

APPROVED BY
BUREAU OF EXPLOSIVES

J. H. Heshman

DATE 5/13/94

LOADING AND BRACING WITH WOODEN DUNNAGE IN END OPENING ISO CONTAINERS OF BLU-107/B (DURANDAL) WEAPONS IN CNU-381/E SHIPPING AND STORAGE CONTAINERS

INDEX

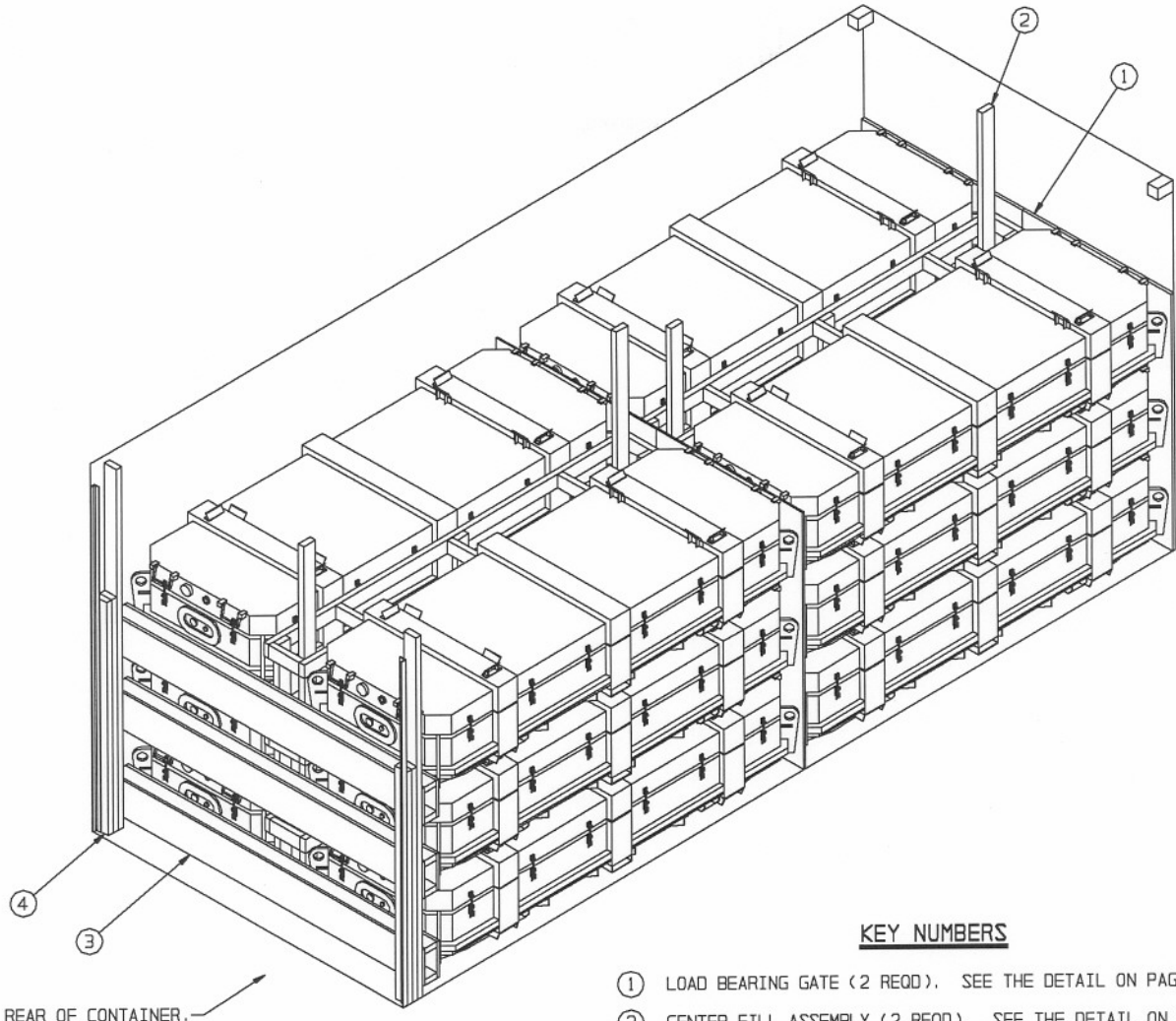
ITEM	PAGE(S)
TYPICAL LOADING PROCEDURES	2
GENERAL NOTES AND MATERIAL SPECIFICATIONS	3
CNU-381/E CONTAINER DETAIL	4
DETAILS	4,5,7,8
LESS-THAN-FULL-LOAD DETAILS	6

- 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 <i>Deirdre E. Haskins</i>	DRAFTSMAN	TECHNICIAN	ENGINEER
			L. FIEFFER
APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND <i>John L. Byrd Jr.</i> U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL	VALIDATION ENGINEERING DIVISION	TRANSPORTATION ENGINEERING DIVISION	LOGISTICS ENGINEERING OFFICE
		<i>W. Frenick</i>	<i>W. Ernst</i>
DECEMBER 1993			
CLASS	DIVISION	DRAWING	FILE
19	48	8529	SP15J29

DO NOT SCALE



REAR OF CONTAINER.

ISOMETRIC VIEW

KEY NUMBERS

- ① LOAD BEARING GATE (2 REQD). SEE THE DETAIL ON PAGE 5.
- ② CENTER FILL ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 4.
- ③ REAR BLOCKING ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 5.
- ④ FILL MATERIAL, 4" WIDE BY 60" LONG MATERIAL (AS REQD). NAIL THE FIRST PIECE TO THE REAR BLOCKING ASSEMBLY W/5 NAILS OF A SUITABLE SIZE (10d FOR 2" THICK MATERIAL). NAIL EACH ADDITIONAL PIECE TO THE PREVIOUS PIECE IN A SIMILAR MANNER. NOTE: MULTIPLE PIECES MAY BE LAMINATED TOGETHER FIRST AND THEN TO NAILED TO THE REAR BLOCKING ASSEMBLY. SEE THE "SOLID FILL DETAIL A" AND THE "SOLID FILL DETAIL B" ON PAGE 7.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	6	2
2" X 4"	283	189
NAILS	NO. REQD	POUNDS
6d (2")	168	1
10d (3")	236	3-3/4
PLYWOOD, 3/4"	118.52 SQ FT REQD	244.45 LBS

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CNU-381/E	12	24,600 LBS
DUNNAGE		632 LBS
CONTAINER		4,700 LBS
TOTAL WEIGHT		29,932 LBS (APPROX)

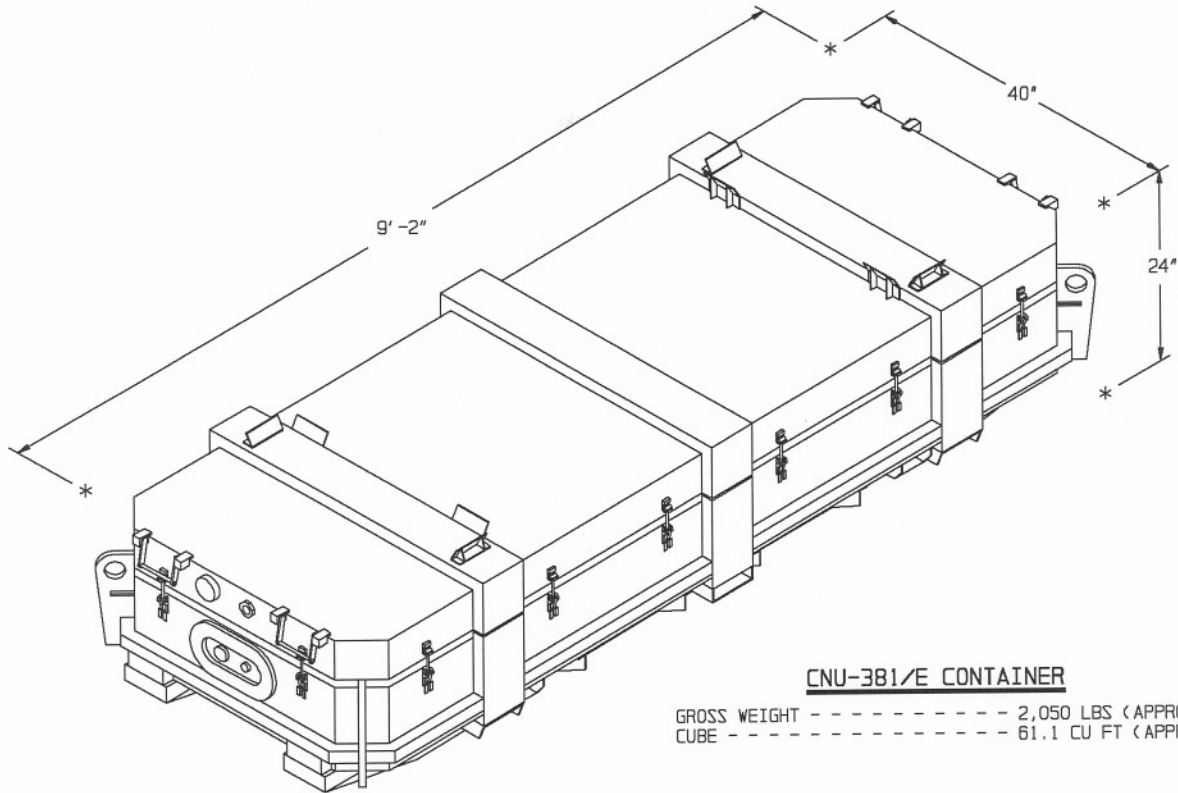
- N. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:
1. PREFABRICATE, TWO LOAD BEARING GATES, TWO CENTER FILL ASSEMBLIES, AND ONE REAR BLOCKING ASSEMBLY.
 2. INSTALL ONE LOAD BEARING GATE.
 3. LOAD SIX CNU-381/E CONTAINERS.
 4. INSTALL ONE CENTER FILL ASSEMBLY.
 5. REPEAT STEPS 2 THROUGH 4.
 6. INSTALL THE REAR BLOCKING ASSEMBLY.
 7. INSTALL THE SOLID FILL MATERIAL.

- 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 BLU-107/B (DURANDAL) WEAPONS PACKED IN CNU-381/E CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CNU-381/E CONTAINER WITH BOMBS INSTALLED. SEE PAGE 4 FOR DETAILS 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 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 CONTAINERS, THEY ARE TO BE POSITIONED SO AS TO ACHIEVE A TIGHT LOAD (TIGHT AGAINST THE DUNNAGE ASSEMBLIES). ALTHOUGH A TOTAL OF 1-1/2" OF UNBLOCKED SPACE ACROSS THE WIDTH OF A LOAD BAY IS PERMITTED, LATERAL VOIDS WITHIN THE LOAD ARE TO BE HELD TO A MINIMUM. EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE LONGITUDINAL PIECES ON THE CENTER FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE LENGTH OF THE LATERAL PIECES AND STIFFENER PIECES IN THE CENTER FILL ASSEMBLIES MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE CONTAINER SIZE.
- E. DUNNAGE LUMBER SPECIFIED IS OF A 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. CAUTION: DO NOT NAIL DUNNAGE MATERIAL TO THE CONTAINER WALLS OR FLOOR. ALL NAILING WILL BE WITHIN THE DUNNAGE.
- H. PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS THE SIDEWALL, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- J. 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.
- K. 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.
- L. 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.
- M. THE QUANTITY OF CONTAINERS SHOWN IN THE LOAD ON PAGE 2 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE LESS-THAN-FULL-LOAD DETAILS ON PAGE 6. WHEN AN END OPENING 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 END OPENING ISO CONTAINER.

(CONTINUED AT LEFT)

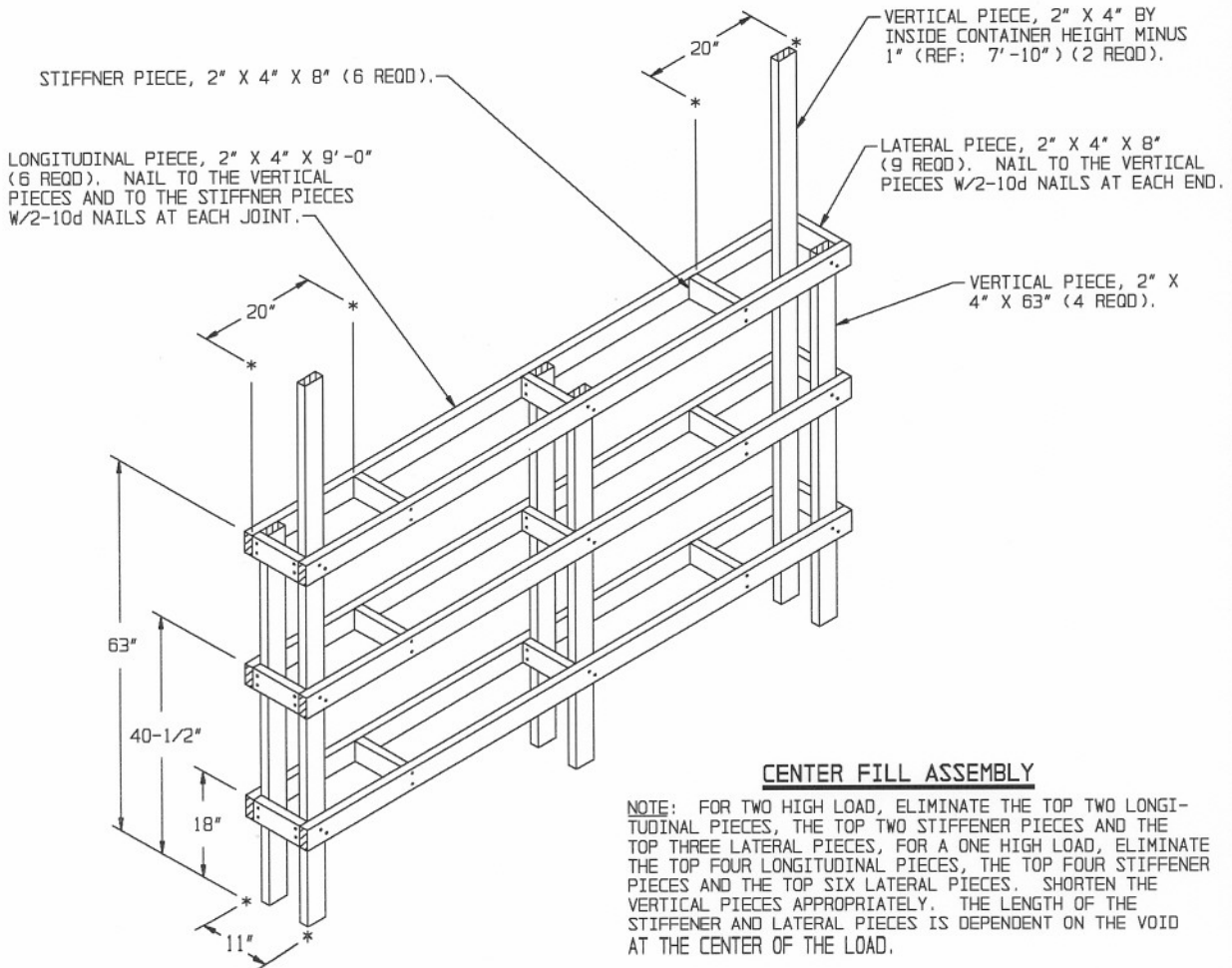
MATERIAL SPECIFICATIONS

- LUMBER - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND FED SPEC MM-L-751.
- NAILS - - - - - : FED SPEC FF-N-105; COMMON.
- PLYWOOD - - - - - : COMMERCIAL ITEM DESCRIPTION A-A-55057, TYPE A, CONSTRUCTION AND 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.
- STEEL, STRUCTURAL - : ASTM A501, STEEL STRUCTURAL TUBING; AND ASTM A570, STEEL, STRIP, HOT-ROLLED, GRADE 36 (MINIMUM).



CNU-381/E CONTAINER

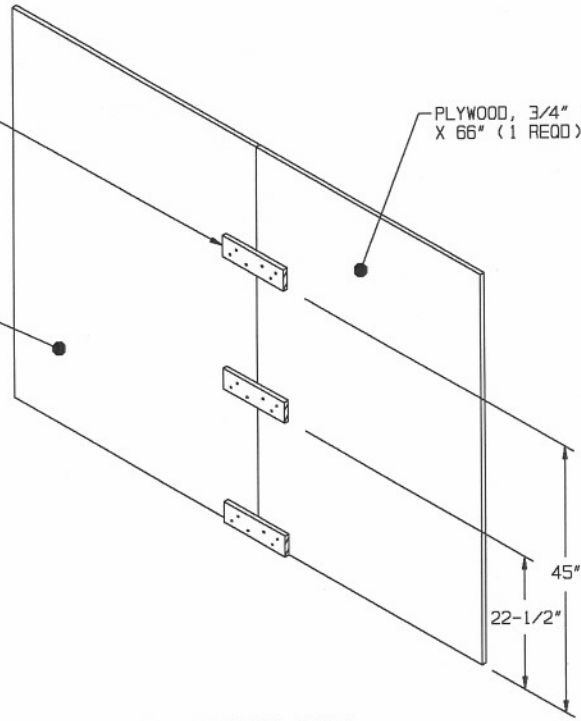
GROSS WEIGHT ----- 2,050 LBS (APPROX)
 CUBE ----- 61.1 CU FT (APPROX)



TIE PIECE, 1" X 4" X 12" (3 REQD).
NAIL THROUGH THE PLYWOOD W/3-6d
NAILS AT EACH END AND CLINCH.

PLYWOOD, 3/4" X 48"
X 66" (1 REQD).

PLYWOOD, 3/4" X 42"
X 66" (1 REQD).



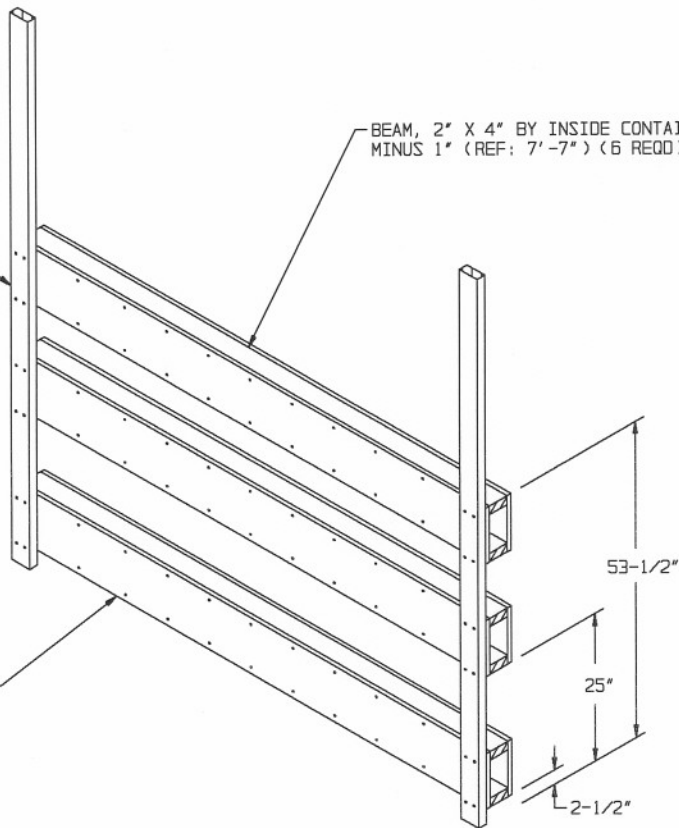
LOAD BEARING GATE

NOTE: FOR A TWO HIGH LOAD, USE ONE PIECE OF 7'-6" WIDE BY 48" HIGH PLYWOOD WITH TWO 1" X 4" X 22" HOLD-DOWN PIECES CENTERED AND LOCATED AT THE HEIGHTS OF THE TWO LOWEST TIE PIECES. FOR A ONE HIGH LOAD, USE ONE PIECE OF 7'-6" WIDE BY 24" HIGH PLYWOOD WITH ONE 1" X 4" X 22" HOLD-DOWN PIECE CENTERED AT THE BOTTOM OF THE PLYWOOD.

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

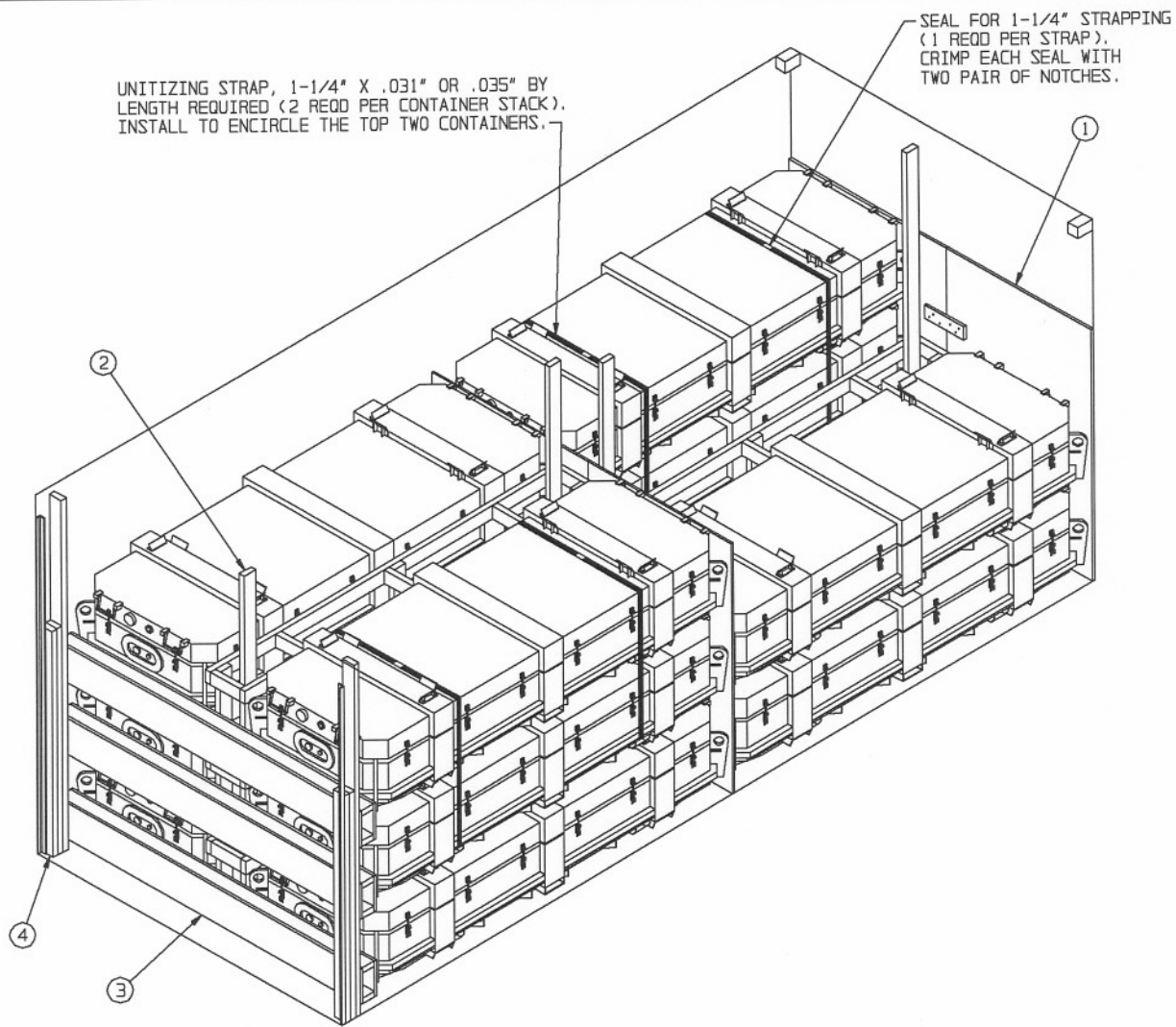
BEAM, 2" X 4" BY INSIDE CONTAINER WIDTH
MINUS 1" (REF: 7'-7") (6 REQD).

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



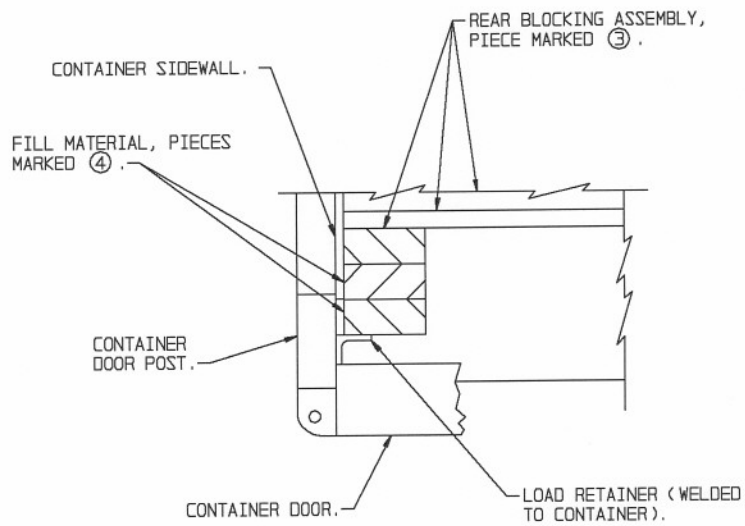
REAR BLOCKING ASSEMBLY

NOTE: FOR A TWO HIGH LOAD, ELIMINATE THE TOP BOX BEAM ASSEMBLY. FOR A ONE HIGH LOAD, ELIMINATE THE TOP TWO BOX BEAM ASSEMBLIES.



LESS-THAN-FULL-LOAD PROCEDURE

THE DETAIL ABOVE DEPICTS A BLOCKING METHOD TO BE USED IN A LESS-THAN-FULL CONTAINER LOAD (LESS THAN 12 UNITS). KEY NUMBERS REFER TO KEY NUMBERS ON PAGE 2. WHEN REDUCING A LOAD BY ONE OR MORE CONTAINERS IT WILL BE NECESSARY TO UNITIZE THE CONTAINER STACKS WHICH ARE Laterally AND LONGI-TUDINALLY ADJACENT TO THE OMITTED CONTAINER AS DEPICTED IN THE LOAD VIEW ABOVE. SEE GENERAL NOTE "M" ON PAGE 3.

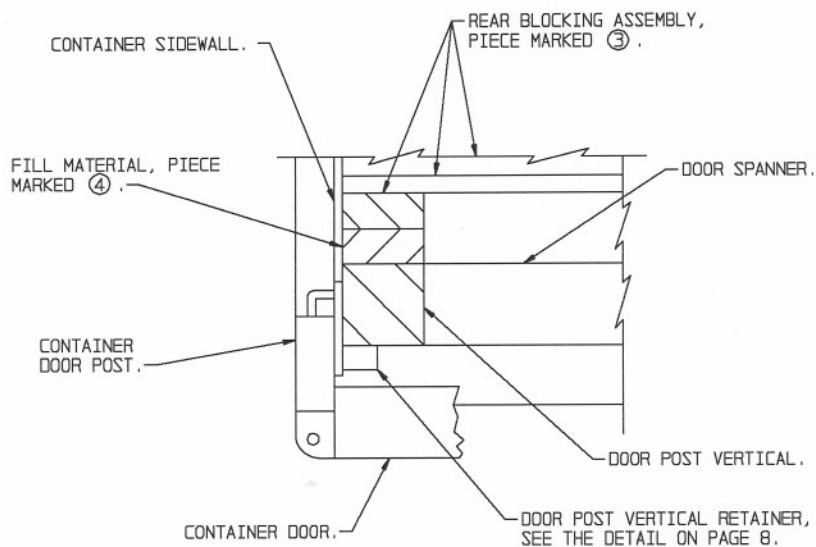


DETAIL A

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.

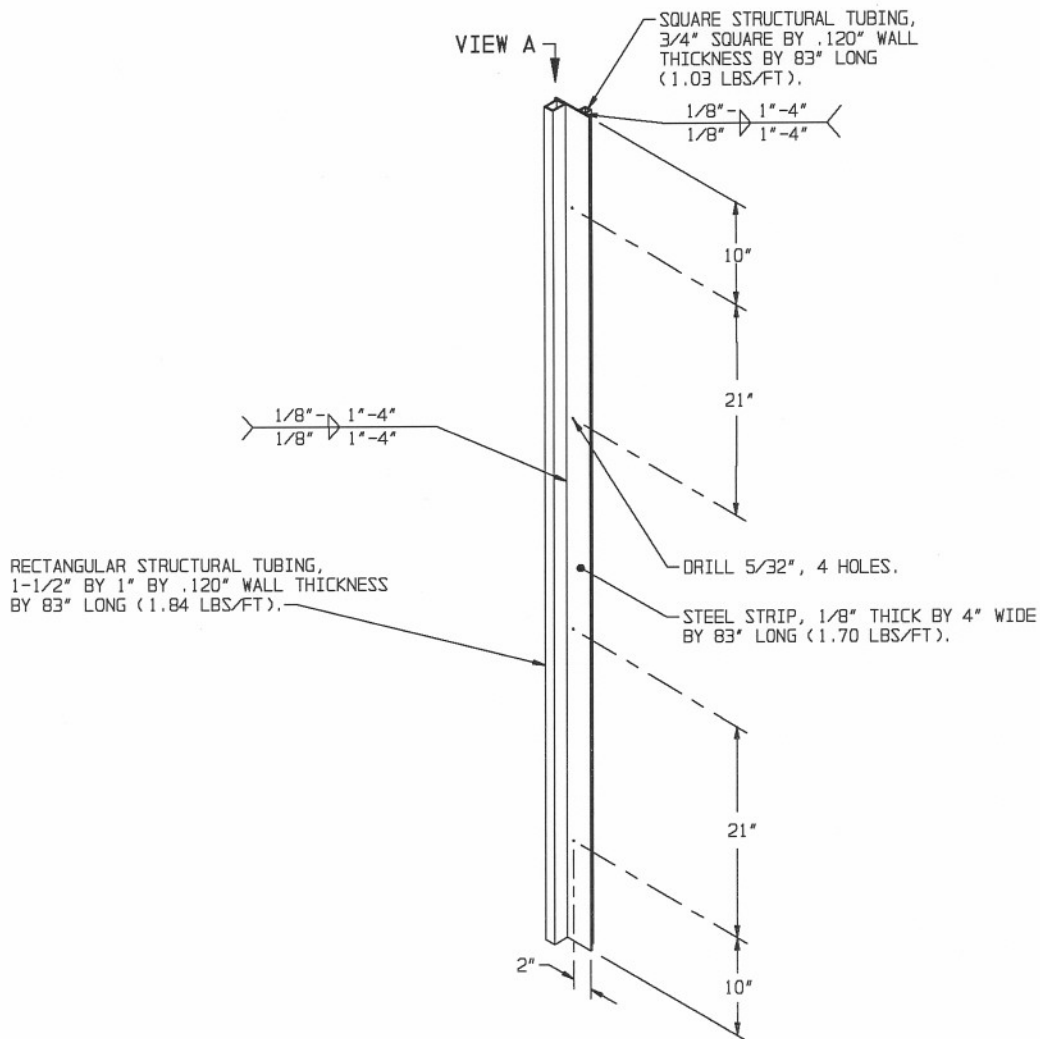
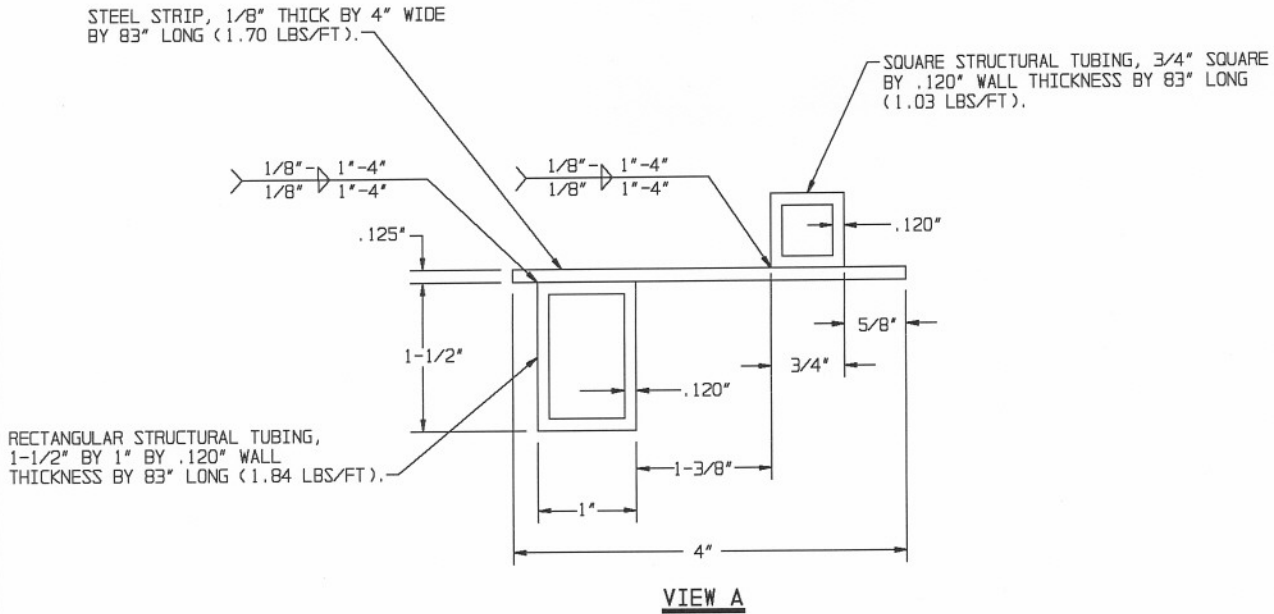
SPECIAL NOTE:

WHEN ISO CONTAINERS ARE NOT EQUIPPED WITH PRE-WELDED LOAD RETAINERS, AS DEPICTED IN "DETAIL A" ABOVE, DOOR POST VERTICALS, DOOR POST VERTICAL RETAINERS AND DOOR SPANNERS WILL BE REQUIRED FOR THE LOAD DEPICTED ON PAGE 2. SEE VARIOUS LOADS WITHIN AMC DRAWING 19-48-4153-15PA1002 FOR EXAMPLES. SEE PAGE 8 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.



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.