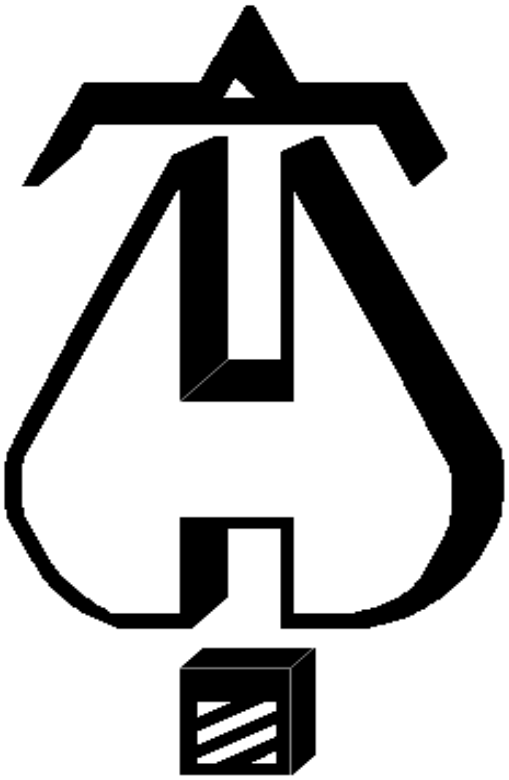


. . . Fire Protection by Computer Design

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 3
Drawing	:	Unit C
Location	:	135 Walton Street Portland
Remote Area	:	Grid #3
Contract	:	041415-2
Data File	:	Grid 3 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 #3
Contractor - High Tech Fire Protection Contract No. - 041415-2
Calculated By - Ed Poulin Drawing No. - FP-01
Construction: ( ) Combustible (X) Non-Combustible Ceiling Height - 18'
Occupancy - Chapter 18 Tire Storage up to 25' with ESFR

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 - 1045	System Type	Sprinkler/Nozzle
Density - .001	(X) Wet	Make VIKING
Area Per Sprinkler - 100	( ) Dry	Model VK510
Elevation at Highest Outlet - 17	( ) Deluge	Size 1"
Hose Allowance - Inside - N/A	( ) Preaction	K-Factor 25.2
Rack Sprinkler Allowance - N/A	( ) Other	Temp.Rat.165
Hose Allowance - Outside - 250	HEAD SPEC FOR ESFR	

Note

Calculation Summary: Flow Required - 1436 Press Required - 76; C-Factor Used: 120 Overhead 140 Underground

WATER SUPPLY

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

Location - ACROSS THE STREET FROM SITE ON CANCO ST.

Source of Information - PORTLAND WATER DISTRICT

COMMODITY

Commodity TIRES Class Location
Storage Ht. UP TO 25 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	

STORAGE

Flue Spacing Clearance:Storage to Ceiling 36"
Longitudinal Transverse

Horizontal Barriers Provided:

Water Supply Curve (C)

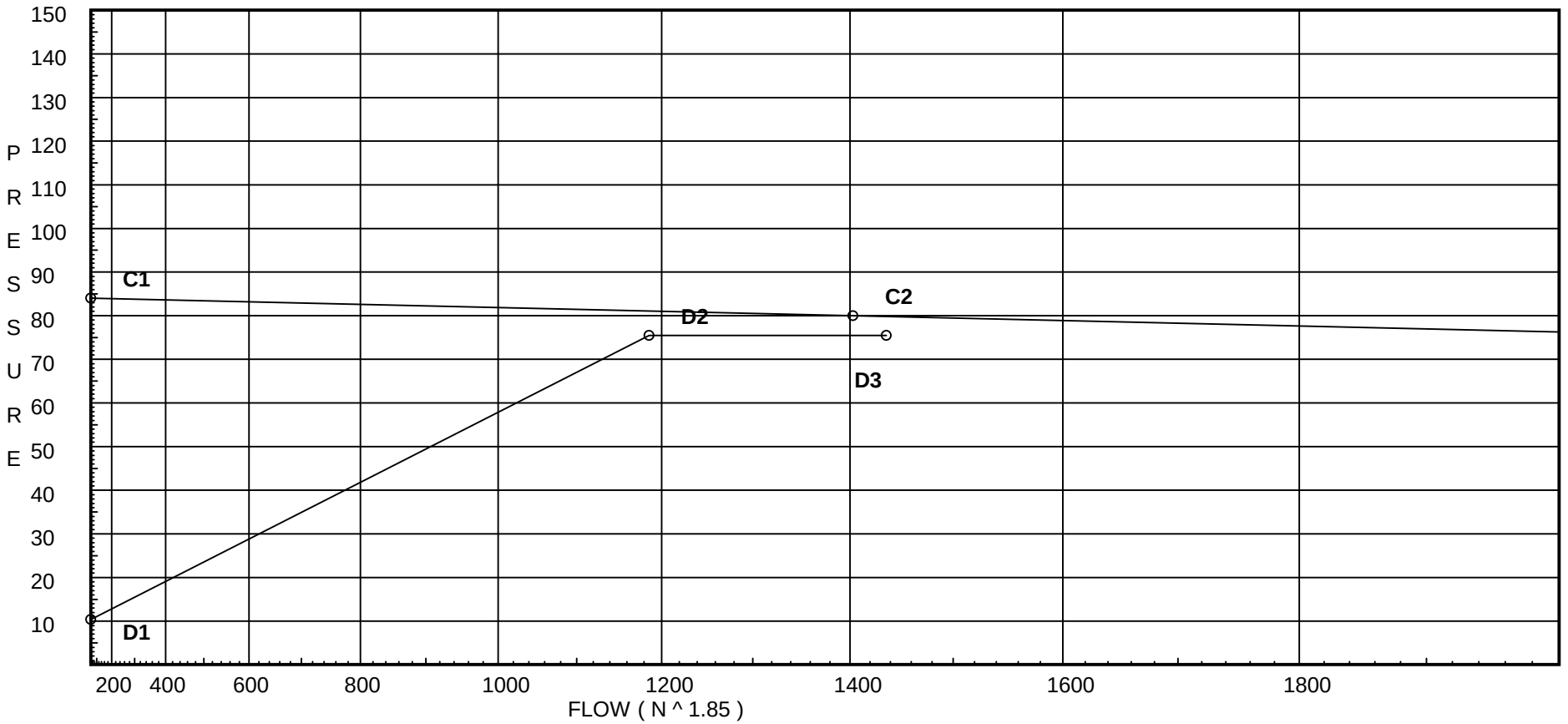
HIGH TECH FIRE PROTECTION
NOKIAN TYRES WALTON STREET GRID 3

Date 9-15-15

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

Demand:

D1 - Elevation	:	10.394
D2 - System Flow	:	1185.86
D2 - System Pressure	:	75.487
Hose (Demand)	:	250
D3 - System Demand	:	1435.86
Safety Margin	:	4.338



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	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

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
C1	14.8		21.36	na				
209	17.0		17.25	na				
210	17.0	25.2	15.24	na	98.37	0.001	100	15.0
211	17.0	25.2	15.0	na	97.6	0.001	100	15.0
212	17.0	25.2	15.0	na	97.6	0.001	100	15.0
213	17.0	25.2	15.96	na	100.66	0.001	100	15.0
214	17.0		21.84	na				
C3	14.8		21.46	na				
219	17.0		17.33	na				
220	17.0	25.2	15.29	na	98.55	0.001	100	15.0
221	17.0	25.2	15.05	na	97.77	0.001	100	15.0
222	17.0	25.2	15.05	na	97.77	0.001	100	15.0
223	17.0	25.2	16.0	na	100.8	0.001	100	15.0
224	17.0		21.87	na				
C5	14.8		21.75	na				
229	17.0		17.54	na				
230	17.0	25.2	15.45	na	99.05	0.001	100	15.0
231	17.0	25.2	15.2	na	98.24	0.001	100	15.0
232	17.0	25.2	15.2	na	98.24	0.001	100	15.0
233	17.0	25.2	16.12	na	101.19	0.001	100	15.0
234	17.0		21.94	na				
C7	14.8		22.54	na				
240	17.0		21.99	na				
241	17.0		23.53	na				
C9	14.8		23.18	na				
250	17.0		22.64	na				
251	17.0		24.24	na				
C11	14.8		23.61	na				
260	17.0		23.0	na				
261	17.0		24.33	na				
C20	14.8		24.12	na				
C21	23.5		20.96	na				
C2	14.8		24.7	na				
C4	14.8		24.73	na				
C6	14.8		24.79	na				
C8	14.8		24.93	na				
CA	14.8		25.39	na				
C10	14.8		25.42	na				
C12	14.8		25.47	na				
C30	14.8		25.59	na				
C31	23.5		21.96	na				
C32	23.5		22.23	na				
CB	14.8		25.81	na				
CC	22.0		23.14	na				
A1	22.0		23.83	na				
2	25.5		22.53	na				
6	25.5		22.76	na				
A3	22.0		23.89	na				
11	25.5		22.57	na				
15	25.5		22.78	na				
A5	22.0		24.01	na				
21	25.5		22.65	na				
25	25.5		22.82	na				
A7	22.0		24.13	na				
30	25.5		22.74	na				
31	25.5		22.88	na				
A9	22.0		24.22	na				
40	25.5		22.82	na				
41	25.5		22.95	na				
A11	22.0		24.26	na				
50	25.5		22.87	na				
51	25.5		23.0	na				

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
A13	22.0		24.29	na				
60	25.5		22.94	na				
61	25.5		23.11	na				
A15	22.0		24.31	na				
70	25.5		23.01	na				
71	25.5		23.24	na				
A17	22.0		24.32	na				
80	25.5		23.09	na				
81	25.5		23.41	na				
A19	22.0		24.34	na				
90	25.5		23.2	na				
91	25.5		23.61	na				
CD	22.0		23.82	na				
A2	22.0		24.4	na				
A4	22.0		24.41	na				
A6	22.0		24.42	na				
A8	22.0		24.47	na				
A10	22.0		24.53	na				
A12	22.0		24.59	na				
A14	22.0		24.72	na				
A16	22.0		24.87	na				
A18	22.0		25.09	na				
A22	22.0		25.24	na				
B1	24.0		21.8	na				
100	27.0		20.58	na				
105	27.0		20.71	na				
B3	24.0		21.82	na				
110	27.0		20.59	na				
115	27.0		20.71	na				
B5	24.0		21.85	na				
120	27.0		20.62	na				
125	27.0		20.72	na				
B7	24.0		21.88	na				
126	27.0		20.64	na				
127	27.0		20.74	na				
B9	24.0		21.9	na				
130	27.0		20.66	na				
131	27.0		20.76	na				
B11	24.0		21.93	na				
135	27.0		20.69	na				
136	27.0		20.79	na				
B13	24.0		21.95	na				
140	27.0		20.71	na				
141	27.0		20.82	na				
B15	24.0		21.96	na				
145	27.0		20.74	na				
146	27.0		20.87	na				
B17	24.0		21.98	na				
150	27.0		20.77	na				
151	27.0		20.93	na				
B19	24.0		21.98	na				
155	27.0		20.81	na				
156	27.0		21.01	na				
B21	24.0		21.99	na				
160	27.0		20.85	na				
161	27.0		21.11	na				
B23	24.0		22.1	na				
165	27.0		20.98	na				
166	27.0		21.28	na				
C22	24.0		21.8	na				
B2	24.0		22.05	na				
B4	24.0		22.05	na				

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
B6	24.0		22.06	na				
B8	24.0		22.07	na				
B10	24.0		22.09	na				
B12	24.0		22.12	na				
B14	24.0		22.16	na				
B16	24.0		22.21	na				
B18	24.0		22.29	na				
B20	24.0		22.38	na				
B22	24.0		22.49	na				
C33	24.0		22.66	na				
B24	24.0		22.68	na				
C34	24.0		23.08	na				
C35	22.0		24.21	na				
A21	22.0		24.31	na				
A20	22.0		25.34	na				
TOR	22.0		27.67	na				
BOR	6.0		36.37	na				
BASE	0.0		45.98	na				
H1	0.0		63.38	na				
H2	0.0		65.02	na				
HOSE	0.0		68.99	na	250.0			
TEST	-7.0		75.49	na				

The maximum velocity is 15.46 and it occurs in the pipe between nodes HOSE and TEST

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
C1	-191.68	2.635	1X	14.827	1.500	21.355		
to		120.0	1T	16.474	31.301	-0.953		
209	-191.68	-0.0960		0.0	32.801	-3.148		Vel = 11.28
209	0.0	2.635		0.0	21.000	17.254		
to		120.0		0.0	0.0	0.0		
210	-191.68	-0.0960		0.0	21.000	-2.016		Vel = 11.28
210	98.37	2.635		0.0	9.400	15.238		K Factor = 25.20
to		120.0		0.0	0.0	0.0		
211	-93.31	-0.0253		0.0	9.400	-0.238		Vel = 5.49
211	97.60	2.635		0.0	8.000	15.000		K Factor = 25.20
to		120.0		0.0	0.0	0.0		
212	4.29	0.0001		0.0	8.000	0.001		Vel = 0.25
212	97.60	2.635	4V	23.613	8.400	15.001		K Factor = 25.20
to		120.0		0.0	23.613	0.0		
213	101.89	0.0298		0.0	32.013	0.954		Vel = 5.99
213	100.66	2.635	1X	14.827	40.500	15.955		K Factor = 25.20
to		120.0		0.0	14.827	0.0		
214	202.55	0.1063		0.0	55.327	5.881		Vel = 11.92
214	0.0	2.635	1T	16.474	1.500	21.836		
to		120.0		0.0	16.474	0.953		
C2	202.55	0.1063		0.0	17.974	1.911		Vel = 11.92
	0.0							
	202.55					24.700		K Factor = 40.76
C3	-192.61	2.635	1X	14.827	1.500	21.458		
to		120.0	1T	16.474	31.301	-0.953		
219	-192.61	-0.0969		0.0	32.801	-3.177		Vel = 11.33
219	0.0	2.635		0.0	21.000	17.328		
to		120.0		0.0	0.0	0.0		
220	-192.61	-0.0969		0.0	21.000	-2.034		Vel = 11.33
220	98.55	2.635		0.0	9.400	15.294		K Factor = 25.20
to		120.0		0.0	0.0	0.0		
221	-94.06	-0.0256		0.0	9.400	-0.241		Vel = 5.53
221	97.77	2.635		0.0	8.000	15.053		K Factor = 25.20
to		120.0		0.0	0.0	0.0		
222	3.71	0.0		0.0	8.000	0.0		Vel = 0.22
222	97.77	2.635	4V	23.613	8.400	15.053		K Factor = 25.20
to		120.0		0.0	23.613	0.0		
223	101.48	0.0296		0.0	32.013	0.948		Vel = 5.97
223	100.80	2.635	1X	14.827	40.500	16.001		K Factor = 25.20
to		120.0		0.0	14.827	0.0		
224	202.28	0.1060		0.0	55.327	5.867		Vel = 11.90
224	0.0	2.635	1T	16.474	1.500	21.868		
to		120.0		0.0	16.474	0.953		
C4	202.28	0.1060		0.0	17.974	1.906		Vel = 11.90
	0.0							
	202.28					24.727		K Factor = 40.68
C5	-195.33	2.635	1X	14.827	1.500	21.751		
to		120.0	1T	16.474	31.301	-0.953		
229	-195.33	-0.0994		0.0	32.801	-3.260		Vel = 11.49

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
229	0.0	2.635		0.0	21.000	17.538		
to		120.0		0.0	0.0	0.0		
230	-195.33	-0.0994		0.0	21.000	-2.087		Vel = 11.49
230	99.05	2.635		0.0	9.400	15.451		K Factor = 25.20
to		120.0		0.0	0.0	0.0		
231	-96.28	-0.0269		0.0	9.400	-0.253		Vel = 5.66
231	98.24	2.635		0.0	8.000	15.198		K Factor = 25.20
to		120.0		0.0	0.0	0.0		
232	1.96	0.0		0.0	8.000	0.0		Vel = 0.12
232	98.24	2.635	4V	23.613	8.400	15.198		K Factor = 25.20
to		120.0		0.0	23.613	0.0		
233	100.2	0.0289		0.0	32.013	0.926		Vel = 5.90
233	101.20	2.635	1X	14.827	40.500	16.124		K Factor = 25.20
to		120.0		0.0	14.827	0.0		
234	201.4	0.1052		0.0	55.327	5.819		Vel = 11.85
234	0.0	2.635	1T	16.474	1.500	21.943		
to		120.0		0.0	16.474	0.953		
C6	201.4	0.1052		0.0	17.974	1.891		Vel = 11.85
	0.0							
	201.40					24.787		K Factor = 40.45
C7	63.02	2.635	1X	14.827	1.500	22.540		
to		120.0	1T	16.474	31.301	-0.953		
240	63.02	0.0123		0.0	32.801	0.402		Vel = 3.71
240	0.0	2.635	4V	23.613	87.000	21.989		
to		120.0	1X	14.827	38.440	0.0		
241	63.02	0.0123		0.0	125.440	1.538		Vel = 3.71
241	0.0	2.635	1T	16.474	1.500	23.527		
to		120.0		0.0	16.474	0.953		
C2	63.02	0.0122		0.0	17.974	0.220		Vel = 3.71
	0.0							
	63.02					24.700		K Factor = 12.68
C9	64.31	2.635	1X	14.827	1.500	23.176		
to		120.0	1T	16.474	31.301	-0.953		
250	64.31	0.0127		0.0	32.801	0.418		Vel = 3.78
250	0.0	2.635	4V	23.613	87.000	22.641		
to		120.0	1X	14.827	38.440	0.0		
251	64.31	0.0127		0.0	125.440	1.597		Vel = 3.78
251	0.0	2.635	1T	16.474	1.500	24.238		
to		120.0		0.0	16.474	0.953		
C10	64.31	0.0127		0.0	17.974	0.228		Vel = 3.78
	0.0							
	64.31					25.419		K Factor = 12.76
C11	58.14	2.635	1X	14.827	1.500	23.607		
to		120.0	1T	16.474	31.301	-0.953		
260	58.14	0.0105		0.0	32.801	0.346		Vel = 3.42
260	0.0	2.635	4V	23.613	87.000	23.000		
to		120.0	1X	14.827	38.440	0.0		
261	58.14	0.0106		0.0	125.440	1.325		Vel = 3.42

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
261	0.0	2.635	1T	16.474	1.500	24.325		
to		120.0		0.0	16.474	0.953		
C12	58.14	0.0106		0.0	17.974	0.190		Vel = 3.42
	0.0							
	58.14					25.468		K Factor = 11.52
C1	191.68	4.26		0.0	11.100	21.355		
to		120.0		0.0	0.0	0.0		
C3	191.68	0.0093		0.0	11.100	0.103		Vel = 4.31
C3	192.62	4.26		0.0	8.750	21.458		
to		120.0		0.0	0.0	0.0		
C5	384.3	0.0335		0.0	8.750	0.293		Vel = 8.65
C5	195.33	4.26		0.0	11.000	21.751		
to		120.0		0.0	0.0	0.0		
C7	579.63	0.0717		0.0	11.000	0.789		Vel = 13.05
C7	-63.02	4.26		0.0	11.000	22.540		
to		120.0		0.0	0.0	0.0		
C9	516.61	0.0578		0.0	11.000	0.636		Vel = 11.63
C9	-64.31	4.26		0.0	9.500	23.176		
to		120.0		0.0	0.0	0.0		
C11	452.3	0.0454		0.0	9.500	0.431		Vel = 10.18
C11	-58.14	4.26	1V	8.954	5.600	23.607		
to		120.0		0.0	8.954	0.0		
C20	394.16	0.0351		0.0	14.554	0.511		Vel = 8.87
C20	0.0	4.26	1V	8.954	8.500	24.118		
to		120.0		0.0	8.954	-3.768		
C21	394.16	0.0351		0.0	17.454	0.612		Vel = 8.87
C21	0.0	4.26	1X	21.067	9.000	20.962		
to		120.0		0.0	21.067	-0.217		
C22	394.16	0.0352		0.0	30.067	1.057		Vel = 8.87
	0.0							
	394.16					21.802		K Factor = 84.42
C2	265.57	6.357		0.0	11.100	24.700		
to		120.0		0.0	0.0	0.0		
C4	265.57	0.0024		0.0	11.100	0.027		Vel = 2.68
C4	202.28	6.357		0.0	8.750	24.727		
to		120.0		0.0	0.0	0.0		
C6	467.85	0.0069		0.0	8.750	0.060		Vel = 4.73
C6	201.40	6.357		0.0	11.000	24.787		
to		120.0		0.0	0.0	0.0		
C8	669.25	0.0133		0.0	11.000	0.146		Vel = 6.77
C8	0.0	6.357	1X	31.433	2.750	24.933		
to		120.0		0.0	31.433	0.0		
CA	669.25	0.0133		0.0	34.183	0.455		Vel = 6.77
CA	-333.79	6.357		0.0	8.400	25.388		
to		120.0		0.0	0.0	0.0		
C10	335.46	0.0037		0.0	8.400	0.031		Vel = 3.39
C10	64.31	6.357		0.0	9.500	25.419		
to		120.0		0.0	0.0	0.0		
C12	399.77	0.0052		0.0	9.500	0.049		Vel = 4.04

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
C12	58.14	6.357	1V	12.573	5.600	25.468		
to		120.0		0.0	12.573	0.0		
C30	457.91	0.0066		0.0	18.173	0.120		Vel = 4.63
C30	0.0	6.357	1V	12.573	8.900	25.588		
to		120.0		0.0	12.573	-3.768		
C31	457.91	0.0066		0.0	21.473	0.142		Vel = 4.63
C31	0.0	6.357	1X	31.433	9.000	21.962		
to		120.0		0.0	31.433	0.0		
C32	457.91	0.0066		0.0	40.433	0.266		Vel = 4.63
C32	73.25	6.357	1X	31.433	43.000	22.228		
to		120.0		0.0	31.433	-0.217		
C33	531.16	0.0087		0.0	74.433	0.647		Vel = 5.37
	0.0							
	531.16					22.658		K Factor = 111.59
CA	333.78	4.26	1V	8.954	7.500	25.388		
to		120.0		0.0	8.954	0.0		
CB	333.78	0.0258		0.0	16.454	0.425		Vel = 7.51
CB	0.0	4.26	1V	8.954	8.400	25.813		
to		120.0		0.0	8.954	-3.118		
CC	333.78	0.0258		0.0	17.354	0.447		Vel = 7.51
CC	0.0	4.26	1X	21.067	5.300	23.142		
to		120.0		0.0	21.067	0.0		
CD	333.78	0.0258		0.0	26.367	0.681		Vel = 7.51
	0.0							
	333.78					23.823		K Factor = 68.39
A1	43.56	2.635	1X	14.827	3.500	23.827		
to		120.0	1T	16.474	31.301	-1.516		
2	43.56	0.0062		0.0	34.801	0.216		Vel = 2.56
2	0.0	2.635	1X	14.827	23.200	22.527		
to		120.0		0.0	14.827	0.0		
6	43.56	0.0062		0.0	38.027	0.235		Vel = 2.56
6	0.0	2.635	1T	16.474	3.500	22.762		
to		120.0		0.0	16.474	1.516		
A2	43.56	0.0062		0.0	19.974	0.124		Vel = 2.56
	0.0							
	43.56					24.402		K Factor = 8.82
A3	41.31	2.635	1X	14.827	3.500	23.887		
to		120.0	1T	16.474	31.301	-1.516		
11	41.31	0.0056		0.0	34.801	0.195		Vel = 2.43
11	0.0	2.635	1X	14.827	23.200	22.566		
to		120.0		0.0	14.827	0.0		
15	41.31	0.0056		0.0	38.027	0.214		Vel = 2.43
15	0.0	2.635	1T	16.474	3.500	22.780		
to		120.0		0.0	16.474	1.516		
A4	41.31	0.0056		0.0	19.974	0.112		Vel = 2.43
	0.0							
	41.31					24.408		K Factor = 8.36

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*******	Notes	******
A5	36.46	2.635	1X	14.827	3.500	24.011				
to		120.0	1T	16.474	31.301	-1.516				
21	36.46	0.0045		0.0	34.801	0.155		Vel = 2.15		
21	0.0	2.635	1X	14.827	23.200	22.650				
to		120.0		0.0	14.827	0.0				
25	36.46	0.0045		0.0	38.027	0.170		Vel = 2.15		
25	0.0	2.635	1T	16.474	3.500	22.820				
to		120.0		0.0	16.474	1.516				
A6	36.46	0.0045		0.0	19.974	0.089		Vel = 2.15		
	0.0									
	36.46					24.425		K Factor = 7.38		
A7	32.67	2.635	1X	14.827	3.500	24.129				
to		120.0	1T	16.474	31.301	-1.516				
30	32.67	0.0036		0.0	34.801	0.127		Vel = 1.92		
30	0.0	2.635	1X	14.827	23.200	22.740				
to		120.0		0.0	14.827	0.0				
31	32.67	0.0036		0.0	38.027	0.138		Vel = 1.92		
31	0.0	2.635	1T	16.474	3.500	22.878				
to		120.0		0.0	16.474	1.516				
A8	32.67	0.0036		0.0	19.974	0.072		Vel = 1.92		
	0.0									
	32.67					24.466		K Factor = 6.60		
A9	31.53	2.635	1X	14.827	3.500	24.215				
to		120.0	1T	16.474	31.301	-1.516				
40	31.53	0.0034		0.0	34.801	0.119		Vel = 1.86		
40	0.0	2.635	1X	14.827	23.200	22.818				
to		120.0		0.0	14.827	0.0				
41	31.53	0.0034		0.0	38.027	0.129		Vel = 1.86		
41	0.0	2.635	1T	16.474	3.500	22.947				
to		120.0		0.0	16.474	1.516				
A10	31.53	0.0034		0.0	19.974	0.068		Vel = 1.86		
	0.0									
	31.53					24.531		K Factor = 6.37		
A11	32.63	2.635	1X	14.827	3.500	24.255				
to		120.0	1T	16.474	31.301	-1.516				
50	32.63	0.0036		0.0	34.801	0.127		Vel = 1.92		
50	0.0	2.635	1X	14.827	23.200	22.866				
to		120.0		0.0	14.827	0.0				
51	32.63	0.0036		0.0	38.027	0.138		Vel = 1.92		
51	0.0	2.635	1T	16.474	3.500	23.004				
to		120.0		0.0	16.474	1.516				
A12	32.63	0.0036		0.0	19.974	0.072		Vel = 1.92		
	0.0									
	32.63					24.592		K Factor = 6.58		
A13	36.87	2.635	1X	14.827	3.500	24.294				
to		120.0	1T	16.474	31.301	-1.516				
60	36.87	0.0045		0.0	34.801	0.158		Vel = 2.17		
60	0.0	2.635	1X	14.827	23.200	22.936				
to		120.0		0.0	14.827	0.0				
61	36.87	0.0045		0.0	38.027	0.173		Vel = 2.17		

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
61	0.0	2.635	1T	16.474	3.500	23.109		
to		120.0		0.0	16.474	1.516		
A14	36.87	0.0046		0.0	19.974	0.091		Vel = 2.17
	0.0							
	36.87					24.716		K Factor = 7.42
A15	43.01	2.635	1X	14.827	3.500	24.311		
to		120.0	1T	16.474	31.301	-1.516		
70	43.01	0.0061		0.0	34.801	0.211		Vel = 2.53
70	0.0	2.635	1X	14.827	23.200	23.006		
to		120.0		0.0	14.827	0.0		
71	43.01	0.0060		0.0	38.027	0.230		Vel = 2.53
71	0.0	2.635	1T	16.474	3.500	23.236		
to		120.0		0.0	16.474	1.516		
A16	43.01	0.0060		0.0	19.974	0.120		Vel = 2.53
	0.0							
	43.01					24.872		K Factor = 8.62
A17	51.27	2.635	1X	14.827	3.500	24.316		
to		120.0	1T	16.474	31.301	-1.516		
80	51.27	0.0084		0.0	34.801	0.291		Vel = 3.02
80	0.0	2.635	1X	14.827	23.200	23.091		
to		120.0		0.0	14.827	0.0		
81	51.27	0.0084		0.0	38.027	0.318		Vel = 3.02
81	0.0	2.635	1T	16.474	3.500	23.409		
to		120.0		0.0	16.474	1.516		
A18	51.27	0.0084		0.0	19.974	0.167		Vel = 3.02
	0.0							
	51.27					25.092		K Factor = 10.24
A19	58.66	2.635	1X	14.827	3.500	24.343		
to		120.0	1T	16.474	31.301	-1.516		
90	58.66	0.0107		0.0	34.801	0.374		Vel = 3.45
90	0.0	2.635	1X	14.827	23.200	23.201		
to		120.0		0.0	14.827	0.0		
91	58.66	0.0108		0.0	38.027	0.409		Vel = 3.45
91	0.0	2.635	1T	16.474	3.500	23.610		
to		120.0		0.0	16.474	1.516		
A20	58.66	0.0107		0.0	19.974	0.214		Vel = 3.45
	0.0							
	58.66					25.340		K Factor = 11.65
A1	-43.56	4.26		0.0	6.750	23.827		
to		120.0		0.0	0.0	0.0		
CD	-43.56	-0.0006		0.0	6.750	-0.004		Vel = 0.98
CD	333.78	4.26		0.0	3.200	23.823		
to		120.0		0.0	0.0	0.0		
A3	290.22	0.0200		0.0	3.200	0.064		Vel = 6.53
A3	-41.31	4.26		0.0	8.300	23.887		
to		120.0		0.0	0.0	0.0		
A5	248.91	0.0149		0.0	8.300	0.124		Vel = 5.60

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
A5	-36.46	4.26		0.0	10.500	24.011		
to		120.0		0.0	0.0	0.0		
A7	212.45	0.0112		0.0	10.500	0.118		Vel = 4.78
A7	-32.67	4.26		0.0	10.500	24.129		
to		120.0		0.0	0.0	0.0		
A9	179.78	0.0082		0.0	10.500	0.086		Vel = 4.05
A9	-31.53	4.26		0.0	7.000	24.215		
to		120.0		0.0	0.0	0.0		
A11	148.25	0.0057		0.0	7.000	0.040		Vel = 3.34
A11	-32.64	4.26		0.0	10.500	24.255		
to		120.0		0.0	0.0	0.0		
A13	115.61	0.0037		0.0	10.500	0.039		Vel = 2.60
A13	-36.87	4.26		0.0	10.000	24.294		
to		120.0		0.0	0.0	0.0		
A15	78.74	0.0017		0.0	10.000	0.017		Vel = 1.77
A15	-43.00	4.26		0.0	10.500	24.311		
to		120.0		0.0	0.0	0.0		
A17	35.74	0.0005		0.0	10.500	0.005		Vel = 0.80
A17	-51.27	4.26	1X	21.067	5.400	24.316		
to		120.0		0.0	21.067	0.0		
A21	-15.53	-0.0001		0.0	26.467	-0.003		Vel = 0.35
	0.0							
	-15.53					24.313		K Factor = -3.15
A19	-58.66	4.26	1T	26.334	2.750	24.343		
to		120.0		0.0	26.334	0.0		
A21	-58.66	-0.0010		0.0	29.084	-0.030		Vel = 1.32
	0.0							
	-58.66					24.313		K Factor = -11.90
A2	43.56	4.26		0.0	9.900	24.402		
to		120.0		0.0	0.0	0.0		
A4	43.56	0.0006		0.0	9.900	0.006		Vel = 0.98
A4	41.31	4.26		0.0	8.300	24.408		
to		120.0		0.0	0.0	0.0		
A6	84.87	0.0020		0.0	8.300	0.017		Vel = 1.91
A6	36.46	4.26		0.0	10.500	24.425		
to		120.0		0.0	0.0	0.0		
A8	121.33	0.0039		0.0	10.500	0.041		Vel = 2.73
A8	32.67	4.26		0.0	10.500	24.466		
to		120.0		0.0	0.0	0.0		
A10	154.0	0.0062		0.0	10.500	0.065		Vel = 3.47
A10	31.54	4.26		0.0	7.000	24.531		
to		120.0		0.0	0.0	0.0		
A12	185.54	0.0087		0.0	7.000	0.061		Vel = 4.18
A12	32.63	4.26		0.0	10.500	24.592		
to		120.0		0.0	0.0	0.0		
A14	218.17	0.0118		0.0	10.500	0.124		Vel = 4.91
A14	36.87	4.26		0.0	10.000	24.716		
to		120.0		0.0	0.0	0.0		
A16	255.04	0.0156		0.0	10.000	0.156		Vel = 5.74

Hyd. Ref. Point	Qa / Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
A16	43.01	4.26		0.0	10.500	24.872		
to		120.0		0.0	0.0	0.0		
A18	298.05	0.0210		0.0	10.500	0.220		Vel = 6.71
A18	51.26	4.26		0.0	5.400	25.092		
to		120.0		0.0	0.0	0.0		
A22	349.31	0.0281		0.0	5.400	0.152		Vel = 7.86
A22	777.88	6.357		0.0	2.750	25.244		
to		120.0		0.0	0.0	0.0		
A20	1127.19	0.0349		0.0	2.750	0.096		Vel = 11.39
	0.0							
	1127.19					25.340		K Factor = 223.92
B1	24.91	2.635	1X	14.827	3.000	21.802		
to		120.0	1T	16.474	31.301	-1.299		
100	24.91	0.0022		0.0	34.301	0.075		Vel = 1.47
100	0.0	2.635	1X	14.827	43.000	20.578		
to		120.0		0.0	14.827	0.0		
105	24.91	0.0022		0.0	57.827	0.127		Vel = 1.47
105	0.0	2.635	1T	16.474	3.000	20.705		
to		120.0		0.0	16.474	1.299		
B2	24.91	0.0022		0.0	19.474	0.043		Vel = 1.47
	0.0							
	24.91					22.047		K Factor = 5.31
B3	24.22	2.635	1X	14.827	3.000	21.816		
to		120.0	1T	16.474	31.301	-1.299		
110	24.22	0.0021		0.0	34.301	0.071		Vel = 1.42
110	0.0	2.635	1X	14.827	43.000	20.588		
to		120.0		0.0	14.827	0.0		
115	24.22	0.0021		0.0	57.827	0.121		Vel = 1.42
115	0.0	2.635	1T	16.474	3.000	20.709		
to		120.0		0.0	16.474	1.299		
B4	24.22	0.0021		0.0	19.474	0.041		Vel = 1.42
	0.0							
	24.22					22.049		K Factor = 5.16
B5	22.47	2.635	1X	14.827	3.000	21.853		
to		120.0	1T	16.474	31.301	-1.299		
120	22.47	0.0018		0.0	34.301	0.062		Vel = 1.32
120	0.0	2.635	1X	14.827	43.000	20.616		
to		120.0		0.0	14.827	0.0		
125	22.47	0.0018		0.0	57.827	0.106		Vel = 1.32
125	0.0	2.635	1T	16.474	3.000	20.722		
to		120.0		0.0	16.474	1.299		
B6	22.47	0.0018		0.0	19.474	0.035		Vel = 1.32
	0.0							
	22.47					22.056		K Factor = 4.78
B7	21.55	2.635	1X	14.827	3.000	21.880		
to		120.0	1T	16.474	31.301	-1.299		
126	21.55	0.0017		0.0	34.301	0.057		Vel = 1.27

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	0.0	2.635	1X	14.827	43.000	20.638		
to		120.0		0.0	14.827	0.0		
127	21.55	0.0017		0.0	57.827	0.097		Vel = 1.27
127	0.0	2.635	1T	16.474	3.000	20.735		
to		120.0		0.0	16.474	1.299		
B8	21.55	0.0017		0.0	19.474	0.034		Vel = 1.27
	0.0							
	21.55					22.068		K Factor = 4.59
B9	21.25	2.635	1X	14.827	3.000	21.904		
to		120.0	1T	16.474	31.301	-1.299		
130	21.25	0.0016		0.0	34.301	0.056		Vel = 1.25
130	0.0	2.635	1X	14.827	43.000	20.661		
to		120.0		0.0	14.827	0.0		
131	21.25	0.0016		0.0	57.827	0.095		Vel = 1.25
131	0.0	2.635	1T	16.474	3.000	20.756		
to		120.0		0.0	16.474	1.299		
B10	21.25	0.0016		0.0	19.474	0.032		Vel = 1.25
	0.0							
	21.25					22.087		K Factor = 4.52
B11	21.81	2.635	1X	14.827	3.000	21.930		
to		120.0	1T	16.474	31.301	-1.299		
135	21.81	0.0017		0.0	34.301	0.059		Vel = 1.28
135	0.0	2.635	1X	14.827	43.000	20.690		
to		120.0		0.0	14.827	0.0		
136	21.81	0.0017		0.0	57.827	0.099		Vel = 1.28
136	0.0	2.635	1T	16.474	3.000	20.789		
to		120.0		0.0	16.474	1.299		
B12	21.81	0.0017		0.0	19.474	0.034		Vel = 1.28
	0.0							
	21.81					22.122		K Factor = 4.64
B13	22.92	2.635	1X	14.827	3.000	21.946		
to		120.0	1T	16.474	31.301	-1.299		
140	22.92	0.0019		0.0	34.301	0.064		Vel = 1.35
140	0.0	2.635	1X	14.827	43.000	20.711		
to		120.0		0.0	14.827	0.0		
141	22.92	0.0019		0.0	57.827	0.110		Vel = 1.35
141	0.0	2.635	1T	16.474	3.000	20.821		
to		120.0		0.0	16.474	1.299		
B14	22.92	0.0019		0.0	19.474	0.037		Vel = 1.35
	0.0							
	22.92					22.157		K Factor = 4.87
B15	25.02	2.635	1X	14.827	3.000	21.961		
to		120.0	1T	16.474	31.301	-1.299		
145	25.02	0.0022		0.0	34.301	0.076		Vel = 1.47
145	0.0	2.635	1X	14.827	43.000	20.738		
to		120.0		0.0	14.827	0.0		
146	25.02	0.0022		0.0	57.827	0.129		Vel = 1.47
146	0.0	2.635	1T	16.474	3.000	20.867		
to		120.0		0.0	16.474	1.299		
B16	25.02	0.0022		0.0	19.474	0.043		Vel = 1.47

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							
	25.02					22.209		K Factor = 5.31
B17	28.30	2.635	1X	14.827	3.000	21.975		
to		120.0	1T	16.474	31.301	-1.299		
150	28.3	0.0028		0.0	34.301	0.096		Vel = 1.67
150	0.0	2.635	1X	14.827	43.000	20.772		
to		120.0		0.0	14.827	0.0		
151	28.3	0.0028		0.0	57.827	0.161		Vel = 1.67
151	0.0	2.635	1T	16.474	3.000	20.933		
to		120.0		0.0	16.474	1.299		
B18	28.3	0.0028		0.0	19.474	0.054		Vel = 1.67
	0.0							
	28.30					22.286		K Factor = 5.99
B19	32.07	2.635	1X	14.827	3.000	21.985		
to		120.0	1T	16.474	31.301	-1.299		
155	32.07	0.0035		0.0	34.301	0.120		Vel = 1.89
155	0.0	2.635	1X	14.827	43.000	20.806		
to		120.0		0.0	14.827	0.0		
156	32.07	0.0035		0.0	57.827	0.203		Vel = 1.89
156	0.0	2.635	1T	16.474	3.000	21.009		
to		120.0		0.0	16.474	1.299		
B20	32.07	0.0035		0.0	19.474	0.069		Vel = 1.89
	0.0							
	32.07					22.377		K Factor = 6.78
B21	36.63	2.635	1X	14.827	3.000	21.992		
to		120.0	1T	16.474	31.301	-1.299		
160	36.63	0.0045		0.0	34.301	0.153		Vel = 2.16
160	0.0	2.635	1X	14.827	43.000	20.846		
to		120.0		0.0	14.827	0.0		
161	36.63	0.0045		0.0	57.827	0.260		Vel = 2.16
161	0.0	2.635	1T	16.474	3.000	21.106		
to		120.0		0.0	16.474	1.299		
B22	36.63	0.0045		0.0	19.474	0.088		Vel = 2.16
	0.0							
	36.63					22.493		K Factor = 7.72
B23	39.76	2.635	1X	14.827	3.000	22.097		
to		120.0	1T	16.474	31.301	-1.299		
165	39.76	0.0052		0.0	34.301	0.179		Vel = 2.34
165	0.0	2.635	1X	14.827	43.000	20.977		
to		120.0		0.0	14.827	0.0		
166	39.76	0.0052		0.0	57.827	0.302		Vel = 2.34
166	0.0	2.635	1T	16.474	3.000	21.279		
to		120.0		0.0	16.474	1.299		
B24	39.76	0.0052		0.0	19.474	0.102		Vel = 2.34
	0.0							
	39.76					22.680		K Factor = 8.35
B1	-24.91	6.357		0.0	4.900	21.802		
to		120.0		0.0	0.0	0.0		
C22	-24.91	0.0		0.0	4.900	0.0		Vel = 0.25

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
C22	394.16	6.357		0.0	3.200	21.802		
to		120.0		0.0	0.0	0.0		
B3	369.25	0.0044		0.0	3.200	0.014		Vel = 3.73
B3	-24.22	6.357		0.0	9.600	21.816		
to		120.0		0.0	0.0	0.0		
B5	345.03	0.0039		0.0	9.600	0.037		Vel = 3.49
B5	-22.47	6.357		0.0	7.600	21.853		
to		120.0		0.0	0.0	0.0		
B7	322.56	0.0036		0.0	7.600	0.027		Vel = 3.26
B7	-21.55	6.357		0.0	8.000	21.880		
to		120.0		0.0	0.0	0.0		
B9	301.01	0.0030		0.0	8.000	0.024		Vel = 3.04
B9	-21.26	6.357		0.0	9.900	21.904		
to		120.0		0.0	0.0	0.0		
B11	279.75	0.0026		0.0	9.900	0.026		Vel = 2.83
B11	-21.81	6.357		0.0	7.000	21.930		
to		120.0		0.0	0.0	0.0		
B13	257.94	0.0023		0.0	7.000	0.016		Vel = 2.61
B13	-22.92	6.357		0.0	8.000	21.946		
to		120.0		0.0	0.0	0.0		
B15	235.02	0.0019		0.0	8.000	0.015		Vel = 2.38
B15	-25.02	6.357		0.0	9.000	21.961		
to		120.0		0.0	0.0	0.0		
B17	210.0	0.0016		0.0	9.000	0.014		Vel = 2.12
B17	-28.30	6.357		0.0	8.100	21.975		
to		120.0		0.0	0.0	0.0		
B19	181.7	0.0012		0.0	8.100	0.010		Vel = 1.84
B19	-32.07	6.357		0.0	8.000	21.985		
to		120.0		0.0	0.0	0.0		
B21	149.63	0.0009		0.0	8.000	0.007		Vel = 1.51
B21	-36.63	6.357	1X	31.433	8.750	21.992		
to		120.0		0.0	31.433	0.217		
C32	113.0	0.0005		0.0	40.183	0.019		Vel = 1.14
	0.0							
	113.00					22.228		K Factor = 23.97
B23	-39.76	2.635	1X	14.827	1.500	22.097		
to		120.0		0.0	14.827	0.217		
C32	-39.76	-0.0053		0.0	16.327	-0.086		Vel = 2.34
	0.0							
	-39.76					22.228		K Factor = -8.43
B2	24.91	4.26		0.0	8.000	22.047		
to		120.0		0.0	0.0	0.0		
B4	24.91	0.0002		0.0	8.000	0.002		Vel = 0.56
B4	24.22	4.26		0.0	9.600	22.049		
to		120.0		0.0	0.0	0.0		
B6	49.13	0.0007		0.0	9.600	0.007		Vel = 1.11
B6	22.47	4.26		0.0	7.500	22.056		
to		120.0		0.0	0.0	0.0		
B8	71.6	0.0016		0.0	7.500	0.012		Vel = 1.61

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
B8	21.55	4.26		0.0	8.000	22.068		
to		120.0		0.0	0.0	0.0		
B10	93.15	0.0024		0.0	8.000	0.019		Vel = 2.10
B10	21.26	4.26		0.0	9.900	22.087		
to		120.0		0.0	0.0	0.0		
B12	114.41	0.0035		0.0	9.900	0.035		Vel = 2.58
B12	21.81	4.26		0.0	7.000	22.122		
to		120.0		0.0	0.0	0.0		
B14	136.22	0.0050		0.0	7.000	0.035		Vel = 3.07
B14	22.92	4.26		0.0	8.000	22.157		
to		120.0		0.0	0.0	0.0		
B16	159.14	0.0065		0.0	8.000	0.052		Vel = 3.58
B16	25.02	4.26		0.0	9.000	22.209		
to		120.0		0.0	0.0	0.0		
B18	184.16	0.0086		0.0	9.000	0.077		Vel = 4.15
B18	28.30	4.26		0.0	8.100	22.286		
to		120.0		0.0	0.0	0.0		
B20	212.46	0.0112		0.0	8.100	0.091		Vel = 4.78
B20	32.07	4.26		0.0	8.000	22.377		
to		120.0		0.0	0.0	0.0		
B22	244.53	0.0145		0.0	8.000	0.116		Vel = 5.50
B22	36.63	4.26		0.0	8.750	22.493		
to		120.0		0.0	0.0	0.0		
C33	281.16	0.0189		0.0	8.750	0.165		Vel = 6.33
C33	531.16	6.357		0.0	1.200	22.658		
to		120.0		0.0	0.0	0.0		
B24	812.32	0.0183		0.0	1.200	0.022		Vel = 8.21
B24	39.75	6.357	1V	12.573	6.500	22.680		
to		120.0		0.0	12.573	0.0		
C34	852.07	0.0208		0.0	19.073	0.397		Vel = 8.61
C34	0.0	6.357	1V	12.573	0.100	23.077		
to		120.0		0.0	12.573	0.866		
C35	852.07	0.0208		0.0	12.673	0.264		Vel = 8.61
C35	0.0	6.357		0.0	5.100	24.207		
to		120.0		0.0	0.0	0.0		
A21	852.07	0.0208		0.0	5.100	0.106		Vel = 8.61
A21	-74.19	6.357	1X	31.433	21.500	24.313		
to		120.0		0.0	31.433	0.0		
A22	777.88	0.0176		0.0	52.933	0.931		Vel = 7.86
	0.0							
	777.88					25.244		K Factor = 154.82
A20	1185.86	6.357	1V	12.573	16.800	25.340		
to		120.0	1X	31.433	44.006	0.0		
TOR	1185.86	0.0384		0.0	60.806	2.332		Vel = 11.99
TOR	0.0	6.065	1Fsp	0.0	16.000	27.672		
to		120.0		0.0	0.0	7.930		* Fixed loss = 1
BOR	1185.86	0.0482		0.0	16.000	0.771		Vel = 13.17
BOR	0.0	6.357	1Zia	0.0	2.000	36.373		
to		120.0		0.0	0.0	9.531		* Fixed loss = 6.933
BASE	1185.86	0.0385		0.0	2.000	0.077		Vel = 11.99

Final Calculations - Hazen-Williams

HIGH TECH FIRE PROTECTION
NOKIAN TYRES WALTON STREET GRID 3

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	******* Notes ******
BASE	0.0	6.16	1G	4.304	430.000	45.981		
to		140.0	2E	40.168	87.509	0.0		
H1	1185.86	0.0336	1T	43.037	517.509	17.395		Vel = 12.77
H1	0.0	8.27	1T	55.354	150.000	63.376		
to		140.0		0.0	55.354	0.0		
H2	1185.86	0.0080		0.0	205.354	1.644		Vel = 7.08
H2	0.0	8.27	1T	55.354	440.000	65.020		
to		140.0		0.0	55.354	0.0		
HOSE	1185.86	0.0080		0.0	495.354	3.967		Vel = 7.08
HOSE	250.00	6.16	1G	4.304	5.000	68.987		Qa = 250
to		140.0	1E	20.084	67.425	3.032		
TEST	1435.86	0.0479	1T	43.037	72.425	3.468		Vel = 15.46
	0.0							
	1435.86					75.487		K Factor = 165.26