APPROVED BY
BUREAU OF EXPLOSIVES

Httleshw DATE 1/29/93

LOADING AND BRACING IN END OPENING ISO CONTAINERS OF COMPLETE ROUNDS PACKED IN CYLINDRICAL METAL CONTAINERS

PA116 SERIES CONTAINERS

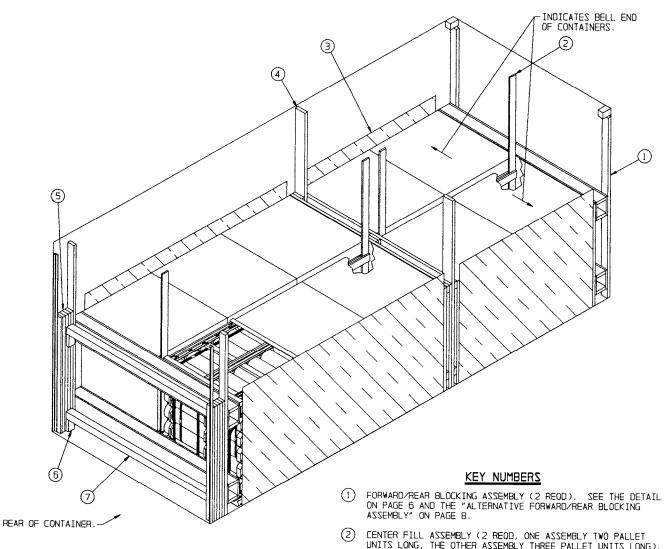
INDEX

| <u>ITEM</u> | PAGE(S) |
|----------------------------|---------|
| TYPICAL LOADING PROCEDURES | 3 |

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 MATERI | EL C | | AND DF | RAWING | | | |
|---|------------------------------|----------|-------------------------------------|------------------------------------|--|--|--|
| APPROVED, U.S. ARMY ARMAMENT, MUNITIONS AND | DRAFT: | NAMZ | TECHNICIAN | ENGINEER | | | |
| CHEMICAL COMMAND | | | | L. FIEFFER | | | |
| Dylones | | | | | | | |
| APPROVED BY OFFICER OF COMMANDING GENERAL, U.S. | VALIDAT ENGINEE DIVISI | RING | TRANSPORTATION ENGINEERING DIVISION | LOGISTICS ENGINEERING OFFICE | | | |
| ARMY MATERIEK COMMAND | (| MK | W. Dreveh J.J. Mile | | | | |
| William FErnst | 7 MAY 1993 | | | | | | |
| U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL | CLASS | NOISIAIO | DRAWING | FILE | | | |
| | 19 | 48 | 4245/ 48 | 15PM1009 | | | |

DO NOT SCALE



ISOMETRIC VIEW

| BILL OF MATERIAL | | | | | | | |
|--|--------------------------|----------------------|--|--|--|--|--|
| LUMBER | LINEAR FEET BOARD FEE | | | | | | |
| 1" X 4" 2" X 4" 2" X 6" 4" X 4" | 120 102 94 15 | 40 68 94 20 | | | | | |
| NAILS | NO. REOD | 20NUO9 | | | | | |
| 5d (2") 10d (3") 12d (3-1/4") | 2 4 2 119 8 | 1-1/2 2 1/4 | | | | | |
| PLYWOOD, 3/4" 48.03 SQ FT REQD 99.07 LBS FIBERBOARD AS REQD NIL | | | | | | | |

- CENTER FILL ASSEMBLY (2 REOD, ONE ASSEMBLY TWO PALLET UNITS LONG, THE OTHER ASSEMBLY THREE PALLET UNITS LONG). SEE THE DETAIL ON PAGE 6.
- ANTI-CHAFING FIBERBOARD (4 PLACES). AFFIX (STRAP TAPE, ETC.) TO THE SIDEWALL OR THE PALLET UNIT TO ELIMINATE METAL-TO-METAL CONTACT. ANTI-CHAFING IS NOT REQUIRED BETWEEN PALLET UNITS IN EITHER THE LATERAL OR LONGITUDINAL DIRECTIONS. NOTE: PLYWOOD OR HARDBOARD MAY BE USED IN PLACE OF THE FIBERBOARD, AS LONG AS IT IS SECURED TO PREVENT UNDIL MOVEMENT. PREVENT UNDUE MOVEMENT.
- (4) SEPARATOR GATE (1 REOD). SEE THE DETAIL ON PAGE 7.
- (5) FILL MATERIAL, 4" WIDE BY 58" LONG MATERIAL (AS REOD).
 TOENAIL THE FIRST PIECE TO THE REAR BLOCKING ASSEMBLY W/S
 NAILS OF A SUITABLE SIZE (10d NAILS FOR 2" THICK
 MATERIAL). TOENAIL 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 DETAILS A AND B ON PAGE 9
- STRUT LEDGER, 2" X 4" X 6" (4 SHOWN OPTIONAL). INSTALL IF DESIRED TO AID IN THE INSTALLATION OF SPANNER PIECES. NAIL TO THE FILL MATERIAL W/2-10d NAILS.
- DOOR SPANNER, 4" X 4" MATERIAL CUT TO A LENGTH THAT WILL PROVIDE FOR A DRIVE FIT (REF: 7'-1-3/8')(2 REOD). TOENAIL TO THE FILL MATERIAL W/2-12d NAILS AT EACH END. SEE THE BEVEL CUT DETAIL ON PAGE 6.

LOAD AS SHOWN

| ITEM | QUANTITY | WEIGHT (APPROX) |
|-------------|-----------|---------------------|
| PALLET UNIT | · | 547 LBS |
| TOTAL WEIG | iHT | 29,687 LBS (APPROX) |

(GENERAL NOTES CONTINUED)

- N. THE QUANTITY OF PALLET UNITS SHOWN IN THE LOADS ON PAGES 2 AND 4 MAY BE REDUCED FOR SHIPMENT, IF DESIRED. SEE THE FILLER ASSEMBLY ON PAGE 5. 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.
 - IF A LOAD IS REDUCED BY ONLY A SMALL AMOUNT (ONE OR TWO LADING UNITS), LADING UNITS NORMALLY MAY BE ELIMINATED FROM THE CENTER OF THE LOAD.
 - IF A LOAD IS REDUCED BY A LARGE AMOUNT (MORE THAN TWO 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.
- O. RECOMMENDED SEQUENTIAL LOADING PROCEDURES:
 - PREFABRICATE TWO FORWARD/REAR BLOCKING ASSEMBLIES TWO CENTER FILL ASSEMBLIES, AND ONE SEPARATOR GATE.
 - INSTALL THE FORWARD BLOCKING ASSEMBLY.
 - 3. INSTALL THE ANTI-CHAFING MATERIAL
 - 4. LOAD FOUR PALLET UNITS.
 - INSTALL ONE CENTER FILL ASSEMBLY.
 - INSTALL THE SEPARATOR GATE.
 - INSTALL THE ANTI-CHAFING MATERIAL.
 - LOAD SIX PALLET UNITS.
 - 9. INSTALL ONE CENTER FILL ASSEMBLY.
 - 10. INSTALL THE REAR BLOCKING ASSEMBLY.
 - 11. INSTALL THE FILL MATERIAL.
 - INSTALL THE FOUR STRUT LEDGERS (IF DESIRED) AND THE TWO DOOR SPANNER PIECES. 12.

MATERIAL SPECIFICATIONS

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

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

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 PLYWOOD - - - - -:

MAY BE SUBSTITUTED.

WIRE, CARBON STEEL -: ASTM A853; ANNEALED AT FINISH, BLACK

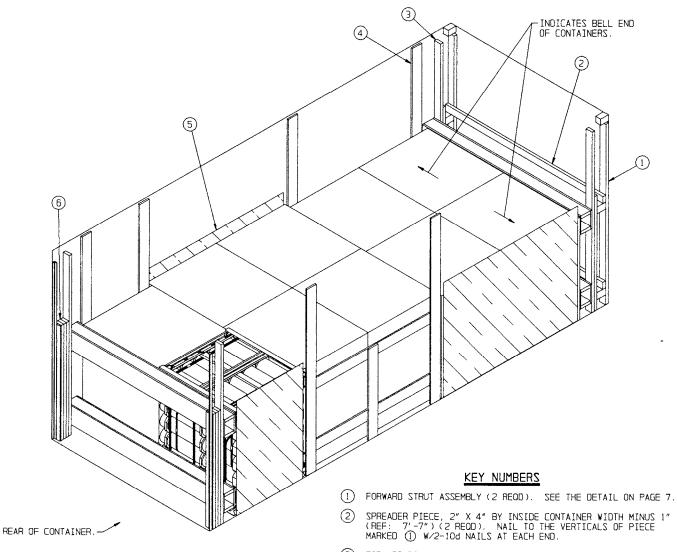
OXIDE FINISH, .0800" DIA, GRADE 1006

OR BETTER.

GENERAL NOTES

- A. 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 UNILOUDING MUCEDURES ARE APPLICABLE TO LOADS OF COMPLETE ROUNDS PACKED IN PAIL 16 SERIES METAL CONTAINERS. SUBSEQUENT REFERENCE TO PALLET UNIT HEREIN MEANS THE PALLET UNIT WITH AMMUNITION ITEMS. SEE PAGE 5 AND AMC DRAWING 19-48-4231/48-20PM1006 FOR DETAILS OF THE PALLET UNIT. 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 LOADS AS SHOWN ARE 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). THE LOAD IS DESIGNED FOR TRAILER/CONTAINED FOR THE LOAD CONTAINED TAINER-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 PALLET UNITS, 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 VERTICAL PIECES ON THE SIDE OR CENTER FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE W/I APPROPRIATE THICKNESS AND/OR OUANTITY OF THE VERTICAL OR HORIZONTAL PIECES IN THE SIDE OR CENTER FILL ASSEMBLIES MAY BE ADJUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE PALLET UNIT SIZE.
- 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" BY 5-1/2" WIDE.
- A STAGGERED NAILING PATTERN WILL BE USED WHEN PRIVATE OF DUNNAGE POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES OR WHEN LAMINATING DUNNAGE. ADDITIONALL THE NAILING PATTERN FOR AN UPPER PIECE OF LAMINATED ADDITIONALLY, 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 FORWARD BLOCKING 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.
- DO NOT NAIL DUNNAGE MATERIAL TO THE CONTAINER WALLS OR FLOOR. ALL NAILING WILL BE WITHIN THE DUNNAGE.
- PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS THE SIDEWALL, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES
- 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
 - 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.
- 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.
- 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.

(CONTINUED AT LEFT)



ISOMETRIC VIEW

| BILL OF MATERIAL | | | | | | | |
|--|----------------------------|--------------------------|--|--|--|--|--|
| LUMBER | LINEAR FEET | BOARD FEET | | | | | |
| 1" X 4" 1" X 6" 2" X 4" 2" X 6" 4" X 4" | 10 88 101 61 2 | 4 44 68 61 3 | | | | | |
| NAILS | NO. REOD | POUNDS | | | | | |
| 6d (2°) 10d (3°) | 234 96 | 1-1/2 1-1/2 | | | | | |
| PLYWOOD, 3/4" 48.03 SO FT REOD 99.07 LBS FIBERBOARD NIL | | | | | | | |

- (3) FORWARD/REAR BLOCKING ASSEMBLY (2 REOD). SEE THE DETAIL ON PAGE 6 AND THE "ALTERNATIVE FORWARD/REAR BLOCKING ASSEMBLY" ON PAGE 8. NAIL THROUGH THE BUFFER PIECES INTO THE VERTICAL PIECES OF PIECE MARKED (1) W/5-10d NAILS.
- 4 SIDE FILL ASSEMBLY (3 REOD, TWO ASSEMBLIES TWO PALLET UNITS LONG, ONE ASSEMBLY ONE PALLET UNIT LONG). SEE THE DETAIL ON PAGE 8.
- S ANTI-CHAFING FIBERBOARD (3 PLACES), AFFIX (STRAP TAPE, ETC.) TO THE SIDEWALL OR THE PALLET UNIT TO ELIMINATE METAL-TO-METAL CONTACT. ANTI-CHAFING IS NOT REQUIRED BETWEEN PALLET UNITS IN EITHER THE LATERAL OR LONGITUDINAL DIRECTIONS. NOTE: PLYWOOD OR HARDBOARD MAY BE USED IN PLACE OF THE FIBERBOARD, AS LONG AS IT IS SECURED TO PREVENT UNDUE MOVEMENT.
- (6) FILL MATERIAL, 4" WIDE BY 58" LONG MATERIAL (AS REOD).
 TOENAIL THE FIRST PIECE TO THE REAR BLOCKING ASSEMBLY W/5
 NAILS OF A SUITABLE SIZE (100 NAILS FOR 2" THICK MATERIAL).
 TOENAIL 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 DETAILS A AND B ON PAGE 9.

LOAD AS SHOWN

| ITEM | | | | | QI | JA | NT. | IT | <u> </u> | | | | WEIGHT | (APPROX) |
|---------------------------------------|---|---|---|---|----|----|-----|----|----------|---|-------|---|--------|----------|
| PALLET UNIT DUNNAGE CONTAINER - | - | - | - | - | - | - | - | - | - | - | - | - | 463 | LB2 |

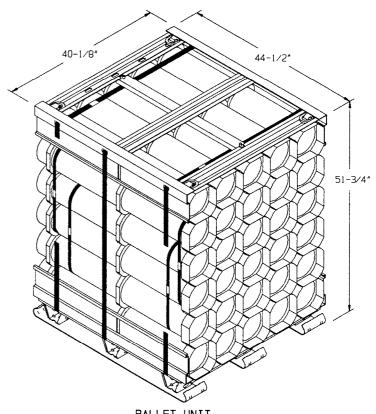
TOTAL WEIGHT + - - - - - - 29,603 LBS (APPROX)

RECOMMENDED SEQUENTIAL LOADING PROCEDURES FOR THE LOAD DEPICTED ON PAGE 4:

- PREFABRICATE TWO FORWARD STRUT ASSEMBLIES, TWO FORWARD/REAR BLOCKING ASSEMBLIES AND THREE SIDE FILL ASSEMBLIES.
- INSTALL THE TWO FORWARD STRUT ASSEMBLIES AND THE TWO SPREADER PIECES.
- 3. INSTALL THE FORWARD BLOCKING ASSEMBLY.
- 4. INSTALL THE ANTI-CHAFING MATERIAL.
- 5. LOAD FOUR PALLET UNITS.
- 6. INSTALL ONE SIDE FILL ASSEMBLY.
- 7. REPEAT STEPS 4 THROUGH 6.
- 8. INSTALL THE ANTI-CHAFING MATERIAL.
- 9. LOAD TWO PALLET UNITS.
- 10. INSTALL ONE SIDE FILL ASSEMBLY.
- 11. INSTALL THE REAR BLOCKING ASSEMBLY.
- 12. INSTALL THE FILL MATERIAL.

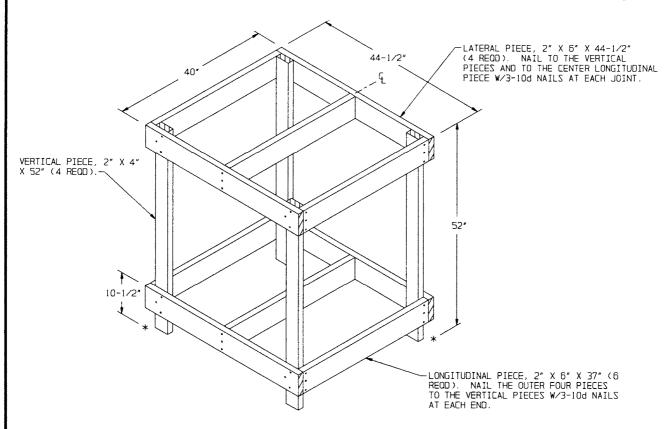
SPECIAL NOTE:

THE ALTERNATIVE LOAD PATTERN DEPICTED ON PAGE 4 MAY BE USED IF DEEMED MORE ECONOMICAL TO LOAD THAN THE PATTERN DEPICTED ON PAGE 2.



PALLET UNIT

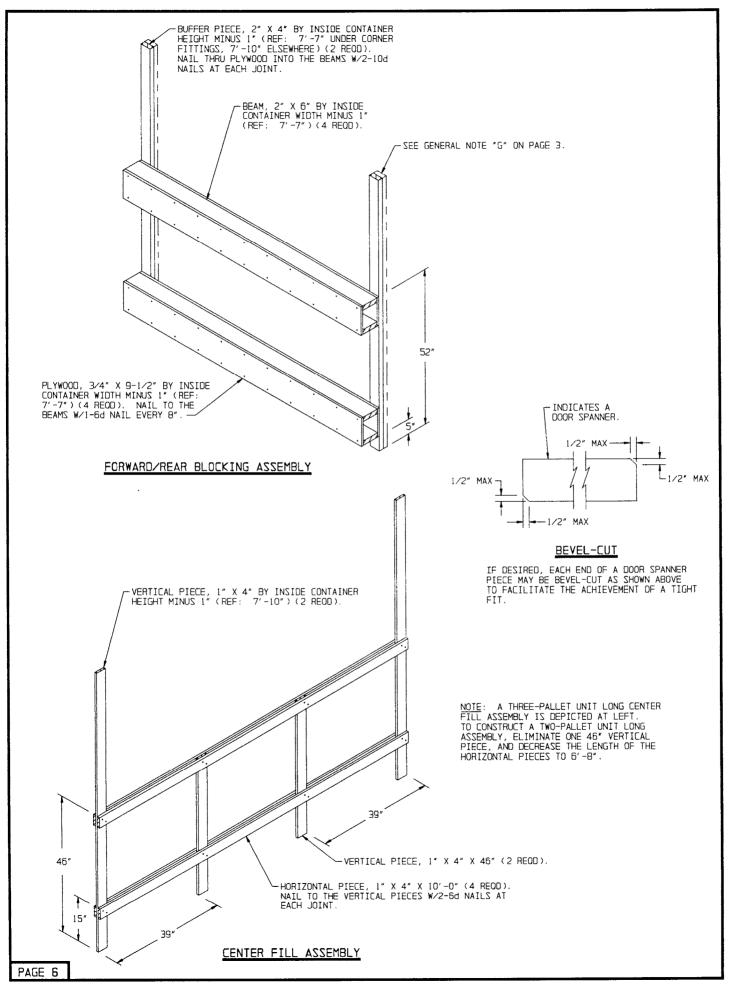
UNIT WEIGHT - - - - - - - - 2,444 LBS (APPROX)
CUBE - - - - - - - - - - 53.5 CU FT (APPROX)

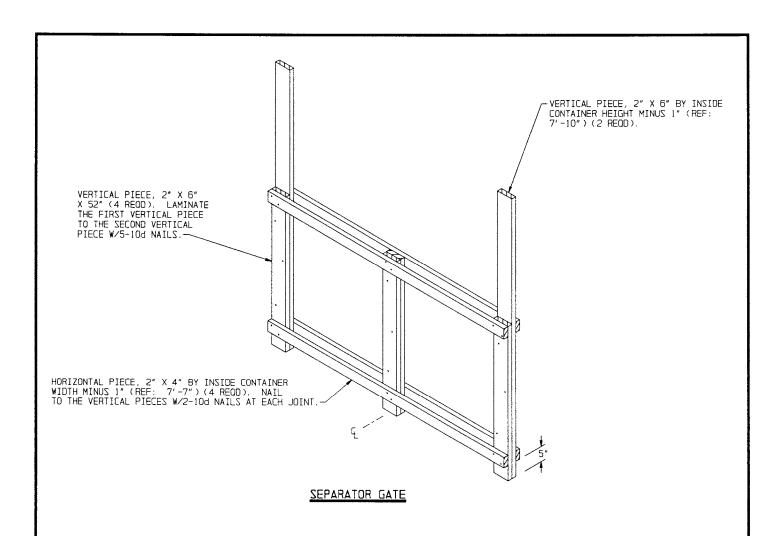


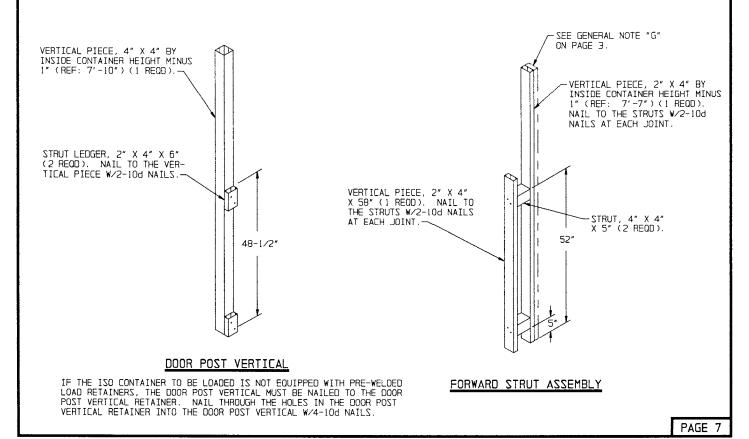
FILLER ASSEMBLY

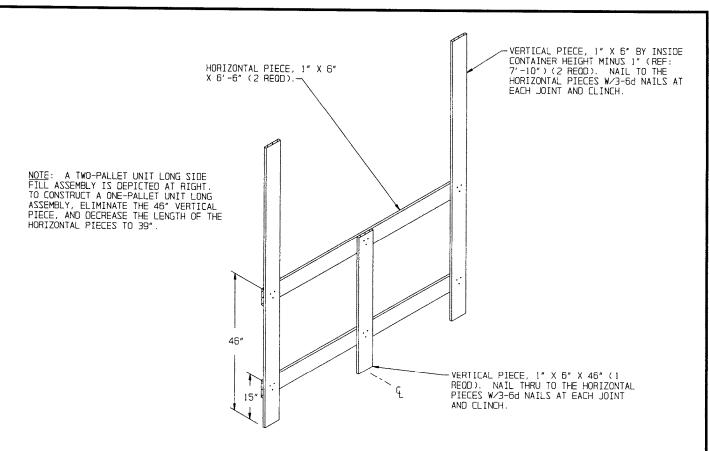
THE ASSEMBLY DEPICTED ABOVE IS FOR USE IN PLACE OF AN OMITTED PALLET UNIT. FILLER ASSEMBLIES MUST BE WIRE TIED TO ADJACENT PALLET UNITS TO PREVENT UNDUE MOVEMENT. NO MORE THAN FIVE FILLER ASSEMBLIES MAY BE USED PER LOAD. DO NOT INSTALL A FILLER ASSEMBLY IMMEDIATELY ADJACENT TO ANOTHER FILLER ASSEMBLY.

PAGE 5

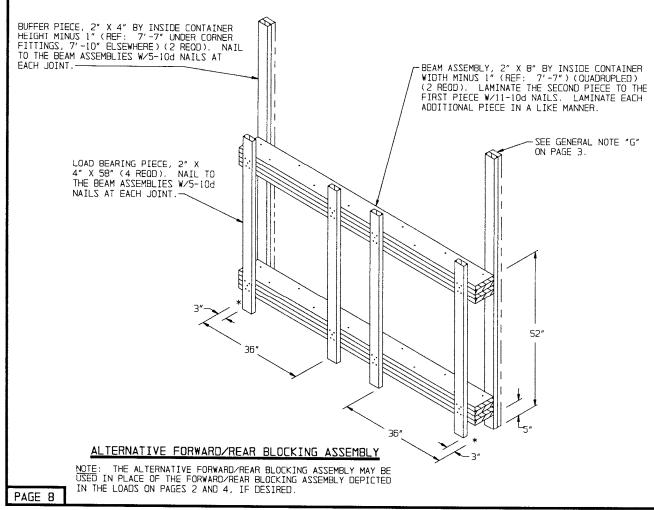




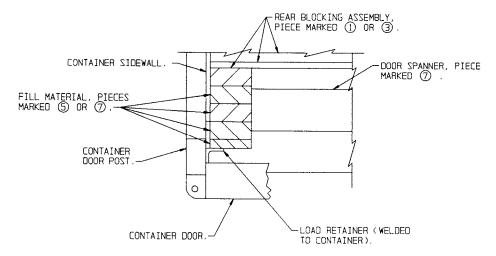




SIDE FILL ASSEMBLY



PROJECT CA 257/48-88

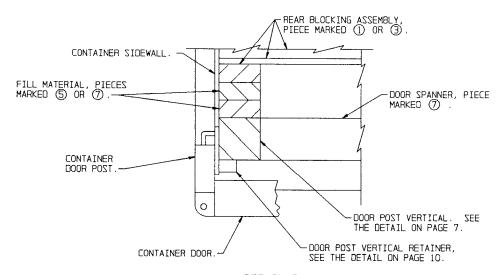


DETAIL A

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.

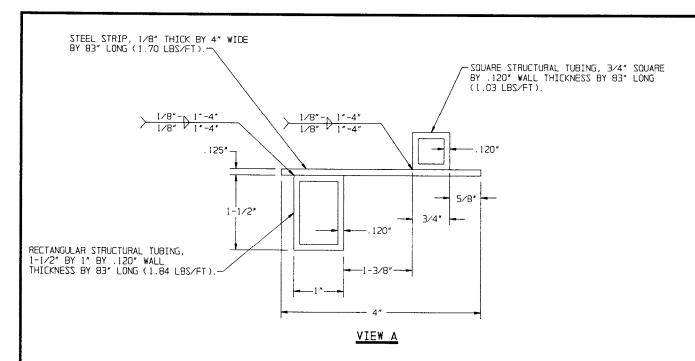
SPECIAL NOTE:

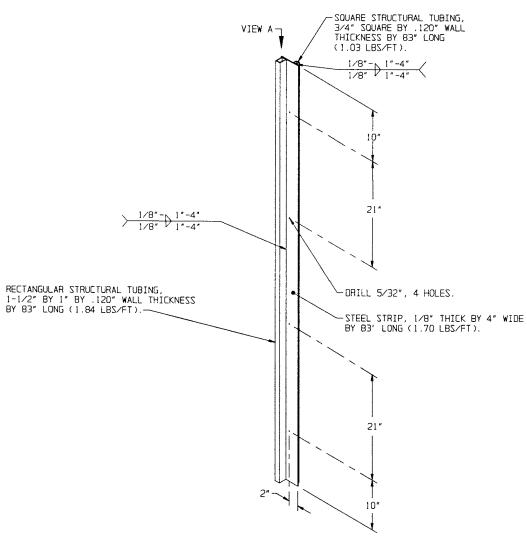
WHEN ISO CONTAINERS ARE NOT EQUIPPED WITH PRE-WELDED LOAD RETAINERS, AS DEPICTED IN 'DETAIL A" ABOVE. DOOR POST VERTICALS, DOOR POST VERTICAL RETAINERS AND DOOR SPANNERS WILL BE REQUIRED FOR THE LOADS DEPICTED ON PAGES AND 4. SEE VARIOUS LOADS WITHIN AMC DRAWING 19-48-4[53-15PA1002 FOR EXAMPLES. SEE PAGE 10 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

 ${\hbox{NOTE}}\colon$ 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.