APPROVED BY
BUREAU OF EXPLOSIVES

DATE 8-2-2005

LOADING AND BRACING (CL & LCL) IN BOXCARS* OF JSOW (AGM-154) MISSILES PACKED IN CNU-671 OR CNU-672 SHIPPING AND STORAGE CONTAINERS

INDEX

ITEM	PAGE(S)
GENERAL NOTES AND MATERIAL SPECIFICATIONS	2-3
CONTAINER STACKING AND HANDLING GUIDANCE	4
CONTAINER DETAIL	4
DETAILS	5
27 CONTAINER LOAD IN A 50'-6" LONG BY 8'-6" WIDE CONVENTIONAL BOXCAR	6-7
26 CONTAINER LOAD IN A 60'-8" LONG BY 9'-4" WIDE BOXCAR EQUIPPED WITH LOAD DIVIDER BULKHEADS	8-9
8 CONTAINER LOAD IN A 60'-8" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR	10-11
TYPICAL LCL USING KNEE BRACES	12-13
TYPICAL LCL USING LCL BRACES	14
DETAILS	15-22

*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
FIELD SUPPORT COMMAND

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

U.S. ARMY DEFENSE AMMUNITION CENTER

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.

DO NOT SCALE

AUGUST 2005

ENGINEER OR TECHNICIAN	BASIC	MELVIN SIX	
	REV.		
TRANSPORTATION ENGINEERING DIVISON			
VALIDATION ENGINEERING DIVISON			TESTED
ENGINEERING DIRECTORATE			

CLASS	DIVISION	DRAWING	FILE
19	48	8818	SP5J35

PROJECT SP 516-05

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 JSOW PACKED IN CNU-671 OR CNU-672 CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH MISSILE ITEMS. SEE PAGE 4 AND RAYTHEON DRAWING 4283068 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 CONTAINER OF JSOW MISSILES 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 END-OF-CAR BULKHEAD MUST BE INSTALLED TO PROVIDE A "SQUARED OFF" SURFACE FOR THE LOAD AT THE END OF THE CAR. REFER TO PAGE 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.

(CONTINUED AT RIGHT)

MATERIAL SPECIFICATIONS

LUMBER	SEE TM 743-200-1 (DUNNAGE LUMBER) AND VOLUNTARY PRODUCT STANDARD PS 20.
NAILS	ASTM F1667; COMMON STEEL NAIL (NLCMS OR NLCMMS).
STRAPPING, STEEL	ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.
SEAL, STRAP	ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.
PLYWOOD	COMMERCIAL ITEM DESCRIPTION A-A-55057, INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRADE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.
STAPLE, STRAP	COMMERCIAL GRADE.
ANTI-CHAFING MATERIAL	MIL-PRF-121 (OR EQUAL); NEUTRAL BARRIER MATERIAL.
WIRE, CARBON STEEL	ASTM A853; ANNEALED AT FINISH, BLACK OXIDE FINISH, 0.0800" DIA, GRADE 1006 OR BETTER.

(GENERAL NOTES CONTINUED)

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. THE TWO CNU CONTAINER INTERLOCKS LOCATED ON EITHER END OF THE CONTAINERS CAN BE UNITIZED IN PLACE OF STEEL STRAPPING WHEN UNITIZING CONTAINERS AS DEPICTED ON PAGE 7, IF DESIRED. CONTAINERS MAY BE STACKED UP TO THREE HIGH WITH INTERLOCKS ENGAGED FOR TRANSPORTATION. WHEN HANDLING STACKS OF CONTAINERS WITH INTERLOCKS ENGAGED, LIFT BY BOTTOM CONTAINER ONLY. SEE THE “CONTAINER INTERLOCK DETAIL” ON PAGE 7.

N. 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.

O. 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.

P. 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.

Q. 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.

R. CONVERSION TO METRIC EQUIVALENTS: DIMENSIONS WITHIN THIS DOCUMENT ARE EXPRESSED IN INCHES AND WEIGHTS ARE EXPRESSED IN POUNDS. WHEN NECESSARY, THE METRIC EQUIVALENTS MAY BE COMPUTED ON THE BASIS OF ONE INCH EQUALS 25.4MM AND ONE POUND EQUALS 0.454 KG.

S. 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)

(GENERAL NOTES CONTINUED FROM PAGE 2)

T. 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 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 18. 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)

(GENERAL NOTES CONTINUED)

U. 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.

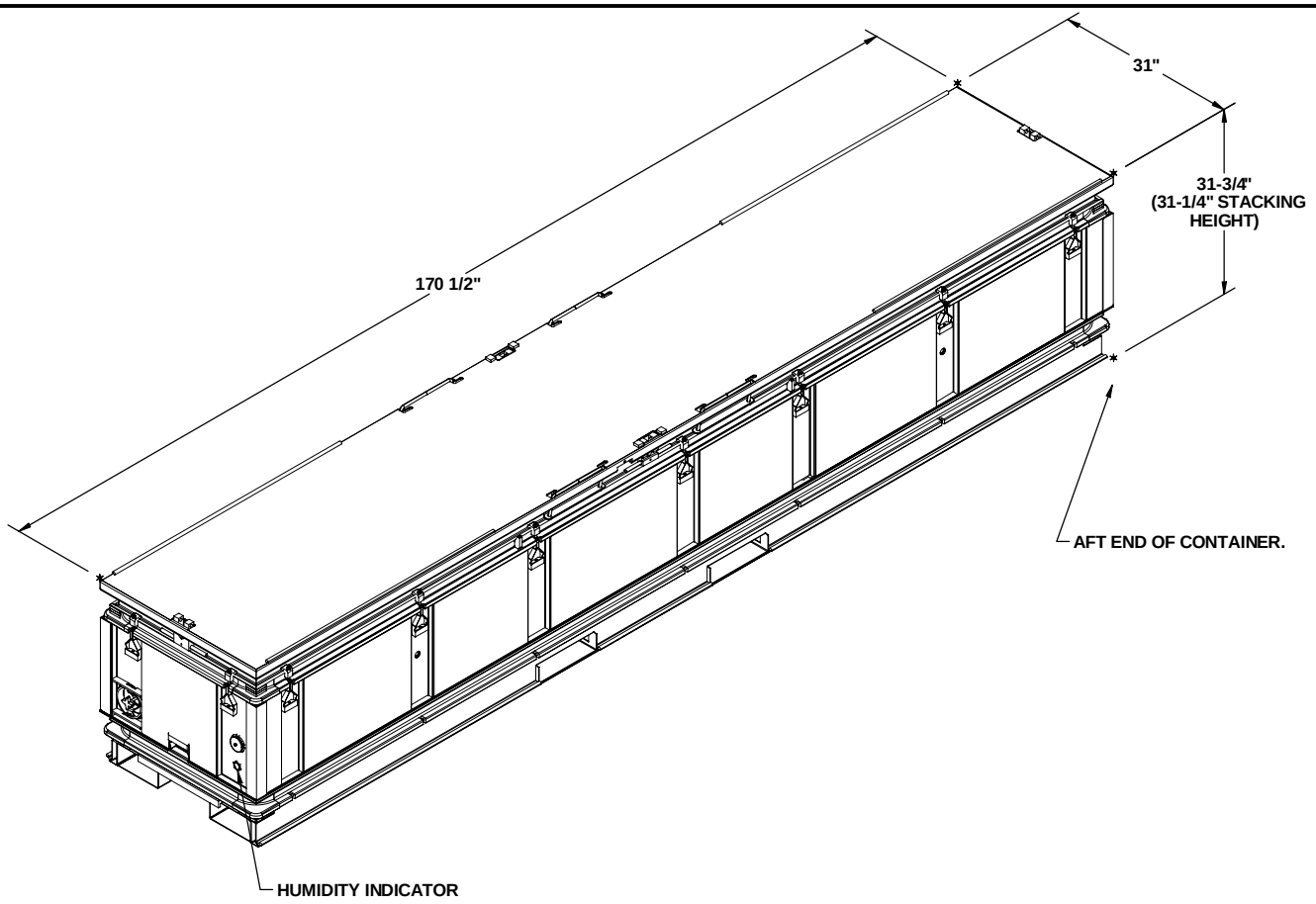
3. IF NAILING TO A CAR SIDEWALL IS NOT REQUIRED, BOXCARS EQUIPPED WITH ADJUSTABLE SIDE FILLERS THAT HAVE 3/8" OR THICKER PANELS MAY BE USED, HOWEVER, THESE SIDE FILLERS MUST NOT BE USED FOR LATERAL BLOCKING; THEY MUST BE RETRACTED AND LOCKED AGAINST THE CAR SIDEWALL. A "FILL PIECE" MUST BE INSTALLED 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. 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.

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

   II. 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.



CNU-671 OR CNU-672 CONTAINER

GROSS WEIGHT (CNU-671) - - - - - - - - 1,893 LBS
GROSS WEIGHT (CNU-672) - - - - - - - - 2,249 LBS
CUBE - - - - - - - - - - - - - - - - - - 95.60 CU FT

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. INSTALLATION OF UNITIZING STRAPS:

   A. STRAPS WILL BE POSITIONED SO AS TO ENCIRCLE THE CONTAINERS AND SO THAT THE STRAPPING LAYS FLAT AND STRAIGHT WITH THE BODY SURFACE OF THE CONTAINER; I.E., VERTICAL ALONG THE SIDES AND FLAT ACROSS THE TOP AND BOTTOM OF THE STACK.

   B. PLACE ANTI-CHAFING NEUTRAL BARRIER MATERIAL UNDER THE STRAPPING AT ALL POINTS OF CONTACT WITH THE CONTAINER AND SECURE TO PREVENT DISLODGEMENT DURING AND AFTER STRAP APPLICATION. STRIPS OF ANTI-CHAFING MATERIAL MAY BE TAPED OR STRING-TIED TO THE CONTAINER OR STRAPPING, OR IT CAN BE FORMED INTO STRAP ENCIRCLING TUBES BY WINDING THE MATERIAL AROUND THE STRAPPING TO FORM A SELF-HOLDING UNIT.

   C. STRAPPING WILL BE FIRMLY TENSIONED AND EACH END-OVER-END LAP JOINT WILL BE SEALED WITH ONE DOUBLE NOTCHED STRAP SEAL. SEE GENERAL NOTE "M" ON PAGE 2. THE LAP JOINTS WILL BE MADE ALONG THE SIDE OF THE STACK AS SHOWN. DURING STRAP TENSIONING, CARE SHOULD BE EXERCISED TO ENSURE THAT THE CONTAINERS ARE NOT DAMAGED. EXCESS STRAPPING (STRAP ENDS) SHOULD BE CUT OFF OR BROKEN OFF NEAR THE JOINT SEALS.

(CONTINUED AT RIGHT)

(UNITIZATION AND HANDLING GUIDANCE CONTINUED)

3. CONTAINER OR CONTAINER STACK HANDLING:

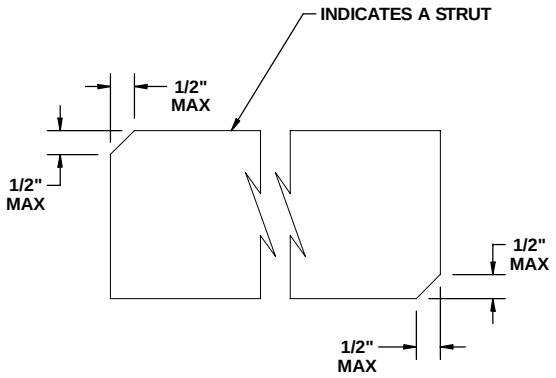
   A. ONLY APPROVED AND APPROPRIATELY SIZED MATERIALS HANDLING EQUIPMENT WILL BE USED FOR HANDLING THE DEPICTED CONTAINERS. APPROVED MATERIAL HANDLING EQUIPMENT (FORKLIFT TRUCKS, CRANES, HAND TRUCKS, DOLLIES, ROLLER ASSEMBLIES, SLINGS, SPREADER BARS, ETC.) IS SPECIFIED ELSEWHERE.

   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. IF ONE CONTAINER IS HANDLED BY SLINGING, THE SLING MAY BE ATTACHED TO THE LIFTING POINTS ON THE CONTAINER. DO NOT HANDLE STACKED CONTAINERS WITH A SLING.

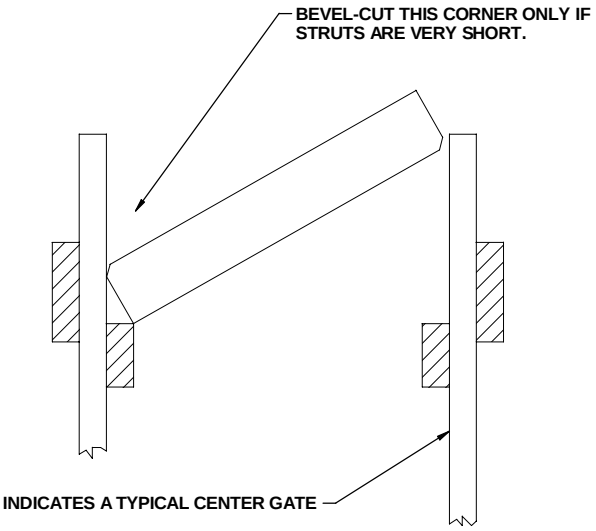
   D. WHEN HANDLING A CONTAINER OR CONTAINER STACK, THE CONTAINER OR STACK WILL BE PARTIALLY PLACED INTO THE DOORWAY OF THE BOXCAR BY HANDLING WITH A FORKLIFT FROM THE SIDE. THE FORKLIFT MUST THEN INSERT ITS TINES FROM THE END OF THE CONTAINER OR STACK, LIFT THE END SLIGHTLY, THEN PROCEED TO PUSH THE CONTAINER OR STACK INTO ITS FINAL POSITION WITHIN THE BOXCAR. CARE MUST BE EXERCISED TO AVOID DAMAGE TO THE CONTAINER ENDS, ETC., DURING PUSHING OPERATIONS.

   E. WHEN UNLOADING A CONTAINER OR CONTAINER STACK FROM THE BOXCAR, THE FORKLIFT TINES WILL BE INSERTED UNDER THE LOWER CONTAINER, THE FORKLIFT WILL THEN ELEVEATE THE END SLIGHTLY ABOVE THE FLOOR, AND BEGIN DRAGGING THE CONTAINER OR STACK FROM THE BOXCAR 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.



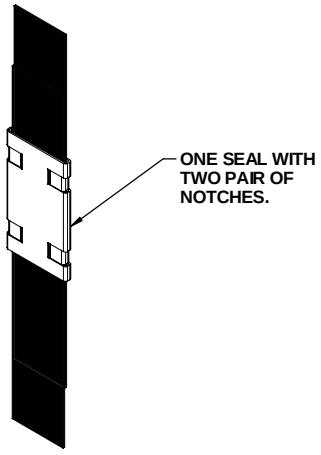
BEVEL CUT

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



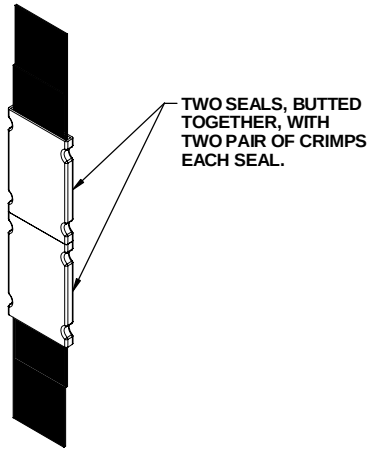
STRUT INSTALLATION

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



STRAP JOINT A

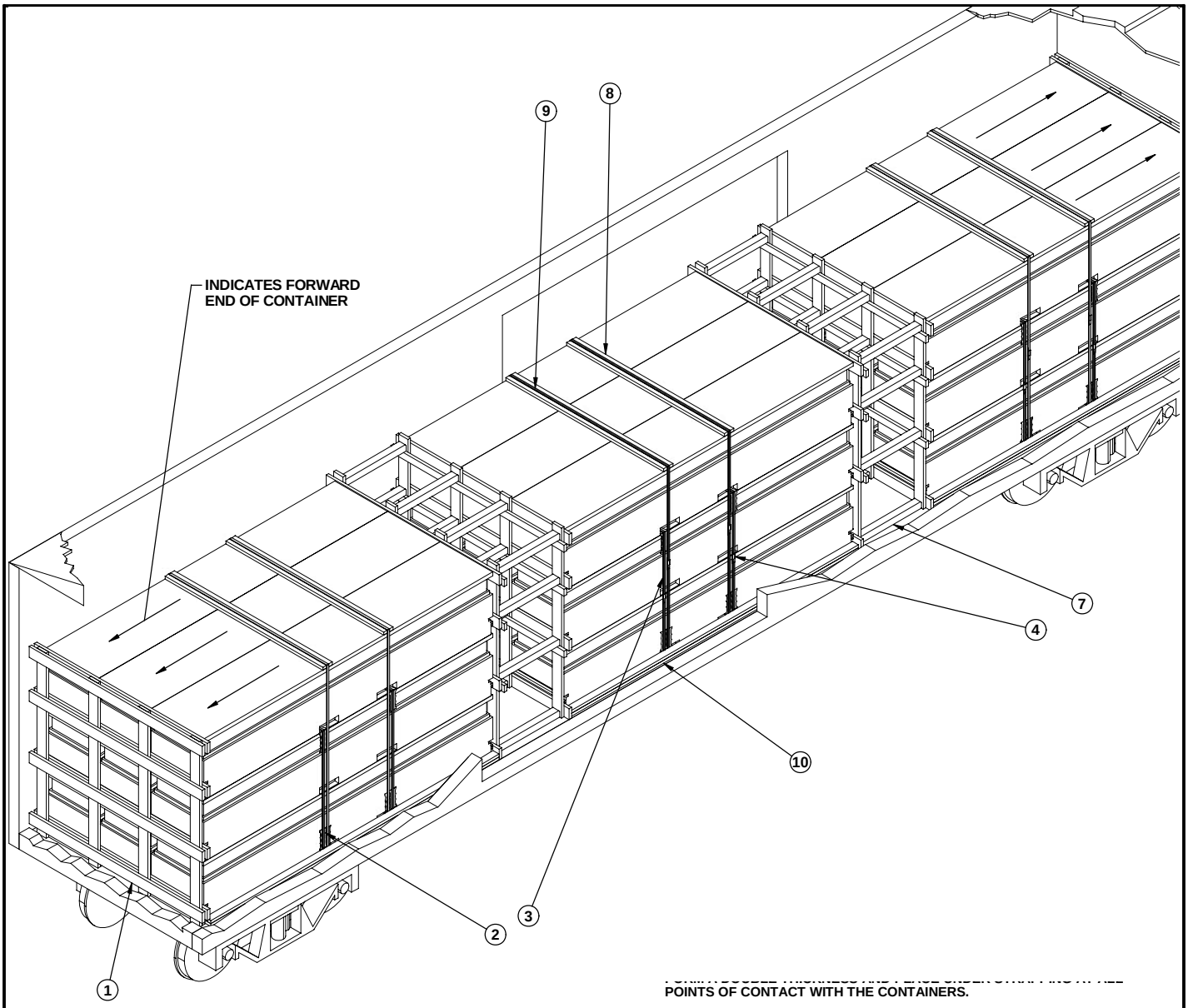
METHOD OF SECURING A STRAP JOINT WHEN USING A NOTCH-TYPE SEALER.



STRAP JOINT B

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

END-OVER-END LAP JOINT DETAILS



ISOMETRIC VIEW

POINTS OF CONTACT WITH THE CONTAINERS.

③ UNITIZING STRAP, 1-1/4" X .035" OR .031" X 15'-9" LONG STEEL STRAPPING (18 REQD). INSTALL TWO STRAPS THRU THE FORK POCKETS OF THE BOTTOM CONTAINER AND THRU THE FORK POCKETS OF THE TOP CONTAINER TO ENCIRCLE ALL THREE CONTAINERS. SEE THE "UNITIZING AND HANDLING GUIDANCE" ON PAGE 4 AND GENERAL NOTE "M" ON PAGE 2.

④ 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.

⑤ SIDE FILL ASSEMBLY (4 REQD). SEE THE DETAIL ON PAGE 16. SEE SPECIAL NOTE 6 ON PAGE 7.

⑥ CENTER GATE A (2 REQD). SEE THE DETAIL ON PAGE 15. SEE SPECIAL NOTE 7 ON PAGE 7.

⑦ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 36-3/4") (32 REQD). TOENAIL TO THE CENTER GATES W/2-16d NAILS AT EACH END.

⑧ STRAPPING BOARD, 2" X 6" X 7'-9" (2 REQD).

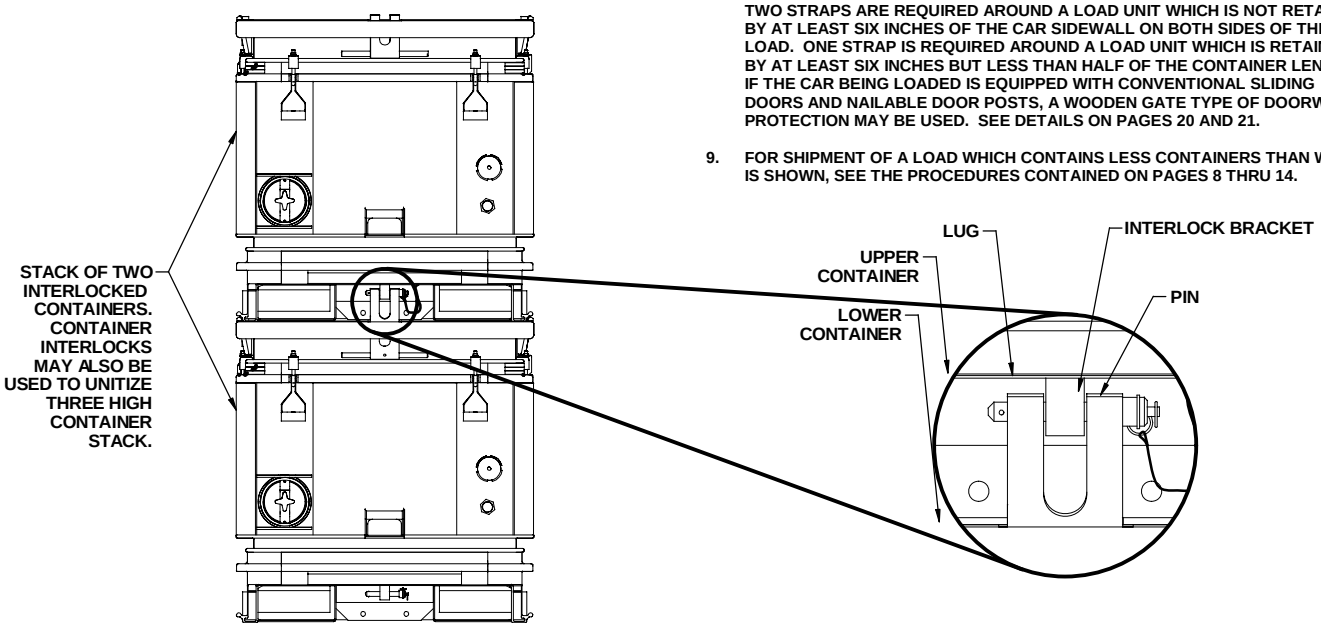
⑨ DOORWAY PROTECTION STRAP, 1-1/4" X .035" OR .031" X 32'-0" LONG STEEL STRAPPING (2 REQD). INSTALL AS TO ENCIRCLE THE LOAD UNITS IN THE DOORWAY AREA. STAPLE TO THE STRAPPING BOARD W/2 STAPLES. SEE SPECIAL NOTE 8 ON PAGE 7.

⑩ FLOORLINE BLOCKING, 2" X 4" X 14'-2" (DOUBLED) (2 REQD). POSITION SO AS TO CONTACT THE CONTAINER TO BE PLACED IN THE DOORWAY AREA. NAIL THE FIRST PIECE TO THE CAR FLOOR W/14-16d NAILS. LAMINATE THE SECOND TO THE FIRST IN LIKE MANNER. SEE SPECIAL NOTE 8 ON PAGE 7.

27 CONTAINER LOAD IN A 50'-6" LONG BY 8'-6" WIDE CONVENTIONAL BOXCAR

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 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 OTHER DOOR OPENINGS 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 BULKHEAD. POSITION AT THE HEIGHTS SHOWN FOR THE ENDWALL BULKHEAD 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. CONTAINERS POSITIONED NEAREST TO THE ENDS OF THE BOXCAR MUST BE POSITIONED WITH THEIR AFT ENDS TOWARDS THE CENTER OF THE CAR.
6. SIDE FILL ASSEMBLIES ARE REQUIRED WHEN THE TOTAL SPACE BETWEEN THE CONTAINERS AND THE SIDE WALLS EXCEEDS 6", AS MEASURED FROM CONTAINER TO EACH SIDE WALL.
7. CENTER GATE "B" WILL BE REQUIRED IF BOXCAR WIDTH IS 9'-4".
8. 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. 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.
9. FOR SHIPMENT OF A LOAD WHICH CONTAINS LESS CONTAINERS THAN WHAT IS SHOWN, SEE THE PROCEDURES CONTAINED ON PAGES 8 THRU 14.



CONTAINER INTERLOCK DETAIL

ALIGN AND INSERT PIN THROUGH INTERLOCK BRACKET AND LUG. PIN SHALL BE FULLY INSERTED AND LOCKED. BOTH ENDS OF CONTAINERS MUST BE INTERLOCKED AS SHOWN BY THIS DETAIL. SEE GENERAL NOTE "M" ON PAGE 2.

BILL OF MATERIAL

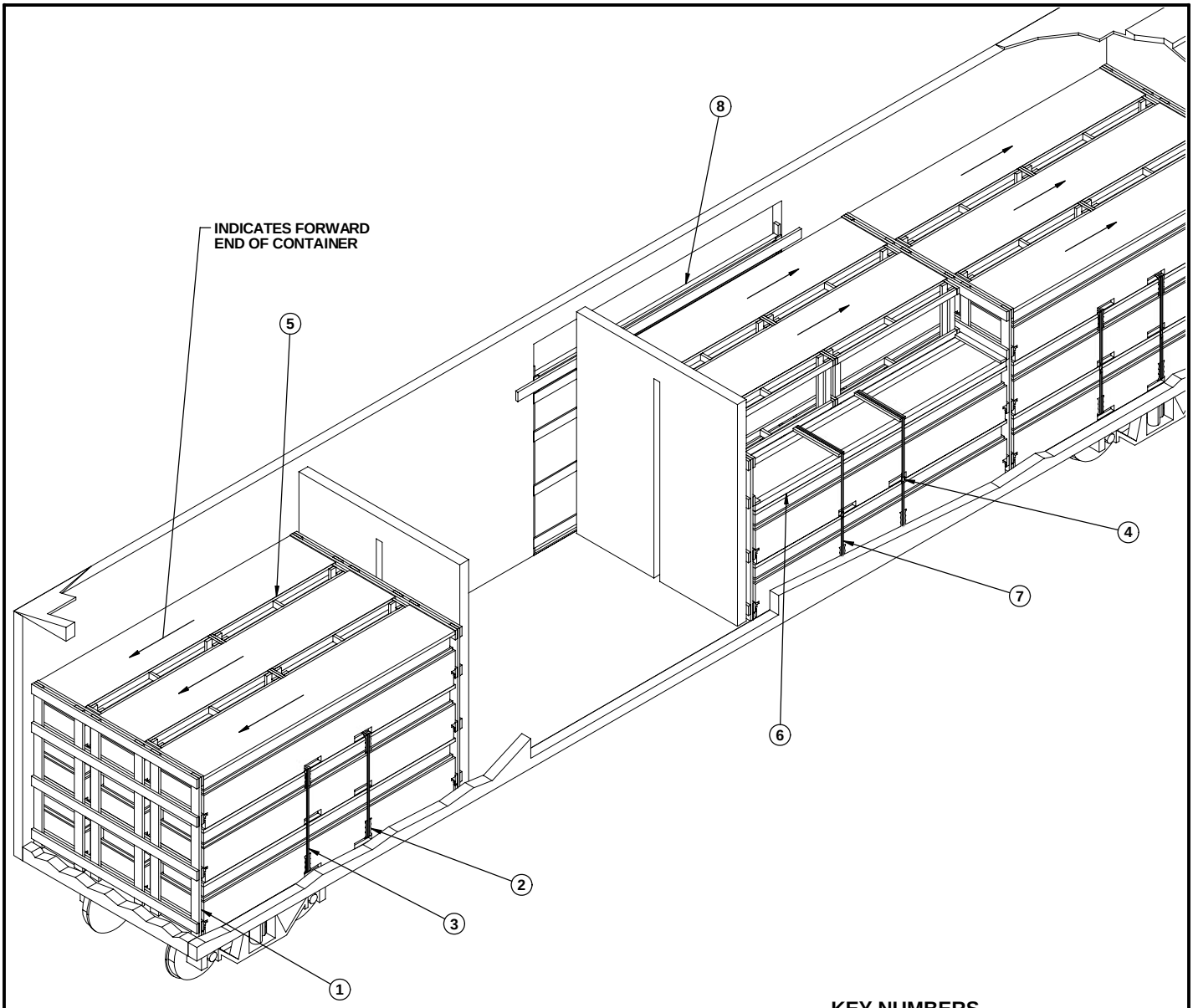
LUMBER	LINEAR FEET	BOARD FEET
2" X 4"	988	658
2" X 6"	479	479
4" X 4"	98	131
NAILS	**NO. REQD**	**POUNDS**
10d (3")	960	15
16d (3-1/2")	184	4
STEEL STRAPPING, 1-1/4" - 348' REQD - - -		50 LBS
SEAL FOR 1-1/4" STRAPPING - 20 REQD - - -		1 LBS
ANTI-CHAFING MATERIAL - - - AS REQD - - - -		NIL

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CNU-672 CONTAINER - -	27	60,723 LBS
DUNNAGE - - - - - - - - - - - - - - -		2,605 LBS
TOTAL WEIGHT - - - - - -		63,328 LBS (APPROX)

27 CONTAINER LOAD IN A 50'-6"" LONG BY 8'-6" WIDE CONVENTIONAL BOXCAR

PROJECT SP 516-05



ISOMETRIC VIEW

KEY NUMBERS

① ENDWALL BULKHEAD B (5 REQD). SEE THE DETAIL ON PAGE 17.

② FIBERBOARD ANTI-CHAFING MATERIAL (AS REQD). FOLD FIBERBOARD TO FORM A DOUBLE THICKNESS AND PLACE UNDER STRAPPING AT ALL POINTS OF CONTACT WITH THE CONTAINERS.

③ UNITIZING STRAP, 1-1/4" X .035" OR .031" X 15'-9" LONG STEEL STRAPPING (16 REQD). INSTALL TWO STRAPS THRU THE FORK POCKETS OF THE BOTTOM CONTAINER AND THE FORK POCKETS OF THE TOP CONTAINER TO ENCIRCLE ALL THREE CONTAINERS. SEE THE "UNITIZING AND HANDLING GUIDANCE" ON PAGE 4 AND GENERAL NOTE "M" ON PAGE 2.

④ SEAL FOR 1-1/4" STEEL STRAPPING (18 REQD, 1 PER STRAP). DOUBLE NOTCH EACH SEAL. SEE THE END-OVER-END LAP JOINT DETAILS ON PAGE 5.

⑤ CRIB FILL ASSEMBLY (12 REQD). SEE THE DETAIL ON PAGE 16 AND SPECIAL NOTE 7 ON PAGE 9.

⑥ FILLER ASSEMBLY (1 REQD). SEE DETAIL ON PAGE 18.

⑦ FILLER ASSEMBLY STRAP, 1-1/4" X .035" OR .031" X 16'-9" LONG STEEL STRAPPING (2 REQD). INSTALL TWO STRAPS THRU THE FORK POCKETS OF THE BOTTOM CONTAINER TO ENCIRCLE BOTH CONTAINERS AND THE FILLER ASSEMBLY.

⑧ DOORWAY PROTECTION D (1 REQD). SEE THE DETAIL ON PAGE 21 AND SPECIAL NOTE 8 ON PAGE 9.

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

SPECIAL NOTES:

1. A 26 CONTAINER LOAD IS SHOWN IN A 60'-8" LONG BY 9'-4" WIDE CUSHIONED TYPE BOXCAR EQUIPPED WITH LOAD DIVIDERS AND 14'-0" WIDE STAGGERED DOOR OPENINGS. BOXCARS OF OTHER DIMENSIONS AND BOXCARS HAVING WIDER DOOR OPENINGS CAN BE USED.
2. THE CAR SHOWN IS EQUIPPED WITH 14'-0" WIDE OFFSET DOORS. CARS EQUIPPED WITH OTHER DOOR OPENINGS CAN BE USED.
3. CONTAINERS POSITIONED NEAREST TO THE ENDS OF THE BOXCAR MUST BE POSITIONED WITH THEIR AFT ENDS TOWARDS THE CENTER OF THE CAR.
4. IF THE CAR TO BE LOADED HAS NAILABLE ENDWALLS, BATTENS MAY BE NAILED TO THE ENDWALL IN LIEU OF USING THE ENDWALL BULKHEAD. POSITION AT THE HEIGHTS SHOWN FOR THE ENDWALL BULKHEAD AND NAIL TO THE CAR ENDWALL W/1-10d NAIL EVERY 12".
5. 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.
6. IF THE CAR BEING LOADED IS EQUIPPED WITH SLIDING DOORS WHICH HAVE NAILABLE DOORPOSTS, REFER TO THE ALTERNATIVE DOORWAY PROTECTION DETAILS ON PAGES 20 AND 21.
7. CRIB FILL ASSEMBLIES ARE REQUIRED WHEN THE TOTAL LATERAL SPACE BETWEEN THE CONTAINERS EXCEEDS 6", AS MEASURED FROM CONTAINER TO CONTAINER.
8. 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.
9. FOR SHIPMENTS OF A LOAD WHICH CONTAINS MORE OR FEWER CONTAINERS THAN WHAT IS SHOWN, SEE THE PROCEDURES ON PAGES 6, 10, 12 AND 14.

BILL OF MATERIAL

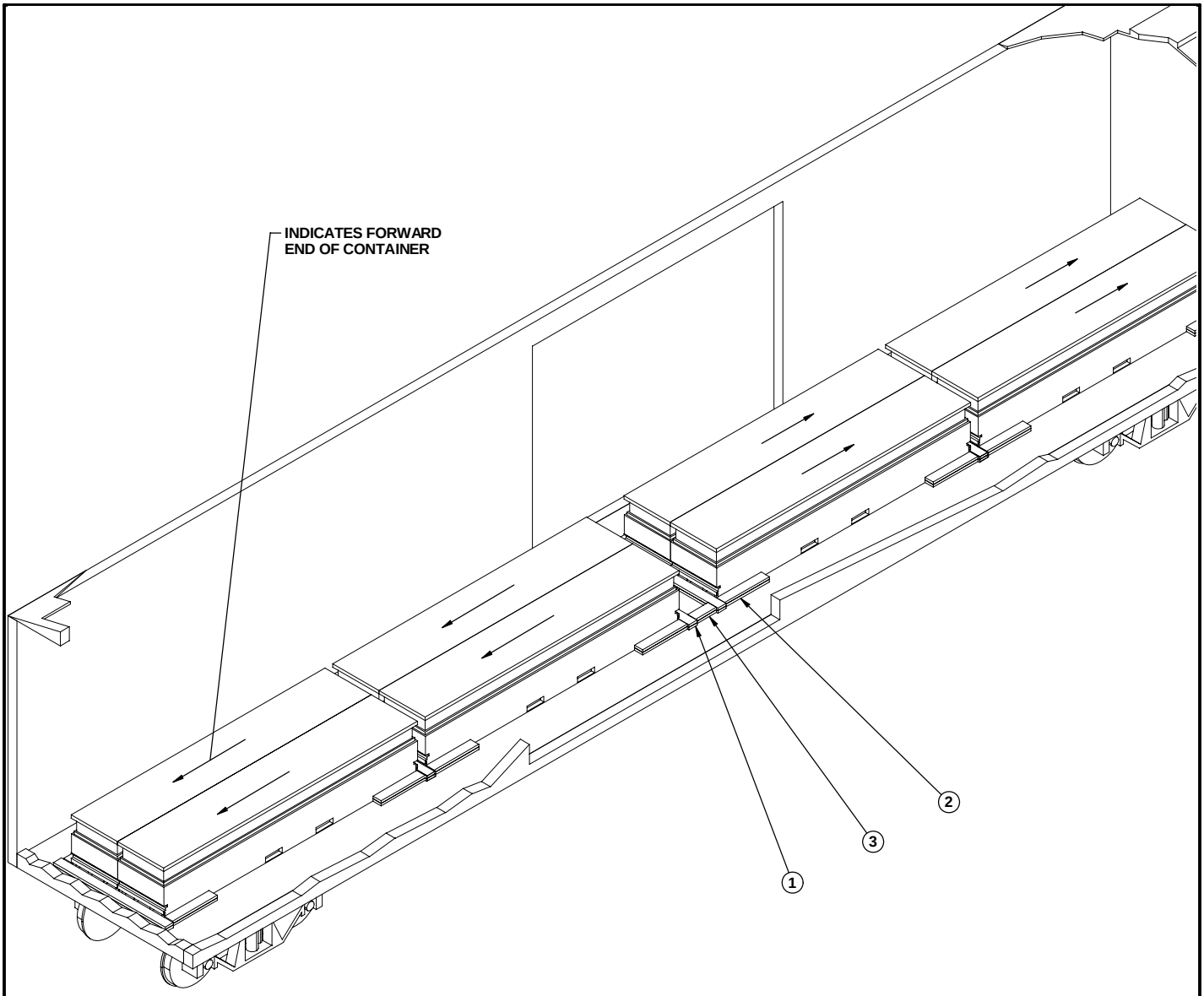
LUMBER	LINEAR FEET	BOARD FEET
1″ X 4″	2	1
1″ X 6″	56	28
2″ X 3″	48	24
2″ X 4″	1525	1017
2″ X 6″	624	624
4″ X 4″	29	38
NAILS	**NO. REQD**	**POUNDS**
6d (2″)	30	1/4
10d (3″)	2304	35-1/2
12d (3-1/4″)	6	NIL

STEEL STRAPPING, 1-1/4″ - 285′ REQD - - - 41 LBS
SEAL FOR 1-1/4″ STRAPPING - 18 REQD - - - 1 LBS
ANTI-CHAFING MATERIAL - - - AS REQD - - - - NIL

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CNU-672 CONTAINER	26	58,474 LBS
DUNNAGE		3,539 LBS
TOTAL WEIGHT		62,013 LBS (APPROX)

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



ISOMETRIC VIEW

KEY NUMBERS

① HEADER, 2" X 6" X 6'-2" (DOUBLED) (6 REQD). LOCATE SO AS TO BE CENTERED ON THE CONTAINER SKIDS AND LAMINATE THE FIRST PIECE TO THE CAR FLOOR W/7-16d NAILS. LAMINATE THE SECOND PIECE TO THE FIRST W/7-40d NAILS.

② SIDE BLOCKING, 2" X 6" X 30" (DOUBLED) (16 REQD). LOCATE AS SHOWN, ADJACENT TO CONTAINER SKIDS. LAMINATE THE FIRST PIECE TO THE CAR FLOOR W/7-16d NAILS. LAMINATE THE SECOND PIECE TO THE FIRST W/7-16d NAILS.

③ BACK-UP CLEAT, 2" X 6" BY CUT-TO FIT (DOUBLED) (3 REQD). LOCATE AT THE CENTER AND EACH END OF THE HEADERS LOCATED AT THE CENTER OF THE BOXCAR. LAMINATE FIRST PIECE TO THE CAR FLOOR W/4-16d NAILS. LAMINATE THE SECOND PIECE TO THE FIRST W/4-40d NAILS.

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

PROJECT SP 516-05

SPECIAL NOTES:

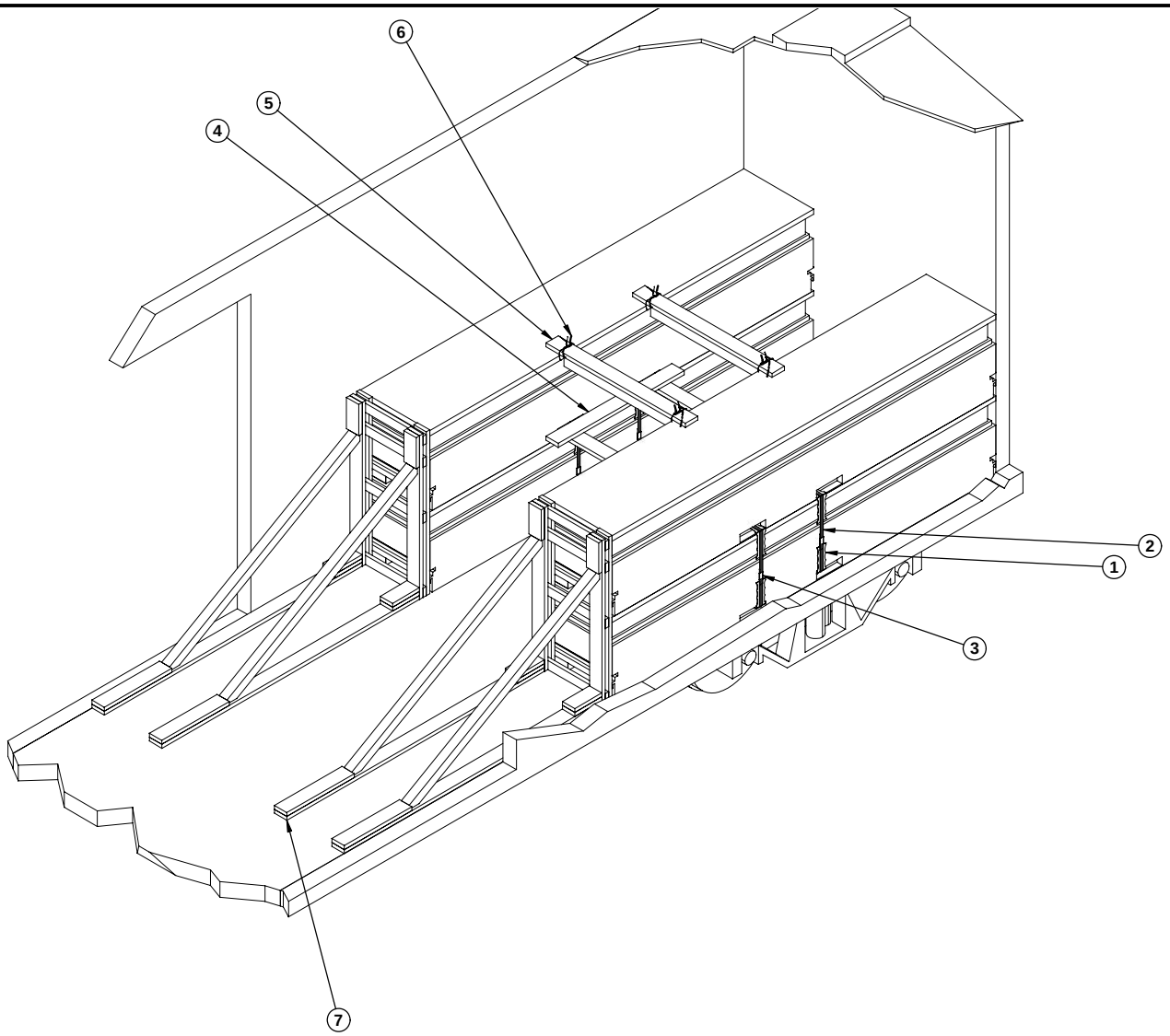
1. A 8 CONTAINER LOAD IS SHOWN IN A 60'-8" LONG BY 9'-4" WIDE A 60'-8" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR HAVING A WOOD OR NAILABLE METAL FLOOR EQUIPPED WITH 14'-0" WIDE STAGGERED DOOR OPENINGS IS SHOWN. BOXCARS OF OTHER DIMENSIONS AND BOXCARS HAVING WIDER OR NARROWER DOOR OPENINGS CAN BE USED.
2. CONTAINERS POSITIONED NEAREST TO THE ENDS OF THE BOXCAR MUST BE POSITIONED WITH THEIR AFT ENDS TOWARDS THE CENTER OF THE CAR.
3. A WIDER OR NARROWER BOXCAR CAN BE USED FOR SHIPPING THE DEPICTED LOAD BY ADJUSTING THE DISTANCE FROM THE SIDEWALL TO THE INSIDE OF THE SIDE BLOCKING PIECES.
4. FOR SHIPMENTS OF A LOAD WHICH CONTAINS MORE OR FEWER CONTAINERS THAN WHAT IS SHOWN, SEE THE PROCEDURES ON PAGES 6, 8 AND 12.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
2″ X 6″	161	161
NAILS	NO. REQD	POUNDS
16d (3-1/2″)	278	6-1/4
40d (5″)	54	3-1/4

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CNU-672 CONTAINER	8	17,992 LBS
DUNNAGE		332 LBS
TOTAL WEIGHT		18,324 LBS (APPROX)

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



ISOMETRIC VIEW

SPECIAL NOTES:

1. A FOUR CONTAINER LOAD IS SHOWN IN A 9'-2" WIDE CONVENTIONAL TYPE BOXCAR 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. THE QUANTITY MAY BE ADJUSTED TO SUIT, PROVIDED THE LIMITATIONS OF THE KNEE BRACE AS SET FORTH IN SPECIAL NOTE 3 ARE NOT EXCEEDED.
3. A KNEE BRACE ASSEMBLY WILL BE USED FOR EACH ROW OF CONTAINERS. ONE KNEE BRACE ASSEMBLY IS ADEQUATE FOR RETAINING A MAXIMUM LCL LOAD OF NOT MORE THAN 8,500 POUNDS OR THREE CONTAINERS.
4. WHEN USING CRIB FILL OR SIDE FILL ASSEMBLIES WITH KNEE BRACE ASSEMBLIES, PROVISIONS MUST BR MADE TO PREVENT LONGITUDINAL MOVEMENT OF THE CRIB FILL OR SIDE FILL ASSEMBLIES.

KEY NUMBERS

① FIBERBOARD ANTI-CHAFING MATERIAL (AS REQD). FOLD FIBER BOARD TO FORM A DOUBLE THICKNESS AND PLACE UNDER STRAPPING AT ALL POINTS OF CONTACT WITH THE CONTAINERS.

② UNITIZING STRAP FOR 2 HIGH CONTAINER STACKS, 1-1/4" X .035" OR .031" X 10'-10" LONG STEEL STRAPPING (4 REQD). SEE GENERAL NOTE "M".

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.

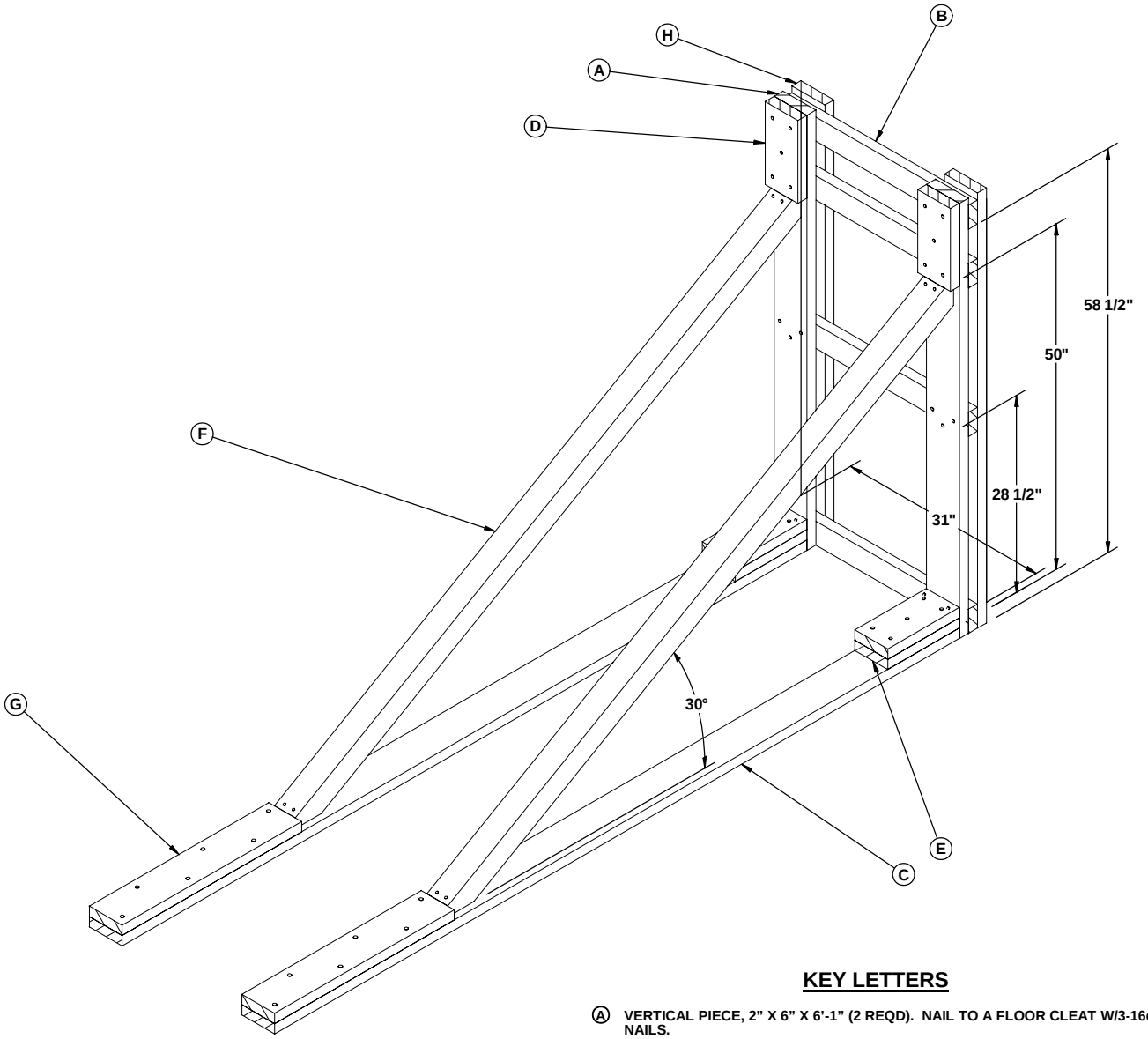
④ ANTI-SWAY BRACE (2 REQD). SEE THE DETAIL ON PAGE 19. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF CONTAINERS.

⑤ TOP-OF-LOAD ANTI-SWAY BRACE (2 REQD). SEE THE DETAIL ON PAGE 19.

⑥ TIE WIRE, .0800" DIA 60" LONG (4 REQD). INSTALL THE WIRE TO FORM A COMPLETE LOOP AROUND THE TOP-OF-LOAD ANTI-SWAY BRACE AND A LIFTING RING OF THE CONTAINER. BRING ENDS TOGETHER AND TWIST TAUT.

⑦ KNEE BRACE ASSEMBLY (2 REQD). SEE DETAIL ON PAGE 13.

TYPICAL LCL LOAD USING KNEE BRACES



KEY LETTERS

Ⓐ VERTICAL PIECE, 2" X 6" X 6'-1" (2 REQD). NAIL TO A FLOOR CLEAT W/3-16d NAILS.

Ⓑ HORIZONTAL PIECE, 2" X 6" X 31" (4 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

Ⓒ FLOOR CLEAT, 2" X 6" X 10'-0" (2 REQD). NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8".

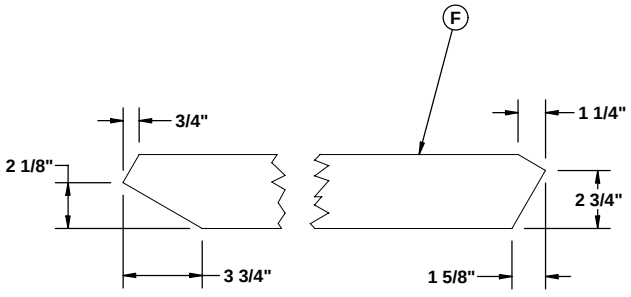
Ⓓ HOLD-DOWN CLEAT, 2" X 6" X 12" (2 REQD). NAIL TO A VERTICAL PIECE W/5-10d NAILS.

Ⓔ POCKET CLEAT, 2" X 6" X 12" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE FLOOR CLEAT W/5-16d NAILS. NAIL THE SECOND PIECE IN A LIKE MANNER AND TOENAIL THE SECOND PIECE TO THE VERTICAL PIECE W/2-16d NAILS.

Ⓕ BRACE, 4" X 4" X 8'-1-1/2" (2 REQD). SEE THE DETAIL BELOW FOR BEVEL-CUTS REQUIRED. TOENAIL TO THE VERTICAL PIECE AND TO THE FLOOR CLEAT W/2-16d NAIL.

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

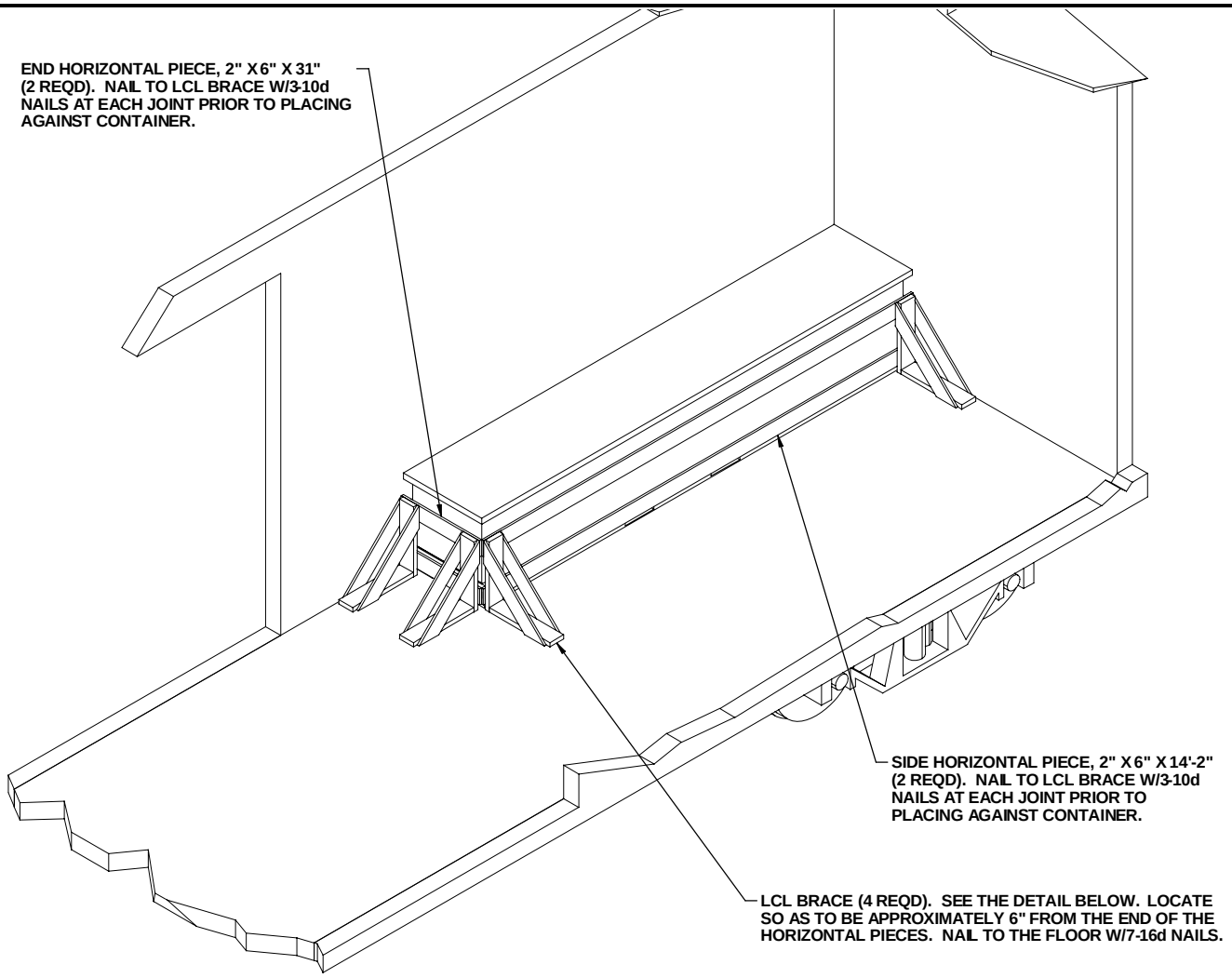
Ⓗ BUFFER PIECE, 2" X 6" X 6'-1" (2 REQD). NAIL TO HORIZONTAL PIECE W/3-10d NAILS AT EACH JOINT.



BRACE

TYPICAL LCL LOAD USING KNEE BRACES

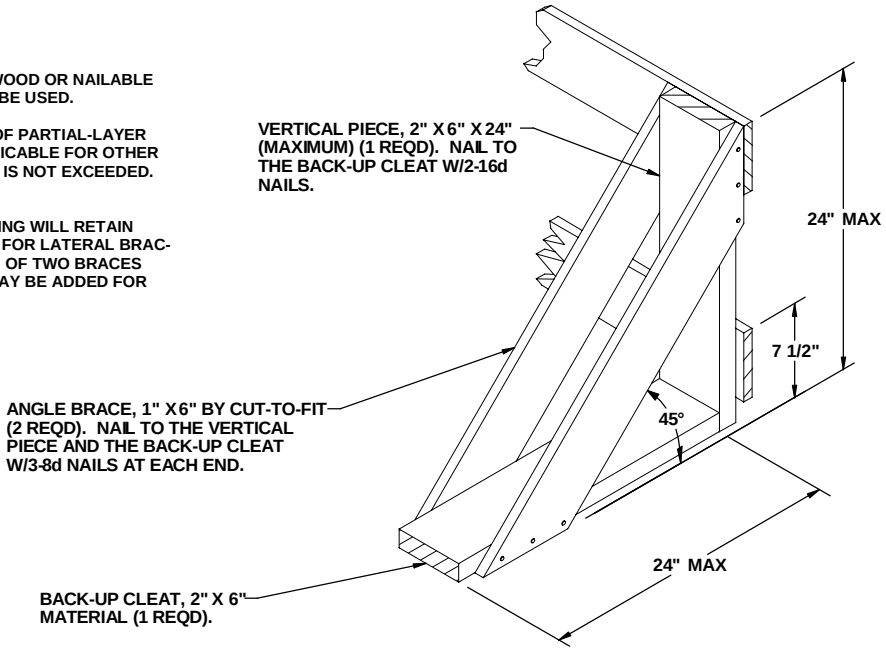
PROJECT SP 516-05



ISOMETRIC VIEW

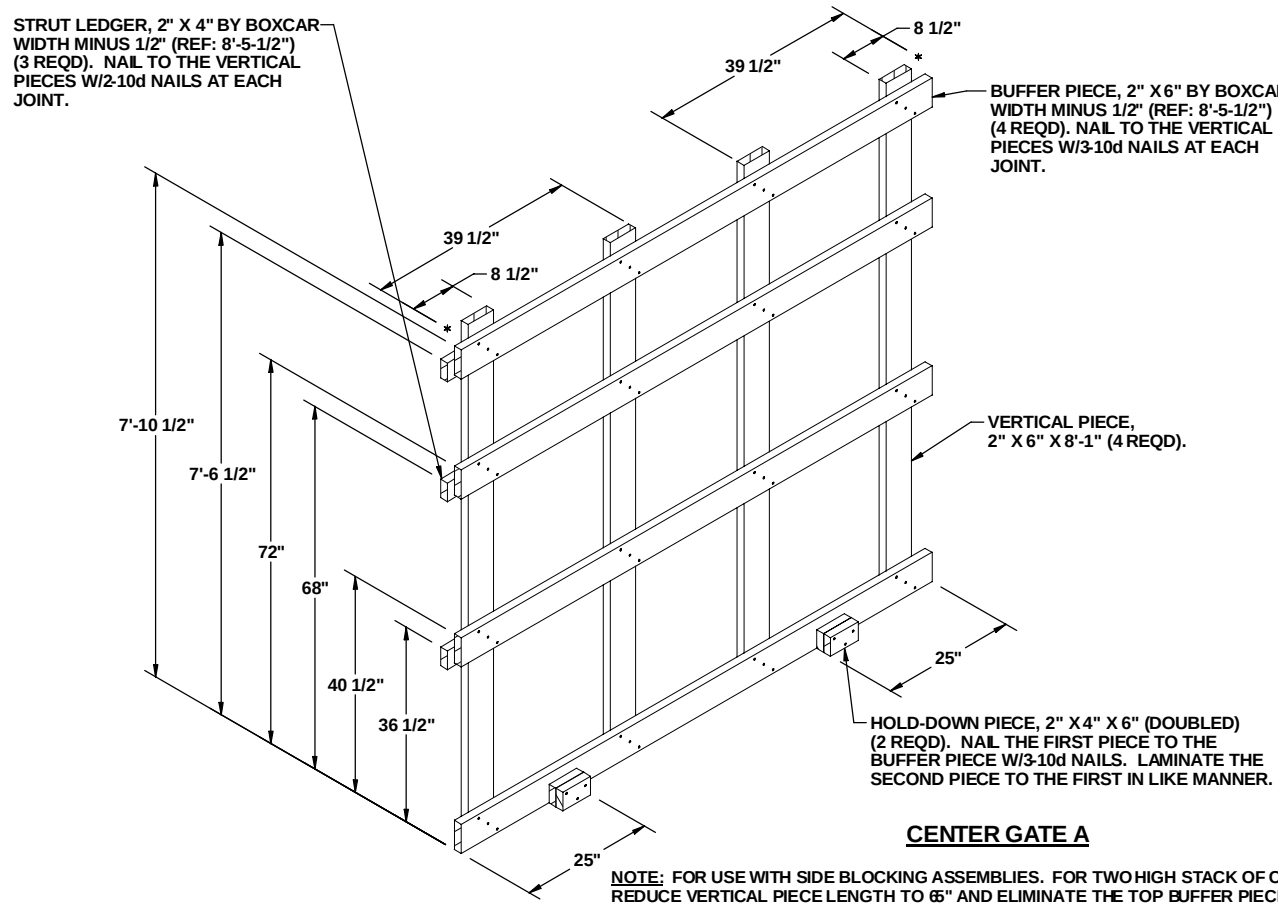
SPECIAL NOTES:

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.



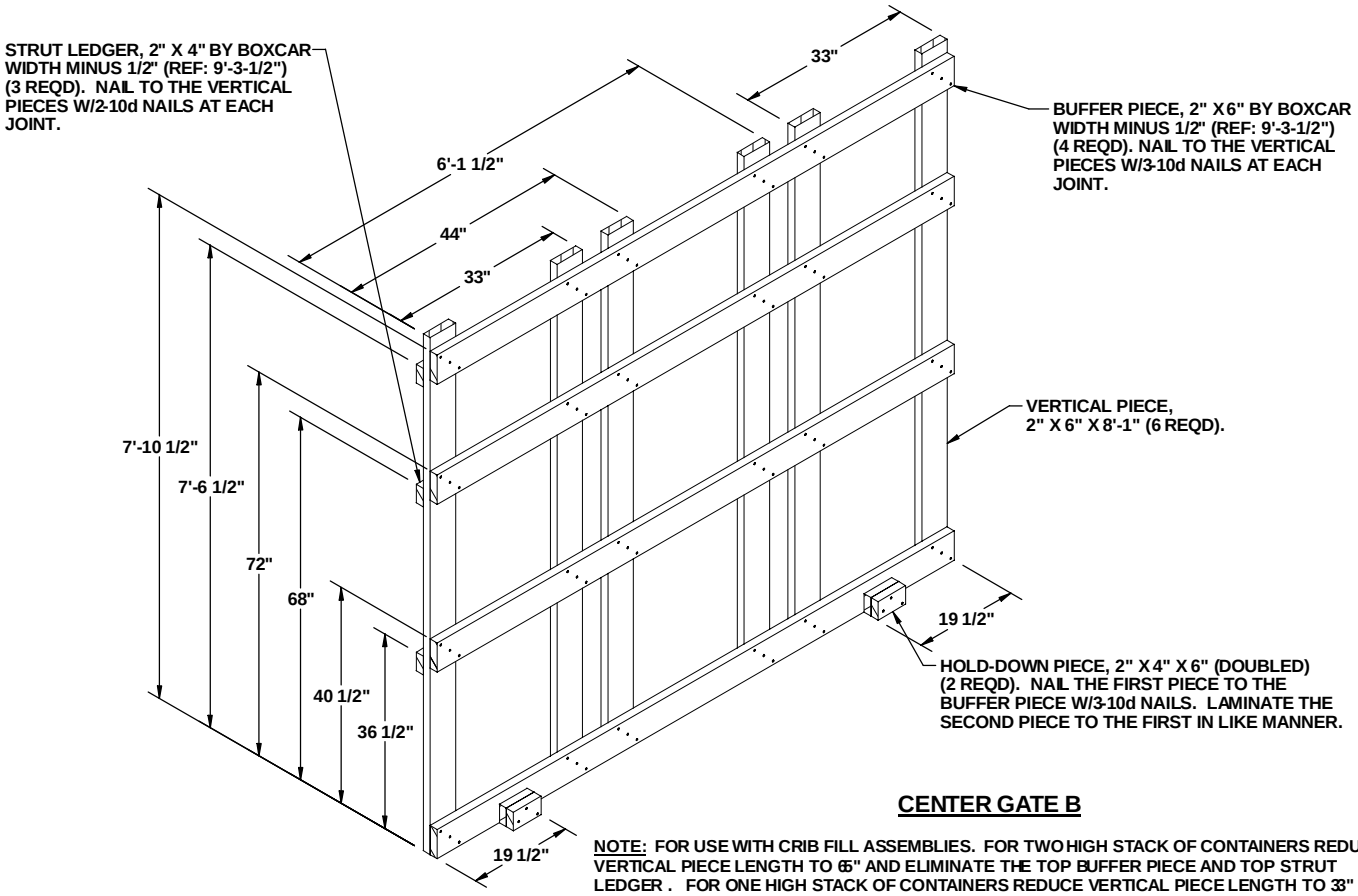
TYPICAL LCL LOAD USING LCL BRACES

PROJECT SP 516-05



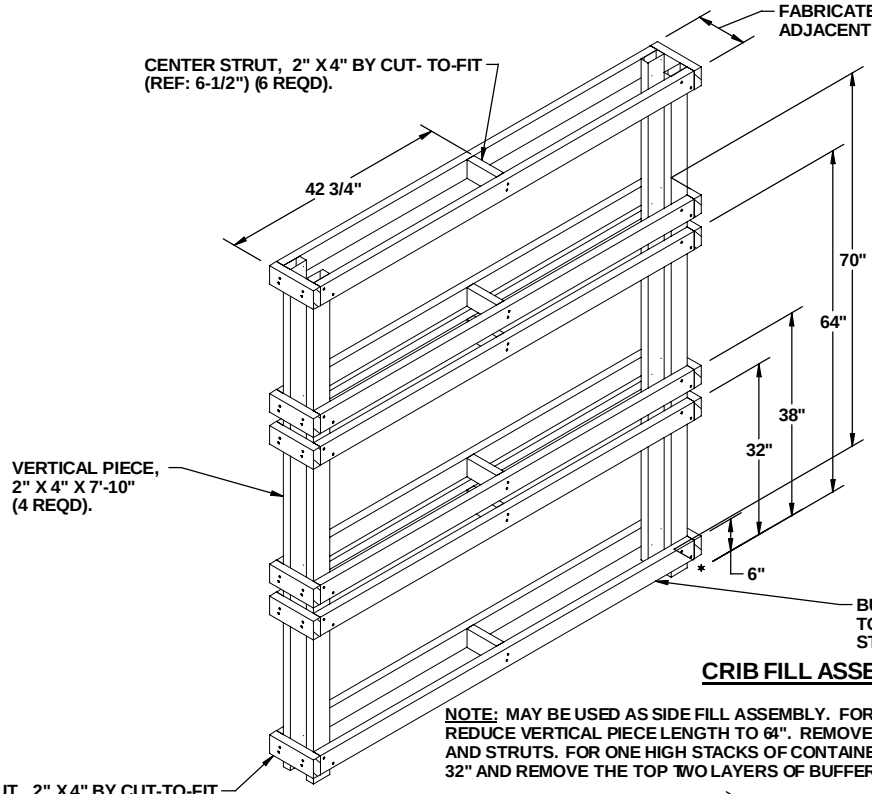
CENTER GATE A

NOTE: FOR USE WITH SIDE BLOCKING ASSEMBLIES. FOR TWO HIGH STACK OF CONTAINERS REDUCE VERTICAL PIECE LENGTH TO 65" AND ELIMINATE THE TOP BUFFER PIECE AND TOP STRUT LEDGER . FOR ONE HIGH STACK OF CONTAINERS REDUCE VERTICAL PIECE LENGTH TO 33" AND ELIMINATE THE TOP TWOBUFFER PIECES AND TOP TWO STRUT LEDGERS .



CENTER GATE B

NOTE: FOR USE WITH CRIB FILL ASSEMBLIES. FOR TWO HIGH STACK OF CONTAINERS REDUCE VERTICAL PIECE LENGTH TO 65" AND ELIMINATE THE TOP BUFFER PIECE AND TOP STRUT LEDGER . FOR ONE HIGH STACK OF CONTAINERS REDUCE VERTICAL PIECE LENGTH TO 33" AND ELIMINATE THE TOP TWOBUFFER PIECES AND TOP TWO STRUT LEDGERS .

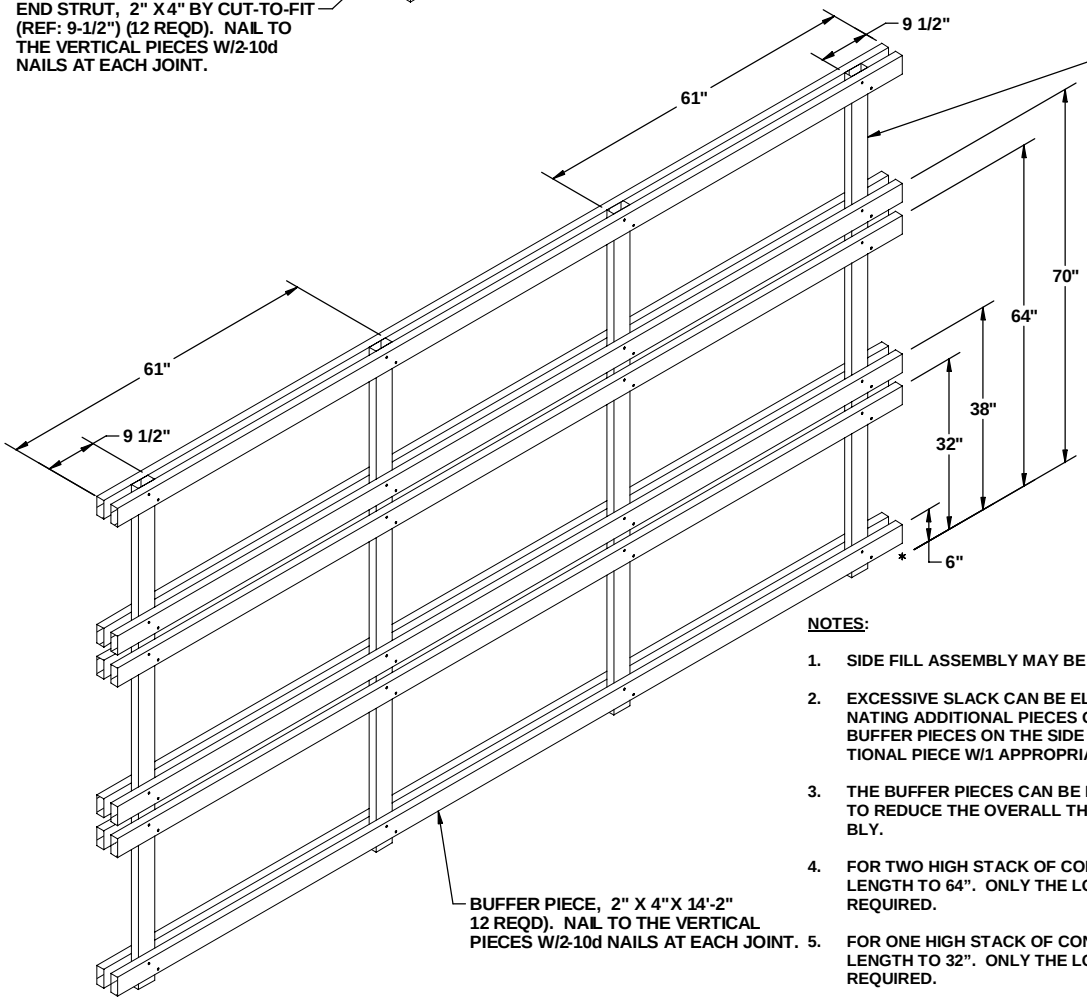


NOTE: EACH CENTER PAIR OF BUFFER PIECES, END STRUTS AND CENTER STRUTS MAY BE REPLACED WITH 2" X 10" MATERIAL. NAIL W/3-10d NAILS AT APPROPRIATE LOCATIONS.

CRIB FILL ASSEMBLY

NOTE: MAY BE USED AS SIDE FILL ASSEMBLY. FOR TWO HIGH STACKS OF CONTAINERS REDUCE VERTICAL PIECE LENGTH TO 64". REMOVE THE TOPLAYER OF BUFFER PIECES AND STRUTS. FOR ONE HIGH STACKS OF CONTAINERS REDUCE THE VERTICAL PIECES TO 32" AND REMOVE THE TOP TWO LAYERS OF BUFFER PIECES AND STRUTS.

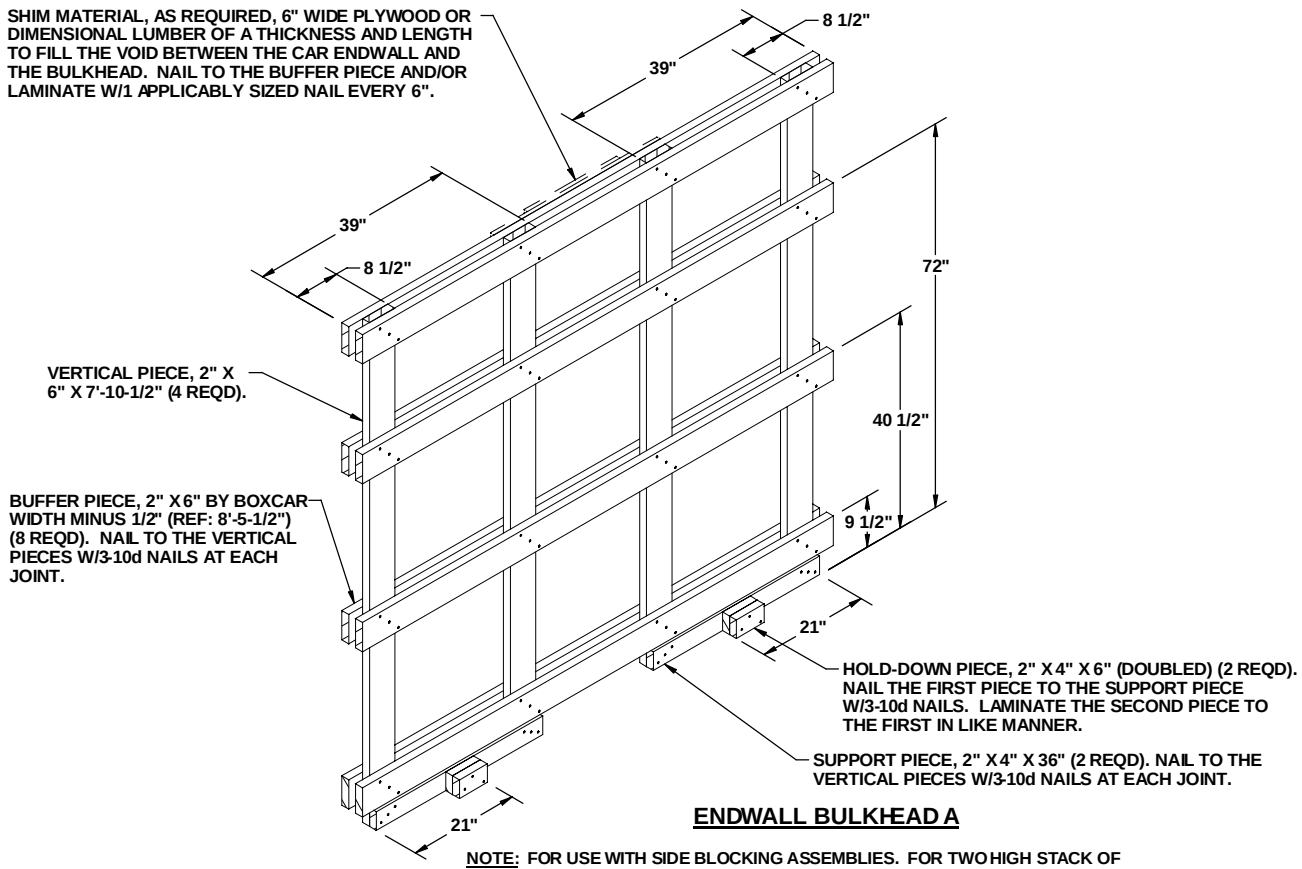
END STRUT, 2" X 4" BY CUT-TO-FIT (REF: 9-1/2") (12 REQD). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH JOINT.



NOTES:

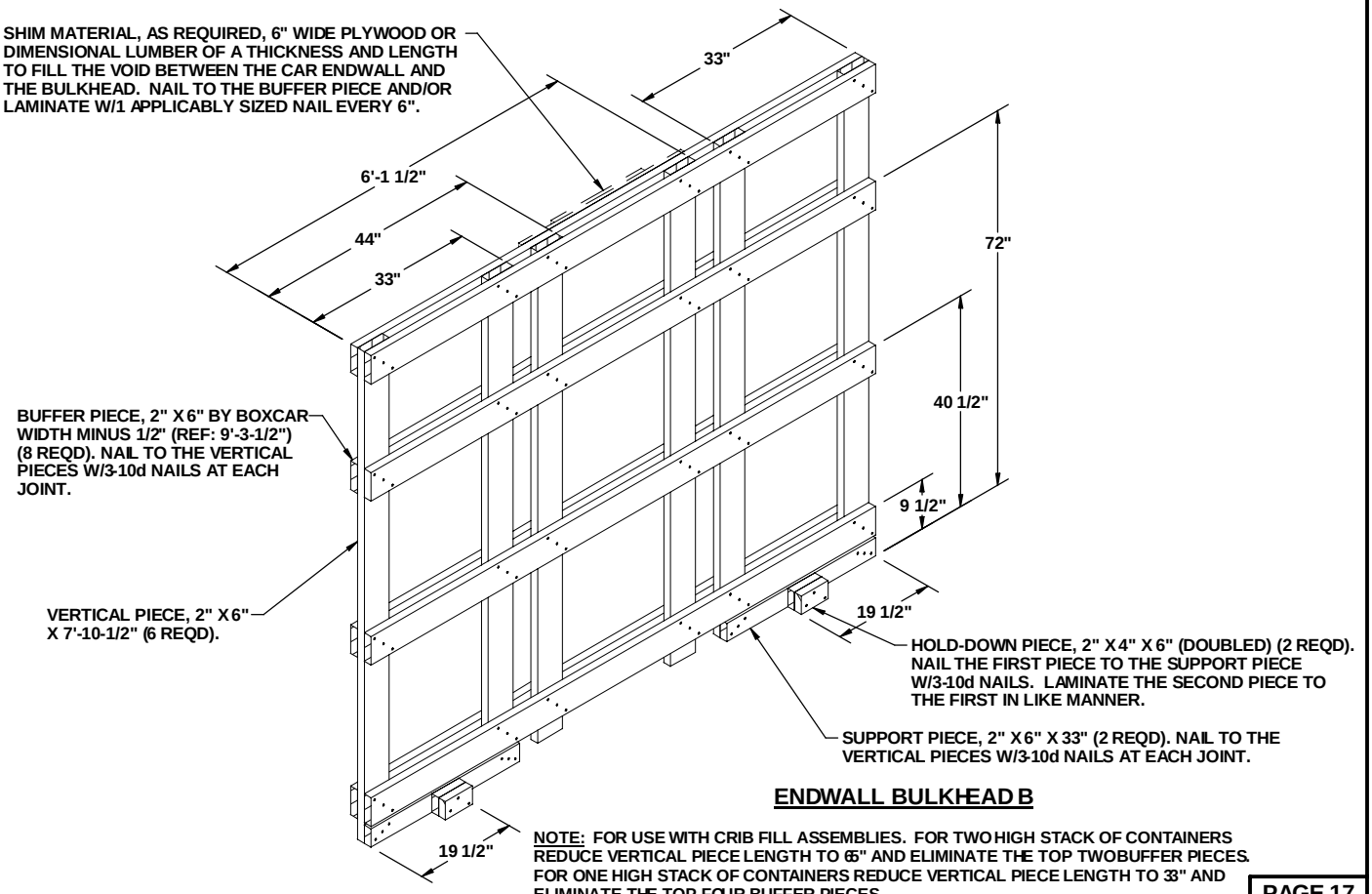
1. SIDE FILL ASSEMBLY MAY BE USED AS A CRIB FILL ASSEMBLY.
2. EXCESSIVE SLACK CAN BE ELIMINATED FROM A LOAD BY LAMINATING ADDITIONAL PIECES OF APPROPRIATE THICKNESS TO THE BUFFER PIECES ON THE SIDE FILL ASSEMBLY. NAIL EACH ADDITIONAL PIECE W/1 APPROPRIATELY SIZED NAIL EVERY 12".
3. THE BUFFER PIECES CAN BE REPLACED WITH 1" THICK MATERIAL TO REDUCE THE OVERALL THICKNESS OF THE SIDE FILL ASSEMBLY.
4. FOR TWO HIGH STACK OF CONTAINERS REDUCE VERTICAL BOARD LENGTH TO 64". ONLY THE LOWER EIGHT BUFFER PIECES ARE REQUIRED.
5. FOR ONE HIGH STACK OF CONTAINERS REDUCE VERTICAL BOARD LENGTH TO 32". ONLY THE LOWER FOUR BUFFER PIECES ARE REQUIRED.
6. ASSEMBLY MAY BE MADE AS TWO SIDE FILL ASSEMBLIES WITH TWO VERTICAL PIECES EACH AND ALL BUFFER PIECES 7'-1" LONG.
7. EACH PAIR OF CENTER BUFFER PIECES MAY BE REPLACED WITH ONE 2" X 10" X 14'-2". NAIL W/3-10d NAILS ATE EACH JOINT.

SIDE FILL ASSEMBLY



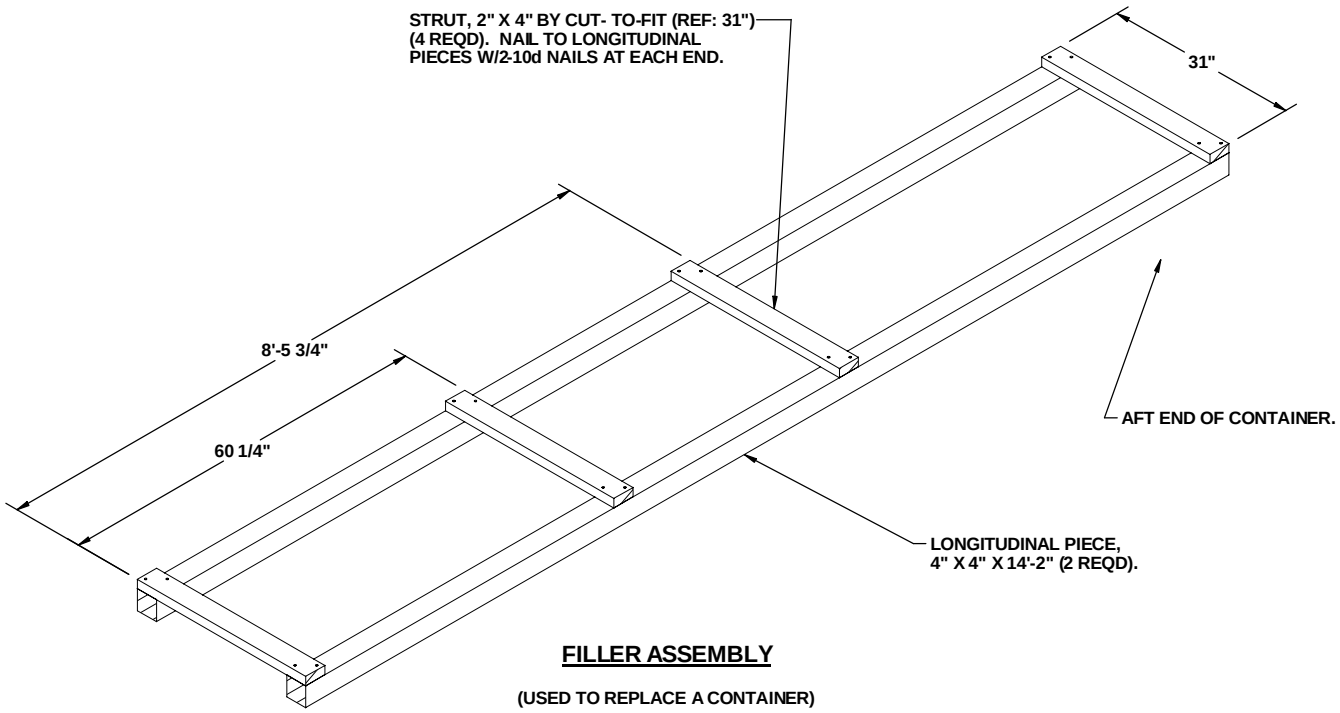
ENDWALL BULKHEAD A

NOTE: FOR USE WITH SIDE BLOCKING ASSEMBLIES. FOR TWO HIGH STACK OF CONTAINERS REDUCE VERTICAL PIECE LENGTH TO 65" AND ELIMINATE THE TOP TWO BUFFER PIECES. FOR ONE HIGH STACK OF CONTAINERS REDUCE VERTICAL BOARD LENGTH TO 33" AND ELIMINATE THE TOP FOUR BUFFER PIECES.



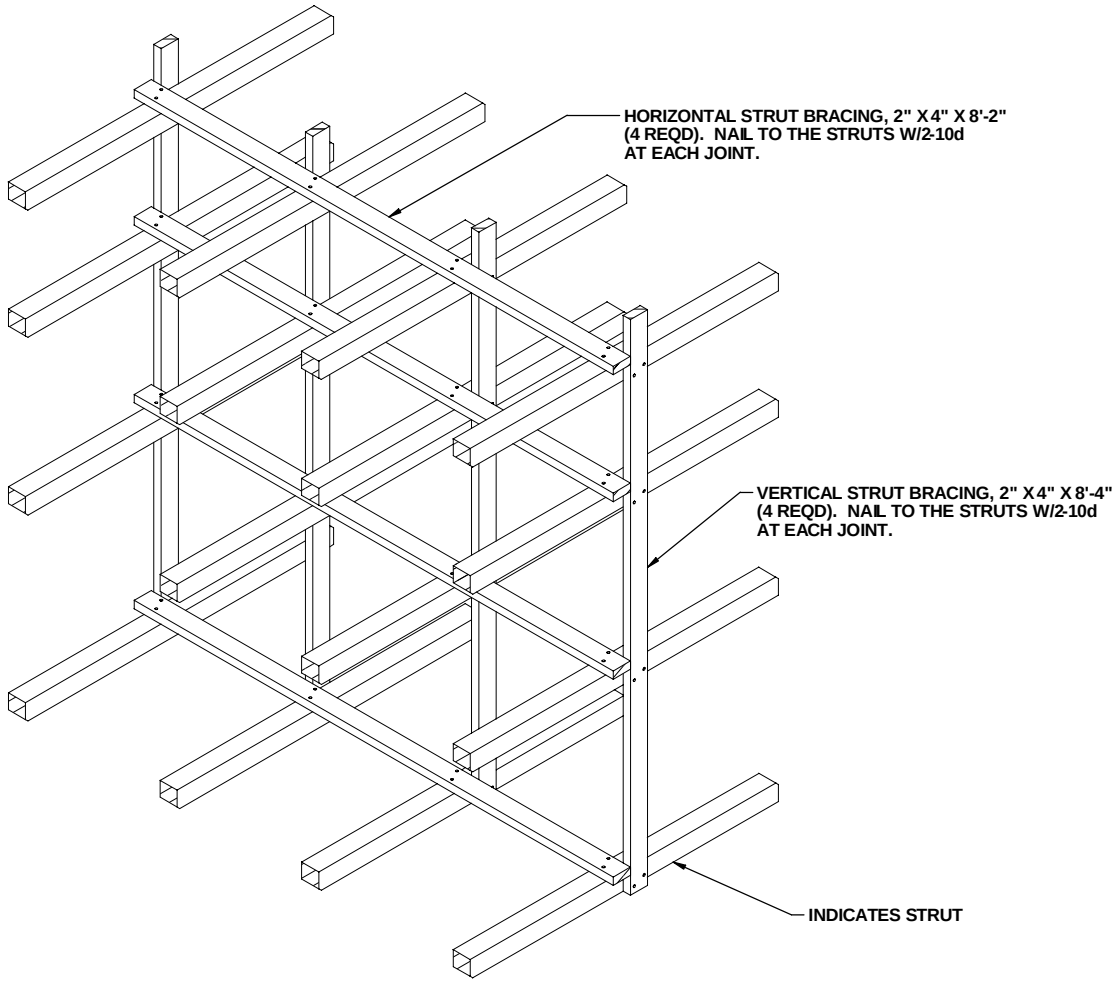
ENDWALL BULKHEAD B

NOTE: FOR USE WITH CRIB FILL ASSEMBLIES. FOR TWO HIGH STACK OF CONTAINERS REDUCE VERTICAL PIECE LENGTH TO 65" AND ELIMINATE THE TOP TWO BUFFER PIECES. FOR ONE HIGH STACK OF CONTAINERS REDUCE VERTICAL PIECE LENGTH TO 33" AND ELIMINATE THE TOP FOUR BUFFER PIECES.



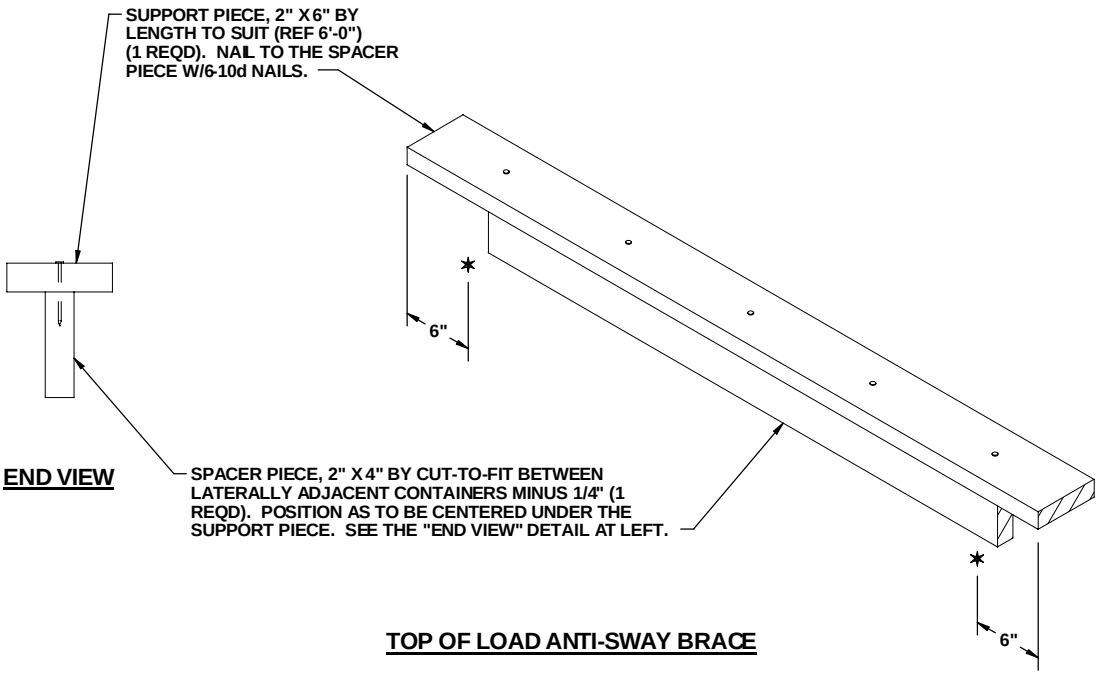
FILLER ASSEMBLY

(USED TO REPLACE A CONTAINER)

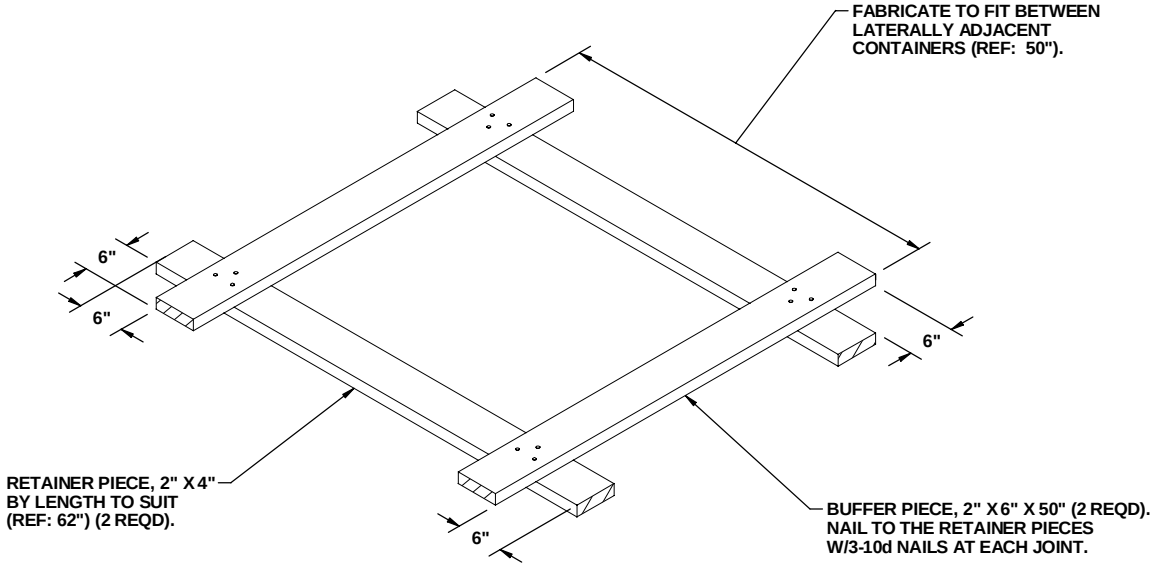


STRUT BRACING DETAIL

(USE WHEN STRUTS ARE 48" OR
LONGER. SEE GENERAL NOTE T.3)

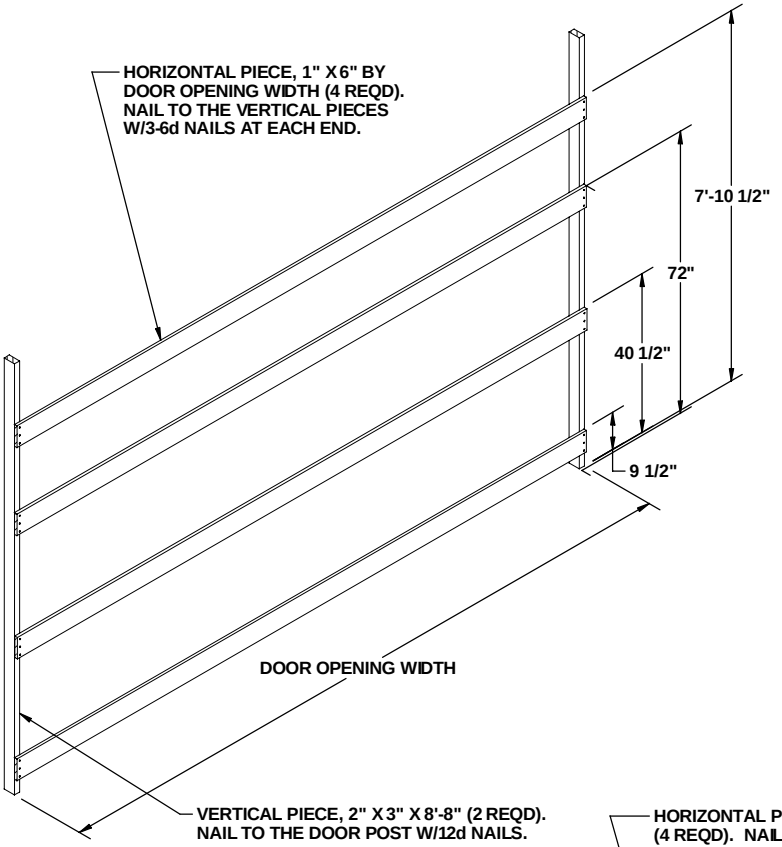


TOP OF LOAD ANTI-SWAY BRACE



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.

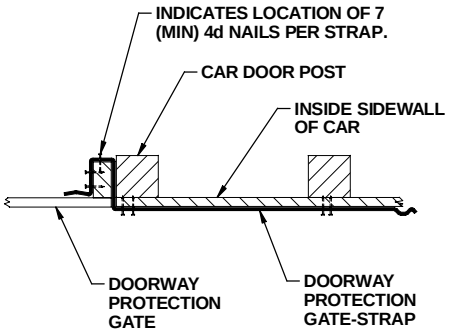


SPECIAL NOTES:

1. DOORWAY PROTECTION "A" IS FOR USE IN CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NAILABLE DOOR POSTS.
2. DOORWAY PROTECTION "B" IS FOR USE IN CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS WHEN THE DOOR POSTS ARE STEEL WITHOUT NAILING HOLES AND THE CAR SIDEWALLS ARE NAILABLE.
3. DOORWAY PROTECTION "C" IS FOR USE IN CARS EQUIPPED WITH EITHER PLUG TYPE DOORS OR CONVENTIONAL SLIDING DOORS, BUT ONLY IF THE CAR IS EQUIPPED WITH NAILABLE SIDEWALLS. IF THE CAR IS EQUIPPED WITH SPECIAL ANCHOR RODS IN THE CAR DOOR POSTS, THE DOORWAY PROTECTION STRAPS MAY BE SECURED TO THESE RODS IN LIEU OF ATTACHING TO THE CAR SIDEWALL WITH STRAP ANCHOR PLATES.
4. DOORWAY PROTECTION "D" IS FOR USE IN CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS, WHEN THE DOOR POSTS ARE NOT NAILABLE. IF THE CAR HAS NAILABLE SIDEWALLS, NAIL-ON TYPE STRAPPING MAY BE USED TO SECURE THE GATE IN LIEU OF USING THE SPREADER PIECES. SEE THE DOORWAY PROTECTION "B" DETAIL FOR GUIDANCE.
5. NAILED FLOORLINE BLOCKING AND BUNDLING STRAPS ARE REQUIRED FOR DOORWAY PROTECTION IF NONE OF THE ABOVE METHODS CAN BE USED. SEE THE LOAD ON PAGE 6 FOR GUIDANCE.
6. THE VIEWS ON PAGES 20 AND 21 DEPICT DOORWAY PROTECTION FOR A THREE-LAYER LOAD. FOR A TWO-LAYER LOAD, ELIMINATE THE TOP HORIZONTAL PIECE AND/OR STRAP AND REDUCE THE HEIGHT OF THE VERTICAL PIECES BY 31". FOR A ONE-LAYER LOAD, ELIMINATE THE TOP TWO HORIZONTAL PIECES AND/OR STRAPS AND REDUCE THE HEIGHT OF THE VERTICAL PIECES BY 62". FOR DOORWAY PROTECTION "D", MOVE THE SPANNER BY AN APPROPRIATE DISTANCE.

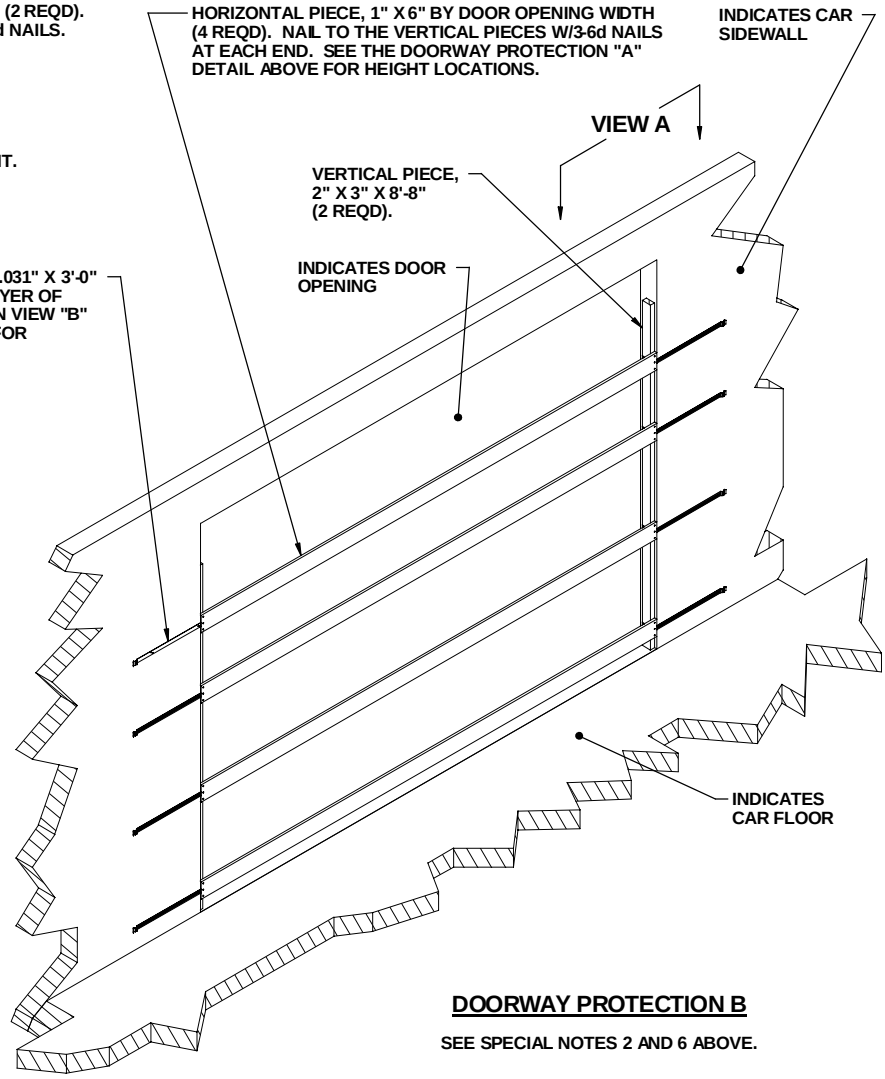
DOORWAY PROTECTION A

SEE SPECIAL NOTES 1 AND 6 AT RIGHT.



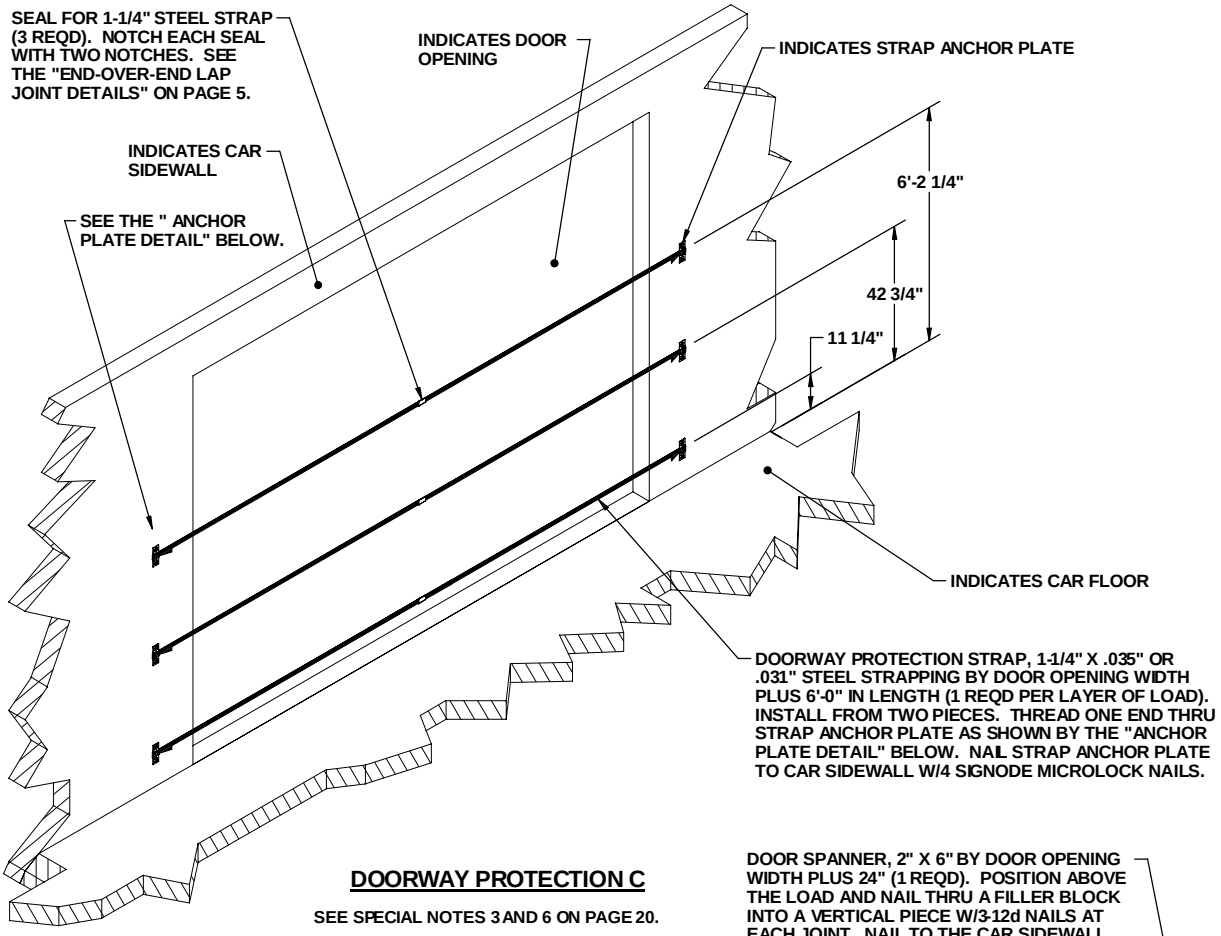
VIEW A

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



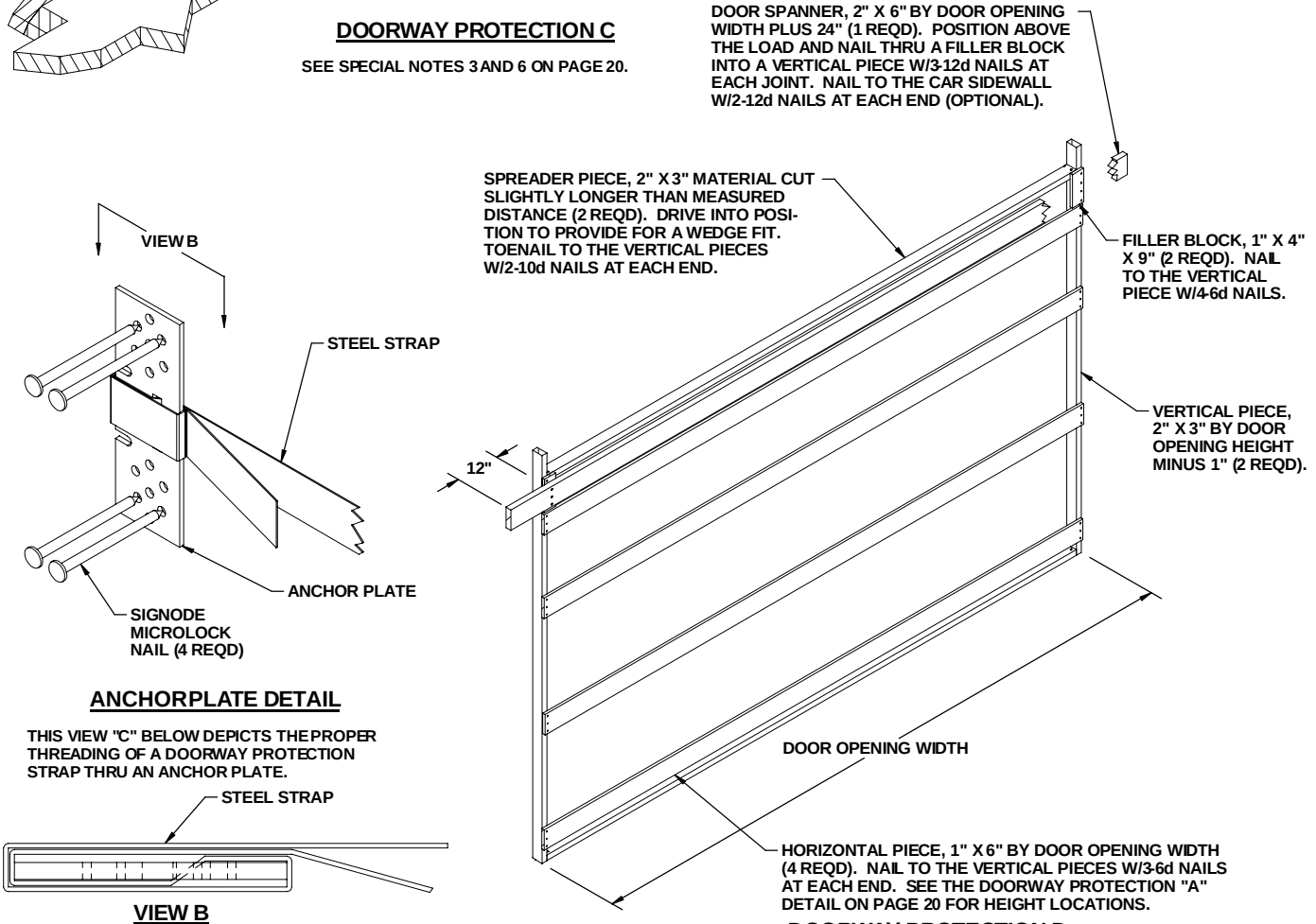
DOORWAY PROTECTION B

SEE SPECIAL NOTES 2 AND 6 ABOVE.



DOORWAY PROTECTION C

SEE SPECIAL NOTES 3 AND 6 ON PAGE 20.



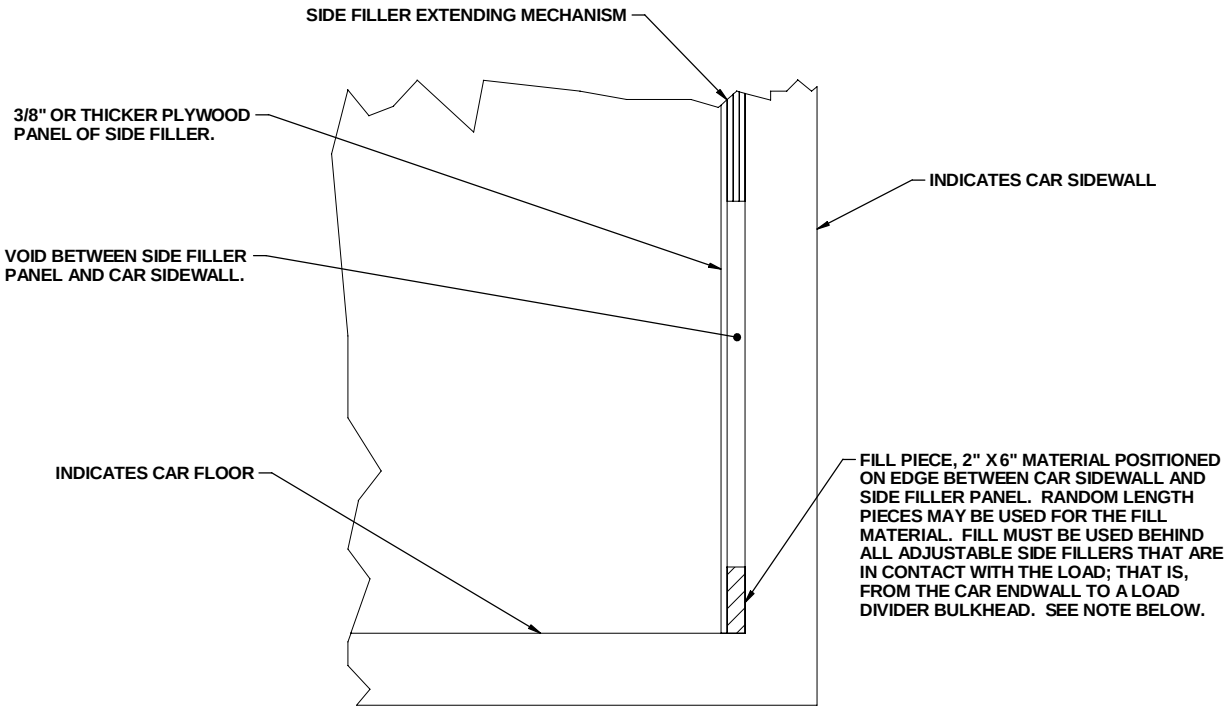
DOORWAY PROTECTION D

SEE SPECIAL NOTES 4 AND 6 ON PAGE 20.

ANCHORPLATE DETAIL

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

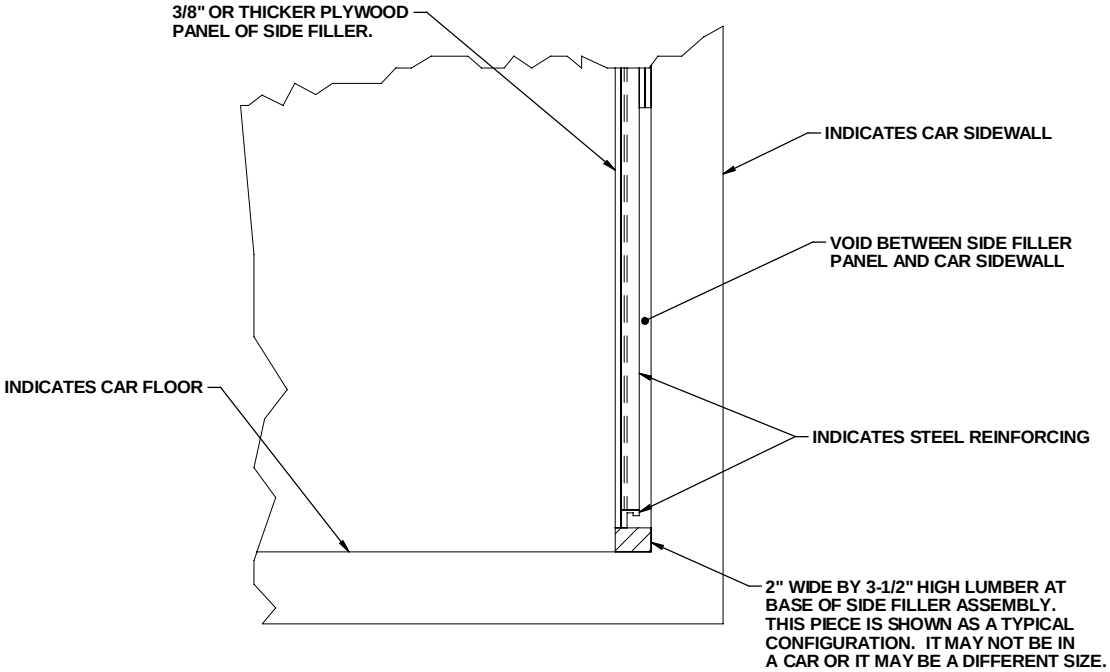
VIEW B



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.

PROVISIONS FOR BOXCARS EQUIPPED WITH LOAD DIVIDER BULKHEADS