

*J. H. Sherman*  
DATE 11/5/92

# LOADING AND BRACING<sup>●</sup> IN MILVAN CONTAINERS<sup>⊕</sup> OF COMPLETE ROUNDS PACKED IN PA116 CYLINDRICAL METAL CONTAINERS ON METAL PALLET

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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-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.

## U.S. ARMY MATERIEL COMMAND DRAWING

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

*EM Jones*

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

*John H. Reynolds*  
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL

DRAFTSMAN	TECHNICIAN	ENGINEER
B. KUNDERT		L. FIEFFER
P. BELLICH		G. WILLIS
VALIDATION ENGINEERING DIVISION	TRANSPORTATION ENGINEERING DIVISION	LOGISTICS ENGINEERING OFFICE
<i>or JMK</i>	<i>W. Furrick</i>	<i>W. Ernst</i>

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REVISION NO. 1      JANUARY 1993  
SEE THE REVISION LISTING ON PAGE 3

CLASS	DIVISION	DRAWING	FILE
19	48	4214/8A	15PM1006

DO NOT SCALE

## GENERAL NOTES

(GENERAL NOTES CONTINUED)

- 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 PROCEDURE SPECIFIED HEREIN IS APPLICABLE TO PALLETIZED UNITS OF COMPLETE ROUNDS PACKED IN PA116 SERIES CYLINDRICAL METAL CONTAINERS. SUBSEQUENT REFERENCE TO PALLET UNIT MEANS THE PALLETIZED UNIT WITH AMMUNITION ITEMS. SEE PAGE 4 OF THIS DRAWING AND U.S. AMC DRAWING NO. 19-48-4079/7A-20PM1002 FOR DETAIL OF THE PALLETIZED UNIT. 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 HEIGHT 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 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 7 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 4" MATERIAL IS ACTUALLY 1-1/2" THICK BY 3-1/2" 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.
- 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:

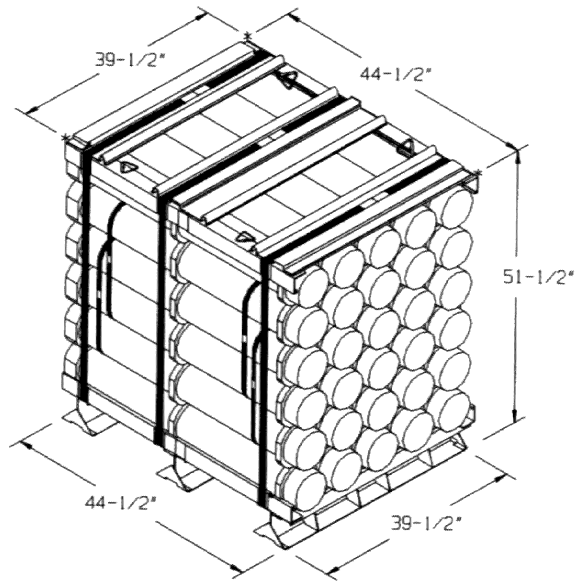
- CAUTION: LOADED CONTAINERS MUST BE ON CHASSIS EQUIPPED WITH TWO BOGIE ASSEMBLIES WHEN BEING MOVED IN TOFC SERVICE, REGARDLESS OF THE LOAD WEIGHT WITHIN THE CONTAINERS.
- LOAD LIMITS OF T/COFC RAIL CARS MUST NOT BE EXCEEDED. NOR WILL A CAR BE LOADED SO THAT THE TRUCK UNDER ONE END OF THE CAR CARRIES MORE THAN ONE-HALF OF THE LOAD LIMIT FOR THAT CAR.
- 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.

(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.
WIRE	FED SPEC QQ-W-461; ANNEALED, BLACK.
STAPLE, STRAP	COMMERCIAL GRADE.
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.

- 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 USING A DIFFERENT THICKNESS SIDE FILL PIECE OR BY LAMINATING ADDITIONAL PIECES TO THE SIDE FILL PIECES ON ONE OR BOTH SIDES OF THE LOAD W/1 APPROPRIATELY SIZED NAIL EVERY 12".
- O. IF DEEMED MORE ECONOMICAL BY THE SHIPPING INSTALLATION/ACTIVITY, THE 4 REQUIRED SIDE FILL PIECES, AS DELINEATED ON PAGE 4 AS PIECES MARKED (2), MAY BE REPLACED BY 15 "ALTERNATIVE SIDE/CENTER FILL ASSEMBLIES", AS DETAILED ON PAGE 6. PLACEMENT OF THESE ASSEMBLIES WILL BE AS SPECIFIED IN THE ISOMETRIC VIEW ON PAGE 4. NOTE THAT 3 ASSEMBLIES ARE REQUIRED FOR EACH LATERALLY ADJACENT PAIR OF PALLET UNITS LOADED INTO THE MILVAN CONTAINER.



PALLET UNIT

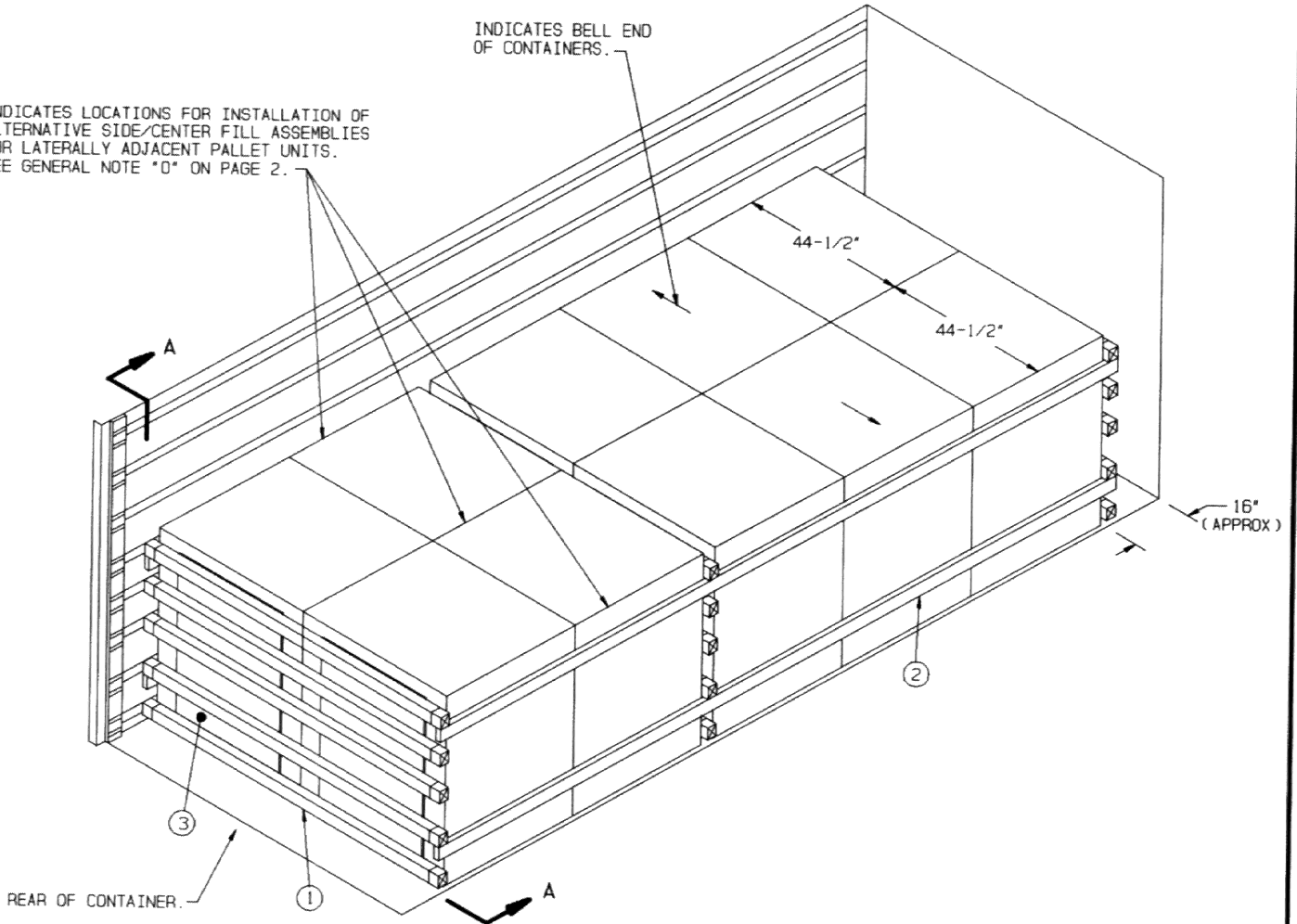
UNIT WEIGHT - - - - - 2,421 LBS (APPROX)  
CUBE - - - - - 52.4 CUBIC FEET

REVISION

REVISION NO. 1, DATED JANUARY 1993, CONSISTS OF:  
REDESIGNING LOAD BEARING GATE TO BETTER UTILIZE PLYWOOD MATERIALS.

INDICATES LOCATIONS FOR INSTALLATION OF ALTERNATIVE SIDE/CENTER FILL ASSEMBLIES FOR LATERALLY ADJACENT PALLET UNITS. SEE GENERAL NOTE "O" ON PAGE 2.

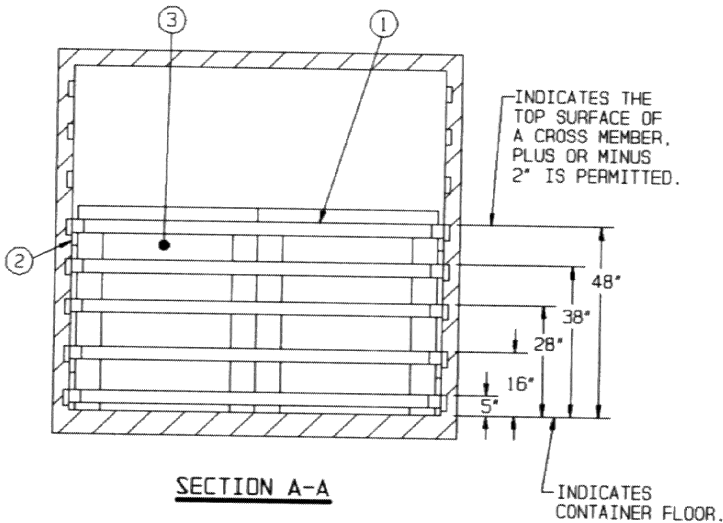
INDICATES BELL END OF CONTAINERS.



**ISOMETRIC VIEW**

**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 SIDE FILL, 2" X 4" BY LADING LENGTH (4 REQD). INSTALLATION MAY BE MADE FROM RANDOM LENGTH PIECES. WIRE TIE TO THE 16" AND 48" HIGH BELT RAILS ON EACH SIDE OF THE CONTAINER. SEE THE "SIDE FILL" DETAIL ON PAGE 7 AND GENERAL NOTES "N" AND "O" ON PAGE 2.
- ③ LOAD BEARING GATE (8 REQD). SEE THE "LOAD BEARING GATE" DETAIL ON PAGE 6.



**SECTION A-A**

**REDUCED-LOAD PROVISIONS**

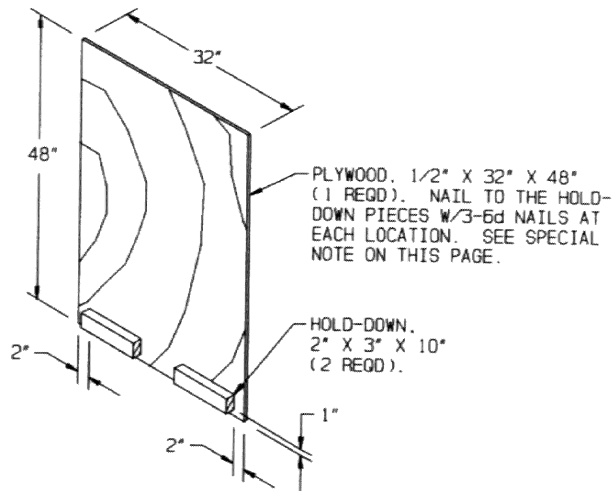
WHEN A CONTAINER IS TO BE LOADED WITH A REDUCED QUANTITY OF LADING UNITS, THE LENGTHWISE CENTER OF GRAVITY OF A LOAD MUST BE WITHIN 12" IN EITHER DIRECTION, OF THE MID-POINT IN A MILVAN, AND THE FOLLOWING CRITERIA WILL APPLY.

- A. IF A LOAD IS REDUCED BY ONLY A SMALL AMOUNT, LADING UNITS NORMALLY MAY BE ELIMINATED FROM THE REAR OF THE LOAD. SEE THE "ALTERNATIVE LOADING PATTERN" PROCEDURES ON PAGE 8 FOR ADDITIONAL GUIDANCE.
- B. IF A LOAD IS REDUCED BY A LARGE AMOUNT, LADING UNITS SHOULD BE ELIMINATED FROM LOCATIONS WITHIN THE LOAD OR LADING UNITS SHOULD BE ELIMINATED AS REQUIRED AND THE TOTAL LOAD SHIFTED AS NECESSARY FORE OR AFT, 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.
- C. COMBINATIONS OF THE DEPICTED LOADING PATTERNS (PAGES 4 AND 8) MAY BE USED TO SATISFY THE NUMBER OF UNITS TO BE SHIPPED. HOWEVER, EACH LOAD BAY WILL BE INDEPENDENTLY BLOCKED AS A SEPARATE LOAD BAY IN ACCORDANCE WITH THE DEPICTED PROCEDURES FOR THAT SPECIFIC LOADING PATTERN.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
2" X 3"	14	7
2" X 4"	68	46
NAILS	NO. REQD	POUNDS
6d (2")	48	1/4
10d (3")	16	1/4
PLYWOOD, 1/2" - - - 85.03 SQ FT REQD - - - - 117 LBS		
WIRE, NO. 14 GAGE - - - - 48' REQD - - - - - 1 LB		
CROSS MEMBER - - - - - 15 REQD		

**LOAD AS SHOWN**

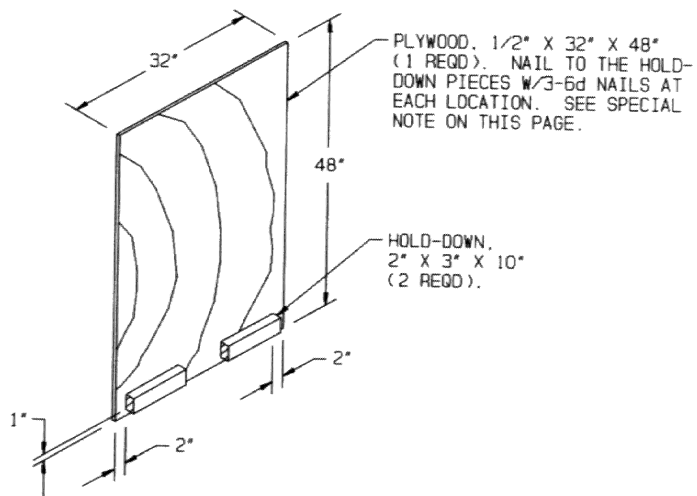
ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	10	24,210 LBS
DUNNAGE		225 LBS
CONTAINER		5,700 LBS
TOTAL WEIGHT		30,135 LBS (APPROX)



**LOAD BEARING GATE**

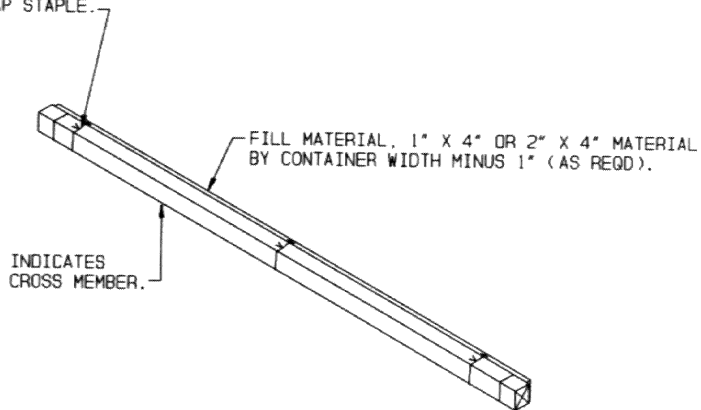
SPECIAL NOTE:

THE ACTUAL WIDTH OF THE PLYWOOD PIECE MAY BE SLIGHTLY LESS THAN 32" (I.E. APPROXIMATELY 31-7/8") TO ALLOW FOR SAW KERF AND PERMIT FULL UTILIZATION OF A 4' X 8' PLYWOOD SHEET CUT INTO THREE EQUAL PIECES.



**ALTERNATIVE SIDE/CENTER  
FILL ASSEMBLY**

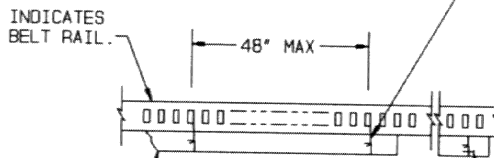
TIE WIRE, NO. 14 GAGE WIRE 18" LONG (3 REQD./CROSS MEMBER). INSTALL TO FORM A COMPLETE LOOP AROUND FILL MATERIAL AND CROSS MEMBER. BRING ENDS TOGETHER AND TWIST TAUT. SECURE TO THE FILL MATERIAL WITH A PARTIALLY DRIVEN 10d NAIL BENT OVER THE TIE WIRE OR WITH A STRAP STAPLE.



**FILL DETAIL**

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

TIE WIRE, NO. 14 GAGE WIRE 18" LONG. WIRE TO FORM COMPLETE LOOP THROUGH HOLE IN BELT RAIL AND AROUND FILL PIECE. BRING ENDS TOGETHER AND TWIST TAUT. REQUIRED NEAR EACH END OF FILL PIECE AND EVERY 48" OF FILL PIECE LENGTH AS SHOWN.

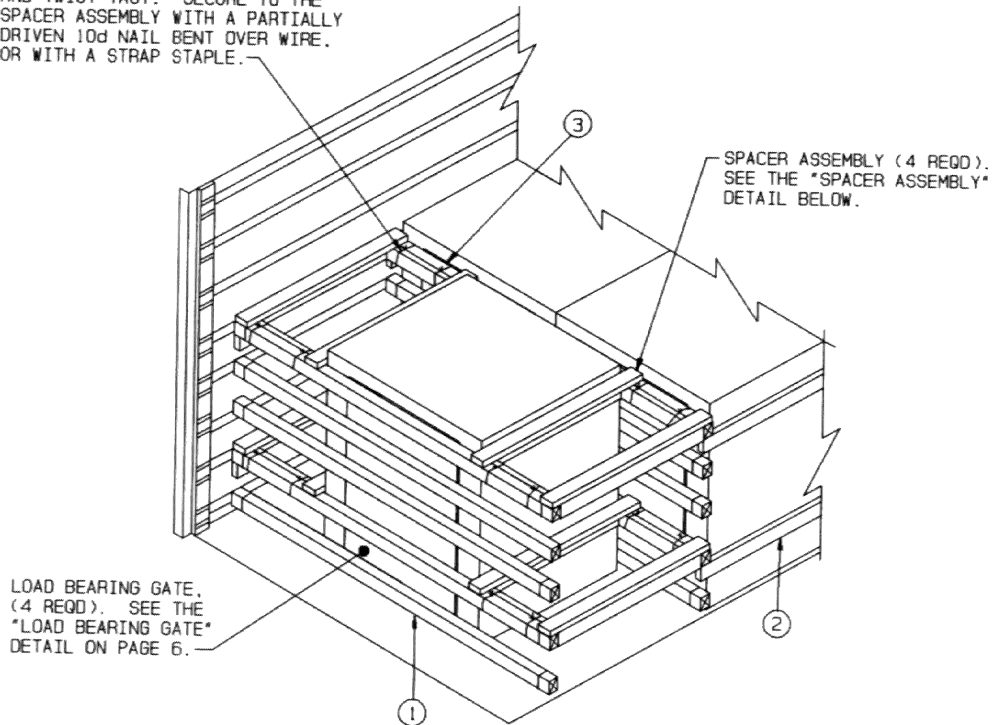


**SIDE FILL DETAIL**

FILL PIECE, 2" X 4" BY LADING LENGTH. RANDOM LENGTH PIECES MAY BE USED (4 REQD). REQUIRED AT THE 16" AND 48" HIGH BELT RAILS.

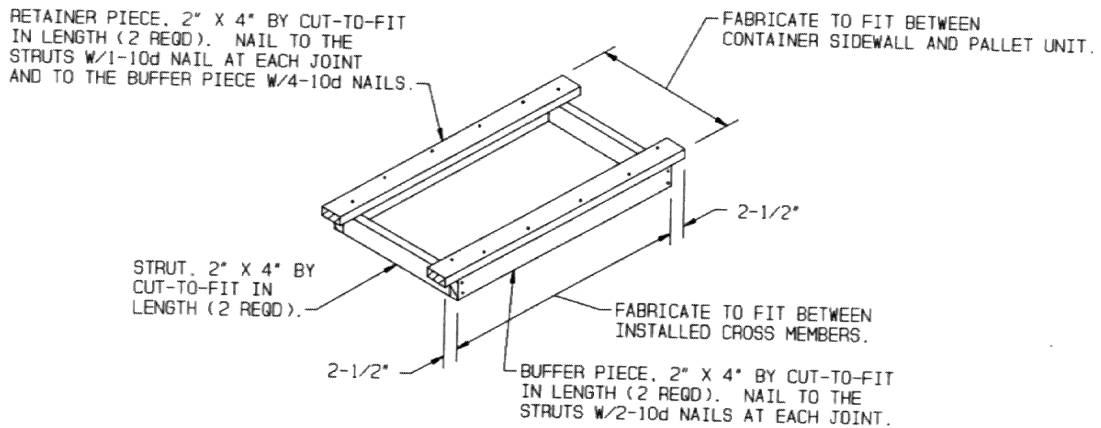
RETAINER NAIL. PARTIALLY DRIVEN 10d NAIL BENT OVER THE WIRE TO PREVENT LONGITUDINAL MOVEMENT OF FILL PIECES (1 REQD NEAR EACH END OF EACH LENGTH OF SIDE FILL PIECE). A STRAP STAPLE MAY BE USED IN LIEU OF A RETAINER NAIL.

TIE WIRE, NO. 14 GAGE WIRE 18" LONG (16 REQD). WIRE TO FORM A LOOP AROUND CROSS MEMBER AND SPACER ASSEMBLY. BRING ENDS TOGETHER AND TWIST TAUT. SECURE TO THE SPACER ASSEMBLY WITH A PARTIALLY DRIVEN 10d NAIL BENT OVER WIRE, OR WITH A STRAP STAPLE.



### ALTERNATIVE LOADING PROCEDURE

KEY NUMBERS REFER TO KEY NUMBERS LISTED ON PAGE 4.



### SPACER ASSEMBLY