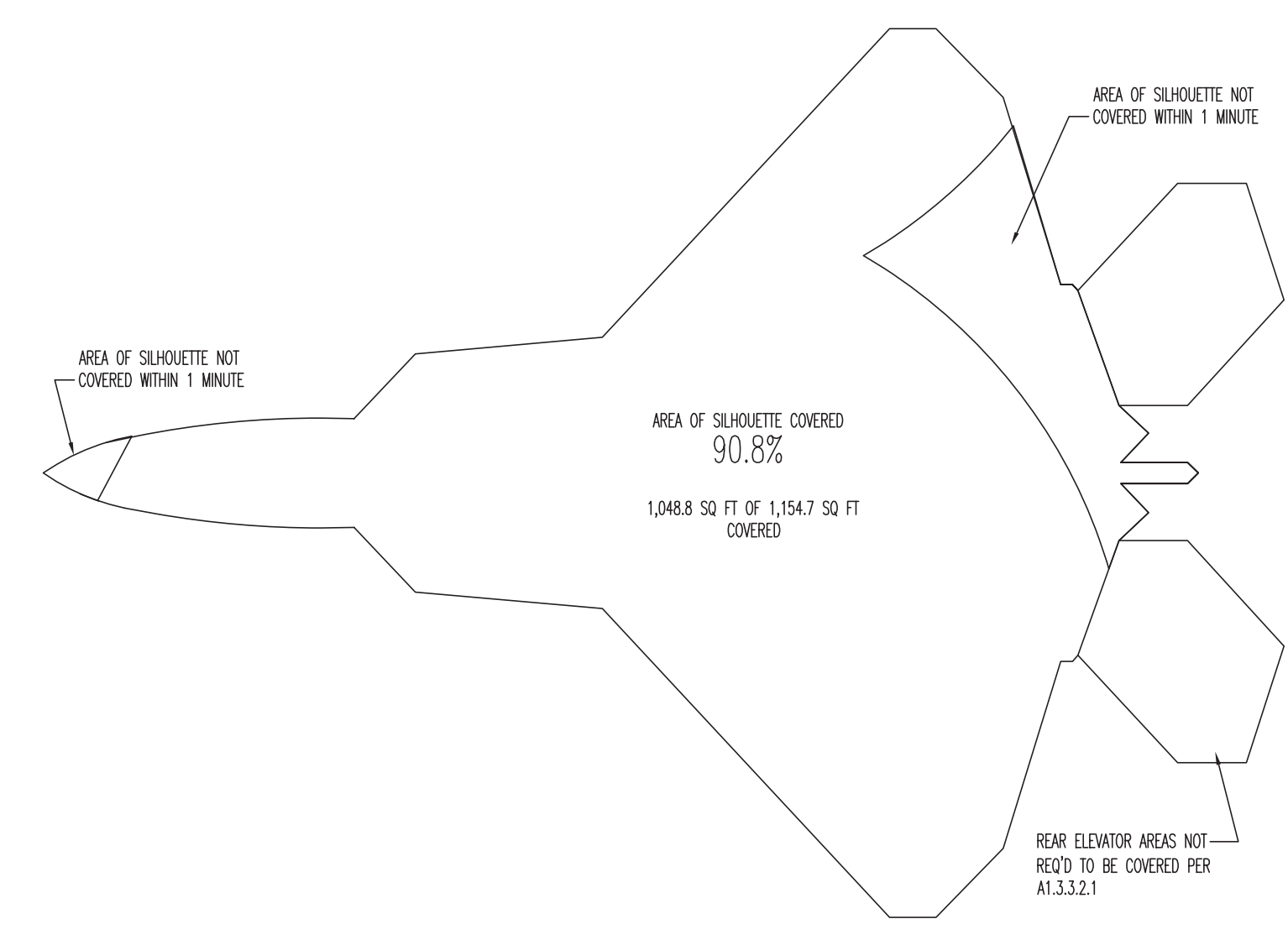


SEE SHEET F-103 FOR CONTINUATION

SEE SHEET F-101 FOR CONTINUATION



1 MINUTE SILHOUETTE COVERAGE (WORST CASE)

1 MINUTE SILHOUETTE COVERAGE CALCULATION

ELAPSED TIMES AT EACH NODE DERIVED FROM USING VELOCITY DATA IN COMBINED CALCULATION. (VELOCITY IN EACH PIPE x PIPE LENGTH)

NOTE: ELAPSED TIME:

RP	2 SEC (ALARM INITIATION DELAY)
RP	2.482
RP	2.678
RP	2.900
RP	3.853
RP	15.342
RP	19.853
RP	24.962
RP	27.102
RP	27.438 (+3 SEC FOAM FALL TIME)
RP	30.925
RP	35.979
RP	38.180
RP	38.528 (+3 SEC FOAM FALL TIME)

FOAM SPREAD TIME AT NORTH ARRAY DEVICES: 29.562 SECONDS (TYPICAL TO NODE '04')

FOAM SPREAD TIME AT SOUTH ARRAY DEVICES: 18.474 SECONDS (TYPICAL TO NODE '04')

FOAM DISCHARGE BASIS

$R = (Q1) + (R2) + (Q3) + (CL)$

Where:

- V = 33.856 x 5.28 = 111.048
- T = 4 minutes (per ETL 02-15)
- R₁ = 5 x Q
- S = 10 (per ETL 02-15)
- Q = 1788
- Q₁ = 1.15 (per ETL 02-15)
- Q₂ = 3.0 (per ETL 02-15)
- CL = 3.0 (per ETL 02-15)

$R = (111.048) + (17.850) + (1.15) + (3.0) = 133.048$ cfm

136.328 Adm. 8 discharge outlets = 19,540.8 cfm MINIMUM per outlet

FOAM OUTPUT PROVIDED = 20,230 cfm per outlet (PLUS OVERAGE)

KEY PLAN

SPRINKLER HEAD LEGEND:

SYMBOL	SN	ORIFICE K FACTOR	HEAD FINISH	PLATE FINISH	TEMP.	QUANT SOUTH	QUANT NORTH	QUANT UGR
RELIABLE F1FR56 Q.R. PEND	RA1414	1/2"	5.6	CHROME	155°	299	8	
RELIABLE F1FR56 Q.R. PEND	RA1414	1/2"	5.6	WHITE	155°	6		
REL F1FR56 Q.R. UPRIGHT ON SPRIG	RA1425	1/2"	5.6	BRASS	N/A	175°		288
RELIABLE F1FR56 Q.R. UPRIGHT	RA1425	1/2"	5.6	BRASS	N/A	155°	60	49
RELIABLE F1FR56 Q.R. UPRIGHT	RA1425	1/2"	5.6	BRASS	N/A	175°	1	
RELIABLE Q XLO S.R. UPRIGHT	R2921	3/4"	11.2	BRASS	N/A	288°		20
RELIABLE F1FR Q.R. UPRIGHT	R3622	1/2"	8.0	BRASS	N/A	175°		26
RELIABLE F1FR56 Q.R. HSW	RA1435	1/2"	5.6	BRASS	N/A	175°	2	
TOTAL SPRINKLERS ON PROJECT						368	103	288

FIRE PROTECTION PLAN - HANGAR - HE FOAM SYSTEM



REVISIONS

REV.	DATE	DESCRIPTION	INIT.
0	04-26-12	FOR APPROVAL	RD
1	6-22-12	REV FOR APPROVAL	RD
2	7-22-12	REV FOR APPROVAL	RD
3	8-12-12	REV FOR APPROVAL	RD



HAWAII AIR NATIONAL GUARD
HICKAM AIR FORCE BASE
OAHU, HAWAII
Project No. - KNMD069209

date	JUNE 2011	detailed
designed	R.A.D.	checked
E.W.W.		A.R.B.



KANSAS CITY, MISSOURI
ENGINEERS ARCHITECTS & CONSULTANTS

TFI - F-22 SQUADRON
OPERATIONS & AIRCRAFT
MAINTENANCE UNIT HANGAR
FIRE PROTECTION
HANGAR - HE FOAM SYSTEM
PLAN

project	52085	contract	W9133N-04-D-0003
drawing	F-102	rev.	0
sheet	3	of	sheets
file	KNMD069209-F200.DWG		

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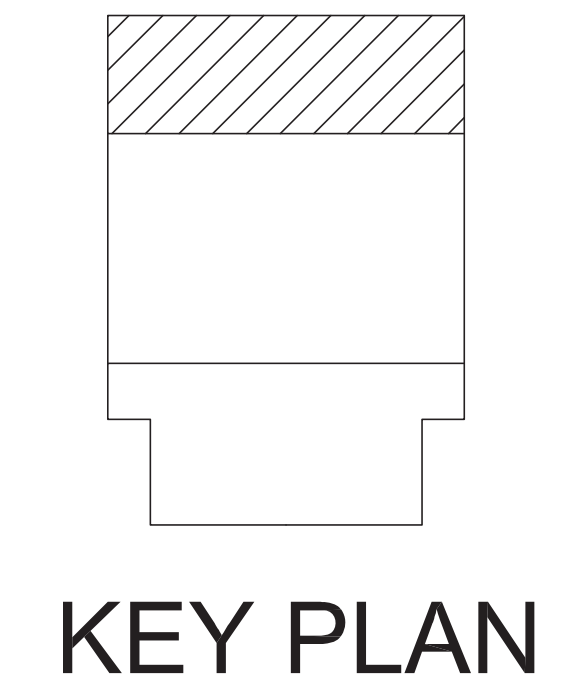
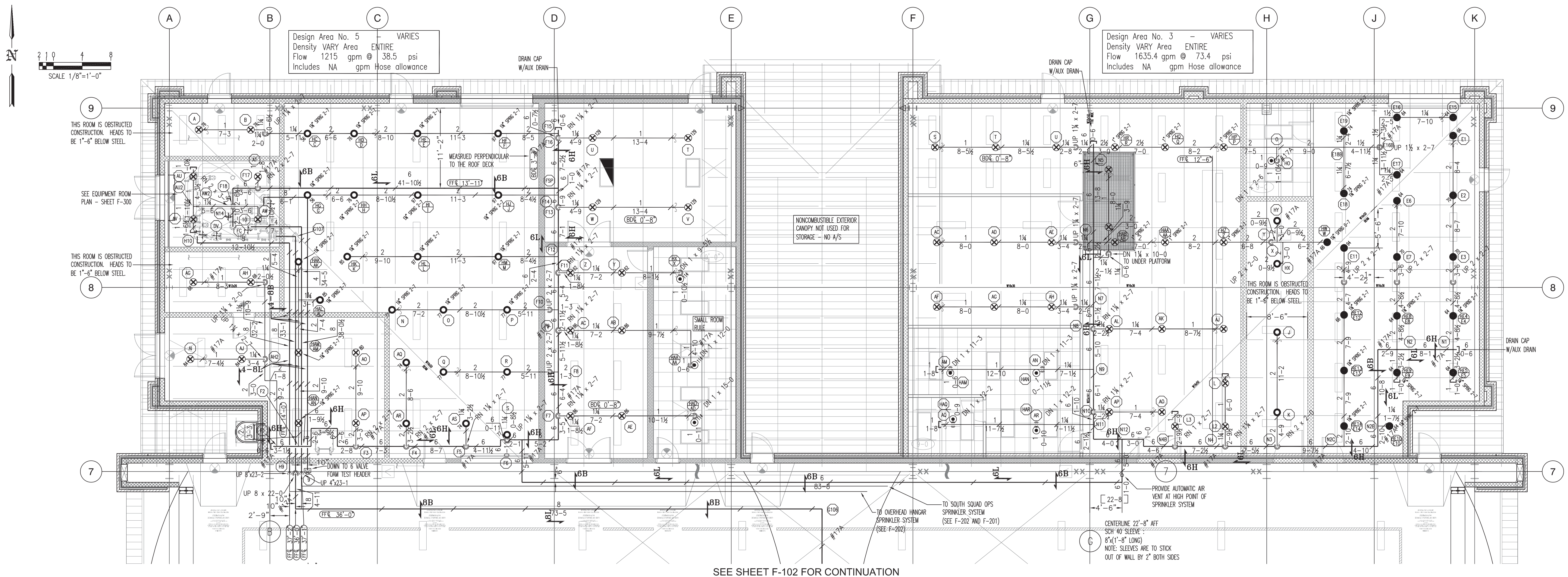


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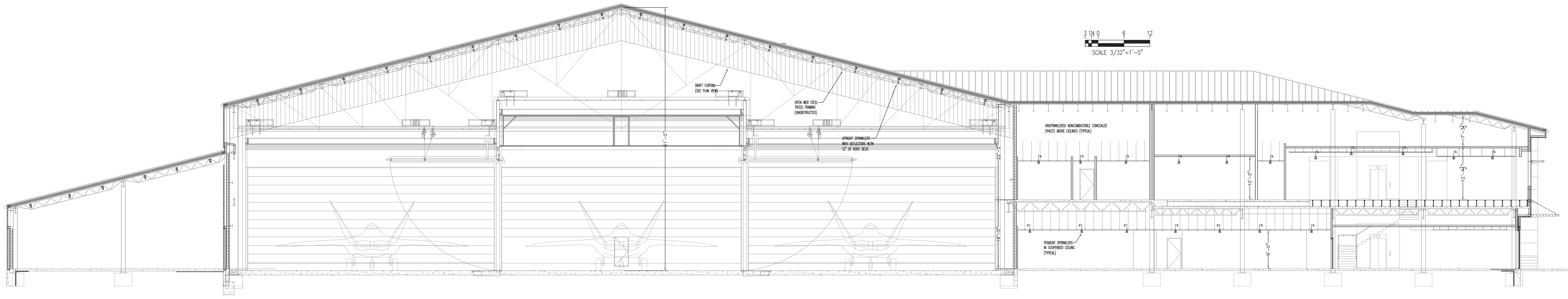
SPRINKLER HEAD LEGEND:		SYMBOL	IN	K-FACTOR	HEAD FINISH	PLATE FINISH	TEMP.	QUANT SOUTH	QUANT NORTH	QUANT TOTAL		
RELIABLE F1FR56 Q.R. PEND	●	RA1414	1/2"	5.6	CHROME	CHROME	155°	299	8			
RELIABLE F1FR56 Q.R. PEND	○	RA1414	1/2"	5.6	WHITE POLY	WHITE	155°	6				
REL F1FR56 Q.R. UPRIGHT ON SPRIG	⊙	RA1425	1/2"	5.6	BRASS	N/A	175°			288		
RELIABLE F1FR56 Q.R. UPRIGHT	○	RA1425	1/2"	5.6	BRASS	N/A	155°	60	49			
RELIABLE F1FR56 Q.R. UPRIGHT	○	RA1425	1/2"	5.6	BRASS	N/A	175°	1				
RELIABLE G.XLO S.R. UPRIGHT	●	R2921	1/2"	11.2	BRASS	N/A	286°			20		
RELIABLE F1FR Q.R. UPRIGHT	●	R3622	1/2"	8.0	BRASS	N/A	175°			26		
RELIABLE F1FR56 Q.R. HSW	◁	RA1435	1/2"	5.6	BRASS	N/A	175°	2				
TOTAL SPRINKLERS ON PROJECT								759		368	103	288



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FIRE SPRINKLER PLAN - LEVEL 1 - MAINTENANCE AREA



FULL HEIGHT BUILDING SECTION



HAWAII AIR NATIONAL GUARD
HICKAM AIR FORCE BASE
OAHU, HAWAII
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KANSAS CITY, MISSOURI
ENGINEERS ARCHITECTS & CONSULTANTS

TFI - F-22 SQUADRON
OPERATIONS & AIRCRAFT
MAINTENANCE UNIT HANGAR
FIRE SPRINKLER
MAINTENANCE - 1ST FLOOR
PLAN & SECTION

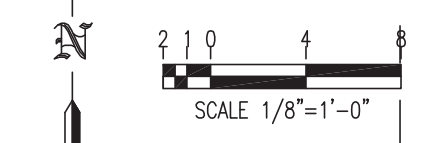
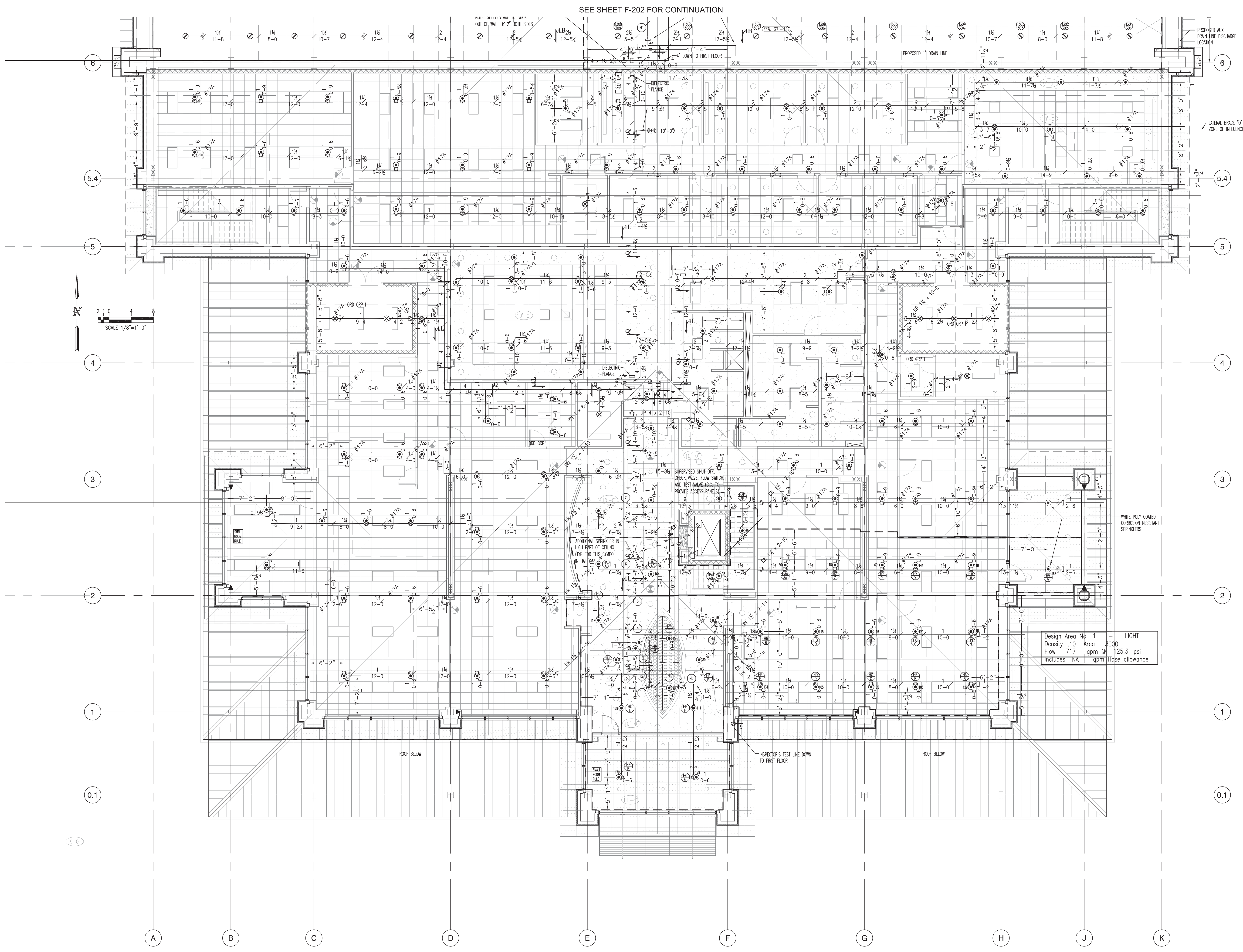
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drawing	F-103	rev.	0
sheet	3	of	sheets
file	KNMD069209F-200.DWG		



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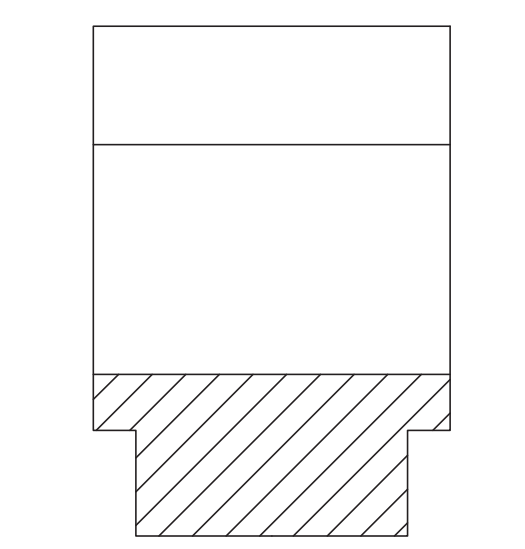


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Design Area No. 1 LIGHT
 Density 1.0 Area 3000
 Flow 717 gpm @ 125.3 psi
 Includes NA 1 gpm hose allowance

SQUAD OPS - 2ND FLOOR



KEY PLAN

SPRINKLER HEAD LEGEND:										
SYMBOL	SIN	ORIFICE K-FACTOR	HEAD FINISH	PLATE FINISH	TEMP.	QUANT SOUTH	QUANT NORTH	QUANT UGR		
●	RA1414	1/2"	5.6	CHROME	155°	299	8			
●	RA1414	1/2"	5.6	WHITE	155°	6				
○	RA1425	1/2"	5.6	BRASS	N/A	175°		288		
○	RA1425	1/2"	5.6	BRASS	N/A	155°	60	49		
○	RA1425	1/2"	5.6	BRASS	N/A	175°	1			
○	R2921	3/4"	11.2	BRASS	N/A	286°		20		
○	R3622	3/4"	8.0	BRASS	N/A	175°		26		
◁	RA1435	1/2"	5.6	BRASS	N/A	175°	2			
TOTAL SPRINKLERS ON PROJECT						759	368	10.3	288	



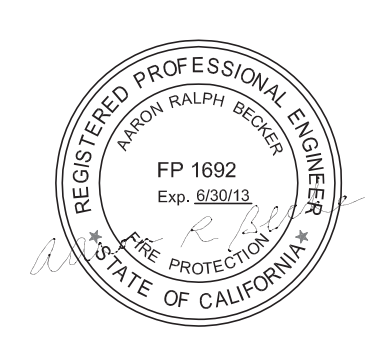
HAWAII AIR NATIONAL GUARD
 HICKAM AIR FORCE BASE
 OAHU, HAWAII
 Project No. - KNMD069209

date	JUNE 2011	designed	E.W.W.	detailed	R.A.D.	checked	A.R.B.
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KANSAS CITY, MISSOURI
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 MAINTENANCE UNIT HANGAR
 FIRE SPRINKLER
 SQUAD OPS - 2ND FLOOR
 PLAN

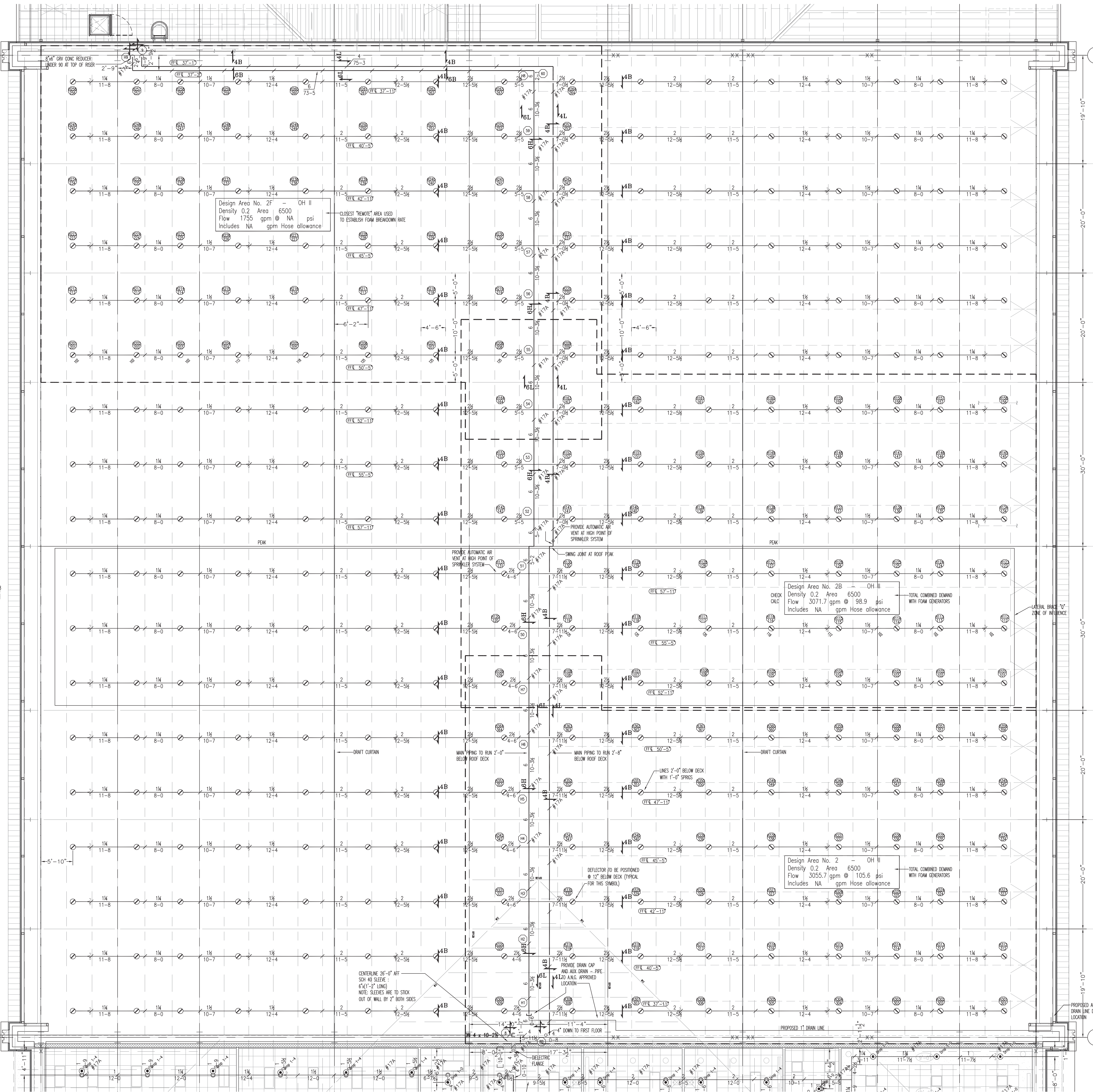


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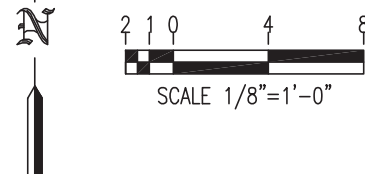
project	52085	contract	W9133N-04-D-0003
drawing	F-201	rev.	0
sheet	3	of	3
file	KNMD069209F-200.DWG		

SEE SHEET F-103 FOR CONTINUATION

SEE SHEET F-201 FOR CONTINUATION



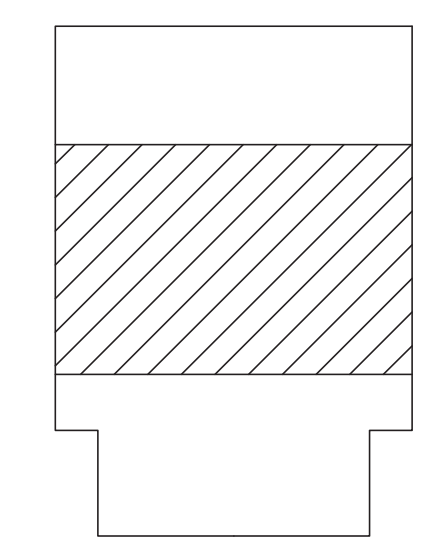
Notes:
Scale for Microfilming
Millimeters



SPRINKLER HEAD LEGEND:	SYMBOL	SN	ORIFICE & FACTOR	HEAD FINISH	PLATE FINISH	TEMP.	QUANT SOUTH	QUANT NORTH	QUANT HGR
RELIABLE F1FR56 Q.R. PEND	⊙	RA1414	1/2" 5.6	CHROME	CHROME REC.	155°	299	6	8
RELIABLE F1FR56 Q.R. PEND	⊙	RA1414	1/2" 5.6	WHITE POLY	WHITE	155°	6		
REL. F1FR56 Q.R. UPRIGHT ON SPRIG	⊙	RA1425	1/2" 5.6	BRASS	N/A	175°			288
RELIABLE F1FR56 Q.R. UPRIGHT	⊙	RA1425	1/2" 5.6	BRASS	N/A	155°	60	49	
RELIABLE F1FR56 Q.R. UPRIGHT	⊙	RA1425	1/2" 5.6	BRASS	N/A	175°	1		
RELIABLE C XLO S.R. UPRIGHT	●	R2921	3/4" 11.2	BRASS	N/A	286°		20	
RELIABLE F1FR Q.R. UPRIGHT	⊙	R3622	3/4" 8.0	BRASS	N/A	175°		26	
RELIABLE F1FR56 Q.R. HSW	⊙	RA1435	1/2" 5.6	BRASS	N/A	175°	2		
TOTAL SPRINKLERS ON PROJECT							759	368	103
								288	

HANGAR OVERHEAD SYSTEM

KEY PLAN



REVISIONS			
REV.	DATE	DESCRIPTION	INIT.
0	04/26/12	FOR APPROVAL	RD
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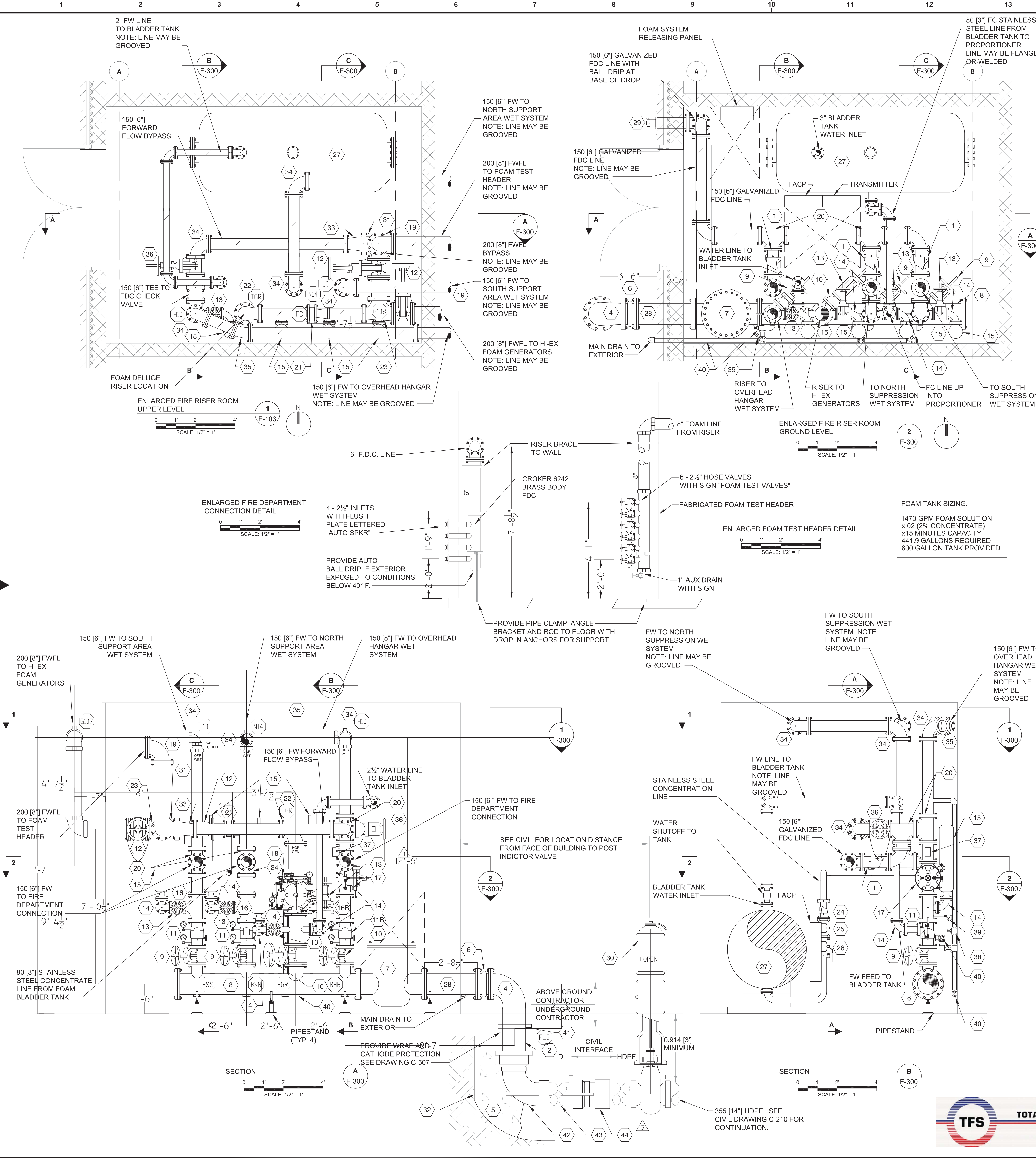
KANSAS CITY, MISSOURI
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TFI - F-22 SQUADRON
OPERATIONS & AIRCRAFT
MAINTENANCE UNIT HANGAR
FIRE SPRINKLER
HANGAR OVERHEAD SYSTEM
PLAN

project	52085	contract	W9133N-04-D-0003
drawing	F-202	rev.	0
sheet	3	of	3
file	KNMD069209-200.DWG		

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- NOTES:**
- FOR GENERAL NOTES, LEGEND, AND ABBREVIATIONS SEE DRAWING F-001.
 - PROVIDE ALL NECESSARY COMPONENTS, CONFIGURED GENERALLY AS SHOWN.
 - ROUTE MAIN DRAIN, INSP. TEST, AND RELIEF LINE TO EXTERIOR. DISCHARGE A MAXIMUM OF 0.60 [2'-0"] ABOVE GRADE THROUGH A 45 DEGREE ELBOW, PROVIDE SPLASH BLOCK.
 - PROVIDE HYDROPNEUMATIC SURGE ARRESTERS (TANK) AS INDICATED PER ETL 02-15.
 - MAINTAIN 0.152 [6"] CLEARANCE BETWEEN ANY AND ALL COMPONENTS OF ADJACENT RISERS.
 - PROVIDE ALL PIPE PENETRATIONS AS PER DRAWING 3/F-500.
 - PROVIDE PROPER SUPPORT FOR ALL RISERS. SEE DETAIL 5/F-500.
 - ALL RISERS SHALL BE PROPERLY SUPPORTED FROM BUILDING STRUCTURE AS REQUIRED.
 - ALL CONTROL VALVES SHALL BE ELECTRICALLY SUPERVISED IN THEIR NORMAL POSITION UNLESS OTHERWISE NOTED AND ACCESSIBLE FROM NOT MORE THAN 2.44 [8'] ABOVE THE FINISHED FLOOR.
 - PROVIDE PLACARD WITH FOLLOWING MESSAGE BY SPRINKLER SYSTEM INSPECTORS TEST CONNECTION. CAUTION: OPENING THIS INSPECTOR'S TEST STATION WILL RESULT IN A FOAM SYSTEM DUMP UNLESS HIGH-EXPANSION FOAM SYSTEM CONTROL VALVES ARE SECURE.
 - PROVIDE INSPECTORS TEST STATION OFF EACH WET-RISER CHECK VALVE. LOCATE TEST STATION IN MECHANICAL ROOM AND DRAIN TO EXTERIOR. PROVIDE CORROSION RESISTANT ORIFICE GIVING FLOW EQUIVALENT OF THE SPRINKLER HEAD.
 - PROVIDE FOUR-WAY BRACING AT THE TOP OF EACH RISER AS REQUIRED BY NFPA 13.
 - PIPING / FITTINGS ARE REQUIRED TO BE FLANGED OR WELDED UPSTREAM OF THE DISCHARGE SIDE OF THE PROPORTIONER, PRESSURE REDUCING VALVE, AND SURGE ARRESTERS OR AS INDICATED IN THE SPECIFICATIONS PER ETL REQUIREMENTS AND HEREIN. PIPING DOWNSTREAM MAY BE GROOVED AT THE CONTRACTOR'S OPTION.

- KEYED NOTES:**
- | | |
|---|--|
| 1 150 [6"] CHECK VALVE | 22 200 X 150 [8"x6"] FLANGED RED. 90 ELL |
| 2 350 [14"] D.I. CEMENT LINED FLANGE SPIGOT PIECE | 23 200 X 200 X 150 [8"x8"x6"] FLANGED RED. TEE |
| 3 NOT USED | 24 FLANGED CHECK VALVE |
| 4 350 X 300 [14"x12"] GALVANIZED FLANGED REDUCING 90 ELL | 25 HYDRAULICALLY ACTUATED BALL VALVE |
| 5 SEE C-503 FOR THRUST BLOCK REQUIREMENTS | 26 MANUAL CONCENTRATE CONTROL VALVE |
| 6 300 [12"] FLANGED EXPANSION JOINT FITTING INSTALLED WITH CONTROL RODS AND SHALL BE UV RATED | 27 600 GAL HORIZONTAL BLADDER TANK |
| 7 300 [12"] FLANGED BASKET STRAINER | 28 300 [12"] FLANGED GALVANIZED SPOOL PIECE |
| 8 300 [12"] FLANGED HEADER | 29 FLUSH 4-65 [2-1/2"] FIRE DEPARTMENT CONNECTION. |
| 9 150 [6"] FLANGED OS&Y VALVE | 30 POST INDICATOR VALVE WITH LOCK & TAMPER SWITCH |
| 10 200 [8"] FLANGED OS&Y VALVE | 31 200 [8"] FLANGED SIDE OUTLET ELBOW |
| 11 150 [6"] FLANGED RISER CHECK VALVE "16B" INDICATES 8" MODEL | 32 LIMIT OF EXCAVATION UNDISTURBED SOIL |
| 12 200 [8"] FLANGED OS&Y VALVE W/ CHAIN OPERATION | 33 200 X 150 [8" X 6"] FLANGED CONCENTRIC REDUCER |
| 13 80 [3"] FLANGED OS&Y VALVE (N.O.) | 34 150 [6"] 90 ELL |
| 14 80 [3"] FLANGED 90 ELL | 35 150 [6"] 22-1/2 ELL |
| 15 37.9 L [10 GAL] SURGE ARRESTER | 36 150 [6"] OS&Y VALVE WITH CHAIN OPERATION |
| 16 150 X 150 X 75 [6"x6"x3"] FLANGE TEE "16B" INDICATES 8"x3"x3" MODEL | 37 WATER FLOW SWITCH |
| 17 FLANGED PRESSURE REGULATING VALVE (NOTE: NOT USED - PLACEHOLDER) | 38 PRESSURE RELIEF VALVE |
| 18 200 [8"] ELECTRIC ACTUATED FLANGED DELUGE VALVE WITH BRASS TRIM PIPING | 39 TEST & DRAIN VALVE |
| 19 200 [8"] FLANGED 90 ELL | 40 MAIN DRAIN |
| 20 150 [6"] TEE | 41 350 [14"] DUCTILE IRON PIPE FLANGED BOTH ENDS |
| 21 150 [6"] RATIO FLOW CONTROLLER WITH ADEQUATE UP/DOWN STREAM STRAIGHT LENGTHS PER MANUFACTURER'S RECOMMENDATION | 42 350 [14"] FLANGED DUCTILE IRON ELBOW |
| | 43 350 [14"] DUCTILE IRON PIPE FLANGED AT ELBOW |
| | 44 DUCTILE IRON TO HDPE COUPLING |

FOAM TANK SIZING:
 1473 GPM FOAM SOLUTION
 x.02 (2% CONCENTRATE)
 x15 MINUTES CAPACITY
 441.9 GALLONS REQUIRED
 600 GALLON TANK PROVIDED

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KANSAS CITY, MISSOURI
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TFI - F-22 SQUADRON
 OPERATIONS & AIRCRAFT
 MAINTENANCE UNIT HANGAR
 FIRE SPRINKLER
 RISER ROOM #161
 AND DETAILS

project 52085 contract W9133N-04-D-0003
 drawing F-300 rev. 0
 sheet 3 of sheets
 file KNMD069209F-200.DWG



7-26-12