

# LOADING AND BRACING<sup>⊕</sup> IN SIDE OPENING ISO CONTAINERS OF M93 WIDE AREA MUNITION (WAM), OR M98 WAM TRAINER, PACKED IN PA160 CYLINDRICAL METAL CONTAINERS, ON METAL PALLETS

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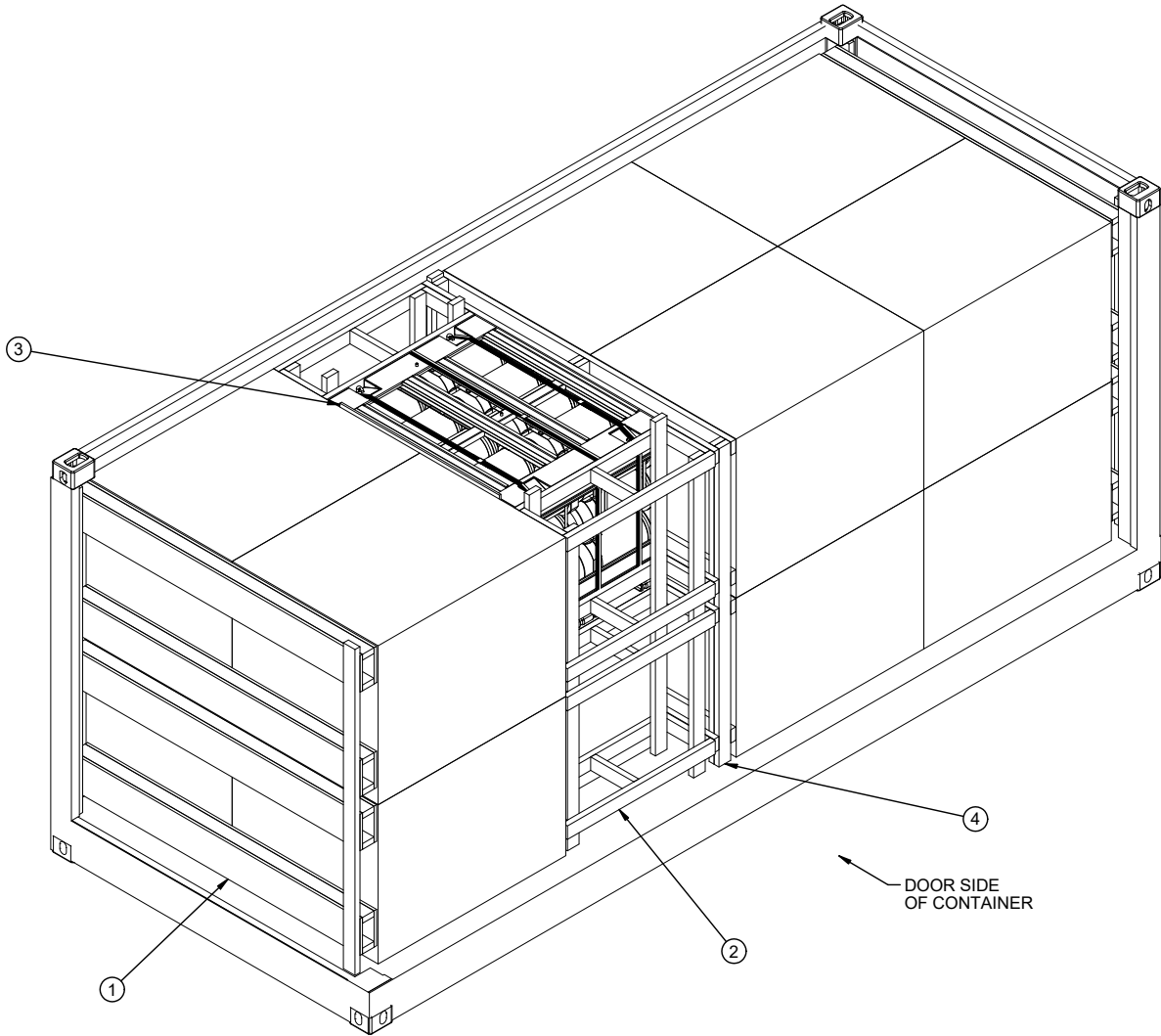
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⊕ THE PROCEDURES SHOWN HEREIN ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC) RAIL, MOTOR, OR WATER CARRIERS.

## U.S. ARMY MATERIEL COMMAND DRAWING

<p>APPROVED, U.S. ARMY JOINT MUNITIONS COMMAND</p> <p>RUS.ALLEN.J .1230354282</p> <p><small>Digitally signed by RUS.ALLEN.J.1230354282 DN: cn=US, ou=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=RUS.ALLEN.J.1230354282 Date: 2018.02.08 13:00:39 -06'00'</small></p>		<p><b>CAUTION: VERIFY PRIOR TO USE AT <a href="https://mhp.redstone.army.mil">HTTPS://MHP.REDSTONE.ARMY.MIL</a> THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 6.</b></p>				
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<p>APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND</p> <p>SHIMP.UPTON .R.1231257183</p> <p><small>Digitally signed by SHIMP.UPTON.R.1231257183 Date: 2018.02.21 09:18:58 -06'00'</small></p>		ENGINEERING DIVISON	<p>FIEFFER.LAUR A.A.1230375727</p> <p><small>Digitally signed by FIEFFER.LAURA.1230375727 DN: cn=US, ou=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=FIEFFER.LAURA.A.1230375727 Date: 2018.01.09 08:04:11 -06'00'</small></p>			
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**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① END BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5.
- ② SIDE FILL ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5.
- ③ SEPARATOR GATE (1 REQD). INSTALL WITH THE HOLD-DOWN PIECES TOWARD THE CROSSWISE PALLET UNIT. SEE THE DETAIL ON PAGE 6.
- ④ CENTER FILL ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 6.

**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	388	259
NAI LS	NO. REQD	POUNDS
6d (2")	352	2-1/8
10d (3")	296	4-5/8
PLYWOOD, 1/2"	28.0 SQ FT REQD	38.5 LBS
PLYWOOD, 3/4"	91.9 SQ FT REQD	189.4 LBS

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	14	29,092 LBS
DUNNAGE		753 LBS
CONTAINER		6,050 LBS
<b>TOTAL WEIGHT</b>		<b>35,895 LBS (APPROX)</b>

## GENERAL NOTES

- 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 UNLOADING PROCEDURES ARE APPLICABLE TO LOADS OF M93 WIDE AREA MUNITION (WAM), OR M98 WAM TRAINER PACKED IN PA160 CYLINDRICAL METAL CONTAINERS. SUBSEQUENT REFERENCE TO PALLET UNIT HEREIN MEANS THE PALLET UNIT WITH AMMUNITION ITEMS. SEE PAGE 4 AND AMC DRAWING 19-48-4231/100-20PM1006 FOR DETAILS OF THE PALLET UNIT. **CAUTION:** REGARDLESS OF THE QUANTITY OF PALLET UNITS 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 6,500 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 1-3/4". THE LOADS MUST BE AS TIGHT AS POSSIBLE LONGITUDINALLY, BUT THE VOID MUST NOT EXCEED 3/4" OVERALL. EXCESSIVE SLACK CAN BE ELIMINATED BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO HORIZONTAL PIECES ON THE CENTER FILL ASSEMBLY FOR THE LOAD ON PAGE 2 OR INCREASE THE LENGTH OF STRUTS FOR THE LOAD ON PAGE 7. NAIL EACH ADDITIONAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12".
- E. 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.
- F. 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.
- G. 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.
- 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.
- 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:
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.

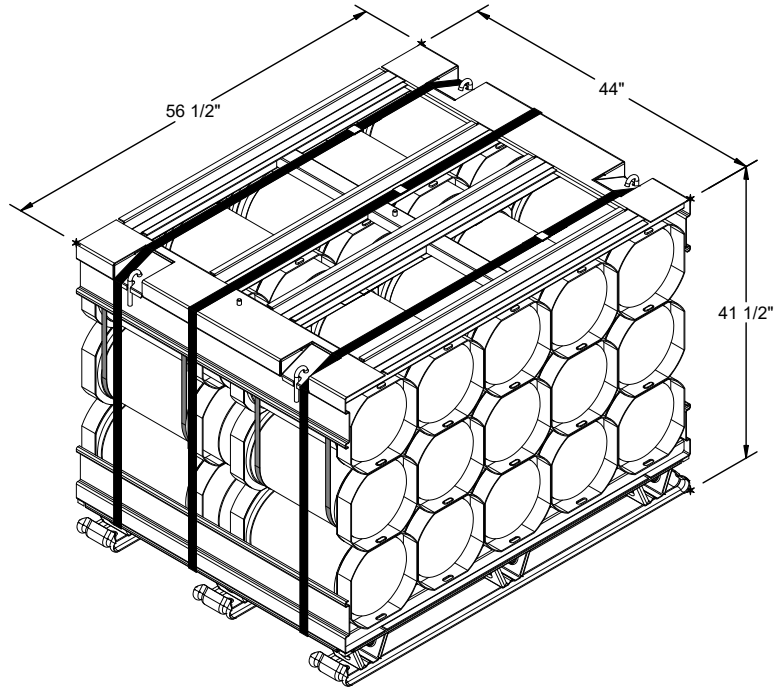
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## (GENERAL NOTES CONTINUED)

- 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 PALLET UNITS SHOWN IN THE LOAD ON PAGE 2 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE "LESS-THAN-FULL LOAD PROCEDURE" ON PAGE 6.
- P. 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.
- Q. RECOMMENDED SEQUENTIAL LOADING PROCEDURES (LOAD ON PAGE 2):
1. PREFABRICATE TWO END BLOCKING ASSEMBLIES, TWO SIDE FILL ASSEMBLIES, CENTER FILL ASSEMBLY, AND SEPARATOR GATE.
  2. INSTALL THE TWO END BLOCKING ASSEMBLIES.
  3. LOAD 12 PALLET UNITS.
  4. INSTALL THE FIRST SIDE FILL ASSEMBLY.
  5. INSTALL THE SEPARATOR GATE AND LOAD THE LAST TWO PALLET UNITS.
  6. INSTALL THE CENTER FILL ASSEMBLY.
  7. INSTALL THE LAST SIDE FILL ASSEMBLY.
- R. RECOMMENDED SEQUENTIAL LOADING PROCEDURES (LOAD ON PAGE 7):
1. PREFABRICATE TWO END BLOCKING ASSEMBLIES, TWO CENTER GATE ASSEMBLIES, AND FILEER ASSEMBLY.
  2. INSTALL THE TWO END BLOCKING ASSEMBLIES.
  3. LOAD 11 PALLET UNITS.
  4. INSTALL TWO CENTER GATE ASSEMBLIES.
  5. INSTALL THE FILLER ASSEMBLY AND TIE TO THE CENTER GATE ASSEMBLY OR ADJACENT PALLET UNITS WITH TIE WIRE.
  6. MEASURE AND INSTALL 12 CUT-TO-FIT STRUTS.

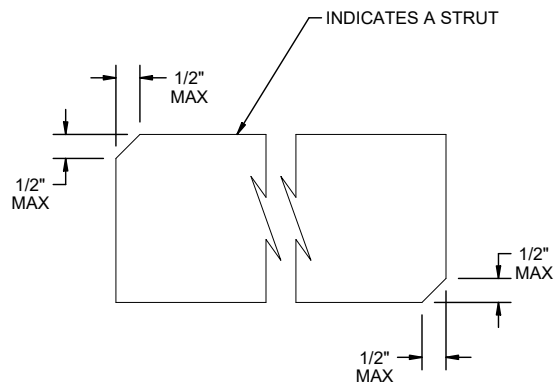
## MATERIAL SPECIFICATIONS

- 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.



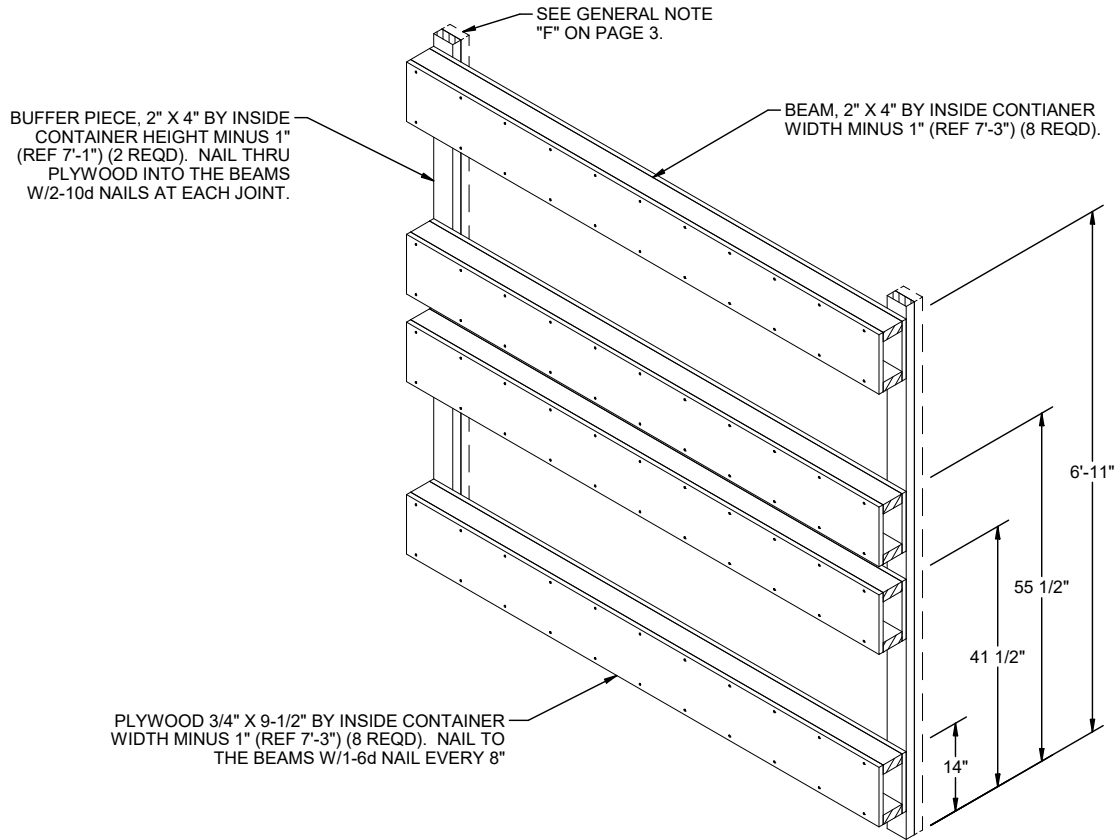
**PALLET UNIT DATA**

GROSS WEIGHT - - - - - 2,078 LBS (APPROX)  
 CUBE - - - - - 59.7 CU FT (APPROX)



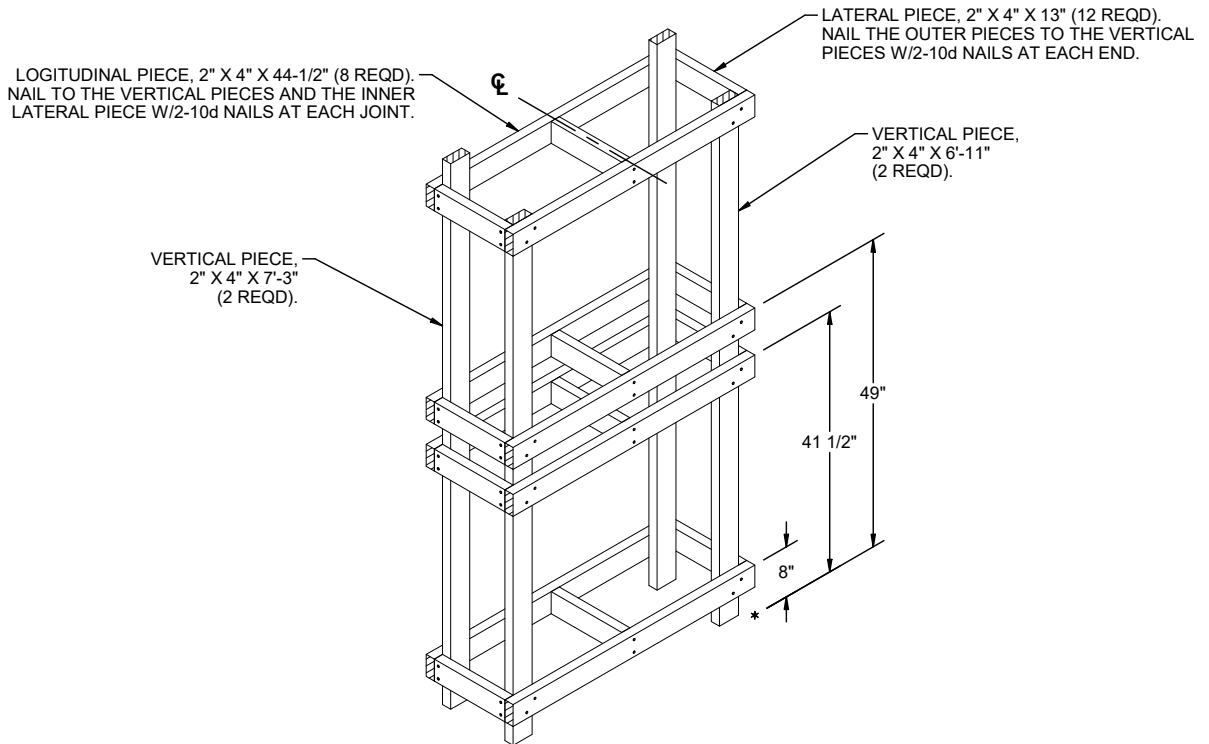
**BEVEL CUT**

IF DESIRED, EACH END OF A STRUT OR DOOR SPANNER MAY BE BEVEL-CUT AS SHOWN ABOVE TO FACILITATE INSTALLING THE STRUTS WITH A "DRIVE" FIT.



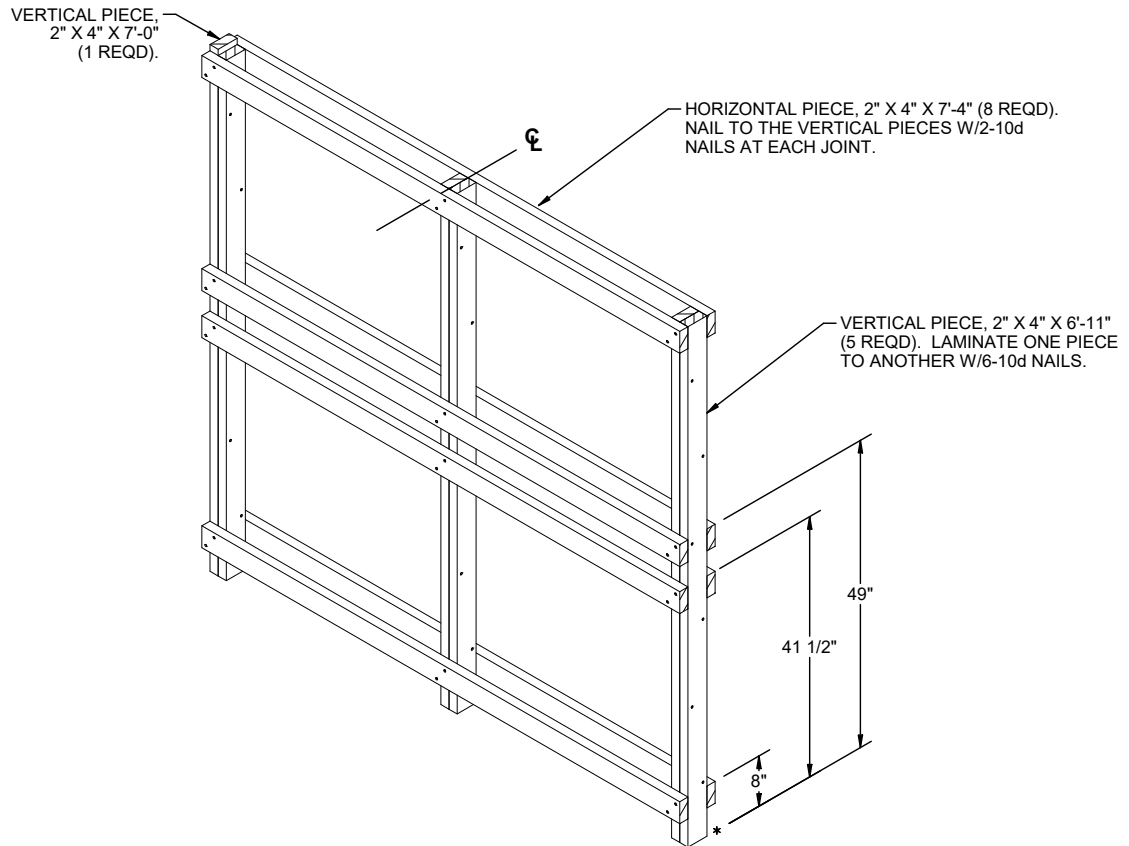
**END BLOCKING ASSEMBLY**

THE DETAIL ABOVE DEPICTS A END BLOCKING ASSEMBLY TO BE USED WITH A TWO HIGH LOAD. FOR A ONE HIGH LOAD ELIMINATE THE TOP TWO BOX BEAM ASSEMBLIES.



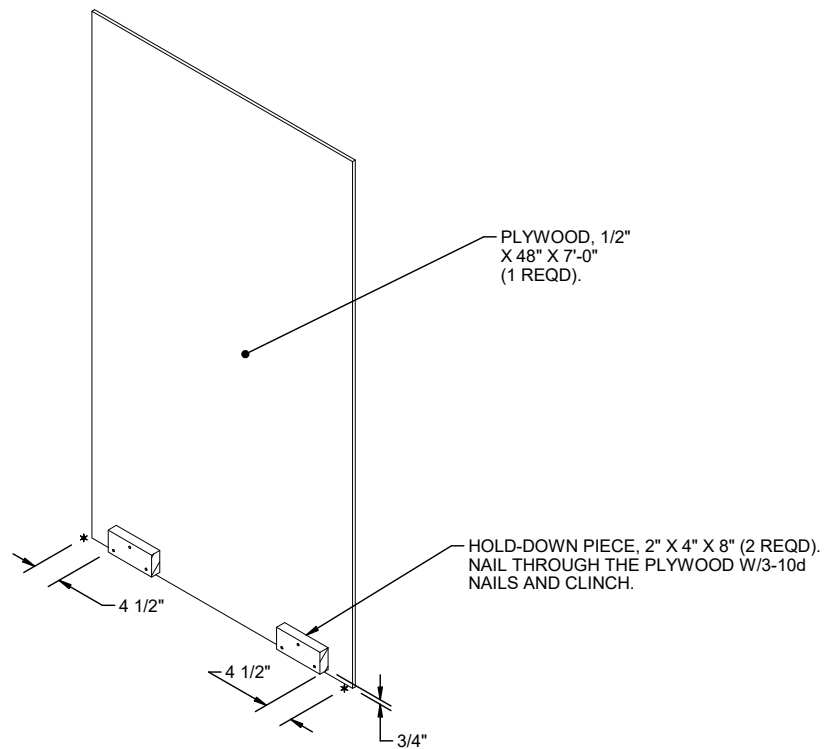
**SIDE FILL ASSEMBLY**

THE DETAIL ABOVE DEPICTS A SIDE FILL ASSEMBLY TO BE USED WITH A TWO HIGH LOAD. FOR A ONE HIGH LOAD ELIMINATE THE TOP FOUR LOGITUDINAL PIECES, THE TOP SIX LATERAL PIECES, AND SHORTEN THE 6'-11" VERTICAL PIECES TO 41-1/2".



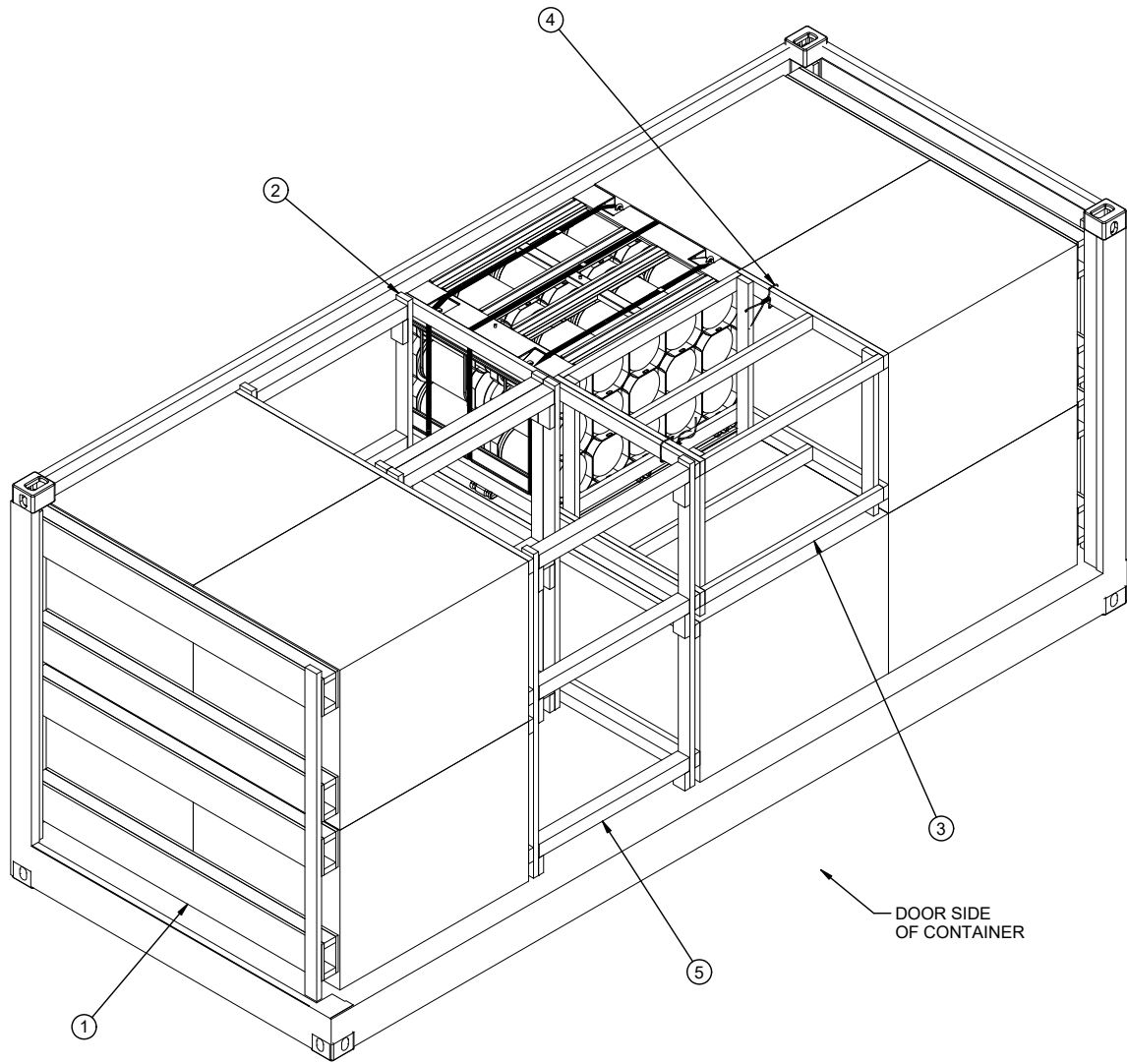
**CENTER FILL ASSEMBLY**

THE DETAIL ABOVE DEPICTS A CENTER FILL ASSEMBLY TO BE USED WITH A TWO HIGH LOAD. FOR A ONE HIGH LOAD ELIMINATE THE TOP FOUR HORIZONTAL PIECES AND SHORTEN THE INNER FOUR VERTICAL PIECES TO 41-1/2".



**SEPARATOR GATE**

FOR A ONE HIGH LOAD, REDUCE THE HEIGHT OF THE PLYWOOD TO 42".



**ISOMETRIC VIEW**

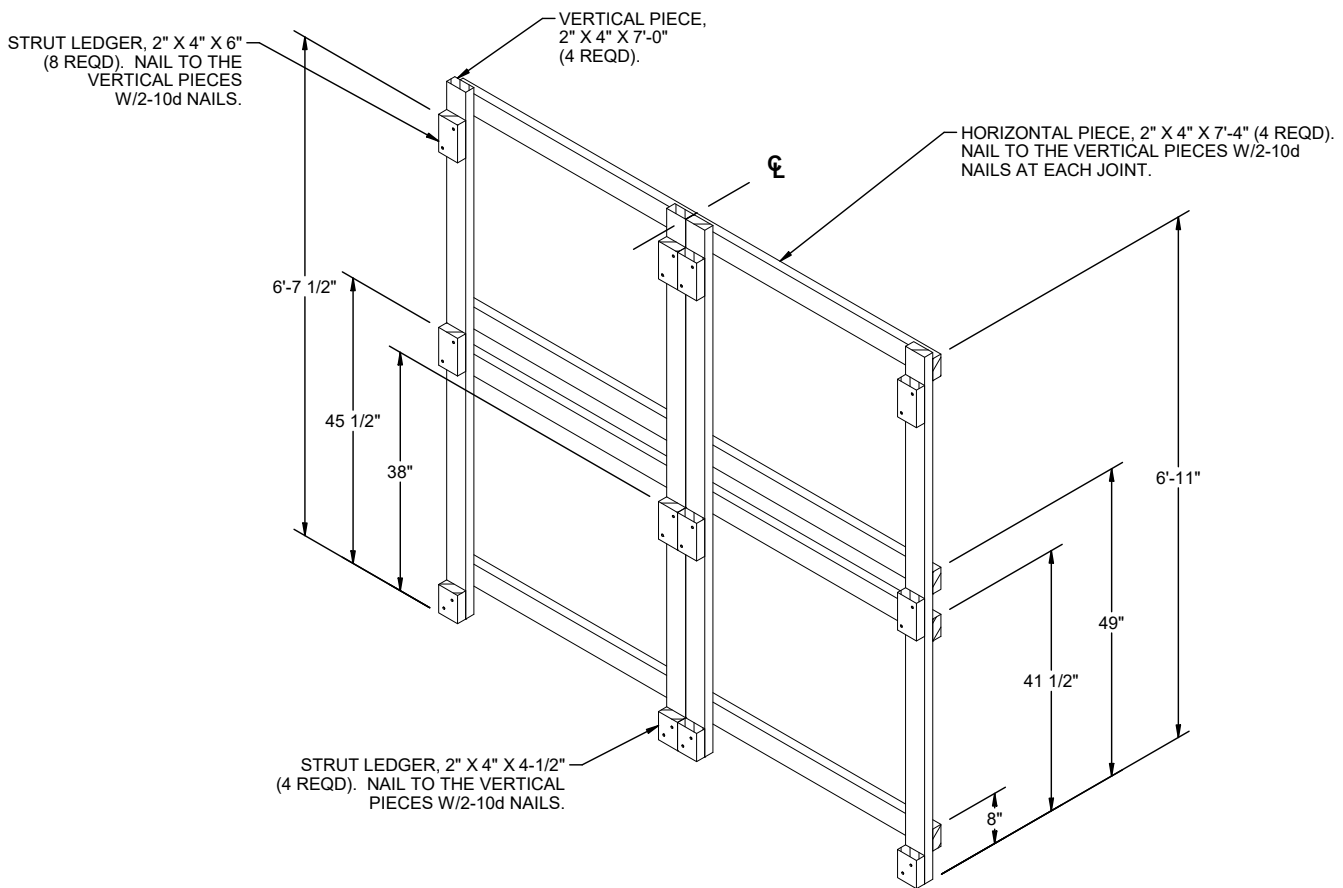
**KEY NUMBERS**

- ① END BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5.
- ② CENTER GATE (2 REQD). SEE THE DETAIL ON PAGE 8.
- ③ FILLER ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 8.
- ④ TIE WIRE, .0800 BY 24" LONG (2 REQD). INSTALL TO FORM A COMPLETE LOOP AROUND THE FILLER ASSEMBLY AND AN ADJACENT PALLET UNIT OR CENTER GATE ASSEMBLY. BRING ENDS TOGETHER AND TWIST TAUT.
- ⑤ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 45-1/2") (12 REQD). TOENAIL TO THE HORIZONTAL PIECES OF THE CENTER GATE ASSEMBLIES W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 4.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	325	217
4" X 4"	46	61
NAILS	NO. REQD	POUNDS
6d (2")	352	2-1/8
10d (3")	216	3-3/8
12d (3-1/4")	48	1
PLYWOOD, 3/4" - - 91.9 SQ FT REQD - - 189.4 LBS		

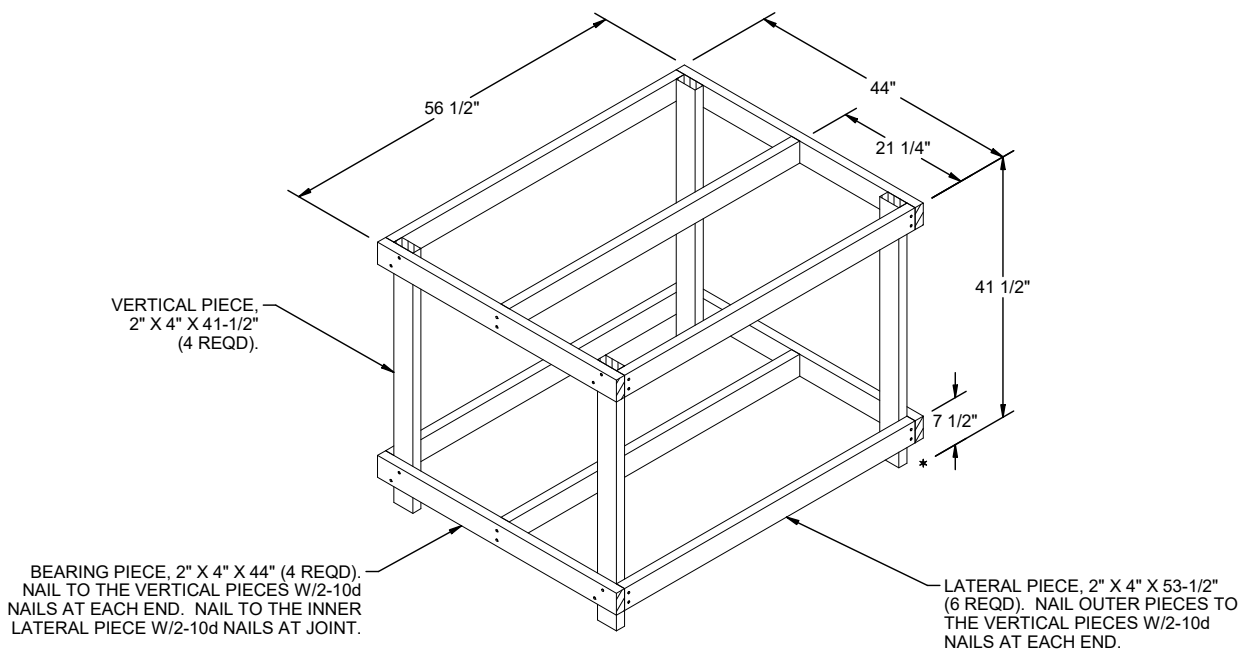
**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	11	22,858 LBS
DUNNAGE		752 LBS
CONTAINER		6,050 LBS
<b>TOTAL WEIGHT</b>		<b>29,660 LBS (APPROX)</b>



**CENTER GATE**

THE DETAIL ABOVE DEPICTS A CENTER GATE ASSEMBLY TO BE USED WITH A TWO HIGH LOAD. FOR A ONE HIGH LOAD, ELIMINATE THE TOP TWO HORIZONTAL PIECES AND TOP FOUR STRUT LEDGERS, SHORTEN THE TWO MIDDLE VERTICAL PIECES TO 44", AND RELOCATION THE TWO OUTER MIDDLE STRUT LEDGERS TO 38".



**FILLER ASSEMBLY**

FOR MINUS ONE PALLET UNIT. NO MORE THAN THREE FILLER ASSEMBLIES MAY BE USED PER TWO HIGH LOAD, AND NO MORE THAN ONE FILLER ASSEMBLY MAY BE USED PER ONE HIGH LOAD.