US Army Corps
of Engineers
Huntsville Center

MODULAR STORAGE MAGAZINE, BOX-TYPE FLOW-THRU STD 421-80-10

US Army Corps
of Engineers
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Revisions			
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Designed by: JMU
Drawn by: JMU
Checked by: RSW
Project Engineer/Architect: Jeff Coulston
Date:

U. S. ARMY CORPS OF ENGINEERS
ENGINEERING AND
SUPPORT CENTER,
HUNTSVILLE, ALABAMA

MODULAR STORAGE MAGAZINE
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COVER SHEET

Sheet reference number:

G-001

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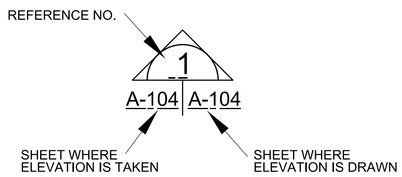
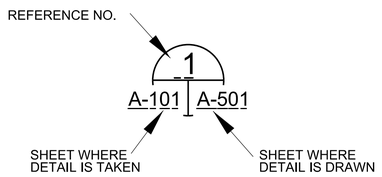
GENERAL ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR
ALUM	ALUMINUM
APPROX	APPROXIMATELY
BLDG	BUILDING
BOTT	BOTTOM
BRG	BEARING
CIP	CAST-IN-PLACE
CJ	CONTROL JOINT
CL	CENTER LINE
CMU	CONCRETE MASONRY UNIT
CP	CENTER POINT
COL	COLUMN
COORD	COORDINATE
CONC	CONCRETE
CONT	CONTINUE, CONTINUOUS
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
EA	EACH
ELEV	ELEVATION
EF	EACH FACE
EJ	EXPANSION JOINT
EQ	EQUAL
E.W.	EACH WAY
(E) OR EXIST	EXISTING
EXT	EXTERIOR
FTG	FOOTING
FV	FIELD VERIFY
GALV	GALVANIZED
HD	HEADED
HT	HEIGHT
INT	INTERIOR
ID	INSIDE DIAMETER
LLH	LONG-LEG HORIZONTAL
LLV	LONG-LEG VERTICAL
MIN	MINIMUM
MANF	MANUFACTURER
NTS	NOT TO SCALE
O.C.	ON CENTER
OD	OUTSIDE DIAMETER
OH	OPPOSITE HAND
R	RADIUS
REINF	REINFORCEMENT
REQ'D	REQUIRED
SF	SQUARE FEET
SHT	SHEET
SIM	SIMILAR
SOG	SLAB-ON-GRADE
STIFF	STIFFENER
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
VIF	VERIFY IN FIELD
WWF	WELDED WIRE FABRIC
WWR	WELDED WIRE REINFORCEMENT
W/	WITH
WP	WORKING POINT

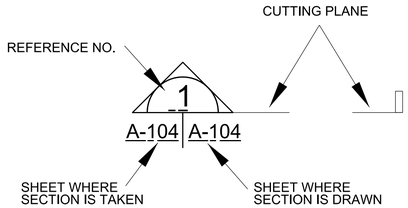
DRAWING SYMBOLS



ELEVATION REFERENCE



DETAIL REFERENCE



SECTION CUT

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INDEX, SYMBOLS,
& ABBREVIATIONS

Sheet reference number:
G-002
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1.0 DESIGN CRITERIA:

A. BUILDING CODES AND SPECIFICATIONS:

1. INTERNATIONAL BUILDING CODE 2012 (IBC) AS MODIFIED BY UFC 1-200-01
2. AMERICAN CONCRETE INSTITUTE (ACI 318)
3. AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC 13th ED.)
4. AMERICAN WELDING SOCIETY, A.W.S.

B. LIVE LOADS

ROOF----------100 PSF
FLOOR----------500 PSF

SNOW LOAD:

GROUND SNOW LOAD (Pg) = 60 PSF
IMPORTANCE FACTOR (I) = 1.1
EXPOSURE CATEGORY (Ce) = 1.0
THERMAL CATEGORY (Ct) = 1.2

C. WIND LOAD:

BASIC WIND SPEED: 160 MPH
IMPORTANCE FACTOR (I): 1.0
EXPOSURE CATEGORY: C
ENCLOSURE CLASSIFICATION: ENCLOSED

D. EARTHQUAKE:

RISK CATEGORY=III
Ie= 1.25
Ss= 0.65
Sds= 0.49
S1 = 0.18
Sd1 = 0.19
SITE CLASS: C
BASIC SEISMIC-FORCE RESISTING SYSTEM=
INTERMEDIATE PRECAST SHEAR WALLS, R = 4
SEISMIC DESIGN CATEGORY= C
ANALYSIS PROCEDURE = EQUIVALENT LATERAL FORCE PROCEDURE

E. SOILS

SOIL DENSITY (γ): 120 PCF
ANGLE OF INTERNAL FRICTION OF THE SOIL (Φ) : 30 DEGREES
EQUIVALENT FLUID PRESSURE (EFP) : 60 PSF PER FOOT OF DEPTH (AT-REST)

2.0 GENERAL

2.1 CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND SITE CONDITIONS PRIOR TO CONSTRUCTION/FABRICATION. CONTRACTOR SHALL NOTIFY CONTRACTING OFFICER OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.

2.2 THE STRUCTURE (MEMBERS AND CONNECTIONS) HAS BEEN DESIGNED TO SUPPORT IN-PLACE DESIGN LOADS ONLY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LIMITING CONSTRUCTION LOADS SUCH THAT THESE LOADS DO NOT EXCEED THE DESIGN LOADS NOTED ABOVE.

2.3 IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE CONSTRUCTION METHODS, PROCEDURES, AND SEQUENCES TO ENSURE STABILITY AND SAFETY DURING CONSTRUCTION. THE CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PROTECT AND MAINTAIN THE STRUCTURAL INTEGRITY OF ALL NEW AND EXISTING CONSTRUCTION AT ALL STAGES.

2.4 SECTIONS AND DETAILS SHOWN ON THE STRUCTURAL DRAWINGS SHALL BE CONSIDERED TYPICAL FOR SIMILAR CONDITIONS THAT DO NOT HAVE A SPECIFIC SECTION INDICATED.

2.5 THE CONTRACTOR SHALL COORDINATE STANDARD DRAWINGS WITH THE VENDOR/MANF. SHOP DRAWINGS TO VERIFY SIZES AND LOCATIONS OF OPENINGS, SLEEVES, INSERTS, DEPRESSIONS, FINISHES, SLOPES, ETC. ANY DISCREPANCY SHALL BE BROUGHT TO THE ATTENTION OF THE CONTRACTING OFFICER.

2.6 SEE CIVIL SITE LAYOUT DRAWINGS (PART OF SITE ADAPTION) FOR ACTUAL FINISHED FLOOR ELEVATIONS (F.F.E.) FOR ALL BUILDINGS. ELEVATIONS SHOWN IN STRUCTURAL DOCUMENTS WILL BE BASED ON REFERENCED F.F.E. EQUAL TO 100'-0", U.O.N.

2.7 ANY DISCREPANCIES BETWEEN DRAWINGS, SPECIFICATIONS, REFERENCE STANDARDS, OR GOVERNING CODE, THE MORE STRINGENT REQUIREMENTS SHALL GOVERN. CONTRACTOR SHALL NOTIFY THE CONTRACTING OFFICER OF DISCREPANCIES AND OBTAIN DIRECTION PRIOR TO PROCEEDING.

2.8 CONTRACTOR SHALL PROVIDE TEMPORARY SHORING AND BRACING OF ALL STRUCTURAL WORK, AND SOIL EXCAVATION AS REQUIRED. SHORING AND BRACING SHALL NOT BE REMOVED UNTIL ALL FINAL CONNECTIONS HAVE BEEN COMPLETED IN ACCORDANCE WITH THE DRAWINGS, AND MATERIALS HAVE ACHIEVED DESIGN STRENGTH.

3.0 FOUNDATIONS

3.1 SEE CIVIL DRAWINGS AND SPECIFICATIONS (PART OF SITE ADAPTION) FOR EARTHWORK PREPARATION OF FOUNDATIONS INCLUDING THE REMOVAL OF ORGANIC MATERIALS, COMPACTING SOILS BENEATH STRUCTURES, BACK FILL REQUIREMENTS FOR OVER EXCAVATION AND REMOVAL OF UNSUITABLE MATERIALS.

3.2 MAXIMUM ASSUMED ALLOWABLE NET SOIL BEARING PRESSURE USED FOR DESIGN: 3000 PSF .

3.3 ASSUMED UNIT WEIGHT OF SOIL USED FOR DESIGN: 120 PCF

3.4 ALL FOUNDATION BEARING SURFACES SHALL BE REVIEWED BY THE GEOTECHNICAL ENGINEER PRIOR TO PLACING CONCRETE TO ENSURE THEIR COMPLIANCE WITH THE PRESSURES NOTE ABOVE.

3.5 ALL FOOTINGS SHALL PROJECT AT LEAST 1'-6" INTO UNDISTURBED NATURAL SOIL OR COMPACTED ENGINEERED FILL HAVING A SOIL BEARING PRESSURE THAT MEETS OR EXCEEDS THAT SPECIFIED ABOVE.

3.6 ALL DISTURBED EARTH UNDER FOOTINGS SHALL BE REPLACED WITH LEAN CONCRETE.

3.7 CONCRETE SHALL NOT BE PLACED OVER FROZEN SOIL OR FOOTING EXCAVATIONS SUBJECTED TO WATER.

4.0 CONCRETE

4.1 ALL CONCRETE WORK INCLUDING DETAILING, FABRICATION, PLACEMENT OF REINFORCING, MIXING, HANDLING, PLACING, FINISHING, AND CURING SHALL CONFORM TO THE FOLLOWING DOCUMENTS:

ACI 301----------"STANDARD SPECIFICATIONS FOR STRUCTURAL CONCRETE"
ACI 315----------"MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES"
ACI 318----------"BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE"

4.2 ALL CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS, U.O.N. ALL CONCRETE SHALL CONFORM TO ASTM C94.

4.3 REINFORCING BARS SHALL BE DEFORMED TYPE CONFORMING TO ASTM A615 GRADE 60 U.O.N.

4.4 WELDED WIRE REINFORCEMENT SHALL CONFORM TO ASTM A185. MINIMUM LAP AND EMBEDMENT TO BE THE GREATER OF ONE CROSS WIRE SPACING PLUS 2" OR 6", WHICHEVER IS GREATER.

4.5 FABRICATE AND PROVIDE BAR SUPPORTING ACCESSORIES IN ACCORDANCE WITH ACI MANUAL OF STANDARD PRACTICE AND C.R.S.I. SPECIFICATIONS. REINFORCING SHALL NOT BE WELDED IN ANY MANNER U.O.N. IN CONSTRUCTION DOCUMENTS.

4.6 REINFORCING SHALL BE CONTINUOUS WITH CLASS "B" TENSION LAP SPLICES, U.O.N.

4.7 CONCRETE COVERAGE OF REINFORCEMENT FOR CAST-IN-PLACE CONSTRUCTION U.O.N.:

CONCRETE CAST AGAINST EARTH:.....3 INCHES
FORMED CONCRETE EXPOSED TO EARTH OR WEATHER:
NO. 6 BAR AND LARGER.....2 INCHES
NO. 5 BAR AND SMALLER.....1 1/2 INCHES
CONCRETE NOT EXPOSED TO WEATHER:
SLABS, WALLS, JOISTS.....1 INCHES
BEAMS AND COLUMNS.....1 1/2 INCHES
SLAB ON GRADE.....MID-DEPTH OF SLAB

4.8 PROVIDE REINFORCING BARS IN CONCRETE FOOTINGS TO MATCH THE SIZE AND SPACING OF THE HORIZONTAL REINFORCING AT ALL CORNERS AND INTERSECTIONS OF STRIP FOOTINGS. PROVIDE LEG LENGTH EQUIVALENT TO CLASS "A" TENSION LAP SPLICE U.O.N.

4.9 PROVIDE DOWEL TO FOUNDATION WITH 90 DEGREE HOOK TO MATCH SIZE AND SPACING OF VERTICAL REINFORCING AT ALL PEDESTALS, WALLS, AND COLUMNS.

4.10 FOOTINGS AND SLABS SHALL HAVE NO HORIZONTAL JOINTS (POURED TO THEIR FULL DEPTHS IN ONE OPERATION). ANY STOP IN CONCRETE WORK SHALL BE BULKHEAD AND KEYED, U.O.N.

4.11 REINFORCEMENT SHALL NOT BE BENT OR STRAIGHTENED IN A MANNER THAT WILL DAMAGE THE MATERIAL. BARS WITH WITH KINKS OR IMPROPER BENDS SHALL NOT BE USED.

4.12 REINFORCEMENT SHALL BE CONTINUOUS THROUGH ALL CONSTRUCTION JOINTS, BUT DISCONTINUOUS THROUGH ALL CONTROL JOINTS, U.O.N..

4.13 A CLASS C FINISH IS REQUIRED FOR EXPOSED FORMED SURFACES OF PRECAST PANELS. A CLASS D FINISH IS REQUIRED FOR SURFACES WHICH WILL BE BELOW GRADE OR NOT EXPOSED TO VIEW AFTER FINAL ASSEMBLY.

4.13 REFER TO GEOTECHNICAL REPORT FOR RECOMMENDATIONS RELATIVE TO SUBGRADE PREPARATION FOR SLAB ON GRADE WORK.

5.0 STRUCTURAL STEEL

5.1 STRUCTURAL STEEL FABRICATION, ERECTION, AND CONNECTION DESIGN SHALL CONFORM TO A.I.S.C.'S "SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS."

5.2 STRUCTURAL STEEL SHALL CONFORM TO THE FOLLOWING ASTM DESIGNATIONS:

W SHAPES.....ASTM A36
STEEL CHANNELS, ANGLES, PLATES AND BARS: .....ASTM A36
(MAXIMUM YIELD STRESS (Fy) SHALL NOT EXCEED 50 KSI FOR DOOR CONSTRUCTION)
RECTANGULAR, SQUARE, AND ROUND HSS.....ASTM A500, GRADE B
STEEL PIPE (HSS).....ASTM A53, GRADE B

THE DOORS SHALL NOT BE FABRICATED FROM DUAL GRADED ASTM A36 AND ASTM A572 GRADE 50 STRUCTURAL STEEL PLATES. THE YIELD STRESS (fy) OF ALL STUCTURAL STEEL PLATES USED IN THE DOORS SHALL BE LESS THAN 50 KSI. TO ENSURE SATISFACTION OF THIS REQUIREMENT, THE DOOR FABRICATOR SHALL SUBMIT CERTIFIED MANUFACTURER'S MILL REPORTS FOR ALL STRUCTURAL STEEL PLATES USED IN THE DOORS.

5.3 STRUCTURAL FASTENERS SHALL CONFORM TO THE FOLLOWING ASTM DESIGNATIONS:

ANCHOR BOLTS.....ASTM 307
THREADED RODS.....ASTM A36
HEADED STUDS.....ASTM A108, GRADES 1015 TO 1020 (65 KSI TENSILE STRENGTH)
DEFORMED BAR ANCHORS.....ASTM A496, TYPE C (80 KSI MIN. TENSILE STRENGTH)

5.4 BOLTED CONNECTIONS SHALL CONFORM TO RCSC'S "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS". ALL BOLTS SHALL BE 3/4" DIAMETER UNLESS OTHERWISE NOTED.

5.5 WELDED CONNECTIONS SHALL CONFORM TO AWS D1.1 "STRUCTURAL WELDING CODE-STEEL". MINIMUM SIZE FILLET WELDS SHALL BE 3/16" UNLESS OTHERWISE NOTED AND ELECTRODES SHALL BE E70xx. WELDERS SHALL BE QUALIFIED IN ACCORDANCE WITH AWS.

5.6 UNLESS SPECIFICALLY DETAILED ON THE CONTRACT DRAWINGS, ALL FRAMED BEAM CONNECTIONS SHALL BE DESIGNED BY A QUALIFIED PROFESSIONAL ENGINEER EMPLOYED BY THE FABRICATOR. STANDARD BEAM CONNECTIONS (NON-COMPOSITE) SHALL BE DESIGNED BASED ON A REACTION EQUAL TO ONE-HALF THE MAXIMUM TOTAL UNIFORM LOAD CAPACITY FROM AISC'S "MAXIMUM TOTAL UNIFORM LOAD" TABLE MULTIPLIED BY A FACTOR OF 1.2, UNLESS REACTIONS ARE SHOWN ON STRUCTURAL DRAWINGS. MINIMUM REACTION TO DESIGN FOR SHALL BE (12.0 KIPS).

5.7 ALL EXTERIOR STEEL EXPOSED TO THE WEATHER SHALL BE HOT DIPPED GALVANIZED OR COATED WITH A HIGH PERFORMANCE COATING SYSTEM (HPCS). MEMBERS NOT REQUIRED FOR CORROSION PROTECTION SHALL RECEIVE ONE COAT OF STANDARD PRIMER PAINT. DO NOT PRIME OR PAINT SURFACES WHICH ARE TO RECEIVE FIELD WELDED HEADED SHEAR STUDS. PROVIDE 3" MINIMUM CONCRETE COVER FOR ALL STEEL BELOW GRADE AND PAINT WITH 2 COATS OF COAL TAR EPOXY. EPOXY SHALL MEET THE REQUIREMENTS OF PAINT SPECIFICATION SSPC-PAINT 16.

5.8 ALL STEEL EMBED PLATES, ANGLES, AND CHANNELS THAT ARE CAST INTO PRECAST CONCRETE PANELS AND/OR CAST-IN-PLACE CONCRETE, SLAB OR EARTH BARRIER/HEADER SHALL BE HOT-DIPPED GALVANIZED. WELDS AT GALVANIZED MEMBERS SHALL BE TOUCHED UP IN ACCORDANCE WITH ASTM A780.

5.9 ALL STIFFENERS AND GUSSETS PLATES SHALL BE MINIMUM 3/8" THICK, UNLESS OTHERWISE NOTED.

6.0 STRUCTURAL PRECAST CONCRETE

6.1 ALL PRECAST ELEMENTS NOT DETAILED ON DRAWINGS SHALL BE DESIGNED FOR THE SPAN AND CONCRETE AND CONSTRUCTION LOADING CONDITIONS SHOWN ON THE DRAWINGS BY A LICENSED STRUCTURAL ENGINEER. ALL DESIGN CALCULATIONS, INCLUDING THE DESIGN OF ALL STRUCTURAL ELEMENTS AND LIFTING POINTS SHALL BE SUBMITTED TO THE CONTRACTING OFFICER FOR REVIEW PRIOR TO THE START OF FABRICATION.

6.2 THE PRECAST MANUFACTURER SHALL BE RESPONSIBLE FOR COORDINATION OF ALL DISCIPLINES AS THEY EFFECT THE PRECAST ELEMENTS.

6.3 THERE SHALL BE NO FIELD CUTTING OF PRECAST ELEMENTS WITHOUT THE APPROVAL OF THE CONTRACTING OFFICER.

6.4 CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH AT TWENTY-EIGHT DAYS OF 4000 PSI.

6.5 ALL GROUT SHALL BE NON-SHRINK, NON-METALLIC WITH F'c = 6000 PSI.

7.0 LIGHTNING PROTECTION SYSTEM (LPS)

7.1 ALL METAL PARTS, TO INCLUDE REINFORCEMENT IN FLOOR, PRECAST WALLS AND ROOF PANELS, LOUVERS, VENTILATORS, DOORS AND DOOR FRAME, SHALL BE MADE ELECTRICALLY CONTINUOUS BY BONDING (CLIPPING, BRAZING OR TACK WELDING) AT 5 LINEAR FEET INTERVALS. ELECTRICAL CONTINUITY SHALL BE PROVIDED ACROSS FLOOR EXPANSION AND ISOLATION JOINTS TO FOUNDATION PEDESTALS AND PRECAST ROOF PANELS, AND BETWEEN PRECAST WALLS AND CONCRETE PEDESTAL FOOTING SHALL BE PROVIDED DURING CONSTRUCTION. ACCEPTABLE CONTINUITY METHODS ARE REINFORCING BARS (MINIMUM OVERLAP SHALL BE 20 BAR DIAMETERS), COPPER STRAPS, ETC. SEE ELECTRICAL DRAWINGS FOR ADDITIONAL INFORMATION REGARDING LPS.

DESIGNER NOTES: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION OF THIS DESIGN.

1. THE MAGAZINE HAS BEEN ANALYZED FOR THE LOADS LISTED ON THIS SHEET AND DETERMINED TO BE ADEQUATE UNDER THESE LOADINGS. HOWEVER, THE DESIGNER SHOULD VERIFY THE STRUCTURE FOR THE SITE-SPECIFIC LOADING CRITERIA. IF SITE-SPECIFIC LOADS EXCEED THESE LISTED ON THIS SHEET, THE DESIGNER SHOULD ADDRESS ALL DEFICIENCIES THAT DO NOT MEET CURRENT BUILDING CODES.
2. FOUNDATIONS SHALL BE REVISED TO REFLECT SPECIFIC SITE SOIL CONDITIONS INCLUDING LOCAL SITING, TOPOGRAPHIC CONDITIONS, AND FROST PENETRATION DEPTHS.
3. STRUCTURAL COMPONENTS, WITH THE EXCEPTION OF THE FOUNDATION (FOOTINGS), SLAB-ON-GRADE, AND WING WALLS SHALL NOT BE MODIFIED WITHOUT THE APPROVAL OF THE CONTRACTING OFFICER, WHO SHOULD CONSULT WITH THE U.S. ARMY ENGINEERING AND SUPPORT CENTER, HUNTSVILLE (STRUCTURAL BRANCH). STRUCTURE HAS BEEN DETERMINED TO BE ADEQUATE FOR THE DESIGN CRITERIA LISTED ON THIS SHEET.
4. SHEETS S701 - S705 (HIGH SECURITY HASP) AND 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 CONTRACT DOCUMENTS FOR THE SYSTEM NOT USED.

STRUCTURAL DESIGNATION (7-BAR) NOTES:

1. ANY DEVIATION FROM THE STANDARD APPROVED DESIGN DRAWINGS FOR THE CONCRETE HEADWALL, STEEL DOOR, CONCRETE ROOF OR THEIR SUPPORTS WITHOUT WRITTEN APPROVAL FROM THE DEPARTMENT OF DEFENSE EXPLOSIVE SAFETY BOARD (DDESB) MAY REQUIRE THE MAGAZINE TO BE CONSIDERED AN UNDEFINED MAGAZINE AND MAY SEVERELY RESTRICT THE ALLOWABLE STORAGE CAPACITY.
2. IF CONSTRUCTED PER THESE DRAWINGS, FACILITY MEETS BLAST-RESISTANT DESIGN CRITERIA FOR A 7-BAR STRUCTURAL DESIGNATION PER DESR 6055.09, EDITION 1. THIS DESIGNATION IN NO WAY IMPLIES VALIDATION OF THE DESIGN AGAINST OTHER LOAD CASES.

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GENERAL NOTES

Sheet reference number:
S-001
Sheet 3 of 28

SPECIAL INSPECTION SCHEDULE/VERIFICATION

ITEM	EXTENT OF INSPECTION [1]	REFERENCE	COMMENTS/SCOPE
CONCRETE CONSTRUCTION			
REINFORCING STEEL PLACEMENT	P	ACI 318: 3.5, 7.1-7.7	INSPECT SIZE, SPACING, COVER, POSITIONING AND GRADE OF REINFORCING STEEL. VERIFY THAT REINFORCING BARS ARE FREE OF FORM OIL OR OTHER DELETERIOUS MATERIALS. INSPECT BAR LAPS AND MECHANICAL SPLICES. VERIFY THAT BARS ARE ADEQUATELLY TIED AND SUPPORTED ON CHAIRS OR BOLSTERS
WELDING OF RIENFORCEMENT	C, P	AWS D1.4, ACI 318:3.5.2	VISUALLY INSPECT ALL REINFORCING STEEL WELDS. VERIFY WELDABILITY OF REINFORCING STEEL. INSPECT PREHEATING OF STEEL WHEN REQUIRED.
CONCRETE PLACEMENT	C	ACI 318: 5.9, 5.10	INSPECT PLACEMENT OF CONCRETE. VERIFY THAT CONCRETE CONVEYANCE AND DEPOSITING AVOIDS SEGREGATION OR CONTAMINATION. VERIFY THAT CONCRETE IS PROPERLY CONSOLIDATED
SAMPLING AND TESTING OF CONCRETE	C	ASTM C 172 ASTM C 31 ACI 318: 5.6, 5.8	TEST CONCRETE COMPRESSIVE STRENGTH, SLUMP, AIR-CONTENT AND TEMPERATURE
CURING AND PROTECTION	P	ACI 318: 5.11-5.13	INSPECT CURING, COLD WEATHER PROTECTION AND HOT WEATHER PROTECTION PROCEDURES
FORMWORK	P	ACI 318: 6.1.1	INSPECT FORWORK FOR SHAPE, LOCATION, AND DIMENSIONS OF THE CONCRETE MEMBER BEING FORMED
PRECAST CONCRETE			
PLANT CERTIFICATION/QUALITY CONTROL PROCEDURES	S		REVIEW OF PLANT OPERATIONS AND QUALITY CONTROL PROCEDURES
MIX DESIGN	S		INSPECT CONCRETE BATCHING OPERATIONS AND VERIFY COMPLIANCE WITH APPROVED MIX DESIGN
MATERICAL CERTIFICATION	S		REVIEW FOR CONFORMANCE TO ACI 318
REINFORCEMENT INSTALLATION	P		INSPECT SIZE, SPACING, POSITION AND GRADE OF REINFORCING STEEL
CONNECTIONS/EMBEDDED ITEMS	P		INSPECT INTERFACE CONNECTIONS INCLUDING END AND EDGE DOWELING. INSPECT EMBEDMENTS FOR PROPER LOCATION AND WELDING OF CONNECTIONS
CONCRETE PLACEMENT	C	ACI 318: 5.9, 5.10	INSPECT PLACEMENT OF CONCRETE. VERIFY THAT CONCRETE CONVEYANCE AND DEPOSITING AVOIDS SEGREGATION OR CONTAMINATION. VERIFY THAT CONCRETE IS PROPERLY CONSOLIDATED
SAMPLING AND TESTING	C		
CURING AND PROTECTION	P		
ERECTED PRECAST ELEMENTS	C	ACI 318: Ch. 16	INSPECT ERECTION OF PRECAST CONCRETE INCLUDING MEMBER CONFIGURATION, CONNECTIONS, WELDING AND GROUTING
DOOR CONSTRUCTION			
FABRICATOR CERTIFICATION/QUALITY CONTROL PROCEDURES	S		REVIEW OF FABRICATOR'S QUALITY CONTROL PROCEDURES OR AISC CERTIFICATION
FABRICATOR INSPECTION	P		INSPECT IN-PLANT FABRICATION, OR REVIEW FABRICATOR'S APPROVED INDEPENDENT INSPECTION AGENCY'S REPORTS
SPECIAL ITEMS RELATED TO THE OTHER EXPLOSIVES SAFETY RELATED ITEMS			
REBAR FARADAY-SHIELD	P	DWGS E-101; E-102	INSPECT REINFORCING STEEL TO ENSURE ELECTRICAL CONTINUITY BETWEEN THE CAP, WALLS, SLAB AND FOUNDATION THROUGH BONDING WELDS. DOCUMENT BONDS WITH PHOTOS AND CONTINUITY TEST.
ECM GROUNDNG	P	DWGS E-101; E-102	VISUALLY INSPECT TO ENSURE ECM FOUNDATION IS BONDED TO THE GROUNDING SYSTEM. DOCUMENT WITH PHOTOS.
GROUNDING SYSTEM	P	DWGS E-101; E-102, NFPA 780, DA PAM 385-64, 17-27.	VISUALLY INSPECT GROUNDING SYSEM CONDUCTORS TO ENSURE NO DAMAGE, BREAKAGE, OR CORROSION HAS OCCURRED TO THE CONDUCTORS DURING INSTALL AND BEFORE EARTH BURIAL.
INDIVIDUAL BONDS	P	DWGS E-101, E-102, NFPA 780, 8.9 DA PAM 385-64, 17.27.	INSPECT ALL BONDS FOR LOOSE CONNECTIONS THAT MIGHT RESULT IN HIGH-RESISTANCE CONNECTIONS.
LPS COMPONENTS	P	NFPA 780, 8.9 DA PAM 385-64, 17-27.	INSPECT LPS COMPONENTS FOR SECURE MOUNTING AND PROTECTION AGAINST ACCIDENTAL MECHANICAL DISPLACEMENT.
LPS TESTING	S	NFPA 780, 8.9 DA PAM 385-64, 17-28.	PERFORM BONDING TEST ACROSS EACH BOND, AND AN EARTH ELECTRODE TEST OF THE LPS.
EARTH COVER	P	DWGS S-301-302	INSPECT DEPTH GAUGES ON ROOF PRIOR TO EARTH COVER PLACEMENT FOR SIZE AND STABILITY. INSPECT EARTH COVER DEPTH AND SLOPE TO ENSURE A 2' MIN. IS PROVIDED ABOVE STRUCTURE
DOOR LAPS	C	DWG S-701	INSPECT DOOR LAPS AT TOP AND BOTTOM OF DOOR FRAME

SPECIAL INSPECTION NOTES:

1 INSPECTION INTERVALS ARE AS FOLLOWS:
C - Continuous: The full-time observation of work requiring special inspection by an approved special inspector who is present in the area where the work is being performed
P - Periodic: The part-time or intermittent observation of work requiring special inspection by an approved special inspector who is present in the area where the work has been or is being performed and at the completion of the work.
S - Submittal
2 STRUCTURAL TEST AND SPECIAL INSPECTIONS ARE BASED ON CHAPTER 17 OF THE IBC 2009 EDITION
3 CONTRACTOR SHALL HIRE A QUALIFIED INSPECTION AND TESTING AGENCY TO PERFORM SPECIAL INSPECTIONS AND TESTING IN ACCORDANCE WITH THE IBC. SUBMIT INSPECTION REPORTS TO THE CONTRACTING OFFICER FOR EACH DAY SPECIAL INSPECTIONS AND TESTING IS PERFORMED.

DESIGNER NOTES: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION OF THIS DESIGN.

1. SPECIAL INSPECTION SCHEDULE SHALL BE REVISED TO REFLECT SPECIFIC PROJECT REQUIREMENTS IN ACCORDANCE WITH CHAPTER 17 OF THE INTERNATIONAL BUILDING CODE; HOWEVER, AT A MINIMUM THE SPECIAL ITEMS RELATED TO THE 'OTHER EXPLOSIVES SAFETY RELATED ITEMS' SHALL BE INSPECTED AS SHOWN ON THIS SCHEDULE.

US Army Corps of Engineers Huntsville Center

Revisions

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Project Engineer/Architect: Jeff Coulston
Date:

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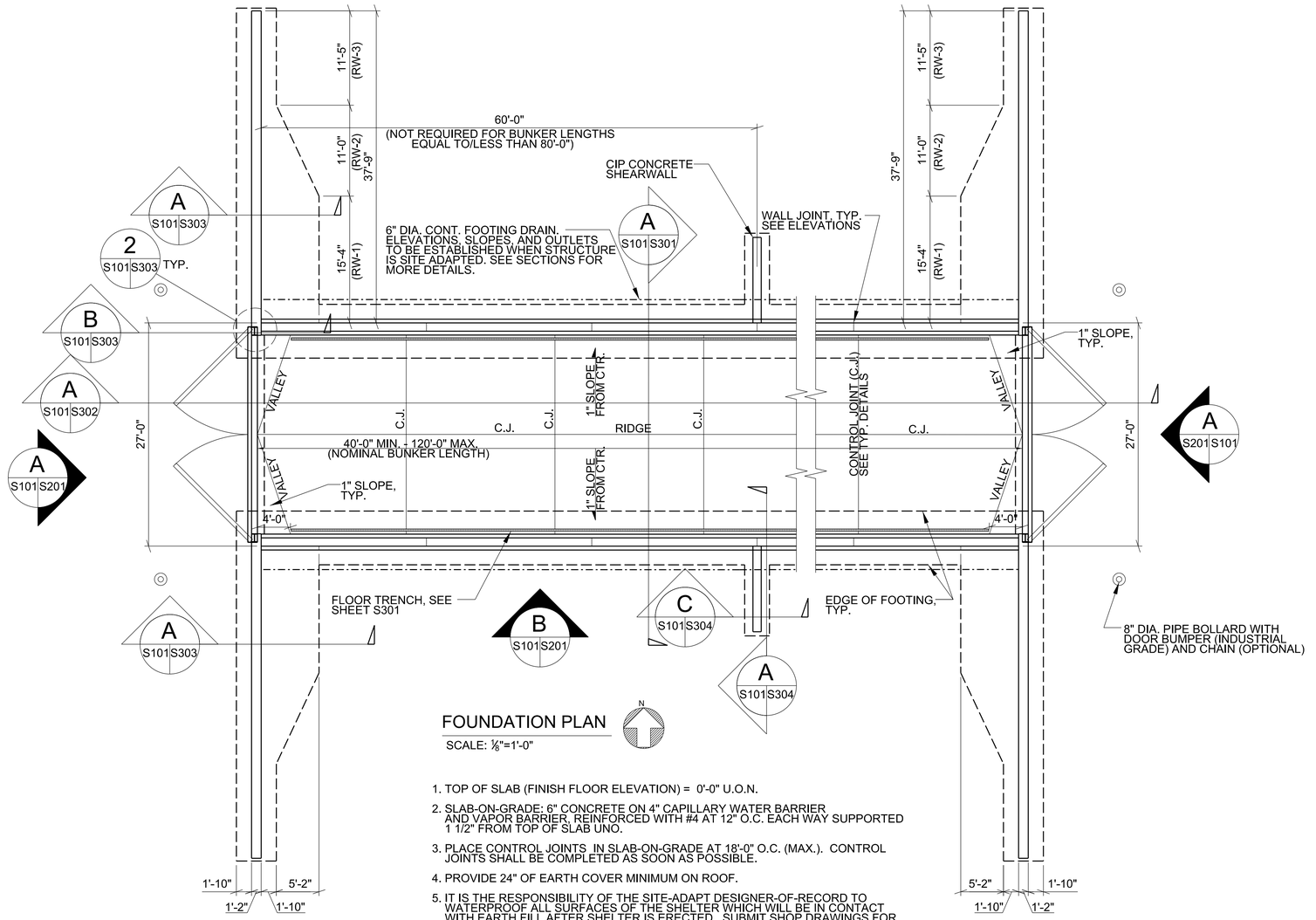
SPECIAL INSPECTIONS

Sheet reference number:
S-002
Sheet 4 of 28



FOUNDATION PLAN

SCALE: ⅛"=1'-0"

1. TOP OF SLAB (FINISH FLOOR ELEVATION) = 0'-0" U.O.N.
2. SLAB-ON-GRADE: 6" CONCRETE ON 4" CAPILLARY WATER BARRIER AND VAPOR BARRIER, REINFORCED WITH #4 AT 12" O.C. EACH WAY SUPPORTED 1 1/2" FROM TOP OF SLAB UNO.
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. IT IS THE RESPONSIBILITY OF THE SITE-ADAPT DESIGNER-OF-RECORD TO WATERPROOF ALL SURFACES OF THE SHELTER WHICH WILL BE IN CONTACT WITH EARTH FILL AFTER SHELTER IS ERECTED. SUBMIT SHOP DRAWINGS FOR GOVERNMENT AND AE APPROVAL.
6. SIZE, LOCATION, AND QUANTITY OF TILT-UP BRACE ATTACHMENT POINTS AND LIFTING INSERTS TO BE DETERMINED BY CONTRACTOR/PRECAST MANF..
7. IT IS THE RESPONSIBILITY OF THE SITE ADAPTION 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 MAY BE PRECAST AT THE JOB-SITE.

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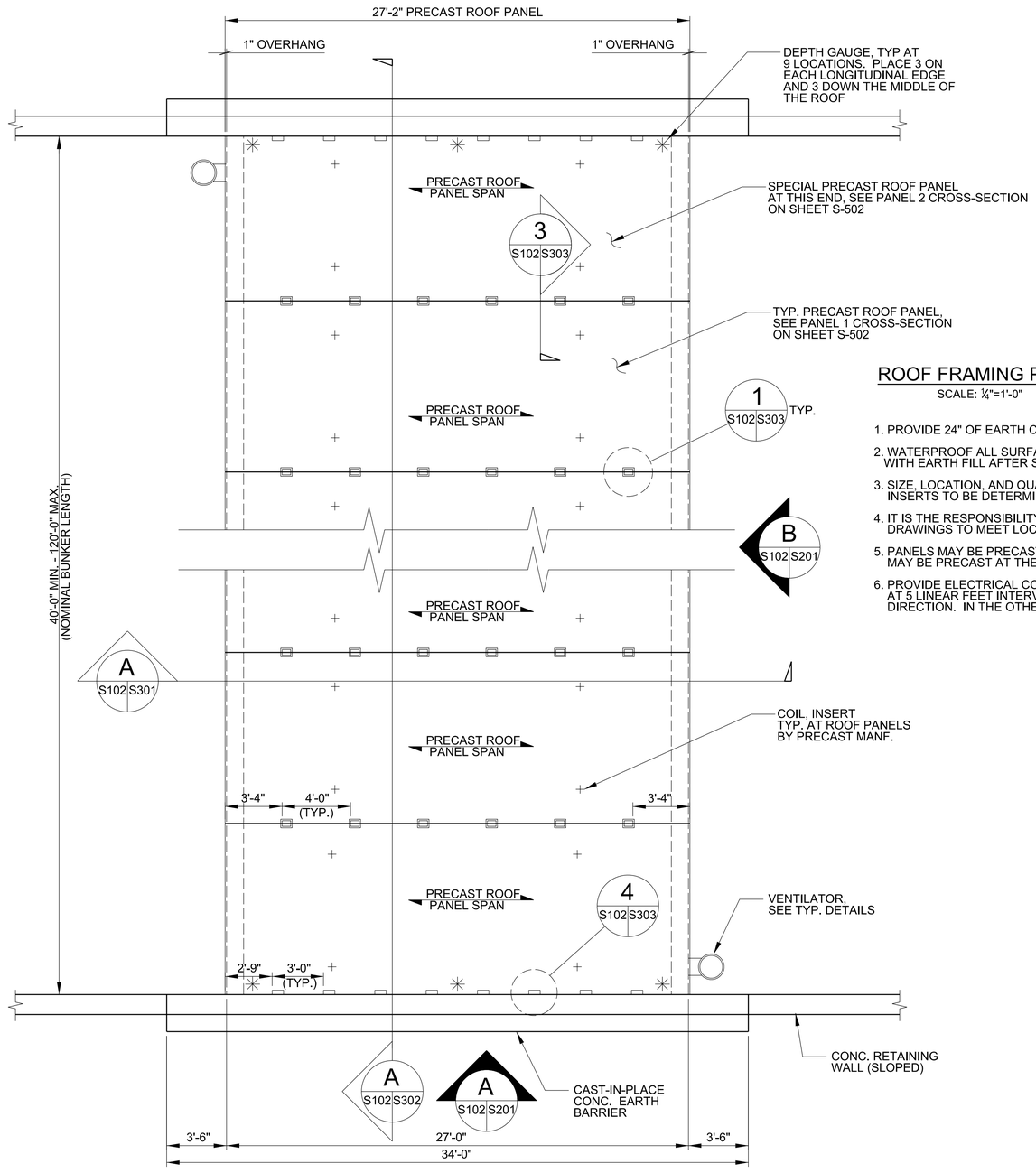
FOUNDATION PLAN

Sheet reference number:
S-101
Sheet 5 of 28



ROOF FRAMING PLAN

SCALE: ¼"=1'-0"

N

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 MANF..
4. IT IS THE RESPONSIBILITY OF THE SITE ADAPTION ENGINEER TO MODIFY THESE DRAWINGS TO MEET LOCAL SITING, FOUNDATION, AND TOPOGRAPHIC CONDITIONS.
5. PANELS MAY BE PRECAST BY A MANUFACTURER SPECIALIZING IN PRECAST OR MAY BE PRECAST AT THE JOB-SITE.
6. PROVIDE ELECTRICAL CONTINUITY WITHIN THE PRECAST ROOF PANELS BY TACK WELDING AT 5 LINEAR FEET INTERVALS ACROSS TOP OF STIRRUPS TO END ANGLES IN ONE DIRECTION. IN THE OTHER DIRECTION, TACL WELD #4 BAR FROM BOTTOM PLATE TO #4 REINF.

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ROOF FRAMING PLAN

Sheet reference number:
S-102

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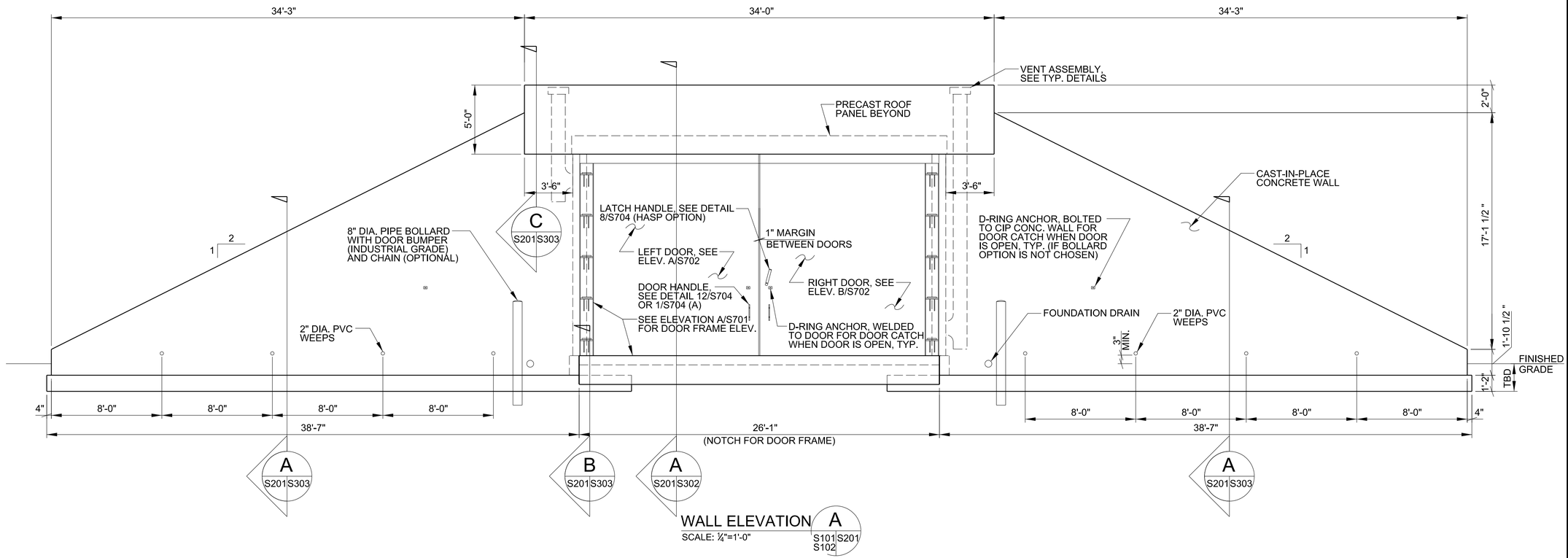
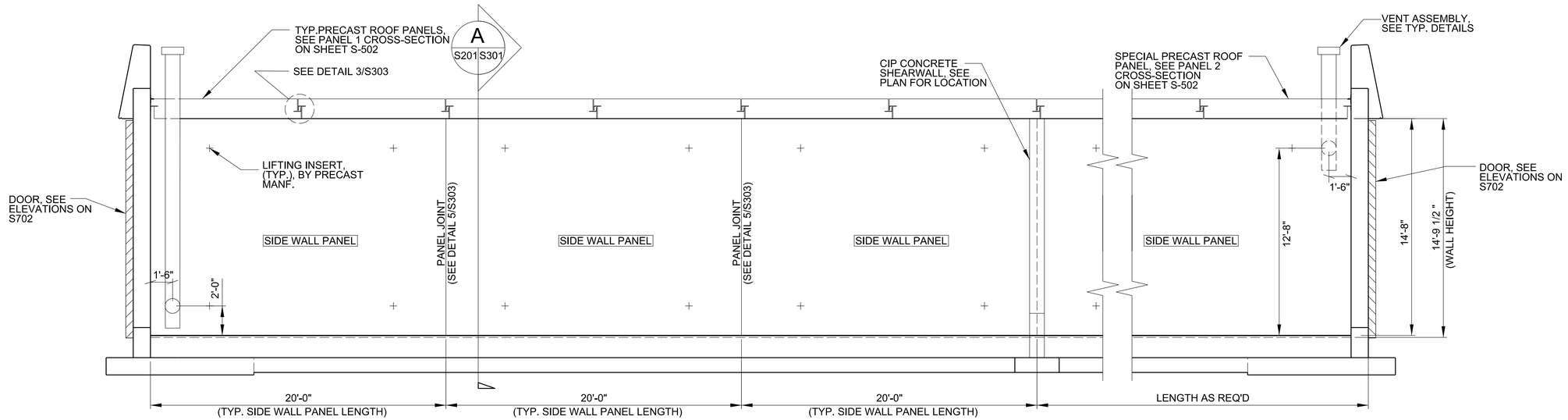


WALL ELEVATION A
SCALE: ¼"=1'-0"
S101 S201 S102



WALL ELEVATION B
SCALE: ¼"=1'-0"
S101 S201 S102

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ELEVATIONS

Sheet reference number:
S-201
Sheet 7 of 28

WATERPROOFING MEMBRANE (60 MIL), TYP. AT ROOF AND WALLS

SLOPE FILL

SEE PLAN

REASONABLY COHESIVE SOILS ONLY. SOLID OR WET CLAY SHALL NOT BE USED.

NOTE:
EARTH FILL SHALL CONTAIN NO STONES HEAVIER THAN 10 POUNDS OR LARGER THAN 6" (15.2) IN ANY DIMENSION

DEPTH GAUGE, SEE DETAIL E/S501. REFER TO ROOF PLAN FOR LOCATIONS

2'-0" MIN.

2 MIN. 1

#4 BARS TO MATCH STIRRUP SPACING

1'-4"

2" (TYP.)

#6 BARS CONT., TYP.

PRECAST ROOF PANELS, SEE ROOF PLAN

(2) #5 HORZ. CONT. TOP & BOTT. TYP. AT TOP OF WALLS

#4 STIRRUPS AT 4" O.C., TYP. ENCLOSE HORIZ. REINFORCEMENT WITHIN STIRRUPS

10"

11'-2"

#4 BAR AT 5'-0" O.C. TACK WELDED TO PL. AND REINF. FOR ELECTRICAL CONTINUITY. (SEE NOTE 6 ON S102)

1/2" DIA. x 8" HEADED STUDS AT 12" O.C., (START 4 3/4" FROM END)

(2) #4 CONT.

TYP. 1/4

1"

2" (TYP.)

1"

1"

1/2"x14"x9'-11 3/8" LONG PL. EACH END OF EACH PANEL

C12x20.7 CONT.

TYP. 3/8 3/8

#4 BAR AT 5'-0" O.C. WELDED TO CHANNELS AND VERT. REINF. FOR ELECTRICAL CONTINUITY.

1/2" DIA. x 8" HEADED STUDS AT 12" O.C., STAGGERED.

NOTE:
STAGGER REBAR LAYERS TO FORM A 6"x6" SQUARE MESH PATTERN OF #5 AND #8 REBAR.

1" (TYP.)

1'-0" (TYP.)

PRECAST WALL PANELS

#8 VERT. AT 12" O.C., TYP.

#5 HORZ. AT 12" O.C. W/ SEISMIC HOOK EA END, TYP.

6" SAND MATERIAL (SW)

14'-8"

3" DIAMETER GALV. CORRUGATED STEEL CONDUIT (24 GAUGE MIN.). GROUT SHALL BE 5000 PSI HIGH STRENGTH, NON-SHRINK

1 1/2" TYP.

4"

3"

1 1/2"

5000 PSI HIGH STRENGTH, NON-SHRINK GROUT

#7 DOWELS AT 12" O.C. ALTERNATE HOOK DIRECTION.

4'-1" (EMBEDMENT)

#4 BAR AT 5'-0" O.C. BRAZED OR WELDED TO REINF.

3" DIAMETER GALV. CORRUGATED STEEL CONDUIT (24 GAUGE MIN.). GROUT SHALL BE 5000 PSI HIGH STRENGTH, NON-SHRINK

#7 DOWELS AT 12" O.C. ALTERNATE HOOK DIRECTION.

1 1/2" DIA. WEEPS AT 1'-8" O.C.

#5 DOWELS AT 12" O.C.

6" DIA. PERFORATED FOOTING DRAIN PIPE, TYP. (TURN PERFORATIONS DOWN)

#4 BAR AT 5'-0" O.C. BRAZED OR WELDED TO REINF.

FILTER FABRIC

3 1/2" (MIN.) WIDE PRE-SLOPED TRENCH CONT.. PROVIDE BOTTOM OUTLETS/DRAINS (2" DIA.) AT 20'-0" O.C. MAX. RUN DRAINS THRU FOUNDATION STEM WALL AND TERMINATE WITHIN 6" OF FOOTING DRAIN PIPE. (NOT SHOWN)

JOINT SEALER,1/2" MIN. DEPTH

1/2" EXP. JOINT W/ JOINT FILLER

SLAB-ON-GRADE SEE PLAN

SLOPE

SLOPE

4" MIN.

VARIES

1'-6"

WRAP END OF WEEPS WITH FILTER FABRIC, TYP.

1'-0"

#4 BAR AT 5'-0" O.C. WELDED TO WWF AND REINF.

8" 3" 8"

1'-6"

1'-0"

2'-0" 1 12

GRAVEL MATERIAL (GW)

#5 CONT. AT 12" O.C. TOP AND BOTT.

#5 TRANSVERSE BARS AT 12" O.C. TOP AND BOTT.

#6 HORZ. CONT. AT 12" O .C.

10" 1'-9 1/2 " 1'-11" 2'-9 1/2 " 6'-6"

2'-9 1/2 " 1'-11" 1'-9 1/2 " 10" 6'-6"

A SECTION
S101 S301 S102 S201
SCALE: 3/4"=1'-0"

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Huntsville Center

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BUILDING SECTION

Sheet reference number:
S-301
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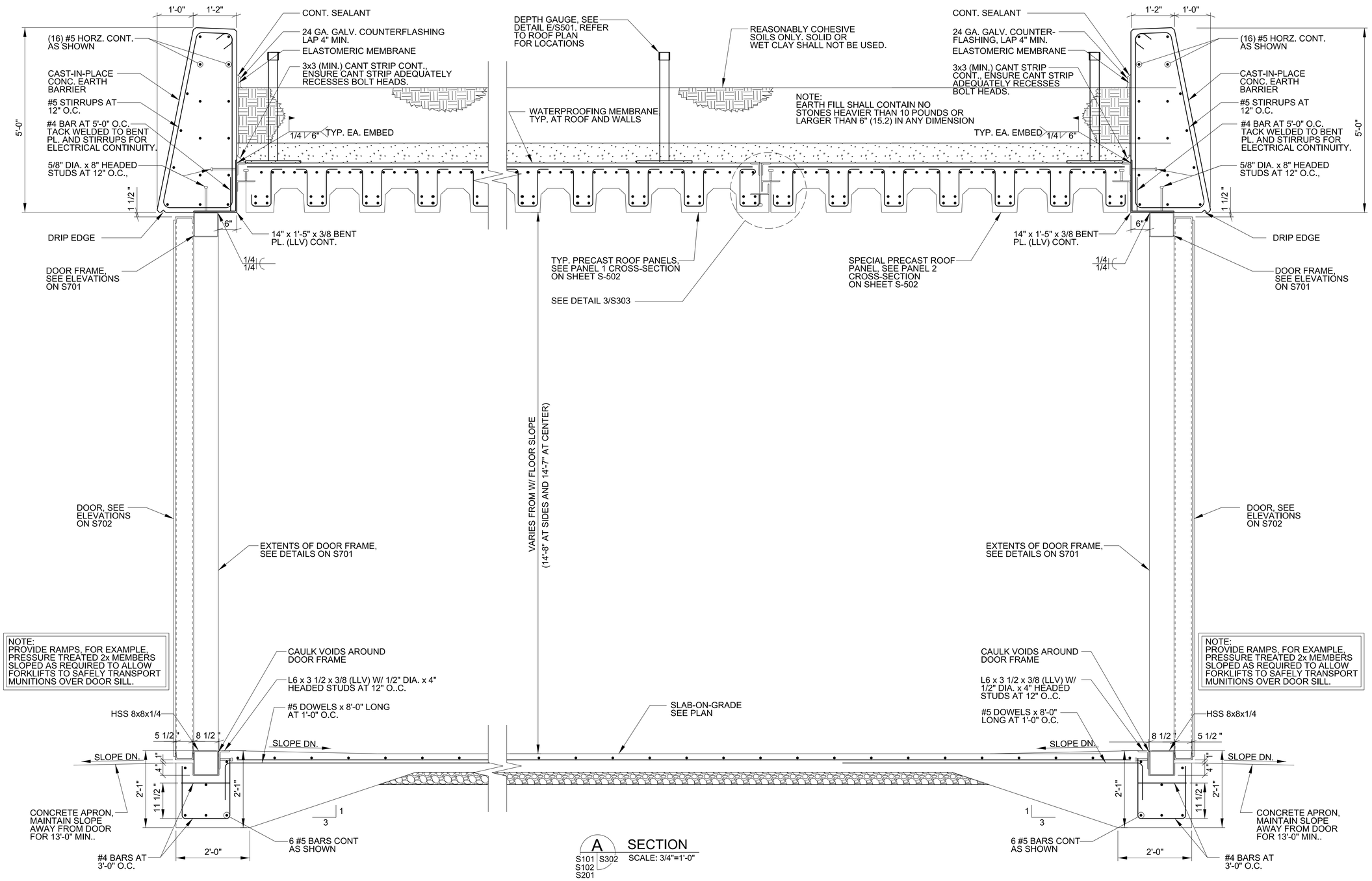

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BUILDING SECTION

Sheet reference number:
S-302

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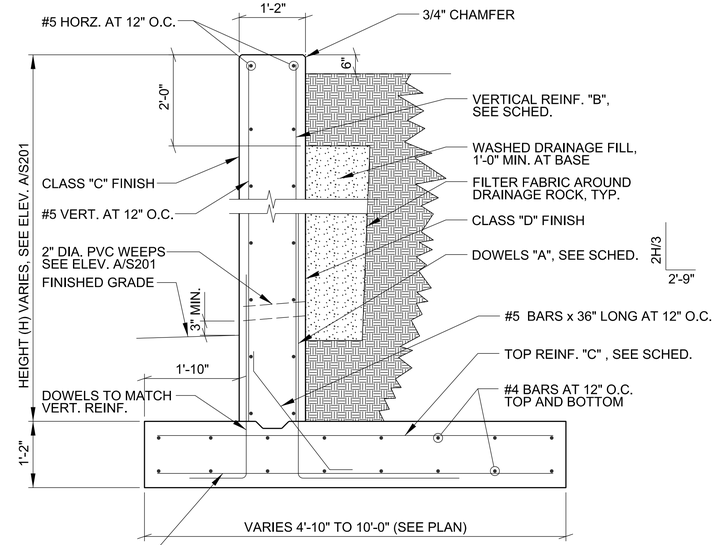
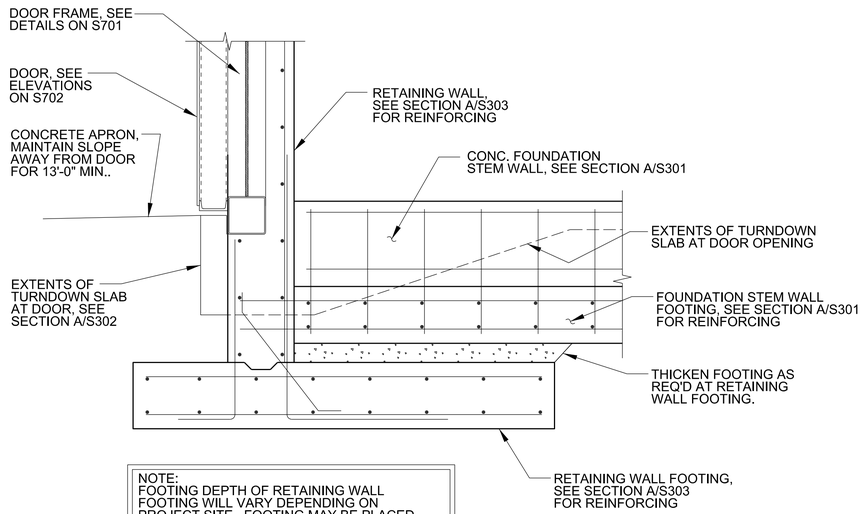


NOTES:
1. FRONT SIDE OF WALL MUST BE BACKFILLED AND COMPACTED BEFORE BACKFILLING BEHIND WALL.

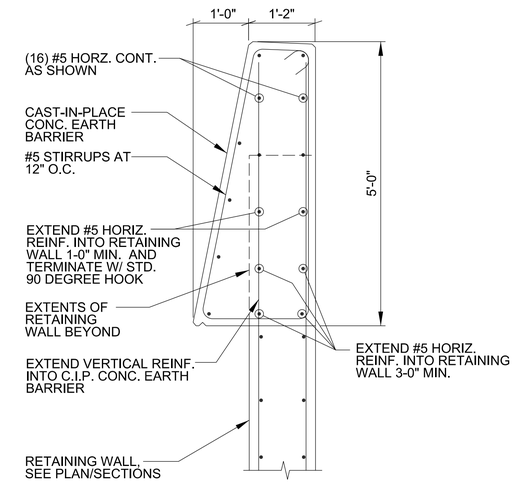
RETAINING WALL SCHED.				
WALL TYPE	STEM REINF.		WALL FTG. REINF.	
	DOWELS "A"	VERTICAL "B"	TOP "C"	BOTTOM "D"
RW-1	#7 AT 5 ½"	#7 AT 11"	#7 AT 5 ½"	#5 AT 11"
RW-2	#7 AT 11"	#7 AT 11"	#7 AT 11"	#5 AT 11"
RW-3	#5 AT 12"	#5 AT 12"	#5 AT 12"	#5 AT 12"

A SECTION
S101 S303 S201
SCALE: 3/4"=1'-0"

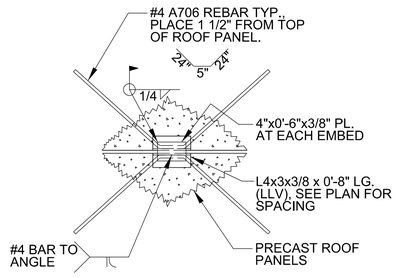


NOTE:
FOOTING DEPTH OF RETAINING WALL FOOTING WILL VARY DEPENDING ON PROJECT SITE. FOOTING MAY BE PLACED MONOLITHICALLY WITH SIDE WALL FOOTING IF PLACED AT THE SAME ELEVATION.

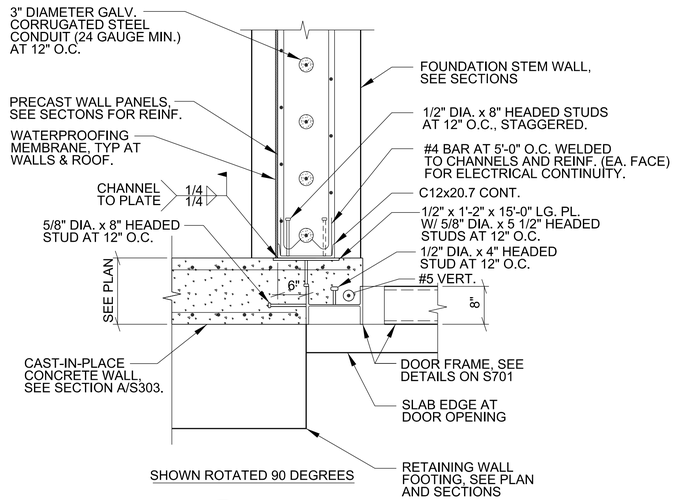
B SECTION
S101 S303 S201
SCALE: 3/4"=1'-0"



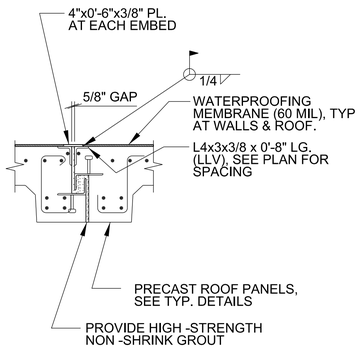
C SECTION
S201 S303
SCALE: 3/4"=1'-0"



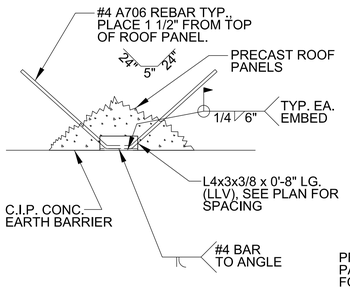
1 DETAIL
S102 S303
SCALE: 3/4"=1'-0"



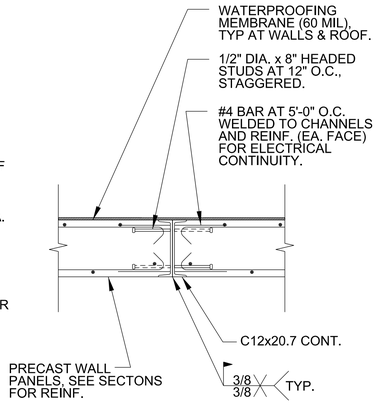
2 DETAIL
S101 S303
SCALE: 3/4"=1'-0"



3 DETAIL
S102 S303
S201
S302
SCALE: 3/4"=1'-0"



4 DETAIL
S102 S303
SCALE: 3/4"=1'-0"



5 DETAIL
S201 S303
SCALE: 3/4"=1'-0"

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SECTIONS

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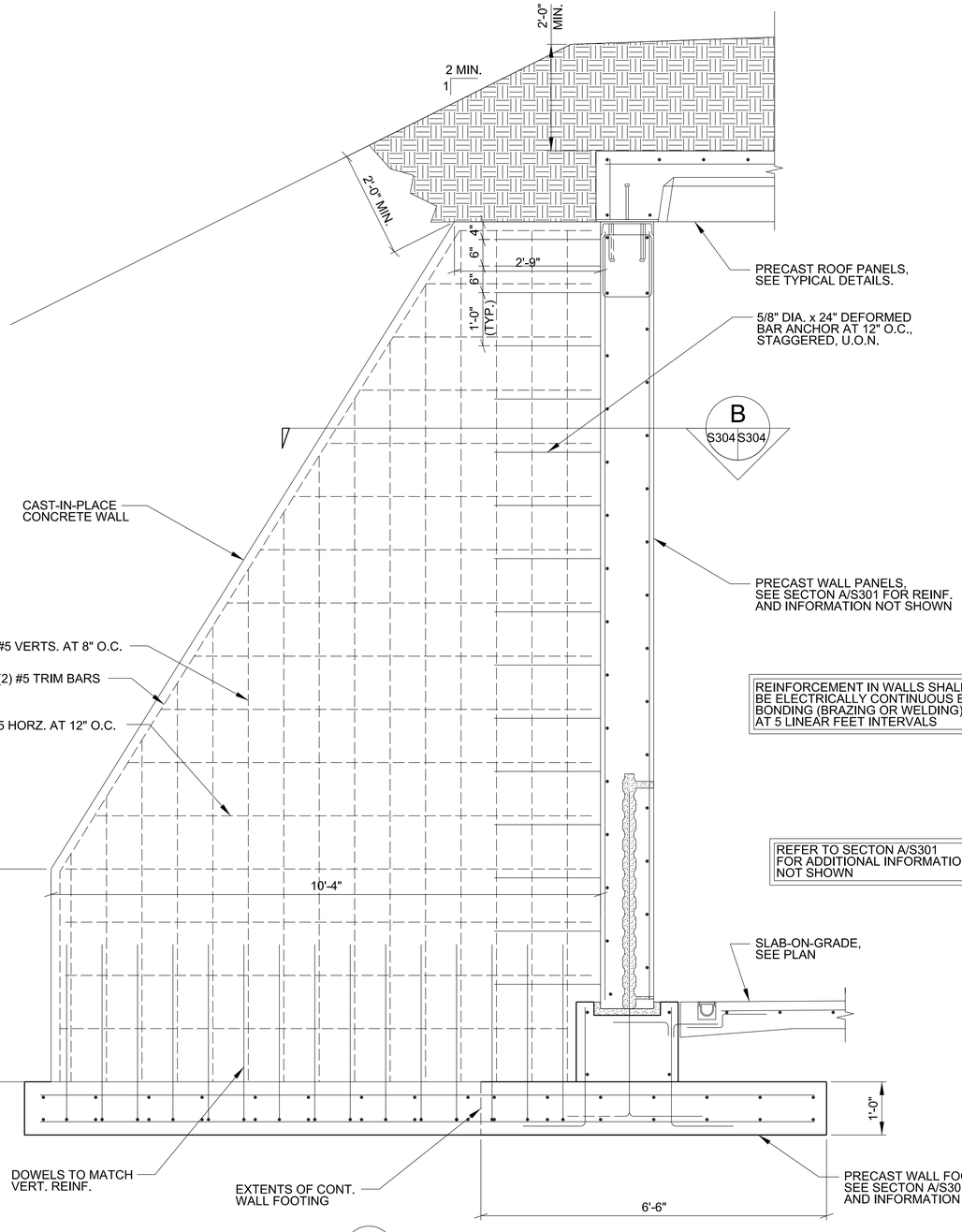
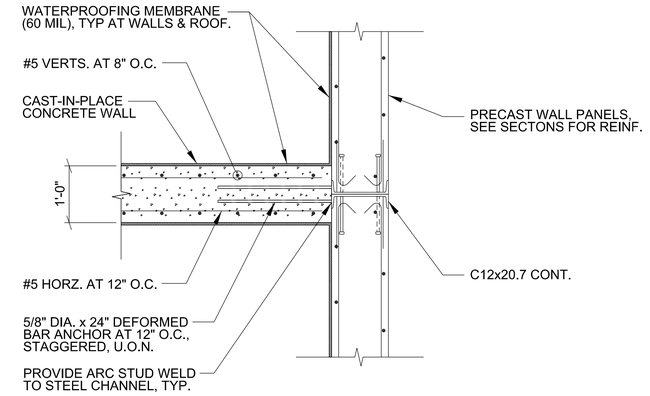
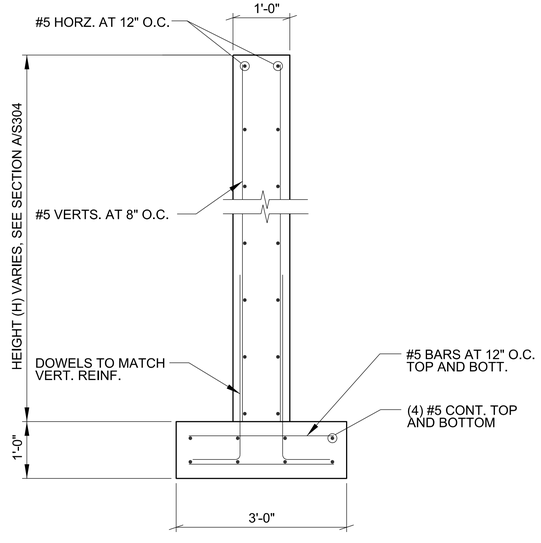


A SECTION
S101 S304 SCALE: 3/4"=1'-0"



B SECTION
S304 S304 SCALE: 3/4"=1'-0"



C SECTION
S101 S304 SCALE: 3/4"=1'-0"

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SECTIONS

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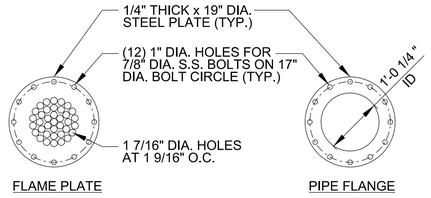
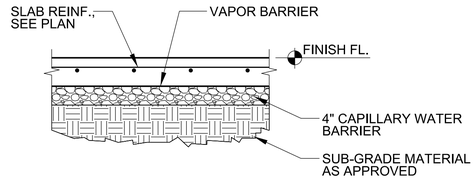


NOTE:
CLASS 150 FORGED FLANGES MAY BE SUBSTITUTED FOR FABRICATED PLATE FLANGES

VENTILATOR FLAME PLATE DETAIL A S501

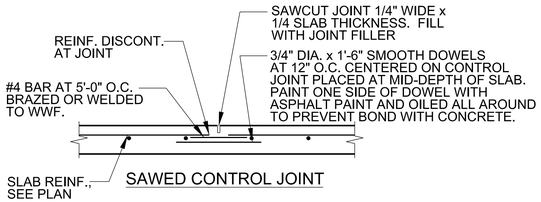
SCALE: 3/4"=1'-0"



SLAB-ON-GRADE DETAIL B S501

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

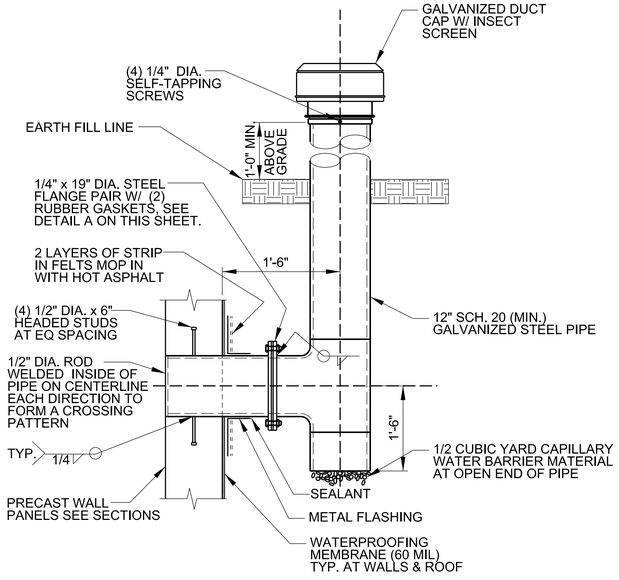
NOTES:
REFER TO GEOTECHNICAL REPORT FOR THE SUBGRADE PREPARATION AND EARTHWORK RECOMMENDATIONS.



SLAB CONTROL JOINT DETAIL C S501

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

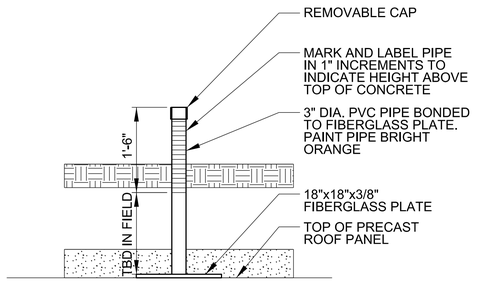
USE EITHER AT CONTRACTOR'S OPTION
SAWCUT JOINTS AS EARLY AS ALLOWED
HAND- TOOL AREAS INACCESSIBLE BY SAW



TYPICAL VENT DETAIL D S501

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

NOTE:
PROVIDE ELECTRICAL CONTINUITY BY WELDING VERTICAL AND HORZ. REINFORCEMENT TO VENT PIPE



DEPTH GAUGE DETAIL E S501

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

SPLICE LENGTHS					DEVELOPMENT LENGTHS	
BAR SIZE	f_c= 4000 PSI				f_c= 4000 PSI	
	TOP BARS		OTHER BARS			
NO.	A	B	A	B	TOP BARS	OTHER BARS
#3	19"	24"	15"	19"	19"	15"
#4	25"	32"	19"	25"	25"	19"
#5	31"	40"	24"	31"	31"	24"
#6	37"	48"	29"	37"	37"	29"
#7	54"	70"	42"	54"	54"	42"
#8	62"	80"	48"	60"	62"	48"
#9	78"	101"	60"	78"	70"	54"
#10	85"	111"	66"	85"	79"	61"

TOP BARS ARE HORIZONTAL REINF. WITH MORE THAN 12" ON CONCRETE CAST BELOW THE REINF.

CONCRETE LAP LENGTHS SHALL BE INCREASED 20 PERCENT WHERE EPOXY COATING IS USED.

WHEN LAPPING TWO DIFFERENT SIZE BARS, USE THE LARGER OF THE LAP SPLICE DIMENSION OF THE SMALLER BAR OR THE DEVELOPMENT LENGTH OF THE LARGER BARS

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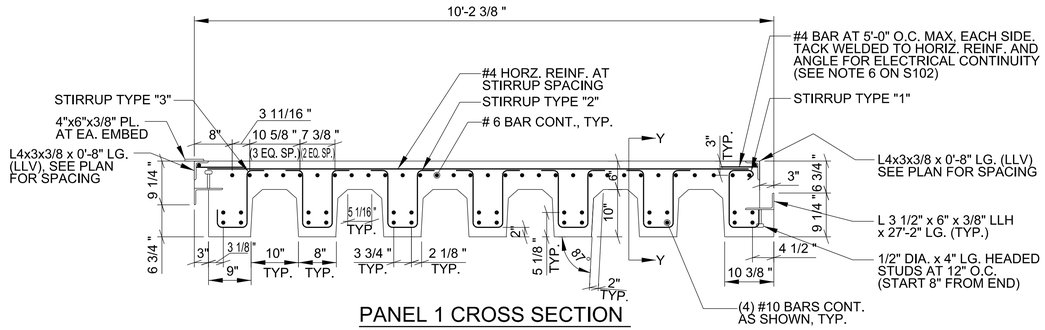
U. S. ARMY CORPS OF ENGINEERS
ENGINEERING AND SUPPORT CENTER,
HUNTSVILLE, ALABAMA

MODULAR STORAGE MAGAZINE
BOX-TYPE FLOW-THRU
STD 421-80-10

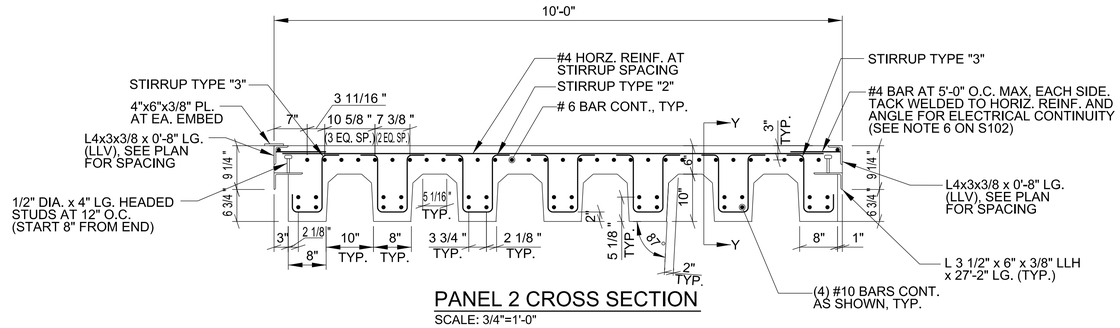
TYPICAL DETAILS

Sheet reference number:
S-501
Sheet 12 of 28



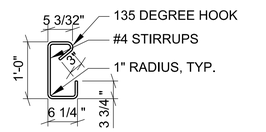
PANEL 1 CROSS SECTION

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



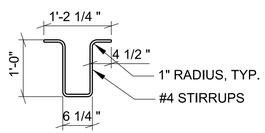
PANEL 2 CROSS SECTION

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



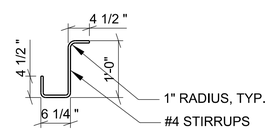
STIRRUP TYPE "1"

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



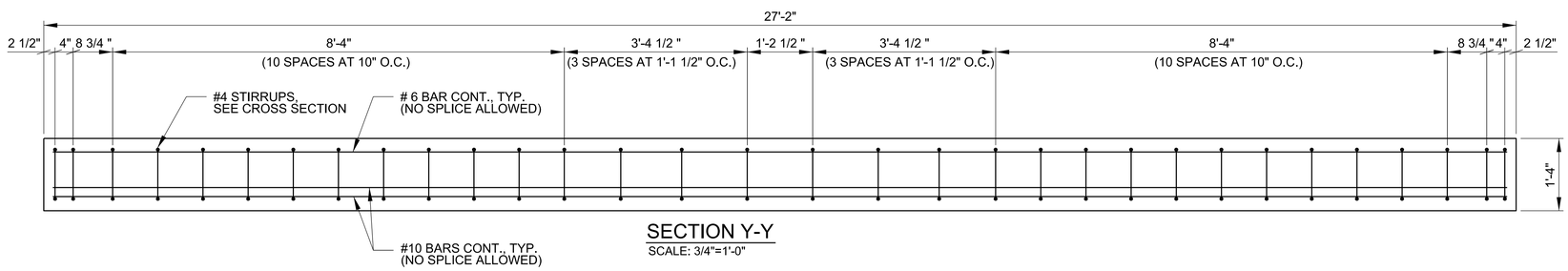
STIRRUP TYPE "2"

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



STIRRUP TYPE "3"

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



SECTION Y-Y

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

PRECAST ROOF PANEL DETAIL A

SCALE: 3/4"=1'-0" — S502

NOTES:
PROVIDE ELECTRICAL CONTINUITY WITHIN THE PRECAST ROOF PANEL BY BONDING AT 5 LINEAR FEET INTERVALS ACROSS TOP OF STIRRUPS TO END ANGLES IN ONE DIRECTION. IN THE OTHER DIRECTION, FROM BOTTOM PLATE TO #4 REINFORCEMENT AS SHOWN ON SECTION A/S301.

US Army Corps of Engineers
Huntsville Center

No.	Description	Revisions	Date	Appr.

Designed by: JMU
Drawn by: JMU
Checked by: RSW
Date: MARCH 2019
Scale: AS SHOWN
Drawing code:
Project Engineer/Architect: Jeff Coulston
Date:

U. S. ARMY CORPS OF ENGINEERS
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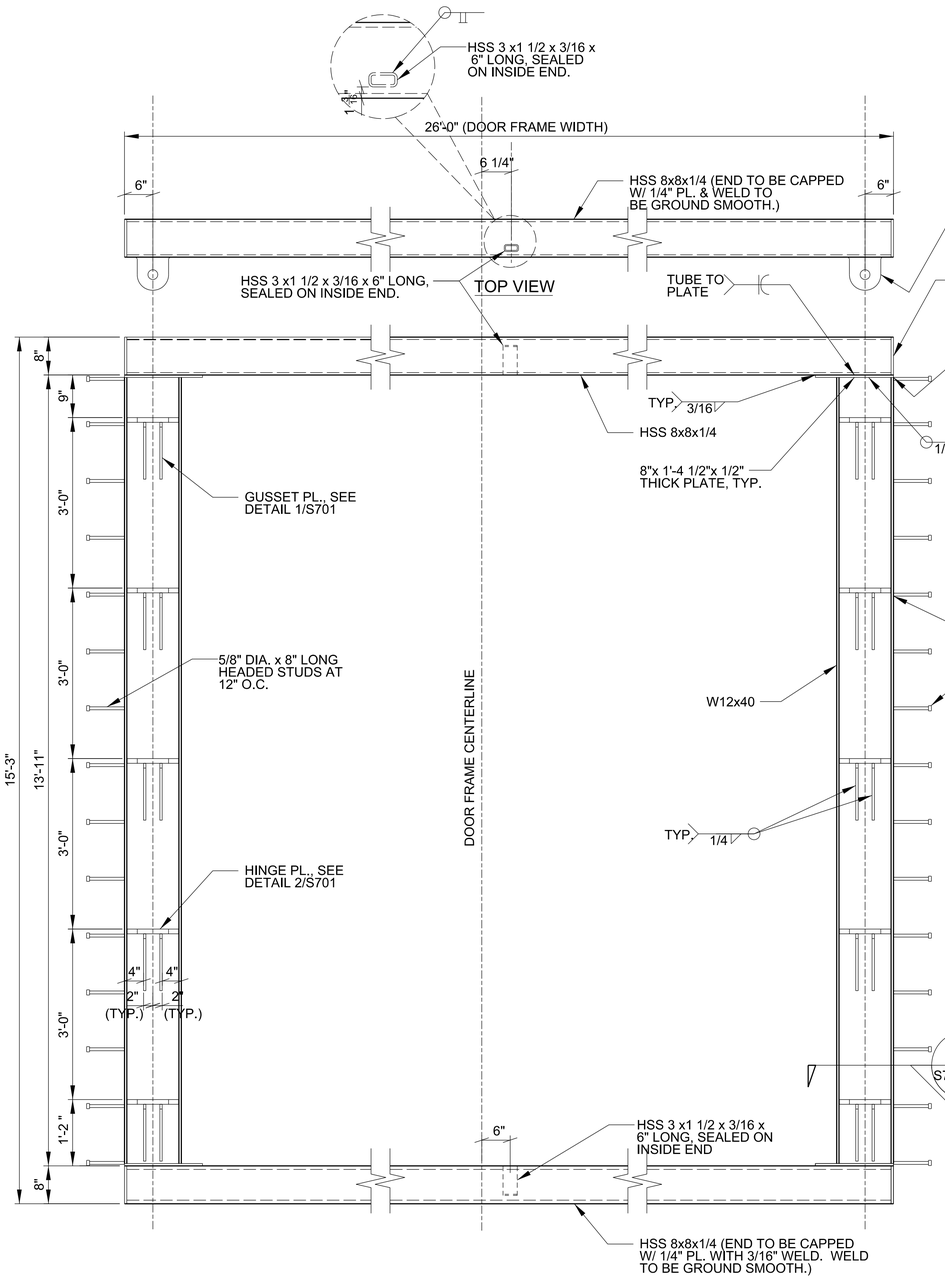
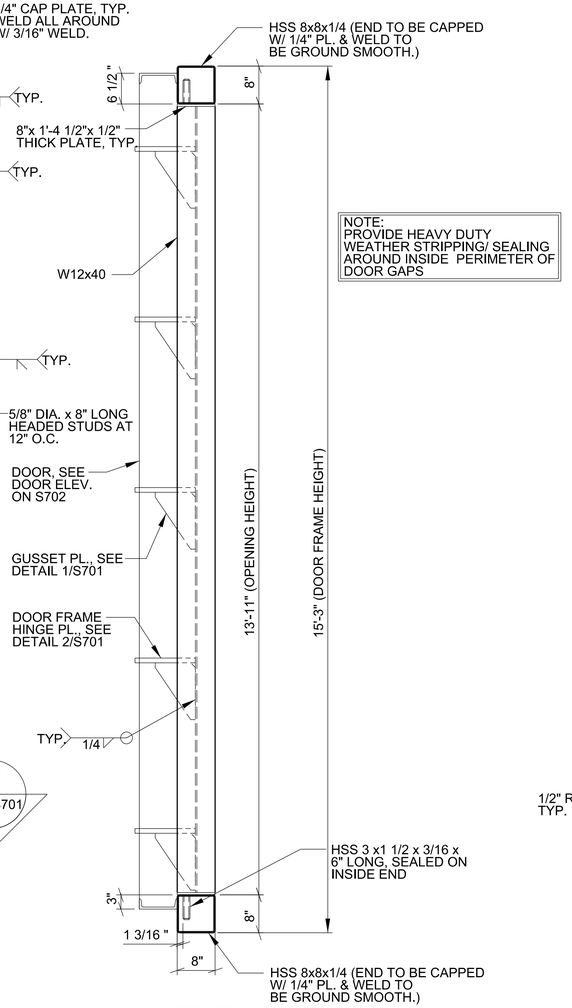
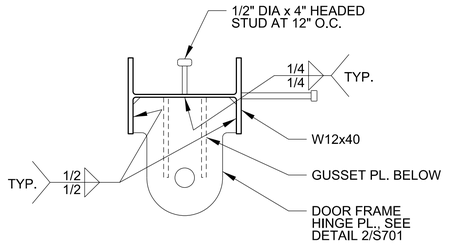




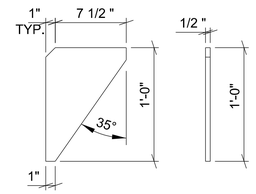
NOTE:
PROVIDE HEAVY DUTY WEATHER STRIPPING/ SEALING AROUND INSIDE PERIMETER OF DOOR GAPS

NOTE:
THE 6 1/2" AND 3" DOOR OVERLAP AT THE TOP AND BOTT. OF THE DOOR FRAME, RESPECTIVELY SHALL NOT BE REDUCED AS THIS IS IMPERATIVE TO CARRY OUT THE DESIGN INTENT.

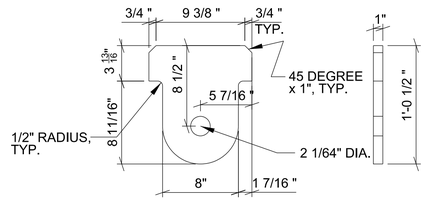


NOTE:
CONCRETE WALLS NOT SHOWN, SEE DETAIL 3/S303 FOR WALLS

SECTION B
SCALE: 1 1/2"=1'-0"
S701 S701



GUSSET PL. DETAIL 1
SCALE: 1 1/2"=1'-0"
S701 S701



DOOR FRAME HINGE PL. DETAIL 2
SCALE: 1 1/2"=1'-0"
S701 S701

NAVY PROJECTS
HIGH SECURITY HASP NOT PERMITTED

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION DESIGN

SHEETS S701 - S705 (HIGH SECURITY HASPS) AND 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 CONTRACT DOCUMENTS FOR THE SYSTEM NOT USED.

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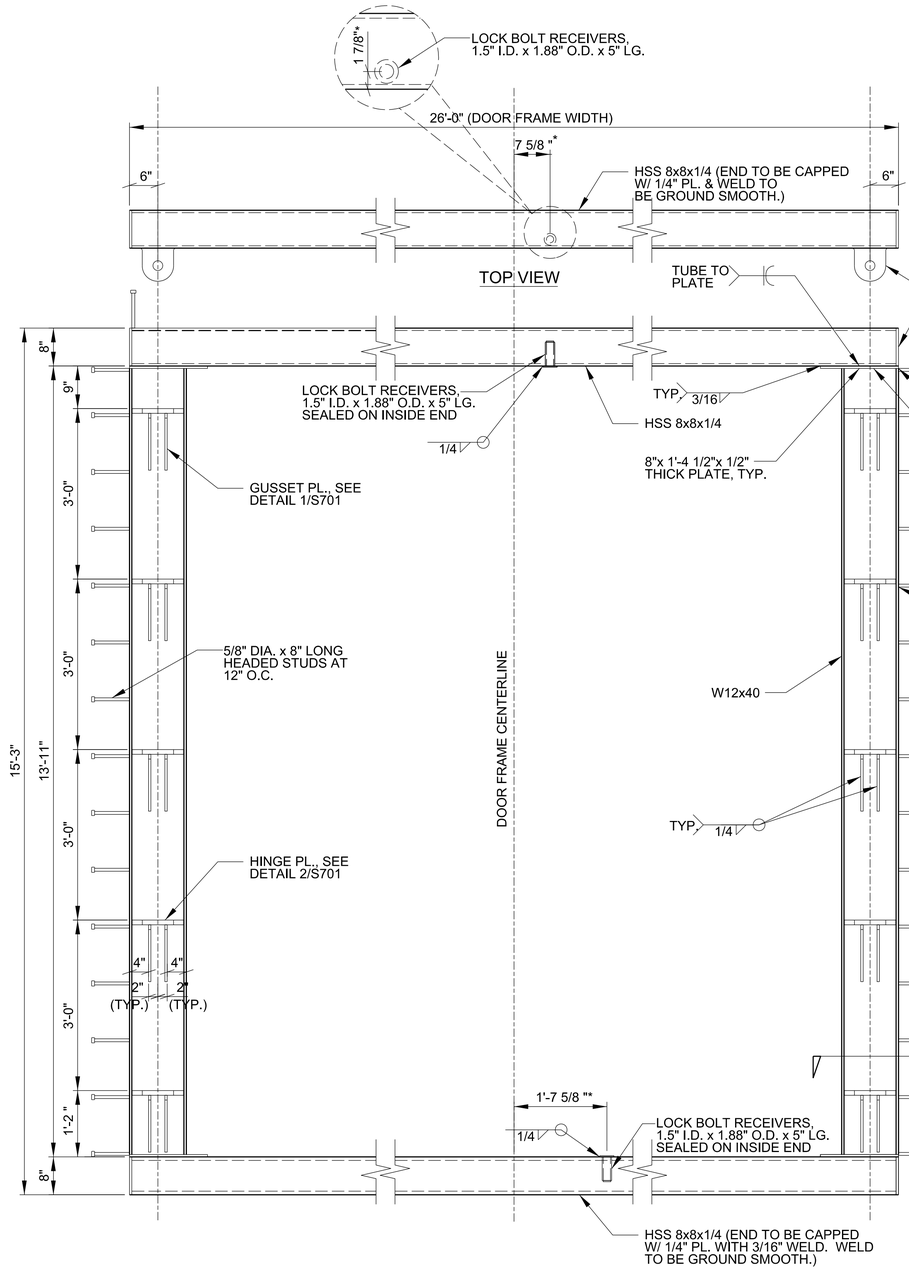
DOOR FRAME ELEVATIONS AND DETAILS

Sheet reference number:
S-701
Sheet 14 of 28



DOOR FRAME ELEVATION A
SCALE: 3/4"=1'-0"
S201 | S701

* DENOTES VERIFICATION W/ ILD MANUFACTURER

SIDE VIEW

NOTE:
PROVIDE HEAVY DUTY WEATHER STRIPPING/ SEALING AROUND INSIDE PERIMETER OF DOOR GAPS

NOTE:
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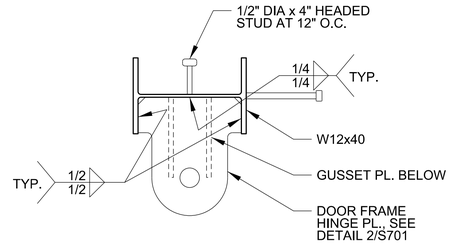
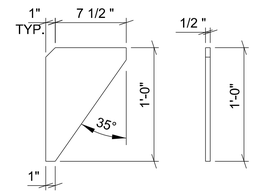
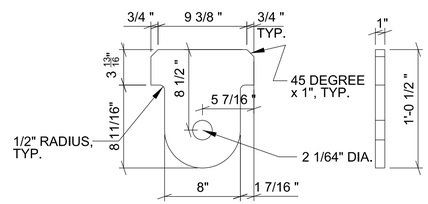


NOTE:
CONCRETE WALLS NOT SHOWN, SEE DETAIL 3/S303 FOR WALLS

SECTION B
SCALE: 1 1/2"=1'-0"
S701 | S701



GUSSET PL. DETAIL 1
SCALE: 1 1/2"=1'-0"
S701 | S701



DOOR FRAME HINGE PL. DETAIL 2
SCALE: 1 1/2"=1'-0"
S701 | S701

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION DESIGN

SHEETS S701 - S705 (HIGH SECURITY HASPS) AND 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 CONTRACT DOCUMENTS FOR THE SYSTEM NOT USED.

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Huntsville Center

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HUNTSVILLE, ALABAMA

MODULAR STORAGE MAGAZINE
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STD 421-80-10

DOOR FRAME ELEVATIONS AND DETAILS

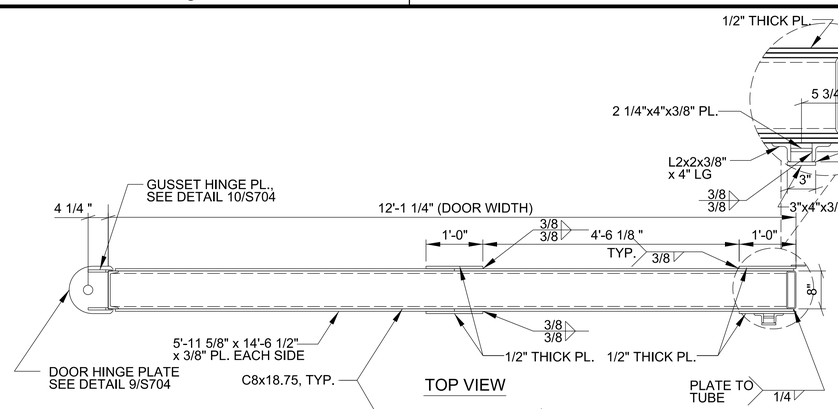
Sheet reference number:
S-701 (A)
Sheet 15 of 28

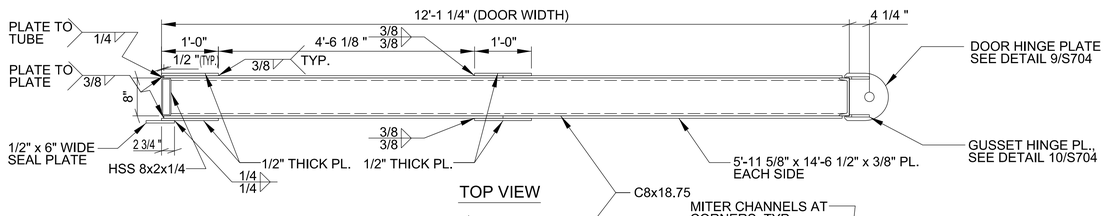
NAVY PROJECTS

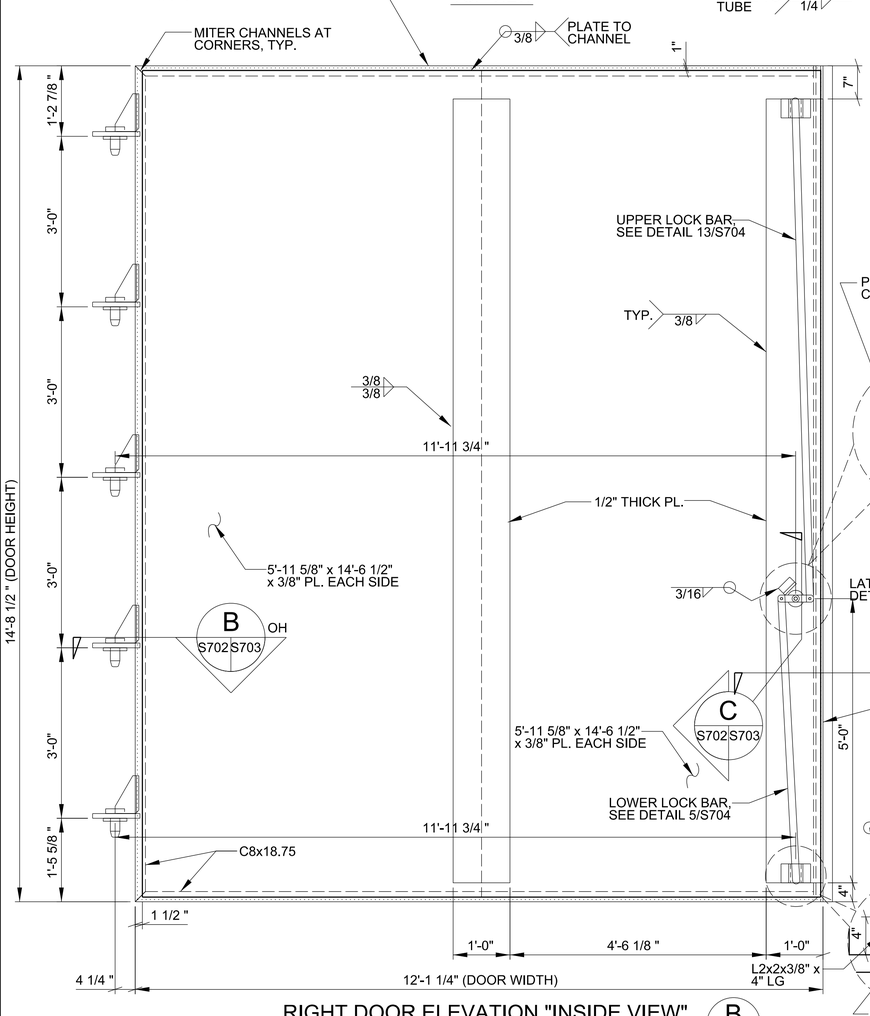
HIGH SECURITY HASP NOT PERMITTED

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION DESIGN

SHEETS S701 - S705 (HIGH SECURITY HASPS) AND 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 CONTRACT DOCUMENTS FOR THE SYSTEM NOT USED.



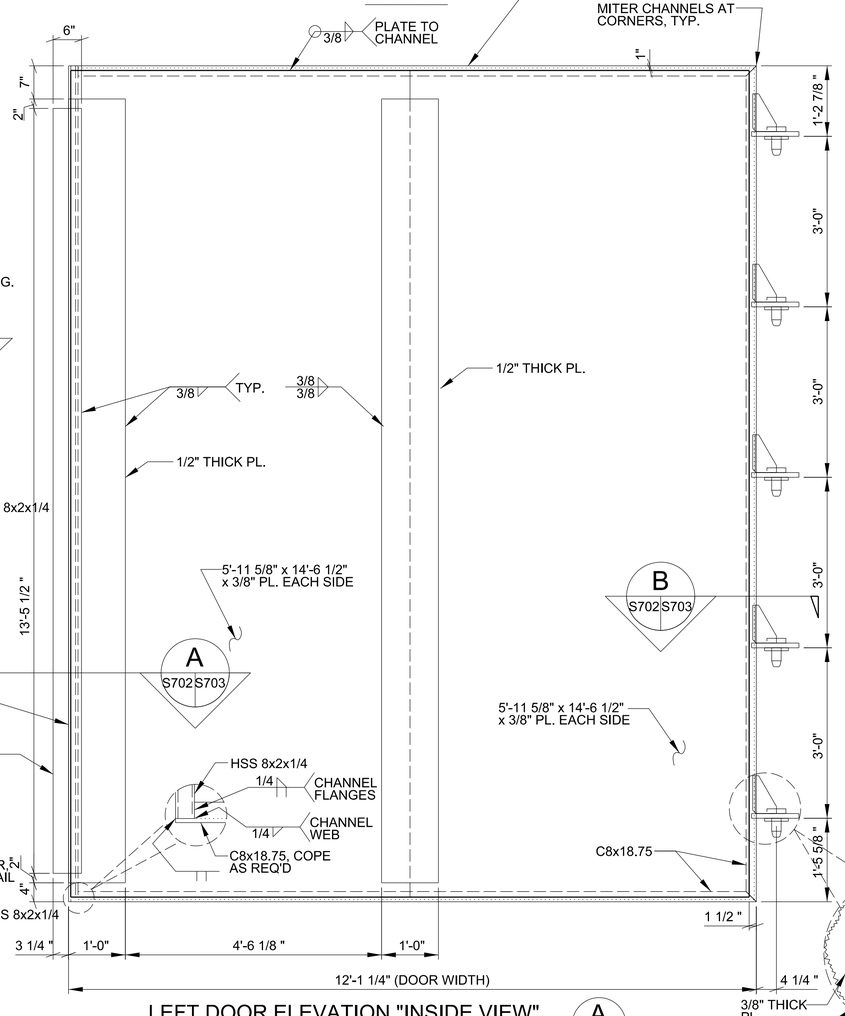




RIGHT DOOR ELEVATION "INSIDE VIEW" B S201 S702

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

NOTE:
1. SEE DOOR PLATE ELEVATION E/S703 FOR INNER DOOR SUPPORT FRAMING.
2. SEE DOOR LOCKING DEVICES ON SHEET S705 FOR ADDITIONAL REQUIREMENTS.



LEFT DOOR ELEVATION "INSIDE VIEW" A S201 S702

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

NOTE:
1. SEE DOOR PLATE ELEVATION E/S703 FOR INNER DOOR SUPPORT FRAMING.
2. SEE DOOR LOCKING DEVICES ON SHEET S705 FOR ADDITIONAL REQUIREMENTS.

US Army Corps of Engineers Huntsville Center

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ENGINEERING AND SUPPORT CENTER, HUNTSVILLE, ALABAMA

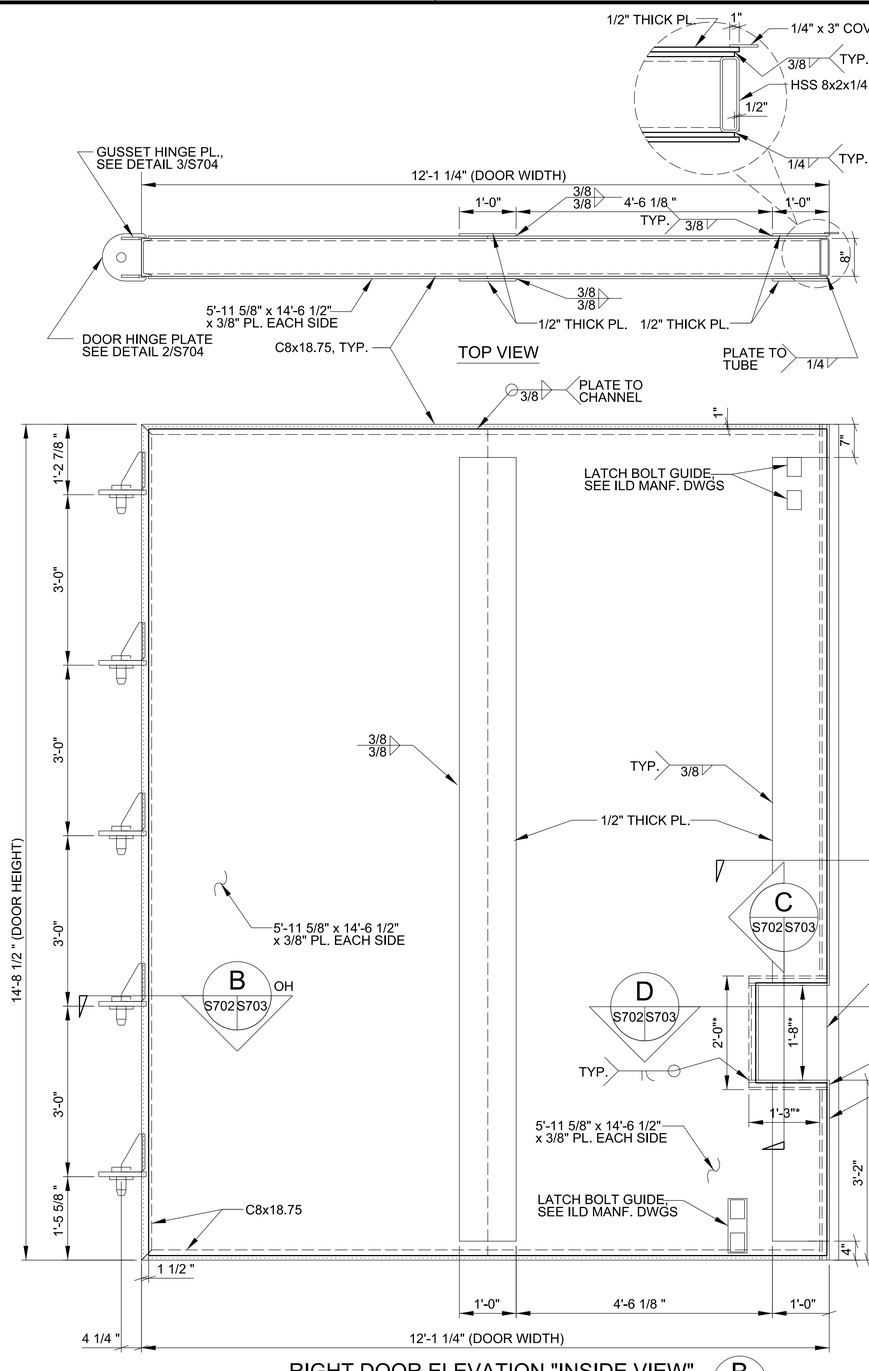
MODULAR STORAGE MAGAZINE
BOX-TYPE FLOW-THRU
STD 421-80-10

DOOR ELEVATIONS

Sheet reference number:
S-702
Sheet 16 of 28

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION DESIGN

SHEETS S701 - S705 (HIGH SECURITY HASPS) AND 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 CONTRACT DOCUMENTS FOR THE SYSTEM NOT USED.

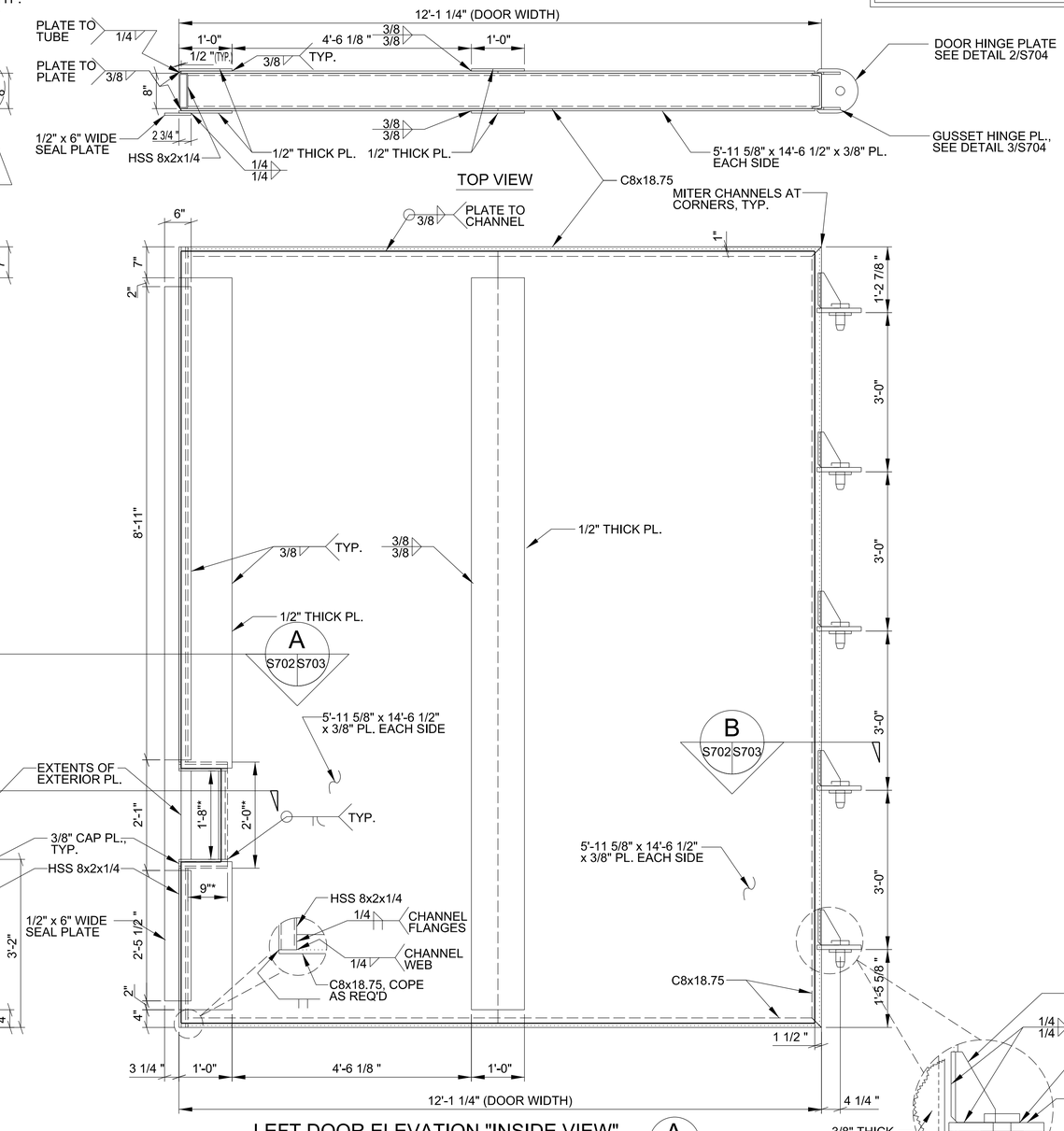


RIGHT DOOR ELEVATION "INSIDE VIEW" B (S201 S702)

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

NOTE:
1. SEE DOOR PLATE ELEVATION E/S703 FOR INNER DOOR SUPPORT FRAMING.
2. SEE DOOR LOCKING DEVICES ON SHEET S705 FOR ADDITIONAL REQUIREMENTS.

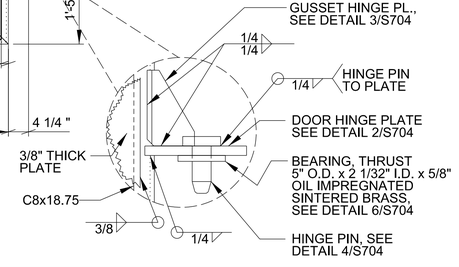
* DENOTES VERIFICATION W/ ILD MANUFACTURER



LEFT DOOR ELEVATION "INSIDE VIEW" A (S201 S702)

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

NOTE:
1. SEE DOOR PLATE ELEVATION E/S703 FOR INNER DOOR SUPPORT FRAMING.
2. SEE DOOR LOCKING DEVICES ON SHEET S705 FOR ADDITIONAL REQUIREMENTS.



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Huntsville Center

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ENGINEERING AND SUPPORT CENTER, HUNTSVILLE, ALABAMA

MODULAR STORAGE MAGAZINE
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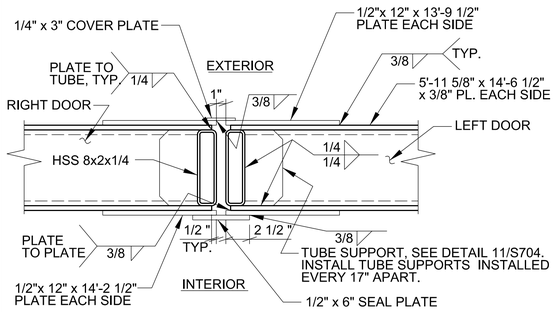
STD 421-80-10

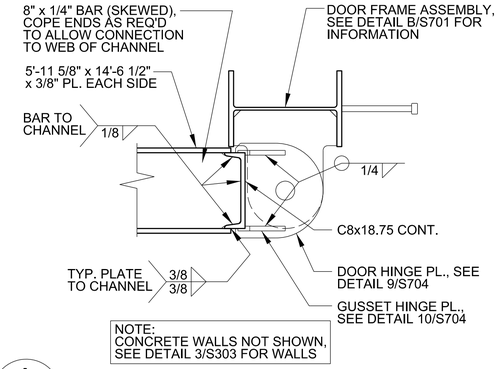
DOOR ELEVATIONS

Sheet reference number:
S-702 (A)

Sheet 17 of 28

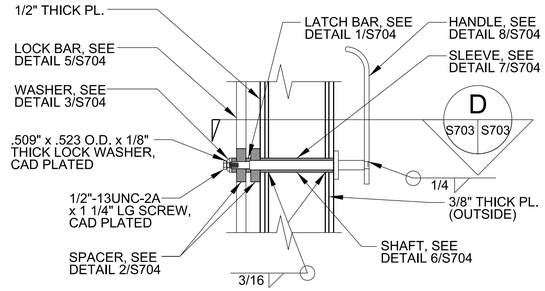


SECTION A
SCALE: 1 1/2"=1'-0" S702 S703



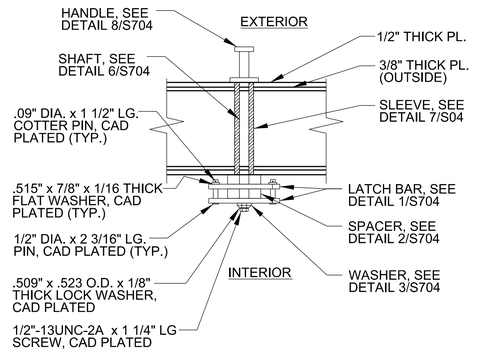
NOTE:
CONCRETE WALLS NOT SHOWN, SEE DETAIL 3/S303 FOR WALLS

SECTION B
SCALE: 1 1/2"=1'-0" S702 S703



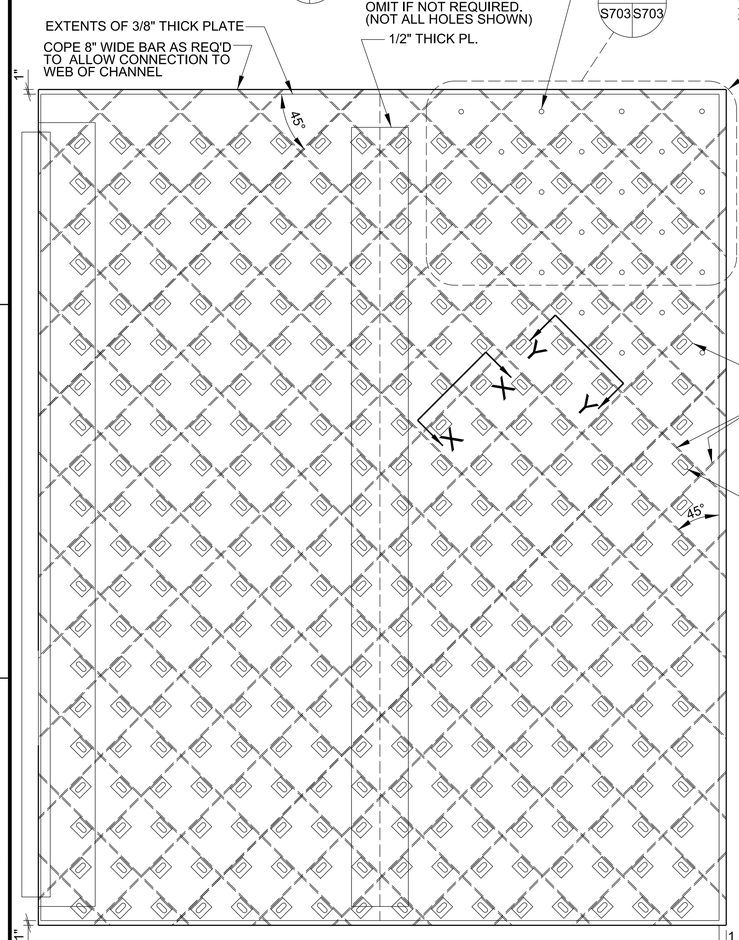
NOTE:
THE HANDLE IS TURNED UP IN THE "UNLOCK" POSITION

SECTION C
SCALE: 1 1/2"=1'-0" S702 S703



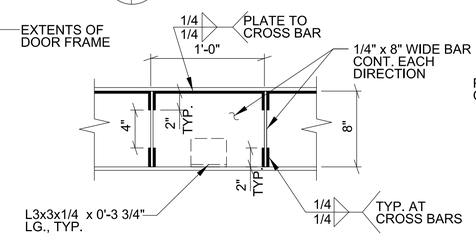
NOTE:
L3x2x 1/2" (LATCH STOP ANGLE) NOT SHOWN FOR CLARITY

SECTION D
SCALE: 1 1/2"=1'-0" S703 S703

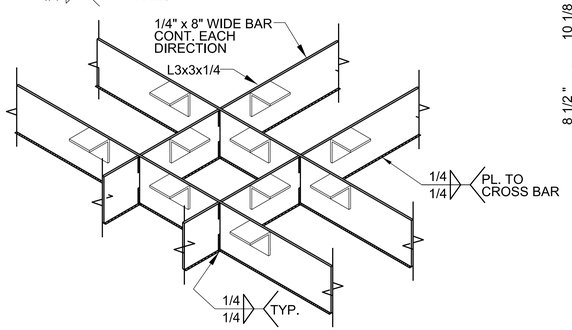


LEFT DOOR PLATE ELEVATION "INSIDE VIEW"
SCALE: 3/4"=1'-0" E S702 S703

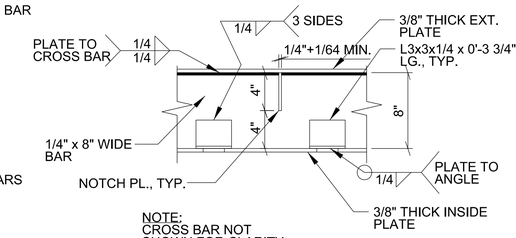
NOTE: RIGHT DOOR PLATE ELEVATION IS THE SAME AS THE LEFT



TYPICAL WELDED CONNECTION AT INTERSECTION OF CROSS BARS
SCALE: 1 1/2"=1'-0"

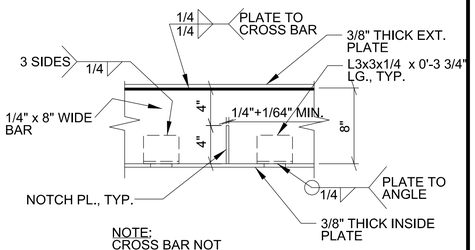


"ISOMETRIC VIEW" OF WELDS AT CROSS BARS
SCALE: 1 1/2" = 1'-0"



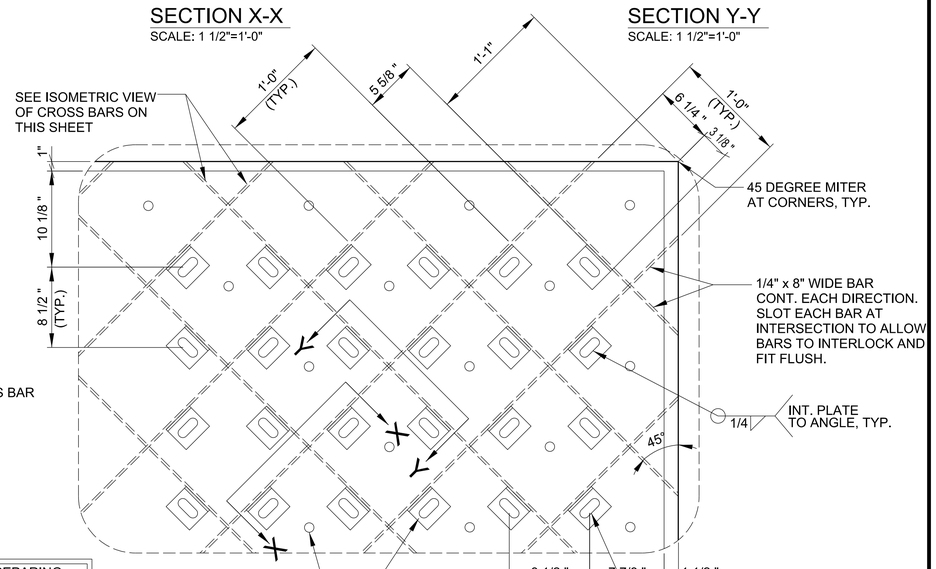
NOTE:
CROSS BAR NOT SHOWN FOR CLARITY

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



NOTE:
CROSS BAR NOT SHOWN FOR CLARITY

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



DETAIL A
SCALE: 1 1/2"=1'-0" S703 S703

NAVY PROJECTS

HIGH SECURITY HASP NOT PERMITTED

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION DESIGN

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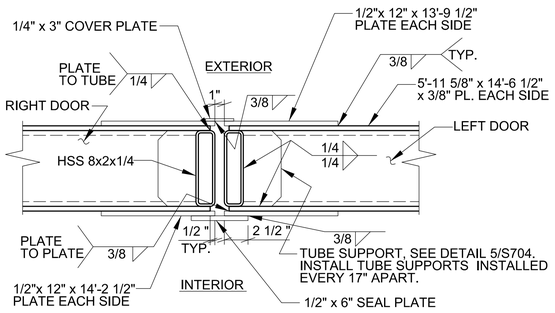
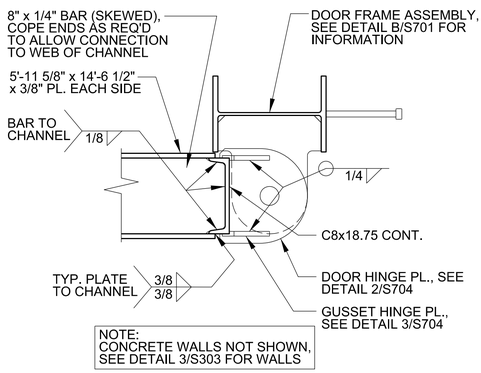
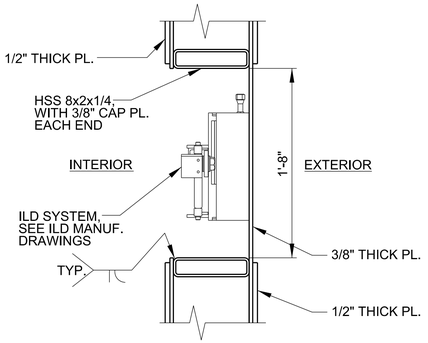
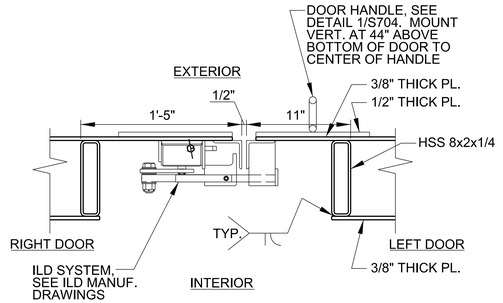
DOOR SECTIONS

Sheet reference number:
S-703
Sheet 18 of 28

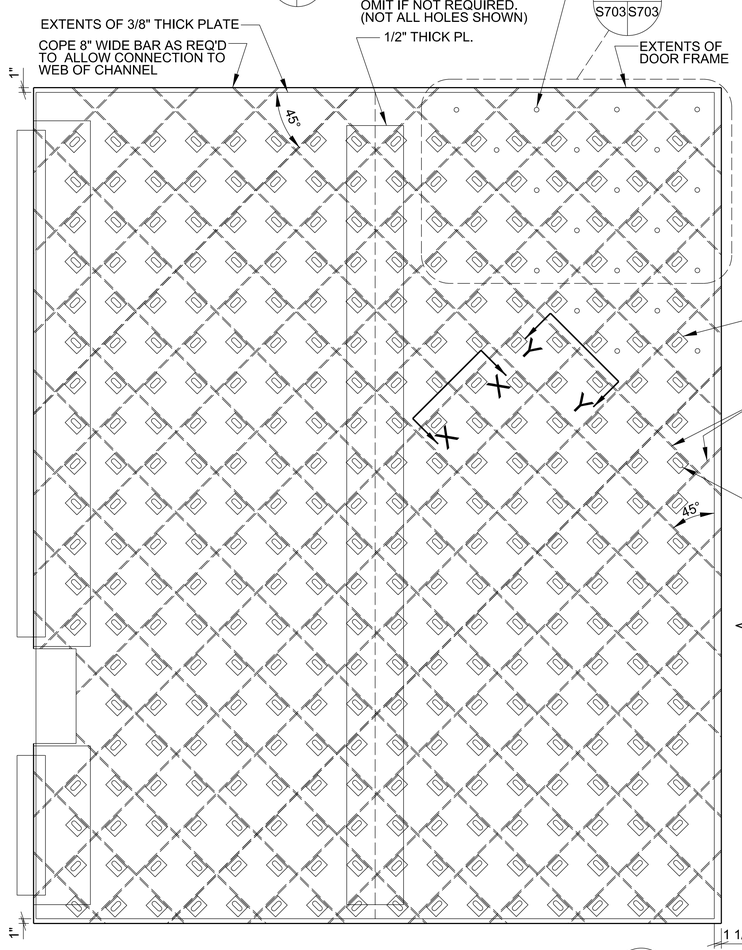






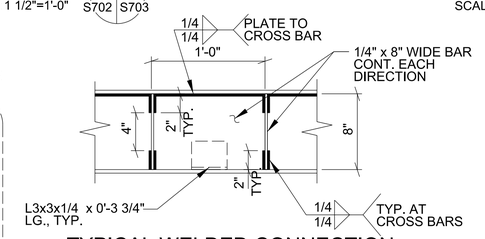


SECTION A
SCALE: 1 1/2"=1'-0"
S702 | S703

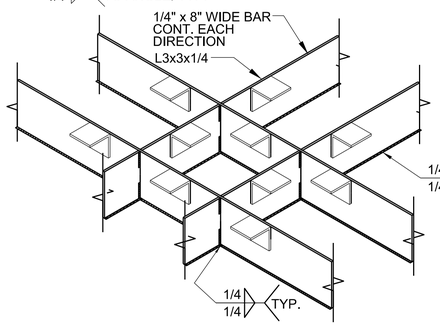


LEFT DOOR PLATE ELEVATION "INSIDE VIEW"
SCALE: 3/4"=1'-0"
NOTE: RIGHT DOOR PLATE ELEVATION IS SIMILAR (DOOR NOTCH IS GREATER)
E
S702 | S703

SECTION B
SCALE: 1 1/2"=1'-0"
S702 | S703



TYPICAL WELDED CONNECTION AT INTERSECTION OF CROSS BARS
SCALE: 1 1/2"=1'-0"



"ISOMETRIC VIEW" OF WELDS AT CROSS BARS
SCALE: 1 1/2" = 1'-0"

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION DESIGN

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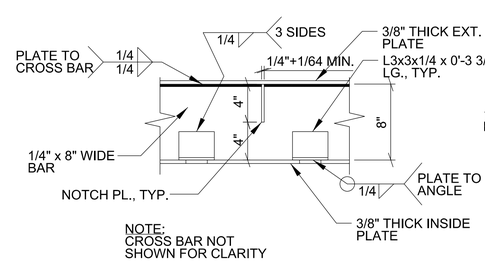
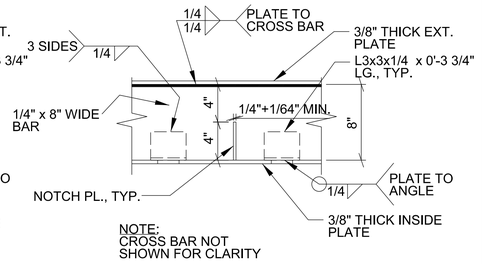
SECTION C
SCALE: 1 1/2"=1'-0"
S702 | S703



NOTE: CROSS BAR NOT SHOWN FOR CLARITY

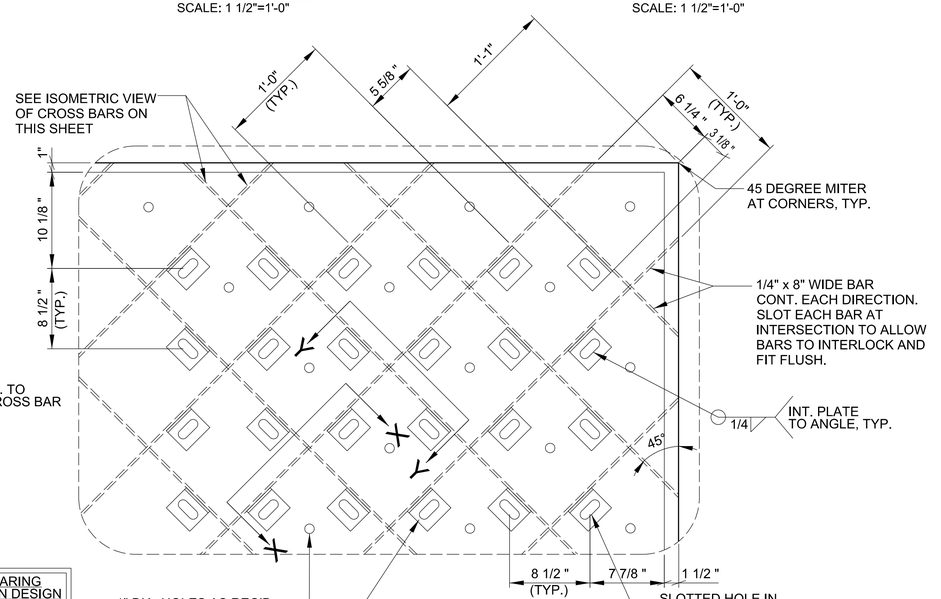
SECTION X-X
SCALE: 1 1/2"=1'-0"

SECTION D
SCALE: 1 1/2"=1'-0"
S702 | S703



NOTE: CROSS BAR NOT SHOWN FOR CLARITY

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



DETAIL
SCALE: 1 1/2"=1'-0"
A
S703 | S703

US Army Corps of Engineers
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Designed by: JMU
Drawn by: JMU
Checked by: RSW
Project Engineer/Architect: Jeff Coulston

U. S. ARMY CORPS OF ENGINEERS
ENGINEERING AND SUPPORT CENTER, HUNTSVILLE, ALABAMA

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DOOR SECTIONS

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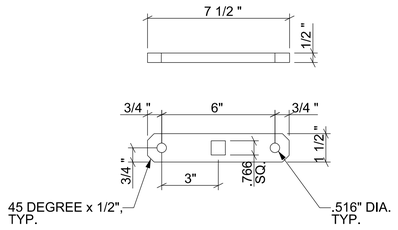
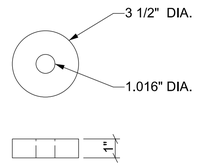
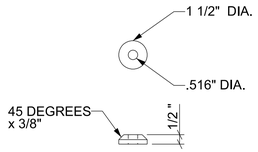


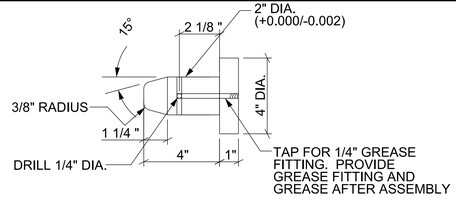
LATCH BAR DETAIL 1
SCALE: 3"=1'-0"
S702 S703 S704



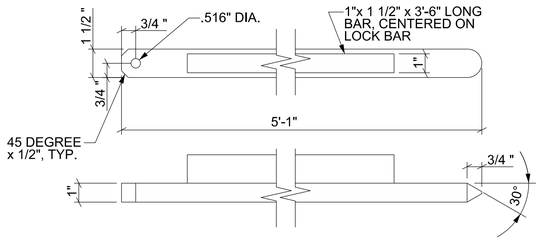
SPACER DETAIL 2
SCALE: 3"=1'-0"
S702 S703 S704



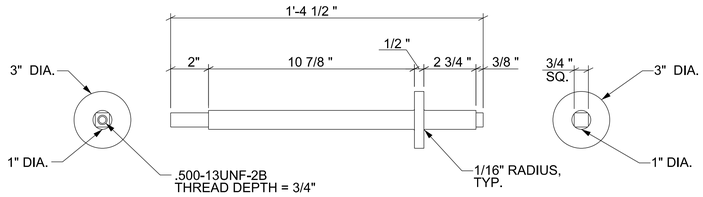
WASHER DETAIL 3
SCALE: 3"=1'-0"
S702 S703 S704



HINGE PIN DETAIL 4
SCALE: 3"=1'-0"
S702 S704

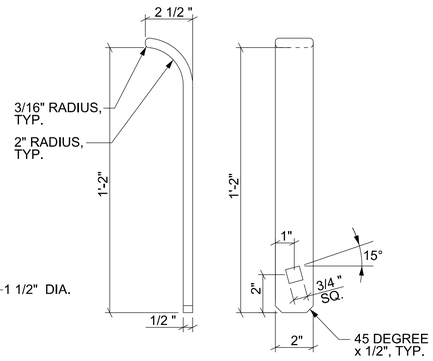


LOWER LOCK BAR DETAIL 5
SCALE: 3"=1'-0"
S702 S703 S704

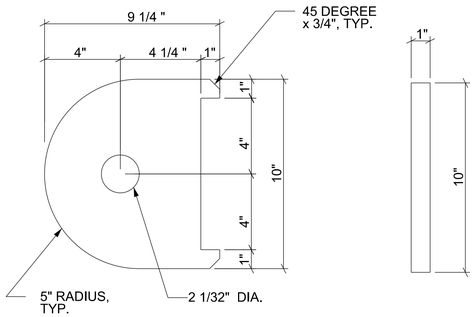


SHAFT DETAIL 6
SCALE: 3"=1'-0"
S703 S704

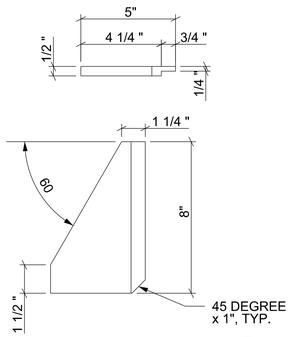
SLEEVE DETAIL 7
SCALE: 3"=1'-0"
S703 S704



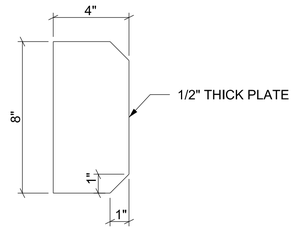
HANDLE DETAIL 8
SCALE: 3"=1'-0"
S201 S703 S704



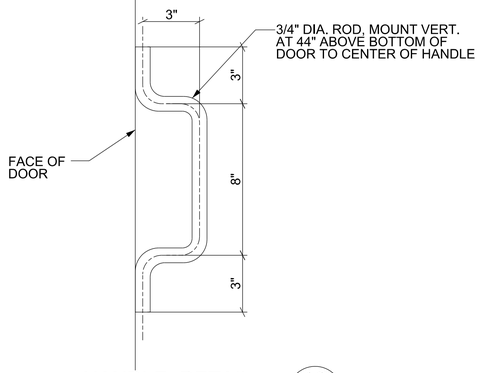
DOOR HINGE PL. DETAIL 9
SCALE: 3"=1'-0"
S702 S703 S704



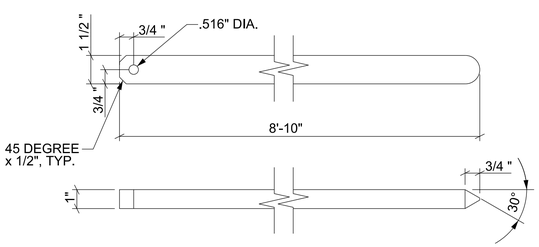
GUSSET HINGE PL. DETAIL 10
SCALE: 3"=1'-0"
S702 S703 S704



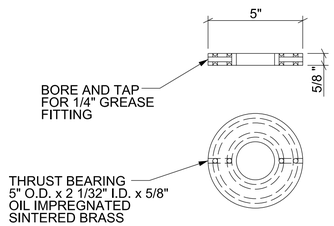
TUBE SUPPORT PL. DETAIL 11
SCALE: 3"=1'-0"
S703 S704



HANDLE DETAIL 12
SCALE: 3"=1'-0"
S201 S704



UPPER LOCK BAR DETAIL 13
SCALE: 3"=1'-0"
S702 S704



THRUST BEARING DETAIL 14
SCALE: 3"=1'-0"
S702 S704

NAVY PROJECTS

HIGH SECURITY HASP NOT PERMITTED

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DOOR DETAILS

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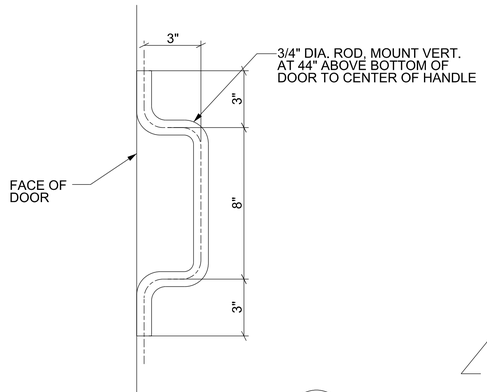
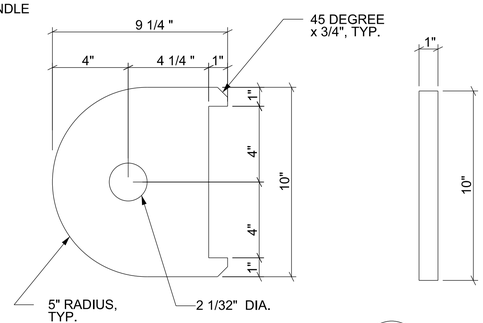
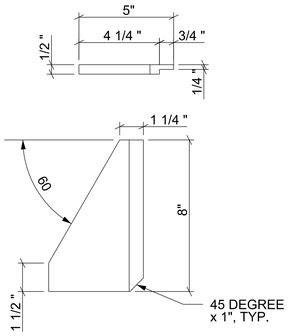


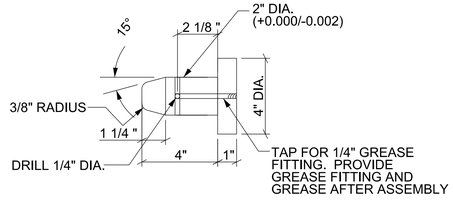
HANDLE DETAIL 1
SCALE: 3"=1'-0"
S201 S703 | S704



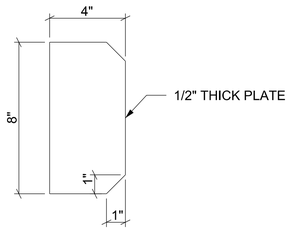
DOOR HINGE PL. DETAIL 2
SCALE: 3"=1'-0"
S702 S703 | S704



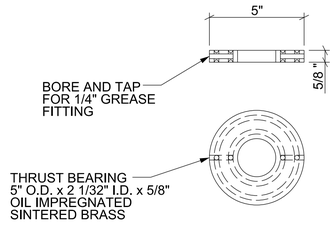
GUSSET HINGE PL. DETAIL 3
SCALE: 3"=1'-0"
S702 S703 | S704



HINGE PIN DETAIL 4
SCALE: 3"=1'-0"
S702 S704



TUBE SUPPORT PL. DETAIL 5
SCALE: 3"=1'-0"
S703 S704



THRUST BEARING DETAIL 6
SCALE: 3"=1'-0"
S702 S704

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DOOR DETAILS

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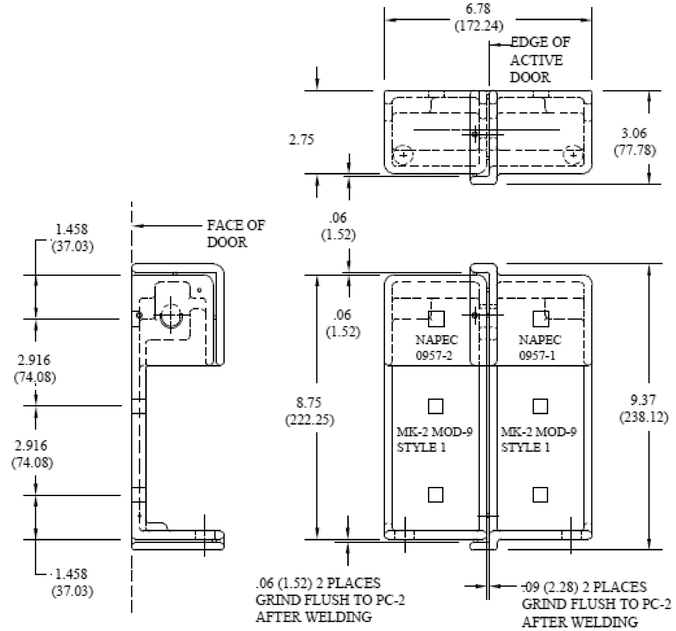
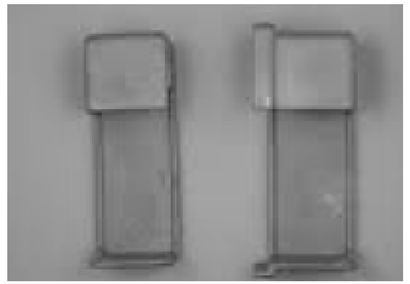


NOTES:

1. On back side of each half, machine or cast 3 holes to accept 0.375-inch (9.52 mm) square neck carriage bolts. Holes to be centered horizontally and vertically spaced 1.458-inch (37.03 mm) from top and bottom outside surface. Bolt hole centers 2.916 inches (74.08 mm) apart.

FIGURE 1. Style 1, MK 2 MOD 9.

HIGH SECURITY HASP A S705



HIGH SECURITY HASP B S705

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 SPECIFICATION MIL-DTL-43607J.
2. NO MODIFICATIONS AND/OR DEVIATIONS TO THE DOOR CONSTRUCTION SHOWN IN THE STANDARD DRAWINGS IS PERMITTED TO ACCOMMODATE THE HIGH SECURITY HASP 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 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.

NAVY PROJECTS

HIGH SECURITY HASP NOT PERMITTED

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HIGH SECURITY HASP

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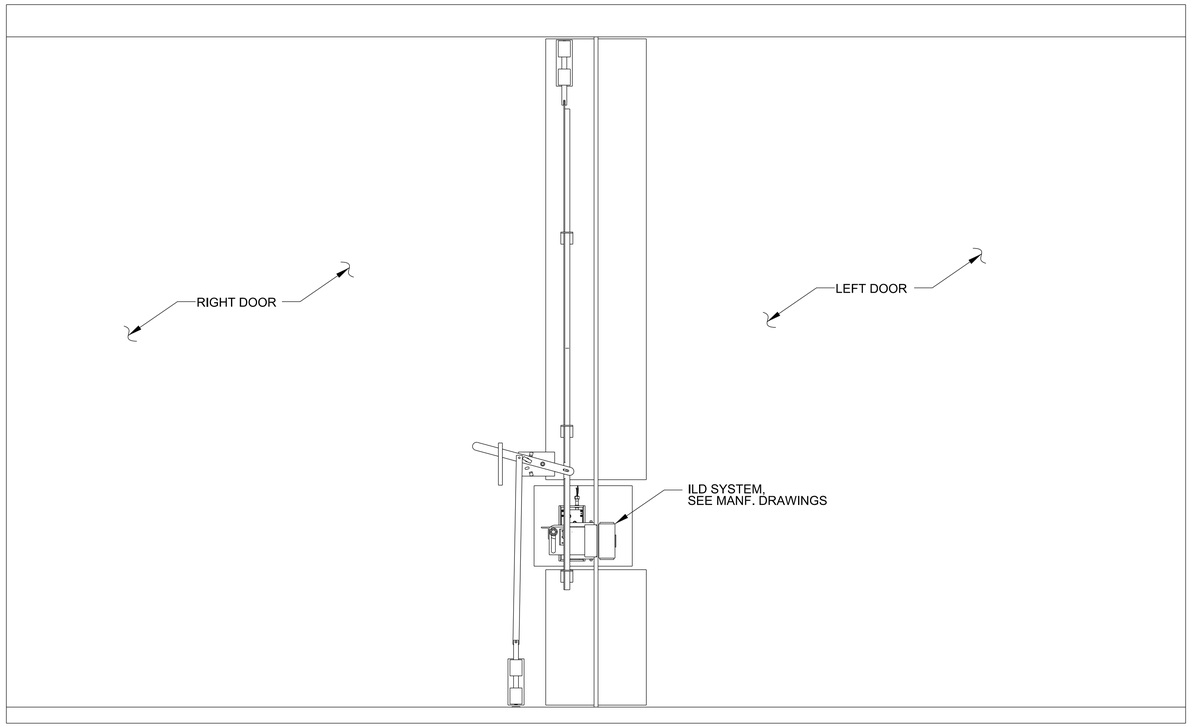
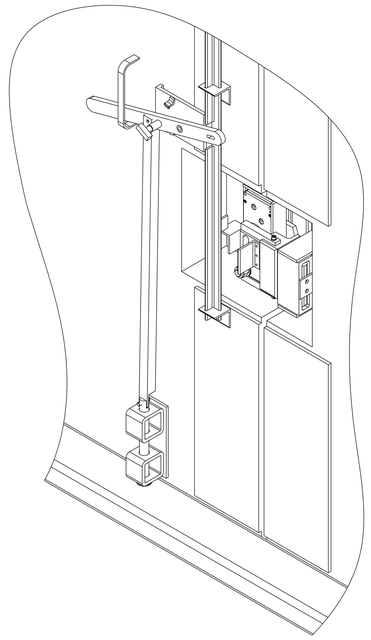


INTERNAL LOCKING DEVICE (ILD) A S705
SCALE: NTS
VIEW FROM INSIDE OF MAGAZINE
FOOT & HEAD BOLT SHOWN DISENGAGED

DETAILS ARE SHOWN FOR GENERAL INFORMATION ONLY. SEE ILD MANUF. DRAWINGS FOR A COMPLETE SET OF DETAILS AND REQUIREMENTS.



INTERNAL LOCKING DEVICE (ILD) B S705
SCALE: NTS
VIEW FROM INSIDE OF MAGAZINE
FOOT & HEAD BOLT SHOWN DISENGAGED

INTERNAL LOCKING DEVICE (ILD) NOTES:

1. INTERNAL LOCKING DEVICE IS A U.S. GOVERNMENT DESIGNED AND PATENTED LOCKING SYSTEM. THE ILD SYSTEM SHALL BE PURCHASED FROM A GOVERNMENT APPROVED ILD MANUFACTURER WITH COORDINATION OF NAVAL FACILITIES ENGINEERING SERVICE CENTER (NAVFAC ESC) SECURITY ENGINEERING DIVISION. CONTACT CAN BE MADE VIA PHONE BY CALLING 805-982-1212 OR THEIR WEBSITE (https://portal.navfac.navy.mil/portal/page/portal/navfac/navfac_ww_pp/navfac_nfesc_pp/locks/) FOR ORDERING INFORMATION.
2. NO MODIFICATIONS AND/OR DEVIATIONS TO THE DOOR CONSTRUCTION SHOWN IN THE STANDARD DRAWINGS ARE PERMITTED TO ACCOMMODATE THE ILD 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 ILD AND PROVIDE THE NECESSARY STIFFENERS AND ADDITIONAL FRAMING (IF REQUIRED) TO ACCOMMODATE THE ILD.
4. SEE ILD MANUFACTURERS INSTALLATION DRAWINGS FOR ADDITIONAL INFORMATION NOT SHOWN IN THESE DRAWINGS.
5. SEE DOOR FRAME AND DOOR DETAILS ON SHEETS S701(A) - S704(A).

DESIGNER NOTE: TO BE REMOVED WHEN PREPARING CONSTRUCTION DRAWINGS FOR SITE ADAPTION DESIGN

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INTERNAL LOCKING DEVICES

Sheet reference number:
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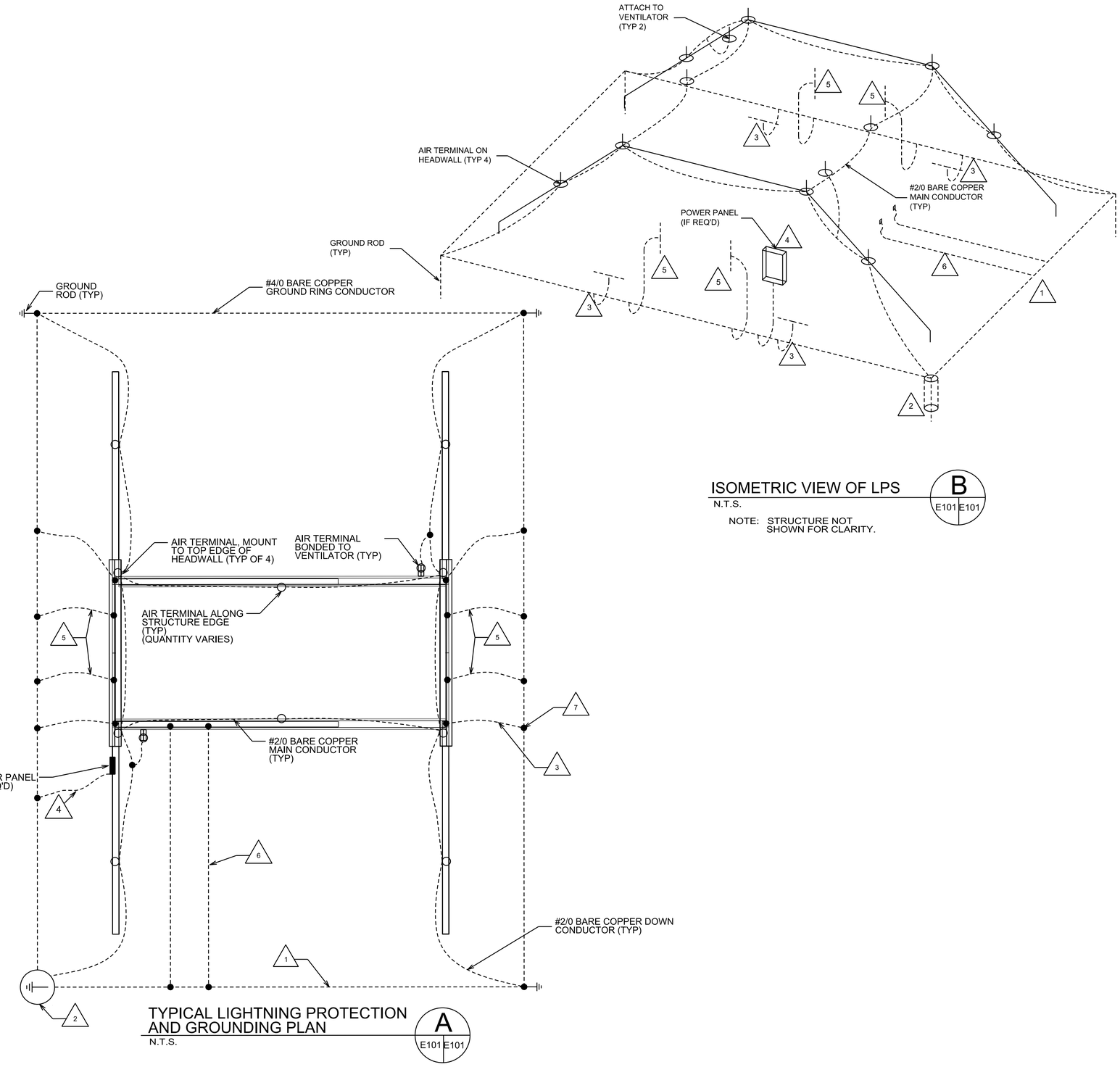

ISOMETRIC VIEW OF LPS
N.T.S.
NOTE: STRUCTURE NOT SHOWN FOR CLARITY.
B E101 E101

TYPICAL LIGHTNING PROTECTION AND GROUNDING PLAN
N.T.S.
A E101 E101

NOTES: (APPLICABLE TO DRAWINGS E-101, E-102, E-103, E-104)

1. DRAWINGS E-101, E-102, E-103, E-104, AND E-105 ARE US ARMY CORPS OF ENGINEERS (USACE) STANDARD GUIDANCE FOR LIGHTNING PROTECTION SYSTEM (LPS) DESIGN APPLICABLE TO EARTH COVERED MAGAZINES (ECM). THESE DRAWINGS DO NOT CONSTITUTE A COMPLETE LPS DESIGN. DESIGNER SHALL ADAPT THE STANDARDS TO UNIQUE SITE CONDITIONS, AND CONSULT THE BELOW LISTED CRITERIA TO ENSURE A COMPLETE AND FUNCTIONAL DESIGN. THE COMPLETED LPS INSTALLATION SHALL RECEIVE A UL MASTER LABEL CERTIFICATE OR EQUIVALENT.
2. THE LPS MUST PROVIDE A ZONE OF PROTECTION BASED ON A 100FT. RADIUS STRIKING DISTANCE (ds). THE ZONE OF PROTECTION MUST BE DOCUMENTED USING THE ROLLING SPHERE METHOD (RSM) ANALYSIS OF 100FT. RADIUS. SEE DRAWING E-104 AND E-105 FOR TYPICAL RSM ANALYSIS.
3. THE LPS SHALL BE MADE OF MATERIALS ACCEPTABLY PROTECTED AGAINST CORROSION AS SPECIFIED IN UL 96.
4. MINIMUM AIR TERMINAL HEIGHT IS AS SHOWN IN INCHES, ABOVE THE PROTECTED OBJECT.
5. REINFORCING STEEL IN WALLS, FLOOR SLAB, AND ARCH OR BOX STRUCTURE MUST ALL BE INTERCONNECTED THRU BONDING, AND MUST HAVE A CONTINUOUS PATH TO THE PRIMARY GROUNDING SYSTEM. MINIMUM REBAR OVERLAP IS 20x DIAMETER (20D). METAL VENTILATORS, STEEL DOORS AND DOOR FRAMES SHALL BE BONDED TO THE PRIMARY GROUNDING SYSTEM. PHOTO DOCUMENTATION OF THE REINFORCING STEEL BONDING AND PRIMARY GROUND BONDING IS MANDATORY.
6. INCOMING POWER AND COMM. MUST ENTER THE GROUND AT LEAST 50FT FROM FACILITY. CABLES AND WIRE MUST BE SHIELDED OR BE INSTALLED IN METALLIC PIPING THAT IS BONDED TO THE PRIMARY GROUNDING SYSTEM AT THE POINT OF ENTRY.
7. INTERIOR ELECTRICAL SYSTEMS SHALL BE DESIGNED BY USER ACCORDING TO SITE CONDITIONS AND USER REQUIREMENTS. USER SHALL DEFINE HAZARDOUS CLASSIFICATION, WHEN REQ'D.
8. PROVIDE SURGE PROTECTIVE DEVICES (SPD) FOR POWER, COMM, AND INSTRUMENTATION PER NFPA 780.
9. CONSIDER ALL MASSES FOR SIDEFLASH POTENTIAL. METAL MASSES WITHIN THE SIDEFLASH DISTANCE SHALL BE BONDED TO THE LPS, OR BE MOVED OUTSIDE THE SIDEFLASH SEPARATION DISTANCE.
10. THE LPS SHALL BE TESTED PER THE BELOW LISTED CRITERIA.
11. EXOTHERMIC WELD ALL GROUNDING CONDUCTOR BONDS AND TERMINATIONS, EXCEPT IN TEST WELLS WHICH REQUIRE BOLTED CONNECTIONS.
12. GROUNDING AND BONDING CABLES MUST BE COPPER.
13. WHERE CONFLICTS EXISTS BETWEEN THESE DRAWINGS AND THE BELOW CRITERIA, THE MOST STRINGENT REQUIREMENT SHALL APPLY.
14. CRITERIA:
    a. DOD 6055.09 - M, VOL.2 - AMMUNITION AND EXPLOSIVES SAFETY STANDARDS
    b. DA PAM 385-64 AMMUNITION AND EXPLOSIVES SAFETY STANDARDS
    c. NFPA 780 STANDARD FOR THE INSTALLATION OF LIGHTNING PROTECTION SYSTEMS
    d. UL 96A INSTALLATION REQUIREMENTS FOR LIGHTNING PROTECTION SYSTEMS
    e. UL 96 STANDARD FOR LIGHTNING PROTECTION COMPONENTS
    f. NFPA 70 NATIONAL ELECTRICAL CODE (NEC)

KEYED NOTES

1. #4/0 BARE COPPER CONDUCTOR (BCC) GROUNDING SYSTEM ENCIRCLING STRUCTURE'S PERIMETER. INSTALL IN DIRECT CONTACT WITH EARTH, 30"MIN. BELOW GRADE AND 3' FROM EDGE OF EARTH MOUND.
2. GROUND TEST WELL WITH GROUND ROD. ALL BONDS WITHIN THE TEST WELL SHALL BE BOLTED-TYPE CONNECTIONS. SEE DETAIL B, DWG E-102.
3. BOND HEADWALLS AND FOUNDATION REBAR TO GROUNDING SYSTEM WITH #4/0 BCC. INSTALL CABLE IN NONMETALLIC CONDUIT WHERE IT PASSES THROUGH CONCRETE (SEE DETAIL D, DWG E-102).
4. WHEN POWER IS REQUIRED, PROVIDE GROUNDING ELECTRODE CONDUCTOR SIZED PER NEC IN PVC CONDUIT.
5. BOND DOOR FRAME TO GROUNDING SYSTEM (1 EACH SIDE). BOND DOOR TO DOOR FRAME WITH BRAIDED COPPER STRAP, EQUAL TO #1/0 COPPER CONDUCTOR (2 EACH DOOR, TOP & BOTTOM).
6. BOND SIDE PANELS TO GROUNDING SYSTEM. INSTALL CABLE IN NONMETALLIC CONDUIT WHERE IT PASSES THROUGH CONCRETE. SEE DETAIL C, DWG E-102
7. EXOTHERMIC BOND (TYP).

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LIGHTNING PROTECTION SYSTEM

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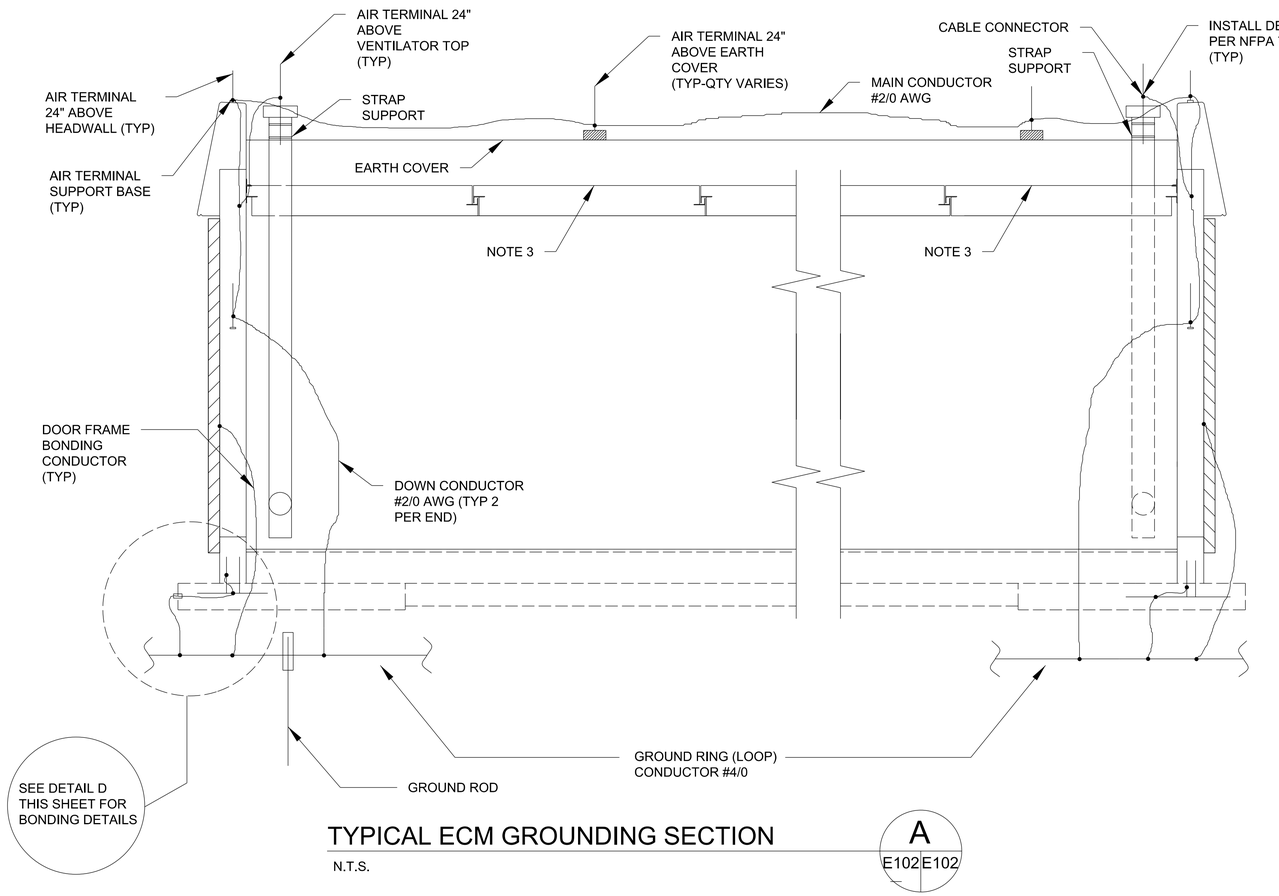


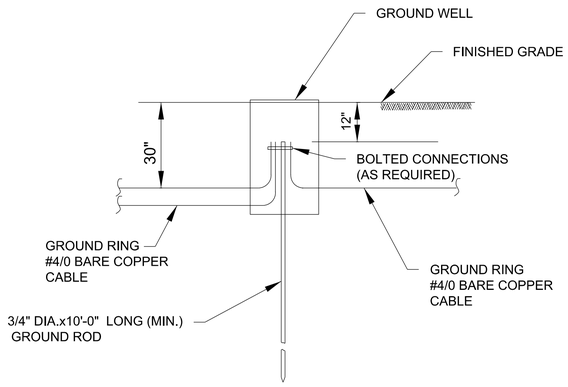
TYPICAL ECM GROUNDING SECTION

A
E102 E102

N.T.S.

NOTES:

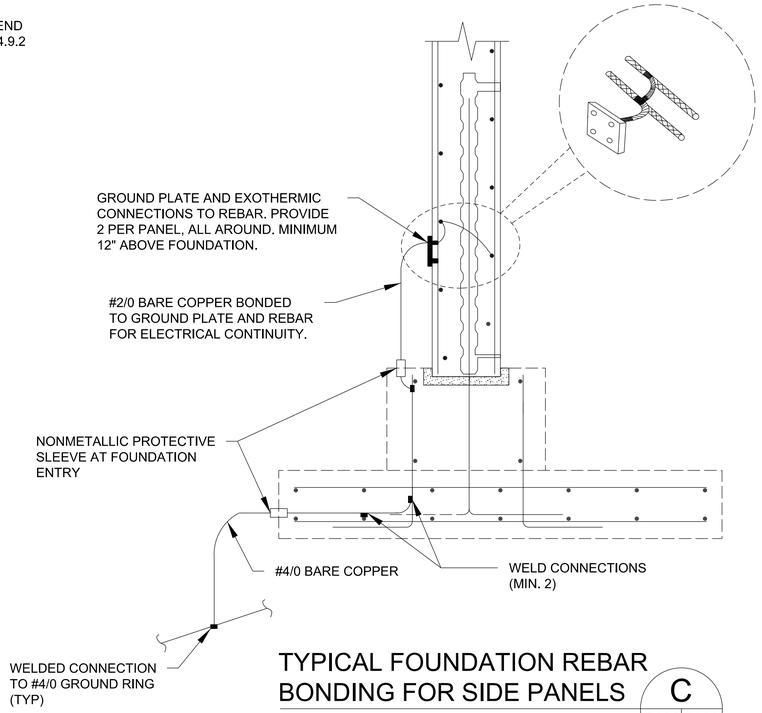
1. ALL VENTILATORS MAY NOT BE SHOWN FOR CLARITY. ANY VENTILATORS OR OTHER METALLIC BODIES WHICH RISE ABOVE FINISHED GRADE WITHIN MUNITIONS STORAGE SHALL HAVE AN AIR TERMINAL ATOP AND BONDED TO NEAREST GROUNDING ELECTRODE SYSTEM SIMILARLY AS SHOWN.
2. CONDUCTORS SHALL BE MINIMUM #2/0 AWG UNLESS OTHERWISE NOTED.
3. PROVIDE SOLID CONCRETE BLOCK ON WHICH TO SECURE AIR TERMINAL BASE. PLACE BLOCK AT TOP OF EARTH COVER.
4. SEE STRUCTURAL DRAWINGS FOR REBAR BONDING DETAILS, THAT ESTABLISH ELECTRICAL CONTINUITY BETWEEN STRUCTURAL PANELS.
5. REBAR AND CABLE WELDS SHALL BE > 1 1/4".



GROUND ROD TEST WELL DETAIL

B
E102 E102

N.T.S.

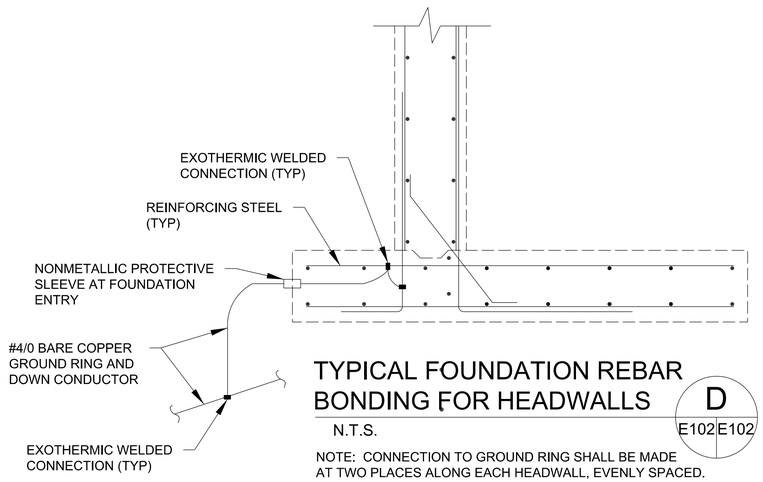


TYPICAL FOUNDATION REBAR BONDING FOR SIDE PANELS

C
E102 E102

N.T.S.

NOTE: BOND FOUNDATION REBAR TO GROUND RING AT CORNERS AND EVERY 60 FT. OR FRACTION THEREOF.



TYPICAL FOUNDATION REBAR BONDING FOR HEADWALLS

D
E102 E102

N.T.S.

NOTE: CONNECTION TO GROUND RING SHALL BE MADE AT TWO PLACES ALONG EACH HEADWALL, EVENLY SPACED.

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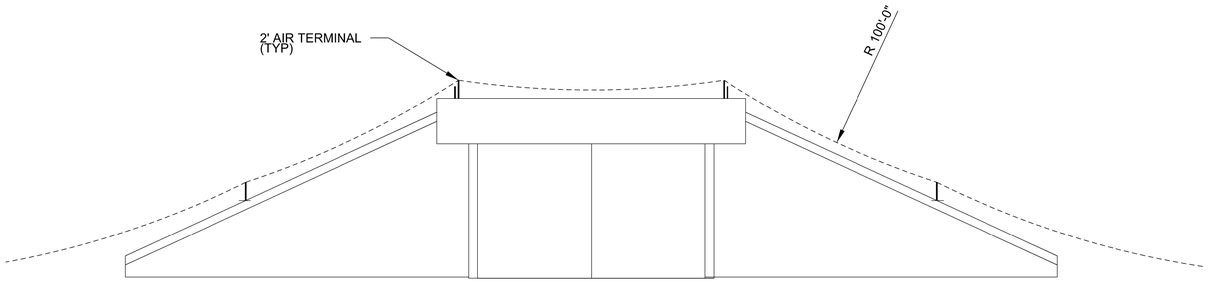
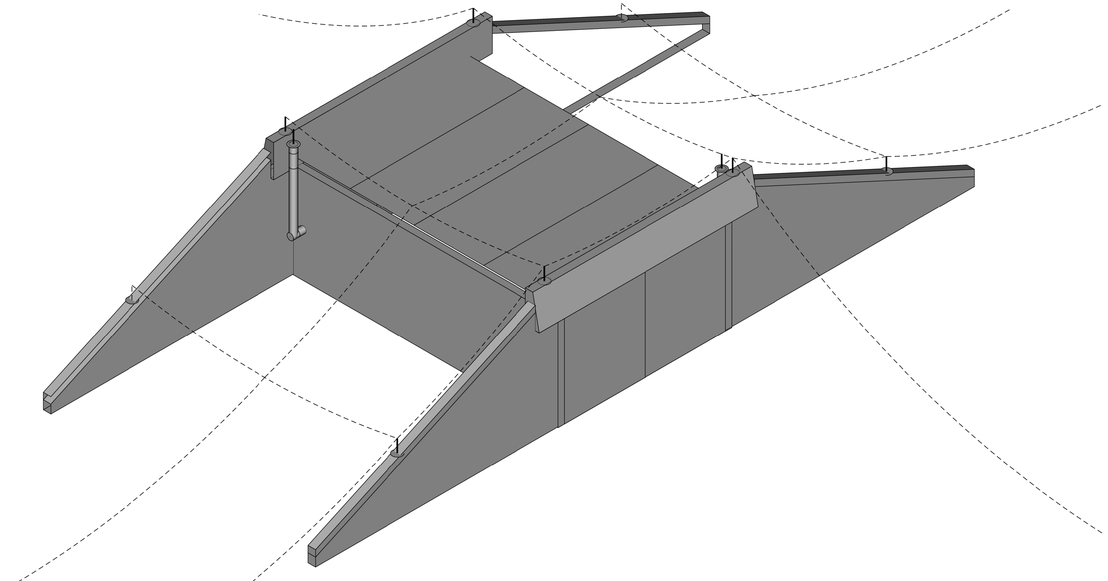


TYPICAL HEADWALL DETAIL
WITH ROLLING SPHERE ANALYSIS
N.T.S.

A
E103 E103

TYPICAL CROSS SECTION DETAIL
WITH ROLLING SPHERE ANALYSIS
N.T.S.

B
E103 E103



TYPICAL ISOMETRIC VIEW WITH
ROLLING SPHERE ANALYSIS
N.T.S.

C
E103 E103

NOTE: ISOMETRIC VIEW SHOWN IS TYPICAL FOR 40 FT. ECM

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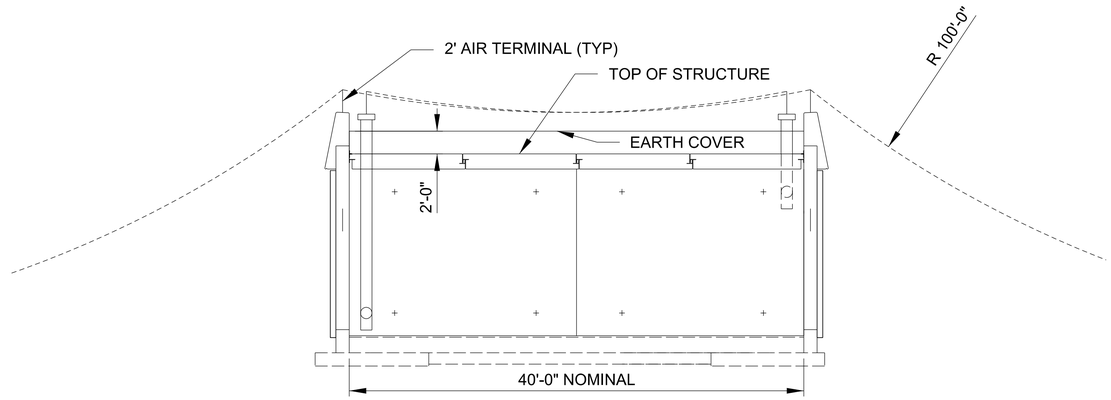


TYPICAL RSM ANALYSIS DIAGRAM - 40 FT ECM (A, E104 E104)

N.T.S

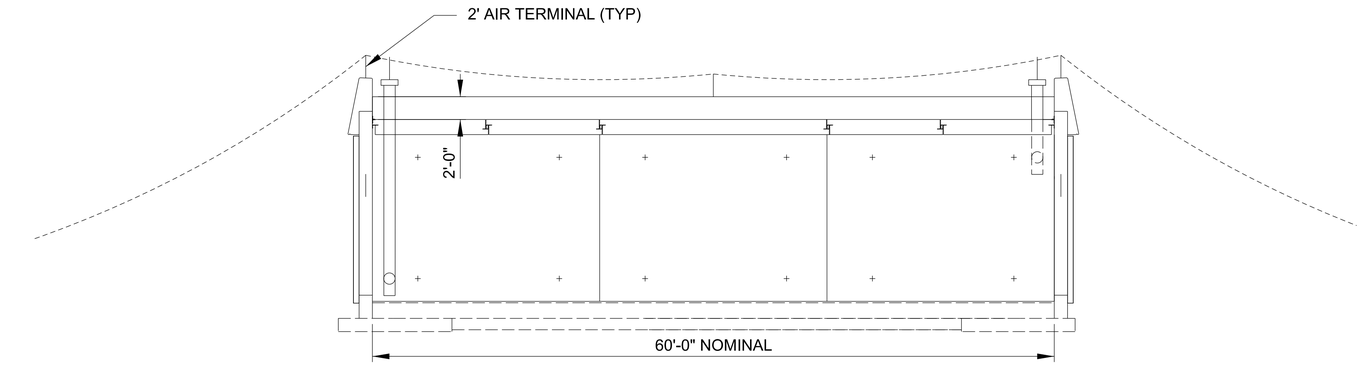
TYPICAL AIR TERMINAL PLACEMENT FOR EARTH COVERED MAGAZINES

421-80-10 NOMINAL ECM LENGTH	EACH HEADWALL	SPACEDALONG EACH EDGE	EACH VENT STACK	MINIMUM AIR TERMINAL QUANTITY
40 FT. OR LESS	4	0	1	10
MORE THAN 40 FT. LESS THAN 80 FT.	4	1	1	12
MORE THAN 60 FT. LESS THAN 100 FT.	4	2	1	14
MORE THAN 80 FT. LESS THAN 120 FT.	4	3	1	16
120 FT. MAX	4	4	1	18

NOTE: 24" AIR TERMINALS UNLESS OTHERWISE NOTED.

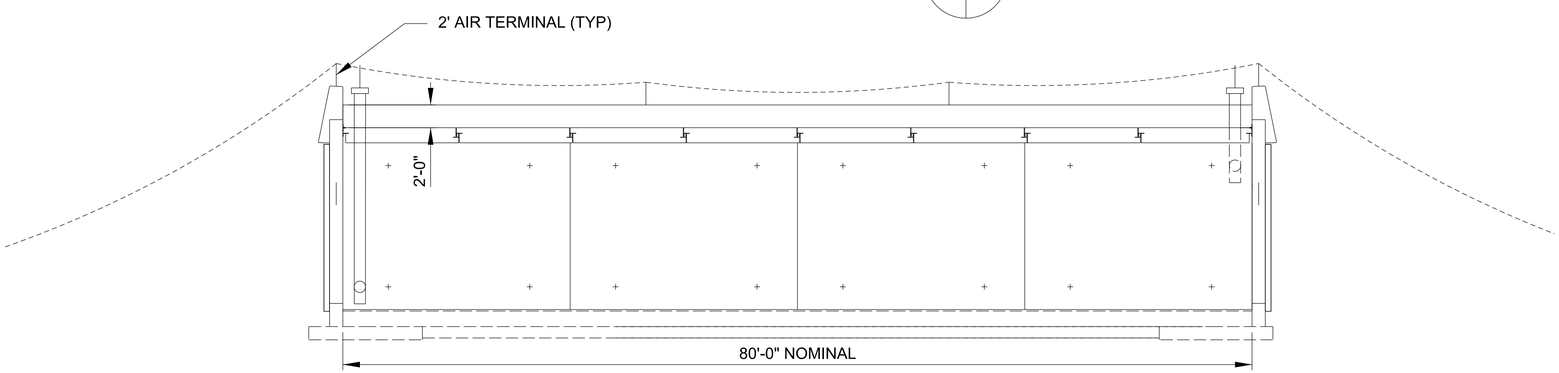
NOTES:

1. ALL VENTILATORS MAY NOT BE SHOWN FOR CLARITY. ANY VENTILATORS OR OTHER METALLIC BODIES WHICH RISE ABOVE FINISHED GRADE WITHIN MUNITIONS STORAGE SHALL HAVE AN AIR TERMINAL ATOP AND BONDED TO GROUND SIMILARLY AS SHOWN.
2. GROUNDING CONNECTIONS NOT SHOWN FOR CLARITY.



TYPICAL RSM ANALYSIS DIAGRAM - 60 FT. ECM (B, E104 E104)

N.T.S



TYPICAL RSM ANALYSIS DIAGRAM - 80 FT. ECM (C, E104 E104)

N.T.S

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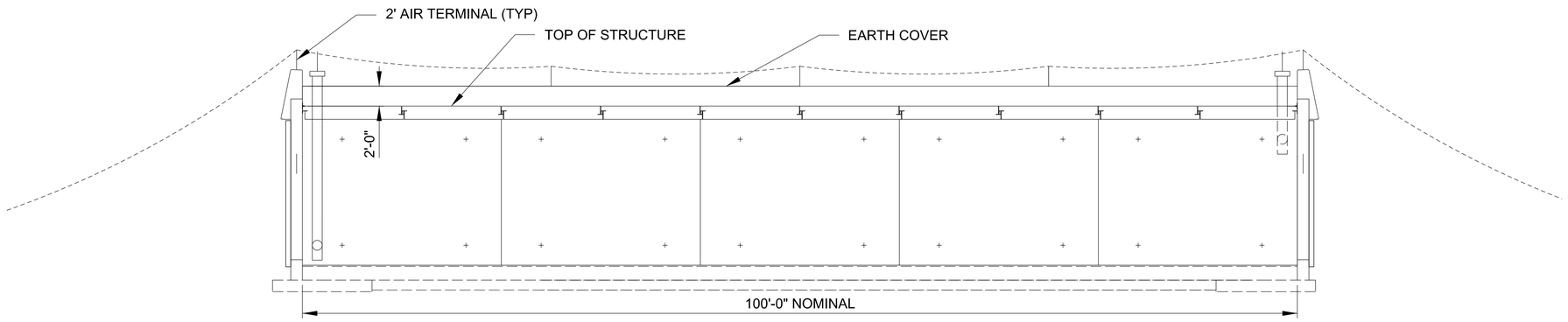


TYPICAL RSM ANALYSIS DIAGRAM - 100 FT. ECM

N.T.S

B
E105 E105

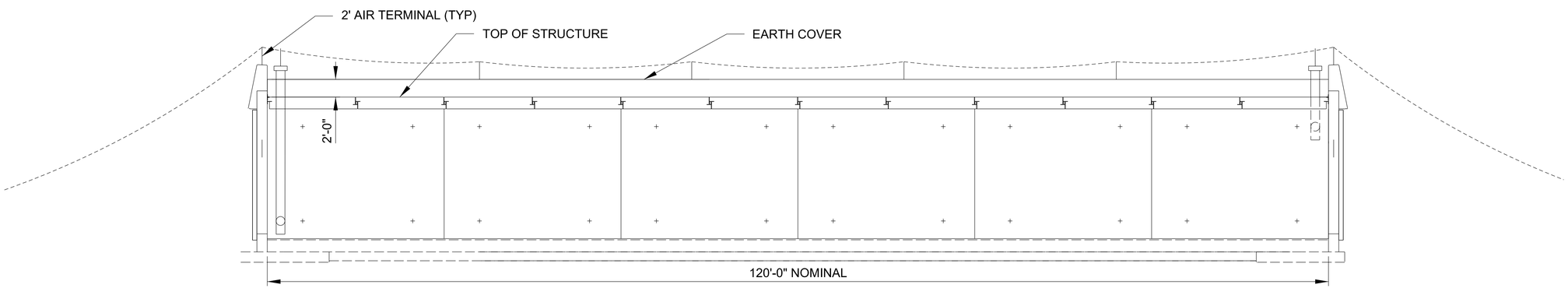
TYPICAL AIR TERMINAL PLACEMENT FOR EARTH COVERED MAGAZINES

421-80-10 NOMINAL ECM LENGTH	EACH HEADWALL	SPACED ALONG EACH EDGE	EACH VENT STACK	MINIMUM AIR TERMINAL QUANTITY
40 FT. OR LESS	4	0	1	10
MORE THAN 40 FT. LESS THAN 80 FT.	4	1	1	12
MORE THAN 60 FT. LESS THAN 100 FT.	4	2	1	14
MORE THAN 80 FT. LESS THAN 120 FT.	4	3	1	16
120 FT. MAX	4	4	1	18

NOTE: 24" AIR TERMINALS UNLESS OTHERWISE NOTED.

NOTES:

1. ALL VENTILATORS MAY NOT BE SHOWN FOR CLARITY. ANY VENTILATORS OR OTHER METALLIC BODIES WHICH RISE ABOVE FINISHED GRADE WITHIN MUNITIONS STORAGE SHALL HAVE AN AIR TERMINAL ATOP AND BONDED TO GROUND SIMILARLY AS SHOWN.
2. GROUNDING CONNECTIONS NOT SHOWN FOR CLARITY.



TYPICAL RSM ANALYSIS DIAGRAM - 120 FT. ECM

N.T.S

A
E105 E105

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