



**... Fire Protection by Computer Design**

SPRINKLER SYSTEMS INC.  
4 AVON STREET  
P O BOX 1285  
LEWISTON, ME. 04243  
207-782-0104

Job Name : 89 Anderson Street Dry System Area 1  
Building : NEW  
Location : 89 ANDERSON STREET PORTLAND, MAINE  
System : 2 DRY  
Contract : 15-126  
Data File : 89 Anderson Street Dry System Area 1.WXF

Hydraulic Design Information Sheet

Name - 89 ANDERSON STREET APARTMENTS DRY SYSTEM AREA 1      Date - 3/17/16  
 Location - 89 ANDERSON STREET PORTLAND, MAINE  
 Building - NEW      System No. - 2 DRY  
 Contractor - SPRINKLER SYSTEMS INC      Contract No. - 15-126  
 Calculated By - CDS      Drawing No. - 1-3 OF 3  
 Construction: (X) Combustible ( ) Non-Combustible      Ceiling Height - VARIES  
 Occupancy - APARTMENTS/ PARKING

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

S Other NFPA 13R  
 T Specific Ruling

Made By      Date

M	Area of Sprinkler Operation - 1950	System Type	Sprinkler/Nozzle
	Density - .15	(X) Wet	Make RELIABLE
D	Area Per Sprinkler - 130	( ) Dry	Model F1FR56
E	Elevation at Highest Outlet - 110	( ) Deluge	Size 1/2" X 1/2"
S	Hose Allowance - Inside - 0	( ) Preaction	K-Factor 5.6
I	Rack Sprinkler Allowance - 0	( ) Other	Temp.Rat.200 DEG.
G	Hose Allowance - Outside - 250		

N Note

Calculation Flow Required - 483.64 Press Required - 789.236 AT BASE  
 Summary C-Factor Used: 100 Overhead 150 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 5-23-15		Cap. -
T	Time of Test - AM	Rated Cap.-	Elev.-
E	Static Press - 86	@ Press -	
R	Residual Press - 78	Elev. -	Well
	Flow - 1299		Proof Flow
S	Elevation - 160.0'		

U Location - ON SITE

P Source of Information - OWNER AND WATER DISTRICT

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

# Fittings Used Summary

SPRINKLER SYSTEMS INC.  
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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																				
Bvcb	B Fly Vic 705W	0	0	0	0	0	0	5	5	0	12	12	8	11	12	14	0	0	0	0	0
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
G	NFPA 13 Gate Valve	0	0	0	0	0	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
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.
TYP	0.0	5.6	12.13	na	19.5	0.15	130	7.0
224	110.0	K = K @ SPRG	24.7	na	26.96			
225	110.0	K = K @ SPRG	25.07	na	27.17			
226	110.0	K = K @ SPRG	26.43	na	27.89			
215	110.0	K = K @ SPRG	13.44	na	19.89			
213	110.0	K = K @ SPRG	14.34	na	20.54			
214	110.0	K = K @ SPRG	14.49	na	20.65			
211	110.0	K = K @ SPRG	12.92	na	19.5			
209	110.0	K = K @ SPRG	13.79	na	20.14			
210	110.0	K = K @ SPRG	13.93	na	20.25			
212	110.0		14.54	na				
216	110.0		15.12	na				
217	110.0	K = K @ SPRG	17.73	na	22.84			
218	110.0		17.75	na				
219	110.0	K = K @ SPRG	18.98	na	23.63			
220	110.0	K = K @ SPRG	20.21	na	24.39			
221	110.0	K = K @ SPRG	21.79	na	25.32			
222	110.0	K = K @ SPRG	23.78	na	26.46			
205	110.0	K = K @ SPRG	23.17	na	26.11			
206	110.0	K = K @ SPRG	23.43	na	26.26			
207	110.0	K = K @ SPRG	24.22	na	26.7			
201	110.0	K = K @ SPRG	23.08	na	26.07			
202	110.0	K = K @ SPRG	23.35	na	26.21			
203	110.0	K = K @ SPRG	24.13	na	26.65			
204	110.0		26.46	na				
208	110.0		26.56	na				
223	110.0		26.87	na				
227	110.0		28.94	na				
233	110.0		31.84	na				
239	110.0		34.75	na				
241	110.0		37.66	na				
242	110.0		56.72	na				
TDR	110.0		59.28	na				
TDV	106.0		62.07	na				
BDR	104.0		71.69	na				
H	104.0		73.14	na				
BKFL	103.5		73.38	na				
BASE	100.0		79.24	na				
HOSE	100.0		86.94	na	250.0			
TEST	160.0		60.98	na				

The maximum velocity is 20.99 and it occurs in the pipe between nodes TDV and BDR

# 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	*****
TYP to SPRG	19.50 19.5	1.049 100.0 0.1740	T 3.568 0.0 0.0	1.000 3.568 4.568	12.125 0.0 0.795			K Factor = 5.60 Vel = 7.24	
	0.0 19.50							K Factor = 5.43	
224 to 225	26.96 26.96	1.682 100.0 0.0317	0.0 0.0 0.0	11.750 0.0 11.750	24.701 0.0 0.373			K Factor @ node SPRG Vel = 3.89	
225 to 226	27.17 27.17	1.682 100.0 0.1154	0.0 0.0 0.0	11.750 0.0 11.750	25.074 0.0 1.356			K Factor @ node SPRG Vel = 7.82	
226 to 227	27.89 82.02	1.682 100.0 0.2490	T 7.065 0.0 0.0	3.000 7.066 10.066	26.430 0.0 2.506			K Factor @ node SPRG Vel = 11.84	
	0.0 82.02							K Factor = 15.25	
215 to 216	19.89 19.89	1.049 100.0 0.1805	T 3.568 0.0 0.0	5.750 3.568 9.318	13.440 0.0 1.682			K Factor @ node SPRG Vel = 7.38	
	0.0 19.89							K Factor = 5.11	
213 to 214	20.54 20.54	1.682 100.0 0.0192	0.0 0.0 0.0	7.750 0.0 7.750	14.341 0.0 0.149			K Factor @ node SPRG Vel = 2.97	
214 to 216	20.66 41.2	1.682 100.0 0.0697	T 7.065 0.0 0.0	2.000 7.066 9.066	14.490 0.0 0.632			K Factor @ node SPRG Vel = 5.95	
	0.0 41.20							K Factor = 10.59	
211 to 212	19.50 19.5	1.049 100.0 0.1740	T 3.568 0.0 0.0	5.750 3.568 9.318	12.920 0.0 1.621			K Factor @ node SPRG Vel = 7.24	
	0.0 19.50							K Factor = 5.11	
209 to 210	20.14 20.14	1.682 100.0 0.0185	0.0 0.0 0.0	7.750 0.0 7.750	13.789 0.0 0.143			K Factor @ node SPRG Vel = 2.91	
210 to 212	20.25 40.39	1.682 100.0 0.0672	T 7.065 0.0 0.0	2.000 7.066 9.066	13.932 0.0 0.609			K Factor @ node SPRG Vel = 5.83	
212 to 216	19.50 59.89	2.157 100.0 0.0415	0.0 0.0 0.0	14.000 0.0 14.000	14.541 0.0 0.581			Vel = 5.26	
216 to 218	61.09 120.98	2.157 100.0 0.1521	T 8.783 0.0 0.0	8.500 8.783 17.283	15.122 0.0 2.629			Vel = 10.62	

# 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	*****
	0.0 120.98					17.751		K Factor = 28.71	
217 to 218	22.84	2.635 100.0		8.000 0.0	17.730 0.0			K Factor @ node SPRG	
218 to 219	22.84	0.0026		8.000	0.021			Vel = 1.34	
218 to 219	120.98	2.635 100.0	T	11.758 3.750 11.757	17.751 0.0				
219 to 220	143.82	0.0791		0.0 15.507	1.226			Vel = 8.46	
219 to 220	23.64	2.635 100.0		0.0 11.750 0.0	18.977 0.0			K Factor @ node SPRG	
220 to 221	167.46	0.1048		0.0 11.750	1.231			Vel = 9.85	
220 to 221	24.38	2.635 100.0		0.0 11.750 0.0	20.208 0.0			K Factor @ node SPRG	
221 to 222	191.84	0.1347		0.0 11.750	1.583			Vel = 11.29	
221 to 222	25.33	2.635 100.0		0.0 11.750 0.0	21.791 0.0			K Factor @ node SPRG	
222 to 223	217.17	0.1694		0.0 11.750	1.991			Vel = 12.78	
222 to 223	26.45	2.635 100.0	T	11.758 3.000 11.757	23.782 0.0			K Factor @ node SPRG	
223	243.62	0.2095		0.0 14.757	3.092			Vel = 14.33	
	0.0 243.62					26.874		K Factor = 46.99	
205 to 206	26.11	1.682 100.0		8.750 0.0	23.172 0.0			K Factor @ node SPRG	
206 to 207	26.11	0.0299		8.750	0.262			Vel = 3.77	
206 to 207	26.27	1.682 100.0		7.250 0.0	23.434 0.0			K Factor @ node SPRG	
207 to 208	52.38	0.1086		7.250	0.787			Vel = 7.56	
207 to 208	26.70	1.682 100.0	T	7.065 3.000 7.066	24.221 0.0			K Factor @ node SPRG	
208	79.08	0.2327		0.0 10.066	2.342			Vel = 11.42	
	0.0 79.08					26.563		K Factor = 15.34	
201 to 202	26.07	1.682 100.0		8.750 0.0	23.084 0.0			K Factor @ node SPRG	
202 to 203	26.07	0.0299		8.750	0.262			Vel = 3.76	
202 to 203	26.21	1.682 100.0		7.250 0.0	23.346 0.0			K Factor @ node SPRG	
203 to 204	52.28	0.1081		7.250	0.784			Vel = 7.55	
203 to 204	26.65	1.682 100.0	T	7.065 3.000 7.066	24.130 0.0			K Factor @ node SPRG	
204 to 208	78.93	0.2319		0.0 10.066	2.334			Vel = 11.40	
204 to 208	0.0	3.26 100.0		0.0 10.750 0.0	26.464 0.0				
208	78.93	0.0092		0.0 10.750	0.099			Vel = 3.03	

# 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	*****
208	79.07	3.26		9.330	26.563				
to		100.0	0.0	0.0	0.0				
223	158.0	0.0333	0.0	9.330	0.311		Vel = 6.07		
223	243.62	3.26	0.0	11.000	26.874				
to		100.0	0.0	0.0	0.0				
227	401.62	0.1875	0.0	11.000	2.062		Vel = 15.44		
227	82.02	3.26	0.0	11.000	28.936				
to		100.0	0.0	0.0	0.0				
233	483.64	0.2644	0.0	11.000	2.908		Vel = 18.59		
233	0.0	3.26	0.0	11.000	31.844				
to		100.0	0.0	0.0	0.0				
239	483.64	0.2643	0.0	11.000	2.907		Vel = 18.59		
239	0.0	3.26	0.0	11.000	34.751				
to		100.0	0.0	0.0	0.0				
241	483.64	0.2644	0.0	11.000	2.908		Vel = 18.59		
241	0.0	3.26	E 6.714	51.000	37.659				
to		100.0	T 14.388	21.101	0.0				
242	483.64	0.2643	0.0	72.101	19.058		Vel = 18.59		
242	0.0	3.26	E 6.714	3.000	56.717				
to		100.0	0.0	6.714	0.0				
TDR	483.64	0.2644	0.0	9.714	2.568		Vel = 18.59		
TDR	0.0	3.26	0.0	4.000	59.285				
to		100.0	0.0	0.0	1.732				
TDV	483.64	0.2642	0.0	4.000	1.057		Vel = 18.59		
TDV	0.0	3.068	Bvcb 5.0	0.500	62.074				
to		120.0	T 15.0	34.000	0.866				
BDR	483.64	0.2536	Eq 14.0	34.500	8.748		Vel = 20.99		
BDR	0.0	4.26	T 26.334	2.000	71.688				
to		120.0	0.0	26.334	0.0				
H	483.64	0.0512	0.0	28.334	1.452		Vel = 10.89		
H	0.0	4.26	0.0	0.500	73.140				
to		120.0	0.0	0.0	0.217				
BKFL	483.64	0.0500	0.0	0.500	0.025		Vel = 10.89		
BKFL	0.0	4.026	Zac 0.0	0.500	73.382				
to		120.0	0.0	0.0	5.820		* * Fixed Loss = 4.304		
BASE	483.64	0.0680	0.0	0.500	0.034		Vel = 12.19		
BASE	0.0	4.07	2E 31.864	115.000	79.236				
to		150.0	T 31.864	66.914	0.0				
HOSE	483.64	0.0424	G 3.186	181.914	7.707		Vel = 11.93		
HOSE	250.00	20.57	0.0	685.000	86.943		Qa = 250		
to		140.0	0.0	0.0	-25.986				
TEST	733.64	0.0	0.0	685.000	0.026		Vel = 0.71		
	0.0								
	733.64				60.983		K Factor = 93.95		

# Water Supply Curve C

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City Water Supply:  
C1 - Static Pressure : 86  
C2 - Residual Pressure: 78  
C2 - Residual Flow : 1299

Demand:  
D1 - Elevation : -21.655  
D2 - System Flow : 483.642  
D2 - System Pressure : 60.983  
Hose ( Demand ) : 250  
D3 - System Demand : 733.642  
Safety Margin : 22.237

