

PATRIOT

LOADING AND BRACING* IN SIDE OPENING ISO CONTAINERS OF PA- TRIOT MISSILES PACKED IN MISSILE CANISTERS (SHIPPING, STORAGE AND LAUNCH CONTAINERS)

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*THE PROCEDURES SHOWN HEREIN ARE APPLICABLE TO LOADS THAT ARE TO
BE SHIPPED BY CONTAINER-ON-FLATCAR (COFC) RAIL, MOTOR, OR WATER
CARRIERS.

U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY AVIATION AND MISSILE COMMAND POWELL.ANTHON Y.CHARLES.11100 70809 <small>Digitally signed by POWELL.ANTHONY.CHARLES. 1110070809 Date: 2022.03.09 11:03:38 -06'00'</small>	CAUTION: VERIFY PRIOR TO USE AT https://www.dau.edu/cop/ammo/pages/default.aspx THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 10.			
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GENERAL NOTES

- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- B. THE SPECIFIED OUTLOADING PROCEDURES ARE APPLICABLE TO LOADS OF PATRIOT MISSILES WHEN PACKED IN MISSILE CANISTERS (SHIPPING, STORAGE AND LAUNCH CANISTER). SUBSEQUENT REFERENCE TO CANISTER HEREIN MEANS CANISTER WITH MISSILE ITEMS. SEE PAGE 3 AND DRAWING 11450002 FOR DETAILS OF THE CANISTER. **CAUTION:** REGARDLESS OF THE QUANTITY OF CANISTERS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE SIDE OPENING ISO CONTAINER MUST NOT BE EXCEEDED.
- C. THE LOAD AS SHOWN IS BASED ON A 6,050 POUND 20' LONG BY 8' WIDE BY 8'-6" HIGH SIDE OPENING ISO CONTAINERS WITH INSIDE DIMENSIONS OF 19'-6-1/4" LONG BY 90" WIDE BY 89" HIGH, WITH A MAXIMUM GROSS WEIGHT OF 52,910 POUNDS. OLDER/OTHER CONTAINERS MAY HAVE DIFFERENT INSIDE MEASUREMENTS, VERIFY INSIDE CONTAINER DIMENSIONS PRIOR TO FABRICATING DUNNAGE. THE LOAD IS DESIGNED FOR TRAILER/CONTAINER-ON-FLATCAR (T/COFC) SHIPMENT, HOWEVER, THE LOAD AS DESIGNED CAN ALSO BE MOVED BY OTHER SURFACE MODES OF TRANSPORT. **NOTICE:** OTHER CONTAINERS OF THE SAME DESIGN CONFIGURATION CAN BE USED.
- D. WHEN LOADING CONTAINERS, THEY ARE TO BE POSITIONED SO AS TO ACHIEVE A TIGHT LOAD (TIGHT AGAINST THE DUNNAGE ASSEMBLIES). THE UNBLOCKED SPACE ACROSS THE WIDTH OF A LOAD BAY IS NOT TO EXCEED 1-1/2". EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE FILL PIECES ON THE SIDE FILL ASSEMBLIES ON THE DOOR SIDE OF THE CONTAINER. NAIL EACH ADDITIONAL PIECE TO THE FILL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". THE LOADS MUST BE AS TIGHT AS POSSIBLE LONGITUDINALLY, BUT THE VOID MUST NOT EXCEED 3/4" OVERALL. EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE FILL PIECES ON THE HEADER ASSEMBLY. NAIL EACH ADDITIONAL PIECE TO THE FILL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE THICKNESS OR QUANTITY OF THE FILL PIECES MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIDE OPENING CONTAINER.
- E. A STAGGERED NAILING PATTERN WILL BE USED WHENEVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES OR WHEN LAMINATING DUNNAGE. ADDITIONALLY, THE NAILING PATTERN FOR AN UPPER PIECE OF LAMINATED DUNNAGE WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL FOR THAT PIECE WILL NOT BE DRIVEN THROUGH ONTO OR RIGHT BESIDE A NAIL IN A LOWER PIECE.
- F. DUNNAGE LUMBER SPECIFIED IS OF NOMINAL SIZE. FOR EXAMPLE, 1" X 4" MATERIAL IS ACTUALLY 3/4" THICK BY 3-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE.
- G. WHETHER A CONTAINER IS FULL OR IS LOADED WITH A REDUCED QUANTITY OF LADING UNITS, THE LENGTHWISE CENTER OF GRAVITY OF THE LOAD MUST BE WITHIN 12", IN EITHER DIRECTION, OF THE MID-POINT OF THE CONTAINER.
- H. **CAUTION:** DO NOT NAIL DUNNAGE MATERIAL TO THE CONTAINER WALLS OR FLOOR. ALL NAILING WILL BE WITHIN THE DUNNAGE.
- J. PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS THE SIDEWALL, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- K. **MAXIMUM LOAD WEIGHT CRITERIA:**
- THE MAXIMUM LOAD WEIGHTS ARE CONTROLLED BY EQUIPMENT CAPABILITY FACTORS. ALTHOUGH THE HEAVIEST MAXIMUM LOADS ARE DELINEATED IN THE LOAD VIEWS, PROVISIONS ARE INCLUDED WITHIN THIS DRAWING SO THAT THE BASIC LOADS CAN BE ADJUSTED TO SATISFY A LESSER QUANTITY OF LADING UNITS. DEPENDING ON TRANSPORTATION ROUTING, IT MAY BE NECESSARY TO REDUCE THE LOAD WEIGHT TO SATISFY "WEIGHT LAWS" OF CERTAIN STATES. ALSO, IT MAY BE NECESSARY TO REDUCE THE LOAD WEIGHT TO SATISFY OTHER WEIGHT RESTRICTIONS IMPOSED ON THE INTERMODAL CONTAINER SYSTEM.
- L. REQUIREMENTS CITED WITHIN THE ASSOCIATION OF AMERICAN RAILROADS (AAR) INTERMODAL LOADING GUIDE APPLY WHEN THE SHIPMENT MOVES BY TRAILER/CONTAINER -ON-FLATCAR (T/COFC). SPECIAL T/COFC NOTES FOLLOW:
1. A LOADED CONTAINER MUST BE ON A CHASSIS EQUIPPED WITH TWO BOGIE ASSEMBLIES WHEN BEING MOVED IN TOFC SERVICE.
 2. THE LOAD LIMIT OF A T/COFC RAILCAR MUST NOT BE EXCEEDED. NOR WILL A CAR BE LOADED SO THAT THE TRUCK UNDER ONE END OF THE CAR CARRIES MORE THAN ONE-HALF OF THE LOAD LIMIT FOR THAT CAR.
- M. DURING INTRASTATE AND/OR INTERSTATE MOVES BY MOTOR CARRIER, A PROPER CHASSIS OR MODIFIED FLATBED TRAILER MUST BE USED TO PRECLUDE VIOLATION OF ONE OR MORE "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.

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(GENERAL NOTES CONTINUED)

- N. DURING INTRASTATE AND/OR INTERSTATE MOVES BY MOTOR CARRIER, A PROPER CHASSIS OR MODIFIED FLATBED TRAILER MUST BE USED TO PRECLUDE VIOLATION OF ONE OR MORE "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.
- O. CONVERSION TO METRIC EQUIVALENTS: DIMENSIONS WITHIN THIS DOCUMENT ARE EXPRESSED IN INCHES AND WEIGHTS ARE EXPRESSED IN POUNDS. WHEN NECESSARY, THE METRIC EQUIVALENTS MAY BE COMPUTED ON THE BASIS OF ONE INCH EQUALS 25.4MM AND ONE POUND EQUALS 0.454 KG.
- O. THE QUANTITY OF CANISTERS SHOWN IN THE LOADS ON PAGES 4 AND 5 MAY BE REDUCED FOR SHIPMENT, IF DESIRED.
- P. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN CANISTER SHOCK ISOLATORS, AND CANISTER SHOCK ISOLATORS AND THE SIDE OPENING CONTAINER IF DESIRED, TO PREVENT CHAFING DAMAGE TO CANISTER.
- Q. DIMENSIONS GIVEN FOR DUNNAGE PIECES OR DUNNAGE ASSEMBLIES WILL BE FIELD CHECKED PRIOR TO THEIR ASSEMBLY AND INSTALLATION IN THE SIDE OPENING CONTAINER. DUNNAGE ASSEMBLIES MUST BE CONSTRUCTED SO THAT A SNUG FIT WITH THE MISSILE CANISTERS IS OBTAINED. ALSO, ADJUSTMENTS MAY BE REQUIRED AS TO THE LOCATION OF CERTAIN PIECES OF DUNNAGE IN AN ASSEMBLY IN ORDER FOR THE DUNNAGE ASSEMBLY TO CONTACT THE CANISTER AT ITS SHOCK ISOLATION FRAMES.
- R. FOR SHIPMENT OF THE MISSILE CANISTER IN A SIDE OPENING CONTAINER IT IS NECESSARY THAT THE SHOCK ISOLATION FRAMES AND SKIDS BE IN A REVERSE POSITION (THE WOODEN SKIDS EXTENDING UNDER THE BODY OF THE CANISTER RATHER THAN PROTRUDING). THE OVERALL LENGTH OF THE CANISTER WILL BE REDUCED FROM 234" TO 216".
- S. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:
1. PREFABRICATE TWO HEADER ASSEMBLIES AND TWO SIDE FILL ASSEMBLIES.
 2. INSTALL THE HEADER ASSEMBLIES.
 3. LOAD FOUR CANISTERS.
 4. INSTALL TWO SIDE FILL ASSEMBLIES.
 5. WIRE TIE ASSEMBLIES TO CANISTERS.

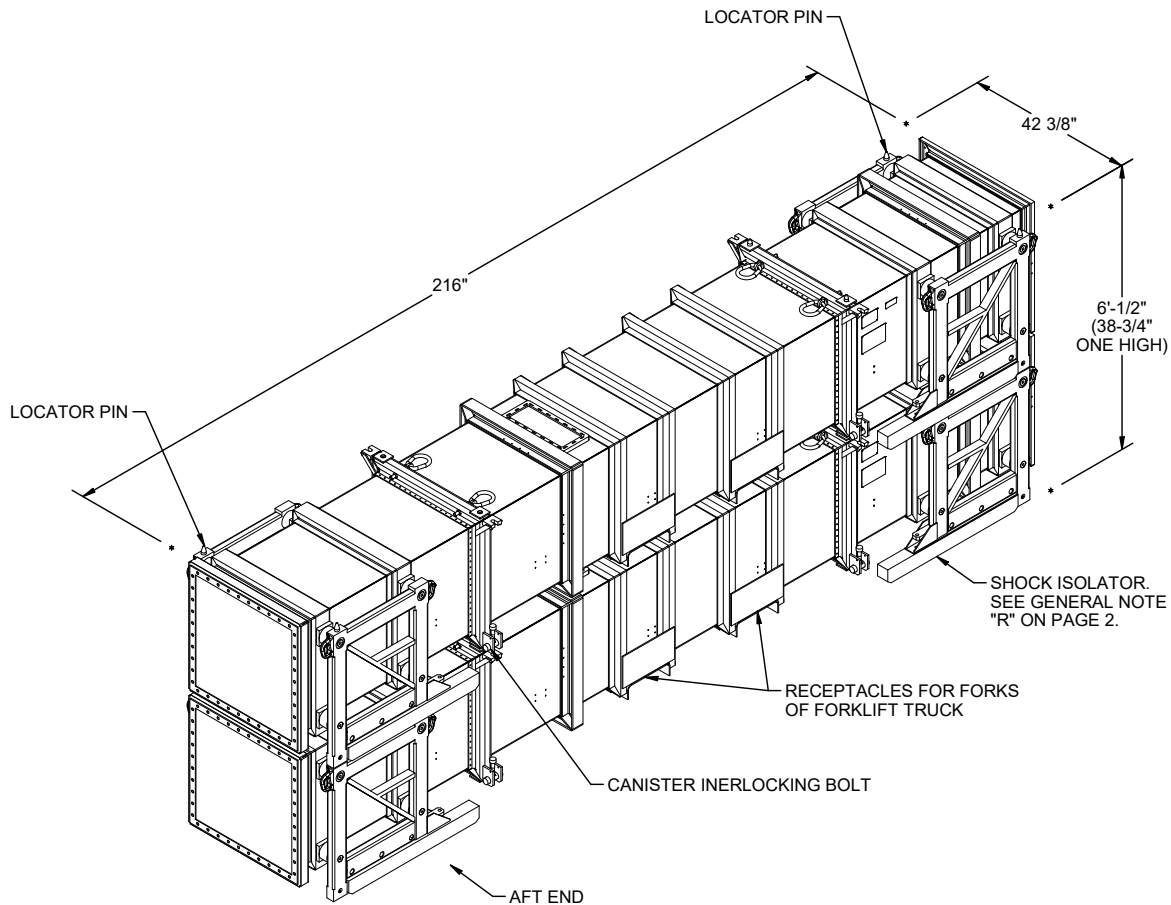
MATERIAL SPECIFICATIONS

<u>LUMBER</u>	---	SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
<u>NAILS</u>	---	ASTM F1667; COMMON STEEL NAIL NLCMS OR NLCMMS).
<u>PLYWOOD</u>	---	COMMERCIAL ITEM DESCRIPTION A-A-55057, INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.
<u>WIRE, CARBON STEEL</u>	---	ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.
<u>ANTI-CHAFING MATERIAL</u>	---	MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.

REVISION

REVISION, DATED FEBRUARY 2022, CONSISTS OF:

1. ADDING GENERAL NOTE "P" (ANTI-CHAFING) AND A REFERENCE TO GENERAL NOTE "P" IN LOAD VIEWS.
2. CORRECTING SIDE FILL ASSEMBLY AND ADDED SIDE FILL TO THE LOAD ON PAGE 5.



TYPICAL STACK DETAIL

SINGLE PATRIOT DETAIL

GROSS WEIGHT - - - - - 3,750 LBS
 CUBE - - - - - 205.3 CU FT

UNITIZATION AND HANDLING GUIDANCE

(PROCEDURAL GUIDANCE CONTINUED)

1. STACKING CANISTERS FOR UNITIZATION:
 - A. THE SKIDS OF THE UPPER CANISTER MUST BE FULLY SEATED UPON THE LOCATOR PINS OF THE LOWER CANISTER.
 - B. POSITION THE FORWARD END OF THE UPPER CANISTER ABOVE THE FORWARD END OF THE LOWER CANISTER.
 - C. CANISTER INTERLOCKING BOLTS MUST BE TIGHTENED AS SECURELY AS POSSIBLE WITH A NORMAL SIZE HAND TOOL WRENCH (REF: 50 FOOT POUNDS).

- A. ONLY APPROVED AND APPROPRIATELY SIZED MATERIALS HANDLING EQUIPMENT WILL BE USED FOR HANDLING THE DEPICTED CANISTERS.
- B. IF HANDLING IS ACCOMPLISHED WITH A FORKLIFT TRUCK, THE CANISTERS SHOULD BE HANDLED FROM A SIDE POSITION AS MUCH AS POSSIBLE. CARE MUST BE EXERCISED WHEN INSERTING FORKS UNDER A CANISTER, TO PREVENT DAMAGE TO THE CONTAINER BY THE FORK TINES OR THE FORKLIFT PACKAGE GUARD. FOR VERY SHORT "INCHING" SPEED MOVEMENTS, SUCH AS WILL BE EXPERIENCED DURING CANISTER LOADING, A TWO-HIGH CANISTER STACK MAY BE HANDLED BY INSERTING THE FORKS OF THE FORKLIFT TRUCK INTO THE FORK RECEPTACLES OF THE UPPER CANISTER.
- C. SLINGING OF A CANISTER OR A CANISTER STACK WILL BE IN ACCORDANCE WITH APPROVED PROCEDURES.

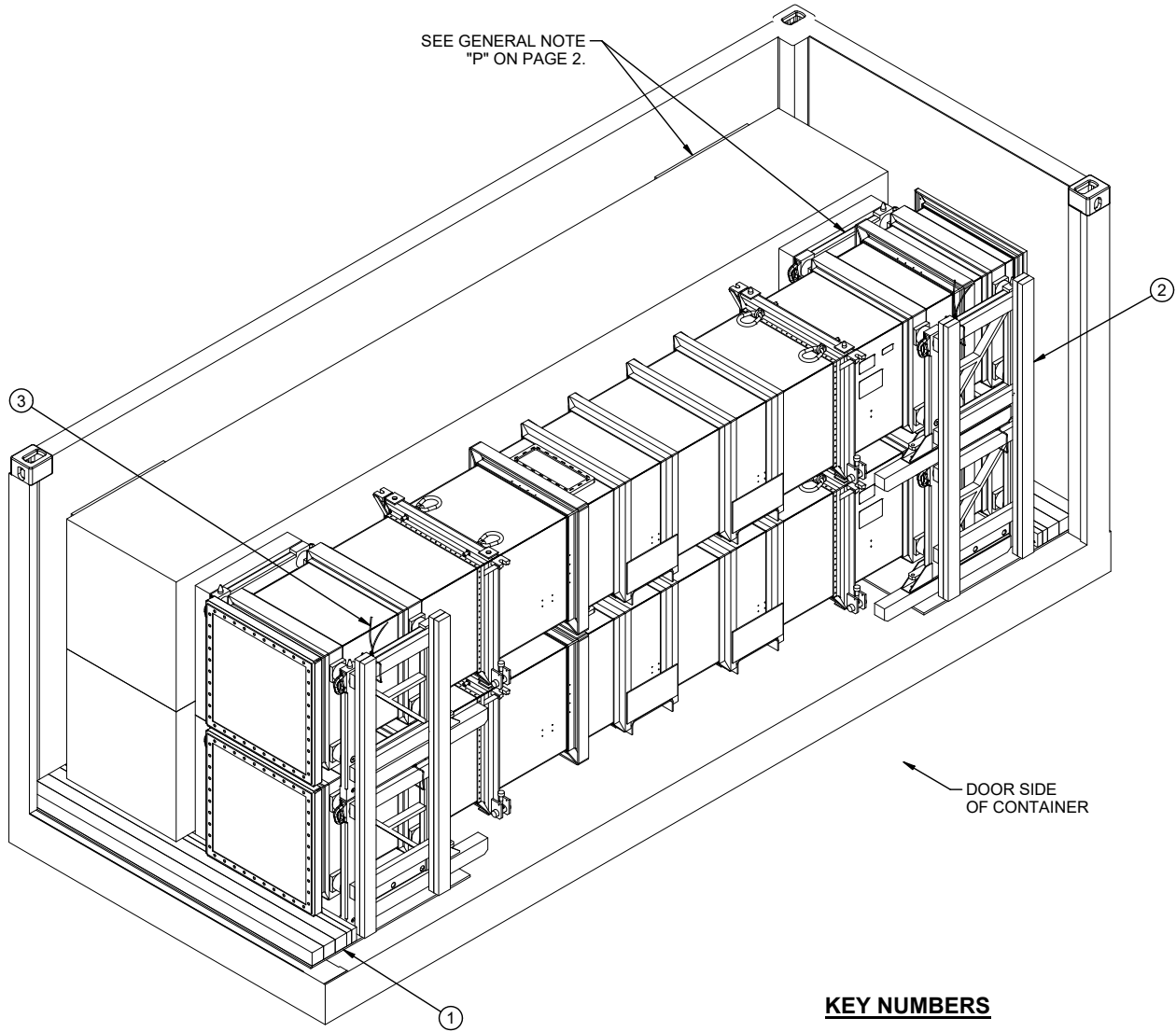
2. CANISTER OR CANISTER STACK HANDLING:

NOTES: (1) APPROVED MATERIALS HANDLING EQUIPMENT (MHE) IS SPECIFIED IN OTHER DOCUMENTS. MHE IS INTENDED TO MEAN EQUIPMENT SUCH AS FORKLIFT TRUCKS, CRANES, HAND TRUCKS, DOLLIES, ROLLER ASSEMBLIES, SLINGS, AND SPREADER BARS.

(2) PRECAUTIONARY HANDLING TECHNIQUES NORMALLY EMPLOYED OR AS SPECIFIED FOR THE TYPE OF COMMODITY INVOLVED WILL BE OBSERVED.

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SEE GENERAL NOTE
"P" ON PAGE 2.



DOOR SIDE
OF CONTAINER

ISOMETRIC VIEW

KEY NUMBERS

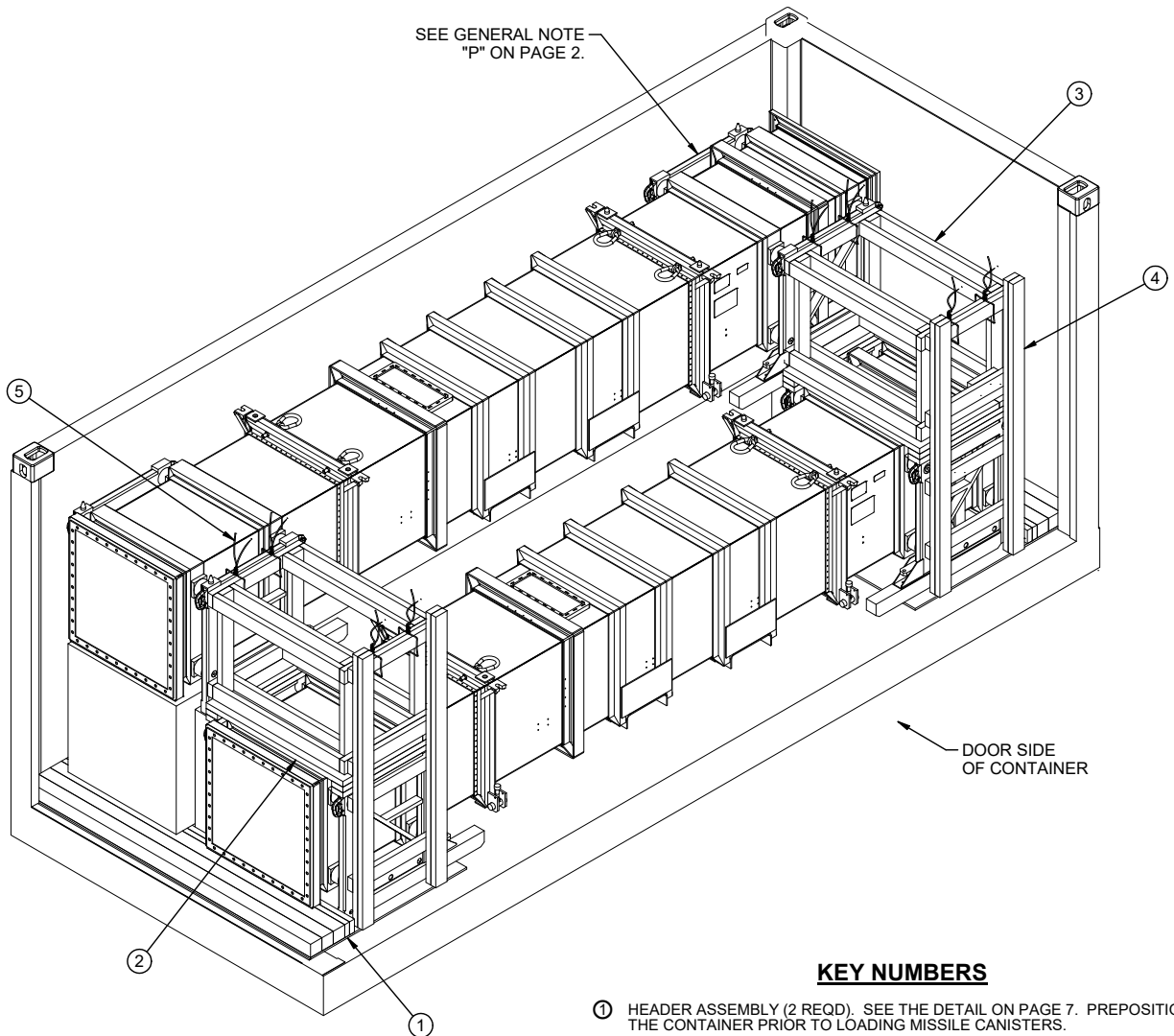
- ① HEADER ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 7. PREPOSITION IN CONTAINER PRIOR TO LOADING MISSILE CANISTERS.
- ② SIDE FILL ASSEMBLY (2 REQD, ONE RIGHT HAND AND ONE LEFT HAND). SEE THE DETAIL ON PAGE 7.
- ③ TIE WIRE, .0800" DIA BY 18" LONG (2 REQD PER SIDE FILL ASSEMBLY). INSTALL TO FORM A LOOP AROUND THE ISOLATION FRAME AND THE SIDE FILL ASSEMBLY.

BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	94	63
4" X 4"	44	58
NAILS	NO. REQD	POUNDS
10d (3")	218	3-1/2
PLYWOOD, 3/4" - - 58.00 SQ FT REQD - - - 120 LBS		

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
MISSILE CANISTER	4	15,000 LBS
DUNNAGE		365 LBS
CONTAINER		6,050 LBS
TOTAL WEIGHT		21,415 LBS (APPROX)



ISOMETRIC VIEW

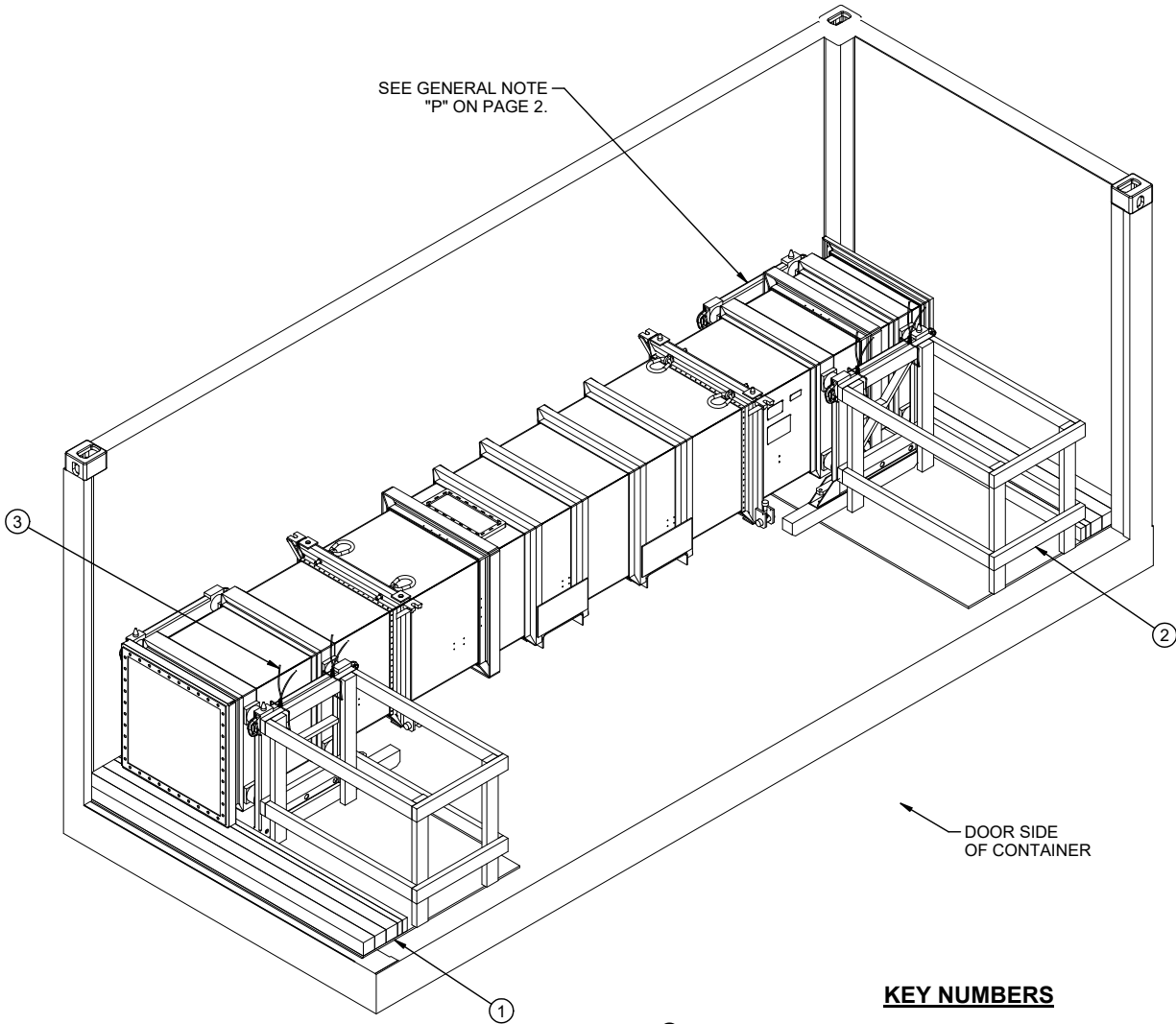
KEY NUMBERS

- ① HEADER ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 7. PREPOSITION IN THE CONTAINER PRIOR TO LOADING MISSILE CANISTERS.
- ② SPACER ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 8. POSITION AS SHOWN SO AS TO REST ON THE SHOCK ISOLATOR FRAMES.
- ③ FILLER ASSEMBLY A (2 REQD). SEE THE DETAIL ON PAGE 9. POSITION ON TOP OF AND NAIL TO THE SPACER ASSEMBLIES W/6-10d NAILS. WIRE TIE TO THE SHOCK ISOLATION FRAMES.
- ④ SIDE FILL ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 7.
- ⑤ TIE WIRE, .0800" DIA BY 18" LONG (4 REQD PER FILLER ASSEMBLY "A"). INSTALL TO FORM A LOOP AROUND THE ISOLATION FRAME AND FILLER ASSEMBLY "A", OR TO FORM A LOOP AROUND THE FILLER ASSEMBLY "A" AND THE SIDE FILL ASSEMBLY.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" x 4"	6	2
2" x 4"	222	148
2" x 6"	14	14
4" x 4"	44	58
NAILS	NO. REQD	POUNDS
6d (2")	32	1/4
10d (3")	346	5-1/2
WIRE, .0800" DIA	12' REQD	0.20 LBS
PLYWOOD, 3/4"	58.00 SQ FT REQD	120 LBS

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
MISSILE CANISTER	3	11,250 LBS
DUNNAGE		570 LBS
CONTAINER		6,050 LBS
TOTAL WEIGHT		17,870 LBS (APPROX)



ISOMETRIC VIEW

KEY NUMBERS

- ① HEADER ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 7. PREPOSITION IN THE CONTAINER PRIOR TO LOADING MISSILE CANISTERS.
- ② FILLER ASSEMBLY B (2 REQD). SEE THE DETAIL ON PAGE 9. WIRE TIE TO THE SHOCK ISOLATION FRAMES.
- ③ TIE WIRE, .0800" DIA BY 18" LONG (2 REQD PER FILLER ASSEMBLY "B"). INSTALL TO FORM A LOOP AROUND THE ISOLATION FRAME AND FILLER ASSEMBLY "B".

BILL OF MATERIAL

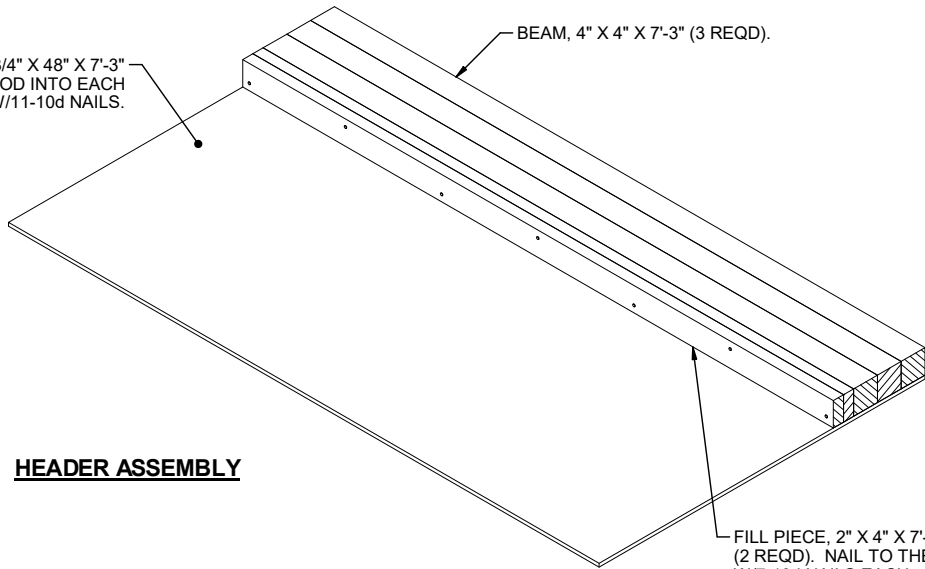
LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	100	66
4" X 4"	44	58
NAILS	NO. REQD	POUNDS
10d (3")	198	3
WIRE, .0800" DIA	6' REQD	0.10 LBS
PLYWOOD, 3/4"	58.00 SQ FT REQD	119 LBS

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
MISSILE CANISTER	1	3,750 LBS
DUNNAGE		372 LBS
CONTAINER		6,050 LBS
TOTAL WEIGHT		10,172 LBS (APPROX)

BASE, PLYWOOD, 1/2" OR 3/4" X 48" X 7'-3"
(1 REQD). NAIL THRU PLYWOOD INTO EACH
BEAM W/11-10d NAILS.

BEAM, 4" X 4" X 7'-3" (3 REQD).

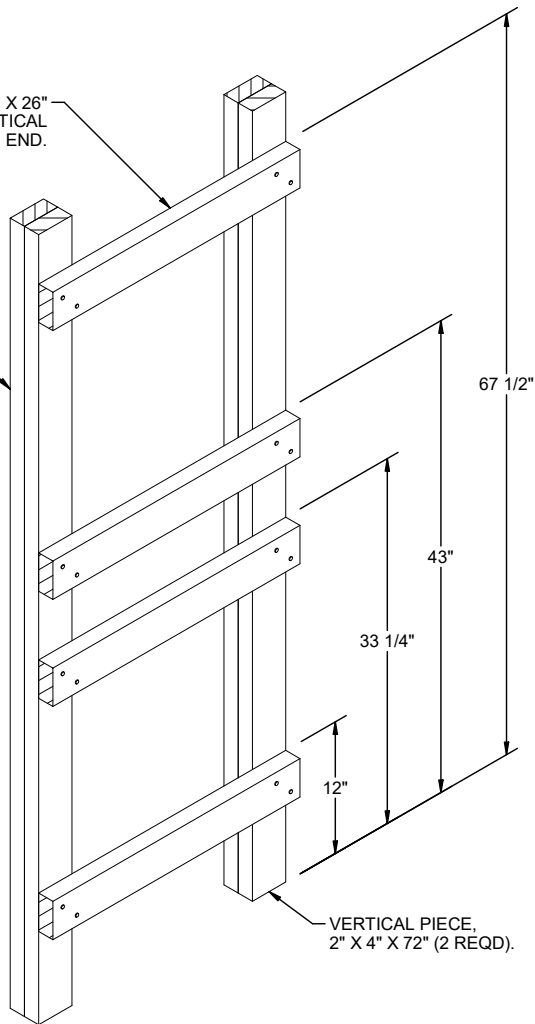


HEADER ASSEMBLY

FILL PIECE, 2" X 4" X 7'-3"
(2 REQD). NAIL TO THE BEAMS
W/7-10d NAILS EACH.

HORIZONTAL PIECE, 2" X 4" X 26"
(4 REQD). NAIL TO THE VERTICAL
PIECES W/2-10d NAILS AT EACH END.

FILL PIECE, 2" X 4" X 72" (2 REQD).
LAMINATE TO THE VERTICAL PIECE
W/5-10d NAILS.



SIDE FILL ASSEMBLY

NOTE: FOR A ONE HIGH LOAD, ELIMINATE
THE TOP TWO HORIZONTAL PIECES AND
REDUCE THE LENGTH OF THE VERTICAL
AND FILL PIECES TO 38".

LONGITUDINAL SUPPORT PIECE,
2" X 4" X 19" (2 REQD). NAIL
TO THE BOTTOM SUPPORT PIECE
W/4-10d NAILS.

LATERAL SUPPORT PIECE,
2" X 6" X 42-3/4" (2 REQD).
NAIL TO THE BOTTOM SUPPORT
PIECE W/3-10d NAILS AT EACH END.

FABRICATE ASSEMBLY SO THAT THE HOLES
DRILLED IN THE BOTTOM SUPPORT PIECE
AND THE SPACER PIECE ARE BOTH ON THE
SAME SIDE OF THE ASSEMBLY. HOLES MUST
BE ALIGNED SO THAT THEY WILL ACCEPT THE
LOCATOR PINS OF THE SHOCK ISOLATION
FRAMES.

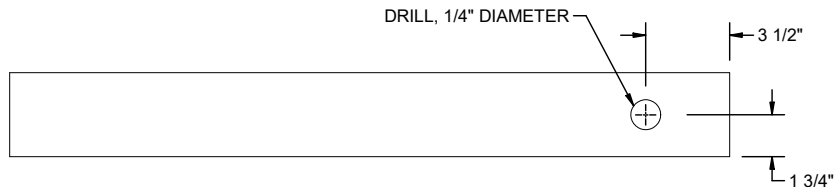
BOTTOM SUPPORT PIECE,
2" X 4" X 30" (2 REQD). DRILL
A 1-1/4" DIAMETER HOLE AS
SHOWN BY DETAIL BELOW.

SPACER PIECE, 2" X 4" X 30"
(2 REQD). DRILL A 1-1/4"
DIAMETER HOLE AS SHOWN
BY DETAIL BELOW. NAIL TO
THE BOTTOM SUPPORT PIECE
W/8-10d NAILS.

RISER PIECE, 1" X 4" X 19"
(2 REQD). NAIL TO THE
SPACER PIECE W/8-6d NAILS.

5 1/2"

SPACER ASSEMBLY



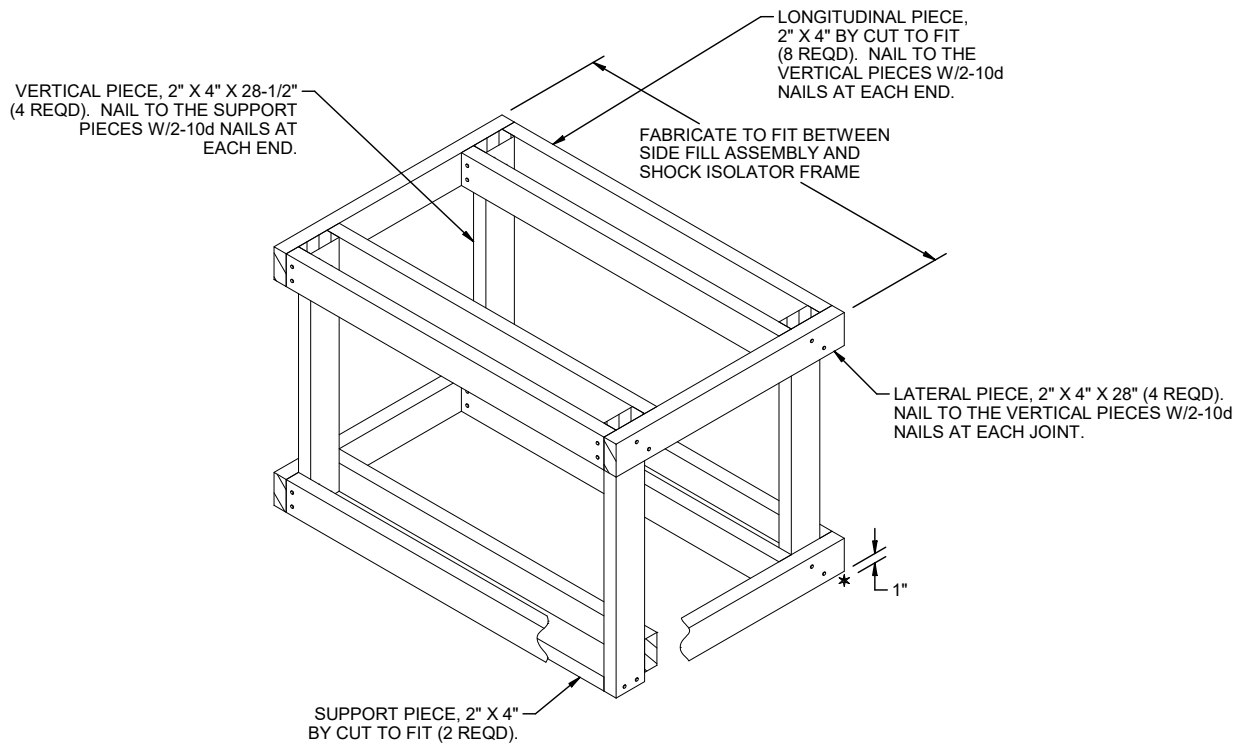
TOP VIEW



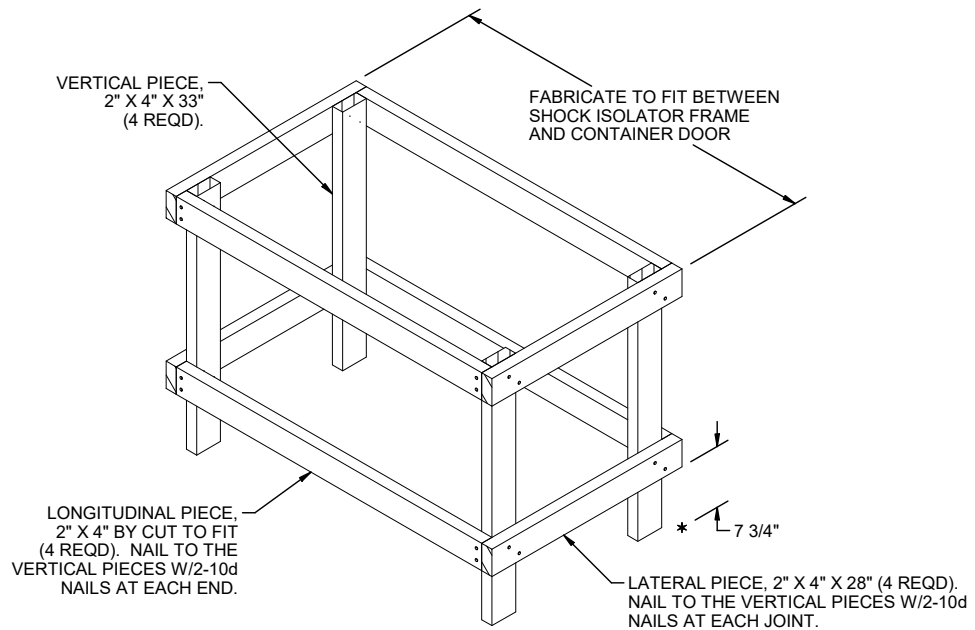
SIDE VIEW

DETAIL

THE TOP AND SIDE VIEWS ABOVE SHOW DETAILS OF
THE BOTTOM SUPPORT PIECE AND THE SPACER PIECE.



FILLER ASSEMBLY A



FILLER ASSEMBLY B

