

# LOADING AND BRACING<sup>⊕</sup> IN END OPENING ISO CONTAINERS OF CHARGE, DEMOLITION, LINEAR, HE M58, M58A1, M58A2 & M58A4, AND PRACTICE M68A1, IN METAL SHIPPING AND STORAGE CONTAINERS

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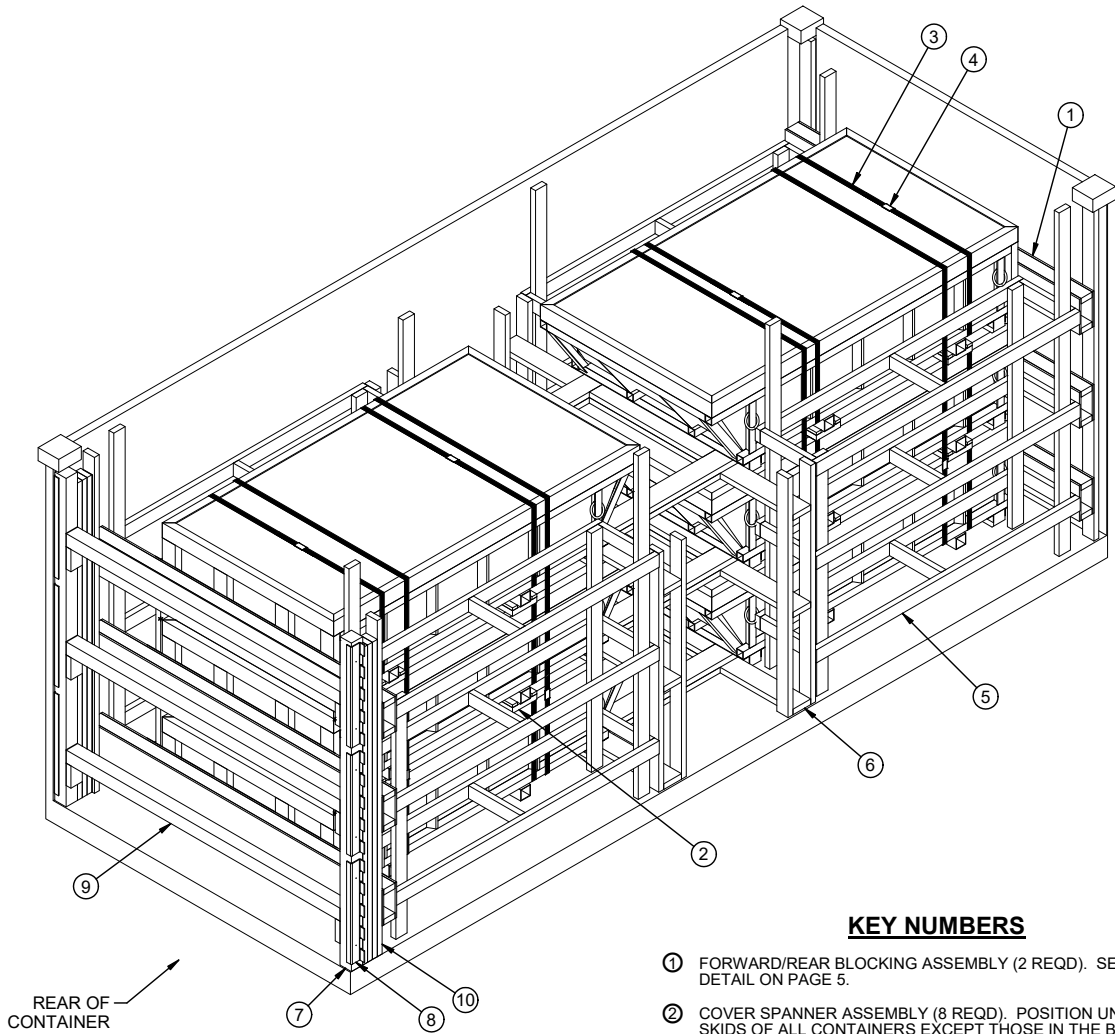
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REAR OF CONTAINER

**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① FORWARD/REAR BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5.
- ② COVER SPANNER ASSEMBLY (8 REQD). POSITION UNDER THE SKIDS OF ALL CONTAINERS EXCEPT THOSE IN THE BOTTOM LAYER, WITH THE STOP PIECES ON THE UPPER SIDE. SEE DETAIL ON PAGE 5.
- ③ UNITIZATION STRAP, 1-1/4" X .035" OR .031" OR .029" BY LENGTH TO SUIT (REF: 22'-0") (4 REQD, 2 PER STACK). INSTALL TO EN-CIRCLE EACH STACK OF THREE CONTAINERS.
- ④ SEAL FOR 1-1/4" STRAPPING (4 REQD). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES.
- ⑤ SIDE FILL ASSEMBLY (4 REQD). SEE THE DETAIL ON PAGE 6.
- ⑥ CENTER FILL ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 6.
- ⑦ DOOR POST VERTICAL (2 REQD). SEE THE DETAIL ON PAGE 5, "DETAIL A" ON PAGE 7, AND GENERAL NOTE "Q" ON PAGE 3.
- ⑧ UNIVERSAL LOAD RETAINER (6 REQD, 3 PER SIDE). NAIL THROUGH THE HOLES INTO THE DOOR POST VERTICAL W/2-10d NAILS. SEE DEPARTMENT OF ARMY DRAWING DA-116, "DETAIL A" ON PAGE 7, AND GENERAL NOTE "Q" ON PAGE 3.
- ⑨ DOOR SPANNER. 4" X 4" MATERIAL CUT TO A LENGTH THAT WILL PROVIDE A DRIVE FIT (REF: 7'-1-1/4") (3 REQD). TOENAIL TO THE DOOR POST VERTICAL W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 7.
- ⑩ FILL MATERIAL, 4" WIDE BY 7'-1" LONG MATERIAL (AS REQD). NAIL THE FIRST PIECE TO THE REAR BLOCKING ASSEMBLY W/6 NAILS OF A SUITABLE SIZE (10d FOR 2" THICK MATERIAL). NAIL EACH ADDITIONAL PIECE TO THE PREVIOUS PIECE IN A SIMILAR MANNER. **NOTE:** MULTIPLE PIECES MAY BE LAMINATED TOGETHER FIRST AND THEN TOENAILED TO THE REAR BLOCKING ASSEMBLY. SEE "DETAIL A" ON PAGE 7.

**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	521	347
2" X 6"	103	103
4" X 4"	36	48
NAI LS	NO. REQD	POUNDS
6d (2")	264	1-3/4
10d (3")	486	7-1/2
12d(3-1/4")	12	1/4
PLYWOOD, 1/2"	- - 72.00 SQ FT REQD	- -148.75 LBS
STEEL STRAPPING, 1-1/4"	- 88' REQD	- - 12.57 LBS
SEAL FOR 1-1/4" STRAPPING	- 4 REQD	- - 0.18 LBS
UNIVERSAL LOAD RETAINER	- - 6 REQD	- - 39.00 LBS

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
CONTAINER	6	18,000 LBS
DUNNAGE		1,168 LBS
ISO CONTAINER		4,700 LBS
<b>TOTAL WEIGHT</b>		<b>23,868 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 OUTLOADING PROCEDURES ARE APPLICABLE TO LOADS OF HE M58, M58A1, M58A2 & M58A4 AND PRACTICE M68A1 LINEAR DEMOLITION CHARGE PACKED IN METAL SHIPPING AND STORAGE CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH AMMUNITION ITEMS. SEE PAGE 4 FOR DETAILS 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.
- D. WHEN LOADING CONTAINERS, 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". THE LENGTH OF THE STRUTS IN THE SIDE FILL ASSEMBLIES MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIZE OF THE CONTAINER. THE LOADS MUST BE AS TIGHT AS POSSIBLE LONGITUDINALLY, BUT THE VOID MUST NOT EXCEED 3/4" OVERALL.
- 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 FORWARD WALL. PIECES OF DUNNAGE MATERIAL MUST BE LAMINATED TO THE BUFFER PIECES ON THE FORWARD BLOCKING ASSEMBLY OR FORWARD STRUT 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.
- 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.

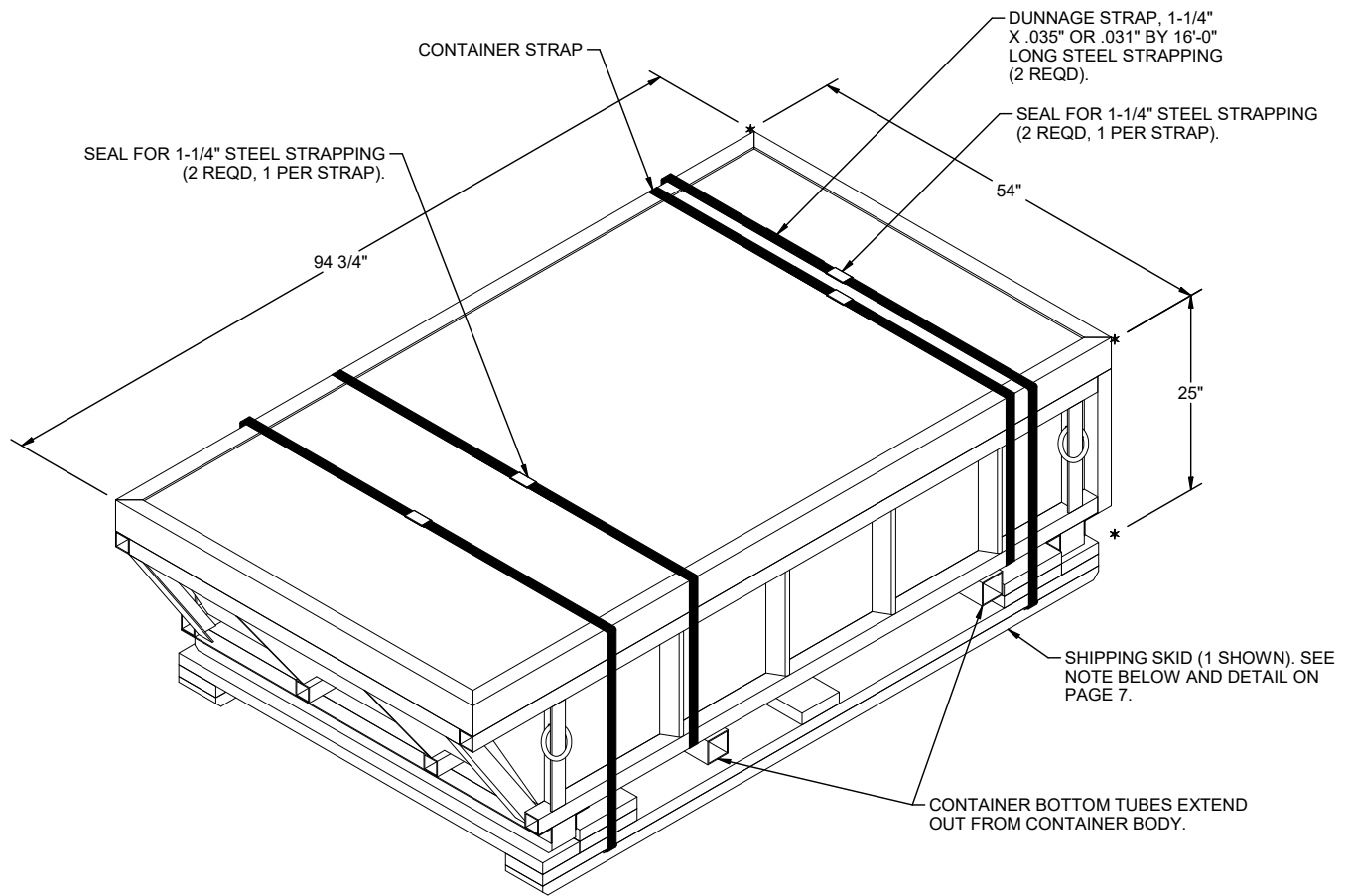
(CONTINUED AT RIGHT)

## (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 CONTAINERS SHOWN IN THE LOAD ON PAGE 2 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE FILLER ASSEMBLY AND THE "LESS-THAN-FULL LOAD PROCEDURE" ON PAGE 8. 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.
- P. SIX UNIVERSAL LOAD RETAINERS, AS DEPICTED IN THE LOADS ON PAGES 2 AND 8, ARE REQUIRED WHEN LOADING FIVE OR SIX CONTAINERS, FOUR ARE REQUIRED WHEN LOADING THREE OR FOUR CONTAINERS, AND TWO ARE REQUIRED WHEN LOADING ONE OR TWO CONTAINERS. REFER TO DAC DRAWING ACV00682 FOR DETAILS OF THE UNIVERSAL LOAD RETAINER CONSTRUCTION, AND TO DEPARTMENT OF THE ARMY DRAWING DA-116 FOR DETAILS FOR INSTALLATION TO THE DOOR POST VERTICAL, PLACEMENT INTO THE CONTAINER, AND FOR OTHER METHODS OF REAR-OF-LOAD RESTRAINT.
- Q. 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.
- R. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN CONTAINERS, AND BETWEEN CONTAINERS AND THE UNITIZING STRAPS, IF DESIRED, TO PREVENT CHAFING DAMAGE TO CONTAINER PAINT AND MARKINGS.
- S. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:
1. PREFABRICATE EIGHT COVER SPANNER ASSEMBLIES, TWO FORWARD/REAR BLOCKING ASSEMBLIES, FOUR SIDE FILL ASSEMBLIES, TWO DOOR POST VERTICALS, AND ONE CENTER FILL ASSEMBLY.
  2. APPLY UNITIZATION STRAPS.
  3. INSTALL THE FORWARD BLOCKING ASSEMBLY.
  4. LOAD THREE CONTAINERS WITH COVER SPANNER ASSEMBLIES.
  5. INSTALL TWO SIDE FILL ASSEMBLIES.
  6. INSTALL THE CENTER FILL ASSEMBLY.
  7. LOAD THREE CONTAINERS WITH COVER SPANNER ASSEMBLIES.
  8. INSTALL TWO SIDE FILL ASSEMBLIES.
  9. INSTALL THE REAR BLOCKING ASSEMBLY.
  10. INSTALL THE DOOR POST VERTICALS, DOOR SPANNERS, AND FILL MATERIAL.

## 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.
- 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-PRF-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.
- STEEL, STRUCTURAL** - - - - - : ASTM A36; 36,000 PSI MINIMUM YIELD OR BETTER.
- WIRE, CARBON STEEL** - - : ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.



**CONTAINER DATA**

GROSS WEIGHT - - - - - 3,000 LBS (APPROX)  
 CUBE - - - - - 74.0 CU FT (APPROX)

**NOTE:** THE USE OF A SHIPPING SKID IS A HELPFUL LOADING OPTION, BUT NOT REQUIRED. IT IS USED UNDERNEATH THE BOTTOM CONTAINER LAYER. THE OTHER LAYERS ARE STACKED ON COVER SPANNER ASSEMBLIES. IF SHIPPING SKIDS ARE USED THEN THE HEIGHT OF ALL HORIZONTAL PIECES ON ASSEMBLIES MUST BE INCREASED BY 3".

BEAM, 2" X 4" BY INSIDE  
CONTAINER WIDTH MINUS  
1" (REF: 7'-7") (6 REQD).

BUFFER PIECE, 2" X 4" BY INSIDE CONTAINER  
HEIGHT MINUS 1" ( REF: 7'-6" UNDER CORNER  
BLOCKS, 7'-8" ELSEWHERE) (2 REQD). NAIL TO  
THE BEAMS W/2-10d NAILS AT EACH JOINT.

67"

42"

17"

SEE GENERAL NOTE  
"F" ON PAGE 3.

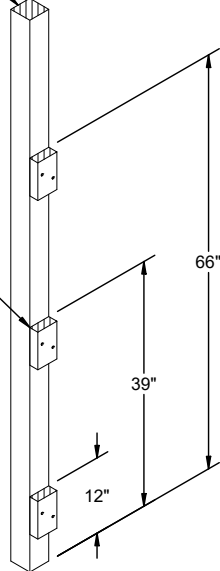
PLYWOOD, 3/4" X 9-1/2" BY INSIDE  
CONTAINER WIDTH MINUS 1"  
(REF: 7'-7") (6 REQD). NAIL TO  
THE BEAMS W/1-6d NAIL EVERY 8".

**FORWARD/REAR BLOCKING ASSEMBLY**

FOR A TWO HIGH LOAD, ELIMINATE THE TOP BOX  
BEAM ASSEMBLY. FOR A ONE HIGH LOAD,  
ELIMINATE THE TOP TWO BOX BEAM ASSEMBLIES.  
WHEN LOADING AN ODD NUMBER OF CONTAINERS,  
MODIFY AS SHOWN IN THE LOAD ON PAGE 8.

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

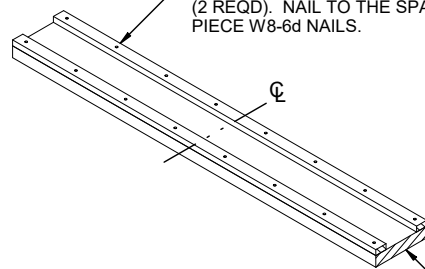
DOOR SPANNER LEDGER,  
2" X 4" X 6" (3 REQD). NAIL  
TO THE VERTICAL PIECE  
W/2-10d NAILS.



**DOOR POST VERTICAL**

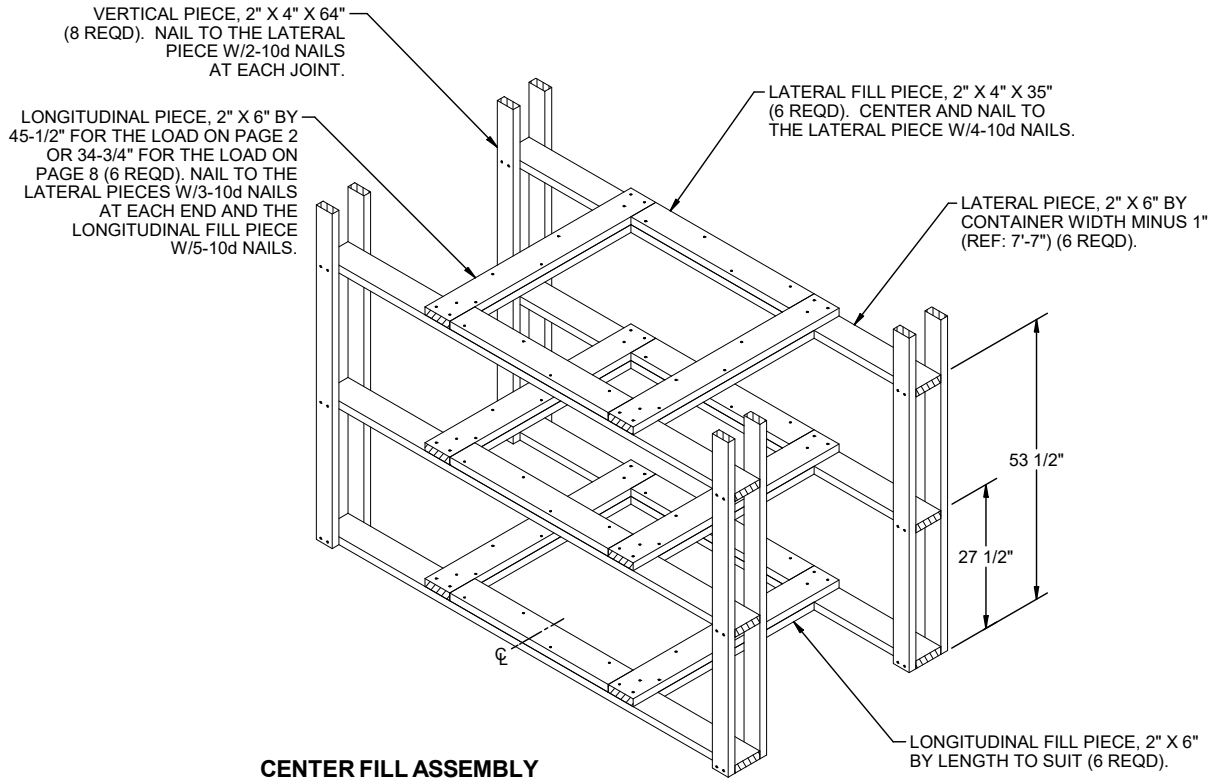
FOR A ONE OR TWO HIGH LOAD, ELIMINATE  
THE TOP DOOR SPANNER LEDGER.

STOP PIECE, 1" X 2" X 53-1/2"  
(2 REQD). NAIL TO THE SPANNER  
PIECE W/8-6d NAILS.

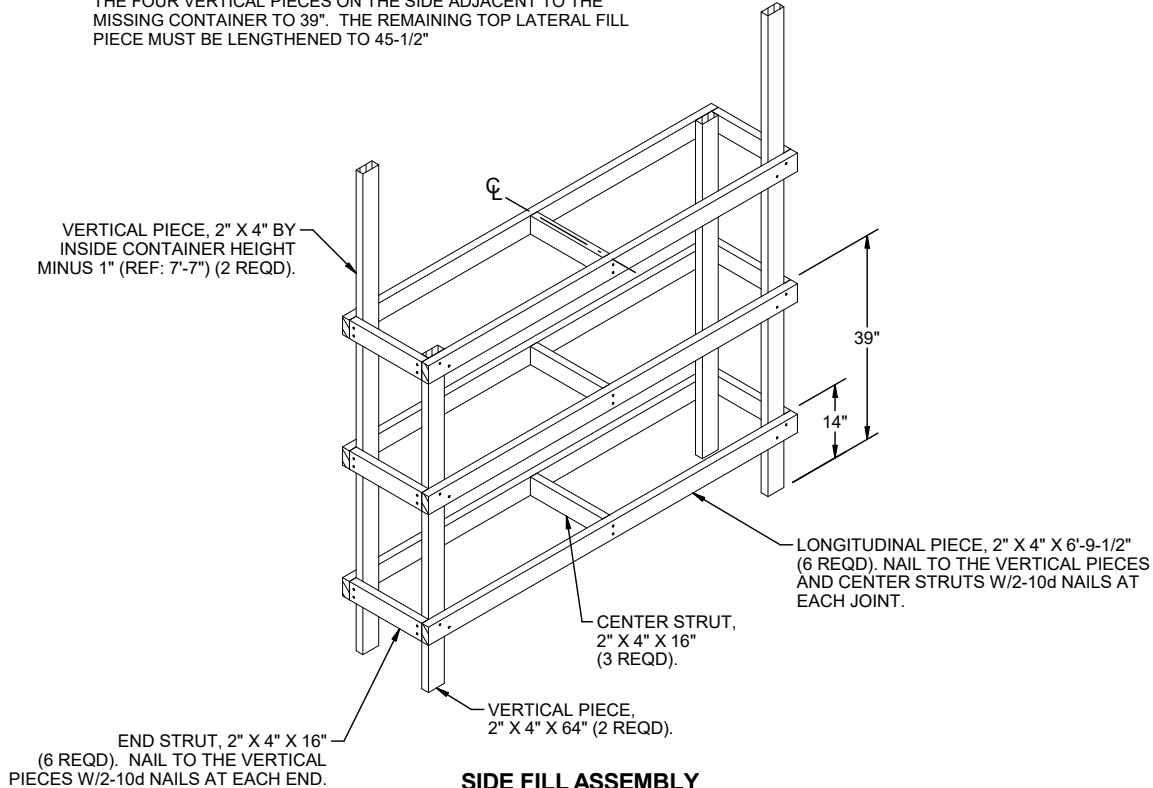


SPANNER PIECE,  
2" X 8" X 53-1/2"  
(1 REQD).

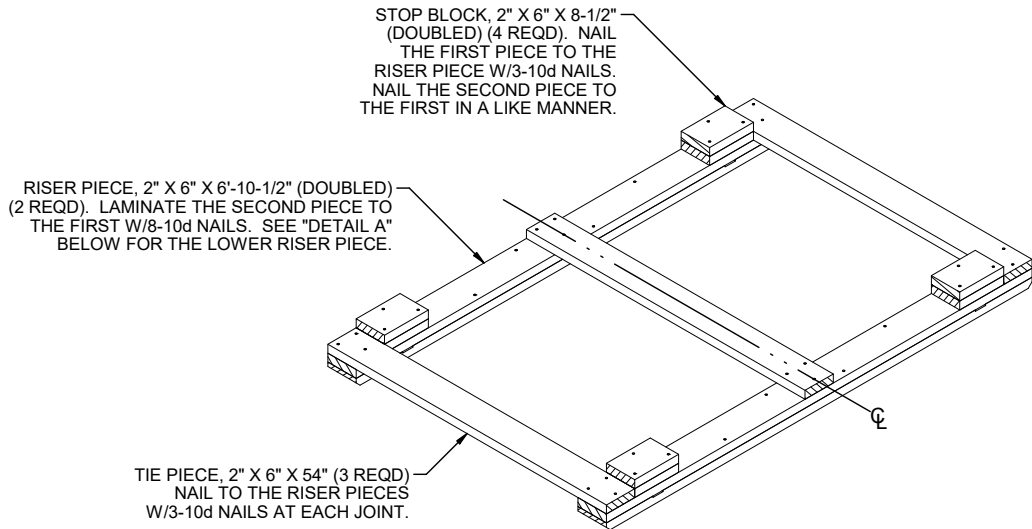
**COVER SPANNER ASSEMBLY**



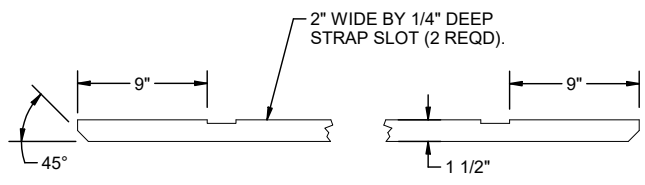
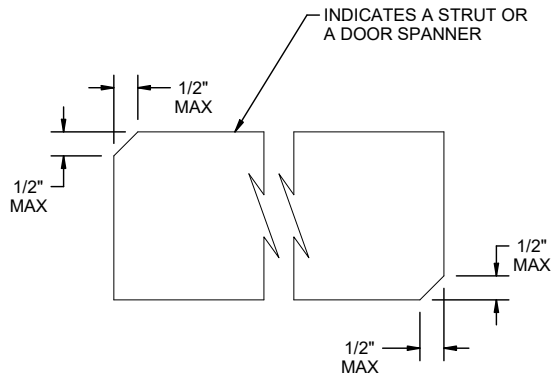
FOR A TWO HIGH LOAD OR A ONE HIGH LOAD, ELIMINATE THE TOP TWO LATERAL PIECES, THE TOP TWO LONGITUDINAL PIECES, THE TOP TWO LATERAL FILL PIECES, AND THE TOP TWO LONGITUDINAL FILL PIECES. ALSO, SHORTEN THE VERTICAL PIECES TO 39". WHEN LOADING AN ODD NUMBER OF CONTAINERS, OMIT THE TOP TWO LONGITUDINAL PIECES, THE TOP LATERAL PIECE AND THE TOP LATERAL FILL PIECE ON THE SIDE ADJACENT TO THE MISSING CONTAINER, AND SHORTEN THE FOUR VERTICAL PIECES ON THE SIDE ADJACENT TO THE MISSING CONTAINER TO 39". THE REMAINING TOP LATERAL FILL PIECE MUST BE LENGTHENED TO 45-1/2"



FOR A TWO HIGH LOAD, ELIMINATE THE TOP THREE STRUTS AND THE TOP TWO LONGITUDINAL PIECES, AND SHORTEN THE 64" VERTICAL PIECES TO 39". FOR A ONE HIGH LOAD, ELIMINATE THE TOP SIX STRUTS AND THE TOP FOUR LONGITUDINAL PIECES, AND SHORTEN THE 64" VERTICAL PIECES TO 14".



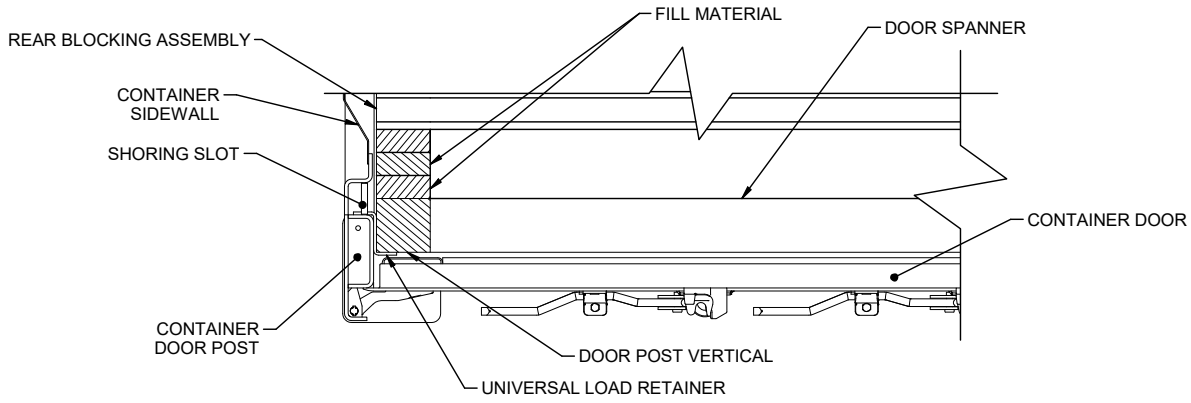
**SHIPPING SKID**



**DETAIL A**

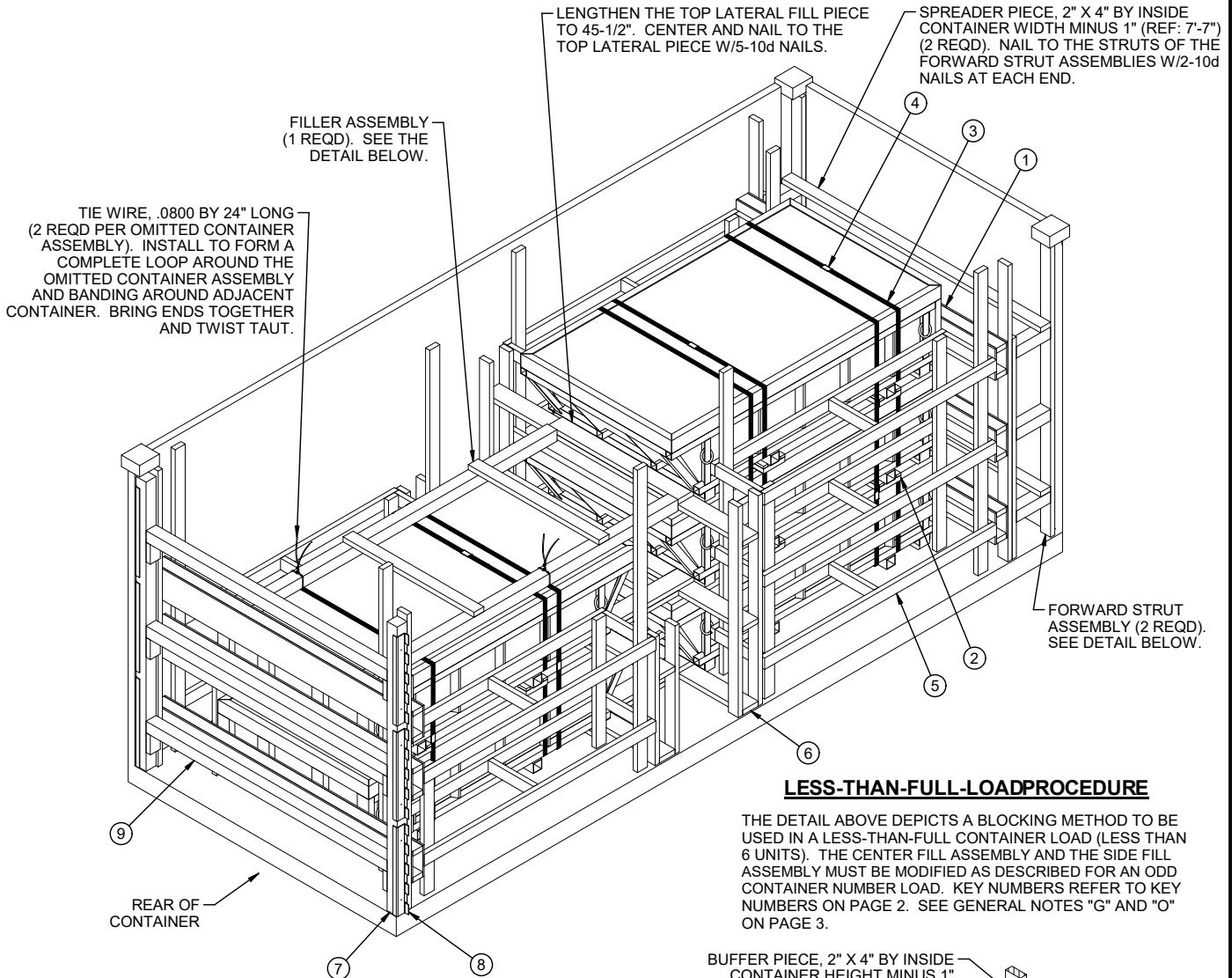
**BEVEL CUT**

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



**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 RETAINER AND ADJACENT DUNNAGE PIECES.



**ISOMETRIC VIEW**

**LESS-THAN-FULL-LOADPROCEDURE**

THE DETAIL ABOVE DEPICTS A BLOCKING METHOD TO BE USED IN A LESS-THAN-FULL CONTAINER LOAD (LESS THAN 6 UNITS). THE CENTER FILL ASSEMBLY AND THE SIDE FILL ASSEMBLY MUST BE MODIFIED AS DESCRIBED FOR AN ODD CONTAINER NUMBER LOAD. KEY NUMBERS REFER TO KEY NUMBERS ON PAGE 2. SEE GENERAL NOTES "G" AND "O" ON PAGE 3.

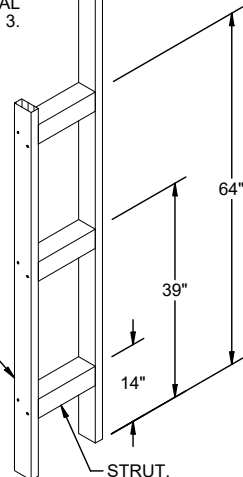
BUFFER PIECE, 2" X 4" BY INSIDE CONTAINER HEIGHT MINUS 1" (REF: 7'-6") (1 REQD). NAIL TO THE STRUTS W/2-10d NAILS AT EACH JOINT. SEE GENERAL NOTE "F" ON PAGE 3.

STRUT, 4" X 4" BY CUT-TO-FIT IN LENGTH (REF: 9'-4-1/4") (2 REQD)

TIE PIECE, 2" X 4" X 46" (3 REQD). NAIL TO THE STRUTS W/2-12d NAILS AT EACH JOINT.

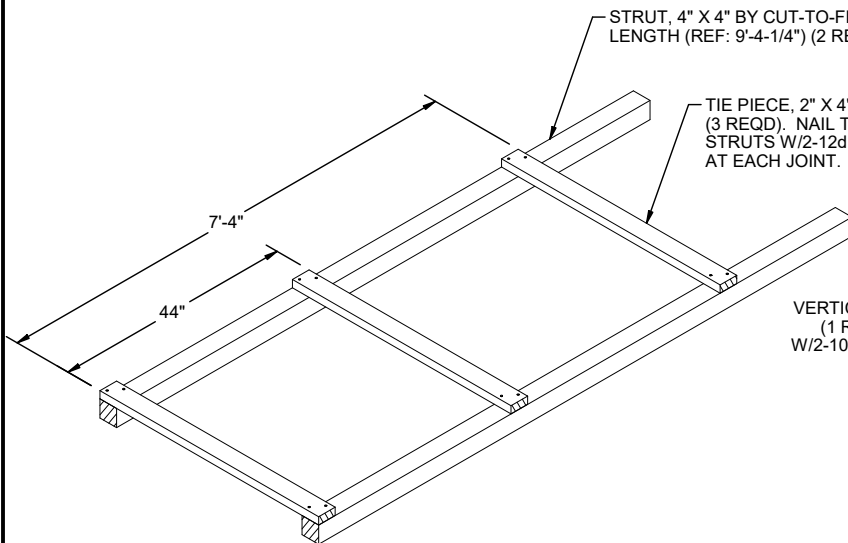
VERTICAL PIECE, 2" X 4" X 5'-7" (1 REQD). NAIL TO STRUTS W/2-10d NAILS AT EACH JOINT.

STRUT, 4" X 4" X 12" (3 REQD).



**FORWARD STRUT ASSEMBLY**

FOR A TWO HIGH LOAD, ELIMINATE THE TOP STRUT AND SHORTEN THE VERTICAL PIECE TO 41".



**OMITTED CONTAINER ASSEMBLY**