DATE 9/2/2 001

# LOADING AND BRACING WITH WOODEN DUNNAGE IN END OPENING ISO CONTAINERS OF JSOW (AGM-154) MISSILES PACKED IN CNU-575/E SHIPPING AND STORAGE CONTAINERS

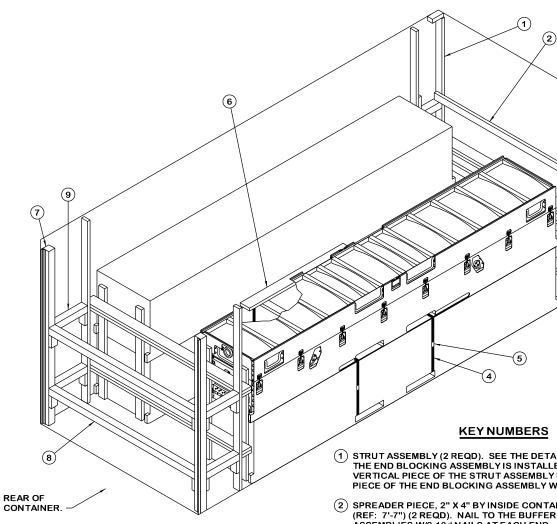
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■ LOADING AND BRACING SPECIFICATIONS SET FORTH WITHIN THIS DRAWING ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC) RAIL CARRIER SERVICE. THESE SPECIFICATIONS MAY ALSO BE USED FOR LOADS THAT ARE TO BE MOVED BY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

# U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY OPERATIONS SUPPORT COMMAND	ENGINEER	BASIC	WALTER GORDON		DO	NOTSCA	ALE.
		REV.		WEBSITE: HTTP://WWW.DAC.ARMY.MIL			
	TECHNICIAN	BASIC REV.		<u> </u>			
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APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND	TRANSPORTAT ENGINEERIN DIVISION	1G	Haura a Plush				
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	DIVISION	<u>~</u> /}	toy W/ San	•			
U.S. ARMY DEFENSE AMMUNITION CENTER	ENGINEERIN DIRECTORA	ig TE	wielion R. Frerick	19	48	8694	SP15J110



## **ISOMETRIC VIEW**

BILL OF MATERIAL					
LUMBER	LINEAR FEET	BOARD FEET			
2" x 4" 2" x 6" 4" x 4"	128 81 39	85 81 53			
NAILS	NO. REQD	POUNDS			
10d (3") 12d (3-1/4")	184 24	2-3/4 1/2			

STEEL STRAPPING, 1-1/4" - 45.00'REQD - - - 6.43 LBS SEAL FOR 1-1/4" STRAPPING - - 4 REQD - - - - NIL

(1) STRUT ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 6. AFTER THE END BLOCKING ASSEMBLY IS INSTALLED, NAIL THROUGH THE VERTICAL PIECE OF THE STRUT ASSEMBLY INTO THE VERTICAL PIECE OF THE END BLOCKING ASSEMBLY W/4-10d NAILS.

(3)

- ② SPREADER PIECE, 2" X 4" BY INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-7") (2 REQD). NAIL TO THE BUFFER PIECES OF THE STRUT ASSEMBLIES W/2-10d NAILS AT EACH END.
- (3) END BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5.
- (4) STACK UNITIZING STRAP, 1-1/4" X .035" OR .031" X 11'-3" LONG STEEL STRAPPING (4 REQD, 2 PER STACK). INSTALL THROUGH THE FORKLIFT OPENINGS OF TWO CONTAINERS AND POSITION AS FAR APART AS THE FORKLIFT OPENINGS PERMIT.
- (5) SEAL FOR 1-1/4" UNITIZING STRAP (4 REQD, 1 PER STRAP). CRIMP ONE SEAL WITH TWO PAIR OF NOTCHES OR CRIMP TWO SEALS EACH WITH TWO PAIR OF CRIMPS. SEE GENERAL NOTE "R" ON
- (6) ANTI-SWAY BRACE (2 REQD). SEE THE DETAIL ON PAGE 6. INSTALL ONE ANTI-SWAY BRACE FOR EACH LAYER OF CONTAINERS.
- (7) DOOR POST VERTICAL (2 REQD). SEE THE DETAIL ON PAGE 7 AND DETAILS "A" AND "B" ON PAGE 8.
- (8) 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 DOOR POST VERTICAL W/2-12d NAILS AT EACH END.
- 9 STRUT, 4" X 4" BY CUT-TO-FIT (REF: 19-3/8") (4 REQD). TOENAIL TO THE DOOR POST VERTICAL AND THE END BLOCKING ASSEMBLY W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON

# **LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
DUNNAGE	4	448 LBS

TOTAL WEIGHT - - - - - - 14,016 LBS (APPROX)

### (GENERAL NOTES CONTINUED)

- H. CAUTION: DO NOT NAIL DUNNAGE MATERIAL TO THE ISO CONTAINER WALLS OR FLOOR. ALL NAILING WILL BE WITHIN THE DUNNAGE.
- J. PORTIONS OF THE ISO CONTAINER DEPICTED WITHIN THIS DRAW-ING, 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:
  - A LOADED CONTAINER MUST BE ON A CHASSIS EQUIPPED WITH TWO BOGIE ASSEMBLIES WHEN BEING MOVED IN TOFC SERVICE.
  - 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. 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 CONTAINERS SHOWN IN THE LOAD ON PAGE 2 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE "LESS-THAN-FULL-LOAD" PROCEDURE ON PAGE 10. WHEN AN ISO 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.
- P. AS REQUIRED BY THE ASSOCIATION OF AMERICAN RAILROADS (AAR), ALL 1-1/4" AND 2" STEEL STRAPPING USED FOR LOAD RESTRAINT MUST BE MARKED AS SPECIFIED WITHIN THE APPLICABLE AAR RULES GOVERNING LOADING, BLOCKING AND BRACING OF FREIGHT WITHIN THE CONVEYANCE. FOR THE SPECIFIC MARKING SIZE, FREQUENCY, ETC., REQUIRED, REFER TO THE APPROPRIATE AAR LOADING RULES.
- Q. ANTI-CHAFING MATERIAL, CONSISTING OF NEUTRAL BARRIER MATERIAL, PLYWOOD, OR HARDBOARD, MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN THE LADING AND THE END OPENING ISO CONTAINER AND BETWEEN THE LADING AND THE STACK UNITIZING STRAPS TO PREVENT CHAFING DAMAGE TO CONTAINER PAINT AND MARKINGS.
- R. WHEN STEEL STRAPPING IS SEALED AT AN END-OVER-END LAP JOINT, A MINIMUM OF ONE SEAL WITH TWO PAIR OF NOTCHES WILL BE USED TO SEAL THE JOINT WHEN A NOTCH-TYPE SEALER IS BEING USED. A MINIMUM OF TWO SEALS, BUTTED TOGETHER, WITH TWO PAIR OF CRIMPS PER SEAL WILL BE USED TO SEAL THE JOINT WHEN A CRIMP-TYPE SEALER IS BEING USED. REFER TO THE "STRAP JOINT A" AND "STRAP JOINT B" DETAILS ON PAGE 4 FOR GUIDANCE.
- S. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:
  - 1. PREFABRICATE TWO STRUT ASSEMBLIES, TWO END BLOCKING ASSEMBLIES, AND TWO DOOR POST VERTICALS.
  - INSTALL THE TWO STRUT ASSEMBLIES, THE TWO SPREADER PIECES. AND ONE END BLOCKING ASSEMBLY.
  - 3. UNITIZE AND LOAD TWO STACKS OF TWO CONTAINERS AND INSTALL TWO ANTI-SWAY BRACES.
  - 4. INSTALL THE REMAINING END BLOCKING ASSEMBLY, THE TWO DOOR POST VERTICALS AND THE TWO DOOR SPANNERS.
  - 5. INSTALL FOUR STRUTS.

### **GENERAL NOTES**

- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCOR-DANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- B. THE SPECIFIED OUTLOADING PROCEDURES ARE APPLICABLE TO LOADS OF JSOW (AGM-154) MISSILES PACKED IN CNU-575/E CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CNU-575/E CONTAINER WITH MISSILE INSTALLED. SEE PAGE 4 FOR DETAIL OF THE CONTAINER. 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.
- WHEN LOADING CNU-575/E CONTAINERS, THEY ARE TO BE POSID. TIONED 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 ADJUSTING THE POSITIONS OF THE BUFFER PIECES ON THE ANTI-SWAY BRACES OR BY
  LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO
  THE LONGITUDINAL PIECES ON THE CENTER FILL ASSEMBLY. NAIL
  EACH ADDITIONAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY
  12". ADDITIONALLY, THE LENGTH OF THE LATERAL PIECES IN THE
  CENTER FILL ASSEMBLY MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE ISO CONTAINER SIZE.
- DUNNAGE LUMBER SPECIFIED IS OF NOMINAL SIZE. FOR EXAMPLE, E. 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.
- A STAGGERED NAILING PATTERN WILL BE USED WHENEVER POS-F. SIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE AS-SEMBLIES 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.
- IN SOME CONTAINERS THERE IS A SLOT AT THE CORNERS OF THE G. 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 PRECUDE 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.

(CONTINUED AT LEFT)

## **MATERIAL SPECIFICATIONS**

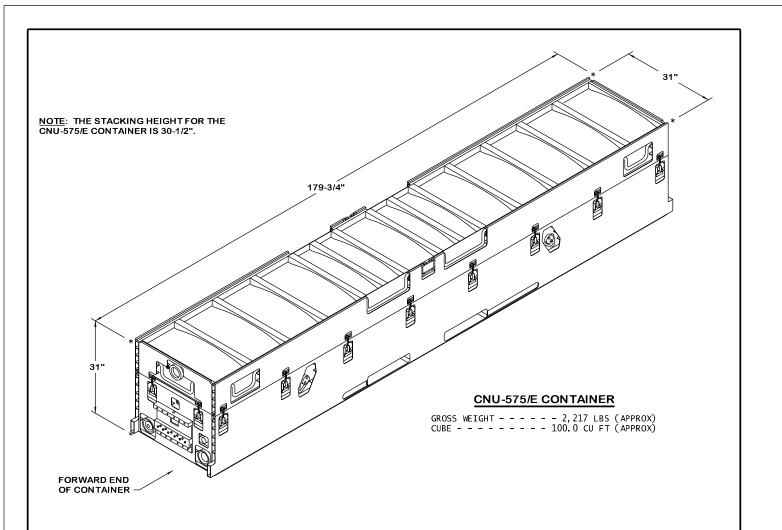
LUMBER - - - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.

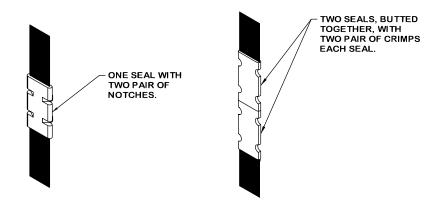
NAILS - - - - - - - : ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMMS).

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.





# **STRAP JOINT A**

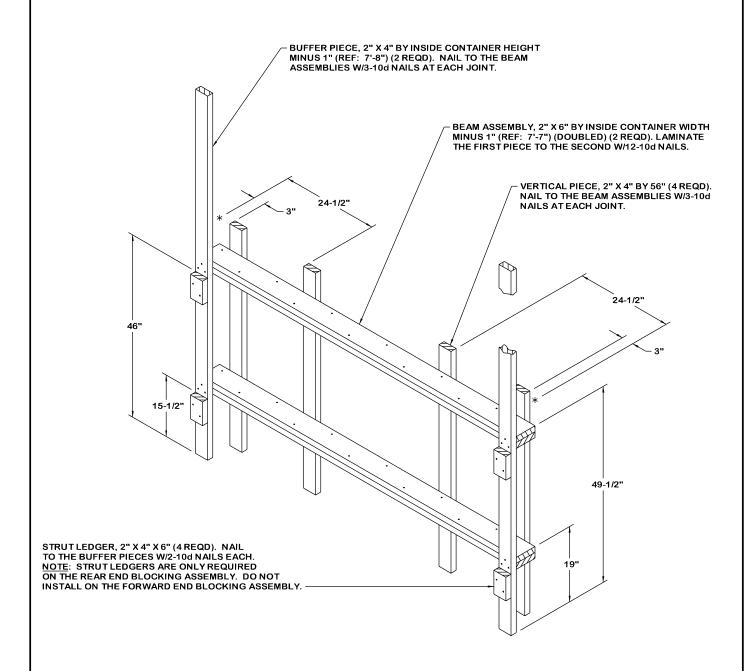
METHOD OF SECURING A STRAP JOINT WHEN USING A NOTCH-TYPE SEALER.

# **STRAP JOINT B**

METHOD OF SECURING A STRAP JOINT WHEN USING A CRIMP-TYPE SEALER.

# **END-OVER-END LAP JOINT DETAILS**

SEE GENERAL NOTE "R" ON PAGE 3.



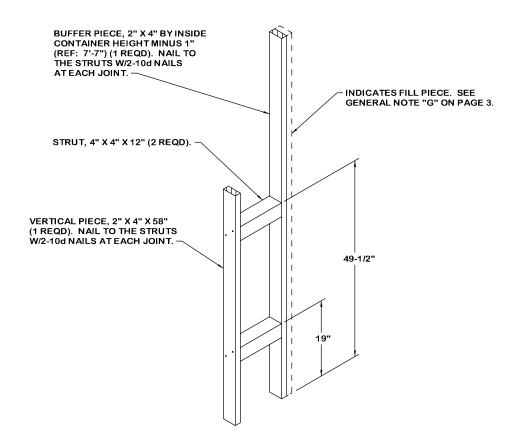
# **END BLOCKING ASSEMBLY**

SEE THE SPECIAL NOTE BELOW.

SPECIAL NOTE: FOR A ONE-LAYER LOAD, ELIMINATE THE TOP STRUTS, THE TOP BEAM ASSEMBLIES, THE TOP STRUT LEDGERS, AND THE TOP ANTI-SWAY BRACE. SHORTEN THE VERTICAL PIECES (NOT THE BUFFER PIECES) TO 26".

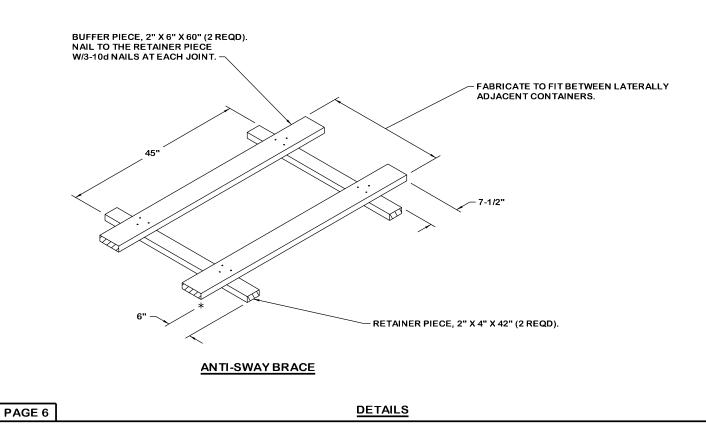
**DETAILS** 

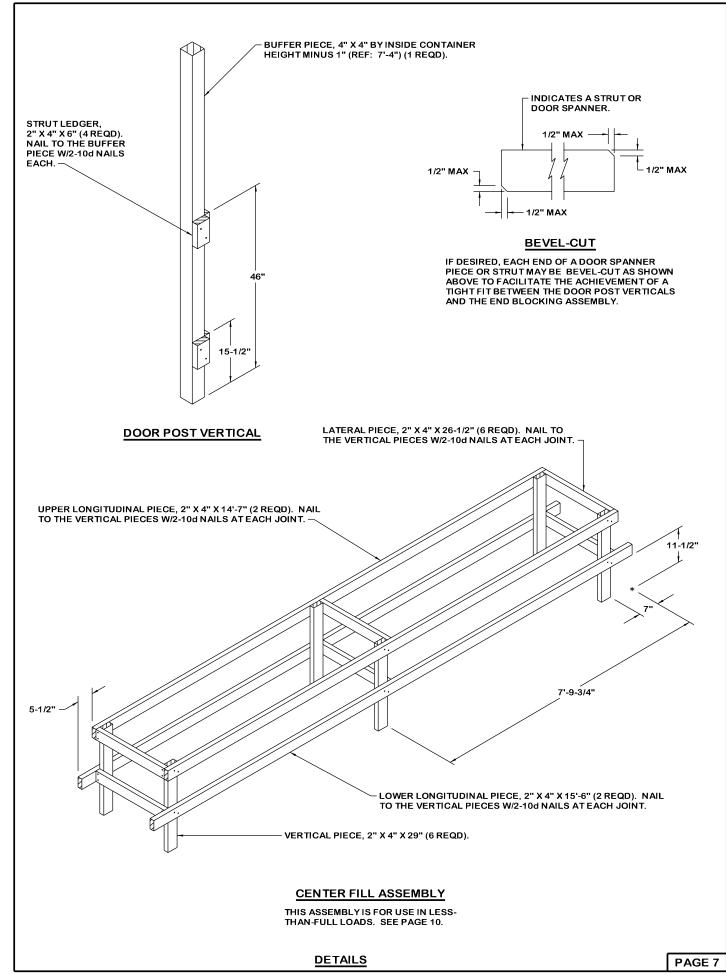
PAGE 5

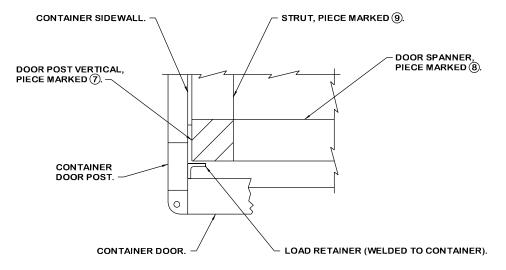


# STRUT ASSEMBLY

SEE THE SPECIAL NOTE ON PAGE 5.





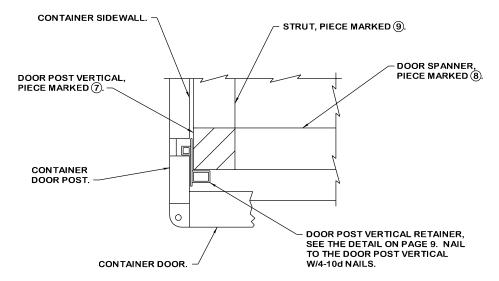


## **DETAIL A**

A PARTIAL PLAN VIEW OF THE LEFT REAR PORTION OF THE CONTAINER IS SHOWN DEPICTING THE PROPER POSITION OF THE DOOR POST VERTICAL AND ADJACENT DUNNAGE PIECES. KEY NUMBERS REFER TO KEY NUMBERS ON PAGES 2 AND 10.

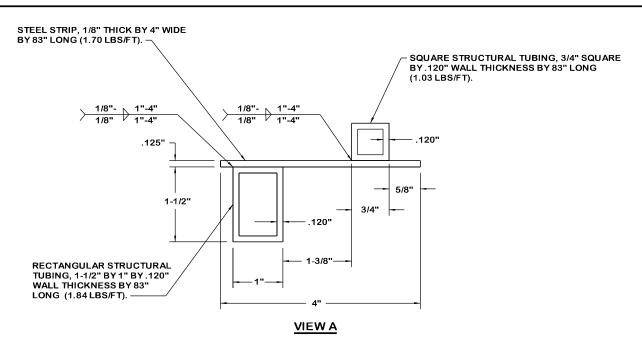
# SPECIAL NOTE:

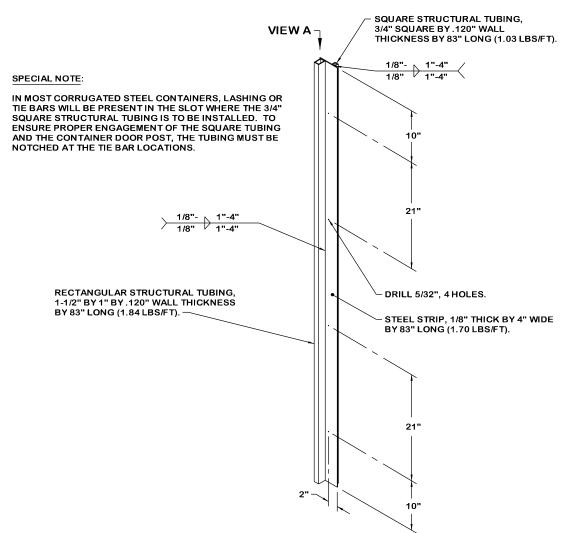
WHEN ISO CONTAINERS ARE NOT EQUIPPED WITH PRE-WELDED LOAD RETAINERS, AS DEPICTED IN "DETAIL A" ABOVE, DOOR POST VERTICALS, DOOR POST VERTICAL RETAINERS AND DOOR SPANNERS WILL BE REQUIRED FOR THE LOAD DEPICTED ON PAGE 2. SEE VARIOUS LOADS WITHIN AMC DRAWING 19-48-4153-15PA1002 FOR EXAMPLES. SEE PAGE 9 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. KEY NUMBERS REFER TO KEY NUMBERS ON PAGES 2 AND 10.

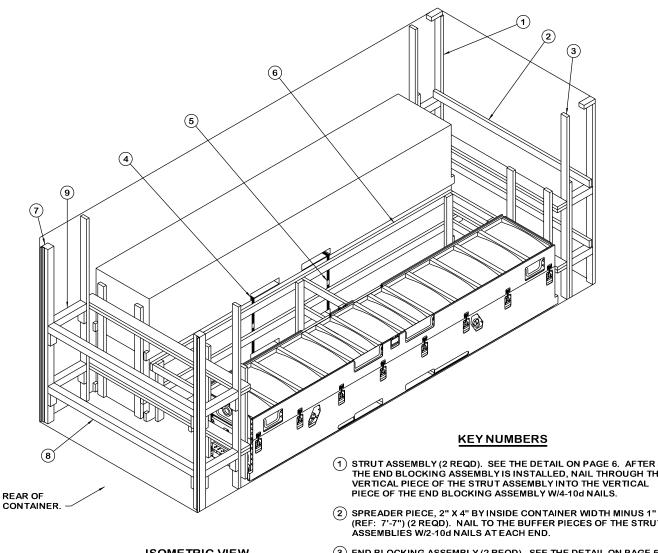




## DOOR POST VERTICAL RETAINER

 $\underline{\text{NOTE}}$ : THE ABOVE ASSEMBLY HAS BEEN SHOWN ROTATED  $90^{\circ}\text{FROM}$  THE ORIENTATION IN WHICH IT IS INSTALLED IN THE LEFT REAR CORNER OF THE CONTAINER. THE ASSEMBLY HAS BEEN ROTATED FOR HOLE LOCATION CLARITY.

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# ISOMETRIC VIEW

В	BILL OF MATERIAL					
LUMBER	LINEAR FEET	BOARD FEET				
2" x 4" 2" x 6" 4" x 4"	202 61 39	135 61 53				
NAILS	NO. REQD	POUNDS				
10d (3") 12d (3-1/4")	208 24	3-1/4 1/2				
STEEL STRAPPING,	1-1/4" - 22.50'R	EQD 3.21 LBS				

DULL OF MATERIAL

SEAL FOR 1-1/4" STRAPPING - - 2 REQD - - - - NIL

- THE END BLOCKING ASSEMBLY IS INSTALLED, NAIL THROUGH THE
- (REF: 7'-7") (2 REQD). NAIL TO THE BUFFER PIECES OF THE STRUT
- (3) END BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5
- (4) STACK UNITIZING STRAP, 1-1/4" X .035" OR .031" X 11'-3" LONG STEEL STRAPPING (2 REQD, 2 PER STACK). INSTALL THROUGH THE FORKLIFT OPENINGS OF TWO CONTAINERS AND POSITION AS FAR APART AS THE FORKLIFT OPENINGS PERMIT.
- (5) SEAL FOR 1-1/4" UNITIZING STRAP (2 REQD, 1 PER STRAP). CRIMP ONE SEAL WITH TWO PAIR OF NOTCHES OR CRIMP TWO SEALS EACH WITH TWO PAIR OF CRIMPS. SEE GENERAL NOTE "R" ON PAGE 3.
- (6) CENTER FILL ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 7.
- (7) DOOR POST VERTICAL (2 REQD). SEE THE DETAIL ON PAGE 7 AND DETAILS "A" AND "B" ON PAGE 8.
- (8) 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 DOOR POST VERTICAL W/2-12d NAILS AT EACH END.
- (9) STRUT, 4" X 4" BY CUT-TO-FIT (REF: 19-3/8") (4 REQD). TOENAIL TO THE DOOR POST VERTICAL AND THE END BLOCKING ASSEMBLY W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON

# **LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
DUNNAGE	3	505 LBS

TOTAL WEIGHT - - - - - - - 11,856 LBS (APPROX)

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**LESS-THAN-FULL-LOAD PROCEDURE**