

APPROVED BY
BUREAU OF EXPLOSIVES

David W. Healy

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LOADING AND BRACING WITH WOODEN DUNNAGE IN END OPENING ISO CONTAINERS OF TRI-SERVICE STANDOFF ATTACK MISSILES (TSSAM) PACKED IN CNU-446/E SHIPPING AND STORAGE CONTAINERS

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- LOADING AND BRACING SPECIFICATIONS SET FORTH WITHIN THIS DRAWING ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC) RAIL CARRIER SERVICE. THESE SPECIFICATIONS MAY ALSO BE USED FOR LOADS THAT ARE TO BE MOVED BY MOTOR OR WATER CARRIERS.

U.S. ARMY MATERIEL COMMAND DRAWING

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Justin R. Fore

APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND

William F. Ernst

U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL

DRAFTSMAN

TECHNICIAN

ENGINEER

L. FIEFFER

VALIDATION ENGINEERING DIVISION

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SEPTEMBER 1994

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DRAWING

FILE

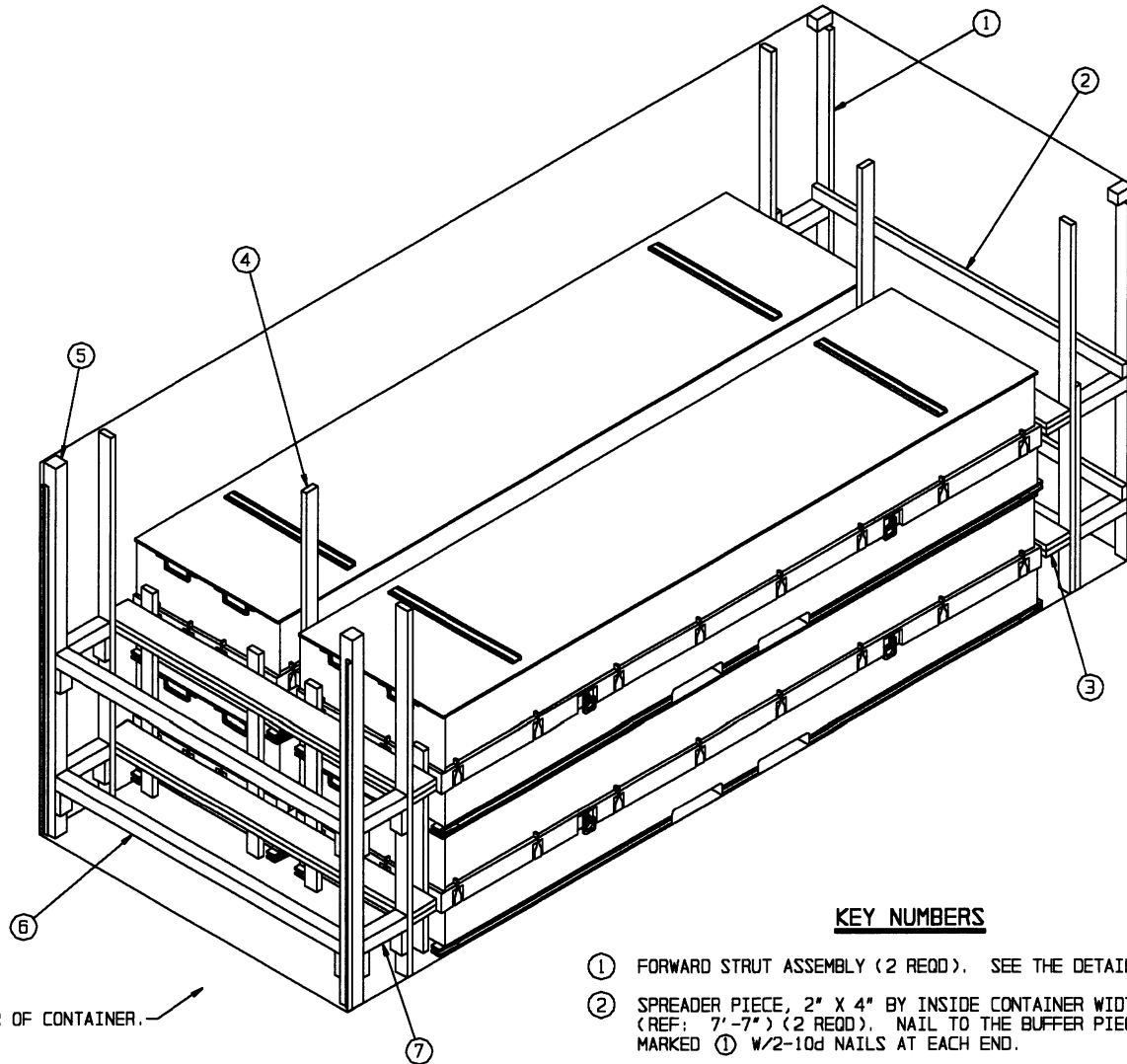
19

48

8592

SP15J71

DO NOT SCALE



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 BUFFER PIECES OF PIECE 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 PIECES OF PIECE 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 (1 REQD). SEE THE DETAIL ON PAGE 4.
- ⑤ DOOR POST VERTICAL (2 REQD). SEE THE DETAIL ON PAGE 5, AND "DETAIL A" AND "DETAIL B" ON PAGE 7.
- ⑥ DOOR SPANNER, 4" X 4" MATERIAL, CUT TO A LENGTH THAT WILL PROVIDE FOR A DRIVE FIT (REF: 7'-1-3/8") (2 REQD). TOENAIL TO THE DOOR POST VERTICAL W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 8.
- ⑦ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 12-3/4") (4 REQD). TOENAIL TO THE BUFFER PIECES OF THE REAR BLOCKING ASSEMBLY AND THE DOOR POST VERTICAL W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 8.

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CNU-446/E	4	13,400 LBS
DUNNAGE		528 LBS
CONTAINER		4,700 LBS

TOTAL WEIGHT ----- 18,628 LBS (APPROX)

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	192	128
2" x 8"	61	82
4" x 4"	39	52
NAILS	NO. REQD	POUNDS
10d (3")	188	3
12d (3-1/4")	40	3/4

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 BUREAU OF EXPLOSIVES PAMPHLET 6C 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. THE QUANTITY OF CONTAINERS SHOWN IN THE LOAD ON PAGE 2 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE "LESS-THAN-FULL-LOAD" DETAIL ON PAGE 8. WHEN A CONTAINER IS TO BE 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.

P. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN CONTAINERS AND THE END OPENING CONTAINER, AND BETWEEN CONTAINERS AND STEEL STRAPPING, IF DESIRED, TO PREVENT CHAFING DAMAGE TO CONTAINER PAINT AND MARKINGS.

O. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:

1. PREFABRICATE TWO FORWARD STRUT ASSEMBLIES, TWO FORWARD/REAR BLOCKING ASSEMBLIES, ONE CENTER FILL ASSEMBLY AND TWO DOOR POST VERTICALS.
2. INSTALL THE TWO FORWARD STRUT ASSEMBLIES AND THE TWO SPREADER PIECES.
3. INSTALL THE FORWARD BLOCKING ASSEMBLY.
4. LOAD FOUR CONTAINERS.
5. INSTALL THE CENTER FILL ASSEMBLY.
6. INSTALL THE REAR BLOCKING ASSEMBLY.
7. INSTALL THE TWO DOOR POST VERTICALS.
8. INSTALL THE TWO DOOR SPANNER PIECES.
9. INSTALL THE FOUR STRUTS.

A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).

B. THE OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE TO LOADS OF TRI-SERVICE STANDOFF ATTACK MISSILES (TSSAM) PACKED IN CNU-446/E CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH MISSILE INSTALLED. SEE PAGE 4 FOR DETAIL OF THE CONTAINER. CAUTION: REGARDLESS OF THE QUANTITY OF UNITS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE END OPENING ISO CONTAINER MUST NOT BE EXCEEDED.

C. THE LOADS AS SHOWN ARE BASED ON 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 95" HIGH (93" CLEAR HEIGHT) AND A MAXIMUM GROSS WEIGHT OF 52,910 POUNDS. THE LOAD IS DESIGNED FOR TRAILER/CONTAINER-ON-FLATCAR (T/COFC) SHIPMENT, HOWEVER, THE LOAD AS DESIGNED CAN ALSO BE MOVED BY MOTOR OR WATER CARRIERS. NOTICE: OTHER CONTAINERS OF THE SAME DESIGN CONFIGURATION CAN ALSO 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 CENTER FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE TO THE HORIZONTAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE THICKNESS AND QUANTITY OF THE DUNNAGE LUMBER USED 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 6" MATERIAL IS ACTUALLY 3/4" THICK BY 5-1/2" 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 ENDWALLS. A PIECE OF DUNNAGE MATERIAL MUST BE LAMINATED TO THE BUFFER PIECES OF STRUT ASSEMBLY TO PROVIDE A FLAT SURFACE FOR THE 2" X 4" 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". THIS PIECE IS NOT REQUIRED WHEN THE ENDWALL OF THE CONTAINER IS SMOOTH AND FLAT.

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 VIEW FOR CLARITY PURPOSES.

K. 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 25.4 MM AND ONE POUND EQUALS 0.454 KG.

(CONTINUED AT LEFT)

MATERIAL SPECIFICATIONS

LUMBER - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND FED SPEC MM-L-751.

NAILS - - - - - : FED SPEC FF-N-105; COMMON.

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-B-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.

LOADING AND UNLOADING GUIDANCE

(LOADING AND UNLOADING GUIDANCE CONT.)

1. STACKING CONTAINERS FOR LOADING.

- A. AN UPPER CONTAINER SHOULD BE PLACED AS CLOSE AS POSSIBLE IN VERTICAL ALIGNMENT WITH THE NEXT LOWER CONTAINER.
- B. POSITION THE AFT END OF AN UPPER CONTAINER ABOVE THE AFT END OF THE NEXT LOWER CONTAINER.
- C. THE CONTAINER SKIDS OF AN UPPER CONTAINER SHOULD BE FULLY SEATED AGAINST THE SKID LOCATOR PIECES ON THE COVER OF THE NEXT LOWER CONTAINER.

(2) PRECAUTIONARY HANDLING TECHNIQUES NORMALLY EMPLOYED OR AS SPECIFIED FOR THE TYPE OF COMMODITY INVOLVED WILL BE OBSERVED.

2. CONTAINER OR CONTAINER STACK HANDLING.

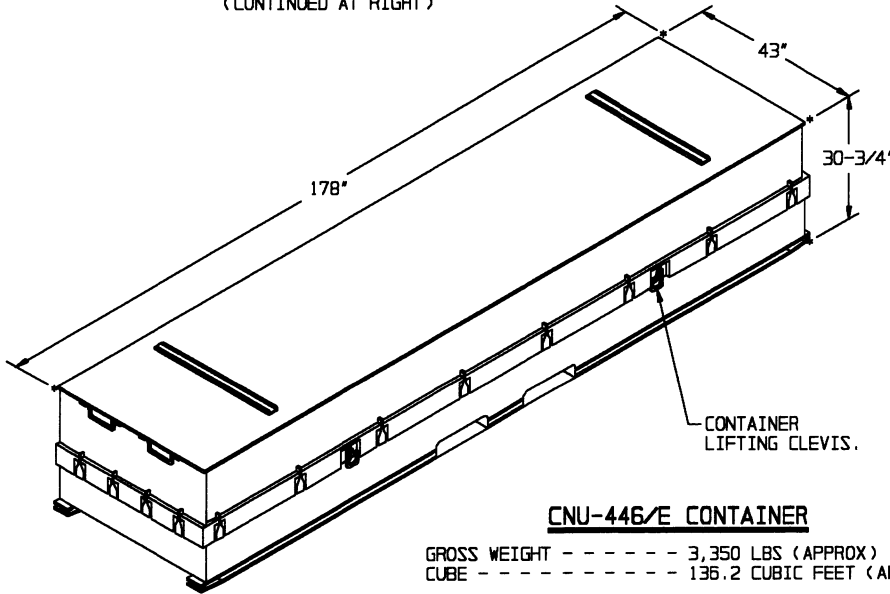
NOTES: (1) APPROVED MATERIAL HANDLING EQUIPMENT (FORKLIFT TRUCKS, CRANES, HAND TRUCKS, DOLLIES, ROLLER ASSEMBLIES, SLINGS, SPREADER BARS, ETC.) IS SPECIFIED ELSEWHERE.

(CONTINUED AT RIGHT)

A. ONLY APPROVED AND APPROPRIATELY SIZED MATERIALS HANDLING EQUIPMENT WILL BE USED FOR HANDLING THE DEPICTED CONTAINERS.

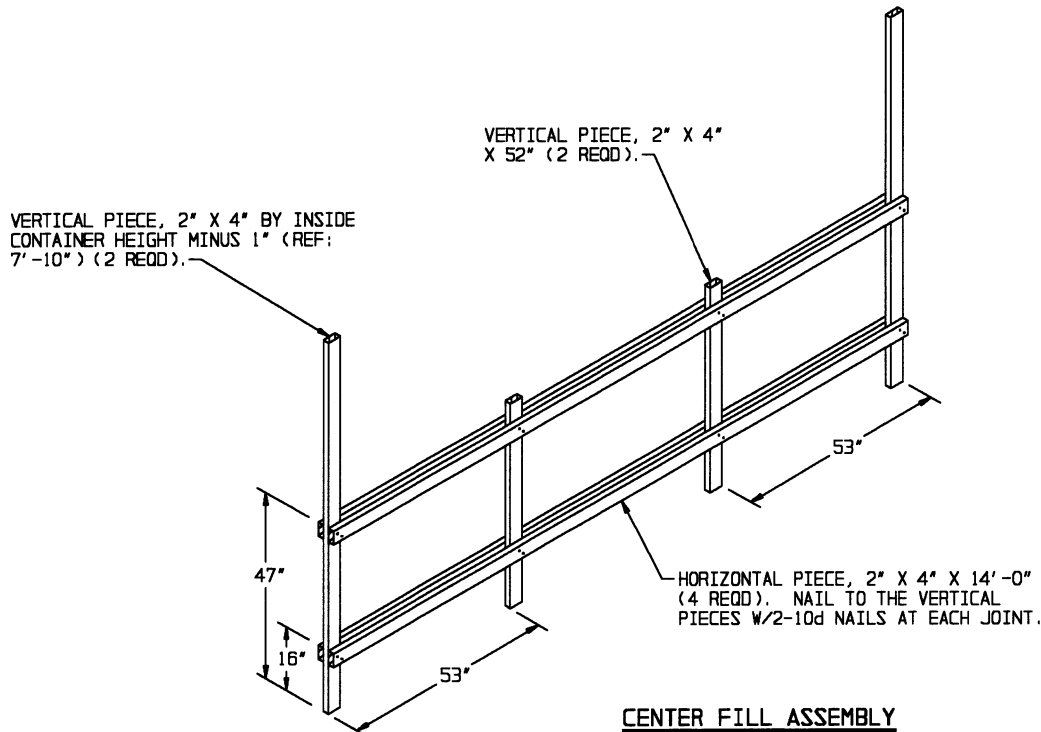
B. IF HANDLING IS ACCOMPLISHED WITH A FORKLIFT TRUCK, THE CONTAINERS SHOULD BE HANDLED FROM A SIDE POSITION AS MUCH AS POSSIBLE. CARE MUST BE EXERCISED WHEN INSERTING FORKS UNDER A CONTAINER, TO PREVENT DAMAGE TO THE CONTAINER BY THE FORK TINES OR THE FORKLIFT PACKAGE GUARD. IF ONE CONTAINER IS HANDLED BY SLINGING, THE SLING MAY BE ATTACHED TO THE LIFTING POINTS ON THE CONTAINER. DO NOT HANDLE STACKED CONTAINERS WITH A SLING.

C. WHEN UNLOADING CONTAINERS, REMOVE THE LATERAL DUNNAGE, AND SHIFT THE NEAR END OF THE CONTAINER STACK TOWARDS THE CENTER OF THE END OPENING CONTAINER. ATTACH A CHAIN FROM THE CONTAINER LIFTING CLEVIS ON ONE SIDE OF THE 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.



CNU-446/E CONTAINER

GROSS WEIGHT ----- 3,350 LBS (APPROX)
 CUBE ----- 136.2 CUBIC FEET (APPROX)



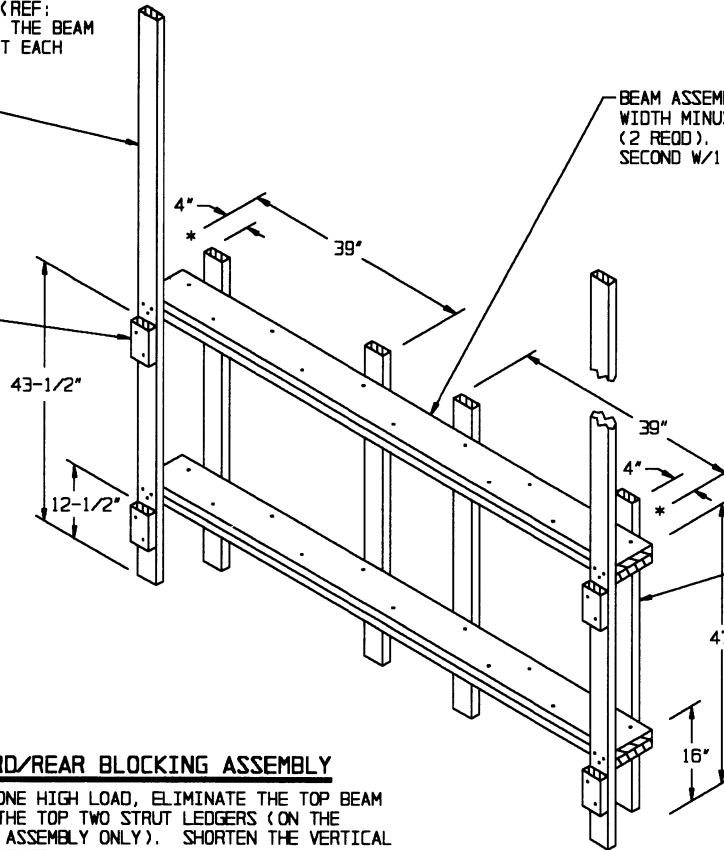
CENTER FILL ASSEMBLY

NOTE: FOR A ONE HIGH LOAD, LOCATE THE HORIZONTAL PIECES AT 16" AND 6". SHORTEN THE 52" VERTICAL PIECES APPROPRIATELY.

BUFFER PIECE, 2" X 4" BY INSIDE CONTAINER HEIGHT MINUS 1" (REF: 7'-10") (2 REOD). NAIL TO THE BEAM ASSEMBLIES W/3-10d NAILS AT EACH JOINT.

STRUT LEDGER, 2" X 4" X 6" (4 REOD). NAIL TO THE VERTICAL PIECES W/2-10d NAILS. STRUT LEDGERS ARE ONLY REQUIRED ON THE REAR BLOCKING ASSEMBLY. DO NOT INSTALL STRUT LEDGERS ON THE FORWARD BLOCKING ASSEMBLY.

BEAM ASSEMBLY, 2" X 8" BY INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-7") (DOUBLED) (2 REOD). LAMINATE THE FIRST PIECE TO THE SECOND W/11-10d NAILS.



VERTICAL PIECE, 2" X 4" X 52" (4 REOD). NAIL TO THE BEAM ASSEMBLIES W/3-10d NAILS AT EACH JOINT.

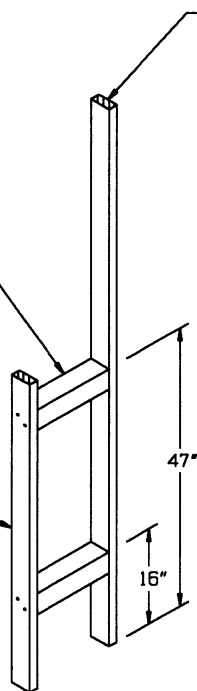
FORWARD/REAR BLOCKING ASSEMBLY

NOTE: FOR A ONE HIGH LOAD, ELIMINATE THE TOP BEAM ASSEMBLY AND THE TOP TWO STRUT LEDGERS (ON THE REAR BLOCKING ASSEMBLY ONLY). SHORTEN THE VERTICAL PIECES APPROPRIATELY.

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

STRUT, 4" X 4" X 14" (2 REOD).

VERTICAL PIECE, 2" X 4" X 52" (1 REOD). NAIL TO THE STRUTS W/2-12d NAILS AT EACH JOINT.

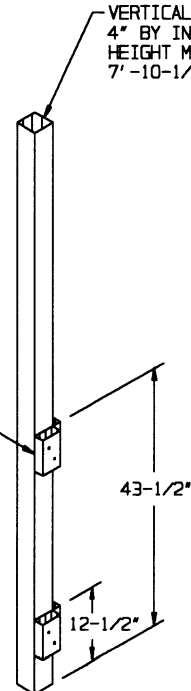


FORWARD STRUT ASSEMBLY

NOTE: FOR A ONE HIGH LOAD, RELOCATE THE STRUTS AT 18" AND 14-1/2". SHORTEN THE VERTICAL PIECE APPROPRIATELY.

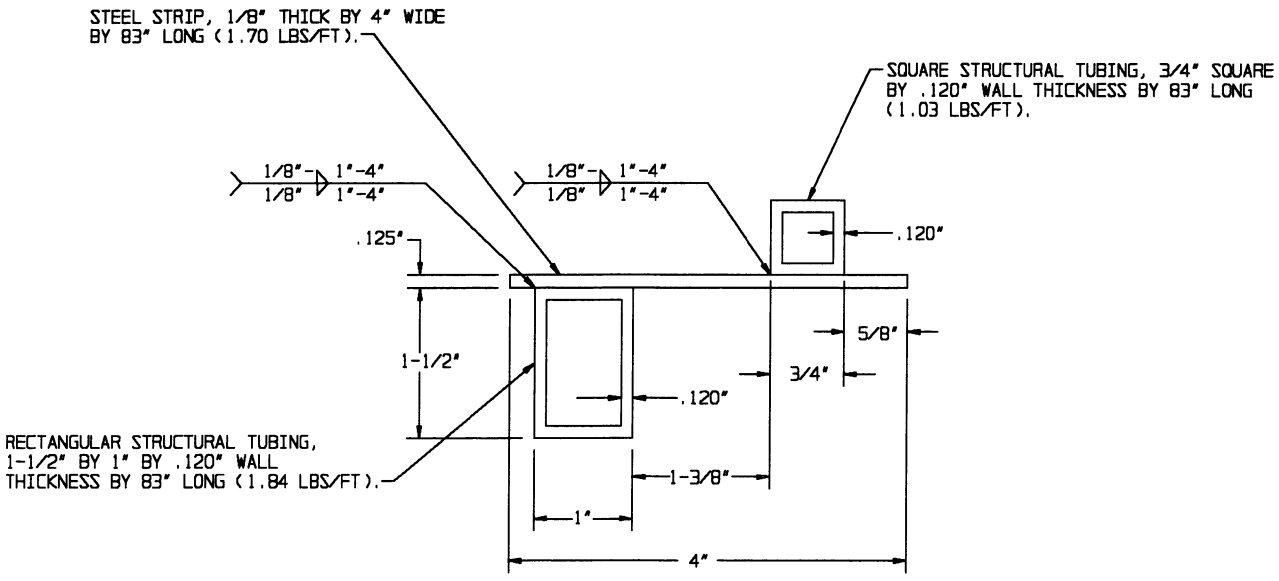
VERTICAL PIECE, 4" X 4" BY INSIDE CONTAINER HEIGHT MINUS 1/2" (REF: 7'-10-1/2") (1 REOD).

STRUT LEDGER, 2" X 4" X 6" (4 REOD). NAIL TO THE VERTICAL PIECE W/2-10d NAILS.



DOOR POST VERTICAL

NOTE: FOR A ONE HIGH LOAD, ELIMINATE THE TOP TWO STRUT LEDGERS. LOCATE THE LOWER TWO STRUT LEDGERS AT 11". LOCATE BOTH STRUTS ON ONE SIDE OF THE LOAD ON TOP OF EACH OTHER.

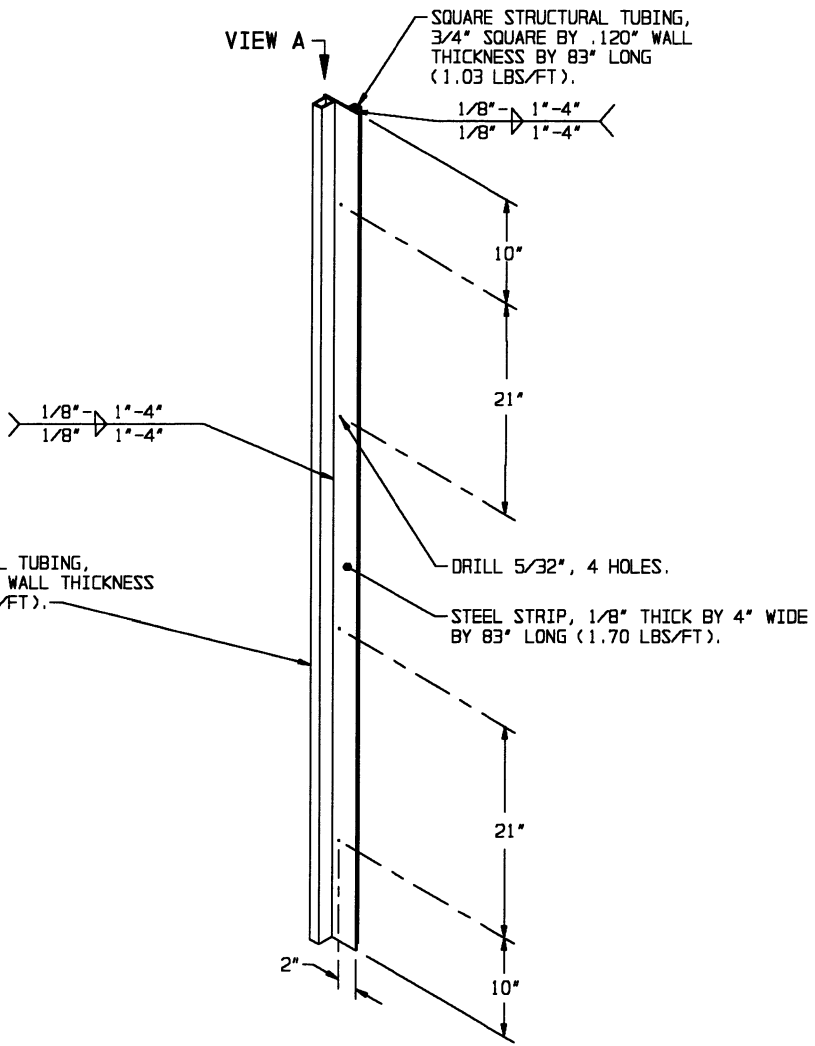


STEEL STRIP, 1/8" THICK BY 4" WIDE BY 83" LONG (1.70 LBS/FT).

SQUARE STRUCTURAL TUBING, 3/4" SQUARE BY .120" WALL THICKNESS BY 83" LONG (1.03 LBS/FT).

RECTANGULAR STRUCTURAL TUBING, 1-1/2" BY 1" BY .120" WALL THICKNESS BY 83" LONG (1.84 LBS/FT).

VIEW A



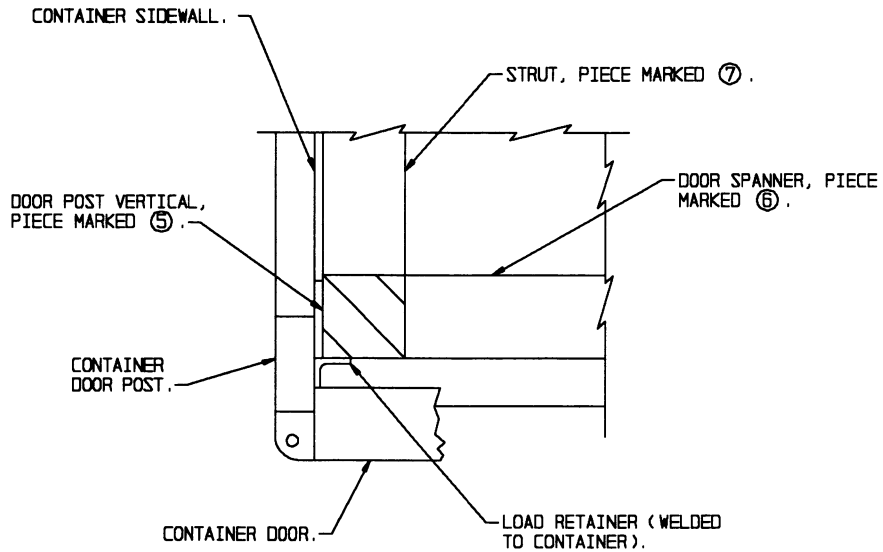
SQUARE STRUCTURAL TUBING, 3/4" SQUARE BY .120" WALL THICKNESS BY 83" LONG (1.03 LBS/FT).

RECTANGULAR STRUCTURAL TUBING, 1-1/2" BY 1" BY .120" WALL THICKNESS BY 83" LONG (1.84 LBS/FT).

DRILL 5/32", 4 HOLES.
STEEL STRIP, 1/8" THICK BY 4" WIDE BY 83" LONG (1.70 LBS/FT).

DOOR POST VERTICAL RETAINER

NOTE: THE ABOVE ASSEMBLY HAS BEEN SHOWN ROTATED 90° FROM THE ORIENTATION IN WHICH IT IS INSTALLED IN THE LEFT REAR CORNER OF THE CONTAINER. THE ASSEMBLY HAS BEEN ROTATED FOR HOLE LOCATION CLARITY.

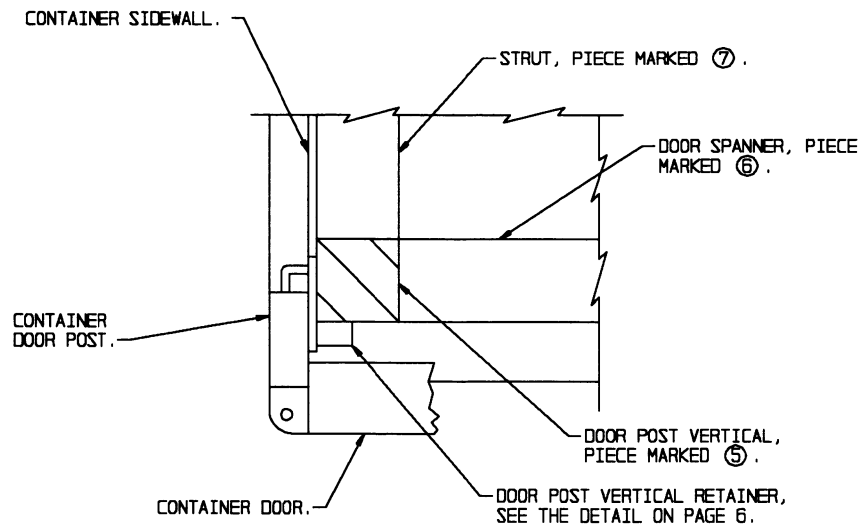


DETAIL A

A PARTIAL PLAN VIEW OF THE LEFT REAR PORTION OF THE CONTAINER IS SHOWN DEPICTING THE PROPER POSITION OF THE FILL MATERIAL AND ADJACENT DUNNAGE PIECES.

SPECIAL NOTE:

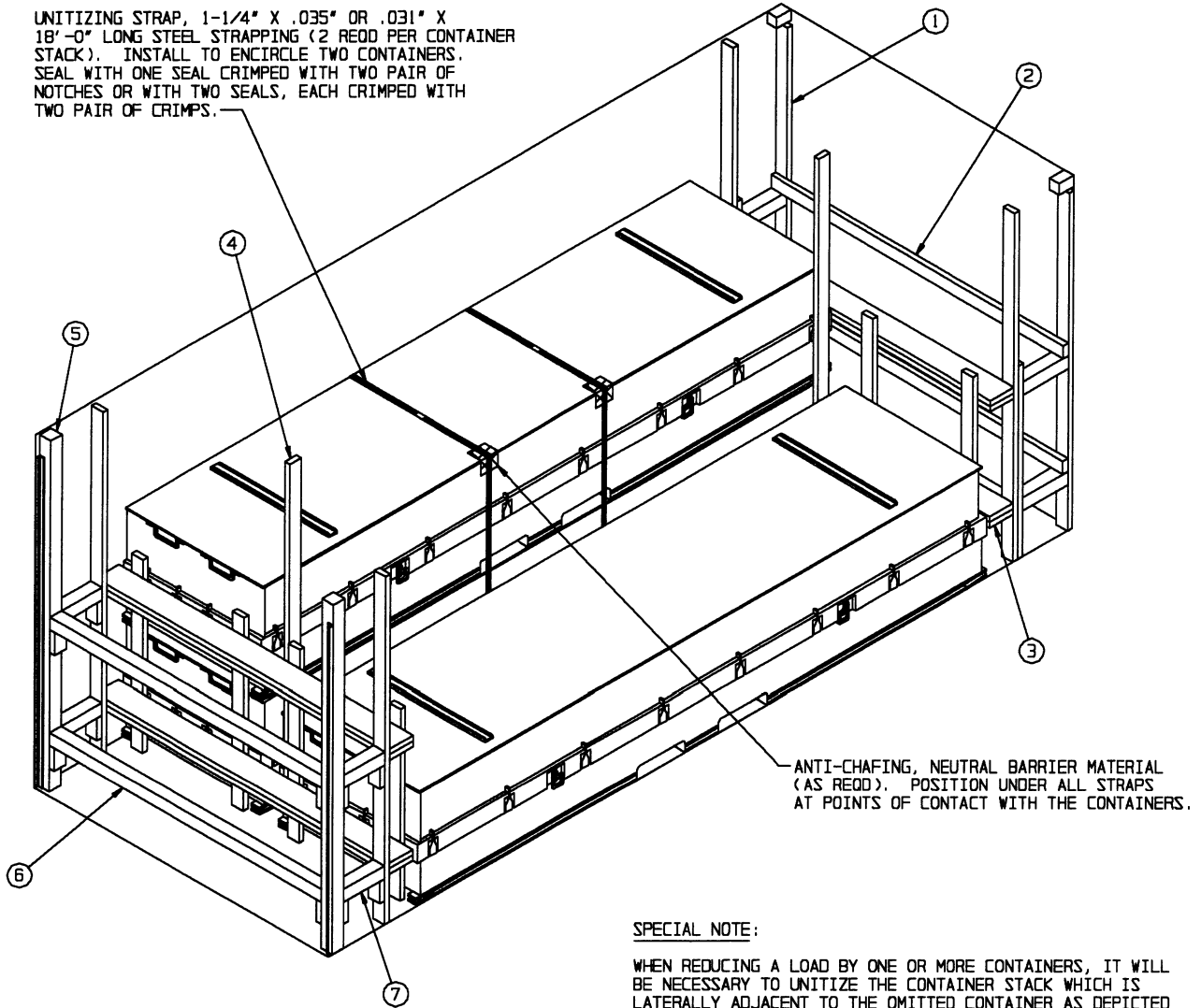
WHEN ISO CONTAINERS ARE NOT EQUIPPED WITH PRE-WELDED LOAD RETAINERS, AS DEPICTED IN "DETAIL A" ABOVE, DOOR POST VERTICAL RETAINERS WILL BE REQUIRED FOR THE LOAD DEPICTED ON PAGE 2. SEE VARIOUS LOADS WITHIN AMC DRAWING 19-48-4153-15PA1002 FOR EXAMPLES. SEE PAGE 6 FOR DETAILS OF THE METAL DOOR POST VERTICAL RETAINER.



DETAIL B

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.

UNITIZING STRAP, 1-1/4" X .035" OR .031" X 18'-0" LONG STEEL STRAPPING (2 REQD PER CONTAINER STACK). INSTALL TO ENCIRCLE TWO CONTAINERS. SEAL WITH ONE SEAL CRIMPED WITH TWO PAIR OF NOTCHES OR WITH TWO SEALS, EACH CRIMPED WITH TWO PAIR OF CRIMPS.



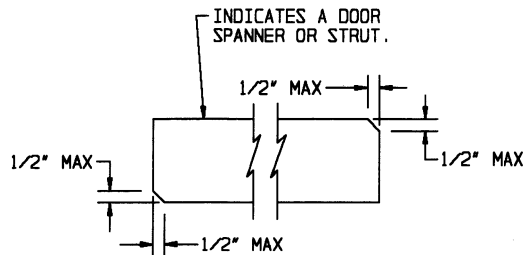
SPECIAL NOTE:

WHEN REDUCING A LOAD BY ONE OR MORE CONTAINERS, IT WILL BE NECESSARY TO UNITIZE THE CONTAINER STACK WHICH IS LATERALLY ADJACENT TO THE OMITTED CONTAINER AS DEPICTED IN THE LOAD VIEW ABOVE. SEE GENERAL NOTE "O" ON PAGE 3.

ISOMETRIC VIEW

LESS-THAN-FULL-LOAD PROCEDURE

KEY NUMBERS REFER TO KEY NUMBERS ON PAGE 2. NOTE THAT THE CENTER FILL ASSEMBLY HAS BEEN MODIFIED AS DESCRIBED ON PAGE 4.



BEVEL-CUT

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