

BUILDING SECTION
SCALE: 3/16" = 1'-0"

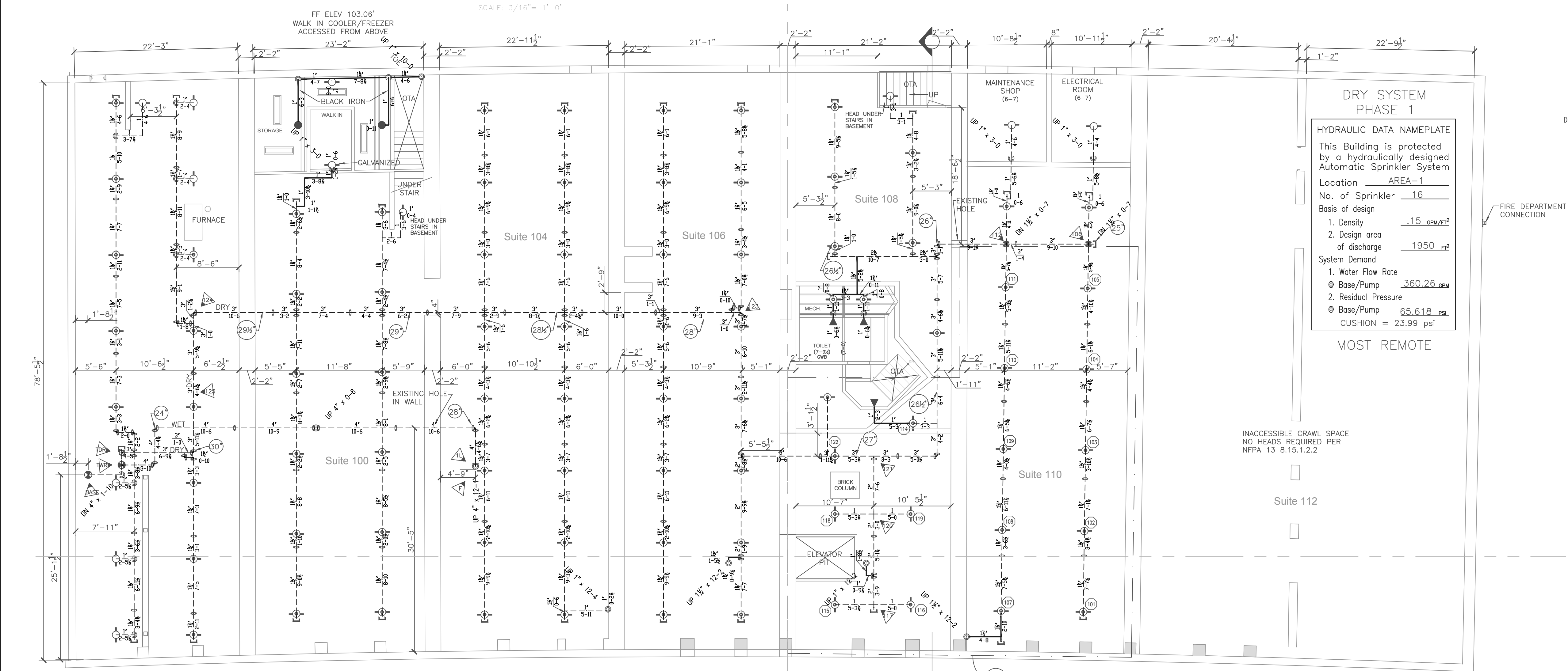
WATER DATA
 STATIC 110 PSI
 RESIDUAL 48 PSI
 FLOW 1162 GPM
 BY PORTLAND WATER DISTRICT
 DATE 10/06/15 @ 6:35 AM
 HYDRANT ELEV: 100.00' +/-

GENERAL NOTES:

- IT IS THE BUILDING OWNERS RESPONSIBILITY TO PROVIDE ADEQUATE HEAT FOR ALL AREAS IN THE BUILDING PROTECTED BY WET SPRINKLER SYSTEMS AND FOR ALL WATER FILLED SUPPLY PIPES, VALVES AND SYSTEM RISERS IN ALL DRY PIPE SPRINKLER SYSTEMS.
- ALL NEW PIPING IS TO BE HYDROSTATICALLY TESTED AT NOT LESS THAN 200 PSI FOR 2 HOURS, OR AT 50 PSI IN EXCESS OF THE MAXIMUM PRESSURE, WHEN THE MAXIMUM PRESSURE TO BE MAINTAINED IS IN EXCESS OF 150 PSI. (PER NFPA 13)
- WHETHER OR NOT INDICATED ON DRAWINGS, THE FOLLOWING ITEMS ARE TO BE PROVIDED:
 - SPARE HEAD CABINET WITH WRENCH (NFPA 13)
 - PROVISIONS FOR FLUSHING CONNECTIONS AND DRAINING OF ALL PIPE
 - INSPECTORS TEST CONNECTION SHALL BE PROVIDED FOR EACH SYSTEM
 - A) FOR WET PIPE SYSTEMS SEE NFPA 13)
 - B) FOR DRY PIPE SYSTEMS SEE NFPA 13)
 - AIR PRESSURE SHALL BE MAINTAINED ON ALL DRY PIPE SYSTEMS BY AN APPROVED AUTOMATIC AIR COMPRESSOR OR PLANT AIR SYSTEM SPECIFICALLY APPROVED FOR AND CAPABLE OF AUTOMATICALLY MAINTAINING THE REQUIRED AIR PRESSURE.
 - WET PIPE SYSTEMS SHALL BE PROVIDED WITH A RELIEF VALVE NOT LESS THAN 1/2" IN SIZE. (NFPA 13).
- ALL PIPE 1" SHALL BE SCHEDULE 40 STEEL WITH MALLEABLE IRON FITTINGS.
- ALL PIPE 1 1/2" AND LARGER, SHALL BE SCHEDULE 10 STEEL, WITH GROOVED COUPLINGS AND VICTAULIC™ MECHANICAL FITTINGS OR EQUIVALENT.
- ALL MECHANICAL TRADES ARE TO COORDINATE THEIR WORK WITH SPRINKLER WORK AS SHOWN ON THESE PLANS.
- ALL HANGERS AND LOCATIONS ARE TO BE IN ACCORDANCE WITH N.F.P.A. 13.
- ALL SPRINKLER HEADS IN SUSPENDED CEILING TILES ARE TO BE LOCATED IN THE CENTER OF THE 1 FOOT BY 1 FOOT PORTION OF THE ACOUSTICAL CEILING PANEL.
- ALL PIPING IS TO BE PITCHED IN ACCORDANCE WITH N.F.P.A. 13.
- HYDRAULIC DATA REFERENCE POINTS: (25) BELOW DECK (12)
- CENTER LINE OF PIPE ABOVE FINISH FLOOR (12'-0") BELOW DECK (12")
- PROTECTIVE CAPS ARE TO REMAIN ON THE SPRINKLER HEADS UNTIL AFTER CEILINGS ARE INSTALLED.
- WHERE SURFACE MOUNTED OBSTRUCTIONS EXIST DEEP ESCUTCHEON SPRINKLER HEADS WILL BE INSTALLED.
- WORK IS LIMITED TO THE WORK SHOWN ON THESE DOCUMENTS.
- SCOPE OF WORK IN PHASE 2 IS TO DESIGN AND INSTALL A SPRINKLER COVERAGE FOR THE FIRST FLOOR AND UNITS 402, 404, 406, AND 408.

DRY SYSTEMS NOTES

- THE VOLUME OF THE DRY SYSTEM IS 198 GALLONS.
- A SYSTEM SIZE OF NOT MORE THAN 500 GALLONS (1893 L) SHALL BE PERMITTED WITHOUT A QUICK-OPENING DEVICE AND SHALL NOT BE REQUIRED TO MEET ANY SPECIFIC WATER DELIVERY REQUIREMENT TO THE INSPECTION TEST CONNECTION, PER NFPA 7.2.3.3

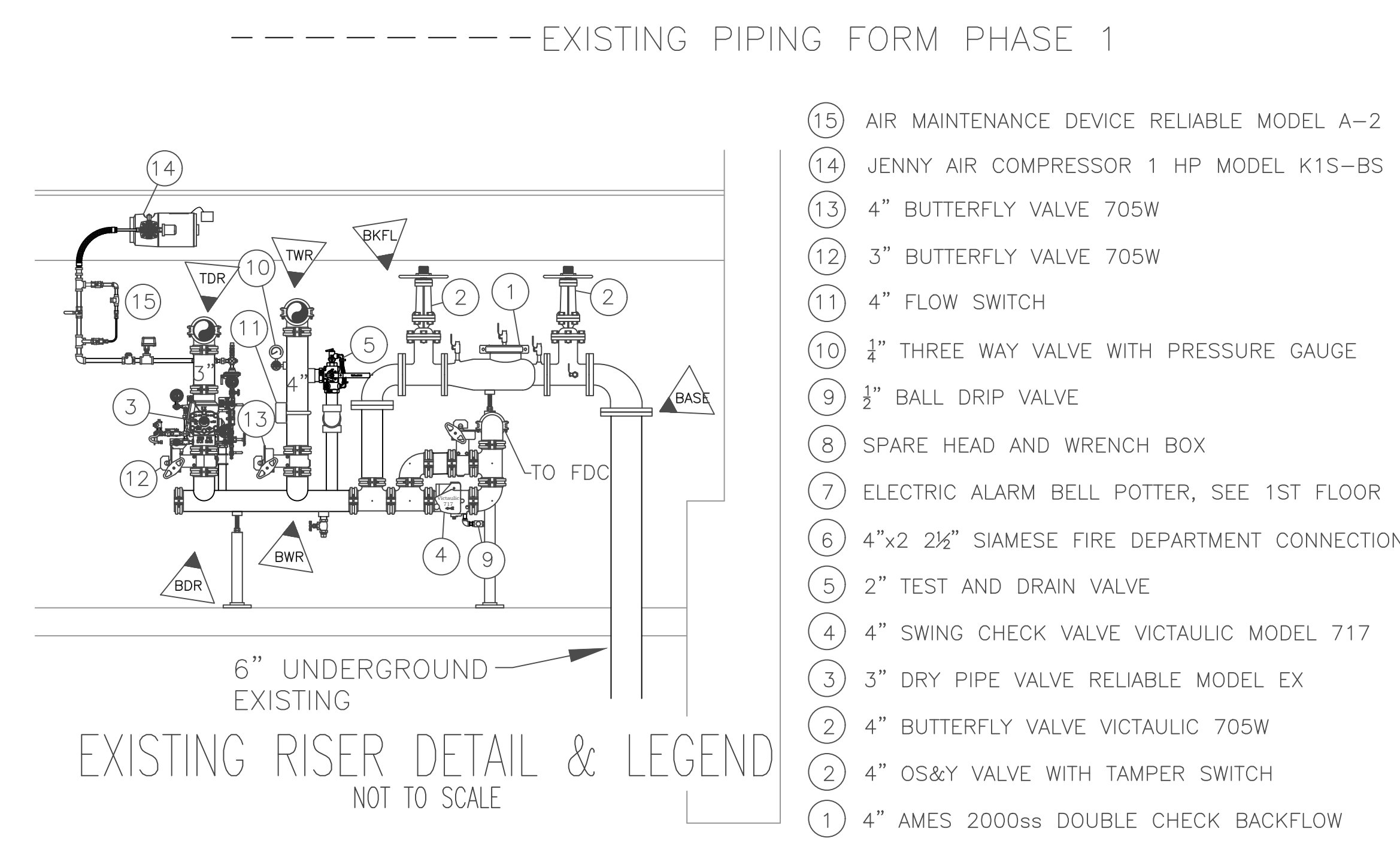
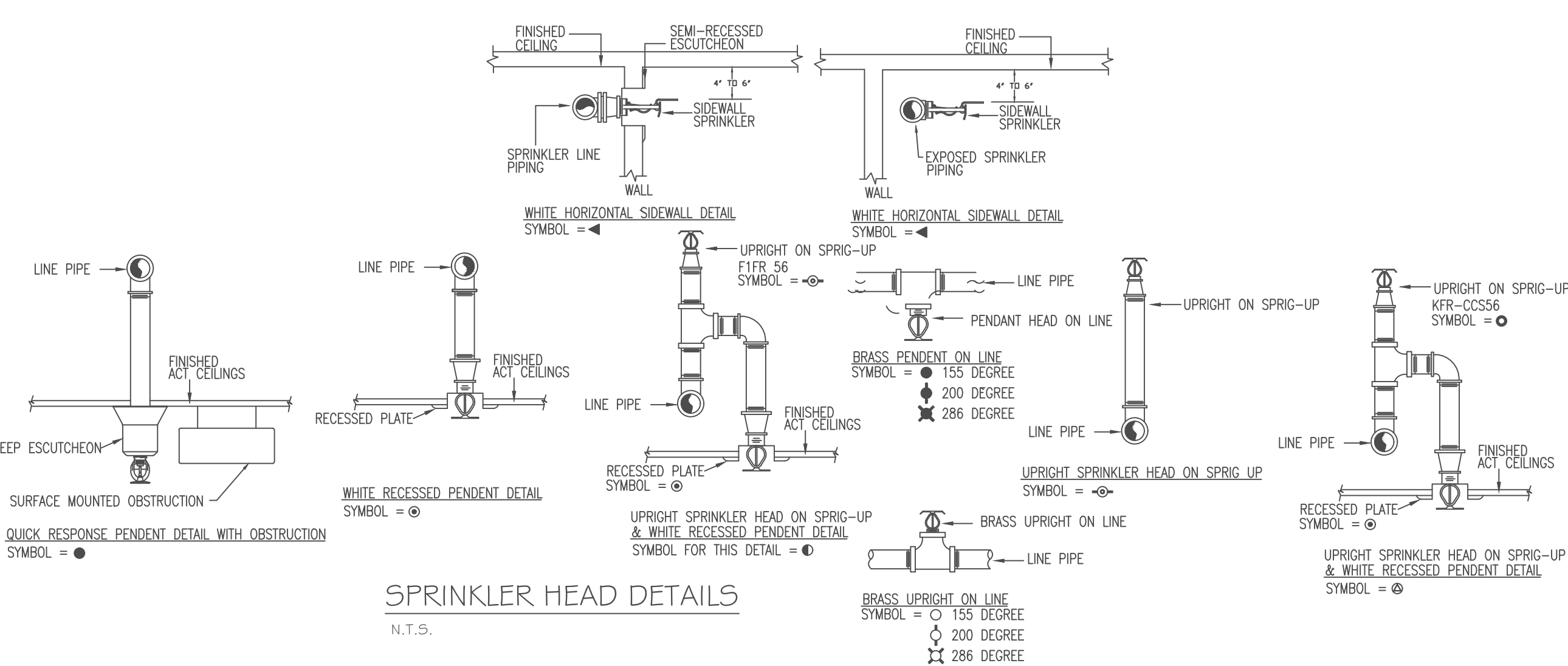


BASEMENT SPRINKLER PLAN
SCALE: 1/8" = 1'-0"
FINISH FLOOR ELEV. 100.0' AT RISER

DRY SYSTEM PHASE 1

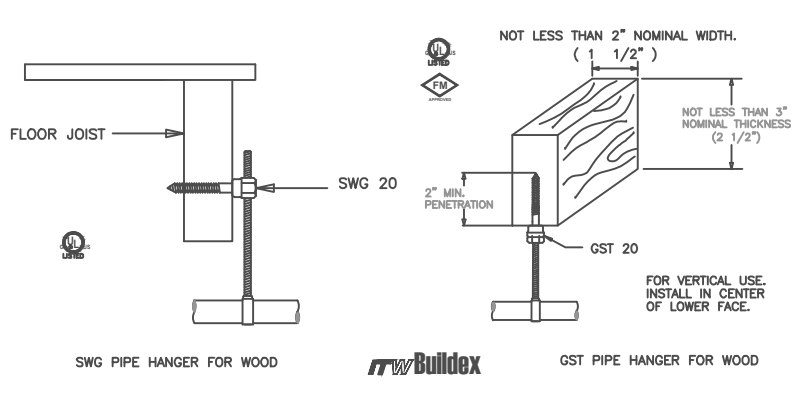
HYDRAULIC DATA NAMEPLATE
 This Building is protected by a hydraulically designed Automatic Sprinkler System
 Location AREA-1
 No. of Sprinkler 16
 Basis of design
 1. Density .15 gpm/sqft
 2. Design area 1950 sqft
 System Demand
 1. Water Flow Rate 360.26 gpm
 @ Base/Pump
 2. Residual Pressure 65.618 psi
 @ Base/Pump
 CUSHION = 23.99 psi

MOST REMOTE



- (15) AIR MAINTENANCE DEVICE RELIABLE MODEL A-2
- (14) JENNY AIR COMPRESSOR 1 HP MODEL K1S-BS
- (13) 4" BUTTERFLY VALVE 705W
- (12) 3" BUTTERFLY VALVE 705W
- (11) 4" FLOW SWITCH
- (10) 3" THREE WAY VALVE WITH PRESSURE GAUGE
- (9) 1/2" BALL DRIP VALVE
- (8) SPARE HEAD AND WRENCH BOX
- (7) ELECTRIC ALARM BELL POTTER, SEE 1ST FLOOR
- (6) 4"x2 1/2" SIAMISE FIRE DEPARTMENT CONNECTION
- (5) 2" TEST AND DRAIN VALVE
- (4) 4" SWING CHECK VALVE VICTAULIC MODEL 717
- (3) 3" DRY PIPE VALVE RELIABLE MODEL EX
- (2) 4" BUTTERFLY VALVE VICTAULIC 705W
- (1) 4" OS&Y VALVE WITH TAMPER SWITCH
- (1) 4" AMES 2000ss DOUBLE CHECK BACKFLOW

- Type of Hazard LIGHT/ORDINARY 2. Deflector Distance PER SPEC.
- Pipe Type Used BLK SCH 10/40 4. Sprinkler Area PER SPEC.
- Type of Construction COMBUSTIBLE
- Maximum Spacing Allowed PER NFPA 13
- PIPE SIZING METHOD: PIPE SCHEDULE HYDRAULICALLY CALCULATED
- ALL HANGERS AND LOCATIONS TO BE IN ACCORDANCE WITH N.F.P.A. PAMPHLET NO. 13
- HIGH DEGREE TEMPERATURE SPRINKLER HEADS TO BE INSTALLED IN ACCORDANCE WITH N.F.P.A. PAMPHLET NO. 13



CONTRACT RESPONSIBILITIES

ITEM	FFC	OTHERS
LOG MAN		
EXCAVATION		
FLUSHING		
WIRING		
PAINTING		
TAMPER SWITCHES		
FLOW SWITCHES		
STREET CONN.		

ABBREVIATIONS

B	Bottom of Beam
D	Bottom of Deck
P	Bottom of Pipe
H/V	Hose Valve
N & C	Nipple and Cap
NC	Not in Contact
NTS	Not to Scale
OSU	Open Bar Joints
PRV	Pressure Red Valve
RM	Riser Manifold
SP	Standpipe
TOP	Top of Slab
TOP	Top of Pipe
TSS	Top of Steel
UNION	Unless Otherwise Noted
CL	Centerline
W&S	No Automatic Sprinklers
OTA	Open to Above

SPRINKLER HEAD LEGEND

SYMBOL	MAKE	MODEL	SIN	FINISH	TYPE	TEMP	NPT	ORIFICE	K-FACTOR	TOTAL
(Symbol)	RELIABLE	F1FR 56	RA1414	WHITE	SEMI-REC PENDING	155° F	1/2"	1/2"	5.6	71
(Symbol)	RELIABLE	F1FR 56	RA1414	WHITE	SEMI-REC PENDING	200° F	1/2"	1/2"	5.6	8
(Symbol)	RELIABLE	F1FR 56	RA1425	BRONZE	UPRIGHT	200° F	1/2"	1/2"	5.6	69
(Symbol)	RELIABLE	KFR-CCS	RA4454	BRONZE	UPRIGHT	212° F	1/2"	1/2"	5.6	17
(Symbol)	RELIABLE	F1FR 56	RA1414	BRONZE	PENDING	155° F	1/2"	1/2"	5.6	55
(Symbol)	RELIABLE	F1FR 56	RA1414	BRONZE	PENDING	200° F	1/2"	1/2"	5.6	34
(Symbol)	RELIABLE	GS 56	RA3415	WHITE	CONCEAL	165° F	1/2"	1/2"	5.6	3
(Symbol)	RELIABLE	F3QR	R5714	WHITE	DRY PENDING	200° F	1"	1/2"	5.6	1
(Symbol)	RELIABLE	F3QR	R5714	CHROME	DRY PENDING	155° F	1"	1/2"	5.6	2
(Symbol)	RELIABLE	F1FR 56	RA1435	BRONZE	DRY SIDEWALL	155° F	1/2"	1/2"	5.6	13
TOTAL										273

SUBMITTALS

SENT TO	DATE SENT	DATE RECEIVED
1'S O	11/17/15	
L M		
L R I		
L A		
STATE FIRE		
LOCAL FIRE		
LOCAL WATER		
OWNER		

LICENSE# 093 442
R.M.S.# 442

SPRINKLER SYSTEMS INC.
P.O. BOX 1285
LEWISTON MAINE
04243-1285

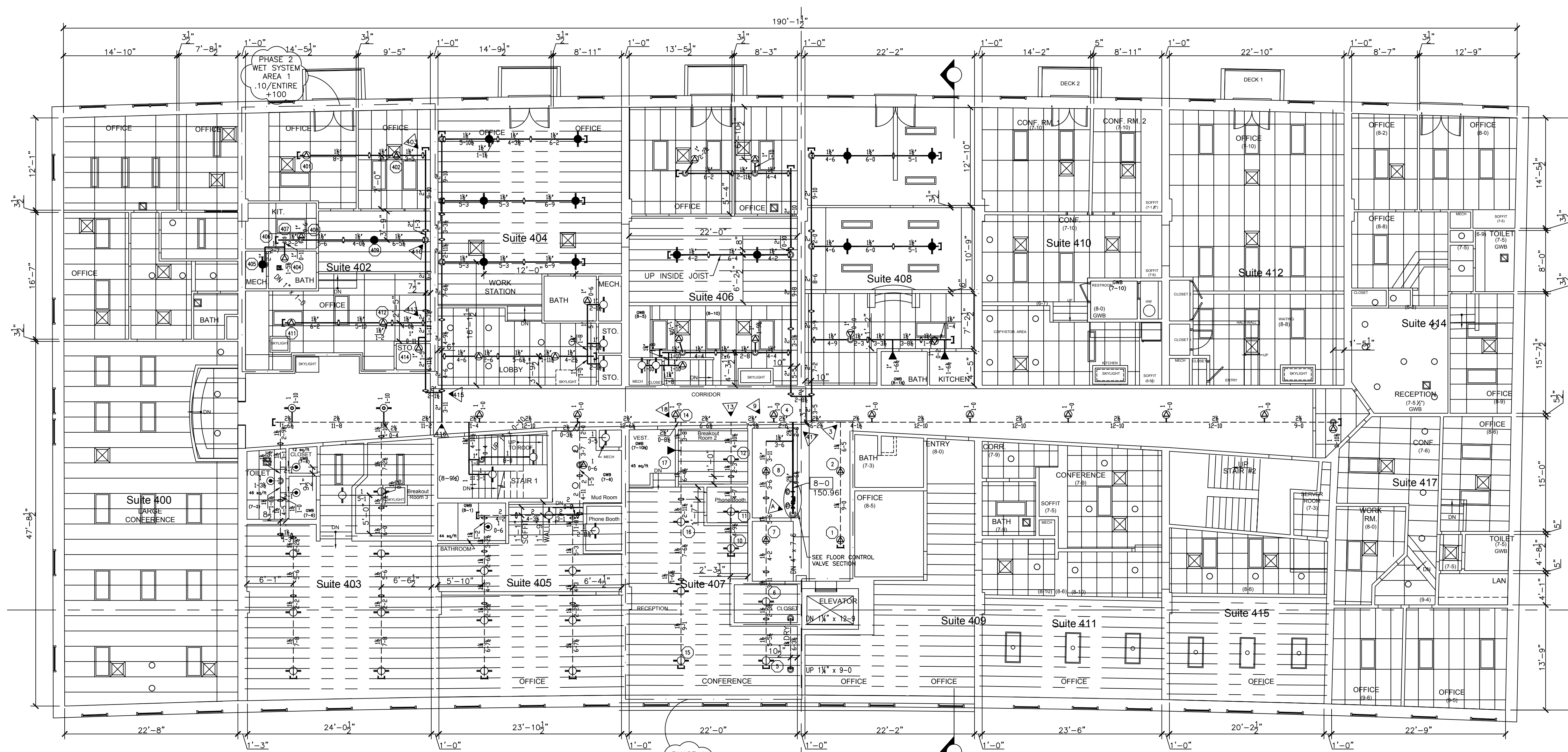
PHASE 2 SUBMITTAL COPY

THOMAS BLOCK
100 COMMERCIAL STREET
PORTLAND, MAINE 04101

CONTRACT WITH EAST BROWN COW

SYSTEM TYPE	NO.	DATE	DESCRIPTION
WET			
DRY			
DELUGE			
PREACTION			
ME LIFE			
HYDRO-PRO			

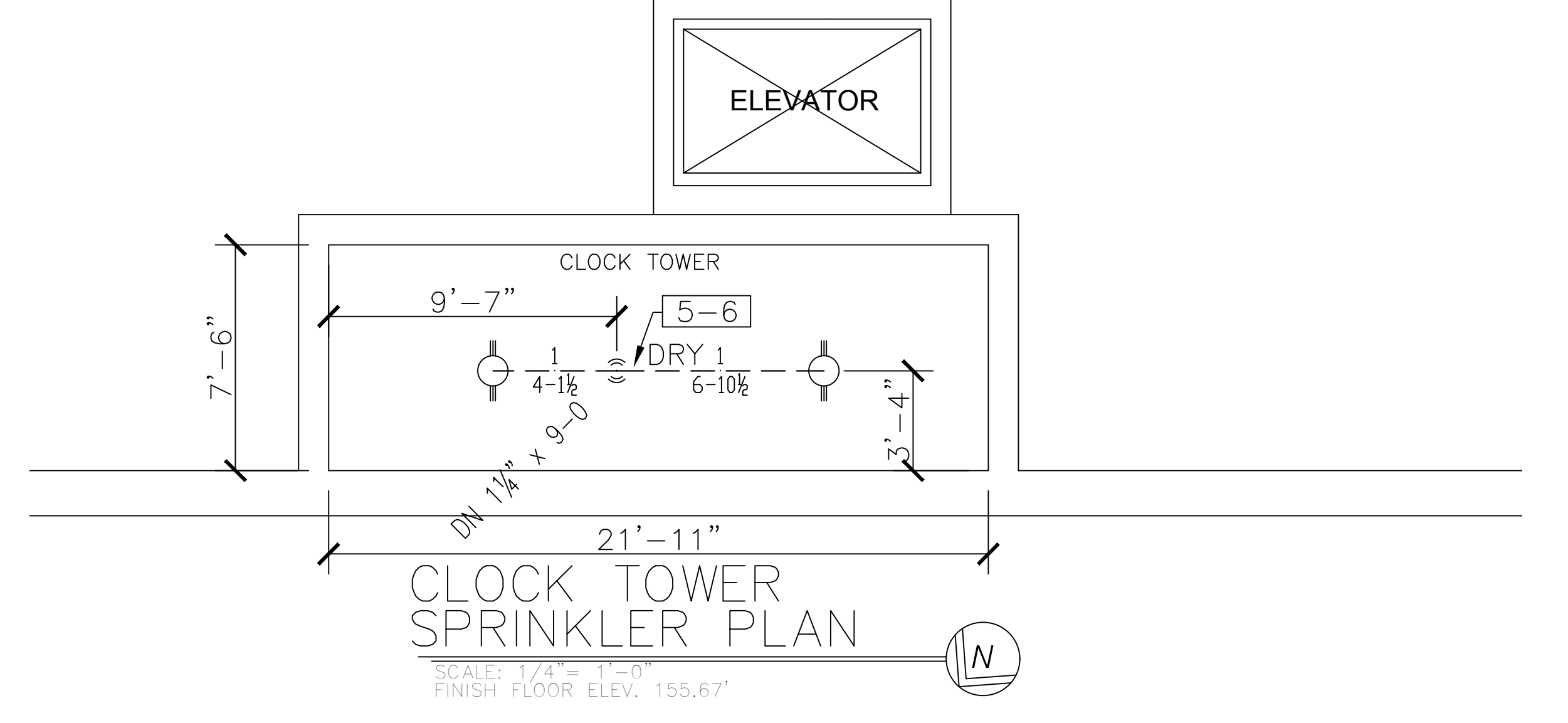
DATE 01/04/2018
DRAWN BY JJP
CHECKED BY CDS
TOTAL SPRINKERS ON JOB
PHASE 2
273
SHEET# 1 of 3
JOB# 15095



PHASE 1 WET SYSTEM AREA-1
 1:100
 FINISH FLOOR ELEV. 142.96'

SCALE: 1/8" = 1'-0"
 FINISH FLOOR ELEV. 142.96'

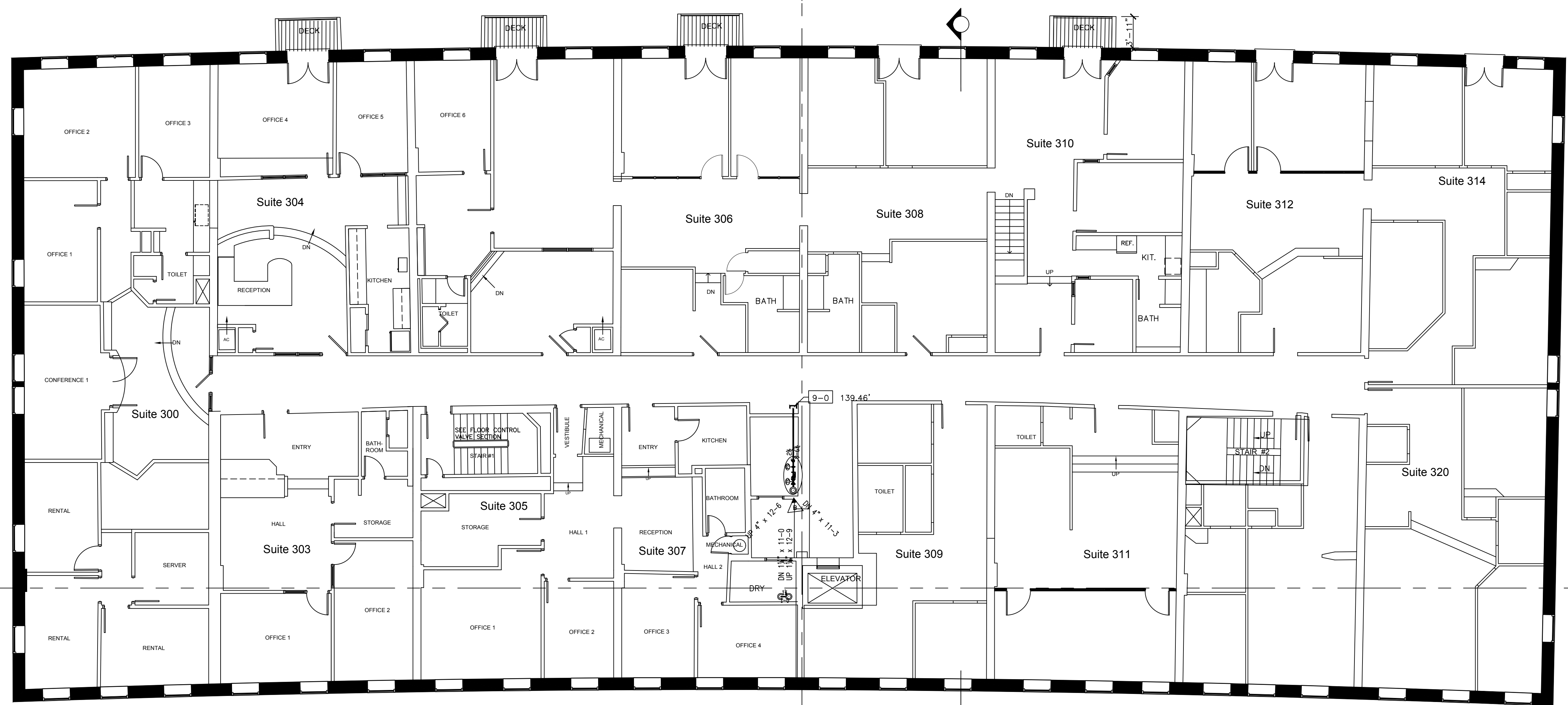
HANG LINES 8" DOWN FROM THE BOTTOM OF JOIST.
 CENTER OF TILE JOB. CENTER HEAD IN ONE OF THE EIGHT SQUARES IN THE TILE.



WET SYSTEM PHASE 1
 HYDRAULIC DATA NAMEPLATE
 This Building is protected by a hydraulically designed Automatic Sprinkler System
 Location AREA-1
 No. of Sprinkler 14
 Basis of design
 1. Density .10 gpm/ft²
 2. Design area of discharge 945 ft²
 System Demand
 1. Water Flow Rate
 @ Base 248.18 gpm
 2. Residual Pressure
 @ Base 85,803 psi
 CUSHION = 16.91 psi
 MOST REMOTE

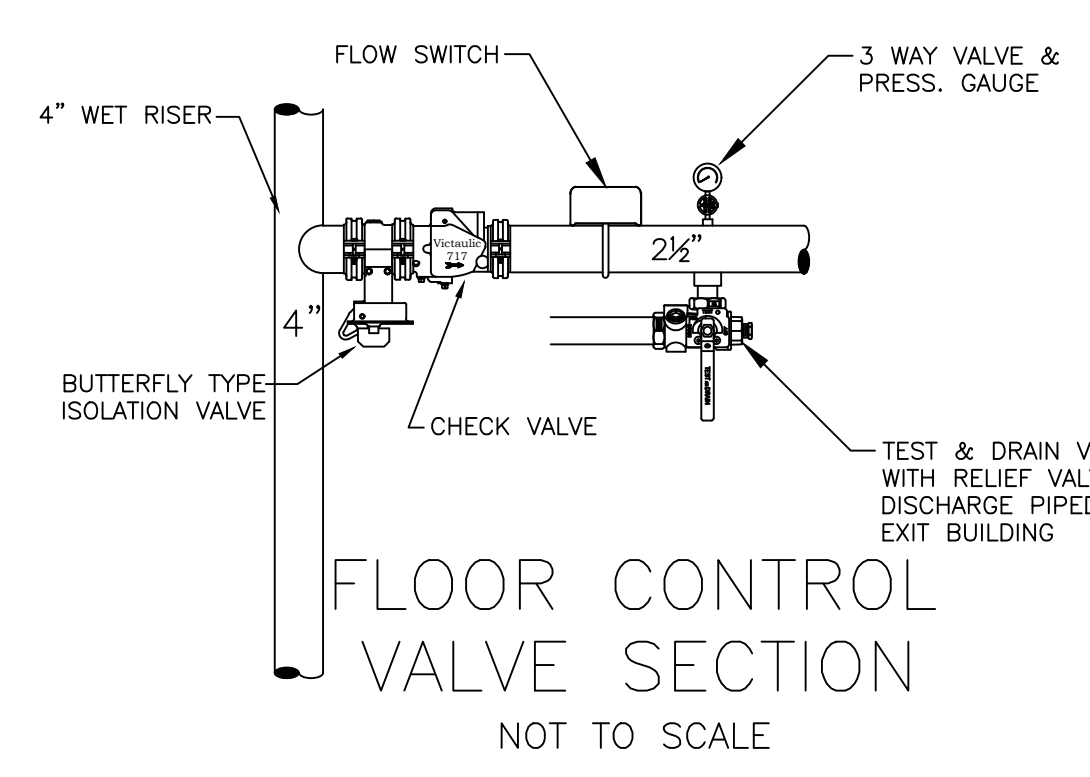
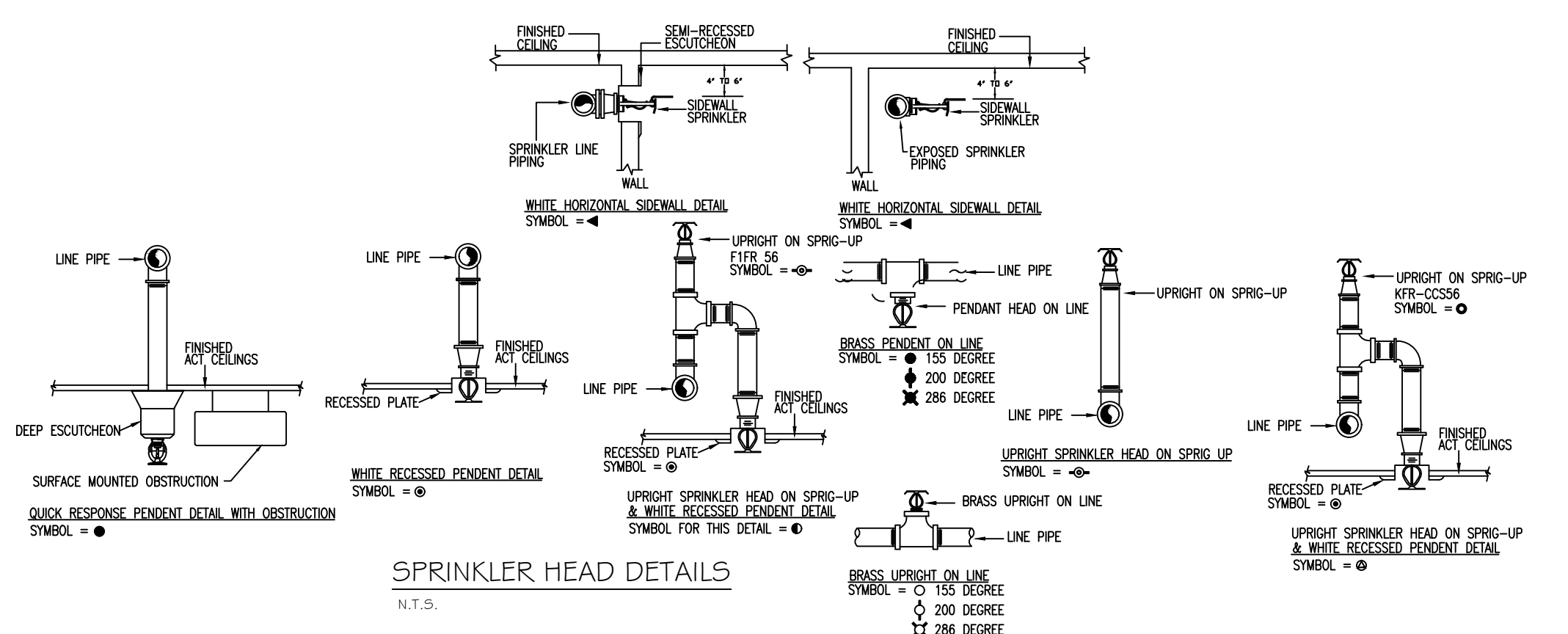
WET SYSTEM PHASE 2
 HYDRAULIC DATA NAMEPLATE
 This Building is protected by a hydraulically designed Automatic Sprinkler System
 Location AREA-1
 No. of Sprinkler 9
 Basis of design
 1. Density .10 gpm/ft²
 2. Design area of discharge ENTIRE ft²
 System Demand
 1. Water Flow Rate
 @ Base 182.10 gpm
 2. Residual Pressure
 @ Base 73,086 psi
 CUSHION = 32.00 psi
 NOT MOST REMOTE

EXISTING PIPING FORM PHASE 1

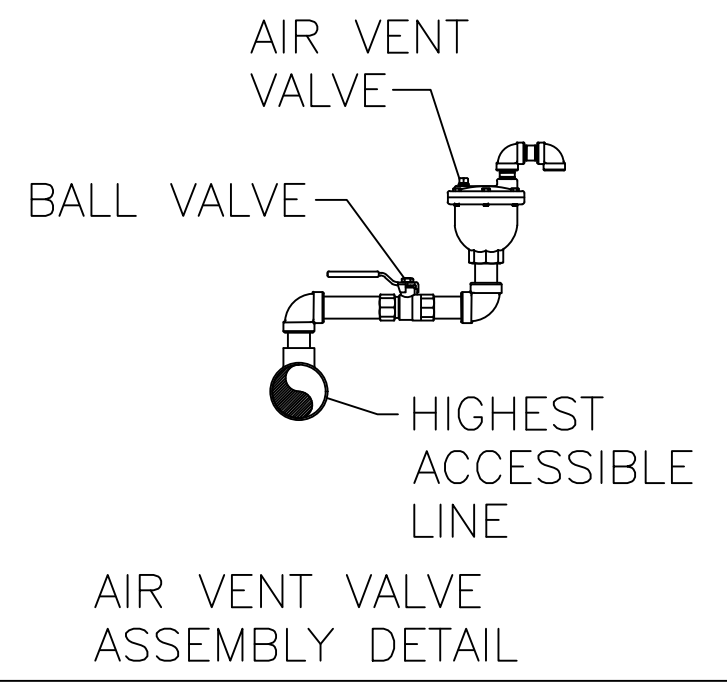


PHASE 2 WET SYSTEM AREA-1
 1:100
 FINISH FLOOR ELEV. 130.46'

SCALE: 1/8" = 1'-0"
 FINISH FLOOR ELEV. 130.46'

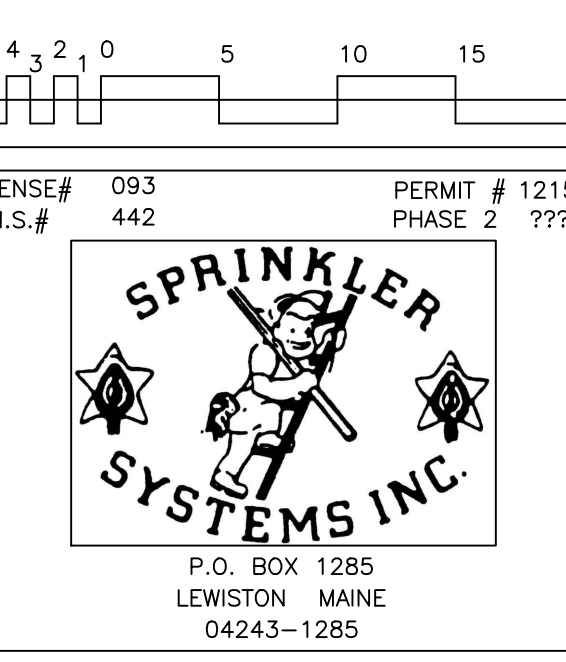


ABOVE AND BELOW COVERAGE, ONE BRONZE CONCEALED SPACE UPRIGHT 212' HEAD AND ONE WHITE SEMI-RECESSED PENDENT 155'. SEE SPRINKLER HEAD DETAILS.



SPRINKLER HEAD LEGEND

SYMBOL	MAKE	MODEL	SIN	FINISH	TYPE	TEMP	NPT	ORIFICE	K-FACTOR	TOTAL
○	RELIABLE	F1FR 56	RA1414	WHITE	SEMI-RECESSED PENDENT	155° F	1/2"	1/2"	5.6	71
○	RELIABLE	F1FR 56	RA1414	WHITE	SEMI-RECESSED PENDENT	200° F	1/2"	1/2"	5.6	8
○	RELIABLE	F1FR 56	RA1425	BRONZE	UPRIGHT	200° F	1/2"	1/2"	5.6	69
○	RELIABLE	KFR-CCS	RA4454	BRONZE	UPRIGHT	212° F	1/2"	1/2"	5.6	17
○	RELIABLE	F1FR 56	RA1414	BRONZE	PENDENT	155° F	1/2"	1/2"	5.6	55
○	RELIABLE	F1FR 56	RA1414	BRONZE	PENDENT	200° F	1/2"	1/2"	5.6	34
○	RELIABLE	G5 56	RA3415	WHITE	CONCEALED	165° F	1/2"	1/2"	5.6	3
○	RELIABLE	F3GR	RS714	WHITE	DRY PENDENT	200° F	1"	1/2"	5.6	1
○	RELIABLE	F3GR	RS714	CHROME	DRY HORIZ. SIDEWALL	155° F	1"	1/2"	5.6	2
○	RELIABLE	F1FR 56	RA1435	BRONZE	DRY HORIZ. SIDEWALL	155° F	1/2"	1/2"	5.6	13
TOTAL										273



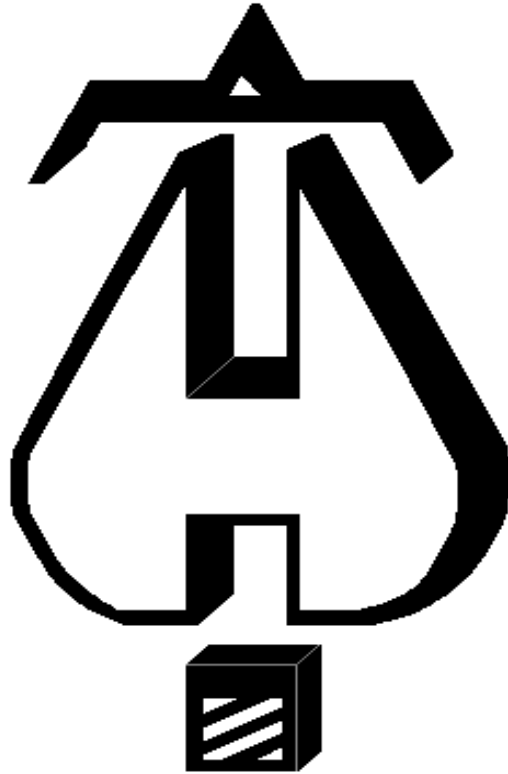
PHASE 2 SUBMITTAL COPY

SYSTEM TYPE	NO.	DATE	REVISIONS DESCRIPTION
WET			
DRY			
DELUGE			
PREACTION			
ME. LIFE			
HYDRO-PRO			

THOMAS BLOCK
 100 COMMERCIAL STREET
 PORTLAND, MAINE 04101

CONTRACT WITH EAST BROWN COW

DATE: 01/04/2018
 TOTAL SPKRS ON JOB: PHASE 2 273
 SHEET# 3 of 3
 JOB# 15095



. . . Fire Protection by Computer Design

SPRINKLER SYSTEMS INC.
P O BOX 1285
4 AVON STREET
LEWISTON, MAINE
2077820104

Job Name : 100 Commercial Street Wet System 1st Flr Area 1
Drawing : Existing
Location : 100 Commercial Street Portland, Maine
Remote Area : 1 Wet
Contract : 15-095
Data File : 100 Commercial Street Wet System 1st Flr Area 1.WXF

Hydraulic Design Information Sheet

Name - 100 Commercial Street 1st Floor Area 1 Date - 01-01-18
 Location - 100 Commercial Street Portland, Maine
 Building - Existing System No. - 1 Wet
 Contractor - Sprinkler Systems Inc. Contract No. - 15-095
 Calculated By - CDS Drawing No. - 1-3 of 3
 Construction: (X) Combustible () Non-Combustible Ceiling Height - varies
 Occupancy - Office Building

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

M	Area of Sprinkler Operation	- 945	System Type	Sprinkler/Nozzle
	Density	- .10	(X) Wet	Make Reliable
D	Area Per Sprinkler	- 149	() Dry	Model F1FR56
E	Elevation at Highest Outlet	- 117.75	() 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	- 100		

N Note

Calculation Flow Required - 251.28 Press Required - 88.407 AT BASE
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 10-06-15		Cap. -
T	Time of Test - AM	Rated Cap.-	Elev.-
E	Static Press - 110	@ Press -	
R	Residual Press - 48	Elev. -	Well
	Flow - 1162		Proof Flow
S	Elevation - 100.0'		

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:	%	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:

Pressure / Flow Summary - STANDARD

SPRINKLER SYSTEMS INC.
100 Commercial Street Wet System 1st Flr Area 1

Page 2
Date

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
TYP1	0.0	5.6	7.08	na	14.9	0.1	149	7.0
143	116.75		12.68	na				
158	117.75	5.6	7.18	na	15.01	0.1	149	7.0
159	117.75	5.6	7.89	na	15.73	0.1	149	7.0
155	117.75	5.6	7.08	na	14.9	0.1	149	7.0
156	117.75	5.6	7.78	na	15.62	0.1	149	7.0
147	116.0	5.6	8.18	na	16.02	0.1	149	7.0
ARM1	116.0	5.6	7.54	na	15.38	0.1	149	7.0
148	116.0	5.6	7.58	na	15.42	0.1	149	7.0
149	116.0		8.5	na				
150	116.0		9.19	na				
151	116.0		9.78	na				
152	116.75	K = K @ SPRG	10.21	na	17.13			
145	117.75	5.6	10.38	na	18.04	0.1	149	7.0
141	117.75	5.6	7.25	na	15.07	0.1	149	7.0
142	117.75	5.6	8.02	na	15.86	0.1	149	7.0
144	116.75	K = K @ SPRG	12.43	na	18.91			
146	116.75		12.11	na				
153	116.75		11.91	na				
154	116.75	K = K @ SPRG	11.91	na	18.5			
157	116.75		11.91	na				
160	116.75		12.07	na				
161	116.75	K = K @ SPRG	12.12	na	18.67			
162	116.75	5.6	14.1	na	21.03	0.1	149	7.0
132	116.0		16.8	na				
134	116.0		17.41	na				
137	116.0		17.58	na				
138	117.5		22.96	na				
1D	117.5		26.54	na				
1E	116.0		36.83	na				
1F	116.0		46.05	na				
1G	118.75		48.2	na				
1C	118.75		49.52	na				
1B	118.75		50.79	na				
1H	117.75		56.58	na				
1I	117.75		67.15	na				
1K	117.75		70.51	na				
1L	106.5		75.77	na				
TWR	105.5		78.33	na				
BWR	101.5		83.73	na				
BKFL	101.5		84.43	na				
BASE	100.0		88.41	na				
HOSE	100.0		88.63	na	100.0			
TEST	100.0		89.04	na				

The maximum velocity is 22.06 and it occurs in the pipe between nodes 1D and 1E

Fittings Used Summary

SPRINKLER SYSTEMS INC.
100 Commercial Street Wet System 1st Flr Area 1

Page 3
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
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
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	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
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
Zac	Ames 2000SS	Fitting generates a Fixed Loss Based on Flow																			

Unit 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.

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TYP1 to SPRG	0 0	5.60	14.90 14.9	1 1.049	E T	2.0 5.0 0.0	1.500 7.000 8.500	120 0.0755	7.079 0.0 0.642			Vel = 5.53
SPRG			0.0 14.90						7.721		K Factor =	5.36
143 to 1D	116.750 117.500		134.81 134.81	2 2.157	4E T	24.613 12.307 0.0	70.000 36.920 106.920	120 0.1327	12.677 -0.325 14.185			Vel = 11.84
1D			0.0 134.81						26.537		K Factor =	26.17
158 to 159	117.750 117.750	5.60	15.01	1 1.049		0.0 0.0 0.0	9.250 0.0 9.250	120 0.0765	7.183 0.0 0.708			Vel = 5.57
159 to 160	117.750 116.750	5.60	15.73 30.74	1 1.049	E T	2.0 5.0 0.0	6.000 7.000 13.000	120 0.2882	7.891 0.433 3.747			Vel = 11.41
160			0.0 30.74						12.071		K Factor =	8.85
155 to 156	117.750 117.750	5.60	14.90	1 1.049		0.0 0.0 0.0	9.250 0.0 9.250	120 0.0756	7.079 0.0 0.699			Vel = 5.53
156 to 157	117.750 116.750	5.60	15.62 30.52	1 1.049	E T	2.0 5.0 0.0	6.000 7.000 13.000	120 0.2844	7.778 0.433 3.697			Vel = 11.33
157			0.0 30.52						11.908		K Factor =	8.84
147 to 151	116 116	5.60	16.02	1 1.049	3E T	6.0 5.0 0.0	7.500 11.000 18.500	120 0.0863	8.181 0.0 1.596			Vel = 5.95
151			0.0 16.02						9.777		K Factor =	5.12
ARM1 to 149	116 116	5.60	15.38	1 1.049	2E T	4.0 5.0 0.0	3.000 9.000 12.000	120 0.0800	7.543 0.0 0.960			Vel = 5.71
149			0.0 15.38						8.503		K Factor =	5.27
148 to 149	116 116	5.60	15.42	1 1.049	E T	2.0 5.0 0.0	4.500 7.000 11.500	120 0.0803	7.579 0.0 0.924			Vel = 5.72
149 to 150	116 116		15.38	1.25	T	6.0 0.0 0.0	3.000 6.000 9.000	120 0.0761	8.503 0.0 0.685			Vel = 6.61
150 to 151	116 116		0.0	1.25	T	6.0 0.0 0.0	1.750 6.000 7.750	120 0.0760	9.188 0.0 0.589			Vel = 6.61
151 to 152	116 116.750		16.01	1.5		0.0 0.0 0.0	12.000 0.0 12.000	120 0.0630	9.777 -0.325 0.756			Vel = 6.76

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
100 Commercial Street Wet System 1st Flr Area 1

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
152 to 153	116.750 116.750	5.36	17.14 63.95	1.5 1.682	T	9.9 0.0	5.250 9.900	120	10.208 0.0		K = K @ SPRG	
			0.0						11.906		Vel = 9.23	
153			63.95								K Factor = 18.53	
145 to 146	117.750 116.750	5.60	18.04 18.04	1 1.049	E T	2.0 5.0	5.000 7.000	120	10.382 0.433		Vel = 6.70	
			0.0						12.106		K Factor = 5.18	
146			18.04									
141 to 142	117.750 117.750	5.60	15.07 15.07	1 1.049		0.0 0.0	10.000 0.0	120	7.245 0.0		Vel = 5.59	
142 to 143	117.750 116.750	5.60	15.86 30.93	1 1.049	E T	2.0 5.0	7.500 7.000	120	8.017 0.433		Vel = 11.48	
143 to 144	116.750 116.750		-134.81 -103.88	2 2.157		0.0 0.0	3.000 0.0	120	12.677 0.0		Vel = 9.12	
144 to 146	116.750 116.750	5.36	18.91 -84.97	2 2.157		0.0 0.0	5.750 5.750	120	12.431 -0.325		K = K @ SPRG	Vel = 7.46
146 to 153	116.750 116.750		18.04 -66.93	2 2.157		0.0 0.0	5.500 5.500	120	12.106 -0.200		Vel = 5.88	
153 to 154	116.750 116.750		63.95 -2.98	2 2.157		0.0 0.0	10.000 10.000	120	11.906 -0.001		Vel = 0.26	
154 to 157	116.750 116.750	5.36	18.50 15.52	2 2.157		0.0 0.0	1.000 1.000	120	11.905 0.003		K = K @ SPRG	Vel = 1.36
157 to 160	116.750 116.750		30.52 46.04	2 2.157		0.0 0.0	9.000 9.000	120	11.908 0.163		Vel = 4.04	
160 to 161	116.750 116.750		30.74 76.78	2 2.157		0.0 0.0	1.000 1.000	120	12.071 0.047		Vel = 6.74	
161 to 162	116.750 116.750	5.36	18.66 95.44	2 2.157	2E	12.307 0.0	16.000 12.307	120	12.118 0.0		K = K @ SPRG	Vel = 8.38
162 to 132	116.750 116	5.60	21.03 116.47	2 2.157	E T	6.153 12.307	5.000 18.460	120	14.101 0.325		Vel = 10.23	
132 to 134	116 116		0.0 116.47	2 2.157		0.0 0.0	6.000 6.000	120	16.800 0.608		Vel = 10.23	
134 to 137	116 116		0.0 116.47	2 2.157		0.0 0.0	1.750 1.750	120	17.408 0.177		Vel = 10.23	

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
100 Commercial Street Wet System 1st Flr Area 1

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
137 to 138	116 117.500		0.0 116.47	2 2.157	2F 2E T	4.923 12.307 12.307	30.000 29.537 59.537	120 0.1012	17.585 -0.650 6.027			Vel = 10.23
138 to 1D	117.500 117.500		0.0 116.47	2 2.157	T	12.307 0.0 0.0	23.000 12.307 35.307	120 0.1013	22.962 0.0 3.575			Vel = 10.23
1D to 1E	117.500 116		134.81 251.28	2 2.157	E T	6.153 12.307 0.0	4.500 18.460 22.960	120 0.4198	26.537 0.650 9.639			Vel = 22.06
1E to 1F	116 116		0.0 251.28	2.5 2.635	E	8.237 0.0 0.0	50.000 8.237 58.237	120 0.1584	36.826 0.0 9.225			Vel = 14.78
1F to 1G	116 118.750		0.0 251.28	3 3.26	E	9.408 0.0 0.0	50.000 9.408 59.408	120 0.0562	46.051 -1.191 3.337			Vel = 9.66
1G to 1C	118.750 118.750		0.0 251.28	3 3.26		0.0 0.0 0.0	23.500 0.0 23.500	120 0.0562	48.197 0.0 1.320			Vel = 9.66
1C to 1B	118.750 118.750		0.0 251.28	3 3.26	T	20.159 0.0 0.0	2.500 20.159 22.659	120 0.0562	49.517 0.0 1.273			Vel = 9.66
1B to 1H	118.750 117.750		0.0 251.28	3 3.26	2T	40.319 0.0 0.0	55.000 40.319 95.319	120 0.0562	50.790 0.433 5.355			Vel = 9.66
1H to 1I	117.750 117.750		0.0 251.28	3 3.26	Fsp Bvcb S T 6E	0.0 6.72 21.503 20.159 56.446	30.000 104.828 134.828	120 0.0562	56.578 3.000 7.575		* Fixed Loss = 3	Vel = 9.66
1I to 1K	117.750 117.750		0.0 251.28	4 4.26	11E	144.838 0.0 0.0	75.000 144.838 219.838	120 0.0153	67.153 0.0 3.356			Vel = 5.66
1K to 1L	117.750 106.500		0.0 251.28	4 4.26	E	13.167 0.0 0.0	12.500 13.167 25.667	120 0.0153	70.509 4.872 0.392			Vel = 5.66
1L to TWR	106.500 105.500		0.0 251.28	4 4.26	6E	79.002 0.0 0.0	60.000 79.002 139.002	120 0.0153	75.773 0.433 2.122			Vel = 5.66
TWR to BWR	105.500 101.500		0.0 251.28	4 4.26	Bvcb T Fsp	15.8 26.334 0.0	2.000 42.134 44.134	120 0.0153	78.328 4.732 0.674		* Fixed Loss = 3	Vel = 5.66
BWR to BKFL	101.500 101.500		0.0 251.28	4 4.26	E T	13.167 26.334 0.0	6.000 39.501 45.501	120 0.0153	83.734 0.0 0.695			Vel = 5.66
BKFL to BASE	101.500 100		0.0 251.28	4 4.026	Zac T	0.0 20.0 0.0	1.000 20.000 21.000	120 0.0201	84.429 3.556 0.422		* Fixed Loss = 2.906	Vel = 6.33
BASE to HOSE	100 100		0.0 251.28	6 6.16	G T E	4.304 43.037 20.084	50.000 67.425 117.425	140 0.0019	88.407 0.0 0.223			Vel = 2.71

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
100 Commercial Street Wet System 1st Flr Area 1

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
HOSE to TEST	100 100	H100	100.00 351.28	8		0.0	480.000	140	88.630			
			0.0			0.0	0.0		0.0	Vel = 2.10		
TEST			351.28						89.035	K Factor = 37.23		

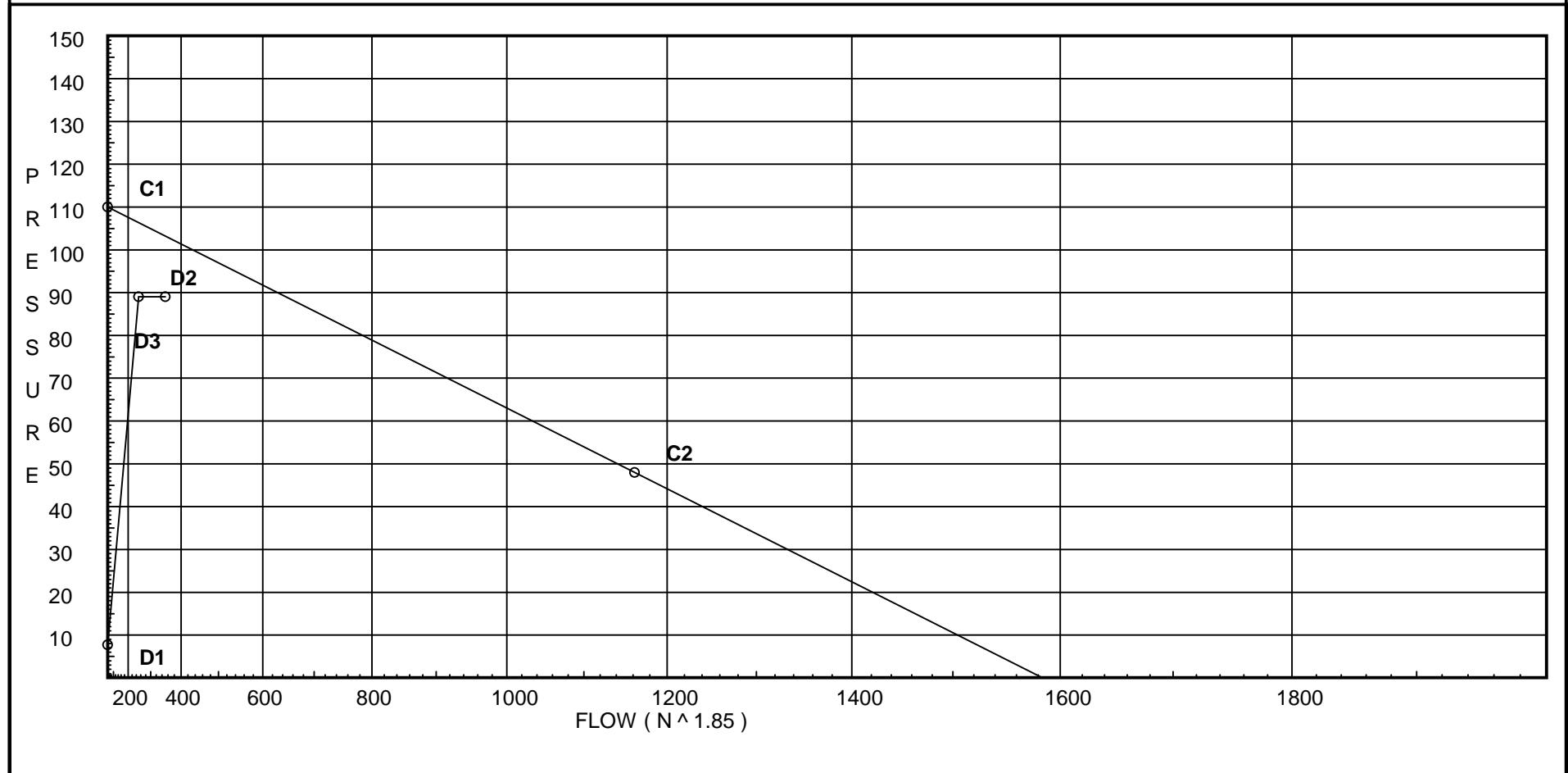
Water Supply Curve C

SPRINKLER SYSTEMS INC.
100 Commercial Street Wet System 1st Flr Area 1

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City Water Supply:
C1 - Static Pressure : 110
C2 - Residual Pressure: 48
C2 - Residual Flow : 1162

Demand:
D1 - Elevation : 7.688
D2 - System Flow : 251.28
D2 - System Pressure : 89.035
Hose (Demand) : 100
D3 - System Demand : 351.28
Safety Margin : 14.185



Hydraulic Design Information Sheet

Name - 100 Commercial Street 1st Floor Area 2 Date - 01-01-18
 Location - 100 Commercial Street Portland, Maine
 Building - Existing System No. - 1 Wet
 Contractor - Sprinkler Systems Inc. Contract No. - 15-095
 Calculated By - CDS Drawing No. - 1-3 of 3
 Construction: (X) Combustible () Non-Combustible Ceiling Height - varies
 Occupancy - Office Building

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	- 945	System Type	Sprinkler/Nozzle
	Density	- .20	(X) Wet	Make Reliable
D	Area Per Sprinkler	- 130	() Dry	Model F1FR56
E	Elevation at Highest Outlet	- 118.75	() 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 - 238.45 Press Required - 74.187 AT BASE
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 10-06-15		Cap. -
T	Time of Test - AM	Rated Cap.-	Elev.-
E	Static Press - 110	@ Press -	
R	Residual Press - 48	Elev. -	Well
	Flow - 1162		Proof Flow
S	Elevation - 100.0'		

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:	%	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:

Pressure / Flow Summary - STANDARD

SPRINKLER SYSTEMS INC.
100 Commercial Street Wet System 1st Flr Area 2

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Date

Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
TYP	0.0	5.6	11.21	na	18.75	0.15	125	7.0
113	118.75	5.6	25.11	na	28.06	0.2	130	7.0
110	118.75	5.6	22.6	na	26.62	0.2	130	7.0
111	118.75	5.6	22.85	na	26.77	0.2	130	7.0
107	118.75	5.6	21.95	na	26.23	0.2	130	7.0
108	118.75	5.6	22.19	na	26.38	0.2	130	7.0
104	118.75	5.6	21.64	na	26.05	0.2	130	7.0
105	118.75	5.6	21.88	na	26.2	0.2	130	7.0
101	118.75	5.6	21.56	na	26.0	0.2	130	7.0
102	118.75	5.6	21.8	na	26.14	0.2	130	7.0
103	117.75		23.7	na				
106	117.75		23.79	na				
109	117.75		24.12	na				
112	117.75		24.81	na				
114	117.75		26.01	na				
115	117.75		31.11	na				
1A	117.75		35.06	na				
1B	118.75		38.55	na				
1H	117.75		43.84	na				
1I	117.75		53.72	na				
1K	117.75		56.77	na				
1L	106.5		61.99	na				
TWR	105.5		64.35	na				
BWR	101.5		69.7	na				
BKFL	101.5		70.33	na				
BASE	100.0		74.19	na				
HOSE	100.0		74.39	na	250.0			
TEST	100.0		75.14	na				

The maximum velocity is 14.03 and it occurs in the pipe between nodes 114 and 115

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TYP to ARM	0 0	5.60	18.75 18.75	1 1.049	E T Eq	2.0 5.0 19.0	2.000 26.000 28.000	120	11.210 0.0 3.234			Vel = 6.96
ARM			0.0 18.75						14.444		K Factor =	4.93
113 to 114	118.750 117.750	5.60	28.06 28.06	1.5 1.682	E T	4.95 9.9 0.0	4.250 14.850 19.100	120	25.110 0.433 0.467			Vel = 4.05
114			0.0 28.06						26.010		K Factor =	5.50
110 to 111	118.750 118.750	5.60	26.62 26.62	1.5 1.682		0.0 0.0 0.0	11.330 0.0 11.330	120	22.595 0.0 0.251			Vel = 3.84
111 to 112	118.750 117.750	5.60	26.77 53.39	1.5 1.682	E T	4.95 9.9 0.0	4.250 14.850 19.100	120	22.846 0.433 1.533			Vel = 7.71
112			0.0 53.39						24.812		K Factor =	10.72
107 to 108	118.750 118.750	5.60	26.23 26.23	1.5 1.682		0.0 0.0 0.0	11.330 0.0 11.330	120	21.946 0.0 0.244			Vel = 3.79
108 to 109	118.750 117.750	5.60	26.38 52.61	1.5 1.682	E T	4.95 9.9 0.0	4.250 14.850 19.100	120	22.190 0.433 1.493			Vel = 7.60
109			0.0 52.61						24.116		K Factor =	10.71
104 to 105	118.750 118.750	5.60	26.05 26.05	1.5 1.682		0.0 0.0 0.0	11.330 0.0 11.330	120	21.641 0.0 0.241			Vel = 3.76
105 to 106	118.750 117.750	5.60	26.20 52.25	1.5 1.682	E T	4.95 9.9 0.0	4.250 14.850 19.100	120	21.882 0.433 1.473			Vel = 7.54
106			0.0 52.25						23.788		K Factor =	10.71
101 to 102	118.750 118.750	5.60	26.00 26.0	1.5 1.682		0.0 0.0 0.0	11.330 0.0 11.330	120	21.556 0.0 0.240			Vel = 3.75
102 to 103	118.750 117.750	5.60	26.14 52.14	1.5 1.682	E T	4.95 9.9 0.0	4.250 14.850 19.100	120	21.796 0.433 1.469			Vel = 7.53
103 to 106	117.750 117.750		0.0 52.14	2.5 2.635		0.0 0.0 0.0	10.500 0.0 10.500	120	23.698 0.0 0.090			Vel = 3.07
106 to 109	117.750 117.750		52.25 104.39	2.5 2.635		0.0 0.0 0.0	10.500 0.0 10.500	120	23.788 0.0 0.328			Vel = 6.14
109 to 112	117.750 117.750		52.61 157.0	2.5 2.635		0.0 0.0 0.0	10.500 0.0 10.500	120	24.116 0.0 0.696			Vel = 9.24

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
100 Commercial Street Wet System 1st Flr Area 2

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
112 to 114	117.750 117.750		53.39 210.39	2.5 2.635		0.0 0.0	10.500 0.0	120 0.1141	24.812 0.0			Vel = 12.38
114 to 115	117.750 117.750		28.06 238.45	2.5 2.635	T	16.474 0.0	19.000 16.474	120 0.1438	26.010 0.0			Vel = 14.03
115 to 1A	117.750 117.750		0.0 238.45	2.5 2.635	2E	16.474 0.0	11.000 16.474	120 0.1437	31.110 0.0			Vel = 14.03
1A to 1B	117.750 118.750		0.0 238.45	3 3.26	2E T	18.815 20.159	38.000 38.974	120 0.0510	35.059 -0.433			Vel = 9.17
1B to 1H	118.750 117.750		0.0 238.45	3 3.26	2T	40.319 0.0	55.000 40.319	120 0.0510	38.551 0.433			Vel = 9.17
1H to 1I	117.750 117.750		0.0 238.45	3 3.26	Fsp Bvcb S T 6E	0.0 6.72 21.503 20.159 56.446	30.000 104.828 134.828	120 0.0510	43.844 3.000 6.875		* Fixed Loss = 3	Vel = 9.17
1I to 1K	117.750 117.750		0.0 238.45	4 4.26	11E	144.838 0.0	75.000 144.838	120 0.0139	53.719 0.0			Vel = 5.37
1K to 1L	117.750 106.500		0.0 238.45	4 4.26	E	13.167 0.0	12.500 13.167	120 0.0139	56.765 4.872			Vel = 5.37
1L to TWR	106.500 105.500		0.0 238.45	4 4.26	6E	79.002 0.0	60.000 79.002	120 0.0139	61.993 0.433			Vel = 5.37
TWR to BWR	105.500 101.500		0.0 238.45	4 4.26	Bvcb T Fsp	15.8 26.334 0.0	2.000 42.134 44.134	120 0.0139	64.352 4.732 0.612		* Fixed Loss = 3	Vel = 5.37
BWR to BKFL	101.500 101.500		0.0 238.45	4 4.26	E T	13.167 26.334	6.000 39.501	120 0.0138	69.696 0.0			Vel = 5.37
BKFL to BASE	101.500 100		0.0 238.45	4 4.026	Zac T	0.0 20.0	1.000 20.000	120 0.0182	70.326 3.478		* Fixed Loss = 2.828	Vel = 6.01
BASE to HOSE	100 100		0.0 238.45	6 6.16	G T E	4.304 43.037 20.084	50.000 67.425 117.425	140 0.0017	74.187 0.0 0.203			Vel = 2.57
HOSE to TEST	100 100	H250	250.00 488.45	8 8.27		0.0 0.0	480.000 0.0	140 0.0016	74.390 0.0			Vel = 2.92
TEST			0.0 488.45						75.135		K Factor = 56.35	

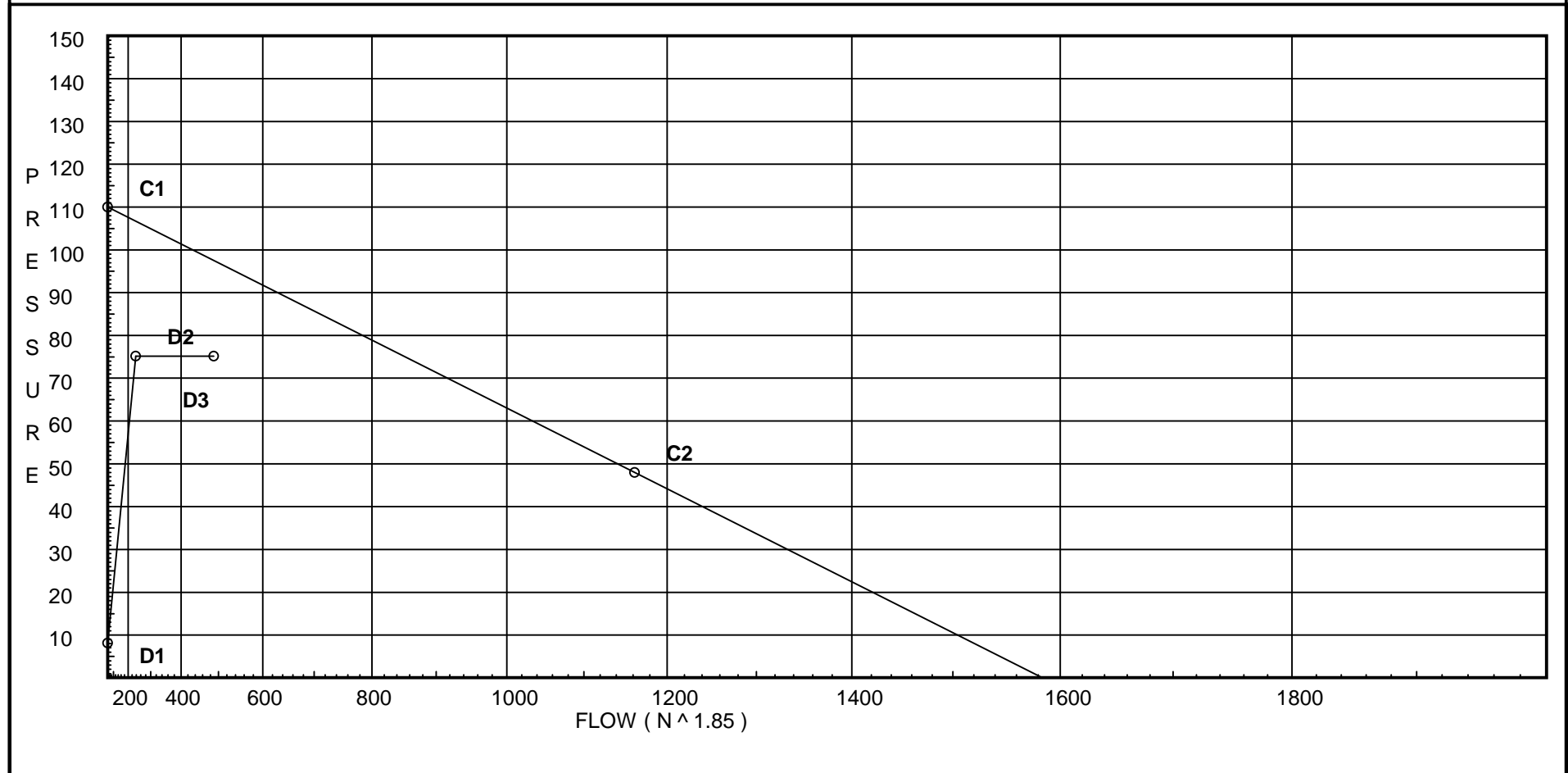
Water Supply Curve C

SPRINKLER SYSTEMS INC.
100 Commercial Street Wet System 1st Flr Area 2

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City Water Supply:
C1 - Static Pressure : 110
C2 - Residual Pressure: 48
C2 - Residual Flow : 1162

Demand:
D1 - Elevation : 8.121
D2 - System Flow : 238.452
D2 - System Pressure : 75.135
Hose (Demand) : 250
D3 - System Demand : 488.452
Safety Margin : 22.389



Hydraulic Design Information Sheet

Name - 100 Commercial Street 1st Floor Area 3 Date - 01-01-18
 Location - 100 Commercial Street Portland, Maine
 Building - Existing System No. - 1 Wet
 Contractor - Sprinkler Systems Inc. Contract No. - 15-095
 Calculated By - CDS Drawing No. - 1-3 of 3
 Construction: (X) Combustible () Non-Combustible Ceiling Height - varies
 Occupancy - Office Building

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

S Other

T Specific Ruling Made By Date

M	Area of Sprinkler Operation	- 945	System Type	Sprinkler/Nozzle
	Density	- .15	(X) Wet	Make Reliable
D	Area Per Sprinkler	- 125	() Dry	Model F1FR56
E	Elevation at Highest Outlet	- 116.75	() 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 - 193.00 Press Required - 79.727 AT BASE
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 10-06-15		Cap. -
T	Time of Test - AM	Rated Cap.-	Elev.-
E	Static Press - 110	@ Press -	
R	Residual Press - 48	Elev. -	Well
	Flow - 1162		Proof Flow
S	Elevation - 100.0'		

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:	%	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:

Pressure / Flow Summary - STANDARD

SPRINKLER SYSTEMS INC.
100 Commercial Street Wet System 1st Flr Area 3

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
TYP	0.0	5.6	11.21	na	18.75	0.15	125	7.0
1D	116.75		29.91	na				
143	116.75		24.65	na				
144	116.75		24.5	na				
146	116.75		24.22	na				
153	116.75		23.95	na				
154	116.75		23.46	na				
157	116.75		23.41	na				
160	116.75		22.97	na				
161	116.75		22.92	na				
162	116.75		21.53	na				
135	116.0	K = K @ ARM	19.54	na	23.46			
136	116.0	K = K @ ARM	19.72	na	23.57			
133	116.0		20.92	na				
126	116.0	5.6	11.35	na	18.87	0.15	115	7.0
127	116.0	5.6	12.7	na	19.96	0.15	125	7.0
128	116.0		13.86	na				
121	116.0	5.6	11.21	na	18.75	0.15	125	7.0
122	116.0	5.6	12.49	na	19.79	0.15	125	7.0
123	116.0		13.64	na				
124	116.0		18.01	na				
125	116.0	K = K @ ARM	18.03	na	22.53			
129	116.0		18.3	na				
130	116.0	K = K @ ARM	18.4	na	22.77			
131	116.0	K = K @ ARM	19.29	na	23.31			
132	116.0		20.7	na				
134	116.0		20.92	na				
137	116.0		20.98	na				
138	116.75		26.46	na				
1E	116.0		36.15	na				
1F	116.0		41.81	na				
1G	118.75		46.28	na				
1C	118.75		48.57	na				
1B	118.75		50.41	na				
1H	117.75		54.13	na				
1I	117.75		61.78	na				
1K	117.75		63.84	na				
1L	106.5		68.95	na				
TWR	105.5		70.69	na				
BWR	101.5		75.83	na				
BKFL	101.5		76.26	na				
BASE	100.0		79.73	na				
HOSE	100.0		79.86	na	250.0			
TEST	100.0		80.49	na				

The maximum velocity is 16.95 and it occurs in the pipe between nodes 1D and 1E

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TYP to ARM	0 0	5.60	18.75 18.75	1 1.049	2E T	4.0 5.0 0.0	2.000 9.000 11.000	120	11.210 0.0 1.271		Vel = 6.96	
ARM			0.0 18.75						12.481		K Factor = 5.31	
1D to 143	116.750 116.750		-78.83 -78.83	2 2.157	4E T	24.613 12.307 0.0	70.000 36.920 106.920	120	29.909 0.0 -5.258		Vel = 6.92	
143 to 144	116.750 116.750		0.0 -78.83	2 2.157		0.0 0.0 0.0	3.000 0.0 3.000	120	24.651 0.0 -0.147		Vel = 6.92	
144 to 146	116.750 116.750		0.0 -78.83	2 2.157		0.0 0.0 0.0	5.750 0.0 5.750	120	24.504 0.0 -0.283		Vel = 6.92	
146 to 153	116.750 116.750		0.0 -78.83	2 2.157		0.0 0.0 0.0	5.500 0.0 5.500	120	24.221 0.0 -0.270		Vel = 6.92	
153 to 154	116.750 116.750		0.0 -78.83	2 2.157		0.0 0.0 0.0	10.000 0.0 10.000	120	23.951 0.0 -0.492		Vel = 6.92	
154 to 157	116.750 116.750		0.0 -78.83	2 2.157		0.0 0.0 0.0	1.000 0.0 1.000	120	23.459 0.0 -0.049		Vel = 6.92	
157 to 160	116.750 116.750		0.0 -78.83	2 2.157		0.0 0.0 0.0	9.000 0.0 9.000	120	23.410 0.0 -0.443		Vel = 6.92	
160 to 161	116.750 116.750		0.0 -78.83	2 2.157		0.0 0.0 0.0	1.000 0.0 1.000	120	22.967 0.0 -0.049		Vel = 6.92	
161 to 162	116.750 116.750		0.0 -78.83	2 2.157	2E	12.307 0.0 0.0	16.000 12.307 28.307	120	22.918 0.0 -1.392		Vel = 6.92	
162 to 132	116.750 116		0.0 -78.83	2 2.157	E T	6.153 12.307 0.0	5.000 18.460 23.460	120	21.526 0.325 -1.154		Vel = 6.92	
132			0.0 -78.83						20.697		K Factor = -17.33	
135 to 136	116 116	5.31	23.46 23.46	1.5 1.682		0.0 0.0 0.0	10.000 0.0 10.000	120	19.542 0.0 0.175		K = K @ ARM Vel = 3.39	
136 to 137	116 116	5.31	23.57 47.03	1.5 1.682	T	9.9 0.0 0.0	10.000 9.900 19.900	120	19.717 0.0 1.264		K = K @ ARM Vel = 6.79	
137			0.0 47.03						20.981		K Factor = 10.27	
133 to 134	116 116		0.0 0.0	1 1.049	T	5.0 0.0 0.0	1.500 5.000 6.500	120 0	20.917 0.0 0.0		Vel = 0	

Final Calculations - Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
134			0.0 0.0						20.917		K Factor = 0	
126 to 128	116 116	5.60	18.87	1	2T 2E	10.0 4.0	7.500 14.000	120	11.353 0.0			
			18.87	1.049		0.0	21.500	0.1168	2.512		Vel = 7.01	
128			0.0 18.87						13.865		K Factor = 5.07	
127 to 128	116 116	5.60	19.96	1	3E	6.0 0.0	3.000 6.000	120	12.698 0.0			
			19.96	1.049		0.0	9.000	0.1297	1.167		Vel = 7.41	
128 to 129	116 116		18.86	1	T	5.0 0.0	5.000 5.000	120	13.865 0.0			
			38.82	1.049		0.0	10.000	0.4439	4.439		Vel = 14.41	
129			0.0 38.82						18.304		K Factor = 9.07	
121 to 123	116 116	5.60	18.75	1	3E T	6.0 5.0	10.000 11.000	120	11.210 0.0			
			18.75	1.049		0.0	21.000	0.1155	2.426		Vel = 6.96	
123			0.0 18.75						13.636		K Factor = 5.08	
122 to 123	116 116	5.60	19.79	1	3E	6.0 0.0	3.000 6.000	120	12.487 0.0			
			19.79	1.049		0.0	9.000	0.1277	1.149		Vel = 7.35	
123 to 124	116 116		18.75	1	T	5.0 0.0	5.000 5.000	120	13.636 0.0			
			38.54	1.049		0.0	10.000	0.4379	4.379		Vel = 14.31	
124 to 125	116 116		0.0	2		0.0 0.0	1.000 0.0	120	18.015 0.0			
			38.54	2.157		0.0	1.000	0.0130	0.013		Vel = 3.38	
125 to 129	116 116	5.31	22.53	2		0.0 0.0	9.000 0.0	120	18.028 0.0		K = K @ ARM	
			61.07	2.157		0.0	9.000	0.0307	0.276		Vel = 5.36	
129 to 130	116 116		38.83	2		0.0 0.0	1.250 0.0	120	18.304 0.0			
			99.9	2.157		0.0	1.250	0.0760	0.095		Vel = 8.77	
130 to 131	116 116	5.31	22.76	2		0.0 0.0	8.000 0.0	120	18.399 0.0		K = K @ ARM	
			122.66	2.157		0.0	8.000	0.1114	0.891		Vel = 10.77	
131 to 132	116 116	5.31	23.31	2	E	6.153 0.0	3.000 6.153	120	19.290 0.0		K = K @ ARM	
			145.97	2.157		0.0	9.153	0.1537	1.407		Vel = 12.82	
132 to 134	116 116		-78.83	2		0.0 0.0	6.000 0.0	120	20.697 0.0			
			67.14	2.157		0.0	6.000	0.0367	0.220		Vel = 5.89	
134 to 137	116 116		0.0	2		0.0 0.0	1.750 0.0	120	20.917 0.0			
			67.14	2.157		0.0	1.750	0.0366	0.064		Vel = 5.89	

Final Calculations - Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
137 to 138	116 116.750		47.03 114.17	2 2.157	2F 2E T	4.923 12.307 12.307	30.000 29.537 59.537	120 0.0976	20.981 -0.325 5.808			Vel = 10.02
138 to 1D	116.750 116.750		0.0 114.17	2 2.157	T	12.307 0.0 0.0	23.000 12.307 35.307	120 0.0976	26.464 0.0 3.445			Vel = 10.02
1D to 1E	116.750 116		78.83 193.0	2 2.157	E T	6.153 12.307 0.0	4.500 18.460 22.960	120 0.2577	29.909 0.325 5.916			Vel = 16.95
1E to 1F	116 116		0.0 193.0	2.5 2.635	E	8.237 0.0 8.237	50.000 8.237 58.237	120 0.0972	36.150 0.0 5.662			Vel = 11.35
1F to 1G	116 118.750		0.0 193.0	2.5 2.635	E	8.237 0.0 8.237	50.000 8.237 58.237	120 0.0972	41.812 -1.191 5.661			Vel = 11.35
1G to 1C	118.750 118.750		0.0 193.0	2.5 2.635		0.0 0.0 0.0	23.500 0.0 23.500	120 0.0972	46.282 0.0 2.285			Vel = 11.35
1C to 1B	118.750 118.750		0.0 193.0	2.5 2.635	T	16.474 0.0 16.474	2.500 16.474 18.974	120 0.0972	48.567 0.0 1.844			Vel = 11.35
1B to 1H	118.750 117.750		0.0 193.0	3 3.26	2T	40.319 0.0 0.0	55.000 40.319 95.319	120 0.0345	50.411 0.433 3.287			Vel = 7.42
1H to 1I	117.750 117.750		0.0 193.0	3 3.26	Fsp Bvcb S T 6E	0.0 6.72 21.503 20.159 56.446	30.000 104.828 134.828	120 0.0345	54.131 3.000 4.649		* Fixed Loss = 3	Vel = 7.42
1I to 1K	117.750 117.750		0.0 193.0	4 4.26	11E	144.838 0.0 0.0	75.000 144.838 219.838	120 0.0094	61.780 0.0 2.060			Vel = 4.34
1K to 1L	117.750 106.500		0.0 193.0	4 4.26	E	13.167 0.0 0.0	12.500 13.167 25.667	120 0.0094	63.840 4.872 0.241			Vel = 4.34
1L to TWR	106.500 105.500		0.0 193.0	4 4.26	6E	79.002 0.0 0.0	60.000 79.002 139.002	120 0.0094	68.953 0.433 1.302			Vel = 4.34
TWR to BWR	105.500 101.500		0.0 193.0	4 4.26	Bvcb T Fsp	15.8 26.334 0.0	2.000 42.134 44.134	120 0.0094	70.688 4.732 0.414		* Fixed Loss = 3	Vel = 4.34
BWR to BKFL	101.500 101.500		0.0 193.0	4 4.26	E T	13.167 26.334 0.0	6.000 39.501 45.501	120 0.0094	75.834 0.0 0.426			Vel = 4.34
BKFL to BASE	101.500 100		0.0 193.0	4 4.026	Zac T	0.0 20.0 0.0	1.000 20.000 21.000	120 0.0123	76.260 3.208 0.259		* Fixed Loss = 2.558	Vel = 4.86
BASE to HOSE	100 100		0.0 193.0	6 6.16	G T E	4.304 43.037 20.084	50.000 67.425 117.425	140 0.0012	79.727 0.0 0.137			Vel = 2.08

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
HOSE to TEST	100 100	H250	250.00 443.0	8 8.27		0.0 0.0	480.000 0.0	140 0.0013	79.864 0.622		Vel = 2.65	
TEST			0.0 443.00						80.486		K Factor = 49.38	

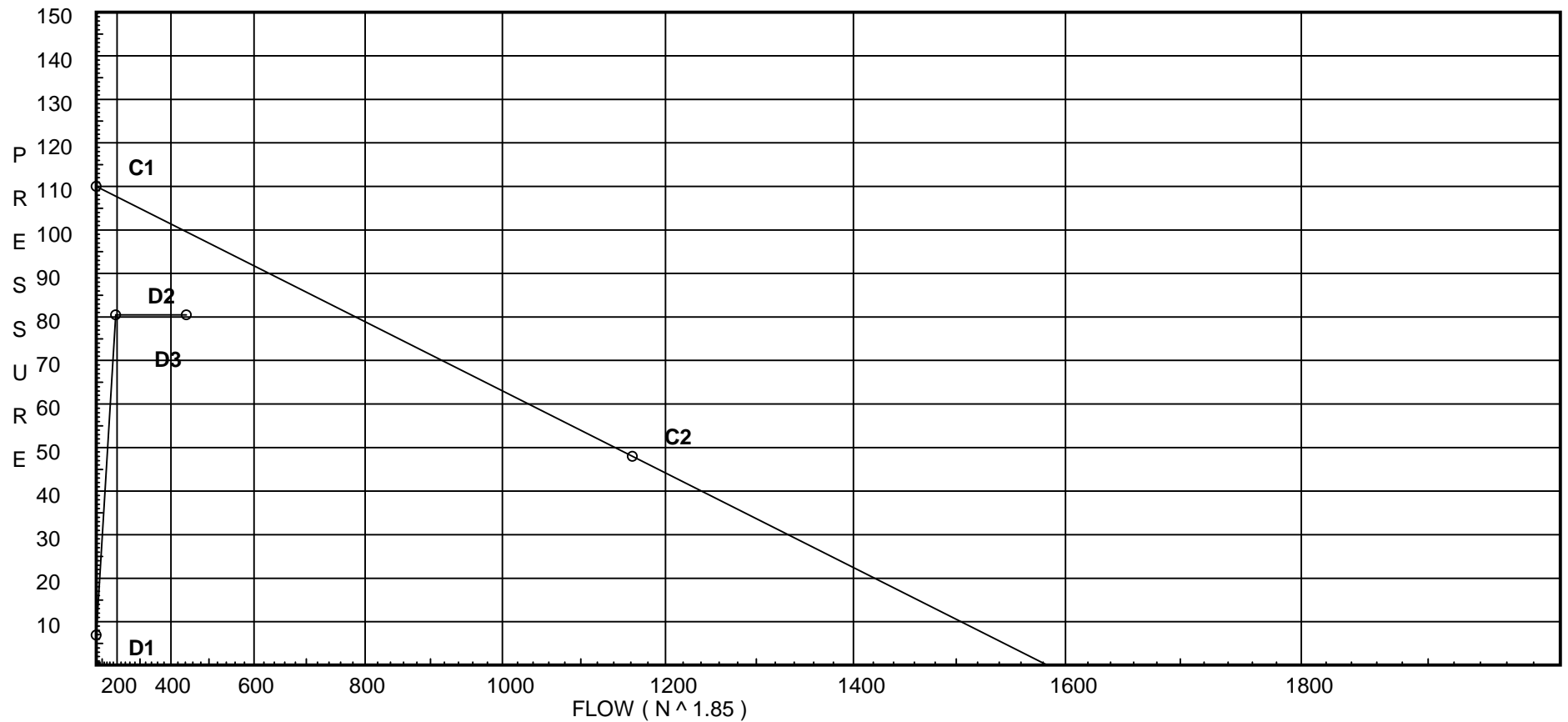
Water Supply Curve C

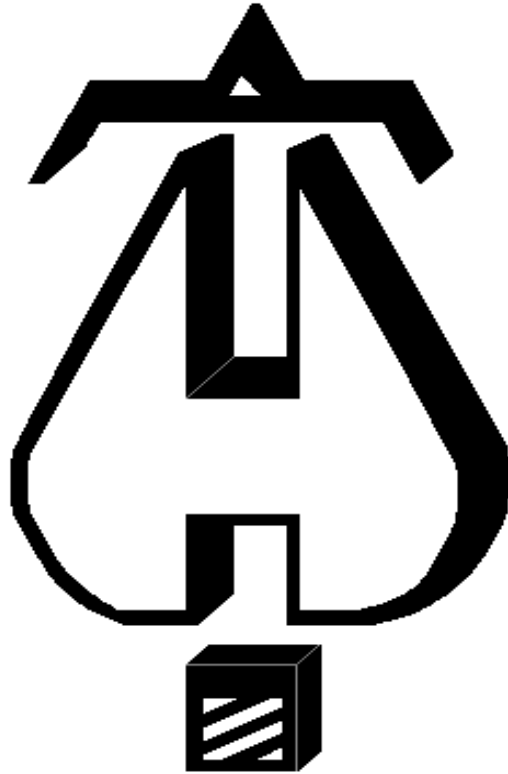
SPRINKLER SYSTEMS INC.
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City Water Supply:
C1 - Static Pressure : 110
C2 - Residual Pressure: 48
C2 - Residual Flow : 1162

Demand:
D1 - Elevation : 6.930
D2 - System Flow : 193.002
D2 - System Pressure : 80.486
Hose (Demand) : 250
D3 - System Demand : 443.002
Safety Margin : 19.100





. . . Fire Protection by Computer Design

SPRINKLER SYSTEMS INC.
P O BOX 1285
4 AVON STREET
LEWISTON, MAINE
2077820104

Job Name : 100 Commercial Street Wet System 4th Flr Area 1
Drawing : Existing
Location : 100 Commercial Street Portland, Maine
Remote Area : 1 Wet
Contract : 15-095
Data File : 100 Commercial Street Wet System 4th Flr Area 1.WXF

Hydraulic Design Information Sheet

Name - 100 Commercial Street 4th Floor Area 1 Date - 01-01-18
 Location - 100 Commercial Street Portland, Maine
 Building - Existing System No. - 1 Wet
 Contractor - Sprinkler Systems Inc. Contract No. - 15-095
 Calculated By - CDS Drawing No. - 1-3 of 3
 Construction: (X) Combustible () Non-Combustible Ceiling Height - varies
 Occupancy - Office Building

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

M	Area of Sprinkler Operation	- Entire	System Type	Sprinkler/Nozzle
	Density	- .10	(X) Wet	Make Reliable
D	Area Per Sprinkler	- 168	() Dry	Model F1FR56
E	Elevation at Highest Outlet	- 153	() 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.155 Deg.
G	Hose Allowance - Outside	- 100		

N Note

Calculation Flow Required - 182.10 Press Required - 73.086 AT BASE
 Summary C-Factor Used: 120 Overhead 140 Underground

W	Water Flow Test:	Pump Data:	Tank or Reservoir:
A	Date of Test - 10-06-15		Cap. -
T	Time of Test - AM	Rated Cap.-	Elev.-
E	Static Press - 110	@ Press -	
R	Residual Press - 48	Elev. -	Well
	Flow - 1162		Proof Flow
S	Elevation - 100.0'		

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:	%	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:

Pressure / Flow Summary - STANDARD

SPRINKLER SYSTEMS INC.
100 Commercial Street Wet System 4th Flr Area 1

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Node No.	Elevation	K-Fact	Pt Actual	Pn	Flow Actual	Density	Area	Press Req.
TYP1	0.0	5.6	9.0	na	16.8	0.1	168	7.0
ARM1	151.0	5.6	16.51	na	22.75	0.1	168	7.0
411	151.0	K = K @ ARM	17.64	na	21.86			
412	151.0	K = K @ ARM	17.82	na	21.98			
405	152.0	5.6	8.56	na	16.39	0.15	100	7.0
ARM2	152.0	5.6	11.44	na	18.94	0.1	168	7.0
404	153.0	5.6	9.0	na	16.8	0.1	168	7.0
406	153.0		9.71	na				
407	152.0		13.13	na				
408	152.0		13.2	na				
409	152.0	5.6	13.97	na	20.93	0.1	168	7.0
401	151.0	K = K @ ARM	16.53	na	21.17			
402	151.0	K = K @ ARM	16.71	na	21.28			
403	151.0		17.44	na				
410	151.0		17.61	na				
413	151.0		18.71	na				
414	151.0		19.07	na				
415	151.0		25.48	na				
416	151.0		26.41	na				
417	151.0		31.86	na				
A	151.0		39.62	na				
B	139.5		44.71	na				
C	128.5		50.14	na				
D	118.75		54.58	na				
1I	117.75		55.68	na				
1K	117.75		57.53	na				
1L	106.5		62.62	na				
TWR	105.5		64.23	na				
BWR	101.5		69.33	na				
BKFL	101.5		69.71	na				
BASE	100.0		73.09	na				
HOSE	100.0		73.21	na	100.0			
TEST	100.0		73.48	na				

The maximum velocity is 15.99 and it occurs in the pipe between nodes 414 and 415

Fittings Used Summary

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100 Commercial Street Wet System 4th Flr Area 1

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Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
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
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
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
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
Zac	Ames 2000SS	Fitting generates a Fixed Loss Based on Flow																			

Unit 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.

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
TYP1 to ARM	0 0	5.60	16.80 16.8	1 1.049	2T E	10.0 2.0 0.0	3.000 12.000 15.000	120 0.0943	9.000 0.0 1.414		Vel = 6.24	
ARM			0.0 16.80						10.414		K Factor = 5.21	
ARM1 to 414	151 151	5.60	22.75 22.75	1 1.049	2T E	10.0 2.0 0.0	3.500 12.000 15.500	120 0.1652	16.509 0.0 2.561		Vel = 8.45	
414			0.0 22.75						19.070		K Factor = 5.21	
411 to 412	151 151	5.21	21.86 21.86	1.5 1.682		0.0 0.0 0.0	12.000 0.0 12.000	120 0.0153	17.637 0.0 0.184		K = K @ ARM Vel = 3.16	
412 to 413	151 151	5.21	21.98 43.84	1.5 1.682	T	9.9 0.0 0.0	6.000 9.900 15.900	120 0.0558	17.821 0.0 0.887		K = K @ ARM Vel = 6.33	
413			0.0 43.84						18.708		K Factor = 10.14	
405 to 406	152 153	5.60	16.39 16.39	1 1.049	3E T	6.0 5.0 0.0	6.500 11.000 17.500	120 0.0900	8.565 -0.433 1.575		Vel = 6.08	
406			0.0 16.39						9.707		K Factor = 5.26	
ARM2 to 408	152 152	5.60	18.94 18.94	1 1.049	2T E	10.0 2.0 0.0	3.000 12.000 15.000	120 0.1177	11.439 0.0 1.765		Vel = 7.03	
408			0.0 18.94						13.204		K Factor = 5.21	
404 to 406	153 153	5.60	16.80 16.8	1 1.049	T	5.0 0.0 0.0	2.500 5.000 7.500	120 0.0943	9.000 0.0 0.707		Vel = 6.24	
406 to 407	153 152		16.39 33.19	1 1.049	E T	2.0 5.0 0.0	2.000 7.000 9.000	120 0.3321	9.707 0.433 2.989		Vel = 12.32	
407 to 408	152 152		0.0 33.19	1.5 1.682		0.0 0.0 0.0	2.250 0.0 2.250	120 0.0333	13.129 0.0 0.075		Vel = 4.79	
408 to 409	152 152		18.94 52.13	1.5 1.682		0.0 0.0 0.0	10.000 0.0 10.000	120 0.0768	13.204 0.0 0.768		Vel = 7.53	
409 to 410	152 151	5.60	20.93 73.06	1.5 1.682	E T	4.95 9.9 0.0	7.500 14.850 22.350	120 0.1435	13.972 0.433 3.207		Vel = 10.55	
410			0.0 73.06						17.612		K Factor = 17.41	
401 to 402	151 151	5.21	21.17 21.17	1.5 1.682		0.0 0.0 0.0	12.000 0.0 12.000	120 0.0145	16.532 0.0 0.174		K = K @ ARM Vel = 3.06	

Final Calculations - Hazen-Williams

SPRINKLER SYSTEMS INC.
100 Commercial Street Wet System 4th Flr Area 1

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
402 to 403	151 151	5.21	21.28 42.45	1.5 1.682	T	9.9 0.0	4.000 9.900	120 0.0525	16.706 0.0 0.730		K = K @ ARM	
403 to 410	151 151		0.0 42.45	2 2.157		0.0 0.0	11.250 0.0	120 0.0156	17.436 0.0 0.176		Vel = 6.13	
410 to 413	151 151		73.06 115.51	2 2.157		0.0 0.0	11.000 0.0	120 0.0996	17.612 0.0 1.096		Vel = 3.73	
413 to 414	151 151		43.84 159.35	2 2.157		0.0 0.0	2.000 2.000	120 0.1810	18.708 0.0 0.362		Vel = 10.14	
414 to 415	151 151		22.75 182.1	2 2.157	E T	6.153 12.307	9.250 18.460	120 0.2314	19.070 0.0 6.412		Vel = 13.99	
415 to 416	151 151		0.0 182.1	2 2.157		0.0 0.0	4.000 0.0	120 0.2315	25.482 0.0 0.926		Vel = 15.99	
416 to 417	151 151		0.0 182.1	2.5 2.635	T	16.474 0.0	46.000 16.474	120 0.0873	26.408 0.0 5.454		Vel = 10.71	
417 to A	151 151		0.0 182.1	2.5 2.635	Bvcb S T Fsp	6.864 19.22 16.474 0.0	12.000 42.558 54.558	120 0.0873	31.862 3.000 4.763		* Fixed Loss = 3	Vel = 10.71
A to B	151 139.500		0.0 182.1	4 4.26		0.0 0.0	12.500 0.0	120 0.0084	39.625 4.981 0.105		Vel = 4.10	
B to C	139.500 128.500		0.0 182.1	4 4.26	2E T	26.334 26.334	27.000 52.668	120 0.0084	44.711 4.764 0.670		Vel = 4.10	
C to D	128.500 118.750		0.0 182.1	4 4.26	E	13.167 0.0	12.000 13.167	120 0.0084	50.145 4.223 0.212		Vel = 4.10	
D to 1l	118.750 117.750		0.0 182.1	4 4.26	3E T	39.501 26.334	14.000 65.835	120 0.0084	54.580 0.433 0.671		Vel = 4.10	
1l to 1K	117.750 117.750		0.0 182.1	4 4.26	11E	144.838 0.0	75.000 144.838	120 0.0084	55.684 0.0 1.850		Vel = 4.10	
1K to 1L	117.750 106.500		0.0 182.1	4 4.26	E	13.167 0.0	12.500 13.167	120 0.0084	57.534 4.872 0.216		Vel = 4.10	
1L to TWR	106.500 105.500		0.0 182.1	4 4.26	6E	79.002 0.0	60.000 79.002	120 0.0084	62.622 0.433 1.170		Vel = 4.10	
TWR to BWR	105.500 101.500		0.0 182.1	4 4.26	Bvcb T Fsp	15.8 26.334 0.0	2.000 42.134 44.134	120 0.0084	64.225 4.732 0.372		* Fixed Loss = 3	Vel = 4.10

Final Calculations - Hazen-Williams

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Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqv.	Ln.	Pipe Ftng's Total	CFact Pf/Ft	Pt Pe Pf	*****	Notes	*****
BWR to BKFL	101.500 101.500		0.0 182.1	4 4.26	E T	13.167 26.334	6.000 39.501	120 0.0084	69.329 0.0			Vel = 4.10
BKFL to BASE	101.500 100		0.0 182.1	4 4.026	Zac T	0.0 20.0	1.000 20.000	120 0.0110	69.712 3.142		* Fixed Loss = 2.492	Vel = 4.59
BASE to HOSE	100 100		0.0 182.1	6 6.16	G T E	4.304 43.037 20.084	50.000 67.425 117.425	140 0.0010	73.086 0.0 0.123			Vel = 1.96
HOSE to TEST	100 100	H100	100.00 282.1	8 8.27		0.0 0.0	480.000 0.0	140 0.0006	73.209 0.0			Vel = 1.68
TEST			0.0 282.10						73.479		K Factor = 32.91	

Water Supply Curve C

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City Water Supply:
C1 - Static Pressure : 110
C2 - Residual Pressure: 48
C2 - Residual Flow : 1162

Demand:
D1 - Elevation : 22.954
D2 - System Flow : 182.101
D2 - System Pressure : 73.479
Hose (Demand) : 100
D3 - System Demand : 282.101
Safety Margin : 32.002

