

APPROVED BY  
BUREAU OF EXPLOSIVES

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# LOADING AND BRACING WITH WOODEN DUNNAGE IN END OPENING ISO CONTAINERS OF CBU-87/B AND CBU-89/B CLUSTER BOMBS PACKED IN CNU-411/E SHIPPING AND STORAGE CONTAINERS

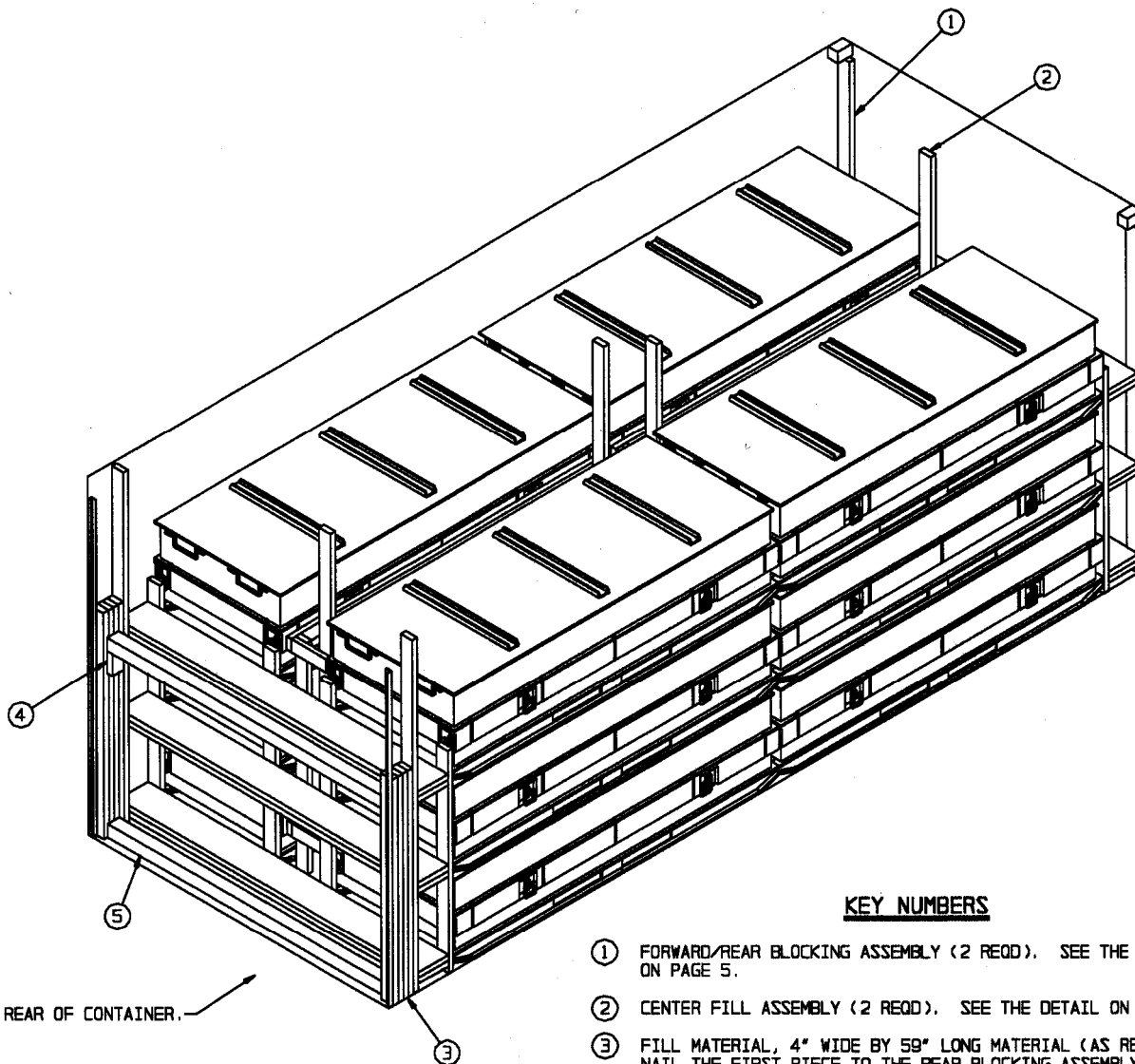
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- LOADING AND BRACING SPECIFICATIONS SET FORTH WITHIN THIS DRAWING ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC) RAIL CARRIER SERVICE. THESE SPECIFICATIONS MAY ALSO BE USED FOR LOADS THAT ARE TO BE MOVED BY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

U.S. ARMY MATERIEL COMMAND DRAWING			
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APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND  <i>John L. Byrd Jr.</i>	MAY 1994		
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DO NOT SCALE



**ISOMETRIC VIEW**

REAR OF CONTAINER.

**KEY NUMBERS**

- ① FORWARD/REAR BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5.
- ② CENTER FILL ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5.
- ③ FILL MATERIAL, 4" WIDE BY 59" LONG MATERIAL (AS REQD). NAIL THE FIRST PIECE TO THE REAR BLOCKING ASSEMBLY W/5 NAILS OF A SUITABLE SIZE (10d FOR 2" THICK MATERIAL). NAIL 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 THE "SOLID FILL DETAIL A" AND THE "SOLID FILL DETAIL B" ON PAGE 7.
- ④ DOOR SPANNER LEDGER, 2" X 4" X 6" (2 REQD). LOCATE SUCH THAT THE TOP OF THE TOP DOOR SPANNER WILL BE FLUSH WITH THE TOP OF THE TOP BEAM ASSEMBLY IN PIECE MARKED ①. NAIL TO THE FILL MATERIAL W/2-10d NAILS.
- ⑤ DOOR SPANNER, 4" X 4" MATERIAL, CUT TO A LENGTH THAT WILL PROVIDE FOR A DRIVE FIT (REF: 7'-1-3/8") (2 REQD). TOENAIL TO THE FILL MATERIAL W/2-12d NAILS AT EACH END. SEE GENERAL NOTE "P" ON PAGE 3 AND THE "BEVEL-CUT" DETAIL ON PAGE 4.

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
CBU-87/B	12	28,440 LBS
DUNNAGE		709 LBS
CONTAINER		4,700 LBS
<b>TOTAL WEIGHT</b>		<b>33,849 LBS (APPROX)</b>

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
CBU-88/B	12	23,160 LBS
DUNNAGE		709 LBS
CONTAINER		4,700 LBS
<b>TOTAL WEIGHT</b>		<b>28,569 LBS (APPROX)</b>

**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	269	180
2" X 10"	91	152
4" X 4"	15	20
NAILS	NO. REQD	POUNDS
10d (3")	278	4-1/2
12d (3-1/4")	8	1/4

(GENERAL NOTES CONTINUED)

GENERAL NOTES

K. 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.

L. 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.

M. 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.

N. THE QUANTITY OF CONTAINERS SHOWN IN THE LOAD ON PAGE 2 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE "LESS-THAN-FULL-LOAD" DETAIL ON PAGE 8. WHEN AN END OPENING CONTAINER IS TO BE 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. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN CNU CONTAINERS AND THE END OPENING CONTAINER, AND BETWEEN CNU CONTAINERS AND STEEL STRAPPING, IF DESIRED, TO PREVENT CHAFING DAMAGE TO CONTAINER PAINT AND MARKINGS.

P. DOOR SPANNERS AND DOOR SPANNER LEDGERS ARE NOT REQUIRED AND MAY BE OMITTED IF LESS THAN 6" OF FILL MATERIAL, PIECE MARKED ③ ON PAGE 2, IS REQUIRED ON BOTH SIDES OF THE REAR OF THE LOAD.

Q. MAXIMUM LOAD WEIGHT CRITERIA:

THE MAXIMUM LOAD WEIGHTS ARE CONTROLLED BY EQUIPMENT CAPABILITY FACTORS. ALTHOUGH THE HEAVIEST MAXIMUM LOAD IS DELINEATED IN THE LOAD VIEW, PROVISIONS ARE INCLUDED WITHIN THIS DRAWING SO THAT THE BASIC LOAD 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.

R. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:

- 1. PREFABRICATE TWO FORWARD/REAR BLOCKING ASSEMBLIES, AND TWO CENTER FILL ASSEMBLIES.
- 2. INSTALL THE FORWARD BLOCKING ASSEMBLY.
- 3. LOAD SIX CNU-411/E CONTAINERS.
- 4. INSTALL ONE CENTER FILL ASSEMBLY.
- 5. REPEAT STEPS 3 AND 4.
- 6. INSTALL THE REAR BLOCKING ASSEMBLY.
- 8. INSTALL THE SOLID FILL MATERIAL.
- 9. INSTALL THE DOOR SPANNER LEDGERS AND DOOR SPANNERS, IF REQUIRED.

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 HEREIN ARE APPLICABLE TO LOADS OF CBU-87/B OR CBU-89/B CLUSTER BOMBS PACKED IN CNU-411/E CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH CBU ITEMS INSTALLED. SEE PAGE 4 FOR DETAILS OF THE CONTAINER. CAUTION: REGARDLESS OF THE QUANTITY OF UNITS 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 95" HIGH (93" CLEAR HEIGHT) 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 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 BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE LONGITUDINAL PIECES ON THE CENTER FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE TO THE LONGITUDINAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE LENGTH OF THE LATERAL PIECES IN THE CENTER FILL ASSEMBLY MAY BE ADJUSTED, AS NECESSARY, TO FACILITATE VARIANCE IN THE CONTAINER SIZE.

E. 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.

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". THIS PIECE IS NOT REQUIRED WHEN THE CORNER PORTIONS OF THE CONTAINER FORWARD WALL ARE SMOOTH AND FLAT.

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.

(CONTINUED AT LEFT)

MATERIAL SPECIFICATIONS

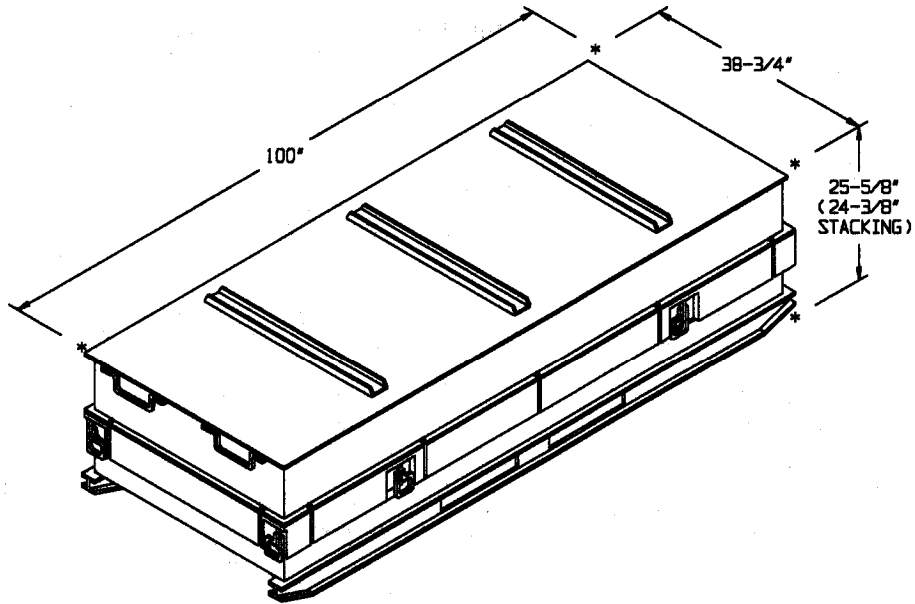
LUMBER - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND FED SPEC MM-L-751.

NAILS - - - - - : FED SPEC FF-N-105; COMMON.

STRAPPING, STEEL - - : ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.

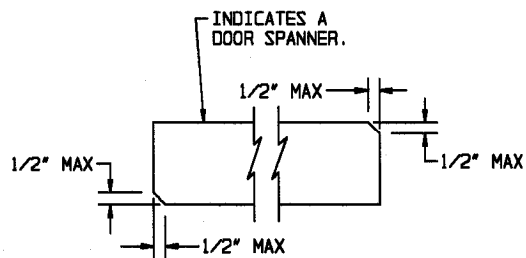
SEAL, STRAP - - - - : ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.

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



**CNU-411/E CONTAINER**

GROSS WEIGHT (CBU-87/B) ----- 2,370 LBS (APPROX)  
 GROSS WEIGHT (CBU-89/B) ----- 1,930 LBS (APPROX)  
 CUBE ----- 57.5 CUBIC FEET (APPROX)



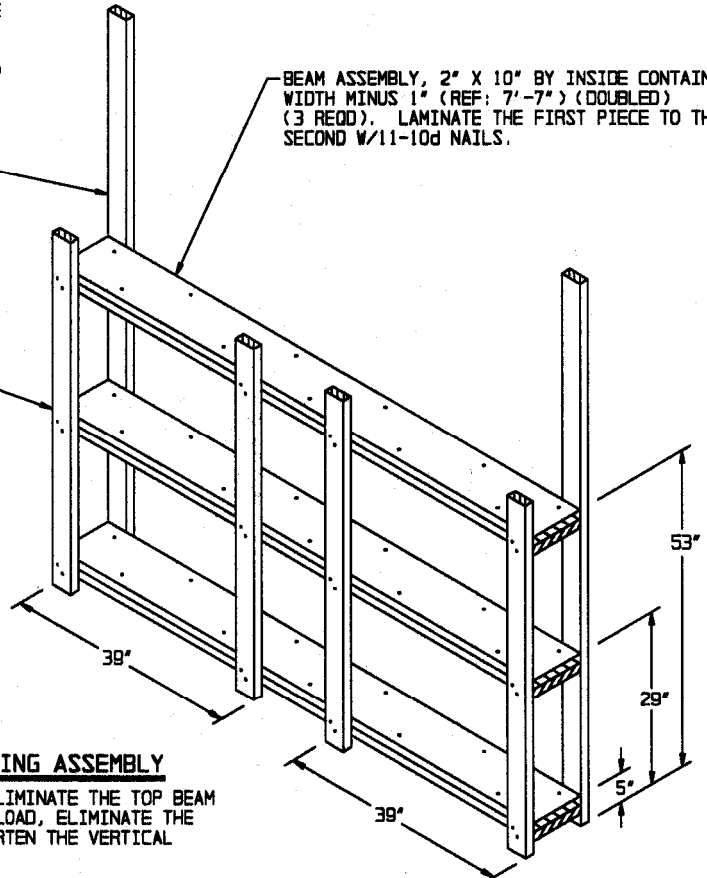
**BEVEL-CUT**

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.

BUFFER PIECE, 2" X 4" BY INSIDE CONTAINER HEIGHT MINUS 1" (REF: 7'-7" AT THE FRONT OF THE LOAD, 7'-10" AT THE REAR OF THE LOAD) (2 REQD). NAIL TO THE BEAM ASSEMBLIES W/2-10d NAILS AT EACH JOINT.

BEAM ASSEMBLY, 2" X 10" BY INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-7") (DOUBLED) (3 REQD). LAMINATE THE FIRST PIECE TO THE SECOND W/11-10d NAILS.

VERTICAL PIECE, 2" X 4" X 59" (4 REQD). NAIL TO THE BEAM ASSEMBLIES W/2-10d NAILS AT EACH JOINT.



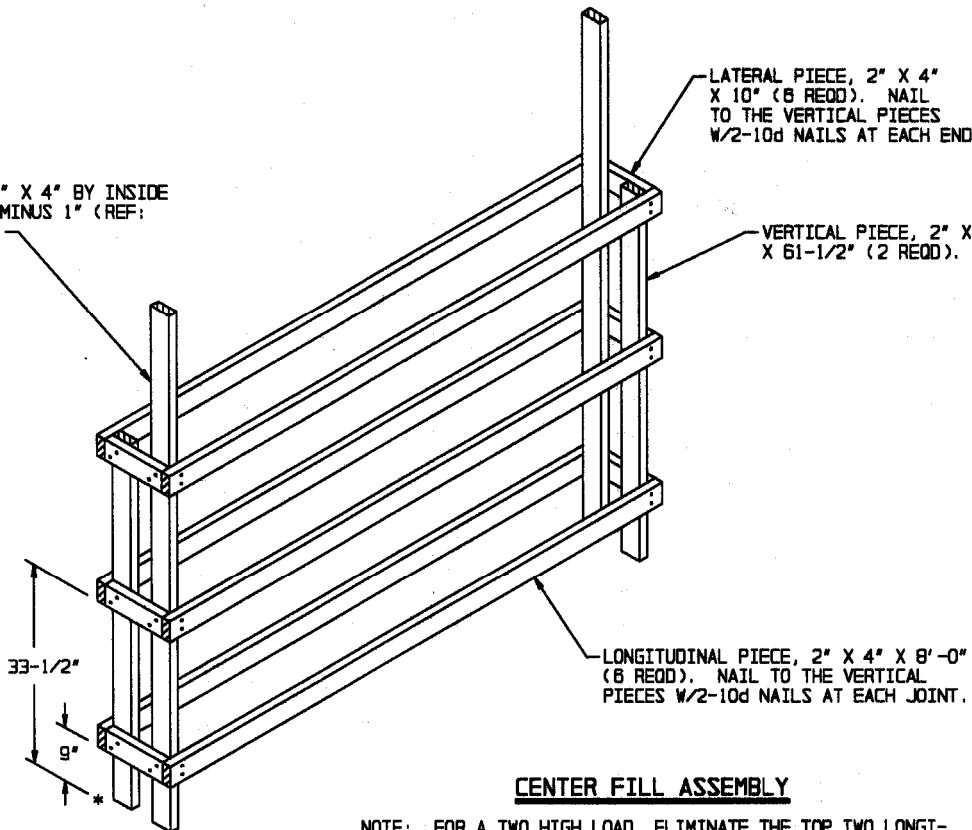
**FORWARD/REAR BLOCKING ASSEMBLY**

NOTE: FOR A TWO HIGH LOAD, ELIMINATE THE TOP BEAM ASSEMBLY, AND FOR A ONE HIGH LOAD, ELIMINATE THE TOP TWO BEAM ASSEMBLIES. SHORTEN THE VERTICAL PIECES APPROPRIATELY.

VERTICAL PIECE, 2" X 4" BY INSIDE CONTAINER HEIGHT MINUS 1" (REF: 7'-10") (2 REQD).

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

VERTICAL PIECE, 2" X 4" X 61-1/2" (2 REQD).



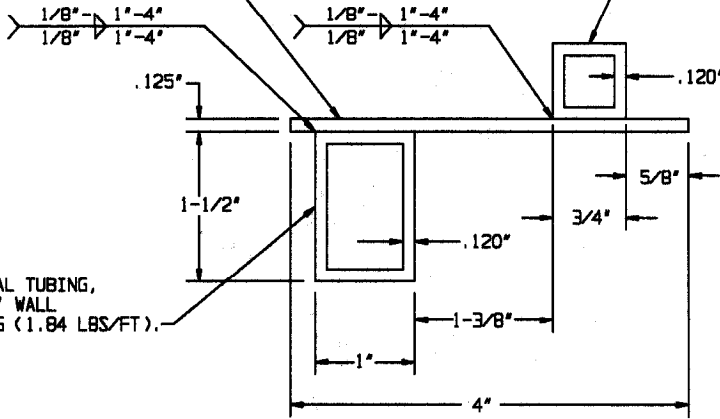
LONGITUDINAL PIECE, 2" X 4" X 8'-0" (8 REQD). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH JOINT.

**CENTER FILL ASSEMBLY**

NOTE: FOR A TWO HIGH LOAD, ELIMINATE THE TOP TWO LONGITUDINAL PIECES AND THE TOP TWO LATERAL PIECES, AND FOR A ONE HIGH LOAD, ELIMINATE THE TOP FOUR LONGITUDINAL PIECES AND THE TOP FOUR LATERAL PIECES. SHORTEN THE 61-1/2" VERTICAL PIECES APPROPRIATELY. THE LENGTH OF THE LATERAL PIECES IS DEPENDENT ON THE VOID AT THE CENTER OF THE LOAD.

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

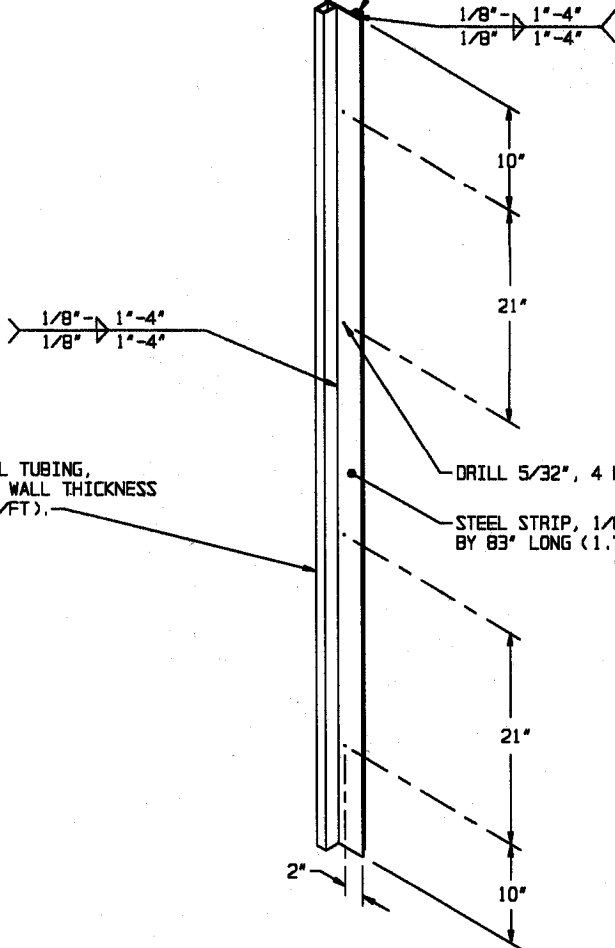
SQUARE STRUCTURAL TUBING, 3/4" SQUARE  
BY .120" WALL THICKNESS BY 83" LONG  
(1.03 LBS/FT).



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).



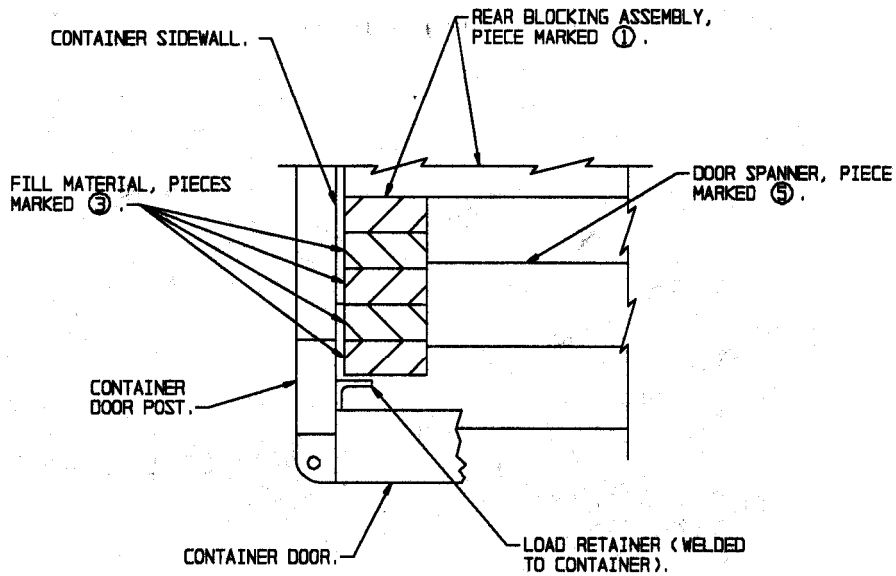
RECTANGULAR STRUCTURAL TUBING,  
1-1/2" BY 1" BY .120" WALL THICKNESS  
BY 83" LONG (1.84 LBS/FT).

DRILL 5/32", 4 HOLES.

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

**DOOR POST VERTICAL RETAINER**

NOTE: THE ABOVE ASSEMBLY HAS BEEN SHOWN ROTATED 90° FROM THE ORIENTATION IN WHICH IT IS INSTALLED IN THE LEFT REAR CORNER OF THE CONTAINER. THE ASSEMBLY HAS BEEN ROTATED FOR HOLE LOCATION CLARITY.

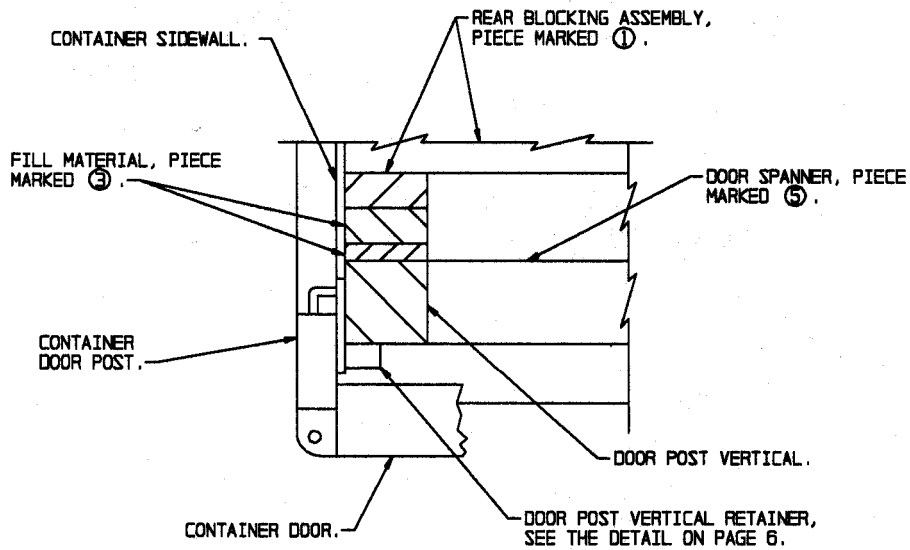


**DETAIL A**

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:**

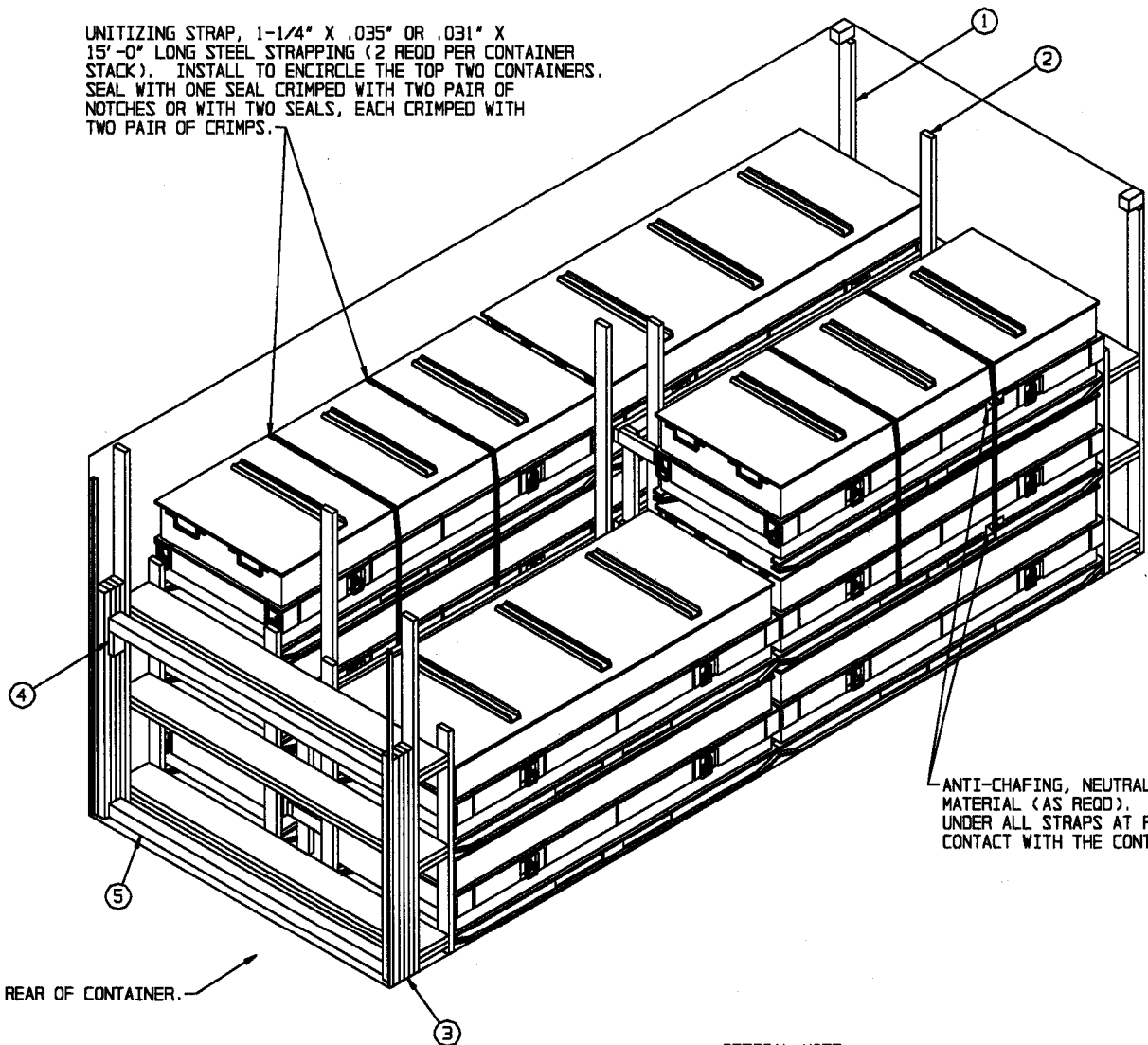
WHEN ISO CONTAINERS ARE NOT EQUIPPED WITH PRE-WELDED LOAD RETAINERS, AS DEPICTED IN "DETAIL A" ABOVE, DOOR POST VERTICALS AND DOOR POST VERTICAL RETAINERS WILL BE REQUIRED FOR THE LOAD DEPICTED ON PAGE 2. SEE VARIOUS LOADS WITHIN AMC DRAWING 19-48-4153-15PA1002 FOR EXAMPLES. SEE PAGE 6 FOR DETAILS OF 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.

UNITIZING STRAP, 1-1/4" X .035" OR .031" X 15'-0" LONG STEEL STRAPPING (2 REQD PER CONTAINER STACK). INSTALL TO ENCIRCLE THE TOP TWO CONTAINERS. SEAL WITH ONE SEAL CRIMPED WITH TWO PAIR OF NOTCHES OR WITH TWO SEALS, EACH CRIMPED WITH TWO PAIR OF CRIMPS.



ANTI-CHAFING, NEUTRAL BARRIER MATERIAL (AS REQD). POSITION UNDER ALL STRAPS AT POINTS OF CONTACT WITH THE CONTAINERS.

REAR OF CONTAINER.

ISOMETRIC VIEW

SPECIAL NOTE:

WHEN REDUCING A LOAD BY ONE OR MORE CONTAINERS, IT WILL BE NECESSARY TO UNITIZE THE CONTAINER STACKS WHICH ARE Laterally and longitudinally adjacent to the omitted container as depicted in the load view above. See GENERAL NOTE "N" ON PAGE 3.

LESS-THAN-FULL-LOAD PROCEDURE

KEY NUMBERS REFER TO KEY NUMBERS ON PAGE 2. NOTE THAT CENTER FILL ASSEMBLY HAS BEEN MODIFIED AS DESCRIBED ON PAGE 5.