



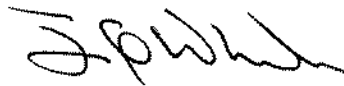
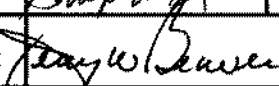
# LOADING AND BRACING\* IN END OPENING ISO CONTAINERS OF ADG-769 OR ADG-770 ADAPTER GROUPS PACKED IN CNU-439 CONTAINERS

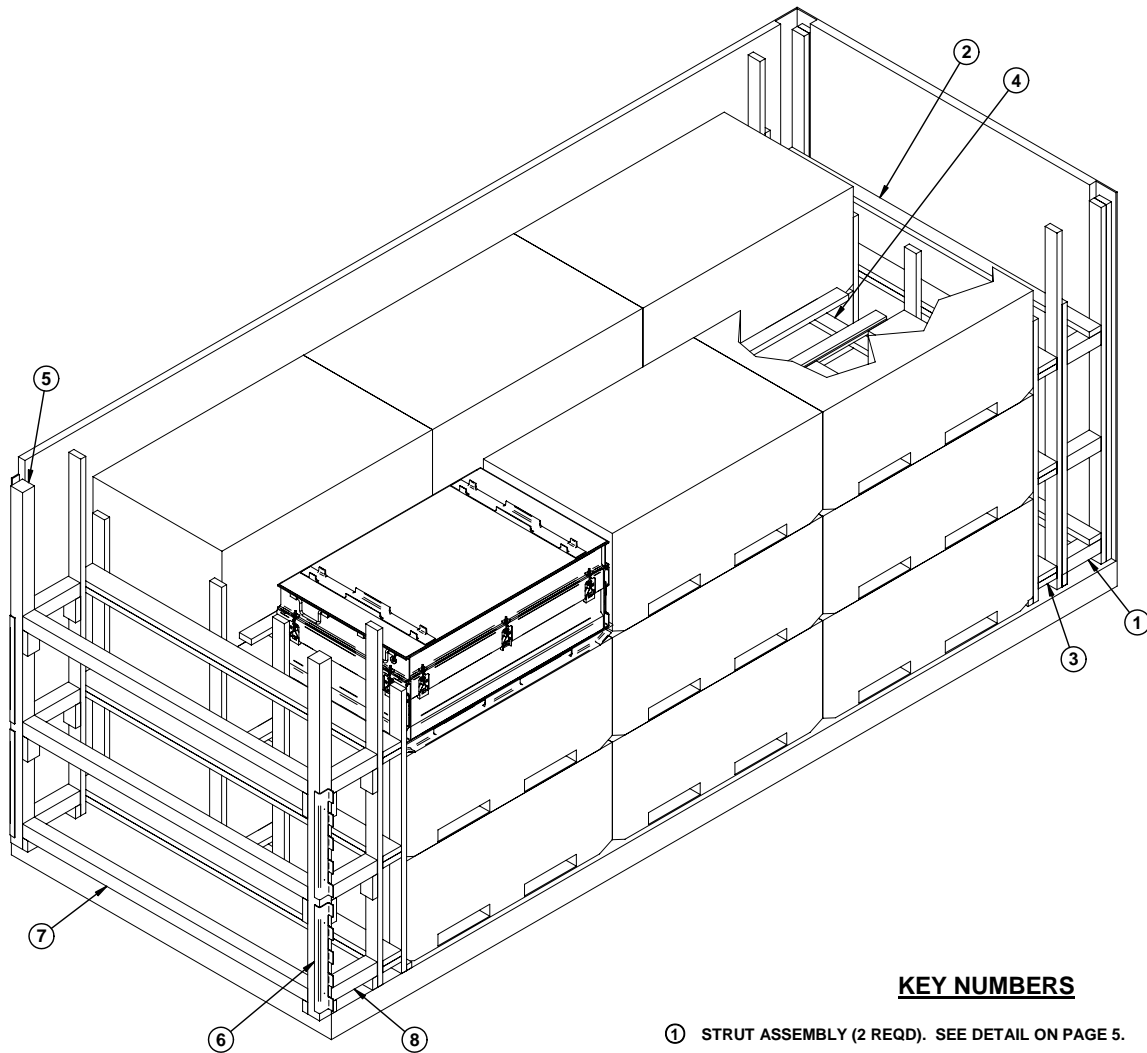
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\*THE PROCEDURES SHOWN HEREIN ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY CONTAINER-ON-FLATCAR (COFC) RAIL, MOTOR, OR WATER CARRIERS.

## U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY JOINT MUNITIONS COMMAND		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		NOVEMBER 2006			
		ENGINEER OR TECHNICIAN	BASIC REV.			PATRICK DOUGHERTY	
APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND		TRANSPORTATION ENGINEERING DIVISION					
		VALIDATION ENGINEERING DIVISION		TESTED	CLASS		
		ENGINEERING DIRECTORATE			DIVISION	DRAWING	FILE
U.S. ARMY DEFENSE AMMUNITION CENTER				19	48	8681	SP15J104



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① STRUT ASSEMBLY (2 REQD). SEE DETAIL ON PAGE 5.
- ② SPREADER PIECE, 2" X 4" BY INSIDE CONTAINER WIDTH MINUS 3" (REF: 7'-7") (2 REQD). NAIL TO THE STRUTS OF THE STRUT ASSEMBLIES W/2-10d NAILS AT EACH END.
- ③ FORWARD/REAR BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 5. **NOTE:** THE STRUT LEDGERS ARE ONLY REQUIRED ON THE BLOCKING ASSEMBLY AT THE REAR OF THE LOAD.
- ④ ANTI-SWAY BRACE (9 REQD). SEE DETAIL ON PAGE 6. POSITION LATERALLY BETWEEN CONTAINERS WITH THE RETAINER PIECES INSERTED INTO THE FORK POCKETS OF THE CONTAINERS.
- ⑤ DOOR POST VERTICAL (2 REQD). SEE DETAIL ON PAGE 6, "DETAIL A" ON PAGE 7 AND GENERAL NOTE "Q" 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 "Q" ON PAGE 3. THE QUANTITY OF UNIVERSAL LOAD RETAINERS (4 REQD) AS NOTED ABOVE IS AN EXCEPTION TO ARMY DRAWING DA-116 AND IS AUTHORIZED FOR USE IN THE LOAD AS SHOWN ON THIS PAGE.
- ⑦ 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.
- ⑧ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 13-1/2") (6 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 7.

**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	263	175
2" X 6"	91	91
4" X 4"	48	64
NAI LS	NO. REQD	POUNDS
10d (3")	350	5-1/2
12d (3-1/2")	36	3/4
UNIVERSAL LOAD RETAINER - 4 REQD		26.00 LBS

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
CNU-439 CONTAINER	18	11,142 LBS
DUNNAGE		692 LBS
CONTAINER		4,700 LBS
<b>TOTAL WEIGHT</b>		<b>16,534 LBS (APPROX)</b>

## GENERAL NOTES

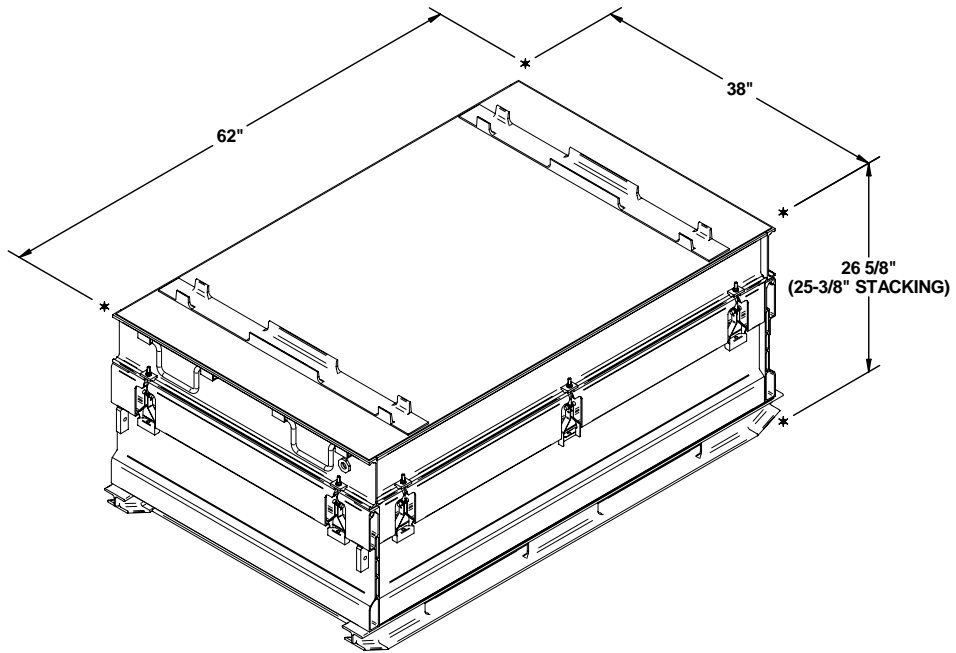
(GENERAL NOTES CONTINUED)

- 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 ADG-769 OR ADG-770 ADAPTER GROUPS PACKED IN CNU-439 CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH AMMUNITION ITEMS. SEE PAGE 4 AND US AIR FORCE DRAWING 8644260 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 ADJUSTING THE POSITION OF THE BUFFER PIECES ON THE ANTI-SWAY BRACES.
- 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 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.
- 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.
- 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 CONTAINERS SHOWN IN THE LOAD ON PAGE 2 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE FILLER ASSEMBLY 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 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.
- Q. FOUR UNIVERSAL LOAD RETAINERS, AS DEPICTED IN THE LOAD ON PAGE 2 ARE REQUIRED WHEN LOADING SEVEN OR MORE CONTAINERS; TWO ARE REQUIRED WHEN LOADING LESS THAN SEVEN 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 FOR INSTALLATION TO THE DOOR POST VERTICAL, PLACEMENT INTO THE CONTAINER, AND FOR OTHER METHODS OF REAR-OF-LOAD RESTRAINT.
- R. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:
1. PREFABRICATE TWO FORWARD/REAR BLOCKING ASSEMBLIES, NINE ANTI-SWAY BRACES, TWO STRUT ASSEMBLIES, AND TWO DOOR POST VERTICALS.
  2. INSTALL THE TWO STRUT ASSEMBLIES AND SPREADER PIECES.
  3. INSTALL THE FORWARD BLOCKING ASSEMBLY.
  4. LOAD THE CNU CONTAINERS AND ANTI-SWAY BRACES.
  5. INSTALL THE END BLOCKING ASSEMBLY.
  6. INSTALL THE DOOR POST VERTICALS, UNIVERSAL LOAD RETAINERS, DOOR SPANNERS, AND STRUTS.

(CONTINUED AT RIGHT)

## 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).
- WIRE, CARBON STEEL :: ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.
- STEEL, STRUCTURAL - - - - - :: ASTM A36; 36,000 PSI MINIMUM YIELD OR BETTER.

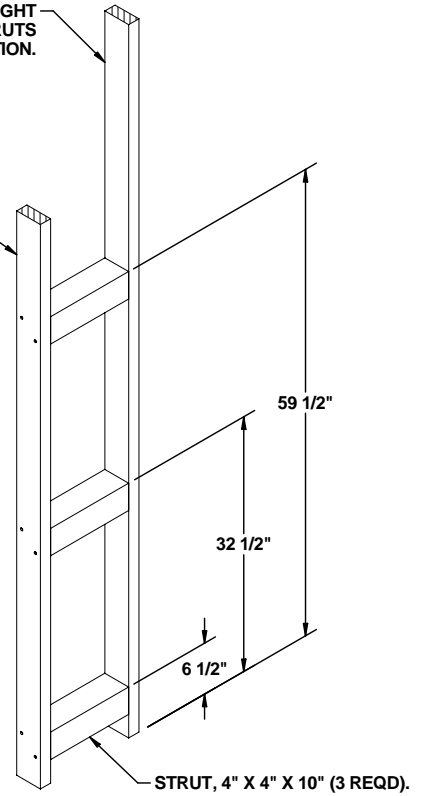


**CNU-439 CONTAINER**

GROSS WEIGHT - - - - - 619 LBS  
CUBE - - - - - 36.3 CU FT

**BUFFER PIECE, 2" X 4" BY INSIDE CONTAINER HEIGHT MINUS 1" (REF: 7'-7") (1 REQD). NAIL TO THE STRUTS W/2-10d NAILS AT EACH LOCATION.**

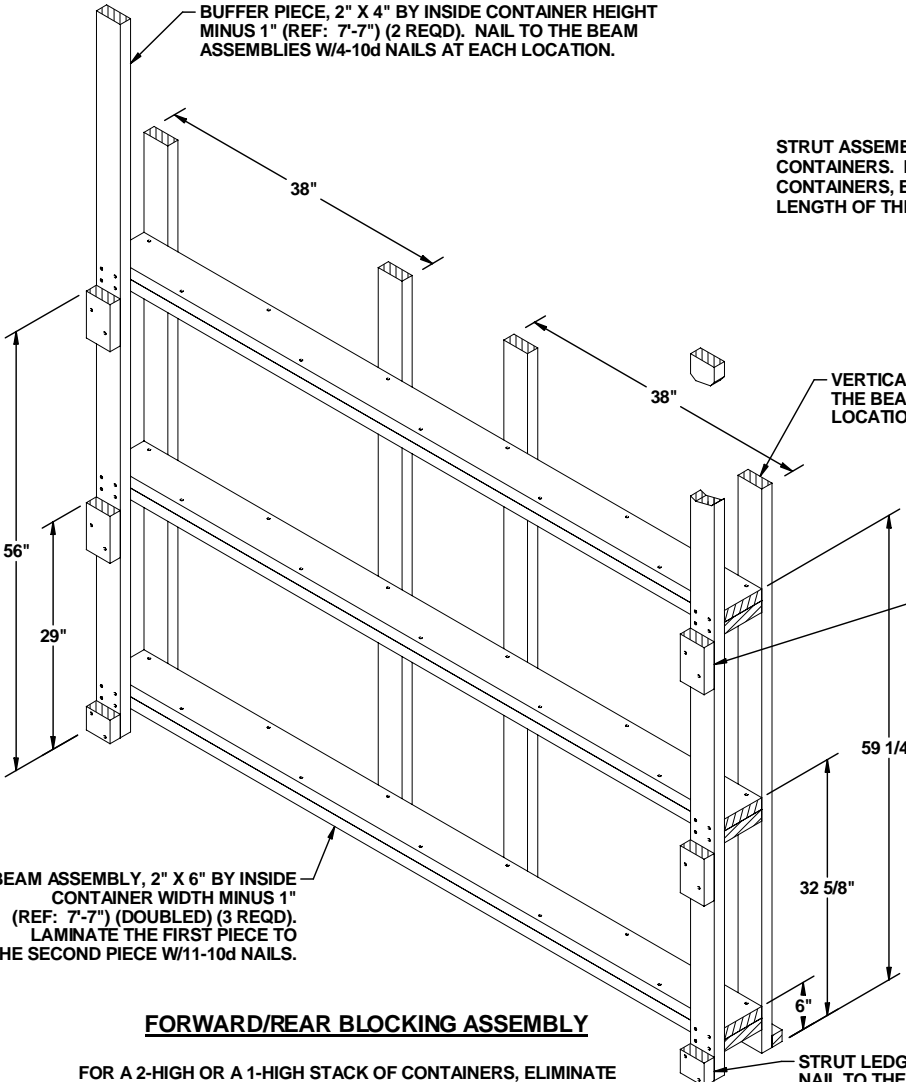
**VERTICAL PIECE, 2" X 4" X 72" (1 REQD). NAIL TO THE STRUTS W/2-10d NAILS AT EACH LOCATION.**



**STRUT ASSEMBLY**

STRUT ASSEMBLY SHOWN IS FOR A 3-HIGH LOAD OF CNU-439 CONTAINERS. FOR A 2-HIGH OR 1-HIGH LOAD OF CNU-439 CONTAINERS, ELIMINATE THE TOP STRUT AND REDUCE THE LENGTH OF THE VERTICAL PIECE TO 48".

**BUFFER PIECE, 2" X 4" BY INSIDE CONTAINER HEIGHT MINUS 1" (REF: 7'-7") (2 REQD). NAIL TO THE BEAM ASSEMBLIES W/4-10d NAILS AT EACH LOCATION.**



**VERTICAL PIECE, 2" X 4" X 72" (4 REQD). NAIL TO THE BEAM ASSEMBLIES W/4-10d NAILS AT EACH LOCATION.**

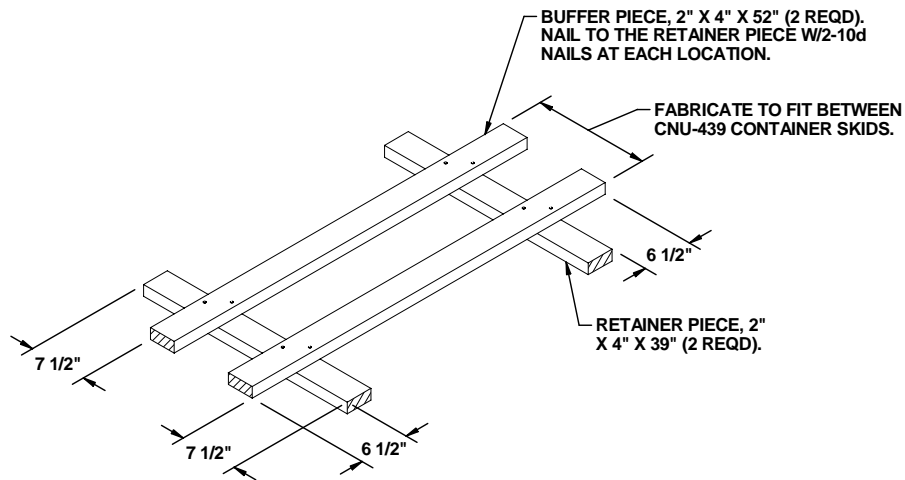
**STRUT LEDGER, 2" X 4" X 6" (4 REQD). NAIL TO THE BUFFER PIECES W/2-10d NAILS EACH. NOTE: STRUT LEDGERS ARE ONLY REQUIRED ON THE REAR BLOCKING ASSEMBLY.**

**BEAM ASSEMBLY, 2" X 6" BY INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-7") (DOUBLED) (3 REQD). LAMINATE THE FIRST PIECE TO THE SECOND PIECE W/11-10d NAILS.**

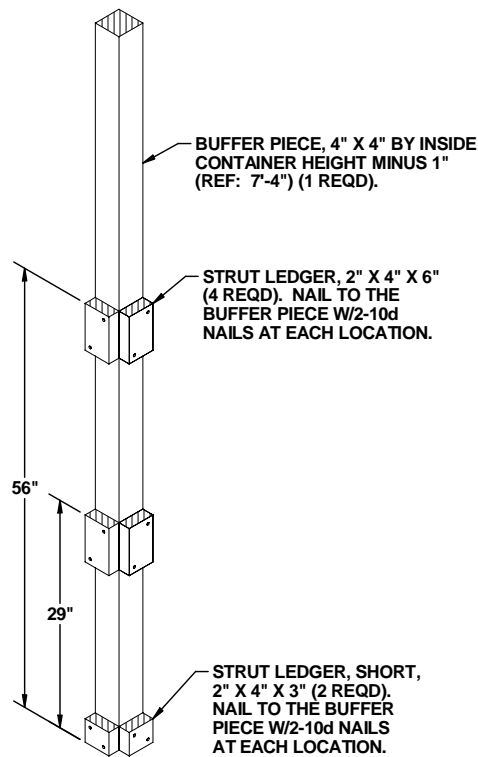
**FORWARD/REAR BLOCKING ASSEMBLY**

FOR A 2-HIGH OR A 1-HIGH STACK OF CONTAINERS, ELIMINATE THE TOP BEAM ASSEMBLY AND THE TOP STRUT LEDGERS. SHORTEN THE VERTICAL PIECES TO 40".

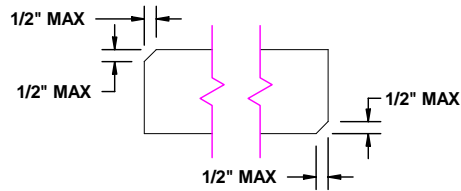
**STRUT LEDGER, SHORT, 2" X 4" X 3-1/2" (2 REQD). NAIL TO THE BUFFER PIECES W/2-10d NAILS EACH. NOTE: STRUT LEDGERS ARE ONLY REQUIRED ON THE REAR END BLOCKING ASSEMBLY.**



**ANTI-SWAY BRACE**

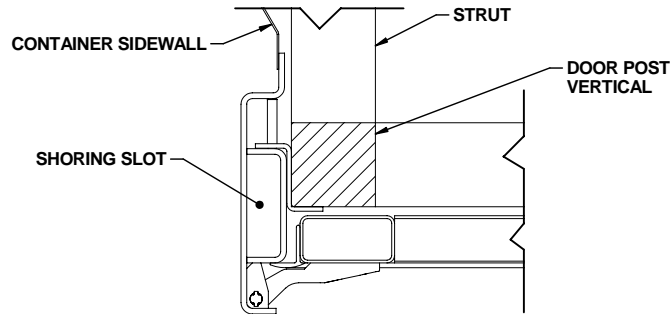


**DOOR POST VERTICAL**



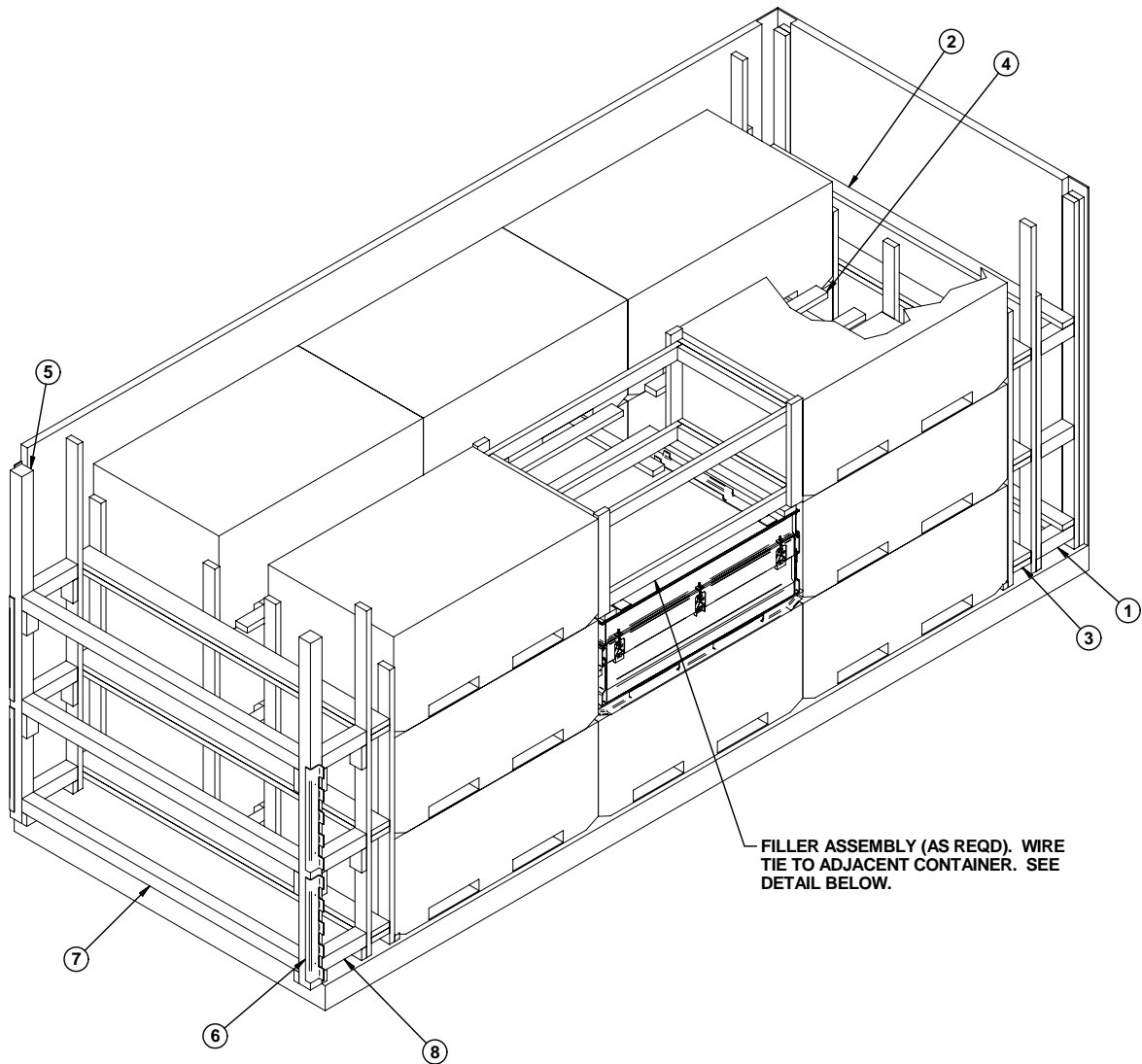
**BEVEL CUT**

IF DESIRED, EACH END OF A DOOR SPANNER  
PIECE OR STRUT MAY BE BEVEL-CUT AS SHOWN  
ABOVE TO FACILITATE ACHIEVEMENT OF A TIGHT  
FIT BETWEEN THE DOOR POST VERTICALS AND  
THE END BLOCKING ASSEMBLY.

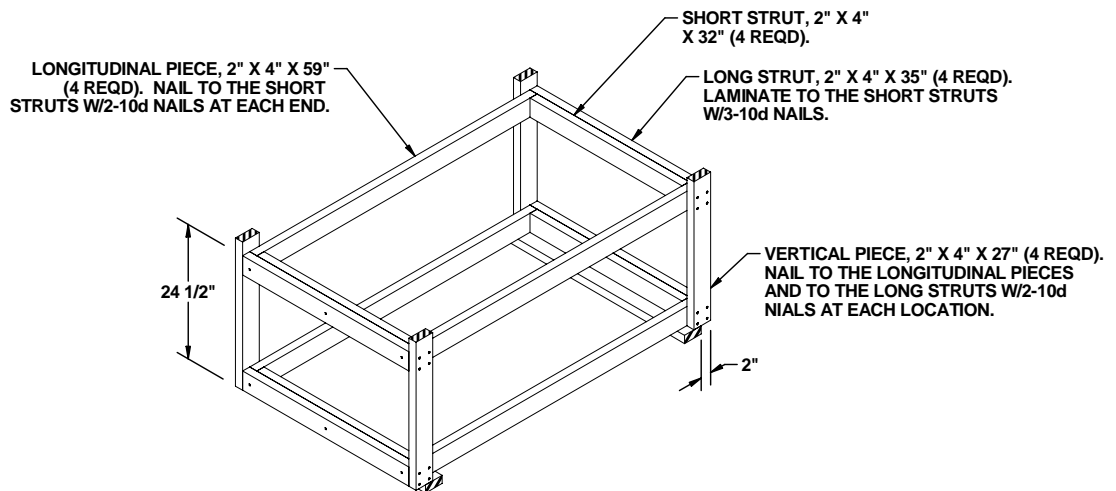


**DETAIL A**

A PARTIAL PLAN VIEW OF THE LEFT REAR PORTION OF THE  
CONTAINER IS SHOWN DEPICTING THE PROPER POSITION OF  
THE UNIVERSAL LOAD RETAINER AND ADJACENT DUNNAGE  
PIECES. SEE DEPARTMENT OF THE ARMY DRAWING DA-116  
FOR ADDITIONAL DETAILS AND PROCEDURES FOR OTHER  
TYPES OF RETAINERS THAT MAY BE USED FOR REAR OF  
LOAD RESTRAINT.



**LESS THAN FULL LOAD PROCEDURE**  
 KEY NUMBERS REFER TO THE KEY NUMBERS ON PAGE 2.



**FILLER ASSEMBLY**

SECURE THE FILLER ASSEMBLY TO THE CNU CONTAINER BELOW (OR ADJACENT TO FOR ONE HIGH LOADS) WITH 0.0800" DIA, BLACK ANNEALED WIRE 18" LONG (4 REQD) (TWO PER SIDE). INSTALL EACH WIRE AROUND THE FILLER ASSEMBLY LONGITUDINAL PIECE AND THROUGH THE HANDLE OF THE CNU CONTAINER BELOW. PULL WIRE TAUT AND TWIST WIRE WITH A MINIMUM OF TWO COMPLETE TWISTS.