

APPROVED BY
BUREAU OF EXPLOSIVES

Don Heath

DATE 5/3/04

LOADING AND BRACING* IN SIDE OPENING ISO CONTAINERS OF M231 MACS CHARGES PACKED IN CYLINDRICAL METAL CONTAINERS

PA161 SERIES CONTAINER

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- LOADING AND BRACING SPECIFICATIONS SET FORTH WITHIN THIS DRAWING ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC) RAIL CARRIER SERVICE. THESE SPECIFICATIONS MAY ALSO BE USED FOR LOADS THAT ARE TO BE MOVED BY MOTOR OR WATER CARRIERS.

U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY
FIELD SUPPORT COMMAND

CAUTION: VERIFY PRIOR TO USE AT WWW.DAC.ARMY.MIL THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 8.

DO NOT SCALE

APRIL 2004

Rand Aslett

ENGINEER OR TECHNICIAN	BASIC	LAURA FIEFFER
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APPROVED BY ORDER OF COMMANDING GENERAL,
U.S. ARMY MATERIEL COMMAND

TRANSPORTATION ENGINEERING DIVISION	<i>L. L. Willis</i>
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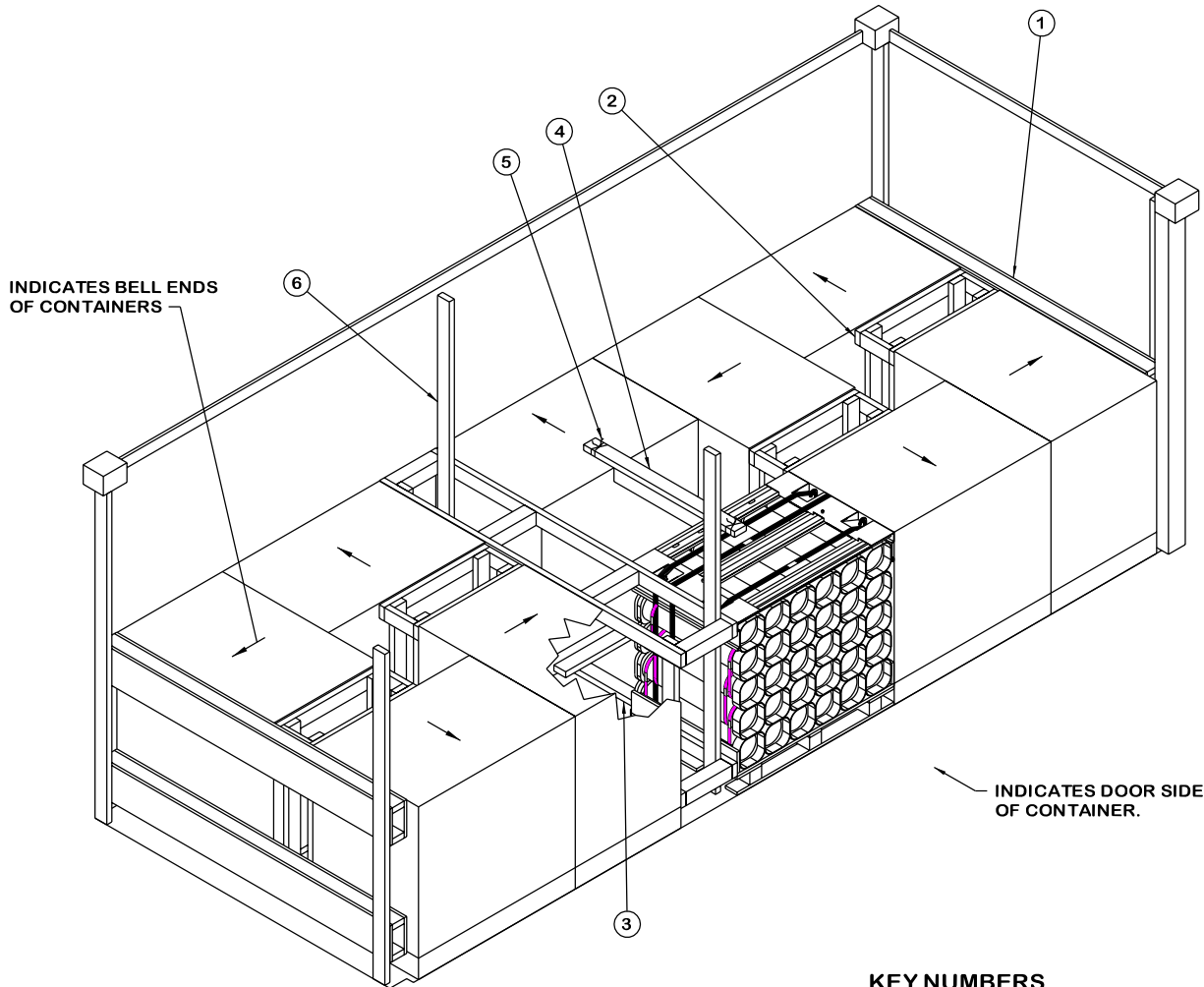
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U.S. ARMY DEFENSE AMMUNITION CENTER

ENGINEERING DIRECTORATE	<i>David B. Lander</i>
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CLASS	DIVISION	DRAWING	FILE
19	48	4334/50	15PM1025



INDICATES BELL ENDS OF CONTAINERS

INDICATES DOOR SIDE OF CONTAINER.

ISOMETRIC VIEW

KEY NUMBERS

- ① END BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 7.
- ② CRIB FILL ASSEMBLY (4 REQD). SEE THE DETAIL ON PAGE 6. INSTALL WITH THE HOLD DOWN PIECES TOWARDS THE 31-3/8" SIDE OF THE PALLET UNITS.
- ③ ANTI-SWAY BRACE (1 REQD). SEE THE DETAIL ON PAGE 5.
- ④ TOP SPACER (1 REQD). SEE THE DETAIL ON PAGE 6.
- ⑤ TIE WIRE, 0.0800" DIA WIRE 24" LONG (2 REQD). INSTALL THE WIRE TO FORM A COMPLETE LOOP AROUND THE TOP SPACER AND ATTACH TO THE UNITIZING STRAPS OF THE LADING UNIT.
- ⑥ CENTER FILL ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 5.

BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	279	186
4" X 4"	12	16
NAILS	NO. REQD	POUNDS
6d (2")	176	1-1/4
10d (3")	259	4
PLYWOOD, 3/4"	45.39 SQ FT REQD	93.62 LBS
WIRE, 0.0800" DIA	4' REQD	NIL

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	10	12,970 LBS
DUNNAGE		500 LBS
CONTAINER		6,050 LBS
TOTAL WEIGHT		19,520 LBS (APPROX)

J. 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.

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:

A. A LOADED CONTAINER MUST BE ON A CHASSIS EQUIPPED WITH TWO BOGIE ASSEMBLIES WHEN BEING MOVED IN TOFC SERVICE.

B. 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.

N. 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.

O. THE QUANTITY OF PALLET UNITS SHOWN IN THE LOAD ON PAGE 2 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE FILLER ASSEMBLY ON PAGE 4 AND THE LOAD ON PAGE 8. IF TWO OR MORE PALLET UNITS ARE TO BE OMITTED, THE STRUTS IN THE CENTER FILL ASSEMBLY CAN BE LENGTHENED RATHER THAN USING TWO OR MORE FILLER ASSEMBLIES.

P. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN PALLET UNITS AND THE SIDE OPENING CONTAINER, IF DESIRED, TO PREVENT CHAFING DAMAGE TO PAINT AND MARKINGS.

Q. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:

1. PREFABRICATE TWO END BLOCKING ASSEMBLIES AND FOUR CRIB FILL ASSEMBLIES. THE REMAINING ASSEMBLIES DEPEND ON MEASUREMENTS FROM THE LOAD FOR CONSTRUCTION.

2. INSTALL ONE END BLOCKING ASSEMBLY.

3. LOAD TWO PALLET UNITS.

4. INSTALL ONE CRIB FILL ASSEMBLY AND WIRE TIE.

5. REPEAT STEPS 3 AND 4.

6. REPEAT STEPS 1 THROUGH 5.

7. INSTALL CENTER TWO PALLET UNITS.

8. INSTALL ANTI-SWAY BRACE, TOP SPACER AND WIRE TIE.

9. INSTALL CENTER FILL ASSEMBLY.

A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).

B. THE OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE TO PALLETIZED LOADS OF M231 MODULAR ARTILLERY CHARGE SYSTEM (MACS) PACKED IN PA161 CONTAINERS. SUBSEQUENT REFERENCE TO PALLET UNIT HEREIN MEANS THE PALLET UNIT WITH MACS ITEMS. SEE PAGE 4 AND AMC DRAWING 19-48-4326/50-20PM1012 FOR DETAILS OF THE PALLET UNITS. CAUTION: REGARDLESS OF THE QUANTITY OF UNITS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE SIDE OPENING ISO CONTAINER MUST NOT BE EXCEEDED.

C. THE LOADS AS SHOWN ARE BASED ON A 6,050 POUND 20' LONG BY 8' WIDE BY 8'-6" HIGH SIDE OPENING ISO CONTAINER WITH INSIDE DIMENSIONS OF 19'-4" LONG BY 89" WIDE BY 88" HIGH AND A MAXIMUM GROSS WEIGHT OF 52,910 POUNDS. THE LOAD IS DESIGNED FOR TRAILER/CONTAINER-ON-FLATCAR (T/COFC) SHIPMENT, HOWEVER, THE LOAD AS DESIGNED CAN ALSO BE MOVED BY MOTOR OR WATER CARRIERS. NOTICE: OTHER CONTAINERS OF THE SAME DESIGN CONFIGURATION CAN ALSO BE USED.

D. WHEN LOADING PALLET UNITS, 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 CRIB FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE TO A LONGITUDINAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE THICKNESS OR LENGTH OF THE DUNNAGE LUMBER USED MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIZE OF THE PALLET UNIT.

E. DUNNAGE LUMBER SPECIFIED IS OF NOMINAL SIZE. FOR EXAMPLE, 1" X 6" MATERIAL IS ACTUALLY 3/4" THICK BY 5-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE.

F. 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.

G. IN SOME CONTAINERS THERE IS A SLOT AT THE CORNERS OF THE ENDWALLS. PIECES OF DUNNAGE MATERIAL MUST BE LAMINATED TO THE BUFFER PIECES ON THE END BLOCKING ASSEMBLIES TO PROVIDE A FLAT SURFACE FOR THE BUFFER PIECES. A PIECE OF 2" X 4", 2" X 3" OR A SPECIAL WIDTH PIECE CUT-TO-FIT CAN BE USED. THIS FILL PIECE WILL BE NAILED WITH ONE APPROPRIATELY SIZED NAIL EVERY 12". NOTE THAT SOME CONTAINERS ARE EQUIPPED WITH "TIE-BARS" IN THE CORNER SLOT, WHICH PRECLUDE THE USE OF A FULL HEIGHT FILL PIECE. WHEN "TIE-BARS" ARE PRESENT, THE FILL PIECE MUST BE INSTALLED IN SEGMENTS DESIGNED TO FIT BETWEEN THE "TIE-BARS" VERTICALLY. THE FILL PIECE(S) IS NOT REQUIRED WHEN THE CORNER PORTIONS OF THE CONTAINER ENDWALLS ARE SMOOTH AND FLAT. DO NOT ALLOW ANY DUNNAGE ASSEMBLY TO CONTACT THE CONTAINER ENDWALLS, ONLY THE CORNER POSTS OF THE CONTAINER SHOULD BE USED FOR LONGITUDINAL BLOCKING.

H. CAUTION: DO NOT NAIL DUNNAGE MATERIAL TO THE CONTAINER WALLS OR FLOOR. ALL NAILING WILL BE WITHIN THE DUNNAGE. PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS THE SIDE DOORS, HAVE NOT BEEN SHOWN IN THE LOAD VIEW FOR CLARITY PURPOSES.

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MATERIAL SPECIFICATIONS

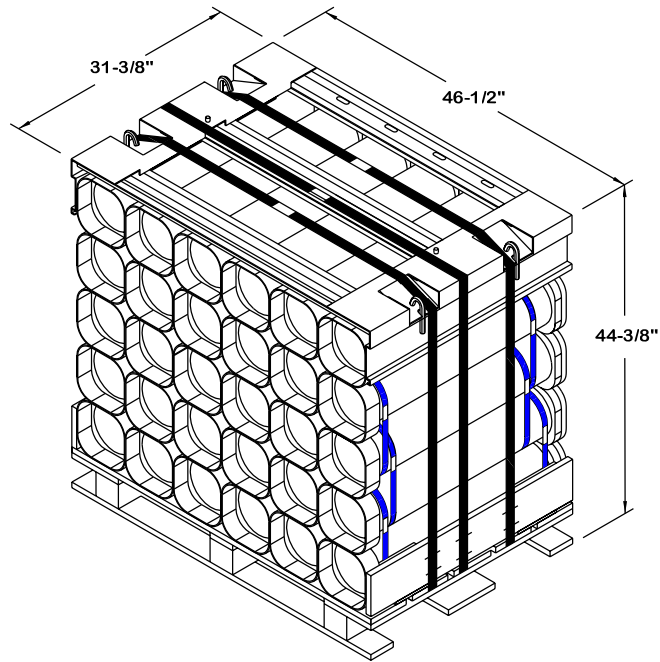
LUMBER - - - - - -: SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.

NAILS - - - - - -: ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMMS).

PLYWOOD - - - - - -: 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.

WIRE, CARBON STEEL -: ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.

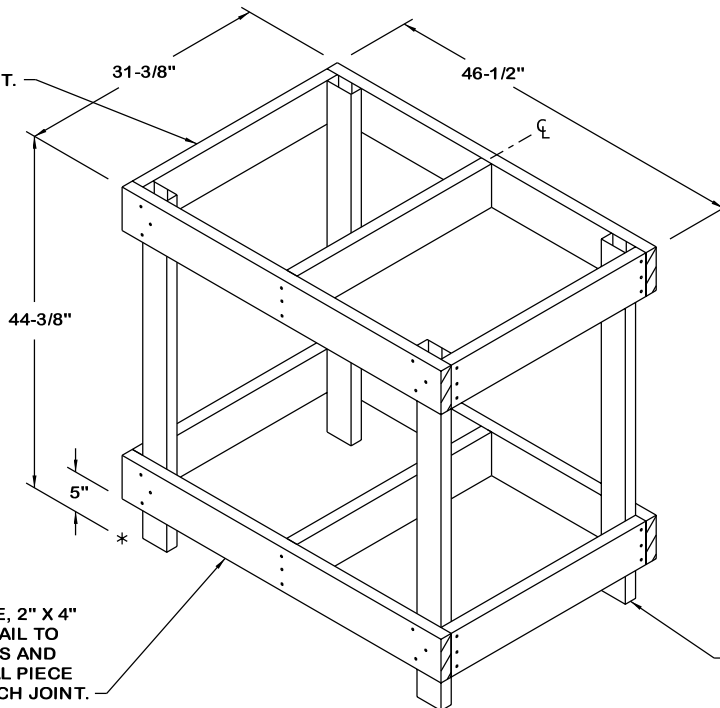
ANTI-CHAFING MATERIAL - - - - - -: MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.



PALLET UNIT DETAIL

GROSS WEIGHT - - - - - 1,297 LBS (APPROX)
 CUBE - - - - - 37.5 CU FT (APPROX)

LATERAL PIECE, 2" X 4"
 X 28-3/8" (6 REQD). NAIL
 TO THE VERTICAL PIECES
 W/3-10d NAILS AT EACH JOINT.



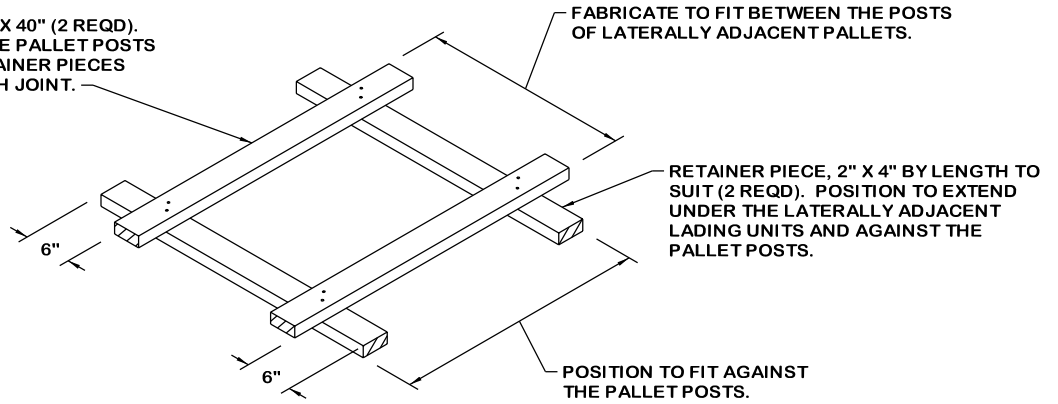
LONGITUDINAL PIECE, 2" X 4"
 X 46-1/2" (4 REQD). NAIL TO
 THE VERTICAL PIECES AND
 THE CENTER LATERAL PIECE.
 W/3-10d NAILS AT EACH JOINT.

VERTICAL PIECE, 2" X
 4" X 44-3/8" (4 REQD).

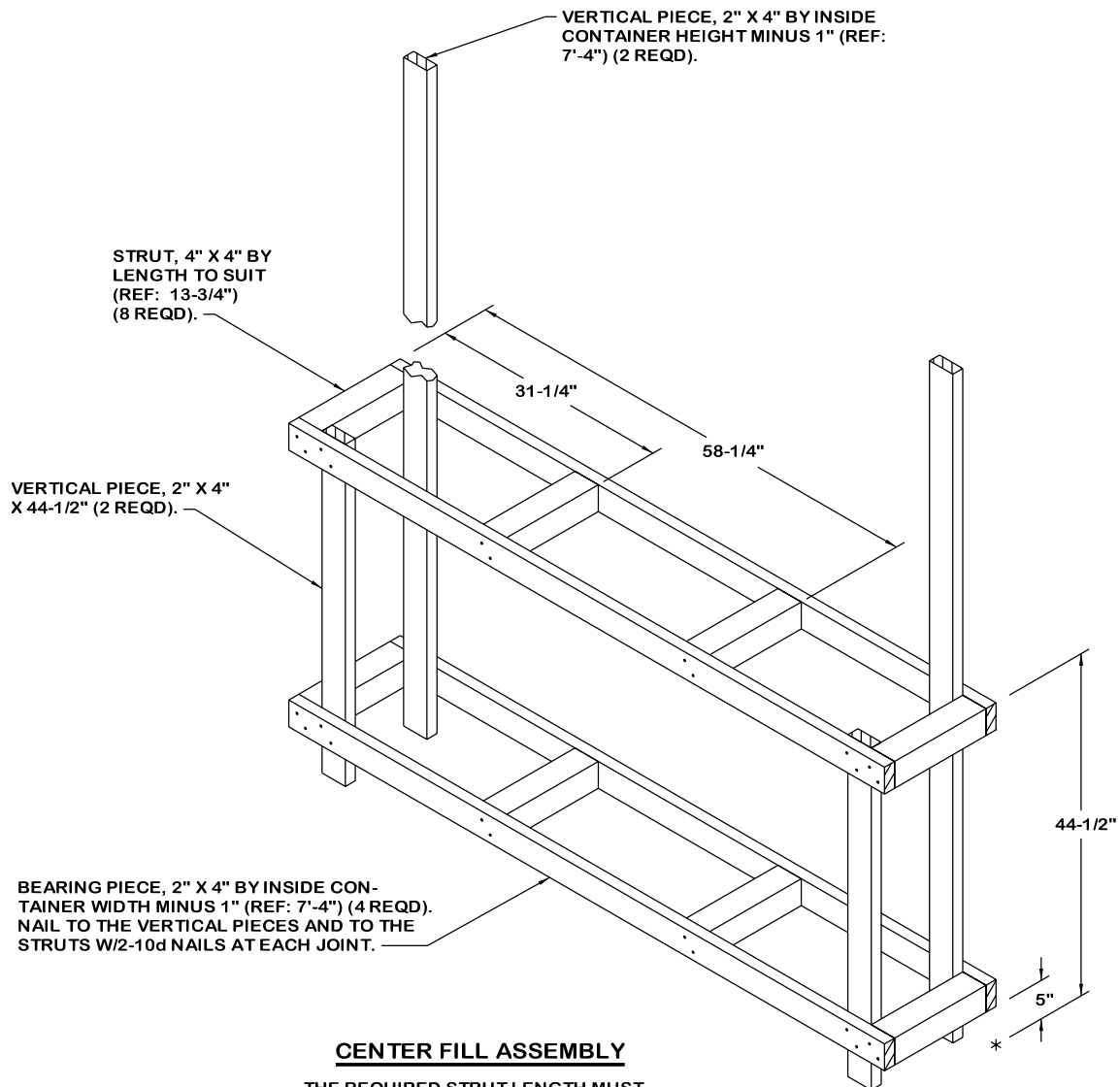
FILLER ASSEMBLY

WIRE TIE ASSEMBLY TO ADJACENT PALLET UNITS IN TWO PLACES.

BUFFER PIECE, 2" X 4" X 40" (2 REQD).
POSITION AGAINST THE PALLET POSTS
AND NAIL TO THE RETAINER PIECES
W/2-10d NAILS AT EACH JOINT.



ANTI-SWAY BRACE

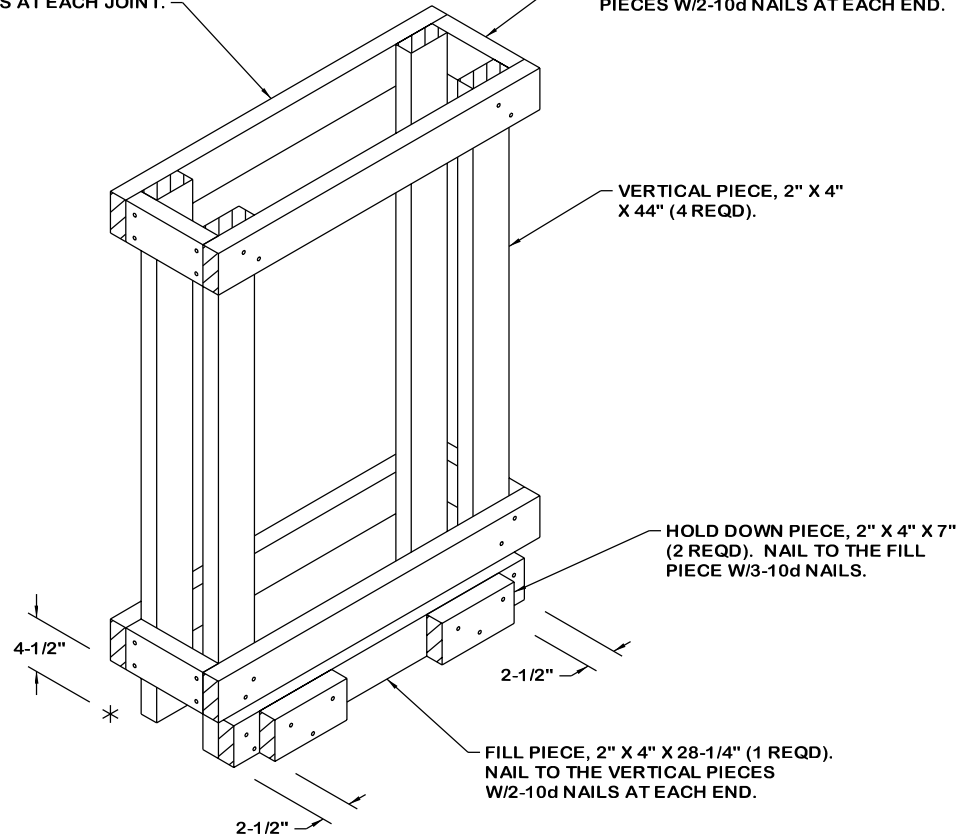


CENTER FILL ASSEMBLY

THE REQUIRED STRUT LENGTH MUST
BE VERIFIED PRIOR TO CONSTRUCTION.

LONGITUDINAL PIECE, 2" X 4" X 31-1/4"
(4 REQD). NAIL TO THE VERTICAL PIECES
W/2-10d NAILS AT EACH JOINT.

LATERAL PIECE, 2" X 4" X 7-1/2"
(4 REQD). NAIL TO THE VERTICAL
PIECES W/2-10d NAILS AT EACH END.

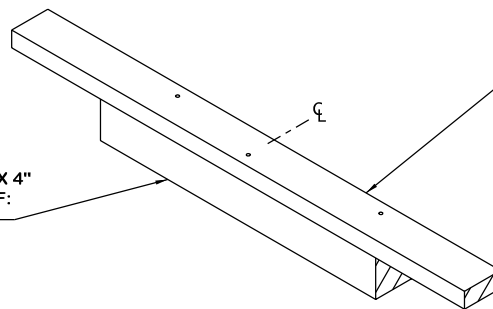


CRIB FILL ASSEMBLY

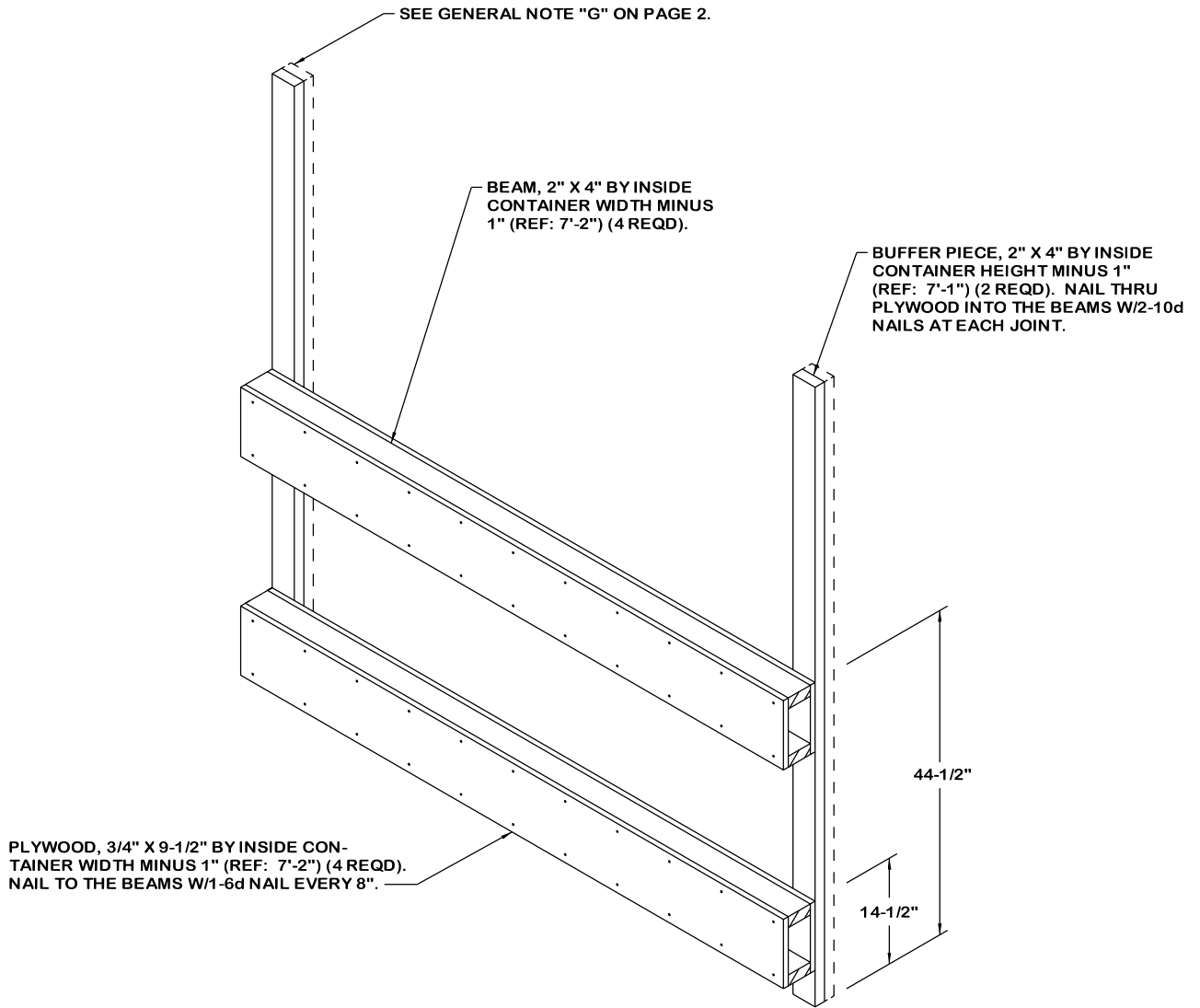
POSITION WITH THE HOLD DOWN PIECES TOWARDS
THE 31-3/8" SIDE OF THE PALLET UNIT.

SPACER PIECE, 4" X 4"
BY CUT-TO-FIT (REF:
26-1/4") (1 REQD).

RETAINER PIECE, 2" X 4" X 44"
(1 REQD). NAIL TO THE SPACER
PIECE W/3-10d NAILS.

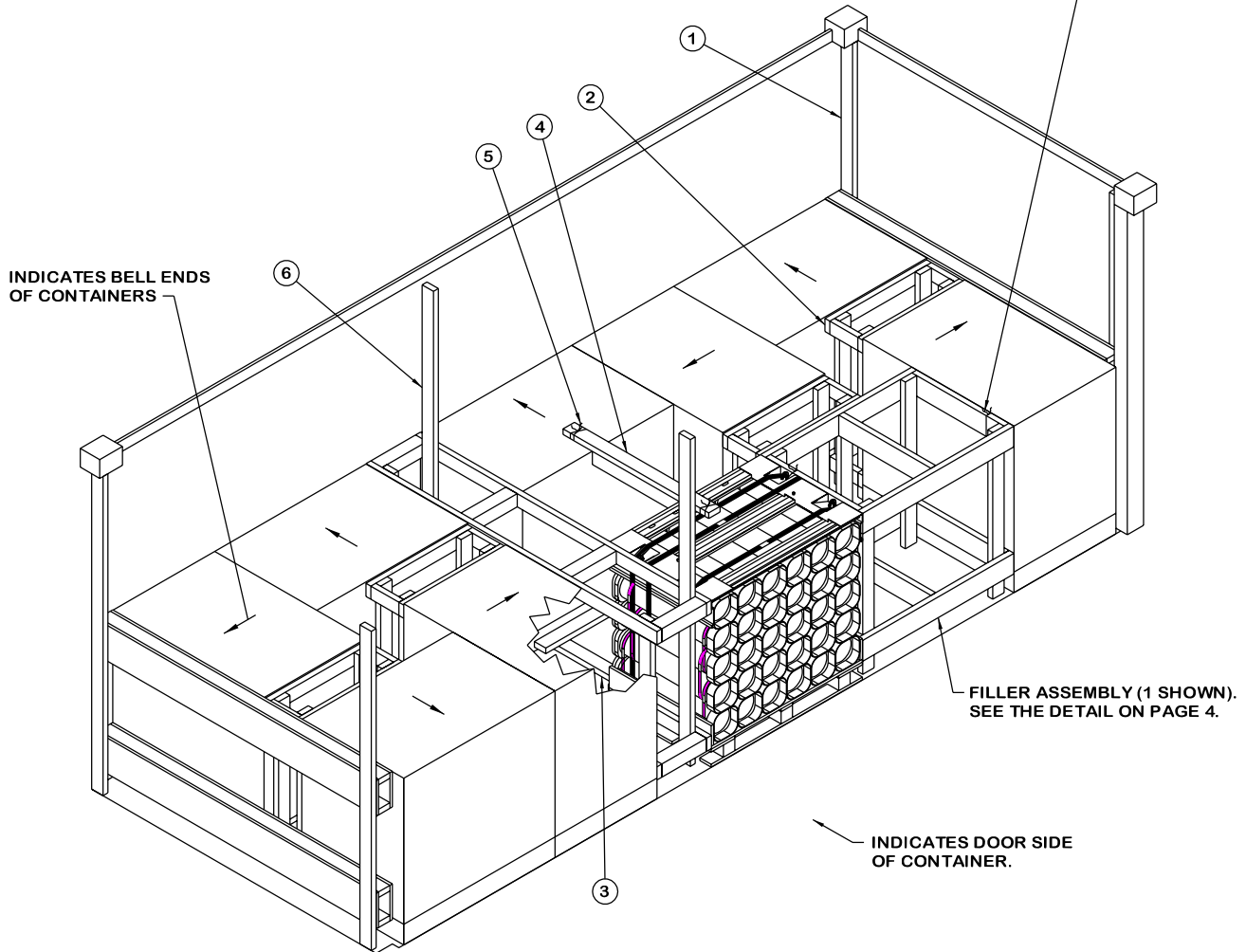


TOP SPACER



END BLOCKING ASSEMBLY

TIE WIRE, 0.0800" DIA 24" LONG (3 REQD PER FILLER ASSEMBLY - 2 SHOWN). INSTALL TO FORM A COMPLETE LOOP AROUND THE FILLER ASSEMBLY AND AN ADJACENT PALLET UNIT. ALSO INSTALL ONE AROUND THE VERTICAL PIECES OF THE FILLER ASSEMBLY AND THE ADJACENT CRIB FILL TO PREVENT LONGITUDINAL MOVEMENT OF THE CRIB FILL ASSEMBLY.



ISOMETRIC VIEW

LESS-THAN-FULL-LOAD PROCEDURES

THE DETAIL ABOVE DEPICTS A BLOCKING METHOD TO BE USED IN A LESS-THAN-FULL CONTAINER LOAD (LESS THAN 10 UNITS). KEY NUMBERS REFER TO KEY NUMBERS ON PAGE 2. SEE GENERAL NOTE "N" ON PAGE 3.