

*[Signature]*

DATE 7-21-2007

# LOADING AND BRACING (CL & LCL) IN BOXCARS\* OF BLU-122 BOMBS PACKED IN CNU-658 CONTAINERS

## INDEX

ITEM	PAGE(S)
GENERAL NOTES AND MATERIAL SPECIFICATIONS - - - - -	2-3
CONTAINER DETAIL - - - - -	4
DETAILS - - - - -	5
27 CONTAINER LOAD IN A 50'-6" LONG BY 8'-6" WIDE CONVENTIONAL BOXCAR - - - - -	6-7
27 CONTAINER LOAD IN A 50'-6" LONG BY 9'-4" WIDE BOXCAR EQUIPPED WITH LOAD DIVIDER BULKHEADS - - - - -	8-9
23 CONTAINER LOAD IN A 60'-8" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR - - - - -	10-11
TYPICAL LCL USING KNEE BRACES - - - - -	12-13
DETAILS - - - - -	14-24

\*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		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 24.							
<i>[Signature]</i>		DO NOT SCALE			JULY 2007				
		ENGINEER OR TECHNICIAN	BASIC REV.	MELVIN SIX					
APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND		TRANSPORTATION ENGINEERING DIVISION	<i>[Signature]</i>						
<i>[Signature]</i> U.S. ARMY DEFENSE AMMUNITION CENTER		VALIDATION ENGINEERING DIVISION	<i>[Signature]</i>			TESTED			
		ENGINEERING DIRECTORATE	<i>[Signature]</i>			CLASS	DIVISION	DRAWING	FILE
						19	48	8848	SP5PB3

## 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 BLU-122 BOMBS PACKED IN CNU-658 CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS CONTAINER WITH BOMB INSTALLED. SEE AIR FORCE DRAWING X20065101 AND PAGE 4 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 FOR SHIPMENTS IN CUSHIONED BOXCARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.
- E. THE SELECTION OF RAILCARS FOR THE TRANSPORT OF CNU-658 CONTAINERS IS THE RESPONSIBILITY OF THE ORIGINATING CARRIER AND THE SHIPPER. ONLY CARS WHICH HAVE "SOUND" FLOORS AND ARE IN OTHERWISE PROPER CONDITION, IN ACCORDANCE WITH THE REQUIREMENTS OF THE APPLICABLE REGULATORY DOCUMENTS, WILL BE SELECTED.
- F. WHEN SELECTING RAILCARS, EVERY EFFORT SHOULD BE MADE TO OBTAIN BOXCARS THAT DO NOT HAVE BOWED ENDWALLS. CARS HAVING BOWED ENDS CAN BE USED, HOWEVER, IF AN ENDWALL IS BOWED OUTWARD MORE THAN 2" EITHER FROM SIDE TO SIDE OR FROM FLOOR TO ROOF, SHIMS MUST BE INSTALLED ON THE ENDWALL GATE TO PROVIDE A "SQUARED OFF" SURFACE FOR THE LOAD AT THE END OF THE CAR. SEE THE DETAIL ON PAGE 24.
- G. CONVENTIONAL BOXCARS EQUIPPED WITH SLIDING DOORS HAVE BEEN SHOWN, HOWEVER, THE DEPICTED OUTLOADING PROCEDURES ARE ALSO APPLICABLE FOR CONVENTIONAL CARS EQUIPPED WITH PLUG DOORS. **CAUTION:** DUNNAGE MATERIAL MUST NOT BE NAILED TO ANY PLUG DOOR, WHETHER AUXILIARY OR MAIN. ALSO, AFTER THE PLUG DOORS ON A CAR ARE CLOSED AND READY FOR THE INSTALLATION OF CAR SEALS, A PIECE OF WIRE OF SUITABLE SIZE WILL BE USED IN ADDITION TO AND IN CONJUNCTION WITH EACH CAR SEAL USED TO SEAL THE CAR. THE WIRE WILL BE THREADED THRU THE HOLES IN THE DOOR LATCH ASSEMBLY ONE OR MORE TIMES AND THE WIRE ENDS WILL BE TWISTED TOGETHER.
- H. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN CARS WHICH ARE PARTIALLY LOADED WITH BLU-122 BOMBS, PROVIDING THE TOTAL LOAD IS COMPATIBLE, EXISTING DIRECTIVES ARE NOT VIOLATED, AND THE OTHER LADING ITEMS ARE BLOCKED AND BRACED TO EQUAL THE BLOCKING AND BRACING CRITERIA SPECIFIED HEREIN.

(CONTINUED AT RIGHT)

## (GENERAL NOTES CONTINUED)

- J. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-1/2" THICK BY 3-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE.
- 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, 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.
- Q. CONVERSION TO METRIC EQUIVALENTS: DIMENSIONS WITHIN THIS DOCUMENT ARE EXPRESSED IN INCHES AND WEIGHTS ARE EXPRESSED IN POUNDS. WHEN NECESSARY, THE METRIC EQUIVALENTS MAY BE COMPUTED ON THE BASIS OF ONE INCH EQUALS 25.4MM AND ONE POUND EQUALS 0.454 KG.
- R. AS REQUIRED BY THE ASSOCIATION OF AMERICAN RAILROADS (AAR), ALL 1-1/4" AND 2" STEEL STRAPPING USED FOR LOAD RESTRAINT MUST BE MARKED AS SPECIFIED WITHIN THE APPLICABLE AAR RULES GOVERNING LOADING, BLOCKING AND BRACING OF FREIGHT WITHIN THE CONVEYANCE. FOR THE SPECIFIC MARKING SIZE, FREQUENCY, ETC., REQUIRED, REFER TO THE APPROPRIATE AAR LOADING RULES.

(CONTINUED ON PAGE 3)

## MATERIAL SPECIFICATIONS

- LUMBER - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOL-UNTARY 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.
- 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.

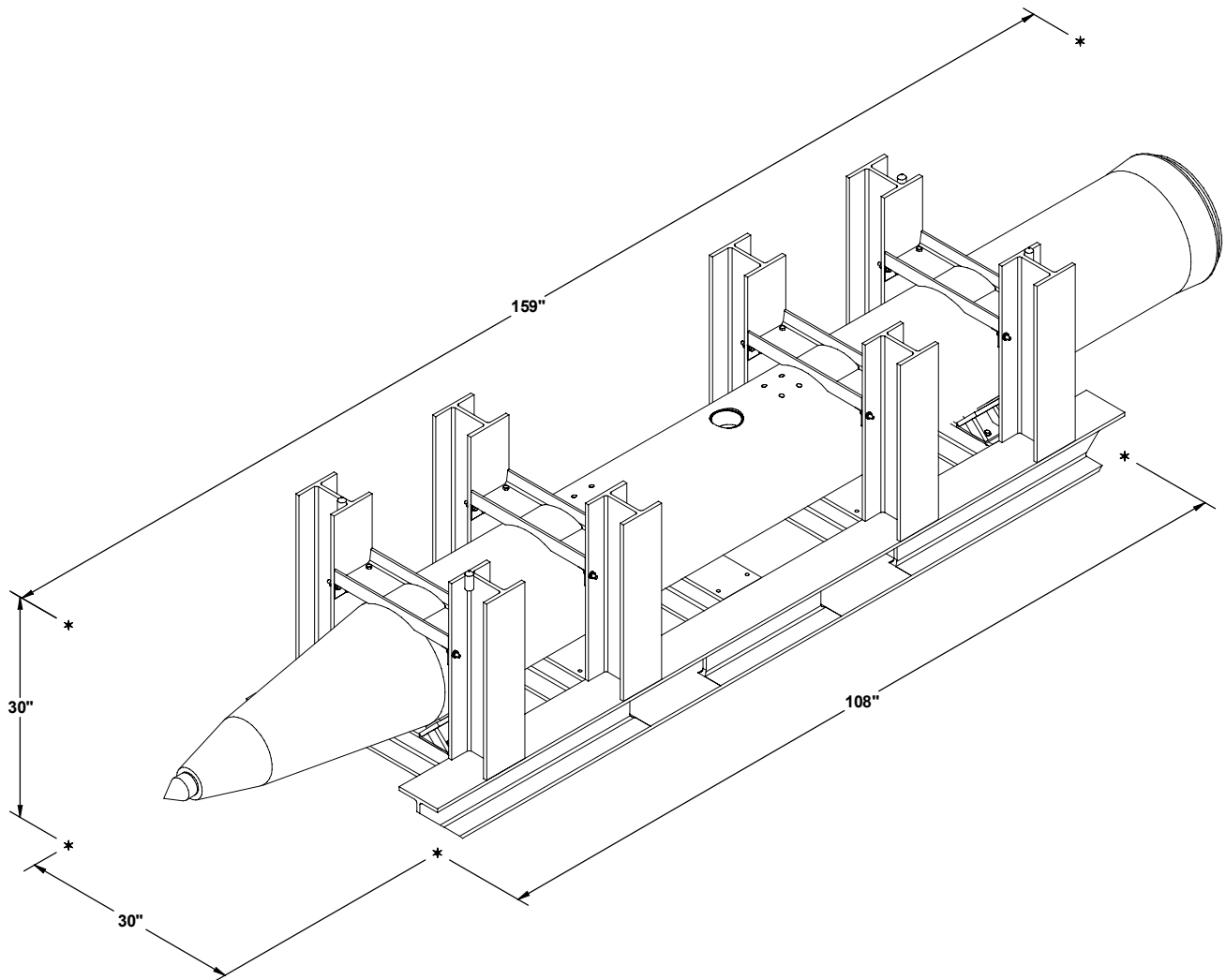
**S. FOR CONVENTIONAL TYPE BOXCARS:**

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 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 CONTAINERS IN A CAR, THEY SHOULD BE PLACED TIGHTLY AGAINST A CAR SIDEWALL OR SIDE FILL ASSEMBLIES 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 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 CONTAINER I-BEAMS. 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 14. 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.

(CONTINUED AT RIGHT)

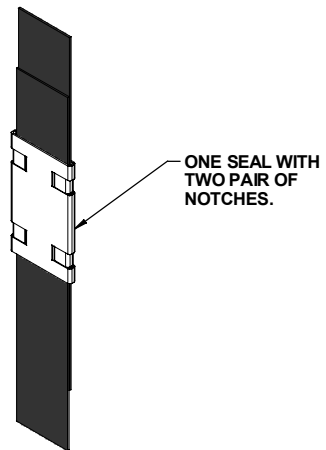
**T. FOR CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS:**

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 "TYPICAL TYPE A" VIEW ON PAGE 22 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 22, 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 "T.6" BELOW. DETAILS OF STRUT ASSEMBLIES FOR USE BETWEEN 2-PIECE BULKHEADS AND BETWEEN 1-PIECE BULKHEADS ARE SHOWN ON PAGE 23.
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 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. ONE OR MORE UNITS CAN BE POSITIONED BETWEEN THE LOAD DIVIDER BULKHEAD ON THE CENTER-OF-CAR SIDE, BLOCKED AND BRACED WITH KNEE BRACE ASSEMBLIES, AS SHOWN ON PAGE 12. A FILLER ASSEMBLY MAY ALSO BE USED TO REPLACE ONE CONTAINER, SEE THE METHOD DETAILED ON PAGE 10.

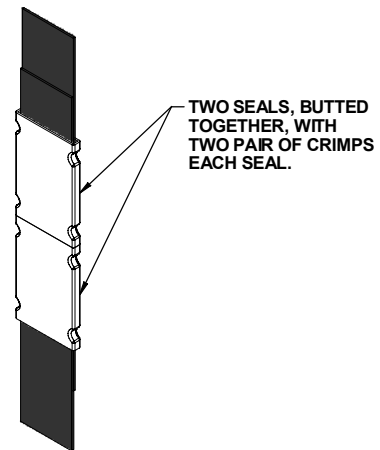


**CNU-658 CONTAINER**

GROSS WEIGHT - - - - - 4,915 LBS (APPROX)  
 CUBE - - - - - 82.8 CU FT (APPROX)

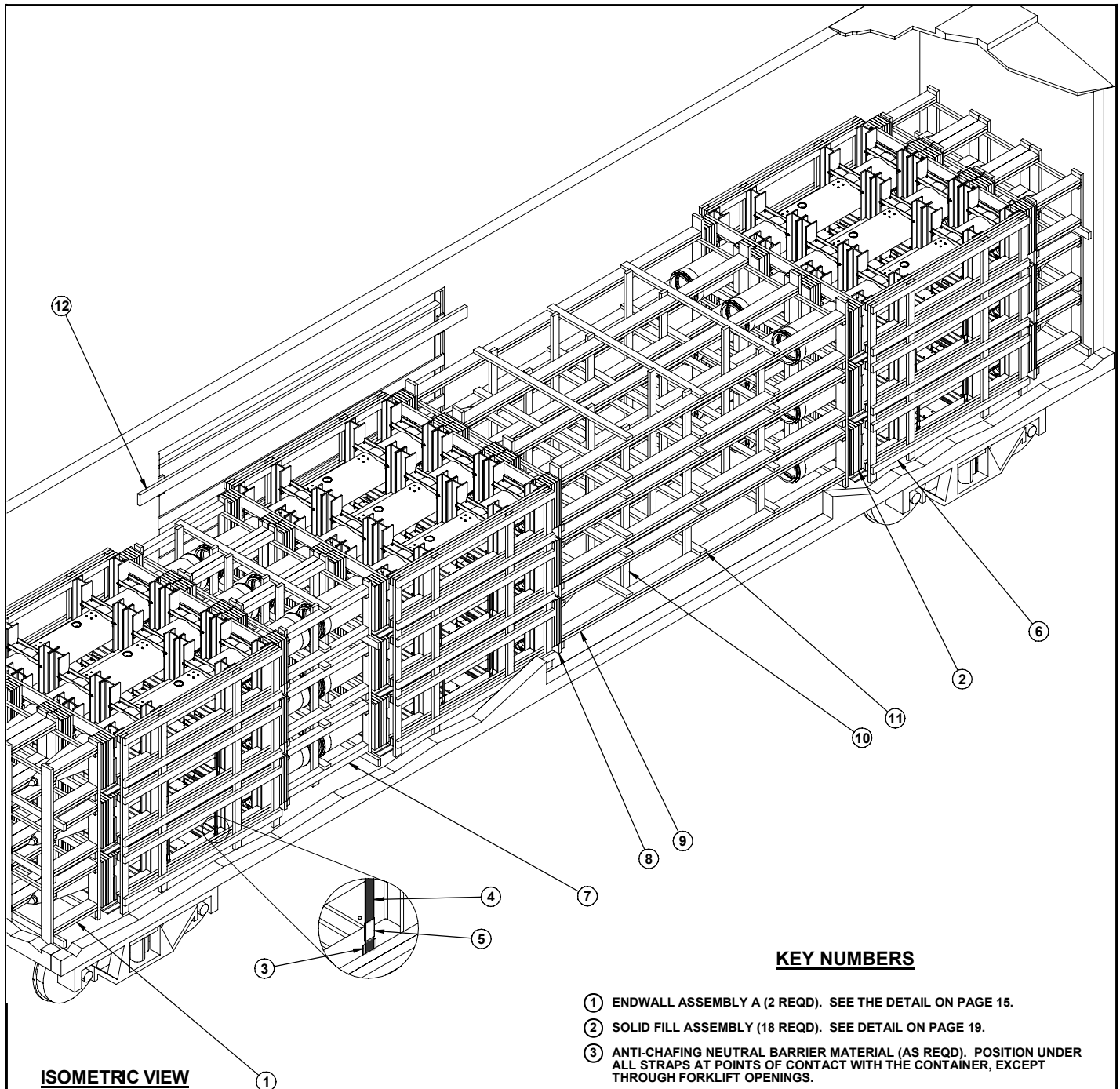


**STRAP JOINT A**  
 METHOD OF SECURING A  
 STRAP JOINT WHEN USING  
 A NOTCH-TYPE SEALER.



**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 ENDWALL ASSEMBLY A (2 REQD). SEE THE DETAIL ON PAGE 15.
- ② SOLID FILL ASSEMBLY (18 REQD). SEE DETAIL ON PAGE 19.
- ③ ANTI-CHAFING NEUTRAL BARRIER MATERIAL (AS REQD). POSITION UNDER ALL STRAPS AT POINTS OF CONTACT WITH THE CONTAINER, EXCEPT THROUGH FORKLIFT OPENINGS.
- ④ UNITIZING STRAP, 1-1/4" X .035" OR .031" X 11'-0" LONG STEEL STRAPPING (36 REQD, 4 PER CONTAINER STACK). INSTALL TO PASS THROUGH THE FORK POCKETS OF TWO CONTAINERS.
- ⑤ SEAL FOR 1-1/4" STEEL STRAPPING (36 REQD, 1 PER STRAP). DOUBLE NOTCH EACH SEAL. SEE THE "END-OVER-END LAP JOINT DETAILS" ON PAGE 5.
- ⑥ SIDE FILL ASSEMBLY A (6 REQD). SEE DETAIL ON PAGE 18 AND SPECIAL NOTE 3 ON PAGE 7.
- ⑦ INTERMEDIATE ASSEMBLY A (1 REQD). SEE DETAIL ON PAGE 16.
- ⑧ CENTER GATE (2 REQD). SEE THE DETAIL ON PAGE 14. NAIL OUTER VERTICAL PIECES TO SOLID FILL ASSEMBLY W/2-10d NAILS AT EACH JOINT.
- ⑨ STRUT, 2" X 6" BY CUT-TO-FIT (REF: 13'-11" LONG) (DOUBLED) (24 REQD). TOENAIL TO THE CENTER GATES W/2-16d NAILS AT EACH END. LAMINATE FIRST PIECE TO SECOND PIECE W/1-10d NAIL EVERY 12".
- ⑩ VERTICAL STRUT BRACING, 2" X 4" X 62" (12 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑪ HORIZONTAL STRUT BRACING, 2" X 4" X 7'-6" (18 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑫ DOORWAY PROTECTION D (2 REQD). SEE THE DETAIL ON PAGE 21 AND SPECIAL NOTE 4 ON PAGE 7.

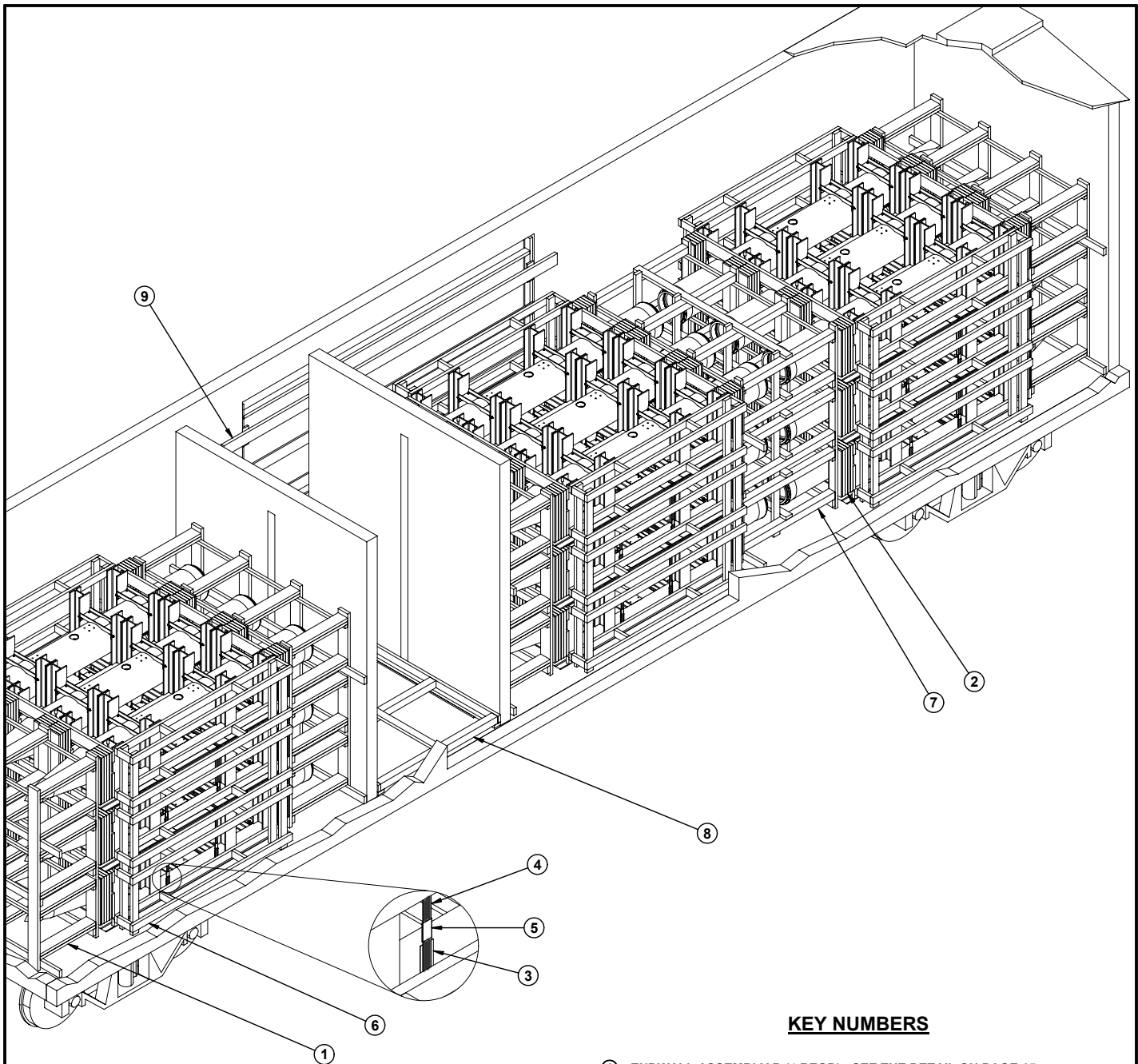
**SPECIAL NOTES:**

1. A 27 CONTAINER LOAD IS SHOWN IN A 50'-6" LONG BY 8'-6" WIDE CONVENTIONAL BOXCAR EQUIPPED WITH 14'-0" WIDE STAGGERED DOOR OPENINGS. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER OR NARROWER DOOR OPENINGS OR THROUGH DOORS, CAN BE USED.
2. CONTAINERS SHOULD BE STACKED IN THE DOORWAY AREA OF THE CAR FOR UNITIZING. AFTER THE STACK IS COMPLETED AND THE UNITIZING STRAPS HAVE BEEN INSTALLED, THE CONTAINER STACK CAN BE PARTIALLY LIFTED FROM THE END AND PUSHED INTO PLACE.
3. SIDE FILL ASSEMBLIES ARE REQUIRED WHEN THE TOTAL LATERAL SPACE ACROSS THE WIDTH OF THE LOAD EXCEEDS 6", AS MEASURED FROM CONTAINERS TO EACH SIDEWALL.
4. DOORWAY PROTECTION IS REQUIRED FOR ALL CONTAINER STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK LENGTH. THE WOODEN GATE TYPE OF DOOR-WAY PROTECTION IN THE LOAD ON PAGE 6 IS APPLICABLE FOR BOXCARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NON-NAILED DOOR POSTS. REFER TO PAGES 20 AND 21 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 10 FOR GUIDANCE.
5. FOR SHIPMENT OF A LOAD WHICH CONTAINS FEWER CONTAINERS THAN WHAT IS SHOWN, SEE THE PROCEDURES CONTAINED ON PAGES 10 AND 12.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	3	1
1" X 6"	168	84
1" X 8"	207	138
2" X 2"	179	60
2" X 3"	76	38
2" X 4"	1,594	1,063
2" X 6"	1,727	1,727
2" X 8"	936	1,248
4" X 4"	144	192
NAILS	NO. REQD	POUNDS
6d (2")	628	4
10d (3")	5,056	78
12d (3-1/4")	12	1/4
16d (3-1/2")	144	3-1/4
STEEL STRAPPING, 1-1/4" - 396' REQD - - - 57 LBS		
SEAL FOR 1-1/4" STRAPPING - 36 REQD - 1-3/4 LBS		
ANTI-CHAFING MATERIAL - - - AS REQD - - - - NIL		

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
CNU-658 CONTAINER - - 27	- - - - -	132,705 LBS
DUNNAGE - - - - -	- - - - -	9,242 LBS
TOTAL WEIGHT - - - - -		141,947 LBS (APPROX)



# **ISOMETRIC VIEW**

## **KEY NUMBERS**

- ① ENDWALL ASSEMBLY B (4 REQD). SEE THE DETAIL ON PAGE 15.
- ② SOLID FILL ASSEMBLY (18 REQD). SEE DETAIL ON PAGE 19.
- ③ ANTI-CHAFING NEUTRAL BARRIER MATERIAL (AS REQD). POSITION UNDER ALL STRAPS AT POINTS OF CONTACT WITH THE CONTAINER, EXCEPT THROUGH FORKLIFT OPENINGS.
- ④ UNITIZING STRAP, 1-1/4" X .035" OR .031" X 11'-0" LONG STEEL STRAPPING (36 REQD, 4 REQD PER CONTAINER STACK). INSTALL TO PASS THROUGH THE FORK POCKETS OF TWO CONTAINERS.
- ⑤ SEAL FOR 1-1/4" STEEL STRAPPING (36 REQD, 1 PER STRAP). DOUBLE NOTCH EACH SEAL.
- ⑥ SIDE FILL ASSEMBLY B (6 REQD). SEE THE DETAIL ON PAGE 18 AND SPECIAL NOTE 3 ON PAGE 9.
- ⑦ INTERMEDIATE ASSEMBLY B (1 REQD). SEE THE DETAIL ON PAGE 17.
- ⑧ STRUT ASSEMBLY (1 REQD). SEE THE "STRUT ASSEMBLY FOR 1-PIECE BULKHEADS" DETAIL ON PAGE 23, SPECIAL NOTE 5 ON PAGE 9 AND GENERAL NOTE "T.6" ON PAGE 3.
- ⑨ DOORWAY PROTECTION D (2 REQD). SEE THE DETAIL ON PAGE 21 AND SPECIAL NOTE 4 ON PAGE 9.



**SPECIAL NOTES:**

1. A 27 CONTAINER LOAD IS SHOWN IN A 50'-6" LONG BY 9'-4" WIDE CUSHIONED TYPE BOXCAR EQUIPPED WITH LOAD DIVIDERS AND 14'-0" WIDE THROUGH DOOR OPENINGS. BOXCARS OF OTHER DIMENSIONS AND BOXCARS HAVING WIDER OR NARROWER DOOR OR STAGGERED DOORS OPENINGS, CAN BE USED.
2. CONTAINERS SHOULD BE STACKED IN THE DOORWAY AREA OF THE CAR FOR UNITIZING. AFTER THE STACK IS COMPLETED AND THE UNITIZING STRAPS HAVE BEEN INSTALLED, THE CONTAINER STACK CAN BE PARTIALLY LIFTED FROM THE END AND PUSHED INTO PLACE.
3. SIDE FILL ASSEMBLIES ARE REQUIRED WHEN THE TOTAL LATERAL SPACE ACROSS THE WIDTH OF THE LOAD EXCEEDS 6", AS MEASURED FROM CONTAINERS TO EACH SIDEWALL.
4. DOORWAY PROTECTION IS REQUIRED FOR ALL CONTAINER STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK LENGTH. THE WOODEN GATE TYPE OF DOORWAY PROTECTION IN THE LOAD ON PAGE 8 IS APPLICABLE FOR BOXCARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NON-NAILED DOOR POSTS. REFER TO PAGES 20 AND 21 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 10 FOR GUIDANCE.
5. STRUT ASSEMBLIES ARE REQUIRED WHEN THE LOAD IN EITHER END OF A CAR IS 50,000 POUNDS OR MORE. FOR THE LOAD SHOWN ON PAGE 8, THE STRUT ASSEMBLY WOULD NOT BE REQUIRED IF THE LOAD CONSISTED OF NINE CONTAINERS OR LESS ON EACH END OF THE BOXCAR.
6. FOR SHIPMENTS OF A LOAD WHICH CONTAINS FEWER CONTAINERS THAN WHAT IS SHOWN, SEE THE PROCEDURES ON PAGES 10 AND 12.

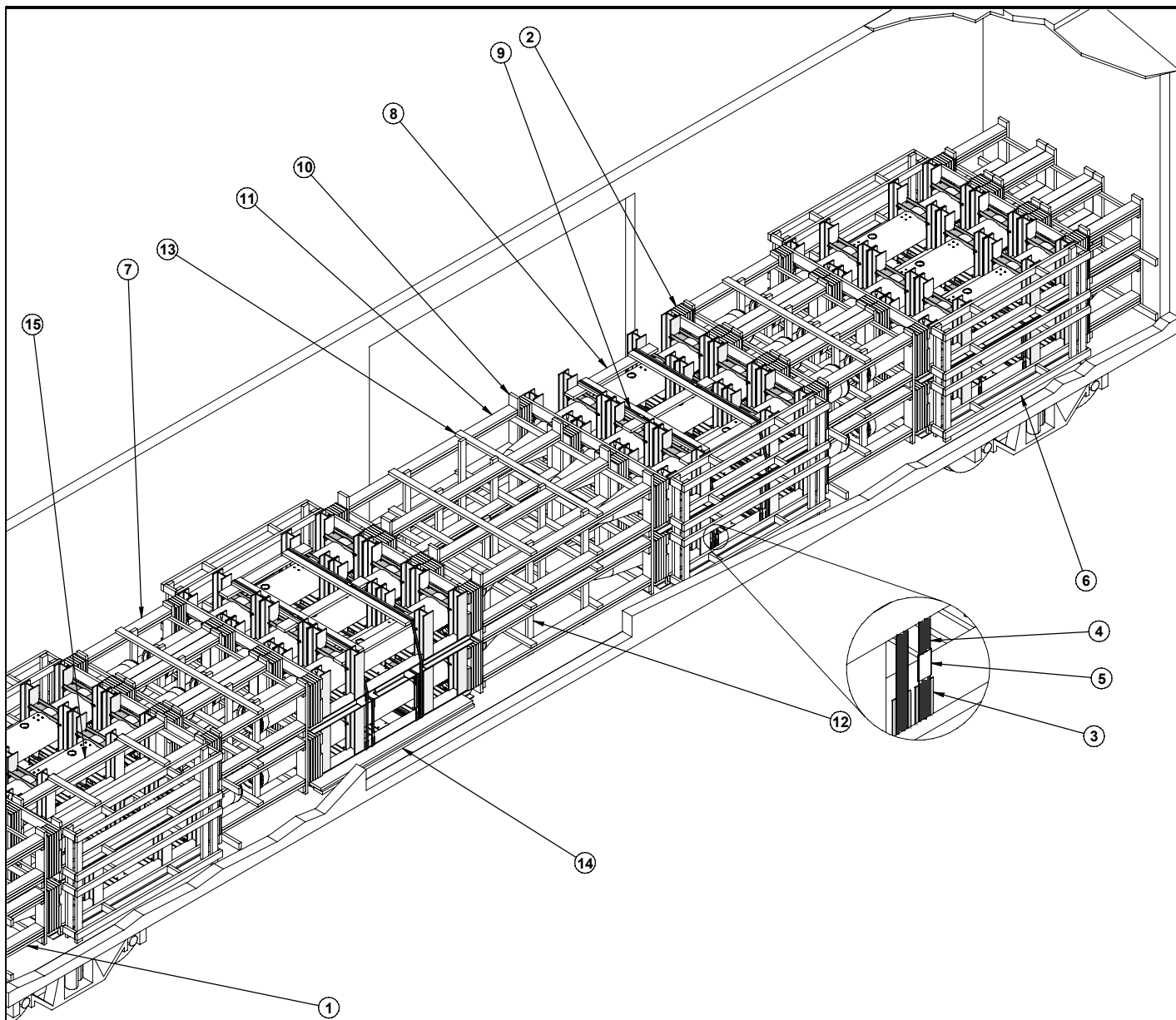
BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	3	1
1" X 6"	168	84
1" X 8"	224	150
2" X 2"	224	75
2" X 3"	76	38
2" X 4"	1,329	886
2" X 6"	922	922
2" X 8"	936	1,248
4" X 4"	119	158
NAILS	NO. REQD	POUNDS
6d (2")	646	4
10d (3")	4122	63-1/2
12d (3-1/4")	28	1/2
STEEL STRAPPING, 1-1/4" - 396' REQD - - - 57 LBS		
SEAL FOR 1-1/4" STRAPPING - 36 REQD - 1-3/4 LBS		
ANTI-CHAFING MATERIAL - - - AS REQD - - - - NIL		

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
CNU-658 CONTAINER - - - 27	- - - - -	132,705 LBS
DUNNAGE - - - - -	- - - - -	7,246 LBS
TOTAL WEIGHT - - - - -		139,951 LBS (APPROX)

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

**PAGE 9**



## ISOMETRIC VIEW

## KEY NUMBERS

### (KEY NUMBERS CONTINUED)

- ⑩ CENTER GATE (2 REQD). NAIL OUTER VERTICAL PIECES TO SOLID FILL ASSEMBLY W/2-10d NAILS AT EACH JOINT. SEE THE DETAIL ON PAGE 14.
- ⑪ STRUT, 2" X 6" BY CUT-TO-FIT (REF: 8'-10" LONG) (DOUBLED) (24 REQD). TOE-NAIL TO THE CENTER GATES W/2-16d NAILS AT EACH END. LAMINATE FIRST PIECE TO SECOND PIECE W/1-10d NAILS EVERY 12".
- ⑫ VERTICAL STRUT BRACING, 2" X 4" X 62" (8 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑬ HORIZONTAL STRUT BRACING, 2" X 4" X 7'-6" (8 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑭ SIDE BLOCKING, 2" X 6" X 8'-0" AND 2" X 8" X 8'-0" (2 REQD). NAIL 2" X 6" PIECE TO BOXCAR FLOOR W/20-16d NAILS. POSITION 2" X 8" PIECE AGAINST THE SKID AND LAMINATE TO THE 2" X 6" W/20-16d NAILS.
- ⑮ FILLER ASSEMBLY (1 REQD). NAIL VERTICAL PIECES TO THE SOLID FILL ASSEMBLY W/4-10d NAILS AT EACH JOINT. SEE THE DETAIL ON PAGE 19.
- ① ENDWALL ASSEMBLY C (2 REQD). SEE THE DETAIL ON PAGE 16.
- ② SOLID FILL ASSEMBLY (16 REQD). SEE DETAIL ON PAGE 19.
- ③ ANTI-CHAFING NEUTRAL BARRIER MATERIAL (AS REQD). POSITION UNDER ALL STRAPS AT POINTS OF CONTACT WITH THE CONTAINER, EXCEPT THROUGH FORKLIFT OPENINGS.
- ④ UNITIZING STRAP, 1-1/4" X .035" OR .031" X 11'-0" LONG STEEL STRAPPING (22 REQD, 2 PER CONTAINER STACK). INSTALL TO PASS THROUGH THE FORK POCKETS OF TWO CONTAINERS.
- ⑤ SEAL FOR 1-1/4" STEEL STRAPPING (26 REQD, 1 PER STRAP). DOUBLE NOTCH EACH SEAL.
- ⑥ SIDE FILL ASSEMBLY B (6 REQD). SEE DETAIL ON PAGE 18 AND SPECIAL NOTE 4 ON PAGE 11.
- ⑦ INTERMEDIATE ASSEMBLY C (2 REQD). SEE DETAIL ON PAGE 17.
- ⑧ STRAPPING BOARD ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 19.
- ⑨ DOORWAY PROTECTION STRAP, 1-1/4" X .035" OR .031" X 25'-6" LONG STEEL STRAPPING (4 REQD). INSTALL TWO STRAPS THRU THE FORK POCKETS OF THE BOTTOM CONTAINER TO ENCIRCLE ALL CONTAINERS IN THE DOORWAY AREA. STAPLE TO THE STRAPPING BOARD W/2 STAPLES. SEE SPECIAL NOTE 5 ON PAGE 11.

(CONTINUED AT LEFT)

**SPECIAL NOTES:**

1. A 23 CONTAINER LOAD IS SHOWN IN A 60'-8" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR EQUIPPED WITH 14'-0" WIDE STAGGERED DOOR OPENINGS. BOXCARS OF OTHER DIMENSIONS AND BOXCARS HAVING WIDER OR NARROWER DOOR OPENINGS OR THROUGH DOORS, CAN BE USED.
2. CONTAINERS SHOULD BE STACKED IN THE DOORWAY AREA OF THE CAR FOR UNITIZING. AFTER THE STACK IS COMPLETED AND THE UNITIZING STRAPS HAVE BEEN INSTALLED, THE CONTAINER STACK CAN BE PARTIALLY LIFTED FROM THE END AND PUSHED INTO PLACE.
3. SIDE FILL ASSEMBLIES ARE REQUIRED WHEN THE TOTAL LATERAL SPACE ACROSS THE WIDTH OF THE LOAD EXCEEDS 6", AS MEASURED FROM CONTAINERS TO EACH SIDEWALL.
4. DOORWAY PROTECTION IS REQUIRED FOR ALL CONTAINERS STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK LENGTH. DOORWAY PROTECTION WILL CONSIST OF NAILED FLOORLINE BLOCKING, STRAPPING BOARDS, AND DOORWAY PROTECTION STRAPS ENCIRCLING THE LOAD UNIT. TWO STRAPS ARE REQUIRED AROUND A LOAD UNIT WHICH IS NOT RETAINED BY AT LEAST 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, A WOODEN GATE TYPE OF DOORWAY PROTECTION MAY BE USED. SEE DETAILS ON PAGES 20 AND 21.
5. FOR SHIPMENTS OF A LOAD WHICH CONTAINS MORE OR FEWER CONTAINERS THAN WHAT IS SHOWN, SEE THE PROCEDURES ON PAGES 6 AND 12.

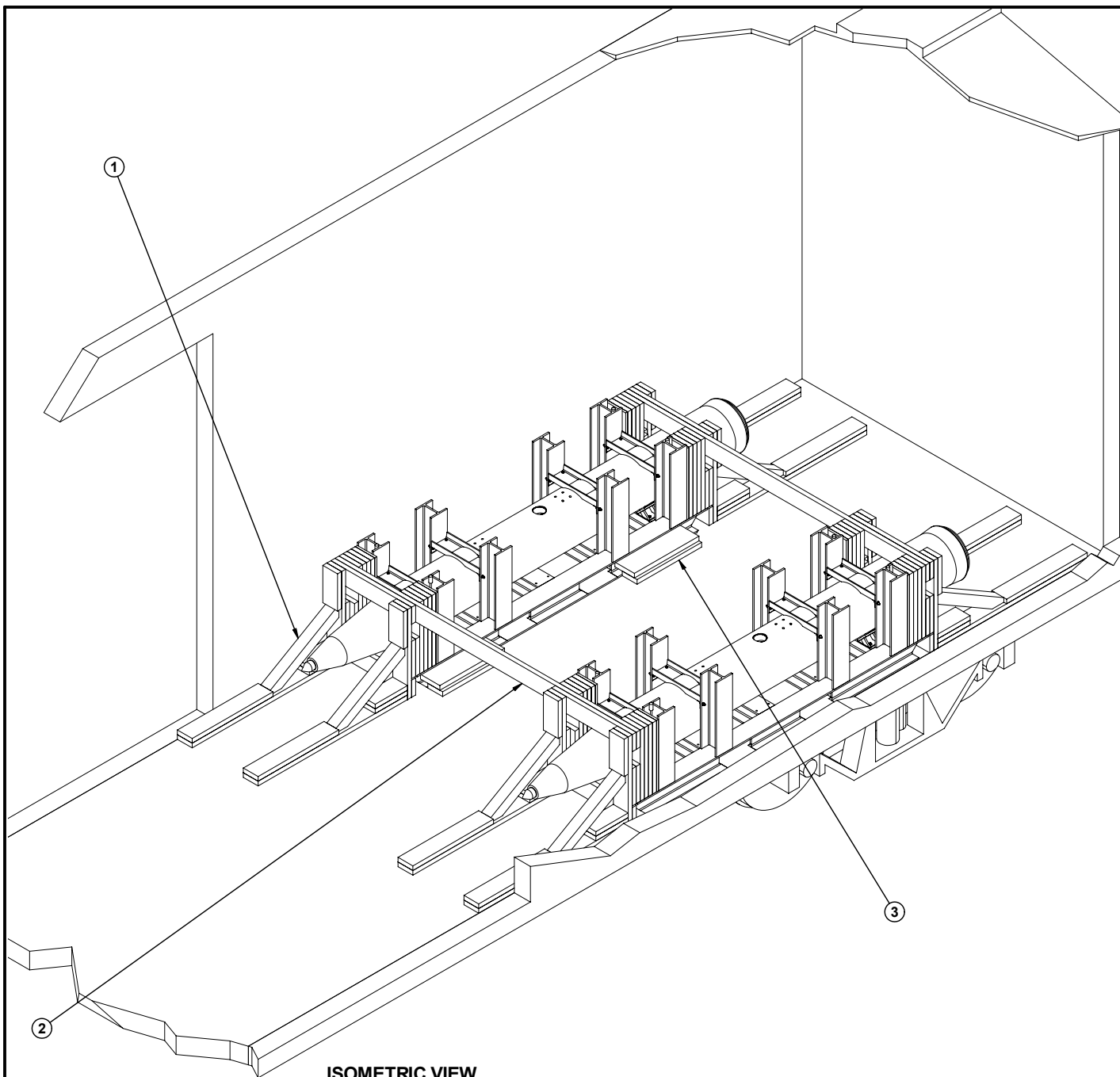
**BILL OF MATERIAL**

LUMBER	LINEAR FEET	BOARD FEET
1" X 8"	184	123
2" X 2"	165	55
2" X 4"	1,031	688
2" X 6"	1,307	1,307
2" X 8"	848	1,131
4" X 4"	15	20
NAILS	NO. REQD	POUNDS
6d (2")	480	3
10d (3")	4,360	68
16d (3-1/2")	176	4
STEEL STRAPPING, 1-1/4" - 344' REQD - - - 50 LBS		
SEAL FOR 1-1/4" STRAPPING - 26 REQD - 1-1/4 LBS		
STAPLE, 1-1/4" - - - - - 8 REQD - - - - - NIL		
ANTI-CHAFING MATERIAL - - - AS REQD - - - - - NIL		

**LOAD AS SHOWN**

ITEM	QUANTITY	WEIGHT (APPROX)
CNU-658 CONTAINER - - 23 - - - - -		113,045 LBS
DUNNAGE - - - - -		6,766 LBS
TOTAL WEIGHT - - - - -		119,811 LBS (APPROX)

**23 CONTAINER LOAD IN A 60'-8" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR****PAGE 11**



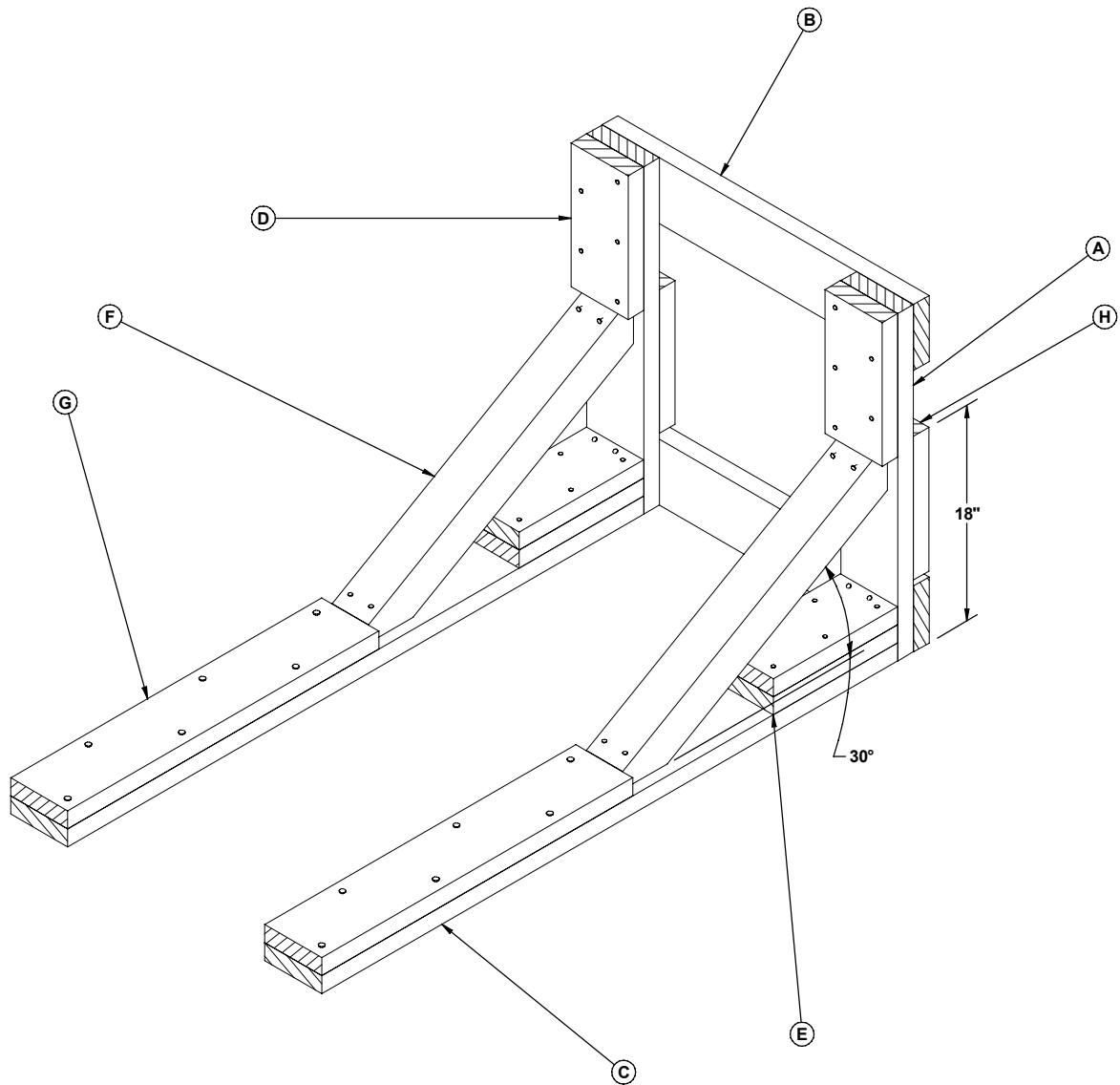
**ISOMETRIC VIEW**

**SPECIAL NOTES:**

1. A TWO CONTAINER LOAD IS SHOWN IN A 9'-4" WIDE CONVENTIONAL TYPE BOX-CAR HAVING A WOOD OR NAILABLE METAL FLOOR. CARS OF OTHER WIDTHS MAY BE USED.
2. THE LOAD SHOWN DEPICTING THE KNEE BRACE METHOD OF PARTIAL-LAYER BRACING IS TYPICAL. EACH CNU CONTAINER REQUIRES A KNEE BRACE AT EACH END OF THE CONTAINER.
3. ONE KNEE BRACE ASSEMBLY IS ADEQUATE FOR RETAINING A MAXIMUM LCL LOAD OF NOT MORE THAN 8,500 POUNDS OR ONE CONTAINER.
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.

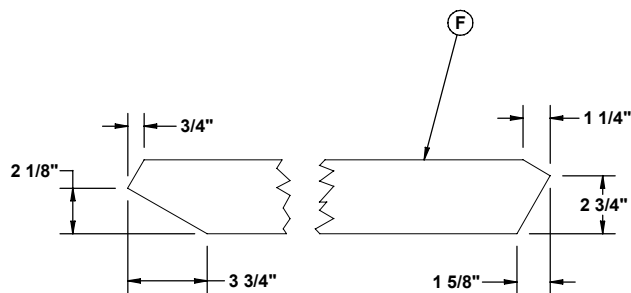
**KEY NUMBERS**

- ① KNEE BRACE ASSEMBLY (4 REQD). SEE DETAIL ON PAGE 13.
- ② SOLID FILL ASSEMBLY (2 REQD). SEE DETAIL AND NOTES ON PAGE 19.
- ③ SIDE BLOCKING, 2" X 6" X 24" AND 2" X 8" X 24" (4 REQD). NAIL 2" X 6" PIECE TO BOXCAR FLOOR W/4-16d NAILS. POSITION 2" X 8" PIECE AGAINST INSIDE WALL OF THE SKID AND LAMINATE TO THE 2" X 6" W/4-16d NAILS.



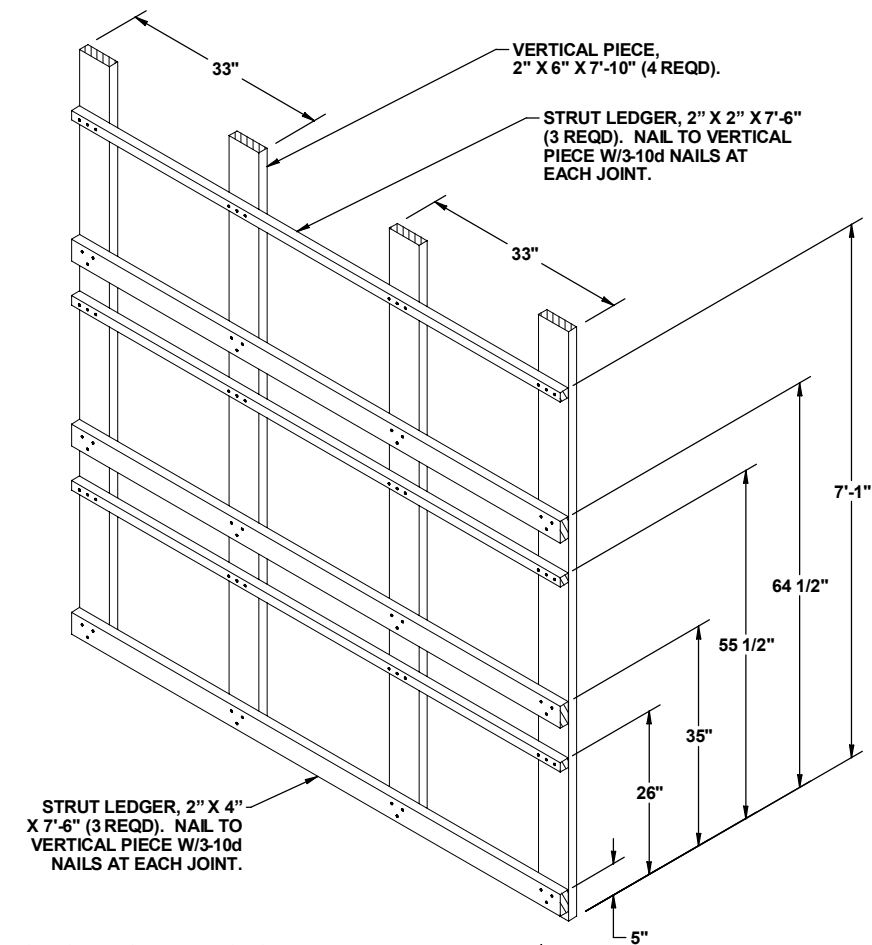
### KEY LETTERS

- (A) VERTICAL PIECE, 2" X 6" X 29" (2 REQD). NAIL TO A FLOOR CLEAT W/3-16d NAILS.
- (B) HORIZONTAL PIECE, 2" X 6" X 30" (2 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.
- (C) FLOOR CLEAT, 2" X 6" X 55" (2 REQD). NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8".
- (D) HOLD-DOWN CLEAT, 2" X 6" X 12" (2 REQD). NAIL TO A VERTICAL PIECE W/5-10d NAILS.
- (E) POCKET CLEAT, 2" X 6" X 12" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE FLOOR CLEAT W/5-16d NAILS. NAIL THE SECOND PIECE IN A LIKE MANNER AND TOENAIL THE SECOND PIECE TO THE VERTICAL PIECE W/2-16d NAILS.
- (F) BRACE, 4" X 4" X 29-3/8" (2 REQD). SEE THE DETAIL AT LEFT FOR BEVEL-CUTS REQUIRED. TOENAIL TO THE VERTICAL PIECE AND TO THE FLOOR CLEAT W/2-16d NAIL.
- (G) BACK-UP CLEAT, 2" X 6" X 30" (2 REQD). NAIL TO THE FLOOR CLEAT W/6-40d NAILS.
- (H) BUFFER PIECE, 2" X 6" X 12" (2 REQD). NAIL TO VERTICAL PIECE W/4-10d NAILS.



### BRACE

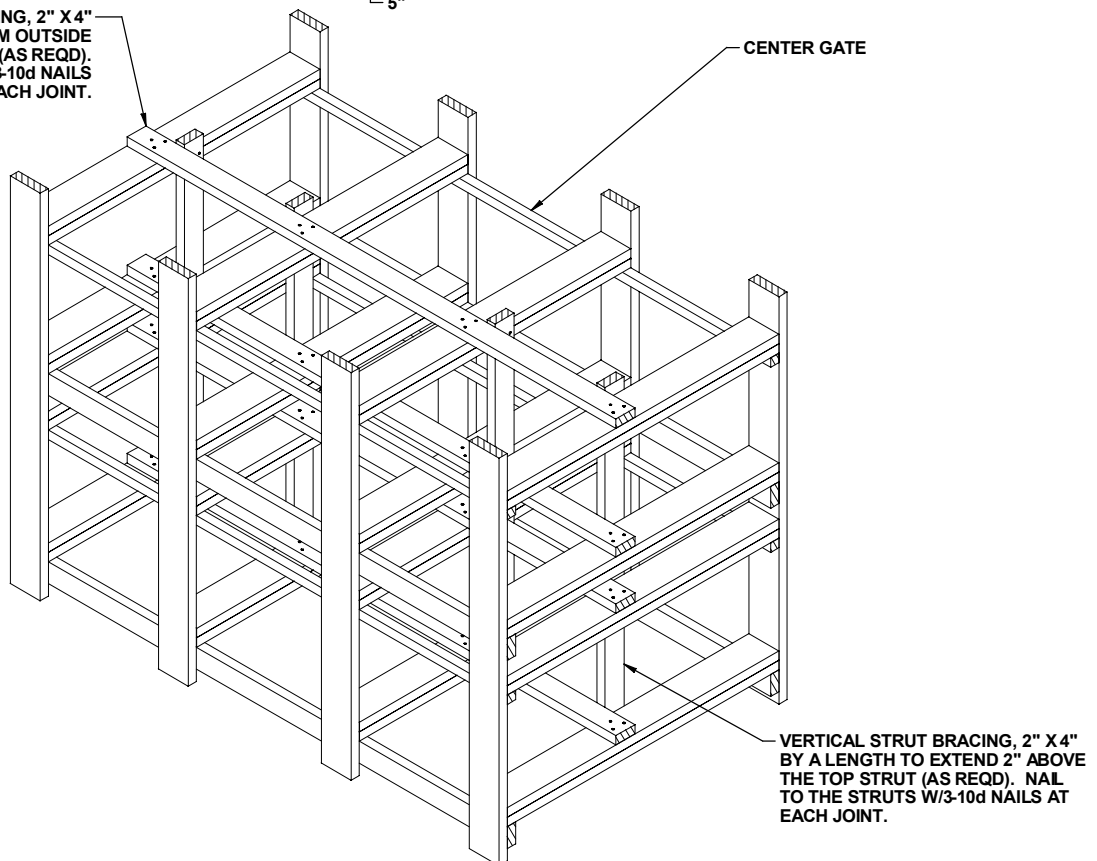
### TYPICAL LCL USING KNEE BRACES



### CENTER GATE

#### NOTES:

1. FOR USE WITH BOXCAR LOADS USING SIDE FILL (SIDE VOID) WITH A MAXIMUM OF 18 CNU CONTAINERS (3 HIGH X 3 WIDE X 2 LOAD BAY DEEP) AT THE HEAVIEST END OF THE CENTER GATE.
2. FOR TWO HIGH LOAD REDUCE VERTICAL PIECES TO 64" AND ELIMINATE THE TOP TWO LAYERS OF STRUT LEDGERS.
3. FOR ONE HIGH LOAD REDUCE VERTICAL PIECES TO 34" AND ELIMINATE THE TOP FOUR LAYERS OF STRUT LEDGERS.



### TYPICAL STRUT BRACING

STRUT, 2" X 6" X 26" (DOUBLED)  
(36 REQD). LAMINATE FIRST PIECE  
TO SECOND PIECE W/1-10d NAILS  
EVERY 12".

STRUT LEDGER, 2" X 2" X 7'-6" (6 REQD). NAIL  
TO VERTICAL PIECE W/3-10d NAILS AT EACH JOINT.

## ENDWALL ASSEMBLY A

### NOTES:

1. FOR USE WITH BOXCAR LOADS USING  
SIDE FILL (SIDE VOID) WITH A MAXIMUM  
OF 27 CNU CONTAINERS (3 HIGH X 3 WIDE  
X 3 LOAD BAYS DEEP).
2. FOR TWO HIGH LOAD REDUCE VERTICAL  
PIECES TO 61" AND ELIMINATE THE TOP  
TWO LAYERS OF STRUTS AND STRUT  
LEDGERS.
3. FOR ONE HIGH LOAD REDUCE VERTICAL  
PIECES TO 32" AND ELIMINATE THE TOP  
FOUR LAYERS OF STRUTS AND STRUT  
LEDGERS.

STRUT LEDGER, 2" X 4"  
X 7'-6" (4 REQD). NAIL TO  
VERTICAL PIECE W/3-10d  
NAILS AT EACH JOINT.

STRUT LEDGER, 2" X 4" BY BOXCAR  
WIDTH MINUS 1/2" (REF: 8'-5-1/2")  
(2 REQD). NAIL TO VERTICAL PIECE  
W/3-10d NAILS AT EACH JOINT.

VERTICAL PIECE, 2" X 6" X 7'-6" (12 REQD). NAIL  
TO THE STRUTS W/3-10d NAILS AT EACH JOINT.

6" FOR 8'-6" WIDE BOXCARS,  
11" FOR 9'-4" WIDE BOXCARS

STRUT, 2" X 6" X 26" (DOUBLED) (24 REQD).  
LAMINATE FIRST PIECE TO SECOND PIECE  
W/1-10d NAILS EVERY 12".

VERTICAL PIECE, 2" X 6" X 7'-6"  
(8 REQD). NAIL TO THE STRUTS  
W/3-10d NAILS AT EACH JOINT.

STRUT LEDGER, 2" X 4" BY BOXCAR  
WIDTH MINUS 1/2" (REF: 9'-3-1/2")  
(2 REQD). NAIL TO VERTICAL PIECE  
W/3-10d NAILS AT EACH JOINT.

STRUT LEDGER, 2" X 2" X 7'-6"  
(6 REQD). NAIL TO VERTICAL  
PIECE W/3-10d NAILS AT EACH JOINT.

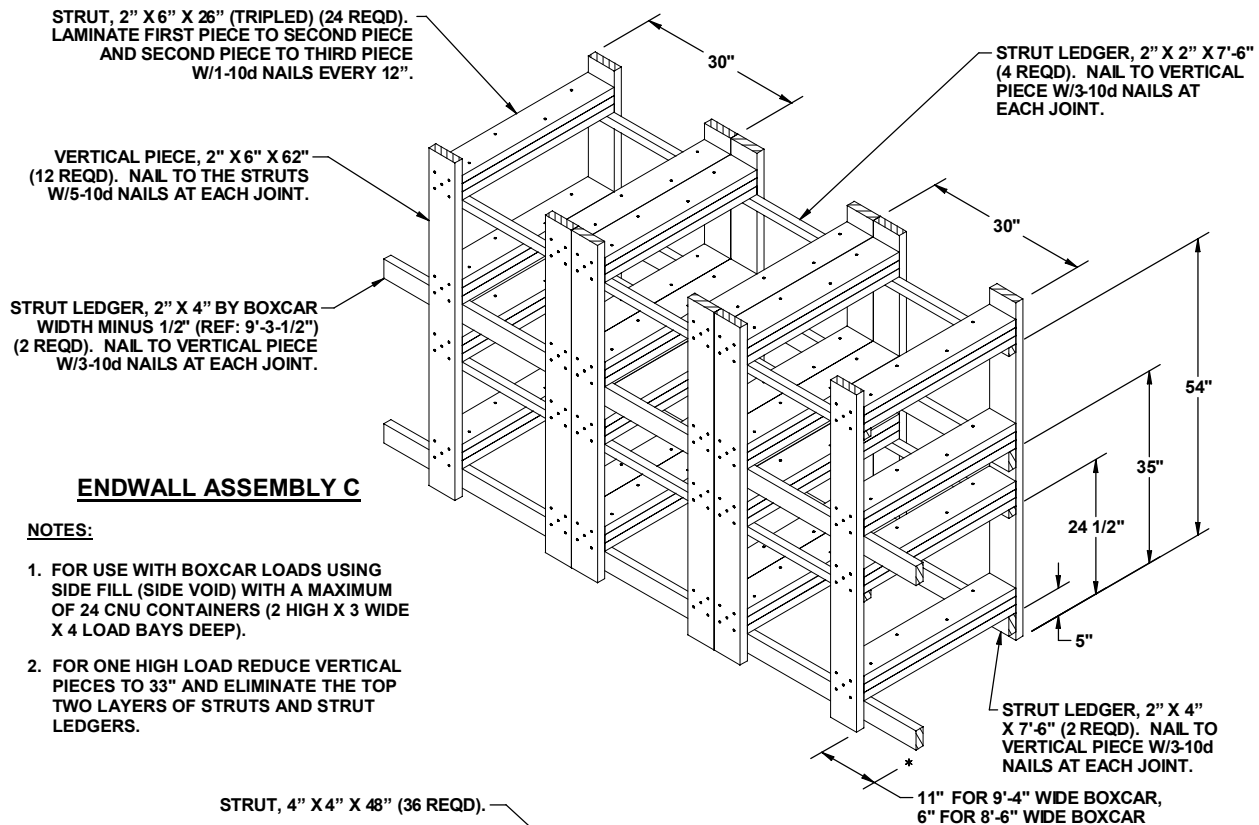
## ENDWALL ASSEMBLY B

### NOTES:

1. FOR USE WITH BOXCAR LOADS USING  
SIDE FILL (SIDE VOID) WITH A MAXIMUM  
OF 18 CNU CONTAINERS (3 HIGH X 3 WIDE  
X 2 LOAD BAYS DEEP).
2. FOR TWO HIGH LOAD REDUCE VERTICAL  
PIECES TO 61" AND ELIMINATE THE TOP  
TWO LAYERS OF STRUTS AND STRUT  
LEDGERS.
3. FOR ONE HIGH LOAD REDUCE VERTICAL  
PIECES TO 32" AND ELIMINATE THE TOP  
FOUR LAYERS OF STRUTS AND STRUT  
LEDGERS.

STRUT LEDGER, 2" X 4"  
X 7'-6" (4 REQD). NAIL TO  
VERTICAL PIECE W/3-10d  
NAILS AT EACH JOINT.

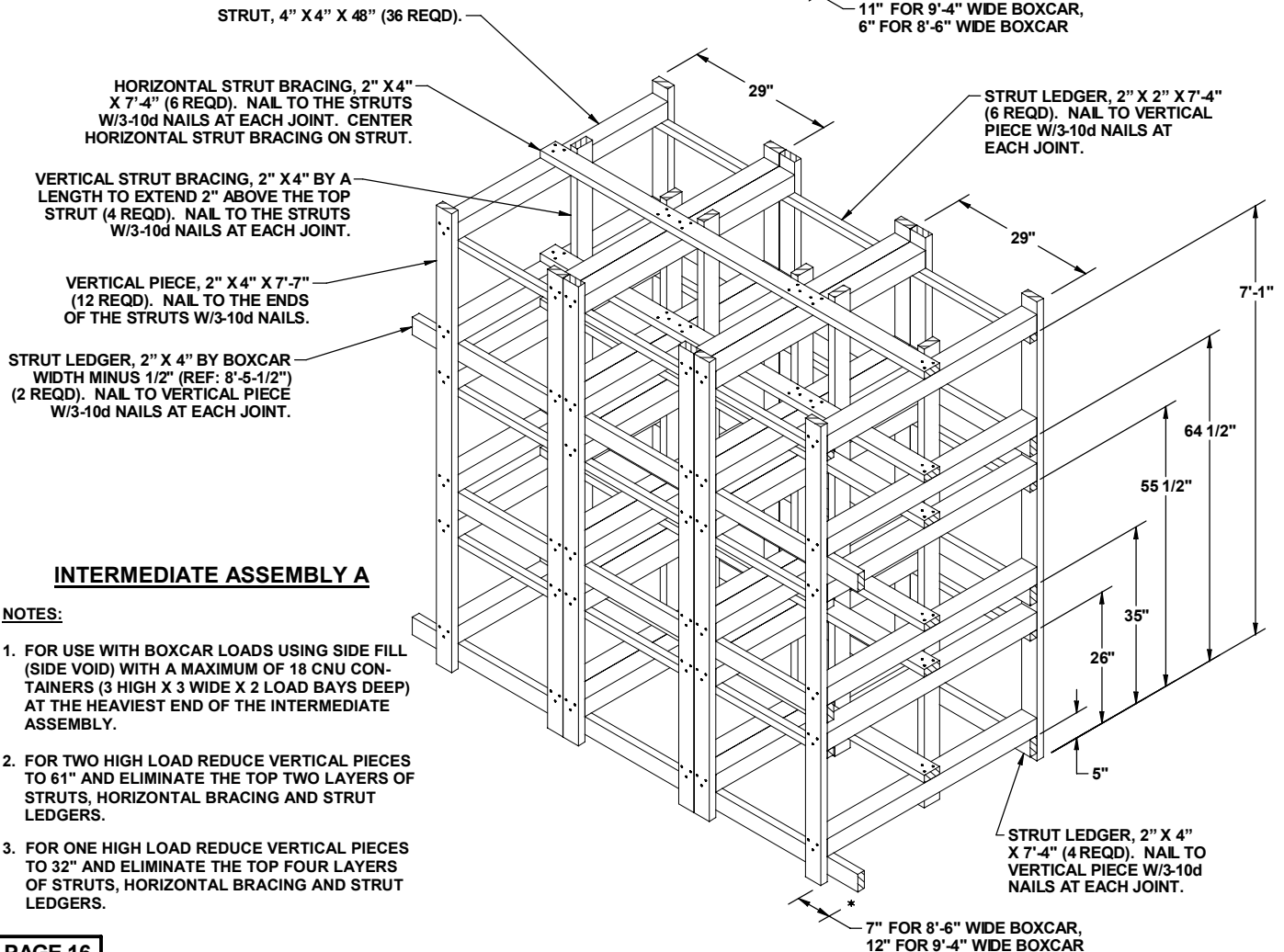
11" FOR 9'-4" WIDE BOXCARS,  
6" FOR 8'-6" WIDE BOXCARS



### ENDWALL ASSEMBLY C

#### NOTES:

1. FOR USE WITH BOXCAR LOADS USING SIDE FILL (SIDE VOID) WITH A MAXIMUM OF 24 CNU CONTAINERS (2 HIGH X 3 WIDE X 4 LOAD BAYS DEEP).
2. FOR ONE HIGH LOAD REDUCE VERTICAL PIECES TO 33" AND ELIMINATE THE TOP TWO LAYERS OF STRUTS AND STRUT LEDGERS.



### INTERMEDIATE ASSEMBLY A

#### NOTES:

1. FOR USE WITH BOXCAR LOADS USING SIDE FILL (SIDE VOID) WITH A MAXIMUM OF 18 CNU CONTAINERS (3 HIGH X 3 WIDE X 2 LOAD BAYS DEEP) AT THE HEAVIEST END OF THE INTERMEDIATE ASSEMBLY.
2. FOR TWO HIGH LOAD REDUCE VERTICAL PIECES TO 61" AND ELIMINATE THE TOP TWO LAYERS OF STRUTS, HORIZONTAL BRACING AND STRUT LEDGERS.
3. FOR ONE HIGH LOAD REDUCE VERTICAL PIECES TO 32" AND ELIMINATE THE TOP FOUR LAYERS OF STRUTS, HORIZONTAL BRACING AND STRUT LEDGERS.



HORIZONTAL STRUT BRACING, 2" X 4" X 7'-4" (6 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT. CENTER HORIZONTAL STRUT BRACING ON STRUT.

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

VERTICAL PIECE, 2" X 4" X 7'-7" (8 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.

STRUT LEDGER, 2" X 4" BY BOXCAR WIDTH MINUS 1/2" (REF: 9'-3-1/2") (2 REQD). NAIL TO VERTICAL PIECE W/3-10d NAILS AT EACH JOINT.

STRUT, 4" X 4" X 48" (24 REQD).

STRUT LEDGER, 2" X 2" X 7'-4" (6 REQD). NAIL TO VERTICAL PIECE W/3-10d NAILS AT EACH JOINT.

## INTERMEDIATE ASSEMBLY B

### NOTES:

1. FOR USE WITH BOXCAR LOADS USING SIDE FILL (SIDE VOID) WITH A MAXIMUM OF 9 CNU CONTAINERS (3 HIGH X 3 WIDE X 1 LOAD BAY DEEP) AT THE HEAVIEST END OF THE INTERMEDIATE ASSEMBLY.
2. FOR TWO HIGH LOAD REDUCE VERTICAL PIECES TO 61" AND ELIMINATE THE TOP TWO LAYERS OF STRUTS, HORIZONTAL BRACING AND STRUT LEDGERS.
3. FOR ONE HIGH LOAD REDUCE VERTICAL PIECES TO 32" AND ELIMINATE THE TOP FOUR LAYERS OF STRUTS, HORIZONTAL BRACING AND STRUT LEDGERS.

STRUT, 2" X 6" X 48" (DOUBLED) (24 REQD). LAMINATE FIRST PIECE TO SECOND PIECE W/1-10d NAILS EVERY 12".

HORIZONTAL STRUT BRACING, 2" X 4" X 7'-6" (4 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT. CENTER HORIZONTAL STRUT BRACING ON STRUT.

VERTICAL STRUT BRACING, 2" X 4" BY A LENGTH TO EXTEND 2" ABOVE THE TOP STRUT (6 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.

VERTICAL PIECE, 2" X 6" X 61" (12 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.

STRUT LEDGER, 2" X 4" BY BOXCAR WIDTH MINUS 1/2" (REF: 9'-3-1/2") (2 REQD). NAIL TO VERTICAL PIECE W/3-10d NAILS AT EACH JOINT.

12" FOR 9'-4" WIDE BOXCAR, 7" FOR 8'-6" WIDE BOXCAR

STRUT LEDGER, 2" X 2" X 7'-6" (4 REQD). NAIL TO VERTICAL PIECE W/3-10d NAILS AT EACH JOINT.

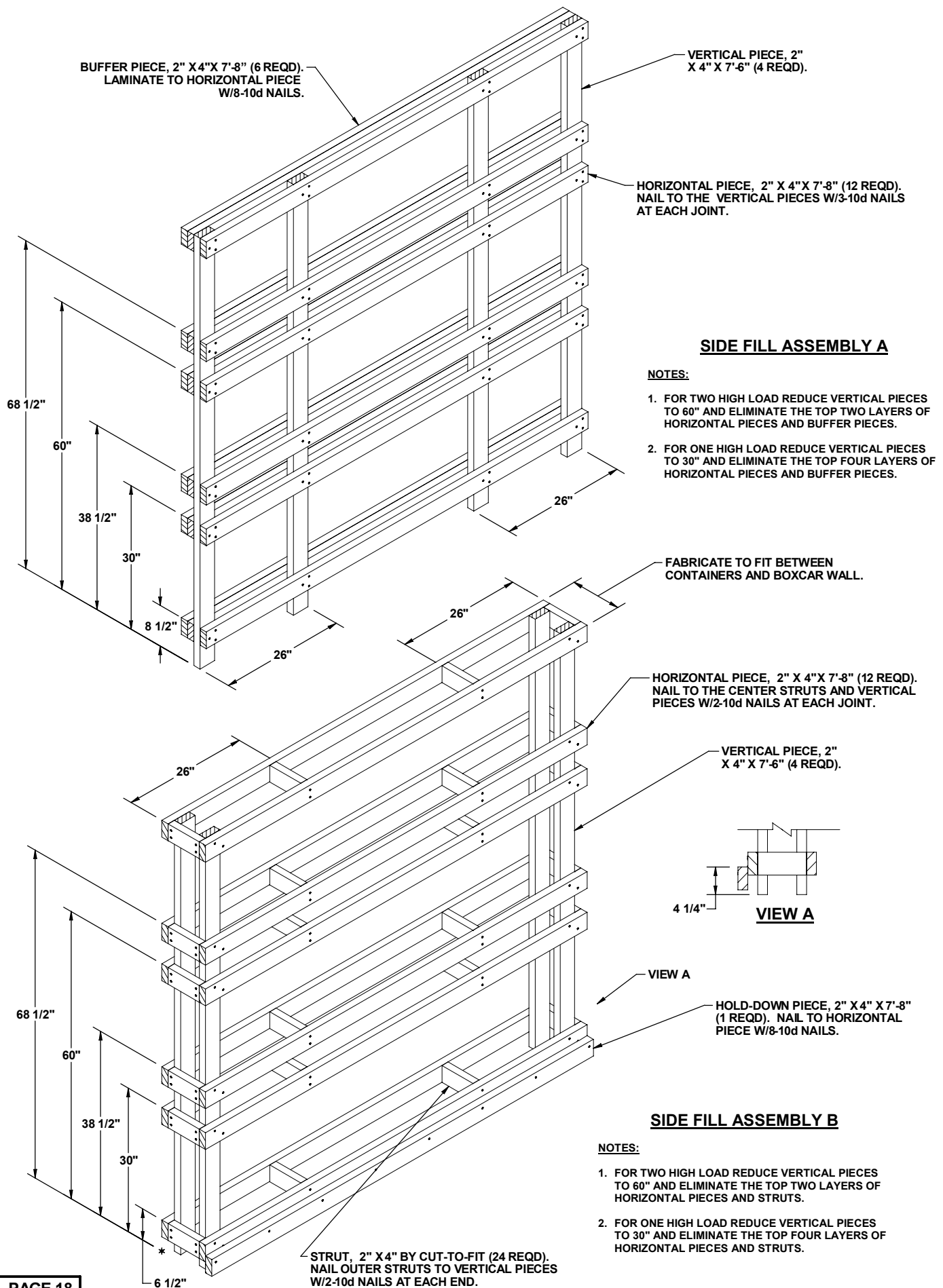
## INTERMEDIATE ASSEMBLY C

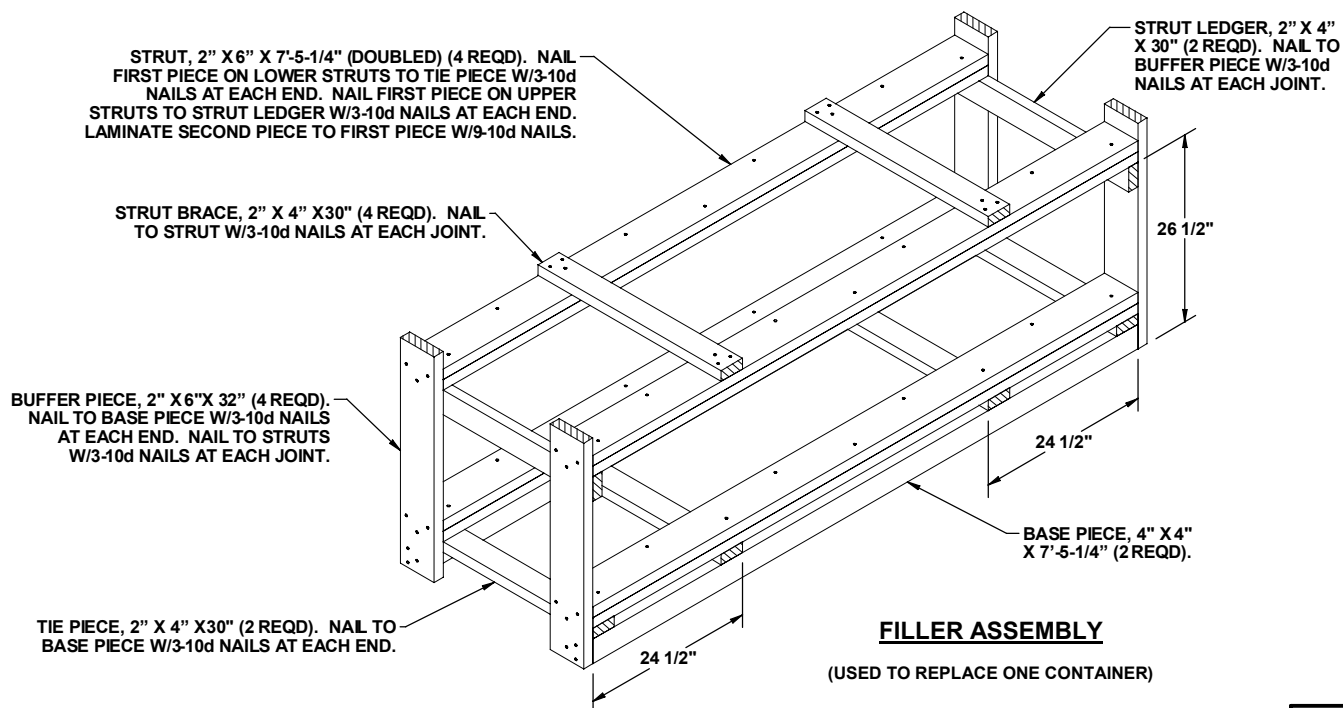
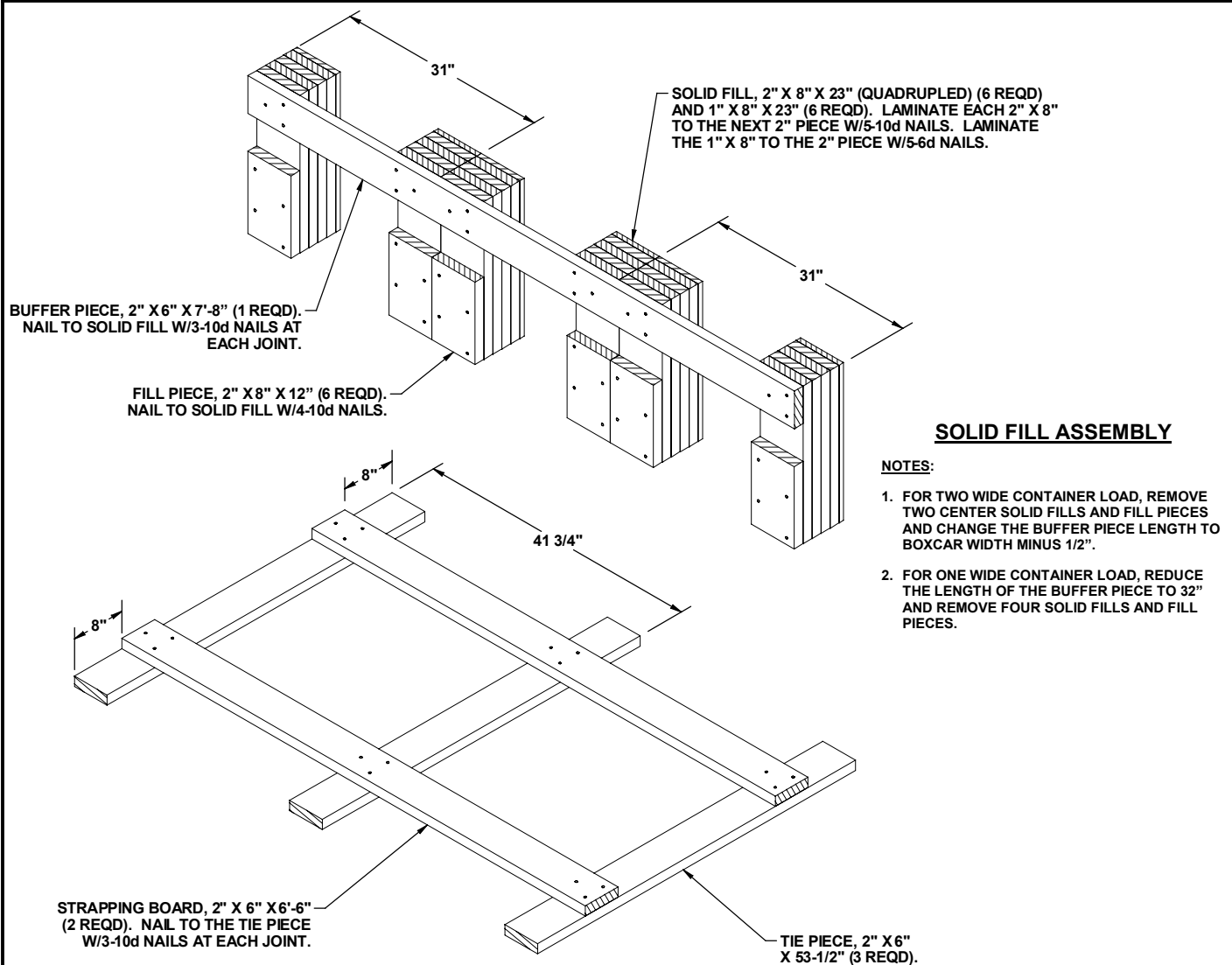
### NOTES:

1. FOR USE WITH BOXCAR LOADS USING SIDE FILL (SIDE VOID) WITH A MAXIMUM OF 18 CNU CONTAINERS (2 HIGH X 3 WIDE X 3 LOAD BAYS DEEP) AT THE HEAVIEST END OF THE INTERMEDIATE ASSEMBLY.
2. FOR ONE HIGH LOAD REDUCE VERTICAL PIECES TO 32" AND ELIMINATE THE TOP TWO LAYERS OF STRUTS, HORIZONTAL BRACING AND STRUT LEDGERS.

STRUT LEDGER, 2" X 4" X 7'-6" (2 REQD). NAIL TO VERTICAL PIECE W/3-10d NAILS AT EACH JOINT.

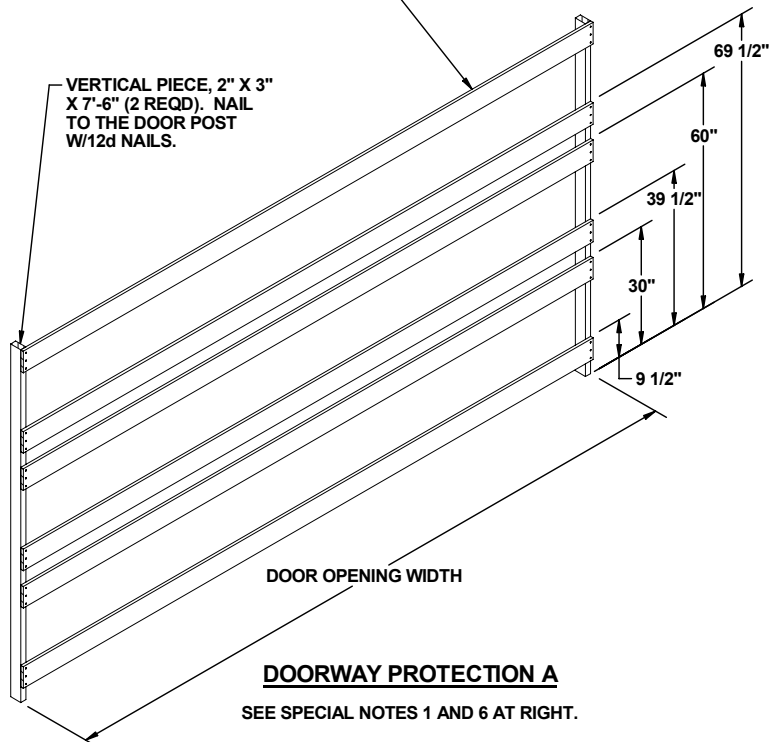
11" FOR 9'-4" WIDE BOXCARS, 6" FOR 8'-6" WIDE BOXCARS





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

VERTICAL PIECE, 2" X 3"  
X 7'-6" (2 REQD). NAIL  
TO THE DOOR POST  
W/12d NAILS.



**DOORWAY PROTECTION A**  
SEE SPECIAL NOTES 1 AND 6 AT RIGHT.

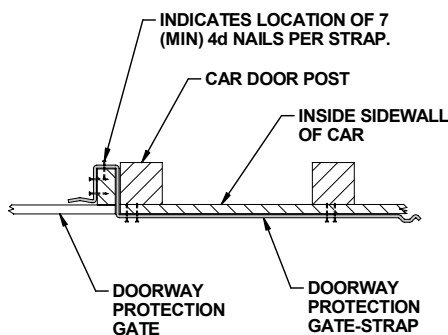
**SPECIAL NOTES:**

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.
6. THE VIEWS ON PAGES 20 AND 21 DEPICT DOORWAY PROTECTION FOR A THREE-LAYER LOAD. FOR EACH REDUCTION IN NUMBER OF LOAD LAYERS, ELIMINATE THE APPROPRIATE TOP TWO HORIZONTAL PIECES AND/OR STRAPS AND REDUCE THE VERTICAL PIECES BY 30". FOR DOORWAY PROTECTION "D", MOVE THE SPANNER BY AN APPROPRIATE DISTANCE.

VERTICAL PIECE, 2" X 3" X 8'-0" (2 REQD).

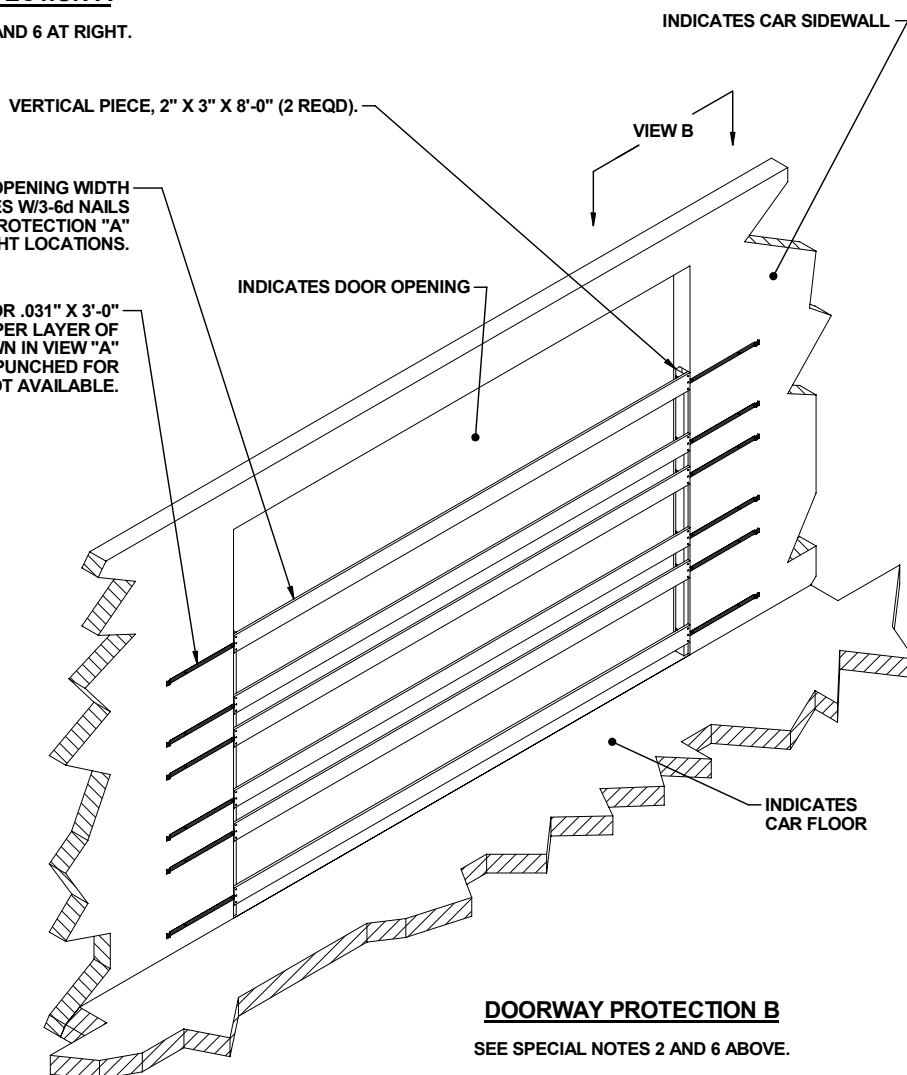
HORIZONTAL PIECE, 1" X 6" BY DOOR OPENING WIDTH (6 REQD). NAIL TO THE VERTICAL PIECES W/3-6d NAILS AT EACH END. SEE THE DOORWAY PROTECTION "A" DETAIL ABOVE FOR HEIGHT LOCATIONS.

DOORWAY PROTECTION-GATE STRAP, 1-1/4" X .035" OR .031" X 3'-0" (REF) NAIL-ON TYPE STEEL STRAPPING (12 REQD, 2 PER LAYER OF LOAD). NAIL TO GATE AND CAR SIDEWALL AS SHOWN IN VIEW "A" BELOW. NOTE: TYPE 1 STRAPPING MAY BE PUNCHED FOR NAILING IF TYPE 2 STRAPPING IS NOT AVAILABLE.



**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 SIDEWALL PRIOR TO POSITIONING THE ADJACENT CONTAINERS.



**DOORWAY PROTECTION B**

SEE SPECIAL NOTES 2 AND 6 ABOVE.

SEAL FOR 1-1/4" STEEL STRAP (6 REQD). NOTCH EACH SEAL WITH TWO NOTCHES. SEE THE "END-OVER-END LAP JOINT DETAILS" ON PAGE 5.

SEE THE "ANCHOR PLATE DETAIL" BELOW.

INDICATES DOOR OPENING

INDICATES CAR SIDEWALL

7'-8 1/2"

69 1/2"

39 1/2"

32 1/2"

9 1/2"

INDICATES STRAP ANCHOR PLATE

INDICATES CAR FLOOR

DOORWAY PROTECTION STRAP, 1-1/4" X .035" OR .031" STEEL STRAPPING BY DOOR OPENING WIDTH PLUS 6'-0" IN LENGTH (6 REQD, 2 PER LAYER OF LOAD). INSTALL FROM TWO PIECES. THREAD ONE END THRU STRAP ANCHOR PLATE AS SHOWN BY THE "ANCHOR PLATE DETAIL" BELOW. NAIL STRAP ANCHOR PLATE TO CAR SIDEWALL W/4 SIGNODE MICROLOCK NAILS.

### DOORWAY PROTECTION C

SEE SPECIAL NOTES 3 AND 6 ON PAGE 20.

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

SPREADER PIECE, 2" X 3" MATERIAL CUT SLIGHTLY LONGER THAN MEASURED DISTANCE (2 REQD). DRIVE INTO POSITION TO PROVIDE FOR A WEDGE FIT. TOENAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH END.

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

VIEW C

STEEL STRAP

12"

ANCHOR PLATE

SIGNODE MICROLOCK NAIL (4 REQD)

### ANCHORPLATE DETAIL

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

STEEL STRAP

VIEW C

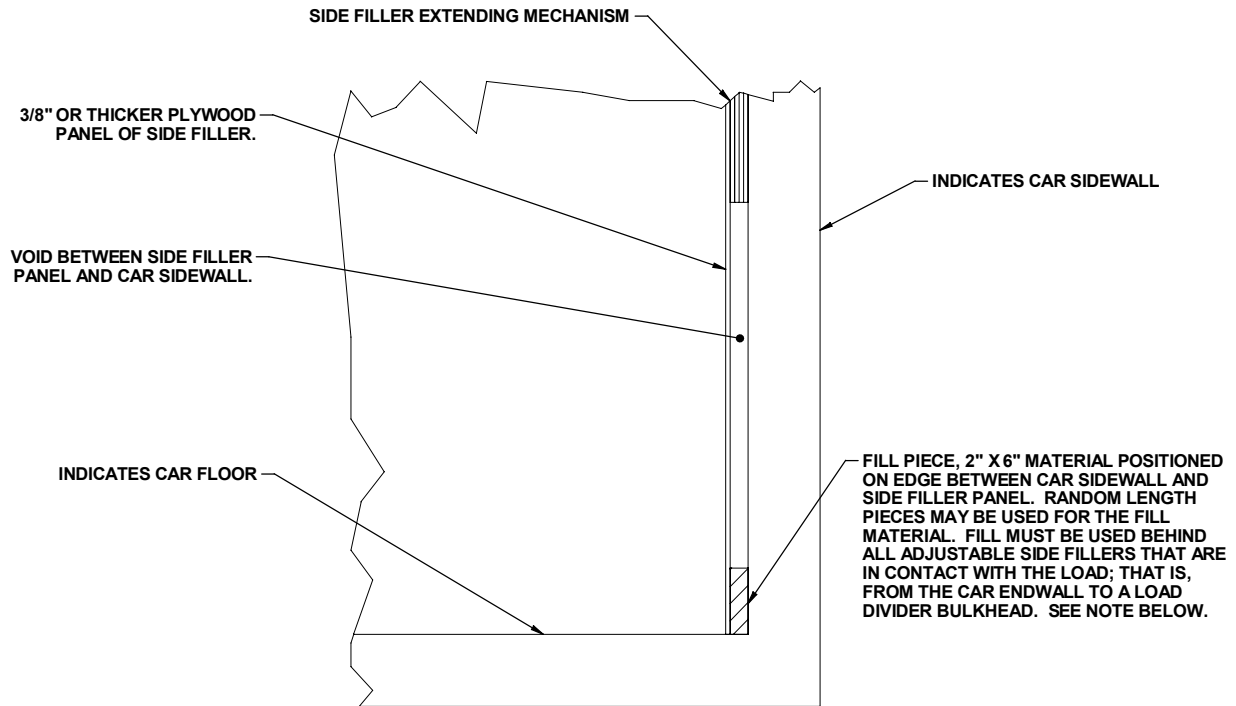
VERTICAL PIECE, 2" X 3" BY DOORWAY HEIGHT MINUS 1" (2 REQD).

DOOR OPENING WIDTH

HORIZONTAL PIECE, 1" X 6" BY DOOR OPENING WIDTH (6 REQD). NAIL TO THE VERTICAL PIECES W/3-6d NAILS AT EACH END. SEE THE DOORWAY PROTECTION "A" DETAIL ON PAGE 20 FOR HEIGHT LOCATIONS.

### DOORWAY PROTECTION D

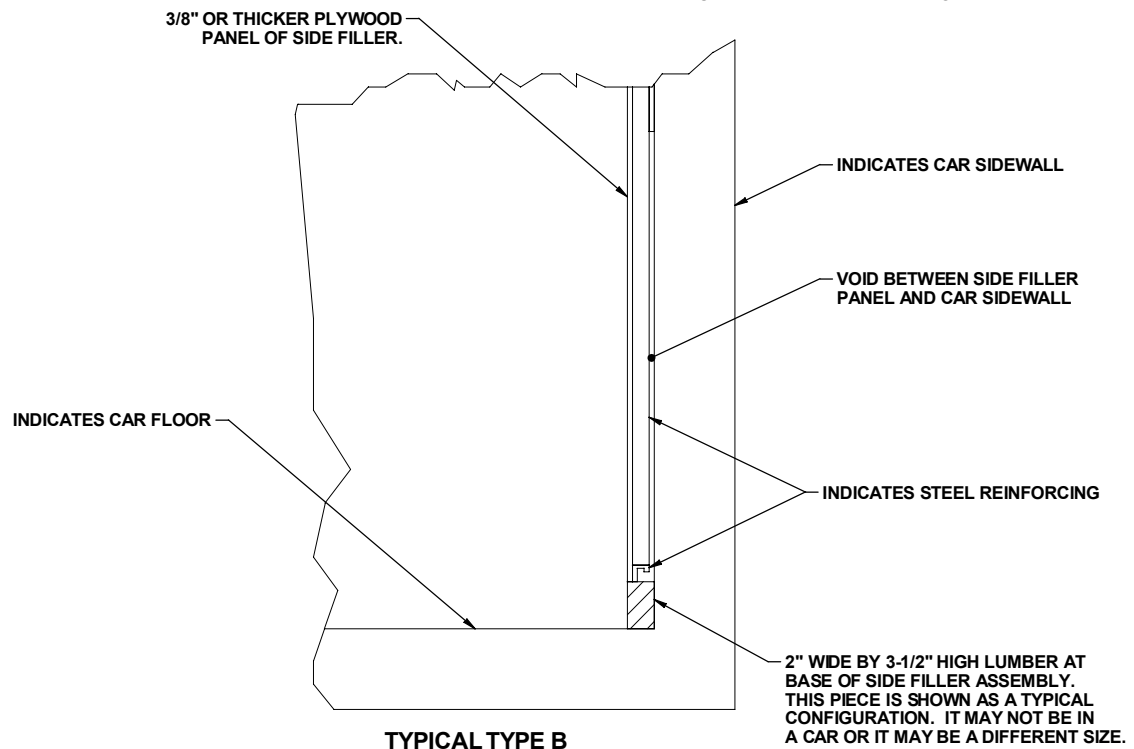
SEE SPECIAL NOTES 4 AND 6 ON PAGE 20.



#### TYPICAL TYPE A

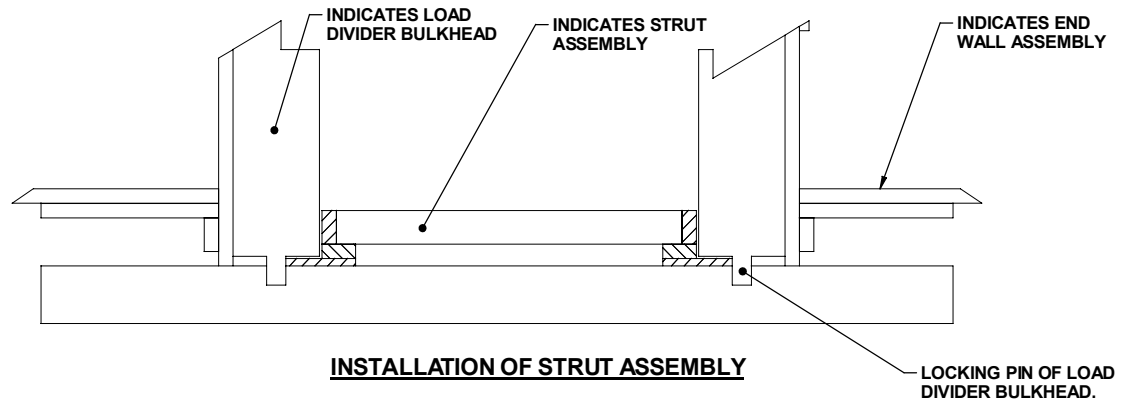
THIS VIEW SHOWS THE INSTALLATION OF A "FILL PIECE" IN A CAR EQUIPPED WITH A STANDARD ADJUSTABLE SIDE FILLER

**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".



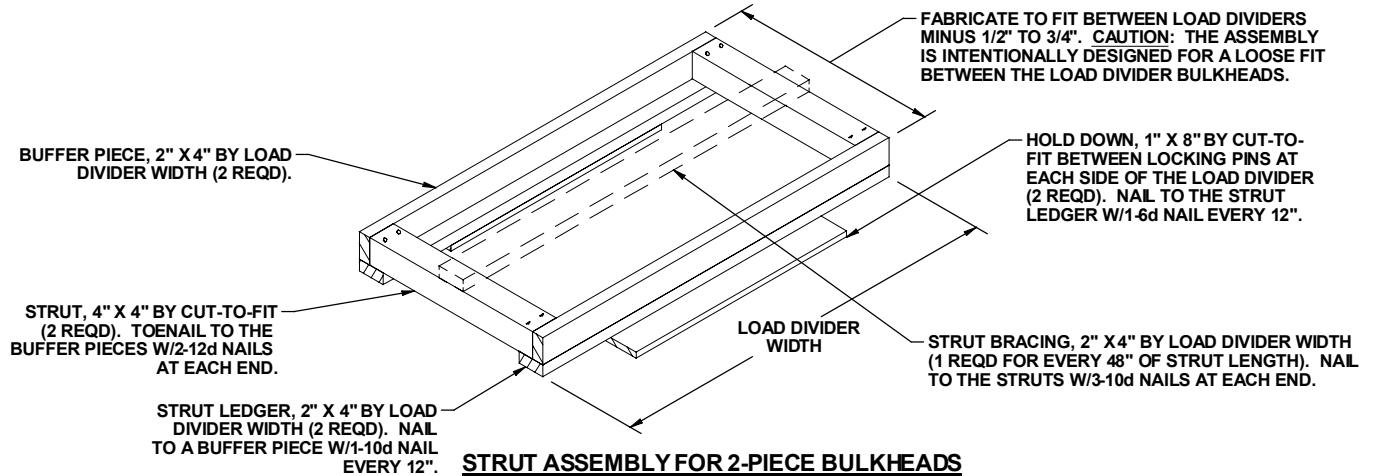
#### TYPICAL TYPE B

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.



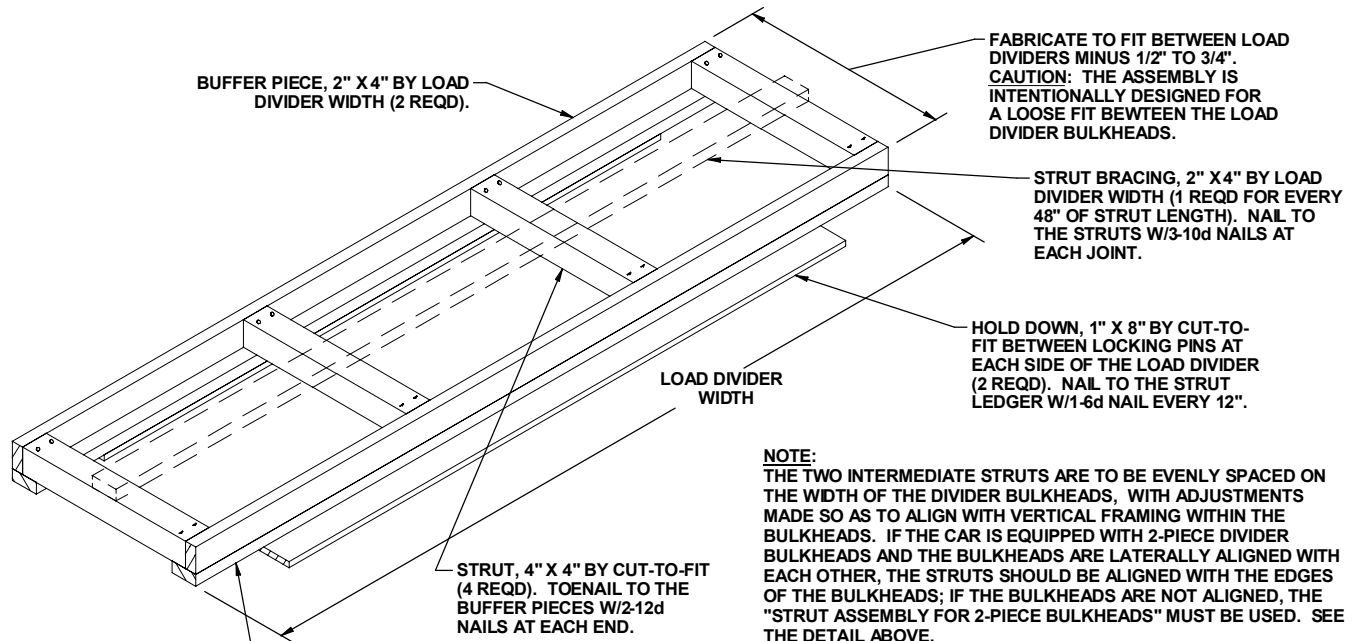
### INSTALLATION OF STRUT ASSEMBLY

THIS SIDE ELEVATION VIEW SHOWS THE STRUT ASSEMBLY INSTALLED BETWEEN THE LOAD DIVIDER BULKHEADS. NOTE THE 1/2" TO 3/4" (TOTAL) SPACE INTENTIONALLY PROVIDED BETWEEN THE ASSEMBLY AND THE BULKHEADS.



### STRUT ASSEMBLY FOR 2-PIECE BULKHEADS

A STRUT ASSEMBLY IS REQUIRED WHEN THE LOAD BEHIND EITHER LOAD DIVIDER BULKHEAD EXCEEDS 50,000 POUNDS OF HAZARD CLASS AND DIVISION 1.1, 1.2, OR 1.3 EXPLOSIVES. A STRUT ASSEMBLY IS NOT REQUIRED FOR LOADS OF HAZARD CLASS AND DIVISION 1.4 EXPLOSIVES, REGARDLESS OF THE WEIGHT OF THE LOAD. NOTE: TWO ASSEMBLIES AS SHOWN ARE REQUIRED FOR A 2-PIECE BULKHEAD IF NOT LATERALLY ALIGNED. SEE "NOTE" BELOW.



**NOTE:**  
THE TWO INTERMEDIATE STRUTS ARE TO BE EVENLY SPACED ON THE WIDTH OF THE DIVIDER BULKHEADS, WITH ADJUSTMENTS MADE SO AS TO ALIGN WITH VERTICAL FRAMING WITHIN THE BULKHEADS. IF THE CAR IS EQUIPPED WITH 2-PIECE DIVIDER BULKHEADS AND THE BULKHEADS ARE LATERALLY ALIGNED WITH EACH OTHER, THE STRUTS SHOULD BE ALIGNED WITH THE EDGES OF THE BULKHEADS; IF THE BULKHEADS ARE NOT ALIGNED, THE "STRUT ASSEMBLY FOR 2-PIECE BULKHEADS" MUST BE USED. SEE THE DETAIL ABOVE.

### STRUT ASSEMBLY FOR 1-PIECE BULKHEADS

A STRUT ASSEMBLY IS REQUIRED WHEN THE LOAD BEHIND EITHER LOAD DIVIDER BULKHEAD EXCEEDS 50,000 POUNDS OF HAZARD CLASS AND DIVISION 1.1, 1.2, OR 1.3 EXPLOSIVES. A STRUT ASSEMBLY IS NOT REQUIRED FOR LOADS OF HAZARD CLASS AND DIVISION 1.4 EXPLOSIVES, REGARDLESS OF THE WEIGHT OF THE LOAD.

### PROVISIONS FOR BOXCARS EQUIPPED WITH LOAD DIVIDER BULKHEADS

