


# LOADING AND BRACING\* (CL & LCL) IN BOXCARS OF BSU-84, BSU-88 OR BSG-92 AIRFOIL GROUP PACKED IN CNU-373/E SHIPPING AND STORAGE CONTAINERS

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

## U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY JOINT MUNITIONS COMMAND		<b>CAUTION: VERIFY PRIOR TO USE AT WWW.DAC.ARMY.MIL THAT THIS IS THE MOST CURRENT VERSION OF THIS DOCUMENT. THIS IS PAGE 1 OF 26.</b>			
		<b>DO NOT SCALE</b>		<b>MARCH 2005</b>	
		ENGINEER OR TECHNICIAN	BASIC REV.	MELVIN SIX	
APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND		TRANSPORTATION ENGINEERING DIVISION		REVISION NO. 1	
		VALIDATION ENGINEERING DIVISION		DECEMBER 2006	
		ENGINEERING DIRECTORATE		SEE THE REVISION LISTING ON PAGE 3	
U.S. ARMY DEFENSE AMMUNITION CENTER		CLASS	DIVISION	DRAWING	FILE
		19	48	8685	SP5J19

PROJECT SP 384-00

## GENERAL NOTES

- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- B. THE OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE TO LOADS OF BSU-84, BSU-88 OR BSG-92 AIRFOIL GROUP PACKED IN THE CNU-373/E CONTAINER. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH MISSILE INSTALLED. SEE PAGE 4 AND AIR FORCE DRAWING NUMBER 817218-30 FOR DETAILS OF THE CONTAINER.
- C. THE OUTLOADING PROCEDURES SPECIFIED HEREIN CAN ALSO BE USED FOR THE SHIPMENT OF THE CONTAINERS WHEN THEY ARE LOADED WITH AN ITEM THAT IS IDENTIFIED DIFFERENTLY BY NOMENCLATURE THAN THE ITEM IDENTIFIED WITHIN THE DRAWING TITLE.
- D. THE OUTLOADING PROCEDURES DEPICTED WITHIN THIS DOCUMENT ARE APPLICABLE FOR SHIPMENTS IN CONVENTIONAL TYPE BOXCARS AND BOXCARS WITH LOAD DIVIDER BULKHEADS.
- E. 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".
- F. **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.
- G. 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.
- H. 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.

(CONTINUED AT RIGHT)

## MATERIAL SPECIFICATIONS

LUMBER	- - - - -	SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
NAILS	- - - - -	ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMS).
STRAPPING, STEEL	- -	ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.
SEAL, STRAP	- - - -	ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.
WIRE, CARBON STEEL	- -	ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.
ANTI-CHAFING MATERIAL	- - - - -	MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.

## (GENERAL NOTES CONTINUED)

- J. 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.
- K. THE SELECTION OF RAILCARS FOR THE TRANSPORT OF CONTAINERS IS THE RESPONSIBILITY OF THE ORIGINATING CARRIER AND THE SHIPPER. ONLY CARS WHICH HAVE "SOUND" FLOORS AND ARE IN OTHERWISE PROPER CONDITION, IN ACCORDANCE WITH THE REQUIREMENTS OF THE APPLICABLE REGULATORY DOCUMENTS, WILL BE SELECTED.
- L. WHEN SELECTING RAILCARS, EVERY EFFORT SHOULD BE MADE TO OBTAIN BOXCARS THAT DO NOT HAVE BOWED ENDWALLS. CARS WITH BOWED ENDS CAN BE USED; HOWEVER, IF AND ENDWALL IS BOWED OUTWARD MORE THAN 2", EITHER FROM SIDE-TO-SIDE OR FROM FLOOR-TO-ROOF, FILL MATERIAL MUST BE NAILED TO THE BACKSIDE OF THE ENDWALL BULKHEAD TO PROVIDE ADDITIONAL CONTACT AREA BETWEEN THE BULKHEAD AND ENDWALL.
- M. 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 CONTAINERS. **NOTICE:** A SHIPMENT WILL BE POSITIONED IN THE RAILCAR IN COMPLIANCE WITH THE WEIGHT DISTRIBUTION REQUIREMENTS OF THE ASSOCIATION OF AMERICAN RAILROADS.
- N. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN CARS WHICH ARE PARTIALLY LOADED WITH CONTAINERS, PROVIDING THE TOTAL LOAD IS COMPATIBLE, EXISTING DIRECTIVES ARE NOT VIOLATED, AND THE OTHER LADING ITEMS ARE BLOCKED AND BRACED TO EQUAL THE BLOCKING AND BRACING CRITERIA SPECIFIED HEREIN.
- O. LOADS WITHIN THIS DOCUMENT ARE TYPICAL. SINCE THE ACTUAL QUANTITY TO BE SHIPPED MAY NOT BE DEPICTED IN ANY OF THE LOAD VIEWS SHOWN HEREIN, A LOAD PLAN SHOULD BE DEVELOPED WHICH WILL BE THE MOST EFFICIENT AS TO THE AMOUNT OF DUNNAGE REQUIRED AND THE EASE OF LOADING FOR THE QUANTITY TO BE SHIPPED.
- P. **CAUTION:** CARE MUST BE EXERCISED DURING HANDLING OF THE CONTAINERS TO PREVENT DAMAGE CAUSED BY BUMPING OR DROPPING THE CONTAINERS.
- Q. POWER DRIVEN STAPLES MAY BE USED AS ALTERNATIVE FASTENERS FOR NAILS WHEN CONSTRUCTING DUNNAGE ASSEMBLIES WHICH ARE TO BE USED IN THE DELINEATED BOXCAR LOADS SHOWN THROUGHOUT THIS DRAWING. THE STAPLES TO BE USED MUST BE EQUAL IN LENGTH TO THE SPECIFIED NAIL SIZE AND MUST BE SUBSTITUTED ON A ONE STAPLE FOR ONE NAIL BASIS. STAPLES WHICH ARE 2-1/2" OR LESS IN LENGTH SHOULD BE IN ACCORDANCE WITH ASTM F1667 AS NEARLY AS PRACTICABLE. STAPLES WHICH ARE LONGER THAN 2-1/2" WILL BE A COMMERCIAL GRADE, OF A QUALITY EQUIVALENT TO THOSE MANUFACTURED BY SENCO PRODUCTS INCORPORATED. **NOTE:** STAPLES WILL NOT BE SUBSTITUTED FOR NAILS IN ANY LOAD RESTRAINING FLOOR DUNNAGE APPLICATION.
- R. **CAUTION:** WHEN POWER OR PNEUMATIC NAILERS ARE BEING USED IN THE APPLICATION OF NAILED FLOORLINE BLOCKING OR BRACING, CONTAINERS 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.
- S. 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.
- T. AS REQUIRED BY THE ASSOCIATION OF AMERICAN RAILROADS (AAR), ALL 1-1/4" AND 2" STEEL STRAPPING USED FOR LOAD RESTRAINT MUST BE MARKED AS SPECIFIED WITHIN THE APPLICABLE AAR RULES GOVERNING LOADING, BLOCKING AND BRACING OF FREIGHT WITHIN THE CONVEYANCE. FOR THE SPECIFIC MARKING SIZE, FREQUENCY, ETC., REQUIRED, REFER TO THE APPROPRIATE AAR LOADING RULES.

(CONTINUED ON PAGE 3)

## U. FOR CONVENTIONAL 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 TO THE CAR FLOOR OF THE HEADERS AND BACK-UP CLEAT IN THE LESS-THAN-FULL LOADS. IF A NAIL SIZE IS NOT SPECIFIED IN THE CAR, 30d NAILS SHOULD BE USED IN LIEU OF THOSE SPECIFIED IN THE APPLICABLE KEY NUMBERS. SEE GENERAL NOTE "F" ON PAGE 2.
2. **NOTICE:** WHEN POSITIONING CONTAINERS IN A CAR, THEY SHOULD BE PRESSED TIGHTLY TOGETHER Laterally AND LENGTHWISE 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 CONTAINERS 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 CONTAINERS, 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. 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 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.

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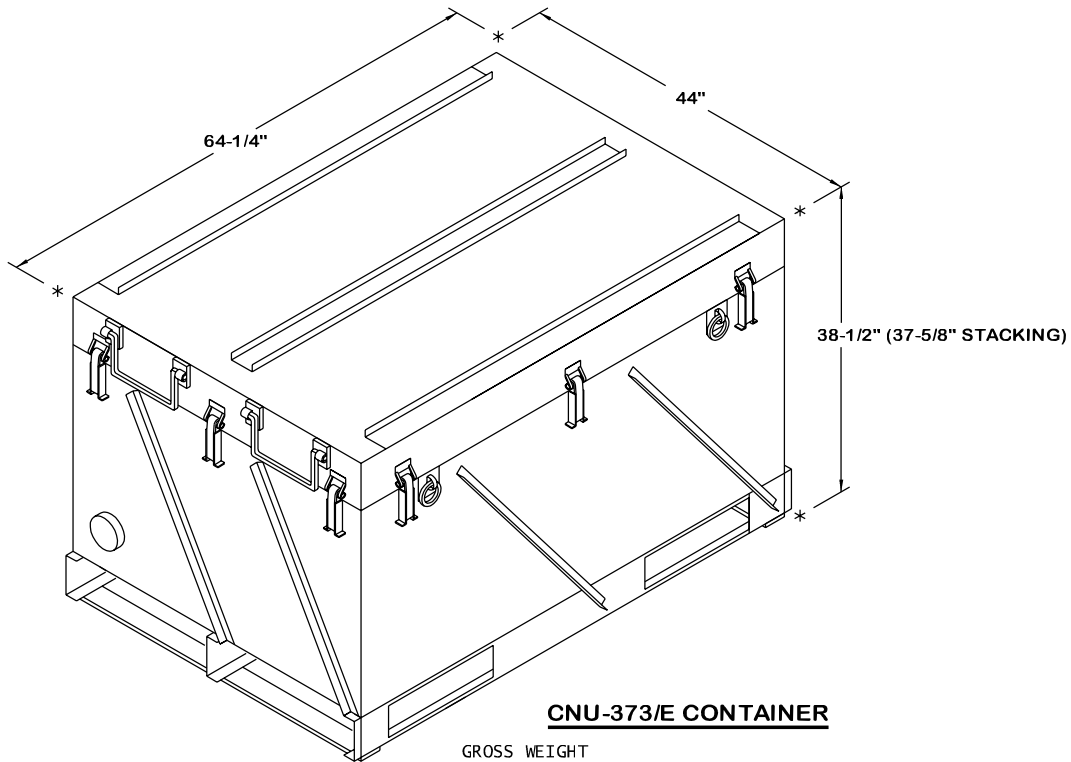
## V. FOR CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS

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) THAT 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 "TYPICAL TYPE A" VIEW ON PAGE 26 SPACER GATE 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 26, 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. A "STRUT ASSEMBLY" MUST BE INSTALLED BETWEEN THE LOAD DIVIDER BULKHEADS IF THE CAR CONTAINS HAZARD CLASS AND DIVISION 1.1, 1.2, OR 1.3 EXPLOSIVES AND THE LOAD IN EITHER END OF THE CAR WEIGHS 50,000 POUNDS OR MORE. A STRUT ASSEMBLY IS NOT REQUIRED FOR LOADS OF HAZARD CLASS AND DIVISION 1.4 EXPLOSIVES. NOTE THAT THE STRUT ASSEMBLY MAY BE OMITTED FROM LOADS OF HAZARD CLASS AND DIVISION 1.1, 1.2, OR 1.3 EXPLOSIVES WEIGHING 50,000 POUNDS WHEN THE LADING AND ADEQUATE BLOCKING AND BRACING ARE POSITIONED TO COMPLETELY FILL THE SPACE BETWEEN THE INSTALLED BULKHEADS AS SPECIFIED IN GENERAL NOTE "V-6" BELOW.
6. 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 CONTAINERS THAT ARE IN ONE LOAD UNIT. A LOAD UNIT IS DEFINED AS A STACK OF CONTAINERS, WHICH IS FULL CAR WIDTH, BY FULL LOAD HEIGHT BY ONE UNIT IN LENGTH. IF THE QUANTITY TO BE SHIPPED CANNOT BE ATTAINED BY ADJUSTING THE NUMBER OF TIERS IN ONE OR BOTH ENDS OF A CAR, OR BY ADJUSTING THE NUMBER OF LOAD UNITS IN EITHER END OF THE CAR, A FILLER ASSEMBLY MUST BE INSTALLED. SEE THE LOAD ON PAGE 8 FOR DETAILS.

**REVISION**

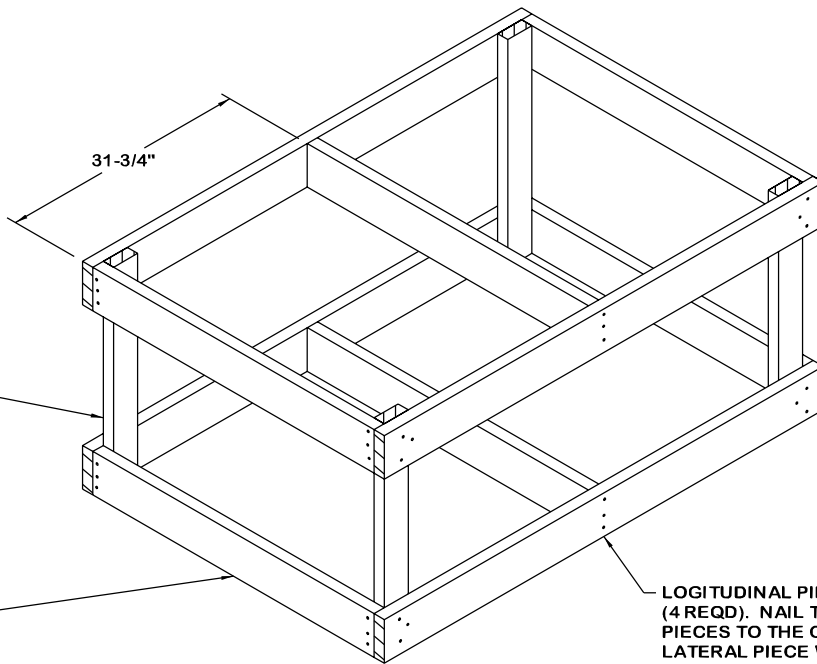
REVISION NO. 1, DATED DECEMBER 2006, CONSISTS OF:

ADDING REFERENCE TO BSU-88 AND BSG-92 TO THE DRAWING.



**CNU-373/E CONTAINER**

GROSS WEIGHT	
BSU-84	1,192 LBS (APPROX)
BSU-88	785 LBS (APPROX)
BSG-92	836 LBS (APPROX)
CUBE	63.0 CU FT (APPROX)



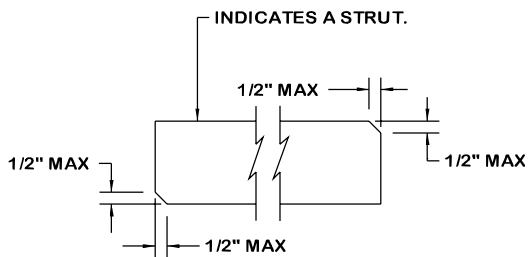
VERTICAL PIECE,  
2" X 6" X 30" (4 REQD).

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

LOGITUDINAL PIECE, 2" X 6" X 64"  
(4 REQD). NAIL TO THE VERTICAL  
PIECES TO THE CENTER  
LATERAL PIECE W/3-10d NAILS  
AT EACH JOINT.

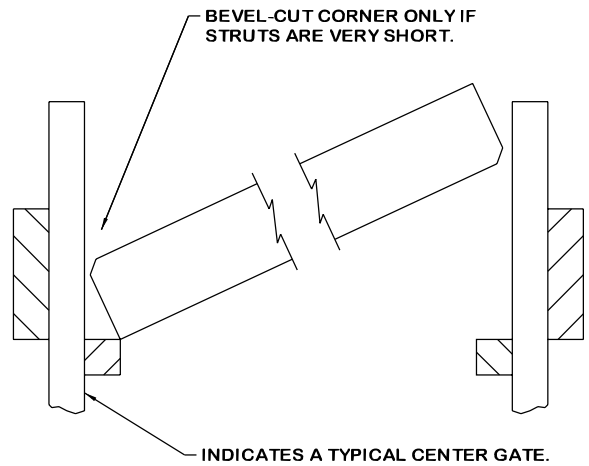
**FILLER ASSEMBLY**

(FOR MINUS ONE UNIT)



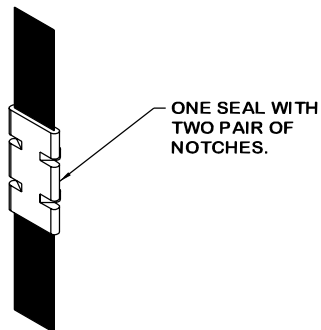
**BEVEL-CUT**

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



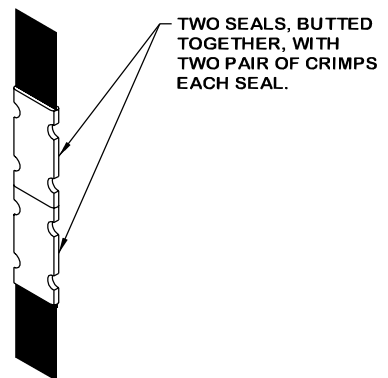
**STRUT INSTALLATION**

SEE GENERAL NOTE "W-4" ON PAGE 3 FOR ADDITIONAL STRUT INSTALLATION GUIDANCE.



**STRAP JOINT A**

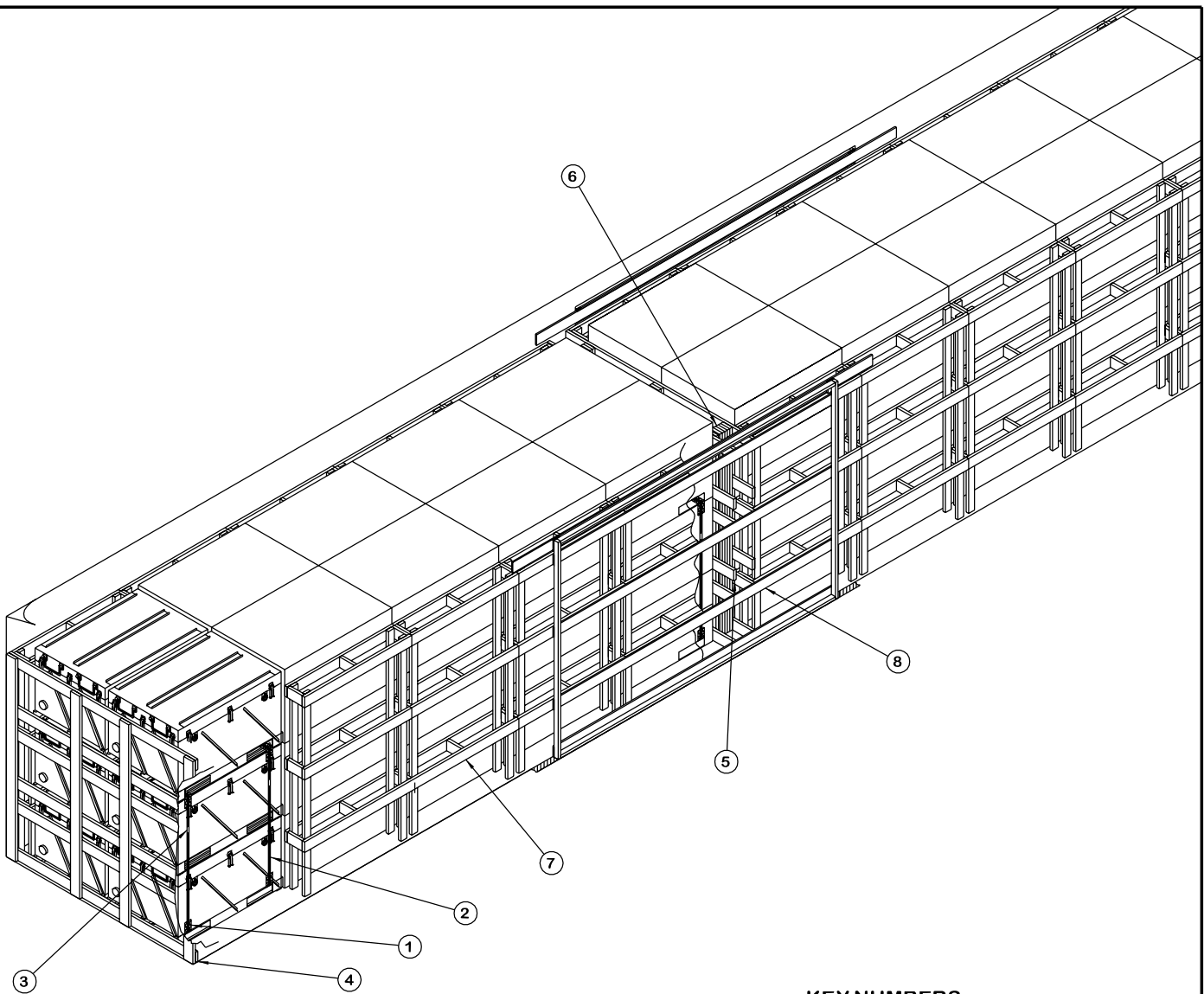
METHOD OF SECURING A STRAP JOINT WHEN USING A NOTCH-TYPE SEALER.



**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 FIBERBOARD ANTI-CHAFING MATERIAL (AS REQD). FOLD FIBERBOARD TO FORM A DOUBLE THICKNESS AND PLACE UNDER STRAPPING AT ALL POINTS OF CONTACT WITH THE CONTAINERS.
- ② UNITIZING STRAP, 1-1/4" X .035" OR .031" X 19'-9" LONG STEEL STRAPPING (44 REQD).
- ③ SEAL FOR 1-1/4" STRAPPING (44 REQD, 1 PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES.
- ④ ENDWALL BULKHEAD (2 REQD). SEE THE DETAIL ON PAGE 20.
- ⑤ SPACER GATE (2 REQD). SEE THE DETAIL ON PAGE 22.
- ⑥ SOLID FILL, 6" WIDE BY 8'-9-1/2" LONG BY THE THICKNESS REQUIRED TO FILL THE EXCESS SPACE BETWEEN SPACER GATES MARKED ⑤ TO A WEDGE FIT (REQUIRED AT 3 PLACES). NAIL TO SPACER GATE W/1-10d NAIL EVERY 12". NAIL TO EACH OTHER W/1 APPROPRIATE NAIL EVERY 12" (6d FOR 1" THICK DUNNAGE, 10d FOR 2" THICK DUNNAGE).
- ⑦ SIDE FILL ASSEMBLY (22 REQD). SEE THE DETAIL ON PAGE 21.
- ⑧ DOOR PROTECTION D (2 REQD). SEE THE DETAIL ON PAGE 24 AND SPECIAL NOTE 3 ON PAGE 7.

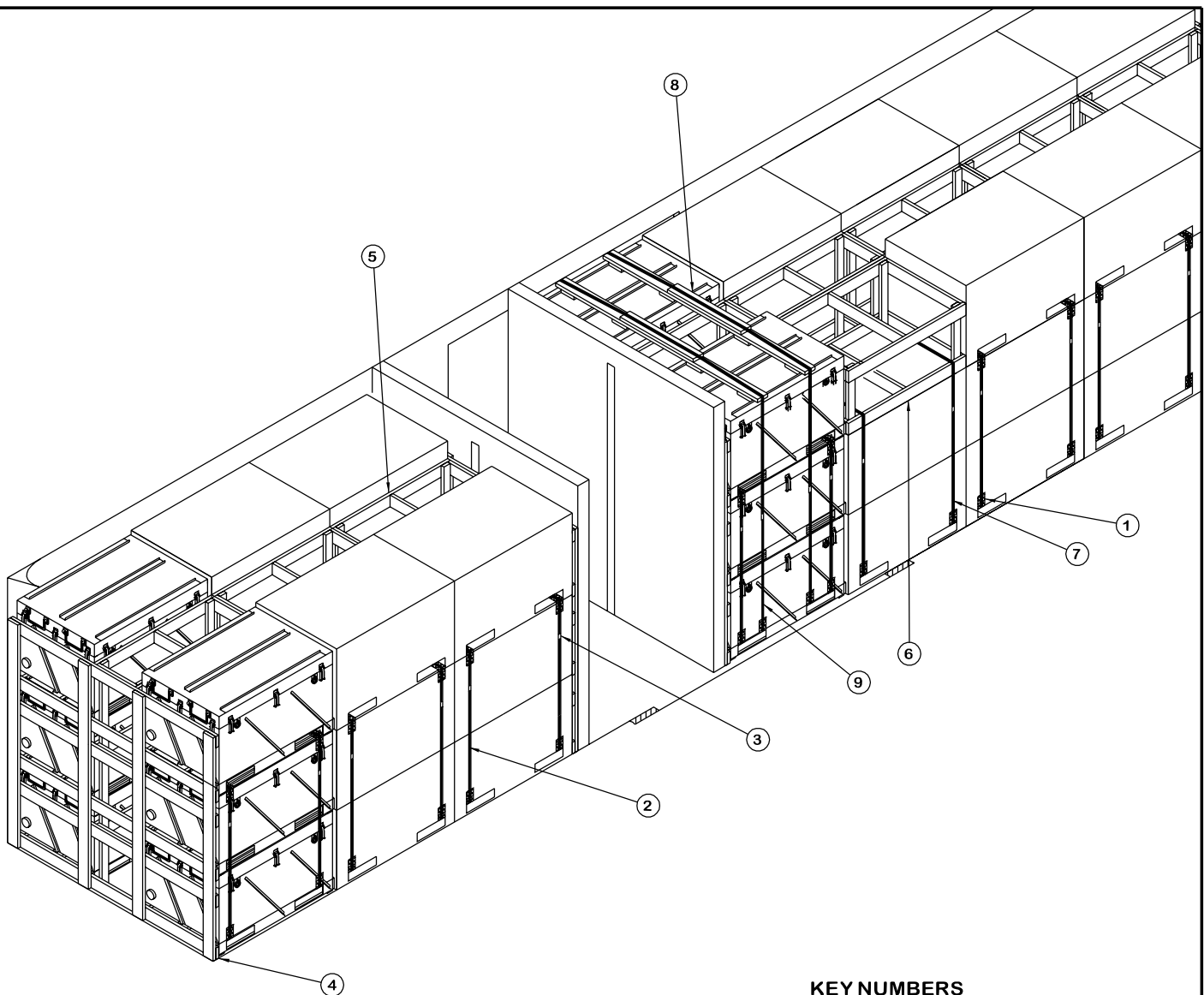
**SPECIAL NOTES:**

1. A 60'-6" LONG BY 9'-4" WIDE CONVENTIONAL TYPE BOXCAR EQUIPPED WITH 14'-0" WIDE DOOR OPENINGS IS SHOWN. BOXCARS OF OTHER DIMENSIONS AND BOXCARS HAVING NARROWER OR WIDER DOOR OPENINGS CAN BE USED.
2. A WIDER OR NARROWER BOXCAR CAN BE USED FOR SHIPPING THE DEPICTED LOAD BY ADJUSTING THE SIDE FILL STRUTS, PIECES MARKED ⑤ ON PAGE 6.
3. THE SPECIFIED BLOCKING AND BRACING PROCEDURES APPLICABLE TO A 66 CONTAINER LOAD ARE ALSO APPLICABLE TO A 54 CONTAINER LOAD TO BE PLACED IN A 50'-6" LONG BY 9'-2" WIDE BOXCAR. FOR ADDITIONAL GUIDANCE SEE GENERAL NOTE "U" ON PAGE 3. QUANTITIES OF DUNNAGE WILL BE ADJUSTED AS REQUIRED.
4. THE DOORWAY PROTECTION ASSEMBLIES ARE REQUIRED TO PROVIDE LATERAL RESTRAINT FOR THE CENTER SPACER ASSEMBLY AND THE SIDE FILL ASSEMBLIES. IF THE CAR HAS PLUG DOORS, THE DOORWAY PROTECTION SHOWN ON PAGE 6 IS NOT REQUIRED. IF THE CAR IS EQUIPPED WITH STAGGERED DOOR OPENINGS, AND THE AUXILIARY DOOR OPENING IS OF THE SLIDING TYPE, DOORWAY PROTECTION WILL BE REQUIRED IN THAT AREA.
5. FOR SHIPMENT OF A LOAD WHICH CONTAINS LESS ASSEMBLIES THAN WHAT IS SHOWN, SEE THE PROCEDURES CONTAINED ON PAGES 8 THRU 12.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 6"	171	86
2" X 3"	93	47
2" X 4"	774	516
2" X 6"	1305	1305
NAILS	NO. REQD	POUNDS
6d (2")	87	1/2
10d (3")	2348	36-1/4
STEEL STRAPPING, 1-1/4" - - -869' REQD - - - 125 LBS		
SEAL FOR 1-1/4" STRAPPING - - 44 REQD - - - 2 LBS		

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
CNU-373 CONTAINER	66	78,672 LBS
DUNNAGE		4,068 LBS
TOTAL WEIGHT		82,740 LBS (APPROX)



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① FIBERBOARD ANTI-CHAFING MATERIAL (AS REQD). FOLD FIBERBOARD TO FORM A DOUBLE THICKNESS AND PLACE UNDER STRAPPING AT ALL POINTS OF CONTACT WITH THE CONTAINERS.
- ② UNITIZING STRAP, 1-1/4" X .035" OR .031" X 19'-9" LONG STEEL STRAPPING (30 REQD).
- ③ SEAL FOR 1-1/4" STRAPPING (34 REQD, 1 PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES.
- ④ ENDWALL BULKHEAD (4 REQD). SEE THE DETAIL ON PAGE 20.
- ⑤ CRIB FILL ASSEMBLY (8 REQD). SEE THE DETAIL ON PAGE 21 AND SPECIAL NOTES 2 AND 3 ON PAGE 9.
- ⑥ FILLER ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 4.
- ⑦ FILLER ASSEMBLY STRAP, 1-1/4" X .035" OR .031" X 20'-4" LONG STEEL STRAPPING (2 REQD).
- ⑧ STRAPPING BOARD (2 REQD). SEE DETAIL ON PAGE 22.
- ⑨ DOORWAY PROTECTION STEEL STRAPPING, 1-1/4" X .035" OR .031" X 38'-6" LONG STEEL STRAPPING (2 REQD). INSTALL AS SHOWN TO ENCIRCLE THOSE LOAD UNITS WHICH EXTEND INTO THE DOORWAY AREA MORE THAN ONE-HALF THE LENGTH OF A CONTAINER.



**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-4" WIDE WOOD-LINED CUSHIONED TYPE BOX-CAR EQUIPPED WITH LOAD DIVIDERS AND 10'-6" WIDE DOOR OPENINGS IS SHOWN. BOXCARS OF OTHER DIMENSIONS CAN BE USED.
2. CRIB FILL ASSEMBLIES ARE REQUIRED WHEN THE SPACE BETWEEN THE LATERALLY ADJACENT CONTAINERS EXCEEDS 6", AS MEASURED FROM UNIT TO UNIT.
3. A WIDER OR NARROWER BOXCAR CAN BE USED FOR SHIPPING THE DEPICTED LOAD BY ADJUSTING THE STRUTS ON THE CRIB FILL ASSEMBLIES, PIECES MARKED ⑤ ON PAGE 8.

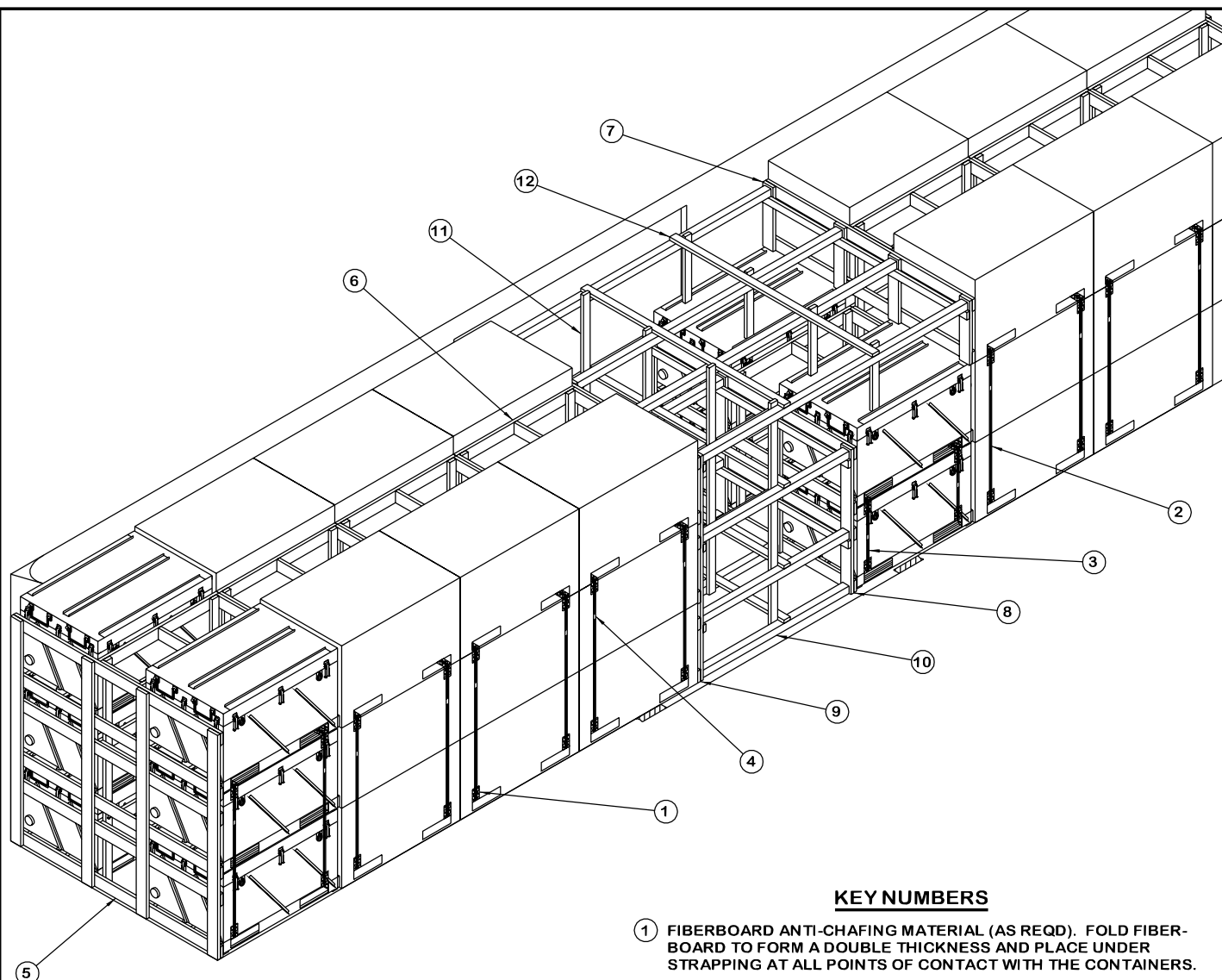
**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	211	141
2" X 6"	729	729
NAILS	NO. REQD	POUNDS
10d (3")	898	14
STEEL STRAPPING, 1-1/4" - - -730' REQD - - - 105 LBS		
SEAL FOR 1-1/4" STRAPPING - - 12 REQD - - 1-1/2 LBS		

**LOAD AS SHOWN**

<u>ITEM</u>	<u>QUANTITY</u>	<u>WEIGHT (APPROX)</u>
CNU-373 CONTAINER	- - - 47	- - - - - 56,024 LBS
DUNNAGE	- - - - -	- - - - - 1,859 LBS
TOTAL WEIGHT		- - - - - 57,883 LBS (APPROX)

**47 CONTAINER LOAD IN A 50'-6" LONG BY 9'-4" WIDE  
CONVENTIONAL BOXCAR EQUIPPED WITH LOAD DIVER BULKHEADS**



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① FIBERBOARD ANTI-CHAFING MATERIAL (AS REQD). FOLD FIBERBOARD TO FORM A DOUBLE THICKNESS AND PLACE UNDER STRAPPING AT ALL POINTS OF CONTACT WITH THE CONTAINERS.
- ② UNITIZING STRAP FOR 3 HIGH CONTAINER STACKS, 1-1/4" X .035" OR .031" X 19'-9" LONG STEEL STRAPPING (28 REQD).
- ③ UNITIZING STRAP FOR 2 HIGH CONTAINER STACKS, 1-1/4" X .035" OR .031" X 13'-8" LONG STEEL STRAPPING (4 REQD).
- ④ SEAL FOR 1-1/4" STRAPPING (32 REQD, 1 PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES.
- ⑤ ENDWALL BULKHEAD (2 REQD). SEE THE DETAIL ON PAGE 20.
- ⑥ CRIB FILL ASSEMBLY (7 REQD FOR 3 HIGH CONTAINER STACKS, 1 REQD FOR 2 HIGH CONTAINER STACKS). SEE THE DETAIL ON PAGE 21 AND SPECIAL NOTES 2 AND 3 ON PAGE 11.
- ⑦ CENTER GATE FOR ONE HIGH CONTAINER STACKS (1 REQD). SEE THE DETAIL ON PAGE 20.
- ⑧ CENTER GATE FOR TWO HIGH CONTAINER STACKS (1 REQD). SEE THE DETAIL ON PAGE 20.
- ⑨ CENTER GATE FOR THREE HIGH CONTAINER STACKS (1 REQD). SEE THE DETAIL ON PAGE 20.
- ⑩ STRUT, 4" X 4" BY CUT-TO-FIT (12 REQD, REF: 6'-8" FOR THREE LOWER LAYERS, 4 REQD, REF: 12'-1" FOR TOP LAYER). TOENAIL TO CENTER GATES W/2-16d NAILS AT EACH END.
- ⑪ VERTICAL STRUT BRACING, 2" X 4" BY CUT-TO-FIT (4 REQD, REF: 8'-10" FOR FULL HEIGHT BRACING, 4 REQD, REF: 32" FOR BRACING ABOVE 2 HIGH CONTAINER STACKS). NAIL TO THE STRUTS, PIECES MARKED ⑩, W/3-10d NAILS AT EACH JOINT.
- ⑫ HORIZONTAL STRUT BRACING, 2" X 4" BY CAR WIDTH MINUS 2" (5 REQD). NAIL TO THE STRUTS, PIECES MARKED ⑩, W/3-10d NAILS AT EACH JOINT.

**SPECIAL NOTES:**

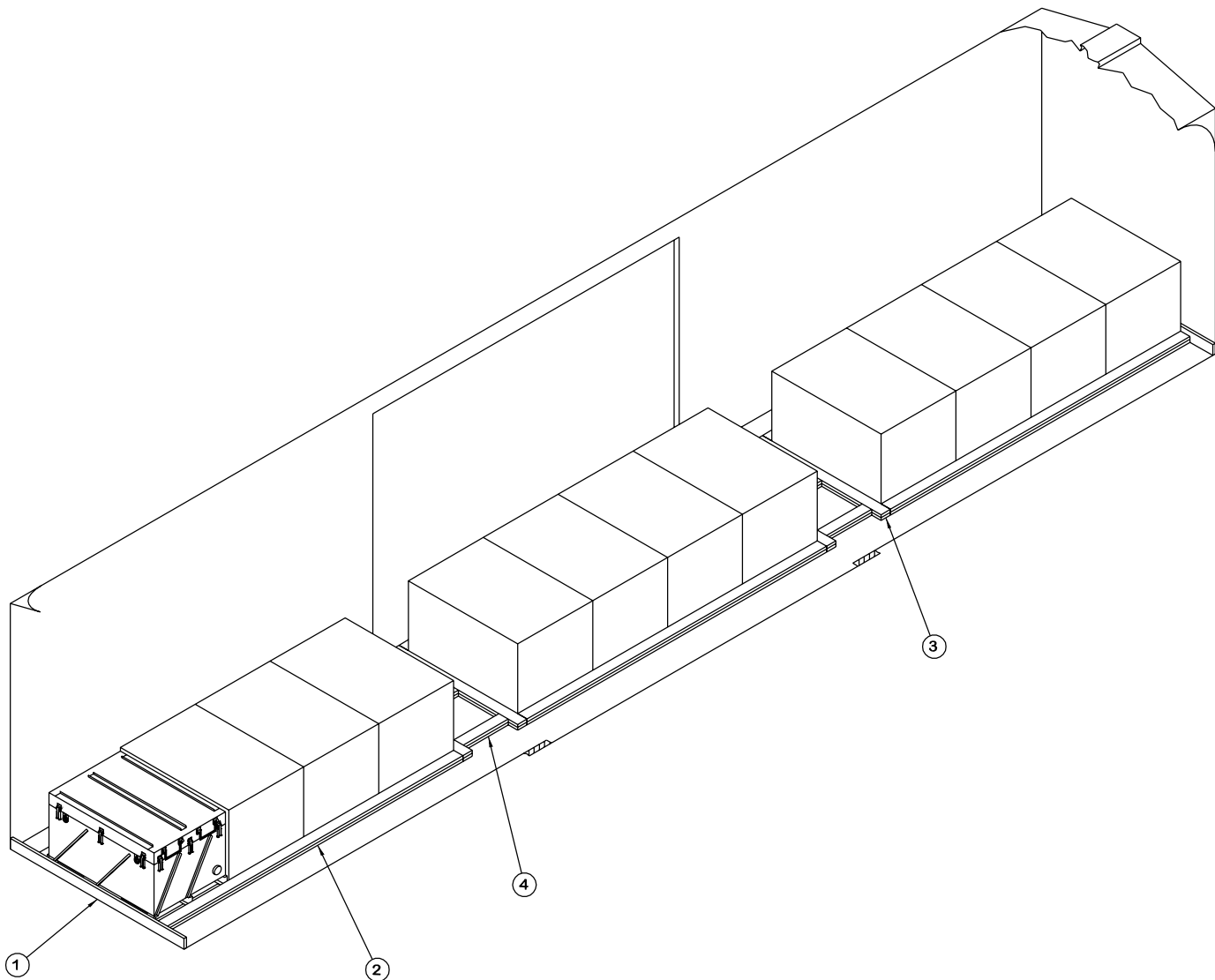
1. A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOXCAR EQUIPPED WITH 10'-6" WIDE DOOR OPENINGS IS SHOWN. BOXCARS OF OTHER DIMENSIONS AND BOXCARS HAVING OTHER DOOR OPENINGS CAN BE USED.
2. CRIB FILL ASSEMBLIES ARE REQUIRED WHEN THE SPACE BETWEEN THE LATERALLY ADJACENT CONTAINERS EXCEEDS 6", AS MEASURED FROM UNIT TO UNIT.
3. A WIDER OR NARROWER BOXCAR CAN BE USED FOR SHIPPING THE DEPICTED LOAD BY ADJUSTING THE CRIB FILL STRUT LENGTH, PIECES MARKED ⑤ ON PAGE 10.

**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	414	276
2" X 6"	728	728
4" X 4"	129	172
NAILS	NO. REQD	POUNDS
10d (3")	1156	18
16d (3-1/2")	64	1-1/2
STEEL STRAPPING, 1-1/4" - - -608' REQD - - - - 87 LBS		
SEAL FOR 1-1/4" STRAPPING - - 32 REQD - - 1-1/2 LBS		

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
CNU-373 CONTAINER	- - - 46 - - - - -	54,832 LBS
DUNNAGE	- - - - -	2,456 LBS
TOTAL WEIGHT - - - - -		57,288 LBS (APPROX)



**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① ENDWALL BULKHEAD, 2" X 6" BY CAR WIDTH MINUS 1/2" (2 REQD). NAIL TO THE ENDWALL W/6-8d NAILS.
- ② SIDE BLOCKING, 2" X 6" BY LADING LENGTH (DOUBLED) (6 REQD). LOCATE AS SHOWN. LAMINATE THE FIRST PIECE TO THE CAR FLOOR W/1-16d NAILS EVERY 12". LAMINATE THE SECOND PIECE TO THE FIRST W/1-16d NAILS EVERY 12". RANDOM LENGTHS MAY BE USED.
- ③ HEADER, 2" X 6" X 6'-3" (DOUBLED (4 REQD)). LOCATE SO AS TO BE CENTERED ON THE CONTAINER AND LAMINATE THE FIRST PIECE TO THE CAR FLOOR W 6-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST W/6-40d NAILS.
- ④ BACK-UP CLEAT, 2" X 6" BY CUT-TO FIT (DOUBLED) (6 REQD). LOCATE AS SHOWN. LAMINATE FIRST PIECE TO THE CAR FLOOR W/4-16d NAILS. LAMINATE THE SECOND PIECE TO THE FIRST W/4-40d NAILS.

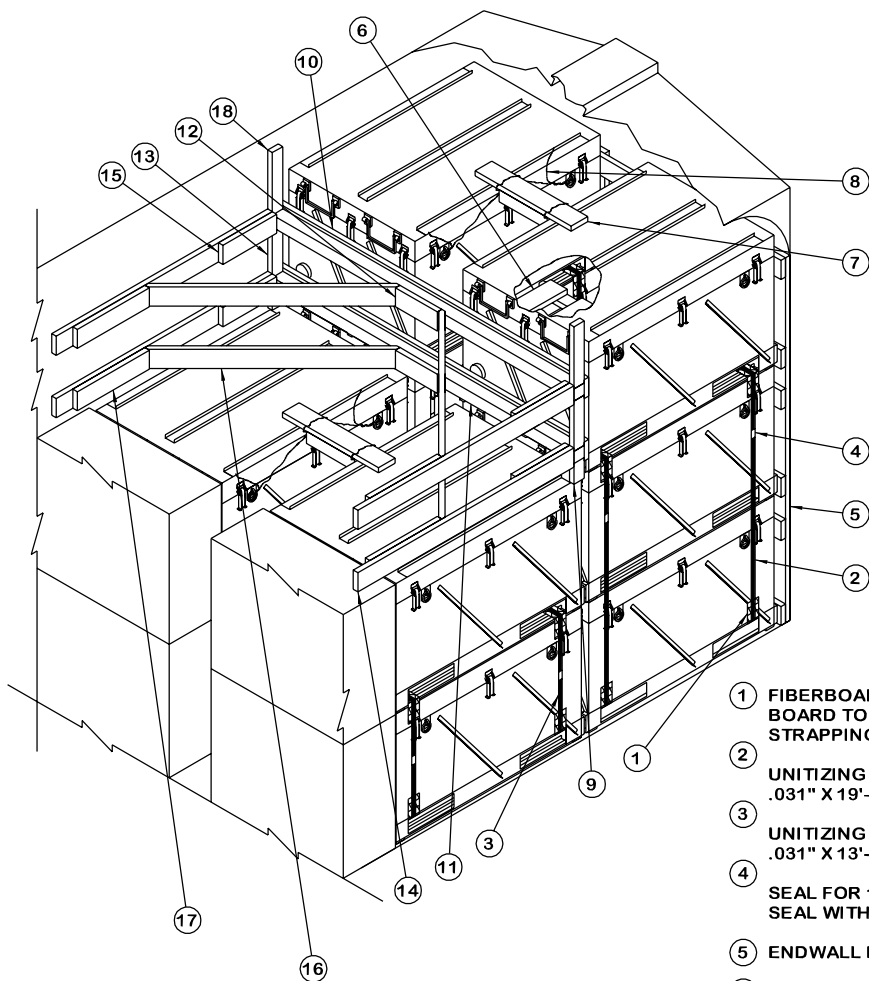
**SPECIAL NOTES:**

1. A 50'-6" LONG BY 8'-6" WIDE CONVENTIONAL BOXCAR IS SHOWN. BOXCARS OF OTHER DIMENSIONS CAN BE USED.
2. A WIDER OR NARROWER BOXCAR CAN BE USED FOR SHIPPING THE DEPICTED LOAD BY ADJUSTING THE DISTANCE FROM THE SIDE-WALL TO THE INSIDE OF THE SIDE BLOCKING PIECES, PIECES MARKED ② ON PAGE 12.

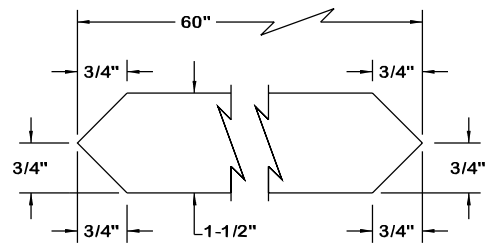
BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
2" x 6"	270	270
NAILS	NO. REQD	POUNDS
8d (2-1/2")	12	1/2
16d (3-1/2")	260	5-3/4
40d (5")	80	4-3/4

**LOAD AS SHOWN**

<u>ITEM</u>	<u>QUANTITY</u>	<u>WEIGHT (APPROX)</u>
CNU-373 CONTAINER	12	14,304 LBS
DUNNAGE		550 LBS
TOTAL WEIGHT		14,854 LBS (APPROX)



**ISOMETRIC VIEW**



**DIAGONAL BRACE**

**KEY NUMBERS**

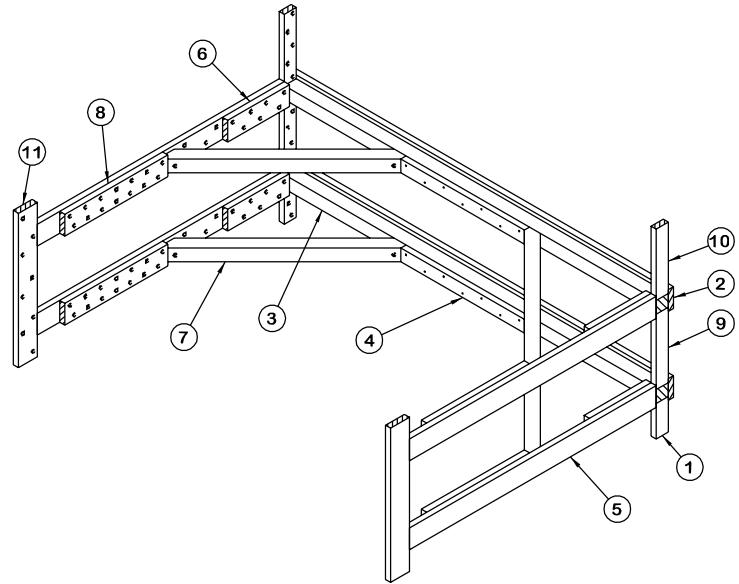
- ① FIBERBOARD ANTI-CHAFING MATERIAL (AS REQD). FOLD FIBERBOARD TO FORM A DOUBLE THICKNESS AND PLACE UNDER STRAPPING AT ALL POINTS OF CONTACT WITH THE CONTAINERS.
- ② UNITIZING STRAP FOR 3 HIGH CONTAINER STACKS, 1-1/4" X .035" OR .031" X 19'-9" LONG STEEL STRAPPING (28 REQD).
- ③ UNITIZING STRAP FOR 2 HIGH CONTAINER STACKS, 1-1/4" X .035" OR .031" X 13'-8" LONG STEEL STRAPPING (4 REQD).
- ④ SEAL FOR 1-1/4" STRAPPING (32 REQD, 1 PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES.
- ⑤ ENDWALL BULKHEAD (1 REQD). SEE THE DETAIL ON PAGE 20.
- ⑥ ANTI-SWAY BRACE (5 SHOWN). SEE THE DETAIL ON PAGE 25. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF CONTAINERS.
- ⑦ TOP-OF-LOAD ANTI-SWAY BRACE (2 SHOWN). SEE THE DETAIL ON PAGE 20.
- ⑧ TIE WIRE, .0800" DIA 60" LONG (4 REQD). INSTALL THE WIRE TO FORM A COMPLETE LOOP AROUND THE TOP-OF-LOAD ANTI-SWAY BRACE AND A LIFTING RING OF THE CONTAINER. BRING ENDS TOGETHER AND TWIST TAUT.
- ⑨ SUPPORT CLEAT, 2" X 4" X 6" (2 REQD). NAIL TO THE SIDEWALL W/3-12d NAILS. POSITION AS TO CENTER PIECES ⑨ AND ⑩ ACROSS CONTAINER ANGLE SUPPORT PIECES. SEE SPECIAL NOTE 3 AT LEFT.
- ⑩ LOAD BEARING PIECE, 2" X 6" BY CAR WIDTH (CUT-TO-FIT) (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ⑪, W/1-12d NAIL EVERY 6".
- ⑪ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH (CUT-TO-FIT) (2 REQD).
- ⑫ CENTER CLEAT, 2" X 4" X 14" (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ⑩, W/4-16d NAILS. SEE SPECIAL NOTE 4 AT LEFT.
- ⑬ SPACER CLEAT, 2" X 4" X 14-1/2" (2 REQD). NAIL TO THE CAR SIDEWALL W/4-12d NAILS.
- ⑭ HORIZONTAL WALL CLEAT, 2" X 4" X 6'-0" (4 REQD). NAIL TO THE CAR SIDEWALL W/6-12d NAILS.
- ⑮ POCKET CLEAT, 2" X 4" X 12" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT W/4-16d NAILS.
- ⑯ DIAGONAL BRACE, 2" X 4" X 60" (4 REQD). SEE THE DETAIL ABOVE FOR BEVEL CUTS REQUIRED. TOENAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑭, AND TO THE CROSS CAR BRACE, PIECE MARKED ⑪, W/2-16d NAILS AT EACH END.
- ⑰ BACK-UP CLEAT, 2" X 6" X 24" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑭, W/8-16d NAILS.
- ⑱ HOLD-DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.

**SPECIAL NOTES:**

1. AN 8'-6" WIDE CONVENTIONAL WOOD-LINED BOXCAR IS SHOWN. WOOD-LINED CARS OF OTHER WIDTHS CAN BE USED.
2. 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 6 CONTAINERS.
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 OR CONFIGURATION OF THE CAR DOORS WILL NOT PERMIT PROPER INSTALLATION OF THE SPECIFIED K-BRACE DUNNAGE. PIECES MARKED ⑨, ⑩, ⑪, ⑬, ⑮, AND ⑱ MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDEWALL. IT IS ALRIGHT FOR THE ENDS OF THE DIAGONAL BRACES MARKED ⑯ TO BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE ADJACENT PIECE MARKED ⑭ MUST BE DOUBLED AND EXTENDED ACROSS AND FAR ENOUGH PAST THE DOOR OPENING (REF: 54") TO PROVIDE FOR THE SPECIFIED NAILING OF EACH PIECE. LAMINATE THE SECOND PIECE OF THE DOUBLED PIECE MARKED ⑭ 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 58-7/8" LONG IN LIEU OF 60" WHEN PIECE MARKED ⑭ IS DOUBLED.
4. THE CENTER CLEAT, SHOWN AS PIECE MARKED ⑫, WILL BE 14" LONG FOR AN 8'-6" WIDE CAR, 22" LONG FOR A 9'-2", AND 24" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.

**SPECIAL NOTES:**

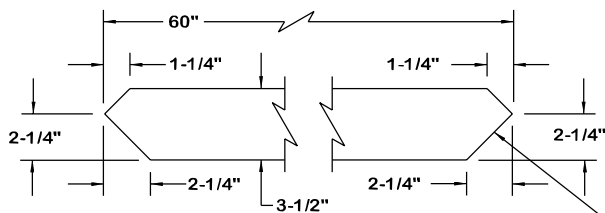
1. THE TYPE "B" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN 14,000 POUNDS OR NOT MORE THAN 10 CONTAINERS. IF ONLY TWO TO SIX CONTAINERS ARE TO BE SHIPPED IN THE PARTIAL LAYER, THE TYPE "A" K-BRACE DEPICTED ON PAGE 14 MAY BE USED.
2. **CAUTION:** SOME CARS ARE NOT SUITED FOR THE APPLICATION OF "PARTIAL-LAYER BRACING" BECAUSE THE LENGTH OF THE PARTIAL TIER TO BE SHIPPED AND/OR THE SIZE OR CONFIGURATION OF THE CAR DOORS WILL NOT PERMIT PROPER INSTALLATION OF THE SPECIFIED K-BRACE DUNNAGE. PIECES MARKED ①, ②, ③, ⑥, ⑨, ⑩, AND ⑪ MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDEWALL. IT IS ALRIGHT FOR THE ENDS OF THE DIAGONAL BRACES MARKED ⑦ TO BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE ADJACENT PIECE MARKED ⑤ MUST BE DOUBLED AND EXTENDED ACROSS AND FAR ENOUGH PAST THE DOOR OPENING (REF: 54") TO PROVIDE FOR THE SPECIFIED NAILING OF EACH PIECE. LAMINATE THE SECOND PIECE OF THE DOUBLED PIECE MARKED ⑤ TO THE FIRST W/16-16d NAILS. CLINCH THOSE NAILS WHICH PROTRUDE THRU THE HORIZONTAL WALL CLEAT WITHIN THE DOOR OPENING. NOTE THAT THE DIAGONAL BRACE WILL BE 58-7/8" LONG IN LIEU OF 60" WHEN PIECE MARKED ⑤ IS DOUBLED.
3. THE CENTER CLEAT, SHOWN AS PIECE MARKED ④, WILL BE 28" LONG FOR AN 8'-6" WIDE CAR, 36" LONG FOR A 9'-2", AND 38" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.
4. REFER TO PAGE 14 FOR A TYPICAL INSTALLATION OF A K-BRACE.



**ISOMETRIC VIEW**

**KEY NUMBERS**

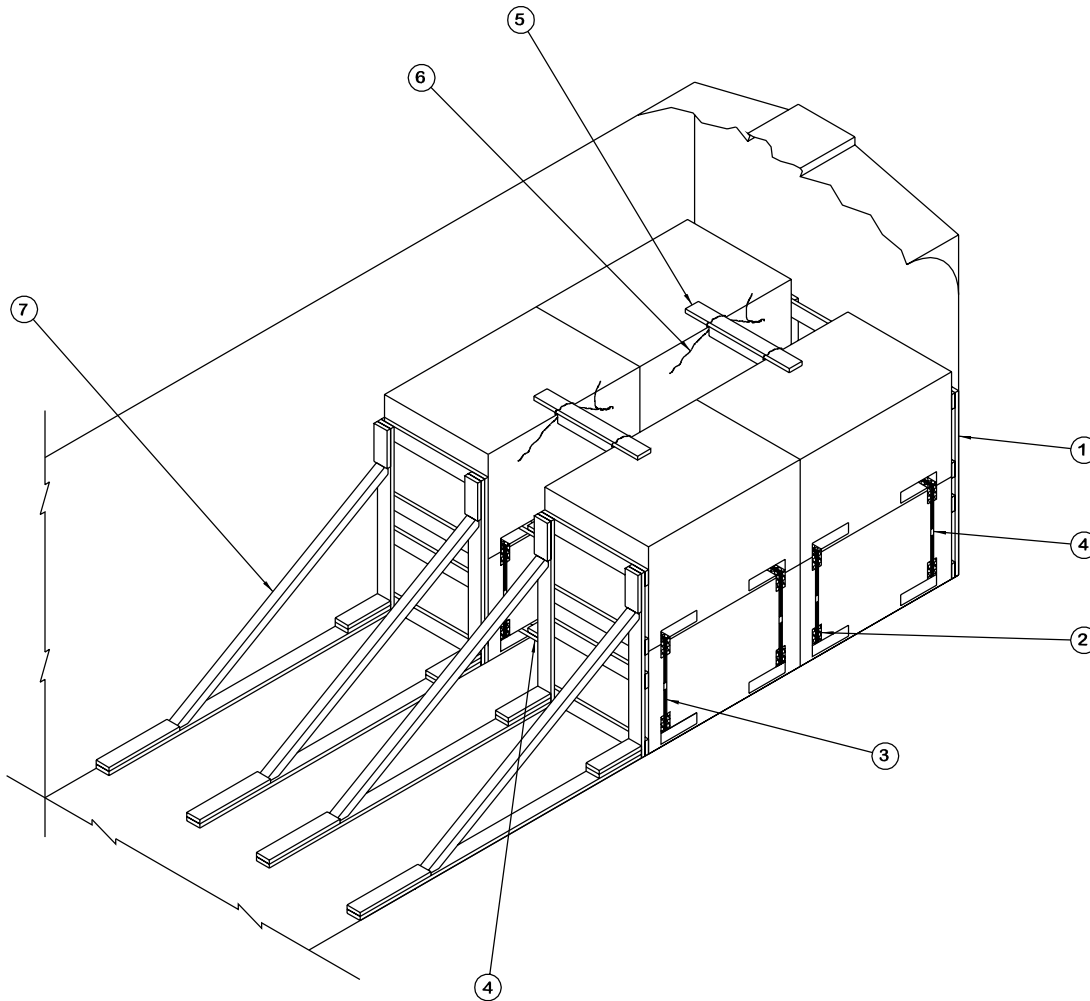
- ① SUPPORT CLEAT, 2" X 4" X 6" (2 REQD). POSITION VERTICALLY AS SHOWN SO AS TO CENTER PIECES MARKED ② AND ③ ON THE JOINT BETWEEN THE BOTTOM TWO LAYERS OF CONTAINERS ON THE UNITS. NAIL TO THE CAR SIDEWALL W/3-12d NAILS.
- ② LOAD BEARING PIECE, 2" X 6" BY CAR WIDTH (CUT TO FIT) (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/1-12d NAIL EVERY 6".
- ③ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH (CUT TO FIT) (2 REQD).
- ④ CENTER CLEAT, 2" X 4" X 36" (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/7-16d NAILS. SEE SPECIAL NOTE 3 AT LEFT.
- ⑤ HORIZONTAL WALL CLEAT, 2" X 6" X 6'-0" (4 REQD). NAIL TO THE CAR SIDEWALL W/16-12d NAILS.
- ⑥ POCKET CLEAT, 2" X 6" X 12" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/7-16d NAILS.
- ⑦ DIAGONAL BRACE, 4" X 4" X 60" (4 REQD). SEE THE DETAIL BELOW FOR BEVEL-CUTS REQUIRED. TOENAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, AND TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/1-60d NAIL AT EACH END.
- ⑧ BACK-UP CLEAT, 2" X 6" X 24" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/14-16d NAILS.
- ⑨ SPACER CLEAT, 2" X 4" X 14-1/2" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑩ HOLD-DOWN CLEAT, 2" X 6" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑪ VERTICAL BACK-UP CLEAT, 2" X 6" X 39" (2 REQD). NAIL TO THE CAR SIDEWALL W/8-12d NAILS.



**DIAGONAL BRACE**

SEE SPECIAL NOTE 2 ABOVE.

THIS BEARING SURFACE MUST BE POSITIONED SO AS TO BE IN CONTACT WITH A CROSS CAR BRACE, PIECE MARKED ③, OR A HORIZONTAL WALL CLEAT, PIECE MARKED ⑤.



**ISOMETRIC VIEW**

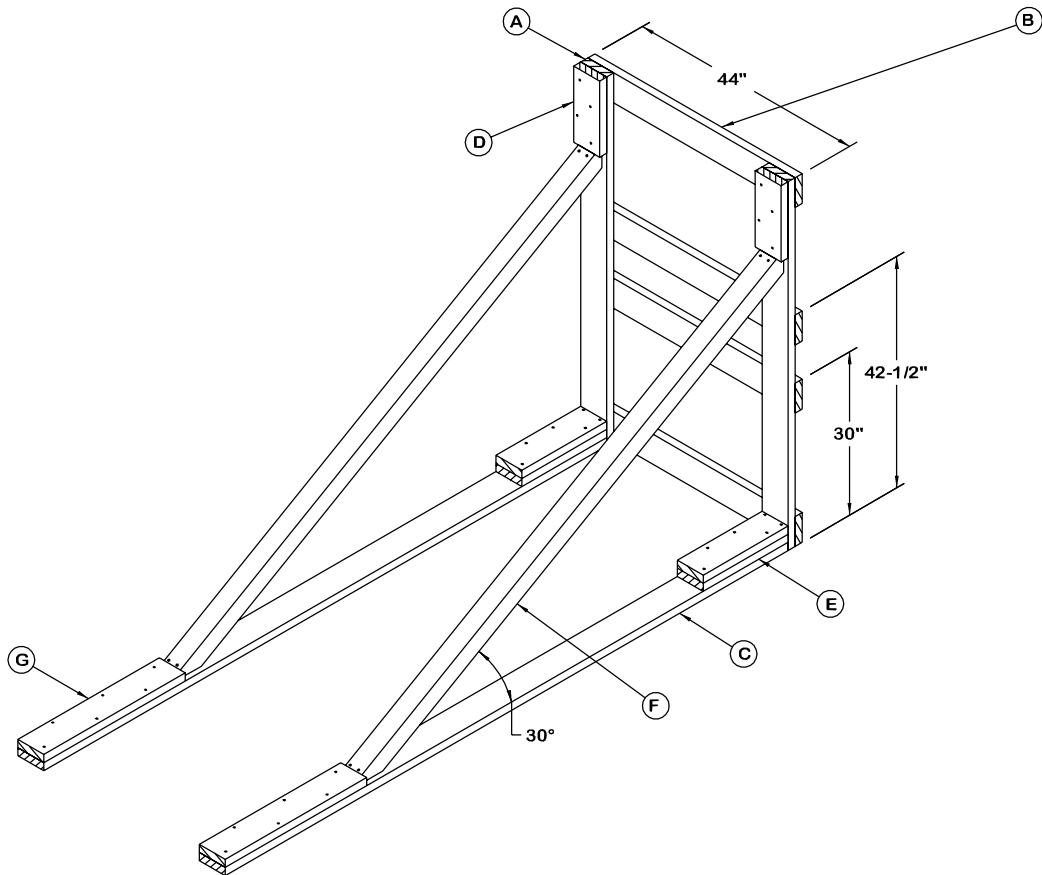
**SPECIAL NOTES:**

1. A 9'-2" WIDE CONVENTIONAL TYPE BOXCAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS AND CARS HAVING METAL LININGS MAY 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 CONTAINERS. ONE KNEE BRACE ASSEMBLY IS ADEQUATE FOR RETAINING A MAXIMUM LCL LOAD OF NOT MORE THAN 8,500 POUNDS OR SEVEN CONTAINERS.
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.

**KEY NUMBERS**

- ① ENDWALL BULKHEAD (1 REQD). SEE THE DETAIL ON PAGE 20.
- ② FIBERBOARD ANTI-CHAFING MATERIAL (AS REQD). FOLD FIBERBOARD TO FORM A DOUBLE THICKNESS AND PLACE UNDER STRAPPING AT ALL POINTS OF CONTACT WITH THE CONTAINERS.
- ③ UNITIZING STRAP FOR 2 HIGH CONTAINER STACKS, 1-1/4" X .035" OR .031" X 13'-8" LONG STEEL STRAPPING (16 REQD).
- ④ SEAL FOR 1-1/4" STRAPPING (16 REQD, 1 PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF NOTCHES.
- ⑤ ANTI-SWAY BRACE (4 REQD). SEE THE DETAIL ON PAGE 25. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF CONTAINERS.
- ⑥ TOP-OF-LOAD ANTI-SWAY BRACE (2 REQD). SEE THE DETAIL ON PAGE 20.
- ⑦ TIE WIRE, .0800" DIA 60" LONG (4 REQD). INSTALL THE WIRE TO FORM A COMPLETE LOOP AROUND THE TOP-OF-LOAD ANTI-SWAY BRACE AND A LIFTING RING OF THE CONTAINER. BRING ENDS TOGETHER AND TWIST TAUT.
- ⑧ KNEE BRACE ASSEMBLY (2 REQD). SEE DETAIL ON PAGE 17.

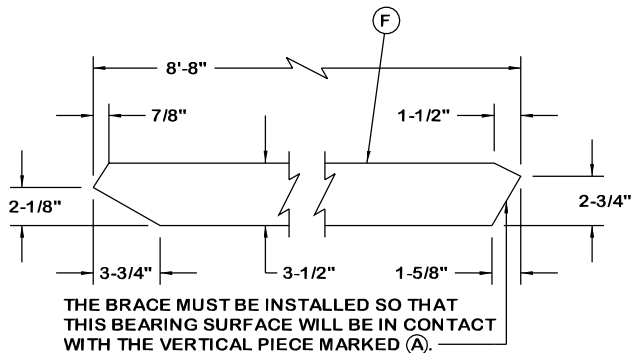




**KNEE BRACE ASSEMBLY**

**KEY LETTERS**

- (A) VERTICAL PIECE, 2" X 6" X 67'-3/4" (2 REQD). NAIL TO A FLOOR CLEAT, PIECE MARKED (C), W/3-16d NAILS.
- (B) HORIZONTAL PIECE, 2" X 6" X 44" (4 REQD). NAIL TO THE VERTICAL PIECES, PIECE MARKED (A), W/3-10d NAILS AT EACH JOINT.
- (C) FLOOR CLEAT, 2" X 6" X 10'-0" (2 REQD). NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8".
- (D) HOLD-DOWN CLEAT, 2" X 6" X 14" (2 REQD). NAIL TO A VERTICAL PIECE, PIECE MARKED (A), W/4-10d NAILS.
- (E) POCKET CLEAT, 2" X 6" X 18" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE FLOOR CLEAT, PIECE MARKED (C), W/4-16d NAILS. NAIL THE SECOND PIECE IN A LIKE MANNER AND TOENAIL THE SECOND PIECE TO THE VERTICAL PIECE, PIECE MARKED (A), W/2-16d NAILS.
- (F) BRACE, 4" X 4" X 8'-8" (2 REQD). SEE THE DETAIL BELOW FOR BEVEL-CUTS REQUIRED. TOENAIL TO THE VERTICAL PIECE AND TO THE FLOOR CLEAT, PIECES MARKED (A) AND (C), W/2-16d NAILS.
- (G) BACK-UP CLEAT, 2" X 6" X 30" (2 REQD). NAIL TO THE FLOOR CLEAT, PIECE MARKED (C), W/6-40d NAILS.



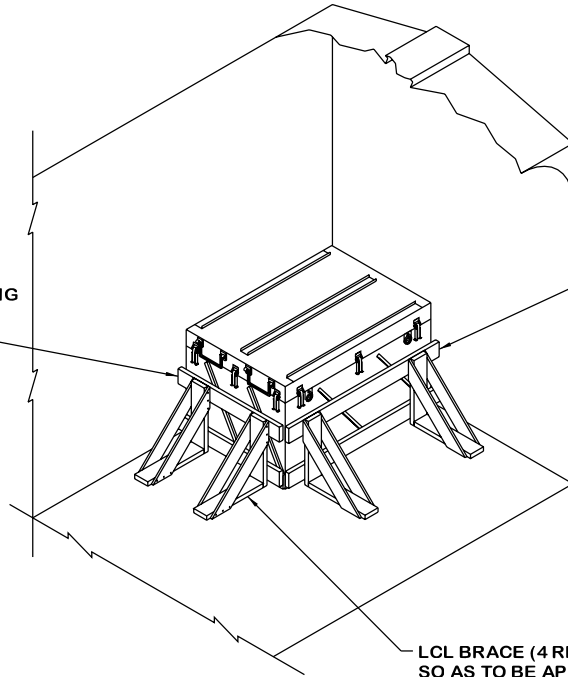
THE BRACE MUST BE INSTALLED SO THAT THIS BEARING SURFACE WILL BE IN CONTACT WITH THE VERTICAL PIECE MARKED (A).

**BRACE BEVEL DETAIL**

4" X 4" MATERIAL

END HORIZONTAL PIECE, 2" X 6" X 44"  
(2 REQD). NAIL TO LCL BRACE W/3-10d  
NAILS AT EACH JOINT PRIOR TO PLACING  
AGAINST CONTAINER.

SIDE HORIZONTAL PIECE, 2" X 6" X 64"  
(2 REQD). NAIL TO LCL BRACE W/3-10d  
NAILS AT EACH JOINT PRIOR TO  
PLACING AGAINST CONTAINER.



LCL BRACE (4 REQD). SEE THE DETAIL BELOW. LOCATE  
SO AS TO BE APPROXIMATELY 6" FROM THE END OF THE  
HORIZONTAL PIECES. NAIL TO THE FLOOR W/7-16d NAILS.

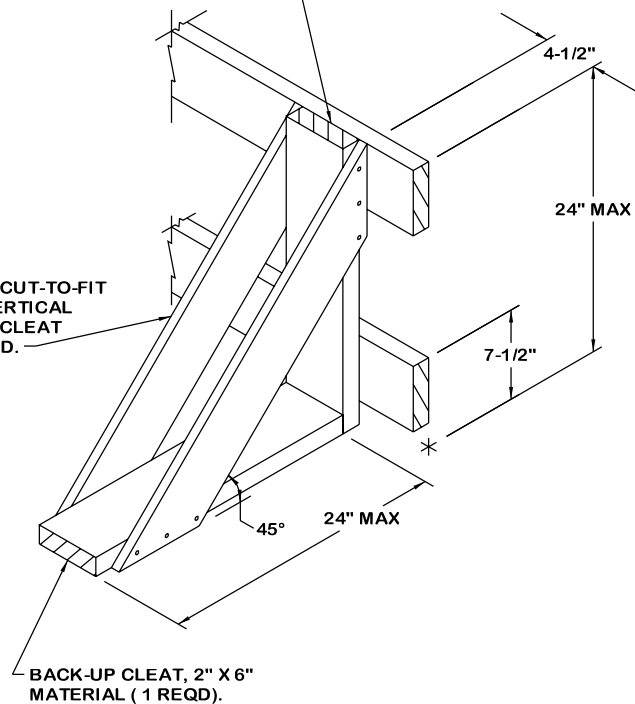
**ISOMETRIC VIEW**

**SPECIAL NOTES:**

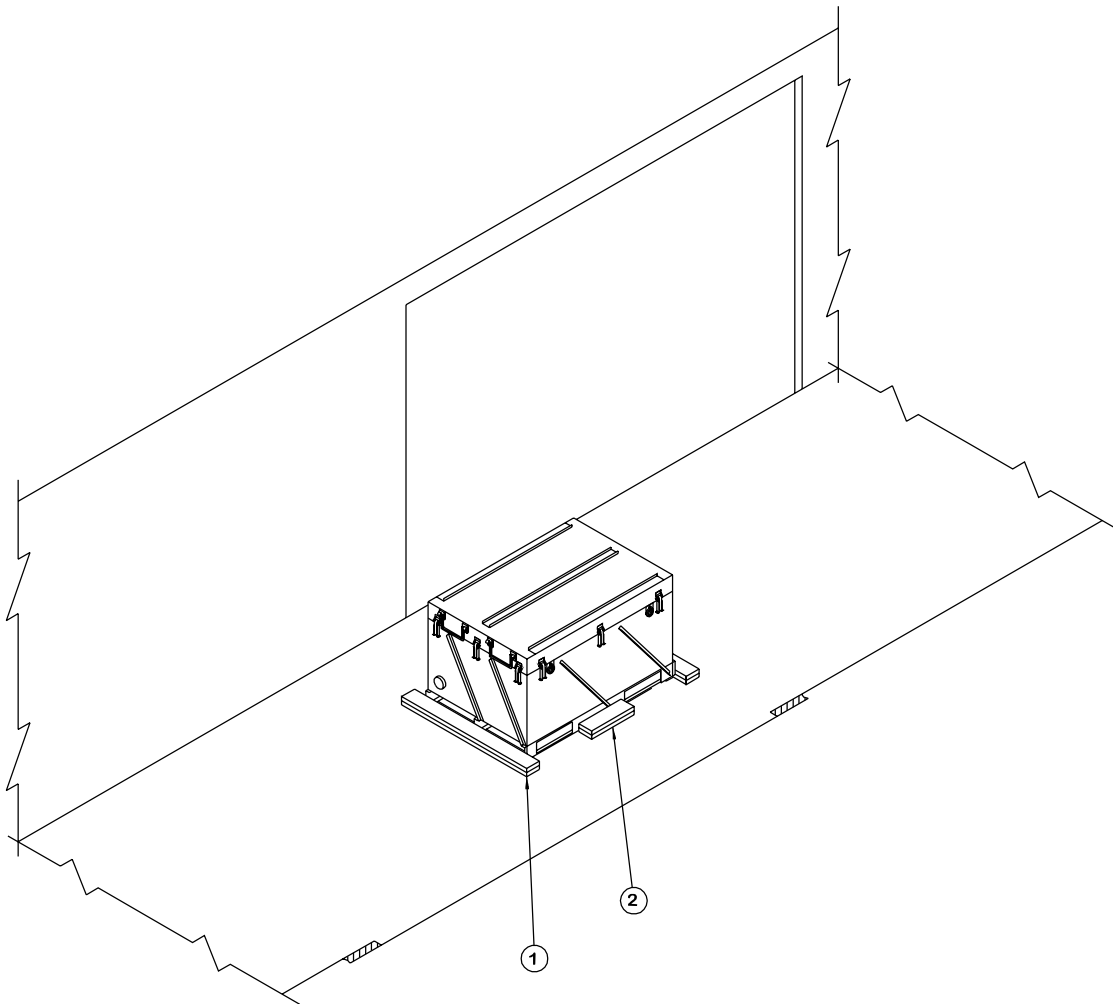
1. AN 8'-6" WIDE WOOD-LINED CONVENTIONAL TYPE BOXCAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED.
2. THE LOAD SHOWN DEPICTING THE LCL BRACE METHOD OF PARTIAL-LAYER BRACING IS TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR OTHER QUANTITIES AS LONG AS THE CAPACITY OF THE BRACES IS NOT EXCEEDED. SEE SPECIAL NOTE 3.
3. EACH LCL BRACE AS APPLIED FOR LONGITUDINAL BRACING WILL RETAIN 2,000 POUNDS OF LADING. EACH LCL BRACE AS APPLIED FOR LATERAL BRACING WILL SUPPORT 8,000 POUNDS OF LADING. A MINIMUM OF TWO BRACES MUST BE USED FOR LONGITUDINAL BRACING. BRACES MAY BE ADDED FOR LONGITUDINAL BRACING AS NECESSARY.

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

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



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



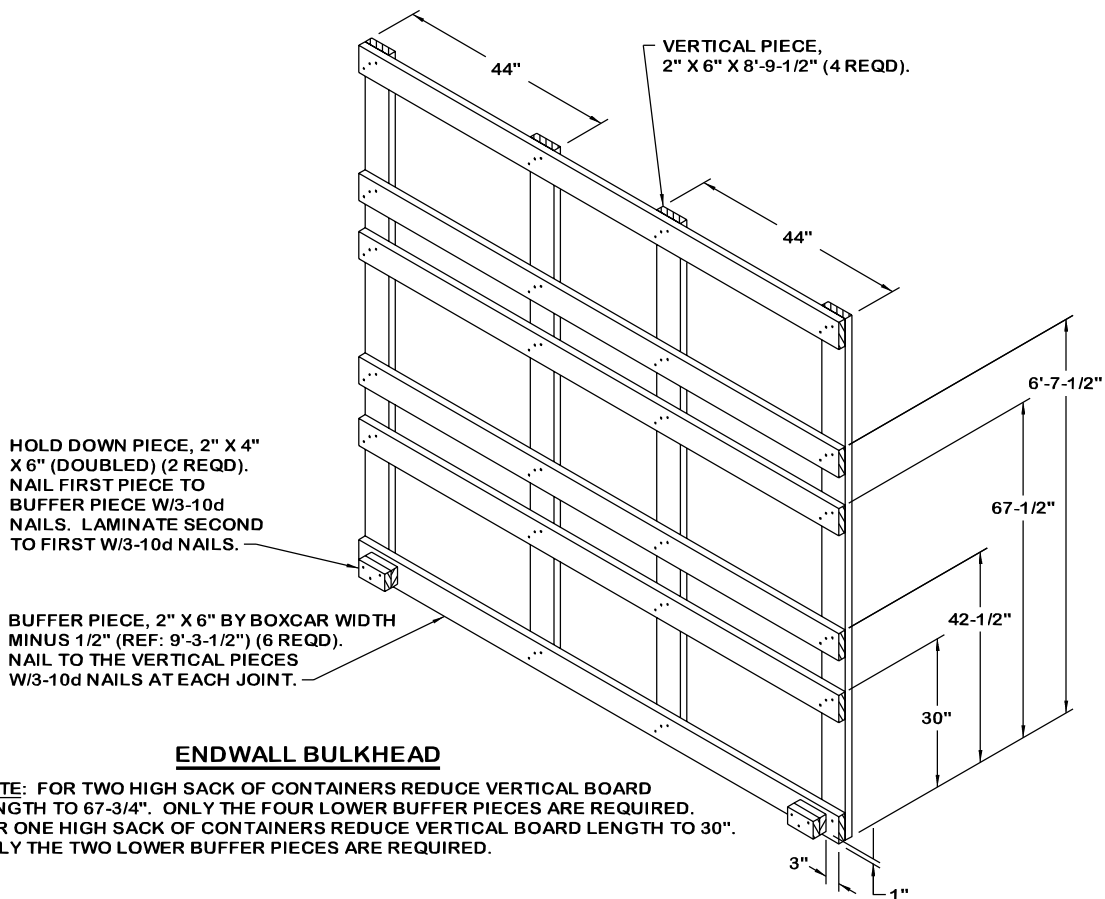
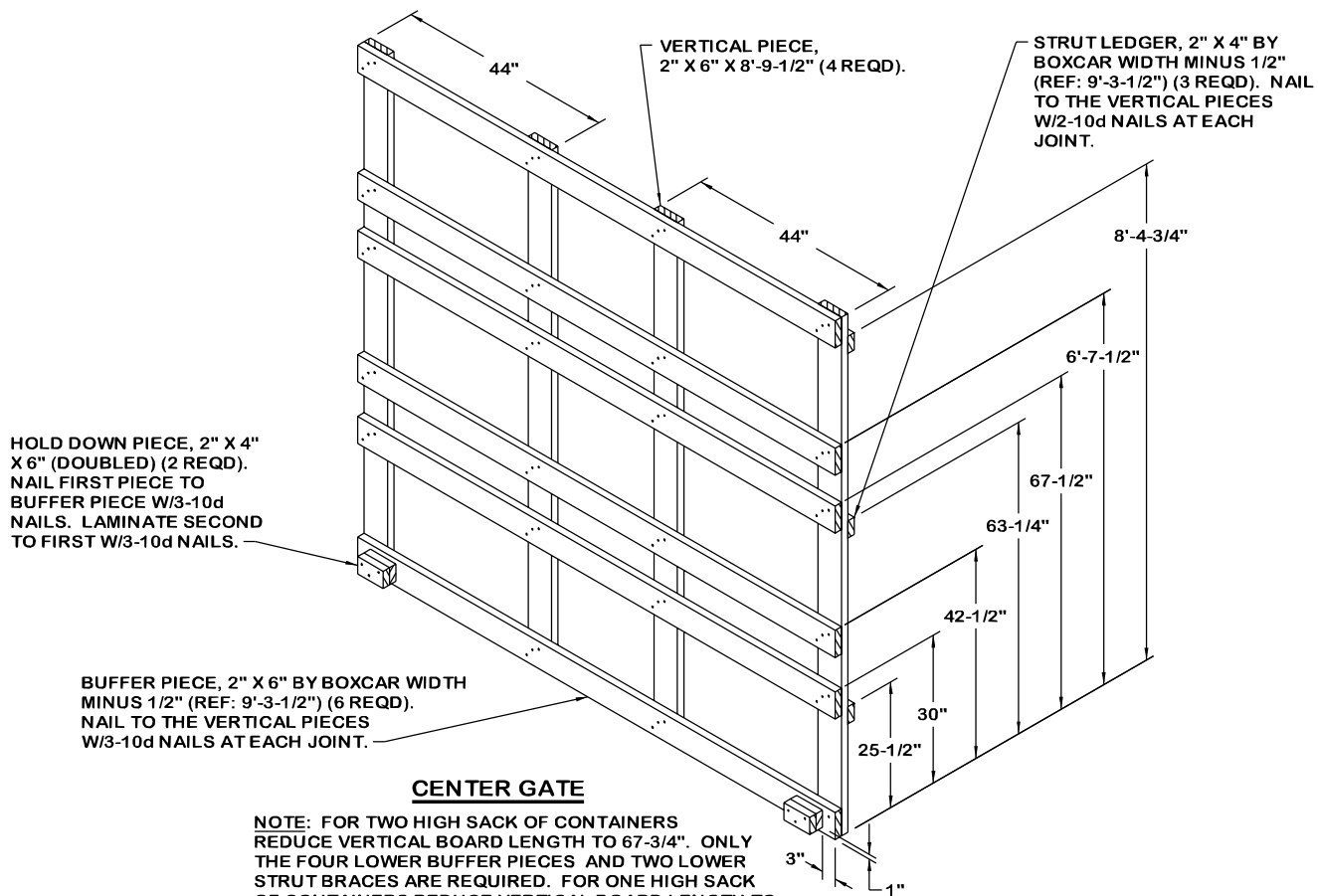
**ISOMETRIC VIEW**

**SPECIAL NOTES:**

1. A 9'-2" WIDE CONVENTIONAL TYPE BOXCAR EQUIPPED WITH 14'-0" WIDE STAGGERED DOOR OPENINGS IS SHOWN. BOXCARS OF OTHER WIDTHS AND BOXCARS HAVING OTHER DOOR OPENINGS CAN BE USED.
2. THE PROCEDURES SHOWN ARE ONLY FOR USE IN BOXCARS HAVING WOODEN OR NAILABLE METAL FLOORS.
3. A WIDER OR NARROWER BOXCAR CAN BE USED FOR SHIPPING THE DEPICTED LOAD BY ADJUSTING THE DISTANCE FROM THE SIDEWALL TO THE INSIDE OF THE SIDE BLOCKING PIECES, PIECES MARKED ②.

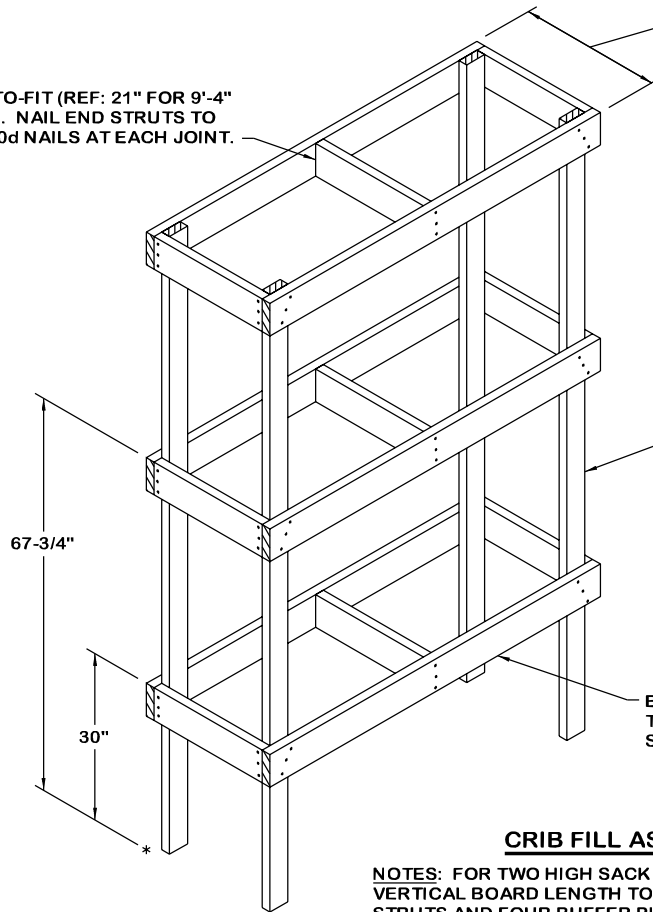
**KEY NUMBERS**

- ① HEADER, 2" X 6" X 45" (DOUBLED) (2 REQD). LOCATE SO AS TO BE CENTERED ON THE END OF THE CONTAINER. LAMINATE THE FIRST PIECE TO THE CAR FLOOR W/6-16d NAILS. LAMINATE THE SECOND PIECE TO THE FIRST W/6-40d NAILS.
- ② SIDE BLOCKING, 2" X 6" X 18" (DOUBLED) (4 REQD). LOCATE SO AS TO BE CENTERED ON THE SIDE OF THE CONTAINER. LAMINATE THE FIRST PIECE TO THE CAR FLOOR W/4-16d NAILS. LAMINATE THE SECOND PIECE TO THE FIRST W/4-16d NAILS.



STRUT, 2" X 6" BY CUT- TO-FIT (REF: 21" FOR 9'-4" WIDE BOXCAR) (9 REQD). NAIL END STRUTS TO VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

FABRICATE TO FIT BETWEEN LATERALLY ADJACENT CONTAINERS (REF: 24" FOR 9'-4" WIDE BOXCAR).



VERTICAL PIECE, 2" X 4" X 8'-9-1/2" (4 REQD).

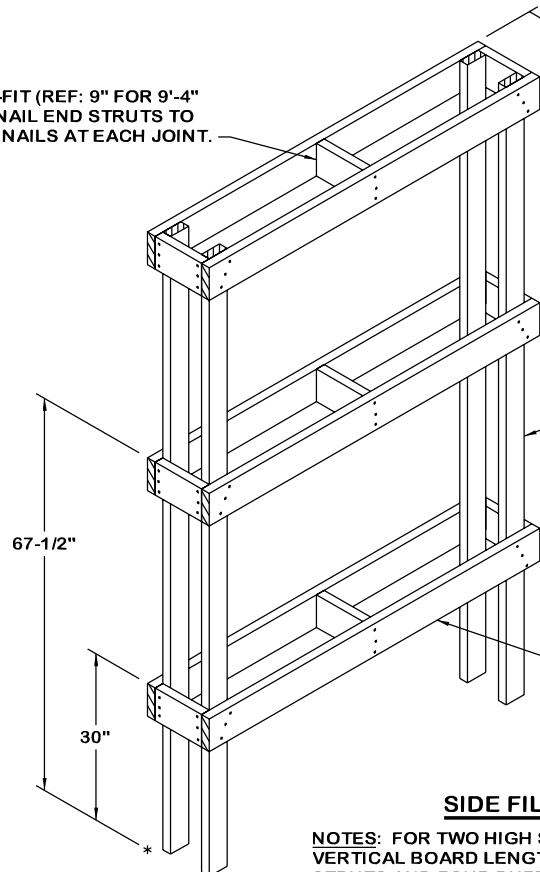
BUFFER PIECE, 2" X 6" X 64" (6 REQD). NAIL TO THE VERTICAL PIECES AND THE CENTER STRUTS W/3-10d NAILS AT EACH JOINT.

**CRIB FILL ASSEMBLY**

NOTES: FOR TWO HIGH SACK OF CONTAINERS REDUCE VERTICAL BOARD LENGTH TO 67-3/4". ONLY THE LOWER SIX STRUTS AND FOUR BUFFER PIECES ARE REQUIRED.

STRUT, 2" X 6" BY CUT- TO-FIT (REF: 9" FOR 9'-4" WIDE BOXCAR) (9 REQD). NAIL END STRUTS TO VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

FABRICATE TO FIT BETWEEN LATERALLY ADJACENT CONTAINERS (REF: 12" FOR 9'-4" WIDE BOXCAR).

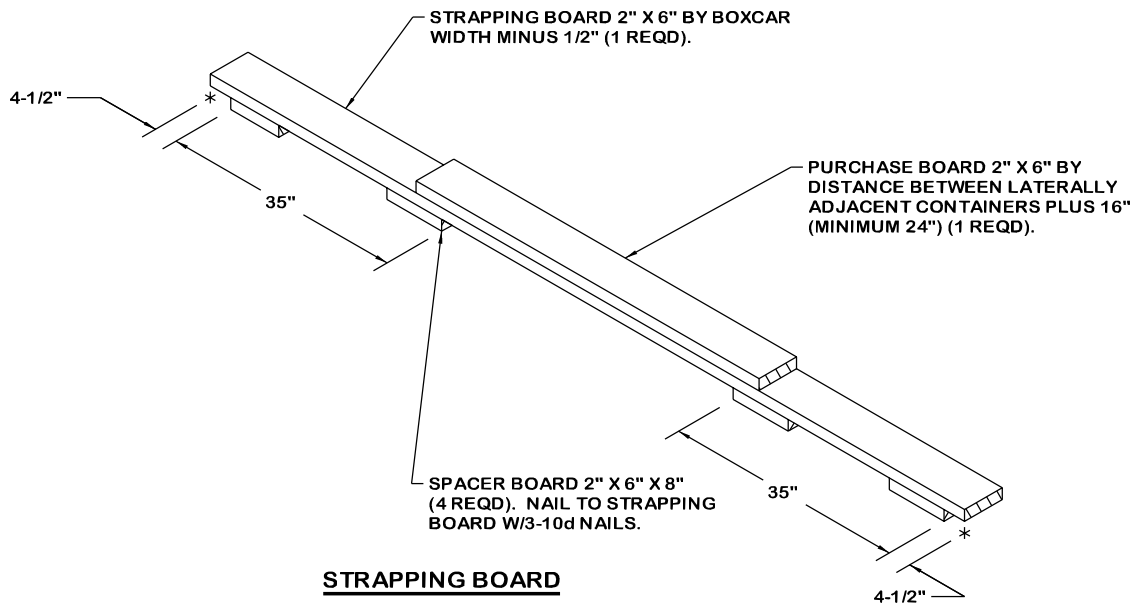
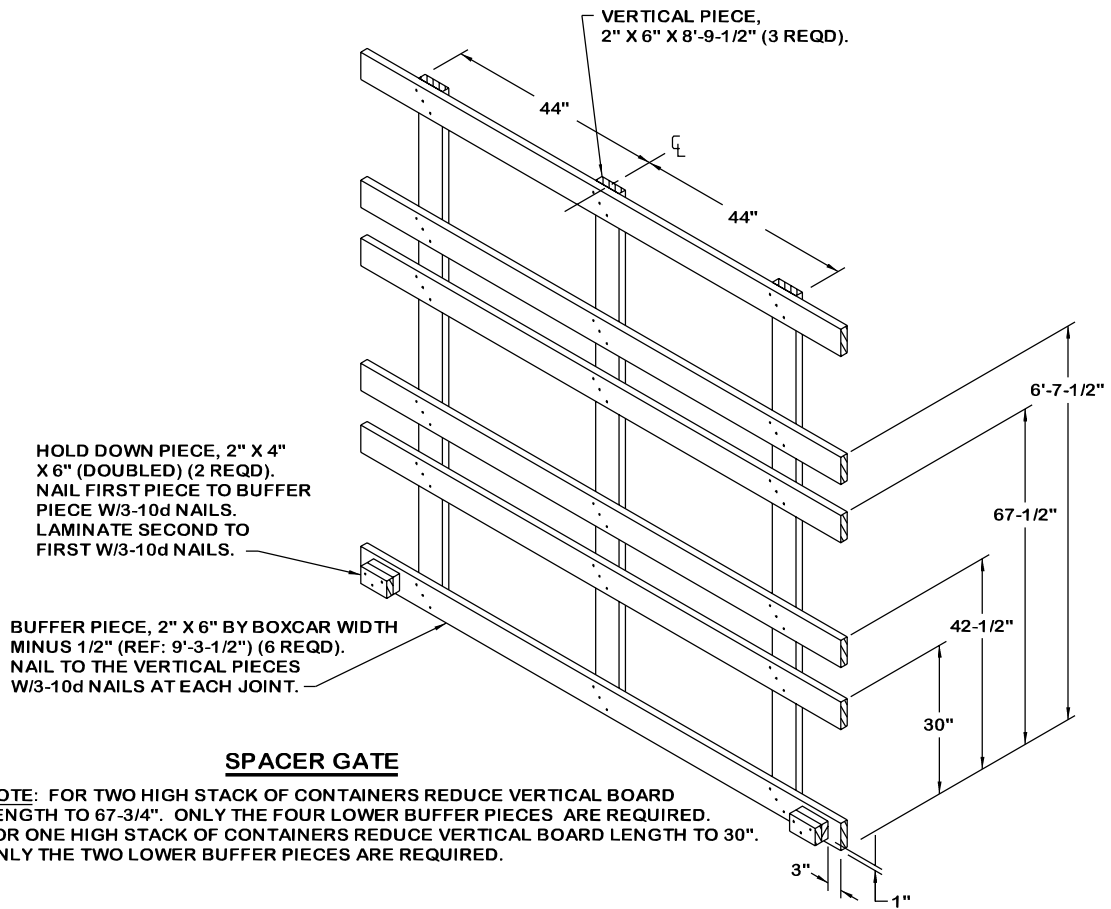


VERTICAL PIECE, 2" X 4" X 8'-9-1/2" (4 REQD).

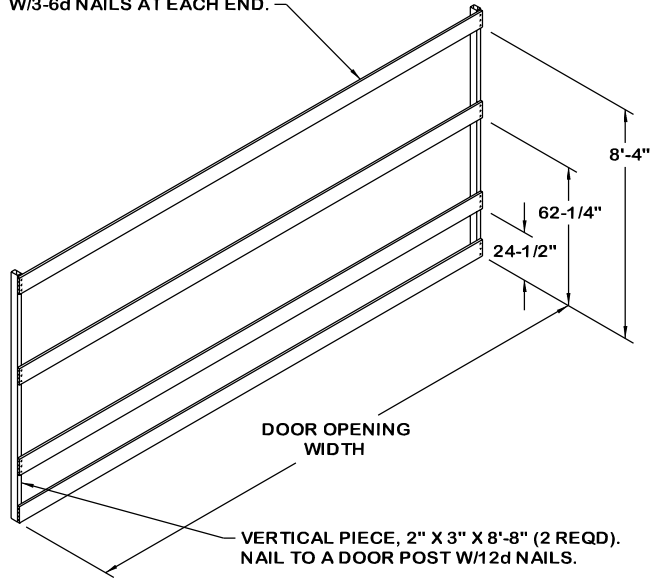
BUFFER PIECE, 2" X 6" X 64" (6 REQD). NAIL TO THE VERTICAL PIECES AND TO THE CENTER STRUTS W/3-10d NAILS AT EACH JOINT.

**SIDE FILL ASSEMBLY**

NOTES: FOR TWO HIGH SACK OF CONTAINERS REDUCE VERTICAL BOARD LENGTH TO 67-3/4". ONLY THE LOWER SIX STRUTS AND FOUR BUFFER PIECES ARE REQUIRED.



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

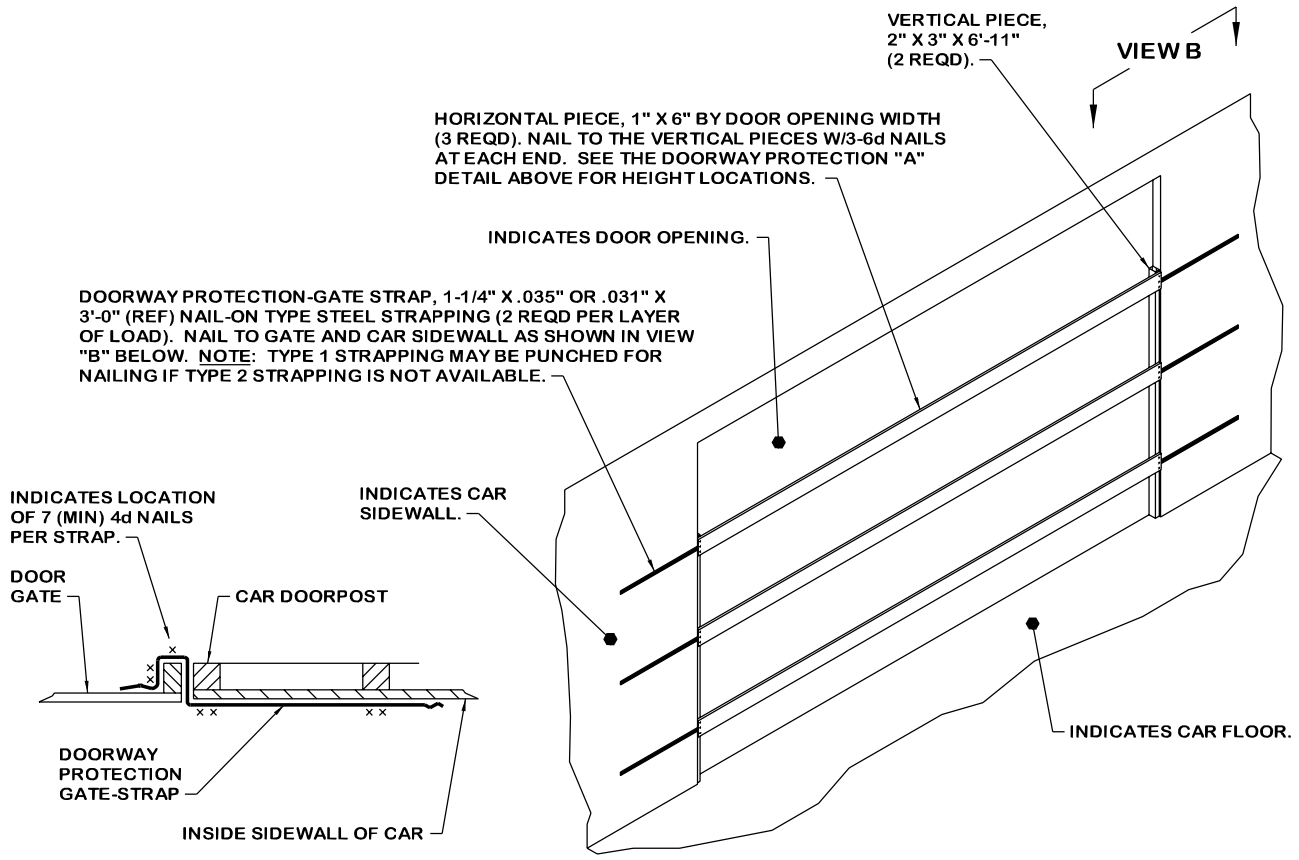


**DOORWAY PROTECTION A**

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 10 FOR GUIDANCE.
6. THE DETAILS ON PAGES 23 AND 24 DEPICT DOOR PROTECTION FOR A THREE-LAYER LOAD. FOR A TWO-LAYER LOAD, ELIMINATE THE TOP HORIZONTAL PIECE AND/OR STRAP AND REDUCE THE HEIGHT OF THE VERTICAL PIECES BY 38". FOR A ONE-LAYER LOAD, ELIMINATE THE TOP TWO HORIZONTAL PIECES AND/OR STRAPS AND REDUCE THE HEIGHT OF THE VERTICAL PIECES BY 75-1/4". FOR DOORWAY PROTECTION "D", MOVE THE SPANNER BY AN APPROPRIATE DISTANCE.

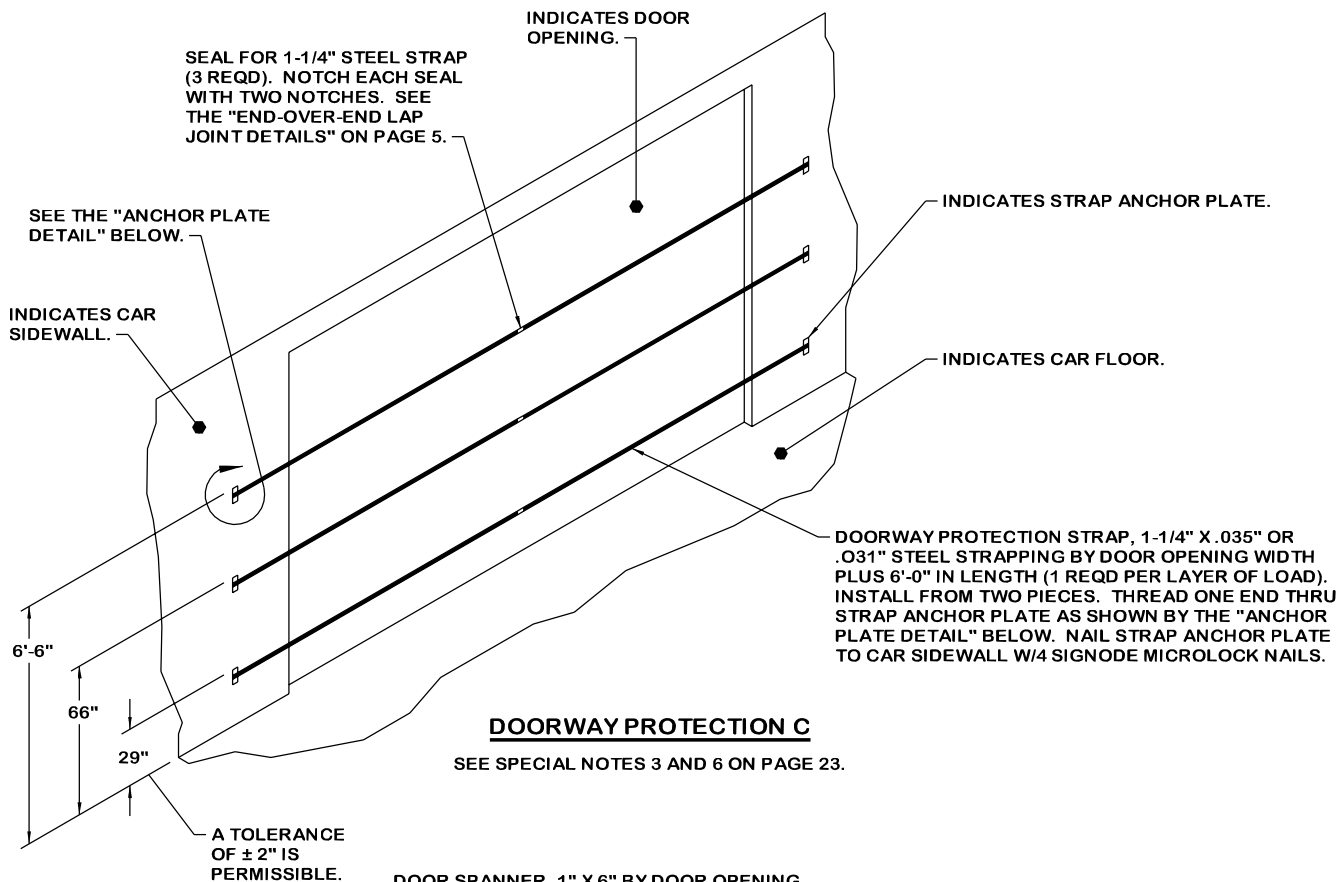


**VIEW B**

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

**DOORWAY PROTECTION B**

SEE SPECIAL NOTES 2 AND 6 ABOVE.

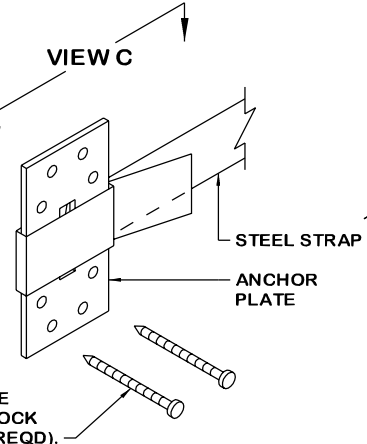


**DOORWAY PROTECTION C**

SEE SPECIAL NOTES 3 AND 6 ON PAGE 23.

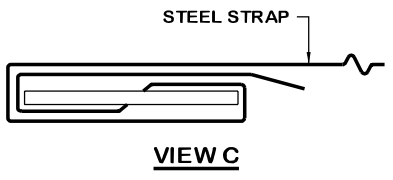
DOOR SPANNER, 1" X 6" BY DOOR OPENING WIDTH PLUS 24" (1 REQD). POSITION ABOVE THE LOAD AND NAIL THRU A FILLER BLOCK INTO A VERTICAL PIECE W/3-12d NAILS AT EACH JOINT. NAIL TO THE CAR SIDEWALL W/2-12d NAILS AT EACH END (OPTIONAL).

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

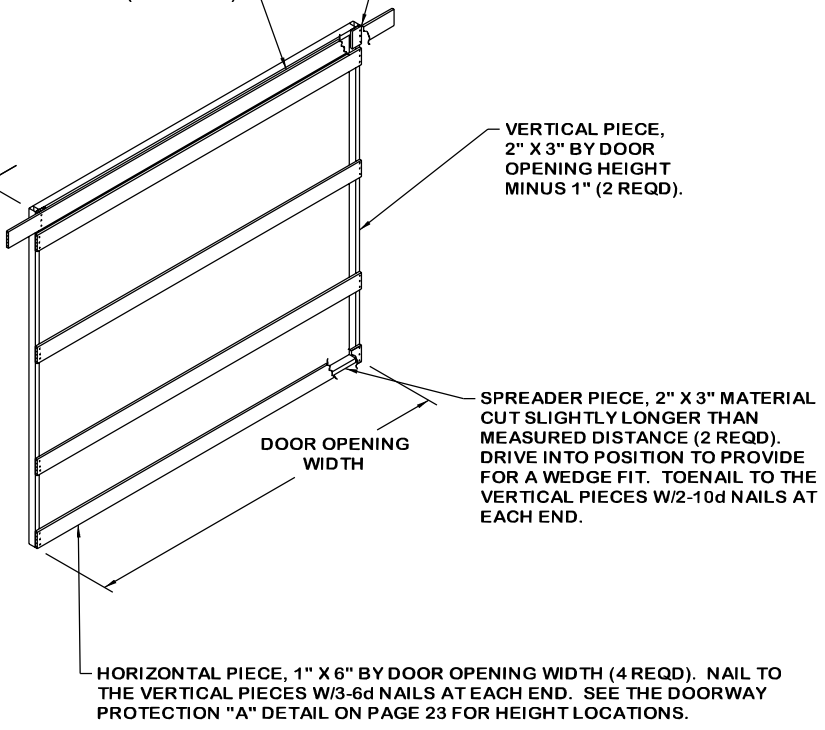


**ANCHOR PLATE DETAIL**

THIS VIEW AND VIEW "C" BELOW DEPICT THE PROPER THREADING OF A DOORWAY PROTECTION STRAP THRU AN ANCHOR PLATE. NOTE: FOR CLARITY PURPOSES, ONLY TWO NAILS ARE SHOWN. FOUR ARE REQUIRED.



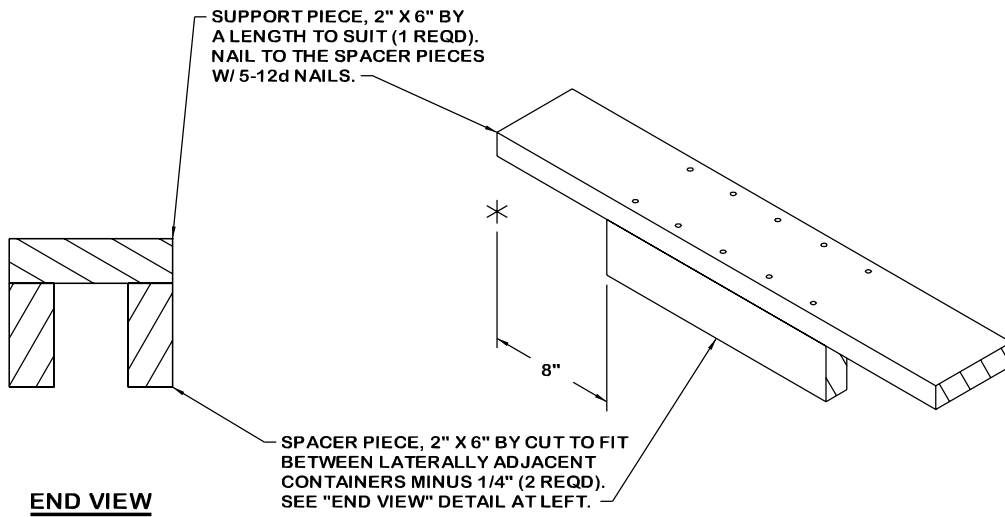
**VIEW C**



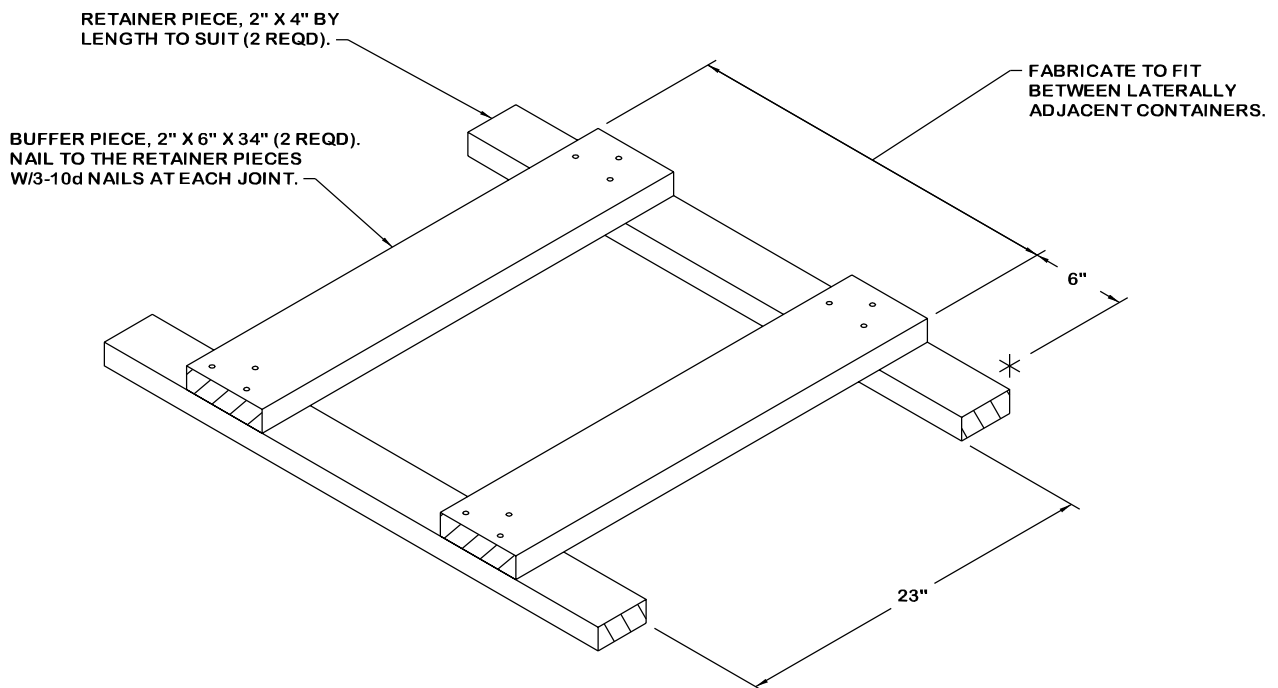
**DOORWAY PROTECTION D**

SEE SPECIAL NOTES 4 AND 6 ON PAGE 23.



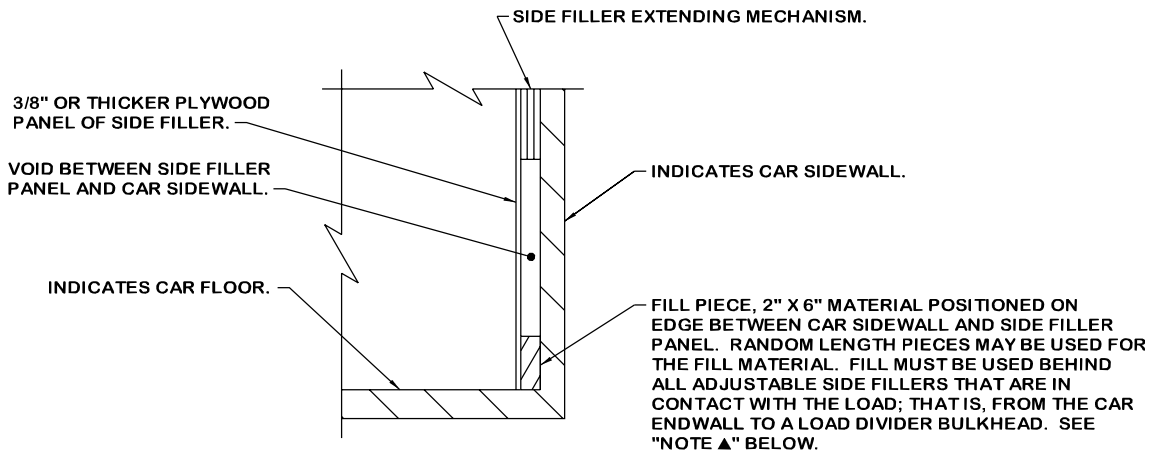


**TOP-OF-LOAD ANTI-SWAY BRACE**



**ANTI-SWAY BRACE**

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

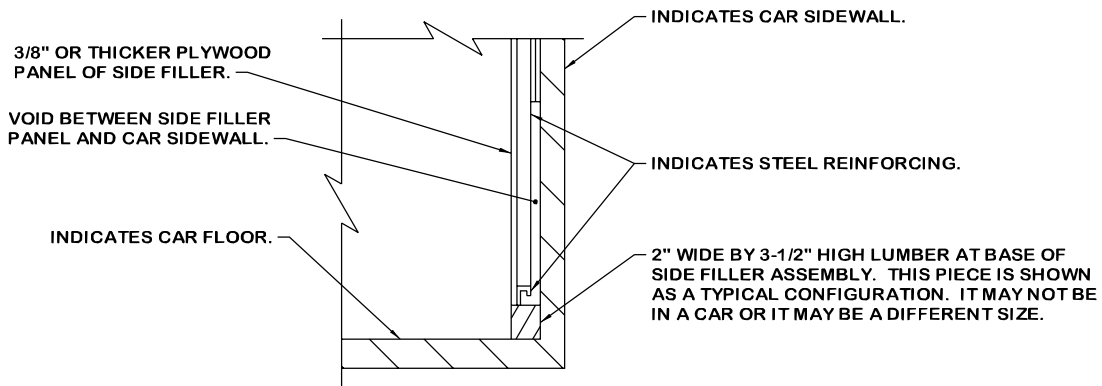


**SIDE FILLER TYPICAL TYPE A**

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.