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BUREAU OF EXPLOSIVES

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# LOADING AND BRACING (CL & LCL) IN BOXCARS OF AMMUNITION AND COMPONENTS PACKED IN M592 METAL CONTAINERS AND UNITIZED ON A 40" X 48" METAL PALLET

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- THIS OUTLOADING PROCEDURE DRAWING INCLUDES PROCEDURES FOR CONVENTIONAL TYPE BOXCARS, HIGH CAPACITY BOXCARS, AND CUSHIONED BOXCARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.

## U.S. ARMY MATERIEL COMMAND DRAWING

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**CAUTION: VERIFY PRIOR TO USE AT WWW.DAC.ARMY.MIL/DET THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 44.**

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U.S. ARMY DEFENSE AMMUNITION CENTER

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## GENERAL NOTES

- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- B. THE OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE FOR AMMUNITION AND COMPONENTS PACKED IN THE M592 METAL CONTAINER AND UNITIZED ON A 40" X 48" MK3 MOD 0 METAL PALLET. SEE THE PICTORIAL VIEW ON PAGE 5. REFER TO NAVSEA DRAWING NO. 6214179 FOR UNITIZATION PROCEDURES FOR THE M592 CONTAINERS.
- C. THE OUTLOADING PROCEDURES DEPICTED WITHIN THIS DOCUMENT ARE APPLICABLE FOR SHIPMENTS IN CONVENTIONAL TYPE BOXCARS AND FOR SHIPMENTS IN CUSHIONED BOXCARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.
- D. CAUTION: METAL COMPONENTS THAT ARE FLUSH WITH OR OVERHANG THE PALLET END MUST NOT BE ALLOWED TO CONTACT STEEL ENDWALLS OF BOXCARS. THIS TYPE OF UNIT LOAD SHOULD BE SHIPPED IN BOXCARS HAVING WOOD ENDWALLS. IF CARS WITH WOOD ENDWALLS ARE NOT AVAILABLE, AND ALL-STEEL CARS ARE USED, THE ENDWALLS 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 39 FOR GUIDANCE.
- E. THE SELECTION OF RAILCARS FOR THE TRANSPORT OF PALLET UNITS OF M592 CONTAINERS 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.
- F. WHEN SELECTING RAILCARS, EVERY EFFORT SHOULD BE MADE TO OBTAIN BOXCARS THAT DO NOT HAVE BOWED ENDWALLS. CARS HAVING BOWED ENDS CAN BE USED, HOWEVER, IF AN ENDWALL IS BOWED OUTWARD MORE THAN 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 19 FOR GUIDANCE.

(CONTINUED AT RIGHT)

## MATERIAL SPECIFICATIONS

- LUMBER - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
- NAILS - - - - - : ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMS).
- PLYWOOD - - - - - : COMMERCIAL ITEM DESCRIPTION A-A-55057, 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.
- STRAPPING, STEEL - - : ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.
- SEAL, STRAP - - - - : ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.
- WIRE, CARBON STEEL - : ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.
- STAPLE - - - - - : ASTM F1667; STFCs-189 OR STFCs-207, 15/16" OR 1" CROWN WIDTH X 3/4" LEG LENGTH, FOR 3/4" STRAPPING, OR STFCs-224, 1-17/32" CROWN WIDTH X 3/4" LEG LENGTH, FOR 1-1/4" STRAPPING.
- ANTI-CHAFING MATERIAL - - - - - : MIL-B-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.
- HARDBOARD - - - - - : ANSI/AHA A135.4, CLASS 1.
- FIBERBOARD - - - - - : ASTM D4727.
- WAFFERBOARD - - - - : VOLUNTARY PRODUCT STANDARD PS2; WOOD-BASED STRUCTURAL-USE PANELS, EXPOSURE 1 (INTERIOR WITH EXTERIOR GLUE), GRADE C. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER EXPOSURE 1 OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.

## (GENERAL NOTES CONTINUED)

- G. CONVENTIONAL BOXCARS 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.
- H. 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.
- J. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN CARS WHICH ARE PARTIALLY LOADED WITH PALLET UNITS OF M592 CONTAINERS, 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.
- K. 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. IF 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".
- L. 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 BE- SIDE A NAIL IN A LOWER PIECE.
- M. POWER DRIVEN STAPLES MAY BE USED AS ALTERNATIVE FASTENERS FOR NAILS WHEN CONSTRUCTING DUNNAGE ASSEMBLIES WHICH ARE TO BE USED IN THE DELINEATED BOXCAR 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 ASTM F1667 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.
- N. WHEN STEEL STRAPPING IS SEALED AT AN END-OVER-END LAP JOINT, A MINIMUM OF ONE SEAL WITH TWO PAIR OF NOTCHES WILL BE USED TO SEAL THE JOINT WHEN A NOTCH-TYPE SEALER IS BEING USED. A MINIMUM OF TWO SEALS, BUTTED TOGETHER, WITH TWO 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 15 FOR GUIDANCE.
- O. THROUGHOUT THIS PROCEDURAL DRAWING, PORTIONS OF THE BLOCKING COMPONENTS AND OF THE DEPICTED CARS, SUCH AS A CAR SIDEWALL, HAVE BEEN OMITTED FROM THE LOAD VIEW FOR CLARITY PURPOSES.
- P. THE NUMBER OF LADING UNITS MAY BE ADJUSTED TO FIT THE SIZE OF THE BOXCAR 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 RAILCAR IN COMPLIANCE WITH THE WEIGHT DISTRIBUTION REQUIREMENTS OF THE AAR.

(CONTINUED ON PAGE 3)

- Q. CAUTION: WHEN POWER OR PNEUMATIC NAILERS ARE BEING USED IN THE APPLICATION OF NAILED FLOORLINE BLOCKING OR BRACING, PALLET UNITS BEING LOADED INTO THE CONVEYANCE MUST BE POSITIONED TO ALLOW A CLEAR PATH OF EXIT FOR THE OPERATOR AT ALL TIMES, SHOULD AN EMERGENCY EXIT BECOME NECESSARY.
- R. CONVERSION TO METRIC EQUIVALENTS: DIMENSIONS WITHIN THIS DOCUMENT ARE EXPRESSED IN INCHES AND WEIGHTS ARE EXPRESSED IN POUNDS. WHEN NECESSARY, THE METRIC EQUIVALENTS MAY BE COMPUTED ON THE BASIS OF ONE INCH EQUALS 25.4MM AND ONE POUND EQUALS 0.454 KG.
- S. AS REQUIRED BY THE ASSOCIATION OF AMERICAN RAILROADS (AAR), ALL 1-1/4" AND 2" STEEL STRAPPING USED FOR LOAD RESTRAINT MUST BE MARKED AS SPECIFIED WITHIN THE APPLICABLE AAR RULES GOVERNING LOADING, BLOCKING AND BRACING OF FREIGHT WITHIN THE CONVEYANCE. FOR THE SPECIFIC MARKING SIZE, FREQUENCY, ETC., REQUIRED, REFER TO THE APPROPRIATE AAR LOADING RULES.

## (FOR CONVENTIONAL TYPE BOXCARS)

- T. 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 "L" ON PAGE 2.
- U. 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" THICK LUMBER OR ANY OTHER MATERIAL OF SIMILAR CONSISTENCY, SHOULD BE PLACED BETWEEN THE JACK AND THE LADING.
- V. 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 ⑥ AND ⑦ ON PAGE 8. 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 STRUT AS DEPICTED. STRUT BRACING WILL BE EQUALLY EFFECTIVE IF APPLIED TO THE UNDER SIDE OF THOSE STRUTS.

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- W. TO ACHIEVE A TIGHTLY BLOCKED LOAD, A STRUT WILL BE CUT APPROXIMATELY 1/4" TO 3/8" LONGER THAN THE MEASURED DISTANCE BETWEEN THE STRUT BEARING AREAS ON THE TWO CENTER GATES. MEASUREMENTS FOR STRUT LENGTHS NEED TO BE ACCOMPLISHED AT SEVERAL PLACES DURING THE BLOCKING AND BRACING PROCESS. CARE MUST BE EXERCISED WHEN MEASURING FOR AND INSTALLING STRUTS. THE SPECIFIED APPROXIMATE DIMENSION FOR A STRUT LENGTH MAY BE ADJUSTED, AS NECESSARY, TO PROVIDE FOR A TIGHTLY BLOCKED LOAD WITHOUT DISTORTING, DENTING OR OTHERWISE DAMAGING THE CONTAINERS. ONE END OF THE STRUT WILL BE POSITIONED AT ITS BEARING AREA JUST ABOVE THE STRUT LEDGER ON ONE GATE. THE OTHER END, WHICH CAN BE BEVELED ON THE LOWER CORNER IF DESIRED, WILL THEN BE DRIVEN DOWNWARD UNTIL IT CONTACTS THE STRUT LEDGER ON THE OTHER GATE. EACH END OF THE STRUT WILL BE TOENAILED TO THE ADJACENT CENTER GATE, AS SPECIFIED WITHIN THE KEY NUMBERS FOR A LOAD, IN SUCH A MANNER SO THAT AS NEARLY AS PRACTICAL EQUAL LENGTHS OF A NAIL ARE EMBEDDED IN THE STRUT AND IN THE VERTICAL PIECE OF THE CENTER GATE. SEE THE "BEVEL CUT" DETAIL ON PAGE 27 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.

- X. WHERE 2" X 2" PIECES ARE SPECIFIED FOR STRUT LEDGERS, 2" X 4" MATERIAL MAY BE SUBSTITUTED, IF DESIRED.
- Y. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTIONS WHICH ARE IMMEDIATELY ADJACENT TO THE DEPICTED OUTLOADING METHODS.

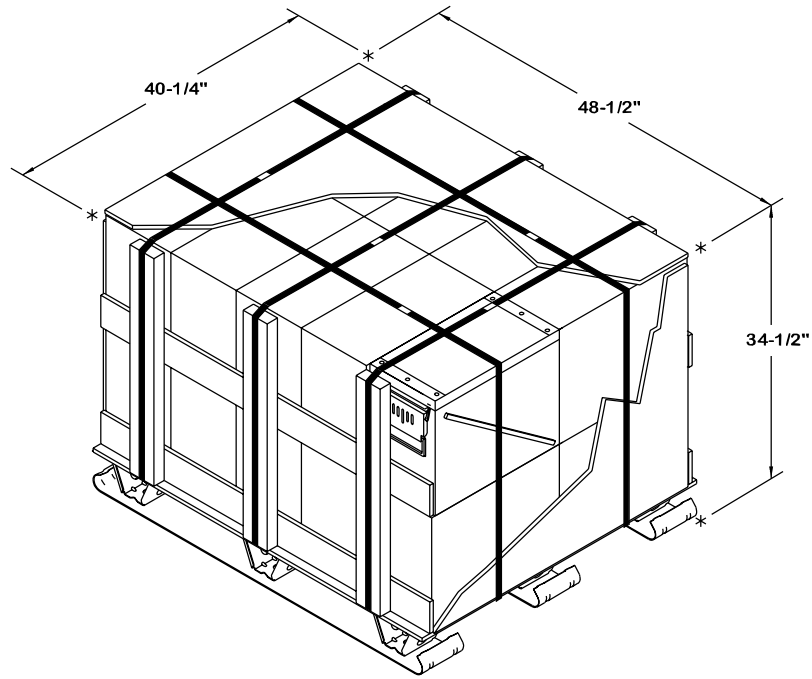
## (FOR CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS)

- Z. CAUTION: FOR CUSHIONED BOXCARS EQUIPPED WITH LOAD DIVIDER BULKHEADS, ONLY CARS EQUIPPED WITH LOAD DIVIDERS MANUFACTURED BY EVANS, EQUIPCO, OR PRECO MAY BE USED. LOAD DIVIDERS MANUFACTURED BY TRANSCO ARE NOT ACCEPTABLE WHETHER OF ALUMINUM OR STEEL CONSTRUCTION. THE DEPICTED PROCEDURES ARE APPLICABLE FOR CARS OF VARIOUS LENGTHS AND WIDTHS. THE AAR MECHANICAL DESIGNATION CLASS FOR THESE CARS, AS IDENTIFIED IN "THE OFFICIAL RAILWAY EQUIPMENT REGISTER", WILL BE RBL, XL, OR XLI.
- AA. 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 BOXCAR 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 PALLET UNITS OF M592 CONTAINERS. NOTICE: ONLY CUSHIONED CARS THAT HAVE SLIDING CENTER SILL TYPE CUSHIONED DEVICES OR END-OF-CAR TYPE DEVICES WHICH HAVE AT LEAST 15" OF TRAVEL ARE ACCEPTABLE.
- BB. IF NAILING TO A CAR SIDEWALL IS NOT REQUIRED, BOXCARS EQUIPPED WITH ADJUSTABLE SIDE FILLERS THAT HAVE 3/8" OR THICKER PANELS MAY BE USED, HOWEVER, THESE SIDE FILLERS MUST NOT BE USED FOR LATERAL BLOCKING; THEY MUST BE RETRACTED AND LOCKED AGAINST THE CAR SIDEWALL. A "FILL PIECE" MUST BE INSTALLED IN THE VOID BETWEEN THE CAR SIDEWALL AND THE SIDE FILLER PANEL. SEE THE "TYPICAL TYPE A" VIEW ON PAGE 44 FOR GUIDANCE. IF THE BACK OF THE SIDE FILLER PANELS ARE REINFORCED WITH VERTICAL AND HORIZONTAL STEEL MEMBERS AS SHOWN IN THE "TYPICAL TYPE B" VIEW ON PAGE 44, THE "FILL PIECE" MATERIAL IS NOT REQUIRED.
- CC. 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.

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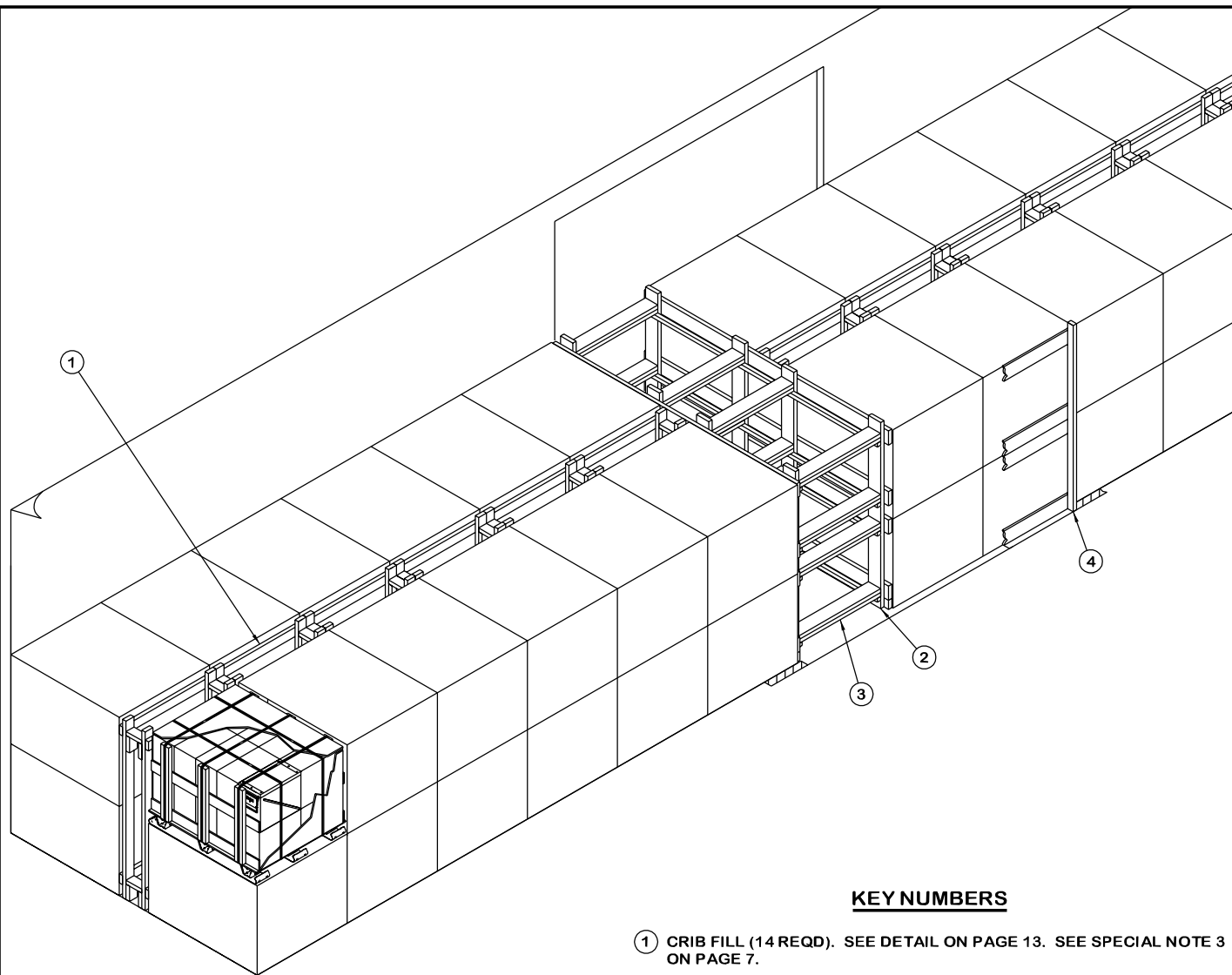
(GENERAL NOTES CONTINUED)

- DD. 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 IN GENERAL NOTE "EE-3" BELOW. DETAILS OF STRUT ASSEMBLIES FOR USE BETWEEN 2-PIECE BULKHEADS AND BETWEEN 1-PIECE BULKHEADS ARE SHOWN ON PAGE 43.
- EE. THE NORMAL LOADING PATTERN IN CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS IS TO POSITION THE LADING BETWEEN A CAR ENDWALL 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 23 THRU 25.
  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 20 THRU 22 FOR GUIDANCE.
  3. AT LOCATION(S) WHERE K-BRACES MIGHT NORMALLY BE USED IN A LOAD IN A CONVENTIONAL CAR, LOAD DIVIDER BULKHEADS CAN BE POSITIONED. LOADING CAN THEN CONTINUE TOWARD THE CENTER OF THE CAR FROM EACH INSTALLED LOAD DIVIDER BULKHEAD IN A ONE-HIGH LOADING PATTERN. INSTALL CENTER GATES AND STRUTS AS SHOWN ON PAGE 6 OR 8 OF THE CONVENTIONAL BOX-CAR DRAWING HEREIN TO PROVIDE FOR A TIGHT LOAD BETWEEN THE BULKHEADS.
  4. ONE OR MORE UNITS CAN BE POSITIONED IN CONTACT WITH A LOAD DIVIDER BULKHEAD ON THE CENTER-OF-CAR SIDE. BLOCK AND BRACE WITH LCL BRACES AS SHOWN ON PAGE 38 OR WITH KNEE BRACE ASSEMBLIES, AS SHOWN ON PAGE 42.
- FF. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTION WHICH IS IMMEDIATELY ADJACENT TO THE DEPICTED OUTLOADING METHOD.



**PALLET UNIT**

20 M592 CONTAINERS @ 126 LBS	-----	2,520 LBS (APPROX)
DUNNAGE	-----	65 LBS
PALLET	-----	95 LBS
<hr/>		
TOTAL WEIGHT (MAXIMUM)	-----	2,680 LBS (APPROX)
CUBE	-----	39.0 CU FT (APPROX)



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① CRIB FILL (14 REQD). SEE DETAIL ON PAGE 13. SEE SPECIAL NOTE 3 ON PAGE 7.
- ② CENTER GATE A (2 REQD). SEE THE DETAIL ON PAGE 12. SEE SPECIAL NOTE 4 ON PAGE 7.
- ③ STRUT, 2" X 6" BY CUT TO FIT (REF: 43") (DOUBLED) (16 REQD). POSITION FIRST PIECE BETWEEN THE CENTER GATES AS SHOWN AND NAIL W/2-10d NAILS AT EACH END. LAMINATE THE SECOND PIECE TO THE FIRST PIECE W/4-10d NAILS. SEE GENERAL NOTE "K" ON PAGE 2 AND SEE GENERAL NOTES "V" AND "W" ON PAGE 3.
- ④ DOORWAY PROTECTION (2 REQD). SEE DOORWAY PROTECTION A DETAIL ON PAGE 13. NAIL TO THE DOOR POSTS W/12d NAILS. SEE SPECIAL NOTE 5 ON PAGE 7.

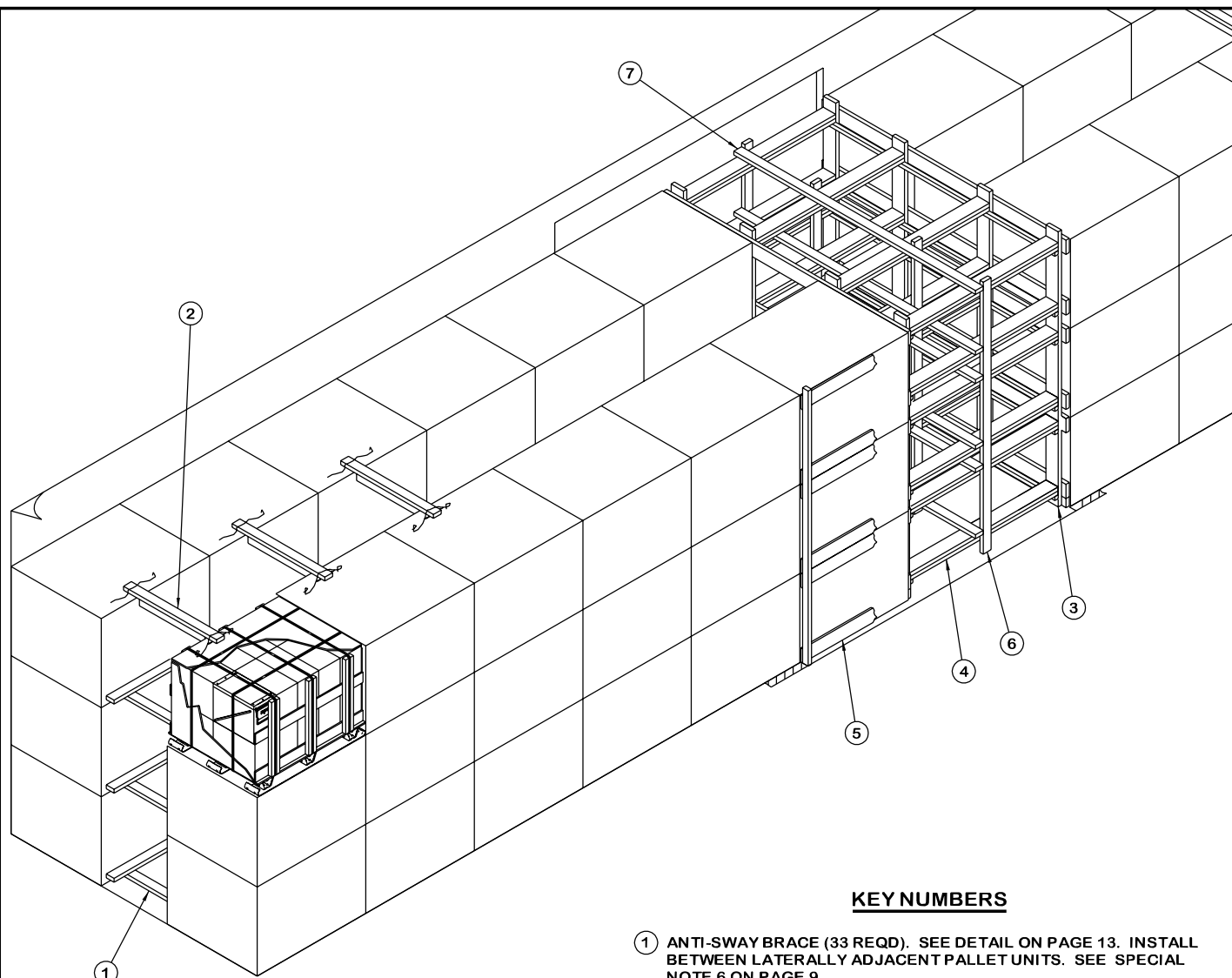
**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-2" WIDE WOOD-LINED CONVENTIONAL TYPE BOXCAR EQUIPPED WITH 10'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER OR NARROWER DOOR OPENINGS CAN BE USED.
2. 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 26 FOR GUIDANCE.
3. THE CRIB FILL ASSEMBLIES MUST BE INSTALLED BETWEEN STACKS OF LATERALLY ADJACENT PALLET UNITS.
4. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED AS AN ALTERNATIVE TO THE CAR-WIDTH GATES. IN LIEU OF EACH "CENTER GATE A", SHOWN AS PIECE MARKED ② IN THE LOAD ON PAGE 6, INSTALL TWO "CENTER GATE B" AS SHOWN ON PAGE 12. AFTER THE SPLIT GATES AND STRUTS HAVE BEEN INSTALLED, THE SPLIT GATES MUST BE TIED TOGETHER AS DEPICTED BY THE "TIE PIECE APPLICATION" DETAIL ON PAGE 26.
5. DOORWAY PROTECTION IS REQUIRED FOR ALL PALLET UNIT STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK WIDTH. THE WOODEN GATE TYPE OF DOORWAY PROTECTION, SHOWN AS PIECE MARKED ④ IN THE LOAD ON PAGE 6, IS APPLICABLE FOR BOXCARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NAILABLE DOOR POSTS. REFER TO PAGES 28 THROUGH 30 FOR ALTERNATIVE DOORWAY PROTECTION FOR CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS. IF THE CAR BEING LOADED IS EQUIPPED WITH PLUG TYPE DOORS OR COMBINATION PLUG AND SLIDING DOORS, NAILED FLOORLINE BLOCKING AND LOAD BUNDLING STRAPS MUST BE USED. SEE THE "ALTERNATIVE DOORWAY PROTECTION D" DETAIL ON PAGE 30 FOR GUIDANCE.
6. 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 PALLET UNITS OR A 1-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF TWO PALLET UNITS BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD OR THE ENTIRE TOP TIER CAN BE OMITTED. FOR OTHER METHODS OF REDUCING A LOAD, AND FOR TYPICAL LCL PROCEDURES, REFER TO PAGES 16, 20 AND 21 FOR GUIDANCE.
7. FOR PALLET UNITS WHICH DO NOT CONTAIN A FULL PALLET UNIT QUANTITY OF CONTAINERS, REFER TO PAGES 31 AND 32 FOR SHIPPING GUIDANCE.
8. A MAXIMUM OF 56 PALLET UNITS, FOR A LADING WEIGHT OF APPROXIMATELY 151,212 POUNDS, CAN BE LOADED IN A 50'-6" LONG CAR BY USING THE DEPICTED PROCEDURES.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 6"	80	40
2" X 2"	106	36
2" X 3"	33	17
2" X 4"	606	404
2" X 6"	236	236
NAILS	NO. REQD	POUNDS
6d (2")	48	1/2
10d (3")	1,272	19-3/4
12d (3-1/4")	72	1-1/4

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	56	150,080 LBS
DUNNAGE		1,482 LBS
TOTAL WEIGHT		151,562 LBS (APPROX)



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① ANTI-SWAY BRACE (33 REQD). SEE DETAIL ON PAGE 13. INSTALL BETWEEN LATERALLY ADJACENT PALLET UNITS. SEE SPECIAL NOTE 6 ON PAGE 9.
- ② TOP OF LOAD ANTI-SWAY BRACE (6 REQD). SEE DETAIL ON PAGE 13. WIRE TIE TO THE STEEL STRAPPING OF THE PALLET UNITS WITH 0.080" DIAMETER STEEL WIRE AS SHOWN BY THE "TIE WIRE APPLICATION" DETAIL ON PAGE 17. SEE SPECIAL NOTE 2 ON PAGE 9.
- ③ CENTER GATE C (2 REQD). SEE DETAIL ON PAGE 14. SEE SPECIAL NOTE 4 ON PAGE 9.
- ④ STRUT, 2" X 6" BY CUT TO FIT (REF: 66-1/2" ) (DOUBLED) ( 24 REQD). POSITION FIRST PIECE BETWEEN THE CENTER GATES AS SHOWN AND NAIL W/2-10d NAILS AT EACH END. LAMINATE THE SECOND PIECE TO THE FIRST PIECE W/6-10d NAILS. SEE GENERAL NOTE "K" ON PAGE 2 AND SEE GENERAL NOTES "V" AND "W" ON PAGE 3.
- ⑤ DOORWAY PROTECTION B (2 REQD). SEE DETAIL ON PAGE 14. NAIL TO THE DOOR POSTS W/12d NAILS. SEE SPECIAL NOTE 5 ON PAGE 9.
- ⑥ VERTICAL STRUT BRACING, 2" X 4" BY LENGTH TO EXTEND 3" ABOVE THE TOP STRUT (REF: 8'-7-1/4") (4 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑦ HORIZONTAL STRUT BRACING, 2" X 4" BY CAR WIDTH MINUS 1/2" IN LENGTH (6 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.



**SPECIAL NOTES:**

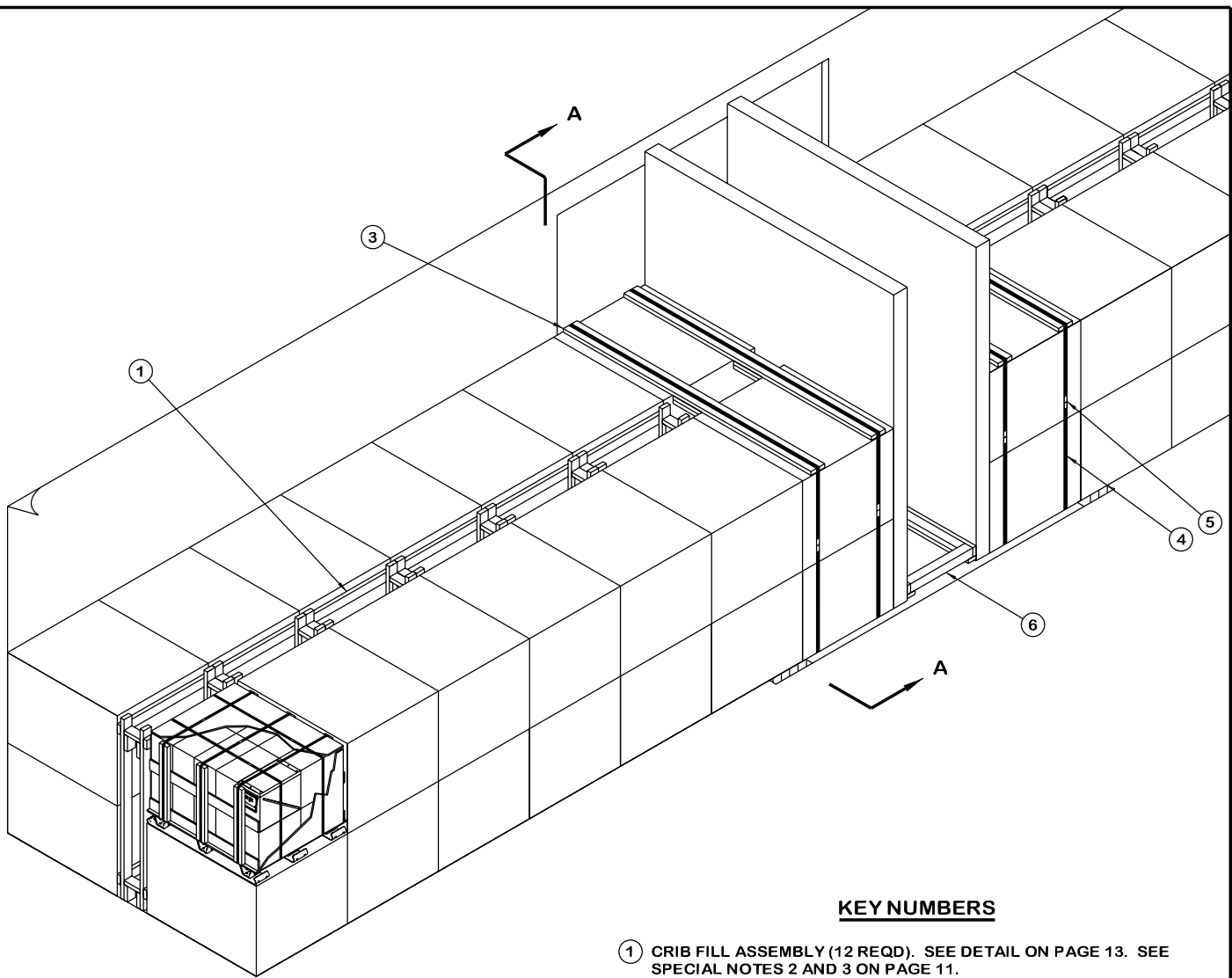
1. A 50'-6" LONG BY 9'-2" WIDE WOOD-LINED HIGH CAPACITY TYPE BOXCAR EQUIPPED WITH 10'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER OR NARROWER DOOR OPENINGS CAN BE USED.
2. TOP OF LOAD ANTI-SWAY BRACES, SHOWN AS PIECE MARKED ② IN THE LOAD ON PAGE 8, MUST BE INSTALLED IN EACH END OF THE CAR AND WIRE TIED TO THE STRAPPING WITH 0.0800" DIA. STEEL WIRE AS TYPICALLY SHOWN BY THE "TIE WIRE APPLICATION" DETAIL ON PAGE 17. THREE TOP OF LOAD ANTI-SWAY BRACES ARE REQUIRED IN EACH END OF A LOAD IN EITHER A 50' OR A 40' LONG CAR, AND FOUR REQUIRED IN A 60' CAR.
3. CENTER GATE "C" 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 26 FOR GUIDANCE.
4. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED AS AN ALTERNATIVE TO THE CAR-WIDTH GATES. IN LIEU OF EACH "CENTER GATE C", SHOWN AS PIECE MARKED ③ IN THE LOAD ON PAGE 8, INSTALL TWO "CENTER GATE D" AS SHOWN ON PAGE 14. AFTER THE SPLIT GATES AND STRUTS HAVE BEEN INSTALLED, THE SPLIT GATES MUST BE TIED TOGETHER AS DEPICTED BY THE "TIE PIECE APPLICATION" DETAIL ON PAGE 26.
5. DOORWAY PROTECTION IS REQUIRED FOR ALL PALLET UNIT STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK WIDTH. THE WOODEN GATE TYPE OF DOORWAY PROTECTION, SHOWN AS PIECE MARKED ⑤ IN THE LOAD ON PAGE 8, IS APPLICABLE FOR BOXCARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NAILABLE DOOR POSTS. REFER TO PAGES 28 THROUGH 30 FOR ALTERNATIVE DOORWAY PROTECTION FOR CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS. IF THE CAR BEING LOADED IS EQUIPPED WITH PLUG TYPE DOORS OR COMBINATION PLUG AND SLIDING DOORS, NAILED FLOORLINE BLOCKING AND LOAD BUNDLING STRAPS MUST BE USED. SEE THE "ALTERNATIVE DOORWAY PROTECTION D" DETAIL ON PAGE 30 FOR GUIDANCE.
6. IF NAILED SIDE BLOCKING AND DOORWAY PROTECTION STRAPS ARE USED, OMIT EACH FLOOR LEVEL ANTI-SWAY BRACE IN THE DOORWAY AREA. IN LIEU OF PIECE MARKED ⑤ ON PAGE 8 USE PIECES MARKED ② THROUGH ⑤ ON PAGE 10. SEE SPECIAL NOTE 3 ON PAGE 11 FOR GUIDANCE.
7. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED. A 3-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF SIX PALLET UNITS, A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF FOUR PALLET UNITS OR A 1-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF TWO PALLET UNITS BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD OR THE ENTIRE TOP TIER CAN BE OMITTED. FOR OTHER METHODS OF REDUCING A LOAD, AND FOR TYPICAL LCL PROCEDURES, REFER TO PAGES 16, 20 AND 21 FOR GUIDANCE.
8. IF PALLET UNITS WHICH DO NOT CONTAIN A FULL PALLET UNIT OF CONTAINERS ARE TO BE TRANSPORTED, REFER TO PAGES 31 AND 32 FOR SHIPPING GUIDANCE.

**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
1" X 6"	120	60
2" X 2"	106	36
2" X 3"	35	18
2" X 4"	594	396
2" X 6"	536	536
NAILS	NO. REQD	POUNDS
6d (2")	72	1/2
10d (3")	936	14-1/4
12d (3-1/4")	12	1/4
WIRE, 0.0800" DIA.	----- 24' REQD	----- NIL

**LOAD AS SHOWN**

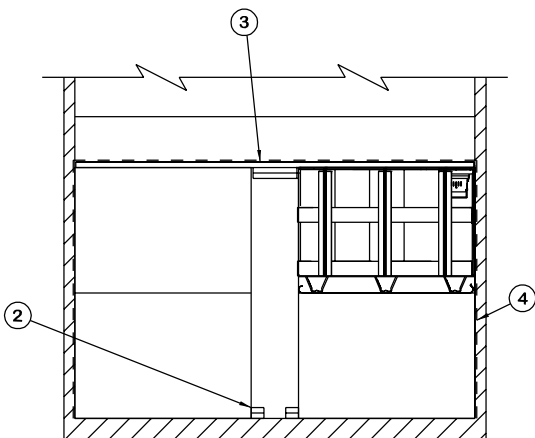
ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	----- 66	----- 176,880 LBS
DUNNAGE	-----	----- 2,107 LBS
TOTAL WEIGHT		----- 178,987 LBS (APPROX)



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① CRIB FILL ASSEMBLY (12 REQD). SEE DETAIL ON PAGE 13. SEE SPECIAL NOTES 2 AND 3 ON PAGE 11.
- ② SIDE BLOCKING, 2" X 6" X 40" (DOUBLED) (4 REQD). NAIL THE FIRST PIECE TO THE CAR FLOOR W/6-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE SPECIAL NOTE 3 ON PAGE 11.
- ③ STRAPPING BOARD ASSEMBLY (4 REQD). SEE THE DETAIL ON PAGE 15.
- ④ DOORWAY PROTECTION STRAP, 1-1/4" X .035" OR .031" X 31'-1" LONG STEEL STRAPPING (4 REQD). INSTALL TO ENCIRCLE THE LOAD UNITS IN THE DOORWAY AREA. STAPLE TO THE STRAPPING BOARD W/2 STAPLES.
- ⑤ SEAL FOR 1-1/4" STRAPPING (8 REQD, 2 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "N" ON PAGE 2.
- ⑥ STRUT ASSEMBLY (1 REQD). SEE THE STRUT ASSEMBLY FOR 1-PIECE BULKHEADS DETAIL ON PAGE 43. SEE SPECIAL NOTE 4 ON PAGE 11.



**SECTION A-A**

**SPECIAL NOTES:**

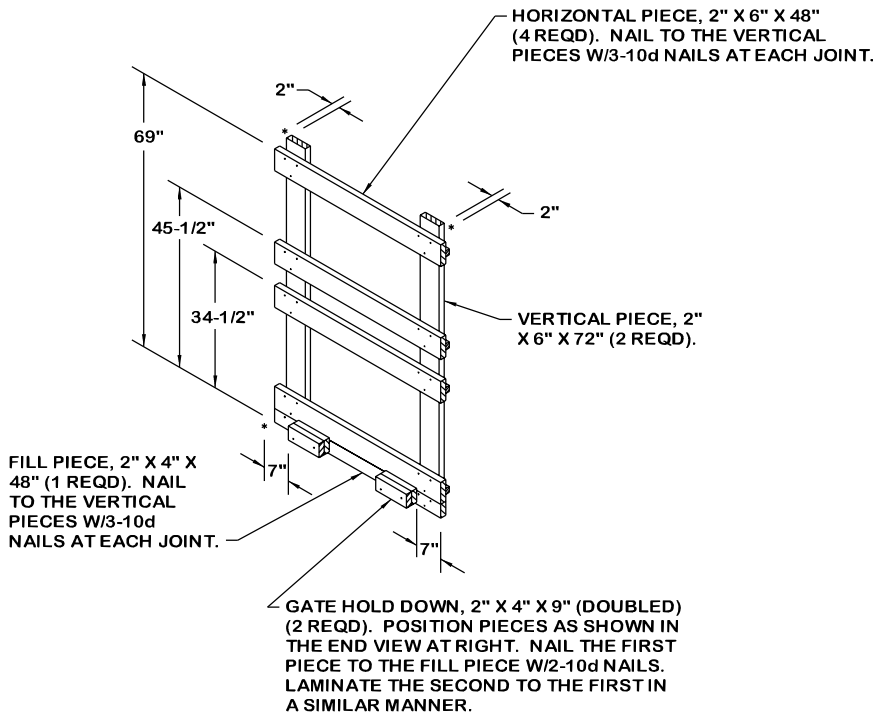
1. A 50'-6" LONG BY 9'-2" WIDE WOOD-LINED, CUSHIONED BOXCAR EQUIPPED WITH LOAD DIVIDER BULKHEADS AND WITH 10'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER OR NARROWER DOOR OPENINGS CAN BE USED. SEE GENERAL NOTES "Z" THROUGH "EE" ON PAGES 3 AND 4.
2. THE CRIB FILL ASSEMBLIES MUST BE INSTALLED BETWEEN STACKS OF LATERALLY ADJACENT PALLET UNITS EXCEPT FOR THE STACKS OF PALLET UNITS ADJACENT TO THE LOAD DIVIDER BULKHEADS. THE PALLET UNITS THAT BEAR UP AGAINST THE LOAD DIVIDER BULKHEAD SHALL BE STABILIZED WITH STRAPPING BOARDS AS SHOWN ON PAGE 10.
3. DOORWAY PROTECTION IS REQUIRED FOR ALL PALLET UNITS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE UNIT WIDTH. SIDE BLOCKING SHOWN AS PIECE MARKED ② IN THE SECTION VIEW, MUST BE USED IN LIEU OF THE CRIB FILL ASSEMBLY, PIECE MARKED ① FOR ALL UNITS REQUIRING DOORWAY PROTECTION STRAPS. TWO DOORWAY PROTECTION STRAPS ARE REQUIRED FOR EACH GROUP OF PALLET STACKS AND/OR LOAD UNIT WHICH IS COMPLETELY WITHIN THE DOORWAY AREA OR WHICH IS NOT RETAINED BY AT LEAST 6" OF THE SIDEWALL ON BOTH SIDES OF THE CAR. ONE DOORWAY PROTECTION 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. IF THE CAR BEING LOADED IS EQUIPPED WITH SLIDING DOORS, A WOODEN GATE TYPE OF DOORWAY PROTECTION SUCH AS SHOWN IN THE LOAD ON PAGE 8, OR ANY OF THE ALTERNATIVES ON PAGES 28 THROUGH 30 MAY BE USED.
4. A "STRUT ASSEMBLY FOR 1 PIECE BULKHEADS", AS SHOWN ON PAGE 43 IS REQUIRED WHEN THE LOAD IN EITHER END OF THE CAR IS 50,000 LBS OR MORE AND THE CAR CONTAINS HAZARD CLASS AND DIVISION 1.1, 1.2, OR 1.3 EXPLOSIVES. SEE GENERAL NOTE "DD" ON PAGE 4. FOR THE DEPICTED LOAD, THE STRUT ASSEMBLY WOULD BE REQUIRED IF THE LOAD CONSISTED OF EIGHT LOAD UNITS IN EITHER END OF THE CAR. THE STRUT ASSEMBLY WILL ALWAYS BE REQUIRED FOR FULL LOADS IN 60' OR LONGER CARS.
5. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED. A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF FOUR PALLET UNITS, A 1-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF TWO PALLET UNITS BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD OR THE ENTIRE TOP TIER CAN BE OMITTED. FOR OTHER METHODS OF REDUCING A LOAD, AND FOR TYPICAL LCL PROCEDURES, REFER TO PAGES 16, 20 AND 21 FOR GUIDANCE.
6. IF PALLET UNITS WHICH DO NOT CONTAIN A FULL PALLET UNIT OF CONTAINERS ARE TO BE TRANSPORTED, REFER TO PAGES 31 AND 32 FOR SHIPPING GUIDANCE.

**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
1" X 8"	16	11
2" X 4"	388	259
2" X 6"	72	72
4" X 4"	10	13
NAILS	NO. REQD	POUNDS
6d (2")	16	1/4
10d (3")	426	6-1/2
12d (3-1/4")	16	1/2
16d (3-1/2")	32	3/4
STEEL STRAPPING, 1-1/4" - 124.33' REQD - - 17.76 LBS		
SEAL FOR 1-1/4" STRAPPING - - 8 REQD - - - - - NIL		
STAPLE FOR 1-1/4" STRAPPING - 8 REQD - - - - - NIL		

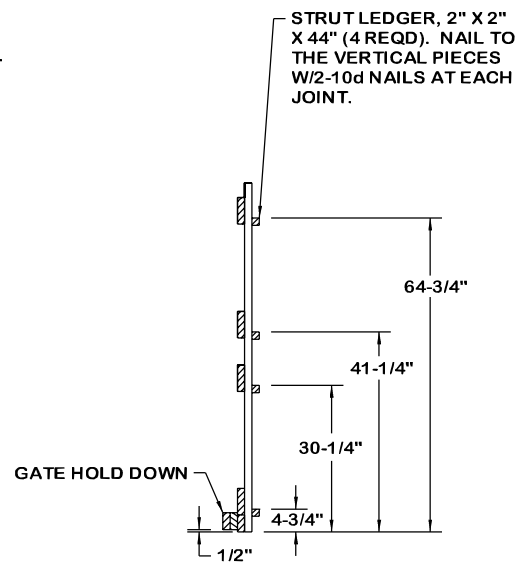
**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	56	150,080 LBS
DUNNAGE		736 LBS
TOTAL WEIGHT		150,816 LBS (APPROX)

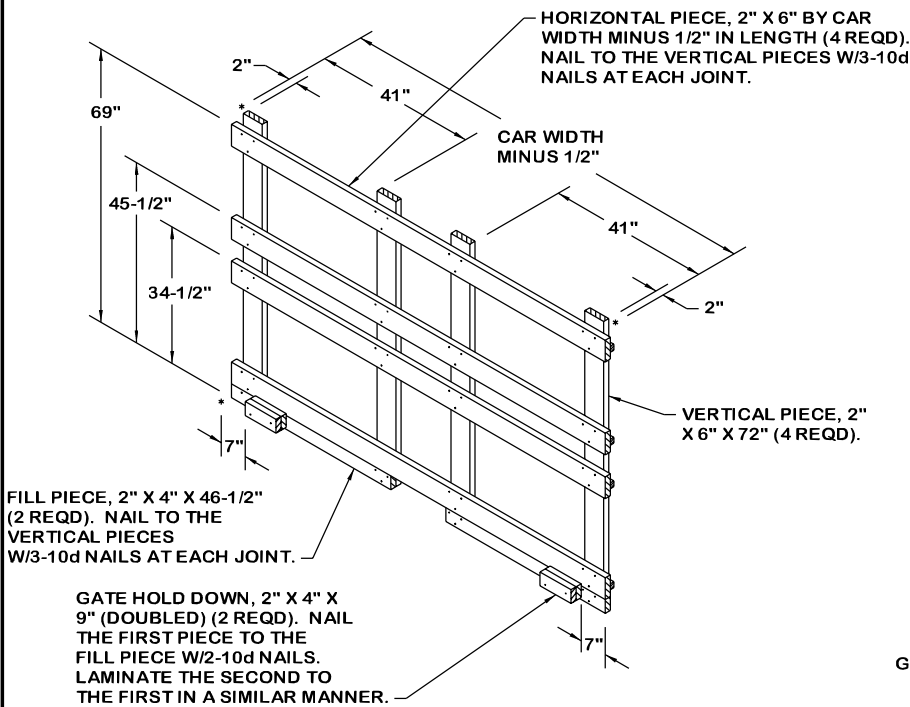


**CENTER GATE B**

SPLIT CENTER GATE FOR USE WITH 2-HIGH PALLET STACKS LOADED LENGTHWISE.

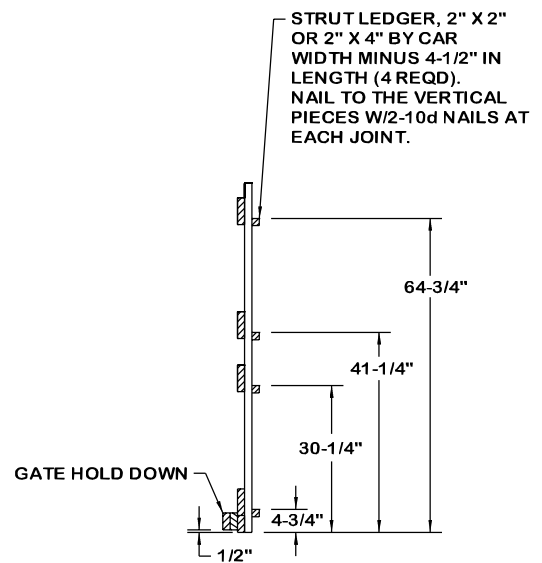


**END VIEW**  
CENTER GATE B



**CENTER GATE A**

FOR USE WITH 2-HIGH PALLET STACKS LOADED LENGTHWISE.

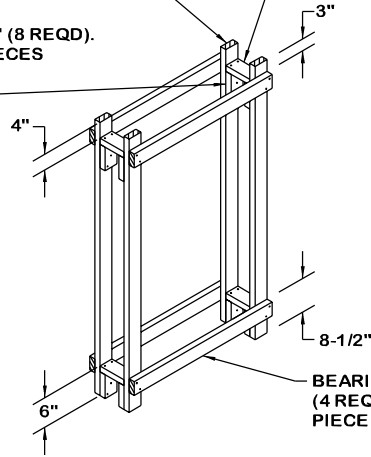


**END VIEW**  
CENTER GATE A

VERTICAL PIECE, 2" X 4" BY LENGTH AS REQUIRED, SEE "CRIB FILL A TABLE" BELOW (4 REQD).

STRUT, 2" X 4" BY CUT-TO-FIT (REF: 7") (4 REQD). NAIL TO CLEATS W/2-10d NAILS AT EACH END.

CLEAT, 2" X 4" X 4-1/2" (8 REQD). NAIL TO VERTICAL PIECES W/2-10d NAILS AT EACH LOCATION.

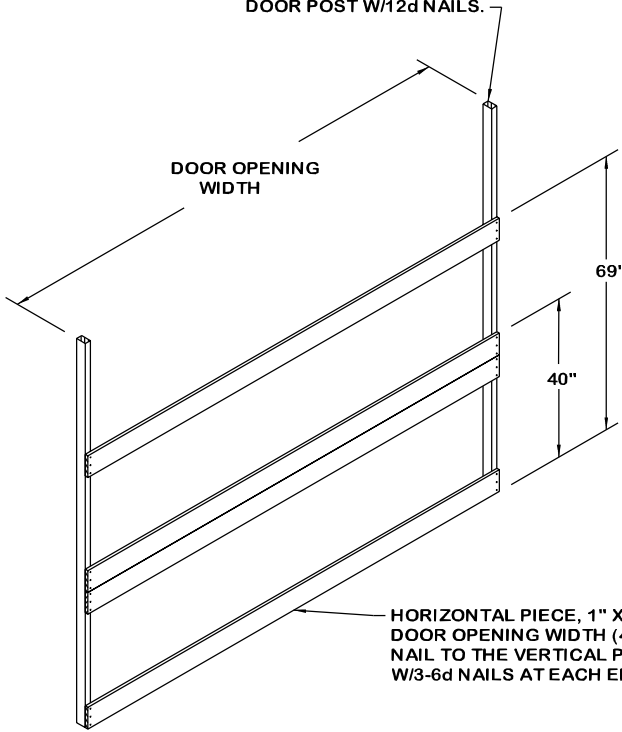


**CRIB FILL**

POSITION CRIB FILL ASSEMBLY BETWEEN LATERALLY ADJACENT PALLET STACKS.

VERTICAL PIECE, 2" X 3" X 8'-1" (2 REQD). NAIL TO DOOR POST W/12d NAILS.

DOOR OPENING WIDTH



HORIZONTAL PIECE, 1" X 6" BY DOOR OPENING WIDTH (4 REQD). NAIL TO THE VERTICAL PIECES W/3-6d NAILS AT EACH END.

**DOORWAY PROTECTION A**

**CRIB FILL TABLE**

STACKED HEIGHT OF PALLET UNITS	LENGTH OF VERTICAL PIECE
1	34-1/2"
1-1/3	47"
1-2/3	58"
2	69"

THE 1-1/3 AND 1-2/3 PALLET UNITS NOTED ABOVE IN THE "CRIB FILL A TABLE" REFERS TO THE LOAD AS SHOWN ON PAGE 24 USING THE 1/3 AND 2/3 PALLET UNIT HEIGHT RISER ASSEMBLIES.

SUPPORT PIECE

SPACER PIECE

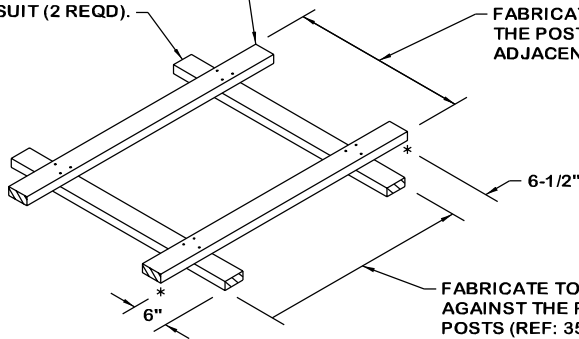
**END VIEW**

TOP OF LOAD ANTI-SWAY BRACE

BUFFER PIECE, 2" X 4" X 48" (2 REQD). NAIL TO THE RETAINER PIECES W/2-10d NAILS AT EACH JOINT.

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

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

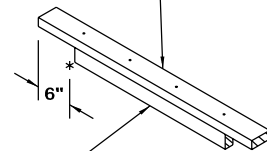


FABRICATE TO FIT AGAINST THE PALLET POSTS (REF: 35").

**ANTI-SWAY BRACE**

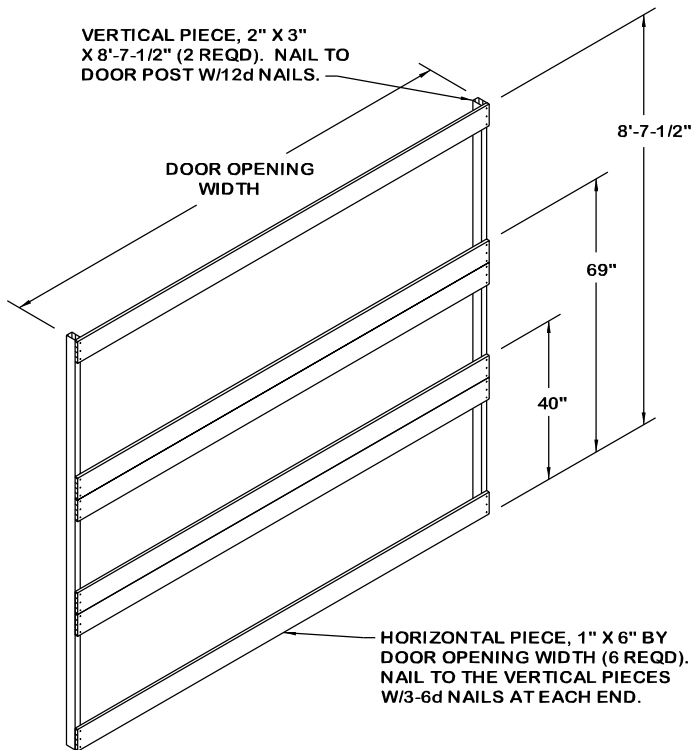
IF DESIRED, THE ANTI-SWAY BRACE CAN BE PARTIALLY PREASSEMBLED; ONE BUFFER PIECE CAN BE NAILED TO BOTH RETAINER PIECES. THE LONG ENDS OF THE ASSEMBLY CAN THEN BE INSTALLED INTO THE FORKLIFT OPENINGS OF A PALLET UNIT PRIOR TO POSITIONING THE LATERALLY ADJACENT PALLET UNIT.

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

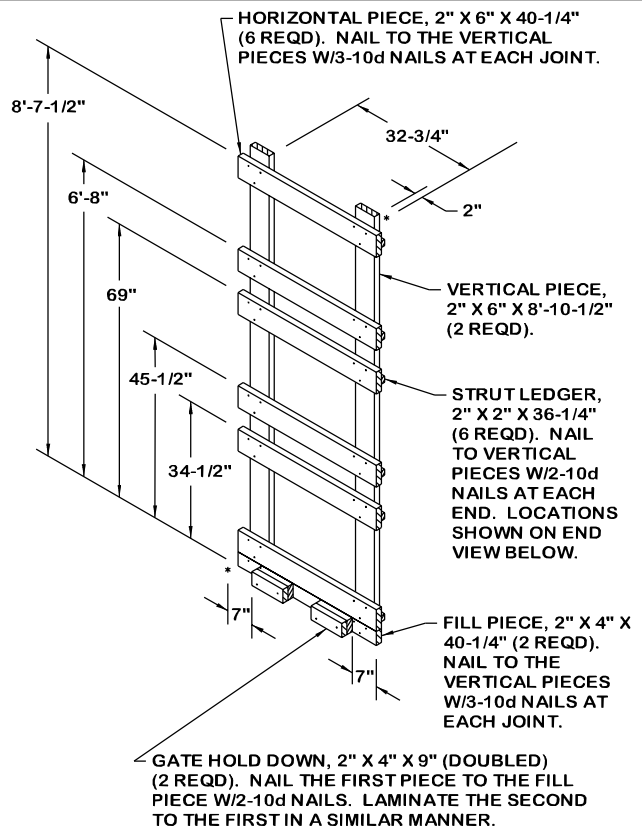


SPACER PIECE, 2" X 4" BY CUT TO FIT BETWEEN LATERALLY ADJACENT PALLET UNITS MINUS 1/4" (1 REQD). POSITION SO AS TO BE CENTERED UNDER THE SUPPORT PIECE. SEE THE END VIEW ABOVE.

**TOP OF LOAD ANTI-SWAY BRACE**

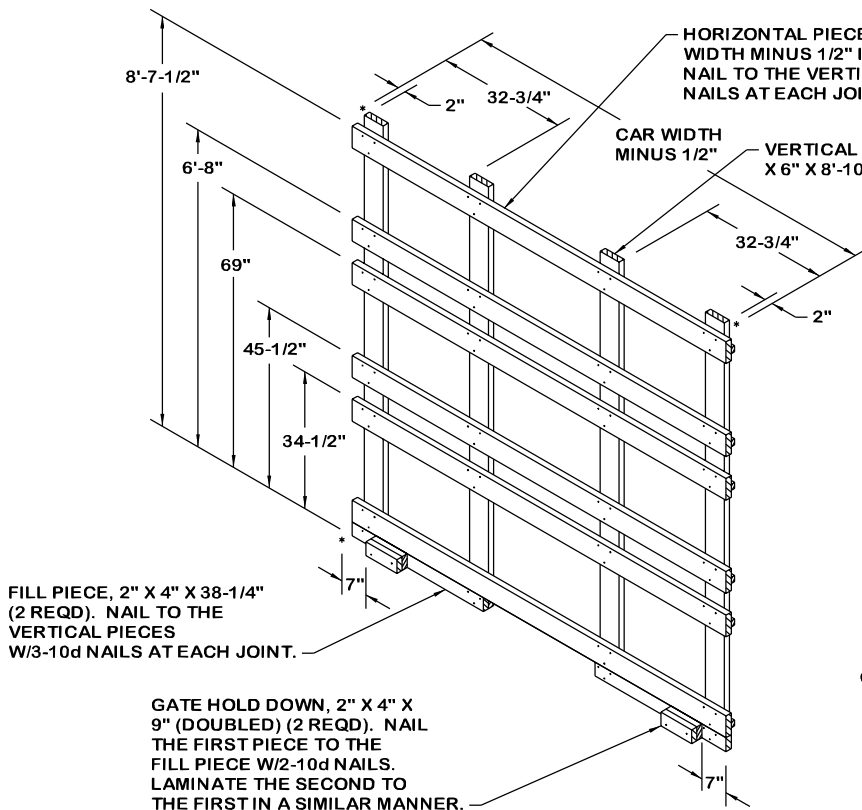


**DOORWAY PROTECTION B**



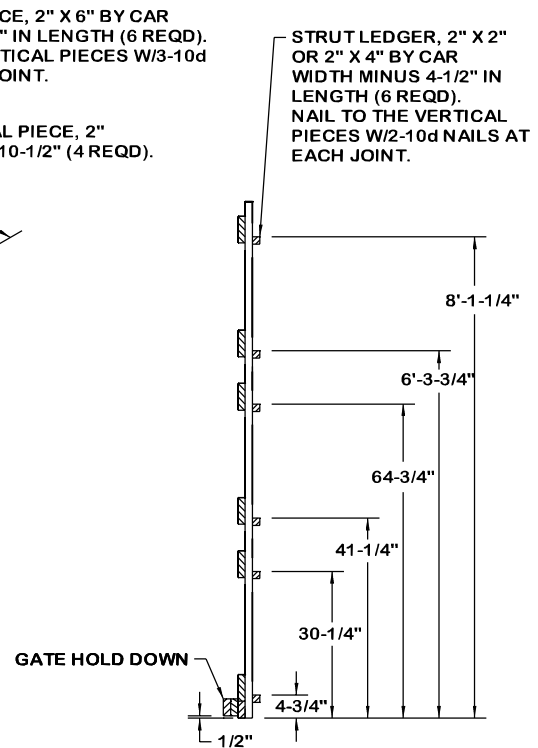
**CENTER GATE D**

SPLIT CENTER GATE FOR USE WITH 3-HIGH PALLET STACKS LOADED CROSSWISE.



**CENTER GATE C**

FOR USE WITH 3-HIGH PALLET STACKS LOADED CROSSWISE.

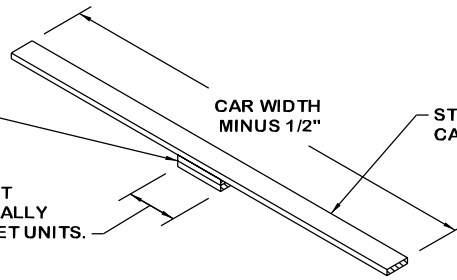


**END VIEW**

CENTER GATES C & D

SPACER PIECE, 2" X 6" BY A LENGTH TO SUIT (DOUBLED) (1 REQD). NAIL THE FIRST PIECE TO THE STRAPPING BOARD W/3-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A SIMILAR MANNER.

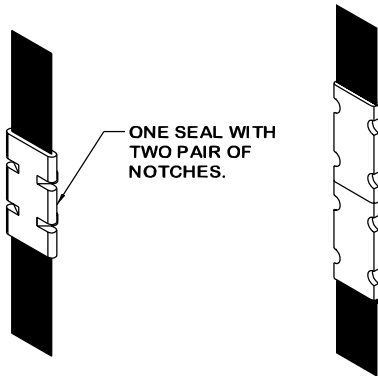
FABRICATE TO FIT BETWEEN LATERALLY ADJACENT PALLET UNITS.



CAR WIDTH MINUS 1/2"

STRAPPING BOARD, 2" X 6" BY CAR WIDTH MINUS 1/2" (1 REQD).

**STRAPPING BOARD ASSEMBLY**



ONE SEAL WITH TWO PAIR OF NOTCHES.

TWO SEALS, BUTTED TOGETHER, WITH TWO PAIR OF CRIMPS EACH SEAL.

**STRAP JOINT A**

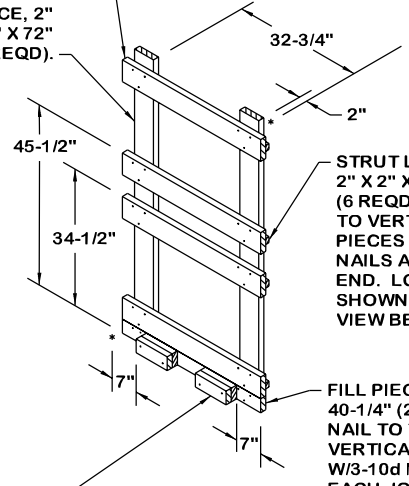
METHOD OF SECURING A STRAP JOINT WHEN USING A NOTCH-TYPE SEALER.

**STRAP JOINT B**

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

HORIZONTAL PIECE, 2" X 6" X 40-1/4" (4 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

VERTICAL PIECE, 2" X 6" X 72" (2 REQD).



STRUT LEDGER, 2" X 2" X 36-1/4" (6 REQD). NAIL TO VERTICAL PIECES W/2-10d NAILS AT EACH END. LOCATIONS SHOWN ON END VIEW BELOW.

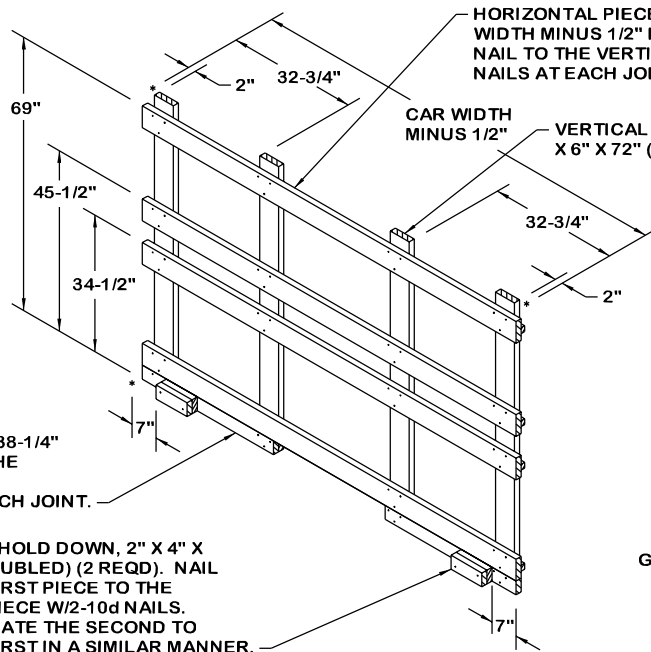
FILL PIECE, 2" X 4" X 40-1/4" (2 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

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

**CENTER GATE F**

SPLIT CENTER GATE FOR USE WITH 2-HIGH PALLET STACKS LOADED CROSSWISE.

**END-OVER-END LAP JOINT DETAILS**



FILL PIECE, 2" X 4" X 38-1/4" (2 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 W/2-10d NAILS. LAMINATE THE SECOND TO THE FIRST IN A SIMILAR MANNER.

HORIZONTAL PIECE, 2" X 6" BY CAR WIDTH MINUS 1/2" IN LENGTH (4 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

CAR WIDTH MINUS 1/2"

VERTICAL PIECE, 2" X 6" X 72" (4 REQD).

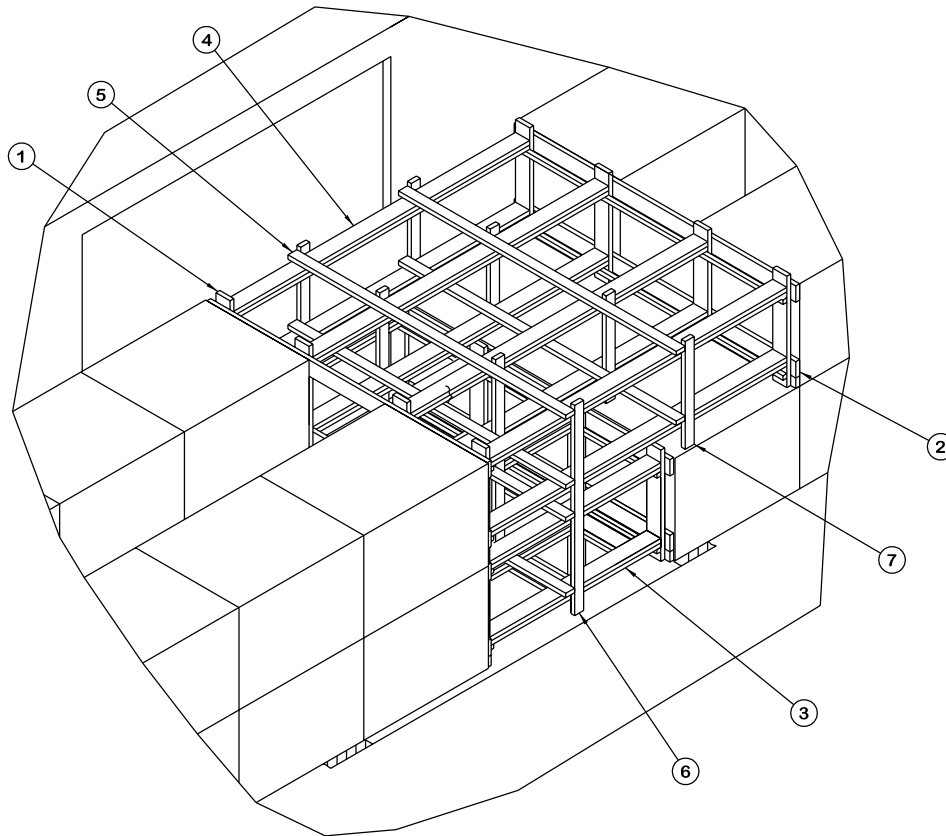
STRUT LEDGER, 2" X 2" OR 2" X 4" BY CAR WIDTH MINUS 4-1/2" IN LENGTH (4 REQD). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH JOINT.

**CENTER GATE E**

FOR USE WITH 2-HIGH PALLET STACKS LOADED CROSSWISE.

**END VIEW**

CENTER GATES E & F



**ISOMETRIC VIEW**

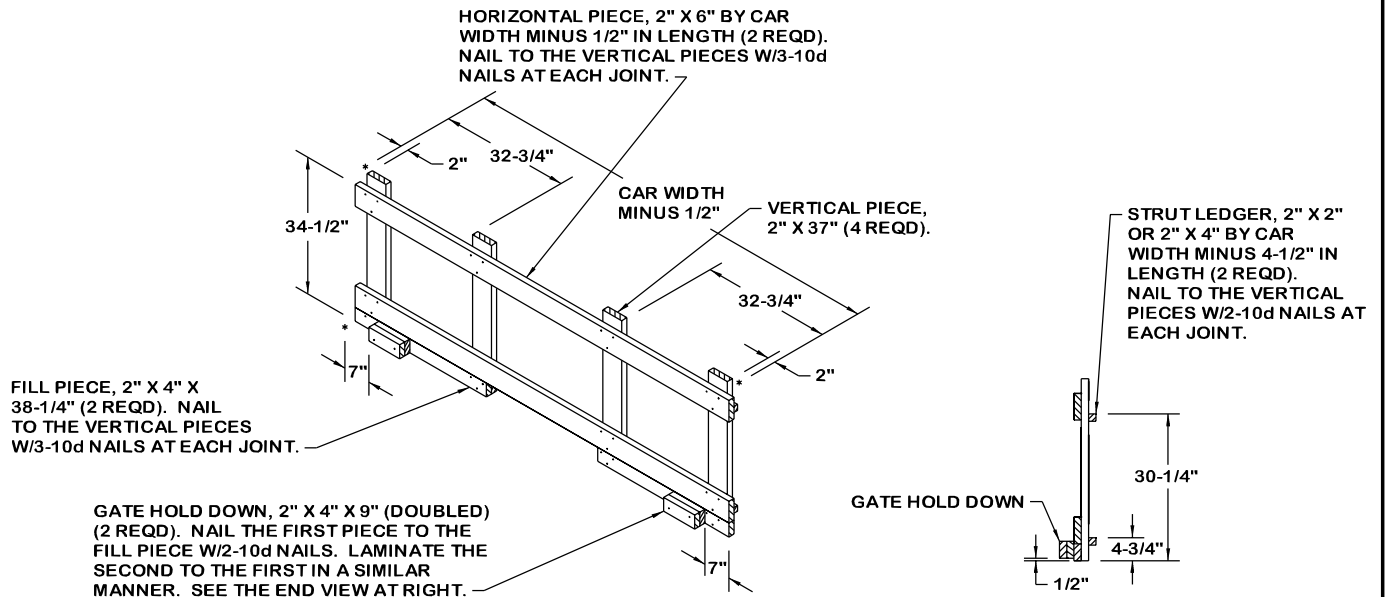
**SPECIAL NOTES:**

1. ONLY THE CENTER PORTION OF A 9'-2" WIDE CONVENTIONAL TYPE BOXCAR IS SHOWN TO PORTRAY THE STRUTTED GATE METHOD OF PARTIAL LAYER BRACING. CARS OF OTHER WIDTHS CAN ALSO BE USED.
2. THE PROCEDURES FOR THE ADJUSTMENT OF A LOAD QUANTITY BY THE OMISSION OF THE TOP LAYER FROM TWO LOAD UNITS ARE SHOWN AS TYPICAL. THE PRINCIPLES MAY ALSO BE APPLIED FOR THE OMISSION OF THE TOP LAYER FROM JUST ONE LOAD UNIT.
3. ONLY THE BLOCKING AND BRACING PIECES WHICH ARE NECESSARY TO PERMIT THE OMISSION OF THE UNITS FROM THE TOP LAYER ARE SHOWN.
4. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED AS AN ALTERNATIVE TO THE CAR-WIDTH GATES. IN LIEU OF EACH "CENTER GATE E", SHOWN AS PIECE MARKED ① IN THE LOAD ABOVE, INSTALL TWO "CENTER GATES F" AS SHOWN ON PAGE 15. AFTER THE SPLIT GATES AND STRUTS HAVE BEEN INSTALLED, THE SPLIT GATES MUST BE TIED TOGETHER AS DEPICTED BY THE "TIE PIECE APPLICATION" DETAIL ON PAGE 26.
5. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED AS AN ALTERNATIVE TO THE CAR-WIDTH GATES. IN LIEU OF EACH "CENTER GATE G", SHOWN AS PIECE MARKED ② IN THE LOAD ABOVE, INSTALL TWO "CENTER GATES H" AS SHOWN ON PAGE 17. AFTER THE SPLIT GATES AND STRUTS HAVE BEEN INSTALLED, THE SPLIT GATES MUST BE TIED TOGETHER AS DEPICTED BY THE "TIE PIECE APPLICATION" DETAIL ON PAGE 26.

**KEY NUMBERS**

- ① CENTER GATE E (1 REQD). SEE DETAIL ON PAGE 15. SEE SPECIAL NOTE 4.
- ② CENTER GATE G (2 REQD). SEE DETAIL ON PAGE 17. SEE SPECIAL NOTE 5.
- ③ STRUT A, 2" X 6" BY CUT TO FIT (REF: 66-1/2") (DOUBLED) (8 REQD). NAIL THE FIRST PIECE TO THE CENTER GATES W/2-10d NAILS AT EACH END. LAMINATE THE SECOND PIECE TO THE FIRST W/6-10d NAILS. SEE GENERAL NOTE "K" ON PAGE 2 AND GENERAL NOTES "V" AND "W" ON PAGE 3.
- ④ STRUT B, 2" X 6" BY CUT TO FIT (REF: 9'-7") (DOUBLED) (8 REQD). NAIL THE FIRST PIECE TO THE CENTER GATES W/2-10d NAILS AT EACH END. LAMINATE THE SECOND PIECE TO THE FIRST W/10-10d NAILS. SEE GENERAL NOTE "K" ON PAGE 2 AND GENERAL NOTES "V" AND "W" ON PAGE 3.
- ⑤ HORIZONTAL STRUT BRACING, 2" X 4" BY A LENGTH TO SUIT (REF: 9'-0") (6 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑥ VERTICAL STRUT BRACING A, 2" X 4" BY CUT TO EXTEND FROM THE FLOOR TO 3" ABOVE THE TOP STRUT (REF: 70-3/4") (4 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑦ VERTICAL STRUT BRACING B, 2" X 4" BY CUT TO EXTEND FROM THE TOP OF THE PALLET UNIT TO 3" ABOVE THE TOP STRUT (REF: 37-1/2") (4 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.

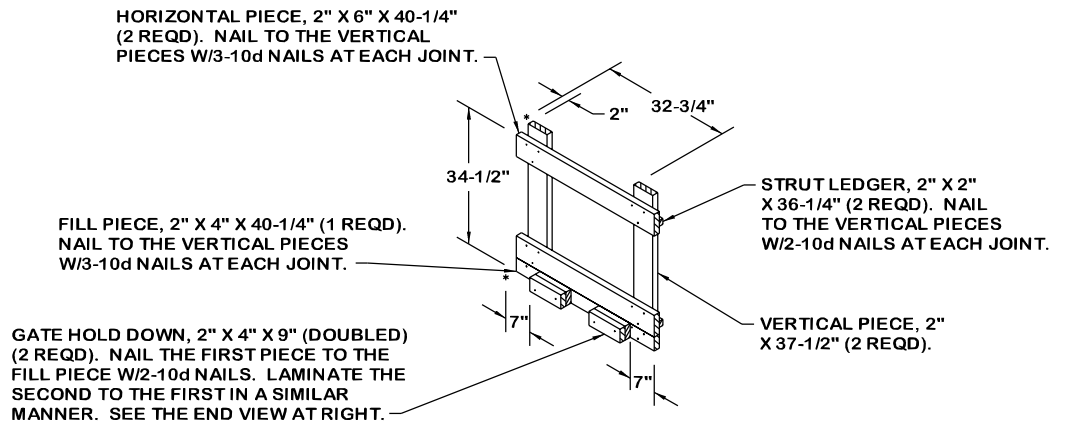




**CENTER GATE G**

FOR USE WITH 1-HIGH PALLET STACKS LOADED CROSSWISE.

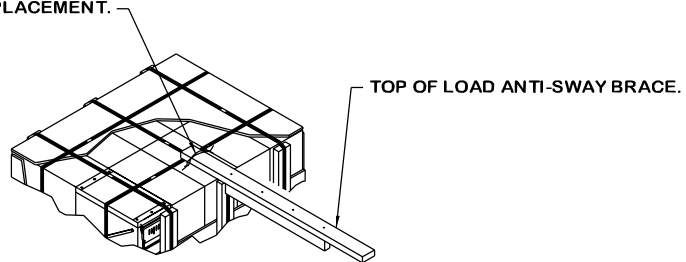
**END VIEW**  
CENTER GATES G AND H



**CENTER GATE H**

SPLIT CENTER GATE FOR USE WITH 1-HIGH PALLET STACKS LOADED LENGTHWISE.

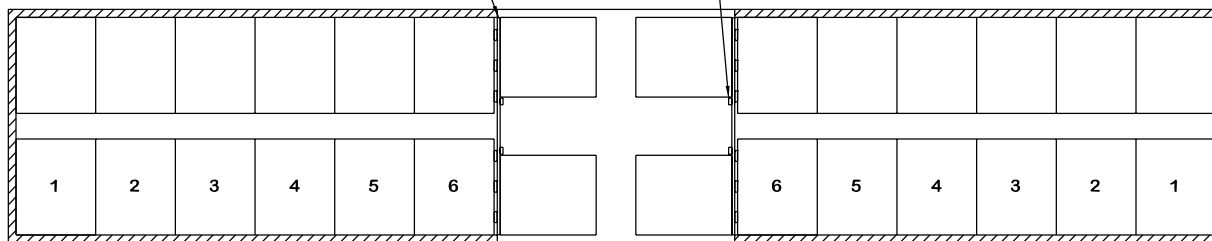
.080" DIA. WIRE BY A LENGTH TO SUIT. FORM TWO LOOPS AROUND TOP OF LOAD ANTI-SWAY BRACE AND PALLET UNIT STRAPPING. TWIST WIRE TO SELF WITH THREE COMPLETE TWISTS IN ORDER TO PREVENT DISPLACEMENT.



**TIE WIRE APPLICATION**

SEPARATOR GATE (1 OR 2 REQD, AS APPLICABLE).  
SEE THE SEPARATOR GATE DETAIL ON PAGE 19.  
POSITION AS SHOWN WITH THE VERTICAL PIECES  
AGAINST THE LENGTHWISE POSITIONED PALLET UNITS.

STOP PIECE, 2" X 4" BY A LENGTH TO SUIT (2 REQD).  
POSITION SO AS TO BE IN CONTACT WITH THE AD-  
JACENT PALLET UNIT AND SECURE BY NAILING  
THROUGH THE HORIZONTAL PIECES OF THE  
SEPARATOR GATE W/3-10d NAILS AT EACH JOINT.  
NOTE THAT STOP PIECES ARE ONLY REQUIRED ON  
SEPARATOR GATES WHICH ARE IN THE DOOR  
OPENING.



**TYPICAL COMBINATION PATTERN PLAN VIEW**

12 LENGTHWISE PLUS 2 CROSSWISE LOAD UNITS ARE SHOWN AT EACH END.

CAR LENGTH	UNITS PER LAYER	LOAD PATTERN	APPROX STRUT LENGTH
40' -6" CAR	22 20 18	LENGTHWISE LOAD ON PAGE 6 6 LONG AT 48-1/2" PLUS 4 AT 40-1/4" CROSSWISE LOAD ON PAGE 8	39" 24" 45"
50' -6" CAR	28 26 24	LENGTHWISE LOAD ON PAGE 6 10 LONG AT 48-1/2" PLUS 3 AT 40-1/4" CROSSWISE LOAD ON PAGE 8	38" 48" 20"
60' -8" CAR	34 32 30 28	LENGTHWISE LOAD ON PAGE 6 15 LONG AT 40-1/4" PLUS 1 AT 48-1/2" 12 LONG AT 48-1/2" PLUS 3 AT 40-1/4" CROSSWISE LOAD ON PAGE 8	39" 66" 17" 45"

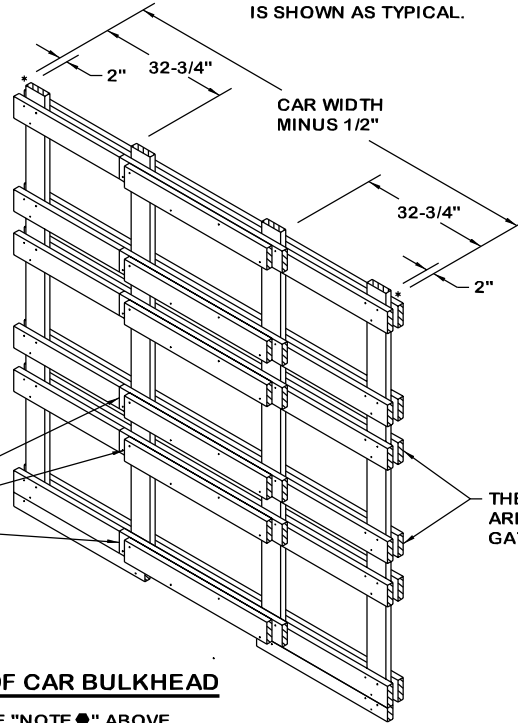
**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOXCAR IS SHOWN. WIDER CARS AND CARS OF OTHER LENGTHS CAN BE USED.
2. THE PROCEDURES ON THIS PAGE ARE PRESENTED TO PROVIDE A METHOD OF OBTAINING A LOAD QUANTITY WHICH MAY NOT BE READILY ATTAINABLE BY ANY OF THE OTHER METHODS OF ADJUSTING A LOAD QUANTITY SPECIFIED HEREIN, INCLUDING THE DEPICTED LCL PROCEDURES.
3. THE BLOCKING AND BRACING FOR THE COMBINATION LOAD, OTHER THAN THE SEPARATOR GATE, HAS NOT BEEN SHOWN. REFER TO THE APPLICABLE LOAD PAGES FOR THE BLOCKING AND BRACING SPECIFICATIONS. A SEPARATOR GATE MUST BE INSTALLED AT EVERY LOCATION WHERE THE DIRECTION OF THE PALLET UNITS CHANGE. THE GATE MUST BE POSITIONED SO THAT THE VERTICAL PIECES ARE AGAINST THE LENGTHWISE PALLET UNITS OF THE LOAD.
4. THE CHART ABOVE SHOWS THE VARIOUS QUANTITIES (PER LAYER) WHICH CAN BE ATTAINED BY THE COMBINATION LOAD METHOD, AND THE PATTERNS REQUIRED TO PROVIDE THESE QUANTITIES, ARE SPECIFIED. FOR COMPARISON PURPOSES, THE OTHER TYPE LOADS WHICH CAN BE USED TO OBTAIN A LIKE QUANTITY WITHIN THE RANGE OF THE COMBINATION LOAD METHOD, AS WELL AS THE APPROXIMATE LENGTH OF THE STRUTS, ARE ALSO INCLUDED IN THE CHART.

**NOTE ●:**

IF A BOXCAR TO BE LOADED HAS BOWED ENDWALLS WHICH ARE BOWED OUTWARD MORE THAN 2", EITHER FROM SIDE TO SIDE OR 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 CAR OR IN A CAR EQUIPPED WITH LOAD DIVIDER BULKHEADS. THE BULKHEAD MAY BE FABRICATED FROM A CENTER GATE FOR THE STACKED HEIGHT OF THE UNITS TO BE LOADED AND THE UNIT POSITIONING (LENGTHWISE OR CROSSWISE). NOTE: THE GATE MUST BE MODIFIED BY OMITTING THE 2" X 2" STRUT LEDGERS AND THE GATE HOLD DOWN PIECES. A MODIFIED CENTER GATE "C" AS DETAILED ON PAGE 14 IS SHOWN AS TYPICAL.

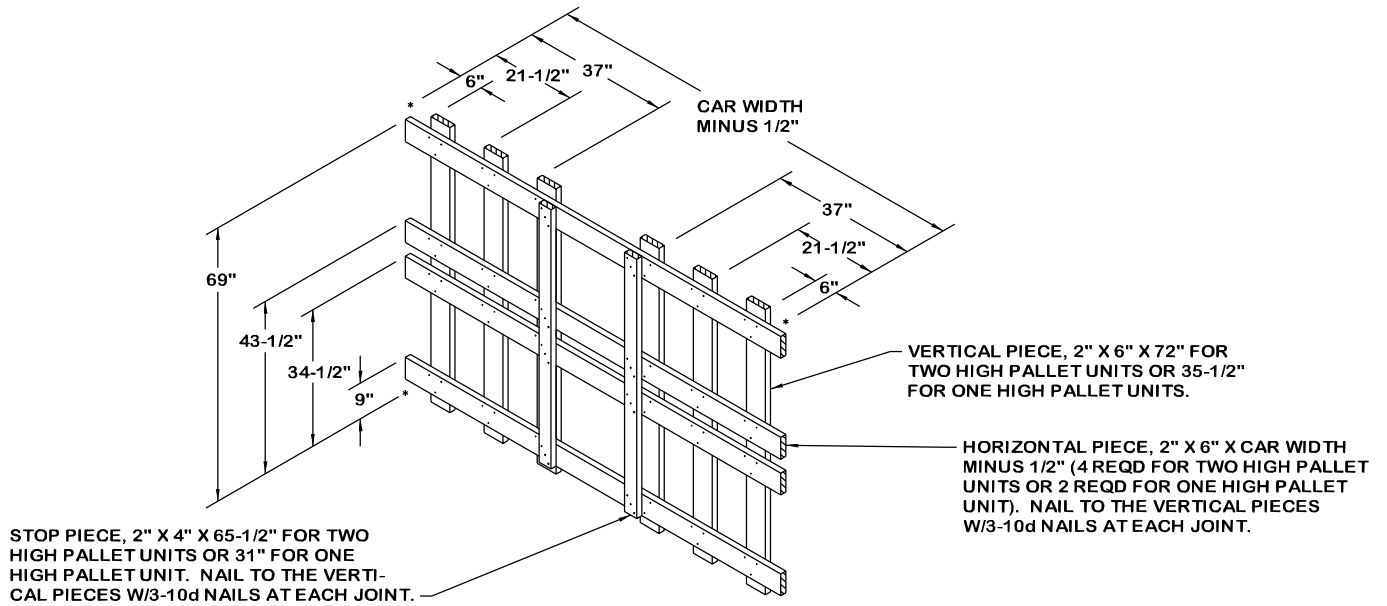
SHIM MATERIAL, 6" WIDE PLYWOOD OR DIMENSIONAL LUMBER OF A THICKNESS AND LENGTH AS REQUIRED TO FILL THE VOID BETWEEN THE CAR ENDWALL AND BULKHEAD. NAIL TO THE HORIZONTAL PIECE AND/OR LAMINATE W/1 APPLICABLY SIZED NAIL EVERY 6".



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

**END OF CAR BULKHEAD**

SEE "NOTE ●" ABOVE.

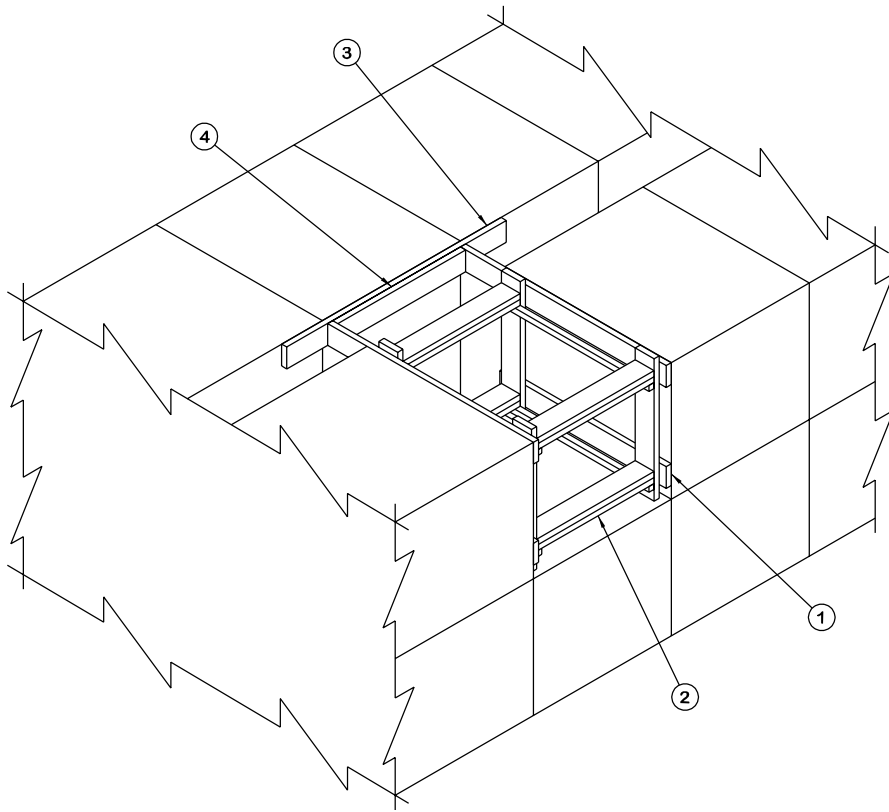


STOP PIECE, 2" X 4" X 65-1/2" FOR TWO HIGH PALLET UNITS OR 31" FOR ONE HIGH PALLET UNIT. NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

VERTICAL PIECE, 2" X 6" X 72" FOR TWO HIGH PALLET UNITS OR 35-1/2" FOR ONE HIGH PALLET UNITS.

HORIZONTAL PIECE, 2" X 6" X CAR WIDTH MINUS 1/2" (4 REQD FOR TWO HIGH PALLET UNITS OR 2 REQD FOR ONE HIGH PALLET UNIT). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

**SEPARATOR GATE**



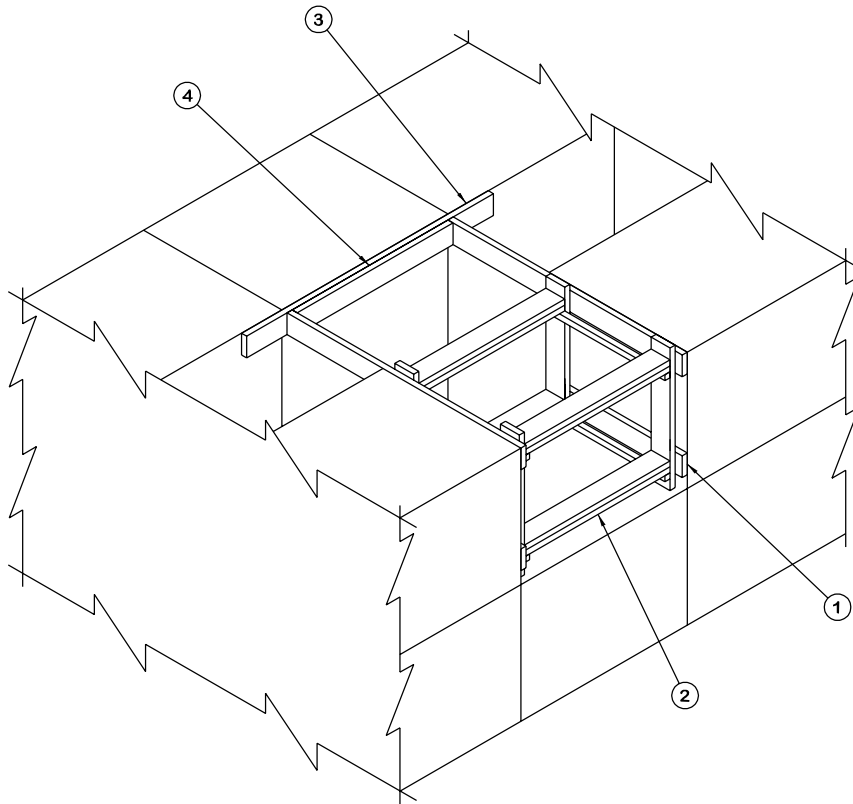
**ISOMETRIC VIEW**

**SPECIAL NOTES:**

1. A PARTIAL VIEW OF A 9'-2" WIDE CONVENTIONAL TYPE BOXCAR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED.
2. A UNIT OMITTED FROM THE TOP LAYER OF A TWO LAYER LOAD IS SHOWN AS TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR THE OMISSION OF A TOP LAYER PALLET UNIT FROM A THREE LAYER LOAD.
3. THE OMITTED UNIT PROCEDURE SHOULD BE APPLIED NEAR THE CENTER OF THE CAR LENGTH, BUT NOT IN THE DOORWAY AREA. ALSO, THERE SHOULD BE AT LEAST ONE LOAD UNIT BETWEEN THE OMITTED UNIT AND A CENTER GATE.
4. ONLY THE BLOCKING AND BRACING FOR THE OMITTED UNIT IS SHOWN; REFER TO THE APPLICABLE LOAD PAGE FOR THE BLOCKING AND BRACING REQUIREMENTS OF THE BALANCE OF THE LOAD.

**KEY NUMBERS**

- ① LOAD BEARING GATE A (2 REQD, 1 RIGHT HAND AND 1 LEFT HAND). SEE THE DETAIL ON PAGE 22. NAIL TO THE FILLER PIECE W/3-10d NAILS.
- ② STRUT, 2" X 6" BY CUT TO FIT (REF: 34-1/4") ( DOUBLED) (4 REQD). POSITION FIRST PIECE BETWEEN THE CENTER GATES AS SHOWN AND NAIL W/2-10d NAILS AT EACH END. LAMINATE THE SECOND PIECE TO THE FIRST PIECE W/4-10d NAILS. SEE GENERAL NOTE "K" ON PAGE 2 AND GENERAL NOTES "V" AND "W" ON PAGE 3.
- ③ ANTI-SWAY BEARING PIECE, 2" X 6" X 64" (1 REQD).
- ④ FILLER PIECE, 2" X 6" X 37-1/4" (1 REQD). NAIL TO THE ANTI-SWAY BEARING PIECE W/5-10d NAILS.



**ISOMETRIC VIEW**

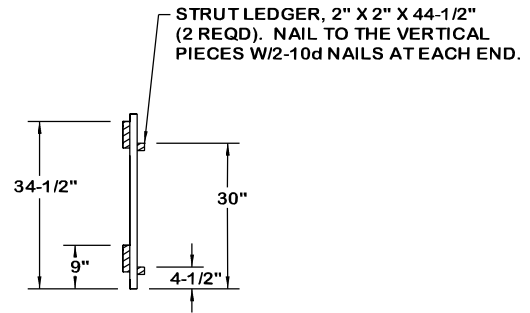
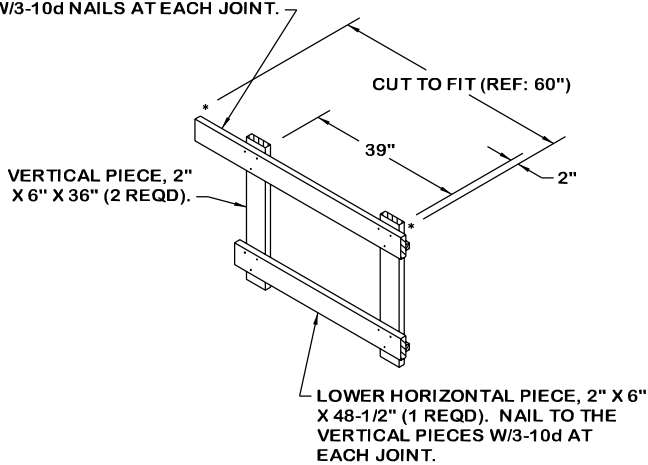
**SPECIAL NOTES:**

1. A PARTIAL VIEW OF A 9'-2" WIDE CONVENTIONAL TYPE BOXCAR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED.
2. A UNIT OMITTED FROM THE TOP LAYER OF A TWO LAYER LOAD IS SHOWN AS TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR THE OMISSION OF A TOP LAYER PALLET UNIT FROM A THREE LAYER LOAD.
3. THE OMITTED UNIT PROCEDURE SHOULD BE APPLIED NEAR THE CENTER OF THE CAR LENGTH, BUT NOT IN THE DOORWAY AREA. ALSO, THERE SHOULD BE AT LEAST ONE LOAD UNIT BETWEEN THE OMITTED UNIT AND A CENTER GATE.
4. ONLY THE BLOCKING AND BRACING FOR THE OMITTED UNIT IS SHOWN; REFER TO THE APPLICABLE LOAD PAGE FOR THE BLOCKING AND BRACING REQUIREMENTS OF THE BALANCE OF THE LOAD.

**KEY NUMBERS**

- ① LOAD BEARING GATE B (2 REQD, 1 RIGHT HAND AND 1 LEFT HAND). SEE THE DETAIL ON PAGE 22. NAIL TO THE FILLER PIECE W/3-10d NAILS.
- ② STRUT, 2" X 6" BY CUT TO FIT (REF: 42-1/2") (DOUBLED) (4 REQD). POSITION FIRST PIECE BETWEEN THE CENTER GATES AS SHOWN AND NAIL W/2-10d NAILS AT EACH END. LAMINATE THE SECOND PIECE TO THE FIRST PIECE W/4-10d NAILS. SEE GENERAL NOTE "K" ON PAGE 2, AND GENERAL NOTES "V" AND "W" ON PAGE 3.
- ③ ANTI-SWAY BEARING PIECE, 2" X 6" X 72" (1 REQD).
- ④ FILLER PIECE. 2" X 6" X 45-1/2" (1 REQD). NAIL TO THE ANTI-SWAY BEARING PIECE W/5-10d NAILS.

UPPER HORIZONTAL PIECE, 2" X 6" BY CUT TO FIT (REF: 60") (1 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.



**END VIEW**

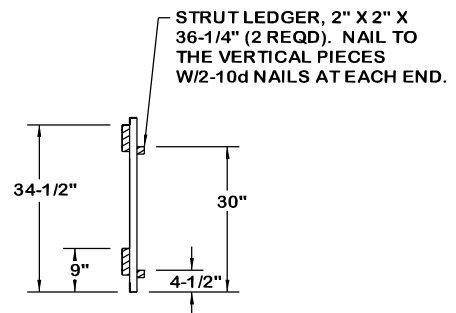
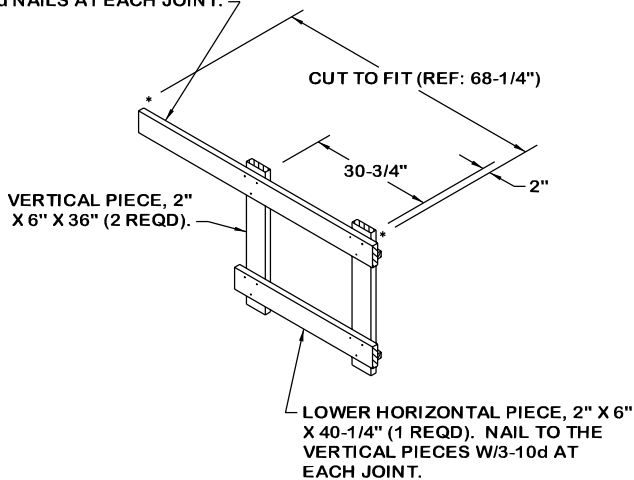
**LOAD BEARING GATE A**

SEE SPECIAL NOTE 1 AT RIGHT. ONE RIGHT HAND AND ONE LEFT HAND GATE REQUIRED. A LEFT HAND GATE IS SHOWN.

**SPECIAL NOTES:**

1. LOAD BEARING GATE "A" IS FOR USE WITH LCL PROCEDURES SHOWN ON PAGE 20. THOSE PROCEDURES DEPICT THE OMISSION OF A PALLET UNIT FROM A LOAD OF LENGTHWISE POSITIONED PALLET UNITS.
2. THE REFERENCE DIMENSION GIVEN FOR 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.

UPPER HORIZONTAL PIECE, 2" X 6" BY CUT TO FIT (REF: 68-1/4") (1 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.



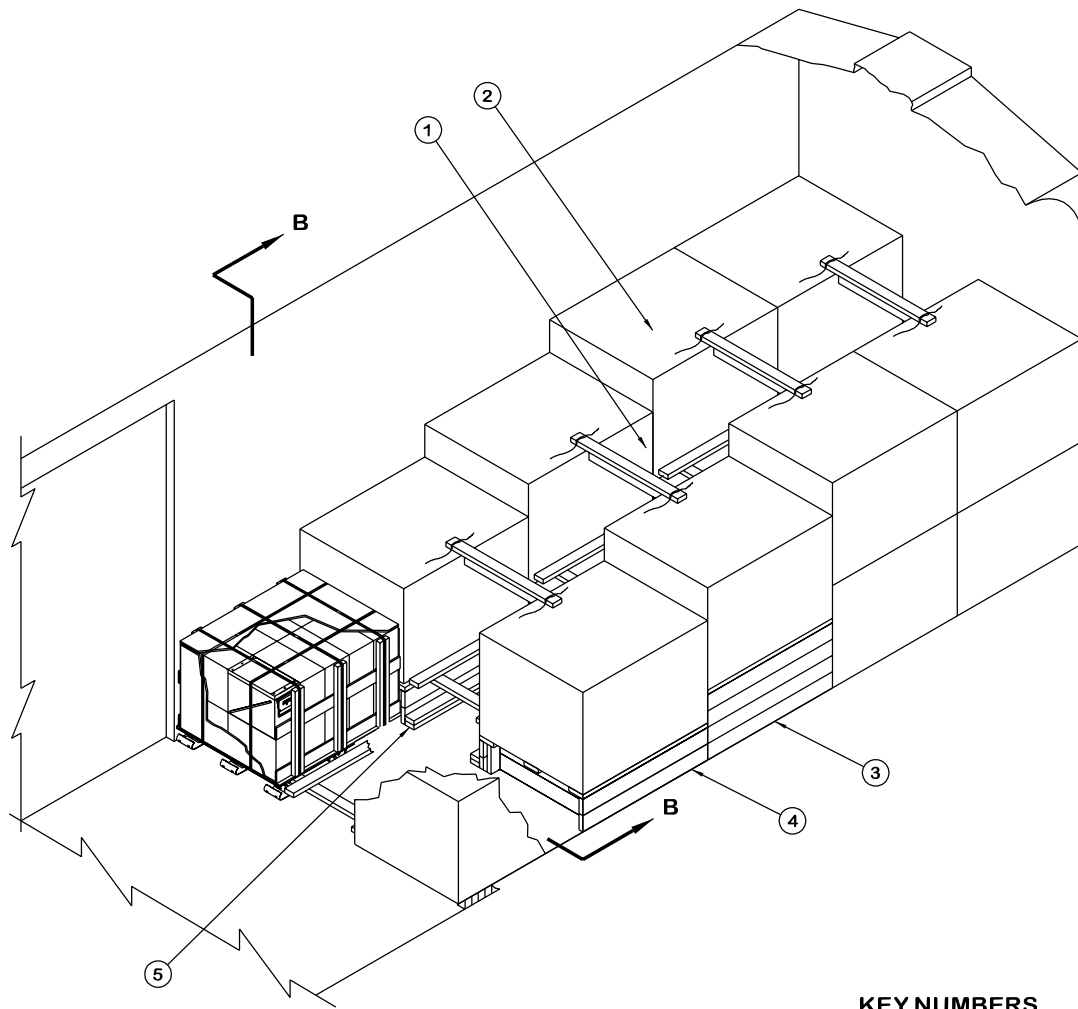
**END VIEW**

**LOAD BEARING GATE B**

SEE SPECIAL NOTE 1 AT RIGHT. ONE RIGHT HAND AND ONE LEFT HAND GATE REQUIRED. A LEFT HAND GATE IS SHOWN.

**SPECIAL NOTES:**

1. LOAD BEARING GATE "B" IS FOR USE WITH LCL PROCEDURES SHOWN ON PAGE 21. THOSE PROCEDURES DEPICT THE OMISSION OF A PALLET UNIT FROM A LOAD OF CROSSWISE POSITIONED PALLET UNITS.
2. THE REFERENCE DIMENSION GIVEN FOR 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.

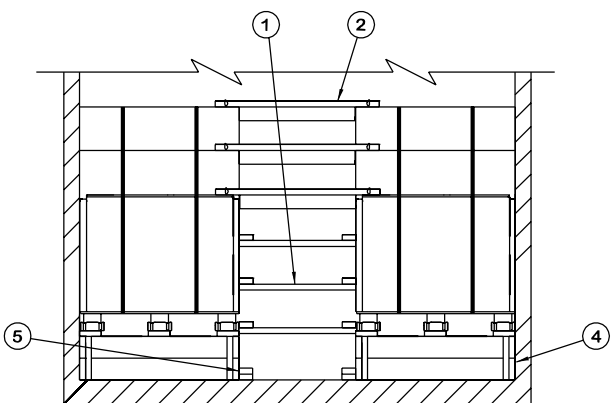


SEE GENERAL NOTE "F" ON PAGE 2.

**ISOMETRIC VIEW**

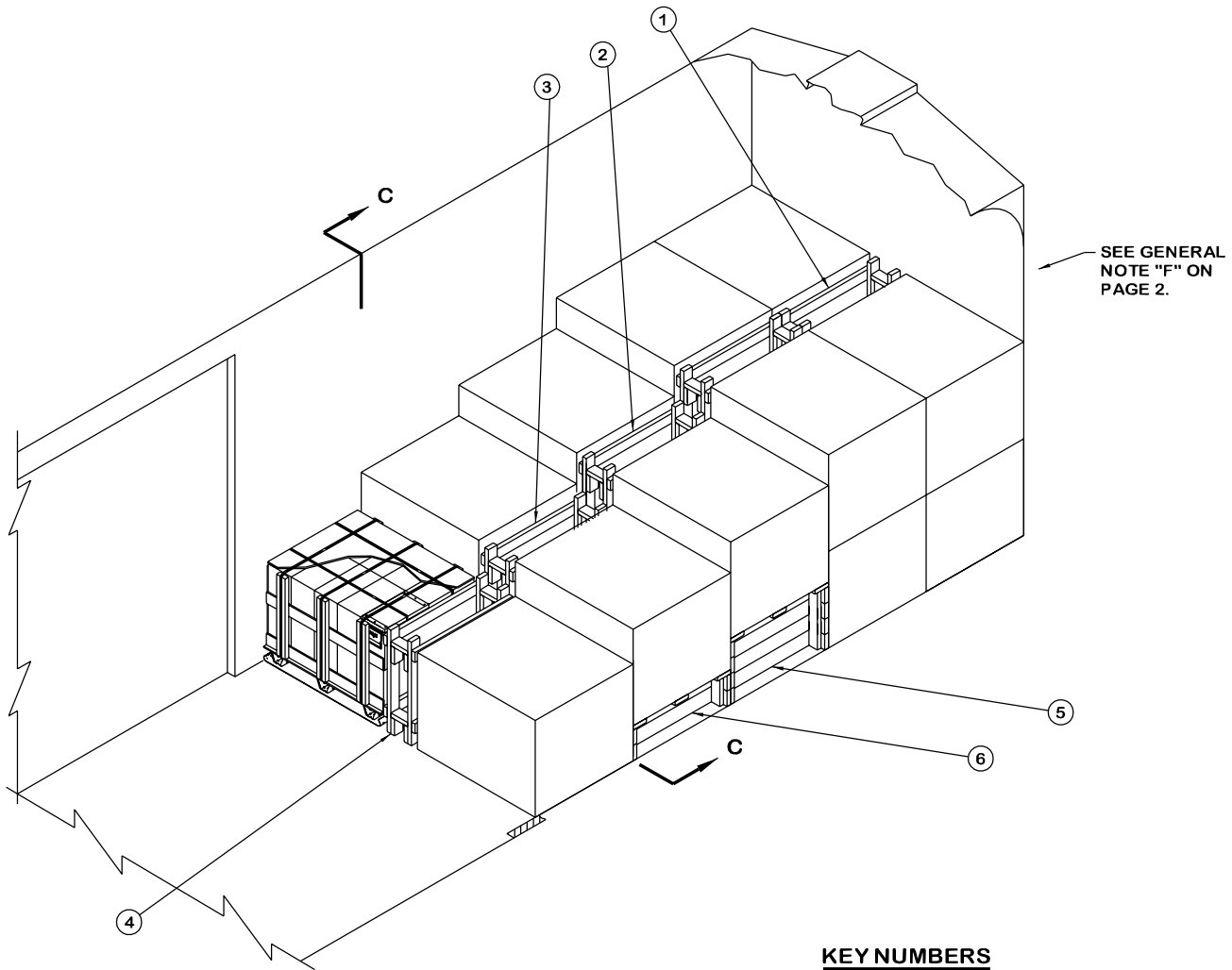
**KEY NUMBERS**

- ① ANTI-SWAY BRACE (7 REQD). SEE DETAIL ON PAGE 13. INSTALL BETWEEN LATERALLY ADJACENT PALLET UNITS.
- ② TOP OF LOAD ANTI-SWAY BRACE (4 REQD). SEE DETAIL ON PAGE 13. WIRE TIE TO THE TOP PALLET UNIT STRAPPING WITH .0800" DIAMETER WIRE AS SHOWN BY THE "TIE WIRE APPLICATION DETAIL ON PAGE 17.
- ③ RISER ASSEMBLY (2 REQD). THE HEIGHT OF THESE RISER ASSEMBLIES WILL BE TWO THIRDS OF THE PALLET UNIT HEIGHT. SEE THE RISER ASSEMBLY DETAIL ON PAGE 25.
- ④ RISER ASSEMBLY (2 REQD). THE HEIGHT OF THESE RISER ASSEMBLIES WILL BE ONE THIRD OF THE PALLET UNIT HEIGHT. SEE THE RISER ASSEMBLY DETAIL ON PAGE 25.
- ⑤ SIDE BLOCKING, 2" X 4" X 48" (DOUBLED) (4 REQD). POSITION THE SIDE BLOCKING AGAINST EACH RISER ASSEMBLY. NAIL THE FIRST PIECE TO THE FLOOR W/4-10d NAILS. LAMINATE THE SECOND PIECE TO THE FIRST IN A SIMILAR MANNER.



**SECTION B-B**

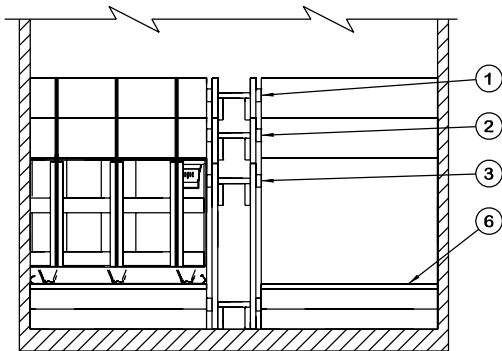
**TYPICAL LCL LOAD USING RISER METHOD OF PARTIAL LAYER BRACING**



**ISOMETRIC VIEW**

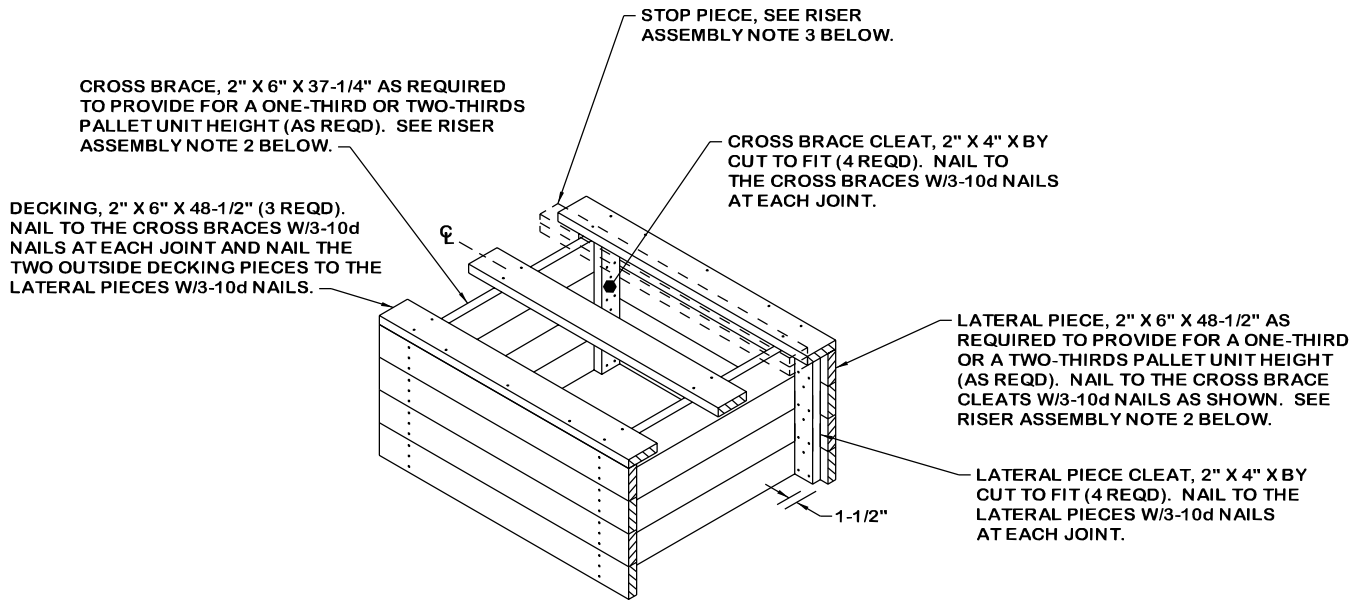
**KEY NUMBERS**

- ① CRIB FILL (2 REQD). USE THE 2-HIGH CRIB FILL ASSEMBLIES AT TWO LOCATIONS. SEE DETAIL ON PAGE 13. INSTALL BETWEEN LATERALLY ADJACENT STACKS OF TWO HIGH PALLET UNITS.
- ② CRIB FILL (1 REQD). USE THE 1-2/3 HIGH CRIB FILL ASSEMBLY AT THIS LOCATION. SEE DETAIL ON PAGE 13. INSTALL BETWEEN LATERALLY ADJACENT STACKS OF PALLET UNITS ON TWO-THIRD HEIGHT RISER ASSEMBLIES.
- ③ CRIB FILL (1 REQD). USE THE 1-1/3 HIGH CRIB FILL ASSEMBLY AT THIS LOCATION. SEE DETAIL ON PAGE 13. INSTALL BETWEEN LATERALLY ADJACENT STACKS OF PALLET UNITS ON ONE-THIRD HEIGHT RISER ASSEMBLIES.
- ④ CRIB FILL (1 REQD). USE THE 1-HIGH CRIB FILL ASSEMBLY AT THIS LOCATION. SEE DETAIL ON PAGE 13. INSTALL BETWEEN LATERALLY ADJACENT STACKS OF 1-HIGH PALLET UNITS.
- ⑤ RISER ASSEMBLY (2 REQD). THE HEIGHT OF THESE RISER ASSEMBLIES WILL BE TWO THIRDS OF THE PALLET UNIT HEIGHT. SEE THE RISER ASSEMBLY DETAIL ON PAGE 25.
- ⑥ RISER ASSEMBLY (2 REQD). THE HEIGHT OF THESE RISER ASSEMBLIES WILL BE ONE THIRD OF THE PALLET UNIT HEIGHT. SEE THE RISER ASSEMBLY DETAIL ON PAGE 25.



**SECTION C-C**





**RISER ASSEMBLY**

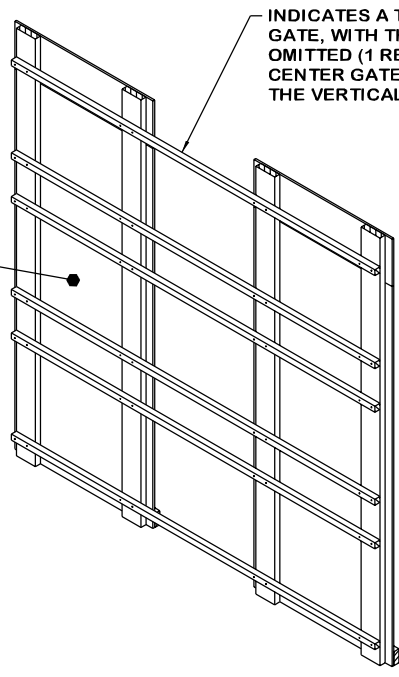
**SPECIAL NOTES FOR LOADS:**

1. A 9'-2" WIDE CONVENTIONAL TYPE WOOD LINED BOXCAR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED.
2. THE RISER METHOD OF PARTIAL LAYER BRACING IS SHOWN WITH THE PALLET UNITS POSITIONED CROSSWISE ON PAGE 23 AND POSITIONED LENGTHWISE IN THE CAR ON PAGE 24.
3. ONLY THE BLOCKING AND BRACING FOR THE RISER METHOD OF PARTIAL LAYER BRACING IS SHOWN. REFER TO THE APPLICABLE LOAD FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.
4. TOP OF LOAD ANTI-SWAY BRACES ARE REQUIRED FOR ALL LENGTHWISE POSITIONED PALLET UNITS AS SHOWN ON PAGE 23 EXCEPT FOR ADJACENT 1-HIGH PALLET UNITS THAT ARE NOT ON RISER ASSEMBLIES.
5. CRIB FILL ASSEMBLIES ARE REQUIRED FOR THE CROSSWISE POSITIONED PALLET UNITS AS SHOWN ON PAGE 24.

**SPECIAL NOTES FOR RISER ASSEMBLY:**

1. A TWO-THIRDS PALLET UNIT HEIGHT RISER ASSEMBLY IS SHOWN ABOVE.
2. EACH CROSS BRACE AND EACH LATERAL PIECE OF THE RISER IS FABRICATED FROM FOUR PIECES OF 2" X 6" MATERIAL AND THREE 2" X 6" DECK BOARDS FOR A TOTAL HEIGHT OF 23-1/2". A ONE-THIRD HEIGHT RISER ASSEMBLY WILL CONSIST OF TWO PIECES OF 2" X 6" MATERIAL FOR EACH CROSS BRACE AND LATERAL PIECE AND THREE 2" X 6" DECK BOARD FOR A TOTAL HEIGHT OF 12-1/2".
3. THE STOP PIECE SHOWN ON THE RISER ASSEMBLY ABOVE IS ONLY REQUIRED WHEN THE PALLET UNITS ARE POSITIONED LENGTHWISE IN THE IN THE CAR AS SHOWN ON PAGE 23. POSITION A DOUBLED 2" X 4" X 48-1/2" SO AS TO BE AGAINST THE DECKING PIECE WHICH IS ADJACENT TO THE CENTER OF THE CAR AND NAIL THE FIRST PIECE TO THE CROSS BRACE W/2-10d AT EACH JOINT. LAMINATE THE SECOND PIECE TO THE FIRST W/4-10d NAILS.

PLYWOOD, 1/2" THICK BY THE UNIT WIDTH OR LENGTH BY THE LOAD HEIGHT (2 REQD). NAIL TO THE VERTICAL PIECES W/1-6d NAIL EVERY 6". NOTE: THE WIDTH OF THE PLYWOOD WILL BE THE UNIT WIDTH IF THE LENGTH OF THE UNIT IS PARALLEL WITH THE SIDEWALL OF THE CAR, AS TYPICALLY SHOWN IN THE LOAD VIEW ON PAGE 6, OR UNIT LENGTH IF THE WIDTH OF THE UNIT IS PARALLEL WITH THE SIDEWALL OF THE CAR, AS TYPICALLY SHOWN IN THE LOAD ON PAGE 8. PLYWOOD MAY BE ALLOWED TO EXTEND BEYOND THE UNIT LENGTH OR WIDTH, IF DESIRED.

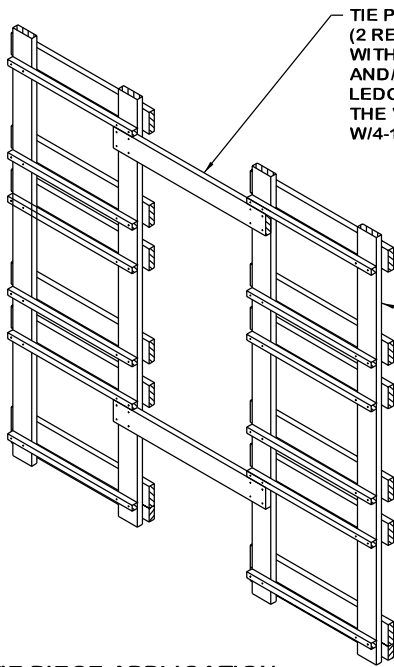


INDICATES A TYPICAL CAR WIDTH CENTER GATE, WITH THE HORIZONTAL PIECES OMITTED (1 REQD). SEE THE APPLICABLE CENTER GATE DETAIL FOR THE LOCATION OF THE VERTICAL PIECES AND STRUT LEDGERS.

FILL PIECES AND GATE HOLD DOWN PIECES MUST BE SECURED TO THE PLYWOOD.

**PLYWOOD CENTER GATE ALTERNATIVE**

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.

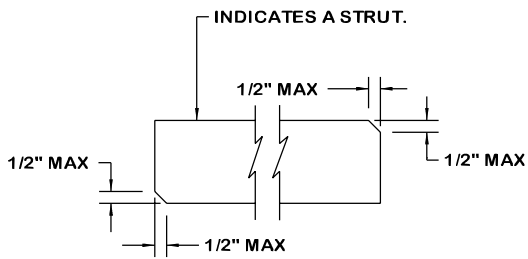


TIE PIECE, 2" X 6" BY A LENGTH TO SUIT (2 REQD). POSITION UNDER AND IN CONTACT WITH THE UPPERMOST STRUT LEDGERS AND/OR UNDER THE SECOND STRUT LEDGERS FROM THE BOTTOM. NAIL TO THE VERTICAL PIECES OF THE GATES W/4-10d NAILS AT EACH JOINT.

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.

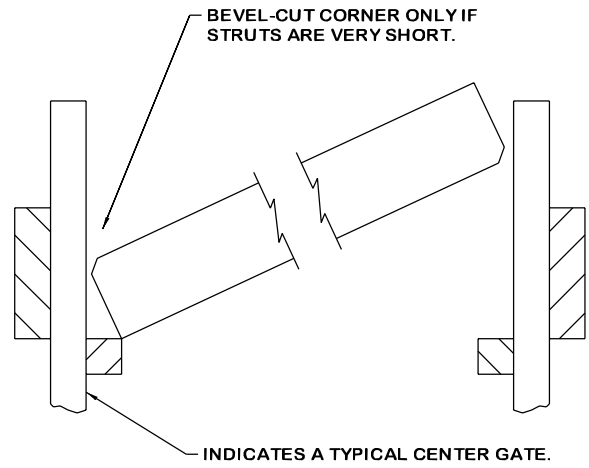
**TIE PIECE APPLICATION**

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.



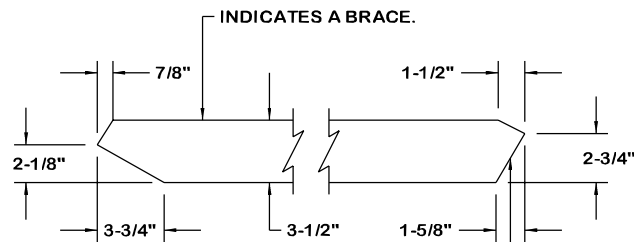
**BEVEL-CUT**

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 "W" ON PAGE 3 FOR ADDITIONAL STRUT INSTALLATION GUIDANCE.



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

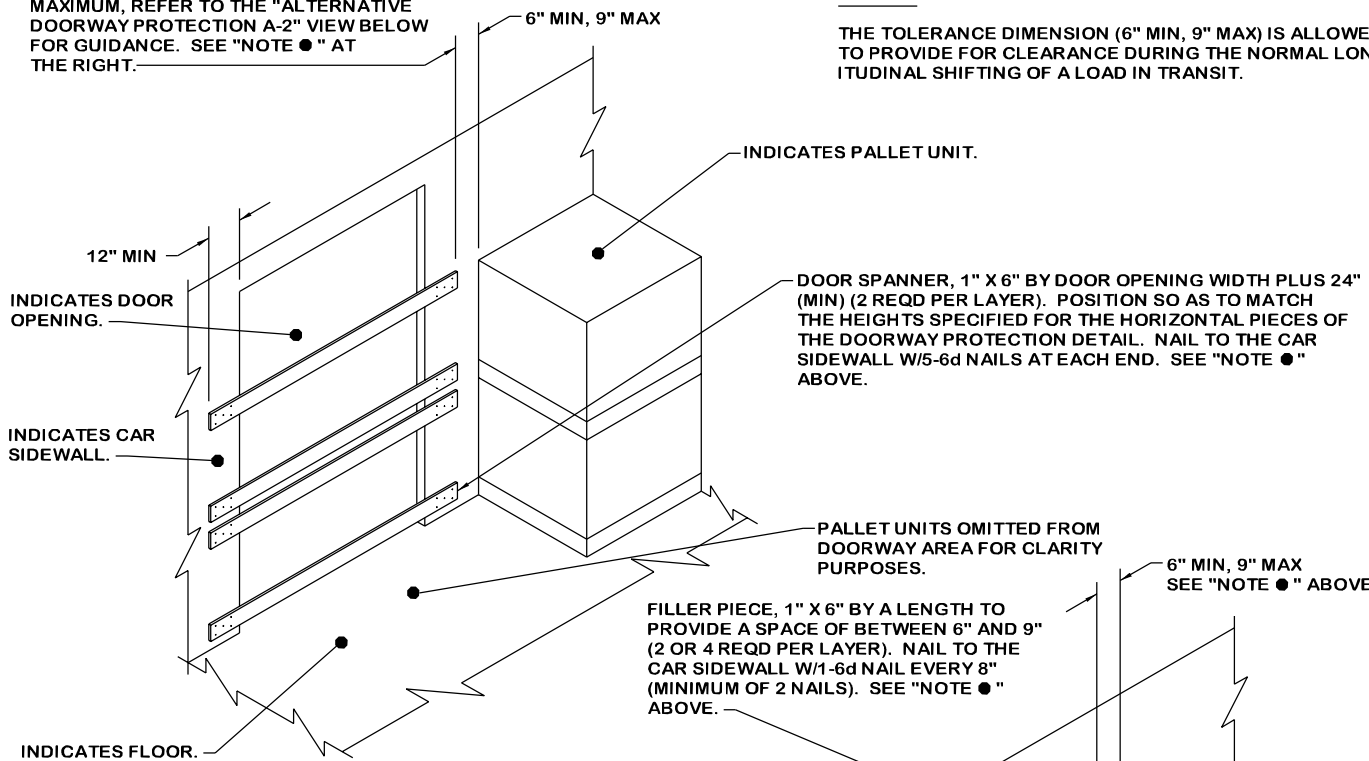
**BRACE BEVEL DETAIL**

4" X 4" MATERIAL

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

**NOTE ●:**

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



**ALTERNATIVE DOORWAY PROTECTION A-1**

THIS METHOD OF DOORWAY PROTECTION IS FOR USE IN CARS HAVING NAILABLE SIDEWALLS AND EQUIPPED WITH CONVENTIONAL SLIDING DOORS, AND IS APPLICABLE ONLY FOR THE SIDE OPPOSITE THE LOADING SIDE OF THE CAR. THE METHOD CAN ALSO BE USED IN CARS EQUIPPED WITH PLUG DOORS; HOWEVER, A METHOD OTHER THAN THE "ALTERNATIVE DOORWAY PROTECTION A-3" PROCEDURES BELOW MUST BE USED ON THE LOADING SIDE OF THE CAR. THE NAILED-DOWN BLOCKING AND STEEL STRAPPING METHOD DEPICTED BY THE "ALTERNATIVE DOORWAY PROTECTION "E" DETAIL ON PAGE 30 OR IN THE LOAD AS SHOWN ON PAGE 10 MAY BE USED ON THE LOADING SIDE.

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

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

INDICATES DOOR OPENING.

INDICATES CAR SIDEWALL.

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

INDICATES CAR SIDEWALL.

INDICATES DOOR OPENING.

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

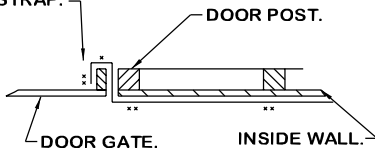
**ALTERNATIVE DOORWAY PROTECTION A-3**

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

HORIZONTAL PIECE, 1" X 6" BY DOOR OPENING WIDTH (2 REQD PER LAYER). NAIL TO THE VERTICAL PIECES W/3-6d NAILS AT EACH END. SEE THE "DOORWAY PROTECTION" DETAIL ON PAGE 49 FOR HEIGHT LOCATIONS.

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.

INDICATES DOOR OPENING.

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

INDICATES CAR SIDEWALL.

INDICATES FLOOR.

**VIEW B**

**ALTERNATIVE DOORWAY PROTECTION B**

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

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

INDICATES DOOR OPENING.

INDICATES CAR SIDEWALL.

DOORWAY PROTECTION STRAP, 1-1/4" X .035" OR .031" STEEL STRAPPING BY DOOR OPENING WIDTH PLUS 8'-0" IN LENGTH (2 REQD PER LAYER). INSTALL FROM TWO 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 MICRO-LOCK NAILS.

DOOR SPANNER END OF STRAP.

**VIEW C**

INDICATES STRAP ANCHOR PLATE.

**ISOMETRIC VIEW**

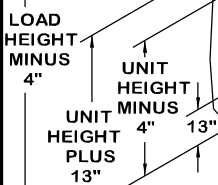
**VIEW C**

**APPLICATION OF STRAPPING TO STRAP ANCHOR PLATE**

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

INDICATES STRAP ANCHOR PLATE (2 REQD PER STRAP).

INDICATES FLOOR.



A TOLERANCE OF PLUS OF MINUS 2" IS PERMISSIBLE.

**ALTERNATIVE DOORWAY PROTECTION C**

THIS METHOD OF DOORWAY PROTECTION IS ONLY FOR USE WITH LOADS IN WHICH THE PALLET UNITS 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.

**DOORWAY PROTECTION**

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

DOOR OPENING WIDTH

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

12"

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

HORIZONTAL PIECE, 1" X 6" BY DOOR OPENING WIDTH (2 REQD PER LAYER). LOCATE AT HEIGHTS AS SPECIFIED BY THE APPLICABLE 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. TOENAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH END.

#### 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 29 FOR GUIDANCE.

DOOR OPENING.

TOP OF LOAD ANTI-SWAY BRACE (AS REQD). SEE THE DETAIL ON PAGE 13.

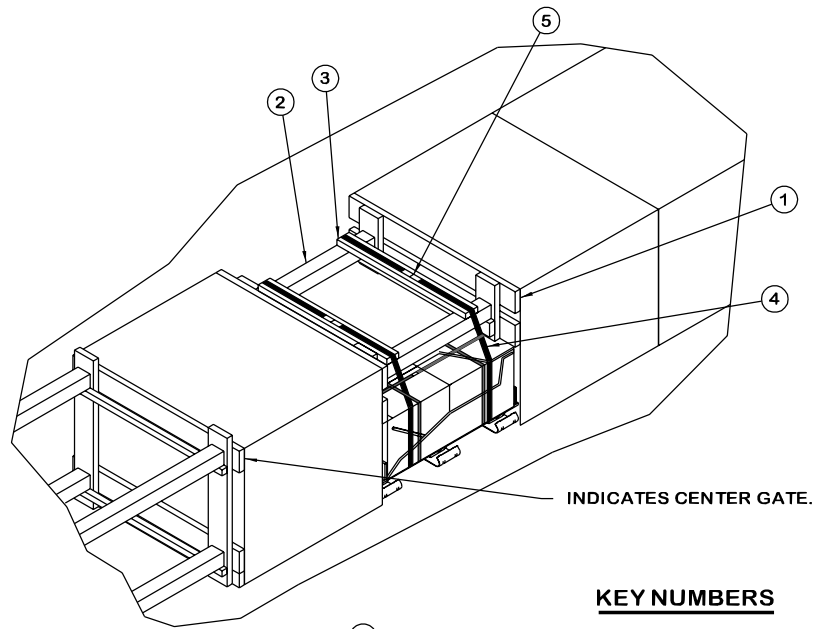
DOORWAY PROTECTION STRAP, 1-1/4" X .031" OR .035" BY A LENGTH TO SUIT STEEL STRAPPING (AS REQD). STAPLE TO SPACER ASSEMBLY W/3 STAPLES. SEE "NOTE ●" BELOW.

SIDE BLOCKING, 2" X 6" X 48" (DOUBLED) (2 REQD FOR EACH LOAD UNIT REQUIRING 1 OR 2 DOORWAY PROTECTION STRAPS). 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.

NOTE ●: TWO 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 6" OF CAR SIDEWALL ON BOTH SIDES OF THE CAR. ONE BUNDLING STRAP IS REQUIRED FOR EACH PALLET STACK AND/OR LOAD UNIT WHICH IS RETAINED BY FROM 6" TO ONE-HALF THE PALLET/LOAD UNIT WIDTH.

#### ALTERNATIVE DOORWAY PROTECTION E

#### DOORWAY PROTECTION



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

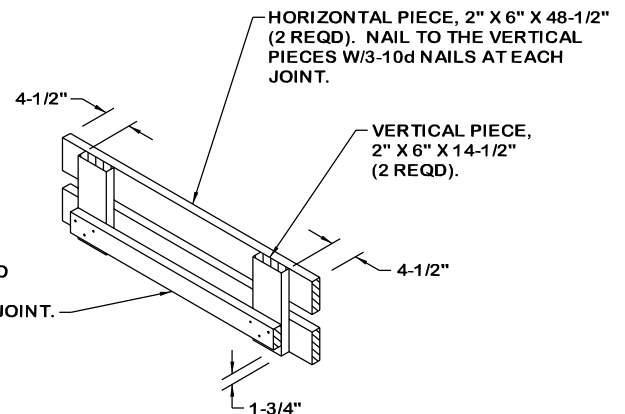
**SPECIAL NOTES:**

1. SHIPMENTS OF PALLET UNITS 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 NEED 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 LENGTHWISE LOAD.
2. THE PALLET UNIT SHOWN IN THE SHIPMENT OF A PARTIAL UNIT VIEW IS A ONE LAYER HIGH PALLET UNIT.
3. A PARTIAL UNIT MUST CONSIST OF FULL LAYERS OF 10 M592 CONTAINERS, OR AN APPROVED FILLER ASSEMBLY, AS DETAILED BY NAVSEA DRAWING 6214179. FILLER MUST BE INSTALLED IN PLACE OF OMITTED CONTAINERS.
4. THE FILLERS AS REFERENCED IN SPECIAL NOTE 3 AND THE DUNNAGE DEPICTED ABOVE FOR THE SHIPMENT OF THE PARTIAL UNIT MAY BE REMOVED WHEN A SHIPMENT REACHES DESTINATION, OR IF DESIRED, THE FILLERS MAY REMAIN WITH THE UNIT DURING STORAGE (IF APPLICABLE) FOR POSSIBLE USE IN A FUTURE SHIPMENT.
5. THE "POSITIONING OF PARTIAL CROSSWISE UNIT IN A LAYER" VIEW ABOVE DEPICTS A PORTION OF A CONVENTIONAL BOXCAR LOAD, HOWEVER, THE PROCEDURES ARE ALSO APPLICABLE 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 LOAD UNIT BETWEEN THE PARTIAL UNIT AND THE CENTER GATE.

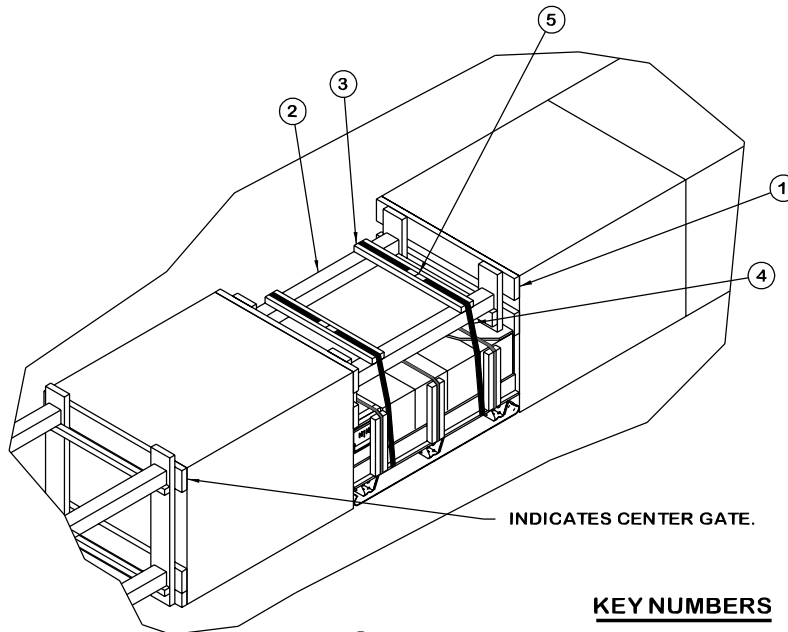
**KEY NUMBERS**

- ① PARTIAL UNIT GATE A (2 REQD). SEE THE DETAIL BELOW.
- ② STRUT, 4" X 4" X 3/4" (2 REQD). TOENAIL TO THE VERTICAL PIECES OF THE PARTIAL UNIT GATE W/2-16d NAILS AT EACH END.
- ③ STRAPPING BOARD, 2" X 4" X 37-1/2" (2 REQD). NAIL TO THE STRUTS W/2-10d NAILS AT EACH END.
- ④ UNITIZING STRAP, 1-1/4" X .035" OR .031" BY A LENGTH TO SUIT STEEL STRAPPING (2 REQD). PRE-POSITION.
- ⑤ SEAL FOR 1-1/4" STEEL STRAPPING (4 REQD, 2 PER JOINT). SEE GENERAL NOTE "N" ON PAGE 2.

STRUT LEDGER, 2" X 4" X 39-1/2" (1 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.



**PARTIAL UNIT GATE A**



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

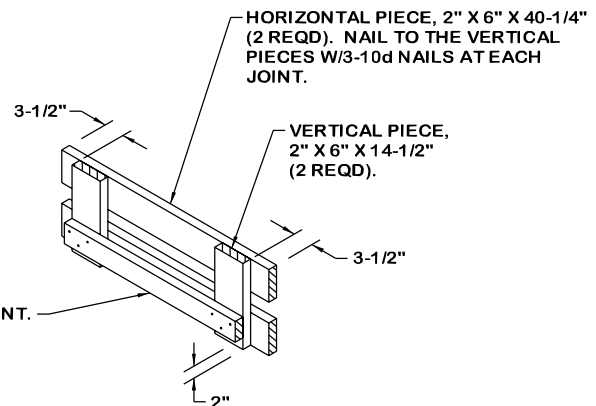
**SPECIAL NOTES:**

1. SHIPMENTS OF PALLET UNITS 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 NEED 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 LENGTHWISE LOAD.
2. THE PALLET UNIT SHOWN IN THE SHIPMENT OF A PARTIAL UNIT VIEW IS A ONE LAYER HIGH PALLET UNIT.
3. A PARTIAL UNIT MUST CONSIST OF FULL LAYERS OF 10 M592 CONTAINERS, OR AN APPROVED FILLER ASSEMBLY, AS DETAILED BY NAVSEA DRAWING 6214179. FILLER MUST BE INSTALLED IN PLACE OF OMITTED CONTAINERS.
4. THE FILLERS AS REFERENCED IN SPECIAL NOTE 3 AND THE DUNNAGE DEPICTED ABOVE FOR THE SHIPMENT OF THE PARTIAL UNIT MAY BE REMOVED WHEN A SHIPMENT REACHES DESTINATION, OR IF DESIRED, THE FILLERS MAY REMAIN WITH THE UNIT DURING STORAGE (IF APPLICABLE) FOR POSSIBLE USE IN A FUTURE SHIPMENT.
5. THE "POSITIONING OF PARTIAL LENGTHWISE UNIT IN A LAYER" VIEW ABOVE DEPICTS A PORTION OF A CONVENTIONAL BOXCAR LOAD, HOWEVER, THE PROCEDURES ARE ALSO APPLICABLE 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 LOAD UNIT BETWEEN THE PARTIAL UNIT AND THE CENTER GATE.

**KEY NUMBERS**

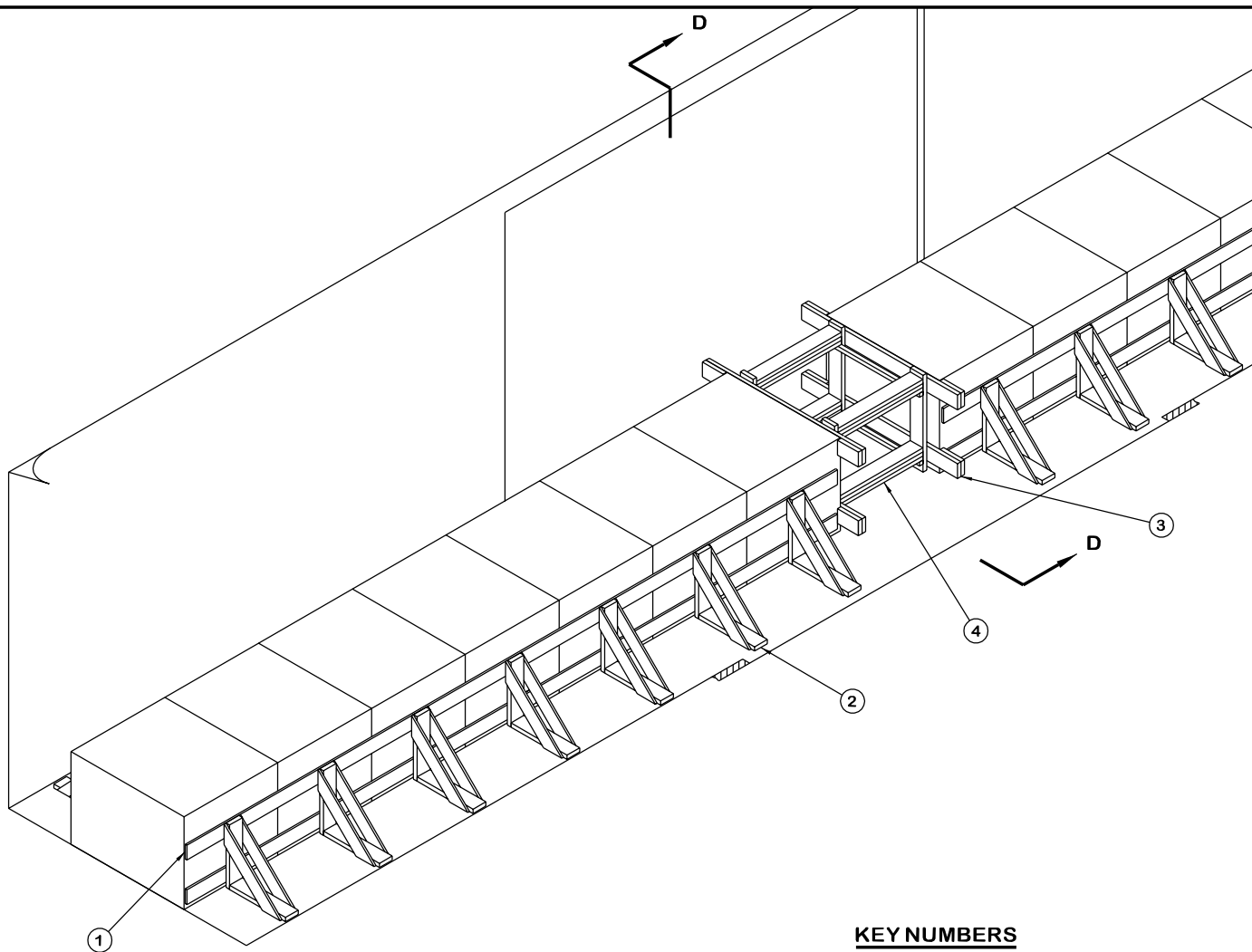
- ① PARTIAL UNIT GATE B (2 REQD). SEE THE DETAIL BELOW.
- ② STRUT, 4" X 4" X 42-1/2" (2 REQD). TOENAIL TO THE VERTICAL PIECES OF THE PARTIAL UNIT GATE W/2-16d NAILS AT EACH END.
- ③ STRAPPING BOARD, 2" X 4" X 31-1/4" (2 REQD). NAIL TO THE STRUTS W/2-10d NAILS AT EACH END.
- ④ UNITIZING STRAP, 1-1/4" X .035" OR .031" BY A LENGTH TO SUIT STEEL STRAPPING (2 REQD). PRE-POSITION.
- ⑤ SEAL FOR 1-1/4" STEEL STRAPPING (4 REQD, 2 PER JOINT). SEE GENERAL NOTE "N" ON PAGE 2.

STRUT LEDGER, 2" X 4" X 33-1/4" (1 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.



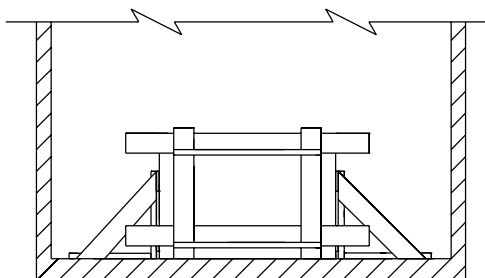
**PARTIAL UNIT GATE B**





**KEY NUMBERS**

- ① 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 38.
- ② LCL BRACE (28 REQD). SEE THE DETAIL ON PAGE 38. NAIL TO THE CAR FLOOR W/7-16d NAILS. SEE GENERAL NOTE "T" ON PAGE 3.
- ③ CENTER GATE (2 REQD). SEE THE CENTER GATE "J" OR CENTER GATE "K" DETAIL ON PAGE 42 FOR LENGTHWISE OR CROSSWISE UNITS RESPECTIVELY.
- ④ STRUT, 2" X 6" BY CUT TO FIT (4 REQD) (TRIPLED). NAIL THE FIRST PIECE TO THE CENTER GATE STRUT LEDGER W/2-10d NAILS AT EACH END. LAMINATE THE SECOND PIECE TO THE FIRST W/1-10d NAIL EVERY 12". LAMINATE THE THIRD PIECE TO THE SECOND IN A SIMILAR MANNER. SEE GENERAL NOTES "V" AND "W" ON PAGE 3.

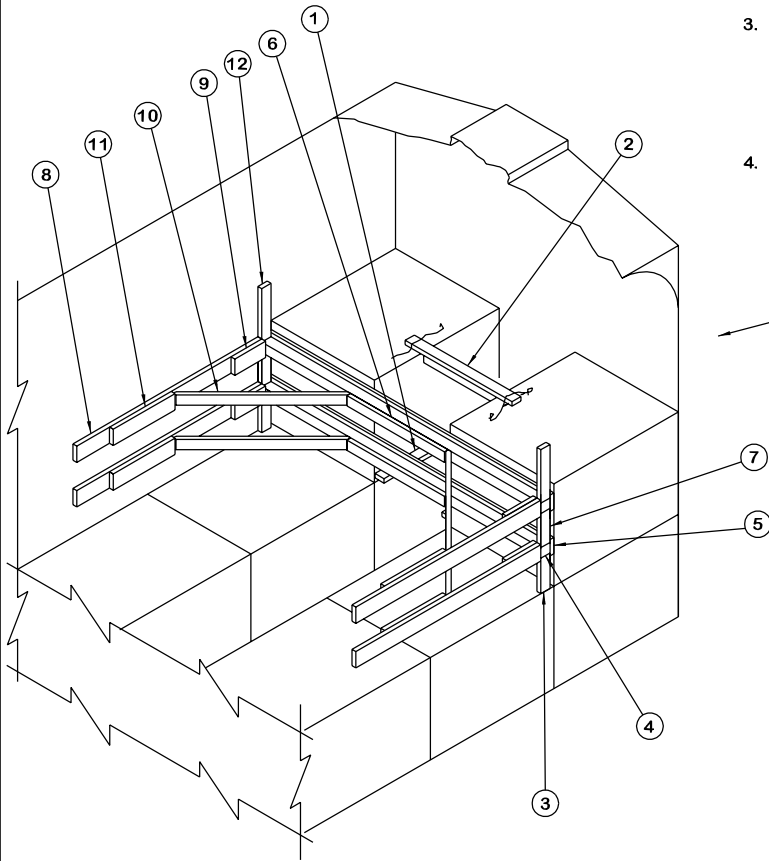


**SECTION D-D**

(STRUTS OMITTED FOR CLARITY)

**TYPICAL LCL LOAD USING ONE WIDE LOADING METHOD**

(SPECIAL NOTES CONTINUED)



**ISOMETRIC VIEW**

3. THE K-BRACE METHOD OF PARTIAL LAYER (TIER) BRACING SHOWN MAY BE USED IN WOOD-LINED CARS FOR THE SECUREMENT OF A PARTIAL TOP TIER, BE IT A SECOND TIER, THIRD TIER OR FIRST. THE TYPE "A" K-BRACE SHOWN IS ADEQUATE FOR RETAINING PARTIAL TIER OF NOT MORE THAN 8,000 LBS (THREE PALLET UNITS).
4. THE CENTER CLEAT, SHOWN AS PIECE MARKED ⑤, WILL BE 30" LONG FOR AN 8'-6" WIDE CAR, 38" LONG FOR A 9'-2", AND 40" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.

SEE GENERAL NOTE "F" ON PAGE 2.

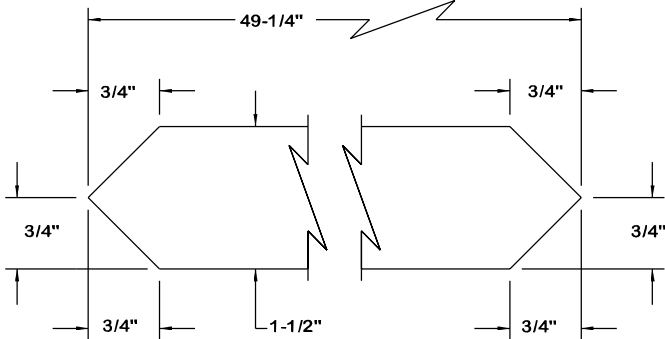
**SPECIAL NOTES:**

1. A 9'-2" WIDE CONVENTIONAL WOOD-LINED BOXCAR 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. 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 40" LONG PIECES TO THE CAR ENDWALL AND TO THE K-BRACE. NAIL TO THE CAR ENDWALL W/6-12d NAILS EACH LAYER. THE FIRST PIECE APPLIED TO THE K-BRACE WILL BE NAILED TO PIECE MARKED ④ 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 PAGES 35, 36, AND 37 FOR SELECTION OF THE APPLICABLY SIZED K-BRACE TO USE AND THE DESIGN SPECIFICATIONS FOR THE BRACE.

**KEY NUMBERS**

- ① ANTI-SWAY BRACE (1 REQD). SEE THE DETAIL ON PAGE 13. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF PALLET UNITS. NOTE THAT THE QUANTITY IS ONLY FOR THE PARTIAL-TIER UNITS.
- ② TOP OF LOAD ANTI-SWAY BRACE (1 REQD). SEE THE DETAIL ON PAGE 13. WIRE TIE TO THE STEEL STRAPPING OF THE PALLET UNIT WITH .080" DIA. WIRE AS TYPICALLY SHOWN BY THE "TIE WIRE APPLICATION" DETAIL ON PAGE 17. NOTE THAT THE QUANTITY IS ONLY FOR THE PARTIAL-TIER UNITS.
- ③ SUPPORT CLEAT, 2" X 4" X 12 (2 REQD). POSITION VERTICALLY AS SHOWN SO AS THAT CROSS CAR BRACES WILL BEAR ON THE PALLET UNITS. NAIL TO THE CAR SIDEWALL W/3-12d NAILS.
- ④ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH IN LENGTH (CUT TO FIT) (2 REQD).
- ⑤ HORIZONTAL PIECE, 2" X 6" BY CAR WIDTH (CUT TO FIT) (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ④, W/1-12d NAIL EVERY 12".
- ⑥ CENTER CLEAT, 2" X 4" X 38" (2 REQD). NAIL TO THE CROSS CAR BRACE W/7-16d NAILS. SEE SPECIAL NOTE 4 ABOVE.
- ⑦ SPACER CLEAT, 2" X 4" X 11-1/2" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑧ HORIZONTAL WALL CLEAT, 2" X 6" X 72" (4 REQD). NAIL TO THE CAR SIDEWALL W/16-12d NAILS.
- ⑨ POCKET CLEAT, 2" X 6" X 12" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT W/4-16d NAILS.
- ⑩ DIAGONAL BRACE, 2" X 4" X 49-1/2" (4 REQD). SEE THE DETAIL AT LEFT FOR BEVEL-CUTS REQUIRED. TOENAIL TO THE CROSS CAR BRACE AND TO THE HORIZONTAL WALL CLEAT W/2-16d NAILS AT EACH END.
- ⑪ BACK-UP CLEAT, 2" X 6" X 24" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT W/8-16d NAILS.
- ⑫ HOLD-DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.

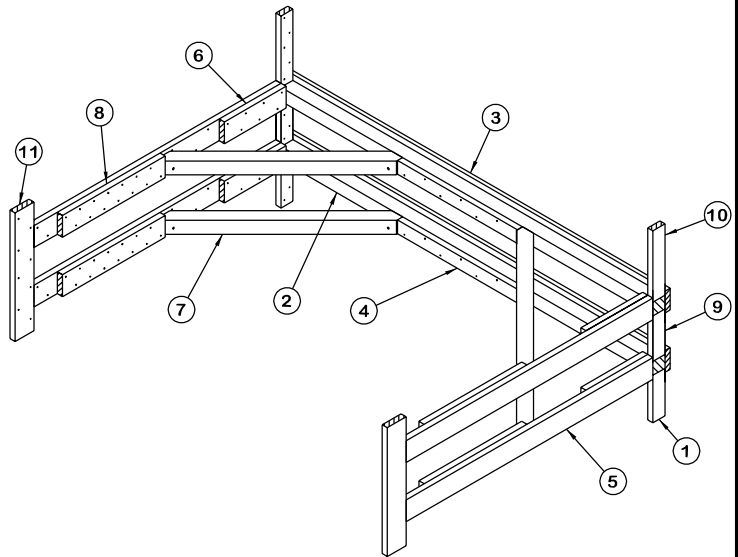
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**DIAGONAL BRACE**

**SPECIAL NOTES:**

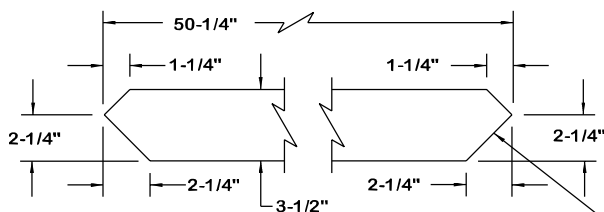
1. THE TYPE "B" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN 14,000 POUNDS. THIS WILL BE NOT MORE THAN FOUR PALLET UNITS. IF IT IS NECESSARY TO BLOCK MORE THAN FOUR PALLET UNITS, REFER TO THE DETAILS ON PAGES 36 AND 37 FOR SELECTION OF THE APPLICABLY SIZED K-BRACE TO USE AND THE DESIGN SPECIFICATIONS FOR THE BRACE. IF THE PARTIAL TIER TO BE BRACED WEIGHS 8,000 POUNDS OR LESS, THE TYPE "A" K-BRACE SHOWN ON PAGE 34 WILL 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, ⑤, 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 34 FOR A TYPICAL INSTALLATION OF A K-BRACE.



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① SUPPORT CLEAT, 2" X 4" X 12" (2 REQD). POSITION VERTICALLY AS SHOWN SO THAT CROSS CAR BRACES WILL BEAR ON THE PALLET UNITS. NAIL TO THE CAR SIDEWALL W/3-12d NAILS.
- ② CROSS CAR BRACE, 4" X 4" BY CAR WIDTH (CUT TO FIT) (2 REQD).
- ③ HORIZONTAL PIECE, 2" X 6" BY CAR WIDTH (CUT TO FIT) (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ②, W/1-12d NAIL EVERY 12".
- ④ CENTER CLEAT, 2" X 4" X 38" (2 REQD). NAIL TO THE CROSS CAR BRACE 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 W/7-16d NAILS.
- ⑦ DIAGONAL BRACE, 4" X 4" X 50-1/4" (4 REQD). SEE THE DETAIL BELOW LEFT FOR BEVEL CUTS REQUIRED. TOENAIL TO THE CROSS CAR BRACE AND TO THE HORIZONTAL WALL CLEAT W/1-60d NAIL AT EACH END.
- ⑧ BACK-UP CLEAT, 2" X 6" X 30" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT W/14-16d NAILS.
- ⑨ SPACER CLEAT, 2" X 4" X 11-1/2" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑩ HOLD-DOWN CLEAT, 2" X 6" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑪ VERTICAL BACK-UP CLEAT, 2" X 6" X 32-1/2" (2 REQD). NAIL TO THE CAR SIDEWALL W/8-12d NAILS.



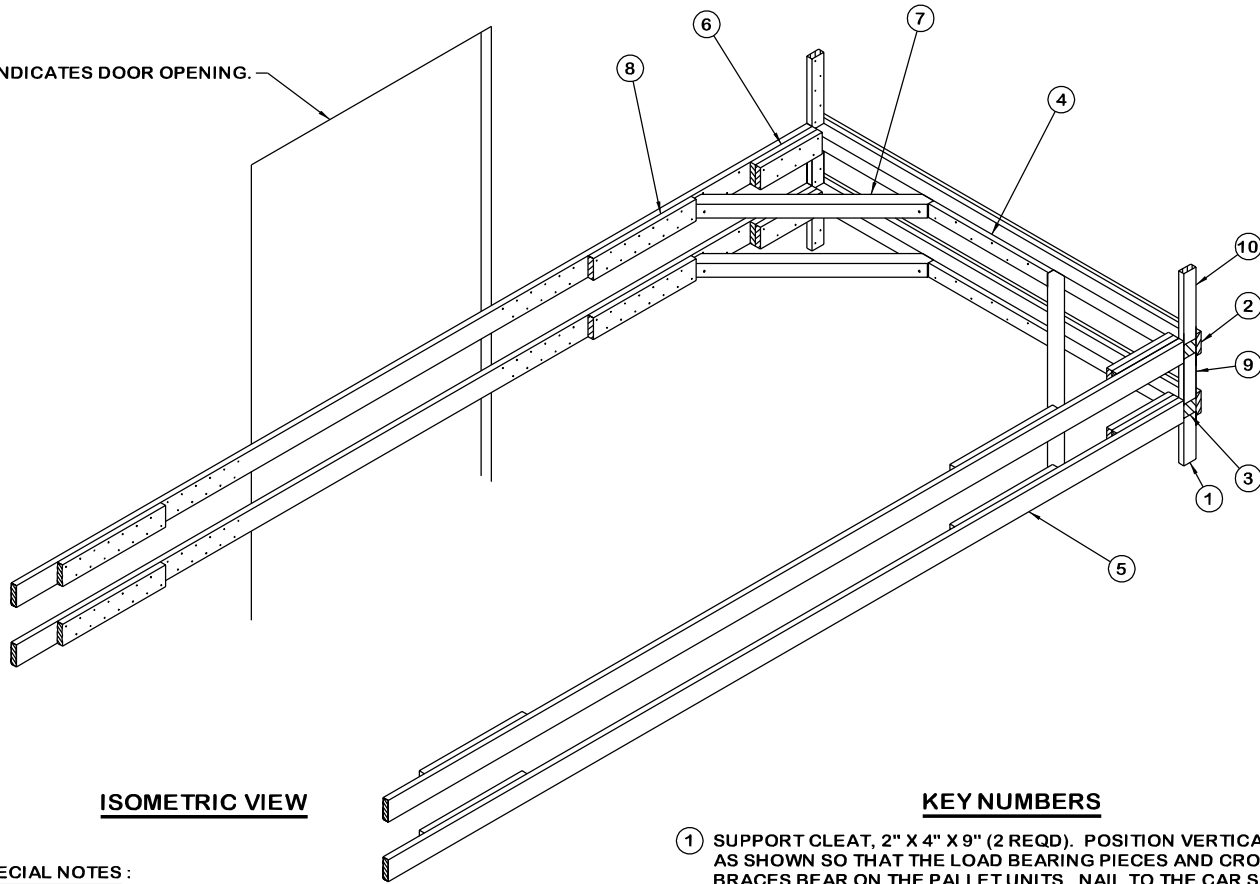
**DIAGONAL BRACE**

SEE SPECIAL NOTE 2 ABOVE.

THIS BEARING SURFACE MUST BE POSITIONED SO AS TO BE IN CONTACT WITH A CROSS CAR BRACE, PIECE MARKED ②, OR A HORIZONTAL WALL CLEAT, PIECE MARKED ⑤.

**TYPE "B" K-BRACE**

INDICATES DOOR OPENING.



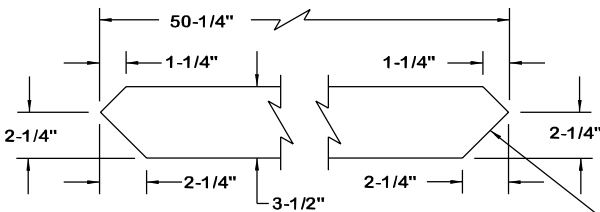
**ISOMETRIC VIEW**

**KEY NUMBERS**

**SPECIAL NOTES:**

1. THE TYPE "C" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN SIX PALLET UNITS (20,000 POUNDS OR LESS). IF IT IS NECESSARY TO BLOCK MORE THAN SIX PALLET UNITS, REFER TO THE DETAIL ON PAGE 37. IF THE PARTIAL TIER TO BE BRACED CONSISTS OF FOUR PALLET UNITS, THE TYPE "B" BRACE DEPICTED ON PAGE 35 MAY BE USED. IF THE PARTIAL TIER TO BE BRACED CONSISTS OF TWO PALLET UNITS, THE TYPE "A" BRACE DEPICTED ON PAGE 34 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, ⑥, 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 PROPORTION LATELY 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 9" (2 REQD). POSITION VERTICALLY AS SHOWN SO THAT THE LOAD BEARING PIECES AND CROSS CAR BRACES BEAR ON THE PALLET UNITS. 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 W/1-12d NAIL EVERY 6".
- ③ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH (CUT TO FIT) (2 REQD).
- ④ CENTER CLEAT, 2" X 4" X 38" (2 REQD). NAIL TO THE CROSS CAR BRACE W/7-16d NAILS. SEE SPECIAL NOTE 3 AT LEFT.
- ⑤ HORIZONTAL WALL CLEAT, 2" X 6" BY CUT TO FIT (4 REQD). THE CLEATS SHALL RUN THE FULL LENGTH OF THE CAR CONTACTING THE CROSS CAR BRACES IN EITHER END OF THE CAR. THERE SHALL NOT BE ANY JOINTS IN THE DOOR OPENING AREA. NAIL TO THE CAR SIDEWALL W/40-12d NAILS. SEE SPECIAL NOTE 2 AT LEFT.
- ⑥ POCKET CLEAT, 2" X 6" X 18" (DOUBLED) (4 REQD). NAIL THE FIRST PIECE TO THE HORIZONTAL WALL CLEAT 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 AND TO THE HORIZONTAL WALL CLEAT W/1-60d NAIL AT EACH END.
- ⑧ BACK-UP CLEAT, 2" X 6" X 30" (4 REQD). NAIL TO THE HORIZONTAL W/14-16d NAILS.
- ⑨ SPACER CLEAT, 2" X 4" X 11-1/2" (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.



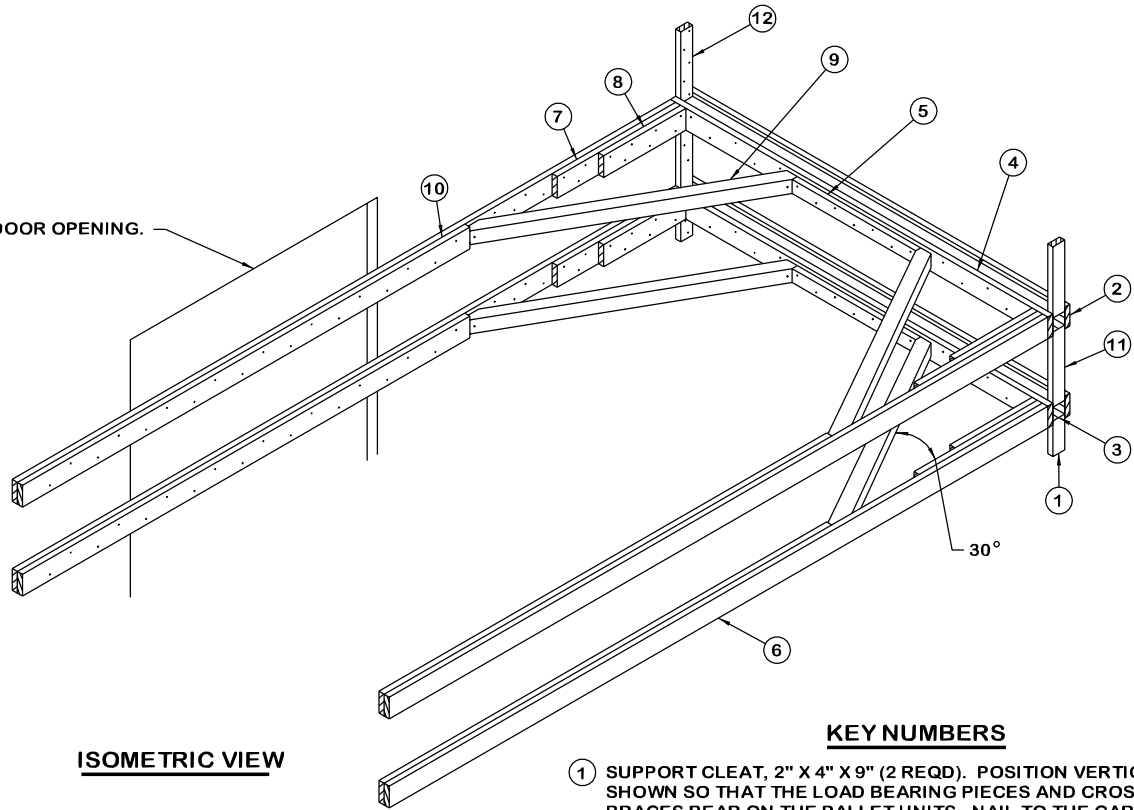
**DIAGONAL BRACE**

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**

INDICATES DOOR OPENING.



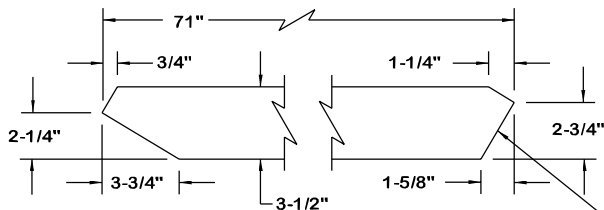
**ISOMETRIC VIEW**

**KEY NUMBERS**

**SPECIAL NOTES :**

1. THE TYPE "D" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN EIGHT PALLET UNITS. IF THE PARTIAL TIER TO BE BRACED IS ONLY SIX PALLET UNITS, THE TYPE "C" K-BRACE DEPICTED ON PAGE 36 MAY BE USED. IF FOUR PALLET UNITS ARE TO BE SHIPPED, THE TYPE "B" K-BRACE DEPICTED ON PAGE 35 MAY BE USED. IF THE PARTIAL TIER IS ONLY TWO PALLET UNITS, THE TYPE "A" K-BRACE DEPICTED ON PAGE 34 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 ALRIGHT FOR THE ENDS OF THE DIAGONAL BRACES MARKED ⑨ TO BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE ADJACENT PIECE MARKED ⑥ MUST BE DOUBLED. LAMINATE THE SECOND PIECE TO THE FIRST W/40-16d NAILS. CLINCH THOSE NAILS WHICH PROTRUDE THRU THE HORIZONTAL WALL CLEAT WITHIN THE DOOR OPENING. NOTE THAT THE DIAGONAL BRACE WILL BE 70-1/4" LONG IN LIEU OF 71" LONG WHEN PIECE MARKED ⑥ IS DOUBLED.
3. THE CENTER CLEAT, SHOWN AS PIECE MARKED ⑤, WILL BE 28" LONG FOR AN 8'-6" WIDE CAR, 36" LONG FOR A 9'-2", AND 38" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.
4. CAUTION: A TYPE "D" K-BRACE MUST BE USED IN BOTH ENDS OF THE CAR; THE BRACE IS NOT DESIGNED FOR USE IN ONLY ONE END. NOTE THAT EXCEPT FOR PIECES MARKED ⑥ AND ⑩, THE QUANTITIES SPECIFIED ARE APPLICABLE ONLY FOR THE BRACE IN ONE END.

- ① SUPPORT CLEAT, 2" X 4" X 9" (2 REQD). POSITION VERTICALLY AS SHOWN SO THAT THE LOAD BEARING PIECES AND CROSS CAR BRACES BEAR ON THE PALLET UNITS. 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".
- 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 OPENINGS 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 11-1/2" (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.

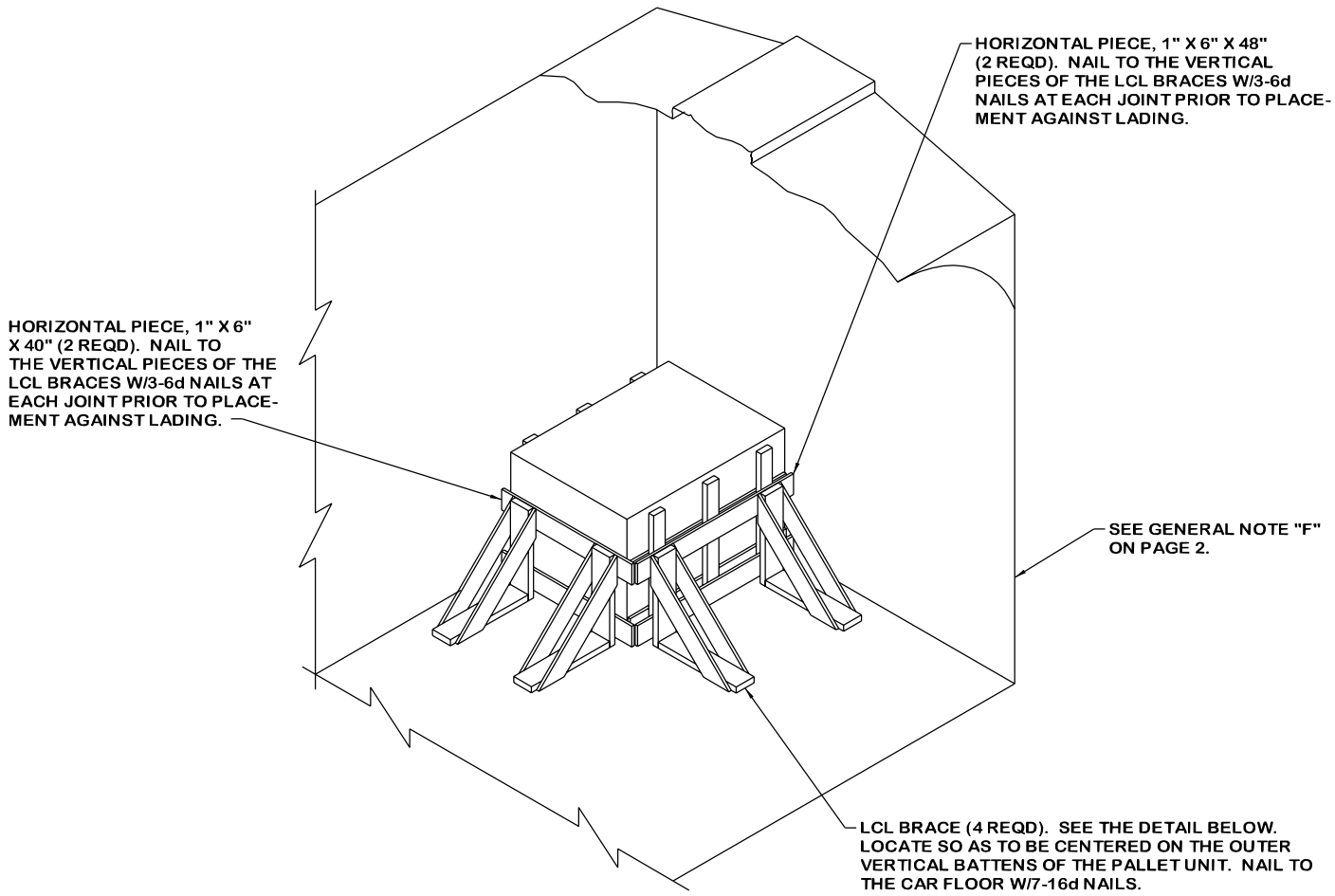


**DIAGONAL BRACE**

SEE SPECIAL NOTE 2 ABOVE.

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

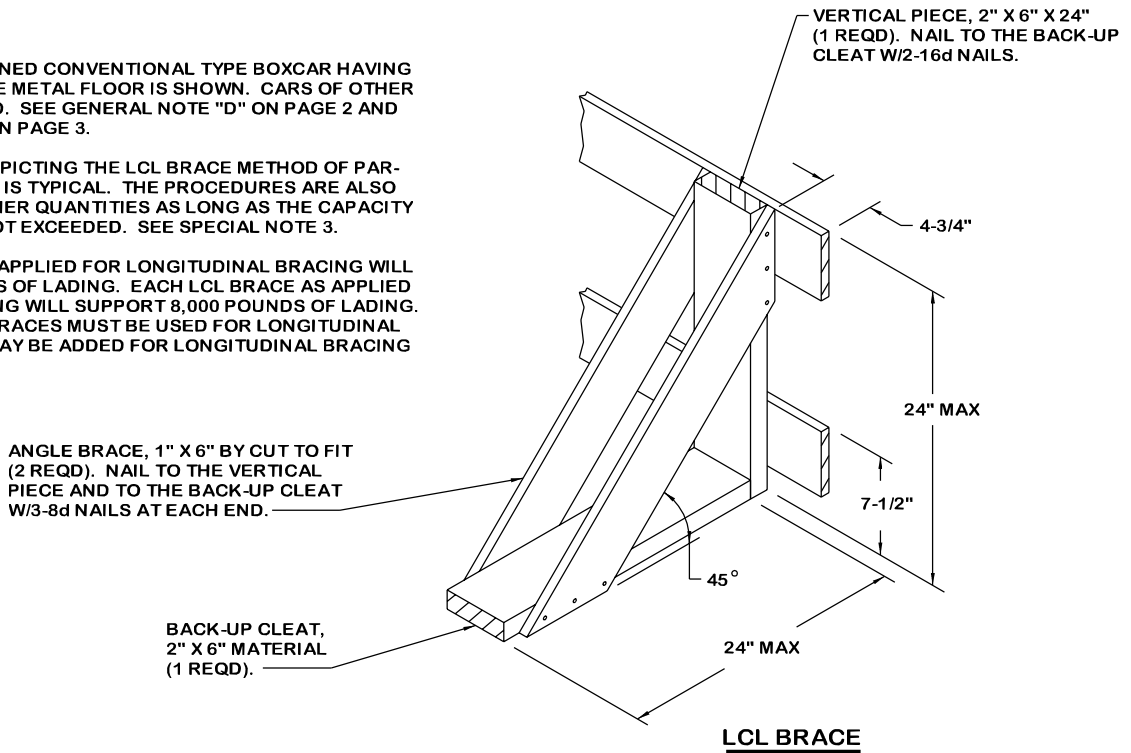
**TYPE "D" K-BRACE**

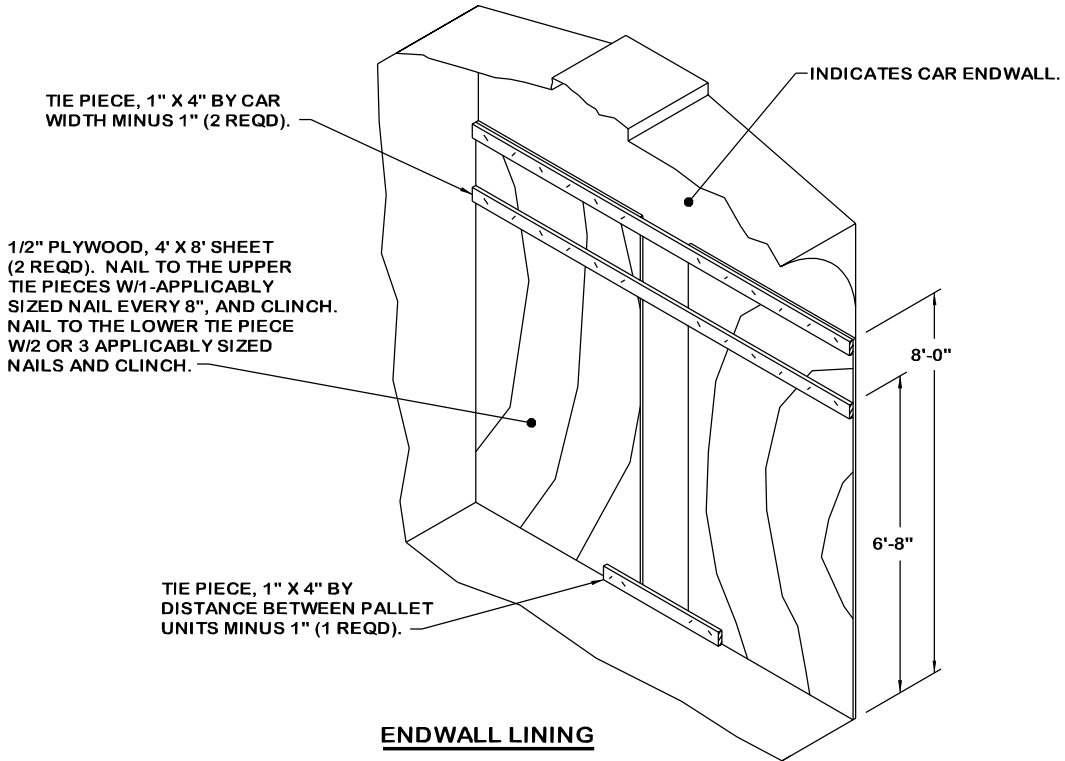


**ISOMETRIC VIEW**

**SPECIAL NOTES :**

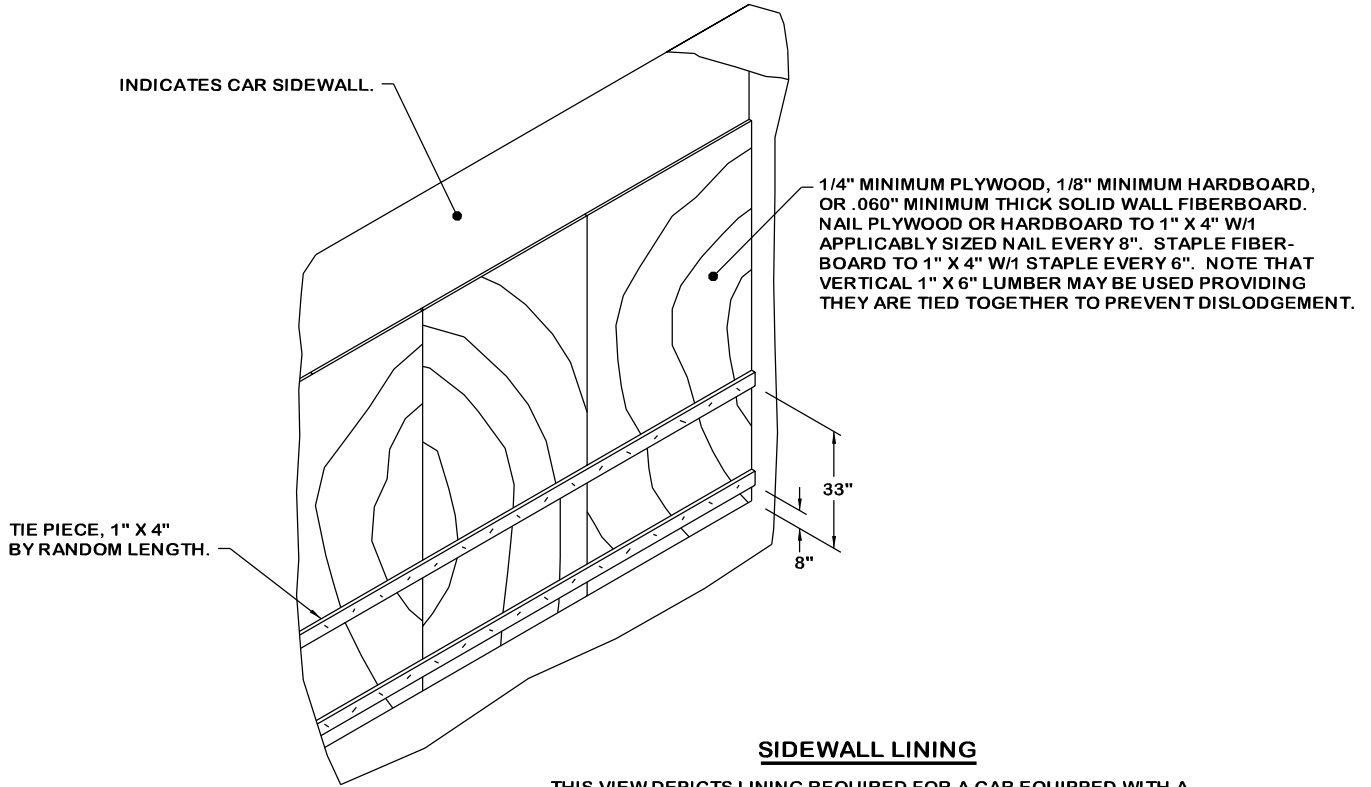
1. A 9'-2" WIDE WOOD-LINED CONVENTIONAL TYPE BOXCAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED. SEE GENERAL NOTE "D" ON PAGE 2 AND GENERAL NOTE "T" ON PAGE 3.
2. THE LOAD SHOWN DEPICTING THE LCL BRACE METHOD OF PARTIAL-LAYER BRACING IS TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE 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 BRACES MUST BE USED FOR LONGITUDINAL BRACING. BRACES MAY BE ADDED FOR LONGITUDINAL BRACING AS NECESSARY.





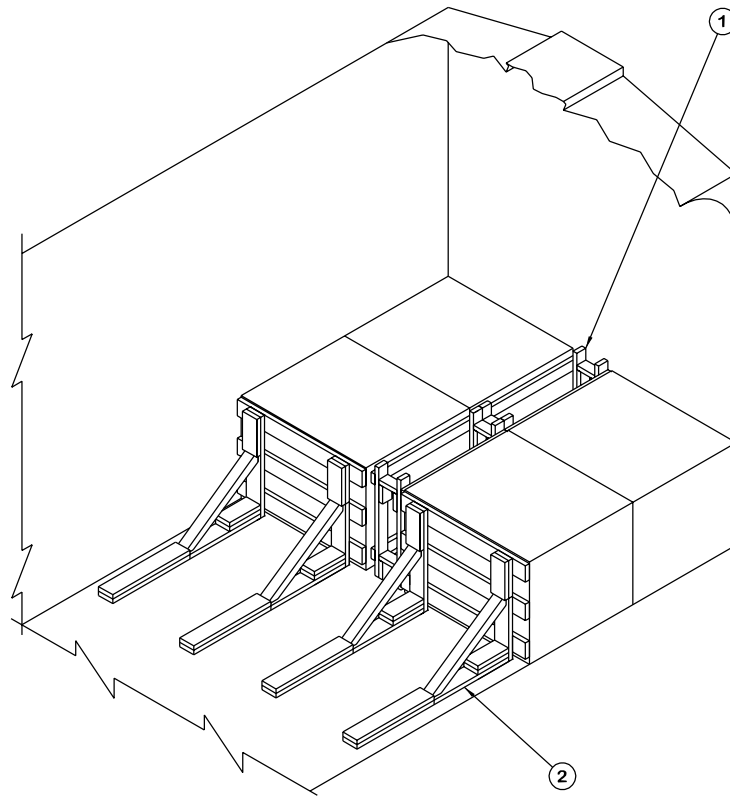
**ENDWALL LINING**

THIS VIEW DEPICTS LINING REQUIRED FOR A LOAD IN A CAR EQUIPPED WITH A STEEL ENDWALL.



**SIDEWALL LINING**

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



**ISOMETRIC VIEW**

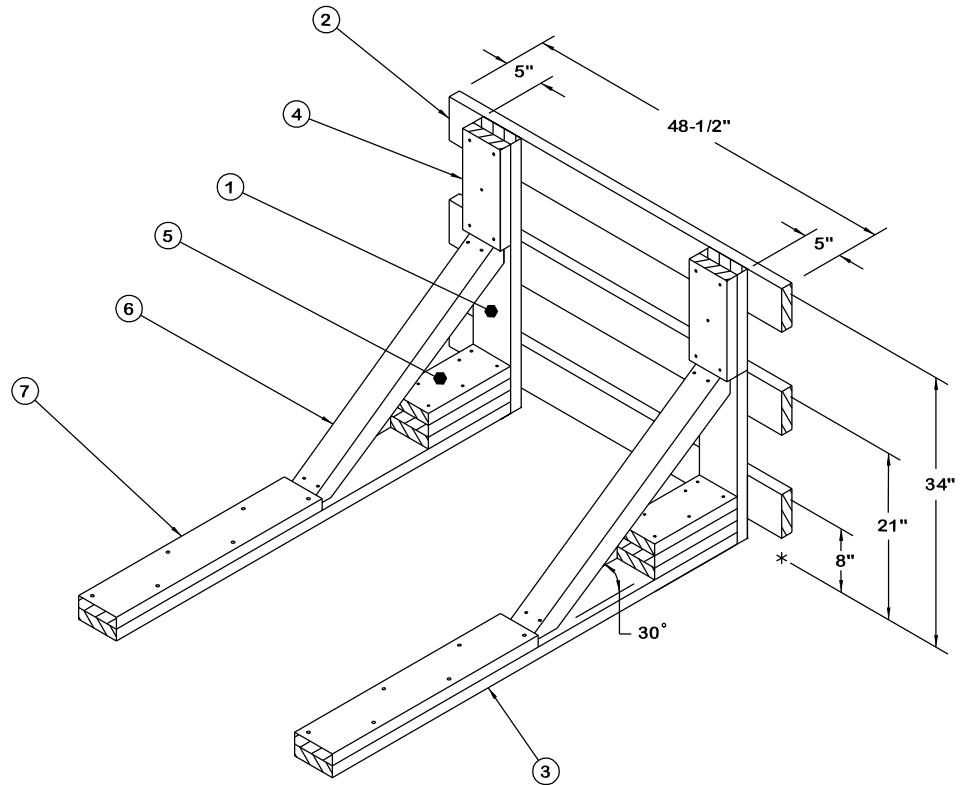
**SPECIAL NOTES:**

1. A 9'-2" WIDE WOOD LINED CONVENTIONAL TYPE BOXCAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. WIDER CARS 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 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 A" DETAIL ON PAGE 12.

**KEY NUMBERS**

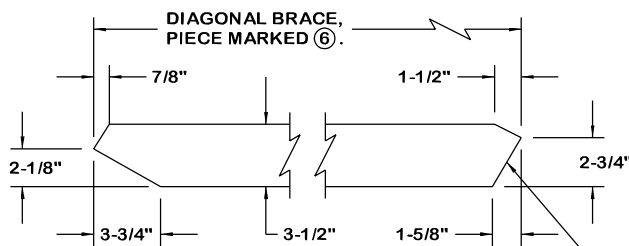
- ① CRIB FILL (2 REQD). SEE DETAIL ON PAGE 13. INSTALL BETWEEN LATERALLY ADJACENT PALLET UNITS.
- ② KNEE BRACE ASSEMBLY (2 REQD). SEE DETAIL ON PAGE 41 FOR CONSTRUCTION SPECIFICATIONS AND NAILING REQUIREMENTS.





### KEY NUMBERS

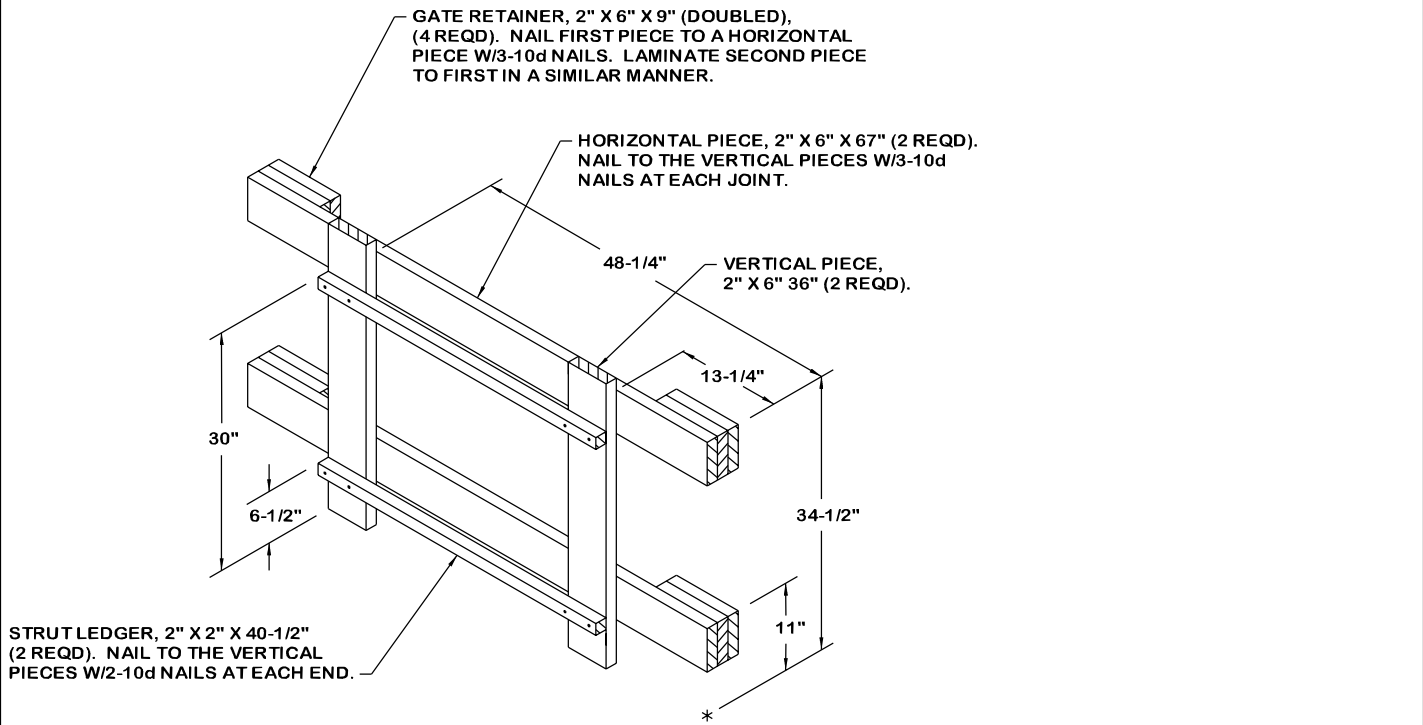
- ① VERTICAL PIECE, 2" X 6" X 34" (2 REQD).
- ② HORIZONTAL PIECE, 2" X 6" X 48-1/2" (3 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT. SEE GENERAL NOTES "L" AND "M" ON PAGE 2, AND SPECIAL NOTE 4 ON PAGE 40.
- ③ FLOOR CLEAT, 2" X 6" X 59" (2 REQD). ALIGN WITH A VERTICAL PIECE AND NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8". SEE GENERAL NOTE "T" ON PAGE 3.
- ④ HOLD DOWN CLEAT, 2" X 6" X 12-3/4" (2 REQD). NAIL TO A VERTICAL PIECE W/5-10d NAILS.
- ⑤ POCKET CLEAT, 2" X 6" X 12" (TRIPLED) (2 REQD). NAIL THE FIRST PIECE TO THE FLOOR CLEAT W/4-16d NAILS. NAIL THE SECOND AND THIRD PIECES IN A LIKE MANNER AND TOENAIL THE THIRD PIECE TO THE VERTICAL PIECE W/2-16d NAILS.
- ⑥ BRACE, 4" X 4" BY CUT TO FIT (REF: 33") (2 REQD). SEE THE DETAIL AT LEFT FOR REQUIRED BEVEL CUTS. TOENAIL TO THE VERTICAL PIECE AND THE FLOOR CLEAT W/2-16d NAILS AT EACH JOINT.
- ⑦ BACK UP CLEAT, 2" X 6" X 30" (2 REQD). NAIL TO THE FLOOR CLEAT W/6-20d NAILS.
- ⑧ HOLD DOWN CLEAT (NOT SHOWN). SEE SPECIAL NOTE 4 ON PAGE 40.



### BRACE BEVEL DETAIL

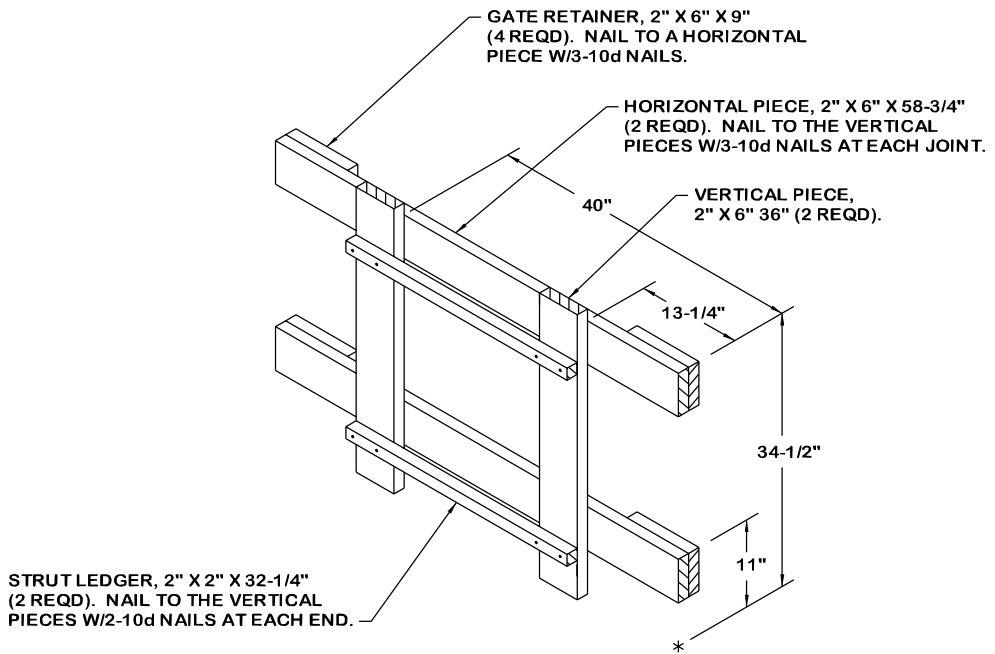
4" X 4" MATERIAL

THE BRACE MUST BE INSTALLED SO THAT THIS BEARING SURFACE WILL BE IN CONTACT WITH THE VERTICAL PIECE MARKED ①.



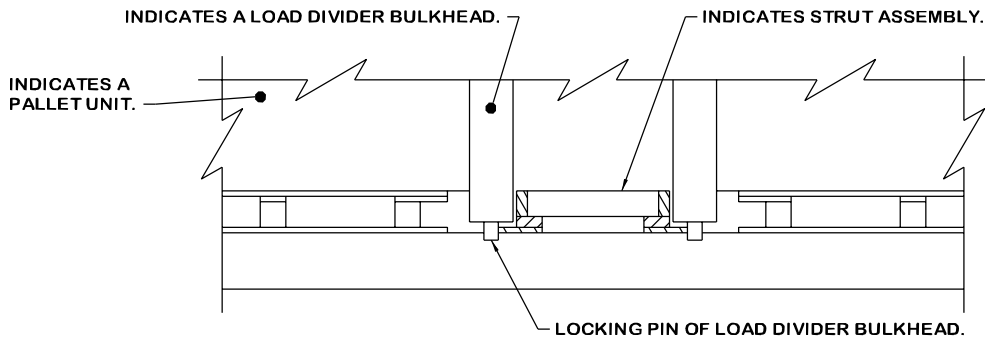
**CENTER GATE J**

THIS GATE IS FOR USE WITH LENGTHWISE UNITS.



**CENTER GATE K**

THIS GATE IS FOR USE WITH CROSSWISE UNITS.

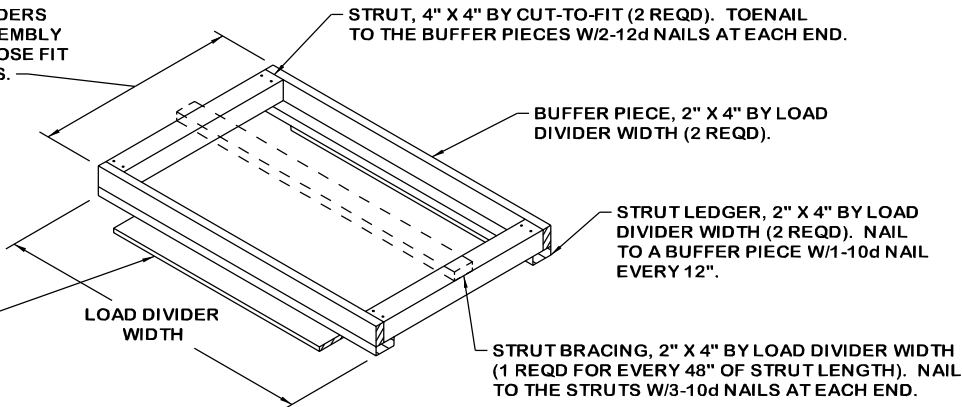


**INSTALLATION OF STRUT ASSEMBLY**

THIS SIDE ELEVATION 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.

FABRICATE TO FIT BETWEEN LOAD DIVIDERS MINUS 1/2" TO 3/4". CAUTION: THE ASSEMBLY IS INTENTIONALLY DESIGNED FOR A LOOSE FIT BETWEEN THE LOAD DIVIDER BULKHEADS.

HOLD DOWN, 1" X 8" BY CUT-TO-FIT BETWEEN LOCKING PINS AT EACH SIDE OF THE LOAD DIVIDER (2 REQD). NAIL TO THE STRUT LEDGER W/1-6d NAIL EVERY 12".

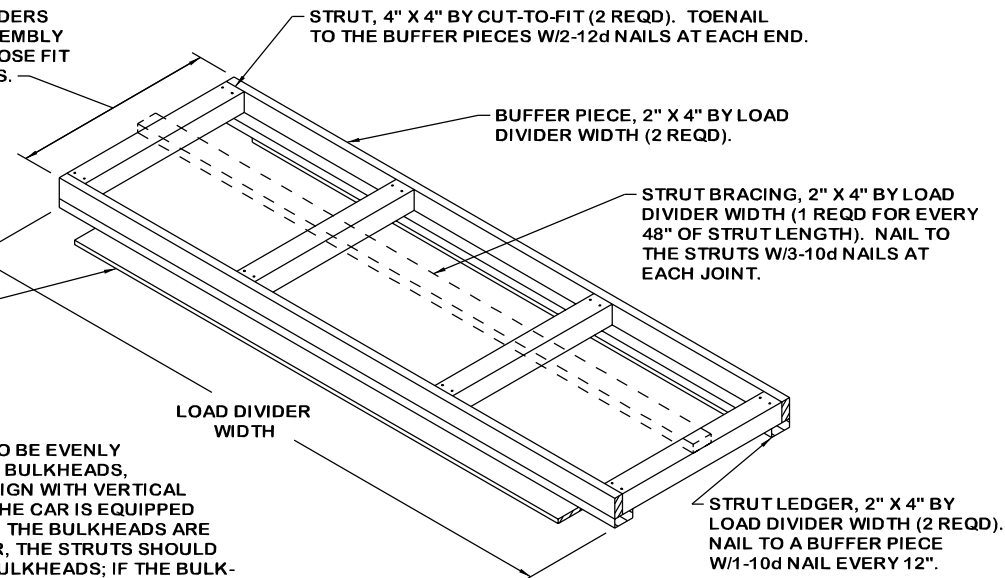


**STRUT ASSEMBLY FOR 2-PIECE BULKHEADS**

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 ASSEMBLIES AS SHOWN ARE REQUIRED FOR A 2-PIECE BULKHEAD IF NOT LATERALLY ALIGNED. SEE "NOTE ▲" BELOW.

FABRICATE TO FIT BETWEEN LOAD DIVIDERS MINUS 1/2" TO 3/4". CAUTION: THE ASSEMBLY IS INTENTIONALLY DESIGNED FOR A LOOSE FIT BETWEEN THE LOAD DIVIDER BULKHEADS.

HOLD DOWN, 1" X 8" BY CUT-TO-FIT BETWEEN LOCKING PINS AT EACH SIDE OF THE LOAD DIVIDER (2 REQD). NAIL TO THE STRUT LEDGER W/1-6d NAIL EVERY 12".

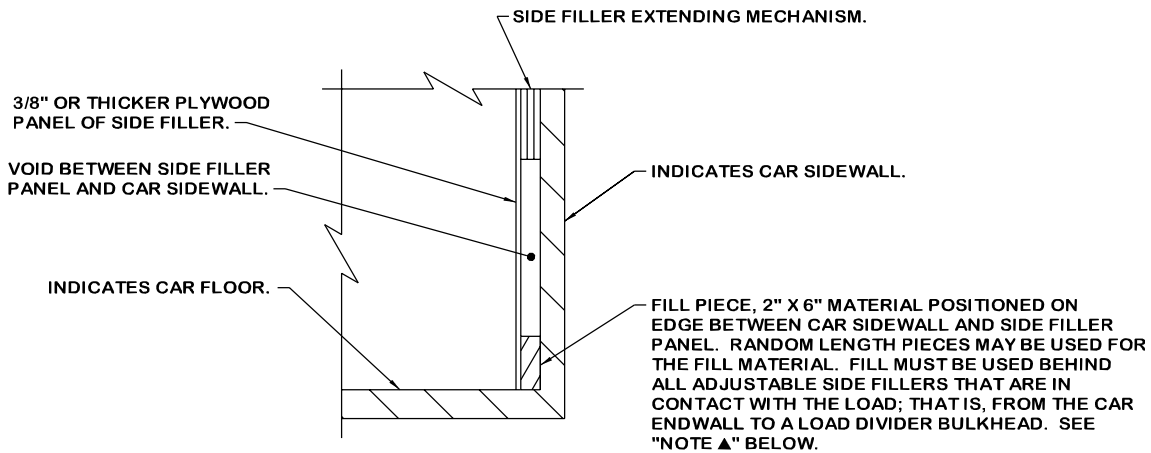


**NOTE ▲:**

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.

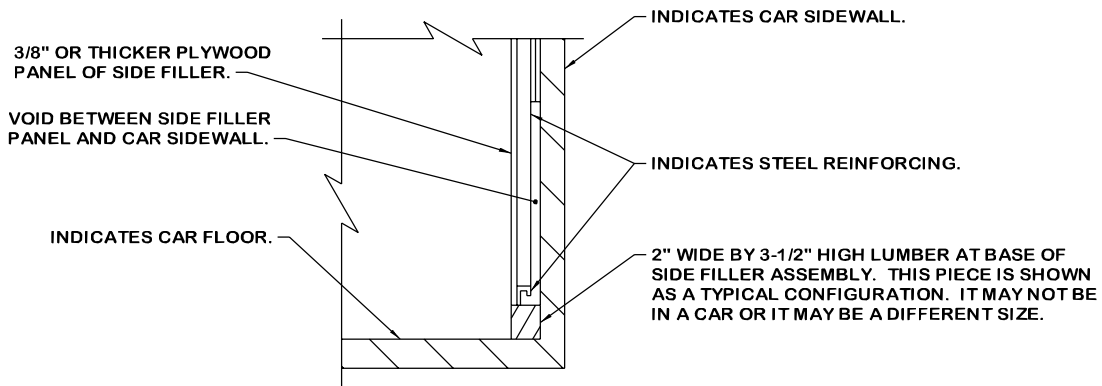


**SIDE FILLER TYPICAL TYPE A**

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

**NOTE ▲:**

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".



**SIDE FILLER 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.