

... Fire Protection by Computer Design

High Tech Fire Protection
PO Box 156
Minot, ME 04258
(207) 998-2551

Job Name : Hangar Calc.
Building : Northeast Air North Hangar
Location : 1071 Westbrook Street
System : NFPA 13
Contract : 100517-1
Data File : Hangar Calc.wxf

Hydraulic Design Information Sheet

Name - Hangar Calc. Date - 12/11/2017
 Location - 1071 Westbrook Street
 Building - Northeast Air North Hangar System No. - NFPA 13
 Contractor - High Tech Fire Protection Contract No. - 100517-1
 Calculated By - Jeremy A Foss Drawing No. - FP-1.1
 Construction: () Combustible (X) Non-Combustible Ceiling Height - Varies
 Occupancy - Aircraft Hangar

S (X) NFPA 13 () Lt. Haz. Ord.Haz.Gp. () 1 () 2 () 3 (X) Ex.Haz.
 Y () NFPA 231 () NFPA 231C () Figure Curve

S Other

T Specific Ruling Made By Date

E		Made By	Date
M	Area of Sprinkler Operation - 2,000	System Type	Sprinkler/Nozzle
	Density - .3	(X) Wet	Make Globe
D	Area Per Sprinkler - 100	() Dry	Model GL8164
E	Elevation at Highest Outlet - 36.500	() Deluge	Size 3/4"
S	Hose Allowance - Inside -	() Preaction	K-Factor 8.0
I	Rack Sprinkler Allowance -	() Other	Temp.Rat.286
G	Hose Allowance - Outside - 500		

N Note

Calculation Flow Required - 1,111 Press Required - 51
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 07/20/2017		Cap. -
T	Time of Test -	Rated Cap.-	Elev.-
E	Static Press - 80	@ Press -	
R	Residual Press - 78	Elev. -	Well
	Flow - 1500		Proof Flow
S	Elevation - 13		

U Location - Test Hydrant Located on Westbrook Street 800' from Site

P Source of Information - Portland Water District

C	Commodity	Class	Location
O	Storage Ht.	Area	Aisle W.
M	Storage Method:	%	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:

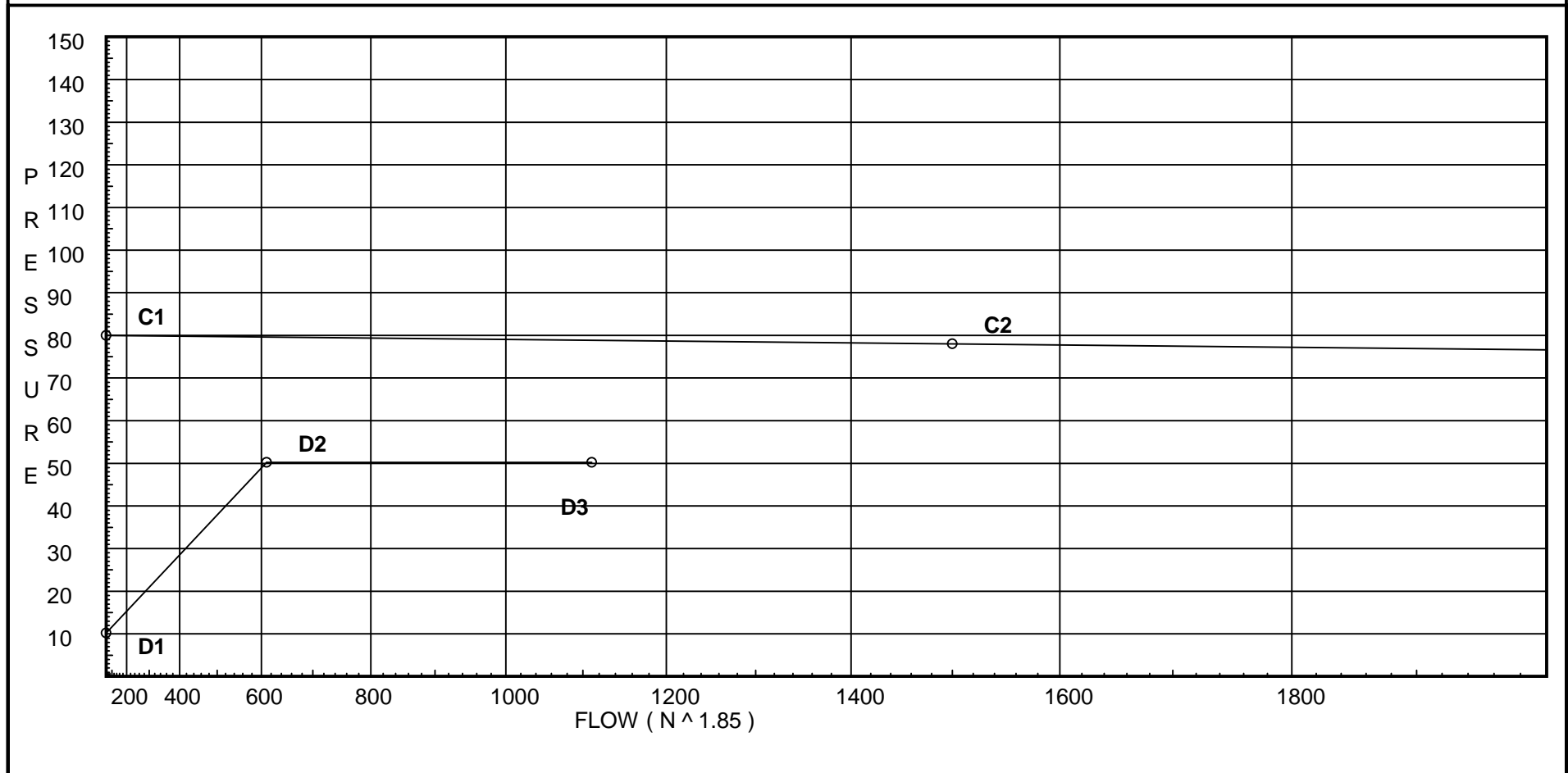
Water Supply Curve (C)

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City Water Supply:
C1 - Static Pressure : 80
C2 - Residual Pressure: 78
C2 - Residual Flow : 1500

Demand:
D1 - Elevation : 10.178
D2 - System Flow : 610.88
D2 - System Pressure : 50.211
Hose (Demand) : 500
D3 - System Demand : 1110.88
Safety Margin : 28.641



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
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	1	1	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	8.5	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

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
DP1	1.0	8	14.06	na	30.0	0.3	100	7.0
A2	32.5		21.11	na				
A1	35.5		18.59	na				
201	35.7	K = K @ EQ01	17.03	na	30.81			
202	35.9	K = K @ EQ01	16.53	na	30.35			
203	36.0	K = K @ EQ01	16.34	na	30.18			
204	36.3	K = K @ EQ01	16.2	na	30.05			
205	36.5	K = K @ EQ01	16.15	na	30.0			
206	36.9	K = K @ EQ01	16.18	na	30.03			
A3	37.0		17.05	na				
B2	32.5		21.14	na				
B1	35.5		18.62	na				
207	35.7	K = K @ EQ01	17.07	na	30.84			
208	35.9	K = K @ EQ01	16.57	na	30.39			
209	36.0	K = K @ EQ01	16.39	na	30.22			
210	36.3	K = K @ EQ01	16.24	na	30.09			
211	36.5	K = K @ EQ01	16.19	na	30.04			
212	36.9	K = K @ EQ01	16.23	na	30.08			
B3	37.0		17.11	na				
C2	32.5		21.24	na				
C1	35.5		18.74	na				
213	35.7	K = K @ EQ01	17.21	na	30.97			
214	35.9	K = K @ EQ01	16.72	na	30.53			
215	36.0	K = K @ EQ01	16.54	na	30.36			
216	36.3	K = K @ EQ01	16.4	na	30.24			
217	36.5	K = K @ EQ01	16.36	na	30.19			
218	36.9	K = K @ EQ01	16.41	na	30.24			
C3	37.0		17.32	na				
D2	32.5		21.46	na				
D1	35.5		19.76	na				
219	35.7	K = K @ EQ01	19.18	na	32.7			
220	35.9	K = K @ EQ01	19.04	na	32.58			
D3	37.0		18.62	na				
E2	32.5		21.76	na				
E1	35.5		20.38	na				
E3	37.0		19.27	na				
F2	32.5		22.09	na				
F1	35.5		20.73	na				
F3	37.0		19.71	na				
G2	32.5		22.47	na				
G1	35.5		21.1	na				
G3	37.0		20.09	na				
H2	32.5		22.87	na				
H1	35.5		21.5	na				
H3	37.0		20.42	na				
J2	32.5		23.32	na				
J1	35.5		21.92	na				
J3	37.0		20.69	na				
K2	32.5		23.82	na				
K1	35.5		22.38	na				
K3	37.0		20.91	na				
L2	32.5		25.42	na				
L1	35.5		23.78	na				
L3	37.0		21.21	na				
M2	32.5		25.41	na				
M1	35.5		23.78	na				
M3	37.0		21.23	na				
A4	34.0		19.11	na				
B4	34.0		19.17	na				
C4	34.0		19.41	na				
D4	34.0		19.93	na				
E4	34.0		20.48	na				
F4	34.0		20.94	na				
G4	34.0		21.33	na				
H4	34.0		21.64	na				

Flow Summary - Standard

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
J4	34.0		21.89	na				
K4	34.0		22.06	na				
L4	34.0		22.17	na				
N1	32.5		25.48	na				
TOR	32.5		26.65	na				
BOR	5.0		43.74	na				
BASE	1.0		54.14	na				
X1	-2.0		55.77	na				
X2	13.0		49.82	na				
TEST	13.0		50.21	na	500.0			

The maximum velocity is 13.75 and it occurs in the pipe between nodes N1 and TOR

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	*****
DP1 to EQ01	30.00 30.0	1.049 120.0 0.2757	1T	5.0 0.0 0.0	1.000 5.000 6.000	14.062 0.433 1.654			K Factor = 8.00 Vel = 11.14	
	0.0 30.00						16.149		K Factor = 7.47	
A2 to A1	-102.21 -102.21	2.157 120.0 -0.0796	1T	12.307 0.0 0.0	3.000 12.307 15.307	21.107 -1.299 -1.218			Vel = 8.97	
A1 to 201	0.0 -102.21	2.157 120.0 -0.0795	1X	10.461 0.0 0.0	8.100 10.461 18.561	18.590 -0.087 -1.475			Vel = 8.97	
201 to 202	30.81 -71.4	2.157 120.0 -0.0409		0.0 0.0 0.0	10.000 0.0 10.000	17.028 -0.087 -0.409			K Factor @ node EQ01 Vel = 6.27	
202 to 203	30.35 -41.05	2.157 120.0 -0.0147		0.0 0.0 0.0	10.000 0.0 10.000	16.532 -0.043 -0.147			K Factor @ node EQ01 Vel = 3.60	
203 to 204	30.18 -10.87	2.157 120.0 -0.0013		0.0 0.0 0.0	10.000 0.0 10.000	16.342 -0.130 -0.013			K Factor @ node EQ01 Vel = 0.95	
204 to 205	30.05 19.18	2.157 120.0 0.0037		0.0 0.0 0.0	10.000 0.0 10.000	16.199 -0.087 0.037			K Factor @ node EQ01 Vel = 1.68	
205 to 206	30.00 49.18	2.157 120.0 0.0205		0.0 0.0 0.0	10.000 0.0 10.000	16.149 -0.173 0.205			K Factor @ node EQ01 Vel = 4.32	
206 to A3	30.03 79.21	2.157 120.0 0.0496	1X	10.461 0.0 0.0	7.900 10.461 18.361	16.181 -0.043 0.910			K Factor @ node EQ01 Vel = 6.95	
A3 to A4	0.0 79.21	2.157 120.0 0.0497	1T	12.307 0.0 0.0	3.000 12.307 15.307	17.048 1.299 0.760			Vel = 6.95	
	0.0 79.21						19.107		K Factor = 18.12	
B2 to B1	-102.00 -102.0	2.157 120.0 -0.0792	1T	12.307 0.0 0.0	3.000 12.307 15.307	21.136 -1.299 -1.213			Vel = 8.96	
B1 to 207	0.0 -102.0	2.157 120.0 -0.0792	1X	10.461 0.0 0.0	8.100 10.461 18.561	18.624 -0.087 -1.470			Vel = 8.96	
207 to 208	30.84 -71.16	2.157 120.0 -0.0406		0.0 0.0 0.0	10.000 0.0 10.000	17.067 -0.087 -0.406			K Factor @ node EQ01 Vel = 6.25	
208 to 209	30.40 -40.76	2.157 120.0 -0.0145		0.0 0.0 0.0	10.000 0.0 10.000	16.574 -0.043 -0.145			K Factor @ node EQ01 Vel = 3.58	

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	*****
209 to 210	30.21 -10.55	2.157 120.0 -0.0012		0.0 0.0 0.0	10.000 0.0 10.000	16.386 -0.130 -0.012		K Factor @ node EQ01 Vel = 0.93		
210 to 211	30.09 19.54	2.157 120.0 0.0037		0.0 0.0 0.0	10.000 0.0 10.000	16.244 -0.087 0.037		K Factor @ node EQ01 Vel = 1.72		
211 to 212	30.04 49.58	2.157 120.0 0.0209		0.0 0.0 0.0	10.000 0.0 10.000	16.194 -0.173 0.209		K Factor @ node EQ01 Vel = 4.35		
212 to B3	30.08 79.66	2.157 120.0 0.0501	1X	10.461 0.0 0.0	7.900 10.461 18.361	16.230 -0.043 0.920		K Factor @ node EQ01 Vel = 6.99		
B3 to B4	0.0 79.66	2.157 120.0 0.0501	1T	12.307 0.0 0.0	3.000 12.307 15.307	17.107 1.299 0.767		Vel = 6.99		
	0.0 79.66					19.173		K Factor = 18.19		
C2 to C1	-101.23 -101.23	2.157 120.0 -0.0781	1T	12.307 0.0 0.0	3.000 12.307 15.307	21.240 -1.299 -1.196		Vel = 8.89		
C1 to 213	0.0 -101.23	2.157 120.0 -0.0781	1X	10.461 0.0 0.0	8.100 10.461 18.561	18.745 -0.087 -1.450		Vel = 8.89		
213 to 214	30.96 -70.27	2.157 120.0 -0.0397		0.0 0.0 0.0	10.000 0.0 10.000	17.208 -0.087 -0.397		K Factor @ node EQ01 Vel = 6.17		
214 to 215	30.53 -39.74	2.157 120.0 -0.0138		0.0 0.0 0.0	10.000 0.0 10.000	16.724 -0.043 -0.138		K Factor @ node EQ01 Vel = 3.49		
215 to 216	30.37 -9.37	2.157 120.0 -0.0010		0.0 0.0 0.0	10.000 0.0 10.000	16.543 -0.130 -0.010		K Factor @ node EQ01 Vel = 0.82		
216 to 217	30.23 20.86	2.157 120.0 0.0042		0.0 0.0 0.0	10.000 0.0 10.000	16.403 -0.087 0.042		K Factor @ node EQ01 Vel = 1.83		
217 to 218	30.20 51.06	2.157 120.0 0.0220		0.0 0.0 0.0	10.000 0.0 10.000	16.358 -0.173 0.220		K Factor @ node EQ01 Vel = 4.48		
218 to C3	30.24 81.3	2.157 120.0 0.0521	1X	10.461 0.0 0.0	7.900 10.461 18.361	16.405 -0.043 0.956		K Factor @ node EQ01 Vel = 7.14		
C3 to C4	0.0 81.3	2.157 120.0 0.0521	1T	12.307 0.0 0.0	3.000 12.307 15.307	17.318 1.299 0.797		Vel = 7.14		
	0.0									

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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	*****
	81.30					19.414			K Factor = 18.45	
D2 to D1	-56.24	2.157 120.0	1T	12.307	3.000 12.307	21.458 -1.299				
	-56.24	-0.0263		0.0	15.307	-0.403			Vel = 4.94	
D1 to 219	0.0	2.157 120.0	1X	10.461	8.100 10.461	19.756 -0.087				
	-56.24	-0.0263		0.0	18.561	-0.488			Vel = 4.94	
219 to 220	32.70	2.157 120.0		0.0	10.000 0.0	19.181 -0.087			K Factor @ node EQ01	
	-23.54	-0.0052		0.0	10.000	-0.052			Vel = 2.07	
220 to D3	32.57	2.157 120.0	1X	10.461	47.900 10.461	19.042 -0.476			K Factor @ node EQ01	
	9.03	0.0009		0.0	58.361	0.052			Vel = 0.79	
D3 to D4	0.0	2.157 120.0	1T	12.307	3.000 12.307	18.618 1.299				
	9.03	0.0008		0.0	15.307	0.013			Vel = 0.79	
	0.0 9.03					19.930			K Factor = 2.02	
E2 to E1	-23.68	2.157 120.0	1T	12.307	3.000 12.307	21.758 -1.299				
	-23.68	-0.0054		0.0	15.307	-0.082			Vel = 2.08	
E1 to E3	0.0	2.157 120.0	2X	20.921	66.000 20.921	20.377 -0.650				
	-23.68	-0.0053		0.0	86.921	-0.461			Vel = 2.08	
E3 to E4	0.0	2.157 120.0	1T	12.307	3.000 12.307	19.266 1.299				
	-23.68	-0.0053		0.0	15.307	-0.081			Vel = 2.08	
	0.0 -23.68					20.484			K Factor = -5.23	
F2 to F1	-21.03	2.157 120.0	1T	12.307	3.000 12.307	22.095 -1.299				
	-21.03	-0.0043		0.0	15.307	-0.066			Vel = 1.85	
F1 to F3	0.0	2.157 120.0	2X	20.921	66.000 20.921	20.730 -0.650				
	-21.03	-0.0043		0.0	86.921	-0.370			Vel = 1.85	
F3 to F4	0.0	2.157 120.0	1T	12.307	3.000 12.307	19.710 1.299				
	-21.03	-0.0042		0.0	15.307	-0.065			Vel = 1.85	
	0.0 -21.03					20.944			K Factor = -4.60	
G2 to G1	-20.75	2.157 120.0	1T	12.307	3.000 12.307	22.466 -1.299				
	-20.75	-0.0042		0.0	15.307	-0.064			Vel = 1.82	
G1 to G3	0.0	2.157 120.0	2X	20.921	66.000 20.921	21.103 -0.650				
	-20.75	-0.0042		0.0	86.921	-0.361			Vel = 1.82	

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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	*****
G3 to G4	0.0 -20.75	2.157 120.0 -0.0042	1T	12.307 0.0 0.0	3.000 12.307 15.307	20.092 1.299 -0.064		Vel = 1.82		
	0.0 -20.75					21.327		K Factor = -4.49		
H2 to H1	-22.79	2.157 120.0 -0.0050	1T	12.307 0.0 0.0	3.000 12.307 15.307	22.874 -1.299 -0.077		Vel = 2.00		
H1 to H3	0.0 -22.79	2.157 120.0 -0.0049	2X	20.921 0.0 0.0	66.000 20.921 86.921	21.498 -0.650 -0.429		Vel = 2.00		
H3 to H4	0.0 -22.79	2.157 120.0 -0.0050	1T	12.307 0.0 0.0	3.000 12.307 15.307	20.419 1.299 -0.076		Vel = 2.00		
	0.0 -22.79					21.642		K Factor = -4.90		
J2 to J1	-26.78	2.157 120.0 -0.0067	1T	12.307 0.0 0.0	3.000 12.307 15.307	23.322 -1.299 -0.102		Vel = 2.35		
J1 to J3	0.0 -26.78	2.157 120.0 -0.0067	2X	20.921 0.0 0.0	66.000 20.921 86.921	21.921 -0.650 -0.580		Vel = 2.35		
J3 to J4	0.0 -26.78	2.157 120.0 -0.0067	1T	12.307 0.0 0.0	3.000 12.307 15.307	20.691 1.299 -0.102		Vel = 2.35		
	0.0 -26.78					21.888		K Factor = -5.72		
K2 to K1	-32.27	2.157 120.0 -0.0094	1T	12.307 0.0 0.0	3.000 12.307 15.307	23.821 -1.299 -0.144		Vel = 2.83		
K1 to K3	0.0 -32.27	2.157 120.0 -0.0094	2X	20.921 0.0 0.0	66.000 20.921 86.921	22.378 -0.650 -0.819		Vel = 2.83		
K3 to K4	0.0 -32.27	2.157 120.0 -0.0094	1T	12.307 0.0 0.0	3.000 12.307 15.307	20.909 1.299 -0.144		Vel = 2.83		
	0.0 -32.27					22.064		K Factor = -6.87		
L2 to L1	-51.15	2.157 120.0 -0.0221	1T	12.307 0.0 0.0	3.000 12.307 15.307	25.416 -1.299 -0.339		Vel = 4.49		
L1 to L3	0.0 -51.15	2.157 120.0 -0.0221	2X	20.921 0.0 0.0	66.000 20.921 86.921	23.778 -0.650 -1.919		Vel = 4.49		
L3 to L4	0.0 -51.15	2.157 120.0 -0.0221	1T	12.307 0.0 0.0	3.000 12.307 15.307	21.209 1.299 -0.338		Vel = 4.49		

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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 -51.15					22.170			K Factor = -10.86	
M2 to M1	-50.75	2.157 120.0	1T	12.307 0.0	3.000 12.307	25.408 -1.299			Vel = 4.46	
M1 to M3	-50.75	-0.0218		0.0	15.307	-0.334			Vel = 4.46	
M1 to M3	0.0	2.157 120.0	2X	20.921 0.0	66.000 20.921	23.775 -0.650			Vel = 4.46	
M3 to M4	-50.75	-0.0218		0.0	86.921	-1.892			Vel = 4.46	
M3 to M4	0.0	2.157 120.0	1T	12.307 0.0	3.000 12.307	21.233 16.025			Vel = 4.46	
	0.0 -50.75					36.925			K Factor = -8.35	
A4 to B4	79.21	3.26 120.0		0.0 0.0	10.000 0.0	19.107 0.0			Vel = 3.04	
B4 to C4	79.21	0.0066		0.0	10.000	0.066			Vel = 3.04	
B4 to C4	79.66	3.26 120.0		0.0 0.0	10.000 0.0	19.173 0.0			Vel = 6.11	
C4 to D4	158.87	0.0241		0.0	10.000	0.241			Vel = 6.11	
C4 to D4	81.29	3.26 120.0		0.0 0.0	10.000 0.0	19.414 0.0			Vel = 9.23	
D4 to E4	240.16	0.0516		0.0	10.000	0.516			Vel = 9.23	
D4 to E4	9.04	3.26 120.0		0.0 0.0	10.000 0.0	19.930 0.0			Vel = 9.58	
E4 to F4	249.2	0.0554		0.0	10.000	0.554			Vel = 9.58	
E4 to F4	-23.69	3.26 120.0		0.0 0.0	10.000 0.0	20.484 0.0			Vel = 8.67	
F4 to G4	225.51	0.0460		0.0	10.000	0.460			Vel = 8.67	
F4 to G4	-21.03	3.26 120.0		0.0 0.0	10.000 0.0	20.944 0.0			Vel = 7.86	
G4 to H4	204.48	0.0383		0.0	10.000	0.383			Vel = 7.86	
G4 to H4	-20.75	3.26 120.0		0.0 0.0	10.000 0.0	21.327 0.0			Vel = 7.06	
H4 to J4	183.73	0.0315		0.0	10.000	0.315			Vel = 7.06	
H4 to J4	-22.79	3.26 120.0		0.0 0.0	10.000 0.0	21.642 0.0			Vel = 6.19	
J4 to K4	160.94	0.0246		0.0	10.000	0.246			Vel = 6.19	
J4 to K4	-26.78	3.26 120.0		0.0 0.0	10.000 0.0	21.888 0.0			Vel = 5.16	
K4 to L4	134.16	0.0176		0.0	10.000	0.176			Vel = 5.16	
K4 to L4	-32.26	3.26 120.0		0.0 0.0	10.000 0.0	22.064 0.0			Vel = 3.92	
L4 to M4	101.9	0.0106		0.0	10.000	0.106			Vel = 3.92	
L4 to M4	-51.15	3.26 120.0		0.0 0.0	10.000 0.0	22.170 14.725			Vel = 1.95	
M4	50.75	0.0030		0.0	10.000	0.030			Vel = 1.95	

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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 50.75					36.925			K Factor = 8.35	
A2 to B2	102.21	4.26 120.0		0.0	10.000 0.0	21.107 0.0				
B2 to C2	102.21	0.0029		0.0	10.000	0.029			Vel = 2.30	
B2 to C2	102.00	4.26 120.0		0.0	10.000 0.0	21.136 0.0				
C2 to D2	204.21	0.0104		0.0	10.000	0.104			Vel = 4.60	
C2 to D2	101.23	4.26 120.0		0.0	10.000 0.0	21.240 0.0				
D2 to E2	305.44	0.0218		0.0	10.000	0.218			Vel = 6.88	
D2 to E2	56.24	4.26 120.0		0.0	10.000 0.0	21.458 0.0				
E2 to F2	361.68	0.0300		0.0	10.000	0.300			Vel = 8.14	
E2 to F2	23.68	4.26 120.0		0.0	10.000 0.0	21.758 0.0				
F2 to G2	385.36	0.0337		0.0	10.000	0.337			Vel = 8.67	
F2 to G2	21.03	4.26 120.0		0.0	10.000 0.0	22.095 0.0				
G2 to H2	406.39	0.0371		0.0	10.000	0.371			Vel = 9.15	
G2 to H2	20.75	4.26 120.0		0.0	10.000 0.0	22.466 0.0				
H2 to J2	427.14	0.0408		0.0	10.000	0.408			Vel = 9.61	
H2 to J2	22.80	4.26 120.0		0.0	10.000 0.0	22.874 0.0				
J2 to K2	449.94	0.0448		0.0	10.000	0.448			Vel = 10.13	
J2 to K2	26.77	4.26 120.0		0.0	10.000 0.0	23.322 0.0				
K2 to N1	476.71	0.0499		0.0	10.000	0.499			Vel = 10.73	
K2 to N1	32.27	4.26 120.0	1X	21.067	8.400 21.067	23.821 0.0				
N1	508.98	0.0563		0.0	29.467	1.660			Vel = 11.46	
	0.0 508.98					25.481			K Factor = 100.83	
M2 to L2	50.75	4.26 120.0		0.0	10.000 0.0	25.408 0.0				
L2 to N1	50.75	0.0008		0.0	10.000	0.008			Vel = 1.14	
L2 to N1	51.15	4.26 120.0	1X	21.067	1.800 21.067	25.416 0.0				
N1	101.9	0.0028		0.0	22.867	0.065			Vel = 2.29	
	0.0 101.90					25.481			K Factor = 20.19	
N1 to TOR	610.88	4.26 120.0	1V	8.954	5.900 8.954	25.481 0.0				
TOR	610.88	0.0790		0.0	14.854	1.173			Vel = 13.75	

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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	*****
TOR	0.0	4.26	1Fsp	0.0	27.500	26.654			
to		120.0		0.0	0.0	14.910		* Fixed loss = 3	
BOR	610.88	0.0790		0.0	27.500	2.172		Vel = 13.75	
BOR	0.0	4.26	1Zib	0.0	4.000	43.736			
to		120.0		0.0	0.0	10.089		* Fixed loss = 8.357	
BASE	610.88	0.0790		0.0	4.000	0.316		Vel = 13.75	
BASE	0.0	8.27	1E	28.468	50.000	54.141			
to		140.0	1G	6.326	90.148	1.299			
X1	610.88	0.0024	1T	55.354	140.148	0.330		Vel = 3.65	
X1	0.0	12.24	1T	48.362	800.000	55.770			
to		100.0		0.0	48.362	-6.496			
X2	610.88	0.0006		0.0	848.362	0.549		Vel = 1.67	
X2	0.0	6.16	1E	20.084	15.000	49.823			
to		140.0	1G	4.304	24.388	0.0			
TEST	610.88	0.0099		0.0	39.388	0.388		Vel = 6.58	
	500.00							Qa = 500.00	
	1110.88					50.211		K Factor = 156.77	