

... Fire Protection by Computer Design

ADVANCED FIRE PROTECTION
P.O. BOX 81
MINOT, MAINE
04258
207-513-6480

Job Name : NEW YARD YACHT BLDG PHASE 2 WET SYS
Building : NEW YARD
Location : 40 WEST COMMERCIAL ST
System : WET
Contract :
Data File : NEW YARD PHASE 2 WET.WXF

Hydraulic Design Information Sheet

Name - NEW YARD YACHT BLDG. Date - 9-9-14
 Location - 40 WEST COMMERCIAL ST
 Building - NEW YARD System No. - WET
 Contractor - ADVANCED FIRE PROTECTION Contract No. -
 Calculated By - TIM FORTIN Drawing No. - FP-1
 Construction: () Combustible (X) Non-Combustible Ceiling Height - VARIES
 Occupancy - BOAT STORAGE AND REPAIR

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

M	Area of Sprinkler Operation - 1950	System Type	Sprinkler/Nozzle
	Density - .2	(X) Wet	Make VIKING
D	Area Per Sprinkler - 130	() Dry	Model VK200
E	Elevation at Highest Outlet - 54	() Deluge	Size 3/4"
S	Hose Allowance - Inside -	() Preaction	K-Factor 8.0
I	Rack Sprinkler Allowance -	() Other	Temp.Rat.155
G	Hose Allowance - Outside - 250		

N Note

Calculation Flow Required - 805 Press Required - 79
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 9-13-2011		Cap. -
T	Time of Test -	Rated Cap.-	Elev.-
E	Static Press - 106	@ Press -	
R	Residual Press - 100	Elev. -	Well
	Flow - 1209		Proof Flow
S	Elevation - 0		

U Location - COMMERCIAL ST 400'-0" EAST OF BEACH ST.

P Source of Information - PORTLAND WATER DEPT.

C	Commodity	ORDIANRY HAZARD GROUP	2 Class	Location
O	Storage Ht.		Area	Aisle W.
M	Storage Method:	Solid Piled	%	Palletized % Rack
M	() Single Row	() Conven. Pallet	() Auto. Storage	() Encap.
S	() Double Row	() Slave Pallet	() Solid Shelf	() Non
T	() Mult. Row		() Open Shelf	

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

E Horizontal Barriers Provided:

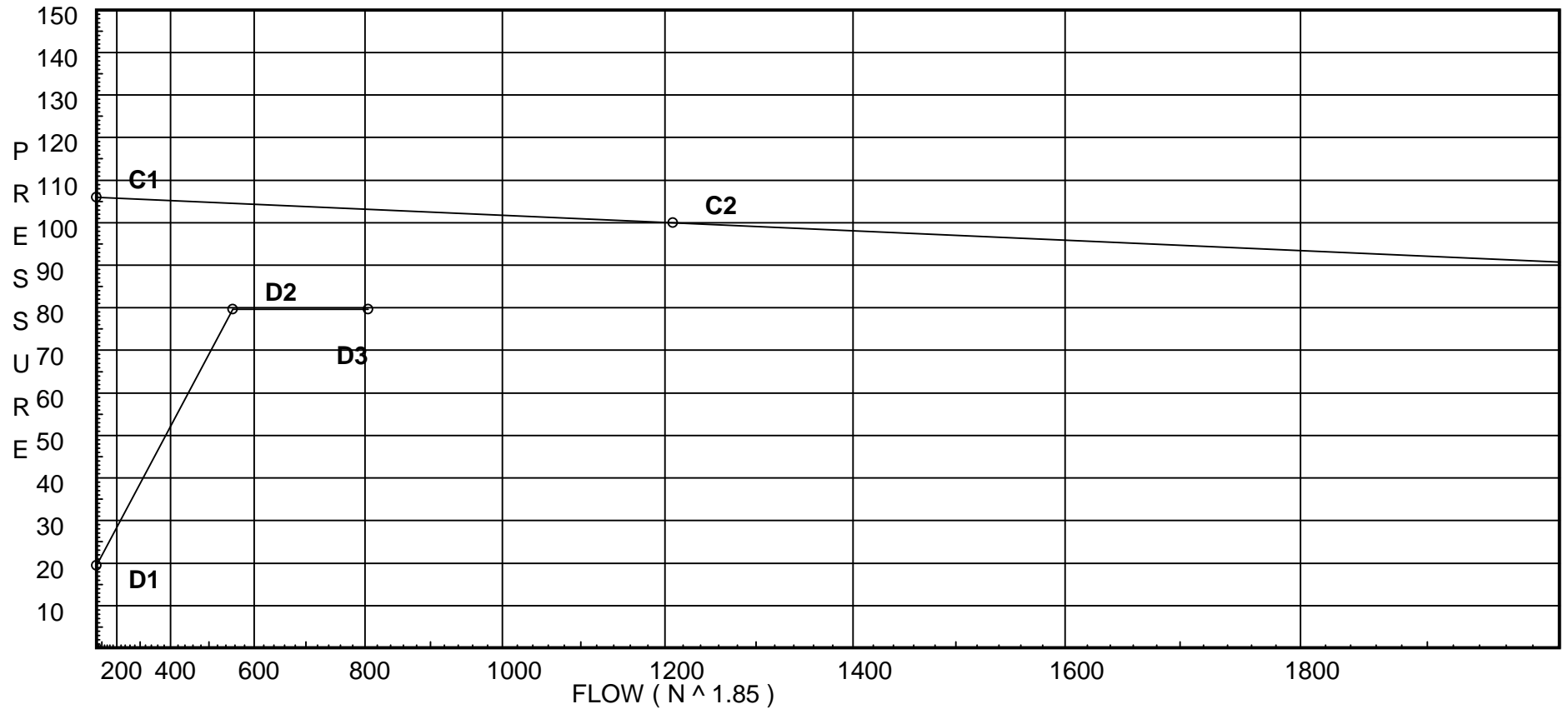
Water Supply Curve (C)

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City Water Supply:
C1 - Static Pressure : 106
C2 - Residual Pressure: 100
C2 - Residual Flow : 1209

Demand:
D1 - Elevation : 19.446
D2 - System Flow : 555.416
D2 - System Pressure : 79.666
Hose (Adj City) :
Hose (Demand) : 250
D3 - System Demand : 805.416
Safety Margin : 23.504



Fittings Used Summary

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Fitting Legend		½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Abbrev.	Name																				
B	Generic Butterfly Valve	0	0	0	0	0	7	7	10	0	12	9	10	12	19	21	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
G	Generic Gate Valve	0	0	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
V	90' Ell Firelock #001	0	0	0	0	0	3.5	4.3	5	0	6.8	8.5	10	13	0	0	0	0	0	0	0
Z	Generic Flow Switch	2	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Zia	Wilkins 350	Fitting generates a Fixed Loss Based on Flow																			

Units Summary

Diameter Units Inches
Length Units Feet
Flow Units US Gallons per Minute
Pressure Units Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

Pressure / Flow Summary - STANDARD

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
D1	30.9		23.9	na				
P1	54.0		14.72	na				
D3	30.9		23.9	na				
P2	54.0		14.72	na				
D5	30.9	8	19.65	na	35.47	0.2	130	7.0
10	32.9	8	15.76	na	31.76	0.2	130	7.0
11	36.9	8	13.7	na	29.61	0.2	130	7.0
12	40.9	8	11.97	na	27.67	0.2	130	7.0
13	44.9	8	10.56	na	26.0	0.2	130	7.0
14	48.9		9.63	na				
P3	53.9		7.58	na				
D7	30.9	8	19.69	na	35.5	0.2	130	7.0
20	32.9	8	15.8	na	31.79	0.2	130	7.0
21	36.9	8	13.73	na	29.65	0.2	130	7.0
22	40.9	8	12.0	na	27.71	0.2	130	7.0
23	44.9	8	10.6	na	26.05	0.2	130	7.0
24	48.9		9.68	na				
P4	53.9		7.62	na				
D9	30.9	8	19.88	na	35.67	0.2	130	7.0
30	32.9	8	15.94	na	31.94	0.2	130	7.0
31	36.9	8	13.87	na	29.8	0.2	130	7.0
32	40.9	8	12.14	na	27.88	0.2	130	7.0
33	44.9	8	10.74	na	26.22	0.2	130	7.0
34	48.9		9.82	na				
P5	53.9		7.77	na				
D11	30.9	8	22.66	na	38.08	0.2	130	7.0
40	40.9	8	17.17	na	33.15	0.2	130	7.0
41	44.9	8	15.47	na	31.46	0.2	130	7.0
42	48.9		14.16	na				
P6	53.9		12.06	na				
D13	30.9		25.57	na				
P7	54.0		16.15	na				
D15	30.9		26.35	na				
P8	54.0		16.83	na				
D17	30.9		27.08	na				
P9	54.0		17.51	na				
D19	30.9		27.76	na				
P10	54.0		18.19	na				
D21	30.9		28.39	na				
P11	54.0		18.86	na				
D23	30.9		28.99	na				
P12	54.0		19.54	na				
D25	30.9		29.54	na				
P13	54.0		20.23	na				
D27	30.9		30.01	na				
P14	54.0		20.76	na				
D29	30.9		30.37	na				
P15	54.0		20.94	na				
D31	30.9		30.91	na				
P16	54.0		22.39	na				
D33	30.9		31.22	na				
P17	54.0		23.01	na				
D35	30.9		32.05	na				
P18	54.0		27.24	na				
D37	30.9		32.28	na				

Flow Summary - Standard

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
P19	54.0		28.13	na				
D39	30.9		32.4	na				
P20	54.0		28.74	na				
F1	30.9		25.54	na				
F3	30.9		25.54	na				
F5	30.9		24.28	na				
F7	30.9		24.36	na				
F9	30.9		24.55	na				
F11	30.9		25.6	na				
F13	30.9		26.75	na				
F15	30.9		27.33	na				
F17	30.9		27.95	na				
F19	30.9		28.62	na				
F21	30.9		29.34	na				
F23	30.9		30.1	na				
F25	30.9		30.93	na				
F27	30.9		31.52	na				
F29	30.9		33.09	na				
F31	30.9		33.88	na				
F33	30.9		34.82	na				
F35	30.9		42.44	na				
F37	30.9		43.99	na				
F39	30.9		45.09	na				
D2	28.9		24.6	na				
D4	28.9		24.6	na				
D6	28.9		24.59	na				
D8	28.9		24.63	na				
D10	28.9		24.87	na				
D12	28.9		25.44	na				
D14	28.9		26.31	na				
D16	28.9		27.11	na				
D18	28.9		27.85	na				
D20	28.9		28.54	na				
D22	28.9		29.17	na				
D24	28.9		29.74	na				
D26	28.9		30.26	na				
D28	28.9		30.72	na				
D30	28.9		31.12	na				
D32	28.9		31.48	na				
D34	28.9		31.72	na				
D36	28.9		31.87	na				
D38	28.9		31.97	na				
F2	28.9		26.57	na				
F4	28.9		26.57	na				
F6	28.9		26.58	na				
F8	28.9		26.67	na				
F10	28.9		26.86	na				
F12	28.9		27.23	na				
F14	28.9		27.73	na				
F16	28.9		28.29	na				
F18	28.9		28.91	na				
F20	28.9		29.58	na				
F22	28.9		30.3	na				
F24	28.9		31.08	na				
F26	28.9		31.93	na				

Flow Summary - Standard

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
F28	28.9		32.86	na				
F30	28.9		33.96	na				
F32	28.9		35.05	na				
F34	28.9		36.04	na				
F36	28.9		44.35	na				
F38	28.9		46.03	na				
F40	28.9		47.23	na				
TOR	8.0		61.58	na				
BOR	3.0		67.8	na				
BOR1	-3.0		73.95	na				
U1	-4.0		75.6	na				
U2	3.0		78.22	na				
TEST	0.0		79.67	na	250.0			

The maximum velocity is 21.35 and it occurs in the pipe between nodes F40 and TOR

Final Calculations - Hazen-Williams

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
D1	16.94	1.682	1E 4.95	80.500	23.900				
to		120.0	0.0	4.950	-10.005				
P1	16.94	0.0096	0.0	85.450	0.820		Vel = 2.45		
P1	0.0	1.682	1E 4.95	80.500	14.715				
to		120.0	0.0	4.950	10.005				
F1	16.94	0.0096	0.0	85.450	0.820		Vel = 2.45		
	0.0								
	16.94				25.540		K Factor = 3.35		
D3	16.96	1.682	1E 4.95	80.500	23.898				
to		120.0	0.0	4.950	-10.005				
P2	16.96	0.0096	0.0	85.450	0.822		Vel = 2.45		
P2	0.0	1.682	1E 4.95	80.500	14.715				
to		120.0	0.0	4.950	10.005				
F3	16.96	0.0096	0.0	85.450	0.822		Vel = 2.45		
	0.0								
	16.96				25.542		K Factor = 3.36		
D5	-60.42	1.682	0.0	30.000	19.654		K Factor = 8.00		
to		120.0	0.0	0.0	-0.866				
10	-60.42	-0.1009	0.0	30.000	-3.028		Vel = 8.72		
10	31.76	1.682	0.0	13.000	15.760		K Factor = 8.00		
to		120.0	0.0	0.0	-1.732				
11	-28.66	-0.0255	0.0	13.000	-0.331		Vel = 4.14		
11	29.61	1.682	0.0	13.000	13.697		K Factor = 8.00		
to		120.0	0.0	0.0	-1.732				
12	0.95	0.0001	0.0	13.000	0.001		Vel = 0.14		
12	27.67	1.682	0.0	13.000	11.966		K Factor = 8.00		
to		120.0	0.0	0.0	-1.732				
13	28.62	0.0252	0.0	13.000	0.328		Vel = 4.13		
13	26.00	1.682	0.0	9.600	10.562		K Factor = 8.00		
to		120.0	0.0	0.0	-1.732				
14	54.62	0.0838	0.0	9.600	0.804		Vel = 7.89		
14	0.0	1.682	0.0	1.300	9.634				
to		120.0	0.0	0.0	-2.166				
P3	54.62	0.0846	0.0	1.300	0.110		Vel = 7.89		
P3	0.0	1.682	0.0	80.500	7.578				
to		120.0	0.0	0.0	9.961				
F5	54.62	0.0838	0.0	80.500	6.742		Vel = 7.89		
	0.0								
	54.62				24.281		K Factor = 11.08		
D7	-60.44	1.682	0.0	30.000	19.692		K Factor = 8.00		
to		120.0	0.0	0.0	-0.866				
20	-60.44	-0.1010	0.0	30.000	-3.030		Vel = 8.73		

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
20	31.79	1.682	0.0	13.000	15.796			K Factor = 8.00	
to		120.0	0.0	0.0	-1.732				
21	-28.65	-0.0255	0.0	13.000	-0.331			Vel = 4.14	
21	29.65	1.682	0.0	13.000	13.733			K Factor = 8.00	
to		120.0	0.0	0.0	-1.732				
22	1.0	0.0001	0.0	13.000	0.001			Vel = 0.14	
22	27.72	1.682	0.0	13.000	12.002			K Factor = 8.00	
to		120.0	0.0	0.0	-1.732				
23	28.72	0.0255	0.0	13.000	0.331			Vel = 4.15	
23	26.04	1.682	0.0	9.600	10.601			K Factor = 8.00	
to		120.0	0.0	0.0	-1.732				
24	54.76	0.0841	0.0	9.600	0.807			Vel = 7.91	
24	0.0	1.682	0.0	1.300	9.676				
to		120.0	0.0	0.0	-2.166				
P4	54.76	0.0846	0.0	1.300	0.110			Vel = 7.91	
P4	0.0	1.682	0.0	80.500	7.620				
to		120.0	0.0	0.0	9.961				
F7	54.76	0.0842	0.0	80.500	6.775			Vel = 7.91	
	0.0								
	54.76				24.356			K Factor = 11.10	
D9	-60.89	1.682	0.0	30.000	19.881			K Factor = 8.00	
to		120.0	0.0	0.0	-0.866				
30	-60.89	-0.1024	0.0	30.000	-3.072			Vel = 8.79	
30	31.94	1.682	0.0	13.000	15.943			K Factor = 8.00	
to		120.0	0.0	0.0	-1.732				
31	-28.95	-0.0259	0.0	13.000	-0.337			Vel = 4.18	
31	29.80	1.682	0.0	13.000	13.874			K Factor = 8.00	
to		120.0	0.0	0.0	-1.732				
32	0.85	0.0	0.0	13.000	0.0			Vel = 0.12	
32	27.88	1.682	0.0	13.000	12.142			K Factor = 8.00	
to		120.0	0.0	0.0	-1.732				
33	28.73	0.0255	0.0	13.000	0.332			Vel = 4.15	
33	26.22	1.682	0.0	9.600	10.742			K Factor = 8.00	
to		120.0	0.0	0.0	-1.732				
34	54.95	0.0846	0.0	9.600	0.812			Vel = 7.93	
34	0.0	1.682	0.0	1.300	9.822				
to		120.0	0.0	0.0	-2.166				
P5	54.95	0.0854	0.0	1.300	0.111			Vel = 7.93	
P5	0.0	1.682	0.0	80.500	7.767				
to		120.0	0.0	0.0	9.961				
F9	54.95	0.0847	0.0	80.500	6.817			Vel = 7.93	

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
	0.0 54.95					24.545		K Factor = 11.09	
D11 to 40	-25.82	1.682 120.0	0.0	55.000	22.657	-4.331		K Factor = 8.00	
40 to 41	-25.82	-0.0209	0.0	55.000	-1.152			Vel = 3.73	
40 to 41	33.15	1.682 120.0	0.0	13.000	17.174	-1.732		K Factor = 8.00	
41 to 42	7.33	0.0020	0.0	13.000	0.026			Vel = 1.06	
41 to 42	31.47	1.682 120.0	0.0	9.600	15.468	-1.732		K Factor = 8.00	
42 to P6	38.8	0.0445	0.0	9.600	0.427			Vel = 5.60	
42 to P6	0.0	1.682 120.0	0.0	1.300	14.163	-2.166			
P6 to F11	38.8	0.0446	0.0	1.300	0.058			Vel = 5.60	
P6 to F11	0.0	1.682 120.0	0.0	80.500	12.055	9.961			
F11	38.8	0.0445	0.0	80.500	3.581			Vel = 5.60	
	0.0 38.80					25.597		K Factor = 7.67	
D13 to P7	14.17	1.682 120.0	1E	4.95	80.500	25.566			
P7 to P7	14.17	0.0069	0.0	85.450	0.590	-10.005		Vel = 2.05	
P7 to F13	0.0	1.682 120.0	1E	4.95	80.500	16.151			
F13	14.17	0.0069	0.0	85.450	0.590	10.005		Vel = 2.05	
	0.0 14.17					26.746		K Factor = 2.74	
D15 to P8	12.82	1.682 120.0	1E	4.95	80.500	26.346			
P8 to P8	12.82	0.0057	0.0	85.450	0.491	-10.005		Vel = 1.85	
P8 to F15	0.0	1.682 120.0	1E	4.95	80.500	16.832			
F15	12.82	0.0057	0.0	85.450	0.490	10.005		Vel = 1.85	
	0.0 12.82					27.327		K Factor = 2.45	
D17 to P9	12.08	1.682 120.0	1E	4.95	80.500	27.075			
P9 to P9	12.08	0.0051	0.0	85.450	0.440	-10.005		Vel = 1.74	
P9 to F17	0.0	1.682 120.0	1E	4.95	80.500	17.510			
F17	12.08	0.0051	0.0	85.450	0.438	10.005		Vel = 1.74	

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 12.08					27.953		K Factor = 2.28	
D19 to P10	11.99	1.682 120.0	1E	4.95 0.0	80.500 4.950	27.757 -10.005			
P10	11.99	0.0051		0.0	85.450	0.433		Vel = 1.73	
P10 to F19	0.0	1.682 120.0	1E	4.95 0.0	80.500 4.950	18.185 10.005			
F19	11.99	0.0051		0.0	85.450	0.433		Vel = 1.73	
	0.0 11.99					28.623		K Factor = 2.24	
D21 to P11	12.56	1.682 120.0	1E	4.95 0.0	80.500 4.950	28.395 -10.005			
P11	12.56	0.0055		0.0	85.450	0.472		Vel = 1.81	
P11 to F21	0.0	1.682 120.0	1E	4.95 0.0	80.500 4.950	18.862 10.005			
F21	12.56	0.0055		0.0	85.450	0.472		Vel = 1.81	
	0.0 12.56					29.339		K Factor = 2.32	
D23 to P12	13.75	1.682 120.0	1E	4.95 0.0	80.500 4.950	28.988 -10.005			
P12	13.75	0.0065		0.0	85.450	0.559		Vel = 1.99	
P12 to F23	0.0	1.682 120.0	1E	4.95 0.0	80.500 4.950	19.542 10.005			
F23	13.75	0.0065		0.0	85.450	0.557		Vel = 1.99	
	0.0 13.75					30.104		K Factor = 2.51	
D25 to P13	15.49	1.682 120.0	1E	4.95 0.0	80.500 4.950	29.536 -10.005			
P13	15.49	0.0081		0.0	85.450	0.696		Vel = 2.24	
P13 to F25	0.0	1.682 120.0	1E	4.95 0.0	80.500 4.950	20.227 10.005			
F25	15.49	0.0081		0.0	85.450	0.695		Vel = 2.24	
	0.0 15.49					30.927		K Factor = 2.79	
D27 to P14	16.19	1.682 120.0	1E	4.95 0.0	80.500 4.950	30.008 -10.005			
P14	16.19	0.0088		0.0	85.450	0.755		Vel = 2.34	
P14 to F27	0.0	1.682 120.0	1E	4.95 0.0	80.500 4.950	20.758 10.005			
F27	16.19	0.0088		0.0	85.450	0.755		Vel = 2.34	

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 16.19					31.518		K Factor = 2.88	
D29 to P15	13.95	1.682 120.0	1E	4.95 0.0	80.500 4.950	30.372 -10.005			
	13.95	0.0067		0.0	85.450	0.573		Vel = 2.01	
P15 to F27	0.0	1.682 120.0	1E	4.95 0.0	80.500 4.950	20.940 10.005			
	13.95	0.0067		0.0	85.450	0.573		Vel = 2.01	
	0.0 13.95					31.518		K Factor = 2.48	
D31 to P16	23.36	1.682 120.0	1E	4.95 0.0	80.500 4.950	30.908 -10.005			
	23.36	0.0174		0.0	85.450	1.488		Vel = 3.37	
P16 to F31	0.0	1.682 120.0	1E	4.95 0.0	80.500 4.950	22.391 10.005			
	23.36	0.0174		0.0	85.450	1.487		Vel = 3.37	
	0.0 23.36					33.883		K Factor = 4.01	
D33 to P17	25.89	1.682 120.0	1E	4.95 0.0	80.500 4.950	31.219 -10.005			
	25.89	0.0210		0.0	85.450	1.798		Vel = 3.74	
P17 to F33	0.0	1.682 120.0	1E	4.95 0.0	80.500 4.950	23.012 10.005			
	25.89	0.0210		0.0	85.450	1.798		Vel = 3.74	
	0.0 25.89					34.815		K Factor = 4.39	
D35 to P18	45.93	1.682 120.0	1E	4.95 0.0	80.500 4.950	32.049 -10.005			
	45.93	0.0608		0.0	85.450	5.194		Vel = 6.63	
P18 to F35	0.0	1.682 120.0	1E	4.95 0.0	80.500 4.950	27.238 10.005			
	45.93	0.0608		0.0	85.450	5.194		Vel = 6.63	
	0.0 45.93					42.437		K Factor = 7.05	
D37 to P19	49.00	1.682 120.0	1E	4.95 0.0	80.500 4.950	32.284 -10.005			
	49.0	0.0685		0.0	85.450	5.854		Vel = 7.08	
P19 to F37	0.0	1.682 120.0	1E	4.95 0.0	80.500 4.950	28.133 10.005			
	49.0	0.0685		0.0	85.450	5.853		Vel = 7.08	

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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 49.00					43.991		K Factor = 7.39	
D39 to P20	51.19	1.682 120.0 0.0743	1E 4.95 0.0	80.500 4.950	32.400 -10.005	6.348		Vel = 7.39	
P20 to F39	0.0 51.19	1.682 120.0 0.0743	1E 4.95 0.0	80.500 4.950	28.743 10.005	6.347		Vel = 7.39	
	0.0 51.19					45.095		K Factor = 7.62	
D1 to D2	-16.94	1.682 120.0 -0.0096	1E 4.95 1T 9.9 0.0	2.300 14.850	23.900 0.866	-0.165		Vel = 2.45	
	0.0 -16.94					24.601		K Factor = -3.42	
D3 to D4	-16.96	1.682 120.0 -0.0096	1E 4.95 1T 9.9 0.0	2.300 14.850	23.898 0.866	-0.165		Vel = 2.45	
	0.0 -16.96					24.599		K Factor = -3.42	
D5 to D6	95.88	1.682 120.0 0.2372	1E 4.95 1T 9.9 0.0	2.300 14.850	19.654 0.866	4.068		Vel = 13.84	
	0.0 95.88					24.588		K Factor = 19.34	
D7 to D8	95.94	1.682 120.0 0.2374	1E 4.95 1T 9.9 0.0	2.300 14.850	19.692 0.866	4.072		Vel = 13.85	
	0.0 95.94					24.630		K Factor = 19.33	
D9 to D10	96.56	1.682 120.0 0.2403	1E 4.95 1T 9.9 0.0	2.300 14.850	19.881 0.866	4.121		Vel = 13.94	
	0.0 96.56					24.868		K Factor = 19.36	
D11 to D12	63.90	1.682 120.0 0.1120	1E 4.95 1T 9.9 0.0	2.300 14.850	22.657 0.866	1.921		Vel = 9.23	
	0.0 63.90					25.444		K Factor = 12.67	

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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	*****
D13 to D14	-14.17 -14.17	1.682 120.0 -0.0069	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	25.566 0.866 -0.118		Vel = 2.05		
	0.0 -14.17				26.314		K Factor = -2.76		
D15 to D16	-12.82 -12.82	1.682 120.0 -0.0057	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	26.346 0.866 -0.098		Vel = 1.85		
	0.0 -12.82				27.114		K Factor = -2.46		
D17 to D18	-12.08 -12.08	1.682 120.0 -0.0051	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	27.075 0.866 -0.088		Vel = 1.74		
	0.0 -12.08				27.853		K Factor = -2.29		
D19 to D20	-11.99 -11.99	1.682 120.0 -0.0051	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	27.757 0.866 -0.087		Vel = 1.73		
	0.0 -11.99				28.536		K Factor = -2.24		
D21 to D22	-12.56 -12.56	1.682 120.0 -0.0055	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	28.395 0.866 -0.095		Vel = 1.81		
	0.0 -12.56				29.166		K Factor = -2.33		
D23 to D24	-13.75 -13.75	1.682 120.0 -0.0065	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	28.988 0.866 -0.111		Vel = 1.99		
	0.0 -13.75				29.743		K Factor = -2.52		
D25 to D26	-15.49 -15.49	1.682 120.0 -0.0081	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	29.536 0.866 -0.139		Vel = 2.24		
	0.0 -15.49				30.263		K Factor = -2.82		
D27 to D28	-16.19 -16.19	1.682 120.0 -0.0088	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	30.008 0.866 -0.151		Vel = 2.34		
	0.0 -16.19				30.723		K Factor = -2.92		

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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	*****
D29 to D30	-13.95 -13.95	1.682 120.0 -0.0067	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	30.372 0.866 -0.115		Vel = 2.01		
	0.0 -13.95				31.123		K Factor = -2.50		
D31 to D32	-23.36 -23.36	1.682 120.0 -0.0174	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	30.908 0.866 -0.298		Vel = 3.37		
	0.0 -23.36				31.476		K Factor = -4.16		
D33 to D34	-25.89 -25.89	1.682 120.0 -0.0210	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	31.219 0.866 -0.361		Vel = 3.74		
	0.0 -25.89				31.724		K Factor = -4.60		
D35 to D36	-45.93 -45.93	1.682 120.0 -0.0608	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	32.049 0.866 -1.043		Vel = 6.63		
	0.0 -45.93				31.872		K Factor = -8.14		
D37 to D38	-49.00 -49.0	1.682 120.0 -0.0685	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	32.284 0.866 -1.175		Vel = 7.08		
	0.0 -49.00				31.975		K Factor = -8.67		
D39 to D40	-51.19 -51.19	1.682 120.0 -0.0743	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	32.400 13.383 -1.274		Vel = 7.39		
	0.0 -51.19				44.509		K Factor = -7.67		
F1 to F2	16.94 16.94	1.682 120.0 0.0096	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	25.540 0.866 0.165		Vel = 2.45		
	0.0 16.94				26.571		K Factor = 3.29		
F3 to F4	16.96 16.96	1.682 120.0 0.0096	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	25.542 0.866 0.165		Vel = 2.45		
	0.0 16.96				26.573		K Factor = 3.29		

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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	*****
F5 to F6	54.62 54.62	1.682 120.0 0.0838	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	24.281 0.866 1.437			Vel = 7.89	
	0.0 54.62					26.584		K Factor = 10.59	
F7 to F8	54.76 54.76	1.682 120.0 0.0841	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	24.356 0.866 1.443			Vel = 7.91	
	0.0 54.76					26.665		K Factor = 10.60	
F9 to F10	54.95 54.95	1.682 120.0 0.0847	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	24.545 0.866 1.453			Vel = 7.93	
	0.0 54.95					26.864		K Factor = 10.60	
F11 to F12	38.80 38.8	1.682 120.0 0.0445	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	25.597 0.866 0.763			Vel = 5.60	
	0.0 38.80					27.226		K Factor = 7.44	
F13 to F14	14.17 14.17	1.682 120.0 0.0069	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	26.746 0.866 0.118			Vel = 2.05	
	0.0 14.17					27.730		K Factor = 2.69	
F15 to F16	12.82 12.82	1.682 120.0 0.0058	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	27.327 0.866 0.099			Vel = 1.85	
	0.0 12.82					28.292		K Factor = 2.41	
F17 to F18	12.08 12.08	1.682 120.0 0.0051	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	27.953 0.866 0.088			Vel = 1.74	
	0.0 12.08					28.907		K Factor = 2.25	
F19 to F20	11.99 11.99	1.682 120.0 0.0051	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	28.623 0.866 0.087			Vel = 1.73	
	0.0 11.99					29.576		K Factor = 2.20	

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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	*****
F21 to F22	12.56 12.56	1.682 120.0 0.0055	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	29.339 0.866 0.095			Vel = 1.81	
	0.0 12.56					30.300		K Factor = 2.28	
F23 to F24	13.75 13.75	1.682 120.0 0.0065	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	30.104 0.866 0.112			Vel = 1.99	
	0.0 13.75					31.082		K Factor = 2.47	
F25 to F26	15.49 15.49	1.682 120.0 0.0082	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	30.927 0.866 0.140			Vel = 2.24	
	0.0 15.49					31.933		K Factor = 2.74	
F27 to F28	30.15 30.15	1.682 120.0 0.0279	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	31.518 0.866 0.478			Vel = 4.35	
	0.0 30.15					32.862		K Factor = 5.26	
F29 to F30	0.0 0.0	1.682 120.0 0.0	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	33.089 0.866 0.0			Vel = 0	
	0.0 0.0					33.955		K Factor = 0	
F31 to F32	23.36 23.36	1.682 120.0 0.0174	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	33.883 0.866 0.299			Vel = 3.37	
	0.0 23.36					35.048		K Factor = 3.95	
F33 to F34	25.89 25.89	1.682 120.0 0.0210	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	34.815 0.866 0.361			Vel = 3.74	
	0.0 25.89					36.042		K Factor = 4.31	
F35 to F36	45.93 45.93	1.682 120.0 0.0608	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	42.437 0.866 1.043			Vel = 6.63	
	0.0 45.93					44.346		K Factor = 6.90	

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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	*****
F37 to F38	49.00 49.0	1.682 120.0 0.0685	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	43.991 0.866 1.175			Vel = 7.08	
	0.0 49.00					46.032		K Factor = 7.22	
F39 to F40	51.19 51.19	1.682 120.0 0.0743	1E 4.95 1T 9.9 0.0	2.300 14.850 17.150	45.095 0.866 1.274			Vel = 7.39	
	0.0 51.19					47.235		K Factor = 7.45	
D2 to D4	-16.94 -16.94	3.26 120.0 -0.0003	0.0 0.0 0.0	6.200 0.0 6.200	24.601 0.0 -0.002			Vel = 0.65	
D4 to D6	-16.95 -33.89	3.26 120.0 -0.0014	0.0 0.0 0.0	7.600 0.0 7.600	24.599 0.0 -0.011			Vel = 1.30	
D6 to D8	95.88 61.99	3.26 120.0 0.0042	0.0 0.0 0.0	10.000 0.0 10.000	24.588 0.0 0.042			Vel = 2.38	
D8 to D10	95.94 157.93	3.26 120.0 0.0238	0.0 0.0 0.0	10.000 0.0 10.000	24.630 0.0 0.238			Vel = 6.07	
D10 to D12	96.56 254.49	3.26 120.0 0.0576	0.0 0.0 0.0	10.000 0.0 10.000	24.868 0.0 0.576			Vel = 9.78	
D12 to D14	63.90 318.39	3.26 120.0 0.0870	0.0 0.0 0.0	10.000 0.0 10.000	25.444 0.0 0.870			Vel = 12.24	
D14 to D16	-14.17 304.22	3.26 120.0 0.0800	0.0 0.0 0.0	10.000 0.0 10.000	26.314 0.0 0.800			Vel = 11.69	
D16 to D18	-12.82 291.4	3.26 120.0 0.0739	0.0 0.0 0.0	10.000 0.0 10.000	27.114 0.0 0.739			Vel = 11.20	
D18 to D20	-12.08 279.32	3.26 120.0 0.0683	0.0 0.0 0.0	10.000 0.0 10.000	27.853 0.0 0.683			Vel = 10.74	
D20 to D22	-11.99 267.33	3.26 120.0 0.0630	0.0 0.0 0.0	10.000 0.0 10.000	28.536 0.0 0.630			Vel = 10.28	

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Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
D22	-12.57	3.26	0.0	10.000	29.166				
to		120.0	0.0	0.0	0.0				
D24	254.76	0.0577	0.0	10.000	0.577		Vel =	9.79	
D24	-13.75	3.26	0.0	10.000	29.743				
to		120.0	0.0	0.0	0.0				
D26	241.01	0.0520	0.0	10.000	0.520		Vel =	9.26	
D26	-15.49	3.26	0.0	10.000	30.263				
to		120.0	0.0	0.0	0.0				
D28	225.52	0.0460	0.0	10.000	0.460		Vel =	8.67	
D28	-16.19	3.26	0.0	10.000	30.723				
to		120.0	0.0	0.0	0.0				
D30	209.33	0.0400	0.0	10.000	0.400		Vel =	8.05	
D30	-13.95	3.26	0.0	10.000	31.123				
to		120.0	0.0	0.0	0.0				
D32	195.38	0.0353	0.0	10.000	0.353		Vel =	7.51	
D32	-23.37	3.26	0.0	8.900	31.476				
to		120.0	0.0	0.0	0.0				
D34	172.01	0.0279	0.0	8.900	0.248		Vel =	6.61	
D34	-25.89	3.26	0.0	7.200	31.724				
to		120.0	0.0	0.0	0.0				
D36	146.12	0.0206	0.0	7.200	0.148		Vel =	5.62	
D36	-45.93	3.26	0.0	10.000	31.872				
to		120.0	0.0	0.0	0.0				
D38	100.19	0.0103	0.0	10.000	0.103		Vel =	3.85	
D38	-49.00	3.26	0.0	5.900	31.975				
to		120.0	0.0	0.0	12.517				
D40	51.19	0.0029	0.0	5.900	0.017		Vel =	1.97	
	0.0								
	51.19				44.509		K Factor =	7.67	
F2	16.94	3.26	0.0	6.200	26.571				
to		120.0	0.0	0.0	0.0				
F4	16.94	0.0003	0.0	6.200	0.002		Vel =	0.65	
F4	16.95	3.26	0.0	7.600	26.573				
to		120.0	0.0	0.0	0.0				
F6	33.89	0.0014	0.0	7.600	0.011		Vel =	1.30	
F6	54.63	3.26	0.0	10.000	26.584				
to		120.0	0.0	0.0	0.0				
F8	88.52	0.0081	0.0	10.000	0.081		Vel =	3.40	
F8	54.76	3.26	0.0	10.000	26.665				
to		120.0	0.0	0.0	0.0				
F10	143.28	0.0199	0.0	10.000	0.199		Vel =	5.51	

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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	*****
F10	54.95	3.26		10.000	26.864				
to		120.0	0.0	0.0	0.0				
F12	198.23	0.0362	0.0	10.000	0.362		Vel =	7.62	
F12	38.79	3.26	0.0	10.000	27.226				
to		120.0	0.0	0.0	0.0				
F14	237.02	0.0504	0.0	10.000	0.504		Vel =	9.11	
F14	14.17	3.26	0.0	10.000	27.730				
to		120.0	0.0	0.0	0.0				
F16	251.19	0.0562	0.0	10.000	0.562		Vel =	9.66	
F16	12.83	3.26	0.0	10.000	28.292				
to		120.0	0.0	0.0	0.0				
F18	264.02	0.0615	0.0	10.000	0.615		Vel =	10.15	
F18	12.08	3.26	0.0	10.000	28.907				
to		120.0	0.0	0.0	0.0				
F20	276.1	0.0669	0.0	10.000	0.669		Vel =	10.61	
F20	11.99	3.26	0.0	10.000	29.576				
to		120.0	0.0	0.0	0.0				
F22	288.09	0.0724	0.0	10.000	0.724		Vel =	11.07	
F22	12.56	3.26	0.0	10.000	30.300				
to		120.0	0.0	0.0	0.0				
F24	300.65	0.0782	0.0	10.000	0.782		Vel =	11.56	
F24	13.75	3.26	0.0	10.000	31.082				
to		120.0	0.0	0.0	0.0				
F26	314.4	0.0851	0.0	10.000	0.851		Vel =	12.08	
F26	15.50	3.26	0.0	10.000	31.933				
to		120.0	0.0	0.0	0.0				
F28	329.9	0.0929	0.0	10.000	0.929		Vel =	12.68	
F28	30.14	3.26	0.0	10.000	32.862				
to		120.0	0.0	0.0	0.0				
F30	360.04	0.1093	0.0	10.000	1.093		Vel =	13.84	
F30	0.0	3.26	0.0	10.000	33.955				
to		120.0	0.0	0.0	0.0				
F32	360.04	0.1093	0.0	10.000	1.093		Vel =	13.84	
F32	23.36	3.26	0.0	8.100	35.048				
to		120.0	0.0	0.0	0.0				
F34	383.4	0.1227	0.0	8.100	0.994		Vel =	14.74	
F34	25.89	3.26	2V 13.44	46.500	36.042				
to		120.0	0.0	13.440	0.0				
F36	409.29	0.1385	0.0	59.940	8.304		Vel =	15.73	
F36	45.94	3.26	0.0	10.000	44.346				
to		120.0	0.0	0.0	0.0				
F38	455.23	0.1686	0.0	10.000	1.686		Vel =	17.50	

Final Calculations - Hazen-Williams

ADVANCED FIRE PROTECTION
NEW YARD YACHT BLDG PHASE 2 WET SYS

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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	*****
F38	49.00	3.26		5.900	46.032				
to		120.0		0.0	0.0				
F40	504.23	0.2039		5.900	1.203		Vel = 19.38		
F40	51.19	3.26	1V 6.72	15.000	47.235				
to		120.0		6.720	9.052				
TOR	555.42	0.2436		21.720	5.292		Vel = 21.35		
TOR	0.0	4.26	1B 15.8	6.000	61.579				
to		120.0	1Z 13.167	55.301	2.166				
BOR	555.42	0.0662	1T 26.334	61.301	4.059		Vel = 12.50		
BOR	0.0	6.16	1T 32.359	9.000	67.804				
to		120.0	1Zia 0.0	32.359	5.694		* Fixed loss = 3.095		
BOR1	555.42	0.0110		41.359	0.454		Vel = 5.98		
BOR1	0.0	6.16	1E 20.084	80.000	73.952				
to		140.0	1G 4.304	67.425	0.433				
U1	555.42	0.0083	1T 43.037	147.425	1.218		Vel = 5.98		
U1	0.0	6.16	3E 60.252	580.000	75.603				
to		140.0	1T 43.037	103.289	-3.032				
U2	555.42	0.0083		683.289	5.646		Vel = 5.98		
U2	0.0	12.34	1E 42.195	400.000	78.217				
to		140.0	1T 93.767	135.962	1.299				
TEST	555.42	0.0003		535.962	0.150		Vel = 1.49		
	250.00						Qa = 250.00		
	805.42				79.666		K Factor = 90.24		