

LOADING AND BRACING* IN END OPENING ISO CONTAINERS OF PAL-LETIZED MODULAR ARTILLERY CHARGE SYSTEM (MACS) PACKED IN CYLINDRICAL METAL CONTAINERS

PA161 CONTAINER, WOODEN PALLET

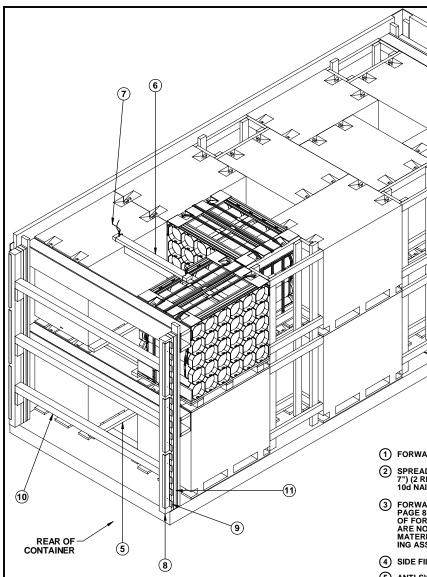
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*THE PROCEDURES SHOWN HEREIN ARE APPLICABLE TO LOADS THAT ARE TO BE SHIPPED BY CONTAINER-ON-FLATCAR (COFC) RAIL, MOTOR, OR WATER CARRIERS.

U.S. ARMY MATERIEL COMMAND DRAWING APPROVED, U.S. ARMY CAUTION: VERIFY PRIOR TO USE AT WWW.DAC.ARMY.MIL THAT THIS IS FIELD SUPPORT COMMAND THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 8. DO NOT SCALE **APRIL 2006** ENGINEER **MELVIN SIX** OR REV TECHNICIAN TRANSPORTATION APPROVED BY ORDER OF COMMANDING **ENGINEERING** GENERAL, U.S. ARMY MATERIEL COMMAND DIVISON VALIDATION TESTED CLASS DIVISION DRAWING **ENGINEERING** DIVISON 19 48 4333/50 15PM1024 ENGINEERING. DIRECTORATE U.S. ARMY DEFENSE AMMUNITION CENTER

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BILL OF MATERIAL		
LUMBER	LI NEAR FEET	BOARD FEET
1" X 4"	15	5
2" X 4"	337	225
2" X 6"	61	61
4" X 4"	40	53
NAI LS	NO. REQD	POUNDS
6d (2")	188	1-1/4
10d (3")	508	8
12d (3-1/4")	12	1/4
PLYWOOD, 3/4" 48.03 SQ FT REQD 100 LBS		
UNI VERSAL LOAD RETAINER 6 REQD 39 LBS		

KEY NUMBERS

(4)

- 1 FORWARD STRUT ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 7.
- (2) SPREADER PIECE, 2" X 4" BY INSIDE CONTAINER WIDTH MINUS 1" (REF: 7'-7") (2 REQD). NAIL TO THE STRUTS OF FORWARD STRUT ASSEMBLY W/2-10d NAILS AT EACH END.

(1)

- (3) FORWARD/REAR BLOCKING ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 8. NAIL THROUGH THE BUFFER PIECES INTO THE VERTICAL PIECES OF FORWARD STRUT ASSEMBLIES W/5-104 NAILS. NOTE: STRUT LEDGERS ARE NOT REQUIRED ON THE REAR BLOCKING ASSEMBLY WHEN USING FILL MATERIAL. DO NOT INSTALL STRUT LEDGERS ON THE FORWARD BLOCKING ASSEMBLY.
- (4) SIDE FILL ASSEMBLY (4 REQD). SEE THE DETAIL ON PAGE 7.
- (5) ANTI-SWAY BRACE (2 REQD). INSTALL BETWEEN LATERALLY ADJACENT ROWS OF PALLET UNITS. SEE THE DETAIL ON PAGE 6.
- 6 TOP OF LOAD ANTI-SWAY BRACE (1 REQD). SEE THE DETAIL ON PAGE 6.
- (7) TIE WIRE, .0800" DIA 24" LONG (2 REQD). INSTALL THE WIRE TO FORM A COMPLETE LOOP AROUND THE TOP OF LOAD ANTI-SWAY BRACE AND THE TOP PALLET ADAPTOR CENTER SUPPORT.
- (8) DOOR POST VERTICAL (2 REQD). SEE THE DETAIL ON PAGE 7, "DETAIL A" ON PAGE 8 AND GENERAL NOTE "Q" ON PAGE 3.
- (9) UNIVERSAL LOAD RETAINER (6 REQD, 3 PER SIDE). NAIL THROUGH THE HOLES INTO THE DOOR POST VERTICAL W/2-10d NAILS. SEE DEPARTMENT OF ARMY DRAWING DA-116 "DETAIL A" ON PAGE 8, AND GENERAL NOTE "Q" ON PAGE 3.
- (10) DOOR SPANNER, 4" X 4" MATERIAL CUT TO A LENGTH THAT WILL PROVIDE A DRIVE FIT (REF: 7'-1-1/4") (3 REQD). TOENAIL TO THE DOOR POST VERTICAL W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 8
- (1) FILL MATERIAL, 4" WIDE BY 7'-4" LONG MATERIAL (AS REQD). NAIL THE FIRST PIECE TO THE REAR BLOCKING ASSEMBLY W/6 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 "DETAIL A" ON PAGE 8.

LOAD AS SHOWN

<u>I TEM</u>	QUANTI TY	<u>WEIGHT</u> (APPROX)
DUNNAGE -	T 20	25, 940 LBS 834 LBS 4, 700 LBS

TOTAL WEIGHT - - - - - 31,474 LBS (APPROX)

PAGE 2

20 PALLET UNIT LOAD

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 IN THIS DRAWING ARE APPLICA BLE TO PALLETIZED MODULAR ARTILLERY CHARGE SYSTEM (MACS) PACKED IN PA161 CONTAINERS. SUBSEQUENT REFERENCE TO PALLET UNIT HEREIN MEANS PALLET UNIT WITH CONTAINERS. SEE PAGE 5 AND U. S. ARMY MA-TERIEL COMMAND DRAWING 19-48-4326/50-20PM1012 FOR DETAILS OF THE PALLET UNIT. <u>CAUTION</u>: 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 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 DE-SIGNED FOR TRAILER/CONTAINER-ON-FLATCAR (T/COFC) SHIPMENT, HOW-EVER, THE LOAD AS DESIGNED CAN ALSO BE MOVED BY OTHER SURFACE MODES OF TRANSPORT. NOTICE: OTHER CONTAINERS OF THE SAME DE-SIGN 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). THE 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 SLACK CAN BE ELIMINATED FROM A LOAD BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE BUFFER PIECES ON THE SIDE FILL ASSEMBLIES. NAIL EACH ADDITIONAL PIECE W1 APPROPRIATELY SIZED NAIL EVERY 12". ADDITIONALLY, THE THICKNESS AND/OR LENGTH OF THE PIECES IN THE SIDE FILL ASSEMBLY MAY BE ADJUSTED AS PECULIED TO EACH TATE VARIANCE IN THE SIZE OF THE BALLET. JUSTED AS REQUIRED TO FACILITATE VARIANCE IN THE SIZE OF THE PALLET
- 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.
- 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. IN SOME CONTAINERS THERE IS A SLOT AT THE CORNERS OF THE FORWARD WALL. PIECES OF DUNNAGE MATERIAL MUST BE LAMINATED TO THE WALL. PIECES OF DUNNAGE MATERIAL MUST BE 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 APE SMOOTH AND BLAT DO NOT ALL OW ANY DIMNAGE AS. WARD WALL ARE SMOOTH AND FLAT. DO NOT ALLOW ANY DUNNAGE AS-SEMBLY TO CONTACT THE CONTAINER FORWARD WALL, ONLY THE CORNER POSTS OF THE CONTAINER SHOULD BE USED FOR FORWARD LONGITUDINAL
- H. 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 CON-
- J. <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.

(CONTINUED AT RIGHT)

(GENERAL NOTES CONTINUED)

L. MAXIMUM LOAD WEIGHT CRITERIA:

THE MAXIMUM LOAD 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 OF THE NEW WEIGHT TO SATISFY OTHER WEIGHT RESTRICTIONS IMPOSED ON THE IN-TERMODAL CONTAINER SYSTEM.

- M. REQUIREMENTS CITED WITHIN THE ASSOCIATION OF AMERICAN RAILROADS (AAR) INTERMODAL LOADING GUIDE APPLY WHEN THE SHIPMENT MOVES BY TRAILER/CONTAINER-ON-FLATCAR (T/COFC). SPECIAL T/COFC NOTES FOL-
 - 1. A LOADED CONTAINER MUST BE ON A CHASSIS EQUIPPED WITH TWO BO-GIE ASSEMBLIES WHEN BEING MOVED IN TOFC SERVICE.
 - 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 PRE-CLUDE VIOLATION OF ONE OR MORE "WEIGHT LAWS" APPLICABLE TO THE STATE OR STATES INVOLVED.
- O. CONVERSION TO METRIC EQUIVALENTS: DIMENSIONS WITHIN THIS DOCU-MENT ARE EXPRESSED IN INCHES AND WEIGHTS ARE EXPRESSED IN POUNDS. WHEN NECESSARY, THE METRIC EQUIVALENTS MAY BE COM-PUTED ON THE BASIS OF ONE INCH EQUALS 25.4MM AND ONE POUND FOUALS 0.454 KG.
- P. 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. FILLER ASSEMBLY ONLY FOR USE IN REDUCING LOAD DEPICTED ON PAGE 4.
 - IF A LOAD IS REDUCED BY ONLY A SMALL AMOUNT (ONE, TWO OR THREE LADING UNITS), LADING UNITS NORMALLY MAY BE ELIMINATED FROM THE CENTER OF THE LOAD.
 - 2. IF A LOAD IS REDUCED BY A LARGE AMOUNT (MORE THAN THREE LAD-ING 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 ACCOM-MODATE THE NUMBER OF UNITS TO BE SHIPPED.
- Q. SIX UNIVERSAL LOAD RETAINERS, AS DEPICTED IN THE LOADS ON PAGES 2 AND 4, ARE REQUIRED WHEN LOADING TWO LAYERS OF PALLET UNITS, AND FOUR ARE REQUIRED WHEN LOADING ONE LAYER OF PALLET UNITS. REFER TO DAC DRAWING ACVO0682 FOR DETAILS OF THE UNIVERSAL LOAD RETAINER CONSTRUCTION, AND TO DEPARTMENT OF THE ARMY DRAWING DA-116 FOR DETAILS FOR INSTALLATION TO THE DOOR POST VERTICAL, PLACEMENT INTO THE CONTAINER, AND FOR OTHER METHODS OF REAR-OF-LOAD RESTRAINT.
- R. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN PALLET UNITS OR BETWEEN PALLET UNITS AND THE END OPENING CONTAINER, IF DESIRED, TO PREVENT CHAFING DAMAGE TO CONTAINER PAINT AND MARKINGS.

MATERIAL SPECIFICATIONS

SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOL-UNTARY PRODUCT STANDARD PS 20. LUMBER - - - - - -:

<u>NAI LS</u> - - - - - -: ASTM F1667; COMMON STEEL NAIL (NLCMS OR

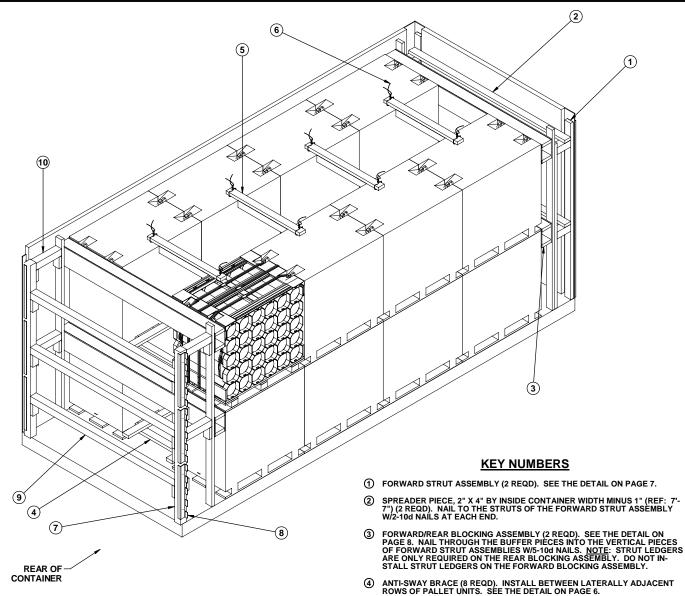
NLCMMS)

PLYWOOD - - - - -:

COMMERCIAL ITEM DESCRIPTION A-A-55057, IN-DUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EX-TERIOR GRADE MAY BE SUBSTITUTED.

ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER. WIRE, CARBON STEEL -:

ANTI - CHAFING MATERI AL MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER



ISOMETRIC VIEW

BILL OF MATERIAL		
LUMBER	LI NEAR FEET	BOARD FEET
2" X 4"	143	96
2" X 6"	61	61
4" X 4"	54	72
NAI LS	NO. REQD	POUNDS
6d (2")	176	1
10d (3")	304	4-3/4
12d (3-1/4")	28	1/2
PLYWOOD, 1/2" 48.03 SQ FT REQD 66 LBS UNI VERSAL LOAD RETAI NER 6 REQD 39 LBS		

- 1 FORWARD STRUT ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 7.

- 5 TOP OF LOAD ANTI-SWAY BRACE (4 REQD). SEE THE DETAIL ON PAGE 6.
- TIE WIRE, .0800" DIA 24" LONG (8 REQD). INSTALL THE WIRE TO FORM A COMPLETE LOOP AROUND THE TOP OF LOAD ANTI-SWAY BRACE AND THE TOP PALLET ADAPTOR CENTER SUPPORT. 6
- DOOR POST VERTICAL (2 REQD, ONE LEFT HAND AND ONE RIGHT HAND). SEE THE DETAIL ON PAGE 7, "DETAIL A" ON PAGE 8, AND GENERAL NOTE "Q" ON PAGE 3. 7
- UNIVERSAL LOAD RETAINER (6 REQD, 3 PER SIDE). NAIL THROUGH THE HOLES INTO THE DOOR POST VERTICAL W/2-10d NAILS. SEE DEPARTMENT OF ARMY DRAWING DA-116, "DETAIL A" ON PAGE 8, AND GENERAL NOTE
- DOOR SPANNER, 4" X 4" MATERIAL CUT TO A LENGTH THAT WILL PROVIDE A DRIVE FIT (REF: 7'-1-1/4") (3 REQD). TOENAIL TO THE DOOR POST VERTI-CAL W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE
- (10) STRUT, 4" X 4" BY CUT-TO-FIT (REF: 16") (4 REQD). TOENAIL TO THE BUFFER PIECES OF THE REAR BLOCKING ASSEMBLY AND TO THE DOOR POST VERTICAL W/2-12d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAILS OF THE SET TAIL ON PAGE 8.

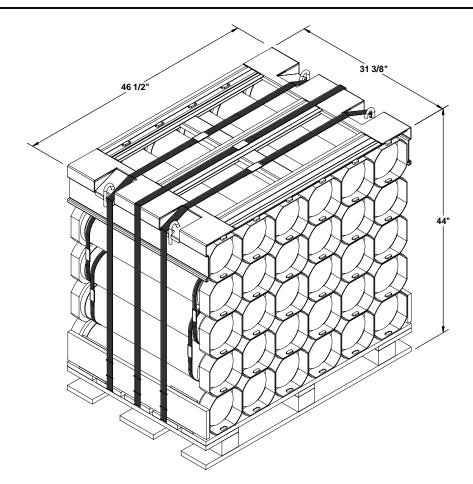
LOAD AS SHOWN

<u>I TEM</u>	QUANTI TY	WEIGHT (APPROX)
DUNNAGE	16	20, 752 LBS 567 LBS 4, 700 LBS

TOTAL WEIGHT - - - - 26,019 LBS (APPROX)

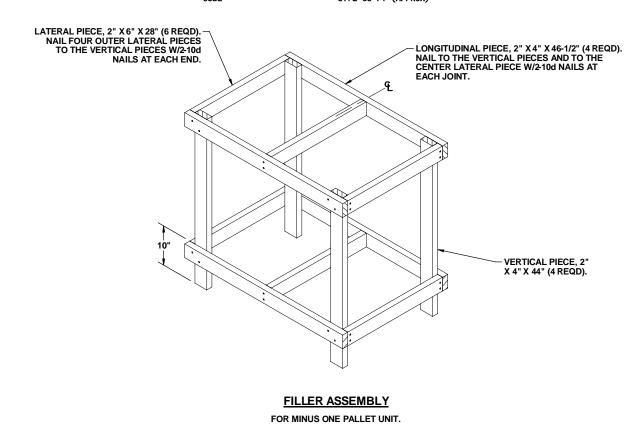
PAGE 4

16 PALLET UNIT LOAD

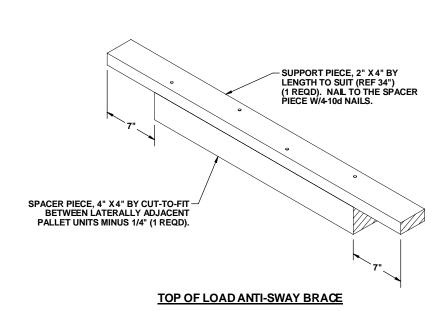


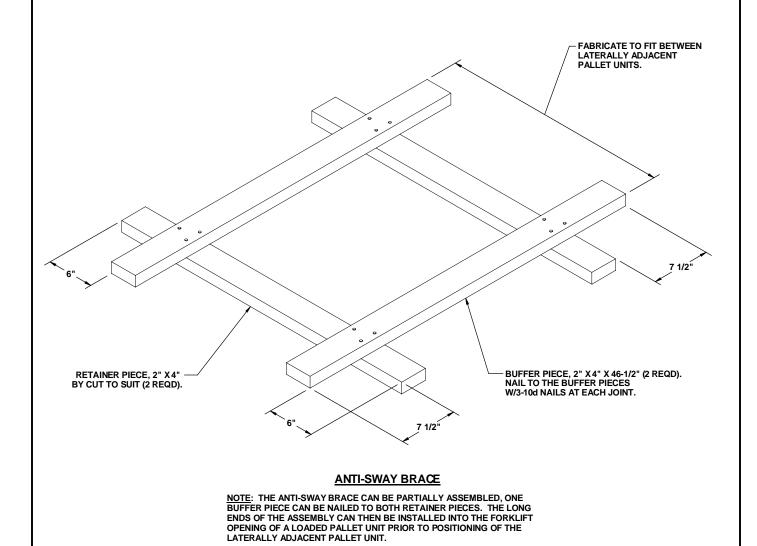
PALLET UNIT DETAIL

GROSS WEI GHT - - - - - - - 1, 297 LBS (APPROX) CUBE - - - - - - - - - 37. 2 CU FT (APPROX)



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PAGE 6

