



... Fire Protection by Computer Design

Dean and Allyn Inc
116 Lewiston Road
Gray ME, 04039
(207)657-5646

Job Name : Cash Star
Building : 25 PEARL STREET
Location : 3RD FLOOR
System : 1
Contract : C141216
Data File : C1216_3RD.WXF

Hydraulic Design Information Sheet

Name - CASH STAR Date - 7/21/14
 Location - 3RD FLOOR
 Building - 25 PEARL STREET System No. - 1
 Contractor - DEAN AND ALLYN INC Contract No. - C141216
 Calculated By - S. COTE Drawing No. - 1 OF 1
 Construction: () Combustible (X) Non-Combustible Ceiling Height - VARIES
 Occupancy - OFFICE

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

S Other

T Specific Ruling Made By Date

E
 M Area of Sprinkler Operation - 1500 System Type Sprinkler/Nozzle
 Density - .10 (X) Wet Make RELIABLE
 D Area Per Sprinkler - VARIES () Dry Model F1FR-56
 E Elevation at Highest Outlet - 128.083 () Deluge Size 1/2"
 S Hose Allowance - Inside - () Preaction K-Factor 5.6
 I Rack Sprinkler Allowance - () Other Temp.Rat.155
 G Hose Allowance - Outside - 250

N Note

Calculation Flow Required - 316.769 Press Required - 83.122
 Summary C-Factor Used: 120 Overhead 140 Underground

W Water Flow Test: Pump Data: Tank or Reservoir:
 A Date of Test - 7/2/14 Cap. -
 T Time of Test - 6:45A.M. Rated Cap.- Elev.-
 E Static Press - 105 @ Press -
 R Residual Press - 90 Elev. - Well
 Flow - 1591 Proof Flow
 S Elevation -

U Location - FRANKLIN/FORE

P Source of Information - PORTALND 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 R () Double Row () Slave Pallet () Solid Shelf () Non
 T A () Mult. Row () Open Shelf

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

G
 E Horizontal Barriers Provided:

Fittings Used Summary

Dean and Allyn Inc
Cash Star

Page 2
Date

Fitting Legend

Abbrev.	Name	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	
A	Alarm Rel E1 & E3							7.7	21.5		17		27	29								
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	1	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	

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

Dean and Allyn Inc
Cash Star

Page 3
Date

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
300B	128.083	5.6	20.49	na	25.35	0.1	168	7.0
300C	129.583		23.47	na				
301B	128.083	5.6	19.8	na	24.92	0.1	144	7.0
301C	129.583		21.95	na				
301E	128.083	5.6	18.74	na	24.24	0.1	196	7.0
301F	129.583		20.87	na				
301D	129.583		24.18	na				
302B	128.083	5.6	26.1	na	28.61	0.1	168	7.0
303B	128.083	5.6	28.12	na	29.7	0.1	122	7.0
304B	128.083	5.6	31.41	na	31.39	0.1	103	7.0
300	129.25		25.15	na				
301	129.25		25.48	na				
302	129.25		27.91	na				
303	129.25		30.19	na				
304	129.25		33.6	na				
312	129.25		38.66	na				
305B	128.083	5.6	8.16	na	16.0	0.1	160	7.0
305C	129.583		8.45	na				
306B	128.083	5.6	8.83	na	16.64	0.1	160	7.0
306C	129.25		9.08	na				
307B	128.083	5.6	9.98	na	17.7	0.1	120	7.0
308B	128.083	5.6	11.35	na	18.87	0.1	110	7.0
309C	128.083	5.6	10.68	na	18.3	0.1	108	7.0
309B	128.083	5.6	11.02	na	18.59	0.1	108	7.0
309D	129.25		11.88	na				
310B	128.083	5.6	15.77	na	22.24	0.1	110	7.0
311B	128.083	5.6	18.73	na	24.24	0.1	134	7.0
305	129.25		9.6	na				
306	129.25		9.73	na				
307	129.25		10.44	na				
308	129.25		12.52	na				
309	129.25		14.65	na				
310	129.25		16.89	na				
311	129.25		22.02	na				
313	129.25		28.9	na				
30	128.583		45.17	na				
31	128.583		45.42	na				
32	128.583		62.54	na				
23	117.333		68.3	na				
24	105.75		73.59	na				
25	105.75		74.64	na				
26	104.25		75.75	na				
TOR	101.25		77.14	na				
BOR	92.083		81.24	na				
27	92.083		82.87	na				
TEST	92.083		83.12	na	250.0			

The maximum velocity is 29.56 and it occurs in the pipe between nodes 311 and 313

Final Calculations - Hazen-Williams

Dean and Allyn Inc
Cash Star

Page 4
Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
300B to 300C	25.35	1.049 120.0	3E	6.0 0.0	12.000 6.000	20.488 -0.650			K Factor = 5.60	
	25.35	0.2017		0.0	18.000	3.631			Vel = 9.41	
300C to 300	0.0	1.104 120.0	2E	5.13 0.0	4.666 5.130	23.469 0.144				
	25.35	0.1573		0.0	9.796	1.541			Vel = 8.50	
	0.0 25.35						25.154		K Factor = 5.05	
301B to 301C	24.92	1.049 120.0	3E	6.0 0.0	8.333 6.000	19.796 -0.650			K Factor = 5.60	
	24.92	0.1954		0.0	14.333	2.801			Vel = 9.25	
301C to 301D	0.0	1.104 120.0	2T	12.826 0.0	1.833 12.826	21.947 0.0				
	24.92	0.1523		0.0	14.659	2.233			Vel = 8.35	
	0.0 24.92						24.180		K Factor = 5.07	
301E to 301F	24.24	1.049 120.0	3E	6.0 0.0	9.000 6.000	18.738 -0.650			K Factor = 5.60	
	24.24	0.1858		0.0	15.000	2.787			Vel = 9.00	
301F to 301D	0.0	1.104 120.0	2T	12.826 0.0	10.000 12.826	20.875 0.0				
	24.24	0.1448		0.0	22.826	3.305			Vel = 8.12	
301D to 301	24.92	1.452 120.0	T	7.686 0.0	0.500 7.686	24.180 0.144				
	49.16	0.1411		0.0	8.186	1.155			Vel = 9.53	
	0.0 49.16						25.479		K Factor = 9.74	
302B to 302	28.61	1.049 120.0	E T	2.0 5.0	2.208 7.000	26.096 -0.505			K Factor = 5.60	
	28.61	0.2523		0.0	9.208	2.323			Vel = 10.62	
	0.0 28.61						27.914		K Factor = 5.42	
303B to 303	29.70	1.049 120.0	E T	2.0 5.0	2.500 7.000	28.124 -0.505			K Factor = 5.60	
	29.7	0.2703		0.0	9.500	2.568			Vel = 11.03	
	0.0 29.70						30.187		K Factor = 5.41	
304B to 304	31.39	1.049 120.0	E T	2.0 5.0	2.000 7.000	31.414 -0.505			K Factor = 5.60	
	31.39	0.2996		0.0	9.000	2.696			Vel = 11.65	
	0.0 31.39						33.605		K Factor = 5.41	
300 to 301	25.35	1.452 120.0	E	3.843 0.0	4.000 3.843	25.154 0.0				
	25.35	0.0414		0.0	7.843	0.325			Vel = 4.91	
301 to 302	49.15	1.452 120.0		0.0 0.0	8.000 0.0	25.479 0.0				
	74.5	0.3044		0.0	8.000	2.435			Vel = 14.43	

Final Calculations - Hazen-Williams

Dean and Allyn Inc
Cash Star

Page 5
Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
302	28.61	1.687		0.0	8.500	27.914				
to		120.0		0.0	0.0	0.0				
303	103.11	0.2674		0.0	8.500	2.273		Vel = 14.80		
303	29.70	1.687		0.0	8.000	30.187				
to		120.0		0.0	0.0	0.0				
304	132.81	0.4272		0.0	8.000	3.418		Vel = 19.06		
304	31.39	1.687		0.0	8.000	33.605				
to		120.0		0.0	0.0	0.0				
312	164.2	0.6324		0.0	8.000	5.059		Vel = 23.57		
312	0.0	2.154	T	12.224	20.083	38.664				
to		120.0		0.0	12.224	0.289				
30	164.2	0.1924		0.0	32.307	6.215		Vel = 14.46		
	0.0									
	164.20					45.168		K Factor = 24.43		
305B	16.00	1.049	3E	6.0	4.833	8.163		K Factor = 5.60		
to		120.0		0.0	6.000	-0.650				
305C	16.0	0.0862		0.0	10.833	0.934		Vel = 5.94		
305C	0.0	1.104	E	2.565	12.500	8.447				
to		120.0		0.0	2.565	0.144				
305	16.0	0.0671		0.0	15.065	1.011		Vel = 5.36		
	0.0									
	16.00					9.602		K Factor = 5.16		
306B	16.64	1.049	3E	6.0	2.166	8.832		K Factor = 5.60		
to		120.0		0.0	6.000	-0.505				
306C	16.64	0.0925		0.0	8.166	0.755		Vel = 6.18		
306C	0.0	1.104	T	6.413	2.500	9.082				
to		120.0		0.0	6.413	0.0				
306	16.64	0.0723		0.0	8.913	0.644		Vel = 5.58		
	0.0									
	16.64					9.726		K Factor = 5.34		
307B	17.70	1.049	E	2.0	2.291	9.985		K Factor = 5.60		
to		120.0	T	5.0	7.000	-0.505				
307	17.7	0.1036		0.0	9.291	0.963		Vel = 6.57		
	0.0									
	17.70					10.443		K Factor = 5.48		
308B	18.87	1.049	3E	6.0	3.333	11.352		K Factor = 5.60		
to		120.0	T	5.0	11.000	-0.505				
308	18.87	0.1168		0.0	14.333	1.674		Vel = 7.01		
	0.0									
	18.87					12.521		K Factor = 5.33		
309C	18.30	1.049	E	2.0	8.500	10.678		K Factor = 5.60		
to		120.0	T	5.0	7.000	-0.505				
309D	18.3	0.1103		0.0	15.500	1.710		Vel = 6.79		
	0.0									
	18.30					11.883		K Factor = 5.31		
309B	18.59	1.049	E	2.0	5.000	11.024		K Factor = 5.60		
to		120.0	T	5.0	7.000	-0.505				
309D	18.59	0.1137		0.0	12.000	1.364		Vel = 6.90		

Final Calculations - Hazen-Williams

Dean and Allyn Inc
Cash Star

Page 6
Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv.	Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
309D to 309	18.30 36.89	1.38 120.0 0.1062	E T	3.0 6.0 0.0	17.000 9.000 26.000	11.883 0.0 2.762				Vel = 7.91
	0.0 36.89					14.645				K Factor = 9.64
310B to 310	22.24 22.24	1.049 120.0 0.1583	E T	2.0 5.0 0.0	3.250 7.000 10.250	15.771 -0.505 1.623				K Factor = 5.60 Vel = 8.26
	0.0 22.24					16.889				K Factor = 5.41
311B to 311	24.24 24.24	1.049 120.0 0.1856	3E T	6.0 5.0 0.0	9.458 11.000 20.458	18.729 -0.505 3.798				K Factor = 5.60 Vel = 9.00
	0.0 24.24					22.022				K Factor = 5.17
305 to 306	16.00 16.0	1.452 120.0 0.0177		0.0 0.0 0.0	7.000 0.0 7.000	9.602 0.0 0.124				Vel = 3.10
306 to 307	16.64 32.64	1.452 120.0 0.0661	E	3.843 0.0 0.0	7.000 3.843 10.843	9.726 0.0 0.717				Vel = 6.32
307 to 308	17.70 50.34	1.452 120.0 0.1474	T	7.686 0.0 0.0	6.416 7.686 14.102	10.443 0.0 2.078				Vel = 9.75
308 to 309	18.86 69.2	1.452 120.0 0.2655		0.0 0.0 0.0	8.000 0.0 8.000	12.521 0.0 2.124				Vel = 13.41
309 to 310	36.90 106.1	1.452 120.0 0.5854		0.0 0.0 0.0	3.833 0.0 3.833	14.645 0.0 2.244				Vel = 20.56
310 to 311	22.24 128.34	1.452 120.0 0.8325		0.0 0.0 0.0	6.166 0.0 6.166	16.889 0.0 5.133				Vel = 24.87
311 to 313	24.23 152.57	1.452 120.0 1.1463		0.0 0.0 0.0	6.000 0.0 6.000	22.022 0.0 6.878				Vel = 29.56
313 to 31	0.0 152.57	1.687 120.0 0.5521	E T	5.022 10.044 0.0	14.333 15.066 29.399	28.900 0.289 16.231				Vel = 21.90
	0.0 152.57					45.420				K Factor = 22.64
30 to 31	164.20 164.2	3.26 120.0 0.0256		0.0 0.0 0.0	9.833 0.0 9.833	45.168 0.0 0.252				Vel = 6.31
31 to 32	152.57 316.77	3.26 120.0 0.0862	3E T	28.223 20.159 0.0	150.166 48.382 198.548	45.420 0.0 17.121				Vel = 12.18

Final Calculations - Hazen-Williams

Dean and Allyn Inc
Cash Star

Page 7
Date

Hyd. Ref. Point	Qa Qt	Dia. "C" Pf/Ft	Fitting or Eqv. Ln.	Pipe Ftng's Total	Pt Pe Pf	Pt Pv Pn	*****	Notes	*****
32	0.0	4.26	T	26.334	11.500	62.541			
to		120.0		0.0	26.334	4.872			
23	316.77	0.0234		0.0	37.834	0.887		Vel = 7.13	
23	0.0	4.26		0.0	11.583	68.300			
to		120.0		0.0	0.0	5.017			
24	316.77	0.0234		0.0	11.583	0.271		Vel = 7.13	
24	0.0	4.26	T	26.334	18.500	73.588			
to		120.0		0.0	26.334	0.0			
25	316.77	0.0234		0.0	44.834	1.050		Vel = 7.13	
25	0.0	6.357	T	37.72	82.000	74.638			
to		120.0	E	17.603	55.323	0.650			
26	316.77	0.0033		0.0	137.323	0.458		Vel = 3.20	
26	0.0	6.357	E	17.603	10.000	75.746			
to		120.0		0.0	17.603	1.299			
TOR	316.77	0.0033		0.0	27.603	0.092		Vel = 3.20	
TOR	0.0	6.357	G	3.772	3.000	77.137			
to		120.0	A	33.948	37.720	3.970			
BOR	316.77	0.0033		0.0	40.720	0.136		Vel = 3.20	
BOR	0.0	6.16	4E	80.336	475.000	81.243			
to		140.0		0.0	80.336	0.0			
27	316.77	0.0029		0.0	555.336	1.624		Vel = 3.41	
27	0.0	8.27	3E	85.404	225.000	82.867			
to		140.0	T	55.354	140.758	0.0			
TEST	316.77	0.0007		0.0	365.758	0.255		Vel = 1.89	
	250.00							Qa = 250.00	
	566.77					83.122		K Factor = 62.17	

Water Supply Curve C

Dean and Allyn Inc
Cash Star

Page 8
Date

City Water Supply:
C1 - Static Pressure : 105
C2 - Residual Pressure: 90
C2 - Residual Flow : 1591

Demand:
D1 - Elevation : 15.592
D2 - System Flow : 316.769
D2 - System Pressure : 83.122
Hose (Demand) : 250
D3 - System Demand : 566.769
Safety Margin : 19.656

