel = 0.04	
H.26 to H.31	0.0 0.07	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	15.000 2.000 17.000	30.271 0.0 0.0			Vel = 0.04	
H.31 to H.36	0.0 0.07	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	17.000 2.000 19.000	30.271 0.0 0.0			Vel = 0.04	
H.36 to H.37	0.0 0.07	0.86 150.0 0.0		0.0 0.0 0.0	10.000 0.0 10.000	30.271 0.0 0.0			Vel = 0.04	
H.37 to H.34	0.0 0.07	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	30.271 0.0 0.0			Vel = 0.04	
H.34 to T.74	0.0 0.07	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	9.000 2.000 11.000	30.271 0.0 0.0			Vel = 0.04	
	0.0 0.07					30.271			K Factor = 0.01	
T.84 to H.42	0.10 0.1	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	6.000 2.000 8.000	25.940 0.0 0.0			Vel = 0.06	
H.42 to T.85	0.0 0.1	0.86 150.0 0.0	1Utr	2.0 0.0 0.0	5.000 2.000 7.000	25.940 0.0 0.0			Vel = 0.06	
	0.0 0.10					25.940			K Factor = 0.02	
T.78 to H.35	0.17 0.17	0.67 150.0 0.0001	1Utr 1Utb	2.0 6.0 0.0	11.000 8.000 19.000	30.277 0.0 0.002			Vel = 0.15	
H.35 to T.79	0.0 0.17	0.67 150.0 0.0001	1Utb	6.0 0.0 0.0	10.000 6.000 16.000	30.279 0.0 0.002			Vel = 0.15	

Final Calculations - Hazen-Williams

Uponor
Church - One Head Calculation (H.50)

Page 15
Date 4/5/2012

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
	0.0 0.17				30.281		K Factor =	0.03	