



. . . Fire Protection by Computer Design

DEAN & ALLYN, INC.
PO BOX 709
116 LEWISTON ROAD
GRAY, MAINE 04039
207-657-5646

Job Name : UNUM HO1 MAIL ROOM
Building : HO1 ZONE 2 GROUND FLOOR MAIL ROOM
Location : PORTLAND, MAINE
System : Z2-OH.WX3
Contract : C121125
Data File : UNUM HO1 GROUND Z2-OH.WX3

Hydraulic Design Information Sheet

Name - UNUM HO1 IMPROVEMENTS/RENOVATIONS Date - 02/08/2013
 Location - PORTLAND, MAINE
 Building - HO1 ZONE 2 GROUND FLOOR MAIL ROOM System No. - Z2-OH.WX3
 Contractor - DEAN & ALLYN, INC. Contract No. - C121125
 Calculated By - T. CLARKE Drawing No. -
 Construction: () Combustible (X) Non-Combustible Ceiling Height - 8'-0"
 Occupancy - MAIL ROOM

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

E

Area	Value	System Type	Notes
Area of Sprinkler Operation	- 1500	(X) Wet	Sprinkler/Nozzle
Density	- 0.20	() Dry	Make VIKING
Area Per Sprinkler	- 18X18	() Deluge	Model VK572
Elevation at Highest Outlet	- 8	() Preaction	Size 3/4 X 3/4
Hose Allowance - Inside	- 0	() Other	K-Factor 14.0
Rack Sprinkler Allowance	- 0		Temp.Rat.155F
Hose Allowance - Outside	- 250		

N

Note CALC WITH BOOSTER PUMP-37.0 PSI CUSHION

Calculation Flow Required - 664.5 Press Required - 28.0 AT TEST
 Summary C-Factor Used: 120 Overhead 140 Underground

Water Flow Test:	Pump Data:	Tank or Reservoir:
Date of Test - SEPT. 2012	Rated Cap.- 750	Cap. -
Time of Test -	@ Press - 50	Elev.-
Static Press - 67	Elev. - 2	Well
Residual Press - 60		Proof Flow
Flow - 1316		
Elevation - 2		

U

P Location - HYDRANT #5

P

L Source of Information - BY OWNER

Y

Commodity	N/A	Class	Location
Storage Ht.	Area	Aisle W.	
Storage Method:	Solid Piled	% Palletized	% Rack
() Single Row	() Conven. Pallet	() Auto. Storage	() Encap.
() Double Row	() Slave Pallet	() Solid Shelf	() Non
() Mult. Row		() Open Shelf	

S

R K Flue Spacing Clearance:Storage to Ceiling
 A Longitudinal Transverse

G

E Horizontal Barriers Provided:

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
Abbrev.	Name																				
Bvca	B Fly Vic 705						6	6	7		8	12	14	16	18	19					
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
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
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
H	45' Grvd-Vic Elbow #11	0	0	1	1.5	2	2	3	3	3.5	3.5	4.5	5	6.5	8.5	10	18	20	23	25	30
I	90' Grvd-Vic Elbow #10	0	0	2	3	4	3.5	6	5	8	7	8.5	10	13	17	20	23	25	33	36	40
J	90'Tee-Branch Grv Vic #20	0	0	4.5	6	8	8.5	10.8	13	17	16	21	25	33	41	50	65	78	88	98	120
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
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
Y	Mechanical Tee	2	4	5	6	8	10.5	12.5	15.5	0	22	0	0	0	0	0	0	0	0	0	0
Zac	Ames 2000SS	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.
501A	8.0	14	23.55	na	67.94	0.2	324	21.6
502A	8.0	14	27.29	na	73.13	0.2	324	21.6
503A	8.0	14	23.69	na	68.15	0.2	324	21.6
504A	8.0	14	21.6	na	65.07	0.2	324	21.6
505A	8.0	14	24.68	na	69.55	0.2	324	21.6
506A	8.0	14	25.46	na	70.65	0.2	324	21.6
501	8.667		30.34	na				
502	8.667		35.12	na				
503	8.667		37.34	na				
504	8.667		31.46	na				
505	8.667		35.87	na				
506	8.667		36.99	na				
511	8.667		43.42	na				
512	8.667		43.41	na				
513	8.667		43.48	na				
514	8.667		45.97	na				
515	8.667		48.63	na				
516	8.667		54.85	na				
523	8.667		45.27	na				
524	8.667		45.99	na				
525	8.833		51.51	na				
537	7.833		72.3	na				
538	7.833		72.36	na				
539	7.833		72.56	na				
540	7.833		74.22	na				
TR2	5.833		75.52	na				
BR2	2.0		78.51	na				
PO	2.0		78.74	na				
PI	2.0		60.22	na				
FF	1.0		63.4	na				
UG1	-7.0		67.7	na	250.0			
UG2	-7.0		68.43	na				
UG3	-7.0		68.72	na				
TEST	2.0		65.02	na				

The maximum velocity is 27.71 and it occurs in the pipe between nodes 502 and 511

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
501A	67.94	1.049	1T	5.0	0.667	23.548			K Factor = 14.00	
to		120.0		0.0	5.000	-0.289				
501	67.94	1.2499		0.0	5.667	7.083			Vel = 25.22	
	0.0									
	67.94						30.342		K Factor = 12.33	
502A	73.14	1.049	1T	5.0	0.667	27.289			K Factor = 14.00	
to		120.0		0.0	5.000	-0.289				
502	73.14	1.4327		0.0	5.667	8.119			Vel = 27.15	
	0.0									
	73.14						35.119		K Factor = 12.34	
503A	68.15	1.049	1E	2.0	4.083	23.694			K Factor = 14.00	
to		120.0	1T	5.0	7.000	-0.289				
503	68.15	1.2571		0.0	11.083	13.932			Vel = 25.30	
	0.0									
	68.15						37.337		K Factor = 11.15	
504A	65.07	1.049	1E	2.0	1.792	21.600			K Factor = 14.00	
to		120.0	1T	5.0	7.000	-0.289				
504	65.07	1.1540		0.0	8.792	10.146			Vel = 24.16	
	0.0									
	65.07						31.457		K Factor = 11.60	
505A	69.55	1.049	1E	2.0	1.792	24.679			K Factor = 14.00	
to		120.0	1T	5.0	7.000	-0.289				
505	69.55	1.3054		0.0	8.792	11.477			Vel = 25.82	
	0.0									
	69.55						35.867		K Factor = 11.61	
506A	70.65	1.049	1E	2.0	1.792	25.464			K Factor = 14.00	
to		120.0	1T	5.0	7.000	-0.289				
506	70.65	1.3436		0.0	8.792	11.813			Vel = 26.23	
	0.0									
	70.65						36.988		K Factor = 11.62	
501	67.94	1.442		0.0	18.000	30.342				
to		120.0		0.0	0.0	0.0				
502	67.94	0.2654		0.0	18.000	4.777			Vel = 13.35	
502	73.13	1.442	1T	7.432	0.667	35.119				
to		120.0		0.0	7.432	0.0				
511	141.07	1.0256		0.0	8.099	8.306			Vel = 27.71	
	0.0									
	141.07						43.425		K Factor = 21.41	
503	68.15	1.442	1T	7.432	15.333	37.337				
to		120.0		0.0	7.432	0.0				
512	68.15	0.2669		0.0	22.765	6.076			Vel = 13.39	

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 68.15					43.413		K Factor = 10.34	
504 to 505	65.07	1.442 120.0	0.0	18.000	31.457	0.0			
505 to 513	65.07	0.2450 120.0	0.0	18.000	4.410	0.0		Vel = 12.78	
505 to 513	69.55	1.442 120.0	1T 7.432	0.667	35.867	0.0			
	134.62	0.9404	0.0	8.099	7.616			Vel = 26.45	
	0.0 134.62					43.483		K Factor = 20.42	
506 to 513	70.65	1.442 120.0	1T 7.432	15.333	36.988	0.0			
	70.65	0.2853	0.0	22.765	6.495			Vel = 13.88	
	0.0 70.65					43.483		K Factor = 10.71	
511 to 512	-31.58	2.635 120.0	0.0	3.417	43.425	0.0			
512 to 513	-31.58	-0.0035 120.0	0.0	3.417	-0.012	0.0		Vel = 1.86	
512 to 513	68.15	2.635 120.0	0.0	15.708	43.413	0.0			
	36.57	0.0045	0.0	15.708	0.070			Vel = 2.15	
513 to 514	205.26	2.635 120.0	0.0	16.875	43.483	0.0			
	241.83	0.1476	0.0	16.875	2.490			Vel = 14.23	
514 to 515	0.0	2.635 120.0	0.0	18.000	45.973	0.0			
	241.83	0.1476	0.0	18.000	2.656			Vel = 14.23	
515 to 516	0.0	2.635 120.0	1J 14.827	27.333	48.629	0.0			
	241.83	0.1476	0.0	42.160	6.221			Vel = 14.23	
516 to 538	0.0	2.635 120.0	3I 24.711 1Y 17.161	74.375	54.850	0.361			
	241.83	0.1476	0.0	116.247	17.153			Vel = 14.23	
	0.0 241.83					72.364		K Factor = 28.43	
511 to 523	172.65	2.635 120.0	1I 8.237	15.083	43.425	0.0			
	172.65	0.0791	0.0	23.320	1.844			Vel = 10.16	
523 to 524	0.0	2.635 120.0	0.0	9.125	45.269	0.0			
	172.65	0.0791	0.0	9.125	0.722			Vel = 10.16	

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	*****
524	0.0	2.635	2I 16.474	46.000	45.991				
to		120.0	2H 8.237	24.711	-0.072				
525	172.65	0.0791	0.0	70.711	5.594		Vel = 10.16		
525	0.0	2.635	8I 65.897	174.229	51.513				
to		120.0	1Y 17.161	83.058	0.433				
537	172.65	0.0791	0.0	257.287	20.352		Vel = 10.16		
537	0.0	6.065	0.0	48.563	72.298				
to		120.0	0.0	0.0	0.0				
538	172.65	0.0014	0.0	48.563	0.066		Vel = 1.92		
538	241.83	6.065	1J 25.0	3.167	72.364				
to		120.0	0.0	25.000	0.0				
539	414.48	0.0069	0.0	28.167	0.195		Vel = 4.60		
539	0.0	6.065	1J 25.0	24.375	72.559				
to		120.0	1Bvca 14.0	71.000	1.000		** Fixed Loss = 1		
540	414.48	0.0069	1Fsp 0.0	95.375	0.657		Vel = 4.60		
			1S 32.0						
540	0.0	6.357	5I 62.867	17.313	74.216				
to		120.0	0.0	62.867	0.866				
TR2	414.48	0.0055	0.0	80.180	0.440		Vel = 4.19		
TR2	0.0	6.357	1Fsp 0.0	3.833	75.522				
to		120.0	1Bvca 17.603	55.323	2.660		** Fixed Loss = 1		
BR2	414.48	0.0055	1T 37.72	59.156	0.325		Vel = 4.19		
BR2	0.0	6.357	2I 25.147	17.104	78.507				
to		120.0	0.0	25.147	0.0				
PO	414.48	0.0055	0.0	42.251	0.232		Vel = 4.19		
	0.0								
	414.48				78.739		K Factor = 46.71		
System Demand Pressure					78.739				
Safety Margin					37.000				
Continuation Pressure					115.739				
Pressure @ Pump Outlet					115.739				
Pressure From Pump Curve					-55.523				
Pressure @ Pump Inlet					60.216				
PI	0.0	6.357	2I 25.147	7.250	60.216				
to		120.0	1Zac 0.0	25.147	3.005		** Fixed Loss = 2.572		
FF	414.48	0.0055	0.0	32.397	0.178		Vel = 4.19		
FF	0.0	6.16	2E 40.168	90.667	63.399				
to		140.0	1T 43.037	83.205	3.465				
UG1	414.48	0.0048	0.0	173.872	0.836		Vel = 4.46		
UG1	250.00	8.27	2F 28.468	174.667	67.700		Qa = 250		
to		140.0	1G 6.326	90.148	0.0				
UG2	664.48	0.0027	1T 55.354	264.815	0.726		Vel = 3.97		

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	*****
UG2 to UG3	0.0 664.48	8.27 140.0 0.0027	1T	55.354 0.0 55.354	50.000 0.0 105.354	68.426 0.0 0.289		Vel = 3.97	
UG3 to TEST	0.0 664.48	8.27 140.0 0.0027	1T 1G	55.354 6.326 74.847	13.167 61.680 0.205	68.715 -3.898 0.205		Vel = 3.97	
	0.0 664.48					65.022		K Factor = 82.40	

Water Supply Curve C

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City Water Supply: C1 - Static Pressure : 67 C2 - Residual Pressure: 60 C2 - Residual Flow : 1316 City Water Adjusted to Pump Inlet for Pf - Elev - Hose Flow A1 - Adjusted Static: 62.476 A2 - Adj Resid : 53.561 @ 750 A3 - Adj Resid : 42.669 @ 1125	Pump Data: P1 - Pump Churn Pressure : 56 P2 - Pump Rated Pressure : 50 P2 - Pump Rated Flow : 750 P3 - Pump Pressure @ Max Flow : 32.5 P3 - Pump Max Flow : 1125 City Residual Flow @ 0 = 4461.84 City Residual Flow @ 20 = 3683.69 City Water @ 150% of Pump = 61.76	Demand: D1 - Elevation : 2.599 D2 - System Flow : 414.48 D2 - System Pressure : 78.739 Hose (Demand) : D3 - System Demand : 414.48 Hose (Adj City) : 250 Safety Margin : 37.000
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