

... 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 : NOKIAN TYRES WALTON STREET GRID 2
Drawing : Unit C
Location : 135 Walton Street Portland
Remote Area : Grid #2
Contract : 041415-2
Data File : Grid 2 looped.WXF

Hydraulic Design Information Sheet

Name - Nokian Tyre Warehouse Date - 9-15-15
 Location - 135 Walton Street Portland
 Building - Unit C System No. - Grid #2
 Contractor - High Tech Fire Protection Contract No. - 041415-2
 Calculated By - Ed Poulin Drawing No. - FP-01
 Construction: () Combustible (X) Non-Combustible Ceiling Height - 28'
 Occupancy - Chapter 18 Tire Storage up to 25' with ESFR

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

M	Area of Sprinkler Operation	- 916	System Type	Sprinkler/Nozzle
	Density	- .001	(X) Wet	Make VIKING
D	Area Per Sprinkler	- 100	() Dry	Model VK510
E	Elevation at Highest Outlet	- 26.5	() Deluge	Size 1"
S	Hose Allowance - Inside	- N/A	() Preaction	K-Factor 25.2
I	Rack Sprinkler Allowance	- N/A	() Other	Temp.Rat.165
G	Hose Allowance - Outside	- 250	HEAD SPEC FOR	ESFR

N Note

Calculation Flow Required - 1429 Press Required - 77
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 9-11-15		Cap. -
T	Time of Test - 9:00 AM	Rated Cap.-	Elev.-
E	Static Press - 84	@ Press -	
R	Residual Press - 80	Elev. -	Well
	Flow - 1403		Proof Flow
S	Elevation - 0		

U Location - ACROSS THE STREET FROM SITE ON CANCO ST.

P
 L Source of Information - PORTLAND WATER DISTRICT
 Y

C	Commodity TIRES	Class	Location
O	Storage Ht. UP TO 25	Area	Aisle W.
M	Storage Method: Solid Piled 20 %	Palletized 80 %	Rack
M	(X) Single Row () Conven. Pallet () Auto. Storage () Encap.		
S	(X) Double Row () Slave Pallet () Solid Shelf () Non		
T	() Mult. Row () Open Shelf		
O			
C			
R	Flue Spacing	Clearance:Storage to Ceiling 36"	
A	Longitudinal	Transverse	
G			
E	Horizontal Barriers Provided:		

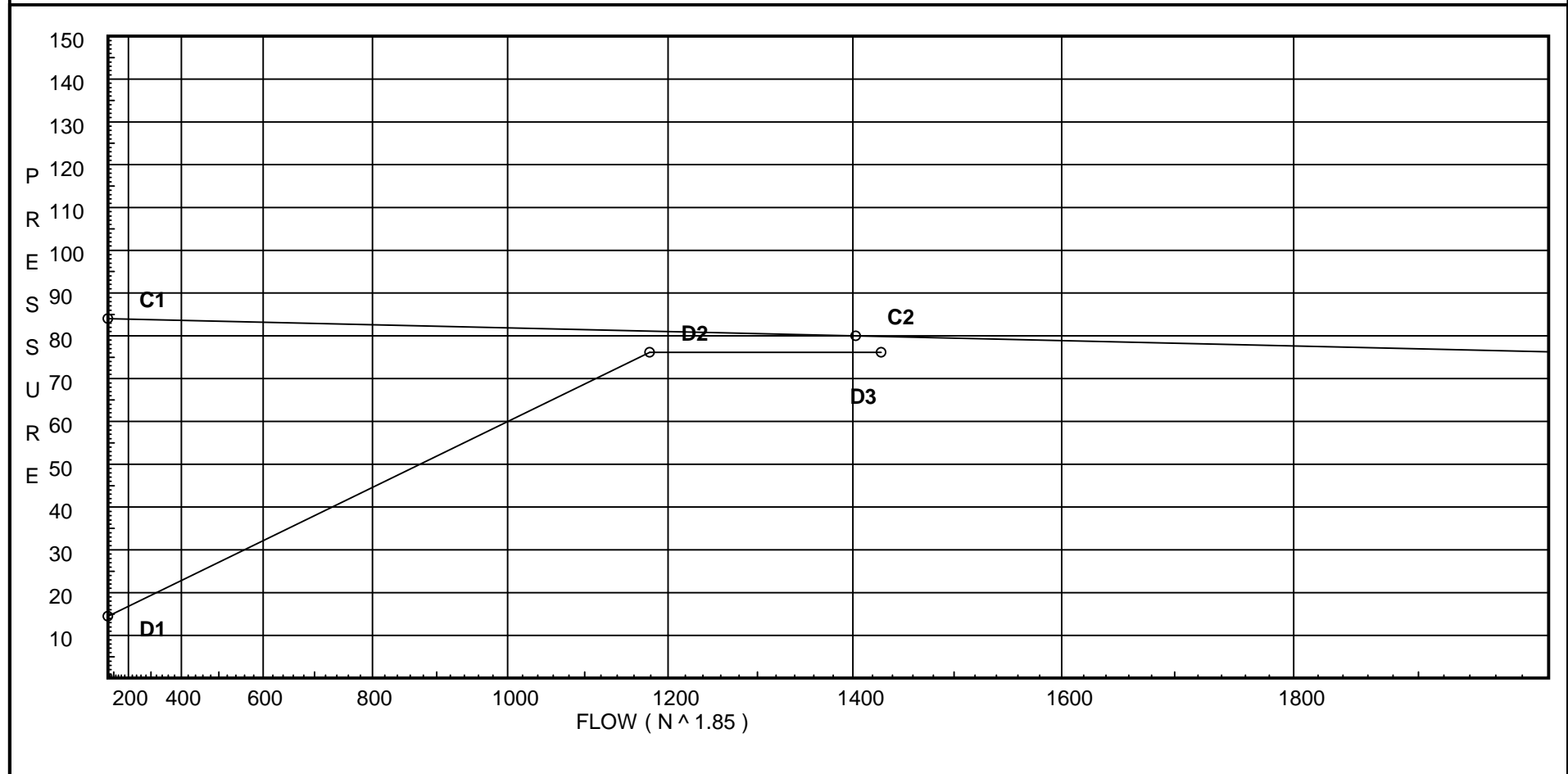
Water Supply Curve (C)

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City Water Supply:
C1 - Static Pressure : 84
C2 - Residual Pressure: 80
C2 - Residual Flow : 1403

Demand:
D1 - Elevation : 14.509
D2 - System Flow : 1178.67
D2 - System Pressure : 76.136
Hose (Demand) : 250
D3 - System Demand : 1428.67
Safety Margin : 3.727



Fittings Used Summary

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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	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	0	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	0	8.5	10.8	13	0	16	21	25	33	0	0	0	0	0	0	0
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.
A1	22.0		25.65	na				
2	25.5		24.14	na				
6	25.5		24.14	na				
A3	22.0		25.12	na				
11	25.5		23.81	na				
15	25.5		24.02	na				
A5	22.0		25.21	na				
21	25.5		23.86	na				
25	25.5		24.05	na				
A7	22.0		25.29	na				
30	25.5		23.92	na				
31	25.5		24.08	na				
A9	22.0		25.33	na				
40	25.5		23.96	na				
41	25.5		24.12	na				
A11	22.0		25.35	na				
50	25.5		23.99	na				
51	25.5		24.15	na				
A13	22.0		25.36	na				
60	25.5		24.03	na				
61	25.5		24.23	na				
A15	22.0		25.37	na				
70	25.5		24.08	na				
71	25.5		24.33	na				
A17	22.0		25.36	na				
80	25.5		24.15	na				
81	25.5		24.47	na				
A19	22.0		25.35	na				
90	25.5		24.22	na				
91	25.5		24.65	na				
A2	22.0		25.65	na				
A4	22.0		25.65	na				
A6	22.0		25.66	na				
A8	22.0		25.68	na				
A10	22.0		25.72	na				
A12	22.0		25.76	na				
A14	22.0		25.85	na				
A16	22.0		25.98	na				
A18	22.0		26.16	na				
A22	22.0		26.29	na				
CD	22.0		25.08	na				
CC	14.8		27.98	na				
CB	14.8		27.73	na				
CA	14.8		27.3	na				
C30	14.8		27.23	na				
C31	23.5		23.41	na				
B1	24.0		21.46	na				
100	26.5		16.61	na				
101	26.5	25.2	15.29	na	98.52	0.001	100	15.0
102	26.5	25.2	15.0	na	97.61	0.001	100	15.0
103	26.5	25.2	15.0	na	97.6	0.001	100	15.0
104	26.5	25.2	15.18	na	98.18	0.001	100	15.0
105	26.5		16.84	na				
B3	24.0		21.47	na				
110	26.5		16.63	na				
111	26.5	25.2	15.32	na	98.63	0.001	100	15.0
112	26.5	25.2	15.04	na	97.73	0.001	100	15.0
113	26.5	25.2	15.04	na	97.72	0.001	100	15.0
114	26.5	25.2	15.22	na	98.31	0.001	100	15.0
115	26.5		16.89	na				
B5	24.0		21.52	na				
120	26.5		16.75	na				

Flow Summary - Standard

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
121	26.5	25.2	15.46	na	99.08	0.001	100	15.0
122	26.5	25.2	15.19	na	98.22	0.001	100	15.0
123	26.5	25.2	15.19	na	98.21	0.001	100	15.0
124	26.5	25.2	15.39	na	98.85	0.001	100	15.0
125	26.5		17.12	na				
B7	24.0		21.61	na				
126	26.5		20.21	na				
127	26.5		19.66	na				
B9	24.0		21.72	na				
130	26.5		20.42	na				
131	26.5		20.05	na				
B11	24.0		21.87	na				
135	26.5		20.67	na				
136	26.5		20.47	na				
B13	24.0		21.98	na				
140	26.5		20.83	na				
141	26.5		20.73	na				
B15	24.0		22.12	na				
145	26.5		21.02	na				
146	26.5		21.0	na				
B17	24.0		22.28	na				
150	26.5		21.23	na				
151	26.5		21.3	na				
B19	24.0		22.41	na				
155	26.5		21.42	na				
156	26.5		21.58	na				
B21	24.0		22.54	na				
160	26.5		21.62	na				
161	26.5		21.9	na				
B23	24.0		23.17	na				
165	26.5		22.2	na				
166	26.5		22.4	na				
C22	24.0		21.47	na				
C32	24.0		23.11	na				
B2	24.0		19.68	na				
B4	24.0		19.75	na				
B6	24.0		20.06	na				
B8	24.0		20.56	na				
B10	24.0		21.01	na				
B12	24.0		21.48	na				
B14	24.0		21.78	na				
B16	24.0		22.08	na				
B18	24.0		22.4	na				
B20	24.0		22.72	na				
B22	24.0		23.07	na				
C33	24.0		23.52	na				
B24	24.0		23.55	na				
C34	24.0		24.02	na				
C35	22.0		25.19	na				
A21	22.0		25.32	na				
A20	22.0		26.39	na				
TOR	22.0		28.69	na				
BOR	6.0		37.38	na				
BASE	0.0		46.92	na				
H1	0.0		64.12	na				
H2	0.0		65.75	na				
HOSE	0.0		69.67	na	250.0			
TEST	-7.0		76.14	na				

The maximum velocity is 15.38 and it occurs in the pipe between nodes HOSE and TEST

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	*****	Notes	*****
A1 to 2	0.0	2.635 120.0	1X 1T	14.827 16.474	3.500 31.301	25.654 -1.516				
	0.0	0.0		0.0	34.801	0.0		Vel = 0		
2 to 6	0.0	2.635 120.0	1X	14.827 0.0	23.200 14.827	24.138 0.0				
	0.0	0.0		0.0	38.027	0.0		Vel = 0		
6 to A2	0.0	2.635 120.0	1T	16.474 0.0	3.500 16.474	24.138 1.516				
	0.0	0.0		0.0	19.974	0.0		Vel = 0		
	0.0					25.654		K Factor = 0		
A3 to 11	41.77	2.635 120.0	1X 1T	14.827 16.474	3.500 31.301	25.123 -1.516				
	41.77	0.0057		0.0	34.801	0.199		Vel = 2.46		
11 to 15	0.0	2.635 120.0	1X	14.827 0.0	23.200 14.827	23.806 0.0				
	41.77	0.0057		0.0	38.027	0.218		Vel = 2.46		
15 to A4	0.0	2.635 120.0	1T	16.474 0.0	3.500 16.474	24.024 1.516				
	41.77	0.0057		0.0	19.974	0.114		Vel = 2.46		
	0.0					25.654		K Factor = 8.25		
A5 to 21	38.12	2.635 120.0	1X 1T	14.827 16.474	3.500 31.301	25.210 -1.516				
	38.12	0.0048		0.0	34.801	0.168		Vel = 2.24		
21 to 25	0.0	2.635 120.0	1X	14.827 0.0	23.200 14.827	23.862 0.0				
	38.12	0.0048		0.0	38.027	0.184		Vel = 2.24		
25 to A6	0.0	2.635 120.0	1T	16.474 0.0	3.500 16.474	24.046 1.516				
	38.12	0.0049		0.0	19.974	0.097		Vel = 2.24		
	0.0					25.659		K Factor = 7.53		
A7 to 30	35.45	2.635 120.0	1X 1T	14.827 16.474	3.500 31.301	25.286 -1.516				
	35.45	0.0042		0.0	34.801	0.147		Vel = 2.09		
30 to 31	0.0	2.635 120.0	1X	14.827 0.0	23.200 14.827	23.917 0.0				
	35.45	0.0042		0.0	38.027	0.161		Vel = 2.09		
31 to A8	0.0	2.635 120.0	1T	16.474 0.0	3.500 16.474	24.078 1.516				
	35.45	0.0042		0.0	19.974	0.084		Vel = 2.09		
	0.0					25.678		K Factor = 7.00		
A9 to 40	34.93	2.635 120.0	1X 1T	14.827 16.474	3.500 31.301	25.334 -1.516				
	34.93	0.0041		0.0	34.801	0.144		Vel = 2.06		
40 to 41	0.0	2.635 120.0	1X	14.827 0.0	23.200 14.827	23.962 0.0				
	34.93	0.0041		0.0	38.027	0.156		Vel = 2.06		

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	*****	Notes	*****
41 to A10	0.0 34.93	2.635 120.0 0.0041	1T	16.474 0.0 0.0	3.500 16.474 19.974	24.118 1.516 0.082		Vel = 2.06		
	0.0 34.93					25.716		K Factor = 6.89		
A11 to 50	36.05 36.05	2.635 120.0 0.0044	1X 1T	14.827 16.474 0.0	3.500 31.301 34.801	25.352 -1.516 0.152		Vel = 2.12		
50 to 51	0.0 36.05	2.635 120.0 0.0044	1X	14.827 0.0 0.0	23.200 14.827 38.027	23.988 0.0 0.166		Vel = 2.12		
51 to A12	0.0 36.05	2.635 120.0 0.0044	1T	16.474 0.0 0.0	3.500 16.474 19.974	24.154 1.516 0.087		Vel = 2.12		
	0.0 36.05					25.757		K Factor = 7.10		
A13 to 60	39.76 39.76	2.635 120.0 0.0052	1X 1T	14.827 16.474 0.0	3.500 31.301 34.801	25.364 -1.516 0.182		Vel = 2.34		
60 to 61	0.0 39.76	2.635 120.0 0.0052	1X	14.827 0.0 0.0	23.200 14.827 38.027	24.030 0.0 0.199		Vel = 2.34		
61 to A14	0.0 39.76	2.635 120.0 0.0053	1T	16.474 0.0 0.0	3.500 16.474 19.974	24.229 1.516 0.105		Vel = 2.34		
	0.0 39.76					25.850		K Factor = 7.82		
A15 to 70	44.96 44.96	2.635 120.0 0.0066	1X 1T	14.827 16.474 0.0	3.500 31.301 34.801	25.366 -1.516 0.228		Vel = 2.65		
70 to 71	0.0 44.96	2.635 120.0 0.0066	1X	14.827 0.0 0.0	23.200 14.827 38.027	24.078 0.0 0.250		Vel = 2.65		
71 to A16	0.0 44.96	2.635 120.0 0.0066	1T	16.474 0.0 0.0	3.500 16.474 19.974	24.328 1.516 0.131		Vel = 2.65		
	0.0 44.96					25.975		K Factor = 8.82		
A17 to 80	51.94 51.94	2.635 120.0 0.0086	1X 1T	14.827 16.474 0.0	3.500 31.301 34.801	25.364 -1.516 0.298		Vel = 3.06		
80 to 81	0.0 51.94	2.635 120.0 0.0086	1X	14.827 0.0 0.0	23.200 14.827 38.027	24.146 0.0 0.326		Vel = 3.06		
81 to A18	0.0 51.94	2.635 120.0 0.0086	1T	16.474 0.0 0.0	3.500 16.474 19.974	24.472 1.516 0.171		Vel = 3.06		

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	*****	Notes	*****
	0.0 51.94					26.159			K Factor = 10.16	
A19 to 90	59.85	2.635 120.0	1X 1T	14.827 16.474	3.500 31.301	25.351 -1.516			Vel = 3.52	
90 to 91	0.0 59.85	2.635 120.0	1X	14.827 0.0	23.200 14.827	24.223 0.0			Vel = 3.52	
91 to A20	0.0 59.85	2.635 120.0	1T	16.474 0.0	3.500 16.474	24.647 1.516			Vel = 3.52	
	0.0 59.85					26.385			K Factor = 11.65	
A2 to A4	0.0	4.26 120.0		0.0 0.0	9.900 0.0	25.654 0.0			Vel = 0	
A4 to A6	41.77	4.26 120.0		0.0 0.0	8.300 0.0	25.654 0.0			Vel = 0.94	
A6 to A8	38.11 79.88	4.26 120.0		0.0 0.0	10.500 0.0	25.659 0.0			Vel = 1.80	
A8 to A10	35.46 115.34	4.26 120.0		0.0 0.0	10.500 0.0	25.678 0.0			Vel = 2.60	
A10 to A12	34.92 150.26	4.26 120.0		0.0 0.0	7.000 0.0	25.716 0.0			Vel = 3.38	
A12 to A14	36.05 186.31	4.26 120.0		0.0 0.0	10.500 0.0	25.757 0.0			Vel = 4.19	
A14 to A16	39.76 226.07	4.26 120.0		0.0 0.0	10.000 0.0	25.850 0.0			Vel = 5.09	
A16 to A18	44.97 271.04	4.26 120.0		0.0 0.0	10.500 0.0	25.975 0.0			Vel = 6.10	
A18 to A22	51.94 322.98	4.26 120.0		0.0 0.0	5.400 0.0	26.159 0.0			Vel = 7.27	
A22 to A20	795.84 1118.82	6.357 120.0		0.0 0.0	2.750 0.0	26.290 0.0			Vel = 11.31	
	0.0 1118.82					26.385			K Factor = 217.81	
CD to A3	247.20 247.2	4.26 120.0		0.0 0.0	3.200 0.0	25.075 0.0			Vel = 5.56	

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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	*****
A3 to A5	-41.77 205.43	4.26 120.0 0.0105		0.0 0.0 0.0	8.300 0.0 8.300	25.123 0.0 0.087		Vel =	4.62	
A5 to A7	-38.11 167.32	4.26 120.0 0.0072		0.0 0.0 0.0	10.500 0.0 10.500	25.210 0.0 0.076		Vel =	3.77	
A7 to A9	-35.46 131.86	4.26 120.0 0.0046		0.0 0.0 0.0	10.500 0.0 10.500	25.286 0.0 0.048		Vel =	2.97	
A9 to A11	-34.92 96.94	4.26 120.0 0.0026		0.0 0.0 0.0	7.000 0.0 7.000	25.334 0.0 0.018		Vel =	2.18	
A11 to A13	-36.05 60.89	4.26 120.0 0.0011		0.0 0.0 0.0	10.500 0.0 10.500	25.352 0.0 0.012		Vel =	1.37	
A13 to A15	-39.76 21.13	4.26 120.0 0.0002		0.0 0.0 0.0	10.000 0.0 10.000	25.364 0.0 0.002		Vel =	0.48	
A15 to A17	-44.97 -23.84	4.26 120.0 -0.0002		0.0 0.0 0.0	9.500 0.0 9.500	25.366 0.0 -0.002		Vel =	0.54	
A17 to A21	-51.94 -75.78	4.26 120.0 -0.0017	1X	21.067 0.0 0.0	5.400 21.067 26.467	25.364 0.0 -0.044		Vel =	1.71	
	0.0 -75.78					25.320		K Factor =	-15.06	
A19 to A21	-59.85 -59.85	4.26 120.0 -0.0011	1T	26.334 0.0 0.0	2.750 26.334 29.084	25.351 0.0 -0.031		Vel =	1.35	
	0.0 -59.85					25.320		K Factor =	-11.89	
CD to CC	-247.20 -247.2	4.26 120.0 -0.0148	1V	8.954 0.0 0.0	5.300 8.954 14.254	25.075 3.118 -0.211		Vel =	5.56	
CC to CB	0.0 -247.2	4.26 120.0 -0.0148	1V	8.954 0.0 0.0	8.400 8.954 17.354	27.982 0.0 -0.256		Vel =	5.56	
CB to CA	0.0 -247.2	4.26 120.0 -0.0148	1X	21.067 0.0 0.0	7.500 21.067 28.567	27.726 0.0 -0.424		Vel =	5.56	
CA to C30	0.0 -247.2	6.357 120.0 -0.0021	1V	12.573 0.0 0.0	23.500 12.573 36.073	27.302 0.0 -0.076		Vel =	2.50	
C30 to C31	0.0 -247.2	6.357 120.0 -0.0021	1V	12.573 0.0 0.0	8.900 12.573 21.473	27.226 -3.768 -0.045		Vel =	2.50	
C31 to C32	0.0 -247.2	6.357 120.0 -0.0021	1X	31.433 0.0 0.0	9.000 31.433 40.433	23.413 -0.217 -0.085		Vel =	2.50	

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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 -247.20						23.111		K Factor = -51.42	
B1 to 100	-206.28 -206.28	2.635 120.0 -0.1099	1X 1T	14.827 16.474 0.0	3.000 31.301 34.301	21.459 -1.083 -3.771			Vel = 12.14	
100 to 101	0.0 -206.28	2.635 120.0 -0.1099		0.0 0.0 0.0	12.000 0.0 12.000	16.605 0.0 -1.319			Vel = 12.14	
101 to 102	98.52 -107.76	2.635 120.0 -0.0331		0.0 0.0 0.0	8.500 0.0 8.500	15.286 0.0 -0.281			K Factor = 25.20 Vel = 6.34	
102 to 103	97.62 -10.14	2.635 120.0 -0.0005		0.0 0.0 0.0	11.000 0.0 11.000	15.005 0.0 -0.005			K Factor = 25.20 Vel = 0.60	
103 to 104	97.60 87.46	2.635 120.0 0.0225		0.0 0.0 0.0	8.000 0.0 8.000	15.000 0.0 0.180			K Factor = 25.20 Vel = 5.15	
104 to 105	98.18 185.64	2.635 120.0 0.0905	1X	14.827 0.0 0.0	3.500 14.827 18.327	15.180 0.0 1.658			K Factor = 25.20 Vel = 10.92	
105 to B2	0.0 185.64	2.635 120.0 0.0904	1T	16.474 0.0 0.0	3.000 16.474 19.474	16.838 1.083 1.761			Vel = 10.92	
	0.0 185.64						19.682		K Factor = 41.84	
B3 to 110	-205.84 -205.84	2.635 120.0 -0.1095	1X 1T	14.827 16.474 0.0	3.000 31.301 34.301	21.472 -1.083 -3.757			Vel = 12.11	
110 to 111	0.0 -205.84	2.635 120.0 -0.1095		0.0 0.0 0.0	12.000 0.0 12.000	16.632 0.0 -1.314			Vel = 12.11	
111 to 112	98.63 -107.21	2.635 120.0 -0.0327		0.0 0.0 0.0	8.500 0.0 8.500	15.318 0.0 -0.278			K Factor = 25.20 Vel = 6.31	
112 to 113	97.73 -9.48	2.635 120.0 -0.0004		0.0 0.0 0.0	11.000 0.0 11.000	15.040 0.0 -0.004			K Factor = 25.20 Vel = 0.56	
113 to 114	97.72 88.24	2.635 120.0 0.0229		0.0 0.0 0.0	8.000 0.0 8.000	15.036 0.0 0.183			K Factor = 25.20 Vel = 5.19	
114 to 115	98.31 186.55	2.635 120.0 0.0913	1X	14.827 0.0 0.0	3.500 14.827 18.327	15.219 0.0 1.673			K Factor = 25.20 Vel = 10.98	
115 to B4	0.0 186.55	2.635 120.0 0.0912	1T	16.474 0.0 0.0	3.000 16.474 19.474	16.892 1.083 1.777			Vel = 10.98	
	0.0 186.55						19.752		K Factor = 41.97	

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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	*****
B5 to 120	-203.88	2.635 120.0	1X 1T	14.827 16.474	3.000 31.301	21.524 -1.083				
120 to 121	-203.88	-0.1076		0.0	34.301	-3.691		Vel = 12.00		
120 to 121	0.0	2.635 120.0		0.0	12.000	16.750				
121 to 122	-203.88	-0.1076		0.0	12.000	-1.291		Vel = 12.00		
121 to 122	99.08	2.635 120.0		0.0	8.500	15.459		K Factor = 25.20		
122 to 123	-104.8	-0.0314		0.0	8.500	-0.267		Vel = 6.17		
122 to 123	98.22	2.635 120.0		0.0	11.000	15.192		K Factor = 25.20		
123 to 124	-6.58	-0.0002		0.0	11.000	-0.002		Vel = 0.39		
123 to 124	98.21	2.635 120.0		0.0	8.000	15.190		K Factor = 25.20		
124 to 125	91.63	0.0245		0.0	8.000	0.196		Vel = 5.39		
124 to 125	98.85	2.635 120.0	1X	14.827 0.0	3.500 14.827	15.386 0.0		K Factor = 25.20		
125 to B6	190.48	0.0949		0.0	18.327	1.739		Vel = 11.21		
125 to B6	0.0	2.635 120.0	1T	16.474 0.0	3.000 16.474	17.125 1.083				
B6	190.48	0.0948		0.0	19.474	1.847		Vel = 11.21		
	0.0 190.48					20.055		K Factor = 42.53		
B7 to 126	-54.52	2.635 120.0	1X 1T	14.827 16.474	3.000 31.301	21.610 -1.083				
126 to 127	-54.52	-0.0094		0.0	34.301	-0.321		Vel = 3.21		
126 to 127	0.0	2.635 120.0	1X	14.827 0.0	43.000 14.827	20.206 0.0				
127 to B8	-54.52	-0.0094		0.0	57.827	-0.542		Vel = 3.21		
127 to B8	0.0	2.635 120.0	1T	16.474 0.0	3.000 16.474	19.664 1.083				
B8	-54.52	-0.0094		0.0	19.474	-0.183		Vel = 3.21		
	0.0 -54.52					20.564		K Factor = -12.02		
B9 to 130	-44.01	2.635 120.0	1X 1T	14.827 16.474	3.000 31.301	21.717 -1.083				
130 to 131	-44.01	-0.0063		0.0	34.301	-0.216		Vel = 2.59		
130 to 131	0.0	2.635 120.0	1X	14.827 0.0	43.000 14.827	20.418 0.0				
131 to B10	-44.01	-0.0063		0.0	57.827	-0.365		Vel = 2.59		
131 to B10	0.0	2.635 120.0	1T	16.474 0.0	3.000 16.474	20.053 1.083				
B10	-44.01	-0.0063		0.0	19.474	-0.123		Vel = 2.59		
	0.0 -44.01					21.013		K Factor = -9.60		
B11 to 135	-31.65	2.635 120.0	1X 1T	14.827 16.474	3.000 31.301	21.866 -1.083				
135	-31.65	-0.0034		0.0	34.301	-0.117		Vel = 1.86		

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135 to 136	0.0 -31.65	2.635 120.0 -0.0034	1X	14.827 0.0	43.000 14.827	20.666 0.0				
				0.0	57.827	-0.198		Vel =	1.86	
136 to B12	0.0 -31.65	2.635 120.0 -0.0034	1T	16.474 0.0	3.000 16.474	20.468 1.083				
				0.0	19.474	-0.067		Vel =	1.86	
	0.0 -31.65					21.484		K Factor =	-6.83	
B13 to 140	-22.57 -22.57	2.635 120.0 -0.0018	1X 1T	14.827 16.474	3.000 31.301	21.980 -1.083				
				0.0	34.301	-0.063		Vel =	1.33	
140 to 141	0.0 -22.57	2.635 120.0 -0.0018	1X	14.827 0.0	43.000 14.827	20.834 0.0				
				0.0	57.827	-0.106		Vel =	1.33	
141 to B14	0.0 -22.57	2.635 120.0 -0.0018	1T	16.474 0.0	3.000 16.474	20.728 1.083				
				0.0	19.474	-0.036		Vel =	1.33	
	0.0 -22.57					21.775		K Factor =	-4.84	
B15 to 145	-9.37 -9.37	2.635 120.0 -0.0004	1X 1T	14.827 16.474	3.000 31.301	22.118 -1.083				
				0.0	34.301	-0.013		Vel =	0.55	
145 to 146	0.0 -9.37	2.635 120.0 -0.0003	1X	14.827 0.0	43.000 14.827	21.022 0.0				
				0.0	57.827	-0.020		Vel =	0.55	
146 to B16	0.0 -9.37	2.635 120.0 -0.0004	1T	16.474 0.0	3.000 16.474	21.002 1.083				
				0.0	19.474	-0.008		Vel =	0.55	
	0.0 -9.37					22.077		K Factor =	-1.99	
B17 to 150	17.43 17.43	2.635 120.0 0.0011	1X 1T	14.827 16.474	3.000 31.301	22.276 -1.083				
				0.0	34.301	0.039		Vel =	1.03	
150 to 151	0.0 17.43	2.635 120.0 0.0011	1X	14.827 0.0	43.000 14.827	21.232 0.0				
				0.0	57.827	0.066		Vel =	1.03	
151 to B18	0.0 17.43	2.635 120.0 0.0011	1T	16.474 0.0	3.000 16.474	21.298 1.083				
				0.0	19.474	0.022		Vel =	1.03	
	0.0 17.43					22.403		K Factor =	3.68	
B19 to 155	28.11 28.11	2.635 120.0 0.0028	1X 1T	14.827 16.474	3.000 31.301	22.412 -1.083				
				0.0	34.301	0.095		Vel =	1.65	
155 to 156	0.0 28.11	2.635 120.0 0.0027	1X	14.827 0.0	43.000 14.827	21.424 0.0				
				0.0	57.827	0.159		Vel =	1.65	

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156 to B20	0.0 28.11	2.635 120.0 0.0028	1T	16.474 0.0 0.0	3.000 16.474 19.474	21.583 1.083 0.054			Vel = 1.65	
	0.0 28.11						22.720		K Factor = 5.90	
B21 to 160	37.92 37.92	2.635 120.0 0.0048	1X 1T	14.827 16.474 0.0	3.000 31.301 34.301	22.538 -1.083 0.165			Vel = 2.23	
160 to 161	0.0 37.92	2.635 120.0 0.0048	1X	14.827 0.0 0.0	43.000 14.827 57.827	21.620 0.0 0.277			Vel = 2.23	
161 to B22	0.0 37.92	2.635 120.0 0.0048	1T	16.474 0.0 0.0	3.000 16.474 19.474	21.897 1.083 0.093			Vel = 2.23	
	0.0 37.92						23.073		K Factor = 7.89	
B23 to 165	31.64 31.64	2.635 120.0 0.0034	1X 1T	14.827 16.474 0.0	3.000 31.301 34.301	23.167 -1.083 0.118			Vel = 1.86	
165 to 166	0.0 31.64	2.635 120.0 0.0034	1X	14.827 0.0 0.0	43.000 14.827 57.827	22.202 0.0 0.198			Vel = 1.86	
166 to B24	0.0 31.64	2.635 120.0 0.0034	1T	16.474 0.0 0.0	3.000 16.474 19.474	22.400 1.083 0.067			Vel = 1.86	
	0.0 31.64						23.550		K Factor = 6.52	
B1 to C22	206.28 206.28	6.357 120.0 0.0016		0.0 0.0 0.0	4.900 0.0 4.900	21.459 0.0 0.008			Vel = 2.09	
C22 to B3	0.0 206.28	6.357 120.0 0.0016		0.0 0.0 0.0	3.200 0.0 3.200	21.467 0.0 0.005			Vel = 2.09	
B3 to B5	205.84 412.12	6.357 120.0 0.0054		0.0 0.0 0.0	9.600 0.0 9.600	21.472 0.0 0.052			Vel = 4.17	
B5 to B7	203.88 616.0	6.357 120.0 0.0113		0.0 0.0 0.0	7.600 0.0 7.600	21.524 0.0 0.086			Vel = 6.23	
B7 to B9	54.52 670.52	6.357 120.0 0.0134		0.0 0.0 0.0	8.000 0.0 8.000	21.610 0.0 0.107			Vel = 6.78	
B9 to B11	44.01 714.53	6.357 120.0 0.0151		0.0 0.0 0.0	9.900 0.0 9.900	21.717 0.0 0.149			Vel = 7.22	
B11 to B13	31.65 746.18	6.357 120.0 0.0163		0.0 0.0 0.0	7.000 0.0 7.000	21.866 0.0 0.114			Vel = 7.54	

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B13 to B15	22.57 768.75	6.357 120.0 0.0173		0.0	8.000	21.980 0.0 0.138			Vel = 7.77	
B15 to B17	9.37 778.12	6.357 120.0 0.0176		0.0	9.000	22.118 0.0 0.158			Vel = 7.87	
B17 to B19	-17.43 760.69	6.357 120.0 0.0168		0.0	8.100	22.276 0.0 0.136			Vel = 7.69	
B19 to B21	-28.11 732.58	6.357 120.0 0.0158		0.0	8.000	22.412 0.0 0.126			Vel = 7.41	
B21 to C32	-37.92 694.66	6.357 120.0 0.0143	1X	31.433	8.750 31.433 40.183	22.538 0.0 0.573			Vel = 7.02	
	0.0 694.66					23.111			K Factor = 144.50	
B23 to C32	-31.64 -31.64	2.635 120.0 -0.0034	1X	14.827	1.500 14.827 16.327	23.167 0.0 -0.056			Vel = 1.86	
C32 to C33	447.46 415.82	6.357 120.0 0.0055	1X	31.433	43.000 31.433 74.433	23.111 0.0 0.411			Vel = 4.20	
	0.0 415.82					23.522			K Factor = 85.74	
B2 to B4	185.64 185.64	4.26 120.0 0.0088		0.0	8.000	19.682 0.0 0.070			Vel = 4.18	
B4 to B6	186.54 372.18	4.26 120.0 0.0316		0.0	9.600	19.752 0.0 0.303			Vel = 8.38	
B6 to B8	190.48 562.66	4.26 120.0 0.0679		0.0	7.500	20.055 0.0 0.509			Vel = 12.67	
B8 to B10	-54.52 508.14	4.26 120.0 0.0561		0.0	8.000	20.564 0.0 0.449			Vel = 11.44	
B10 to B12	-44.01 464.13	4.26 120.0 0.0476		0.0	9.900	21.013 0.0 0.471			Vel = 10.45	
B12 to B14	-31.64 432.49	4.26 120.0 0.0416		0.0	7.000	21.484 0.0 0.291			Vel = 9.74	
B14 to B16	-22.57 409.92	4.26 120.0 0.0378		0.0	8.000	21.775 0.0 0.302			Vel = 9.23	
B16 to B18	-9.38 400.54	4.26 120.0 0.0362		0.0	9.000	22.077 0.0 0.326			Vel = 9.02	

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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	*****
B18 to B20	17.43 417.97	4.26 120.0 0.0391		0.0	8.100	22.403 0.0				
B20 to B22	28.11 446.08	4.26 120.0 0.0441		0.0	8.000	22.720 0.0			Vel = 9.41	
B22 to C33	37.92 484.0	4.26 120.0 0.0513		0.0	8.750	23.073 0.0			Vel = 10.04	
C33 to B24	415.83 899.83	6.357 120.0 0.0233		0.0	1.200	23.522 0.0			Vel = 10.89	
B24 to C34	31.64 931.47	6.357 120.0 0.0245	1V	12.573	6.500	23.550 0.0			Vel = 9.10	
C34 to C35	0.0 931.47	6.357 120.0 0.0245	1V	12.573	0.100	24.018 0.866			Vel = 9.42	
C35 to A21	0.0 931.47	6.357 120.0 0.0245		0.0	5.100	25.195 0.0			Vel = 9.42	
A21 to A22	-135.63 795.84	6.357 120.0 0.0183	1X	31.433	21.500	25.320 0.0			Vel = 9.42	
	0.0 795.84					26.290			K Factor = 155.21	
A20 to TOR	1178.67 1178.67	6.357 120.0 0.0379	1V 1X	12.573 31.433	16.800	26.385 0.0			Vel = 11.91	
TOR to BOR	0.0 1178.67	6.065 120.0 0.0477	1Fsp	0.0	16.000	28.691 7.930			* Fixed loss = 1 Vel = 13.09	
BOR to BASE	0.0 1178.67	6.357 120.0 0.0375	1Zia	0.0	2.000	37.384 9.461			* Fixed loss = 6.862 Vel = 11.91	
BASE to H1	0.0 1178.67	6.16 140.0 0.0332	1G 2E 1T	4.304 40.168 43.037	430.000	46.920 0.0			Vel = 12.69	
H1 to H2	0.0 1178.67	8.27 140.0 0.0079	1T	55.354	150.000	64.120 0.0			Vel = 7.04	
H2 to HOSE	0.0 1178.67	8.27 140.0 0.0079	1T	55.354	440.000	65.746 0.0			Vel = 7.04	
HOSE to TEST	250.00 1428.67	6.16 140.0 0.0474	1G 1E 1T	4.304 20.084 43.037	5.000	69.668 3.032			Qa = 250 Vel = 15.38	

0.0

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	1428.67				76.136			K Factor = 163.73	