

APPROVED BY  
BUREAU OF EXPLOSIVES

*David H. ...*

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# LOADING AND BRACING (CL & LCL) IN BOXCARS\* OF SEWINDER (AIM-9X) MISSILES PACKED IN CNU-609 SHIP- PING AND STORAGE CONTAINERS

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

## U.S. ARMY MATERIEL COMMAND DRAWING

|   |  |  |                      |            |          |
|---|--|--|----------------------|------------|----------|
| APPROVED, U.S. ARMY<br>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 22. |                      |            |          |
| <i>David H. ...</i>   |  | DO NOT SCALE   |                      | MARCH 2007 |          |
|   |  | ENGINEER OR TECHNICIAN   | BASIC REV.           |            |          |
| APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND |  | TRANSPORTATION ENGINEERING DIVISION  | <i>Ronald G. ...</i> | TESTED     |          |
| <i>Charles R. ...</i>   |  | VALIDATION ENGINEERING DIVISION  | <i>Philip W. ...</i> | CLASS      | DIVISION |
|   |  | ENGINEERING DIRECTORATE  | <i>Philip W. ...</i> | 19         | 48       |
| U.S. ARMY DEFENSE AMMUNITION CENTER                                 |  |  |                      | DRAWING    | FILE     |
|   |  |  |                      | 8841       | SP5J38   |

## GENERAL NOTES

(GENERAL NOTES CONTINUED)

- A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).
- B. THE OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE TO SIDEWINDER (AIM-9X) MISSILES PACKED IN CNU-609 SHIPPING AND STORAGE CONTAINER. SEE PAGE 4 AND RAYTHEON DRAWING 2215440 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-609 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, AN ENDWALL GATE WITH SHIMS MUST BE INSTALLED TO PROVIDE A "SQUARED OFF" SURFACE FOR THE LOAD AT THE END OF THE CAR. REFER TO PAGE 17 FOR GUIDANCE.
- 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 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.
- J. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-1/2" THICK BY 3-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE. IF THOSE MEMBERS SPECIFICALLY IDENTIFIED AS "STRUTS" WITHIN THE KEY NUMBERS OF A DEPICTED LOAD ARE SPECIFIED TO BE 4" X 4" MATERIAL, IT IS PERMISSIBLE TO USE TWO LAMINATED PIECES OF 2" X 6" MATERIAL IN LIEU OF EACH 4" X 4" STRUT. DOUBLED 2" X 6" STRUTS WILL BE LAMINATED W/1-10d NAIL EVERY 6".
- K. **NOTICE:** A STAGGERED NAILING PATTERN WILL BE USED WHEREVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES. ALSO, A STAGGERED NAILING PATTERN WILL BE USED WHEN DUNNAGE IS NAILED TO THE FLOOR OR SIDEWALL OF THE TRANSPORTING VEHICLE, OR WHEN LAMINATING DUNNAGE. THE NAILING PATTERN WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL DOES NOT PENETRATE INTO OR NEAR A CRACK BETWEEN FLOOR BOARDS OR SIDEWALL BOARDS. ADDITIONALLY, THE NAILING PATTERN FOR AN UPPER PIECE OF LAMINATED DUNNAGE WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL FOR THAT PIECE WILL NOT BE DRIVEN THROUGH ONTO, OR RIGHT BESIDE A NAIL IN A LOWER PIECE.
- L. POWER DRIVEN STAPLES MAY BE USED AS ALTERNATIVE FASTENERS FOR NAILS WHEN CONSTRUCTING DUNNAGE ASSEMBLIES THAT ARE TO BE USED IN THE DELINEATED BOXCAR LOADS SHOWN THROUGHOUT THIS DRAWING. THE STAPLES TO BE USED MUST BE EQUAL IN LENGTH TO THE SPECIFIED NAIL SIZE AND MUST BE SUBSTITUTED ON A ONE STAPLE FOR ONE NAIL BASIS. STAPLES WHICH ARE 2-1/2" OR LESS IN LENGTH SHOULD BE IN ACCORDANCE WITH ASTM F1667 AS NEARLY AS PRACTICABLE. STAPLES THAT ARE LONGER THAN 2-1/2" WILL BE A COMMERCIAL GRADE, OF A QUALITY EQUIVALENT TO THOSE MANUFACTURED BY SENCO PRODUCTS INCORPORATED. **NOTE:** STAPLES WILL NOT BE SUBSTITUTED FOR NAILS IN ANY LOAD RESTRAINING FLOOR DUNNAGE APPLICATION.
- M. WHEN STEEL STRAPPING IS SEALED AT AN END-OVER-END LAP JOINT, A MINIMUM OF ONE SEAL WITH TWO PAIR OF NOTCHES WILL BE USED TO SEAL THE JOINT WHEN A NOTCH-TYPE SEALER IS BEING USED. A MINIMUM OF TWO SEALS, BUTTED TOGETHER, WITH TWO PAIR OF CRIMPS PER SEAL WILL BE USED TO SEAL THE JOINT WHEN A CRIMP-TYPE SEALER IS BEING USED. REFER TO THE "STRAP JOINT A" AND "STRAP JOINT B" DETAILS ON PAGE 5 FOR GUIDANCE.
- N. THROUGHOUT THIS PROCEDURAL DRAWING, PORTIONS OF THE BLOCKING COMPONENTS AND OF THE DEPICTED CARS, SUCH AS A CAR SIDEWALL, HAVE BEEN OMITTED FROM THE LOAD VIEW FOR CLARITY PURPOSES.
- O. THE NUMBER OF LADING UNITS MAY BE ADJUSTED TO FIT THE SIZE OF THE BOXCAR BEING LOADED OR THE QUANTITY TO BE SHIPPED, HOWEVER, THE APPROVED METHODS SPECIFIED HEREIN MUST BE FOLLOWED AS CLOSELY AS POSSIBLE FOR BLOCKING, BRACING, AND STAYING OF THE UNITS. **NOTICE:** A SHIPMENT WILL BE POSITIONED IN THE RAILCAR IN COMPLIANCE WITH THE WEIGHT DISTRIBUTION REQUIREMENTS OF THE AAR.
- P. **CAUTION:** WHEN POWER OR PNEUMATIC NAILERS ARE BEING USED IN THE APPLICATION OF NAILED FLOORLINE BLOCKING OR BRACING, 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.

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## 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.
- PLYWOOD - - - - - : COMMERCIAL ITEM DESCRIPTION A-A-55057, INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.
- STAPLE, STRAP - - - : COMMERCIAL GRADE.
- ANTI-CHAFING MATERIAL - - - - - : MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.
- WIRE, CARBON STEEL - - : ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.

**S. FOR CONVENTIONAL TYPE BOXCARS:**

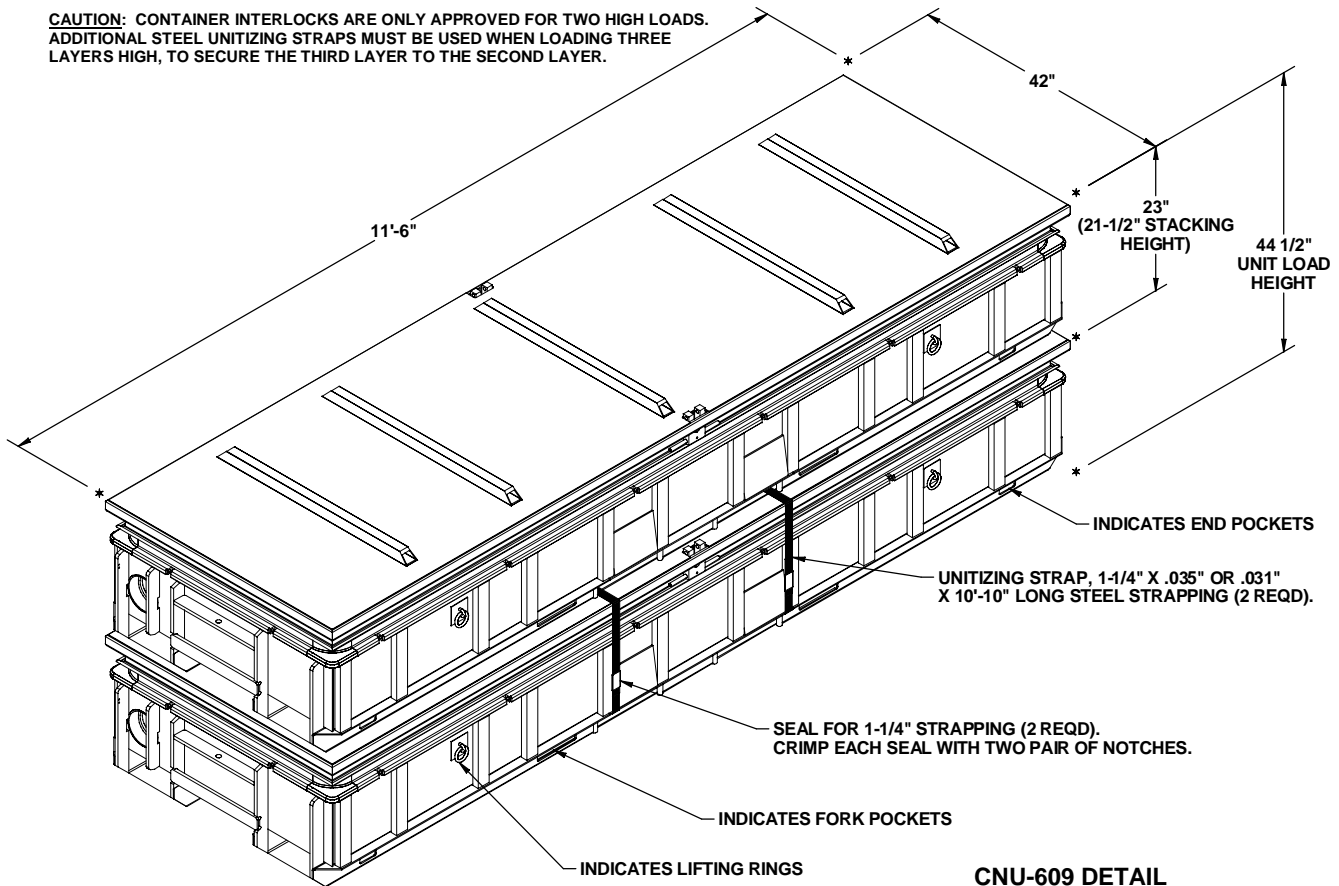
1. IF THE CAR BEING USED FOR A SHIPMENT IS EQUIPPED WITH A NAILABLE METAL FLOOR AND A NAIL SIZE FOR FLOOR NAILING IS MARKED ON THE SIDEWALL OF THE CAR, THAT GUIDANCE SHOULD BE APPLIED TO THE NAILING OF THE "DOORWAY BLOCKING" PIECES IN THE FULL LOADS AND TO THE NAILING TO THE CAR FLOOR OF THE LCL BRACES AND KNEE BRACE ASSEMBLIES IN THE LESS-THAN-FULL LOADS. IF A NAIL SIZE IS NOT SPECIFIED IN THE CAR, 30d NAILS SHOULD BE USED IN LIEU OF THOSE SPECIFIED IN THE APPLICABLE KEY NUMBERS.
2. **NOTICE:** WHEN POSITIONING CONTAINERS IN A CAR, THEY SHOULD BE PLACED TIGHTLY AGAINST A CAR SIDEWALL OR CRIB 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 THE JOINTS BETWEEN THE LAYERS OF CONTAINERS. 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 22. 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.

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

1. **CAUTION:** FOR CUSHIONED BOXCARS EQUIPPED WITH LOAD DIVIDER BULKHEADS, ONLY CARS EQUIPPED WITH LOAD DIVIDERS MANUFACTURED BY EVANS, EQUIPCO, OR PRECO MAY BE USED. LOAD DIVIDERS MANUFACTURED BY TRANSCO ARE NOT ACCEPTABLE WHETHER OF ALUMINUM OR STEEL CONSTRUCTION. THE DEPICTED PROCEDURES ARE APPLICABLE FOR CARS OF VARIOUS LENGTHS AND WIDTHS. THE AAR MECHANICAL DESIGNATION CLASS FOR THESE CARS, AS IDENTIFIED IN "THE OFFICIAL RAILWAY EQUIPMENT REGISTER", WILL BE RBL, XL, OR XLI.
2. THE USE OF LOAD DIVIDER EQUIPPED CARS WILL ELIMINATE THE NEED FOR CENTER GATES AND STRUTS, AND GATE HOLD DOWNS (WHEN APPLICABLE) WHICH ARE REQUIRED IN CONVENTIONAL BOXCAR LOADS. THIS WILL ACCOUNT FOR A CONSIDERABLE SAVING IN MATERIAL AND LABOR COSTS. THEREFORE, EVERY EFFORT SHOULD BE MADE TO ACQUIRE CUSHIONED CARS EQUIPPED WITH LOAD DIVIDERS FOR SHIPMENT OF 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 19 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 19, THE "FILL PIECE" MATERIAL IS NOT REQUIRED.
4. **NOTICE:** AFTER THE LOAD DIVIDER BULKHEADS ARE POSITIONED AGAINST THE LADING, AND THE LOCKING PINS ARE ENGAGED IN THE HOLES OF THE RAILS, THE LOWER LOCKING PINS MUST BE INSPECTED TO ENSURE THAT THE PINS ARE FULLY ENGAGED IN THE LOCKING HOLES. IF THE PINS ARE NOT FULLY SEATED IN THE LOCKING HOLES, THE LINKAGE MECHANISM WILL BE ADJUSTED AS REQUIRED SO THAT THE PINS WILL BE FULLY SEATED INTO THE LOCKING HOLES OF THE LOWER RAILS. IF PRESENT, DEBRIS MUST BE REMOVED FROM BENEATH THE LOCKING HOLES WHICH HAVE BEEN SELECTED FOR SECURING A LOAD DIVIDER BULKHEAD.
5. THE NORMAL LOADING PATTERN IN CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS IS TO POSITION THE LADING BETWEEN A CAR ENDWALL AND A LOAD DIVIDER BULKHEAD IN FULL LAYERS. OBVIOUSLY, A LOAD QUANTITY MUST THEN BE A MULTIPLE OF THE NUMBER OF 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 IN CONTACT WITH A LOAD DIVIDER BULKHEAD ON THE CENTER-OF-CAR SIDE, BLOCK AND BRACE WITH LCL BRACES AS SHOWN ON PAGE 14 OR WITH KNEE BRACE ASSEMBLIES, AS SHOWN ON PAGE 12. A FILLER ASSEMBLY MAY ALSO BE USED TO REPLACE ONE CONTAINER, SEE THE DETAILS ON PAGE 8.

CAUTION: CONTAINER INTERLOCKS ARE ONLY APPROVED FOR TWO HIGH LOADS. ADDITIONAL STEEL UNITIZING STRAPS MUST BE USED WHEN LOADING THREE LAYERS HIGH, TO SECURE THE THIRD LAYER TO THE SECOND LAYER.



**TYPICAL UNIT LOAD DETAIL**

NOTE: UNITIZATION USING THE CONTAINER INTERLOCKS IS THE PREFERRED METHOD. THE ALTERNATE STEEL STRAPPING METHOD IS DEPICTED ABOVE. SEE NAVAL SEA SYSTEMS COMMAND DRAWING 6214173 FOR FURTHER DETAILS.

**CNU-609 DETAIL**

GROSS WEIGHT - - - - - 1,473 LBS (APPROX)  
 CUBE - - - - - 77.2 CU FT (APPROX)

**UNIT LOAD DETAIL (WITH STEEL STRAPPING)**

GROSS WEIGHT - - - - - 2,949 LBS (APPROX)  
 CUBE - - - - - 149.3 CU FT (APPROX)

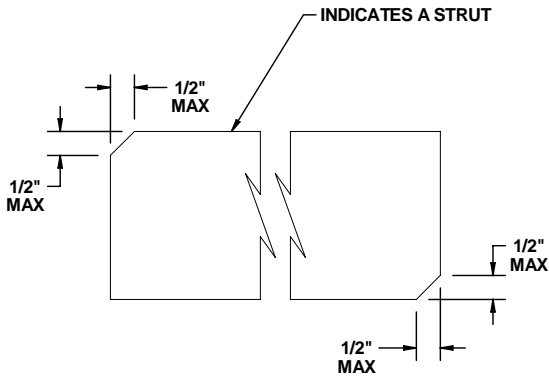
**UNITIZATION AND HANDLING GUIDANCE**

1. STACKING CONTAINERS FOR UNITIZING:
  - A. AN UPPER CONTAINER SHOULD BE PLACED AS CLOSE AS POSSIBLE IN VERTICAL ALIGNMENT WITH THE NEXT LOWER CONTAINER.
  - B. POSITION THE AFT END OF AN UPPER CONTAINER ABOVE THE AFT END OF THE NEXT LOWER CONTAINER.
  - C. THE CONTAINER SKIDS OF AN UPPER CONTAINER SHOULD BE FULLY SEATED AGAINST THE SKID LOCATOR PIECES ON THE COVER OF THE NEXT LOWER CONTAINER.
2. UNITIZING PROCEDURE USING PREFERRED INTERLOCKING FEATURE.
  - A. DETACH QUICK RELEASE PIN (BOTH SIDES) ON CONTAINER TO BE PLACED ON TOP.
  - B. STACK TWO CONTAINERS AS SHOWN. BE SURE TO ALIGN THE STACKING FEATURES.
  - C. SECURE TOP CONTAINER TO BOTTOM CONTAINER USING INTERLOCKING FEATURE.
  - D. INSTALL QUICK RELEASE PIN (BOTH SIDES).
3. UNITIZING PROCEDURE USING OPTIONAL 1-1/4" BANDING STRAPS.
  - A. STACK TWO CONTAINERS AS SHOWN. BE SURE TO ALIGN THE STACKING FEATURES.
  - B. FEED UNITIZING STRAP THROUGH FORK POCKETS OF BOTH CONTAINERS. (2 PLACES)
  - C. TENSION AND SECURE EACH STRAP WITH ONE DOUBLE-NOTCHED SEAL.

**(UNITIZATION AND HANDLING GUIDANCE CONTINUED)**

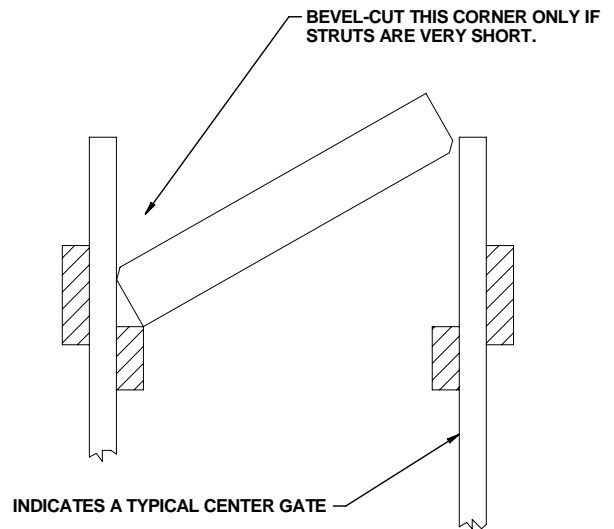
4. CONTAINER OR CONTAINER STACK HANDLING:
  - A. ONLY APPROVED AND APPROPRIATELY SIZED MATERIALS HANDLING EQUIPMENT WILL BE USED FOR HANDLING THE DEPICTED CONTAINERS. APPROVED MATERIAL HANDLING EQUIPMENT (FORKLIFT TRUCKS, CRANES, HAND TRUCKS, DOLLIES, ROLLER ASSEMBLIES, SLINGS, SPREADER BARS, ETC.) IS SPECIFIED ELSEWHERE.
  - B. PRECAUTIONARY HANDLING TECHNIQUES NORMALLY EMPLOYED OR AS SPECIFIED FOR THE TYPE OF COMMODITY INVOLVED WILL BE OBSERVED.
  - C. IF HANDLING IS ACCOMPLISHED WITH A FORKLIFT TRUCK, THE CONTAINERS SHOULD BE HANDLED FROM A SIDE POSITION AS MUCH AS POSSIBLE. CARE MUST BE EXERCISED WHEN INSERTING FORKS UNDER A CONTAINER, TO PREVENT DAMAGE TO THE CONTAINER BY THE FORK TINES OR THE FORKLIFT PACKAGE GUARD.
  - D. WHEN UNLOADING A CONTAINER OR CONTAINER STACK FROM THE BOX-CAR, THE FORKLIFT TINES WILL BE INSERTED UNDER THE LOWER CONTAINER, THE FORKLIFT WILL THEN ELEVATE THE END SLIGHTLY ABOVE THE FLOOR, AND BEGIN DRAGGING THE CONTAINER OR STACK FROM THE BOX-CAR AFTER ATTACHING A CHAIN OR WEB STRAP FROM A LOWER CONTAINER LIFT POINT AROUND THE FORKLIFT MAST TO A LIFT POINT OF THE OPPOSITE SIDE OF THE CONTAINER.

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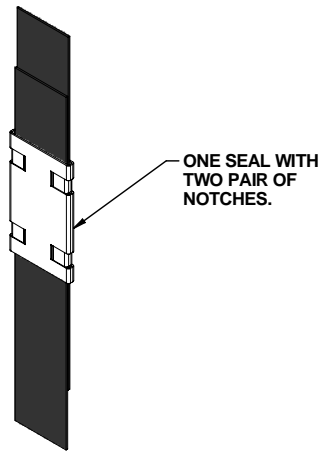
**BEVEL CUT**

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

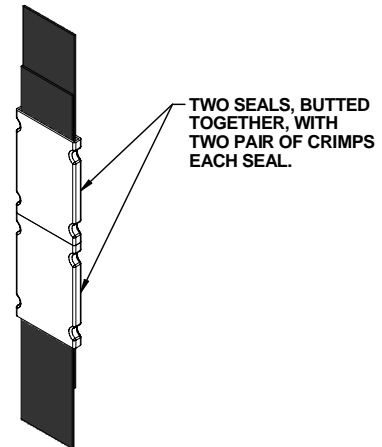


**STRUT INSTALLATION**

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



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



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

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



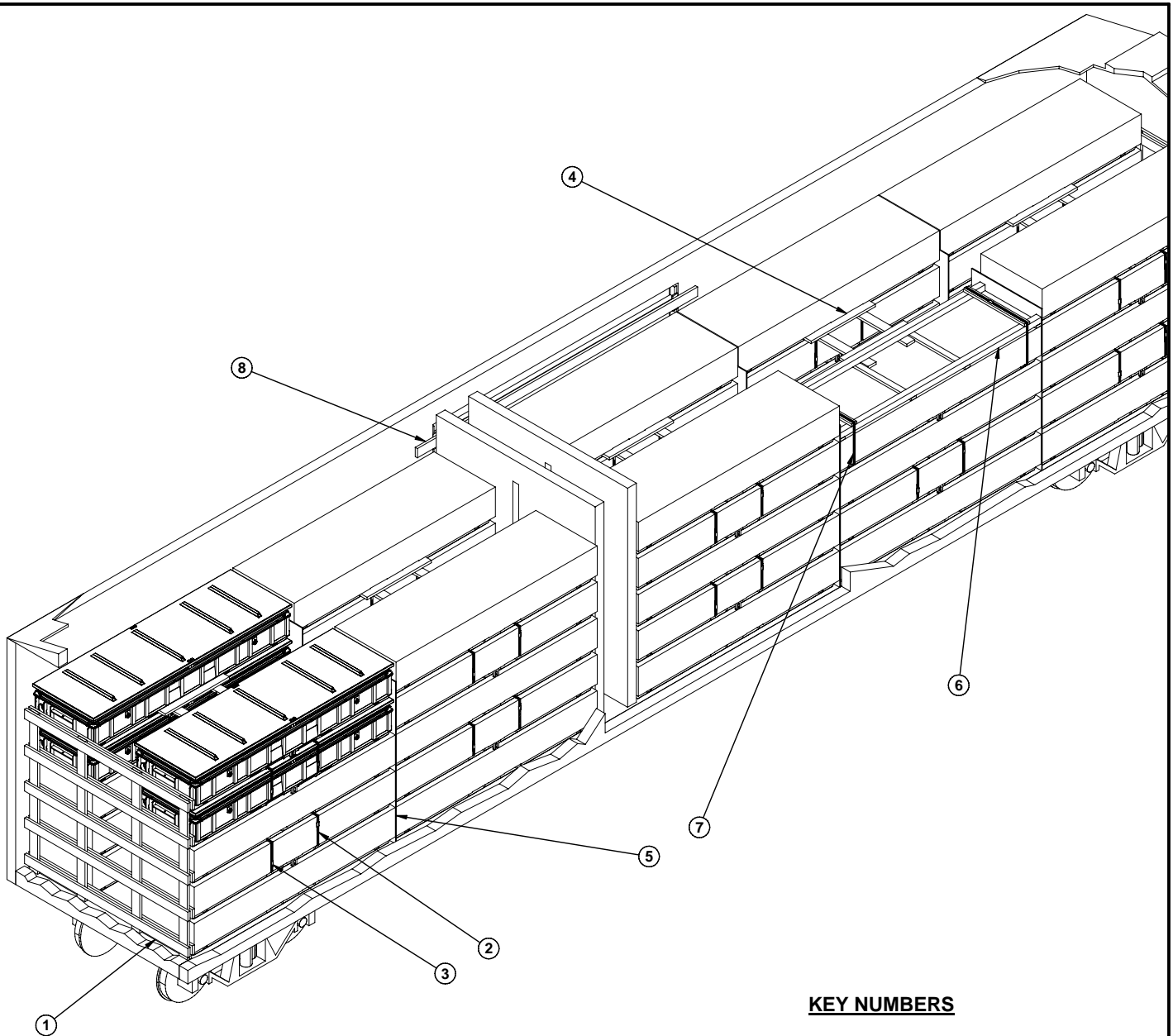
**SPECIAL NOTES:**

1. A 50 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 DOOR OPENINGS CAN BE USED.
2. THE CAR SHOWN IS EQUIPPED WITH 14'-0" WIDE OFFSET DOORS. CARS EQUIPPED WITH NARROWER DOOR OPENINGS AND THROUGH DOORS CAN BE USED.
3. IF THE CAR TO BE LOADED HAS NAILABLE ENDWALLS, BATTENS MAY BE NAILED TO THE ENDWALL IN LIEU OF USING THE ENDWALL GATE. POSITION AT THE HEIGHTS SHOWN FOR THE ENDWALL GATE AND NAIL TO THE CAR ENDWALL W/1-10d NAIL EVERY 12".
4. 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.
5. CRIB FILL ASSEMBLIES OR ANTI-SWAY BRACES ARE REQUIRED WHEN THE TOTAL LATERAL SPACE ACROSS THE WIDTH OF THE LOAD EXCEEDS 6", AS MEASURED FROM CONTAINERS TO EACH SIDE WALL.
6. 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 AND NAILABLE DOOR POSTS, A WOODEN GATE TYPE OF DOORWAY PROTECTION MAY BE USED. SEE DETAILS ON PAGES 20 AND 21.
7. FOR SHIPMENTS OF A LOAD WHICH CONTAINS FEWER CONTAINERS THAN WHAT IS SHOWN, SEE THE PROCEDURES ON PAGES 8 THRU 14.

| BILL OF MATERIAL                                 |             |            |
|--|-------------|------------|
| LUMBER   | LINEAR FEET | BOARD FEET |
| 1" X 4"  | 93          | 31         |
| 2" X 4"  | 202         | 135        |
| 2" X 6"  | 1,084       | 1,084      |
| 4" X 4"  | 30          | 40         |
| NAI LS   | NO. REQD    | POUNDS     |
| 6d (2")  | 60          | 1/2        |
| 10d (3")   | 1,400       | 21-3/4     |
| 12d (3-1/4")                                     | 64          | 1-1/4      |
| 16d (3-1/2")                                     | 80          | 1-3/4      |
| STEEL STRAPPING, 1-1/4" - 236' REQD - - - 34 LBS |             |            |
| SEAL FOR 1-1/4" STRAPPING - 22 REQD - - - 1 LBS  |             |            |
| PLYWOOD, 1/2" - - - 192 SQ FT REQD - - 264 LBS   |             |            |
| WI RE, .008" DIA - - - - 40' REQD - - 3/4 LB     |             |            |

**LOAD AS SHOWN**

| ITEM              | QUANTITY  | WEIGHT (APPROX)               |
|-------------------|-----------|-------------------------------|
| CNU-609 CONTAINER | - - 50    | 73,650 LBS                    |
| DUNNAGE           | - - - - - | 2,900 LBS                     |
| TOTAL WEIGHT      |           | - - - - - 76,550 LBS (APPROX) |



**ISOMETRIC VIEW**

**KEY NUMBERS**

- 1 ENDWALL GATE B (2 REQD). SEE THE DETAIL ON PAGE 17 AND SPECIAL NOTE 3 ON PAGE 9.
- 2 UNITIZING STRAP, 1-1/4" X .035" OR .031" X 8'-6" (18 REQD). INSTALL TO UNITIZED CONTAINER IN THE CENTER OF THE STACK TO THE CONTAINER ON THE TOP OF THE STACK. NOTE: THE LOAD SHOWN ABOVE DEPICTS THE CONTAINERS IN THE FIRST AND SECOND LAYERS AS BEING UNITIZED USING THE CONTAINER INTERLOCKS AND THE THIRD LAYER AS BEING UNITIZED USING STEEL STRAPPING. IF DESIRED, ALL THREE LAYERS CAN BE UNITIZED USING STRAPPING. SEE THE DETAILS ON PAGE 4.
- 3 SEAL FOR 1-1/4" STEEL STRAPPING (20 REQD, 1 PER STRAP). DOUBLE NOTCH EACH SEAL. SEE THE "END-OVER-END LAP JOINT DETAILS" ON PAGE 5.
- 4 ANTI-SWAY BRACE (15 REQD, 3 PER STACK OF CONTAINERS). INSTALL BETWEEN THE FIRST, THIRD AND FIFTH LAYERS. SEE DETAIL ON PAGE 18 AND SPECIAL NOTE 5 ON PAGE 9.
- 5 SEPARATOR GATE (6 REQD). SEE THE DETAIL ON PAGE 16.
- 6 FILLER ASSEMBLY (1 REQD). SEE DETAIL ON PAGE 18.
- 7 FILLER ASSEMBLY STRAP, 1-1/4" X .035" OR .031" X 9'-1" LONG STEEL STRAPPING (2 REQD). INSTALL TWO STRAPS THRU THE END POCKETS OF THE TOP CONTAINER TO ENCIRCLE THE CONTAINER AND THE FILLER ASSEMBLY.
- 8 DOORWAY PROTECTION D (2 REQD). SEE THE DETAIL ON PAGE 21 AND SPECIAL NOTE 6 ON PAGE 9.



**SPECIAL NOTES:**

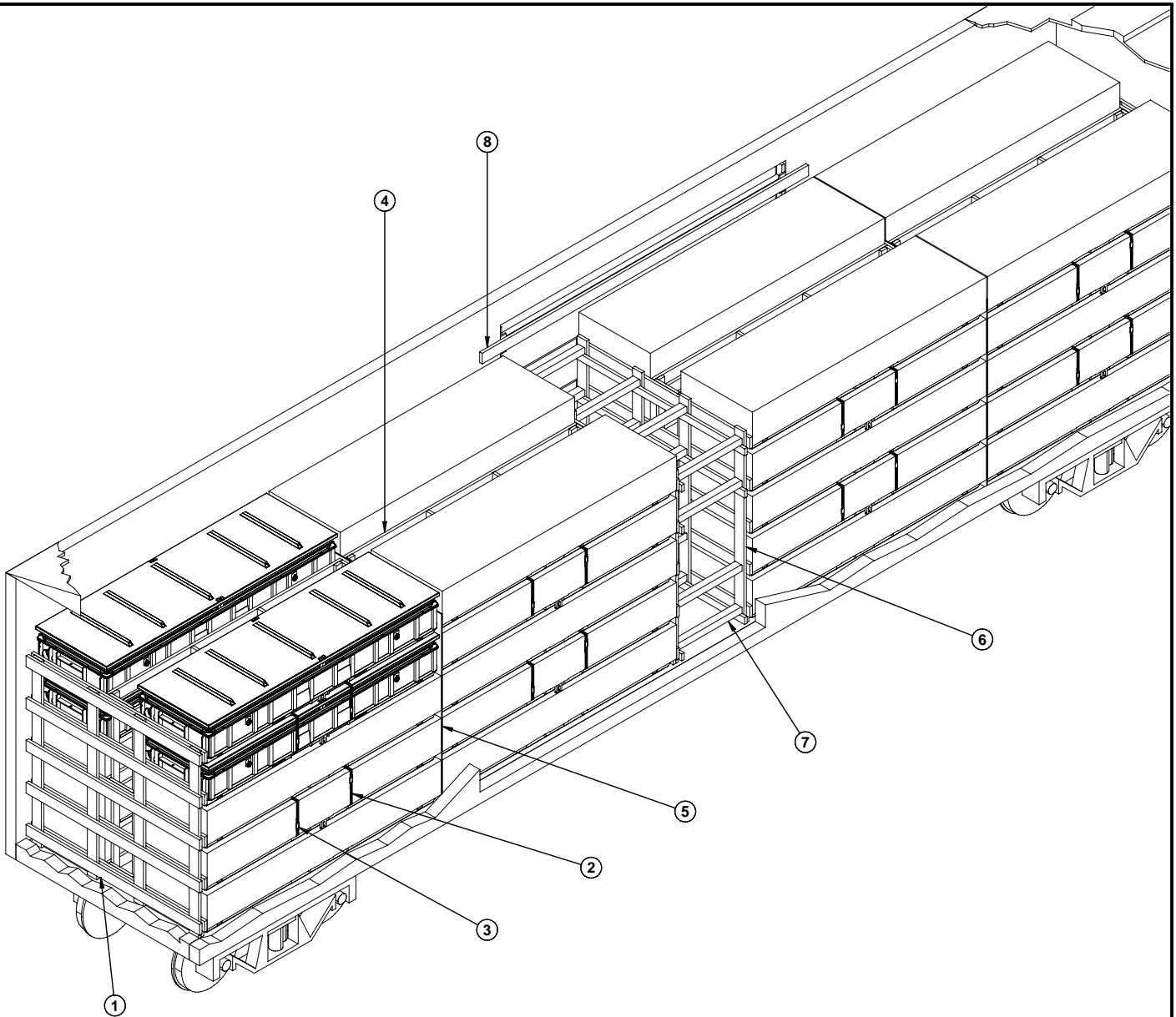
1. A 49 CONTAINER LOAD IS SHOWN IN A 60'-8" LONG BY 9'-4" WIDE CUSHIONED TYPE BOXCAR EQUIPPED WITH LOAD DIVIDERS AND 14'-0" WIDE OFFSET DOOR OPENINGS. BOXCARS OF OTHER DIMENSIONS AND BOXCARS HAVING WIDER DOOR OPENINGS CAN BE USED.
2. THE CAR SHOWN IS EQUIPPED WITH 14'-0" WIDE STAGGERED DOORS. CARS EQUIPPED WITH NARROWER DOOR OPENINGS AND THROUGH DOORS CAN BE USED.
3. IF THE CAR TO BE LOADED HAS NAILABLE ENDWALLS, BATTENS MAY BE NAILED TO THE ENDWALL IN LIEU OF USING THE ENDWALL GATE. POSITION AT THE HEIGHTS SHOWN FOR THE ENDWALL GATE AND NAIL TO THE CAR ENDWALL W/1-10d NAIL EVERY 12".
4. 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.
5. CRIB FILL ASSEMBLIES OR ANTI-SWAY BRACES ARE REQUIRED WHEN THE TOTAL LATERAL SPACE BETWEEN THE CONTAINERS EXCEEDS 6", AS MEASURED FROM CONTAINER TO CONTAINER.
6. 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-NAILABLE 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 6 FOR GUIDANCE.
7. FOR SHIPMENTS OF A LOAD WHICH CONTAINS MORE OR FEWER CONTAINERS THAN WHAT IS SHOWN, SEE THE PROCEDURES ON PAGES 6 AND 10 THRU 14.

| BILL OF MATERIAL                                 |             |            |
|--|-------------|------------|
| LUMBER   | LINEAR FEET | BOARD FEET |
| 1" X 4"  | 3           | 1          |
| 1" X 6"  | 84          | 42         |
| 2" X 3"  | 96          | 48         |
| 2" X 4"  | 963         | 642        |
| 2" X 6"  | 1,187       | 1,187      |
| 4" X 4"  | 26          | 34         |
| NAI LS   | NO. REQD    | POUNDS     |
| 6d (2")  | 42          | 1/4        |
| 10d (3")   | 1,448       | 22-1/4     |
| 12d (3-1/4")                                     | 12          | 1/4        |
| STEEL STRAPPING, 1-1/4" - 172' REQD - - - 25 LBS |             |            |
| SEAL FOR 1-1/4" STRAPPING - 20 REQD - - - 1 LB   |             |            |
| PLYWOOD, 1/2" - - - 192 SQ FT REQD - - 264 LBS   |             |            |

**LOAD AS SHOWN**

| ITEM              | QUANTITY  | WEIGHT (APPROX)     |
|-------------------|-----------|---------------------|
| CNU-609 CONTAINER | - - 49    | 72,177 LBS          |
| DUNNAGE           | - - - - - | 1,666 LBS           |
| TOTAL WEIGHT      |           | 73,843 LBS (APPROX) |

**49 CONTAINER LOAD IN A 60'-8" LONG BY 9'-4" WIDE  
BOXCAR EQUIPPED WITH LOAD DIVER BULKHEADS**



**ISOMETRIC VIEW**

**KEY NUMBERS**

- 1 ENDWALL GATE B (2 REQD). SEE THE DETAIL ON PAGE 17 AND SPECIAL NOTE 3 ON PAGE 11.
- 2 UNITIZING STRAP, 1-1/4" X .035" OR .031" X 8'-6" (16 REQD). INSTALL TO UNITIZED CONTAINER IN THE CENTER OF THE STACK TO THE CONTAINER ON THE TOP OF THE STACK. NOTE: THE LOAD SHOWN ABOVE DEPICTS THE CONTAINERS IN THE FIRST AND SECOND LAYERS AS BEING UNITIZED USING THE CONTAINER INTERLOCKS AND THE THIRD LAYER AS BEING UNITIZED USING STEEL STRAPPING. IF DESIRED, ALL THREE LAYERS CAN BE UNITIZED USING STRAPPING. SEE THE DETAILS ON PAGE 4.
- 3 SEAL FOR 1-1/4" STEEL STRAPPING (16 REQD, 1 PER STRAP). DOUBLE NOTCH EACH SEAL. SEE THE "END-OVER-END LAP JOINT DETAILS" ON PAGE 5.
- 4 CRIB FILL ASSEMBLY (4 REQD, WITH 15" STRUTS). SEE DETAIL ON PAGE 16 AND SPECIAL NOTE 5 ON PAGE 11.
- 5 SEPARATOR GATE (4 REQD). SEE THE DETAIL ON PAGE 16.
- 6 CENTER GATE B (2 REQD). SEE THE DETAIL ON PAGE 15.
- 7 STRUT, 4" X 4" BY CUT-TO-FIT (REF: 38-1/2") (16 REQD). TOENAIL TO THE CENTER GATES W/2-16d NAILS AT EACH END.
- 8 DOORWAY PROTECTION D (2 REQD). SEE THE DETAIL ON PAGE 21 AND SPECIAL NOTE 6 ON PAGE 11.

**SPECIAL NOTES:**

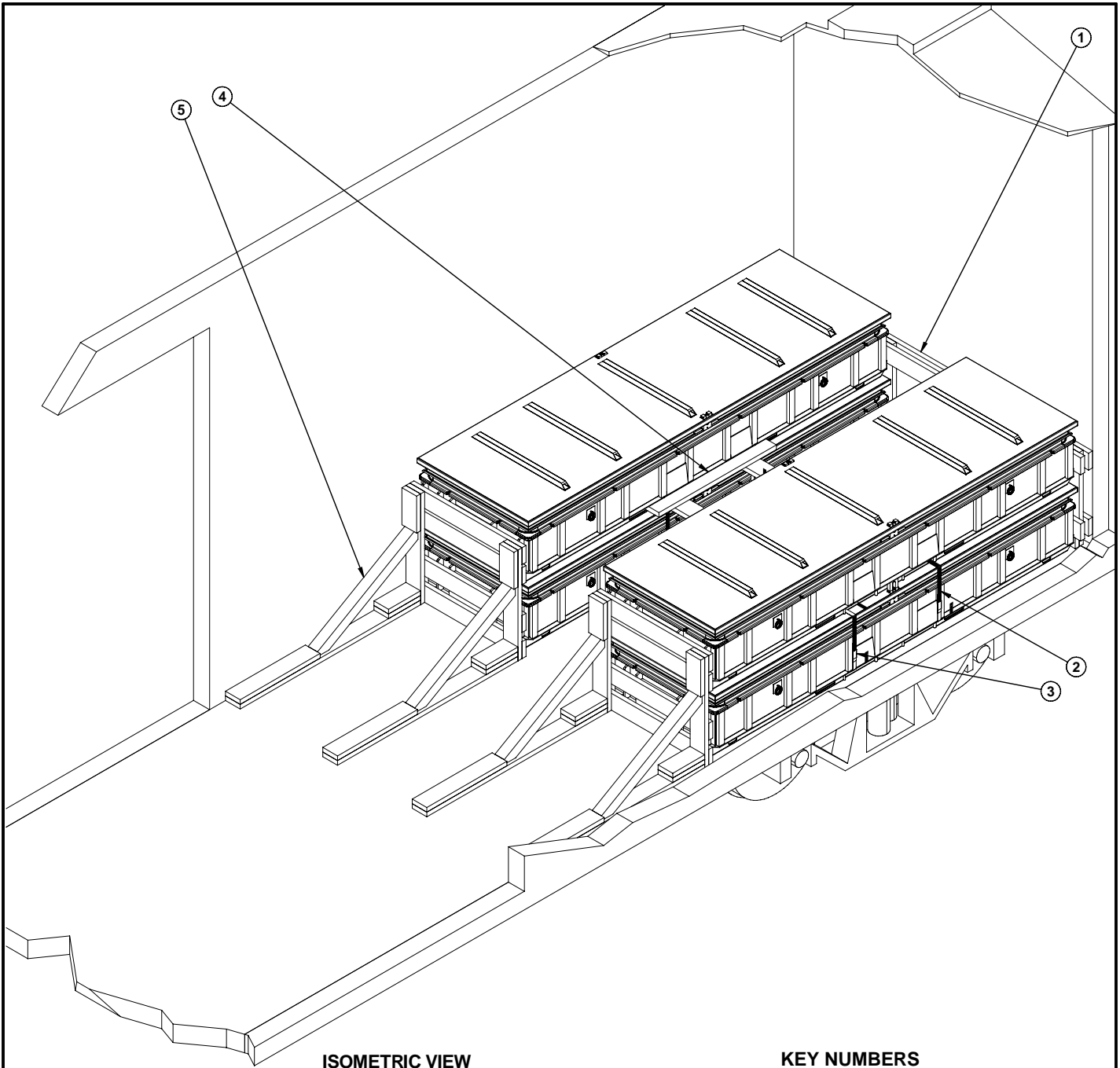
1. A 40 CONTAINER LOAD IS SHOWN IN A 50'-6" LONG BY 8'-6" WIDE CONVENTIONAL BOXCAR EQUIPPED WITH 14'-0" WIDE DOOR OPENINGS. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER OR NARROWER DOOR OPENINGS CAN BE USED.
2. THE CAR SHOWN IS EQUIPPED WITH 14'-0" WIDE OFFSET DOORS. CARS EQUIPPED WITH NARROWER DOOR OPENINGS OR THROUGH DOORS CAN BE USED.
3. IF THE CAR TO BE LOADED HAS NAILABLE ENDWALLS, BATTENS MAY BE NAILED TO THE ENDWALL IN LIEU OF USING THE ENDWALL GATE. POSITION AT THE HEIGHTS SHOWN FOR THE ENDWALL GATE AND NAIL TO THE CAR ENDWALL W/1-10d NAIL EVERY 12".
4. CONTAINER 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.
5. CRIB FILL ASSEMBLIES ARE REQUIRED WHEN THE TOTAL SPACE BETWEEN THE CONTAINERS EXCEEDS 6", AS MEASURED FROM CONTAINER TO ADJACENT CONTAINER.
6. 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 10 IS APPLICABLE FOR BOXCARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NON-NAILABLE 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 6 FOR GUIDANCE.
7. FOR SHIPMENT OF A LOAD WHICH CONTAINS MORE OR FEWER CONTAINERS THAN WHAT IS SHOWN, SEE THE PROCEDURES CONTAINED ON PAGES 6, 8, 12 AND 14.

**BILL OF MATERIAL**

| LUMBER  | LINEAR FEET | BOARD FEET |
|---|-------------|------------|
| 1" X 4"   | 3           | 1          |
| 1" X 6"   | 140         | 70         |
| 2" X 3"   | 35          | 48         |
| 2" X 4"   | 253         | 169        |
| 2" X 6"   | 746         | 746        |
| 4" X 4"   | 52          | 69         |
| NAI LS  | NO. REQD    | POUNDS     |
| 6d (2")   | 116         | 3/4        |
| 10d (3")  | 980         | 15         |
| 12d (3-1/4")                                      | 64          | 1-1/4      |
| STEEL STRAPPING, 1-1/4" - 136' REQD - - - 20 LBS  |             |            |
| SEAL FOR 1-1/4" STRAPPING - 48 REQD - - - 3/4 LBS |             |            |
| PLYWOOD, 1/2" - - - 128 SQ FT REQD - - - 176 LBS  |             |            |

**LOAD AS SHOWN**

| ITEM                | QUANTITY  | WEIGHT (APPROX)            |
|---------------------|-----------|----------------------------|
| CNU-609 CONTAINER   | - - 40    | 58,920 LBS                 |
| DUNNAGE             | - - - - - | 2,415 LBS                  |
| <b>TOTAL WEIGHT</b> |           | <b>61,335 LBS (APPROX)</b> |



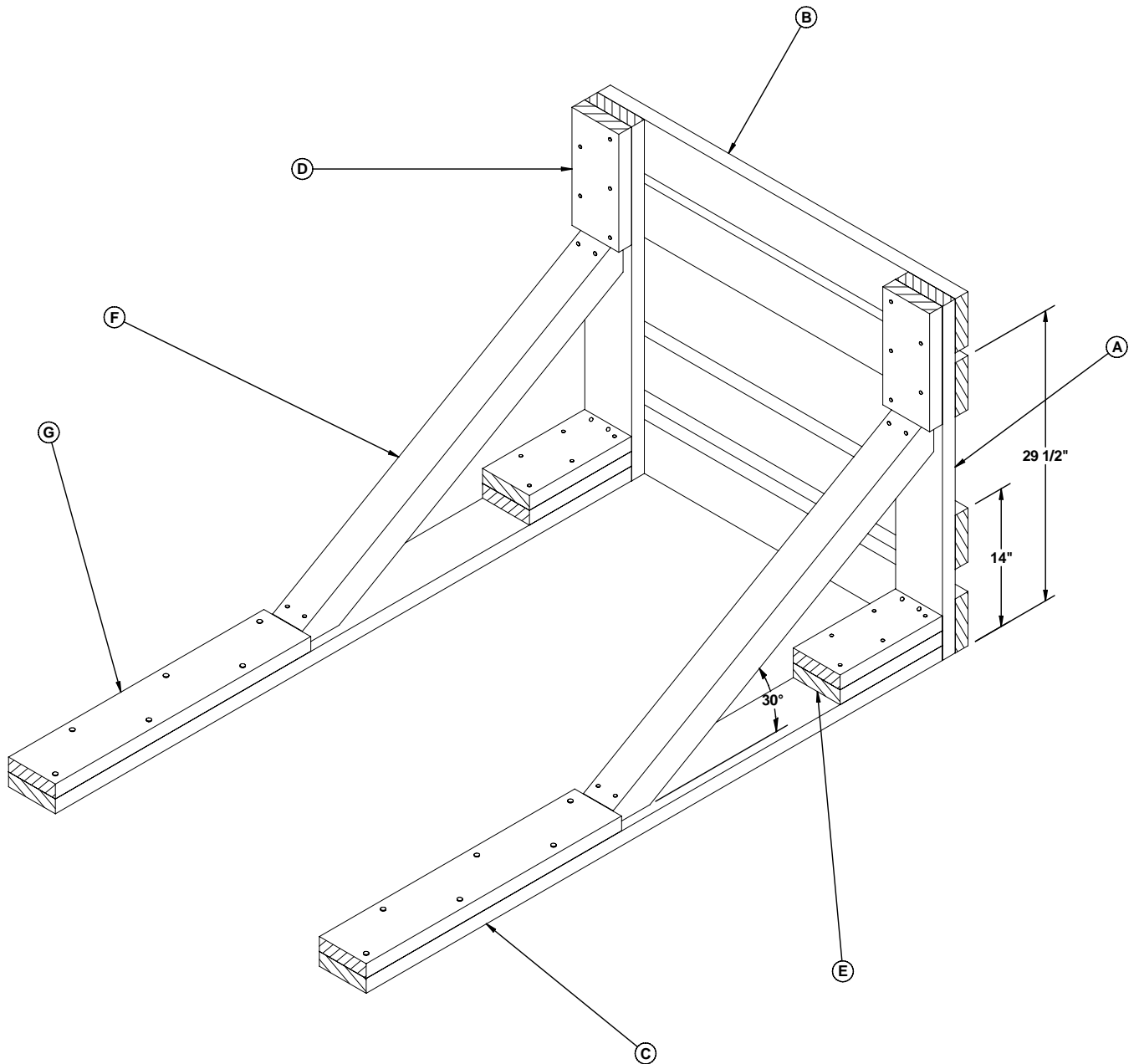
**ISOMETRIC VIEW**

**KEY NUMBERS**

**SPECIAL NOTES:**

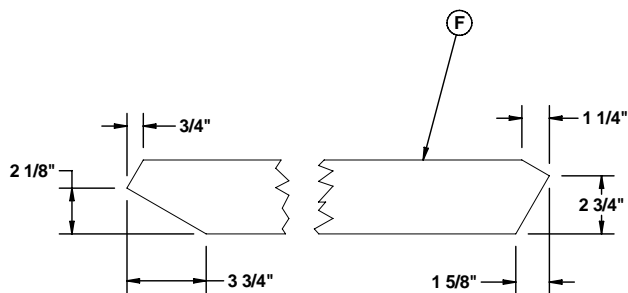
1. A FOUR CONTAINER LOAD IS SHOWN IN A 9'-4" WIDE CONVENTIONAL TYPE BOXCAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS AND CARS HAVING METAL LININGS MAY BE USED.
2. IF THE CAR TO BE LOADED HAS NAILABLE ENDWALLS, BATTENS MAY BE NAILED TO THE ENDWALL IN LIEU OF USING THE ENDWALL GATE. POSITION AT THE HEIGHTS SHOWN FOR THE ENDWALL GATE AND NAIL TO THE CAR ENDWALL W/1-10d NAIL EVERY 12".
3. 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.
4. 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 FOUR CONTAINERS.
5. 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.
6. CONTAINERS WILL NOT BE STACKED MORE THAN TWO LAYERS HIGH FOR BRACING WITH KNEE BRACES.

- 1 ENDWALL GATE B (1 REQD). SEE THE DETAIL ON PAGE 17 AND SPECIAL NOTE 2 AT LEFT.
- 2 UNITIZING STRAP FOR 2 HIGH CONTAINER STACKS, 1-1/4" X .035" OR .031" X 10'-10" LONG STEEL STRAPPING (4 REQD). IF DESIRED, THE STEEL STRAPPING CAN BE ELIMINATED IF THE CONTAINER INTERLOCKS ARE USED. SEE THE DETAILS ON PAGE 4.
- 3 SEAL FOR 1-1/4" STEEL STRAPPING (4 REQD, 1 PER STRAP). DOUBLE NOTCH EACH SEAL. SEE THE "END-OVER-END LAP JOINT DETAILS" ON PAGE 5.
- 4 ANTI-SWAY BRACE (2 REQD). SEE THE DETAIL ON PAGE 18. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF CONTAINERS.
- 5 KNEE BRACE ASSEMBLY (2 REQD). SEE DETAIL ON PAGE 13.



**KEY LETTERS**

- A VERTICAL PIECE, 2" X 6" X 36" (2 REQD). NAIL TO A FLOOR CLEAT W/3-16d NAILS.
- B HORIZONTAL PIECE, 2" X 6" X 42" (4 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.
- C FLOOR CLEAT, 2" X 6" X 67-1/2" (2 REQD). NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8".
- D HOLD-DOWN CLEAT, 2" X 6" X 12" (2 REQD). NAIL TO A VERTICAL PIECE W/5-10d NAILS.
- E POCKET CLEAT, 2" X 6" X 12" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE FLOOR CLEAT W/5-16d NAILS. NAIL THE SECOND PIECE IN A LIKE MANNER AND TOENAIL THE SECOND PIECE TO THE VERTICAL PIECE W/2-16d NAILS.
- F BRACE, 4" X 4" X 44" (2 REQD). SEE THE DETAIL BELOW 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.



**BRACE**

**TYPICAL LCL USING KNEE BRACES**

LCL BRACE (4 REQD). SEE THE DETAIL BELOW. AT THE SIDE OF THE CONTAINER, LOCATE SO AS TO BE APPROXIMATELY 9" FROM THE END OF THE HORIZONTAL PIECES. NAIL TO THE FLOOR W/7-16d NAILS.

ENDWALL BATTEN, 2" X 6" X 48" (2 REQD). NAIL TO CAR ENDWALL W/4-10d NAILS.

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

SIDE HORIZONTAL PIECE, 1" X 6" X 11'-6" (1 REQD). NAIL TO LCL BRACE W/3-6d NAILS AT EACH JOINT PRIOR TO PLACING AGAINST CONTAINER.

UNITIZING STEEL STRAPS IS SHOWN, IF DESIRED, THE STEEL STRAPPING CAN BE ELIMINATED IF THE CONTAINER INTERLOCKS ARE USED. SEE THE DETAILS ON PAGE 4.

31 1/2"  
10 1/2"

**ISOMETRIC VIEW**

**SPECIAL NOTES:**

1. AN 8'-6" WIDE CONVENTIONAL TYPE BOXCAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED.
2. THE LOAD SHOWN DEPICTING THE LCL BRACE METHOD OF PARTIAL-LAYER BRACING IS TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR OTHER QUANTITIES AS LONG AS THE CAPACITY OF THE BRACES IS NOT 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.

HORIZONTAL PIECE

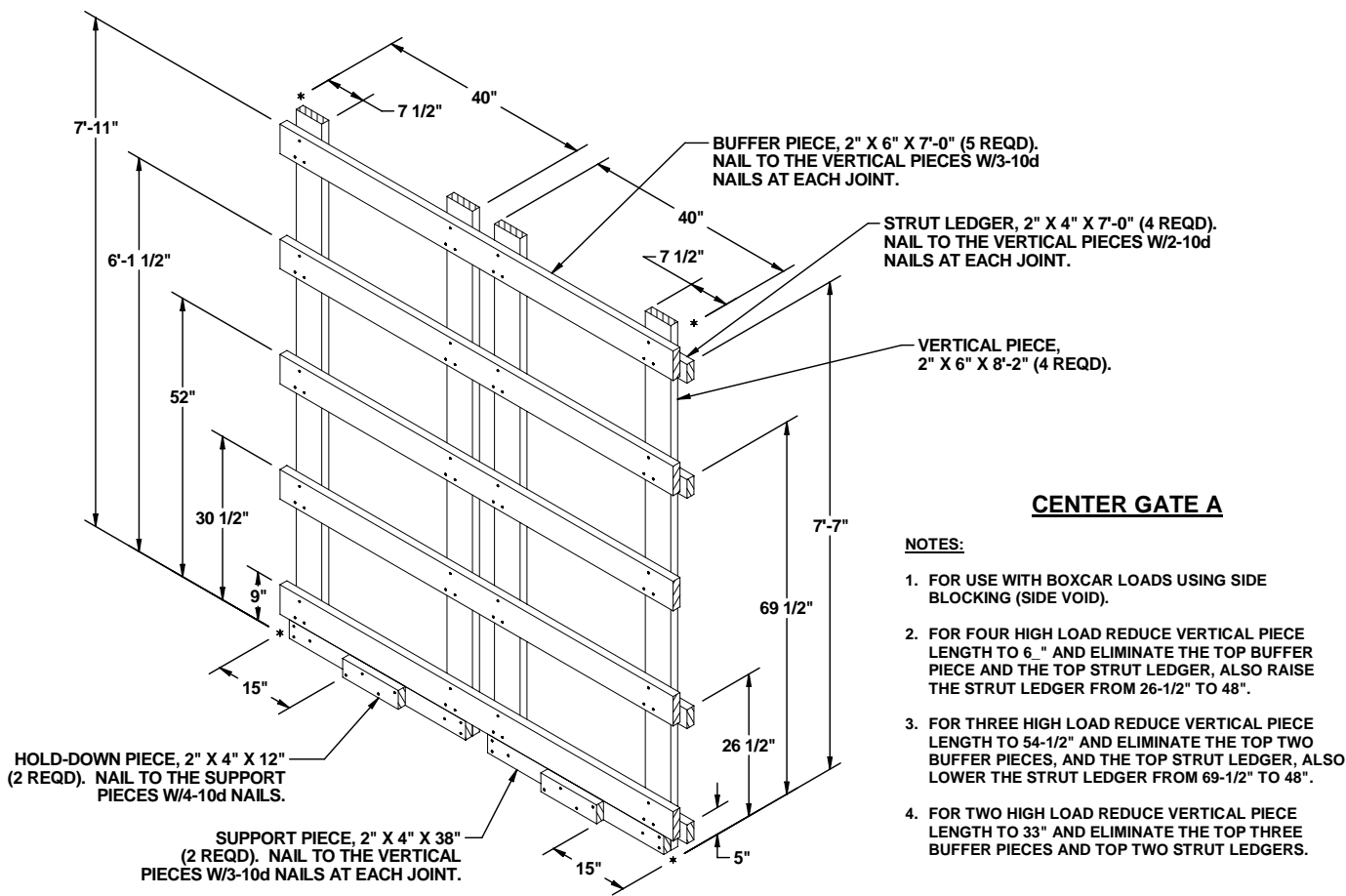
VERTICAL PIECE, 2" X 6" X 15" (MAXIMUM) (1 REQD). NAIL TO THE BACK-UP CLEAT W/2-16d NAILS.

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).

15"  
45°  
24" MIN

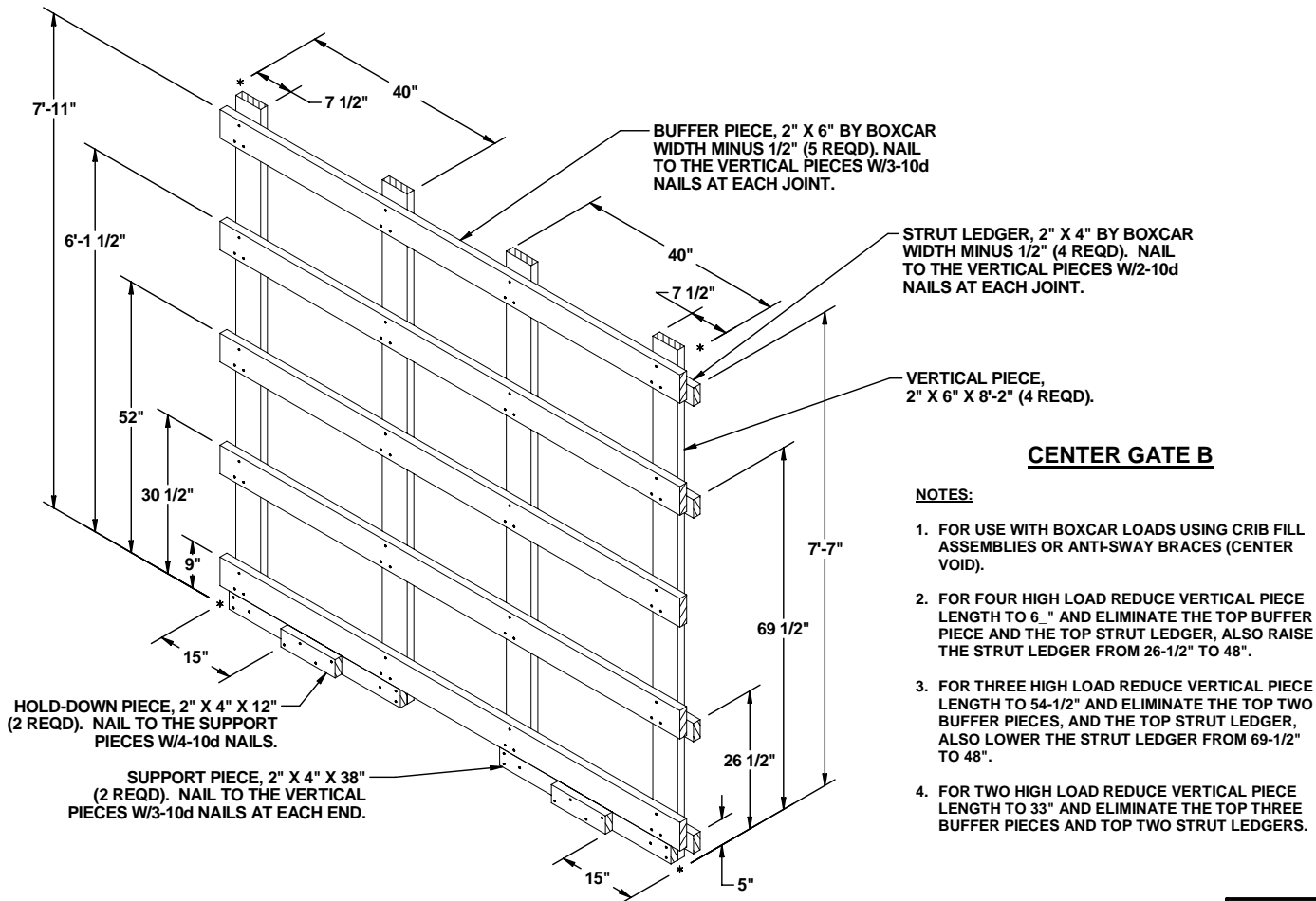
**TYPICAL LCL USING LCL BRACES**



**CENTER GATE A**

**NOTES:**

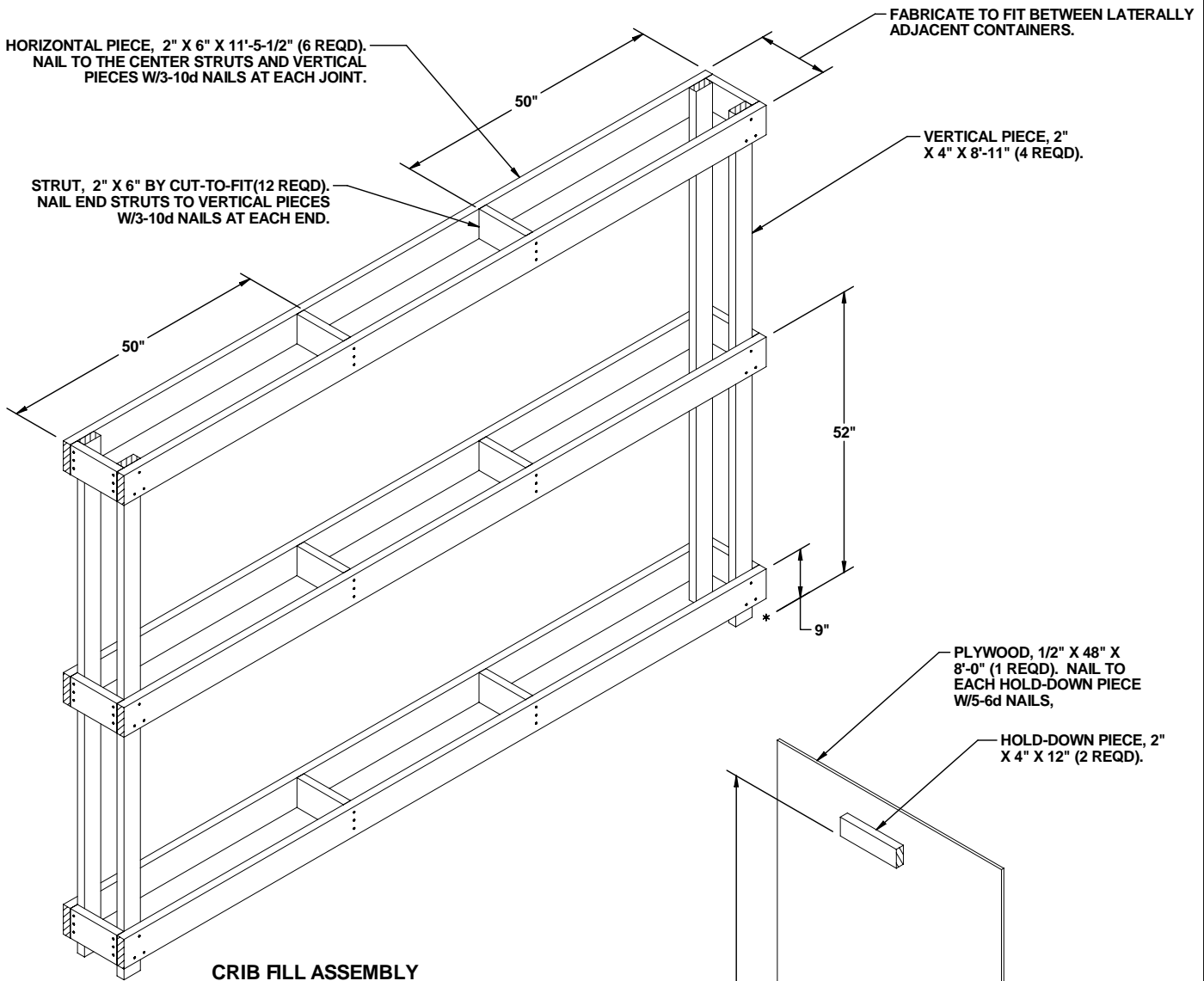
1. FOR USE WITH BOXCAR LOADS USING SIDE BLOCKING (SIDE VOID).
2. FOR FOUR HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 6' " AND ELIMINATE THE TOP BUFFER PIECE AND THE TOP STRUT LEDGER, ALSO RAISE THE STRUT LEDGER FROM 26'-1/2" TO 48" .
3. FOR THREE HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 54'-1/2" AND ELIMINATE THE TOP TWO BUFFER PIECES, AND THE TOP STRUT LEDGER, ALSO LOWER THE STRUT LEDGER FROM 69'-1/2" TO 48" .
4. FOR TWO HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 33" AND ELIMINATE THE TOP THREE BUFFER PIECES AND TOP TWO STRUT LEDGERS.



**CENTER GATE B**

**NOTES:**

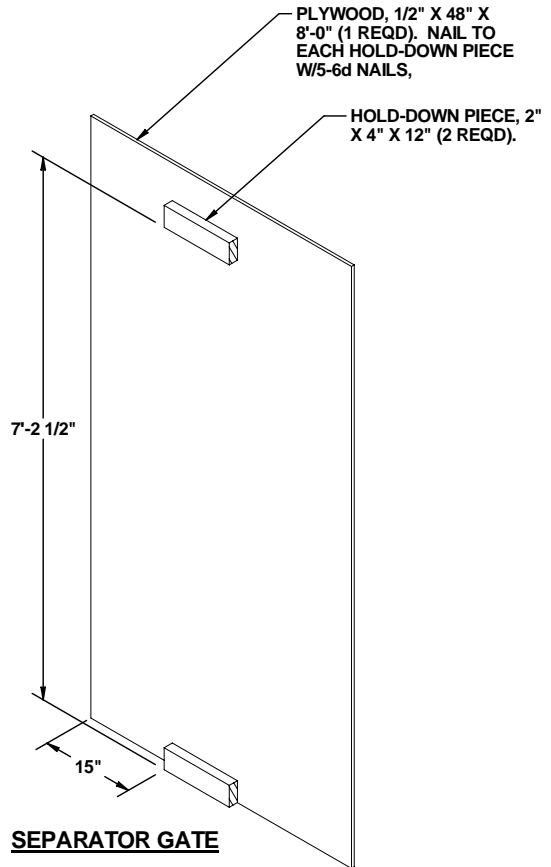
1. FOR USE WITH BOXCAR LOADS USING CRIB FILL ASSEMBLIES OR ANTI-SWAY BRACES (CENTER VOID).
2. FOR FOUR HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 6' " AND ELIMINATE THE TOP BUFFER PIECE AND THE TOP STRUT LEDGER, ALSO RAISE THE STRUT LEDGER FROM 26'-1/2" TO 48" .
3. FOR THREE HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 54'-1/2" AND ELIMINATE THE TOP TWO BUFFER PIECES, AND THE TOP STRUT LEDGER, ALSO LOWER THE STRUT LEDGER FROM 69'-1/2" TO 48" .
4. FOR TWO HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 33" AND ELIMINATE THE TOP THREE BUFFER PIECES AND TOP TWO STRUT LEDGERS.



**CRIB FILL ASSEMBLY**

**NOTES:**

1. FOR FOUR HIGH STACK OF CONTAINERS REDUCE VERTICAL PIECE LENGTH TO 7'-1-1/2".
2. FOR THREE HIGH STACK OF CONTAINERS REDUCE VERTICAL PIECE LENGTH TO 52" AND ELIMINATE THE CENTER LAYER OF STRUTS AND HORIZONTAL PIECES.
3. FOR TWO HIGH STACK OF CONTAINERS REDUCE VERTICAL PIECE LENGTH TO 30-1/2" AND ELIMINATE THE CENTER LAYER OF STRUTS AND HORIZONTAL PIECES.
4. FOR SINGLE LAYER CONTAINERS REDUCE VERTICAL PIECE LENGTH TO 9" AND ELIMINATE THE TOP TWO LAYERS OF STRUTS AND HORIZONTAL PIECES.



**SEPARATOR GATE**

**NOTES:**

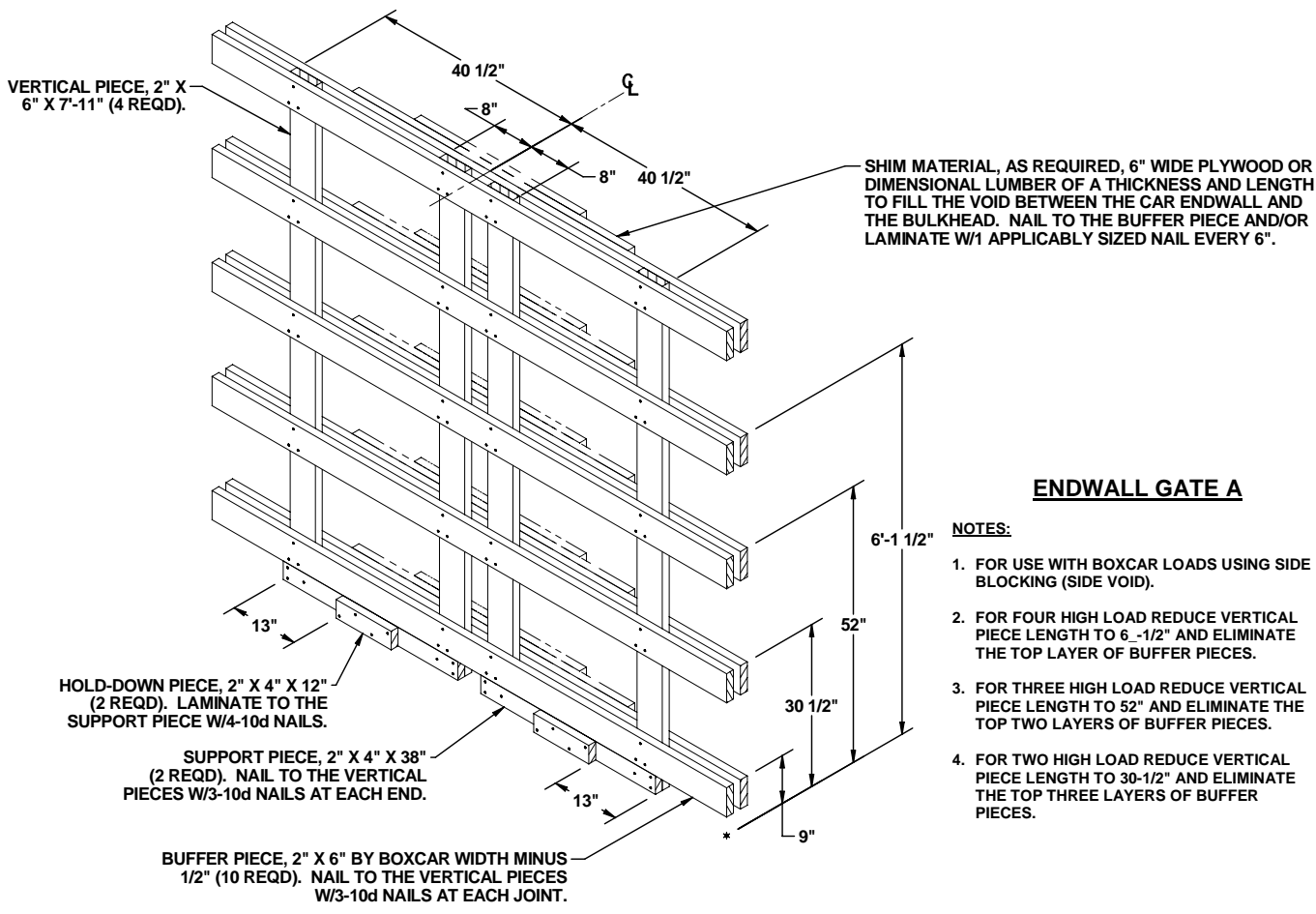
1. FOR FOUR HIGH STACK OF CONTAINERS REDUCE PLYWOOD HEIGHT TO 6'-8" AND REDUCE THE HEIGHT OF THE UPPER HOLD-DOWN PIECE TO 65".
2. FOR THREE HIGH STACK OF CONTAINERS REDUCE PLYWOOD HEIGHT TO 58" AND REDUCE THE HEIGHT OF THE UPPER HOLD-DOWN PIECE TO 43-1/2".
3. FOR TWO HIGH STACK OF CONTAINERS REDUCE PLYWOOD HEIGHT TO 37-1/2" AND REDUCE THE HEIGHT OF THE UPPER HOLD-DOWN PIECE TO 22".
4. FOR SINGLE LAYER CONTAINERS REDUCE PLYWOOD HEIGHT TO 23" AND ELIMINATE THE TOP HOLD-DOWN PIECE.

**SEPARAT**

**NOTES:**

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4. FOR SINGLE ELIMINATE T

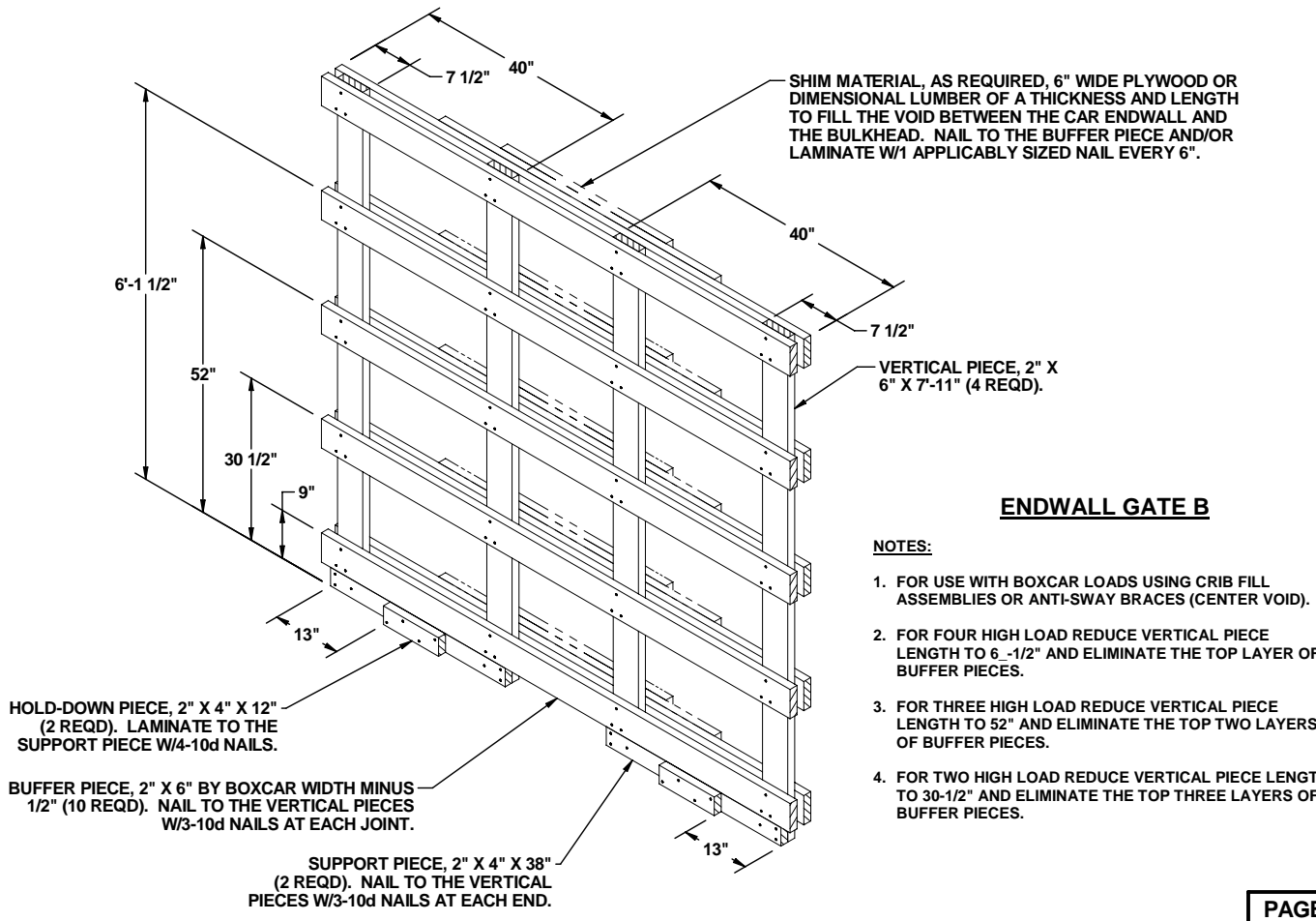




**ENDWALL GATE A**

**NOTES:**

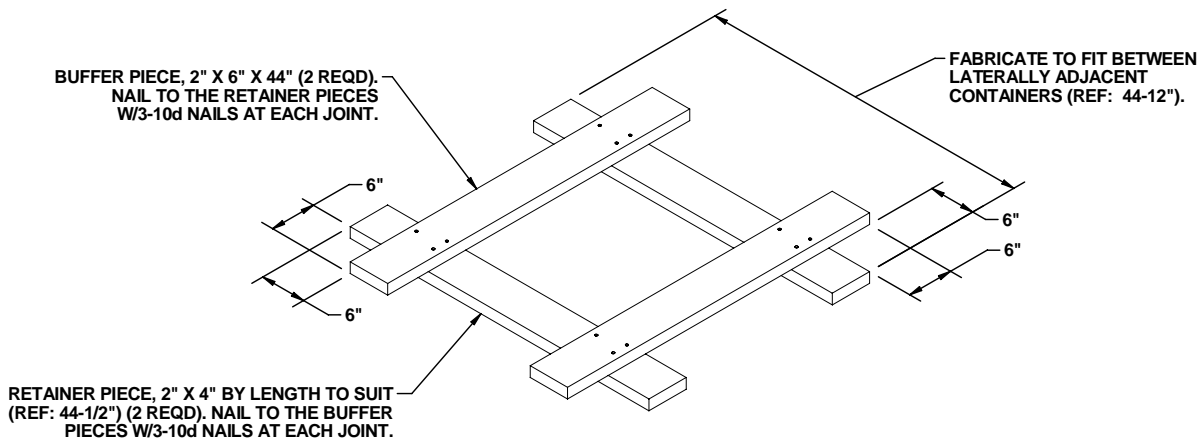
1. FOR USE WITH BOXCAR LOADS USING SIDE BLOCKING (SIDE VOID).
2. FOR FOUR HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 6'-1/2" AND ELIMINATE THE TOP LAYER OF BUFFER PIECES.
3. FOR THREE HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 52" AND ELIMINATE THE TOP TWO LAYERS OF BUFFER PIECES.
4. FOR TWO HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 30-1/2" AND ELIMINATE THE TOP THREE LAYERS OF BUFFER PIECES.



**ENDWALL GATE B**

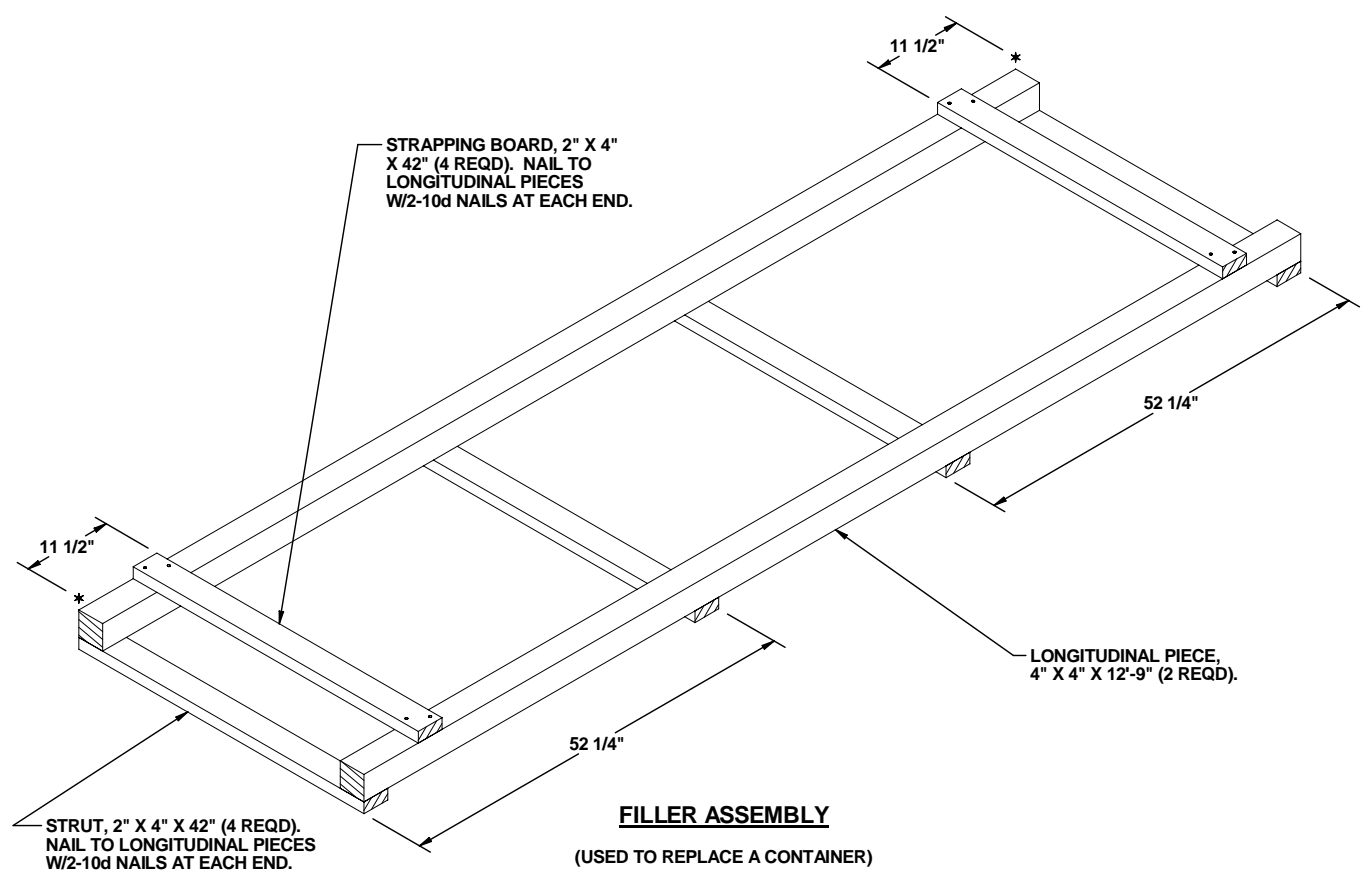
**NOTES:**

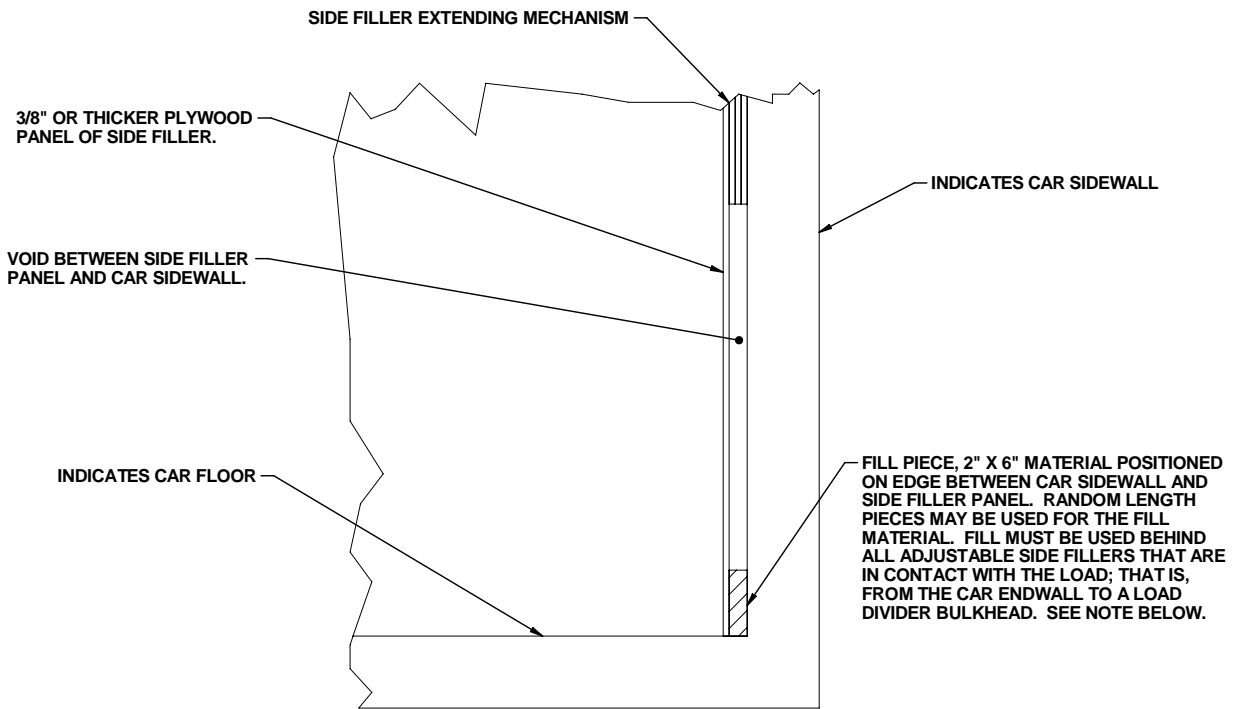
1. FOR USE WITH BOXCAR LOADS USING CRIB FILL ASSEMBLIES OR ANTI-SWAY BRACES (CENTER VOID).
2. FOR FOUR HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 6'-1/2" AND ELIMINATE THE TOP LAYER OF BUFFER PIECES.
3. FOR THREE HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 52" AND ELIMINATE THE TOP TWO LAYERS OF BUFFER PIECES.
4. FOR TWO HIGH LOAD REDUCE VERTICAL PIECE LENGTH TO 30-1/2" AND ELIMINATE THE TOP THREE LAYERS OF BUFFER PIECES.



**ANTI-SWAY BRACE**

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

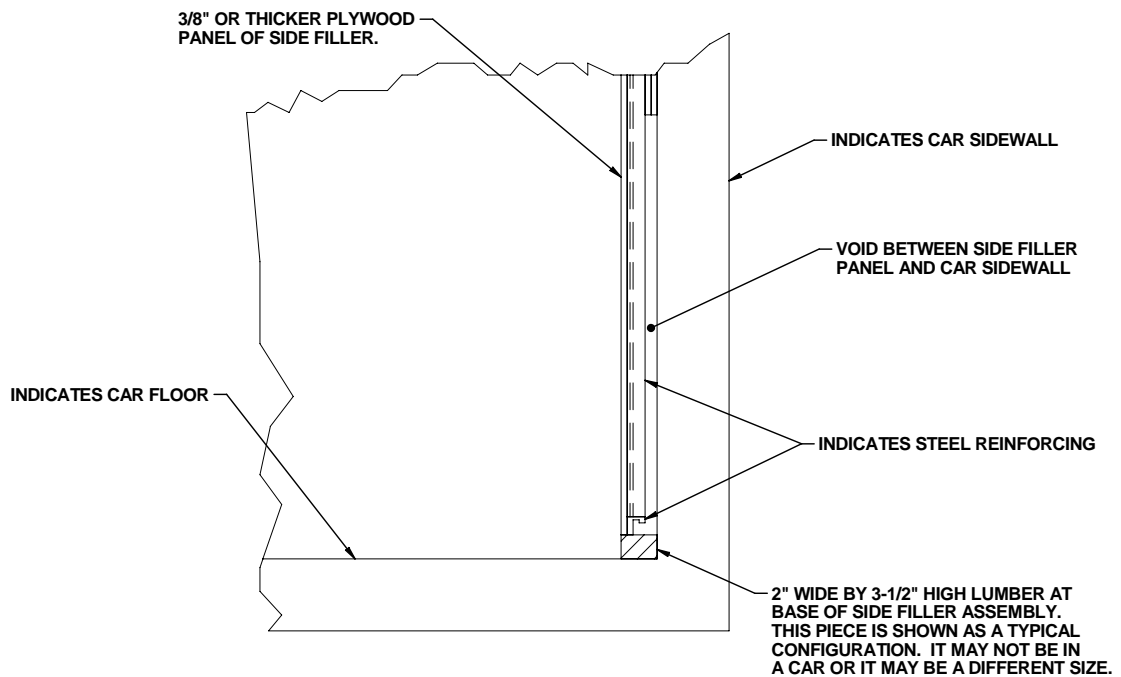




**TYPICAL TYPE A**

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".

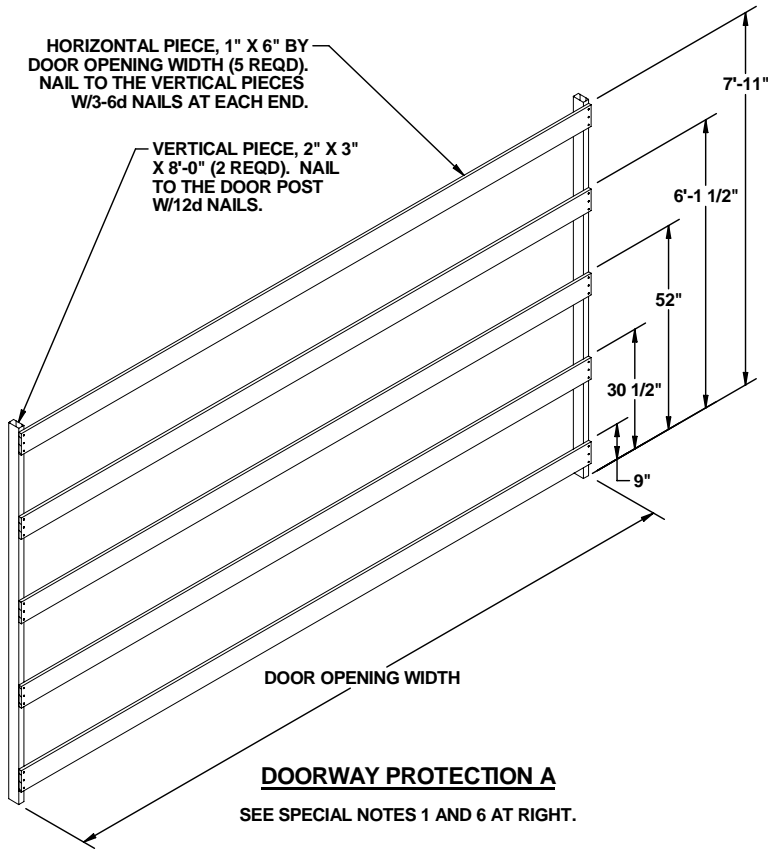


**TYPICAL TYPE B**

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.

HORIZONTAL PIECE, 1" X 6" BY DOOR OPENING WIDTH (5 REQD). NAIL TO THE VERTICAL PIECES W/3-6d NAILS AT EACH END.

VERTICAL PIECE, 2" X 3" X 8'-0" (2 REQD). NAIL TO THE DOOR POST W/12d NAILS.



**SPECIAL NOTES:**

1. DOORWAY PROTECTION "A" IS FOR USE IN CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NAILABLE DOOR POSTS.
2. DOORWAY PROTECTION "B" IS FOR USE IN CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS WHEN THE DOOR POSTS ARE STEEL WITHOUT NAILING HOLES AND THE CAR SIDEWALLS ARE NAILABLE.
3. DOORWAY PROTECTION "C" IS FOR USE IN CARS EQUIPPED WITH EITHER PLUG TYPE DOORS OR CONVENTIONAL SLIDING DOORS, BUT ONLY IF THE CAR IS EQUIPPED WITH NAILABLE SIDEWALLS. IF THE CAR IS EQUIPPED WITH SPECIAL ANCHOR RODS IN THE CAR DOOR POSTS, THE DOORWAY PROTECTION STRAPS MAY BE SECURED TO THESE RODS IN LIEU OF ATTACHING TO THE CAR SIDEWALL WITH STRAP ANCHOR PLATES.
4. DOORWAY PROTECTION "D" IS FOR USE IN CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS, WHEN THE DOOR POSTS ARE NOT NAILABLE. IF THE CAR HAS NAILABLE SIDEWALLS, NAIL-ON TYPE STRAPPING MAY BE USED TO SECURE THE GATE IN LIEU OF USING THE SPREADER PIECES. SEE THE DOORWAY PROTECTION "B" DETAIL FOR GUIDANCE.
5. NAILED FLOORLINE BLOCKING AND BUNDLING STRAPS ARE REQUIRED FOR DOORWAY PROTECTION IF NONE OF THE ABOVE METHODS CAN BE USED.
6. THE VIEWS ON PAGES 20 AND 21 DEPICT DOORWAY PROTECTION FOR A FIVE-LAYER LOAD. FOR EACH REDUCTION IN NUMBER OF LOAD LAYERS, ELIMINATE THE APPROPRIATE TOP HORIZONTAL PIECES AND/OR STRAPS AND REDUCE THE VERTICAL PIECES BY 21-1/2". FOR DOORWAY PROTECTION "D", MOVE THE SPANNER BY AN APPROPRIATE DISTANCE.

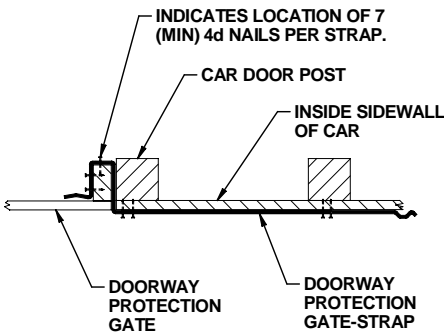
**DOORWAY PROTECTION A**

SEE SPECIAL NOTES 1 AND 6 AT RIGHT.

HORIZONTAL PIECE, 1" X 6" BY DOOR OPENING WIDTH (5 REQD). NAIL TO THE VERTICAL PIECES W/3-6d NAILS AT EACH END. SEE THE DOORWAY PROTECTION "A" DETAIL ABOVE FOR HEIGHT LOCATIONS.

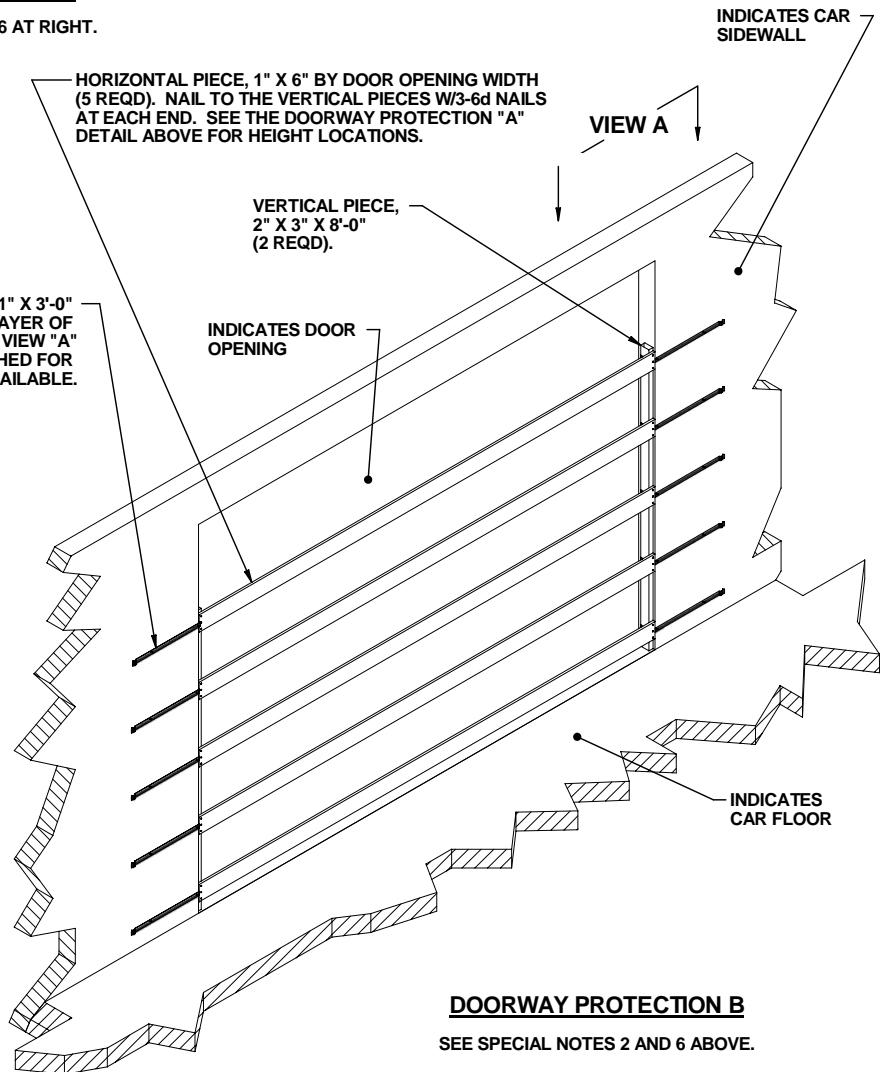
VERTICAL PIECE, 2" X 3" X 8'-0" (2 REQD).

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



**VIEW A**

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



**DOORWAY PROTECTION B**

SEE SPECIAL NOTES 2 AND 6 ABOVE.

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

INDICATES DOOR OPENING

INDICATES STRAP ANCHOR PLATE

SEE THE "ANCHOR PLATE DETAIL" BELOW.

INDICATES CAR SIDEWALL

INDICATES CAR FLOOR

DOORWAY PROTECTION STRAP, 1-1/4" X .035" OR .031" STEEL STRAPPING BY DOOR OPENING WIDTH PLUS 6'-0" IN LENGTH (1 REQD 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 B

STEEL STRAP

12"

ANCHOR PLATE

SIGNODE MICROLOCK NAIL (4 REQD)

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

**ANCHOR PLATE DETAIL**

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

STEEL STRAP

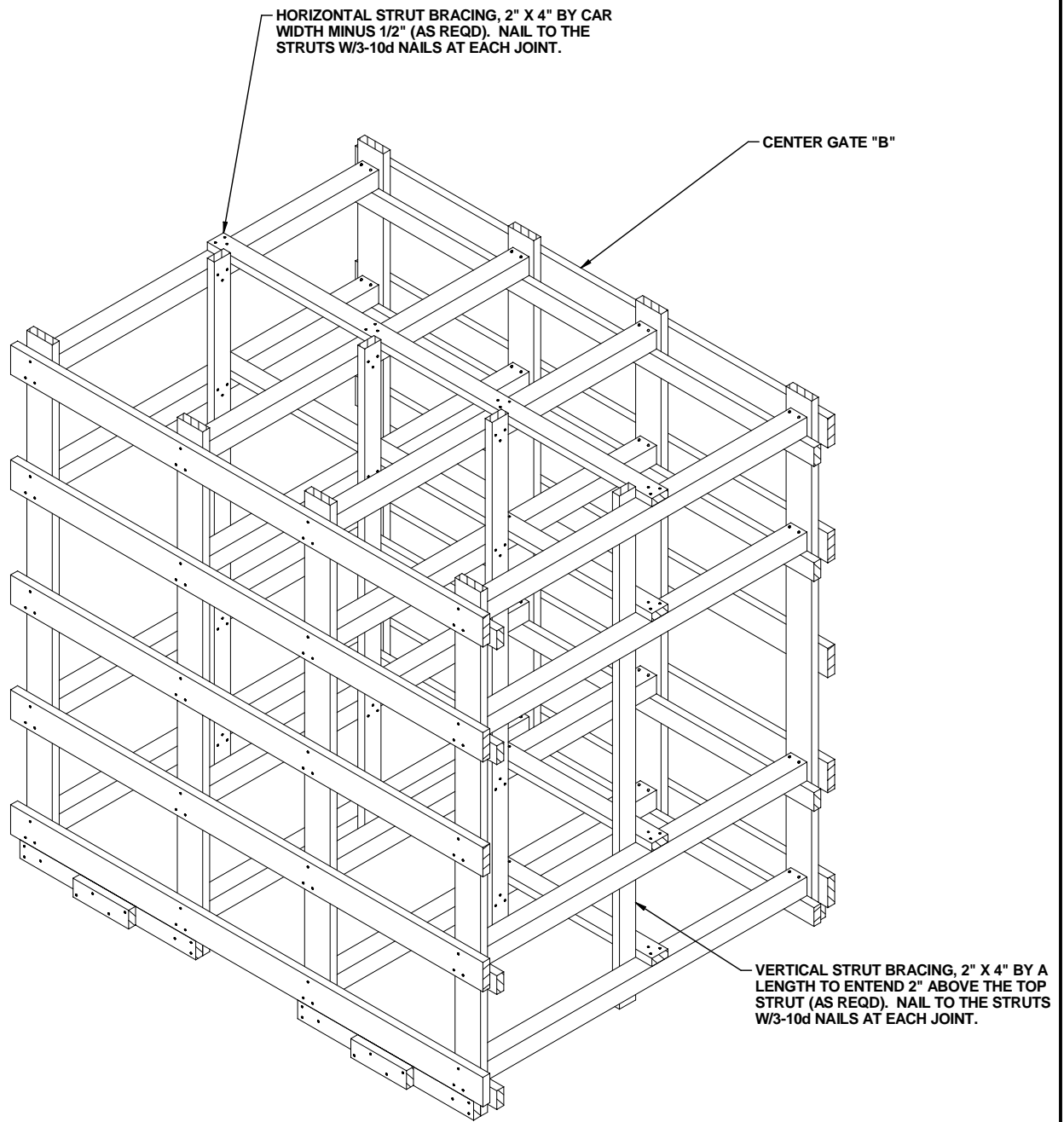
VIEW B

DOOR OPENING WIDTH

HORIZONTAL PIECE, 1" X 6" BY DOOR OPENING WIDTH (5 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 SRUT BRACNG**

SEE GENERAL NOTE "S" ON PAGE 3.