Reviewed for Code Compliance
Inspections Division
Approved with Conditions
Date: 10/17/16

AquaSAFE™ FIRE SAFETY SYSTEM

Uponor
5925 148th Street West

Apple Valley, MN 55124
800-321-4739

Job Name	:	TOWLE RESIDENCE - One Head Calculation (H.6)
Drawing	:	RESIDENTIAL
Location	:	1637 WASHINGTON AVE EXT PORTLAND ME 04103
Remote Area	:	1
Contract	:	20201F
Data File	:	20201F Towle Residence.wx1

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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: (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 Psi (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 LF SENJU SPRINKLER Model RC-RES
I Elevation at Highest Outlet - 119 Feet Size 7/16 K-Factor 4.9
G Note: Temperature Rating 162
N

Calculation Summary
Gpm Required 17 Psi Required 40.42 At Ref Pt STR
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 : 8.229
- D2 - System Flow : 16.974
- D2 - System Pressure : 40.416
- Hose (Demand) : _____
- D3 - System Demand : 16.974
- Safety Margin : 35.559

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			
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

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SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
STR	76.0	71	300.0	75.975	16.97	40.416

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes
H.6	119.0	4.9	12.0	16.97	
T.16	119.0		16.97		
T.26	109.0		21.99		
T.22	109.0		27.87		
S.1	104.0		31.84		
MTR	100.0		37.12		
STR	100.0		40.42		
T.17	119.0		12.25		
H.3	119.0		14.46		
T.13	119.0		17.66		
T.21	109.0		22.61		
H.9	109.0		27.09		
H.5	119.0		17.19		
T.15	119.0		17.31		
H.4	119.0		17.36		
T.14	119.0		17.63		
T.23	109.0		21.99		
H.7	109.0		22.28		
H.8	109.0		22.37		
T.19	109.0		22.45		
H.2	119.0		17.64		
H.1	119.0		17.64		
H.12	109.0		21.99		
H.11	109.0		21.99		
T.27	109.0		21.99		
T.25	109.0		21.99		
H.10	109.0		21.99		

Final Calculations - Hazen-Williams

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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	******* Not
H.6	9.50	0.671	Utb	17.0	7.000	12.000		K Factor = 4.90
to		150.0	Utr	2.0	19.000	0.0		
T.16	9.5	0.1913		0.0	26.000	4.973		Vel = 8.62
T.16	-2.00	0.862		0.0	18.719	16.973		
to		150.0		0.0	0.0	4.331		
T.26	7.5	0.0365		0.0	18.719	0.683		Vel = 4.12
T.26	-0.12	0.671	2Utb	34.0	15.000	21.987		
to		150.0		0.0	34.000	0.0		
T.22	7.38	0.1201		0.0	49.000	5.883		Vel = 6.70
T.22	9.59	0.862	T	7.528	8.000	27.870		
to		150.0		0.0	2.904	2.166		
S.1	16.97	0.1654		0.0	10.904	1.803		Vel = 9.33
S.1	0.0	0.995	2E	4.673	2.000	31.839		
to		150.0		0.0	4.673	4.732		* * Fixed Loss = 3
MTR	16.97	0.0823		0.0	6.673	0.549		Vel = 7.00
MTR	0.0	0.911	E	1.521	20.000	37.120		
to		150.0	T	3.801	6.082	0.0		
STR	16.97	0.1264	G	0.76	26.082	3.296		Vel = 8.35
	0.0							
	16.97					40.416		K Factor = 2.67
H.6	7.48	0.671		0.0	2.000	12.000		
to		150.0		0.0	0.0	0.0		
T.17	7.48	0.1230		0.0	2.000	0.246		Vel = 6.79
T.17	0.0	0.671	Utr	2.0	16.000	12.246		
to		150.0		0.0	2.000	0.0		
H.3	7.48	0.1229		0.0	18.000	2.213		Vel = 6.79
H.3	0.0	0.671	Utb	17.0	7.000	14.459		
to		150.0	Utr	2.0	19.000	0.0		
T.13	7.48	0.1230		0.0	26.000	3.197		Vel = 6.79
T.13	0.40	0.862		0.0	15.538	17.656		
to		150.0		0.0	0.0	4.331		
T.21	7.88	0.0400		0.0	15.538	0.622		Vel = 4.33
T.21	1.71	0.671	Utb	17.0	4.000	22.609		
to		150.0	Utr	2.0	19.000	0.0		
H.9	9.59	0.1948		0.0	23.000	4.481		Vel = 8.70
H.9	0.0	0.671	Utr	2.0	2.000	27.090		
to		150.0		0.0	2.000	0.0		
T.22	9.59	0.1950		0.0	4.000	0.780		Vel = 8.70
	0.0							
	9.59					27.870		K Factor = 1.82
T.16	2.00	0.671	Utb	17.0	3.000	16.973		
to		150.0		0.0	17.000	0.0		
H.5	2.0	0.0107		0.0	20.000	0.215		Vel = 1.81
H.5	0.0	0.671	Utr	2.0	9.000	17.188		
to		150.0		0.0	2.000	0.0		
T.15	2.0	0.0107		0.0	11.000	0.118		Vel = 1.81
T.15	0.0	0.671	Utr	2.0	3.000	17.306		
to		150.0		0.0	2.000	0.0		
H.4	2.0	0.0106		0.0	5.000	0.053		Vel = 1.81

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H.4	0.0	0.671	Utb	17.0	6.000	17.359		
to		150.0	Utr	2.0	19.000	0.0		
T.14	2.0	0.0107		0.0	25.000	0.268		Vel = 1.81
T.14	-0.40	0.862		0.0	15.570	17.627		
to		150.0		0.0	0.0	4.331		
T.23	1.6	0.0021		0.0	15.570	0.033		Vel = 0.88
T.23	0.11	0.671	Utb	17.0	19.000	21.991		
to		150.0		0.0	17.000	0.0		
H.7	1.71	0.0080		0.0	36.000	0.289		Vel = 1.55
H.7	0.0	0.671	Utr	2.0	9.000	22.280		
to		150.0		0.0	2.000	0.0		
H.8	1.71	0.0080		0.0	11.000	0.088		Vel = 1.55
H.8	0.0	0.671	Utr	2.0	8.000	22.368		
to		150.0		0.0	2.000	0.0		
T.19	1.71	0.0080		0.0	10.000	0.080		Vel = 1.55
T.19	0.0	0.671	Utb	17.0	3.000	22.448		
to		150.0		0.0	17.000	0.0		
T.21	1.71	0.0080		0.0	20.000	0.161		Vel = 1.55
	0.0							
	1.71					22.609		K Factor = 0.36
T.14	0.40	0.671	Utb	17.0	8.000	17.627		
to		150.0		0.0	17.000	0.0		
H.2	0.4	0.0006		0.0	25.000	0.014		Vel = 0.36
H.2	0.0	0.671	Utr	2.0	4.000	17.641		
to		150.0		0.0	2.000	0.0		
H.1	0.4	0.0005		0.0	6.000	0.003		Vel = 0.36
H.1	0.0	0.671	Utb	17.0	4.000	17.644		
to		150.0		0.0	17.000	0.0		
T.13	0.4	0.0006		0.0	21.000	0.012		Vel = 0.36
	0.0							
	0.40					17.656		K Factor = 0.10
T.26	0.11	0.671	Utb	17.0	3.000	21.987		
to		150.0	Utr	2.0	19.000	0.0		
H.12	0.11	0.0		0.0	22.000	0.001		Vel = 0.10
H.12	0.0	0.671		0.0	9.000	21.988		
to		150.0		0.0	0.0	0.0		
H.11	0.11	0.0		0.0	9.000	0.0		Vel = 0.10
H.11	0.0	0.671	Utr	2.0	2.000	21.988		
to		150.0		0.0	2.000	0.0		
T.27	0.11	0.0002		0.0	4.000	0.001		Vel = 0.10
T.27	0.0	0.671	Utr	2.0	10.000	21.989		
to		150.0		0.0	2.000	0.0		
T.25	0.11	0.0		0.0	12.000	0.0		Vel = 0.10
T.25	0.0	0.671	Utr	2.0	7.000	21.989		
to		150.0		0.0	2.000	0.0		
H.10	0.11	0.0001		0.0	9.000	0.001		Vel = 0.10
H.10	0.0	0.671	Utb	17.0	1.000	21.990		
to		150.0	Utr	2.0	19.000	0.0		
T.23	0.11	0.0		0.0	20.000	0.001		Vel = 0.10

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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	*******	Not
	0.0								
	0.11					21.991		K Factor =	0.02