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# LOADING AND BRACING<sup>⊕</sup> IN SIDE OPENING ISO CONTAINERS OF 105MM CARTRIDGE, M1, M67, M84 OR M327, PACKED IN M152 CYLIN- DRICAL METAL CONTAINERS, PAL- LETIZED

## INDEX

ITEM	PAGE(S)
TYPICAL LOADING PROCEDURES	2
GENERAL NOTES AND MATERIAL SPECIFICATIONS	3
PALLET UNIT DETAIL	4
DETAILS	4-7
LESS-THAN-FULL-LOAD PROCEDURES	8

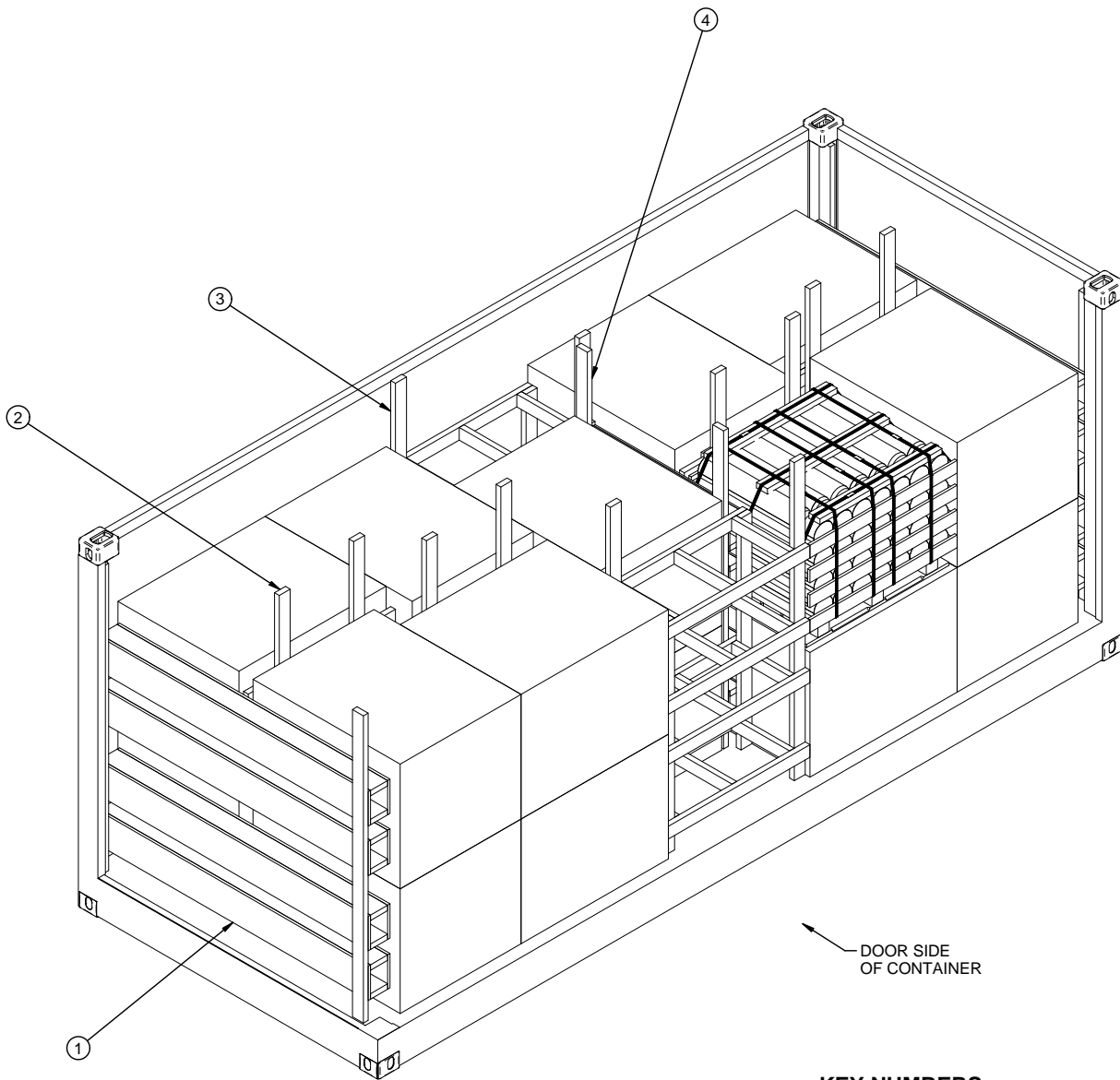
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⊕ THE PROCEDURES SHOWN HEREIN ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC) RAIL, MOTOR, OR WATER CARRIERS.

## U.S. ARMY MATERIEL COMMAND DRAWING

<p>APPROVED, U.S. ARMY JOINT MUNITIONS COMMAND</p>		<p><b>CAUTION: VERIFY PRIOR TO USE AT WWW.DAC.ARMY.MIL THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 8.</b></p>			
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<p>U.S. ARMY DEFENSE AMMUNITION CENTER</p>		<p>ENGINEERING DIRECTORATE</p>	<p>BEAVER.JERRY .W.1230949952 <small>Digitally signed by BEAVER.JERRY.W.1230949952 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=BEAVER.JERRY.W.1230949952 Date: 2011.02.03 09:11:19 -06'00'</small></p>	<p>19</p>	<p>48</p>
				<p>DRAWING</p>	<p>FILE</p>
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**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① END BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5.
- ② CRIB FILL ASSEMBLY (4 REQD). SEE THE DETAIL ON PAGE 7.
- ③ FILLER ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 7.
- ④ CENTER BLOCKING ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 6.

<b>BI LL OF MATERIAL</b>		
<b>LUMBER</b>	<b>LI NEAR FEET</b>	<b>BOARD FEET</b>
2" X 4"	222	243
2" X 6"	115	115
<b>NAI LS</b>	<b>NO. REQD</b>	<b>POUNDS</b>
6d (2")	416	2.4
10d (3")	304	4.7
PLYWOOD, 1/2" - - 24.81 SQ FT REQD - - 34.11 LBS		
PLYWOOD, 3/4" - - 90.78 SQ FT REQD - - 187.2 LBS		

**LOAD AS SHOWN**

<b>ITEM</b>	<b>QUAN TITY</b>	<b>WEI GHT (APPROX)</b>
PALLET UNIT - - - - -	18 - - - - -	38,646 LBS
DUNNAGE - - - - -	- - - - -	945 LBS
CONTAI NER - - - - -	- - - - -	6,050 LBS
<b>TOTAL WEI GHT - - - - -</b>		<b>45,641 LBS (APPROX)</b>

**GENERAL NOTES**

**(GENERAL NOTES CONTINUED)**

- 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 105MM CARTRIDGE, M1, M67, M84 OR M327, PACKED IN M152 CYLINDRICAL METAL CONTAINERS. SUBSEQUENT REFERENCE TO PALLET UNIT HEREIN MEANS THE PALLET UNIT WITH AMMUNITION ITEMS. SEE PAGE 4 AND AMC DRAWING 19-48-4079/4-20PM1002 FOR DETAILS OF THE PALLET UNIT. **CAUTION:** REGARDLESS OF THE QUANTITY OF CONTAINERS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE SIDE OPENING ISO CONTAINER MUST NOT BE EXCEEDED.
- C. THE LOAD AS SHOWN IS BASED ON A 6,050 POUND 20' LONG BY 8' WIDE BY 8'-6" HIGH SIDE OPENING ISO CONTAINER WITH INSIDE DIMENSIONS OF 19'-5-1/4" LONG BY 89-3/4" WIDE BY 88" HIGH, WITH A MAXIMUM GROSS WEIGHT OF 52,910 POUNDS. OLDER/OTHER CONTAINERS MAY HAVE DIFFERENT INSIDE MEASUREMENTS, VERIFY INSIDE CONTAINER DIMENSIONS 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 CRIB FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE TO THE VERTICAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE DIMENSIONS AND/OR QUANTITY OF THE DUNNAGE LUMBER USED MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIZE OF THE PALLET UNIT AND/OR THE CONTAINER.
- 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 BE-SIDE A NAIL IN A LOWER PIECE.
- G. IN SOME CONTAINERS THERE IS A SLOT AT THE CORNERS OF THE ENDWALL. PIECES OF DUNNAGE MATERIAL MUST BE LAMINATED TO THE BUFFER PIECES ON THE END 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 ENDWALLS, 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. 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:

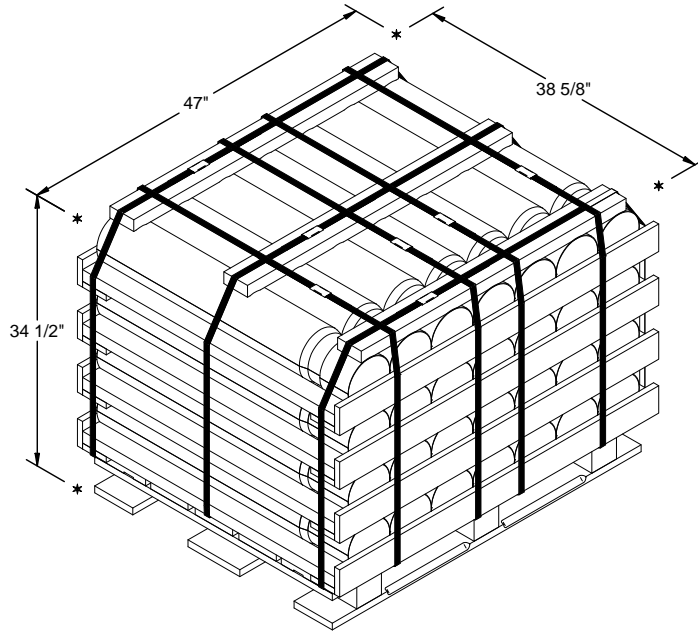
- 1. A LOADED CONTAINER MUST BE ON A CHASSIS EQUIPPED WITH TWO BOGIE ASSEMBLIES WHEN BEING MOVED IN TOFC SERVICE.
- 2. THE LOAD LIMIT OF A T/COFC RAILCAR MUST NOT BE EXCEEDED, NOR WILL A CAR BE LOADED SO THAT THE TRUCK UNDER ONE END OF THE CAR CARRIES MORE THAN ONE-HALF OF THE LOAD LIMIT FOR THAT CAR.

(CONTINUED AT RIGHT)

- 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 "LESS-THAN-FULL-LOAD PROCEDURES" ON PAGE 8.
  - 1. IF A LOAD IS REDUCED BY ONLY A SMALL AMOUNT (ONE, TWO OR THREE 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 THREE LADING UNITS), LADING UNITS SHOULD BE ELIMINATED AS REQUIRED AND THE VOID IN THE LONGITUDINAL CENTER OF THE CONTAINER 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. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:
  - 1. PREFABRICATE TWO END BLOCKING ASSEMBLIES, FOUR CRIB FILL ASSEMBLIES AND TWO FILLER ASSEMBLIES. THE CENTER BLOCKING ASSEMBLY MAY BE PARTIALLY ASSEMBLED AT THIS TIME BUT CANNOT BE COMPLETED UNTIL THE REQUIRED THICKNESS OF THE BUFFER PIECES OR THE NUMBER OF THE FILL PIECES IS DETERMINED.
  - 2. INSTALL ONE END BLOCKING ASSEMBLY AND LOAD FOUR PALLET UNITS.
  - 3. INSTALL TWO CRIB FILL ASSEMBLIES AND LOAD FOUR PALLET UNITS.
  - 4. REPEAT STEPS 2 AND 3.
  - 5. INSTALL ONE FILLER ASSEMBLY.
  - 6. LOAD TWO PALLET UNITS.
  - 7. MEASURE THE VOID BETWEEN THE PALLET UNITS AT THE CENTER OF THE CONTAINER AND COMPLETE THE CENTER BLOCKING ASSEMBLY.
  - 8. INSTALL THE CENTER BLOCKING ASSEMBLY WITH THE BUFFER PIECES AGAINST THE CENTER TWO PALLET UNITS.
  - 9. INSTALL THE REMAINING FILLER ASSEMBLY.

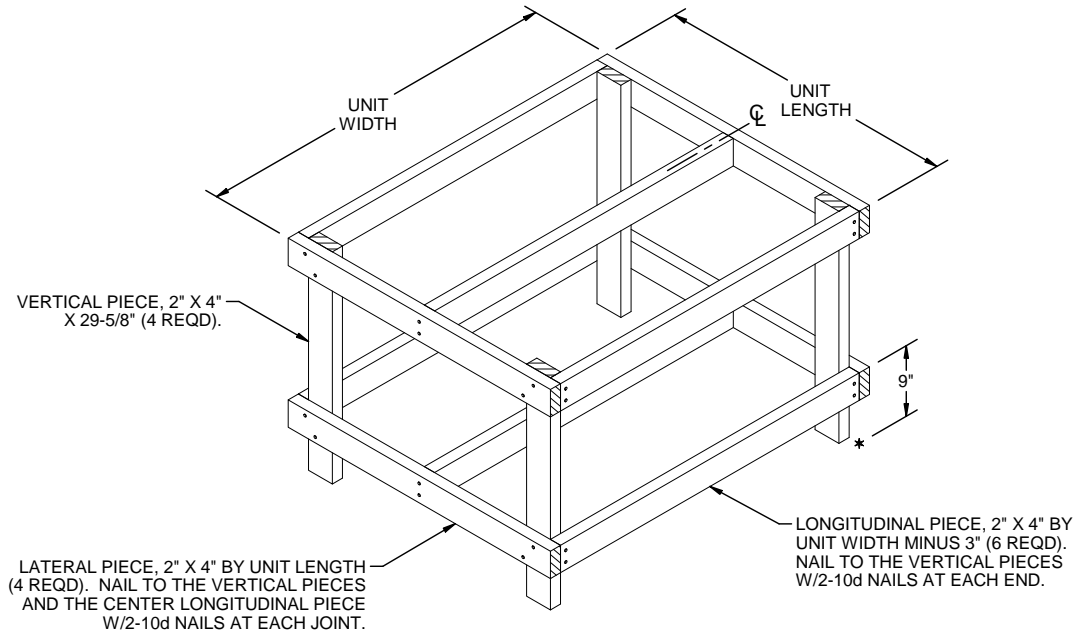
**MATERIAL SPECIFICATIONS**

- LUMBER** - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
- NAILS** - - - - - : ASTM F1667; COMMON STEEL NAIL NLCMS OR NLCMMS).
- PLYWOOD** - - - - - : COMMERCIAL ITEM DESCRIPTION A-A-55057, 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.
- WIRE, CARBON STEEL** - : ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.



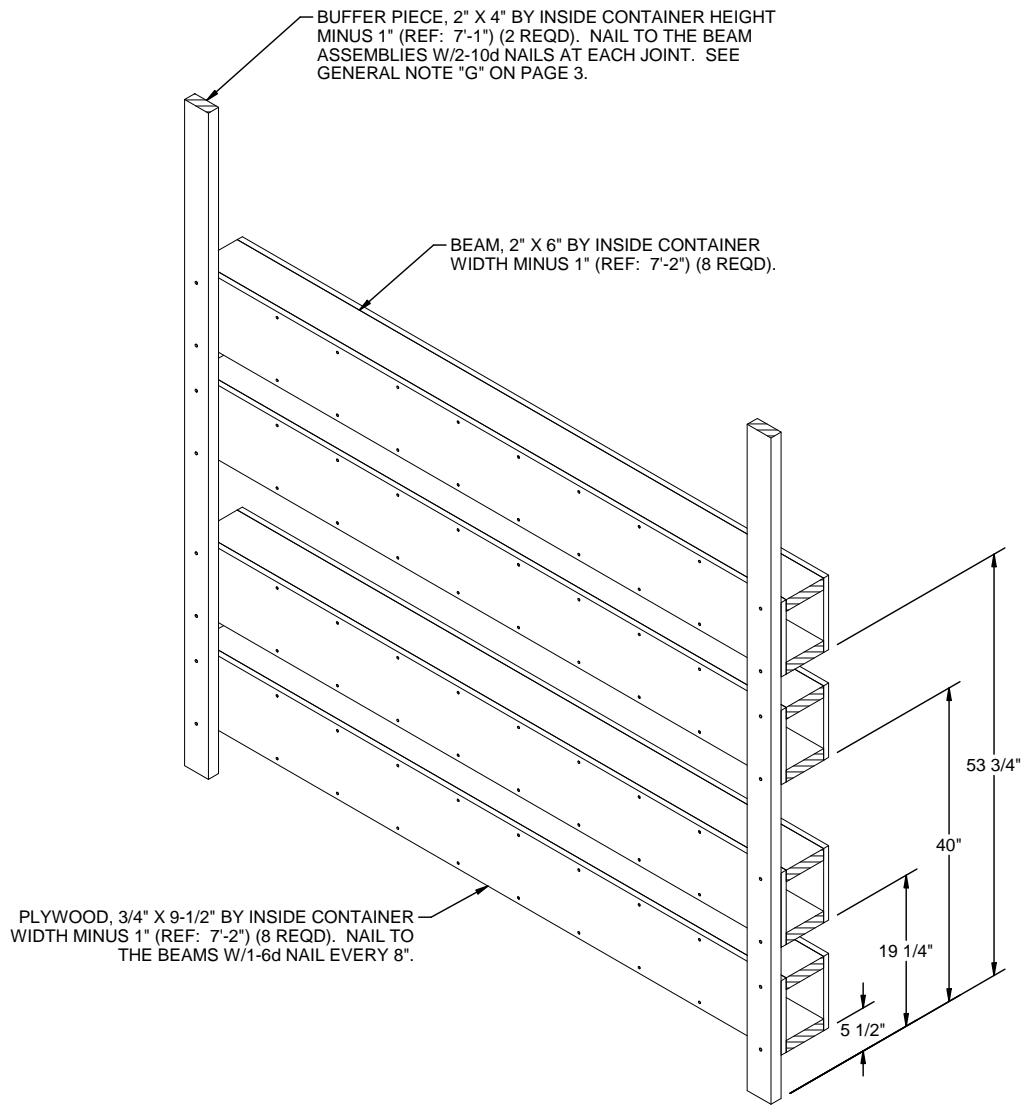
**PALLET UNIT DATA**

GROSS WEIGHT - - - - - 2,147 LBS  
 CUBE - - - - - 36.2 CU FT

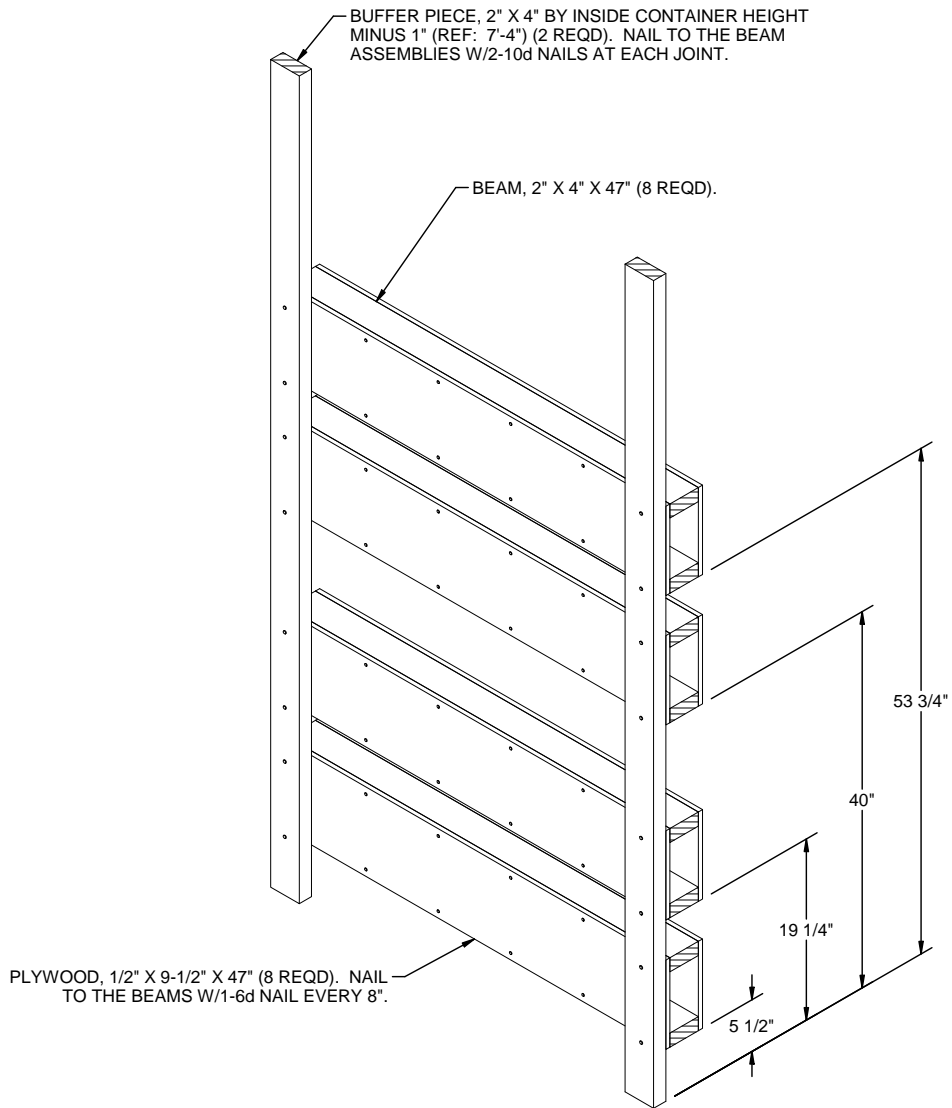


**OMITTED UNIT ASSEMBLY**

THIS ASSEMBLY IS FOR USE IN PLACE OF AN OMITTED PALLET UNIT. OMITTED UNIT ASSEMBLY MUST BE WIRE TIED TO AN ADJACENT PALLET UNIT STRAP, CRIB OR FILLER ASSEMBLY TO PREVENT UNDUE MOVEMENT. NO MORE THAN THREE OMITTED UNIT ASSEMBLIES WILL BE USED PER LOAD. DO NOT INSTALL AN OMITTED UNIT ASSEMBLY IMMEDIATELY ADJACENT TO ANOTHER OMITTED UNIT ASSEMBLY.

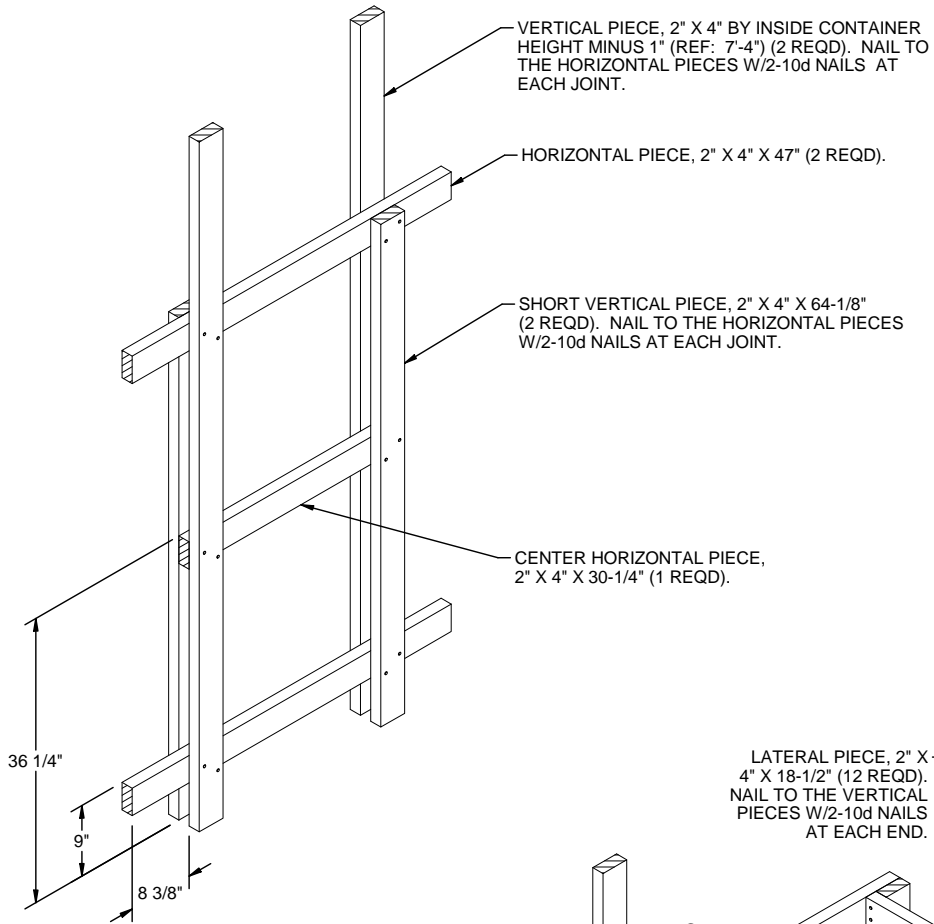


**END BLOCKING ASSEMBLY**  
 FOR AN ONE-HIGH LOAD, ELIMINATE THE TOP TWO BEAM ASSEMBLIES.



**CENTER BLOCKING ASSEMBLY**

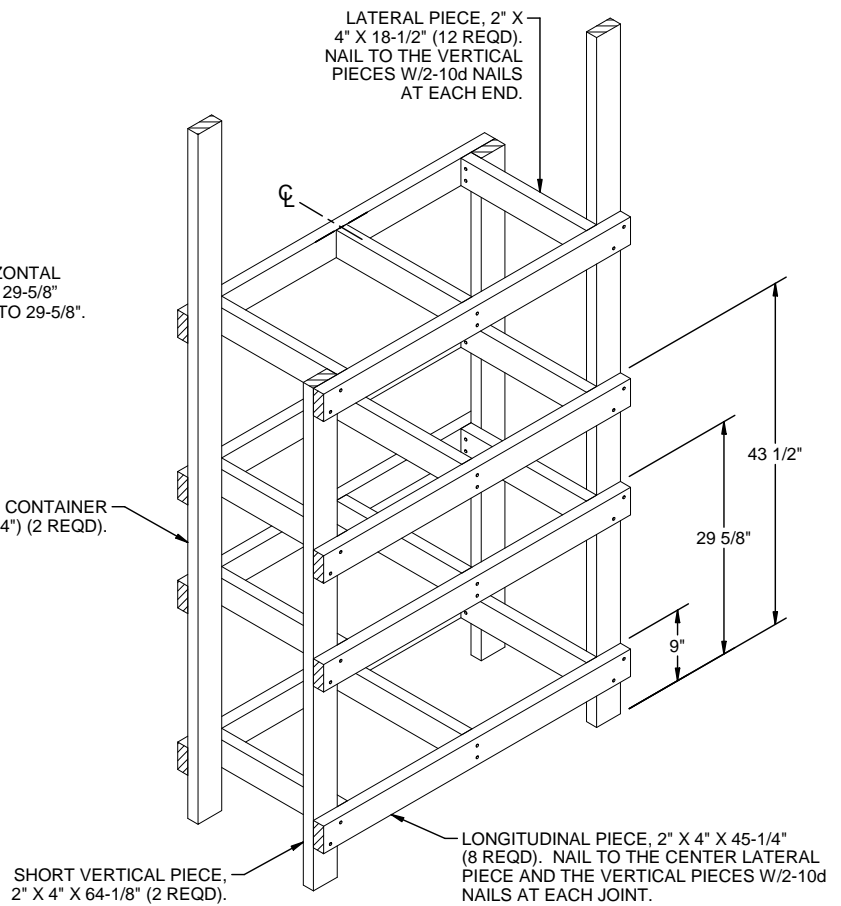
FOR AN ONE-HIGH LOAD, ELIMINATE THE TOP TWO BEAM ASSEMBLIES.



**CRIB FILL ASSEMBLY**

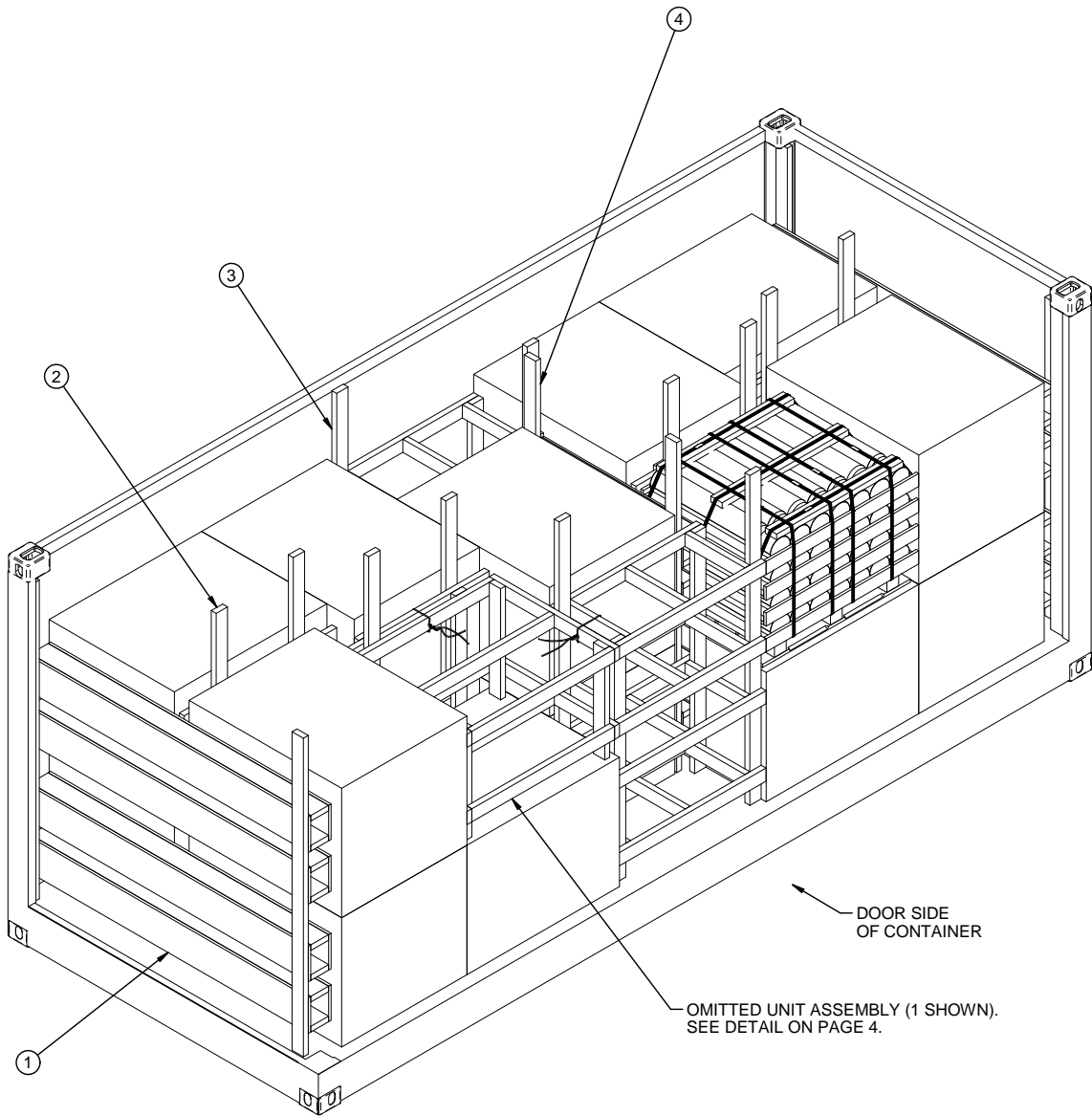
FOR AN ONE-HIGH LOAD, ELIMINATE THE CENTER HORIZONTAL PIECE, AND SHORTEN THE SHORT VERTICAL PIECES TO 29-5/8" AND LOWER THE TOP HORIZONTAL PIECE FROM 64-1/8" TO 29-5/8".

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



**FILLER ASSEMBLY**

FOR AN ONE-HIGH LOAD, ELIMINATE THE TOP TWO LAYERS OF LONGITUDINAL AND LATERAL PIECES, AND SHORTEN THE SHORT VERTICAL PIECES TO 29-5/8".



**LESS-THAN-FULL-LOAD PROCEDURES**

KEY NUMBERS REFER TO THE KEY NUMBERS ON PAGE 2.  
SEE GENERAL NOTES "H" AND "P" ON PAGE 3.