



**. . . Fire Protection by Computer Design**

FREEDOM FIRE PROTECTION INC.  
209 QUAKER RIDGE ROAD  
CASCO, MAINE 04015  
207-627-4109

Job Name : BERLIN CITY TOYOTA SHOWROOM ADDITION  
Building : 191 RIVERSIDE STREET  
Location : PORTLAND, MAINE 04103  
System : #1 AREA#1  
Contract :  
Data File : Berlin City Toyota Show Room HC.WXF

Hydraulic Design Information Sheet

Name - BERLIN CITY TOYOTA SHOWROOM ADDITION Date - 7/11/12  
 Location - PORTLAND, MAINE 04103  
 Building - 191 RIVERSIDE STREET System No. - #1 AREA#1  
 Contractor - Contract No. -  
 Calculated By - TIM VESS Drawing No. - FP-2  
 Construction: ( ) Combustible (X) Non-Combustible Ceiling Height - 12'-0"  
 Occupancy - CAR DEALERSHIP

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

S Other

T Specific Ruling Made By Date

E

	Specific Ruling	Made By	Date
M	Area of Sprinkler Operation - 945	System Type	Sprinkler/Nozzle
	Density - .15	(X) Wet	Make TYCO
D	Area Per Sprinkler - 130.00	( ) Dry	Model TY-FRB
E	Elevation at Highest Outlet - 14"-0"	( ) 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 - 250		

N

Note

Calculation Flow Required - 404.529 Press Required - 38.168 At Test  
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 9/8/2004		Cap. -
T	Time of Test -	Rated Cap.-	Elev.-
E	Static Press - 82	@ Press -	
R	Residual Press - 78	Elev. -	Well
	Flow - 1393		Proof Flow
S	Elevation - 0		

U

P Location -

P

L Source of Information - PORTLAND WATER DISTRICT

Y

# Water Supply Curve (C)

FREEDOM FIRE PROTECTION INC.  
BERLIN CITY TOYOTA SHOWROOM ADDITION

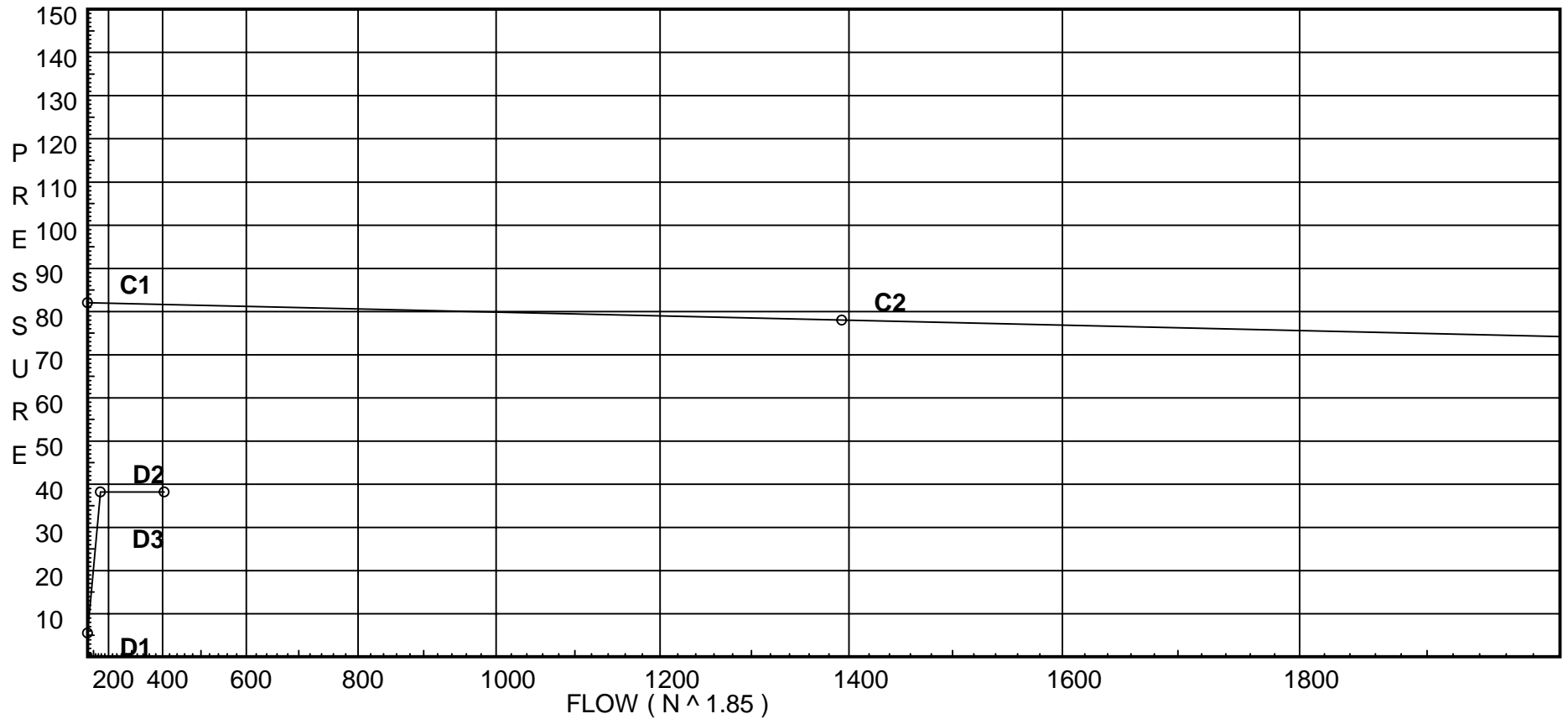
Page 2  
Date 7/11/12

### City Water Supply:

C1 - Static Pressure : 82  
C2 - Residual Pressure: 78  
C2 - Residual Flow : 1393

### Demand:

D1 - Elevation : 5.557  
D2 - System Flow : 154.529  
D2 - System Pressure : 38.168  
Hose ( Adj City ) :  
Hose ( Demand ) : 250  
D3 - System Demand : 404.529  
Safety Margin : 43.426



# Fittings Used Summary

FREEDOM FIRE PROTECTION INC.  
 BERLIN CITY TOYOTA SHOWROOM ADDITION

Page 3  
 Date 7/11/12

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
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
Zac	Ames 2000SS	Fitting generates a Fixed Loss Based on Flow																			

Pressure / Flow Summary - STANDARD

FREEDOM FIRE PROTECTION INC.  
 BERLIN CITY TOYOTA SHOWROOM ADDITION

Page 4  
 Date 7/11/12

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
201	12.83	5.6	14.17	na	21.08	0.15	120	7.0
202	12.83	5.6	13.03	na	20.22	0.15	120	7.0
74	12.83		13.37	na				
73	12.83		14.96	na				
72	12.83		16.53	na				
203	12.83	5.6	12.52	na	19.81	0.15	120	7.0
204	12.83	5.6	11.31	na	18.83	0.15	120	7.0
P-18	14.0		9.82	na				
205	12.83	5.6	10.39	na	18.05	0.15	120	7.0
77	12.83		10.66	na				
76	12.83		11.95	na				
75	12.83		13.22	na				
206	12.83	5.6	12.45	na	19.76	0.15	120	7.0
207	12.83	5.6	11.25	na	18.78	0.15	120	7.0
208	12.83	5.6	10.33	na	18.0	0.15	120	7.0
71	12.83		10.6	na				
70	12.83		11.88	na				
69	12.83		13.15	na				
68	12.83		19.76	na				
67	12.83		19.86	na				
66	12.83		20.23	na				
61	12.83		22.9	na				
60	12.83		23.59	na				
59	12.83		24.04	na				
65	14.33		22.42	na				
57	12.83		26.58	na				
64	14.33		23.08	na				
56	12.83		26.61	na				
63	14.33		23.51	na				
55	12.83		26.64	na				
58	12.83		24.41	na				
62	14.33		23.86	na				
54	12.83		26.59	na				
53	12.83		26.75	na				
52	12.83		26.75	na				
51	12.83		26.76	na				
33	18.5		22.92	na				
43	20.0		22.31	na				
106	20.0		22.33	na				
105	20.0		22.35	na				
104	20.0		22.37	na				
103	20.0		22.39	na				
102	20.0		22.41	na				
101	20.0		22.43	na				
23	20.0		22.82	na				
32	18.5		22.92	na				
42	20.0		22.3	na				
22	20.0		22.83	na				
31	18.5		22.91	na				
41	20.0		22.3	na				
21	20.0		22.83	na				
30	18.5		22.9	na				
40	20.0		22.28	na				
20	20.0		22.84	na				
29	18.5		22.89	na				
39	20.0		22.26	na				
19	20.0		22.86	na				

Flow Summary - Standard

FREEDOM FIRE PROTECTION INC.  
 BERLIN CITY TOYOTA SHOWROOM ADDITION

Page 5  
 Date 7/11/12

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
28	18.5		22.86	na				
38	20.0		22.26	na				
90	20.0		22.8	na				
18	20.0		22.93	na				
27	18.5		22.82	na				
37	20.0		22.2	na				
17	20.0		22.96	na				
26	18.5		22.77	na				
36	20.0		22.16	na				
16	20.0		23.0	na				
34	18.5		22.92	na				
25	18.5		22.65	na				
80	12.83		25.08	na				
35	20.0		22.03	na				
15	20.0		23.06	na				
44	20.0		22.31	na				
112	20.0		22.33	na				
111	20.0		22.35	na				
110	20.0		22.37	na				
109	20.0		22.39	na				
108	20.0		22.41	na				
107	20.0		22.43	na				
24	20.0		22.83	na				
14	18.5		23.49	na				
13	18.5		23.49	na				
12	18.5		23.5	na				
11	18.5		23.51	na				
10	18.5		23.51	na				
9	18.5		23.53	na				
8	18.5		23.6	na				
7	18.5		23.64	na				
6	18.5		23.69	na				
5	18.5		23.76	na				
4	12.83		26.54	na				
3	7.66		28.86	na				
50	7.66		28.93	na				
2A	7.66		29.0	na				
2	7.66		29.1	na				
1	2.0		31.67	na				
0	2.0		34.2	na				
TEST	0.0		38.17	na	250.0			

The maximum velocity is 12.16 and it occurs in the pipe between nodes 75 and 67

Final Calculations - Hazen-Williams

FREEDOM FIRE PROTECTION INC.  
 BERLIN CITY TOYOTA SHOWROOM ADDITION

Page 6  
 Date 7/11/12

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	***** Notes *****
201 to 73	21.08 21.08	1.049 120 0.1435	1T 5.0 0.0 0.0	0.500 5.000 5.500	14.170 0.0 0.789		K Factor = 5.60 Vel = 7.83
	0.0 21.08					14.959	K Factor = 5.45
202 to 74	20.22 20.22	1.049 120 0.1328	1E 2.0 0.0 0.0	0.500 2.000 2.500	13.034 0.0 0.332		K Factor = 5.60 Vel = 7.51
74 to 73	0.0 20.22	1.049 120 0.1328	0.0 0.0 0.0	12.000 0.0 12.000	13.366 0.0 1.593		Vel = 7.51
73 to 72	21.08 41.3	1.38 120 0.1309	0.0 0.0 0.0	12.000 0.0 12.000	14.959 0.0 1.571		Vel = 8.86
72 to 66	0.0 41.3	1.38 120 0.1309	1T 6.0 0.0 0.0	22.250 6.000 28.250	16.530 0.0 3.697		Vel = 8.86
	0.0 41.30					20.227	K Factor = 9.18
203 to 75	19.81 19.81	1.049 120 0.1278	1T 5.0 0.0 0.0	0.500 5.000 5.500	12.517 0.0 0.703		K Factor = 5.60 Vel = 7.35
	0.0 19.81					13.220	K Factor = 5.45
204 to 76	18.83 18.83	1.049 120 0.1164	1T 5.0 0.0 0.0	0.500 5.000 5.500	11.306 0.0 0.640		K Factor = 5.60 Vel = 6.99
	0.0 18.83					11.946	K Factor = 5.45
205 to 77	18.05 18.05	1.049 120 0.1076	1E 2.0 0.0 0.0	0.500 2.000 2.500	10.386 0.0 0.269		K Factor = 5.60 Vel = 6.70
77 to 76	0.0 18.05	1.049 120 0.1076	0.0 0.0 0.0	12.000 0.0 12.000	10.655 0.0 1.291		Vel = 6.70
76 to 75	18.83 36.88	1.38 120 0.1062	0.0 0.0 0.0	12.000 0.0 12.000	11.946 0.0 1.274		Vel = 7.91
75 to 67	19.81 56.69	1.38 120 0.2352	1T 6.0 0.0 0.0	22.250 6.000 28.250	13.220 0.0 6.644		Vel = 12.16

Final Calculations - Standard

FREEDOM FIRE PROTECTION INC.  
 BERLIN CITY TOYOTA SHOWROOM ADDITION

Page 7  
 Date 7/11/12

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 56.69					19.864		K Factor = 12.72	
206 to 69	19.76 19.76	1.049 120 0.1273	1T 5.0 0.0 0.0	0.500 5.000 5.500	12.452 0.0 0.700			K Factor = 5.60 Vel = 7.34	
	0.0 19.76					13.152		K Factor = 5.45	
207 to 70	18.78 18.78	1.049 120 0.1158	1T 5.0 0.0 0.0	0.500 5.000 5.500	11.247 0.0 0.637			K Factor = 5.60 Vel = 6.97	
	0.0 18.78					11.884		K Factor = 5.45	
208 to 71	18.00 18.0	1.049 120 0.1068	1E 2.0 0.0 0.0	0.500 2.000 2.500	10.332 0.0 0.267			K Factor = 5.60 Vel = 6.68	
71 to 70	0.0 18.0	1.049 120 0.1071	0.0 0.0 0.0	12.000 0.0 12.000	10.599 0.0 1.285			Vel = 6.68	
70 to 69	18.78 36.78	1.38 120 0.1057	0.0 0.0 0.0	12.000 0.0 12.000	11.884 0.0 1.268			Vel = 7.89	
69 to 68	19.76 56.54	1.38 120 0.2341	1T 6.0 0.0 0.0	22.250 6.000 28.250	13.152 0.0 6.612			Vel = 12.13	
68 to 67	0.0 56.54	2.635 120 0.0100	0.0 0.0 0.0	10.000 0.0 10.000	19.764 0.0 0.100			Vel = 3.33	
67 to 66	56.69 113.23	2.635 120 0.0363	0.0 0.0 0.0	10.000 0.0 10.000	19.864 0.0 0.363			Vel = 6.66	
66 to 61	41.30 154.53	2.635 120 0.0644	0.0 0.0 0.0	41.458 0.0 41.458	20.227 0.0 2.671			Vel = 9.09	
61 to 60	-20.99 133.54	2.635 120 0.0492	0.0 0.0 0.0	14.000 0.0 14.000	22.898 0.0 0.689			Vel = 7.86	
60 to 59	-18.87 114.67	2.635 120 0.0371	0.0 0.0 0.0	12.330 0.0 12.330	23.587 0.0 0.457			Vel = 6.75	
59 to 58	-17.36 97.31	2.635 120 0.0275	0.0 0.0 0.0	13.330 0.0 13.330	24.044 0.0 0.366			Vel = 5.73	



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 97.31					24.410		K Factor = 19.70	
61 to 65	20.98	1.61 120	1T	8.0 0.0	1.500 8.000	22.898 -0.650		Vel = 3.31	
65 to 57	20.98	0.0177		0.0	9.500	0.168			
65 to 57	0.0	1.61 120	2E	8.0 0.0	191.000 8.000	22.416 0.650		Vel = 3.31	
57 to 53	20.98	0.0177		0.0	199.000	3.514			
57 to 53	0.0	1.61 120	1T	8.0 0.0	1.500 8.000	26.580 0.0		Vel = 3.31	
	0.0 20.98					26.748		K Factor = 4.06	
60 to 64	18.87	1.61 120	1T	8.0 0.0	1.500 8.000	23.587 -0.650		Vel = 2.97	
64 to 56	18.87	0.0145		0.0	9.500	0.138			
64 to 56	0.0	1.61 120	2E	8.0 0.0	191.000 8.000	23.075 0.650		Vel = 2.97	
56 to 52	18.87	0.0145		0.0	199.000	2.887			
56 to 52	0.0	1.61 120	1T	8.0 0.0	1.500 8.000	26.612 0.0		Vel = 2.97	
	0.0 18.87					26.750		K Factor = 3.65	
59 to 63	17.36	1.61 120	1T	8.0 0.0	1.500 8.000	24.044 -0.650		Vel = 2.74	
63 to 55	17.36	0.0125		0.0	9.500	0.119			
63 to 55	0.0	1.61 120	2E	8.0 0.0	191.000 8.000	23.513 0.650		Vel = 2.74	
55 to 51	17.36	0.0124		0.0	199.000	2.475			
55 to 51	0.0	1.61 120	1T	8.0 0.0	1.500 8.000	26.638 0.0		Vel = 2.74	
	0.0 17.36					26.756		K Factor = 3.36	
58 to 62	15.80	1.61 120	1T	8.0 0.0	1.500 8.000	24.410 -0.650		Vel = 2.49	
62 to 54	15.8	0.0104		0.0	9.500	0.099			
62 to 54	0.0	1.61 120	2E	8.0 0.0	191.000 8.000	23.859 0.650		Vel = 2.49	
54	15.8	0.0104		0.0	199.000	2.078			

Final Calculations - Standard

FREEDOM FIRE PROTECTION INC.  
 BERLIN CITY TOYOTA SHOWROOM ADDITION

Page 9  
 Date 7/11/12

Hyd. Ref. Point	Qa  Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
54	0.0	1.61	1T 8.0	1.500	26.587				
to		120	0.0	8.000	2.239				
50	15.8	0.0105	0.0	9.500	0.100		Vel = 2.49		
	0.0								
	15.80				28.926		K Factor = 2.94		
53	20.98	4.26	0.0	14.000	26.748				
to		120	0.0	0.0	0.0				
52	20.98	0.0001	0.0	14.000	0.002		Vel = 0.47		
52	18.87	4.26	0.0	12.330	26.750				
to		120	0.0	0.0	0.0				
51	39.85	0.0005	0.0	12.330	0.006		Vel = 0.90		
51	17.37	4.26	0.0	9.660	26.756				
to		120	0.0	0.0	2.239				
2A	57.22	0.0010	0.0	9.660	0.010		Vel = 1.29		
	0.0								
	57.22				29.005		K Factor = 10.62		
33	7.00	1.61	2T 16.0	1.450	22.920				
to		120	0.0	16.000	-0.650				
43	7.0	0.0023	0.0	17.450	0.041		Vel = 1.10		
43	0.0	1.61	0.0	6.660	22.311				
to		120	0.0	0.0	0.0				
106	7.0	0.0023	0.0	6.660	0.015		Vel = 1.10		
106	0.0	1.61	0.0	8.830	22.326				
to		120	0.0	0.0	0.0				
105	7.0	0.0024	0.0	8.830	0.021		Vel = 1.10		
105	0.0	1.61	0.0	8.830	22.347				
to		120	0.0	0.0	0.0				
104	7.0	0.0023	0.0	8.830	0.020		Vel = 1.10		
104	0.0	1.61	0.0	8.830	22.367				
to		120	0.0	0.0	0.0				
103	7.0	0.0024	0.0	8.830	0.021		Vel = 1.10		
103	0.0	1.61	0.0	8.830	22.388				
to		120	0.0	0.0	0.0				
102	7.0	0.0023	0.0	8.830	0.020		Vel = 1.10		
102	0.0	1.61	0.0	8.830	22.408				
to		120	0.0	0.0	0.0				
101	7.0	0.0024	0.0	8.830	0.021		Vel = 1.10		
101	0.0	1.61	1T 8.0	162.160	22.429				
to		120	0.0	8.000	0.0				
23	7.0	0.0023	0.0	170.160	0.394		Vel = 1.10		
23	0.0	1.61	1T 8.0	1.450	22.823				
to		120	0.0	8.000	0.650				
13	7.0	0.0022	0.0	9.450	0.021		Vel = 1.10		

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 7.00					23.494		K Factor = 1.44	
32 to 42	6.56	1.61 120	2T 16.0 0.0	1.450 16.000	22.916 -0.650			Vel = 1.03	
42 to 22	6.56	0.0021	0.0	17.450	0.036			Vel = 1.03	
42 to 22	0.0	1.61 120	8E 32.0 1T 8.0	217.000 40.000	22.302 0.0			Vel = 1.03	
22 to 12	6.56	0.0021	0.0	257.000	0.529			Vel = 1.03	
22 to 12	0.0	1.61 120	1T 8.0 0.0	1.450 8.000	22.831 0.650			Vel = 1.03	
	0.0 6.56					23.500		K Factor = 1.35	
31 to 41	7.14	1.61 120	2T 16.0 0.0	1.450 16.000	22.911 -0.650			Vel = 1.13	
41 to 21	7.14	0.0024	0.0	17.450	0.042			Vel = 1.13	
41 to 21	0.0	1.61 120	1T 8.0 0.0	213.000 8.000	22.303 0.0			Vel = 1.13	
21 to 11	7.14	0.0024	0.0	221.000	0.531			Vel = 1.13	
21 to 11	0.0	1.61 120	1T 8.0 0.0	1.450 8.000	22.834 0.650			Vel = 1.13	
	0.0 7.14					23.507		K Factor = 1.47	
30 to 40	7.37	1.61 120	1T 8.0 0.0	1.450 8.000	22.903 -0.650			Vel = 1.16	
40 to 20	7.37	0.0026	0.0	9.450	0.025			Vel = 1.16	
40 to 20	0.0	1.61 120	2E 8.0 0.0	213.000 8.000	22.278 0.0			Vel = 1.16	
20 to 10	7.37	0.0025	0.0	221.000	0.563			Vel = 1.16	
20 to 10	0.0	1.61 120	1T 8.0 0.0	1.450 8.000	22.841 0.650			Vel = 1.16	
	0.0 7.37					23.514		K Factor = 1.52	
29 to 39	7.60	1.61 120	1T 8.0 0.0	1.450 8.000	22.885 -0.650			Vel = 1.20	
39 to 19	7.6	0.0028	0.0	9.450	0.026			Vel = 1.20	
39 to 19	0.0	1.61 120	2E 8.0 0.0	213.000 8.000	22.261 0.0			Vel = 1.20	
	7.6	0.0027	0.0	221.000	0.596			Vel = 1.20	

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
19 to 9	0.0 7.6	1.61 120 0.0028	1T 8.0 0.0 0.0	1.450 8.000 9.450	22.857 0.650 0.026		Vel = 1.20		
	0.0 7.60				23.533		K Factor = 1.57		
28 to 38	10.55 10.55	1.61 120 0.0050	1T 8.0 0.0 0.0	1.450 8.000 9.450	22.859 -0.650 0.047		Vel = 1.66		
38 to 90	0.0 10.55	1.61 120 0.0050	1E 4.0 0.0 0.0	106.040 4.000 110.040	22.256 0.0 0.545		Vel = 1.66		
90 to 18	0.0 10.55	2.157 120 0.0012	1E 6.153 0.0 0.0	106.120 6.153 112.273	22.801 0.0 0.133		Vel = 0.93		
18 to 8	0.0 10.55	2.157 120 0.0012	1T 12.307 0.0 0.0	1.450 12.307 13.757	22.934 0.650 0.016		Vel = 0.93		
	0.0 10.55				23.600		K Factor = 2.17		
27 to 37	8.65 8.65	1.61 120 0.0035	1T 8.0 0.0 0.0	1.450 8.000 9.450	22.820 -0.650 0.033		Vel = 1.36		
37 to 17	0.0 8.65	1.61 120 0.0034	2E 8.0 0.0 0.0	212.160 8.000 220.160	22.203 0.0 0.754		Vel = 1.36		
17 to 7	0.0 8.65	1.61 120 0.0034	1T 8.0 0.0 0.0	1.450 8.000 9.450	22.957 0.650 0.032		Vel = 1.36		
	0.0 8.65				23.639		K Factor = 1.78		
26 to 36	9.23 9.23	1.61 120 0.0039	1T 8.0 0.0 0.0	1.450 8.000 9.450	22.768 -0.650 0.037		Vel = 1.45		
36 to 16	0.0 9.23	1.61 120 0.0039	2E 8.0 0.0 0.0	212.160 8.000 220.160	22.155 0.0 0.850		Vel = 1.45		
16 to 6	0.0 9.23	1.61 120 0.0038	1T 8.0 0.0 0.0	1.450 8.000 9.450	23.005 0.650 0.036		Vel = 1.45		
	0.0 9.23				23.691		K Factor = 1.90		

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
34	-7.04	3.26		14.660	22.921				
to		120	0.0	0.0	0.0				
33	-7.04	-0.0001	0.0	14.660	-0.001		Vel =	0.27	
33	-7.01	3.26	0.0	14.660	22.920				
to		120	0.0	0.0	0.0				
32	-14.05	-0.0003	0.0	14.660	-0.004		Vel =	0.54	
32	-6.56	3.26	0.0	9.290	22.916				
to		120	0.0	0.0	0.0				
31	-20.61	-0.0005	0.0	9.290	-0.005		Vel =	0.79	
31	-7.14	3.26	0.0	8.160	22.911				
to		120	0.0	0.0	0.0				
30	-27.75	-0.0010	0.0	8.160	-0.008		Vel =	1.07	
30	-7.36	3.26	0.0	12.290	22.903				
to		120	0.0	0.0	0.0				
29	-35.11	-0.0015	0.0	12.290	-0.018		Vel =	1.35	
29	-7.61	3.26	0.0	12.290	22.885				
to		120	0.0	0.0	0.0				
28	-42.72	-0.0021	0.0	12.290	-0.026		Vel =	1.64	
28	-10.54	3.26	0.0	12.290	22.859				
to		120	0.0	0.0	0.0				
27	-53.26	-0.0032	0.0	12.290	-0.039		Vel =	2.05	
27	-8.66	3.26	0.0	12.290	22.820				
to		120	0.0	0.0	0.0				
26	-61.92	-0.0042	0.0	12.290	-0.052		Vel =	2.38	
26	-9.22	3.26	1E	9.408	12.290	22.768			
to		120	0.0	9.408	0.0				
25	-71.14	-0.0054	0.0	21.698	-0.118		Vel =	2.73	
25	-10.37	3.26	0.0	3.166	22.650				
to		120	0.0	0.0	2.456				
80	-81.51	-0.0069	0.0	3.166	-0.022		Vel =	3.13	
80	0.0	2.635	0.0	34.166	25.084				
to		120	0.0	0.0	0.0				
58	-81.51	-0.0197	0.0	34.166	-0.674		Vel =	4.80	
	0.0								
	-81.51				24.410		K Factor =	-16.50	
25	10.37	1.61	1E	4.0	1.450	22.650			
to		120	0.0	4.000	-0.650				
35	10.37	0.0050	0.0	5.450	0.027		Vel =	1.63	
35	0.0	1.61	1E	4.0	212.160	22.027			
to		120	0.0	4.000	0.0				
15	10.37	0.0048	0.0	216.160	1.036		Vel =	1.63	

Final Calculations - Standard

FREEDOM FIRE PROTECTION INC.  
 BERLIN CITY TOYOTA SHOWROOM ADDITION

Page 13  
 Date 7/11/12

Hyd. Ref. Point	Qa  Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
15 to 5	0.0 10.37	1.61 120 0.0048	1T 8.0 0.0 0.0	1.450 8.000 9.450	23.063 0.650 0.045		Vel = 1.63		
	0.0 10.37				23.758		K Factor = 2.13		
34 to 44	7.04 7.04	1.61 120 0.0024	2T 16.0 0.0 0.0	1.450 16.000 17.450	22.921 -0.650 0.042		Vel = 1.11		
44 to 112	0.0 7.04	1.61 120 0.0023	0.0 0.0 0.0	6.660 0.0 6.660	22.313 0.0 0.015		Vel = 1.11		
112 to 111	0.0 7.04	1.61 120 0.0024	0.0 0.0 0.0	8.830 0.0 8.830	22.328 0.0 0.021		Vel = 1.11		
111 to 110	0.0 7.04	1.61 120 0.0024	0.0 0.0 0.0	8.830 0.0 8.830	22.349 0.0 0.021		Vel = 1.11		
110 to 109	0.0 7.04	1.61 120 0.0023	0.0 0.0 0.0	8.830 0.0 8.830	22.370 0.0 0.020		Vel = 1.11		
109 to 108	0.0 7.04	1.61 120 0.0024	0.0 0.0 0.0	8.830 0.0 8.830	22.390 0.0 0.021		Vel = 1.11		
108 to 107	0.0 7.04	1.61 120 0.0024	0.0 0.0 0.0	8.830 0.0 8.830	22.411 0.0 0.021		Vel = 1.11		
107 to 24	0.0 7.04	1.61 120 0.0023	1T 8.0 0.0 0.0	162.160 8.000 170.160	22.432 0.0 0.399		Vel = 1.11		
24 to 14	0.0 7.04	1.61 120 0.0022	1E 4.0 0.0 0.0	1.450 4.000 5.450	22.831 0.650 0.012		Vel = 1.11		
14 to 13	0.0 7.04	3.068 120 0.0001	0.0 0.0 0.0	14.660 0.0 14.660	23.493 0.0 0.001		Vel = 0.31		
13 to 12	7.01 14.05	3.068 120 0.0004	0.0 0.0 0.0	14.660 0.0 14.660	23.494 0.0 0.006		Vel = 0.61		
12 to 11	6.56 20.61	3.068 120 0.0008	0.0 0.0 0.0	9.290 0.0 9.290	23.500 0.0 0.007		Vel = 0.89		
11 to 10	7.14 27.75	3.26 120 0.0009	0.0 0.0 0.0	8.160 0.0 8.160	23.507 0.0 0.007		Vel = 1.07		

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
10	7.36	3.26		12.290	23.514				
to		120		0.0	0.0				
9	35.11	0.0015		12.290	0.019		Vel =	1.35	
9	7.61	3.26	2E	18.815	13.160	23.533			
to		120		0.0	18.815	0.0			
8	42.72	0.0021		0.0	31.975	0.067	Vel =	1.64	
8	10.54	3.26		0.0	12.290	23.600			
to		120		0.0	0.0	0.0			
7	53.26	0.0032		0.0	12.290	0.039	Vel =	2.05	
7	8.66	3.26		0.0	12.290	23.639			
to		120		0.0	0.0	0.0			
6	61.92	0.0042		0.0	12.290	0.052	Vel =	2.38	
6	9.22	3.26		0.0	12.290	23.691			
to		120		0.0	0.0	0.0			
5	71.14	0.0055		0.0	12.290	0.067	Vel =	2.73	
5	10.37	3.26	3E	28.223	18.160	23.758			
to		120		0.0	28.223	2.456			
4	81.51	0.0070		0.0	46.383	0.324	Vel =	3.13	
4	0.0	3.26	1E	9.408	3.000	26.538			
to		120		0.0	9.408	2.239			
3	81.51	0.0070		0.0	12.408	0.087	Vel =	3.13	
3	0.0	4.26	1T	26.334	5.830	28.864			
to		120		0.0	26.334	0.0			
50	81.51	0.0019		0.0	32.164	0.062	Vel =	1.83	
50	15.80	4.26	1T	26.334	3.660	28.926			
to		120		0.0	26.334	0.0			
2A	97.31	0.0026		0.0	29.994	0.079	Vel =	2.19	
2A	57.22	4.26		0.0	16.000	29.005			
to		120		0.0	0.0	0.0			
2	154.53	0.0062		0.0	16.000	0.099	Vel =	3.48	
2	0.0	4.26	1E	13.167	5.660	29.104			
to		120		0.0	13.167	2.451			
1	154.53	0.0062		0.0	18.827	0.117	Vel =	3.48	
1	0.0	4.26	2E	26.334	4.830	31.672			
to		120	1Zac	0.0	26.334	2.330	* Fixed loss =	2.33	
0	154.53	0.0062		0.0	31.164	0.194	Vel =	3.48	
0	0.0	8.27	4E	113.872	458.330	34.196			
to		140		0.0	113.872	3.866	* Fixed loss =	3	
TEST	154.53	0.0002		0.0	572.202	0.106	Vel =	0.92	
	250.00						Qa =	250.00	
	404.53					38.168	K Factor =	65.48	

---

Hyd. Ref. Point	Qa  Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
-----------------------	--------------	----------------------	---------------------------	-------------------------	----------------	----------------	-------	-------	-------

---