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# LOADING AND BRACING (CL & LCL) IN BOX CARS OF COMPLETE ROUNDS PACKED IN CYLINDRICAL METAL CONTAINERS AND UNITIZED ON A 40" X 44" WOODEN PALLET

## PA116 SERIES CONTAINER

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THIS OUTLOADING PROCEDURE DRAWING INCLUDES PROCEDURES FOR CONVENTIONAL TYPE BOX CARS, BOX CARS EQUIPPED WITH MECHANICAL BRACING DEVICES OF VARIOUS DESIGN AND MANUFACTURE, AND CUSHIONED BOX CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.

DO NOT SCALE

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		CLASS	DIVISION	DRAWING	FILE	
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## 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 APPLICABLE FOR THE 120MM COMPLETE ROUND PACKED IN THE PA116 CONTAINER AND UNITIZED ON A 40" X 44" WOODEN PALLET. SEE THE PICTORIAL VIEW ON PAGE 3. REFER TO THE U.S. ARMY AMC DRAWING 19-48-4079/7-20PM1002 FOR UNITIZATION PROCEDURES FOR THE PA116 SERIES CONTAINER.
- C. THE OUTLOADING PROCEDURES DEPICTED WITHIN THIS DOCUMENT ARE APPLICABLE FOR SHIPMENTS IN CONVENTIONAL TYPE BOX CARS, FOR SHIPMENTS IN BOX CARS EQUIPPED WITH VARIOUS TYPES OF SELF-CONTAINED MECHANICAL BRACING DEVICES, AND FOR SHIPMENTS IN CUSHIONED BOX CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.
- D. **CAUTION:** METAL COMPLETE ROUND CONTAINERS THAT ARE FLUSH WITH OR OVERHANG THE PALLET END MUST NOT BE ALLOWED TO CONTACT STEEL SIDEWALLS OR END WALLS OF BOX CARS. THIS TYPE OF UNIT LOAD SHOULD BE SHIPPED IN BOX CARS HAVING WOOD SIDEWALLS AND/OR END WALLS. IF CARS WITH WOOD SIDEWALLS AND/OR END WALLS ARE NOT AVAILABLE, AND ALL-STEEL CARS ARE USED, THE SIDEWALLS AND/OR END WALLS MUST BE LINED WITH DIMENSIONAL LUMBER, PLYWOOD, HARDBOARD, OR SOLID FIBERBOARD. THE LINING SHOULD BE PROVIDED WHEREVER METAL-OF-CONTAINER TO METAL-OF-CAR CONTACT IS POSSIBLE. REFER TO PAGE 42 FOR GUIDANCE.
- E. PALLET UNITS WILL BE POSITIONED WITH THE BASE END OF CONTAINERS AGAINST THE CAR END WALL OR SIDEWALL AS APPLICABLE TO THE LOAD BEING SHIPPED. LONGITUDINALLY ADJACENT LENGTHWISE UNITS WILL BE POSITIONED WITH BASE END AGAINST BASE END OR BELL END AGAINST BELL END.
- F. THE SELECTION OF RAIL CARS FOR THE TRANSPORT OF PALLET UNITS OF COMPLETE ROUNDS IS THE RESPONSIBILITY OF THE ORIGINATING CARRIER AND THE SHIPPER. ONLY CARS WHICH HAVE "SOUND" FLOORS AND ARE IN OTHERWISE PROPER CONDITION, IN ACCORDANCE WITH THE REQUIREMENTS OF THE APPLICABLE REGULATORY DOCUMENTS, WILL BE SELECTED.
- G. WHEN SELECTING RAIL CARS, EVERY EFFORT SHOULD BE MADE TO OBTAIN BOX CARS THAT DO NOT HAVE BOWED END WALLS. CARS HAVING BOWED ENDS CAN BE USED, HOWEVER, IF AN END WALL IS BOWED OUTWARD MORE THAN TWO INCHES (2"), EITHER FROM SIDE TO SIDE OR FROM FLOOR TO ROOF, AN END-OF-CAR BULKHEAD MUST BE INSTALLED TO PROVIDE A "SQUARED OFF" SURFACE FOR THE LOAD AT THE END OF THE CAR. REFER TO PAGE 43 FOR GUIDANCE.
- H. CONVENTIONAL BOX CARS EQUIPPED WITH SLIDING DOORS HAVE BEEN SHOWN. HOWEVER, THE DEPICTED OUTLOADING PROCEDURES ARE ALSO APPLICABLE FOR CONVENTIONAL CARS EQUIPPED WITH PLUG DOORS. **CAUTION:** DUNNAGE MATERIAL MUST NOT BE NAILED TO ANY PLUG DOOR, WHETHER AUXILIARY OR MAIN. ALSO, AFTER THE PLUG DOORS ON A CAR ARE CLOSED AND READY FOR THE INSTALLATION OF CAR SEALS, A PIECE OF WIRE OF SUITABLE SIZE WILL BE USED IN ADDITION TO, AND IN CONJUNCTION WITH EACH CAR SEAL USED TO SEAL THE CAR. THE WIRE WILL BE THREADED THRU THE HOLES IN THE DOOR LATCH ASSEMBLY ONE OR MORE TIMES, AND THE WIRE ENDS WILL BE TWISTED TOGETHER.
- J. THE USE OF AN OFFSET LOADING PATTERN WILL FACILITATE LOADING AND UNLOADING OPERATIONS IN THE DOORWAY AREA OF THE CAR. UNLESS PROHIBITED WITHIN THE SPECIAL NOTES, A FULL LOAD SHOULD BE BUILT USING AN OFFSET LOADING PATTERN. FOR INSTANCE, A LOAD CONSISTING OF AN EVEN NUMBER OF LOAD UNITS AND HAVING TWO MORE LOAD UNITS IN ONE END OF THE CAR THAN IN THE OPPOSITE END, OR A LOAD CONSISTING OF AN ODD NUMBER OF LOAD UNITS AND HAVING ONE MORE LOAD UNIT IN ONE END THAN IN THE OTHER IS CONSIDERED TO BE AN OFFSET LOAD.
- K. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN CARS WHICH ARE PARTIALLY LOADED WITH PALLET UNITS OF COMPLETE ROUNDS, PROVIDING THE TOTAL LOAD IS COMPATIBLE, EXISTING DIRECTIVES ARE NOT VIOLATED, AND THE OTHER LADING ITEMS ARE BLOCKED AND BRACED TO EQUAL THE BLOCKING AND BRACING CRITERIA SPECIFIED HEREIN. MIXED ITEMS TO BE SHIPPED IN CARS EQUIPPED WITH MECHANICAL BRACING DEVICES MUST BE SEPARATELY BLOCKED, USING THE PROCEDURES SHOWN FOR THESE CARS AS GUIDANCE.

(CONTINUED AT RIGHT)

## MATERIAL SPECIFICATIONS

- LUMBER** ----- : SEE TM 743-200-1, DUNNAGE LUMBER; FED SPEC MM-L-751
- NAILS** ----- : COMMON, FED SPEC FF-N-105.
- STRAPPING, STEEL** ---- : ASTM D 3953; FLAT STRAPPING, TYPE 1 OR 2, HEAVY DUTY, COATED FINISH (ORGANIC), ZINC-COATED (GRADE 2), OR UNCOATED.
- STRAP SEAL** ----- : ASTM D 3953; CLASS H, FINISH A, B (GRADE 2), OR C, TYPE D, STYLE 1, II, OR IV.
- STRAP STAPLE** ----- : COMMERCIAL GRADE.
- PLYWOOD** ----- : GROUP B, CONSTRUCTION AND INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D, FED SPEC NN-P-530. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.
- WIRE** ----- : FED SPEC QQ-W-461.
- HARDBOARD** ----- : ANSI/AHA A135.4, CLASS 1.
- SOLID FIBERBOARD** - : FED SPEC PP-F-320, TYPE SF, CLASS DOMESTIC, GRADE 175 OR STRONGER; OR TYPE SF, CLASS WEATHER-RESISTANT, GRADE W65 OR STRONGER.

## (GENERAL NOTES CONTINUED)

- L. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-1/2" THICK BY 3-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE. THOSE MEMBERS SPECIFICALLY IDENTIFIED AS "STRUTS" WITHIN THE KEY NUMBERS OF A DEPICTED LOAD ARE SPECIFIED TO BE 4" X 4" MATERIAL; IT IS PERMISSIBLE TO USE TWO LAMINATED PIECES OF 2" X 6" MATERIAL IN LIEU OF EACH 4" X 4" STRUT. DOUBLED 2" X 6" STRUTS WILL BE LAMINATED W/1-10d NAIL EVERY 6".
- M. **NOTICE:** A STAGGERED NAILING PATTERN WILL BE USED WHEREVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES. ALSO, A STAGGERED NAILING PATTERN WILL BE USED WHEN DUNNAGE IS NAILED TO THE FLOOR OR SIDEWALL OF THE TRANSPORTING VEHICLE, OR WHEN LAMINATING DUNNAGE. THE NAILING PATTERN WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL DOES NOT PENETRATE INTO OR NEAR A CRACK BETWEEN FLOOR BOARDS OR SIDEWALL BOARDS. 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.
- N. POWER DRIVEN STAPLES MAY BE USED AS ALTERNATIVE FASTENERS FOR NAILS WHEN CONSTRUCTING DUNNAGE ASSEMBLIES WHICH ARE TO BE USED IN THE DELINEATED BOX CAR LOADS SHOWN THROUGHOUT THIS DRAWING. THE STAPLES TO BE USED MUST BE EQUAL IN LENGTH TO THE SPECIFIED NAIL SIZE AND MUST BE SUBSTITUTED ON A ONE STAPLE FOR ONE NAIL BASIS. STAPLES WHICH ARE 2-1/2" OR LESS IN LENGTH SHOULD BE IN ACCORDANCE WITH FEDERAL SPECIFICATION FF-N-105 AS NEARLY AS PRACTICABLE. STAPLES WHICH ARE LONGER THAN 2-1/2" WILL BE A COMMERCIAL GRADE, OF A QUALITY EQUIVALENT TO THOSE MANUFACTURED BY SENCO PRODUCTS INCORPORATED. **NOTE:** STAPLES WILL NOT BE SUBSTITUTED FOR NAILS IN ANY LOAD RESTRAINING FLOOR DUNNAGE APPLICATION.
- O. WHEN STEEL STRAPPING IS SEALED AT AN END-OVER-END LAP JOINT, A MINIMUM OF ONE (1) SEAL WITH TWO (2) PAIR OF NOTCHES WILL BE USED TO SEAL THE JOINT WHEN A NOTCH-TYPE SEALER IS BEING USED. A MINIMUM OF TWO (2) SEALS, BUTTED TOGETHER, WITH TWO (2) PAIR OF CRIMPS PER SEAL WILL BE USED TO SEAL THE JOINT WHEN A CRIMP-TYPE SEALER IS BEING USED. REFER TO THE "STRAP JOINT A" AND "STRAP JOINT B" DETAILS ON PAGE 41 FOR GUIDANCE.
- P. THROUGHOUT THIS PROCEDURAL DRAWING, PORTIONS OF THE BLOCKING COMPONENTS AND OF THE DEPICTED CARS, SUCH AS A CAR SIDE WALL, HAVE BEEN OMITTED FROM THE LOAD VIEW FOR CLARITY PURPOSES.
- Q. THE NUMBER OF LADING UNITS MAY BE ADJUSTED TO FIT THE SIZE OF THE BOX CAR BEING LOADED OR THE QUANTITY TO BE SHIPPED, HOWEVER, THE APPROVED METHODS SPECIFIED HEREIN MUST BE FOLLOWED AS CLOSELY AS POSSIBLE FOR BLOCKING, BRACING, AND STAYING OF THE UNITS. **NOTICE:** A SHIPMENT WILL BE POSITIONED IN THE RAIL CAR IN COMPLIANCE WITH THE WEIGHT DISTRIBUTION REQUIREMENTS OF THE AAR.

## GENERAL NOTES

(FOR CONVENTIONAL TYPE BOX CARS)

- R. IF THE CAR BEING USED FOR A SHIPMENT IS EQUIPPED WITH A NAILABLE METAL FLOOR AND A NAIL SIZE FOR FLOOR NAILING IS MARKED ON THE SIDEWALL OF THE CAR, THAT GUIDANCE SHOULD BE APPLIED TO THE NAILING OF THE "DOORWAY BLOCKING" PIECES IN THE FULL LOADS AND TO THE NAILING TO THE CAR FLOOR OF THE LCL BRACES AND KNEE BRACE ASSEMBLIES IN THE LESS-THAN-FULL LOADS. IF A NAIL SIZE IS NOT SPECIFIED IN THE CAR, 30d NAILS SHOULD BE USED IN LIEU OF THOSE SPECIFIED IN THE APPLICABLE KEY NUMBERS. SEE GENERAL NOTE "M" ABOVE.
- S. **NOTICE:** WHEN POSITIONING PALLET UNITS IN A CAR THEY SHOULD BE PLACED TIGHTLY AGAINST A CAR SIDEWALL AND ARE TO BE PRESSED TIGHTLY TOGETHER LENGTHWISE SO AS TO ACHIEVE A TIGHT LOAD. TO AID IN ACHIEVING TIGHTNESS LENGTHWISE IN A FULL LOAD, A LOAD-COMPRESSING JACK MAY BE EMPLOYED IN THE AREA OF THE CENTER GATES TO MOVE THE PALLET UNITS INTO THEIR FINAL SHIPPING POSITION. A HYDRAULIC JACK IS RECOMMENDED FOR THIS OPERATION. **CAUTION:** WHEN USING A JACK TO COMPACT A LOAD THE JACK MUST BE USED AGAINST STRONG POINTS OF THE PALLET UNITS, SUCH AS THE JOINTS BETWEEN THE LAYERS OF CONTAINERS ON THE UNIT. PADDING, OF 2-INCH (2") THICK LUMBER OR ANY OTHER MATERIAL OF SIMILAR CONSISTENCY, SHOULD BE PLACED BETWEEN THE JACK AND THE LADING.
- T. LOAD-BLOCKING STRUTS WHICH ARE 48" OR LONGER MUST BE STIFFENED BY THE APPLICATION OF HORIZONTAL AND VERTICAL STRUT BRACING AS SHOWN BY KEY NUMBERS (7) AND (8) ON PAGE 4. BRACING IS NOT REQUIRED IF THE STRUTS FOR THE LOAD BEING SHIPPED ARE SHORTER THAN 48". THE LENGTH OF THE LOAD-BLOCKING STRUTS SHOULD BE KEPT AS SHORT AS POSSIBLE (APPROX 18" MINIMUM), BUT IN THE EVENT IT IS NECESSARY TO USE STRUTS WHICH ARE 8'-0" OR MORE IN LENGTH, IT WILL BE NECESSARY TO APPLY AN ADDITIONAL SET OF HORIZONTAL AND VERTICAL STRUT BRACING PIECES. STRUT BRACING SHOULD BE APPLIED SO AS TO PROVIDE NEARLY EQUAL SPACES BETWEEN THE BRACING PIECES AND THE CENTER GATES AND/OR BETWEEN ADJACENT STRUT BRACING PIECES. NOTE THAT HORIZONTAL STRUT BRACING PIECES FOR THE UPPER LEVEL OF STRUTS FOR ALL BUT THE UPPERMOST TIER OF A LOAD MAY BE DIFFICULT TO APPLY TO THE TOP SURFACES OF THE STRUTS AS DEPICTED. STRUT BRACING WILL BE EQUALLY EFFECTIVE IF APPLIED TO THE UNDER SIDE OF THOSE STRUTS.

(CONTINUED ON PAGE 3)

(GENERAL NOTES CONTINUED)

- U. TO ACHIEVE A TIGHTLY BLOCKED LOAD, A STRUT WILL BE CUT SLIGHTLY LONGER THAN THE MEASURED DISTANCE BETWEEN THE STRUT BEARING AREAS ON THE TWO CENTER GATES. ONE END OF THE STRUT WILL BE POSITIONED AT ITS BEARING AREA JUST ABOVE THE STRUT LEDGER ON ONE GATE. THE OTHER END, WHICH CAN BE BEVELED ON THE LOWER CORNER IF DESIRED, WILL THEN BE DRIVEN DOWNWARD UNTIL IT CONTACTS THE STRUT LEDGER ON THE OTHER GATE. EACH END OF THE STRUT WILL BE TOENAILED TO THE ADJACENT CENTER GATE, AS SPECIFIED WITHIN THE KEY NUMBERS FOR A LOAD, IN SUCH A MANNER SO THAT AS NEARLY AS PRACTICAL EQUAL LENGTHS OF A NAIL ARE EMBEDDED IN THE STRUT AND IN THE VERTICAL PIECE OF THE CENTER GATE. SEE THE "BEVEL CUT" DETAIL ON PAGE 45 FOR BEVELING INSTRUCTIONS AND THE "STRUT INSTALLATION" DETAIL ON THAT PAGE FOR A PICTORIAL VIEW SHOWING THE PROPER POSITIONING OF A BEVELED STRUT FOR INSTALLATION. NOTE THAT THE UPPER CORNER NEEDS TO BE BEVELED ONLY IF THE STRUTS ARE VERY SHORT. IF ONLY ONE END IS BEVEL-CUT, THE BEVELED EDGE WILL BE PLACED IN THE DOWNWARD POSITION SO THAT IT WILL ALLOW THE STRUT END TO SLIDE MORE FREELY DOWN THE FACE OF THE VERTICAL PIECE ON THE ADJACENT CENTER GATE AS THE STRUT IS DRIVEN DOWN INTO ITS FINAL BLOCKING POSITION.
- V. WHERE 2" X 2" PIECES ARE SPECIFIED FOR STRUT LEDGERS, 2" X 4" MATERIAL MAY BE SUBSTITUTED IF DESIRED.
- W. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTIONS WHICH ARE IMMEDIATELY ADJACENT TO THE DEPICTED OUTLOADING METHODS.

**GENERAL NOTES**

(FOR BOX CARS EQUIPPED WITH MECHANICAL BRACING DEVICES)

- X. THE OUTLOADING PROCEDURES FOR BOX CARS EQUIPPED WITH MECHANICAL BRACING DEVICES MAY BE ADAPTED AS REQUIRED TO FACILITATE THE USE OF BOX CARS EQUIPPED WITH VARIOUS TYPES OF SELF-CONTAINED MECHANICAL BRACING DEVICES, HOWEVER, FIXED OR ADJUSTABLE WALL MEMBERS AND DOORWAY MEMBERS WITHIN THESE CARS MUST PROVIDE FOR THE INSTALLATION OF LOAD BLOCKING CROSS MEMBERS AT THE HEIGHTS SPECIFIED. **CAUTION:** BOX CARS EQUIPPED WITH MEMBERS WHICH DO NOT MEET THE LOCATION REQUIREMENTS MUST NOT BE USED.
  1. FOR BLOCKING THE LOAD WHICH IS DEPICTED, A CROSS MEMBER WILL NOT BE RELIED UPON TO RETAIN MORE LADING ON EITHER SIDE THAN AS SHOWN. VOIDS LENGTHWISE WITHIN THE LOAD MUST BE HELD TO A MINIMUM AND CROSS MEMBERS MUST BE PLACED AGAINST THE LADING AS TIGHTLY AS THE SPACING OF THE LOCKING HOLES IN THE WALL MEMBERS PERMIT. LOCKING BARS (LEVER JACKS) SHOULD BE USED FOR THIS PURPOSE. AN ADDITIONAL 1/2" OF ADJUSTMENT CAN BE MADE BY TURNING A CROSS MEMBER END-FOR-END WHEN LOCKING PINS ON THE MEMBER ARE OFF-CENTER. **NOTE:** IT IS RECOMMENDED THAT EACH CROSS MEMBER BE INSTALLED WITH THE ENDS ATTACHED AS NEARLY AS POSSIBLE IN "MATED" POSITIONS (AT EQUAL HEIGHTS AND AT EQUAL DISTANCES FROM THE END OF THE CAR).
  2. **CAUTION:** ALL BLOCKING AND BRACING COMPONENTS IN EMPTY CARS AND ALL UNUSED COMPONENTS IN LOADED CARS MUST BE "SECURED" FOR SHIPMENT - ADJUSTABLE WALL MEMBERS TO VERTICAL WALL ATTACHMENT RAILS, AND CROSS MEMBERS TO ADJUSTABLE WALL MEMBERS OR TO FIXED HORIZONTAL WALL MEMBERS OR TO DOORWAY MEMBERS, AND DOORWAY MEMBERS TO DOOR POSTS. COMPONENTS ASSIGNED TO EACH CAR MUST REMAIN THEREWITH EVEN THOUGH UNUSED DURING SOME SHIPMENTS.
- Y. IN A CAR EQUIPPED WITH ADJUSTABLE WALL MEMBERS, PROVIDING THE FIXED WALL MEMBERS WHICH ARE PRESENT IN SOME "ADJUSTABLE" CARS ARE NOT PROPERLY POSITIONED TO PROVIDE SIDE BEARING SURFACES BETWEEN THE UNITS AND THE CAR SIDEWALLS, ADJUSTABLE WALL MEMBERS (AS REQUIRED) MUST BE INSTALLED TO PROVIDE A MINIMUM OF ONE SURFACE AREA FOR SIDE BEARING AT SOME LOCATION WITHIN THE UPPER HALF OF EACH UNIT.
- Z. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTION WHICH IS IMMEDIATELY ADJACENT TO THE DEPICTED OUTLOADING METHOD.

**GENERAL NOTES**

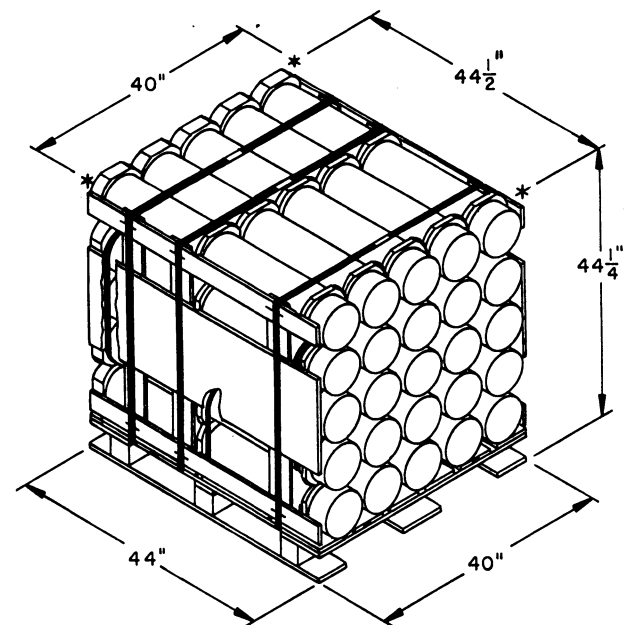
(FOR CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS)

- AA. **CAUTION:** FOR CUSHIONED BOX CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS, ONLY CARS EQUIPPED WITH LOAD DIVIDERS MANUFACTURED BY EVANS, EQUIPCO, OR PRECO MAY BE USED. LOAD DIVIDERS MANUFACTURED BY TRANSCO ARE NOT ACCEPTABLE, WHETHER OF ALUMINUM OR STEEL CONSTRUCTION. THE DEPICTED PROCEDURES ARE APPLICABLE FOR CARS OF VARIOUS LENGTHS AND WIDTHS. THE AAR MECHANICAL DESIGNATION CLASS FOR THESE CARS, AS IDENTIFIED IN "THE OFFICIAL RAILWAY EQUIPMENT REGISTER", WILL BE RBL, XL, OR XLI.
- BB. THE USE OF LOAD DIVIDER EQUIPPED CARS WILL ELIMINATE THE NEED FOR CENTER GATES AND STRUTS, AND GATE HOLD DOWNS (WHEN APPLICABLE) WHICH ARE REQUIRED IN CONVENTIONAL BOX CAR LOADS. THIS WILL ACCOUNT FOR A CONSIDERABLE SAVING IN MATERIAL AND LABOR COSTS. THEREFORE, EVERY EFFORT SHOULD BE MADE TO ACQUIRE CUSHIONED CARS EQUIPPED WITH LOAD DIVIDERS FOR SHIPMENT OF COMPLETE ROUNDS. **NOTICE:** ONLY CUSHIONED CARS THAT HAVE SLIDING CENTER SILL TYPE CUSHIONING DEVICES OR END-OF-CAR TYPE DEVICES WHICH HAVE AT LEAST FIFTEEN INCHES (15") OF TRAVEL ARE ACCEPTABLE.
- CC. IF NAILING TO A CAR SIDEWALL IS NOT REQUIRED, BOX CARS EQUIPPED WITH ADJUSTABLE SIDE FILLERS THAT HAVE 3/8" OR THICKER PANELS MAY BE USED, HOWEVER, THESE SIDE FILLERS MUST NOT BE USED FOR LATERAL BLOCKING; THEY MUST BE RETRACTED AND LOCKED AGAINST THE CAR SIDEWALL. A "FILL PIECE" MUST BE INSTALLED IN THE VOID BETWEEN THE CAR SIDEWALL AND THE SIDE FILLER PANEL. SEE THE "TYPICAL TYPE A" VIEW ON PAGE 51 FOR GUIDANCE. IF THE BACK OF THE SIDE FILLER PANELS ARE REINFORCED WITH VERTICAL AND HORIZONTAL STEEL MEMBERS AS SHOWN IN THE "TYPICAL TYPE B" VIEW ON PAGE 51, THE "FILL PIECE" MATERIAL IS NOT REQUIRED.

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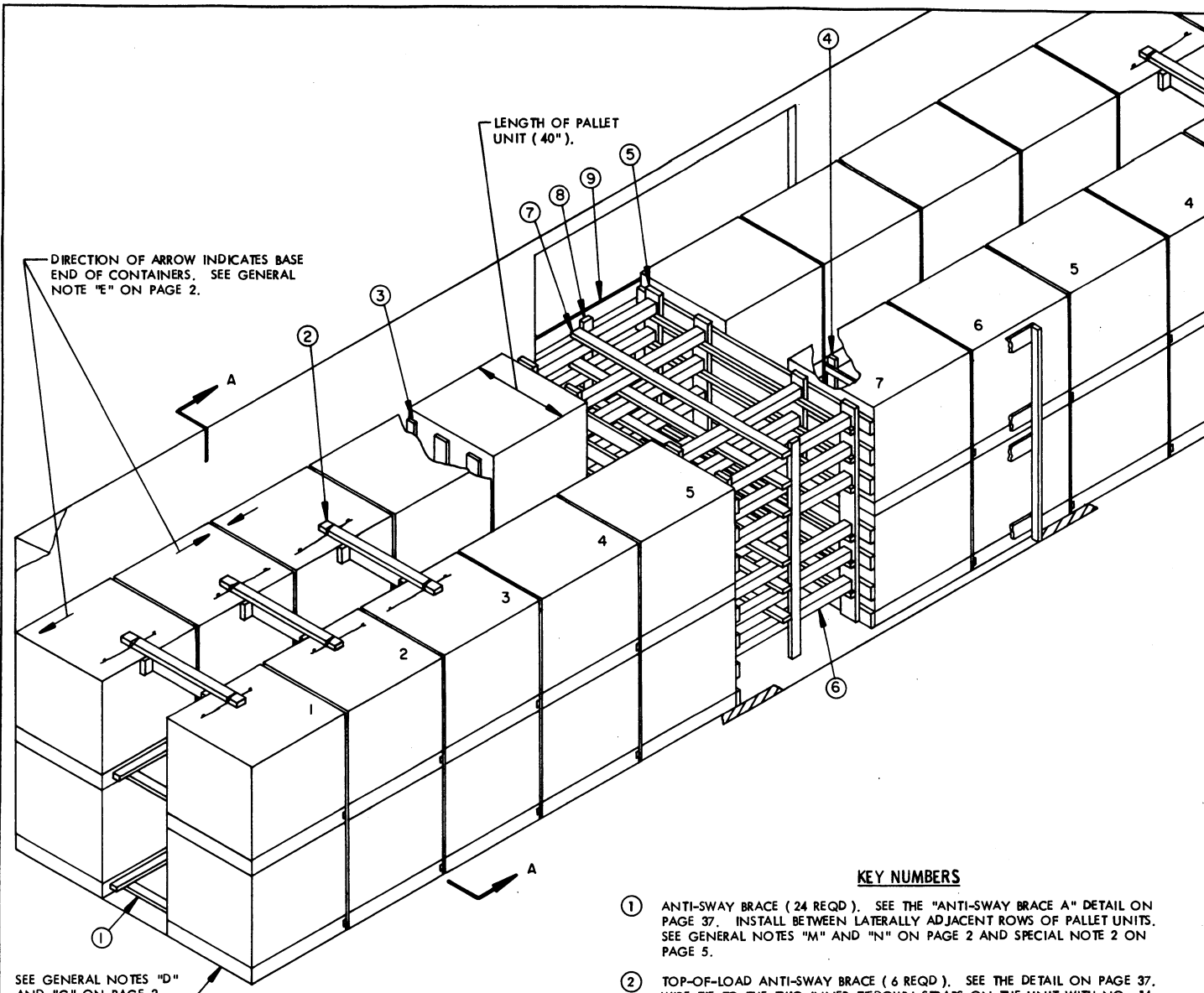
(GENERAL NOTES CONTINUED)

- DD. **NOTICE:** AFTER THE LOAD DIVIDER BULKHEADS ARE POSITIONED AGAINST THE LADING, AND THE LOCKING PINS ARE ENGAGED IN THE HOLES OF THE RAILS, THE LOWER LOCKING PINS MUST BE INSPECTED TO ENSURE THAT THE PINS ARE FULLY ENGAGED IN THE LOCKING HOLES. IF THE PINS ARE NOT FULLY SEATED IN THE LOCKING HOLES, THE LINKAGE MECHANISM WILL BE ADJUSTED AS REQUIRED SO THAT THE PINS WILL BE FULLY SEATED INTO THE LOCKING HOLES OF THE LOWER RAILS, IF PRESENT, DEBRIS MUST BE REMOVED FROM BENEATH THE LOCKING HOLES WHICH HAVE BEEN SELECTED FOR SECURING A LOAD DIVIDER BULKHEAD.
- EE. A "STRUT ASSEMBLY" MUST BE INSTALLED BETWEEN THE LOAD DIVIDER BULKHEADS IF THE CAR CONTAINS CLASS A OR CLASS B EXPLOSIVES AND THE LOAD IN EITHER END OF THE CAR WEIGHS 50,000 POUNDS OR MORE. A STRUT ASSEMBLY IS NOT REQUIRED FOR LOADS OF CLASS C EXPLOSIVES, NOTE THAT THE STRUT ASSEMBLY MAY BE OMITTED FROM LOADS OF CLASS A OR B EXPLOSIVES WEIGHING 50,000 POUNDS WHEN THE LADING AND ADEQUATE BLOCKING AND BRACING ARE POSITIONED TO COMPLETELY FILL THE SPACE BETWEEN THE INSTALLED BULKHEADS AS SPECIFIED IN GENERAL NOTE "FF-3" BELOW. DETAILS OF STRUT ASSEMBLIES FOR USE BETWEEN 2-PIECE BULKHEADS AND BETWEEN 1-PIECE BULKHEADS ARE SHOWN ON PAGE 50.
- FF. THE NORMAL LOADING PATTERN IN CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS IS TO POSITION THE LADING BETWEEN A CAR END WALL AND A LOAD DIVIDER BULKHEAD IN FULL LAYERS. OBVIOUSLY, A LOAD QUANTITY MUST THEN BE A MULTIPLE OF THE NUMBER OF PALLET UNITS WHICH ARE IN ONE LOAD UNIT, A LOAD UNIT IS DEFINED AS A STACK OF CONTAINERS WHICH IS FULL CAR WIDTH BY FULL LOAD HEIGHT BY ONE UNIT IN LENGTH. IF THE QUANTITY TO BE SHIPPED CANNOT BE ATTAINED BY ADJUSTING THE NUMBER OF TIERS IN ONE OR BOTH ENDS OF A CAR, OR BY ADJUSTING THE NUMBER OF LOAD UNITS IN EITHER END OF THE CAR, ONE OF THE FOLLOWING PROCEDURES MUST BE USED IN ORDER TO OBTAIN THE DESIRED QUANTITY.
  1. ONE OR MORE RISERS CAN BE POSITIONED WITHIN A LOAD TO INCREASE A LOAD QUANTITY. SEE THE RISER PROCEDURES AND DETAILS ON PAGES 20 AND 21.
  2. THE "GATES AND STRUTS" METHOD OF OMITTING A PALLET UNIT MAY BE USED TO ADJUST A LOAD QUANTITY DOWNWARD BY OTHER THAN A MULTIPLE OF A LOAD UNIT. SEE THE PROCEDURES ON PAGES 17 AND 18 FOR GUIDANCE.
  3. AT LOCATION (S) WHERE K-BRACES MIGHT NORMALLY BE USED IN A LOAD IN A CONVENTIONAL CAR, LOAD DIVIDER BULKHEADS CAN BE POSITIONED. LOADING CAN THEN CONTINUE TOWARD THE CENTER OF THE CAR FROM EACH INSTALLED LOAD DIVIDER BULKHEAD IN A ONE-HIGH LOADING PATTERN. INSTALL CENTER GATES AND STRUTS AS SHOWN ON PAGE 4, 6, OR 8, OF THE CONVENTIONAL BOX CAR DRAWING HEREIN TO PROVIDE FOR A TIGHT LOAD BETWEEN THE BULKHEADS.
  4. ONE OR MORE UNITS CAN BE POSITIONED IN CONTACT WITH A LOAD DIVIDER BULKHEAD ON THE CENTER-OF-CAR SIDE. BLOCK AND BRACE WITH LCL BRACES AS SHOWN ON PAGE 32 OR WITH KNEE BRACE ASSEMBLIES, AS SHOWN ON PAGE 28.
- GG. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTION WHICH IS IMMEDIATELY ADJACENT TO THE DEPICTED OUTLOADING METHOD.



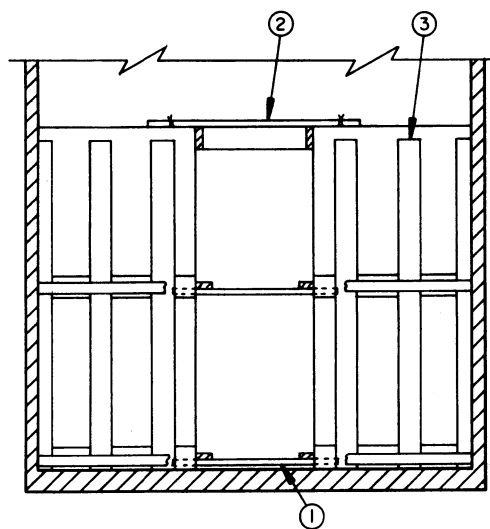
**PALLET UNIT**

CONTAINER-----25 EACH @ 75 LBS (APPROX)  
 CUBE-----45.6 CUBIC FEET (APPROX)  
 GROSS WEIGHT-----1,999 LBS (APPROX)



SEE GENERAL NOTES "D" AND "G" ON PAGE 2.

**ISOMETRIC VIEW**



**SECTION A-A**

**CONTAINER LENGTHWISE  
48-UNIT LOAD IN A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR**

**KEY NUMBERS**

- ① ANTI-SWAY BRACE ( 24 REQD ). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 37. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF PALLET UNITS. SEE GENERAL NOTES "M" AND "N" ON PAGE 2 AND SPECIAL NOTE 2 ON PAGE 5.
- ② TOP-OF-LOAD ANTI-SWAY BRACE ( 6 REQD ). SEE THE DETAIL ON PAGE 37. WIRE TIE TO THE TWO INNER TEDOWN STRAPS ON THE UNIT WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON PAGE 43. SEE SPECIAL NOTE 3 ON PAGE 5.
- ③ SEPARATOR GATE ( 10 REQD ). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 38. POSITION WITH HORIZONTAL PIECES AGAINST THE ALREADY-LOADED UNITS. SEE SPECIAL NOTES 4 THRU 7 ON PAGE 5.
- ④ STOP PIECES, 1" X 4" X 50" ( 2 REQD ). INSTALL ON THE SIDE OPPOSITE THE VERTICAL PIECES OF THE SEPARATOR GATE, PIECE MARKED ③, WHICH IS IN THE DOORWAY AREA. POSITION IN CONTACT WITH THE ADJACENT PALLET UNITS AND NAIL TO THE HORIZONTAL PIECES W/3-6d NAILS AT EACH JOINT AND CLINCH. SEE SPECIAL NOTE 5 ON PAGE 5.
- ⑤ CENTER GATE ( 2 REQD ). SEE THE "CENTER GATE A" DETAIL ON PAGE 37. SEE SPECIAL NOTES 8 THRU 10 ON PAGE 5.
- ⑥ STRUT, 4" X 4" BY CUT TO FIT ( REF: 58-1/2" ) ( 24 REQD ). TOENAIL TO PIECES MARKED ⑤ W/2-16d NAILS AT EACH END. SEE GENERAL NOTES "L" AND "T" ON PAGE 2 AND GENERAL NOTE "U" ON PAGE 3 AND SPECIAL NOTE 11 ON PAGE 5.
- ⑦ HORIZONTAL STRUT BRACING, 2" X 4" X 8'-6" ( 6 REQD ). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑧ VERTICAL STRUT BRACING, 2" X 4" X 7'-3" ( 4 REQD ). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑨ DOORWAY PROTECTION ( 2 REQD ). SEE THE "DOORWAY PROTECTION A" DETAIL ON PAGE 39. NAIL TO THE DOOR POSTS W/12d NAILS. SEE SPECIAL NOTE 12 ON PAGE 5.

( SPECIAL NOTES CONTINUED )

12. DOORWAY PROTECTION IS REQUIRED FOR ALL PALLET UNIT STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK WIDTH. THE WOODEN GATE TYPE OF DOORWAY PROTECTION, SHOWN AS PIECES MARKED ③ IN THE LOAD ON PAGE 4, IS APPLICABLE FOR BOX CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NAILABLE DOOR POSTS. REFER TO PAGES 47 THRU 49 FOR ALTERNATIVE DOORWAY PROTECTION FOR CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS. IF THE CAR BEING LOADED IS EQUIPPED WITH PLUG TYPE DOORS OR COMBINATION PLUG AND SLIDING DOORS, NAILED FLOORLINE BLOCKING AND LOAD BUNDLING STRAPS MUST BE USED. SEE THE "ALTERNATIVE DOORWAY PROTECTION E" DETAIL ON PAGE 49 FOR GUIDANCE. NOTE THAT NAILED FLOORLINE BLOCKING AND LOAD BUNDLING STRAPS MAY ALSO BE USED IN CARS EQUIPPED WITH SLIDING DOORS.
13. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED. A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF FOUR (4) UNITS, OR A 1-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF TWO (2) UNITS BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD. NOTE THAT ADDITIONAL STRUT BRACING WILL BE REQUIRED WHEN A LOAD UNIT IS OMITTED. OR, THE ENTIRE TOP TIER CAN BE OMITTED. FOR OTHER METHODS OF REDUCING A LOAD, AND FOR TYPICAL LCL PROCEDURES, REFER TO PAGES 15 THRU 32 FOR GUIDANCE.
14. IF PALLET UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF CONTAINERS ARE TO BE TRANSPORTED, REFER TO PAGE 33 FOR SHIPPING GUIDANCE.
15. FOR SHIPMENT OF ONE OR MORE LEFTOVER CONTAINERS, SEE THE "PROCEDURES FOR SHIPMENT OF LEFTOVER CONTAINERS" ON PAGE 36 FOR GUIDANCE.
16. THE CENTER GATES AND STRUTS SHOWN FOR A LOAD IN A 50'-6" LONG CAR ARE ALSO ADEQUATE FOR A FULL LOAD IN A 60' CAR. A 60-UNIT LOAD, FOR AN APPROXIMATE LADING WEIGHT OF 119,940 POUNDS, CAN BE LOADED IN A 60'-8" LONG CAR HAVING A LOAD LIMIT OF AT LEAST 130,000 POUNDS. FORTY (40) PALLET UNITS, FOR AN APPROXIMATE LADING WEIGHT OF 79,960 POUNDS, CAN BE LOADED IN AN OFFSET PATTERN IN A CAR HAVING A LOAD LIMIT OF AT LEAST 87,200 POUNDS.

SPECIAL NOTES:

1. A 50'-6" LONG BY 9'-2" WIDE WOOD-LINED CONVENTIONAL TYPE BOX CAR EQUIPPED WITH 10'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER OR NARROWER DOOR OPENINGS CAN BE USED. SEE GENERAL NOTE "D" ON PAGE 2.
2. IF THE "ALTERNATIVE DOORWAY PROTECTION E" PROCEDURES AS SHOWN ON PAGE 49 ARE USED IN LIEU OF THE WOODEN DOOR GATE TYPE PROTECTION, PIECE MARKED ③, NAILED FLOORLINE BLOCKING MUST BE USED IN LIEU OF EACH LOWER ANTI-SWAY BRACE IN THE DOORWAY AREA. NAILED BLOCKING IS REQUIRED FOR ALL PALLET STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK WIDTH ON EITHER SIDE OF THE CAR.
3. TOP-OF-LOAD ANTI-SWAY BRACES, SHOWN AS PIECES MARKED ② IN THE LOAD ON PAGE 4, MUST BE INSTALLED IN EACH END OF THE CAR AND WIRE TIED TO THE TWO INNER PALLET UNIT TIEDOWN STRAPS WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON PAGE 43. THREE (3) BRACES ARE REQUIRED IN EACH END OF A LOAD IN A 50'-6" OR 40'-6" LONG CAR; FOUR (4) REQUIRED IN 60'-8" LONG CAR.
4. TO FACILITATE POSITIONING OF THE PALLET UNITS AS LOADING PROGRESSES, POSITION PALLET UNIT STACKS AGAINST THE END WALL, THEN POSITION A SEPARATOR GATE, SHOWN AS PIECE MARKED ③, SO THE 1" X 3" TIE PIECES ARE LOCATED UNDER THE "OVERHANG" OF THE PALLET UNITS. REPEAT THIS PROCEDURE FOR THE REMAINING STACKS.
5. THE SEPARATOR GATES IN THE DOORWAY AREA MUST BE PREVENTED FROM SHIFTING INTO A DOOR OPENING BY THE APPLICATION OF STOP PIECES, AS SHOWN ON THE "SEPARATOR GATE A" DETAIL ON PAGE 38. IN CARS EQUIPPED WITH STAGGERED DOORS, STOP PIECES MAY BE REQUIRED ON UP TO FOUR SEPARATOR GATES. SEE SPECIAL NOTE 6.
6. WHEN NAILED FLOORLINE BLOCKING IS USED FOR DOORWAY PROTECTION, THE SEPARATOR GATES ADJACENT TO THE NAILED BLOCKING MUST BE MODIFIED. SEE THE "SEPARATOR GATE C" AND "SEPARATOR GATE D" DETAILS ON PAGE 19. THE USE OF A MODIFIED GATE WILL ALLOW THE SEPARATOR GATE TO CLEAR THE NAILED FLOORLINE BLOCKING DURING THE NORMAL SHIFTING OF THE LOAD.
7. SEPARATOR GATES MAY BE FORMED FROM 3/8" OR THICKER PLYWOOD IN LIEU OF DIMENSIONAL LUMBER, IF DESIRED. SEE THE "ALTERNATIVE SEPARATOR GATE" DETAIL ON PAGE 43 FOR CONSTRUCTION GUIDANCE.
8. CENTER GATE "A" MAY BE PARTIALLY FORMED FROM 1/2" OR THICKER PLYWOOD IF DESIRED. PLYWOOD MAY BE USED IN LIEU OF THE 2" X 6" HORIZONTAL PIECES. SEE THE "PLYWOOD CENTER GATE ALTERNATIVE" DETAIL ON PAGE 44 FOR GUIDANCE.
9. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED AS AN ALTERNATIVE TO THE CAR-WIDTH GATES. IN LIEU OF EACH "CENTER GATE A", SHOWN AS PIECE MARKED ⑤ IN THE LOAD ON PAGE 4, INSTALL TWO (2) "CENTER GATES C" AS SHOWN ON PAGE 40. AFTER THE SPLIT GATES AND STRUTS HAVE BEEN INSTALLED, THE SPLIT GATES MUST BE TIED TOGETHER AS DEPICTED BY THE "TIE PIECE APPLICATION" DETAIL ON PAGE 44.
10. DOOR SPANNER TYPE GATE HOLD DOWN MAY BE USED IN LIEU OF THE DOUBLED 2" X 4" MATERIAL NAILED TO CENTER GATE "A", PROVIDING THE CAR BEING LOADED HAS NAILABLE SIDEWALLS. SEE THE "ALTERNATIVE GATE HOLD-DOWN" AND "CENTER GATE "A" MODIFICATION" DETAIL ON PAGE 46 FOR GUIDANCE.
11. AN OFFSET LOADING PATTERN IS SHOWN ON PAGE 4. IF SIX (6) LOAD UNITS ARE PLACED IN EACH END OF THE CAR, ONLY SIXTEEN (16) STRUTS WILL BE REQUIRED. OMIT THE CENTER STRUTS FOR EACH LAYER. NOTE THAT A CAR TO BE USED FOR SHIPMENT OF THE DEPICTED 48-UNIT OFFSET LOAD MUST HAVE A LOAD LIMIT OF AT LEAST 99,300 POUNDS.

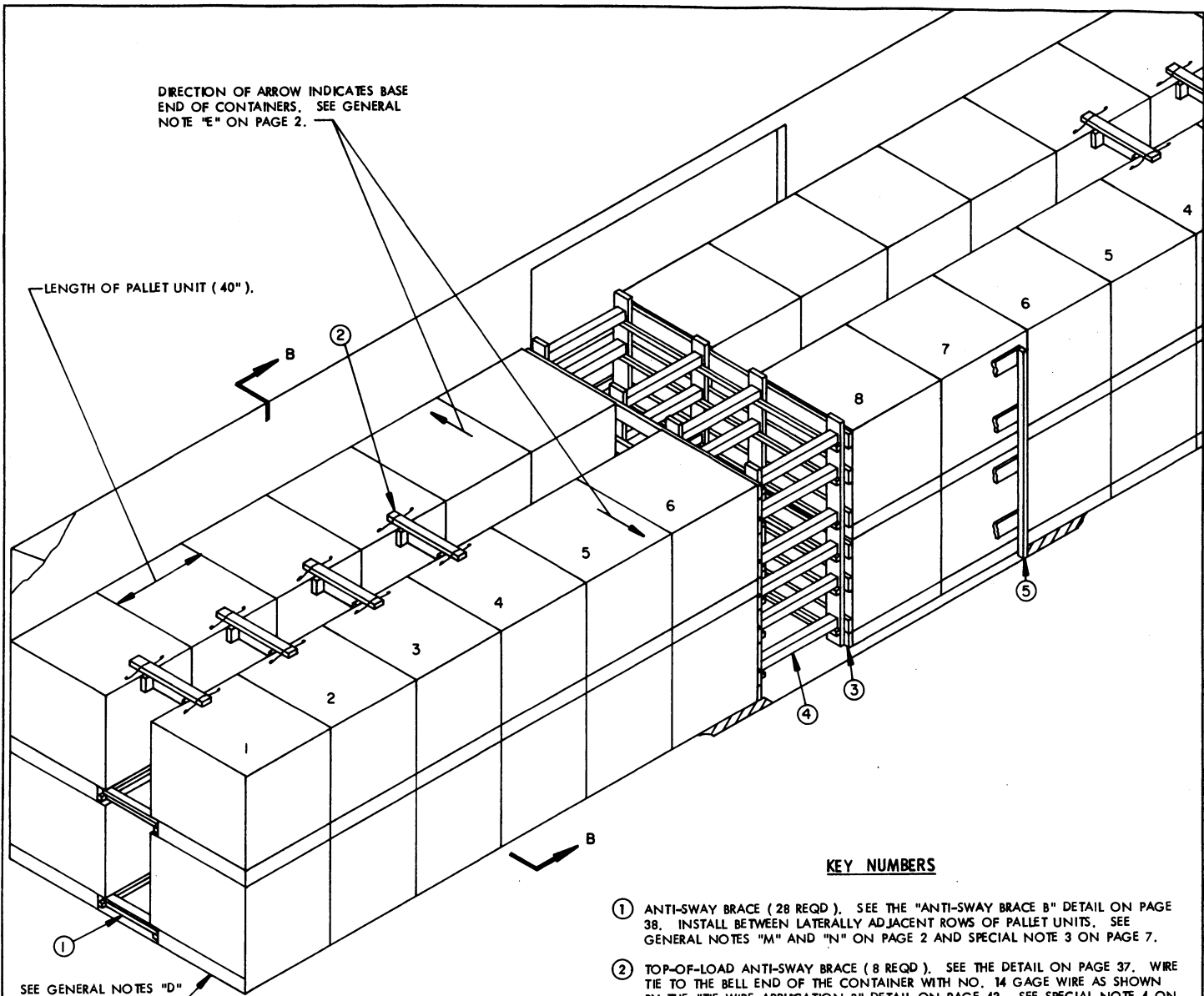
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BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 3"	183	46
1" X 4"	149	50
1" X 6"	360	180
2" X 2"	102	34
2" X 3"	29	15
2" X 4"	422	282
2" X 6"	203	203
4" X 4"	117	156
NAILS	NO. REQD	POUNDS
6d (2")	420	2-1/2
10d (3")	712	11
12d (3-1/4")	112	2
16d (3-1/2")	96	2-1/4
WIRE, NO. 14 GAGE-----	48' REQD-----	3/4 LB

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT ( APPROX )
PALLET UNIT -----	48-----	95,952 LBS
DUNNAGE-----		1,949 LBS
TOTAL WEIGHT-----		97,901 LBS ( APPROX )

CONTAINERS LENGTHWISE  
48-UNIT LOAD IN A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR



DIRECTION OF ARROW INDICATES BASE END OF CONTAINERS. SEE GENERAL NOTE "E" ON PAGE 2.

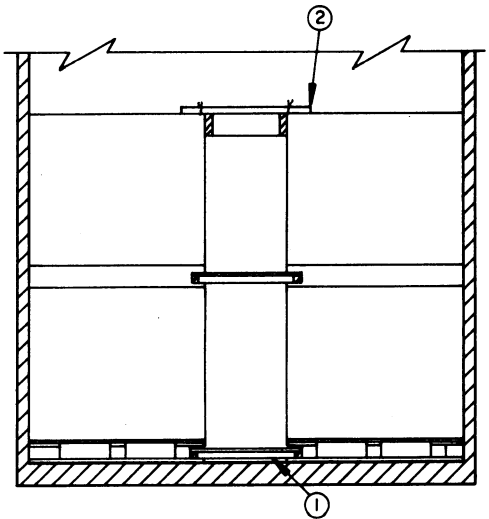
LENGTH OF PALLET UNIT (40").

SEE GENERAL NOTES "D" AND "G" ON PAGE 2.

**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① ANTI-SWAY BRACE (28 REQD). SEE THE "ANTI-SWAY BRACE B" DETAIL ON PAGE 38. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF PALLET UNITS. SEE GENERAL NOTES "M" AND "N" ON PAGE 2 AND SPECIAL NOTE 3 ON PAGE 7.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (8 REQD). SEE THE DETAIL ON PAGE 37. WIRE TIE TO THE BELL END OF THE CONTAINER WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION B" DETAIL ON PAGE 43. SEE SPECIAL NOTE 4 ON PAGE 7.
- ③ CENTER GATE (2 REQD). SEE THE "CENTER GATE B" DETAIL ON PAGE 38. SEE SPECIAL NOTES 5 THRU 7 ON PAGE 7.
- ④ STRUT, 4" X 4" BY CUT TO FIT (REF: 40") (24 REQD). TOENAIL TO PIECES MARKED ③ W/2-16# NAILS AT EACH END. SEE GENERAL NOTES "L" AND "T" ON PAGE 2 AND GENERAL NOTE "U" ON PAGE 3. SEE SPECIAL NOTE 13 ON PAGE 7.
- ⑤ DOORWAY PROTECTION (2 REQD). SEE THE "DOORWAY PROTECTION B" DETAIL ON PAGE 39. NAIL TO THE DOOR POSTS W/12# NAILS. SEE SPECIAL NOTE 8 ON PAGE 7.



**SECTION B-B**

CONTAINERS CROSSWISE  
56-UNIT LOAD IN A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR

**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-2" WIDE WOOD-LINED CONVENTIONAL TYPE BOX CAR EQUIPPED WITH 10'-0" WIDE DOOR OPENINGS IS SHOWN. WIDER CARS OF OTHER LENGTHS AND CARS HAVING WIDER OR NARROWER DOOR OPENINGS CAN BE USED. SEE GENERAL NOTE "D" ON PAGE 2.
2. IF A 60'-8" LONG CAR IS FURNISHED FOR LOADING, A MAXIMUM OF SIXTY-EIGHT (68) PALLET UNITS CAN BE LOADED FOR A LADING WEIGHT OF APPROXIMATELY 134,000 POUNDS. THE LOADING PROCEDURES SPECIFIED FOR A 50'-6" LONG CAR WILL APPLY EXCEPT THAT FIVE (5) TOP-OF-LOAD ANTI-SWAY BRACES, PIECES MARKED ②, WILL BE REQUIRED IN EACH END OF THE LOAD. IF A 40'-6" LONG CAR IS USED, ONLY FOUR (4) STRUTS PER LAYER WILL BE REQUIRED. A MAXIMUM OF FORTY-FOUR (44) PALLET UNITS, FOR A LADING WEIGHT OF APPROXIMATELY 88,000 POUNDS, CAN BE LOADED IN A 40'-6" LONG CAR. SEE SPECIAL NOTE 12.
3. IF THE CAR BEING LOADED IS EQUIPPED WITH PLUG TYPE DOORS, OR IF THE DOORWAY PROTECTION PROCEDURES AS SHOWN IN THE LOAD ON PAGE 12 ARE TO BE USED IN A CAR EQUIPPED WITH CONVENTIONAL SLIDING DOORS, NAILED FLOORLINE BLOCKING MUST BE USED IN LIEU OF EACH LOWER ANTI-SWAY BRACE IN THE DOORWAY AREA. NAILED BLOCKING IS REQUIRED FOR ALL PALLET STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK LENGTH ON EITHER SIDE OF THE CAR.
4. TOP-OF-LOAD ANTI-SWAY BRACES, SHOWN AS PIECES MARKED ② IN THE LOAD ON PAGE 6, MUST BE INSTALLED IN EACH END OF THE CAR AND WIRE TIED TO THE BELL END OF THE CONTAINER WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION B" DETAIL ON PAGE 43, FOUR (4) BRACES ARE REQUIRED IN EACH END OF A LOAD IN A 50'-6" OR A 40'-6" LONG CAR; FIVE (5) ARE REQUIRED IN A 60'-8" LONG CAR.
5. CENTER GATE "B" MAY BE PARTIALLY FORMED FROM 1/2" OR THICKER PLYWOOD, IF DESIRED. PLYWOOD MAY BE USED IN LIEU OF THE 2" X 6" HORIZONTAL PIECES. SEE THE "PLYWOOD CENTER GATE ALTERNATIVE" DETAIL ON PAGE 44 FOR GUIDANCE.
6. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED AS AN ALTERNATIVE TO THE CAR-WIDTH GATES. IN LIEU OF EACH "CENTER GATE B", SHOWN AS MARKED ③, IN THE LOAD ON PAGE 6, INSTALL TWO (2) "CENTER GATES D" AS SHOWN ON PAGE 40. AFTER THE SPLIT GATES AND STRUTS HAVE BEEN INSTALLED, THE SPLIT GATES MUST BE TIED TOGETHER AS DEPICTED BY THE "TIE PIECE APPLICATION" DETAIL ON PAGE 44.
7. DOOR SPANNER TYPE GATE HOLD DOWN MAY BE USED IN LIEU OF THE DOUBLED 2" X 3" HOLD DOWNS ON CENTER GATE "B", PROVIDING THE CAR BEING LOADED HAS NAILABLE SIDEWALLS. SEE THE DETAILS ON PAGE 46 FOR GUIDANCE.
8. DOORWAY PROTECTION IS REQUIRED FOR ALL PALLET UNIT STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK LENGTH. THE WOODEN GATE TYPE OF DOORWAY PROTECTION SHOWN AS PIECES MARKED ⑤ IN THE LOAD ON PAGE 6 IS APPLICABLE FOR BOX CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NAILABLE DOOR POSTS. REFER TO PAGES 47 THRU 49 FOR ALTERNATIVE DOORWAY PROTECTION FOR CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS. IF THE CAR BEING LOADED IS EQUIPPED WITH PLUG TYPE DOORS OR COMBINATION PLUG AND SLIDING DOORS, NAILED FLOORLINE BLOCKING AND LOAD BUNDLING STRAPS MUST BE USED. SEE PIECES MARKED ③, ④, AND ⑥ IN THE LOAD ON PAGE 12 FOR GUIDANCE.
9. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED. A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF FOUR (4) UNITS, OR A 1-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF TWO (2) UNITS BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD. NOTE THAT HORIZONTAL AND VERTICAL STRUT BRACING WILL BE REQUIRED WHEN OMITTING A LOAD UNIT. THE HORIZONTAL BRACING PIECES WILL BE CAR WIDTH MINUS 1/2" IN LENGTH AND THE VERTICAL PIECES WILL BE 8'-6" LONG. SEE PIECES MARKED ⑦ AND ⑧ ON PAGE 4 FOR A TYPICAL INSTALLATION. OR, THE ENTIRE TOP TIER CAN BE OMITTED. FOR OTHER METHODS OF REDUCING A LOAD, AND FOR TYPICAL LCL PROCEDURES, REFER TO PAGES 15 THRU 32 FOR GUIDANCE.
10. IF PALLET UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF CONTAINERS ARE TO BE TRANSPORTED, REFER TO PAGES 34 AND 35 FOR SHIPPING GUIDANCE.
11. FOR SHIPMENT OF ONE OR MORE LEFTOVER CONTAINERS, SEE THE "PROCEDURES FOR SHIPMENT OF LEFTOVER CONTAINERS" ON PAGE 36 FOR GUIDANCE.
12. A CAR HAVING A LOAD LIMIT OF AT LEAST 114,100 POUNDS IS REQUIRED FOR THE DEPICTED 56-UNIT LOAD WHEN LOADED IN AN OFFSET LOADING PATTERN. A 68-UNIT LOAD IN A 60'-8" LONG CAR WILL REQUIRE A LOAD LIMIT OF AT LEAST 137,400 POUNDS. A 44-UNIT LOAD IN A 40'-6" LONG CAR WILL REQUIRE A LOAD LIMIT OF 89,600 POUNDS OR GREATER.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	132	44
1" X 6"	80	40
2" X 2"	297	99
2" X 3"	35	18
2" X 4"	140	94
2" X 6"	208	208
4" X 4"	80	107
NAILS	NO. REQD	POUNDS
6d (2")	440	2-3/4
10d (3")	504	8
12d (3-1/4")	140	2-1/2
16d (3-1/2")	96	2-1/4
WIRE, NO. 14 GAGE-----48' REQD-----3/4 LB		

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT ( APPROX )
PALLET UNIT-----	56-----	111,944 LBS
DUNNAGE-----	-----	1,237 LBS
TOTAL WEIGHT-----		113,181 LBS

**CONTAINERS CROSSWISE  
56-UNIT LOAD IN A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR**

**CAR EQUIPMENT REQUIRED**

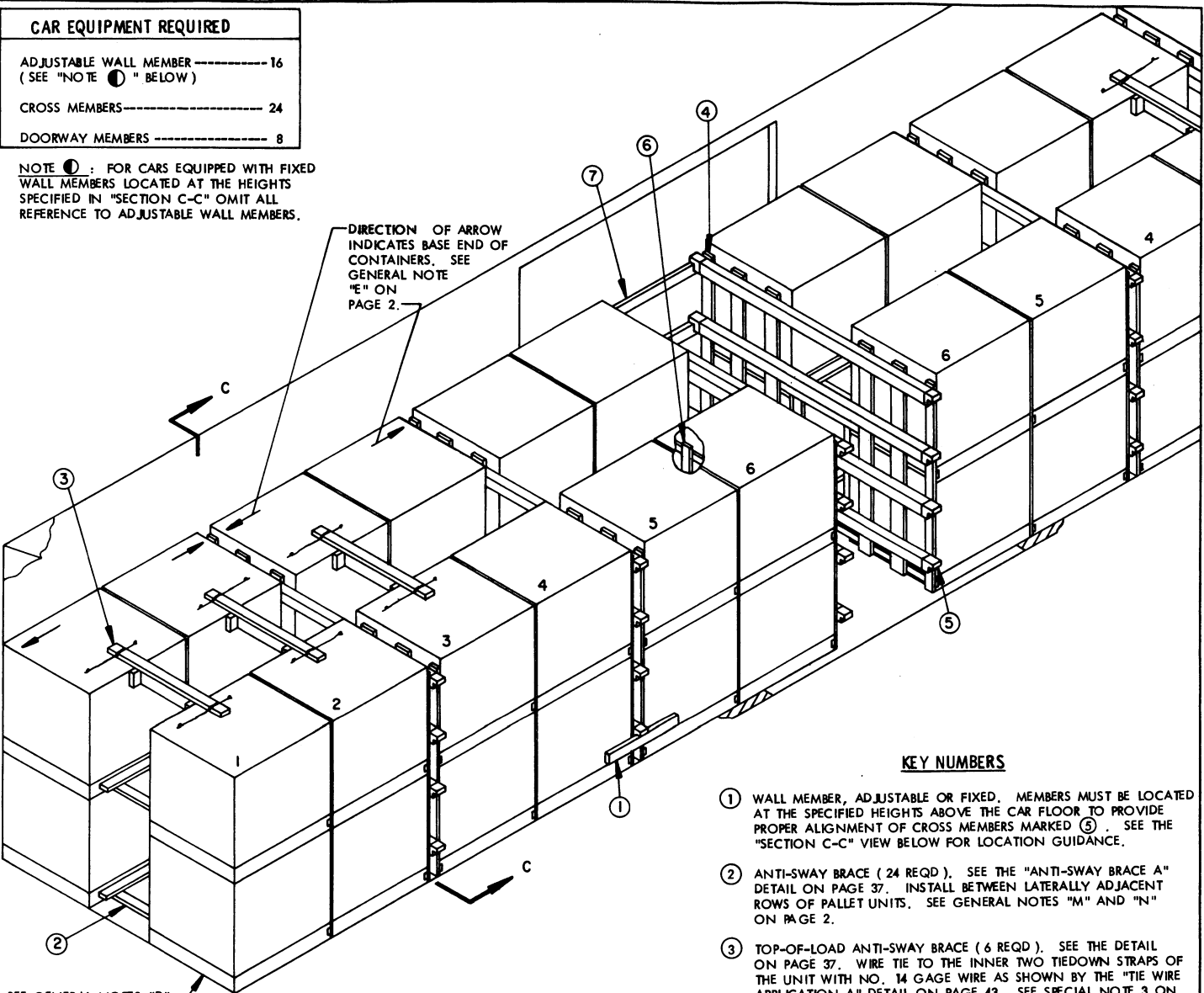
ADJUSTABLE WALL MEMBER ----- 16  
(SEE "NOTE 1" BELOW)

CROSS MEMBERS ----- 24

DOORWAY MEMBERS ----- 8

NOTE 1: FOR CARS EQUIPPED WITH FIXED WALL MEMBERS LOCATED AT THE HEIGHTS SPECIFIED IN "SECTION C-C" OMIT ALL REFERENCE TO ADJUSTABLE WALL MEMBERS.

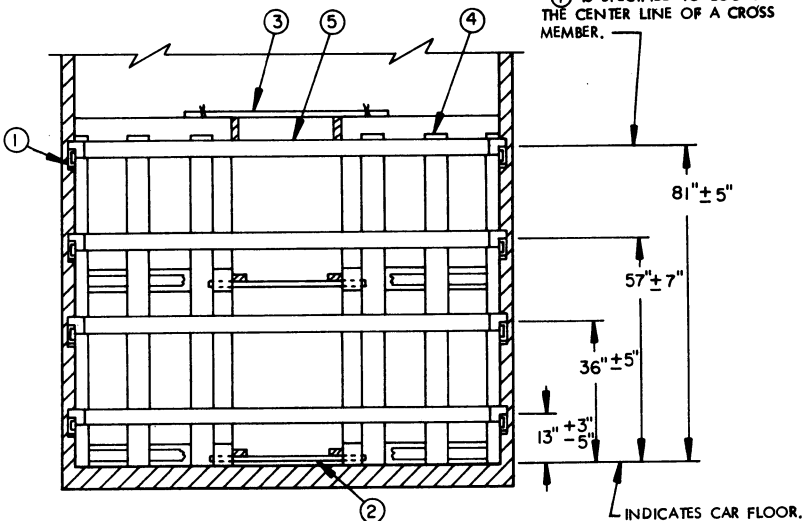
DIRECTION OF ARROW INDICATES BASE END OF CONTAINERS. SEE GENERAL NOTE "E" ON PAGE 2.



SEE GENERAL NOTES "D" AND "G" ON PAGE 2 AND SPECIAL NOTE 2 ON PAGE 11.

**ISOMETRIC VIEW**

EACH DIMENSIONED HEIGHT ABOVE THE CAR FLOOR TO AN ADJUSTABLE OR FIXED WALL MEMBER MARKED 1 AND/OR A DOORWAY MEMBER MARKED 7 IS SPECIFIED TO LOCATE THE CENTER LINE OF A CROSS MEMBER.



**SECTION C-C**

INDICATES CAR FLOOR.

**KEY NUMBERS**

- 1 WALL MEMBER, ADJUSTABLE OR FIXED. MEMBERS MUST BE LOCATED AT THE SPECIFIED HEIGHTS ABOVE THE CAR FLOOR TO PROVIDE PROPER ALIGNMENT OF CROSS MEMBERS MARKED 3. SEE THE "SECTION C-C" VIEW BELOW FOR LOCATION GUIDANCE.
- 2 ANTI-SWAY BRACE (24 REQD). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 37. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF PALLET UNITS. SEE GENERAL NOTES "M" AND "N" ON PAGE 2.
- 3 TOP-OF-LOAD ANTI-SWAY BRACE (6 REQD). SEE THE DETAIL ON PAGE 37. WIRE TIE TO THE INNER TWO TIEDOWN STRAPS OF THE UNIT WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON PAGE 43. SEE SPECIAL NOTE 3 ON PAGE 9.
- 4 SEPARATOR GATE (16 REQD). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 38. AS APPLICABLE, POSITION WITH THE HORIZONTAL PIECES AGAINST THE ALREADY-LOADED UNITS. SEE SPECIAL NOTES 4 AND 6 ON PAGE 9.
- 5 CROSS MEMBER (24 REQD). SEE GENERAL NOTE "X" ON PAGE 3.
- 6 STOP PIECE, 1" X 4" X 50" (4 REQD). INSTALL ON THE SIDE OPPOSITE THE VERTICAL PIECES OF THE SEPARATOR GATE, PIECE MARKED 4, WHICH IS IN THE DOORWAY AREA. POSITION IN CONTACT WITH THE ADJACENT PALLET UNITS AND NAIL TO THE HORIZONTAL PIECES W/3-6d NAILS AT EACH JOINT AND CLINCH. SEE SPECIAL NOTE 5 ON PAGE 9.
- 7 DOORWAY MEMBER (8 REQD). SEE THE "SECTION C-C" VIEW AT LEFT FOR LOCATION GUIDANCE.

CONTAINERS LENGTHWISE

48-UNIT LOAD IN A 50'-6" LONG BY 9'-0" WIDE BOX CAR EQUIPPED WITH MECHANICAL BRACING DEVICES



**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-0" WIDE ( INSIDE CLEARANCE ) WOOD-LINED BOX CAR EQUIPPED WITH ADJUSTABLE AND/OR FIXED WALL MEMBERS, AND WITH 10'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER OR NARROWER DOOR OPENINGS CAN BE USED. SEE GENERAL NOTE "D" ON PAGE 2.
2. IF A CAR HAS BOWED END WALLS WHICH ARE BOWED OUTWARD TWO INCHES ( 2" ) OR MORE EITHER FROM SIDE-TO-SIDE OR FROM FLOOR-TO-ROOF, CROSS MEMBERS CAN BE INSTALLED NEAR THE END WALL OF THE CAR TO PROVIDE A "SQUARED END" RATHER THAN INSTALLING DUNNAGE AS SPECIFIED IN GENERAL NOTE "G" ON PAGE 2. THESE CROSS MEMBERS SHOULD BE INSTALLED AT THE SAME HEIGHTS AS THE CROSS MEMBERS USED THROUGHOUT THE LOAD AS BLOCKING MEMBERS. A SEPARATOR GATE, SHOWN AS PIECE MARKED (4), MUST BE POSITIONED AGAINST THESE CROSS MEMBERS PRIOR TO LOADING.
3. TOP-OF-LOAD ANTI-SWAY BRACES, SHOWN AS PIECES MARKED (3), IN THE LOAD ON PAGE 8, MUST BE INSTALLED IN EACH END OF THE CAR AND WIRE TIED TO THE TWO INNER PALLET UNIT TIEDOWN STRAPS WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON PAGE 43. THREE ( 3 ) BRACES ARE REQUIRED IN EACH END OF A LOAD WHEN USING A 40'-6" OR 50'-6" LONG CAR; FOUR ( 4 ) ARE REQUIRED IN EACH END IF LOADING A 60'-8" LONG CAR.
4. TO FACILITATE POSITIONING OF THE PALLET UNITS AS LOADING PROGRESSES, POSITION PALLET UNIT STACKS AGAINST THE END WALL, THEN POSITION A SEPARATOR GATE, SHOWN AS PIECE MARKED (4), SO THE 1" X 3" TIE PIECES ARE LOCATED UNDER THE "OVERHANG" OF THE PALLET UNITS. REPEAT THIS PROCEDURE FOR THE REMAINING STACKS.
5. THE SEPARATOR GATES IN THE DOORWAY AREA MUST BE PREVENTED FROM SHIFTING INTO A DOOR OPENING BY THE APPLICATION OF STOP PIECES, AS SHOWN ON THE "SEPARATOR GATE A" DETAIL ON PAGE 38. IN CARS EQUIPPED WITH STAGGERED DOORS, STOP PIECES MAY BE REQUIRED ON UP TO FOUR SEPARATOR GATES.
6. SEPARATOR GATES MAY BE FORMED FROM 3/8" OR THICKER PLYWOOD IN LIEU OF DIMENSIONAL LUMBER, IF DESIRED. SEE THE "ALTERNATIVE SEPARATOR GATE" DETAIL ON PAGE 43 FOR CONSTRUCTION GUIDANCE.
7. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED. A LOAD MAY BE REDUCED BY MULTIPLES OF TWO ( 2 ) PALLET UNITS BY OMITTING LATERALLY ADJACENT UNITS FROM THE TOP ONE OR TWO LAYERS OF ONE OR MORE LOAD UNITS, OR BY MULTIPLES OF FOUR ( 4 ) PALLET UNITS BY OMITTING ONE OR MORE ENTIRE LOAD UNITS. TO REDUCE A LOAD BY ONE ( 1 ) PALLET UNIT, REFER TO THE LCL PROCEDURES ON PAGES 10 AND 11 FOR GUIDANCE.
8. FOR SHIPMENT OF ONE OR MORE LEFTOVER CONTAINERS, SEE THE "PROCEDURES FOR SHIPMENT OF LEFTOVER CONTAINERS" ON PAGE 36 FOR GUIDANCE.
9. SIXTY ( 60 ) PALLET UNITS, FOR AN APPROXIMATE LADING WEIGHT OF 119,940 POUNDS, CAN BE LOADED IN A 60'-8" LONG CAR USING THE DEPICTED PROCEDURES. THIRTY-SIX ( 36 ) PALLET UNITS, FOR AN APPROXIMATE LADING WEIGHT OF 71,964 POUNDS, CAN BE PLACED IN A 40'-6" LONG CAR. NOTE THAT A 1-LONG LOAD UNIT MUST BE PLACED IN END OF THE CAR IN ORDER TO OBTAIN A FULL LOAD IN A 40'-6" CAR.

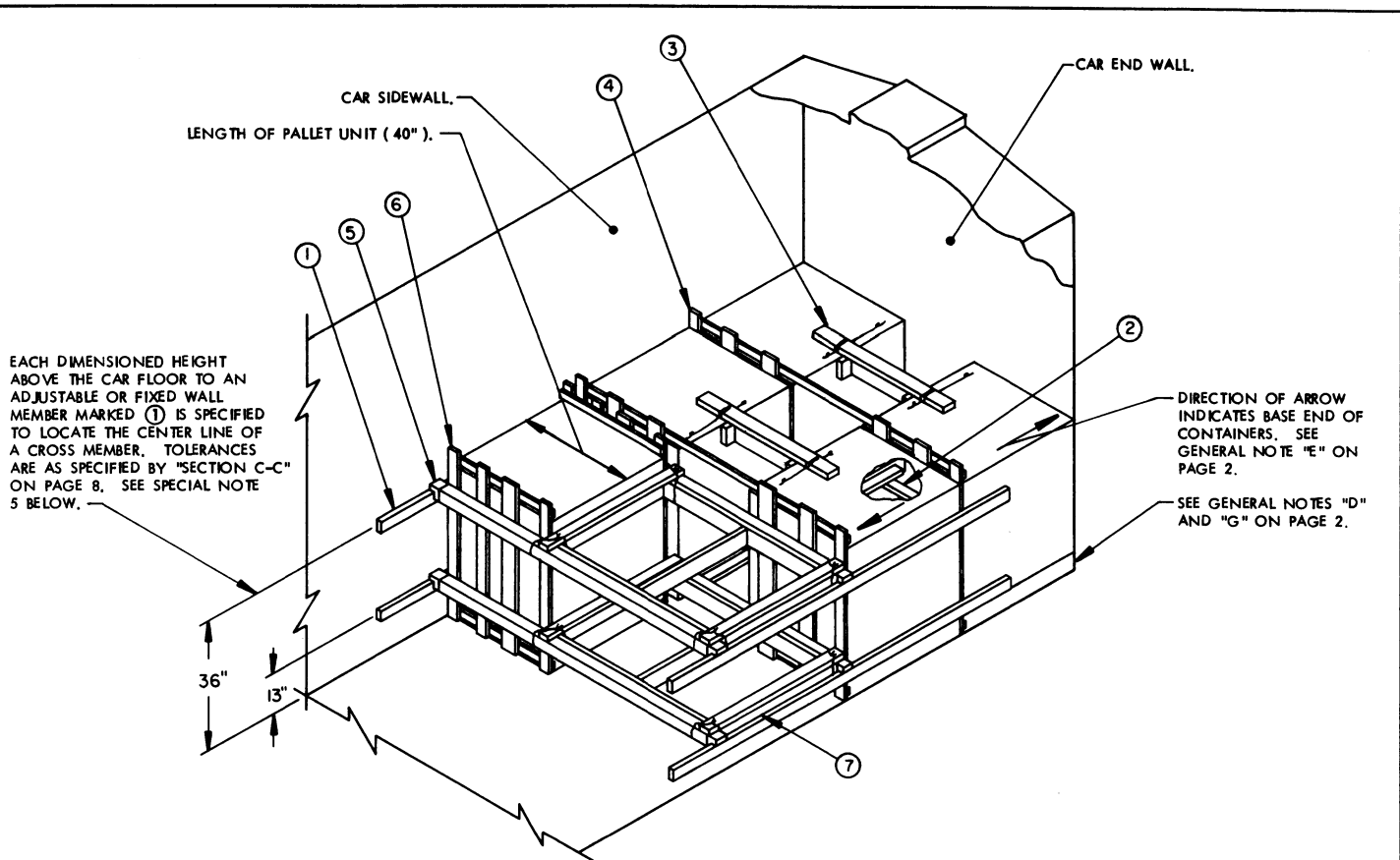
**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
1" X 3"	287	72
1" X 4"	241	81
1" X 6"	448	224
2" X 4"	327	218
2" X 6"	21	21
NAILS	NO. REQD	POUNDS
6d ( 2" )	588	3-1/2
10d ( 3" )	288	4-1/2
12d ( 3-1/4" )	84	1-1/2
WIRE, NO. 14 GAGE-----48' REQD-----3/4 LB		

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT ( APPROX )
PALLET UNIT-----	48-----	95,952 LBS
DUNNAGE-----	-----	1,243 LBS
TOTAL WEIGHT-----		97,195 LBS ( APPROX )

CONTAINERS LENGTHWISE  
48-UNIT LOAD IN A 50'-6" LONG BY 9'-0" WIDE BOX CAR EQUIPPED WITH MECHANICAL BRACING DEVICES



EACH DIMENSIONED HEIGHT ABOVE THE CAR FLOOR TO AN ADJUSTABLE OR FIXED WALL MEMBER MARKED ① IS SPECIFIED TO LOCATE THE CENTER LINE OF A CROSS MEMBER. TOLERANCES ARE AS SPECIFIED BY "SECTION C-C" ON PAGE 8. SEE SPECIAL NOTE 5 BELOW.

DIRECTION OF ARROW INDICATES BASE END OF CONTAINERS. SEE GENERAL NOTE "E" ON PAGE 2.

SEE GENERAL NOTES "D" AND "G" ON PAGE 2.

**ISOMETRIC VIEW**

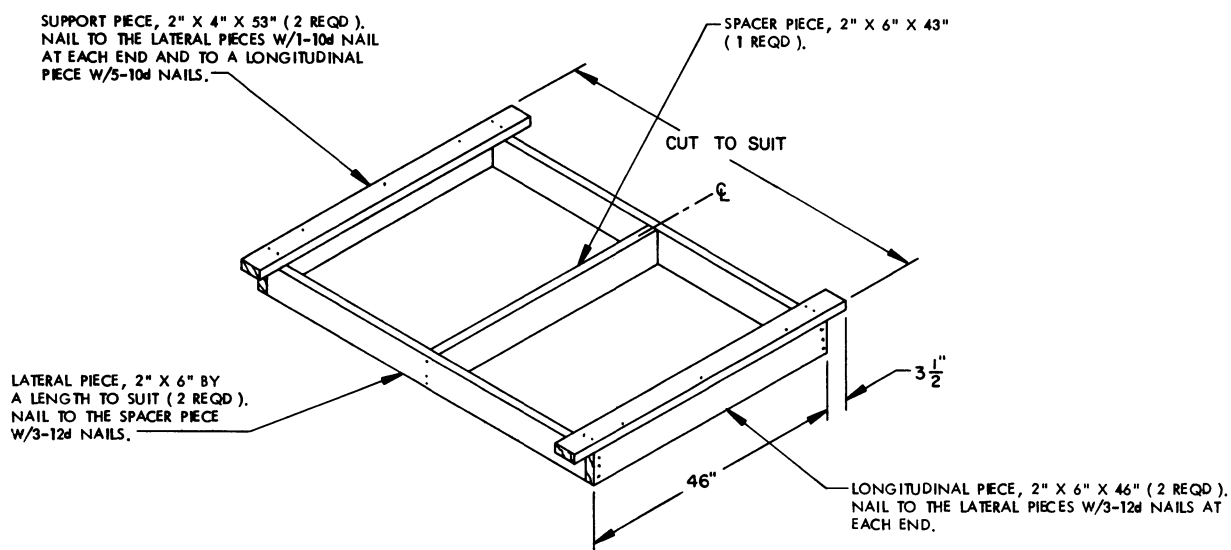
**KEY NUMBERS**

**SPECIAL NOTES:**

1. A 9'-0" WIDE (INSIDE CLEARANCE) WOOD-LINED BOX CAR EQUIPPED WITH ADJUSTABLE AND/OR FIXED WALL MEMBERS IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED. SEE GENERAL NOTE "D" ON PAGE 2.
2. FIVE (5) UNITS ARE SHOWN AS A TYPICAL LOAD QUANTITY. THE NUMBER OF UNITS CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED.
3. TOP-OF-LOAD ANTI-SWAY BRACES, SHOWN AS PIECES MARKED ③, MUST BE INSTALLED IN EACH END OF THE CAR AND WIRE TIED TO A UNIT WITH NO. 14 GAGE WIRE. THREE (3) BRACES ARE REQUIRED IN EACH END OF A LOAD WHEN USING A 40'-6" OR A 50'-6" LONG CAR; FOUR (4) BRACES ARE REQUIRED IF LOADING A 60'-8" LONG CAR.
4. SEPARATOR GATES MAY BE FORMED FROM 3/8" OR THICKER PLYWOOD IN LIEU OF DIMENSIONAL LUMBER, IF DESIRED. CONSTRUCT EACH GATE TO BE CAR WIDTH MINUS 1/2" IN LENGTH; FOR THE HEIGHT OF THE GATE, 48" WIDE PLYWOOD WILL BE ADEQUATE.
5. THE SPACER ASSEMBLIES, SHOWN AS PIECES MARKED ⑦, MAY ALSO BE USED IN AN UPPER LAYER OF A LOAD FOR THE OMISSION OF A PALLET UNIT. IF THE ASSEMBLIES ARE USED NEXT TO THE CAR END WALL IN EITHER A FIRST LAYER OR IN AN UPPER LAYER, AND THE END WALL IS WOOD-LINED, CUT THE ADJACENT ENDS OFF THE SUPPORT PIECES FLUSH WITH THE LATERAL PIECE. EACH ASSEMBLY CAN THEN BE SUPPORTED BY NAILING THE LATERAL PIECE TO THE CAR END WALL W/6-10d NAILS. IF THE END WALL IS NON-NAILABLE, CROSS MEMBERS MUST BE INSTALLED AT THE END OF THE LOAD TO SUPPORT THE SPACER ASSEMBLIES.

- ① WALL MEMBER, ADJUSTABLE OR FIXED. MEMBERS MUST BE LOCATED AT THE SPECIFIED HEIGHTS ABOVE THE CAR FLOOR TO PROVIDE PROPER ALIGNMENT OF CROSS MEMBERS MARKED ⑤. SEE SPECIAL NOTE 5 AT LEFT.
- ② ANTI-SWAY BRACE (2 REQD). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 37. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF PALLET UNITS. SEE GENERAL NOTES "M" AND "N" ON PAGE 2.
- ③ TOP-OF-LOAD ANTI-SWAY BRACE (2 REQD). SEE THE DETAIL ON PAGE 37. WIRE TIE TO THE INNER TWO TIEDOWN STRAPS OF THE UNIT WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON PAGE 43. SEE SPECIAL NOTE 3 AT LEFT.
- ④ SEPARATOR GATE FOR 1-HIGH BY 2-WIDE (2 REQD). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 38. POSITION AS SHOWN WITH THE HORIZONTAL PIECES AGAINST THE ALREADY-LOADED UNITS. SEE SPECIAL NOTE 4 AT LEFT.
- ⑤ CROSS MEMBER (4 REQD). SEE GENERAL NOTE "X" ON PAGE 3.
- ⑥ SEPARATOR GATE FOR 1-HIGH BY 1-WIDE (2 REQD). SEE THE "SEPARATOR GATE B" DETAIL ON PAGE 39.
- ⑦ SPACER ASSEMBLY (2 REQD). SEE THE "SPACER ASSEMBLY A" DETAIL ON PAGE 11 AND SPECIAL NOTE 5 AT LEFT. WIRE TIE TO CROSS MEMBERS W/2 WRAPS OF NO. 14 GAGE WIRE AT EACH CORNER.

TYPICAL LCL (5-UNIT LOAD) IN A BOX CAR EQUIPPED WITH MECHANICAL BRACING DEVICES HAVING ADJUSTABLE AND/OR FIXED WALL MEMBERS

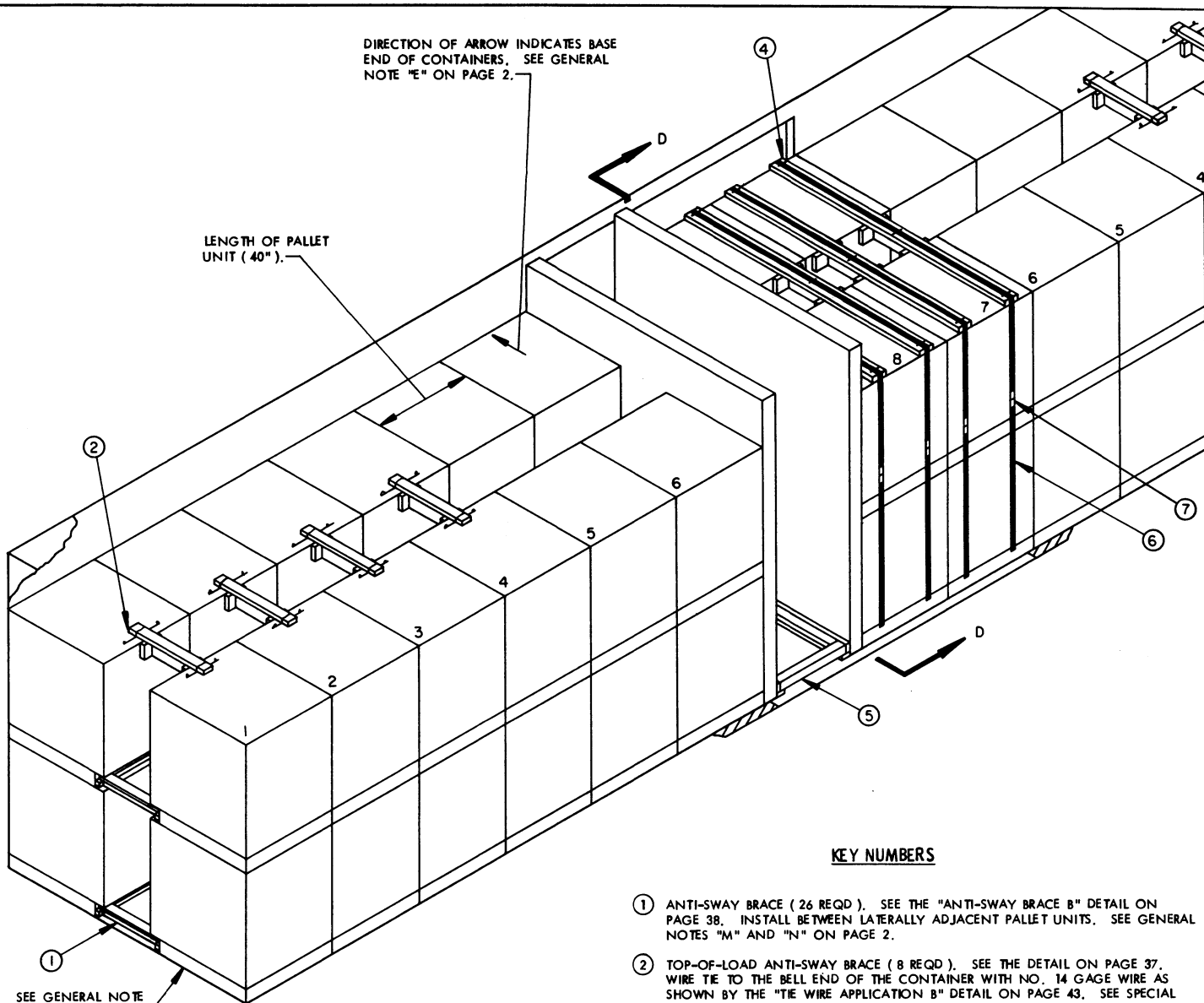


SPACER ASSEMBLY A

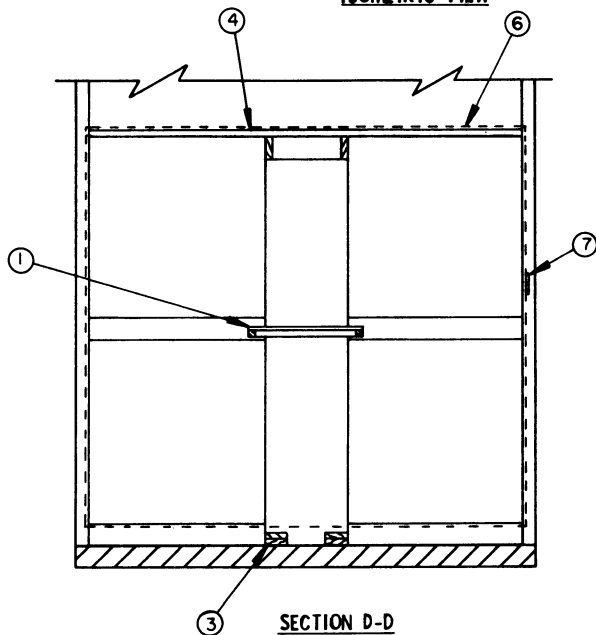
TYPICAL LCL ( 5-UNIT LOAD ) IN A BOX CAR EQUIPPED WITH  
 MECHANICAL BRACING DEVICES HAVING ADJUSTABLE AND/OR FIXED WALL MEMBERS

DIRECTION OF ARROW INDICATES BASE END OF CONTAINERS. SEE GENERAL NOTE "E" ON PAGE 2.

LENGTH OF PALLET UNIT (40").



**ISOMETRIC VIEW**



**SECTION D-D**

**KEY NUMBERS**

- ① ANTI-SWAY BRACE (26 REQD). SEE THE "ANTI-SWAY BRACE B" DETAIL ON PAGE 38. INSTALL BETWEEN LATERALLY ADJACENT PALLET UNITS. SEE GENERAL NOTES "M" AND "N" ON PAGE 2.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (8 REQD). SEE THE DETAIL ON PAGE 37. WIRE TIE TO THE BELL END OF THE CONTAINER WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION B" DETAIL ON PAGE 43. SEE SPECIAL NOTE 2 ON PAGE 13.
- ③ DOORWAY BLOCKING, 2" X 6" X 40" (DOUBLED) (4 REQD). POSITION AGAINST THE PALLET UNITS IN THE DOORWAY AREA AS SHOWN IN THE "SECTION D-D" VIEW BELOW. NAIL THE FIRST PIECE TO THE CAR FLOOR W/5-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE SPECIAL NOTE 3 ON PAGE 13.
- ④ SPACER ASSEMBLY (4 REQD). SEE THE "SPACER ASSEMBLY B" DETAIL ON PAGE 39.
- ⑤ STRUT ASSEMBLY (1 REQD). SEE THE "STRUT ASSEMBLY FOR 1-PIECE BULKHEADS" DETAIL ON PAGE 50. INSTALL BETWEEN THE LOAD DIVIDER BULKHEADS. SEE SPECIAL NOTE 4 ON PAGE 13.
- ⑥ BUNDLING STRAP, 1-1/4" X .035" OR .031" X 34'-0" LONG STEEL STRAPPING (4 REQD). INSTALL TO ENCIRCLE THE PALLET UNIT STACKS AND SPACER IN THE DOORWAY AREA. STAPLE TO THE SPACER W/3 STAPLES. SEE SPECIAL NOTES 3 AND 9 ON PAGE 13.
- ⑦ SEAL FOR 1-1/4" STRAPPING (8 REQD). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "O" ON PAGE 2.

**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-2" WIDE WOOD-LINED CUSHIONED BOX CAR EQUIPPED WITH LOAD DIVIDER BULKHEADS AND WITH 10'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING NARROWER OR WIDER DOOR OPENINGS CAN BE USED. SEE GENERAL NOTES "AA" THRU "EE" ON PAGE 3.
2. TOP-OF-LOAD ANTI-SWAY BRACES, SHOWN AS PIECES MARKED ② IN THE LOAD ON PAGE 12, MUST BE INSTALLED IN EACH END OF THE CAR AND WIRE TIED TO THE BELL END OF A CONTAINER WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION B" DETAIL ON PAGE 43. FOUR (4) BRACES ARE REQUIRED IN EACH END OF A LOAD WHEN USING A 40'-6" OR A 50'-6" LONG CAR; FIVE (5) BRACES ARE REQUIRED WHEN LOADING 60'-8" LONG CARS.
3. DOORWAY PROTECTION IS REQUIRED FOR ALL PALLET UNIT STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK LENGTH. THE DEPICTED DOORWAY PROTECTION IS APPLICABLE FOR CARS EQUIPPED WITH EITHER SLIDING TYPE OR PLUG TYPE DOORS, OR A COMBINATION THEREOF. IF THE CAR BEING LOADED IS EQUIPPED WITH SLIDING TYPE DOORS, WOODEN DOOR GATES, SHOWN AS PIECE MARKED ⑤ ON PAGE 6, OR ANY OF THE ALTERNATIVES ON PAGES 47 THRU 49, MAY BE USED.
4. A STRUT ASSEMBLY, SHOWN AS PIECE MARKED ⑤ IN THE LOAD ON PAGE 12, IS REQUIRED BETWEEN THE LOAD DIVIDER BULKHEADS WHEN THE LOAD IN EITHER END OF THE CAR IS 50,000 POUNDS OR MORE. FOR THE DEPICTED PALLET UNIT, A STRUT ASSEMBLY WILL BE REQUIRED IF THE LOAD IN ONE END OF THE CAR CONSISTS OF MORE THAN SIX (6) LOAD UNITS.
5. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED. A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF FOUR (4) PALLET UNITS OR A 1-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF TWO (2) UNITS BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD. OR, THE ENTIRE TOP TIER CAN BE OMITTED. FOR OTHER METHODS OF REDUCING A LOAD, AND FOR TYPICAL LCL PROCEDURES, REFER TO PAGES 17 THRU 32 FOR GUIDANCE.
6. IF PALLET UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF CONTAINERS ARE TO BE TRANSPORTED, REFER TO PAGES 33 AND 35 FOR SHIPPING GUIDANCE.
7. FOR SHIPMENT OF ONE OR MORE LEFTOVER CONTAINERS, SEE THE "PROCEDURES FOR SHIPMENT OF LEFTOVER CONTAINERS" ON PAGE 36 FOR GUIDANCE.
8. A MAXIMUM OF SIXTY-EIGHT (68) PALLET UNITS, FOR AN APPROXIMATE LADING WEIGHT OF APPROXIMATELY 135,932 POUNDS, CAN BE LOADED IN A 60'-8" LONG CAR USING THE DEPICTED PROCEDURES, IF THE LOAD LIMIT OF THE CAR PERMITS. A MAXIMUM OF FORTY-FOUR (44) UNITS, FOR AN APPROXIMATE LADING WEIGHT OF 88,000 POUNDS, CAN BE PLACED IN A 40'-6" LONG CAR. A 68-UNIT LOAD IN A 60'-8" CAR WILL REQUIRE A LOAD LIMIT OF AT LEAST 137,400 POUNDS AND A 44-UNIT LOAD IN A 40'-6" CAR WILL REQUIRE A LOAD LIMIT OF 89,600 POUNDS OR GREATER.
9. FOR DOORWAY PROTECTION, TWO (2) BUNDLING STRAPS ARE REQUIRED FOR EACH PALLET STACK AND/OR LOAD UNIT WHICH IS COMPLETELY WITHIN THE DOORWAY AREA OR WHICH IS NOT RETAINED BY AT LEAST SIX INCHES (6") OF CAR SIDEWALL ON BOTH SIDES OF THE CAR. ONE (1) BUNDLING STRAP IS REQUIRED FOR EACH PALLET STACK AND/OR LOAD UNIT WHICH IS RETAINED BY FROM 6" TO ONE-HALF THE PALLET/LOAD UNIT LENGTH.

**BILL OF MATERIAL**

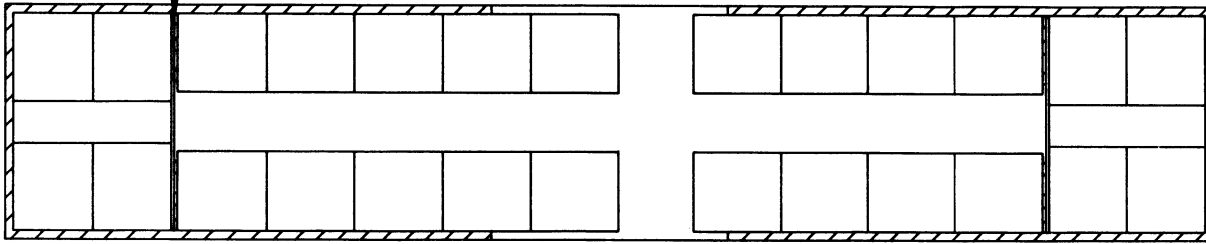
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	123	41
1" X 8"	17	12
2" X 2"	174	58
2" X 4"	168	112
2" X 6"	89	89
4" X 4"	11	15
NAILS	NO. REQD	POUNDS
6d (2")	382	2-1/4
10d (3")	226	3-1/2
12d (3-1/4")	184	3-1/4
16d (3-1/2")	40	1
STEEL STRAPPING, 1-1/4" X .031" OR .035" ---- 136' REQD ---- 20 LBS		
SEAL FOR 1-1/4" STRAPPING ----- 8 REQD ----- NIL		
STAPLES FOR 1-1/4" STRAPPING ----- 12 REQD ----- NIL		
WIRE, NO. 14 GAGE ----- 48' REQD ----- 3/4 LB		

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	56	111,944 LBS
DUNNAGE		685 LBS
TOTAL WEIGHT		112,629 LBS (APPROX)

**CONTAINERS CROSSWISE  
56-UNIT LOAD IN A 50'-6" LONG BY 9'-2" WIDE BOX CAR EQUIPPED WITH LOAD DIVIDER BULKHEADS**

SEPARATOR GATE ( 1 OR 2 REQD AS APPLICABLE ).  
SEE THE "SEPARATOR GATE C" DETAIL BELOW.  
POSITION AS SHOWN WITH THE VERTICAL PIECES  
AGAINST THE ENDS OF THE CONTAINERS ON THE  
PALLET UNIT.

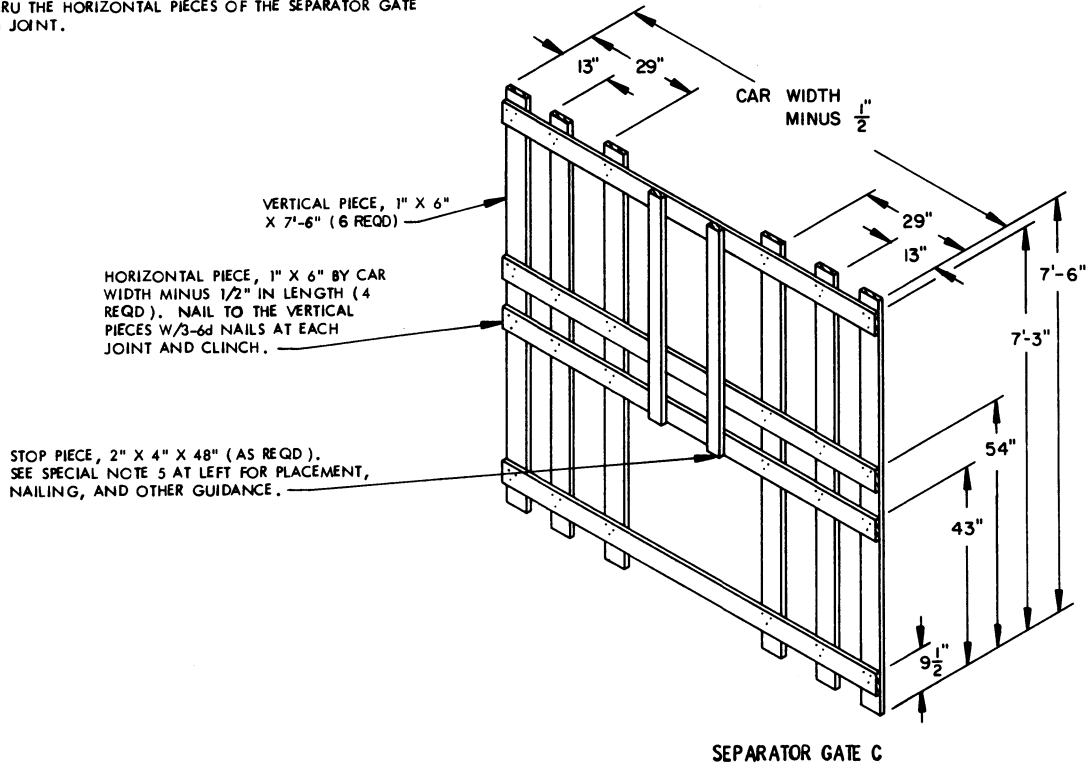


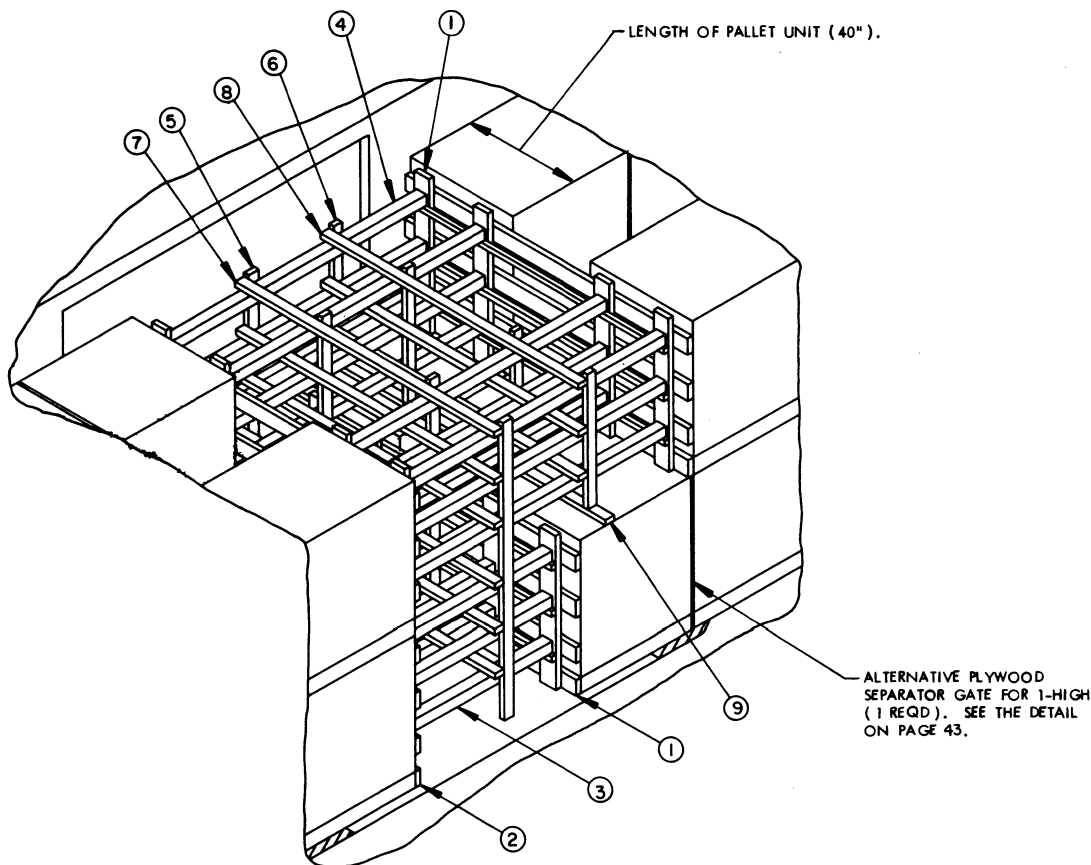
**TYPICAL COMBINATION LOAD PATTERN PLAN VIEW**

**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOX CAR IS SHOWN. WIDER CARS AND CARS OF OTHER LENGTHS CAN BE USED.
2. THE PROCEDURES ON THIS PAGE ARE PRESENTED TO PROVIDE AN ALTERNATIVE METHOD OF OBTAINING A LOAD QUANTITY OTHER THAN THAT SHOWN IN ANY OF THE LOADS DEPICTED HEREIN OR AS COVERED BY THE SPECIAL NOTES FOR A LOAD.
3. THE BLOCKING AND BRACING FOR THE COMBINATION LOAD, OTHER THAN SEPARATOR GATE "C", HAS NOT BEEN SHOWN. REFER TO THE APPLICABLE LOAD PAGES FOR BLOCKING AND BRACING SPECIFICATIONS. A SEPARATOR GATE "C" MUST BE INSTALLED AT EVERY LOCATION WHERE THE DIRECTION OF THE UNITS CHANGES. THE GATE MUST BE POSITIONED SO THAT THE VERTICAL PIECES ARE AGAINST THE ENDS OF THE CONTAINERS ON THE ADJACENT PALLET UNITS.
4. A CHART IS SHOWN WHICH PROVIDES DATA FOR 50'-6" AND 60'-8" LONG CARS. TWO LOADING PATTERNS FOR A SPECIFIC QUANTITY ( PER LAYER ) WHICH CAN BE ATTAINED BY THE COMBINATION LOAD METHOD, AND THE PATTERNS REQUIRED TO PROVIDE THESE QUANTITIES, ARE SPECIFIED. FOR COMPARISON PURPOSES, THE OTHER TYPE LOADS WHICH CAN BE USED TO OBTAIN A LOAD QUANTITY WHICH IS EITHER TWO PALLETS UNITS PER LAYER MORE OR LESS THAN THE QUANTITY OBTAINABLE BY A COMBINATION LOAD ARE GIVEN, AS WELL AS THE APPROXIMATE STRUT LENGTHS FOR EACH OF THE LOADS. NOTE THAT 40'-6" LONG CARS ARE NOT ADAPTABLE TO THE COMBINATION LOAD PATTERN.
5. STOP PIECES ARE ONLY REQUIRED ON SEPARATOR GATES WHICH ARE IN THE DOOR OPENING OR WITHIN SIX INCHES ( 6" ) OF BEING IN THE DOORWAY OPENING. POSITION SO AS TO BE IN CONTACT WITH THE ADJACENT CONTAINERS AND SECURE BY NAILING THRU THE HORIZONTAL PIECES OF THE SEPARATOR GATE W/3-6d NAILS AT EACH JOINT.

LOAD CHART			
CAR LENGTH	UNITS PER LAYER	LOAD PATTERN	APPROX STRUT LENGTH
50'-6"	28	CROSSWISE LOAD ON PAGE 6	40"
	26	4 LONG AT 40" PLUS 9 WIDE AT 44-1/2"	31"
	26	3 LONG AT 40" PLUS 10 WIDE AT 44-1/2"	26"
	24	LENGTHWISE LOAD ON PAGE 4	58"
60'-8"	34	CROSSWISE LOAD ON PAGE 6	42"
	32	5 LONG AT 40" PLUS 11 WIDE AT 44-1/2"	22"
	32	6 LONG AT 40" PLUS 10 WIDE AT 44-1/2"	28"
	30	LENGTHWISE LOAD ON PAGE 4	44"





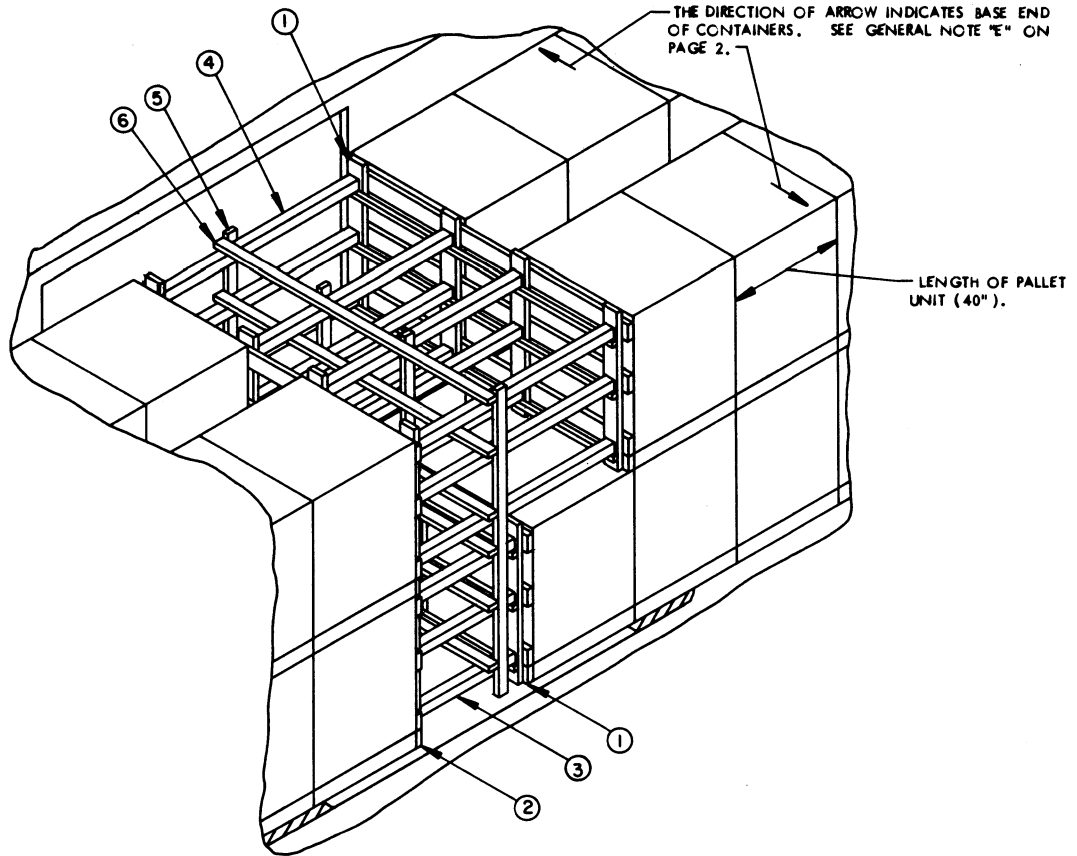
ISOMETRIC VIEW

**SPECIAL NOTES:**

1. ONLY THE CENTER PORTION OF A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOX CAR IS SHOWN TO PORTRAY THE STRUTTED GATE METHOD OF PARTIAL-LAYER BRACING. CARS OF OTHER WIDTHS AND CARS OF OTHER LENGTHS CAN ALSO BE USED. SEE SPECIAL NOTE 3.
2. ONLY THE BLOCKING AND BRACING PIECES WHICH ARE NECESSARY TO PERMIT THE OMISSION OF THE UNITS FROM THE TOP LAYER ARE SHOWN. REFER TO PAGE 4 FOR LATERAL BRACING AND DOORWAY PROTECTION REQUIREMENTS.
3. THE DEPICTED PROCEDURES ARE APPLICABLE FOR A 50'-6" LONG CAR. THE PROCEDURES ARE ADAPTABLE FOR THE OMISSION OF TWO PALLET UNITS FROM A LOAD IN A 60'-8" LONG CAR. IF A FULL LOAD MINUS TWO PALLET UNITS IS TO BE SHIPPED, ONLY ONE SET OF STRUT BRACING WILL BE REQUIRED. THIS WILL BE FOUR (4) 39" LONG STRUT BRACING PIECES AND THREE (3) HORIZONTAL STRUT BRACING PIECES.

**KEY NUMBERS**

- ① CENTER GATE FOR 1-HIGH (2 REQD). SEE THE "CENTER GATE A" DETAIL ON PAGE 37. SEE GENERAL NOTES "M" AND "N" ON PAGE 2. SEE SPECIAL NOTE 3 AT LEFT.
- ② CENTER GATE FOR 2-HIGH (1 REQD). SEE THE "CENTER GATE A" DETAIL ON PAGE 37.
- ③ STRUT, 4" X 4" BY CUT TO FIT (12 REQD). POSITION BETWEEN PIECES MARKED ① AND ② IN THE FIRST LAYER AND TOENAIL W/2-16d NAILS AT EACH END. SEE GENERAL NOTES "L" AND "T" ON PAGE 2 AND GENERAL NOTE "U" ON PAGE 3.
- ④ STRUT, 4" X 4" BY CUT TO FIT (12 REQD). POSITION BETWEEN PIECES MARKED ① AND ② IN THE SECOND LAYER AND TOENAIL W/2-16d NAILS AT EACH END. SEE GENERAL NOTES "L" AND "T" ON PAGE 2 AND GENERAL NOTE "U" ON PAGE 3.
- ⑤ VERTICAL STRUT BRACING, 2" X 4" X 7'-2" (4 REQD). NAIL TO THE STRUTS MARKED ③ AND ④ W/3-10d NAILS AT EACH JOINT.
- ⑥ VERTICAL STRUT BRACING, 2" X 4" X 39" (4 REQD). NAIL TO THE STRUTS MARKED ④ W/3-10d NAILS AT EACH JOINT.
- ⑦ HORIZONTAL STRUT BRACING, 2" X 4" X 8'-6" (6 REQD). NAIL TO THE STRUTS MARKED ③ AND ④ W/3-10d NAILS AT EACH JOINT.
- ⑧ HORIZONTAL STRUT BRACING, 2" X 4" X 8'-6" (3 REQD). NAIL TO THE STRUTS MARKED ④ W/3-10d NAILS AT EACH JOINT.
- ⑨ STRUT BRACING PAD, 2" X 4" BY A LENGTH TO SUIT (1 REQD). POSITION UNDER THE VERTICAL STRUT BRACING AS SHOWN.



**ISOMETRIC VIEW**

**SPECIAL NOTES:**

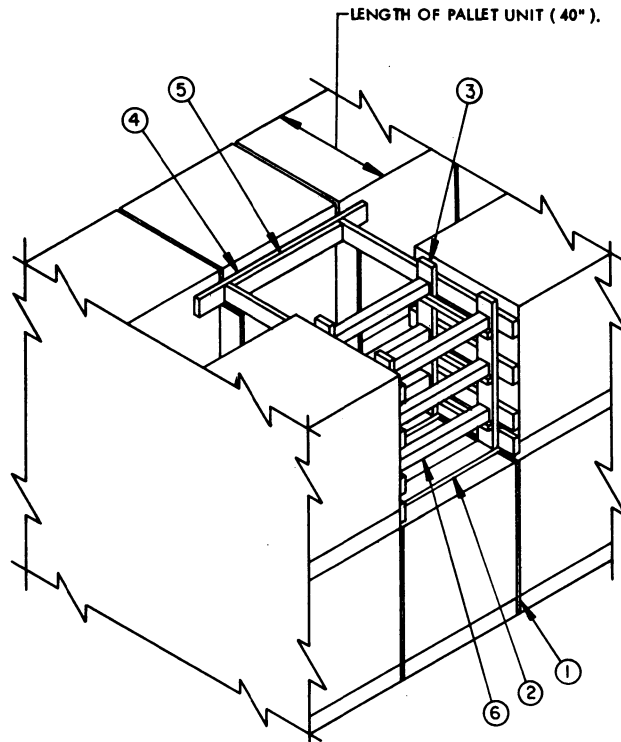
1. ONLY THE CENTER PORTION OF A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR IS SHOWN TO PORTRAY THE STRUTTED-GATE METHOD OF PARTIAL-LAYER BRACING. WIDER CARS AND CARS OF OTHER LENGTHS CAN ALSO BE USED. SEE SPECIAL NOTE 3.
2. ONLY THE BLOCKING AND BRACING PIECES WHICH ARE NECESSARY TO PERMIT THE OMISSION OF THE UNITS FROM THE TOP LAYER ARE SHOWN. REFER TO PAGE 6 FOR LATERAL BRACING AND DOORWAY PROTECTION.
3. THE DEPICTED PROCEDURES ARE APPLICABLE FOR THE OMISSION OF TWO PALLET UNITS FROM A FULL LOAD IN A 50'-6" LONG CAR. THE PROCEDURES MAY ALSO BE USED FOR OMITTING TWO PALLET UNITS FROM A FULL LOAD IN A 60'-8" LONG CAR.

**KEY NUMBERS**

- ① CENTER GATE FOR 1-HIGH (2 REQD). SEE THE "CENTER GATE B" DETAIL ON PAGE 38. SEE GENERAL NOTES "M" AND "N" ON PAGE 2.
- ② CENTER GATE FOR 2-HIGH (1 REQD). SEE THE "CENTER GATE B" DETAIL ON PAGE 38.
- ③ STRUT, 4" X 4" BY CUT TO FIT (12 REQD). POSITION BETWEEN THE CENTER GATES, PIECES MARKED ① AND ② IN THE FIRST LAYER AND TOENAIL W/2-16d NAILS AT EACH END. SEE GENERAL NOTES "L" AND "T" ON PAGE 2. AND GENERAL NOTE "U" ON PAGE 3. SEE SPECIAL NOTE 3 AT LEFT.
- ④ STRUT, 4" X 4" BY CUT TO FIT (12 REQD). POSITION BETWEEN THE CENTER GATES, PIECES MARKED ① AND ② IN THE SECOND LAYER AND TOENAIL W/2-16d NAILS AT EACH END.
- ⑤ VERTICAL STRUT BRACING, 2" X 4" X 7'-4" (4 REQD). NAIL TO THE STRUTS, PIECES MARKED ③ AND ④ W/3-10d NAILS AT EACH JOINT.
- ⑥ HORIZONTAL STRUT BRACING, 2" X 4" BY CAR WIDTH MINUS 2" (6 REQD). NAIL TO THE STRUTS, PIECES MARKED ③ AND ④ W/3-10d NAILS AT EACH JOINT.

**CONTAINERS CROSSWISE  
TYPICAL LCL LOAD USING STRUTTED GATE METHOD OF PARTIAL-LAYER BRACING**





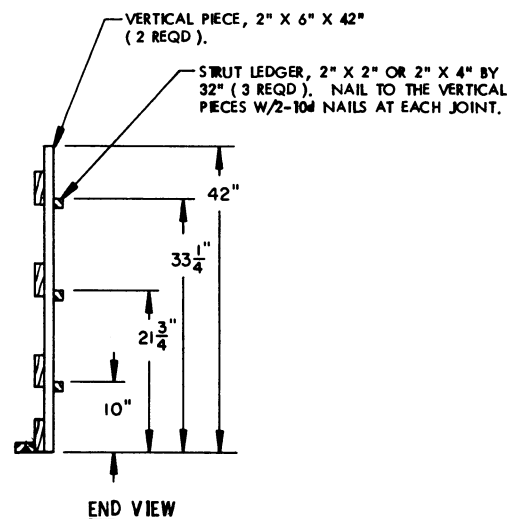
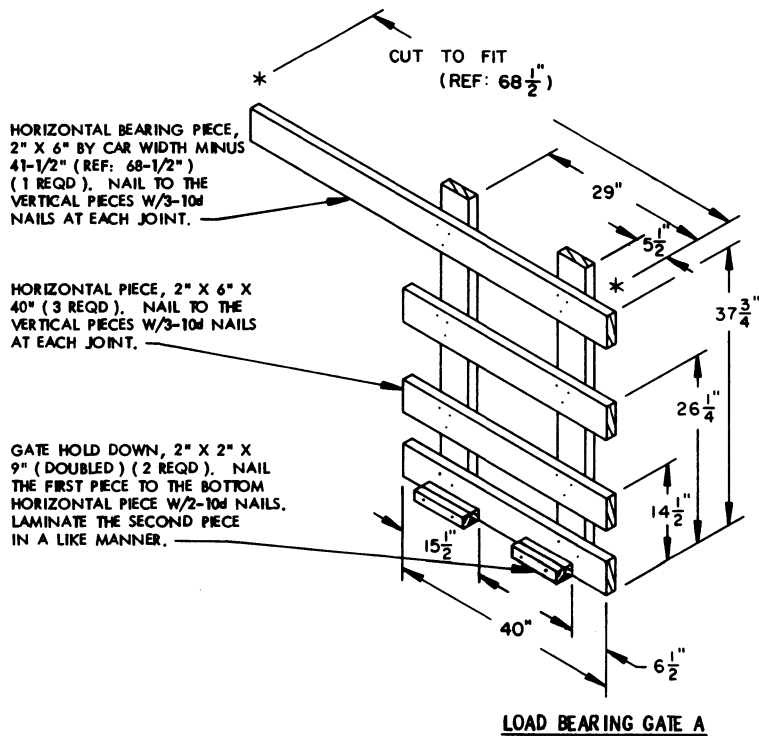
**ISOMETRIC VIEW**

**KEY NUMBERS**

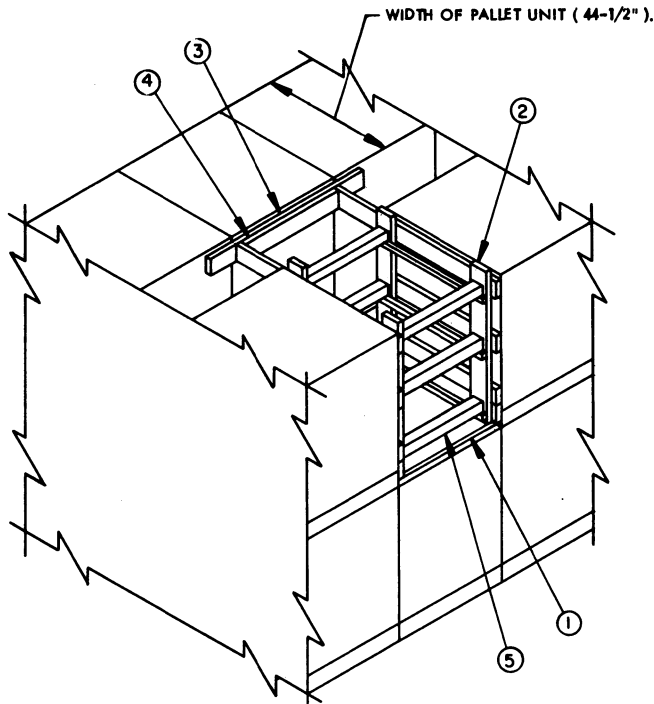
**SPECIAL NOTES:**

1. A PARTIAL VIEW OF A 9'-2" WIDE CONVENTIONAL TYPE BOX CAR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED.
2. A UNIT OMITTED FROM THE TOP LAYER OF A 2-LAYER LOAD IS SHOWN AS TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR THE OMISSION OF A PALLET UNIT FROM A 1-LAYER LOAD.
3. THE OMITTED-UNIT PROCEDURE SHOULD BE APPLIED NEAR THE CENTER OF THE CAR LENGTH, BUT NOT IN THE DOORWAY AREA. ALSO, THERE SHOULD BE AT LEAST ONE (1) LOAD UNIT BETWEEN THE OMITTED UNIT AND A CENTER GATE.
4. ONLY THE BLOCKING AND BRACING FOR THE OMITTED UNIT IS SHOWN; REFER TO PAGE 4 FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.
5. THE REFERENCE DIMENSION GIVEN FOR THE CUT-TO-FIT PIECE IS BASED ON AN INSIDE CAR WIDTH OF 9'-2". THIS DIMENSION WILL HAVE TO BE INCREASED WHEN LOADING WIDER CARS.

- ① ALTERNATIVE PLYWOOD SEPARATOR GATE (2 REQD). SEE THE "SEPARATOR GATE D" DETAIL ON PAGE 41.
- ② SUPPORT PIECE, 2" X 6" X 45-1/4" (2 REQD). POSITION SO AS TO BE UNDER THE VERTICAL PIECES OF THE LOAD BEARING GATE, PIECE MARKED ③.
- ③ LOAD BEARING GATE (2 REQD, 1 RIGHT HAND AND 1 LEFT HAND). SEE THE "LOAD BEARING GATE A" DETAIL BELOW. NAIL TO THE FILLER PIECE, PIECE MARKED ⑤, W/3-10d NAILS.
- ④ ANTI-SWAY BEARING PIECE, 2" X 6" X 66" (1 REQD).
- ⑤ FILLER PIECE, 2" X 6" X 42-1/4" (1 REQD). NAIL TO THE ANTI-SWAY BEARING PIECE, PIECE MARKED ④, W/5-10d NAILS.
- ⑥ STRUT, 4" X 4" X 39-1/4" (6 REQD). TOENAIL TO PIECE MARKED ③ W/2-16d NAILS AT EACH END.



**LOAD BEARING GATE A**



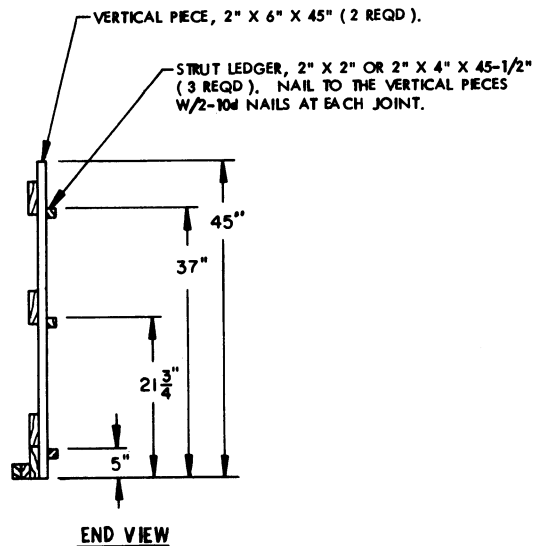
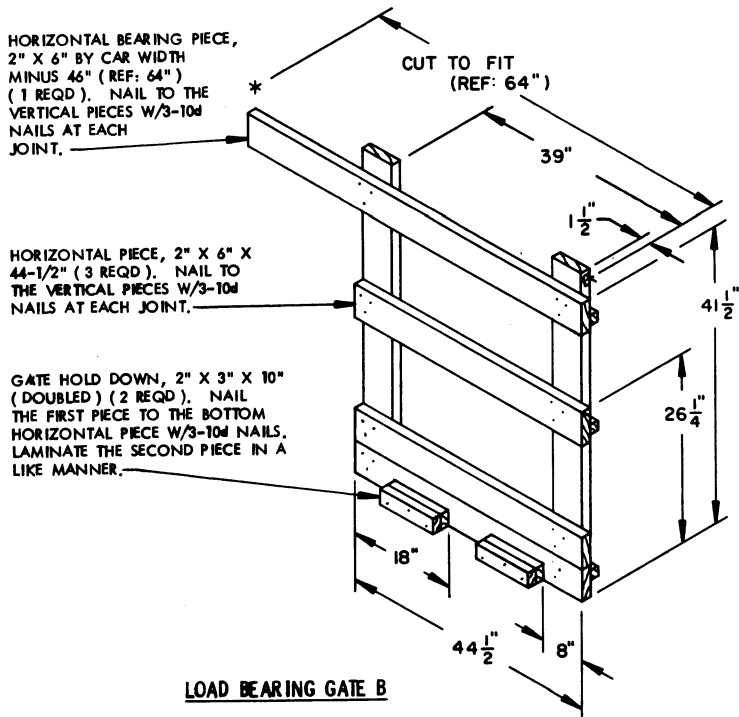
ISOMETRIC VIEW

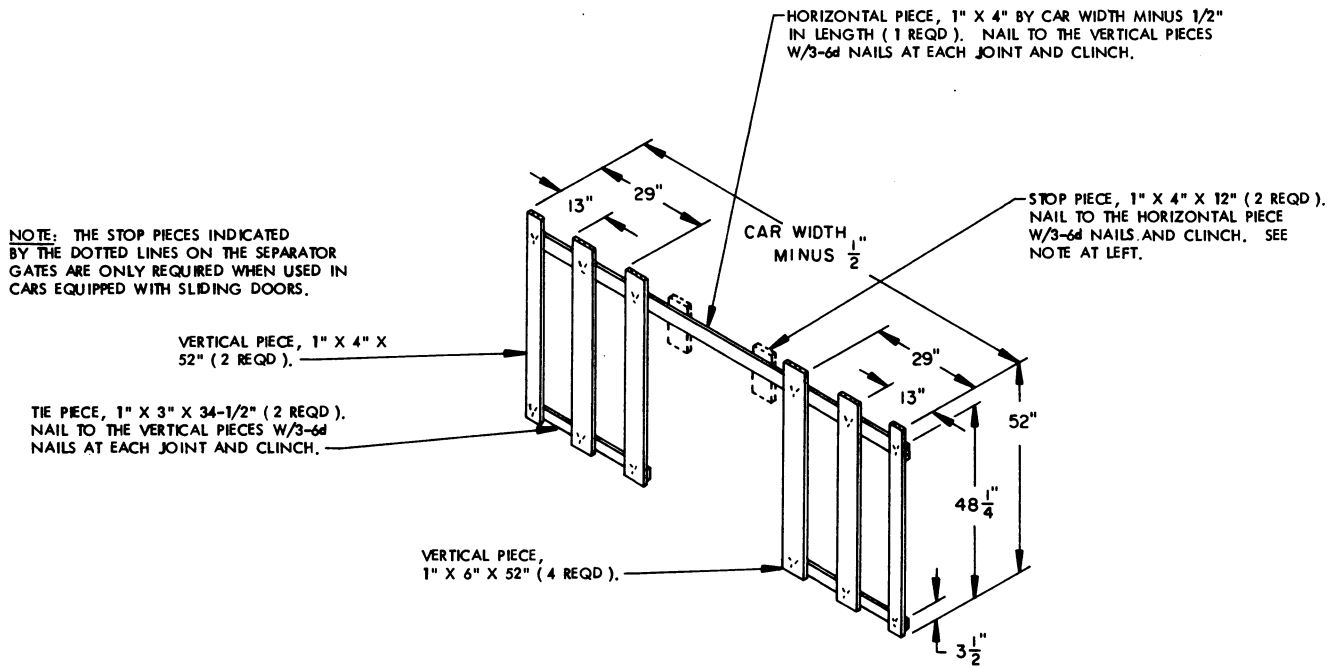
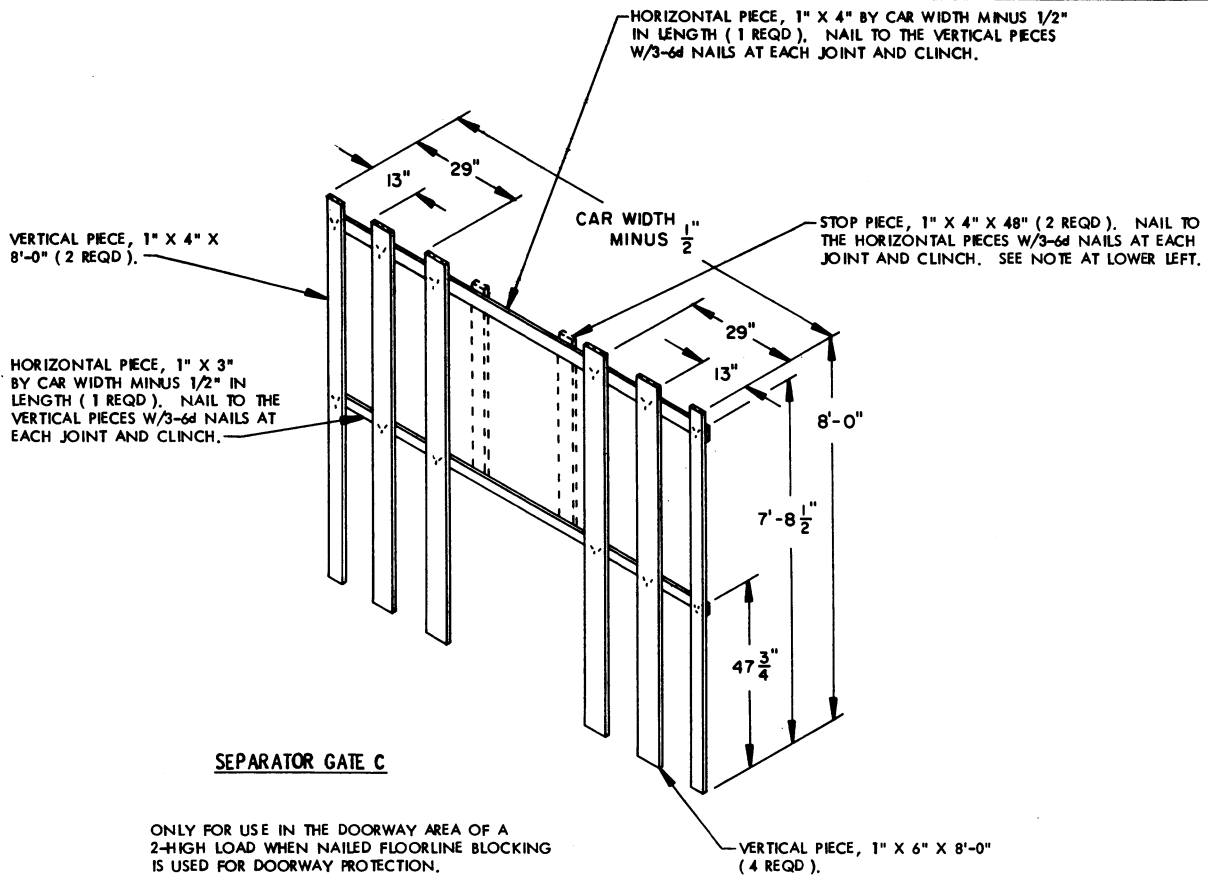
SPECIAL NOTES:

1. A PARTIAL VIEW OF A 9'-2" WIDE CONVENTIONAL TYPE BOX CAR IS SHOWN. WIDER CARS CAN BE USED.
2. A UNIT OMITTED FROM THE TOP LAYER OF A 2-LAYER LOAD IS SHOWN AS TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR THE OMISSION OF A PALLET UNIT FROM A 1-LAYER LOAD.
3. THE OMITTED-UNIT PROCEDURES SHOULD BE APPLIED NEAR THE CENTER OF THE CAR LENGTH, BUT NOT IN THE DOORWAY AREA. ALSO, THERE SHOULD BE AT LEAST ONE (1) LOAD UNIT BETWEEN THE OMITTED UNIT AND A CENTER GATE.
4. ONLY THE BLOCKING AND BRACING FOR THE OMITTED UNIT IS SHOWN. REFER TO PAGE 6 FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.
5. THE REFERENCE DIMENSION GIVEN FOR THE CUT-TO-FIT PIECE IS BASED ON AN INSIDE CAR WIDTH OF 9'-2". THIS DIMENSION WILL HAVE TO BE INCREASED WHEN LOADING WIDER CARS.

KEY NUMBERS

- ① SUPPORT PIECE, 2" X 6" X 40" (2 REQD). POSITION SO AS TO BE BENEATH THE VERTICAL PIECES OF THE LOAD BEARING GATE, PIECE MARKED ②.
- ② LOAD BEARING GATE (2 REQD, 1 RIGHT HAND AND 1 LEFT HAND). SEE THE "LOAD BEARING GATE B" DETAIL BELOW. NAIL TO THE FILLER PIECE, PIECE MARKED ④, W/3-10d NAILS.
- ③ ANTI-SWAY BEARING PIECE, 2" X 6" X 60" (1 REQD).
- ④ FILLER PIECE, 2" X 6" X 37" (1 REQD). NAIL TO THE ANTI-SWAY BEARING PIECE, PIECE MARKED ③, W/5-10d NAILS.
- ⑤ STRUT, 4" X 4" X 34" (6 REQD). TOENAIL TO THE VERTICAL PIECE OF THE LOAD BEARING GATE, PIECE MARKED ②, W/2-16d NAILS AT EACH END.





ONLY FOR USE IN THE DOORWAY AREA OF A 1-HIGH LOAD WHEN NAILED FLOORLINE BLOCKING IS USED FOR DOORWAY PROTECTION.

**DETAILS**

THE DIRECTION OF THE ARROW INDICATES BASE END OF CONTAINERS. SEE GENERAL NOTE "E" ON PAGE 2.

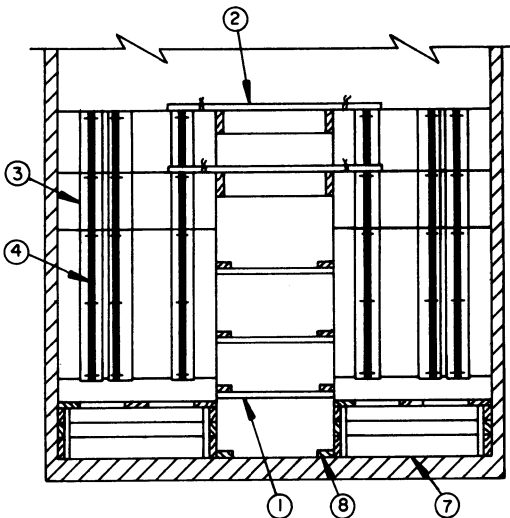
NOTICE: FOR LENGTHWISE POSITIONED LOADS, THE LONGITUDINAL ADJACENT PALLET UNITS MUST BE POSITIONED IN THE SAME ORIENTATION SO THAT THE STRAPPING BOARDS WILL ALIGN.

WIDTH OF UNIT (44-1/2").

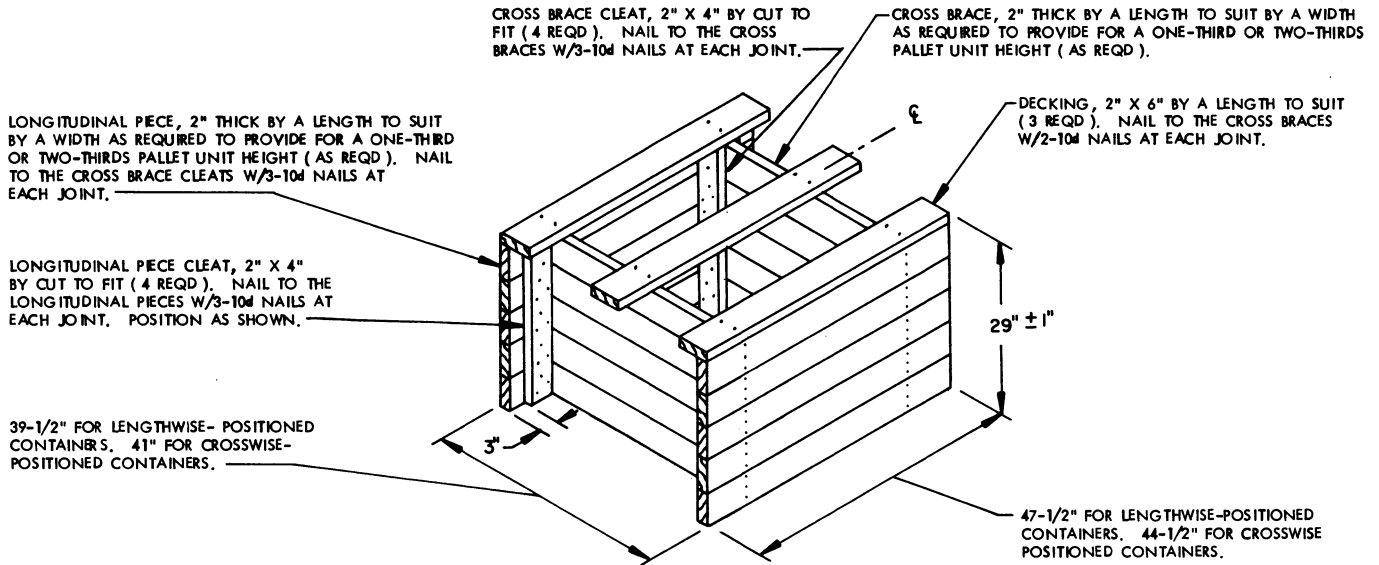
ISOMETRIC VIEW

KEY NUMBERS

- ① ANTI-SWAY BRACE (7 REQD). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 37. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF PALLET UNITS. SEE GENERAL NOTES "M" AND "N" ON PAGE 2.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (3 REQD). SEE THE "TOP-OF-LOAD ANTI-SWAY BRACE A" DETAIL ON PAGE 37. WIRE TIE TO THE TWO INNER MOST TIEDOWN STRAPS ON THE PALLET UNIT WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON PAGE 43.
- ③ STRAPPING BOARD, 2" X 6" X 39" (48 REQD/6 PER PALLET UNIT). POSITION SO AS TO BE CENTERED ON THE JOINT BETWEEN THE OUTER TWO STACKS OF CONTAINERS AND ON THE JOINT BETWEEN THE MIDDLE CONTAINER AND THE ADJACENT CONTAINER. SEE THE "METHOD A" DETAIL ON PAGE 21.
- ④ REINFORCING STRAP, 1-1/4" X .035" X 16'-0" LONG (REF) STEEL STRAPPING (24 REQD). INSTALL TO ENIRCLE THE PALLET UNIT AND THE STRAPPING BOARDS, PIECE MARKED ③. SECURE TO A STRAPPING BOARD W/3 STAPLES.
- ⑤ SEAL FOR 1-1/4" STRAPPING (48 REQD, 2 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "O" ON PAGE 2.
- ⑥ RISER ASSEMBLY (2 REQD). SEE THE "RISER ASSEMBLY A" DETAIL ON PAGE 21.
- ⑦ RISER ASSEMBLY (2 REQD). SEE RISER ASSEMBLY SPECIAL NOTE 1 ON PAGE 21.
- ⑧ RISER STOP PIECE, 2" X 4" X 36" (4 REQD). POSITION AGAINST A RISER ASSEMBLY AND NAIL TO THE CAR FLOOR W/3-16d NAILS. SEE RISER ASSEMBLY SPECIAL NOTE 2 ON PAGE 21.



SECTION E-E



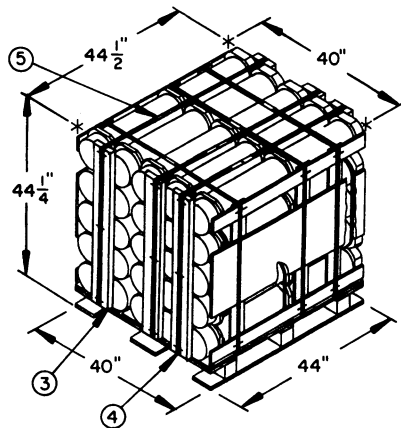
**RISER ASSEMBLY A**

**SPECIAL NOTES FOR LOAD:**

**SPECIAL NOTES FOR RISER ASSEMBLY:**

1. A 9'-2" WIDE CONVENTIONAL TYPE WOOD-LINED BOX CAR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED. SEE GENERAL NOTE "D" ON PAGE 2.
2. THE RISER METHOD OF PARTIAL-LAYER BRACING IS TYPICALLY SHOWN WITH THE CONTAINERS POSITIONED LENGTHWISE IN THE CAR. WITH MODIFICATIONS, THE PROCEDURES ARE ALSO APPLICABLE FOR CONTAINERS POSITIONED CROSSWISE. SEE SPECIAL NOTES 3 AND 4.
3. ONLY THE BLOCKING AND BRACING FOR THE RISER METHOD OF PARTIAL-LAYER BRACING IS SHOWN. FOR THE BLOCKING AND BRACING FOR THE BALANCE OF THE LOAD, REFER TO PAGE 4 FOR LENGTHWISE POSITIONED CONTAINERS AND PAGE 6 FOR CROSSWISE-POSITIONED CONTAINERS.
4. FOR CONTAINERS-CROSSWISE UNITS, THE STRAPPING BOARDS, SHOWN AS PIECES MARKED ③ WILL NOT BE REQUIRED. PLYWOOD, 1/2" X 44" WIDE BY 36-1/2" HIGH MUST BE APPLIED TO EACH SIDE OF THE PALLET UNIT. SEE THE "METHOD B" DETAIL BELOW.
5. **CAUTION:** APPLY STRAPPING BOARDS AND POSITION THE PALLET UNITS IN EACH ROW SO THAT THE STRAPPING BOARDS ARE ALIGNED AS SHOWN IN THE ISOMETRIC VIEW AND THE "SECTION E-E" VIEW ON PAGE 20.

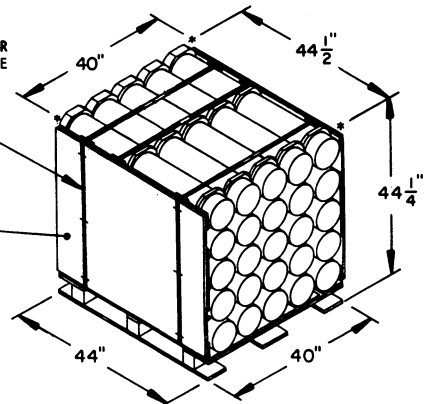
1. THE HEIGHT OF THE PALLET UNIT IS 44-1/4". A TWO-THIRDS HEIGHT RISER IS SHOWN. A ONE-THIRD HEIGHT RISER, SHOWN AS KEY NUMBER ⑦ IN THE LOAD ON PAGE 20, WILL BE FABRICATED FROM TWO (2) PIECES OF 2" X 4" MATERIAL AND ONE (1) PIECE OF 2" X 6" MATERIAL FOR EACH CROSS BRACE AND EACH LATERAL PIECE FOR A TOTAL HEIGHT OF 14" AFTER THE DECKING IS IN PLACE. **NOTE:** A PLUS OR MINUS 1" TOLERANCE IS PERMISSIBLE ON THE RISER HEIGHT.
2. A RISER STOP PIECE, 2" X 6" X 18" IS REQUIRED FOR EACH CROSSWISE POSITIONED RISER ASSEMBLY. POSITION AGAINST THE RISER AND NAIL TO THE FLOOR W/3-16# NAILS EACH. SEE KEY NUMBER ⑧ ON PAGE 20 FOR A LENGTHWISE POSITIONED RISER.



**METHOD A**

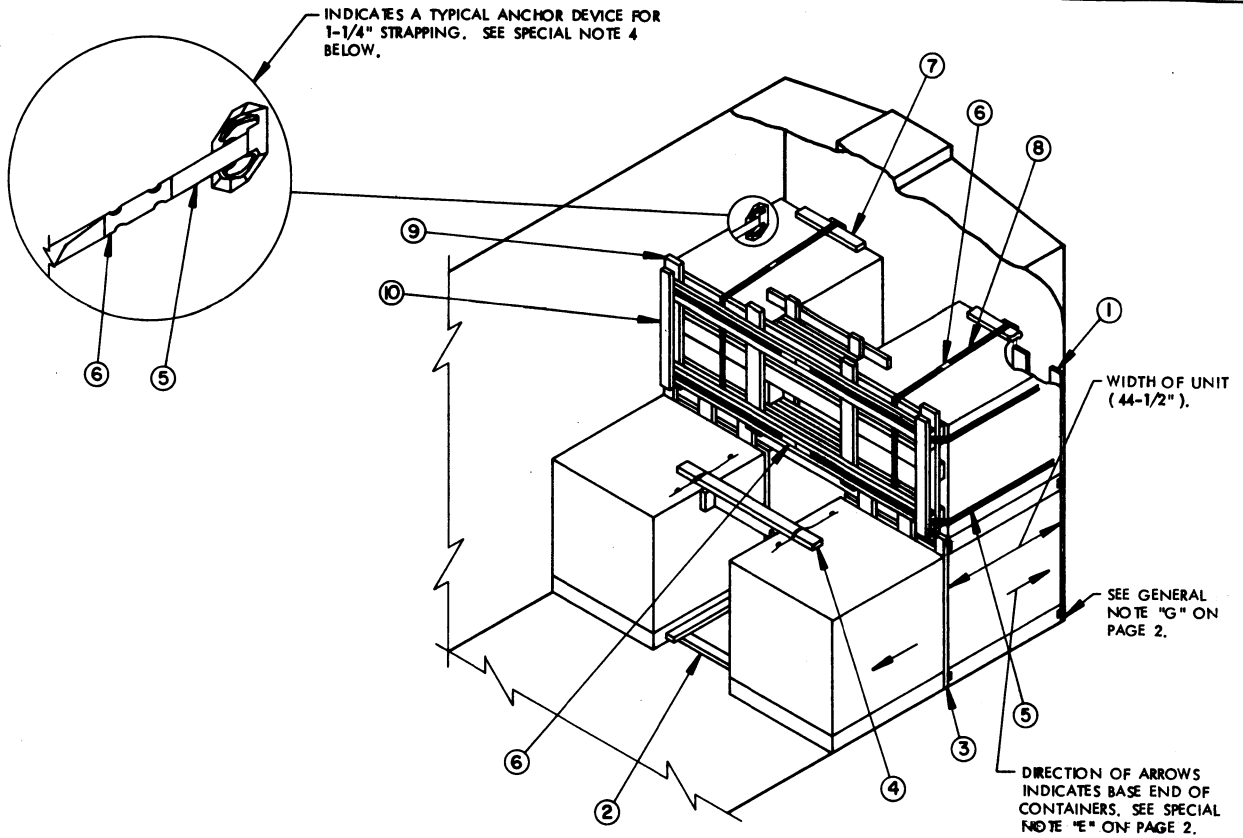
STEEL STRAPPING, 1-1/4" X .035" OR .031" X 15'-0" (2 REQD). SEAL THE JOINT W/2 SEALS. STAPLE TO PLYWOOD W/3 STAPLES.

PLYWOOD, 1/2" X 44" WIDE X 36-1/2" HIGH (2 REQD).



**METHOD B**

**TYPICAL LCL LOAD USING RISER METHOD OF PARTIAL-LAYER BRACING**



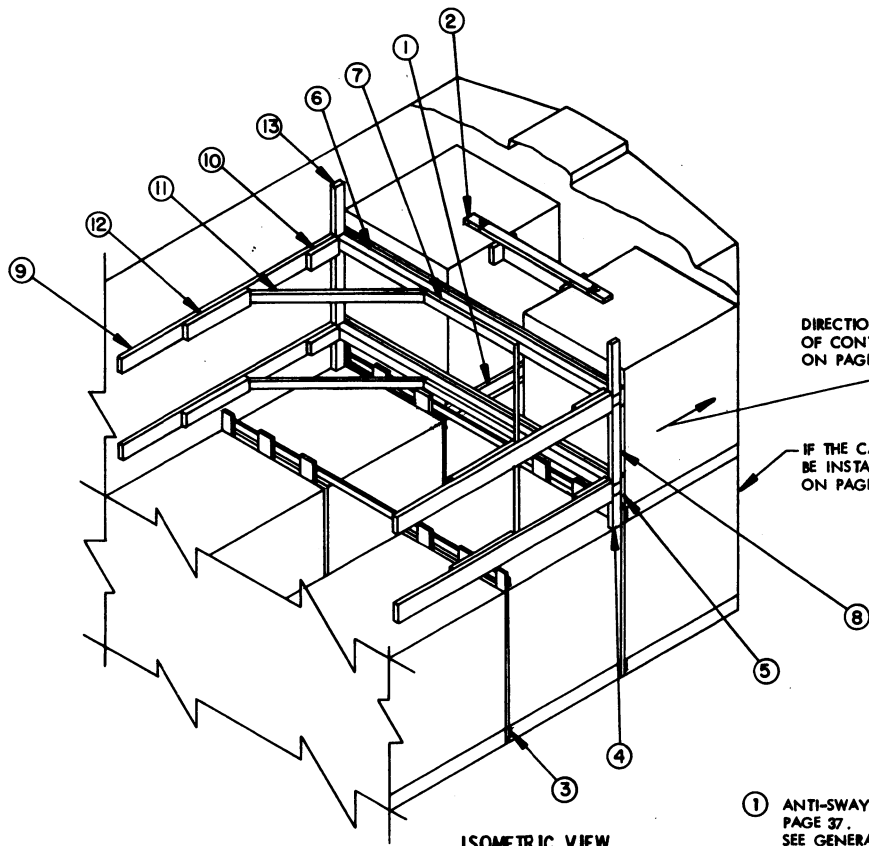
**SPECIAL NOTES:**

1. A 9'-2" WIDE ALL-METAL BOX CAR EQUIPPED WITH STRAP ANCHOR DEVICES AND HAVING AN AAR MECHANICAL DESIGNATION CLASS OF XL IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED.
2. THE BULKHEAD GATE METHOD OF PARTIAL-LAYER BRACING IS ONLY APPLICABLE FOR USE IN LOADS OF LENGTHWISE POSITIONED CONTAINERS AS SHOWN IN THE VIEW ABOVE. PARTIAL LAYERS OF CROSSWISE POSITIONED CONTAINERS WILL NOT BE RETAINED BY THE BULKHEAD GATE METHOD.
3. A BULKHEAD GATE USED IN CONJUNCTION WITH THREE (3) BULKHEAD STRAPS WILL RETAIN UP TO 7,500 POUNDS OF LADING; A BULKHEAD GATE WITH TWO (2) STRAPS WILL RETAIN NOT MORE THAN 5,000 POUNDS. IF ONLY TWO STRAPS ARE USED, THEY MUST BE APPLIED OVER THE UPPER AND LOWER STRAPPING BOARDS. A BULKHEAD GATE WITH 2 STRAPS WILL RETAIN 2 PALLET UNITS; A BULKHEAD GATE WITH 3 STRAPS WILL RETAIN 3 PALLET UNITS.
4. THE ANCHOR DEVICES TO BE USED FOR THE ATTACHMENT OF THE BULKHEAD STRAPS MUST BE LOCATED AT LEAST THIRTY-SIX INCHES (36") TOWARD THE CAR END WALL FROM THE OPPOSITE-THE-LOAD SIDE OF THE BULKHEAD GATE. IF THE ANCHOR DEVICES IN THE CAR BEING LOADED ARE NOT LOCATED NEAR ENOUGH TO THE END OF THE CAR SO THAT THE 36" REQUIREMENT CAN BE SATISFIED, IT WILL BE NECESSARY TO INSTALL GATES AND STRUTS AT THE END OF THE CAR. THESE WILL BE 1-HIGH GATES FOR THE ITEM BEING LOADED AND WILL BE INSTALLED SIMILAR TO THE STRUTTED GATE METHOD SHOWN ON PAGE 15 FOR AN EVEN QUANTITY OF UNITS, OR THE PALLET UNIT OMITTED PROCEDURES ON PAGE 17 FOR A SINGLE UNIT.
5. THE STRAPPING BOARDS ON A BULKHEAD GATE ARE TO BE ALIGNED AS NEARLY AS POSSIBLE WITH THE ANCHOR DEVICES IN THE CAR TO WHICH THE BULKHEAD STRAPS ARE ATTACHED. TOLERANCES ARE SPECIFIED ON THE END VIEW OF THE BULKHEAD GATE ON PAGE 23 FOR THE LOCATION OF THE STRAPPING BOARDS IN RELATION TO THE LOCATION OF THE HORIZONTAL PIECES. THE STRAPPING BOARDS SHOULD BE LOCATED WITHIN THESE TOLERANCES. IF THIS IS NOT POSSIBLE, ADDITIONAL HORIZONTAL PIECES MUST BE APPLIED, AS NECESSARY TO PROVIDE PROPER BEARING AGAINST THE CONTAINERS.

**KEY NUMBERS**

- ① SEPARATOR GATE FOR 2-HIGH LOAD (1 REQD). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 38. POSITION WITH THE VERTICAL PIECES AGAINST THE CAR END WALL.
- ② ANTI-SWAY BRACE (3 REQD). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 37. INSTALL BETWEEN THE LATERALLY ADJACENT ROWS OF PALLET UNITS. SEE GENERAL NOTES "M" AND "N" ON PAGE 2.
- ③ SEPARATOR GATE FOR 1-HIGH LOAD (1 REQD). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 38.
- ④ TOP-OF-LOAD ANTI-SWAY BRACE (1 REQD). SEE THE DETAIL ON PAGE 37. WIRE TIE TO THE INNER TWO TIEDOWN STRAPS OF THE PALLET UNIT AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON PAGE 43.
- ⑤ BULKHEAD STRAP, 1-1/4" X .031" OR .035" BY A LENGTH TO SUIT (2 REQD). INSTALL FROM TWO EQUAL LENGTH PIECES. SEE THE "STRAP APPLICATION PLAN VIEW" ON PAGE 23 FOR INSTALLATION GUIDANCE. SEE SPECIAL NOTES 3 AND 4 AT LEFT.
- ⑥ SEAL FOR 1-1/4" STEEL STRAPPING (10 REQD, 4 PER BULKHEAD STRAP, PIECE MARKED ⑤, AND 1 PER BUNDLING STRAP, PIECE MARKED ⑧).
- ⑦ STRAPPING BOARD (2 REQD). SEE THE DETAIL ON PAGE 23.
- ⑧ BUNDLING STRAP, 1-1/4" X .035" X 16'-0" LONG (REF) STEEL STRAPPING. (2 REQD). ENCIRCLE THE PALLET UNIT AND THE HORIZONTAL PIECES OF THE BULKHEAD GATE. TENSION AND SEAL AFTER TENSIONING THE BULKHEAD STRAPS, PIECE MARKED ⑤.
- ⑨ BULKHEAD GATE (1 REQD). SEE THE DETAIL ON PAGE 23. SEE SPECIAL NOTE 3 AT LEFT.
- ⑩ STRAP RETAINER, 2" X 4" X 40" (2 REQD). NAIL TO THE BULKHEAD GATE W/2-12d NAILS ABOVE AND BELOW EACH BULKHEAD STRAP.





DIRECTION OF ARROW INDICATES BASE END OF CONTAINER. SEE GENERAL NOTE "E" ON PAGE 2.

IF THE CAR HAS A BOWED END WALL, A BULKHEAD MUST BE INSTALLED. SEE THE "END-OF-CAR BULKHEAD" DETAIL ON PAGE 43.

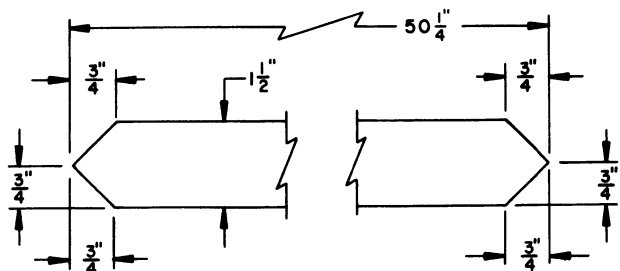
ISOMETRIC VIEW

SPECIAL NOTES:

1. A 9'-2" WIDE CONVENTIONAL WOOD-LINED BOX CAR IS SHOWN. WOOD-LINED CARS OF OTHER WIDTHS CAN BE USED.
2. PARTIAL-LAYER BRACING MAY BE APPLIED FOR ANY OF THE CONVENTIONAL CARLOADS DEPICTED HEREIN. A CONTAINERS-LENGTHWISE LOAD IS SHOWN AS TYPICAL. NOTE THAT FOR A CONTAINERS-CROSSWISE PARTIAL TIER, THE LOWER PIECES MARKED ⑤ MUST BE LOCATED SO AS TO BEAR AGAINST THE PALLET UNIT BASE AND THE BUFFER PLYWOOD PIECE OF THE SIDE ASSEMBLY. THE SUPPORT PIECE MARKED ④, MUST BE POSITIONED HORIZONTALLY 1" ABOVE THE LOWER PALLET UNIT AND PIECE MARKED ⑧ WILL BE 30" LONG IN LIEU OF 19-3/4". ADDITIONALLY, ANTI-SWAY BRACE "B" WILL BE USED IN LIEU OF ANTI-SWAY BRACE "A", PIECE MARKED ②. SEE THE DETAIL ON PAGE 38. IF ONLY ONE PALLET UNIT IS TO BE SHIPPED IN A PARTIAL SECOND LAYER, IT WILL BE POSITIONED DIRECTLY ABOVE THE LOWER PALLET UNIT. FOR A PARTIAL FIRST LAYER POSITION THE PALLET UNIT IN ONE CORNER. PROVIDE LATERAL BRACING BY APPLYING VERTICALLY POSITIONED DOUBLED 2" X 4" X 48" LONG PIECES TO THE CAR END WALL AND TO THE K-BRACE. NAIL TO THE CAR END WALL W/6-12d NAILS EACH LAYER. THE FIRST PIECE APPLIED TO THE K-BRACE WILL BE NAILED TO PIECE MARKED ③ W/3-12d NAILS EACH JOINT. LAMINATE THE SECOND PIECE W/6-12d NAILS. IF IT IS NECESSARY TO BRACE MORE PALLET UNITS, REFER TO THE DETAILS ON PAGE 25, 26, OR 27 FOR SELECTION OF THE APPLICABLY SIZED K-BRACE TO USE AND THE DESIGN SPECIFICATIONS FOR THE BRACE.
3. THE K-BRACE METHOD OF PARTIAL-LAYER (TIER) BRACING SHOWN MAY BE USED IN WOOD-LINED CARS FOR THE SECUREMENT OF A PARTIAL SECOND TIER OR FIRST TIER. THE TYPE "A" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN FOUR (4) PALLET UNITS.
4. THE CENTER CLEAT, SHOWN AS PIECE MARKED ⑦, WILL BE 28" LONG FOR AN 8'-6" WIDE CAR, 36" LONG FOR A 9'-2", AND 38" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.

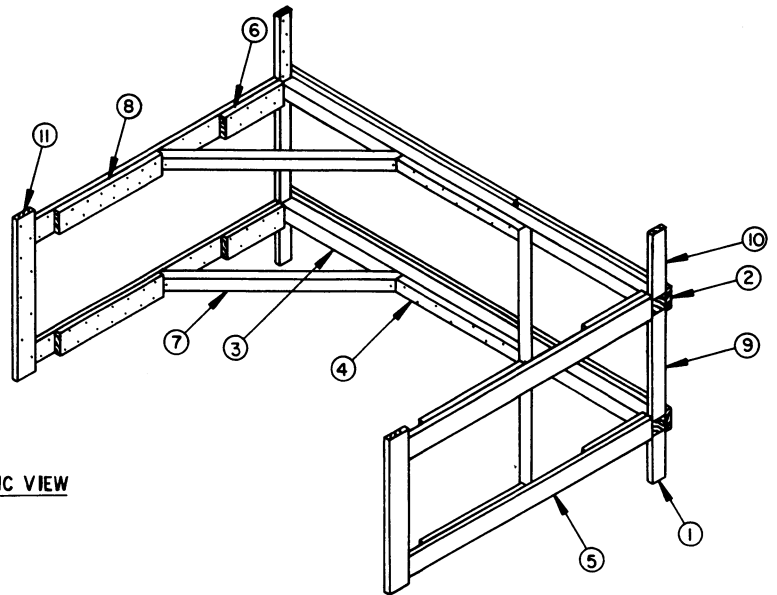
KEY NUMBERS

- ① ANTI-SWAY BRACE (2 REQD). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 37. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF PALLET UNITS. SEE GENERAL NOTES "M" AND "N" ON PAGE 2 AND SPECIAL NOTE 2 AT LEFT.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (1 REQD). SEE THE "TOP-OF-LOAD ANTI-SWAY BRACE A" DETAIL ON PAGE 37. WIRE TIE TO PALLET UNITS AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON PAGE 43. NOTE THAT THE QUANTITY IS ONLY FOR THE PARTIAL-TIER UNITS.
- ③ SEPARATOR GATE FOR 1-HIGH (2 REQD). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 38.
- ④ SUPPORT CLEAT, 2" X 4" X 10-1/2" (2 REQD). FOR LENGTHWISE LOADED CONTAINERS, POSITION VERTICALLY AS SHOWN SO AS TO CENTER PIECES MARKED ⑤ AND ⑥ ON THE JOINT BETWEEN THE BOTTOM TWO LAYERS OF CONTAINERS ON THE UNITS. NAIL TO THE CAR SIDEWALL W/3-12d NAILS. FOR CROSSWISE LOADED-CONTAINERS, SEE SPECIAL NOTE 2 AT LEFT.
- ⑤ HORIZONTAL PIECE, 2" X 6" BY CAR WIDTH IN LENGTH (CUT-TO-FIT) (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ⑥, W/1-12d NAIL EVERY 6".
- ⑥ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH IN LENGTH (CUT-TO-FIT) (2 REQD).
- ⑦ CENTER CLEAT, 2" X 4" X 36" (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ⑥, W/7-16d NAILS. SEE SPECIAL NOTE 4 AT LEFT.
- ⑧ SPACER CLEAT, 2" X 4" X 19-3/4" FOR A LENGTHWISE LOAD, 2" X 4" X 30" FOR A CROSSWISE LOAD (2 REQD). NAIL TO THE SIDEWALL W/5-12d NAILS.
- ⑨ HORIZONTAL WALL CLEAT, 2" X 6" X 72" (4 REQD). NAIL TO THE CAR SIDEWALL W/16-12d NAILS.
- ⑩ POCKET CLEAT, 2" X 6" X 12" (2 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑨ W/4-16d NAILS.
- ⑪ DIAGONAL BRACE, 2" X 4" X 50-1/4" (4 REQD). SEE THE DETAIL AT LEFT FOR BEVEL CUTS REQUIRED. TOENAIL TO THE CROSS CAR BRACE, PIECE MARKED ⑥, AND TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑨, W/2-16d NAILS AT EACH END.
- ⑫ BACK-UP CLEAT, 2" X 6" X 24" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑨, W/8-16d NAILS.
- ⑬ HOLD DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.



DIAGONAL BRACE





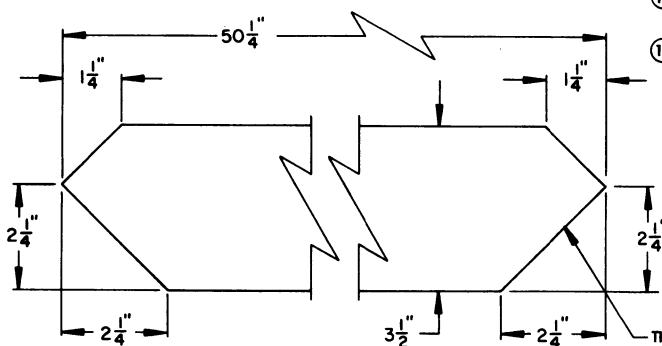
ISOMETRIC VIEW

**SPECIAL NOTES:**

1. THE TYPE "B" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN SIX (6) PALLET UNITS. IF IT IS NECESSARY TO BLOCK MORE THAN SIX PALLET UNITS, REFER TO THE DETAILS ON PAGES 26 AND 27 FOR SELECTION OF THE APPLICABLY SIZED K-BRACE TO USE AND THE DESIGN SPECIFICATIONS FOR THIS BRACE. IF ONLY TWO OR FOUR PALLET UNITS ARE TO BE SHIPPED IN THE PARTIAL LAYER, THE TYPE "A" K-BRACE DEPICTED ON PAGE 24 MAY BE USED.
2. CAUTION: SOME CARS ARE NOT SUITED FOR THE APPLICATION OF "PARTIAL-LAYER BRACING" BECAUSE THE LENGTH OF THE PARTIAL TIER TO BE SHIPPED AND/OR THE SIZE OR CONFIGURATION OF THE CAR DOORS WILL NOT PERMIT PROPER INSTALLATION OF THE SPECIFIED K-BRACE DUNNAGE. PIECES MARKED ①, ②, ③, ④, ⑨, ⑩, AND ⑪ MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDEWALL. IT IS ALRIGHT FOR THE ENDS OF THE DIAGONAL BRACES MARKED ⑦ TO BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE ADJACENT PIECE MARKED ⑤ MUST BE DOUBLED AND EXTENDED ACROSS AND FAR ENOUGH PAST THE DOOR OPENING (REF: 54") TO PROVIDE FOR THE SPECIFIED NAILING OF EACH PIECE. LAMINATE THE SECOND PIECE OF THE DOUBLED PIECE MARKED ⑤ TO THE FIRST W/16-16d NAILS. CLINCH THOSE NAILS WHICH PROTRUDE THRU THE HORIZONTAL WALL CLEAT WITHIN THE DOOR OPENING. NOTE THAT THE DIAGONAL BRACE WILL BE 49-1/8" LONG IN LIEU OF 50-1/4" WHEN PIECE MARKED ⑤ IS DOUBLED.
3. THE CENTER CLEAT, SHOWN AS PIECE MARKED ④, WILL BE 28" LONG FOR AN 8'-6" WIDE CAR, 36" LONG FOR A 9'-2", AND 38" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.
4. REFER TO PAGE 24 FOR A TYPICAL INSTALLATION OF A K-BRACE.

**KEY NUMBERS**

- ① SUPPORT CLEAT, 2" X 4" X 10-1/2" (2 REQD). FOR LENGTHWISE LOADED CONTAINERS, POSITION VERTICALLY AS SHOWN SO AS TO CENTER PIECES MARKED ② AND ③ ON THE JOINT BETWEEN THE BOTTOM TWO LAYERS OF CONTAINERS ON THE UNITS. FOR CROSSWISE LOADED CONTAINERS, POSITION HORIZONTALLY 1" ABOVE THE LOWER PALLET UNIT AND NAIL TO THE CAR SIDEWALL W/3-12d NAILS.
- ② LOAD BEARING PIECE, 2" X 6" BY CAR WIDTH (CUT TO FIT) (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/1-12d NAIL EVERY 6". SEE GENERAL NOTES "M" AND "N" ON PAGE 2.
- ③ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH (CUT TO FIT) (2 REQD).
- ④ CENTER CLEAT, 2" X 4" X 36" (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/7-16d NAILS. SEE SPECIAL NOTE 3 AT LEFT.
- ⑤ HORIZONTAL WALL CLEAT, 2" X 6" X 72" (4 REQD). NAIL TO THE CAR SIDEWALL W/16-12d NAILS.
- ⑥ POCKET CLEAT, 2" X 6" X 18" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/7-16d NAILS.
- ⑦ DIAGONAL BRACE, 4" X 4" X 50-1/4" (4 REQD). SEE THE DETAIL BELOW FOR BEVEL CUTS REQUIRED. TOENAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, AND TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/1-60d NAIL AT EACH END.
- ⑧ BACK-UP CLEAT, 2" X 6" X 30" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/14-16d NAILS.
- ⑨ SPACER CLEAT, 2" X 4" X 19-3/4" FOR A LENGTHWISE LOAD, 2" X 4" X 30" FOR A CROSSWISE LOAD (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑩ HOLD-DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑪ VERTICAL BACK-UP CLEAT, 2" X 6" BY UNIT HEIGHT (2 REQD). NAIL TO THE CAR SIDEWALL W/8-12d NAILS.

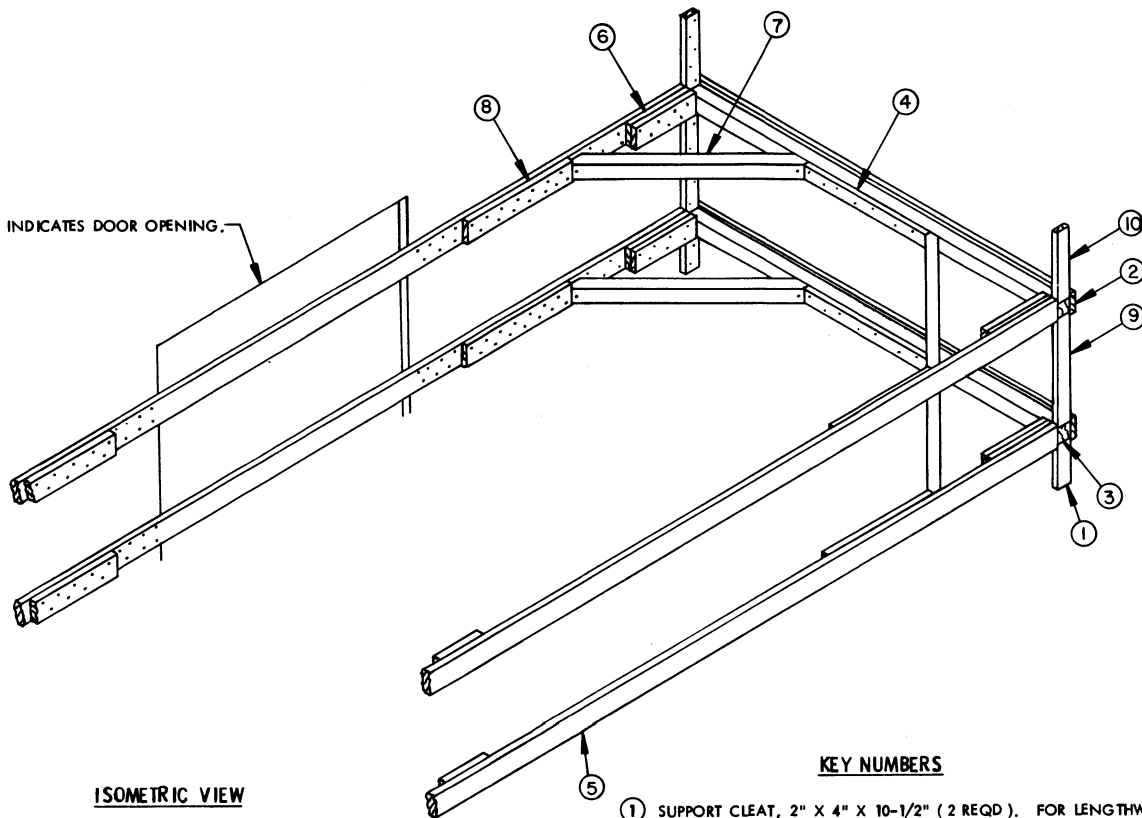


THIS BEARING SURFACE MUST BE POSITIONED SO AS TO BE IN CONTACT WITH A CROSS CAR BRACE, PIECE MARKED ③, OR A HORIZONTAL WALL CLEAT, PIECE MARKED ⑤.

**DIAGONAL BRACE**

SEE SPECIAL NOTE 2 ABOVE.

**TYPE "B" K-BRACE**



ISOMETRIC VIEW

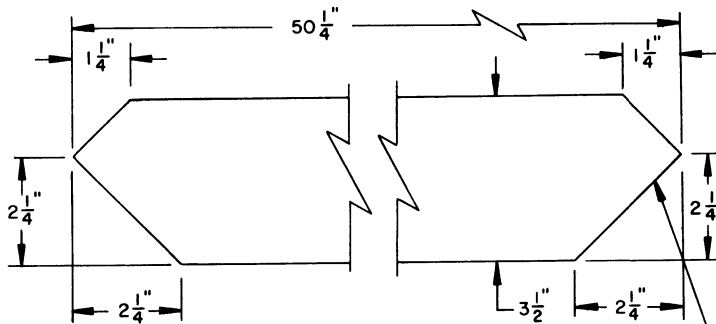
KEY NUMBERS

- ① SUPPORT CLEAT, 2" X 4" X 10-1/2" (2 REQD). FOR LENGTHWISE LOADED CONTAINERS, POSITION VERTICALLY AS SHOWN SO AS TO CENTER PIECES MARKED ② AND ③ ON THE JOINT BETWEEN THE BOTTOM TWO LAYERS OF CONTAINERS ON THE UNITS. FOR CROSSWISE LOADED CONTAINERS, POSITION HORIZONTALLY 1" ABOVE THE LOWER PALLET UNIT AND NAIL TO THE CAR SIDEWALL W/3-12d NAILS.
- ② LOAD BEARING PIECE, 2" X 6" BY CAR WIDTH (CUT TO FIT) (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/1-12d NAIL EVERY 6". SEE GENERAL NOTES "M" AND "N" ON PAGE 2.
- ③ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH (CUT TO FIT) (2 REQD).
- ④ CENTER CLEAT, 2" X 4" X 36" (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/7-16d NAILS. SEE SPECIAL NOTE 3 AT LEFT.
- ⑤ HORIZONTAL WALL CLEAT, 2" X 6" BY CUT TO FIT (4 REQD). A CLEAT WILL BE OF A LENGTH AS NECESSARY TO EXTEND ACROSS AND FAR ENOUGH PAST THE DOOR OPENINGS TO CONTACT PIECE MARKED ③ OF THE K-BRACE IN THE OPPOSITE END OF THE CAR. NAIL TO THE CAR SIDEWALL W/40-12d NAILS.
- ⑥ POCKET CLEAT, 2" X 6" X 18" (DOUBLED) (4 REQD). NAIL THE FIRST PIECE TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/7-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER.
- ⑦ DIAGONAL BRACE, 4" X 4" X 50-1/4" (4 REQD). SEE THE DETAIL BELOW FOR BEVEL CUTS REQUIRED. TOENAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, AND TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/1-60d NAIL AT EACH END.
- ⑧ BACK-UP CLEAT, 2" X 6" X 30" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/14-16d NAILS.
- ⑨ SPACER CLEAT, 2" X 4" X 19-3/4" FOR A LENGTHWISE LOAD, 2" X 4" X 30" FOR A CROSSWISE LOAD (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑩ HOLD-DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.

SPECIAL NOTES:

1. THE TYPE "C" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN TEN (10) PALLET UNITS. IF IT IS NECESSARY TO BLOCK MORE THAN TEN PALLET UNITS, REFER TO THE DETAIL ON PAGE 27 FOR THE APPLICABLY SIZED K-BRACE TO USE AND THE DESIGN SPECIFICATIONS FOR THE BRACE. IF THE PARTIAL TIER TO BE BRACED IS ONLY SIX PALLET UNITS, THE TYPE "B" K-BRACE DEPICTED ON PAGE 25 MAY BE USED. IF THE PARTIAL TIER IS ONLY ONE, TWO, OR FOUR PALLET UNITS, THE TYPE "A" K-BRACE DEPICTED ON PAGE 24 WILL BE ADEQUATE.
2. **CAUTION:** SOME CARS ARE NOT SUITED FOR THE APPLICATION OF "PARTIAL-LAYER BRACING" BECAUSE THE LENGTH OF THE PARTIAL TIER TO BE SHIPPED AND/OR THE SIZE OR CONFIGURATION OF THE CAR DOORS WILL NOT PERMIT PROPER INSTALLATION OF THE SPECIFIED K-BRACE DUNNAGE. PIECES MARKED ①, ②, ③, ④, ⑨, AND ⑩ MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDEWALL. IT IS ALRIGHT FOR THE ENDS OF THE DIAGONAL BRACES MARKED ⑦ TO BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE ADJACENT PIECE MARKED ⑤ MUST BE DOUBLED. LAMINATE THE SECOND PIECE TO THE FIRST W/40-16d NAILS. CLINCH THOSE NAILS WHICH PROTRUDE THRU THE HORIZONTAL WALL CLEAT WITHIN THE DOOR OPENING. NOTE THAT THE DIAGONAL BRACE WILL BE 49-1/8" LONG IN LIEU OF 50-1/4" WHEN PIECE MARKED ⑤ IS DOUBLED.

(CONTINUED AT RIGHT)



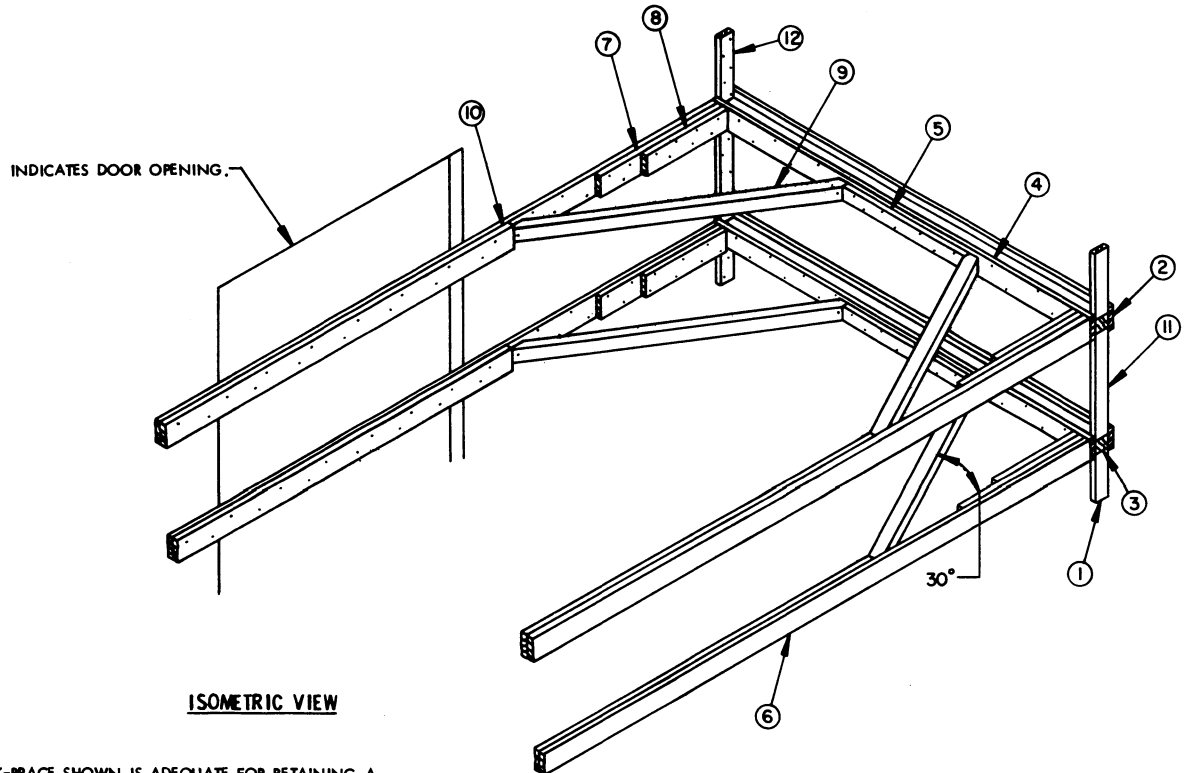
DIAGONAL BRACE

SEE SPECIAL NOTE 2 ABOVE

THIS BEARING SURFACE MUST BE POSITIONED SO AS TO BE IN CONTACT WITH A CROSS CAR BRACE, PIECE MARKED ③, OR A HORIZONTAL WALL CLEAT, PIECE MARKED ⑤.

(SPECIAL NOTES CONTINUED)

3. THE CENTER CLEAT, SHOWN AS PIECE MARKED ④, WILL BE 28" LONG FOR AN 8'-6" WIDE CAR, 36" LONG FOR A 9'-2", AND 38" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.
4. **CAUTION:** A TYPE "C" K-BRACE MUST BE USED IN BOTH ENDS OF THE CAR; THE BRACE IS NOT DESIGNED FOR USE IN ONLY ONE END. NOTE THAT EXCEPT FOR PIECES MARKED ⑤, THE QUANTITIES SPECIFIED ARE APPLICABLE ONLY FOR THE BRACE IN ONE END.



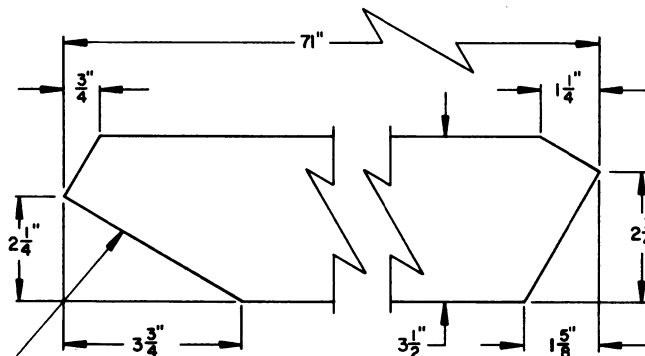
ISOMETRIC VIEW

SPECIAL NOTES:

1. THE TYPE "D" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN TWELVE (12) PALLET UNITS. IF THE PARTIAL TIER TO BE BRACED IS ONLY TEN PALLET UNITS, THE TYPE "C" K-BRACE DEPICTED ON PAGE 26 MAY BE USED. IF SIX PALLET UNITS ARE TO BE SHIPPED, THE TYPE "B" K-BRACE DEPICTED ON PAGE 25 MAY BE USED. IF THE PARTIAL TIER IS ONLY ONE, TWO OR FOUR PALLET UNITS, THE TYPE "A" K-BRACE DEPICTED ON PAGE 24 WILL BE ADEQUATE.
2. **CAUTION:** SOME CARS ARE NOT SUITED FOR THE APPLICATION OF "PARTIAL-LAYER BRACING" BECAUSE THE LENGTH OF THE PARTIAL TIER TO BE SHIPPED AND/OR THE SIZE OR CONFIGURATION OF THE CAR DOORS WILL NOT PERMIT PROPER INSTALLATION OF THE SPECIFIED K-BRACE DUNNAGE. PIECES MARKED ①, ②, ③, ④, ⑦, ⑧, ⑩, AND ⑫ MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDEWALL. IT IS ALRIGHT FOR THE ENDS OF THE DIAGONAL BRACES MARKED ⑨ TO BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE ADJACENT PIECE MARKED ⑥ MUST BE DOUBLED. LAMINATE THE SECOND PIECE TO THE FIRST W/40-16d NAILS. CLINCH THOSE NAILS WHICH PROTRUDE THRU THE HORIZONTAL WALL CLEAT WITHIN THE DOOR OPENING. NOTE THAT THE DIAGONAL BRACE WILL BE 70-1/4" LONG IN LIEU OF 71" LONG WHEN PIECE MARKED ⑥ IS DOUBLED.
3. THE CENTER CLEAT, SHOWN AS PIECE MARKED ⑤, WILL BE 28" LONG FOR AN 8'-6" WIDE CAR, 36" LONG FOR A 9'-2", AND 38" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.
4. **CAUTION:** A TYPE "D" K-BRACE MUST BE USED IN BOTH ENDS OF THE CAR; THE BRACE IS NOT DESIGNED FOR USE IN ONLY ONE END. NOTE THAT EXCEPT FOR PIECES MARKED ④ AND ⑩, THE QUANTITIES SPECIFIED ARE APPLICABLE ONLY FOR THE BRACE IN ONE END.

KEY NUMBERS

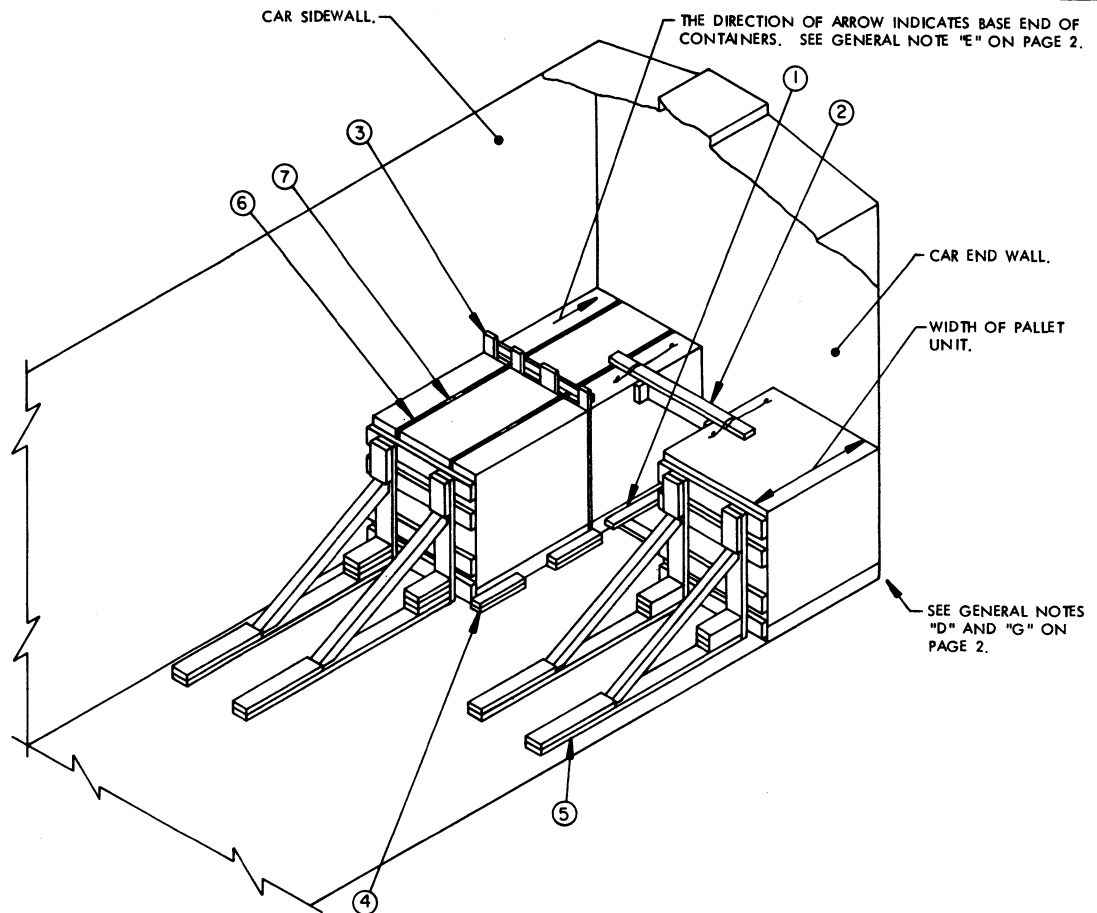
- ① SUPPORT CLEAT, 2" X 4" X 10-1/2" (2 REQD). FOR LENGTHWISE LOADED CONTAINERS, POSITION VERTICALLY AS SHOWN SO AS TO CENTER PIECES MARKED ② AND ③ ON THE JOINT BETWEEN THE BOTTOM TWO LAYERS OF CONTAINERS ON THE UNIT. FOR CROSSWISE LOADED CONTAINERS, POSITION HORIZONTALLY 1" ABOVE THE LOWER PALLET UNIT AND NAIL TO THE CAR SIDEWALL W/3-12d NAILS.
- ② LOAD BEARING PIECE, 2" X 6" BY CAR WIDTH (CUT-TO-FIT) (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/1-12d NAIL EVERY 6". SEE GENERAL NOTES "M" AND "N" ON PAGE 2.
- ③ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH (CUT TO FIT) (2 REQD).
- ④ HORIZONTAL PIECE, 2" X 6" BY CAR WIDTH (CUT TO FIT) ( 2 REQD ). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/1-12d NAIL EVERY 6".
- ⑤ CENTER CLEAT, 2" X 4" X 36" (2 REQD). NAIL TO THE HORIZONTAL PIECE, PIECE MARKED ④, W/7-16d NAILS. SEE SPECIAL NOTE 3 AT LEFT.
- ⑥ HORIZONTAL WALL CLEAT, 2" X 6" BY CUT TO FIT ( 4 REQD ). A CLEAT WILL BE OF A LENGTH AS NECESSARY TO EXTEND ACROSS AND FAR ENOUGH PAST THE DOOR OPENING TO CONTACT PIECE MARKED ④ OF THE K-BRACE IN THE OPPOSITE END OF THE CAR. NAIL TO THE CAR SIDEWALL W/40-12d NAILS.
- ⑦ POCKET CLEAT, 2" X 6" X 36" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑥, W/ 10-16d NAILS.
- ⑧ POCKET CLEAT, 2" X 6" X 24" (4 REQD). NAIL TO THE POCKET CLEAT, PIECE MARKED ⑦, W/7-16d NAILS.
- ⑨ DIAGONAL BRACE, 4" X 4" X 71" (4 REQD). SEE THE DETAIL BELOW FOR BEVEL CUTS REQUIRED. TOENAIL TO THE HORIZONTAL PIECE, PIECE MARKED ④, AND TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑥, W/1-60d NAIL AT EACH END.
- ⑩ BACK-UP CLEAT, 2" X 6" BY CUT TO FIT (4 REQD). A CLEAT WILL BE OF A LENGTH AS NECESSARY TO EXTEND TO CONTACT THE DIAGONAL BRACE, PIECE MARKED ⑨, IN THE OPPOSITE END OF THE CAR. NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑥, W/18-16d NAILS. CLINCH THOSE NAILS WHICH PROTRUDE THRU THE HORIZONTAL WALL CLEAT WITHIN THE DOOR OPENING, IF APPLICABLE.
- ⑪ SPACER CLEAT, 2" X 4" X 19-3/4" FOR A LENGTHWISE LOAD, 2" X 4" X 30" FOR A CROSSWISE LOAD (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑫ HOLD-DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.



DIAGONAL BRACE  
SEE SPECIAL NOTE 2 ABOVE

THIS BEARING SURFACE MUST BE POSITIONED SO AS TO BE IN CONTACT WITH A HORIZONTAL WALL CLEAT, PIECE MARKED ⑥.

TYPE "D" K-BRACE



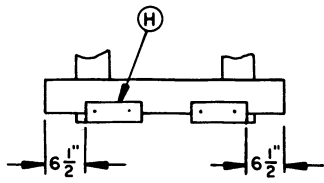
**SPECIAL NOTES:**

**ISOMETRIC VIEW**

1. A 9'-2" WIDE WOOD-LINED CONVENTIONAL TYPE BOX CAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS AND CARS HAVING METAL LININGS CAN BE USED.
2. THE LOAD SHOWN DEPICTING THE KNEE BRACE METHOD OF PARTIAL-LAYER BRACING IS TYPICAL. THE QUANTITY MAY BE ADJUSTED TO SUIT, PROVIDED THE LIMITATIONS OF THE KNEE BRACE AS SET FORTH IN SPECIAL NOTE 3 ARE NOT EXCEEDED.
3. A KNEE BRACE ASSEMBLY WILL BE USED FOR EACH ROW OF PALLET UNITS. ONE (1) KNEE BRACE ASSEMBLY IS ADEQUATE FOR RETAINING A MAXIMUM LCL LOAD OF NOT MORE THAN 8,500 POUNDS.
4. THE KNEE BRACE METHOD OF PARTIAL-LAYER BRACING IS ONLY APPLICABLE FOR LOADS OF LENGTHWISE-POSITIONED CONTAINERS.

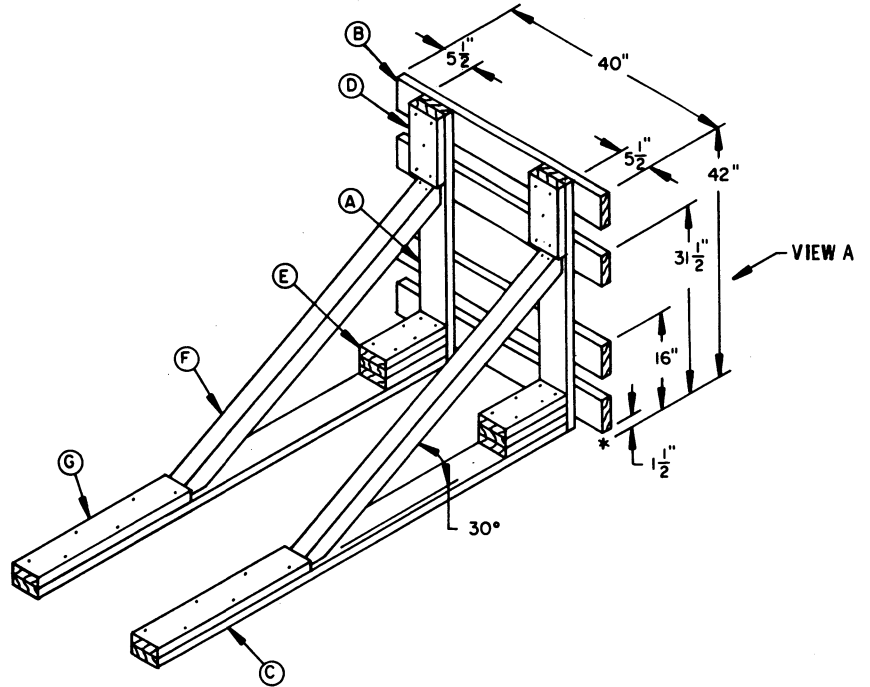
**KEY NUMBERS**

- ① ANTI-SWAY BRACE (1 REQD). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 37.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (1 REQD). SEE THE DETAIL ON PAGE 37. WIRE TIE TO THE INNER TWO TIEDOWN STRAPS AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON PAGE 43.
- ③ SEPARATOR GATE (1 REQD). SEE THE "SEPARATOR GATE B" DETAIL ON PAGE 39. POSITION WITH THE HORIZONTAL PIECES AGAINST THE ALREADY LOADED UNITS.
- ④ SIDE BLOCKING, 2" X 4" X 18" (DOUBLED) (2 REQD). POSITION AS SHOWN WITH ONE TO EXTEND PAST THE END OF THE UNIT AND THE SEPARATOR GATE, PIECE MARKED ③, POSITION THE OTHER AT THE OPPOSITE END OF THE UNIT WITH THE END EVEN WITH THE BOTTOM HORIZONTAL PIECE OF THE KNEE BRACE.
- ⑤ KNEE BRACE ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 29.
- ⑥ BUNDLING STRAP, 1-1/4" X .031" OR .035" X 23'-0" LONG STEEL STRAPPING (2 REQD). PRE-POSITION. NOTE THAT STRAPPING MUST EXTEND UNDER THE DECK BOARDS OF THE PALLET AND MUST BE THREADED THRU THE SEPARATOR GATE, PIECE MARKED ③.
- ⑦ SEAL FOR 1-1/4" STEEL STRAPPING (4 REQD, 2 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "O" ON PAGE 2.



**VIEW A**

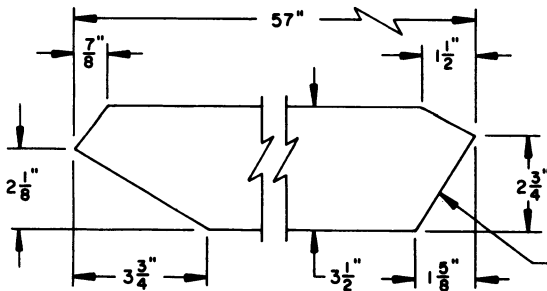
FOR LENGTHWISE-POSITIONED CONTAINERS



**KNEE BRACE ASSEMBLY**

**KEY LETTERS**

- (A) VERTICAL PIECE, 2" X 6" X 42" (2 REQD).
- (B) HORIZONTAL PIECE, 2" X 6" X 40" (4 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT. SEE GENERAL NOTES "M" AND "N" ON PAGE 2.
- (C) FLOOR CLEAT, 2" X 6" X 6'-8" (2 REQD). ALIGN WITH A VERTICAL PIECE AND NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8". SEE GENERAL NOTE "R" ON PAGE 2.
- (D) HOLD-DOWN CLEAT, 2" X 6" X 12" (2 REQD). NAIL TO THE VERTICAL PIECE W/5-10d NAILS.
- (E) POCKET CLEAT, 2" X 6" X 12" (TRIPLED) (2 REQD). NAIL THE FIRST PIECE TO THE FLOOR CLEAT, PIECE MARKED (C), W/4-16d NAILS. NAIL EACH ADDITIONAL PIECE IN A LIKE MANNER AND TOENAIL THE THIRD PIECE TO THE VERTICAL PIECE, PIECE MARKED (A), W/2-16d NAILS.
- (F) BRACE, 4" X 4" X 57" (2 REQD). SEE THE DETAIL BELOW FOR BEVEL CUTS: REQUIRED. TOENAIL TO THE VERTICAL PIECES AND TO THE FLOOR CLEAT, PIECES MARKED (A) AND (C), W/2-16d NAILS AT EACH END.
- (G) BACK-UP CLEAT, 2" X 6" X 30" (2 REQD). NAIL TO THE FLOOR CLEAT, PIECE MARKED (C), W/6-40d NAILS.
- (H) HOLD-DOWN CLEAT, 2" X 4" X 9" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE BOTTOM HORIZONTAL PIECE W/2-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE "VIEW A" ABOVE FOR PLACEMENT.



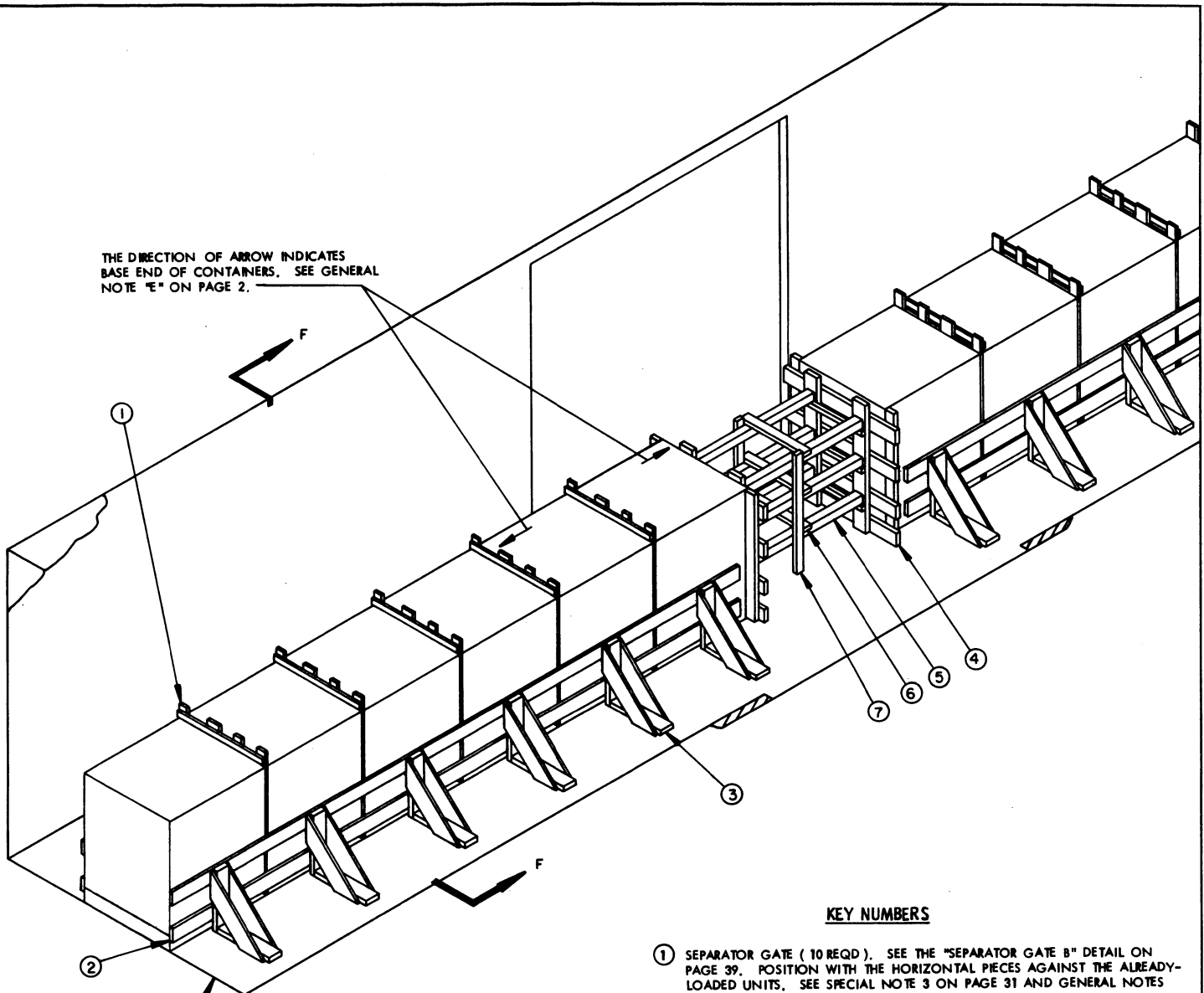
**BRACE**

4" X 4" MATERIAL

THE BRACE MUST BE INSTALLED SO THAT THIS BEARING SURFACE WILL BE IN CONTACT WITH THE VERTICAL PIECE MARKED (A).

**TYPICAL LCL LOAD USING KNEE BRACE METHOD OF PARTIAL-LAYER BRACING**

THE DIRECTION OF ARROW INDICATES  
BASE END OF CONTAINERS. SEE GENERAL  
NOTE "E" ON PAGE 2.

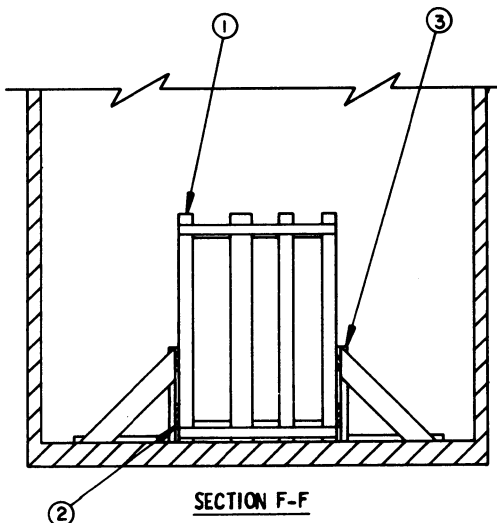


SEE GENERAL NOTES "D"  
AND "G" ON PAGE 2.

**ISOMETRIC VIEW**

**KEY NUMBERS**

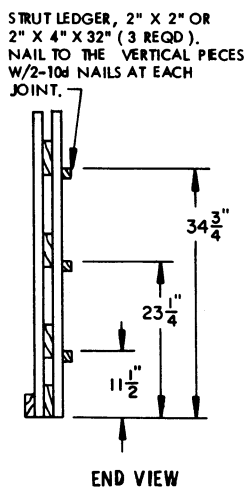
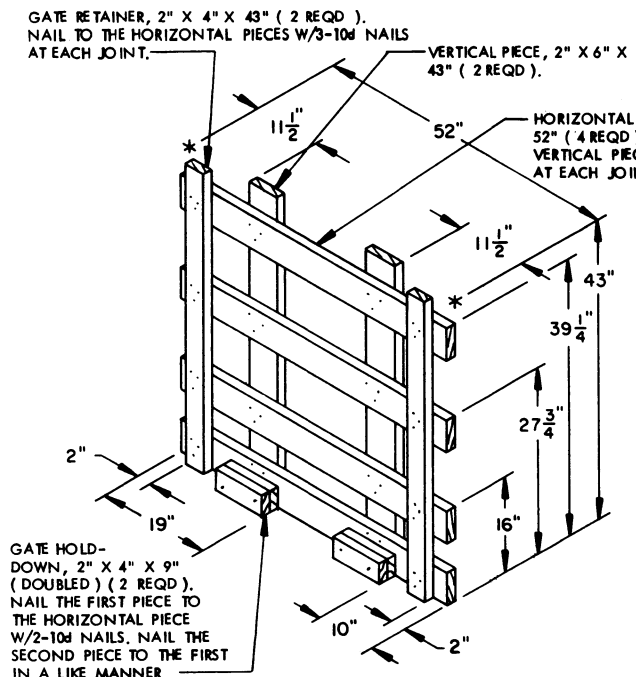
- ① SEPARATOR GATE ( 10 REQD ). SEE THE "SEPARATOR GATE B" DETAIL ON PAGE 39. POSITION WITH THE HORIZONTAL PIECES AGAINST THE ALREADY-LOADED UNITS. SEE SPECIAL NOTE 3 ON PAGE 31 AND GENERAL NOTES "M" AND "N" ON PAGE 2.
- ② HORIZONTAL PIECE, 1" X 6" BY A LENGTH TO SUIT ( 8 REQD ). NAIL TO THE VERTICAL PIECES OF THE LCL BRACES W/3-6d NAILS AT EACH JOINT PRIOR TO PLACEMENT AGAINST THE LADING. SEE THE "LCL BRACE" DETAIL ON PAGE 32 FOR HEIGHT LOCATION GUIDANCE.
- ③ LCL BRACE ( 24 REQD ). SEE THE DETAIL ON PAGE 32 AND SPECIAL NOTE 4 ON PAGE 31. NAIL TO THE CAR FLOOR W/7-16d NAILS. SEE GENERAL NOTE "R" ON PAGE 2.
- ④ CENTER GATE ( 2 REQD ). SEE THE "CENTER GATE E" DETAIL ON PAGE 31. SEE SPECIAL NOTES 2 AND 3 ON PAGE 31.
- ⑤ STRUT, 4" X 4" BY CUT TO FIT ( REF. 58-1/2" ) ( 6 REQD ). TOENAIL TO PIECES MARKED ④ W/2-16d NAILS AT EACH END. SEE GENERAL NOTE "L" ON PAGE 2 AND GENERAL NOTE "U" ON PAGE 3. SEE SPECIAL NOTES 2 AND 3 ON PAGE 31.
- ⑥ HORIZONTAL STRUT BRACING, 2" X 4" X 30" ( 3 REQD ). NAIL TO THE STRUTS, PIECES MARKED ⑤, W/3-10d NAILS AT EACH JOINT. SEE GENERAL NOTE "T" ON PAGE 2.
- ⑦ VERTICAL STRUT BRACING, 2" X 4" X 45" ( 2 REQD ). NAIL TO THE STRUTS, PIECES MARKED ⑤, W/3-10d NAILS AT EACH JOINT.



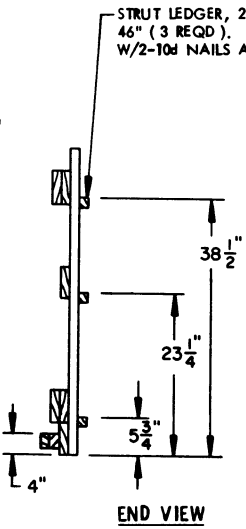
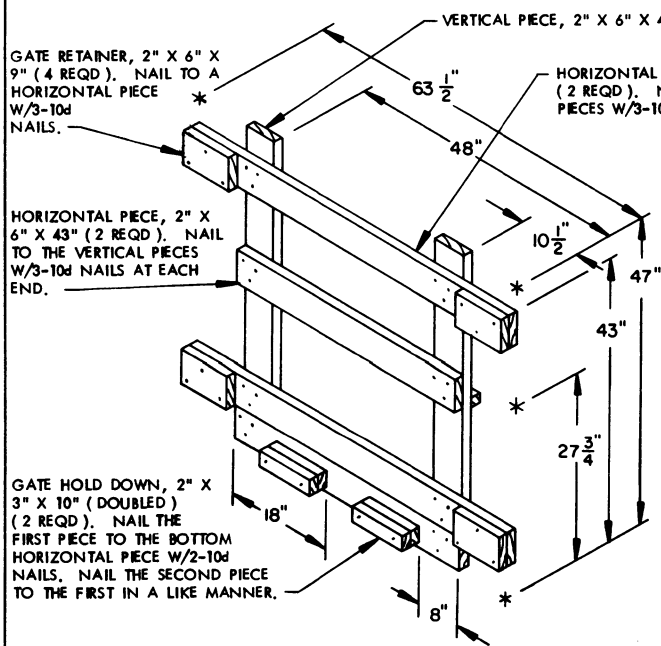
**SECTION F-F**

**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOX CAR IS SHOWN. CARS OF OTHER WIDTHS AND LENGTHS CAN BE USED. SEE SPECIAL NOTE 2.
2. A 1-WIDE LENGTHWISE LOAD IN A 50'-6" LONG CAR IS SHOWN AS TYPICAL. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR A 10-UNIT LENGTHWISE LOAD IN A 40'-6" LONG CAR. A 15-UNIT LOAD MAY BE SHIPPED IN A 60'-8" LONG CAR.
3. ONE-WIDE LOADING PROCEDURES ARE ALSO APPLICABLE FOR CROSSWISE LOADS. ELEVEN (11) PALLET UNITS CAN BE LOADED IN A 40'-6" LONG CAR, FOURTEEN (14) CAN BE LOADED IN A 50'-6" LONG CAR, AND SEVENTEEN (17) CAN BE LOADED IN A 60'-8" LONG CAR. SEPARATOR GATES WILL NOT BE REQUIRED. CENTER GATE "F" WILL BE USED IN ALL LENGTH CARS.
4. ONE (1) LCL BRACE WILL BE USED AT EACH SIDE OF EACH PALLET UNIT. FOR CROSSWISE PALLET UNITS, THE BRACES WILL BE CENTERED ON THE LENGTH OF THE UNIT. FOR LENGTHWISE UNITS, THE BRACES WILL BE LOCATED NEAR THE CENTER OF THE UNIT WIDTH, WITH SLIGHT ADJUSTMENTS AS NECESSARY TO ALIGN A BRACE WITH THE CENTER COLLAR OF THE CONTAINER.
5. THE BILL OF MATERIAL AND LOAD AS SHOWN ARE BASED ON THE DEPICTED UNIT POSITIONING AND THEREFORE ARE ONLY TYPICAL.



**CENTER GATE E**  
FOR A CONTAINERS-LENGTHWISE LOAD.



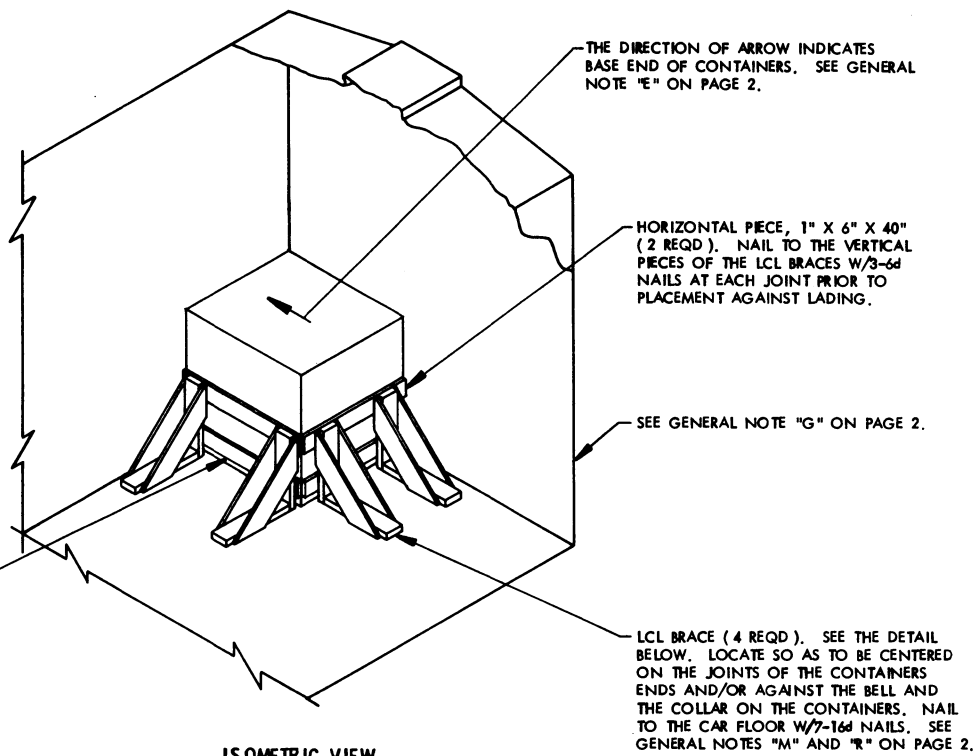
**CENTER GATE F**  
FOR A CONTAINERS-CROSSWISE LOAD.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 3"	67	17
1" X 4"	125	42
1" X 6"	347	174
2" X 2"	16	6
2" X 4"	36	24
2" X 6"	145	145
4" X 4"	30	40
NAILS	NO. REQD	POUNDS
6d (2")	384	2-1/2
8d (2-1/2")	288	3-1/4
10d (3")	172	2-3/4
16d (3-1/2")	240	5-1/4

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT ( APPROX )
PALLET UNIT	12	23,988 LBS
DUNNAGE		910 LBS

TOTAL WEIGHT----- 24,898 LBS ( APPROX )

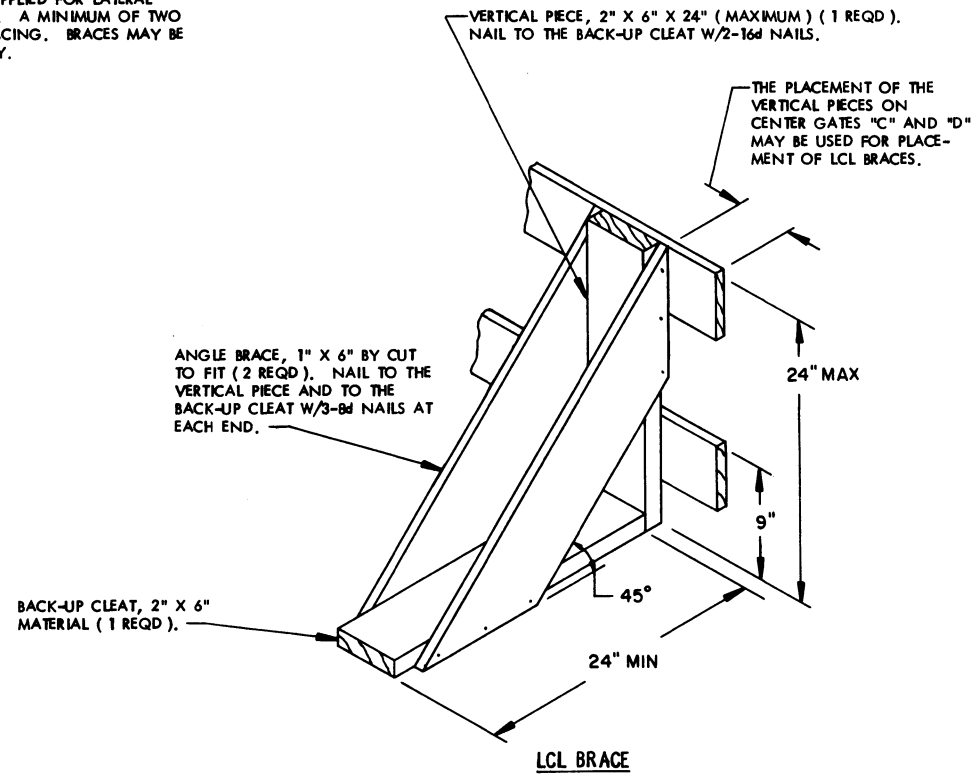


**ISOMETRIC VIEW**

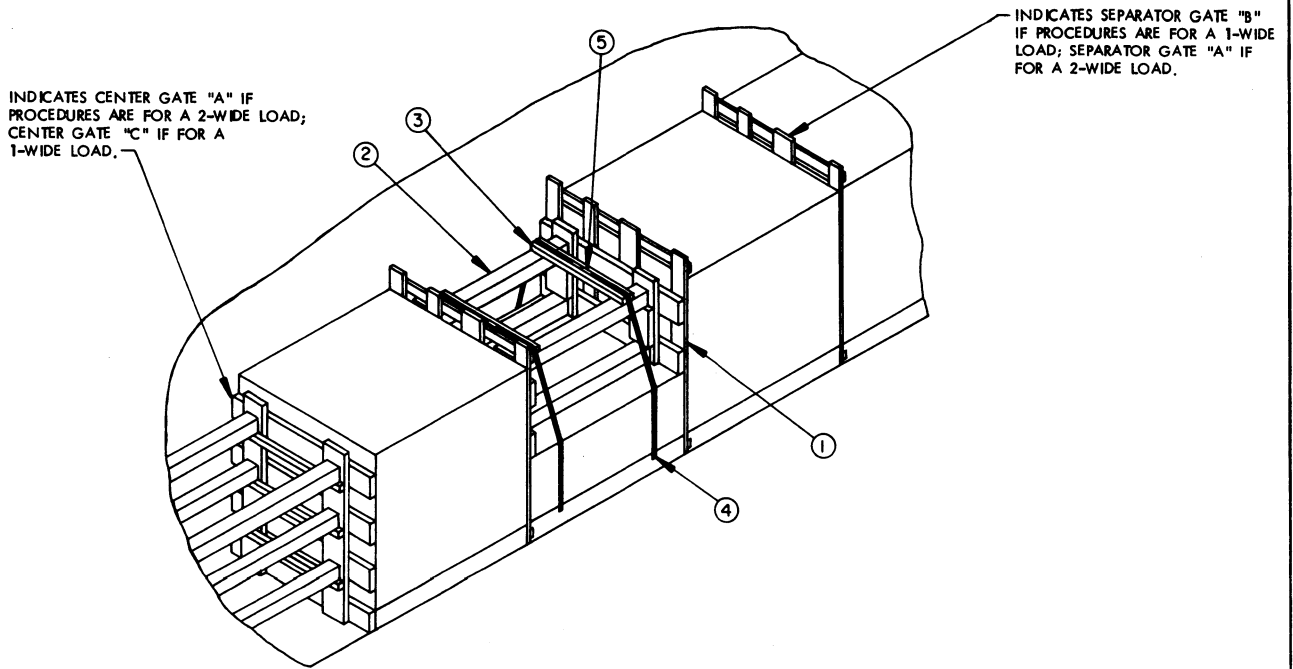
HORIZONTAL PIECE, 1" X 6" X 44-1/2" (2 REQD). NAIL TO THE VERTICAL PIECES OF THE LCL BRACES W/3-6d NAILS AT EACH JOINT PRIOR TO PLACEMENT AGAINST LADING.

**SPECIAL NOTES:**

1. A 9'-2" WIDE WOOD-LINED CONVENTIONAL TYPE BOX CAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED. SEE GENERAL NOTES "D" AND "Q" ON PAGE 2.
2. THE LOAD SHOWN DEPICTING THE LCL BRACE METHOD OF PARTIAL-LAYER BRACING IS TYPICAL. A CROSSWISE UNIT IS SHOWN, HOWEVER, THE PROCEDURES ARE ALSO APPLICABLE FOR LENGTHWISE UNITS AND FOR OTHER QUANTITIES AS LONG AS THE CAPACITY OF THE BRACES IS NOT EXCEEDED. SEE SPECIAL NOTE 3.
3. EACH LCL BRACE AS APPLIED FOR LONGITUDINAL BRACING WILL RETAIN 2,000 POUNDS OF LADING. EACH LCL BRACE AS APPLIED FOR LATERAL BRACING WILL SUPPORT 8,000 POUNDS OF LADING. A MINIMUM OF TWO (2) BRACES MUST BE USED FOR LONGITUDINAL BRACING. BRACES MAY BE ADDED FOR LONGITUDINAL BRACING AS NECESSARY.







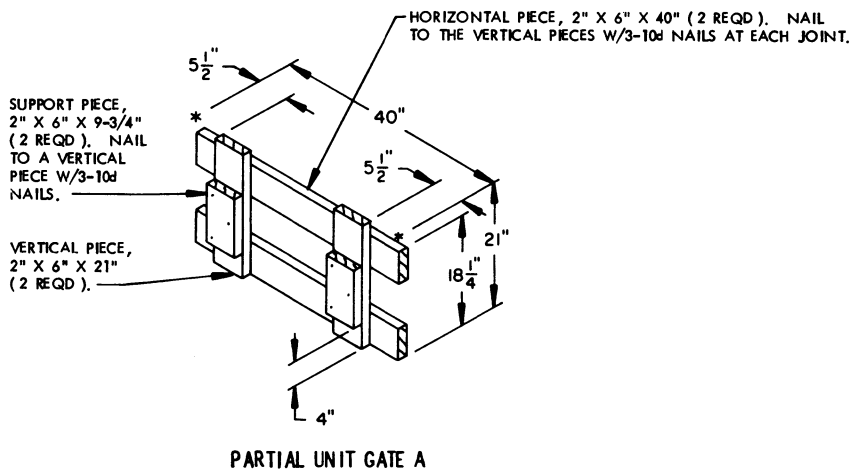
**POSITIONING OF PARTIAL LENGTHWISE UNIT WITHIN A LAYER**

**SPECIAL NOTES:**

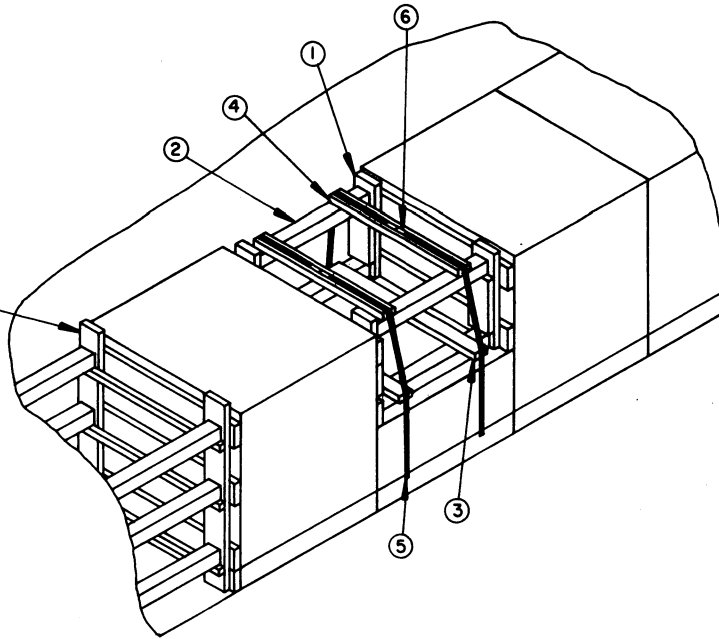
1. SHIPMENTS OF COMPLETE ROUNDS SHOULD CONSIST OF FULL-HEIGHT AND FULL-LAYER UNITS TO THE MAXIMUM EXTENT POSSIBLE, HOWEVER, THE END OF A LOT OR THE QUANTITY OF ITEMS NEEDED TO FILL A REQUISITION, MAY NECESSITATE THE SHIPMENT OF ONE OR MORE LESS-THAN-FULL PALLET UNITS WITHIN A LOAD. THE PROCEDURES ON THIS PAGE ARE PRESENTED AS GUIDANCE IN THE SHIPMENT OF A PARTIAL UNIT WITHIN A 1-LAYER LENGTHWISE LOAD. THE PRINCIPLES MAY ALSO BE APPLIED FOR SHIPMENT OF A PARTIAL PALLET UNIT IN THE SECOND LAYER.
2. A LESS-THAN-FULL HEIGHT PALLET UNIT OF LENGTHWISE-POSITIONED COMPLETE ROUNDS WHICH IS TO BE SHIPPED WITHIN A LAYER OF A LOAD WILL BE LIMITED TO NOT LESS THAN TWO (2) LAYERS OF CONTAINERS ON THE PARTIAL UNIT. THE DEPICTED PROCEDURES SHOW THE BRACING OF A 2-LAYER UNIT WITHIN A LOAD. THE PRINCIPLES CAN BE ADAPTED TO SUIT 3 AND 4-LAYER PARTIAL UNITS.
3. A PARTIAL UNIT MUST CONSIST OF FULL LAYERS OF FIVE (5) CONTAINERS, OR AN APPROVED FILLER ASSEMBLY, AS DETAILED BY DRAWING 19-48-4079/7-20PM1002, MUST BE INSTALLED IN THE PLACE OF THE OMITTED CONTAINERS.
4. THE FILLERS AS REFERENCED IN SPECIAL NOTE 3 SHOULD REMAIN WITH THE UNIT DURING STORAGE ( IF APPLICABLE ) FOR POSSIBLE USE IN A FUTURE SHIPMENT; THE DUNNAGE DEPICTED ABOVE FOR THE SHIPMENT OF THE PARTIAL UNIT MAY BE REMOVED WHEN A SHIPMENT REACHES ITS DESTINATION.
5. THE "POSITIONING OF PARTIAL LENGTHWISE UNIT WITHIN A LAYER" VIEW ABOVE DEPICTS A PORTION OF A CONVENTIONAL BOX CAR LOAD, HOWEVER, THE PROCEDURES ARE ALSO APPLICABLE FOR LOADS IN CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.
6. THE PARTIAL-UNIT PROCEDURES SHOULD BE APPLIED NEAR THE CENTER OF THE CAR LENGTH, BUT NOT IN THE DOORWAY AREA. ALSO, THERE SHOULD BE AT LEAST ONE (1) LOAD UNIT BETWEEN THE PARTIAL UNIT AND A CENTER GATE.

**KEY NUMBERS**

- ① PARTIAL-UNIT GATE ( 2 REQD ). SEE THE "PARTIAL-UNIT GATE A" DETAIL BELOW. SEE GENERAL NOTES "M" AND "N" ON PAGE 2 AND SPECIAL NOTE 2 AT LEFT.
- ② STRUT, 4" X 4" X 38-1/2" ( 4 REQD ). TOENAIL TO THE VERTICAL PIECES OF THE PARTIAL-UNIT GATE, PIECE MARKED ①, W/2-16d NAILS AT EACH END.
- ③ STRAPPING BOARD, 2" X 4" X 27" ( 2 REQD ). NAIL TO THE STRUTS, PIECES MARKED ②, W/3-10d NAILS AT EACH END.
- ④ UNITIZING STRAP, 1-1/4" X .031" OR .035" X 15'-0" LONG STEEL STRAPPING ( 2 REQD ). PRE-POSITION THRU THE FORKLIFT OPENINGS OF THE PALLET.
- ⑤ SEAL FOR 1-1/4" STRAPPING ( 4 REQD, 2 PER JOINT ). SEE GENERAL NOTE "O" ON PAGE 2.



INDICATES CENTER GATE "B" IF PROCEDURES ARE FOR A 2-WIDE LOAD; CENTER GATE "D" IF FOR A 1-WIDE LOAD.



**POSITIONING OF PARTIAL CROSSWISE UNIT WITHIN A LOAD**

**SPECIAL NOTES:**

1. SHIPMENT OF COMPLETE ROUNDS SHOULD CONSIST OF FULL-HEIGHT AND FULL-LAYER UNITS TO THE MAXIMUM EXTENT POSSIBLE, HOWEVER, THE END OF A LOT OR THE QUANTITY OF ITEMS NEEDED TO FILL A REQUISITION, MAY NECESSITATE THE SHIPMENT OF ONE OR MORE LESS-THAN-FULL PALLET UNITS WITHIN A LOAD. THE PROCEDURES ON THIS PAGE ARE PRESENTED AS GUIDANCE IN THE SHIPMENT OF A PARTIAL UNIT WITHIN A 1-LAYER CROSSWISE LOAD. THE PRINCIPLES MAY ALSO BE APPLIED FOR SHIPMENT OF A PARTIAL PALLET UNIT IN THE SECOND LAYER.
2. A LESS-THAN-FULL HEIGHT PALLET UNIT OF CROSSWISE-POSITIONED COMPLETE ROUNDS WHICH IS TO BE SHIPPED WITHIN A LAYER OF A LOAD WILL BE LIMITED TO NOT LESS THAN TWO (2) LAYERS OF CONTAINERS ON THE PARTIAL UNIT. THE DEPICTED PROCEDURES SHOW THE BRACING OF A 2-LAYER UNIT WITHIN A LOAD. THE PROCEDURES ALSO APPLY TO SHIPMENTS OF 3 OR 4-LAYER PARTIAL UNITS.
3. A PARTIAL UNIT MUST CONSIST OF FULL LAYERS OF FIVE (5) CONTAINERS, OR AN APPROVED FILLER ASSEMBLY, AS DETAILED BY DRAWING 19-48-4079/7-20PM1002, MUST BE INSTALLED IN PLACE OF THE OMITTED CONTAINERS.
4. THE FILLERS AS REFERENCED IN SPECIAL NOTE 3 SHOULD REMAIN WITH THE UNIT DURING STORAGE (IF APPLICABLE) FOR POSSIBLE USE IN A FUTURE SHIPMENT. THE DUNNAGE DEPICTED ABOVE FOR THE SHIPMENT OF THE PARTIAL UNIT MAY BE REMOVED WHEN A SHIPMENT REACHES DESTINATION.
5. THE "POSITIONING OF PARTIAL CROSSWISE UNIT WITHIN A LAYER" VIEW ABOVE DEPICTS A PORTION OF A CONVENTIONAL BOX CAR LOAD, HOWEVER, THE PROCEDURES ARE ALSO APPLICABLE FOR LOADS IN CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.

(CONTINUED AT RIGHT)

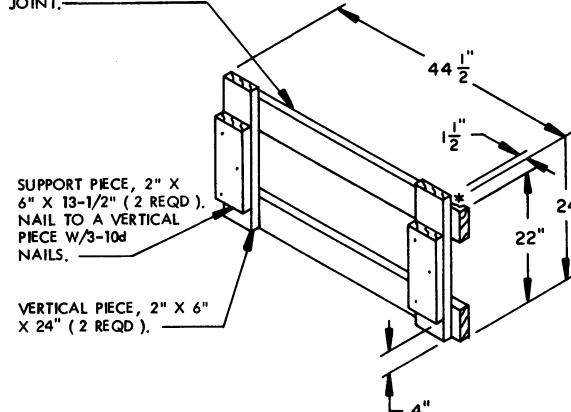
**KEY NUMBERS**

- ① PARTIAL-UNIT GATE (2 REQD, 1 RIGHT HAND AND 1 LEFT HAND). SEE THE "PARTIAL UNIT GATE B" DETAIL BELOW. SEE GENERAL NOTES "M" AND "N" ON PAGE 2.
- ② STRUT, 4" X 4" X 34" (4 REQD). TOENAIL TO THE VERTICAL PIECES OF THE PARTIAL-UNIT GATE, PIECE MARKED ①, W/2-16d NAILS AT EACH END.
- ③ RETAINER PIECE, 2" X 4" X 44-1/2" (2 REQD). NAIL TO THE BOTTOM STRUTS, PIECES MARKED ②, W/3-10d NAILS AT EACH JOINT.
- ④ STRAPPING BOARD, 2" X 4" X 41" (2 REQD). NAIL TO THE TOP STRUTS, PIECES MARKED ②, W/3-10d NAILS AT EACH END.
- ⑤ UNITIZING STRAP, 1-1/4" X .031" OR .035" X 15'-6" LONG STEEL STRAPPING (2 REQD). PRE-POSITION UNDER THE PALLET.
- ⑥ SEAL FOR 1-1/4" STEEL STRAPPING (4 REQD, 2 PER JOINT). SEE GENERAL NOTE "O" ON PAGE 2.

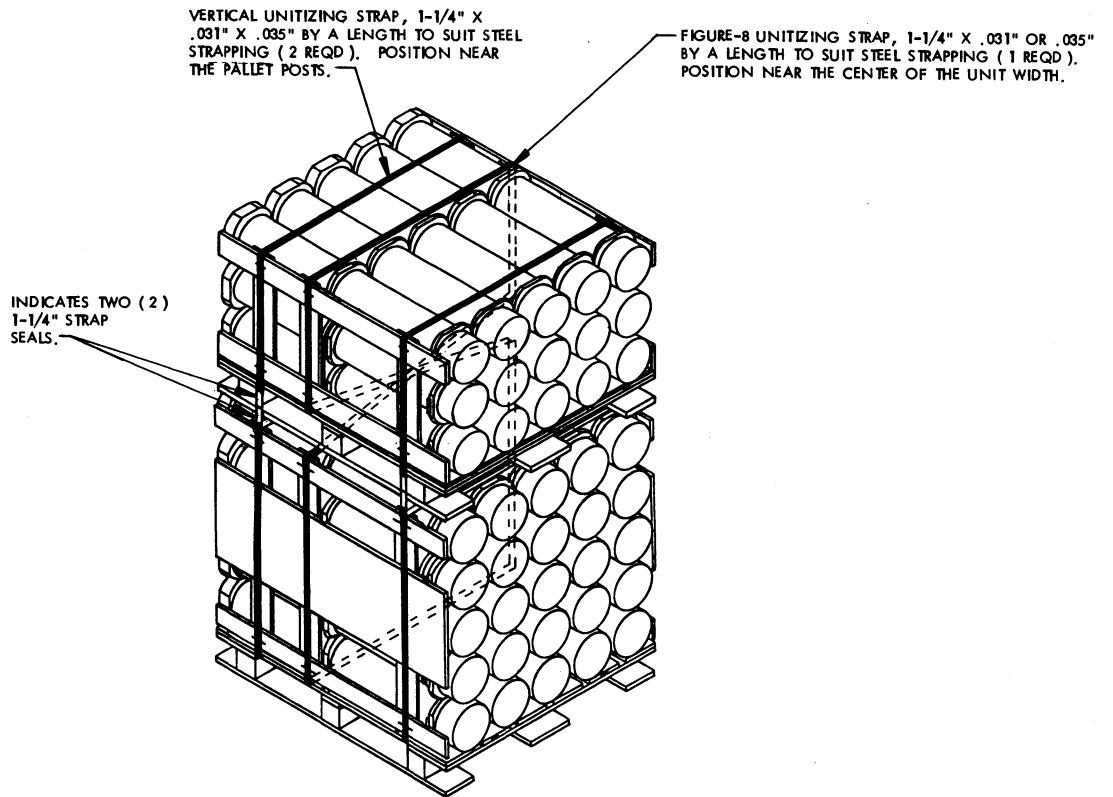
(SPECIAL NOTES CONTINUED)

6. FOR THE SHIPMENT OF A PARTIAL UNIT CONSISTING OF ONE LAYER, THE PROCEDURES SHOWN ON PAGE 35 MUST BE USED IN LIEU OF THE ABOVE DEPICTED PROCEDURE. FOR SHIPMENT OF A 2 OR 3 LAYER PARTIAL UNIT, THE PROCEDURES SHOWN ON PAGE 35 MAY BE MORE ECONOMICAL AND MAY BE USED IN LIEU OF THE ABOVE DEPICTED PROCEDURES, IF DESIRED.
7. THE PARTIAL-UNIT PROCEDURES SHOULD BE APPLIED NEAR THE CENTER OF THE CAR LENGTH, BUT NOT IN THE DOORWAY AREA. ALSO, THERE SHOULD BE AT LEAST ONE (1) LOAD UNIT BETWEEN THE PARTIAL UNIT AND A CENTER GATE.

HORIZONTAL PIECE, 2" X 6" X 44-1/2"  
(2 REQD). NAIL TO THE VERTICAL PIECES  
W/3-10d NAILS AT EACH  
JOINT.



**PARTIAL UNIT GATE B**



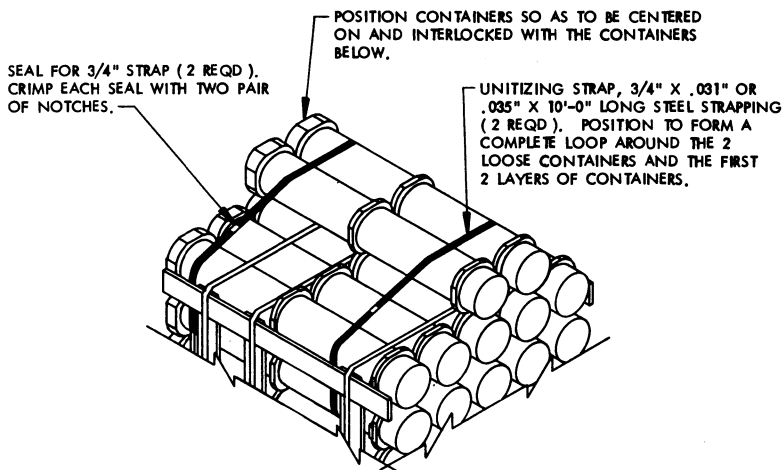
**SECUREMENT OF PARTIAL UNIT ON TOP**

**SPECIAL NOTES:**

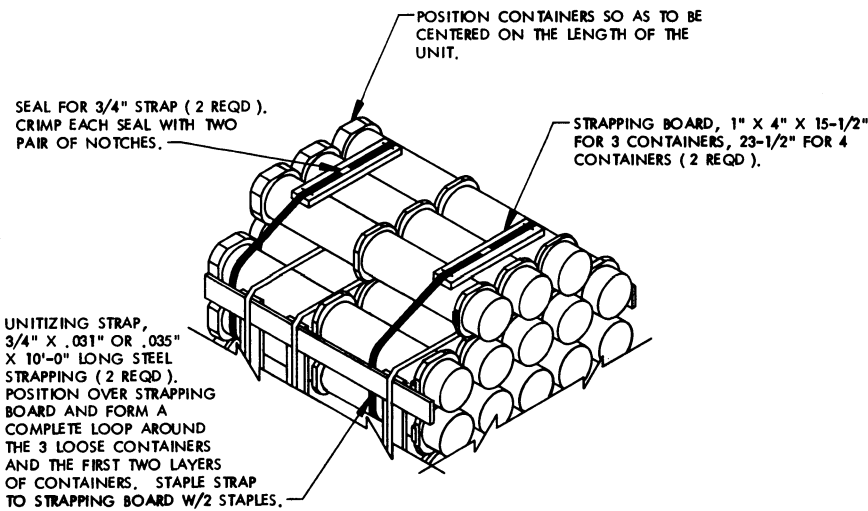
1. THIS PROCEDURE IS APPLICABLE ONLY FOR USE IN A CONTAINERS CROSSWISE LOAD. **CAUTION:** THE PARTIAL UNIT ON TOP IS LIMITED TO NOT MORE THAN THREE (3) LAYERS OF CONTAINERS. FOR SHIPMENT OF MORE THAN THREE LAYERS OF CONTAINERS OR AN ALTERNATIVE METHOD FOR TWO OR THREE LAYERS, REFER TO THE PROCEDURES ON PAGE 34.
2. IF THE PARTIAL UNIT CONSISTS OF EITHER ONE OR TWO LAYERS, THE STRAPS UNITIZING THE TOP TWO LAYERS OF CONTAINERS ON THE PARTIAL UNIT WILL NOT BE REQUIRED.

**SPECIAL NOTES:**

1. SHIPMENTS OF COMPLETE ROUNDS SHOULD CONSIST OF FULL-HEIGHT AND FULL-LAYER UNITS TO THE MAXIMUM EXTENT POSSIBLE, HOWEVER THE END OF A LOT, OR THE QUANTITY OF ITEMS NEEDED TO FILL A REQUISITION, MAY NECESSITATE THE SHIPMENT OF ONE OR MORE LEFTOVER CONTAINERS. LEFTOVER CONTAINERS ARE DESCRIBED AS A QUANTITY OF CONTAINERS WHICH IS INSUFFICIENT TO FORM A FULL-LAYERED PARTIAL UNIT FOR SHIPMENT EITHER ON TOP OF A LOAD AS SHOWN ON PAGE 35 OR WITHIN A LAYER AS SHOWN ON PAGES 33 AND 34.
2. SHIPMENT OF LEFTOVER CONTAINERS IS APPLICABLE FOR CONUS AND OCONUS RAILROAD SHIPMENTS FROM DEPOT TO DEPOT OR FROM DEPOT TO POSTS, CAMPS, AND STATIONS, OR UPON APPROVAL FROM HIGHER HEADQUARTERS, FOR SHIPMENTS FROM LOAD, ASSEMBLY, AND PACK PLANTS TO DEPOTS. CAUTION: A LOAD CONTAINING LEFTOVER CONTAINERS IN AN AMOUNT WHICH IS LESS THAN A FULL LAYER, AND SECURED TO THE TOP OF A FULL OR PARTIAL UNIT, MUST NOT BE DESTINED FOR SHIPMENT OVERSEAS BY WATER CARRIER.
3. OBVIOUSLY, A PALLET UNIT WITH ONE OR MORE CONTAINERS STRAPPED TO THE TOP MUST BE POSITIONED IN THE TOP LAYER OF A LOAD. THE PREFERRED LOCATION WOULD BE NEAR THE CENTER AREA OF A CAR IF A FULL LOAD IS BEING SHIPPED.
4. THE PROCEDURES ON THIS PAGE ARE APPLICABLE FOR THE SHIPMENT OF LEFTOVER CONTAINERS IN ANY OF THE LOADS DEPICTED HEREIN.



**SECUREMENT OF TWO CONTAINERS**



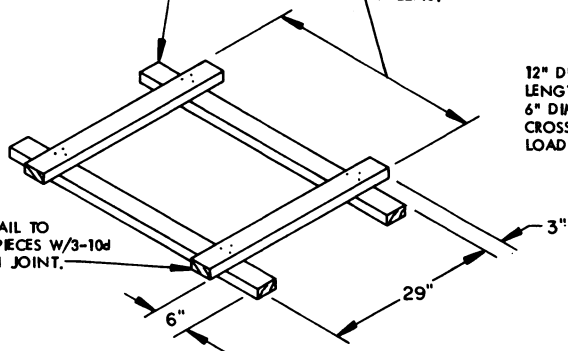
**SECUREMENT OF THREE CONTAINERS**

**PROCEDURES FOR SHIPMENT OF LEFTOVER CONTAINERS**

RETAINER PIECE, 2" X 4" BY A LENGTH TO SUIT (2 REQD).

FABRICATE TO FIT BETWEEN THE POSTS OF LATERALLY ADJACENT PALLETS.

BUFFER PIECE, 2" X 4" X 35" (2 REQD). NAIL TO THE RETAINER PIECES W/3-10d NAILS AT EACH JOINT.



**ANTI-SWAY BRACE A**

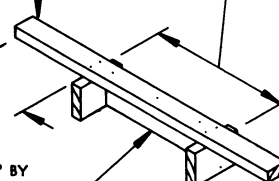
FOR USE IN THE CONTAINERS-LENGTHWISE LOADS ON PAGES 4, 8, AND 10. IF DESIRED, THE ANTI-SWAY BRACE CAN BE PARTIALLY PRE-ASSEMBLED; ONE BUFFER PIECE CAN BE NAILED TO BOTH RETAINER PIECES. THE LONG ENDS OF THE ASSEMBLY CAN THEN BE INSTALLED INTO THE FORKLIFT OPENINGS OF A LOADED PALLET UNIT PRIOR TO POSITIONING THE LATERALLY ADJACENT PALLET UNIT.

12" DIMENSION IF USED IN A LENGTHWISE POSITIONED LOAD, 6" DIMENSION IF USED IN A CROSSWISE POSITIONED LOAD.

SUPPORT PIECE, 2" X 4" BY A LENGTH TO SUIT (1 REQD). NAIL TO SPACER PIECE W/4-12d NAILS AND TO THE BUFFER PIECES W/2-12d NAILS AT EACH JOINT.

VOID BETWEEN CONTAINER BODIES MINUS 1/4".

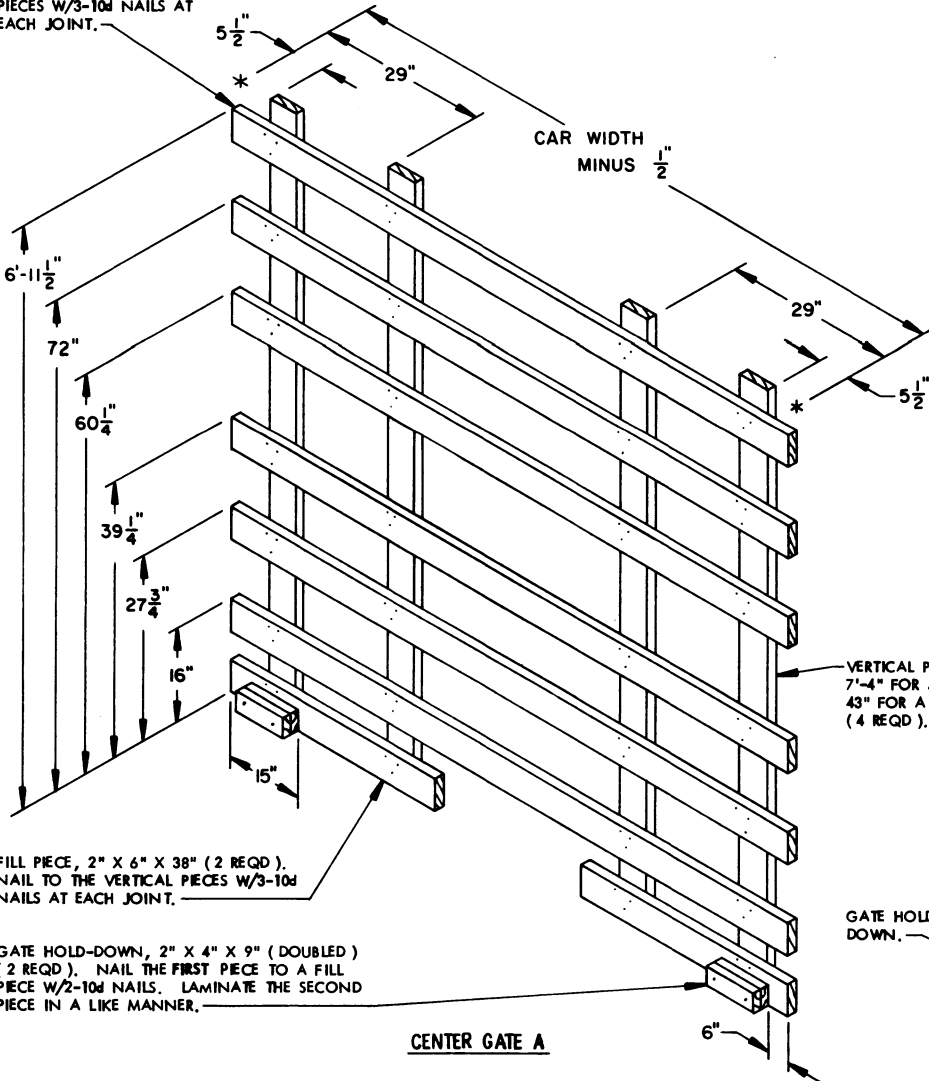
SPACER PIECE, 2" X 6" BY A LENGTH TO SUIT (1 REQD).



BUFFER PIECE, 2" X 6" X 8" (2 REQD). NAIL TO THE SPACER PIECE W/3-12d NAILS.

**TOP-OF-LOAD ANTI-SWAY BRACE**

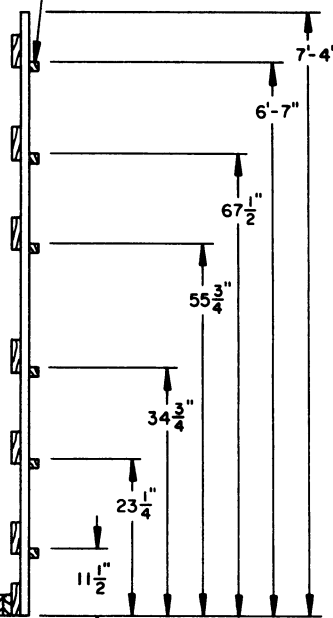
HORIZONTAL PIECE, 2" X 6" BY CAR WIDTH MINUS 1/2" IN LENGTH (6 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.



**CENTER GATE A**

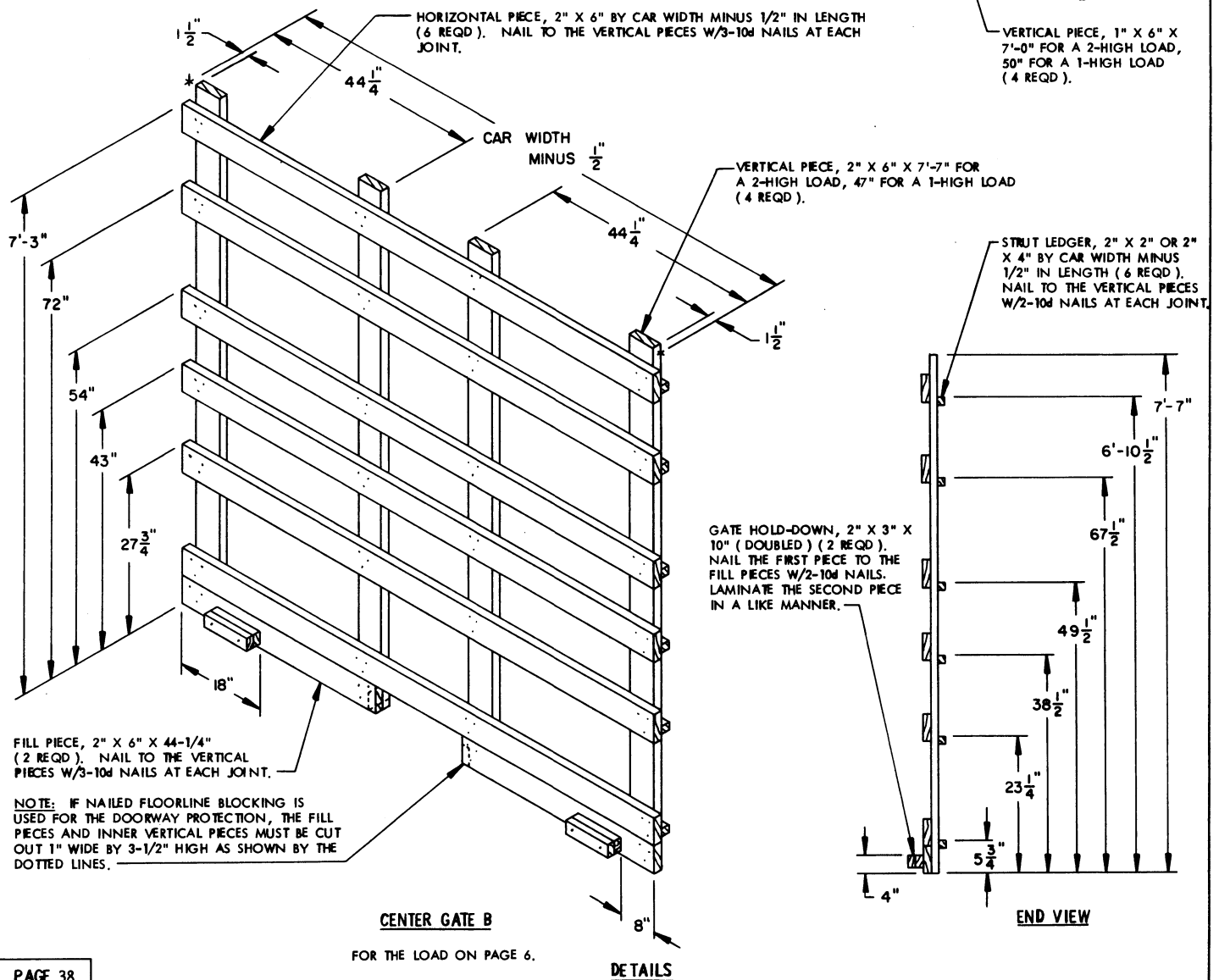
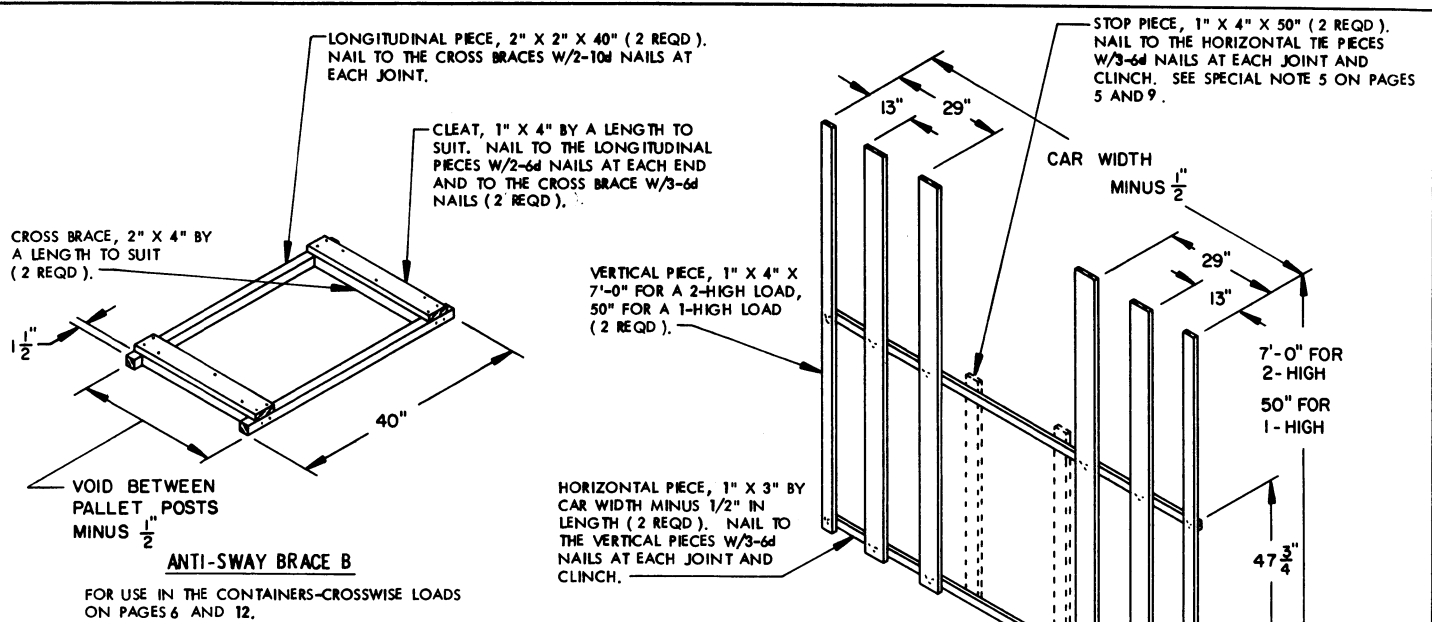
FOR USE IN THE LOAD ON PAGE 4.

STRUT LEDGER, 2" X 2" OR 2" X 4" BY CAR WIDTH MINUS 8" IN LENGTH (6 REQD). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH JOINT.



**END VIEW**

**DETAILS**



SUPPORT PIECE, 2" X 6" BY A LENGTH TO SUIT (1 REQD). NAIL TO SPACER PIECE W/4-12d NAILS AND TO THE BUFFER PIECES W/2-12d NAILS AT EACH JOINT.

BUFFER PIECE, 2" X 6" X 12" (2 REQD). NAIL TO THE SPACER PIECE W/3-12d NAILS.

SPACER PIECE, 2" X 6" BY A LENGTH TO SUIT (1 REQD).

VOID BETWEEN CONTAINER BODIES MINUS 1/4".

HORIZONTAL PIECE, 1" X 3" X 40" (2 REQD). NAIL TO THE VERTICAL PIECES W/3-6d NAILS AT EACH JOINT AND CLINCH.

VERTICAL PIECE, 1" X 4" X 50" (3 REQD).

VERTICAL PIECE, 1" X 6" X 50" (1 REQD).

SEE CHART BELOW.

**SPACER ASSEMBLY B**

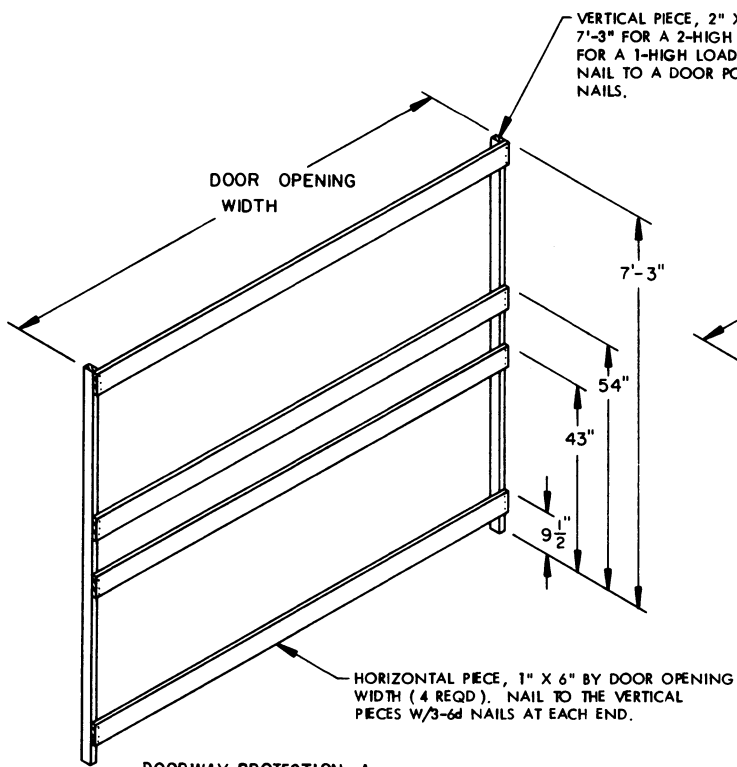
THIS ASSEMBLY IS FOR USE UNDER A BUNDLING STRAP WHICH IS INSTALLED AROUND PALLET UNITS OF CROSSWISE OR LENGTHWISE POSITIONED CONTAINERS IN THE DOORWAY AREA OF A LOAD. SEE PIECE MARKED ④ ON PAGE 12 FOR A TYPICAL INSTALLATION.

**SEPARATOR GATE B**

THIS ASSEMBLY IS FOR USE IN THE LOADS ON PAGES 10 AND 30.

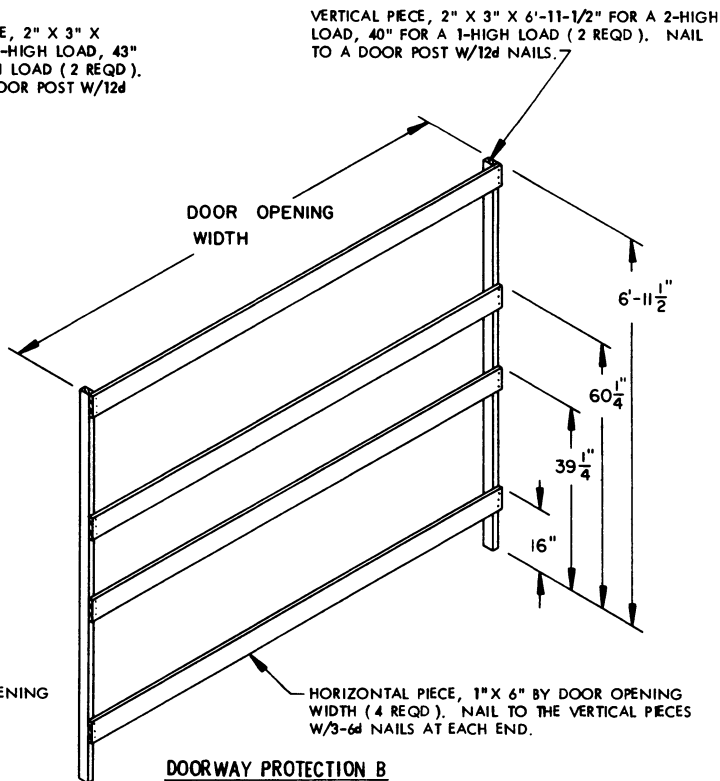
**DIMENSION CHART**

CONTAINER POSITION	A	B
LENGTHWISE	35-3/4"	35-3/4"
CROSSWISE	44-1/2"	44-1/2"



**DOORWAY PROTECTION A**

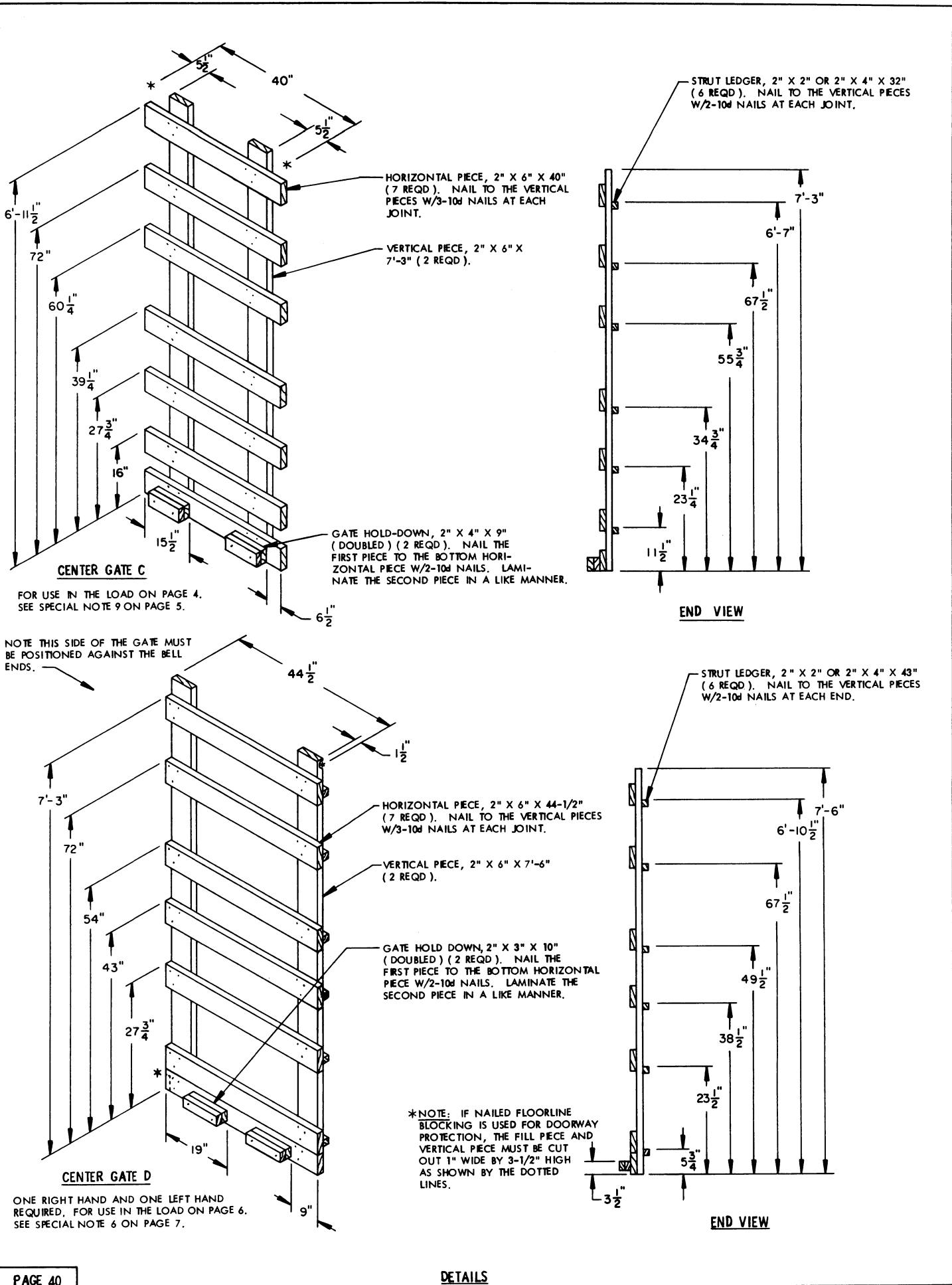
FOR USE IN THE LOAD ON PAGE 4.



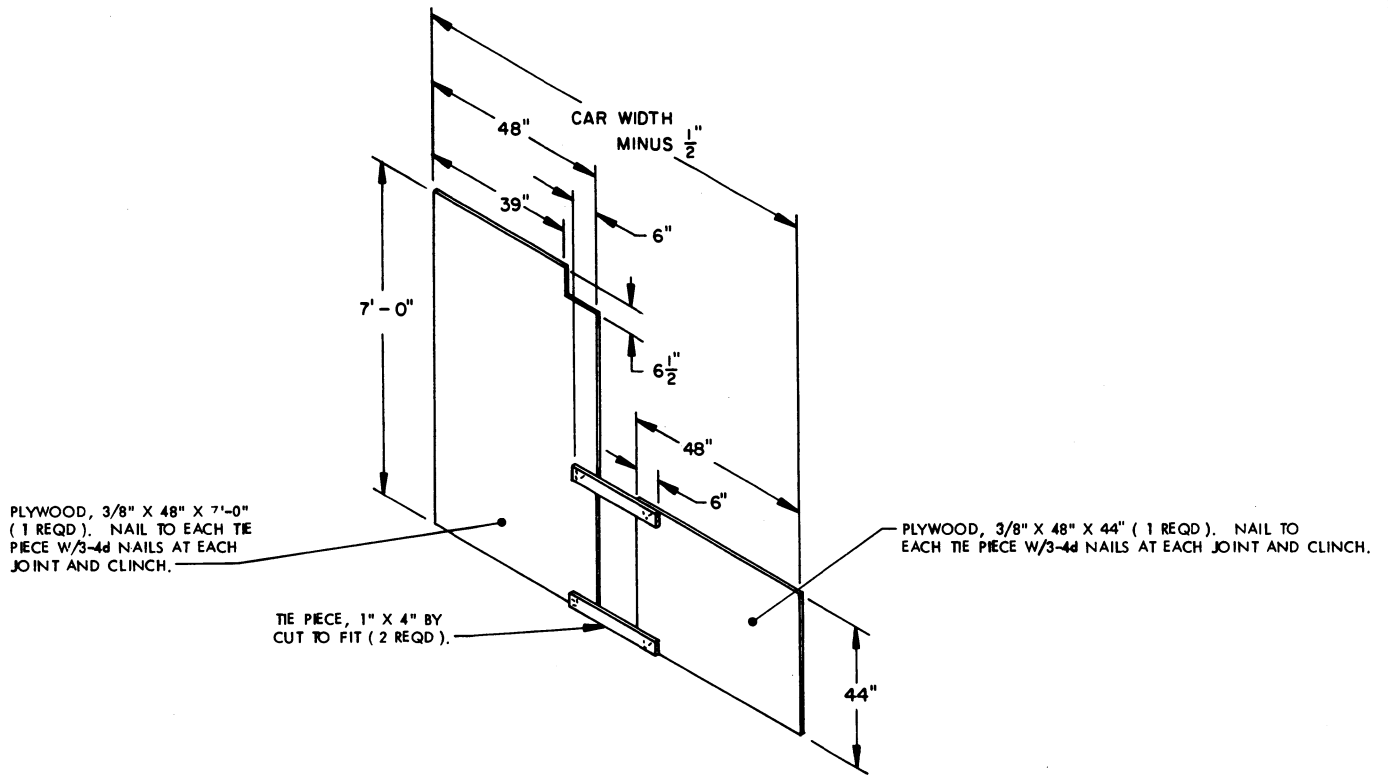
**DOORWAY PROTECTION B**

FOR USE IN THE LOAD ON PAGE 6.

**DETAILS**

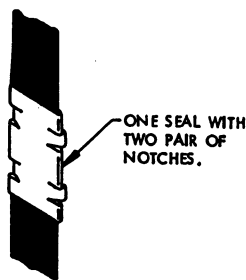






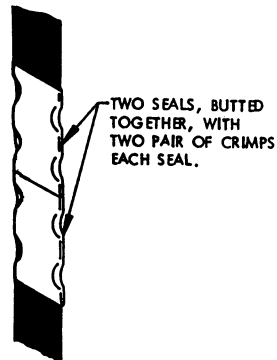
**SEPARATOR GATE D**

THIS ASSEMBLY IS FOR USE IN THE OMITTED PALLET UNIT PROCEDURES ON PAGE 17.



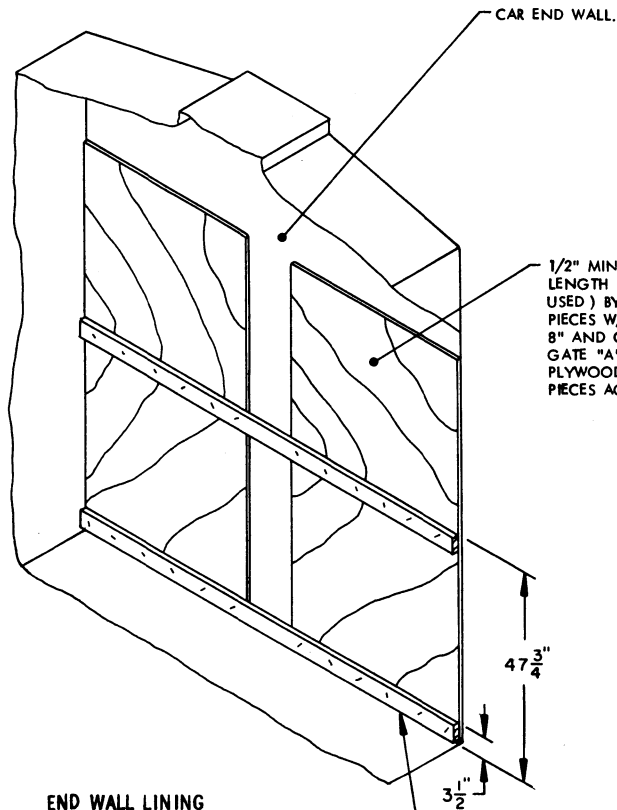
**STRAP JOINT A**

METHOD OF SECURING A STRAP JOINT WHEN USING A NOTCH-TYPE SEALER.



**STRAP JOINT B**

METHOD OF SECURING A STRAP JOINT WHEN USING A CRIMP-TYPE SEALER.

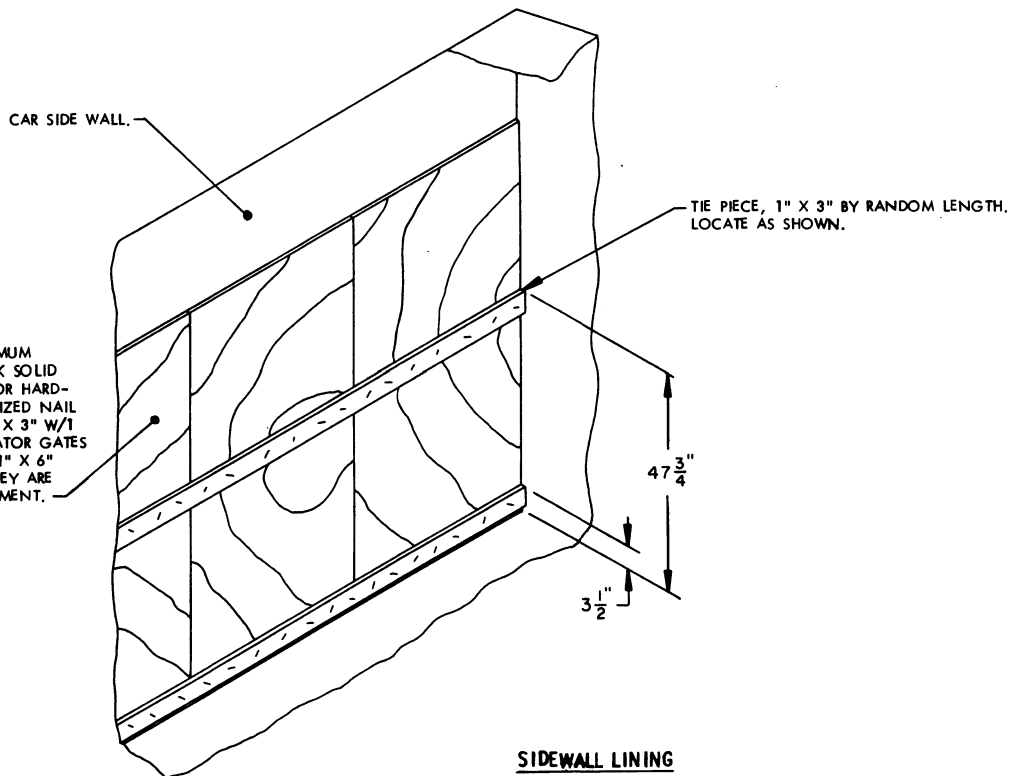


1/2" MINIMUM THICK PLYWOOD, UNIT LENGTH IN WIDTH (48" WIDE MAY BE USED) BY 8'-0" HIGH. NAIL TO THE TIE PIECES W/1 APPLICABLY SIZED NAIL EVERY 8" AND CLINCH. NOTE THAT SEPARATOR GATE "A" MAY BE USED IN LIEU OF PLYWOOD. POSITION WITH THE VERTICAL PIECES AGAINST THE CAR END WALL.

**END WALL LINING**

THIS VIEW DEPICTS LINING REQUIRED FOR A LENGTHWISE LOAD IN A CAR EQUIPPED WITH A STEEL END WALL.

TIE PIECE, 1" X 3" BY CAR WIDTH MINUS 1" (2 REQD).

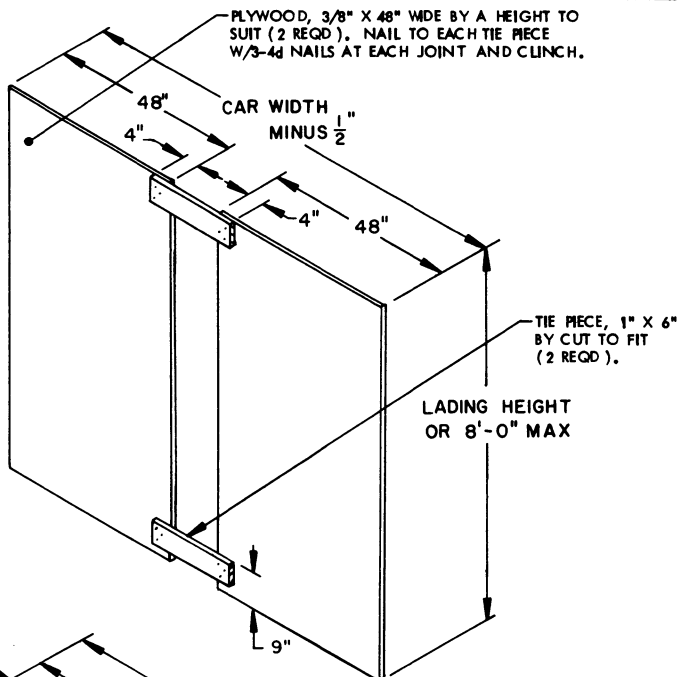


1/4" MINIMUM PLYWOOD, 1/8" MINIMUM HARDBOARD OR .060" MINIMUM THICK SOLID WALL FIBERBOARD. NAIL PLYWOOD OR HARDBOARD TO 1" X 3" W/1 APPLICABLY SIZED NAIL EVERY 8". STAPLE FIBERBOARD TO 1" X 3" W/1 STAPLE EVERY 6". NOTE THAT SEPARATOR GATES OR SIMILARLY POSITIONED VERTICAL 1" X 6" LUMBER, MAY BE USED PROVIDING THEY ARE TIED TOGETHER TO PREVENT DISPLACEMENT.

TIE PIECE, 1" X 3" BY RANDOM LENGTH. LOCATE AS SHOWN.

**SIDEWALL LINING**

THIS VIEW DEPICTS LINING REQUIRED FOR A CROSSWISE SHIPMENT IN A CAR EQUIPPED WITH A STEEL SIDEWALL. NOTE THAT IF THE CAR IS EQUIPPED WITH A STEEL-FACED PLUG DOOR, THE SPECIAL LINING WILL ALSO BE REQUIRED IN THE DOORWAY AREA IF THE SPECIFIED DOORWAY PROTECTION DOES NOT SUFFICE.

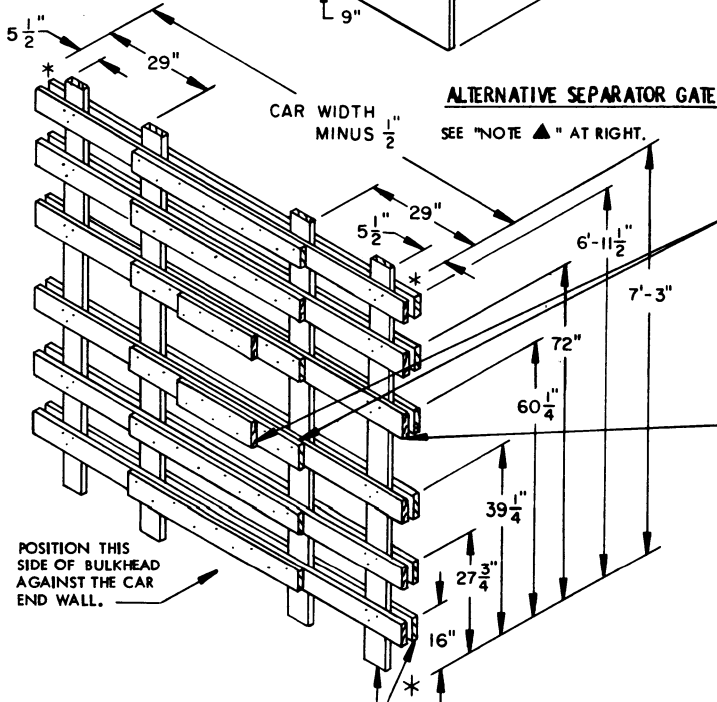


**NOTE ▲ :**

THE ALTERNATIVE SEPARATOR GATE MAY BE USED IN LIEU OF THE SEPARATOR GATE SHOWN WITHIN A LOAD, WHICH IS FABRICATED FROM 1" X 3", 1" X 4", AND 1" X 6" MATERIAL. WHEN THE ALTERNATIVE SEPARATOR GATE IS BEING USED IN A CONVENTIONAL BOX CAR AND NAILED FLOORLINE BLOCKING IS TO BE USED FOR DOORWAY PROTECTION IN LIEU OF THE WOODEN GATE TYPE, THE LOWER INSIDE CORNER OF EACH PLYWOOD SHEET MUST BE CUT OUT 3-1/2" HIGH BY 8-1/2" WIDE. THE USE OF THIS MODIFIED GATE WILL ALLOW THE SEPARATOR GATE TO CLEAR THE NAILED FLOORLINE BLOCKING DURING THE NORMAL SHIFTING OF THE LOAD.

**NOTE ○ :**

IF A BOX CAR TO BE LOADED HAS BOWED END WALLS WHICH ARE BOWED OUTWARD MORE THAN TWO INCHES (2"), EITHER FROM SIDE TO SIDE OR FROM FLOOR TO ROOF, AN END-OF-CAR BULKHEAD MUST BE INSTALLED TO PROVIDE A "SQUARED OFF" SURFACE FOR THE LOAD AT THE END OF THE CAR. THE BULKHEAD IS APPLICABLE FOR USE AT THE END OF A LOAD IN A CONVENTIONAL BOX CAR OR IN A CAR EQUIPPED WITH LOAD DIVIDER BULKHEADS, OR AT THE END OF A CAR EQUIPPED WITH MECHANICAL BRACING DEVICES, IF DESIRED, IN LIEU OF USING CROSS MEMBERS. THE BULKHEAD MAY BE FABRICATED FROM A CENTER GATE FOR THE UNIT POSITION (LENGTHWISE OR CROSSWISE). NOTE THAT THE GATE MUST BE MODIFIED BY OMITTING THE 2" X 2" STRUT LEDGERS AND THE GATE HOLD DOWN PIECES. A MODIFIED CENTER GATE "A", AS DETAILED ON PAGE 37, IS SHOWN AS TYPICAL.



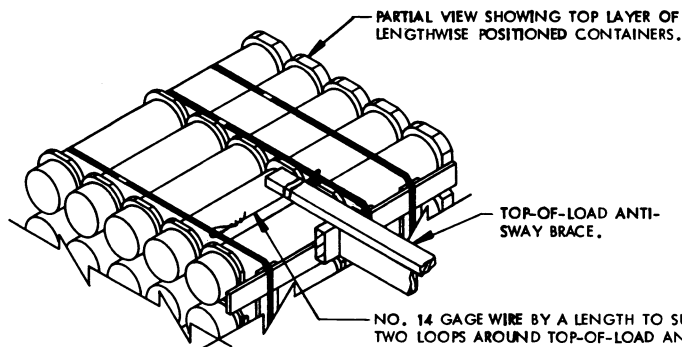
SHIM MATERIAL, 6" WIDE PLYWOOD OR DIMENSIONAL LUMBER OF A THICKNESS AND LENGTH AS REQUIRED TO FILL THE VOID BETWEEN THE CAR END WALL AND THE BULKHEAD. NAIL TO THE FILLER PIECE AND/OR LAMINATE W/1 APPLICABLY SIZED NAIL EVERY 6".

FILLER PIECE, 2" X 6" BY CAR WIDTH MINUS 1/2" IN LENGTH (ONE REQUIRED FOR EACH HORIZONTAL PIECE ON THE CENTER GATE. ALIGN WITH THE HORIZONTAL PIECES AND NAIL TO THE VERTICAL PIECES OF THE CENTER GATE W/3-10d NAILS AT EACH JOINT.

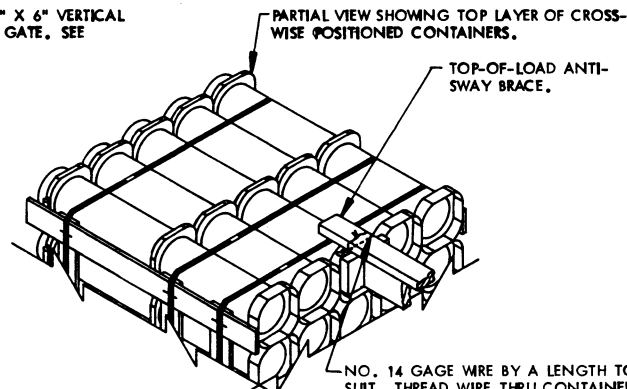
**END-OF-CAR BULKHEAD**

SEE "NOTE ○" AT RIGHT.

THESE 2" X 6" HORIZONTAL PIECES AND 2" X 6" VERTICAL PIECES ARE PART OF THE MODIFIED CENTER GATE. SEE "NOTE ○" ABOVE.



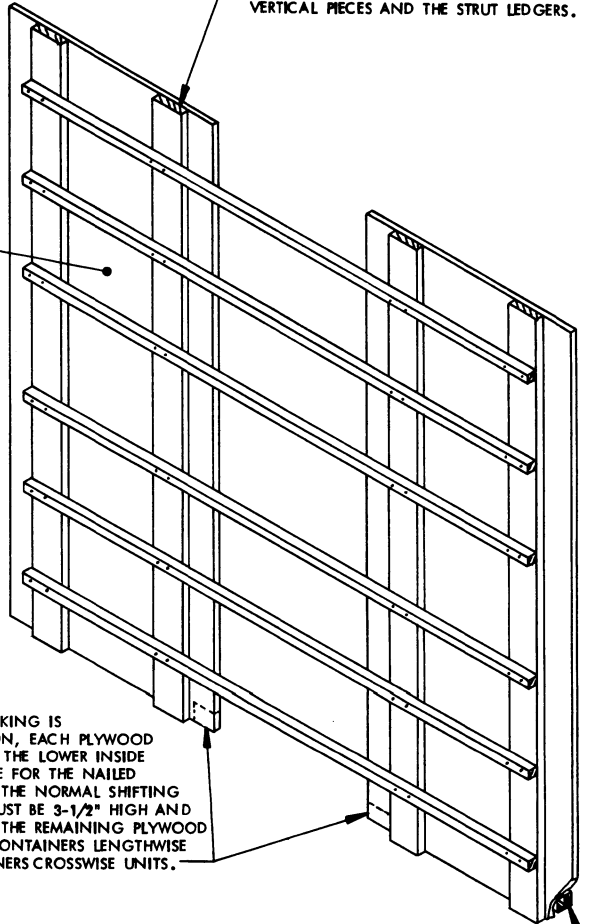
**TIE WIRE APPLICATION A**



**TIE WIRE APPLICATION B**

PLYWOOD, 1/2" THICK BY THE UNIT WIDTH OR LENGTH BY THE LOAD HEIGHT (2 REQD). NAIL TO THE VERTICAL PIECES W/1-6d NAIL EVERY 6". NOTE: THE WIDTH OF THE PLYWOOD WILL BE UNIT WIDTH IF THE LENGTH OF THE UNIT IS PARALLEL WITH THE SIDEWALL OF A CAR, AS TYPICALLY SHOWN IN THE LOAD ON PAGE 6, OR UNIT LENGTH IF THE WIDTH OF THE UNIT IS PARALLEL WITH THE SIDEWALL OF A CAR AS TYPICALLY SHOWN IN THE LOAD ON PAGE 4. PLYWOOD MAY BE ALLOWED TO EXTEND BEYOND THE UNIT LENGTH, WIDTH, OR HEIGHT IF DESIRED.

INDICATES A CENTER GATE "A" WITH THE HORIZONTAL PIECES OMITTED (1 REQD). SEE THE "CENTER GATE A" DETAIL ON PAGE 37 FOR THE LOCATION OF THE VERTICAL PIECES AND THE STRUT LEDGERS.



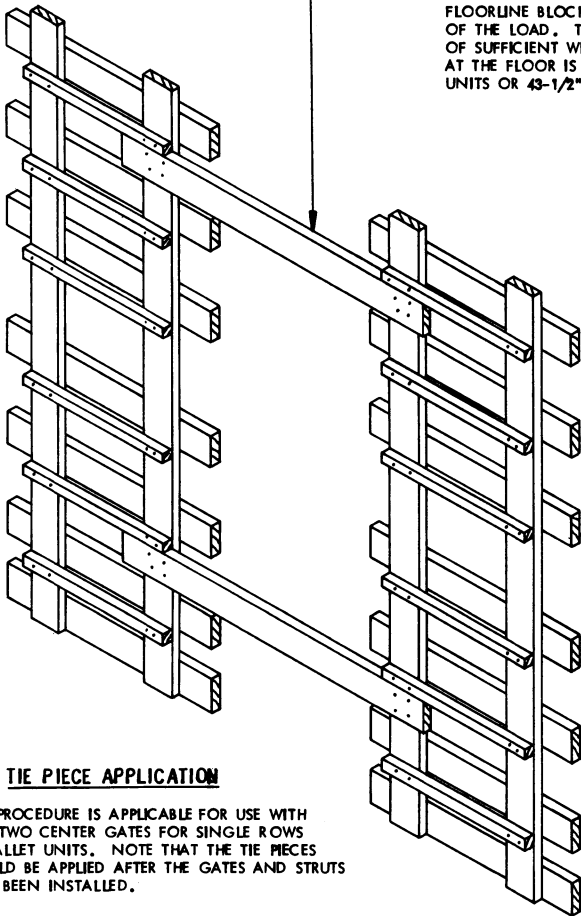
TIE PIECE, 2" X 6" BY LENGTH TO SUIT (2 REQD). POSITION UNDER AND IN CONTACT WITH THE UPPERMOST STRUT LEDGER AND/OR UNDER THE SECOND STRUT LEDGER FROM THE BOTTOM. NAIL TO THE VERTICAL PIECES OF THE GATES W/4-10d NAILS AT EACH JOINT.

WHEN NAILED FLOORLINE BLOCKING IS USED FOR DOORWAY PROTECTION, EACH PLYWOOD SHEET MUST HAVE A CUTOUT AT THE LOWER INSIDE CORNER TO PROVIDE CLEARANCE FOR THE NAILED FLOORLINE BLOCKING DURING THE NORMAL SHIFTING OF THE LOAD. THE CUTOUT MUST BE 3-1/2" HIGH AND OF SUFFICIENT WIDTH SO THAT THE REMAINING PLYWOOD AT THE FLOOR IS 39-1/2" FOR CONTAINERS LENGTHWISE UNITS OR 43-1/2" FOR CONTAINERS CROSSWISE UNITS.

GATE HOLD DOWN PIECES MUST BE SECURED TO THE PLYWOOD.

**PLYWOOD CENTER GATE ALTERNATIVE**

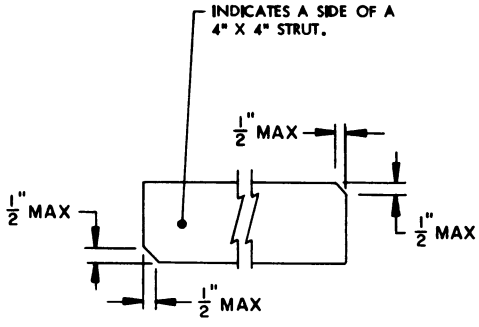
CENTER GATE "A" IS SHOWN AS TYPICAL. PLYWOOD MAY BE USED IN LIEU OF THE HORIZONTAL PIECES ON ANY CENTER GATE DEPICTED HEREIN, INCLUDING THOSE WHICH ARE FOR THE BRACING OF A SINGLE ROW.



INDICATES A TYPICAL "SPLIT" CENTER GATE (2 REQD). SEE THE CENTER GATE DETAIL WHICH IS APPLICABLE FOR THE ORIENTATION OF THE UNIT. A GATE FOR UNITS WHICH ARE POSITIONED WITH THE UNIT WIDTH PARALLEL TO THE CAR SIDEWALL IS SHOWN. THE TIE PIECE APPLICATION PROCEDURES IS ALSO APPLICABLE TO GATES FOR UNITS WHICH ARE POSITIONED WITH THE UNIT LENGTH PARALLEL TO THE CAR SIDEWALL.

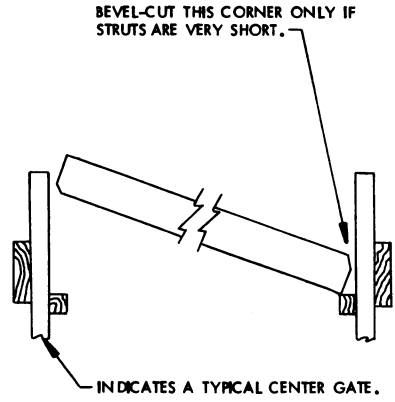
**TIE PIECE APPLICATION**

THIS PROCEDURE IS APPLICABLE FOR USE WITH ANY TWO CENTER GATES FOR SINGLE ROWS OF PALLET UNITS. NOTE THAT THE TIE PIECES SHOULD BE APPLIED AFTER THE GATES AND STRUTS HAVE BEEN INSTALLED.



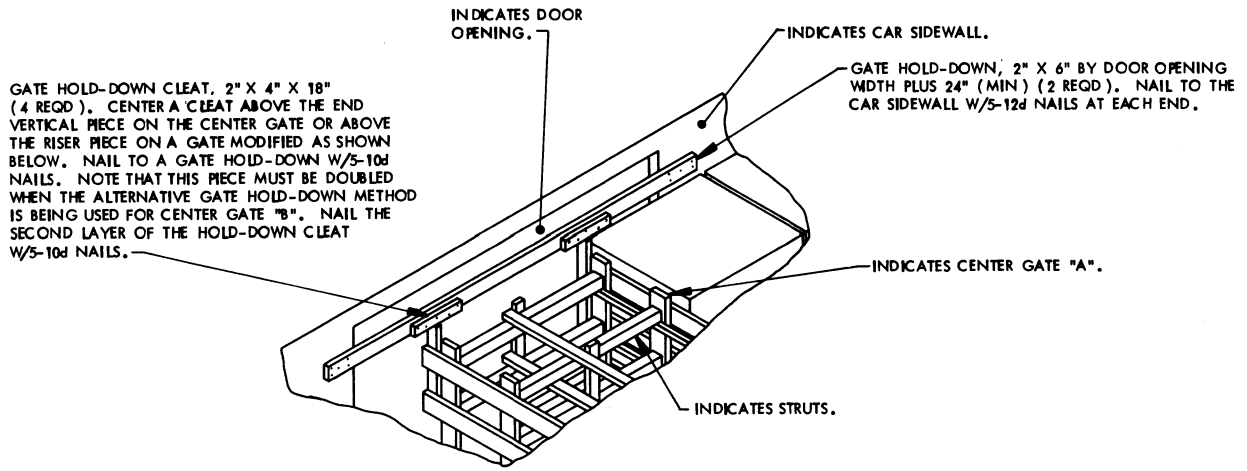
**BEVEL-CUT**

BEVEL CUTTING THE STRUTS AS SPECIFIED WILL FACILITATE INSTALLING THE STRUTS WITH A "DRIVE-FIT". CAUTION: DO NOT BEVEL A CORNER MORE THAN 1/2"



**STRUT INSTALLATION**

SEE GENERAL NOTE "U" ON PAGE 3 FOR ADDITIONAL STRUT INSTALLATION GUIDANCE.

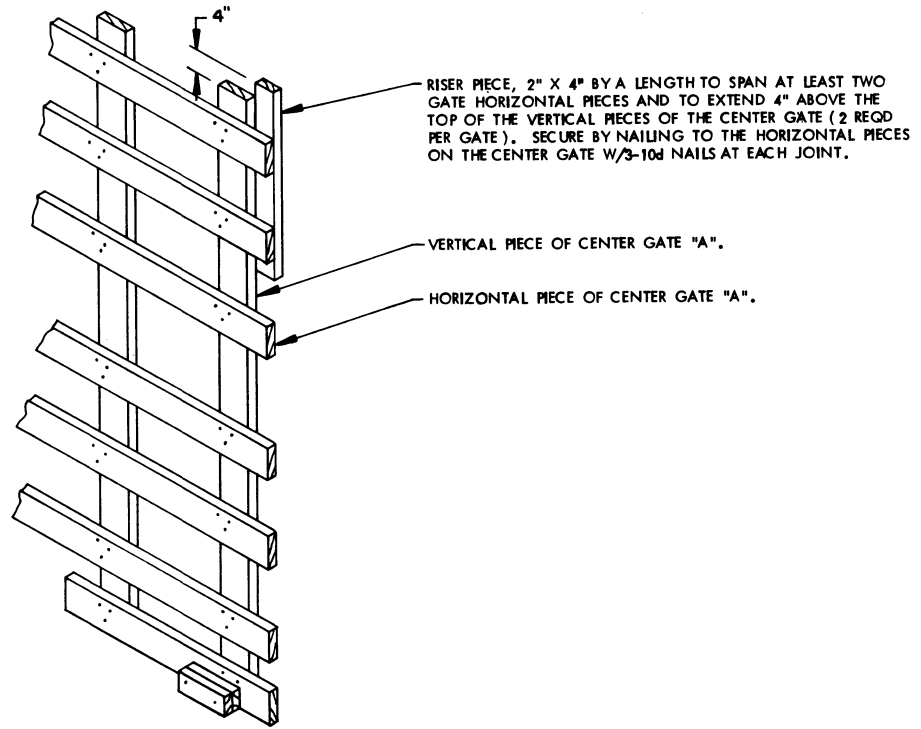


GATE HOLD-DOWN CLEAT, 2" X 4" X 18" (4 REQD). CENTER A CLEAT ABOVE THE END VERTICAL PIECE ON THE CENTER GATE OR ABOVE THE RISER PIECE ON A GATE MODIFIED AS SHOWN BELOW. NAIL TO A GATE HOLD-DOWN W/5-10d NAILS. NOTE THAT THIS PIECE MUST BE DOUBLED WHEN THE ALTERNATIVE GATE HOLD-DOWN METHOD IS BEING USED FOR CENTER GATE "B". NAIL THE SECOND LAYER OF THE HOLD-DOWN CLEAT W/5-10d NAILS.

GATE HOLD-DOWN, 2" X 6" BY DOOR OPENING WIDTH PLUS 24" (MIN) (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS AT EACH END.

**ALTERNATIVE GATE HOLD-DOWN**

THIS VIEW DEPICTS AN ALTERNATIVE METHOD OF CENTER GATE HOLD-DOWN WHICH CAN BE USED, IF DESIRED, PROVIDING THE CAR HAS NAILABLE SIDEWALLS. THIS METHOD MAY BE APPLIED IN LIEU OF USING THE GATE HOLD-DOWN PIECES WHICH ARE PART OF THE CENTER GATE. NOTE: IN THE EVENT THAT NEITHER CENTER GATE IS LOCATED IN OR NEAR THE DOORWAY AREA, THE GATE HOLD-DOWN CLEAT MAY BE DOUBLED AND NAILED TO THE CAR SIDEWALL TO PROVIDE A HOLD-DOWN; OMIT THE 2" X 6" GATE HOLD DOWN PIECES.



RISER PIECE, 2" X 4" BY A LENGTH TO SPAN AT LEAST TWO GATE HORIZONTAL PIECES AND TO EXTEND 4" ABOVE THE TOP OF THE VERTICAL PIECES OF THE CENTER GATE (2 REQD PER GATE). SECURE BY NAILING TO THE HORIZONTAL PIECES ON THE CENTER GATE W/3-10d NAILS AT EACH JOINT.

VERTICAL PIECE OF CENTER GATE "A".

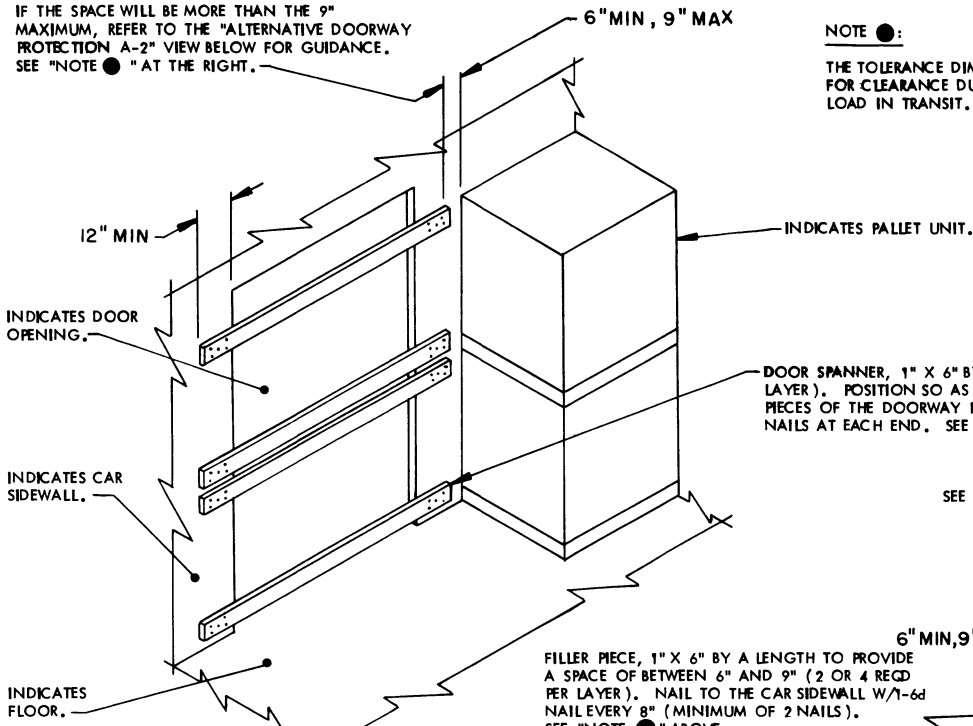
HORIZONTAL PIECE OF CENTER GATE "A".

**CENTER GATE "A" MODIFICATION**

THE MODIFICATION PROCEDURES SHOWN IN THIS VIEW ARE APPLICABLE FOR CENTER GATE "A" WHICH HAS THE VERTICAL PIECES INSET FROM THE END OF THE HORIZONTAL PIECES. THE RISER PIECE WILL PROVIDE A MEANS FOR THE GATE TO CONTACT THE GATE HOLD-DOWN AS SHOWN IN THE "ALTERNATIVE GATE HOLD-DOWN" DETAIL AT THE TOP OF THIS PAGE.

**DETAILS**

IF THE SPACE WILL BE MORE THAN THE 9" MAXIMUM, REFER TO THE "ALTERNATIVE DOORWAY PROTECTION A-2" VIEW BELOW FOR GUIDANCE. SEE "NOTE ●" AT THE RIGHT.



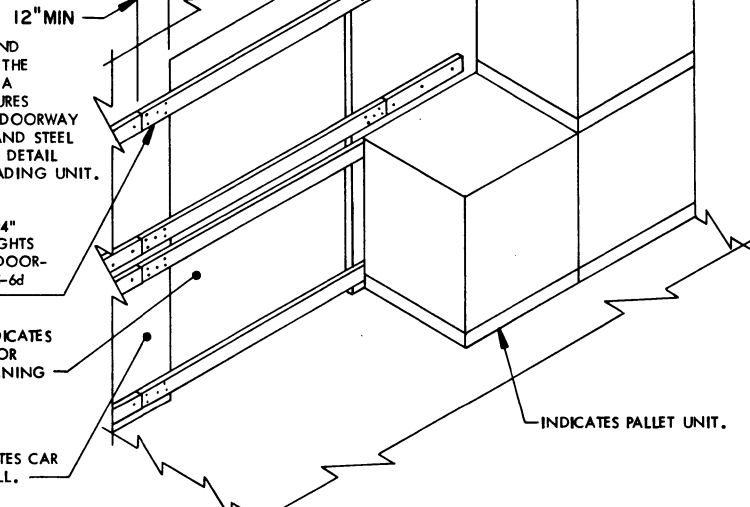
NOTE ●:

THE TOLERANCE DIMENSION (6" MIN, 9" MAX) IS ALLOWED TO PROVIDE FOR CLEARANCE DURING THE NORMAL LONGITUDINAL SHIFTING OF A LOAD IN TRANSIT.

**ALTERNATIVE DOORWAY PROTECTION A-1**

THIS METHOD OF DOORWAY PROTECTION IS FOR USE IN CARS HAVING NAILABLE SIDEWALLS AND EQUIPPED WITH CONVENTIONAL SLIDING DOORS, AND IS APPLICABLE ONLY FOR THE SIDE OPPOSITE THE LOADING SIDE OF THE CAR. THE METHOD CAN ALSO BE USED IN CARS EQUIPPED WITH PLUG DOORS; HOWEVER, A METHOD OTHER THAN THE "ALTERNATIVE DOORWAY PROTECTION A-3" PROCEDURES BELOW MUST BE USED ON THE LOADING SIDE OF THE CAR. THE "ALTERNATIVE DOORWAY PROTECTION C" PROCEDURES ON PAGE 48 OR THE NAILED-DOWN BLOCKING AND STEEL STRAPPING METHOD DEPICTED BY THE "ALTERNATIVE DOORWAY PROTECTION E" DETAIL ON PAGE 49 OR IN THE LOAD SHOWN ON PAGE 12 MAY BE USED ON THE LOADING UNIT.

DOOR SPANNER, 1" X 6" BY DOOR OPENING WIDTH PLUS 24" (2 REQD PER LAYER). POSITION SO AS TO MATCH THE HEIGHTS SPECIFIED FOR THE HORIZONTAL PIECES OF THE APPLICABLE DOORWAY PROTECTION DETAIL. NAIL TO THE CAR SIDEWALL W/5-6d NAILS AT EACH END. SEE "NOTE ●" ABOVE.



**ALTERNATIVE DOORWAY PROTECTION A-2**

THIS METHOD OF DOORWAY PROTECTION IS FOR USE IN CARS HAVING NAILABLE SIDEWALLS AND EQUIPPED WITH CONVENTIONAL SLIDING DOORS, AND IS APPLICABLE ONLY FOR THE SIDE OPPOSITE THE LOADING SIDE OF THE CAR. SEE THE NOTE UNDER THE "A-1 PROCEDURES".

DOOR SPANNER, 2" (MIN) X 6" BY DOOR OPENING WIDTH PLUS 24" (2 REQD PER LAYER). POSITION SO AS TO MATCH THE HEIGHTS SPECIFIED FOR THE HORIZONTAL PIECES OF THE DOORWAY PROTECTION DETAIL. SEE "NOTE ●" ABOVE.

INDICATES DOOR OPENING.

INDICATES OUTSIDE WALL OF CAR.

INDICATES A FILLER PIECE, 2" X 6" BY A LENGTH TO EQUAL THE LENGTH OF THE FILLER PIECE ON THE OPPOSITE SIDEWALL MINUS 1" (QUANTITY TO BE THE SAME AS FOR THE DOOR SPANNERS AND/OR FILLER PIECES ON THE OPPOSITE SIDEWALL). SEE "NOTE ●" ABOVE.

SUPPORT PIECE, 2" X 4" BY A LENGTH TO SUIT (2 REQD). POSITION AGAINST DOOR POSTS AND NAIL TO THE DOOR SPANNER PIECES W/3-10d NAILS AT EACH JOINT.

**ALTERNATIVE DOORWAY PROTECTION A-3**

THIS VIEW DEPICTS THE DOOR OPENING OF A CAR AS IT APPEARS WHEN LOOKING AT IT FROM OUTSIDE OF THE CAR. THE METHOD OF DOORWAY PROTECTION IS FOR USE IN CARS HAVING NAILABLE SIDEWALLS AND EQUIPPED WITH CONVENTIONAL SLIDING DOORS, AND IS APPLICABLE FOR THE LOADING SIDE OF THE CAR. NOTE THAT THE ADJACENT PALLET UNITS MUST BE POSITIONED APPROXIMATELY 1-3/4" (REF) FROM THE CAR SIDEWALL (1/4" MORE THAN THE THICKNESS OF THE DOOR SPANNER PIECES) TO FACILITATE THE INSTALLATION OF THESE DOOR SPANNER PIECES. THE VIEW SHOWN ABOVE IS FOR A TWO LAYER LOAD.

HORIZONTAL PIECE, 1" X 6" BY DOOR OPENING WIDTH (2 REQD PER LAYER). NAIL TO THE VERTICAL PIECES W/3-6d NAILS AT EACH END. SEE THE "DOORWAY PROTECTION A" OR "DOORWAY PROTECTION B" DETAIL ON PAGE 39 FOR HEIGHT LOCATIONS.

VIEW B

VERTICAL PIECE, 2" X 3" BY A LENGTH TO SUIT (2 REQD).

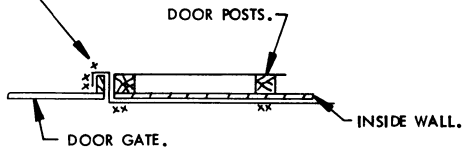
INDICATES DOOR OPENING.

INDICATES CAR SIDEWALL.

DOORWAY PROTECTION-GATE STRAP, 1-1/4" X .035" X 3'-0" (REF) NAIL-ON TYPE STEEL STRAPPING (4 REQD PER LAYER OF LOAD). NAIL TO GATE AND CAR SIDEWALL AS SHOWN BY THE "VIEW B" SKETCH BELOW. NOTE THAT TYPE 1 STRAPPING MAY BE PUNCHED FOR NAILING IF TYPE 2 STRAPPING IS NOT AVAILABLE.

INDICATES FLOOR.

INDICATES LOCATION OF 7 (MIN) 4d NAILS PER STRAP.



VIEW B

THIS VIEW DEPICTS THE LOCATION OF THE NAILS FOR SECURING THE DOORWAY PROTECTION GATE STRAP. NOTE THAT THE STRAPS MUST BE APPLIED TO THE CAR SIDEWALL PRIOR TO POSITIONING THE ADJACENT UNITS.

**ALTERNATIVE DOORWAY PROTECTION B**

THIS METHOD OF DOORWAY PROTECTION IS FOR USE IN CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS WHEN THE DOOR POSTS ARE STEEL WITHOUT NAILING HOLES AND THE CAR SIDEWALLS ARE NAILABLE. THE VIEW SHOWN ABOVE IS FOR A TWO-LAYER LOAD.

SEAL FOR 1-1/4" STRAP (2 REQD PER STRAP). DOUBLE CRIMP EACH SEAL WITH TWO PAIR OF CRIMPS.

INDICATES DOOR OPENING.

DOORWAY PROTECTION STRAP, 1-1/4" X .035" OR .031" STEEL STRAPPING BY DOOR OPENING WIDTH PLUS 8'-0" IN LENGTH (2 REQD PER LAYER). INSTALL FROM TWO (2) PIECES. THREAD ONE END THRU A STRAP ANCHOR PLATE AS SHOWN BY THE "APPLICATION OF STRAPPING TO STRAP ANCHOR PLATE" DETAILS BELOW. NAIL STRAP ANCHOR PLATE TO CAR SIDEWALL W/4 SIGNODE IN MICROLOCK NAILS.

INDICATES CAR SIDEWALL.

DOOR SPANNER END OF STRAP.

VIEW A

INDICATES STRAP ANCHOR PLATE.

ISOMETRIC VIEW

VIEW A

INDICATES STRAP ANCHOR PLATE (2 REQD PER STRAP).

**APPLICATION OF STRAPPING TO STRAP ANCHOR PLATE**

THESE VIEWS DEPICT THE PROPER THREADING OF A DOORWAY PROTECTION STRAP THRU AN ANCHOR PLATE.

**ALTERNATIVE DOORWAY PROTECTION C**

THIS METHOD OF DOORWAY PROTECTION IS ONLY FOR USE WITH THOSE LOADS IN WHICH THE PALLET UNITS ARE POSITIONED WITH THE CONTAINERS CROSSWISE. THE METHOD MAY BE USED IN CARS EQUIPPED WITH EITHER PLUG TYPE DOORS OR CONVENTIONAL SLIDING DOORS, BUT ONLY IF THE CAR IS EQUIPPED WITH NAILABLE SIDEWALLS. IF THE CAR IS EQUIPPED WITH SPECIAL ANCHOR RODS IN THE CAR DOOR POSTS, THE DOORWAY PROTECTION STRAPS MAY BE SECURED TO THESE RODS IN LIEU OF ATTACHING TO THE CAR SIDEWALL WITH STRAP ANCHOR PLATES.

7'-2 1/2"

55"

42 1/2"

11"

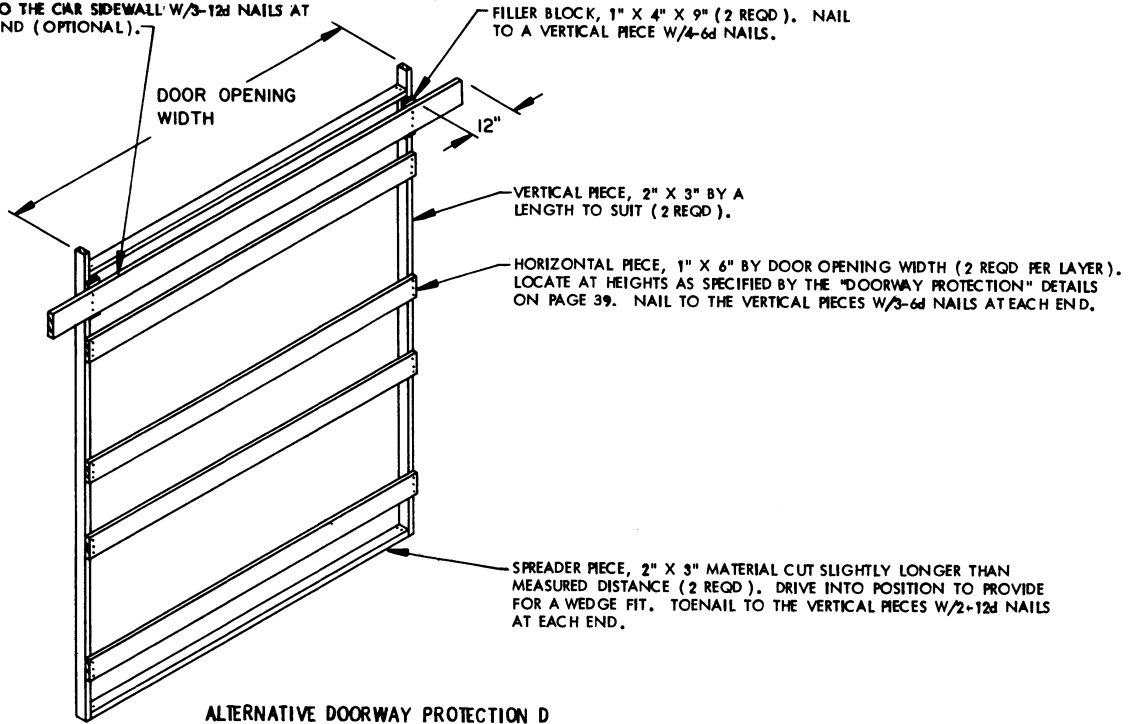
INDICATES FLOOR.

A TOLERANCE OF PLUS OR MINUS 2" IS PERMISSIBLE.

**DOORWAY PROTECTION**

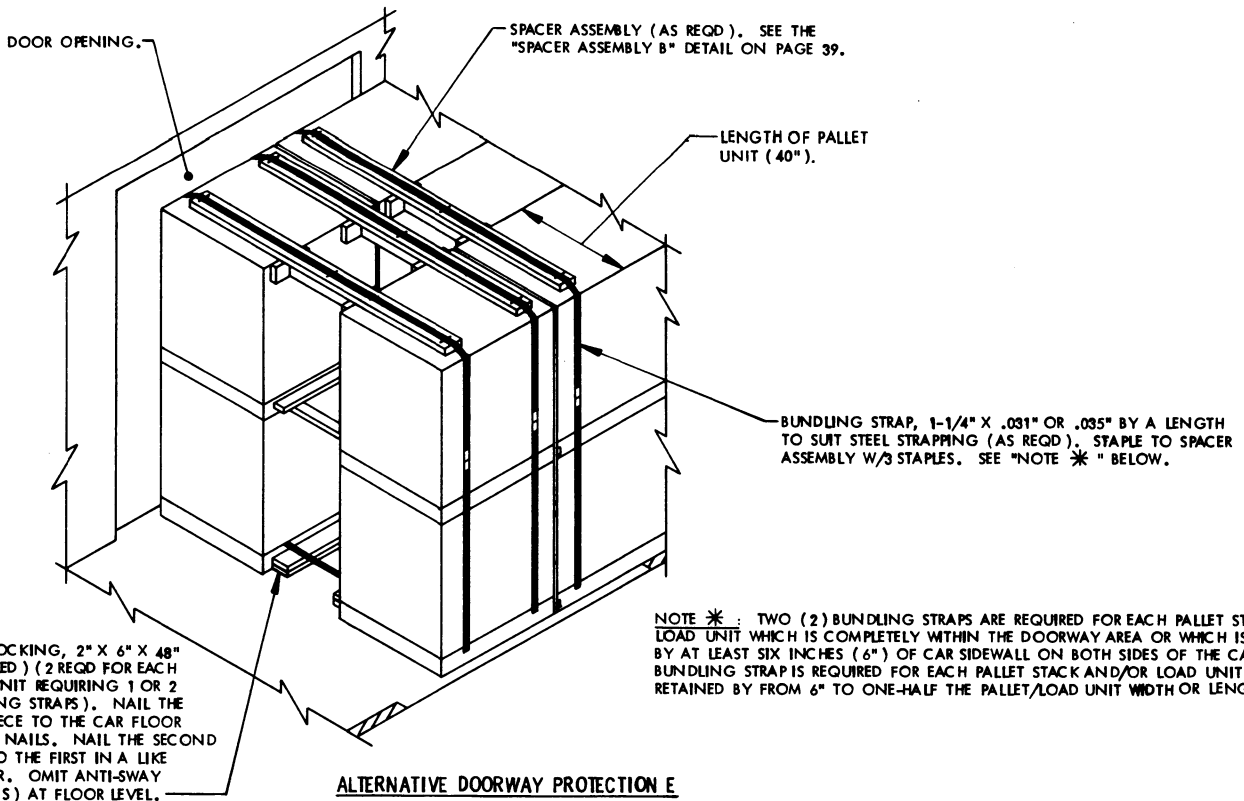


DOOR SPANNER, 2" X 6" BY DOOR OPENING WIDTH PLUS 24" (1 REQD). POSITION ABOVE THE LOAD AND NAIL THRU A FILLER BLOCK INTO A VERTICAL PIECE W/3-12d NAILS AT EACH JOINT. NAIL TO THE CAR SIDEWALL W/3-12d NAILS AT EACH END (OPTIONAL).



**ALTERNATIVE DOORWAY PROTECTION D**

THIS METHOD OF DOORWAY PROTECTION IS FOR USE IN CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS WHEN THE DOOR POSTS ARE NOT NAILABLE. IF THE CAR HAS NAILABLE SIDEWALLS, NAIL-ON TYPE STRAPPING MAY BE USED TO SECURE THE GATE IN LIEU OF USING SPREADER PIECES. SEE THE "ALTERNATIVE DOORWAY PROTECTION B" DETAIL USED ON PAGE 48 FOR GUIDANCE. NOTE THAT THE DOOR SPANNER IN THIS DETAIL MAY BE USED AS A GATE HOLD-DOWN PIECE FOR THE "ALTERNATIVE GATE HOLD-DOWN" METHOD SHOWN ON PAGE 46.

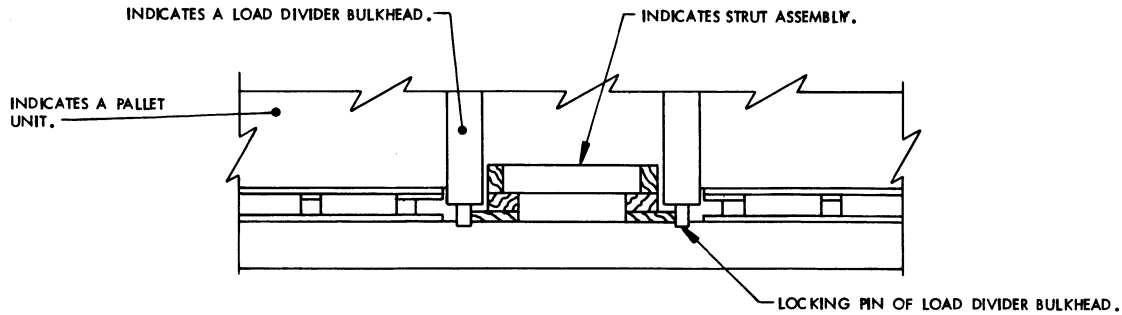


**ALTERNATIVE DOORWAY PROTECTION E**

SEE PIECES MARKED ③, ④, ⑤, AND ⑦ ON PAGE 12 IF UNIT LENGTH IS PARALLEL WITH THE CAR SIDEWALL.

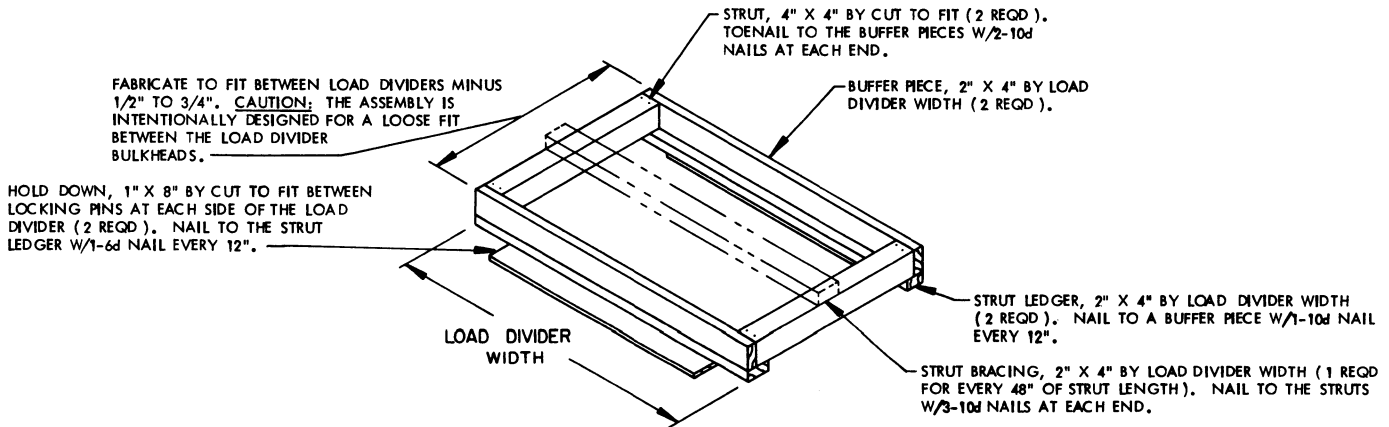
NOTE \* : TWO (2) BUNDLING STRAPS ARE REQUIRED FOR EACH PALLET STACK AND/OR LOAD UNIT WHICH IS COMPLETELY WITHIN THE DOORWAY AREA OR WHICH IS NOT RETAINED BY AT LEAST SIX INCHES (6") OF CAR SIDEWALL ON BOTH SIDES OF THE CAR. ONE (1) BUNDLING STRAP IS REQUIRED FOR EACH PALLET STACK AND/OR LOAD UNIT WHICH IS RETAINED BY FROM 6" TO ONE-HALF THE PALLET/LOAD UNIT WIDTH OR LENGTH.

**DOORWAY PROTECTION**



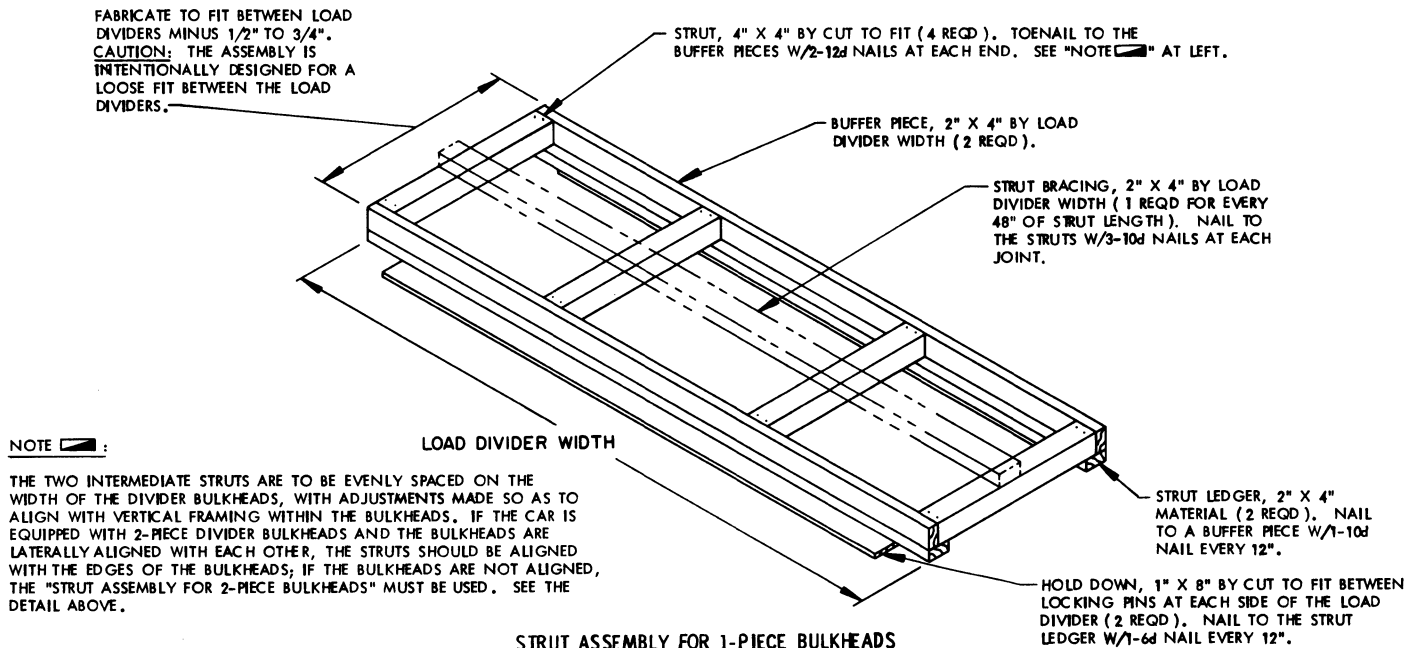
**INSTALLATION OF STRUT ASSEMBLY**

THIS VIEW SHOWS THE STRUT ASSEMBLY INSTALLED BETWEEN THE LOAD DIVIDER BULKHEADS. NOTE THAT THE 1/2" TO 3/4" (TOTAL) SPACE INTENTIONALLY PROVIDED BETWEEN THE ASSEMBLY AND THE BULKHEADS.



**STRUT ASSEMBLY FOR 2-PIECE BULKHEADS**

A STRUT ASSEMBLY IS REQUIRED WHEN THE LOAD BEHIND EITHER LOAD DIVIDER BULKHEAD EXCEEDS 50,000 POUNDS OF CLASS A OR CLASS B EXPLOSIVES. A STRUT ASSEMBLY IS NOT REQUIRED FOR LOADS OF CLASS C EXPLOSIVES, REGARDLESS OF THE WEIGHT OF THE LOAD. NOTE: TWO (2) ASSEMBLIES AS SHOWN ARE REQUIRED FOR A 2-PIECE BULKHEAD IF NOT LATERALLY ALIGNED. SEE "NOTE" BELOW.

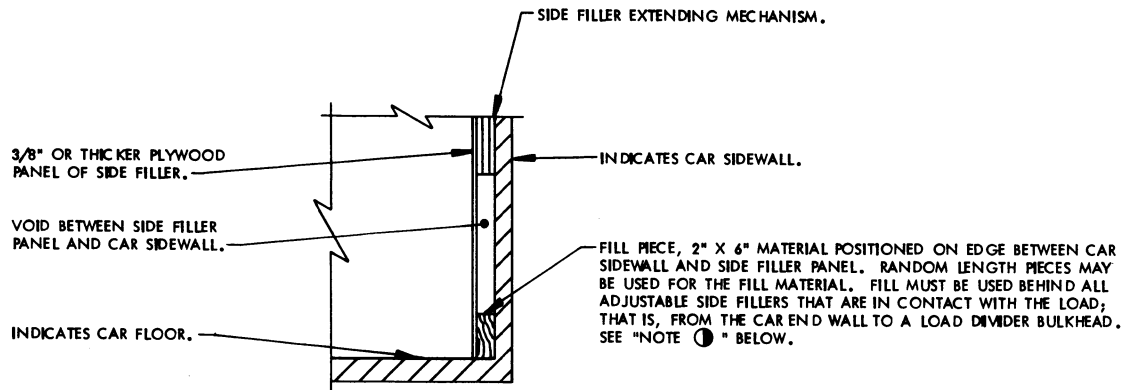


**NOTE:**

THE TWO INTERMEDIATE STRUTS ARE TO BE EVENLY SPACED ON THE WIDTH OF THE DIVIDER BULKHEADS, WITH ADJUSTMENTS MADE SO AS TO ALIGN WITH VERTICAL FRAMING WITHIN THE BULKHEADS. IF THE CAR IS EQUIPPED WITH 2-PIECE DIVIDER BULKHEADS AND THE BULKHEADS ARE LATERALLY ALIGNED WITH EACH OTHER, THE STRUTS SHOULD BE ALIGNED WITH THE EDGES OF THE BULKHEADS; IF THE BULKHEADS ARE NOT ALIGNED, THE "STRUT ASSEMBLY FOR 2-PIECE BULKHEADS" MUST BE USED. SEE THE DETAIL ABOVE.

**STRUT ASSEMBLY FOR 1-PIECE BULKHEADS**

A STRUT ASSEMBLY IS REQUIRED WHEN THE LOAD BEHIND EITHER LOAD DIVIDER BULKHEAD EXCEEDS 50,000 POUNDS OF CLASS A OR CLASS B EXPLOSIVES. A STRUT ASSEMBLY IS NOT REQUIRED FOR LOADS OF CLASS C EXPLOSIVES, REGARDLESS OF THE WEIGHT OF THE LOAD.

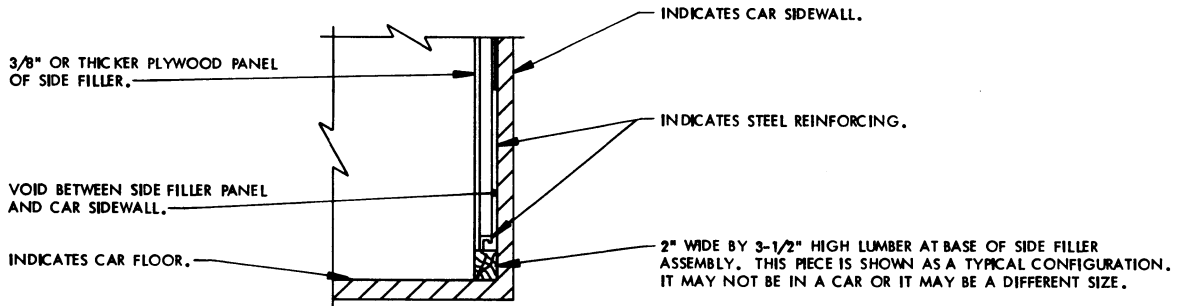


**TYPICAL TYPE A**

THIS VIEW SHOWS THE INSTALLATION OF A "FILL PIECE" IN A CAR EQUIPPED WITH A STANDARD ADJUSTABLE SIDE FILLER.

**NOTE 1 :**

NAILING OF "FILL PIECES" IS NOT REQUIRED EXCEPT THAT EACH "FILL PIECE" LOCATED NEAREST THE DOOR OPENING OF THE CAR WILL BE SECURED AGAINST LONGITUDINAL MOVEMENT W/1-6d NAIL DRIVEN THROUGH THE SIDE FILLER PANEL AND INTO THE "FILL PIECE".



**TYPICAL TYPE B**

THIS VIEW SHOWS A TYPICAL SECTION OF A CAR EQUIPPED WITH HEAVY DUTY, STEEL REINFORCED, ADJUSTABLE SIDE FILLERS. A "FILL PIECE", AS SHOWN IN THE "TYPICAL TYPE A" DETAIL ABOVE, IS NOT REQUIRED IN CARS SO EQUIPPED.

