



AquaSAFE™ FIRE SAFETY SYSTEM

Uponor EP
5925 148th Street West

Apple Valley, MN 55124
800-321-4739

Job Name : FISHER RESIDENCE - Two Head Calculation (H.16 & H.17)
Drawing : RESIDENTIAL
Location : 67 HIGH ST PORTLAND ME 04103
Remote Area : 1
Contract : 120606-41L
Data File : 120606-41L Fisher Residence.wx2

HYDRAULIC DESIGN INFORMATION SHEET

Name - FISHER RESIDENCE Date - 6/19/12
Location - PORTLAND ME 04103
Building - RESIDENTIAL System No. - 1
Contractor - BRADBURY'S PLG & HTG Contract No. - 120606-41L
Calculated By - MELISA RODRIGUEZ CET III 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: ()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 RELIABLE Model RFC49
I Elevation at Highest Outlet - 109 Feet Size 3/8 K-Factor 4.9
G Note: Temperature Rating 165
N

Calculation Gpm Required 26.1036 Psi Required 46.81 At Ref Pt Pump
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) - 0 Elev.
R Residual (Psi) - 0 Other Well
Flow (Gpm) - 0 Proof Flow Gpm
S Elevation - 100

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

Water Supply Curve (C)

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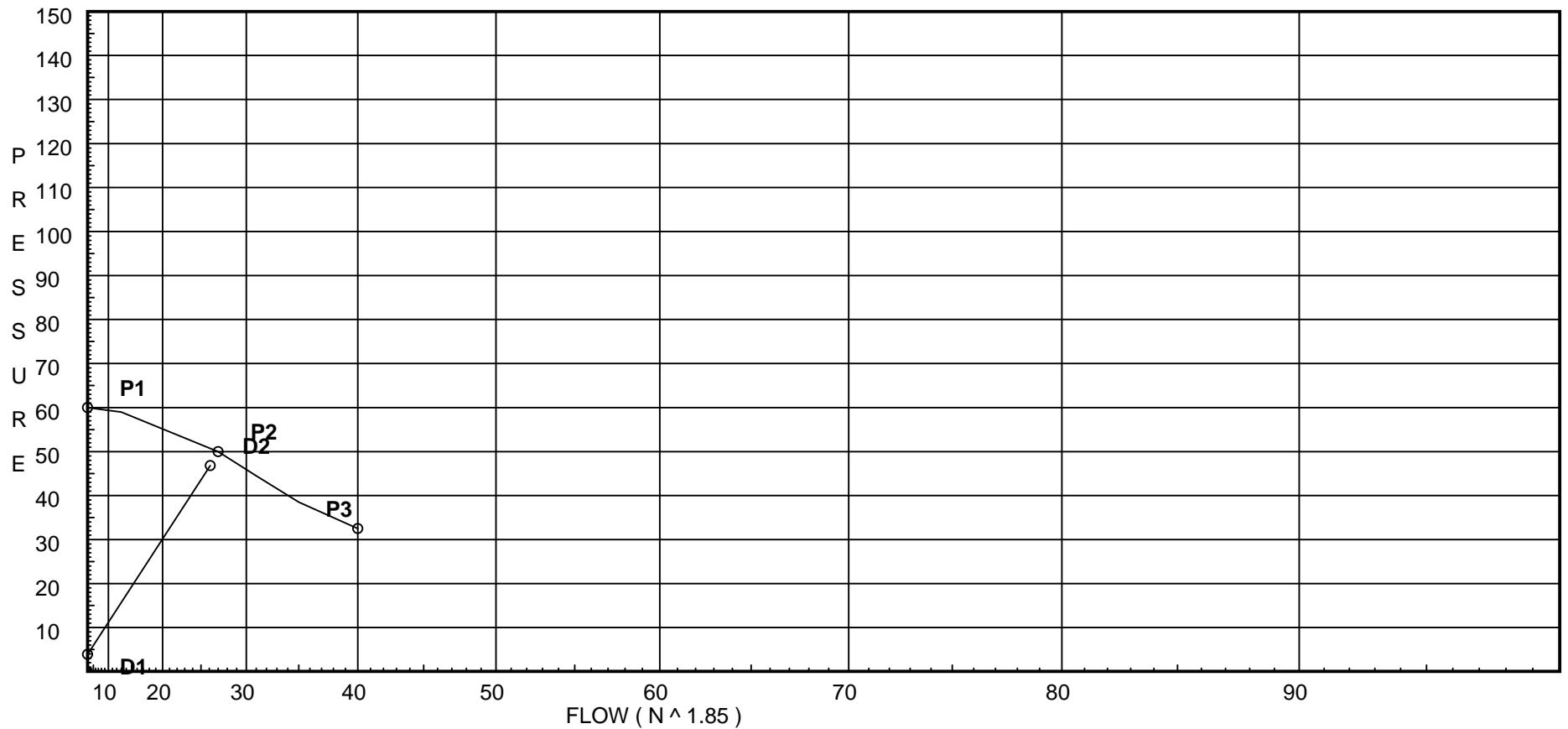
Page 2
Date 6/19/2012

Pump Data:

P1 - Pump Churn Pressure : 60
P2 - Pump Rated Pressure : 50
P2 - Pump Rated Flow : 27
P3 - Pump Pressure @ Max Flow : 32.5
P3 - Pump Max Flow : 40

Demand:

D1 - Elevation : 3.898
D2 - System Flow : 26.1036
D2 - System Pressure : 46.814
Hose (Adj City) : _____
Hose (Demand) : _____
D3 - System Demand : 26.1036
Safety Margin : 3.921



Fittings Used Summary

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 FISHER RESIDENCE - Two Head Calculation (H.16 & H.17)

Page 3
 Date 6/19/2012

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
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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Page 4
 Date 6/19/2012

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>
PUMP	See Information on Pump Curve			50.735	0.0	46.814

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.16	109.0	4.9	7.04	13.0	
H.8	109.0		11.91		
T.34	109.0		19.35		
T.33	109.0		24.07		
T.32	99.0		29.79		
H.12	99.0		34.02		
H.11	99.0		35.28		
H.19	99.0		38.14		
H.18	99.0		39.19		
T.38	99.0		41.62		
S.1	96.0		46.95		
X01	100.0		46.44		
PUMP	100.0		46.81		
H.17	109.0	4.9	7.15	13.1	
T.36	109.0		18.85		
H.9	109.0		24.27		
T.31	109.0		29.32		
T.30	99.0		35.92		
T.37	119.0		14.87		
H.15	119.0		15.81		
H.13	119.0		16.49		
H.7	119.0		17.22		
T.27	119.0		17.68		
T.25	109.0		22.85		
H.3	109.0		24.38		
T.23	109.0		24.76		
H.1	109.0		25.84		
T.20	109.0		26.83		
T.21	109.0		28.29		
H.2	109.0		28.71		
T.28	109.0		28.93		
H.14	119.0		14.99		
H.10	119.0		15.06		
T.35	119.0		15.16		
T.26	119.0		16.45		
H.6	119.0		16.6		
H.4	99.0		30.86		
H.5	99.0		31.44		
T.24	99.0		32.73		

Final Calculations - Hazen-Williams

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FISHER RESIDENCE - Two Head Calculation (H.16 & H.17)

Page 5

Date 6/19/2012

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.16 to H.8	11.08	0.67 150.0	1Utr	2.0 0.0	17.000 2.000	7.040 0.0			K Factor = 4.90	
H.8 to T.34	11.08	0.2564		0.0	19.000	4.872			Vel = 10.08	
H.8 to T.34	0.0	0.67 150.0	1Utr 1Utb	2.0 17.0	10.000 19.000	11.912 0.0				
T.34 to T.33	11.08	0.2564		0.0	29.000	7.435			Vel = 10.08	
T.34 to T.33	-3.48	0.67 150.0	2Utb	34.0 0.0	3.000 34.000	19.347 0.0				
T.33 to T.32	7.6	0.1277		0.0	37.000	4.725			Vel = 6.92	
T.33 to T.32	3.56	0.86 150.0		0.0 0.0	18.000 0.0	24.072 4.331				
T.32 to H.12	11.16	0.0771		0.0	18.000	1.387			Vel = 6.16	
T.32 to H.12	-4.30	0.67 150.0	1Utr 1Utb	2.0 17.0	21.000 19.000	29.790 0.0				
H.12 to H.11	6.86	0.1056		0.0	40.000	4.225			Vel = 6.24	
H.12 to H.11	0.0	0.67 150.0	1Utr	2.0 0.0	10.000 2.000	34.015 0.0				
H.11 to H.19	6.86	0.1057		0.0	12.000	1.268			Vel = 6.24	
H.11 to H.19	0.0	0.67 150.0	1Utr	2.0 0.0	25.000 2.000	35.283 0.0				
H.19 to H.18	6.86	0.1056		0.0	27.000	2.852			Vel = 6.24	
H.19 to H.18	0.0	0.67 150.0		0.0 0.0	10.000 0.0	38.135 0.0				
H.18 to T.38	6.86	0.1056		0.0	10.000	1.056			Vel = 6.24	
H.18 to T.38	0.0	0.67 150.0	1Utr 1Utb	2.0 17.0	4.000 19.000	39.191 0.0				
T.38 to S.1	6.86	0.1057		0.0	23.000	2.430			Vel = 6.24	
T.38 to S.1	19.24	0.86 150.0	1T	2.871 0.0	8.000 2.871	41.621 1.299				
S.1 to X01	26.1	0.3709		0.0	10.871	4.032			Vel = 14.42	
S.1 to X01	0.0	0.86 150.0	2E	2.297 0.0	1.000 2.297	46.952 -1.732				
X01 to PUMP	26.1	0.3709		0.0	3.297	1.223			Vel = 14.42	
X01 to PUMP	0.0	0.86 150.0		0.0 0.0	1.000 0.0	46.443 0.0				
PUMP	26.1	0.3710		0.0	1.000	0.371			Vel = 14.42	
	0.0 26.10					46.814			K Factor = 3.81	
H.16 to H.17	-24.18	0.67 150.0		0.0 0.0	11.000 0.0	7.040 0.0				
H.17 to T.36	1.92	0.0100		0.0	11.000	0.110			Vel = 1.75	
H.17 to T.36	13.10	0.67 150.0	1Utr 1Utb	2.0 17.0	7.000 19.000	7.150 0.0			K Factor = 4.90	
T.36 to H.9	15.02	0.4501		0.0	26.000	11.703			Vel = 13.67	
T.36 to H.9	-5.85	0.67 150.0	1Utb	17.0 0.0	13.000 17.000	18.853 0.0				
H.9 to T.31	9.17	0.1805		0.0	30.000	5.415			Vel = 8.34	
H.9 to T.31	0.0	0.67 150.0	1Utr 1Utb	2.0 17.0	9.000 19.000	24.268 0.0				
T.31	9.17	0.1805		0.0	28.000	5.055			Vel = 8.34	

Final Calculations - Hazen-Williams

Uponor EP
 FISHER RESIDENCE - Two Head Calculation (H.16 & H.17)

Page 6
 Date 6/19/2012

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.31 to T.30	2.78 11.95	0.86 150.0 0.0873	1Utb	14.0 0.0 0.0	12.000 14.000 26.000	29.323 4.331 2.271		Vel = 6.60	
T.30 to T.38	7.29 19.24	0.86 150.0 0.2110	1Utr	2.0 0.0 0.0	25.000 2.000 27.000	35.925 0.0 5.696		Vel = 10.63	
	0.0 19.24					41.621		K Factor = 2.98	
T.36 to T.37	5.85 5.85	0.86 150.0 0.0233		0.0 0.0 0.0	15.000 0.0 15.000	18.853 -4.331 0.350		Vel = 3.23	
T.37 to H.15	-1.17 4.68	0.67 150.0 0.0521	1Utb	17.0 0.0 0.0	1.000 17.000 18.000	14.872 0.0 0.938		Vel = 4.26	
H.15 to H.13	0.0 4.68	0.67 150.0 0.0521	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	15.810 0.0 0.677		Vel = 4.26	
H.13 to H.7	0.0 4.68	0.67 150.0 0.0521	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	16.487 0.0 0.729		Vel = 4.26	
H.7 to T.27	0.0 4.68	0.67 150.0 0.0521	1Utr	2.0 0.0 0.0	7.000 2.000 9.000	17.216 0.0 0.469		Vel = 4.26	
T.27 to T.25	4.65 9.33	0.86 150.0 0.0553		0.0 0.0 0.0	15.000 0.0 15.000	17.685 4.331 0.830		Vel = 5.15	
T.25 to H.3	-3.56 5.77	0.67 150.0 0.0767	1Utb	17.0 0.0 0.0	3.000 17.000 20.000	22.846 0.0 1.534		Vel = 5.25	
H.3 to T.23	0.0 5.77	0.67 150.0 0.0768	1Utr	2.0 0.0 0.0	3.000 2.000 5.000	24.380 0.0 0.384		Vel = 5.25	
T.23 to H.1	0.0 5.77	0.67 150.0 0.0766	1Utr	2.0 0.0 0.0	12.000 2.000 14.000	24.764 0.0 1.073		Vel = 5.25	
H.1 to T.20	0.0 5.77	0.67 150.0 0.0767	1Utr	2.0 0.0 0.0	11.000 2.000 13.000	25.837 0.0 0.997		Vel = 5.25	
T.20 to T.21	0.0 5.77	0.67 150.0 0.0767	1Utb	17.0 0.0 0.0	2.000 17.000 19.000	26.834 0.0 1.457		Vel = 5.25	
T.21 to H.2	-2.99 2.78	0.67 150.0 0.0199	1Utr 1Utb	2.0 17.0 0.0	2.000 19.000 21.000	28.291 0.0 0.417		Vel = 2.53	
H.2 to T.28	0.0 2.78	0.67 150.0 0.0198	1Utr	2.0 0.0 0.0	9.000 2.000 11.000	28.708 0.0 0.218		Vel = 2.53	
T.28 to T.31	0.0 2.78	0.67 150.0 0.0198	1Utb	17.0 0.0 0.0	3.000 17.000 20.000	28.926 0.0 0.397		Vel = 2.53	

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Uponor EP

FISHER RESIDENCE - Two Head Calculation (H.16 & H.17)

Page 7

Date 6/19/2012

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftg's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
	0.0 2.78					29.323			K Factor = 0.51	
T.37 to H.14	1.17	0.67 150.0	1Utb	17.0 0.0	12.000 17.000	14.872 0.0			Vel = 1.06	
H.14 to H.10	1.17	0.0040		0.0	29.000	0.116				
H.14 to H.10	0.0	0.67 150.0	1Utr	2.0 0.0	17.000 2.000	14.988 0.0			Vel = 1.06	
H.10 to T.35	1.17	0.0040		0.0	19.000	0.076				
H.10 to T.35	0.0	0.67 150.0	1Utr 1Utb	2.0 17.0	6.000 19.000	15.064 0.0			Vel = 1.06	
T.35 to T.26	1.17	0.0040		0.0	25.000	0.101				
T.35 to T.26	3.48	0.67 150.0	1Utb	17.0 0.0	8.000 17.000	15.165 0.0			Vel = 4.23	
T.26 to H.6	4.65	0.0514		0.0	25.000	1.286				
T.26 to H.6	0.0	0.67 150.0	1Utr	2.0 0.0	1.000 2.000	16.451 0.0			Vel = 4.23	
H.6 to T.27	4.65	0.0513		0.0	3.000	0.154				
H.6 to T.27	0.0	0.67 150.0	1Utr 1Utb	2.0 17.0	2.000 19.000	16.605 0.0			Vel = 4.23	
	0.0 4.65					17.685			K Factor = 1.11	
T.34 to T.35	3.48	0.86 150.0		0.0 0.0	16.645 0.0	19.347 -4.331			Vel = 1.92	
	0.0 3.48					15.165			K Factor = 0.89	
T.25 to T.33	3.56	0.67 150.0	2Utb	34.0 0.0	5.000 34.000	22.846 0.0			Vel = 3.24	
	0.0 3.56					39.000	1.226			
T.32 to H.4	4.30	0.67 150.0	1Utb	17.0 0.0	7.000 17.000	29.790 0.0			Vel = 3.91	
H.4 to H.5	4.3	0.0445		0.0	24.000	1.069				
H.4 to H.5	0.0	0.67 150.0	1Utr	2.0 0.0	11.000 2.000	30.859 0.0			Vel = 3.91	
H.5 to T.24	4.3	0.0445		0.0	13.000	0.579				
H.5 to T.24	0.0	0.67 150.0	1Utb	17.0 0.0	12.000 17.000	31.438 0.0			Vel = 3.91	
T.24 to T.30	4.3	0.0446		0.0	29.000	1.292				
T.24 to T.30	3.00	0.67 150.0	1Utb 1Utr	17.0 2.0	8.000 19.000	32.730 0.0			Vel = 6.64	
T.30	7.3	0.1183		0.0	27.000	3.195				
	0.0 7.30					35.925			K Factor = 1.22	
T.21 to T.24	2.99	0.86 150.0		0.0 0.0	16.000 0.0	28.291 4.331			Vel = 1.65	
T.24	2.99	0.0068		0.0	16.000	0.108				

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Uponor EP
 FISHER RESIDENCE - Two Head Calculation (H.16 & H.17)

Page 8
 Date 6/19/2012

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 2.99				32.730			K Factor = 0.52	