


APPROVED BY  
 BUREAU OF EXPLOSIVES  
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 DATE 4/9/92

# LOADING AND BRACING (CL & LCL) IN BOX CARS OF COMPLETE ROUNDS PACKED IN CYLINDRICAL METAL CONTAINERS AND UNITIZED ON A 40" X 48" WOODEN PALLET

## PA 98 SERIES CONTAINERS

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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**

REVISIONS			DESIGNER	TYPIST	CHECKER	TECHNICIAN	ENGINEER
REV			SP BT	DI			R. Amell
REV			SMCAG-DEV		SMCAG-DEC		SMCAG-DE
REV			APPROVED BY U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND				
REV			<i>Samuel R. Fore</i>				
REV			APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND (AMC)				
REV			<i>William F. Ernst</i> U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL				
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REV			DECEMBER 1992				
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**GENERAL NOTES**

**(GENERAL NOTES CONTINUED)**

- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- B. THE OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE FOR COMPLETE ROUNDS PACKED IN THE PA98 SERIES CONTAINER AND UNITIZED ON A 40" X 48" WOOD PALLET. SEE THE PICTORIAL VIEW ON PAGE 3. REFER TO THE U. S. ARMY AMC DRAWING 19-48-4079/5-20PM1002 FOR UNITIZATION PROCEDURES FOR THE PA98 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 ENDS 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** ----- : FFD SPEC MM-L-751. SEE TM 743-200-1; DUNNAGE LUMBER.
- NAILS** ----- : FED SPEC FF-N-105. COMMON.
- STRAPPING, STEEL** -- : ASTM D 3953; FLAT STRAPPING, TYPE 1 OR 2, HEAVY DUTY, COATED FINISH (ORGANIC), ZINC-COATED (GRADE 2), OR UNCOATED.
- SEAL, STRAP** ----- : ASTM D 3953; CLASS H, FINISH A, B (GRADE 2), OR C, TYPE D, STYLE I, II, OR IV.
- STRAP STAPLE** ----- : COMMERCIAL GRADE.
- PLYWOOD** ----- : FED SPEC NN-P-530. GROUP B, CONSTRUCTION AND INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.
- 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.

- 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)

(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 TOE-NAILED 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 PRACTICAL PIECE OF THE CENTER GATE. SEE THE "BEVEL CUT" DETAIL ON PAGE 44 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.

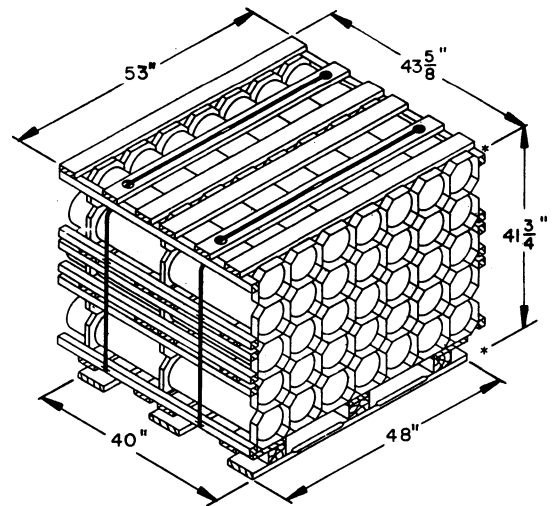
GENERAL NOTES

(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 TRANSICO 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 CUSHIONED 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 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 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.

- 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 HAZARD CLASS AND DIVISION 1.1, 1.2 OR 1.3 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 HAZARD CLASS AND DIVISION 1.4 EXPLOSIVES. NOTE THAT THE STRUT ASSEMBLY MAY BE OMITTED FROM LOADS OF HAZARD CLASS AND DIVISION 1.1, 1.2 OR 1.3 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 BY 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 PAGES 4 OR 6 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 33 OR WITH KNEE BRACE ASSEMBLIES, AS SHOWN ON PAGE 22.

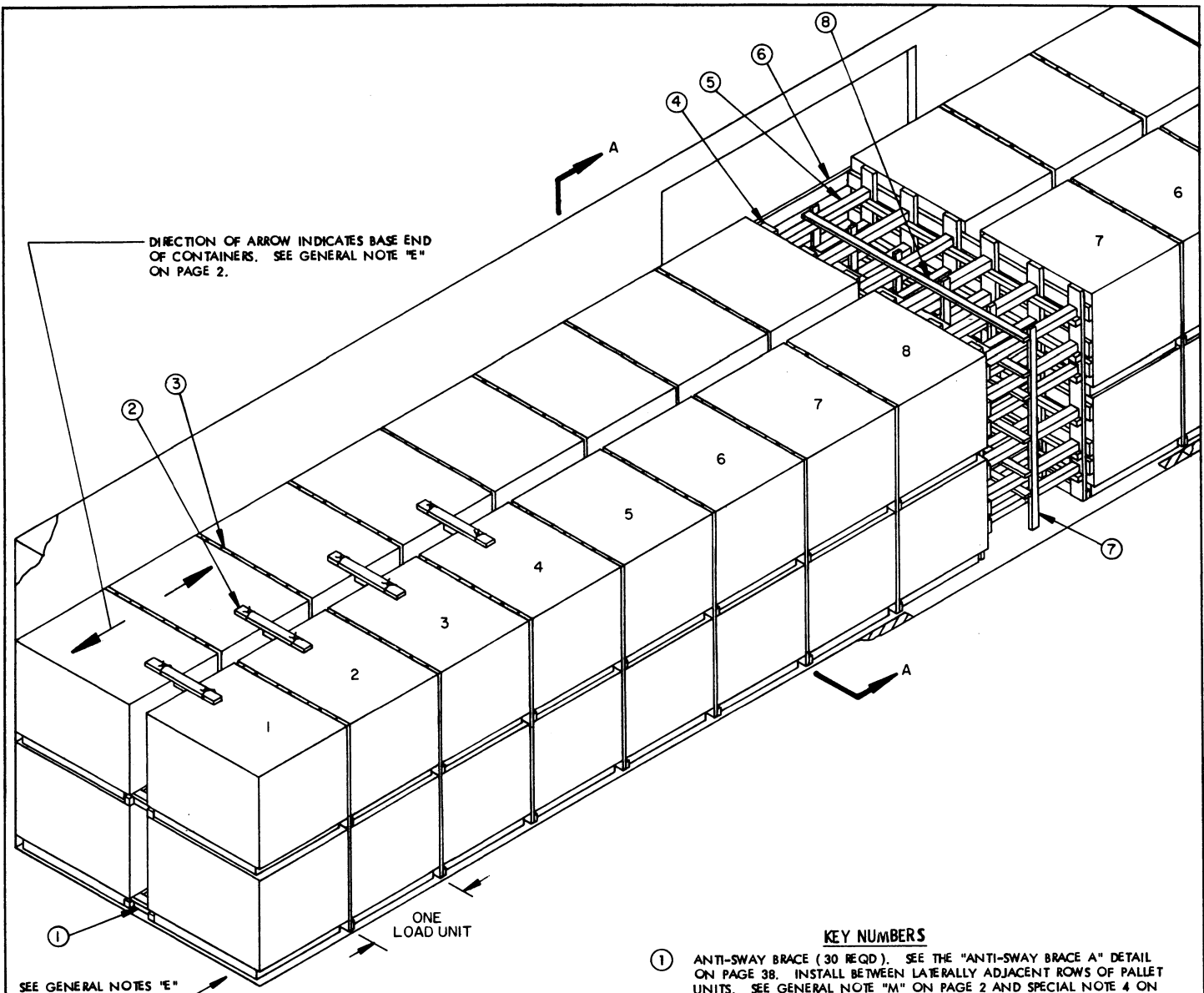
- GG. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTION WHICH IS IMMEDIATELY ADJACENT TO THE DEPICTED OUTLOADING METHODS.



PALLET UNIT

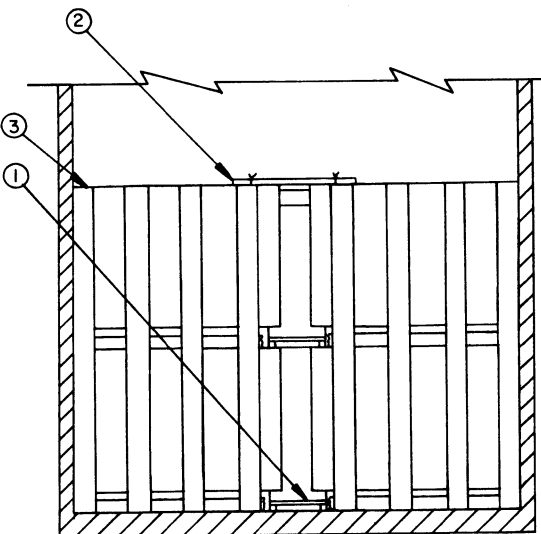
CONTAINER ----- 35 EACH @ 75 LBS (APPROX)  
 CUBE ----- 55.9 CUBIC FEET (APPROX)  
 GROSS WEIGHT ----- 2,795 LBS (APPROX)

(CONTINUED AT RIGHT)



ISOMETRIC VIEW

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



SECTION A-A

**KEY NUMBERS**

- ① ANTI-SWAY BRACE (30 REQD). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 38. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF PALLET UNITS. SEE GENERAL NOTE "M" ON PAGE 2 AND SPECIAL NOTE 4 ON PAGE 5.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (8 REQD). SEE THE "TOP-OF-LOAD ANTI-SWAY BRACE A" DETAIL ON PAGE 38. WIRE TIE TO TOP DUNNAGE ASSEMBLY AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON PAGE 43 WITH NO. 14 GAGE WIRE. SEE SPECIAL NOTE 5 ON PAGE 5.
- ③ SEPARATOR GATE (13 REQD). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 40. POSITION WITH THE HORIZONTAL PIECES AGAINST THE ALREADY LOADED UNITS. SEE SPECIAL NOTES 6 THRU 8 ON PAGE 5.
- ④ CENTER GATE (2 REQD). SEE THE "CENTER GATE A" DETAIL ON PAGE 38. SEE SPECIAL NOTES 9 THRU 11 ON PAGE 5.
- ⑤ STRUT, 4" X 4" BY CUT TO FIT (REF: 58) (36 REQD). TOENAIL TO PIECES MARKED ④ W/2-16d NAILS AT EACH END. SEE GENERAL NOTES "L" AND "T" ON PAGE 2 AND GENERAL NOTE "U" ON PAGE 3.
- ⑥ DOORWAY PROTECTION (2 REQD). SEE THE DETAIL ON PAGE 40. NAIL TO THE DOOR POSTS W/12d NAILS. SEE SPECIAL NOTE 12 ON PAGE 5.
- ⑦ VERTICAL STRUT BRACING, 2" X 4" X 6'-9" (6 REQD). NAIL TO THE STRUTS MARKED ⑤ W/3-10d NAILS AT EACH JOINT.
- ⑧ HORIZONTAL STRUT BRACING, 2" X 4" BY CAR WIDTH MINUS 8" IN LENGTH (6 REQD). NAIL TO THE STRUTS MARKED ⑤ W/3-10d NAILS AT EACH JOINT.

(SPECIAL NOTES CONTINUED)

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 4 PALLET UNITS OR A 1-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF 2 UNITS BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD. FOR OTHER METHODS OF REDUCING A LOAD, AND FOR TYPICAL LCL PROCEDURES, REFER TO PAGES 15 THRU 33 FOR GUIDANCE.
14. IF PALLET UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF CONTAINERS ARE TO BE TRANSPORTED, REFER TO PAGES 34 AND 37 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.

SPECIAL NOTES:

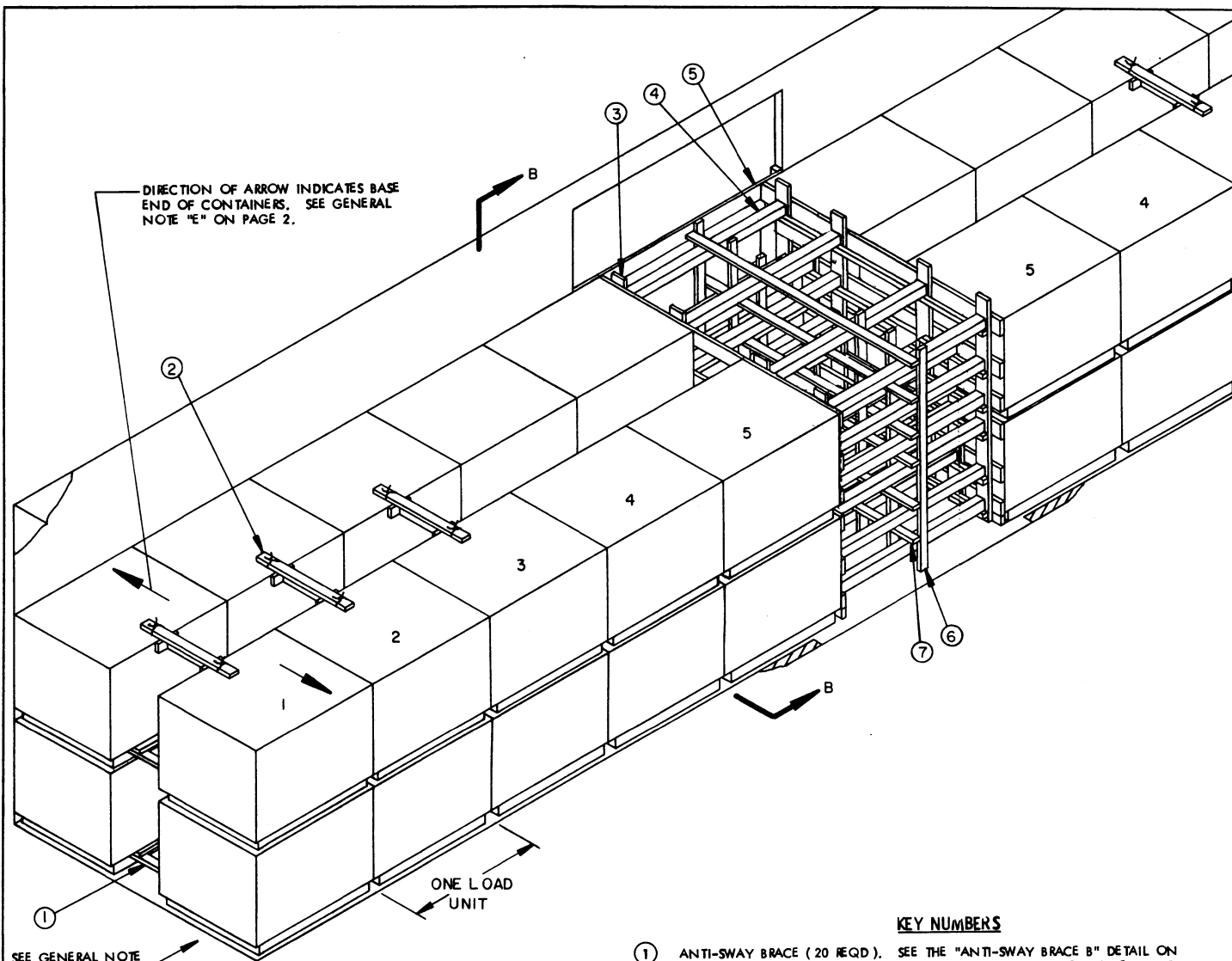
1. A 60'-8" LONG BY 9'-6" WIDE WOOD-LINED CONVENTIONAL TYPE BOX CAR EQUIPPED WITH 10'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER OR NARROWER DOOR OPENINGS CAN BE USED. SEE GENERAL NOTE "D" ON PAGE 2 AND SPECIAL NOTES 2 AND 3 BELOW.
2. CAUTION: THE 60'-8" LONG CAR TO BE USED FOR SHIPMENT OF A 60-UNIT LOAD MUST HAVE A LOAD LIMIT OF AT LEAST 171,400 POUNDS. FIFTY-SIX (56) UNITS CAN BE LOADED IN A 60'-8" CAR HAVING A LOAD LIMIT OF AT LEAST 159,400 POUNDS. NOTE THAT AN ADDED SET OF VERTICAL AND HORIZONTAL STRUT BRACING, PIECES MARKED ⑦ AND ⑧, WILL BE REQUIRED FOR A 56-UNIT LOAD.
3. A MAXIMUM OF FIFTY-TWO (52) PALLET UNITS, FOR AN APPROXIMATE LADING WEIGHT OF 145,340 POUNDS, CAN BE PLACED IN A 50'-6" LONG CAR WHEN USING THE DEPICTED PROCEDURES. THE CAR MUST HAVE A LOAD LIMIT OF AT LEAST 148,700 POUNDS. FORTY (40) UNITS, FOR AN APPROXIMATE LADING WEIGHT OF 111,800 POUNDS, CAN BE LOADED IN A 40'-6" LONG CAR. IF AN OFFSET LOADING PATTERN IS USED IN A 40'-6" CAR, THE CAR MUST HAVE A LOAD LIMIT OF AT LEAST 116,200 POUNDS.
4. IF THE NAILED FLOORLINE BLOCKING AND STEEL STRAPPING DOORWAY PROTECTION PROCEDURES SHOWN ON PAGE 48 ARE USED IN LIEU OF THE WOODEN DOOR GATE TYPE PROTECTION, PIECE MARKED ④ ON PAGE 4, NAILED FLOOR LINE BLOCKING MUST BE USED IN LIEU OF EACH ANTI-SWAY BRACE IN THE DOORWAY AREA. NAILED BLOCKING 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 ON EITHER SIDE OF THE CAR.
5. TOP-OF-LOAD ANTI-SWAY BRACES, SHOWN AS PIECE MARKED ② IN THE LOAD ON PAGE 4, MUST BE INSTALLED IN EACH END OF THE CAR AND WIRE TIED TO THE STOP PIECE OF THE TOP DUNNAGE ASSEMBLY OF THE UNIT WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON PAGE 43. FOUR (4) BRACES ARE REQUIRED IN EACH END OF A LOAD REGARDLESS OF THE CAR LENGTH.
6. 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 4" TIE PIECES ARE LOCATED UNDER THE "OVERHANG" OF THE PALLET UNITS. REPEAT THE PROCEDURE FOR THE REMAINING STACKS.
7. 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" DETAIL ON PAGE 19. THE USE OF THESE MODIFIED SEPARATOR GATES WILL ALLOW THE GATE TO CLEAR THE NAILED FLOORLINE BLOCKING DURING THE NORMAL SHIFTING OF THE LOAD.
8. NOTE THAT IF DESIRED, PLYWOOD SEPARATOR GATES MAY BE USED IN LIEU OF THE DIMENSIONAL LUMBER SEPARATOR GATES, PIECE MARKED ③. SEE THE "ALTERNATIVE SEPARATOR GATE" DETAIL ON PAGE 43 FOR CONSTRUCTION GUIDANCE.
9. 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 45 FOR GUIDANCE.
10. 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. SEE THE "CENTER GATE E" DETAIL ON PAGE 40 FOR CONSTRUCTION GUIDANCE. NOTE THAT TWO (2) RIGHT HAND AND TWO (2) LEFT HAND GATES ARE REQUIRED. AFTER THE SPLIT CENTER GATES HAVE BEEN INSTALLED, THEY MUST BE TIED TOGETHER AS DEPICTED BY THE "TIE PIECE APPLICATION" DETAIL ON PAGE 45.
11. DOOR SPANNER TYPE GATE HOLD DOWN MAY BE USED IN LIEU OF THE DOUBLED 2" X 3" MATERIAL NAILED TO CENTER GATE "A", PROVIDING THE CAR BEING LOADED HAS AVAILABLE SIDEWALLS. SEE THE DETAILS ON PAGE 49 FOR GUIDANCE.
12. DOORWAY PROTECTION IS REQUIRED FOR ALL PALLET UNIT STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY BY ONE-HALF OR MORE OF THE STACK LENGTH. THE WOODEN GATE TYPE OF DOORWAY PROTECTION, SHOWN AS PIECE MARKED ⑥ IN THE LOAD ON PAGE 4, IS APPLICABLE FOR BOX CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NAILABLE DOOR POSTS. REFER TO PAGES 46 THRU 48 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 DOORWAY PROTECTION STRAPS MUST BE USED. SEE THE "ALTERNATIVE DOORWAY PROTECTION E" DETAIL ON PAGE 48 FOR GUIDANCE. NOTE THAT THE DOORWAY PROTECTION PROCEDURES FOR CARS EQUIPPED WITH PLUG TYPE DOORS MAY ALSO BE USED IN CARS EQUIPPED WITH SLIDING DOORS.

(CONTINUED AT LEFT)

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	345	115
1" X 6"	808	404
2" X 2"	324	108
2" X 3"	36	18
2" X 4"	210	140
2" X 6"	215	215
4" X 4"	174	232
NAILS	NO. REQD	POUNDS
6d (2")	1092	6-1/2
10d (3")	1052	16-1/4
12d (3-1/4")	28	1/2
16d (3-1/2")	144	3-1/4
WIRE, NO. 14 GAGE-----80' REQD-----1-1/2 LBS		

LOAD AS SHOWN

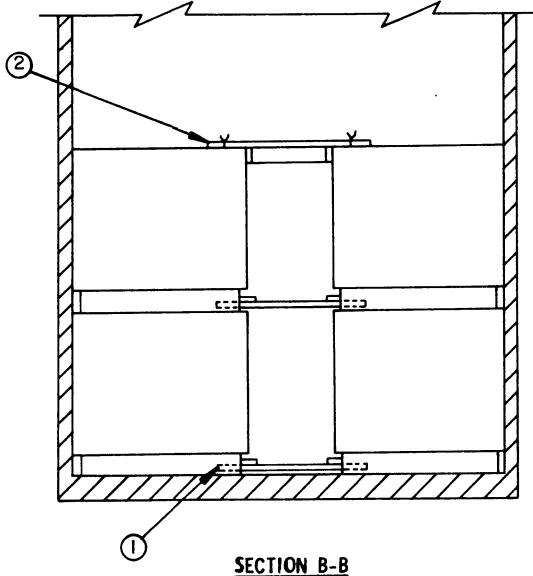
ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT-----	60	167,700 LBS
DUNNAGE-----		2,492 LBS
TOTAL WEIGHT-----		170,192 LBS



ISOMETRIC VIEW

**KEY NUMBERS**

- ① ANTI-SWAY BRACE (20 REQD). SEE THE "ANTI-SWAY BRACE B" DETAIL ON PAGE 39. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF PALLET UNITS. SEE GENERAL NOTE "M" ON PAGE 2.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (6 REQD). SEE THE "TOP-OF-LOAD ANTI-SWAY BRACE B" DETAIL ON PAGE 39. WIRE TIE TO THE TOP DUNNAGE ASSEMBLY 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 39 AND SPECIAL NOTES 5 THRU 7 ON PAGE 7.
- ④ STRUT, 4" X 4" BY CUT TO FIT (REF: 70") (24 REQD). TOENAIL TO PIECES MARKED ③ W/2-16d NAILS AT EACH END. SEE GENERAL NOTES "L" AND "I" ON PAGE 2 AND GENERAL NOTE "U" ON PAGE 3.
- ⑤ DOORWAY PROTECTION (2 REQD). SEE THE DETAIL ON PAGE 40. NAIL TO THE DOOR POSTS W/12d NAILS. SEE SPECIAL NOTES 8 AND 9 ON PAGE 7.
- ⑥ VERTICAL STRUT BRACING, 2" X 4" X 7'-4" (4 REQD). NAIL TO THE STRUTS, PIECES MARKED ④, W/3-10d NAILS AT EACH JOINT. SEE GENERAL NOTE "T" ON PAGE 2.
- ⑦ HORIZONTAL STRUT BRACING, 2" X 4" BY CAR WIDTH MINUS 5" IN LENGTH (6 REQD). NAIL TO THE STRUTS, PIECES MARKED ④, W/3-10d NAILS AT EACH JOINT.



**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-2" WIDE WOOD-LINED CONVENTIONAL TYPE BOX CAR EQUIPPED WITH 8'-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 AND SPECIAL NOTES 2 AND 3 BELOW.
2. IT MAY BE POSSIBLE IN A 50'-6" LONG CAR, AND DEFINITELY IF A CAR A FEW INCHES LONGER IS FURNISHED, TO POSITION AN ADDITIONAL LOAD UNIT OF 4 PALLET UNITS. THE FORTY-FOUR (44) UNITS CAN BE LOADED IN A CAR HAVING A LOAD LIMIT OF AT LEAST 125,000 POUNDS.
3. A MAXIMUM OF FIFTY-TWO (52) PALLET UNITS, FOR AN APPROXIMATE LADING WEIGHT OF 145,340 POUNDS, CAN BE PLACED IN A 60'-8" LONG CAR WHEN USING THE DEPICTED PROCEDURES. THE CAR MUST HAVE A LOAD LIMIT OF AT LEAST 147,700 POUNDS. THIRTY-TWO (32) UNITS, FOR AN APPROXIMATE WEIGHT OF 89,440 POUNDS, CAN BE LOADED IN A 40'-6" LONG CAR. IF AN OFFSET LOADING PATTERN IS USED IN A 40'-6" LONG CAR, THE CAR MUST HAVE A LOAD LIMIT OF AT LEAST 93,900 POUNDS.
4. TOP-OF-LOAD ANTI-SWAY BRACES, SHOWN AS PIECE MARKED (2) IN THE LOAD ON PAGE 6, MUST BE INSTALLED IN EACH END OF THE CAR AND WIRE TIED TO THE TOP DUNNAGE ASSEMBLY WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION B" DETAIL ON PAGE 43. THREE (3) BRACES ARE REQUIRED IN EACH END OF A LOAD REGARDLESS OF THE CAR LENGTH.
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 45 FOR GUIDANCE.
6. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED IN LIEU OF THE CAR WIDTH GATES. IN LIEU OF EACH "CENTER GATE B" SHOWN IN THE LOAD VIEW ON PAGE 6 AS PIECE MARKED (3), INSTALL TWO (2) "CENTER GATES F" AS SHOWN ON PAGE 41. AFTER THE SPLIT GATES HAVE BEEN INSTALLED, THEY MUST BE TIED TOGETHER AS TYPICALLY DEPICTED BY THE "TIE PIECE APPLICATION" DETAIL ON PAGE 45.
7. DOOR SPANNER TYPE GATE HOLD DOWN MAY BE USED IN LIEU OF THE DOUBLED 2" X 3" MATERIAL NAILED TO CENTER GATE "B", PROVIDING THE CAR BEING LOADED HAS NAILABLE SIDEWALLS. SEE THE DETAILS ON PAGE 49 FOR GUIDANCE.
8. DOORWAY PROTECTION IS REQUIRED FOR ALL PALLET UNIT STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY OR WHICH EXTEND IN TO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK WIDTH. THE WOODEN GATE TYPE OF DOORWAY PROTECTION, SHOWN AS PIECE 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 46 THRU 48 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 DOORWAY PROTECTION STRAPS MUST BE USED. SEE PIECES MARKED (3) THRU (6) ON PAGE 12 FOR GUIDANCE. NOTE THAT THE DOORWAY PROTECTION PROCEDURES FOR CARS EQUIPPED WITH PLUG TYPE DOORS MAY ALSO BE USED IN CARS EQUIPPED WITH SLIDING DOORS.
9. IF THE CAR BEING LOADED IS A METAL LINED CAR AND SIDEWALL LINING AS SHOWN ON PAGE 42 IS USED, IT WILL BE NECESSARY TO INCREASE THE WIDTH OF THE VERTICAL PIECES OF THE DOORWAY PROTECTION, PIECE MARKED (5) ON PAGE 6, TO 2" X 4" OR 2" X 6" MATERIAL IN ORDER FOR THE HORIZONTAL PIECES OF THE ASSEMBLY TO CONTACT THE LADING AND/OR THE CENTER GATES.
10. 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 BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD. THE ENTIRE TOP TIER CAN ALSO BE OMITTED. FOR OTHER METHODS OF REDUCING A LOAD, AND FOR TYPICAL LCL PROCEDURES, REFER TO PAGES 15 THRU 33 FOR GUIDANCE.
11. IF PALLET UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF CONTAINERS ARE TO BE TRANSPORTED, REFER TO PAGE 35 FOR SHIPPING GUIDANCE.
12. FOR SHIPMENT OF ONE OR MORE LEFTOVER CONTAINERS, SEE THE "PROCEDURES FOR SHIPMENT OF LEFTOVER CONTAINERS" ON PAGE 36 FOR GUIDANCE.

**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
1" X 6"	64	32
2" X 2"	106	36
2" X 3"	28	14
2" X 4"	364	243
2" X 6"	196	196
4" X 4"	140	187
NAILS	NO. REQD	POUNDS
6d (2")	48	1/2
10d (3")	772	12
12d (3-1/4")	28	1/2
16d (3-1/2")	96	2-1/4
WIRE, NO. 14 GAGE-----60' REQD-----1 LB		

**LOAD AS SHOWN**

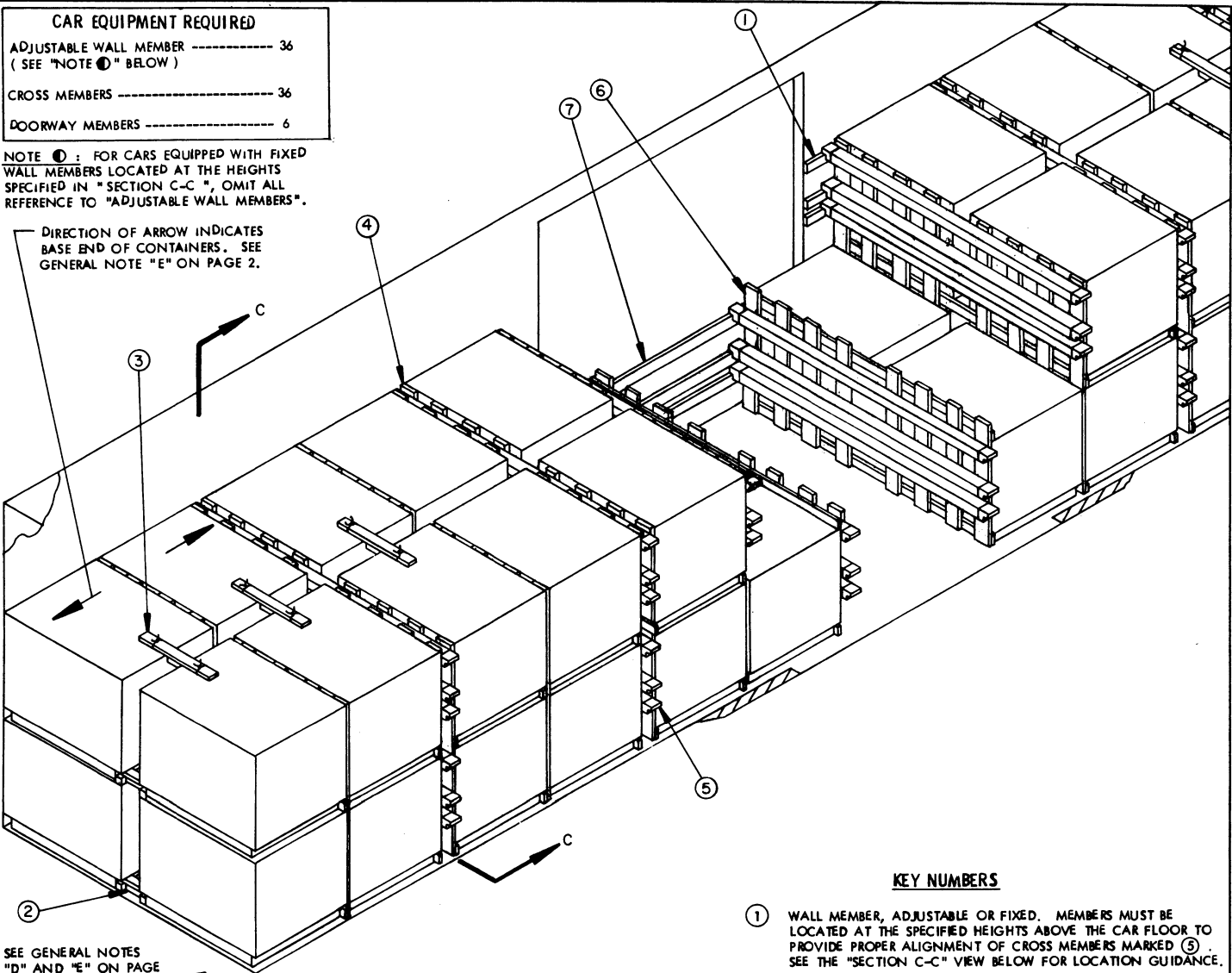
ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT -----	40 -----	111,800 LBS
DUNNAGE -----	-----	1,433 LBS
TOTAL WEIGHT -----		113,233 LBS

**CAR EQUIPMENT REQUIRED**

ADJUSTABLE WALL MEMBER -----	36
(SEE "NOTE 1" BELOW)	
CROSS MEMBERS -----	36
DOORWAY MEMBERS -----	6

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".

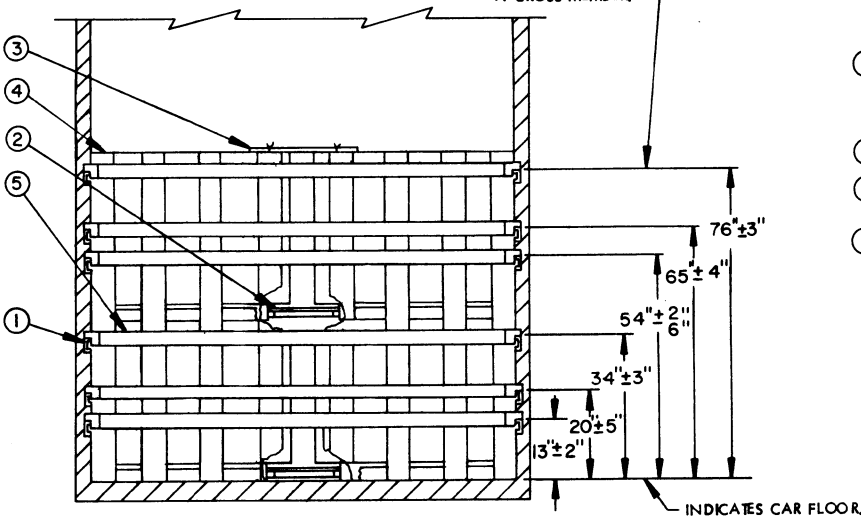
DIRECTION OF ARROW INDICATES BASE END OF CONTAINERS. SEE GENERAL NOTE "E" ON PAGE 2.



**ISOMETRIC VIEW**

SEE GENERAL NOTES "D" AND "E" ON PAGE 2 AND SPECIAL NOTE 3 ON PAGE 9.

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**

**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 5. SEE THE "SECTION C-C" VIEW BELOW FOR LOCATION GUIDANCE.
- 2 ANTI-SWAY BRACE (22 REQD). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 38. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF PALLET UNITS. SEE GENERAL NOTE "M" ON PAGE 2. SEE SPECIAL NOTE 3 ON PAGE 9.
- 3 TOP-OF-LOAD ANTI-SWAY BRACE (6 REQD). SEE THE "TOP-OF-LOAD ANTI-SWAY BRACE A" DETAIL ON PAGE 38. WIRE TIE TO THE TOP DUNNAGE ASSEMBLY WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" ON PAGE 43. SEE SPECIAL NOTE 5 ON PAGE 9.
- 4 SEPARATOR GATE FOR 2-HIGH (14 REQD). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 40. POSITION SO THAT THE TIE PIECES WILL BE UNDER THE OVERHANG OF THE ALREADY LOADED UNITS.
- 5 CROSS MEMBER (36 REQD). SEE GENERAL NOTE "X" ON PAGE 3
- 6 SEPARATOR GATE FOR 1-HIGH (2 REQD). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 40.
- 7 DOORWAY MEMBER (6 REQD). SEE THE "SECTION C-C" VIEW AT LEFT FOR LOCATION GUIDANCE. SEE SPECIAL NOTE 7 ON PAGE 9.



**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 A 10'-0" WIDE DOOR OPENING, 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. A MAXIMUM OF THIRTY-SIX ( 36 ) PALLET UNITS, FOR AN APPROXIMATE LADING WEIGHT OF 100,620 POUNDS, CAN BE PLACED IN A 40'-6" LONG CAR WHEN USING THE DEPICTED PROCEDURES. SIXTY ( 60 ) PALLET UNITS, FOR AN APPROXIMATE LADING WEIGHT OF 167,700 POUNDS, CAN BE PLACED IN A 60'-8" LONG CAR, LOAD LIMIT PERMITTING. A 60-UNIT LOAD WILL REQUIRE A CAR HAVING A LOAD LIMIT OF AT LEAST 169,600 POUNDS.
3. THE ANTI-SWAY BRACES, PIECE MARKED ②, WHICH ARE LOCATED IN THE FIRST LOAD UNIT IN EACH END OF THE CAR MUST HAVE ONE INCH ( 1" ) CUT OFF THE CENTER-OF-CAR END OF THE LONGITUDINAL PIECES TO PROVIDE CLEARANCE FOR THE TIE PIECE OF THE ADJACENT SEPARATOR GATE. ALL OTHER ANTI-SWAY BRACES WILL BE 43-1/2" LONG, AS DIMENSIONED.
4. IF A CAR HAS BOWED ENDWALLS 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 WITH THE TIE PIECES UNDER THESE CROSS MEMBERS PRIOR TO LOADING.
5. 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 TOP DUNNAGE ASSEMBLY 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 40' OR 50' CAR. NOTE THAT FOUR ( 4 ) BRACES WILL BE REQUIRED IN EACH END OF A LOAD IN A 60' LONG CAR.
6. NOTE THAT IF DESIRED, PLYWOOD SEPARATOR GATES MAY BE USED IN LIEU OF THE DIMENSIONAL LUMBER SEPARATOR GATES, PIECES MARKED ④ AND ⑤. SEE THE "ALTERNATIVE SEPARATOR GATE" DETAIL ON PAGE 43 FOR CONSTRUCTION GUIDANCE.
7. IF THE 40'-6" OR 50'-6" LONG CAR BEING LOADED IS EQUIPPED WITH AT LEAST TWELVE ( 12 ) DOORWAY MEMBERS, AN ADDITIONAL 4 PALLET UNITS CAN BE LOADED IN THE DOORWAY AREA.
8. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED. A LOAD MAY BE REDUCED BY A MULTIPLE OF TWO ( 2 ) PALLET UNITS BY OMITTING LATERALLY ADJACENT UNITS FROM THE TOP LAYER OF ONE OR MORE LOAD UNITS, OR BY MULTIPLES OF FOUR ( 4 ) PALLET UNITS BY OMITTING ONE OR MORE ENTIRE LOAD UNITS FROM THE END PORTION OF THE LOAD. TO REDUCE A LOAD BY ONE ( 1 ) PALLET UNIT, REFER TO THE LCL PROCEDURES ON PAGES 10 AND 11 FOR GUIDANCE.
9. FOR SHIPMENT OF ONE OR MORE LEFTOVER CONTAINERS, SEE THE "PROCEDURES FOR SHIPMENT OF LEFTOVER CONTAINERS" ON PAGE 36 FOR GUIDANCE.

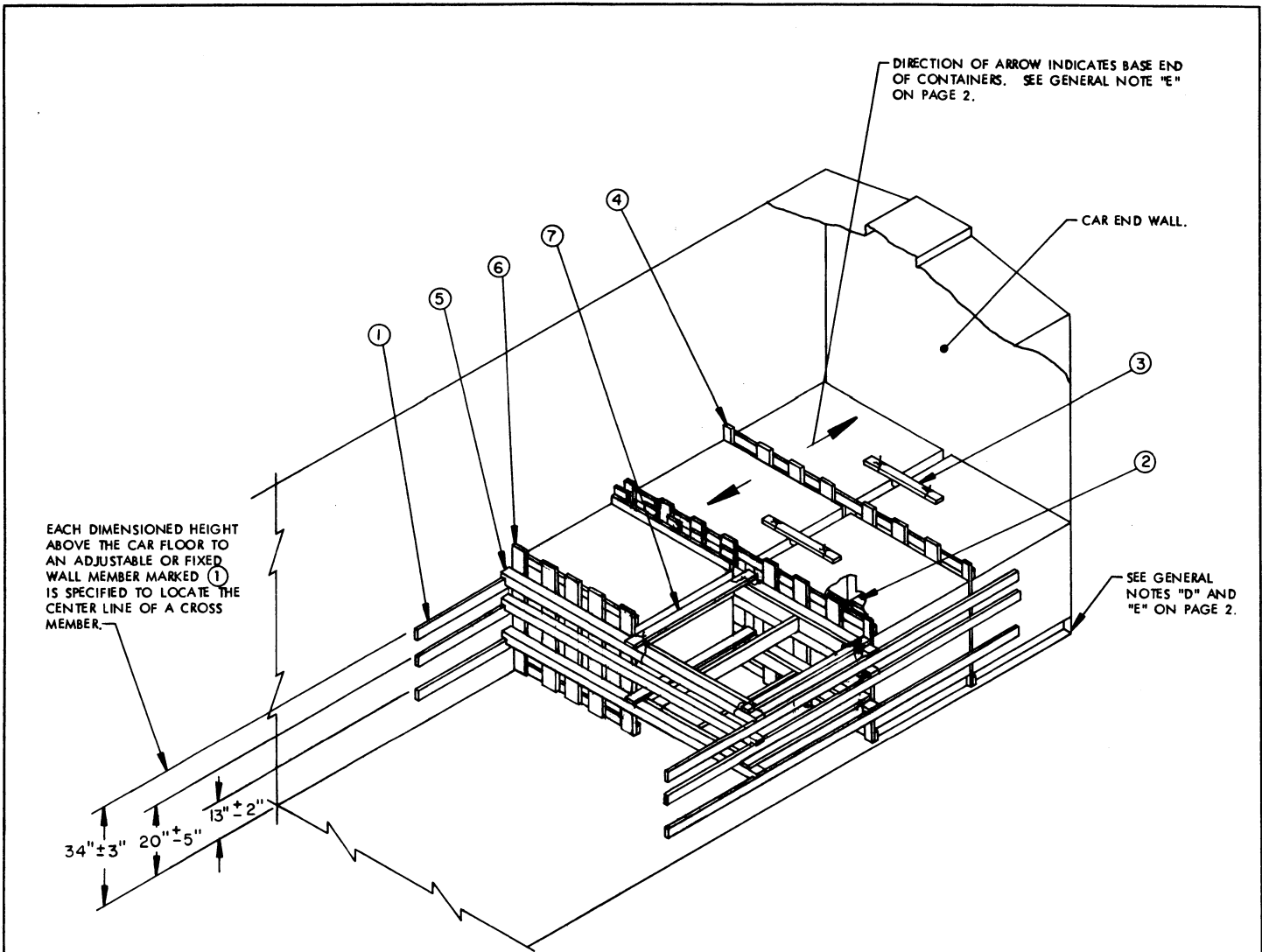
**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	344	115
1" X 6"	848	424
2" X 2"	160	54
2" X 4"	54	36
NAILS	NO. REQD	POUNDS
6d ( 2" )	1,076	6-1/2
10d ( 3" )	176	2-3/4
12d ( 3-1/4" )	18	1/2
WIRE, NO. 14 GAGE-----80' REQD-----1-1/2 LBS		

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT ( APPROX )
PALLET UNIT -----	44 -----	122,980 LBS
DUNNAGE -----		1,270 LBS
TOTAL WEIGHT-----		124,250 LBS

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



ISOMETRIC VIEW

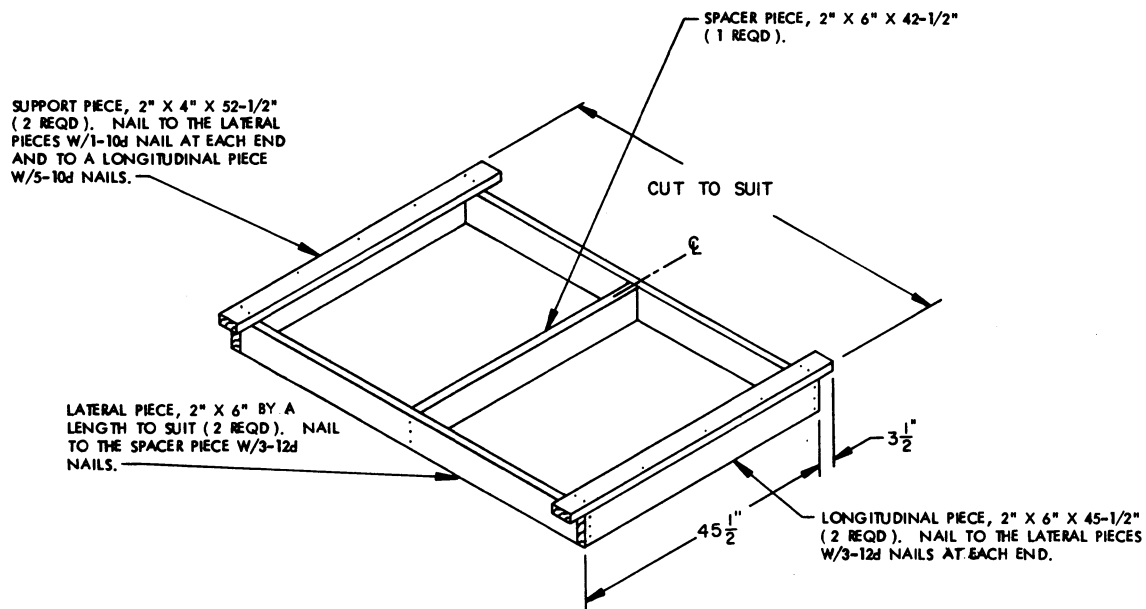
KEY NUMBERS

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 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 OF 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 NO CROSS MEMBERS MUST BE INSTALLED AT THE END OF THE LOAD TO SUPPORT THE SPACER ASSEMBLIES.

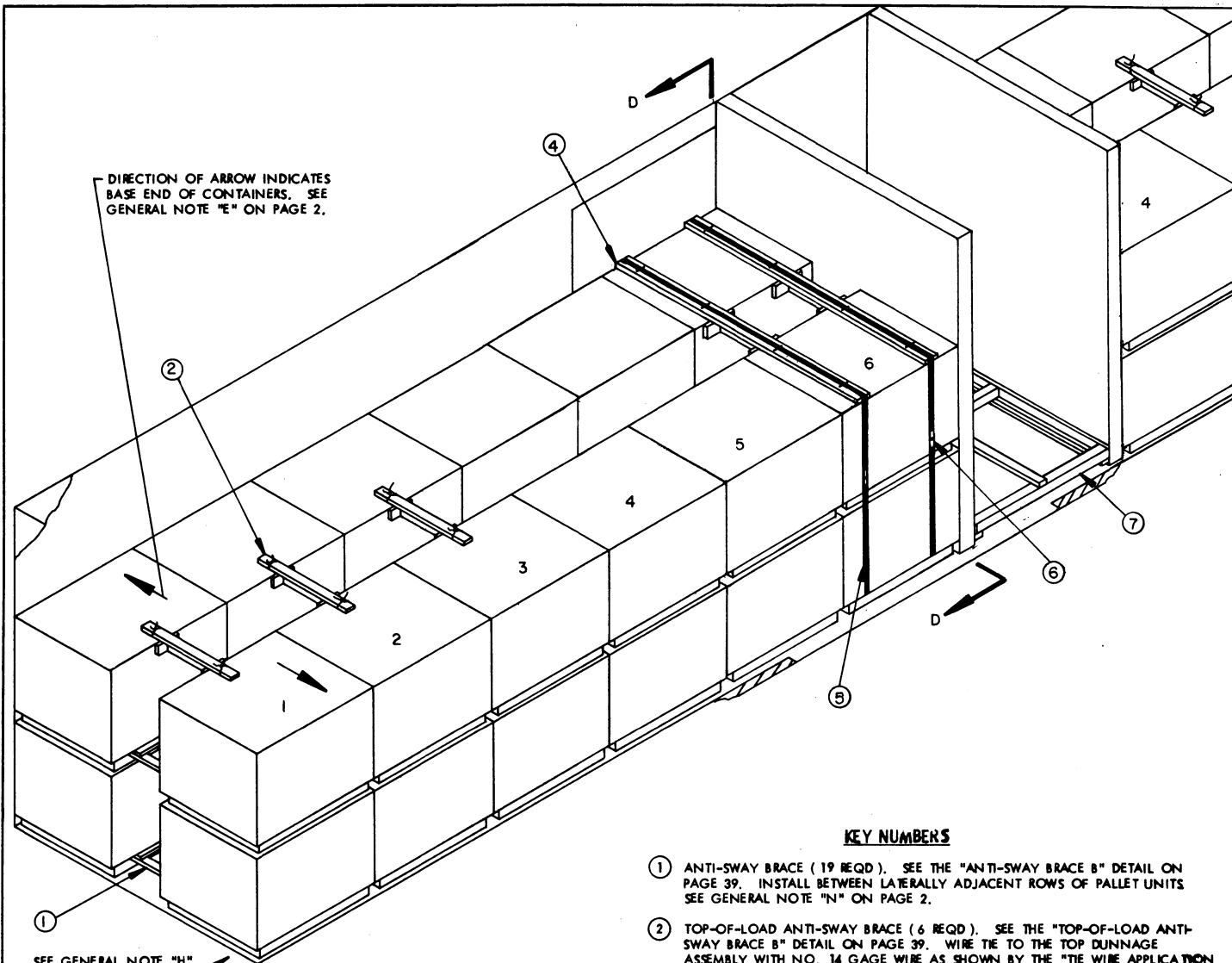
- ① WALL MEMBER, ADJUSTABLE OR FIXED. MEMBERS MUST BE LOCATED AT THE SPECIFIED HEIGHTS ABOVE THE CAR FLOOR TO PROVIDE PROPER ALIGNMENT OF CROSS MEMBERS MARKED ⑤. SEE SPECIAL NOTE 5.
- ② ANTI-SWAY BRACE (2 REQD). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 38. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF PALLET UNITS. SEE GENERAL NOTE "M" ON PAGE 2.
- ③ TOP-OF-LOAD ANTI-SWAY BRACE (2 REQD). SEE THE "TOP-OF-LOAD ANTI-SWAY BRACE A" DETAIL ON PAGE 38. WIRE TIE TO THE TOP DUNNAGE ASSEMBLY AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON PAGE 43. SEE SPECIAL NOTE 3.
- ④ SEPARATOR GATE FOR 1-HIGH BY 2-WIDE (2 REQD). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 40. POSITION AS SHOWN WITH THE TIE PIECES AGAINST THE ALREADY LOADED UNITS. SEE SPECIAL NOTE 4.
- ⑤ CROSS MEMBER (6 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 31.
- 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 OR FIXED WALL MEMBERS

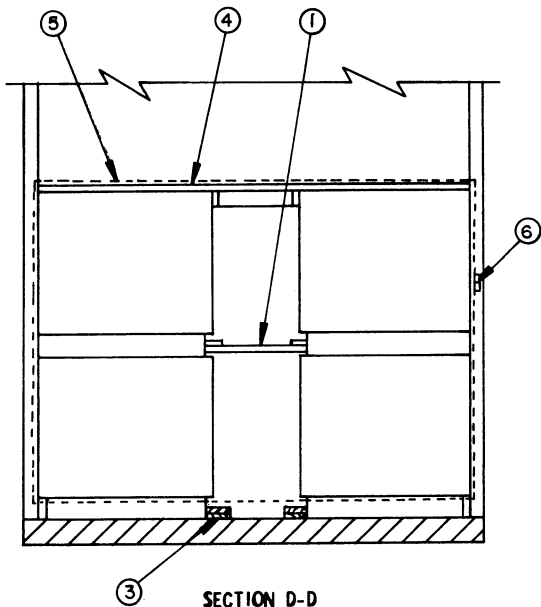


**SPACER ASSEMBLY A**

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



**ISOMETRIC VIEW**



**KEY NUMBERS**

- ① ANTI-SWAY BRACE (19 REQD). SEE THE "ANTI-SWAY BRACE B" DETAIL ON PAGE 39. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF PALLET UNITS. SEE GENERAL NOTE "N" ON PAGE 2.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (6 REQD). SEE THE "TOP-OF-LOAD ANTI-SWAY BRACE B" DETAIL ON PAGE 39. WIRE TIE TO THE TOP DUNNAGE ASSEMBLY WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION B" DETAIL ON PAGE 43. SEE SPECIAL NOTE 4 ON PAGE 9.
- ③ DOORWAY BLOCKING, 2" X 6" X 48" (DOUBLED) (2 REQD). 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 6 ON PAGE 13.
- ④ SPACER ASSEMBLY (2 REQD). SEE THE "SPACER ASSEMBLY B" DETAIL ON PAGE 48.
- ⑤ DOORWAY PROTECTION STRAP, 1-1/4" X .035" OR .031" X 34'-0" LONG STEEL STRAPPING (2 REQD). INSTALL TO ENCIRCLE THE PALLET UNIT STACK AND SPACER ASSEMBLY IN THE DOORWAY AREA. STAPLE TO THE SPACER ASSEMBLY W/3 STAPLES. SEE SPECIAL NOTE 6 ON PAGE 13.
- ⑥ SEAL FOR 1-1/4" STRAPPING (4 REQD). DOUBLE CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES. SEE GENERAL NOTE "O" ON PAGE 2.
- ⑦ 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 7 ON PAGE 13.

**SPECIAL NOTES:**

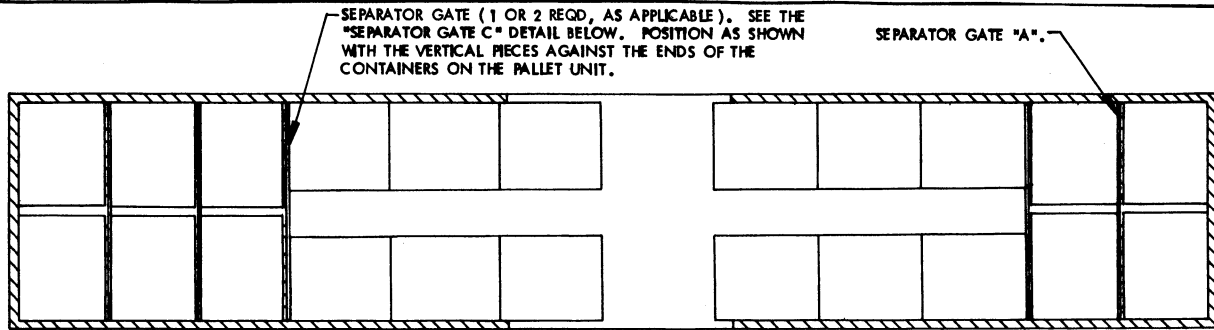
1. A 50'-6" LONG BY 9'-2" WIDE WOOD-LINED CUSHIONED BOX CAR EQUIPPED WITH LOAD DIVIDER BULKHEADS AND 10'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING NARROWER OR WIDER DOOR OPENINGS CAN BE USED. SEE GENERAL NOTE "BB" THRU "FF" ON PAGE 3.
2. THE DEPICTED LOAD WILL REQUIRE A CAR HAVING A LOAD LIMIT OF AT LEAST 115,600 POUNDS. IF LOADED SO THERE ARE 5 LOAD UNITS IN EACH END OF THE CAR, A LOAD LIMIT OF 112,500 POUNDS WILL BE ADEQUATE. NOTE THAT IF THE CAR BEING LOADED IS EQUIPPED WITH LOAD DIVIDER BULKHEADS WHICH HAVE THE OPERATING MECHANISM LOCATED ON THE EDGE OF THE BULKHEAD, AN ADDITIONAL 4 PALLET UNITS CAN BE LOADED FOR AN APPROXIMATE LADING WEIGHT OF 122,980 POUNDS. A LOAD LIMIT OF 124,300 POUNDS IS ADEQUATE FOR THE 44-UNIT LOAD.
3. A MAXIMUM OF FIFTY-TWO (52) PALLET UNITS, FOR AN APPROXIMATE LADING WEIGHT OF 145,340 POUNDS, CAN BE PLACED IN A 60'-8" LONG CAR WHEN USING THE DEPICTED PROCEDURES. A CAR HAVING A LOAD LIMIT OF AT LEAST 144,800 POUNDS WILL BE REQUIRED. THIRTY-TWO (32) PALLET UNITS, FOR AN APPROXIMATE LADING WEIGHT OF 89,400 POUNDS, CAN BE PLACED IN A 40'-6" LONG CAR. A LOAD LIMIT OF AT LEAST 193,200 POUNDS WILL BE REQUIRED IF AN OFFSET LOADING PATTERN IS USED..
4. IF IT IS DESIRABLE TO SHIP A LARGER QUANTITY, UP TO SIXTY (60) PALLET UNITS CAN BE PLACED IN A 60'-8" LONG CAR, FORTY-EIGHT (48) WILL GO IN A 50'-6" CAR, AND FORTY (40) CAN BE LOADED IN A 40'-6" LONG CAR BY PLACING THE PALLET UNITS WITH THE CONTAINERS LENGTHWISE IN THE CAR. IN LIEU OF THE DEPICTED DUNNAGE, ANTI-SWAY BRACE "A", TOP-OF-LOAD ANTI-SWAY BRACE "A", AND SEPARATOR GATE "A" WILL BE USED AS SHOWN; IN THE LOAD ON PAGE 4. ALSO, SPACER ASSEMBLY "A" WILL BE USED IN LIEU OF PIECE MARKED ④.
5. 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 TOP DUNNAGE ASSEMBLY WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION B" DETAIL ON PAGE 43. THREE BRACES ARE REQUIRED IN THIS LOAD AND IN A 40' LONG CAR; FOUR BRACES WILL BE REQUIRED IN EACH END OF THE LOAD WHEN SHIPPING IN A 60' LONG CAR.
6. 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 OR LENGTH. IF CAR BEING LOADED IS EQUIPPED WITH PLUG TYPE DOORS OR COMBINATION PLUG AND SLIDING DOORS, PIECES MARKED ③ THRU ④ ON PAGE 12 WILL BE USED WHEN THE UNITS ARE POSITIONED SO THE CONTAINERS ARE CROSSWISE IN THE CAR. SEE THE "ALTERNATIVE DOORWAY PROTECTION E" DETAIL ON PAGE 48 FOR GUIDANCE IF THE UNITS ARE POSITIONED WITH THE CONTAINERS LENGTHWISE IN THE CAR. WOODEN GATE TYPE OF DOORWAY PROTECTION IS APPLICABLE FOR BOX CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND AVAILABLE DOOR POSTS. REFER TO THE "DOORWAY PROTECTION" DETAIL ON PAGE 40 OR THE "ALTERNATIVE DOORWAY PROTECTION" PROCEDURES ON PAGE 46 THRU 48 FOR CARS EQUIPPED WITH SLIDING DOORS.
7. THE STRUT ASSEMBLY, SHOWN AS PIECE MARKED ⑦ IN THE LOAD ON PAGE 12, IS REQUIRED WHEN THE LOAD IN EITHER END OF A CAR IS 50,000 POUNDS OR MORE. THE STRUT ASSEMBLY WILL ALWAYS BE REQUIRED FOR FULL LOADS IN 60' OR LONGER CARS.
8. 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, REFER TO PAGES 17 AND 18 AND GENERAL NOTE "F-F" ON PAGE 3 FOR GUIDANCE.
9. IF PALLET UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF CONTAINERS ARE TO BE SHIPPED, REFER TO PAGE 34 FOR LENGTHWISE UNITS OR PAGES 35 AND 37 FOR CROSSWISE UNITS.
10. FOR SHIPMENT OF ONE OR MORE LEFTOVER CONTAINERS, SEE THE "PROCEDURES FOR SHIPMENT OF LEFTOVER CONTAINERS" ON PAGE 36 FOR GUIDANCE.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 8"	17	12
2" X 4"	286	191
2" X 6"	60	60
4" X 4"	21	28
NAILS	NO. REQD	POUNDS
6d (2")	18	NIL
10d (3")	282	4-1/2
12d (3-1/4")	30	1/2
16d (3-1/2")	20	1/2
STEEL STRAPPING, 1-1/4" X .031" OR .035" --- 68' REQD-----10 LBS		
SEAL FOR 1-1/4" STRAPPING-----4 REQD-----NIL		
WIRE, NO. 14 GAGE-----60' REQD-----1 LB		

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	40	111,800 LBS
DUNNAGE		599 LBS

TOTAL WEIGHT----- 112,399 LBS (APPROX)

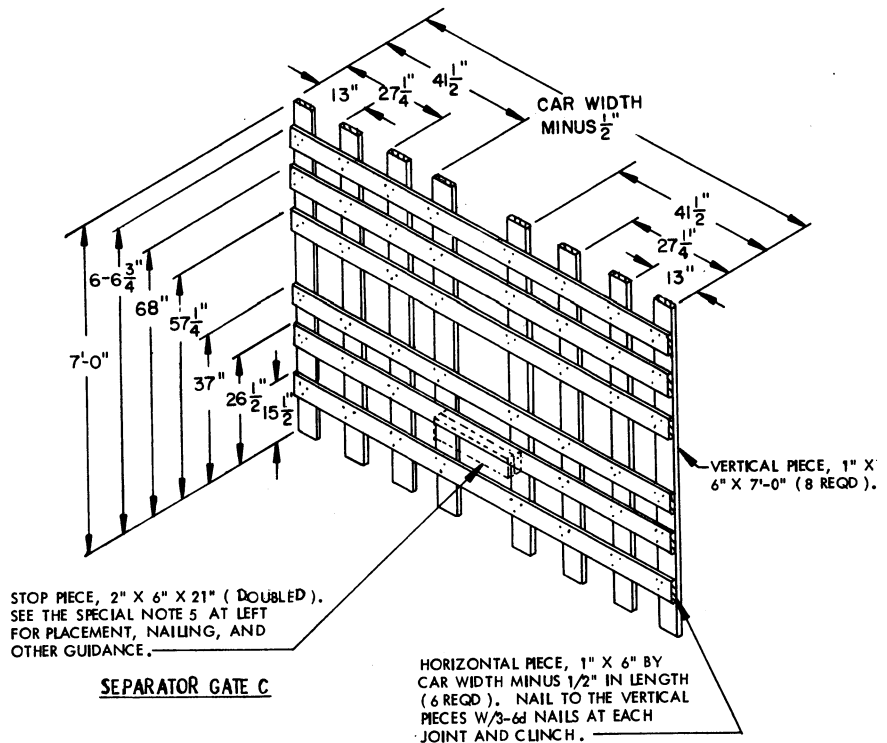


**TYPICAL COMBINATION LOAD PATTERN PLAN VIEW**

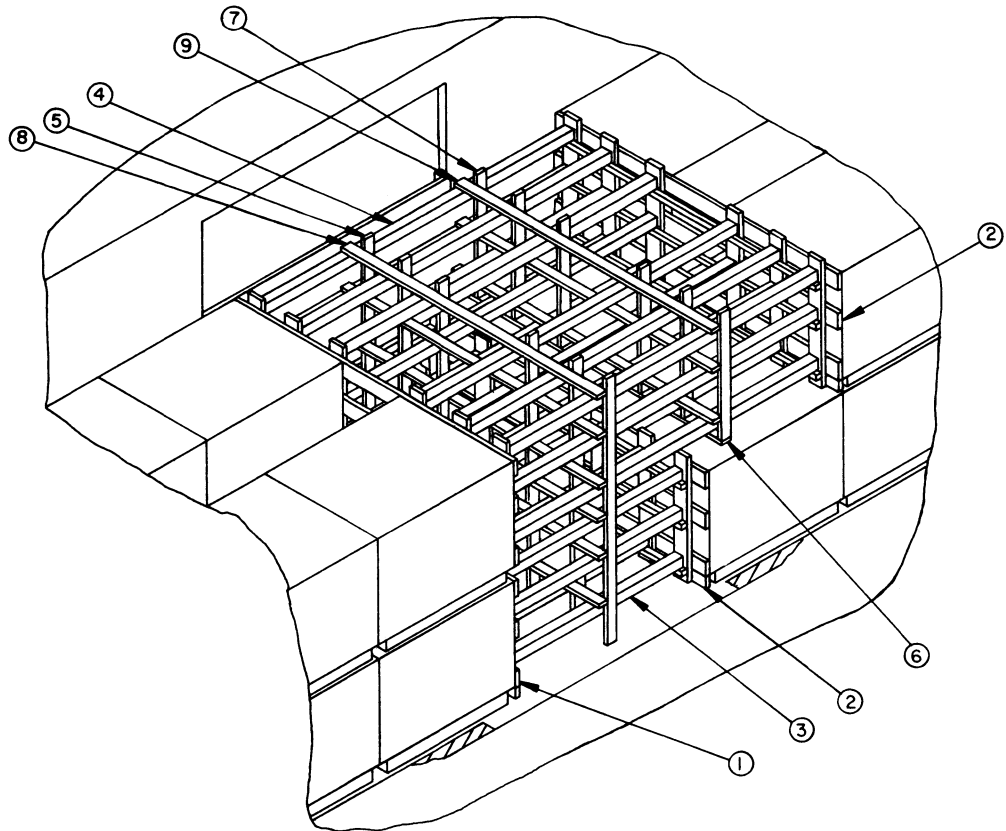
**SPECIAL NOTES:**

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 GATES "A" AND "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 UNIT.
4. A CHART IS SHOWN WHICH PROVIDES DATA FOR 40'-6", 50'-6", AND 60'-8" LONG CARS. A LOADING PATTERN FOR A SPECIFIC QUANTITY (PER LAYER) WHICH CAN BE ATTAINED BY THE COMBINATION LOAD METHOD, AND THE PATTERNS REQUIRED TO PROVIDE THESE QUANTITIES, IS SPECIFIED. FOR COMPARISON PURPOSES, THE OTHER TYPE LOADS WHICH CAN BE USED TO OBTAIN A LOAD QUANTITY WHICH IS EITHER TWO PALLET 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.
5. STOP PIECES ARE ONLY REQUIRED ON SEPARATOR GATES WHICH ARE IN THE DOOR OPENING OR WITHIN SIX INCHES (6") OF BEING IN THE DOOR 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/8-6d NAILS. LAMINATE THE SECOND PIECE OF THE DOUBLED PIECE W/3-10d NAILS.

LOAD CHART			
CAR LENGTH	UNITS PER LAYER	LOAD PATTERN	APPROX STRUT LENGTH
40'-6"	16	CROSSWISE LOAD ON PAGE 6	56"
	18	4 LONG AT 43-5/8" PLUS 5 WIDE AT 53"	36"
	20	LENGTHWISE LOAD ON PAGE 4	35"
50'-6"	20	CROSSWISE LOAD ON PAGE 6.	70"
	22	2 LONG AT 43-5/8" PLUS 9 WIDE AT 53"	34"
	24	8 LONG AT 43-5/8" PLUS 4 WIDE AT 53"	31"
	26	LENGTHWISE LOAD ON PAGE 4	24"
60'-8"	26	CROSSWISE LOAD ON PAGE 6	33"
	28	7 LONG AT 43-5/8" PLUS 7 WIDE AT 53"	39"
	30	LENGTHWISE LOAD ON PAGE 4	58"



**TYPICAL COMBINATION LOAD IN A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR**



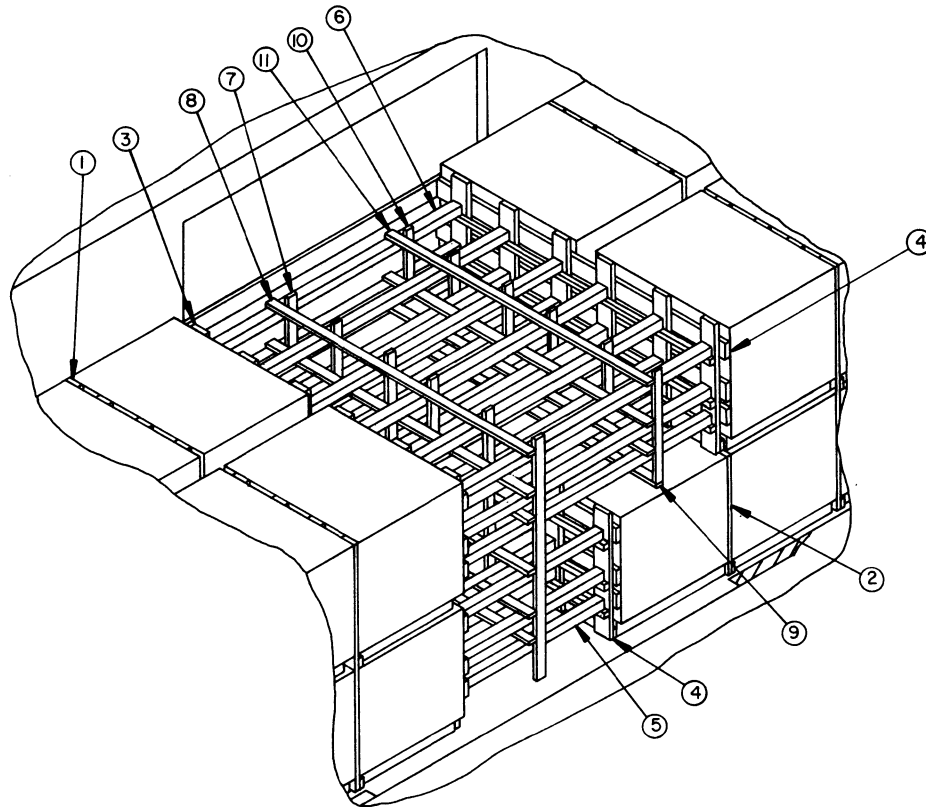
ISOMETRIC VIEW

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. THIS PROCEDURE IS APPLICABLE FOR USE IN THE LOAD SHOWN ON PAGE 6.
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 REQUIREMENTS.
3. TO PROTECT THE LADING FROM BEING PUNCTURED WHEN A SET OF VERTICAL STRUT BRACING IS INSTALLED ABOVE THE LOWER LAYER OF A LOAD, A SUITABLE LENGTH PAD OF 2" X 4" MATERIAL, SHOWN AS PIECE MARKED ⑥, MUST BE POSITIONED UNDER AND SECURED TO EACH APPLICABLE VERTICAL STRUT BRACING PIECE.

KEY NUMBERS

- ① CENTER GATE FOR 2-HIGH (1 REQD). SEE THE "CENTER GATE B" DETAIL ON PAGE 39. SEE GENERAL NOTE "M" ON PAGE 2.
- ② CENTER GATE FOR 1-HIGH (2 REQD). SEE "CENTER GATE B" DETAIL ON PAGE 39.
- ③ STRUT, 4" X 4" BY CUT TO FIT (18 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 (18 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'-3" (6 REQD). NAIL TO THE STRUTS MARKED ③ AND ④ W/3-10d NAILS AT EACH JOINT.
- ⑥ STRUT BRACING PAD, 2" X 4" BY A LENGTH TO SUIT (1 REQD). POSITION UNDER THE VERTICAL STRUT BRACING AS SHOWN.
- ⑦ VERTICAL STRUT BRACING, 2" X 4" X 46" (6 REQD). NAIL TO THE STRUTS MARKED ④ W/3-10d NAILS AT EACH JOINT. TOENAIL TO THE STRUT BRACING PAD, PIECE MARKED ⑥, W/1-10d NAIL AT EACH JOINT. SEE SPECIAL NOTE 3 AT LEFT.
- ⑧ HORIZONTAL STRUT BRACING, 2" X 4" X 9'-0" (6 REQD). NAIL TO THE STRUTS MARKED ③ AND ④ W/3-10d NAILS AT EACH JOINT.
- ⑨ HORIZONTAL STRUT BRACING, 2" X 4" X 9'-0" (3 REQD). NAIL TO THE STRUTS MARKED ④ W/3-10d NAILS AT EACH JOINT.



ISOMETRIC VIEW

KEY NUMBERS

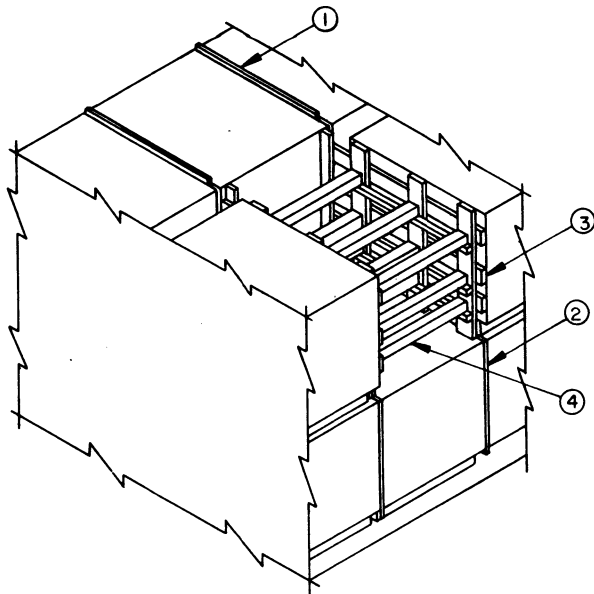
SPECIAL NOTES:

1. ONLY THE CENTER PORTION OF A 50'-6" LONG BY 9'-2" CONVENTIONAL TYPE 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. THIS PROCEDURE IS APPLICABLE FOR USE IN THE LOAD SHOWN ON PAGE 4.
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 ONE-HIGH SEPARATOR GATE, PIECE MARKED ②, IS REQUIRED WHEN USED IN CONJUNCTION WITH AN UPPER LAYER CENTER GATE. NOTE THAT THE TOP TIE PIECE OF THE SEPARATOR GATE HAS BEEN OMITTED AND THE VERTICAL PIECES HAVE BEEN CUT TO THE HEIGHT OF THE LOWER UNIT, SO AS NOT TO INTERFERE WITH THE 1-HIGH CENTER GATE. SHOULD THE 1-HIGH SEPARATOR GATE FALL WITHIN OR NEXT TO THE UNIT IN THE DOORWAY AREA, THE BOTTOM TIE PIECE MAY ALSO HAVE TO BE CUT SO AS NOT TO INTERFERE WITH THE NAILED FLOORLINE BLOCKING, IF USED.
4. TO PROTECT THE LADING FROM BEING PUNCTURED WHEN A SET OF VERTICAL STRUT BRACING IS INSTALLED ABOVE THE LOWER LAYER OF A LOAD, A SUITABLE LENGTH PAD OF 2" X 4" MATERIAL, SHOWN AS PIECE MARKED ⑨, MUST BE POSITIONED UNDER AND SECURED TO EACH APPLICABLE VERTICAL STRUT BRACING PIECE.

- ① SEPARATOR GATE FOR 2-HIGH (AS REQD). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 40.
- ② SEPARATOR GATE FOR 1-HIGH (1 REQD). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 40. SEE SPECIAL NOTE 3 AT LEFT.
- ③ CENTER GATE FOR 2-HIGH (1 REQD). SEE THE "CENTER GATE A" DETAIL ON PAGE 38. SEE GENERAL NOTE "M" ON PAGE 2.
- ④ CENTER GATE FOR 1-HIGH (2 REQD). SEE THE "CENTER GATE A" DETAIL ON PAGE 38. SEE GENERAL NOTE "M" ON PAGE 2. SEE SPECIAL NOTE 3 AT LEFT.
- ⑤ STRUT, 4" X 4" BY CUT TO FIT (18 REQD). POSITION BETWEEN PIECES MARKED ③ AND ④ 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.
- ⑥ STRUT, 4" X 4" BY CUT TO FIT (18 REQD). POSITION BETWEEN PIECES MARKED ③ AND ④ 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.
- ⑦ VERTICAL STRUT BRACING, 2" X 4" BY 6'-8" (6 REQD). NAIL TO THE STRUTS, PIECES MARKED ⑤ AND ⑥ W/3-10d NAILS AT EACH JOINT.
- ⑧ HORIZONTAL STRUT BRACING, 2" X 4" X 8'-9" (6 REQD). NAIL TO THE STRUTS, PIECES MARKED ⑤ AND ⑥ W/3-10d NAILS AT EACH JOINT.
- ⑨ STRUT BRACING PAD, 2" X 4" X 9'-0" (1 REQD). POSITION UNDER THE VERTICAL STRUT BRACING AS SHOWN. LOCATE ON CROSS PIECES OF THE TOP DUNNAGE ASSEMBLIES OF THE PALLETS.
- ⑩ VERTICAL STRUT BRACING, 2" X 4" X 40" (6 REQD). NAIL TO THE STRUTS, PIECES MARKED ⑥ W/3-10d NAILS AT EACH JOINT.
- ⑪ HORIZONTAL STRUT BRACING, 2" X 4" X 8'-9" (3 REQD). NAIL TO THE STRUTS, PIECES MARKED ⑥ W/3-10d NAILS AT EACH JOINT.

LENGTHWISE POSITIONED PALLET UNITS  
TYPICAL LCL LOAD USING STRUTTED-GATE METHOD OF PARTIAL-LAYER BRACING





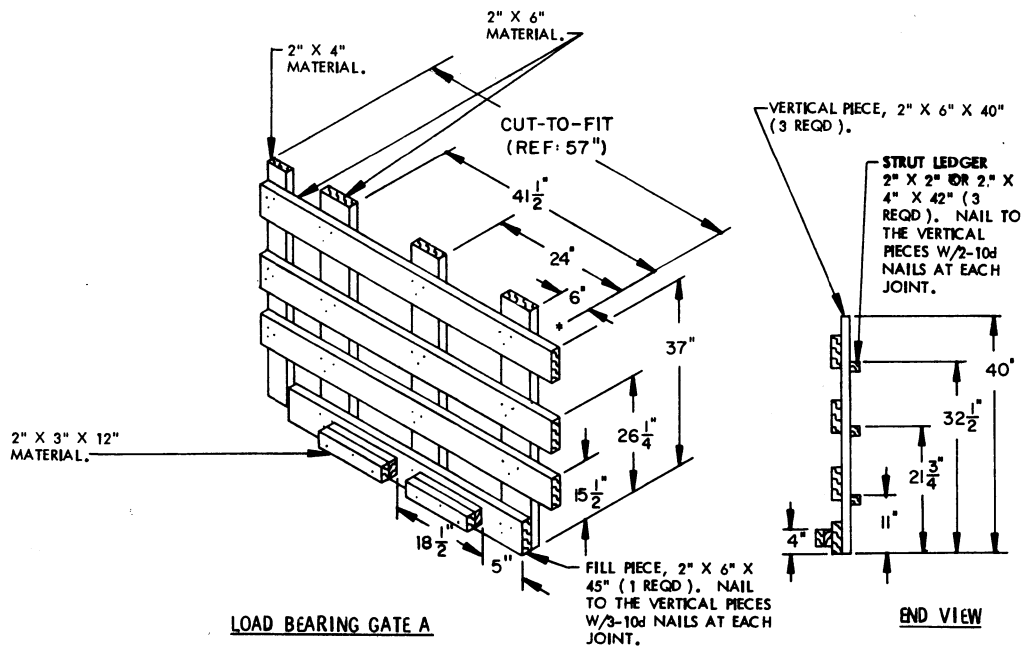
**ISOMETRIC VIEW**

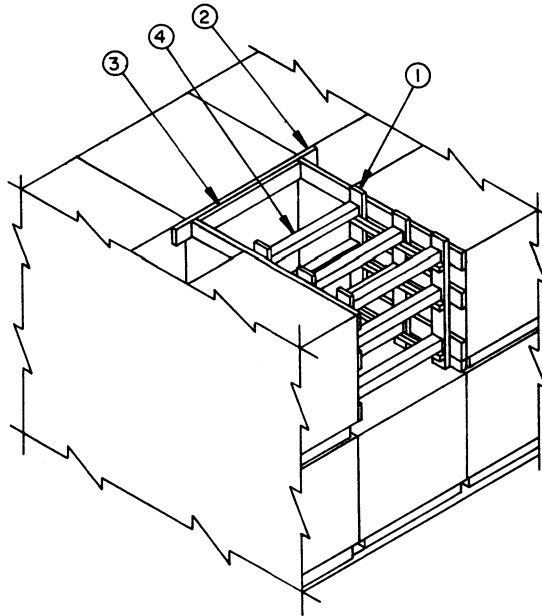
**KEY NUMBERS**

- ① SEPARATOR GATE, 3/8" PLYWOOD, 48" WIDE X 7'-0" (MIN) LONG (2 REQD).
- ② SEPARATOR GATE, 3/8" PLYWOOD, 48" WIDE X 42" LONG (2 REQD).
- ③ LOAD BEARING GATE (2 REQD, 1 RIGHT HAND AND 1 LEFT HAND). SEE THE "LOAD BEARING GATE A" DETAIL BELOW.
- ④ STRUT, 4" X 4" X 37-5/8" (9 REQD). TOENAIL TO PIECES MARKED ③ W/2-16d NAILS EACH END.

**SPECIAL NOTES:**

1. A PARTIAL VIEW OF A 9'-2" WIDE CONVENTIONAL TYPE BOX CAR IS SHOWN. WIDER CARS CAN BE USED.
2. THE 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 4 FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.
5. THE DIMENSION GIVEN FOR THE HORIZONTAL PIECES (57") IS BASED ON AN INSIDE CAR WIDTH OF 9'-2". THIS DIMENSION WILL HAVE TO BE INCREASED ACCORDINGLY IF WIDER CARS ARE USED.





ISOMETRIC VIEW

KEY NUMBERS

SPECIAL NOTES:

1. A PARTIAL VIEW OF A 9'-2" WIDE CONVENTIONAL TYPE BOX CAR IS SHOWN. WIDER CARS MAY 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 THE 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 REFERENCED 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.

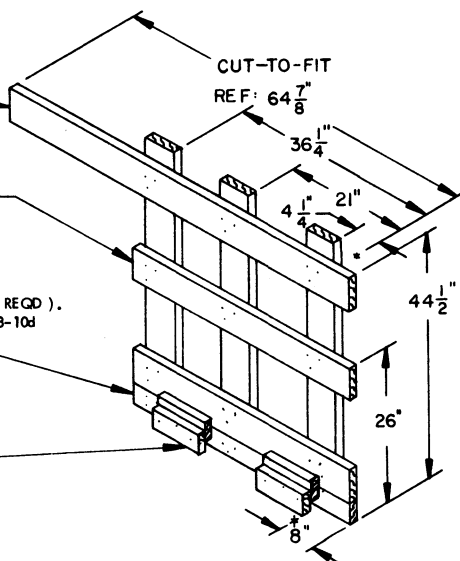
- ① LOAD BEARING GATE (2 REQD, 1 RIGHT AND 1 LEFT HAND). SEE THE "LOAD BEARING GATE B" DETAIL BELOW. NAIL TO THE FILLER PIECE, MARKED ③, W/3-10d NAILS.
- ② ANTI-SWAY BEARING PIECE, 2" X 6" X 65" (1 REQD).
- ③ FILLER PIECE, 2" X 6" X 40-5/8" (1 REQD). NAIL TO THE ANTI-SWAY BEARING PIECE, MARKED ②, W/5-10d NAILS.
- ④ STRUT, 4" X 4" X 37-5/8" (9 REQD). TOENAIL TO PIECES MARKED ① W/2-16d NAILS AT EACH END.

HORIZONTAL BEARING PIECE, 2" X 6" BY CAR WIDTH MINUS 45-5/8" (REF: 64-7/8") (1 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

HORIZONTAL PIECE, 2" X 6" X 43-1/2" (2 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

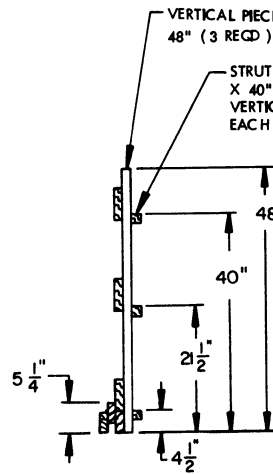
FILL PIECE, 2" X 4" X 43-1/2" (1 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

GATE HOLD DOWN, 2" X 4" X 9" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE FILL PIECE AT 5-1/4" HEIGHT W/3-10d NAILS. LAMINATE THE SECOND PIECE TO THE FIRST AT 3-1/2" HEIGHT IN A LIKE MANNER.

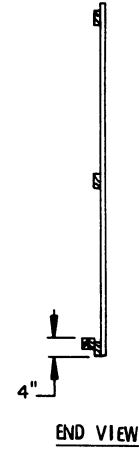
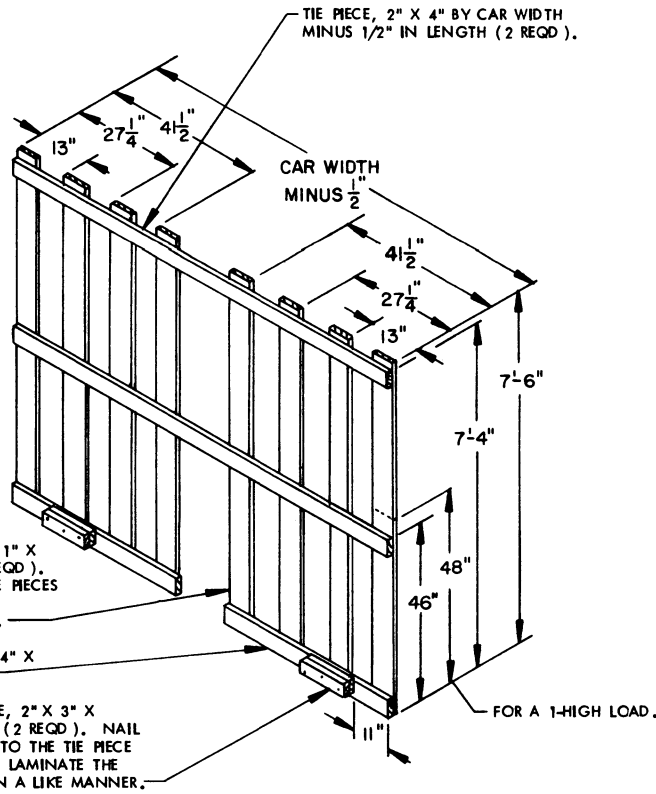


LOAD BEARING GATE B

VERTICAL PIECE, 2" X 6" X 48" (3 REQD).  
STRUT LEDGER, 2" X 2" OR 2" X 4" X 40" (3 REQD). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH JOINT.

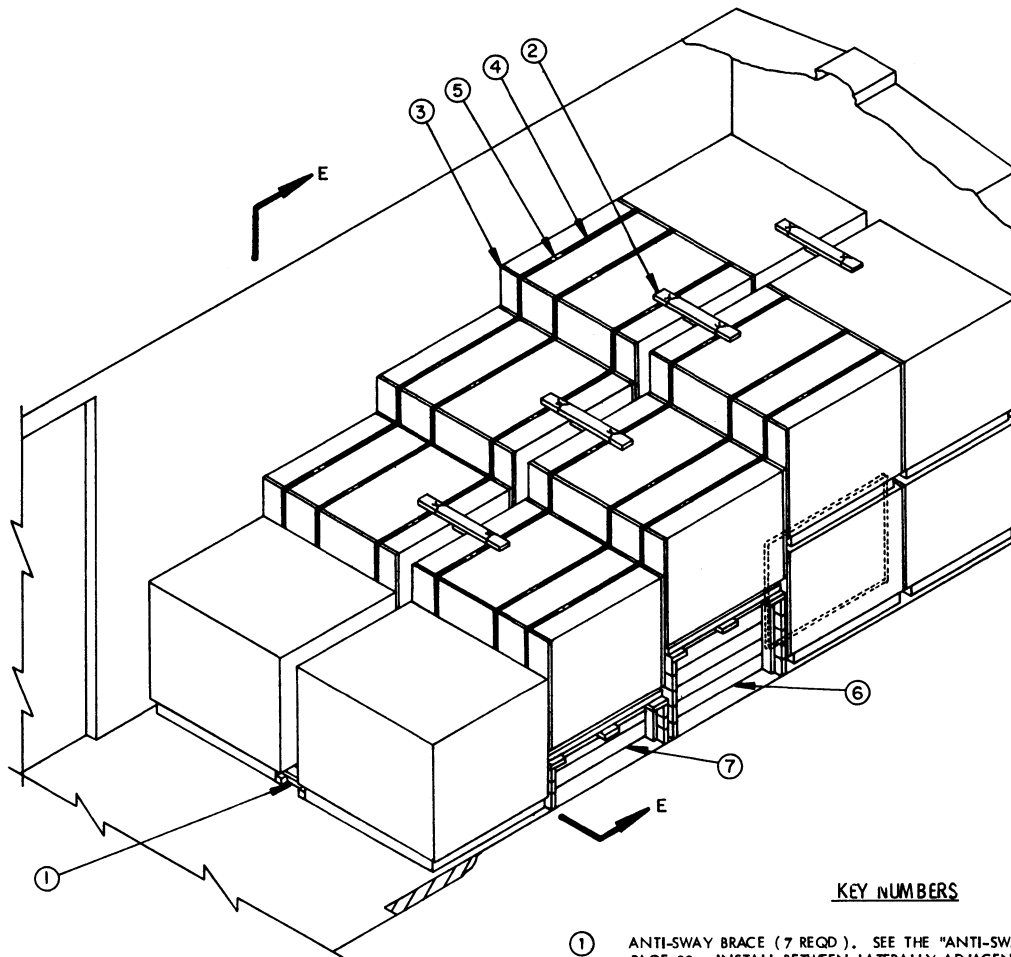


END VIEW



**SEPARATOR GATE C**

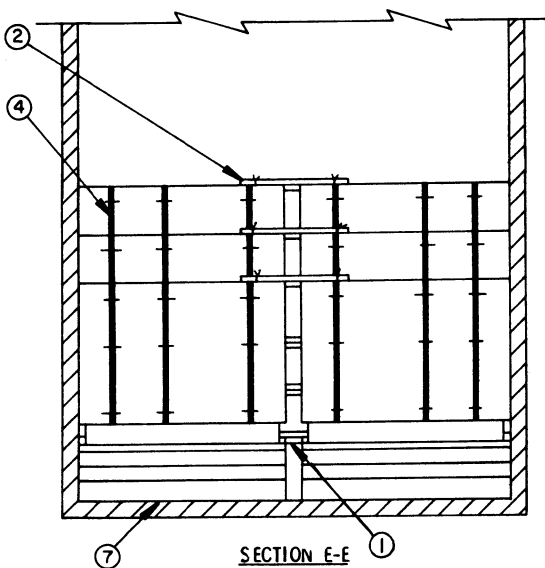
SEE SPECIAL NOTE 7 ON PAGE 5. NOTE THAT THE GATE STOP PIECES ARE ONLY REQUIRED ON A SEPARATOR GATE WHICH IS IN THE DOORWAY OR WITHIN SIX INCHES (6") OF BEING IN THE DOORWAY.



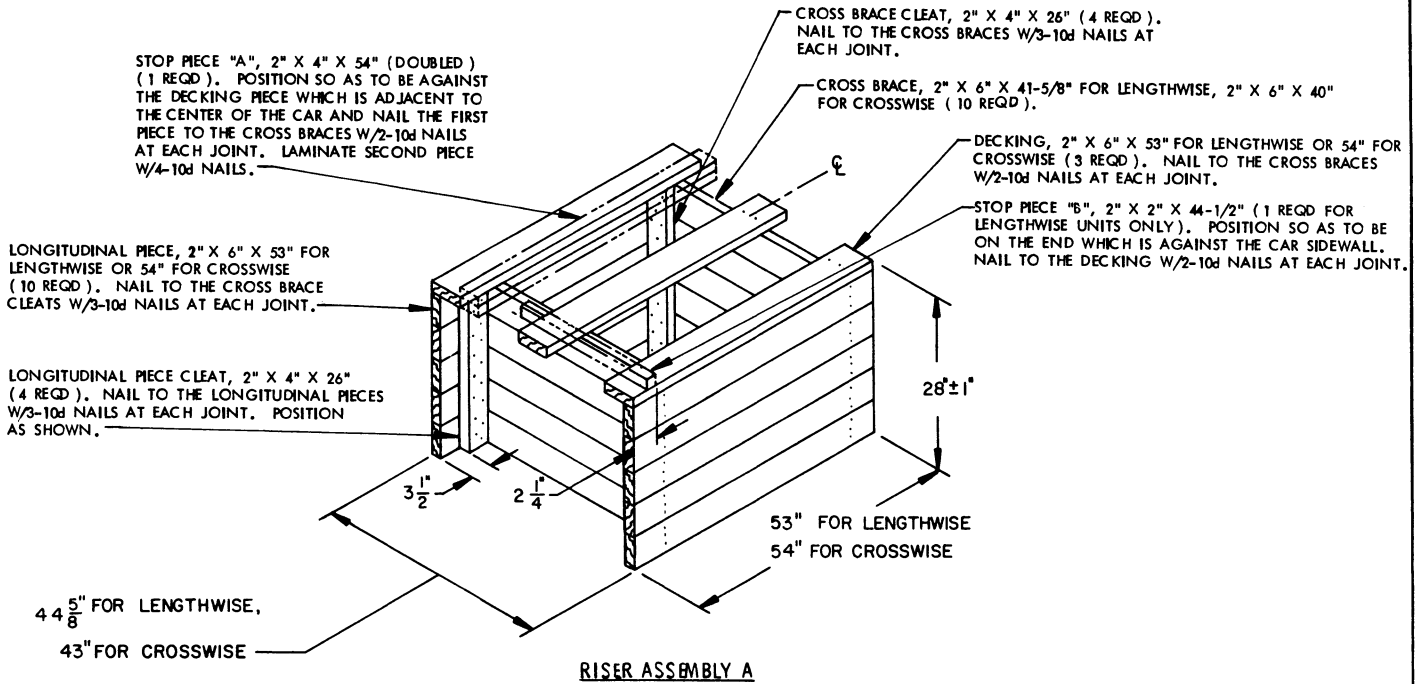
ISOMETRIC VIEW

KEY NUMBERS

- ① ANTI-SWAY BRACE (7 REQD). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 38. INSTALL BETWEEN LATERALLY ADJACENT PALLET UNITS. SEE GENERAL NOTE "M" AND "N" ON PAGE 2 AND SPECIAL NOTE 4 ON PAGE 21.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (4 REQD). SEE THE "TOP-OF-LOAD ANTI-SWAY BRACE A" DETAIL ON PAGE 38. WIRE TIE TO TOP DUNNAGE ASSEMBLY OF UNIT WITH NO. 14 GAGE WIRE AS TYPICALLY SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON PAGE 43.
- ③ SIDE FILL, 1/2" PLYWOOD, 36" WIDE BY 53" LONG (16 REQD, 2/PALLET UNIT). SEE SPECIAL NOTE 4 ON PAGE 21.
- ④ REINFORCING STRAP, 1-1/4" X .031" OR .035" X 15'-0" LONG STEEL STRAPPING (24 REQD). INSTALL TO ENCIRCLE THE PALLET UNIT AND THE SIDE FILL, PIECE MARKED ③. STAPLE TO THE SIDE FILL 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). THE HEIGHT OF THESE RISER ASSEMBLIES WILL BE TWO-THIRDS OF THE PALLET UNIT HEIGHT. SEE THE "RISER ASSEMBLY A" DETAIL ON PAGE 21.
- ⑦ RISER ASSEMBLY (2 REQD). THE HEIGHT OF THESE RISER ASSEMBLIES WILL BE ONE-THIRD OF THE PALLET UNIT HEIGHT. SEE THE "RISER ASSEMBLY B" DETAIL ON PAGE 21.
- ⑧ STOP PIECE "B" (4 REQD). SEE THE "RISER ASSEMBLY A" AND/OR "RISER ASSEMBLY B" DETAIL ON PAGE 21 FOR LOCATION AND NAILING GUIDANCE.

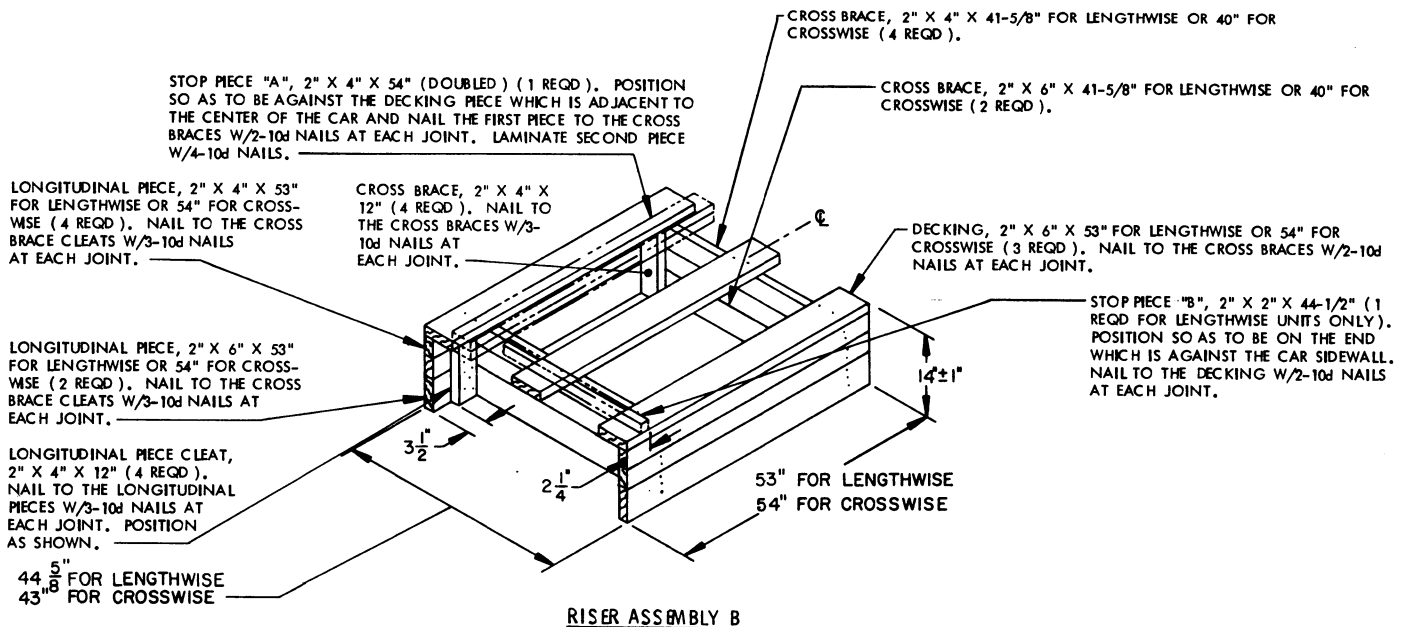


SECTION E-E

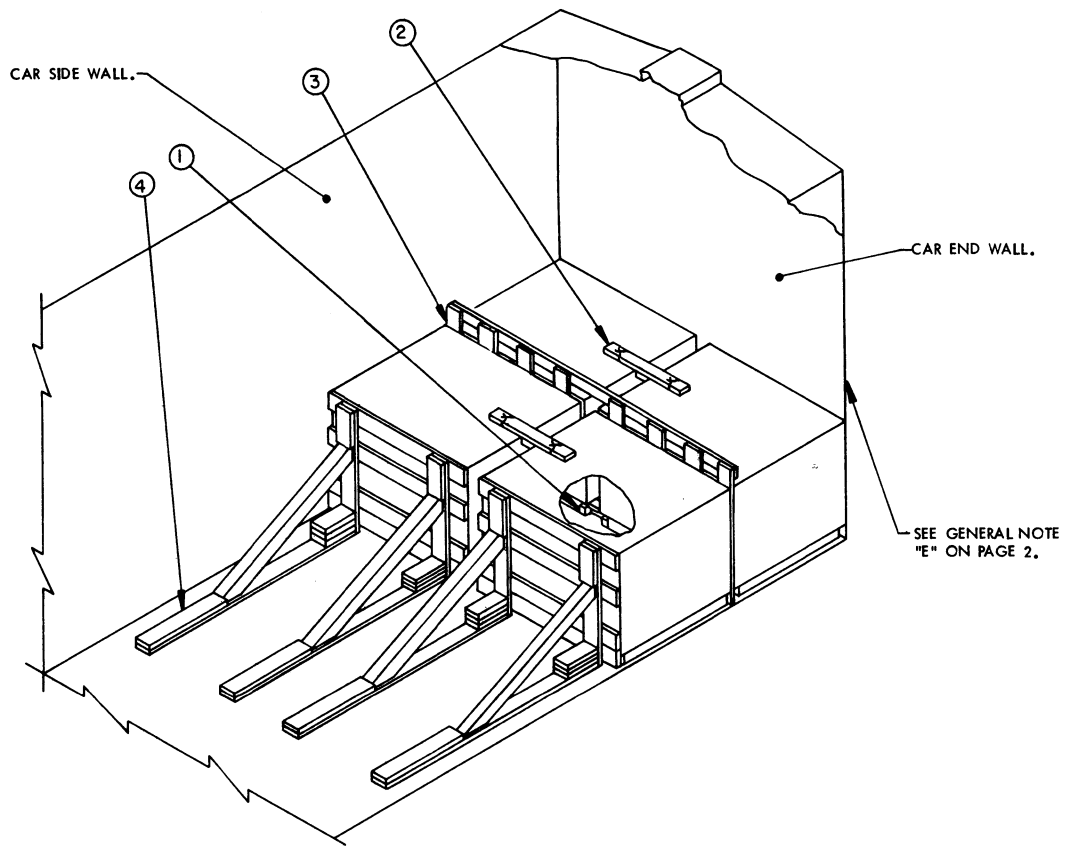


**SPECIAL NOTES:**

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 PALLET UNITS POSITIONED LENGTHWISE IN THE CAR. WITH MODIFICATIONS, THE PROCEDURES ARE ALSO APPLICABLE FOR CROSSWISE POSITIONED PALLET UNITS. SEE SPECIAL NOTE 4.
3. ONLY THE BLOCKING AND BRACING FOR THE RISER METHOD OF PARTIAL LAYER BRACING IS SHOWN. REFER TO PAGE 4 OF 6 FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.
4. FOR CROSSWISE POSITIONED PALLET UNITS, THE SIDE FILL, PIECE MARKED ③ WILL BE 36" WIDE BY 43-1/2" LONG AND THE REINFORCING STRAPS WILL BE 16'-6" LONG. NOTE THAT ANTI-SWAY BRACE "B" AND TOP-OF-LOAD ANTI-SWAY BRACE "B" WILL BE USED IN LIEU OF THE DEPICTED PIECES MARKED ① AND ②. ALSO, FOR LOADS OF CROSSWISE POSITIONED CONTAINERS, STOP PIECE "A", AS SHOWN ON THE RISER DETAILS ABOVE AND BELOW WILL BE USED IN LIEU OF STOP PIECE "B".



TYPICAL LCL LOAD USING RISER METHOD OF PARTIAL-LAYER BRACING



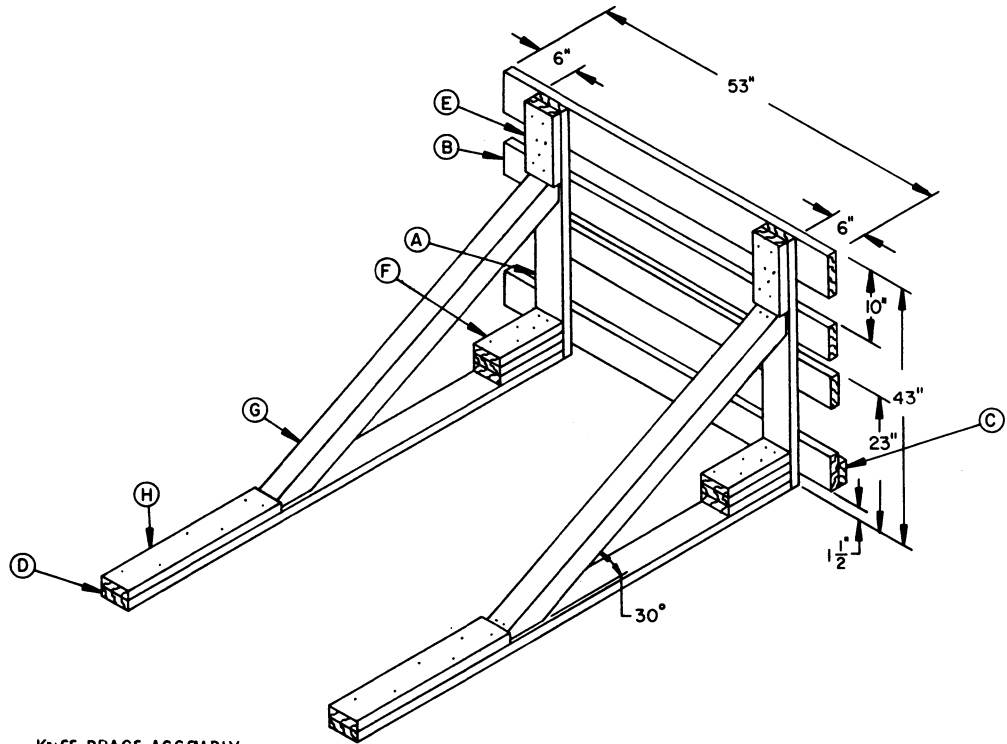
ISOMETRIC VIEW

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 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. HOLD-DOWN CLEATS (GATE HOLD DOWN) MUST BE APPLIED TO THE BOTTOM HORIZONTAL PIECE OF A KNEE BRACE ASSEMBLY. THE PROPER MATERIAL SIZE AND PLACEMENT WILL BE AS DEPICTED BY THE CENTER GATE DETAILS FOR ONE ROW SPECIFIED ELSEWHERE. FOR HOLD DOWN PIECES TO BE APPLIED TO THE KNEE BRACE ASSEMBLY WHICH IS USED AGAINST THE LENGTHWISE ROW, REFER TO THE "CENTER GATE E" DETAIL ON PAGE 40.

KEY NUMBERS

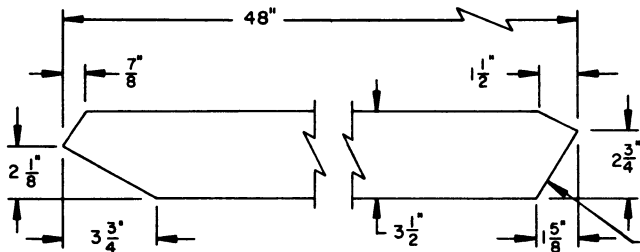
- ① ANTI-SWAY BRACE (2 REQD). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 38. INSTALL BETWEEN LATERALLY ADJACENT PALLET UNITS. SEE GENERAL NOTES "M" AND "N" ON PAGE 2.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (2 REQD). SEE THE "TOP-OF-LOAD ANTI-SWAY BRACE A" DETAIL ON PAGE 38. WIRE TO THE TOP DUNNAGE ASSEMBLY OF THE PALLET UNIT WITH NO. 14 GAGE WIRE AS TYPICALLY SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON PAGE 43.
- ③ SEPARATOR GATE (1 REQD). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 40. POSITION WITH THE HORIZONTAL PIECES AGAINST THE ALREADY-LOADED UNITS. SEE SPECIAL NOTE 6 ON PAGE 5.
- ④ KNEE BRACE ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 23 FOR CONSTRUCTION SPECIFICATIONS AND NAILING REQUIREMENTS. SEE SPECIAL NOTE 3 AT LEFT.



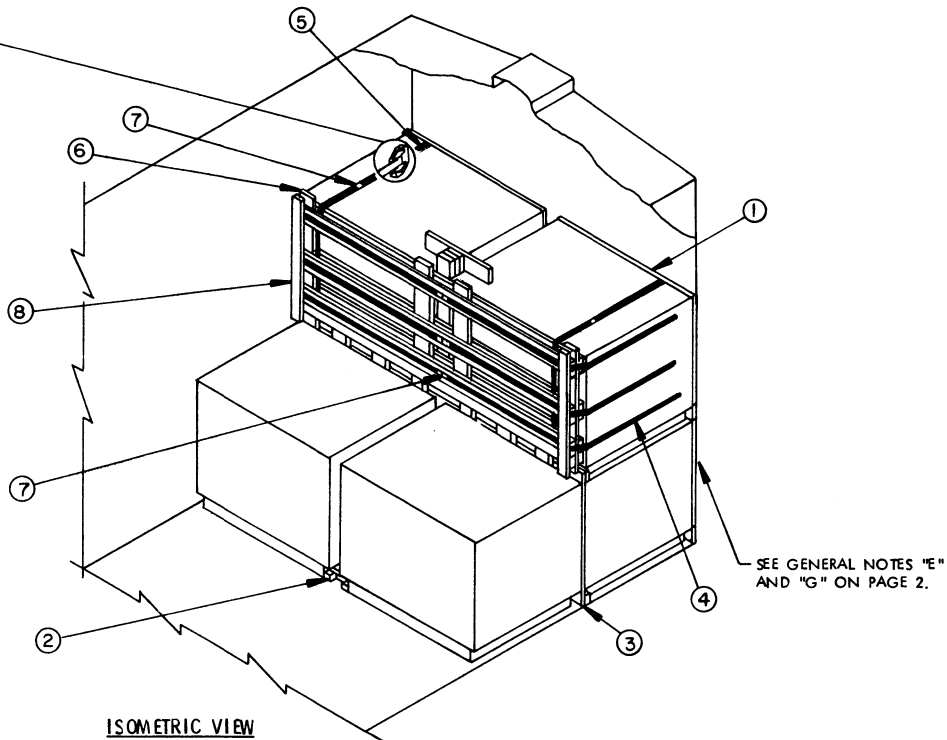
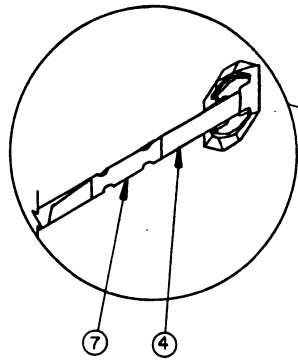
**KNEE BRACE ASSEMBLY**

**KEY LETTERS**

- (A) VERTICAL PIECE, 2" X 6" X 42" (2 REQD). NAIL TO THE FLOOR CLEAT, PIECE MARKED (D), W/3-16d NAILS.
- (B) HORIZONTAL PIECE, 2" X 6" X 53" (4 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT. SEE GENERAL NOTE "M" ON PAGE 2.
- (C) HOLD DOWN PIECE, 2" X 4" X 53" (1 REQD). NAIL TO THE BOTTOM HORIZONTAL PIECE MARKED (B) W/7-10d NAILS.
- (D) FLOOR CLEAT, 2" X 6" X 7'-2" (2 REQD). NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8". SEE GENERAL NOTE "R" ON PAGE 2.
- (E) HOLD DOWN CLEAT, 2" X 6" X 14" (2 REQD). NAIL TO A VERTICAL PIECE W/7-10d NAILS.
- (F) POCKET CLEAT, 2" X 6" X 12" (TRIPLED) (2 REQD). NAIL THE FIRST PIECE TO THE FLOOR CLEAT, PIECE MARKED (D), W/4-16d NAILS AND TOENAIL TO THE VERTICAL PIECE, PIECE MARKED (A), W/2-16d NAILS. NAIL THE SECOND AND THIRD PIECES IN A LIKE MANNER.
- (G) BRACE, 4" X 4" X 48" (2 REQD). SEE THE DETAIL AT LEFT FOR BEVEL CUTS REQUIRED. TOENAIL TO THE VERTICAL PIECE AND TO THE FLOOR CLEAT, PIECES MARKED (A) AND (D), W/2-16d NAILS AT EACH JOINT.
- (H) BACK-UP CLEAT, 2" X 6" X 30" (2 REQD). NAIL TO THE FLOOR CLEAT, PIECE MARKED (D), W/6-40d NAILS.



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



ISOMETRIC VIEW

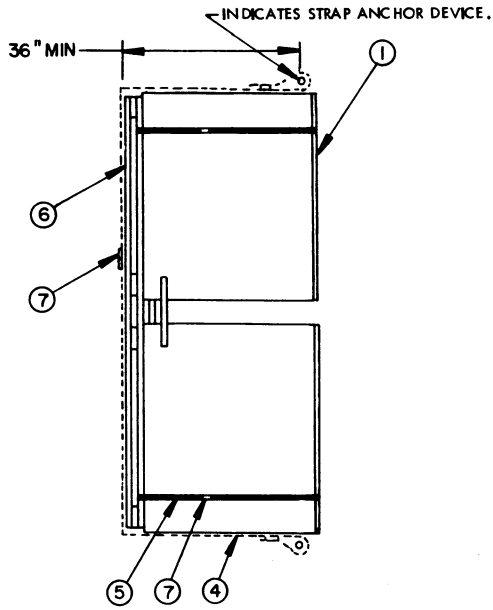
**SPECIAL NOTES:**

1. A 9'-4" WIDE ALL-METAL BOX CAR EQUIPPED WITH STRAP ANCHOR DEVICES AND HAVING AN AAR MECHANICAL DESIGNATION CLASS OF XL IS SHOWN. WIDER CARS CAN BE USED BUT NARROWER CARS SHOULD BE AVOIDED, HOWEVER, IF IT IS NECESSARY TO LOAD A PARTIAL LAYER IN A 9'-2" WIDE CAR, IT CAN BE ACCOMPLISHED BY CHANGING THE RISER/SPACER PIECE TO 2" X 4" MATERIAL. CARS NARROWER THAN 9'-2" WILL NOT BE USED.
2. THE BULKHEAD GATE METHOD OF PARTIAL-LAYER BRACING IS ONLY APPLICABLE FOR USE IN LOADS OF LENGTHWISE POSITIONED PALLET UNITS AS SHOWN IN THE VIEW ABOVE. PARTIAL LAYERS OF CROSSWISE POSITIONED PALLET UNITS 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. THE PARTIAL LAYER IS THEN LIMITED TO NOT MORE THAN TWO (2) PALLET UNITS. THREE (3) BULKHEAD STRAPS MUST BE USED.
4. THE STRAPPING BOARDS ON A BULKHEAD GATE ARE TO BE ALIGNED AS NEAR 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 25 FOR THE LOCATION OF THE STRAPPING BOARDS. THE STRAPPING BOARDS/HORIZONTAL PIECES 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.
5. 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 16 FOR AN EVEN QUANTITY OF UNITS, OR THE PALLET UNIT OMITTED PROCEDURES ON PAGE 17 FOR A SINGLE UNIT.

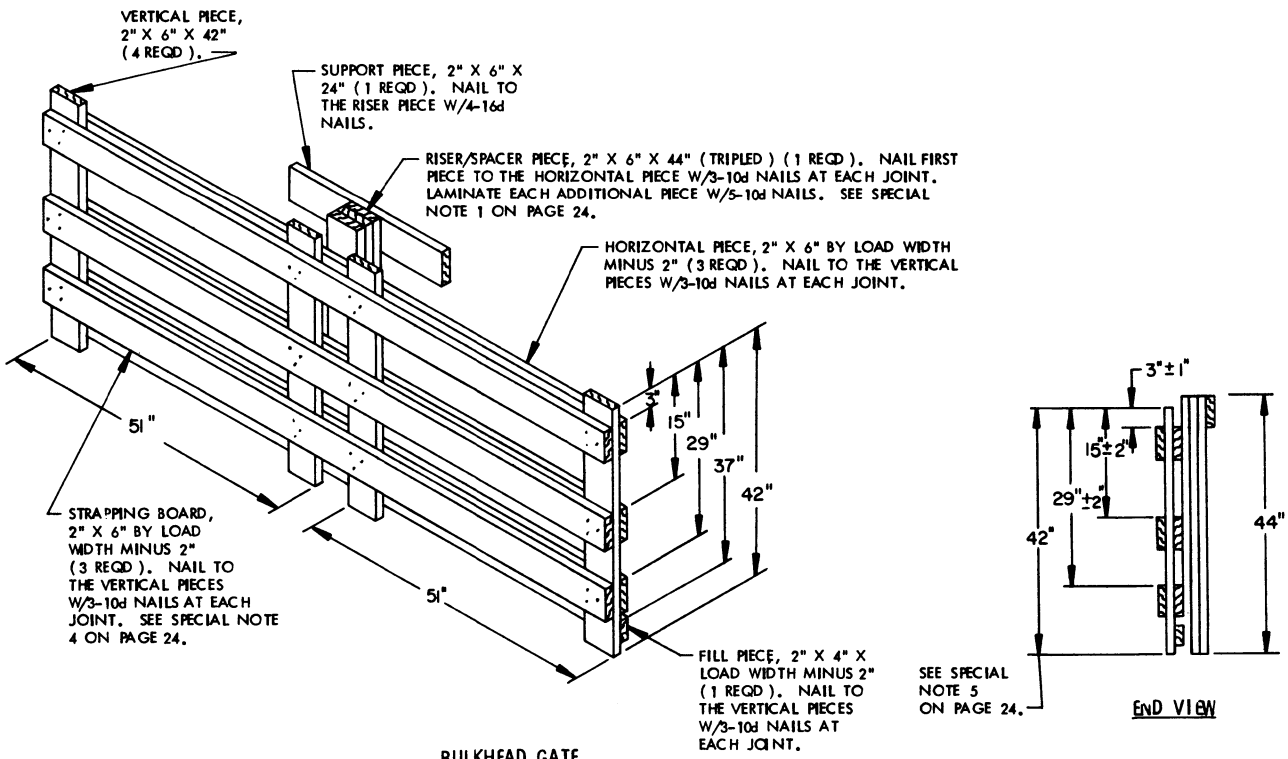
**KEY NUMBERS**

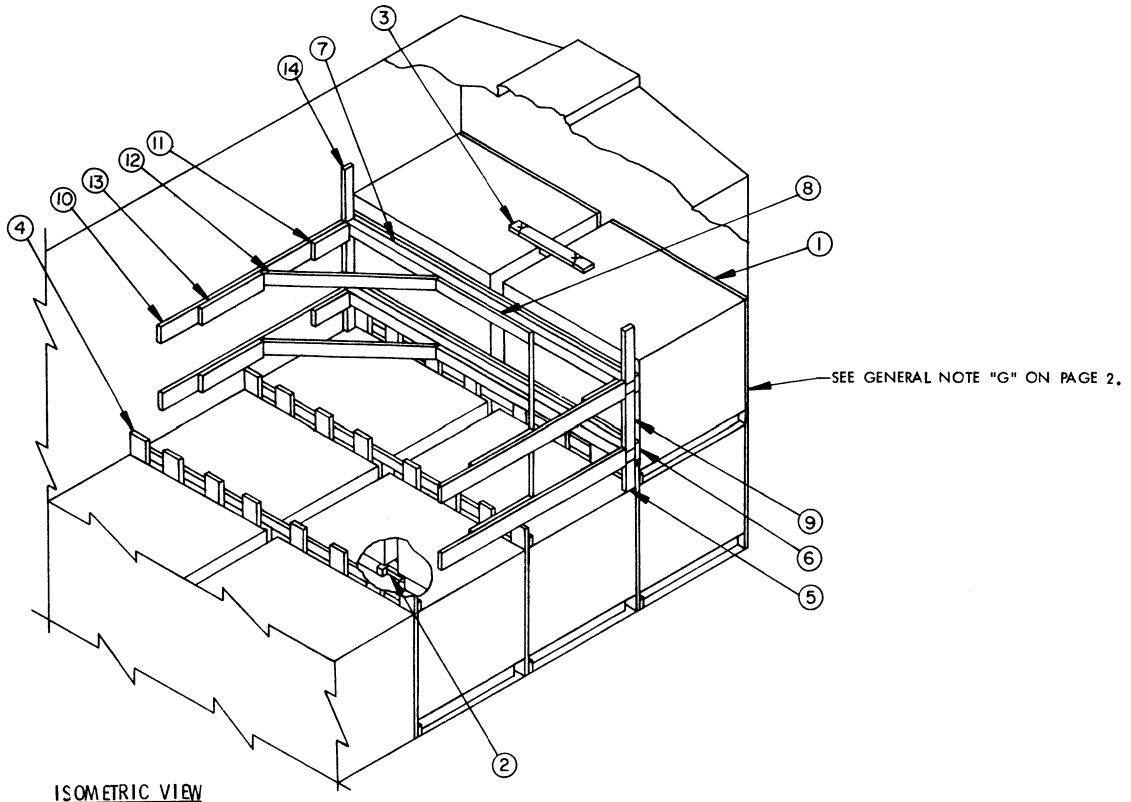
- ① END-WALL LINING (1 REQD). SEE THE DETAIL ON PAGE 42. SEE GENERAL NOTE "D" ON PAGE 2. NOTE THAT IF AN END-OF-CAR BULKHEAD, AS DETAILED ON PAGE 43 IS USED, THE END-WALL LINING IS NOT REQUIRED.
- ② ANTI-SWAY BRACE (2 REQD). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 38. INSTALL BETWEEN THE LATERALLY ADJACENT ROWS OF PALLET UNITS. SEE GENERAL NOTE "M" ON PAGE 2.
- ③ SEPARATOR GATE FOR 1-HIGH LOAD (1 REQD). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 40. NOTE THAT THE VERTICAL PIECES MUST BE ONLY 45-1/2" LONG AND THE TIE PIECE LOCATED AT THAT HEIGHT TO PROVIDE CLEARANCE FOR THE BULKHEAD GATE.
- ④ BULKHEAD STRAP, 1-1/4" X .031" OR .035" BY A LENGTH TO SUIT STEEL STRAPPING (3 REQD). INSTALL FROM 2 EQUAL LENGTH PIECES. SEE THE "STRAP APPLICATION PLAN VIEW" ON PAGE 25 FOR INSTALLATION GUIDANCE. SEE SPECIAL NOTES 3 THRU 5 AT LEFT.
- ⑤ BUNDLING STRAP, 1-1/4" X .035" X 17'-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 ④.
- ⑥ BULKHEAD GATE (1 REQD). SEE THE DETAIL ON PAGE 25. SEE SPECIAL NOTE 2 AT LEFT.
- ⑦ SEAL FOR 1-1/4" STEEL STRAPPING (14 REQD, 4 PER BULKHEAD STRAP, PIECE MARKED ④ AND ① PER BUNDLING STRAP, PIECE MARKED ⑤). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "O" ON PAGE 2.
- ⑧ STRAP RETAINER, 2" X 4" X 36" (2 REQD). NAIL TO THE BULKHEAD GATE W/2-12d NAILS ABOVE AND BELOW EACH BULKHEAD STRAP.





**STRAP APPLICATION PLAN VIEW**





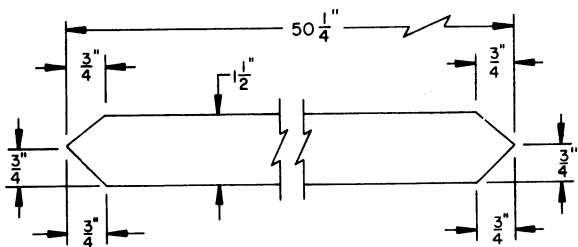
ISOMETRIC VIEW

SPECIAL NOTES:

1. A 9'-4" 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 LENGTHWISE LOAD IS SHOWN AS TYPICAL. NOTE THAT THESE GUIDELINES DO NOT APPLY TO CROSSWISE LOADS, THESE UNITS WILL NOT BE SHIPPED CROSSWISE IN A RAIL CAR. 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 ⑥ 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 27, 28, OR 29 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 TWO (2) PALLET UNITS.
4. THE CENTER CLEAT, SHOWN AS PIECE MARKED ⑧, WILL BE 28" LONG FOR AND 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 END-WALL LINING (1 REQD). SEE THE DETAIL ON PAGE 42. SEE GENERAL NOTE "D" ON PAGE 2. NOTE THAT IF AN END-OF-CAR BULKHEAD, AS DETAILED ON PAGE 43, IS USED THE END-WALL LINING IS NOT REQUIRED.
- ② ANTI-SWAY BRACE (4 REQD). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 38. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF PALLET UNITS. SEE GENERAL NOTE "M" ON PAGE 2 AND SPECIAL NOTE 2 AT LEFT.
- ③ TOP-OF-LOAD ANTI-SWAY BRACE (1 REQD). SEE THE "TOP-OF-LOAD ANTI-SWAY BRACE A" DETAIL ON PAGE 38. 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.
- ④ SEPARATOR GATE FOR 1-HIGH (3 REQD). SEE THE "SEPARATOR GATE A" DETAIL ON PAGE 40.
- ⑤ SUPPORT CLEAT, 2" X 4" X 10" (2 REQD). FOR LENGTHWISE LOADED PALLET UNITS, POSITION VERTICALLY AS SHOWN SO AS TO CENTER PIECES MARKED ⑥ AND ⑦ ON THE JOINT BETWEEN THE BOTTOM TWO LAYERS OF CONTAINERS ON THE UNITS. FOR CROSSWISE LOADED PALLET UNITS, POSITION HORIZONTALLY SO AS TO CENTER PIECES MARKED ⑥ AND ⑦ ON THE PALLET DUNNAGE ASSEMBLY OF THE UNIT. NAIL TO THE CAR SIDEWALL W/3-12d NAILS.
- ⑥ HORIZONTAL PIECE, 2" X 6" BY CAR WIDTH IN LENGTH (CUT TO FIT) (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ⑦, W/1-12d NAIL EVERY 6".
- ⑦ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH IN LENGTH (CUT TO FIT) (2 REQD).
- ⑧ CENTER CLEAT, 2" X 4" X 36" (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ⑦, W/7-16d NAILS. SEE SPECIAL NOTE 4 AT LEFT.
- ⑨ SPACER CLEAT, 2" X 4" X 18" FOR A LENGTHWISE LOAD, 2" X 4" X 31-1/2" FOR A CROSSWISE LOAD (2 REQD). NAIL TO THE SIDEWALL W/5-12d NAILS.
- ⑩ HORIZONTAL WALL CLEAT, 2" X 6" X 72" (4 REQD). NAIL TO THE CAR SIDEWALL W/16-12d NAILS.
- ⑪ POCKET CLEAT, 2" X 6" X 12" (2 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑩, W/4-16d NAILS.
- ⑫ 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 ⑦, AND TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑩, W/2-16d NAILS AT EACH END.
- ⑬ BACK-UP CLEAT, 2" X 6" X 24" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑩, W/8-16d NAILS.
- ⑭ HOLD-DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.

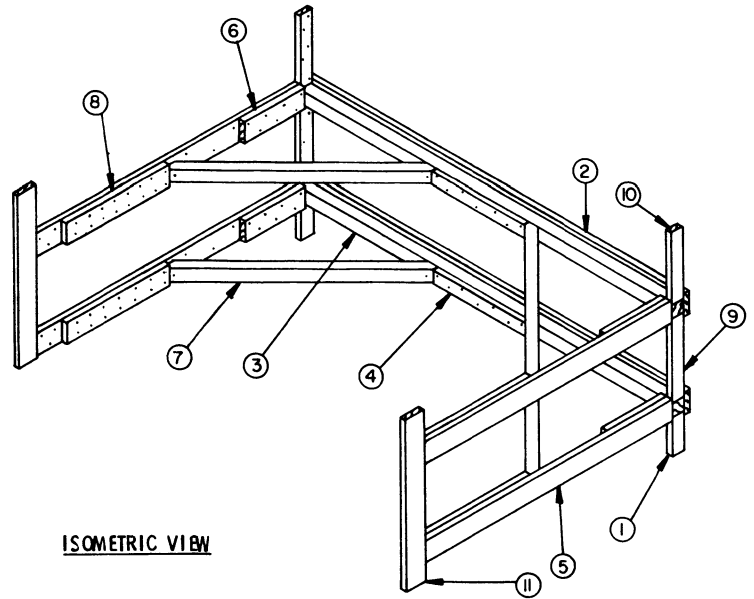


DIAGONAL BRACE

TYPICAL LCL LOAD USING K-BRACE METHOD OF PARTIAL-LAYER BRACING

**SPECIAL NOTES:**

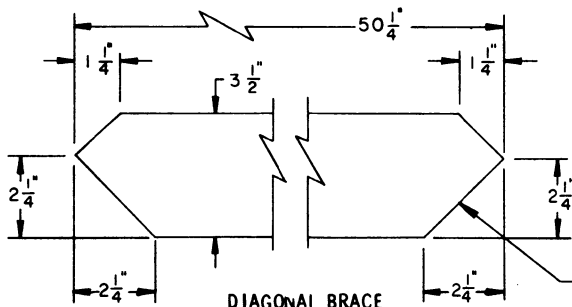
1. THE TYPE "B" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN FOUR (4) PALLET UNITS. IF IT IS NECESSARY TO BLOCK MORE THAN FOUR PALLET UNITS, REFER TO THE DETAILS ON PAGES 28 AND 29 FOR SELECTION OF THE APPLICABLY SIZED K-BRACE TO USE AND THE DESIGN SPECIFICATIONS FOR THIS BRACE. IF ONLY TWO PALLET UNITS ARE TO BE SHIPPED IN THE PARTIAL LAYER, THE TYPE "A" K-BRACE DEPICTED ON PAGE 26 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 26 FOR TYPICAL INSTALLATION OF A K-BRACE.



**ISOMETRIC VIEW**

**KEY NUMBERS**

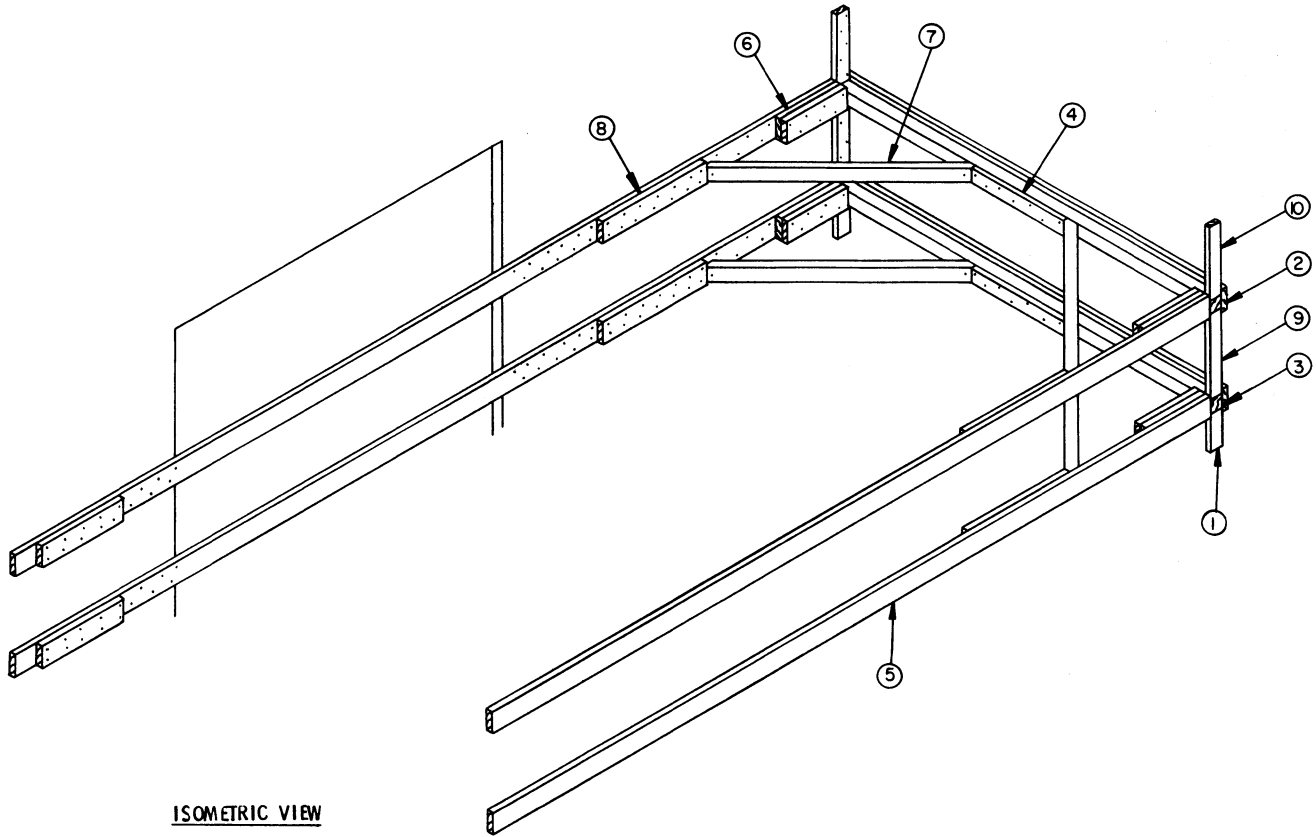
- ① SUPPORT CLEAT, 2" X 4" X 10" (2 REQD). FOR LENGTHWISE LOADED PALLET UNITS, POSITION VERTICALLY AS SHOWN SO AS TO CENTER PIECES MARKED ② AND ③ ON THE JOINT BETWEEN THE BOTTOM TWO LAYERS OF CONTAINERS ON THE UNITS. FOR CROSSWISE LOADED PALLET UNITS, POSITION HORIZONTALLY SO AS TO CENTER PIECES MARKED ② AND ③ ON THE PALLET DUNNAGE ASSEMBLY OF THE UNIT. NAIL TO THE CAR SIDEWALL W/5-12d 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 NOTE "M" 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 18" FOR A LENGTHWISE LOAD, 2" X 4" X 31-1/2" 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" X 42" (2 REQD). NAIL TO THE CAR SIDEWALL W/8-12d NAILS.



**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.

**TYPE "B" K-BRACE**



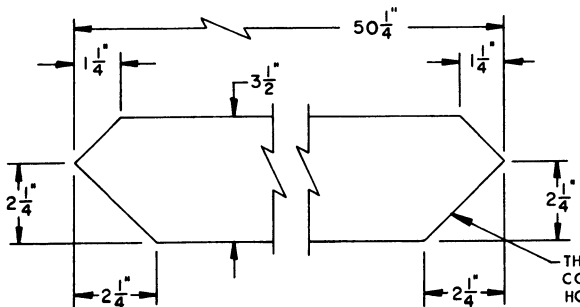
ISOMETRIC VIEW

KEY NUMBERS

SPECIAL NOTES:

1. THE TYPE "C" 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 DETAIL ON PAGE 29 FOR THE APPLICABLY SIZED K-BRACE TO USE AND THE DESIGN SPECIFICATIONS FOR THE BRACE. IF THE PARTIAL TIER TO BE BRACED IS ONLY FOUR PALLET UNITS, THE TYPE "B" K-BRACE DEPICTED ON PAGE 27 MAY BE USED. IF THE PARTIAL TIER IS ONLY ONE OR TWO PALLET UNITS, THE TYPE "A" K-BRACE DEPICTED ON PAGE 26 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.
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.

- ① SUPPORT CLEAT, 2" X 4" X 10" (2 REQD). FOR LENGTHWISE LOADED PALLET UNITS, 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 PALLET UNITS, POSITION HORIZONTALLY SO AS TO CENTER PIECES MARKED ② AND ③ ON THE PALLET DUNNAGE ASSEMBLY OF THE PALLET UNIT. 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/7-12d NAIL EVERY 6". SEE GENERAL NOTE "M" 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 18" FOR A LENGTHWISE LOAD, 2" X 4" X 34-1/2" 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.

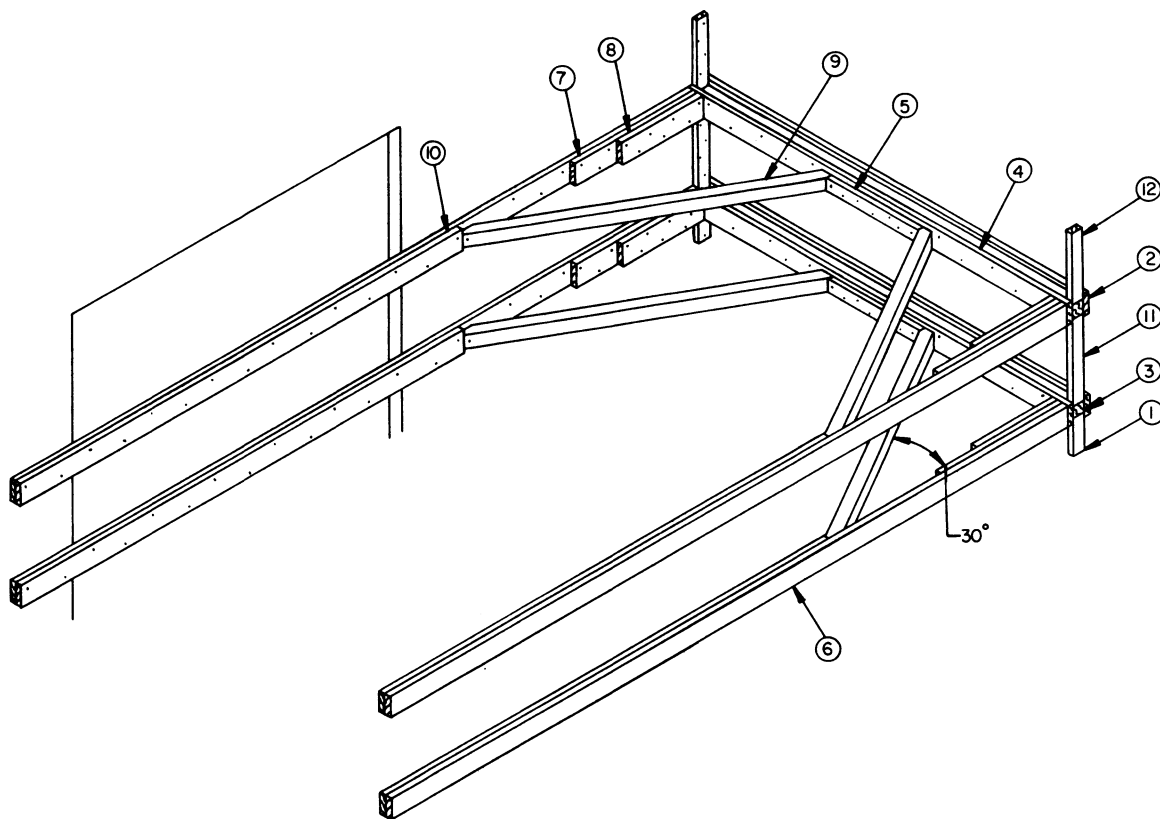


DIAGONAL BRACE

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.

TYPE "C" K-BRACE



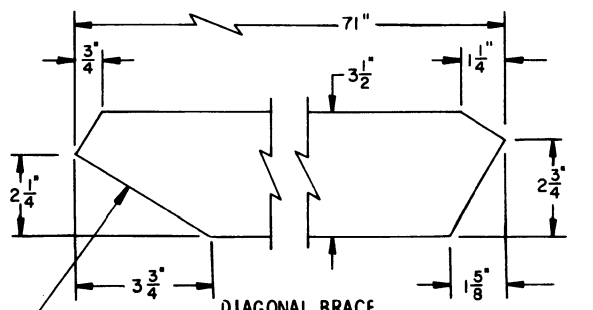
ISOMETRIC VIEW

SPECIAL NOTES:

1. THE TYPE "D" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN EIGHT (8) PALLET UNITS. IF THE PARTIAL TIER TO BE BRACED IS ONLY SIX PALLET UNITS, THE TYPE "C" K-BRACE DEPICTED ON PAGE 28 MAY BE USED. IF FOUR PALLET UNITS ARE TO BE SHIPPED, THE TYPE "B" K-BRACE DEPICTED ON PAGE 27 MAY BE USED. IF THE PARTIAL TIER IS ONLY ONE OR TWO PALLET UNITS, THE TYPE "A" K-BRACE DEPICTED ON PAGE 26 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, ⑪, AND ⑫ MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDEWALL. IT IS ALLRIGHT 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

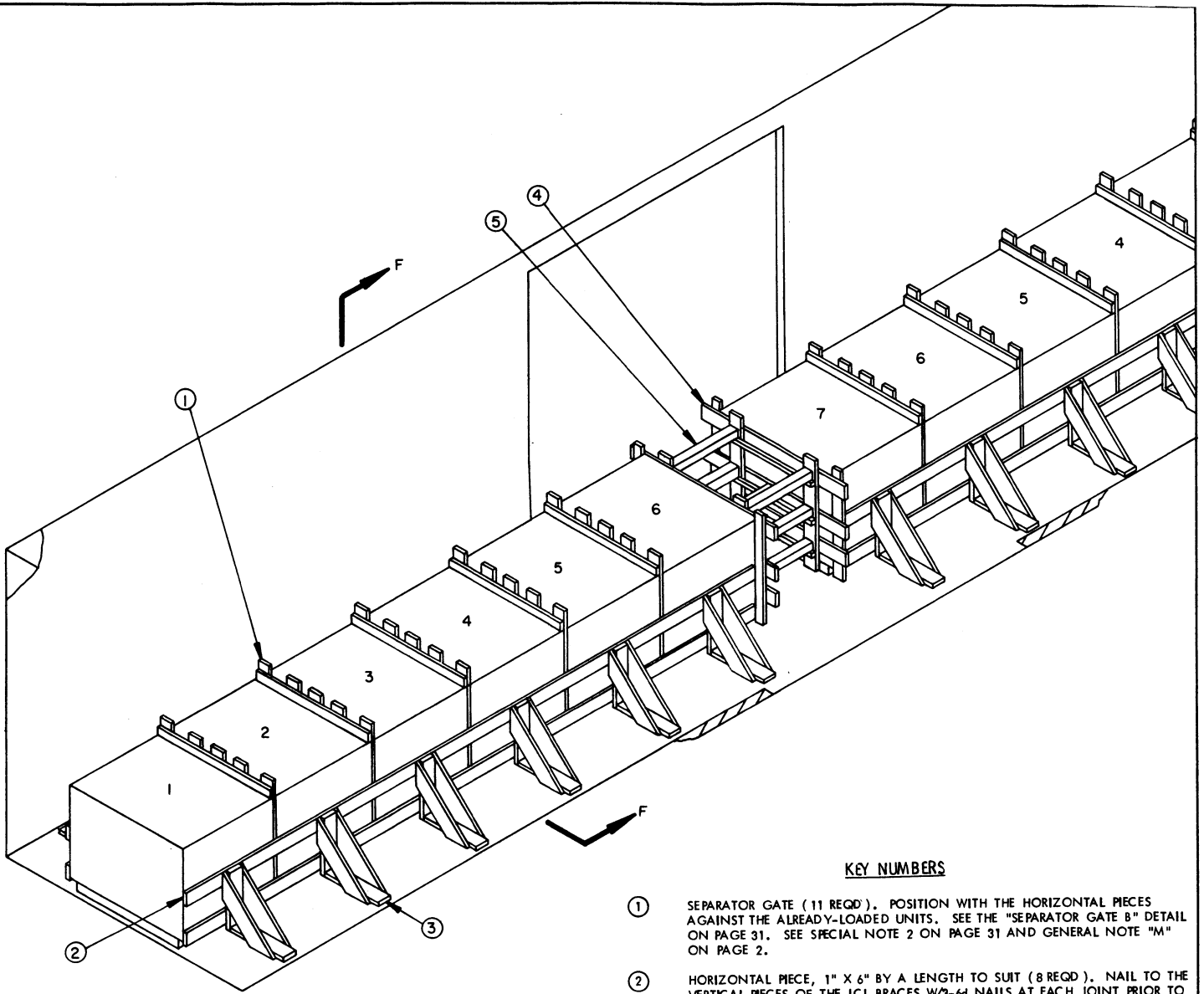
- ① SUPPORT CLEAT, 2" X 4" X 10" (2 REQD). FOR LENGTHWISE LOADED PALLET UNITS, POSITION VERTICALLY AS SHOWN SO AS TO CENTER PIECES MARKED ② AND ③ ON THE JOINT BETWEEN THE BOTTOM TWO LAYERS OF CONTAINERS ON THE UNITS. FOR CROSSWISE LOADED PALLET UNITS POSITION HORIZONTALLY SO AS TO CENTER PIECES MARKED ② AND ③ ON THE PALLET DUNNAGE ASSEMBLY OF THE PALLET UNIT. 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 NOTE "M" 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 18" FOR A LENGTHWISE LOAD, 2" X 4" X 31-1/2" 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.

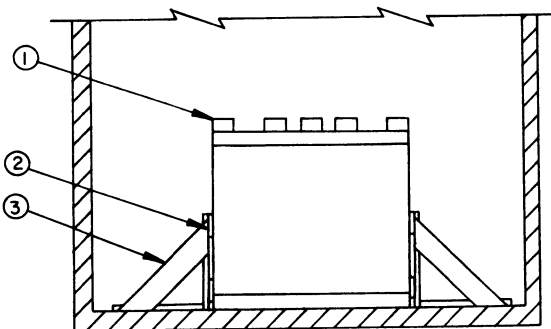
TYPE "D" K-BRACE



ISOMETRIC VIEW

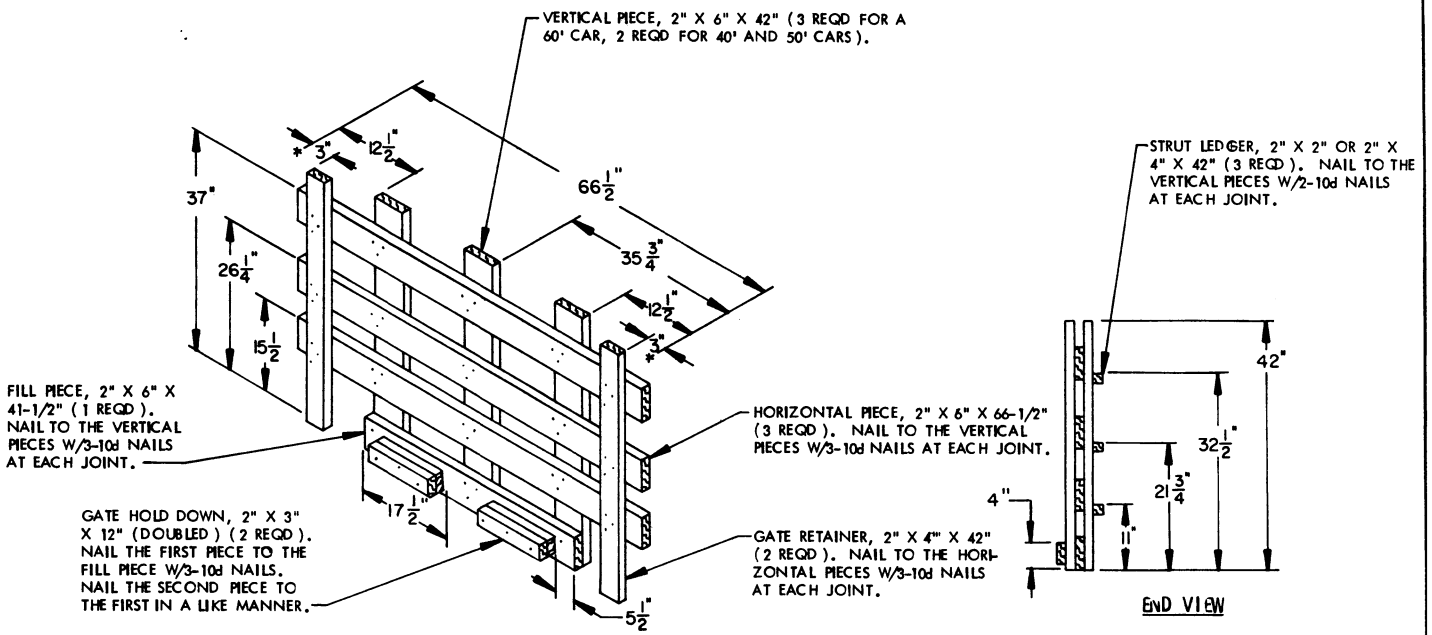
KEY NUMBERS

- ① SEPARATOR GATE (11 REQD). POSITION WITH THE HORIZONTAL PIECES AGAINST THE ALREADY-LOADED UNITS. SEE THE "SEPARATOR GATE B" DETAIL ON PAGE 31. SEE SPECIAL NOTE 2 ON PAGE 31 AND GENERAL NOTE "M" 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 33 FOR HEIGHT LOCATION GUIDANCE.
- ③ LCL BRACE (26 REQD). SEE THE DETAIL ON PAGE 33 AND SPECIAL NOTE 4 ON PAGE 31. NAIL TO THE CAR FLOOR W/7-16d NAILS. SEE GENERAL NOTE "R" ON PAGE 2 AND SPECIAL NOTE 3 ON PAGE 31.
- ④ CENTER GATE (2 REQD). SEE THE "CENTER GATE C" DETAIL ON PAGE 31. SEE SPECIAL NOTE 2 ON PAGE 31.
- ⑤ STRUT, 4" X 4" BY CUT TO FIT (REF: 24-1/2") (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.

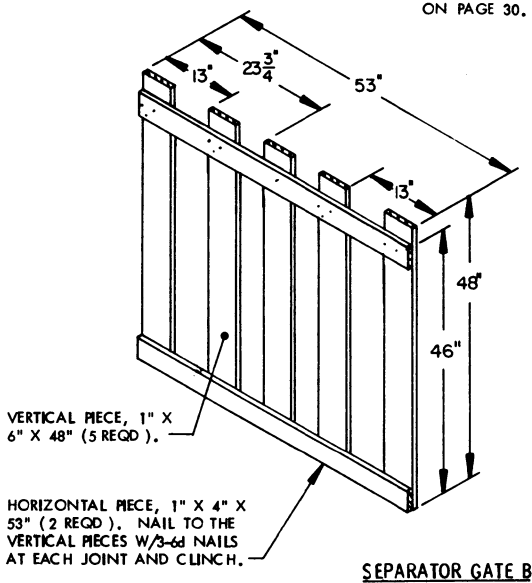


SECTION F-F

TYPICAL LCL LOAD USING 1-WIDE LOADING METHOD



THIS GATE IS FOR USE IN THE LOAD ON PAGE 30.



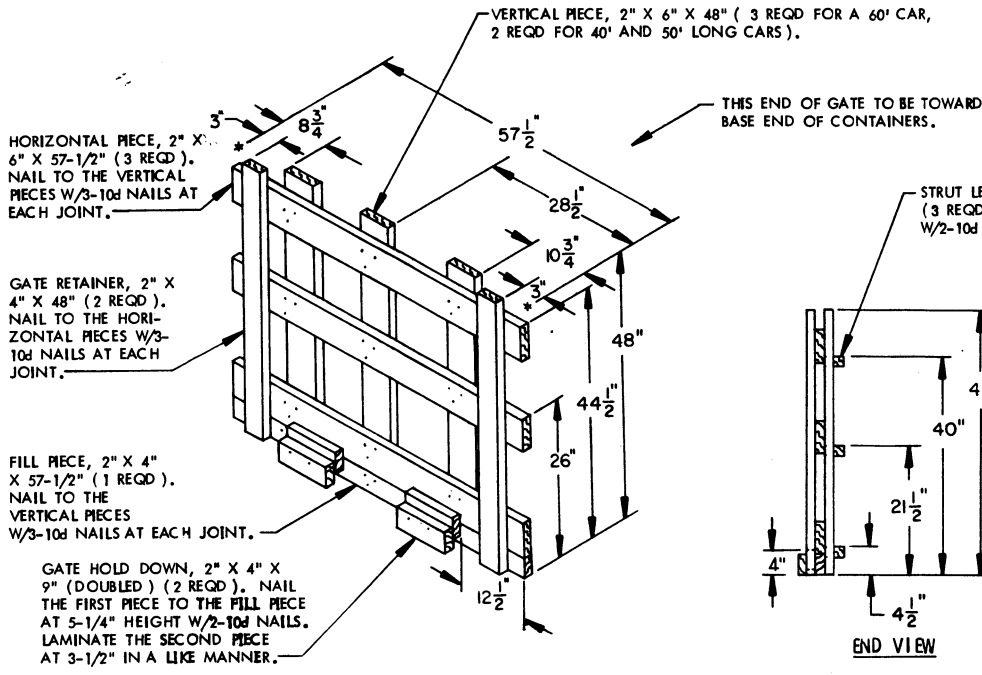
**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOX CAR IS SHOWN. CARS OF OTHER WIDTHS AND LENGTHS CAN BE USED.
2. A 1-WIDE CONTAINERS-LENGTHWISE LOAD IS SHOWN AS TYPICAL. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR A 1-WIDE CONTAINERS-CROSSWISE LOAD. THE SEPARATOR GATES, PIECE MARKED ①, WILL NOT BE REQUIRED AND CENTER GATE "D", AS DETAILED ON PAGE 32, WILL BE USED IN LIEU OF THE CENTER GATE "C", PIECE MARKED ④.
3. ONE (1) LCL BRACE WILL BE USED AT EACH SIDE OF EACH PALLET UNIT. FOR CONTAINERS-CROSSWISE UNITS, THE BRACES WILL BE CENTERED ON THE WIDTH OF THE UNIT. FOR CONTAINERS LENGTHWISE UNITS, THE BRACES WILL BE CENTERED NEAR THE CENTER OF THE UNIT LENGTH WITH SLIGHT ADJUSTMENTS AS NECESSARY SO AS TO ALIGN THE BRACES WITH THE CROSS PIECES OF THE PALLET DUNNAGE AND INTERMEDIATE DUNNAGE ASSEMBLIES. THE QUANTITY OF BRACES SPECIFIED WILL NOT BE CORRECT FOR CONTAINERS-CROSSWISE LOADS.
4. THE BILL OF MATERIAL AND LOAD AS SHOWN ARE BASED ON THE DEPICTED LOAD AND THEREFORE ARE ONLY TYPICAL.

BILL OF MATERIAL (TYPICAL)		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	98	33
1" X 6"	478	239
2" X 2"	21	7
2" X 3"	8	4
2" X 4"	14	10
2" X 6"	166	166
4" X 4"	13	18
NAILS	NO. REQD	POUNDS
6d (2")	462	2-3/4
8d (2-1/2")	312	3-1/2
10d (3")	168	2-3/4
16d (3-1/2")	76	1-3/4

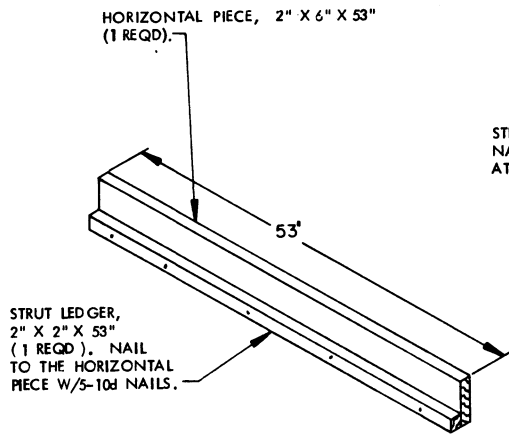
**LOAD AS SHOWN: (TYPICAL)**

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	13	36,335 LBS
DUNNAGE		965 LBS
<b>TOTAL WEIGHT</b>		<b>37,300 LBS</b>



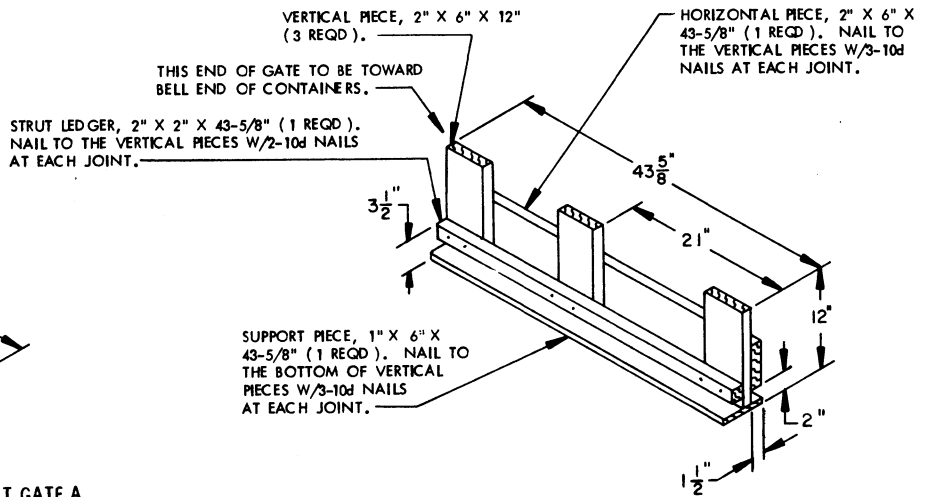
**CENTER GATE D**

THIS GATE IS FOR USE IN THE LOAD ON PAGE 30 WHEN THE CONTAINERS ARE CROSSWISE IN THE CAR. NOTE THAT LEFT HAND AND RIGHT HAND GATES ARE REQUIRED.



**PARTIAL UNIT GATE A**

FOR 4 LAYERS OF LENGTHWISE CONTAINERS OF A PARTIAL UNIT. SEE PAGE 34.



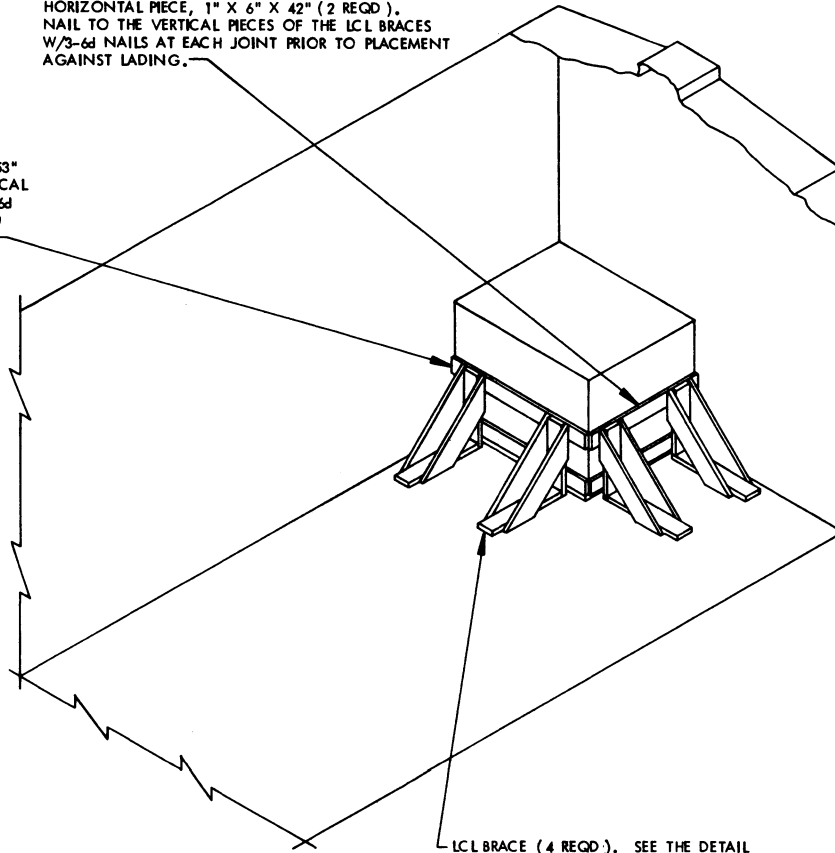
**PARTIAL UNIT GATE B**

FOR 4 LAYERS OF CROSSWISE CONTAINERS ON A PARTIAL UNIT. NOTE THAT LEFT HAND AND RIGHT HAND GATES ARE REQUIRED. SEE PAGE 35.



HORIZONTAL PIECE, 1" X 6" X 42" (2 REQD).  
NAIL TO THE VERTICAL PIECES OF THE LCL BRACES  
W/3-6d NAILS AT EACH JOINT PRIOR TO PLACEMENT  
AGAINST LADING.

HORIZONTAL PIECE, 1" X 6" X 53"  
(2 REQD). NAIL TO THE VERTICAL  
PIECES OF THE LCL BRACES W/3-6d  
NAILS AT EACH JOINT PRIOR TO  
PLACEMENT AGAINST LADING.



SEE GENERAL NOTE  
"G" ON PAGE 2.

ISOMETRIC VIEW

LCL BRACE (4 REQD). SEE THE DETAIL  
BELOW. LOCATE SO AS TO BE CENTERED  
ON THE JOINTS OF THE CONTAINER ENDS  
AND/OR AGAINST THE ENDS OF THE CON-  
TAINER LENGTH. NAIL TO THE CAR FLOOR  
W/7-16d NAILS. SEE GENERAL  
NOTES "M" AND "R" ON PAGE 2.

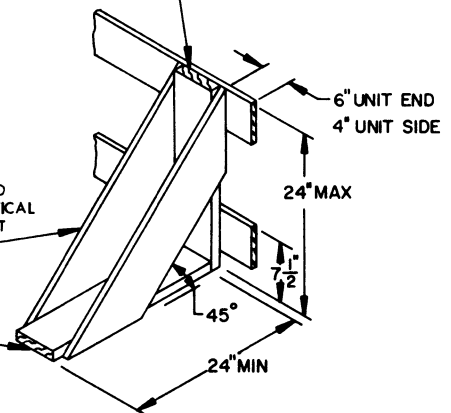
SPECIAL NOTES:

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 "R" ON PAGE 2.
2. THE LOAD SHOWN DEPICTING THE LCL BRACE METHOD OF PARTIAL-LAYER BRACING IS TYPICAL. A CONTAINERS-LENGTHWISE UNIT IS SHOWN, HOWEVER, THE PROCEDURES ARE ALSO APPLICABLE FOR CONTAINERS-CROSSWISE 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 AS NECESSARY.

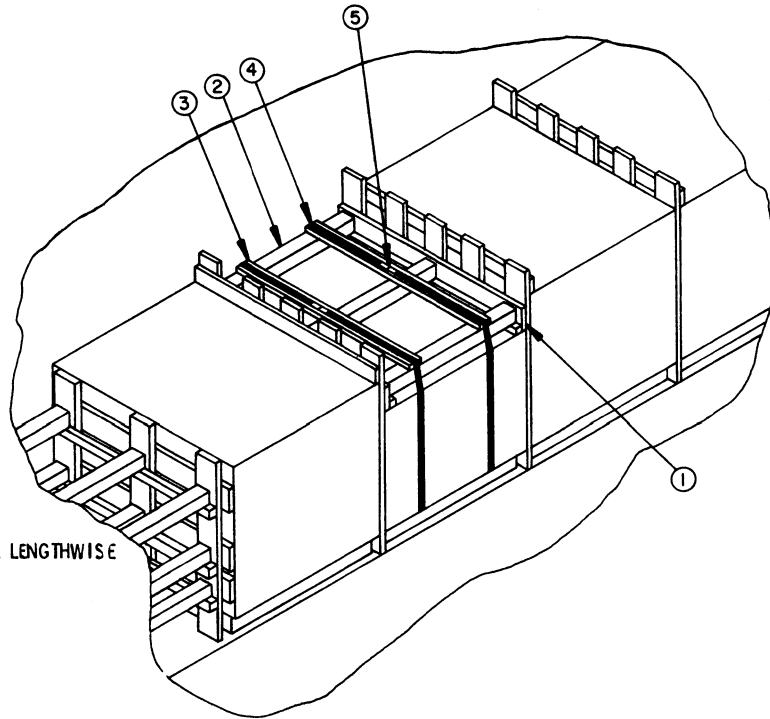
VERTICAL PIECE, 2" X 6" X 24" (MAXIMUM)  
(1 REQD). NAIL TO THE BACK-UP CLEAT  
W/2-16d NAILS.

ANGLE BRACE, 1" X 6" BY CUT TO  
FIT (2 REQD). NAIL TO THE VERTICAL  
PIECE AND TO THE BACK-UP CLEAT  
W/3-8d NAILS AT EACH END.

BACK-UP CLEAT, 2" X 6"  
MATERIAL (1 REQD).



LCL BRACE



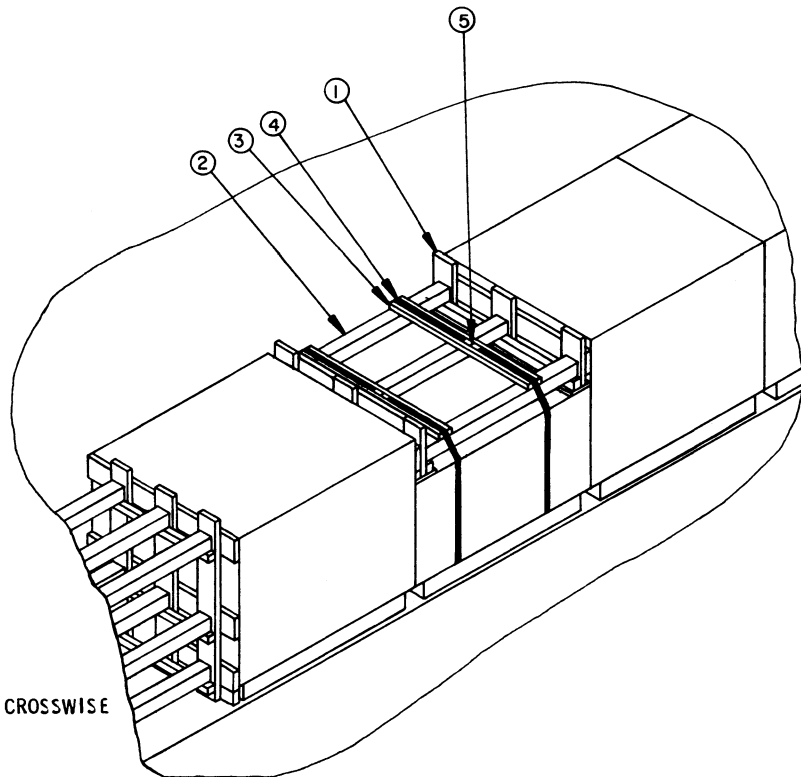
**POSITIONING OF PARTIAL LENGTHWISE UNIT WITHIN A LAYER**

**SPECIAL NOTES:**

1. SHIPMENTS OF COMPLETE ROUNDS SHOULD CONSIST OF FULL-HEIGHT 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 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 THREE (3) LAYERS OF CONTAINERS ON THE PARTIAL UNIT. THE DEPICTED PROCEDURES SHOW THE BRACING OF A 4-LAYER UNIT WITHIN A LOAD. THE PRINCIPLES CAN BE ADAPTED TO SUIT 3-LAYER PARTIAL UNITS OR THE DEPICTED PROCEDURES CAN BE APPLIED IN TWO PLACES.
3. A PARTIAL UNIT MUST CONSIST OF FULL LAYERS OF SEVEN (7) CONTAINERS, OR AN APPROVED FILLER ASSEMBLY, AS DETAILED BY DRAWING 19-48-4079/5-20PM1000, 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 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. 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 ON PAGE 32. SEE GENERAL NOTE "M" ON PAGE 2 AND SPECIAL NOTE 2 AT LEFT.
- ② STRUT, 4" X 4" X 40-5/8" (4 REQD). POSITION AS SHOWN AND TOENAIL TO THE PARTIAL-UNIT GATE, PIECE MARKED ①, W/2-16d NAILS AT EACH END.
- ③ STRAPPING BOARD, 2" X 4" X 51" (2 REQD). NAIL TO THE STRUTS, PIECES MARKED ②, W/3-10d NAILS AT EACH JOINT.
- ④ UNITIZING STRAP, 1-1/4" X .031" OR .035" X 15'-6" LONG STEEL STRAPPING (2 REQD). PRE-POSITION UNDER THE PALLET.
- ⑤ SEAL FOR 1-1/4" STEEL STRAPPING (4 REQD, 2 PER JOINT). SEE GENERAL NOTE "O" ON PAGE 2.



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

**SPECIAL NOTES:**

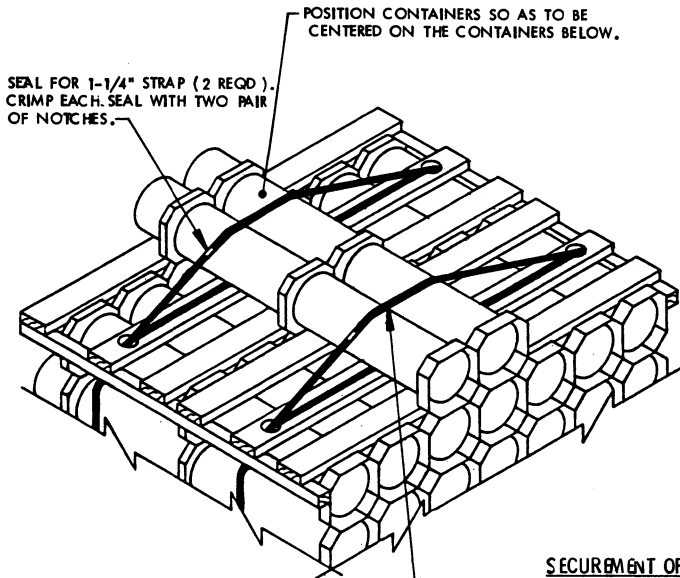
1. SHIPMENTS OF COMPLETE ROUNDS SHOULD CONSIST OF FULL-HEIGHT AND FULL-LAYER UNITS TO THE MAXIMUM EXTENT POSSIBLE, HOWEVER, THE END OF A LOT, OR THE QUANTITY OF ITEMS NEEDED TO FILL A REQUISITION, MAY NECESSITATE THE SHIPMENT OF ONE OR MORE LESS-THAN-FULL PALLET UNITS WITHIN A LOAD. THE PROCEDURES ON THIS PAGE ARE PRESENTED AS GUIDANCE IN THE SHIPMENT OF A PARTIAL UNIT WITHIN A 1-LAYER CROSSWISE LOAD. THE PRINCIPLES MAY 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 THREE (3) LAYERS OF CONTAINERS ON THE PARTIAL UNIT. THE DEPICTED PROCEDURES SHOW THE BRACING OF A 4-LAYER UNIT WITHIN A LOAD. THE PROCEDURES CAN BE ADAPTED TO SHIPMENTS OF 3-LAYER PARTIAL UNITS.
3. A PARTIAL UNIT MUST CONSIST OF FULL LAYERS OF SEVEN (7) CONTAINERS, OR AN APPROVED FILL ASSEMBLY, AS DETAILED BY DRAWING 19-48-4079/5-20PM1002, MUST BE INSTALLED IN PLACE OF THE OMITTED CONTAINER.
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 MUST 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.
6. FOR THE SHIPMENT OF A PARTIAL UNIT CONSISTING OF ONE OR TWO LAYERS, THE PROCEDURES SHOWN ON PAGE 37 MUST BE USED LIEU OF THE ABOVE DEPICTED PROCEDURE. FOR SHIPMENT OF A 3-LAYER PARTIAL UNIT, THE PROCEDURES SHOWN ON PAGE 37 MAY BE MORE ECONOMICAL.
7. THE PARTIAL UNIT PROCEDURES SHOULD BE APPLIED NEAR THE CENTER OF THE CAR LENGTH BUT NOT IN THE DOORWAY. ALSO, THERE SHOULD BE AT LEAST ONE (1) LOAD UNIT BETWEEN THE PARTIAL UNIT AND A CENTER GATE.

**KEY NUMBERS**

- ① PARTIAL-UNIT GATE (1 REQD). SEE THE "PARTIAL-UNIT GATE B" DETAIL ON PAGE 32. SEE GENERAL NOTE "M" ON PAGE 2.
- ② STRUT, 4" X 4" X 47" (3 REQD). TOENAIL TO THE VERTICAL PIECES OF PIECE MARKED ① W/2-16d NAILS AT EACH END.
- ③ STRAPPING BOARD, 2" X 4" X 41-1/2" (2 REQD). NAIL TO THE STRUTS, PIECE MARKED ②, W/3-10d NAILS AT EACH JOINT.
- ④ UNITIZING STRAP, 1-1/4" X .035" OR .031" 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.
- ⑥ ANTI-CHAFING NEUTRAL BARRIER MATERIAL (AS REQD). POSITION UNDER STRAPPING AT POINTS OF CONTACT WITH BELL END OF CONTAINERS. THIS MATERIAL NOT SHOWN IN THE ABOVE VIEW.

SPECIAL NOTES:

1. SHIPMENT OF COMPLETE ROUNDS SHOULD CONSIST OF FULL HEIGHT AND FULL LAYERS 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 37 OR WITHIN A LAYER AS SHOWN ON PAGES 34 AND 35.
2. SHIPMENT OF LEFTOVER CONTAINERS IS APPLICABLE FOR CONUS OR CONUS RAILROAD SHIPMENTS FROM DEPOT TO DEPOT OR FROM DEPOT TO POSTS, CAMPS, AND STATIONS OR UPON APPROVAL FROM HIGHER HEADQUARTERS FOR SHIPMENTS FROM LOAD, ASSEMBLE, AND PACK PLANTS TO DEPOTS. CAUTION: A UNIT 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, BUT NOT IN THE DOORWAY.
4. THE PROCEDURES ON THIS PAGE ARE APPLICABLE FOR THE SHIPMENT OF LEFTOVER CONTAINERS IN ANY OF THE LOADS DEPICTED HEREIN.

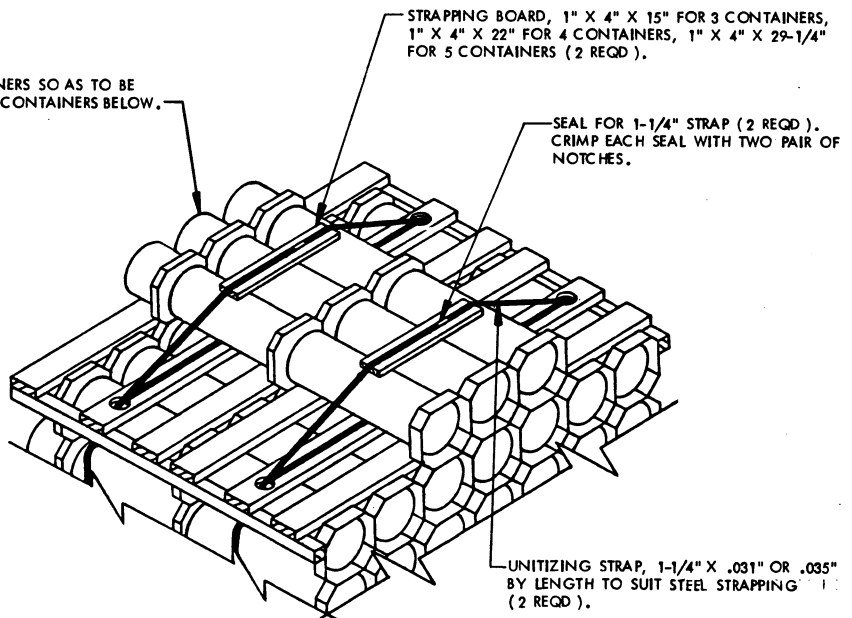


SECUREMENT OF TWO CONTAINERS

ALSO APPLICABLE FOR SECUREMENT OF ONE CONTAINER.

UNITIZING STRAP, 1-1/4" X .031" OR .035" BY LENGTH TO SUIT STEEL STRAPPING (2 REQD). THREAD THRU THE HOLES IN THE TOP DUNNAGE ASSEMBLY.

POSITION CONTAINERS SO AS TO BE CENTERED ON THE CONTAINERS BELOW.

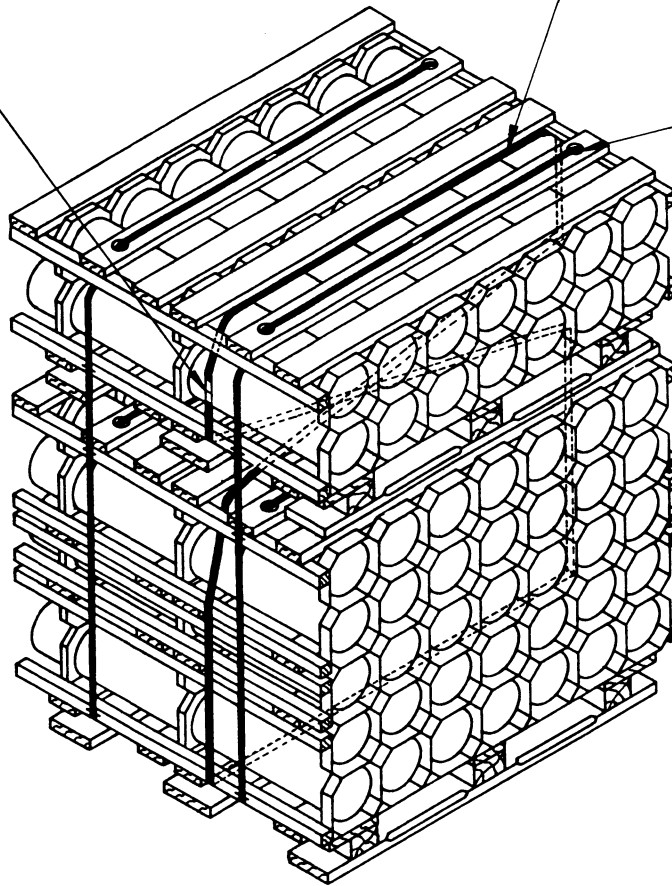


SECUREMENT OF THREE CONTAINERS

ALSO APPLICABLE FOR SECUREMENT OF FOUR OR FIVE CONTAINERS. NO MORE THAN FIVE LEFTOVER CONTAINERS WILL BE SECURED TO THE TOP OF A PALLET UNIT.

INDICATES TWO (2) 1-1/4" STRAP SEALS.

FIGURE-EIGHT UNITIZING STRAP, 1-1/4" X .031" OR .035" BY A LENGTH TO SUIT STEEL STRAPPING (1 REQD). POSITION NEAR THE CENTER PALLET POST AS CLOSE AS POSSIBLE. NOTE THAT THE STRAP PASSES UNDER THE 2" X 2" OF THE TOP DUNNAGE ASSEMBLIES.

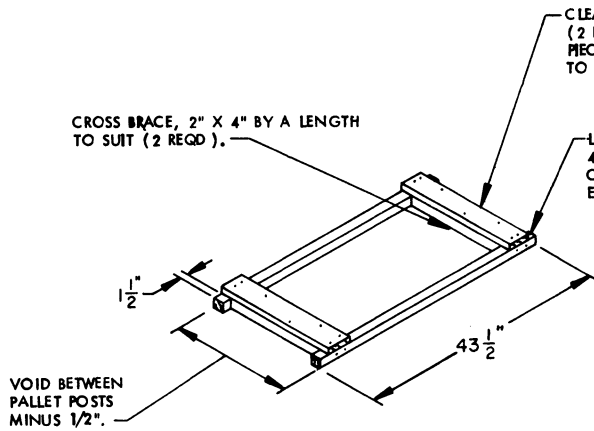


VERTICAL UNITIZING STRAP, 1-1/4" X .031" OR .035" BY A LENGTH TO SUIT STEEL STRAPPING (2 REQD). POSITION OVER THE LOAD STRAP ON THE UNITS. EXTEND THRU THE HOLES IN THE TOP DUNNAGE ASSEMBLY OF THE TOP UNIT.

**SECUREMENT OF A PARTIAL PALLET UNIT  
ON TOP OF A FULL PALLET UNIT**

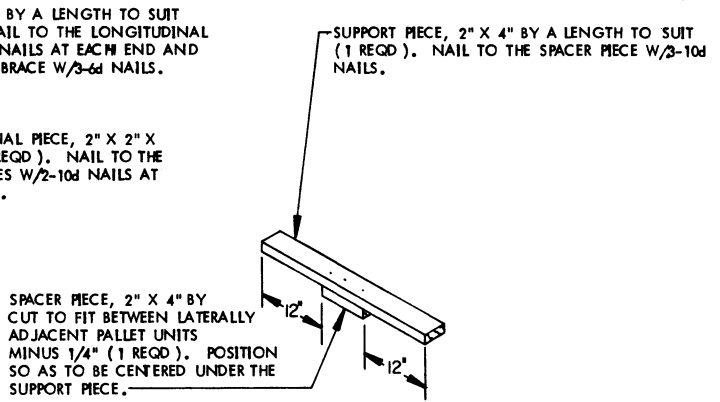
**SPECIAL NOTES:**

1. THIS PROCEDURE IS APPLICABLE ONLY FOR USE IN A 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 ONE, TWO, OR THREE LAYERS, REFER TO THE PROCEDURES ON PAGE 35.
2. IF THE PARTIAL UNIT CONSISTS OF EITHER ONE OR TWO-LAYERS, THE STRAPS UNITIZING THE TOP TWO LAYERS OF CONTAINERS WILL NOT BE REQUIRED.



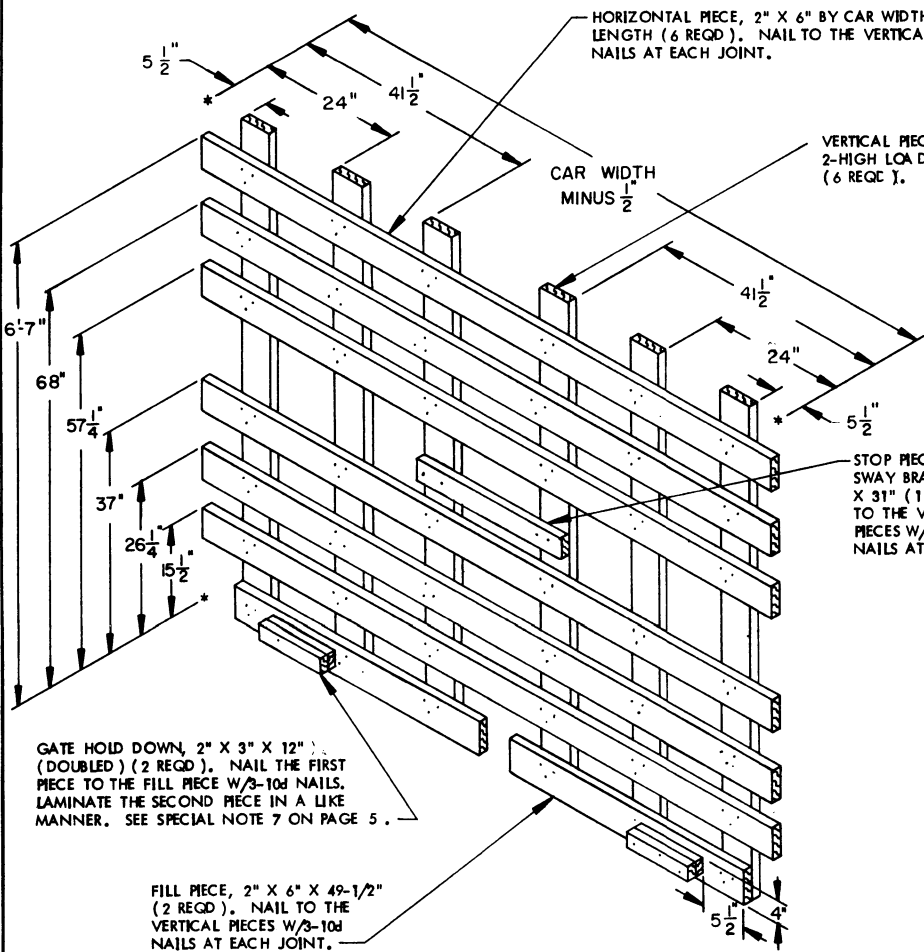
**ANTI-SWAY BRACE A**

THIS BRACE IS FOR USE IN THE LOADS ON PAGES 4 AND 8, AND ON PAGE 12 WHEN THE CONTAINERS ARE LENGTHWISE IN THE CAR.



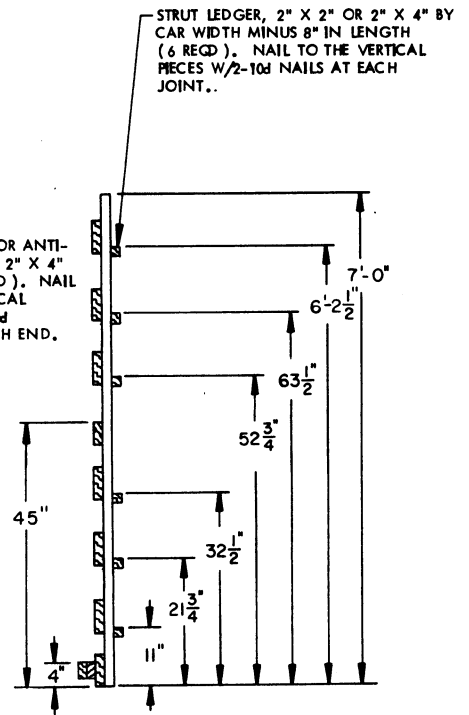
**TOP-OF-LOAD ANTI-SWAY BRACE A**

THIS BRACE IS FOR USE IN THE LOAD ON PAGES 4 AND 8, AND ON PAGE 12 WHEN THE CONTAINERS ARE LENGTHWISE IN THE CAR.



**CENTER GATE A**

THIS GATE IS DESIGNED FOR USE IN THE LOAD SHOWN ON PAGE 4.



**END VIEW**

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

FABRICATE TO FIT BETWEEN THE POSTS OF LATERALLY ADJACENT PALLET UNITS.

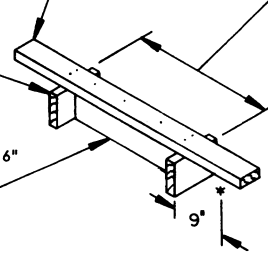
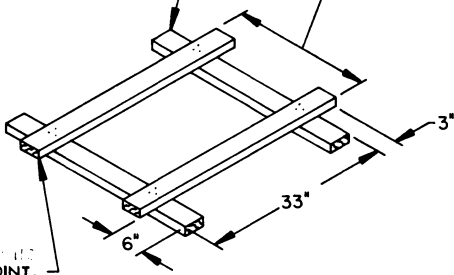
SUPPORT PIECE, 2" X 4" BY A LENGTH TO SUIT (1 REQD). NAIL TO THE SPACER PIECE W/4-10d NAILS AND TO THE BUFFER PIECES W/2-10d NAILS AT EACH JOINT.

BUFFER PIECE, 2" X 6" X 8" (2 REQD). NAIL TO THE SPACER PIECE W/3-10d NAILS.

VOID BETWEEN CONTAINER BODIES MINUS 1/4"

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

BUFFER PIECE, 2" X 4" X 39" (2 REQD). NAIL TO THE RETAINER PIECES W/3-10d NAILS AT EACH JOINT.

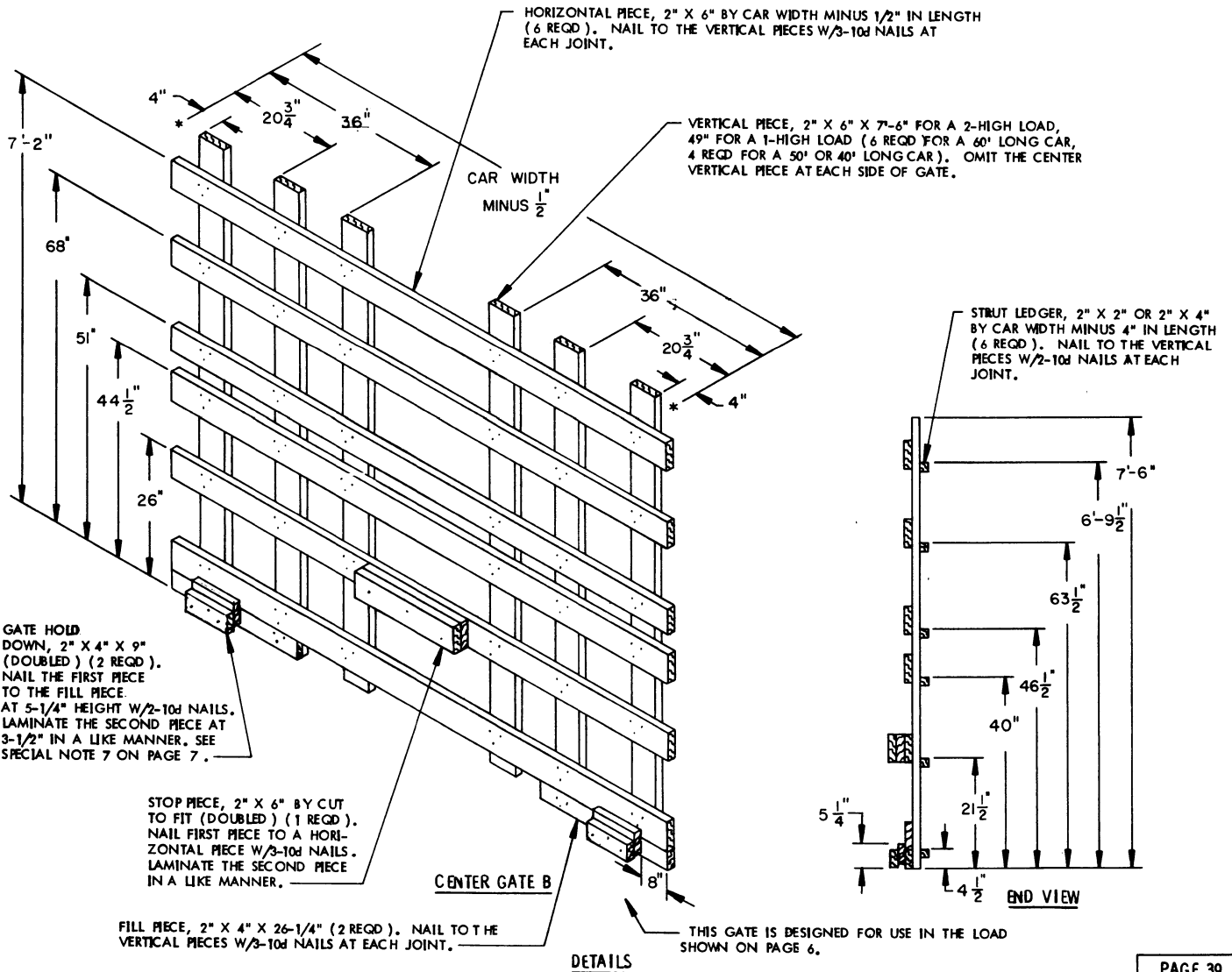


**ANTI-SWAY BRACE B**

THIS BRACE IS FOR USE IN THE LOAD ON PAGE 6, AND IN THE LOAD ON PAGE 12 WHEN THE CONTAINERS ARE CROSSWISE IN THE CAR.

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

THIS BRACE IS FOR USE IN THE LOAD ON PAGE 6, AND IN THE LOAD ON PAGE 12 WHEN THE CONTAINERS ARE CROSSWISE IN THE CAR.



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.

VERTICAL PIECE, 2" X 6" X 7'-6" FOR A 2-HIGH LOAD, 49" FOR A 1-HIGH LOAD (6 REQD FOR A 60' LONG CAR, 4 REQD FOR A 50' OR 40' LONG CAR). OMIT THE CENTER VERTICAL PIECE AT EACH SIDE OF GATE.

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

GATE HOLD DOWN, 2" X 4" X 9" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE FILL PIECE AT 5-1/4" HEIGHT W/2-10d NAILS. LAMINATE THE SECOND PIECE AT 3-1/2" IN A LIKE MANNER. SEE SPECIAL NOTE 7 ON PAGE 7.

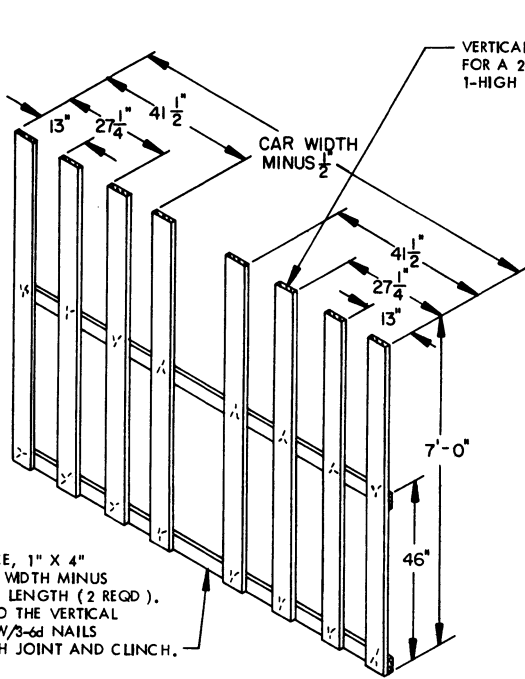
STOP PIECE, 2" X 6" BY CUT TO FIT (DOUBLED) (1 REQD). NAIL FIRST PIECE TO A HORIZONTAL PIECE W/3-10d NAILS. LAMINATE THE SECOND PIECE IN A LIKE MANNER.

FILL PIECE, 2" X 4" X 26-1/4" (2 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

**DETAILS**

THIS GATE IS DESIGNED FOR USE IN THE LOAD SHOWN ON PAGE 6.

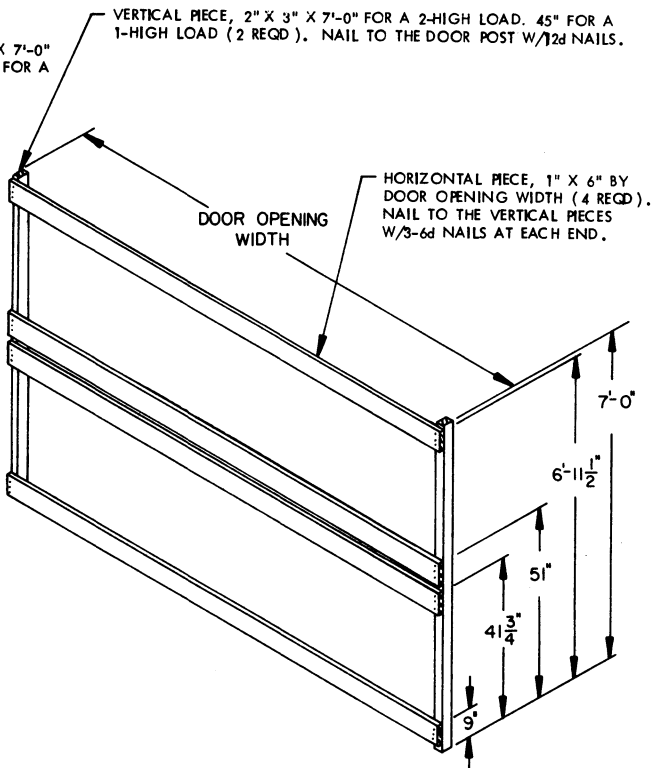
**END VIEW**



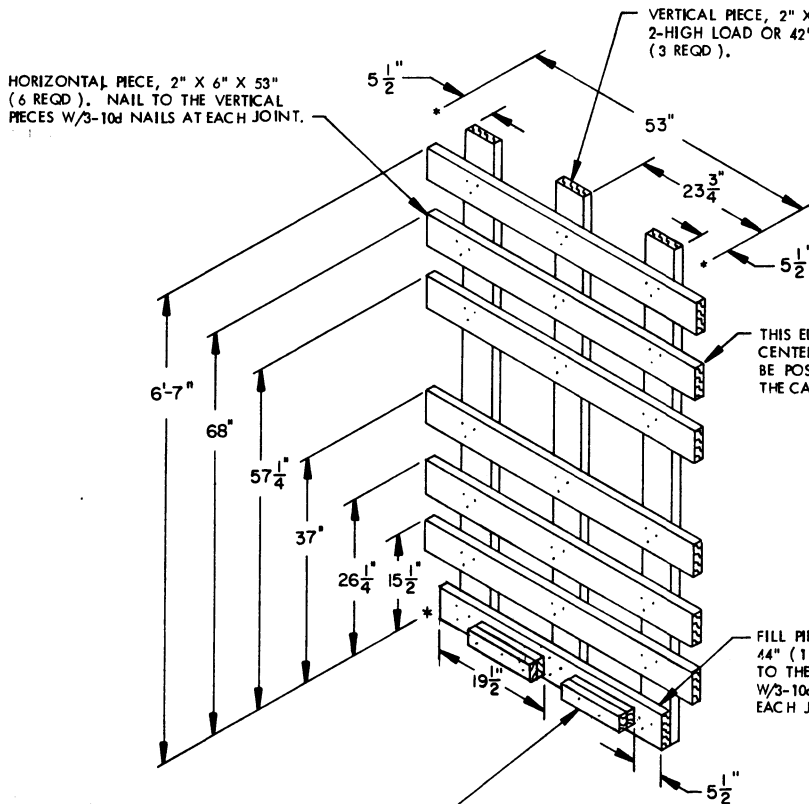
TIE PIECE, 1" X 4" BY CAR WIDTH MINUS 1/2" IN LENGTH (2 REQD). NAIL TO THE VERTICAL PIECES W/3-6d NAILS AT EACH JOINT AND CLINCH.

**SEPARATOR GATE A**

THIS SEPARATOR GATE IS FOR USE IN THE LOADS ON PAGES 4 AND 8, AND IN THE LOAD ON PAGE 12 WHEN THE CONTAINERS ARE LENGTHWISE IN THE CAR.



**DOORWAY PROTECTION**



HORIZONTAL PIECE, 2" X 6" X 53" (6 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

VERTICAL PIECE, 2" X 6" X 7'-0" FOR A 2-HIGH LOAD OR 42" FOR A 1-HIGH LOAD (3 REQD).

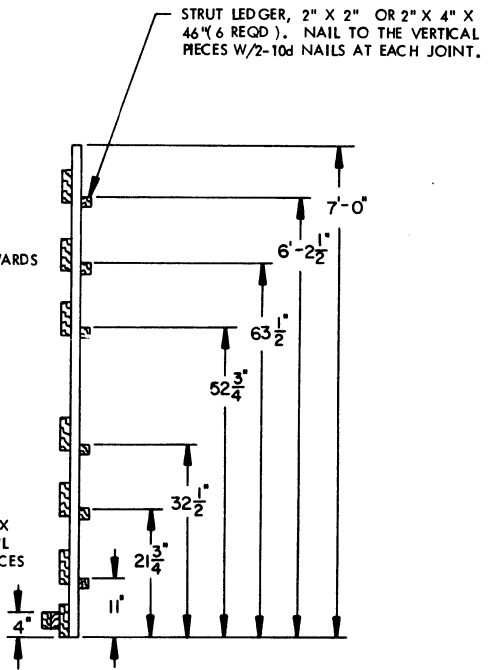
THIS EDGE OF THE CENTER GATE IS TO BE POSITIONED TOWARDS THE CAR SIDEWALL.

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

GATE HOLD DOWN, 2" X 3" X 12" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE FILL PIECE W/3-10d NAILS. LAMINATE THE SECOND PIECE IN A LIKE MANNER.

**CENTER GATE E**

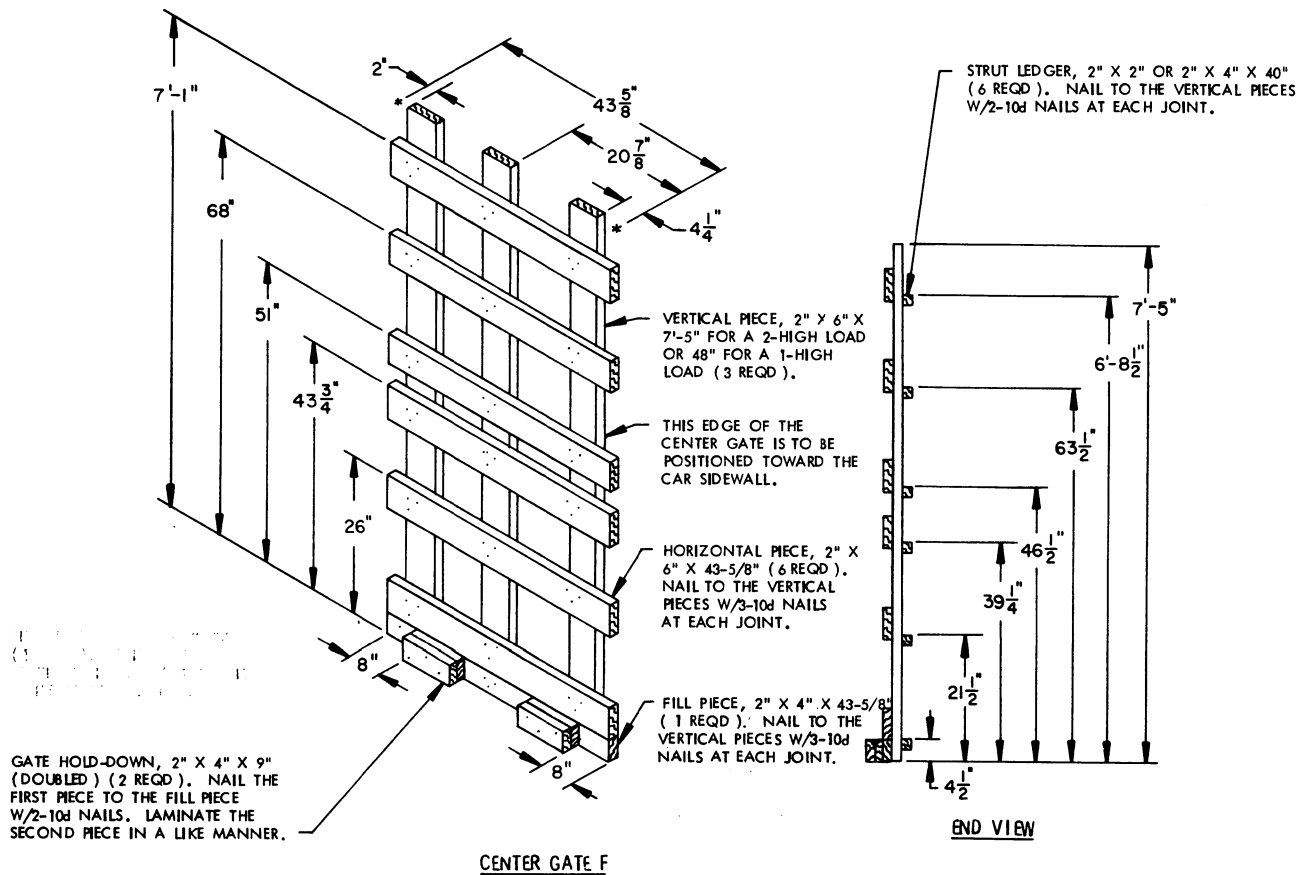
THIS GATE IS DESIGNED FOR USE AS A "SPLIT" GATE IN THE LOAD SHOWN ON PAGE 4. SEE SPECIAL NOTE 10 ON PAGE 5. TWO (2) RIGHT HAND AND TWO (2) LEFT HAND GATES WILL BE REQUIRED.



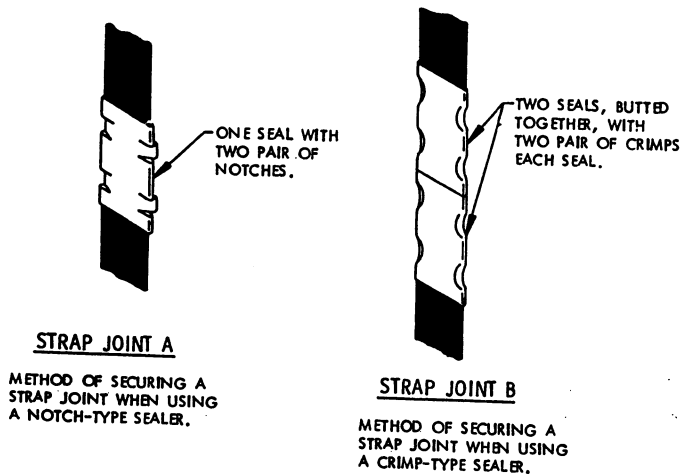
**END VIEW**

STRUT LEDGER, 2" X 2" OR 2" X 4" X 46" (6 REQD). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH JOINT.

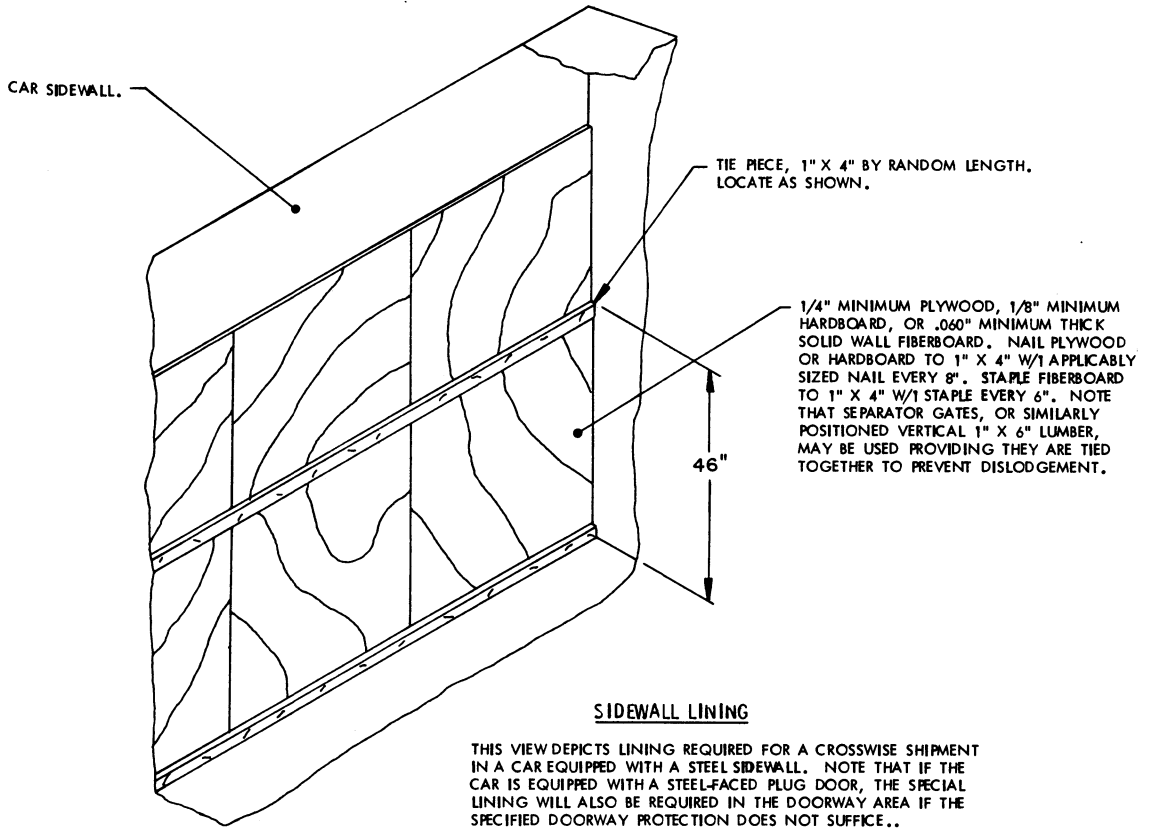
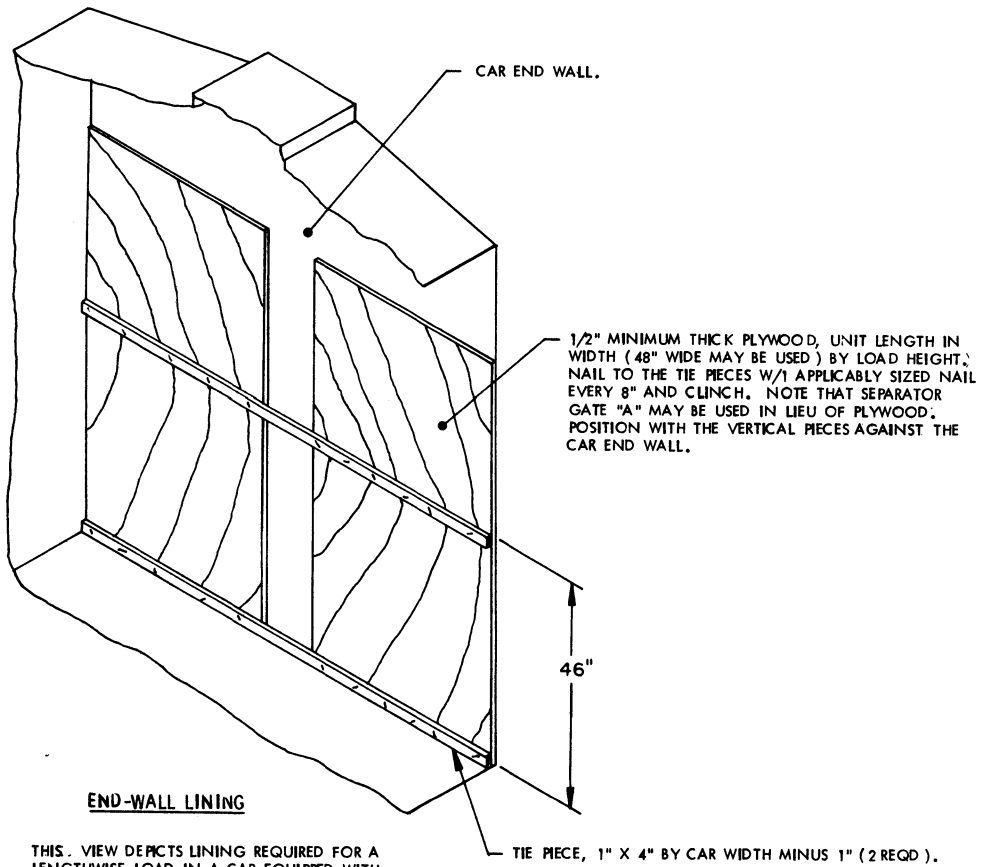




THIS GATE IS DESIGNED FOR USE AS A "SPLIT" GATE IN THE LOAD SHOWN ON PAGE 6. SEE SPECIAL NOTE 6 ON PAGE 7. TWO (2) RIGHT-HAND AND TWO (2) LEFT HAND GATES WILL BE REQUIRED.



**DETAILS**



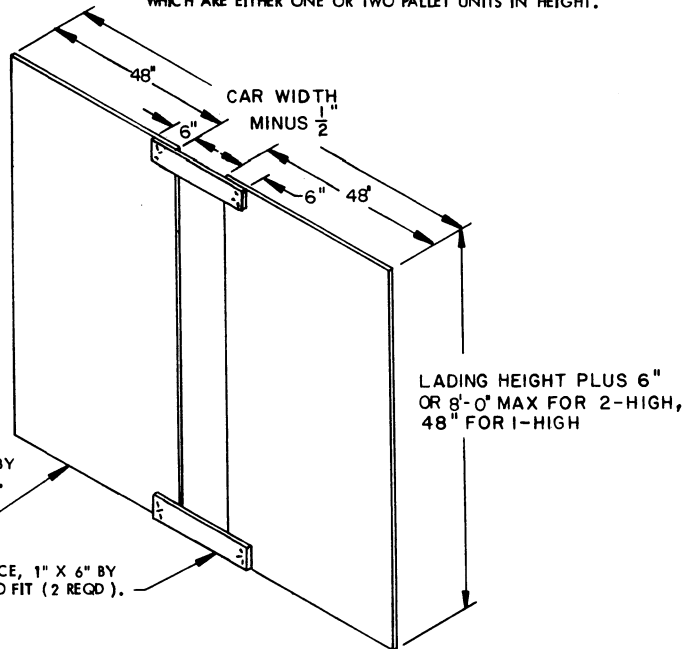
**DETAILS**

**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 "B" AS DETAILED ON PAGE 39, IS SHOWN AS TYPICAL.

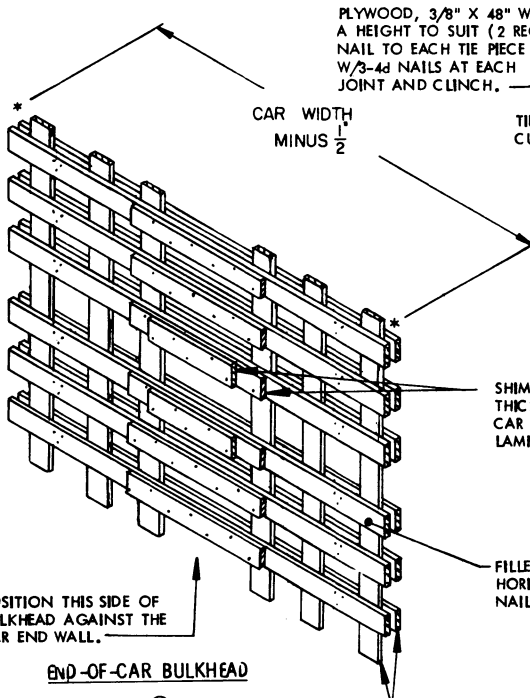
**NOTE ▲ :**

THE ALTERNATIVE SEPARATOR GATE MAY BE USED IN LIEU OF THE SEPARATOR GATE SHOWN WITHIN A LOAD, WHICH IS FABRICATED FROM 1" X 4" AND 1" X 6" MATERIAL. THE ALTERNATIVE SEPARATOR GATE MAY BE USED IN LOADS WHICH ARE EITHER ONE OR TWO PALLET UNITS IN HEIGHT.



**ALTERNATIVE SEPARATOR GATE**

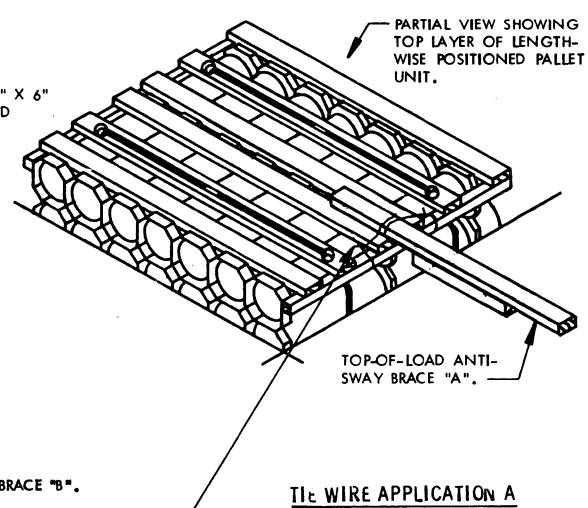
SEE "NOTE ▲ " ABOVE.



**END-OF-CAR BULKHEAD**

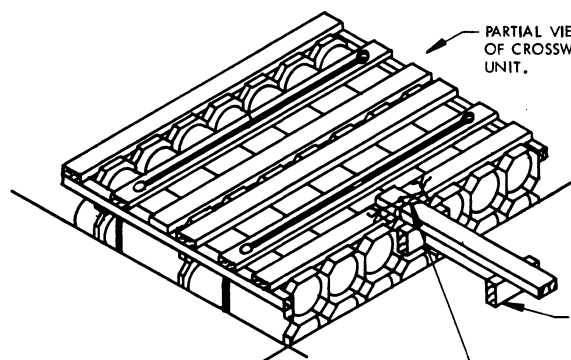
SEE "NOTE ○ " ABOVE.

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**

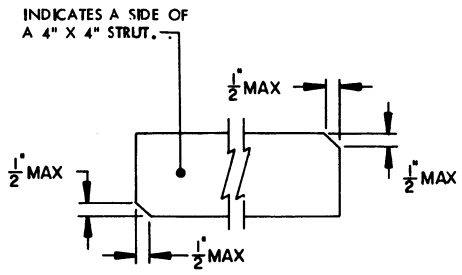
NO. 14 GAGE WIRE BY A LENGTH TO SUIT. FORM TWO LOOPS AROUND TOP-OF-LOAD ANTI-SWAY BRACE SUPPORT PIECE AND TWIST TO PREVENT DISPLACEMENT. THREAD EACH END OF WIRE UNDERNEATH AND AROUND STOP PIECE OF TOP DUNNAGE ASSEMBLY AND TWIST.



**TIE WIRE APPLICATION B**

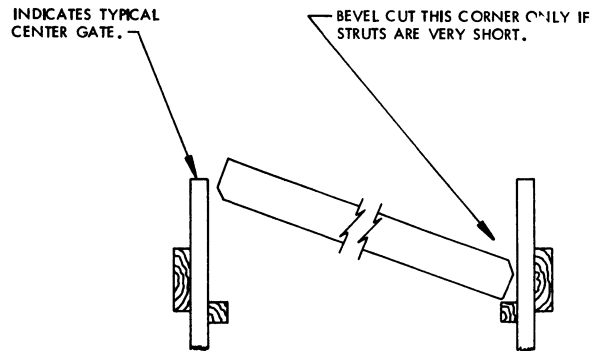
NO. 14 GAGE WIRE BY A LENGTH TO SUIT. FORM TWO LOOPS AROUND TOP-OF-LOAD ANTI-SWAY BRACE SUPPORT PIECE AND TWIST TO PREVENT DISPLACEMENT. THREAD EACH END OF WIRE UNDERNEATH AND AROUND CROSS PIECE OF TOP DUNNAGE ASSEMBLY AND TWIST.

**DETAILS**



**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 ONE-HALF INCH (1/2").

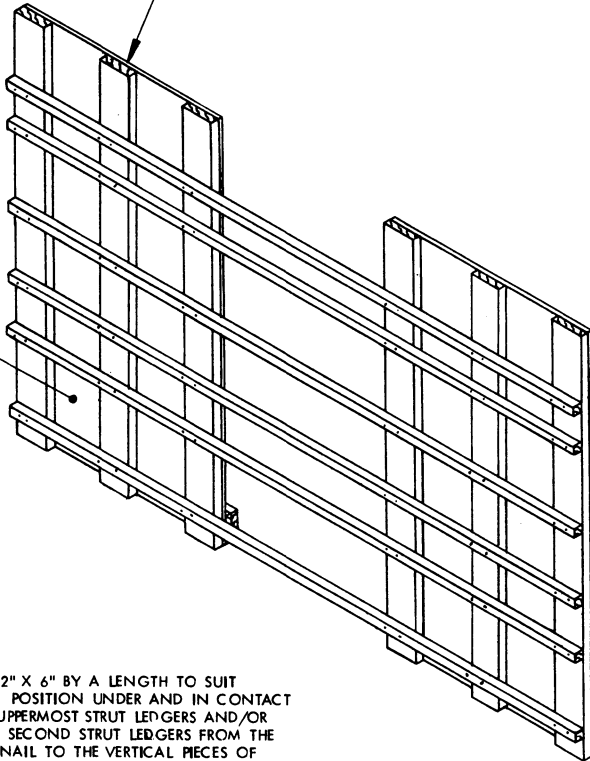


**STRUT INSTALLATION**

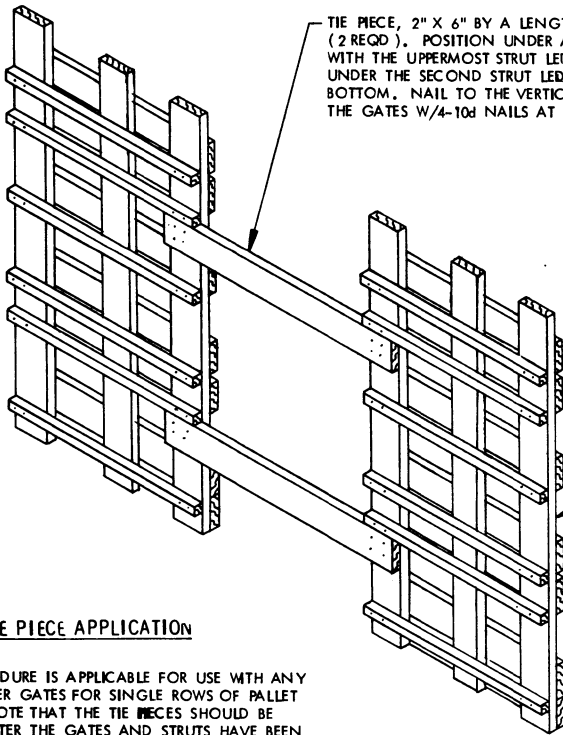
SEE GENERAL NOTE "U" ON PAGE 3 FOR ADDITIONAL STRUT INSTALLATION GUIDANCE.

PLYWOOD, 1/2" THICK BY THE UNIT WIDTH OR LENGTH BY THE LOAD HEIGHT (2 REQD). NAIL TO THE VERTICAL PIECES W/4-6d 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 8. PLYWOOD MAY BE ALLOWED TO EXTEND BEYOND THE UNIT LENGTH OR WIDTH, IF DESIRED.

INDICATES A TYPICAL CAR WIDTH CENTER GATE, WITH THE HORIZONTAL PIECES OMITTED (1 REQD). SEE THE APPLICABLE CENTER GATE DETAIL FOR LOCATION OF THE VERTICAL PIECES AND THE STRUT LEDGERS.



GATE HOLD DOWN PIECE MUST BE SECURED TO THE PLYWOOD.



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

**PLYWOOD CENTER GATE ALTERNATIVE**

CENTER GATE "B" 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 CENTER GATE FOR A SINGLE ROW (2 REQD). SEE THE APPLICABLE CENTER GATE DETAIL FOR THE UNIT BEING SHIPPED. A GATE FOR UNITS WHICH ARE POSITIONED WITH THE UNIT WIDTH PARALLEL TO THE CAR SIDEWALL IS SHOWN. THE PROCEDURE IS ALSO APPLICABLE TO GATES FOR UNITS WHICH ARE POSITIONED WITH THE UNIT LENGTH PARALLEL TO THE CAR SIDEWALL.

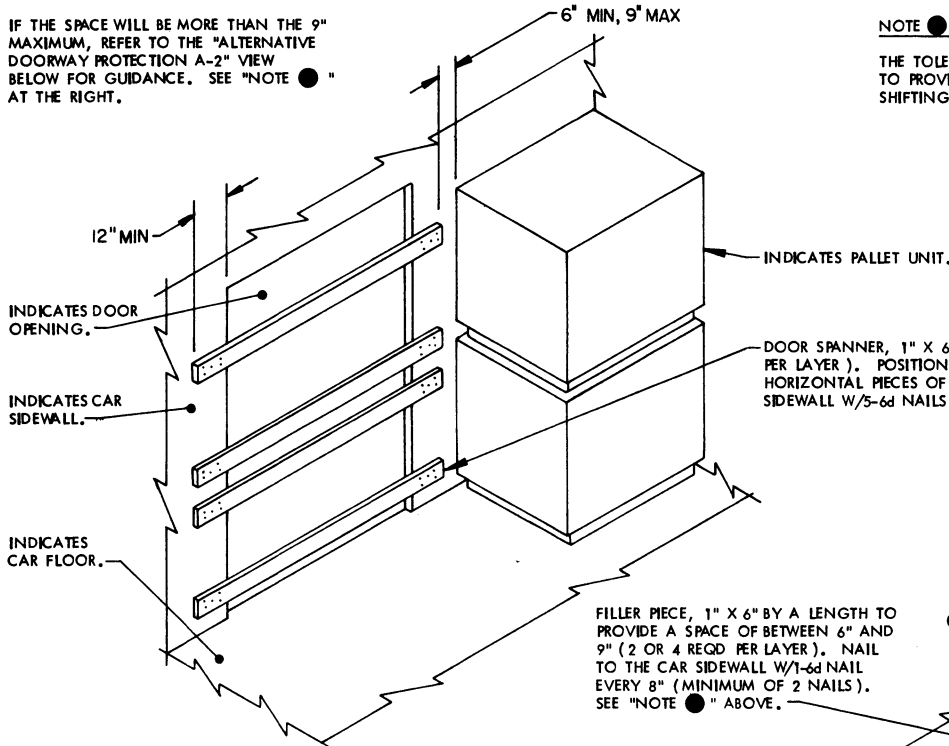
**TIE PIECE APPLICATION**

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.

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 ● :

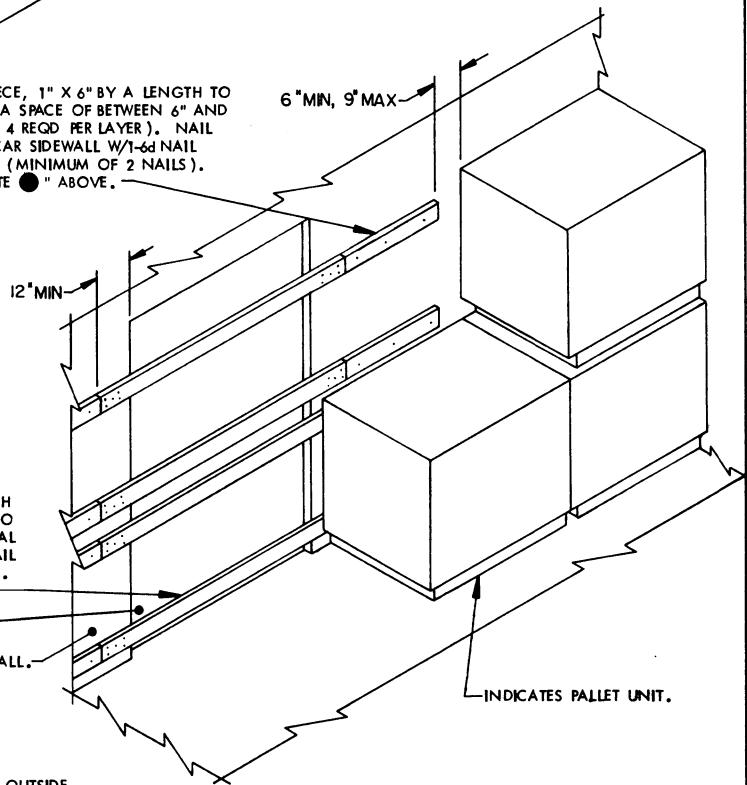
THE TOLERANCE DIMENSION (6" MIN, 9" MAX) IS ALLOWED TO PROVIDE FOR CLEARANCE DURING THE NORMAL LONGITUDINAL SHIFTING OF A LOAD IN TRANSIT.



**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, SUCH AS THE "ALTERNATIVE DOORWAY PROTECTION C" PROCEDURES ON PAGE 47 OR THE NAILED-DOWN BLOCKING AND STEEL STRAPPING METHOD DEPICTED BY THE "ALTERNATIVE DOORWAY PROTECTION E" DETAIL ON PAGE 47 AND IN THE LOAD ON PAGE 12.

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 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.

**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 APPLICABLE DOORWAY PROTECTION DETAIL FOR HEIGHT LOCATION.

VIEW B

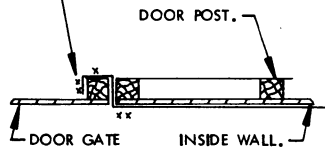
VERTICAL PIECE, 2" X 3" BY A LENGTH TO SUIT (2 REQD).

INDICATES DOOR OPENING.

INDICATES CAR SIDEWALL.

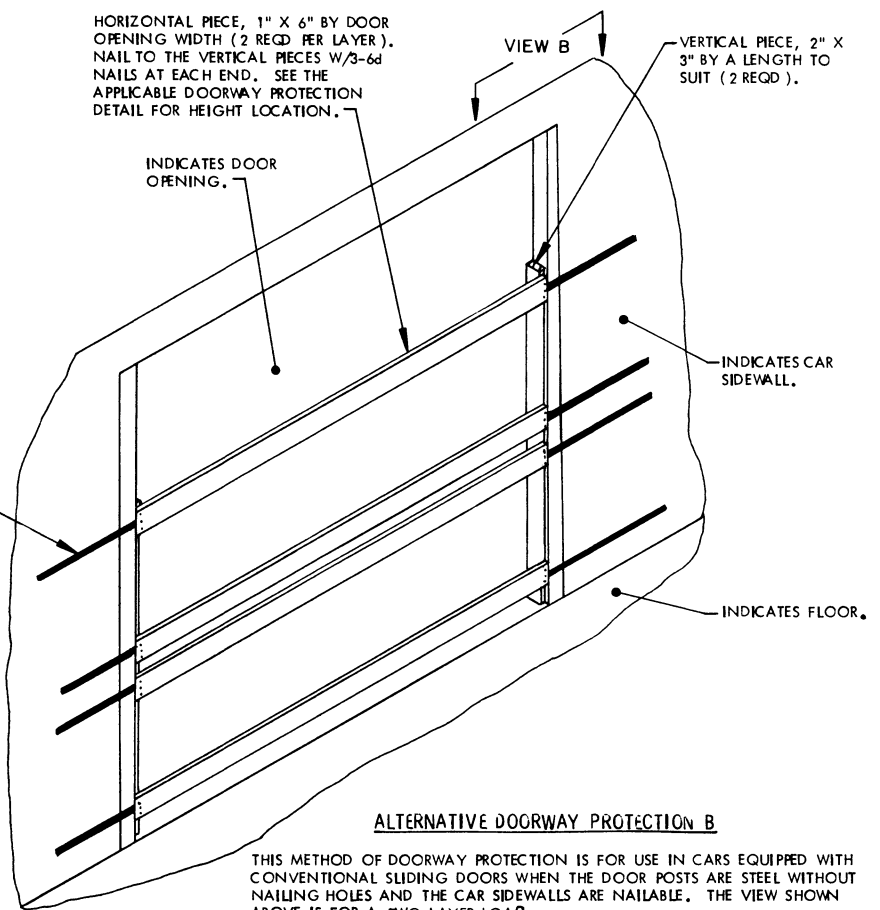
DOORWAY PROTECTION-GATE STRAP, 1-1/4" X .035" X 3'-0" (REF) NAIL-ON TYPE STEEL STRAPPING (4 REQD PER LAYER OF LOAD). NAIL TO GATE AND CAR SIDEWALL AS SHOWN BY THE "VIEW B" SKETCH BELOW. NOTE THAT TYPE 1 STRAPPING MAY BE PUNCHED FOR NAILING IF TYPE 2 STRAPPING IS NOT AVAILABLE.

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



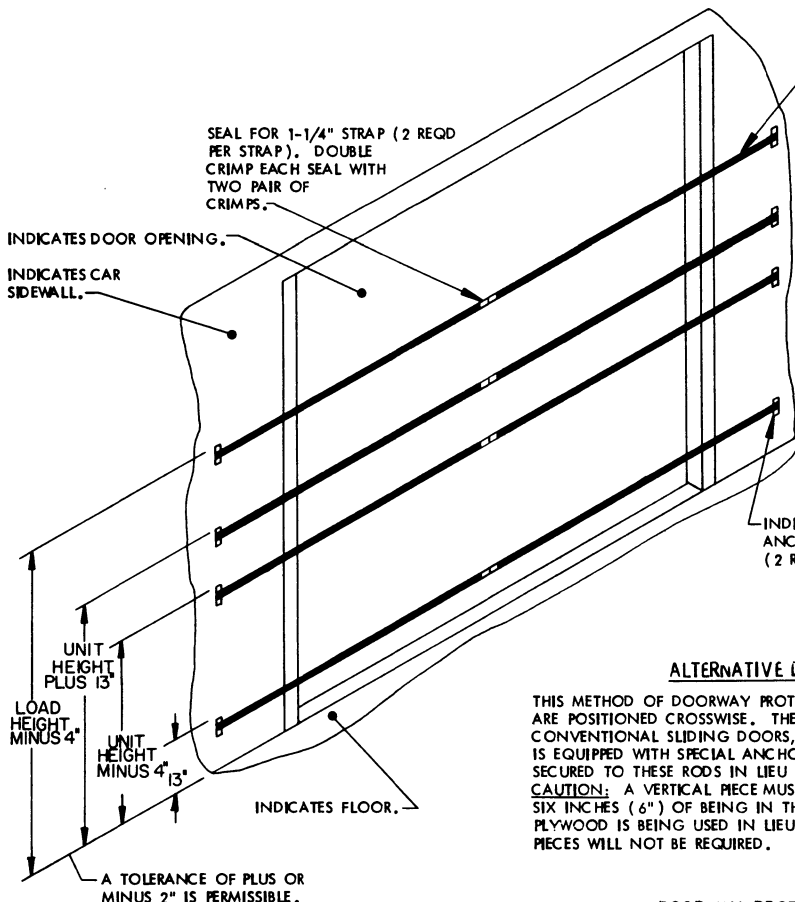
VIEW B

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.



**ALTERNATIVE DOORWAY PROTECTION C**

THIS METHOD OF DOORWAY PROTECTION IS ONLY FOR USE WITH THOSE LOADS IN WHICH THE CONTAINERS ARE POSITIONED 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. **CAUTION:** A VERTICAL PIECE MUST BE ADDED TO EACH END OF A CENTER GATE WHICH IS IN OR WITHIN SIX INCHES (6") OF BEING IN THE DOOR OPENING, TO PREVENT THE GATE FROM SHIFTING Laterally, UNLESS PLYWOOD IS BEING USED IN LIEU OF THE 2" X 6" HORIZONTAL PIECES IN WHICH CASE THE ADDED VERTICAL PIECES WILL NOT BE REQUIRED.

DOORWAY PROTECTION STRAP, 1-1/4" X .035" 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 NUMBER 27 RINGLOCK NAILS.

VIEW A

INDICATES STRAP ANCHOR PLATE.



ISOMETRIC VIEW

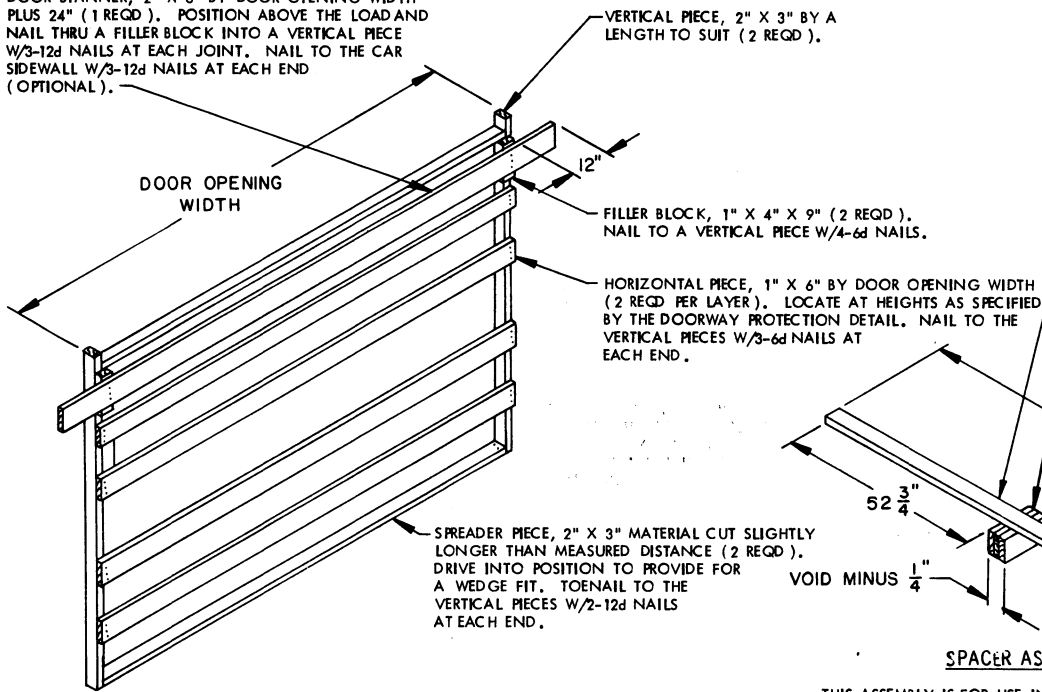
VIEW A

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.

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 THE SPREADER PIECES. SEE THE "ALTERNATIVE DOORWAY PROTECTION B" DETAIL ON PAGE 47 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 49.

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

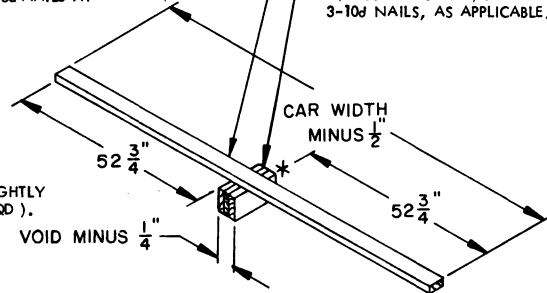
FILLER BLOCK, 1" X 4" X 9" (2 REQD). NAIL TO A VERTICAL PIECE W/4-6d NAILS.

HORIZONTAL PIECE, 1" X 6" BY DOOR OPENING WIDTH (2 REQD PER LAYER). LOCATE AT HEIGHTS AS SPECIFIED BY THE DOORWAY PROTECTION DETAIL. NAIL TO THE VERTICAL PIECES W/3-6d NAILS AT EACH END.

SPREADER PIECE, 2" X 3" MATERIAL CUT SLIGHTLY LONGER THAN MEASURED DISTANCE (2 REQD). DRIVE INTO POSITION TO PROVIDE FOR A WEDGE FIT. TO NAIL TO THE VERTICAL PIECES W/2-12d NAILS AT EACH END.

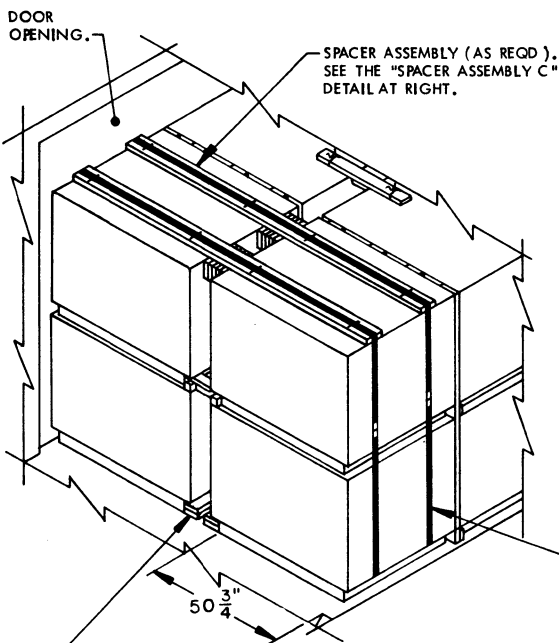
STRAPPING BOARD, 2" X 6" BY CAR WIDTH MINUS 1/2" (1 REQD). NAIL TO THE FILL PIECE W/2-12d NAILS AT EACH JOINT.

FILL PIECE, 1" X 6" X 12" AND/OR 2" X 6" X 12" (AS REQD). LAMINATE W/3-6d NAILS AND/OR 3-10d NAILS, AS APPLICABLE.



**SPACER ASSEMBLY C**

THIS ASSEMBLY IS FOR USE IN THE LOAD ON PAGE 4, AND IN THE LOAD ON PAGE 12 WHEN THE CONTAINERS ARE LENGTHWISE IN THE CAR, WHEN NAILED FLOORLINE BLOCKING AND DOORWAY PROTECTION STRAPS ARE USED.

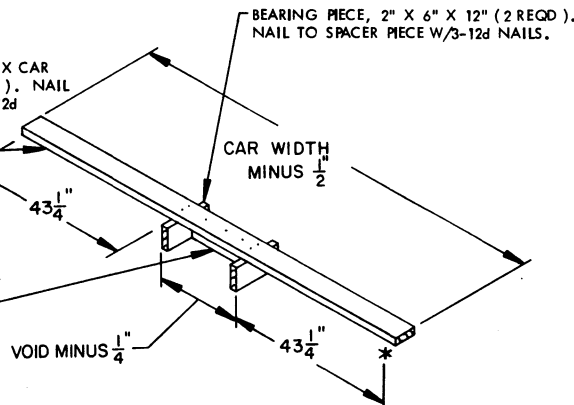


**ALTERNATIVE DOORWAY PROTECTION E**

SIDE BLOCKING, 2" X 6" X 48" (DOUBLED) (2 REQD FOR EACH LOAD UNIT REQUIRING 1 OR 2 BUNDLING STRAPS). PRE-POSITION THE NEARSIDE PIECE. NAIL THE FIRST PIECE TO THE CAR FLOOR W/5-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. OMIT ANTI-SWAY BRACE (S) AT FLOOR LEVEL.

STRAPPING BOARD, 2" X 6" X CAR WIDTH MINUS 1/2" (1 REQD). NAIL TO THE 2" X 6" X 12" W/2-12d NAILS AT EACH JOINT AND TO THE SPACER PIECE W/3-12d NAILS.

SPACER PIECE, 2" X 6" BY CUT TO FIT (1 REQD).



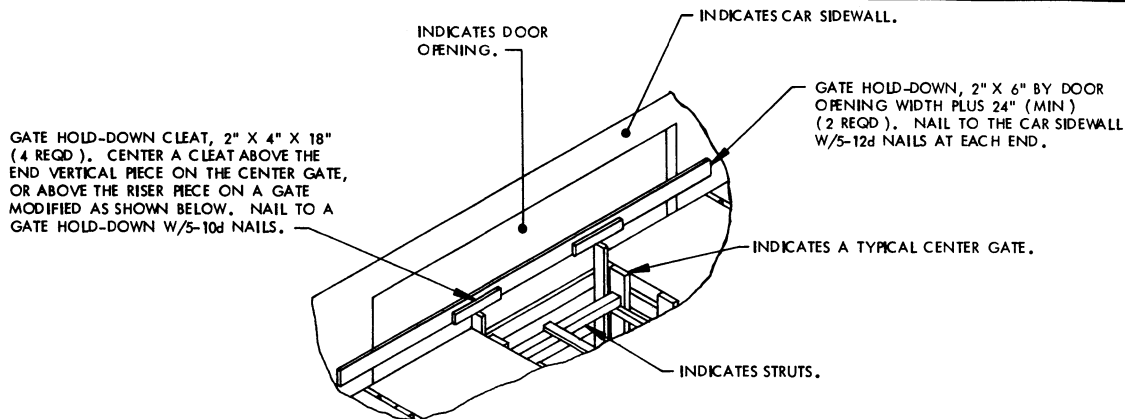
**SPACER ASSEMBLY B**

THIS ASSEMBLY IS FOR USE IN THE LOAD ON PAGE 6 AND IN THE LOAD ON PAGE 12 WHEN THE CONTAINERS ARE CROSSWISE IN THE CAR, WHEN NAILED FLOORLINE BLOCKING AND DOORWAY PROTECTION STRAPS ARE USED.

DOORWAY PROTECTION STRAP, 1-1/4" X .031" OR .035" BY A LENGTH TO SUIT STEEL STRAPPING (AS REQD). STAPLE TO SPACER ASSEMBLY W/3 STAPLES. SEE "NOTE \*" BELOW.

NOTE \* : TWO (2) DOORWAY PROTECTION 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) 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 OR WIDTH.





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.

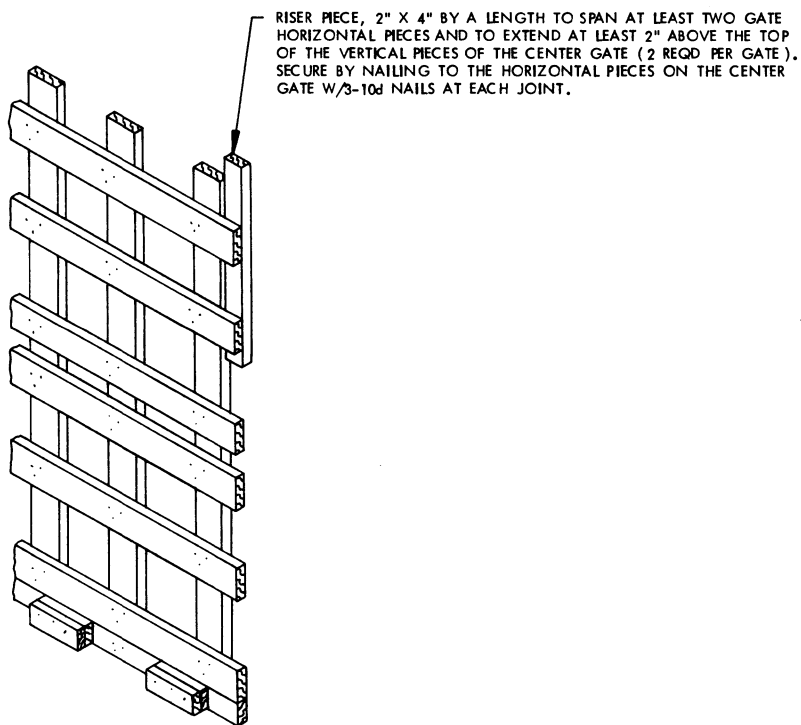
GATE HOLD-DOWN, 2" X 6" BY DOOR OPENING WIDTH PLUS 24" (MIN) (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS AT EACH END.

INDICATES A TYPICAL CENTER GATE.

INDICATES STRUTS.

ALTERNATIVE GATE HOLD-DOWN

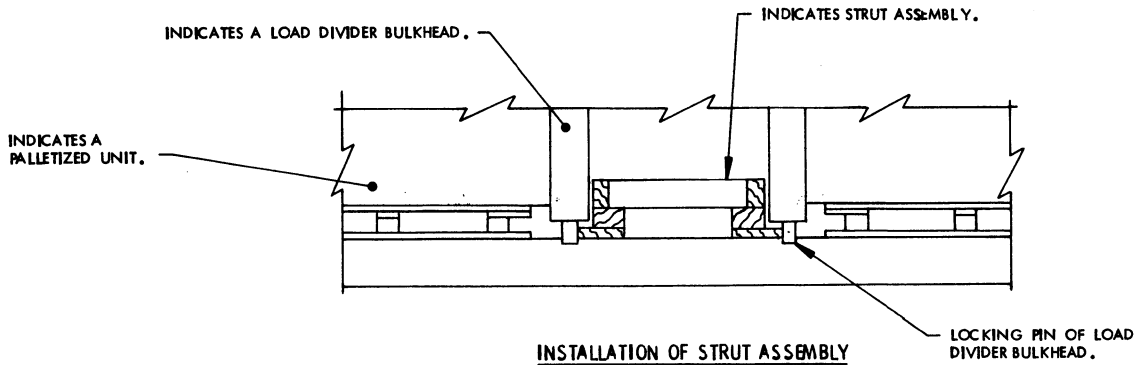
THIS VIEW DEPICTS AN ALTERNATIVE METHOD OF CENTER GATE HOLD-DOWN WHICH CAN BE USED, IF DESIRED, PROVIDING THE CAR HAS NAILABLE SIDEWALLS. THIS METHOD MAY BE APPLIED IN LIEU OF USING THE GATE HOLD-DOWN PIECES WHICH ARE PART OF A CENTER GATE. NOTE: IN THE EVENT THAT NEITHER CENTER GATE IS LOCATED IN OR 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 AT LEAST 2" 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.

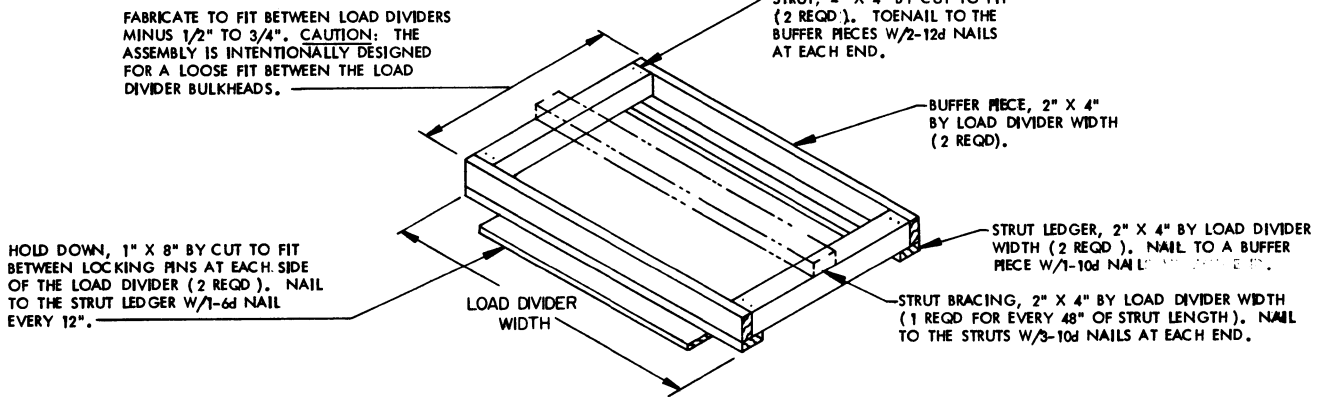
CENTER GATE MODIFICATION

THE MODIFICATION PROCEDURES SHOWN IN THIS VIEW ARE APPLICABLE FOR ANY OF THE CAR WIDTH CENTER GATES SHOWN HEREIN. 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.



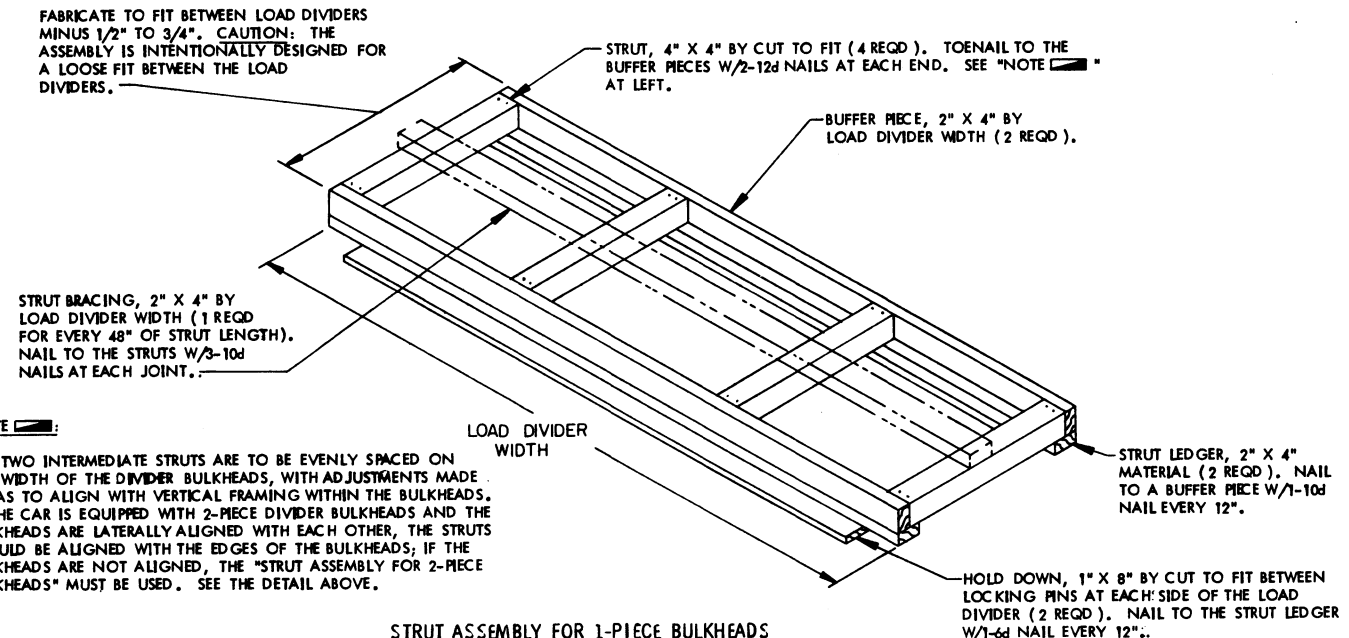
**INSTALLATION OF STRUT ASSEMBLY**

THIS VIEW SHOWS THE STRUT ASSEMBLY INSTALLED BETWEEN THE LOAD DIVIDER BULKHEADS. NOTE 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 HAZARD CLASS AND DIVISION 1.1, 1.2 OR 1.3 EXPLOSIVES. A STRUT ASSEMBLY IS NOT REQUIRED FOR LOADS OF HAZARD CLASS AND DIVISION 1.4 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.



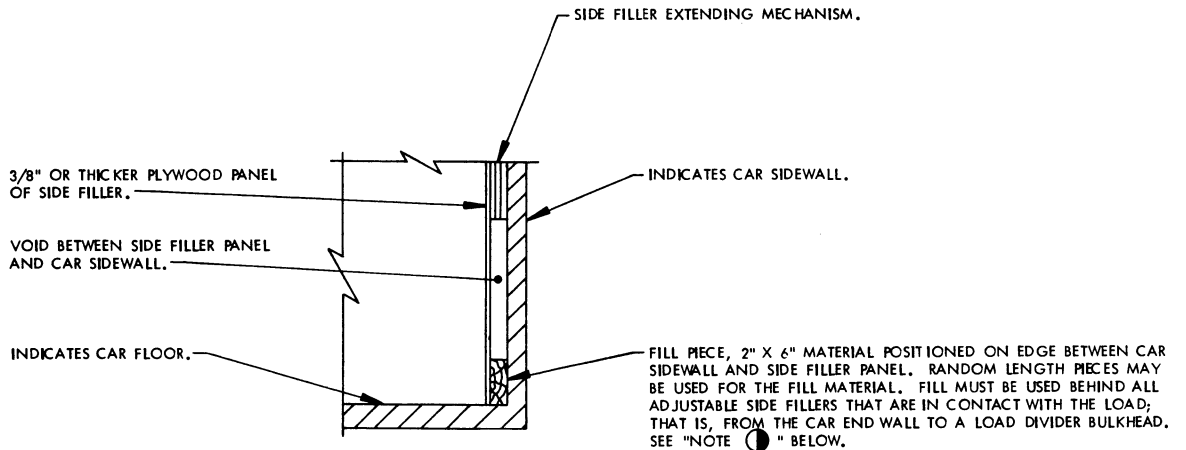
**NOTE:**

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 HAZARD CLASS AND DIVISION 1.1, 1.2 OR 1.3 EXPLOSIVES. A STRUT ASSEMBLY IS NOT REQUIRED FOR LOADS OF HAZARD CLASS AND DIVISION 1.4 EXPLOSIVES, REGARDLESS OF THE WEIGHT OF THE LOAD.

**PROVISIONS FOR BOX CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS**

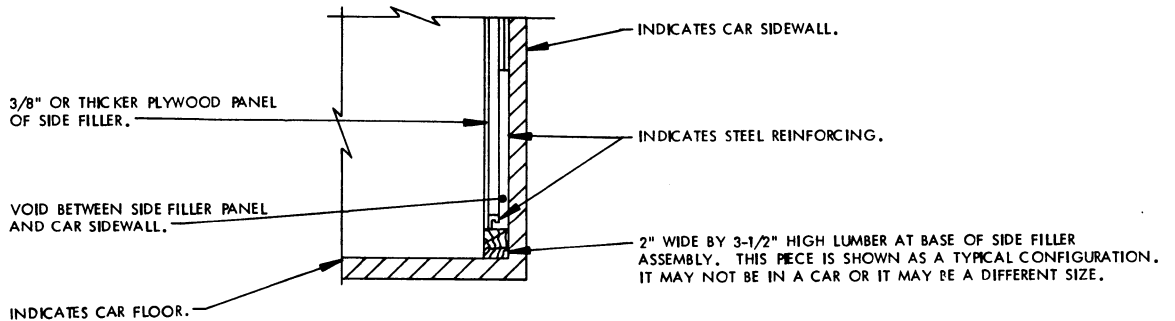


**TYPICAL TYPE A**

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 OPENINGS 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.

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