MODULAR STORAGE MAGAZINE, BOX-TYPE STD 421-80-07 WITH 10'-8" DOOR
3.6 STRUCTURAL FASTENERS SHALL CONFORM TO THE FOLLOWING ASTM DESIGNATIONS:

- **HEADED STUDS**.................................ASTM A108, GRADES 1015 TO 1020 (60 KSI TENSILE STRENGTH)
- **STEEL PIPE (HSS)**...............................................................ASTM A53, GRADE B
- **SHOULDERS**.................................................................ASTM A529-04, GRADE A
- **WASHERS**.................................................................ASTM A567, GRADE B
- **SCREWS**.................................................................ASTM A307, GRADE A

6.3 STRUCTURAL STEEL:

- **SHEAR STUDS**...........................................................ASTM A325
- **HEADED STUDS**.............................................................ASTM A108, GRADES 1015 TO 1020
- **HEADED SHEAR STUDS**..................................................ASTM A325
- **BOLTED STUDS**............................................................ASTM A325
- **BOLT ASSOCIATED MATERIALS**.............................ASTM A325

5.6.10 ALL STRUCTURAL STEEL SHALL BE MARKED WITH A BOLT MARKING INTO CONCRETE. BOLTS SHALL BE MARKED WITH A BOLT MARKING INTO CONCRETE.

6.4 BOLTED CONNECTIONS SHALL CONFORM TO RCSC'S "SPECIFICATION FOR STRUCTURAL JOINTS USING BOLTED CONNECTIONS" (1997), AND A.I.S.C.'S "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS."
1. TOP OF SLAB (FINISH FLOOR ELEVATION) = 100'-0" U.O.N.
2. SLAB-ON-GRADE OF CONCRETE ON 4" CAPILLARY WATER BARRIER AND VAPOR BARRIER, REINFORCED WITH 6X6 HWILANS 9" WIDE SUPPORTED 2" FROM TOP OF SLAB UNDO.
3. PLACE CONTROL JOINTS IN SLAB-ON-GRADE AT 18'-0" O.C. (MAX.). CONTROL JOINTS SHALL BE COMPLETED AS SOON AS POSSIBLE.
4. PROVIDE 24" OF EARTH COVER MINIMUM ON ROOF.
5. WATERPROOF ALL SURFACES OF THE SHELTER WHICH WILL BE IN CONTACT WITH EARTH-fill AFTER SHELTER IS ERECTED.
6. SIZE, LOCATION, AND QUANTITY OF TILT-UP BRACE ATTACHMENT POINTS AND LIFTING DEVICES TO BE DETERMINED BY CONTRACTOR/PRECAST MANUFACTURER.
7. IT IS THE RESPONSIBILITY OF THE SITE ADAPTATION ENGINEER TO MODIFY THESE DRAWINGS TO MEET LOCAL SITING, FOUNDATION, AND TOPOGRAPHIC CONDITIONS.
8. PANELS MAY BE PRECAST BY A MANUFACTURER SPECIALIZING IN PRECAST OR PRECAST DRAWINGS TO MEET LOCAL SITING, FOUNDATION, AND TOPOGRAPHIC CONDITIONS.

FROM CENTER
1" SLOPE

FROM CENTER
1" SLOPE

FROM CENTER
1" SLOPE

FROM CENTER
1" SLOPE

26'-4" (NOTCH FOR DOOR FRAME)

20'-0" MIN. - 80'-0" MAX.

8'-10"

20'-0"

8'-10"
1. Provide 24" of earth cover minimum on roof.
2. Waterproof all surfaces of the shelter which will be in contact with earth fill after shelter is erected.
3. Size, location, and quantity of tilt-up brace attachment points and lifting inserts to be determined by contractor/precast maker.
4. It is the responsibility of the site adaptation engineer to modify these specifications to meet local siting, foundation, and topographic conditions.
5. It is recommended that the contractor/prefab manufacturer specializing in precast or structural steel be consulted for the type and size of the lift inserts.
6. Panels may be precast by a manufacturer specializing in precast.
7. Provide electrical continuity within the precast roof panels by welding all linear ties at lateral tie locations, top of all panels at head of panel and at each panel support and in one direction. In the other direction, weld at half of panel from bottom plate to top PLA.

*** SAFETY FIRST ***
WALL ELEVATION A

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

VENT ASSEMBLY
SEE TYP. DETAILS

PRECAST ROOF PANELS,
SEE TYP. DETAILS

PRECAST ROOF PANEL,
SEE TYP. DETAILS

LIFTING INSERT (TYP.), BY PRECAST MANUFACTURER

SHEAR PANEL

EXTENTS OF SIDE WALL PANEL

LENGTH AS REQ'D (TYP. SIDE WALL PANEL LENGTH)

20'-0" (TYP.)

VENT ASSEMBLY
SEE DETAIL 49300

SIDE WALL PANEL

PANEL JOINT

SEE TYP. DETAILS

PRECAST ROOF PANELS,
SEE TYP. DETAILS

VENT ASSEMBLY,
S102

WALL PANEL

EXTENTS OF SIDE WALL PANEL

S101

S202

MANF. (TYP.), BY PRECAST
LIFTING INSERT,
PANEL

PANEL-TO-PANEL

SEE DETAIL 4/303

3/8" 3/8"

2'-0"

2'-0"
RIGHT DOOR ELEVATION "INSIDE VIEW"

scale: 3/4"=1'-0"

note:
1. see door plate elevations E805 & 88793 for inner door support framing.
2. see door locking devices on sheet S703 for additional requirements.

LEFT DOOR ELEVATION "INSIDE VIEW"

scale: 3/4"=1'-0"

note:
1. see door plate elevations E805 & 88793 for inner door support framing
2. see door locking devices on sheet S703 for additional requirements

*** SAFETY FIRST ***
*** SAFETY FIRST ***

1/2" x 12" x 10'-0" PLATE

THICK PLATE

DOOR FRAME

EXTENTS OF

SECTION A

SCALE: 1 1/2"=1'-0"

LEFT DOOR PLATE ELEVATION "INSIDE VIEW"

NOTE: RIGHT DOOR PLATE ELEVATION IS THE SAME AS THE LEFT

SECTION B

SCALE: 1 1/2"=1'-0"

SECTION C

SCALE: 1 1/2"=1'-0"

SECTION D

SCALE: 1 1/2"=1'-0"

CROSS BAR NOT SHOWN FOR CLARITY

NOTE:

LATCH BAR, SEE DETAIL 1/S704

HANDLE, SEE DETAIL 2/S704

PLATE TO ANGLE

PLATE TO ANGLE

SECTION Y-Y

SCALE: 1 1/2"=1'-0"

SECTION X-X

SCALE: 1 1/2"=1'-0"

*** SUPPORT VALUE ENGINEERING - IT PAYS ***
Contract Documents for the System Not Used.

Redundant Sheets from the Construction Locking System Required and Remove the
With the Contracting Officer the Correct
Locking Systems. The Designer Shall Verify
S701(A) - S705(A) (ILD) Identify Two Different
Sheets S701 - S705 (High Security Hasp) and
Construction Drawings for Site Adaptation Design

Design Note: To be removed when preparing

A *** SAFETY FIRST ***

*** SUPPORT VALUE ENGINEERING - IT PAYS ***
S704 DETAIL

HANDLE DETAIL

DOOR HINGE PL. DETAIL

GUSSET HINGE PL. DETAIL

HINGE PIN DETAIL

TUBE SUPPORT PL. DETAIL

THRUST BEARING DETAIL

*** SAFETY FIRST ***
1. HIGH SECURITY HASPS SHALL CONFORM TO MILITARY SPECIFICATION MIL-DTL-29181C.

2. NO MODIFICATIONS AND/OR DEVIATIONS TO THE DOOR CONSTRUCTION SHOWN IN THE STANDARD SPECIFICATION MIL-DTL-43607J.

3. DOOR MANUFACTURER WILL COORDINATE WITH THE GOVERNMENT ON INSTALLATION AND DRAWINGS IS PERMITTED TO ACCOMMODATE THE HIGH SECURITY HASP UNLESS APPROVED BY THE U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE (STRUCTURAL BRANCH).

4. SEE DOOR FRAME AND DOOR DETAILS ON SHEETS S701 - S704.

ADDITIONAL FRAMING (IF REQUIRED) TO ACCOMMODATE THE HIGH SECURITY HASPS.

ATTACHMENT DETAILS OF THE HASPS AND PROVIDE THE NECESSARY STIFFENERS AND

HIGH SECURITY HASP NOTES:

1. HIGH SECURITY HASPS SHALL CONFORM TO MILITARY SPECIFICATION MIL-DTL-29181C. STYLE 1-HASP (M29181-01) FOR RIGHT HAND SWINGING DOOR AND STYLE 2-HASP (M29181-02) FOR LEFT HAND SWINGING DOOR. HIGH SECURITY PADLOCKS SHALL CONFORM TO MILITARY STYLE 1-HASP (M29181-01) FOR RIGHT HAND SWINGING DOOR AND STYLE 2-HASP (M29181-02) FOR LEFT HAND SWINGING DOOR.

2. NO MODIFICATIONS AND/OR DEVIATIONS TO THE DOOR CONSTRUCTION SHOWN IN THE STANDARD SPECIFICATION MIL-DTL-43607J.

3. DOOR MANUFACTURER WILL COORDINATE WITH THE GOVERNMENT ON INSTALLATION AND ATTACHMENT DETAILS OF THE HASPS AND PROVIDE THE NECESSARY STIFFENERS AND ADDITIONAL FRAMING (IF REQUIRED) TO ACCOMMODATE THE HIGH SECURITY HASPS.

4. SEE DOOR FRAME AND DOOR DETAILS ON SHEETS S701 - S704.
INTERNAL LOCKING DEVICE (ILD) NOTES:

1. INTERNAL LOCKING DEVICE IS A U.S. GOVERNMENT DESIGNED AND PATENTED LOCKING SYSTEM.
2. NO MODIFICATIONS AND/OR DEVIATIONS TO THE DOOR CONSTRUCTION SHOWN IN THE STANDARD DRAWINGS ARE PERMITTED TO ACCOMMODATE THE INTERNAL LOCKING SYSTEM UNLESS APPROVED BY THE U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE (STRUCTURAL BRANCH).
3. DOOR MANUFACTURER WILL COORDINATE WITH THE GOVERNMENT ON INSTALLATION AND ATTACHMENT DETAILS OF THE I.LD INSERTION INTO DOOR FRAME TO ACCOMMODATE THE I.LD SYSTEM.
4. SEE I.LD MANUFACTURERS INSTALLATION DRAWINGS FOR ADDITIONAL INFORMATION NOT SHOWN IN THESE DRAWINGS.
5. SITE DOOR FRAME AND DOOR DETAILS ON SHEETS S701(A) - S705(A) (ILD) IDENTIFY TWO DIFFERENT LOCKING SYSTEMS. THE DESIGNER SHALL VERIFY WITH THE CONTRACTING OFFICER THE CORRECT LOCKING SYSTEM REQUIRED AND REMOVE THE REDUNDANT SHEETS FROM THE CONSTRUCTION DRAWINGS FOR SITE ADAPTATION DESIGN.

INTERNAL LOCKING DEVICE (ILD) WARNING:

- LOCKS SHOULD NOT BE USED AS THE ONLY METHOD OF SECURITY.
- IT IS IMPORTANT TO FOLLOW ALL SECURITY PROCEDURES TO ENSURE THE SAFETY OF ALL PERSONS IN THE AREA.
- THE USE OF ANY OTHER LOCKING SYSTEM WITHOUT THE CONSENT OF THE U.S. ARMY ENGINEERING AND SUPPORT CENTER IS NOT PERMITTED.

INTERNAL LOCKING DEVICE (ILD) SYSTEM:

- S705(A)
- Foot & Head Bolt Shown Disengaged
- View from Inside of Magazine
- Scale: NTS

SEE MANF. DRAWINGS ILD SYSTEM, LEFT DOOR, RIGHT DOOR, OF DETAILS AND REQUIREMENTS.

CONTRACT DOCUMENTS FOR THE SYSTEM NOT USED.

REDUNDANT SHEETS FROM THE CONSTRUCTION DRAWINGS FOR SITE ADAPTATION DESIGN.

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING DRAWINGS.


NO EXTRAS一定能内

5. SEE DOOR FRAME AND DOOR DETAILS ON SHEETS S701(A) - S705(A).

*** SAFETY FIRST ***

*** SUPPORT VALUE ENGINEERING - IT PAYS ***
**SAFETY FIRST**

**MEYD NOTES**

1. **#4/0 BARE COPPER CONDUCTOR (ECC), GROUND RING ELECTRODE, ENCLOSING BUILDING PERIMETER, INSTALL IN DIRECT EARTH CONTACT.** 
   2. MINIMUM BELOW GRADE SURFACE AND MINIMUM FROM EDGE OF GRADE BEAM.

2. **DRIVEN GROUND ROOD, SEE DETAIL B, DWG E-103. ALL GROUND ROOD TO BE BONDED TO GROUND RING ELECTRODE WITH EXOTHERMIC WELD. GROUND ROOD #2 GALV.**

3. **BOND FOOTING TOP STEEL, PLATE TO COUNTERPOISE WITH #4/0 RCC. EXOTHERMIC WELD AT EACH END.** CABLES PROVIDE CONDUIT WHERE WIRE PASSES THROUGH CONCRETE. (TYPE EACH CORNER) REFERENCE DETAL C, SHEET E-102.

4. **GROUNDING ELECTRODE CONDUCTOR IN PVC CONDUIT, CONNECT ELECTRICAL SERVICE TO GROUNDING ELECTRODE.** (MIN PER N.E.C.)

5. **BOND DOORS FRAME TO GROUNDING ELECTRODE, BOND DOORS TO FRAME WITH BRAIDED COPPER STRAP EQUAL TO #4/0 COPPER CONDUCTOR. 2 EA DOOR, 1 TOP, 1 BOTTOM, (TYPE)**

---

**TYPICAL LIGHTNING PROTECTION AND GROUNDING PLAN**

**A**

**B**

**C**

**D**

---

**NOTES:** (APPLICABLE TO DRAWINGS E-101, E-102, E-103)

1. THE FOLLOWING NOTES AND APPLICABLE DRAWINGS ARE PROVIDED AS STANDARD GUIDANCE FOR LIGHTNING PROTECTION DESIGN OF EARTH COVERED BUILDING PROTECTED BY LIGHTNING PROTECTION SYSTEM. THIS DESIGN IS FOR USE IN THE LIGHTNING PROTECTION DESIGN OF BUILDINGS, INCLUDING LIGHTNING PROTECTION SYSTEM DESIGNER SHALL CONSULT THE BELOW CRITERIA TO ENSURE A COMPLETE AND FUNCTIONAL DESIGN IS PROVIDED. THE COMPLETE INSTALLATION SHALL BE A REGISTERED ELECTRICAL ENGINEER.

2. **THE LIGHTNING PROTECTION SYSTEM MUST PROVIDE A LIGHTNING PROTECTION SYSTEM (LPS).** THE LPS MUST PROVIDE THE FOLLOWING:
   - PROVIDE EFFICIENT CONDUCTIVE PATH.
   - PROVIDE THE REQUIRED EARTH Bonds.
   - PROVIDE THE REQUIRED VENTILATION SYSTEMS.

3. **THE LPS MUST BE MADE OF MATERIALS ACCEPTABLY CORROSION RESISTANT.** AS SPECIFIED IN UL 96.

4. **MINIMUM AIR TERMINAL HEIGHT IS 24 INCHES ABOVE THE PROTECTED OBJECT.**

5. **REINFORCING STEEL IN WALL, FLOOR AND ARCHITECTURE MUST BE INTERCONNECTED. BONDS AND MUST HAVE A CONDUCTOR OF NO LESS THAN #2 COPPER (ECC). LIGHTNING PROTECTION SYSTEM. METAL VENTILATION, STEEL DOORS (DOOR FRAMES) SHALL BE BONDED TO THE PRIMARY GROUNDING SYSTEM.

6. **INCOMING POWER AND COMM. MUST ENTER THE GROUND AT LEAST 1 FT. FROM THE FACILITY, MEASURED TO THE NEAREST POINT. CABLES AND WIRES MUST BE SHIELDED OR BE INSTALLED IN METALLIC PIPE. ALL GROUND ROOD TO BE BONDED TO THE GROUNDING SYSTEM AT THE POINT OF ENTRY.**

7. **ANY METAL PENETRATION, I.E., WATER PIPE, CONDUIT, ETC., MUST BE CONNECTED TO THE REBAR AT THE POINT OF ENTRY.**

8. **PROVIDE SUGGESTIVE DEVICES (SD) FOR POWER, COMM. AND REFRIGERATION. UL 1449 APPROVED.**

9. **CONSIDER ALL MASSES FOR SIDEFLASHES. METAL MOUNTED WITHIN THE SIDEFLASH PROTECTION DISTANCE MUST BE BONDED TO THE LPS OR BE MOVED OUTSIDE THE SIDEFLASH PROTECTION DISTANCE.**

10. **RESISTANCE OF COMPONENTS OF THE LPS SHALL NOT EXCEED THAT SPECIFIED IN TABLE 11.3 OF DA Pam 380-44.**

11. **EXOTHERMIC WELD ALL CONDUCTIVE BONDS AND TERMINATIONS.**

12. **LOCATIONS OF COMPONENTS ARE APPROXIMATE.** COORDINATES OF EARTH ELECTRICAL LOCATION BEFORE INSTALLATION.

13. **INTERNAL ELECTRICAL SYSTEMS (LPS LIGHTING, WIRING, SIGNAL, ETC.) SHALL BE RATED AND APPROVED FOR THE ENVIRONMENT AND HAZARD CLASSIFICATION IN WHICH IT IS INSTALLED ACCORDING TO THE UL 96, SECTION 420.**

14. **GROUND AND BONDING CABLE SIZES ARE BASED ON COPPER CONDUCTORS. ALL ALUMINUM CONDUCTORS, IF USED, MUST BE SIZED TO THE COPPER EQUIPMENT.**

15. **WHERE CONFLICTS EXIST BETWEEN THESE DRAWINGS AND THE BELOW CRITERIA, THE MOST STRINGENT REQUIREMENT SHALL APPLY.**

16. **DESIGN INSTALLATION CRITERIA:**
   - AIA, DA Pam 380-44, AMMUNITION AND EXPLOSIVES STORAGE CONTAINERS (FMR 400-210)
   - NAPA 785, STANDARD FOR THE INSTALLATION OF LIGHTNING PROTECTION SYSTEMS
   - UL 96, INSTALLATION REQUIREMENTS FOR LIGHTNING PROTECTION SYSTEMS
   - UL 96, STANDARD FOR LIGHTNING PROTECTION COMPONENTS
   - UL 96, NATIONAL ELECTRICAL CODE (NEC)

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**SUPPORT VALUE ENGINEERING - IT PAYS**
**SAFETY FIRST**

**TYPICAL ROLLING SPHERE ANALYSIS DIAGRAM**

**TYPICAL ROLLING SPHERE ANALYSIS DIAGRAM**

**TYPICAL ROLLING SPHERE ANALYSIS DIAGRAM**

**TABLE**

<table>
<thead>
<tr>
<th>Nominal Bunker Length</th>
<th>X</th>
<th>DIM</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 FT. OR LESS</td>
<td>2</td>
<td>X</td>
</tr>
<tr>
<td>40 FT. LES THAN 60 FT.</td>
<td>3</td>
<td>X</td>
</tr>
<tr>
<td>60 FT. OR MORE</td>
<td>4+</td>
<td>X</td>
</tr>
</tbody>
</table>

**NOTES:**

1. ALL VENTILATORS ARE NOT SHOWN ON PLAN FOR CLARITY. ANY VENTILATORS OR OTHER METALLIC BODIES WHICH HIDE ABOVE FINISHED GROUND WITHIN MUNITIONS STORAGE SHALL HAVE AN AIR TERMINAL AT TOP AND BONDED TO GROUND SIMILARLY AS SHOWN.

2. GROUNDING CONNECTIONS NOT SHOWN FOR CLARITY.

**SUPPORT VALUE ENGINEERING - IT PAYS**