LOADING AND BRACING (CL & LCL) IN BOXCARS⊕ OF FIN ASSEMBLY, BSU-33, ON METAL PALLET

INDEX

⊕ THIS OUTLOADING 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
JOINT MUNITIONS COMMAND

WARD.GINA.M.1369379808 Digitally signed by WARD.GINA.M.1369379808 Date: 2020.04.22 10:18:25 -05'00'

APPROVED BY ORDER OF COMMANDING
GENERAL, U.S. ARMY MATERIEL COMMAND

SMITH.THERESA.ANN.1009147639 Digitally signed by SMITH.THERESA.ANN.1009147639 Date: 2020.04.22 11:58:58 -05'00'

U.S. ARMY DEFENSE AMMUNITION CENTER

CAUTION: VERIFY PRIOR TO USE AT https://www.dau.edu/cop/amo/Pages/Default.aspx THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 34.

DO NOT SCALE

ENGINEER OR TECHNICIAN	BASIC	SPENCER HOVEY	
	REV.		
ENGINEERING DIVISION		FIEFFER.LAURA.A.1230375727 Digitally signed by FIEFFER.LAURA.A.1230375727 Date: 2020.01.06 13:39:19 -06'00'	
TEST ENGINEER		FELICIANO.ADIN.1259200373 Digitally signed by FELICIANO.ADIN.1259200373 Date: 2020.01.28 10:56:55 -06'00'	
TEST REPORT	NA		
EXPLOSIVE SAFETY DIRECTORATE		THOMAS.CARL.ANTHONY.1104621372 Digitally signed by THOMAS.CARL.ANTHONY.1104621372 Date: 2020.03.02 13:25:41 -06'00'	

JANUARY 2020

CLASS	DIVISION	DRAWING	FILE
19	48	8805	SP5PM2

PROJECT SP 504-04

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 BSU-33 FIN ASSEMBLIES ON METAL PALLETS. SUBSEQUENT REFERENCE TO PALLET HEREIN MEANS THE PALLET UNIT WITH AMMUNITION ITEMS. SEE PAGE 4 AND NAVY DRAWING 6214035 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 SELECTION OF RAILCARS FOR THE TRANSPORT OF PALLET UNITS OF FIN ASSEMBLIES 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 30 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.

(CONTINUED AT RIGHT)

MATERIAL SPECIFICATIONS

LUMBER - - - - - - - -: SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.

NAILS - - - - - - - -: ASTM F1667; COMMON STEEL NAIL (NLCMS OR 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.

PLYWOOD - - - - - -: COMMERCIAL ITEM DESCRIPTION A-A-55057, INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.

STAPLE, STRAP - - -: COMMERCIAL GRADE.

ANTI-CHAFING MATERIAL - - - - - -: MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.

WIRE, CARBON STEEL -: ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.

(GENERAL NOTES CONTINUED)

H. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN CARS WHICH ARE PARTIALLY LOADED WITH THE DESIGNATED ITEM, 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. 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. 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. ANTI-CHAFING MATERIAL MAY BE INSTALLED AT POINTS OF CONTACT BETWEEN PALLET UNITS, BETWEEN PALLET UNITS AND THE BOXCAR, AND BETWEEN PALLET UNITES AND STEEL STRAPPING, IF DESIRED, TO PREVENT CHAFING DAMAGE TO PALLET UNIT PAINT AND MARKINGS.

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)

(GENERAL NOTES CONTINUED FROM PAGE 2)

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 PALLET UNITS. 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 12. 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.

(CONTINUED AT RIGHT)

(GENERAL NOTES CONTINUED)

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 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.

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 "SIDE FILLER TYPICAL TYPE A" VIEW ON PAGE 33 FOR GUIDANCE. IF THE BACK OF THE SIDE FILLER PANELS ARE REINFORCED WITH VERTICAL AND HORIZONTAL STEEL MEMBERS AS SHOWN IN THE "SIDE FILLER TYPICAL TYPE B" VIEW ON PAGE 33, THE "FILL PIECE" MATERIAL IS NOT REQUIRED.

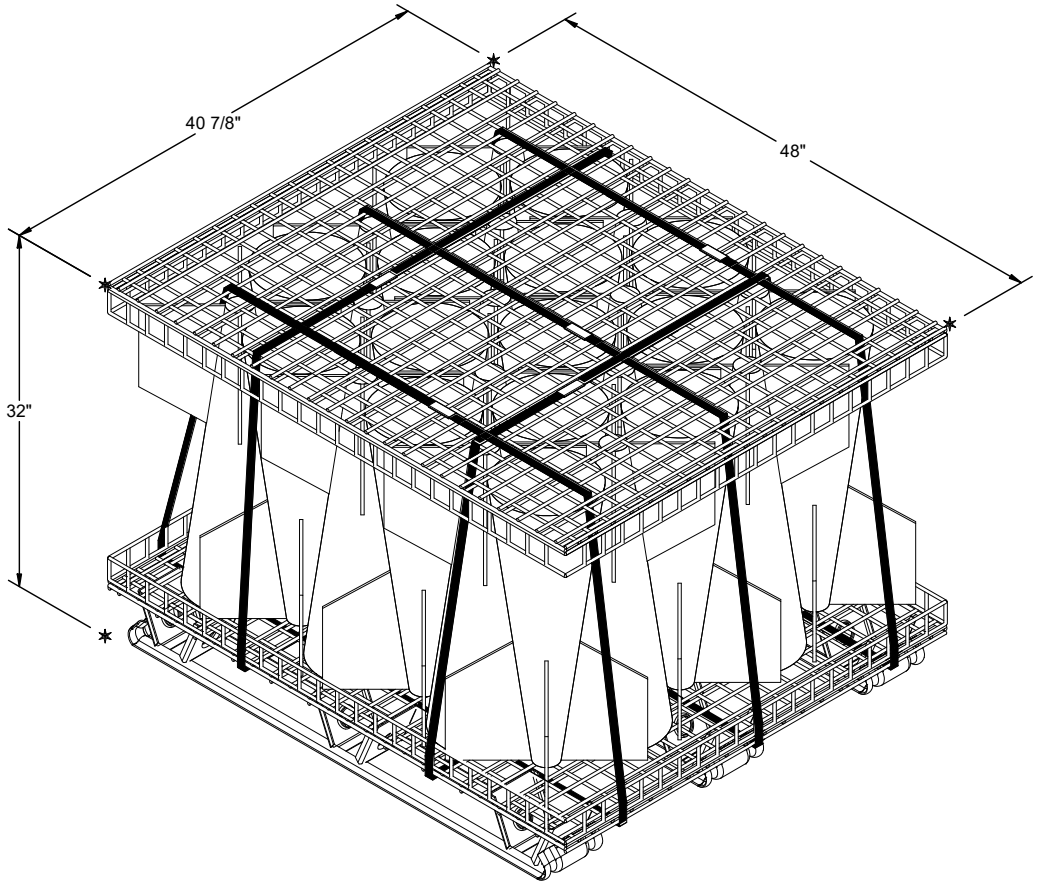
4. **NOTICE:** AFTER THE LOAD DIVIDER BULKHEADS ARE POSITIONED AGAINST THE LADING, AND THE LOCKING PINS ARE ENGAGED IN THE HOLES OF THE RAILS, THE LOWER LOCKING PINS MUST BE INSPECTED TO ENSURE THAT THE PINS ARE FULLY ENGAGED IN THE LOCKING HOLES. IF THE PINS ARE NOT FULLY SEATED IN THE LOCKING HOLES, 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 BENEATH 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. THE "GATES AND STRUTS" METHOD OF OMITTING A PALLET UNIT MAY BE USED TO ADJUST A LOAD QUANTITY DOWNWARD BY OTHER THAN A MULTIPLE OF A LOAD UNIT. SEE THE PROCEDURES ON PAGE 13 FOR GUIDANCE.

   II. AT LOCATION(S) WHERE K-BRACES MIGHT NORMALLY BE USED IN A LOAD IN A CONVENTIONAL CAR, LOAD DIVIDER BULKHEADS CAN BE POSITIONED. LOADING CAN THEN CONTINUE TOWARD THE CENTER OF THE CAR FROM EACH INSTALLED LOAD DIVIDER BULKHEAD IN A ONE-HIGH LOADING PATTERN. INSTALL CENTER GATES AND STRUTS AS SHOWN ON PAGE 6 OR 8 OF THE CONVENTIONAL BOXCAR DRAWING HEREIN TO PROVIDE FOR A TIGHT LOAD BETWEEN THE BULKHEADS.

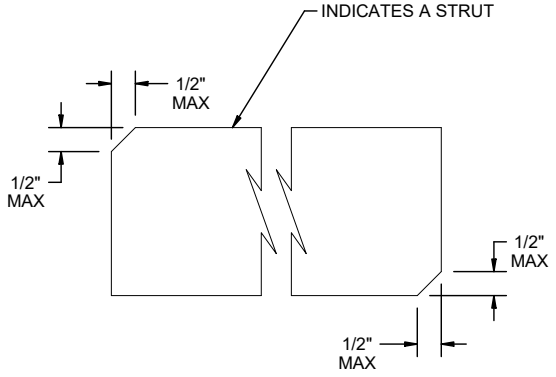
   III. ONE OR MORE UNITS CAN BE POSITIONED IN CONTACT WITH A LOAD DIVIDER BULKHEAD ON THE CENTER-OF-CAR SIDE. BLOCK AND BRACE WITH KNEE BRACE ASSEMBLIES, AS SHOWN ON PAGES 20-21.



PALLET UNIT

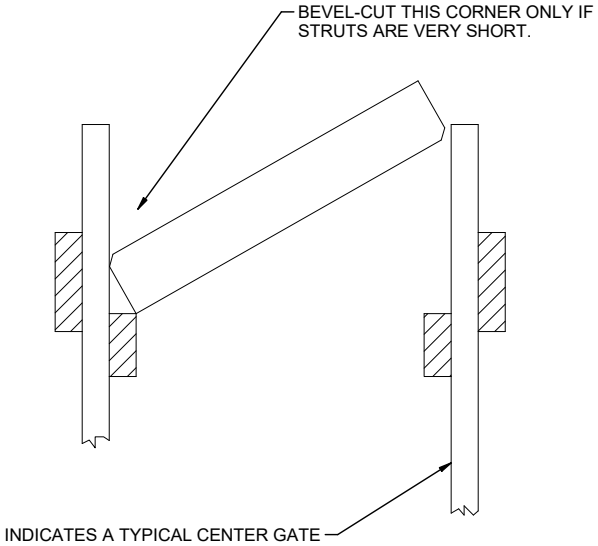
GROSS WEIGHT - - - - - - - - - - 836 LBS (APPROX)
CUBE - - - - - - - - - - - - - - 36.4 CU FT (APPROX)

PROJECT SP 504-04



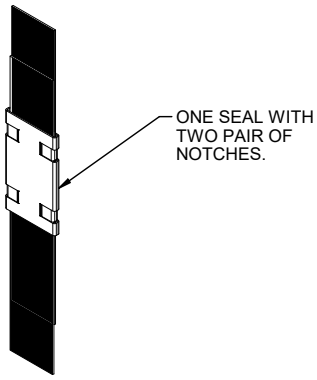
BEVEL CUT

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



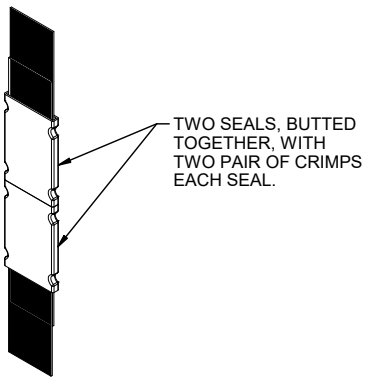
STRUT INSTALLATION

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



STRAP JOINT A

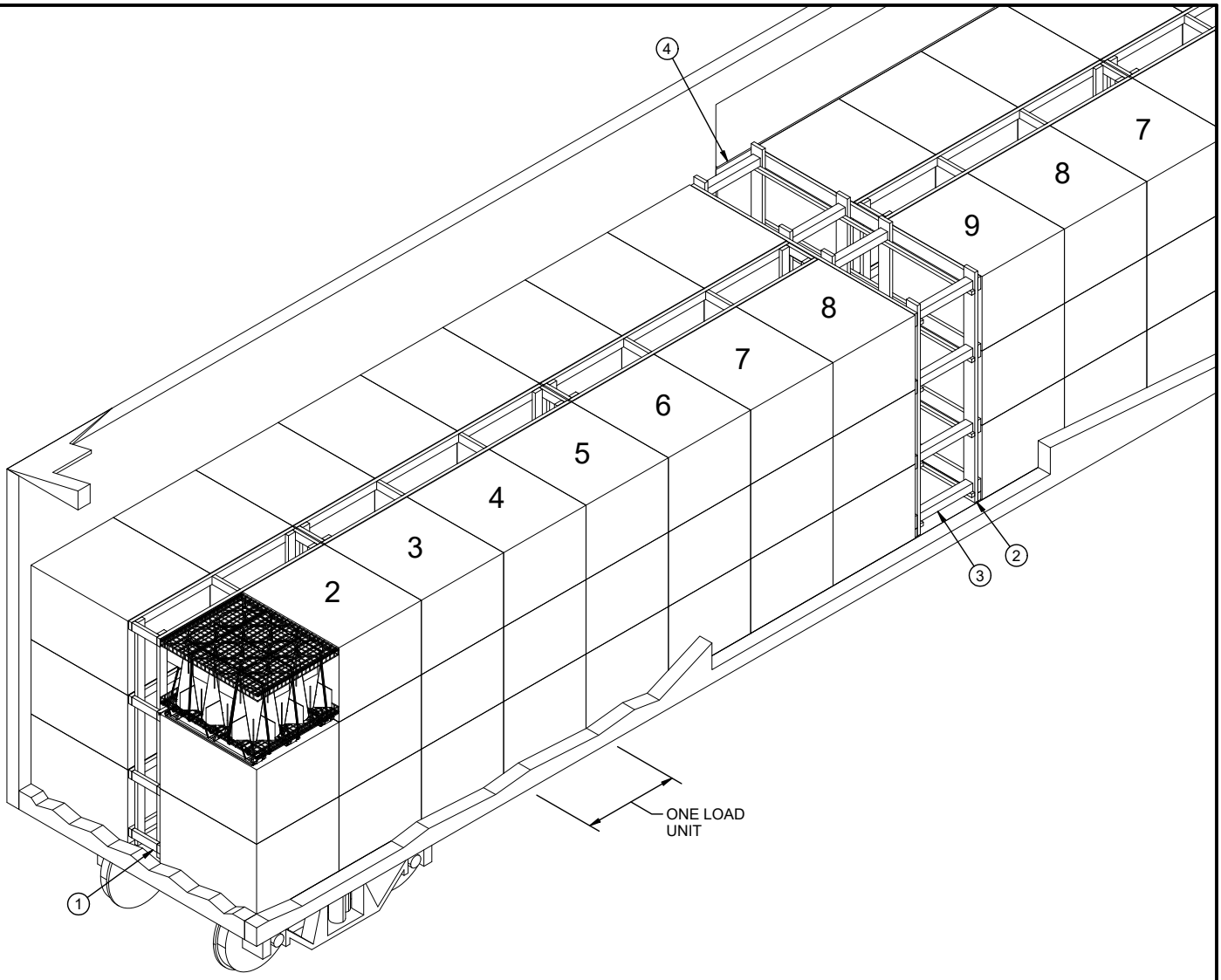
METHOD OF SECURING A STRAP JOINT WHEN USING A NOTCH-TYPE SEALER.



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 CENTER FILL ASSEMBLY A (6 REQD, FIVE 3-PALLET UNIT LONG ASSEMBLIES, ONE 2-PALLET UNIT LONG ASSEMBLY). SEE THE DETAIL ON PAGE 24.

② CENTER GATE A (2 REQD). SEE THE DETAIL ON PAGE 25.

③ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 27") (16 REQD). TOENAIL TO CENTER GATE W/2-16d NAILS AT EACH END. SEE THE BEVEL CUT DETAIL ON PAGE 5.

④ DOORWAY PROTECTION A (2 REQD). SEE THE DETAIL ON PAGE 31. NAIL TO THE DOOR POSTS W/12d NAILS.

102 UNIT LOAD IN A 60'-8" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR

SPECIAL NOTES:

1. A 60'-8" LONG BY 9'-4" WIDE CONVENTIONAL TYPE BOXCAR EQUIPPED WITH 14'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER OR NARROWER DOOR OPENINGS CAN BE USED.

2. A MAXIMUM OF 66 PALLET UNITS, FOR A LADING WEIGHT OF APPROXIMATELY 55,176 POUNDS, CAN BE LOADED IN A 40'-6" LONG CAR, AND A MAXIMUM OF 84 PALLET UNITS, FOR A LADING WEIGHT OF APPROXIMATELY 70,224 POUNDS, CAN BE LOADED IN A 50'-6" LONG CAR BY USING THE DEPICTED PROCEDURES.

3. "CENTER GATE A" MAY BE PARTIALLY FORMED FROM 1/2" OR THICKER PLY-WOOD, IF DESIRED. PLYWOOD MAY BE USED IN LIEU OF THE 2" X 6" HORIZONTAL PIECES. SEE THE "PLYWOOD CENTER GATE ALTERNATIVE" DETAIL ON PAGE 29 FOR GUIDANCE.

4. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED AS AN ALTERNATIVE TO THE CAR WIDTH GATES. IN LIEU OF EACH "CENTER GATE A" IN THE LOAD ON PAGE 6, IN-STALL TWO "CENTER GATES E" AS SHOWN ON PAGE 27. AFTER THE SPLIT GATES AND STRUTS HAVE BEEN INSTALLED, THE SPLIT GATES MUST BE TIED TOGETHER AS DEPICTED BY THE "TIE PIECE APPLICATION" DETAIL ON PAGE 29.

5. DOORWAY PROTECTION IS REQUIRED FOR ALL PALLET UNIT STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK WIDTH. THE WOODEN GATE TYPE OF DOORWAY PROTECTION IS APPLICABLE FOR BOXCARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NAILABLE DOOR POSTS. REFER TO PAGES 31 AND 32 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 8 FOR GUIDANCE. NOTE THAT THE DOORWAY PROTECTION PROCEDURES FOR CARS EQUIPPED WITH PLUG DOORS MAY ALSO BE USED IN CARS EQUIPPED WITH SLIDING DOORS.

6. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED. A 3-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF SIX UNITS, A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF FOUR UNITS, OR A 1-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF 2 UNITS BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD, OR THE ENTIRE TOP TIERS CAN BE OMITTED. FOR OTHER METHODS OF REDUCING A LOAD, AND FOR TYPICAL LCL PROCEDURES, REFER TO PAGES 12 THRU 23 FOR GUIDANCE.

BILL OF MATERIAL

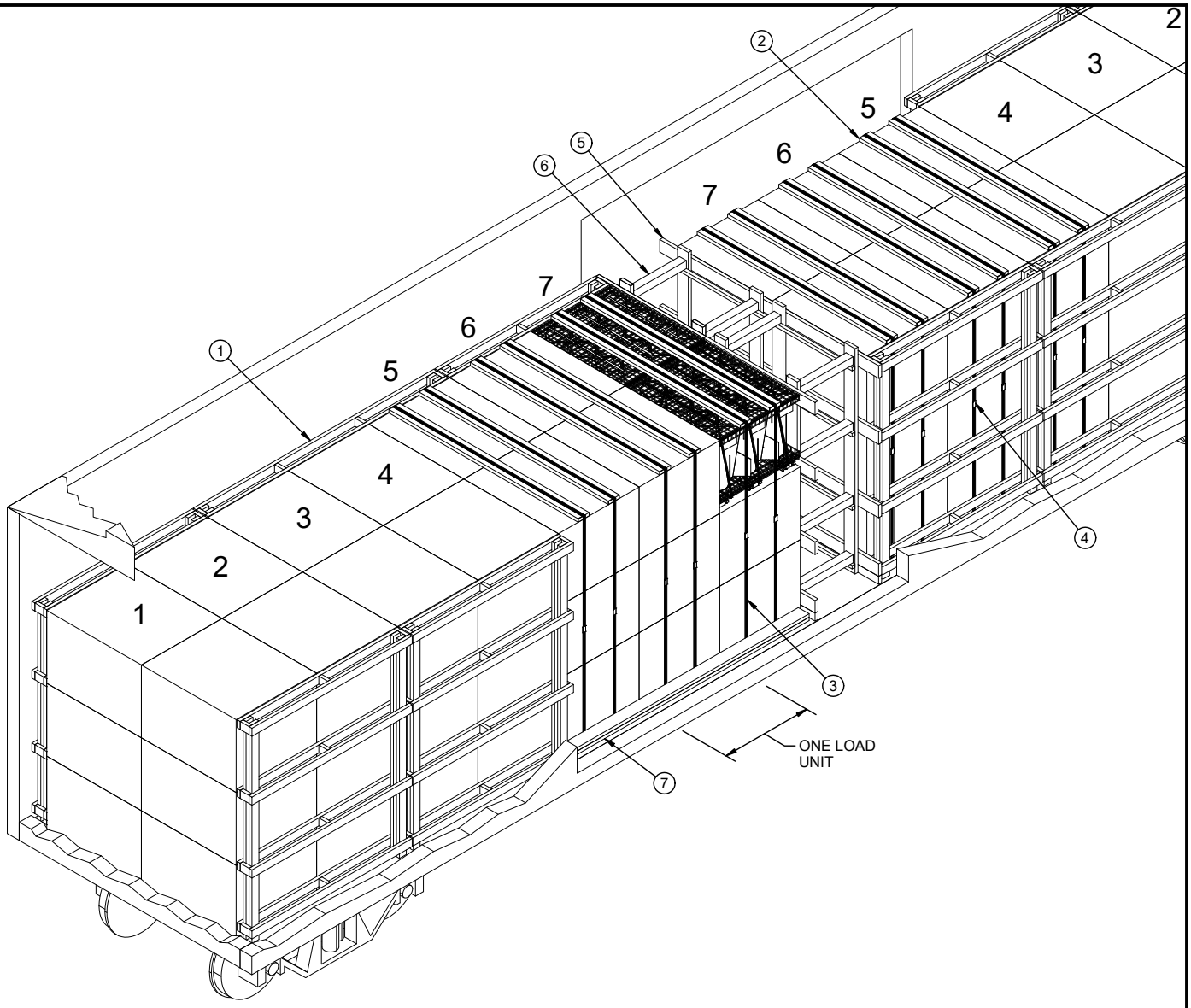
LUMBER	LINEAR FEET	BOARD FEET
1″ X 6″	112	56
2″ X 2″	74	25
2″ x 3″	34	17
2″ x 4″	767	511
2″ X 6″	140	140
4″ x 4″	36	48
NAILS	**NO. REQD**	**POUNDS**
6d (2″)	48	1/2
10d (3″)	748	11-1/2
16d (3-1/2″)	64	1-1/2

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	102	85,272 LBS
DUNNAGE		1,607 LBS
TOTAL WEIGHT		86,879 LBS (APPROX)

102 UNIT LOAD IN A 60'-8" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR

PROJECT SP 504-04



ISOMETRIC VIEW

KEY NUMBERS

① SIDE FILL ASSEMBLY (10 REQD, EIGHT 2-PALLET UNIT LONG ASSEMBLIES, TWO 3-PALLET UNIT LONG ASSEMBLIES). SEE THE DETAIL ON PAGE 28.

② STRAPPING BOARD, 2" X 6" X 8'-0" (12 REQD).

③ DOORWAY PROTECTION STRAP, 1-1/4" X .036" OR .031" X 33'-0" LONG STEEL STRAPPING (12 REQD). INSTALL AS TO ENCIRCLE BUNDLES OF SIX PALLET UNITS IN THE DOORWAY AREA.

④ SEAL FOR 1-1/4" STRAPPING (12 REQD). CRIMP SINGLE SEALS WITH TWO PAIR OF NOTCHES OR CRIMP DOUBLE SEALS WITH TWO PAIR OF CRIMPS EACH.

⑤ CENTER GATE B (2 REQD). SEE THE DETAIL ON PAGE 26.

⑥ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 27-3/4") (16 REQD). TOENAIL TO CENTER GATE W/2-16d NAILS AT EACH END. SEE "BEVEL CUT" DETAIL ON PAGE 5.

⑦ SIDE BLOCKING, 2" X 6" X 10'-0" (DOUBLED) (2 REQD). POSITION AGAINST THE PALLETS IN THE DOORWAY AREA. NAIL THE FIRST PIECE TO THE CAR FLOOR W/12-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER.

84 UNIT LOAD IN A 50'-6" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR

SPECIAL NOTES:

1. A 50'-6" LONG BY 9'-4" WIDE WOOD-LINED CONVENTIONAL TYPE BOXCAR EQUIPPED WITH 14'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER OR NARROWER DOOR OPENINGS CAN BE USED.

2. A MAXIMUM OF 102 PALLET UNITS FOR AN APPROXIMATE LADING WEIGHT OF 85,272 POUNDS CAN BE PLACED IN A 60'-8" LONG CAR WHEN USING THE DEPICTED PROCEDURES. A MAXIMUM OF 66 PALLET UNITS FOR AN APPROXIMATE LADING WEIGHT OF 55,176 POUNDS CAN BE PLACED IN A 40'-6" LONG CAR WHEN USING THE DEPICTED PROCEDURES.

3. CENTER GATE "B" MAY BE PARTIALLY FORMED FROM 1/2" OR THICKER PLYWOOD, IF DESIRED. PLYWOOD MAY BE USED IN LIEU OF THE 2" X 6" HORIZONTAL PIECES. SEE THE "PLYWOOD CENTER GATE ALTERNATIVE" DETAIL ON PAGE 29 FOR GUIDANCE. ADJUST QUANTITY AND LOCATION OF STRUT LEDGERS TO MATCH "CENTER GATE B" ON PAGE 26.

4. DOORWAY PROTECTION IS REQUIRED FOR ALL PALLET UNIT STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK WIDTH. 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 SIX INCHES OF THE CAR SIDEWALL ON BOTH SIDES OF THE LOAD. ONE STRAP IS REQUIRED AROUND A LOAD UNIT WHICH IS RETAINED BY AT LEAST SIX INCHES BUT LESS THAN HALF OF THE CONTAINER 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 31 AND 32.

5. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED. A 3-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF SIX UNITS, A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF FOUR UNITS, OR A 1-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF 2 UNITS BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD, OR THE ENTIRE TOP TIERS CAN BE OMITTED. FOR OTHER METHODS OF REDUCING A LOAD, AND FOR TYPICAL LCL PROCEDURES, REFER TO PAGES 12 THRU 23 FOR GUIDANCE.

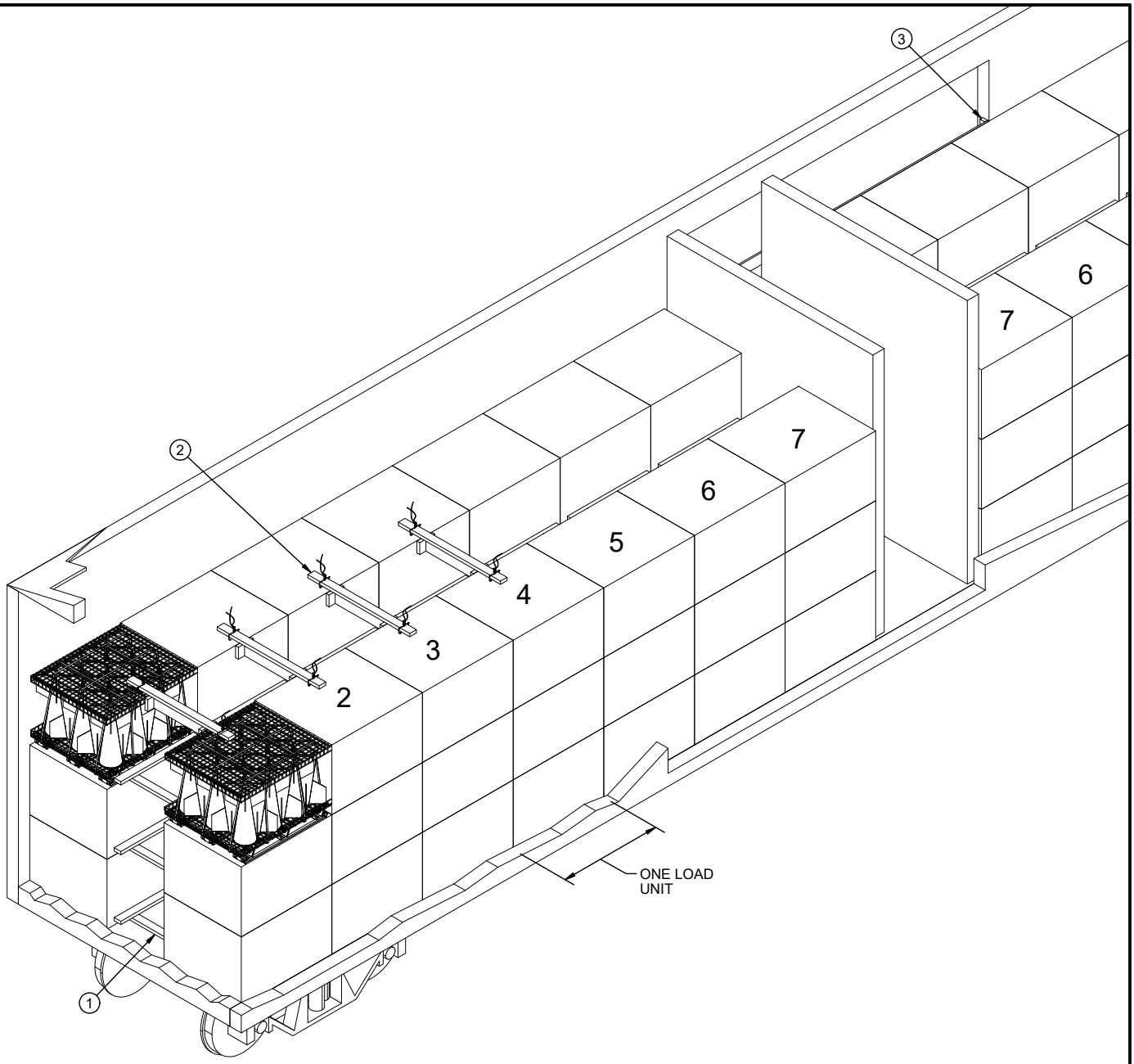
BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
2″ X 2″	74	25
2″ x 3″	2	1
2″ x 4″	980	653
2″ X 6″	276	276
4″ x 4″	37	49
NAILS	**NO. REQD**	**POUNDS**
10d (3″)	1020	15-3/4
16d (3-1/2″)	112	2-1/2
STEEL STRAPPING, 1/1-4″ – 396′ REQD - - 56.57 LBS		
SEAL FOR 1-1/4″ STRAPPING – 12 REQD - - 3/4 LBS		

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	84	70,224 LBS
DUNNAGE		2,084 LBS
TOTAL WEIGHT		72,308 LBS (APPROX)

84 UNIT LOAD IN A 50'-6" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR



ISOMETRIC VIEW

KEY NUMBERS

① ANTI-SWAY BRACE (42 REQD). SEE THE DETAIL ON PAGE 24. INSTALL BETWEEN LATERALLY ADJACENT PALLET UNITS.

② TOP-OF-LOAD ANTI-SWAY BRACE (8 REQD). SEE THE DETAIL ON PAGE 30. WIRE TIE TO THE PALLET UNITIZING STRAPS WITH 0.0080" DIA WIRE AS SHOWN BY THE "TIE WIRE APPLICATION" DETAIL ON PAGE 30.

③ DOORWAY PROTECTION A (2 REQD). SEE THE DETAIL ON PAGE 31. NAIL TO THE DOOR POSTS W/12d NAILS.

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

SPECIAL NOTES:

1. A 60'-8" LONG BY 9'-4" WIDE CUSHIONED TYPE BOXCAR EQUIPPED WITH LOAD DIVIDER BULKHEADS AND 14'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER OR NARROWER DOOR OPENINGS CAN BE USED.

2. A MAXIMUM OF 66 PALLET UNITS, FOR A LADING WEIGHT OF APPROXIMATELY 55,176 POUNDS, CAN BE LOADED IN A 40'-6" LONG CAR, AND A MAXIMUM OF 84 PALLET UNITS, FOR A LADING WEIGHT OF APPROXIMATELY 70,224 POUNDS, CAN BE LOADED IN A 50'-6" LONG CAR BY USING THE DEPICTED PROCEDURES.

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 WIDTH. THE WOODEN GATE TYPE OF DOORWAY PROTECTION IS APPLICABLE FOR BOXCARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NAILABLE DOOR POSTS. REFER TO PAGES 31 AND 32 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 8 FOR GUIDANCE. NOTE THAT THE DOORWAY PROTECTION PROCEDURES FOR CARS EQUIPPED WITH PLUG DOORS MAY ALSO BE USED IN CARS EQUIPPED WITH SLIDING DOORS.

4. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED. A 3-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF SIX UNITS, A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF FOUR UNITS, OR A 1-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF 2 UNITS BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD, OR THE ENTIRE TOP TIERS CAN BE OMITTED. FOR OTHER METHODS OF REDUCING A LOAD, AND FOR TYPICAL LCL PROCEDURES, REFER TO PAGES 12 THRU 23 FOR GUIDANCE.

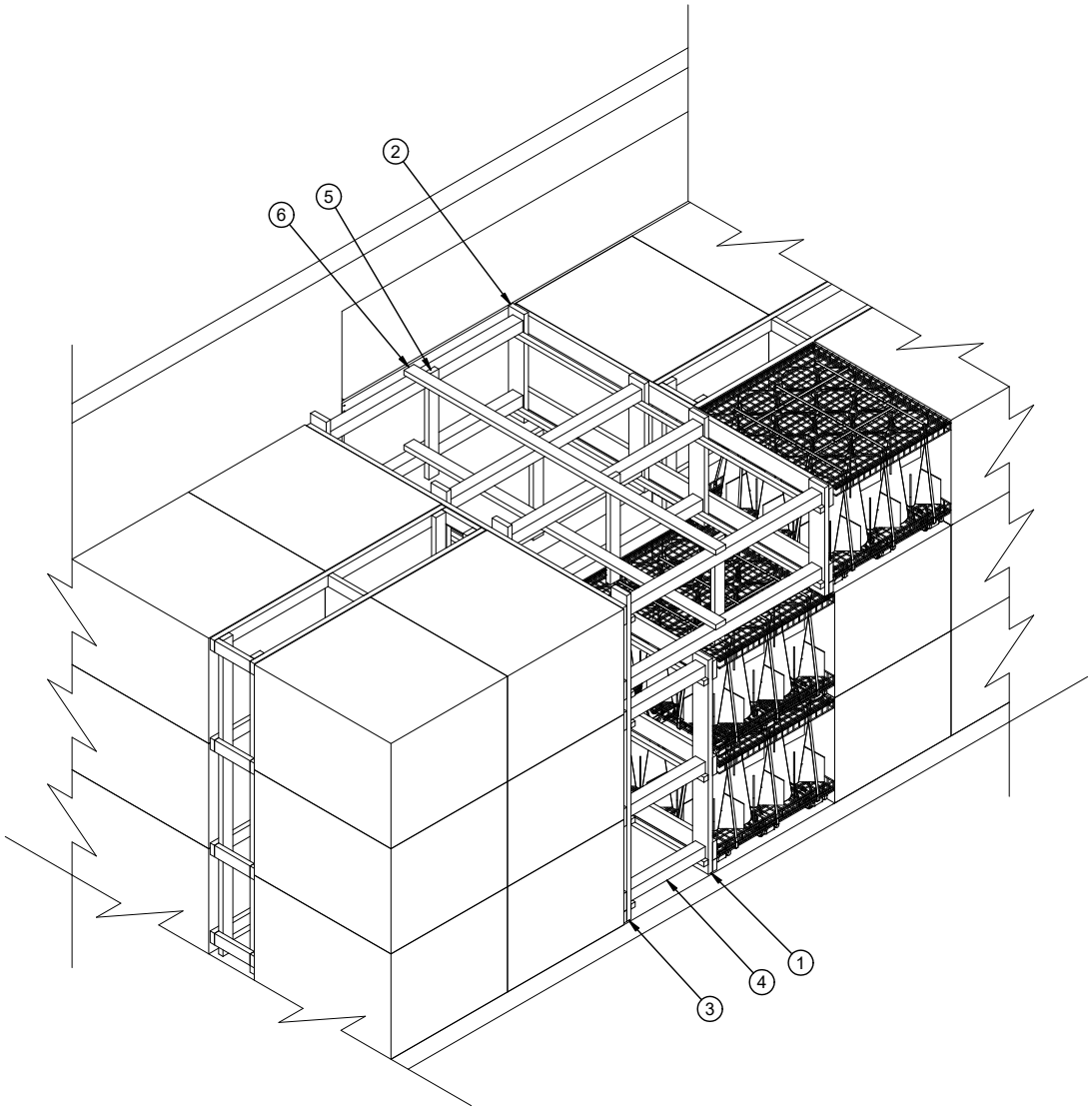
BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
1″ x 6″	112	56
2″ x 3″	32	16
2″ x 4″	565	376
2″ x 6″	11	11
4″ x 4″	36	48
NAILS	**NO. REQD**	**POUNDS**
6d (2″)	48	1/2
10d (3″)	576	9
WIRE, 0.0080 DIA - - 32′ REQD - - .75 LB		

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	84	70,224 LBS
DUNNAGE		1,024 LBS
TOTAL WEIGHT		71,248 LBS (APPROX)

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



ISOMETRIC VIEW

SPECIAL NOTES:

1. ONLY THE CENTER PORTION OF A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOXCAR IS SHOWN TO PORTRAY THE STRUTTED GATE METHOD OF PARTIAL-LAYER BRACING. CARS OF OTHER WIDTHS AND CARS OF OTHER LENGTHS CAN ALSO BE USED.
2. ONLY THE BLOCKING AND BRACING PIECES WHICH ARE NECESSARY TO PERMIT THE OMISSION OF THE UNITS FROM THE TOP LAYER ARE SHOWN. REFER TO PAGE 6 FOR ALTERNATIVE BRACING AND DOORWAY PROTECTION REQUIREMENTS.

KEY NUMBERS

① CENTER GATE A FOR 2-HIGH (2 REQD). SEE THE DETAIL ON PAGE 25.

② CENTER GATE A FOR 1-HIGH (1 REQD). SEE THE DETAIL ON PAGE 25.

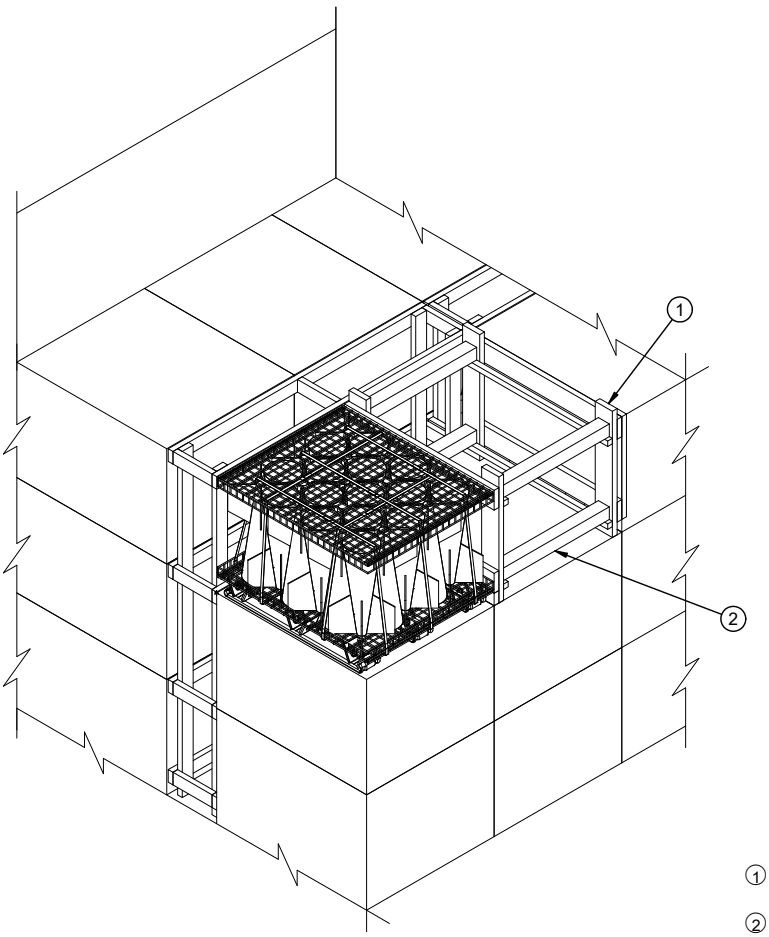
③ CENTER GATE C (2 REQD). SEE THE DETAIL ON PAGE 26 AND SPECIAL NOTES 4 AND 5 ON PAGE 7.

④ STRUT, 4" X 4" BY CUT-TO-FIT (20 REQD). POSITION BETWEEN CENTER GATES IN THE FIRST, SECOND, AND THIRD LAYERS AND TOENAIL W/2-16d NAILS AT EACH JOINT.

⑤ VERTICAL STRUT BRACING, 2" X 4" X 32" (4 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.

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

TYPICAL LCL USING STRUTTED GATES



ISOMETRIC VIEW

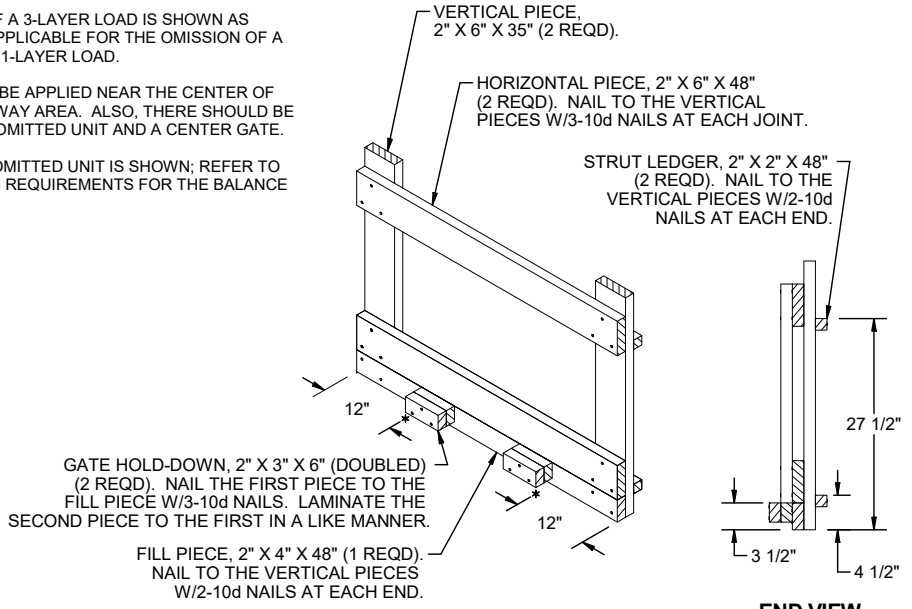
KEY NUMBERS

① LOAD BEARING GATE (2 REQD, 1 RIGHT HAND AND 1 LEFT HAND). SEE THE DETAIL BELOW.

② STRUT, 4" X 4" BY CUT-TO-FIT (REF: 35") (4 REQD).

SPECIAL NOTES:

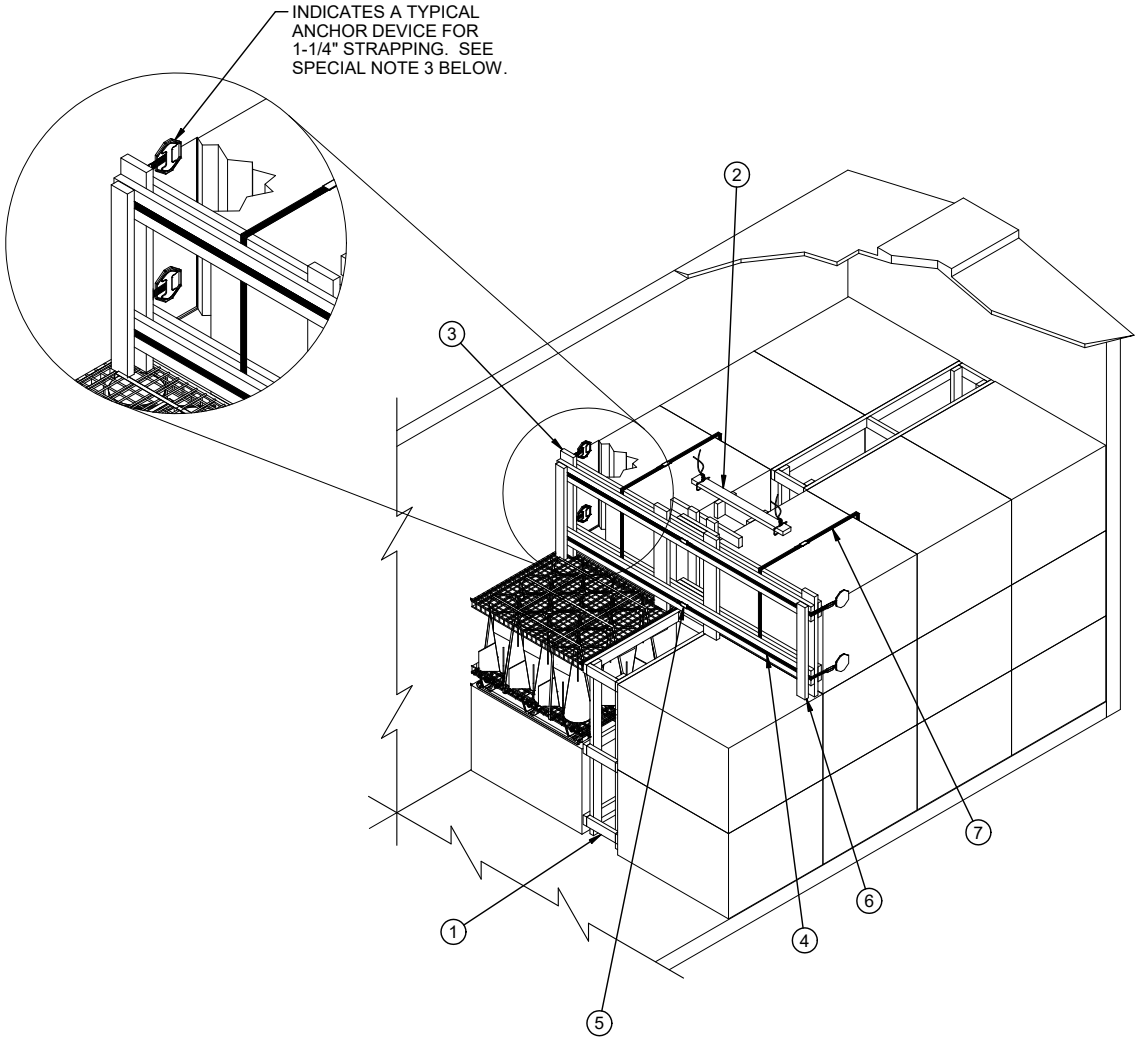
1. A PARTIAL VIEW OF A 9'-4" WIDE CONVENTIONAL TYPE BOXCAR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED.
2. A UNIT OMITTED FROM THE TOP LAYER OF A 3-LAYER LOAD IS SHOWN AS TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR THE OMISSION OF A PALLET UNIT FROM A 2-LAYER LOAD OR A 1-LAYER LOAD.
3. THE OMITTED-UNIT PROCEDURE SHOULD BE APPLIED NEAR THE CENTER OF THE CAR LENGTH, BUT NOT IN THE DOORWAY AREA. ALSO, THERE SHOULD BE AT LEAST ONE LOAD UNIT BETWEEN THE OMITTED UNIT AND A CENTER GATE.
4. ONLY BLOCKING AND BRACING FOR THE OMITTED UNIT IS SHOWN; REFER TO PAGE 6 FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.



LOAD BEARING GATE

END VIEW

TYPICAL LCL ONE PALLET UNIT OMITTED FROM THE TOP LAYER



ISOMETRIC VIEW

SPECIAL NOTES:

1. A 9'-4" WIDE ALL-METAL BOXCAR EQUIPPED WITH STRAP ANCHOR DEVICES AND HAVING AN AAR MECHANICAL DESIGNATION CLASS OF XL IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED.
2. A BULKHEAD GATE USED IN CONJUNCTION WITH TWO BULKHEAD STRAPS WILL RETAIN UP TO 5,000 POUNDS OF LADING.
3. THE ANCHOR DEVICES TO BE USED FOR THE ATTACHMENT OF THE BULKHEAD STRAPS MUST BE LOCATED AT LEAST 6" TOWARD THE CAR ENDWALL 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 6" 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 12 FOR AN EVEN QUANTITY OF UNITS, OR THE PALLET UNIT OMITTED PROCEDURES ON PAGE 13 FOR A SINGLE UNIT.
4. THE STRAPPING BOARDS ON A BULKHEAD GATE ARE TO BE ALIGNED AS NEARLY AS POSSIBLE WITH THE ANCOR DEVICES IN THE CAR TO WHICH THE BULKHEAD STRAPS ARE ATTACHED. TOLERANCES ARE SPECIFIED ON THE END VIEW OF THE BULKHEAD GATE ON PAGE 15 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.

KEY NUMBERS

① CENTER FILL ASSEMBLY A (2 REQD, ONE 2-PALLET UNIT LONG ASSEMBLY AND ONE SHORTENED 2-PALLET UNIT LONG ASSEMBLY). SEE THE DETAIL ON PAGE 24.

② TOP-OF-LOAD ANTI-SWAY BRACE (1 REQD). SEE THE DETAIL ON PAGE 30. WIRE TIE TO PALLET UNITS AS SHOWN BY THE "TIE WIRE APPLICATION" DETAIL ON PAGE 30.

③ BULKHEAD GATE (1 REQD). SEE THE DETAIL ON PAGE 15.

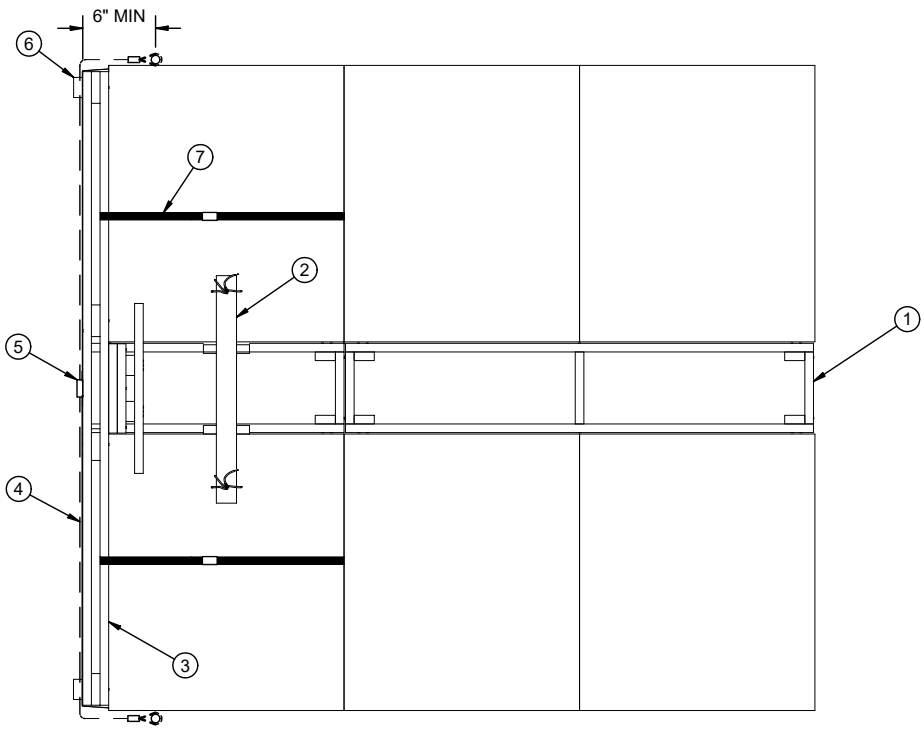
④ BULKHEAD STRAP, 1-1/4" X .031" OR .035" BY A LENGTH TO SUIT STEEL STRAPPING (2 REQD). INSTALL FROM TWO EQUAL LENGTH PIECES. ATTACH TO AN ANCHOR WITH ONE SEAL. SEE THE "STRAP APPLICATION PLAN VIEW" ON PAGE 15 FOR INSTALLATION GUIDANCE.

⑤ SEAL FOR 1-1/4" STEEL STRAPPING (4 REQD). DOUBLE NOTCH EACH SEAL.

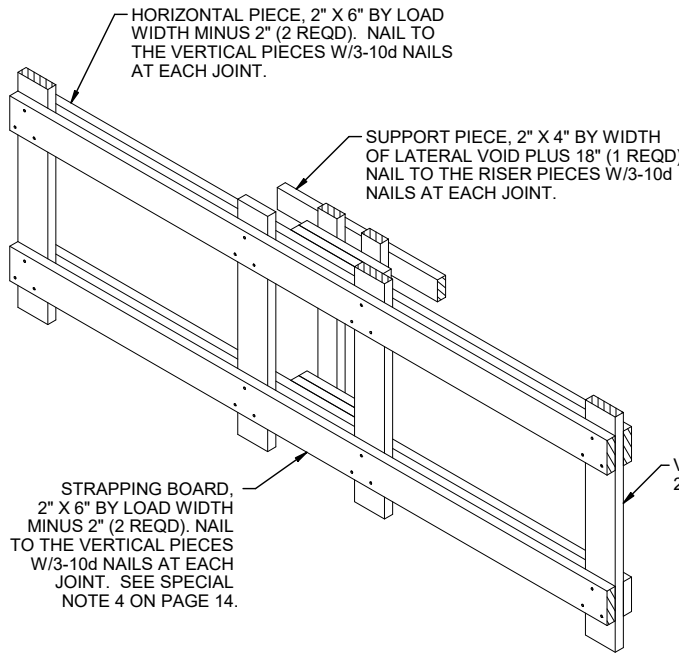
⑥ STRAP RETAINER, 2" X 4" BY A LENGTH TO SUIT (2 REQD). NAIL TO THE BULKHEAD GATE W/2-12d NAILS ABOVE AND BELOW EACH BULKHEAD STRAP.

⑦ BUNDLING STRAP, 1-1/4" X .035" OR .031" X 12'-2" LONG (REF) STEEL STRAPPING (2 REQD). ENCIRCLE THE PALLET UNIT AND THE HORIZONTAL PIECES OF THE BULKHEAD GATE. TENSION AND SEAL AFTER TENSIONING THE BULKHEAD STRAPS.

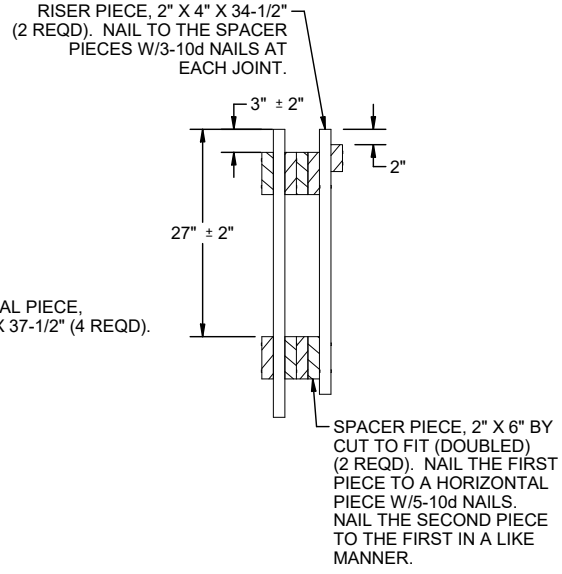
TYPICAL LCL USING BULKHEAD GATES



STRAP APPLICATION PLAN VIEW

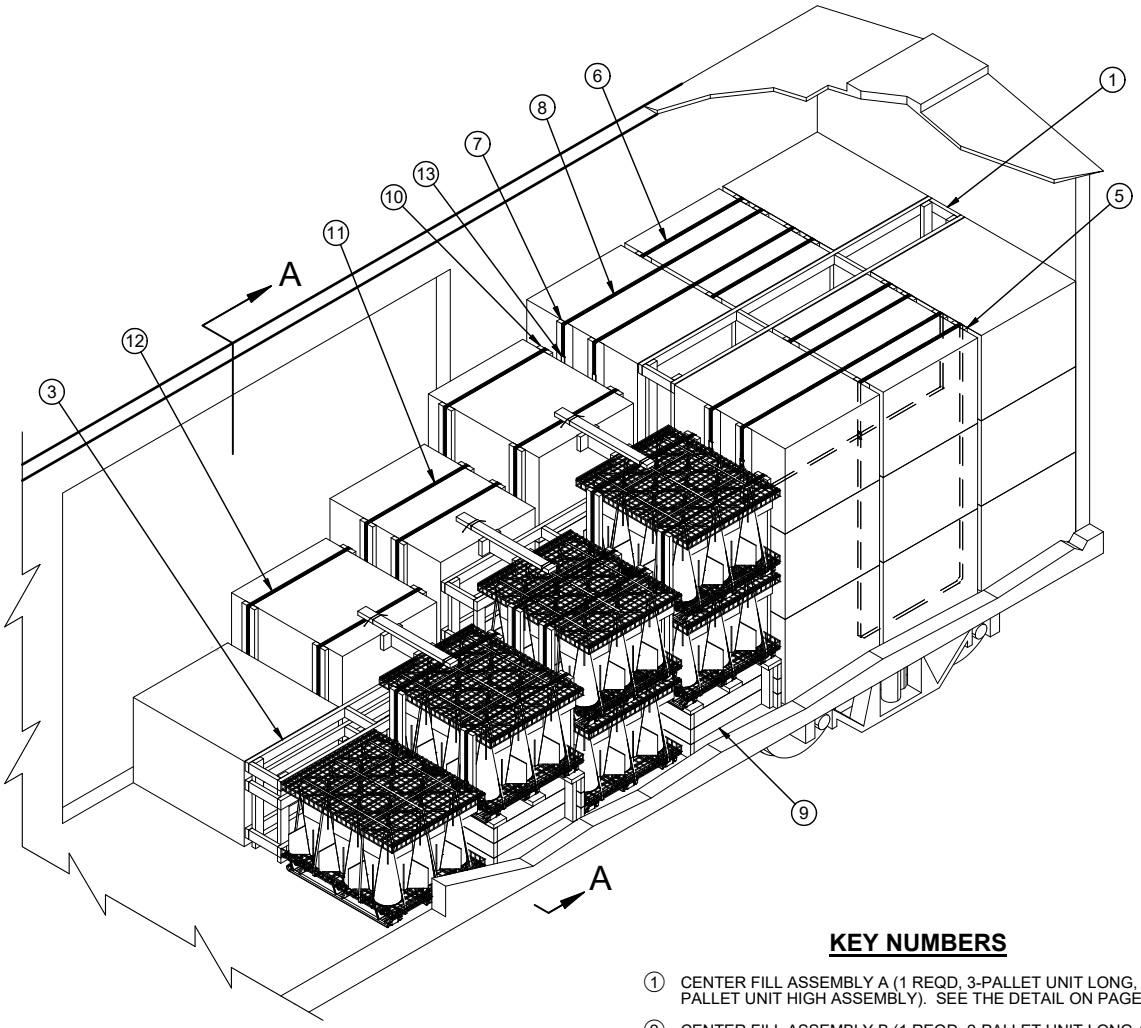


BULKHEAD GATE

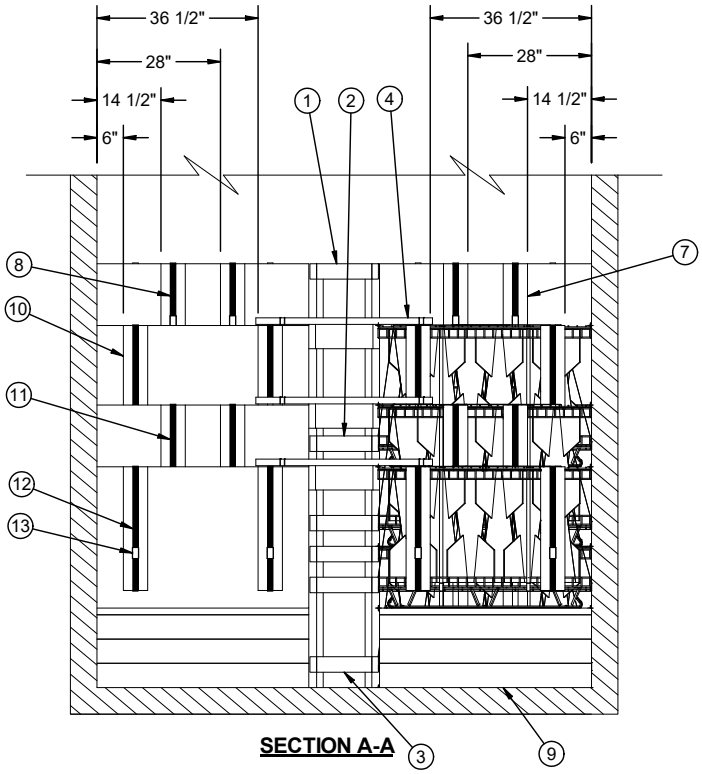


END VIEW

TYPICAL LCL USING BULKHEAD GATES



ISOMETRIC VIEW



SECTION A-A

KEY NUMBERS

① CENTER FILL ASSEMBLY A (1 REQD, 3-PALLET UNIT LONG, 3-PALLET UNIT HIGH ASSEMBLY). SEE THE DETAIL ON PAGE 24.

② CENTER FILL ASSEMBLY B (1 REQD, 2-PALLET UNIT LONG ASSEMBLY). SEE THE DETAIL ON PAGE 24.

③ CENTER FILL ASSEMBLY C (1 REQD, 2-PALLET UNIT LONG ASSEMBLY). SEE THE DETAIL ON PAGE 25.

④ TOP-OF-LOAD ANTI-SWAY BRACE (3 REQD). SEE THE DETAIL ON PAGE 30. WIRE TIE TO PALLET UNITS AS SHOWN BY THE "TIE WIRE APPLICATION" DETAIL ON PAGE 30.

⑤ STRAPPING BOARD A, 2" X 6" X 8'-0" (8 REQD, 2 PER VERTICAL UNITIZING STRAP). POSITION AS SHOWN ABOVE.

⑥ VERTICAL UNITIZING STRAP, 1-1/4" X .035" X 23'-10" LONG (REF) STEEL STRAPPING (4 REQD, 2 PER STACK) INSTALL SO AS TO ENCIRCLE THE THREE PALLETIZED UNITS AND STRAPPING BOARDS "A", AND SEAL THE JOINT PRIOR TO FINAL POSITIONING OF THE STACK IN THE CAR. SEE SPECIAL NOTE 3 ON PAGE 17.

⑦ STRAPPING BOARD B, 2" X 6" X 28" (16 REQD, 2 PER HORIZONTAL UNITIZING STRAP AND REINFORCING STRAP). POSITION AS SHOWN ABOVE AND IN THE "SECTION A-A" VIEW AT LEFT.

⑧ HORIZONTAL UNITIZING STRAP, 1-1/4" X .035" X 19'-6" LONG (REF) STEEL STRAPPING (4 REQD). PRE-POSITION AROUND THE TOP UNIT OF THE UNITIZED 3-HIGH STACK. INSTALL SO AS TO ENCIRCLE THE TWO LONGITUDINALLY ADJACENT PALLETIZED UNITS AND STRAPPING BOARDS "B", AND SEAL THE JOINT.

⑨ RISER ASSEMBLY (4 REQD). SEE THE DETAIL ON PAGE 17.

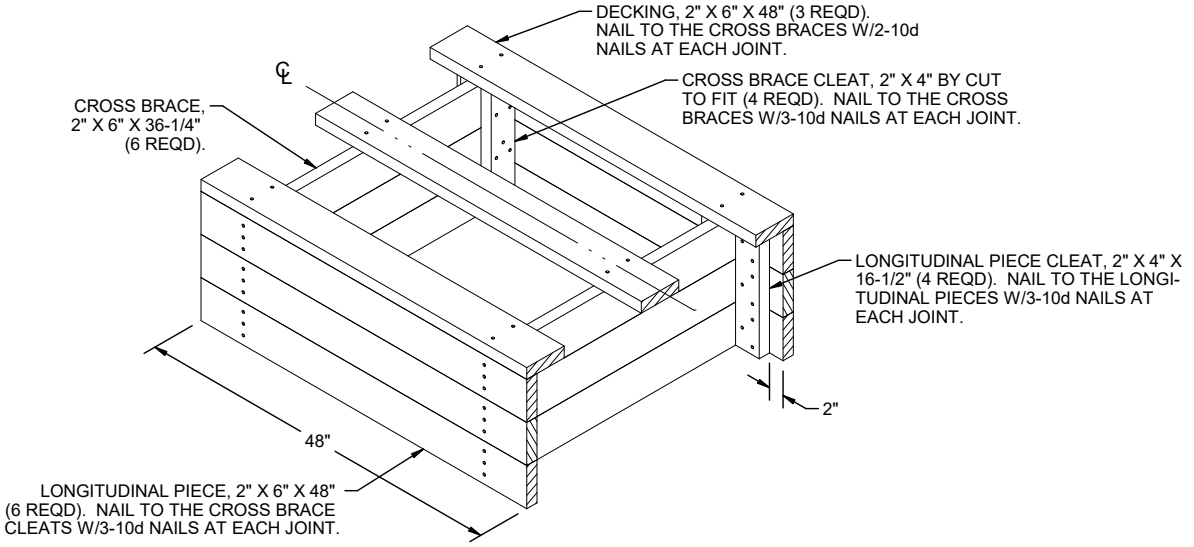
⑩ STRAPPING BOARD C, 2" X 6" X 59-3/4" (16 REQD, 2 PER REINFORCING STRAP OF TWO-HIGH STACKS). POSITION AS SHOWN ABOVE AND IN THE "SECTION A-A" VIEW AT LEFT.

⑪ REINFORCING STRAP A, 1-1/4" X .035" X 17'-10" LONG (REF) STEEL STRAPPING (8 REQD). INSTALL TO ENCIRCLE TWO PALLET UNITS AND THE STRAPPING BOARDS "C". SECURE TO A STRAPPING BOARD W/3 STAPLES.

⑫ REINFORCING STRAP B, 1-1/4" X .035" X 13'-2" LONG (REF) STEEL STRAPPING (4 REQD). INSTALL TO ENCIRCLE THE PALLET UNIT AND THE STRAPPING BOARDS "B". SECURE TO A STRAPPING BOARD W/3 STAPLES.

⑬ SEAL FOR 1-1/4" STRAPPING (20 REQD). NOTCH EACH SEAL.

TYPICAL LCL USING RISERS



RISER ASSEMBLY

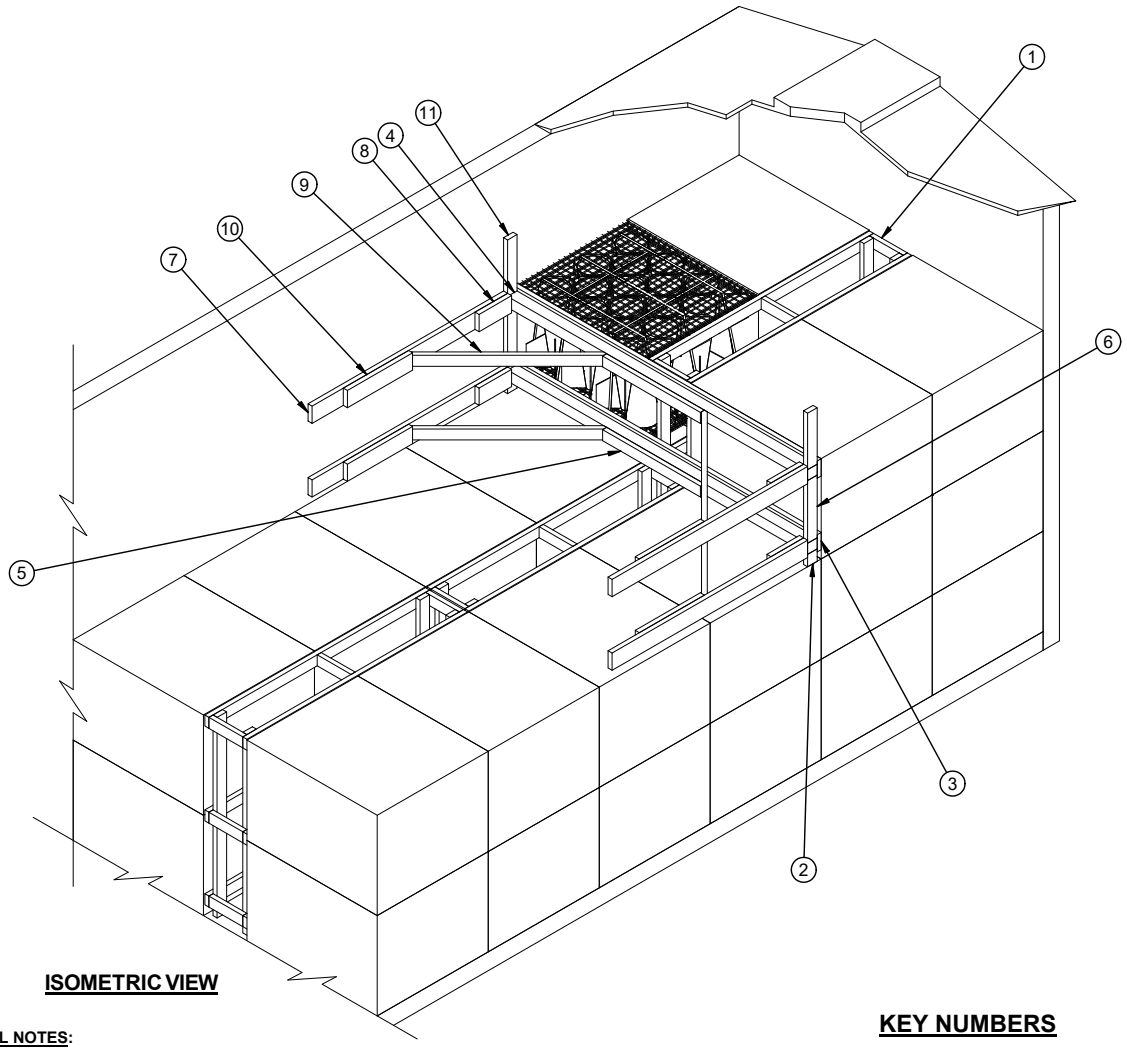
SPECIAL NOTES FOR LOAD:

1. A 9'-4" WIDE CONVENTIONAL TYPE BOXCAR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED.
2. THE RISER METHOD OF PARTIAL-LAYER BRACING MAY BE USED IN ALL-METAL CARS OR IN WOOD-LINED CARS FOR THE SECUREMENT OF A PARTIAL TOP TIER OF NOT MORE THAN 16,000 POUNDS (8,000 POUNDS IN EACH ROW WHICH IS RETAINED BY A RISER.
3. THE POSITIONING OF THE VERTICAL UNITIZING STRAPS, AND THE HORIZONTAL UNITIZING STRAPS ARE APPLICABLE FOR LCL LOADS WHICH ARE AT LEAST TWO LOAD UNITS LONG IN THE UPPERMOST TIER. IF THE UPPERMOST TIER IS ONLY ONE LOAD UNIT IN LENGTH, THE VERTICAL UNITIZING STRAP WILL BE INSTALLED SO AS TO ENCIRCLE A STACK IN THAT LOAD UNIT, AND THE HORIZONTAL UNITIZING STRAP WILL NOT BE REQUIRED.
4. ONLY THE BLOCKING AND BRACING FOR THE RISER METHOD OF PARTIAL LAYER BRACING IS SHOWN. REFER TO THE APPLICABLE LOAD PAGE FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.

SPECIAL NOTES FOR RISER ASSEMBLY:

A ONE-HALF HEIGHT RISER IS SHOWN. THE RISER IS CONSTRUCTED TO BE 18" IN HEIGHT AFTER THE DECKING IS IN PLACE. **NOTE:** A PLUS OR MINUS 1" TOLERANCE IS PERMISSIBLE.

TYPICAL LCL USING RISERS



ISOMETRIC VIEW

SPECIAL NOTES:

1. A 9'-4" WIDE CONVENTIONAL WOOD-LINED BOXCAR IS SHOWN. WOOD-LINED CARS OF OTHER WIDTHS CAN BE USED. THE REQUIRED QUANTITIES SHOWN AT RIGHT REFLECT ONLY THE PORTION OF THE LOAD DETAILS ABOVE, ADDITIONAL QUANTITIES MAY BE REQUIRED FOR THE REMAINDER OF THE LOAD.

2. THE K-BRACE METHOD OF PARTIAL-LAYER (TIER) BRACING SHOWN MAY BE USED IN WOOD-LINED CARS FOR THE SECUREMENT OF A PARTIAL TOP TIER. THE K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN 8,000 LBS.

3. **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 OF CONFIGURATION OF THE CAR DOORS WILL NOT PERMIT PROPER INSTLALLATION OF THE SPCIFIED K-BRACE DUNNAGE. PIECES SUCH AS THE SUPPORT CLEAT, LOAD BEARING PIECE, CROSS CAR BRACE, SPACER CLEAT, POCKET CLEAT, AND HOLD-DOWN CLEAT 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: 60") 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 49-1/8" LONG IN LIEU OF 50-1/4" WHEN THE HORZONTAL CLEAT IS DOUBLED.

4. THE CENTER CLEAT WILL BE 28" LONG FOR AN 8'-6" WIDE CAR, 36" LONG FOR A 9'-2" WIDE CAR, AND 38" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.

KEY NUMBERS

① CENTER FILL ASSEMBLY A (3 REQD, ONE 2-PALLET UNITS LONG AND 3-PALLET UNITS HIGH AND TWO 2-PALLET UNITS LONG AND 2 PALLET UNITS HIGH ASSEMBLIES). SEE THE DETAIL ON PAGE 24.

② SUPPORT CLEAT, 2" X 4" X 4" (2 REQD). POSITION VERTICALLY AS SHOWN SO AS TO ALIGN THE HORIZONTAL PIECE AND CROSS CAR BRACE WITH THE BOTTOM OF THE PALLET UNITS. NAIL TO THE CAR SIDEWALL W/2-12d NAILS.

③ 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".

④ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH IN LENGTH (CUT TO FIT) (2 REQD).

⑤ CENTER CLEAT, 2" X 4" X 36" (2 REQD). NAIL TO THE CROSS CAR BRACE W/7-16d NAILS. SEE SPECIAL NOTE 4 AT LEFT.

⑥ SPACER CLEAT, 2" X 4" X 20" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.

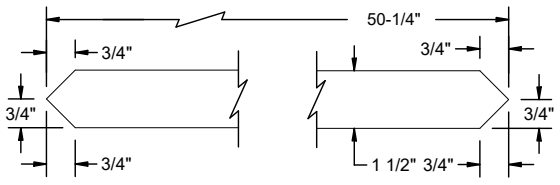
⑦ HORIZONTAL WALL CLEAT, 2" X 6" X 72" (4 REQD). NAIL TO THE CAR SIDEWALL W/16-12d NAILS.

⑧ POCKET CLEAT, 2" X 6" X 12" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT W/4-16d NAILS.

⑨ DIAGONAL BRACE, 2" X 4" X 50-1/4" (4 REQD). SEE THE DETAIL AT LEFT FOR BEVEL-CUTS REQUIRED. TOENAIL TO THE CROSS CAR BRACE 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.

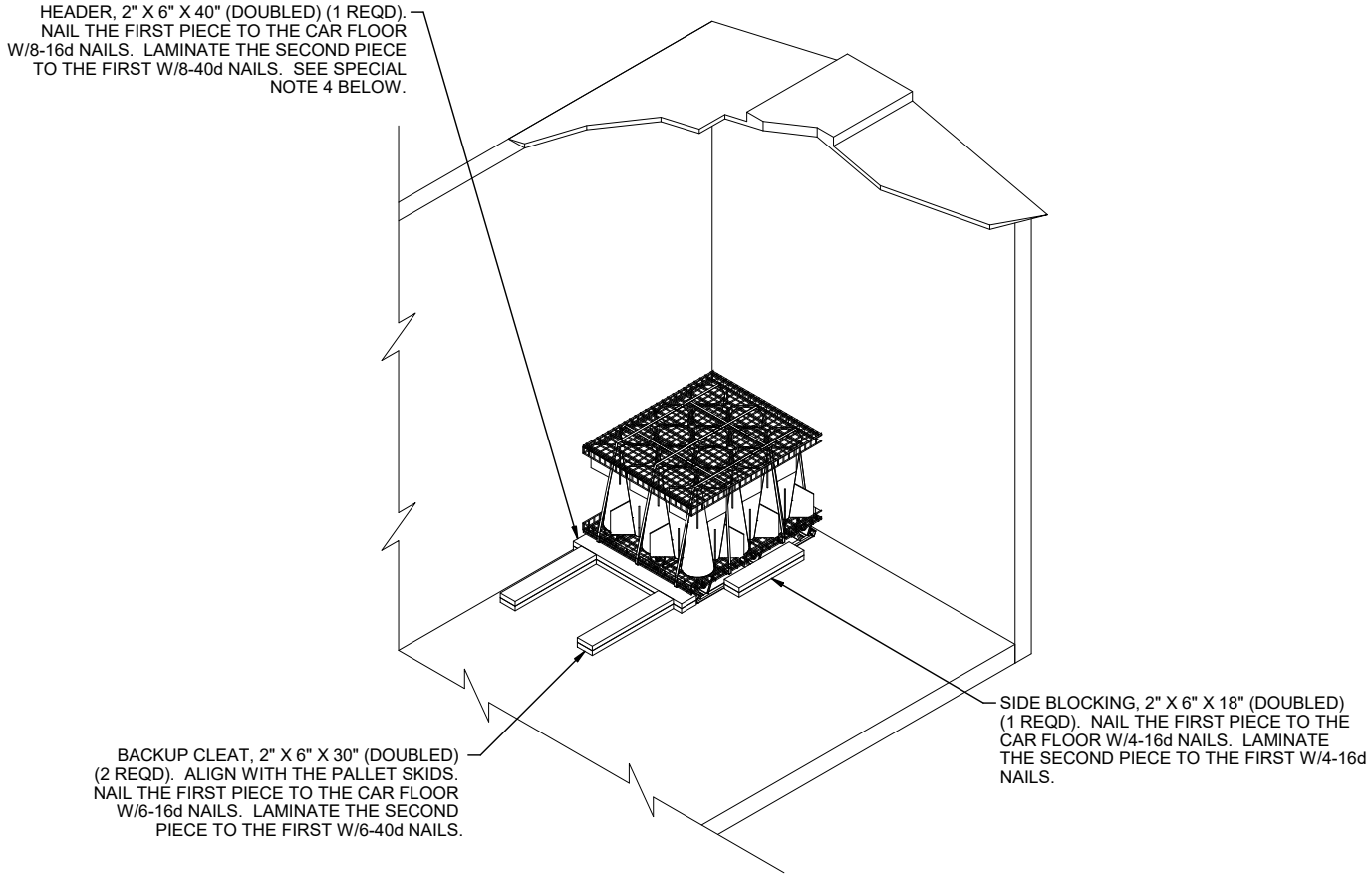
⑪ HOLD-DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.



DIAGONAL BRACE

TYPICAL LCL USING K-BRACES

PROJECT SP 504-04

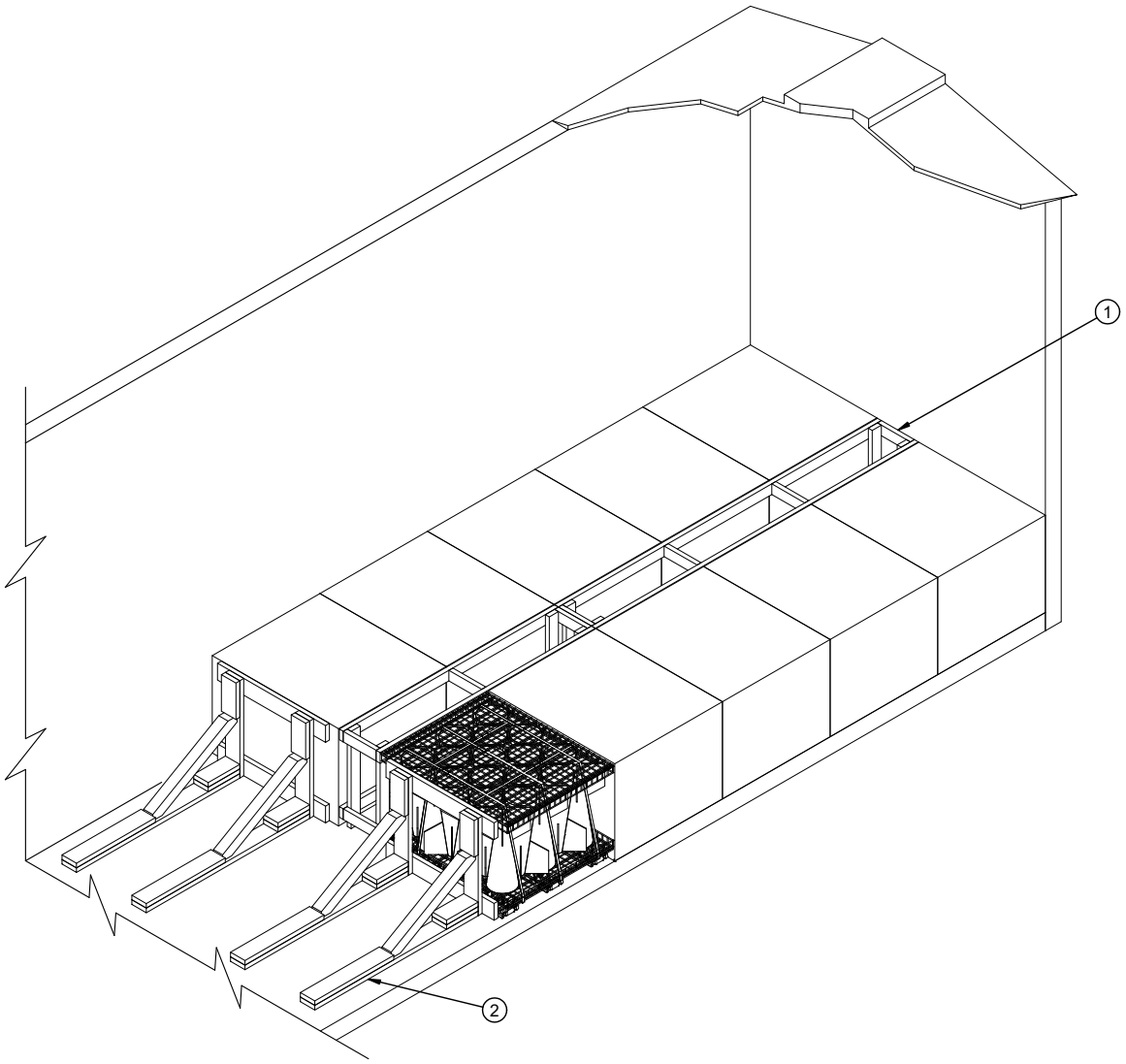


ISOMETRIC VIEW

SPECIAL NOTES:

1. A WOOD-LINED CONVENTIONAL TYPE BOXCAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED. SEE GENERAL NOTE "S.1" ON PAGE 3.
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 BACKUP CLEATS IS NOT EXCEEDED. SEE SPECIAL NOTE 3.
3. EACH SET OF TWO BACKUP CLEATS APPLIED FOR LONGITUDINAL BRACING WILL RETAIN 9,000 POUNDS OF LADING.
4. THE POSITIONING OF A UNIT IS OPTIONAL. UNITS MAY BE LOCATED IN THE CENTER OF THE BOXCAR, ALTHOUGH THIS WILL REQUIRE THE INSTALLATION OF ADDITIONAL SIDE BLOCKING AND RETAINER PIECES.
5. MORE THAN ONE PALLET UNIT CAN BE SHIPPED, PROVIDING THE CAPACITY OF THE BACKUP CLEATS IS NOT EXCEEDED. THE LOAD SHOULD BE FORMED IN ROWS, WITH THE UNITS POSITIONED AGAINST OPPOSITE SIDEWALLS. THE NAILED SIDE BLOCKING WILL BE INSTALLED BETWEEN THE LATERALLY ADJACENT UNITS, DEPENDING ON THE SIZE OF THE VOID.

TYPICAL LCL USING FLOORLINE BLOCKING



ISOMETRIC VIEW

SPECIAL NOTES:

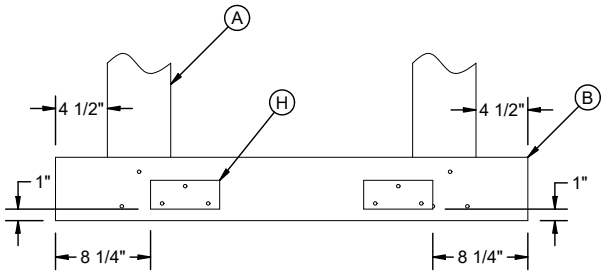
1. A 9'-4" WIDE WOOD-LINED CONVENTIONAL TYPE BOXCAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS AND CARS HAVING METAL LININGS CAN BE USED.
2. THE LOAD SHOWN DEPICTING THE KNEE BRACE METHOD OF PARTIAL-LAYER BRACING IS TYPICAL. THE QUANTITY MAY BE ADJUSTED TO SUIT PROVIDED THE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

KEY NUMBERS

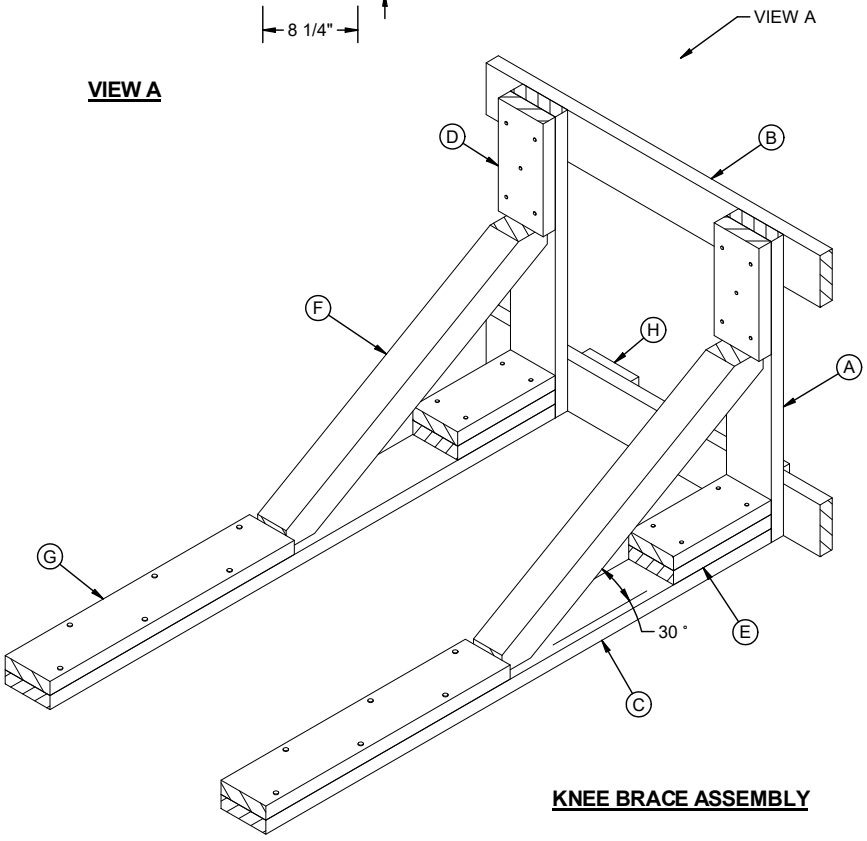
① CENTER FILL ASSEMBLY A (2 REQD, ONE 3-PALLET UNIT LONG ASSEMBLY AND ONE 2-PALLET UNIT LONG ASSEMBLY, BOTH ARE 1-PALLET HIGH). SEE THE DETAIL ON PAGE 24.

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

TYPICAL LCL USING KNEE BRACES



VIEW A



KNEE BRACE ASSEMBLY

KEY LETTERS

Ⓐ VERTICAL PIECE, 2" X 6" X 32" (2 REQD). NAIL TO A FLOOR CLEAT W/3-16d NAILS.

Ⓑ HORIZONTAL PIECE, 2" X 6" X 41" (2 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

Ⓒ FLOOR CLEAT, 2" X 6" X 62" (2 REQD). NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8".

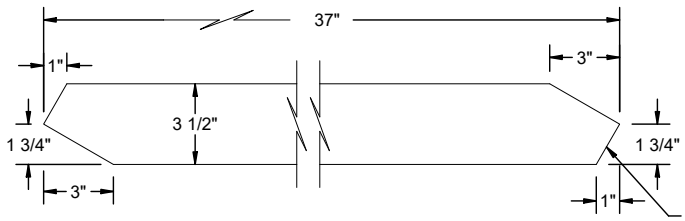
Ⓓ HOLD-DOWN CLEAT, 2" X 6" X 12" (2 REQD). NAIL TO A VERTICAL PIECE W/5-10d NAILS.

Ⓔ POCKET CLEAT, 2" X 6" X 12" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE FLOOR CLEAT W/4-16d NAILS. NAIL THE SECOND PIECE IN A LIKE MANNER AND TOENAIL TO THE VERTICAL PIECE W/2-16d NAILS.

Ⓕ BRACE, 4" X 4" X 37" (2 REQD). SEE THE DETAIL AT LEFT FOR BEVEL-CUTS REQUIRED. TOENAIL TO THE VERTICAL PIECE AND TO THE FLOOR CLEAT W/2-16d NAILS.

Ⓖ BACK-UP CLEAT, 2" X 6" X 30" (2 REQD). NAIL TO THE FLOOR CLEAT W/6-40d NAILS.

Ⓗ HOLD-DOWN CLEAT, 2" X 3" X 6" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO A HORIZONTAL PIECE W/3-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE "VIEW A" ABOVE FOR LOCATION DIMENSIONS.



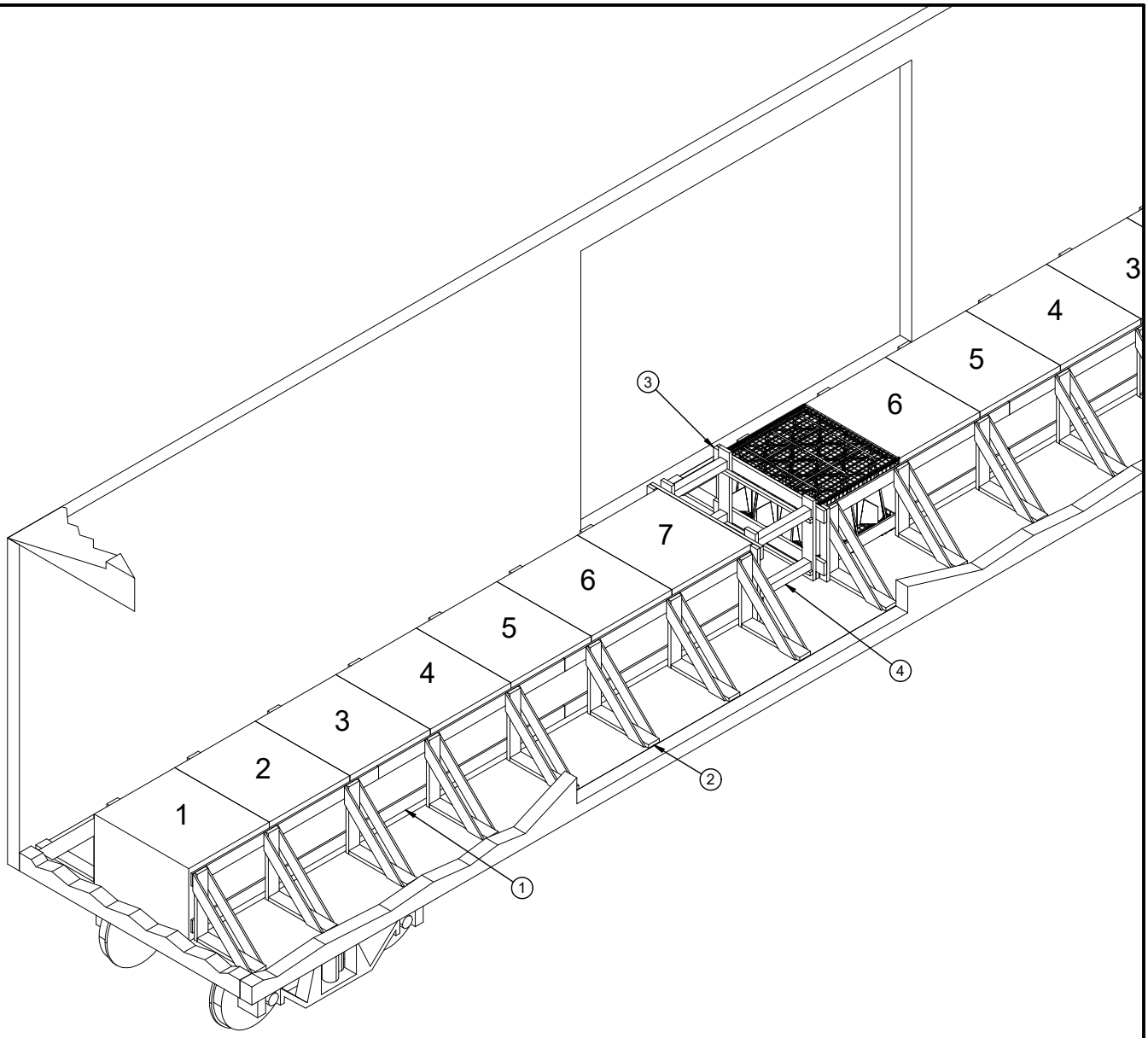
THE BRACE MUST BE INSTALLED SO THAT THIS BEARING SURFACE WILL BE IN CONTACT WITH THE VERTICAL PIECE.

BRACE

4" X 4" MATERIAL

TYPICAL LCL USING KNEE BRACES

PROJECT SP 504-04



ISOMETRIC VIEW

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 CROSSWISE LOAD IN A 50'-6" LONG CAR IS SHOWN AS TYPICAL. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR AN 11-UNIT LOAD IN A 40'-6" LONG CAR OR A 17-UNIT LOAD IS SHIPPED IN A 60'-8" LONG CAR.
3. LCL BRACES WILL BE USED AT EACH SIDE OF EACH PALLET UNIT. THE BRACES WILL BE LOCATED NEAR THE JOINT OF EACH UNIT, WITH SLIGHT ADJUSTMENTS AS NECESSARY.
4. THE BILL OF MATERIAL AND LOAD AS SHOWN ARE BASED ON THE DEPICTED LOAD AND THEREFORE ONLY TYPICAL.

KEY NUMBERS

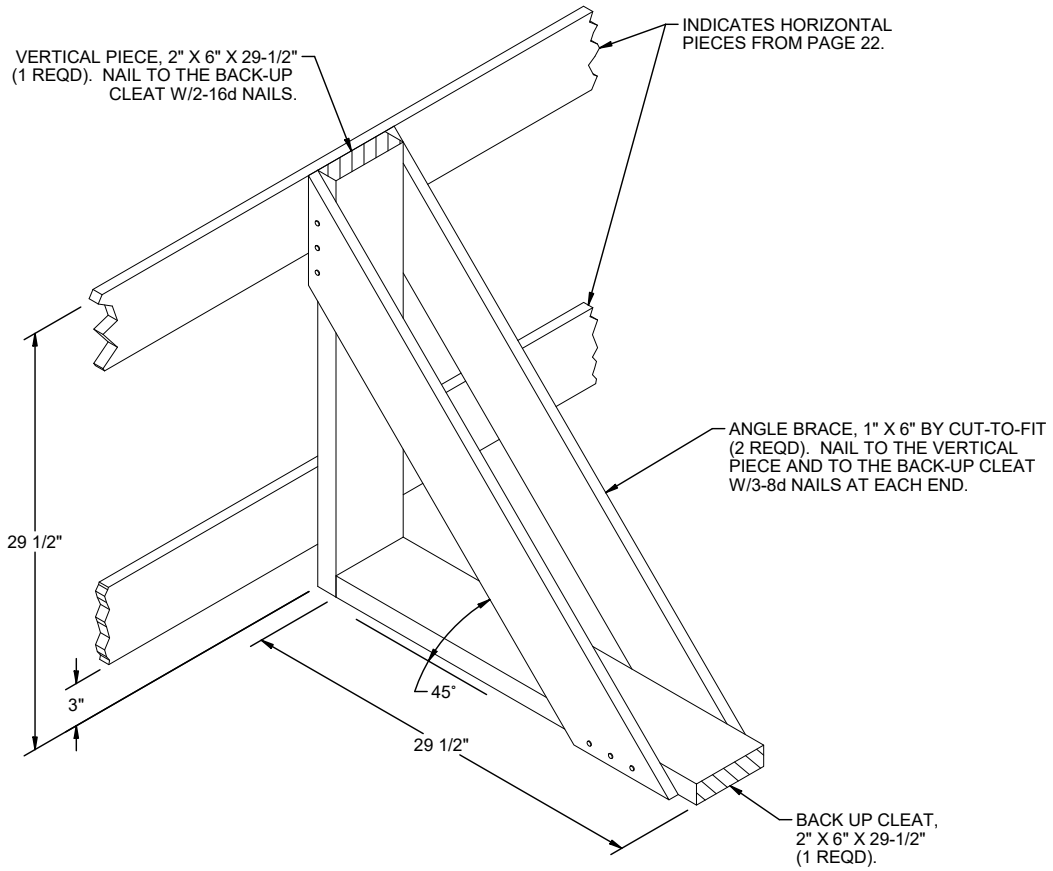
① HORIZONTAL PIECE, 1" X 6" BY A LENGTH TO SUIT (24 REQD). NAIL TO THE VERTICAL PIECES OF THE LCL BRACES W/3-6d NAILS AT EACH JOINT PRIOR TO PLACEMENT AGAINST THE LADING. SEE THE "LCL BRACE" DETAIL ON PAGE 23 FOR HEIGHT LOCATION GUIDANCE.

② LCL BRACE (32 REQD). SEE THE DETAIL ON PAGE 23. NAIL TO THE CAR FLOOR W/7-16d NAILS. INSTALL AS DEPICTED, AT THE STRONG POINTS OF THE PALLET UNITS. SEE GENERAL NOTE "S.1" ON PAGE 3 AND SPECIAL NOTE 3.

③ CENTER GATE D (2 REQD). SEE THE DETAIL ON PAGE 27.

④ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 27-3/4") (4 REQD). TOENAIL TO THE CENTER GATES W/2-16d NAILS AT EACH END. SEE THE "BEVEL-CUT" DETAIL ON PAGE 5.

TYPICAL LCL USING A 1-WIDE LOADING METHOD



LCL BRACE

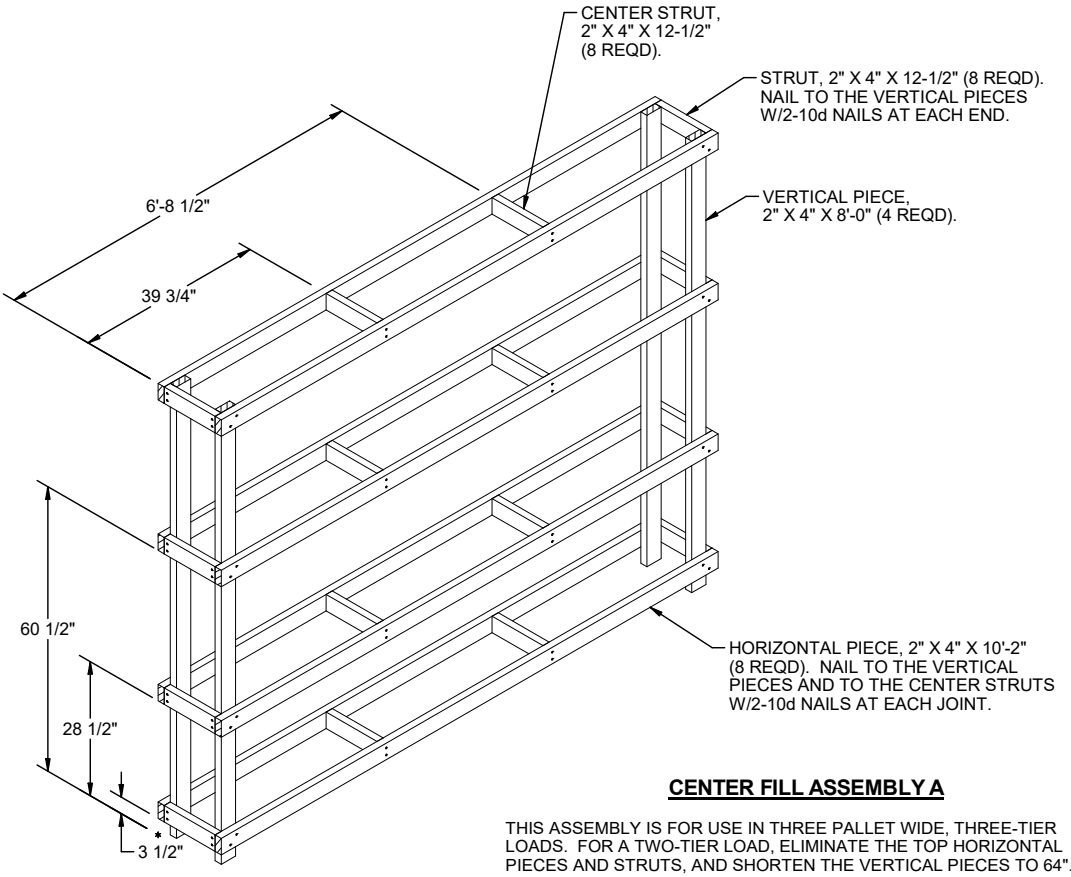
BILL OF MATERIAL		
LUMBER	**LINEAR FEET**	**BOARD FEET**
1″ X 6″	412	206
2″ X 2″	16	5
2″ x 3″	4	2
2″ X 4″	19	12
2″ X 6″	188	188
4″ X 4″	9	12
NAILS	**NO. REQD**	**POUNDS**
6d (2″)	192	1-1/4
8d (2-1/2″)	384	4
10d (3″)	96	1-1/2
16d (3-1/2″)	80	1-3/4

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNIT	14	11,704 LBS
DUNNAGE		860 LBS
TOTAL WEIGHT		12,564 LBS (APPROX)

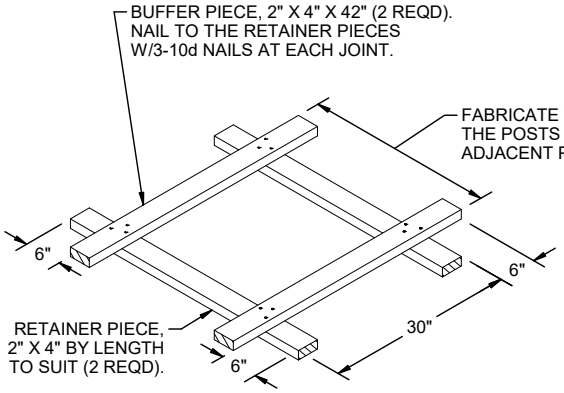
TYPICAL LCL USING A 1-WIDE LOADING METHOD

PROJECT SP 504-04



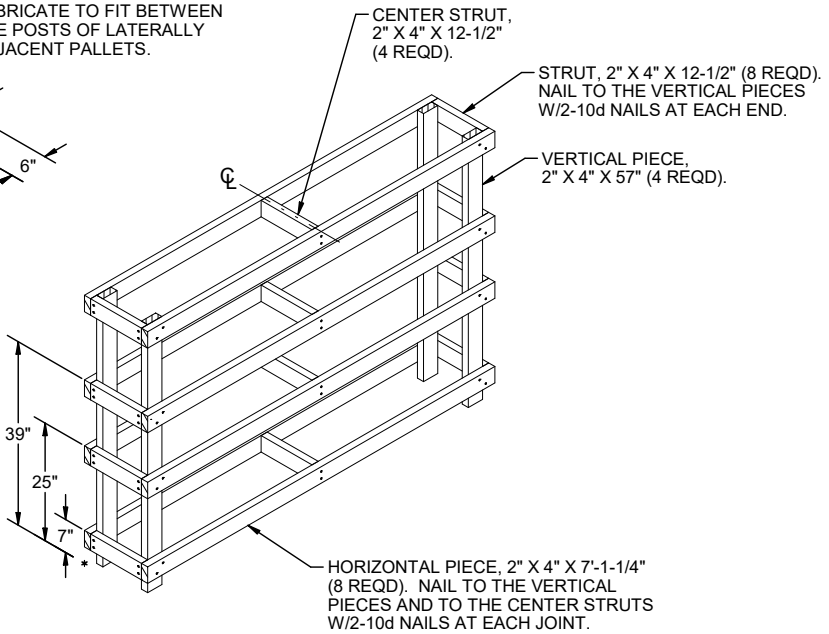
CENTER FILL ASSEMBLY A

THIS ASSEMBLY IS FOR USE IN THREE PALLET WIDE, THREE-TIER LOADS. FOR A TWO-TIER LOAD, ELIMINATE THE TOP HORIZONTAL PIECES AND STRUTS, AND SHORTEN THE VERTICAL PIECES TO 64". FOR A TWO PALLET WIDE ASSEMBLY, ELIMINATE THE FOUR CENTER STRUTS AND SHORTEN THE LENGTH OF THE HORIZONTAL PIECES TO 6'-9-1/4". CENTER THE FOUR REMAINING STRUTS TO THE THE HORIZONTAL PIECES. A COMBINATION OF THESE MODIFICATIONS CAN BE USED TO ASSEMBLE A ONE, TWO, OR THREE PALLET UNIT WIDE AND ONE, TWO, OR THREE PALLET UNIT HIGH ASSEMBLY.



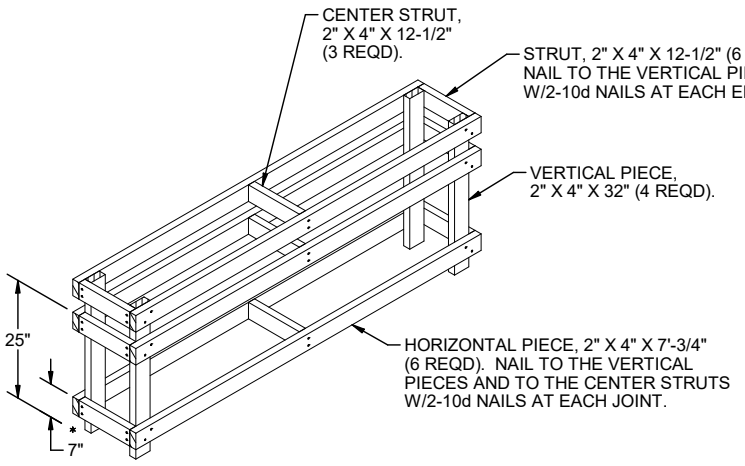
ANTI-SWAY BRACE

NOTE: THE ANTI-SWAY BRACE CAN BE PARTIALLY ASSEMBLED; ONE BUFFER PIECE CAN BE NAILED TO BOTH RETAINER PIECES. THE LONG ENDS OF THE ASSEMBLY CAN THEN BE INSTALLED INTO THE FORKLIFT OPENING OF A LOADED PALLET PRIOR TO POSITIONING OF THE LATERALLY ADJACENT PALLET UNIT.



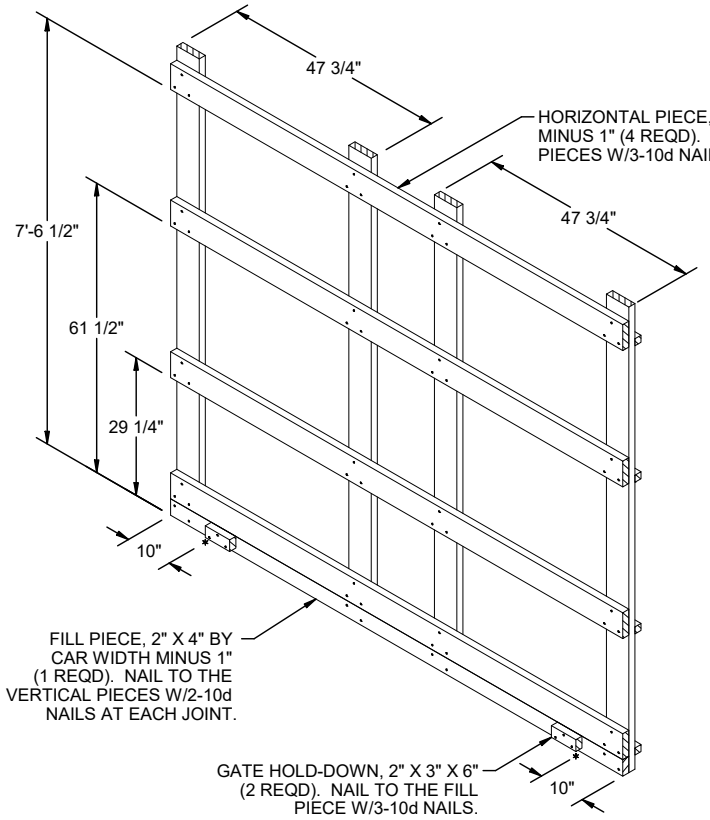
CENTER FILL ASSEMBLY B

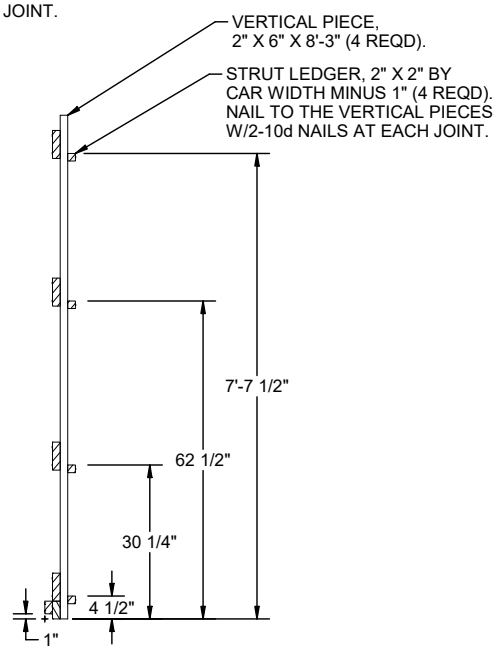
THIS ASSEMBLY IS FOR USE IN THE LCL RISER LOADING METHOD.



CENTER FILL ASSEMBLY C

THIS ASSEMBLY IS FOR USE IN THE LCL RISER LOADING METHOD.

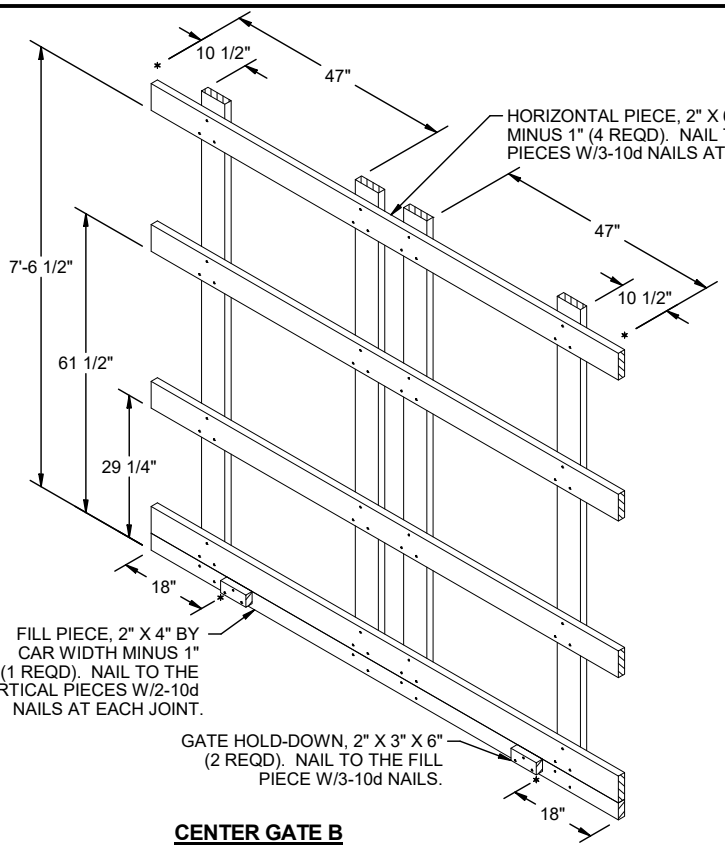




END VIEW

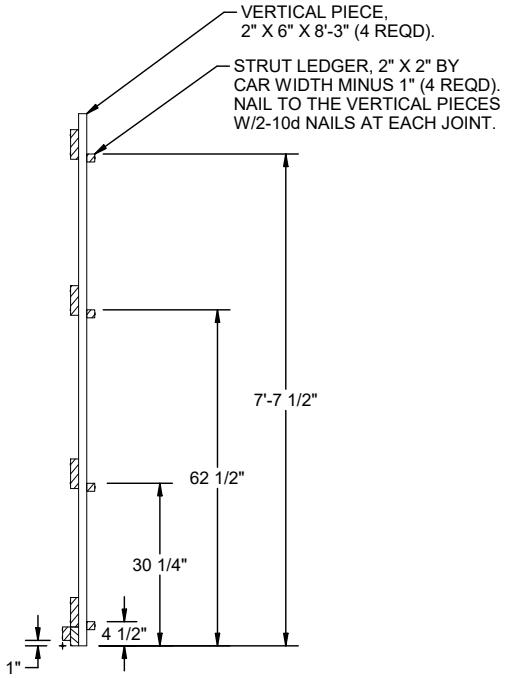
CENTER GATE A

THIS ASSEMBLY IS FOR USE IN A CROSSWISE LOAD WITH A CENTER VOID. FOR A LENGTHWISE LOAD WITH CENTER VOID, MOVE THE VERTICAL PIECES LOCATED AT 47-3/4" TO 41". FOR A TWO TIER LOAD, ELIMINATE THE TOP HORIZONTAL PIECE AND THE TOP STRUT LEDGER. SHORTEN THE VERTICAL PIECES APPROPRIATELY. USE THIS SAME METHOD FOR A ONE TIER LOAD.

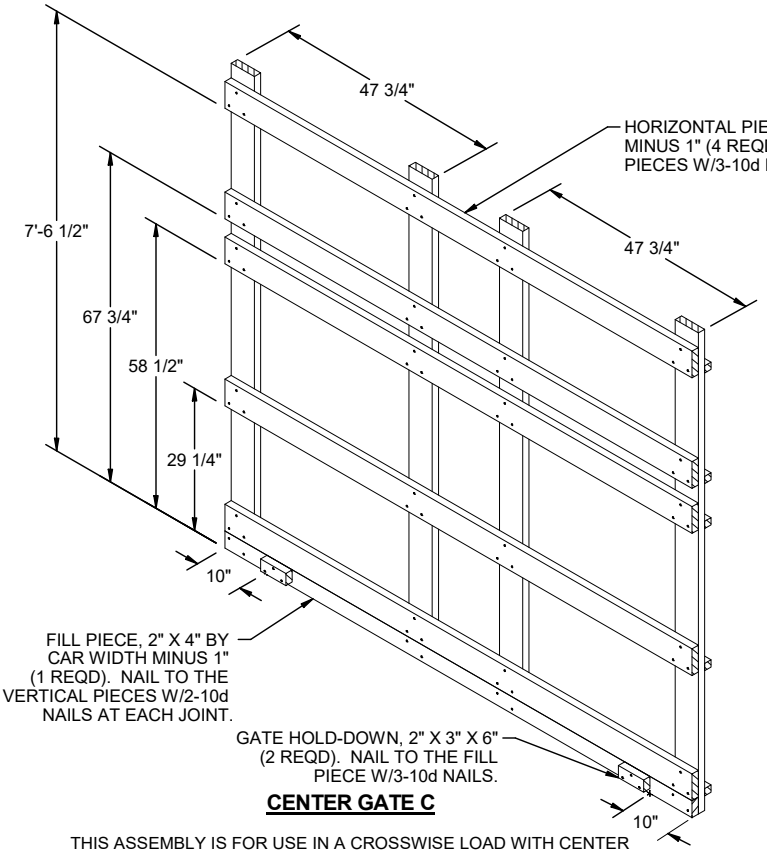


CENTER GATE B

THIS ASSEMBLY IS FOR USE IN A CROSSWISE LOAD WITH SIDE VOID. FOR A LENGTHWISE LOAD WITH SIDE VOID, MOVE THE VERTICAL PIECES LOCATED AT 10-1/2" TO 14-3/4". FOR A TWO TIER LOAD, ELIMINATE THE TOP HORIZONTAL PIECE AND THE TOP STRUT LEDGER. SHORTEN THE VERTICAL PIECES APPROPRIATELY. USE THIS SAME METHOD FOR A ONE TIER LOAD.

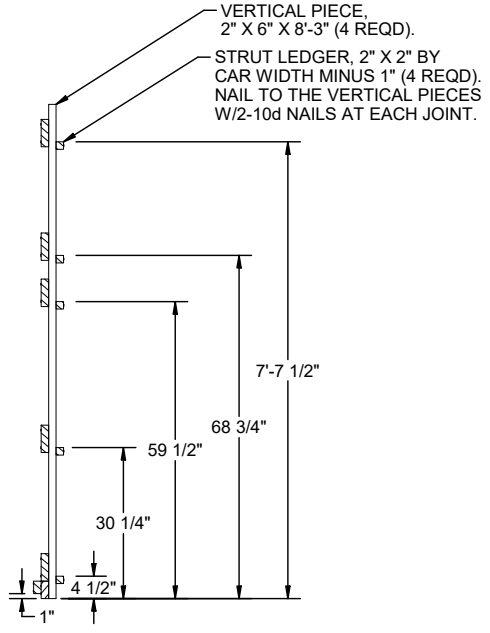


END VIEW



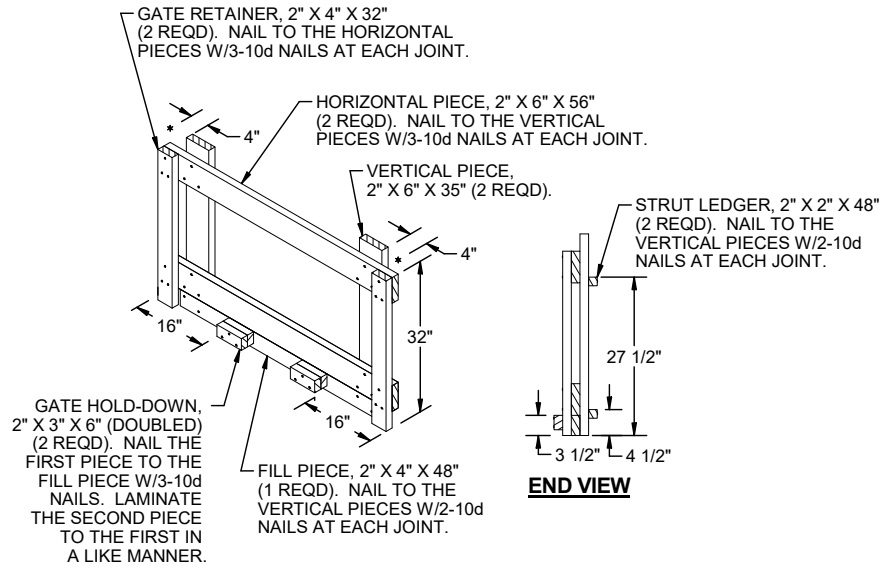
CENTER GATE C

THIS ASSEMBLY IS FOR USE IN A CROSSWISE LOAD WITH CENTER VOID WHERE THE STRUTTED-GATE METHOD OF PARTIAL LAYER BRACING IS USED. TO MODIFY THE ASSMBLY FOR A LENGTHWISE LOAD WITH CENTER VOID, MOVE THE VERTICAL PIECES LOCATED AT 47-3/4" TO 41".



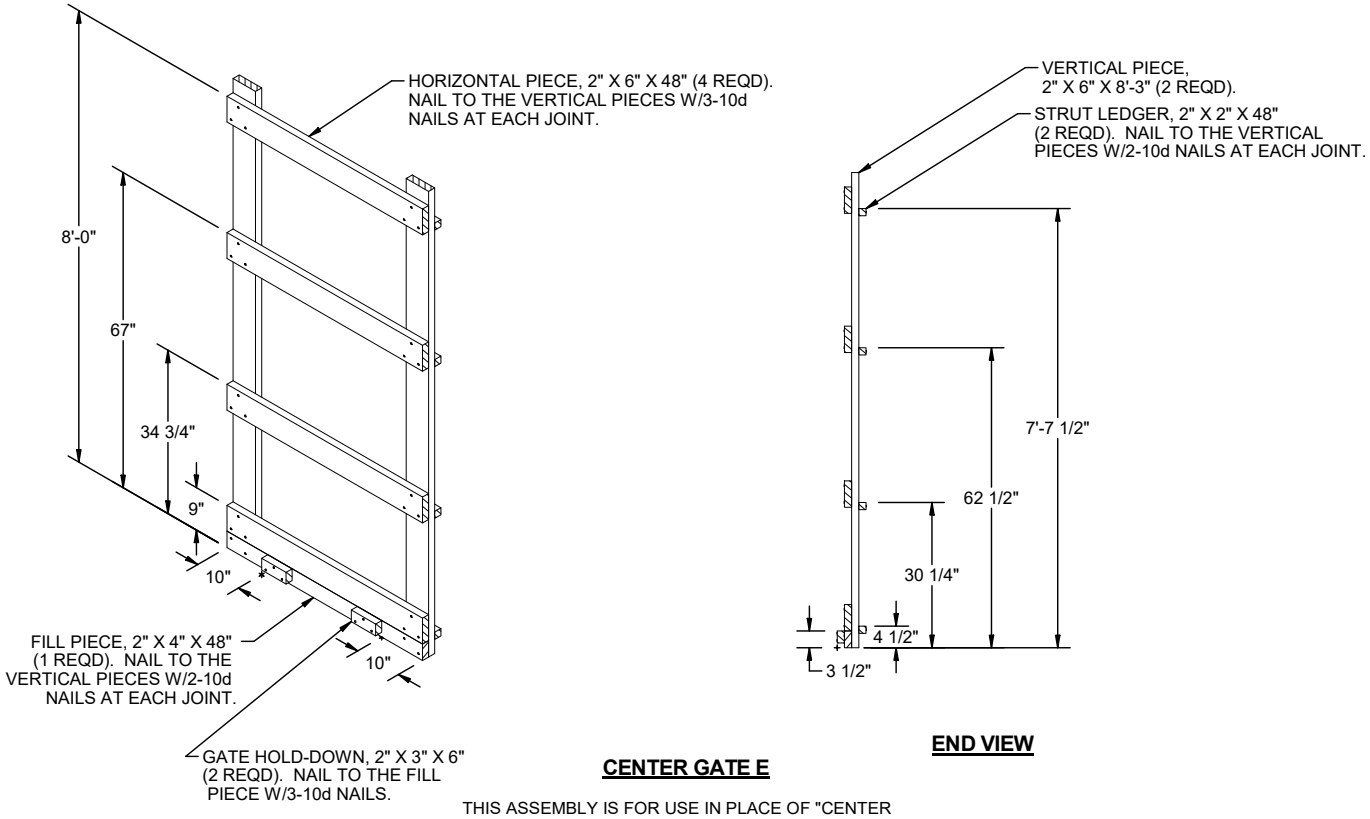
END VIEW

PROJECT SP 504-04



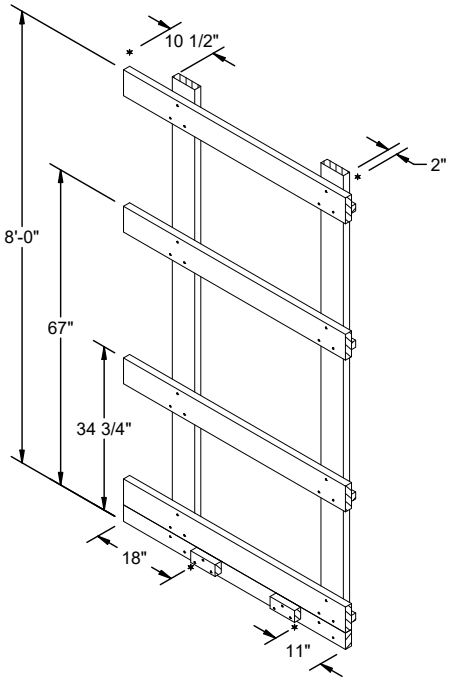
CENTER GATE D

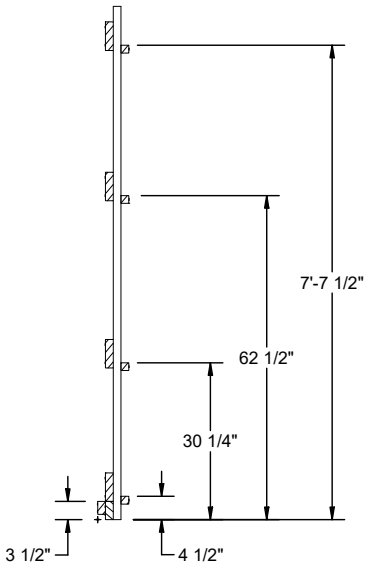
THIS ASSEMBLY IS FOR USE IN 1-WIDE LCL LOADS. INCREASE OR DECREASE THE OVERALL WIDTH OF THE ASSEMBLY TO ACCOMODATE THE LATERAL DIMENSION OF THE APPROPRIATE PALLET UNIT.



CENTER GATE E

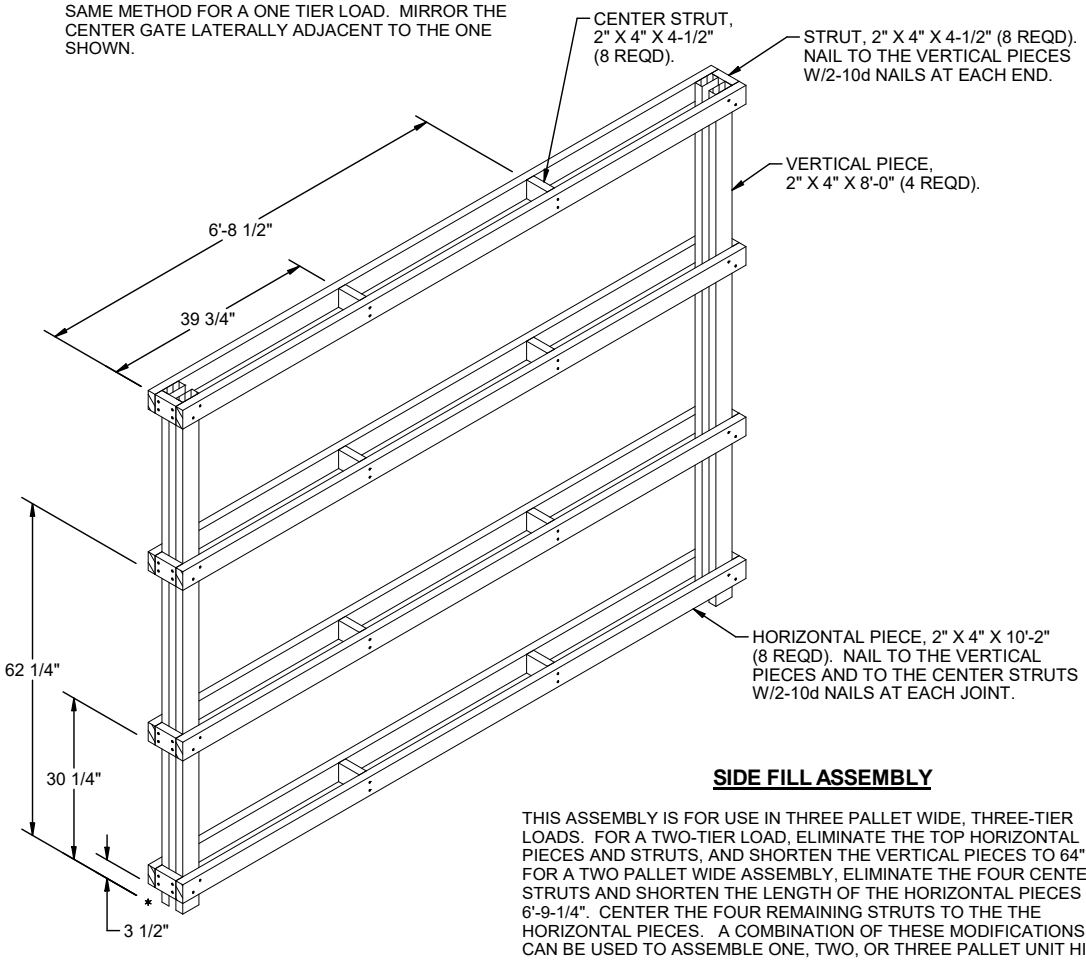
THIS ASSEMBLY IS FOR USE IN PLACE OF "CENTER GATE A" WHEN THE SPLIT GATE METHOD IS USED. TWO OF THE GATES DEPICTED ABOVE ARE NEEDED TO REPLACE ONE "CENTER GATE A". FOR A TWO TIER LOAD, ELIMINATE THE TOP HORIZONTAL PIECE AND THE TOP STRUT LEDGER. SHORTEN THE VERTICAL PIECES APPROPRIATELY. USE THIS SAME METHOD FOR A ONE TIER LOAD.





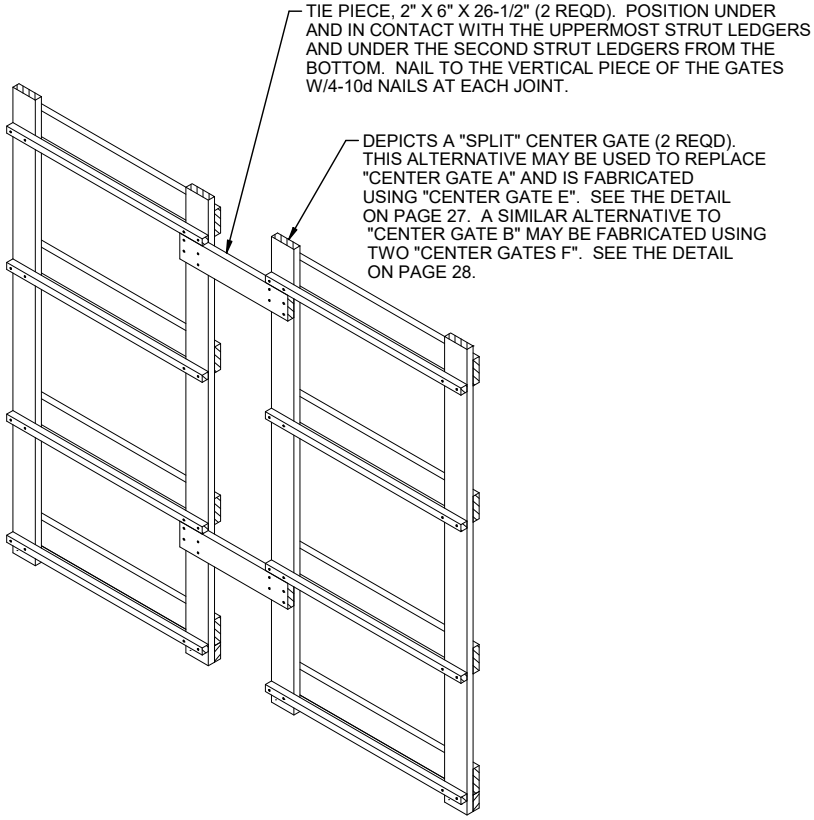
CENTER GATE F

THIS ASSEMBLY IS FOR USE IN PLACE OF "CENTER GATE B" WHEN THE SPLIT GATE METHOD IS USED. TWO OF THE GATES DEPICTED ABOVE ARE NEEDED TO REPLACE ONE "CENTER GATE B". FOR A TWO TIER LOAD, ELIMINATE THE TOP HORIZONTAL PIECE AND THE TOP STRUT LEDGER. SHORTEN THE VERTICAL PIECES APPROPRIATELY. USE THIS SAME METHOD FOR A ONE TIER LOAD. MIRROR THE CENTER GATE LATERALLY ADJACENT TO THE ONE SHOWN.



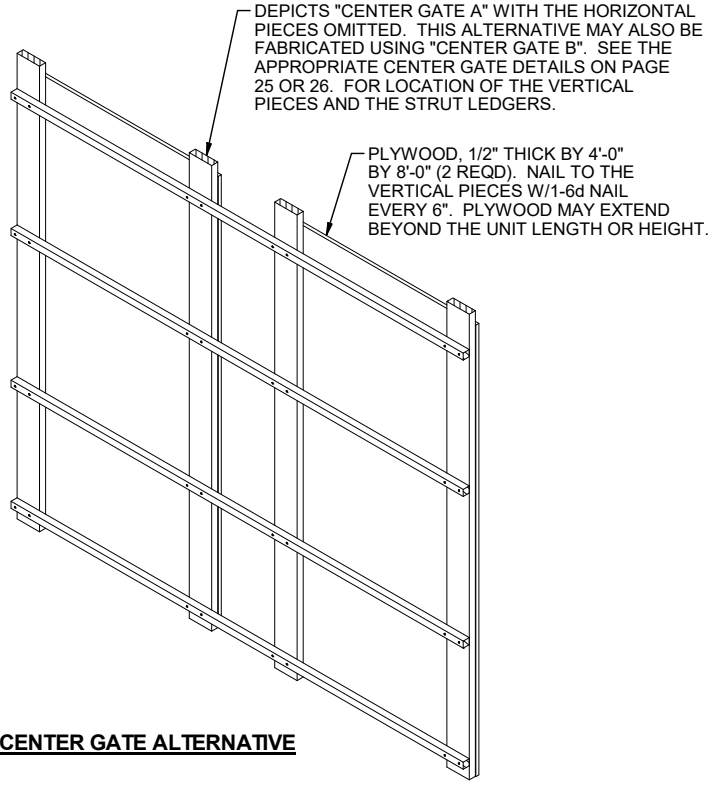
SIDE FILL ASSEMBLY

THIS ASSEMBLY IS FOR USE IN THREE PALLET WIDE, THREE-TIER LOADS. FOR A TWO-TIER LOAD, ELIMINATE THE TOP HORIZONTAL PIECES AND STRUTS, AND SHORTEN THE VERTICAL PIECES TO 64". FOR A TWO PALLET WIDE ASSEMBLY, ELIMINATE THE FOUR CENTER STRUTS AND SHORTEN THE LENGTH OF THE HORIZONTAL PIECES TO 6'-9-1/4". CENTER THE FOUR REMAINING STRUTS TO THE THE HORIZONTAL PIECES. A COMBINATION OF THESE MODIFICATIONS CAN BE USED TO ASSEMBLE ONE, TWO, OR THREE PALLET UNIT HIGH AND ONE, TWO, OR THREE PALLET UNIT WIDE ASSEMBLIES.

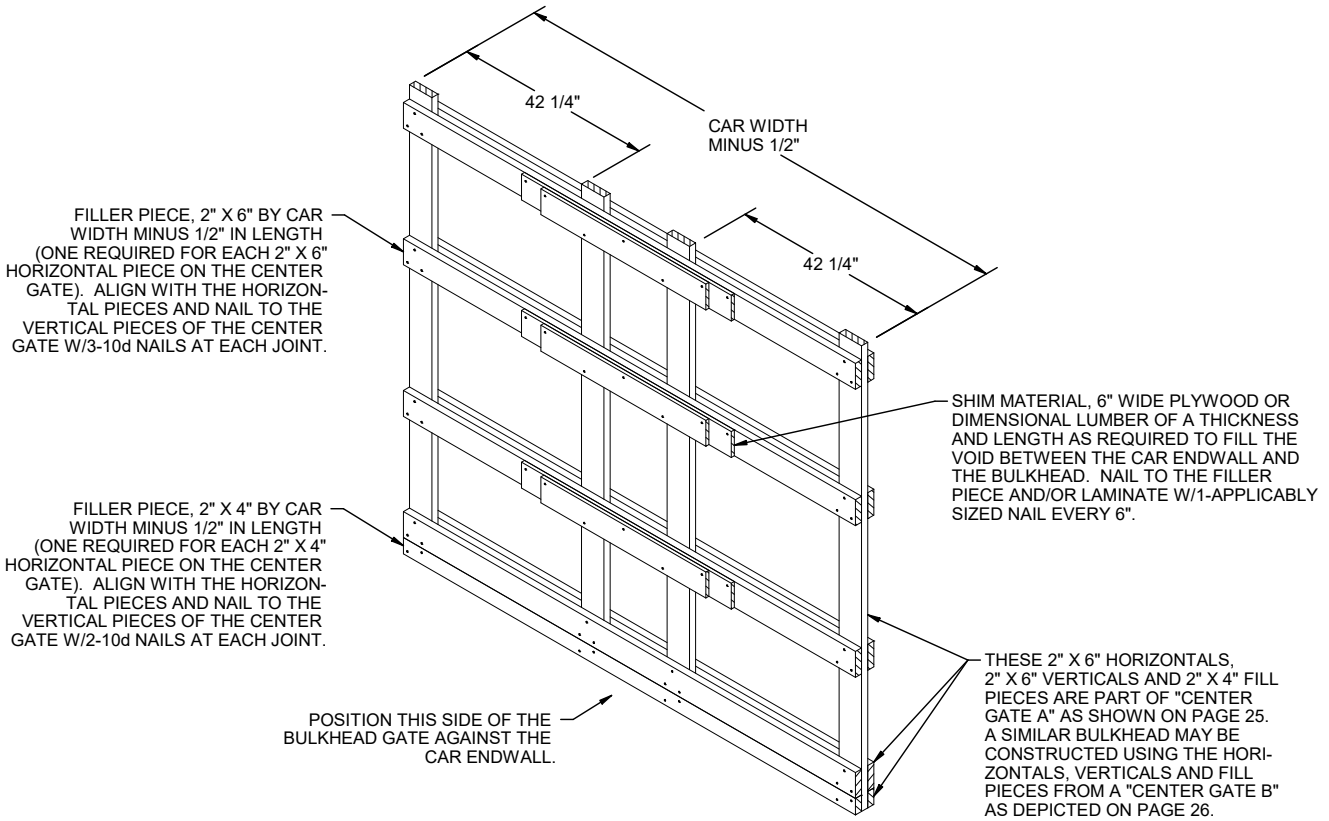


TIE PIECE APPLICATION

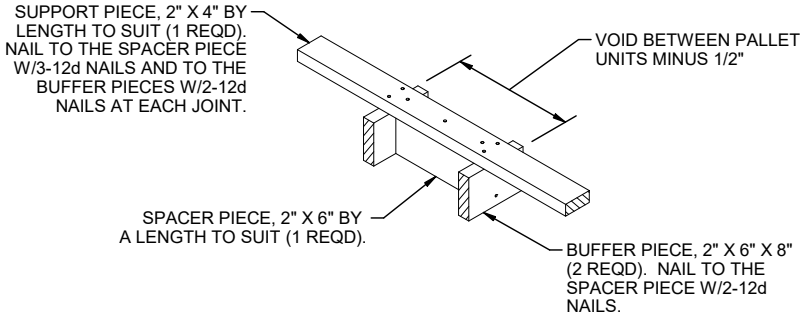
NOTE: THE TIE PIECES SHOULD BE APPLIED AFTER THE GATES AND STRUTS HAVE BEEN INSTALLED.



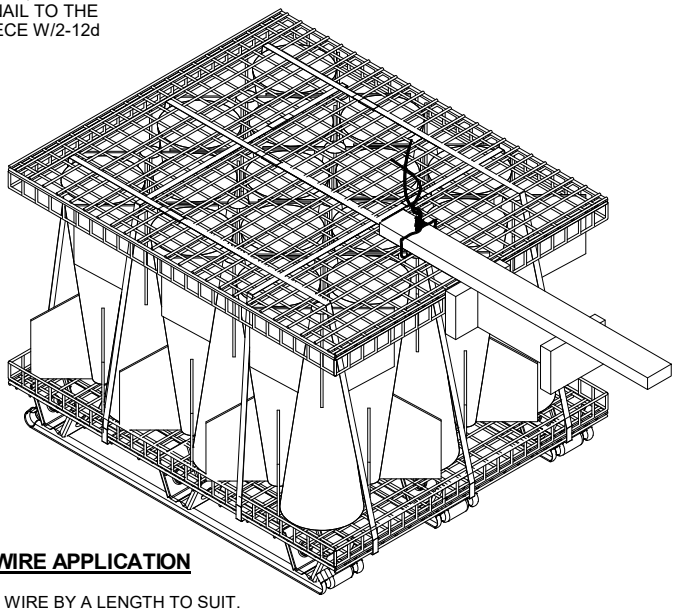
PLYWOOD CENTER GATE ALTERNATIVE



END-OF-CAR BULKHEAD

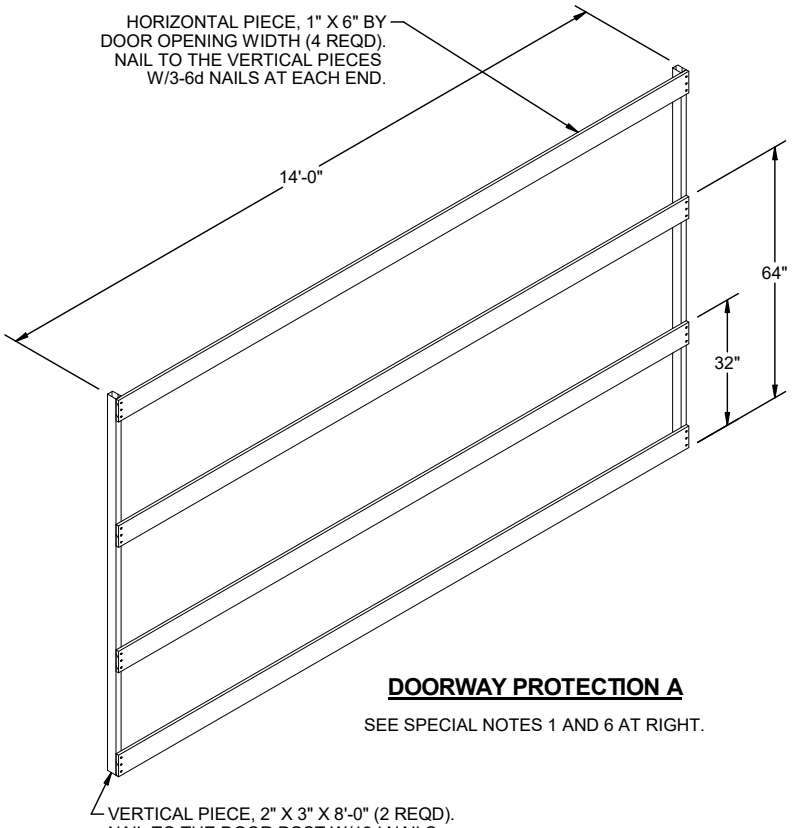


TOP-OF-LOAD ANTI-SWAY BRACE



TIE WIRE APPLICATION

USE 0.0800" DIA WIRE BY A LENGTH TO SUIT. FORM TWO LOOPS AROUND TOP-OF-LOAD ANTI-SWAY BRACE SUPPORT PIECE AND TWIST TO PREVENT DISPLACEMENT. THREAD EACH END OF WIRE THROUGH THE WIRES OF THE TOP PALLET ADAPTER AND TWIST WIRE TO SELF AS SHOWN.

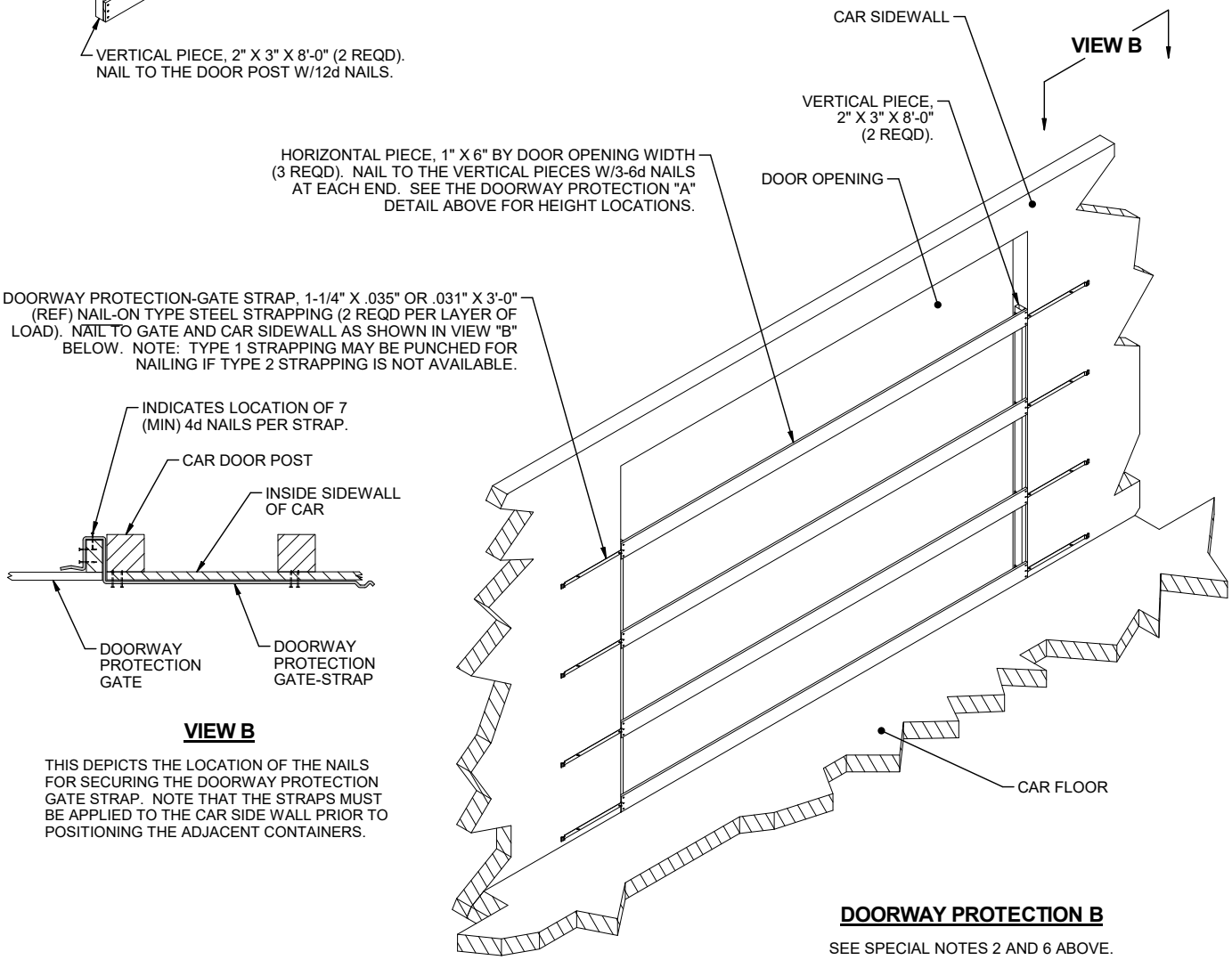


DOORWAY PROTECTION A

SEE SPECIAL NOTES 1 AND 6 AT RIGHT.

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 8 FOR GUIDANCE.
6. THE VIEWS ON PAGES 6, 8, AND 10 DEPICT DOORWAY PROTECTION FOR A THREE-LAYER LOAD. FOR A TWO-LAYER LOAD, ELIMINATE THE HORIZONTAL PIECE AT 8'-0" HEIGHT AND/OR STRAP AND REDUCE THE HEIGHT OF THE VERTICAL PIECES TO 64". FOR A ONE-LAYER LOAD, ELIMINATE THE HORIZONTAL PIECES AT 8'-0" AND 64" AND/OR STRAPS AND REDUCE THE HEIGHT OF THE VERTICAL PIECES TO 32". FOR DOORWAY PROTECTION "D", MOVE THE SPANNER BY AN APPROPRIATE DISTANCE.

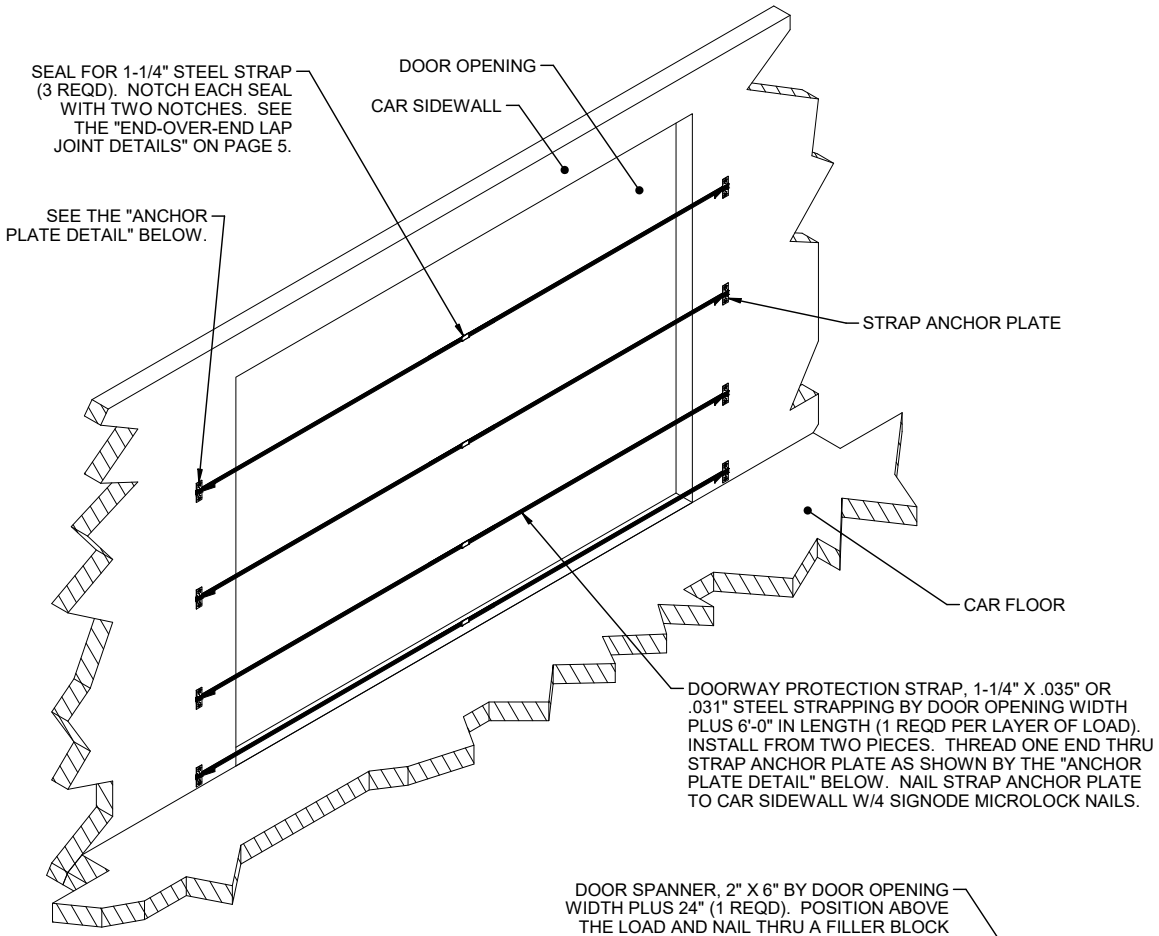


VIEW B

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.

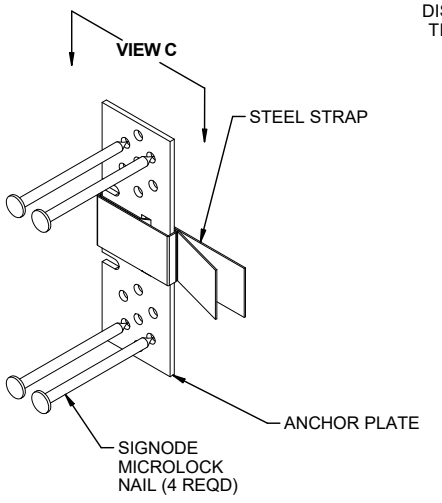
DOORWAY PROTECTION B

SEE SPECIAL NOTES 2 AND 6 ABOVE.



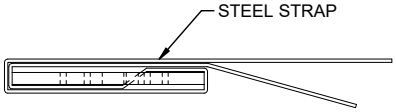
DOORWAY PROTECTION C

SEE SPECIAL NOTES 3 AND 6 ON PAGE 31.

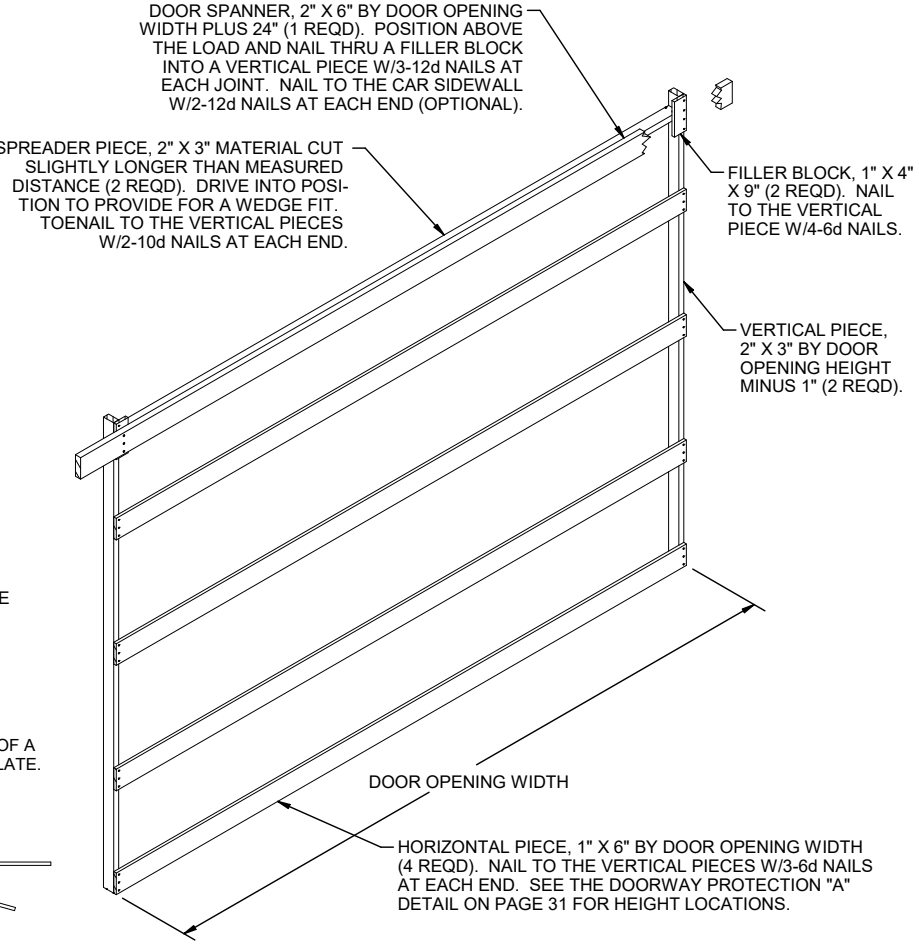


ANCHOR PLATE DETAIL

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

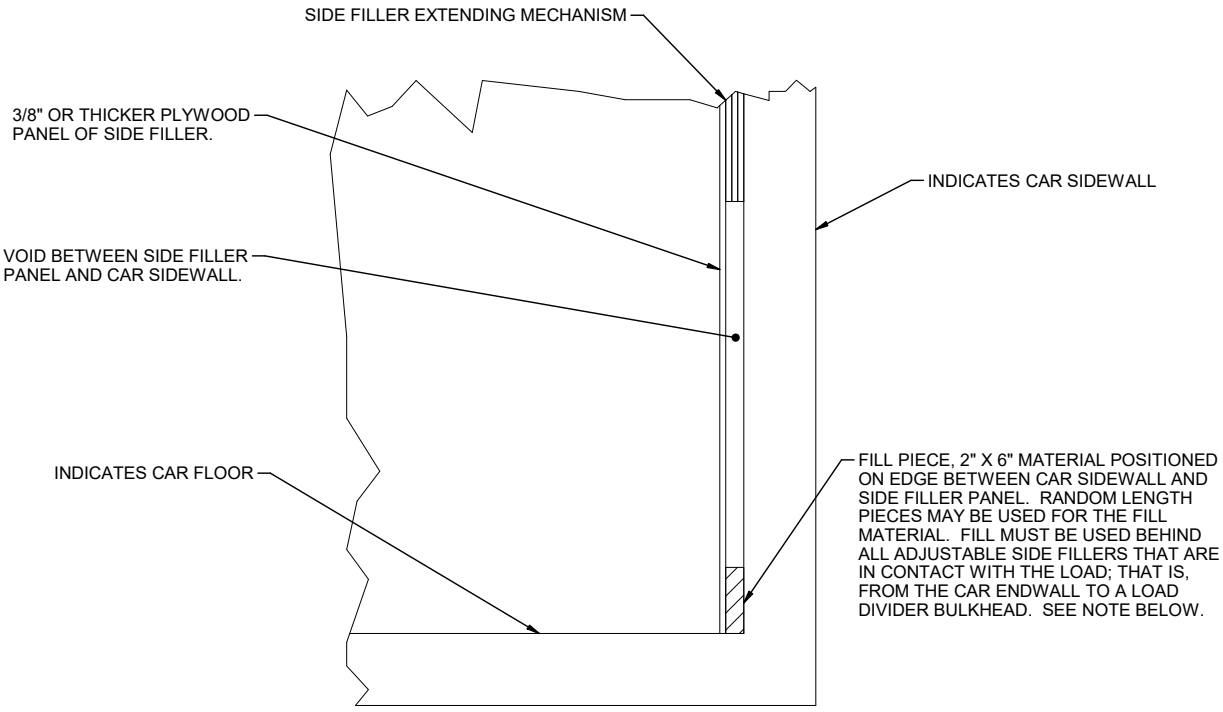


VIEW C



DOORWAY PROTECTION D

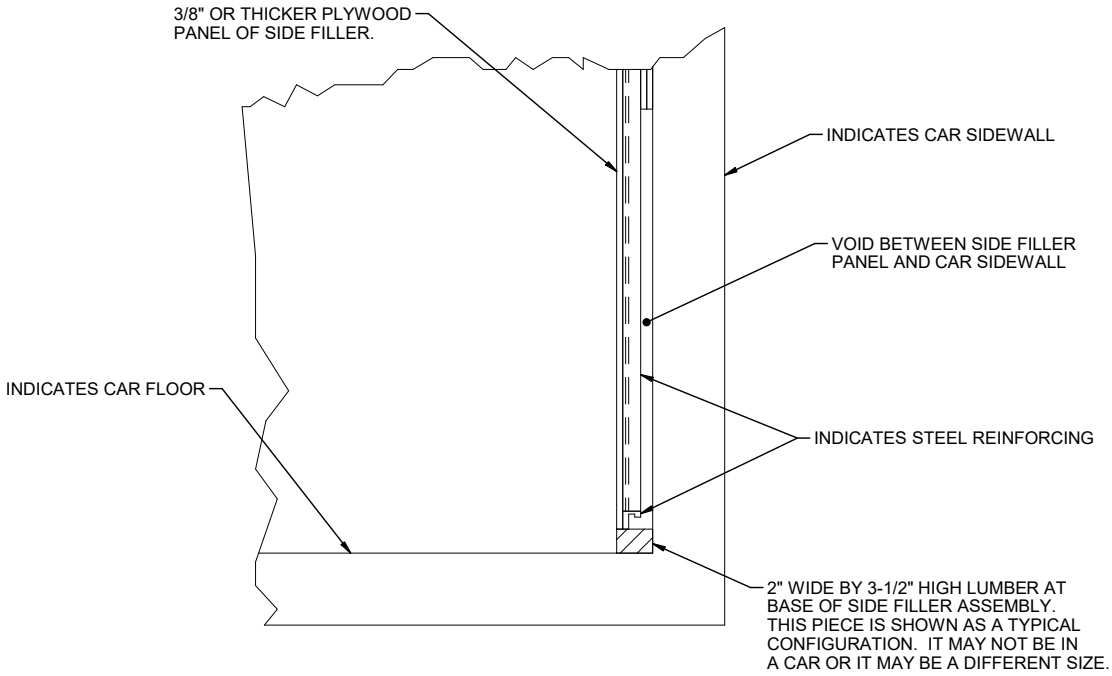
SEE SPECIAL NOTES 4 AND 6 ON PAGE 31.



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.

PROVISIONS FOR BOXCARS EQUIPPED WITH LOAD DIVIDER BULKHEADS