

APPROVED BY
BUREAU OF EXPLOSIVES

DLH

DATE 8-2-2005

LOADING AND BRACING* IN END OPENING ISO CONTAINERS OF SMALL DIAMETER BOMB CAR- RIAGE/SYSTEM PACKED IN CNU- 660 CONTAINERS

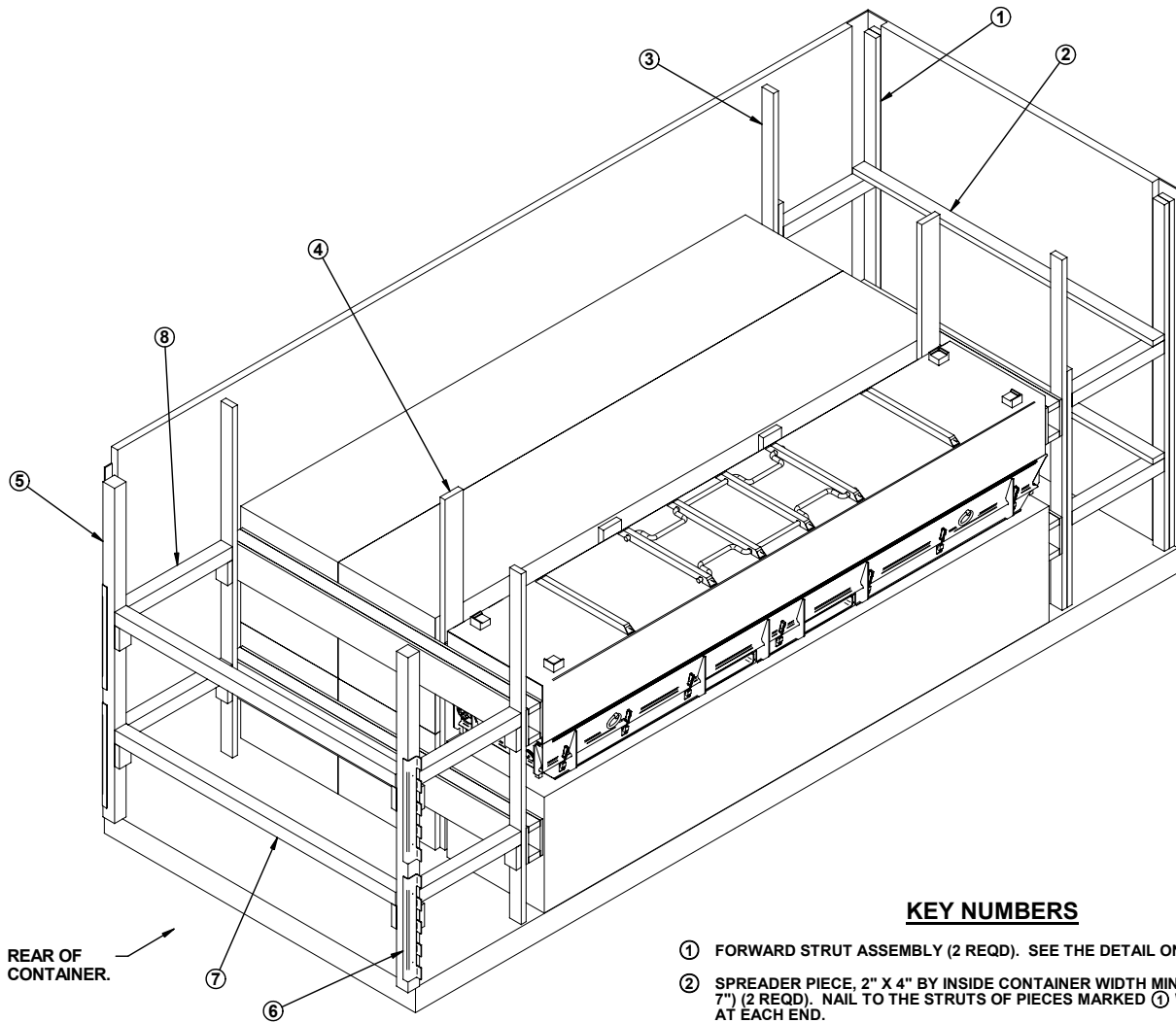
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*THE PROCEDURES SHOWN HEREIN ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY CONTAINER-ON-FLATCAR (COFC) RAIL, MOTOR, OR WATER CARRIERS.

U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY FIELD SUPPORT COMMAND <i>[Signature]</i>	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.							
	DO NOT SCALE				JUNE 2005			
APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND <i>[Signature]</i> U.S. ARMY DEFENSE AMMUNITION CENTER	ENGINEER OR TECHNICIAN	BASIC REV.	LAURA A. FIEFFER					
	TRANSPORTATION ENGINEERING DIVISION	<i>[Signature]</i>		TESTED	CLASS	DIVISION	DRAWING	FILE
	VALIDATION ENGINEERING DIVISION	<i>[Signature]</i>			19	48	8836	SP15J161
	ENGINEERING DIRECTORATE	<i>[Signature]</i>						



REAR OF CONTAINER.

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 PIECES MARKED ① W/2-10d NAILS AT EACH END.
- ③ FORWARD/REAR BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5. NAIL THROUGH THE BUFFER PIECES INTO THE VERTICAL PIECE OF PIECES MARKED ① W/4-10d NAILS. NOTE: STRUT LEDGERS ARE ONLY REQUIRED ON THE REAR BLOCKING ASSEMBLY. DO NOT INSTALL STRUT LEDGERS ON THE FORWARD BLOCKING ASSEMBLY.
- ④ CENTER FILL ASSEMBLY A (1 REQD). SEE THE DETAIL ON PAGE 6.
- ⑤ DOOR POST VERTICAL (2 REQD). SEE THE DETAIL AND "DETAIL A" ON PAGE 7, AND GENERAL NOTE "L" ON PAGE 3.
- ⑥ UNIVERSAL LOAD RETAINER (4 REQD, 2 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 "L" ON PAGE 3.
- ⑦ DOOR SPANNER, 4" X 4" MATERIAL CUT TO A LENGTH THAT WILL PROVIDE A DRIVE FIT (REF: 7'-1-1/4") (2 REQD). TOENAIL TO THE DOOR POST VERTICAL W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 4.
- ⑧ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 31") (4 REQD). TOENAIL TO THE BUFFER PIECES OF THE REAR BLOCKING ASSEMBLY AND TO THE DOOR POST VERTICAL W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 4.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 6"	25	13
2" X 4"	140	94
2" X 6"	26	26
4" X 4"	49	65
NAILS	NO. REQD	POUNDS
6d (2")	200	1-1/4
10d (3")	104	1-3/4
12d (3-1/4")	16	1/2
PLYWOOD, 3/4"	48.03 SQ FT REQD	99.06 LBS
UNIVERSAL LOAD RETAINER	4 REQD	26 LBS

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CNU-660 CONTAINER	6	13,926 LBS
DUNNAGE		520 LBS
CONTAINER		4,700 LBS

TOTAL WEIGHT - - - - - 19,146 LBS (APPROX)

GENERAL NOTES

(GENERAL NOTES CONTINUED)

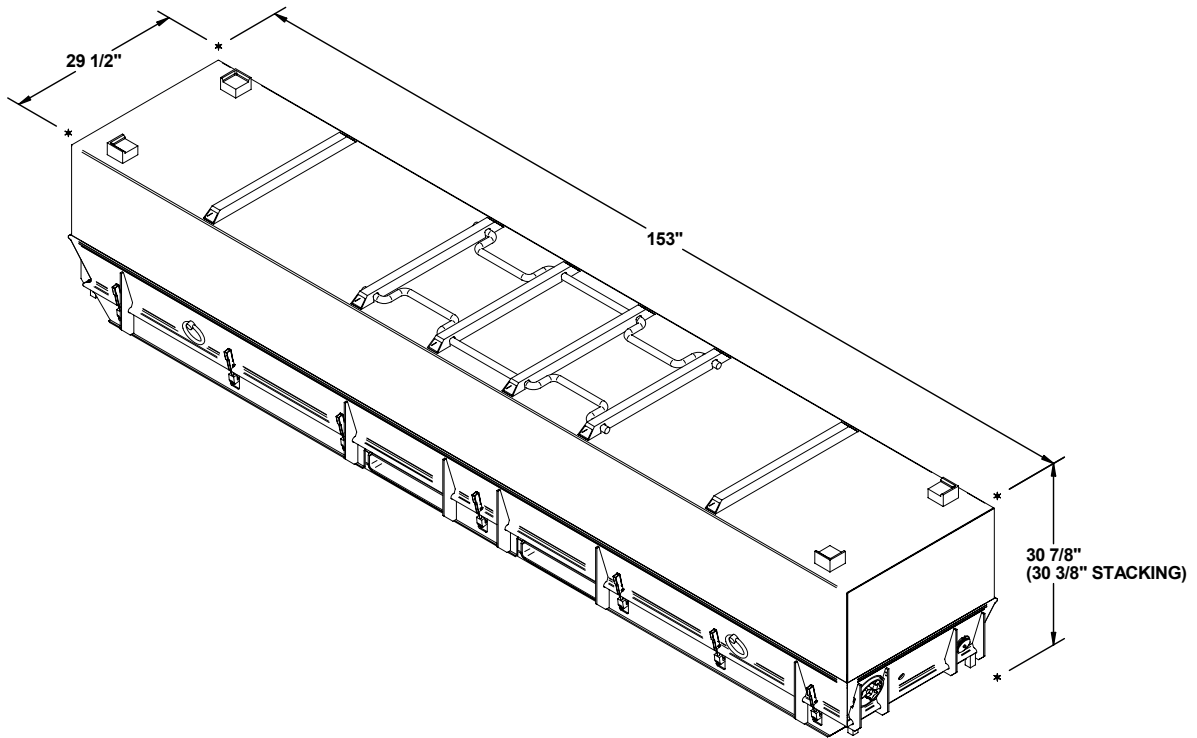
- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- B. THE SPECIFIED OUTLOADING PROCEDURES ARE APPLICABLE TO LOADS OF SMALL DIAMETER BOMB CARRIAGE/SYSTEMS PACKED ONE BRU-61/A CARRIAGE SYSTEM AND FOUR GBU-39/B BOMBS PER CNU-660 CONTAINER. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH AMMUNITION ITEMS. SEE PAGE 4 AND BOEING DRAWING 70P993153-1001 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". EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE HORIZONTAL (CENTER FILL "A") OR LONGITUDINAL (CENTER FILL "B") PIECES ON THE CENTER FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE THICKNESS, QUANTITY AND/OR LENGTH OF THE PIECES IN THE CENTER FILL ASSEMBLIES MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIZE OF 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 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 STRUT ASSEMBLIES 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.
- L. FOUR UNIVERSAL LOAD RETAINERS ARE DEPICTED IN THE LOADS ON PAGES 2 AND 8. FOUR UNIVERSAL LOAD RETAINERS ARE REQUIRED WHEN LOADING TWO LAYERS OF CONTAINERS, AND TWO UNIVERSAL LOAD RETAINERS ARE REQUIRED WHEN LOADING ONE LAYER OF CONTAINERS. THIS IS AN EXCEPTION TO THE ESTABLISHED PROCEDURES; HOWEVER, THE EXCEPTION IS PERMITTED FOR THE AMMUNITION PACK COVERED BY THIS DRAWING. REFER TO DAC DRAWING ACV00682 FOR DETAILS OF THE UNIVERSAL LOAD RETAINER CONSTRUCTION, AND TO DEPARTMENT OF THE ARMY DRAWING DA-116 FOR DETAILS OF THE INSTALLATION TO THE DOOR POST VERTICAL, PLACEMENT INTO THE CONTAINER, AND FOR OTHER METHODS OF REAR-OF-LOAD RESTRAINT.
- M. **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.
- N. 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.
- O. 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.
- P. 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.
- Q. THE QUANTITY OF CONTAINERS SHOWN IN THE LOAD ON PAGE 2 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE REDUCED LOAD PROVISIONS ON PAGE 8.
- R. AS REQUIRED BY THE ASSOCIATION OF AMERICAN RAILROADS (AAR), ALL 1-1/4" AND 2" STEEL STRAPPING USED FOR LOAD RESTRAINT MUST BE MARKED AS SPECIFIED WITHIN THE APPLICABLE AAR RULES GOVERNING LOADING, BLOCKING AND BRACING OF FREIGHT WITHIN THE CONVEYANCE. FOR THE SPECIFIC MARKING SIZE, FREQUENCY, ETC., REQUIRED, REFER TO THE APPROPRIATE AAR LOADING RULES.
- S. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN CONTAINERS AND THE END OPENING CONTAINER, OR BETWEEN STRAPPING AND CONTAINERS, IF DESIRED, TO PREVENT CHAFING DAMAGE TO CONTAINER PAINT AND MARKINGS.
- T. **RECOMMENDED SEQUENTIAL LOADING PROCEDURES FOR A FULL LOAD:**
1. PREFABRICATE TWO FORWARD STRUT ASSEMBLIES, TWO FORWARD/REAR BLOCKING ASSEMBLIES, ONE CENTER FILL ASSEMBLY "A", TWO DOOR POST VERTICALS, AND NAIL TWO UNIVERSAL LOAD RETAINERS TO EACH DOOR POST VERTICAL, ONE RIGHT HAND AND ONE LEFT HAND.
 2. INSTALL THE FORWARD STRUT ASSEMBLIES, THE SPREADER PIECES, AND THE FORWARD BLOCKING ASSEMBLY.
 3. LOAD SIX CONTAINERS.
 4. INSTALL THE CENTER FILL ASSEMBLY.
 5. INSTALL THE REAR BLOCKING ASSEMBLY.
 6. INSTALL THE DOOR POST VERTICAL ASSEMBLIES (ONE LEFT HAND AND ONE RIGHT HAND).
 7. INSTALL THE TWO DOOR SPANNER PIECES.
 8. INSTALL THE FOUR 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 NLCMS).
- 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.

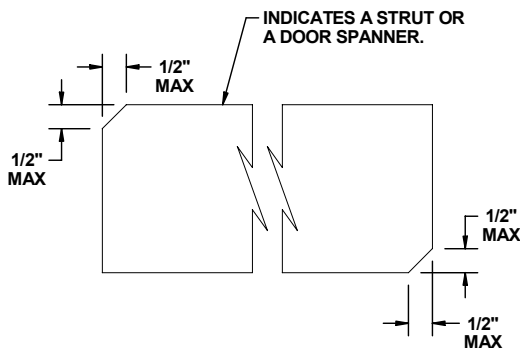
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PAGE 3



CNU-660 CONTAINER

GROSS WEIGHT - - - - - 2,321 LBS
 CUBE - - - - - 80.6 CU FT



BEVEL CUT

IF DESIRED, EACH END OF A STRUT OR DOOR SPANNER MAY BE BEVEL-CUT AS SHOWN ABOVE TO FACILITATE THE ACHIEVEMENT OF A TIGHT END OF LOAD FIT.

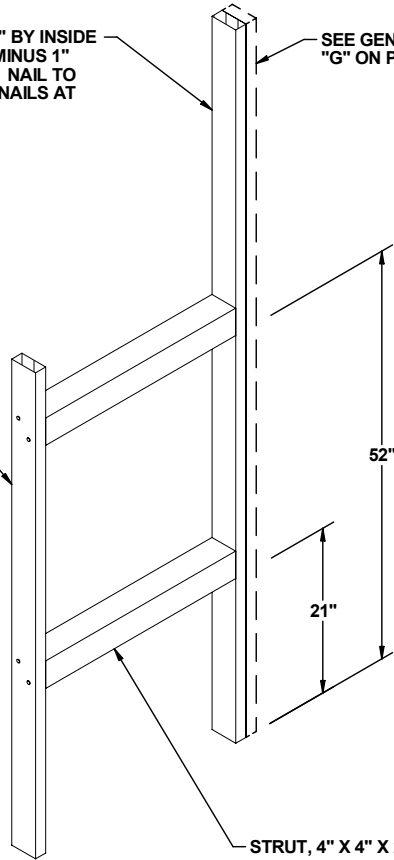
CONTAINER HANDLING GUIDANCE

- A. ONLY APPROVED AND APPROPRIATELY SIZED MATERIALS HANDLING EQUIPMENT WILL BE USED FOR HANDLING THE DEPICTED CONTAINERS. APPROVED MATERIAL HANDLING EQUIPMENT (FORKLIFT TRUCKS, CRANES, HAND TRUCKS, DOLLIES, ROLLER ASSEMBLIES, SLINGS, SPREADER BARS, ETC.) IS SPECIFIED ELSEWHERE.
- B. PRECAUTIONARY HANDLING TECHNIQUES NORMALLY EMPLOYED OR AS SPECIFIED FOR THE TYPE OF COMMODITY INVOLVED WILL BE OBSERVED.
- C. IF HANDLING IS ACCOMPLISHED WITH A FORKLIFT TRUCK, THE CONTAINERS SHOULD BE HANDLED FROM A SIDE POSITION AS MUCH AS POSSIBLE. CARE MUST BE EXERCISED WHEN INSERTING FORKS UNDER A CONTAINER, TO PREVENT DAMAGE TO THE CONTAINER BY THE FORK TINES OR THE FORKLIFT PACKAGE GUARD. IF ONE CONTAINER IS HANDLED BY SLINGING, THE SLING MAY BE ATTACHED TO THE LIFTING POINTS ON THE CONTAINER. DO NOT HANDLE STACKED CONTAINERS WITH A SLING.
- D. WHEN UNLOADING CONTAINERS, REMOVE THE REAR AND LATERAL DUNNAGE, AND SHIFT THE NEAR END OF A CONTAINER STACK TOWARDS THE CENTER OF THE END OPENING CONTAINER. ATTACH A CHAIN FROM THE CONTAINER LIFTING CLEVIS ON ONE SIDE OF THE CONTAINER, CONTAINER, AROUND THE FORKLIFT MAST, TO THE CONTAINER LIFTING CLEVIS ON THE OPPOSITE SIDE OF THE CONTAINER. SLIGHTLY ELEVATE AND INSERT THE FORK TINES UNDER THE END OF THE CONTAINER STACK AND SLOWLY DRAG THE CONTAINER STACK REARWARD UNTIL IT CAN BE HANDLED FROM THE SIDE, TAKING CARE NOT TO DAMAGE THE CONTAINERS.

BUFFER PIECE, 2" X 4" BY INSIDE
CONTAINER HEIGHT MINUS 1"
(REF: 7'-7") (1 REQD). NAIL TO
THE STRUTS W/2-12d NAILS AT
EACH JOINT.

SEE GENERAL NOTE
"G" ON PAGE 3.

VERTICAL PIECE, 2" X 4" X
62" (1 REQD). NAIL TO THE
STRUTS W/2-12d NAILS AT
EACH JOINT.



STRUT, 4" X 4" X 28" (2 REQD).

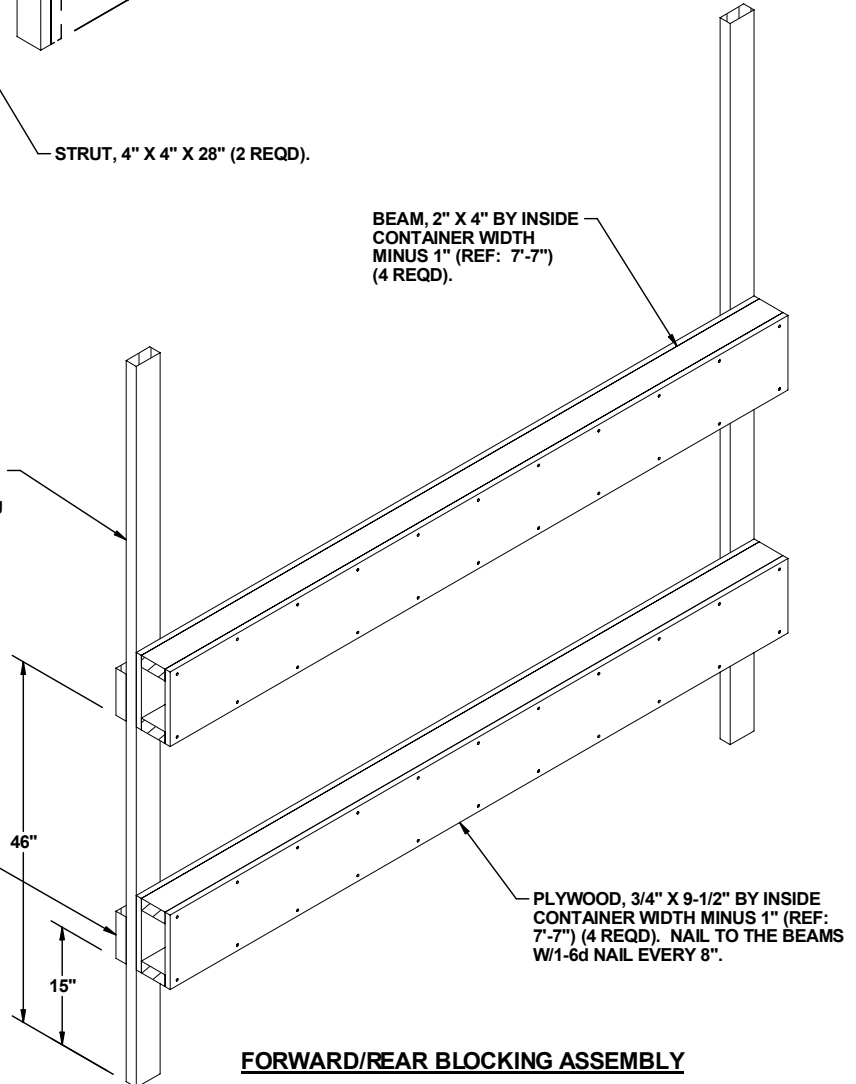
FORWARD STRUT ASSEMBLY

FOR A ONE HIGH LOAD, ELIMINATE THE
TOP STRUT AND SHORTEN THE VERTICAL
PIECE TO 31".

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

BUFFER PIECE, 2" X 4" BY INSIDE
CONTAINER HEIGHT MINUS 1"
(REF: 7'-8") (2 REQD). NAIL THRU
THE PLYWOOD INTO THE BEAMS
W/2-10d NAILS AT EACH JOINT.

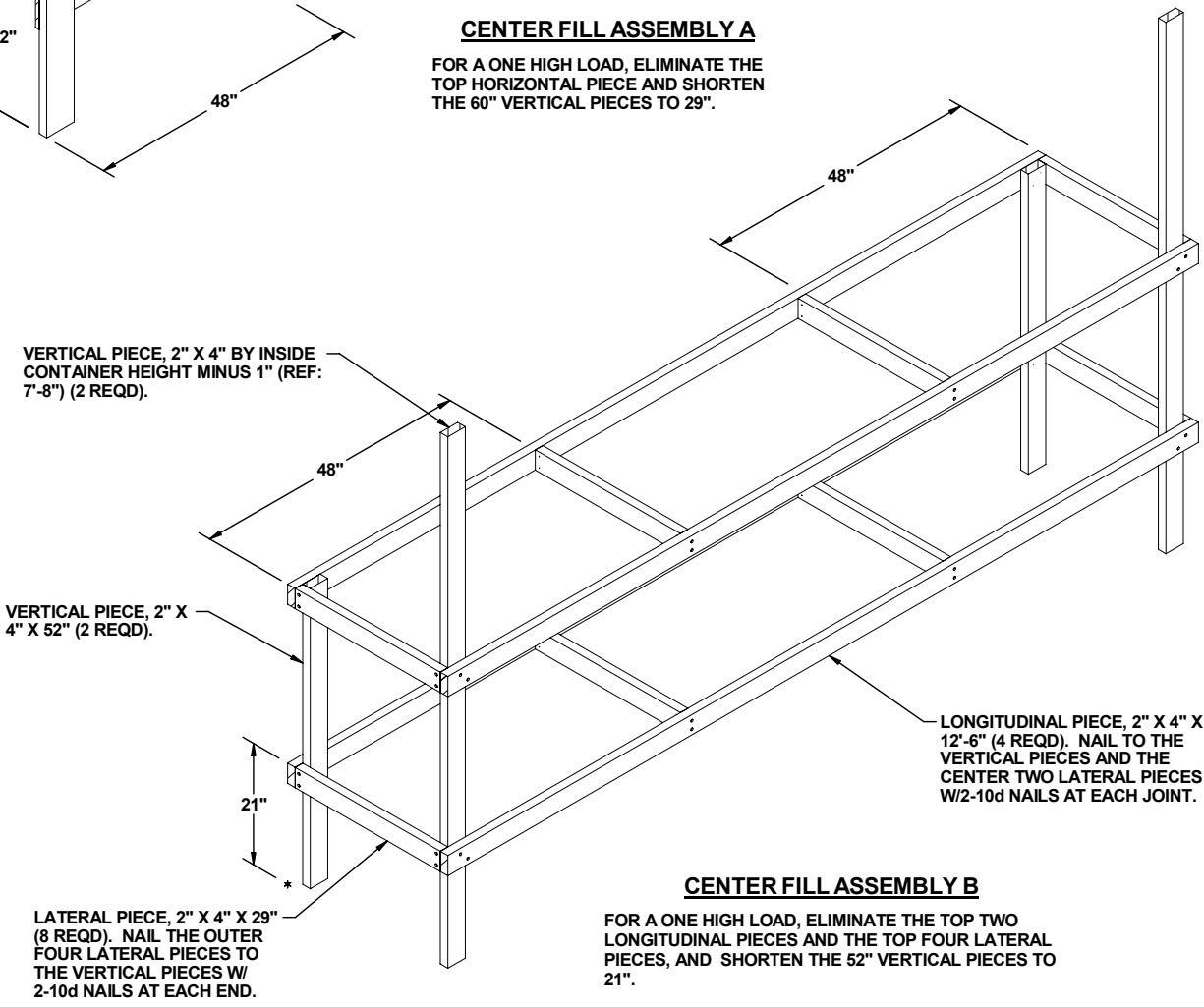
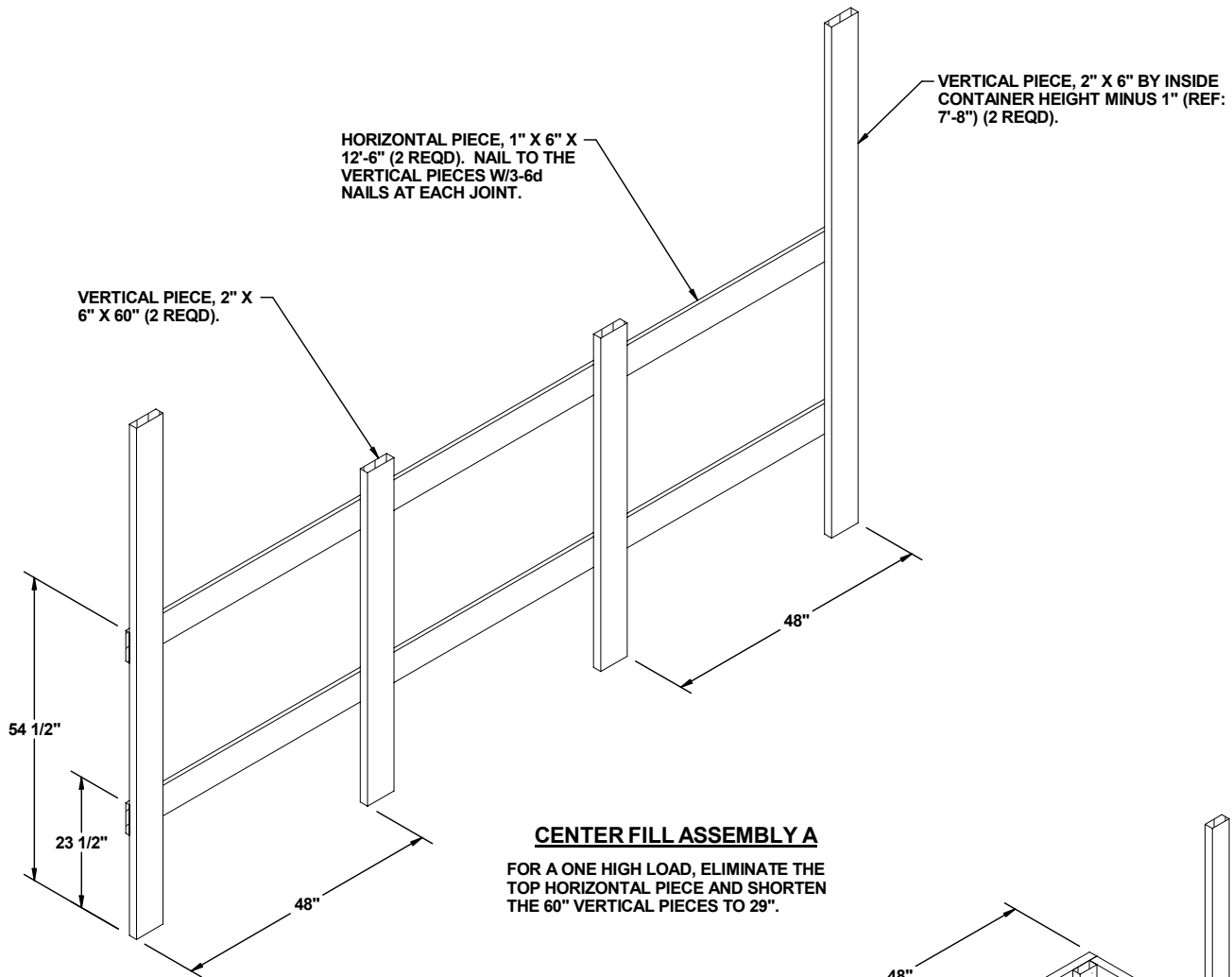
STRUT LEDGER, 2" X 4" X 6"
(4 REQD). NAIL TO THE
BUFFER PIECES W/2-10d
NAILS EACH. NOTE: STRUT
LEDGERS ARE ONLY RE-
QUIRED ON THE REAR
BLOCKING ASSEMBLY.

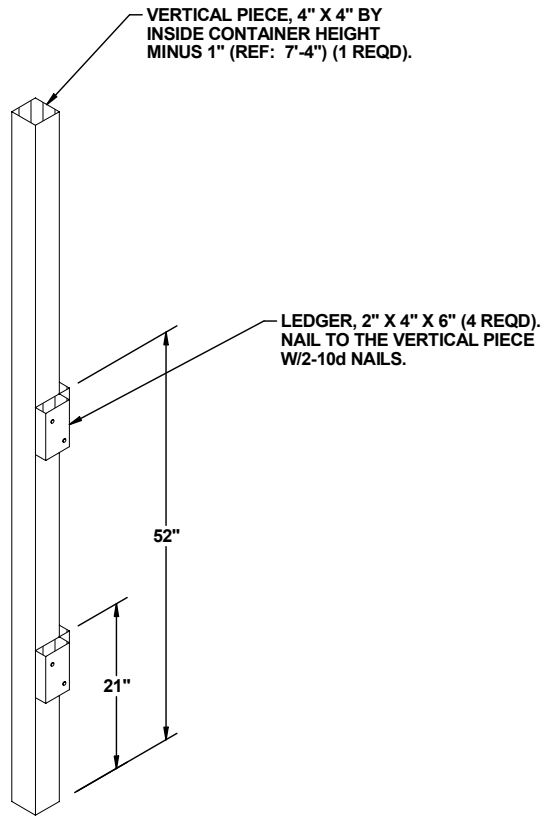


PLYWOOD, 3/4" X 9-1/2" BY INSIDE
CONTAINER WIDTH MINUS 1" (REF:
7'-7") (4 REQD). NAIL TO THE BEAMS
W/1-6d NAIL EVERY 8".

FORWARD/REAR BLOCKING ASSEMBLY

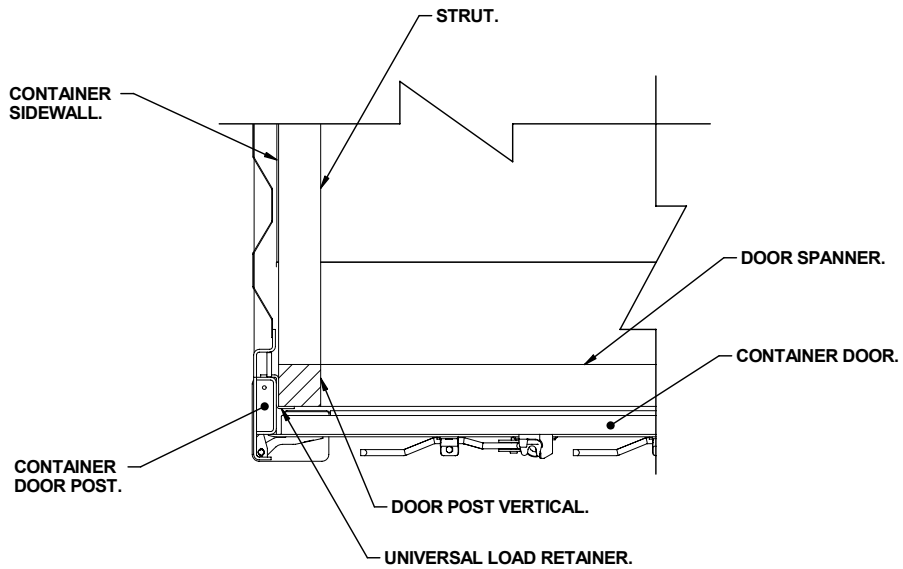
FOR A ONE HIGH LOAD, ELIMINATE THE TOP BEAM
ASSEMBLY AND TWO TOP STRUT LEDGERS.





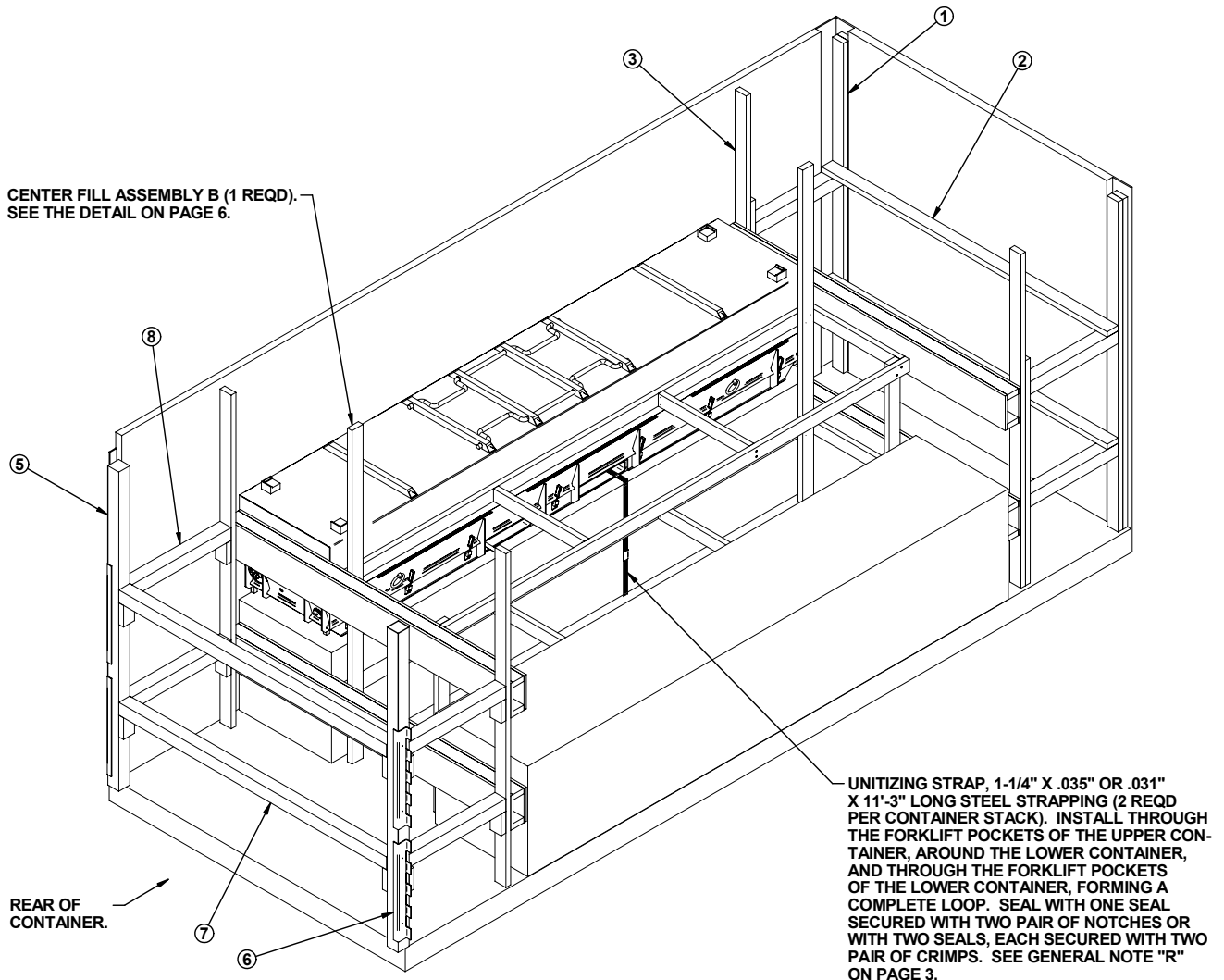
DOOR POST VERTICAL

FOR A ONE HIGH LOAD, ELIMINATE THE TOP TWO LEDGERS.



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, UNIVERSAL LOAD RETAINER, AND ADJACENT DUNNAGE PIECES.



ISOMETRIC VIEW

LESS-THAN-FULL-LOADPROCEDURES

KEY NUMBERS REFER TO KEY NUMBERS ON PAGE 2. WHEN REDUCING A LOAD BY ONE OR MORE CONTAINERS, IT WILL BE NECESSARY TO UNITIZE ANY CONTAINER STACK WHICH IS LATERALLY ADJACENT TO AN OMITTED CONTAINER(S) AS DEPICTED ABOVE. SEE GENERAL NOTE "H" ON PAGE 3.