Date: **4 August 2025**

To: **Major Jeremy Hendrick**

Subject: **ADDENDUM NO. 1**

David Donovan
Digitally signed by David Donovan
DN: cn=David Donovan, o=SS&L, ou=SS&L, email=ddonovan@sslarch.com, c=US
Date: 2025.08.07 08:46:25 -05'00'

Project: **F-35 DEPLOYABLE PARTS STORAGE FACILITY**

Job #: **ANG# FAKZ182366**
SSL# 19084

From: **David Donovan**

The Plans and Specifications for the F35 Deployable Parts Storage Facility (FAKZ182356), dated 10 April 2025 are amended as follows. (Where there are conflicts between the plans and specifications and the addendum, this addendum shall govern).

Item No. 1: Refer to Drawings. Delete drawing sheet C2.1 "DSP Site Layout Plan" and replace with included drawing sheet C2.1 with a revised date of 30 July 2025.

Item No. 2: Refer to Drawings. Delete drawing sheet C3.1 "DSP Site Grading and Drainage Plan" and replace with included drawing sheet C3.1 with a revised date of 30 July 2025.

Item No. 3: Refer to Drawings. Delete drawing sheet C6.1 "DSP Site Details" and replace with included drawing sheet C6.1 with a revised date of 30 July 2025.

Item No. 4: Refer to Drawings. Add included drawing sheet A0.1 "Phasing/ Site Access" with a revised date of 30 July 2025.

Item No. 5: Refer to Drawings. Delete drawing sheet LS1.0B "Life Safety Plan" and replace with included drawing sheet LS1.0B with a revised date of 30 July 2025.

Item No. 6: Refer to Drawings. Delete drawing sheet A2.1B "Plans – DSP Storage" and replace with included drawing sheet A2.1B with a revised date of 30 July 2025.

Item No. 7: Refer to Drawings. Delete drawing sheet A3.0B "DSP Schedules" and replace with included drawing sheet A3.0B with a revised date of 30 July 2025.

Item No. 8: Refer to Drawings. Delete drawing sheet S0.1B "General Notes – Schedules – Typical Details – DPS Storage" and replace with included drawing sheet S0.1B with a revised date of 1 August 2025.

Item No. 9: Refer to Drawings. Delete drawing sheet FP1.1B "Fire Sprinkler Floor Plan" and replace with included drawing sheet FP1.1B with a revised date of 31 July 2025.

Item No. 10: Refer to Drawings. Delete drawing sheet P1 .1B "Plumbing Waste Vent and Gas Piping Floor Plan – DSP Storage" and replace with included drawing sheet P1 .1B with a revised date of 31 July 2025.

Item No. 11 Refer to Drawings. Delete drawing sheet M2.1B "Mechanical Floor Plan – DSP Storage" and replace with included drawing sheet M2.1B with a revised date of 31 July 2025.

Item No. 12: Refer to Drawings. Delete drawing sheet E0.2B "Electrical Details" and replace with included drawing sheet E0.2B with a revised date of 30 July 2025.

Item No. 13: Refer to Drawings. Delete drawing sheet E1.1B "DSP Storage Electrical Plans" and replace with included drawing sheet E1.1B with a revised date of 30 July 2025.

Item No. 14: Refer to Specifications. Delete specification section 00 0102 – Project Information and Summary. Delete specification section 00 0102 and replace it with the attached specification section 00 0102 with a revised date of 30 July 2025. Revisions are noted with bold, italicized, and struck through text.

Item No. 15: Refer to Specifications. Delete specification section 01 4100 – Regulatory Requirements. Delete specification section 01 4100 and replace it with the attached specification section 01 4100 with a revised date of 30 July 2025. Revisions are noted with bold, italicized, and struck through text.

Item No. 16: Refer to Specifications. Delete specification section 01 9113 – General Commissioning Requirements. Delete specification section 01 9113 and replace it with the attached specification section 01 9113 with a revised date of 30 July 2025. Revisions are noted with bold, italicized, and struck through text.

Item No. 17: Refer to Specifications. Delete specification section 03 3000 – Cast-in-Place Concrete. Delete specification section 03 3000 and replace it with the attached specification section 03 3000 with a revised date of 31 July 2025. Revisions are noted with bold, italicized, and struck through text.

Item No. 18: Refer to Specifications. Delete specification section 08 1113 – Hollow Metal Doors and Frames. Delete specification section 08 1113 and replace it with the attached specification section 08 1113 with a revised date of 30 July 2025. Revisions are noted with bold, italicized, and struck through text.

Item No. 19: Refer to Specifications. Delete specification section 10 4400 – Fire Protection Specialties. Delete specification section 10 4400 and replace it with the attached specification section 10 4400 with a revised date of 30 July 2025. Revisions are noted with bold, italicized, and struck through text.

Item No. 20: Refer to Specifications. Delete specification section 21 1313 – Wet-Pipe Fire-Suppression Sprinklers. Delete specification section 21 1313 and replace it with the attached specification section 21 1313 with a revised date of 30 July 2025. Revisions are noted with bold, italicized, and struck through text.

Item No. 21: Refer to Specifications. Delete specification section 22 0514 – Common Work Results for Plumbing. Delete specification section 22 0514 and replace it with the attached specification section 22 0514 with a revised date of 30 July 2025. Revisions are noted with bold, italicized, and struck through text.

Item No. 22: Refer to Specifications. Delete specification section 23 0500 – General HVAC Requirements. Delete specification section 23 0500 and replace it with the attached specification section 23 0500 with a revised date of 30 July 2025. Revisions are noted with bold, italicized, and struck through text.

Item No. 23: Refer to Specifications. Delete specification section 28 3111 – Fire Detection, Evacuation, and Mass Notification. Delete specification section 28 3111 and replace it with the attached specification section 28 3111 with a revised date of 30 July 2025. Revisions are noted with bold, italicized, and struck through text.

End of Addendum #1

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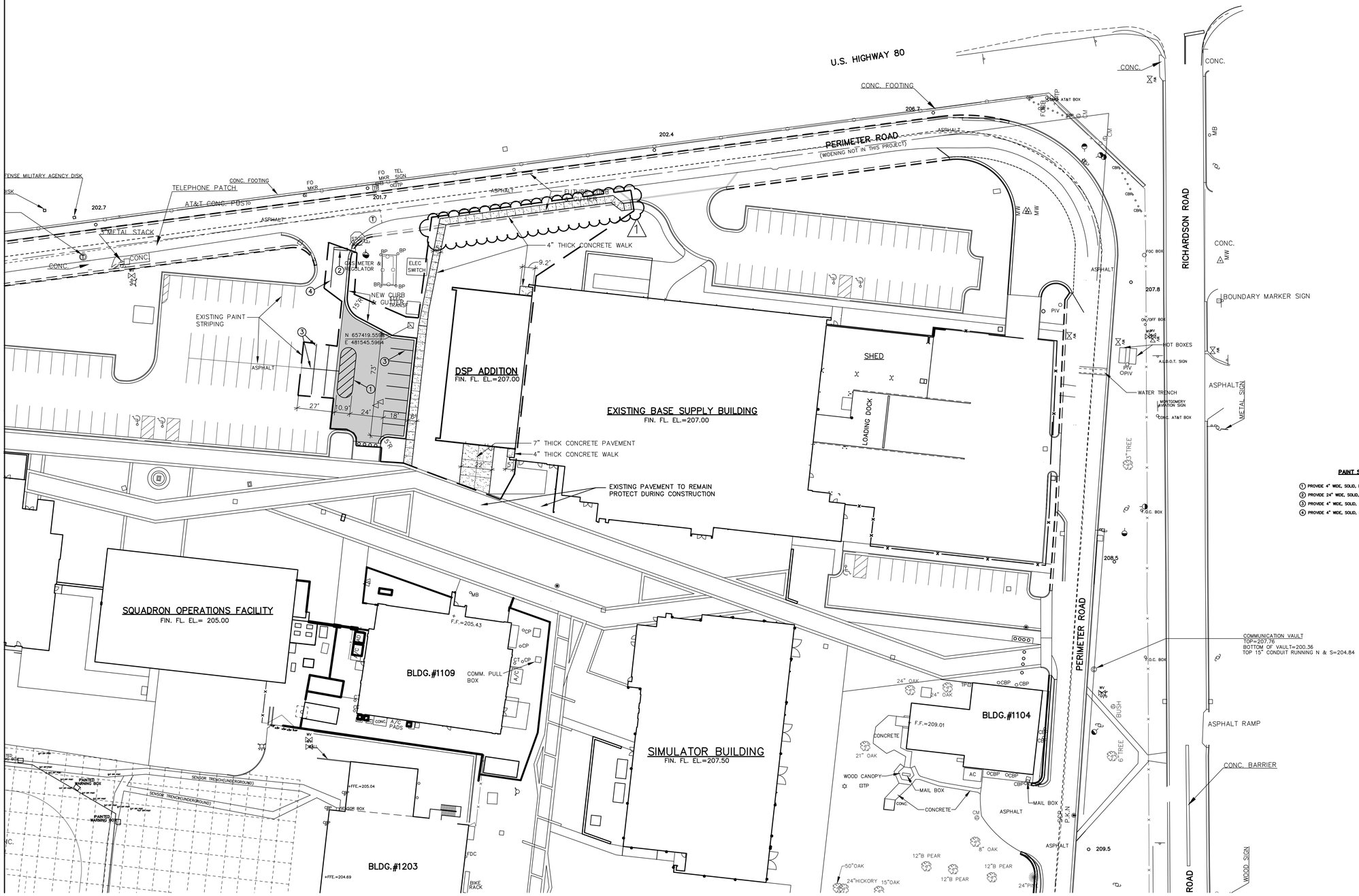


LEGEND

DESCRIPTION	EXISTING	NEW
BUILDING		
CURB		
CURB & GUTTER		
CONCRETE PAVEMENT		
ASPHALT PAVEMENT		
SANITARY SEWER MANHOLE		
SANITARY SEWER LINE	SS	
GAS METER	GM	
GAS LINE	G	
STORM MANHOLE		
CURB INLET		
GRATE INLET		
AREA INLET		
STORM DRAIN LINE	SD	
CLEAN-OUT	CO	
WATER LINE	W	
ELECTRIC (AERIAL)	AE	
ELECTRIC (UNDERGROUND)	UE	
WATER METER	WM	
FIRE HYDRANT		
POWER POLE		
GUY WIRE		
TRAFFIC SIGN		
BUMPER POST	BP	
FENCE		
BUSH		
HEDGE ROW		
TREE		
PROJECT LIMITS		

PAINT STRIPE LEGEND

1. PROVIDE 4" WIDE, SOLID, NON-REFLECTIVE, WHITE PAINTED ISLAND WITH 4" WIDE DIAGONAL PAINTED STRIPES AT 2 FEET ON CENTERS.
2. PROVIDE 24" WIDE, SOLID, REFLECTIVE, WHITE PAINT STOP BAR.
3. PROVIDE 4" WIDE, SOLID, WHITE PAINTED PARKING STRIPES, NON-REFLECTIVE.
4. PROVIDE 4" WIDE, SOLID, REFLECTIVE , WHITE PAINT STRIPE.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

PEC
PROFESSIONAL ENGINEERING CONSULTANTS, LLC
822 South McDonough Street
Montgomery, Alabama 36104
Phone: (334) 262-7307
Fax: (334) 262-7309
PEC JOB # 20-071

SS&L
ARCHITECTURE & INTERIOR DESIGN
Montgomery | Dothan | WWW.SSLARCH.COM
(M) 334.265.5162 | (D) 334.791.5248

Rev.	Description	Date
1	ADDENDA 1	7-30-25

Job Number 19084

Date 09/06/2021

Drawn By SBG

Checked By SBG

Project Title

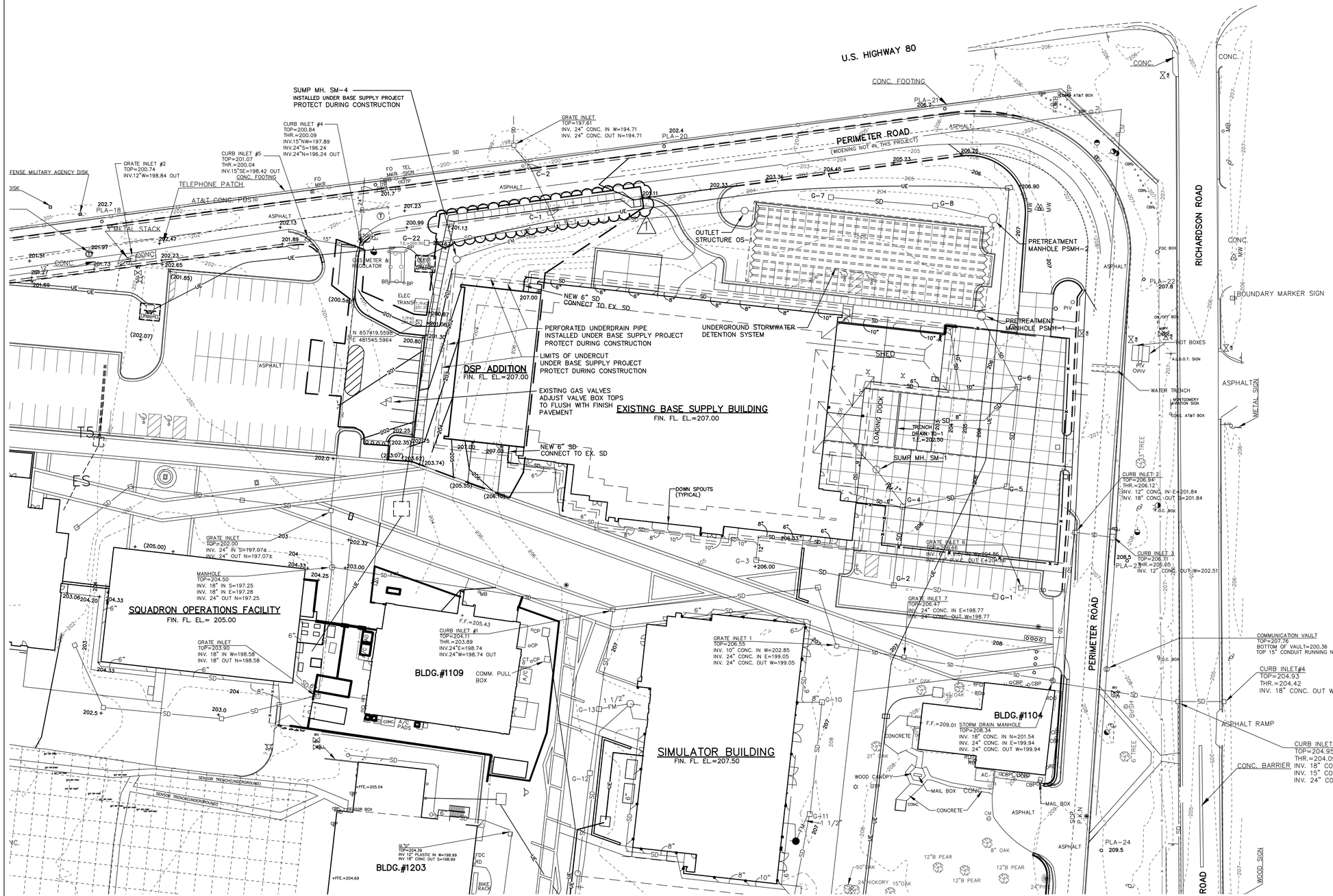
DEPLOYABLE PARTS STORAGE FACILITY

DANNELLY FIELD
MONTGOMERY AL

Sheet Title
DSP SITE LAYOUT PLAN

Sheet Number
C2.1

ALABAMA LICENSED No. 5935 PROFESSIONAL ENGINEER PATRICK A. MOSLEY
7/30/25



LEGEND

DESCRIPTION	EXISTING	NEW
BUILDING		
CURB		
CURB & GUTTER		
CONCRETE PAVEMENT		
ASPHALT PAVEMENT		
SANITARY SEWER MANHOLE	Ⓢ	● MH-1
SANITARY SEWER LINE	SS	
SANITARY SEWER LINE (LRS)		SS
SANITARY SEWER LINE (SIMULATOR)		SS
GAS METER	GM	GM
GAS LINE	G	G
STORM MANHOLE	◎	● M-1
CURB INLET	□	□ C-1
GRATE INLET	□	
AREA INLET	□	
STORM DRAIN LINE	SD	
CLEAN-OUT	○ CO	○ CO
WATER LINE (ABANDONED)	W	
WATER LINE	W	
WATER LINE		W
ELECTRIC (AERIAL)	AE	
ELECTRIC (UNDERGROUND)	UE	
FIRE HYDRANT		
POWER POLE		
LIGHT POLE		
GUY WIRE		
TRAFFIC SIGN		
BUMPER POST	○ BP	
FENCE	x x x	
GRADE CONTOUR	666	666
SPOT ELEVATION	+ (666.00)	+ 666.00
TREE		
PROJECT LIMITS		

NOTES:

1. THE FINISHED PRODUCT, AFTER POURING CONCRETE OR OTHER PAVEMENT SURFACES, OF ALL WALKWAYS AND SIDEWALKS SHALL NOT EXCEED 2.0 PERCENT CROSS SLOPE AND 5.0 PERCENT RUNNING SLOPE.

2. THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM THE INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED ALL OF THE UNDERGROUND UTILITIES.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

N

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822 South McDonough Street
Montgomery, Alabama 36104
Phone: (334) 262-7307
Fax: (334) 262-7309
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Rev.	Description	Date
1	ADDENDA 1	7-30-25

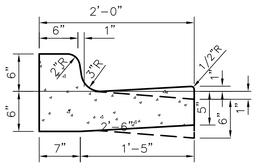
Job Number 19084
Date 09/06/2025
Drawn By SBG
Checked By SBG
Project Title

DEPLOYABLE PARTS STORAGE FACILITY
DANNELLY FIELD
MONTGOMERY AL

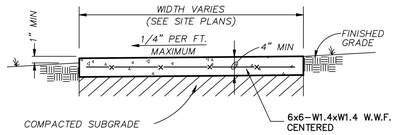
Sheet Title
DSP SITE GRADING AND DRAINAGE PLAN

Sheet Number
C3.1

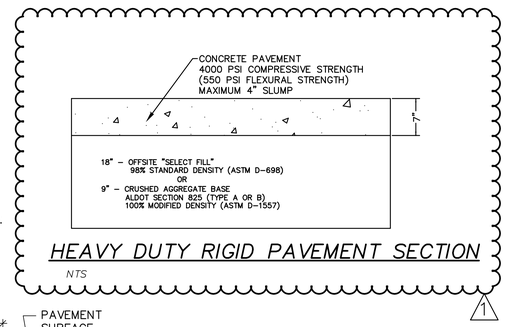
ALABAMA LICENSED No. 5935 PROFESSIONAL ENGINEER PATRICK A. MOSELEY
7/30/25



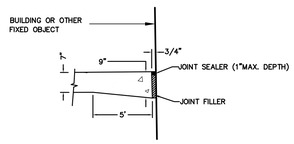
TYPICAL CONCRETE CURB & GUTTER
NTS



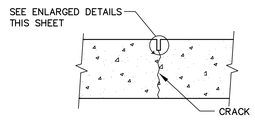
SIDEWALK DETAIL
NTS



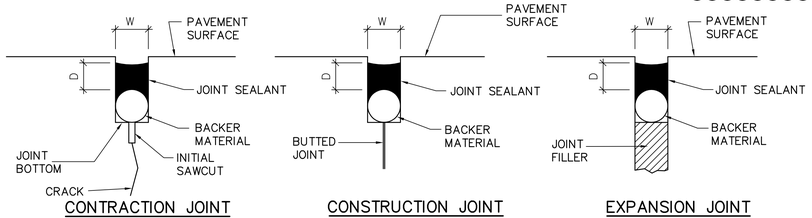
HEAVY DUTY RIGID PAVEMENT SECTION
NTS



EXPANSION JOINT (EJ)

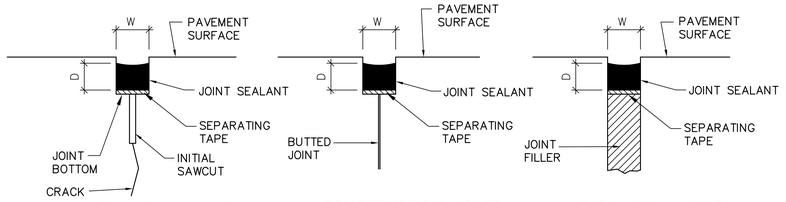


SAWED CONTRACTION JOINT – LONGITUDINAL OR TRANSVERSE (SC)
N.T.S.



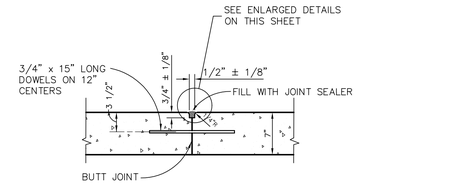
W= WIDTH OF SEALANT RESERVOIR (1/2" MIN, 5/8" MAX.)
D= DEPTH OF SEALANT; 0.5W FOR SILICONE SEALANT
DIAMETER OF BACKER MATERIAL= W + 1/8"
NOTE:
TOP OF SEALANT SHALL BE 1/4" TO 1/16" BELOW TOP OF PAVEMENT

JOINT SEALANT DETAILS (BACKER MATERIAL)
N.T.S.



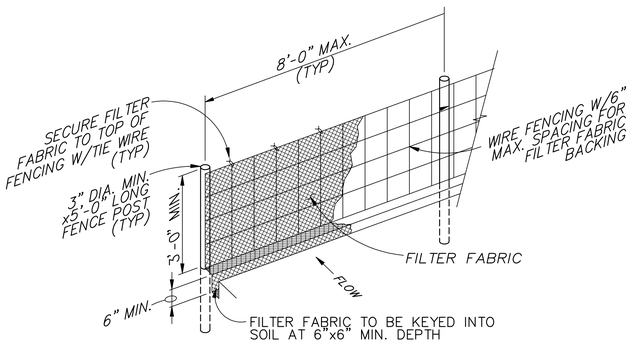
W= WIDTH OF SEALANT RESERVOIR (1/2" MIN, 5/8" MAX.)
D= DEPTH OF SEALANT; 0.5W FOR SILICONE SEALANT
DIAMETER OF BACKER MATERIAL= W + 1/8"
NOTE:
TOP OF SEALANT SHALL BE 1/4" TO 1/16" BELOW TOP OF PAVEMENT

JOINT SEALANT DETAILS (SEPARATING TAPE)
N.T.S.



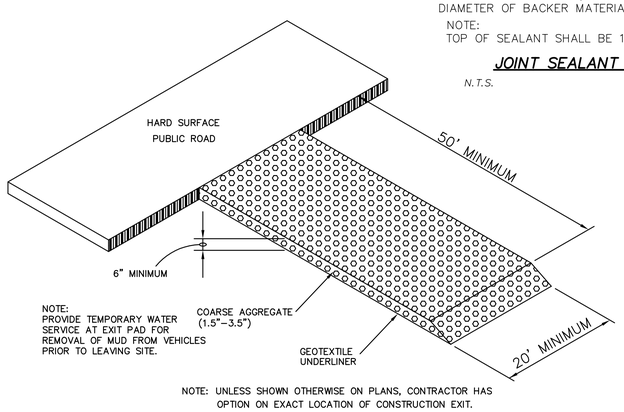
NOTE: INSTALL CONSTRUCTION JOINTS AT THE END OF EACH DAY'S PAVING OPERATION AND AT OTHER POINTS WHERE PAVING IS DISCONTINUED LONG ENOUGH FOR CONCRETE TO SET. LOCATE CONSTRUCTION JOINTS IN PLACE OF CONTRACTION JOINTS.

CONSTRUCTION JOINT DETAIL (CJ)
NTS



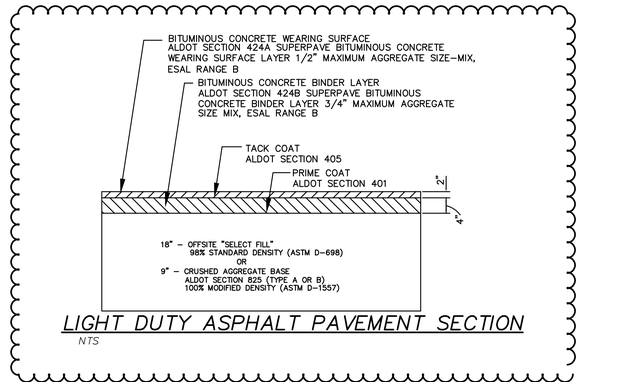
SILT FENCE DETAIL
NTS

NOTE: CONTRACTOR SHALL INSTALL AND MAINTAIN SILT FENCES WHERE SHOWN ON THE DRAWINGS PRIOR TO ALLOWING ANY CONSTRUCTION ACTIVITIES TO COMMENCE

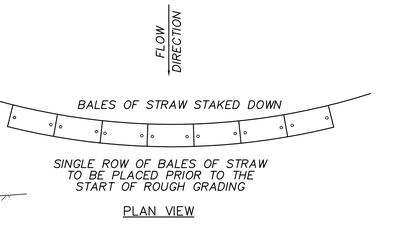


NOTE: UNLESS SHOWN OTHERWISE ON PLANS, CONTRACTOR HAS OPTION ON EXACT LOCATION OF CONSTRUCTION EXIT.

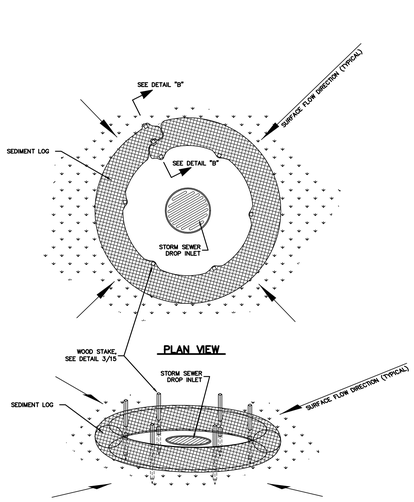
STABILIZED CRUSHED STONE CONSTRUCTION EXIT PAD
NOT TO SCALE



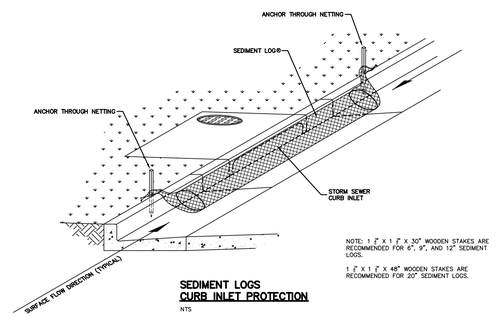
LIGHT DUTY ASPHALT PAVEMENT SECTION
NTS



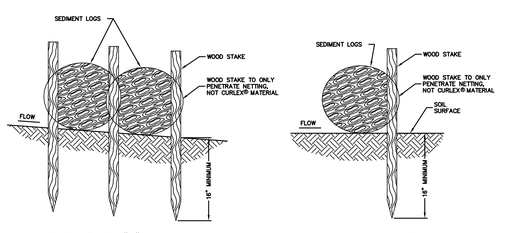
TEMPORARY STRAW BALE SEDIMENT BARRIER
NTS



SEDIMENT LOGS DROP INLET PROTECTION
NTS



SEDIMENT LOGS CURB INLET PROTECTION
NTS



STAKE DETAIL "B"
NTS

STAKE DETAIL "A"
NTS

GENERAL NOTES FOR SOIL EROSION AND SEDIMENT CONTROL

1. AN ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT (ADEM) STORMWATER PERMIT (NOI) FOR THIS PROJECT WILL BE REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE PERMIT AND INSTALLATION OF EROSION CONTROL MEASURES AND THE MAINTENANCE OF SAME DURING ALL PHASES OF CONSTRUCTION.
2. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED IF DEEMED NECESSARY BY ONSITE INSPECTION DUE TO CONDITIONS NOT SHOWN ON PLANS.
3. FAILURE TO PROPERLY INSTALL AND MAINTAIN EROSION CONTROL PRACTICES MAY RESULT IN CONSTRUCTION BEING HALTED.
4. EROSION CONTROL MEASURES WILL BE INSPECTED AT LEAST WEEKLY AND FOLLOWING RAINFALL AND REPAIRED BY CONTRACTOR.
5. ALL SILT FENCING SHALL COMPLY WITH ALABAMA DEPARTMENT OF TRANSPORTATION STANDARDS AND SPECIFICATIONS.
6. STORM DRAIN SYSTEMS SHALL BE MAINTAINED CLEAN AND FREE OF SILT AND DEBRIS.
7. A RESPONSE TO A NOTIFICATION OF NON COMPLIANCE OR INADEQUATE MEASURES SHALL BE MADE WITHIN 24 HOURS AFTER RECEIVING SUCH NOTIFICATION, UNLESS OTHERWISE SPECIFIED FOR CONDITIONS DEEMED CRITICAL.
8. IMPLEMENTATION AND MAINTENANCE:
   A) IMPLEMENTATION:
      1. NO CLEARING, GRADING, FILLING, OR OTHER LAND DISTURBING ACTIVITIES SHALL BE PERMITTED UNTIL APPROVED EROSION AND SEDIMENT CONTROL MEASURES HAVE BEEN INSTALLED, EXCEPT THOSE OPERATIONS NEEDED TO INSTALL SUCH MEASURES.
      2. THESE EROSION AND SEDIMENT CONTROL MEASURES SHALL APPLY TO ALL FEATURES OF THE CONSTRUCTION SITE, INCLUDING BUT NOT LIMITED TO STREET AND UTILITY INSTALLATIONS AS WELL.
   B) MAINTENANCE: ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE CONTINUOUSLY MAINTAINED BY THE CONTRACTOR DURING THE CONSTRUCTION PHASE OF THE DEVELOPMENT.
9. ALL EROSION CONTROL MEASURES SHALL BE REMOVED AT THE COMPLETION OF THIS CONTRACT.

PEC
PROFESSIONAL ENGINEERING CONSULTANTS, LLC
822 South McDonough Street
Montgomery, Alabama 36104
Phone: (334) 262-7307
Fax: (334) 262-7309
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ARCHITECTURE & INTERIOR DESIGN
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Rev.	Description	Date
1	ADDENDA 1	7-30-25

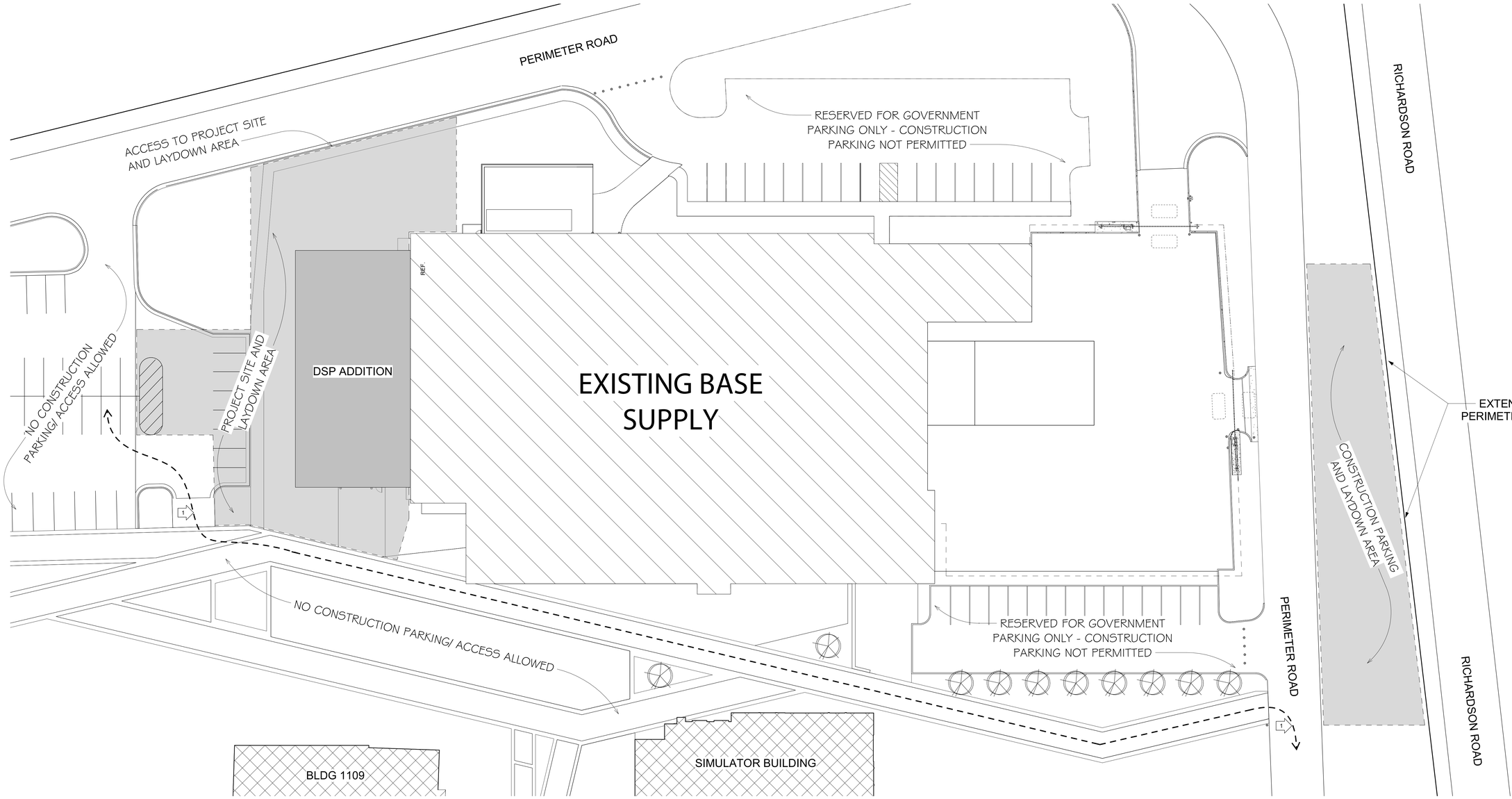
Job Number 19084
Date 09/06/2025
Drawn By SBG
Checked By SBG
Project Title

DEPLOYABLE PARTS STORAGE FACILITY
DANNELLY FIELD
MONTGOMERY AL

Sheet Title
DSP SITE DETAILS

Sheet Number
C6.1

ALABAMA LICENSED No. 5935 PROFESSIONAL ENGINEER PATRICK A. MOSLEY
7/30/25



1 / A0.1 SITE ACCESS
1" = 20'-0"

SITE ACCESS SPECIFIC NOTES

1 EXISTING FIRE DEPARTMENT ACCESS PATHWAY TO REMAIN OPEN TO THE GREATEST EXTENT POSSIBLE. COORDINATE WITH BASE FIRE DEPARTMENT PRIOR TO CLOSING ACCESS ROUTE AS REQUIRED TO CONSTRUCT PARKING LOT. LIMIT DURATION ACCESS DRIVE IS INACCESSIBLE FOR GOVERNMENT USE TO THE GREATEST EXTENT POSSIBLE.

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ARCHITECTURE & INTERIOR DESIGN
Montgomery | Dothan | Auburn | Birmingham
WWW.SSANDL.COM
(M) 334. 265. 5162 | (D) 334. 791. 5248

Rev.	Description	Date
1	ADD #1	7-30-25

Job Number 19084

Date 10 April, 2025

Drawn By JLJ/CF/NJ

Checked By FEL

Project Title

DEPLOYABLE PARTS STORAGE FACILITY

DANNELLY FIELD
MONTGOMERY AL

Sheet Title
PHASING/ SITE ACCESS

Sheet Number
A0.1

STATE OF ALABAMA
MONTGOMERY
Jim S. Seay, Jr.
1984
Gregory A. O'Neal
6045
Wesley S. Carter
6354
ALABAMA
REGISTERED ARCHITECTS

Applicable Codes:

Building Code.....UFC 1-200-01 / 2018 INTERNATIONAL BUILDING CODE
Structural Code.....3-301-01
Plumbing Code.....3-412-01
Mechanical Code.....3-412-01
Fire Code.....3-600-01
Electrical Code.....3-501-01
Energy Code.....1-200-02
Accessibility Code.....2010 ADA STANDARDS
Life Safety Code.....3-600-01 / NFPA 101

IBC Chapter 3 and UFC 3-600-01 Occupancy & Use:
NFPA 101 Chapter 6:
- See Legend on Life Safety Plan

IBC Chapter 4 - Special Detailed Requirements:
- NOT APPLICABLE

IBC Chapter 5 - General Building Heights & Areas:
- Construction Type = II-B, FULLY SPRINKLED, GROUP S-1, B, H-2 SEPARATED
- Allowable Building Height TABLE 504.3
  - GROUP S-1 = 75 FEET ABOVE GRADE PLANE
  - GROUP B = 75 FEET ABOVE GRADE PLANE
  - GROUP H-2 = 55 FEET ABOVE GRADE PLANE
- Allowable Number of Stories Above Grade Plane (PER TABLE 504.4)
  - GROUP S-1 - 3 STORIES ABOVE GRADE PLANE
  - GROUP B = 4 STORIES ABOVE GRADE PLANE
  - GROUP H-2 = 1 STORY ABOVE GRADE PLANE
- Tabular Building Area (PER TABLE 506.2)
  - GROUP S-1 = 70,000 SQUARE FEET
    - ACTUAL GROUP S-1 AREA = 29,244
  - GROUP B = 92,000 SQUARE FEET
    - ACTUAL GROUP B AREA = 8,452
  - GROUP H-2 = 7,000 SQUARE FEET
    - ACTUAL GROUP H-2 AREA = 1,453
- Allowable Building Area (PER SECTION 508.4.2)
  - S-1 = 29,244/70,000 = .42
  - B = 8,452/92,000 = .09
  - H-2 = 1,453/7,000 = .21

  .42+.09+.21=.72, SUM OF RATIOS IS LESS THAN 1
- Fire Separation Requirements Per Table 508.4

OCCUPANCIES	RATING (HR)
B | S-1	0
S-1 | H-2	2

- Incidental Use Areas (PER TABLE 509)
  - See occupancy table.

IBC Chapter 6 Types of Construction:
- Construction Type: II-B
- Fire Ratings (PER TABLE 601) as Follows (Except where noted otherwise)
  - Primary Structural Frame..... 0 HOUR
  - Bearing Walls (Interior & Exterior)..... 0 HOUR
  - Non-Bearing Walls and Partions (Interior)..... 0 HOUR
  - Floor Construction and Secondary Members... 0 HOUR
  - Roof Construction and Secondary Members.... 0 HOUR
- Required Fire Rating (Per Table 602)

OCCUPANCY TYPE	FIRE SEPARATION (ACTUAL)	REQUIRED SEPARATION
S-1	>30'-0"	0 HR
B	27'-6"	0 HR
H-2	>30'-0"	0 HR

NFPA CHAPTER 8 - Fire and Smoke Protection Features:
- Maximum Exterior Wall Openings (PER SECTION IBC 705)

Fire Separation:	Degree of Opening Protection:	Allowable Area:
GREATER THAN 25 FT	UNPROTECTED, SPRINKLERED , (UP, S)	NO LIMIT

- Fire Walls (Per NFPA 8.3.2)
  - No fire walls are present within the scope of the project
- Shaft Enclosure (Per NFPA 8.3.1/7.3.1.2)
  - No shaft enclosure is present
- Opening Protectives (Per NFPA 8.3.4)

Type of Assembly	Assembly Rating	Required Opening Protection (Door/Sidelite)
FIRE BARRIER	2 HOURS	1-1/2 HOUR/1 HOUR
FIRE BARRIER	1 HOUR	3/4 HOUR/ 3/4 HOUR

- Concealed Spaces (Per Section 8.6.11)
  - Not Applicable
- See Legend on Life Safety Plan for Applicable UL Assemblies to be provided.

IBC Chapter 8, UFC 3-600-01, NFPA 101 - Interior Finishes:
- Finish Material Rating Requirements (Per NFPA 101)
  - BUSINESS (CHAPTER 38)
    - Exits and Exit Access Corridors
      - Interior Wall and Ceiling Finish - CLASS A OR B (38.3.3.2.1)
      - Interior Floor Finish - CLASS I OR CLASS II (38.3.3.3.2)
    - Areas other than Exits and Exit Access Corridors
      - Interior Wall and Ceiling Finish - CLASS A, B, OR C (38.3.3.2.2)
  - STORAGE (CHAPTER 42)
    - Exits and Exit Access Corridors
      - Interior Wall and Ceiling Finish - CLASS A, B, OR C (42.3.3.2)
      - Interior Floor Finish - CLASS I OR CLASS II (42.3.3.3.1)
    - Areas other than Exits and Exit Access Corridors
      - Interior Wall and Ceiling Finish - CLASS A, B, OR C (42.3.3.2)
      - Interior Floor Finish - NO REQUIREMENT (42.3.3.3.2)

* THE CONTRACTOR SHALL PROVIDE A QUALIFIED FIRE PROTECTION ENGINEER (QFPE) AS DEFINED BY UFC 3-600-01 TO BE THE QFPE FOR THE PROJECT. THE QFPE SHALL WORK FOR THE CONTRACTOR AND BE RESPONSIBLE FOR PRODUCING, REVIEWING, AND STAMPING ALL SHOP DRAWINGS AND MATERIAL SUBMITTALS FOR THE FIRE ALARM/MNS SYSTEMS. THE QFPE SHALL PROVIDE INSPECTIONS DURING CONSTRUCTION TO ENSURE SYSTEMS COMPLIANCE. THE QFPE SHALL PERFORM A PRE-FINAL INSPECTION AND PROVIDE A REPORT FOR AHJ REVIEW. THE QFPE MUST ALSO BE INVOLVED IN THE FINAL INSPECTION WITH THE GOVERNMENT AHJ. THE QFPE MUST MONITOR THE INSTALLATION OF THE FIRE ALARMS/MNS SYSTEM AND CERTIFY IN WRITING TO THE GOVERNMENT AHJ THAT THE SYSTEMS HAVE BEEN CONSTRUCTED AND OPERATE AS INTENDED TO COMPLY WITH UFC 3-600-01 AND UFC 4-021-01.*

UFC 3-600-01 (replaces IBC Chapter 9) - Fire Protection Systems:
- SECTION 5-1 - EMERGENCY VEHICLE ACCESS
  1. Facility REQUIRES one means of all-weather emergency vehicle ground access in accordance with 5-1.1
  2. Facility REQUIRES aerial apparatus access in accordance with 5-1.2
- SECTION 5-2 - FIRE FLOW FOR FACILITIES
  1. Fire Flow for sprinkler system is provided in accordance with 5-2.1
- SECTION 5-3 - SERVICE MAINS AND LATERALS
  1. Fire hydrants are provided in accordance with 5-3.5.8
     A. Hydrants are spaced at 300 ft maximum
     B. Hydrant to be located within 150' of Fire Department Connection
- SECTION 5-5 - FIRE PUMPS
  1. A fire pump IS required to meet fire protection demand, and is provided in accordance with 5-5 adjacent to building 1201.
  2. Existing fire pumps (2-2,000 gpm pumps) and existing 75,000 gallon on site water storage will serve the facility.
- SECTION 5-7 - AUTOMATIC SPRINKLER SYSTEMS
  1. Per 5-7.2.1, an automatic sprinkler system IS required
- SECTION 5-10 - STANDPIPE SYSTEMS
  1. Per 5-10, a standpipe system IS NOT required
- SECTION 5-17 - PORTABLE FIRE EXTINGUISHERS
  1. Per 5-17.1, portable fire extinguishers ARE required

NFPA Chapter 7 (replaces IBC Chapter 10) - Means of Egress:
- Occupancy Load (PER TABLE 7.3.1.2):
  - See Occupancy Table
- Egress Capacity Sizing (PER TABLE 7.3.3.1)
  - See Code Calculations Table(s)
  - See life safety plan for individual room egress analysis
- Minimum Stair Width (PER SECTION 7.3.3.1)
  - See Code Calculations Table(s)
- Number of Means of Egress (PER SECTION 7.4.1)
  - Total Number of Exits Required
    - Business Occupancy (CHAPTER 38)
      - GROUND FLOOR - 2 EXITS REQUIRED
    - Storage Occupancy (CHAPTER 42)
      - GROUND FLOOR - 1 EXITS REQUIRED
- Common Path of Egress Travel Distance
  - Business Occupancy (CHAPTER 38)
    - 100 ft per 38.2.5.3.1
  - Storage Occupancy (CHAPTER 42)
    - 100 feet per TABLE 42.2.5
  - Other (CHAPTER 7)
    - Mechanical Equipment Rooms, Boiler Rooms, and Furnace Rooms - 100 ft per 7.12.1
- Exit Access Travel Distance
  - Business Occupancy (CHAPTER 38)
    - 300 FT per 38.2.6.3
    - See life saftey plan for exit access travel distance
  - Storage Occupancy (CHAPTER 42)
    - 400 feet per TABLE 42.2.5

NFPA Chapter 7 (CONTINUED)
- Corridors
  - Occupancy Type (B) requires:
    - NO FIRE RATING REQUIRED FOR CORRIDOR WALLS
    - See life saftey Plan for locations of rated corridors
  - Occupancy Type (S-1) requires:
    - NO FIRE RATING REQUIRED FOR CORRIDOR WALLS PER 42.3.6
    - See life saftey Plan for locations of rated corridors
  - Minimum Corridor Width
    - Business Occupancy (CHAPTER 38)
      - 44 inches per 38.2.3.2
    - Storage Occupancy
      - 36 inches per 7.3.4.1
  - Dead End Corridors
    - Business Occupancy (CHAPTER 38)
      - Maximum of 50 feet per 38.2.5.2.1
    - Storage Occupancy (CHAPTER 42)
      - Maximum of 100 feet per TABLE 42.2.5

FIRST FLOOR PLAN CODE CALCULATIONS

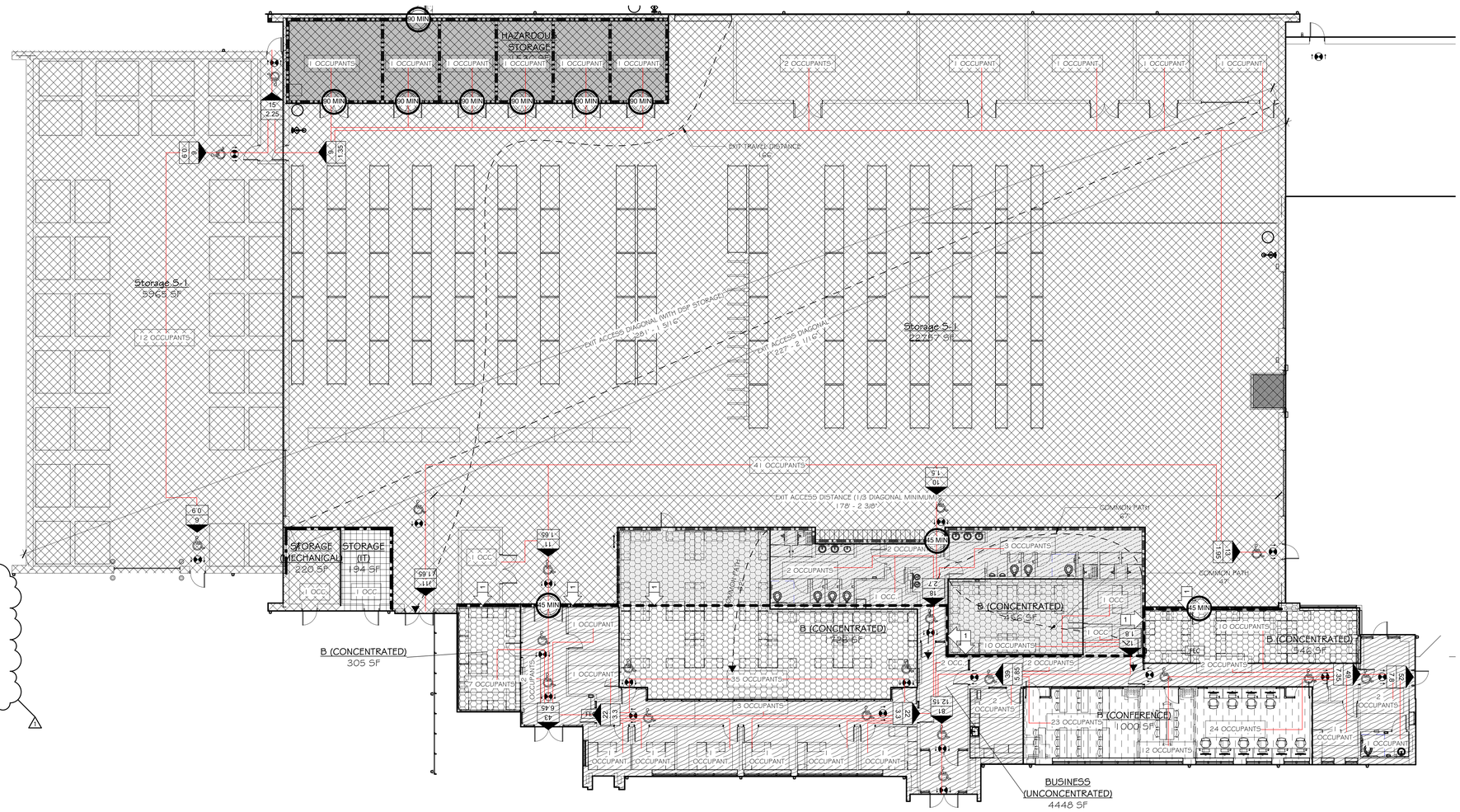
Name	Occupancy Calculations: Area (SF)	Occupancy Factor (SF per Occupant)	Factor Type	Total Occupant Load (Occupants)	Egress Width Calculations: Other Egress Component Width	Calculated Width (Other Egress Components) (Inches)	Required Egress Width (Inches)
B (CONCENTRATED)	1723 SF	50 SF	GROSS	35.00	0.2	7.00	44
B (CONCENTRATED)	546 SF	50 SF	GROSS	11.00	0.2	2.20	44
B (CONCENTRATED)	456 SF	50 SF	GROSS	10.00	0.2	2.00	44
B (CONCENTRATED)	305 SF	50 SF	GROSS	7.00	0.2	1.40	44
B (CONFERENCE)	1000 SF	15 SF	NET	67.00	0.2	13.40	44
BUSINESS (UNCONCENTRATED)	4448 SF	150 SF	GROSS	30.00	0.2	6.00	44
HAZARDOUS STORAGE	1536 SF	500 SF	GROSS	4.00	0.2	0.80	44
STORAGE (IT)	194 SF	300 SF	GROSS	1.00	0.2	0.20	44
STORAGE (MECHANICAL)	220 SF	500 SF	GROSS	1.00	0.2	0.20	44
Storage S-1	22757 SF	500 SF	GROSS	46.00	0.2	9.20	44
Storage S-1	5965 SF	500 SF	GROSS	12.00	0.2	2.40	44
	39149 SF			224.00		44.80	

SYMBOLS LEGEND

- EWC — ELECTRIC WATER COOLER - SEE PLUMBING
- FEC — FIRE EXTINGUISHER IN SEMI-RECESSED CABINET
- FEB — FIRE EXTINGUISHER WITH BRACKET
- 1 HR FIRE RATED WALL (UL #914)
- 2 HR FIRE RATED WALL (UL #U905)
- SMOKE PARTITION AND CEILING ENCLOSURE
- 1 — DASHED LINE INDICATES LOCATION OF 1-HOUR RATED WALL (UL # U404) LOCATED ON MEZZANINE LEVEL SEPARATING WAREHOUSE FROM ADMIN SPACE
- 1 HR FIRE RATED FLOOR/CEILING ASSEMBLY (UL # G717)
- 2 HR FIRE RATED FLOOR/CEILING ASSEMBLY (UL #G505)
- EMERGENCY EXIT SIGNAGE
- HANDICAP ACCESSIBLE EXIT LOCATION
- EXIT TRAVEL PATH
- STORAGE H-2 GROUP (IBC 2018) 300 SF PER OCCUPANT PER NFPA 101 ORDINARY HAZARD (NFPA 101)
- STORAGE S-1 GROUP (IBC 2018) 300 SF PER OCCUPANT PER NFPA 101 ORDINARY HAZARD (NFPA 101)
- BUSINESS B OCCUPANCY GROUP (IBC 2018) 150 SF PER OCCUPANT PER NFPA 101 ORDINARY HAZARD (NFPA 101)
- BUSINESS B OCCUPANCY GROUP (IBC 2018) 50 SF PER OCCUPANT PER NFPA 101 ORDINARY HAZARD (NFPA 101)
- BUSINESS B OCCUPANCY GROUP (IBC 2018) 15 SF PER OCCUPANT PER NFPA 101 ORDINARY HAZARD (NFPA 101)
- STORAGE S-1 OCCUPANCY GROUP (IBC 2018) 300 SF PER OCCUPANT PER NFPA 101 ORDINARY HAZARD (NFPA 101)
- STORAGE S-1 OCCUPANCY GROUP (IBC 2018) 500 SF PER OCCUPANT PER NFPA 101 ORDINARY HAZARD (NFPA 101)
- 0 — OCCUPANT LOAD
- 0" — REQUIRED DOOR WIDTH

PLUMBING FIXTURE CALCULATIONS

Name	Male Occupancy	Female Occupancy	Plumbing Fixtures Required: Water Closets Required: Men	Water Closets Required: Women	Lavatories Required: Men	Lavatories Required: Women	Drinking Fountains Req.
BUSINESS / STORAGE	58	14	2.9	0.7	2.9	0.7	0.96
	58	14					



1 / S1.0B DSP LIFE SAFETY PLAN
3/32" = 1'-0"

S|S&L
ARCHITECTURE & INTERIOR DESIGN
Montgomery, Alabama 36117 SSLDESIGN.COM
(M) 334.265.5162 | (F) 334.791.5248

Rev.	Description	Date
1	ADD #1	7-30-25

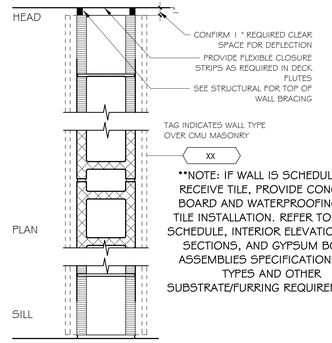
Job Number: 19084
Date: 10 April, 2025
Drawn By: JLJ/CF/NJ
Checked By: FEL
Project Title

DEPLOYABLE PARTS STORAGE FACILITY
DANNELLY FIELD
MONTGOMERY AL

Sheet Title: LIFE SAFETY PLAN
Sheet Number: LS1.0B

STATE OF ALABAMA
MONTGOMERY
John N. Seitz, Jr. 1844
Gregory A. O'Neal 6010
Wesley S. Darrow 6244
ALABAMA REGISTERED ARCHITECTS

TYPE N



NOTE: IF WALL IS SCHEDULED TO RECEIVE TILE, PROVIDE CONCRETE BOARD AND WATERPROOFING FOR TILE INSTALLATION. REFER TO FINISH SCHEDULE, INTERIOR ELEVATIONS AND SECTIONS, AND GYPSUM BOARD ASSEMBLIES SPECIFICATIONS FOR TYPES AND OTHER SUBSTRATE/FURRING REQUIREMENTS

TYPE	STRUCTURE THICKNESS
N4	3 5/8"
N5	7 5/8"

FLOOR PLAN LEGEND

- DS — DOWNSPOUT AND BOOT
- 202A — DOOR TAG
- X / AX.X — SECTION/DETAIL TAG
- 1 — CURTAIN WALL/STOREFRONT TAG
- BD — BOLLARD
- RB — REMOVABLE BOLLARD
- WALL TAG
- # — SPECIFIC NOTE TAG
- GCJ — GYPSUM CONTROL JOINT - REFER TO DETAIL 6/A2.4
- MCJ — MASONRY CONTROL JOINT - REFER TO SO.1, PROVIDE TYPE V SEALANT.

PARTITION TAG LEGEND

1. THE FIRST CHARACTER IN THE TAG REFERENCES THE PARTITION TYPE
2. THE SECOND CHARACTER IN THE TAG REFERENCES THE THICKNESS OF THE STRUCTURE (CMU, METAL STUD, WOOD, ETC.)
3. REFER TO INTERIOR ELEVATIONS AND ASSOCIATED WALL SECTIONS AND DETAILS FOR ADDITIONAL FURRING REQUIREMENTS AND FINISHES NOT SHOWN ON WALL TYPE PLAN SCHEDULE

NOTE - REFER TO LIFE SAFETY PLAN FOR PARTITION RATINGS

ROOF PLAN LEGEND

- STANDING SEAM METAL ROOF (LINES FOR SEAMS ON METAL ROOF TYPES, REFER TO SPECS FOR PANEL SIZES)
- DS — DOWNSPOUT + BOOTS (BOOTS NOT SHOWN) (NOTE: REFER TO ELECTRICAL FOR LIGHTNING PROTECTION - COORDINATE AS REQUIRED)
- VTR — VENT TO ROOF - SEE MECHANICAL/ PLUMBING & 5/A5.1B, AND 6/A5.1B

GENERAL NOTES

NOTE 1 - LOCATE ALL PENETRATIONS THROUGH METAL ROOF PANELS AT MIDPOINT IN ROOF PANEL
NOTE 2 - REFER TO ELECTIRCAL FOR LIGHTNING PROTECTION - COORDINATE AS REQUIRED

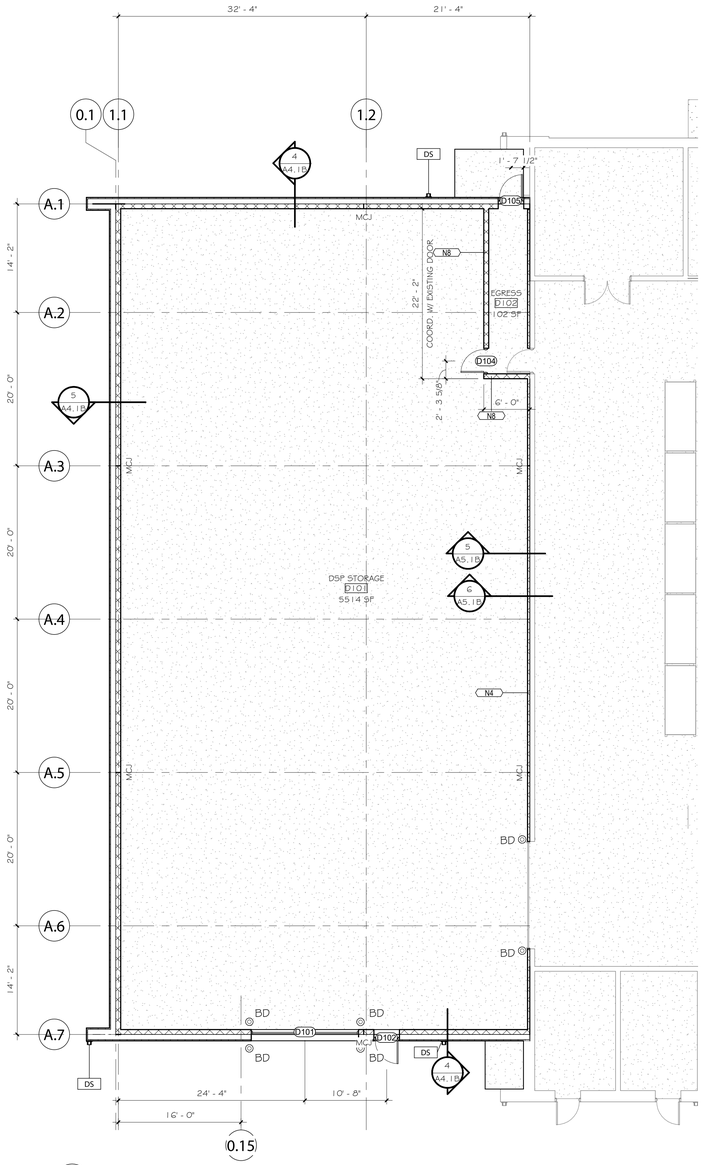
CEILING MATERIAL LEGEND

- LIGHT FIXTURE - SEE ELECTRICAL
- SUPPLY DIFFUSER - SEE MECH.
- RETURN DIFFUSER - SEE MECH.

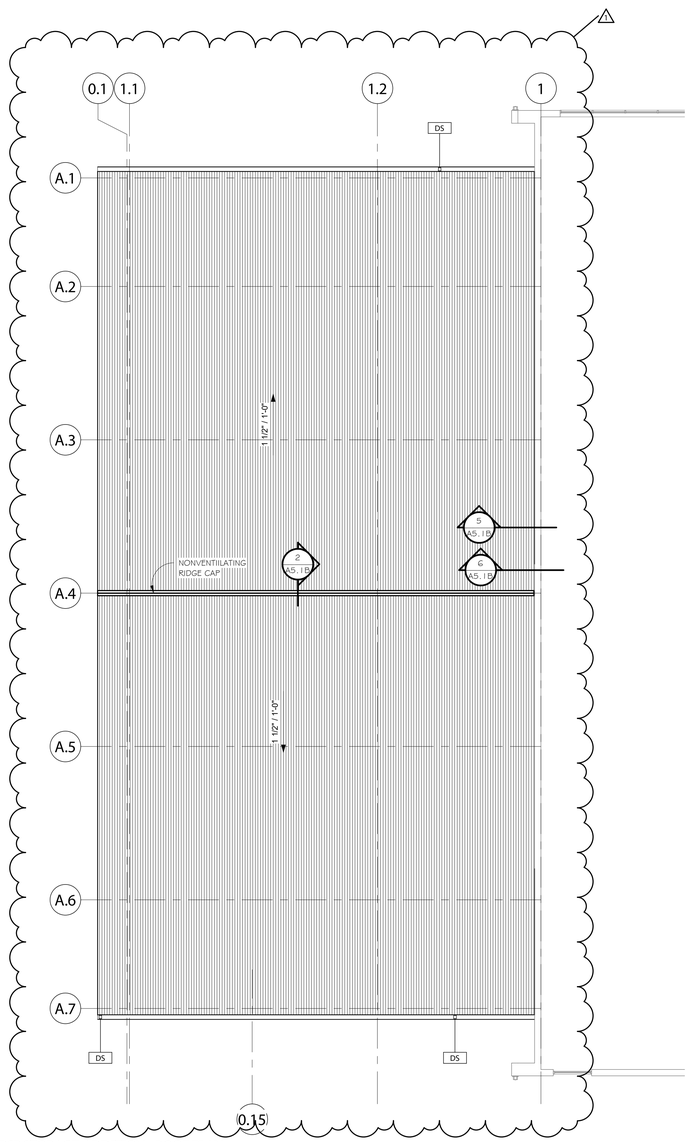
GENERAL NOTES:

1. REFER TO EXTERIOR WALL SECTIONS FOR WALL ASSEMBLIES. .
2. UNLESS SPECIFICALLY NOTED OTHERWISE, ALL WALLS (INCLUDING STRUCTURE, FINISH, AND INSULATION) SHALL EXTEND TO UNDERSIDE OF ROOF DECK ABOVE.
3. ALL WALLS TO RUN FULL HEIGHT TO STRUCTURE ABOVE. COORDINATE OPENINGS TO ACCOMODATE MECHCANICAL. SEAL ALL PLUMBING, MECHANICAL, ELECTRICAL, AND FIRE PROTECTION PENETRATIONS.
4. FOR EXTERIOR WALL EXPANSION JOINTS SEE EXTERIOR ELEVATIONS.

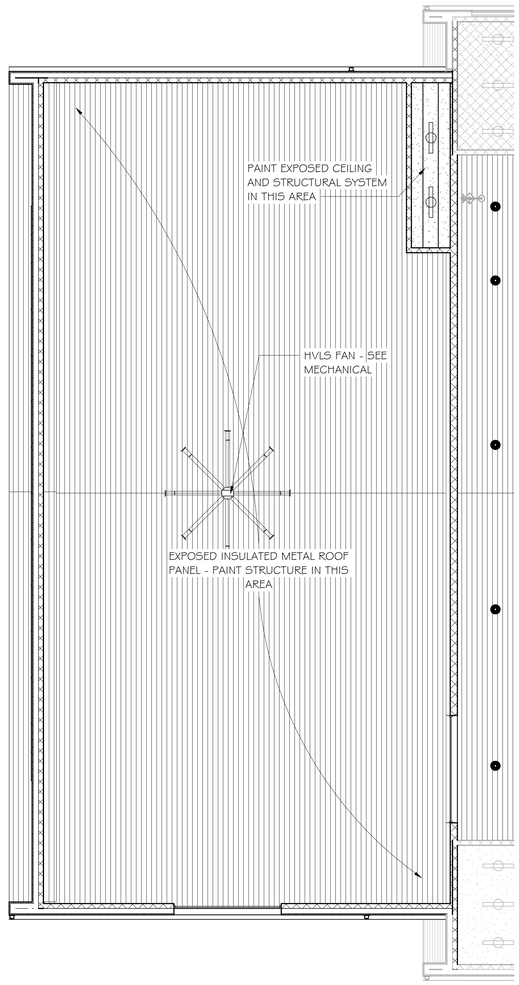
DIMENSION NOTES: ALL DIMENSIONS ARE MEASURED AS FOLLOWS:
- INTERIOR STUD WALLS ARE DIMENSIONED TO THE CENTER LINE OF THE WALL
- EXTERIOR WALLS ARE DIMENSIONED TO THE OUTSIDE FACE OF THE STUDS OR CMU.



1 A2.1B — DSP STORAGE ADDITION - FLOOR PLAN
1/8" = 1'-0"



2 A2.1B — DSP STORAGE ADDITION - ROOF PLAN
1/8" = 1'-0"



3 A2.1B — DSP REFLECTED CEILING PLAN
1/8" = 1'-0"

S|S&L
ARCHITECTURE & INTERIOR DESIGN
Montgomery, Alabama 36106
(M) 334. 265. 5162 | (F) 334. 791. 5248
WWW.SSLARCH.COM

Rev.	Description	Date
1	ADD #1	7-30-25

Job Number: 19084
Date: 10 April, 2025
Drawn By: JLJ/CF/NJ
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DEPLOYABLE PARTS STORAGE FACILITY

DANNELLY FIELD
MONTGOMERY AL

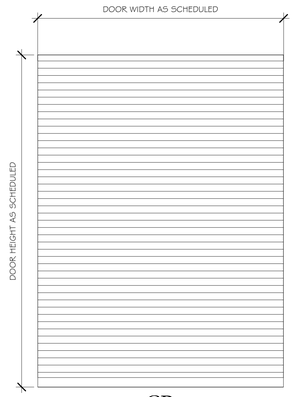
Sheet Title: PLANS - DSP STORAGE

Sheet Number: A2.1B

DSP DOOR AND FRAME SCHEDULE

DOOR NO.	DOOR WIDTH	DOOR PANEL NO.	DOOR PANEL 1 WIDTH	DOOR PANEL 2 WIDTH	DOOR HEIGHT	DOOR THICKNESS	DOOR TYPE	FRAME TYPE	GLAZING TYPE	DETAILS HEAD DETAIL	DETAILS JAMB DETAIL	DETAILS SILL DETAIL	SIGN TYPE	COMMENTS
FIRST FLOOR FFE														
D101	14' - 0"	1	14' - 0"	0' - 0"	14' - 0"	0' - 0 7/8"	CR	HM EXT F3		3/A3.0B	3/A3.0B	3/A3.0B		
D102	3' - 0"	1	3' - 0"		7' - 0"	0' - 1 3/4"	NL HM EXT	HM EXT F2	IG-3	2/A3.0B	2/A3.0B	2/A3.0B	A	
D104	3' - 0"	1	3' - 0"		7' - 0"	0' - 1 3/4"	NL HM INT	HM F2	S-1	1/A3.0B	1/A3.0B	1/A3.0B	A,B,B	Install 1 Type B sign to existing adjacent door
D105	3' - 0"	1	3' - 0"		7' - 0"	0' - 1 3/4"	NL HM EXT	HM EXT F2	IG-3	2/A3.0B	2/A3.0B	2/A3.0B	A	

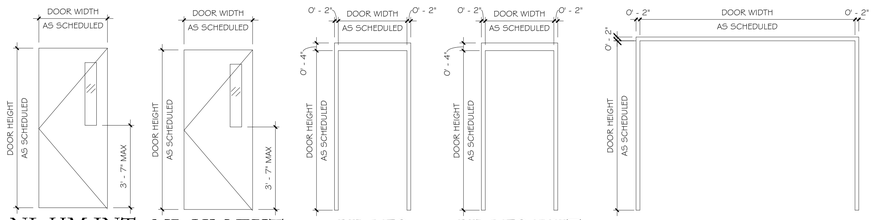
DOOR TYPE SCHEDULE



CR

COILING DOOR (ELECTRIC OPERATION)

FRAME TYPE SCHEDULE



NL HM INT — HOLLOW METAL DOOR WITH NARROW LIGHT

NL HM EXT — INSULATED HOLLOW METAL DOOR WITH NARROW LIGHT

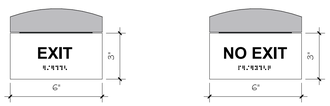
HM F2 — HOLLLOW METAL FRAME 4" HEAD

HM F2 EXT — INSULATED HOLLOW METAL FRAME 4" HEAD

HM EXT F3 — COILING ROLLING DOOR FRAME

SIGNAGE SCHEDULE

NOTE: ALL SIGNS SHALL COMPLY WITH NFPA 101 AND ANSI A117.1



SIGN TYPE: **A** — WAYFINDING ID MOUNTED ADJACENT TO DOOR

SIGN TYPE: **B** — WAYFINDING ID MOUNTED ADJACENT TO DOOR

DSP FINISH SCHEDULE

NO.	ROOM NAME	FLOOR FINISH	BASE FINISH	WALL FINISH NORTH WALL	WALL FINISH EAST WALL	WALL FINISH SOUTH WALL	WALL FINISH WEST WALL	CEILING FINISH	WINDOW SILL	MILLWORK CASEWORK	MILLWORK COUNTERTOP	TOILET PARTITIONS	NOTES
FIRST FLOOR FFE													
D101	DSP STORAGE	SC		PNT 1	PNT 1	PNT 1	PNT 1	NOTE 1 / PNT 1	-	-	-	-	PAINT ALL EXPOSED STRUCTURE
D102	EGRESS	SC	RB1	PNT 1	PNT 1	PNT 1	PNT 1	NOTE 1 / PNT 1	-	-	-	-	PAINT ALL EXPOSED STRUCTURE

FINISH SCHEDULE LEGEND

CONCRETE

SC: Sealed Concrete - See Spec 09 91 23

RESILIENT BASE

RB1: Manufacturer: Roppe
Color: P123 Charcoal
Style B: Cove
Height: 4"
Length: Roll

PAINT

PNT1: Color: SW 7064

PNT2: Color: SW 7004

PNT3: Color: SW 7065

PNT4: Color: SSW HC-166

PNT5: Color: SW 7600

INTERIOR HOLLOW METAL FRAMES

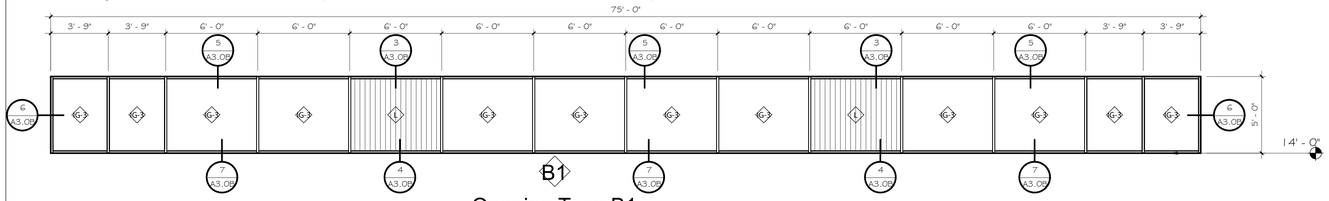
PNT3: Refer to Paint Colors

INTERIOR HOLLOW METAL DOORS

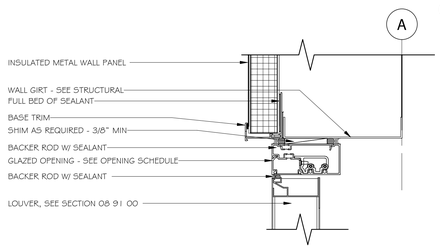
PNT3: Refer to Paint Colors

NOTES:

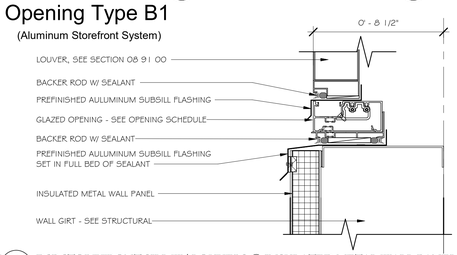
1. PAINT EXPOSED STRUCTURE, PIPING, CONDUIT, ETC. THE COLOR INDICATED IN FINISH SCHEDULE. EXPOSED SIDE OF ROOF PANEL TO REMAIN AS PREFINISHED, TOUCH-UP PAINT AS REQUIRED.



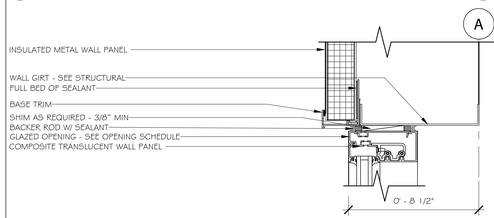
Opening Type B1
(Aluminum Storefront System)



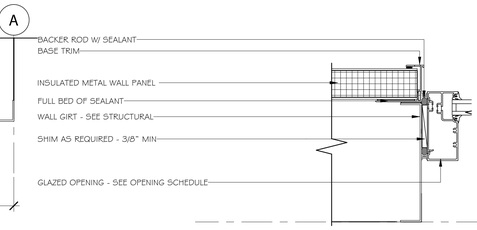
5/A3.0B DSP STOREFRONT HEAD W/ LOUVERS @ INSULATED METAL WALL PANEL 3" = 1'-0"



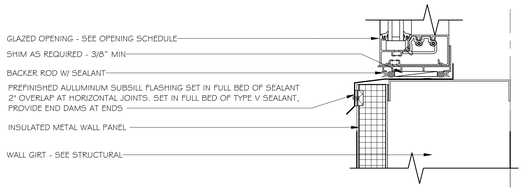
4/A3.0B DSP STOREFRONT SILL W/ LOUVERS @ INSULATED METAL WALL PANEL 3" = 1'-0"



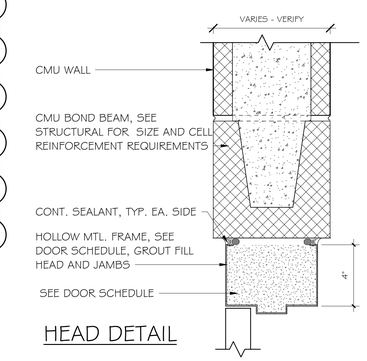
5/A3.0B DSP STOREFRONT HEAD @ INSULATED METAL WALL PANEL 3" = 1'-0"



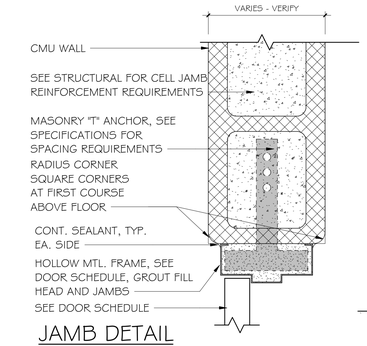
6/A3.0B DSP STOREFRONT @ INSULATED METAL WALL PANEL 3" = 1'-0"



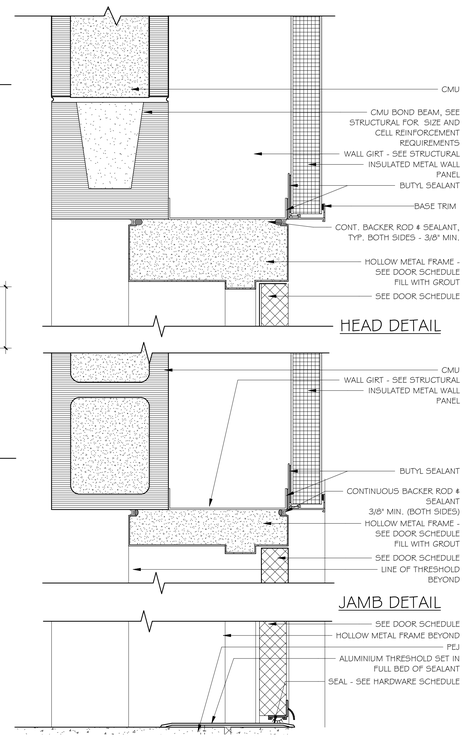
7/A3.0B DSP STOREFRONT SILL @ INSULATED METAL WALL PANEL 3" = 1'-0"



HEAD DETAIL

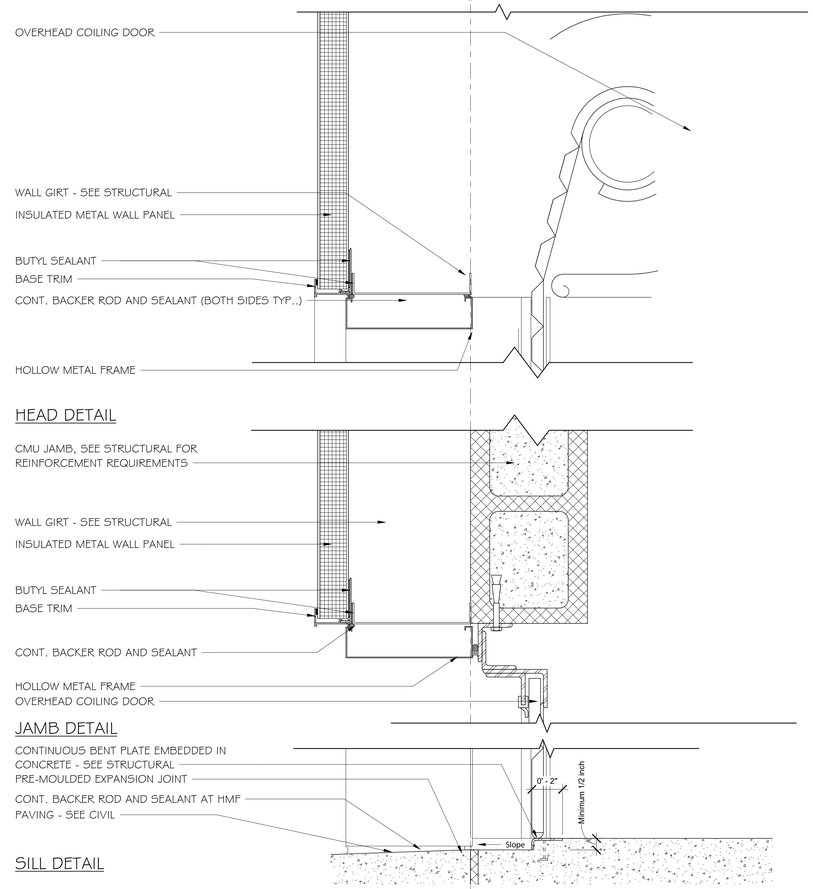


JAMB DETAIL



1/A3.0B DSP HM AT CMU, INSET 3" = 1'-0"

2/A3.0B DSP HM FRAME DETAILS - INSULATED METAL WALL PANEL ON CMU 3" = 1'-0"



8/A3.0B DSP OVERHEAD COILING DOOR HEAD AND JAMB DETAIL - INSULATED METAL PANEL 3" = 1'-0"

S|S&L
ARCHITECTURE & INTERIOR DESIGN
Montgomery, AL 36104 | SSLARCH.COM
(M) 334.265.5162 | (F) 334.791.5248

Rev.	Description	Date
1	ADD #1	7-30-25

Job Number: 19084

Date: 10 April, 2025

Drawn By: JL/CF/NJ

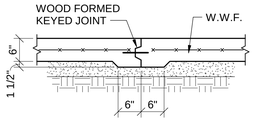
Checked By: FEL

Project Title: DEPLOYABLE PARTS STORAGE FACILITY
DANNELLY FIELD
MONTGOMERY AL

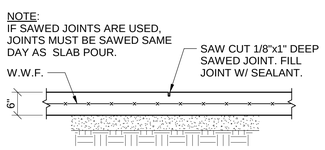
Sheet Title: DSP SCHEDULES

Sheet Number: A3.0B

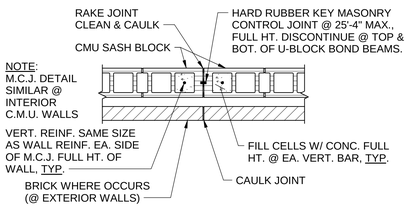
STATE OF ALABAMA MONTGOMERY — Jim E. Seay, Jr. 7594 — Gregory A. O'Neal 8247 — Wesley A. Carter 8544 — REGISTERED ARCHITECTS



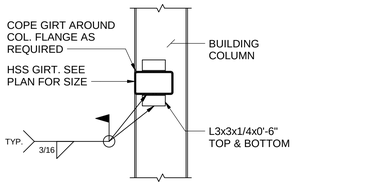
TYPICAL SLAB CONSTRUCTION
JOINT DETAIL-(C.J.)



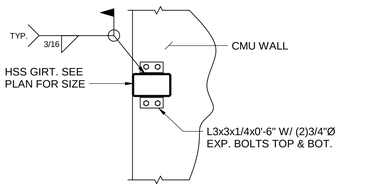
ALTERNATE SLAB CONSTRUCTION
JOINT DETAIL (SAWED JOINT)



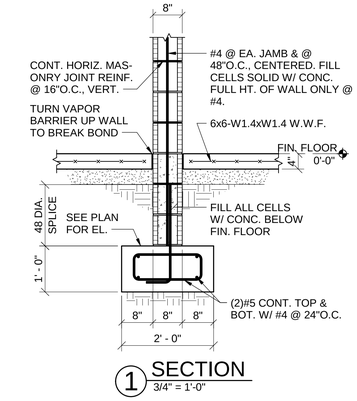
TYPICAL MASONRY CONTROL JOINT (M.C.J.)



TYPICAL HSS GIRT TO BUILDING COLUMN DETAIL



TYPICAL HSS GIRT TO C.M.U. WALL DETAIL



1 SECTION
3/4" = 1'-0"

FOOTING SCHEDULE - DPS

Type Mark	Width	Length	Depth	Reinforcing
F-G	6'-0"	6'-0"	1'-2"	(6)#4 E.W. TOP - (6)#5 E.W. BOT.
F-M	8'-6"	8'-6"	1'-6"	(9)#5 E.W. TOP - (9)#6 E.W. BOT.
F-P	9'-6"	9'-6"	1'-8"	(10)#5 E.W. TOP - (10)#6 E.W. BOT.

Lintel Schedule - DPS

Mark or Location	Max. Span	Type	Size	Reinforcing	Remarks
8" C.M.U.	4'-0"	U-BLOCK	8x16	#5 TOP & BOTTOM	8" HIGH U-BLOCK

GENERAL NOTES

FOUNDATION:
1. THE BEARING STRATA OF ALL FOOTINGS AND GRADE BEAMS SHALL BE INSPECTED AND APPROVED BY THE SOILS TESTING LABORATORY PRIOR TO PLACING THE REINFORCING STEEL AND CONCRETE.
2. ALL FOOTINGS SHALL BEAR ON AN UNDISTURBED SOIL STRATA OR COMPACTED FILL CAPABLE OF SUSTAINING THE LOADS.
3. FOOTINGS WERE DESIGNED FOR AN ALLOWABLE SOIL BEARING OF P = 2500 PSF. THE TESTING AGENCY SHALL VERIFY THAT THE SOILS ARE CAPABLE OF SUSTAINING 2500 PSF PRIOR TO CONCRETE PLACEMENT.
4. ELEVATIONS SHOWN ON PLAN ARE TOP OF FOOTINGS AND ARE MINIMUM DEPTH. DIFFERENT OR UNUSUAL CONDITIONS SHALL BE REPORTED TO THE ARCHITECT AND/OR ENGINEER.
5. ALL FOOTING REINFORCEMENT SHALL BE HELD SECURELY FROM THE GROUND. CONCRETE BLOCK AND BROKEN TILE SHALL NOT BE USED. CONCRETE OR CLAY BRICK MAY BE USED.
6. DOWEL ALL FOOTINGS AND WALLS WHERE THEY ABUT WITH SAME STEEL AS VERTICAL.
7. PROVIDE PREFORMED EXPANSION JOINT WHERE SHOWN.
8. IN FOOTINGS PROVIDE CORNER BARS AT ALL EXTERIOR BUILDING CORNERS.
9. DO NOT BACK FILL BEHIND FOUNDATION WALLS UNTIL TOP AND BOTTOM SLABS HAVE BEEN POURED AND ATTAINED THEIR DESIGN STRENGTHS.
10. BACK FILL BOTH SIDES OF FOUNDATION WALLS AT SAME TIME TO PREVENT OVERTURNING.
11. BACK FILL BEHIND ALL RETAINING WALLS AND BASEMENT WALLS SHALL BE AN APPROVED GRANULAR MATERIAL.

1 CONCRETE:
1. ALL CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH AT 28 DAYS OF F'c = 4000 PSI AND A MAXIMUM WATER-CEMENT RATIO OF 0.53.
2. ALL CONCRETE FOR EXTERIOR APPLICATIONS SHALL CONTAIN ENTRAINED AIR. SEE SPECS FOR ADDITIONAL INFORMATION.
2. REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60.
3. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A1064.
4. UNLESS NOTED OTHERWISE PROTECTIVE COVERING OF REINFORCEMENT SHALL BE AS FOLLOWS (SEE DETAILS) : FOOTINGS AND GRADE BEAMS 3" CLEAR BOTTOM AND SIDES, 2" CLEAR TOP. CONCRETE SLABS 3/4" CLEAR. WALLS 1 1/2" CLEAR SIDES. BEAMS 1 1/2" CLEAR TO STIRRUPS. CONCRETE COLUMNS 1 1/2" CLEAR TO TIES.
5. LAP ALL CONCRETE WALL VERTICAL REINFORCING AND CONCRETE BEAM HORIZONTAL REINFORCING WITH CLASS B LAP SPLICES. LAP ALL OTHER CONTINUOUS BARS WITH CLASS A SPLICES UNLESS NOTED OTHERWISE.
6. PLACING PLANS AND DETAILS SHALL BE IN ACCORDANCE WITH THE LATEST "A.C.I. DETAILING MANUAL".
7. STEEL FABRICATOR SHALL SUBMIT SHOP DRAWINGS FOR THE ARCHITECT AND/OR ENGINEER'S REVIEW.
8. DO NOT RUN CONDUITS, RACEWAYS, OR PIPES IN CONCRETE SLABS, BEAMS, OR COLUMNS WITHOUT SPECIFIC APPROVAL FROM BLACKBURN DANIELS O'BARR.

MASONRY:
1. PROVIDE MASONRY HORIZONTAL JOINT REINFORCEMENT 16" O.C. VERTICAL IN ALL CONCRETE BLOCK WALLS. REINFORCEMENT SHALL BE FOR TOTAL WIDTH OF CAVITY WALLS.
2. WHERE CONCRETE OR STEEL BEAMS BEAR ON CONCRETE BLOCK WALLS, BLOCK CELLS SHALL BE FILLED WITH CONCRETE 1'-4" WIDE TO FOUNDATION AND REINFORCED WITH A #5 EACH CELL UNLESS NOTED OR DETAILED OTHERWISE.
3. CONCRETE OR GROUT FOR BLOCK FILL SHALL HAVE 3/8 INCH MAXIMUM SIZE COARSE AGGREGATE AND SUFFICIENT WATER SO THE CONCRETE WILL FLOW INTO THE BLOCK CELLS WITHOUT LEAVING VOIDS. HEIGHT OF LIFT WHEN FILLING CELLS SHALL NOT EXCEED 4'-0".
4. CONCRETE OR GROUT FILL FOR C.M.U. SHALL HAVE A 28 DAY COMPRESSIVE STRENGTH OF Fc = 3000 PSI. ON 16" AND DEEPER U-BLOCKS, FILL CELLS FULL HEIGHT OF LINTEL AT SAME TIME.
5. ANCHOR ALL MASONRY WALLS TO STEEL COLUMNS WITH STRAP ANCHORS AT 16" O.C. VERTICALLY UNLESS SHOWN OTHERWISE.
6. UNLESS INDICATED OTHERWISE PROVIDE KEYED RUBBER MASONRY CONTROL JOINTS AT A MAXIMUM SPACING OF 25'-4". JOINT SHALL BE DISCONTINUOUS AT BOND BEAM.
7. PROVIDE REINFORCING BAR SUPPORTS TO CENTER VERTICAL REINFORCING IN MASONRY WALLS.
8. PROVIDE 48 DIAMETER LAP SPLICE IN VERTICAL MASONRY REINFORCING.
9. PROVIDE CORNER BARS IN U-BLOCK BOND BEAMS AT CORNERS, TYPICAL.
10. ALL CMU SHALL BE PLACED IN A RUNNING BOND PATTERN UNLESS NOTED OTHERWISE.
11. VERTICAL REINFORCING SHALL BE CONTINUOUS THROUGH BOND BEAMS AND LINTELS (CUT OUT OR NOTCH BOTTOM OF U-BLOCKS AS REQUIRED – DO NOT SUBSTITUTE BLOCK WITH KNOCK-OUT WEBS WHERE STANDARD U-BLOCK IS INDICATED). FOR BOND BEAMS AT TOP OF WALL, EXTEND VERTICAL REINFORCING TO 1" CLEAR TOP OF BOND BEAM.

STRUCTURAL STEEL:
1. ALL STRUCTURAL STEEL W AND WT SHAPES SHALL CONFORM TO ASTM A992 (GRADE 50). OTHER SHAPES SHALL CONFORM TO ASTM, A36, LATEST EDITION (EXCEPT STEEL JOISTS AND TUBE SECTIONS).
2. STRUCTURAL STEEL TUBE SECTIONS SHALL CONFORM TO ASTM A500, GRADE B, Fy = 46.0 KSI.
3. HEADED STUDS SHALL BE TYPE B SHEAR CONNECTORS (Fu = 65 KSI).
4. STEEL FABRICATOR SHALL SUBMIT SHOP DRAWINGS FOR THE ARCHITECT AND/OR ENGINEER'S REVIEW.
5. THE CONTRACTOR SHALL VERIFY ALL SHOP DRAWINGS DIMENSIONS WITH STRUCTURAL AND ARCHITECTURAL PLANS AND DETAILS.
6. BOLTED CONNECTIONS SHALL BE MADE WITH HIGH STRENGTH BOLTS CONFORMING TO ASTM A325. USE 3/4 INCH DIAMETER MINIMUM. UNLESS NOTED OTHERWISE, ALL BOLTS SHALL BE TIGHTENED AS FULLY PRETENSIONED BEARING CONNECTIONS.
7. CONNECTIONS NOT SHOWN ON DRAWINGS SHALL BE DESIGNED BY THE FABRICATOR. WHERE POSSIBLE USE DOUBLE ANGLE CONNECTIONS. USE MAXIMUM NUMBER OF BOLTS FOR DEPTH OF BEAM WITH SINGLE ROW OF BOLTS. WHERE DOUBLE ANGLE CONNECTIONS ARE NOT POSSIBLE, FABRICATOR SHALL DESIGN CONNECTION FOR CAPACITY EQUIVALENT TO DBL-ANGLE CONNECTION WITH MAX NO. BOLTS UNLESS DETAILED OTHERWISE.
8. FOR DBL-ANGLE CONNECTIONS, MIN ANGLE THICKNESS SHALL BE 5/16" FOR 3/4 INCH DIAMETER BOLTS AND 3/8" FOR 7/8 INCH DIAMETER BOLTS AND LARGER.
9. UNLESS SHOWN OTHERWISE PROVIDE 1/2 X 7 1/2 X 7 1/2 BEARING PLATES ON 1 INCH GROUT WITH 2-3/4" DIAMETER ANCHOR BOLTS UNDER ALL STEEL BEAMS THAT BEAR ON MASONRY WALLS.
10. OPEN WEB STEEL JOIST SHALL CONFORM TO THE SPECIFICATIONS OF THE AISC AND SJI AND TO THE LATEST OSHA STEEL ERECTION STANDARD.
11. UNLESS SHOWN OTHERWISE PROVIDE BRIDGING, BEARING SEATS, AND STABILIZER PLATES IN ACCORDANCE WITH ABOVE SPECIFICATIONS AND STANDARD.
12. ALL BRIDGING SHALL BE SECURELY ANCHORED AT END OF EACH RUN. WELD TO STEEL BEAM OR ANCHOR TO MASONRY WALL WITH 3/8 " ANCHOR BOLTS.
13. WHERE JOISTS CAN NOT BEAR 2 1/2 INCHES ON STEEL BEAMS, STAGGER LOCATION OF JOISTS TO PROVIDE 2 1/2 INCHES MINIMUM BEARING.
14. ROOF JOISTS AND BRIDGING SHALL BE DESIGNED FOR A NET UPLIFT OF 15 PSF. SHELTER ROOF JOISTS SHALL HAVE A MINIMUM TOP CHORD THICKNESS OF 1/4".
15. ANY MEMBER CALLED OUT TO BE BENT TO RADIUS SHALL BE FABRICATED OUT OF PLATE WITH EQUIVALENT SECTION PROPERTIES IF BENDING TO RADIUS IS IMPRACTCAL.

PRE-ENGINEERED METAL BUILDING:
1. THE COMPLETE DESIGN OF METAL BUILDING INCLUDING ALL COMPONENTS SHOWN OR NOT SHOWN ON THE DRAWINGS SHALL BE ACCOMPLISHED BY THE BUILDING MANUFACTURER.
2. THE DESIGN SHALL BE MADE BY A REGISTERED ENGINEER, REGISTERED IN THE STATE OF ALABAMA AND HE SHALL AFFIX HIS REGISTRATION NUMBER TO ALL SHOP DRAWINGS AND CALCULATIONS.
3. THE BUILDING AND ALL OF ITS COMPONENTS SHALL BE DESIGNED FOR THE FOLLOWING DEAD AND LIVE LOADS;
   a.) ACTUAL WEIGHT OF STEEL STRUCTURE.
   b.) 10 PSF DEAD (COLLATERAL) LOAD IN ADDITION TO ACTUAL WEIGHT OF STRUCTURE AND ROOFING MATERIALS.
   c.) 20 PSF ROOF LIVE LOAD.
   d.) ANY ADDITIONAL LOADS AND REACTIONS THAT ARE SHOWN ON THE DRAWINGS.
   e.) WIND LOADING AS REQUIRED BY INTERNATIONAL BUILDING CODE.
4. NO LIVE LOAD REDUCTION SHALL BE TAKEN FOR THE DESIGN OF THE RIGID FRAMES.
5. WHERE MEMBER SIZES AND GAGES ARE SHOWN THEY SHALL BE CONSIDERED A MINIMUM SIZE. THE MANUFACTURER SHALL NOT USE SMALLER SIZE OR LIGHTER GAGES, OR OMIT FRAMING WHERE INDICATED. HE SHALL USE ONLY LARGER SIZE AND HEAVIER GAGES IF HIS DESIGN INDICATES THESE ARE REQUIRED TO MEET THE LOADING CRITERIA
6. THE DEFLECTION OF GIRTS SHALL BE LIMITED TO 1/240 OF THE SPAN AND DEFLECTION OF PURLINS SHALL BE LIMITED TO 1/240 OF THE SPAN. DEFLECTION OF RIGID FRAMES AND END WALL COLUMNS SHALL BE LIMITED TO 1/240 OF THE SPAN. DEFLECTIONS SHALL BE BASED ON TOTAL LOAD (DEAD PLUS LIVE LOADS). TOTAL RIGID FRAME DRIFT SHALL BE LIMITED TO H/240, WHERE H IS EQUAL TO THE EAVE HEIGHT.
7. COLUMN BASES SHALL BE DESIGNED AS PINNED CONNECTIONS. MOMENTS AT COLUMN BASE PLATES ARE NOT ACCEPTABLE.
8. LOCATE PORTAL FRAMES ONLY WHERE INDICATED ON PLAN. PORTAL FRAME COLUMNS SHALL BE NESTED TIGHT TO WEB OF RIGID FRAME COLUMN.

COLD-FORMED STEEL STUDS:
1. PROVIDE COLD FORMED STEEL STUDS WHERE INDICATED ON THE PLAN. ALL SIZES AND GAGES SHOWN SHALL BE CONSIDERED MINIMUM.
2. LIGHT STEEL GALVANIZED (G-60) METAL STUDS, OF SIZES SHOWN COMPLETE WITH ALL ACCESSORIES REQUIRED. 16 GA AND HEAVIER MEMBERS SHALL MEET ASTM A-1003/A1003M, GRADE D WITH 50 KSI YIELD.
3. PROVIDE SHOP DRAWINGS PREPARED BY COLD FORMED METAL FRAMING MANUFACTURER. SUBMIT FOR APPROVAL SHOWING PLANS, SECTIONS, ELEVATIONS, LAYOUTS, PROFILES, PRODUCT COMPONENTS, AND INDICATING SPACING OF MEMBERS, PROPOSED METHODS OF FRAMING LINTELS, DOORWAY FRAMING, ETC. SHOW CONNECTION DETAILS WITH SCREW TYPE AND LOCATIONS AND ALL OTHER FASTENER REQUIREMENTS. INCLUDE CATALOG DATA ON ALL PRODUCT MATERIAL.
4. MANUFACTURER SHALL SUBMIT SHOP DRAWINGS AND DESIGN CAL-CULATIONS INCLUDING ALL CONNECTIONS. DESIGNS SHALL BE SIGNED BY A REGISTERED PROFESSIONAL ENGINEER, REGISTERED IN THE STATE OF ALABAMA.
5. MINIMUM CONNECTION OF THE TRACK TO THE FOUNDATION SHALL BE (2)-0.157/IN DIAMETER X 1-1/2" EMBEDMENT HILTI X-U ANCHORS AT EACH STUD. FOLLOW ALL MANUFACTURERS RECOMMENDED EDGE DISTANCES AND SPACING REQUIREMENTS.

CODES:
ALL PARTS SHALL BE FURNISHED AND ERECTED ACCORDING TO THE APPLICABLE CODES AND SPECIFICATIONS OF THE FOLLOWING:
AMERICAN CONCRETE INSTITUTE (ACI)
AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)
AMERICAN WELDING SOCIETY (AWS)
OSHA STEEL ERECTION STANDARD (OSHA)
STEEL JOIST INSTITUTE (SJI)
INTERNATIONAL BUILDING CODE (IBC 2015) (ICC)

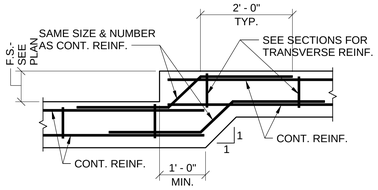
DESIGN LIVE LOADS:
ROOF.....20 PSF.
MEZZANINE..150 PSF
OFFICES.....
RISK CATEGORY (PER IBC 2015/ASCE 7-10).....II
WIND.....INTERNATIONAL BUILDING CODE (PER ASCE 7-10)
ULTIMATE DESIGN WIND SPEED (Vult).....115 MPH
NOMINAL DESIGN WIND SPEED (Vasd).....90 MPH
WIND EXPOSURE.....C
INTERNAL PRESSURE COEFFICIENTS.....+/-0.18
COMPONENTS AND CLADDING ULTIMATE WIND PRESSURES:
NOTE: MULTIPLY ALL VALUES SHOWN BELOW BY 0.6 TO GET ALLOWABLE DESIGN PRESSURES.
ROOF:TRIBUTARY AREA A = 10 SF
ZONE 1: -49.7PSF/31.3PSF
ZONE 2: -86.5PSF/31.3PSF
ZONE 3: -128.0PSF/31.3PSF
WALL:TRIBUTARY AREA A = 10 SF
ZONE 4: -58.9PSF/54.3PSF
ZONE 5: -72.7PSF/54.3PSF
CORNER ZONE = 5 FT
SEISMIC....INTERNATIONAL BUILDING CODE (PER ASCE 7-10)
SEISMIC IMPORTANCE FACTOR.....Ie=1.0
MAPPED SPECTRAL ACCELERATION (SHORT-TERM),Ss=0.134
MAPPED SPECTRAL ACCELERATION (1-SECOND)...S1=0.075
SITE CLASS.....C
SHORT-PERIOD SPECTRAL RESPONSE ACCEL.....Sds=0.107g
1-SECOND SPECTRAL RESPONSE ACCEL.....Sd1=0.085g
SEISMIC DESIGN CATEGORY.....B
SEISMIC FORCE-RESISTING SYSTEM.....STEEL FRAME NOT SPECIFICALLY DETAILED FOR SEISMIC RESISTANCE
DESIGN BASE SHEAR (ULTIMATE).....35k
SEISMIC RESPONSE COEFFICIENT.....Cs=0.035
RESPONSE MODIFICATION FACTOR.....R=3
ANALYSIS PROCEDURE.....ASCE 7 (SECT 12.8)
SNOW.....INTERNATIONAL BUILDING CODE
GROUND SNOW LOAD.....Pg=5 PSF

SPECIAL INSPECTIONS

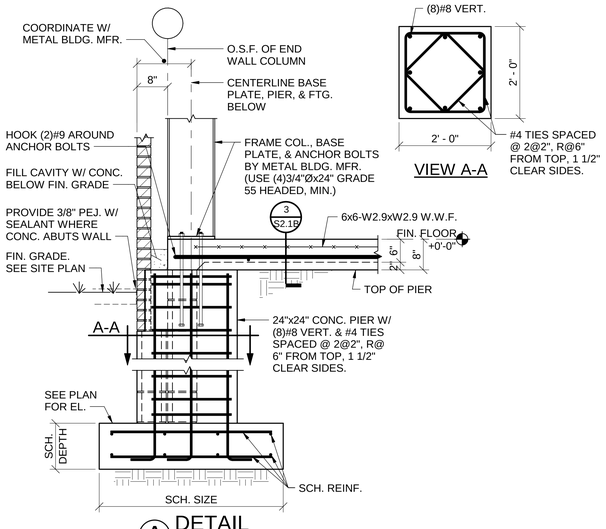
1. ALL SPECIAL INSPECTIONS REQUIRED BY CHAPTER 17 OF THE IBC 2015 SHALL BE PERFORMED BY A DESIGNATED TESTING EGENCY OR AGENCIES RESPONSIBLE FOR SPECIAL INSPECTIONS.

SEISMIC REQUIREMENTS FOR SPECIAL INSPECTIONS:
1. THE FOLLOWING STRUCTURAL COMPONENTS ARE DESIGNATED AS SEISMIC SYSTEMS AND/OR PART OF THE SEISMIC-FORCE-RESISTING SYSTEM OF THE BUILDING AND ARE SUBJECT TO THE REQUIREMENTS OF SECTIONS 1705.12 AND 1705.13 OF IBC 2015 AND PROJECT SPECIFICATIONS:
   X-BRACING
   PRE-ENG TRUSSES AND TRUSS-COLUMN CONNECTIONS
   SHEAR WALLS (INCL. ANCHORAGE TO FOUNDATION)
   THESE SPECIFIC COMPONENTS ARE IN ADDTION TO ALL GENERAL COMPONENTS LISTED IN SECTIONS 1705.12 AND 1705.13 OF IBC 2015 AND ARE SUBJECT TO ALL SPECIAL INSPECTIONS AND TESTING AS REQUIRED BY CHAPTER 17 OF IBC 2015, PROJECT SPECIFICATIONS, AND SCHEDULE OF SPECIAL INSPECTIONS. SPECIAL INSPECTION REPORTS SHALL BE SUBMITTED AS PER THE STATEMENT OF SPECIAL INSPECTIONS.
2. OTHER ARCHITECTURAL, MECHANICAL, OR ELECTRICAL COMPONENTS AND THEIR ANCHORAGES MAY ALSO BE DESIGNATED AS SEISMIC SYSTEMS. SEE OTHER DISCIPLINE'S DRAWINGS AND SPECIFICATIONS.
3. ALL SPECIAL INSPECTIONS AS REQUIRED BY CHAPTER 17 OF THE IBC 2015 SHALL BY PERFORMED. REFER TO TABLES SHOWN IN CHAPTER 17 FOR ALL APPLICABLE COMPONENTS THAT REQUIRE SPECIAL INSPECTIONS.

WIND REQUIREMENTS FOR SPECIAL INSPECTIONS:
1. THE FOLLOWING STRUCTURAL COMPONENTS ARE DESIGNATED AS WIND SYSTEMS AND/OR PART OF THE MAIN WINDFORCE-RESISTING SYSTEM OF THE BUILDING AND ARE SUBJECT TO THE REQUIREMENTS OF SECTION 1705.11 OF IBC 2015 AND PROJECT SPECIFICATIONS:
   ROOF DIAPHRAGM SYSTEM AND ATTACHMENT
   LOAD-BEARING CMU (SHEAR) WALLS
   JOIST CONNECTIONS TO SHEAR WALLS
   SHEAR WALL ANCHORAGE TO FOUNDATION
   THESE SPECIFIC COMPONENTS ARE IN ADDTION TO ALL GENERAL COMPONENTS LISTED IN SECTION 1705.11 OF IBC 2015 AND ARE SUBJECT TO ALL SPECIAL INSPECTIONS AND TESTING AS REQUIRED BY CHAPTER 17 OF IBC 2015, PROJECT SPECIFICATIONS, AND SCHEDULE OF SPECIAL INSPECTIONS. SPECIAL INSPECTION REPORTS SHALL BE SUBMITTED AS PER THE STATEMENT OF SPECIAL INSPECTIONS.
2. OTHER ARCHITECTURAL COMPONENTS AND THEIR ANCHORAGES MAY ALSO BE DESIGNATED AS WIND-RESISTING COMPONENTS. SEE OTHER DISCIPLINE'S DRAWINGS AND SPECIFICATIONS.
3. ALL SPECIAL INSPECTIONS AS REQUIRED BY CHAPTER 17 OF THE IBC 2015 SHALL BY PERFORMED. REFER TO TABLES SHOWN IN CHAPTER 17 FOR ALL APPLICABLE COMPONENTS THAT REQUIRE SPECIAL INSPECTIONS.

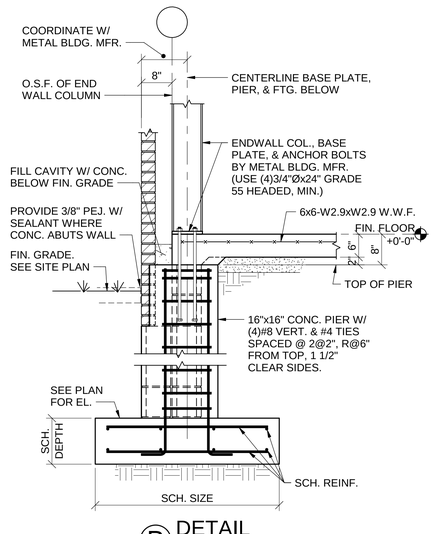


TYPICAL FOOTING STEP DETAIL - (F.S.)



VIEW A-A

A DETAIL
3/4" = 1'-0"



B DETAIL
3/4" = 1'-0"

SS&L
ARCHITECTURE & INTERIOR DESIGN
Montgomery | Dothan | WWW.SSLARCH.COM
(M) 334. 265.5162 | (D) 334. 791.5248

Rev.	Description	Date
1	Addendum #1	08.01.25

Job Number 19084

Date 09/06/2021

Drawn By

Checked By

Project Title

DEPLOYABLE PARTS STORAGE FACILITY

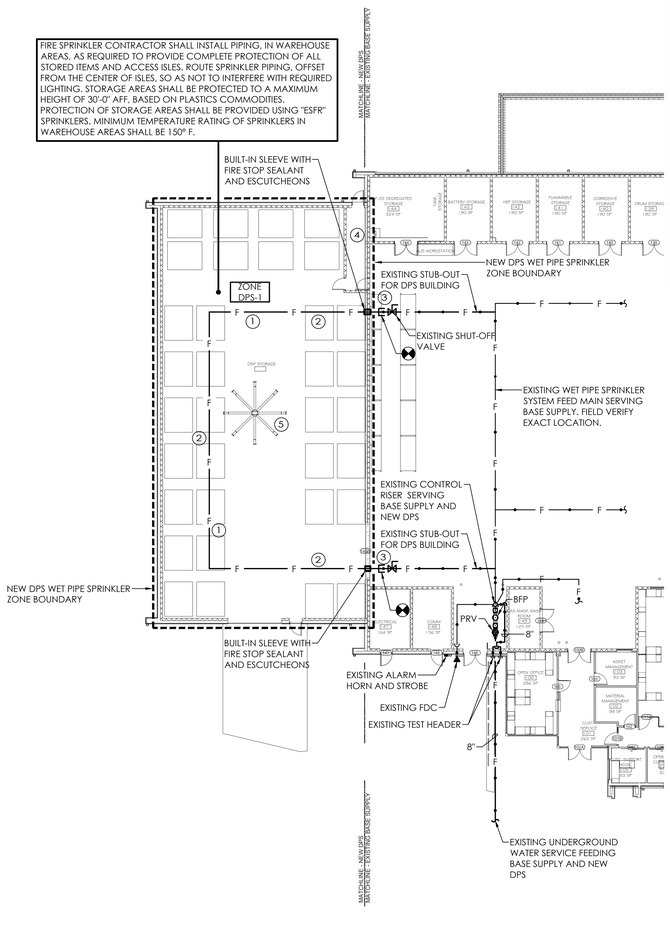
DANNELLY FIELD,
MONTGOMERY AL.

Sheet Title
GENERAL NOTES - SCHEDULES - TYPICAL DETAILS - DPS STORAGE

Sheet Number
S0.1B

09-06-21

FIRE SPRINKLER CONTRACTOR SHALL INSTALL PIPING, IN WAREHOUSE AREAS, AS REQUIRED TO PROVIDE COMPLETE PROTECTION OF ALL STORED ITEMS AND ACCESS ISLES. ROUTE SPRINKLER PIPING, OFFSET FROM THE CENTER OF ISLES, SO AS NOT TO INTERFERE WITH REQUIRED LIGHTING. STORAGE AREAS SHALL BE PROTECTED TO A MAXIMUM HEIGHT OF 30'-0" AFF, BASED ON PLASTICS COMMODITIES. PROTECTION OF STORAGE AREAS SHALL BE PROVIDED USING "ESFR" SPRINKLERS. MINIMUM TEMPERATURE RATING OF SPRINKLERS IN WAREHOUSE AREAS SHALL BE 150° F.



FIRE SPRINKLER FLOOR PLAN

SCALE: 1/16"=1'-0"

(#) NOTE LEGEND: (THIS SHEET ONLY)

1. TEMPERATURE IN THIS AREA MUST BE MAINTAINED AT A MINIMUM OF 40° F. SUPPLEMENTAL HEAT SHALL BE PROVIDED BY THE MECHANICAL CONTRACTOR.
2. FIRE SPRINKLER FEED MAIN. ROUTE AS HIGH AS POSSIBLE.
3. REMOVE CAP AND MAKE FINAL CONNECTION TO EXISTING STUB-OUT INSIDE BASE SUPPLY BUILDING.
4. PROVIDE CEILING MOUNTED SPRINKLERS IN CORRIDOR. AREA ABOVE CORRIDOR SHALL BE PROTECTED BY ESFR SPRINKLERS LOCATED AT ROOF STRUCTURE.
5. COORDINATE SPRINKLER HEADS WITH HVLS FAN. HVLS FAN SHALL STOP WHEN SPRINKLER SYSTEM IS ACTIVATED.

GENERAL SPRINKLER NOTES

1. FIRE PROTECTION SYSTEM SHALL BE A WET PIPE SYSTEM, AND SHALL COMPLY WITH "UFC 3-600-01" (REV. 5.6.2021), "NFPA 13" (2019), AND INTERNATIONAL BUILDING CODE (2021).
2. DESIGN AND INSTALLATION SHALL BE IN ACCORDANCE WITH "UFC 3-600-01" (REV. 5.6.2021).
3. OCCUPANCY CLASSIFICATION SHALL BE PER "UFC 3-600-01" (REV. 5.6.2021).
4. SYSTEMS SHALL BE INTERFACED WITH BUILDING ALARM SYSTEM.
5. ROUTE PIPING TO MINIMIZE OBSTRUCTION TO OTHER WORK.
6. BUILDING SHALL BE SUPERVISED PER "UFC 3-600-01" (REV. 5.6.2021).
7. THE SPRINKLER CONTRACTOR SHALL DESIGN AND INSTALL AN APPROVED, COMPLETE, OPERATIONAL SPRINKLER SYSTEM. PROVIDE COVERAGE TO ENTIRE AREA INCLUDING OVERHANGS. SYSTEM SHALL MEET ALL APPLICABLE CODES AND ORDINANCES. COORDINATE HEADS WITH LIGHTS, MECHANICAL EQUIPMENT, CEILING SYSTEMS, ETC.
8. CUTTING OF STRUCTURAL AND / OR ARCHITECTURAL MEMBERS SHALL BE DONE ONLY WITH THE WRITTEN APPROVAL OF THE ARCHITECT.
9. CONTRACTOR SHALL PROVIDE OFFSETS AS REQUIRED FOR PROPER INSTALLATION, COORDINATION WITH OTHER TRADES, AND / OR TO MAINTAIN PROPER CLEARANCES. VERIFY STRUCTURAL, MECHANICAL, AND ELECTRICAL INSTALLATIONS AND AVOID ANY / ALL OBSTRUCTIONS OR INTERFERENCES WITH FIRE PROTECTION PIPE ROUTING, AND/OR SPRINKLER LOCATIONS.
10. ALL WALL AND FLOOR PENETRATIONS FOR FIRE PROTECTION PIPING SHALL BE FULLY SLEEVED AND SEALED. FIRE STOP ALL PENETRATIONS OF SMOKE / FIRE WALLS, CEILINGS, FLOORS, ROOFS, ETC. SEE ARCHITECTURAL DRAWINGS FOR LOCATION OF FIRE RATED STRUCTURES.
11. PROVIDE STOCK OF EXTRA SPRINKLERS IN ACCORDANCE WITH "UFC 3-600-01" (REV. 5.6.2021).
12. METHODS OF HANGING PIPES, HEADERS AND BRANCHES SHALL BE IN ACCORDANCE WITH "UFC 3-600-01" (REV. 5.6.2021) FOR ALL PROJECTS. DESIGN OF SUPPORTS FOR FIRE PROTECTION SYSTEMS SHALL COMPLY, AS A MINIMUM, WITH SEISMIC CRITERIA AS OUTLINED IN UFC REQUIREMENTS.
13. TEMPERATURE RATINGS, OF FUSIBLE ELEMENTS, IN AUTOMATIC SPRINKLERS SHALL BE IN ACCORDANCE WITH "UFC 3-600-01" (REV. 5.6.2021).
14. ALL VALVES FOR FIRE SERVICE SHALL BE LISTED BY UNDERWRITER'S LABORATORIES, INC. AND THE FACTORY MUTUAL LABORATORIES. VALVES SHALL BE FACTORY MARKED "UL" AND "FM", (175 WORKING PRESSURE.)
15. ALL VALVES ON THE FIRE PROTECTION SYSTEM SHALL BE ELECTRICALLY SUPERVISED. TYPE AND EXACT LOCATION OF FLOW, PRESSURE AND SUPERVISORY SWITCHES SHALL BE COORDINATED BETWEEN THE DIFFERENT RESPONSIBLE TRADES.
16. ALL POWER WIRING, CONTROL WIRING, AND INTERLOCK WIRING SHALL BE ACCOMPLISHED UNDER THE ELECTRICAL DIVISION. COORDINATE ALL ELECTRICAL ITEMS WITH ELECTRICAL CONTRACTOR AND INSURE PROPER COORDINATION.
17. PROVIDE A PERMANENTLY ATTACHED NAME TAG, STATING THE REQUIRED DESIGN CRITERIA, FOR EACH HYDRAULICALLY DESIGNED SYSTEM.
18. SPRINKLERS SHALL COVER THE ENTIRE AREA OF THE ROOM, INCLUDING ALCOVES. SPRAY SHALL NOT BE BLOCKED BY WALLS OR PARTITIONS.
19. PIPE SHALL BE REAMED AND CLEANED BEFORE ASSEMBLY.
20. MAINTAIN A MINIMUM OF 18 INCHES FROM THE BOTTOM OF THE SPRINKLER DEFLECTOR TO THE TOP OF STORAGE / FILE STORAGE.
21. FIRE SUPPRESSION SYSTEM AUXILIARY DRAIN VALVES SHALL BE FULLY ACCESSIBLE AND LOCATED NO HIGHER THAN 7'-0" AFF. PROVIDE ALL SYSTEMS WITH FLUSHING CONNECTIONS.
22. PROVIDE SPRINKLERS ABOVE AND BELOW EXPOSED DUCTWORK THAT IS 48" OR WIDER.
23. PROVIDE HEAD GUARDS ON SPRINKLERS IN ALL AREAS WHERE THE SPRINKLERS MAY BE SUBJECT TO DAMAGE, INCLUDING BUT NOT LIMITED TO WAREHOUSE AREAS, STORAGE ROOMS, LOADING DOCKS, ELECTRICAL ROOMS, AND MECHANICAL ROOMS.
24. SYSTEMS SHALL BE SUPERVISED BY OTHERS.
25. ALL HYDROSTATIC TESTING AND / OR FLUSHING SHALL BE PERFORMED IN STRICT ACCORDANCE WITH "UFC 3-600-01" (REV. 5.6.2021) AND SHALL BE WITNESSED BY A REPRESENTATIVE OF THE LOCAL AUTHORITY HAVING JURISDICTION.
26. ALL MATERIALS USED FOR THE NEW FIRE SPRINKLER SYSTEM SHALL BE NON-COMBUSTIBLE.
27. PROVIDE SPRINKLERS UNDER ALL COMBUSTIBLE PLATFORMS.
28. PROVIDE ALL SIGNAGE AS REQUIRED BY "UFC 3-600-01" (REV. 5.6.2021) THE OWNER'S REPRESENTATIVES, AND THE BASE FIRE DEPARTMENT.

FIRE SPRINKLER CALCULATION
STORAGE WAREHOUSE AREA
"UFC 3-600-01 (REV. 5.6.2021)" / "NFPA 13 (2019)"
(25' RACK STORAGE - PLASTICS - 30' ROOF)
12 ESFR HEADS - 25.2K - AT 15 PSI

ESTIMATED PSI REQUIREMENT				ESTIMATED SPRINKLER DEMAND FLOW (GPM)		
END HEAD PRESSURE:		=	15 PSI	SPRINKLER DEMAND:		
ELEVATION:	30' X .434	=	13.0 PSI	25.2 √15	=	97.6 GPM
PIPING LOSS:		=	10.0 PSI	97.6 GPM X 12 HEADS	=	1171.2 GPM
BACKFLOW LOSS:		=	12.0 PSI	1171.2 GPM X 1.15 (SAFETY FACTOR)	=	1346.9 GPM
SAFETY FACTOR:		=	5.0 PSI			
MINIMUM PSI REQUIREMENT:		=	55.0 PSI	TOTAL GPM:	=	1346.9 GPM

NOTE: CALCS BASED ON NFPA 13 (2019) - CHAPTER 17 - TABLE 17.2.3.1 - NO OPEN TOP CONTAINERS - CARTONED, NONEXPANDED.

ESTIMATED AVAILABLE WATER DATA:

STATIC: 133 PSI *

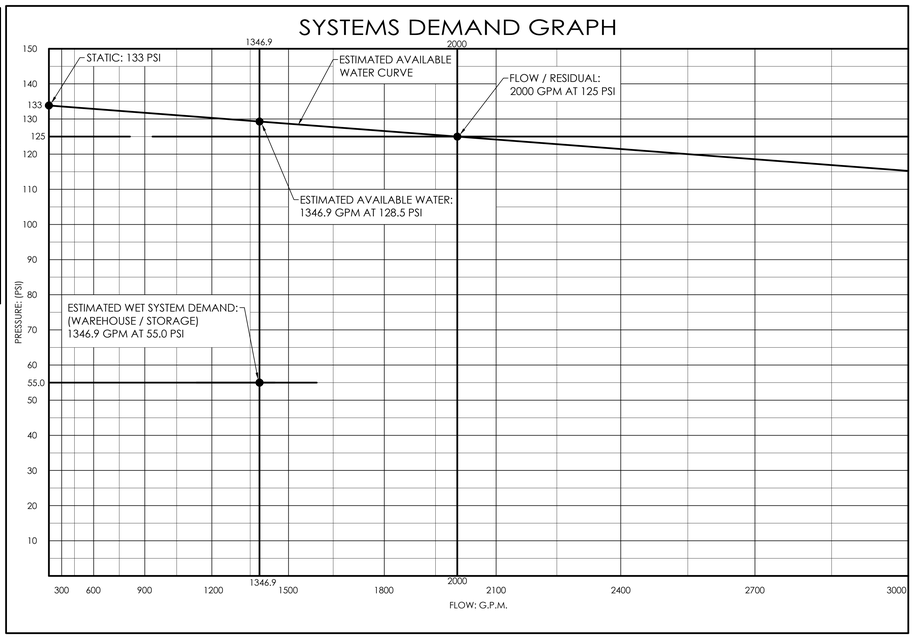
FLOW: 2000 GPM *

RESIDUAL: 125 PSI *

NOTE: SPRINKLER CONTRACTOR SHALL CONDUCT THEIR OWN FLOW TEST FOR CURRENT INFORMATION.

* LISTED STATIC PRESSURE, FLOW, AND RESIDUAL PRESSURE ARE BASED ON CERTIFICATION OF EXISTING FIRE PUMPS BY "HYDRO TECHNOLOGIES". THE EXISTING BASE FIRE PUMP SYSTEM PROVIDES AND MAINTAINS THE AVAILABLE WATER TO BE USED IN THE EXISTING BASE SUPPLY BUILDING FIRE SPRINKLER SYSTEM AND THE NEW DPS BUILDING SYSTEM.

SYSTEMS DEMAND GRAPH



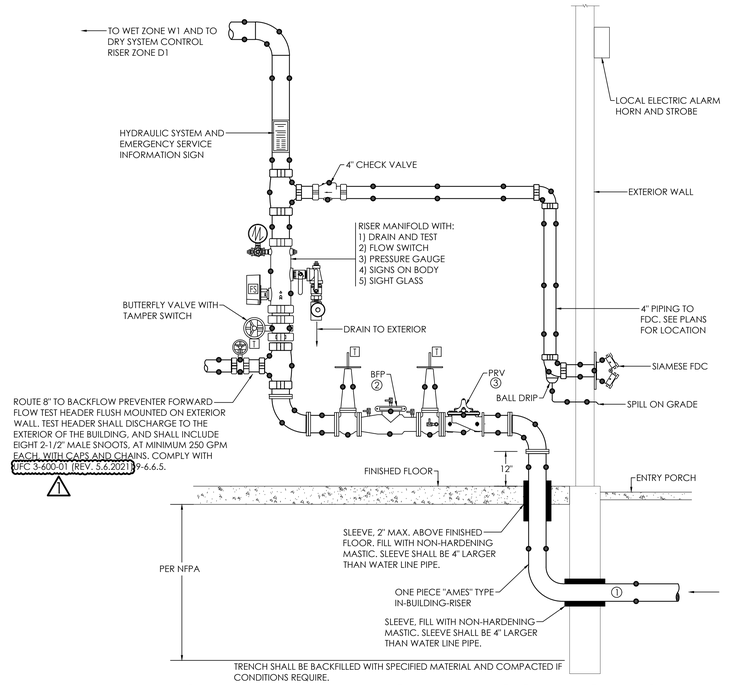
NOTE: WATER FOR REQUIRED HOSE ALLOWANCES SHALL BE PROVIDED THROUGH FIRE HYDRANTS CONNECTED TO UNDERGROUND WATER MAIN NOT BOOSTED BY FIRE PUMP SYSTEM AND IS THEREFORE NOT INCLUDED IN THE ESTIMATED SPRINKLER SYSTEM DEMAND SHOWN IN THESE HYDRAULIC CALCULATIONS.

SPRINKLER SYSTEMS SCHEDULE

ROOM OR AREA	SYSTEM TYPE	CLASSIFICATION	DENSITY GPM / SF	CALCULATED AREA / SF	GPM HOSE ALLOWANCE	TYPE OF SPRINKLER	K-FACTOR
WAREHOUSE AND STORAGE AREAS	WET PIPE	PLASTICS & CLASS IV	1.60	1200	500	ESFR	25.2

NOTES:

1. SIZES NOT SHOWN SHALL BE PER SPRINKLER CONTRACTOR'S HYDRAULIC CALCULATIONS.
2. PROVIDE EXPOSED SPRINKLERS AT ALL AREAS WITHOUT FINISHED CEILINGS. (ROUGH BRASS)
3. USE OF FLEXIBLE ARMOVERS IS NOT ALLOWED UNLESS APPROVED BY THE AUTHORITY HAVING JURISDICTION.



FIRE SERVICE ENTRANCE AND CONTROL RISER

NO SCALE (CONTROL VALVE RISER - ZONE W1)

(#) NOTE LEGEND: (THIS DETAIL ONLY)

1. STAINLESS STEEL EXTENDED 90° FITTING.
2. 8" DUAL CHECK BACKFLOW PREVENTER WITH OS&Y INDICATING GATE VALVES WITH TAMPER SWITCHES.
3. 8" FIRE PROTECTION PRESSURE REDUCING VALVE.

LEGEND

- F — FIRE SPRINKLER PIPING
- F — EXISTING PIPING TO REMAIN
- CONNECT TO EXISTING
- WET PIPE SYSTEM CONTROL ASSEMBLY
- SPRINKLER SYSTEM ZONE BOUNDARY
- (#) — NOTE LEGEND NUMBER
- UFC — UNIFIED FACILITIES CRITERIA
- DIP — DUCTILE IRON PIPE
- MJ — MECHANICAL JOINT
- FDC — FIRE DEPARTMENT CONNECTION
- UG — UNDERGROUND
- GPM — GALLONS PER MINUTE
- PSI — POUNDS PER SQUARE INCH
- SF — SQUARE FEET
- U.L. — UNDERWRITERS LABORATORY
- FM — FACTORY MUTUAL

GENERAL NOTES:

1. FIRE SPRINKLER CONTRACTOR SHALL BE LICENSED THROUGH THE OFFICE OF THE STATE OF ALABAMA FIRE MARSHAL.
2. SEE SPECIFICATIONS FOR SPRINKLER OCCUPANCY HAZARD CLASSIFICATIONS, SPRINKLER DENSITY REQUIREMENTS, SPRINKLER MINIMUM AREA REQUIREMENTS, AND HOSE STREAM DEMAND REQUIREMENTS.
3. ALL WET SYSTEM FIRE SPRINKLER PIPING SHALL BE INSTALLED WITHIN BUILDING INSULATION ENVELOPE. SEE ARCHITECTURAL PLANS FOR THE LOCATION AND EXTENT OF THE BUILDING INSULATION ENVELOPE.
4. ALL TAMPER SWITCHES, FLOW SWITCHES, AND ALARM HORN / STROBE, SHALL BE FURNISHED AND INSTALLED BY THE FIRE SPRINKLER CONTRACTOR. REQUIRED ELECTRICAL CONNECTIONS, AND CONNECTIONS TO THE BUILDING FIRE ALARM SYSTEM, SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR. ALL FLOW AND TAMPER SWITCHES SHALL BE CONNECTED TO A CONSTANTLY MONITORED LOCATION. PROVIDE SURGE PROTECTIONS DEVICES (SPDS) FOR COMMUNICATION EQUIPMENT AND SPECIALIZED ELECTRICAL EQUIPMENT SUCH FIRE ALARM AND DETECTION SYSTEMS (ANTENNAS), ELECTRICAL POWER FOR FIRE ALARM CONTROL PANELS (FACP) AND MASS NOTIFICATIONS SYSTEMS (MNS) ARE AREAS OF REQUIREMENT OF AFI 32-1065 AND NFA 780. SPDS SHALL BE UL1283 AND UL1449 RATED.
5. NO PIPING SHALL BE INSTALLED ABOVE ELECTRICAL EQUIPMENT AND/OR DATA EQUIPMENT. MAINTAIN ALL REQUIRED CLEARANCES.
6. ALL EXPOSED SPRINKLER PIPING SHALL BE INSTALLED AS HIGH AS POSSIBLE.
7. THESE DRAWINGS ARE FOR ENGINEERING INTENT ONLY. FOR NEW OR MODIFIED SYSTEMS, WORKING (SHOP) DRAWINGS AND CALCULATIONS MUST BE PREPARED BY A QUALIFIED FIRE PROTEC TION ENGINEER (QFPE) THAT HAS OBTAINED NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES, AUTOMATIC SPRINKLER SYSTEMS, LEVEL III CERTIFICATION OR SPECIAL HAZARDS SUPPRESSION SYSTEMS LEVEL IV CERTIFICATION, AS APPLICABLE TO THE PROJECT. THE QUALIFIED FIRE PROTECTION ENGINEER (QFPE) MUST REVIEW THE SHOP DRAWINGS, HYDRAULIC CALCULATIONS AND MATERIAL SUBMITTALS. THE SHOP DRAWINGS MUST BEAR THE REVIEW STAMP OF THE QFPE PRIOR TO SUBMITTING THE FIRE EXTINGUISHING SYSTEM SHOP DRAWINGS TO THE DESIGNATED FIRE PROTECTION ENGINEER (DFPE).
8. BRAND NAMES AND MODEL NUMBERS ARE GIVEN FOR ILLUSTRATIVE PURPOSES ONLY. EQUIPMENT, FULFILLING REQUIREMENTS OF THE PLANS AND SPECIFICATIONS, MAY BE SUBMITTED FOR REVIEW AND APPROVAL.
9. THE FIRE SPRINKLER CONTRACTOR SHALL PROVIDE A "STATEMENT OF COMPLIANCE" TO THE AUTHORITY HAVING JURISDICTION (AHJ) BEFORE REQUESTING FINAL APPROVAL OF THE INSTALLATION, AS PER SECTION 901.2.1 IN THE INTERNATIONAL FIRE CODE (2019) EDITION.
10. A COPY OF AS-BUILT DRAWINGS, MANUFACTURER'S OPERATION AND MAINTENANCE LITERATURE, AND NFPA 25 SHALL BE PROVIDED TO THE OWNER AS A PART OF THE SYSTEMS ACCEPTANCE.

S|S&L
ARCHITECTURE & INTERIOR DESIGN
Montgomery, Alabama 36117
(M) 334. 263. 5162 | (O) 334. 791. 2248

Rev.	Description	Date
1	CODE UPDATE	7-31-2025

Job Number 19084
Date 07/31/2025
Drawn By TLM
Checked By JM
Project Title

DEPLOYABLE PARTS STORAGE FACILITY
DANNELLY FIELD
MONTGOMERY, AL

Sheet Title: FIRE SPRINKLER FLOOR PLAN
Sheet Number: FP1.1B

MORRIS ENGINEERING
903 SOUTH PERRY STREET
MONTGOMERY, AL 36104
T. (334) 269-0329
www.jtmorriseng.com
PROJECT NO: 20-120

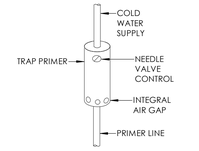
ALABAMA LICENSED No. 16984 PROFESSIONAL ENGINEER JAMES H. MORRIS
07/31/25

PLUMBING GENERAL NOTES

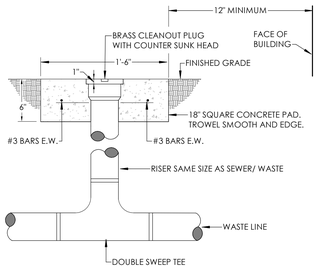
1. SANITARY WASTE AND VENT PIPING ABOVE GRADE TO BE SCHEDULE 40 PVC. SANITARY PIPING BELOW GRADE WILL BE CAST IRON.
2. DOMESTIC HOT AND COLD WATER PIPING ABOVE GRADE WILL BE TYPE "L" COPPER WITH SOLDERED OR PRESS FIT JOINTS. COLD WATER PIPING ENTERING BUILDING WILL BE TYPE "K" WITH SILVER SOLDERED JOINT.
3. ABOVE GRADE NATURAL GAS PIPING WILL BE SCHEDULE 40 BLACK IRON. NO PIPING IN NON VENTED CONCEALED SPACES. EXTERIOR UNDERGROUND GAS PIPING WILL BE HDPE (HIGH DENSITY POLYETHYLENE) PIPING.
4. ALL INDIRECT DRAINS TO HAVE INSULATED DEEP SEAL P-TRAPS.
5. ALL FLOOR DRAINS TO HAVE DEEP SEAL P-TRAPS.
6. THESE DRAWINGS NOT INTENDED TO SHOW ALL POSSIBLE CONDITIONS, IT IS INTENDED THAT A COMPLETE PLUMBING SYSTEM BE PROVIDED WITH ALL NECESSARY EQUIPMENT, APPURTENANCES AND CONTROLS, COMPLETELY COORDINATED WITH ALL DISCIPLINES. ALL PARAMETERS GIVEN IN THESES DOCUMENTS SHALL BE STRICTLY CONFORMED WITH ANY ITEMS AND LABOR REQUIRED FOR A COMPLETE PLUMBING SYSTEM IN ACCORDANCE WITH ALL APPLICABLE CODES, STANDARDS AND THESE CONTRACT DOCUMENTS SHALL BE FURNISHED WITHOUT INCURRING ANY ADDITIONAL COST TO THE PROJECT. CAREFULLY REVIEW ALL CONTRACT DOCUMENTS AND THE DESIGN OF OTHER TRADES BEFORE PREPARING SHOP DRAWINGS.
7. COORDINATE PLUMBING PIPING WITH STRUCTURAL, PLUMBING, HVAC AND ELECTRICAL. MAKE OFFSETS AND TRANSITIONS TO COORDINATE WITH OTHER TRADES WITHOUT ANY ADDITIONAL COST TO THE PROJECT.
8. NO PIPING TO BE RUN ABOVE ELECTRICAL PANELS.
9. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO ANY BID SUBMISSION TO FAMILIARIZE HIMSELF WITH THE EXISTING CONDITIONS. THE CONTRACTOR SHALL MAKE ADJUSTMENTS IN ROUTING AND LOCATION, IF NECESSARY, IN SIZE, IN ORDER TO ACHIEVE THE SPECIFIED PERFORMANCE WITHOUT INCURRING ADDITIONS TO THE CONTRACT. WHERE EXISTING CONDITIONS DIFFER SIGNIFICANTLY ENOUGH TO AFFECT PRICING, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT PRIOR TO BID SUBMISSION FOR A RESOLUTION. NO ALLOWANCE WILL BE MADE FOR LACK OF KNOWLEDGE OF EXISTING CONDITIONS.
10. ALL VTR'S TO BE CAST IRON (3'-0" MIN. LENGTH) AT ROOF PENETRATION.
11. SUPPORT PIPE AS REQUIRED BY THE 2015 INTERNATIONAL PLUMBING CODE.
12. FIRESTOP ALL RATED WALLS AND FLOOR PENETRATIONS. SEE ARCHITECTURAL DRAWINGS FOR RATED WALL AND FLOOR LOCATIONS.
13. COORDINATE ALL PLUMBING IN SLAB WITH BUILDING FOOTINGS.
14. OFFSET ALL VTR'S TO BACKSIDE OF ROOF RIDGE.
15. PROVIDE FIRESTOPPING ASSEMBLIES AT ANY AND ALL FIR-RATED PENETRATIONS. EQUAL TO ROXTEC.
16. DO NOT BEGIN WORK UNTIL ELEVATION OF FINAL CONNECTION POINT IS VERIFIED AND GRADING OF ENTIRE SYSTEM CAN BE DETERMINED (EVEN IF FINAL CONNECTION IS SPECIFIED UNDER ANOTHER SECTION).
17. THE CONTRACTOR SHALL EXECUTE ALL WORK SO THAT IT PROCEEDS WITH A MINIMUM OF INTERFERENCE WITH OTHER TRADES AND NORMAL FUNCTIONING OF EXISTING FACILITIES AND SERVICES.
18. VERIFY EXACT ROUGH-IN AND FINAL EQUIPMENT REQUIREMENTS IN FIELD.
19. THE CONTRACTOR SHALL VERIFY ALL PIPING, AS SHOWN ON THESE DRAWINGS WILL NOT CONFLICT WITH ANY DRAINS, SCUTTLES, JOINTS, VENTS, EQUIPMENT, ETC.
20. COORDINATE ROUTING AND LOCATION OF WASTE AND VENT PIPING WITH ALL OTHER TRADES.
21. THE PLUMBING CONTRACTOR SHALL COORDINATE WITH THE GENERAL CONTRACTOR AND OTHER TRADES. ALL REQUIRED OPENINGS AND EXCAVATIONS. ALL REQUIRED OPENINGS IN FOUNDATIONS, FLOORS WALLS AND ROOFS SHALL BE DESIGNED INTO THE STRUCTURE INITIALLY BY THE USE OF SLEEVES, CURBS, ETC. CUTTING AND PATCHING SHALL BE HELD TO A MINIMUM.
22. ALL ITEMS PROJECTING THROUGH THE ROOF SHALL BE FLASHED A MINIMUM OF 12" ABOVE THE ROOF. ALL VENTS SHALL BE A MINIMUM OF 10'-0" FROM ANY OUTSIDE AIR INTAKE DEVICE.
23. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL FINAL CONNECTIONS TO GAS FIRED EQUIPMENT AND SPECIFIED FIXTURES. ALL GAS FIRED EQUIPMENT AND FIXTURES SHALL BE OPERABLE..
24. WHERE DISSIMILAR PIPING MATERIALS (STEEL AND COPPER) ARE CONNECTED, INSTALL A THREADED BRASS NIPPLE FOR PIPE SIZES 2" AND LESS. FOR PIPE SIZES 2-1/2" AND ABOVE, INSTALL ISOLATING FLANGES. DIELECTRIC UNIONS ARE NOT TO BE USED EXCEPT AT THE WATER HEATERS.
25. ALL WATER LINES INSTALLED IN EXTERIOR WALLS SHALL BE INSTALLED INSIDE OF WALL INSULATION AND INSULATED INDIVIDUALLY TO PROTECT FROM FREEZING PIPING AND FITTINGS.
26. INSTALL "TRAPGUARD" FOR ALL FLOOR DRAINS IN BATHROOMS, RESTROOMS, JANITOR, MECHANICAL ROOMS AND PARTY ROOM FLOOR DRAINS. ALL FLOOR DRAINS ARE TO HAVE 4" DEEP SEAL TRAPS AND THE "TRAPGUARD". (NO EXCEPTIONS).
27. PROVIDE CLEANOUTS EVERY 75'-0" OR AT EACH CHANGE IN DIRECTION MORE THAN 45° AS REQUIRED BY CODE. COORDINATE LOCATIONS WITH ARCHITECT.
28. THESE PLANS (ALL PLUMBING SHEETS) ARE SCHEMATIC IN NATURE AND ARE INTENDED TO ESTABLISH SIZE, GENERAL ROUTING, LOCATION, PERFORMANCE AND ARE NOT INTENDED TO SHOW ALL POSSIBLE CONDITIONS. ALL WORK SHALL BE FULLY COORDINATED WITH OTHER TRADES TO INSURE THE INSTALLATION OF A COMPLETE OPERABLE SYSTEM THAT FITS IN THE SPACE ALLOTTED. PROVIDE ALL LABOR, EQUIPMENT, APPURTENANCES AND MATERIALS NECESSARY, AND PERFORM ALL OPERATIONS REQUIRED FOR THE INSTALLATION OF COMPLETE, FUNCTIONAL PLUMBING SYSTEMS AS OUTLINED ON THE DRAWINGS AND DESCRIBED IN THE SPECIFICATIONS.
29. ALL WORK SHALL COMPLY WITH APPLICABLE NATIONAL, STATE AND LOCAL CODES.
30. VERIFY ALL POINTS OF CONNECTION WITH OTHER DISCIPLINES (LOCATION AND INVERT) PRIOR TO INSTALLATION. THIS SHALL INCLUDE EXISTING SITE UTILITIES AS WELL AS NEW SITE UTILITIES INSTALLED UNDER THE SCOPE OF WORK FOR THIS PROJECT.
31. COORDINATE WITH OTHER TRADES TO PREVENT INTERFERENCE WITH HVAC DUCTS, ELECTRICAL LIGHTING AND STRUCTURE IN THE CEILING PLENUMS.
32. WHEN/ IF A CONFLICT EXISTS BETWEEN THE DRAWING AND SPECIFICATIONS, THE HIGHER STANDARD/ DIRECTION SHALL APPLY. THE FINAL DECISION SHALL BE MADE BY THE ARCHITECT AND/ OR ENGINEER. THE HIGHER PRICE SHALL BE INCLUDED IN THE BID PRICE.
33. COORDINATE ALL DMV PIPING WITH THE JOIST LAYOUT BELOW. COORDINATE THROUGH THE ARCHITECT. GENERAL CONTRACTOR. THIS SET OF CONSTRUCTION DOCUMENTS (STRUCTURAL/ ARCHITECTURAL) ETC. THERE WILL NOT BE ANY CHANGE ORDERS ISSUED OR PAID FOR GENERAL/ REQUIRED OFFSETS DUE TO THE FAILURE OF THE CONTRACTOR TO FAMILIARIZE HIMSELF WITH THE STRUCTURE PRIOR TO THE BID. THE SUBMITTED BID PRICE SHALL HAVE AN ALLOWANCE FOR ALL REQUIRED OFFSETS, ETC.

PLUMBING LEGEND

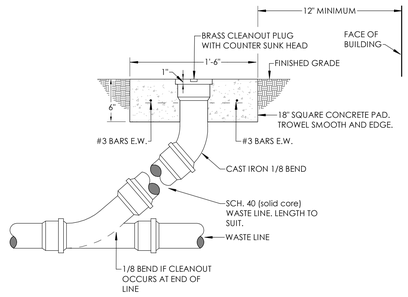
	WASTE PIPING
	VENT PIPING
	COLD WATER PIPING
	BALL VALVE
D	CONDENSATE PIPING
G	GAS PIPING
	GAS VALVE
	GAS PRESSURE REGULATOR
C.O.T.G.	C.O.T.G. (SET IN 18"X18"X6" CONCRETE PAD WITH TOOLED EDGES. PROVIDE BRASS PLUG.)
W.H.(F.P.)	WALL HYDRANT (FREEZE PROOF)
B.F.	BELOW FLOOR
B.G.	BELOW GRADE
V.T.R.	VENT THRU ROOF
W.C.O.	WALL CLEANOUT
F.C.O.	FLOOR CLEANOUT



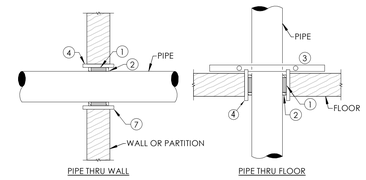
2 TRAP PRIMER DETAIL
NO SCALE



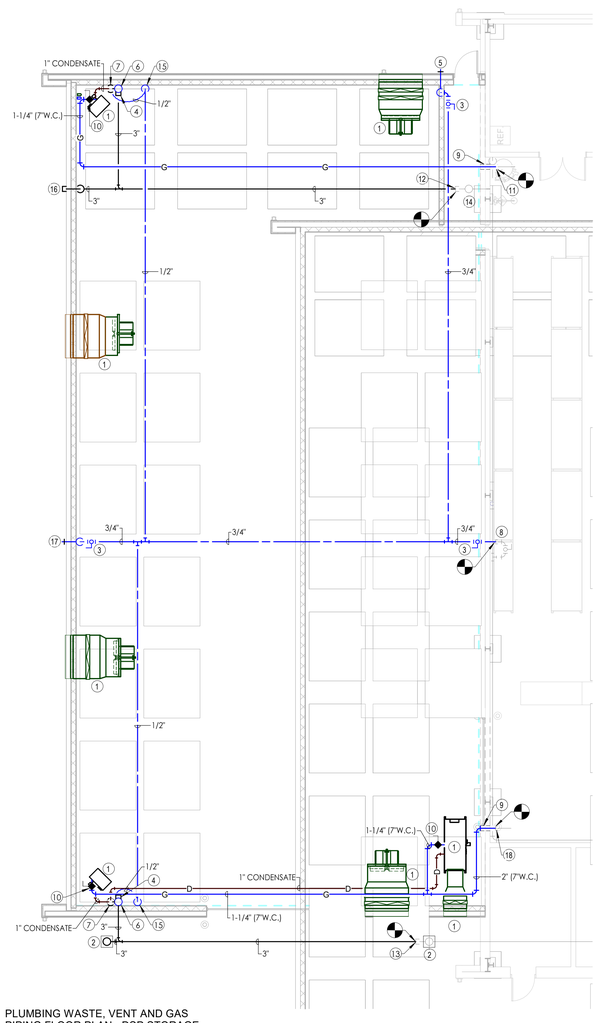
3 2-WAY CLEAN OUT TO GRADE (COTG)
NO SCALE



4 CLEAN OUT TO GRADE (COTG)
NO SCALE



5 PIPE THRU STRUCTURE DETAIL
NO SCALE



1 PLUMBING WASTE, VENT AND GAS PIPING FLOOR PLAN - DSP STORAGE
1/8" = 1'-0"

VENTS THROUGH ROOF MUST BE LOCATED MINIMUM OF 10'-0" FROM ANY OUTSIDE AIR INTAKE. COORDINATE WITH MECHANICAL CONTRACTOR AND WITH ROOFING CONTRACTOR.

PLUMBER SHALL COORDINATE WITH GENERAL CONTRACTOR ALL OPENINGS REQUIRED FOR PLUMBING SYSTEMS TO EXTEND FLOOR TO FLOOR.

SLEEVE ALL PENETRATIONS OF STRUCTURE BELOW GRADE. PROVIDE CLEARANCE AROUND PIPES FOR BUILDING EXPANSION AND CONTRACTION. COORDINATE WITH STRUCTURAL CONTRACTOR AND GENERAL CONTRACTOR.

GAS PIPING IS SIZING USING TABLE 402.4[2] FROM THE (2021) 1 INTERNATIONAL FUEL GAS CODE [SCH. 40 STEEL PIPING AT 7"W.C., INLET PRESSURE]. THE LENGTH OF PIPING FROM THE BUILDING METER TO THE FURTHEST EQUIPMENT CONNECTION IS APPROXIMATELY 450'-0" ANY CHANGE IN THE MATERIALS OR ROUTING WILL REQUIRE RECALCULATION OF REQUIRED PIPE SIZES. TOTAL LOAD = 1,940 MBH LOAD

GAS SYSTEM SHALL BE INSTALLED BY A LICENSED GAS TECHNICIAN.

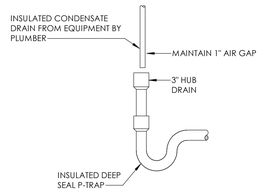
ALL GAS PIPING BELOW GRADE AND SLAB SHALL BE SLEEVED AND VENTED. TRACPIPE PII OR EQUAL. ALL GAS PIPING ABOVE GRADE SHALL BE TRAC PIPE COUNTER STRIKE OR EQUAL.

GAS PIPING EXPOSED (AREAS WITHOUT CEILINGS) SHALL BE PAINTED FLAT BLACK WITH ONE COAT OF PRIMER AND ONE COAT OF ENAMEL PAINT.

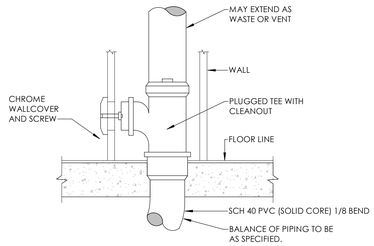
INSTALL ALL WATER AND GAS PIPING AS CLOSE TO STRUCTURE AS POSSIBLE

⑯ KEYED NOTES (THIS SHEET ONLY)

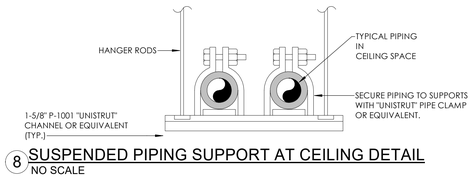
1. MECHANICAL UNIT. (SEE MECHANICAL DRAWINGS) COORDINATE EXACT LOCATION WITH MECHANICAL CONTRACTOR.
2. C.O.T.G. (SET IN 18"X18"X6" CONCRETE PAD WITH TOOLED EDGES. PROVIDE BRASS PLUG.
3. BALL VALVE. PROVIDE 12"X12" ACCESS PANEL TO MATCH CEILING IF LOCATED IN NON-TILE CEILING AREA. (TYPICAL)
4. W.C.O.
5. WALL HYDRANT. (FREEZE PROOF)
6. 2" V.T.R.
7. 2"X3" HUB DRAIN WITH INSULATED DEEP SEAL P-TRAP FOR MECHANICAL UNIT CONDENSATE. MOUNTED AT 7'-0". VERIFY MOUNTING HEIGHT WITH MECHANICAL CONTRACTOR. (PROVIDE TRAP PRIMER.)
8. CONNECT TO 3/4" C.W. STUB OUT FROM BASE SUPPLY BUILDING. SEE BASE SUPPLY FLOOR PLANS FOR CONTINUATION.
9. SLEEVED.
10. GAS VALVE.
11. CONNECT TO 1-1/4" (7"W.C.) STUB OUT FROM BASE SUPPLY BUILDING. SEE BASE SUPPLY FLOOR PLANS FOR CONTINUATION.
12. CONNECT TO 3" WASTE STUB OUT AT 2' - 7-1/4" BELOW FINISHED FLOOR ELEVATION FROM BASE SUPPLY BUILDING. SEE BASE SUPPLY FLOOR PLANS FOR CONTINUATION.
13. CONNECT TO 3" WASTE STUB OUT AT 2' - 5-5/8" BELOW FINISHED FLOOR ELEVATION FROM BASE SUPPLY BUILDING. SEE BASE SUPPLY FLOOR PLANS FOR CONTINUATION.
14. C.O.T.G. FROM BASE SUPPLY TO BE REPLACED WITH F.C.O.
15. TRAP PRIMER. EXPOSED, STRAP TO WALL. COORDINATE MOUNTING HEIGHT AND LOCATION WITH MECHANICAL CONTRACTOR.
16. EXTERIOR W.C.O.
17. WALL HYDRANT. (FREEZE PROOF) (MOUNT WALL HYDRANT 2'-0" ABOVE GRADE)
18. CONNECT TO 2" (7"W.C.) STUB OUT FROM BASE SUPPLY BUILDING. SEE BASE SUPPLY FLOOR PLANS FOR CONTINUATION.



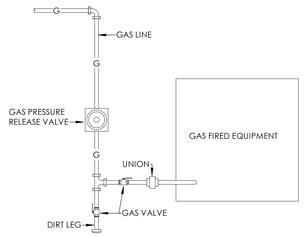
6 HUB DRAIN DETAIL
NO SCALE



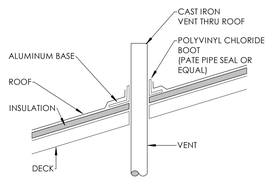
7 WALL CLEANOUT DETAIL
NO SCALE



8 SUSPENDED PIPING SUPPORT AT CEILING DETAIL
NO SCALE

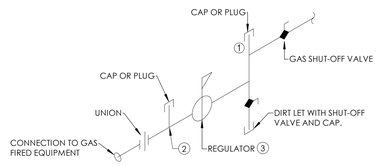


9 TYPICAL GAS CONNECTION DETAIL
NO SCALE



NOTE: ALL VENTS THRU ROOF (VTR) SHALL BE INSTALLED SO THAT THE TOP 3'-0" MINIMUM IS CAST IRON AT ROOF PENETRATION.

10 VENT THRU ROOF DETAIL
NO SCALE

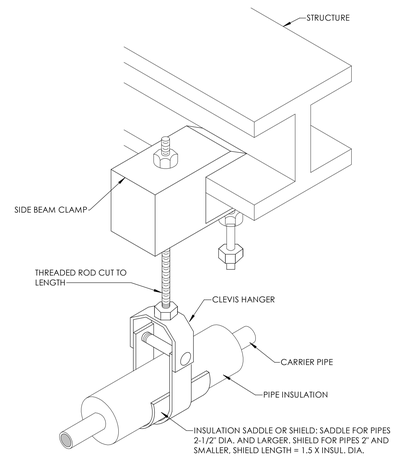


NOTE: THE GAS PRESSURE REGULATOR SHALL BE PROVIDED WITH EASY ACCESS. WHERE LOCATED INDOORS, THE REGULATOR SHALL BE VENTED TO THE ATMOSPHERE. VENT PIPING SHALL NOT BE SMALLER THAN THE VENT CONNECTION ON THE REGULATOR AND SHALL BE RUN INDEPENDENTLY. (SERVING ONLY A SINGLE DEVICE VENT.)

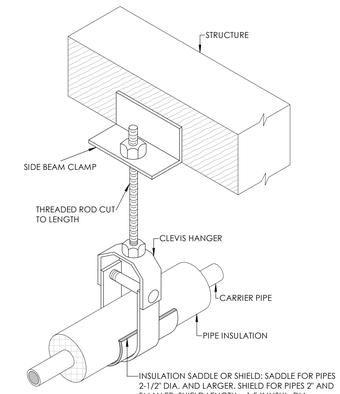
NOTE LEGEND: (THIS DETAIL ONLY)

1. A TEE FITTING WITH ONE OPENING CAPPED OR PLUGGED SHALL BE INSTALLED BETWEEN THE REGULATOR AND ITS UPSTREAM SHUT-OFF VALVE. THE TEE FITTING SHALL BE POSITIONED TO ALLOW CONNECTION OF A PRESSURE GAUGE AND TO SERVE AS A SEDIMENT TRAP. (DIRT LEG)
2. A TEE FITTING WITH ONE OPENING CAPPED OR PLUGGED SHALL BE INSTALLED NOT LESS THAN 10 PIPE DIAMETERS DOWNSTREAM OF THE REGULATOR OUTLET. THE TEE FITTING SHALL BE POSITIONED TO ALLOW CONNECTION OF A PRESSURE GAUGE.
3. LINE GAS PRESSURE REGULATORS SHALL BE LISTED AS COMPLYING WITH "ANSI Z 21.80"

11 GAS PRESSURE REGULATOR DETAIL
NO SCALE



12 PIPE HANGER DETAIL
NO SCALE



13 PIPE HANGER DETAIL
NO SCALE

MORRIS ENGINEERING
903 SOUTH PERRY STREET
MONTGOMERY, AL 36104
T. (334) 269-0329

PROJECT NO: 20-120

S|S&L
ARCHITECTURE & INTERIOR DESIGN
Montgomery, AL | Atlanta, GA | SSLARCH.COM
(M) 334. 265. 5162 | (D) 334. 791. 5248

No.	Revision	Date
1	Code Update	7/31/25

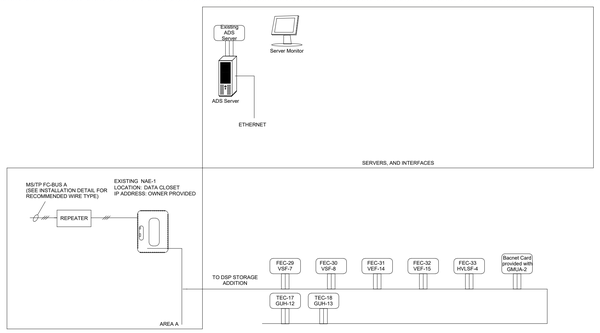
Job Number 19084
Date 09/06/2021
Drawn By MSC/WC
Checked By RLB/ JHM
Project Title

DEPLOYABLE PARTS STORAGE FACILITY
DANNELLY FIELD
MONTGOMERY, AL

Sheet Title
PLUMBING WASTE, VENT AND GAS PIPING FLOOR PLAN - DSP STORAGE

Sheet Number
P1.1B

ALABAMA LICENSED PROFESSIONAL ENGINEER
No. 16984
7-31-2026
JAMES H. MOORE



METASYS NETWORK LAYOUT FOR DSP STORAGE ADDITION

THIS DRAWING SHOWS THE OVERALL NETWORK LAYOUT. SEE THE INDIVIDUAL ENG/ ENG RISER DRAWING(S) FOR MORE SPECIFIC DEVICE DETAILS. IT IS ASSUMED THAT THE ETHERNET SHOWN IS THE CUSTOMERS ETHERNET BACKBONE. NO ADDITIONAL SWITCHES, ROUTERS, FIREWALLS, ETC ARE PROVIDED.

1

EXHAUST FAN SCHEDULE

SYMBOL	CFM	EXT. S.P.	MAX. RPM	SONES	TYPE FAN	H.P.	ELECTRICAL	COOK MODEL NO.	REMARKS
VEF-14	11,000	0.25"	614	18	WALL PROP	1-1/2	208/3/60	42EW618B	1,2,3,4
VEF-15	11,000	0.25"	614	18	WALL PROP	1-1/2	208/3/60	42EW618B	1,2,3,4
VSF-7	11,000	0.25"	614	18	WALL PROP	1-1/2	208/3/60	42EW618B	1,2,3,4
VSF-8	11,000	0.25"	614	18	WALL PROP	1-1/2	208/3/60	42EW618B	5
HVLSF-4	----	----	---	---	HIGH VOL. PROP	2	208/3/60	----	5

EXHAUST FAN SCHEDULE NOTES:

1. PROVIDE ECM MOTOR WITH BACNET CONTROLLER AND HAND OFF AUTO PUSH BUTTON SWITCH. INTERLOCK WITH DDC SYSTEM AND FIRE ALARM SYSTEM.
2. FACTORY MTD DISCONNECT SWITCH.
3. MOTORIZED DAMPER 120V, SINGLE PHASE.
4. BASIS OF DESIGN IS COOK, EQUAL SUBSTITUES BY GREENHECK ARE APPROVED SUBSTITUTES.
5. BASIS OF DESIGN BIG ASS FAN MODEL PFX3-18 WITH VARIABLE SPEED DRIVE, FACTORY DISCONNECT SWITCH, MULTI POINT SAFETY INSTALLATION KIT. PROVIDE WALL CONTROLLER AND INTERLOCK WITH DDC SYSTEM AND FIRE ALARM SYSTEM.

GAS FIRED UNIT HEATER SCHEDULE

SYMBOL	LOCATION	CFM	INPUT BTU/HR	OUTPUT BTU/HR	POWER V / P / Hz	REMARKS
GUH-12	DEPLOYABLE STORAGE	2600	155,000	144,150	115 / 1 / 60	1,2,3
GUH-13	DEPLOYABLE STORAGE	2600	155,000	144,150	115 / 1 / 60	1,2,3
GMAU-2	DEPLOYABLE STORAGE	1200	125,000	101,000	115 / 1 / 60	2,3,4

GAS FIRED UNIT HEATER SCHEDULE NOTES:

1. UNIT BASED ON HIGH EFFICIENCY GAS FIRED UNIT HEATER MFR. BY MODINE MODEL PTC 156. EQUALS BY TRANE AND REZNOR ARE ACCEPTABLE SUBSTITUTES. INSTALL PER U.L. LISTING AND PER MANUFACTURER'S RECOMMENDATIONS.
2. PROVIDE FACTORY DISCONNECT SWITCH, 97% EFFICIENT CONDENSING UNIT HEATER, CONDENSATE PUMP, DEFLECTOR HOOD, MOUNTING KIT AND pH NEUTRALIZING KIT.
3. STAINLESS STEEL HEAT EXCHANGER. CONTROL WITH DDC CONTROL SYSTEM. SEE SPECIFICATIONS.
4. UNIT BASED ON HIGH EFFICIENCY GAS FIRED MAKE UP AIR UNIT MFR. BY MODINE MODEL PDH. DOUBLE WALLED INSULATED CABINET, VARIABLE SPEED BLOWER MOTOR AND MODULATING GAS HEAT EXCHANGER.

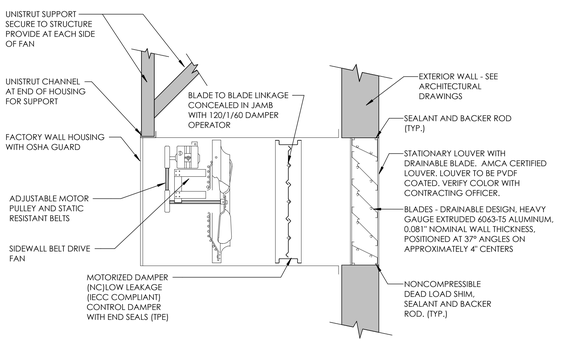
LOUVER SCHEDULE

SYMBOL	TYPE	MAX. EXT. S.P. IN. W.C	SIZE	MIN. SQ. FEET FREE AREA	CFM	REMARKS
L-22	E	0.1	68"X60"	22.9	10,000	1,2
L-23	E	0.1	68"X60"	22.9	10,000	1,2
L-24	I	0.1	68"X60"	22.9	10,000	1,2
L-25	I	0.1	68"X60"	22.9	10,000	1,2
L-26	I	0.1	36"X24"	3.05	1,200	1,2

LOUVER SCHEDULE NOTES:

1. GENERAL CONTRACTOR TO PROVIDE EXTERIOR LOUVERS. REFER TO SPECIFICATIONS SECTION 08 9100.
2. PROVIDE MOTORIZED DAMPER WITH SPRING RETURN CLOSE 120V. ACTUATOR TO INTERFACE WITH DDC CONTROL SYSTEM. SEE SPECIFICATIONS.

TYPE: I - INTAKE
E - EXHAUST



NOTE: REFER TO SPECIFICATION SECTION 08 9100 FOR ADDITIONAL REQUIREMENTS.

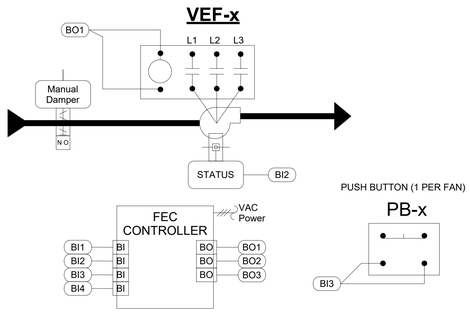
9 M2.1B WALL VENTILATION EXHAUST FAN DETAIL
No Scale

KEYED NOTES (THIS SHEET ONLY)

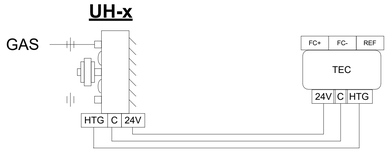
1. PROVIDE A COMPLETE AND OPERATIONAL WALL PROPELLER EXHAUST FAN AS DETAILED AND SPECIFIED. GENERAL CONTRACTOR SHALL PROVIDED WALL LOUVER. COORDINDATE TYPE AND SIZE OF LOUVER PRIOR TO ORDERING.
2. PROVIDE A COMPLETE AND OPERATIONAL WALL PROPELLER SUPPLY FAN WITH FILTER RACK AS DETAILED AND SPECIFIED.
3. PROVIDE A COMPLETE AND OPERATIONAL HIGH EFFICIENCY CONDENSING GAS FIRED UNIT HEATER SUSPENDED FROM STRUCTURE, VERIFY MOUNTING HEIGHT AND LOCATION WITH STORAGE RACKS PRIOR TO ROUGH-IN. PROVIDE CONCENTRIC VENT THRU ROOF.
4. PROVIDE A COMPLETE AND OPERATIONAL CONDENSING GAS FIRED MAKE UP AIR UNIT. COORDINATE EXACT PLACEMENT WITH EQUIPMENT LAYOUT PRIOR TO ORDERING. UNIT SHALL BE SUSPENDED FROM STRUCTURE. VERIFY MOUNTING HEIGHT AND LOCATION WITH STORAGE RACKS PRIOR TO ROUGH-IN. PROVIDE CONCENTRIC VENT THRU ROOF.
5. PROVIDE DOUBLE WALL RECTANGULAR DUCTWORK. DUCTWORK TO BE RUN HIGH AS POSSIBLE TIGHT TO STRUCTURE.
6. PROVID A COMPLETE AND OPERATIONAL HIGH VELOCITY LOW SPEED (HVLS) FAN AS DETAILED AND SPECIFIED. COORDINATE MOUNTING HEIGHT WITH CONTRACTING OFFICER PRIOR TO ROUGH-IN.

GENERAL NOTE:

1. PROVIDE AND INSTALL A COMPLETE AND OPERATIONAL SYSTEM FOR EACH OF THE MECHANICAL ITEMS LISTED ABOVE. INSTALL EACH ITEM IN ACCORDANCE WITH THE MANUFACTURERS INSTRUCTIONS AND WITH THE MANUFACTURERS RECOMMENDED CLEARANCES. EACH SYSTEM SHALL INCLUDE ALL REQUIRED ACCESSORIES.



EXHAUST FAN CONTROLS SCHEMATIC



SUPPLY FAN CONTROLS SCHEMATIC

SEQUENCE OF OPERATION

VEF and VSF SYSTEM OPERATION

Occupied Mode:

The controls will allow sequencing of the dampers and VEF fans per the respective push button PB-x and scheduled interlocked VSF fans.

The VEF fans and associated VSF fans shall be staged to maintain 80 deg F (adj.) Stage 1: VEF-1 and 2. Stage 2: VEF-5 and 6. Stage 3: VEF-3 and 4.

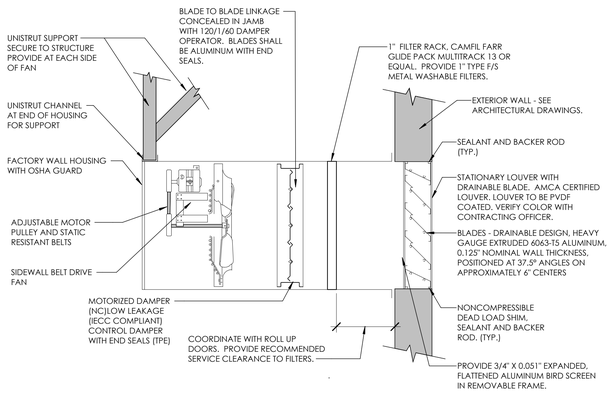
When the temperature falls below the setpoint (adj.), the fans will de-energize in reverse order.

Unoccupied Mode:

The PB-x pushbuttons will be inactive, motorize dampers associated with each fan will be closed, the VEF fans and associated VSF fans will be off.

Notes:

The status of all fans and damper positions will be monitored.

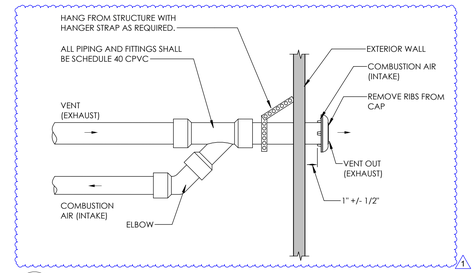


NOTE: REFER TO SPECIFICATION SECTION 08 9100 FOR ADDITIONAL REQUIREMENTS.

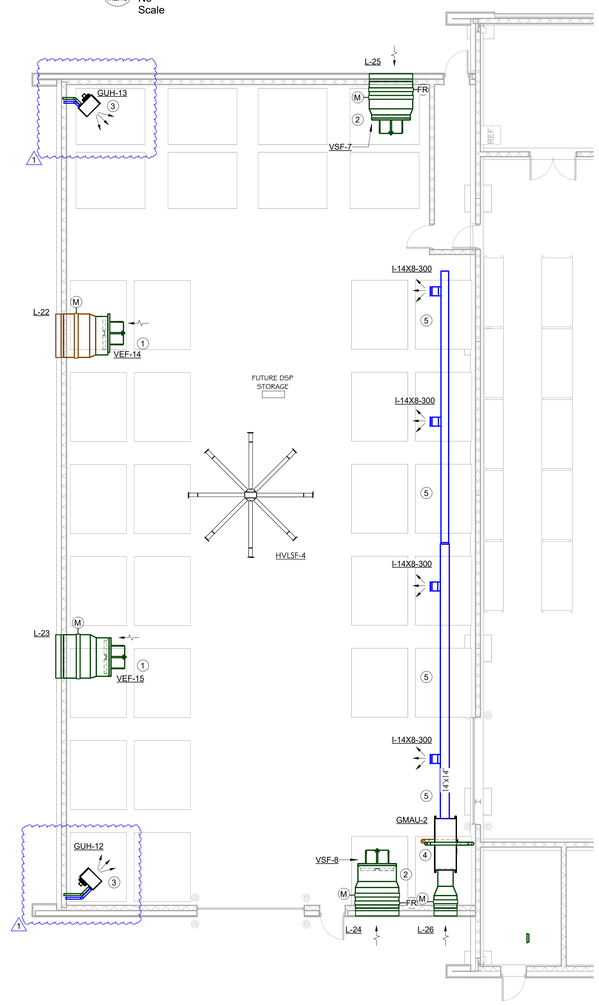
10 M2.1B WALL VENTILATION SUPPLY FAN WITH FILTER DETAIL
No Scale

MECHANICAL GENERAL NOTES

1. THESE DRAWINGS ARE NOT INTENDED TO SHOW ALL POSSIBLE CONDITIONS, IT IS INTENDED THAT A COMPLETE HVAC SYSTEM BE PROVIDED WITH ALL NECESSARY EQUIPMENT, APPURTENANCES, AND CONTROLS, COMPLETELY COORDINATED WITH ALL DISCIPLINES. ALL PARAMETERS GIVEN IN THESE DOCUMENTS SHALL BE STRICTLY CONFORMED WITH. ANY ITEMS AND LABOR REQUIRED FOR A COMPLETE HVAC SYSTEM IN ACCORDANCE WITH ALL APPLICABLE CODES, STANDARDS, AND THESE CONTRACT DOCUMENTS SHALL BE FURNISHED WITHOUT INCURRING ANY ADDITIONAL COST TO THE OWNER. CAREFULLY REVIEW ALL CONTRACT DOCUMENTS AND THE DESIGN OF THE OTHER TRADES BEFORE PREPARING SHOP DRAWINGS.
2. COORDINATE DUCTWORK AND PIPING WITH STRUCTURAL, PLUMBING, AND ELECTRICAL. MAKE OFFSETS AND TRANSITIONS TO COORDINATE WITH OTHER TRADES WITHOUT ANY ADDITIONAL COST TO THE OWNER.
3. REFER TO ARCHITECTURAL CEILING PLANS FOR EXACT LOCATION OF ALL CEILING MOUNTED AIR DISTRIBUTION DEVICES. COORDINATE EXACT LOCATION OF GRILLES, REGISTERS, AND DIFFUSERS WITH ARCHITECTURAL AND INTERIOR REFLECTED CEILING PLANS AND LIGHT FIXTURES. IF A PARTICULAR ITEM IS NOT SHOWN ON THE ARCHITECTURAL REFLECTED CEILING PLAN, PREPARE A DRAWING AND PRESENT IT TO THE ARCHITECT FOR THEIR REVIEW AND/OR APPROVAL.
4. ALL DUCT TRANSITIONS FROM SQUARE TO ROUND SHALL BE SMOOTH SQUARE TO ROUND TRANSITIONS, SPIN-IN FITTINGS AT THE END OF CAPPED DUCTS ARE NOT ACCEPTABLE.
5. PORTIONS OF DUCTWORK VISIBLE THROUGH GRILLES, REGISTERS, AND DIFFUSERS IN FINISHED AREAS SHALL BE PAINTED FLAT BLACK.
6. ALL FAN MOTORS 1/8 HP AND ABOVE SHALL HAVE A DISCONNECT SWITCH MOUNTED AT THE FAN.
7. ALL OPEN-ENDED DUCTS SHALL BE REINFORCED WITH 1-1/2" X 1-1/2" X 1/8" GALVANIZED STEEL ANGLES BOLTED OR RIVETED 6" ON THE CENTER (MAX.) ALL AROUND THE EXTERIOR PERIMETER OF THE DUCT.
8. MOUNT THERMOSTATS AND HUMIDITY SENSORS WHERE INDICATED ON PLANS, 48" AFF UNLESS NOTED OTHERWISE. SEE MECHANICAL DRAWING FOR LOCATIONS. WHERE THERE IS A CONFLICT OF LOCATIONS BETWEEN THE DRAWINGS, NOTIFY ARCHITECT IMMEDIATELY. VERIFY EXACT LOCATION BEFORE INSTALLATION.
9. ALL BRANCH DUCTWORK SHALL BE SIZED TO MATCH THE DIFFUSER SERVED UNLESS NOTED OTHERWISE.
10. PROVIDE INTERNAL INSULATION (1" THICK CLOSED CELL) FOR SUPPLY, RETURN, AND OUTDOOR AIR DUCTS WITHIN 15' OF EACH INDOOR AIR HANDLING UNIT (UNLESS NOTED OTHERWISE). FAN, ETC. ALL OTHER DUCTWORK SHALL BE INSULATED WITH 2" THICK, FOIL BACKED 3/4 LB. DENSITY BLANKET INSULATION UNLESS NOTED OTHERWISE.
11. INSTALL AN IONIZATION TYPE SMOKE DETECTOR IN THE SUPPLY AIR DUCT OF EACH AIR HANDLING UNIT AND SUPPLY FAN. SEE ELEC DRAWINGS. SMOKE DETECTOR SHALL BE PROVIDED BY FIRE ALARM CONTRACTOR AND INSTALLED BY MECHANICAL CONTRACTOR.
12. CONDENSATE DRAIN LINES RUNNING HORIZONTALLY SHALL BE SLOPED 1/4" PER FOOT DOWN IN THE DIRECTION OF FLOW AS INDICATED. ALL CONDENSATE LINES SHALL BE INSULATED.
13. WHERE MECHANICAL EQUIPMENT OCCURS ABOVE A LIFT-OUT ACOUSTICAL CEILING PANEL, IDENTIFY THE PANEL WITH A 3/8" #B ROUND HEAD SELF-THREADING SCREW, SCREWED INTO PANEL WITH ONLY THE HEAD SHOWING. BEFORE INSERTING, PAINT HEAD OF SCREW WITH APPROPRIATE COLOR AS SPECIFIED UNDER PIPE IDENTIFICATION AND COLOR CODING.
14. DUCT DIMENSIONS SHOWN ARE INSIDE CLEAR. ADJUST FOR LINER
15. IN ADDITION TO OFFSETS IN DUCTWORK SHOWN, PROVIDE OFFSETS REQUIRED TO MAINTAIN TOP OF DUCT AND PIPE TIGHT TO STRUCTURE.
16. DUCTS AND EQUIPMENT WITH STANDING BRACES SHALL BE ARRANGED SO THAT THE BRACES WILL NOT BE OVER LIGHTS OR UNDER BEAMS IN AREAS WHERE THE CLEARANCE BETWEEN LIGHTS, AND BEAMS IS LIMITED.
17. EACH CEILING OR WALL DIFFUSER INDICATED SHALL HAVE A RECTANGULAR TO ROUND TAKEOFF W/STANDOFF BRACKET AND MANUAL VOLUME CONTROL DAMPER AT THE SHEET METAL TRUNK DUCT SUCH THAT AIR CAN BE BALANCED.
18. DUCTWORK SHALL BE IN ACCORDANCE WITH SMACNA STANDARD, SEAL ALL JOINTS WITH HARDCAST.
19. VERIFY EXACT LOCATION OF CONTROLS AND THERMOSTATS WITH ARCHITECT BEFORE WIRING AND INSTALLATION.
20. ALL WALL SUPPLY AND RETURN AIR GRILLES SHALL BE CENTERED SYMMETRICALLY.
21. COORDINATE UNDERCUTTING OF DOORS WITH GENERAL CONTRACTOR.
22. COORDINATE LOCATION OF ALL FLOOR DRAINS REQUIRED FOR MECHANICAL EQUIPMENT WITH PLUMBING CONTRACTOR TO INSURE PROPER LOCATION FOR SERVICE TO EQUIPMENT.
23. PROVIDE FLEXIBLE DUCTWORK CONNECTORS AT EQUIPMENT FOR DUCTWORK THAT ATTACHES TO FAN COIL UNIT AND IN-LINE EXHAUST FANS. CONNECTOR SHALL HAVE MIN. 4" SLACK ACROSS FACE.
24. WHERE APPLICABLE, PROVIDE EQUIPMENT THAT IS ENERGY STAR QUALIFIED OR MEETS THE REQUIREMENTS OF THE FEDERAL ENERGY MANAGEMENT PROGRAM (FEMP).
25. ALL HVAC EQUIPMENT SHALL BE CONNECTED TO BASEWIDE EMCS. PROVIDE ALL REQUIRED ACCESSORIES.



2 M2.1B CONCENTRIC GAS VENT THRU WALL - DSP
No Scale



1 FIRST FLOOR PLAN - MECHANICAL DSP
1/8" = 1'-0"

S|S&L
ARCHITECTURE & INTERIOR DESIGN
Montgomery, Dothan | WWW.SSANDL.COM
(M) 334. 263. 5162 | (D) 334. 791. 5246

No.	Revision	Date
1	Code Update	7/31/25

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Checked By JHM
Project Title

DEPLOYABLE PARTS STORAGE FACILITY
DANNELLY FIELD
MONTGOMERY, AL

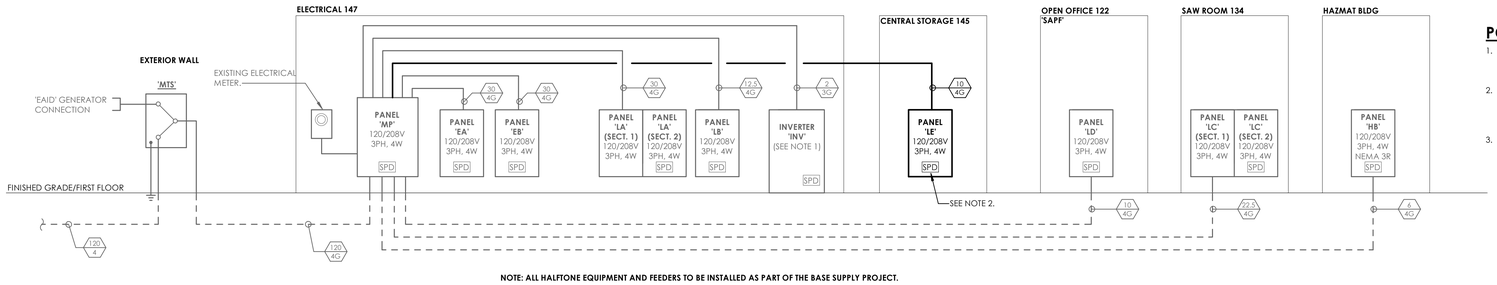
Sheet Title
MECHANICAL FLOOR PLAN - DSP STORAGE

Sheet Number
M2.1B

MORRIS ENGINEERING
903 SOUTH PERRY STREET
MONTGOMERY, AL 36104
T. (334) 269-0329

PROJECT NO: 20-120

ALABAMA LICENSED No. 16984 PROFESSIONAL ENGINEER 7-31-2025 MECHANICAL



NOTE: ALL HALFTONE EQUIPMENT AND FEEDERS TO BE INSTALLED AS PART OF THE BASE SUPPLY PROJECT.

1 POWER RISER DIAGRAM - DSP STORAGE
E0.2B NOT TO SCALE

POWER RISER DIAGRAM NOTES:

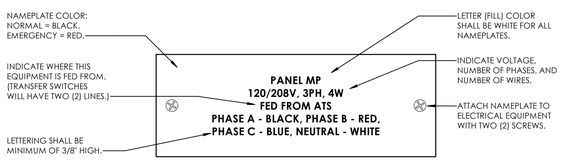
1. 6.6KVA INVERTER SYSTEM FOR LIFE SAFETY LIGHTING. DUAL-LITE LSN SERIES #D208-665120-A200A OR APPROVED EQUAL. UL 924 WITH TYPE 'S' BATTERIES AND 90 MINUTE RUN TIME. PROVIDE WITH 6 OUTPUT BREAKERS AS REQUIRED.
2. PANEL SHALL HAVE SURGE PROTECTION DEVICE. SURGE PROTECTION DEVICE MUST BE INSTALLED INTERNALLY TO THE ELECTRICAL DISTRIBUTION EQUIPMENT AND SHIPPED FROM THE MANUFACTURER'S FACTORY AS A COMPLETE U.L. LISTED ASSEMBLY. PANELBOARD SPD SHALL BE GENERAL ELECTRIC TMENVNE/100/200. OR EQUAL.
3. PANEL-'LE' TO BE FED FROM EXISTING 100 AMP, 3-POLE BREAKER IN PANEL-'MP'.

FEEDER SCHEDULE (##/##)

SYMBOL	COPPER
2/2G	2#12 & 1#12(G) - 3/4"c.
2/3G	3#12 & 1#12(G) - 3/4"c.
3/2G	2#10 & 1#10(G) - 3/4"c.
3/3G	3#10 & 1#10(G) - 3/4"c.
5/3G	3#8 & 1#10(G) - 3/4"c.
6/3G	3#6 & 1#8(G) - 1"c.
6/4G	4#6 & 1#8(G) - 1"c.
7/3G	3#4 & 1#8(G) - 1"c.
10/3G	3#3 & 1#8(G) - 1 1/4"c.
10/4G	4#3 & 1#8(G) - 1 1/4"c.
12.5/4G	4#1 & 1#6(G) - 1 1/2"c.
22.5/4G	4#4/0 & 1#4(G) - 2 1/2"c.
30/4G	4#350MCM & 1#4(G) - 3"c.
120/4	4 PARALLEL RUNS OF 4#350MCM - 3 1/2"c.
120/4G	4 PARALLEL RUNS OF 4#350MCM & 1#3/0(G) - 3 1/2"c.

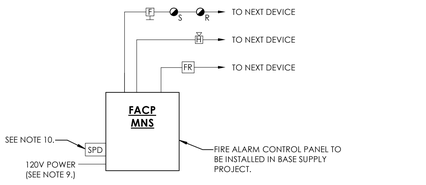
DISCONNECT SWITCH SCHEDULE - DSP

TYPE	VOLT	SIZE/POLE	FUSIBLE	NEMA	REMARKS
3	208	30A/3P	N	1	---



2 ELECTRICAL EQUIPMENT NAMEPLATE DETAIL
E0.2B NOT TO SCALE

NOTES:
1. THIS DETAIL IS TYPICAL FOR ALL ELECTRICAL EQUIPMENT INCLUDING BUT NOT LIMITED TO PANELS, DISCONNECTS, ETC.
2. NAMEPLATES SHALL BE MOUNTED NEAR THE TOP AND CENTER OF EQUIPMENT.



3 FIRE ALARM SYSTEM RISER DIAGRAM
E0.2B NOT TO SCALE

NOTES:
1. PROVIDE WIRING IN **RED** CONDUIT PER MANUFACTURER'S REQUIREMENTS.
2. SEE FLOOR PLAN FOR LOCATION AND QUANTITY OF DEVICES.
3. COORDINATE LOCATIONS AND CONNECTIONS OF HVAC SHUTDOWN RELAYS WITH HVAC/CONTROLS CONTRACTOR.
4. FIRE ALARM SYSTEM SHALL BE ADDRESSABLE.
5. IF NOT SHOWN ON FLOOR PLANS, PROVIDE 120 VOLT CIRCUIT FOR FIRE ALARM CONTROL PANEL POWER.
6. DEVICES SHALL BE RED WITH "ALARM" ENGRAVING TO COMPLY WITH FIRE ALARM USE.
7. FIRE ALARM SYSTEM SHALL BE MONITORED BY AN APPROVED SUPERVISING STATION PER IBC 907.6.5.
8. ALL ACCESS CONTROLLED DOORS THAT ARE LOCKED AND A REQUIRED MEANS OF EGRESS SHALL BE CONNECTED TO THE FIRE ALARM SYSTEM PER NFPA 72-21.9.
9. CIRCUIT BREAKER TO HAVE RED HANDLE AND IS TO BE LOCKABLE.
10. SURGE PROTECTION DEVICE AS REQUIRED WITH LOCKOUT KIT.

FIRE ALARM SYSTEM GENERAL NOTES:

1. THE FIRE ALARM SYSTEM SHALL BE A COMPLETE SUPERVISED DETECTION AND ALARM SYSTEM. PROVIDE PRIMARY POWER CIRCUITS AND ALARM NOTIFICATION AND INITIATING CIRCUITS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND SPECIFICATIONS.
2. INSTALLATION SHALL COMPLY WITH ADA, NEC, NFPA, AND UL.
3. ALL SYSTEM COMPONENTS, ENCLOSURES, FRAMES, SURGE ARRESTORS, ETC., SHALL BE GROUNDED.
4. THE FIRE ALARM WIRING SYSTEM SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS FOR CLASS "B" SYSTEM AND AS FOLLOWS:
   PRIMARY POWER - 120V AC
   NOTIFICATION APPLIANCE CIRCUITS (NAC) - 24V DC
   SIGNALING LINE CIRCUIT (SLC) - 24V DC
5. ALL CLASS 'B' CIRCUITS SHALL BE INSTALLED SUCH THAT THE OUTGOING AND RETURN CONDUCTORS, EXITING FROM AND RETURNING TO THE CONTROL UNIT RESPECTIVELY, ARE ROUTED SEPARATELY AND NOT RUN IN THE SAME CABLE OR RACEWAY.
6. ALL EQUIPMENT AND DEVICES SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS, APPLICABLE STANDARDS AND ACCESSIBLE FOR VISUAL INSPECTION AND MAINTENANCE. WIRING DIAGRAMS SHALL BE SECURED FROM THE SYSTEM MANUFACTURER AND INSTALLED ACCORDINGLY TO MEET THE SPECIFIED TYPES.
7. A "CERTIFICATE OF COMPLETION" IN ACCORDANCE WITH NFPA 72 SHALL BE FURNISHED PRIOR TO FINAL ACCEPTANCE.
8. CONTRACTOR IS RESPONSIBLE FOR VERIFYING AND PROVIDING ALL FIRE ALARM DEVICE QUANTITIES FROM AUXILIARY DRAWINGS. DO NOT USE THIS RISER FOR DEVICE COUNTS.
9. PROVIDE ADDITIONAL NOTIFICATION APPLIANCE CIRCUIT PANELS, AMPLIFIERS, POWER SUPPLIES, ETC. FOR FUTURE CAPACITY TO HAVE SYSTEM WORK CORRECTLY AS ONE SYSTEM.
10. PROVIDE EMERGENCY BATTERIES CAPABLE OF RUNNING THE COMPLETE FIRE ALARM SYSTEM IN ALARM MODE.
11. ALL WIRING TO BE IN CONDUIT SIZED IN ACCORDANCE WITH NEC WITH A MINIMUM SIZE OF 3/4". ALL FIRE ALARM CONDUIT SHALL BE RED.
12. PROVIDE ALL FIRE ALARM JUNCTION BOXES WITH RED COVER, STENCIL THE LETTERS "FA" IN 2" HIGH LETTERS ON EACH BOX COVER.
13. FIRE ALARM SYSTEM PROVIDER IS RESPONSIBLE FOR PROVIDING SIGNAL LINE BOOSTERS AS REQUIRED FOR SYSTEM TO FUNCTION PROPERLY.

FIRE ALARM / MASS NOTIFICATION SYSTEM FUNCTIONAL MATRIX

MATRIX IS A GUIDELINE FOR SYSTEM OPERATION. COORDINATE WITH GOVERNMENT FIRE DEPARTMENT/AHJ WHEN DEVELOPING SHOP DRAWINGS. ADJUST MATRIX TO COMPLY WITH FIRE DEPARTMENT REQUIREMENTS.

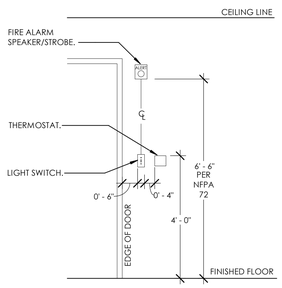
		ANNUNCIATION AT LOCAL PANEL			NOTIFICATION							AUXILIARY FUNCTIONS			
		AUDIO VISUAL ALARM INDICATION	AUDIO-VISUAL TROUBLE INDICATION	AUDIO-VISUAL SUPERVISORY INDICATION	FIRE ALARM SIGNAL TO RECEIVING STATION	SMOKE DETECTOR SIGNAL TO RECEIVING STATION	COMMON FIRE ALARM TROUBLE SIGNAL TO RECEIVING STATION	COMMON FIRE ALARM SUPERVISORY SIGNAL TO RECEIVING STATION	INITIATE FIRE ALARM VISUAL NOTIFICATION	INITIATE GENERAL FIRE ALARM AUDIBLE NOTIFICATION	DISABLE GENERAL FIRE ALARM VOICE MESSAGE (IF ENABLED)	SHUT DOWN ASSOCIATED HVAC UNIT	RECORD EVENT IN FACP HISTORY BUFFER	PLAY MNS MESSAGE ASSOCIATED WITH BUTTON	OVERRIDE FA MESSAGE
ALARM CONDITIONS	MANUAL PULL STATION	X			X				X	X			X		
	SMOKE DETECTOR	X				X			X	X			X		
	CARBON MONOXIDE DETECTOR	X							X	X			X		
	SPRINKLER SYSTEM WATERFLOW SWITCHES	X			X				X	X			X		
	DUCT SMOKE DETECTOR	X			X				X	X		X	X		
TROUBLE CONDITIONS	FACU TROUBLE		X				X						X		
	FACU AC POWER FAILURE		X				X						X		
	FACU SYSTEM LOW BATTERY		X				X						X		
	FACU OPEN CIRCUIT		X				X						X		
	FACU GROUND FAULT		X				X						X		
	REMOTE POWER SUPPLY TROUBLE		X				X						X		
SUPERVISORY CONDITIONS	COMMON SUPERVISORY			X									X		
	PA INPUT			X							X		X		
	SPRINKLER CONTROL VALVE			X				X					X		
	MNS ACU PTT MICROPHONE ACTIVE - PRIORITY 1			X					X		X				X
	MNS LIVE VOICE MESSAGE ACTIVE - PRIORITY 2			X					X		X				X
	MNS LOC MICROPHONE ACTIVE - PRIORITY 3			X					X		X				X
	MNS DIGITAL MESSAGE 1-3 ACTIVE - PRIORITY 4-6			X					X		X			X	
	MNS DIGITAL MESSAGE 5-8 ACTIVE - PRIORITY 7-10			X					X		X			X	

FUNCTIONAL MATRIX

PANELBOARD SCHEDULE — PANEL LE

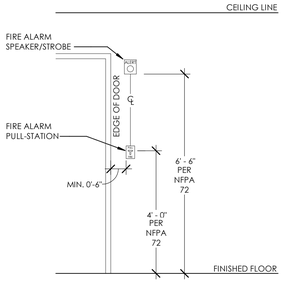
CKT	DIRECTORY	TRIP	POLE	A		B		C		POLE	TRIP	DIRECTORY	CKT
1	LIGHTING DSP STORAGE	20 A	1	745 VA	600 VA					1	20 A	REC. DSP STORAGE D101	2
3	LIGHTING DSP STORAGE	20 A	1			596 VA	600 VA			1	20 A	OVERHEAD DOOR	4
5	MOTORIZED DAMPERS - DSP STOR.	20 A	1					1000 VA	600 VA	1	20 A	REC. DSP STORAGE D101	6
7	REC. DSP STORAGE D101	20 A	1	800 VA	500 VA					1	20 A	GAS UNIT HEATER - GUH-12	8
9	REC. DSP STORAGE D101	20 A	1			800 VA	500 VA			1	20 A	GAS UNIT HEATER - GUH-13	10
11	SPARE	20 A	1					0 VA	1176 VA	1	20 A	GAS HEATER - GMAU-2	12
13	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	14
15	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	16
17	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	18
19	SPARE	20 A	1	0 VA	0 VA					1	20 A	SPARE	20
21	SPARE	20 A	1			0 VA	0 VA			1	20 A	SPARE	22
23	SPARE	20 A	1					0 VA	0 VA	1	20 A	SPARE	24
25				793 VA	0 VA								26
27	SUPPLY FAN - VSF-7	20 A	3			793 VA	0 VA			3	20 A	SPARE	28
29								793 VA	0 VA				30
31				793 VA	793 VA								32
33	SUPPLY FAN - VSF-8	20 A	3			793 VA	793 VA			3	20 A	EXHAUST FAN - VEF-14	34
35								793 VA	793 VA				36
37				1921 VA	793 VA								38
39	HIGH VOLUME FAN - HVLSF-4	30 A	3			1921 VA	793 VA			3	20 A	EXHAUST FAN - VEF-15	40
41								1921 VA	793 VA				42
		TOTAL LOADS:		7737 VA		7588 VA		7868 VA					
		TOTAL AMPS:		65 A		63 A		66 A					

VOLTAGE:	120/208, 3PH, 4W	PANEL TYPE:	RQ	LOCATION:	SAW ROOM 1215
MAIN BREAKER:	MLO	MAIN BUS:	100 A	TOTAL CONNECTED LOAD:	64 A
MOUNTING:	SURFACE	A.I.C. RATING:	65K	FEED FROM:	MP
NOTES:	10	ENCLOSURE:	NEMA 1	FEEDER SIZE:	SEE RISER DIAGRAM.



4 TYPICAL THERMOSTAT/SWITCH/FIRE ALARM INSTALLTION DETAIL
E0.2B NOT TO SCALE

NOTES:
1. MOUNT DEVICES ON SAME VERTICAL CENTERLINE.
2. THERMOSTATS SHALL BE MOUNTED PER ADA.
3. THE LIGHT SWITCH MAY NOT APPLY IN ALL CASES.
4. IF THE THERMOSTAT IS SHOWN IN THE MIDDLE OF A WALL ON THE FLOOR PLANS, THEN THE DOOR EDGE REQUIREMENTS DO NOT APPLY.
5. ALL CONFLICTS SHALL BE PRESENTED TO THE ARCHITECT FOR A RESOLUTION



5 TYPICAL FIRE ALARM DEVICE INSTALLATION DETAIL
E0.2B NOT TO SCALE

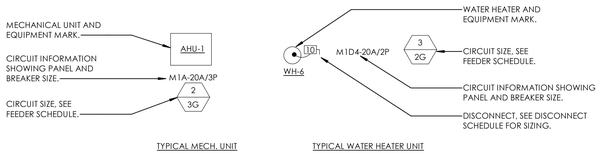
NOTES:
1. FIRE ALARM DEVICES SHALL BE MOUNTED PER NFPA 72. THE PULL STATION HANDLE SHALL BE MOUNTED BETWEEN 42" AND 48" ABOVE THE FINISH FLOOR. THE STROBE SHALL BE MOUNTED BETWEEN 80" AND 96" ABOVE THE FINISH FLOOR.
2. IF FIRE ALARM DEVICES ARE SHOWN IN THE MIDDLE OF A WALL ON THE FLOOR PLANS, THEN THE DOOR EDGE REQUIREMENTS DO NOT APPLY.
3. ALL CONFLICTS SHALL BE PRESENTED TO THE ARCHITECT FOR A RESOLUTION.

PANELBOARD SCHEDULE NOTES: (APPLIES TO ALL PANELBOARDS)

1. PANELBOARD DESIGNATIONS INDICATED IN SCHEDULES ARE THOSE OF G.E COMPANY EQUAL EQUIPMENT BY OTHER MANUFACTURERS WILL BE CONSIDERED IF OTHER MANUFACTURER'S PANELS ARE TO BE USED, CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL SPACE REQUIREMENTS.
2. EACH PANELBOARD SHALL HAVE AN INTEGRATED EQUIPMENT RATING EQUAL TO THE LOWEST A.I.C. OF ANY CIRCUIT BREAKER IN PANEL.
3. WHERE CURRENT LIMITING CIRCUIT BREAKERS ARE USED, THEY SHALL BE SERIES RATED FOR DOWNSTREAM PROTECTION. SUBMITTAL DATA SHALL INCLUDE A CURRENT U.L. APPROVED TABLE OF SERIES CONNECTED RATINGS OF ALL CIRCUIT BREAKERS TO BE USED. ALL 120/208V, 3PH, 4W PANELS SHALL BE SERIES RATED UNLESS NOTED OTHERWISE.
4. AT EACH FLUSH MOUNTED PANELBOARD PROVIDE THREE (3) EACH 1/2" CONDUITS AND THREE (3) EACH, 3/4" CONDUITS STUBBED UP TO ABOVE ACCESSIBLE CEILING AND TERMINATE FOR FUTURE USE.
5. ALL PANELS 400A AND LARGER SHALL HAVE DOOR IN DOOR CONSTRUCTION. DOOR SHALL BE INSTALLED CORRECTLY PER MANUFACTURERS INSTRUCTIONS. WHEN HINGE DOOR IS OPENED, INTERIOR DEAD FRONT OPENS WITH DOOR.
6. ALL BRANCH CIRCUIT BREAKERS SHALL BE BOLT ON TYPE.
7. ALL CIRCUIT BREAKERS 100A AND ABOVE SHALL BE SOLID STATE BREAKERS TYPE LSI.
8. CONTRACTOR TO PROVIDE ALL BRANCH CIRCUIT NUMBERS USING PERMANENT CIRCUIT MARKERS WITH THE PROPER CIRCUIT NUMBER ATTACHED NEXT TO EACH BREAKER. STICK ON NUMBERS WILL NOT BE APPROVED. ON SPECTRA BRANCH BREAKERS, CONTRACTOR TO PROVIDE FIELD MOUNTED PHENOLIC NAMEPLATE INDICATING EACH LOAD.
9. ALL BLANK SPACES SHALL BE ASSUMED BUSSED SPACE FOR EACH PANELBOARD.
10. PANEL SHALL HAVE SURGE PROTECTION DEVICE. SURGE PROTECTION DEVICE MUST BE INSTALLED INTERNALLY TO THE ELECTRICAL DISTRIBUTION EQUIPMENT AND SHIPPED FROM THE MANUFACTURER'S FACTORY AS A COMPLETE U.L. LISTED ASSEMBLY. PANELBOARD SPDS SHALL BE GENERAL ELECTRIC TMENVNE/100/200. OR EQUAL. VOLTAGES FOR DEVICES SHALL BE INDICATED ON THE PANELBOARD SCHEDULES AND SINGLE LINE DIAGRAM. THIS NOTE ONLY APPLIES TO PANELS NOTED SO.
11. ALL TWO SECTION PANELS SHALL HAVE EQUAL CAN HEIGHTS.
12. PROVIDE U.L.S.E. (U.L. SERVICE ENTRANCE) LABEL. THIS NOTE ONLY APPLIES TO PANELS NOTED SO.
13. A.I.C. RATING, SR STANDS FOR SERIES RATED.
14. THE TERMINATION POINT OF THE FEEDER SERVING EACH ASSEMBLY SHALL BE AT THE NEAREST POINT OF FEEDER ENTRY TO MINIMIZE CONDUCTOR FILL IN THE CAN. COORDINATE TOP/BOTTOM FEED PANELBOARD PROVISIONS WITH EACH FEEDER INSTALLATION.
15. PROVIDE THE PROPERLY SIZED CONDUCTOR TERMINATION POINTS OR LUGS (MULTIPLE LUGS WHEN PARALLEL FEEDERS ARE USED) FOR THE NUMBER AND SIZE CIRCUITS INDICATED.
16. EACH PANELBOARD SHALL HAVE A NAMEPLATE AS SHOWN IN DETAIL. ENGINEER WILL NOT ACCEPT JOB UNTIL THESE NAMEPLATES ARE PROVIDED.
17. PROVIDE TYPED CIRCUIT DIRECTORY THAT INDICATES WHAT EACH CIRCUIT IS SERVING AND FOR LIGHTING AND RECEPTACLE CIRCUITS THE ROOM NUMBERS THAT CIRCUIT IS SERVING SHALL BE INCLUDED IN DIRECTORY.
18. ALL PANELBOARDS SHALL BE CLEARLY MARKED TO COMPLY WITH NEC 110.16 REGARDING POTENTIAL HAZARDS OF ARC FLASH.
19. ELECTRICAL CONTRACTOR SHALL PROVIDE SHORT CIRCUIT RATING, A.I.C. LABEL PER N.E.C. 110.24.
20. PROVIDE FACTORY INSTALL POWER METERING EQUIPMENT EQUAL TO G.E. COMPANY MODEL #EPM2000.

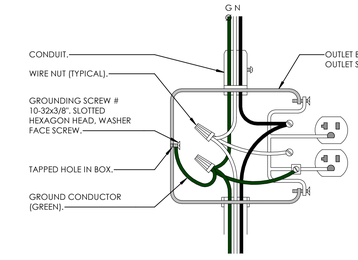
6 TYPICAL ARC FLASH WARNING LABEL
E0.2B NOT TO SCALE

NOTES:
1. PROVIDE SELF-ADHESIVE VINYL LABEL TO AFFIX TO ELECTRICAL EQUIPMENT TO WARN OF ARC FLASH HAZARDS **PER N.E.C. 110.16.**
2. THE LABEL FORMAT AND TEXT SHALL BE IN ACCORDANCE WITH THE FIGURE. ALL OTHER LABELS MUST BE SUBMITTED FOR APPROVAL.
3. THE LABEL SHALL BE LOCATED ON THE EQUIPMENT TO BE CLEARLY VISIBLE TO QUALIFIED PERSONS BEFORE EXAMINATION, ADJUSTMENT, SERVICING, OR MAINTENANCE OF THE EQUIPMENT.
4. THE SIZE OF THE LABEL SHALL BE 4" HIGH AND 6" WIDE FOR INDOOR AND OUTDOOR EQUIPMENT.



7 TYPICAL MECHANICAL EQUIPMENT ELECTRICAL DETAIL
E0.2B NOT TO SCALE

NOTES:
1. THIS DETAIL IS TYPICAL FOR ALL MECHANICAL/PLUMBING EQUIPMENT INCLUDING BUT NOT LIMITED TO AIR HANDLERS, MINI SPLITS, ROOF TOP UNITS, WATER HEATERS, ETC.
2. IF NO DISCONNECT IS SHOWN, UNIT IS FURNISHED WITH INTEGRAL DISCONNECT FROM MANUFACTURER OR IS IN SIGHT OF ELECTRICAL PANEL. MAKE ELECTRICAL CONNECTIONS PER MANUFACTURER'S REQUIREMENTS. ELECTRICAL CONTRACTOR SHALL VERIFY UNITS HAVE INTEGRAL DISCONNECT WITH MECHANICAL CONTRACTOR.



8 TYPICAL RECEPTACLE DETAIL
E0.2B NOT TO SCALE

NOTES:
1. NEUTRAL AND GROUND CONDUCTOR SHALL BE CONTINUOUS SO THAT REMOVAL OF DEVICES WILL NOT INTERFERE WITH CONDUCTOR CONTINUITY.

GARNER & ASSOCIATES ENGINEERING
901 South Perry Street, Montgomery, AL 36104
o | 334.647.1596 e | admin@garner-engineering.com
Project No: 19-013

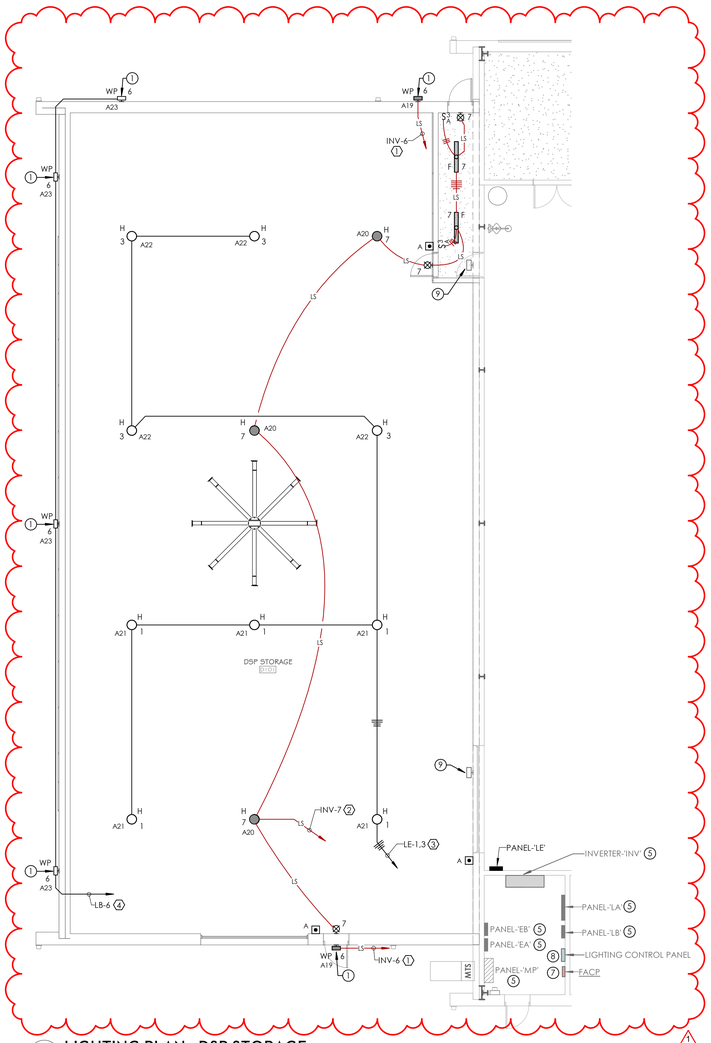
S|S&L
ARCHITECTURE & INTERIOR DESIGN
Montgomery, AL 36104 | www.SSandL.com
(M) 334. 265. 5162 | (F) 334. 791. 5248

Rev.	Description	Date
1	ADD #1	7.30.25

Job Number 19084
Date 9/6/2021
Drawn By JM
Checked By DMG
Project Title

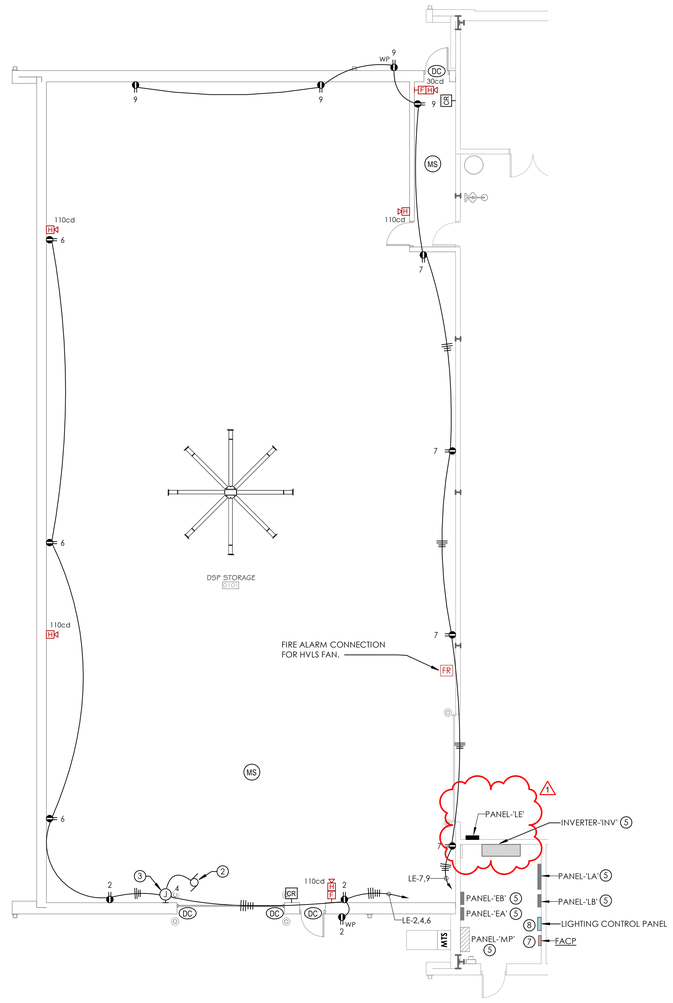
DEPLOYABLE PARTS STORAGE FACILITY
DANNELLY FIELD
MONTGOMERY AL

Sheet Title: ELECTRICAL DETAILS
Sheet Number: E0.2B



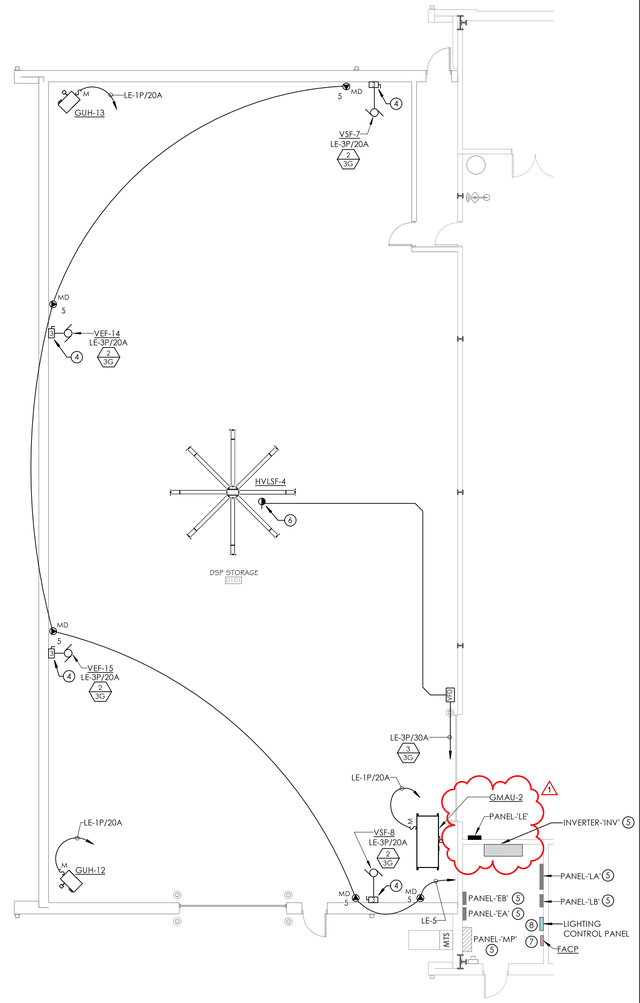
1 LIGHTING PLAN - DSP STORAGE

E1.1B 1/8" = 1'-0"



2 POWER & AUXILIARY PLAN - DSP STORAGE

E1.1B 1/8" = 1'-0"



3 MECHANICAL POWER PLAN - DSP STORAGE

E1.1B 1/8" = 1'-0"

LIGHTING CIRCUIT SCHEDULE

1. INV-6 THRU RELAY A19 IN LIGHTING CONTROL PANEL.
2. INV-7 THRU RELAY A20 IN LIGHTING CONTROL PANEL.
3. LE-1,3,23 THRU RELAYS A21 & A22 IN LIGHTING CONTROL PANEL.
4. LB-6 THRU RELAY A23 IN LIGHTING CONTROL PANEL.

LIGHTING CONTROL PANEL SCHEDULE

ROOM: ELECTRICAL 147

RELAY	VOLT.	CIRCUIT	DESCRIPTION	AUTOMATION	NOTES
A1*	120	INV-1	CENTRAL STORAGE 145 - LIFE SAFETY	MANUAL ON/OFF, TIMED OFF	-
A2*	120	INV-3	CENTRAL STORAGE 145 - LIFE SAFETY	MANUAL ON/OFF, TIMED OFF	-
A3*	120	INV-5	CENTRAL STORAGE 145 - LIFE SAFETY	MANUAL ON/OFF, TIMED OFF	-
A4	120	LB-14	CENTRAL STORAGE 145	MANUAL ON/OFF, TIMED OFF	-
A5	120	LB-16	CENTRAL STORAGE 145	MANUAL ON/OFF, TIMED OFF	-
A6	120	LB-18	CENTRAL STORAGE 145	MANUAL ON/OFF, TIMED OFF	-
A7	120	LB-19	CENTRAL STORAGE 145	MANUAL ON/OFF, TIMED OFF	-
A8	120	LB-21	CENTRAL STORAGE 145	MANUAL ON/OFF, TIMED OFF	-
A9	120	LB-23	CENTRAL STORAGE 145	MANUAL ON/OFF, TIMED OFF	-
A10	120	LB-20	CENTRAL STORAGE 145	MANUAL ON/OFF, TIMED OFF	-
A11	120	LB-22	CENTRAL STORAGE 145	MANUAL ON/OFF, TIMED OFF	-
A12	120	LB-24	CENTRAL STORAGE 145	MANUAL ON/OFF, TIMED OFF	-
A13	120	LB-25	TMO RECEIVING 131 & CENTRAL STORAGE 145	MANUAL ON/OFF, TIMED OFF	-
A14	120	LB-27	TMO SHIPPING 132 & TMO STORAGE 133	MANUAL ON/OFF, TIMED OFF	-
A15	120	LB-29	TMO STORAGE 133 & CENTRAL STORAGE 145	MANUAL ON/OFF, TIMED OFF	-
A16	120	LB-2	BUILDING EXTERIOR	TIMED ON/OFF	1
A17*	120	INV-6	BUILDING EXTERIOR - LIFE SAFETY	TIMED ON/OFF	1
A18	120	LB-4	BUILDING EXTERIOR	TIMED ON/OFF	1
A19*	120	INV-6	BUILDING EXTERIOR - LIFE SAFETY	TIMED ON/OFF	1
A20*	120	INV-7	DSP STORAGE D101 - LIFE SAFETY	MANUAL ON/OFF, TIMED OFF	-
A21	120	LE-1	DSP STORAGE D101 - LIFE SAFETY	MANUAL ON/OFF, TIMED OFF	-
A22	120	LE-3	DSP STORAGE D101 - LIFE SAFETY	MANUAL ON/OFF, TIMED OFF	-
A23	120	LB-6	BUILDING EXTERIOR	TIMED ON/OFF	1
A24	120				

NOTE: * RELAY SHALL BE A UL LISTED 924 DEVICE TO FAIL IN THE CLOSED POSITION.

LIGHTING CONTROL SCHEDULE NOTES

1. PHOTOCELL "ON", TIMED "OFF".

LIGHTING CONTROL SCHEME SCHEDULE

MARK	ROOM	BUTTONS	ROOM CONTROLLER OR RELAY	LABEL - ENGRAVING	AUTOMATION
A	DSP STORAGE D101	1	RELAYS A20,A21, A22	ALL ON	ON
		2	RELAYS A20,A21, A22	ALL OFF	OFF

DSP STORAGE - MECHANICAL EQUIPMENT SCHEDULE

EQUIPMENT MARK	EQUIPMENT LOCATION	VOLTAGE/PHASE	ELECTRICAL CHARACTERISTICS			DISCONNECT CHARACTERISTICS			HOMERUN CHARACTERISTICS		
			HP	kW	AMPS	SIZE/POLE	NEMA	SWITCH TYPE	PANEL	CIRCUIT #	FEEDER SIZE
GMAU-2	DSP STORAGE	115V/1PH	1/2		9.8	20A/1P	1	MOTOR SWITCH	LE	12	2#10 & 1#10(G) - 3/4"c.
GUH-12	DSP STORAGE	115V/1PH	1/2		17.6	20A/1P	1	MOTOR SWITCH	LE	8	2#10 & 1#10(G) - 3/4"c.
GUH-13	DSP STORAGE	115V/1PH	1/2		17.6	20A/1P	1	MOTOR SWITCH	LE	10	2#10 & 1#10(G) - 3/4"c.
HVLSF-4	DSP STORAGE	208V/3PH	2			30A/3P	1	VFD BY MECH.	LE	37,39,41	3#10 & 1#10(G) - 3/4"c.
VEF-14	DSP STORAGE	208V/3PH	1 1/2			30A/3P	1	NON-FUSIBLE	LE	32,34,36	3#12 & 1#12(G) - 3/4"c.
VEF-15	DSP STORAGE	208V/3PH	1 1/2			30A/3P	1	NON-FUSIBLE	LE	38,40,42	3#12 & 1#12(G) - 3/4"c.
VSF-7	DSP STORAGE	208V/3PH	1 1/2			30A/3P	1	NON-FUSIBLE	LE	25,27,29	3#12 & 1#12(G) - 3/4"c.
VSF-8	DSP STORAGE	208V/3PH	1 1/2			30A/3P	1	NON-FUSIBLE	LE	31,33,35	3#12 & 1#12(G) - 3/4"c.

NOTE:
THE CONTRACTOR SHALL PROVIDE A QUALIFIED FIRE PROTECTION ENGINEER (QFPE) AS DEFINED BY UFC 3-600-01 TO BE THE QFPE FOR THE PROJECT. THE QFPE SHALL WORK FOR THE CONTRACTOR AND BE RESPONSIBLE FOR PRODUCING, REVIEWING, AND STAMPING ALL SHOP DRAWINGS AND MATERIAL SUBMITTALS FOR THE FIRE ALARM/MNS SYSTEMS. THE QFPE SHALL PROVIDE INSPECTIONS DURING CONSTRUCTION TO ENSURE SYSTEMS COMPLIANCE. PRIOR TO FINAL INSPECTION, THE QFPE SHALL PERFORM A PRE-FINAL INSPECTION AND PROVIDE A REPORT FOR AHJ REVIEW. THE QFPE MUST ALSO BE INVOLVED IN THE FINAL INSPECTION WITH THE GOVERNMENT AHJ. THE QFPE MUST MONITOR THE INSTALLATION OF THE FIRE ALARM/MNS SYSTEM AND CERTIFY IN WRITING TO THE GOVERNMENT AHJ THAT THE SYSTEMS HAVE BEEN CONSTRUCTED AND OPERATE AS INTENDED TO COMPLY WITH UFC 3-600-01 AND UFC 4-021-01.

0 4' 8' 16'

SCALE: 1/8" = 1'-0"

KEYED NOTES:

1. MOUNT WALL PACK AT APPROXIMATELY 12'-0" ABOVE FINISHED GRADE.
2. POWER CONNECTION FOR ROLL-UP DOOR. VERIFY DOOR AND MOTOR REQUIREMENTS WITH ARCHITECT AND OWNER.
3. SINGLE-GANG JUNCTION BOX FLUSH MOUNTED AT 48" A.F.F. TO TOP OF BOX FOR DOOR CONTROLS. ROUTE 3/4" CONDUIT TO DOORS MOTOR AS REQUIRED.
4. DISCONNECT FOR FAN. MOUNT DISCONNECT ADJACENT TO FAN MOTOR STARTER. VERIFY EXACT LOCATION OF MOTOR STARTER WITH MECHANICAL.
5. EXISTING ELECTRICAL PANELS TO REMAIN. PROVIDE BREAKERS IN PANELS AS REQUIRED.
6. RECEPTACLE FOR HVLSF FAN. MOUNT RECEPTACLE TO STRUCTURE ADJACENT TO FAN.
7. EXISTING FIRE ALARM PANEL TO REMAIN. PROVIDE RELAYS IN PANEL AS REQUIRED.
8. EXISTING LIGHTING CONTROL PANEL TO REMAIN. PROVIDE RELAYS IN PANEL AS REQUIRED.
9. WALL PACK LIGHT FIXTURES INSTALLED AS PART OF THE BASE SUPPLY PROJECT SHALL BE REMOVED OR RELOCATED .

GENERAL LIGHTING NOTES:

1. REFER TO ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT FIXTURE LOCATIONS AND CEILING TYPES.
2. ALL EMERGENCY FIXTURES/NIGHT LIGHTS SHALL BE CONNECTED TO UNSWITCHED CIRCUIT.
3. REFER TO POWER PLAN FOR PANEL LOCATIONS.
4. ELECTRICAL CONTRACTOR SHALL COORDINATE SWITCH LOCATION WITH DOOR SWINGS BEFORE ROUGH IN.
5. ALL AREAS SHALL BE CONTROLLED WITH MANUAL ON/OFF SWITCHING AND BE TIMED OFF OR BE CONTROLLED WITH OCCUPANCY SENSORS.
6. ALL 120 VOLT CIRCUITS MORE THAN 75' LONG FROM PANEL TO FIRST FIXTURE SHALL BE MINIMUM OF #10 AWG COPPER CONDUCTORS.
7. ALL EXTERIOR LIGHTS SHALL BE CONTROLLED AS NOTED ON DRAWINGS.
8. ROOMS WITH ELECTRICAL PANELS SHALL NOT BE AUTOMATICALLY CONTROLLED.
9. LIGHTS IN MECHANICAL ROOMS SHALL BE ADJUSTED AS REQUIRED TO AVOID CONFLICTS WITH DUCT WORK AND BEST LIGHT THE SPACE.
10. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LOW VOLTAGE LIGHTING CONTROL CABLING ALTHOUGH NOT SPECIFICALLY SHOWN ON PLANS. LIGHTING CONTROL MANUFACTURER SHALL PROVIDE LAYOUT OF CABLING WITH THEIR SUBMITTALS.

LIGHTING CONTROL NOTES:

1. PROVIDE COMPLETE LIGHTING CONTROL SYSTEM AS NOTED AND AS SHOWN ON DRAWINGS.
2. ALL SENSORS SHALL BE LOCATED BY MANUFACTURER TO ACCOMPLISH EXACT REQUIREMENTS FOR SENSOR.
3. ALL LIGHTING CONTROLS SHALL BE "MANUAL ON" EXCEPT FOR CORRIDORS AND EXTERIOR AT DOORWAYS.
4. FURNISH AND INSTALL ALL LOW VOLTAGE LIGHTING CONTROL WIRING BETWEEN ROOM CONTROLLER, SENSORS, AND WALL SWITCHES. WHERE DIMMING OF FIXTURES IS REQUIRED, PROVIDE 0-10 VOLT CABLED AS NEED TO EACH FIXTURES. DIMMING CABLES SHALL NOT BE ROUTED IN SAME CONDUIT AS POWER CONDUIT (120V). REFER TO TYPICAL ROOM LIGHTING CONTROL WIRING DIAGRAM.
5. SHOP DRAWINGS MUST BE SUBMITTED AND SHALL INCLUDE SENSOR LOCATIONS AND WIRING LAYOUTS. MANUFACTURER SHALL INCLUDE AT LEAST THREE (3) ON-SITE MEETINGS WITH CONTRACTOR: 1) PRE-INSTALL - AFTER SHOP DRAWINGS ARE APPROVED AND BEFORE ANY WORK BEGINS, 2) START-UP - AFTER WORK IS COMPLETE AND PRIOR TO FINAL INSPECTION, 3) FINAL CHECK- AFTER FINAL INSPECTION IS COMPLETED. OWNER TRAINING.
6. MANUFACTURER SHALL PROVIDE WRITTEN REPORT AS TO FUNCTIONAL TESTING AFTER SYSTEM IS COMPLETE. REPORT MUST BE SIGNED BY FIELD TECHNICIAN AND MUST STATE THAT CONTROLS ARE INSTALLED, CALIBRATED, ADJUSTED, PROGRAMMED, AND IN PROPER WORKING CONDITION AS WELL AS DOCUMENTING THAT THE LIGHTING PERFORMS CORRECTLY TO THE INTENDED OPERATION. REPORT MUST ALSO INDICATE, BY OWNER'S SIGNATURE, THAT ALL CONTROLS HAVE BEEN COORDINATED WITH OWNER.
7. PROVIDE WIRELESS CONFIGURATION TOOL FOR PROGRAMMING LIGHTING CONTROLS AS REQUIRED.

MECHANICAL EQUIPMENT NOTES:

1. COORDINATE WITH MANUFACTURER'S CUTSHEETS OR NAMEPLATE DATA AND ADJUST OVERCURRENT PROTECTION AS NEEDED TO PROTECT EQUIPMENT PER MANUFACTURER'S RECOMMENDATIONS AND TO COMPLY WITH N.E.C. AND LOCAL CODES.
2. ALL DISCONNECTS SHALL BE HEAVY DUTY TYPE.
3. ALL FUSES SHALL BE SIZED PER NAMEPLATE DATA.
4. PROVIDE FUSES IN DISCONNECT PER MECHANICAL EQUIPMENT NAMEPLATE OR MANUFACTURER'S REQUIREMENTS.
5. MULTIPLE DUCTLESS MINI-SPLIT SYSTEM MECHANICAL UNITS CAN BE ON THE SAME CIRCUIT. CONTRACTOR SHALL ROUTE CIRCUIT TO UNITS IN MOST ECONOMICAL ORDER FOLLOWING THE SPECIFICATIONS AND THE N.E.C.
6. MOUNT MANUAL MOTOR START SWITCH NEAR UNIT, ABOVE ACCESSIBLE CEILING SPACE OR 48" A.F.F. TO THE TOP OF THE BOX AND LABEL AS REQUIRED.

GARNER & ASSOCIATES ENGINEERING
901 South Perry Street, Montgomery, AL 36104
o | 334.647.1596 e | admin@garner-engineering.com
Project No: 19-013

S|S&L
ARCHITECTURE & INTERIOR DESIGN
Montgomery, AL | Atlanta, GA | WWW.SSLARCH.COM
(M) 334. 265. 5162 | (D) 334. 791. 5248

Rev.	Description	Date
1	ADD #1	7.30.25

Job Number 19084
Date 9/6/2021
Drawn By JM
Checked By DMG

Project Title
DEPLOYABLE PARTS STORAGE FACILITY
DANNELLY FIELD
MONTGOMERY AL

Sheet Title
DSP STORAGE
ELECTRICAL
PLANS

Sheet Number
E1.1B

L. B. ANN MORGAN
No. 35570
PROFESSIONAL
ENGINEER
9/6/2021

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SECTION 000102 - PROJECT INFORMATION AND SUMMARY

PART 1 GENERAL

1.01 PROJECT IDENTIFICATION

A. Government Project Number: FAKZ182356.

B. Architect's Project Number: 19084.

C. The Owner, hereinafter referred to as the Government: Alabama Air National Guard.

D. Owner's Representatives:

1. Contracting Officer (KO): Mr. Craig Kast

2. Contracting Specialist: Mr. Stephen Shanks

3. Contracting Officer Representative: Major Adam Sanders, Base Civil Engineer

4. Alternate Contracting Officer Representative: Major Nathan Brock, Deputy Base Civil Engineer

1.02 CONTRACT DURATION

A. 275 calendar days from notice to proceed to Beneficial Occupancy, this is in addition to 30 days for the punch list to be completely accomplished. The Government intends to occupy the building upon Beneficial Occupancy. The Contractor will be responsible for coordinating punch list activities around the Government's activities if both are occurring at the same time.

1.03 PROJECT DESCRIPTION

A. Project scope includes sitework, subgrade excavation, building foundations, structural, architectural, plumbing, mechanical, electrical and extension of existing utilities for a new single addition to the recently constructed Base Supply Facility. The proposed project includes the following:

1. Vertical construction will consist of work on one facility as an addition to an existing facility. The existing facility is the New Base Supply Complex which is an approximate 39,000 square foot building housing the Base's Logistic Readiness Squadron (LRS). Within the new Base Supply Complex, special facilities include non-secure and secure office space, storage space, loading dock, secure vaults, meeting and training rooms, and a break room.

2. The addition will include approximately 6,00 square feet of storage space that will house the Base's Deployable Parts Storage mission associated with the F-35 Fighter Jet

3. Special attention will need to be paid to layout, erosion control, and laydown operations due to the limitations of the site, adjacent finished construction, and existing utilities on site.

4. The new building s structural system includes slab on grade with engineered fill soil stabilization, structural steel framing as well as load bearing masonry, open web joists with form deck, and metal floor decking. The roof will have sloped insulated standing seam metal roof panels. The exterior walls include veneer brick, storefront, and insulated metal wall panels.

5. Major building systems are limited to exhaust fans, gas fired makeup air units, and gas fired unit heaters.

6. Specialty equipment included in the project includes HVLS fans.

7. All utilities will be served from the existing Base Supply Facility. This includes, but is not limited to necessary power, storm, gas, water, and data infrastructure. Coordination will be required with existing utilities to maintain operation in the existing Base Supply complex and will include power, storm, gas, water, and data. New electrical panel will be required within the existing electrical room.

8. Site work will comprise of on-site parking, pedestrian paving, landscape and retaining walls, sodding, and landscape planting. B. Antiterrorism and Building Standoff Requirements:

1. The project site and building structural, architectural, electrical and mechanical systems have been designed to meet the prescribed levels of protection against terrorist attacks in accordance with the Department of Defense (DoD) Unified Facilities Criteria (UFC) 4-010-01 DoD Minimum Antiterrorism Standards for Buildings.

C. Special Access Program Facilities (SAPF)

1. Special Access Program Facilities are not included in the scope of the project.

D.Intrusion Detection System (IDS), Access Controls, and CCTV:

1. The IDS system must be fully compatible with the existing USAF approved Advantor IDS Annunciator located in the 187th SFS BDOC and will be tied into the existing IDS system located in the Base Supply Complex.

2. As part of the base bid, the contractor is responsible for engaging Advantor Systems Cooperation (which is a sole source security system) for the procurement (purchase) and installation of the IDS, Access Controls, and CCTV systems. Refer to limited source justification included in the solicitation documents furnished by the Government.

3. The base bid shall include all plant, labor, and materials to provide all collateral support as required by Advantor (in addition to collateral support indicated in the contract documents) for installation of a fully operational IDS, Access Control, and CCTV systems as defined by Advantor System Corporation.

4. The required scope of work is as outlined in the drawings. Advantor systems assisted in the design of the security systems and have furnished a "quote" as part of the design process. The "quote" is included in the project specifications for reference and identification of the required devices/materials. The Contractor shall contact ADVANTOR and receive an updated "quote" as part of the bid process. All costs to install a complete and operation IDS< ACS, and CCTV systems shall be included in the Contractor's bid.

E. Owner Furnished Furniture, furnishings and Equipment (FF&E):

1. Contractor's base bid shall include rough-ins for plumbing, mechanical, and electrical; including installation and final connection of all items indicated on the drawings as Owner Furnished Contractor Installed (OFCI).

F. Sustainability Design and Energy Conservation

1. The project design incorporates Sustainability Concepts to achieve optimum resource efficiency, constructability, sustainability, and energy conservation.

2. This project has been registered with the USGBCI for guiding principles assessment recognition process.

3. The Contractor is responsible for ensuring all specified sustainable and energy conservation goals are achieved and fully implemented. Refer to section 01 3329 for sustainability reporting requirements. Refer to technical specifications for specific product requirements.

G. Contractor’s Qualified Fire Protection Engineers (QFPE) Services:

1. The Contractor shall employ a Qualified Fire Protection Engineer (QFPE) meeting the requirements of UFC 3-600-01.

2. The QFPE shall review, sign, and certify all fire protection and life safety systems including; but, not limited to fire alarm, mass notification, and sprinkler systems included within the proposed project.

3. All shop drawing / calculations / material submittals for applicable life safety systems must be reviewed and stamped by the Contractor’ QFPE in accordance with section 9-6.3 of UFC 3-600-01.

4. Waterflow testing shall be performed under the direction of the Contractor’s QFPE in accordance with section 9-6.4 of UFC 3-600-01. Waterflow testing shall be performed by the Contractor in order to develop required hydraulic

calculations. Use of waterflow testing performed by the Architect during design cannot be utilized by the Contractor for preparation of project submittals.

5. During Construction the Contractor’s QFPE must visit the site in intervals/quantities required to certify that the system has been installed in accordance with the project requirements. At a minimum, the QFPE shall attend/witness the above ceiling inspection and attend/witness final acceptance testing for all fire protection and life safety systems. Additional site inspections are at the discretion of the Contractor’s QFPE. The Contractor’s QFPE shall certify, in writing, that the system has been installed in accordance with project requirements. The Contractor’s QFPE certification shall be in writing, on company letterhead, and include the QFPE’s registration stamp.

1.04 PERMITS, FEES AND NOTICES

A. Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit and other permits and governmental fees, licenses, and inspections necessary for proper execution and completion of the Work which are customarily secured after award of the Construction Contract and which are in effect on the date of receipt of bids.

1. City of Montgomery Buidling Permit will not be required.

B. The Contractor shall comply with and give notices required by all laws, ordinances, rules, regulations, and lawful orders of public authorities applicable to performance of the Work.

1.05 USE OF SITE AND MISC. REQUIREMENTS

A. The space available to the contractor for the performance of the work, either exclusively or in conjunction with others performing other construction as part of the project, is as per the Owner's approval.

1. Other areas are off limits to all construction personnel.

B. Access to site will be limited; obtain Owner's approval of proposed routes of access.

C. Keep existing sidewalks, roads, parking lots and drives on site clear and available at all times. Promptly remove mud, dirt, debris, etc. from sidewalks, streets, and public right-of-way during construction as it occurs.

D. Storage areas on site are very minimal and will be limited to materials that are to be immediately used in the progress of the work. If additional storage is required, then Contractor shall secure and be responsible to pay for such off site storage in a fully bonded and insured facility acceptable to the Government, with all items clearly identified as being assigned to this project.

1. Contractor will be limited to the areas included within the project limits shown on the civil drawings.

E. Provide secure temporary barricades, fencing, etc. as required to separate the public from construction operations. Compliant safety and/or warning signage is to be provided as well in conjunction with fencing and barricades.

1. Site safety and security is the General Contractor's responsibility. Fencing shall be provided as deemed necessary to protect the site from theft and damage and to prevent access to the site by the public. A fence along the project limits is anticipated at a minimum. However, exact location/extents of fencing is at the discretion of the Contractor. Removal of project boundary fencing along the Northern boundary of the project limits and connection of project fencing with fencing of the adjacent base supply project would be acceptable if agreed upon by both Contractors.

F. Construction operations are not to affect any of the ongoing operations thought the site and/or adjacent sites. Construction equipment is not to be attached to, or swing over existing buildings to remain, public areas, occupied buildings or parking lots, right-of-ways, etc.

G. Comply with the Government's security requirements - refer to specification section 01 3553.

H. The contractor shall provide all testing, inspections, and similar services; these services also include those specified to be performed by an independent agency.

1. Where indicated on the drawings work outside of the site extents may be require to connect to existing/new utilities.

1.06 UTILITY OUTAGES AND SHUTDOWN

A. All electrical and communication shut downs shall be performed on a non-working day for the Government(Saturday, Sunday, Monday, or Holidays) unless specifically approved by the base Contracting Officer Representative.

B. Limit shutdown of utility services to 8 hours at a time, arranged at least 72 hours in advance with the Government.

C. Prevent accidental disruption of utility services to other facilities.

1.07 PHASING OF WORK

A. The work of this project shall be completed in one phase. However, the Contractor shall coordinate the work as required to ensure all existing roadways and facilities adjacent to the project site remain open and accessible for use by the Government.

1.08 WORK SEQUENCE

A. Coordinate construction schedule and operations with Contracting Officer Representative.

B. Extension of existing utilites shown on the drawings must be properly sequenced with work assocated with the addition so that shutdown of utility service(s) in the Base Supply Complex is limited.

1.09 PROJECT CONSULTANTS

A. The Architect, hereinafter referred to as The Government: Seay Seay & Litchfield P.C..

1. Address: 1115 South Court Street.
2. City, State, Zip: Montgomery AL 36104.
3. Phone/Fax: 334-263-5162 334-263-5170.
4. Project Manager: Jake Johnson, AIA
5. Prinicipals-in-Charge: Wes R. Osmer, AIA, LEED AP

B. Architect's Consultants:

1. Civil Engineering:
   a. Professional Engineering Consultants
   b. Address: 822 South McDonough St..
   c. City, State, Zip: Montgomery, AL, 36104.
   d. Phone/Fax: 334-262-7307 / 334-262-7309.
   e. Contact: Steve Green - Pat Moseley
2. Structural Engineering:
   a. Blackburn Daniels O'Barr, Inc.
   b. Address: 8805 County Rd. 40E
   c. City, State, Zip: Lowndesboro, AL, 36752.
   d. Phone/Fax: 334-265-0206 / 334-265-0207.
   e. Contact: Mark O'Barr

3. Plumbing, Mechanical & Fire Suppression Engineering:
    a. Morris Engineering
    b. Address: 903 South Perry Street
    c. City, State, Zip: Montgomery, AL, 36104
    d. Phone: 334-269-0329
    e. Contact: Jack Morris, P.E.
4. Electrical Engineering:
    a. Garner & Associates Engineering, PC
    b. Address: 903 South Perry Street
    c. City, State, Zip: Montgomery, AL 36104
    d. Phone: 334-269-0329
    e. Contact: Morgan Garner, P.E.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 014100 - REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY OF REFERENCE STANDARDS

A. Regulatory requirements applicable to this project are the following:

1. All applicable National, State and Local Codes (City of Montgomery)
2. Alabama State Fire Marshall
3. Dannelly Airfield Fire Department
4. Americans with Disability Act Accessibility Guidelines (ADAAG), Current Edition
5. ~~ICC/ANSI A117.1-2003 Design Guidelines for Accessible and Usable Building Facilities~~

   ICC/ANSI A117.1-2017 Design Guidelines for Accessible and Usable Facilities
6. OSHA
7. All Applicable Sections of the US Code of Federal Regulations
   a. 28 CFR 35 Department of Justice Accessibility Regulations Relating to State and Local Governments
      1) 28 CFR 36 Department of Justice Accessibility Regulations Relating to Public Accommodations.
      2) 29 CFR 1910 Occupational Safety and Health Standards
      3) 36 CFR 1191 Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.
   b. FED-STD-795 - Uniform Federal Accessibility Standards; 1988.
8. All applicable Engineering Technical Letters (ANGETL)
   a. ANGETL 10-03, Air National Guard Design Objectives and Procedures
   b. ANGETL 15-01-00 ANG Desgn Policy
   c. ANGETL 15-01-02 SCIF and ATFP Guidance
   d. ANGETL 15-01-03 Fire Protection and Design

e. ANGETL 15-01-04 Mechanical Engineering

f. ANGETL 15-01-05 Electrical and Communications Engineering

g. ANGETL 15-01-06 Roof Design Guidance

h. ANGETL 15-01-07 Airfield and Vehicle Pavement Design

9. Air National Guard Handbook (ANGH) 32-1084, Facility Space Standards

10. All Applicable Sections of the United Facilities Criteria

a. Series 1-200: UFC 1-200-01, UFC 1-200-02

1) Series 3-100: UFC 3-101-01, 3-110-03, 3-120-01, 3-190-06

2) Series 3-200: UFC 3-201-01, 3-201-02, 3-250-04, 3-250-11

3) Series 3-300: UFC 3-301-01, 3-310-04

4) Series 3-400: 3UFC -400-02, 3-401-01, 3-410-02, 3-410-04, 3-420-01, 3-420-02FA, 4-430-01FA, 3-450-01

5) Series 3-500: UFC 3-501-01, 3-520-01, 3-530-01, 3-55-01N, 3-575-01, 3-580-01

6) Series 3-600: UFC 3-600-01

7) Series 4-400: UFC 4-010-01, 4-021-01

8) Series 4-600: UFC 4-610-01

11. All National Fire Protection Association (NFPA) codes and standardsreferenced by Unified Facilities Criteria (UFC).

12. All model codes and standards developed by the International Code Council(ICC) referenced by Unified Facilities Criteria (UFC).

a. International Building Code, edition referenced in applicable UFC.

1) International Fire Code, edition referenced in applicable UFC.

2) International Fuel Gas Code, edition referenced in applicable UFC.

3) International Mechanical Code, edition referenced in applicable UFC.

4) International Plumbing Code, edition referenced in applicable UFC.

5) International Electrical Code, edition reference in applicable UFC.

13. F-35 Lightning II Facilties Requirements Document, Section 3: Operational Facility Requirements, Document No. 2PJG00001, Revision Q dated 19 November 2019.

1.02 RELATED REQUIREMENTS

A. Section 014000 - Quality Requirements.

1.03 QUALITY ASSURANCE

A. Designer Qualifications: Where delegated engineering design is to be performed under the construction contract provide the direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

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SECTION 019113 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Commissioning is intended to achieve the following specific objectives; this section specifies the Contractor's responsibilities for commissioning:

1. Verify that the work is installed in accordance with the Contract Documents and the manufacturer s recommendations and instructions, and that it receives adequate operational checkout prior to startup: Startup reports and Prefunctional Checklists executed by Contractor are utilized to achieve this.

2. Verify and document that functional performance is in accordance with the Contract Documents: Functional Tests executed by Contractor and witnessed by the Commissioning Authority are utilized to achieve this.

3. Verify that operation and maintenance manuals submitted to the Government are complete: Detailed operation and maintenance (O&M) data submittals by Contractor are utilized to achieve this.

4. Verify that the Government s operating personnel are adequately trained: Formal training conducted by Contractor is utilized to achieve this.

B. Commissioning, including Functional Tests, O&M documentation review, and training, is to occur after startup and initial checkout and be completed before Beneficial Occupancy

C. The Commissioning Authority directs and coordinates all commissioning activities; this section describes some but not all of the Commissioning Authority's responsibilities.

D. ~~The Commissioning Authority is employed by the Contractor. All costs associated with Commissioning Services specified shall be included in the Contractor's bid.~~

The Commissioning Authority will be employed by the Government.

1. The contractor will be accountable for those responsibilities outlined in specification section 01 9113 - General Commissioning Requirements, and for compliance with the Commissioning Plan and correction of deficiencies, reinspection, and re-testing, as applicable at no extra cost to the Government.

1.02 SCOPE OF COMMISSIONING

A. The following are to be commissioned:

B. Plumbing Systems:

1. Water heaters.

2. Booster pumps.

C. HVAC System, including:

1. Major and minor equipment items.
2. Piping systems and equipment.
3. Ductwork and accessories.
4. Terminal units.
5. Control system.
6. Variable frequency drives.

D. Electrical Systems:

1. Power quality.
2. Emergency power systems.
3. Uninterruptible power systems.
4. Lighting controls other than manual switches.

E. Electronic Safety and Security:

1. Security system, including doors and hardware.
2. Fire and smoke alarms.

F. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.

G. Indoor Air Quality Procedures: The Commissioning Authority will coordinate; Contractor will execute; see Section 015719 - Temporary Environmental Controls.

1.03 RELATED REQUIREMENTS

A. Section 01 33325 - Project Sustainability Summary

B. Section 01 - 3329 - Sustainable Design Reporting

C. Section 015719 - Temporary Environmental Controls: Precautions and procedures; smoking room testing; building flush-out.

D. Section 017000 - Execution and Closeout Requirements: General startup requirements.

E. Section 017800 - Closeout Submittals: Scope and procedures for operation and maintenance manuals and project record documents.

F. Section 01 7900 - Demonstration and Training: Scope and procedures for Government personnel training.

G. Section 230800 - Commissioning of HVAC: HVAC control system testing; other requirements.

1.04 REFERENCE STANDARDS

A. CSI/CSC MF - Masterformat 2016.

B. PECI (Samples) - Sample Forms for Prefunctional Checklists and Functional Performance Tests Current Edition.

C. See Section 01 3001 - Submittals, for submittal procedures; except:

1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority, unless they require review by the Government; in that case, submit to Contracting Officer Representative first

2. Submit one copy to the Commissioning Authority, not to be returned.

3. Make commissioning submittals on time schedule specified by Commissioning Plan.

4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of Prefunctional Checklists or Functional Test requirements; submit in editable electronic format, Microsoft Word 2010 preferred.

D. Product Data: If submittals to the Government do not include the following, submit copies as soon as possible:

1. Manufacturer's product data, cut sheets, and shop drawings.

2. Manufacturer's installation instructions.

3. Startup, operating, and troubleshooting procedures.

4. Fan and pump curves.

5. Factory test reports.

6. Warranty information, including details of the Government's responsibilities in regard to keeping warranties in force.

E. Startup Plans and Reports.

F. Completed Prefunctional Checklists.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

A. Provide all standard testing equipment required to perform startup and initial checkout and required Functional Testing; unless otherwise noted such testing equipment will NOT become the property of the Government.

B. Calibration Tolerances: Provide testing equipment of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply:

1. Temperature Sensors and Digital Thermometers: Certified calibration within past year to accuracy of 0.5 degree F (0.3 degree C) and resolution of plus/minus 0.1 degree F (0.05 degree C).

2. Pressure Sensors: Accuracy of plus/minus 2.0 percent of the value range being measured (not full range of meter), calibrated within the last year.

3. Calibration: According to the manufacturer s recommended intervals and when dropped or damaged; affix calibration tags or keep certificates readily available for inspection.

C. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to the Government; such equipment, tools, and instruments are to become the property of Government.

D. Dataloggers: Independent equipment and software for monitoring flows, currents, status, pressures, etc. of equipment.

1. Dataloggers required to for Functional Tests will be provided by the Commissioning Authority and will not become the property of the Government.

PART 3 EXECUTION

3.01 COMMISSIONING PLAN

A. Commissioning Authority will prepare the Commissioning Plan.

1. Attend meetings called by the Commissioning Authority for purposes of completing the commissioning plan.

2. Require attendance and participation of relevant subcontractors, installers, suppliers, and manufacturer representatives.

B. Contractor is responsible for compliance with the Commissioning Plan.

C. Commissioning Plan: The commissioning schedule, procedures, and coordination requirements for all parties in the commissioning process.

1. Commissioning will be phased (by floors, for example) to minimize the total construction time.

D. Basis of Design Documentation (BOD): Detailed documentation of the functional requirements of the project; descriptions of the systems, components, and methods chosen to meet the design intent; assumptions underlying the design intent.

1. Basis of Design Documentation is to be prepared by the Commissioning Agent with input from the Government.

E. Commissioning Schedule:

1. Submit anticipated dates of startup of each item of equipment and system to Commissioning Authority within 60 days after start of work.

2. Re-submit anticipated startup dates monthly, but not less than 4 weeks prior to startup.

3. Prefunctional Checklists and Functional Tests are to be performed in sequence from components, to subsystems, to systems.

4. Provide sufficient notice to Commissioning Authority for delivery of relevant Checklists and Functional Test procedures, to avoid delay.

3.02 DOCUMENTATION IDENTIFICATION SYSTEM

A. Give each submitted form or report a unique identification; use the following scheme.

B. Type of Document: Use the following prefixes:

1. Startup Plan: SP-.

2. Startup Report: SR-.

3. Prefunctional Checklist: PC-.

4. Functional Test Procedure: FTP-.

5. Functional Test Report: FTR-.

C. System Type: Use the first 4 digits from CSI/CSC MF (Master Format), that are applicable to the system; for example:

1. 2300: HVAC system as a whole.

2. 2320: HVAC Piping and Pumps.

3. 2330: HVAC Air Distribution.

D. Component Number: Assign numbers sequentially, using 1, 2, or 3 digits as required to accommodate the number of units in the system.

E. Test, Revision, or Submittal Number: Number each successive iteration sequentially, starting with 1.

F. Example: PC-2320-001.2 would be the Prefunctional Checklist for equipment item 1 in the HVAC piping system, probably a pump; this is the second, revised submittal of this checklist.

3.03 STARTUP PLANS AND REPORTS

A. Startup Plans: For each item of equipment and system for which the manufacturer provides a startup plan, submit the plan not less than 8 weeks prior to startup.

B. Startup Reports: For each item of equipment and system for which the manufacturer provides a startup checklist (or startup plan or field checkout sheet), document compliance by submitting the completed startup checklist prior to startup, signed and dated by responsible entity.

C. Submit directly to the Commissioning Authority.

3.04 PREFUNCTIONAL CHECKLISTS

A. A Prefunctional Checklist is required to be filled out for each item of equipment or other assembly specified to be commissioned.

1. No sampling of identical or near-identical items is allowed.

2. These checklists do not replace manufacturers' recommended startup checklists, regardless of apparent redundancy.

3. Prefunctional Checklist forms will not be complete until after award of the contract; the following types of information will be gathered via the completed Checklist forms:

a. Certification by installing contractor that the unit is properly installed, started up, and operating and ready for Functional Testing.

b. Confirmation of receipt of each shop drawing and commissioning submittal specified, itemized by unit.

c. Manufacturer, model number, and relevant capacity information; list information "as specified," "as submitted," and "as installed."

d. Serial number of installed unit.

e. List of inspections to be conducted to document proper installation prior to startup and Functional Testing; these will be primarily static inspections and procedures; for equipment and systems may include normal manufacturer s start-up checklist items and minor testing.

f. Sensor and actuator calibration information.

4. PECI (Samples) found at http://www.peci.org/library/mcpgs.htm indicate anticipated level of detail for Prefunctional Checklists.

B. Contractor is responsible for filling out Prefunctional Checklists, after completion of installation and before startup; witnessing by the Commissioning Authority is not required unless otherwise specified.

1. Each line item without deficiency is to be witnessed, initialed, and dated by the actual witness; checklists are not complete until all line items are initialed and dated complete without deficiencies.

2. Checklists with incomplete items may be submitted for approval provided the Contractor attests that incomplete items do not preclude the performance of safe and reliable Functional Testing; re-submission of the Checklist is required upon completion of remaining items.

3. Individual Checklists may contain line items that are the responsibility of more than one installer; Contractor shall assign responsibility to appropriate installers or subcontractors, with identification recorded on the form.

4. If any Checklist line item is not relevant, record reasons on the form.

5. Contractor may independently perform startup inspections and/or tests, at his option.

6. Regardless of these reporting requirements, Contractor is responsible for correct startup and operation.

7. Submit completed Checklists to Commissioning Authority within two days of completion.

C. Commissioning Authority is responsible for furnishing the Prefunctional Checklists to Contractor.

1. Initial Drafts: Contractor is responsible for initial draft of Prefunctional Checklist where so indicated in the Contract Documents.

2. Provide all additional information requested by Commissioning Authority to aid in preparation of checklists, such as shop drawing submittals, manufacturers' startup checklists, and O&M data.

3. Commissioning Authority may add any relevant items deemed necessary regardless of whether they are explicitly mentioned in the Contract Documents or not.

4. When asked to review the proposed Checklists, do so in a timely manner.

D. Commissioning Authority Witnessing: Required for:

1. Each piece of primary equipment, unless sampling of multiple similar units is allowed by the commissioning plan.

2. A sampling of non-primary equipment, as allowed by the commissioning plan.

E. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to the Government.

1. If difficulty in correction would delay progress, report deficiency to the Commissioning Authority immediately.

3.05 FUNCTIONAL TESTS

A. A Functional Test is required for each item of equipment, system, or other assembly specified to be commissioned, unless sampling of multiple identical or nearidentical units is allowed by the final test procedures.

B. Contractor is responsible for execution of required Functional Tests, after completion of Prefunctional Checklist and before closeout.

C. Commissioning Authority is responsible for witnessing and reporting results of Functional Tests, including preparation and completion of forms for that purpose.

D. Contractor is responsible for correction of deficiencies and re-testing at no extra cost to the Government; if a deficiency is not corrected and re-tested immediately, the Commissioning Authority will document the deficiency and the Contractor's stated intentions regarding correction.

1. Deficiencies are any condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents or does not perform properly.

2. When the deficiency has been corrected, the Contractor completes the form certifying that the item is ready to be re-tested and returns the form to the Commissioning Authority; the Commissioning Authority will reschedule the test and the Contractor shall re-test.

3. Identical or Near-Identical Items: If 10 percent, or three, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will be considered defective; provide a proposal for correction within 2 weeks after notification of defect, including provision for testing sample installations prior to replacement of all items.

4. Contractor shall bear the cost of the Government and Commissioning Authority personnel time witnessing re-testing.

5. Contractor shall bear the cost of the Government and Commissioning Authority personnel time witnessing re-testing if the test failed due to failure to execute the relevant Prefunctional Checklist correctly; if the test failed for reasons that would not have been identified in the Prefunctional Checklist process,

Contractor shall bear the cost of the second and subsequent re-tests.

E. Functional Test Procedures:

1. Some test procedures are included in the Contract Documents; where Functional Test procedures are not included in the Contract Documents, test procedures will be determined by the Commissioning Authority with input by and coordination with Contractor.

2. Examples of Functional Testing:

a. Test the dynamic function and operation of equipment and systems (rather than just components) using manual (direct observation) or monitoring methods under full operation (e.g., the chiller pump is tested interactively

with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint).

b. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc.

c. Systems are run through all the HVAC control system s sequences of operation and components are verified to be responding as the sequence's state.

d. Traditional air or water test and balancing (TAB) is not Functional Testing; spot checking of TAB by demonstration to the Commissioning Authority is Functional Testing.

3. PECI (Samples) found at http://www.peci.org/library/mcpgs.htm indicated anticipated level of detail for Functional Tests.

F. Deferred Functional Tests: Some tests may need to be performed later, after Beneficial Occupancy, due to partial occupancy, equipment, seasonal requirements, design or other site conditions; performance of these tests remains the Contractor's responsibility regardless of timing.

3.06 SENSOR AND ACTUATOR CALIBRATION

A. Calibrate all field-installed temperature, relative humidity, carbon monoxide, carbon dioxide, and pressure sensors and gages, and all actuators (dampers and valves) on this piece of equipment shall be calibrated. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.

B. Calibrate using the methods described below; alternate methods may be used, if approved by Commissioning Authority and the Government beforehand. See PART 2 for test instrument requirements. Record methods used on the relevant Prefunctional Checklist or other suitable forms, documenting initial, intermediate and final results.

C. All Sensors:

1. Verify that sensor location is appropriate and away from potential causes of erratic operation.

2. Verify that sensors with shielded cable are grounded only at one end.

3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make sure they are reading within 0.2 degree F (0.1 degree C) of each other, and for pressure, within tolerance equal to 2 percent of the reading, of each other.

4. Tolerances for critical applications may be tighter.

D. Sensors Without Transmitters - Standard Application:

1. Make a reading with a calibrated test instrument within 6 inches (150 mm) of the site sensor.

2. Verify that the sensor reading, via the permanent thermostat, gage or building automation system, is within the tolerances in the table below of the instrument-measured value.

3. If not, install offset, calibrate or replace sensor.

E. Sensors With Transmitters - Standard Application.
1. Disconnect sensor.

2. Connect a signal generator in place of sensor.

3. Connect ammeter in series between transmitter and building automation system control panel.

4. Using manufacturer s resistance-temperature data, simulate minimum desired temperature.

5. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.

6. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the building automation system.

7. Record all values and recalibrate controller as necessary to conform with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction.

8. Reconnect sensor.

9. Make a reading with a calibrated test instrument within 6 inches (150 mm) of the site sensor.

10. Verify that the sensor reading, via the permanent thermostat, gage or buildingautomation system, is within the tolerances in the table below of the instrument-measured value.

11. If not, replace sensor and repeat.

12. For pressure sensors, perform a similar process with a suitable signal generator.

F. Sensor Tolerances for Standard Applications: Plus/minus the following maximums:
1. Watthour, Voltage, Amperage: 1 percent of design.

2. Pressure, Air, Water, Gas: 3 percent of design.

3. Air Temperatures (Outside Air, Space Air, Duct Air): 0.4 degrees F (0.2 degree C).

4. Relative Humidity: 4 percent of design.

5. Barometric Pressure: 0.1 inch of Hg (340 Pa).

6. Flow Rate, Air: 10 percent of design.

7. Flow Rate, Water: 4 percent of design.

8. Flow Rate, Steam: 3 percent of design.

9. AHU Wet Bulb and Dew Point: 2.0 degrees F (1.1 degrees C).

10. Hot Water Coil and Boiler Water Temperature: 1.5 degrees F (0.8 degrees C).

11. Cooling Coil, Chilled and Condenser Water Temperatures: 0.4 degrees F (0.2 degree C).

12. Combustion Flue Temperature: 5.0 degrees F (2.8 degrees C).

13. Oxygen and CO2 Monitors: 0.1 percentage points.

14. CO Monitor: 0.01 percentage points.

15. Natural Gas and Oil Flow Rate: 1 percent of design.

G. Critical Applications: For some applications more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.

H. Valve/Damper Stroke Setup and Check:

1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.

2. Set pump/fan to normal operating mode.

3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.

4. Command valve/damper to open; verify position is full open and adjust output signal as required.

5. Command valve/damper to a few intermediate positions.

6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).

I. Isolation Valve or System Valve Leak Check: For valves not associated with coils.

1. With full pressure in the system, command valve closed.

2. Use an ultra-sonic flow meter to detect flow or leakage.

3.07 TEST PROCEDURES - GENERAL

A. Provide skilled technicians to execute starting of equipment and to execute the Functional Tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.

B. Provide all necessary materials and system modifications required to produce the flows, pressures, temperatures, and conditions necessary to execute the test

according to the specified conditions. At completion of the test, return all affected equipment and systems to their pre-test condition.

C. Sampling: Where Functional Testing of fewer than the total number of multiple identical or near-identical items is explicitly permitted, perform sampling as follows:

1. Identical Units: Defined as units with same application and sequence of operation; only minor size or capacity difference.

2. Sampling is not allowed for:

   a. Major equipment.

   b. Life-safety-critical equipment.

   c. Prefunctional Checklist execution.

3. XX = the percent of the group of identical equipment to be included in each sample; defined for specific type of equipment.

4. YY = the percent of the sample that if failed will require another sample to be tested; defined for specific type of equipment.

5. Randomly test at least XX percent of each group of identical equipment, but not less than three units. This constitutes the "first sample."

6. If YY percent of the units in the first sample fail, test another XX percent of the remaining identical units.

7. If YY percent of the units in the second sample fail, test all remaining identical units.

8. If frequent failures occur, resulting in more troubleshooting than testing, the Commissioning Authority may stop the testing and require Contractor to perform and document a checkout of the remaining units prior to continuing testing.

D. Manual Testing: Use hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the observation).

E. Simulating Conditions: Artificially create the necessary condition for the purpose of testing the response of a system; for example apply hot air to a space sensor using a hair dryer to see the response in a VAV box.

F. Simulating Signals: Disconnect the sensor and use a signal generator to send an amperage, resistance or pressure to the transducer and control system to simulate the sensor value.

G. Over-Writing Values: Change the sensor value known to the control system in the control system to see the response of the system; for example, change the outside air

temperature value from 50 degrees F to 75 degrees F to verify economizer operation.

H. Indirect Indicators: Remote indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100 percent closed, are considered indirect indicators.

I. Monitoring: Record parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of the relevant control systems; where monitoring of specific points is called for in Functional Test Procedures:

1. All points that are monitored by the relevant control system shall be trended by Contractor; at the Commissioning Authority s request, Contractor shall trend up to 20 percent more points than specified at no extra charge.

2. Other points will be monitored by the Commissioning Authority using dataloggers.

3. At the option of the Commissioning Authority, some control system monitoring may be replaced with datalogger monitoring.

4. Provide hard copies of monitored data in columnar format with time down left column and at least 5 columns of point values on same page.

5. Graphical output is desirable and is required for all output if the system can produce it.

6. Monitoring may be used to augment manual testing.

3.08 OPERATION AND MAINTENANCE MANUALS

A. See Section 017800 - Closeout Submittals for additional requirements.

B. Add design intent documentation to manuals prior to submission to the Government.

C. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.

D. Commissioning Authority will add commissioning records to manuals after submission to the Government.

END OF SECTION

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SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete formwork.

B. Concrete building frame members.

C. Concrete for composite floor construction.

D. Floors and slabs on grade.

E. Concrete reinforcement.

F. Joint devices associated with concrete work.

G. Concrete curing.

H. Materials included in this section shall achieve HPSB Compliance for the following sections:

1. 2-6.1.1 Recycled Content (10%)

2. 2-6.1.2 - Biologically Based Products

3. The contractor is expected to understand the HPSB documentation requirements for these credits and include all applicable overhead in their base bid for the necessary documentation to achieve the above listed credits.

I. Section 01 3325 - Project Sustainability Summary

J. Section 01 3329 - Sustainable Design Reporting

K. Section 07 7419 - Construction Waste Management and Disposal

L. Section 32 1313 - Concrete Paving

1.02 REFERENCE STANDARDS

A. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials 2010 (Reapproved 2015).

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete 1991 (Reapproved 2009).

C. ACI 301 - Specifications for Structural Concrete 2016.

D. ACI 302.1R - Guide to Concrete Floor and Slab Construction 2015.

E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).

F. ACI 305R - Guide to Hot Weather Concreting 2010.

G. ACI 306R - Guide to Cold Weather Concreting 2016.

H. ACI 308R - Guide to External Curing of Concrete 2016.

I. ACI 318 - Building Code Requirements for Structural Concrete and Commentary 2014 (Errata 2018).

J. ACI 347R - Guide to Formwork for Concrete 2014, with Errata (2017).

K. ASTM A185/A185M - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2007.

L. ASTM A497/A497M - Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete; 2007.

M. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2020.

N. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.

O. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2021.

P. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2021a.

Q. ASTM C150/C150M - Standard Specification for Portland Cement 2021.

R. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete 2016.

S. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).

T. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete 2019.

U. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2019.

V. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2019.

W. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete 2020a.

X. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete 2016.

Y. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete 2021.

Z. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink) 2017.

AA. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures 2020.

BB. ASTM D994/D994M - Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type) 2011 (Reapproved 2016).

CC. COE CRD-C 572 - Corps of Engineers Specifications for Polyvinylchloride Waterstop 1974.

DD. NSF 61 - Drinking Water System Components - Health Effects 2020.

1.03 SUBMITTALS

A. See Section 01 3001 - Submittals for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

C. Verification Samples: Submit sample chips of specified colors indicating pigment numbers and required dosage rates, for subsequent comparison to installed concrete.

D. Samples: Submit samples of underslab vapor retarder to be used.

E. Test Reports: Submit report for each test or series of tests specified.

F. Manufacturer's Installation Instructions: For concrete accessories, indicate installation procedures and interface required with adjacent construction.

G. Sustainable Design Submittal: If any fly ash, ground granulated blast furnace slag, silica fume, rice hull ash, or other waste material is used in mix designs to replace Portland cement, submit the total volume of concrete cast in place, mix design(s) used showing the quantity of portland cement replaced, reports showing successful cylinder testing, and temperature on day of pour if cold weather mix is used.

H. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

I. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated, based on comprehensive testing of current materials:

J. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Retain list below with either paragraph above. Edit to suit Project.

2. Cementitious materials and aggregates.

3. Form materials and form-release agents.
4. Steel reinforcement and reinforcement accessories.
5. Admixtures.
6. Waterstops.
7. Curing materials.
8. Floor and slab treatments.
9. Bonding agents.
10. Adhesives.
11. Vapor retarders.
12. Epoxy joint filler.
13. Joint-filler strips.
14. Repair materials.

K. Formwork Shop Drawings: Design and engineering of formwork are Contractor's responsibility.

1. Delete subparagraph below if no shoring and reshoring are required.
2. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and installing and removing reshoring.

L. Steel Reinforcement Shop Drawings: Details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement." Include material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement, and supports of concrete reinforcement. Include special reinforcement required for openings through concrete structures.

M. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mix water to be withheld for later addition at Project site.

N. Sustainability Submittals, Product data for HPSB Compliance:

1. For products having recycled content, documentation indicating percentages by weight of postconsumer and pre-consumer recycled content.
    a. Include statement indicating costs (sell price for each product having recycled content)

1) Total weight of products provided

1.04 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

1. Maintain one copy of each document on site.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

D. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

E. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Delete subparagraph below if not required.

2. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.

F. Testing Agency Qualifications: An independent testing agency as provided by the Contractor, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 to conduct the testing indicated, as documented according to ASTM E 548. Retesting if failed test to be provided and paid for by the General Contractor.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.

G. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

H. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."

I. Refer to Structural Drawings for additional requirements

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.06 SUSTAINABILITY REQUIREMENTS

A. Contractor shall endeavor to provide materials with a high recycled content. A minimum post-consumer recycled content of 30% is required for reinforcing steel.

1. For products having recycled content, documentation indicating percentages by weight of postconsumer and pre-consumer recycled content.

2. Include statement indicating costs (sell price for each product having recycled content)

3. Total weight of products provided

B. For products having Biologically Based Products, documentation indicating percentages of Biologically-Based Products.

PART 2 PRODUCTS

2.01 FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.

B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.

1. Form Facing for Exposed Finish Concrete: Contractor's choice of materials that will provide smooth, stain-free final appearance including:

a. Plywood, metal, or other approved panel materials.

b. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

1) Select one of four subparagraphs below or revise to suit Project. First imparts glossy finish, second imparts matte finish, and third and fourth impart coarser-textured finish depending on face-ply characteristics.

2) High-density overlay, Class 1, or better.

3) Medium-density overlay, Class 1, or better, mill-release agent treated and edge sealed.

4) Structural 1, B-B, or better, mill oiled and edge sealed.

5) B-B (Concrete Form), Class 1, or better, mill oiled and edge sealed.

2. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side

for tight fit.

3. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Form-Release agent to contain a minimum Biobased content of 87% per the USDA's standards

E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Delete or revise subparagraphs below to suit Project.

2. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of the exposed concrete surface.

3. Furnish ties that, when removed, will leave holes not larger than 1 inch (25 mm) in diameter in concrete surface.

4. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.02 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa).

1. Type: Deformed billet-steel bars.

2. Finish: Unfinished, unless otherwise indicated.

B. Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain type.

1. Form: Coiled Rolls.

2. Mesh Size and Wire Gage: As indicated on drawings.

C. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch (1.29 mm).

2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

    a. Provide solid concrete bricks to support bottom mats of spread footings and bottom bars in grade beams where rebar support will be in direct contact with soil. Concrete brick sizes as required to provide specified concrete cover.

    b. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.

3. Joint Dowel Bars: Plain-steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.

B. Fine and Coarse Aggregates: ASTM C 33.

1. Nominal Maximum Aggregate Size: 3/4 inch (19 mm).

C. Fly Ash: ASTM C618, Class C or F.

D. Calcined Pozzolan: ASTM C618, Class N.

E. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.

F. Water: Clean and not detrimental to concrete.

2.04 ADMIXTURES

A. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement. Do not use admixtures containing calcium chloride.

B. Air Entrainment Admixture: ASTM C260/C260M.

C. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

D. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.

E. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.

F. Water Reducing Admixture: ASTM C494/C494M Type A.

2.05 ACCESSORY MATERIALS

A. Underslab on Grade Vapor Retarder

1. Performance-Based Specification: Vapor retarder membrane shall be manufactured from virgin polyolefin resins, and when tested according to all

requirements of ASTM E1745, shall meet the following minimum performance requirements: Install per manufacturer's recommendations. Tape all joints and waterproof seal all penetrations.

a. Thickness: 15 mill

b. 0.0063 Perm, Water Vapor Permeance in accordance with ASTM E-96

c. Greater than 3200 Gram Puncture Resistance in accordance with ASTM D 1709 Method B

d. 72.61 (12.61) Lb. Force/Inch (kN/m) Tensile Strength per ASTM E 154 Section 9

e. 0.0052 Perm Water Vapor Permeance After Wetting Out Drying Out and After Long-Term Soaking per ASTM E-154 Section 8 and ASTM E-96 Procedure B

f. 0.0057 Perm Water Vapor Permeance Resistance to Plastic Flow and Elevated Temperature per ASTM E-154 Section 11 and ASTM E-96 Procedure B

g. 0.0052 Perm Water Vapor Permeance Effect Low Temperature and Flexibility ASTM E-154, Section 12 ASTM E-96, Procedure B

h. 0.0052 Perm Water Vapor Permeance Resistance to Deterioration From Organisms and Substances in Contacting Soil ASTM E-154, Section 13 ASTM E-96 Procedure B

i. 8.7 x 10-9 Radon Transmittance (m/s) k124/02/95

j. 3.3 x 10-12 Radon Coefficient (m^2/s)

B. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.

1. Minimum Compressive Strength at 28 Days: 7,000 pounds per square inch (48 MPa).

2.06 BONDING AND JOINTING PRODUCTS

A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.

B. Epoxy Bonding System:

1. Two-component epoxy resin, capable of humid curing and bonding to damp surfaces.

2. Class and grade to suit requirements, and as follows:

a. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

C. Waterstops: Rubber, complying with COE CRD-C 513.

1. Factory fabricate corners, intersections, and directional changes.

2. Profile: Flat, dumbbell with center bulb.

D. Reglets: Formed steel sheet, galvanized, with temporary filler to prevent concrete intrusion during placement.

1. Fabricate reglets of not less than 0.0217-inch- (0.55-mm-) thick galvanized steel sheet.

E. Slab Isolation Joint Filler: 1/2 inch (13 mm) thick, height equal to slab thickness, with removable top section that will form 1/2 inch (13 mm) deep sealant pocket after removal.

F. Joint Filler: Nonextruding, resilient asphalt impregnated fiberboard, felt, or cork, complying with ASTM D 1751, 1/4 inch thick (6 mm thick) and 4 inches deep (200 mm deep); tongue and groove profile.

G. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

H. Epoxy Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D 2240.

I. Sealant and Primer: As specified in Section 079005.

2.07 CURING MATERIALS

A. Moisture-Retaining Sheet: ASTM C171.

1. Polyethylene film, clear, minimum nominal thickness of 0.0040 inch (0.10 mm).

2. White-burlap-polyethylene sheet, weighing not less than 10 ounces per linear yard, 40 inches wide (305 g/sq m).

B. Evaporation Retarder:

1. Waterborne, monomolecular film forming retarder manufactured for application to fresh concrete.

2. Provide product meeting the recommendations of the following American Institute Publications:

a. ACI 302 Guide for Concrete Floor and Slab Construction

b. ACI 308 Guide to Curing Concrete

c. ACI 305 Recommended Practices for Hot Weather Concreting

d. ACI 345 Guide for Concrete highway Bridge and Deck Construction.

C. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

E. Curing Compound:

1. Water-based acrylic curing and sealing compound with the following characteristics:

a. AASHTO M148 Type 1, Class A and B

b. ASSTM C309 Type 1, Class A and B

c. Maximum VOC content of 20 g/L

d. Tested per CDPH/EHLB Standard Method V1.2-2017 Emission Testing Method

2. Install in accordance with manufacturer's recommendations and at a rate of +/- 200 square feet per gallon.

F. Curing Compound:

1. Water-based acrylic curing and sealing compound with the following characteristics:

a. 1. AASHTO M148 Type 1, Class A and B

b. 2. ASSTM C309 Type 1, Class A and B

c. 3. Maximum VOC content of 20 g/L

d. 4. Tested per CDPH/EHLB Standard Method V1.2-2017 Emission Testing Method

2. Install in accordance with manufacturer's recommendations and at a rate of +/- 200 square feet per gallon.

G. Water: Potable, not detrimental to concrete.

2.08 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

1. Replace as much Portland cement as possible with fly ash, ground granulated blast furnace slag, silica fume, or rice hull ash as is consistent with ACI recommendations.

B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.

1. For trial mixtures method, employ qualified, independent testing agency acceptable to The Government for preparing and reporting proposed mix designs.

C. Footings and Retaining Walls Piers: Proportion normal-weight concrete mix as follows:

1. Compressive Strength (28 Days): 3000 psi (20.7 MPa).

2. Maximum Slump: 4 inches (100 mm).

3. Maximum Slump for Concrete Containing High-Range Water-Reducing Admixture: 8 inches (200 mm) after admixture is added to concrete with 2- to 3-inch (50- to 100-mm) slump.

D. Slab-on-Grade and slab over metal deck: Proportion normal-weight concrete mix as follows:

1. Compressive Strength (28 Days): ~~3000 psi (20.7 MPa).~~ ***4000 PSI***

2. Maximum Slump: 4 inches (100 mm).

E. Suspended Slabs, Beams, and Columns: Proportion normal-weight concrete mix as follows:

1. Compressive Strength (28 Days): 3000 psi.

2. Maximum Slump: 4 inches (100 mm).

F. Outside Porches and Associated Concrete: Proportion normal-weight concrete mix as follows:

1. Compressive Strength (28 Days): 3000 psi (34.5 MPa).

2. Maximum Slump: 4 inches (100 mm).

3. Provide air entrainment per ACI standards to meet ASTM C260

G. Cementitious Materials: For concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements.

H. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 20 percent.

I. Maximum Water-Cementitious Materials Ratio: 0.53 for concrete with a 28 day compressive strength of F'c = 3000 psi.

J. Maximum Water-Cementitious Materials Ratio: 0.45 for concrete with a 28 day compressive strength of F'c = 4000 psi.

K. Limit water - soluble, chloride-ion content in hardened concreter to 0.15 percent by weight of cement.

L. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 4 to 6 percent, unless otherwise indicated.

M. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.09 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm) or coarse sand as recommended by underlayment manufacturer.

4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.10 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

B. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature

is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Verify that forms are clean and free of rust before applying release agent.

C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

D. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.

2. Use latex bonding agent only for non-load-bearing applications.

E. In locations where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

F. Ensure vapor barrier is installed in accordance with project specifications prior to placing concrete. Refer to division 07.

3.03 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Select surface classes, usually two or more, from subparagraphs below. Indicate where each class applies. Classes are taken from ACI 347R. See Evaluations.

2. Class A, 1/8 inch (3 mm).

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.

1. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.04 REMOVING AND REUSING FORMS

A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.

B. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved the following:

1. At least 75 percent of 28-day design compressive strength.

C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

D. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched or damaged forms for concrete surfaces unless approved by the Government.

3.05 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor bolts, accurately located, to elevations required.

2. Select applicable subparagraphs below and add others if required. Revise to suit Project.

3. Install reglets to receive top edge of foundation sheet waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

4. Install dovetail anchor slots in concrete structures as indicated and required.

3.06 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor barrier. Repair damage and reseal vaporbarrier before placing concrete. Refer to division 07.

B. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

C. Install welded wire reinforcement in maximum possible lengths on bar supports spaced to minimize sagging and offset end laps in both directions. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

D. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

1. Shop- or field-weld reinforcement according to AWS D1.4, where indicated.

E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.07 VAPOR RETARDERS

A. Vapor Retarder: Refer to Division 7 and paragraph 2.05 of this section.

B. Granular Fill: Cover compacted subgrade with granular fill, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch (0 mm) or minus 3/4 inch (19 mm).

3.08 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Notify The Government not less than 48 hours prior to commencement of placement operations.

D. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

E. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.09 SLAB JOINTING

A. Locate joints as indicated on drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

D. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

E. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by the Government.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of slabs on grade.

2. Form from preformed, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.

3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.

4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

5. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

F. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

G. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

2. Terminate full-width joint-filler strips not less than 1/2 inch (12 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.

3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

H. Dowel Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where indicated.

1. Use dowel sleeves or lubricate or asphalt-coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.10 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Maximum Variation of Surface Flatness:

1. Exposed Concrete Floors: 1/4 inch (6 mm) in 10 feet (3 m).

2. Under Seamless Resilient Flooring: 1/4 inch (6 mm) in 10 feet (3 m).

3. Under Carpeting: 1/4 inch (6 mm) in 10 feet (3 m).

B. Correct the slab surface if tolerances are less than specified.

C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.11 WATERSTOPS

A. Flexible Waterstops: Install in construction joints as indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of Work. Field-fabricate joints in waterstops according to manufacturer's written instructions.

3.12 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement, unless approved by the Government.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.

D. Deposit concrete in forms in horizontal layers no deeper than 24 inches (600 mm) and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.

1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.

2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Maintain reinforcement in position on chairs during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.

4. Slope surfaces uniformly to drains where required.

5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When air temperature has fallen to or is expected to fall below 40 deg F (4.4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.

3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless otherwise specified and approved in mix designs.

G. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.13 CONCRETE FINISHING

A. Finishing Formed Surfaces

1. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding ACI 347R limits for class of surface specified.

a. Apply to concrete surfaces of retaining walls to be covered with earth backfill.

2. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of

seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch (3 mm) in height.

a. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, or painting.

b. Do not apply rubbed finish to smooth-formed finish.

3. Rubbed Finish: Apply the following to smooth-formed finished concrete:

a. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

4. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

B. Finishing Floors and Slabs

1. General: Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

2. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

a. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

3. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

a. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system

b. Finish surfaces to the following tolerances, measured within 24 hours according to ASTM E 1155/E 1155M for a randomly trafficked floor surface:

1) Specified overall values of flatness, F(F) 35; and levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and levelness, F(L) 17; for slabs-on-grade.

2) For slab on grade areas receiving thin set tile, the overall minimum values of flatness shall be, F(F) 50 and the levelness, F(L) 35. Local values of flatness shall be, F(F) 35, and levelness, F(L) 20.

4. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.

3.14 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.

B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

3.15 CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing by one or a combination of the following methods:

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other

surfaces, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.

   b. Continuous water-fog spray.

   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.16 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

   1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.

   2. Do not apply to concrete that is less than seven days old.

   3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

3.17 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

   1. Defer joint filling until concrete has aged at least six months. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

3.18 FIELD QUALITY CONTROL

A. Testing Agency: Contractor will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include those specified in this Article.

B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements: All retesting as a result of failed test to be provided by and paid for by the General Contractor.

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mix exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.

2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mix. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.

4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C 31; cast and laboratory cure one set of four standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39; test one laboratory-cured specimens at 7 days and two at 28 days. Hold fourth specimen for future specimen for future testing if required. Discard if not required.

    a. The contractor shall engage a qualified independent testing laboratory to make, field cure, and test standard cylinder specimens. The results of these tests shall be used by the contractor to evaluate field curing and for form removal.

    b. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at age indicated.

C. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide

corrective procedures for protecting and curing in-place concrete.

D. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).

E. Test results shall be reported in writing to the Government, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-and 28-day tests.

F. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by the Government but will not be used as sole basis for approval or rejection of concrete.

G. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by the Government. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by the Government.

3.19 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by the Government. Remove and replace concrete that cannot be repaired and patched to the Government's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.2-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match

surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by the Government.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.

2. After concrete has cured at least 14 days, correct high areas by grinding.

3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.

4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.

5. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch (19 mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

6. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to the Government's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to the Government's approval.

G. Test Results: The testing agency shall report test results in writing to The Government and Contractor within 24 hours of test.

H. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.

I. Repair or replacement of defective concrete will be determined by the The Government. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

J. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of The Government for each individual area.

3.20 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

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SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Hollow metal frames for wood doors.

C. Thermally insulated hollow metal doors with frames.

D. Materials included in this section shall meet the requirements for High Performance Sustainable Buildings for New Construction points for the following Sections:

1. 2-6.1.1 - Recycled Content

2. The contractor is expected to understand the HPSB requirements for these sections and include all applicable overhead in their base bid for the necessary documentation to achieve the above listed credits.

1.02 RELATED REQUIREMENTS

A. . Section 01 3325 - Project Sustainability Summary

B. Section 01 3329 - Sustainable Design Reporting

C. Section 01 6000 - Product RequirementsContent Restrictions

D. Section 01 7419 - Construction Waste Management and Disposal

E. Section 04 2000 - Unit Masonry

F. Section 087100 - Door Hardware.

G. Section 088000 - Glazing: Glass for doors and borrowed lites.

H. Section 099113 - Exterior Painting: Field painting.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.

B. ~~ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2009.~~

ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 2017.

C. ANSI/SDI A250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Coatings for Steel Doors and Frames 2007 (Reaffirmed 2011).

D. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors 2011.

E. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100) 2017.

F. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames 2011.

G. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

H. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames 2016.

I. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

J. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames 2002.

K. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames 2011.

L. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames 2007.

M. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doorsand Frames 2014.

N. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2019.

O. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2017.

P. UBC Std 7-2, Part II - Test Standard for Smoke- and Draft-control Assemblies; International Conference of Building Officials; 1997.

Q. UL 10B - Standard for Fire Tests of Door Assemblies Current Edition, Including All Revisions.

R. UL 1784 - Standard for Air Leakage Tests of Door Assemblies Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3001 - Submittals, for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

E. Sustainability Submittals, Product data for HPSB Compliance:

1. For products having recycled content, documentation indicating percentages by weight of postconsumer and pre-consumer recycled content.

a. Include statement indicating costs (sell price for each product havingrecycled content)

b. Total weight of products provided

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Copies of Documents at Project Site: Maintain at the project site a copy of each referenced document that prescribes installation requirements.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 DESIGN CRITERIA

A. Requirements for Hollow Metal Doors and Frames:

1. Steel used for fabrication of doors and frames shall comply with one or more of the following requirements; Galvannealed steel conforming to ASTM A653/A653M, cold-rolled steel conforming to ASTM A1008/A1008M, or hotrolled pickled and oiled (HRPO) steel conforming to ASTM A1011/A1011M, Commercial Steel (CS) Type B for each.

2. Accessibility: Comply with ICC A117.1 and ADA Standards.

3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.

4. Door Edge Profile: Manufacturers standard for application indicated.

5. Typical Door Face Sheets: Flush.

6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.

7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

C. Product Performance:

1. Air leakage for fenestration and doors shall be determined in accordance with NFRX 400. Air leakage shall be determined by a laboratory accredited by a nationally recognized accreditation organization, such as the National Fenestration Rating Council, and shall be labeled and certified by the manufacturer.

    a. Air leakage shall not exceed 1.0 cfm/ft2 for glazed swinging entrance doors and 0.4 cfm/ft2 for all other products.

2. U-factors shall be determined in accordance with NFRC 100. U-Factors shall be determined by a laboratory accredited by a nationally recognized accreditation organization, such as the National Fenestration Rating Council, and shall be labeled and certified by the manufacturer.

    a. Assembly U-value for opaque doors shall not exceed 0.700.

3. Labeling of Doors: The U-factor and the air leakage rate for all manufactured doors installed between conditioned space, semi-heated space, unconditioned space, and exterior space shall be identified on a permanent name-plate installed on the product by the manufacturer.

2.02 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS, Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS, Type B.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 or A40 metallic coating.

D. Recycled Content: For Steel Products: Minimum Total Recovered Materials Content - 30%

2.03 HOLLOW METAL DOORS

A. NL Exterior Doors: Thermally insulated.

1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).

a. Insulated and designed to meet or exceed the requirements of UFC 4-010-01.

b. Level 2 - Heavy-duty.

c. Physical Performance Level B 500 000 cycles; in accordance with ANSI/SDI A250.4.

d. Model 1 - Full Flush.

e. Door Face Metal Thickness: 18 gage, 0.042 inch (1.0 mm), minimum.

2. Core Material: Manufacturers standard core material/construction and in compliance with requirements.

3. Door Thickness: 1-3/4 inch (44.5 mm), nominal.

4. Insulating Value: U-value of 0.50, when tested in accordance with ASTM C 1363 .

5. Weatherstripping: Refer to Section 087100.

B. NL HM Interior Doors, Fire Rated and Non-Fire Rated:

1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).

a. Level 2 - Heavy-duty.

b. Physical Performance Level B 500 000 cycles; in accordance with ANSI/SDI A250.4.

c. Model 1 - Full Flush.

d. Door Face Metal Thickness: 18 gage, 0.042 inch (1.0 mm), minimum.

2. Core Material: Manufacturers standard core material/construction and in compliance with requirements.

3. Door Thickness: 1-3/4 inch (44.5 mm), nominal.

C. Hardware Reinforcement: ANSI/SDI A250.6-1997.

2.04 HOLLOW METAL FRAMES

A. Comply with Standards and /or custom guidelines as indicatedfor corresponding doors in accordance with applicable door frame requirements.

B. Exterior Door Frames: Full profile welded type.

1. *Full profile/continuously welded type.*

   a. Frame Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.

   b. Weatherstripping in Hardware Specification Section: 08 7000.

C. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.

1. Terminated Stops: Provide at interior doors; closed end stop terminated 6 inch (150 mm), maximum, above floor at 45 degree angle.

2. Frame Metal Thickness: 16 gage, 0.053 inch (1.3 mm), minimum.

D. Hardware Reinforcement: ANSI/SDI A250.6.

E. All frames are to wrap the entire wall. No butt conditions will be acceptable. Coordinate frame jamb depths with each wall condition.

2.05 ACCESSORIES

A. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

B. Stops and Moldings:

1. Moldings for Glazed Lites in Doors & Windows: Minimum 0.032-inch (0.8 mm) thick, same material as door face sheet. Metal lite kits are to be flush and shall not require shim kits for door hardware.

2. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated.

3. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch (0.8 mm) thick, same material as frames.

C. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

   a. Jamb Anchors:

      1) Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with

corrugated or perforated straps not less than 2 inches (50 mm) wide by 10 inches (250 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.

2) Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.

3) Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.

4) Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

b. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:

1) Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2) Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (50-mm) height adjustment. Terminate bottom of frames at finish floor surface.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

E. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143/C 143M.

F. Mineral-Fiber Insulation: ASTM C 665, Type I.

2.06 FINISHES

A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.07 FABRICATION

A. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

B. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors. Seal joints in top edges of doors against water penetration with flush door cap.

2. Glazed Lites: Factory cut openings in doors.

3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.

C. Hollow Metal Frames: Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.

3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.

5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.

6. Jamb Anchors: Provide number and spacing of anchors as follows:

a. Masonry Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

1) Two anchors per jamb up to 60 inches (1524 mm) high.

2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.

3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.

4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.

b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:

1) Three anchors per jamb up to 60 inches (1524 mm) high.

2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.

3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.

4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.

5) Two anchors per head for frames more than 42 inches (1066 mm) wide and mounted in metal-stud partitions.

7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers.

    a. Single-Door Frames: Three door silencers.

    b. Double-Door Frames: Two door silencers.

D. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.

2. Reinforce doors and frames to receive nontemplated, mortised and surfacemounted door hardware.

3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.

4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 16 electrical Sections.

E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.

2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.

3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.

4. Provide loose stops and moldings on inside of hollow metal work.

5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

3.03 INSTALLATION

A. Hollow Metal Frames and Stainless Steel Frames: Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

   a. At fire-protection-rated openings, install frames according to NFPA 80.

   b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.

   c. Install frames with removable glazing stops located on secure side of opening.

   d. Install door silencers in frames before grouting.

   e. Remove temporary braces necessary for installation only after frames have been properly set and secured.

   f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

   g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.

   h. Remove temporary shipping spreader bars before installation.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.

   a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.

4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.

5. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.

6. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:

a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.

c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.

d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

B. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).

b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).

c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).

d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

3. Smoke-Control Doors: Install doors according to NFPA 105.

C. Glazing: Comply with installation requirements in Division 8 Section "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (50 mm) o.c. from each corner.

3.04 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified door and frame standards or custom guidelines indicated.

B. Maximum Diagonal Distortion: 1/16 in (1.5 mm) measured with straight edge, corner to corner.

3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition.

Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

3.06 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION

SECTION 104400 - FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

C. Accessories.

D. Materials included in this section shall achieve HPSB Compliance for the following section(s):

1. 2-6.1.3 Ozone Depleting Substances

2. The contractor is expected to understand the HPSB documentation requirements for these credits and include all applicable overhead in their base bid for the necessary documentation to achieve the above listed credits.

1.02 RELATED REQUIREMENTS

A. Section 01 3325 - Project Sustainability Summary

B. Section 01 3329 - Sustainable Design Reporting

C. Section 01 6000 - Product Requirements

D. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions

E. Section 061000 - Rough Carpentry: Wood blocking product and execution requirements.

F. Section 099123 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

A. ~~NFPA 10 - Standard for Portable Fire Extinguishers 2017, with Errata (2018).~~

NFPA 10 - Standard for Portable Fire Extinguishers 2022.

B. UL (DIR) - Online Certifications Directory Current Edition.

1.04 SUBMITTALS

A. See Section 01 3001 - Submittals, for submittal procedures.

B. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

C. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

D. Sustainability Submittals, Product data for HPSB Compliance:1. Documentation (material safety data sheets (MSDS), third-party certificates, or test reports) showing printed statement confirming that ozone depleting substances are not utilized in the product.

PART 2 PRODUCTS

2.01 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.

1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.

B. Type Fire Extinguishers that contain no ozone-depleting substances such as CFCs, Hydrochlorofluorocarbons (HCFCs) or Halons per HPSB requirements: Carbon steel tank, with pressure gage.

1. Class: A:B:C type.

2. Size: 10 pound (4.54 kg).

3. Finish: Baked polyester powder coat Red color.

2.02 FIRE EXTINGUISHER BRACKET

A. Provide Standard Fire Extinguisher Bracket.

B. Mount so that the bottom of the fire extingusher is less than 27" above finish floor.

PART 3 EXECUTION

3.01 EXAMINATION

A. If installed in metal stud wall provide solid wood blocking at top, bottom, and sides of cabinet locations prior to installation of cabinet

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Place extinguishers on wall brackets.

END OF SECTION

SECTION 211313 - WET-PIPE FIRE-SUPPRESSION SPRINKLERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipes, fittings, and specialties.
2. Fire-protection valves.
3. Sprinkler specialty pipe fittings.
4. Sprinklers.

1.2 DEFINITIONS

A. Standard-Pressure Sprinkler Piping: Fire sprinkler systems piping designed to operate at working pressure 175 psig (1200 kPa) maximum.

1.3 SYSTEM DESCRIPTIONS

A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included as required. System shall comply with "UFC 3-600-01" ~~(2016 Edition, Change 5).~~ ***(Rev. 5.6.2021)***

1.4 PERFORMANCE REQUIREMENTS

A. Standard-Pressure Piping System Component: Listed for 175-psig (1200-kPa) minimum working pressure.

B. Sprinkler system design, and required hydraulic calculations, shall be based on available water flow test data. The sprinkler contractor shall conduct their own water flow test in order to obtain current available water pressure and flow information.

C. Sprinkler system design shall be approved by authorities having jurisdiction.

1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
2. Sprinkler Occupancy Hazard Classifications: Comply with "UFC 3-600-01" (~~2016, Change 5~~) ***(Rev. 5.6.2021)*** Table 9-3.

3. Minimum Density for Automatic-Sprinkler Piping Design: Comply with "UFC 3-600-01" ~~(2016, Change 5)~~ ***(Rev. 5.6.2021)*** TABLE 9.3.
4. Maximum Protection Area per Sprinkler: Per UL listing, and "NFPA 13" ~~(2016 Edition)~~ ***(Rev. 5.6.2021)*** Table 8.6.2.2.1 (a), (b), (c), and (d).
5. Minimum "k factor": Comply with "UFC 3-600-01" ~~(2016, Change 5)~~ ***(Rev. 5.6.2021)*** Table 9-3.
6. Total Combined Hose-Stream Demand: Comply with "UFC 3-600-01" ~~(2016, Change 5)~~ ***(Rev. 5.6.2021)*** Table 9-4.

D. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to "UFC 3-600-01" (2016, Change 5). ***(Rev. 5.6.2021)***

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.

C. Approved Sprinkler Piping Drawings: Working plans, prepared according to "UFC 3-600-01" ~~(2016, Change 5)~~ ***(Rev. 5.6.2021)*** that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.

D. Available water flow test report.

E. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in "UFC 3-600-01" ~~(2016, Change 5~~) ***(Rev. 5.6.2021)*** Include "Contractor's Material and Test Certificate for Aboveground Piping."

F. Field quality-control reports.

G. Operation and Maintenance Data.

1.6 COORDINATION

A. Coordinate layout and installation of piping and sprinklers with all other disciplines including, but not limited to, light fixtures, HVAC equipment, and storage rack assemblies.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Sprinkler Cabinets: Finished, wall-mounted, steel cabinet with hinged cover, and with space for minimum of six spare sprinklers plus sprinkler wrench. Include number of sprinklers required by "UFC 3-600-01" ~~(2016, Change 5~~) ***(Rev. 5.6.2021)*** and sprinkler wrench. Include separate cabinet with sprinklers and wrench for each type of sprinkler used on project.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 STEEL PIPE AND FITTINGS

A. Standard Weight, Black Steel Pipe: ASTM A 53/A 53M, Type E, Schedule 40, Grade B. Pipe ends may be factory or field formed to match joining method.

~~**B.** Thinwall Black Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, with wall thickness less than Schedule 30 and equal to or greater than Schedule 10. Pipe ends may be factory or field formed to match joining method.~~

C. Black Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.

D. Black Steel Couplings: ASTM A 865, threaded.

E. Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

F. Grooved-Joint, Steel-Pipe Appurtenances:

1. Pressure Rating: 175 PSIG (1200 KPa) minimum.
2. Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
3. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.

2.3 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick.

1. Class 125, Cast-Iron and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

2.4 LISTED FIRE-PROTECTION VALVES

A. General Requirements:

1. Valves shall be UL listed or FM approved.
2. Minimum Pressure Rating for Standard-Pressure Piping: 175 psig (1200 kPa).

2.5 TRIM AND DRAIN VALVES

A. General Requirements (Angle, Ball and Globe Valves):

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating: 175 psig (1200 kPa) minimum.

2.6 SPECIALTY VALVES

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating:
   a. Standard-Pressure Piping Specialty Valves: 175 psig (1200 kPa) minimum.
3. Body Material: Cast or ductile iron.
4. Size: Same as connected piping.
5. End Connections: Flanged or grooved.

2.7 SPRINKLERS

A. General Requirements:

1. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
2. Pressure Rating for Automatic Sprinklers: 175 psig (1200 kPa) minimum.

B. Automatic Sprinklers with Heat-Responsive Element:

1. Nonresidential Applications: UL 199.
2. Characteristics: Nominal 1/2-inch (12.7-mm) orifice with discharge coefficient K of 5.6, unless otherwise indicated or required by application.

C. Sprinkler Guards:

1. Standard: UL 199.
2. Type: Wire cage with fastening device for attaching to sprinkler.
3. Type: Electrically supervised.
4. Components: Single-pole, double-throw switch with normally closed contacts.
5. Design: Signals that controlled valve is in other than fully open position.

PART 3 - EXECUTION

3.1 SERVICE-ENTRANCE PIPING

A. Existed to remain.

3.2 PIPING INSTALLATION

A. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.

1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Contracting Officer before deviating from approved working plans.

B. Piping Standard: Comply with requirements in "UFC 3-600-01" ~~(2016, Change 5)~~ ***(Rev. 5.6.2021)*** and "NFPA 13" (2016) for installation of sprinkler piping.

C. Install seismic restraints on piping. Comply with requirements in "UFC 3-600-01" ~~(2016, Change 5)~~ ***(Rev. 5.6.2021)*** for seismic-restraint device materials and installation.

D. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

E. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.

F. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.

G. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to "UFC 3-600-01" ~~(2016, Change 5)~~ ***(Rev. 5.6.2021)*** and "NFPA 13" ~~(2016)~~ ***(2019).***

H. Install sprinkler piping with drains for complete system drainage.

I. Install hangers and supports for sprinkler system piping according to UFC 3-600-1 ~~(2016, Change 5)~~ ***(Rev. 5.6.2021)*** and NFPA 13 ~~(2016)~~ ***(2019)***. Comply with requirements in "UFC 3-600-01" ~~(2016, Change 5)~~ ***(Rev. 5.6.2021)*** and "NFPA 13" ~~(2016)~~ ***(2019)*** for hanger materials.

J. Pressurize and check wet-pipe sprinkler system piping.

K. Install sleeves for piping penetrations of walls and ceilings.

L. Install escutcheons for piping penetrations of walls and ceilings.

3.3 JOINT CONSTRUCTION

A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.

B. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller.

C. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger end connections.

D. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

E. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

F. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.

G. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

H. Steel-Piping, Roll-Groove Joints: Groove end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.

I. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.4 VALVE AND SPECIALTIES INSTALLATION

A. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to "UFC 3-600-01" ~~(2016, Change 5)~~ ***(Rev. 5.6.2021)*** and "NFPA 13" ~~(2016)~~ ***(2019)*** and authorities having jurisdiction.

B. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.

3.5 SPRINKLER INSTALLATION

A. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.

3.6 IDENTIFICATION

A. Install labeling and pipe markers on equipment and piping according to requirements in "UFC 3-600-01" ~~(2016, Change 5)~~ ***(Rev. 5.6.2021)***.

3.7 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Flush, test, and inspect sprinkler systems according to "UFC 3-600-01" ~~(2016, Change 5)~~ ***(Rev. 5.6.2021)*** "Systems Acceptance" Chapter.
4. Energize circuits to electrical equipment and devices.
5. Coordinate with fire-alarm tests. Operate as required.

C. Sprinkler piping system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.8 CLEANING

A. Clean dirt and debris from sprinklers.

B. Remove and replace sprinklers with paint other than factory finish.

3.9 PIPING SCHEDULE

A. Standard-pressure, wet-pipe sprinkler system, NPS 2 (DN 50) and smaller, shall be the following:

1. Standard-weight, black-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
2. Standard-weight, black-steel pipe with grooved ends; grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

B. Standard-pressure, wet-pipe sprinkler system, NPS 2-1/2 to NPS 4 (DN 65 to DN 100), shall be the following:

1. Standard weight, black-steel pipe with threaded ends; gray-iron threaded fittings; and threaded joints.
2. Thin wall, black-steel pipe with grooved ends; grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

3.10 SPRINKLER SCHEDULE

A. Use sprinkler types listed below for the following applications:

1. Warehouse / Storage Areas: Exposed pendent “Early Suppression Fast Response” (ESFR) sprinklers. Rough Brass finish.

A. END OF SECTION

SECTION 22 0514 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Sleeves.
5. Escutcheons.
6. Grout.
7. Equipment installation requirements common to equipment sections.
8. Concrete bases.
9. Supports and anchorages.

1.2 DEFINITIONS

A. Finished Spaces: Spaces other than plumbing and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and plumbing equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

1.3 SUBMITTALS

A. Welding certificates.

1.4 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."

2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.

C. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series or BAg1, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12.

G. Solvent Cements for Joining Plastic Piping:

1. CPVC Piping: ASTM F 493.

2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.3 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.

E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

2.4 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

B. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.

C. Pressure Plates: Carbon steel. Include two for each sealing element.

D. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

2.6 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

2.7 GROUT

A. Description: ASTM C 1107, Grade B, non-shrink, and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, non-staining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors.

M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.

2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.

3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 Section "Through-Penetration Firestop Systems" for materials.

Q. Verify final equipment locations for roughing-in.

R. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402, for safe-handling practice of cleaners, primers, and solvent cements.

2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.

4. PVC Non-pressure Piping: Join according to ASTM D 2855.

J. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

K. Plastic Non-pressure Piping Gasketed Joints: Join according to ASTM D 3212.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.

2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel, and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.5 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.

2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of the base.

3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.

4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

5. Install anchor bolts to elevations required for proper attachment to supported equipment.

6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

7. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete."

3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.7 ERECTION OF WOOD SUPPORTS AND ANCHORAGES

A. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor plumbing materials and equipment.

B. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.

C. Attach to substrates as required to support applied loads.

3.8 GROUTING

A. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

3.9 GENERAL

A. General and Special Conditions: Refer thereto for all applicable provisions.

B. Scope: Include all equipment, material and labor required for complete operating plumbing, and gas, even though every item involved is not indicated.

C. Codes: Comply with UFC 3-420-01 Plumbing Systems, ANG ELT 01-1-1 Air National Guard Design Policy, UFC Unified Facility Guide (Design criteria and specifications), ~~2015~~ ***(2021)*** International Plumbing Code, ~~2015~~ ***(2021)*** International Building Code, AGA, ~~2015~~ ***(2021)*** International Gas Code, ADA, USGBCI Guiding Principles for Sustainable Federal Buildings 2016, and OSHA of the locality. Where conflicts occur between code and contact drawings or specifications, most stringent requirements shall apply.

D. Qualifications: Sub-contractor shall be licensed plumber and gas pipe fitter in the locality.

E. Permits: Provide all permits and arrange for inspections as required by city, county, and state authorities.

F. Drawings: In the interest of clearness, the work is not always shown to scale or exact location. Check all measurements, location of pipe, fittings, and equipment with the detail architectural, structural, and electrical drawings and layout work so as to fit in with other parts. Where doubts arise as to the leaning of the plans and specifications, obtain the Architect's decision before proceeding with parts as may be affected; otherwise the Contractor shall be liable for damage to work and for removing and repairing his own work in proper manner.

G. Changes: If during construction, desirable or necessary changes become apparent, advise the architect, and secure his decision in writing. Otherwise make no deviation from

H. Existing Conditions: Bidders shall visit site and become acquainted with all job condi

tions. No consideration will be given after bid opening for alleged misunderstanding regarding utility connections, permits, fees, etc.

I. Prior Approval: Bidders shall submit equipment for prior approval 10 days before bid date.

J. Warranty: Guarantee in writing to make good without cost any defects in materials and workmanship within one year from the date of acceptance of project.

K. Low – Emitting Materials – Adhesives and Sealants: All adhesives and sealants shall comply with USGBCI Guiding Principles for Sustainable Federal Buildings 2016.

L. Low – Emitting Materials – Paints and Coatings: All paints and coatings shall comply with USGBCI Guiding Principles for Sustainable Federal Buildings 2016.

K. Submittals:

1. Within 25 days the award of the contract and before any orders are planned, the contractor shall submit to the Architect for approval seven (7) copies of a complete list of all proposed materials and all equipment, include catalog data, capacities, model numbers, any accessories, and any pertinent information to indicate full compliance with specification and drawings. Partial list will not be accepted. Rejected items shall be resubmitted until approval has been obtained.

2. The contractor shall submit shop drawings on the following items but not limited to the following items.

   a. List of proposed materials and equipment.

   b. Letter stating coordination of plumbing, mechanical and electrical work, signed by plumbing, mechanical, electrical, and general contractors. Submittals and shop drawings will not be reviewed without receipt of this item.

   c. Shop drawing showing coordination of Plumbing and Electrical.

   d. Showing drawing of Plumbing of a scale of not less than 1/8-inch equals one foot. The drawing shall show coordination with all HVAC, lighting, conduit, equipment, & etc.

   e. Pipe hanger shop drawings including methods of attachment to structure anchors.

   f. Schedule of insulation to be used including thickness. Submittal literature

on all insulation, mastics, and materials. Include flame spread and smoke developed ratings.

g. Notify Architect of all pressure tests to be performed.

h. Type sanitary drain and vent/storm piping and accessories.

i. Cleanouts (wall, floor, etc.)

j. Floor drains

k. Trap guard & accessories.

l. Type water piping and accessories

m. Type gas piping and accessories.

3.10 PROJECT CLOSE-OUT:

A. Prior to issuance of certificate for final payment, submit to Architect and obtain his approval of the following:

1. A letter signed by the subcontractors for plumbing and electrical work stating that they have jointly checked each power circuit and control circuit and mutually agree that each item is properly wired, and that controls and power circuits will function properly.

2. Record drawings – waste and vent piping (ACAD 2002 or higher).

3. Record drawings – water piping (ACAD 2002 or higher).

4. Record drawings – gas, air, and miscellaneous systems (ACAD 2002 or higher).

5. Loose tee keys for wall hydrants shall be turned over to owner.

6. Water/Air pressure test for waste and water systems.

7. Equipment submittal data (3). Furnish in searchable .pdf format.

8. Equipment Operating and Maintenance Manuals (3).

9. Maintenance schedule (3).

10. Equipment warranty dates and guarantee (3).

11. List of Owner's Personnel who have received maintenance training.

A. END OF SECTION

SECTION 230500 - GENERAL HVAC REQUIREMENTS

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes general requirements for the HVAC systems.

1.2 QUALIFICATIONS OF SUB-CONTRACTORS

A. Must be properly licensed and established as a Heating and Air Conditioning Contractor at the location of the work and shall maintain locally adequate service facilities. He shall have had previous experience in the satisfactory installation of at least three systems of this type and size.

1.3 SCOPE

A. Include all equipment, material and labor required for complete operation of heating, air conditioning and ventilation systems, even though every item involved is not indicated. Included in the scope but not limited by the scope are the following complete new operating systems. Provide time and material to comply with USGBCI Guiding Principles for Sustainability Federal Buildings 2016.

1.4 CODES

A. Comply with applicable ANG ELT 01-1-1 Air National Guard Design Policy, UFC Unified Facility Guide, UFC-3-410-01, ~~2015~~ ***(2021)*** International Energy Conservation Code, ~~2015~~ ***(2021)*** International Building Code, and ~~2015~~ ***(2021)*** International Mechanical Code requirements and conform to ordinances and codes of the locality. Where conflicts occur between code and construction drawings or specifications, most stringent requirements shall apply. Any work provided contrary to these requirements shall be removed and replaced at contractor's expense.

1.5 PERMITS

A. Provide all permits and arrange for inspections as required by local, city, county, and state authorities. Furnish certificate of final inspection from local building inspector indicating that installation complies with all regulations governing the same. Provide additional materials, parts, labor, etc. and modify the work as required by city and state inspections and regulations.

1.6 DRAWINGS

A. In the interest of clearness, the work is not always shown to scale or exact location. Check all measurements, location of pipe, ducts, and equipment with the detail architectural, structural, and electrical drawings, and lay out work so as to fit with

ceiling grids, lighting, and other parts. Where doubt arises as to the meaning of the plans and specifications, obtain the Architect's decision before proceeding with parts affected; otherwise assume liability for damage to other work and for making necessary corrections to work in question.

B. The Plans are not intended to show all ductwork, pipes valves, fittings, connections, and details of the work to be done. The piping, duct and equipment locations shall be adhered to as closely as possible; however, any changes necessary to avoid columns, beams, lighting fixtures, ductwork, sprinkler piping, etc., shall be made at no additional cost to the owner. Do not scale plumbing or HVAC drawing. Refer to Architectural drawings for dimensions.

1.7 CHANGES AND CONFLICTS

A. If during construction desirable or necessary changes become apparent, advise the Architect, and secure his decision in writing. Otherwise make no deviation from the system as detailed.

1.8 WARRANTY

A. Contractor shall provide a one-year full parts and labor warranty for materials and workmanship for all items starting at substantial completion of entire project. The following items but not limited to the following, shall have extended warranties remain in effect past the one-year warranty. All warranty shall start at substantial completion of entire project.

1. AC Equipment:
Provide 1-year parts and labor warranty for entire system.
Provide 5-year parts warranty for compressors.
2. Control System - Provide two-year parts and labor warranty for entire system.
3. Filters - Contractor shall change all filters every two months for first year.
4. Energy Recovery Unit – Provide five-year warranty on parts and labor for entire system.

1.9 ENHANCED COMMISSIONING

A. Mechanical Contractors responsibilities are as follows:

1. Perform commissioning tests at the direction of the CxA.
2. Attend construction phase controls coordination meetings.
3. Attend testing, adjusting, and balancing review and coordination meetings.
4. Participate in HVAC systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.
5. Provide information requested by the CxA for final commissioning documentation.
6. Provide measuring instruments and logging devices to record test data and provide data acquisition equipment to record data for the complete range of

testing for the required test period.

1.10 Minimum IAQ Performance: Complete HVAC system shall comply with minimum requirements of Section 4 through 7 of ASHRAE Standard 62.1-2013 (Ventilation for Acceptable Indoor Air Quality).

1.11 Outdoor Air Delivery Monitoring: Complete HVAC system to comply with ASHRAE Standard 62.1-2013 to monitor outdoor air intake. All DDC accessories are to be calibrated to manufacturer's guidelines.

1.12 Construction IAQ Management Plan - During Construction: If permanently installed air handlers are used during construction, then filtration media with minimum of MERV 8 must be used. All filtration media must be replaced immediately prior to occupancy.

1.13 Low - Emitting Materials - Adhesives and Sealants: All adhesives and sealants shall comply with USGBCI Guiding Principles for Sustainability Federal Buildings 2016.

1.14 Controllability of Systems - Thermal Comfort: Provide complete DDC control system for all HVAC equipment.

1.15 Thermal Comfort - Verification: Mechanical contractor shall make any necessary adjustment to HVAC system to ensure the thermal comfort of occupants per USGBCI Guiding Principles for Sustainability Federal Buildings 2016.

1.16 MISCELLANEOUS REQUIREMENTS

A. Materials and Equipment: New and of best quality in every respect. All pipes and fittings shall conform to the ASTM Standard designated for pipe of each material. Equipment shall be essentially the standard product of the manufacturer and shall be UL approved where required by Code. Where two or more units of the same class of equipment are required, these units shall be products of a single manufacturer; however, the component parts of the system need not be.

B. Listed Equipment: Being listed as "A supplier of comparable products" means the listed manufacturer will receive consideration if in accordance with all documents, delivery and space requirements. Being listed does not indicate nor imply the manufacturer's equipment is acceptable for the project. Only the "Base" manufacturer's equipment has been verified for compliance with the documents. The burden of approval of the equipment rests solely with the contractor.

C. Equipment Protection: Protect during construction, duct openings against the entrance of foreign materials and protect all equipment from damage by mortar, paint, weather, etc. Damaged equipment shall be replaced at no expense to project. Make provisions to protect equipment.

D. Finishes: Manufacturer's standard unless otherwise stated. Submit color cards for selection where such choice is specified or available.

E. Charges, Grease, Filters, etc.: Furnish first charges of refrigerant grease, oils, etc., and be responsible for such full charges for the guarantee period, except when loss is due to

negligence of Owner. Where disposable type filters are specified, furnish two sets for each air conditioning unit; one set to be used during test period, other set to be installed just prior to occupancy. Contractor shall change all disposable filters every two months for first year. Sets of filters to be installed during one-year guarantee period. Where permanent type is specified, provide disposable type for testing and operating prior to occupancy. Provide Owner a typed list (O&M Manual) of all filter sizes and required quantity.

F. Cleaning and Adjusting: Upon completion of work, clear drains, traps, ducts, and pipelines. Adjust all valves, remove rubbish, and leave work in clean and operating condition. Install final permanent type filters only after cleaning of building is completed.

G. Cutting and Patching: Openings are to be laid out and built in; furnish detailed layout drawings to other trades in advance of their work. Piping within or behind walls must be installed before wall is erected. Otherwise, walls, etc. affected must be reworked by trade which erected same at expense of HVAC Contractor; chasing and cutting of new work will not be accepted. HVAC Contractor shall prepare shop drawings of required opening to General Contractor and Architect for review.

H. Foundations: Provide foundations, supports, etc., not specified under other Sections and as required to mount equipment in a workman like and structurally sound manner. Consult drawings pertaining to other trades to determine extent of their work.

I. Roof Flashing: Roofing work is specified under Roofing Section. Roofer shall be advised of all requirements and all furnished items to be installed before roofing is installed. Roofer shall install all mechanical roof penetration and provide full roof warranty.

J. Vibration and Noise Control: All items of mechanical equipment including air handling units, and fans shall be properly isolated from the structure by means of approved vibration absorbing accessories, foundations or supports.
Elimination of objectionable vibration and noise is the responsibility of the Contractor, who must provide all foundations, isolators, flexible connections, etc., required thereby. Pay special attention to vibration problems at year end inspection and correct all deficiencies noted.

K. Operating and Maintenance Instructions: Provide the services of a competent person to thoroughly instruct representatives appointed by the owner in the proper operation and care of all equipment and control systems. Furnish a complete set of Operating and Maintenance (O&M Manuals) instructions in three (3) copies (including equipment data, spare parts lists, operating instructions, filter sizes, valves services, control and wiring diagrams) in bound folder form prior to final acceptance (Also submit in PDF format). O&M Manuals, Test and Balance report to be submitted two (2) weeks prior to final inspection.

L. Painting and Finishing: Clean and paint with two coats of asphalt varnish all exposed ferrous metal parts of mechanical equipment located above ceilings, etc.). Surfaces in finished areas are to be painted by Painting Contractor. Where factory finished items are marred or scratched item must be replaced, or upon approval, may be refinished or touched-up as required to bring to a like-new condition.

M. Where device occurs above a lift-out acoustical ceiling panel, identify the panel with a 3/8" #8 round head self-threading sheet metal screw, screwed into panel with only the

head showing. Before inserting, paint head of screw with appropriate color as specified under Pipe Identification and Color Coding. Furnish sample for approval.

N. Dis-similar Metal: Separate all dis-similar metals as required for services. Dis-similar metal shall not touch.

O. Coordination:

1. Mechanical contractor shall submit written verification that he has coordinated all electrical requirements for HVAC with electrical subcontractor. Written document shall indicate any difference between design requirements and actual verified requirements and shall recommend solutions to any conflicts found. Refer to "EXAMPLE" form at end of this section.
NOTE: Mechanical submittals will not be reviewed without this document included.

PART 2 – PRODUCTS (not applicable)

PART 3 – EXECUTION (not applicable)

A. END OF SECTION

See Attachment

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SECTION 28 3111 - FIRE DETECTION, EVACUATION, AND MASS NOTIFICATION SYSTEM

PART1 - GENERAL

1.1. RELATED DOCUMENTS

Drawings and general provisions of the contract apply to this section.

The work covered by this section is to be coordinated with related work as specified elsewhere in the specifications. Requirements of the following sections apply:

Division 01 General Requirements

Division 07 Thermal and Moisture Protection

Division 21 Fire Suppression

Division 23 Heating Ventilating and Air Conditioning,

Division 26 Electrical, Section 26 01 00 General Items for Electrical

1.2. SUMMARY

1.2.1. FIRE AND MN

Provide all permits, labor, equipment, materials and services to furnish and install a fully tested functional, UL Listed, code compliant, intelligent addressable networked fire alarm, emergency communications and active smoke control system including but not limited to all initiation and notification appliances, all raceways and wiring, connection to a central monitoring station.

The system supplied under this specification shall utilize modular low voltage design with direct wired, panel to panel, IPv6 communications. The system shall utilize independently addressed, fire detection devices, input/output control modules, audio amplifiers, telephone communications and notification appliances as described in this specification. Network panels shall contain the required user interfaces for all functions. All equipment shall be new and the current products of a single manufacturer, actively engaged in the manufacturing and sale of digital fire detection devices for over ten years.

Also included are system wiring, raceways, pull boxes, terminal cabinets, mounting boxes, and any accessories and miscellaneous items required for a code compliant system.

The system drawings show the intended coverage and suggested device locations. Final device quantity, location, and AHJ approval are the responsibility of the contractor.

The final system shall be complete, tested, and ready for operation as described elsewhere in this specification, before Government acceptance.

Strict conformance to this specification is required to ensure that the installed and programmed system will function as designed, is compatible with existing systems, and will accommodate the future requirements and operations of the Government. All specified operational features must be met without exception.

1.3. REFERENCES

1.3.1. FIRE AND MNS CODES

The equipment and installation shall comply with the provisions of the following codes and standards unless the authority having jurisdiction has adopted an earlier version:

UFC 4-021-01 Mass Notification Systems

UFC 3-600-01 Fire Protection

National Fire Protection Association (NFPA)

~~NFPA 70 - 2020 *National Electric Code®*~~

NFPA 70 - 2023 National Electric Code®

~~NFPA 72 - 2016 *National Fire Alarm Code®*~~

NFPA 72 - 2016 National Fire Alarm Code®

~~NFPA 90A - 2015 Installation of Air-Conditioning and Ventilating Systems~~

NFPA 90A - 2024 Installation of Air-Conditioning and Ventilating Systems

~~NFPA 92 - 2015 *Standard on Smoke Control Systems*~~

~~NFPA 101- 2015 *Life Safety Code®*~~

NFPA 101- 2024 Life Safety Code®

Underwriter’s Laboratories, Inc

UL 864 - Control Units for Fire Protective Signaling Systems.

UL 268 - Smoke Detectors for Fire Protective Signaling Systems.

UL 268A - Smoke Detectors for Duct Applications.

UL 217 - Single and Multiple Station Smoke Alarms

UL 521 - Heat Detectors for Fire Protective Signaling Systems.

UL 228 - Door Closers-Holders, With or Without Integral Smoke Detectors.

UL 464 - Audible Signaling Appliances.

UL 38 - Manually Actuated Signaling Boxes for Use with Fire-Protective Signaling Systems

UL 346 - Waterflow Indicators for Fire Protective Signaling Systems.

UL 1971 - Signaling Devices for the Hearing-Impaired.

UL-1480 - Speakers for Fire Alarm, Emergency, and Commercial and Professional Use
UL 1481 - Power Supplies for Fire Protective Signaling Systems.
UL 1711 - Amplifiers for Fire Protective Signaling Systems.

UL 1635 - Digital Alarm Communicator System Units

UL-1638 - Signaling Appliances - Private Mode Emergency and General Utility Signaling

UL-2572 - Standard for Mass Notification

International Code Council

International Building Code

International Fire Code

International Mechanical Code

Federal Codes and Regulations

Americans with Disabilities Act (ADA)

Electrical Industries Association

EIA-232-D: Interface between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange

EIA-485: Electrical Characteristics of Generators and Receivers for Use in Balanced Digital Multipoint Systems

NIST: FIPS PUB 180-4 Secure Hash Standard

NIST: FIPS PUB 197 - Advanced Encryption Standard

United Facilities Criteria (UFC)

Compliance with applicable UFC documents as applicable to Military Departments, Defense Agencies, and DoD Field Activities in accordance with DoD Directive 4270.5 (Military Construction) and USD(AT&L) Memorandum dated 29 May 2002.

1.4. SYSTEM DESCRIPTION

1.4.1. GENERAL FIRE AND MN

The system supplied under this specification shall be a new UL Listed modular Life Safety platform capable of supporting the functions required by fire alarm, mass notification and smoke control that uses independently addressed fire detection devices, input/output control modules, amplifiers, speakers and notification appliances.

The network shall utilize IPv6 for panel to panel and panel to annunciator communications and shall support communications to occur over a single copper pair or single fiber strand. The network shall consist of a main panel and multiple remote Autonomous Control Unit/Fire Alarm Control Panels (ACU/FACP). To enhance survivability, each panel shall be an equal, active functional member of the network, capable of making all local decisions and initiating network tasks for other panels. In the event of a panel failure or communications failure between panels, panels shall be capable of forming sub-networks and remain operational between communicating panels. Master/slave system configurations shall not be considered as equal.

The system shall be fully field programmable such that virtually any combination of system output functions may be correlated to any type of input event(s). Inputs may be combined using Boolean logic, be time dependent or under manual control, as defined by required system operation. All software operations shall be stored in a non-volatile programmable memory within the fire alarm control panels. There shall be no limit, other than maximum system capacity, as to the number of addressable devices which may be in alarm simultaneously.

Addressable smoke detector sensitivity settings for both pre-alarm and alarm activation shall be automatically individually configurable for both daytime and nighttime operation. Addressable smoke detectors shall be UL listed for automatic sensitivity testing.

Ease of maintenance shall be facilitated by the use of panel based and PC based system diagnostics.

1. The system shall automatically test smoke detector sensitivity, eliminating the need for manual sensitivity testing.

2. Ground fault detection and annunciation shall be by individual module address for supervised input and output devices.

3. System test operation shall be configurable by individual addressable devices, and not disable entire circuits.

4. The system shall be capable of generating a graphical map of connected addressable devices to aide in circuit troubleshooting.

5. Placement supervision of addressable devices shall couple a device's location (not its address) to the programmed system response.

The system shall be designed, inspected, tested and approved to provide occupant notification audibility levels of 15 dBA over ambient conditions. Intelligibility shall be designed to ensure Common Intelligibility Standard (CIS) rating of 0.7 or Sound Transmission Index of 0.5 in all areas designated on the drawings to have intelligible audio.

The system shall provide a one-way multi-channel emergency communication sub-system for the distribution of emergency messages to facility occupants.

The system shall support Carbon Monoxide (CO) detection devices with appropriate independent annunciation and signal processing.

The system shall interface with other building systems as required by the fire codes.

The system shall transmit required signals to a central monitoring station.

System panels (ACU/FACP) and annunciators (LOCs/FAAPs) shall utilize configurable message routing and selective event messaging to direct event information only to the required system displays and printers as determined by the event type and location.

The mass notification network shall connect the main ACU/FACP or Central Command Station (CCS) to all remote ACU/FACPs. The CCS shall be capable of initiating live and prerecorded audio messages to any combinations of ACU/FACPs connected to the network, as detailed under the Performance Requirements section of this specification.

A dedicated fiber optic TCP/IP network utilizing UL864 listed network components shall be supplied to interconnect the CCS with the ACU/FACPs and LOCs in remote buildings.

1.4.2. FIRE ALARM PERFORMANCE

1.4.2.1. GENERAL REQUIREMENTS

A. Comply with the provisions of NFPA 72 and the operational requirements of this specification.

B. The system shall identify all off normal conditions and log each condition into the system as an event.

a. The system shall automatically display on the control panel Color Liquid Crystal Display (LCD) the first (oldest) event of the highest priority by type. The event priority shall be alarm, supervisory, trouble, and monitor.

b. The display shall incorporate a touch screen to aid in navigation between event types and system operation.

c. The system shall not require a user to navigate the LCD display to operate the main control functions of (Panel Silence, Alarm Silence, and Reset). These controls shall be located near the LCD display, be easily found, be tactile in nature and be provided with color coding and be local language/dialect adaptable, operation of the switch shall provide illuminated feedback of the switch activation.

d. The touch screen option of the LCD display must be operable without the use of a stylus and must be resistive in nature, capacitive touch screens shall not be considered as operationally equivalent. A minimum of 8 events must be visible on the LCD without operator intervention.

e. The system shall utilize a minimum of ten color coded event queues on the LCD screen to group event types.

f. The system shall provide the following event queues as a minimum each to include a count of active events for the queue type including a visible indicator showing if events have not been reviewed: Alarm, Emergency, Supervisory, Disable/Test, Trouble, Ground Fault, Monitor, Fire Phone call in, Requested/Granted control.

g. Labeled, color coded indicators shall be provided for each of the following event groups in addition to the LCD queues, indicators shall be provided for alarm - red, supervisory - yellow, trouble - yellow, monitor - Green. The colors used for display of events shall follow the Federal Standard 595 Safety Color chart using the following colors: red (11120), yellow (13591), green (14120), and blue (15092). When an unviewed event exists for a given type, the queue indicator shall be marked.

h. For each event, the display shall include a sequential event number, time stamp, the type of event, and a minimum of 40-character custom user location description.

i. The display shall support a rich set of Unicode symbols to better define messaging including but not limited to radioactive symbol, poisonous substances (skull and crossbones) symbol, biological hazard symbol and Caduceus symbol.

j. The user shall be able to review each event queue by simply selecting scroll arrows (up-down) or 'swipe' navigation for the event type.

k. New alarm, supervisory, or trouble events shall sound a distinct, silenceable audible signal at the control panel. Silenced audible signal will resound in a time period acceptable to the AHJ if off normal condition has not been resolved.

l. The LCD shall show the system time and disabled points in the system.

m. Specific input/output devices shall operate in accordance with the alarm, supervisory, trouble, monitor sections that follow and the input/output matrix.

n. A detailed report of specific off normal conditions shall be accessible directly from the displayed event.

o. For disabled devices the ability to select the disable event, view details and enable the device shall be accomplished in no more than 3 screen touches.

C. All critical systems, sub-systems and circuits shall be monitored for integrity. System faults shall be annunciated. D. Strobes shall be synchronized on each floor.

E. Audio shall be synchronized on each floor.

F. Batteries shall be sized to support the system for 24 Hrs. of standby operation followed by 15 minutes of alarm operation at the end of the 24-Hour period. Battery sizing calculations shall include a minimum of 20% oversizing or

as defined elsewhere in this specification.

G. Off premises reporting of the loss of AC mains power to any system component shall be automatically delayed for a period of time acceptable to the AHJ to reduce traffic at the central monitoring station due to wide-area power failures.

H. The system shall provide configurable service groups to facilitate "one man" testing of the system based on the physical layout of the building. Each service group shall be capable of supporting any combination of system devices, independent of the circuit on which they are installed. Systems that disable entire circuits, circuits serving multiple floors or fire zones for testing shall not be considered as equal. Activated or faulted devices and circuits in a service group shall be capable of initiating alternative system test responses to facilitate system maintenance and minimizing occupant disturbances while in test mode.

I. Event processing and display shall be prioritized as follows:

a. Life Safety

b. Property Safety

c. Supervisory/System Integrity events

d. All other events

1.4.2.2. ALARM OPERATION - ECS

The following representative tasks should be customized for each project. As an alternative to descriptive text, the use of a functional input/output matrix may provide additional detail.

Signals shall be prioritized and processed in accordance with UL 2572 as indicated below:

Special suppression pre discharge alarm (CO2, FM200, or other total flooding gaseous suppression system)

Mass Notification (MN)

Fire Alarm/Life Safety

Other

Only the Central Control Station, a building's Autonomous Control Unit/Fire Alarm Control Panel (ACU/FACP), or a Local Operations Console (LOC/FAAP) shall be capable of initiating mass notification operation. No automatic operation shall be permitted.

Operation of any Mass Notification Emergency Communication (MNEC) functions by a user at a building ACU/FACP or LOC/FAAP shall be indicated at the CCS.

Operation of any MNEC functions by a user at the CCS shall be indicated at the ACU/FACP(s) and LOC/FAAP(s) that the respective building system(s) is in the MNEC mode.

The CCS, ACU/FACP(s) and LOC/FAAP(s) shall display the following information:

Power On indication.

The status of all signaling zones.

The off-normal status of all control switches.

The off-normal status of all circuits and functions monitored for integrity.

The system shall observe the following priorities for evacuation and relocation signals:

The FACP shall not automatically override mass notification messages.

The mass notification system shall not override signals indicating the pre-discharge warning of special fire suppression systems.

Live pages shall override previously and subsequently initiated signals to the operator selected areas.

Message sources shall be prioritized as follows:

Live *local* mass notification and fire evacuation messages.

Live *remote* mass notification and fire evacuation messages.

Automatic pre-recorded mass notification and fire evacuation messages.

Non-emergency messages.

A library of pre-recorded messages shall be available for the operator at the CCS or a building ACU/FACP or LOC/FAAP.

The library shall consist of the following messages:

Lockdown

Weather warning

All Clear

Evacuation

Stand by

Chemical emergency

Test

The CCS shall be capable of transmitting messages to any combination of destination buildings.

The ACU/FACP or LOC/FAAP shall be capable of transmitting messages only within its respective building.

The system shall be capable of live voice page from the CCS, an ACU/FACP, or a LOC/FAAP

The CCS shall be capable of live paging to any combination of destination buildings.

The ACU/FACP or LOC/FAAP shall be capable of live paging only within its respective building.

When any mass notification audio circuits are active, synchronized white, clear, ALERT strobes shall activate in the same areas.

Upon the **alarm activation** of any area smoke detector, heat detector, manual pull station, sprinkler waterflow, the following functions shall automatically occur:

1. The system shall remain in the alarm mode until all initiating devices are reset and the fire alarm panel is manually reset and restored to normal.

2. The internal audible device shall sound at the control panel or command center.

3. The LCD Display shall indicate all applicable information associated with the alarm condition including zone, device type, device location and time/date.

4. All system activity/events shall be documented on the system printer and logged into system history.

5. Any remote or local annunciator LCD/LED's associated with the alarm zone shall be illuminated.

6. The following audio messages and actions shall occur simultaneously:

a. An evacuation message shall be sounded. It is the intent of this message to advise occupants hearing this message that they are near danger and should leave the building compliant with the building emergency plan.

7. Activate visual strobes. The visual strobe shall continue to flash until the system has been reset. The visual strobe shall not stop operating when the "Alarm Silence" is pressed.

8. An instructional message shall be sounded in the stairwells instructing occupants to move carefully and quickly down the stairs to exit the building and to exit to a safe floor if you encounter smoke in the stairwell.

9. An instructional message shall be sounded in the elevator cabs. It is the intent of this message to advise elevator occupants that an emergency exists, the elevator has been directed to the ground floor, and that occupants should quickly exit the building.

10. An instructional message shall be sounded in the lobby. It is the intent of this message to advise lobby occupants to leave the lobby and clear the area for arriving firefighters.

11. Provide selective paging to each individual floor or zone as shown on the plans. In addition to the message/channels detailed above, a dedicated page channel shall be capable of simultaneously providing live voice instructions without interrupting any of the messages listed above.

12. The notification appliance dedicated to sprinkler system water flow alarm shall not be silenced while the sprinkler system is flowing at a rate of flow equal to a single head.

13. Transmit signal to the building automation system.

14. Transmit signal to the central monitoring station with point identification.

15. Activate automatic smoke control sequences.

16. Activate emergency lighting control.

17. Activate emergency shutoffs for gas and fuel supplies.

18. Activate emergency shutdown for additional equipment as shown on the plans.

All automatic events programmed to the addressable alarm point shall be executed and the associated outputs activated.

1. Activation of elevator lobby or elevator equipment room smoke detectors shall initiate recall of the bank of elevators to the 1st floor and lockout the elevator controls. Activation of the first-floor elevator lobby smoke detector shall recall to an alternate floor, and lockout the elevator controls.

2. Activation of heat detectors in elevator shafts and machine rooms shall activate the elevator power shunt trip circuit breaker.

All stairwell/exit doors shall unlock throughout the building.

All self-closing fire/smoke doors held open shall be released.

Transmit E-mail messages to programmed addresses Initiate SMS text messages to smart devices.

1.4.2.3. SUPERVISORY OPERATION

The following representative tasks should be customized for each project

Upon **supervisory activation** of any sprinkler valve supervisory switch, duct smoke detector, guest unit smoke detector (if applicable), guest unit CO detector (if applicable), Tamper, fire pump off-normal, clean agent fire suppression system trouble, or elevator shunt trip supervision, the following functions shall automatically occur:

a. The internal supervisory event audible device shall sound at the control panel.

b. The LCD display shall indicate all applicable information associated with the supervisory condition including zone, device type, device location and time/date.

c. All system activity/events shall be documented on the system printer and logged to system history.

d. Any remote or local annunciator LCD/LED's associated with the supervisory zone shall be illuminated.

e. Transmit signal to the central monitoring station with point identification.

1.4.2.4. TROUBLE OPERATION

Upon activation of a **trouble condition** or signal from any device or internal system integrity monitoring function on the system, the following functions shall automatically occur:

a. The internal panel audible device shall sound at the control panel.

b. The LCD display shall indicate all applicable information associated with the trouble condition including zone, device type, device location and time/date.

c. Trouble conditions that have been restored to normal shall be automatically removed from the trouble display queue and not require operator intervention. This feature shall be software selectable and shall not prevent the logging of trouble events to the historical file.

d. All system activity/events shall be documented on the system printer and logged to system history.

e. Any remote or local annunciator LCD/LED's associated with the trouble zone shall be illuminated.

f. Transmit a trouble signal to the central monitoring station with point identification.

1.5. SUBMITTALS

1.5.1. SUBMITTAL GENERAL

A. The contractor shall not purchase any equipment for the specified system until the Government has approved the project submittals in their entirety and has returned them to the contractor.

B. Approved submittals allow the contractor to proceed with the installation and shall not be construed to mean that the contractor has satisfied the requirements of these specifications.

C. Each submittal shall include a detailed list of variations that the submittal may have from the requirements of the contract documents.

D. The contractor shall provide specific notation on each shop drawing, sample, data sheet, installation manual, etc. submitted for review and approval, of each variation.

E. Any conflicts in the contract documents and/or with Authority Having Jurisdiction (AHJ) requirements shall be submitted to the Contracting Officer Representative in writing 7 days prior to bid.

1.5.2. PRODUCT DATA

System components proposed in this specification shall be UL listed to operate together as a system. The supplier shall provide evidence, with his submittal, of listings of all proposed equipment and combinations of equipment.

For each product submitted provide the following information:

1. Manufacturer's catalog data, to include material description, agency approvals, operating characteristics, electrical characteristics, dimensions, mounting requirements and accessories.

   Product data sheets for system components shall be highlighted to indicate the specific products, features, or functions required to meet this specification.

2. Manufacturer's product installation sheets: A copy of the documentation that is required to be shipped with all listed products by UL.

1.5.3. DESIGN CALCULATIONS

Battery Capacity

Provide battery capacity calculations for each power supply that uses batteries for secondary power. Identify all loads. Identify any loads shed during alarm operation. Use the manufacturer's recommended methods and/or forms.

24 VDC Notification Appliance Circuits

For each 24VDC NAC, provide worst case voltage drop calculations. The load shall be treated as a lump sum at the end of the circuit. *Worst case power supply terminal voltage shall include all applicable internal power supply losses.* Using 85% of nominal circuit voltage (20.4VDC) shall not be accepted as lowest terminal voltage without manufacturer's published documentation stating there are no internal losses in the power supply.

Audio (Speaker) Notification Appliance Circuits - Interior

The system shall be designed for interior building audibility level of 15 dBA-fast over ambient condition and intelligibility. Intelligibility shall be designed to

maintain Common Intelligibility Standard (CIS) rating of 0.7 or Sound Transmission Index of 0.5 in all areas designated on the drawings to have intelligible audio.

Provide dB loss calculations for all audio (speaker) notification appliance circuits. Circuits shall be designed for no more than 0.5 db loss based on lump-sum load method.

All areas required to meet intelligibility requirements shall be modeled in a recognized computer modeling program such as EASE by Renkus-Hienz. All modeling output data shall be part of the submittal.

High Power Speaker Arrays - Exterior

HPSAs shall be designed for an audibility level of 15 dBA-fast over ambient condition and intelligibility. Intelligibility shall be designed to maintain Common Intelligibility Standard (CIS) rating of 0.7 or Sound Transmission Index of 0.5 in outdoor areas during normal weather conditions. Intelligibility may be less than 0.7 CIS in areas of the zone if it can be determined that a voice signal is being broadcast and an individual could walk less than 164 feet to find a location in the zone with at least 0.7 CIS. Values of 0.65 through 0.74 shall be rounded to 0.7.

Fiber Optic Circuits

Provide optical fiber loss (budget) calculations per segment of optical fiber. Fiber loss per segment shall not exceed 80% of equipment manufacturer's permitted loss.

1.5.4. SHOP DRAWINGS

Submit for approval three (3) sets of shop drawings to the consulting engineer for review and comment. Drawings shall be either D-size or E-size blue line drawings and of a sufficient resolution to be completely read. Drawing sets shall be bound.
Additional copies may be required at no additional cost to the project.

Contained in the title block of each drawing shall be symbol legends with device counts, wire tag legends, circuit schedules for all addressable and notification appliance circuits, the project name/address, and a drawing description which corresponds to that indicated in the drawing index on the coversheet drawing. A section of each drawing title block shall be reserved for revision numbers and notes.

Shop drawings shall meet the following requirements:

1. Shop drawings shall be prepared by persons with the following qualifications:

a. Trained and certified by the manufacturer of the submitted equipment in fire-alarm system design.

b. NICET-certified fire-alarm technician, Level III or IV minimum or Alabama registered Professional Engineer.

2. **Coversheet** with project name, address and drawing index.

3. **General notes** drawing with peripheral device backbox size information, part numbers, device mounting height information, and the names, addresses, point of contact, and telephone numbers of all contract project team members.

4. Provide device **floor plans** for all areas served by the fire alarm system. Utilize the CAD Files provided by the consulting engineer in the preparation of the floor plans. Floor plans shall indicate accurate locations for all control and peripheral devices. Drawings shall be NO LESS THAN 1/8-INCH SCALE. If individual floors need to be segmented to accommodate the 1/8" scale requirements, KEY PLANS and BREAK-LINES shall be provided on the plans in an orderly and professional manner.

   a. All addressable devices shall be shown. Coordinate the device address with the same device shown on the riser diagram.
   b. Identify all notification appliances with a circuit and item number. Coordinate the circuit and item number with the same device shown on the riser diagram.
      - ·Show all raceways, marked for size, conductor count with type and size, showing the percentage of allowable National Electric Code fill used.
      - ·Areas required to meet intelligibility requirements shall be clearly identified. Wide area mass notification system plot drawings shall identify all project areas that must meet intelligibility requirements as well as environmentally sensitive areas on or off of the project site where system output shall be minimized.

5. Device **riser diagram**, which individually depict all control panels, annunciators, addressable devices, and notification appliances. Shall include a specific, proposed device description above each addressable device. Shall include a specific, discrete device address that corresponds to addresses shown on the floor plans. Drawings shall provide wire specifications, and wire identification for all conductors depicted on the riser diagram. All circuits shall have identifiers that shall correspond with those required on the control panel and floor plan drawings. End-of-line resistors (and values) shall be depicted.

6. **Control panel drawing**(s) shall show internal component placement and all internal and field terminations. Provide details indicating where conduit

connections shall be made to avoid conflicts with internally mounted batteries. For each additional fire alarm panel, a separate drawing which clearly indicated the panel designation, service and location of the control enclosure.

7. Provide typical **device wiring diagrams** that show all system components, and the respective field wiring. Wire type, gauge, and jacket shall be indicated. When an addressable module is used in multiple configurations for monitoring or controlling equipment, provide a drawing for each application. End-of-line resistors (and values) shall be shown.

8. Provide a fire alarm system **function matrix** that illustrates alarm input/out events in association with initiation devices. Matrix summary shall include system supervisory and trouble output functions.

9. **System Calculations** as detailed elsewhere in this specification.

   Upon receipt of approved drawings from the Authority Having Jurisdiction, the supplier shall immediately forward two sets of drawings to the Government. These drawings shall either be stamped approved or a copy of the letter stating approval shall be included.

1.5.5. CLOSEOUT

Two (2) copies of the following documents shall be delivered to the Contracting Officer Representative at the time of system acceptance.

Project specific operating and maintenance manuals covering the system as installed. The manuals shall contain a description of the system architecture, inputs, notification signaling, auxiliary functions, annunciation, sequence of operations, expansion capability, application considerations and limitations. A generic instruction and operation manual shall not be acceptable.

Technical literature (manufacturer's data sheets and installation manuals/instructions) for all parts of the system, including control panels, smoke detectors, batteries, manual stations, alarm notification appliances, power supplies, and remote alarm transmission means.

Software and Firmware Operational Documentation:

THE END-USER SHALL RETAIN COMPLETE RIGHTS AND OWNERSHIP TO ALL SITE-SPECIFIC SOFTWARE RUNNING IN THE SYSTEM. The fire alarm equipment supplier shall provide hard and soft copies of the software database to the end-user at the end of the warranty period. The database provided shall be useable by any authorized and certified distributor of the product line and shall include all applicable passwords necessary for total and unrestricted use and modification of the database.

The project file shall be stored on the fire alarm equipment so that uploads of the file may be obtained with proper authentication. The authentication credentials shall be provided to the end-user so that at the end-user's discretion any authorized and certified distributor of the product may upload the project file for total and unrestricted use and modification of the database.

Drawings

Provide "As Built" drawings of record of all the shop drawings used in the installation of the system.

Refer to the Submittals - Shop Drawings section of this specification for drawing requirements.

Record of Completion

System supplier and contractor shall provide a certified test report to verify that the system and all components functioned properly and as intended.

A filled-out Record of Completion similar to NFPA 72, 2016 edition figure 7.8.2(a) shall be provided.

Warranty

Provide copies of the warranty documentation as detailed in the Warranty section of this specification.

Service Organization

Provide the name, address and telephone of the authorized factory representative.

Training

Conduct the required training as detailed in the Startup and Commissioning - Training section of this specification.

1.6. QUALITY ASSURANCE

1.6.1. Qualifications of Supplier

The system supplier shall have a minimum of 10 years of experience in distribution and service of the proposed equipment brand.

The supplier shall have successfully designed and installed similar system fire detection, evacuation voice and visual signaling control components on a previous project of comparable scope, size and complexity.

The supplier shall have in-house engineering and project management capability consistent with the requirements of this project. The project shall be supervised by personnel certified by NICET as fire alarm Level IV technicians.

The supplier shall employ qualified and manufacturer certified system designers to perform the detailed engineering design, system calculations, for all the system equipment and programming.

The supplier shall produce all panel and equipment drawings, submittals, and operating manuals, as detailed elsewhere in this specification.

The supplier shall be responsible for providing qualified on-site representative(s) for coordination of system installation, and final system testing and commissioning in accordance with these specifications.

1.6.2. Qualifications of Installer

Before commencing work, submit evidence showing that the equipment installer has successfully installed systems of the similar scope, type and design as specified.

The contractor/installer shall submit copies of all required Licenses and Bonds as required in the State having jurisdiction.

The contractor/installer shall be responsible for retaining qualified and authorized representative(s) of the system manufacturer (The Supplier) specified for detailed system design and documentation, coordination of system installation requirements, and final system testing and commissioning in accordance with NFPA 72 and these specifications.

The contractor/installer shall employ on staff a minimum of one NICET level II technician or a professional engineer, registered in the State of the installation. Contractors unable to comply with the provisions of Qualification of Installers shall present proof of engaging the services of a subcontractor qualified to furnish the required services.

1.7. WARRANTY

1.7.1. Installation Workmanship and Parts

The contractor shall warranty the installation and workmanship for one (1) year and all parts for thirty-six (36) months from date of final acceptance. A copy of the manufacturer’s warranty shall be provided with closeout documentation and included with the operation and installation manuals. The full cost of maintenance, labor and materials required to correct any defect during the warranty period shall be included in the submittal bid.

During the warranty period, each year the contractor shall perform detector sensitivity testing and provide a report to the Contracting Officer Representative. If the system is UL Listed to perform automatic detector sensitivity testing without manual intervention, and if a detector falls outside of sensitivity window the system automatically indicates a devices trouble, then this requirement shall be waived. Documentation from UL shall be provided as proof of automatic sensitivity testing operation.

The system supplier shall maintain a service organization with adequate spare parts stock within 75 miles of the installation. Provide a telephone response to Government's questions within 4 hours and on-site assistance within 24 hours.

Permit the Government's fire alarm technicians to perform temporary bypasses and emergency repairs on the system without voiding the warranty.

1.8. STARTUP AND COMMISSIONING

1.8.1. Test and Inspection

A. Testing, general

1. In addition to tests required in this section, the contractor shall perform all electrical and mechanical tests required by the equipment manufacturer, the Government and the authority having jurisdiction.

2. The contractor shall perform all testing in occupied facilities at times of day that present the lowest impact and disruption to business and activities. Coordinate all testing in occupied buildings with the building Contracting Officer Representative to assure that fire alarm system testing does not interrupt operations. This may require extensive after hours work to perform such testing.

3. All equipment, instruments, tools and labor required to conduct the system tests shall be provided by the installing contractor. At a minimum, the following equipment shall be made available for testing:

    a. Ladders and scaffolds as required to reach all installed equipment.

    b. Meters for reading voltage, current and resistance.

    c. Two-way communication devices

    d. Simulated smoke, heat-producing devices for heat detectors, extension poles for introducing smoke into detectors, as needed.

    e. Manufacturer's instruments to measure air flow through duct smoke detectors.

    f. Decibel meter and intelligibility testing equipment.

g. Status and diagnostic software and PC.

B. All testing shall utilize a written acceptance test plan for testing the system components and operation in accordance with NFPA 72 and this specification. The contractor shall be responsible for the performance of the acceptance test plan, demonstrating the function of the system and verifying the correct operation of all system components, circuits, and system programming.

1. The systems operation matrix created by the equipment supplier shall be used to identify each alarm input and verify all associated output functions.

C. The system test plan shall include but not be limited to the following:

1. Visually inspect all wiring.

2. Verify the absence of unwanted voltages between circuit conductors and ground. The tests shall be accomplished at the preliminary test with results available at the final acceptance test.

3. System wiring shall be tested to demonstrate correct system response for the following conditions:

a. Open, shorted and grounded signal line circuits.

b. Open, shorted and grounded notification appliance circuits.

D. System indications shall be demonstrated as follows:

1. Correct message content for each alarm input at all system displays.

2. Correct annunciator light for each alarm input at each graphic display.

3. Correct history logging for all system activity.

4. Correct sensitivity for all smoke detection devices. The use of system generated sensitivity reports is acceptable in meeting this requirement.

a. Correct signals sent to the Central Monitoring Station.

5. Notification appliances shall be demonstrated as follows:

a. All alarm notification appliances actuate as programmed

b. Audibility and visibility at required levels. The system shall be tested for interior building audibility of 15 dBA-fast over ambient condition and intelligibility. Intelligibility shall be tested to ensure Common Intelligibility Standard (CIS) rating of 0.7 or Sound Transmission Index of 0.5 in all areas designated on the drawings to have intelligible

audio. The mean value of at least 3 readings shall be required to compute the intelligibility score at each test location.

c. HPSAs shall be tested for an outside audibility level of 15 dBA-fast over ambient condition and intelligibility. Intelligibility shall be tested to ensure Common Intelligibility Standard (CIS) rating of 0.7 or Sound Transmission Index of 0.5 in outdoor areas during normal weather conditions. Intelligibility may be less than 0.7 CIS in areas of the zone if it can be determined that a voice signal is being broadcast and an individual could walk less than 164 feet to find a location in the zone with at least 0.7 CIS. Values of 0.65 through 0.74 shall be rounded to 0.7. The mean value of at least 3 readings shall be required to compute the intelligibility score at each test location.

d. For 24VDC NACS, measure and record the voltage at the most remote appliance on each notification appliance circuit, while operating.

6. System control functions shall be demonstrated as follows:

   a. In accordance with the system operation matrix.

7. System off premises reporting functions shall be demonstrated as follows:

   a. Correct information received for each alarm and trouble event

8. Secondary power supply (battery) capacity capabilities shall be demonstrated as follows:

   a. System battery voltages and charging currents shall be measured and recorded at the fire alarm control panels.

   b. System primary power shall be disconnected for 24 hours. At the end of that period, an alarm condition shall be created, and the system shall perform as specified for a period of 15 minutes.

   c. System primary power shall be restored for forty-eight (48) hours.

   d. System battery voltages and charging currents shall again be measured and recorded at the fire alarm control panels.

9. Verify the “As Built” record drawings are accurate.

   Preliminary Testing

   Conduct preliminary tests to ensure that all devices and circuits are functioning properly. Tests shall meet the requirements of the written test plan. Correct any deficiencies, omissions or anomalies and retest the affected devices to assure proper function per the specification.

Acceptance Testing

1. A final acceptance test shall not be scheduled until the system manuals are provided to and approved by the Contracting Officer Representative and the following are provided at the job site:

    a. “As Built” record drawings of the system as actually installed

    b. A copy of the system operation matrix.

2. The acceptance inspector shall use the system “As Built” record drawings in combination with the system operation matrix and the written acceptance test plan during the testing to verify system operation.

3. Should the system not perform to the above criteria it shall not be accepted and the contractor shall correct all deficiencies and shall re-test the system at contractor's expense in the presence of the architect using the same test criteria.

4. The Contracting Officer Representative shall witness the final tests.

5. The central monitoring station and/or fire department shall be notified before final test in accordance with local requirements.

6. Operate every installed device to verify proper operation and correct annunciation at control panel.

7. Open signaling line circuits and notification appliance circuits in at least 2 locations to verify presence of supervision.

Test Reports

A "Fire Alarm System Record of Completion" per the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA72 shall be prepared by the Contractor. Submit three (3) copies to the Contracting Officer Representative. The report shall include, but not be limited to:

A list of all equipment installed and wired.

Certification that all equipment is properly installed and functions and conforms with these specifications.

Sensitivity settings for each smoke detector as measured in place with the HVAC system operating.

Technician's name, certificate number and date.

1.8.2. TRAINING

The system supplier shall schedule and present a minimum of eight (8) hours of formal site-specific instruction for the Government, detailing the proper operation and maintenance of the installed system.

The instruction shall be presented in an organized and professional manner by a person factory trained in the operation and maintenance of the equipment and who is also thoroughly familiar with the installation.

The instruction shall cover the schedule of maintenance required by NFPA 72 and any additional maintenance recommended by the system manufacturer.

Copies of all training aids, presentations, etc. shall be left with the Government.

1.9. MAINTENANCE

1.9.1. Spare Parts

The contractor shall furnish the following extra material that matches the products installed. Spares shall be packaged with protective covering for storage and identified with labels describing contents.

Automatic detection devices - Two (2) percent of the installed quantity of each type, no less than one piece.

Manual fire alarm stations - Two (2) percent of the installed quantity of each type, no less than one piece.

Glass rods or panels for break glass manual fire alarm stations (if used) - <Ten> percent of the installed quantity, but no less than two devices.

Audible and visible devices - One (1) percent of the installed quantity of each type, but no less than two (2) devices.

Keys - A minimum of three (3) sets of keys shall be provided and appropriately identified.

1.9.2. Maintenance Contract

The supplier shall offer for the Government’s consideration at the time of system submittal a priced inspection, test, maintenance and repair agreement for the installed system in compliance with the inspection and maintenance requirements

of NFPA 72 for a period of 12 months, to commence after the expiration of the maintenance agreement included in this contract.

The Government shall have the option of renewing the agreement at the price quoted, in yearly increments up to a maximum of five (5) years.

1.10 QUALIFIED FIRE PROTECTION ENGINEER (QFPE)

A. The QFPE is required per UFC 3-600-01 and UFC 4-021-01.

B. The contractor shall provide a Qualified Fire Protection Engineer (QFPE) as

defined by UFC 3-600-01 to be the QFPE for the project. The QFPE shall work for the contractor and be responsible for producing, reviewing, and stamping all shop drawings and material submittals for the fire alarm/MNS systems. The QFPE shall provide inspections during construction to ensure systems compliance. Prior to final inspection, the QFPE shall perform a pre-final inspection and provide a report for AHJ review. The QFPE must also be involved in the final inspection with the government AHJ. The QFPE must monitor the installation of the fire alarm/MNS system and certify in writing to the government AHJ that the systems have been constructed and operate as intended to comply with UFC 3-600-01 and UFC 4-021-01.

PART 2 - PRODUCTS

2.1. ACCEPTABLE MANUFACTURERS

A. The manufacturer of the system equipment shall be regularly involved in the design, manufacture, and distribution of the products specified in this document. These processes shall be monitored under a quality assurance program that meets ISO 9000/9001 requirements.

B. Approved Products: All panels and peripheral devices shall be of the standard product of single manufacturer and shall display the manufacturer’s name of each component.

C. Fire alarm specifications are written around Edwards. Gamewell-Honeywell and Silent Knight are approved equals.

2.2. FIRE ALARM PANEL

2.2.1. General - Fire

Overview

All materials, equipment, accessories, devices and other facilities and appurtenances covered by these specifications or noted on the drawings shall be new, best suited for the intended use and shall conform to applicable and

recognized standards for their use, and supplied by a single manufacturer. Should any equipment provided under this specification be supplied by a different manufacturer, that equipment shall be recognized compatible by BOTH manufacturers and listed as such as required by Underwriters' Laboratories.

The fire alarm control panel(s) shall be a multi-processor based networked system designed specifically for fire, one-way and two-way emergency audio communications, and smoke control applications. The control panel shall be listed and approved for the application standard(s) as listed in the References section of this specification.

The control panel shall include all required hardware, software and site-specific

system programming to provide a complete and operational system. The control panel(s) shall be designed such that interactions between any applications can be configured and modified using software provided by the manufacturer. The control panel(s) operational priority shall assure that life safety takes precedence among the activities coordinated by the control panel.

The operating controls shall be located in a dead-front steel enclosure behind a locked door with viewing window. All control modules shall be labeled, and all zone locations shall be identified. All panel modules shall be placement supervised and signal a trouble if damaged or removed.

System Features

Each control panel shall include the following capabilities:

- Support multiple languages / dialects.
- Supervision of the system electronics, wiring, detection devices and software
- Up to 2500 analog/addressable input/output points
- Network, a dedicated IPv6 configuration and support mesh configuration.
- Network configuration support for Class A, Class B, Class X, Class N.
- Network physical media connections via fiber, twisted pair, or CAT5 in any combination.
- Network distance between two panels up to 3,280ft using CAT5 wire, 5,000 feet using twisted pair wire.
- Networks deployed with CAT5 wire shall support Class A, Class B, Class X, Class N, mesh wiring topologies.

- Network support for back-to-back pass through degraded-mode operation for media to media applications.
- Network back-to-back pass though shall maintain network connectivity on power down or catastrophic failure of a single panel.
- The ability to download all applications and firmware from the configuration computer at a single location on the fire network.
- The ability to upload project files from any location on the fire network
- Panel time, panel audible signal patterns, and indicator flash rates are synchronized across the network.
- Connections to outside systems shall be made via a listed for the purpose firewall interface.
- Support multiple dialers (DACTs) and modems, IP communication to the central station and cellular connections.
- Support multiple IP connections to external services including, central stations, email servers, web interfaces, and reports.
- Email messages support multiple languages in native characters and match the languages supported in the panel.
- Email messages support symbolic and color alarm event high lighting.
- System reports provide a graphical representation of sensitivity thresholds, detector dirty level and CO Life left.
- An internal audible signal with different patterns to distinguish between alarm, supervisory, trouble and monitor events
- Support multiple 24 VDC and Audio NACs
- Configurable switches and LED indicators to support auxiliary functions with software selectable LED colors of Red, Yellow, Blue, Green or White.
- User interface through color touch screen LCD display.
- Log up to 20,000 chronological events
- A real-time clock for time stamps and timed event control with onboard power back-up
- Electronic addressing of intelligent addressable devices

- Provide an independent hardware watchdog to supervise software and CPU operation
- The ability for “Dry” alarm, trouble and supervisory relay contacts
- Control panel modules shall plug into a chassis assembly for ease of maintenance
- Field wiring shall connect to the panel using removable connectors

User Oriented Features

Each control panel shall include the following user-oriented features:

- A color touchscreen LCD user interface control/display that shall annunciate and control system functions.
- Provide discreet system control switches for reset, alarm silence, panel silence, drill switch, these system control switches shall be constructed of a silicon rubber to provide tactile feedback and include an accompanying indicator that shall provide additional visual feedback of switch activation. Overlay style embedded switches are not considered equal.
- The reset, alarm silence, panel silence and drill system control switches shall provide color coding for ease of distinguishing one from the other.
- Color LCD shall provide visibility of 8 events hands free. Each event can include a minimum 40-character site specific location text. The LCD allows the use of on screen scrolling via display switches or by ‘swiping’ the display screen.
- A “lamp test” feature shall verify operation of all visual indicators on the panel and a visual test of the LCD.

  An authorized user shall have the ability to operate or modify system functions including system time, date, passwords, holiday dates, restart the system and clear control panel event history file.

  An authorized user shall have the ability to disable/enable devices, zones, actions, timers and sequences.

  An authorized user shall have the ability to activate/restore outputs, actions, sequences, and simulate detector smoke levels. The selection of devices, zones, actions, timers and sequences shall be made via a descriptive facility structure view removing the need for look up books or entry of numerical addresses. Systems requiring the entry of numeric addresses shall not be considered as equal.

An authorized user shall have the ability to enter time and date, reconfigure an external port for download programming, initiate programming and change passwords.

An authorized user shall have the ability to test the functions of the installed system.

Service groups shall facilitate one-man walk testing. Service/test groups shall be capable of being configured with any combination of addressable devices, independent of SLC wiring. It shall be possible to program alternate device responses when the device's service group is active. Devices not in an active service group shall process all events normally.

Provide internal system diagnostics and maintenance user interface controls to display/report the power, communication, and general status of specific panel components, detectors, and modules.

SLC loop controller diagnostics shall identify common alarm, trouble, ground fault, Class A fault, and map faults. Map faults include wire changes, device type changes by location, device additions/deletions and conventional open, short, and ground conditions. Ground faults on the supervised circuit wiring of remote addressable modules shall be identified by device. Systems that provide only device address are not considered equal.

An authorized user shall have the ability to generate a report history for alarm, supervisory, monitor, trouble including restore activity.

The panel history shall support storage of up to 20,000 events. History events shall include but not be limited to Event Type, System Command operations, Date and time of the event. Reports shall be displayed locally on the panel LCD display, printed to a system printer, review through a web browser and support exporting to .xml file format.

To enhance forensic examination of history, the system shall support the ability to store the FIFO event history log into a separate region of the database, not impacted by the FIFO operation of events preventing overwriting during forensic examination of an incident. Placing an archive of the History into a separate region of the database shall not interrupt FIFO of the main history or erase any portion of the main History.

Both FIFO history and archived history shall be available for review through the panel LCD display, be printable through the system printer, retrievable through web services interfaces and be exportable as .xlm formatted file.

Web browser-based History shall be easily sorted by History for today, History from yesterday, History this week, History last week, History this month, History last month, History this year, History last year, and in combinations.

System reports shall provide detailed description of the status of system parameters for corrective action or for preventative maintenance programs. Reports shall be displayed by the operator interface or capable of being printed on a printer.

The system shall support multiple printers on the network, printers may be configured for event printing, reports printer or a combination of tasks. Printing of reports and events shall be supported across the entire fire panel network initiated from any LCD user interface point on the network. There must be a method to cancel a report while printing.

The system shall support printer connections to a panel or remote annunciators as required by the specific project requirements.

Printing shall support alarm event high lighting by symbolic character on monochrome printers.

The system shall support single button press printing to configured printers of an active event queue.

Remote connection to the panel shall be by interconnection between the Government's existing TCP/IP network and the native fire panel IP network equipment supplied under this contract as described elsewhere in this specification.

Fire panel remote connections shall include Cybersecurity measures that meet or exceed FIPS PUB 197.

The system shall not use easily removable devices, such as SD cards or external memory storage for system critical information including programming and project files storage.

Security relevant information, such as: failed login attempts, failed unauthorized accesses, and user modification shall be logged to panel history. Unsuccessful authentication attempts shall not leak information regarding the presence of the system or users.

The system shall only transmit credentials that are encrypted. The system shall provide for multiple users, roles to ensure proper access by user for the role they perform on the system. All passwords shall use a Cypher Algorithm, password must use a hash, no password or authentication shall be exposed in any format in the system database viewable as plain text.

Sensitive information shall not be logged to history or displayed on service tools (eg. passwords, PINs etc.).

The system shall support all default passwords and pass phrases being changed in order to complete the setup, prior to being operational. This includes SSID passphrases, default accounts, admin accounts, etc.

No special software or hardware shall be required remotely to retrieve reports; report shall be accessed through the use of a web browser so that any device supporting a web browser may be used.

Proper authentication shall be required to access the system with a web browser.

An authorized user shall have the ability to display/report the condition of addressable analog detectors. Reports shall include device address, device type, percent obscuration, and maintenance indication. The maintenance indication shall provide the user with a measure of contamination of a device upon which cleaning decisions can be made.

Programmability

A Windows-based Configuration Utility (CU) shall be used to create the site-specific system programming. The utility shall facilitate programming of any input point to any output point. The utility shall allow customization of fundamental system operations using initiating events to start actions, timers, sequences and logical algorithms.

·Zoning of initiation devices.

·Initiation of events by time of day, day of week, day of year.

·Initiation of events by matrix groups (X-Y coordinate relationships) for releasing systems.

·Initiation of events using OR, AND, NOT and counting functions.

·Prioritizing system events.

·Programmable activation of detector sounder bases by detector, groups of bases, or all bases.

·Directing selected device messages to specific panel annunciators
·Detector sensitivity selection by time of day
·Support of 256 Central Monitoring Station accounts and directing selected device messages to any one of ten Central Monitoring Stations.

·Support for event driven Email notifications

·Support for event driven SMS notifications via SMTP servers

The configuration utility shall time and date stamp all changes to the site-specific program and shall facilitate program versioning and shall store all previous program version data. The utility shall provide a compare feature to identify the differences between different versions of the site-specific program.

The configuration utility shall be capable of generating reports which detail the configurations of all fire alarm panels, addressable devices and their configuration settings including generating electrical maps of the addressable device SLCs.

The configuration utility shall support the use of bar code and QR code readers to expedite electronic addressing and custom programming functions.

Please refer to the *General, System Description Section* for this project's site-specific system operating requirements.

The fire alarm control panel shall be an EDWARDS EST4 and support components in an appropriately sized enclosure. Approved Equals are Simplex, Siemens and Notifier.

2.2.2. Power Supply

System power supply(s) shall be a high efficiency switched mode design providing multiple supervised power limited 24 VDC output circuits as required by the panel and external loads fed by the panel. Initial power supply loading shall not exceed 80% of power supply capacity in order to allow for future system expansion.

Each system power supply shall be individually supervised. Power supply trouble signals shall identify the specific supply and the nature of the trouble condition.

It shall be possible to parallel system power supplies to increase capacity or to provide redundant operation.

Upon failure of normal (AC) power, the affected portion(s) of the system shall automatically switch over to secondary power without losing any system functionality.

All system power supplies shall be capable of recharging their associated batteries, from a fully discharged condition to a capacity sufficient to allow the system to perform consistent with the requirements of this section, in 48 hours maximum.

All standby batteries shall be continuously monitored by the power supply. The power supply shall be able to perform an automatic load test of batteries and indicate a trouble condition if the batteries fall outside a predetermined range. Power supplies shall incorporate the ability to adjust the charge rate of batteries based on ambient temperatures. The power supply shall automatically disconnect the battery before low voltage damages the battery. Low battery and disconnection of battery power supply conditions shall immediately annunciated as battery trouble and identify the specific power supply(s) affected.

Batteries shall utilize sealed lead acid chemistry. Initial battery capacity shall provide 125% of calculated capacity requirements in order to allow for future system expansion.

All AC power connections shall be to the building's designated emergency electrical power circuit and shall meet the requirements of NFPA 70 and NFPA 72. The power circuit disconnect means shall be clearly labeled FIRE ALARM CIRCUIT CONTROL and shall have a red marking. The location of the circuit disconnect shall be labeled permanently inside each control panel the disconnect serves.

The power supply shall be an EDWARDS 3-PPS/M series.

2.2.3. User Interface

2.2.3.1. Panel LCD and Common Controls

The system shall be designed and equipped to receive, monitor, and annunciate signals from devices and circuits installed throughout the facility.

Each fire alarm control panel shall be capable of supporting a backlit color LCD display. The display on each system panel shall be configurable to *display* the status of any and/or all combinations of alarm, supervisory, trouble, monitor, or service group event messages on the network. Each LCD display on the system shall be capable of being programmed to allow *control* functions of any combination of panels on the entire network. All panel touch screen LCD displays shall use resistive technology, be a minimum of 5.7 inches in size and support a minimum of 256K colors. Each display shall support the display of a minimum of 8 events simultaneously without the need to scroll or make manual selections at the display.

The LCD display shall provide a minimum of 10 separate event queues to minimize operator confusion by automatically categorizing event types, the queues shall include but not be limited to Alarm, Emergency, Supervisory,

Disables/Bypasses/Test, Ground Fault, Monitor, and FirePhone call in. To further enhance the usability only queues with events shall display, queues without active events shall not be displayed. It shall be possible to scroll through and view specific alarm, trouble, supervisory and monitor events separately. Having to scroll through a mixed list of event types shall not be considered as equal. The total number of active and disabled events by type shall be displayed. Visual indication shall be provided of any event type that has not been acknowledged or viewed. It shall be possible to customize the designation of all user interface LEDs and Switches for local language requirements.

The display shall support Instructional text messages by event of up to 2,000 characters each.

Receipt of alarm, trouble, and supervisory signals shall activate integral audible devices at the control panel(s) and at each remote annunciation device.

The LCD display shall contain the following system status:

System Power Indicator

System Test Indication

System CPU Fail Indicator

Ground Fault Indication

Disabled Points Indication

System Normal Indication

System Common Alarm Indicator

System Common Trouble Indicator

System Supervisory Indication

System Common Monitor Event Indication

Call-In Indication

Request for Control Indication

Emergency Indication

The LCD display shall contain the following system switch/indicators. Each common control switch shall be tactile in

nature and shall not be part of the touch screen display area. The switches shall be prominent from the display face allowing ease of operation, be provided with color coded ring as described below and be local language/dialect adaptable. Confirmation of user switch activation shall be provided by illumination of the accompanying indicator. The switches shall support customization by individual LCD location on the project. Switch designation and operation shall be as per the plans or shall be as follows:

Panel Silence Switch with black color coding and visual indicator

Drill Switch with white color coding and visual indicator

System Alarm Silence Switch with red color coding and visual indicator

System Reset Switch with green color coding and visual indicator

The LCD display shall contain the following system function Buttons

System Event Message Queue Scroll Bar.

Details Button (provides an additional 2000-character instructional text message about the device highlighted by the operator.)

Action Bar

The LCD display shall contain the following project display items:

Graphical tree representation of the project

Color coded counters displaying the number of active Alarms, Emergency, Supervisory, Disable, Trouble, Ground fault, events shall be provided. Counters shall only display when events are present for the queue type and shall not be displayed when there are no active events.

Time and date. The date shall be selectable as to the displayed order of its elements and shall be displayed as <MM/DD/YYYY>, <DDMMYYYY>, <YYYYMMDD>.

Events displayed on the LCD shall show the event type with time stamp and text describing the location of the device.

The system Color Touchscreen LCD display shall be an EDWARDS model 4-LCD series.

2.2.3.2. LEDs and Switches

A modular series of switches and LED indicators shall be available to customize the fire alarm control panel operation in accordance with this specification. All LED and switch functions shall be software programmable. Switches shall be configurable for momentary, maintained, toggle, or "exclusive or" operation as required by the application. Any group of switches may use "exclusive or" in combination of 2 switches to 24 switches in a group.

LEDs shall be dynamically programmable for slow flash, fast flash or steady operation. LED/Switch modules shall be capable of mounting in any available fire panel or annunciator inner door position. All LED/Switch modules shall be supervised. All individual indicator LED location shall be configurable for color, including Red, Yellow, Blue, Green or White to facilitate identification from a distance and maximize display location usage. The LED/Switch modules shall provide buttons that are silicon rubber to provide tactile feedback for a button press. LEDs adjacent to each button will provide illuminated visual feedback for a button press. The LED/Switch modules provide insert pockets with room by each LED/Switch location for custom function identification. The LED/Switch modules insert pocket provides room at the top to identify the function of the module's indicators and buttons as a group. The inserts shall be printable from a LaserJet printer, support the use of background colors to accentuate switch grouping and mount under a protective membrane.

The LED/Switch modules shall be EDWARDS model, 4-24L, 4-24L12S, 4-24L18S, 4-24L24S.

2.2.3.3. Audio Annunciation and Control

Provide emergency audio as part of the fire alarm control. The emergency audio shall contain a paging microphone, pre-recorded messages and zoned amplifiers capable of delivering multi-channel audio messages. The system shall support a minimum of 100 audio channels. Transmission of audio shall be over the same data network cabling as the fire panel data. The network cabling shall be a dedicated Category 5 to remote parts of the facility.

For systems requiring multiple locations for paging control, the ability to Request/Grant/Deny page privileges shall be supported in any combination. Priorities based on wiring locations are not considered equal. Priorities shall be configured in software for

operational needs between Autonomous Control Units (ACU), Central Control Station (CCS) and Local Operators Consoles (LOCs). The system shall support a minimum of 9 priority levels.

Each panel shall store digitally up to 750 minutes of pre-recorded audio message files without the need to add additional memory storage devices. These messages shall be automatically played in various areas of a facility under program control. The system shall have the capacity to store up to 250 individual audio messages. The system shall support up to 100 channels of audio. An audio channel shall support up to 250 individual messages. Each panel shall support simultaneous play back of seven (7) different message channels in addition to a live page message. Systems that cause signaling devices to go silent while performing any signaling functions will not be accepted. The system shall support repeat counts of audio messages and stacking of audio messages in a FIFO configuration.

During non-alarm conditions, each panel shall supervise its amplifiers, inter-panel networking shall be supervised, and audio hardware shall be supervised providing total audio path supervision.

Each FACP containing an audio amplifier or audio source connection shall contain its locally required pre-recorded messaging onboard. Should a fire AND a control network system failure occur, the programmed pre-recorded messages shall be played from the locally stored data. Sending pre-recorded messages across a network or external panel interconnection shall not be considered equal. Should local pre-recorded audio be unavailable, the local amplifiers shall provide an integral backup 1 KHz temporal tone generator which shall operate in the event primary audio signals are lost and the amplifier is instructed to broadcast alarm information. The amplifier shall support an alert pattern distinct from the evacuation temporal tone pattern.

The system shall provide control switches and color LCD display to direct live paging messages as follows in any combination:

· "All Call" to direct the page messages to wide areas in the facility, overriding all other messages and tones. "All Call" shall automatically, without user intervention, not affect signaling in areas defined as ‘other’ nor active Mass Notification areas.

· "Page to Evacuation Area" to direct the message to the evacuation area(s), overriding all other messages and tones.

· "Page to Alert Area" to direct page messages to the area(s) receiving the alert message and tones, overriding all other messages and tones.

· "Page to Balance of Building" to direct page messages to the areas in the facility NOT receiving either the evacuation area or alert area messages.

· "Page by Phone" to select the firefighter's telephone system as the paging source.

· "Page to <Other>" shall provide for specific paging in special case areas, as an example stairwells.

· "Page to Emergency" shall provide paging into areas with active Mass Notification events.

The system shall support selection, in any combination, of the above audio controls. Systems that require single audio control selection requiring paging messages to be repeated for different areas shall not be considered as equal.

The system shall provide individual discrete switches for each page zone selection. Each switch shall have two LEDs, a Page Active LED blue in color and Page Zone Trouble LED yellow in color. Each switch shall be supplied with a printed customer label describing the page zone, handwritten labels will not be accepted.

The system shall provide zone audio activity indicators, each indicator shall flash fast when selected and turn steady when paging.

The system shall provide configurable pre-announce tones for emergency and non-emergency paging. The tones shall be separate and differentiated between the two operations.

The system shall automatically deliver a configurable pre-announce tone or message when the emergency operator presses the microphone PTT key for each premise/building. A 'ready to page' LED shall flash during the pre-announce phase and turn steady when the system is ready for the user's page delivery. The system shall include a page deactivation timer which activates for 10 seconds when the emergency user releases the microphone talk key. Should the user subsequently press the microphone key during the deactivation period a page can be delivered immediately. Should the timer complete its cycle the system shall automatically

restore emergency signaling and any subsequent paging will be preceded by the pre-announce tone.

Each paging microphone assembly shall include a three color VU meter display indicating to the emergency operator their voice level.

The system shall support line level input as an audio source. The line level input to output relationship shall be controlled through programming and it shall be possible for the input to be programmed to any output on any system channel. The system shall assign priorities to audio channels based on system programming.

The fire alarm control panels shall support remote cabinets with zoned amplifiers to receive, amplify and distribute live voice paging, line level input and locally stored pre-recorded messages through speakers over supervised circuits.

The system shall provide confirmation of audio channels status for pre-recorded messages, when streaming live audio or from external inputs.

The emergency audio control shall consist of EDWARDS 4-MIC, 4-LCDAUDTEL series, 4-24L series, 4-LCD series.

2.2.3.4. Remote Microphone

Remote microphones shall be included in the LOCs as indicated on the drawings.

The remote microphone shall facilitate live page announcements over the ACU/FACP system from locations distant from the ACU/FACP.

The remote microphone shall feature a Push-to-Talk switch; ready to page LED, and three color VU meter giving indication of the operator’s voice level.

The remote microphone shall operate on filtered-regulated 24 VDC power derived from the panel power supply. Power shall be supplied directly from the ACU/FACP or listed auxiliary power supply, ensuring a reliable and monitored power source.

Audio from the remote microphone shall be processed and sent to paging areas based on programming or from page selection via manual switches and color LCD display. Audio shall be routed to other areas via the systems network infrastructure cabling, having to

pull additional communications cables to support remote microphones is not acceptable.

The remote microphone shall be an EDWARDS model 4-MIC

2.2.4. Signaling Line Circuits

2.2.4.1. Wire Network Wiring

The network inter-panel wiring shall be designed to support the topologies required by the project including mixes of ring, bus, star and mesh. The network shall be configured as combination Class A, Class B, Class X, Class N as described in the project drawings. The network shall support physical media connections via fiber, twisted pair or CAT5 in any combination. Networks restricted to Class N wiring shall not be acceptable.

The Network shall support data transmission of panel-to-panel data, voice audio and firefighters' telephone data on a single twisted pair or single optical fiber.

The system supplied under this specification shall utilize panel to panel, direct wired peer-to-peer IPv6 network operations. The network shall be 'plug and play' networking, not needing a network administrator to configure the network. The system shall utilize independently addressed, smoke detectors, heat detectors and input/output modules as described in this specification. The panel-to-panel network shall contain multiple panels and annunciators consisting of the command center, main controller, remote control panels and color LCD/LED annunciation. Each panel is an equal, active functional node of the network, which is capable of making all local decisions in the event of a panel failure or communications failure between panels. The network shall support a back-to-back pass-through degraded mode for like copper wiring and for copper to fiber in any combination. The pass through shall maintain network connectivity on power down or catastrophic failure of a single panel, networks that do not support network pass-through shall not be considered equal. A panel to panel network deploying centralized servers for Domain Name Services (DNS) or Dynamic Host Configuration Protocol (DHCP) will not be considered equal.

When a network is wired in a Class B configuration, a single break or short on the network wiring isolates the system into two groups of panels. Each group continues to function as a peer-to-peer IPv6 network working with their combined databases. When wired using a Class A configuration, a single break or short on the

network wiring causes the system to isolate the fault, and network communication continues uninterrupted, without any loss of function. Should multiple wiring faults occur, the network re-configures into many sub-networks and continues to respond to alarm events from every panel that can transmit and receive network messages. When the network is wired in a Class X configuration, a single open or single short or combination of single open fault and ground fault, the network communication continues uninterrupted, without any loss of function.

Network interface controllers shall be small form factor pluggable (SFP) and shall be hot pluggable.

The copper network interface shall be an EDWARDS 4-NET-TP (twisted pair) series, 4-NET-CAT (Supporting Category 5e or better).

The fiber optic network interface shall be an EDWARDS 4-NET-MM multi-mode.

2.2.4.2. Intelligent Addressable Device

The signaling line circuit connecting panels/nodes to intelligent addressable devices including, detectors, monitor modules, control modules, isolation modules and notification circuit modules shall be **Class A.** All signaling line circuits shall be supervised and power limited.

When the addressable devices on a signaling line circuit cover more than one designated fire/smoke compartment, a wire-to-wire short on the circuit shall not affect the operation of the addressable devices in other fire/smoke compartments.

Each SLC shall support 125 addressable detector addresses and 125 module addresses. The SLC shall support 100% of all addressable devices in alarm and provide support for a 100% compliment of detector isolator bases. Initial circuit loading shall not exceed 80% in order to allow for future system expansion.

T-taps (branching) shall be permitted on Class B circuits. Where possible, the devices installed at the end of each branch should be easily accessible for troubleshooting, e.g. a pull station at normal mounting height. **The system shall support Class B T-taps (branching) from Class A risers.**

The addressable device SLC module shall be UL Listed for use with code compliant, electrically sound existing wiring.

Each intelligent addressable device shall transmit information about its location with respect to other devices on the circuit. This information shall be used to create an "As-Built" wiring diagram as well as provide enhanced supervision of a device's physical location. The device message and programmed system output function shall be associated with the device's location on the SLC circuit location and not a device address.

The SLC module shall allow replacement of "same type" devices without the need to address and reload the "location" parameters on replacement devices.

The SLC/Panels shall notify the user when un-programmed devices are detected on the SLC circuit. The SLC/Panels shall notify the user when the wrong device type is installed at a location configured for a different device type on the SLC circuit.

Should an SLC Controller CPU fail to communicate, the SLC circuit shall go into the stand-alone mode. The circuit shall be capable of producing a loop alarm if an alarm type device becomes active during stand-alone mode to enhance system integrity.

The addressable device signaling line circuit module shall be an EDWARDS 3-SSDC1 for single SLC and 3-SDDC1 for dual SLC.

2.2.5. Notification Appliance Circuits

2.2.5.1. Notification Appliance Circuits

General

All notification circuits shall be supervised, and power limited. Non-power limited circuits are not acceptable. All notification appliance circuits shall be Class A.

Initial circuit loading shall not exceed 80% in order to allow for future system expansion.

24 VDC Notification Appliance circuits

Notification appliance circuits shall have a minimum circuit output rating of 2 amps @ 24 VDC.

24VDC NACs shall be polarized and provide both strobe synchronization and a horn silence signals on a single pair of wires.

Audio Notification Appliance Circuits

Audio notification appliance circuits shall be polarized and have a minimum circuit output rating of 50 watts @ 25V audio, and 35 watts @ 70V audio.

2.2.5.2. Audio Amplifiers

Provide emergency audio as part of the main fire alarm control panel. The emergency audio shall contain a paging microphone and zoned amplifiers capable of delivering multi-channel audio messages. The system shall support a minimum of 100 audio channels. Transmission of live paging audio shall be over the same data network cabling as the fire panel data. The network data transmission shall be over a dedicated Category 5 cabling to remote parts of the facility. Pre-recorded messages shall be stored locally at each panel, to reduce the impact of wire faults during a fire event. Transmission of pre-recorded audio across the network for notification during an event is not acceptable.

For systems requiring multiple locations for paging, the ability to Request/Grant/Deny page privileges shall be supported. Priorities shall be configured in software covering the operational priorities between Autonomous Control Units (ACU), Emergency Communication Control Unit (ECCU) and Local Operators Consoles (LOCs). As a minimum the system shall consist of: Local Page, Emergency Communication, Evacuation, Alert, Auxiliary, Other and General Signaling. Channels shall support hierarchical operation and be controllable through system programming. The audio system shall also provide Elevator, Stairwell and Auxiliary signaling. Systems that cause signaling devices to go silent while performing any signaling functions will not be accepted. The system shall support repeat counts of audio messages and stacking of audio messages in a FIFO configuration.

The audio system zoned amplifiers must be able to operate 25 VRMS or 70 VRMS speakers and be power limited and protected from short circuit conditions on the audio circuit. The amplifier output must be power limited and wired in a Class A configuration. The amplifiers shall source pre-recorded messages locally and shall not have to rely on network communications to receive pre-recorded messaging. Should local audio be unavailable the amplifiers shall provide an integral backup 1000 Hz temporal (3-3-3) tone generator evacuation notification and 20PPM for alert notification which shall operate in the event primary audio signals are lost and the amplifier is instructed to broadcast alarm information.

Provide a standby audio amplifier that shall automatically sense the failure of a primary amplifier, and automatically program themselves to select and de-multiplex the same audio information channel of the failed primary amplifier, and fully replace the function of the failed amplifier. Amplifiers shall also include a 24 VDC notification appliance circuit rated at 24Vdc @ 3.5A for connection of visible (strobe) appliances. This circuit shall be fully programmable.

Provide as minimum, one twenty (20) watt audio amplifier per paging zone. Initial amplifier loading shall not exceed 80% in order to allow for future system expansion. Calculations shall assume each speaker is connected at one (1) watt.

Audio amplifiers shall be EDWARDS 3-ZA series.

2.2.6. Initiating Device Circuits

2.2.6.1. Initiating Device Circuits

Conventional (2-wire) initiating device circuits monitoring manual fire alarm stations, smoke and heat detectors, waterflow switches, valve supervisory switches, fire pump functions, and air pressure supervisory switches shall be Class A.

Initiating device circuits shall be configurable for latched or non-latched operation and configurable to initiate alarm, supervisory or monitor events.

End-of-line resistors for conventional initiating device circuits shall be covered with insulated tubing, terminated with ring lugs and display a UL label.

2.2.7. Off Premises Communications

2.2.7.1. DACT

The system shall provide off premises communications capability using a Digital Alarm Communications Transmitter (DACT) for sending system events to multiple Central Monitoring Station (CMS) receivers.

The transmission to the Central Station shall be over conventional telephone lines.

The system shall provide the CMS(s) with point identification of system events using Contact ID (SIA DC-05) or SIA DCS protocols. The system shall also transmit an alphanumeric system

activity message, by event, to a commercial paging system provided by the Government, using TAP Pager protocol and an internal V.32BIS or greater 14.4Kbaud modem.

The dialer shall support up to 255 individual accounts and to send account information to eight (8) different receivers, each having primary and secondary telephone access number. System events shall be capable of being directed to one or more receivers depending on event type or location as specified by the system design.

In the event of the fire alarm panel CPU failure during a fire alarm condition, the local DACT degrade mode shall transmit a general fire alarm signal to the CMS.

The Government shall arrange for two (2) dedicated loop-start phone lines to be terminated using two RJ31X jacks within 5 ft. of the main fire alarm control panel.

The DACT shall be an EDWARDS 3-MODCOM(P).

2.3. REMOTE BOOSTER POWER SUPPLY

2.3.1. Remote Booster Power Supply

Install Remote NAC Power Supplies (boosters) at the locations shown on the drawings, as required, to minimize NAC voltage drops. Remote NAC power supplies shall be treated as peripheral NAC devices and shall not be considered fire alarm control units.

The NAC power supplies shall be fully enclosed in a surface mounted steel enclosure with hinged door and cylinder lock and finished in red enamel. Door keys shall be the identical to FACP enclosure keys. The enclosure shall have factory installed mounting brackets for additional UL listed fire alarm equipment within its cabinet. Enclosures shall be sized to allow ample space for interconnection of all components and field wiring, and up to 10AH batteries. The enclosure shall have provisions for an optional tamper switch. All FACP addressable control modules required to initiate the required NAC power supply output functions shall be installed within the NAC power supply enclosure.

Remote NAC power supply input circuits shall be configurable as Class B supervised inputs or for connection to any 6 to 45 VDC initiation source.

Remote booster power supplies shall provide four (4) synchronized Class B or two (2) Class A, supervised and power limited, 24VDC filtered and regulated Notification Appliance Circuits (NACs). Each NAC output shall be configurable as a continuous 24Vdc auxiliary power output circuit. The booster power supply shall be capable of a total output of 10 amps.

The power supply NACs shall be configurable to operate independently at any one of the following rates: continuous synchronized, or 3-3-3 temporal. It shall be possible to configure the NACs to follow the main FACP NAC or activate from intelligent addressable synchronized modules. All visible NACs within the facility shall be synchronized.

Upon failure of primary AC power, the remote power supply shall automatically switch over to secondary battery power without losing any system functions. It shall be possible to delay reporting of an AC power failure for up to 6 hours. All standby batteries shall be continuously monitored by the power supply. Low battery and disconnection of battery power supply conditions shall immediately be annunciated locally as battery trouble. All power supply trouble conditions (DC power failure, ground faults, low batteries, and IDC/NAC circuit faults) shall identify the specific remote power supply affected at the main FACP. All power supply trouble conditions except loss of AC power shall report immediately. Interconnecting NAC Booster power supplies in a manner which prevents identification of an individual power supply trouble shall not be considered as an equal.

The remote booster power supply shall be capable of recharging up to 24AH batteries to 70% capacity in 24 hours maximum. Batteries provided shall be sized to meet the same power supply performance requirements as the main FACP, as detailed elsewhere in this specification.

All AC power connections shall be to the building's designated dedicated emergency electrical power circuit. The power circuit disconnect means shall be clearly labeled FIRE ALARM CIRCUIT CONTROL and shall have a red marking. The location of the circuit disconnect shall be labeled permanently inside each remote NAC power supply the disconnect serves.

The remote NAC power supplies shall be EDWARDS model BPS/APS series.

2.4. ANNUNCIATORS

2.4.1. Local Operating Console

Provide a UL864 listed semi-flush mounted annunciator / local operating consoles (LOC) at the location(s) shown on the drawings. When semi-flush mounting the outer door shall not protrude into the occupied space beyond 4.5 inches.

The LOC shall utilize standard fire alarm user interface components to provide the ability to operate the Autonomous Control Unit/Fire Alarm Control Panel functions from alternate locations within the building. The LOC shall be capable of receiving the same event information and issuing the same system commands as the ACU/FACP to which it is connected, as specified in the functional matrix elsewhere in this specification. Functions shall include initiating all pre-recorded messages and live page messages.

The following common indicators and controls shall be provided on the LOC.

The LOC shall include an integral color LCD touch screen text annunciator. The

LOC shall include an integral remote microphone for fire audio system paging. LOC Power, System Trouble, and Signal Silenced LEDs; System Reset, Silence, Panel Silence, Drill push buttons and support local Lamp Test.

The LOC shall be equipped with a key locked see-through door. The LOC shall be powered by a battery backed up nominal 24 VDC power source. Power to the LOC shall have a redundant path and connection.

All communication between the LOC annunciator and the fire alarm control panel shall be via an IPv6 network.

The Annunciator / LOC shall be EDWARDS 4-ANN series.

2.5. PERIPHERAL COMPONENTS

2.5.1. Addressable

2.5.1.1. Detectors

2.5.1.1.1. General

General Requirements for Intelligent Addressable Heat, Smoke and CO Detectors

Each detector shall contain an integral microprocessor which shall determine if the device is normal, in alarm, or has an internal trouble. The microprocessor's non-volatile memory shall permanently store the detector's serial number, device type and system address. It shall be possible to address each intelligent device without the use of switches. Devices requiring switches for addressing shall not be considered as equal. Memory shall automatically be updated with the hours of operation, last maintenance date, number of alarms and troubles, time of last alarm, and analog signal patterns for each sensing element just before the last alarm.

Each detector shall be capable of identifying up to 32 diagnostic codes. This information shall be available for system maintenance. The diagnostic code shall be stored at the detector.

Each addressable detector on the Signaling Line Circuit (SLC) shall transmit information regarding its location with respect to other intelligent devices on the signaling line circuit to the control panel, creating an "As-Built" circuit map. The circuit mapping function shall provide location supervision of all intelligent devices on the signaling line circuit. An intelligent detector's programmed system response functions shall be associated with the detector's actual *location* on the signaling line circuit and *not with the detector's address*. After system commissioning, detectors improperly installed in the wrong location shall function according to the mapped programmed response for its *location* on the circuit, not its detector's address.

A status indicator shall be provided on each detector. Flashing green shall indicate normal operation; flashing RED shall indicate the alarm state. The indicator shall be visible from any direction.

The system shall allow for changing of detector types for service replacement purposes without the need to reprogram the system. The replacement detector type shall automatically continue to operate with the same programmed sensitivity levels and functions as the detector it replaced, without the need for reprogramming. System shall display an off-normal condition until the proper detector type is installed or a change in the device type profile has been made.

Detectors shall be rated for operation in the following environment unless specifically noted:

· Temperature: 32°F to 120°F (0°C to 49°C)

· Humidity: 0-93% RH, non-condensing

Detectors with addressing components in the base shall not be considered as equal.

The intelligent detectors shall be EDWARDS Signature Series devices.

Please refer to the *General, System Description* Section for site-specific detector operating requirements.

2.5.1.1.2. Optica Photo Detector

Provide analog/addressable optical smoke detectors at the locations shown on the drawings.

The detector shall be listed under standards UL-268 7th edition and UL-2075.

The optical detector shall be listed as a multi criteria detector without the use of other sensing elements, and the use of fixed end of life sensing components is not acceptable. Each optical smoke detector shall be capable of rejecting nuisance sources and detect smoke in the full life safety window of 0.5% to 4.36% obscuration/foot. Detectors that have to operate in a special application mode that cannot achieve the full 0.5% to 4.36% life safety window shall not be considered equal.

Each smoke detector shall be individually programmable to operate at any one of five (5) sensitivity settings. The detector shall also store pre-alarm and alternate pre-alarm sensitivity settings. Pre alarm sensitivity values shall be configurable in 5% increments of the alarm and alternate alarm sensitivity settings respectively. The detector shall be able to differentiate between a long-term drift above the pre alarm threshold and fast rise above the threshold. The detector shall monitor the sensitivity of the smoke sensor. If the sensitivity shifts outside the UL limits, a trouble signal shall be sent to the panel. It shall be possible to automatically change the sensitivity of individual intelligent addressable smoke detectors for day and night (alternate) periods.

Each detector shall utilize an environmental compensation algorithm that shall automatically adjust for background environmental conditions such as dust, temperature, and pressure. The detector shall provide a maintenance alert signal when 80% (dirty) of the available compensation range has been used. The detector shall provide a

dirty fault signal when 100% or greater compensation has been used.

The photoelectric smoke detector shall be an EDWARDS SIGA-OSD.

2.5.1.1.3. Duct Smoke Detector

Provide intelligent low-profile photoelectric duct smoke detectors / remote test switches at the locations shown on the drawings.

The intelligent duct smoke detector shall operate in ducts having from 100ft/min to 4,000ft/min air velocity. The detector shall be suitable for operation over a temperature range of -20 to 158F° and offer a harsh environment gasket option. The detector shall utilize an air exhaust tube and an air sampling inlet tube that extends into the duct air stream up to ten (10) feet. Design of the detector shall permit sampling tube installation from either side of the detector and permit sampling tube installation in 45- degree increments to ensure proper alignment with duct airflow. Drilling templates and gaskets to facilitate locating and mounting the housing shall be provided.

The intelligent duct smoke detector shall obtain information from a photoelectric sensing element. The detector shall be able to differentiate between a long-term drift above the pre alarm threshold and fast rise above the threshold. The detector shall monitor the sensitivity of the smoke sensor. If the sensitivity shifts outside the UL limits, a trouble signal shall be sent to the panel

Each detector shall utilize an environmental compensation algorithm that shall automatically adjust for background environmental conditions such as dust, temperature, and pressure. The detector shall provide a maintenance alert signal when 80% (dirty) of the available compensation range has been used. The detector shall provide a dirty fault signal when 100% or greater compensation has been used.

The intelligent duct smoke detector shall provide a form "C" auxiliary alarm relay rated at 2amps @ 30Vdc. The position of the relay contact shall be supervised by the control panel software. Operation of the relay shall be controlled either by its respective detector processor or under program control from the control panel as required by the application. Detector relays not capable of programmed operation independent of the detector's state shall not be considered as equal. The detector shall be equipped with a local magnet-activated test switch.

Each duct detector shall be installed and testing in accordance with manufacturer's instructions, including pressure differential and, velocity testing. Test results shall be submitted to the Contracting Officer Representative.

Remote test switches/LED indicators shall be provided below the detector on the ceiling to indicate location of the detector in non-mechanical areas, at locations indicated on the drawings.

The Intelligent Photoelectric Duct Smoke Detector shall be an EDWARDS model SIGA-SD.

The remote key operated test switch / LED shall be an EDWARDS model SD-TRK

2.5.1.1.4. Rate of Rise Detector

Provide intelligent combination fixed temperature / rate-of-rise heat detectors at the locations shown on the drawings.

The detector shall continually monitor the temperature of the air in its surroundings to minimize thermal lag to the time required to process an alarm. The detector shall utilize a low mass thermistor heat sensor and operate at a nominal fixed temperature alarm point rating of 135ºF and at a temperature rate-of-rise alarm point of 15ºF per minute. The integral microprocessor shall determine if an alarm condition exists and initiate an alarm based on the analysis of thermistor data. Systems

using central intelligence for alarm decisions shall not be considered as equal.

The heat detector shall be rated for ceiling installation at a minimum of 50 ft centers and also be suitable for wall mount applications.

The Intelligent combination fixed temperature / rate-of-rise heat detector shall an EDWARDS SIGA-HRD.

2.5.1.1.5. Standard Base

Provide standard detector bases suitable for mounting on either North American 1-gang, 3½ or 4-inch octagon box and 4-inch square box, European BESA or 1-gang box.

The bases shall utilize a twist-lock design and provide screw terminals for all field wiring connections.

The base shall contain no active electronics and support all Signature series detector types.

The base shall be capable of supporting a Remote Alarm LED Indicator. Provide remote LED alarm indicators where shown on the plans.

Removal of the respective detector shall not affect communications with other detectors.

The standard addressable detector base shall be an EDWARDS SIGA-SB or SB4.

2.5.1.2. Manual Stations

2.5.1.2.1. Double Action Single Stage

Provide addressable double action, single stage fire alarm stations at the locations shown on the drawings.

The manual station shall be suitable for mounting on North American 2 ½ (64mm) deep 1-gang boxes and 1 ½ (38mm) deep 4 square boxes with 1-gang covers. If indicated as surface mounted, provide manufacturer's surface back box.

The fire alarm station shall utilize red polycarbonate construction with molded, raised-letter operating instructions in a contrasting color; shall show visible indication of operation and incorporate an internal toggle switch.

The manual pull station will have an addressable module integral to the unit.

The station reset key shall match the control panel key.

Manual pull stations that initiated an alarm condition when opening the unit are not acceptable.

The addressable double action, single stage manual fire alarm station shall be an EDWARDS SIGA-278.

2.5.1.2.2. Guards

Provide manual pull station guards at the locations shown on the drawings.

The guard shall consist of a factory-fabricated clear polycarbonate enclosure, hinged at the top. Lifting the cover shall provide access to the manual pull station and activate an integral battery powered audible horn intended to discourage false alarms.

The manual pull station guards shall EDWARDS STI-1000 Series.

2.5.1.3. Modules

2.5.1.3.1. One Input Monitor

Provide addressable single input multifunction modules at the locations shown on the drawings.

The module shall be suitable for mounting on North American 2½" (64mm) deep 1-gang boxes and 1½" (38mm) deep 4" square boxes with 1-gang covers.

Each module shall provide one (1) supervised Class B input circuit configurable as one of the following "personalities."

1. Normally-Open Alarm Latching (for alarm initiation applications)

2. Normally-Open Alarm Delayed Latching (for waterflow switch applications)

3. Normally-Open Active Non-Latching (for limit switch and monitor applications)

4. Normally-Open Active Latching (for tamper switch and supervisory applications)

Each module shall identify and report by device address, ground faults and opens associated with its initiating device circuit, to the control panel. Single function modules or without individual ground fault detection identification capability shall not be considered as equal.

The Intelligent Single Input Module shall be an EDWARDS SIGA-CT1.

2.5.1.3.2. Two Input Monitor

Provide addressable dual input multifunction modules at the locations shown on the drawings.

The module shall be suitable for mounting on North American 2½" (64mm) deep 1-gang boxes and 1½" (38mm) deep 4" square boxes with 1-gang covers.

Each module shall provide two (2) supervised Class B input circuit configurable as one of the following "personalities."

1. Normally-Open Alarm Latching (for alarm initiation applications)

2. Normally-Open Alarm Delayed Latching (for waterflow switch applications)

3. Normally-Open Active Non-Latching (for limit switch and monitor applications)

4. Normally-Open Active Latching (for tamper switch and supervisory applications)

Each module shall identify and report by device address, ground faults and opens associated with its initiating device circuits, to the control panel. Single function modules or without individual ground fault detection identification capability shall not be considered as equal.

The Addressable Dual Input Module shall be an EDWARDS SIGA-CT2 or MCT2.

2.5.1.3.3. Relay

Provide addressable control relay modules at the locations shown on the drawings.

The module shall be suitable for mounting on a North American 2 ½" (64mm) deep 1-gang box or 1 ½" (38mm) deep 4" square box with 1-gang covers.

The module shall provide one (1) form C dry relay contacts rated at 24Vdc @ 2 amps (pilot duty) to control external appliances or equipment. The position of the relay contact shall be confirmed by the system firmware. The relay coil shall be magnetically latched to reduce wiring and ensure 100% of the relays on the SLC can be energized at same time.

The addressable control relay module shall be an EDWARDS SIGA-CR or MCR.

2.5.2. NOTIFICATION APPLIANCES

2.5.2.1. General

All appliances supplied for the requirements of this specification shall be UL Listed for Fire Protective Service, and shall be capable of providing the "equivalent facilitation" which is allowed under the Americans with Disabilities Act Accessibilities Guidelines (ADA(AG)), and shall be UL 1971 Listed.

All appliances shall be of the same manufacturer as the fire alarm control panel specified to ensure absolute compatibility between the appliances and the control panels, and to ensure that the application of the appliances are done in accordance with the single manufacturer's instructions.

Any appliances that do not meet the above requirements and are submitted for use must show written proof of their compatibility for the purpose intended. Such proof shall be in the form of documentation from all manufacturers that clearly states that their equipment (as submitted) is 100% compatible with each other for the purpose intended.

All strobes shall be provided with lens markings oriented for wall

mounting. Exterior mounted devices shall be provided with a weatherproof backbox.

All visual appliances shall be synchronized. Light and audible output levels shall be designed to meet ADA and NFPA requirements

All notification appliances shall be white with clear lenses and marked ALERT unless noted otherwise on the drawings.

2.5.2.2. Low Profile

2.5.2.2.1. Strobes

Provide wall mounted LED strobes at the locations shown on the drawings.

Strobes shall mount to a North American 1-gang box and protrude less than 1” from the finished wall. The word ALERT shall be prominently displayed on the housing.

The strobe output shall be switch selectable as required by its application from the following available settings: 15cd, 30cd, 75cd, or 110cd. Selected strobe rating shall be visible when the strobe is in its installed position. To ensure available power and circuit calculations may accommodate any future field adjustments, calculate all circuit loading and battery requirements based on the highest rated current draw possible, 110cd, regardless of field setting.

Strobe power and strobe synchronization shall be accomplished over a single pair of wires. In and out screw terminals shall accommodate 18AWG to 12 AWG wiring and have captive hardware.

Strobes shall have room-side mounting plates with diagnostic check bar to allow for full circuit installation including EOL Resistor and continuity testing of the NAC without the field appliances being installed. Once the Strobe appliance is snapped into place, room-side diagnostic test points shall be available on the appliance without removing the appliance from the wall. Should color or markings changes be needed, the appliances cover plate shall be changeable without the need to remove or replace the appliance.

The low-profile wall mounted strobes shall be an EDWARDS G4VWN with G4VWA-CVR.

2.5.2.2.2. Speaker-Strobe-Wall

Provide low profile wall mounted speaker-strobes at the locations shown on the drawings.

The low-profile speaker-strobes shall mount in a North American 4” x 2 1/8” square electrical box, without trims or extension rings, and protrude less than 1” from the finished wall. The word ALERT shall be prominently displayed on the housing.

The speaker output shall be switch selectable from the following available settings: 2W (90dBA), 1W (87dBA), 1/2W (84dBA), or 1/4W (81dBA) at 10 ft. when measured in reverberation room per UL-464. Frequency response shall be 400 to 4,000Hz. The selected speaker wattage shall be visible when the speaker-strobe is in its installed position.

The LED strobe output shall be switch selectable as required by its application from the following available settings: 15cd, 30cd, 75cd & 110cd. To ensure available power and circuit calculations may accommodate any future field adjustments, calculate all circuit loading and battery requirements based on the highest rated current draw possible, 110cd, regardless of field setting.

When multiple strobes are installed within view of each other, their outputs shall be synchronized within ten (10) milliseconds of each other for an

indefinite period without the need for separate synchronization modules

The low-profile wall mounted speaker-strobes shall be an EDWARDS G4SVWA series.

The low-profile wall mounted speaker shall be an EDWARDS G4SWA series

2.5.2.2.3. Speaker-Strobe-Ceiling

Provide low profile ceiling mounted speaker-strobes at the locations shown on the drawings.

Speaker-strobes shall mount in a North American 4" x 2 1/8" square electrical box, or a 960A-4RF round flush box, and protrude less than 1.6" from the finished ceiling. The word ALERT shall be prominently displayed on the housing.

The speaker output shall be switch selectable from the following available settings: 2W (91dBA), 1W (87dBA), 1/2W (84dBA), or 1/4W (80dBA) at 10 ft. when measured in reverberation room per UL-1480. Frequency response shall be 400 to 4,000Hz. The selected speaker wattage shall be visible when the speaker-strobe is in its installed position.

The strobe output shall be switch selectable as required by its application from the following available settings: 15cd, 30cd, 75cd & 115cd. Selected strobe rating shall be visible when the speaker-strobe is in its installed position. To ensure available power and circuit calculations may accommodate any future field adjustments, calculate all circuit loading and battery requirements based on the highest rated current draw possible, 110cd, regardless of field setting.

When multiple strobes are installed within view of each other, their outputs shall be synchronized within ten (10) milliseconds of each other for an indefinite period without the need for separate synchronization modules

Strobe power and synchronization shall be accomplished over a single pair of wires. Both the

speaker and strobe elements shall provide in and out screw terminals shall accommodate 18AWG to 12 AWG wiring and have captive hardware.

The low-profile ceiling mounted speaker-strobes shall be an EDWARDS Genesis GCSVWA series.

The low-profile ceiling mounted speakers shall be an EDWARDS Genesis GCSWA series.

2.5.2.3. High Power Speaker Arrays

2.5.2.3.1. High Power Speaker Arrays

Provide high power speaker arrays (HPSA) at the locations shown on the drawings.

Locations of the HPSA sites shall be verified and recorded with GPS coordinates. Each HPSA site shall include a field-mounted local control unit, amplifier, standby batteries, charger, power supply, radio, mounting bracket and loudspeaker assembly for pole or building mounting.

Site coverage shall be designed using directional speaker characteristics to minimize the distortion of voice signals due to the interference from other HPSAs and to prevent the transmission of signals into environmentally sensitive areas on or off of the project site, as shown on the drawings.

Sound levels at any location where personnel may be located, including nearby buildings and underneath the HPSA, shall be at least 15dBA above ambient but not exceed 120 decibels (adjusted) (dBA) when measured on the A-scale of a standard sound level meter at slow response.

Speakers

The directional speaker arrays shall utilize powder coated spun aluminum, 400W re-entrant trumpet speakers featuring 90° horizontal dispersion. Speaker arrays shall be available with 90°, 180°, 270° and 360° horizontal dispersion. The directional speaker arrays shall have an output of 121 dBA @100ft. on the vertical axis.

The omni-directional speaker array shall consist of one or more stackable fiberglass 1600W speaker drivers and provide 360° horizontal dispersion. The omni-directional array shall have an output of 115dBA @ 10ft on both the horizontal and vertical axis.

The HPSA control units

1. All local equipment for each HPSA speaker site shall be housed in modular cabinets suitable for the local environmental conditions, providing space heaters and ventilation fans, as appropriate. Enclosures shall protect the HPSA control unit from external temperatures ranging from -40° F to +140° F. Enclosures shall meet the requirements of National Electrical Manufacturers Association (NEMA) 3R (rain tight), NEMA 4 (wash-down areas), or NEMA 4X (harsh environments). The cabinet and power boxes shall be capable of being locked. A tamper switch shall signal the central control station that the HPSA enclosure door is open.

2. Each HPSA site shall contain from one to eight 800watt high efficiency switch-mode amplifiers. The amplifier shall have not more than 0.1 percent total harmonic distortion (THD). Amplifier frequency response shall be at least 200 Hz to 10,000 Hz. There shall be no more than 2 percent THD at the speaker at 1000 Hz. The amplifier shall be rated by the manufacturer for a minimum of two (2) hours of continuous operation.

3. The primary HPSA to CCS communication link shall be supervised and utilize TCP/IP protocol.

4. Each HPSA site shall be equipped with batteries to supply power for a minimum of 72 hours of electrical supervision following the loss of normal charging power, followed by a total of 60 minutes of full load operation at the end of the supervisory period.

5. Each HPSA site shall provide a charger/power supply that will accept alternating current (AC)

input, backup electrical power generator input, battery input, or solar power cell input.

6. All metallic conductors entering or exiting the equipment cabinet shall be provided with UL Listed surge suppression devices.

   Speakers shall be rated to operate between

   temperatures of -40° F to +140° F

   HSPA Mounting

   When not mounted to an existing building structure, an elevated supporting structure (e.g., pole, tower) shall be provided at the locations shown on the drawing.

   The supporting structure and mount shall be designed to accommodate the static and dynamic loads produced by the sound systems and all attachments and designed to survive a wind speed of 100 miles per hour.

   The minimum mounting height of the speakers on the support structure shall be based on the rated output of the speakers and shall prevent hearing damage to anyone directly below the speakers. The speaker mounting height shall not be less than 30 ft. nor greater than 60 ft. above ground level.

   HPSA equipment cabinets mounted on the supporting structure shall be installed with the top of the enclosure no more than 10 ft. above ground level. HPSA equipment cabinets mounted on existing buildings shall be located as close as practical to the speaker to facilitate ease of maintenance.

   The HPSA shall be an EDWARDS MN-HSHP series.

2.5.3. ACCESSORIES

2.5.3.1. Magnetic Door Holders

Provide wall mounted fail-safe electromagnetic door holders as shown on the drawings.

Holders shall provide approximately 25-lbf nominal holding force when energized. The units shall have an aluminized finish and contain no moving parts. The contact plate shall have an integral nylon swivel to absorb shock and adjust to any door angle.

Flush and semi-flush models shall be designed for concealed wiring applications and shall mount on standard 1-gang electrical box. Floor mounted electromagnet units shall consist of a floor plate, gaskets, and housing. Incoming conduit shall connect directly into floor plate. The housing and gaskets shall mount on the floor plate to form a weatherproof junction box Door holder shall be listed to UL-228.

All holders shall be normally be energized, and a release shall be accomplished by interrupting the circuit.

The electromagnetic door holders shall be EDWARDS 1500 series.

2.5.3.2. Surge Suppression Devices

The system shall utilize the following electrical surge protection devices to prevent damage and nuisance alarms caused by nearby lightning strikes, stray currents, or voltage transients.

On the AC Input of all fire alarm panels, remote power supplies and HPSA sites: Transtector ACO100BWN3, Leviton OEM-120EFI, EFI HWM-120, Ditek DTK-120HW or
DTK-120/240 CM. ***AC Surge protectors shall be installed at the electrical panel board feeding the fire alarm equipment***. Excess lead length shall be trimmed. The branch circuit conductor shall be formed into a 5-10 turn 1” diameter tie-wrapped coil just downstream of the suppressor connection.

On each DC fire alarm circuit entering or leaving the building: Transtector TSP8601, Citel American B280 -24V, Edco P264 and P642, Ditek DTKxLVL series, or equal.

DC Surge protectors shall be installed on each required circuit at the point of entry into the building.

2.5.3.3. Inspection Bar Codes

A. Inspection bar codes shall be installed on all initiating devices, addressable modules, annunciators, control panels and power supplies.

B. Inspection bar codes used by the system must utilize Code 3 of 9 or other approved format and contain a minimum of eight (8) digits that comprise a unique serial identifier within the Web-based Reporting System. There shall be no duplication of device ID numbers. The ID number shall be printed below the bar code for identification purposes.

C. Inspection bar codes shall be limited in size to no more than 2" (5cm) in width, and 3/8" (2 cm), in height and shall include a Mylar® or other protective coating to protect the bar code from fading due to sunlight or exposure.

D. Inspection bar codes shall be installed on each device in such a manner as to require that scanning of the bar code takes place no further than 12" from the device during inspection.

PART 3 - EXECUTION

3.1. INSTALLATION

3.1.1. General

General

A. The entire system shall be installed in a skillful manner in accordance with approved manufacturer's installation manuals, shop drawings and wiring diagrams.

B. All work shall be performed in accordance with the requirements of NFPA 70, NFPA 72 and UFC Codes.

C. Coordinate locations of all devices with all other divisions' drawings and specifications.

D. All fire alarm devices shall be accessible for periodic maintenance. Should a device location indicated on the contract drawings not meet this requirement, it shall be the responsibility of the installing contractor to bring it, in writing, to the attention of the Project Engineer.

E. Fasten equipment to structural members of building or metal supports attached to structure, or to concrete surfaces.

F. All systems and system components listed to UL864 Control Units for Fire Protective Signaling Systems may be installed within a common conduit raceway system, in accordance with the manufacture's recommendations. System(s) or system components not listed to the UL864 standard shall utilize a separate conduit raceway system for each of the sub-systems.

G. No wiring except life safety system circuits and system power supply circuits shall be permitted in the control panel enclosures.

H. Any low-voltage copper wiring that leaves the protection of a building shall be provided with a compatible UL 497B listed transient protection devices where the circuit leaves the building and where it enters the next building.

I. Devices containing end-of-line resistors shall be appropriately labeled. Devices should be labeled such that removal of the device is not required to identify the EOL device.

J. Fiber Optic Cable

1. Only glass filament cable permitted. Plastic filament fiber optic cables are not acceptable.

2. LC connectors shall be used at all equipment terminations.

K. Concrete floors shall be X-rayed prior to core drilling on post tension slabs. Verify with engineer on type of slab prior to bid.

3.1.2. Electrical

Electrical

1. BOXES, ENCLOSURES AND WIRING DEVICES

A. Boxes shall be installed plumb and firmly in position.

B. Extension rings with blank covers shall be installed on junction boxes where required.

C. Junction boxes served by concealed conduit shall be flush mounted.

D. Fire alarm system junction box covers shall be painted red.

E. Wiring within cabinets, enclosures, boxes, junction boxes and fittings shall be installed in a neat and workmanlike manner, installed parallel with or at right angles to the sides and back of any box, enclosure or cabinet, and routed to allow access for maintenance. All conductors that are terminated, spliced, or otherwise interrupted in any enclosure, cabinet, mounting or junction box shall be connected to terminal blocks. Mark each terminal in accordance with the wiring diagrams of the system. Make all connections with approved pressure type terminal blocks, which are securely mounted. All terminal block screws shall have

pressure wire connectors of the self-lifting or box lug type. No more than two conductors shall be installed under one connection. Wire nuts, crimp splices and similar devices shall not be used.

2. Conductors

A. Each conductor shall be identified as shown on the drawings at terminal points. Permanent wire markers shall be located within 2 inches of the wire termination. Marker text shall be visible with protective doors or covers removed.

B. Maintain a consistent color code for fire alarm system conductor functions throughout the installation.

C. All wiring shall be installed in compliance with the National Electric Code, NFPA 70, and the equipment manufacturer's requirements.

Wiring for Signaling Line Circuit and Initiating Device Circuit field wiring shall be solid copper, No. 18 AWG twisted pair conductors at a minimum. Speaker circuits; 16 AWG twisted pair at a minimum. Telephone circuits shall be 18 AWG twisted-shielded pair at a minimum. 24VDC visual and audible Notification Appliance Circuits shall be solid copper No. 14 AWG size conductors at a minimum. The wiring sizes listed herein are minimum sizes. Use larger wire sizes when recommended by the manufacturer, based on system configuration and project specific calculations where shielded wiring is used, the shield shall be grounded at only one point, which shall be in or adjacent to the FACP or other control equipment. Shields shall be continuous, treated as a third conductor, and insulated from ground except as noted.

T-taps (branches) are not permitted in Class B SLC circuits with interconnections occurring on terminal strips. All conductors must be run splice free.

Circuits to third-party systems (HVAC, Elevators, fire pumps, etc.) shall terminate in terminal cabinets within three (3) feet of the controllers for those systems.

AC power wiring shall be No. 12 AWG solid copper having insulation rated for 600 volts.

Crimp type spade lugs shall be used for terminations of stranded conductors to binder screws or stud type terminals.

D. All wiring shall be checked and tested to ensure that there are no grounds, opens or shorts.

3. Devices

A. All devices and appliances shall be mounted to or in an approved electrical box.

B.

1. Raceways

C. Conduits shall be sized according to the conductors contained therein. Cross sectional area percentage fill for system conduits shall not exceed 40%.

D. Install all conductors in rigid metal conduit or electro-metallic tubing, utilizing compression type fittings and couplings, with a minimum diameter 3/4". The use of flexible metal conduit not exceeding a six (6) foot length shall be permitted for initiating device circuits.

E. All fire alarm conduit systems shall be routed and installed to minimize the potential for physical, mechanical or fire damage, and shall not interfere with existing building systems, facilities or equipment.

F. Run conduit or tubing concealed in finished areas unless specifically shown otherwise on the drawings. Conduit may be exposed in unfinished mechanical/electrical rooms, and basement levels.

G. All system conduits, junction boxes, pull boxes, terminal cabinets, electrical enclosures and device back box locations shall be readily accessible for inspection, testing, service and maintenance.

4. Open cable

A. Power Limited cable, when not installed in UL listed metal conduit or raceway, shall be mechanically protected by building construction features per NFPA 70, Article 760.

1. Installation shall be in areas not subjected to mechanical injury.

2. All circuits shall be supported by the building structure. Cable shall be attached by straps or bridal rings to the building structure at intervals not greater than 10 feet. The use of staples is prohibited. Fire alarm wiring shall not be bundled or strapped to existing conduit, pipe or wire in the facility.

3. Where wiring is installed above drop ceilings, cable shall not be laid on ceiling tiles.

4. Cable shall not be fastened in a manner that puts tension on the cable.

B. Power Limited Cable shall be FPLP, FPLR or FPL, or permitted substitute.

5. Labeling:

A. All equipment to be labeled as required with engraved plastic or metallic alphanumeric identification.

3.1.3. FA Components

A. Devices

1. All devices and appliances shall be mounted to or in an approved electrical box.

2. All wall mounted *control equipment* shall comply with requirements defined by the International Building Code.

B. Fire Alarm Control Panels

a. Mount the enclosure with the top of the cabinet 72” above the finished floor or center the cabinet at 63”, whichever is lower.

b. Label the fire alarm panels with the room number, electrical panel number and circuit breaker number feeding them.

c. Paint the handles of the dedicated circuit breakers feeding fire alarm panels red and install handle locks.

d. Within the panel, all non-power limited wiring must be properly separated from power limited circuits.

e. Grounds shall comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

C. Remote power supplies and auxiliary fire alarm panels

a. Locate the panel or cabinet with the top of the panel 72” above the finished floor or center the panel at 63”, whichever is lower.

b. Do not locate these panels above ceilings or where inaccessible by a person standing on the finished floor of the space.

c. Label the power supplies and auxiliary FACPs with the room number, electrical panel number and circuit breaker number feeding them.

d. Paint the handles of the dedicated circuit breakers feeding fire alarm panels red and install handle locks.

e. Within the panel, all non-power limited wiring must be properly separated from power limited circuits.

D. Manual Pull Stations

a. Mount stations so that their operating handles are between 42” and 48” above the finished floor.

E. Notification Appliances: Mount assemblies as follows:

a. All wall mounted audio/visual devices shall be mounted so the entire lens is between 80” and 96” above the finished floor. Where low ceilings exist, devices shall be mounted within 6” of the ceiling.

b. Each speaker’s (horn) output shall be set to the wattage value indicated for its specific location as shown on the drawings.

c. Each strobe’s output shall be set to the candela value indicated for its specific location as shown on the drawings.

d. Each speaker (horn)-strobe’s outputs shall be set to the wattage/candela value indicated for its specific location as shown on the drawings.

e. Where ceiling height exceeds 30 feet, appliances shall be suspended from the ceiling to a height of 30 feet maximum above the finished floor.

f. Appliances installed outdoors shall be UL listed for outdoor use.

F. Smoke Detectors:

a. Smoke and heat detector **heads** shall not be installed until after construction clean-up is completed. Detector **heads** installed prior to construction clean-up shall be cleaned by the manufacturer or replaced.

b. Detectors located on the wall shall have the top of the detector at least 4" and not more than 12” below the ceiling.

c. On smooth ceilings, detectors shall not be installed over 30 ft. apart in any direction.

d. Install smoke detectors no closer than 3 ft. from air handling supply air diffusers or return air openings.

e. Locate detectors no closer than 12” from any part of a lighting fixture.

G. Duct Smoke Detectors:

a. Install sampling tubes, so they extend the full width of ducts exceeding 36”.

b. Detectors shall be located to facilitate ease of maintenance.

c. All penetrations near detectors located on/in return ducts shall be sealed to prevent air entry.

H. End-of-Line Resistors

a. Devices containing end-of-line resistors shall be appropriately labeled.

I. Remote Status and Alarm Indicators:

a. Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.

J. CO Detectors

a. Ceiling mounted CO detectors should be kept 12” from sidewalls.

b. Wall mounted CO detectors should be at least 48” above the finished floor, but less than 6” from the ceiling.

c. Locate at least 60” from fuel burning appliances.

d. Install CO detectors no closer than 3 ft. from air handling supply air diffusers or return air openings.

K. Heat Detectors

a. Heat detectors shall be installed in strict accordance with their UL listing and the requirements of NFPA 72.

b. Heat detectors installed in the elevator machinery room to meet ANSI A17.1 requirement for elevator power disconnect, shall be located adjacent to each sprinkler head. Coordinate temperature rating and location with sprinkler rating and location.

L. Addressable Control (relay) Modules

a. Install the module less than 3 feet from the device controlled.

b. Orient the device mounting for best maintenance access.

c. Label all addressable control modules as to their function.

d. Provide a dedicated 24VDC circuit to feed all auxiliary relays required for inductive loads (auxiliary relays, door holders). Circuits shall be supervised via an end-of-line relay and addressable input module. Auxiliary relays shall not derive their power from the starter or load being controlled.

END OF SECTION