

APPROVED BY  
BUREAU OF EXPLOSIVES

*J. H. Johnson*  
DATE 8/19/91

# LOADING AND BRACING<sup>⊕</sup> IN MILVAN CONTAINERS<sup>⊕</sup> OF PALLETIZED COMPLETE ROUNDS\* PACKED IN M18 CYLINDRICAL METAL CONTAINERS

- LOADING AND BRACING SPECIFICATIONS SET FORTH WITHIN THIS DRAWING ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY TRAILER/CONTAINER-ON-FLAT CAR (T/COFC) RAIL CARRIER SERVICE. THESE SPECIFICATIONS MAY ALSO BE USED FOR LOADS THAT ARE TO BE MOVED BY MOTOR OR WATER CARRIERS. SEE GENERAL NOTE "M" ON PAGE 2.
- ⊕ ONLY MILVAN CONTAINERS WHICH HAVE BEEN MODIFIED TO INCLUDE A MECHANICAL LOAD-BRACING SYSTEM THAT SATISFIES THE REQUIREMENTS OF THE BUREAU OF EXPLOSIVES PAMPHLET 6C WILL BE USED FOR THE MOVEMENT OF AMMUNITION BY T/COFC SERVICE. CAUTION: OTHER REQUIREMENTS OF PAMPHLET 6C ALSO APPLY.

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\*OUTLOADING PROCEDURES CONTAINED WITHIN THIS DRAWING APPLY TO DEMOLITION CRATERING CHARGES.

## U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND <i>James E. Stockwich</i>	DRAFTSMAN	TECHNICIAN	ENGINEER
	D. WHITMORE		<i>P. Fieffer</i>
APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND <i>James L. Beyer</i>	EVALUATION DIVISION	STORAGE & OUTLOADING DIVISION	LOGISTICS ENGINEERING OFFICE
	<i>TJM</i>	<i>W. Smith</i>	<i>W. J. Ernst</i>
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			FILE
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DO NOT SCALE

## GENERAL NOTES

- 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 HEREIN ARE APPLICABLE TO PALLETIZED UNITS OF DEMOLITION CRATERING CHARGES PACKED IN M18 SERIES CYLINDRICAL METAL CONTAINERS. SUBSEQUENT REFERENCE TO PALLET UNIT MEANS THE PALLETIZED UNIT WITH AMMUNITION ITEMS. SEE PAGE 3 OF THIS DRAWING AND U.S. AMC DRAWING NO. 19-48-4079/11-20PM1002 FOR DETAILS OF THE PALLETIZED UNITS. CAUTION: REGARDLESS OF THE QUANTITY OF UNITS TO BE SHIPPED, THE "MAXIMUM GROSS WEIGHT" OF 44,800 POUNDS MUST NOT BE EXCEEDED.
- C. THE LOADS AS SHOWN ARE BASED ON A 20' LONG BY 8' WIDE BY 8' HIGH MILVAN CONTAINER WITH INSIDE DIMENSIONS OF 19'-4" LONG BY 92" WIDE BY 87" HIGH. THE LOADS ARE DESIGNED FOR TRAILER/CONTAINER-ON-FLAT-CAR (T/COFC) SHIPMENT.
- D. THE SPECIFIED OUTLOADING PROCEDURES ARE FOR CONTAINERS EQUIPPED WITH SELF-CONTAINED MECHANICAL BRACING DEVICES AS DESCRIBED WITHIN BUREAU OF EXPLOSIVES PAMPHLET 6C. CROSS MEMBER ATTACHMENT FACILITIES WITHIN THESE CONTAINERS MUST PROVIDE FOR THE INSTALLATION OF LOAD BLOCKING CROSS MEMBERS AT THE HEIGHTS SPECIFIED. THE WEIGHT DIMENSIONS SPECIFIED WITHIN THIS DRAWING FOR THE INSTALLATION OF CROSS MEMBERS CONFORM WITH THE BUREAU OF EXPLOSIVES PAMPHLET 6C, WITH THE EXCEPTION THAT TWO ADDITIONAL BELT RAILS HAVE BEEN SHOWN: ONE AT 72" AND ONE AT 83" HIGH FROM THE CONTAINER FLOOR. VOIDS LENGTHWISE WITHIN THE LOAD MUST BE HELD TO A MINIMUM. CROSS MEMBERS MUST BE PLACED AGAINST THE LADING AS TIGHTLY AS THE HOLE SPACING IN THE CROSS MEMBER ATTACHMENT FACILITY PERMITS. EACH CROSS MEMBER WILL BE INSTALLED WITH THE ENDS ATTACHED AS NEARLY AS POSSIBLE IN "MATED" POSITIONS (AT EQUAL HEIGHT AND AT EQUAL DISTANCES FROM THE END OF THE CONTAINER). CROSS MEMBERS IN EMPTY CONTAINERS AND THOSE NOT USED IN LOADED CONTAINERS MUST BE FASTENED INTO BELT RAILS FOR SHIPMENT. COMPONENTS ASSIGNED TO EACH CONTAINER MUST REMAIN THEREWITH EVEN THOUGH UNUSED DURING SOME SHIPMENTS. SEE THE "FILL DETAIL" ON PAGE 4 FOR THE DUNNAGING METHOD REQUIRED TO ELIMINATE AN EXCESSIVE LENGTHWISE VOID WITHIN A LOAD. THE LOAD BLOCKING COMPONENT DESIGNATED AS "CROSS MEMBER" HEREIN, IS IDENTIFIED AS "BEAM ASSEMBLY" WITHIN TM 55-8115-200-23 & P, DATED DECEMBER 1979. THE BEAM ASSEMBLY IS FURTHER IDENTIFIED AS NSN 8115-00-165-6623 (FSN 8115-165-6623).
- 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" BY 5-1/2" WIDE.
- F. CAUTION: DO NOT NAIL DUNNAGE MATERIAL TO THE CONTAINER WALLS OR FLOOR. ALL NAILING WILL BE WITHIN THE DUNNAGE.
- G. 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.
- H. PORTIONS OF THE CONTAINER DEPICTED WITHIN THIS DRAWING, SUCH AS ONE OF THE SIDEWALLS, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- J. 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 0.454KG.

(CONTINUED AT RIGHT)

## MATERIAL SPECIFICATIONS

- LUMBER - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND FED SPEC MM-L-751.
- NAILS - - - - - : FED SPEC FF-N-105; COMMON.
- PLYWOOD - - - - - : FED SPEC NN-P-530; GROUP B, 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.
- WIRE - - - - - : FED SPEC DD-W-461; ANNEALED, BLACK.
- STAPLE, STRAP - - - : COMMERCIAL GRADE.

## (GENERAL NOTES CONTINUED)

- K. TO MAKE LOADING EASIER, TO HELP ACHIEVE A TIGHT LOAD ACROSS A CONTAINER, AND TO PREVENT UNACCEPTABLE DAMAGE TO LADING UNITS WHEN LOADING A MILVAN, A SLIP-SHEET CAN BE USED EFFECTIVELY AS A "SHOEHORN" TYPE DEVICE. THE SLIP-SHEET WILL PROVIDE A SMOOTH SURFACE THAT WILL PREVENT UNIT STRAPS AND/OR CONTAINERS FROM INTERLOCKING OR CATCHING ON OTHER PROJECTIONS WHEN LATERALLY ADJACENT LADING UNITS ARE BEING LOADED. A SLIP-SHEET WILL BE USED AFTER ONE-HALF OF A STACK IS LOADED WITH ONE OF ITS SIDES IN TIGHT CONTACT AT ONE SIDE OF THE MILVAN. THE SLIP-SHEET IS TO BE PLACED AGAINST THE OTHER SIDE OF THE HALF-STACK BEFORE THE LAST HALF OF THE STACK IS LOADED. AFTER A STACK IS COMPLETED, THE SLIP-SHEET IS TO BE REMOVED FOR SUBSEQUENT USE WITH THE NEXT STACK. A SLIP-SHEET OF SUITABLE SIZE CAN BE MADE FROM A SHEET OF 1/8" TEMPERED HARDBOARD (MASONITE) OR FROM A SHEET OF ANY OTHER MATERIAL THAT WILL SATISFY THE REQUIREMENTS.

## L. MAXIMUM LOAD WEIGHT CRITERIA:

THE ITEMIZED LOAD WEIGHTS ARE CONTROLLED BY EQUIPMENT CAPABILITY FACTORS. ALSO, THESE LISTED LOAD WEIGHTS IDENTIFY THE COMBINED WEIGHT OF AMMUNITION LADING UNITS AND DUNNAGE THAT CAN BE PLACED INTO ONE MILVAN CONTAINER WITHOUT VIOLATING ONE OR MORE OF THE "CAPABILITY FACTORS". SEE NOTES 1 AND 2.

39,100 LBS IN 20-FT CONTAINER (W/O CHASSIS) ABOARD CONTAINERSHIP.

39,100 LBS IN CONTAINER ON 20-FT CHASSIS WITH DOUBLE BOGIE. SEE NOTE 3.

25,300 LBS IN CONTAINER ON 20-FT CHASSIS WITH SINGLE BOGIE. SEE NOTE 4.

21,300 LBS IN EACH CONTAINER ON 40-FT CHASSIS (COUPLED WITH DOUBLE BOGIE). SEE NOTE 3.

NOTE 1: DUNNAGE INCLUDES MATERIALS, OTHER THAN COMPONENTS OF THE MECHANICAL LOAD BRACING SYSTEM, USED TO BLOCK AND BRACE A LOAD.

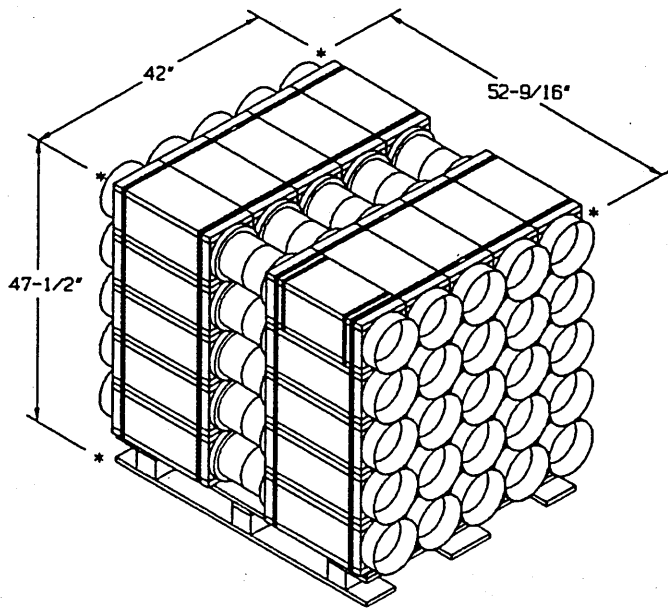
NOTE 2: ALTHOUGH THE HEAVIEST MAXIMUM LOADS ARE DELINEATED IN THE LOAD VIEWS, PROVISIONS ARE INCLUDED WITHIN THIS DRAWING SO THAT THE BASIC LOADS CAN BE ADJUSTED TO SATISFY A LESSER QUANTITY OF LADING UNITS.

NOTE 3: 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 MILVAN SYSTEM.

NOTE 4: BY SPECIAL AUTHORITY, IT MAY BE POSSIBLE TO MOVE HEAVIER LOADS ON SINGLE BOGIE CHASSIS WITHIN AN INSTALLATION.

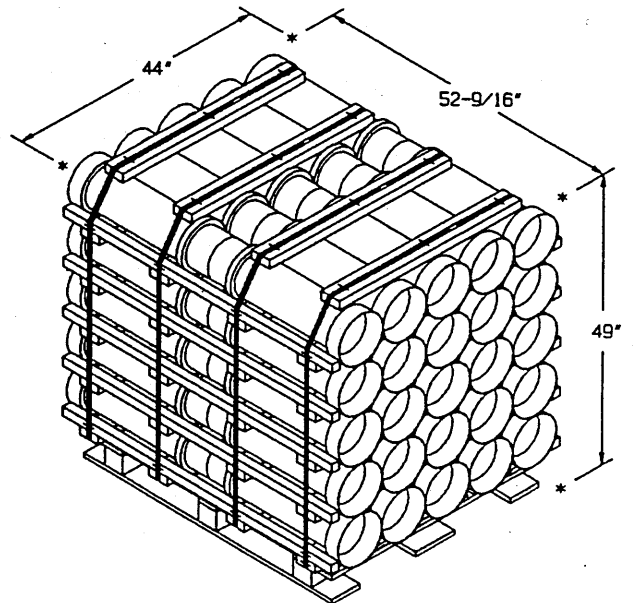
## M. SPECIAL T/COFC NOTES:

1. CAUTION: LOADED CONTAINERS MUST BE ON CHASSIS EQUIPPED WITH TWO BOGIE ASSEMBLIES WHEN BEING MOVED IN TOFC SERVICE, REGARDLESS OF THE LOAD WEIGHT WITHIN THE CONTAINER.
  2. LOAD LIMITS OF T/COFC RAIL CARS 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.
  3. CHASSIS/CONTAINERS COUPLED INTO A 40-FOOT TRAILER CONFIGURATION MUST BE PLACED AT THE B-END OF A TOFC RAIL CAR. THE REAR END OF THE 40-FOOT UNIT WILL OVERHANG THE END OF THE CAR IF IT IS PLACED AT THE A-END. TWENTY-FOOT AND 40-FOOT UNITS CAN BE LOADED ON THE SAME CAR.
- N. THE THICKNESS OF THE SIDE FILL ASSEMBLIES AS DEPICTED ON EACH SIDE OF THE LOAD MUST BE ADJUSTED, AS REQUIRED, TO COMPLY WITH THE DIMENSIONAL VARIANCE OF THE PALLET UNIT, SO AS TO NOT ALLOW MORE THAN 1-1/2" VOID ACROSS THE WIDTH OF A BRACED LOAD. ADJUSTMENTS CAN BE MADE BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE BEARING PIECES ON THE SIDE FILL ASSEMBLIES ON ONE OR BOTH SIDES OF THE LOAD. NAIL EACH ADDITIONAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE THICKNESS OF THE BEARING PIECES MAY BE ADJUSTED AND/OR FILL PIECES MAY BE ADDED OR DELETED ON ONE OR BOTH SIDES OF THE LOAD AS REQUIRED TO FACILITATE VARIANCE IN THE PALLET UNIT SIZE.



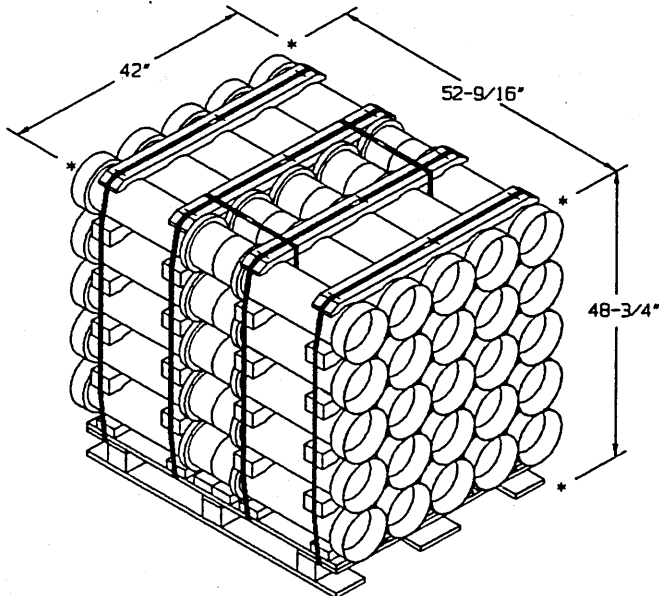
**PALLET UNIT A**

UNIT WEIGHT - - - - - 3,504 LBS (APPROX)  
 CUBE - - - - - 60.7 CU FT (APPROX)



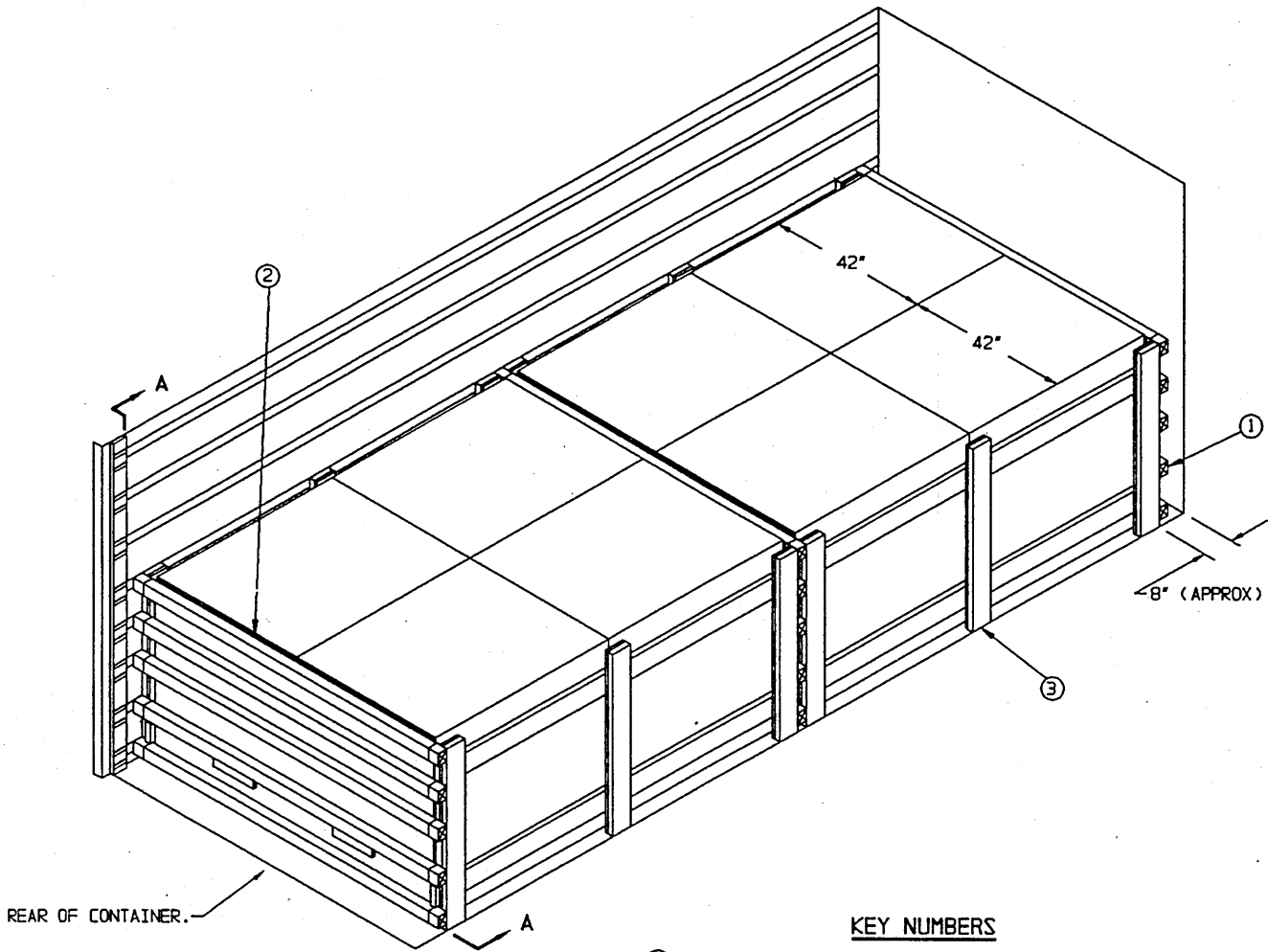
**PALLET UNIT B**

UNIT WEIGHT - - - - - 3,179 LBS (APPROX)  
 CUBE - - - - - 65.6 CU FT (APPROX)



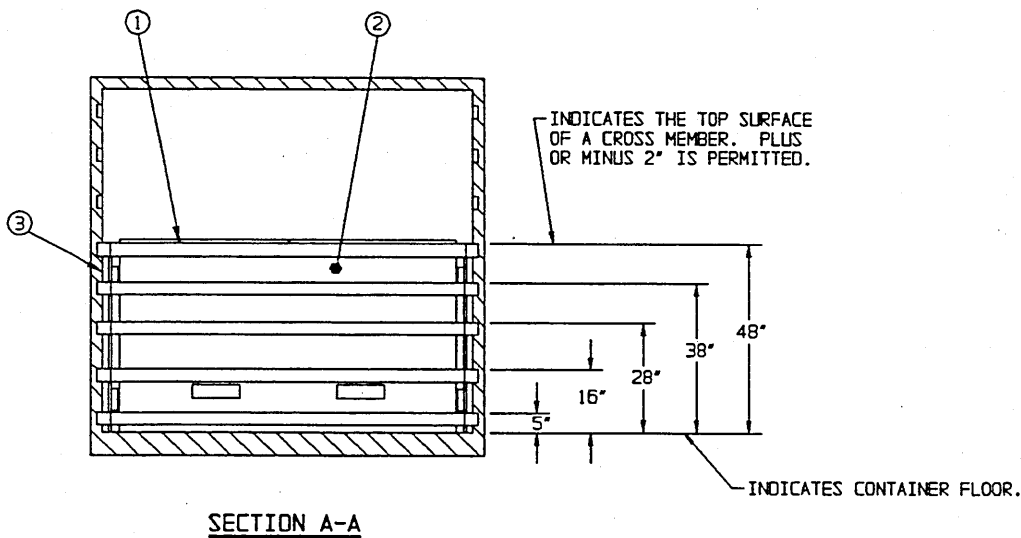
**PALLET UNIT C**

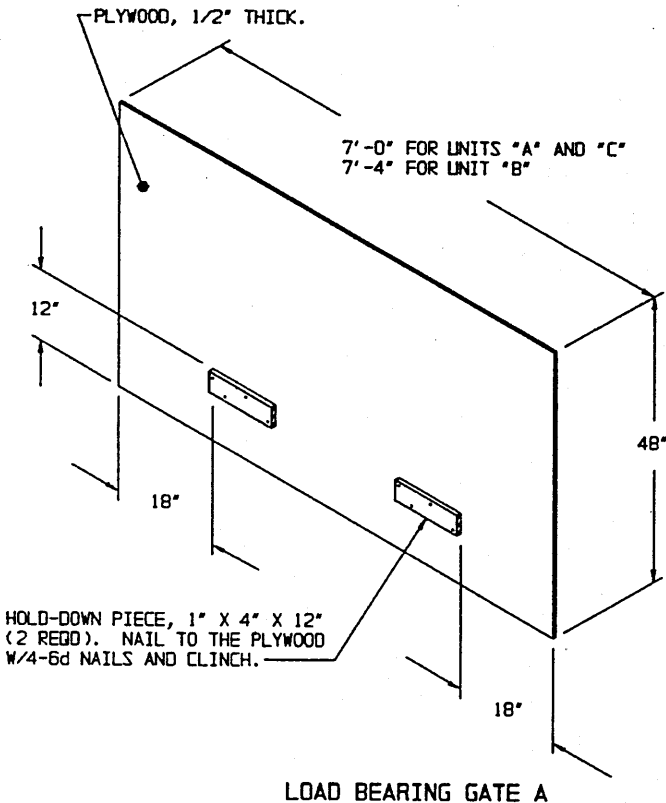
UNIT WEIGHT - - - - - 3,192 LBS (APPROX)  
 CUBE - - - - - 62.3 CU FT (APPROX)



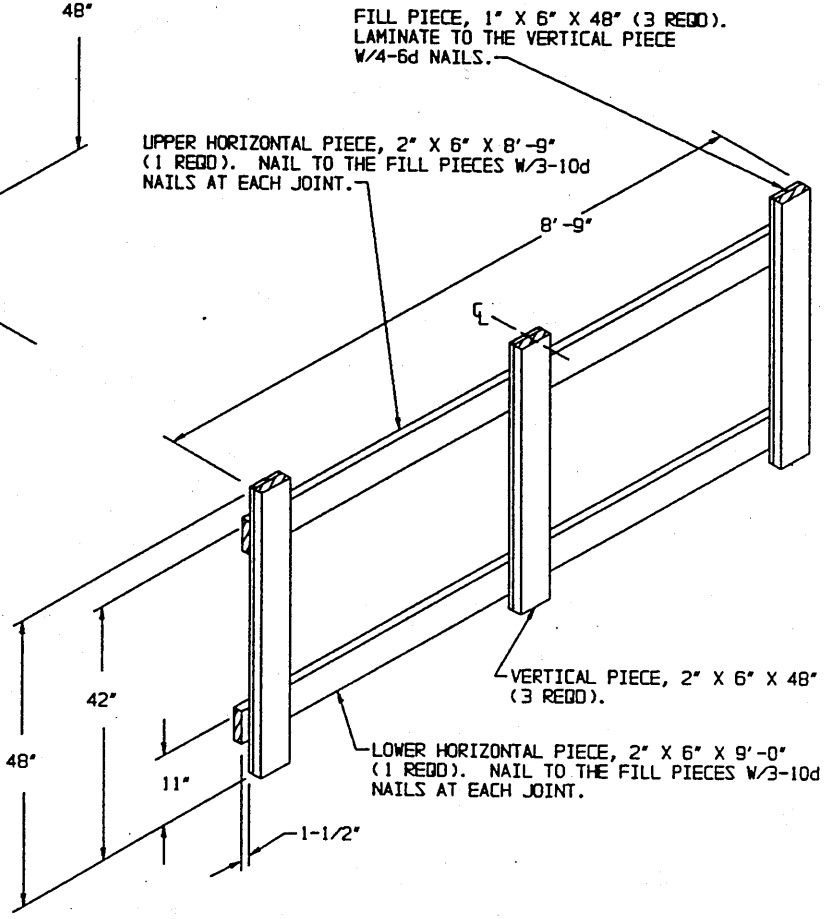
**KEY NUMBERS**

- ① CROSS MEMBER (15 REQD). POSITION AT THE HEIGHTS SPECIFIED IN THE "SECTION A-A" VIEW. SEE THE "FILL DETAIL" ON PAGE 7.
- ② LOAD BEARING GATE (4 REQD). SEE THE "LOAD BEARING GATE A" DETAIL ON PAGE 5.
- ③ SIDE FILL ASSEMBLY (4 REQD). SEE THE "SIDE FILL ASSEMBLY A" DETAIL ON PAGE 5 AND GENERAL NOTE "N" ON PAGE 2.





**LOAD BEARING GATE A**



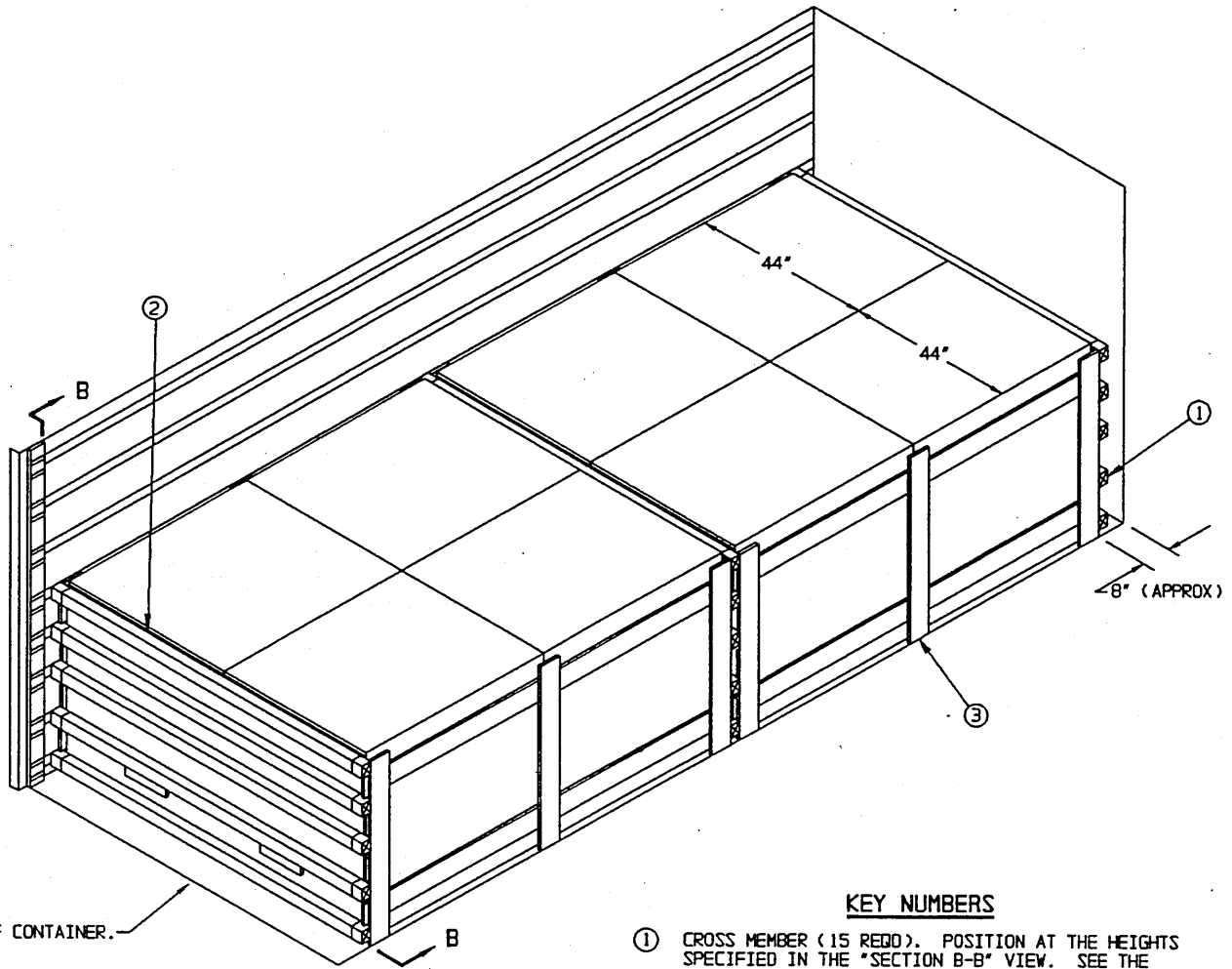
**SIDE FILL ASSEMBLY A**

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	8	3
1" X 6"	48	24
2" X 6"	119	119
NAILS	NO. REQD	POUNDS
6d (2")	80	1/2
10d (3")	72	1-1/4
PLYWOOD, 1/2"	112 SQ FT REQD	154 LBS
CROSS MEMBER		15 REQD

\* NOTE: THE LOAD DEPICTED ON PAGE 4 AND THE LOAD AS SHOWN ON THIS PAGE ARE BASED ON PALLET UNIT "C".

**LOAD AS SHOWN \***

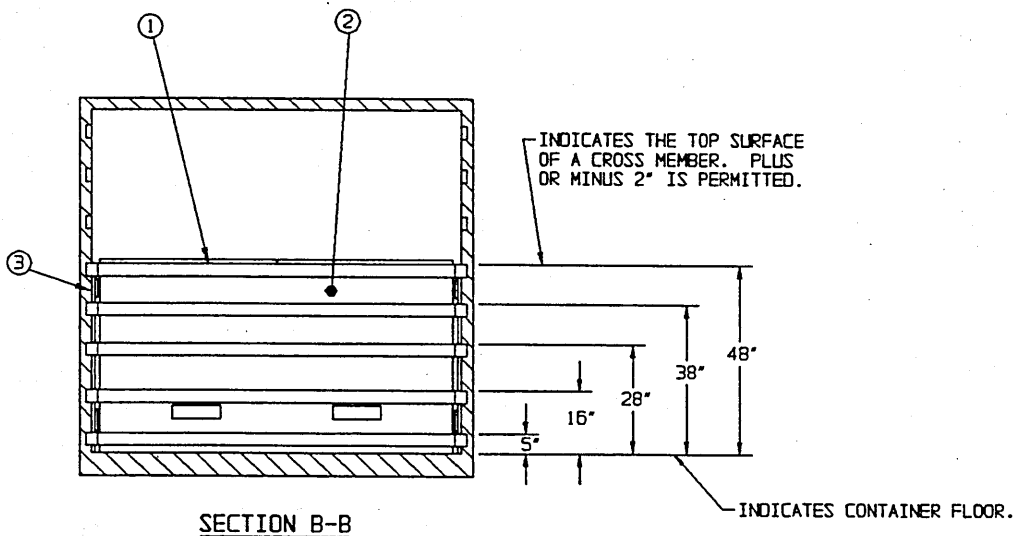
ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	8	25,536 LBS
DUNNAGE		448 LBS
CONTAINER		5,700 LBS
TOTAL WEIGHT		31,684 LBS (APPROX)



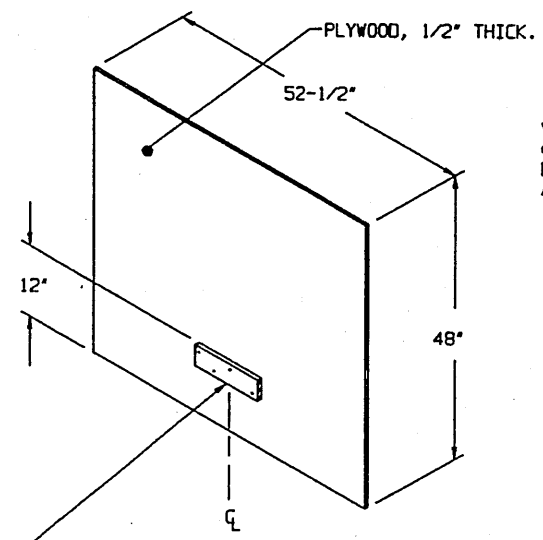
**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① CROSS MEMBER (15 REQD). POSITION AT THE HEIGHTS SPECIFIED IN THE "SECTION B-B" VIEW. SEE THE "FILL DETAIL" ON PAGE 7.
- ② LOAD BEARING GATE (4 REQD). SEE THE "LOAD BEARING GATE A" DETAIL ON PAGE 5.
- ③ SIDE FILL ASSEMBLY (4 REQD). SEE THE "SIDE FILL ASSEMBLY B" DETAIL ON PAGE 7 AND GENERAL NOTE "N" ON PAGE 2.

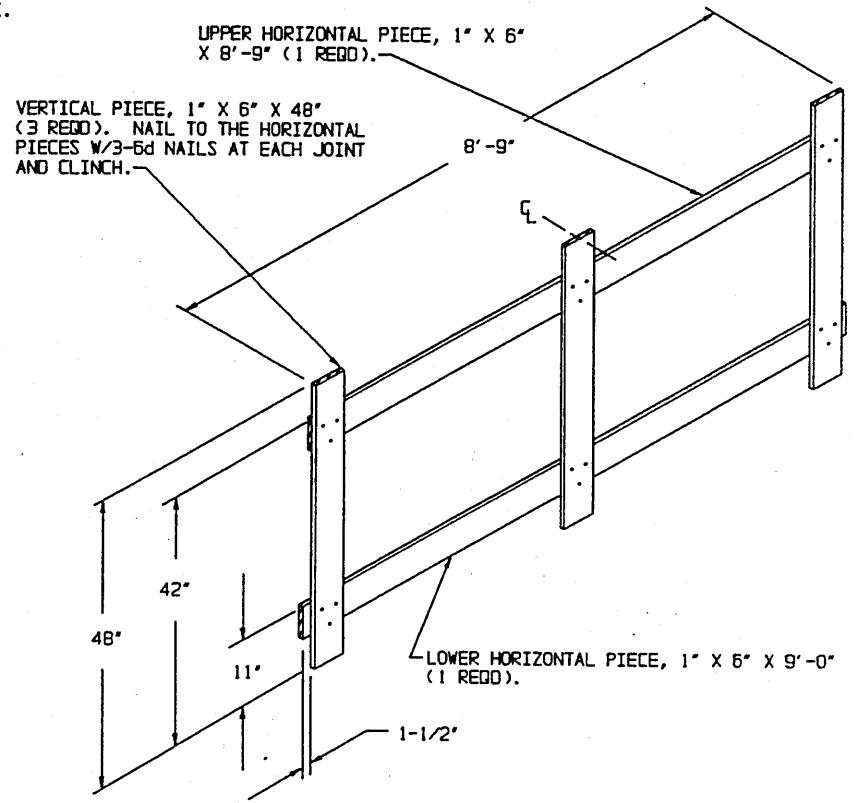


**SECTION B-B**

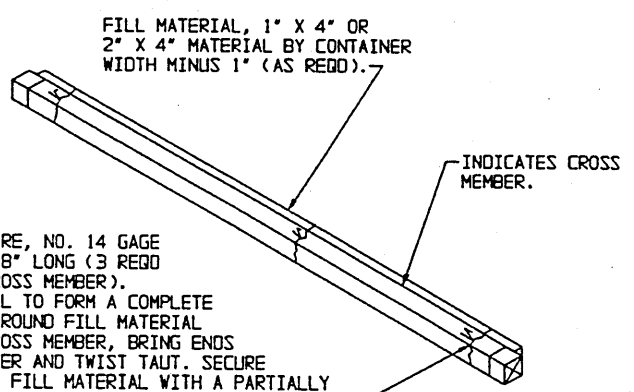


HOLD-DOWN PIECE, 1" X 4" X 12"  
(1 REQD). NAIL TO THE PLYWOOD  
W/4-6d NAILS AND CLINCH.

**LOAD BEARING GATE B**



**SIDE FILL ASSEMBLY B**



TIE WIRE, NO. 14 GAGE  
WIRE 18" LONG (3 REQD  
PER CROSS MEMBER).  
INSTALL TO FORM A COMPLETE  
LOOP AROUND FILL MATERIAL  
AND CROSS MEMBER, BRING ENDS  
TOGETHER AND TWIST TAUT. SECURE  
TO THE FILL MATERIAL WITH A PARTIALLY  
DRIVEN 10d NAIL BENT OVER THE WIRE,  
OR WITH A STRAP STAPLE.

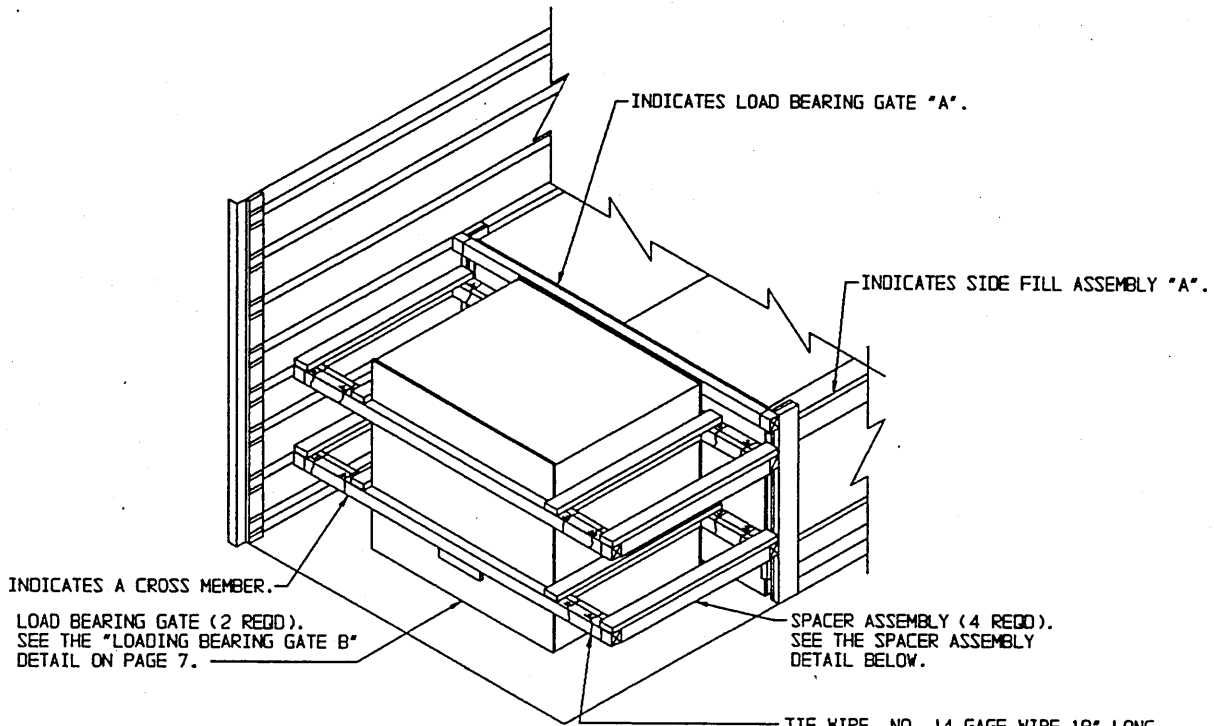
**FILL DETAIL**

THIS DETAIL DEPICTS METHOD OF  
POSITIONING FILL MATERIAL BETWEEN  
LOAD-BRACING CROSS MEMBER AND  
LADING WHEN THE VOID BETWEEN THE  
TWO IS GREATER THAN ONE INCH (1")  
FOR LONGITUDINAL BRACING.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	8	3
1" X 6"	119	60
NAILS	NO. REQD	POUNDS
6d (2")	104	3/4
PLYWOOD, 1/2"	118 SQ FT REQD	163 LBS
CROSS MEMBER		15 REQD

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	8	25,432 LBS
DUNNAGE		290 LBS
CONTAINER		5,700 LBS
TOTAL WEIGHT		31,422 LBS (APPROX)



**ALTERNATIVE LOADING PATTERN**

PALLET UNIT "A" IS DEPICTED ABOVE. THESE PROCEDURES MAY ALSO BE USED FOR PALLET UNIT "C", AND MAY BE MODIFIED USING THE PROCEDURES ON PAGE 6 FOR PALLET UNIT "B".

RETAINER PIECE, 2" X 4" BY CUT-TO-FIT IN LENGTH (2 REQD). NAIL TO THE STRUTS W/1-10d NAIL AT EACH JOINT AND TO THE BUFFER PIECE W/4-10d NAILS.

FABRICATE TO FIT BETWEEN CONTAINER SIDE WALL AND PALLET UNIT.

STRUT, 2" X 4" BY CUT-TO-SUIT IN LENGTH (2 REQD).

2-1/2"

2-1/2"

BUFFER PIECE, 2" X 4" BY CUT-TO-FIT IN LENGTH (2 REQD). NAIL TO THE STRUTS W/2-10d NAILS AT EACH END.

FABRICATE TO FIT BETWEEN INSTALLED CROSS MEMBERS.

**SPACER ASSEMBLY**