LOADING AND BRACING⊕ IN END OPENING ISO CONTAINERS OF CHARGE, DEMOLITION, LINEAR, HE M58, M58A1, M58A2 & M58A4, AND PRACTICE M68A1, IN METAL SHIPPING AND STORAGE CONTAINERS, USING TY-GARD RESTRAINT MATERIAL

INDEX

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U.S. ARMY MATERIEL COMMAND DRAWING

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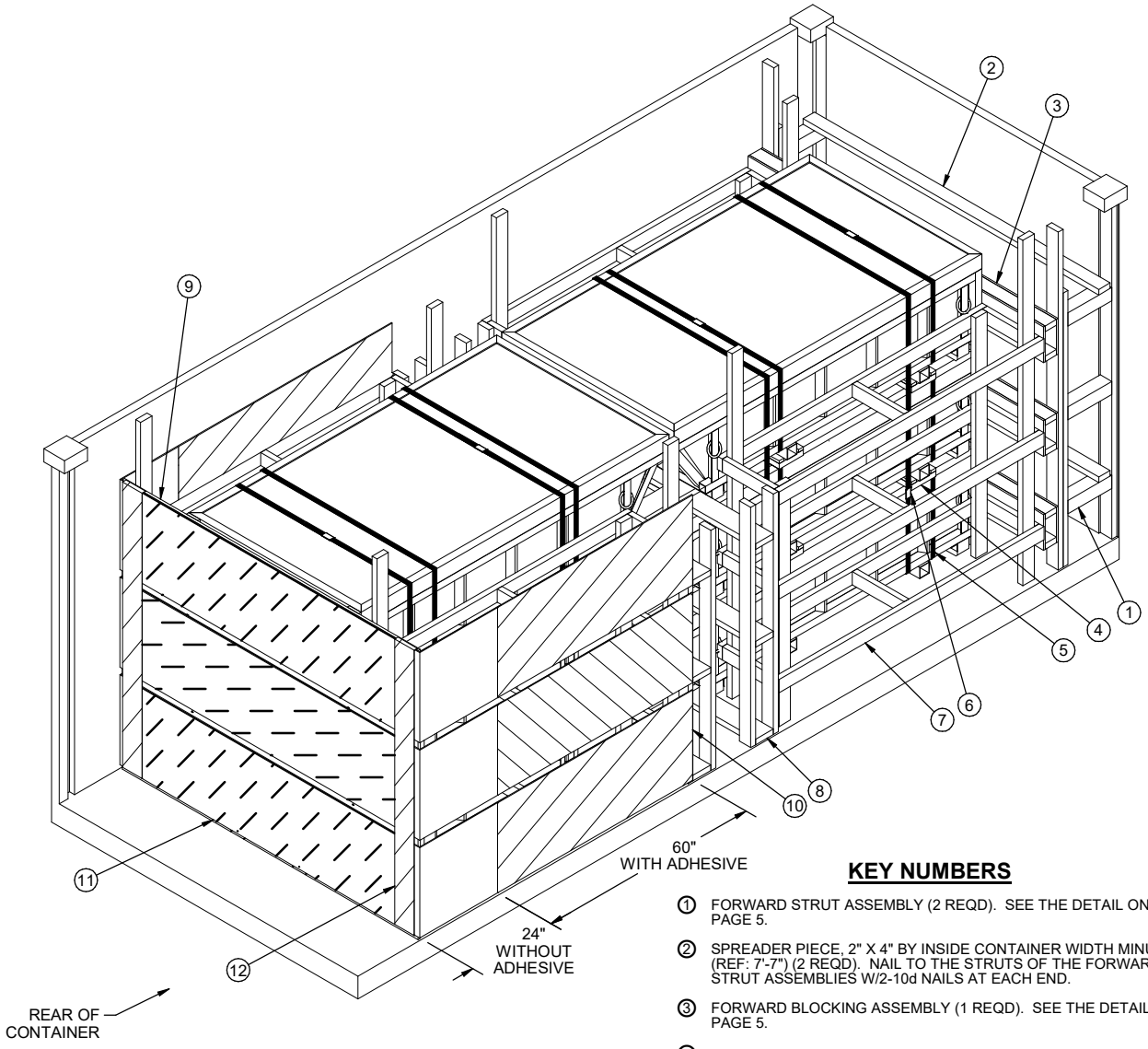
JANUARY 2023

CLASS	DIVISION	DRAWING	FILE
19	48	4298A	15J1003

PROJECT CA 316A-94



ISOMETRIC VIEW

KEY NUMBERS

① FORWARD STRUT ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5.

② SPREADER PIECE, 2" X 4" BY INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-7") (2 REQD). NAIL TO THE STRUTS OF THE FORWARD STRUT ASSEMBLIES W/2-10d NAILS AT EACH END.

③ FORWARD BLOCKING ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 5.

④ 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 THE DETAIL ON PAGE 5.

⑤ 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 ENCIRCLE EACH STACK OF THREE CONTAINERS.

⑥ SEAL FOR 1-1/4" STRAPPING (4 REQD). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES.

⑦ SIDE FILL ASSEMBLY (4 REQD). SEE THE DETAIL ON PAGE 6.

⑧ CENTER FILL ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 6.

⑨ END GATE (1 REQD). SEE THE DETAIL ON PAGE 7.

⑩ TY-GARD DS FLEXIBLE BARRIER, 24" WIDE X 12'-0" LONG (6 REQD). APPLY EACH TY-GARD PIECE IN ACCORDANCE WITH TY-GARD DS INSTALLATION INSTRUCTIONS. PRE-MARK THE CONTAINER SIDEWALL 7'-0" FROM THE EXPECTED REARMOST EDGE OF THE LOAD AT THE REQUIRED HEIGHT. INSTALL THE TY-GARD WITH THE 5 FOOT ADHESIVE SECTION FURTHEST FROM THE REAR OF THE LOAD, AT THE PRE-MARKED LOCATION.

⑪ TY-PATCH DS, 24" WIDE X 7'-0" LONG (3 REQD). APPLY EACH TY-PATCH PIECE IN ACCORDANCE WITH TY-GARD DS INSTALLATION INSTRUCTIONS, FORMING A PATCH OVER TWO PIECES OF TY-GARD MATERIAL AFTER CINCHING THEM TIGHT.

⑫ TY-TAPE DS, 72" LONG (2 REQD). APPLY EACH TY-TAPE PIECE IN ACCORDANCE WITH TY-GARD DS INSTALLATION INSTRUCTIONS.

BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
1" X 2"	71	12
1" X 4"	13	4
2" x 3"	1	1/2
2" X 4"	418	279
2" X 6"	82	82
2" X 8"	36	48
NAILS	**NO. REQD**	**POUNDS**
6d (2")	280	1-3/4
10d (3")	440	7

STEEL STRAPPING, 1-1/4" – 88' REQD - - - 13 LBS
SEAL FOR 1-1/4" STRAPPING – 4 REQD - - - - - NIL
PLYWOOD, 3/4" - - 84.70 SQ FT REQD - 174.70 LBS
TY-GARD - - - - - - - - 72 FT REQD - - 12.10 LBS
TY-PATCH - - - - - - - 21 FT REQD - - 4.70 LBS
TY-TAPE - - - - - - - - 12 FT REQD - - 0.80 LBS
WIRE, 0.0800" DIA - - 8 LN FT REQD - - 0.13 LBS

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CONTAINER - - - - - -	6 - - - - -	18,000 LBS
DUNNAGE - - - - - - - - - - - - - - -		1,063 LBS
ISO CONTAINER - - - - - - - - - - - -		4,700 LBS
TOTAL WEIGHT - - - - - -		23,763 LBS (APPROX)

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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 CHARGES PACKED IN METAL SHIPPING AND STORAGE CONTAINERS USING TY-GARD MATERIALS FOR AFT RESTRAINT. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH AMMUNITION ITEMS. SEE PAGE 4 FOR DETAILS OF THE CONTAINER. FOR ALL NON-TY-GARD SHIPMENTS REFER TO DRAWING 19-48-4298-15J1003. **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. THE LOADS MUST BE AS TIGHT AS POSSIBLE LONGITUDINALLY, BUT THE VOID MUST NOT EXCEED 3/4" OVERALL. EXCESSIVE SLACK CAN BE ELIMINATED BY APPLYING THE TY-GARD MATERIALS TIGHT AGAINST THE REAR OF THE LOAD.

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.

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.

(CONTINUED AT RIGHT)

(**GENERAL NOTES CONTINUED**)

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 "LESS-THAN-FULL-LOAD PROCEDURE" ON PAGE 8.

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. 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.

R. A COMPLETE SET OF TY-GARD RESTRAINTS WILL CONSIST OF TWO SECTIONS OF TY-GARD DS AND ONE SECTION OF TY-PATCH DS. EACH COMPLETE SET IS CAPABLE OF RESTRAINING A MAXIMUM OF 13,200 POUNDS. SEE THE CHART ON PAGE 4 FOR ALLOWABLE LOADING LIMITS. EACH LAYER OF CONTAINERS WITHIN A LOAD MUST HAVE A MINIMUM OF ONE COMPLETE SET OF TY-GARD RESTRAINTS.

S. MARK CONTAINER SIDEWALLS FOR PROPER LOCATION OF TY-GARD. PEEL AND ADHERE TY-GARD TO PRE-MARKED LOCATIONS, TAKING CARE TO FOLLOW THE CONTOUR OF THE CONTAINER CORRUCATIONS. CARE MUST BE USED TO ENSURE A CONSISTENT PRESSURE (APPROXIMATELY 16 PSI) IS APPLIED WHEN AFFIXING THE TY-GARD TO THE ISO CONTAINER. TENSION THE LOAD WITH THE TY-TOOL AND SEAL THE TY-GARD WITH THE TY-PATCH. TY-TAPE WILL THEN BE APPLIED TO VERTICALLY SPAN ALL TY-GARD LAYERS IN AT LEAST TWO LOCTIONS. REFER TO TY-GARD MANUAL 1419090 FOR COMPLETE INSTALLATION INSTRUCTIONS.

T. IF NECESSARY DUE TO LOAD HEIGHT AND WEIGHT RESTRICTIONS, ONE SET OF TY-GARD DS RESTRAINTS MAY VERTICALLY OVERLAP ANOTHER SET, HOWEVER, OVERLAP WILL NOT EXCEED 6". ALSO, IT MAY BE NECESSARY TO EXTEND THE TY-GARD DS RESTRAINTS ABOVE THE TOP OF THE LOADED PALLET UNIT/SKIDS. THIS EXTENSION IS LIMITED TO 6" ABOVE THE TOP OF THE LOADED UNITS, AND MUST BE SUPPORTED BY THE PLYWOOD GATE.

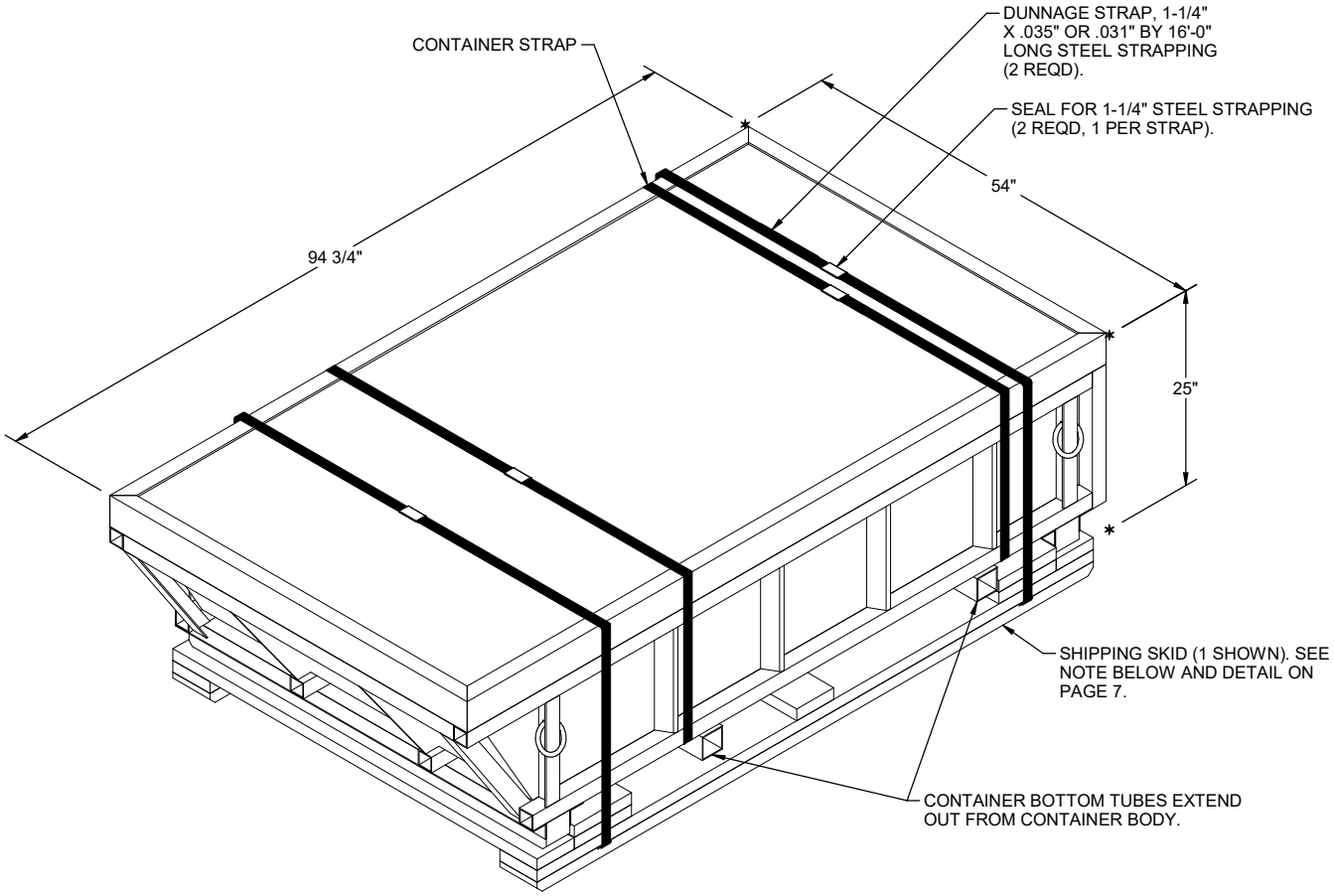
U. IF THE INTERIOR OF THE ISO CONTAINER BEING LOADED HAS TIEDOWN RINGS ALONG THE BASE OF THE SIDE WALLS, THE BOTTOM SET OF TY-GARD RESTRAINTS CAN BE ADJUSTED UPWARD TO CLEAR THE RINGS. IF NECESSARY TO ACHIEVE THIS, OVERLAP TY-GARD SETS OR ADD TO THE HEIGHT OF THE END GATE. SEE GENERAL NOTE "T" FOR DETAILS.

V. OMITTED UNIT ASSEMBLIES MUST NOT BE PLACED IN ROWS THAT CONTACT THE END GATE.

W. PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS THE SIDEWALL, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.

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.
WIRE, CARBON STEEL	ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.
TY-GARD DS®	8135-01-585-0512, 24" WIDE.
TY-PATCH DS®	8135-01-584-6017, 24" WIDE.
TY-TAPE DS®	8135-17-123-0568.
TY-TOOL DS®	5120-17-123-0567, 3 PIECES.



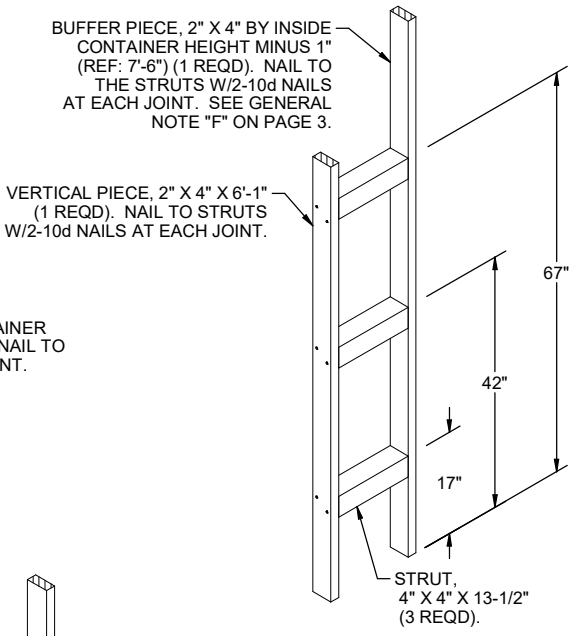
CONTAINER DATA

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".

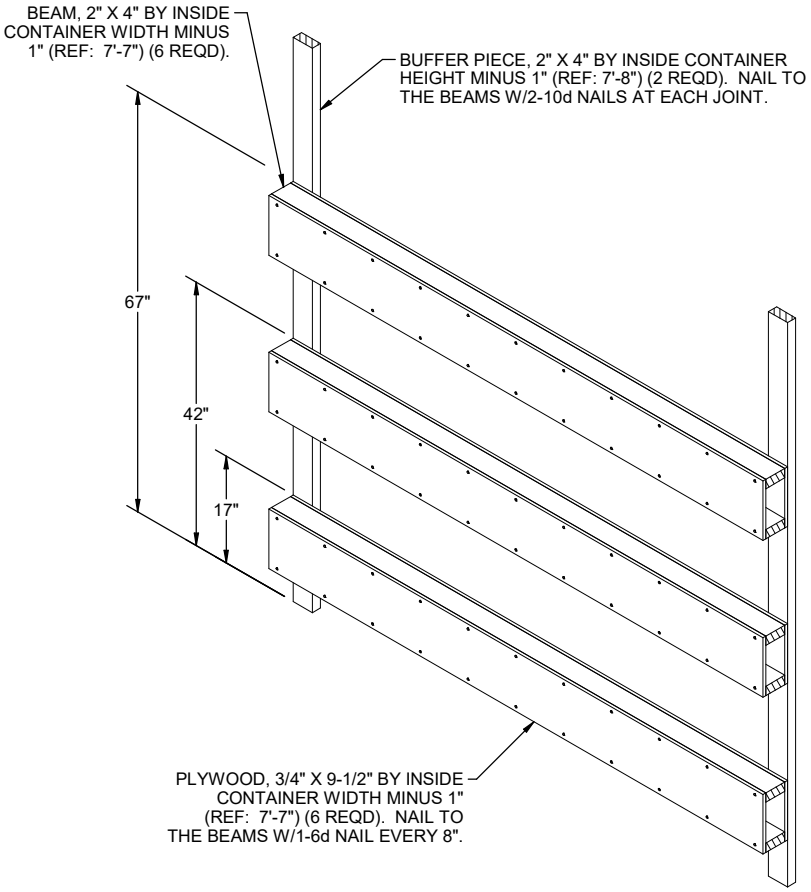
TY-GARD DS STRENGTH RATINGS		
SETS OF TY-GARD	LOAD HEIGHT MIN (INCHES)	ISO CONTAINER CONTENTS MAX (LBS)
1	18	13,200
2	36	26,400
3	54	39,600

NOTE: EACH SET CONTAINS TWO SECTIONS OF TY-GARD DS AND ONE SECTION OF TY-PATCH DS. DO NOT CUT TY-GARD DS AND TY-PATCH DS INTO WIDTHS LESS THAN THE STANDARD 24" WIDE.



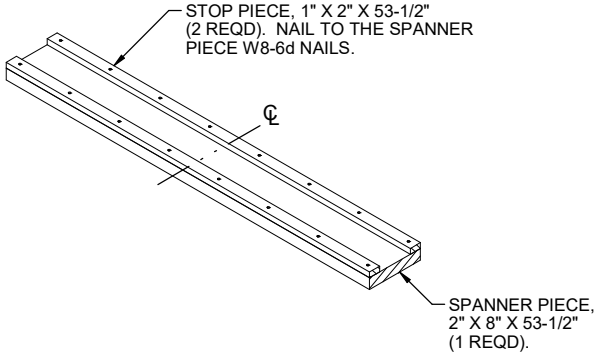
FORWARD STRUT ASSEMBLY

FOR A TWO HIGH LOAD, ELIMINATE THE TOP STRUT AND SHORTEN THE VERTICAL PIECE TO 41". FOR A ONE HIGH LOAD, ELIMINATE THE TOP TWO STRUTS AND SHORTEN THE VERTICAL PIECE TO 15".



FORWARD 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.



COVER SPANNER ASSEMBLY

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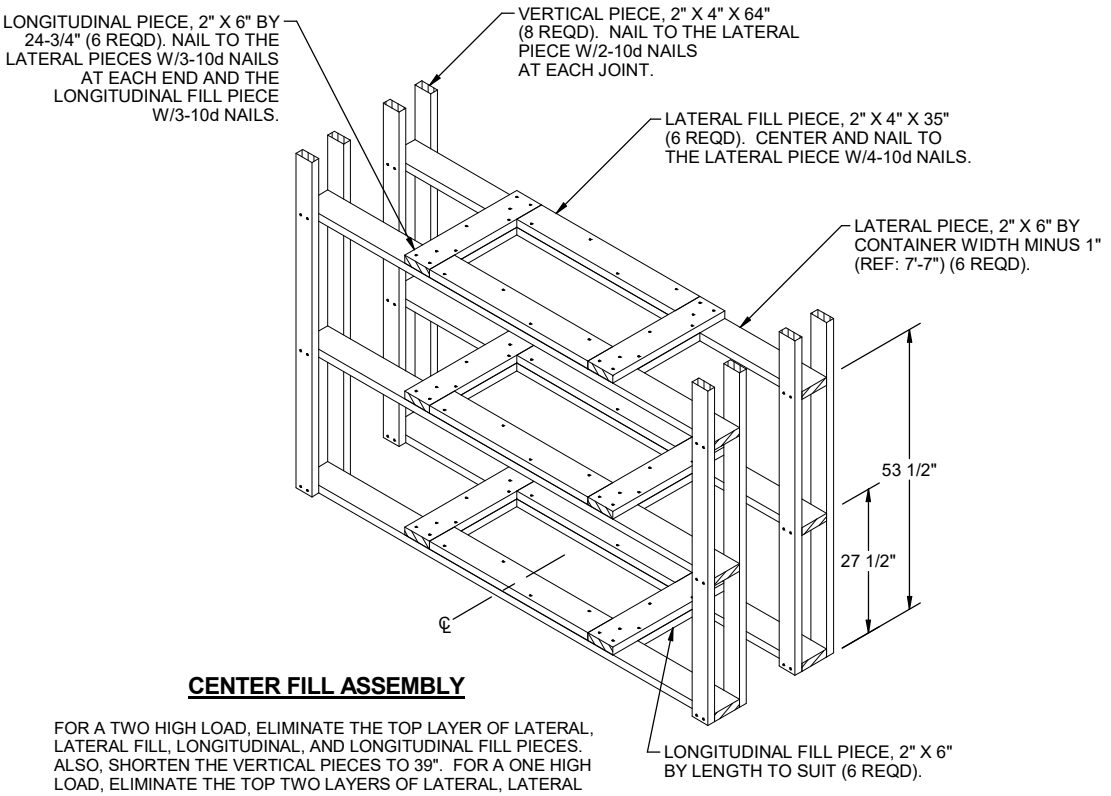
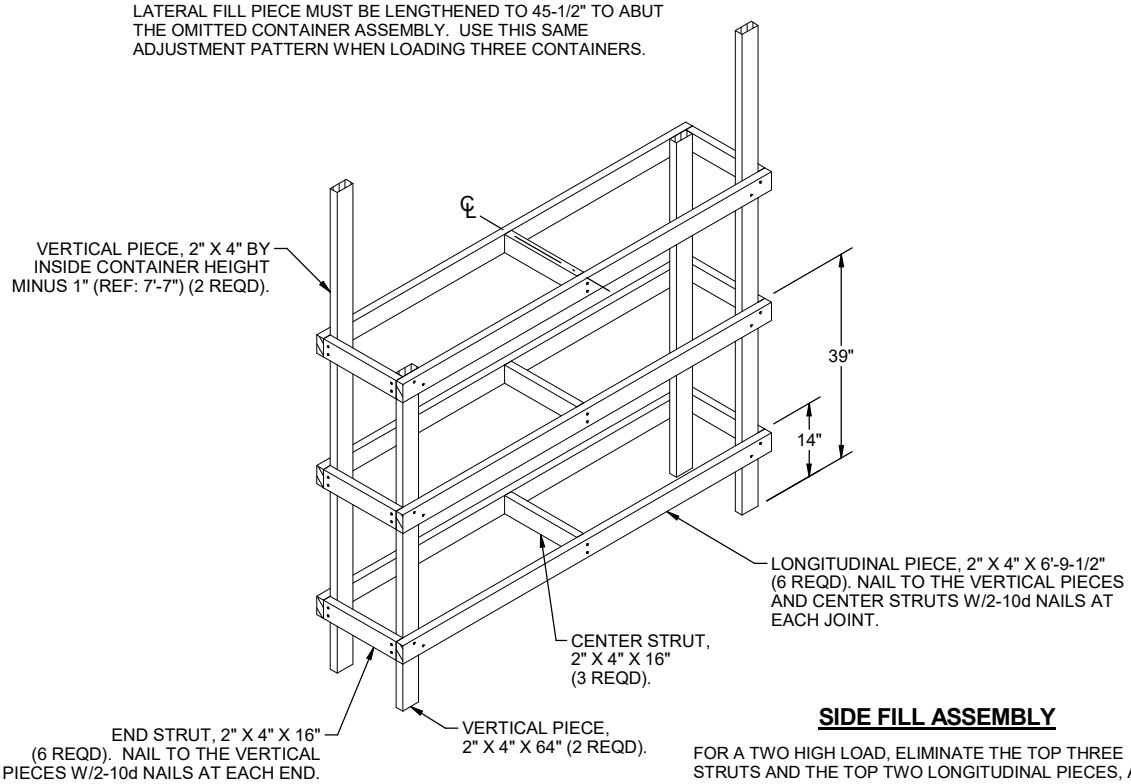


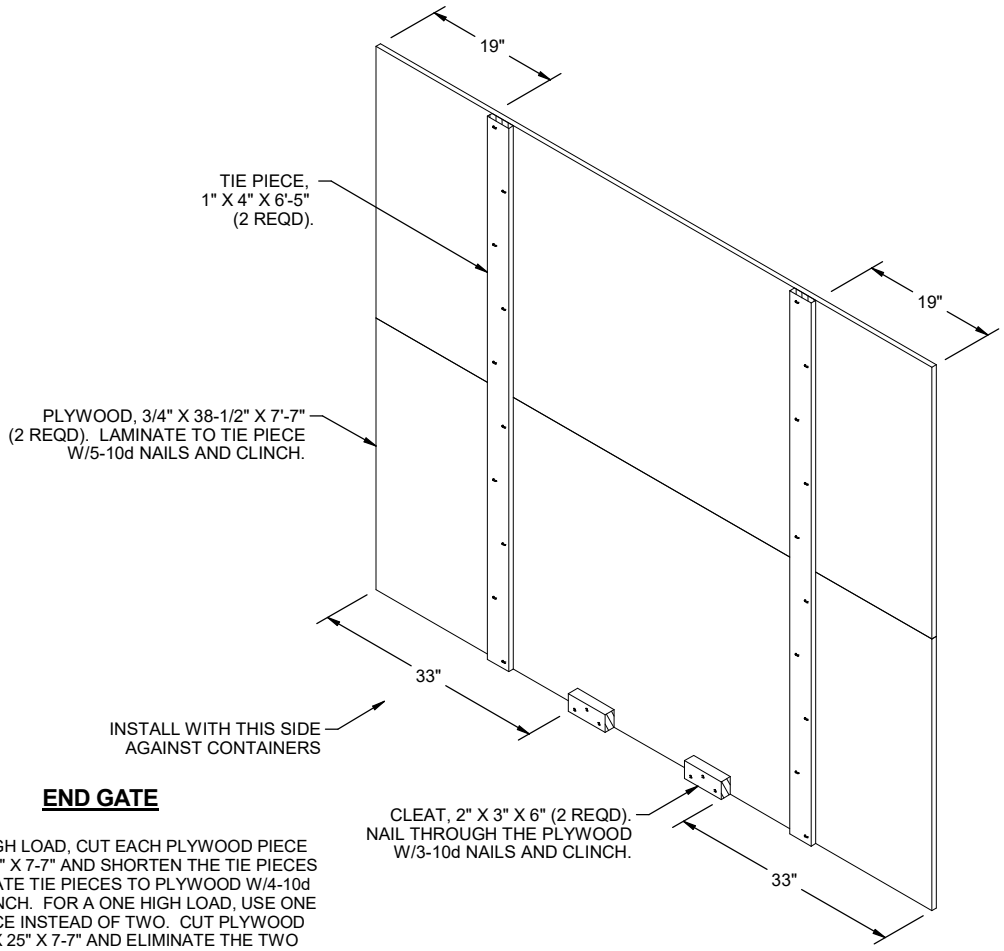
CENTER FILL ASSEMBLY

FOR A TWO HIGH LOAD, ELIMINATE THE TOP LAYER OF LATERAL, LATERAL FILL, LONGITUDINAL, AND LONGITUDINAL FILL PIECES. ALSO, SHORTEN THE VERTICAL PIECES TO 39". FOR A ONE HIGH LOAD, ELIMINATE THE TOP TWO LAYERS OF LATERAL, LATERAL FILL, LONGITUDINAL, AND LONGITUDINAL FILL PIECES. ALSO ELIMINATE THE VERTICAL PIECES. WHEN LOADING AN ODD NUMBER OF CONTAINERS AS SHOWN ON PAGE 8 WITH FIVE CONTAINERS, OMIT THE TOP TWO LONGITUDINAL PIECES. ALSO, ON THE SIDE ADJACENT TO THE MISSING CONTAINER ELIMINATE THE TOP LATERAL PIECE AND THE TOP LATERAL FILL PIECE. 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" TO ABUT THE OMITTED CONTAINER ASSEMBLY. USE THIS SAME ADJUSTMENT PATTERN WHEN LOADING THREE CONTAINERS.



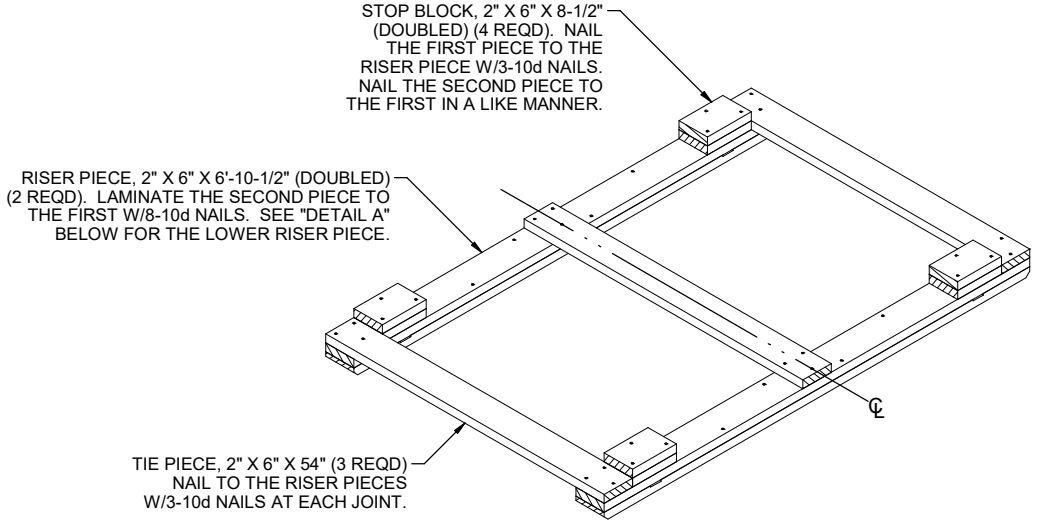
SIDE FILL ASSEMBLY

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".

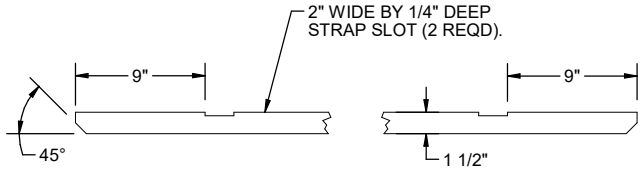


END GATE

FOR A TWO HIGH LOAD, CUT EACH PLYWOOD PIECE TO 3/4" X 25-1/2" X 7-7" AND SHORTEN THE TIE PIECES TO 51". LAMINATE TIE PIECES TO PLYWOOD W/4-10d NAILS AND CLINCH. FOR A ONE HIGH LOAD, USE ONE PLYWOOD PIECE INSTEAD OF TWO. CUT PLYWOOD PIECE TO 3/4" X 25" X 7-7" AND ELIMINATE THE TWO TIE PIECES.



SHIPPING SKID



DETAIL A

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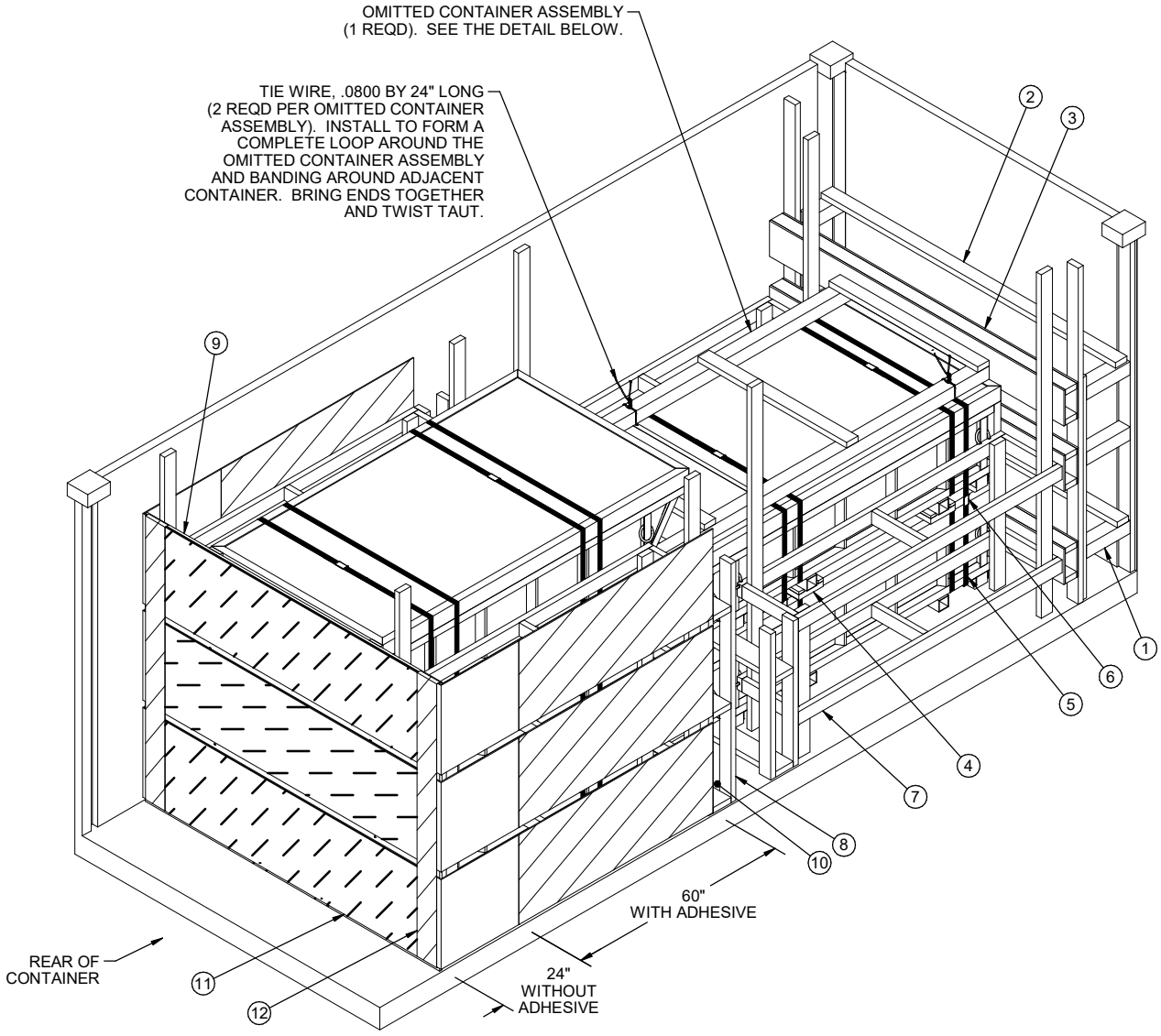
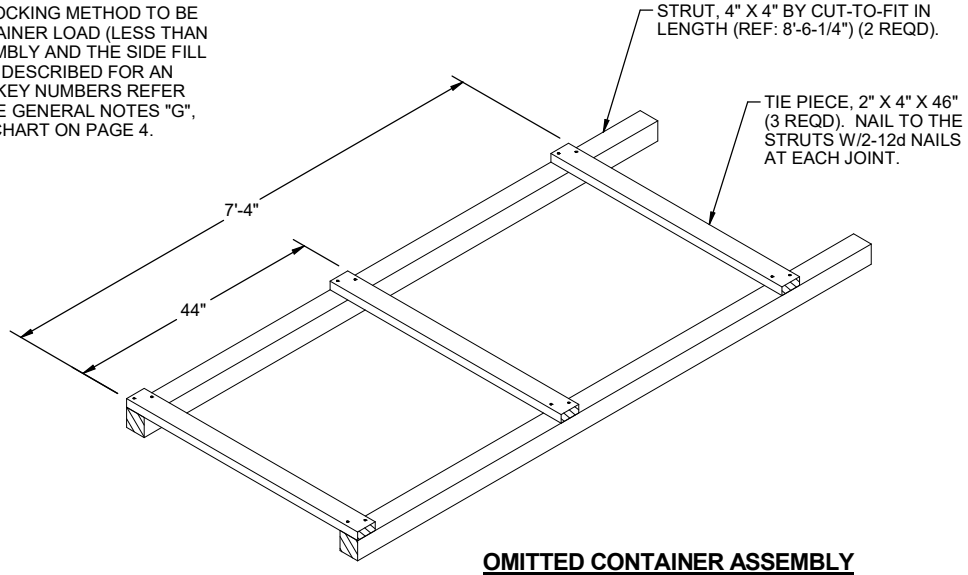


LESS-THAN-FULL-LOAD PROCEDURE

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", "O", AND "R" ON PAGE 2 AND THE CHART ON PAGE 4.



OMITTED CONTAINER ASSEMBLY

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