

APPROVED BY  
BUREAU OF EXPLOSIVES

*D m Healy*

DATE 8/6/96

# LOADING AND BRACING<sup>●</sup> IN END OPENING ISO CONTAINERS OF 25MM CARTRIDGES PACKED IN PA125 METAL BOXES, UNITIZED ON A METAL PALLET

- 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. SEE GENERAL NOTE "L" ON PAGE 2.

## U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY INDUSTRIAL OPERATIONS COMMAND

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JULY 1996

U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL

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FILE

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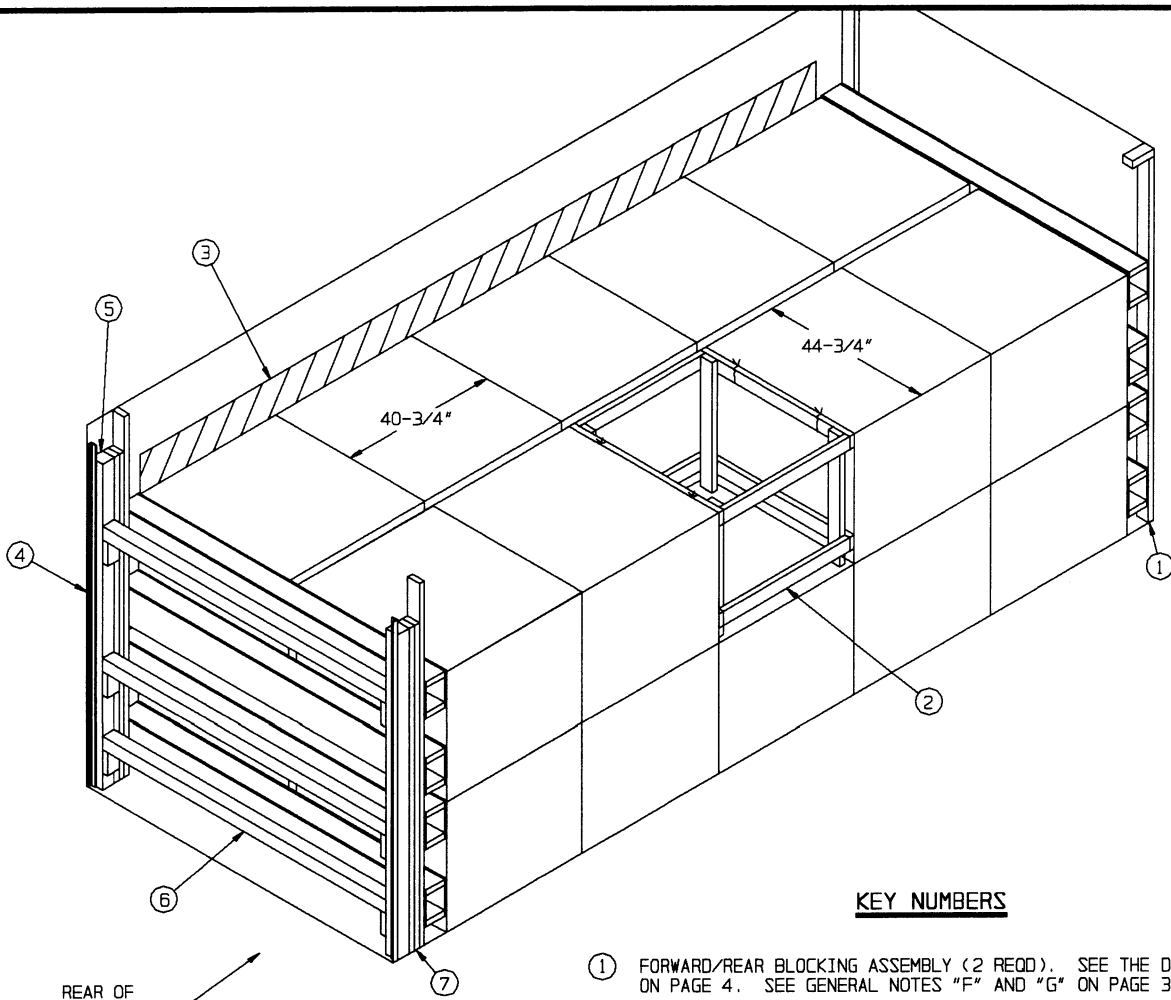
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DO NOT SCALE

PROJECT CA 261/17-88



REAR OF CONTAINER.

**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① FORWARD/REAR BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 4. SEE GENERAL NOTES "F" AND "G" ON PAGE 3.
- ② OMITTED UNIT ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 6. WIRE TIE TO AN ADJACENT PALLET UNIT W/NO. 14 GAGE WIRE.
- ③ ANTI-CHAFING FIBERBOARD (AS REQD). AFFIX (STRAP, TAPE, ETC.) TO THE SIDEWALL OR PALLET UNIT TO ELIMINATE METAL-TO-METAL CONTACT. ANTI-CHAFING IS NOT REQUIRED BETWEEN PALLET UNITS IN EITHER THE LATERAL OR LONGITUDINAL DIRECTIONS. NOTE: PLYWOOD OR HARDBOARD MAY BE USED IN PLACE OF THE FIBERBOARD, AS LONG AS IT IS SECURED TO PREVENT UNQUE MOVEMENT.
- ④ DOOR POST VERTICAL RETAINER (2 REQD). SEE THE "DOOR POST VERTICAL RETAINER" DETAIL AND "VIEW A" ON PAGE 7. NAIL THROUGH THE HOLES INTO THE DOOR POST VERTICAL W/4-10d NAILS.
- ⑤ DOOR POST VERTICAL (2 REQD). SEE THE DETAIL ON PAGE 5 AND DETAILS "A" AND "B" ON PAGE 8.
- ⑥ DOOR SPANNER, 4" X 4" MATERIAL, CUT TO A LENGTH THAT WILL PROVIDE FOR A DRIVE FIT (REF: 7'-1-3/8") (3 REQD). TOENAIL TO THE DOOR POST VERTICAL PIECES W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 5.
- ⑦ FILL MATERIAL, 4" WIDE BY 7'-0" LONG MATERIAL (AS REQD). TOENAIL THE FIRST PIECE TO THE REAR BLOCKING ASSEMBLY W/7 NAILS OF A SUITABLE SIZE (10d NAILS FOR 2" THICK MATERIAL). TOENAIL EACH ADDITIONAL PIECE TO THE PREVIOUS PIECE IN A SIMILAR MANNER. NOTE: MULTIPLE PIECES MAY BE LAMINATED TOGETHER FIRST AND THEN TOENAILED TO THE REAR BLOCKING ASSEMBLY. SEE DETAILS "A" AND "B" ON PAGE 8.

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	19	47,025 LBS
DUNNAGE		750 LBS
CONTAINER		4,700 LBS

TOTAL WEIGHT - - - - - 52,475 LBS (APPROX)

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	107	71
2" X 6"	121	121
4" X 4"	37	49
NAILS	NO. REQD	POUNDS
6d (2")	352	2
10d (3")	156	2-1/2
12d (3-1/4")	12	NIL
PLYWOOD, 3/4"	96 SQ FT REQD	198 LBS
WIRE, NO. 14 GAGE	6' REQD	NIL
ANTI-CHAFING MATERIAL	AS REQD	NIL
DOOR POST VERTICAL RETAINER	2 REQD	64 LBS

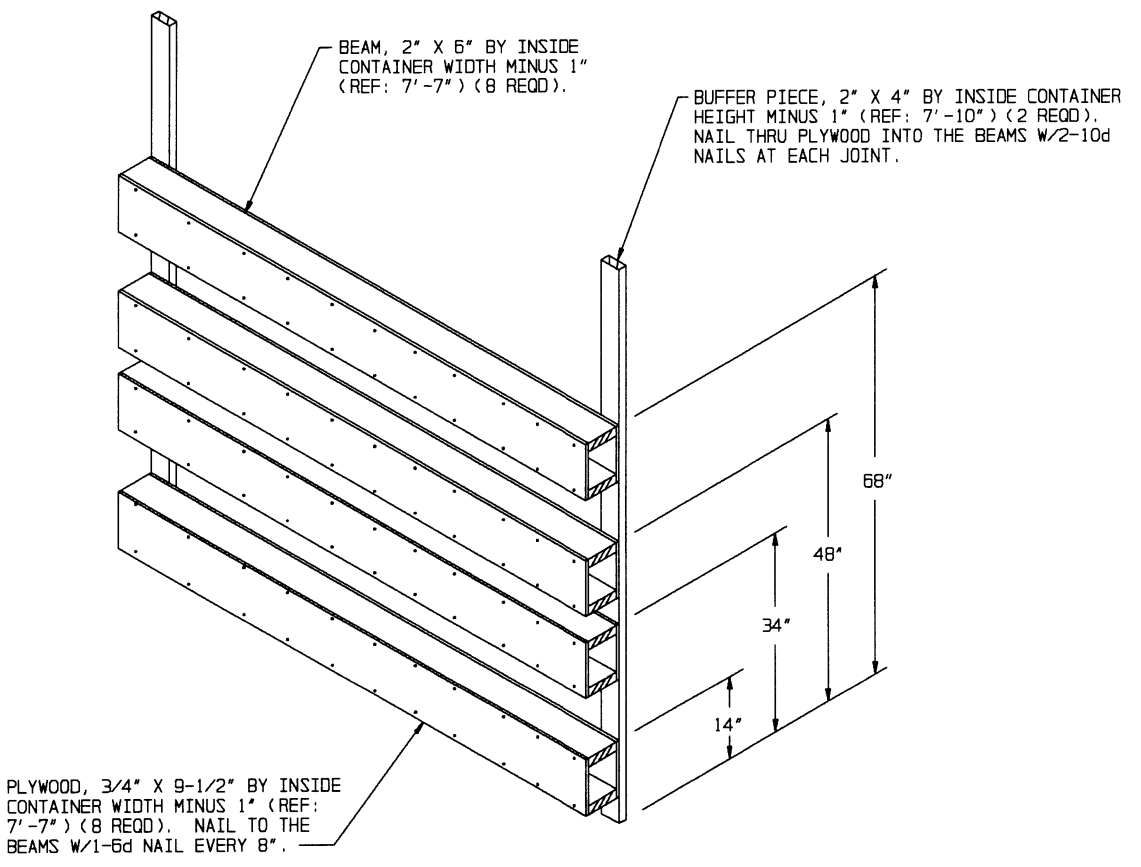
- M. DURING INTRASTATE AND/OR INTERSTATE MOVES BY MOTOR CARRIER, A PROPER CHASSIS OR MODIFIED FLATBED TRAILER MUST BE USED TO PRECLUDE VIOLATION OF ONE OR MORE "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.
- N. CONVERSION TO METRIC EQUIVALENTS: DIMENSIONS WITHIN THIS DOCUMENT ARE EXPRESSED IN INCHES AND WEIGHTS ARE EXPRESSED IN POUNDS. WHEN NECESSARY, THE METRIC EQUIVALENTS MAY BE COMPUTED ON THE BASIS OF ONE INCH EQUALS 25.4 MM AND ONE POUND EQUALS 0.454 KG.
- O. THE QUANTITY OF PALLET UNITS SHOWN IN THE LOAD ON PAGE 2 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE OMITTED-UNIT ASSEMBLY ON PAGE 6.
  - 1. IF A LOAD IS REDUCED BY ONLY A SMALL AMOUNT (ONE OR TWO LADING UNITS), LADING UNITS NORMALLY MAY BE ELIMINATED FROM THE CENTER OF THE LOAD.
  - 2. IF A LOAD IS REDUCED BY A LARGE AMOUNT (MORE THAN TWO LADING UNITS), LADING UNITS SHOULD BE ELIMINATED AS REQUIRED AND THE TOTAL LOAD SHIFTED FORE OR AFT, AS NECESSARY, TO ACHIEVE A SYMMETRICAL WEIGHT DISTRIBUTION. THE DEPICTED PROCEDURES WILL BE FOLLOWED AS CLOSELY AS POSSIBLE, MAKING ONLY THOSE ADJUSTMENTS TO THE DUNNAGE WHICH ARE REQUIRED TO ACCOMMODATE THE NUMBER OF UNITS TO BE SHIPPED.
- P. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:
  - 1. PREFABRICATE TWO FORWARD/REAR BLOCKING ASSEMBLIES, ONE OMITTED UNIT ASSEMBLY, AND TWO DOOR POST VERTICALS.
  - 2. INSTALL THE FORWARD BLOCKING ASSEMBLY.
  - 3. INSTALL ANTI-CHAFING MATERIAL ON THE SIDES OF THE CONTAINER.
  - 4. LOAD ELEVEN PALLET UNITS.
  - 5. INSTALL THE OMITTED UNIT ASSEMBLY AND LOAD EIGHT PALLET UNITS.
  - 6. INSTALL THE REAR BLOCKING ASSEMBLY.
  - 7. INSTALL THE DOOR POST VERTICALS.
  - 8. INSTALL THE DOOR SPANNER PIECES.
  - 9. INSTALL THE FILL MATERIAL AS NEEDED.

**MATERIAL SPECIFICATIONS**

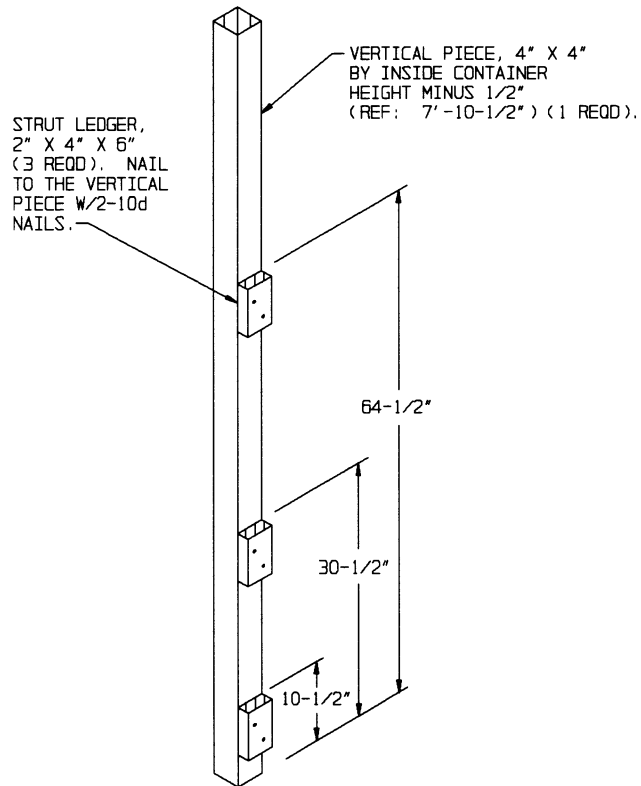
- LUMBER - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND FED SPEC MM-L-751.
- NAILS - - - - - : FED SPEC FF-N-105; COMMON.
- PLYWOOD - - - - - : COMMERCIAL ITEM DESCRIPTION A-A-55057, TYPE A, CONSTRUCTION AND INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.
- STEEL, STRUCTURAL - : ASTM A501, STEEL STRUCTURAL TUBING; AND ASTM A570, STEEL, STRIP, HOT-ROLLED, GRADE 36 (MINIMUM).
- FIBERBOARD - - - - - : FED SPEC PPP-F-320; TYPE SF (SOLID FIBERBOARD), CLASS DOMESTIC, ALL GRADES.
- WIRE, CARBON STEEL - : ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH. .0800" DIA OR BETTER.

- 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 25MM CARTRIDGES PACKED IN PA125 SERIES METAL CONTAINERS. SUBSEQUENT REFERENCE TO PALLET UNIT HEREIN MEANS THE PALLET UNIT WITH AMMUNITION ITEMS. SEE PAGE 6 AND AMC DRAWING 19-48-4232/17-20PM1007 FOR DETAILS OF THE PALLET UNIT. CAUTION: REGARDLESS OF THE QUANTITY OF CONTAINERS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE END OPENING ISO CONTAINER MUST NOT BE EXCEEDED.
- C. THE LOAD AS SHOWN IS BASED ON A 4,700 POUND 20' LONG BY 8' WIDE BY 8'-6" HIGH END OPENING ISO CONTAINER WITH INSIDE DIMENSIONS OF 19'-4" LONG BY 92" WIDE BY 93" HIGH, WITH A MAXIMUM GROSS WEIGHT OF 52,910 POUNDS. OLDER/OTHER CONTAINERS MAY HAVE A TOTAL INSIDE HEIGHT OF 95", BUT A CLEAR HEIGHT UNDER THE ROOF BOWS OF 93". VERIFY INSIDE CONTAINER HEIGHT 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 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".
- E. DUNNAGE LUMBER SPECIFIED IS OF NOMINAL SIZE. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-1/2" THICK BY 3-1/2" 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 FORWARD WALL. PIECES OF DUNNAGE MATERIAL MUST BE LAMINATED TO THE BUFFER PIECES ON THE FORWARD BLOCKING ASSEMBLY 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 FORWARD WALL ARE SMOOTH AND FLAT. DO NOT ALLOW ANY DUNNAGE ASSEMBLY TO CONTACT THE CONTAINER FORWARD WALL, ONLY THE CORNER POSTS OF THE CONTAINER SHOULD BE USED FOR FORWARD LONGITUDINAL BLOCKING.
- H. 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.
- J. CAUTION: DO NOT NAIL DUNNAGE MATERIAL TO THE CONTAINER WALLS OR FLOOR. ALL NAILING WILL BE WITHIN THE DUNNAGE.
- K. PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS THE SIDEWALL, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- L. REQUIREMENTS CITED WITHIN THE BUREAU OF EXPLOSIVES PAMPHLET 6C 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.

(CONTINUED AT LEFT)

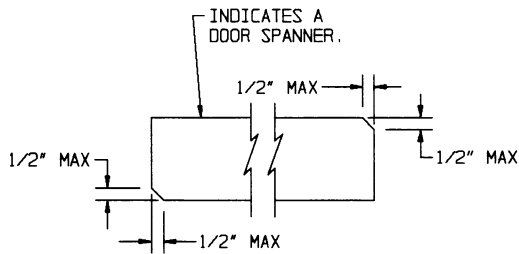


FORWARD/REAR BLOCKING ASSEMBLY



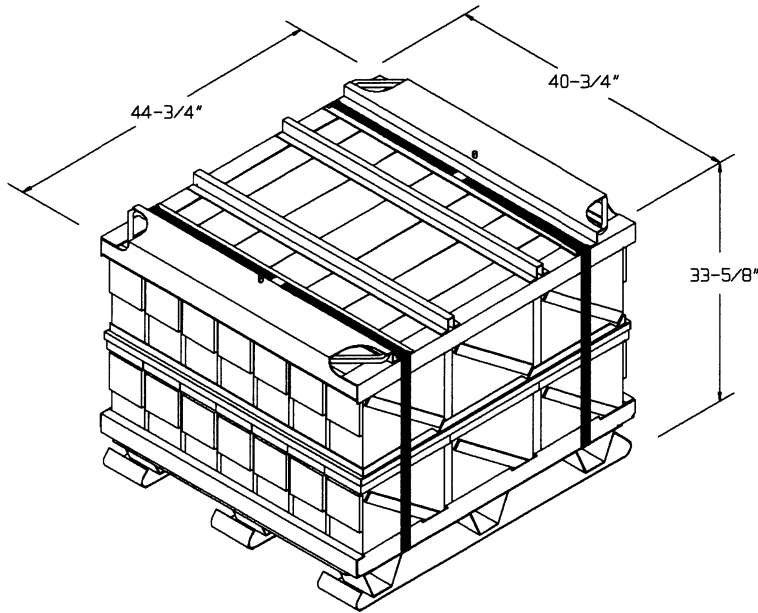
**DOOR POST VERTICAL**

IF THE ISO CONTAINER TO BE LOADED IS NOT EQUIPPED WITH PRE-WELDED LOAD RETAINERS, THE DOOR POST VERTICAL MUST BE NAILED TO THE DOOR POST VERTICAL RETAINER. NAIL THROUGH THE HOLES IN THE DOOR POST VERTICAL RETAINER INTO THE DOOR POST VERTICAL W/4-10d NAILS.



**BEVEL-CUT**

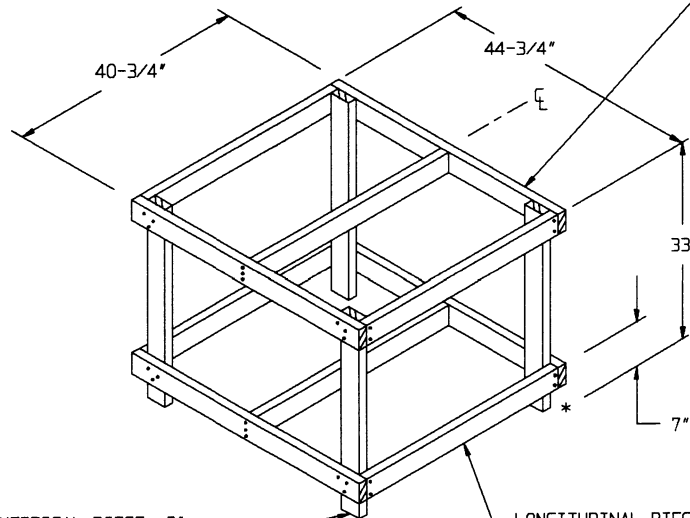
IF DESIRED, EACH END OF A DOOR SPANNER PIECE MAY BE BEVEL-CUT AS SHOWN ABOVE TO FACILITATE THE ACHIEVEMENT OF A TIGHT DOOR-POST-TO-DOOR-POST FIT.



**PALLET UNIT**

UNIT WEIGHT - - - 2,475 LBS (APPROX)  
 CUBE - - - - - 35.5 CU FT (APPROX)

LATERAL PIECE, 2" X 4" X 44-3/4"  
 (4 REQD). NAIL TO THE VERTICAL  
 PIECES AND TO THE CENTER LONGITUDINAL  
 PIECE W/3-10d NAILS AT EACH JOINT.



VERTICAL PIECE, 2"  
 X 4" X 33" (4 REQD).

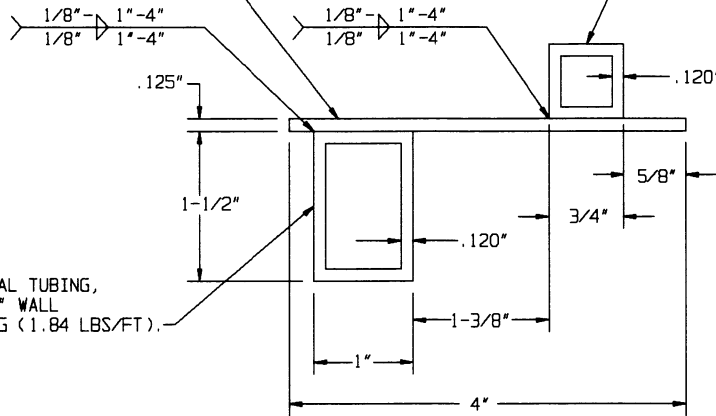
LONGITUDINAL PIECE, 2" X 4"  
 X 37-3/4" (6 REQD). NAIL THE  
 OUTER FOUR PIECES TO THE VERTICAL  
 PIECES W/2-10d NAILS AT  
 EACH END.

**OMITTED-UNIT ASSEMBLY**

THE ASSEMBLY DEPICTED ABOVE IS FOR USE IN PLACE OF AN  
 OMITTED PALLET UNIT. OMITTED-UNIT ASSEMBLIES MUST BE WIRE  
 TIED TO AN ADJACENT PALLET UNIT TO PREVENT UNDUE MOVEMENT.  
 NO MORE THAN FOUR OMITTED-UNIT ASSEMBLIES MAY BE USED IN THE  
 LOAD DEPICTED ON PAGE 2. DO NOT INSTALL AN OMITTED-UNIT  
 ASSEMBLY IMMEDIATELY ADJACENT TO ANOTHER OMITTED-UNIT ASSEMBLY.

STEEL STRIP, 1/8" THICK BY 4" WIDE  
BY 83" LONG (1.70 LBS/FT).

SQUARE STRUCTURAL TUBING, 3/4" SQUARE  
BY .120" WALL THICKNESS BY 83" LONG  
(1.03 LBS/FT).



RECTANGULAR STRUCTURAL TUBING,  
1-1/2" BY 1" BY .120" WALL  
THICKNESS BY 83" LONG (1.84 LBS/FT).

**VIEW A**

VIEW A  
SQUARE STRUCTURAL TUBING,  
3/4" SQUARE BY .120" WALL  
THICKNESS BY 83" LONG  
(1.03 LBS/FT).



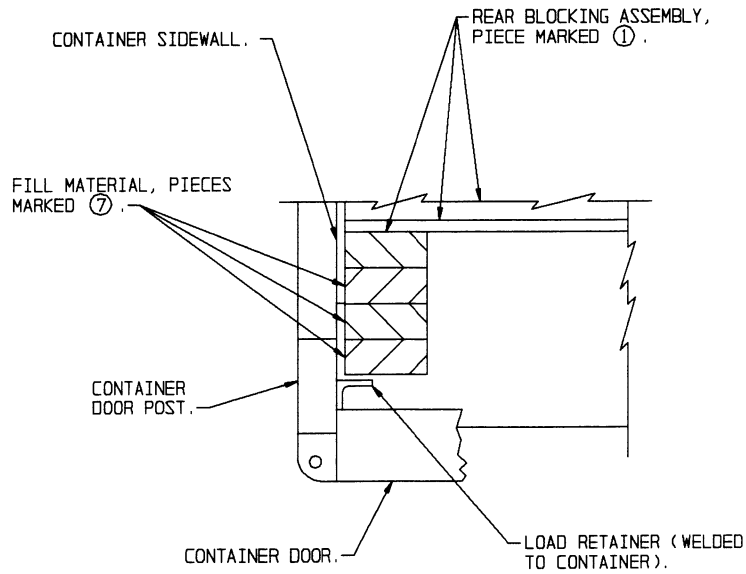
RECTANGULAR STRUCTURAL TUBING,  
1-1/2" BY 1" BY .120" WALL  
THICKNESS  
BY 83" LONG (1.84 LBS/FT).

DRILL 5/32", 4 HOLES.

STEEL STRIP, 1/8" THICK BY 4" WIDE  
BY 83" LONG (1.70 LBS/FT).

**DOOR POST VERTICAL RETAINER**

(TO DEPICT THE LOCATION OF THE NAILING HOLES, THE ABOVE ASSEMBLY HAS BEEN  
ROTATED 90° FROM THE ORIENTATION IN WHICH IT IS INSTALLED.)

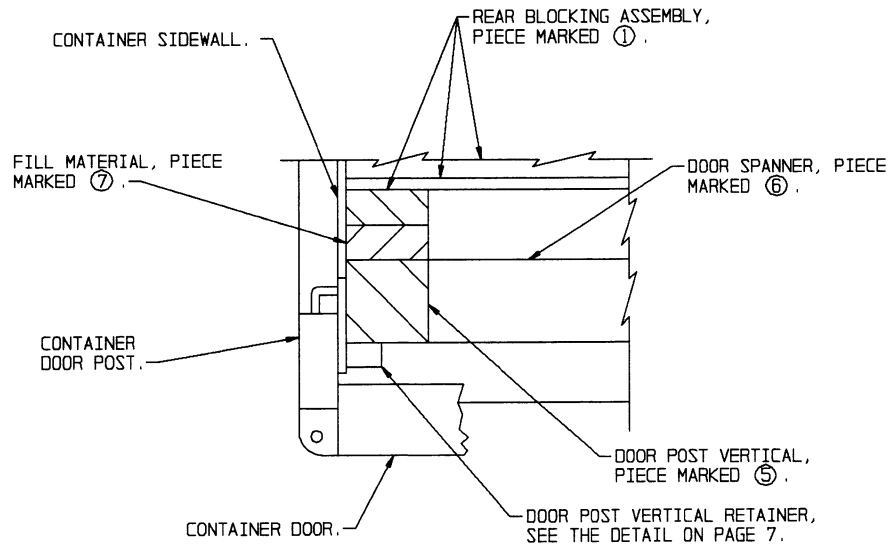


**DETAIL A**

A PARTIAL PLAN VIEW OF THE LEFT REAR PORTION OF THE CONTAINER IS SHOWN DEPICTING THE PROPER POSITION OF THE FILL MATERIAL AND ADJACENT DUNNAGE PIECES.

**SPECIAL NOTE:**

WHEN ISO CONTAINERS ARE NOT EQUIPPED WITH PRE-WELDED LOAD RETAINERS, AS DEPICTED IN "DETAIL A" ABOVE, DOOR POST VERTICALS, DOOR POST VERTICAL RETAINERS AND DOOR SPANNERS WILL BE REQUIRED FOR THE LOAD DEPICTED ON PAGE 2. SEE VARIOUS LOADS WITHIN AMC DRAWING 19-48-4153-15PA1002 FOR EXAMPLES. SEE PAGE 7 FOR DETAILS OF THE METAL DOOR POST VERTICAL RETAINER.



**DETAIL B**

A PARTIAL PLAN VIEW OF THE LEFT REAR PORTION OF THE CONTAINER IS SHOWN DEPICTING THE PROPER POSITION OF THE DOOR POST VERTICAL RETAINER AND ADJACENT DUNNAGE PIECES.