

Hydraulic Design Information Sheet

Name - LIFE STORAGE Date - 10-10-17
 Location - 235 PRESUMSCOT STREET PORTLAND, MAINE
 Building - NEW LOWER LEVEL System No. - 1 OF 1
 Contractor - HARDYPOND CONSTRUCTION Contract No. - C17026
 Calculated By - SJC Drawing No. - 1 OF 1
 Construction: () Combustible (X) Non-Combustible Ceiling Height - 10'-0"
 Occupancy - GENERAL STORAGE

S (X) NFPA 13 () Lt. Haz. Ord.Haz.Gp. () 1 (X) 2 () 3 () Ex.Haz.
 Y () NFPA 231 () NFPA 231C () Figure Curve

S Other

T Specific Ruling Made By Date

E
 M Area of Sprinkler Operation - 900 SQ FT System Type Sprinkler/Nozzle
 Density - .2 (X) Wet Make VIKING
 D Area Per Sprinkler - 130 () Dry Model VK300
 E Elevation at Highest Outlet - 9'-6" () Deluge Size 1/2"
 S Hose Allowance - Inside () Preaction K-Factor 5.6
 I Rack Sprinkler Allowance - () Other Temp.Rat.155
 G Hose Allowance - Outside -
 N

Note SAFETY MARGIN: 8.28 PSI

Calculation Flow Required - 405.227 Press Required - 84.943
 Summary C-Factor Used: 120 Overhead 120 Underground

W Water Flow Test: Pump Data: Tank or Reservoir:
 A Date of Test - 9-22-17 Cap. -
 T Time of Test - Rated Cap.- Elev.-
 E Static Press - 100 @ Press -
 R Residual Press - 90 Elev. - Well
 Flow - 500 Proof Flow
 S Elevation - 0

U
 P Location - AT THE SPRINKLER RISER

P
 L Source of Information - 2" MAIN DRAIN TEST
 Y

C Commodity Class Location
 O Storage Ht. Area Aisle W.
 M Storage Method: Solid Piled % Palletized % Rack
 M
 () Single Row () Conven. Pallet () Auto. Storage () Encap.
 S R () Double Row () Slave Pallet () Solid Shelf () Non
 T A () Mult. Row () Open Shelf
 O C

R K Flue Spacing Clearance:Storage to Ceiling
 A Longitudinal Transverse

G
 E Horizontal Barriers Provided:

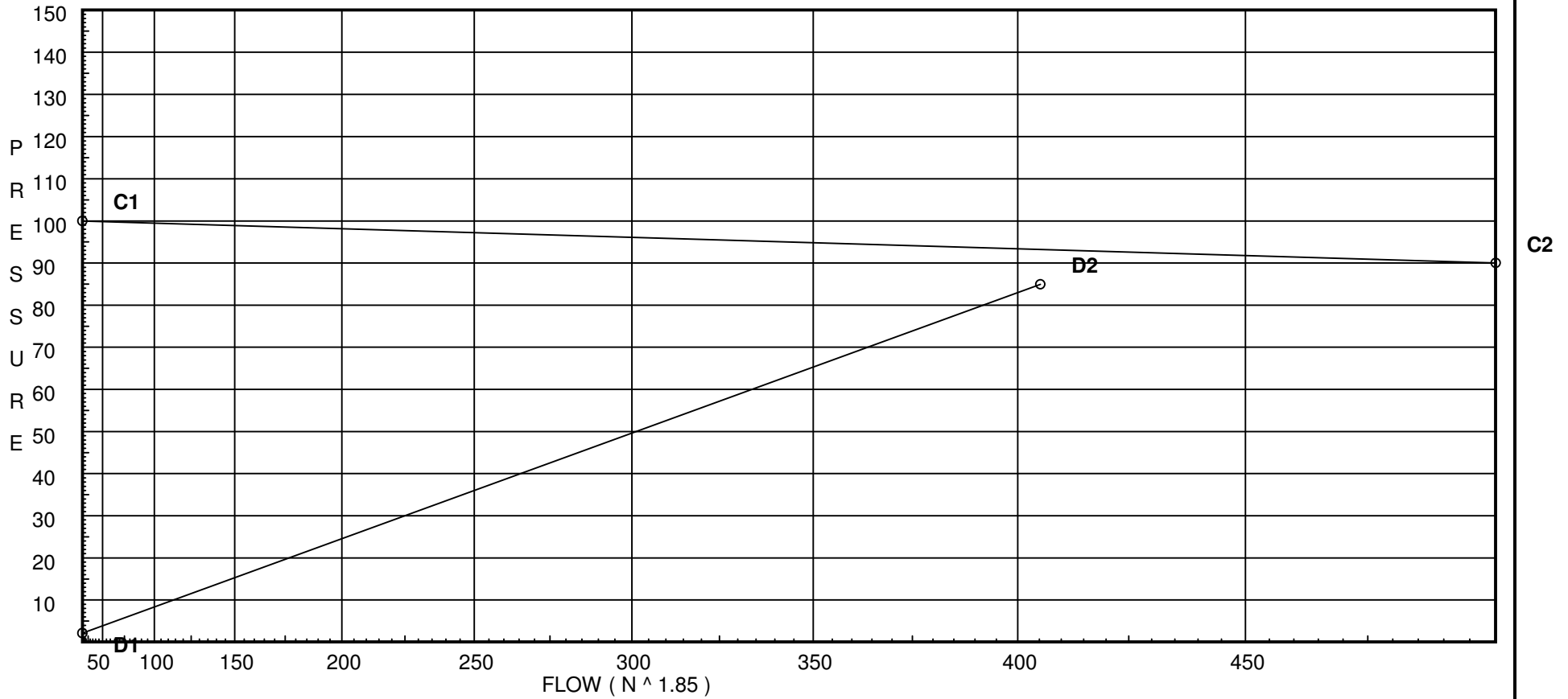
Water Supply Curve (C)

Residential Fire Protection
LIFE STORAGE PORTLAND

Page 2
Date 10-9-17

City Water Supply:
 C1 - Static Pressure : 100
 C2 - Residual Pressure: 90
 C2 - Residual Flow : 500

Demand:
 D1 - Elevation : 2.168
 D2 - System Flow : 405.227
 D2 - System Pressure : 84.943
 Hose (Adj City) : _____
 Hose (Demand) : _____
 D3 - System Demand : 405.227
 Safety Margin : 8.278



Fittings Used Summary

Residential Fire Protection
LIFE STORAGE PORTLAND

Page 3
Date 10-9-17

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
A	Generic Alarm Valve	0	0	0	0	0	0	7.7	21.5	0	17	17	27	29	0	0	0	0	0	0	0
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
Z	Generic Flow Switch	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61

Pressure / Flow Summary - STANDARD

Residential Fire Protection
LIFE STORAGE PORTLAND

Page 4
Date 10-9-17

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
53	9.666		36.22	na				
1	9.666	5.6	23.34	na	27.05	0.2	80	7.0
2	9.666	5.6	18.88	na	24.33	0.2	70	7.0
3	9.666	5.6	18.0	na	23.76	0.2	80	7.0
4	9.666	5.6	18.05	na	23.79	0.2	70	7.0
5	9.666	5.6	19.62	na	24.81	0.2	104	7.0
52	9.666		35.02	na				
6	9.666	5.6	27.69	na	29.47	0.2	70	7.0
7	9.666	5.6	26.52	na	28.84	0.2	70	7.0
8	9.666	5.6	26.88	na	29.04	0.2	70	7.0
51	9.666		34.47	na				
9	9.666	5.6	27.8	na	29.53	0.2	98	7.0
10	9.666	5.6	26.69	na	28.93	0.2	98	7.0
11	9.666	5.6	27.59	na	29.41	0.2	98	7.0
50	9.666		33.81	na				
12	9.666	5.6	24.67	na	27.81	0.2	130	7.0
13	9.666	5.6	21.56	na	26.0	0.2	130	7.0
14	9.666	5.6	21.45	na	25.94	0.2	91	7.0
15	9.666	5.6	22.42	na	26.51	0.2	130	7.0
24	9.666		46.5	na				
25	9.666		47.51	na				
26	9.666		48.67	na				
27	9.666		49.95	na				
28	9.666		51.34	na				
29	9.666		52.83	na				
30	9.666		54.41	na				
31	9.666		56.08	na				
32	9.666		57.84	na				
33	9.666		59.72	na				
34	9.666		61.72	na				
35	9.666		63.87	na				
36	9.666		66.22	na				
37	9.666		70.15	na				
38	9.666		70.05	na				
39	9.666		70.0	na				
70	9.666		60.55	na				
54	9.666		39.27	na				
55	9.666		42.21	na				
56	9.666		44.79	na				
57	9.666		47.09	na				
58	9.666		49.15	na				
59	9.666		51.02	na				
60	9.666		52.72	na				
61	9.666		54.27	na				
62	9.666		55.67	na				
63	9.666		56.92	na				
64	9.666		57.99	na				
65	9.666		58.87	na				
66	9.666		59.56	na				
67	9.666		60.05	na				
68	9.666		60.31	na				
69	9.666		60.46	na				
20	9.666		45.18	na				
21	9.666		45.23	na				
22	9.666		45.39	na				
23	9.666		45.72	na				
80	9.666		70.62	na				
TR	4.66		83.46	na				
TEST	4.66		84.94	na				

The maximum velocity is 26.35 and it occurs in the pipe between nodes 53 and 1

Final Calculations - Hazen-Williams

Residential Fire Protection
LIFE STORAGE PORTLAND

Page 5
Date 10-9-17

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
53	-70.99	1.049			9.500		36.219			
to		120		0.0	0.0		0.0			
1	-70.99	-1.3557		0.0	9.500		-12.879		Vel = 26.35	
1	27.06	1.049		0.0	8.000		23.340		K Factor = 5.60	
to		120		0.0	0.0		0.0			
2	-43.93	-0.5581		0.0	8.000		-4.465		Vel = 16.31	
2	24.33	1.049		0.0	7.000		18.875		K Factor = 5.60	
to		120		0.0	0.0		0.0			
3	-19.6	-0.1254		0.0	7.000		-0.878		Vel = 7.28	
3	23.75	1.049		0.0	8.000		17.997		K Factor = 5.60	
to		120		0.0	0.0		0.0			
4	4.15	0.0071		0.0	8.000		0.057		Vel = 1.54	
4	23.80	1.049		0.0	6.500		18.054		K Factor = 5.60	
to		120		0.0	0.0		0.0			
5	27.95	0.2417		0.0	6.500		1.571		Vel = 10.38	
5	24.81	1.049	1T	5.0	28.330		19.625		K Factor = 5.60	
to		120		0.0	5.000		0.0			
23	52.76	0.7828		0.0	33.330		26.091		Vel = 19.59	
	0.0									
	52.76						45.716		K Factor = 7.80	
52	-48.34	1.049		0.0	11.000		35.018			
to		120		0.0	0.0		0.0			
6	-48.34	-0.6660		0.0	11.000		-7.326		Vel = 17.95	
6	29.47	1.049		0.0	10.000		27.692		K Factor = 5.60	
to		120		0.0	0.0		0.0			
7	-18.87	-0.1168		0.0	10.000		-1.168		Vel = 7.01	
7	28.84	1.049		0.0	10.000		26.524		K Factor = 5.60	
to		120		0.0	0.0		0.0			
8	9.97	0.0359		0.0	10.000		0.359		Vel = 3.70	
8	29.03	1.049	1T	5.0	36.330		26.883		K Factor = 5.60	
to		120		0.0	5.000		0.0			
22	39.0	0.4477		0.0	41.330		18.505		Vel = 14.48	
	0.0									
	39.00						45.388		K Factor = 5.79	
51	-44.83	1.049		0.0	11.500		34.465			
to		120		0.0	0.0		0.0			
9	-44.83	-0.5792		0.0	11.500		-6.661		Vel = 16.64	
9	29.53	1.049		0.0	14.000		27.804		K Factor = 5.60	
to		120		0.0	0.0		0.0			
10	-15.3	-0.0793		0.0	14.000		-1.110		Vel = 5.68	
10	28.93	1.049		0.0	14.000		26.694		K Factor = 5.60	
to		120		0.0	0.0		0.0			
11	13.63	0.0640		0.0	14.000		0.896		Vel = 5.06	
11	29.42	1.049	1T	5.0	27.830		27.590		K Factor = 5.60	
to		120		0.0	5.000		0.0			
21	43.05	0.5374		0.0	32.830		17.642		Vel = 15.98	
	0.0									
	43.05						45.232		K Factor = 6.40	

Final Calculations - Standard

Residential Fire Protection
LIFE STORAGE PORTLAND

Page 6
Date 10-9-17

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
50	-59.84	1.049		0.0	9.250	33.806				
to		120		0.0	0.0	0.0				
12	-59.84	-0.9882		0.0	9.250	-9.141		Vel = 22.21		
12	27.82	1.049		0.0	10.000	24.665		K Factor = 5.60		
to		120		0.0	0.0	0.0				
13	-32.02	-0.3109		0.0	10.000	-3.109		Vel = 11.89		
13	26.00	1.049		0.0	7.500	21.556		K Factor = 5.60		
to		120		0.0	0.0	0.0				
14	-6.02	-0.0141		0.0	7.500	-0.106		Vel = 2.23		
14	25.93	1.049		0.0	7.500	21.450		K Factor = 5.60		
to		120		0.0	0.0	0.0				
15	19.91	0.1291		0.0	7.500	0.968		Vel = 7.39		
15	26.52	1.049	1T	5.0	31.830	22.418		K Factor = 5.60		
to		120		0.0	5.000	0.0				
20	46.43	0.6180		0.0	36.830	22.761		Vel = 17.24		
	0.0									
	46.43					45.179		K Factor = 6.91		
24	-16.72	1.049	2T	10.0	67.330	46.495				
to		120		0.0	10.000	0.0				
54	-16.72	-0.0934		0.0	77.330	-7.221		Vel = 6.21		
	0.0									
	-16.72					39.274		K Factor = -2.67		
25	-14.14	1.049	2T	10.0	67.330	47.514				
to		120		0.0	10.000	0.0				
55	-14.14	-0.0685		0.0	77.330	-5.300		Vel = 5.25		
	0.0									
	-14.14					42.214		K Factor = -2.18		
26	-11.94	1.049	2T	10.0	67.330	48.672				
to		120		0.0	10.000	0.0				
56	-11.94	-0.0501		0.0	77.330	-3.878		Vel = 4.43		
	0.0									
	-11.94					44.794		K Factor = -1.78		
27	-10.14	1.049	2T	10.0	67.330	49.952				
to		120		0.0	10.000	0.0				
57	-10.14	-0.0370		0.0	77.330	-2.865		Vel = 3.76		
	0.0									
	-10.14					47.087		K Factor = -1.48		
28	-8.78	1.049	2T	10.0	67.330	51.343				
to		120		0.0	10.000	0.0				
58	-8.78	-0.0284		0.0	77.330	-2.195		Vel = 3.26		
	0.0									
	-8.78					49.148		K Factor = -1.25		
29	-7.92	1.049	2T	10.0	67.330	52.831				
to		120		0.0	10.000	0.0				
59	-7.92	-0.0234		0.0	77.330	-1.813		Vel = 2.94		
	0.0									
	-7.92					51.018		K Factor = -1.11		

Final Calculations - Standard

Residential Fire Protection
LIFE STORAGE PORTLAND

Page 7
Date 10-9-17

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
30 to 60	-7.62 -7.62	1.049 120 -0.0218	2T	10.0 0.0 0.0	67.330 10.000 77.330	54.410 0.0 -1.688				
	0.0 -7.62						52.722			Vel = 2.83 K Factor = -1.05
31 to 61	-7.90 -7.9	1.049 120 -0.0233	2T	10.0 0.0 0.0	67.330 10.000 77.330	56.079 0.0 -1.805				
	0.0 -7.90						54.274			Vel = 2.93 K Factor = -1.07
32 to 62	-8.73 -8.73	1.049 120 -0.0280	2T	10.0 0.0 0.0	67.330 10.000 77.330	57.844 0.0 -2.169				
	0.0 -8.73						55.675			Vel = 3.24 K Factor = -1.17
33 to 63	-10.02 -10.02	1.049 120 -0.0362	2T	10.0 0.0 0.0	67.330 10.000 77.330	59.717 0.0 -2.800				
	0.0 -10.02						56.917			Vel = 3.72 K Factor = -1.33
34 to 64	-11.70 -11.7	1.049 120 -0.0482	2T	10.0 0.0 0.0	67.330 10.000 77.330	61.719 0.0 -3.731				
	0.0 -11.70						57.988			Vel = 4.34 K Factor = -1.54
35 to 65	-13.70 -13.7	1.049 120 -0.0647	2T	10.0 0.0 0.0	67.330 10.000 77.330	63.874 0.0 -5.000				
	0.0 -13.70						58.874			Vel = 5.09 K Factor = -1.79
36 to 66	-15.99 -15.99	1.049 120 -0.0860	2T	10.0 0.0 0.0	67.330 10.000 77.330	66.218 0.0 -6.654				
	0.0 -15.99						59.564			Vel = 5.94 K Factor = -2.07
37 to 67	-20.03 -20.03	1.049 120 -0.1305	2T	10.0 0.0 0.0	67.330 10.000 77.330	70.147 0.0 -10.092				
	0.0 -20.03						60.055			Vel = 7.44 K Factor = -2.58
38 to 68	-19.65 -19.65	1.049 120 -0.1260	2T	10.0 0.0 0.0	67.330 10.000 77.330	70.051 0.0 -9.740				
	0.0 -19.65						60.311			Vel = 7.29 K Factor = -2.53
39 to 69	-19.43 -19.43	1.049 120 -0.1233	2T	10.0 0.0 0.0	67.330 10.000 77.330	69.995 0.0 -9.537				
										Vel = 7.21

Final Calculations - Standard

Residential Fire Protection
LIFE STORAGE PORTLAND

Page 8
Date 10-9-17

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 -19.43					60.458			K Factor = -2.50	
70 to 40	19.58	1.049 120	2T	10.0 0.0	65.330 10.000	60.553 0.0				
	19.58	0.1251		0.0	75.330	9.427			Vel = 7.27	
	0.0 19.58					69.980			K Factor = 2.34	
50 to 51	59.84	2.157 120	2E	12.307 0.0	10.000 12.307	33.806 0.0				
	59.84	0.0295		0.0	22.307	0.659			Vel = 5.25	
51 to 52	44.82	2.157 120		0.0 0.0	6.660 0.0	34.465 0.0				
	104.66	0.0830		0.0	6.660	0.553			Vel = 9.19	
52 to 53	48.35	2.157 120		0.0 0.0	7.160 0.0	35.018 0.0				
	153.01	0.1677		0.0	7.160	1.201			Vel = 13.43	
53 to 54	70.98	2.157 120		0.0 0.0	9.000 0.0	36.219 0.0				
	223.99	0.3394		0.0	9.000	3.055			Vel = 19.67	
54 to 55	-16.71	2.157 120		0.0 0.0	10.000 0.0	39.274 0.0				
	207.28	0.2940		0.0	10.000	2.940			Vel = 18.20	
55 to 56	-14.14	2.157 120		0.0 0.0	10.000 0.0	42.214 0.0				
	193.14	0.2580		0.0	10.000	2.580			Vel = 16.96	
56 to 57	-11.95	2.157 120		0.0 0.0	10.000 0.0	44.794 0.0				
	181.19	0.2293		0.0	10.000	2.293			Vel = 15.91	
57 to 58	-10.14	2.157 120		0.0 0.0	10.000 0.0	47.087 0.0				
	171.05	0.2061		0.0	10.000	2.061			Vel = 15.02	
58 to 59	-8.78	2.157 120		0.0 0.0	10.000 0.0	49.148 0.0				
	162.27	0.1870		0.0	10.000	1.870			Vel = 14.25	
59 to 60	-7.92	2.157 120		0.0 0.0	10.000 0.0	51.018 0.0				
	154.35	0.1704		0.0	10.000	1.704			Vel = 13.55	
60 to 61	-7.62	2.157 120		0.0 0.0	10.000 0.0	52.722 0.0				
	146.73	0.1552		0.0	10.000	1.552			Vel = 12.88	
61 to 62	-7.90	2.157 120		0.0 0.0	10.000 0.0	54.274 0.0				
	138.83	0.1401		0.0	10.000	1.401			Vel = 12.19	
62 to 63	-8.73	2.157 120		0.0 0.0	10.000 0.0	55.675 0.0				
	130.1	0.1242		0.0	10.000	1.242			Vel = 11.42	
63 to 64	-10.02	2.157 120		0.0 0.0	10.000 0.0	56.917 0.0				
	120.08	0.1071		0.0	10.000	1.071			Vel = 10.54	

Final Calculations - Standard

Residential Fire Protection
LIFE STORAGE PORTLAND

Page 9
Date 10-9-17

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
64	-11.69	2.157	0.0	10.000	57.988				
to		120	0.0	0.0	0.0				
65	108.39	0.0886	0.0	10.000	0.886		Vel = 9.52		
65	-13.71	2.157	0.0	10.000	58.874				
to		120	0.0	0.0	0.0				
66	94.68	0.0690	0.0	10.000	0.690		Vel = 8.31		
66	-15.99	2.157	0.0	10.000	59.564				
to		120	0.0	0.0	0.0				
67	78.69	0.0491	0.0	10.000	0.491		Vel = 6.91		
67	-20.03	2.157	0.0	9.000	60.055				
to		120	0.0	0.0	0.0				
68	58.66	0.0284	0.0	9.000	0.256		Vel = 5.15		
68	-19.65	2.157	0.0	11.000	60.311				
to		120	0.0	0.0	0.0				
69	39.01	0.0134	0.0	11.000	0.147		Vel = 3.43		
69	-19.43	2.157	2E 12.307	13.000	60.458				
to		120	0.0	12.307	0.0				
70	19.58	0.0038	0.0	25.307	0.095		Vel = 1.72		
	0.0								
	19.58				60.553		K Factor = 2.52		
20	46.43	2.635	0.0	7.660	45.179				
to		120	0.0	0.0	0.0				
21	46.43	0.0069	0.0	7.660	0.053		Vel = 2.73		
21	43.04	2.635	0.0	6.660	45.232				
to		120	0.0	0.0	0.0				
22	89.47	0.0234	0.0	6.660	0.156		Vel = 5.26		
22	39.01	2.635	0.0	7.160	45.388				
to		120	0.0	0.0	0.0				
23	128.48	0.0458	0.0	7.160	0.328		Vel = 7.56		
23	52.75	2.635	0.0	9.000	45.716				
to		120	0.0	0.0	0.0				
24	181.23	0.0866	0.0	9.000	0.779		Vel = 10.66		
24	16.72	2.635	0.0	10.000	46.495				
to		120	0.0	0.0	0.0				
25	197.95	0.1019	0.0	10.000	1.019		Vel = 11.65		
25	14.14	2.635	0.0	10.000	47.514				
to		120	0.0	0.0	0.0				
26	212.09	0.1158	0.0	10.000	1.158		Vel = 12.48		
26	11.95	2.635	0.0	10.000	48.672				
to		120	0.0	0.0	0.0				
27	224.04	0.1280	0.0	10.000	1.280		Vel = 13.18		
27	10.14	2.635	0.0	10.000	49.952				
to		120	0.0	0.0	0.0				
28	234.18	0.1391	0.0	10.000	1.391		Vel = 13.78		
28	8.78	2.635	0.0	10.000	51.343				
to		120	0.0	0.0	0.0				
29	242.96	0.1488	0.0	10.000	1.488		Vel = 14.29		
29	7.92	2.635	0.0	10.000	52.831				
to		120	0.0	0.0	0.0				
30	250.88	0.1579	0.0	10.000	1.579		Vel = 14.76		

Final Calculations - Standard

Residential Fire Protection
LIFE STORAGE PORTLAND

Page 10
Date 10-9-17

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
30	7.62	2.635			10.000		54.410			
to		120			0.0		0.0			
31	258.5	0.1669			10.000		1.669		Vel = 15.21	
31	7.90	2.635			10.000		56.079			
to		120			0.0		0.0			
32	266.4	0.1765			10.000		1.765		Vel = 15.67	
32	8.72	2.635			10.000		57.844			
to		120			0.0		0.0			
33	275.12	0.1873			10.000		1.873		Vel = 16.19	
33	10.02	2.635			10.000		59.717			
to		120			0.0		0.0			
34	285.14	0.2002			10.000		2.002		Vel = 16.78	
34	11.70	2.635			10.000		61.719			
to		120			0.0		0.0			
35	296.84	0.2155			10.000		2.155		Vel = 17.46	
35	13.70	2.635			10.000		63.874			
to		120			0.0		0.0			
36	310.54	0.2344			10.000		2.344		Vel = 18.27	
36	16.00	2.635	1T	16.474	0.660		66.218			
to		120			0.0		0.0			
80	326.54	0.2571			17.134		4.406		Vel = 19.21	
80	-405.23	2.635	1T	16.474	9.330		70.624			
to		120			0.0		0.0			
37	-78.69	-0.0185			25.804		-0.477		Vel = 4.63	
37	20.03	2.635			9.000		70.147			
to		120			0.0		0.0			
38	-58.66	-0.0107			9.000		-0.096		Vel = 3.45	
38	19.65	2.635			11.000		70.051			
to		120			0.0		0.0			
39	-39.01	-0.0051			11.000		-0.056		Vel = 2.30	
39	19.43	2.635			11.000		69.995			
to		120			0.0		0.0			
40	-19.58	-0.0014			11.000		-0.015		Vel = 1.15	
	0.0									
	-19.58						69.980		K Factor = -2.34	
80	405.23	2.635	1T	16.474	11.340		70.624			
to		120			0.0		2.168			
TR	405.23	0.3834			27.814		10.665		Vel = 23.84	
TR	0.0	4.26	1A	22.384	4.660		83.457			
to		120	1Z	13.167	35.551		0.0			
TEST	405.23	0.0370			40.211		1.486		Vel = 9.12	
	0.0									
	405.23						84.943		K Factor = 43.97	