APPROVED BY
BUREAU OF EXPLOSIVES

DATE 8/7/96

LOADING AND BRACING WITH WOODEN DUNNAGE IN END OPENING ISO CONTAINERS OF CBU ITEMS PACKED IN CNU-147/E (TWIN PACK) 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.

NOTE: THIS DRAWING SUPERSEDES DEFENSE AMMUNITION CENTER AND SCHOOL DRAWING NUMBER D-SARAC-4458, DATED SEPTEMBER 1982.

DO NOT SCALE

| U.S. ARMY MATERIEL COMMAND DRAWING                                  |                              |            |  |                                    |
|---|------------------------------|------------|--|------------------------------------|
| APPROVED, U.S. ARMY INDUSTRIAL OPERATIONS COMMAND                   | DRAFTS                       | NAMZ       | TECHNICIAN   | ENGINEER                           |
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| William FErnst  |                              | ZE         | PTEMBER 1  | .996 ′                             |
| U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL                      | CLASS                        | DIVISIO    | N DRAWING  | FILE                               |
|   | 19                           | 48         | 8616   | SP15A1                             |

#### GENERAL NOTES

- THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- THE SPECIFIED OUTLOADING PROCEDURES ARE APPLICABLE TO THE SPELLFIED UNITUALING PROLEUDINGS ARE AFFICABLE IN TO LOADS OF CBU ITEMS PACKED IN CNU-147/E (TWIN PACK) CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH CBU ITEMS. SEE PAGE 3 FOR DETAILS OF THE CONTAINER. CAUTION: REGARDLESS OF THE OUANTITY OF UNITS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF THE END OPENING ISO CONTAINER MUST NOT BE
- THE LOAD AS SHOWN IS BASED ON A 4,700 POUND 20' LONG BY 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.
- WHEN LOADING CNU-147/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 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 OR SIDE FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE TO THE LONGITUDINAL OR VERTICAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE THICKNESS AND QUANTITY OF THE DUNNAGE LUMBER USED, OR THE LENGTH OF THE CENTER FILL ASSEMBLY LATERAL PIECES, MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIZE OF THE CONTAINER 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.
- A STAGGERED NAILING PATTERN WILL BE USED WHENEVER A STAGGERED MAILING 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.
- 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 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. FOR FORWARD LONGITUDINAL BLOCKING.

(CONTINUED AT RIGHT)

#### MATERIAL SPECIFICATIONS

SEE TM 743-200-1 (DUNNAGE LUMBER) AND LUMBER - - - - - - : 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.

ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, .0800" DIA, GRADE 1006 WIRE, CARBON STEEL -:

OR BETTER.

#### (GENERAL NOTES CONTINUED)

- 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.
- <u>CAUTION</u>: 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 THE MAXIMUM LUAD 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 GC APPLY WHEN THE SHIPMENT MOVES BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC). SPECIAL T/COFC NOTES FOLLOW:
  - A LOADED CONTAINER MUST BE ON A CHASSIS EQUIPPED WITH TWO BOGIE ASSEMBLIES WHEN BEING MOVED IN TOFC
  - 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 25.4 MM AND ONE POUND EQUALS 0.454 KG.
- P. THE QUANTITY OF CONTAINERS SHOWN IN THE LOADS ON PAGES 4 AND 8 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE "LESS-THAN-FULL-LOAD" DETAILS ON PAGES 11 AND 12.
- O. THE DOOR OPENING WIDTH OF THE ISO CONTAINER MUST BE CHECKED AGAINST THE LENGTH OF THE CNU-147/E CONTAINER PRIOR TO LOADING CONTAINERS IN THE PATTERN DEPICTED ON PAGE 4. IF THE CNU CONTAINER IS TOO LONG TO FIT THROUGH THE DOOR OPENING, THE PATTERN ON PAGE 4 CANNOT BE USED, AND THE PATTERN DEPICTED ON PAGE 8 MUST BE USED INSTEAD.

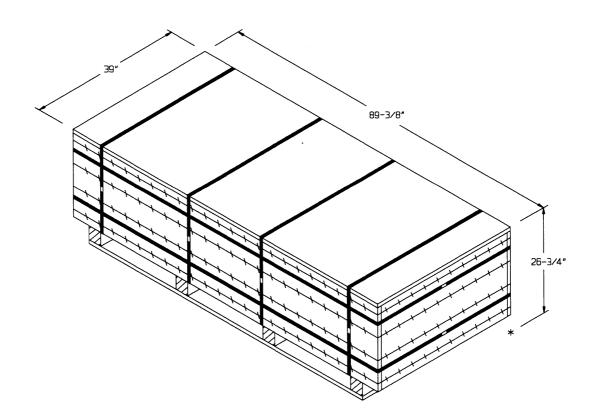
### LOADING AND UNLOADING GUIDANCE

- 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.
- 2. CONTAINER OR CONTAINER STACK HANDLING.
  - 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.

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#### (LOADING AND UNLOADING GUIDANCE CONT.)

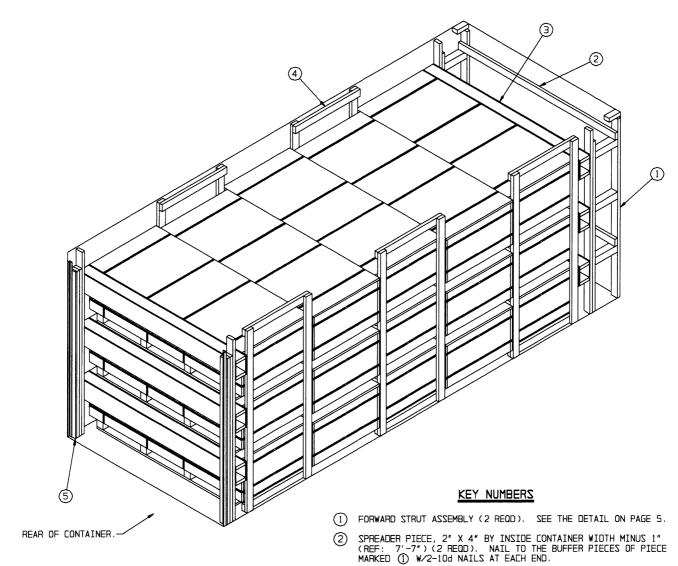
- B. PRECAUTIONARY HANDLING TECHNIQUES NORMALLY EMPLOYED OR AS SPECIFIED FOR THE TYPE OF COMMODITY INVOLVED WILL BE OBSERVED.
- C. IF HANDLING IS ACCOMPLISHED WITH A FORKLIFT TRUCK, THE CONTAINERS SHOULD BE HANDLED FROM A SIDE POSITION AS MUCH AS POSSIBLE. CARE MUST BE EXERCISED WHEN INSERTING FORKS 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 LOADED AS DEPICTED ON PAGE 8, 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 THROUGH THE CONTAINER FORKLIFT OPENING, AND AROUND THE FORKLIFT MAST, FORMING A COMPLETE LOOP. 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-147/E (TWIN PACK) CONTAINER

GROSS WEIGHT - - - - - - - - - 1,855 LBS (APPROX)
CUBE - - - - - - - - - - - 54.0 CUBIC FEET (APPROX)

PAGE 3



## ISOMETRIC VIEW

| BILL OF MATERIAL                         |                      |                               |  |
|--|----------------------|-------------------------------|--|
| LUMBER                                   | LINEAR FEET          | BOARD FEET                    |  |
| 1" X 4"<br>2" X 4"<br>2" X 6"<br>4" X 4" | 14<br>212<br>91<br>7 | 5<br>1 <b>4</b> 2<br>91<br>10 |  |
| NAILS                                    | NO. REQD             | POUNDS                        |  |
| 6d (2")<br>10d (3")<br>12d (3-1/4")      | 278<br>156<br>24     | 1-3/4<br>2-1/2<br>1/2         |  |
| 28 J 30 PP 0038 T3 02 V3 99 06 LBS       |                      |                               |  |

- (3) FORWARD/REAR BLOCKING ASSEMBLY A (2 REOD). SEE THE DETAIL ON PAGE 6. NAIL THROUGH THE BUFFER PIECES INTO THE VERTICAL PIECES OF PIECE MARKED ① W/6-10d NAILS.
- (4) SIDE FILL ASSEMBLY (5 REQD). SEE THE DETAIL ON PAGE 5.
- (\$) FILL MATERIAL, 4" WIDE BY 84" LONG MATERIAL (AS REOD).
  NAIL THE FIRST PIECE TO THE REAR BLOCKING ASSEMBLY W/7
  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 TOENAILED TO THE REAR BLOCKING
  ASSEMBLY. SEE THE "SOLID FILL DETAIL A" AND THE "SOLID
  FILL DETAIL B" ON PAGE 10.

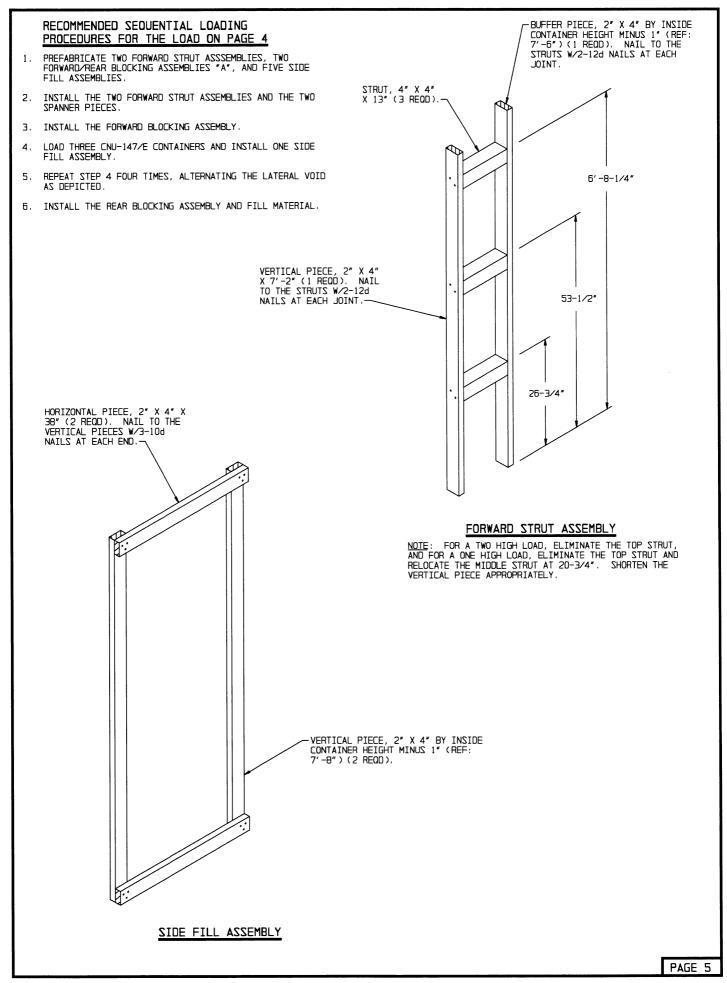
## **LOAD AS SHOWN**

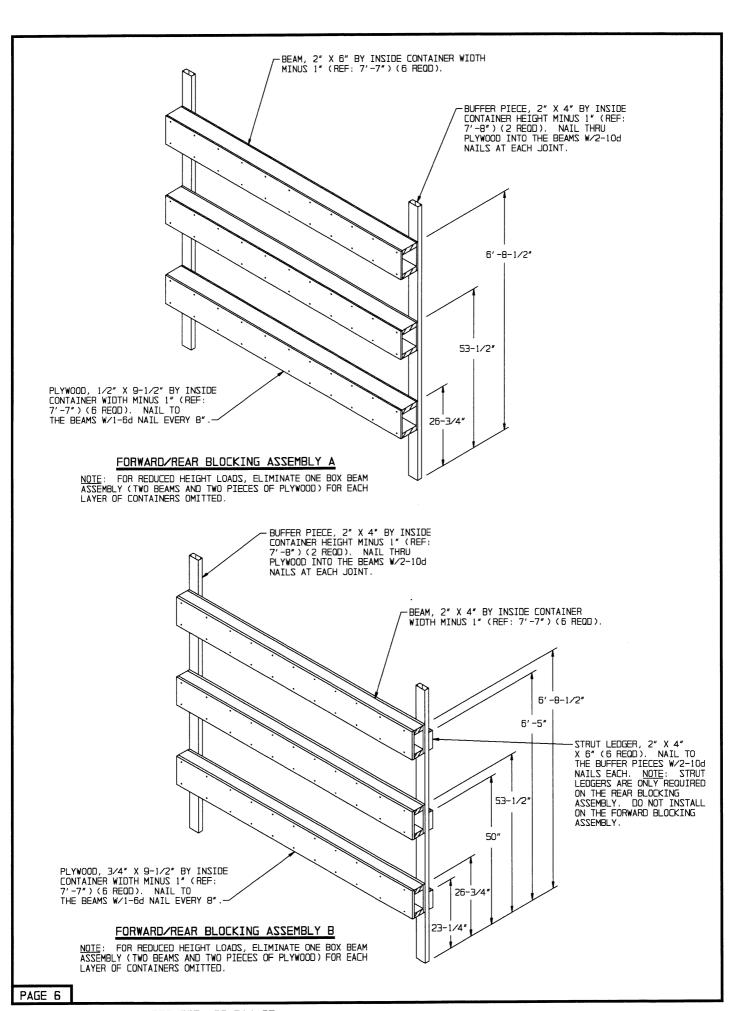
| ITEM      | QUANTITY | <u>WEIGHT</u> (APPROX) |
|-----------|----------|------------------------|
| CNU-147/E |          | 600 LB2                |

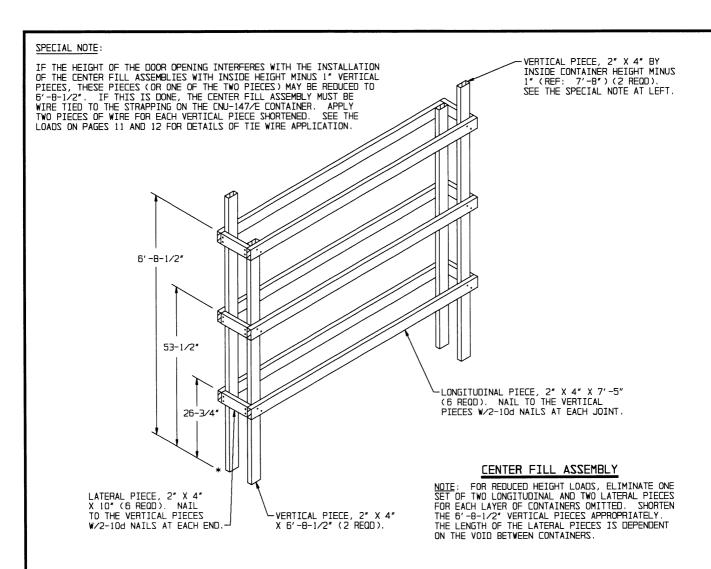
TOTAL WEIGHT - - - - - - 33,125 LBS (APPROX)

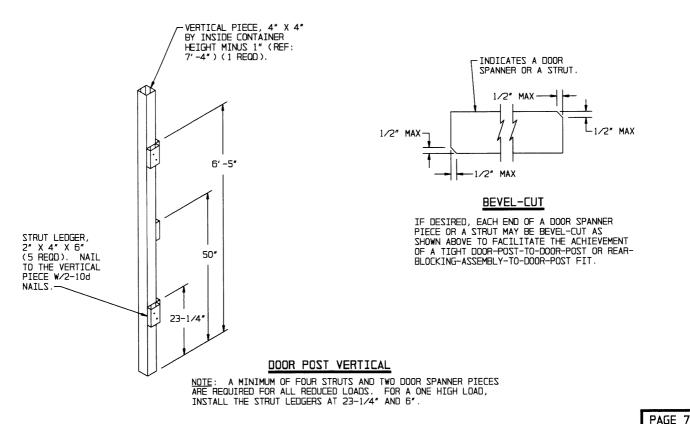
PAGE 4

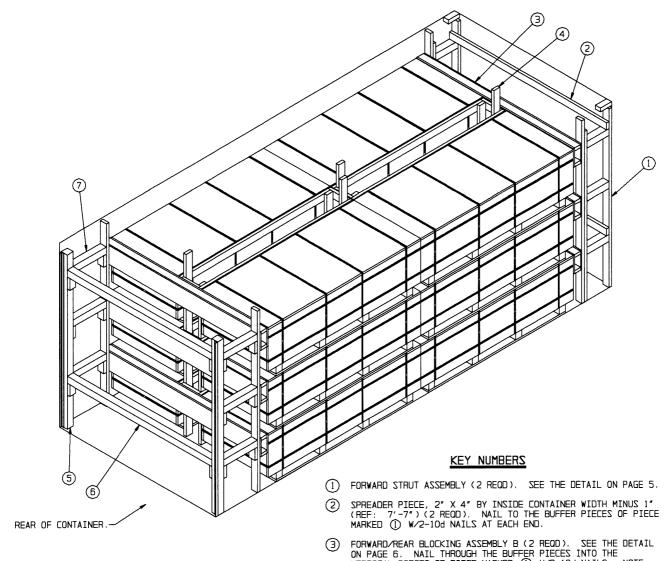
15-UNIT CONTAINER LOAD











# ISOMETRIC VIEW

| BILL OF MATERIAL                          |                        |                     |
|---|------------------------|---------------------|
| LUMBER                                    | LINEAR FEET BOARD FEET |                     |
| 2" X 4"<br>4" X 4"                        | 331<br>46              | 221<br>62           |
| NAILS                                     | NO. REQD               | POUNDS              |
| 6d (2")<br>10d (3")<br>12d (3-1/4")       | 264<br>196<br>56       | 1-3/4<br>3-1/4<br>1 |
| PLYWOOD, 3/4" 72.04 SQ FT REQD 148.58 LBS |                        |                     |

- (3) FORWARD/REAR BLOCKING ASSEMBLY B (2 REQD). SEE THE DETAIL ON PAGE 6. NAIL THROUGH THE BUFFER PIECES INTO THE VERTICAL PIECES OF PIECE 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 (2 REOD). SEE THE DETAIL AND THE SPECIAL NOTE ON PAGE 7.
- (5) DOOR POST VERTICAL (2 REQD). SEE THE DETAIL ON PAGE 7, AND "DETAIL A" AND "DETAIL B" ON PAGE 10.
- 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 7.
- TOENAIL TO THE BUFFER PIECE OF THE REAR BLOCKING ASSEMBLY AND THE DOOR POST VERTICAL W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 7.

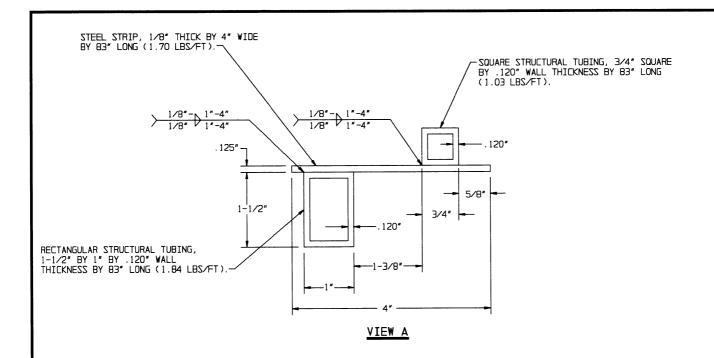
# NWOHZ ZA DAOL

| ITEM      | QUANTITY | WEIGHT (APPROX) |
|-----------|----------|-----------------|
| DUNNAGE - |          | 721 LBS         |

TOTAL WEIGHT - - - - - - 27,681 LBS (APPROX)

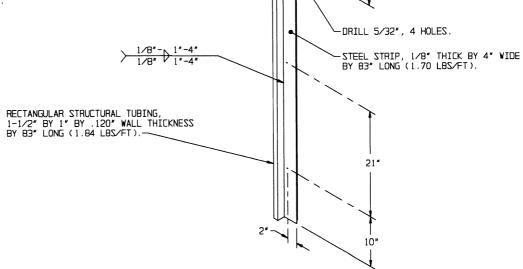
PAGE 8

12-UNIT CONTAINER LOAD



# RECOMMENDED SEQUENTIAL LOADING PROCEDURES FOR THE LOAD ON PAGE B

- PREFABRICATE TWO FORWARD STRUT ASSSEMBLIES, TWO FORWARD/REAR BLOCKING ASSEMBLIES "B", TWO CENTER FILL ASSEMBLIES, AND TWO DOOR POST VERTICALS.
- INSTALL THE TWO FORWARD STRUT ASSEMBLIES AND THE TWO SPANNER PIECES.
- 3. INSTALL THE FORWARD BLOCKING ASSEMBLY.
- 4. LOAD SIX CNU-147/E CONTAINERS AND INSTALL ONE CENTER FILL ASSEMBLY.
- 5. REPEAT STEP 4.
- 6. INSTALL THE REAR BLOCKING ASSEMBLY.
- INSTALL THE TWO DOOR POST VERTICALS AND THE TWO DOOR SPANNER PIECES.
- 8. INSTALL THE SIX STRUTS.



VIEW A

#### DOOR POST VERTICAL RETAINER

NOTE: THE ABOVE ASSEMBLY HAS BEEN SHOWN ROTATED  $90^{\circ}$  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.

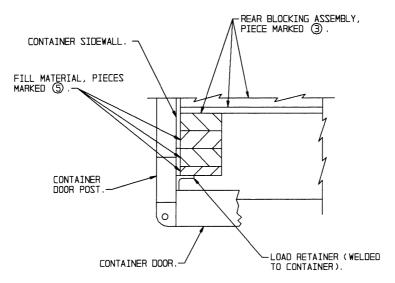
PAGE 9

SQUARE STRUCTURAL TUBING, 3/4" SQUARE BY .120" WALL THICKNESS BY 83" LONG

(1.03 LBS/FT).

21\*

1/8"-\1"-4"

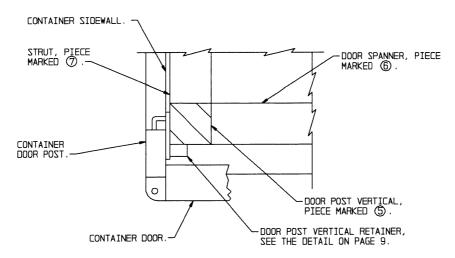


## DETAIL A

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. KEY NUMBERS REFER TO THE KEY NUMBERS ON PAGE 4.

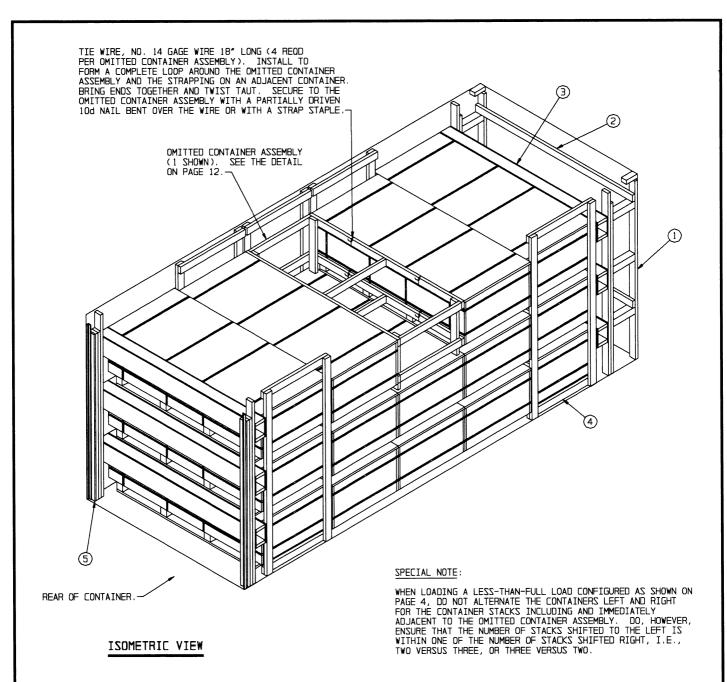
## SPECIAL NOTE:

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 4, AND DOOR POST VERTICAL RETAINERS MUST BE ADDED TO THE LOAD ON PAGE 8. SEE VARIOUS LOADS WITHIN AMC DRAWING 19-48-4153-15PA1002 FOR EXAMPLES. SEE PAGE 9 FOR DETAILS OF THE METAL DOOR POST VERTICAL RETAINER.



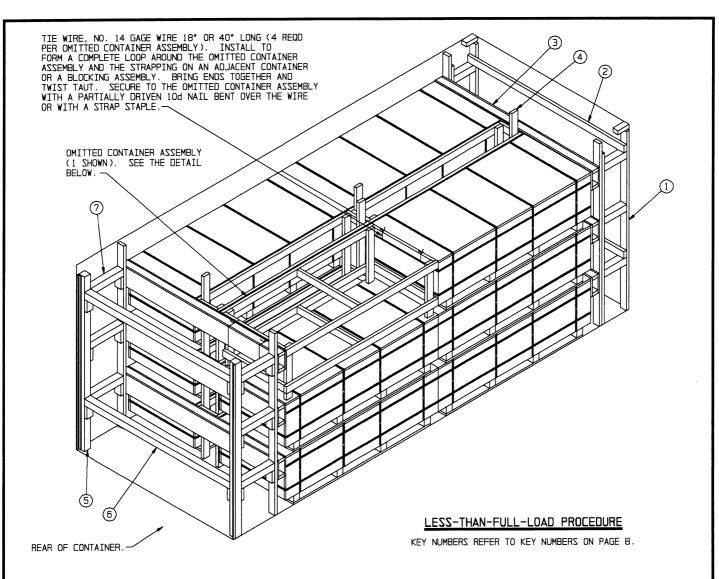
# DETAIL B

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. KEY NUMBERS REFER TO THE KEY NUMBERS ON PAGE 8.



## LESS-THAN-FULL-LOAD PROCEDURE

KEY NUMBERS REFER TO KEY NUMBERS ON PAGE 4.



## ISOMETRIC VIEW

