



AquaSAFE™ FIRE SAFETY SYSTEM

Uponor
5925 148th Street West

Apple Valley, MN 55124
800-321-4739

Job Name : TOWLE RESIDENCE - Two Head Calculation (H.11 & H.12)
Drawing : RESIDENTIAL
Location : 1637 WASHINGTON AVE EXT PORTLAND ME 04103
Remote Area : 1
Contract : 20201F
Data File : 20201F Towle Residence.wx2

HYDRAULIC DESIGN INFORMATION SHEET

Name - TOWLE RESIDENCE Date - 7/5/16
Location - PORTLAND ME 04103
Building - RESIDENTIAL System No. - 1
Contractor - MARK NIGRO SERVICES Contract No. - 20201F
Calculated By - PATRICK BROWN Drawing No. - F100
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: ()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 LF SENJU SPRINKLER Model RC-RES
I Elevation at Highest Outlet - 109 Feet Size 7/16 K-Factor 4.9
G Note: Temperature Rating 162
N

Calculation Gpm Required 26.133 Psi Required 51.82 At Ref Pt STR
Summary C-Factor Used: Overhead 150 Underground 150

W Water Flow Test: Pump Data:
A Date of Test - 6/28/16 Rated Cap.
T Time of Test - NOON @ Psi
E Static (Psi) - 76 Elev.
R Residual (Psi) - 71 Other
Flow (Gpm) - 300
S Elevation - 100

P Location: STREET
P
L Source of Information: WATER AUTHORITY
Y

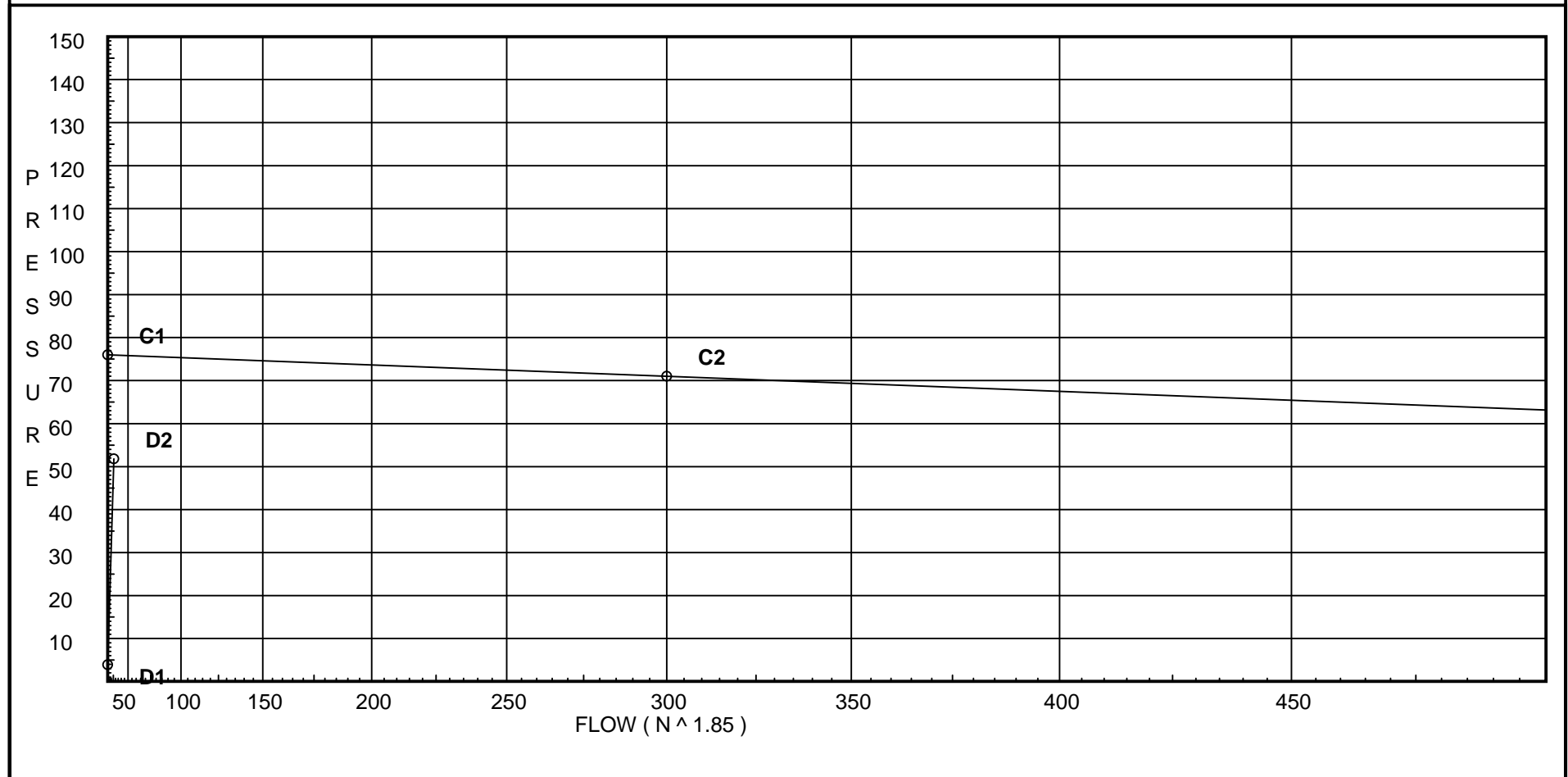
Water Supply Curve C

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City Water Supply:
C1 - Static Pressure : 76
C2 - Residual Pressure: 71
C2 - Residual Flow : 300

Demand:
D1 - Elevation : 3.898
D2 - System Flow : 26.133
D2 - System Pressure : 51.816
Hose (Demand) : _____
D3 - System Demand : 26.133
Safety Margin : 24.130



Fittings Used Summary

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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
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	76.0	71	300.0	75.945	26.13	51.816

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	109.0	4.9	7.04	13.0	
T.27	109.0		7.97		
T.25	109.0		10.75		
H.10	109.0		12.83		
T.23	109.0		17.47		
H.7	109.0		19.45		
H.8	109.0		20.06		
T.19	109.0		20.61		
T.21	109.0		21.71		
H.9	109.0		30.79		
T.22	109.0		32.37		
S.1	104.0		38.54		
MTR	100.0		44.49		
STR	100.0		51.82		
H.12	109.0	4.9	7.18	13.13	
T.26	109.0		17.72		
T.14	119.0		13.48		
H.2	119.0		14.96		
H.1	119.0		15.31		
T.13	119.0		16.56		
T.16	119.0		13.56		
H.6	119.0		14.64		
T.17	119.0		14.72		
H.3	119.0		15.47		
H.4	119.0		13.51		
T.15	119.0		13.52		
H.5	119.0		13.53		

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	*****
H.11 to T.27	10.53	0.671 150.0 0.2318	Utr	2.0 0.0 0.0	2.000 2.000 4.000	7.040 0.0 0.927			K Factor = 4.90 Vel = 9.55	
T.27 to T.25	0.0	0.671 150.0 0.2318	Utr	2.0 0.0 0.0	10.000 2.000 12.000	7.967 0.0 2.781			Vel = 9.55	
T.25 to H.10	0.0	0.671 150.0 0.2318	Utr	2.0 0.0 0.0	7.000 2.000 9.000	10.748 0.0 2.086			Vel = 9.55	
H.10 to T.23	0.0	0.671 150.0 0.2318	Utb Utr	17.0 2.0 0.0	1.000 19.000 20.000	12.834 0.0 4.635			Vel = 9.55	
T.23 to H.7	-5.68	0.671 150.0 0.0551	Utb	17.0 0.0 0.0	19.000 17.000 36.000	17.469 0.0 1.984			Vel = 4.40	
H.7 to H.8	0.0	0.671 150.0 0.0552	Utr	2.0 0.0 0.0	9.000 2.000 11.000	19.453 0.0 0.607			Vel = 4.40	
H.8 to T.19	0.0	0.671 150.0 0.0551	Utr	2.0 0.0 0.0	8.000 2.000 10.000	20.060 0.0 0.551			Vel = 4.40	
T.19 to T.21	0.0	0.671 150.0 0.0552	Utb	17.0 0.0 0.0	3.000 17.000 20.000	20.611 0.0 1.103			Vel = 4.40	
T.21 to H.9	9.20	0.671 150.0 0.3946	Utb Utr	17.0 2.0 0.0	4.000 19.000 23.000	21.714 0.0 9.076			Vel = 12.75	
H.9 to T.22	0.0	0.671 150.0 0.3948	Utr	2.0 0.0 0.0	2.000 2.000 4.000	30.790 0.0 1.579			Vel = 12.75	
T.22 to S.1	12.08	0.862 150.0 0.3675	T	7.528 0.0 0.0	8.000 2.904 10.904	32.369 2.166 4.007			Vel = 14.37	
S.1 to MTR	0.0	0.995 150.0 0.1827	2E	4.673 0.0 0.0	2.000 4.673 6.673	38.542 4.732 1.219			* * Fixed Loss = 3 Vel = 10.78	
MTR to STR	0.0	0.911 150.0 0.2808	E T G	1.521 3.801 0.76	20.000 6.082 26.082	44.493 0.0 7.323			Vel = 12.86	
	0.0 26.13					51.816			K Factor = 3.63	
H.11 to H.12	2.47	0.671 150.0 0.0158		0.0 0.0 0.0	9.000 0.0 9.000	7.040 0.0 0.142			Vel = 2.24	
H.12 to T.26	13.13	0.671 150.0 0.4791	Utb Utr	17.0 2.0 0.0	3.000 19.000 22.000	7.182 0.0 10.541			K Factor = 4.90 Vel = 14.15	
T.26 to T.22	-3.51	0.671 150.0 0.2989	2Utb	34.0 0.0 0.0	15.000 34.000 49.000	17.723 0.0 14.646			Vel = 10.97	

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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	*****
	0.0 12.09					32.369			K Factor = 2.13	
T.23 to T.14	5.69	0.862 150.0		0.0	15.570	17.469 -4.331				
T.14 to H.2	5.69	0.0218		0.0	15.570	0.340			Vel = 3.13	
T.14 to H.2	-0.65	0.671 150.0	Utb	17.0	8.000	13.478 0.0				
H.2 to H.1	5.04	0.0592		0.0	25.000	1.480			Vel = 4.57	
H.2 to H.1	0.0	0.671 150.0	Utr	2.0	4.000	14.958 0.0				
H.1 to T.13	5.04	0.0592		0.0	6.000	0.355			Vel = 4.57	
H.1 to T.13	0.0	0.671 150.0	Utb	17.0	4.000	15.313 0.0				
T.13 to T.21	5.04	0.0591		0.0	21.000	1.242			Vel = 4.57	
T.13 to T.21	4.16	0.862 150.0		0.0	15.538	16.555 4.331				
T.21	9.2	0.0533		0.0	15.538	0.828			Vel = 5.06	
	0.0 9.20					21.714			K Factor = 1.97	
T.26 to T.16	3.51	0.862 150.0		0.0	18.719	17.723 -4.331				
T.16 to H.6	3.51	0.0090		0.0	18.719	0.168			Vel = 1.93	
T.16 to H.6	0.65	0.671 150.0	Utb Utr	17.0 2.0	7.000	13.560 0.0				
H.6 to T.17	4.16	0.0416		0.0	26.000	1.082			Vel = 3.77	
H.6 to T.17	0.0	0.671 150.0		0.0	2.000	14.642 0.0				
T.17 to H.3	4.16	0.0415		0.0	2.000	0.083			Vel = 3.77	
T.17 to H.3	0.0	0.671 150.0	Utr	2.0	16.000	14.725 0.0				
H.3 to T.13	4.16	0.0416		0.0	18.000	0.749			Vel = 3.77	
H.3 to T.13	0.0	0.671 150.0	Utb Utr	17.0 2.0	7.000	15.474 0.0				
T.13	4.16	0.0416		0.0	26.000	1.081			Vel = 3.77	
	0.0 4.16					16.555			K Factor = 1.02	
T.14 to H.4	0.65	0.671 150.0	Utb Utr	17.0 2.0	6.000	13.478 0.0				
H.4 to T.15	0.65	0.0014		0.0	25.000	0.034			Vel = 0.59	
H.4 to T.15	0.0	0.671 150.0	Utr	2.0	3.000	13.512 0.0				
T.15 to H.5	0.65	0.0014		0.0	5.000	0.007			Vel = 0.59	
T.15 to H.5	0.0	0.671 150.0	Utr	2.0	9.000	13.519 0.0				
H.5 to T.16	0.65	0.0013		0.0	11.000	0.014			Vel = 0.59	
H.5 to T.16	0.0	0.671 150.0	Utb	17.0	3.000	13.533 0.0				
T.16	0.65	0.0014		0.0	20.000	0.027			Vel = 0.59	

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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	*****
	0.0 0.65				13.560			K Factor = 0.18	