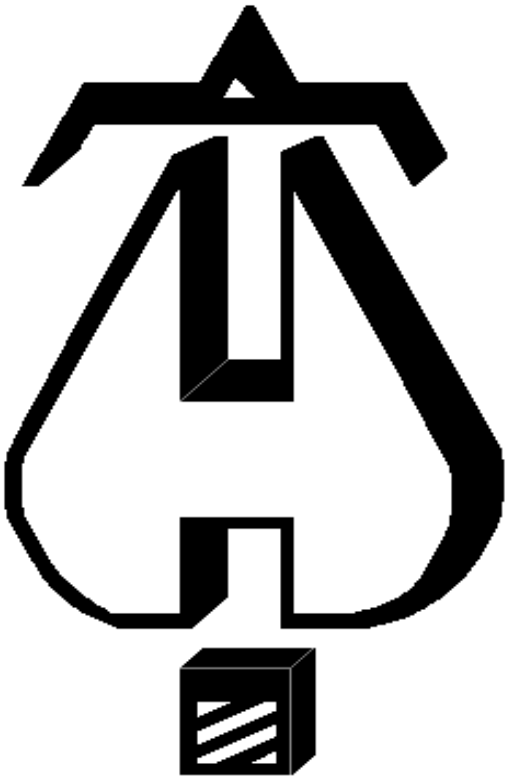


. . . Fire Protection by Computer Design

HIGH TECH FIRE PROTECTION
84 HACKETT MILLS ROAD
P.O. BOX 156
POLAND, ME 04274
207-998-2551

Job Name	:	TIRE WAREHOUSE PORTLAND NORTH BOYD STREET (TIRE STORAGE AREA)
Drawing	:	PORTLAND
Location	:	126 NORTH BOYD STREET
Remote Area	:	#1 WET
Contract	:	062016-1
Data File	:	TIRE STORAGE AREA CALC.WXF

Hydraulic Design Information Sheet

Name - TIRE WAREHOUSE PORTLAND Date - 10/25/16
Location - 126 NORTH BOYD STREET
Building - PORTLAND System No. - #1 WET
Contractor - HIGH TECH FIRE PROTECTION Contract No. - 062016-1
Calculated By - ED POULIN Drawing No. - FP-01
Construction: (X) Combustible ( ) Non-Combustible Ceiling Height - 15'
Occupancy - TIRE STORAGE UP TO 25'

SYSTEM DESIGN

(X) NFPA 13 ( ) Lt. Haz. Ord.Haz.Gp. ( ) 1 ( ) 2 ( ) 3 ( ) Ex.Haz.
( ) NFPA 231 ( ) NFPA 231C ( ) Figure Curve
Other CHAPTER 18
Specific Ruling Made By Date

Area of Sprinkler Operation	- 1024	System Type	Sprinkler/Nozzle
Density	-	(X) Wet	Make TYCO
Area Per Sprinkler	- 80	( ) Dry	Model K17
Elevation at Highest Outlet	- 15	( ) Deluge	Size 3/4"
Hose Allowance - Inside	- N/A	( ) Preaction	K-Factor 16.8
Rack Sprinkler Allowance	- N/A	( ) Other	Temp.Rat.155
Hose Allowance - Outside	- 500	HEAD SPEC PER TABLE 18.4C	

Note

Calculation Summary: Flow Required - 2001 Press Required - 70; C-Factor Used: 120 Overhead 140 Underground

WATER SUPPLY

Water Flow Test:		Pump Data:		Tank or Reservoir:
Date of Test	- 5-18-16			Cap. -
Time of Test	- 1:40 PM	Rated Cap.-		Elev.-
Static Press	- 105	@ Press	-	
Residual Press	- 101	Elev.	-	Well
Flow	- 1443			Proof Flow
Elevation	- 2			

Location - HYDRANT DIRECTLY IN FRONT OF BUILDING AND CORNER OF BOYD.

Source of Information - PORTLAND WATER DISTRICT

STORAGE

Commodity TIRES STORED UP TO 25' Class Location
Storage Ht. Area Aisle W.
Storage Method: Solid Piled 20 % Palletized 80 % Rack

(X) Single Row	( ) Conven. Pallet	( ) Auto. Storage	( ) Encap.	
(X) Double Row	( ) Slave Pallet	( ) Solid Shelf	( ) Non	
( ) Mult. Row		( ) Open Shelf		

Flue Spacing Clearance:Storage to Ceiling 36"
Longitudinal Transverse

Horizontal Barriers Provided:

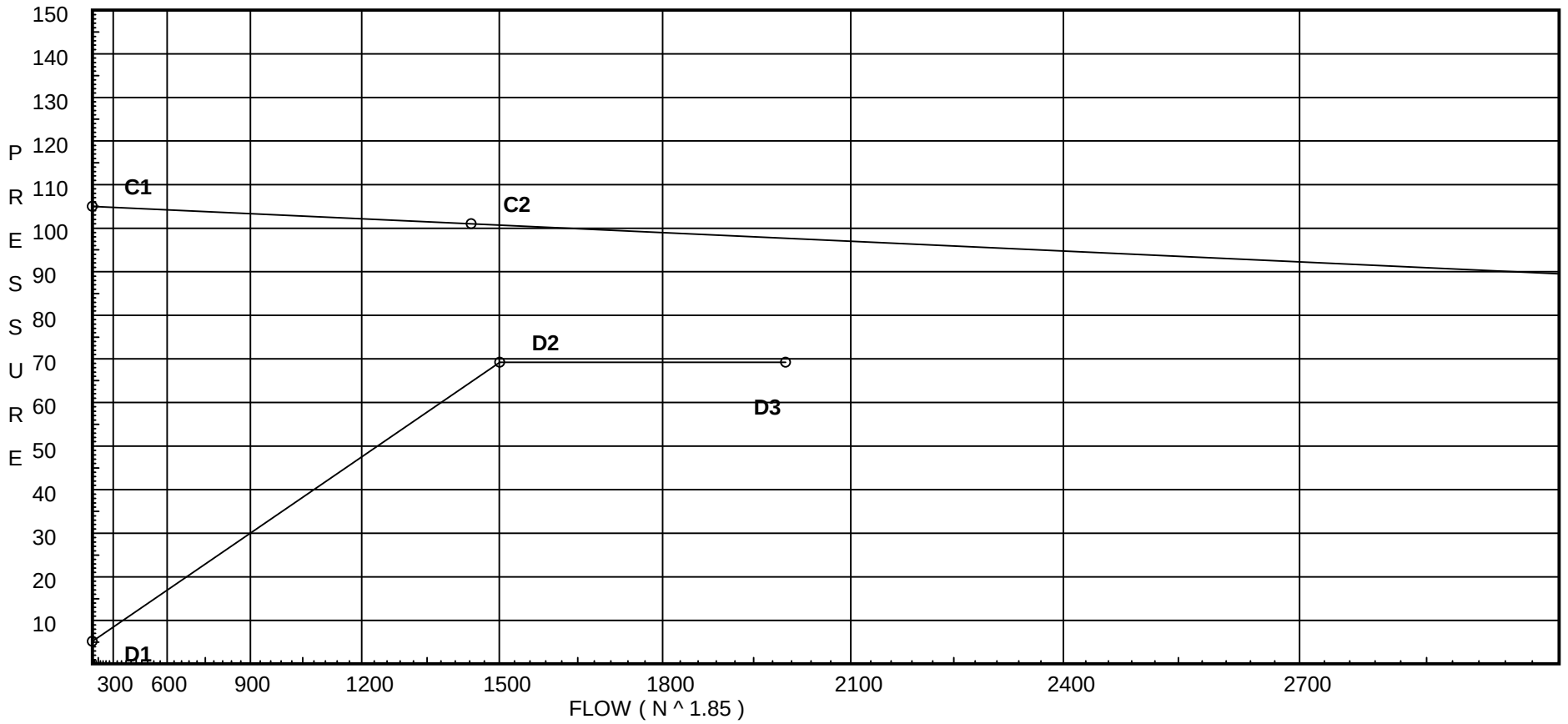
Water Supply Curve (C)

HIGH TECH FIRE PROTECTION
TIRE WAREHOUSE PORTLAND NORTH BOYD STREET (TIRE STORAGE AREA)

Date 10/25/16

City Water Supply:
- C1 - Static Pressure : 105
- C2 - Residual Pressure: 101
- C2 - Residual Flow : 1443

Demand:
- D1 - Elevation : 5.197
- D2 - System Flow : 1500.77
- D2 - System Pressure : 69.221
- Hose (Demand) : 500
- D3 - System Demand : 2000.77
- Safety Margin : 28.457



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	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	1	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
T	NFPA 13 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	3.5	3.5	4.3	5	0	6.8	8.5	10	13	0	0	0	0	0	0	0
X	90'Tee-BranchFirelock002	0	0	0	0	8	8.5	10.8	13	0	16	21	25	33	0	0	0	0	0	0	0
Zib	Wilkins 350A	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

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
AA	13.0		37.65	na				
104	14.0		35.18	na				
105	14.0	16.8	35.06	na	99.48	0.001	80	35.0
106	14.0	16.8	35.0	na	99.39	0.001	80	35.0
107	14.0	16.8	35.43	na	100.0	0.001	80	35.0
108	14.0		37.86	na				
AB	13.0		37.68	na				
114	14.0		35.22	na				
115	14.0	16.8	35.1	na	99.53	0.001	80	35.0
116	14.0	16.8	35.04	na	99.45	0.001	80	35.0
117	14.0	16.8	35.48	na	100.06	0.001	80	35.0
118	14.0		37.91	na				
AC	13.0		37.78	na				
124	14.0		35.33	na				
125	14.0	16.8	35.22	na	99.7	0.001	80	35.0
126	14.0	16.8	35.16	na	99.61	0.001	80	35.0
127	14.0	16.8	35.6	na	100.24	0.001	80	35.0
128	14.0		38.07	na				
AD	13.0		38.04	na				
134	14.0		35.62	na				
135	14.0	16.8	35.51	na	100.11	0.001	80	35.0
136	14.0	16.8	35.46	na	100.04	0.001	80	35.0
137	14.0	16.8	35.93	na	100.7	0.001	80	35.0
138	14.0		38.46	na				
AE	13.0		38.35	na				
144	14.0		35.98	na				
145	14.0	16.8	35.87	na	100.62	0.001	80	35.0
146	14.0	16.8	35.83	na	100.56	0.001	80	35.0
147	14.0	16.8	36.33	na	101.26	0.001	80	35.0
148	14.0		38.94	na				
AF	13.0		39.0	na				
154	14.0		39.88	na				
158	14.0		42.31	na				
AG	13.0		39.34	na				
164	14.0		40.43	na				
168	14.0		43.23	na				
AH	13.0		39.64	na				
174	14.0		41.15	na				
178	14.0		44.74	na				
AI	13.0		39.76	na				
184	14.0		41.68	na				
188	14.0		46.02	na				
AJ	13.0		39.81	na				
194	14.0		42.47	na				
198	14.0		48.16	na				
BA	13.0		41.22	na				
BB	13.0		41.28	na				
BC	13.0		41.47	na				
BD	13.0		41.94	na				
BE	13.0		42.53	na				
BF	13.0		43.77	na				
BG	13.0		44.86	na				
BH	13.0		46.69	na				
BI	13.0		48.3	na				
BJ	13.0		51.01	na				
TOR	15.5		53.56	na				
FLW	5.0		59.46	na				
BOR	2.0		61.88	na				
H1	2.0		65.9	na				
HOSE	0.0		67.58	na	500.0			
TEST	2.0		69.22	na				

The maximum velocity is 30.25 and it occurs in the pipe between nodes BI and BJ

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
AA	-125.20	2.157	1V	4.307	1.000	37.649		
to		120.0	1T	12.307	16.614	-0.433		
104	-125.2	-0.1157		0.0	17.614	-2.038		Vel = 10.99
104	0.0	2.157		0.0	1.000	35.178		
to		120.0		0.0	0.0	0.0		
105	-125.2	-0.1160		0.0	1.000	-0.116		Vel = 10.99
105	99.48	2.157		0.0	10.000	35.062		K Factor = 16.80
to		120.0		0.0	0.0	0.0		
106	-25.72	-0.0062		0.0	10.000	-0.062		Vel = 2.26
106	99.39	2.157		0.0	10.000	35.000		K Factor = 16.80
to		120.0		0.0	0.0	0.0		
107	73.67	0.0434		0.0	10.000	0.434		Vel = 6.47
107	100.00	2.157	1X	10.461	1.000	35.434		K Factor = 16.80
to		120.0		0.0	10.461	0.0		
108	173.67	0.2119		0.0	11.461	2.429		Vel = 15.25
108	0.0	2.157	1T	12.307	1.500	37.863		
to		120.0		0.0	12.307	0.433		
BA	173.67	0.2120		0.0	13.807	2.927		Vel = 15.25
	0.0							
	173.67					41.223		K Factor = 27.05
AB	-125.04	2.157	1V	4.307	1.000	37.683		
to		120.0	1T	12.307	16.614	-0.433		
114	-125.04	-0.1155		0.0	17.614	-2.034		Vel = 10.98
114	0.0	2.157		0.0	1.000	35.216		
to		120.0		0.0	0.0	0.0		
115	-125.04	-0.1150		0.0	1.000	-0.115		Vel = 10.98
115	99.53	2.157		0.0	10.000	35.101		K Factor = 16.80
to		120.0		0.0	0.0	0.0		
116	-25.51	-0.0061		0.0	10.000	-0.061		Vel = 2.24
116	99.45	2.157		0.0	10.000	35.040		K Factor = 16.80
to		120.0		0.0	0.0	0.0		
117	73.94	0.0436		0.0	10.000	0.436		Vel = 6.49
117	100.06	2.157	1X	10.461	1.000	35.476		K Factor = 16.80
to		120.0		0.0	10.461	0.0		
118	174.0	0.2128		0.0	11.461	2.439		Vel = 15.28
118	0.0	2.157	1T	12.307	1.500	37.915		
to		120.0		0.0	12.307	0.433		
BB	174.0	0.2127		0.0	13.807	2.937		Vel = 15.28
	0.0							
	174.00					41.285		K Factor = 27.08
AC	-124.56	2.157	1V	4.307	1.000	37.782		
to		120.0	1T	12.307	16.614	-0.433		
124	-124.56	-0.1146		0.0	17.614	-2.018		Vel = 10.94
124	0.0	2.157		0.0	1.000	35.331		
to		120.0		0.0	0.0	0.0		
125	-124.56	-0.1150		0.0	1.000	-0.115		Vel = 10.94
125	99.70	2.157		0.0	10.000	35.216		K Factor = 16.80
to		120.0		0.0	0.0	0.0		
126	-24.86	-0.0058		0.0	10.000	-0.058		Vel = 2.18

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
126	99.61	2.157		0.0	10.000	35.158		K Factor = 16.80
to		120.0		0.0	0.0	0.0		
127	74.75	0.0445		0.0	10.000	0.445		Vel = 6.56
127	100.24	2.157	1X	10.461	1.000	35.603		K Factor = 16.80
to		120.0		0.0	10.461	0.0		
128	174.99	0.2150		0.0	11.461	2.464		Vel = 15.36
128	0.0	2.157	1T	12.307	1.500	38.067		
to		120.0		0.0	12.307	0.433		
BC	174.99	0.2150		0.0	13.807	2.969		Vel = 15.36
	0.0							
	174.99					41.469		K Factor = 27.17
AD	-123.31	2.157	1V	4.307	1.000	38.038		
to		120.0	1T	12.307	16.614	-0.433		
134	-123.31	-0.1125		0.0	17.614	-1.981		Vel = 10.83
134	0.0	2.157		0.0	1.000	35.624		
to		120.0		0.0	0.0	0.0		
135	-123.31	-0.1130		0.0	1.000	-0.113		Vel = 10.83
135	100.12	2.157		0.0	10.000	35.511		K Factor = 16.80
to		120.0		0.0	0.0	0.0		
136	-23.19	-0.0051		0.0	10.000	-0.051		Vel = 2.04
136	100.04	2.157		0.0	10.000	35.460		K Factor = 16.80
to		120.0		0.0	0.0	0.0		
137	76.85	0.0469		0.0	10.000	0.469		Vel = 6.75
137	100.70	2.157	1X	10.461	1.000	35.929		K Factor = 16.80
to		120.0		0.0	10.461	0.0		
138	177.55	0.2208		0.0	11.461	2.531		Vel = 15.59
138	0.0	2.157	1T	12.307	1.500	38.460		
to		120.0		0.0	12.307	0.433		
BD	177.55	0.2208		0.0	13.807	3.049		Vel = 15.59
	0.0							
	177.55					41.942		K Factor = 27.42
AE	-121.72	2.157	1V	4.307	1.000	38.350		
to		120.0	1T	12.307	16.614	-0.433		
144	-121.72	-0.1099		0.0	17.614	-1.935		Vel = 10.69
144	0.0	2.157		0.0	1.000	35.982		
to		120.0		0.0	0.0	0.0		
145	-121.72	-0.1100		0.0	1.000	-0.110		Vel = 10.69
145	100.62	2.157		0.0	10.000	35.872		K Factor = 16.80
to		120.0		0.0	0.0	0.0		
146	-21.1	-0.0043		0.0	10.000	-0.043		Vel = 1.85
146	100.56	2.157		0.0	10.000	35.829		K Factor = 16.80
to		120.0		0.0	0.0	0.0		
147	79.46	0.0499		0.0	10.000	0.499		Vel = 6.98
147	101.26	2.157	1X	10.461	1.000	36.328		K Factor = 16.80
to		120.0		0.0	10.461	0.0		
148	180.72	0.2282		0.0	11.461	2.615		Vel = 15.87
148	0.0	2.157	1T	12.307	1.500	38.943		
to		120.0		0.0	12.307	0.433		
BE	180.72	0.2281		0.0	13.807	3.150		Vel = 15.87

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							
	180.72					42.526		K Factor = 27.71
AF	98.82	2.157	1V	4.307	1.000	38.999		
to		120.0	1T	12.307	16.614	-0.433		
154	98.82	0.0747		0.0	17.614	1.315		Vel = 8.68
154	0.0	2.157	1X	10.461	22.000	39.881		
to		120.0		0.0	10.461	0.0		
158	98.82	0.0747		0.0	32.461	2.425		Vel = 8.68
158	0.0	2.157	1T	12.307	1.500	42.306		
to		120.0		0.0	12.307	0.433		
BF	98.82	0.0747		0.0	13.807	1.031		Vel = 8.68
	0.0							
	98.82					43.770		K Factor = 14.94
AG	106.93	2.157	1V	4.307	1.000	39.337		
to		120.0	1T	12.307	16.614	-0.433		
164	106.93	0.0864		0.0	17.614	1.522		Vel = 9.39
164	0.0	2.157	1X	10.461	22.000	40.426		
to		120.0		0.0	10.461	0.0		
168	106.93	0.0864		0.0	32.461	2.806		Vel = 9.39
168	0.0	2.157	1T	12.307	1.500	43.232		
to		120.0		0.0	12.307	0.433		
BG	106.93	0.0864		0.0	13.807	1.193		Vel = 9.39
	0.0							
	106.93					44.858		K Factor = 15.97
AH	122.01	2.157	1V	4.307	1.000	39.645		
to		120.0	1T	12.307	16.614	-0.433		
174	122.01	0.1103		0.0	17.614	1.943		Vel = 10.71
174	0.0	2.157	1X	10.461	22.000	41.155		
to		120.0		0.0	10.461	0.0		
178	122.01	0.1103		0.0	32.461	3.581		Vel = 10.71
178	0.0	2.157	1T	12.307	1.500	44.736		
to		120.0		0.0	12.307	0.433		
BH	122.01	0.1103		0.0	13.807	1.523		Vel = 10.71
	0.0							
	122.01					46.692		K Factor = 17.86
AI	135.33	2.157	1V	4.307	1.000	39.761		
to		120.0	1T	12.307	16.614	-0.433		
184	135.33	0.1336		0.0	17.614	2.353		Vel = 11.88
184	0.0	2.157	1X	10.461	22.000	41.681		
to		120.0		0.0	10.461	0.0		
188	135.33	0.1336		0.0	32.461	4.337		Vel = 11.88
188	0.0	2.157	1T	12.307	1.500	46.018		
to		120.0		0.0	12.307	0.433		
BI	135.33	0.1336		0.0	13.807	1.845		Vel = 11.88
	0.0							
	135.33					48.296		K Factor = 19.47
AJ	156.74	2.157	1V	4.307	1.000	39.812		
to		120.0	1T	12.307	16.614	-0.433		
194	156.74	0.1753		0.0	17.614	3.088		Vel = 13.76

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*******	Notes	******
194	0.0	2.157	1X	10.461	22.000	42.467				
to		120.0		0.0	10.461	0.0				
198	156.74	0.1753		0.0	32.461	5.692		Vel = 13.76		
198	0.0	2.157	1T	12.307	1.500	48.159				
to		120.0		0.0	12.307	0.433				
BJ	156.74	0.1753		0.0	13.807	2.421		Vel = 13.76		
	0.0									
	156.74					51.013		K Factor = 21.95		
AA	125.20	4.26		0.0	8.000	37.649				
to		120.0		0.0	0.0	0.0				
AB	125.2	0.0042		0.0	8.000	0.034		Vel = 2.82		
AB	125.04	4.26		0.0	6.600	37.683				
to		120.0		0.0	0.0	0.0				
AC	250.24	0.0150		0.0	6.600	0.099		Vel = 5.63		
AC	124.56	4.26		0.0	8.000	37.782				
to		120.0		0.0	0.0	0.0				
AD	374.8	0.0320		0.0	8.000	0.256		Vel = 8.44		
AD	123.31	4.26		0.0	5.750	38.038				
to		120.0		0.0	0.0	0.0				
AE	498.11	0.0543		0.0	5.750	0.312		Vel = 11.21		
AE	121.72	4.26		0.0	8.000	38.350				
to		120.0		0.0	0.0	0.0				
AF	619.83	0.0811		0.0	8.000	0.649		Vel = 13.95		
AF	-98.82	4.26		0.0	5.750	38.999				
to		120.0		0.0	0.0	0.0				
AG	521.01	0.0588		0.0	5.750	0.338		Vel = 11.73		
AG	-106.93	4.26		0.0	8.000	39.337				
to		120.0		0.0	0.0	0.0				
AH	414.08	0.0385		0.0	8.000	0.308		Vel = 9.32		
AH	-122.01	4.26		0.0	5.750	39.645				
to		120.0		0.0	0.0	0.0				
AI	292.07	0.0202		0.0	5.750	0.116		Vel = 6.57		
AI	-135.33	4.26		0.0	8.000	39.761				
to		120.0		0.0	0.0	0.0				
AJ	156.74	0.0064		0.0	8.000	0.051		Vel = 3.53		
	0.0									
	156.74					39.812		K Factor = 24.84		
BA	173.67	4.26		0.0	8.000	41.223				
to		120.0		0.0	0.0	0.0				
BB	173.67	0.0078		0.0	8.000	0.062		Vel = 3.91		
BB	174.00	4.26		0.0	6.600	41.285				
to		120.0		0.0	0.0	0.0				
BC	347.67	0.0279		0.0	6.600	0.184		Vel = 7.83		
BC	175.00	4.26		0.0	8.000	41.469				
to		120.0		0.0	0.0	0.0				
BD	522.67	0.0591		0.0	8.000	0.473		Vel = 11.77		
BD	177.55	4.26		0.0	5.750	41.942				
to		120.0		0.0	0.0	0.0				
BE	700.22	0.1016		0.0	5.750	0.584		Vel = 15.76		

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
BE	180.71	4.26		0.0	8.000	42.526		
to		120.0		0.0	0.0	0.0		
BF	880.93	0.1555		0.0	8.000	1.244		Vel = 19.83
BF	98.82	4.26		0.0	5.750	43.770		
to		120.0		0.0	0.0	0.0		
BG	979.75	0.1892		0.0	5.750	1.088		Vel = 22.05
BG	106.93	4.26		0.0	8.000	44.858		
to		120.0		0.0	0.0	0.0		
BH	1086.68	0.2292		0.0	8.000	1.834		Vel = 24.46
BH	122.01	4.26		0.0	5.750	46.692		
to		120.0		0.0	0.0	0.0		
BI	1208.69	0.2790		0.0	5.750	1.604		Vel = 27.21
BI	135.33	4.26		0.0	8.000	48.296		
to		120.0		0.0	0.0	0.0		
BJ	1344.02	0.3396		0.0	8.000	2.717		Vel = 30.25
	0.0							
	1344.02					51.013		K Factor = 188.18
BJ	1500.77	6.357	2V	25.147	36.000	51.013		
to		120.0		0.0	25.147	-1.083		
TOR	1500.77	0.0593		0.0	61.147	3.626		Vel = 15.17
TOR	0.0	6.357	1Fsp	0.0	6.000	53.556		
to		120.0		0.0	0.0	5.548		* Fixed loss = 1
FLW	1500.77	0.0592		0.0	6.000	0.355		Vel = 15.17
FLW	0.0	6.357	1Zib	0.0	2.000	59.459		
to		120.0		0.0	0.0	2.299		* Fixed loss = 1
BOR	1500.77	0.0595		0.0	2.000	0.119		Vel = 15.17
BOR	0.0	6.16	1G	4.304	10.000	61.877		
to		140.0	1T	43.037	67.425	0.0		
H1	1500.77	0.0520	1E	20.084	77.425	4.024		Vel = 16.16
H1	0.0	8.27	1T	55.354	10.000	65.901		
to		140.0		0.0	55.354	0.866		
HOSE	1500.77	0.0124		0.0	65.354	0.809		Vel = 8.96
HOSE	500.00	6.16	1G	4.304	4.000	67.576		Qa = 500
to		140.0	1E	20.084	24.388	-0.866		
TEST	2000.77	0.0885		0.0	28.388	2.511		Vel = 21.54
	0.0							
	2000.77					69.221		K Factor = 240.48