



**... 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 BAY SIDE)  
Drawing : PORTLAND  
Location : 126 NORTH BOYD STREET  
Remote Area : #1 WET  
Contract : 062016-1  
Data File : TIRE STORAGE CALC TIRE BAY.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 - ORDINARY HAZARD GROUP 2

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	- 1050	System Type	Sprinkler/Nozzle
	Density	- .2	(X) Wet	Make GLOBE
D	Area Per Sprinkler	- 100	( ) Dry	Model GL5615
E	Elevation at Highest Outlet	- 15	( ) Deluge	Size 1/2"
S	Hose Allowance - Inside	- N/A	( ) Preaction	K-Factor 5.6
I	Rack Sprinkler Allowance	- N/A	( ) Other	Temp.Rat.200
G	Hose Allowance - Outside	- 250		

N Note

Calculation Flow Required - 554 Press Required - 28  
Summary C-Factor Used: 120 Overhead 140 Underground

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

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

L Source of Information - PORTLAND WATER DISTRICT

C	Commodity	Class	Location
O	Storage Ht.	Area	Aisle W.
M	Storage Method:	%	Palletized % Rack
	( ) 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

G Horizontal Barriers Provided:

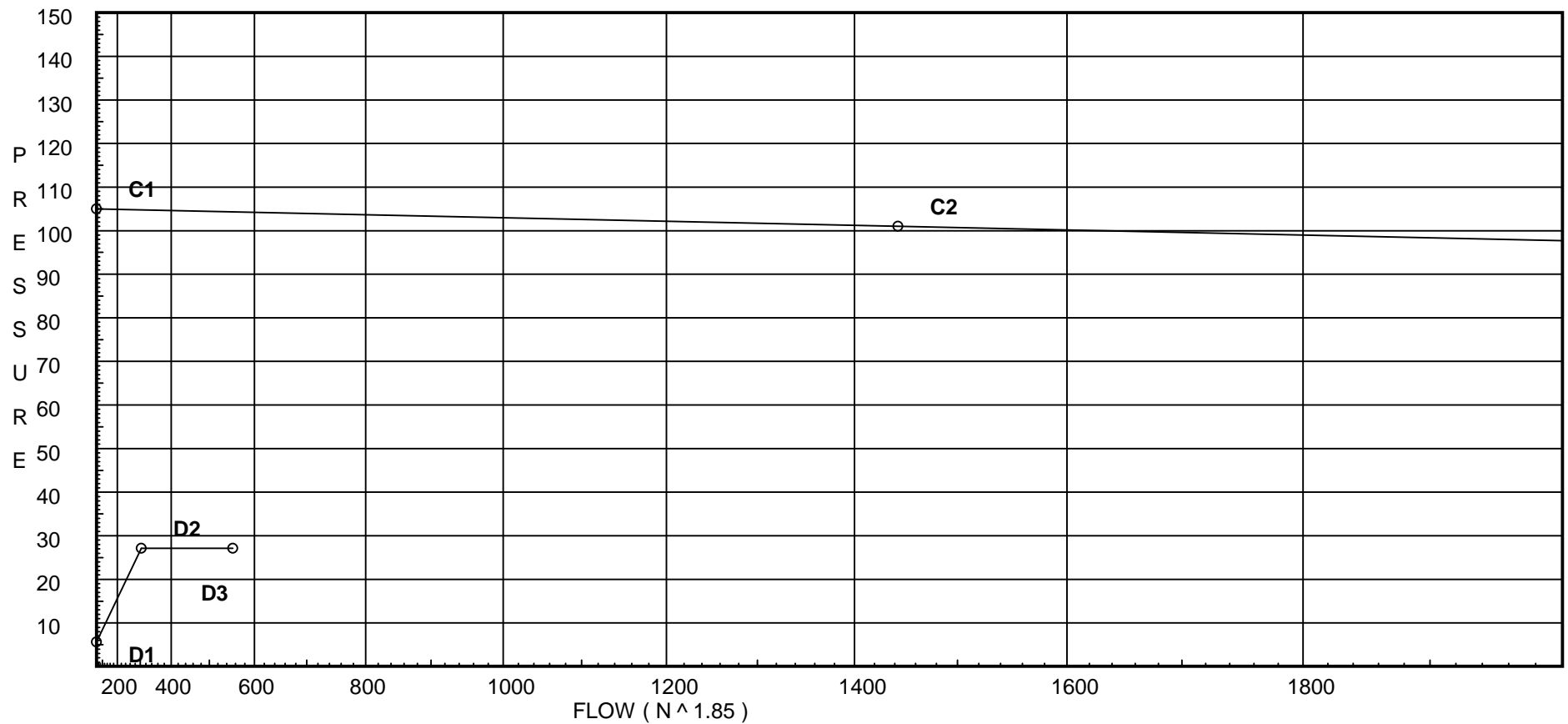
# Water Supply Curve (C)

HIGH TECH FIRE PROTECTION  
TIRE WAREHOUSE PORTLAND NORTH BOYD STREET (TIRE BAY SIDE)

Page 2  
Date 10/25/16

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

Demand:  
D1 - Elevation : 5.630  
D2 - System Flow : 303.646  
D2 - System Pressure : 27.112  
Hose ( Demand ) : 250  
D3 - System Demand : 553.646  
Safety Margin : 77.209



# Fittings Used Summary

HIGH TECH FIRE PROTECTION  
TIRE WAREHOUSE PORTLAND NORTH BOYD STREET (TIRE BAY SIDE)

Page 3  
Date 10/25/16

Fitting Legend		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	
Abbrev.	Name																					
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

HIGH TECH FIRE PROTECTION  
TIRE WAREHOUSE PORTLAND NORTH BOYD STREET (TIRE BAY SIDE)

Page 4  
Date 10/25/16

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
200	15.0	5.6	12.76	na	20.0	0.2	100	7.0
201	15.0	5.6	12.91	na	20.12	0.2	100	7.0
202	15.0	5.6	13.48	na	20.56	0.2	100	7.0
210	15.0	5.6	12.76	na	20.0	0.2	100	7.0
211	15.0	5.6	12.91	na	20.12	0.2	100	7.0
212	15.0	5.6	13.48	na	20.56	0.2	100	7.0
220	15.0	5.6	12.77	na	20.01	0.2	100	7.0
221	15.0	5.6	12.92	na	20.13	0.2	100	7.0
222	15.0	5.6	13.49	na	20.57	0.2	100	7.0
230	15.0	5.6	12.79	na	20.02	0.2	100	7.0
231	15.0	5.6	12.94	na	20.15	0.2	100	7.0
232	15.0	5.6	13.51	na	20.58	0.2	100	7.0
240	15.0	5.6	12.81	na	20.04	0.2	100	7.0
241	15.0	5.6	12.97	na	20.17	0.2	100	7.0
242	15.0	5.6	13.54	na	20.6	0.2	100	7.0
AA	13.0		16.3	na				
104	14.0		15.79	na				
105	14.0		15.78	na				
106	14.0		15.74	na				
107	14.0		15.7	na				
108	14.0		15.65	na				
AB	13.0		16.3	na				
114	14.0		15.79	na				
115	14.0		15.79	na				
116	14.0		15.74	na				
117	14.0		15.7	na				
118	14.0		15.66	na				
AC	13.0		16.3	na				
124	14.0		15.8	na				
125	14.0		15.79	na				
126	14.0		15.75	na				
127	14.0		15.71	na				
128	14.0		15.67	na				
AD	13.0		16.31	na				
134	14.0		15.81	na				
135	14.0		15.81	na				
136	14.0		15.77	na				
137	14.0		15.73	na				
138	14.0		15.69	na				
AE	13.0		16.32	na				
144	14.0		15.83	na				
148	14.0		15.72	na				
AF	13.0		16.34	na				
154	14.0		15.94	na				
158	14.0		15.99	na				
AG	13.0		16.36	na				
164	14.0		15.97	na				
168	14.0		16.05	na				
AH	13.0		16.37	na				
174	14.0		16.0	na				
178	14.0		16.13	na				
AI	13.0		16.37	na				
184	14.0		16.03	na				
188	14.0		16.2	na				
AJ	13.0		16.37	na				
194	14.0		16.07	na				
198	14.0		16.31	na				
BA	13.0		16.28	na				
BB	13.0		16.28	na				
BC	13.0		16.29	na				
BD	13.0		16.33	na				
BE	13.0		16.36	na				

# Flow Summary - Standard

HIGH TECH FIRE PROTECTION  
TIRE WAREHOUSE PORTLAND NORTH BOYD STREET (TIRE BAY SIDE)

Page 5  
Date 10/25/16

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
BF	13.0		16.45	na				
BG	13.0		16.51	na				
BH	13.0		16.62	na				
BI	13.0		16.71	na				
BJ	13.0		16.85	na				
TOR	15.5		15.96	na				
FLW	5.0		21.52	na				
BOR	2.0		26.63	na				
H1	2.0		26.84	na				
HOSE	0.0		27.74	na	250.0			
TEST	2.0		27.11	na				

The maximum velocity is 8.78 and it occurs in the pipe between nodes 242 and 148

# Final Calculations - Hazen-Williams

HIGH TECH FIRE PROTECTION  
TIRE WAREHOUSE PORTLAND NORTH BOYD STREET (TIRE BAY SIDE)

Page 6  
Date 10/25/16

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
200 to 201	20.00 20.0	1.682 120.0 0.0131		0.0 0.0 0.0	12.000 0.0 12.000	12.755 0.0 0.157		K Factor = 5.60 Vel = 2.89		
201 to 202	20.12 40.12	1.682 120.0 0.0473		0.0 0.0 0.0	12.000 0.0 12.000	12.912 0.0 0.568		K Factor = 5.60 Vel = 5.79		
202 to 108	20.56 60.68	1.682 120.0 0.1018	1X	9.9 0.0 0.0	7.200 9.900 17.100	13.480 0.433 1.740		K Factor = 5.60 Vel = 8.76		
	0.0 60.68					15.653		K Factor = 15.34		
210 to 211	20.00 20.0	1.682 120.0 0.0130		0.0 0.0 0.0	12.000 0.0 12.000	12.758 0.0 0.156		K Factor = 5.60 Vel = 2.89		
211 to 212	20.13 40.13	1.682 120.0 0.0473		0.0 0.0 0.0	12.000 0.0 12.000	12.914 0.0 0.568		K Factor = 5.60 Vel = 5.79		
212 to 118	20.56 60.69	1.682 120.0 0.1018	1X	9.9 0.0 0.0	7.200 9.900 17.100	13.482 0.433 1.741		K Factor = 5.60 Vel = 8.76		
	0.0 60.69					15.656		K Factor = 15.34		
220 to 221	20.01 20.01	1.682 120.0 0.0130		0.0 0.0 0.0	12.000 0.0 12.000	12.766 0.0 0.156		K Factor = 5.60 Vel = 2.89		
221 to 222	20.13 40.14	1.682 120.0 0.0474		0.0 0.0 0.0	12.000 0.0 12.000	12.922 0.0 0.569		K Factor = 5.60 Vel = 5.80		
222 to 128	20.57 60.71	1.682 120.0 0.1018	1X	9.9 0.0 0.0	7.200 9.900 17.100	13.491 0.433 1.741		K Factor = 5.60 Vel = 8.77		
	0.0 60.71					15.665		K Factor = 15.34		
230 to 231	20.02 20.02	1.682 120.0 0.0130		0.0 0.0 0.0	12.000 0.0 12.000	12.786 0.0 0.156		K Factor = 5.60 Vel = 2.89		
231 to 232	20.15 40.17	1.682 120.0 0.0475		0.0 0.0 0.0	12.000 0.0 12.000	12.942 0.0 0.570		K Factor = 5.60 Vel = 5.80		
232 to 138	20.58 60.75	1.682 120.0 0.1020	1X	9.9 0.0 0.0	7.200 9.900 17.100	13.512 0.433 1.744		K Factor = 5.60 Vel = 8.77		
	0.0 60.75					15.689		K Factor = 15.34		
240 to 241	20.04 20.04	1.682 120.0 0.0131		0.0 0.0 0.0	12.000 0.0 12.000	12.810 0.0 0.157		K Factor = 5.60 Vel = 2.89		
241 to 242	20.17 40.21	1.682 120.0 0.0475		0.0 0.0 0.0	12.000 0.0 12.000	12.967 0.0 0.570		K Factor = 5.60 Vel = 5.81		

# Final Calculations - Hazen-Williams

HIGH TECH FIRE PROTECTION  
TIRE WAREHOUSE PORTLAND NORTH BOYD STREET (TIRE BAY SIDE)

Page 7  
Date 10/25/16

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
242 to 148	20.60 60.81	1.682 120.0 0.1022	1X	9.9 0.0 0.0	7.200 9.900 17.100	13.537 0.433 1.747			K Factor = 5.60	
	0.0 60.81					15.717			K Factor = 15.34	
AA to 104	-20.82 -20.82	2.157 120.0 -0.0042	1V 1T	4.307 12.307 0.0	1.000 16.614 17.614	16.296 -0.433 -0.074			Vel = 1.83	
104 to 105	0.0 -20.82	2.157 120.0 -0.0040		0.0 0.0 0.0	1.000 0.0 1.000	15.789 0.0 -0.004			Vel = 1.83	
105 to 106	0.0 -20.82	2.157 120.0 -0.0042		0.0 0.0 0.0	10.000 0.0 10.000	15.785 0.0 -0.042			Vel = 1.83	
106 to 107	0.0 -20.82	2.157 120.0 -0.0042		0.0 0.0 0.0	10.000 0.0 10.000	15.743 0.0 -0.042			Vel = 1.83	
107 to 108	0.0 -20.82	2.157 120.0 -0.0042	1X	10.461 0.0 0.0	1.000 10.461 11.461	15.701 0.0 -0.048			Vel = 1.83	
108 to BA	60.68 39.86	2.157 120.0 0.0139	1T	12.307 0.0 0.0	1.500 12.307 13.807	15.653 0.433 0.192			Vel = 3.50	
	0.0 39.86					16.278			K Factor = 9.88	
AB to 114	-20.72 -20.72	2.157 120.0 -0.0041	1V 1T	4.307 12.307 0.0	1.000 16.614 17.614	16.297 -0.433 -0.073			Vel = 1.82	
114 to 115	0.0 -20.72	2.157 120.0 -0.0050		0.0 0.0 0.0	1.000 0.0 1.000	15.791 0.0 -0.005			Vel = 1.82	
115 to 116	0.0 -20.72	2.157 120.0 -0.0041		0.0 0.0 0.0	10.000 0.0 10.000	15.786 0.0 -0.041			Vel = 1.82	
116 to 117	0.0 -20.72	2.157 120.0 -0.0041		0.0 0.0 0.0	10.000 0.0 10.000	15.745 0.0 -0.041			Vel = 1.82	
117 to 118	0.0 -20.72	2.157 120.0 -0.0042	1X	10.461 0.0 0.0	1.000 10.461 11.461	15.704 0.0 -0.048			Vel = 1.82	
118 to BB	60.69 39.97	2.157 120.0 0.0140	1T	12.307 0.0 0.0	1.500 12.307 13.807	15.656 0.433 0.193			Vel = 3.51	
	0.0 39.97					16.282			K Factor = 9.91	
AC to 124	-20.42 -20.42	2.157 120.0 -0.0040	1V 1T	4.307 12.307 0.0	1.000 16.614 17.614	16.300 -0.433 -0.071			Vel = 1.79	



# Final Calculations - Hazen-Williams

HIGH TECH FIRE PROTECTION  
TIRE WAREHOUSE PORTLAND NORTH BOYD STREET (TIRE BAY SIDE)

Page 8  
Date 10/25/16

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftnng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
124	0.0	2.157		0.0	1.000	15.796				
to 125	-20.42	120.0 -0.0040		0.0	0.0	0.0				
125	0.0	2.157		0.0	10.000	15.792				
to 126	-20.42	120.0 -0.0040		0.0	0.0	0.0				Vel = 1.79
126	0.0	2.157		0.0	10.000	15.752				
to 127	-20.42	120.0 -0.0041		0.0	0.0	0.0				Vel = 1.79
127	0.0	2.157	1X	10.461	1.000	15.711				
to 128	-20.42	120.0 -0.0040		0.0	10.461	0.0				Vel = 1.79
128	60.71	2.157	1T	12.307	1.500	15.665				
to BC	40.29	120.0 0.0142		0.0	12.307	0.433				Vel = 3.54
	0.0									
	40.29					16.294				K Factor = 9.98
AD	-19.62	2.157	1V	4.307	1.000	16.310				
to 134	-19.62	120.0 -0.0038	1T	12.307	16.614	-0.433				Vel = 1.72
134	0.0	2.157		0.0	1.000	15.810				
to 135	-19.62	120.0 -0.0030		0.0	0.0	0.0				Vel = 1.72
135	0.0	2.157		0.0	10.000	15.807				
to 136	-19.62	120.0 -0.0038		0.0	0.0	0.0				Vel = 1.72
136	0.0	2.157		0.0	10.000	15.769				
to 137	-19.62	120.0 -0.0037		0.0	0.0	0.0				Vel = 1.72
137	0.0	2.157	1X	10.461	1.000	15.732				
to 138	-19.62	120.0 -0.0038		0.0	10.461	0.0				Vel = 1.72
138	60.76	2.157	1T	12.307	1.500	15.689				
to BD	41.14	120.0 0.0148		0.0	12.307	0.433				Vel = 3.61
	0.0									
	41.14					16.326				K Factor = 10.18
AE	-18.60	2.157	1V	4.307	1.000	16.321				
to 144	-18.6	120.0 -0.0034	1T	12.307	16.614	-0.433				Vel = 1.63
144	0.0	2.157	1X	10.461	22.000	15.828				
to 148	-18.6	120.0 -0.0034		0.0	10.461	0.0				Vel = 1.63
148	60.82	2.157	1T	12.307	1.500	15.717				
to BE	42.22	120.0 0.0155		0.0	12.307	0.433				Vel = 3.71
	0.0									
	42.22					16.364				K Factor = 10.44

# Final Calculations - Hazen-Williams

HIGH TECH FIRE PROTECTION  
TIRE WAREHOUSE PORTLAND NORTH BOYD STREET (TIRE BAY SIDE)

Page 9  
Date 10/25/16

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
AF	12.49	2.157	1V	4.307	1.000	16.343				
to		120.0	1T	12.307	16.614	-0.433				
154	12.49	0.0016		0.0	17.614	0.028		Vel =	1.10	
154	0.0	2.157	1X	10.461	22.000	15.938				
to		120.0		0.0	10.461	0.0				
158	12.49	0.0016		0.0	32.461	0.053		Vel =	1.10	
158	0.0	2.157	1T	12.307	1.500	15.991				
to		120.0		0.0	12.307	0.433				
BF	12.49	0.0017		0.0	13.807	0.023		Vel =	1.10	
	0.0									
	12.49					16.447		K Factor =	3.08	
AG	15.65	2.157	1V	4.307	1.000	16.355				
to		120.0	1T	12.307	16.614	-0.433				
164	15.65	0.0025		0.0	17.614	0.044		Vel =	1.37	
164	0.0	2.157	1X	10.461	22.000	15.966				
to		120.0		0.0	10.461	0.0				
168	15.65	0.0025		0.0	32.461	0.080		Vel =	1.37	
168	0.0	2.157	1T	12.307	1.500	16.046				
to		120.0		0.0	12.307	0.433				
BG	15.65	0.0025		0.0	13.807	0.034		Vel =	1.37	
	0.0									
	15.65					16.513		K Factor =	3.85	
AH	20.10	2.157	1V	4.307	1.000	16.367				
to		120.0	1T	12.307	16.614	-0.433				
174	20.1	0.0039		0.0	17.614	0.069		Vel =	1.76	
174	0.0	2.157	1X	10.461	22.000	16.003				
to		120.0		0.0	10.461	0.0				
178	20.1	0.0039		0.0	32.461	0.128		Vel =	1.76	
178	0.0	2.157	1T	12.307	1.500	16.131				
to		120.0		0.0	12.307	0.433				
BH	20.1	0.0039		0.0	13.807	0.054		Vel =	1.76	
	0.0									
	20.10					16.618		K Factor =	4.93	
AI	23.48	2.157	1V	4.307	1.000	16.372				
to		120.0	1T	12.307	16.614	-0.433				
184	23.48	0.0052		0.0	17.614	0.092		Vel =	2.06	
184	0.0	2.157	1X	10.461	22.000	16.031				
to		120.0		0.0	10.461	0.0				
188	23.48	0.0052		0.0	32.461	0.170		Vel =	2.06	
188	0.0	2.157	1T	12.307	1.500	16.201				
to		120.0		0.0	12.307	0.433				
BI	23.48	0.0052		0.0	13.807	0.072		Vel =	2.06	
	0.0									
	23.48					16.706		K Factor =	5.74	
AJ	28.44	2.157	1V	4.307	1.000	16.374				
to		120.0	1T	12.307	16.614	-0.433				
194	28.44	0.0075		0.0	17.614	0.132		Vel =	2.50	

# Final Calculations - Hazen-Williams

HIGH TECH FIRE PROTECTION  
TIRE WAREHOUSE PORTLAND NORTH BOYD STREET (TIRE BAY SIDE)

Page 10  
Date 10/25/16

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 to 198	0.0 28.44	2.157 120.0 0.0075	1X	10.461 0.0 0.0	22.000 10.461 32.461	16.073 0.0 0.242			Vel = 2.50	
198 to BJ	0.0 28.44	2.157 120.0 0.0075	1T	12.307 0.0 0.0	1.500 12.307 13.807	16.315 0.433 0.103			Vel = 2.50	
	0.0 28.44					16.851			K Factor = 6.93	
AA to AB	20.82	4.26 120.0 0.0001		0.0 0.0 0.0	8.000 0.0 8.000	16.296 0.0 0.001			Vel = 0.47	
AB to AC	20.72	4.26 120.0 0.0005		0.0 0.0 0.0	6.600 0.0 6.600	16.297 0.0 0.003			Vel = 0.94	
AC to AD	20.41	4.26 120.0 0.0012		0.0 0.0 0.0	8.000 0.0 8.000	16.300 0.0 0.010			Vel = 1.39	
AD to AE	19.62	4.26 120.0 0.0019		0.0 0.0 0.0	5.750 0.0 5.750	16.310 0.0 0.011			Vel = 1.84	
AE to AF	18.60	4.26 120.0 0.0028		0.0 0.0 0.0	8.000 0.0 8.000	16.321 0.0 0.022			Vel = 2.25	
AF to AG	-12.50	4.26 120.0 0.0021		0.0 0.0 0.0	5.750 0.0 5.750	16.343 0.0 0.012			Vel = 1.97	
AG to AH	-15.65	4.26 120.0 0.0015		0.0 0.0 0.0	8.000 0.0 8.000	16.355 0.0 0.012			Vel = 1.62	
AH to AI	-20.10	4.26 120.0 0.0009		0.0 0.0 0.0	5.750 0.0 5.750	16.367 0.0 0.005			Vel = 1.17	
AI to AJ	-23.48	4.26 120.0 0.0002		0.0 0.0 0.0	8.000 0.0 8.000	16.372 0.0 0.002			Vel = 0.64	
	0.0 28.44					16.374			K Factor = 7.03	
BA to BB	39.86	4.26 120.0 0.0005		0.0 0.0 0.0	8.000 0.0 8.000	16.278 0.0 0.004			Vel = 0.90	
BB to BC	39.97	4.26 120.0 0.0018		0.0 0.0 0.0	6.600 0.0 6.600	16.282 0.0 0.012			Vel = 1.80	
BC to BD	40.30	4.26 120.0 0.0040		0.0 0.0 0.0	8.000 0.0 8.000	16.294 0.0 0.032			Vel = 2.70	
BD to BE	41.13	4.26 120.0 0.0066		0.0 0.0 0.0	5.750 0.0 5.750	16.326 0.0 0.038			Vel = 3.63	

# Final Calculations - Hazen-Williams

HIGH TECH FIRE PROTECTION  
TIRE WAREHOUSE PORTLAND NORTH BOYD STREET (TIRE BAY SIDE)

Page 11  
Date 10/25/16

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	42.22	4.26		0.0	8.000	16.364				
to		120.0		0.0	0.0	0.0				
BF	203.48	0.0104		0.0	8.000	0.083		Vel =	4.58	
BF	12.49	4.26		0.0	5.750	16.447				
to		120.0		0.0	0.0	0.0				
BG	215.97	0.0115		0.0	5.750	0.066		Vel =	4.86	
BG	15.65	4.26		0.0	8.000	16.513				
to		120.0		0.0	0.0	0.0				
BH	231.62	0.0131		0.0	8.000	0.105		Vel =	5.21	
BH	20.11	4.26		0.0	5.750	16.618				
to		120.0		0.0	0.0	0.0				
BI	251.73	0.0153		0.0	5.750	0.088		Vel =	5.67	
BI	23.47	4.26		0.0	8.000	16.706				
to		120.0		0.0	0.0	0.0				
BJ	275.2	0.0181		0.0	8.000	0.145		Vel =	6.19	
	0.0									
	275.20					16.851		K Factor =	67.04	
BJ	303.65	6.357	2V	25.147	36.000	16.851				
to		120.0		0.0	25.147	-1.083				
TOR	303.65	0.0031		0.0	61.147	0.189		Vel =	3.07	
TOR	0.0	6.357	1Fsp	0.0	6.000	15.957				
to		120.0		0.0	0.0	5.548		* Fixed loss =	1	
FLW	303.65	0.0030		0.0	6.000	0.018		Vel =	3.07	
FLW	0.0	6.357	1Zib	0.0	2.000	21.523				
to		120.0		0.0	0.0	5.098		* Fixed loss =	3.799	
BOR	303.65	0.0030		0.0	2.000	0.006		Vel =	3.07	
BOR	0.0	6.16	1G	4.304	10.000	26.627				
to		140.0	1T	43.037	67.425	0.0				
H1	303.65	0.0027	1E	20.084	77.425	0.209		Vel =	3.27	
H1	0.0	8.27	1T	55.354	10.000	26.836				
to		140.0		0.0	55.354	0.866				
HOSE	303.65	0.0007		0.0	65.354	0.043		Vel =	1.81	
HOSE	250.00	6.16	1G	4.304	4.000	27.745		Qa =	250	
to		140.0	1E	20.084	24.388	-0.866				
TEST	553.65	0.0082		0.0	28.388	0.233		Vel =	5.96	
	0.0									
	553.65					27.112		K Factor =	106.33	