

APPROVED BY U.S. COAST GUARD <i>F. H. Libman</i> DATE <u>6/4/80</u>	APPROVED BY BUREAU OF EXPLOSIVES <i>M. R. Miller</i> SUPERVISOR, MILITARY & INTERMODAL SERVICES DATE <u>5/28/80</u>
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# LOADING AND BRACING WITH WOODEN DUNNAGE IN COMMERCIAL CONTAINERS OF SKIDDED UNITS OF 4.2 INCH AMMUNITION (24-BOX SKIDDED UNIT) (WOODEN BOX)

THE DEPICTED WOODEN DUNNAGE METHOD CAN BE APPLIED TO ANY COMMERCIAL INTERMODAL 20-FOOT CONTAINER, ALTHOUGH THE DUNNAGE DIMENSIONS HAVE BEEN GIVEN FOR A 92" WIDE BY 95" HIGH (INSIDE DIMENSIONS) CONTAINER. ALTHOUGH THE LOAD AS SHOWN IS BASED ON AN 8'-6" HIGH CONTAINER, AN 8'-0" HIGH CONTAINER IS PREFERRED FOR SHIPPING THE DEPICTED LOAD. WHEN AN 8'-0" HIGH CONTAINER IS USED, THE HEIGHT OF SOME DUNNAGE ASSEMBLIES WILL HAVE TO BE LOWERED BY REMOVING SOME MATERIAL FROM THE TOP OR BOTTOM OF SOME OF THE VERTICAL PIECES.

LOADING AND BRACING SPECIFICATIONS AS DELINEATED HEREIN ARE ADEQUATE FOR SHIPMENTS TO BE MOVED BY ANY SURFACE MODE OF TRANSPORT (MOTOR, RAIL, AND WATER).

REQUIREMENTS CITED WITHIN THE BUREAU OF EXPLOSIVES PAMPHLET 6C APPLY WHEN THE SHIPMENT MOVES BY TRAILER/CONTAINER-ON-FLAT-CAR (T/COFC). SPECIAL T/COFC NOTES FOLLOW.

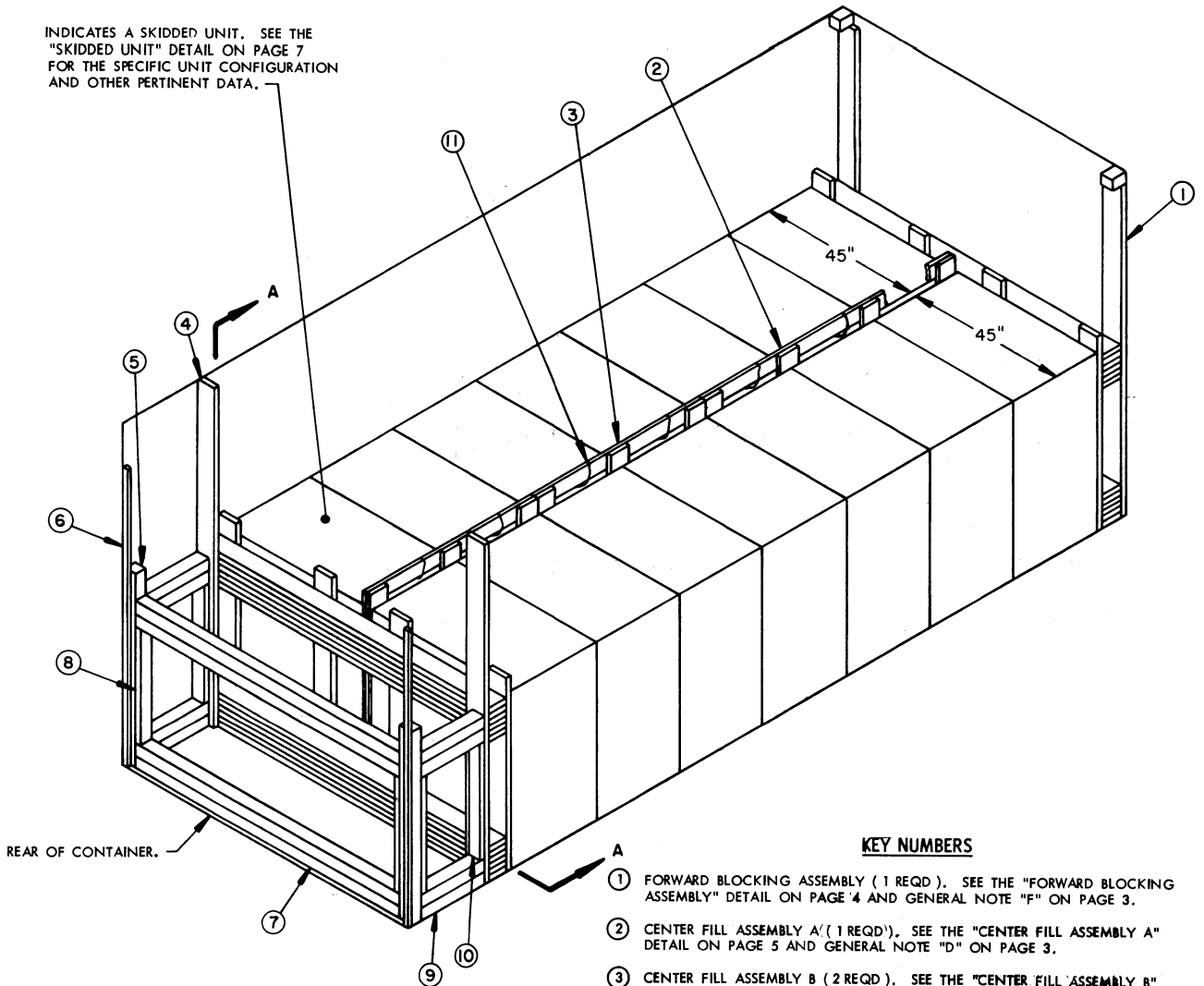
- A. A LOADED CONTAINER MUST BE ON A CHASSIS EQUIPPED WITH TWO BOGIE ASSEMBLIES WHEN BEING MOVED IN TOFC SERVICE.
- B. THE LOAD LIMIT OF A T/COFC RAIL CAR MUST NOT BE EXCEEDED, NOR WILL A CAR BE LOADED SO THAT THE TRUCK UNDER ONE END OF THE CAR CARRIES MORE THAN ONE-HALF OF THE LOAD LIMIT FOR THAT CAR.

DURING INTRASTATE AND/OR INTERSTATE MOVES BY MOTOR CARRIER, A PROPER CHASSIS/MODIFIED FLAT BED TRAILER MUST BE USED TO PRECLUDE VIOLATION OF ONE OR MORE "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.

REVISIONS			DESIGNED BY <i>P.B./BB</i>	FIELD ENG <i>WRE/SFS</i>
			CHECKED <i>RSW</i>	LOG ENGINE OFFICE <i>[Signature]</i>
APPROVED, U. S. ARMY ARMAMENT MATERIEL READINESS COMMAND				
<i>Darnell C. Fettes</i>				
APPROVED BY ORDER OF COMMANDING GENERAL, U. S. ARMY MATERIEL DEVELOPMENT AND READINESS COMMAND (DMRCM)				
<i>John L. Byrd</i>				
U. S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL				
U. S. ARMY DARCOM DRAWING				
JULY 1980				
DEF AMMO CEN & SCH DWG NO				
<b>D-SARAC-4451</b>				

**DO NOT SCALE**

INDICATES A SKIDDED UNIT. SEE THE "SKIDDED UNIT" DETAIL ON PAGE 7 FOR THE SPECIFIC UNIT CONFIGURATION AND OTHER PERTINENT DATA.

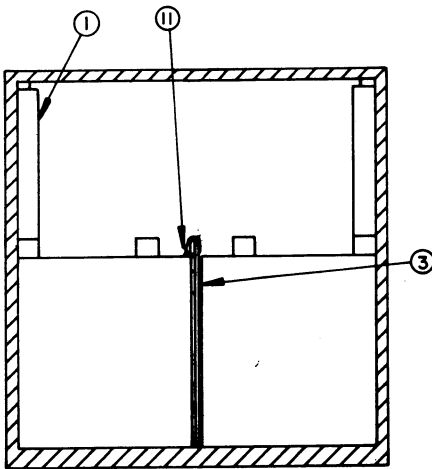


REAR OF CONTAINER.

**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① FORWARD BLOCKING ASSEMBLY (1 REQD). SEE THE "FORWARD BLOCKING ASSEMBLY" DETAIL ON PAGE 4 AND GENERAL NOTE "F" ON PAGE 3.
- ② CENTER FILL ASSEMBLY A (1 REQD). SEE THE "CENTER FILL ASSEMBLY A" DETAIL ON PAGE 5 AND GENERAL NOTE "D" ON PAGE 3.
- ③ CENTER FILL ASSEMBLY B (2 REQD). SEE THE "CENTER FILL ASSEMBLY B" DETAIL ON PAGE 5 AND GENERAL NOTE "D" ON PAGE 3.
- ④ REAR BLOCKING ASSEMBLY (1 REQD). SEE THE "REAR BLOCKING ASSEMBLY" DETAIL ON PAGE 4 AND GENERAL NOTE "F" ON PAGE 3.
- ⑤ DOOR POST VERTICAL, HARDWOOD, 4" X 4" X 54" (2 REQD). SEE "DETAIL A" ON PAGE 7 AND GENERAL NOTE "E" ON PAGE 3.
- ⑥ DOOR POST VERTICAL RETAINER (2 REQD). SEE THE "DOOR POST VERTICAL RETAINER" DETAILS ON PAGE 6 AND "DETAIL A" ON PAGE 7. NAIL THRU THE TWO LOWER HOLES INTO THE DOOR POST VERTICAL W/2-10d NAILS.
- ⑦ DOOR SPANNER, 4" X 4" MATERIAL, CUT TO A LENGTH THAT WILL PROVIDE FOR A DRIVE FIT (REF: 7"-1-3/8") (4 REQD). TOENAIL TO THE 4" X 4" DOOR POST VERTICALS W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 7.
- ⑧ DOOR SPANNER SUPPORT PIECE, 2" X 4" X 32" (2 REQD). NAIL TO A DOOR POST VERTICAL W/5-10d NAILS AFTER THE LOWER DOOR SPANNER PIECES ARE IN POSITION.
- ⑨ STRUT, 4" X 4" BY CUT-TO-FIT (8 REQD). TOENAIL TO THE BUFFER PIECE OF THE "REAR BLOCKING ASSEMBLY" AND THE "DOOR POST VERTICAL" W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 7.
- ⑩ STRUT SUPPORT PIECE, 2" X 4" X 32" (4 REQD). NAIL TO THE BUFFER PIECE OF THE "REAR BLOCKING ASSEMBLY" AND THE "DOOR POST VERTICAL" W/5-10d NAILS AFTER THE LOWER STRUTS ARE IN POSITION.
- ⑪ TIE WIRE, NO. 14 GAGE WIRE 24" LONG (7 REQD). INSTALL THE WIRE TO FORM A COMPLETE LOOP AROUND THE UNITIZING STRAP OF THE UNIT AND THE TIE PIECE OF THE CENTER FILL ASSEMBLY, BRING ENDS TOGETHER AND TWIST TAUT.



**SECTION A-A**

( GENERAL NOTES CONTINUED )

GENERAL NOTES

L. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:

1. PREFABRICATE ONE FORWARD BLOCKING ASSEMBLY, ONE CENTER FILL "A" ASSEMBLY, TWO CENTER FILL "B" ASSEMBLIES, ONE REAR BLOCKING ASSEMBLY, AND NAIL A DOOR POST VERTICAL RETAINER TO EACH DOOR POST VERTICAL, ONE RIGHT HAND AND ONE LEFT HAND.
2. INSTALL FORWARD BLOCKING ASSEMBLY.
3. LOAD THREE SKIDDED UNITS, INSTALL THE CENTER FILL ASSEMBLY "A", LOAD THE THREE ADJACENT SKIDDED UNITS, AND INSTALL THE WIRES.
4. LOAD TWO SKIDDED UNITS, INSTALL ONE CENTER FILL ASSEMBLY "B", LOAD THE TWO ADJACENT SKIDDED UNITS, AND INSTALL THE WIRES.
5. REPEAT STEP 4.
6. INSTALL REAR BLOCKING ASSEMBLY.
7. INSTALL THE TWO DOOR POST VERTICAL ASSEMBLIES ( ONE RIGHT HAND AND ONE LEFT HAND ).
8. INSTALL TWO DOOR SPANNER PIECES AT THE LOWEST POSITION.
9. INSTALL THE STRUTS AND STRUT SUPPORT PIECES BETWEEN THE REAR BLOCKING ASSEMBLY AND THE DOOR POST VERTICALS.
10. INSTALL THE DOOR SPANNER SUPPORT PIECES AND THE REMAINING DOOR SPANNER PIECES.

- 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 PROCEDURE IS APPLICABLE TO A LOAD OF 24-BOX SKIDDED UNITS OF 4.2 INCH AMMUNITION PACKED IN WOODEN BOXES. SUBSEQUENT REFERENCE TO SKIDDED UNIT MEANS THE SKIDDED UNIT WITH AMMUNITION ITEMS. SEE PAGE 7 FOR THE DETAIL OF THE SKIDDED UNIT. **CAUTION:** REGARDLESS OF THE QUANTITY OF UNITS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF 44,800 POUNDS 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 INTERMODAL COMMERCIAL CONTAINER WITH INSIDE DIMENSIONS OF 19'-4" LONG BY 92" WIDE BY 95" HIGH. THE LOAD IS DESIGNED FOR TRAILER/CONTAINER-ON-FLAT-CAR (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 SKIDDED UNITS, THEY ARE TO BE POSITIONED SO AS TO ACHIEVE A TIGHT LOAD (TIGHT AGAINST THE FORWARD BLOCKING ASSEMBLY AND CONTAINER SIDEWALL). ALTHOUGH A TOTAL OF ONE AND ONE-HALF INCHES ( 1-1/2" ) OF UNBLOCKED SPACE ACROSS THE WIDTH OF A LOAD BAY IS PERMITTED, LATERAL VOIDS WITHIN THE LOAD ARE TO BE HELD TO A MINIMUM. EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE BEARING PIECES ON ONE OR BOTH SIDES OF THE CENTER FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE TO THE BEARING PIECES W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE THICKNESS OF THE BEARING AND VERTICAL PIECES MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE LENGTH OF THE SKIDDED UNIT.
- E. DUNNAGE LUMBER SPECIFIED IS OF A NOMINAL SIZE. FOR EXAMPLE, 1" X 6" MATERIAL IS ACTUALLY 3/4" THICK BY 5-1/2" WIDE, 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE AND 4" X 4" MATERIAL IS ACTUALLY 3-1/2" THICK BY 3-1/2" WIDE. **NOTE:** ALL SPECIFIED DUNNAGE LUMBER IS SOFT-WOOD EXCEPT THAT REQUIRED FOR THE TWO DOOR POST VERTICALS, PIECES MARKED (5). THE 54" LONG, 4" X 4" DOOR POST VERTICALS MUST BE HARDWOOD, SUCH AS OAK. IF DESIRED, PILOT HOLES FOR THE NAILS TO BE DRIVEN INTO THE DOOR POST VERTICALS MAY BE PREDRILLED.
- F. A STAGGERED NAILING PATTERN WILL BE USED WHEREVER 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, SUCH AS SOME ALL STEEL CONTAINERS, THERE IS A SLOT AT THE CORNERS OF THE FORWARD WALL. A PIECE OF DUNNAGE MATERIAL MUST BE LAMINATED TO THE BUFFER PIECES ON THE FORWARD BLOCKING ASSEMBLY TO PROVIDE A FLAT SURFACE FOR THE 2" X 6" 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 FRONT WALL OF THE CONTAINER IS 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 ONE OF THE SIDE WALLS, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.

BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	16	6
1" X 6"	46	23
2" X 4"	16	11
2" X 6"	249	249
4" X 4"	52	70
NAILS	NO. REQD	POUNDS
6d (2")	20	1/4
8d (2-1/2")	40	1/2
10d (3")	398	6-1/4
12d (3-1/4")	48	1
PLYWOOD, 1/2" -----	32 SQ FT REQD -----	44 LBS
DOOR POST VERTICAL RETAINER -----	2 REQD -----	64 LBS
WIRE, NO. 14 GAGE -----	14' REQD -----	1/4 LB

(CONTINUED AT LEFT)

MATERIAL SPECIFICATIONS

- LUMBER** ----- : TM 743-200-1 ( DUNNAGE LUMBER ) AND FED SPEC MM-L-731.
- PLYWOOD** ----- : FED SPEC NN-P-530; GROUP B, 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.
- NAILS** ----- : FED SPEC FF-N-105; COMMON.
- STEEL, STRUCTURAL** ----- : FED SPEC QQ-S-741; SQUARE STRUCTURAL TUBING AND HOT-ROLLED STRIP.
- WIRE** ----- : FED SPEC QQ-W-461.

LOAD AS SHOWN

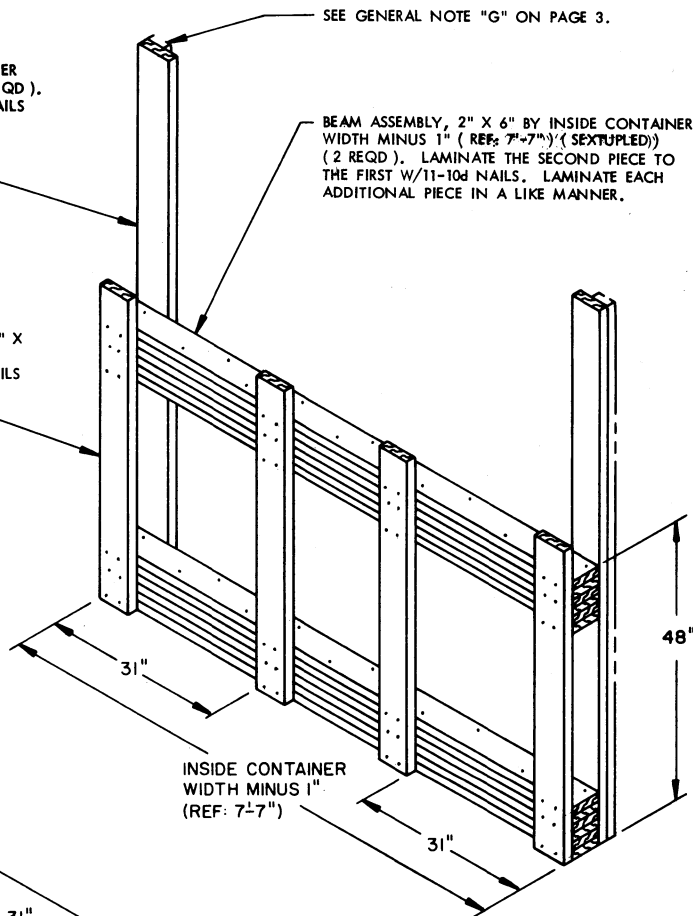
ITEM	QUANTITY	WEIGHT ( APPROX' )
SKIDDED UNIT -----	14 -----	24,052 LBS
DUNNAGE -----		825 LBS
CONTAINER -----		4,700 LBS
<b>TOTAL WEIGHT</b> -----		<b>29,587 LBS</b>

SEE GENERAL NOTE "G" ON PAGE 3.

BUFFER PIECE, 2" X 6" BY INSIDE CONTAINER HEIGHT MINUS 1/2" (REF: 7'-7-1/2") (2 REQD). NAIL TO THE BEAM ASSEMBLIES W/6-10d NAILS AT EACH JOINT.

BEAM ASSEMBLY, 2" X 6" BY INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-7") (SEXTUPLED) (2 REQD). LAMINATE THE SECOND PIECE TO THE FIRST W/11-10d NAILS. LAMINATE EACH ADDITIONAL PIECE IN A LIKE MANNER.

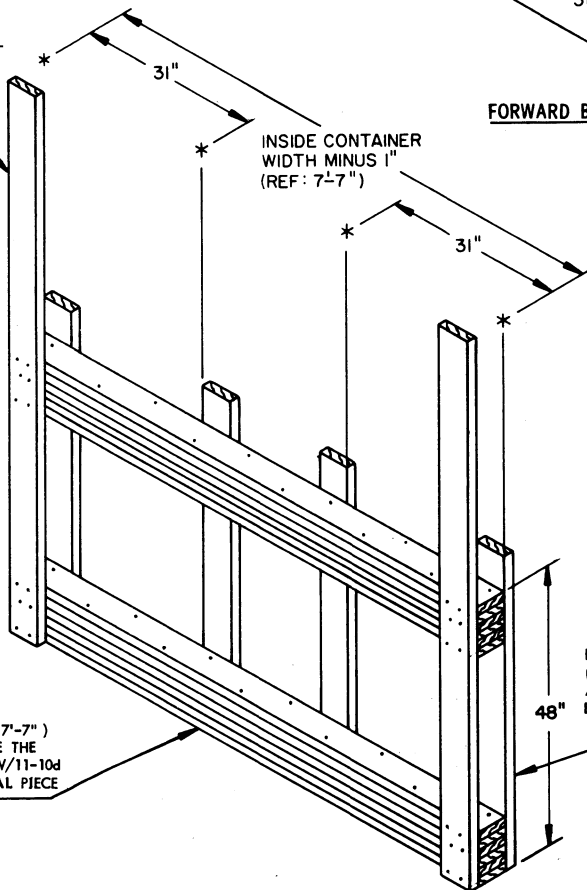
LOAD BEARING PIECE, 2" X 6" X 54" (4 REQD). NAIL TO THE BEAM ASSEMBLIES W/6-10d NAILS AT EACH JOINT.



**FORWARD BLOCKING ASSEMBLY**

BUFFER PIECE, 2" X 6" BY INSIDE CONTAINER HEIGHT MINUS 1/2" (REF: 7'-10-1/2") (2 REQD). NAIL TO THE BEAM ASSEMBLIES W/6-10d NAILS AT EACH JOINT.

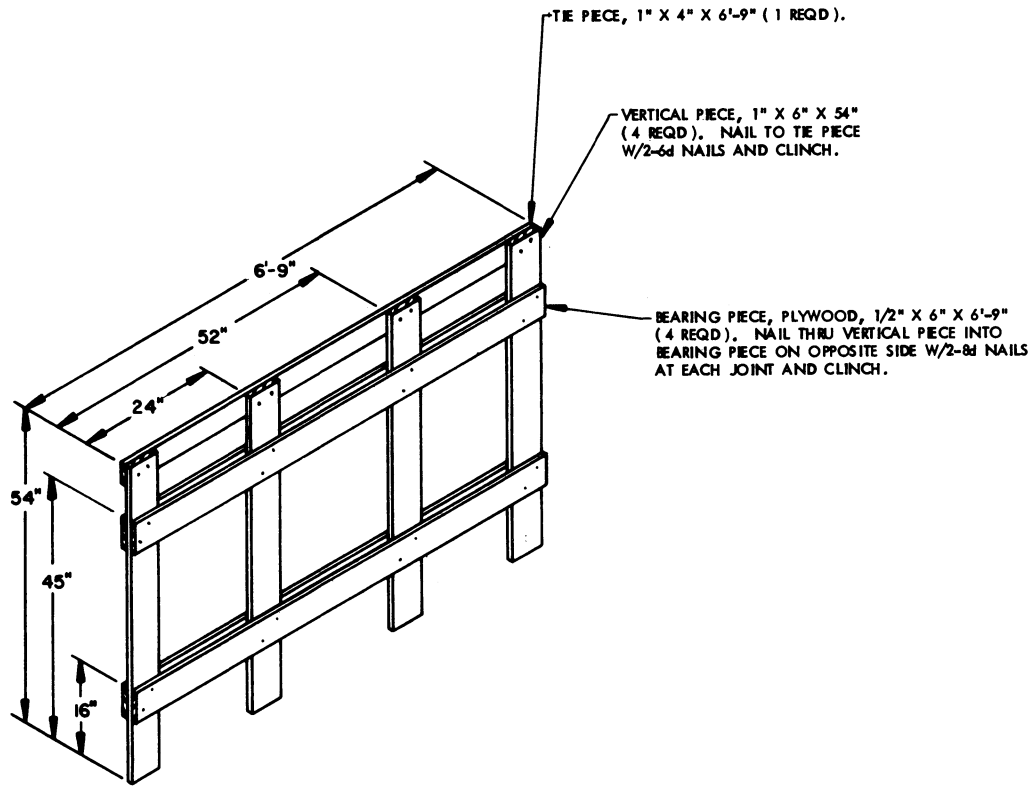
INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-7")



LOAD BEARING PIECE, 2" X 6" X 54", (4 REQD). NAIL TO THE BEAM ASSEMBLIES W/6-10d NAILS AT EACH JOINT.

BEAM ASSEMBLY, 2" X 6" BY INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-7") (SEXTUPLED) (2 REQD). LAMINATE THE SECOND PIECE TO THE FIRST W/11-10d NAILS. LAMINATE EACH ADDITIONAL PIECE IN A LIKE MANNER.

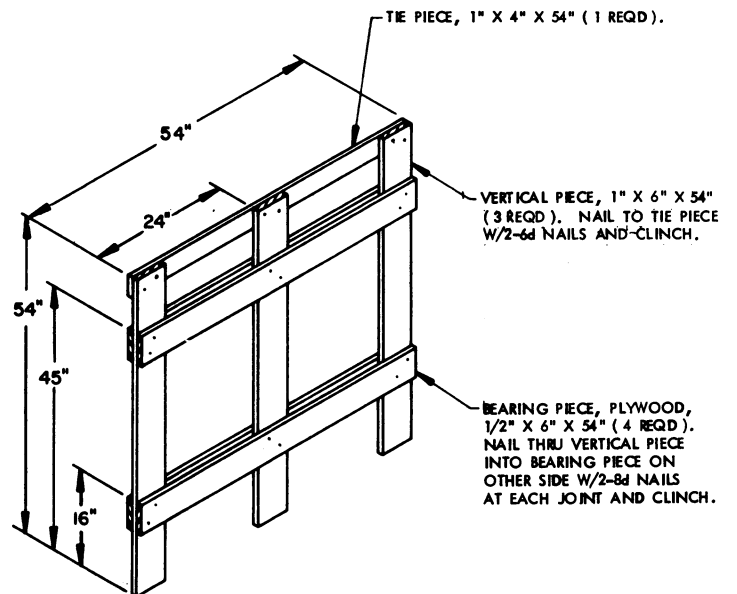
**REAR BLOCKING ASSEMBLY**



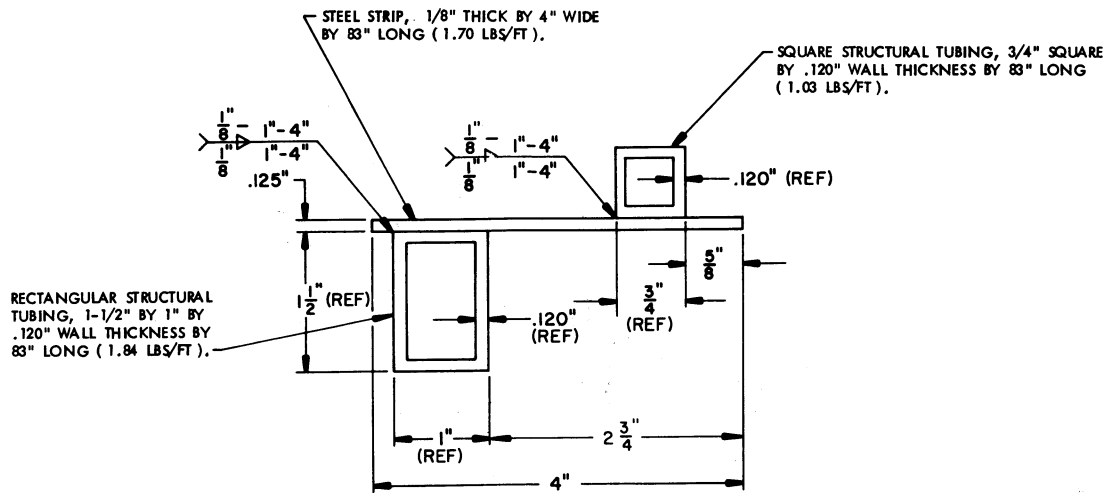
**CENTER FILL ASSEMBLY A**  
SEE SPECIAL NOTE BELOW.

**SPECIAL NOTE:**

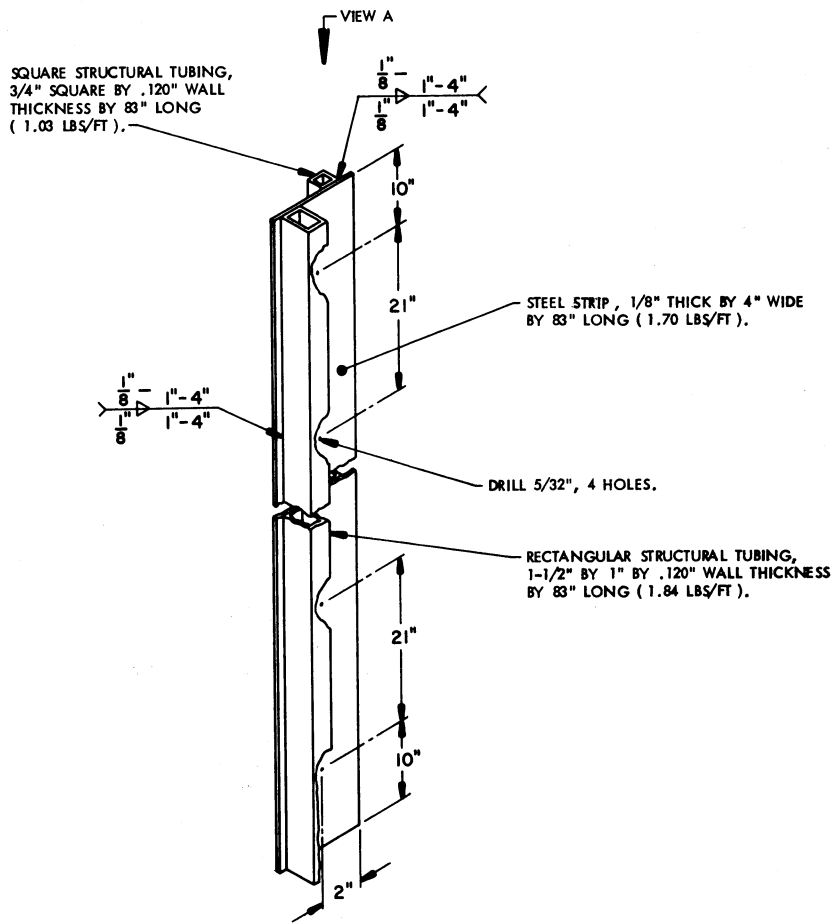
EIGHT (8) ACCEPTABLE WIDTH 6" BEARING PIECES CAN BE MADE BY RIPPING (SAWING) A 48" WIDE SHEET OF PLYWOOD SEVEN TIMES ACROSS ITS 48" WIDTH.



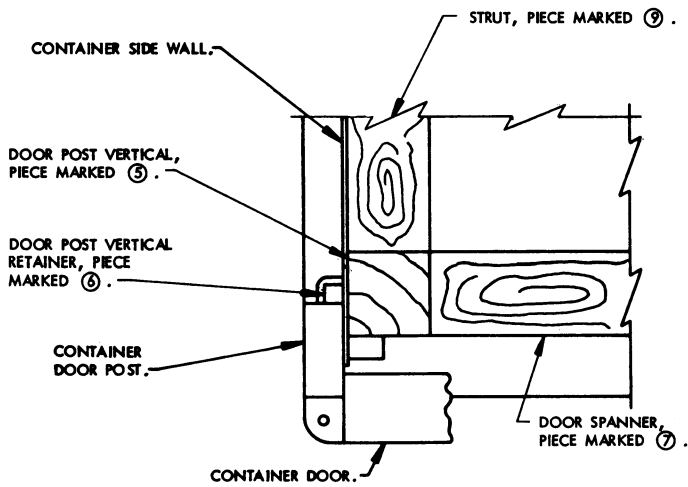
**CENTER FILL ASSEMBLY B**  
SEE SPECIAL NOTE AT LEFT.



VIEW A

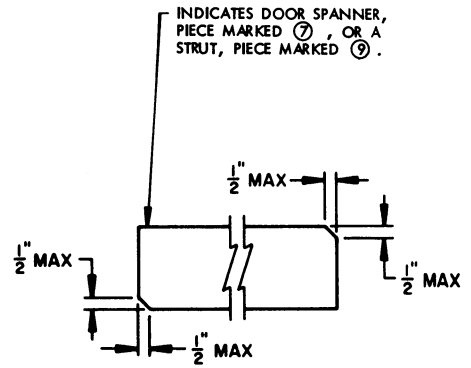


DOOR POST VERTICAL RETAINER



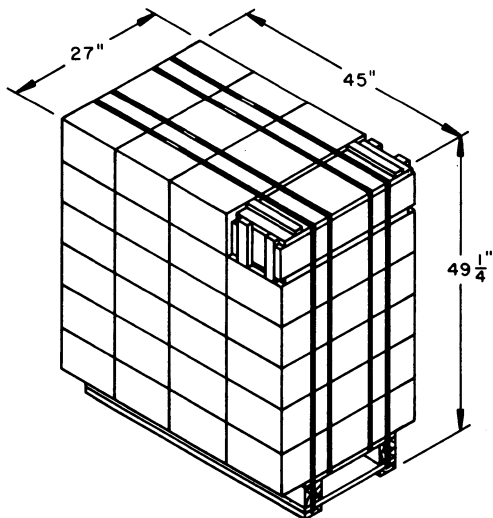
**DETAIL A**

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.



**BEVEL-CUT**

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



**SKIDDED UNIT**

UNIT WEIGHT ----- 1,778 LBS ( APPROX )  
 CUBE ----- 34.6 CUBIC FEET

