

APPROVED BY
BUREAU OF EXPLOSIVES

J. H. Fleckman

DATE 5/13/94

LOADING AND BRACING WITH WOODEN DUNNAGE IN END OPENING ISO CONTAINERS OF HARM (AGM-88) MISSILES PACKED IN CNU-355/E SHIPPING AND STORAGE CONTAINERS

INDEX

<u>ITEM</u>	<u>PAGE(S)</u>
TYPICAL LOADING PROCEDURES - - - - -	2
GENERAL NOTES AND MATERIAL SPECIFICATIONS - - - - -	3
CNU-355/E DETAIL - - - - -	4
DETAILS - - - - -	4-8
LESS-THAN-FULL-LOAD DETAILS - - - - -	8

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

APPROVED, U.S. ARMY ARMAMENT, MUNITIONS AND
CHEMICAL COMMAND

David E. Hochwies

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

John L. Byrd Jr.

U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL

DRAFTSMAN

TECHNICIAN

ENGINEER

L. FIEFFER

VALIDATION
ENGINEERING
DIVISION

TRANSPORTATION
ENGINEERING
DIVISION

LOGISTICS
ENGINEERING
OFFICE

W. French *W. Ernst*

MARCH 1994

CLASS

DIVISION

DRAWING

FILE

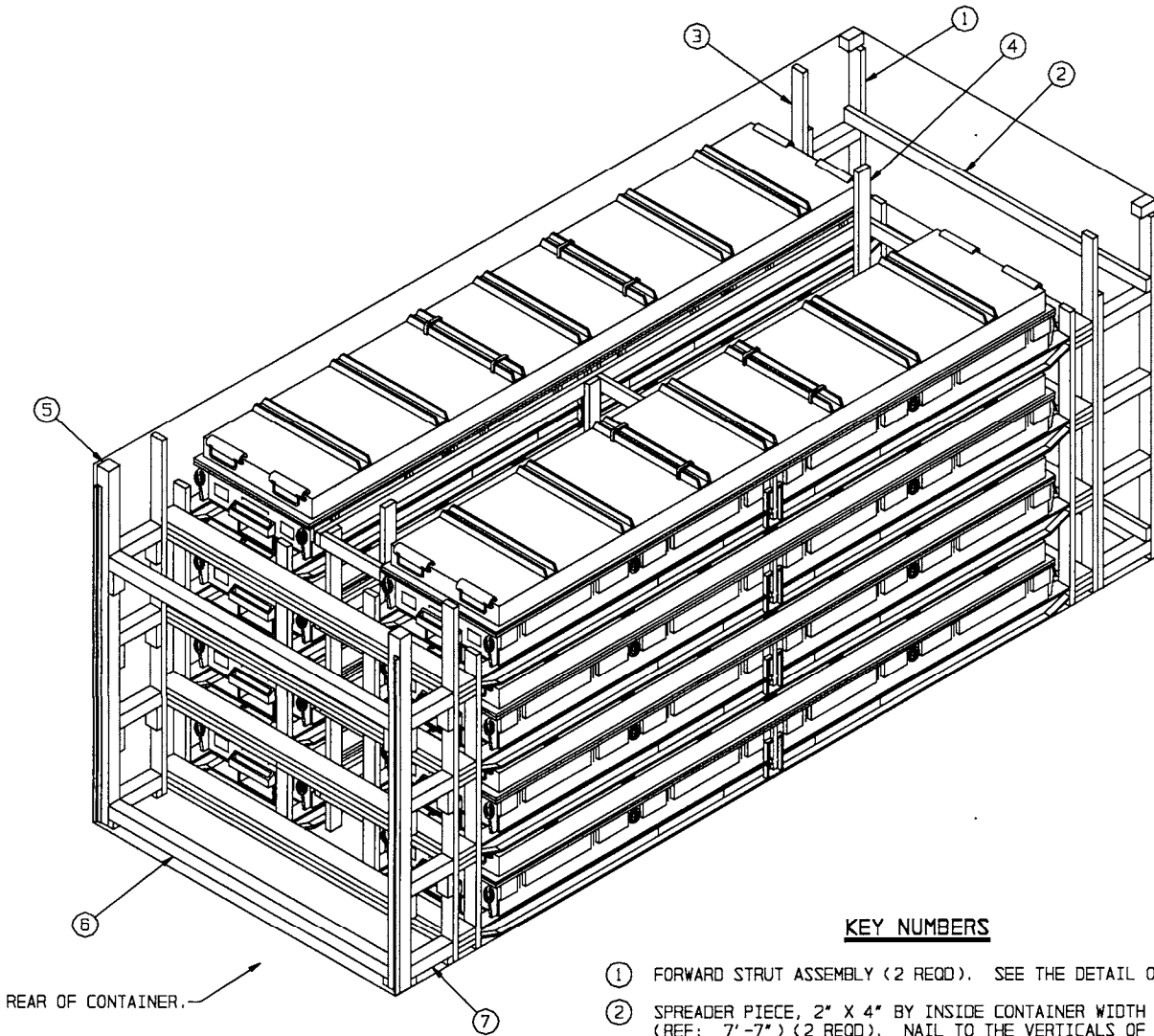
19

48

8584

15J67

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 VERTICALS 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/5-10d 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 6.
- 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: 13-1/4") (8 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 8.

BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	307	205
2" X 6"	182	182
4" X 4"	49	66
NAILS	NO. REQD	POUNDS
10d (3")	458	7-1/4
12d (3-1/4")	40	3/4

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CNU-355/E	8	18,880 LBS
DUNNAGE		914 LBS
CONTAINER		4,700 LBS

TOTAL WEIGHT ----- 24,494 LBS (APPROX)

(GENERAL NOTES CONTINUED)

GENERAL NOTES

- K. 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 TOFF 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.
- L. 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.
- M. 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.
- N. 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.
- O. 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.
- P. 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 EIGHT 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 EIGHT 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 SPECIFIED OUTLOADING PROCEDURES ARE APPLICABLE TO LOADS OF HARM (AGM-88) MISSILES PACKED IN CNU-355/E CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CNU-355/E CONTAINER WITH MISSILES INSTALLED. SEE PAGE 4 FOR DETAIL 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 95" (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 OTHER SURFACE MODES OF TRANSPORT. NOTICE: OTHER CONTAINERS OF THE SAME DESIGN CONFIGURATION CAN BE USED.
- D. WHEN LOADING CNU-355/E 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 LONGITUDINAL PIECES ON THE CENTER FILL ASSEMBLY. NAIL EACH ADDITIONAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE LENGTH OF THE LATERAL PIECES IN THE CENTER FILL ASSEMBLY MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE CONTAINER SIZE.
- 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 FORWARD VERTICAL PIECES ON THE 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". THIS PIECE IS NOT REQUIRED WHEN THE CORNER PORTIONS OF THE CONTAINER FORWARD WALL ARE 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 VIEWS FOR CLARITY PURPOSES.

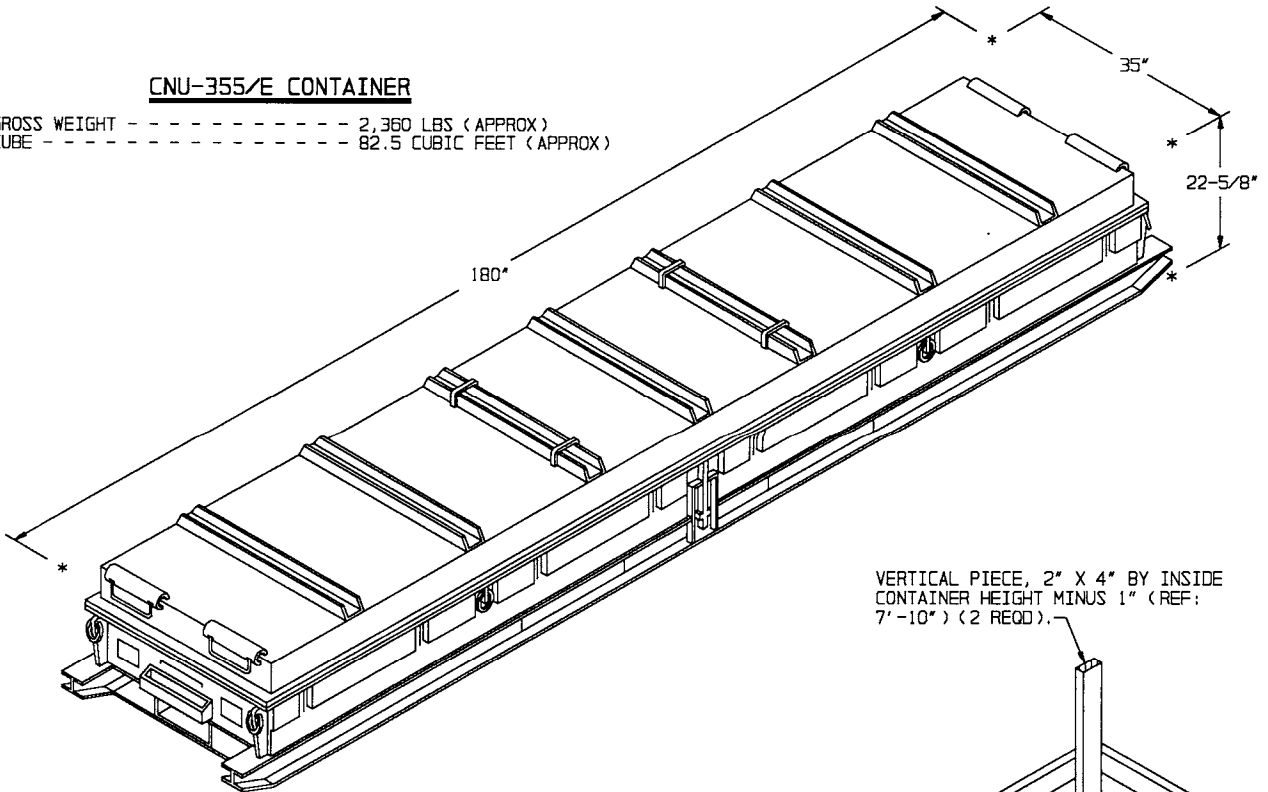
(CONTINUED AT LEFT)

MATERIAL SPECIFICATIONS

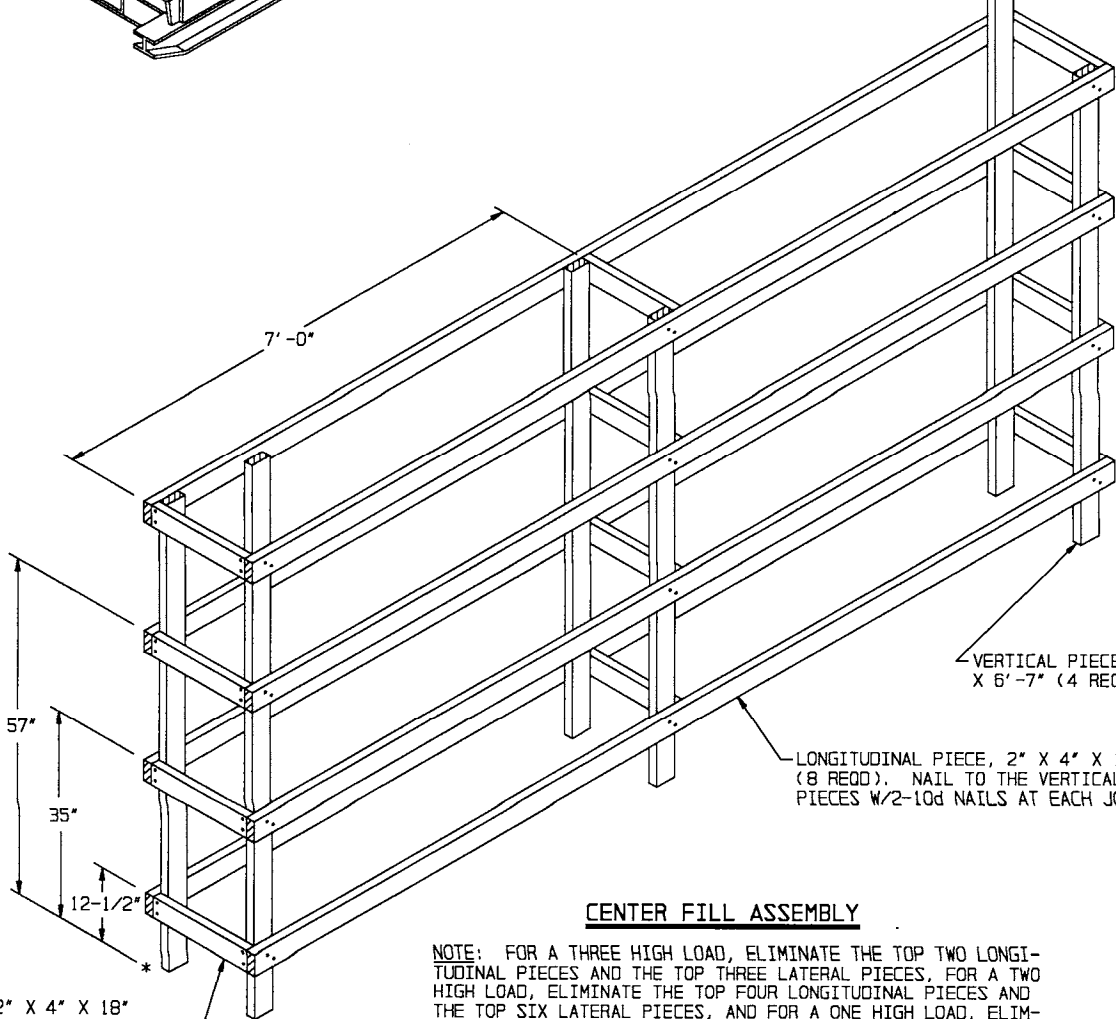
- LUMBER - - - - -: SEE TM 743-200-1 (DUNNAGE LUMBER) AND FED SPEC MM-L-751.
- NAILS - - - - -: FED SPEC FF-N-105; COMMON.
- STRAPPING, STEEL - -: ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.
- SEAL, STRAP - - - -: ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.
- ANTI-CHAFING MATERIAL - - - - -: MIL-B-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.
- STEEL, STRUCTURAL -: ASTM A501, STEEL STRUCTURAL TUBING; AND ASTM A570, STEEL, STRIP, HOT-ROLLED, GRADE 36 (MINIMUM).

CNU-355/E CONTAINER

GROSS WEIGHT ----- 2,360 LBS (APPROX)
 CUBE ----- 82.5 CUBIC FEET (APPROX)



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



VERTICAL PIECE, 2" X 4"
 X 6'-7" (4 REQD).

LONGITUDINAL PIECE, 2" X 4" X 14'-0"
 (8 REQD). NAIL TO THE VERTICAL
 PIECES W/2-10d NAILS AT EACH JOINT.

LATERAL PIECE, 2" X 4" X 18"
 (12 REQD). NAIL TO THE VERTICAL
 PIECES W/2-10d NAILS AT EACH END.

CENTER FILL ASSEMBLY

NOTE: FOR A THREE HIGH LOAD, ELIMINATE THE TOP TWO LONGI-
 TUDINAL PIECES AND THE TOP THREE LATERAL PIECES, FOR A TWO
 HIGH LOAD, ELIMINATE THE TOP FOUR LONGITUDINAL PIECES AND
 THE TOP SIX LATERAL PIECES, AND FOR A ONE HIGH LOAD, ELIM-
 INATE THE TOP SIX LONGITUDINAL PIECES AND THE TOP NINE LATERAL
 PIECES. SHORTEN THE 6'-7" VERTICAL PIECES APPROPRIATELY.
 THE LENGTH OF THE LATERAL PIECES IS DEPENDENT ON THE VOID
 AT THE CENTER OF THE LOAD.

STRUT LEDGERS ARE ONLY REQUIRED ON THE REAR BLOCKING ASSEMBLY. DO NOT INSTALL STRUT LEDGERS ON THE FORWARD BLOCKING ASSEMBLY.

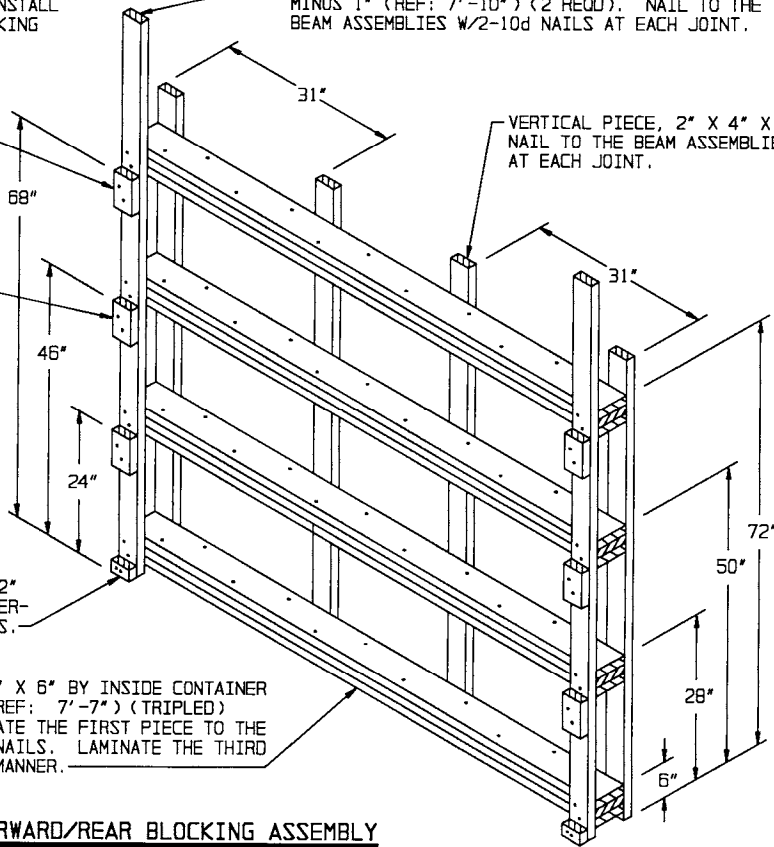
STRUT LEDGER, 2" X 4" X 6" (6 REQD). NAIL TO THE VERTICAL PIECE W/2-10d NAILS.

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

BEAM ASSEMBLY, 2" X 6" BY INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-7") (TRIPLED) (4 REQD). LAMINATE THE FIRST PIECE TO THE SECOND W/11-10d NAILS. LAMINATE THE THIRD PIECE IN A LIKE MANNER.

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

VERTICAL PIECE, 2" X 4" X 6'-6" (4 REQD). NAIL TO THE BEAM ASSEMBLIES W/2-10d NAILS AT EACH JOINT.



FORWARD/REAR BLOCKING ASSEMBLY

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

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

STRUT, 4" X 4" X 14" (4 REQD).

VERTICAL PIECE, 2" X 4" X 6'-6" (1 REQD). NAIL TO THE STRUTS W/2-10d NAILS AT EACH JOINT.

VERTICAL 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 JOINT.

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

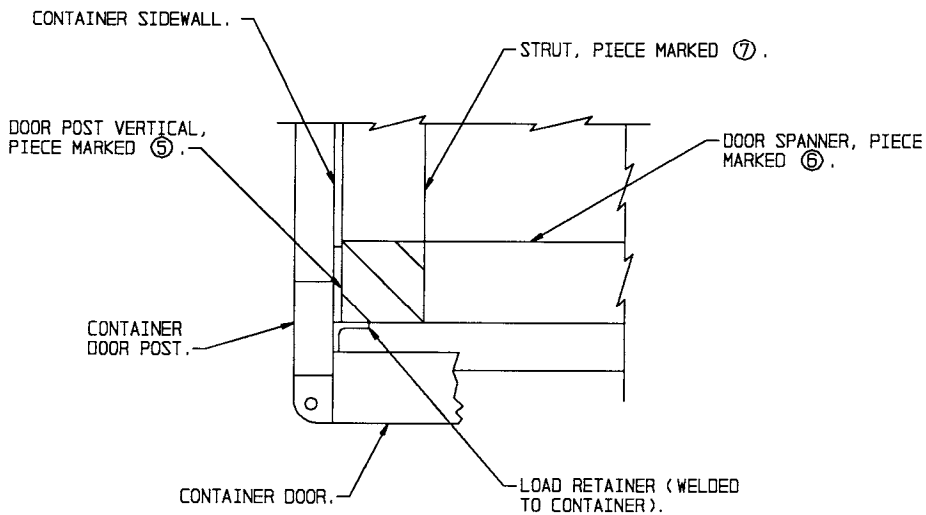
STRUT LEDGER, 2" X 4" X 2" (2 REQD). NAIL TO THE VERTICAL PIECE W/2-10d NAILS.

FORWARD STRUT ASSEMBLY

NOTE: FOR A THREE HIGH LOAD, ELIMINATE THE TOP STRUT, FOR A TWO HIGH LOAD, ELIMINATE THE TOP TWO STRUTS, AND FOR A ONE HIGH LOAD, ELIMINATE THE TOP THREE STRUTS. SHORTEN THE VERTICAL PIECE APPROPRIATELY.

DOOR POST VERTICAL

NOTE: FOR A THREE HIGH LOAD, ELIMINATE THE TOP STRUT LEDGER USED TO SUPPORT STRUTS. FOR A TWO HIGH LOAD, ELIMINATE THE TOP TWO STRUT LEDGERS USED TO SUPPORT STRUTS. FOR A ONE HIGH LOAD, ELIMINATE THE TOP THREE STRUT LEDGERS USED TO SUPPORT STRUTS.

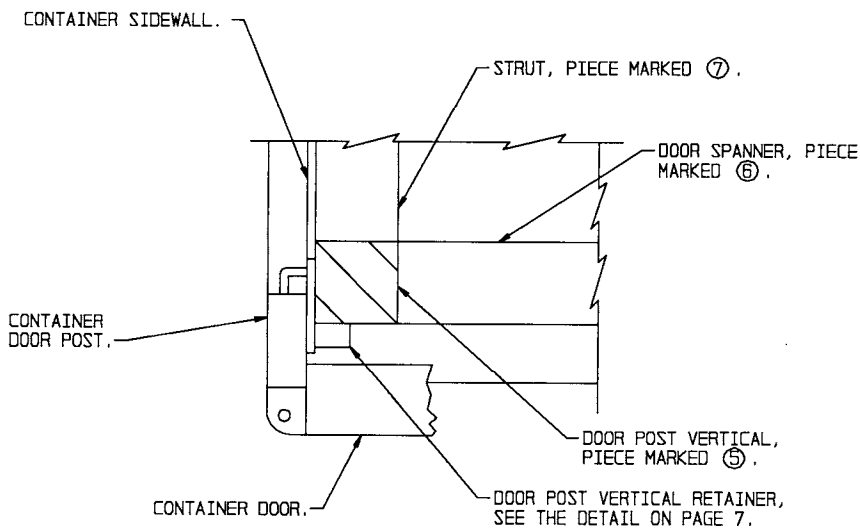


DETAIL A

A PARTIAL PLAN VIEW OF THE LEFT REAR PORTION OF THE CONTAINER IS SHOWN DEPICTING THE PROPER POSITION OF THE DOOR POST VERTICAL 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 IN ADDITION TO DOOR POST VERTICALS AND DOOR SPANNERS FOR THE LOAD DEPICTED ON PAGE 2. SEE VARIOUS LOADS WITHIN AMC DRAWING 19-48-4153-15PA1002 FOR EXAMPLES. SEE PAGE 7 FOR DETAILS OF THE METAL DOOR POST VERTICAL RETAINER.

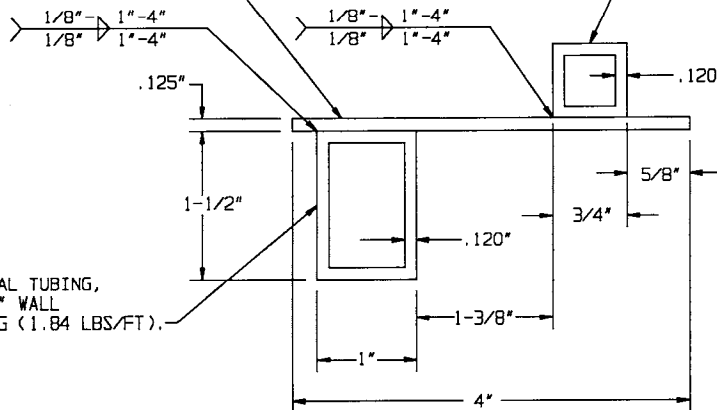


DETAIL B

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.

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

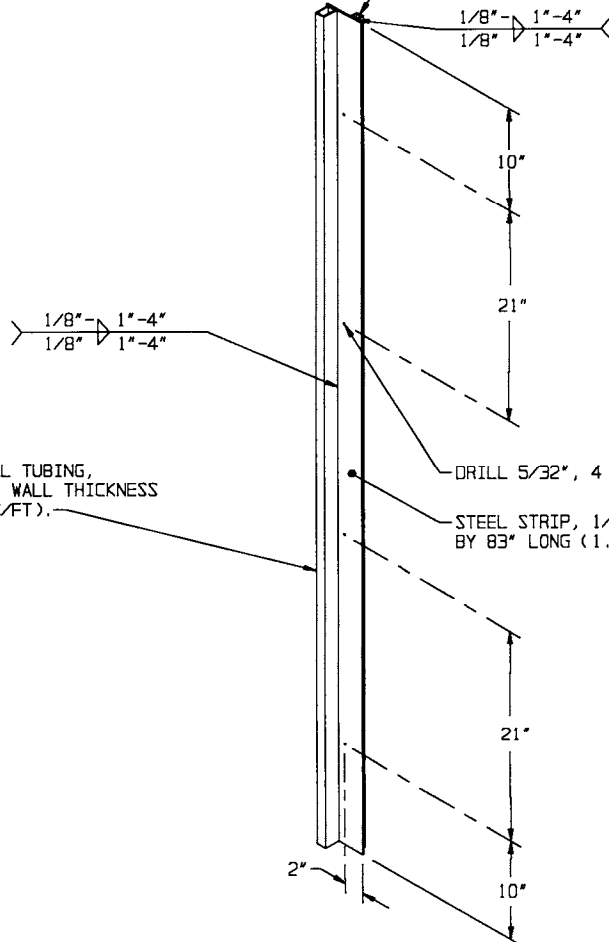
SQUARE STRUCTURAL TUBING, 3/4" SQUARE
BY .120" WALL THICKNESS BY 83" LONG
(1.03 LBS/FT).



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

VIEW A

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).

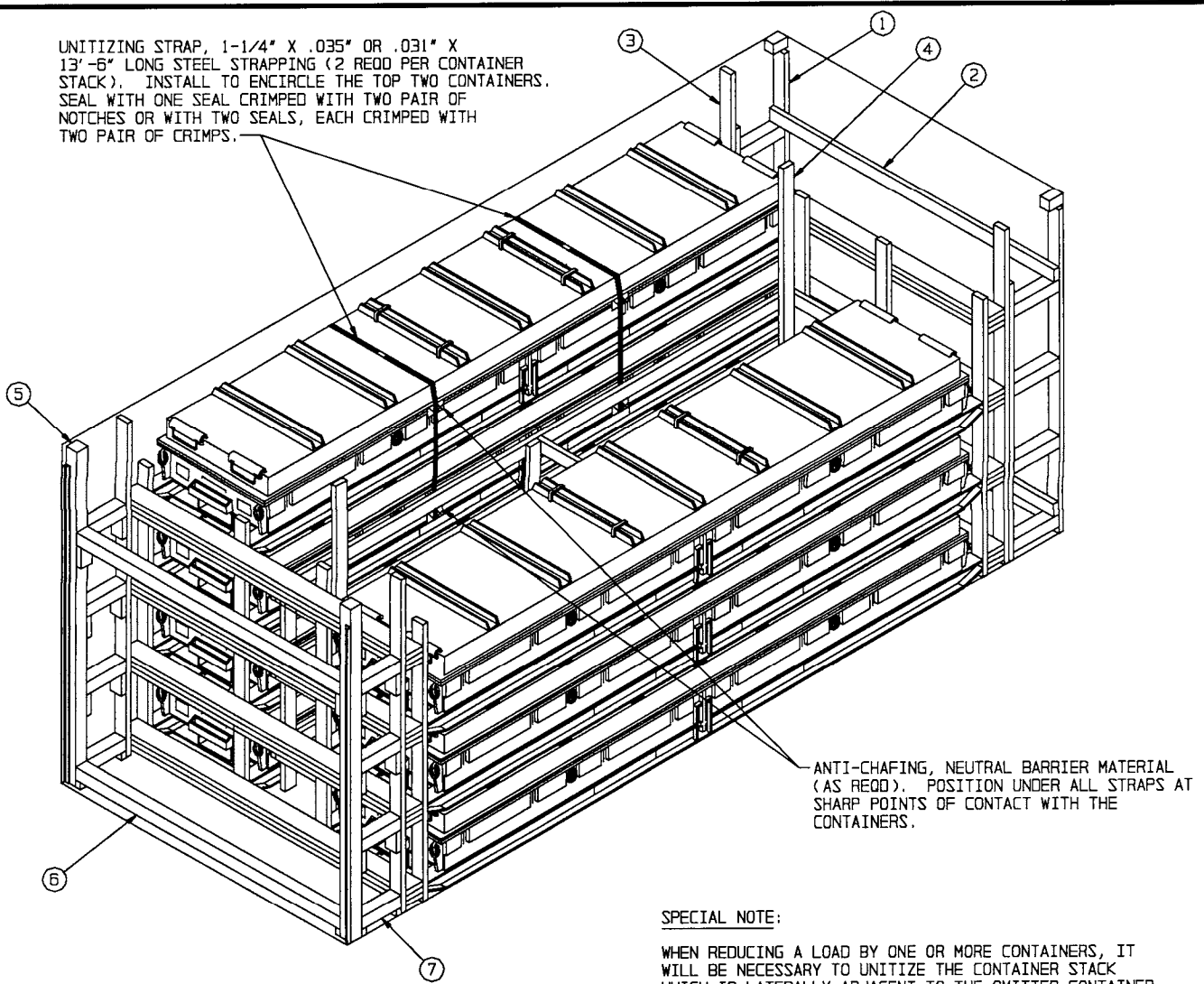
DRILL 5/32", 4 HOLES.

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.

UNITIZING STRAP, 1-1/4" X .035" OR .031" X 13'-6" LONG STEEL STRAPPING (2 REQD PER CONTAINER STACK). INSTALL TO ENCIRCLE THE TOP TWO CONTAINERS. SEAL WITH ONE SEAL CRIMPED WITH TWO PAIR OF NOTCHES OR WITH TWO SEALS, EACH CRIMPED WITH TWO PAIR OF CRIMPS.



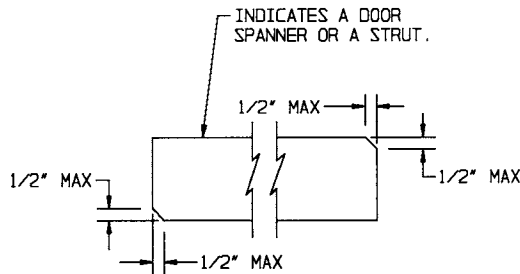
ISOMETRIC VIEW

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 "N" ON PAGE 3.

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.