

APPROVED BY  
BUREAU OF EXPLOSIVES

*Don & The*

DATE 4-20-99

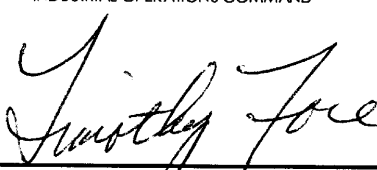

# LOADING AND BRACING IN END OPENING ISO CONTAINERS OF GENERAL PURPOSE MK83 1,000 POUND BOMBS ON MHU-187/E PALLET

## INDEX

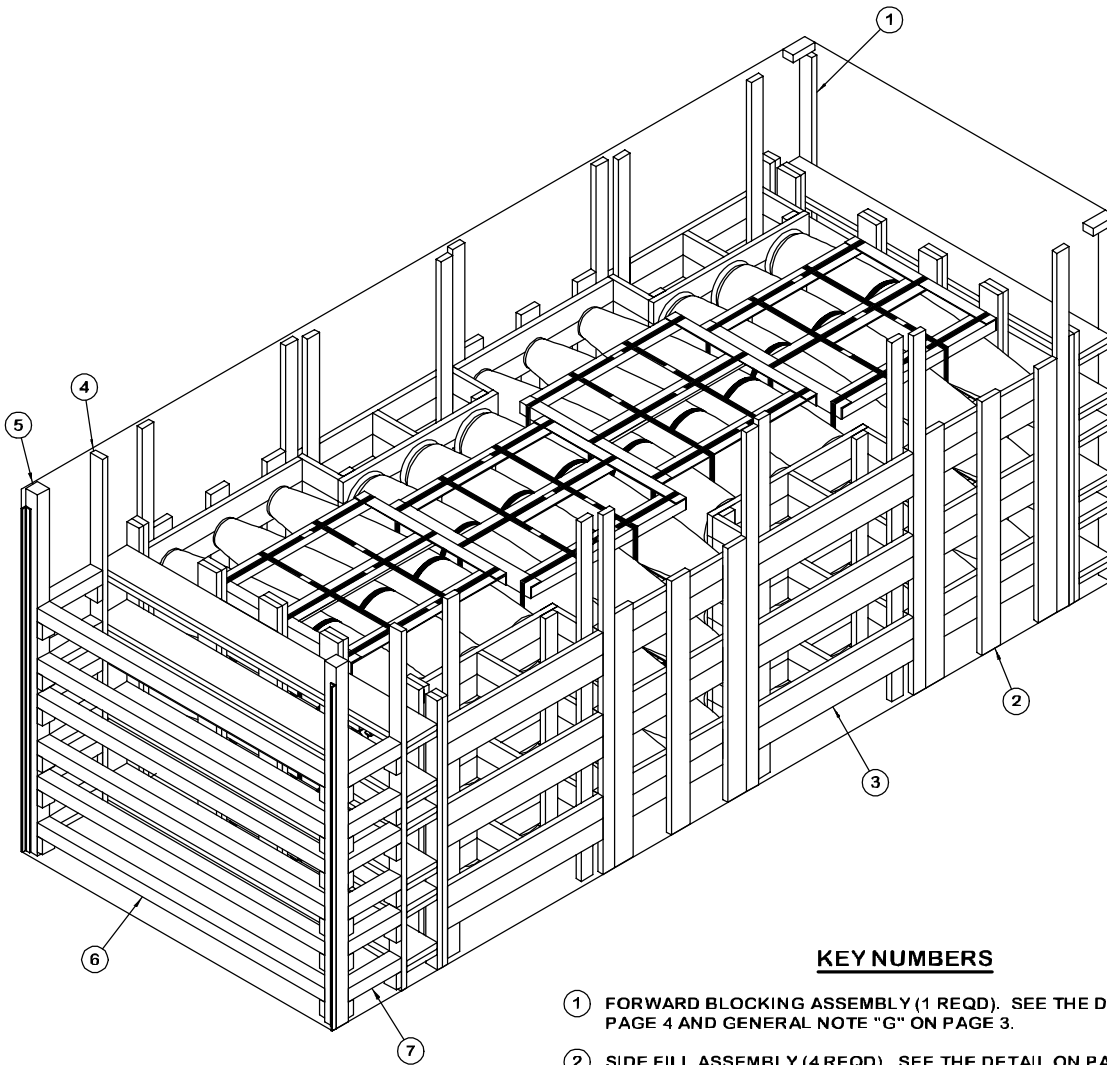
ITEM	PAGE(S)
TYPICAL LOADING PROCEDURES - - - - -	2
GENERAL NOTES AND MATERIAL SPECIFICATIONS - - - - -	3
PALLET UNIT DETAIL - - - - -	6
DETAILS - - - - -	4-8

● 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 INDUSTRIAL OPERATIONS COMMAND  	ENGINEER	BASIC	MICHAEL SARDONE	DO NOT SCALE				
		REV.		WEBSITE: <a href="http://www.dac.army.mil">HTTP://WWW.DAC.ARMY.MIL</a>				
	TECHNICIAN	BASIC		SEPTEMBER 1998				
	REV.							
	DRAFTSMAN	BASIC						
		REV.						
APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND  	TRANSPORTATION ENGINEERING DIVISION		<i>W. R. Franke</i>					
	VALIDATION ENGINEERING DIVISION		<i>Robert A. Kohn</i>	TESTED	CLASS	DIVISION	DRAWING	FILE
	LOGISTICS ENGINEERING OFFICE		<i>William Ernest</i>		19	48	4317	15PM1009

PROJECT CA 337-98



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① FORWARD BLOCKING ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 4 AND GENERAL NOTE "G" ON PAGE 3.
- ② SIDE FILL ASSEMBLY (4 REQD). SEE THE DETAIL ON PAGE 5.
- ③ FILLER ASSEMBLY (4 REQD). LOCATE AT BASE END OF PALLET. SEE THE DETAIL ON PAGE 5.
- ④ REAR BLOCKING ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 4.
- ⑤ DOOR POST VERTICAL (2 REQD). SEE THE DETAIL ON PAGE 5 AND "DETAIL A" AND "DETAIL B" ON PAGE 7.
- ⑥ DOOR SPANNER, 4" X 4" MATERIAL, CUT TO A LENGTH THAT WILL PROVIDE FOR A DRIVE FIT (REF: 7'-1-3/8") (6 REQD). TOENAIL TO THE DOOR POST VERTICALS W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 7. AFTER INSTALLING THE BOTTOM AND THE TOP DOOR SPANNERS, THE STRUTS, PIECES MARKED ⑦, ARE TO BE INSTALLED.
- ⑦ STRUT, 4" X 4" BY CUT-TO-FIT (12 REQD). TOENAIL TO THE BUFFER PIECES OF THE REAR BLOCKING ASSEMBLY, PIECE MARKED ④, AND THE DOOR POST VERTICAL, PIECE MARKED ⑤, W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 7.

**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	256	171
2" X 6"	502	502
2" X 10"	182	304
4" X 4"	74	99
NAILS	NO. REQD	POUNDS
10d (3")	1,572	24-1/4
12d (3-1/4")	72	1-1/4

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	12	35,338 LBS
DUNNAGE		2,178 LBS
CONTAINER		4,700 LBS

TOTAL WEIGHT - - - - - 42,216 LBS (APPROX)

L. 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.

M. 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:

- 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.

N. 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.

O. 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.

P. 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.

Q. NOTICE: THE FORWARD AND REAR BLOCKING ASSEMBLIES ARE DESIGNED SO THAT THE LOAD BEARING PIECES ARE NOT POSITIONED IN A SYMMETRICAL PATTERN. THIS REQUIRED POSITIONING IS DUE TO THE PALLET UNIT CONFIGURATION AND LOADING PATTERN. IF THE QUANTITY OF PALLET UNITS TO BE SHIPPED RESULTS IN AN UNEVEN NUMBER OF STACKS, OR IF THE PALLET UNITS ARE LOADED IN AN ORIENTATION OPPOSITE FROM THAT DEPICTED IN THE LOAD, THE POSITIONING OF THE LOAD BEARING PIECES ON THE FORWARD AND REAR BLOCKING ASSEMBLIES MUST BE REVERSED FROM WHAT IS DEPICTED IN THE APPLICABLE DETAILS.

R. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:

- 1. PREFABRICATE ONE FORWARD BLOCKING ASSEMBLY, ONE REAR BLOCKING ASSEMBLY, FOUR SIDE FILL ASSEMBLIES, FOUR FILLER ASSEMBLIES, AND TWO DOOR POST VERTICALS, ONE RIGHT HAND AND ONE LEFT HAND.
- 2. INSTALL THE FORWARD BLOCKING ASSEMBLY.
- 3. INSTALL ONE SIDE FILL ASSEMBLY ON THE RIGHT SIDE OF THE CONTAINER, LOAD THREE PALLET UNITS, AND INSTALL ONE FILLER ASSEMBLY.
- 4. INSTALL ONE SIDE FILL ASSEMBLY ON THE LEFT SIDE OF THE CONTAINER, LOAD THREE PALLET UNITS, AND INSTALL ONE FILLER ASSEMBLY.
- 5. REPEAT STEP 3.
- 6. REPEAT STEP 4.
- 7. INSTALL THE REAR BLOCKING ASSEMBLY.
- 8. INSTALL THE TWO DOOR POST VERTICALS.
- 9. INSTALL TWO DOOR SPANNER PIECES (ONE AT THE LOWEST POSITION AND ONE AT THE UPPERMOST POSITION).
- 10. INSTALL TWELVE STRUTS.
- 11. INSTALL THE REMAINING FOUR 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 PROCEDURES ARE APPLICABLE TO LOADS OF GENERAL PURPOSE MK83 1,000 POUND BOMBS LOADED ON MHU-187/E OR MHU-187A/E PALLETS. SEE PAGE 6, NAVY MIL-STD 1323/308C (MHU-187/E), AND NAVY MIL-STD 1323/393 (MHU-187A/E) 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". EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE VERTICAL PIECES ON THE SIDE FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE LENGTH OF THE LATERAL PIECES IN THE FILLER ASSEMBLIES 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, 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.

(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).

STEEL, STRUCTURAL - - - - - : ASTM A501, STEEL STRUCTURAL TUBING; AND ASTM A570, STEEL, STRIP, HOT-ROLLED, GRADE 36 (MINIMUM).

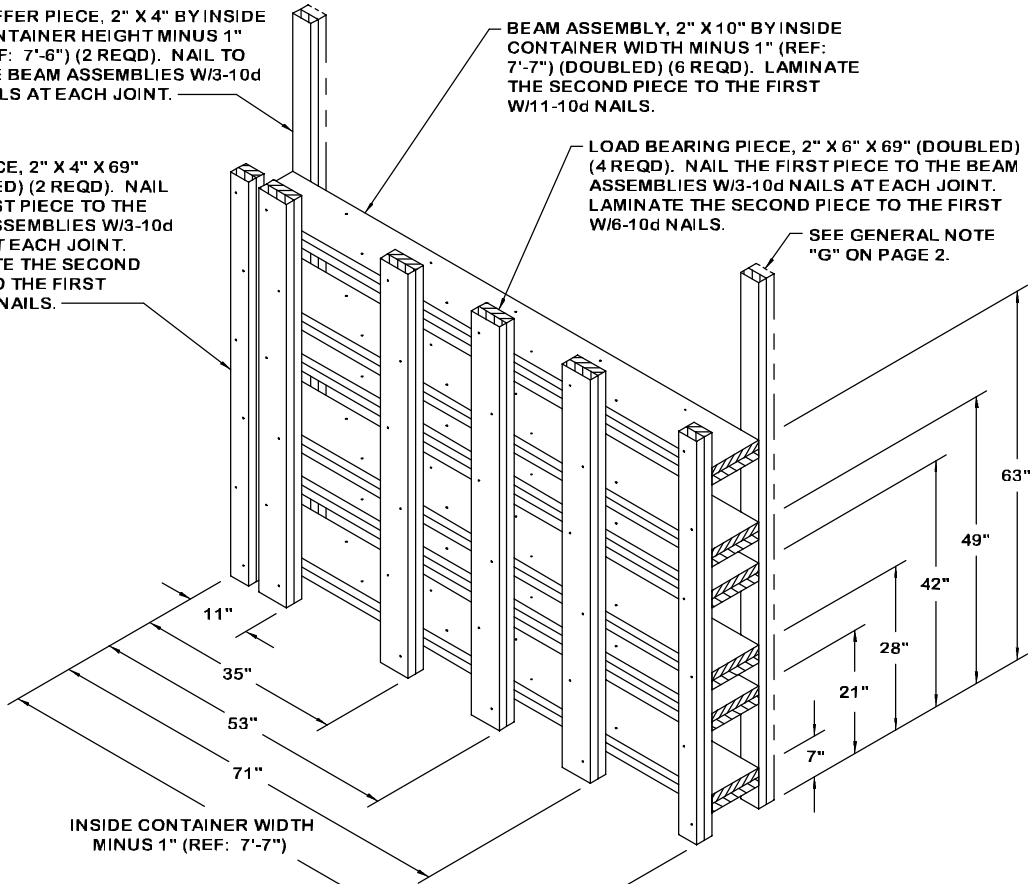
BUFFER PIECE, 2" X 4" BY INSIDE CONTAINER HEIGHT MINUS 1" (REF: 7'-6") (2 REQD). NAIL TO THE BEAM ASSEMBLIES W/3-10d NAILS AT EACH JOINT.

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

FILL PIECE, 2" X 4" X 69" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE BEAM ASSEMBLIES W/3-10d NAILS AT EACH JOINT. LAMINATE THE SECOND PIECE TO THE FIRST W/6-10d NAILS.

LOAD BEARING PIECE, 2" X 6" X 69" (DOUBLED) (4 REQD). NAIL THE FIRST PIECE TO THE BEAM ASSEMBLIES W/3-10d NAILS AT EACH JOINT. LAMINATE THE SECOND PIECE TO THE FIRST W/6-10d NAILS.

SEE GENERAL NOTE "G" ON PAGE 2.



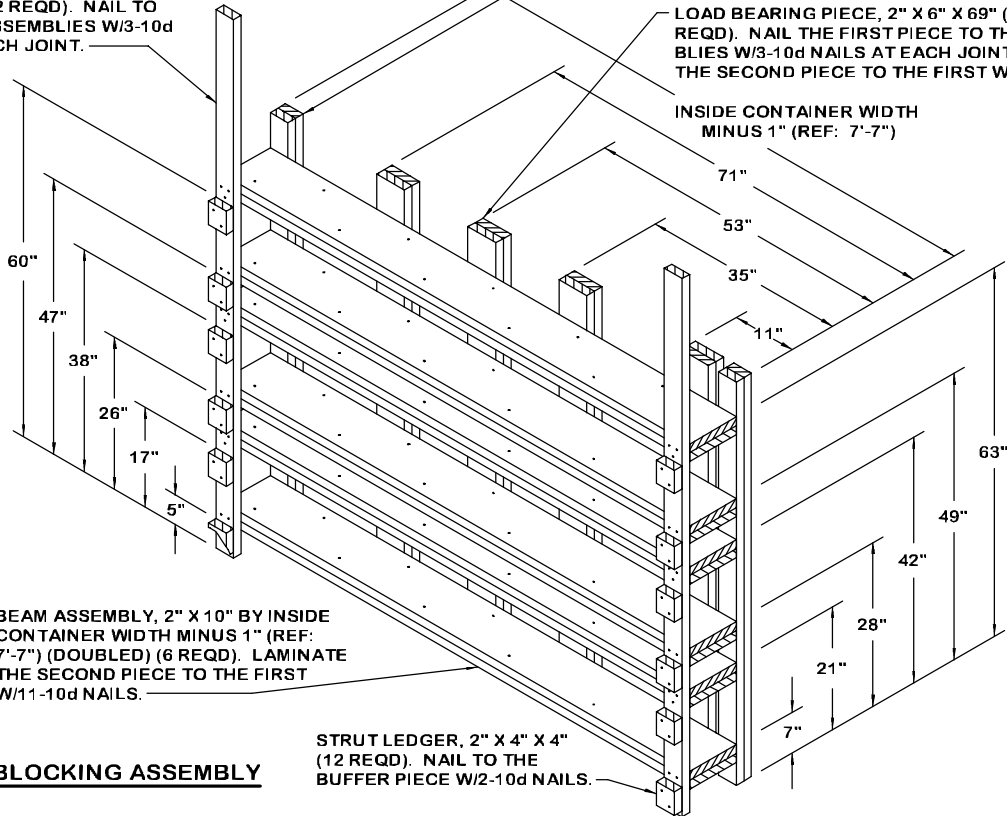
**FORWARD BLOCKING ASSEMBLY**

BUFFER PIECE, 2" X 4" BY INSIDE CONTAINER HEIGHT MINUS 1" (REF: 7'-6") (2 REQD). NAIL TO THE BEAM ASSEMBLIES W/3-10d NAILS AT EACH JOINT.

FILL PIECE, 2" X 4" X 69" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE BEAM ASSEMBLIES W/3-10d NAILS AT EACH JOINT. LAMINATE THE SECOND PIECE TO THE FIRST W/6-10d NAILS.

LOAD BEARING PIECE, 2" X 6" X 69" (DOUBLED) (4 REQD). NAIL THE FIRST PIECE TO THE BEAM ASSEMBLIES W/3-10d NAILS AT EACH JOINT. LAMINATE THE SECOND PIECE TO THE FIRST W/6-10d NAILS.

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

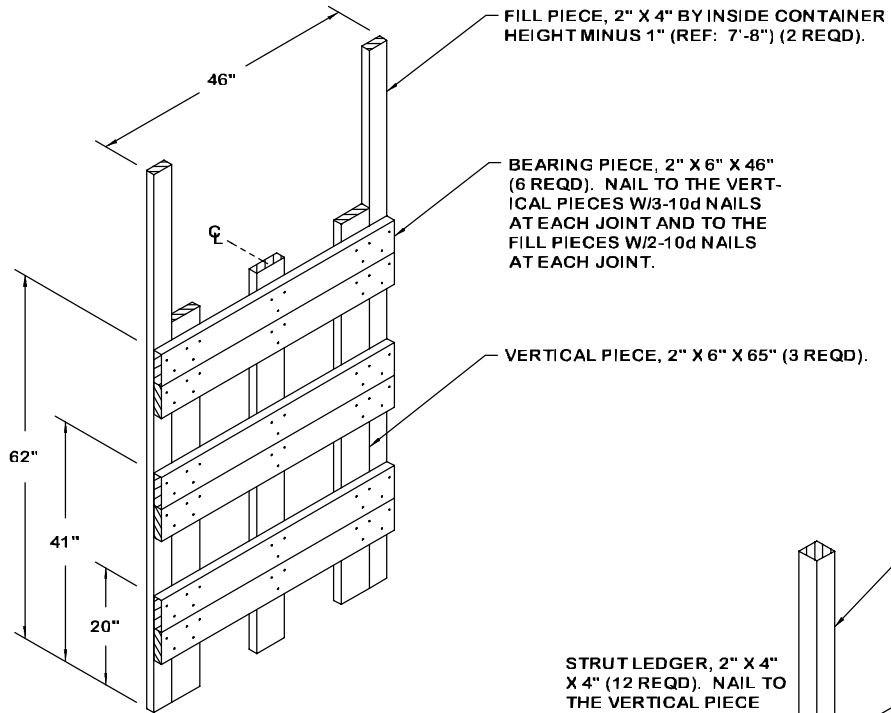


BEAM ASSEMBLY, 2" X 10" BY INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-7") (DOUBLED) (6 REQD). LAMINATE THE SECOND PIECE TO THE FIRST W/11-10d NAILS.

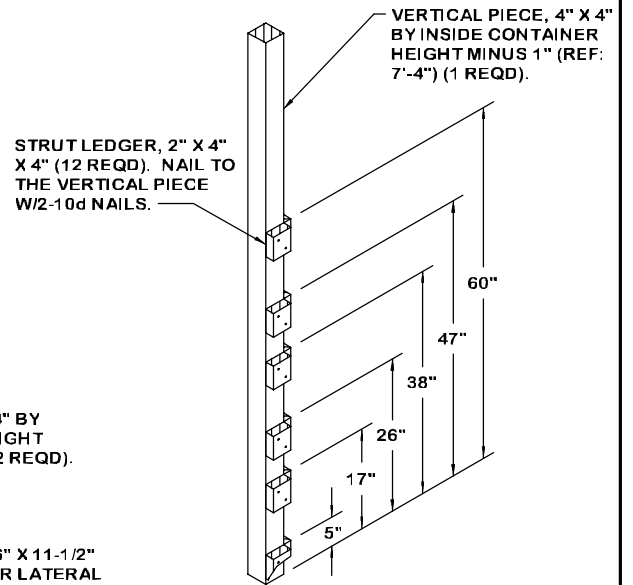
STRUT LEDGER, 2" X 4" X 4" (12 REQD). NAIL TO THE BUFFER PIECE W/2-10d NAILS.

**REAR BLOCKING ASSEMBLY**

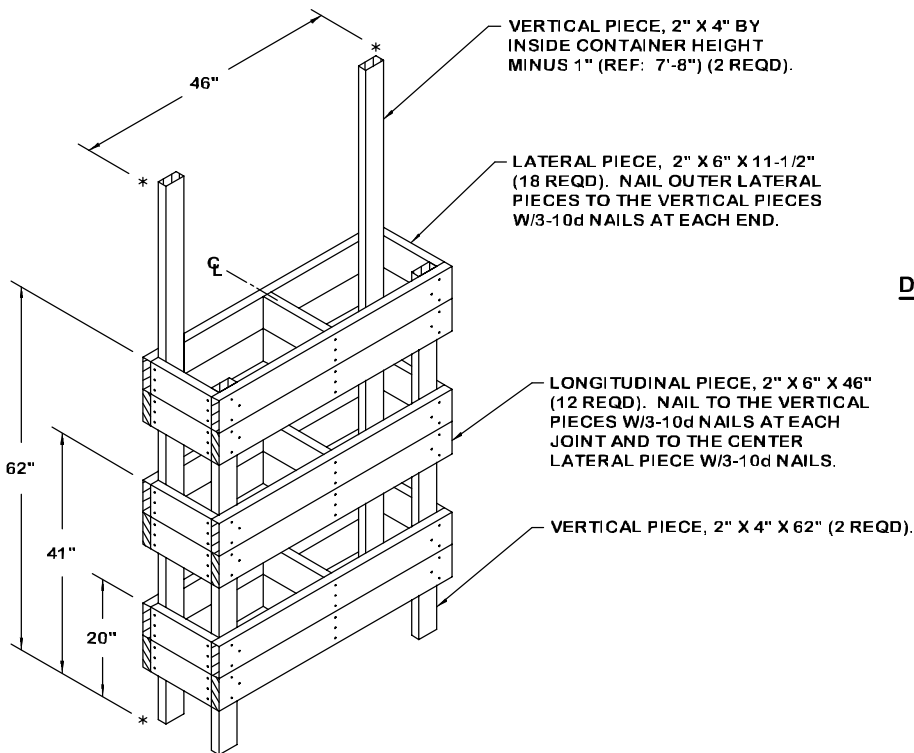
**DETAILS**



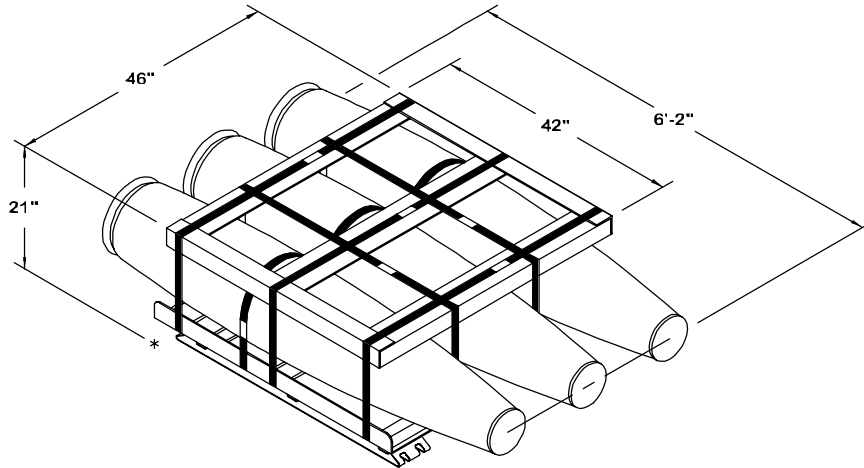
**SIDE FILL ASSEMBLY**



**DOOR POST VERTICAL**

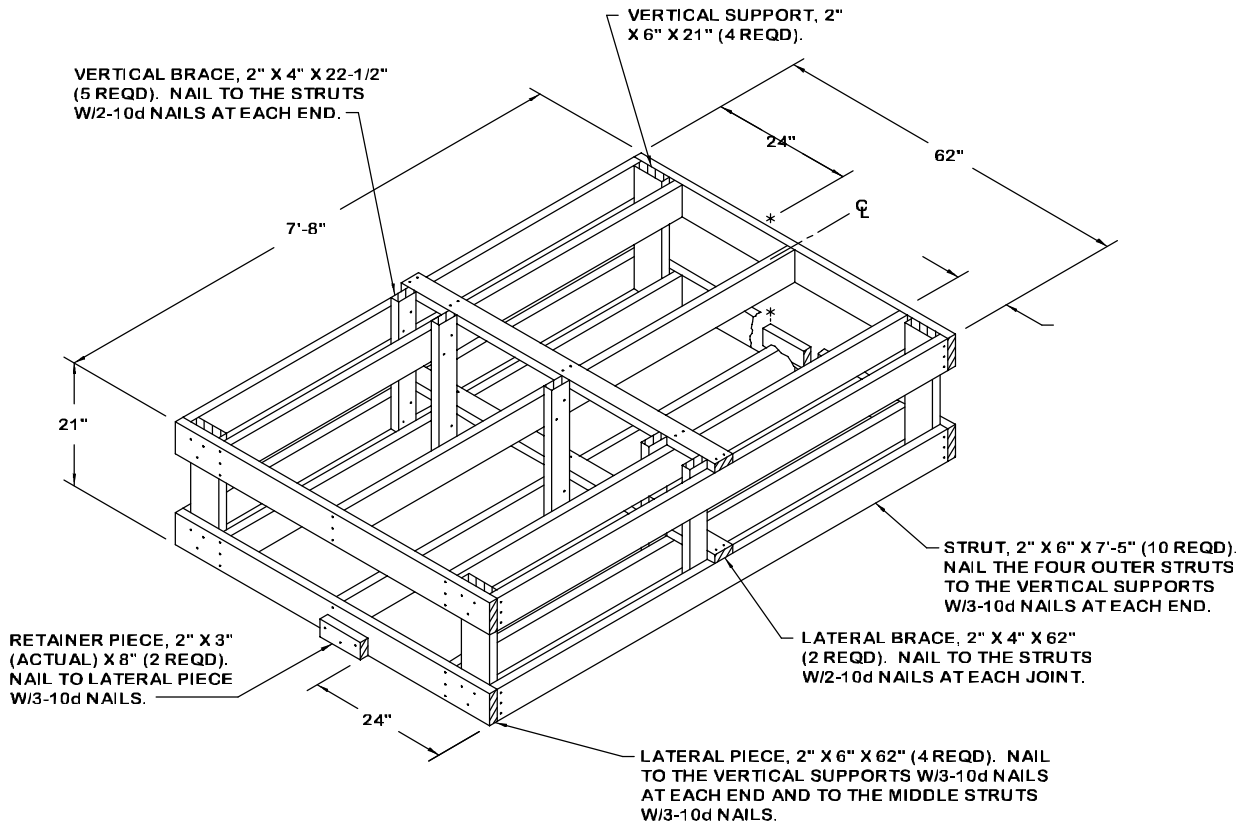


**FILLER ASSEMBLY**



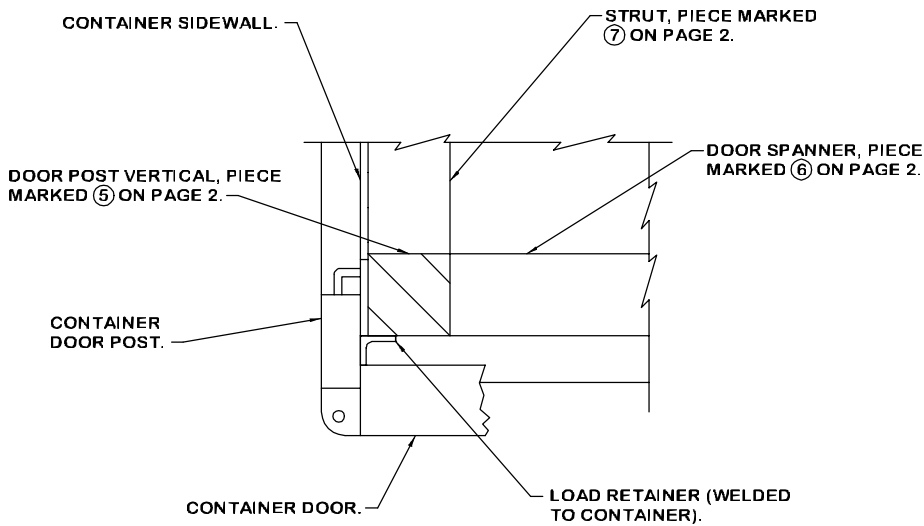
**PALLET UNIT**

UNIT WEIGHT - - - - - 2,949 LBS (APPROX)  
 CUBE - - - - - 41.4 CU FT



**OMITTED UNIT ASSEMBLY**

**NOTE:** THIS OMITTED UNIT ASSEMBLY IS  
 TO BE USED IN PLACE OF TWO PALLET  
 UNITS WHICH HAVE BEEN OMITTED FROM  
 THE MIDDLE OF THE TOP LAYER.

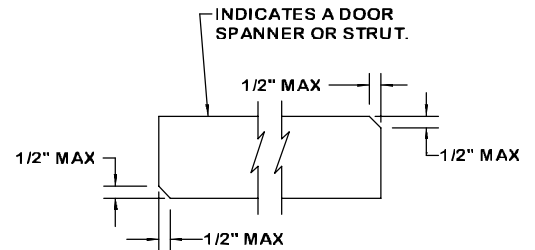


**DETAIL A**

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.

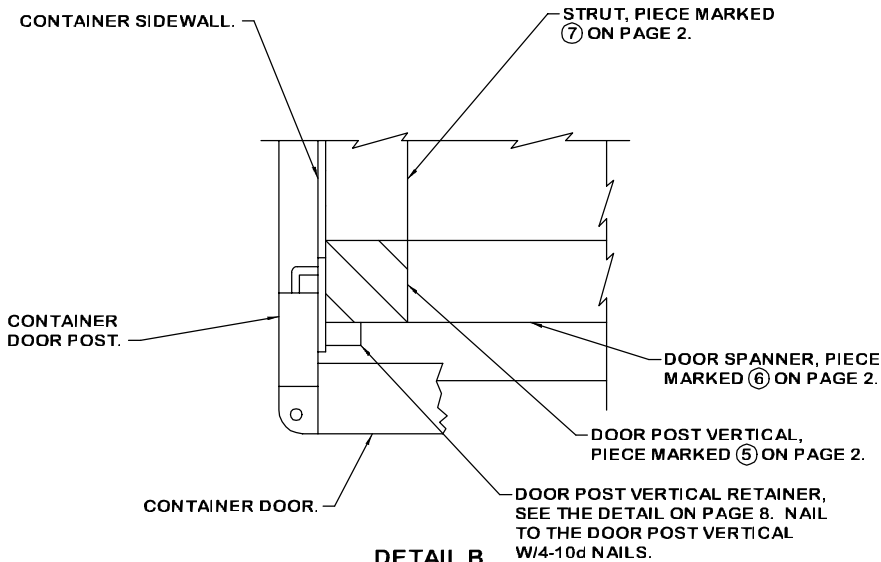
**SPECIAL NOTE:**

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 8 FOR DETAILS OF THE METAL DOOR POST VERTICAL RETAINER.



**BEVEL-CUT**

IF DESIRED, EACH END OF A DOOR SPANNER PIECE OR 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.

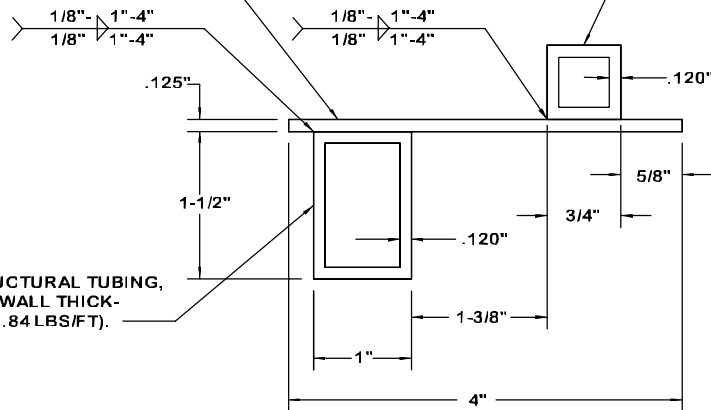


**DETAIL B**

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.

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). SEE SPECIAL NOTE BELOW.



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

**VIEW A**

**SPECIAL NOTE:**

IN MOST CORRUGATED STEEL CONTAINERS, LASHING OR TIE BARS WILL BE PRESENT IN THE SLOT WHERE THE 3/4" SQUARE STRUCTURAL TUBING IS TO BE INSTALLED. TO ENSURE PROPER ENGAGEMENT OF THE SQUARE TUBING AND THE CONTAINER DOOR POST, THE TUBING MUST BE NOTCHED AT THE TIE BAR LOCATIONS.

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

**VIEW A**



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

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.