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# LOADING AND BRACING (CL & LCL) IN BOXCARS<sup>⊕</sup> OF COMPUTER CONTROL GROUP, MAU-157, MAU- 169, MAU-209, WCU-10 AND WGU-53, PACKED IN CNU-317 CONTAINERS, PALLETIZED

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

## U.S. ARMY MATERIEL COMMAND DRAWING

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	ENGINEERING DIRECTORATE	BEAVER.JERRY .W.1230949952 <small>Digitally signed by BEAVER.JERRY.W.1230949952 DN: cn=US, ou=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=BEAVER.JERRY.W.1230949952 Date: 2011.10.18 12:25:10 -05'00'</small>		19	48	DRAWING 8673
U.S. ARMY DEFENSE AMMUNITION CENTER		PROJECT <b>SP 372-00</b>				

## 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 SPECIFIED OUTLOADING PROCEDURES ARE APPLICABLE TO LOADS OF COMPUTER CONTROL GROUPS PACKED IN CNU-317 CONTAINERS, PALLETIZED. SUBSEQUENT REFERENCE TO PALLET UNIT HEREIN MEANS THE PALLET UNIT WITH AMMUNITION ITEMS. SEE PAGE 4 AND NAVY DRAWING 6214415 FOR DETAILS OF THE PALLET UNIT.
- 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 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.
- E. THE SELECTION OF RAILCARS FOR THE TRANSPORT OF PALLET UNITS OF COMPUTER CONTROL GROUPS 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 ENDWALL GATE WITH SHIMS MUST BE INSTALLED TO PROVIDE A "SQUARED OFF" SURFACE FOR THE LOAD AT THE END OF THE CAR.
- 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. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN CARS WHICH ARE PARTIALLY LOADED WITH PALLET UNITS OF COMPUTER CONTROL GROUPS, 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.

(CONTINUED AT RIGHT)

## (GENERAL NOTES CONTINUED)

- 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. 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".
- 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 THAT 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 THAT 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 5 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. **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.
- P. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACTS BETWEEN PALLET UNITS, BETWEEN PALLET UNITS AND THE BOXCAR, AND BETWEEN PALLET UNITS AND STEEL STRAPPING, IF DESIRED, TO PREVENT CHAFING DAMAGE TO PALLET UNIT PAINT AND MARKINGS.
- Q. 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.
- 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.

(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), OR C.
- SEAL, STRAP - - - - : ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.
- STAPLE, STRAP - - - : COMMERCIAL GRADE.
- WIRE, CARBON STEEL - : ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.

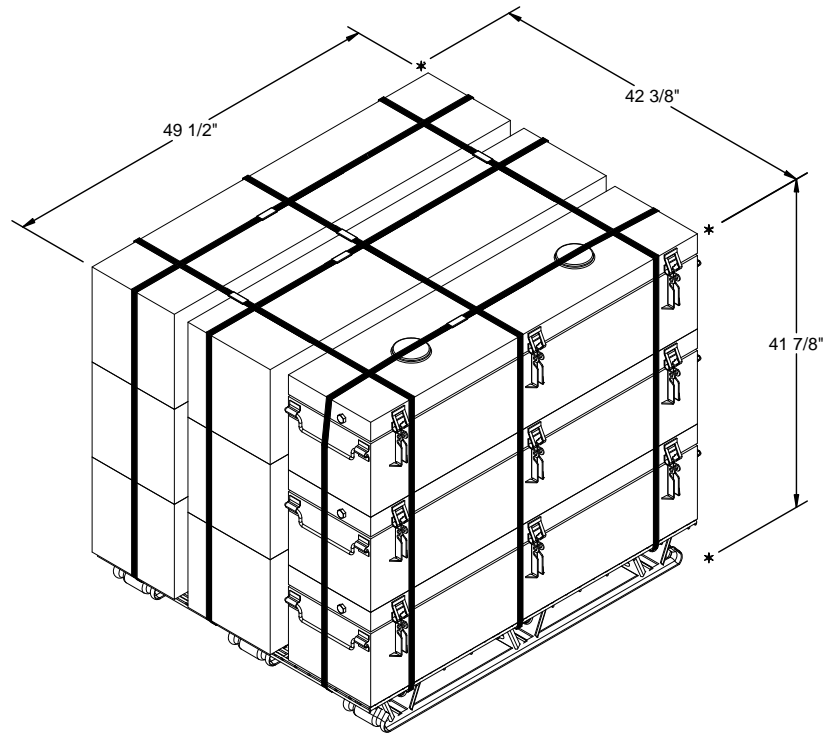
**S. FOR CONVENTIONAL TYPE BOXCARS:**

1. 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.
2. **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.
3. LOAD-BLOCKING STRUTS WHICH ARE 48" OR LONGER MUST BE STIFFENED BY THE APPLICATION OF HORIZONTAL AND VERTICAL STRUT BRACING AS SHOWN ON PAGE 35. 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.
4. 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 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.
5. WHERE 2" X 2" PIECES ARE SPECIFIED FOR STRUT LEDGERS, 2" X 4" MATERIAL MAY BE SUBSTITUTED, IF DESIRED.

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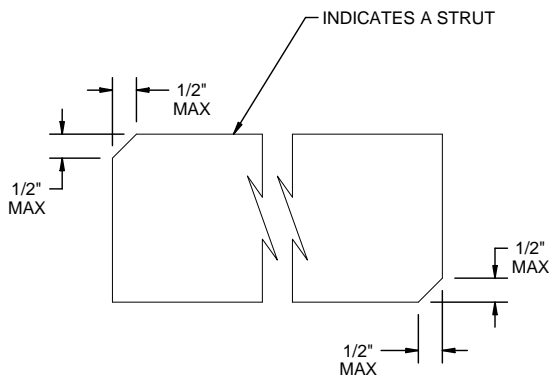
**T. FOR CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS:**

1. **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.
2. 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 COMPUTER CONTROL GROUPS. **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.
3. 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 34 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 34, THE "FILL PIECE" MATERIAL IS NOT REQUIRED.
4. **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 BETWEEN THE LOCKING HOLES WHICH HAVE BEEN SELECTED FOR SECURING A LOAD DIVIDER BULKHEAD.
5. 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 THAT ARE IN ONE LOAD UNIT. A LOAD UNIT IS DEFINED AS A STACK OF PALLET UNITS THAT 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.
  - I. ONE OR MORE RISERS CAN BE POSITIONED WITHIN A LOAD TO INCREASE A LOAD QUANTITY. SEE THE RISER PROCEDURES ON PAGE 16.
  - II. THE "GATES AND STRUTS" METHOD MAY BE USED TO ADJUST A LOAD QUANTITY DOWNWARD BY OTHER THAN A MULTIPLE OF A LOAD UNIT. SEE THE PROCEDURES ON PAGE 17 FOR GUIDANCE.
  - III. 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 10 OF THE CONVENTIONAL BOXCAR DRAWING HEREIN TO PROVIDE FOR A TIGHT LOAD BETWEEN THE BULKHEADS.
  - IV. 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 23 OR WITH KNEE BRACE ASSEMBLIES, AS SHOWN ON PAGE 20. A FILLER ASSEMBLY MAY ALSO BE USED TO REPLACE ONE PALLET UNIT, SEE THE DETAILS ON PAGE 35.



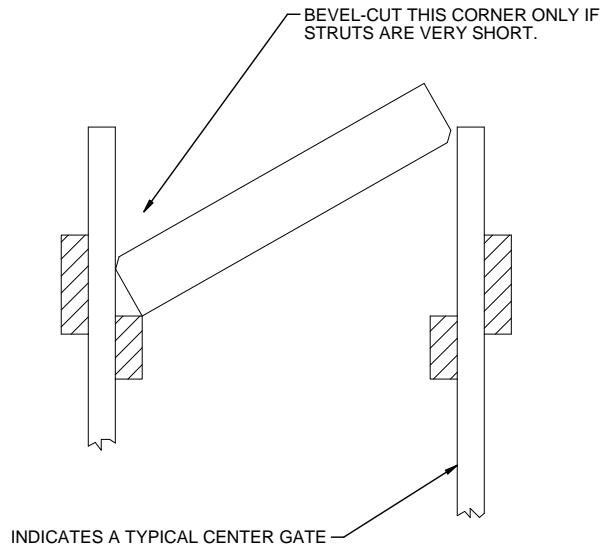
**PALLET UNIT**

GROSS WEIGHT - - - - - 1,256 LBS (APPROX)  
CUBE - - - - - 50.8 CU FT (APPROX)



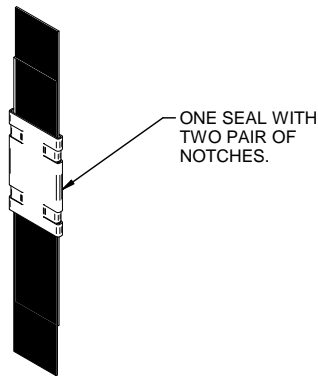
**BEVEL CUT**

IF DESIRED, EACH END OF A STRUT MAY BE BEVEL-CUT AS SHOWN ABOVE TO FACILITATE INSTALLING THE STRUTS WITH A "DRIVE" FIT.



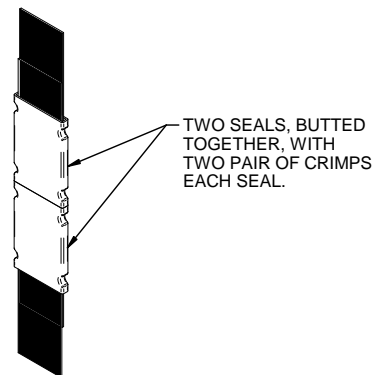
**STRUT INSTALLATION**

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



**STRAP JOINT A**

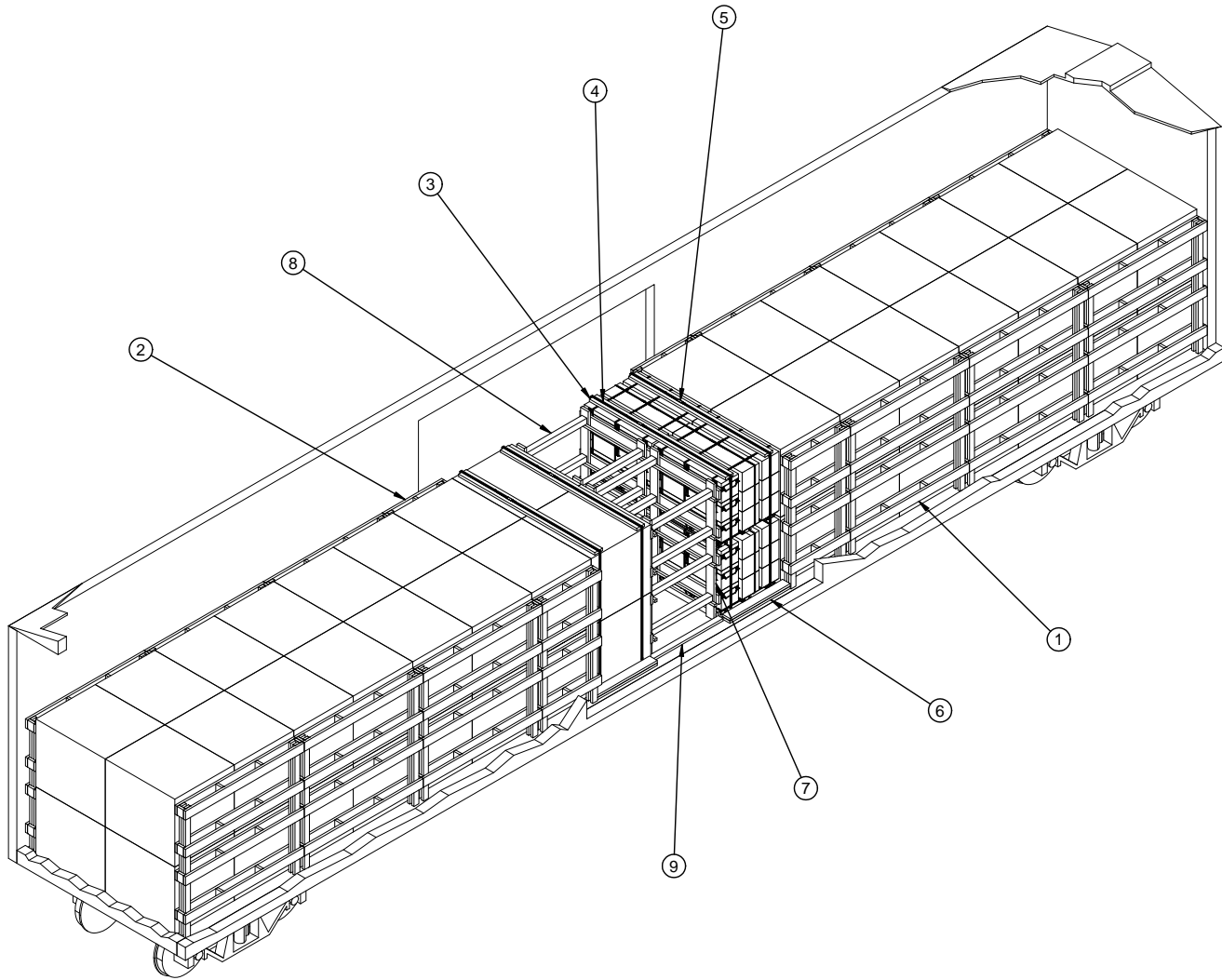
METHOD OF SECURING A STRAP JOINT WHEN USING A NOTCH-TYPE SEALER.



**STRAP JOINT B**

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

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



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① CRIB FILL ASSEMBLY A (12 REQD). SEE DETAIL ON PAGE 28 AND SPECIAL NOTE 2 ON PAGE 7.
- ② CRIB FILL ASSEMBLY B (4 REQD). SEE DETAIL ON PAGE 28 AND SPECIAL NOTE 2 ON PAGE 7.
- ③ STRAPPING BOARD, 2" X 6" X 8'-1" (4 REQD).
- ④ DOORWAY PROTECTION STRAP, 1-1/4" X .035" OR .031" X 31'-0" LONG STEEL STRAPPING (4 REQD). INSTALL TWO STRAPS SO AS TO ENCIRCLE THE LOAD UNIT IN THE DOORWAY AREA. SECURE TO STRAPPING BOARD W/2 STAPLES. SEE SPECIAL NOTE 3 ON PAGE 7.
- ⑤ SEAL FOR 1-1/4" STEEL STRAPPING (4 REQD, 1 PER STRAP). DOUBLE NOTCH EACH SEAL. SEE THE "END-OVER-END LAP JOINT DETAILS" ON PAGE 5.
- ⑥ SIDE BLOCKING, 2" X 6" X 43" (DOUBLED) (4 REQD). INSTALL TIGHT AGAINST PALLET SKIDS AND CRIB FILL ASSEMBLY "B". NAIL FIRST PIECE TO BOXCAR FLOOR W/5-16d NAILS. LAMINATE SECOND TO FIRST W/5-16d NAILS.
- ⑦ CENTER GATE A (2 REQD). SEE DETAIL ON PAGE 27.
- ⑧ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 44") (16 REQD). TOENAIL TO THE CENTER GATES W/2-16d NAILS AT EACH END.
- ⑨ SIDE BLOCKING, 2" X 4" X 50" (2 REQD). INSTALL TIGHT AGAINST CENTER GATES "A" AND LAMINATE TO BOXCAR FLOOR W/4-16d NAILS.

**SPECIAL NOTES:**

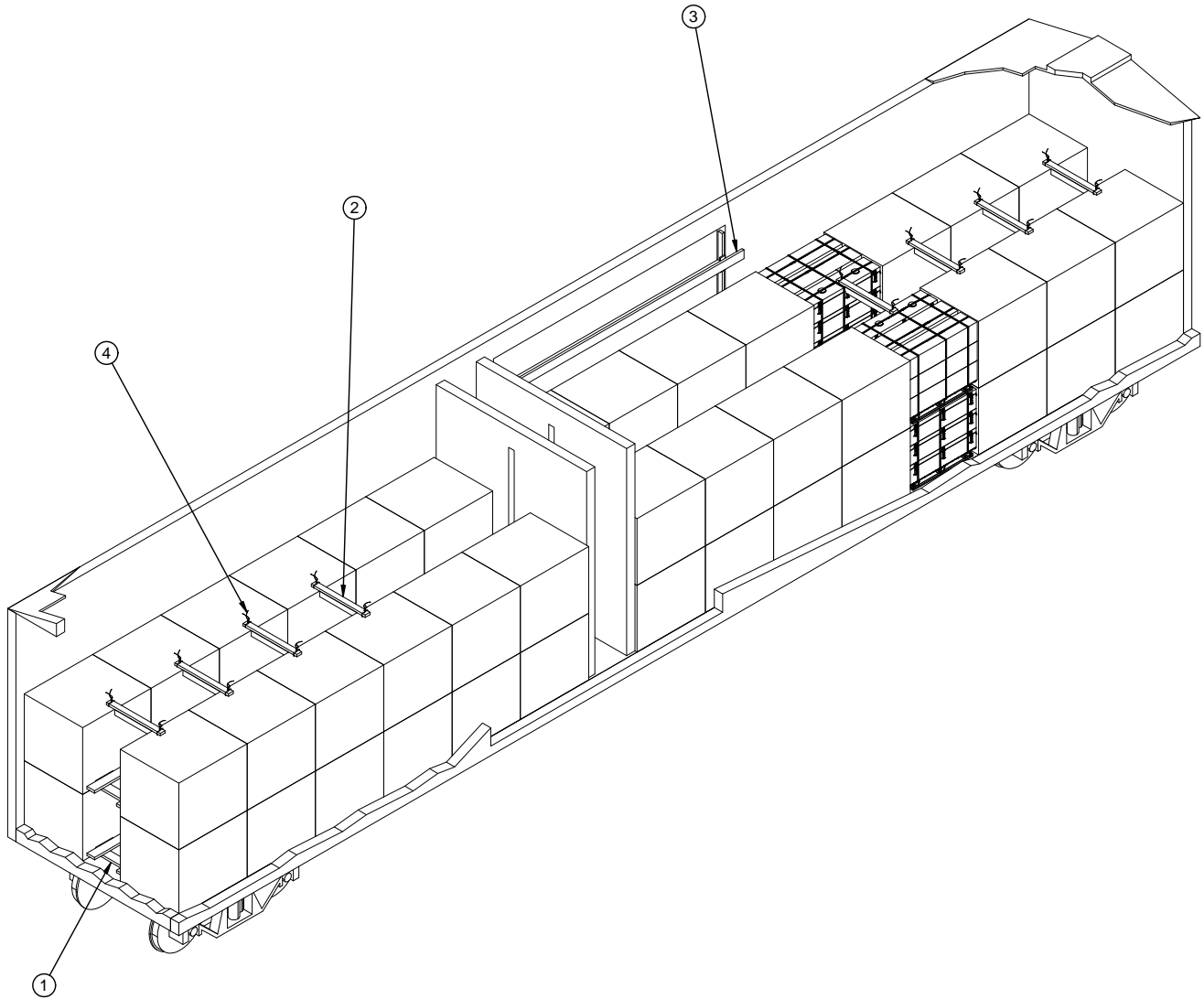
1. A 64 PALLET UNIT LOAD IS SHOWN IN A 60'-8" LONG BY 9'-6" WIDE CONVENTIONAL BOXCAR EQUIPPED WITH 14'-0" WIDE THROUGH DOOR OPENINGS. BOX-CARS OF OTHER DIMENSIONS AND BOXCARS HAVING WIDER, NARROWER OR OFFSET DOOR OPENINGS CAN BE USED.
2. CRIB FILL ASSEMBLIES ARE REQUIRED WHEN THE TOTAL LATERAL SPACE ACROSS THE WIDTH OF THE LOAD EXCEED 6", AS MEASURED FROM PALLET UNITS TO EACH SIDE WALL.
3. DOORWAY PROTECTION IS REQUIRED FOR ALL PALLET UNIT STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK LENGTH. DOORWAY PROTECTION WILL CONSIST OF NAILED FLOORLINE BLOCKING, STRAPPING BOARDS, AND DOORWAY PROTECTION STRAPS ENCIRCLING THE LOAD UNIT. TWO STRAPS ARE REQUIRED AROUND A LOAD UNIT WHICH IS NOT RETAINED BY AT LEAST 6" OF THE CAR SIDEWALL ON BOTH SIDES OF THE LOAD. ONE STRAP IS REQUIRED AROUND A LOAD UNIT WHICH IS RETAINED BY AT LEAST 6" BUT LESS THAN HALF OF THE PALLET UNIT LENGTH. IF THE CAR BEING LOADED IS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NAILABLE DOOR POSTS, A WOODEN GATE TYPE OF DOORWAY PROTECTION MAY BE USED. SEE DETAILS ON PAGES 32 AND 33.
4. FOR SHIPMENTS OF A LOAD WHICH CONTAINS FEWER PALLET UNITS THAN WHAT IS SHOWN, SEE THE PROCEDURES ON PAGE 8 THRU 26.

**BI LL OF MATERI AL**

LUMBER	LI NEAR FEET	BOARD FEET
2" X 2"	66	22
2" X 4"	453	302
2" X 6"	1062	1062
4" X 4"	59	79
NAI LS	NO. REQD	POUNDS
10d (3")	1928	29-3/4
16d (3-1/2")	112	2-1/2
STEEL STRAPPING, 1-1/4" - 124' REQD - - - 19 LBS		
SEAL FOR 1-1/4" STRAPPING - 4 REQD - - - 1/4 LBS		

**LOAD AS SHOWN**

ITEM	QUANTITY	WEI GHT (APPROX)
PALLET UNI T	- - - - - 64	- - - - - 80, 384 LBS
DUNNAGE	- - - - -	- - - - - 2, 982 LBS
TOTAL WEI GHT		- - - - - 83, 366 LBS (APPROX)



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① ANTI-SWAY BRACE (28 REQD). SEE DETAIL ON PAGE 30. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF PALLET UNITS.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (8 REQD). SEE DETAIL ON PAGE 30.
- ③ DOORWAY PROTECTION D (2 REQD). SEE DETAIL ON PAGE 33 AND SPECIAL NOTE 3 ON PAGE 9.
- ④ TIE WIRE, .0800" DIA 24" LONG (16 REQD). INSTALL THE WIRE TO FORM A COMPLETE LOOP AROUND THE TOP-OF-LOAD ANTI-SWAY BRACE AND TIE-DOWN STRAP ON THE PALLET UNIT. BRING ENDS TOGETHER AND TWIST TAUT.

**56 UNIT LOAD IN A 60'-8" LONG BY 9'-4" WIDE BOXCAR  
EQUIPPED WITH LOAD DIVIDER BULKHEADS**



**SPECIAL NOTES:**

1. A 56 PALLET UNIT LOAD IS SHOWN IN A 60'-8" LONG BY 9'-4" WIDE CUSHIONED TYPE BOXCAR EQUIPPED WITH LOAD DIVIDERS AND 14'-0" WIDE STAGGERED DOOR OPENINGS. BOXCARS OF OTHER DIMENSIONS AND BOXCARS HAVING WIDER, NARROWER OR THROUGH DOOR OPENINGS CAN BE USED.
2. ANTI-SWAY BRACES ARE REQUIRED WHEN THE TOTAL LATERAL SPACE BETWEEN THE PALLET UNITS EXCEED 6", AS MEASURED FROM PALLET UNIT TO LATERALLY ADJACENT PALLET UNIT.
3. DOORWAY PROTECTION IS REQUIRED FOR ALL PALLET UNIT STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK LENGTH. THE WOODEN GATE TYPE OF DOORWAY PROTECTION IN THE LOAD ON PAGE 8 IS APPLICABLE FOR BOXCARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NONNAILABLE DOOR POSTS. REFER TO PAGES 32 AND 33 FOR ALTERNATIVE DOORWAY PROTECTION FOR CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS. IF THE CAR BEING LOADED IS EQUIPPED WITH PLUG TYPE DOORS OR COMBINATION PLUG AND SLIDING DOORS, NAILED FLOORLINE BLOCKING AND DOORWAY PROTECTION STRAPS MUST BE USED. SEE THE LOAD ON PAGE 6 FOR GUIDANCE.
4. TOP-OF-LOAD ANTI-SWAY BRACES MUST BE INSTALLED IN EACH END OF THE CAR AND WIRE TIED TO THE TIE-DOWN STRAP ON THE PALLET UNIT WITH 0.0800" DIA WIRE AS SHOWN ON PAGE 8. FOUR BRACES ARE REQUIRED IN EACH END OF A LOAD IN 60'-8" LONG CAR. THREE BRACES ARE REQUIRED IN EACH END OF A LOAD IN A 50'-6" OR A 40'-6" LONG CAR WITH 49-1/2" PALLET UNIT DIMENSION LENGTHWISE. FOUR BRACES ARE REQUIRED IN EACH END OF A LOAD IN A 50'-6" OR A 40'-6" LONG CAR WITH 42-3/8" PALLET UNIT DIMENSION LENGTHWISE.
5. IF NAILED SIDE BLOCKING AND DOORWAY PROTECTION STRAPS, AS DEPICTED ON PAGE 6, ARE USED IN LIEU OF ONE OF THE FOUR METHODS OF DOORWAY PROTECTION SHOWN ON PAGES 32 AND 33, EACH LOWER ANTI-SWAY BRACE IN THE DOORWAY AREA MUST BE OMITTED AND REPLACED WITH SIDE BLOCKING AS SHOWN ON PAGE 6. NAILED BLOCKING IS REQUIRED FOR ALL PALLET UNIT STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK LENGTH ON EITHER SIDE OF THE CAR.
6. FOR SHIPMENTS OF A LOAD WHICH CONTAINS MORE OR FEWER PALLET UNITS THAN WHAT IS SHOWN, SEE THE PROCEDURES ON PAGE 6 AND 10 THRU 26.

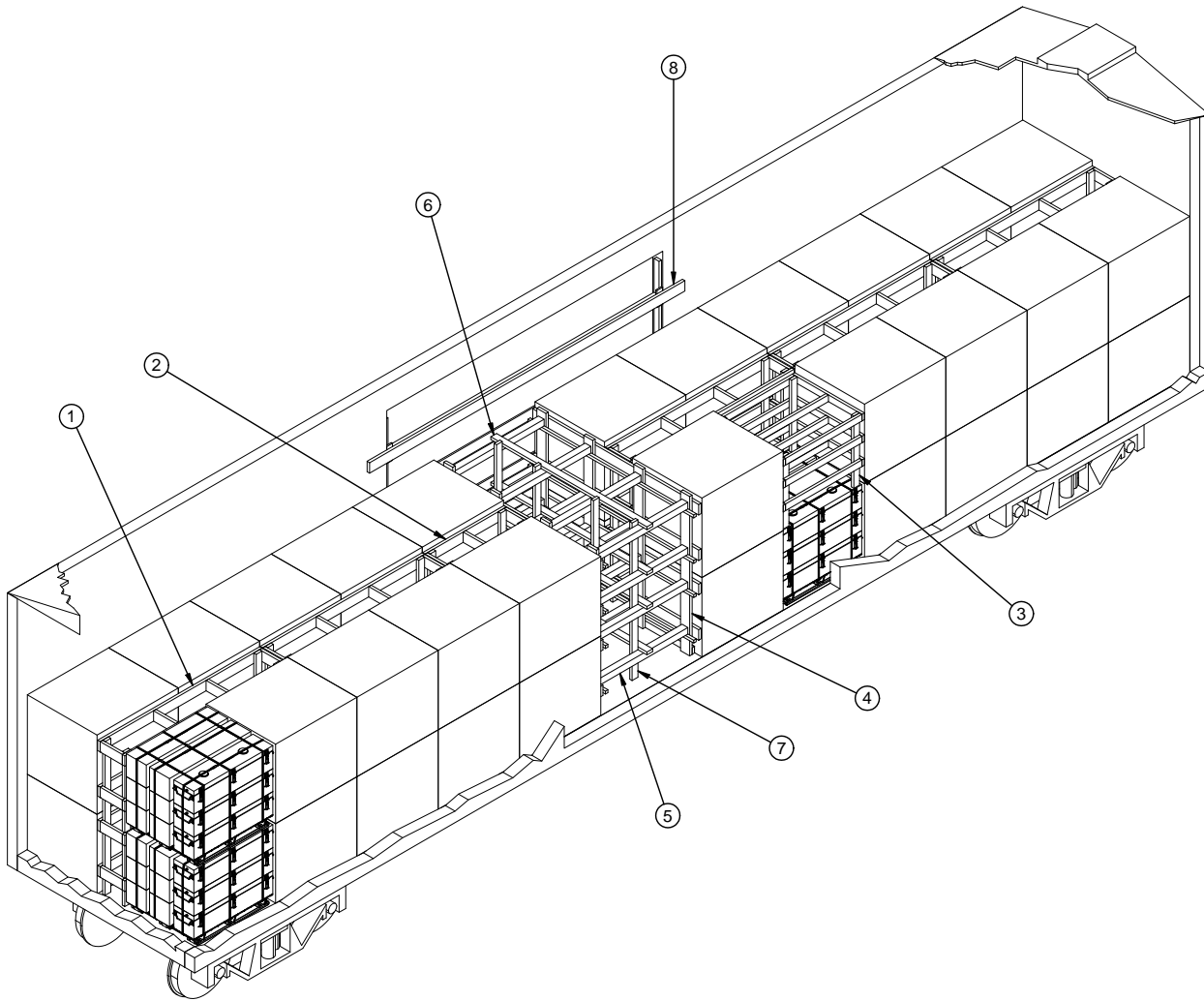
**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	3	1
1" X 6"	112	56
2" X 3"	95	63
2" X 4"	27	18
2" X 6"	438	438
4" X 4"	19	26
NAI LS	NO. REQD	POUNDS
6d (2")	64	1/2
10d (3")	392	6-1/4
12d (3-1/4")	20	1/2
WI RE, .008" DIA - - - 32' REQD - - -		3/4 LBS

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT - - - - -	56 - - - - -	70, 336 LBS
DUNNAGE - - - - -	- - - - -	1, 212 LBS
TOTAL WEIGHT - - - - -		71, 548 LBS (APPROX)

**56 UNIT LOAD IN A 60'-8" LONG BY 9'-4" WIDE BOXCAR  
EQUIPPED WITH LOAD DIVIDER BULKHEADS**



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① CRIB FILL ASSEMBLY C (5 REQD). SEE DETAIL ON PAGE 29 AND SPECIAL NOTE 2 ON PAGE 11.
- ② CRIB FILL ASSEMBLY D (1 REQD). SEE DETAIL ON PAGE 29 AND SPECIAL NOTE 2 ON PAGE 11.
- ③ FILLER ASSEMBLY (1 SHOWN). SEE DETAIL ON PAGE 35 AND SPECIAL NOTE 5 ON PAGE 11.
- ④ CENTER GATE B (2 REQD). SEE DETAIL ON PAGE 27.
- ⑤ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 55") (16 REQD). TOENAIL TO THE CENTER GATES W/2-16d NAILS AT EACH END.
- ⑥ HORIZONTAL STRUT BRACING, 2" X 4" X 7'-11" (4 REQD). NAIL TO THE STRUTS MARKED ④ W/3-10d NAILS AT EACH JOINT.
- ⑦ VERTICAL STRUT BRACING, 2" X 4" X 6'-11" (4 REQD). NAIL TO THE STRUTS MARKED ④ W/3-10d NAILS AT EACH JOINT.
- ⑧ DOORWAY PROTECTION D (2 REQD). SEE DETAIL ON PAGE 33 AND SPECIAL NOTE 3 ON PAGE 11.

**SPECIAL NOTES:**

1. A 43 PALLET UNIT LOAD IS SHOWN IN A 50'-6" LONG BY 8'-6" WIDE CONVENTIONAL BOXCAR EQUIPPED WITH 14'-0" WIDE THROUGH DOOR OPENINGS. BOXCARS OF OTHER DIMENSIONS AND BOXCARS HAVING WIDER, NARROWER OR OFFSET DOOR OPENINGS CAN BE USED.
2. CRIB FILL ASSEMBLIES ARE REQUIRED WHEN THE TOTAL LATERAL SPACE BETWEEN THE PALLET UNITS EXCEED 6", AS MEASURED FROM PALLET UNIT TO LATERALLY ADJACENT PALLET UNIT.
3. DOORWAY PROTECTION IS REQUIRED FOR ALL PALLET UNIT STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK LENGTH. THE WOODEN GATE TYPE OF DOORWAY PROTECTION IN THE LOAD ON PAGE 10 IS APPLICABLE FOR BOXCARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NONNAILABLE DOOR POSTS. REFER TO PAGES 32 AND 33 FOR ALTERNATIVE DOORWAY PROTECTION FOR CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS. IF THE CAR BEING LOADED IS EQUIPPED WITH PLUG TYPE DOORS OR COMBINATION PLUG AND SLIDING DOORS, NAILED FLOORLINE BLOCKING AND DOORWAY PROTECTION STRAPS MUST BE USED. SEE THE LOAD ON PAGE 6 FOR GUIDANCE.
4. IF NAILED SIDE BLOCKING AND DOORWAY PROTECTION STRAPS, AS DEPICTED ON PAGE 6, ARE USED IN LIEU OF CRIB FILL ASSEMBLIES AND ONE OF THE FOUR METHODS OF DOORWAY PROTECTION SHOWN ON PAGES 32 AND 33, EACH CRIB FILL ASSEMBLY IN THE DOORWAY AREA MUST BE OMITTED AND REPLACED WITH SIDE BLOCKING ON THE FLOOR BETWEEN THE PALLET UNITS, SIMILAR TO WHAT IS SHOWN ON PAGE 6, ONE ANTI-SWAY BRACE BETWEEN THE UPPER TWO PALLET UNITS, AND TWO TOP-OF-LOAD ANTI-SWAY BRACES. NAILED BLOCKING IS REQUIRED FOR ALL PALLET UNIT STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK LENGTH ON EITHER SIDE OF THE CAR.
5. THE FILLER ASSEMBLY SHOULD BE INSTALLED NEAR THE CENTER OF THE CAR LENGTH. THERE MUST BE AT LEAST ONE PALLET UNIT BETWEEN THE FILLER ASSEMBLY AND THE CENTER GATE OR LOAD DIVIDER BULKHEAD.
6. FOR SHIPMENTS OF A LOAD WHICH CONTAINS MORE OR FEWER PALLET UNITS THAN WHAT IS SHOWN, SEE THE PROCEDURES ON PAGE 6, 8, 12 TO 26.

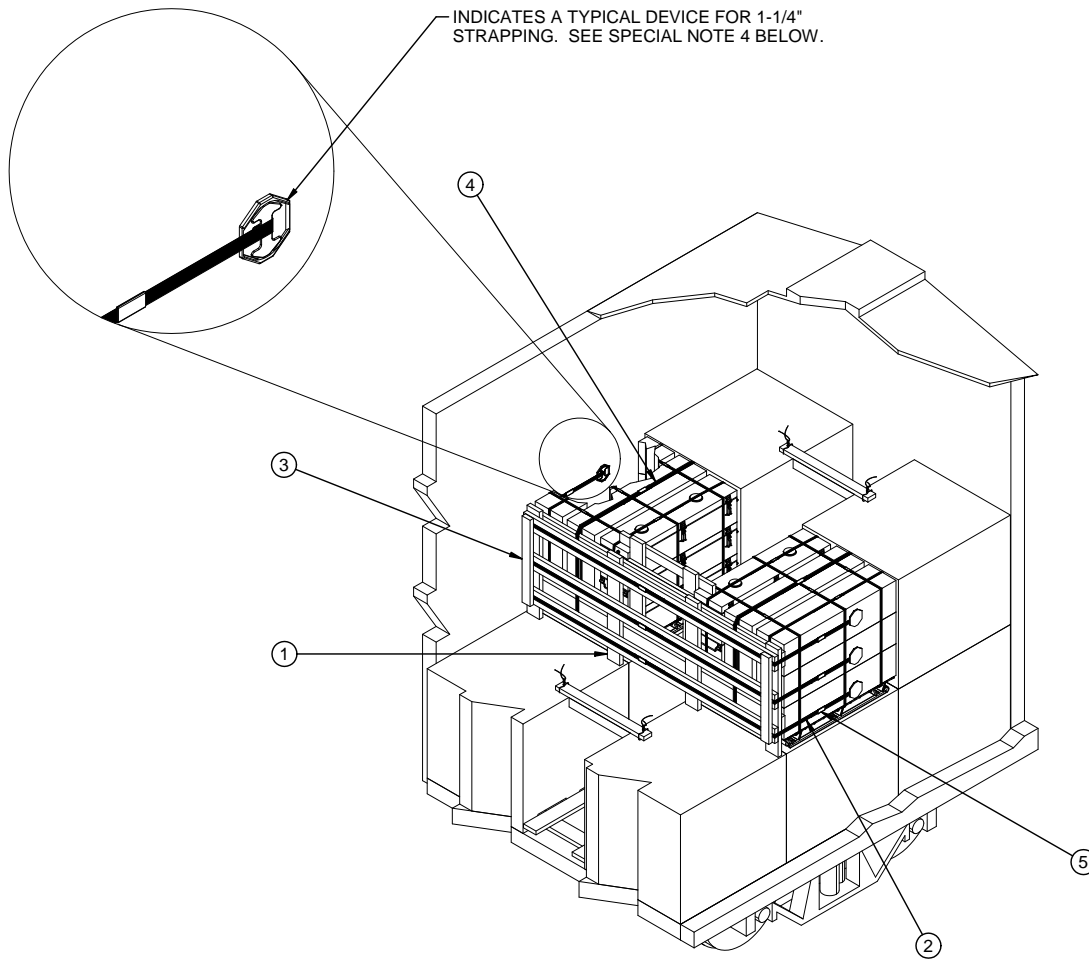
**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	3	1
1" X 6"	112	56
2" X 2"	68	23
2" X 3"	95	63
2" X 4"	302	202
2" X 6"	621	621
4" X 4"	73	98
NAILS	NO. REQD	POUNDS
6d (2")	64	1/2
10d (3")	1028	16
12d (3-1/4")	20	1/2
16d (3-1/2")	64	1-1/2

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT - - - - -	43 - - - - -	54,008 LBS
DUNNAGE - - - - -	- - - - -	2,146 LBS
TOTAL WEIGHT - - - - -		56,154 LBS (APPROX)

**43 UNIT LOAD IN A 50'-6" LONG BY 8'-6" WIDE CONVENTIONAL BOXCAR**



INDICATES A TYPICAL DEVICE FOR 1-1/4" STRAPPING. SEE SPECIAL NOTE 4 BELOW.

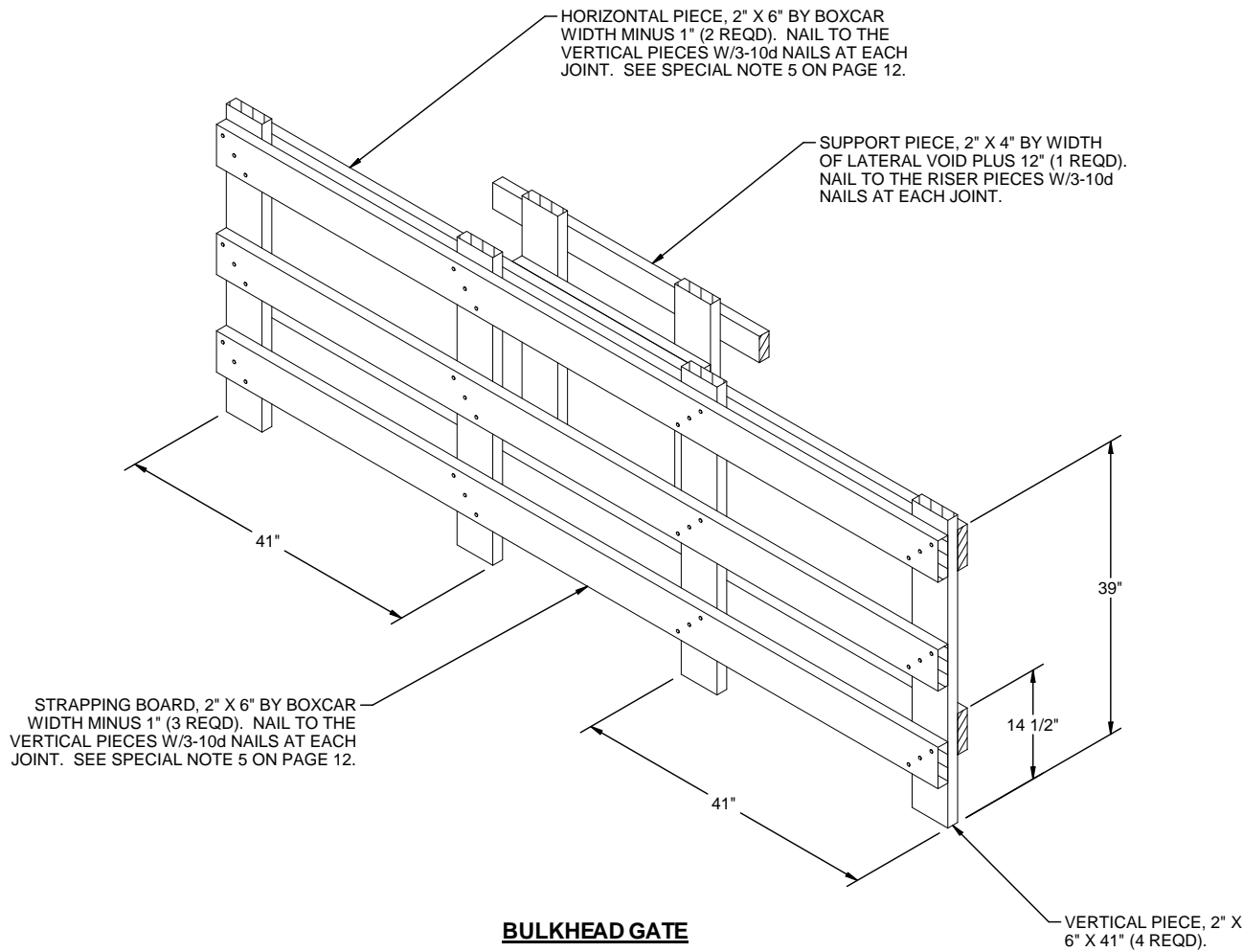
**ISOMETRIC VIEW**

**SPECIAL NOTES:**

1. A 9'-4" WIDE ALL METAL BOXCAR WITH STRAP ANCHOR DEVICES AND HAVING AN AAR MECHANICAL DESIGNATION CLASS OF XL IS SHOWN. CARS OF OTHER WIDTHS MAY BE USED.
2. THE BULKHEAD GATE METHOD OF PARTIAL-LAYER BRACING IS SHOWN ABOVE IS FOR CROSSWISE POSITIONED PALLET UNITS. PARTIAL LAYERS OF LENGTHWISE PALLET UNITS MAY ALSO BE RETAINED BY THE BULKHEAD GATE METHOD.
3. A BULKHEAD GATE USED IN CONJUNCTION WITH THREE BULKHEAD STRAPS WILL RETAIN UP TO 7,500 POUNDS OF LADING, FIVE PALLET UNITS; A BULKHEAD GATE WITH TWO STRAPS WILL RETAIN NOT MORE THAN 5,000 POUNDS, THREE PALLET UNITS. AN ADDITIONAL SET OF HORIZONTAL PIECES WILL NEED TO BE ADDED FOR THE THIRD STRAP.
4. THE ANCHOR DEVICES TO BE USED FOR ATTACHMENT OF THE BULKHEAD STRAPS MUST BE LOCATED AT LEAST 36" TOWARD THE CAR END WALL FROM THE OPPOSITE-THE-LOAD SIDE OF THE BULKHEAD GATE. IF THE ANCHOR DEVICES IN THE CAR BEING LOADED ARE NOT LOCATED NEAR ENOUGH TO THE END OF THE CAR SO THAT THE 36" REQUIREMENT CAN BE SATISFIED, IT WILL BE NECESSARY TO INSTALL GATES AND STRUTS AT THE END OF THE CAR. THESE GATES WILL BE 1-HIGH GATES FOR THE ITEM BEING LOADED AND WILL BE INSTALLED SIMILAR TO THE STRUTTED GATE METHOD SHOWN ON PAGE 17 FOR AN EVEN QUANTITY OF UNITS.
5. THE STRAPPING BOARDS ON A BULKHEAD GATE ARE TO BE ALIGNED AS NEARLY AS POSSIBLE WITH THE ANCHOR DEVICES IN THE CAR TO WHICH THE BULKHEAD STRAPS ARE ATTACHED. TOLERANCES ARE SPECIFIED ON THE END VIEW OF THE BULKHEAD GATE DETAIL ON PAGE 13 FOR THE LOCATION OF THE HORIZONTAL PIECES IN RELATION TO THE LOCATION OF THE STRAPPING BOARDS. THE STRAPPING BOARDS/HORIZONTAL PIECES SHOULD BE LOCATED WITHIN THESE TOLERANCES. IF THIS IS NOT POSSIBLE, ADDITIONAL HORIZONTAL PIECES MUST BE APPLIED, AS NECESSARY TO PROVIDE PROPER BEARING AGAINST THE PALLET UNIT.
6. ONLY THE BLOCKING AND BRACING PIECES WHICH ARE NECESSARY TO PERMIT THE OMISSION OF THE UNITS FROM THE TOP LAYER ARE LISTED IN THE KEY NUMBERS AT RIGHT REFER TO PAGE 8 FOR LATERAL BRACING AND DOORWAY PROTECTION REQUIREMENTS.

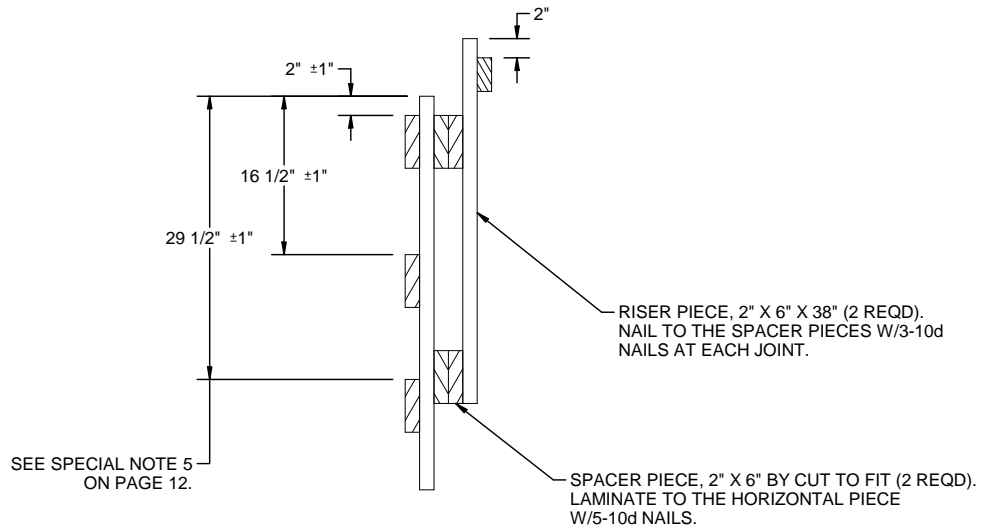
**KEY NUMBERS**

- ① BULKHEAD GATE (1 REQD). SEE THE DETAIL ON PAGE 13. SEE SPECIAL NOTE 3 AT LEFT.
- ② BULKHEAD STRAP, 1-1/4" X .035" OR .031" BY LENGTH TO SUIT STEEL STRAPPING (3 REQD). INSTALL FROM TWO EQUAL LENGTH PIECES. ATTACH TO AN ANCHOR WITH ONE SEAL. SEE SPECIAL NOTES 3 AND 4 AT LEFT.
- ③ STRAP RETAINER, 2" X 4" X 33" (2 REQD). NAIL TO THE BULKHEAD GATE W/2-12d NAILS ABOVE AND BELOW EACH BULKHEAD STRAP.
- ④ BUNDLING STRAP, 1-1/4" X .035" OR .031" X 15'-8" (2 REQD). ENCIRCLE THE PALLET UNIT AND THE HORIZONTAL PIECES OF THE BULKHEAD GATE. TENSION AND SEAL AFTER TENSIONING THE BULKHEAD STRAPS.
- ⑤ SEAL FOR 1-1/4" STEEL STRAPPING (8 REQD). DOUBLE CRIMP EACH SEAL.



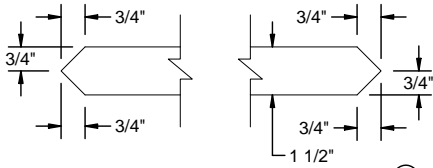
**BULKHEAD GATE**

FOR A LENGTHWISE POSITIONED LOAD, INCREASE DISTANCE BETWEEN THE VERTICAL PIECES FROM 41" TO 47" IN TWO PLACES.

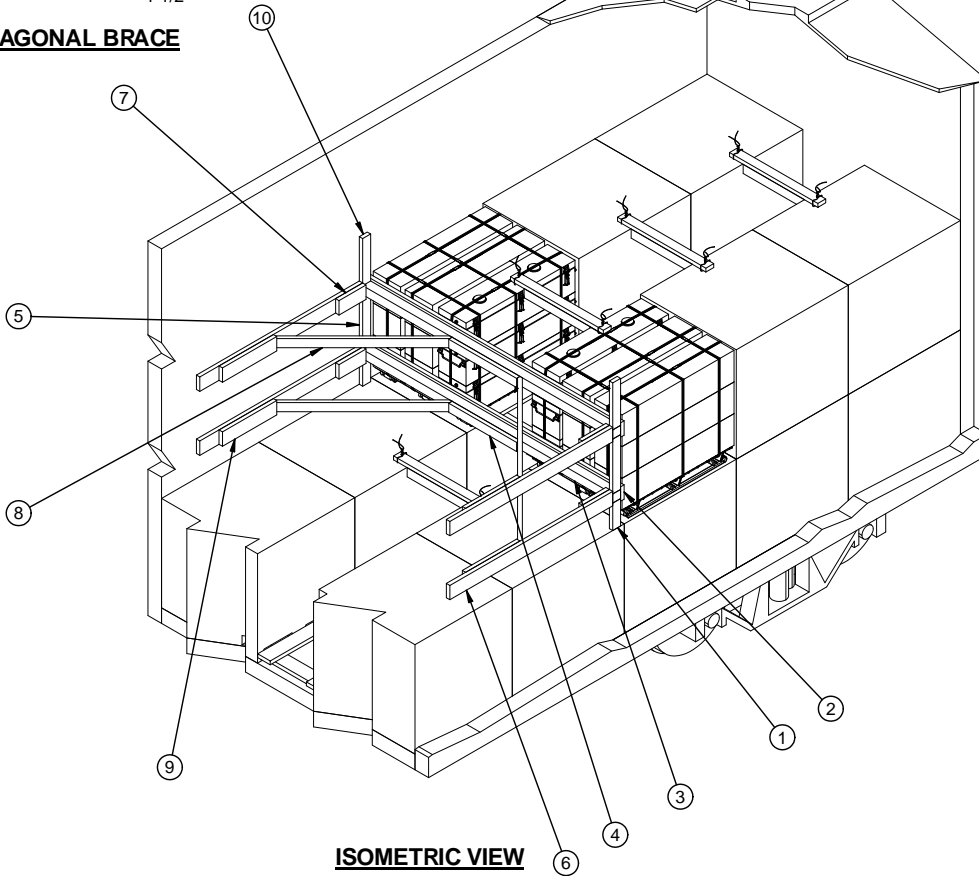


**END VIEW**

**TYPICAL LCL USING BULKHEAD GATE**



**DIAGONAL BRACE**



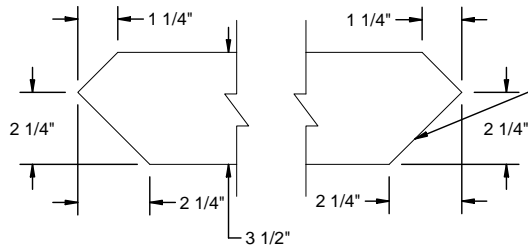
**ISOMETRIC VIEW**

**SPECIAL NOTES:**

1. A 9'-4" WIDE CONVENTIONAL WOOD-LINED BOXCAR IS SHOWN. WOOD-LINED CARS OF OTHER WIDTHS MAY BE USED.
2. ONLY THE BLOCKING AND BRACING FOR THE K-BRACE METHOD OF PARTIAL-LAYER BRACING IS SHOWN. REFER TO PAGE 8 FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.
3. PARTIAL-LAYER BRACING MAY BE APPLIED FOR ANY OF THE CONVENTIONAL CARLOADS DEPICTED HEREIN. A CROSSWISE LOAD IS SHOWN AS TYPICAL. THE BLOCKING AND BRACING WILL VARY FOR A LENGTHWISE LOAD. NOTE THAT FOR A LENGTHWISE PARTIAL TIER, THE LOAD BEARING PIECES SHOULD BE LOCATED SO AS TO BEAR AGAINST THE PALLET UNITS IN THE SAME LOCATION AS THE BUFFER PIECES OF A CENTER GATE.
4. THE K-BRACE METHOD OF PARTIAL-LAYER (TIER) BRACING SHOWN MAY BE USED IN WOOD-LINED CARS FOR THE SECUREMENT OF A PARTIAL SECOND TIER OR FIRST TIER. THE TYPE "A" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN 8,000 LBS OR NOT MORE THAN SIX PALLET UNITS. IF IT IS NECESSARY TO BLOCK A HEAVIER LOAD, REFER TO THE TYPE "B" K-BRACE ON PAGE 15.
5. **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 4, 5, 6, 8, 10, AND 13 MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDEWALL. IT IS ALRIGHT FOR THE ENDS OF THE DIAGONAL BRACES TO BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE ADJACENT HORIZONTAL WALL CLEAT 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 HORIZONTAL WALL CLEAT 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 54-7/8" LONG IN LIEU OF 56" WHEN THE HORIZONTAL WALL CLEAT IS DOUBLED.
6. THE CENTER CLEAT WILL BE 20" LONG FOR AN 8'-6" WIDE CAR, 28" LONG FOR A 9'-2", AND 30" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.

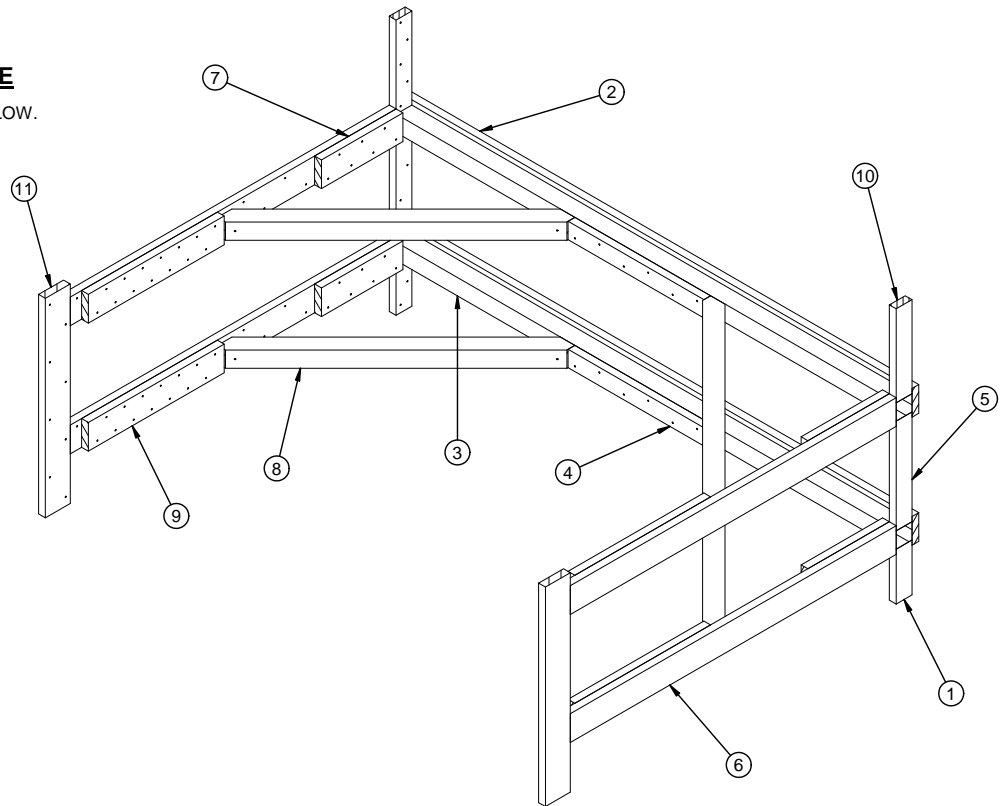
**KEY NUMBERS**

- ① SUPPORT CLEAT, 2" X 4" X 10-1/2" (2 REQD). POSITION AS TO CENTER LOAD BEARING PIECE AND CROSS CAR BRACE ACROSS CONTAINER HANDLES. NAIL TO THE SIDEWALL W/3-12d NAILS. SEE SPECIAL NOTE 3 AT LEFT.
- 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 30" (2 REQD). NAIL TO THE CROSS CAR BRACE W/6-16d NAILS. SEE SPECIAL NOTE 4 AT LEFT.
- ⑤ SPACER CLEAT, 2" X 4" X 21" (2 REQD). NAIL TO THE CAR SIDEWALL W/4-12d NAILS.
- ⑥ HORIZONTAL WALL CLEAT, 2" X 4" X 72" (4 REQD). NAIL TO THE CAR SIDEWALL W/16-12d NAILS).
- ⑦ POCKET CLEAT, 2" X 4" X 12" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT W/4-16d NAILS.
- ⑧ DIAGONAL BRACE, 2" X 4" X 56" (4 REQD). SEE THE DETAIL ABOVE FOR BEVEL CUTS REQUIRED. TOENAIL TO THE HORIZONTAL WALL CLEAT, AND TO THE CROSS CAR BRACE W/2-16d NAILS AT EACH END.
- ⑨ BACK-UP CLEAT, 2" X 6" X 24" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT W/8-16d 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 BELOW.



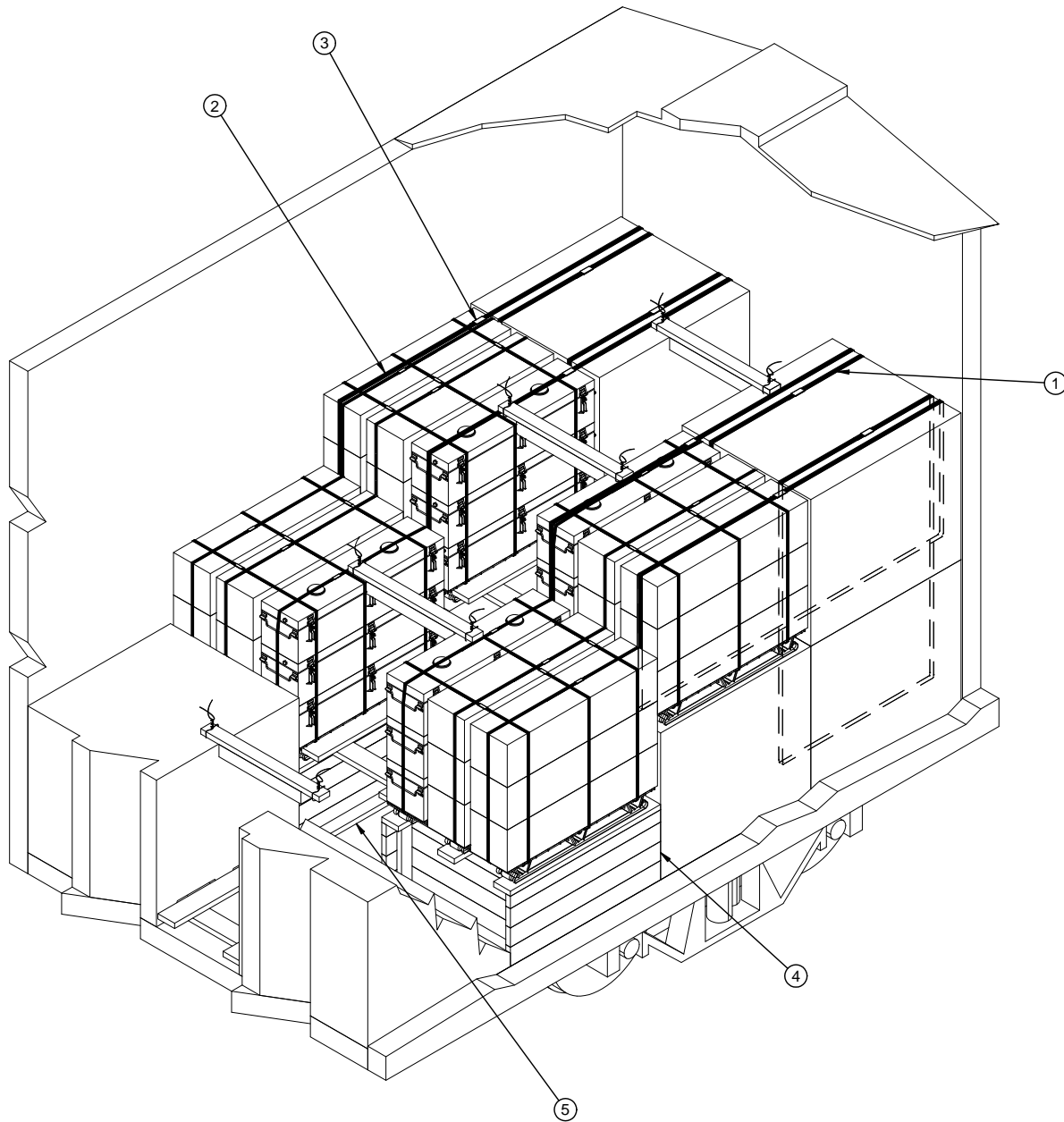
**ISOMETRIC VIEW**

**SPECIAL NOTES:**

1. THE TYPE "B" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN 14,000 LBS (ELEVEN PALLET UNITS). IF THE PARTIAL TIER TO BE BRACED WEIGHS 8,000 LBS OR LESS, THE TYPE "A" K-BRACE DEPICTED ON PAGE 14 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, 2, 3, 5, 7, 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 TO BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE ADJACENT HORIZONTAL WALL CLEAT 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 HORIZONTAL WALL CLEAT 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 54-7/8" LONG IN LIEU OF 56" WHEN THE HORIZONTAL WALL CLEAT IS DOUBLED.
3. THE CENTER CLEAT WILL BE 20" LONG FOR AN 8'-6" WIDE CAR, 28" LONG FOR A 9'-2", AND 30" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.

**KEY NUMBERS**

- ① SUPPORT CLEAT, 2" X 4" X 10-1/2" (2 REQD). POSITION AS TO CENTER LOAD BEARING PIECE AND CROSS CAR BRACE ACROSS CONTAINER HANDLES. NAIL TO THE SIDEWALL W/3-12d NAILS. SEE SPECIAL NOTE 2 AT LEFT.
- 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". SEE GENERAL NOTE "K" ON PAGE 2.
- ③ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH (CUT-TO-FIT) (2 REQD).
- ④ CENTER CLEAT, 2" X 4" X 30" (2 REQD). NAIL TO THE CROSS CAR BRACE W/6-16d NAILS. SEE SPECIAL NOTE 3 AT LEFT.
- ⑤ SPACER CLEAT, 2" X 4" X 21" (2 REQD). NAIL TO THE CAR SIDEWALL W/4-12d NAILS.
- ⑥ HORIZONTAL WALL CLEAT, 2" X 6" X 72" (4 REQD). NAIL TO THE CAR SIDEWALL W/14-16d NAILS.
- ⑦ POCKET CLEAT, 2" X 6" X 18" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT W/7-16d NAILS.
- ⑧ DIAGONAL BRACE, 4" X 4" X 56" (4 REQD). SEE THE DETAIL ABOVE FOR BEVEL CUTS REQUIRED. TOENAIL TO THE HORIZONTAL WALL CLEAT, AND TO THE CROSS CAR BRACE W/1-60d NAIL AT EACH END.
- ⑨ BACK-UP CLEAT, 2" X 6" X 30" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT W/14-16d NAILS.
- ⑩ HOLD-DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑪ VERTICAL BACK-UP CLEAT, 2" X 6" BY UNIT HEIGHT (2 REQD). NAIL TO THE CAR SIDEWALL W/8-12d NAILS.



**ISOMETRIC VIEW**

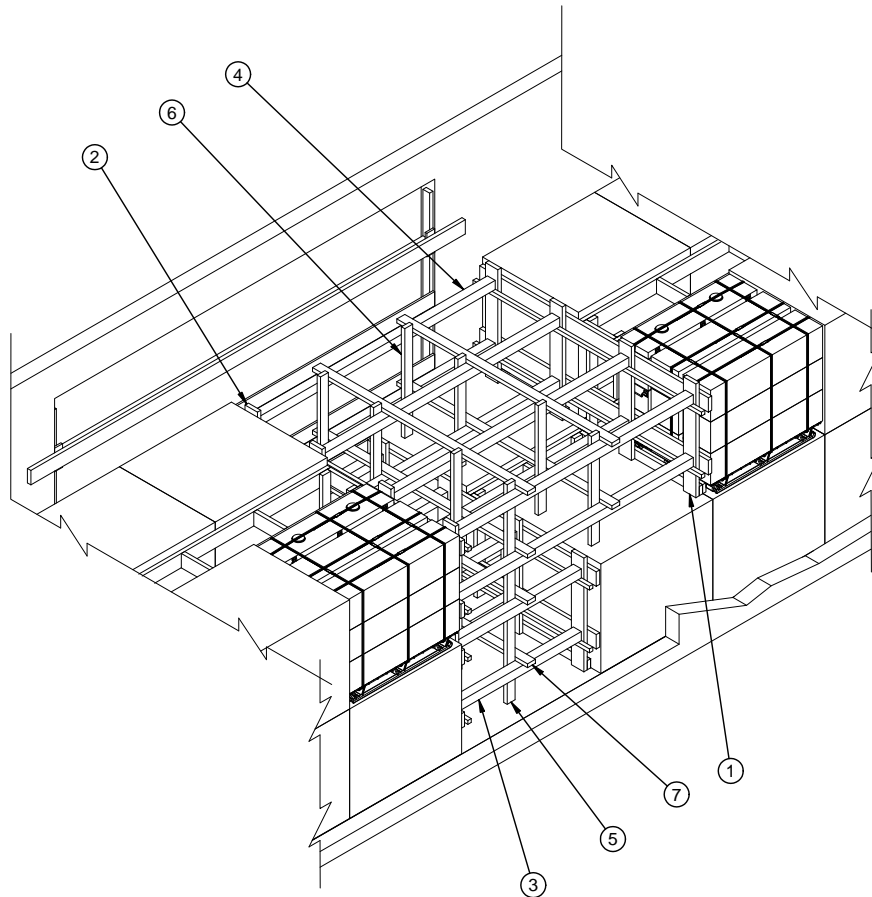
**SPECIAL NOTES:**

1. A 9'-4" WIDE CONVENTIONAL TYPE BOXCAR IS SHOWN. CARS OF OTHER WIDTHS MAY BE USED.
2. THE RISER METHOD OF PARTIAL-LAYER BRACING MAY BE USED IN ALL-METAL OR WOOD-LINED CARS FOR SECUREMENT OF A PARTIAL TOP TIER OF NOT MORE THAN 16,000 POUNDS (8,000 POUNDS PER ROW RETAINED BY RISER).
3. THE POSITIONING OF THE VERTICAL AND HORIZONTAL UNITIZING STRAPS IS APPLICABLE FOR LCL LOADS THAT ARE AT LEAST TWO LOAD UNITS LONG IN THE UPPERMOST TIER. IF THE UPPERMOST TIER IS ONLY ONE LOAD UNIT LONG, THE HORIZONTAL STRAPS WILL BE OMITTED.
4. THE LOAD SHOWN DEPICTING THE RISER METHOD OF PARTIAL-LAYER BRACING IS TYPICAL. THE PROCEDURES ARE SHOWN WITH CROSSWISE PALLET UNITS, BUT MAY ALSO BE APPLIED TO LENGTHWISE PALLET UNIT LOADS. THE QUANTITY MAY BE ADJUSTED TO SUIT.
5. ONLY THE BLOCKING AND BRACING FOR THE RISER METHOD OF PARTIAL-LAYER BRACING IS SHOWN. REFER TO PAGE 8 FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.

**KEY NUMBERS**

- ① VERTICAL UNITIZING STRAP, 1-1/4" X .035" OR .031" X 22'-6" LONG STEEL STRAPPING (4 REQD). INSTALL TO VERTICALLY ENCIRCLE TWO PALLET UNITS.
- ② HORIZONTAL UNITIZING STRAP, 1-1/4" X .035" OR .031" X 24'-0" LONG STEEL STRAPPING (4 REQD). INSTALL THE STRAPS TO ENCIRCLE THE LONGITUDINALLY ADJACENT PALLET UNITS IN THE TOP LAYER.
- ③ SEAL FOR 1-1/4" STEEL STRAPPING (8 REQD). DOUBLE CRIMP EACH SEAL.
- ④ RISER ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 31.
- ⑤ RISER STOP PIECE, 2" X 4" X 48" (2 REQD). POSITION AGAINST A RISER ASSEMBLY AND NAIL TO THE CAR FLOOR W/4-16d NAILS.





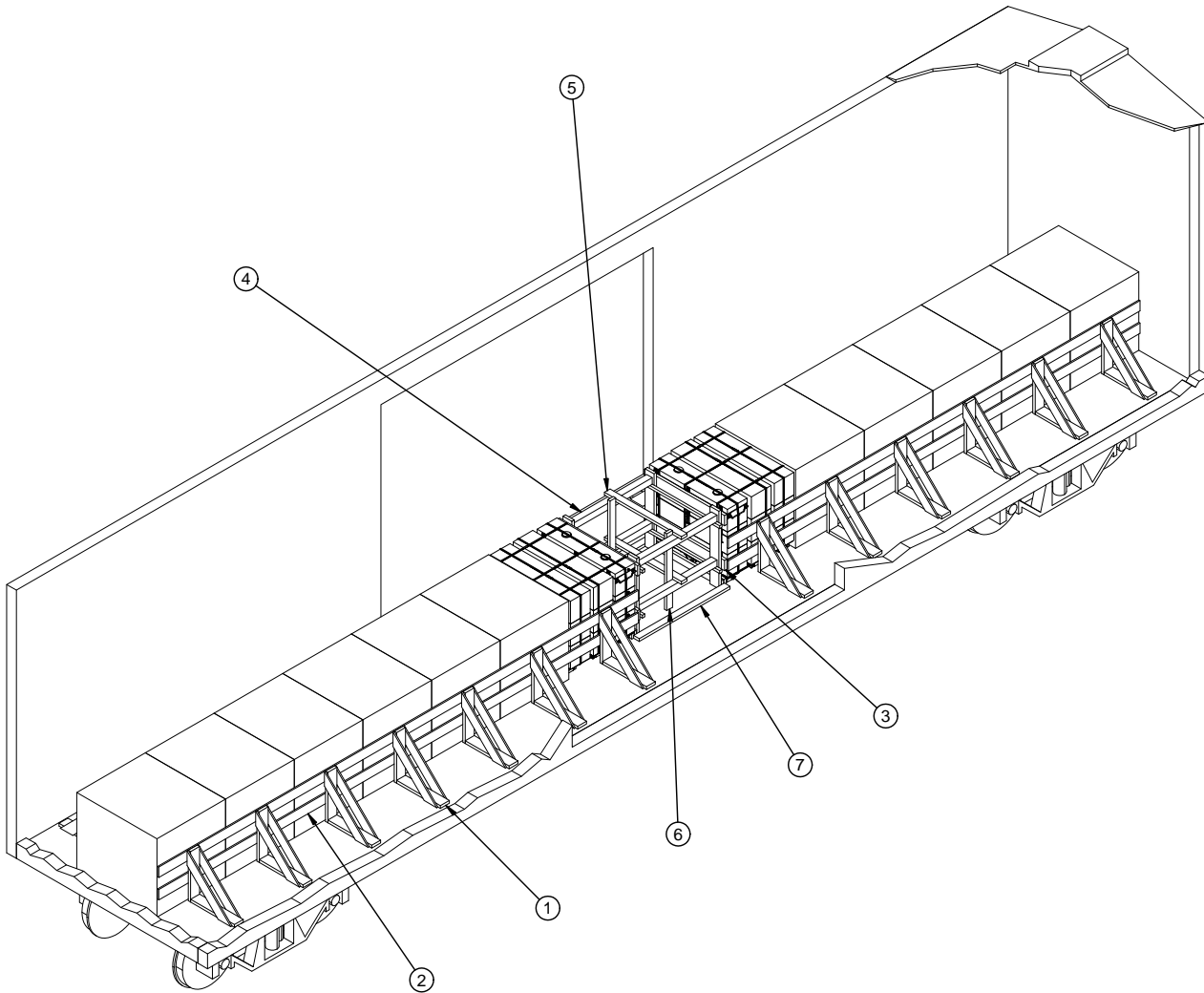
**ISOMETRIC VIEW**

**SPECIAL NOTES:**

1. THE CENTER PORTION OF A 50'-6" LONG BY 8'-6" WIDE CONVENTIONAL TYPE BOXCAR EQUIPPED WITH 14'-0" WIDE DOOR OPENINGS IS SHOWN TO PORTRAY THE STRUTTED GATE METHOD OF PARTIAL-LAYER BRACING. CARS OF OTHER DIMENSIONS AND CARS HAVING NARROWER DOOR OPENINGS CAN BE USED.
2. ONLY THE BLOCKING AND BRACING PIECES WHICH ARE NECESSARY TO PERMIT THE OMISSION OF THE UNITS FROM THE TOP LAYER ARE LISTED IN THE KEY NUMBERS AT RIGHT REFER TO PAGE 10 FOR LATERAL BRACING AND DOORWAY PROTECTION REQUIREMENTS.
3. THE PROCEDURES DEPICTED ABOVE MAY ALSO BE ADAPTED FOR USE WITH LOADS UTILIZING CENTER GATE "A", AS DEPICTED ON PAGE 6.

**KEY NUMBERS**

- ① CENTER GATE FOR 1-HIGH (2 REQD). SEE THE "CENTER GATE B" DETAIL ON PAGE 27.
- ② CENTER GATE FOR 2-HIGH (1 REQD). SEE THE "CENTER GATE B" DETAIL ON PAGE 27.
- ③ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 55") (8 REQD). POSITION BETWEEN PIECES MARKED ① AND ② IN THE LOWER LAYER AND TOENAIL W/2-16d NAILS AT EACH END.
- ④ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 8'-8-1/2") (8 REQD). POSITION BETWEEN PIECES MARKED ① AND ② IN THE UPPER LAYER AND TOENAIL W/2-16d NAILS AT EACH END.
- ⑤ VERTICAL STRUT BRACING, 2" X 4" X 7'-0" (4 REQD). NAIL TO THE STRUTS MARKED ③ AND ④ W/3-10d NAILS AT EACH JOINT.
- ⑥ VERTICAL STRUT BRACING, 2" X 4" X 42" (4 REQD). NAIL TO THE STRUTS MARKED ④ W/3-10d NAILS AT EACH JOINT.
- ⑦ HORIZONTAL STRUT BRACING, 2" X 4" X 7'-11" (6 REQD). NAIL TO THE STRUTS MARKED ③ OR ④ W/3-10d NAILS AT EACH JOINT.



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① LCL BRACE (26 REQD). SEE THE DETAIL ON PAGE 23. NAIL TO THE CAR FLOOR W/7-16d NAILS. SEE GENERAL NOTE "S.1" ON PAGE 3 AND SPECIAL NOTE 3 ON PAGE 19.
- ② HORIZONTAL PIECE, 1" X 6" BY A LENGTH TO SUIT (8 REQD). NAIL TO THE VERTICAL PIECES OF THE LCL BRACES W/3-6d NAILS AT EACH JOINT PRIOR TO PLACEMENT AGAINST THE LADING. SEE THE "LCL BRACE" DETAIL ON PAGE 23 FOR HEIGHT LOCATION GUIDANCE.
- ③ CENTER GATE C (2 REQD). SEE THE DETAIL ON PAGE 31.
- ④ STRUT, 4" X 4" BY CUT-T-FIT (REF: 49") (4 REQD). TOENAIL TO CENTER GATES W/2-16d NAILS AT EACH END.
- ⑤ HORIZONTAL STRUT BRACING, 2" X 4" X 47-1/2" (2" BEYOND STRUT EACH SIDE) (2 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH END.
- ⑥ VERTICAL STRUT BRACING, 2" X 4" X 41" (2 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑦ SIDE BLOCKING PIECE, 2" X 4" X 56" (2 REQD). PLACE AGAINST THE CENTER GATES. NAIL TO THE CAR FLOOR W/7-16d NAILS.

**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-4" WIDE CONVENTIONAL TYPE BOXCAR IS SHOWN. CARS OF OTHER WIDTHS AND LENGTHS CAN BE USED.
2. A 1-WIDE LENGTHWISE LOAD IN A 50'-6" LONG CAR IS SHOWN AS TYPICAL. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR A 10-UNIT LENGTHWISE LOAD IN A 40'-6" LONG CAR OR A 16-UNIT LOAD IN A 60'-8" LONG CAR.
3. ONE LCL BRACE WILL BE USED AT EACH SIDE OF EACH PALLET UNIT. THE BRACES WILL BE LOCATED NEAR THE CENTER OF THE PALLET UNIT.

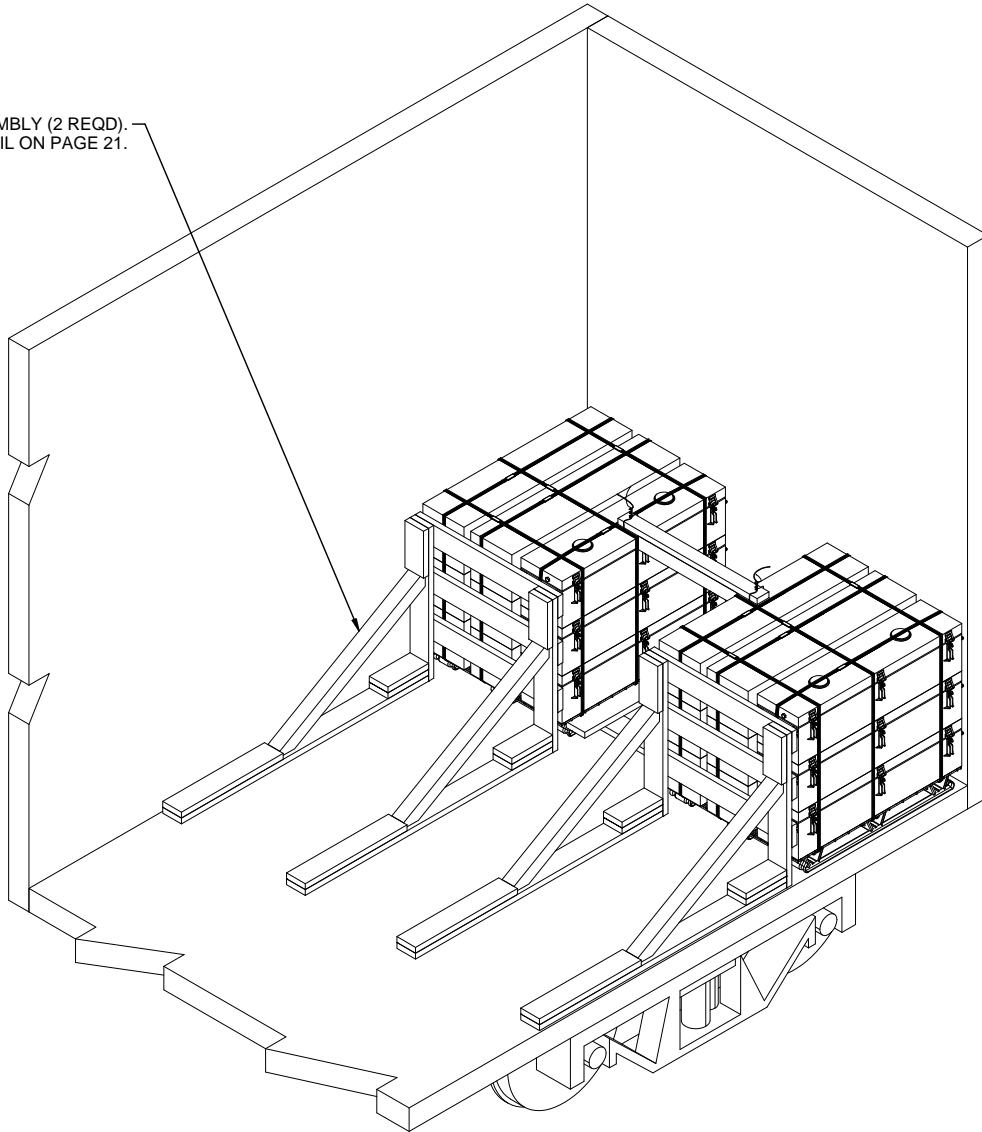
**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
1" X 6"	348	174
2" X 2"	17	6
2" X 4"	41	28
2" X 6"	148	148
4" X 4"	16	22
NAILS	NO. REQD	POUNDS
6d (2")	142	1
8d (2-1/2")	312	3-1/2
10d (3")	748	11-3/4
16d (3-1/2")	82	2

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT - - - - -	13 - - - - -	16,328 LBS
DUNNAGE - - - - -	- - - - -	772 LBS
TOTAL WEIGHT - - - - -		17,100 LBS (APPROX)

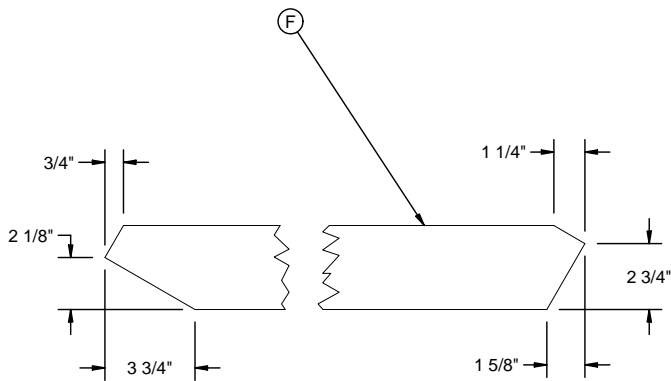
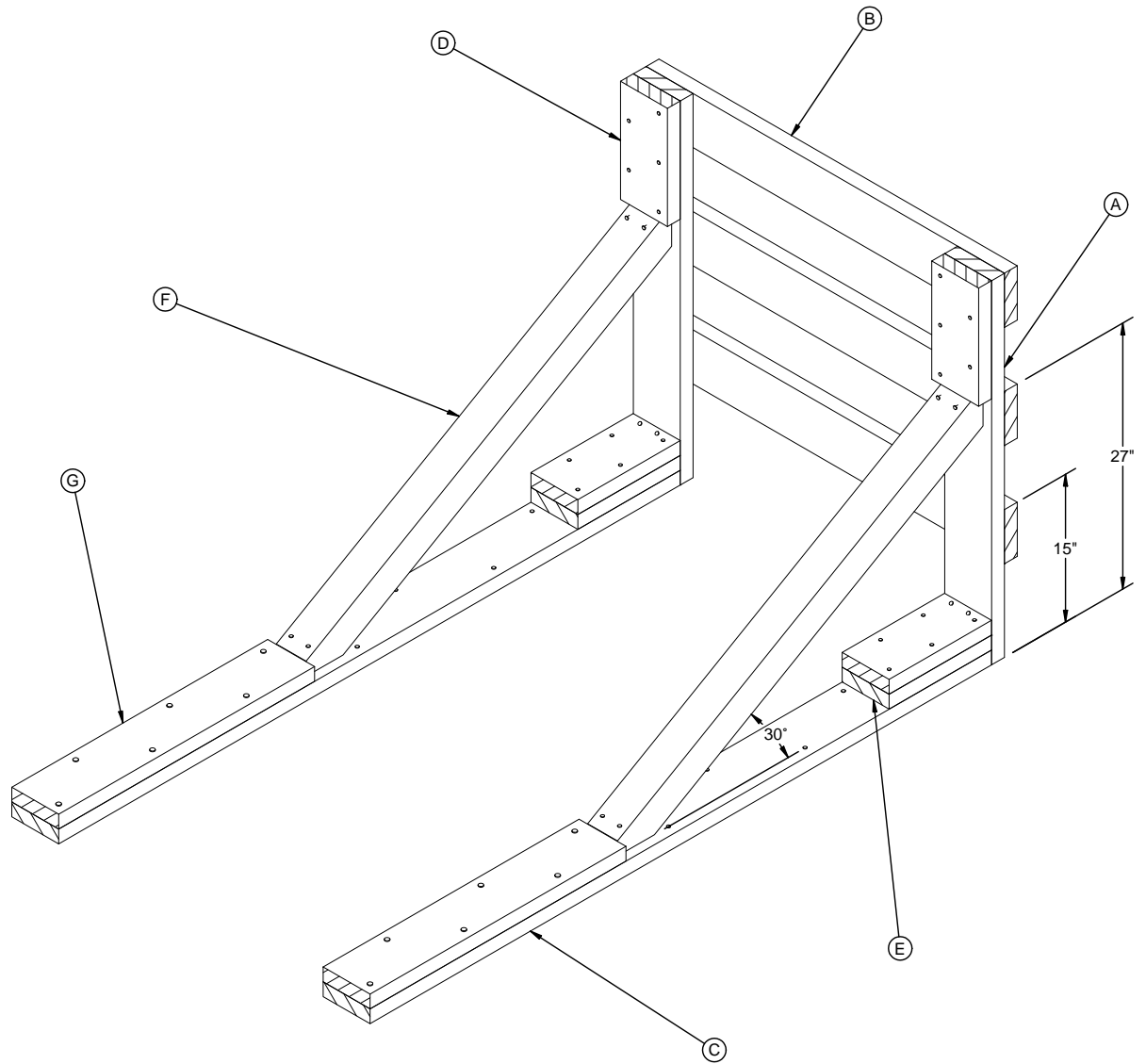
KNEE BRACE ASSEMBLY (2 REQD).  
SEE DETAIL ON PAGE 21.



### **ISOMETRIC VIEW**

#### **SPECIAL NOTES:**

1. A TWO PALLET UNIT LOAD IS SHOWN IN A 9'-4" WIDE CONVENTIONAL TYPE BOXCAR HAVING A WOOD OR NAILABLE METAL FLOOR. CARS OF OTHER WIDTHS AND CARS HAVING METAL LININGS CAN BE USED.
2. THE LOAD SHOWN DEPICTING THE KNEE BRACE METHOD OF PARTIAL-LAYER BRACING IS TYPICAL. THE QUANTITY MAY BE ADJUSTED TO SUIT. PROVIDED THE LIMITATIONS OF THE KNEE BRACE AS SET FORTH IN SPECIAL NOTE 4 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 LOAD OF NOT MORE THAN 8,500 POUNDS.
4. WHEN USING CRIB FILL OR SIDE FILL ASSEMBLIES WITH KNEE BRACE ASSEMBLIES, PROVISIONS MUST BE MADE TO PREVENT LONGITUDINAL MOVEMENT OF THE CRIB FILL OR SIDE FILL ASSEMBLIES.
5. PALLET UNITS WILL NOT BE STACKED MORE THAN ONE LAYER HIGH FOR BRACING WITH KNEE BRACES.
6. ONLY THE BLOCKING AND BRACING FOR THE KNEE BRACE METHOD OF PARTIAL-LAYER BRACING IS SHOWN. REFER TO PAGE 8 FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.
7. THE PROCEDURES ARE SHOWN WITH CROSSWISE PALLET UNITS, BUT MAY ALSO BE APPLIED TO LENGTHWISE PALLET UNIT LOADS. ADJUST DIMENSION OF THE HORIZONTAL PIECE OF KNEE BRACE ASSEMBLY TO SUIT.

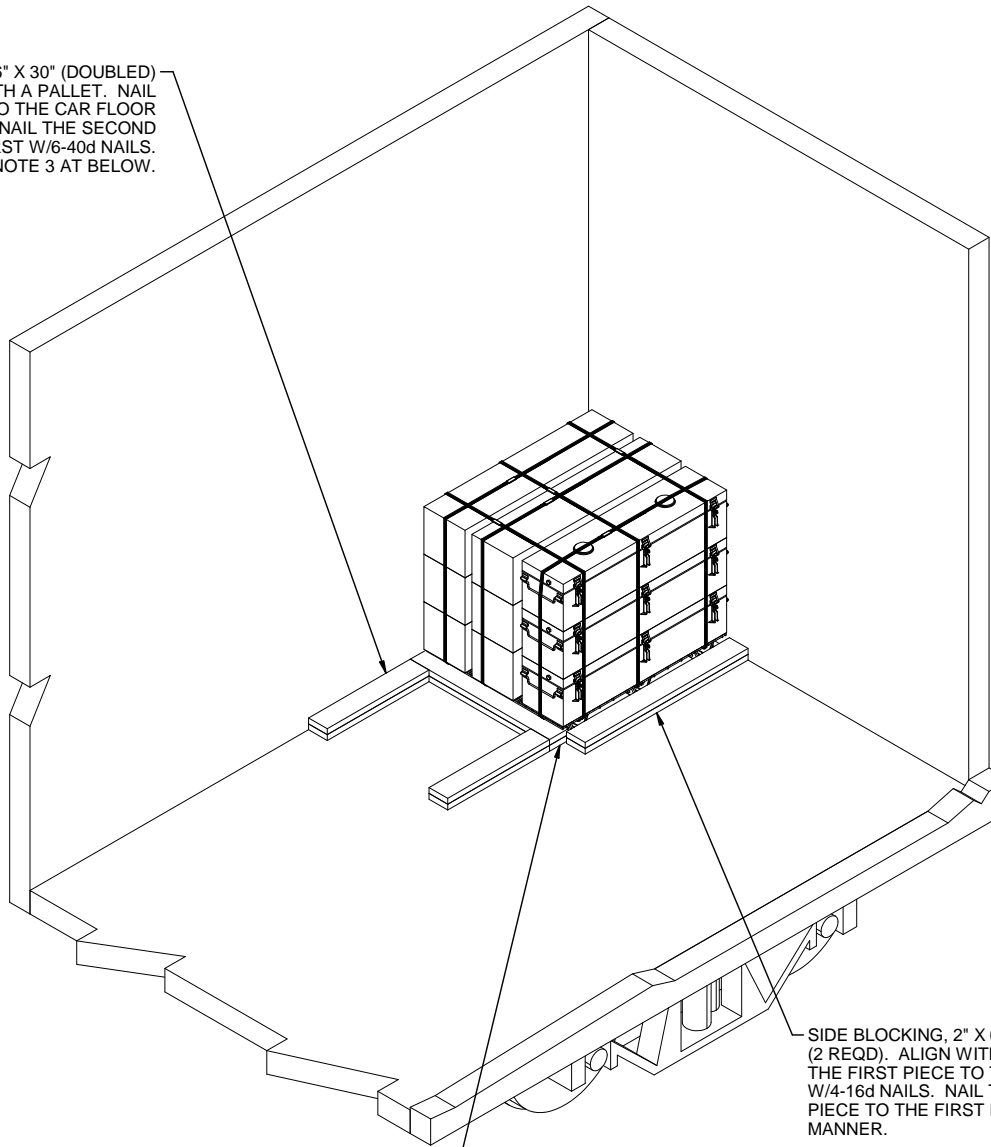


**BRACE**

**KEY NUMBERS**

- (A) VERTICAL PIECE, 2" X 6" X 39" (2 REQD). NAIL TO A FLOOR CLEAT W/3-16d NAILS.
- (B) HORIZONTAL PIECE, 2" X 6" X 42" (3 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.
- (C) FLOOR CLEAT, 2" X 6" X 6'-2" (2 REQD). NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8"
- (D) HOLD-DOWN CLEAT, 2" X 6" X 12" (2 REQD). NAIL TO A VERTICAL PIECE W/5-10d NAILS.
- (E) POCKET CLEAT, 2" X 6" X 12" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE FLOOR CLEAT W/5-16d NAILS. NAIL THE SECOND PIECE IN A LIKE MANNER AND TOENAIL THE SECOND PIECE TO THE VERTICAL PIECE W/2-16d NAILS.
- (F) BRACE, 4" X 4" BY CUT-TO-FIT (KNEE BRACE ASSEMBLY HEIGHT MINUS 13-1/2", TIMES 2) (2 REQD). SEE THE DETAIL AT THE LEFT FOR BEVEL-CUTS REQUIRED. TOENAIL TO THE VERTICAL PIECE AND TO THE FLOOR CLEAT W/2-16d NAILS EACH.
- (G) BACK-UP CLEAT, 2" X 6" X 30" (2 REQD). NAIL TO THE FLOOR CLEAT W/6-40d NAILS.

BACK-UP CLEAT, 2" X 6" X 30" (DOUBLED)  
(2 REQD). ALIGN WITH A PALLET. NAIL  
THE FIRST PIECE TO THE CAR FLOOR  
W/6-16d NAILS. NAIL THE SECOND  
PIECE TO THE FIRST W/6-40d NAILS.  
SEE SPECIAL NOTE 3 AT BELOW.



SIDE BLOCKING, 2" X 6" X 48" (DOUBLED)  
(2 REQD). ALIGN WITH THE PALLET. NAIL  
THE FIRST PIECE TO THE CAR FLOOR  
W/4-16d NAILS. NAIL THE SECOND  
PIECE TO THE FIRST IN A LIKE  
MANNER.

HEADER, 2" X 6" X 42" (DOUBLED) (1 REQD).  
NAIL THE FIRST PIECE TO THE CAR FLOOR  
W/6-16d NAILS. NAIL THE SECOND PIECE  
TO THE FIRST W/6-40d NAILS.

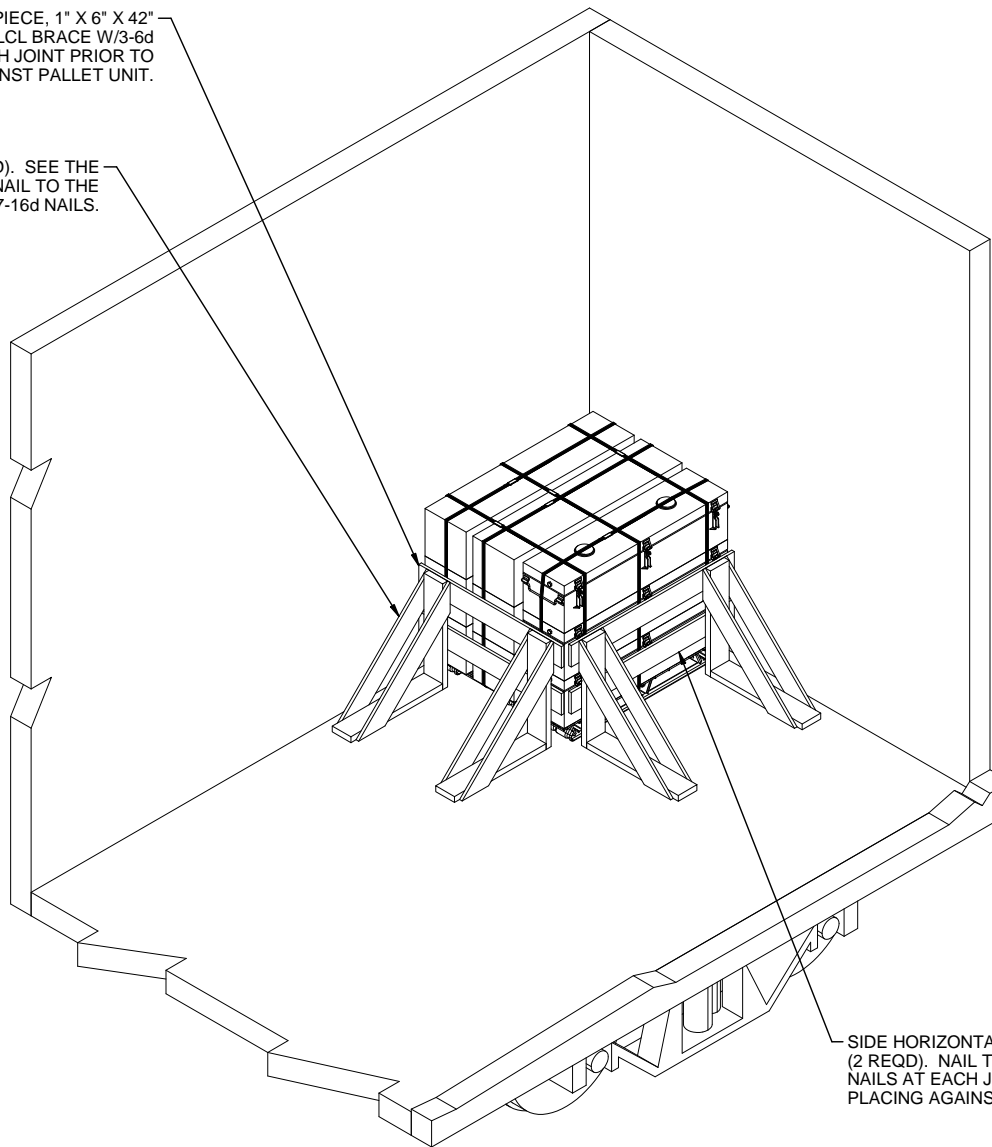
**ISOMETRIC VIEW**

**SPECIAL NOTES:**

1. A 9'-4" WIDE CONVENTIONAL TYPE BOXCAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED.
2. THE LOAD SHOWN DEPICTING THE FLOORLINE BLOCKING METHOD OF PARTIAL-LAYER BRACING IS TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR OTHER QUANTITIES AS LONG AS THE CAPACITY OF THE FLOORLINE BLOCKING IS NOT EXCEED. SEE SPECIAL NOTE 3.
3. TWO 30" LONG BACK-UP CLEATS ARE ADEQUATE FOR RETAINING NOT MORE THAN 9,000 POUNDS.

END HORIZONTAL PIECE, 1" X 6" X 42"  
(2 REQD). NAIL TO LCL BRACE W/3-6d  
NAILS AT EACH JOINT PRIOR TO  
PLACING AGAINST PALLET UNIT.

LCL BRACE (4 REQD). SEE THE  
DETAIL BELOW. NAIL TO THE  
FLOOR W/7-16d NAILS.



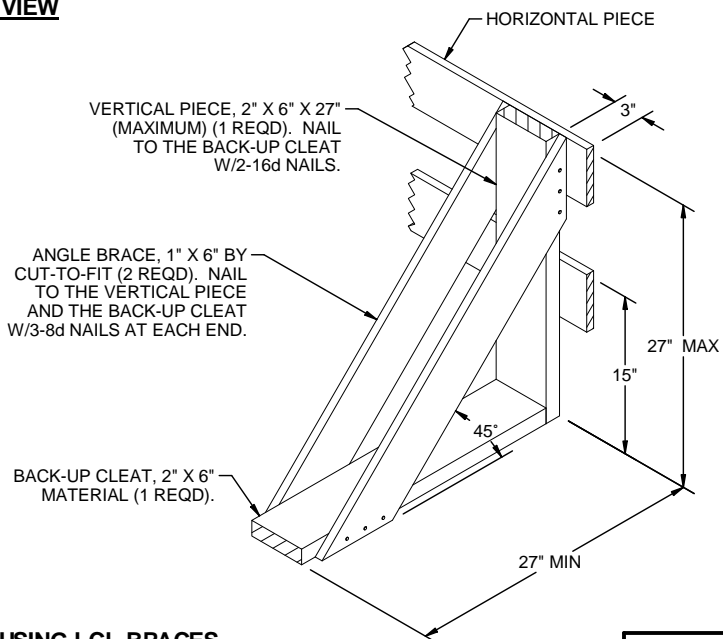
SIDE HORIZONTAL PIECE, 1" X 6" X 48"  
(2 REQD). NAIL TO LCL BRACE W/3-6d  
NAILS AT EACH JOINT PRIOR TO  
PLACING AGAINST PALLET UNIT.

**ISOMETRIC VIEW**

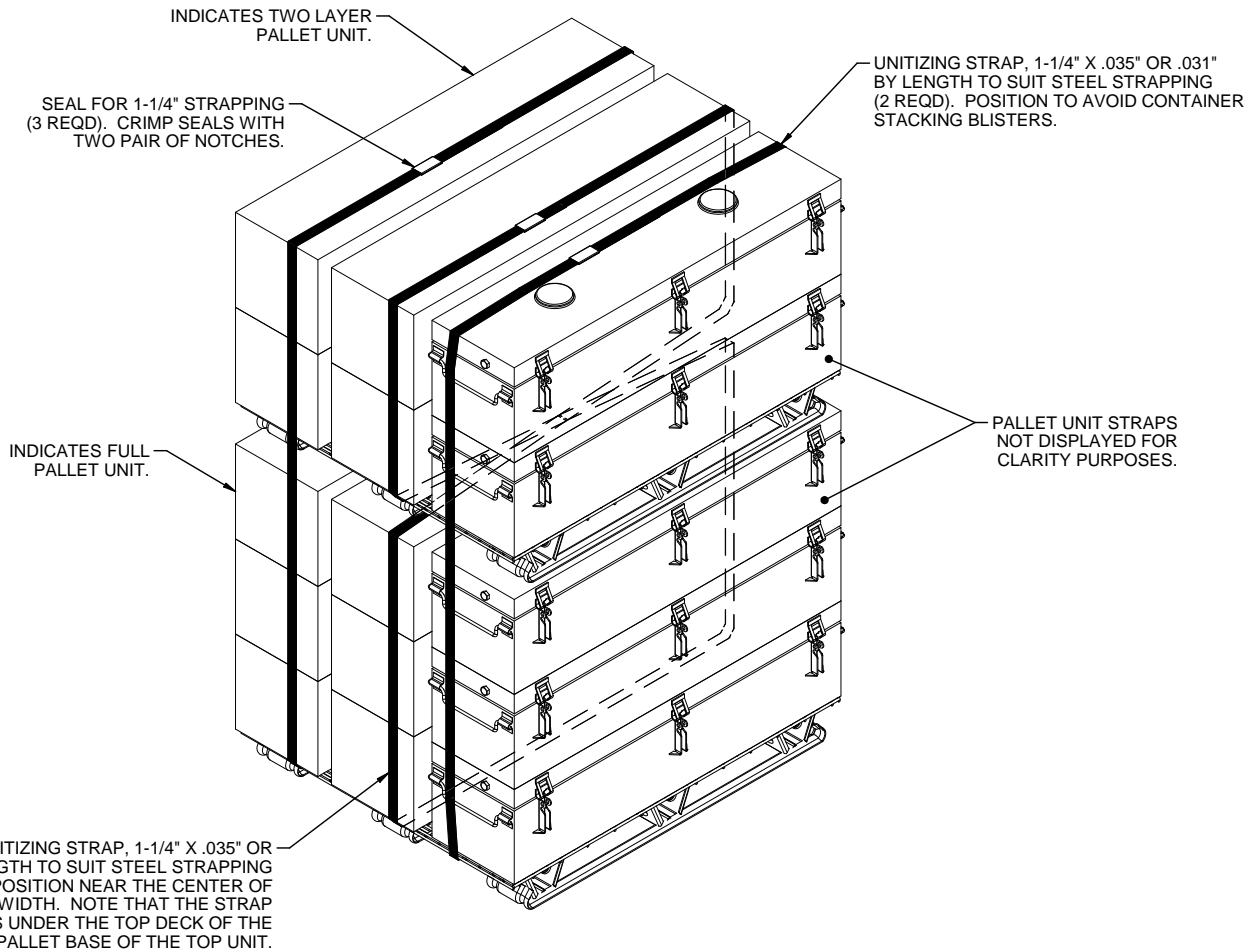
**ISOMETRIC VIEW**

**SPECIAL NOTES:**

1. A 9'-4" WIDE CONVENTIONAL TYPE BOXCAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED.
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 EXCEED. 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 EACH MUST BE USED FOR LONGITUDINAL AND LATERAL BRACING. BRACES MAY BE ADDED FOR LONGITUDINAL BRACING AS NECESSARY.



**TYPICAL LCL USING LCL BRACES**



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

**SPECIAL NOTES:**

1. SHIPMENTS OF PALLET UNITS OF COMPUTER CONTROL GROUPS SHOULD CONSIST OF FULL-HEIGHT AND FULL-LAYER PALLET UNITS TO THE MAXIMUM EXTENT POSSIBLE. HOWEVER, THE END OF A LOT OR THE QUANTITY OF ITEMS NEEDED TO FILL A REQUISITION MAY NECESSITATE THE SHIPMENT OF ONE OR MORE LESS-THAN-FULL PALLET WITHIN A UNITS PER LOAD. THE PROCEDURES ON THIS PAGE AND ON PAGE 25 ARE PRESENTED AS GUIDANCE IN THE SHIPMENT OF PARTIAL UNITS.
2. THE PROCEDURES SHOWN ON THIS PAGE ARE ONLY APPLICABLE TO PARTIAL PALLET UNITS CONSISTING OF ONE OR TWO FULL LAYERS OF CONTAINERS.
3. A LESS-THAN-FULL-HEIGHT PALLET UNIT CAN BE SHIPPED BY POSITIONING IT EITHER ON THE TOP TIER OF A LOAD OR ON THE TOP OF THE LOWER PORTION OF A LOAD WHEN THE LOAD CONTAINS A PARTIAL TIER IN THE END OF THE CAR. THE PARTIAL UNIT WILL BE STRAPPED TO THE PALLETIZED UNIT DIRECTLY BELOW WITH TWO UNITIZING AND ONE FIGURE-8 STRAPS. SEE THE "SECUREMENT OF PARTIAL UNIT ON TOP" VIEW ABOVE FOR GUIDANCE. PLACEMENT WITHIN THE LENGTH OF THE CAR IS OPTIONAL, ALTHOUGH NEAR THE DOORWAY AREA IS RECOMMEND AS LONG AS IT IS NOT WITHIN A LOAD UNIT WHICH IS TO BE EN-CIRCLED WITH DOORWAY PROTECTION STRAPS.

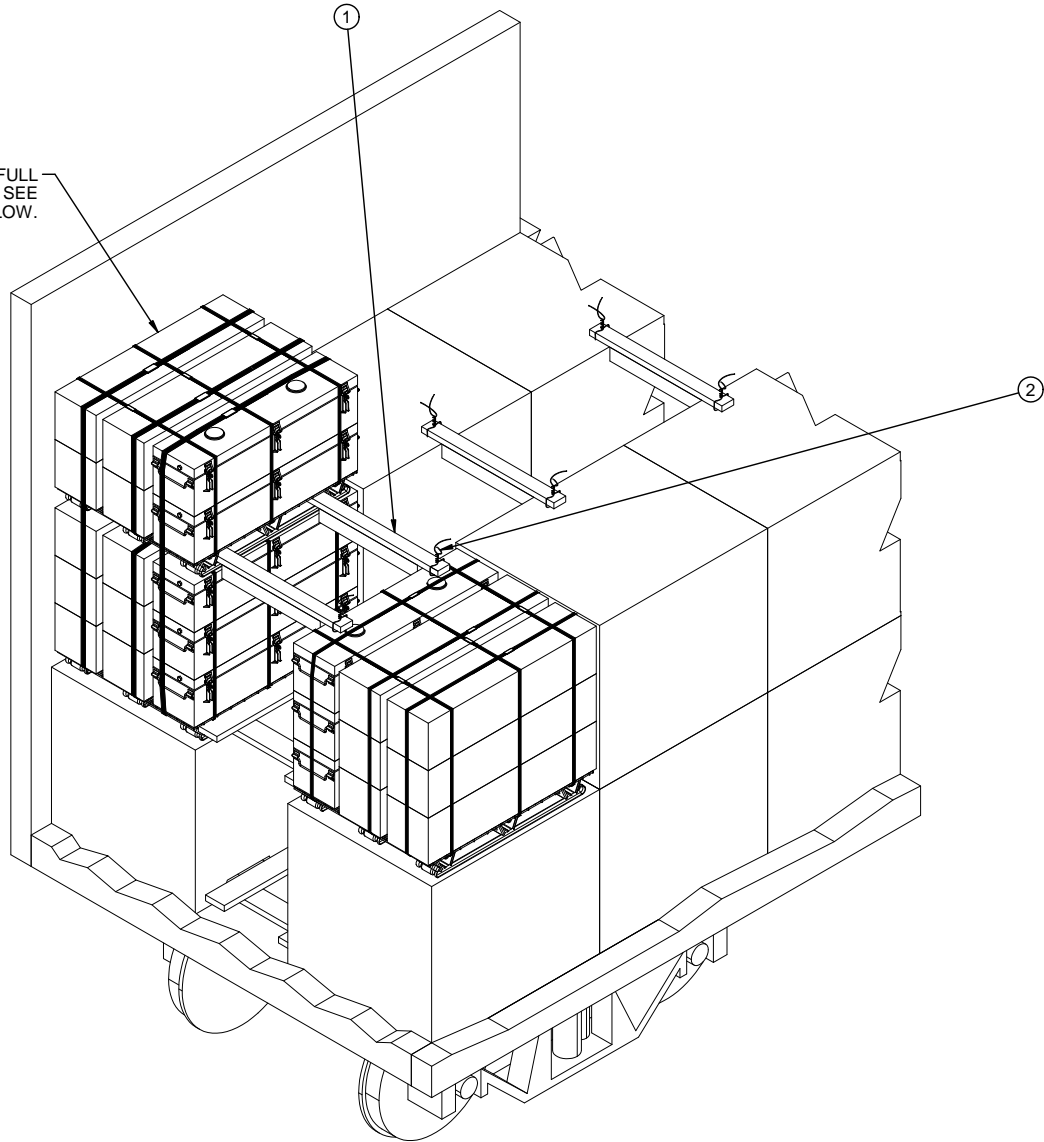
(CONTINUED AT RIGHT)

**(GENERAL NOTES CONTINUED)**

4. LEFTOVER CONTAINERS, IN AN AMOUNT WHICH IS LESS THAN THE QUANTITY IN ONE LAYER OF A UNIT, CAN BE SECURED TO THE TOP OF A PARTIAL UNIT FOR SECUREMENT ON TOP OF A LOAD. THE LEFTOVER CONTAINERS MUST BE SECURED TO THE PARTIAL UNIT WITH THEIR OWN STRAPPING, SEPARATE FROM THE STRAPS FOR THE PARTIAL UNIT. SEE THE DETAILS ON PAGE 26 FOR GUIDANCE IN STRAP APPLICATION.
5. THE "SHIPMENT OF PARTIAL PALLET UNITS" PROCEDURES ON THIS PAGE ARE APPLICABLE FOR LOADS IN CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS AS WELL AS FOR LOADS IN CONVENTIONAL BOXCARS. PARTIAL UNITS ON TOP OF A TIER MUST BE BLOCKED AND BRACED IN ACCORDANCE WITH THE PROCEDURES DEPICTED WITHIN THAT PORTION OF THIS DRAWING.



INDICATES LESS-THAN-FULL HEIGHT PALLET UNIT. SEE SPECIAL NOTE 1 BELOW.



**ISOMETRIC VIEW**

**SPECIAL NOTES:**

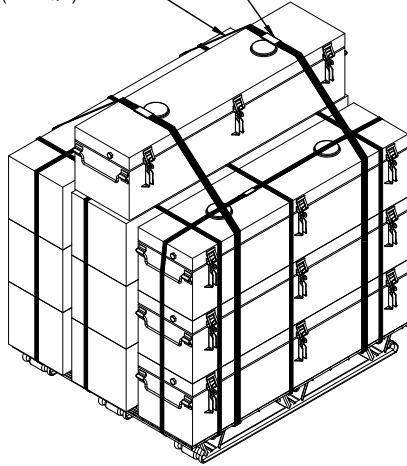
1. FOR SECUREMENT OF PARTIAL PALLET UNIT ON TOP OF A FULL-HEIGHT PALLET UNIT, SEE PAGE 24.
2. SHIPMENTS OF PALLET UNITS OF COMPUTER CONTROL GROUPS SHOULD CONSIST OF FULL-HEIGHT AND FULL-LAYER PALLET UNITS TO THE MAXIMUM EXTENT POSSIBLE. HOWEVER, THE END OF A LOT OR THE QUANTITY OF ITEMS NEEDED TO FILL A REQUISITION MAY NECESSITATE THE SHIPMENT OF ONE OR MORE LESS-THAN-FULL PALLET WITHIN A UNITS PER LOAD. THE PROCEDURES ON THIS PAGE AND ON PAGE 24 ARE PRESENTED AS GUIDANCE IN THE SHIPMENT OF PARTIAL UNITS.
3. THE PARTIAL PALLET UNIT IS SHOWN IN THE END OF THE CAR ONLY AS A TYPICAL LOCATION. THE PARTIAL PALLET UNIT MAY BE POSITIONED ANYWHERE IN THE LENGTH OF THE LOAD EXCEPT WITHIN THE DOORWAY AREA.
4. THE PROCEDURES SHOWN ON THIS PAGE ARE ONLY APPLICABLE TO PARTIAL PALLET UNITS CONSISTING OF ONE LAYER OF CONTAINERS.
5. THE SHIPMENT OF A PARTIAL PALLET UNIT AS SHOWN ABOVE IS APPLICABLE FOR LOADS IN CONVENTIONAL BOXCARS AND BOXCARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.
6. ONLY THE BLOCKING AND BRACING PIECES WHICH ARE NECESSARY TO PERMIT THE OMISSION OF THE UNITS FROM THE TOP LAYER ARE LISTED IN THE KEY NUMBERS AT RIGHT REFER TO PAGE 8 FOR LATERAL BRACING AND DOORWAY PROTECTION REQUIREMENTS.

**KEY NUMBERS**

- ① TOP-OF-LOAD ANTI-SWAY BRACE (2 REQD). SEE THE DETAIL ON PAGE 30.
- ② TIE WIRE, .0800" DIA 24" LONG (4 REQD). INSTALL THE WIRE TO FORM A COMPLETE LOOP AROUND THE TOP-OF-LOAD ANTI-SWAY BRACE AND TIE-DOWN STRAP ON THE PALLET UNITS. BRING ENDS TOGETHER AND TWIST TAUT.

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

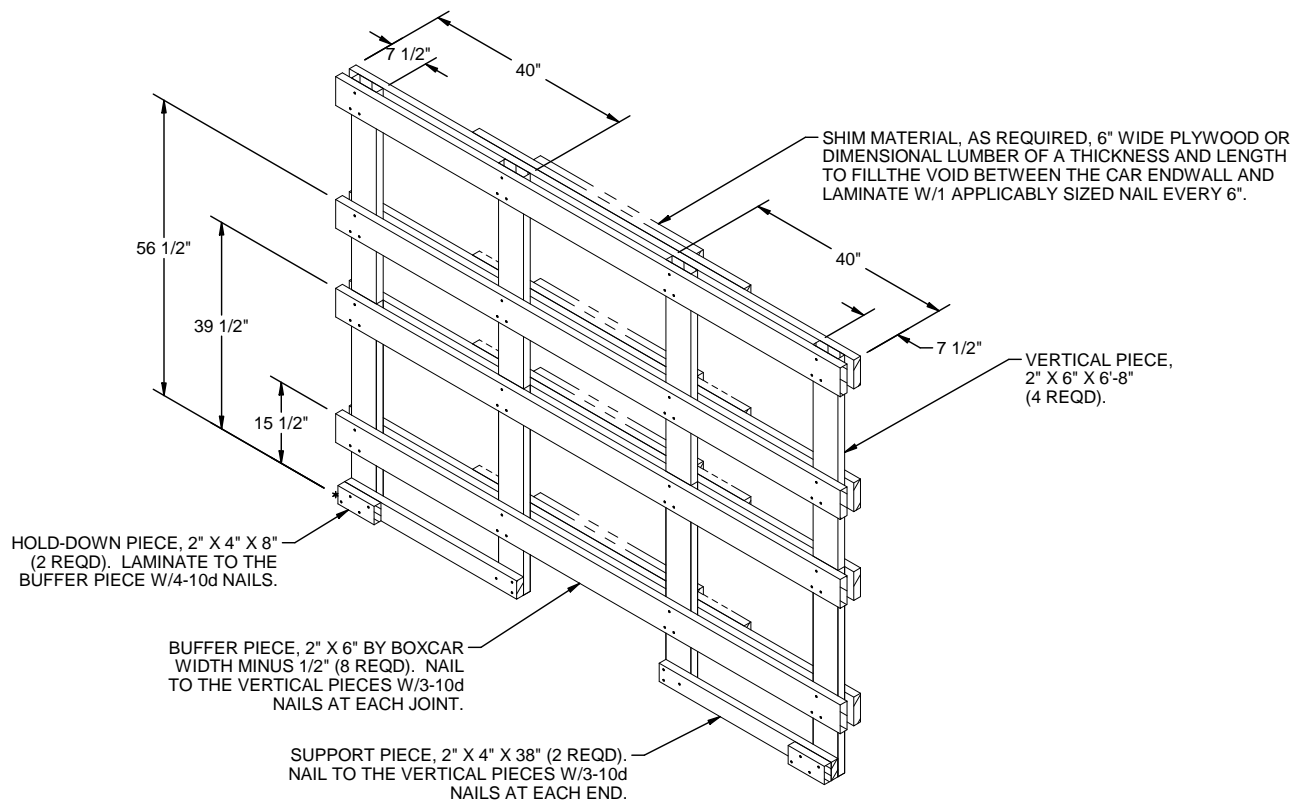
UNITIZING STRAP, 1-1/4" X .035" OR .031" BY LENGTH TO SUIT STEEL STRAPPING (2 REQD).



**SPECIAL NOTES:**

1. SHIPMENTS OF PALLET UNITS OF COMPUTER CONTROL GROUPS SHOULD CONSIST OF FULL-HEIGHT AND FULL-LAYER PALLET UNITS TO THE MAXIMUM EXTENT POSSIBLE. HOWEVER, THE END OF A LOT OR THE QUANTITY OF ITEMS NEEDED TO FILL A REQUISITION MAY NECESSITATE THE SHIPMENT OF ONE OR MORE LEFTOVER CONTAINERS. LEFTOVER CONTAINERS ARE DESCRIBED AS THE QUANTITY OF ONE CONTAINER.
2. SHIPMENT OF LEFTOVER CONTAINERS IS APPLICABLE FOR CONUS AND OCONUS RAILROAD SHIPMENTS FROM DEPOT OR FROM DEPOTS TO POSTS, CAMPS, AND STATIONS, OR, UPON APPROVAL FROM HIGHER HEADQUARTERS, FOR SHIPMENTS FROM LOADS, ASSEMBLE, AND PACK PLANTS TO DEPOTS. **CAUTION:** A LOAD CONTAINING LEFTOVER CONTAINERS IN AN AMOUNT WHICH IS LESS THAN A FULL LAYER, AND SECURED TO THE TOP OF A FULL OR PARTIAL UNIT, MUST NOT BE DESTINED FOR SHIPMENT OVERSEAS BY WATER CARRIER.
3. THE PROCEDURES ON THIS PAGE ARE PRESENTED AS GUIDANCE IN THE SECUREMENT OF LEFTOVER CONTAINERS FOR SHIPMENT. THE PROCEDURES ARE ALSO APPLICABLE FOR SECUREMENT OF LEFTOVER CONTAINERS TO PARTIAL UNITS FOR SHIPMENT ON TOP OF A LOAD. SEE SPECIAL NOTE 5 ON PAGE 24 FOR LIMITATIONS. IN ADDITION, THE PROCEDURES ARE APPLICABLE FOR SECURING LEFTOVER CONTAINERS TO A PARTIAL UNIT FOR SHIPMENT WITHIN A TIER.
4. THE PROCEDURES DEPICTED ON THIS PAGE ARE APPLICABLE FOR THE SHIPMENT OF LEFTOVER CONTAINERS IN ANY OF THE LOADS DEPICTED HEREIN.

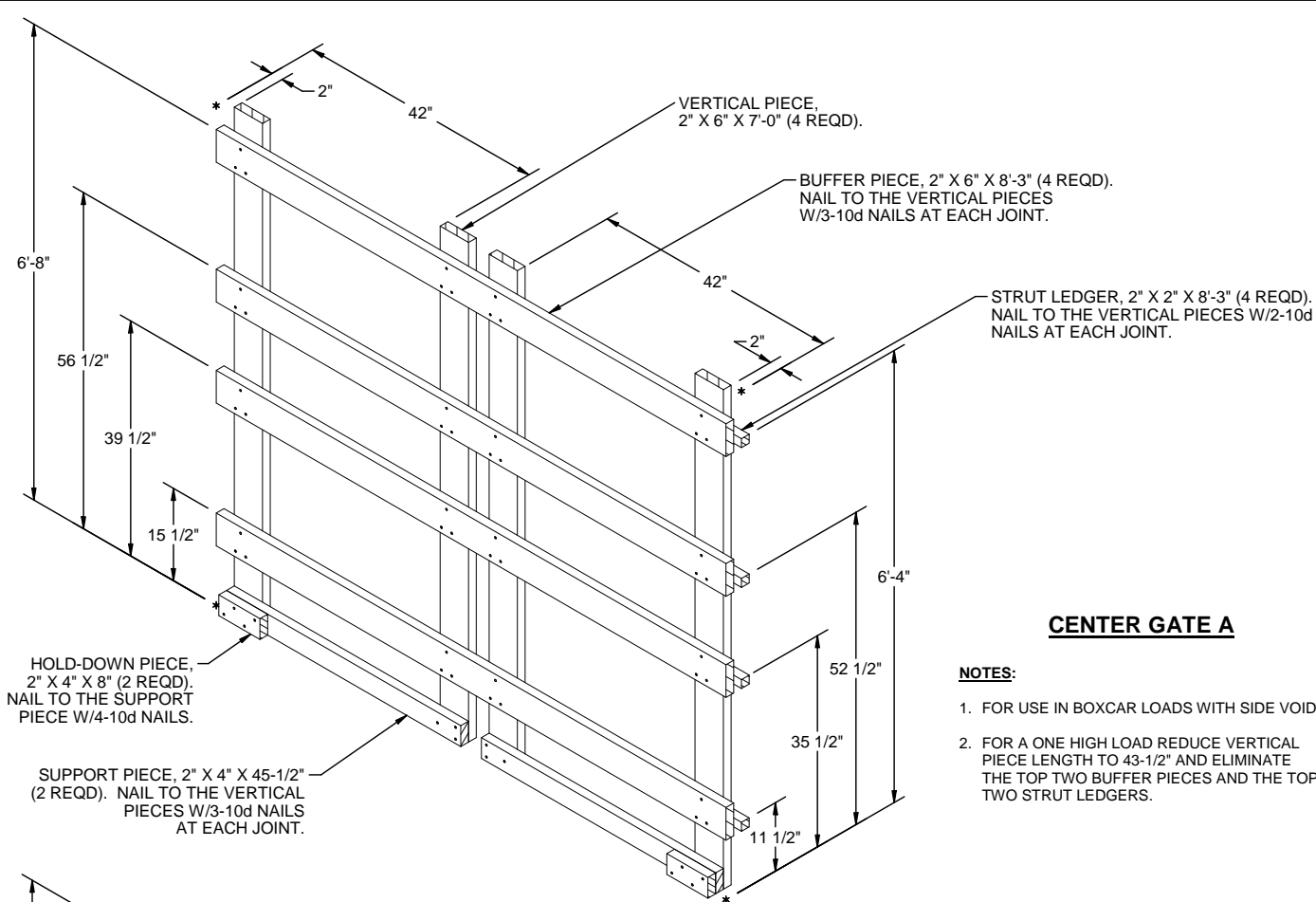
**SHIPMENT OF LEFTOVER CONTAINER**



**ENDWALL GATE**

**NOTES:**

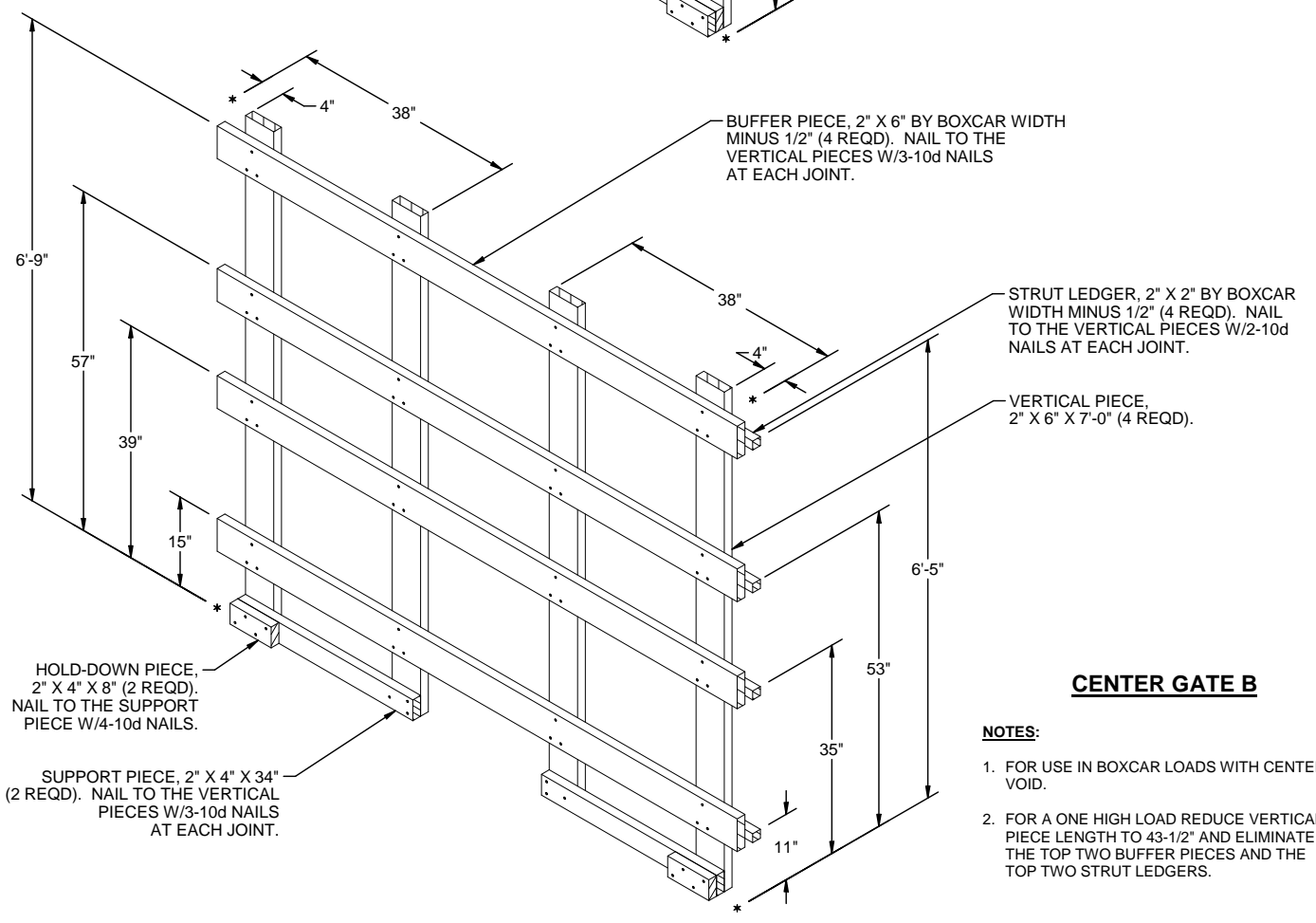
1. FOR USE IN BOXCAR WHICH HAS BOWED ENDWALLS.
2. FOR A ONE HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 39-1/2" AND ELIMINATE THE TOP TWO BUFFER PIECES.
3. THE ENDWALL GATE SHOWN IS FOR CENTER VOID LOADS. IT MAY BE USED FOR SIDE VOID LOADS BY CHANGING THE 7-1/2" AND 40" DIMENSION TO 21" AND 53-1/2", RESPECTIVELY.



**CENTER GATE A**

**NOTES:**

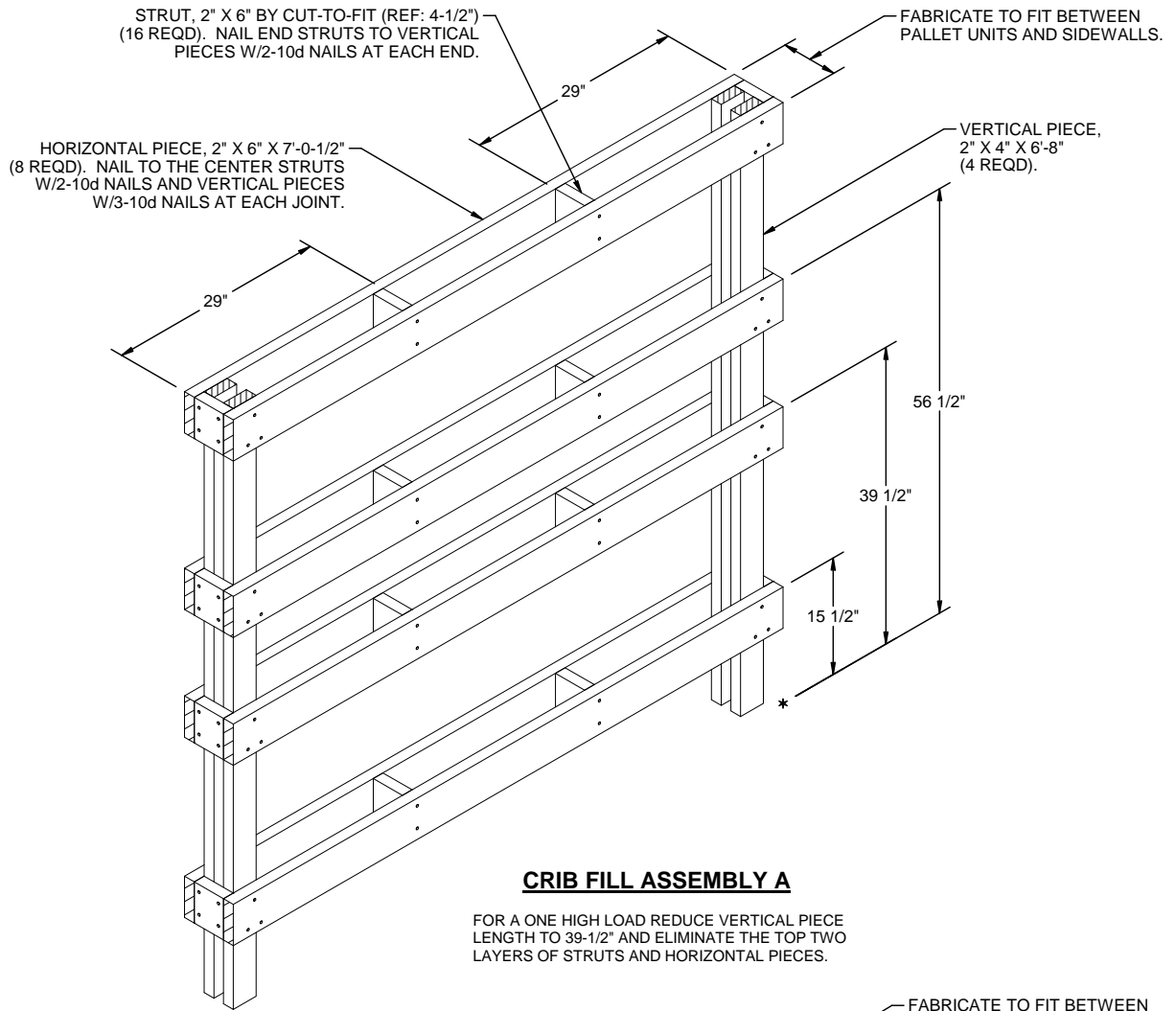
1. FOR USE IN BOXCAR LOADS WITH SIDE VOID.
2. FOR A ONE HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 43-1/2" AND ELIMINATE THE TOP TWO BUFFER PIECES AND THE TOP TWO STRUT LEDGERS.



**CENTER GATE B**

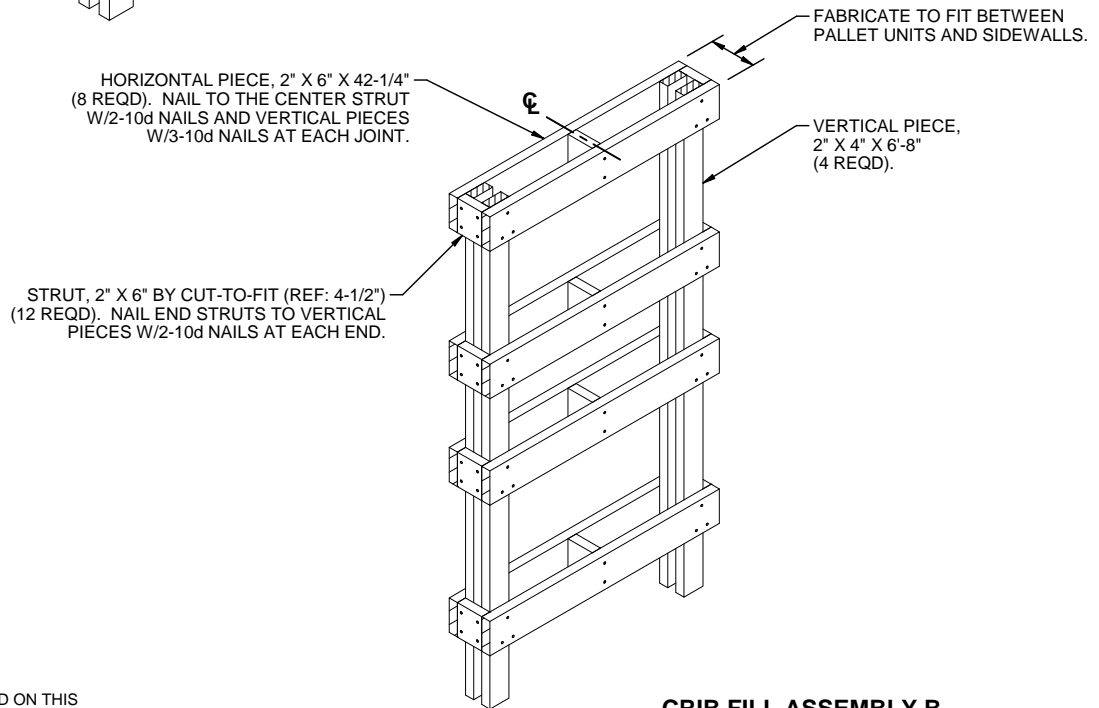
**NOTES:**

1. FOR USE IN BOXCAR LOADS WITH CENTER VOID.
2. FOR A ONE HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 43-1/2" AND ELIMINATE THE TOP TWO BUFFER PIECES AND THE TOP TWO STRUT LEDGERS.



**CRIB FILL ASSEMBLY A**

FOR A ONE HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 39-1/2" AND ELIMINATE THE TOP TWO LAYERS OF STRUTS AND HORIZONTAL PIECES.

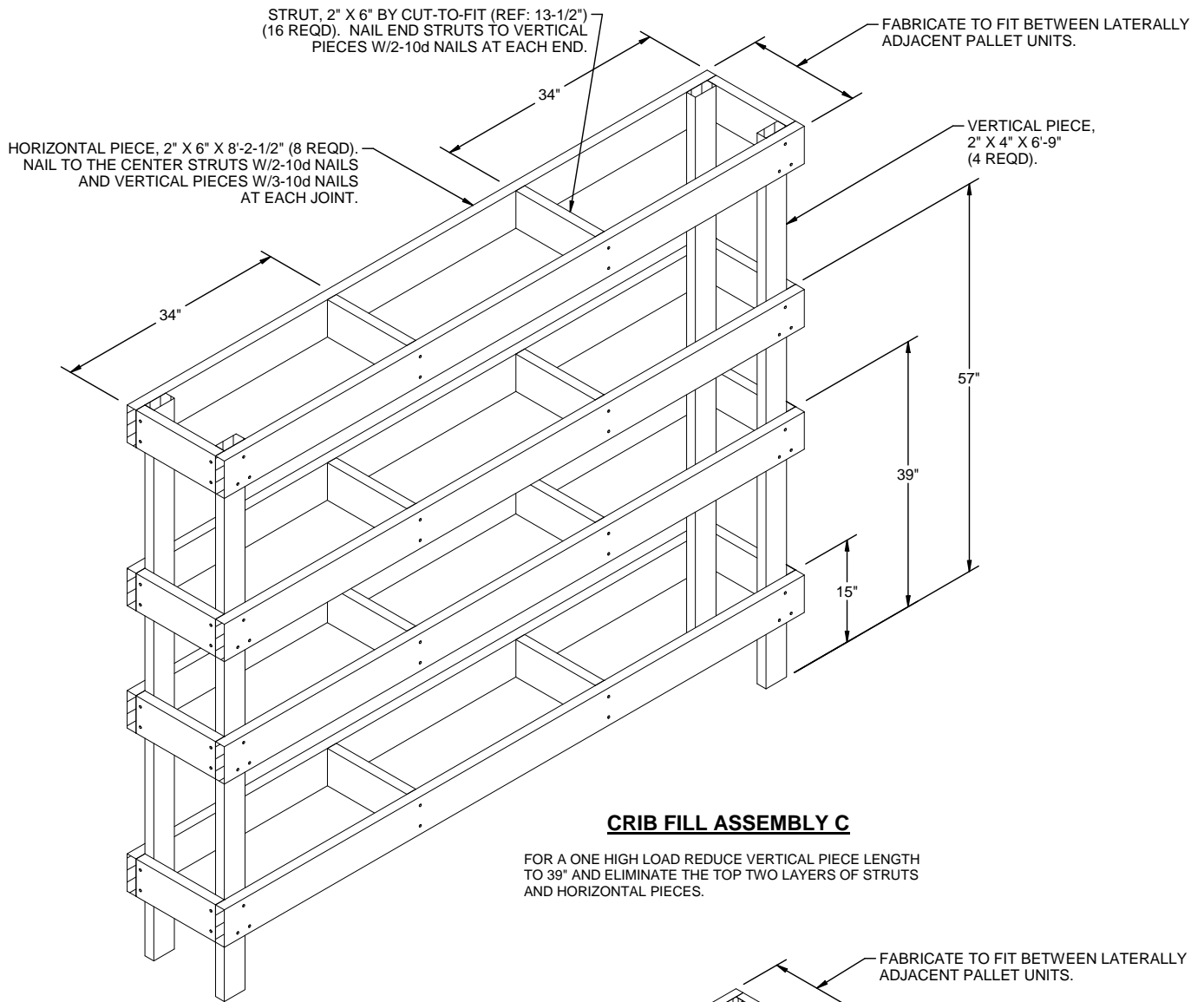


**CRIB FILL ASSEMBLY B**

FOR A ONE HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 39-1/2" AND ELIMINATE THE TOP TWO LAYERS OF STRUTS AND HORIZONTAL PIECES. SEE THE CRIB FILL ASSEMBLY "A" DETAIL ABOVE FOR HEIGHT LOCATIONS.

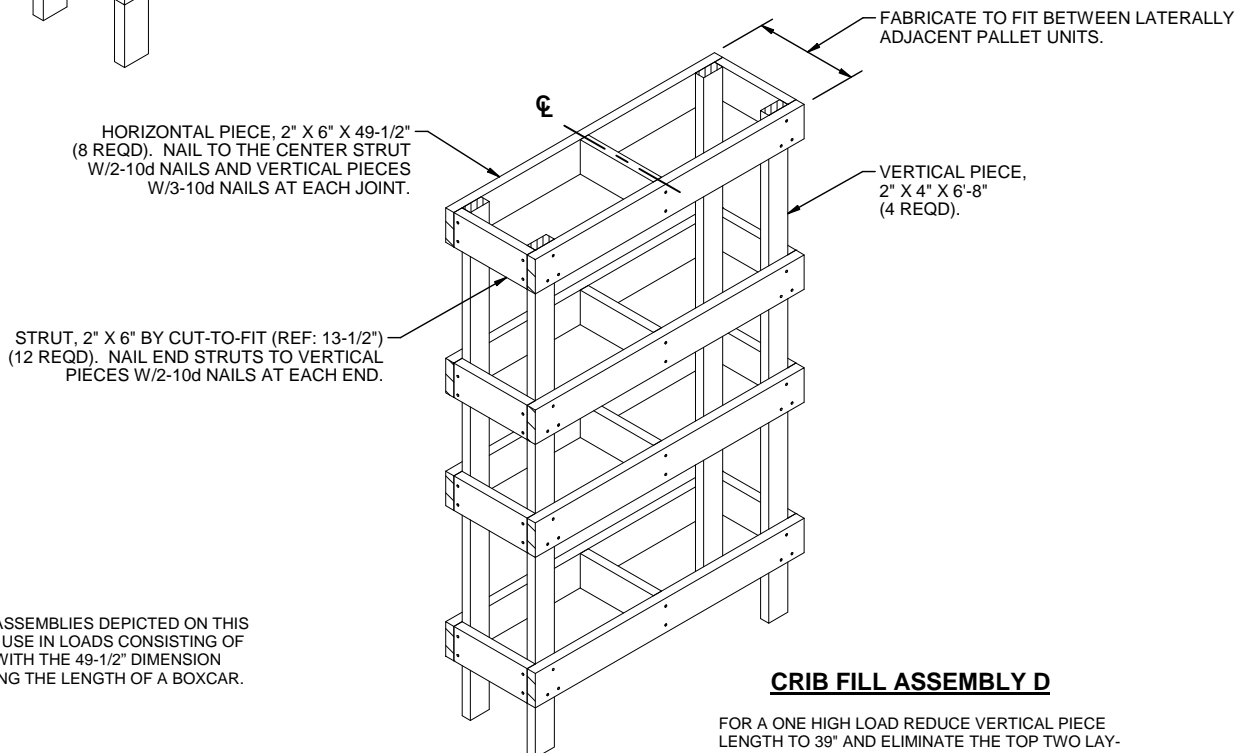
**NOTES:**

THE CRIB FILL ASSEMBLIES DEPICTED ON THIS PAGE ARE FOR USE IN LOADS CONSISTING OF PALLET UNITS WITH THE 49-1/2" DIMENSION ORIENTED ACROSS THE WIDTH OF A BOXCAR.



**CRIB FILL ASSEMBLY C**

FOR A ONE HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 39" AND ELIMINATE THE TOP TWO LAYERS OF STRUTS AND HORIZONTAL PIECES.



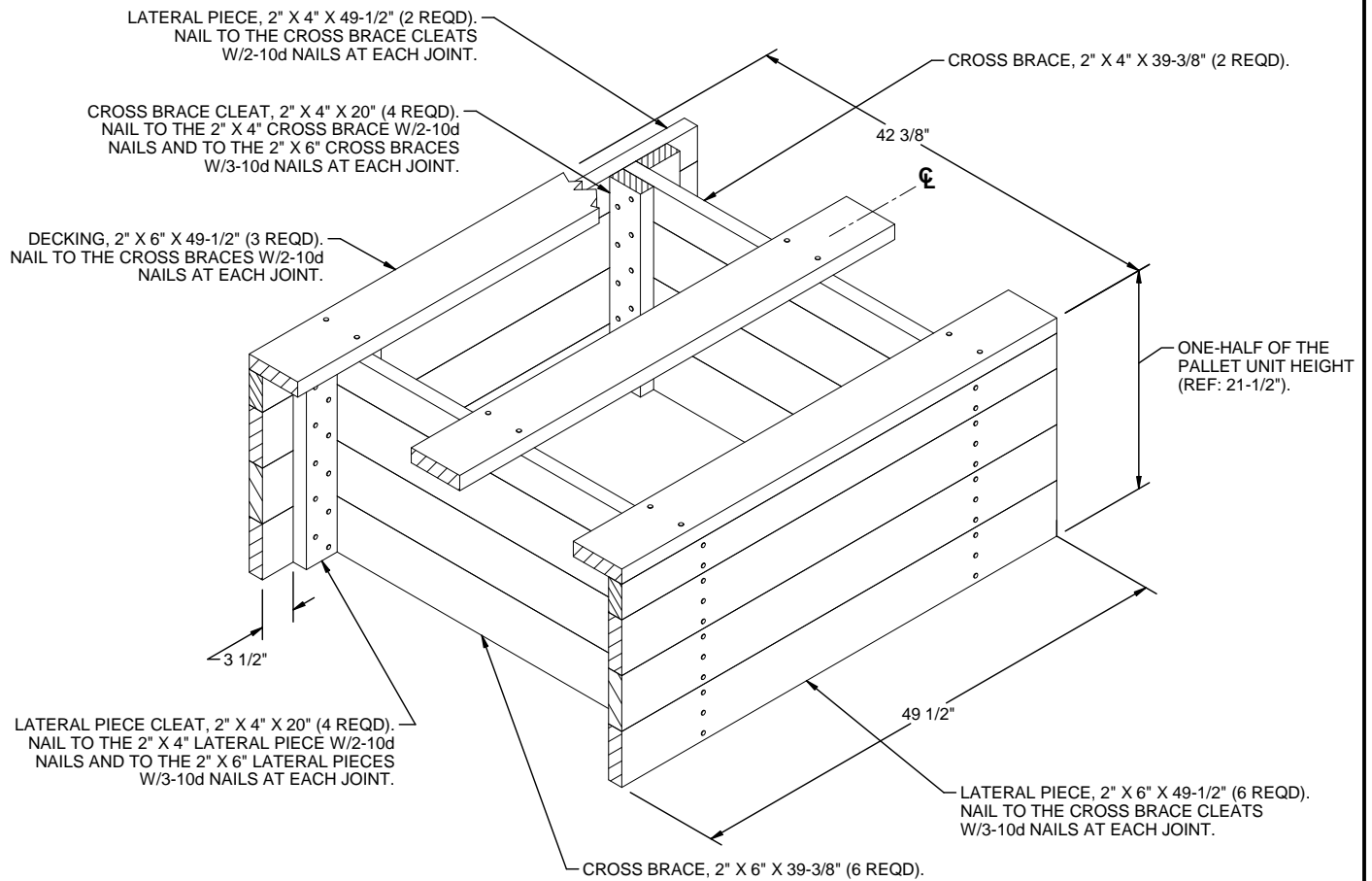
**CRIB FILL ASSEMBLY D**

FOR A ONE HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 39" AND ELIMINATE THE TOP TWO LAYERS OF STRUTS AND HORIZONTAL PIECES. SEE CRIB FILL ASSEMBLY "C" DETAIL ABOVE FOR HEIGHT LOCATIONS.

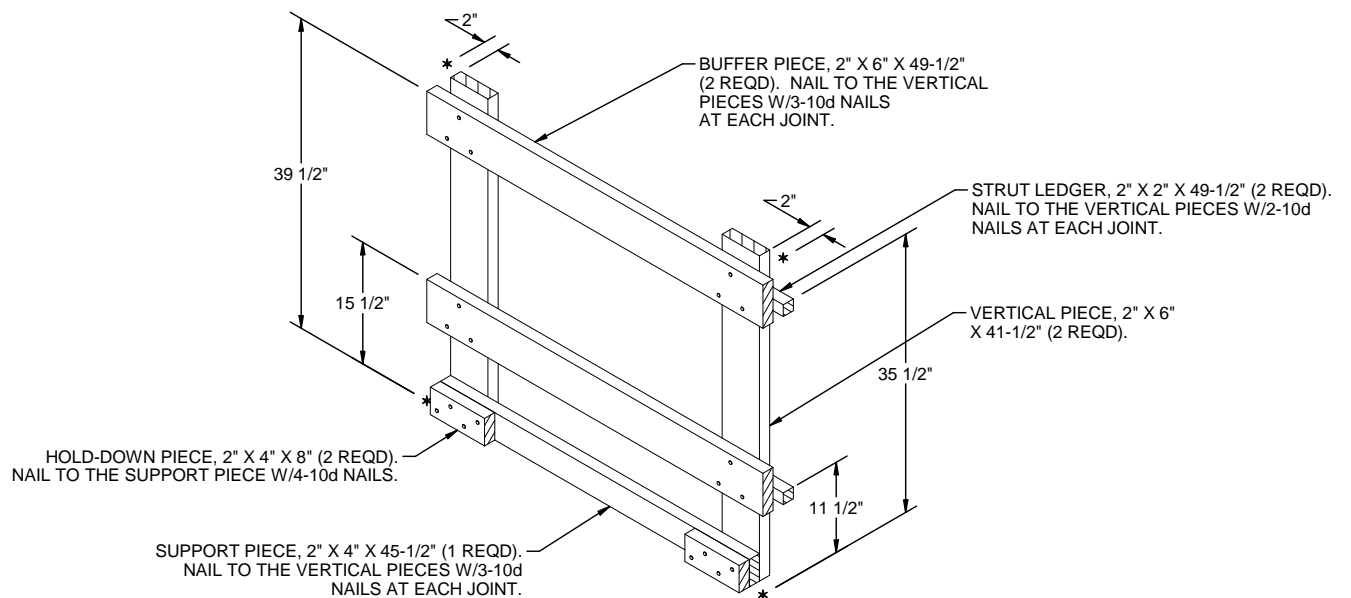
**NOTES:**

THE CRIB FILL ASSEMBLIES DEPICTED ON THIS PAGE ARE FOR USE IN LOADS CONSISTING OF PALLET UNITS WITH THE 49-1/2" DIMENSION ORIENTED ALONG THE LENGTH OF A BOXCAR.





**RISER ASSEMBLY**

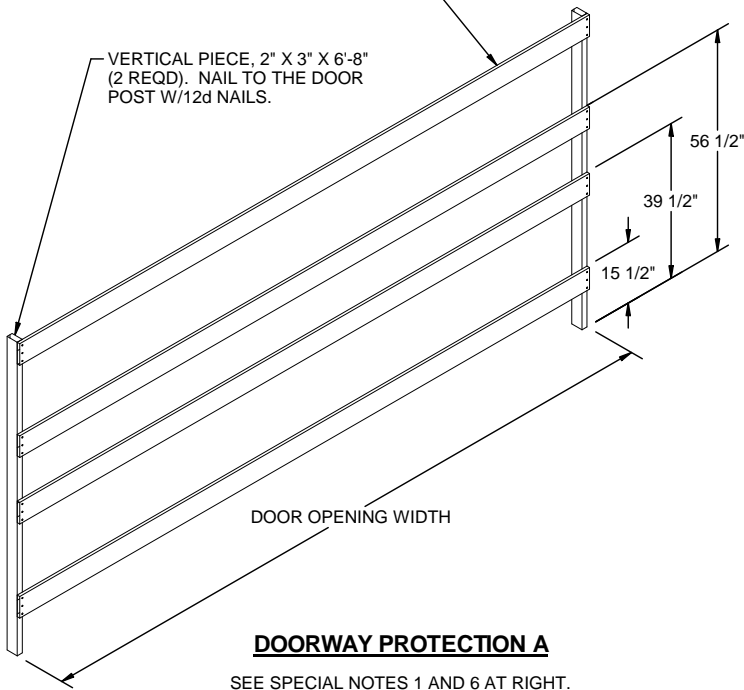


**CENTER GATE C**

FOR A 1-WIDE PALLET UNIT CROSSWISE LOAD,  
AS DEPICTED ON PAGE 16.

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

VERTICAL PIECE, 2" X 3" X 6'-8" (2 REQD). NAIL TO THE DOOR POST W/12d NAILS.

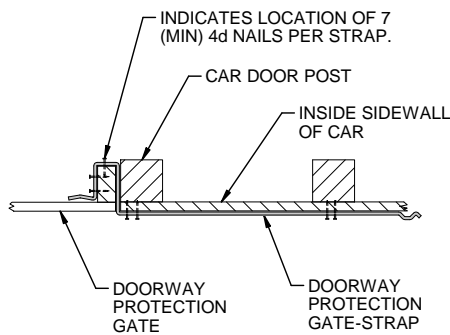


**SPECIAL NOTES:**

1. DOORWAY PROTECTION "A" IS FOR USE IN CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NAILABLE DOOR POSTS.
2. DOORWAY PROTECTION "B" 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.
3. DOORWAY PROTECTION "C" IS FOR USE 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.
4. DOORWAY PROTECTION "D" 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 DOORWAY PROTECTION "B" DETAIL FOR GUIDANCE.
5. NAILED FLOORLINE BLOCKING AND BUNDLING STRAPS ARE REQUIRED FOR DOORWAY PROTECTION IF NONE OF THE ABOVE METHODS CAN BE USED. SEE THE LOAD ON PAGE 6 FOR GUIDANCE.
6. THE VIEWS ON PAGES 20 AND 21 DEPICT DOORWAY PROTECTION FOR A TWO-LAYER LOAD. FOR A ONE-LAYER LOAD, ELIMINATE THE TOP TWO HORIZONTAL PIECES AND/OR STRAPS AND REDUCE THE HEIGHT OF THE VERTICAL PIECES BY 39-1/2". FOR DOORWAY PROTECTION "D", MOVE THE SPANNER BY AN APPROPRIATE DISTANCE.

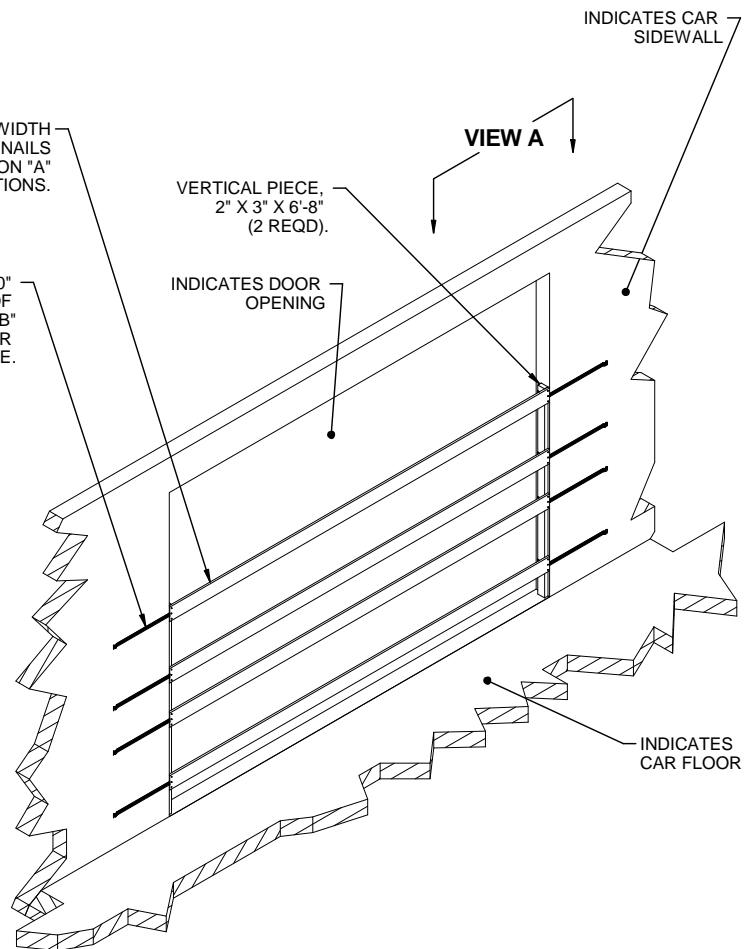
HORIZONTAL PIECE, 1" X 6" BY DOOR OPENING WIDTH (4 REQD). NAIL TO THE VERTICAL PIECES W/3-6d NAILS AT EACH END. SEE THE DOORWAY PROTECTION "A" DETAIL ABOVE FOR HEIGHT LOCATIONS.

DOORWAY PROTECTION-GATE STRAP, 1-1/4" X .035" OR .031" X 3'-0" (REF) NAIL-ON TYPE STEEL STRAPPING (2 REQD PER LAYER OF LOAD). NAIL TO GATE AND CAR SIDEWALL AS SHOWN IN VIEW "B" BELOW. NOTE: TYPE 1 STRAPPING MAY BE PUNCHED FOR NAILING IF TYPE 2 STRAPPING IS NOT AVAILABLE.



**VIEW A**

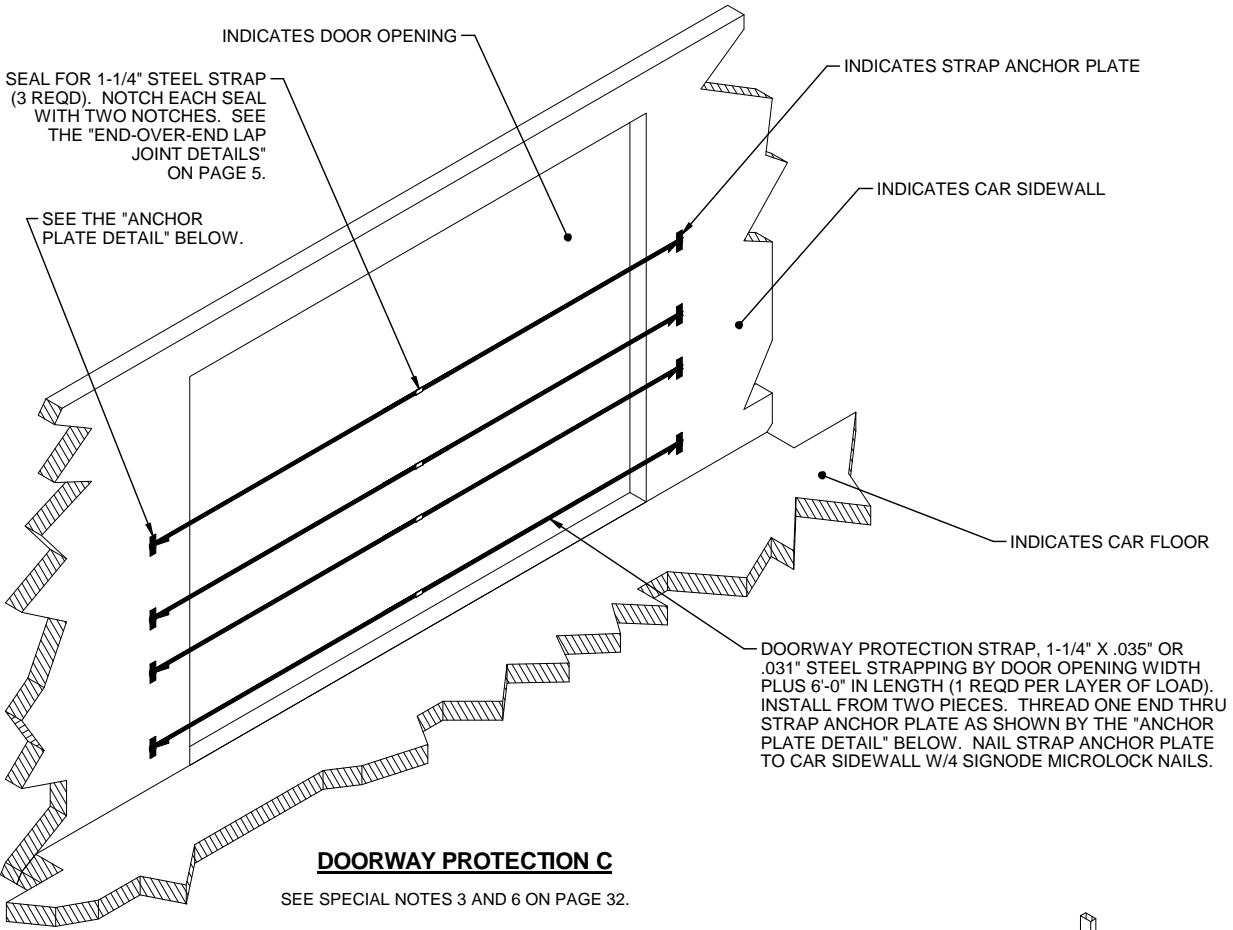
THIS DEPICTS THE LOCATION OF THE NAILS FOR SECURING THE DOORWAY PROTECTION GATE STRAP. NOTE THAT THE STRAPS MUST BE APPLIED TO THE CAR SIDE WALL PRIOR TO POSITIONING THE ADJACENT CONTAINERS.



**DOORWAY PROTECTION B**

SEE SPECIAL NOTES 2 AND 6 ABOVE.

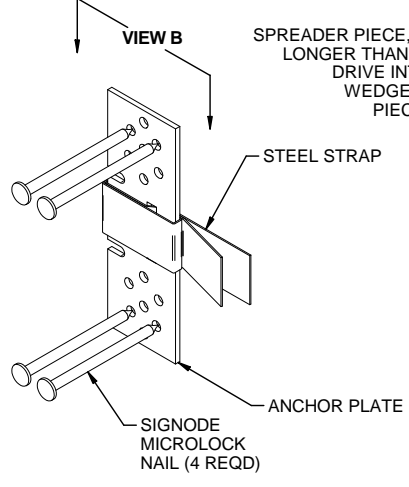




**DOORWAY PROTECTION C**

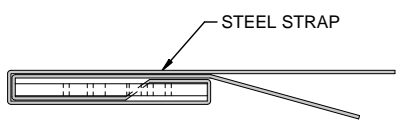
SEE SPECIAL NOTES 3 AND 6 ON PAGE 32.

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).

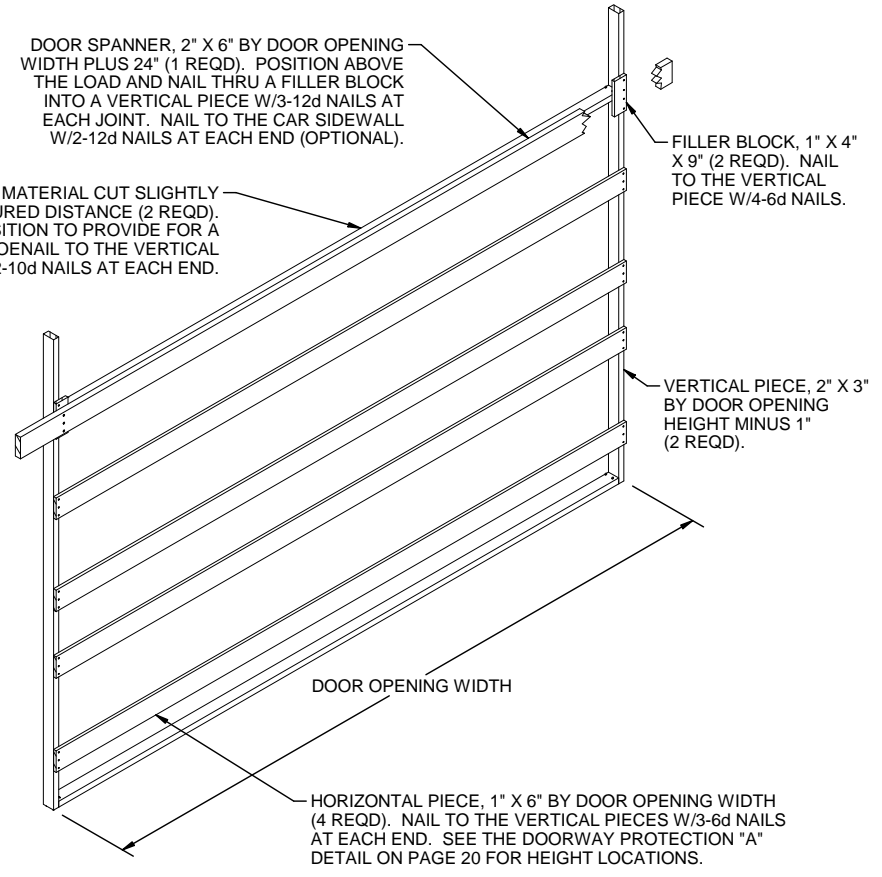


**ANCHOR PLATE DETAIL**

VIEW "B" BELOW DEPICTS THE PROPER THREADING OF A DOORWAY PROTECTION STRAP THRU AN ANCHOR PLATE.

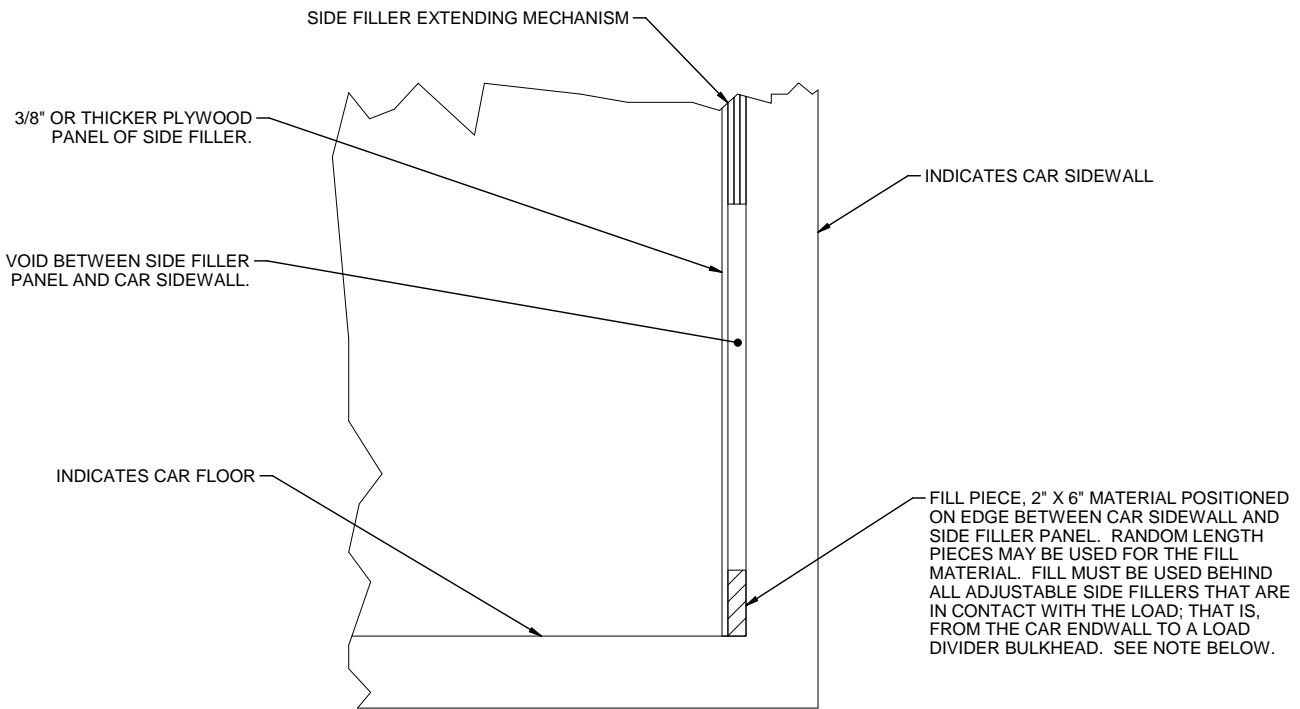


**VIEW B**



**DOORWAY PROTECTION D**

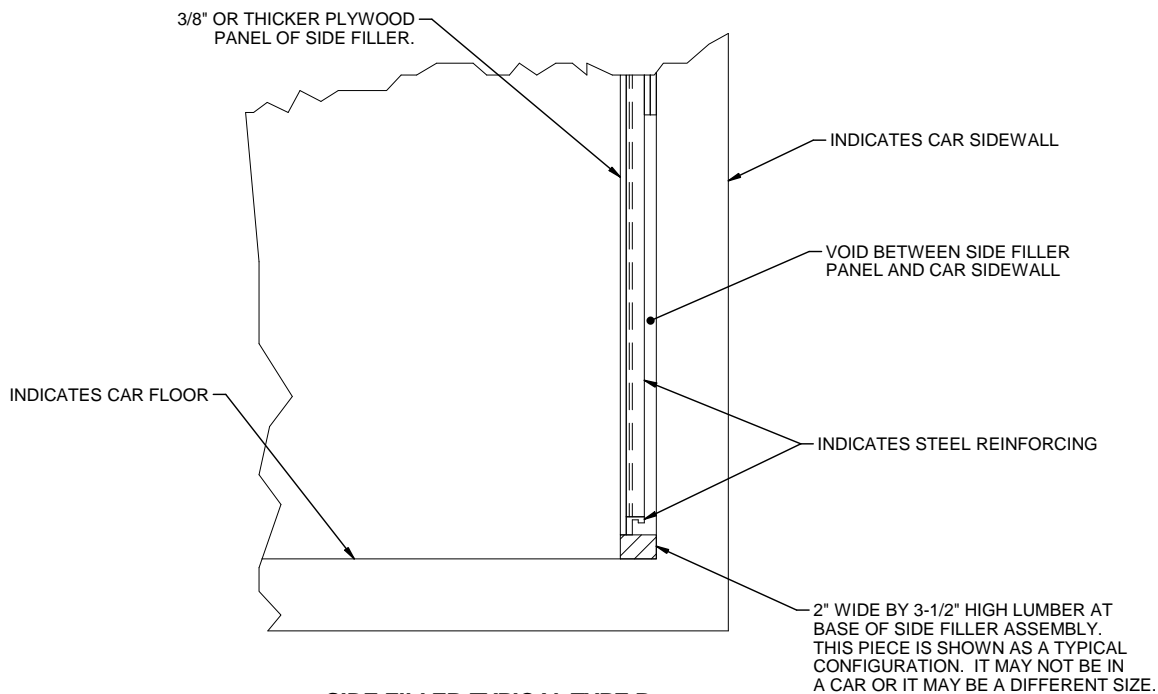
SEE SPECIAL NOTES 4 AND 6 ON PAGE 32.



**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".

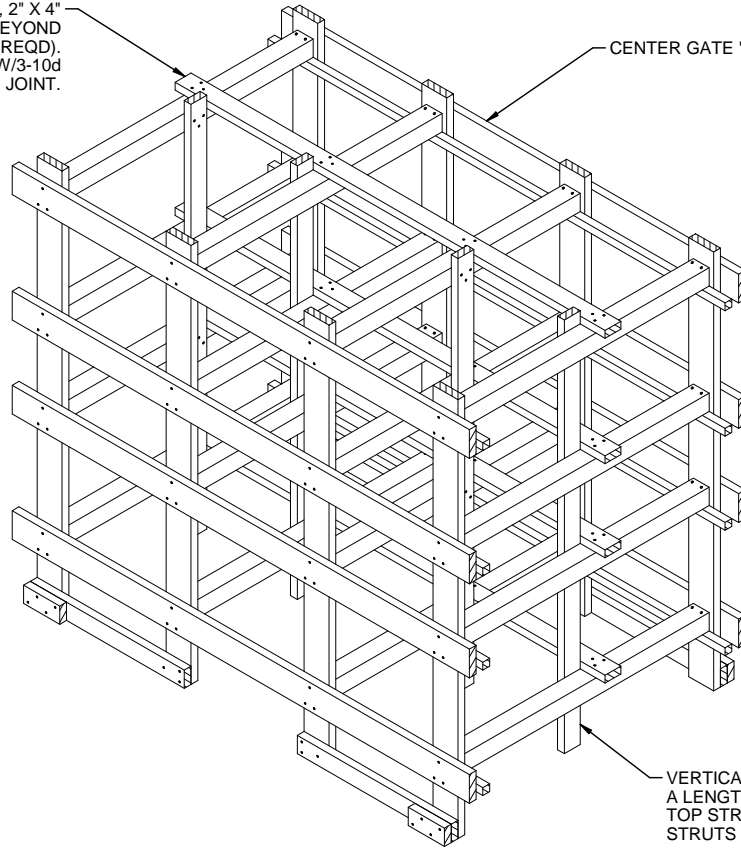


**SIDE FILLER TYPICAL TYPE B**

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.

HORIZONTAL STRUT BRACING, 2" X 4"  
 BY A LENGTH TO EXTEND 2" BEYOND  
 THE OUTER STRUTS (AS REQD).  
 NAIL TO THE STRUTS W/3-10d  
 NAILS AT EACH JOINT.

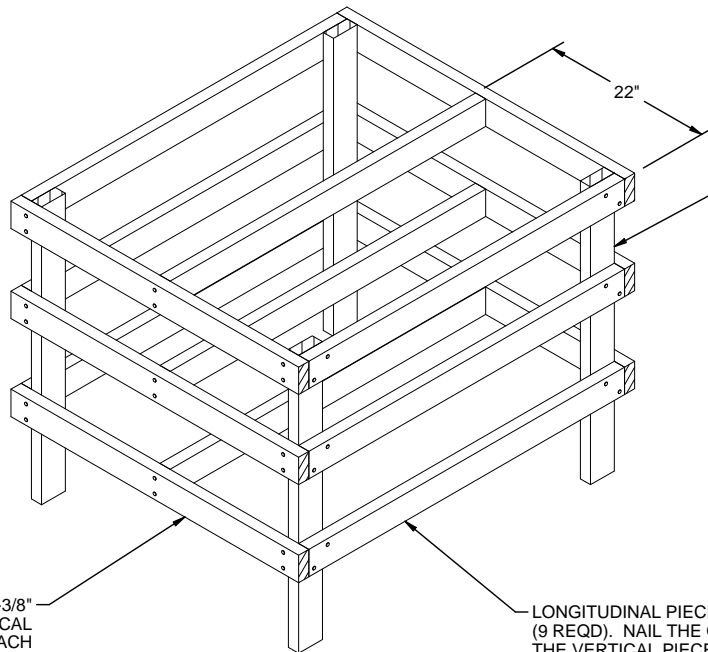
CENTER GATE "B"



VERTICAL STRUT BRACING, 2" X 4" BY  
 A LENGTH TO EXTEND 2" ABOVE THE  
 TOP STRUT (AS REQD). NAIL TO THE  
 STRUTS W/3-10d NAILS AT EACH JOINT.

**TYPICAL STRUT BRACING**

SEE GENERAL NOTE "S.3" ON PAGE 3.



VERTICAL PIECE,  
 2" X 4" X 38"  
 (4 REQD).

LATERAL PIECE, 2" X 4" X 42-3/8"  
 (6 REQD). NAIL TO THE VERTICAL  
 PIECES W/2-10d NAILS AT EACH  
 END. NAIL TO THE CENTER  
 LONGITUDINAL PIECE W/2-10d  
 NAILS AT EACH JOINT.

LONGITUDINAL PIECE, 2" X 4" X 46-1/2"  
 (9 REQD). NAIL THE OUTER PIECES TO  
 THE VERTICAL PIECES W/2-10d NAILS  
 AT EACH END.

**FILLER ASSEMBLY**

(USED TO REPLACE A PALLET UNIT)

