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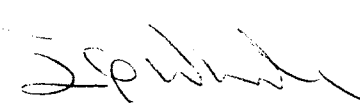
# LOADING AND BRACING (CL & LCL) IN BOXCARS\* OF BLU-109 OR BLU-116 BOMBS ON MHU-212 PALLETS

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\* THIS OUTLOADING PROCEDURE DRAWING INCLUDES PROCEDURES FOR CONVENTIONAL TYPE BOXCARS AND CUSHIONED BOXCARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.

## U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY FIELD SUPPORT COMMAND  	CAUTION: VERIFY PRIOR TO USE AT WWW.DAC.ARMY.MIL THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 26.				<b>JANUARY 2004</b>					
	DO NOT SCALE		PATRICK DOUGHERTY							
APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND    U.S. ARMY DEFENSE AMMUNITION CENTER	ENGINEER OR TECHNICIAN	BASIC REV.	G. L. Kyllis		TESTED		CLASS	DIVISION	DRAWING	FILE
	TRANSPORTATION ENGINEERING DIVISION	Jay W. [Signature]		19			48	8766	SP5PB2	
	VALIDATION ENGINEERING DIVISION	[Signature]		[Signature]						
	ENGINEERING DIRECTORATE	[Signature]		[Signature]						

**GENERAL NOTES**

**(GENERAL NOTES CONTINUED)**

- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- B. THE OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE TO BLU-109 OR BLU-116 BOMBS ON MHU-212 METAL PALLETS. SUBSEQUENT REFERENCE TO THE PALLET UNIT HEREIN MEANS THE MHU-212 METAL PALLET WITH THE BOMBS INSTALLED. SEE DETAIL ON PAGE 5.
- 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. THE SELECTION OF RAILCARS FOR THE TRANSPORT OF BLU-109 OR BLU-116 BOMBS 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.
- E. 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 14 FOR GUIDANCE.
- F. 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.
- G. 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.
- H. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN CARS WHICH ARE PARTIALLY LOADED WITH PALLET UNITS OF BLU-109 OR BLU-116 BOMBS ON MHU-212 PALLETS, 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.
- J. 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.

(CONTINUED AT RIGHT)

- K. NOTICE: A STAGGERED NAILING PATTERN WILL BE USED WHEREVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES. ALSO, A STAGGERED NAILING PATTERN WILL BE USED WHEN DUNNAGE IS NAILED TO THE FLOOR OR SIDEWALL OF THE TRANSPORTING VEHICLE, OR WHEN LAMINATING DUNNAGE. THE NAILING PATTERN WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL DOES NOT PENETRATE INTO OR NEAR A CRACK BETWEEN FLOOR BOARDS OR SIDEWALL BOARDS. ADDITIONALLY, THE NAILING PATTERN FOR AN UPPER PIECE OF LAMINATED DUNNAGE WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL FOR THAT PIECE WILL NOT BE DRIVEN THROUGH ONTO, OR RIGHT BESIDE A NAIL IN A LOWER PIECE.
- L. 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.
- M. 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.
- N. 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.
- O. 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.
- P. 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.
- Q. 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.
- R. 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.

(CONTINUED ON PAGE 3)

**MATERIAL SPECIFICATIONS**

- LUMBER - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
- NAILS - - - - - : ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMMS).
- STRAPPING, STEEL - - : ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), ORC.
- SEAL, STRAP - - - - : ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.

## GENERAL NOTES

(FOR CONVENTIONAL TYPE BOXCARS)

- S. 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 "K" ON PAGE 2.
- T. 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 CENTER OF THE BASE OF THE BOMBS. PADDING, OF 2" THICK LUMBER OR ANY OTHER MATERIAL OF SIMILAR CONSISTENCY, SHOULD BE PLACED BETWEEN THE JACK AND THE LADING.
- U. LOAD-BLOCKING STRUTS WHICH ARE 48" OR LONGER MUST BE STIFFENED BY THE APPLICATION OF HORIZONTAL AND VERTICAL STRUT BRACING AS SHOWN BY THE "TYPICAL STRUT BRACING DETAIL" AS SHOWN ON PAGE 15. 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.
- V. 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 PALLET UNITS. 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 5 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.
- W. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTIONS WHICH ARE IMMEDIATELY ADJACENT TO THE DEPICTED OUTLOADING METHODS.

(CONTINUED ON PAGE 4)

## GENERAL NOTES

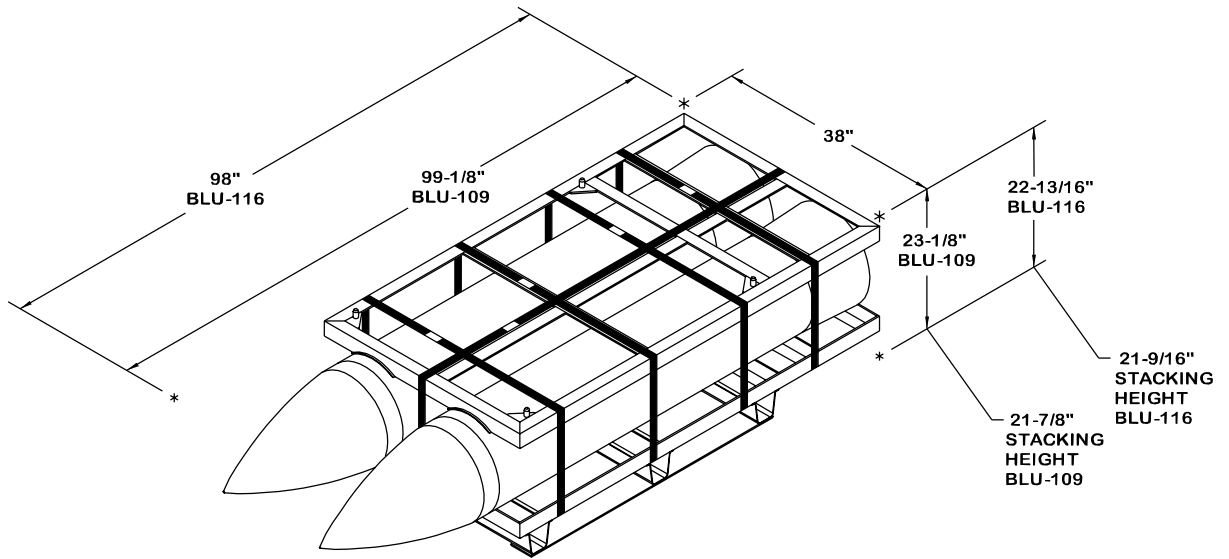
(GENERAL NOTES CONTINUED)

(FOR CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS)

- X. **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.
- Y. 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 COMPLETE ROUNDS. **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.
- Z. 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 25 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 25, THE "FILL PIECE" MATERIAL IS NOT REQUIRED.
- AA. **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.
- BB. 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 "CC-2" BELOW. DETAILS OF STRUT ASSEMBLIES FOR USE BETWEEN 2-PIECE BULKHEADS AND BETWEEN 1-PIECE BULKHEADS ARE SHOWN ON PAGE 24.
- CC. 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. THE METHOD OF OMITTING A PALLET UNIT DEPICTED ON PAGE 21 MAY BE USED TO ADJUST A LOAD QUANTITY DOWNWARD BY OTHER THAN A MULTIPLE OF A PALLET UNIT.
  2. 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 OF THE CONVENTIONAL BOXCAR DRAWING HEREIN TO PROVIDE FOR A TIGHT LOAD BETWEEN THE BULKHEADS.

3. ONE OR MORE UNITS CAN BE POSITIONED IN CONTACT WITH A LOAD DIVIDER BULKHEAD ON THE CENTER-OF-CAR SIDE. BLOCK AND BRACE WITH KNEE BRACE ASSEMBLIES, AS SHOWN ON PAGE 22.

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

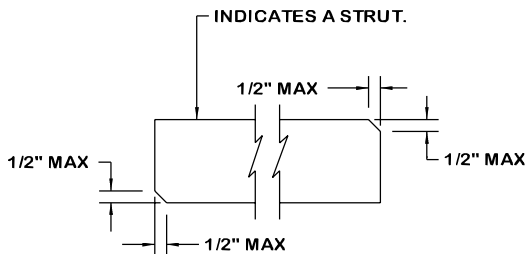


**BLU-109 BOMBS ON MHU-212/E PALLET**

GROSS WEIGHT - - - - - 4,323 LBS (APPROX)  
 CUBE - - - - - 47.7 CU FT (APPROX)

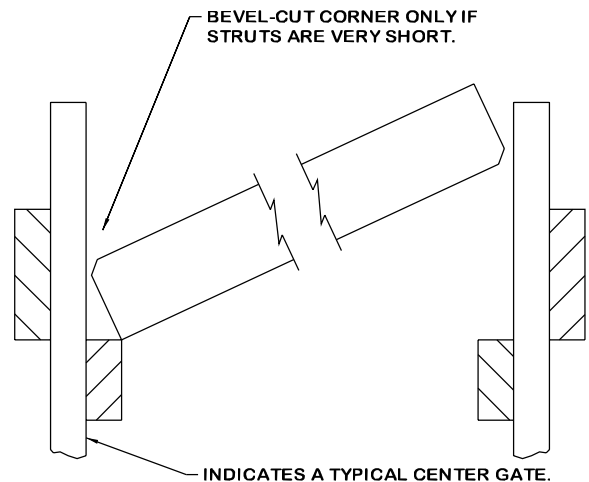
**BLU-116 BOMBS ON MHU-212A/E PALLET**

GROSS WEIGHT - - - - - 4,168 LBS (APPROX)  
 CUBE - - - - - 46.5 CU FT (APPROX)



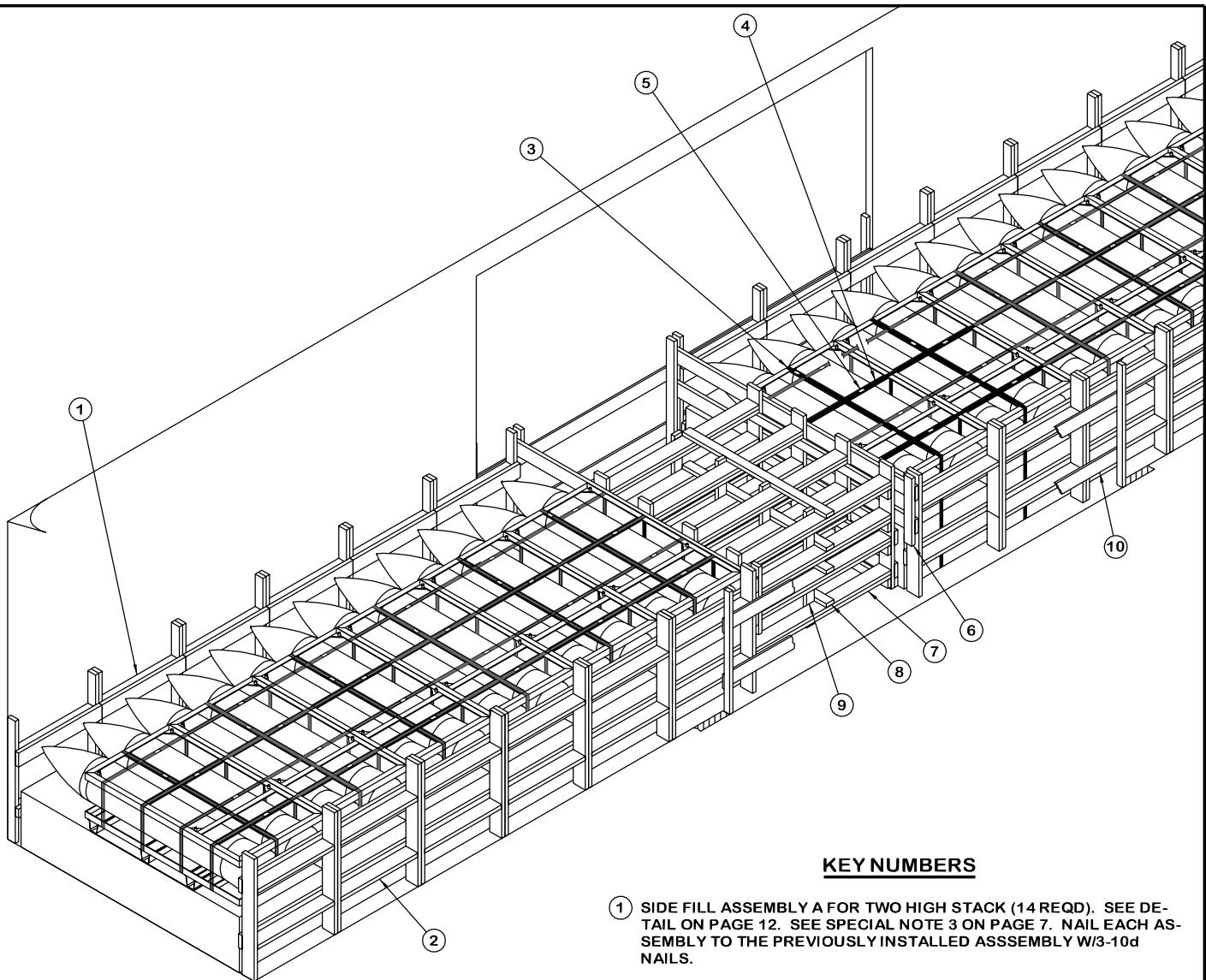
**BEVEL-CUT**

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



**STRUT INSTALLATION**

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



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① SIDE FILL ASSEMBLY A FOR TWO HIGH STACK (14 REQD). SEE DETAIL ON PAGE 12. SEE SPECIAL NOTE 3 ON PAGE 7. NAIL EACH ASSEMBLY TO THE PREVIOUSLY INSTALLED ASSEMBLY W/3-10d NAILS.
- ② SIDE FILL ASSEMBLY B FOR TWO HIGH STACK (14 REQD). SEE DETAIL ON PAGE 13. NAIL EACH ASSEMBLY TO THE PREVIOUSLY INSTALLED ASSEMBLY W/3-10d NAILS.
- ③ UNITIZING STRAP, 1-1/4" X .035" OR .031" X 19'-2" LONG STEEL STRAPPING (2 REQD). INSTALL LONGITUDINALLY TO ENCIRCLE EACH STACK OF TWO HIGH TWO PALLET UNITS IN THE DOORWAY OPENING. SEE SPECIAL NOTE 5 ON PAGE 7.
- ④ BUNDLING STRAP STRAP, 1-1/4" X .035" OR .031" X 13'-10" LONG STEEL STRAPPING (4 REQD). INSTALL Laterally TO ENCIRCLE EACH STACK OF TWO HIGH TWO PALLET UNITS IN THE DOORWAY OPENING.
- ⑤ SEAL FOR 1-1/4" STEEL STRAPPING (12 REQD, 2 PER STRAP). DOUBLE NOTCH EACH SEAL. SEE THE "END OVER END LAP JOINT DETAIL" ON PAGE 15.
- ⑥ CENTER GATE A (2 REQD, 1 RIGHT HAND AND 1 LEFT HAND). SEE DETAIL ON PAGE 12.
- ⑦ STRUT, 2" X 6" BY CUT TO FIT (REF: 68") (DOUBLED) (16 REQD). LAMINATE THE SECOND PIECE TO THE FIRST PIECE W/1-10d NAIL EVERY 6". POSITION BETWEEN CENTER GATES AND NAIL STRUT TO GATES W/2-12d NAILS AT EACH END.
- ⑧ HORIZONTAL SUPPORT, 2" X 4" X 65-1/2" (4 REQD). POSITION ON TOP OF EACH LAYER OF STRUTS. NAIL TO EACH STRUT W/2-10d NAILS. SEE SPECIAL NOTE 8 ON PAGE 7.
- ⑨ VERTICAL SUPPORT, 2" X 4" X 44" (4 REQD). POSITION AGAINST THE SIDE OF THE STRUTS. NAIL TO EACH STRUT W/2-10d NAILS.
- ⑩ DOORWAY PROTECTION A (2 REQD). SEE DETAIL ON PAGE 13. INSTALL IN THE DOORWAY OPENING. NAIL TO THE DOORPOSTS W/12d NAILS. SEE SPECIAL NOTE 4 ON PAGE 7.

**SPECIAL NOTES:**

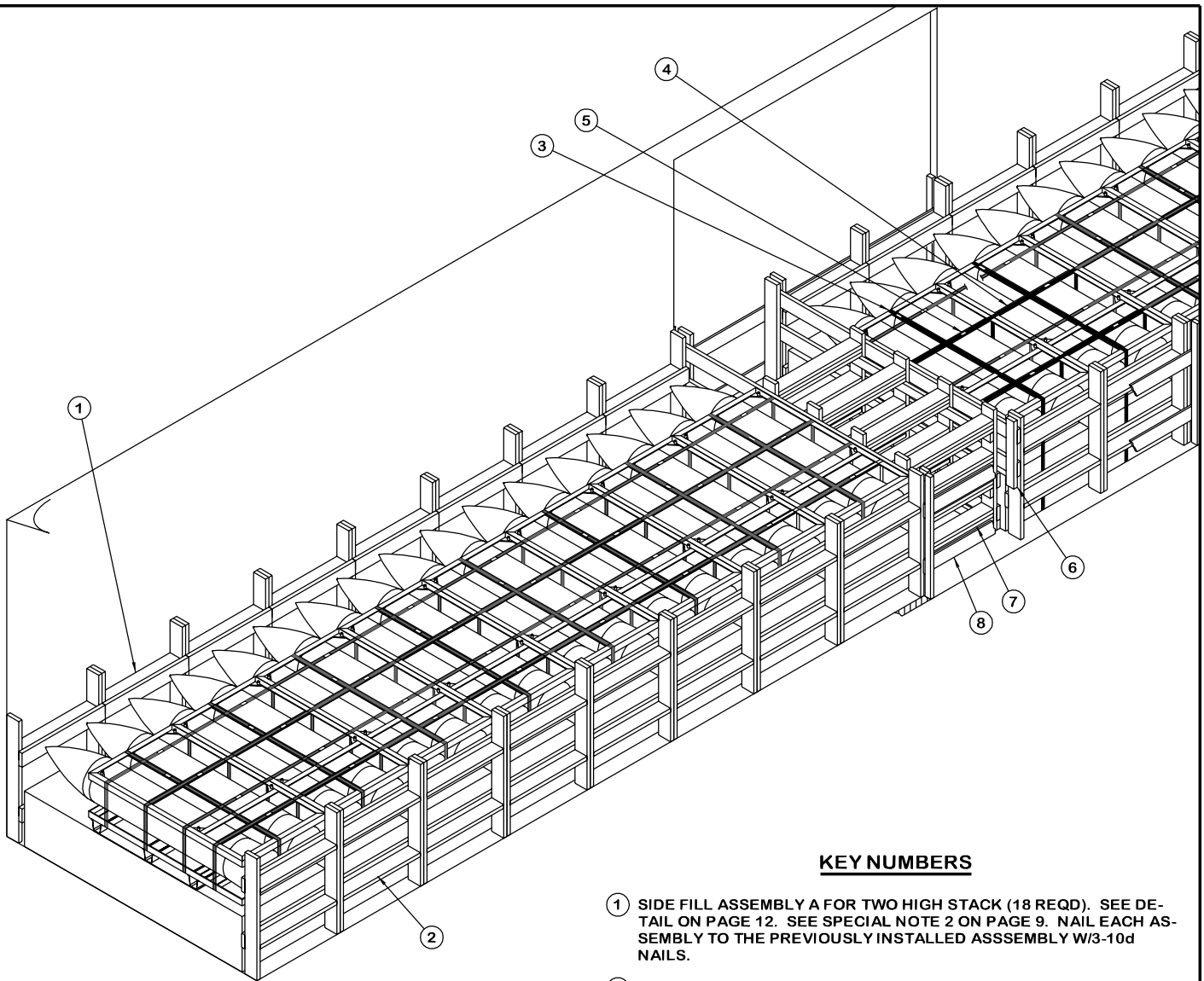
1. A 50'-6" LONG BY 9'-4" WIDE CONVENTIONAL TYPE BOXCAR EQUIPPED WITH 10'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER SIZES AND CARS HAVING OTHER WIDTH (8'-0" MINIMUM) DOOR OPENINGS MAY BE USED.
2. A MAXIMUM OF OF 28 MHU-212 PALLET UNITS, WITH AN APPROXIMATE LADING WEIGHT OF 121,044 POUNDS, CAN BE PLACED IN A 50'-6" LONG BOXCAR USING THE DEPICTED PROCEDURES.
3. THE SIDE FILL ASSEMBLIES "A" AND "B" SHOWN IN THE LOAD ON PAGE 6 ARE CONSTRUCTED WITH 2" X 4" AND 2" X 6" VERTICALS AND FILLER PIECES RESPECTIVELY. SEE DETAILS ON PAGES 12 AND 13. IF THE CAR TO BE USED IS 9'-2" WIDE, THE VERTICAL PIECES AND FILLER PIECES OF SIDE FILL ASSEMBLY "B" SHALL BE CONSTRUCTED USING 2" X 4" MATERIAL. WHEN A 9'-6" WIDE CAR IS FURNISHED FOR LOADING, THE VERTICAL PIECES AND FILLER PIECES OF SIDE FILL ASSEMBLY "A" SHALL BE CONSTRUCTED USING 2" X 6" MATERIAL.
4. THE DOORWAY PROTECTION ASSEMBLIES ARE REQUIRED TO PROVIDE LATERAL RESTRAINT FOR THE CENTER GATES. IF THE CAR HAS PLUG TYPE DOORS, THE DOORWAY PROTECTION SHOWN ON PAGE 6 IS NOT REQUIRED. IF THE CAR IS EQUIPPED WITH STAGGERED DOOR OPENINGS, AND THE AUXILIARY DOOR OPENING ARE OF THE SLIDING TYPE, DOORWAY PROTECTION WILL BE REQUIRED IN THAT AREA. IF THE DOORPOSTS OF THE AUXILIARY DOOR OPENING ARE NOT NAILABLE, SEE "THE ALTERNATIVE DOORWAY PROTECTION" DETAIL ON PAGE 14 FOR GUIDANCE.
5. THE UNITIZING AND BUNDLING STRAPS SHALL BE APPLIED TO ANY STACK OF PALLET UNITS THAT IS IN THE DOORWAY OPENING AREA OR EXTENDS MORE THAN HALFWAY INTO THE DOOR OPENING AREA. STRAPPING MAY BE PREPOSITIONED AND SECURED AFTER THE PALLET UNITS HAVE BEEN PLACED IN THE CAR. IF THE MATERIAL HANDLING EQUIPMENT IS OF ADEQUATE CAPACITY, THE PALLET UNITS MAY BE UNITIZED PRIOR TO PLACEMENT IN THE CAR.
6. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED BY OMITTING ONE OR MORE CONTAINER STACKS FROM THE LOAD, OR THE ENTIRE TOP TIER CAN BE OMITTED. SEE SPECIAL NOTE 7 FOR GUIDANCE. FOR OTHER METHODS OF REDUCING A LOAD, REFER TO THE TYPICAL LCL PROCEDURES ON PAGES 17 THROUGH 23 FOR GUIDANCE.
7. IF A ONE LAYER LOAD IS TO BE SHIPPED, CENTER GATE "B" SHALL BE USED AND THE SIDE FILL ASSEMBLIES "A" AND "B" SHALL BE REDUCED TO THE 24" HEIGHT AS SHOWN ON THE RESPECTIVE DETAILS. EIGHT STRUTS WILL BE REQUIRED.
8. STRUT BRACING AS DEPICTED ON PAGE 6 IS REQUIRED WHEN STRUTS ARE 48" OR GREATER IN LENGTH. ONE SET OF VERTICAL AND HORIZONTAL SUPPORTS AS SHOWN ON PAGE 6 IS REQUIRED FOR EVERY 48" OF STRUT LENGTH.
9. IF A 60'-8" LONG BOXCAR IS FURNISHED, REFER TO PAGES 8 AND 9 FOR GUIDANCE.

**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	60	30
2" X 3"	16	8
2" X 4"	282	188
2" X 6"	640	640
NAILS	NO. REQD	POUNDS
6d (2")	24	1/4
10d (3")	1,352	20-1/2
12d (3-1/4")	64	1-1/4
STEEL STRAPPING, 1-1/4" - 93.66' REQD - - 13-1/2 LBS		
SEAL FOR 1-1/4" STRAPPING - - 6 REQD - - - 1/2 LBS		

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	28	121,044 LBS
DUNNAGE		1,768 LBS
TOTAL WEIGHT		122,812 LBS (APPROX)



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① SIDE FILL ASSEMBLY A FOR TWO HIGH STACK (18 REQD). SEE DETAIL ON PAGE 12. SEE SPECIAL NOTE 2 ON PAGE 9. NAIL EACH ASSEMBLY TO THE PREVIOUSLY INSTALLED ASSEMBLY W/3-10d NAILS.
- ② SIDE FILL ASSEMBLY B FOR TWO HIGH STACK (18 REQD). SEE DETAIL ON PAGE 13. NAIL EACH ASSEMBLY TO THE PREVIOUSLY INSTALLED ASSEMBLY W/3-10d NAILS.
- ③ UNITIZING STRAP, 1-1/4" X .035" OR .031" X 19'-2" LONG STEEL STRAPPING (2 REQD). INSTALL LONGITUDINALLY TO ENCIRCLE EACH STACK OF TWO HIGH TWO PALLET UNITS IN THE DOORWAY OPENING. SEE SPECIAL NOTE 4 ON PAGE 9.
- ④ BUNDLING STRAP STRAP, 1-1/4" X .035" OR .031" X 13'-10" LONG STEEL STRAPPING (4 REQD). INSTALL Laterally TO ENCIRCLE EACH STACK OF TWO HIGH TWO PALLET UNITS IN THE DOORWAY OPENING.
- ⑤ SEAL FOR 1-1/4" STEEL STRAPPING (12 REQD, 2 PER STRAP). DOUBLE NOTCH EACH SEAL. SEE THE "END OVER END LAP JOINT DETAIL" ON PAGE 15.
- ⑥ CENTER GATE A (2 REQD, 1 RIGHT HAND AND 1 LEFT HAND). SEE DETAIL ON PAGE 12.
- ⑦ STRUT, 2" X 6" BY CUT TO FIT (REF: 38") (TRIPLED) (16 REQD). LAMINATE THE SECOND PIECE TO THE FIRST PIECE W/1-10d NAIL EVERY 6". LAMINATE THE THIRD PIECE TO THE SECOND IN A SIMILAR MANNER. POSITION BETWEEN CENTER GATES AND NAIL STRUT TO GATES W/2-12d NAILS AT EACH END.
- ⑧ DOORWAY PROTECTION A (2 REQD). SEE DETAIL ON PAGE 13. INSTALL IN THE DOORWAY OPENING. NAIL TO THE DOORPOSTS W/12d NAILS. SEE SPECIAL NOTE 3 ON PAGE 9.



**SPECIAL NOTES:**

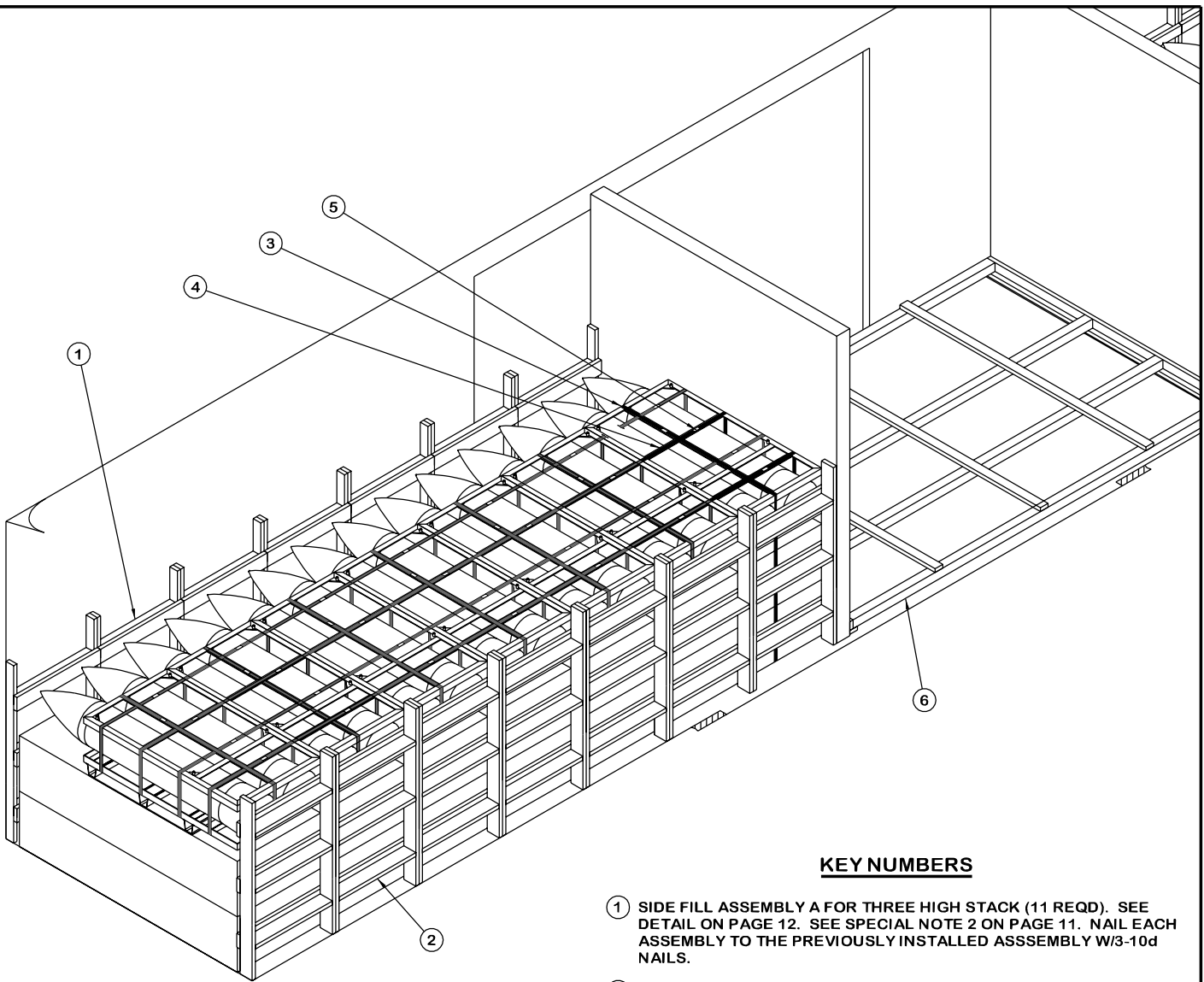
1. A 60'-8" LONG BY 9'-6" WIDE CONVENTIONAL TYPE BOXCAR EQUIPPED WITH 10'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER SIZES AND CARS HAVING OTHER WIDTH (8'-0" MINIMUM) DOOR OPENINGS MAY BE USED.
2. THE SIDE FILL ASSEMBLIES "A" AND "B" SHOWN IN THE LOAD ON PAGE 8 ARE CONSTRUCTED WITH 2" X 6" VERTICAL AND FILLER PIECES. SEE DETAILS ON PAGES 12 AND 13. IF THE CAR TO BE USED IS 9'-2" WIDE, THE VERTICAL AND FILLER PIECES OF SIDE FILL ASSEMBLIES "A" AND "B" SHALL BE CONSTRUCTED USING 2" X 4" MATERIAL. WHEN A 9'-4" WIDE CAR IS FURNISHED FOR LOADING, THE VERTICAL AND FILLER PIECES OF SIDE FILL ASSEMBLY "A" SHALL BE CONSTRUCTED USING 2" X 6" MATERIAL.
3. THE DOORWAY PROTECTION ASSEMBLIES ARE REQUIRED TO PROVIDE LATERAL RESTRAINT FOR THE CENTER GATES. IF THE CAR HAS PLUG TYPE DOORS, THE DOORWAY PROTECTION SHOWN ON PAGE 8 IS NOT REQUIRED. IF THE CAR IS EQUIPPED WITH STAGGERED DOOR OPENINGS, AND THE AUXILIARY DOOR OPENING ARE OF THE SLIDING TYPE, DOORWAY PROTECTION WILL BE REQUIRED IN THAT AREA. IF THE DOORPOSTS OF THE AUXILIARY DOOR OPENING ARE NOT NAILABLE, SEE "THE ALTERNATIVE DOORWAY PROTECTION" DETAIL ON PAGE 14 FOR GUIDANCE.
4. THE UNITIZING AND BUNDLING STRAPS SHALL BE APPLIED TO ANY STACK OF PALLET UNITS THAT IS IN THE DOORWAY OPENING AREA OR EXTENDS MORE THAN HALFWAY INTO THE DOOR OPENING AREA. STRAPPING MAY BE PREPOSITIONED AND SECURED AFTER THE PALLET UNITS HAVE BEEN PLACED IN THE CAR. IF THE MATERIAL HANDLING EQUIPMENT IS OF ADEQUATE CAPACITY, THE PALLET UNITS MAY BE UNITIZED PRIOR TO PLACEMENT IN THE CAR.
5. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED BY OMITTING ONE OR MORE CONTAINER STACKS FROM THE LOAD, OR THE ENTIRE TOP TIER CAN BE OMITTED. SEE SPECIAL NOTE 7 FOR GUIDANCE. FOR OTHER METHODS OF REDUCING A LOAD, REFER TO THE TYPICAL LCL PROCEDURES ON PAGES 17 THROUGH 23 FOR GUIDANCE.
6. IF A ONE LAYER LOAD IS TO BE SHIPPED, CENTER GATE "B" SHALL BE USED AND THE SIDE FILL ASSEMBLIES "A" AND "B" SHALL BE REDUCED TO THE 24" HEIGHT AS SHOWN ON THE RESPECTIVE DETAILS. EIGHT STRUTS WILL BE REQUIRED.
7. IF A 50'-6" LONG BOXCAR IS FURNISHED, REFER TO PAGES 6 AND 7 FOR GUIDANCE.

**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	40	20
2" X 3"	16	8
2" X 4"	73	49
2" X 6"	919	919
NAILS	NO. REQD	POUNDS
6d (2")	24	1/4
10d (3")	1,504	22-3/4
12d (3-1/4")	64	1-1/4
STEEL STRAPPING, 1-1/4" - 93.66' REQD - - 13-1/2 LBS		
SEAL FOR 1-1/4" STRAPPING - - 6 REQD - - - 1/2 LBS		

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	36	155,628 LBS
DUNNAGE		2,016 LBS
<b>TOTAL WEIGHT</b>		<b>157,644 LBS (APPROX)</b>



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① SIDE FILL ASSEMBLY A FOR THREE HIGH STACK (11 REQD). SEE DETAIL ON PAGE 12. SEE SPECIAL NOTE 2 ON PAGE 11. NAIL EACH ASSEMBLY TO THE PREVIOUSLY INSTALLED ASSEMBLY W/3-10d NAILS.
- ② SIDE FILL ASSEMBLY B FOR THREE HIGH STACK (11 REQD). SEE DETAIL ON PAGE 13. NAIL EACH ASSEMBLY TO THE PREVIOUSLY INSTALLED ASSEMBLY W/3-10d NAILS.
- ③ UNITIZING STRAP, 1-1/4" X .035" OR .031" X 24'-3" LONG STEEL STRAPPING (1 REQD). INSTALL LONGITUDINALLY TO ENCIRCLE EACH STACK OF TWO HIGH TWO PALLET UNITS IN THE DOORWAY OPENING. SEE SPECIAL NOTE 3 ON PAGE 11.
- ④ BUNDLING STRAP, 1-1/4" X .035" OR .031" X 18'-11" LONG STEEL STRAPPING (2 REQD). INSTALL LATERALLY TO ENCIRCLE EACH STACK OF THREE HIGH PALLET UNITS IN THE DOORWAY OPENING.
- ⑤ SEAL FOR 1-1/4" STEEL STRAPPING (12 REQD, 2 PER STRAP). DOUBLE NOTCH EACH SEAL. SEE THE "END OVER END LAP JOINT DETAIL" ON PAGE 15.
- ⑥ STRUT ASSEMBLY (1 REQD). SEE THE "STRUT ASSEMBLY FOR 1-PIECE BULKHEADS" DETAIL ON PAGE 24, SPECIAL NOTE 6 ON PAGE 11, AND GENERAL NOTE "B-B" ON PAGE 4.

**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-4" WIDE CUSHIONED BOXCAR EQUIPPED WITH LOAD DIVIDER BULKHEADS AND HAVING 10'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER SIZES AND CARS HAVING OTHER WIDTH (8'-0" MINIMUM) DOOR OPENINGS MAY BE USED.
2. THE SIDE FILL ASSEMBLIES "A" SHOWN IN THE LOAD ON PAGE 10 ARE CONSTRUCTED WITH 2" X 4" VERTICAL AND FILLER PIECES. SEE DETAILS ON PAGES 12 AND 13. IF THE CAR TO BE USED IS 9'-2" WIDE, THE VERTICAL AND FILLER PIECES OF SIDE FILL ASSEMBLY "B" SHALL BE CONSTRUCTED USING 2" X 4" MATERIAL. WHEN A 9'-6" WIDE CAR IS FURNISHED FOR LOADING, THE VERTICAL AND FILLER PIECES OF SIDE FILL ASSEMBLY "A" SHALL BE CONSTRUCTED USING 2" X 6" MATERIAL.
3. THE UNITIZING AND BUNDLING STRAPS SHALL BE APPLIED TO ANY STACK OF PALLET UNITS THAT IS IN THE DOORWAY OPENING AREA OR EXTENDS MORE THAN HALFWAY INTO THE DOOR OPENING AREA. STRAPPING MAY BE PREPOSITIONED AND SECURED AFTER THE PALLET UNITS HAVE BEEN PLACED IN THE CAR. IF THE MATERIAL HANDLING EQUIPMENT IS OF ADEQUATE CAPACITY, THE PALLET UNITS MAY BE UNITIZED PRIOR TO PLACEMENT IN THE CAR.
4. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED BY OMITTING ONE OR MORE CONTAINER STACKS FROM THE LOAD, OR THE ENTIRE TOP TIER CAN BE OMITTED. SEE SPECIAL NOTE 5 FOR GUIDANCE. FOR OTHER METHODS OF REDUCING A LOAD, REFER TO THE TYPICAL LCL PROCEDURES ON PAGES 17 THROUGH 23 FOR GUIDANCE.
5. IF A ONE LAYER LOAD IS TO BE SHIPPED, CENTER GATE "B" SHALL BE USED AND THE SIDE FILL ASSEMBLIES "A" AND "B" SHALL BE REDUCED TO THE 24" HEIGHT AS SHOWN ON THE RESPECTIVE DETAILS.
6. THE STRUT ASSEMBLY IS REQUIRED WHEN THE LOAD IN EITHER END OF THE CAR IS 50,000 POUNDS OR MORE.

**BILL OF MATERIAL**

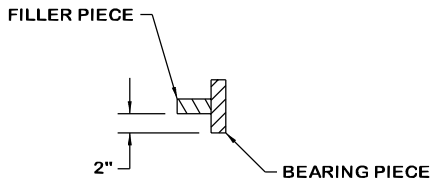
LUMBER	LINEAR FEET	BOARD FEET
1" X 8"	19	13
2" X 4"	294	196
2" X 6"	437	437
4" X 4"	58	77
NAILS	NO. REQD	POUNDS
6d (2")	20	1/4
10d (3")	836	12-3/4
12d (3-1/4")	16	1/4
STEEL STRAPPING, 1-1/4" - 93.66' REQD - - 13-1/2 LBS		
SEAL FOR 1-1/4" STRAPPING - - 6 REQD - - - 1/2 LBS		

**LOAD AS SHOWN**

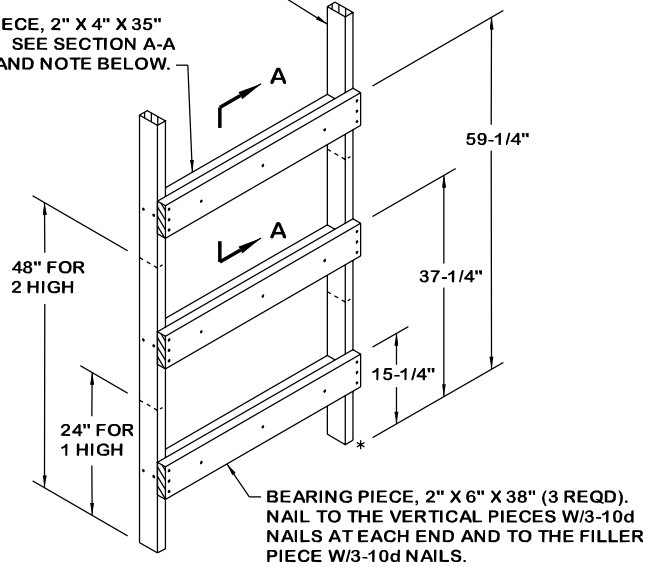
<u>ITEM</u>	<u>QUANTITY</u>	<u>WEIGHT (APPROX)</u>
PALLET UNIT	33	142,659 LBS
DUNNAGE		1,473 LBS
<b>TOTAL WEIGHT</b>		<b>144,132 LBS (APPROX)</b>

VERTICAL PIECE, 2" X 4" BY LENGTH TO SUIT (REF: 24" FOR 1 HIGH, 48" FOR 2 HIGH, OR 72" FOR 3 HIGH) (2 REQD). NAIL TO THE FILLER PIECE W/2-10d NAILS AT EACH LOCATION. SEE NOTE BELOW.

FILLER PIECE, 2" X 4" X 35" (3 REQD). SEE SECTION A-A AT LEFT AND NOTE BELOW.



**SECTION A-A**



**SIDE FILL ASSEMBLY A**

NOTE: VERTICAL AND FILLER PIECES SHALL BE 2" X 6" MATERIAL FOR A 9'-6" WIDE BOXCAR.

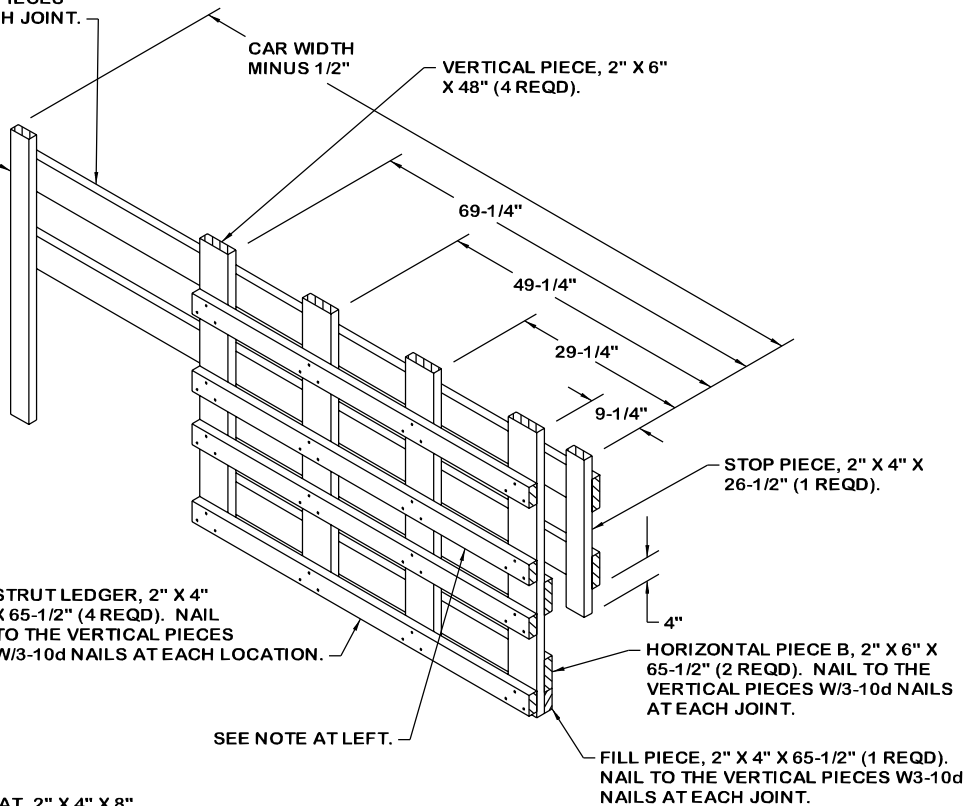
HORIZONTAL PIECE A, 2" X 6" BY CAR WIDTH MINUS 1/2" (REF: 9'-3-1/2") (2 REQD). NAIL TO THE VERTICAL, STOP, AND SUPPORT PIECES W/3-10d NAILS AT EACH JOINT.

SUPPORT PIECE, 2" X 4" X 48" (1 REQD).

CAR WIDTH MINUS 1/2"

VERTICAL PIECE, 2" X 6" X 48" (4 REQD).

NOTE: THIS STRUT LEDGER MAY NEED TO BE TEMPORARILY REMOVED TO INSTALL THE LOWER STRUTS. REINSTALL THIS STRUT LEDGER AS SHOWN AT RIGHT.



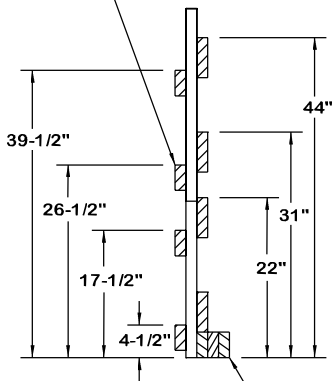
STRUT LEDGER, 2" X 4" X 65-1/2" (4 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH LOCATION.

STOP PIECE, 2" X 4" X 26-1/2" (1 REQD).

HORIZONTAL PIECE B, 2" X 6" X 65-1/2" (2 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

FILL PIECE, 2" X 4" X 65-1/2" (1 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

SEE NOTE AT LEFT.

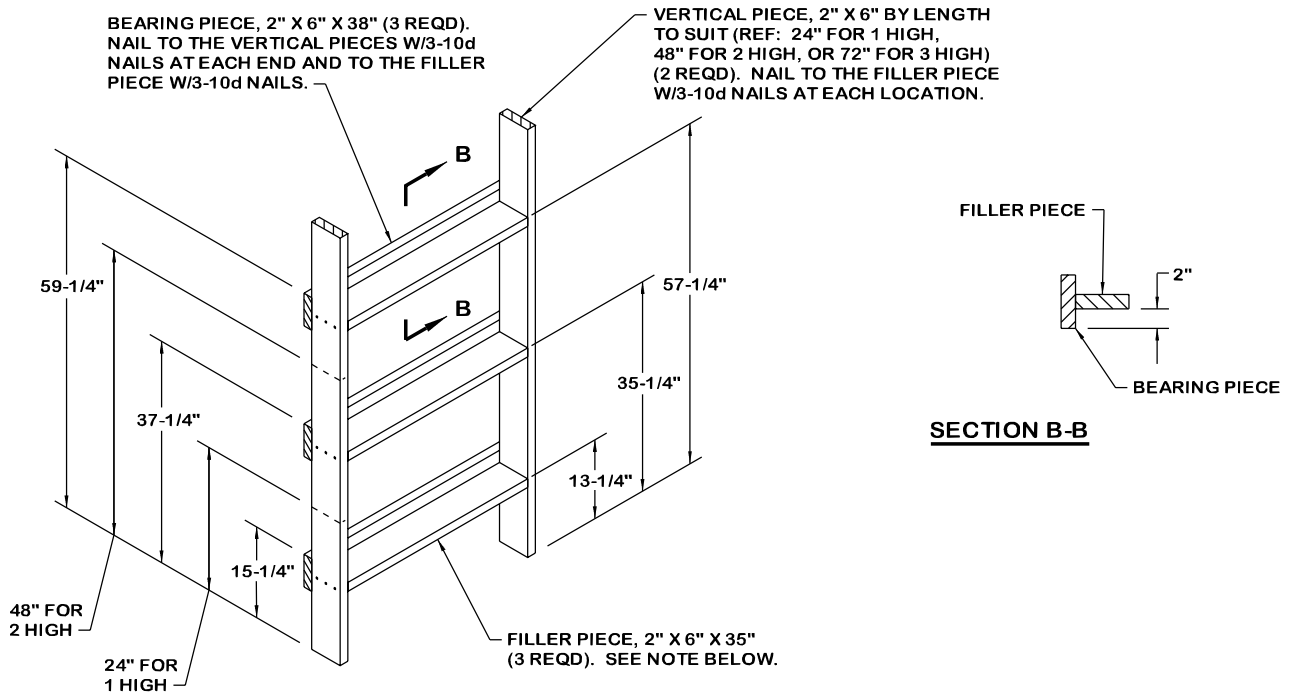


**END VIEW**

HOLD DOWN CLEAT, 2" X 4" X 8" (TRIPLED) (2 REQD). LOCATE TO FIT BETWEEN THE SKIDS OF THE PALLET UNITS. NAIL THE FIRST PIECE TO THE FILL PIECE W/2-10d NAILS. NAIL ADDITIONAL PIECES IN A SIMILAR MANNER.

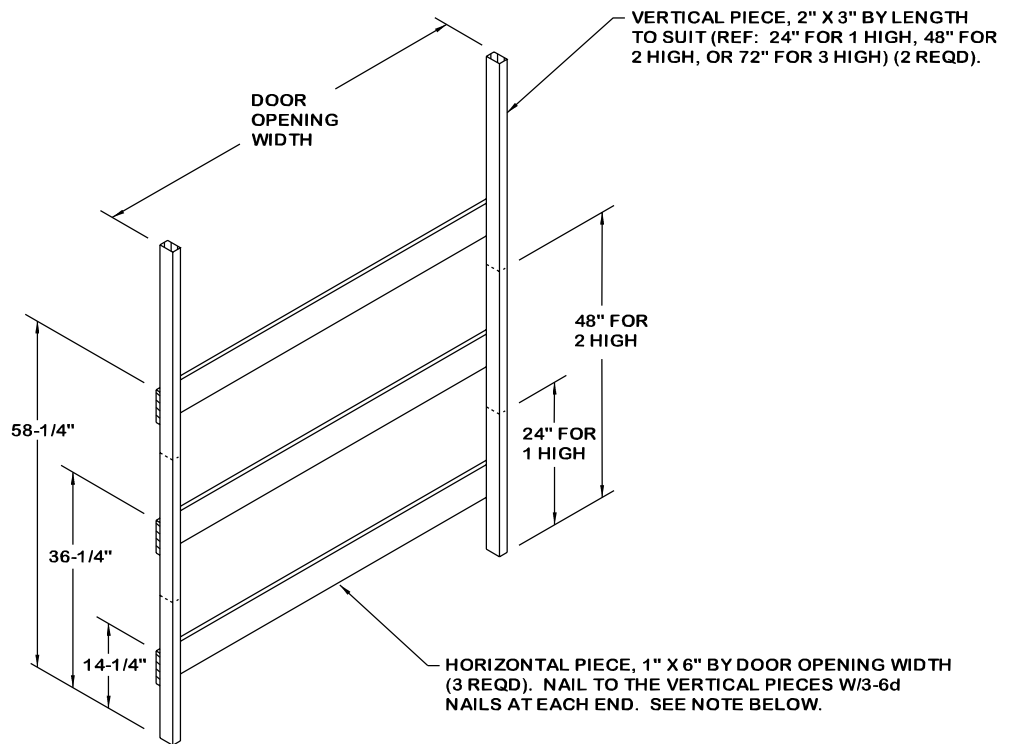
**CENTER GATE A**

RIGHT HAND GATE SHOWN



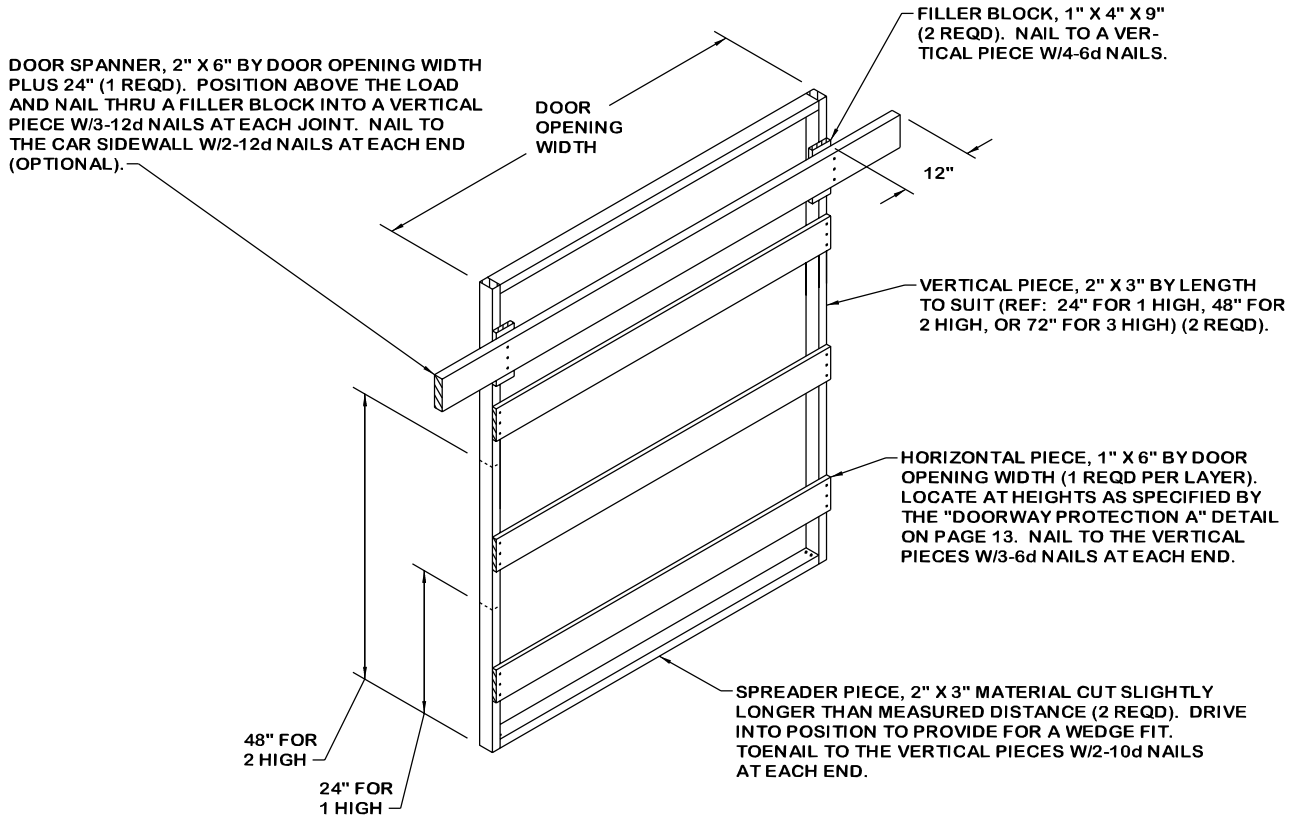
**SIDE FILL ASSEMBLY B**

**NOTE:** VERTICAL AND FILLER PIECES SHALL BE 2" X 4" MATERIAL FOR A 9'-2" WIDE BOXCAR.



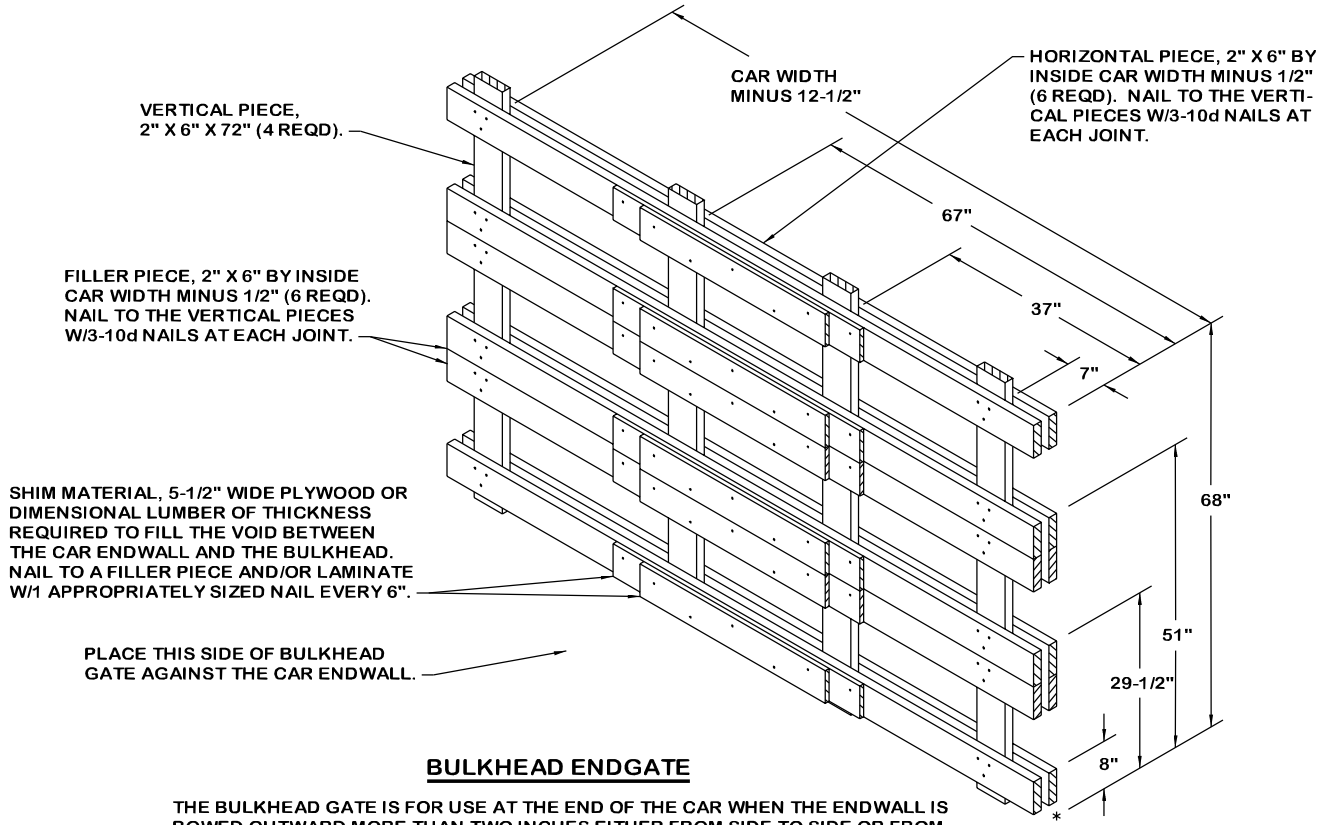
**DOORWAY PROTECTION A**

**NOTE:** USE TWO HORIZONTAL PIECES FOR A TWO LAYER LOAD AND ONE HORIZONTAL FOR A ONE LAYER LOAD.



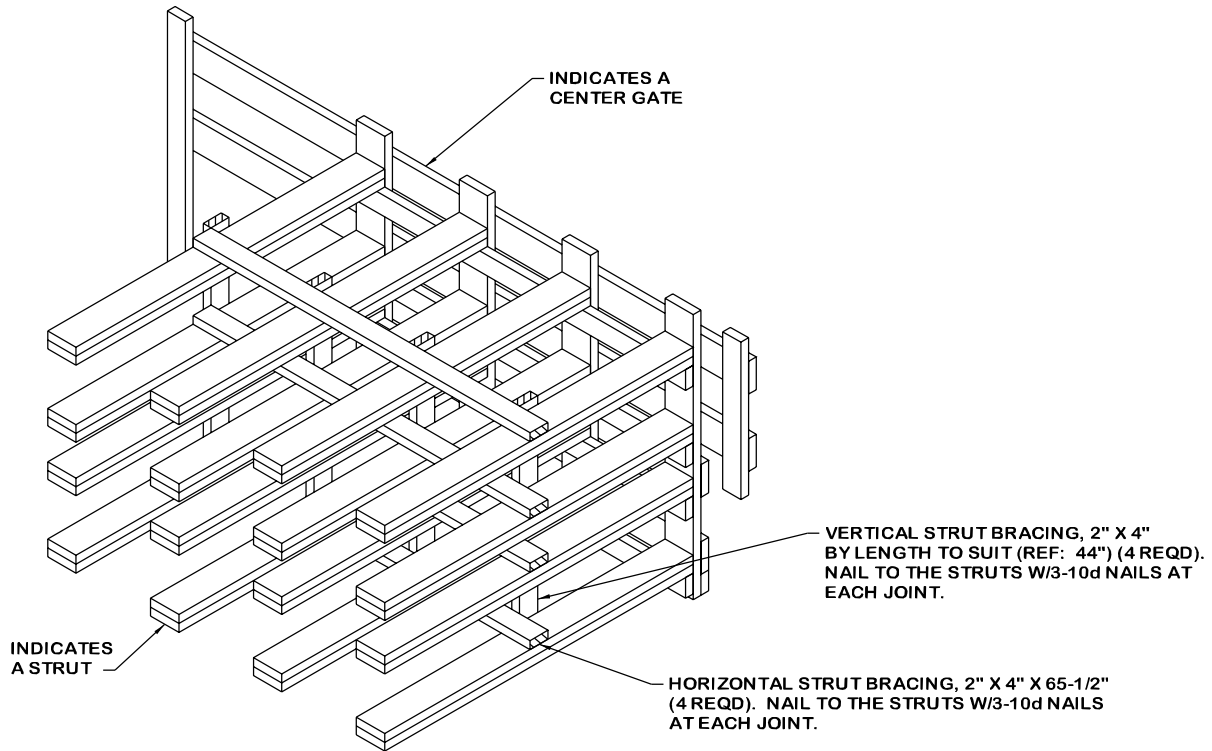
**ALTERNATIVE DOORWAY PROTECTION**

THIS METHOD OF DOORWAY PROTECTION IS FOR USE IN CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS, WHEN THE DOOR POSTS ARE NOT NAILABLE.



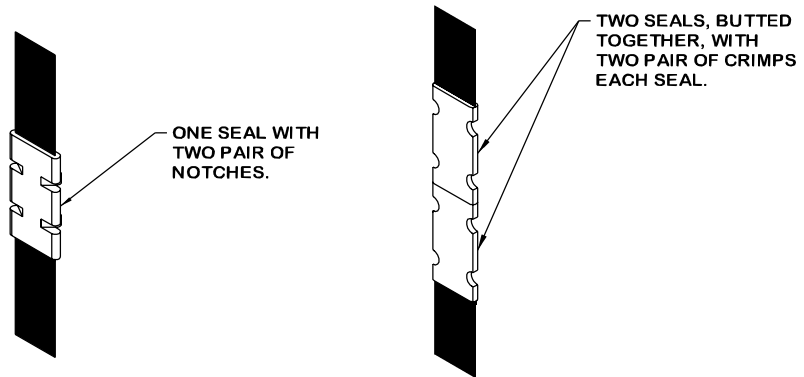
**BULKHEAD ENDGATE**

THE BULKHEAD GATE IS FOR USE AT THE END OF THE CAR WHEN THE ENDWALL IS BOWED OUTWARD MORE THAN TWO INCHES EITHER FROM SIDE TO SIDE OR FROM FLOOR TO CEILING. A LEFT HAND GATE IS SHOWN FOR USE IN THE NEAR END OF THE DEPICTED LOADS. A RIGHT HAND GATE IS REQUIRED FOR USE IN THE FAR END OF A CAR. GATE SHOWN IS FOR USE WITH A THREE LAYER LOAD. ELIMINATE THE TOP TWO HORIZONTAL AND FILLER PIECES AND SHIM MATERIAL FOR A TWO LAYER LOAD. ELIMINATE THE TOP FOUR HORIZONTAL AND FILLER PIECES AND SHIM MATERIAL FOR A ONE LAYER LOAD.



**TYPICAL STRUT BRACING**

STRUT BRACING AS DEPICTED ABOVE IS REQUIRED WHEN STRUTS ARE 48" OR GREATER IN LENGTH. ONE SET OF VERTICAL AND HORIZONTAL BRACING AS SHOWN ABOVE, IS REQUIRED FOR EVERY 48" OF STRUT LENGTH.



**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.

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

HORIZONTAL PIECE, 2" X 6" BY CAR WIDTH MINUS 1/2" (REF: 9'-3-1/2") (2 REQD). NAIL TO THE VERTICAL, STOP, AND SUPPORT PIECES W/3-10d NAILS AT EACH JOINT.

SUPPORT PIECE, 2" X 4" X 26" (1 REQD).

CAR WIDTH MINUS 1/2"

VERTICAL PIECE, 2" X 6" X 26" (4 REQD).

69-1/4"

49-1/4"

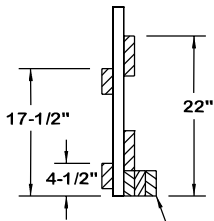
29-1/4"

9-1/4"

STOP PIECE, 2" X 4" X 26" (1 REQD).

STRUT LEDGER, 2" X 4" X 65-1/2" (2 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH LOCATION.

FILL PIECE, 2" X 4" X 65-1/2" (1 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.



**END VIEW**

HOLD DOWN CLEAT, 2" X 4" X 8" (DOUBLED) (2 REQD). LOCATE TO FIT BETWEEN THE SKIDS OF THE PALLET UNITS. NAIL THE FIRST PIECE TO THE FILL PIECE W/2-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A SIMILAR MANNER.

**CENTER GATE B**

THE ABOVE GATE IS FOR USE WITH A ONE LAYER LOAD. RIGHT HAND AND LEFT HAND GATES ARE REQUIRED. RIGHT HAND GATE SHOWN.

VERTICAL SUPPORT, 2" X 4" X 21" (4 REQD). NAIL TO THE BEARING PIECES W/3-10d NAILS AT EACH LOCATION.

STRUT, 4" X 4" X 35" (6 REQD).

BEARING PIECE, 2" X 6" X 67" (4 REQD). NAIL TO THE STRUTS W/2-10d NAILS AT EACH LOCATION.

33-1/4"

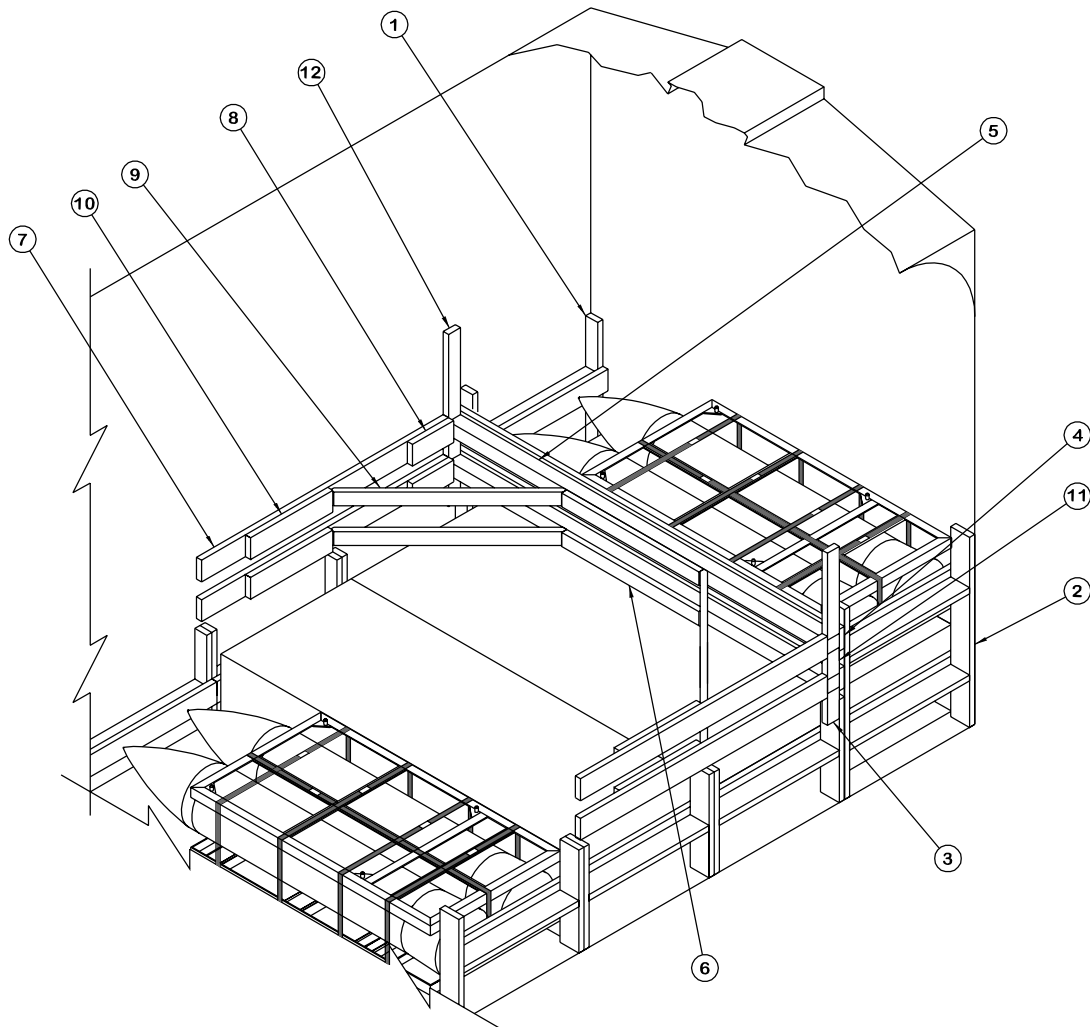
TOP END PIECE, 2" X 6" X 38" (2 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH LOCATION.

BOTTOM END PIECE, 2" X 6" X 38" (2 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH LOCATION AND TO THE BOTTOM SUPPORT W/2-10d NAILS.

BOTTOM SUPPORT, 2" X 6" X 70" (2 REQD). NAIL TO THE BOTTOM BEARING PIECE W/4-10d NAILS.

**OMITTED UNIT ASSEMBLY**





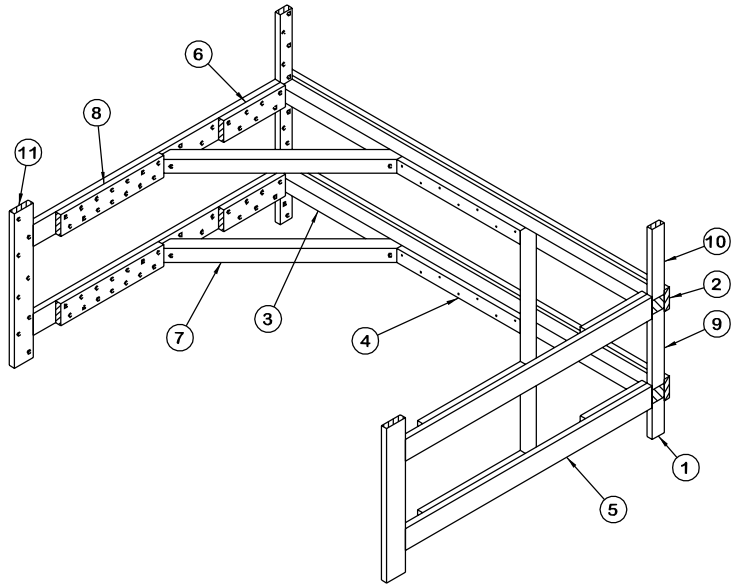
**ISOMETRIC VIEW**

**KEY NUMBERS**

**SPECIAL NOTES :**

1. A 9'-4" WIDE WOOD LINED (SIDEWALLS) CONVENTIONAL BOXCAR IS SHOWN WITH A TYPICAL K-BRACE. WOOD LINED CARS OF OTHER WIDTHS CAN BE USED.
2. THE K-BRACE METHOD OF PARTIAL LAYER (TIER) BRACING SHOWN MAY BE USED IN A WOOD LINED CAR FOR THE SECUREMENT OF A PARTIAL TOP LAYER, BE IT A FIRST, SECOND, OR THIRD LAYER. THE TYPE "A" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL LAYER OF NOT MORE THAN 4,400 POUNDS. THIS WILL BE NOT MORE THAN ONE PALLET UNIT. IF IT IS NECESSARY TO BLOCK A HEAVIER LOAD, REFER TO THE DETAILS ON PAGES 18, 19, OR 20.
3. **CAUTION :** SOME CARS ARE NOT SUITED FOR THE APPLICATION OF "PARTIAL LAYER BRACING" BECAUSE THE LENGTH OF THE PARTIAL LAYER TO BE SHIPPED AND/OR THE SIZE OR CONFIGURATION OF THE CAR DOORS WILL NOT PERMIT PROPER INSTALLATION OF THE SPECIFIED K-BRACE DUNNAGE. SUPPORT CLEATS, LOAD BEARING PIECES, CROSS CAR BRACES, POCKET CLEATS, AND HOLD DOWN CLEATS MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDEWALL. THE ENDS OF THE DIAGONAL BRACES MAY BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE HORIZONTAL WALL CLEAT MUST BE DOUBLED AND EXTEND ACROSS AND PAST THE DOOR OPENING SUFFICIENTLY TO PROVIDE FOR THE SPECIFIED NAILING OF EACH PIECE. LAMINATE THE SECOND PIECE OF THE HORIZONTAL WALL CLEAT TO THE FIRST W/16-16d NAILS. CLINCH NAILS THAT PROTRUDE THROUGH THE HORIZONTAL WALL CLEAT IN THE DOOR OPENING AREA. NOTE THAT THE DIAGONAL WALL CLEAT WILL BE 49-1/8" LONG IN LIEU OF 50-1/4" WHEN THE HORIZONTAL WALL CLEAT IS DOUBLED.
4. THE CENTER CLEAT WILL BE 40" FOR A 9'-6" WIDE CAR, 36" FOR A 9'-2" WIDE CAR, AND 34" FOR A 9'-0" WIDE CAR.
5. ONLY THE BLOCKING AND BRACING FOR THE PARTIAL LAYER IS KEY NUMBERED.

- ① SIDE FILL ASSEMBLY A FOR TWO HIGH STACK (1 REQD). SEE DETAIL ON PAGE 12. SEE SPECIAL NOTE 3 AT LEFT.
- ② SIDE FILL ASSEMBLY B FOR TWO HIGH STACK (1 REQD). SEE DETAIL ON PAGE 13.
- ③ SUPPORT CLEAT, 2" X 4" X 8" (2 REQD). POSITION VERTICALLY AS SHOWN, 8" ABOVE THE SIDE FILL ASSEMBLY FILLER PIECE. NAIL TO THE CAR SIDEWALL W/3-12d NAILS.
- ④ LOAD BEARING PIECE, 2" X 6" BY CAR WIDTH IN LENGTH (CUT TO FIT) (2 REQD). NAIL TO THE CROSS CAR BRACE W/1-12d NAIL EVERY 6".
- ⑤ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH IN LENGTH (CUT TO FIT) (2 REQD).
- ⑥ CENTER CLEAT, 2" X 4" X 40" (2 REQD). NAIL TO THE CROSS CAR BRACE W/7-16d NAILS.
- ⑦ HORIZONTAL WALL CLEAT, 2" X 6" X 72" (4 REQD). NAIL TO THE CAR SIDEWALL W/16-12d NAILS.
- ⑧ POCKET CLEAT, 2" X 6" X 12" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT W/8-16d NAILS.
- ⑨ DIAGONAL BRACE, 2" X 4" X 50-1/4" (4 REQD). SEE DETAIL ON PAGE 19 FOR REQUIRED BEVEL CUTS. TOENAIL TO THE CROSS CAR BRACE AND TO THE HORIZONTAL WALL CLEAT W/2-16d NAILS AT EACH END.
- ⑩ BACK UP CLEAT, 2" X 6" X 24" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT W/8-16d NAILS.
- ⑪ SPACER CLEAT, 2" X 4" X 6-1/2" (2 REQD). NAIL TO THE CAR SIDEWALL W/3-12d NAILS.
- ⑫ HOLD DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.



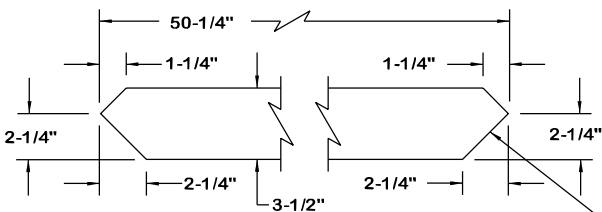
**ISOMETRIC VIEW**

**SPECIAL NOTES :**

1. THE TYPE "B" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL LAYER OF NOT MORE THAN 14,000 POUNDS. THIS WILL BE NOT MORE THAN THREE PALLET UNITS. IF IT IS NECESSARY TO BLOCK A HEAVIER LOAD, REFER TO THE DETAILS ON PAGES 19 AND 20 FOR SELECTION OF THE APPLICABLY SIZED K-BRACE TO USE AND THE DESIGN SPECIFICATIONS FOR THE BRACE. IF THE PARTIAL LAYER TO BE BRACED IS ONLY ONE PALLET UNIT, THE K-BRACE ON PAGE 17 MAY BE USED.
2. **CAUTION :** SOME CARS ARE NOT SUITED FOR THE APPLICATION OF "PARTIAL LAYER BRACING" BECAUSE THE LENGTH OF THE PARTIAL LAYER TO BE SHIPPED AND/OR THE SIZE OR CONFIGURATION OF THE CAR DOORS WILL NOT PERMIT PROPER INSTALLATION OF THE SPECIFIED K-BRACE DUNNAGE. SUPPORT CLEATS, LOAD BEARING PIECES, CROSS CAR BRACES, POCKET CLEATS, AND HOLD DOWN CLEATS MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDEWALL. THE ENDS OF THE DIAGONAL BRACES MAY BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE HORIZONTAL WALL CLEAT MUST BE DOUBLED AND EXTEND ACROSS AND PAST THE DOOR OPENING SUFFICIENTLY (REF: 54") TO PROVIDE FOR THE SPECIFIED NAILING OF EACH PIECE. LAMINATE THE SECOND PIECE OF THE HORIZONTAL WALL CLEAT TO THE FIRST W/16-16d NAILS. CLINCH NAILS THAT PROTRUDE THROUGH THE HORIZONTAL WALL CLEAT IN THE DOOR OPENING AREA. NOTE THAT THE DIAGONAL BRACE WILL BE 49-1/8" LONG IN LIEU OF 50-1/4" WHEN THE HORIZONTAL WALL CLEAT IS DOUBLED.
3. THE CENTER CLEAT WILL BE 40" FOR A 9'-6" WIDE CAR, 38" FOR A 9'-4" WIDE CAR, 36" FOR A 9'-2" WIDE CAR, AND 34" FOR A 9'-0" WIDE CAR.
4. REFER TO PAGE 17 FOR TYPICAL INSTALLATION OF A K-BRACE.

**KEY NUMBERS**

- ① SUPPORT CLEAT, 2" X 4" X 9" (2 REQD). POSITION VERTICALLY AS SHOWN, 8" ABOVE THE SIDE FILL ASSEMBLY FILLER PIECE. 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" 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 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 19" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑩ HOLD-DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑪ VERTICAL BACK-UP CLEAT, 2" X 6" X 39" (2 REQD). NAIL TO THE CAR SIDEWALL W/8-12d NAILS.



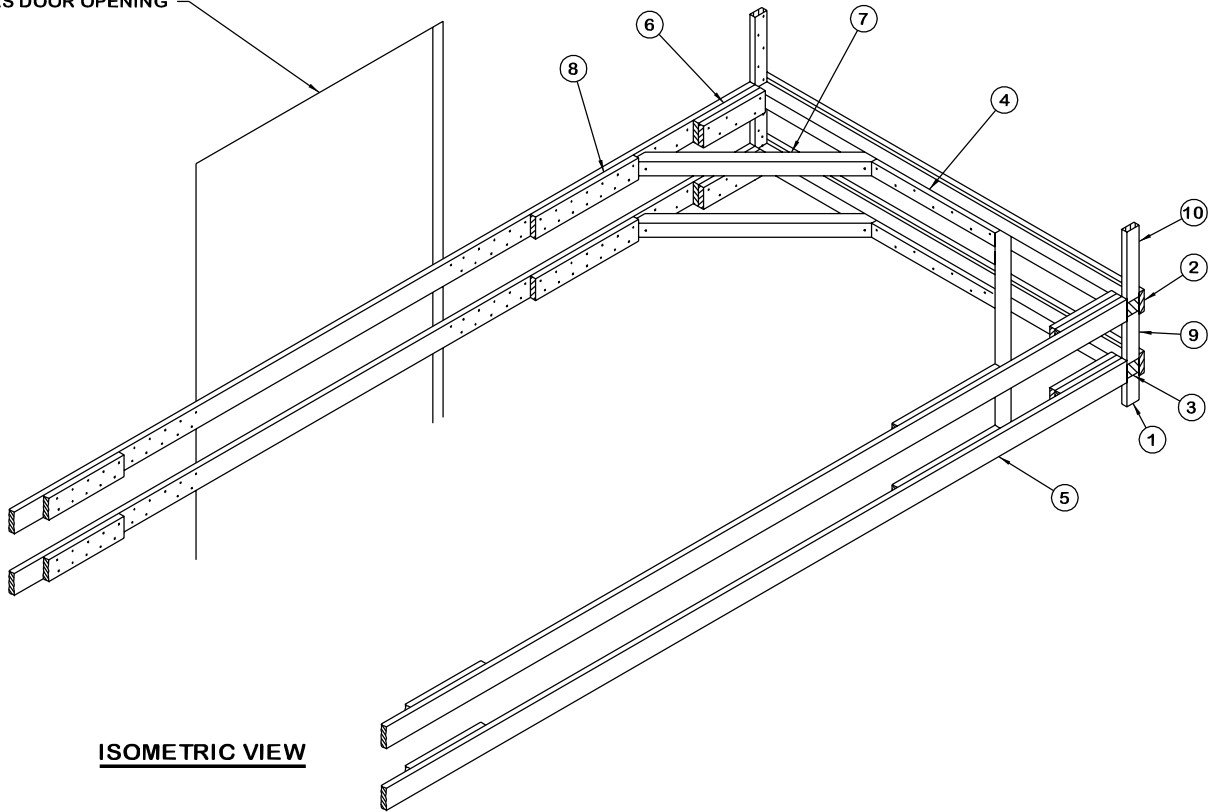
**DIAGONAL BRACE**

SEE SPECIAL NOTE 2 ABOVE.

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

**TYPE "B" K-BRACE**

INDICATES DOOR OPENING



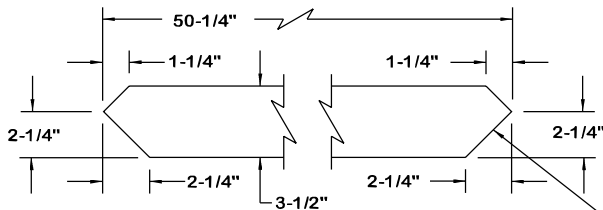
**ISOMETRIC VIEW**

**SPECIAL NOTES :**

1. THE TYPE "C" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL LAYER OF NOT MORE THAN 20,000 POUNDS. THIS WILL BE NOT MORE THAN FOUR PALLET UNITS. IF IT IS NECESSARY TO BLOCK A HEAVIER LOAD, REFER TO THE DETAILS ON PAGE 20 FOR APPLICABLY SIZED K-BRACE TO USE AND THE DESIGN SPECIFICATIONS FOR THE BRACE. IF THE PARTIAL LAYER TO BE BRACED IS ONLY TWO OR THREE PALLET UNITS, THE K-BRACE ON PAGE 18 MAY BE USED. IF THE PARTIAL LAYER TO BE BRACED IS ONLY ONE PALLET UNIT, THE K-BRACE ON PAGE 17 MAY BE USED.
2. **CAUTION :** SOME CARS ARE NOT SUITED FOR THE APPLICATION OF "PARTIAL LAYER BRACING" BECAUSE THE LENGTH OF THE PARTIAL LAYER TO BE SHIPPED AND/OR THE SIZE OR CONFIGURATION OF THE CAR DOORS WILL NOT PERMIT PROPER INSTALLATION OF THE SPECIFIED K-BRACE DUNNAGE. SUPPORT CLEATS, LOAD BEARING PIECES, CROSS CAR BRACES, POCKET CLEATS, AND HOLD DOWN CLEATS MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDEWALL. THE ENDS OF THE DIAGONAL BRACES MAY BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE HORIZONTAL WALL CLEAT MUST BE DOUBLED AND EXTEND ACROSS AND PAST THE DOOR OPENING SUFFICIENTLY (REF: 54") TO PROVIDE FOR THE SPECIFIED NAILING OF EACH PIECE. LAMINATE THE SECOND PIECE OF THE HORIZONTAL WALL CLEAT TO THE FIRST W/16-16d NAILS. CLINCH NAILS THAT PROTRUDE THROUGH THE HORIZONTAL WALL CLEAT IN THE DOOR OPENING AREA. NOTE THAT THE DIAGONAL BRACE WILL BE 49-1/8" LONG IN LIEU OF 50-1/4" WHEN THE HORIZONTAL WALL CLEAT IS DOUBLED.
3. THE CENTER CLEAT WILL BE 40" FOR A 9'-6" WIDE CAR, 38" FOR A 9'-4" WIDE CAR, 36" FOR A 9'-2" WIDE CAR, AND 34" FOR A 9'-0" WIDE CAR.
4. REFER TO PAGE 17 FOR TYPICAL INSTALLATION OF A K-BRACE.

**KEY NUMBERS**

- ① SUPPORT CLEAT, 2" X 4" X 8" (2 REQD). POSITION VERTICALLY AS SHOWN, 8" ABOVE THE SIDE FILL ASSEMBLY FILLER PIECE. 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). CLEAT SHALL BE OF A LENGTH AS NECESSARY TO EXTEND ACROSS AND FAR ENOUGH PAST THE DOOR OPENING TO CONTACT THE CROSS CAR BRACE IN THE OPPOSITE END OF THE CAR. NAIL TO THE CAR SIDEWALL W/40-12d NAILS.
- ⑥ POCKET CLEAT, 2" X 6" X 18"(DOUBLED) (4 REQD). NAIL TO 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 WALL CLEAT W/14-16d NAILS.
- ⑨ SPACER CLEAT, 2" X 4" X 6-1/2" (2 REQD). NAIL TO THE CAR SIDEWALL W/3-12d NAILS.
- ⑩ HOLD-DOWN CLEAT, 2" X 6" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.



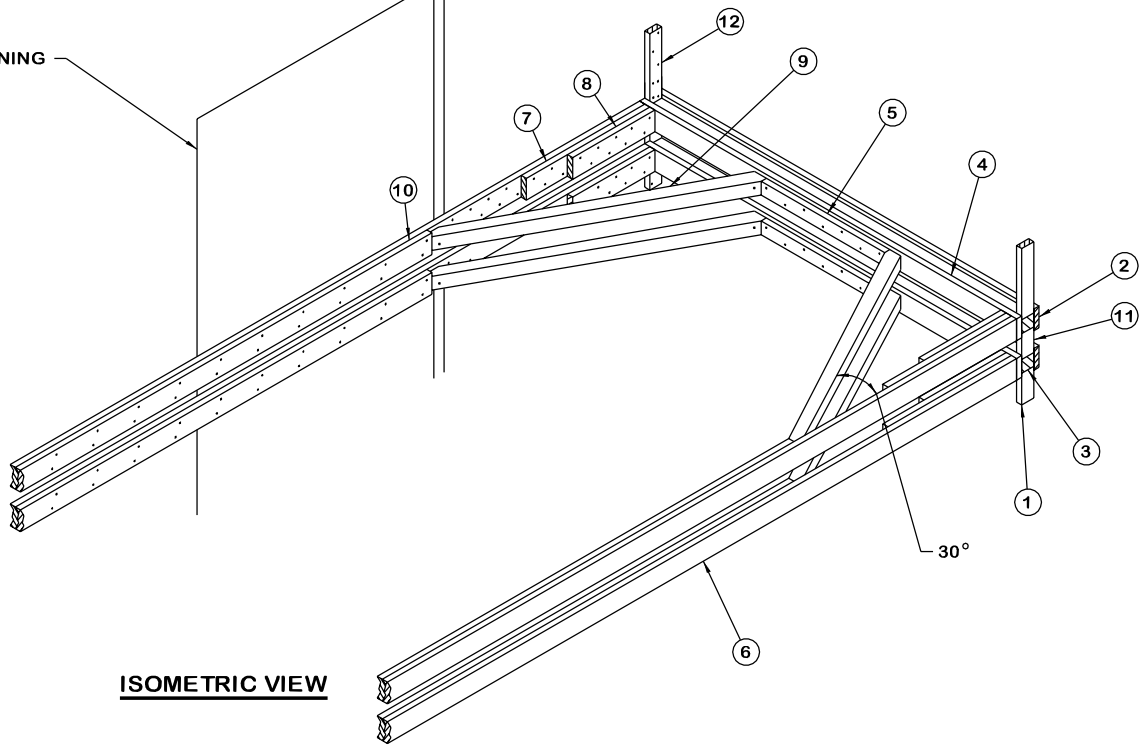
**DIAGONAL BRACE**

SEE SPECIAL NOTE 2 ABOVE.

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

**TYPE "C" K-BRACE**

INDICATES DOOR OPENING



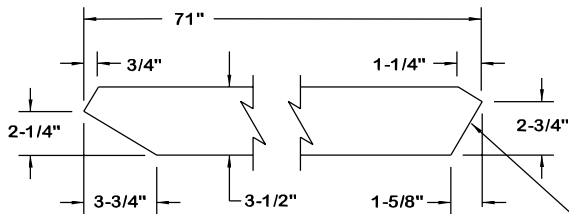
**ISOMETRIC VIEW**

**SPECIAL NOTES :**

1. THE TYPE "D" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL LAYER OF NOT MORE THAN 25,000 POUNDS. THIS WILL BE NOT MORE THAN FIVE PALLET UNITS. IF THE PARTIAL LAYER TO BE BRACED IS ONLY FOUR PALLET UNITS, THE K-BRACE DEPICTED ON PAGE 19 MAY BE USED. IF THE PARTIAL LAYER TO BE BRACED IS ONLY TWO OR THREE PALLET UNITS, THE K-BRACE ON PAGE 18 MAY BE USED. IF THE PARTIAL LAYER TO BE BRACED IS ONLY ONE PALLET UNIT, THE K-BRACE ON PAGE 17 MAY BE USED.
2. CAUTION : SOME CARS ARE NOT SUITED FOR THE APPLICATION OF "PARTIAL LAYER BRACING" BECAUSE THE LENGTH OF THE PARTIAL LAYER TO BE SHIPPED AND/OR THE SIZE OR CONFIGURATION OF THE CAR DOORS WILL NOT PERMIT PROPER INSTALLATION OF THE SPECIFIED K-BRACE DUNNAGE. SUPPORT CLEATS, LOAD BEARING PIECES, CROSS CAR BRACES, HORIZONTAL PIECE, POCKET CLEATS "A", POCKET CLEATS "B", SPACER CLEATS, AND HOLD DOWN CLEATS MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDEWALL. THE ENDS OF THE DIAGONAL BRACES MAY BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE HORIZONTAL WALL CLEAT MUST BE DOUBLED. LAMINATE THE SECOND PIECE OF THE HORIZONTAL WALL CLEAT TO THE FIRST W/40-16d NAILS. CLINCH NAILS THAT PROTRUDE THROUGH THE HORIZONTAL WALL CLEAT IN THE DOOR OPENING AREA. NOTE THAT THE DIAGONAL BRACE WILL BE 70-1/4" LONG IN LIEU OF 70" WHEN THE HORIZONTAL WALL CLEAT IS DOUBLED.
3. 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 THE QUANTITIES SPECIFIED ARE APPLICABLE ONLY FOR THE BRACE IN ONE END. OF THE CAR.
4. THE CENTER CLEAT WILL BE 40" FOR A 9'-6" WIDE CAR, 38" FOR A 9'-4" WIDE CAR, 36" FOR A 9'-2" WIDE CAR, AND 34" FOR A 9'-0" WIDE CAR.
5. REFER TO PAGE 17 FOR TYPICAL INSTALLATION OF A K-BRACE.

**KEY NUMBERS**

- ① SUPPORT CLEAT, 2" X 4" X 8" (2 REQD). POSITION VERTICALLY AS SHOWN, 8" ABOVE THE SIDE FILL ASSEMBLY FILLER PIECE. 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 HORIZONTAL PIECE, 2" X 6" BY CAR WIDTH (CUT TO FIT) (2 REQD). NAIL TO THE CROSS CAR BRACE W/1-12d NAIL EVERY 6".
- ⑤ CENTER CLEAT, 2" X 4" X 38" (2 REQD). NAIL TO THE CROSS CAR BRACE W/7-16d NAILS. SEE SPECIAL NOTE 4 AT LEFT.
- ⑥ HORIZONTAL WALL CLEAT, 2" X 6" BY CUT TO FIT (4 REQD). A CLEAT SHALL BE OF A LENGTH AS NECESSARY TO EXTEND ACROSS AND PAST THE DOOR OPENING AND TO CONTACT THE HORIZONTAL PIECE OF THE K-BRACE IN THE OPPOSITE END OF THE CAR. NAIL TO THE CAR SIDEWALL W/40-12d NAILS.
- ⑦ POCKET CLEAT A, 2" X 6" X 36" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT W/10-16d NAILS.
- ⑧ POCKET CLEAT B, 2" X 6" X 24" (4 REQD). NAIL TO POCKET CLEAT A 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 AND TO THE HORIZONTAL WALL CLEAT W/1-60d NAIL AT EACH END.
- ⑩ BACK-UP CLEAT, 2" X 6" BY CUT TO FIT (4 REQD). A CLEAT SHALL BE OF A LENGTH AS NECESSARY TO CONTACT THE DIAGONAL BRACE IN THE OPPOSITE END OF THE CAR AND ENTEND TO THE END OF THE HORIZONTAL WALL CLEAT AS SHOWN. NAIL TO THE HORIZONTAL WALL CLEAT, W/18-16d NAILS. CLINCH NAILS THAT PROTRUDE THROUGH THE HORIZONTAL WALL CLEAT IN THE DOOR OPENING AREA.
- ⑪ SPACER CLEAT, 2" X 4" X 6-1/2" (2 REQD). NAIL TO THE CAR SIDEWALL W/3-12d NAILS.
- ⑫ HOLD-DOWN CLEAT, 2" X 6" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.

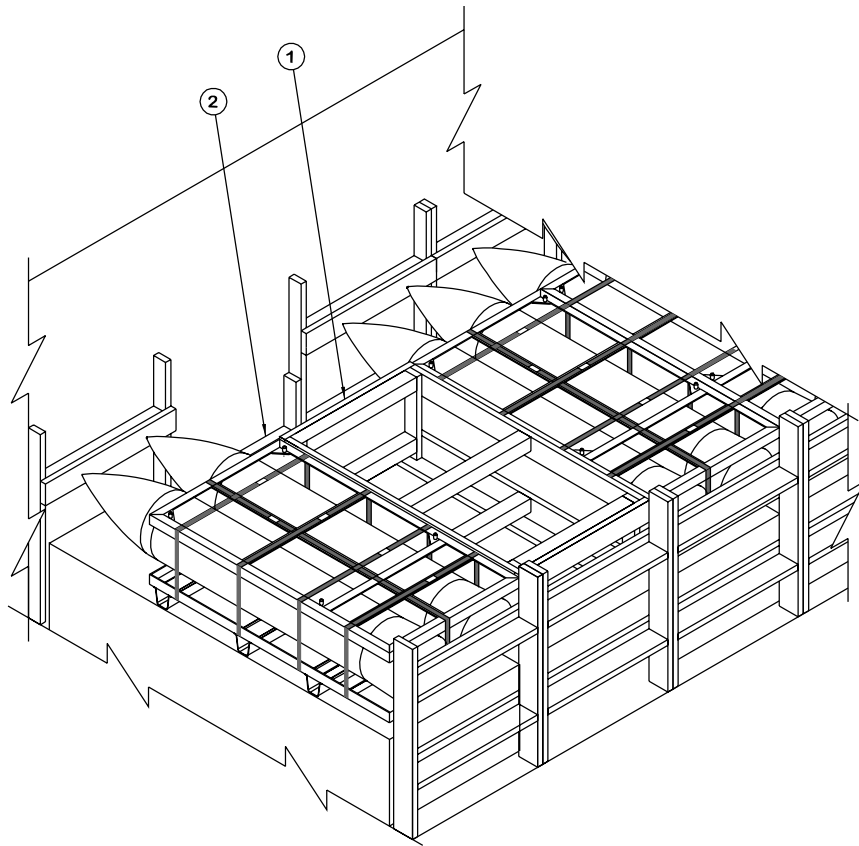


**DIAGONAL BRACE**

SEE SPECIAL NOTE 2 ABOVE.

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

**TYPE "D" K-BRACE**



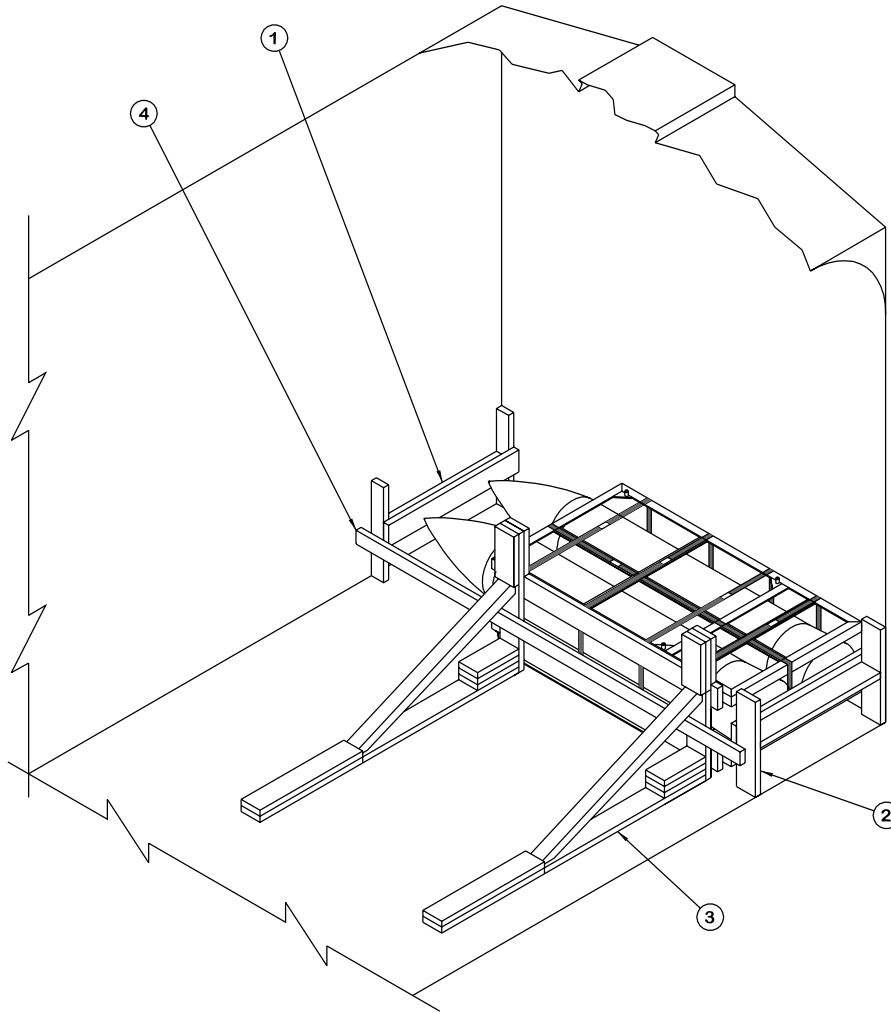
**ISOMETRIC VIEW**

**SPECIAL NOTES :**

1. A PARTIAL VIEW OF 9'-4" WIDE CONVENTIONAL TYPE BOXCAR IS SHOWN. CARS OF OTHER WIDTHS CAN ALSO BE USED.
2. THIS PROCEDURE IS APPLICABLE FOR THE OMISSION OF A PALLET UNIT FROM A LOAD IN EITHER END OF A CONVENTIONAL TYPE BOXCAR OR A CAR EQUIPPED WITH LOAD DIVIDER BULKHEADS.
3. THE OMITTED PALLET UNIT PROCEDURES SHOULD BE APPLIED NEAR THE CENTER OF THE CAR LENGTH. THERE SHOULD BE AT LEAST ONE PALLET UNIT BETWEEN THE OMITTED PALLET UNIT AND THE CENTER GATE OR BETWEEN THE OMITTED PALLET UNIT AND THE LOAD DIVIDER BULKHEAD.
4. ONLY THE BLOCKING AND BRACING FOR THE OMITTED PALLET UNIT AND THE PALLET UNIT BELOW IT IS IDENTIFIED WITHIN THE KEY NUMBERS. REFER TO A FULL LOAD PAGE FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.

**KEY NUMBERS**

- ① OMITTED UNIT ASSEMBLY (1 REQD). POSITION BETWEEN PALLET UNITS AND AGAINST THE TWO-HIGH SIDE FILL ASSEMBLY "B". TOENAIL TO SIDE FILL ASSEMBLY "B" W/1-10d NAIL AT EACH END. SEE SPECIAL NOTE 3 AT LEFT.
- ② SIDE FILL ASSEMBLY B FOR ONE-HIGH STACK (1 REQD). POSITION BETWEEN SIDE FILL ASSEMBLIES "B" FOR TWO-HIGH STACKS. NAIL TO THE ADJACENT SIDE FILL ASSEMBLIES W/2-10d NAILS AT EACH LOCATION.



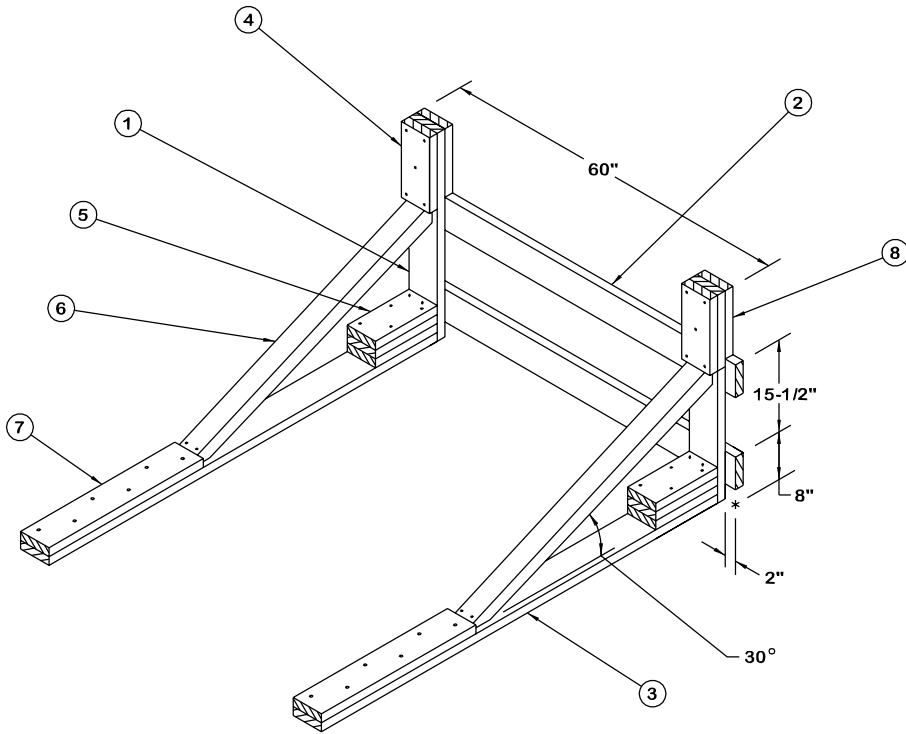
**ISOMETRIC VIEW**

**SPECIAL NOTES :**

1. A 9'-4" WIDE CONVENTIONAL TYPE BOXCAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS CAN ALSO BE USED.
2. THE DEPICTED KNEE BRACE ASSEMBLY MUST NOT BE USED TO RETAIN MORE THAN TWO PALLET UNITS.

**KEY NUMBERS**

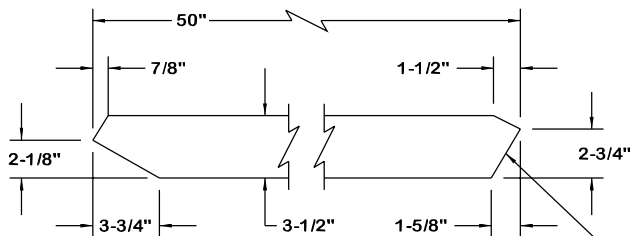
- ① SIDE FILL ASSEMBLY A FOR ONE HIGH STACK (1 REQD). SEE DETAIL ON PAGE 12. INSTALL ASSEMBLY BETWEEN THE CAR SIDEWALL AND THE NOSE END OF BOMBS.
- ② SIDE FILL ASSEMBLY B FOR ONE HIGH STACK (1 REQD). SEE DETAIL ON PAGE 13. INSTALL ASSEMBLY BETWEEN THE CAR SIDEWALL AND THE BASE END OF BOMBS.
- ③ KNEE BRACE ASSEMBLY (1 REQD). SEE DETAIL ON PAGE 23. SEE SPECIAL NOTE 2 AT LEFT.
- ④ STOP PIECE, 2" X 4" BY CAR WIDTH MINUS 1" (CUT TO FIT) (1 REQD). NAIL TO THE VERTICAL PIECES OF THE KNEE BRACE W/2-10d NAILS AT EACH LOCATION.



**ISOMETRIC VIEW**

**KEY NUMBERS**

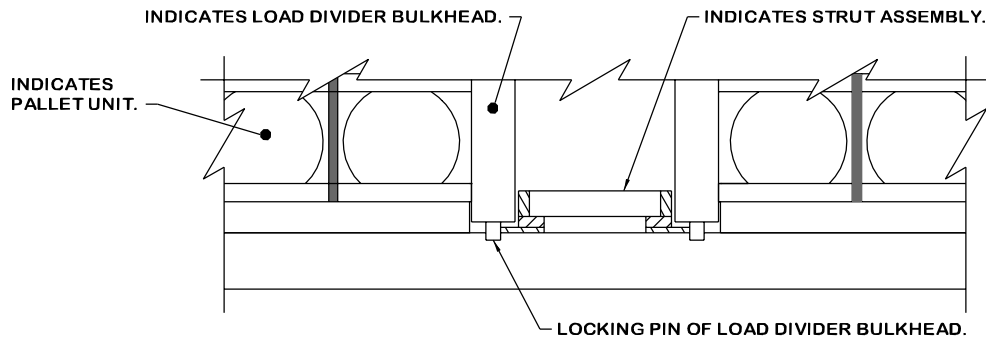
- ① VERTICAL PIECE, 2" X 6" X 35" (2 REQD). NAIL TO THE FLOOR CLEAT W/2-10d NAILS AT EACH LOCATION.
- ② HORIZONTAL PIECE, 2" X 6" X 64" (2 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.
- ③ FLOOR CLEAT, 2" X 6" X 6'-3-1/2" (2 REQD). NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8".
- ④ HOLD 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 A FLOOR CLEAT W/4-16d NAILS. NAIL EACH ADDITIONAL PIECE IN A LIKE MANNER. TOENAIL THE TOP PIECE TO A VERTICAL PIECE W/2-16d NAILS.
- ⑥ BRACE, 4" X 4" X 50" (2 REQD). SEE DETAIL AT LEFT FOR BEVEL CUTS REQUIRED. TOENAIL TO A VERTICAL PIECE AND TO A FLOOR CLEAT W/2-16d NAIL AT EACH END.
- ⑦ BACK UP CLEAT, 2" X 6" X 30" (2 REQD). NAIL TO A FLOOR CLEAT W/6-40d NAILS.
- ⑧ REINFORCING PIECE, 2" X 6" X 11-1/2" (2 REQD). NAIL TO THE VERTICAL PIECE W/4-10d NAILS AT EACH LOCATION.



**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.

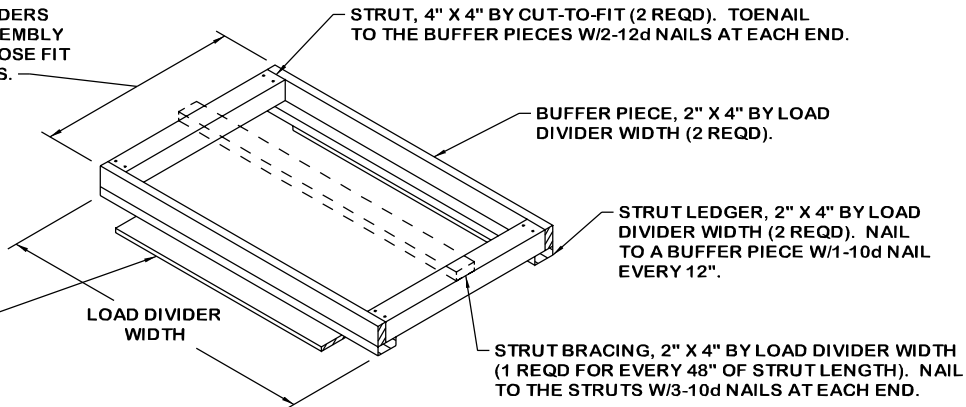


**INSTALLATION OF STRUT ASSEMBLY**

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".

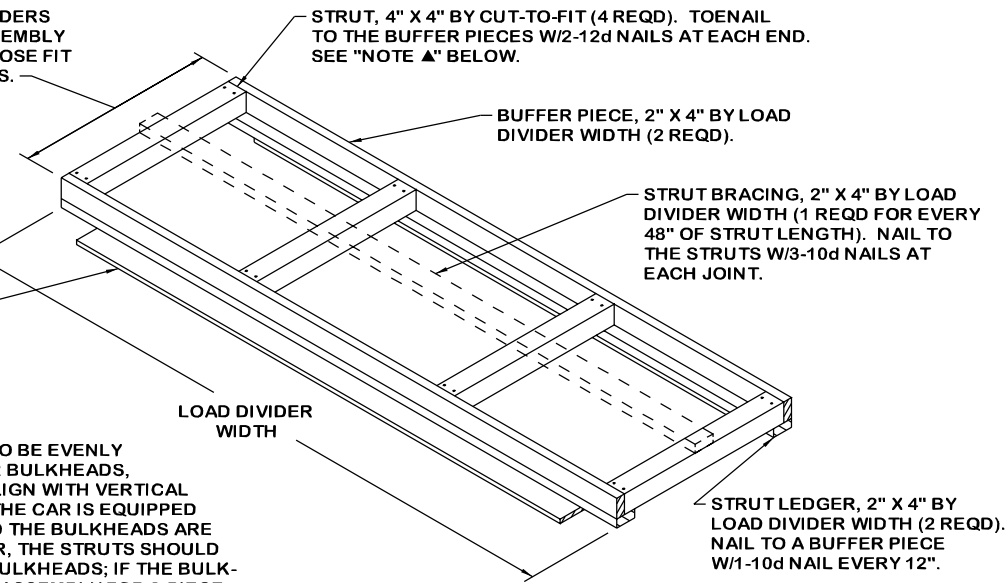


**STRUT ASSEMBLY FOR 2-PIECE BULKHEADS**

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".



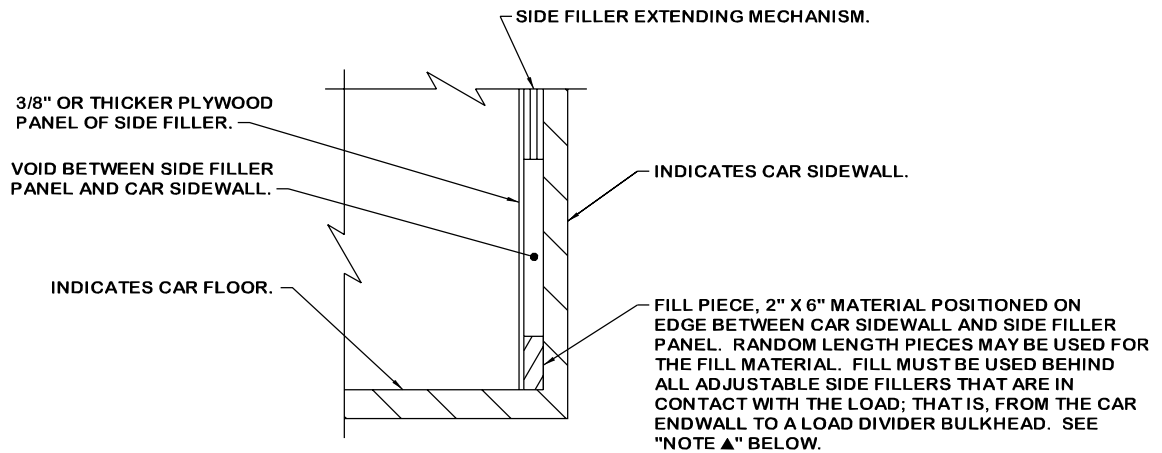
**NOTE ▲:**

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.



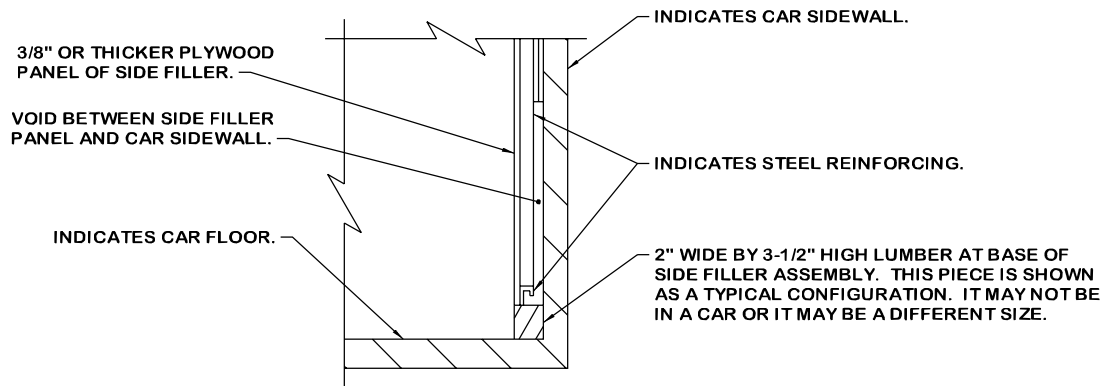


### **SIDE FILLER TYPICAL TYPE A**

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.

