

APPROVED BY
BUREAU OF EXPLOSIVES

O L Hoady

DATE 8/8/96

LOADING AND BRACING (CL & LCL) IN BOXCARS [⊕] OF HARM (AGM-88) MISSILES PACKED IN CNU-355/E SHIPPING AND STORAGE CONTAINERS

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[⊕] INCLUDES CONVENTIONAL TYPE BOXCARS AND CUSHIONED
BOXCARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.

U.S. ARMY MATERIEL COMMAND DRAWING			
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U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL	JULY 1996		
	CLASS	DIVISION	DRAWING
	19	48	8582
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			SP5J14

DO NOT SCALE

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 LOADS OF HARM MISSILES PACKED IN CNU-355/E CONTAINERS. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH MISSILE INSTALLED. SEE PAGE 4 FOR DETAIL OF THE CONTAINER.
 - CONTAINER DIMENSIONS -- 15'-0" LONG X 35" WIDE X 22-5/8" HIGH (STACKING: 20-7/16")
 - GROSS WIEGHT - - - - - 2,360 POUNDS (APPROX)
 - CUBE - - - - - 82.5 CUBIC FEET (APPROX)
- C. THE OUTLOADING PROCEDURES DEPICTED WITHIN THIS DOCUMENT ARE APPLICABLE FOR SHIPMENTS IN CONVENTIONAL TYPE BOXCARS AND FOR SHIPMENTS IN CUSHIONED BOXCARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.
- D. THE SELECTION OF RAILCARS FOR THE TRANSPORT OF CONTAINERS OF HARM 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.
- E. WHEN SELECTING RAILCARS, EVERY EFFORT SHOULD BE MADE TO OBTAIN BOXCARS THAT DO NOT HAVE BOWED ENDWALLS. CARS HAVING BOWED ENDS CAN BE USED, HOWEVER, IF AN ENDWALL IS BOWED OUTWARD MORE THAN 2" EITHER FROM SIDE TO SIDE OR FROM FLOOR TO ROOF, SHIM MATERIAL MUST BE INSTALLED ON THE ENDWALL/SEPARATOR GATE TO PROVIDE A "SQUARED OFF" SURFACE FOR THE LOAD AT THE END OF THE CAR. REFER TO PAGE 15 FOR GUIDANCE.
- F. CONVENTIONAL BOXCARS EQUIPPED WITH SLIDING DOORS HAVE BEEN SHOWN, HOWEVER, THE DEPICTED OUTLOADING PROCEDURES ARE ALSO APPLICABLE FOR CONVENTIONAL CARS EQUIPPED WITH PLUG DOORS. CAUTION: DUNNAGE MATERIAL MUST NOT BE NAILED TO ANY PLUG DOOR, WHETHER AUXILIARY OR MAIN. ALSO, AFTER THE PLUG DOORS ON A CAR ARE CLOSED AND READY FOR THE INSTALLATION OF CAR SEALS, A PIECE OF WIRE OF SUITABLE SIZE WILL BE USED IN ADDITION TO AND IN CONJUNCTION WITH EACH CAR SEAL USED TO SEAL THE CAR. THE WIRE WILL BE THREADED THRU THE HOLES IN THE DOOR LATCH ASSEMBLY ONE OR MORE TIMES, AND THE WIRE ENDS WILL BE TWISTED TOGETHER.
- G. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN CARS WHICH ARE PARTIALLY LOADED WITH CONTAINERS OF HARM MISSILES, 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 FED SPEC MM-L-751.
- NAILS - - - - - : FED SPEC FF-N-105; COMMON.
- PLYWOOD - - - - - : COMMERCIAL ITEM DESCRIPTION A-A-55057, TYPE A, CONSTRUCTION AND INDUSTRIAL PLYWOOD, INTERIOR WITH EXTERIOR GLUE, GRACE C-D. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER INTERIOR OR AN EXTERIOR GRADE MAY BE SUBSTITUTED.
- STRAPPING, STEEL - - : ASTM D3953; FLAT STRAPPING, TYPE 1, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.
- SEAL, STRAP - - - - : ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.
- STAPLE, STRAP - - - : COMMERCIAL GRADE.

- H. 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".
- J. 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.
- K. POWER DRIVEN STAPLES MAY BE USED AS ALTERNATIVE FASTENERS FOR NAILS WHEN CONSTRUCTING DUNNAGE ASSEMBLIES WHICH ARE TO BE USED IN THE DELINEATED BOXCAR LOADS SHOWN THROUGHOUT THIS DRAWING. THE STAPLES TO BE USED MUST BE EQUAL IN LENGTH TO THE SPECIFIED NAIL SIZE AND MUST BE SUBSTITUTED ON A ONE STAPLE FOR ONE NAIL BASIS. STAPLES WHICH ARE 2-1/2" OR LESS IN LENGTH SHOULD BE IN ACCORDANCE WITH FEDERAL SPECIFICATION FF-N-105 AS NEARLY AS PRACTICABLE. STAPLES WHICH ARE LONGER THAN 2-1/2" WILL BE A COMMERCIAL GRADE, OF A QUALITY EQUIVALENT TO THOSE MANUFACTURED BY SENCO PRODUCTS INCORPORATED. NOTE: STAPLES WILL NOT BE SUBSTITUTED FOR NAILS IN ANY LOAD RESTRAINING FLOOR DUNNAGE APPLICATION.
- L. 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.
- M. 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.
- N. 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.
- O. 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.
- P. 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 25.4 MM AND ONE POUND EQUALS 0.454 KG.
- Q. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTIONS WHICH ARE IMMEDIATELY ADJACENT TO THE DEPICTED OUTLOADING PROCEDURES.

(CONTINUED ON PAGE 3)

GENERAL NOTES

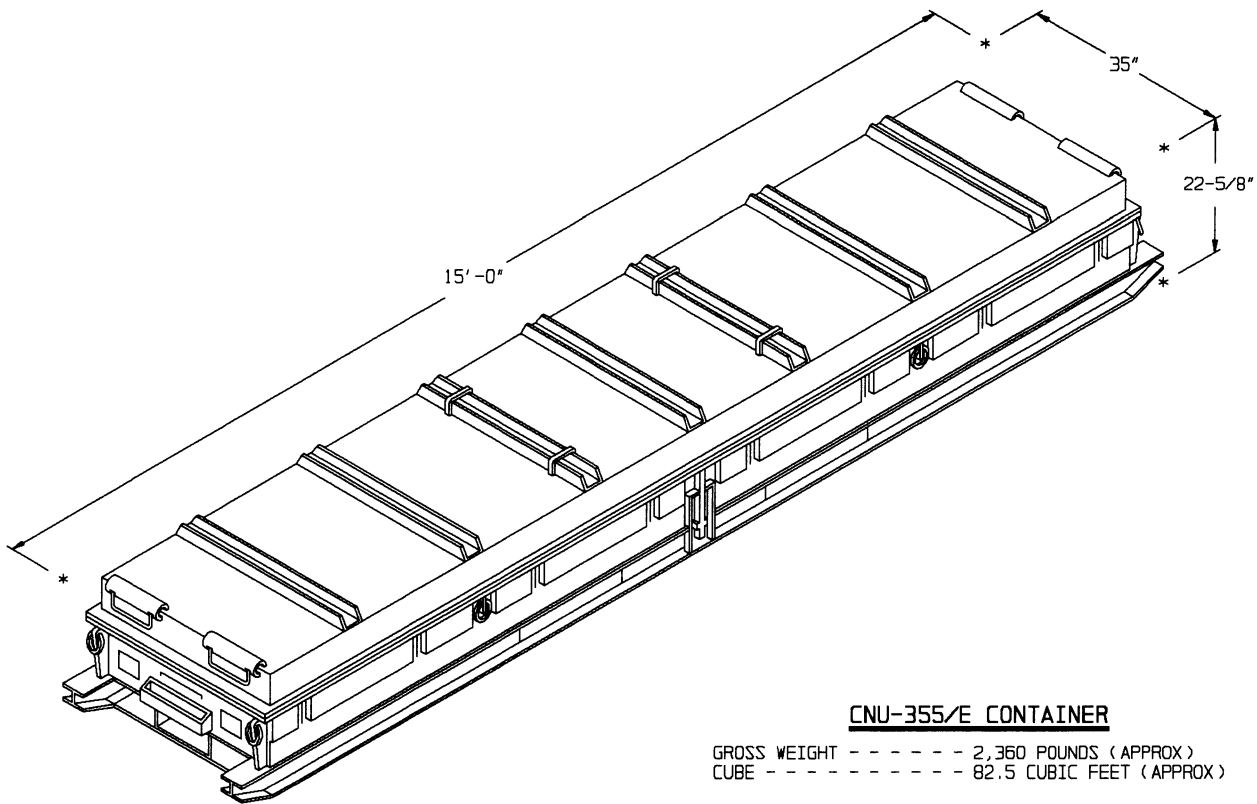
(FOR CONVENTIONAL TYPE BOXCARS)

- R. 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. SEE GENERAL NOTE "J" ON PAGE 2.
- S. 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 PALLET UNITS INTO THEIR FINAL SHIPPING POSITION. A HYDRAULIC JACK IS RECOMMENDED FOR THIS OPERATION. CAUTION: WHEN USING A JACK TO COMPACT A LOAD, THE JACK MUST BE USED AGAINST STRONG POINTS OF THE PALLET UNITS, SUCH AS THE JOINTS BETWEEN THE LAYERS OF CONTAINERS ON THE UNIT. PADDING, OF 2" THICK LUMBER OR ANY OTHER MATERIAL OF SIMILAR CONSISTENCY, SHOULD BE PLACED BETWEEN THE JACK AND THE LADING.
- T. LOAD-BLOCKING STRUTS WHICH ARE 48" OR LONGER MUST BE STIFFENED BY THE APPLICATION OF HORIZONTAL AND VERTICAL STRUT BRACING AS SHOWN BY KEY NUMBERS ⑥ AND ⑦ ON PAGE 6. 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.
- U. 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.
- V. WHERE 2" X 2" PIECES ARE SPECIFIED FOR STRUT LEDGERS, 2" X 4" MATERIAL MAY BE SUBSTITUTED, IF DESIRED.

GENERAL NOTES

(FOR CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS)

- W. 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.
- X. THE USE OF LOAD DIVIDER EQUIPPED CARS WILL ELIMINATE THE NEED FOR CENTER GATES AND STRUTS 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 HARM MISSILES. 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.
- Y. 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 20 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 20, THE "FILL PIECE" MATERIAL IS NOT REQUIRED.
- Z. 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.
- AA. 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 WHICH ARE IN ONE LOAD UNIT. A LOAD UNIT IS DEFINED AS A STACK OF CONTAINERS WHICH IS FULL CAR WIDTH BY FULL LOAD HEIGHT BY ONE UNIT IN LENGTH. IF THE QUANTITY TO BE SHIPPED CANNOT BE ATTAINED BY ADJUSTING THE NUMBER OF TIERS IN ONE OR BOTH ENDS OF A CAR, OR BY ADJUSTING THE NUMBER OF LOAD UNITS IN EITHER END OF THE CAR, ONE OF THE FOLLOWING PROCEDURES MUST BE USED IN ORDER TO OBTAIN THE DESIRED QUANTITY.
1. THE OMITTED CONTAINER METHOD MAY BE USED TO ADJUST A LOAD QUANTITY DOWNWARD BY OTHER THAN A MULTIPLE OF A LOAD UNIT. SEE THE PROCEDURES ON PAGE 11 FOR GUIDANCE.
 2. 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.
 3. ONE OR MORE UNITS CAN BE POSITIONED IN CONTACT WITH A LOAD DIVIDER BULKHEAD ON THE CENTER-OF-CAR SIDE. BLOCK AND BRACE WITH FLOORLINE BLOCKING AS SHOWN ON PAGE 14.



CNU-355/E CONTAINER

GROSS WEIGHT - - - - - 2,360 POUNDS (APPROX)
 CUBE - - - - - 82.5 CUBIC FEET (APPROX)

UNITIZATION AND HANDLING GUIDANCE

(UNITIZATION AND HANDLING GUIDANCE CONTINUED)

1. STACKING CONTAINERS FOR LOADING.

- 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.

3. CONTAINER OR CONTAINER STACK HANDLING.

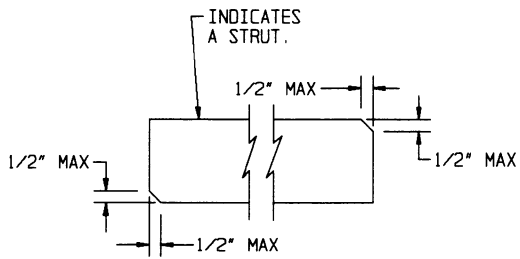
- NOTES:** (1) APPROVED MATERIAL HANDLING EQUIPMENT (FORKLIFT TRUCKS, CRANES, HAND TRUCKS, DOLLIES, ROLLER ASSEMBLIES, SLINGS, SPREADER BARS, ETC.) IS SPECIFIED ELSEWHERE.
- (2) PRECAUTIONARY HANDLING TECHNIQUES NORMALLY EMPLOYED OR AS SPECIFIED FOR THE TYPE OF COMMODITY INVOLVED WILL BE OBSERVED.

2. INSTALLATION OF 1-1/4" X .035" OR .031" UNITIZING STRAPPING.

- A. EACH OF THE TWO SETS OF UNITIZING STRAPS SHOULD BE POSITIONED AROUND THE CONTAINERS AS SHOWN IN THE LOAD DETAILS. PLACE STRAPPING THROUGH FORK RECEPTACLES OF A LOWER CONTAINER, AND SO THAT STRAPPING LAYS FLAT AND STRAIGHT WITH THE BODY SURFACES OF THE CONTAINERS; I.E., VERTICAL ALONG SIDES AND STRAIGHT ACROSS TOP AND BOTTOM OF THE STACK.
- B. STRAPPING WILL BE FIRMLY TENSIONED, AND EACH END-OVER-END LAP JOINT WILL BE SEALED WITH TWO DOUBLE CRIMPED STRAP SEALS AS SHOWN IN THE LOAD DETAILS. THE LAP JOINTS WILL BE MADE ALONG THE SIDE OF THE STACK. 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.

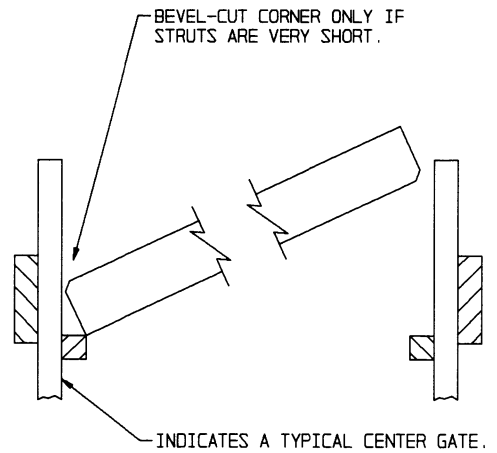
- A. ONLY APPROVED AND APPROPRIATELY SIZED MATERIALS HANDLING EQUIPMENT WILL BE USED FOR HANDLING THE DEPICTED CONTAINERS.
- B. IF HANDLING IS ACCOMPLISHED WITH A FORKLIFT TRUCK, THE CONTAINERS SHOULD BE HANDLED FROM A SIDE POSITION AS MUCH AS POSSIBLE. CARE MUST BE EXERCISED WHEN INSERTING FORKS UNDER A CONTAINER, TO PREVENT DAMAGE TO THE CONTAINER BY THE FORK TINES OR THE FORKLIFT PACKAGE GUARD. FOR VERY SHORT "INCHING" SPEED MOVEMENTS, SUCH AS WILL BE EXPERIENCED DURING BOXCAR LOADING, A UNITIZED CONTAINER STACK MAY BE HANDLED BY INSERTING THE FORKS OF A FORKLIFT TRUCK INTO THE FORK RECEPTACLES OF AN UPPER CONTAINER. IF ONE CONTAINER IS HANDLED BY SLINGING, THE SLING MAY BE ATTACHED TO THE LIFTING POINTS ON THE CONTAINER. HOWEVER, IF A TWO, THREE, OR FOUR-HIGH STACK IS HANDLED BY SLINGING, DO NOT ATTACH THE SLING TO THE LIFTING POINTS ON A CONTAINER. THE SLING USED MUST BE OF SUCH A DESIGN THAT THE LIFTING IS DONE ON THE BOTTOM OF THE LOWEST CONTAINER.
- C. WHEN UNLOADING CONTAINERS, REMOVE THE LATERAL DUNNAGE, AND SHIFT THE NEAR END OF THE CONTAINER STACK TOWARDS THE CENTER OF THE BOXCAR. ATTACH A CHAIN FROM THE CONTAINER LIFTING CLEVIS ON ONE SIDE OF THE CONTAINER, AROUND THE FORKLIFT MAST, TO THE CONTAINER LIFTING CLEVIS ON THE OPPOSITE SIDE OF THE CONTAINER. SLIGHTLY ELEVATE AND INSERT THE FORK TINES UNDER THE END OF THE CONTAINER STACK AND SLOWLY DRAG THE CONTAINER STACK REARWARD UNTIL IT CAN BE HANDLED FROM THE SIDE, TAKING CARE NOT TO DAMAGE THE CONTAINERS.

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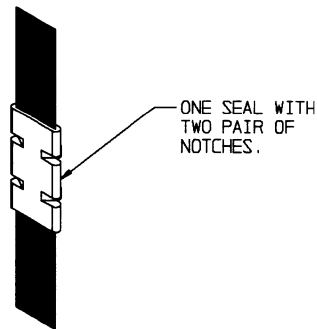
BEVEL-CUT

IF DESIRED, EACH END OF A STRUT MAY BE BEVEL-CUT AS SHOWN ABOVE TO FACILITATE INSTALLATION AND THE ACHIEVEMENT OF A TIGHTLY BLOCKED LOAD.



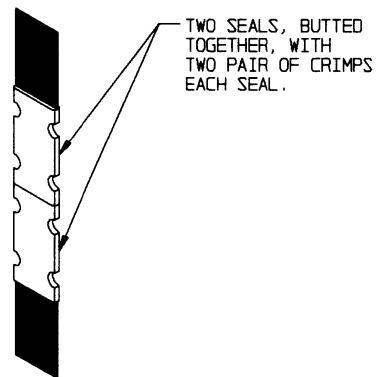
STRUT INSTALLATION

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



STRAP JOINT A

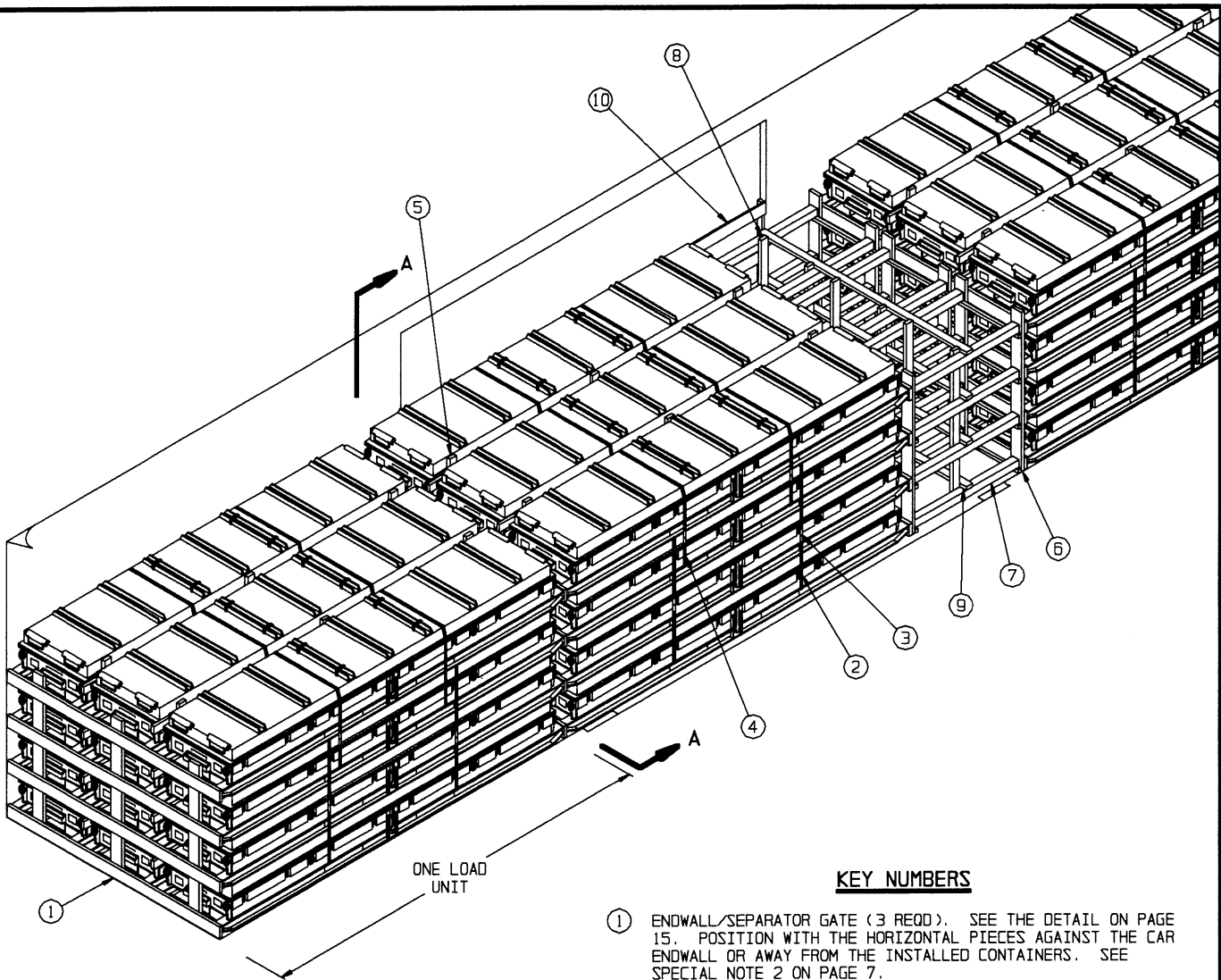
METHOD OF SECURING A STRAP JOINT WHEN USING A NOTCH-TYPE SEALER.



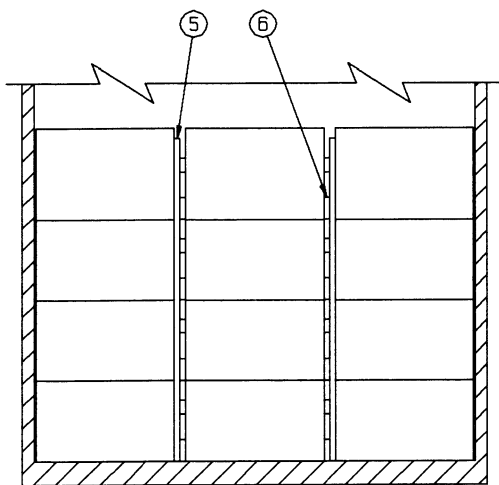
STRAP JOINT B

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

END-OVER-END LAP JOINT DETAILS



ISOMETRIC VIEW



SECTION A-A

KEY NUMBERS

- ① ENDWALL/SEPARATOR GATE (3 REQD). SEE THE DETAIL ON PAGE 15. POSITION WITH THE HORIZONTAL PIECES AGAINST THE CAR ENDWALL OR AWAY FROM THE INSTALLED CONTAINERS. SEE SPECIAL NOTE 2 ON PAGE 7.
- ② UNITIZING STRAP, 1-1/4" X .035" OR .031" X 17'-6" LONG STEEL STRAPPING (18 REQD). INSTALL TO ENCIRCLE THE THREE LOWER CONTAINERS OF A STACK AS SHOWN. SEE SPECIAL NOTE 3 ON PAGE 7.
- ③ SEAL FOR 1-1/4" STRAPPING (72 REQD). CRIMP EACH SEAL WITH TWO PAIR OF CRIMPS. SEE THE "END-OVER-END LAP JOINT DETAILS" ON PAGE 5.
- ④ UNITIZING STRAP, 1-1/4" X .035" OR .031" X 14'-0" LONG STEEL STRAPPING (18 REQD). INSTALL TO ENCIRCLE THE TWO UPPER CONTAINERS OF A STACK AS SHOWN.
- ⑤ ANTI-CHAFING ASSEMBLY (6 REQD). SEE THE DETAIL ON PAGE 16.
- ⑥ CENTER GATE (2 REQD). SEE THE DETAIL ON PAGE 15. SEE SPECIAL NOTE 4 ON PAGE 7.
- ⑦ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 58-1/2") (24 REQD). TOENAIL TO PIECES MARKED (Ⓞ) W/2-16d NAILS AT EACH END. SEE GENERAL NOTES "T" AND "U" ON PAGE 3.
- ⑧ VERTICAL STRUT BRACING, 2" X 4" X 68" (6 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑨ HORIZONTAL STRUT BRACING, 2" X 4" X 9'-2" (4 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑩ DOORWAY PROTECTION (4 REQD). SEE THE DETAIL ON PAGE 16. NAIL TO THE DOOR POSTS W/12d NAILS. SEE SPECIAL NOTE 5 ON PAGE 7.

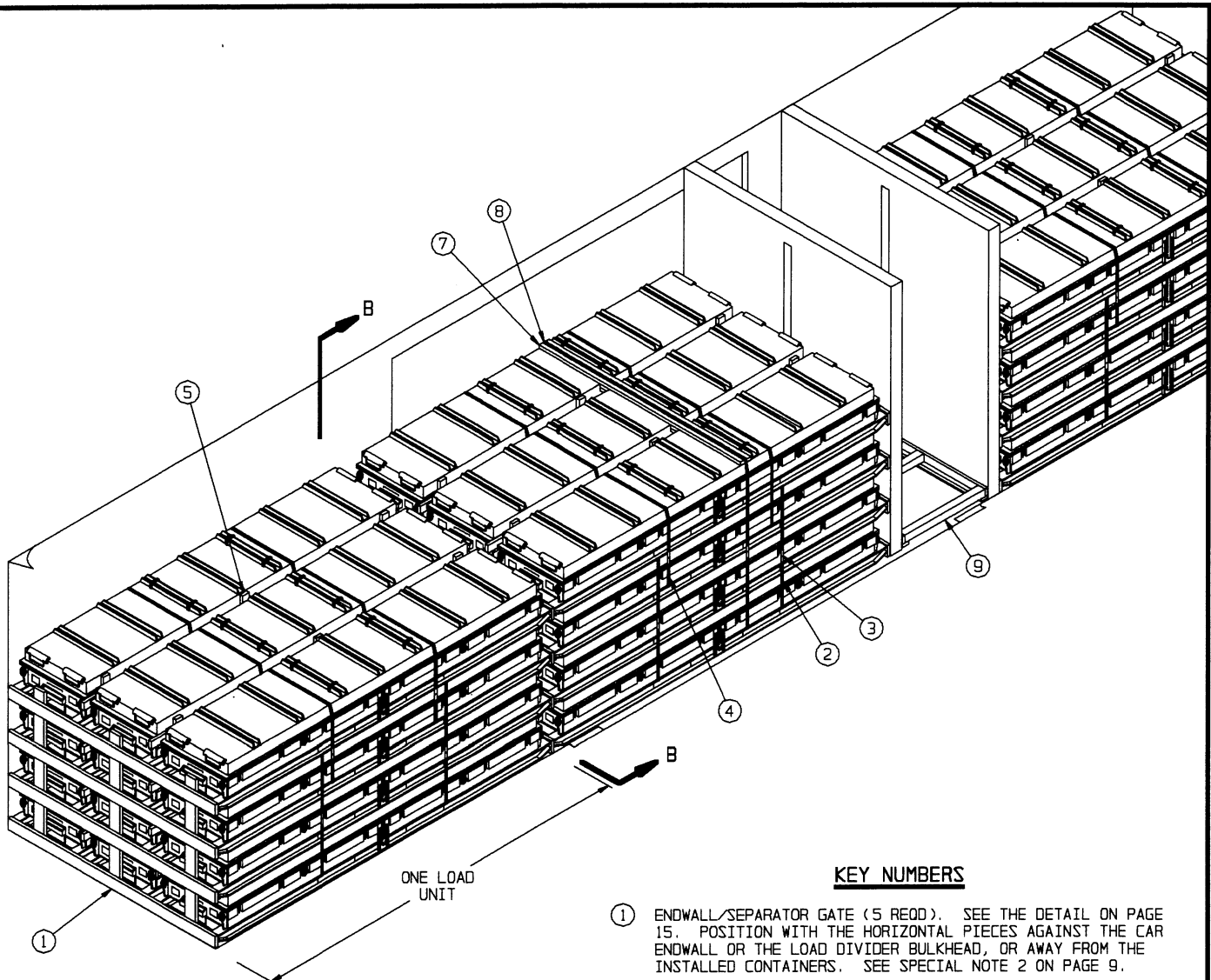
SPECIAL NOTES:

1. A 50'-6" LONG BY 9'-4" WIDE WOOD-LINED CONVENTIONAL TYPE BOXCAR EQUIPPED WITH 15'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER OR NARROWER DOOR OPENINGS CAN BE USED, ALTHOUGH NARROWER DOOR OPENINGS WILL BE DIFFICULT TO UTILIZE. SEE GENERAL NOTE "D" ON PAGE 2.
2. IF THE CAR TO BE LOADED HAS NAILABLE ENDWALLS, BATTENS MAY BE NAILED TO THE ENDWALL IN LIEU OF USING THE ENDWALL/SEPARATOR GATE, PIECE MARKED ①. POSITION AT THE HEIGHTS SPECIFIED FOR THE ENDWALL/SEPARATOR GATE HORIZONTAL PIECES AND NAIL TO THE CAR ENDWALL W/1-10d NAIL EVERY 12".
3. CONTAINERS MUST 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, AS APPLICABLE, BE PARTIALLY LIFTED FROM THE END AND PUSHED INTO PLACE. USE CARE SO AS NOT TO DAMAGE THE CONTAINERS.
4. THE CENTER GATE MAY BE PARTIALLY FORMED FROM 1/2" OR THICKER PLYWOOD, IF DESIRED. PLYWOOD MAY BE USED IN LIEU OF THE 2" X 6" HORIZONTAL PIECES. SEE THE "PLYWOOD CENTER GATE ALTERNATIVE" DETAIL ON PAGE 17 FOR GUIDANCE.
5. 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 WIDTH. THE WOODEN GATE TYPE OF DOORWAY PROTECTION, SHOWN AS PIECE MARKED ① IN THE LOAD ON PAGE 6, IS APPLICABLE FOR BOXCARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND NAILABLE DOOR POSTS. REFER TO PAGES 18 AND 19 FOR ALTERNATIVE DOORWAY PROTECTION FOR CARS EQUIPPED WITH CONVENTIONAL SLIDING AND PLUG DOORS. IF THE CAR BEING LOADED IS EQUIPPED WITH PLUG TYPE DOORS BUT DOES NOT HAVE NAILABLE SIDEWALLS, NAILED FLOORLINE BLOCKING, SPACER ASSEMBLIES, AND LOAD BUNDLING STRAPS MUST BE USED. SEE THE LOAD ON PAGE 8 FOR GUIDANCE.
6. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED. A 4-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF 12 UNITS, A 3-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF NINE UNITS, A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF SIX UNITS, OR A 1-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF THREE UNITS BY OMITTING ONE OR MORE UNITS FROM THE CENTER PORTION OF THE LOAD, OR THE ENTIRE TOP TIER OR TIERS CAN BE OMITTED. FOR OTHER METHODS OF REDUCING A LOAD, AND FOR TYPICAL LCL PROCEDURES, REFER TO PAGES 10 THRU 14 FOR GUIDANCE.
7. A MAXIMUM OF 24 CONTAINERS, FOR AN APPROXIMATE LADING WEIGHT OF 56,640 POUNDS, CAN BE LOADED IN A 40'-6" LONG CAR BY USING THE DEPICTED PROCEDURES. A MAXIMUM OF 36 CONTAINERS, FOR A LADING WEIGHT OF APPROXIMATELY 84,960 POUNDS, CAN BE LOADED IN A 60'-8" LONG BOXCAR BY USING THE DEPICTED METHODS.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 6"	120	60
2" X 3"	24	12
2" X 4"	543	364
2" X 6"	313	313
4" X 4"	117	156
NAILS	NO. REQD	POUNDS
6d (2")	48	1/2
10d (3")	600	9-1/2
12d (3-1/4")	24	1/2
16d (3-1/2")	96	2-1/4
STEEL STRAPPING, 1-1/4" - 567' REQD - - 81.00 LBS		
SEAL FOR 1-1/4" STRAPPING - - 72 REQD - - - 3.27 LBS		

LOAD AS SHOWN

<u>ITEM</u>	<u>QUANTITY</u>	<u>WEIGHT (APPROX)</u>
CONTAINER - - - - -	36 - - - - -	84,960 LBS
DUNNAGE - - - - -	- - - - -	1,908 LBS
TOTAL WEIGHT - - - - -		86,868 LBS (APPROX)

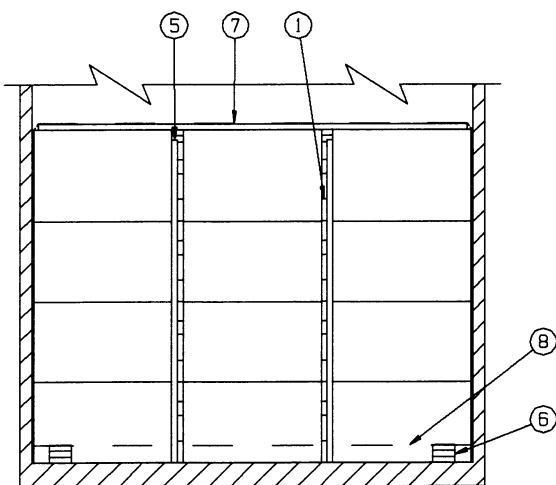


ISOMETRIC VIEW

ONE LOAD UNIT

KEY NUMBERS

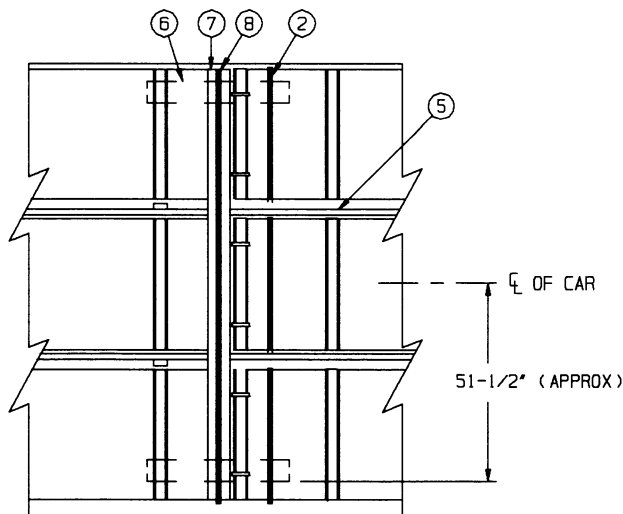
- ① ENDWALL/SEPARATOR GATE (5 REQD). SEE THE DETAIL ON PAGE 15. POSITION WITH THE HORIZONTAL PIECES AGAINST THE CAR ENDWALL OR THE LOAD DIVIDER BULKHEAD, OR AWAY FROM THE INSTALLED CONTAINERS. SEE SPECIAL NOTE 2 ON PAGE 9.
- ② UNITIZING STRAP, 1-1/4" X .035" OR .031" X 17'-6" LONG STEEL STRAPPING (18 REQD). INSTALL TO ENCIRCLE THE THREE LOWER CONTAINERS OF A STACK AS SHOWN. SEE SPECIAL NOTE 3 ON PAGE 9.
- ③ SEAL FOR 1-1/4" STRAPPING (74 REQD). CRIMP EACH SEAL WITH TWO PAIR OF CRIMPS. SEE THE "END-OVER-END LAP JOINT DETAILS" ON PAGE 5.
- ④ UNITIZING STRAP, 1-1/4" X .035" OR .031" X 14'-0" LONG STEEL STRAPPING (18 REQD). INSTALL TO ENCIRCLE THE TWO UPPER CONTAINERS OF A STACK AS SHOWN.
- ⑤ ANTI-CHAFING ASSEMBLY (6 REQD). SEE THE DETAIL ON PAGE 16.
- ⑥ FLOORLINE BLOCKING, 2" X 6" X 36" (TRIPLED) (2 REQD). PRE-POSITION AS SHOWN BY THE "PARTIAL PLAN VIEW" ON PAGE 9. NAIL THE FIRST PIECE TO THE CAR FLOOR W/8-16d NAILS. NAIL THE SECOND AND THIRD PIECES TO THE FIRST IN A LIKE MANNER. SEE GENERAL NOTES "J" ON PAGE 2 AND "R" ON PAGE 3. SEE SPECIAL NOTES 4 AND 5 ON PAGE 9.
- ⑦ SPACER ASSEMBLY (1 REQD). SEE THE "SPACER ASSEMBLY A" DETAIL ON PAGE 17. POSITION UNDER THE DOORWAY PROTECTION STRAP, PIECE MARKED ⑧, AND BETWEEN THE TOPS OF THE CONTAINER STACKS WHICH EXTEND INTO THE DOORWAY.
- ⑧ DOORWAY PROTECTION STRAP, 1-1/4" X .035" OR .031" X 35'-0" LONG STEEL STRAPPING (1 REQD). INSTALL TO ENCIRCLE ALL CONTAINERS IN THE DOORWAY AREA. STAPLE TO THE SPACER ASSEMBLY W/3 STAPLES.
- ⑨ STRUT ASSEMBLY (1 REQD). SEE THE "STRUT ASSEMBLY B" DETAIL ON PAGE 20. SEE SPECIAL NOTE 6 ON PAGE 9.



SECTION B-B

SPECIAL NOTES:

1. A 50'-6" LONG BY 9'-4" WIDE WOOD-LINED CONVENTIONAL TYPE BOXCAR EQUIPPED WITH 15'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER OR NARROWER DOOR OPENINGS CAN BE USED, ALTHOUGH NARROWER DOOR OPENINGS WILL BE DIFFICULT TO UTILIZE. SEE GENERAL NOTE "D" ON PAGE 2.
2. IF THE CAR TO BE LOADED HAS NAILABLE ENDWALLS, BATTENS MAY BE NAILED TO THE ENDWALL IN LIEU OF USING THE ENDWALL/SEPARATOR GATE, PIECE MARKED ①. POSITION AT THE HEIGHTS SPECIFIED FOR THE ENDWALL/SEPARATOR GATE HORIZONTAL PIECES AND NAIL TO THE CAR ENDWALL W/1-10d NAIL EVERY 12".
3. CONTAINERS MUST 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, AS APPLICABLE, BE PARTIALLY LIFTED FROM THE END AND PUSHED INTO PLACE. USE CARE SO AS NOT TO DAMAGE THE CONTAINERS.
4. DOORWAY PROTECTION IS REQUIRED FOR ALL CONTAINER STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE STACK WIDTH. THE DEPICTED TYPE DOORWAY PROTECTION IS APPLICABLE FOR BOXCARS EQUIPPED WITH EITHER SLIDING TYPE OR PLUG TYPE DOORS, OR A COMBINATION THEREOF. ONE DOORWAY PROTECTION STRAP IS REQUIRED FOR CONTAINER STACKS WHICH EXTEND INTO THE DOORWAY AREA BY MORE THAN HALF THE CONTAINER LENGTH, BUT ARE RETAINED BY 6" OR MORE OF SIDEWALL. TWO STRAPS ARE REQUIRED FOR CONTAINER STACKS THAT ARE RETAINED BY LESS THAN 6" OF CAR SIDEWALL. IF THE CAR BEING LOADED IS EQUIPPED WITH SLIDING TYPE DOORS, WOODEN DOOR GATES, SHOWN AS PIECE MARKED ① IN THE LOAD ON PAGE 6, OR ANY OF THE ALTERNATIVES ON PAGES 18 AND 19, MAY BE USED. IF THE CAR BEING LOADED IS EQUIPPED WITH PLUG TYPE DOORS BUT DOES NOT HAVE NAILABLE SIDEWALLS, NAILED FLOORLINE BLOCKING, SPACER ASSEMBLIES, AND LOAD BUNDLING STRAPS MUST BE USED. SEE THE LOAD ON PAGE 8 FOR GUIDANCE.
5. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED. A 4-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF 12 UNITS, A 3-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF NINE UNITS, A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF SIX UNITS, OR A 1-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF THREE UNITS BY OMITTING ONE OR MORE UNITS FROM THE CENTER PORTION OF THE LOAD, OR THE ENTIRE TOP TIER OR TIERS CAN BE OMITTED. FOR OTHER METHODS OF REDUCING A LOAD, AND FOR TYPICAL LCL PROCEDURES, REFER TO PAGES 10 THRU 14 FOR GUIDANCE.
6. THE STRUT ASSEMBLY, SHOWN AS PIECE MARKED ③, IS REQUIRED WHEN THE LOAD IN EITHER END OF THE CAR IS 50,000 POUNDS OR MORE.
7. A MAXIMUM OF 24 CONTAINERS, FOR AN APPROXIMATE LADING WEIGHT OF 56,640 POUNDS, CAN BE LOADED IN A 40'-6" LONG CAR BY USING THE DEPICTED PROCEDURES. A MAXIMUM OF 36 CONTAINERS, FOR A LADING WEIGHT OF APPROXIMATELY 84,960 POUNDS, CAN BE LOADED IN A 60'-8" LONG BOXCAR BY USING THE DEPICTED METHODS.

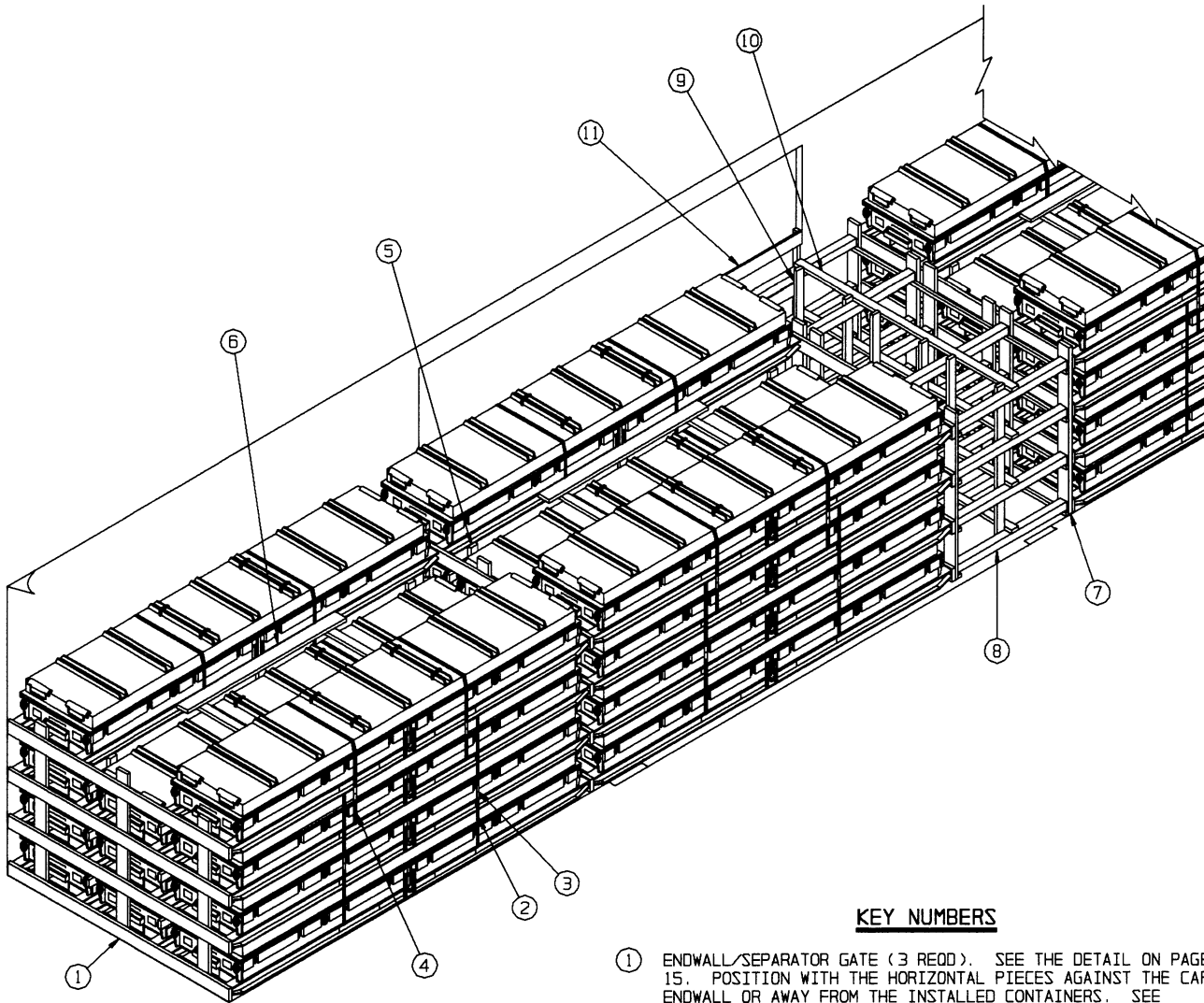


PARTIAL PLAN VIEW

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 8"	17	12
2" X 4"	502	336
2" X 6"	297	297
4" X 4"	15	20
NAILS	NO. REQD	POUNDS
6d (2")	16	1/4
10d (3")	446	7
12d (3-1/4")	16	1/4
16d (3-1/2")	32	3/4
STEEL STRAPPING, 1-1/4" - 602' REQD - - 86.00 LBS		
SEAL FOR 1-1/4" STRAPPING - - 74 REQD - - 3.36 LBS		

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CONTAINER	36	84,960 LBS
DUNNAGE		1,428 LBS
TOTAL WEIGHT		86,388 LBS (APPROX)



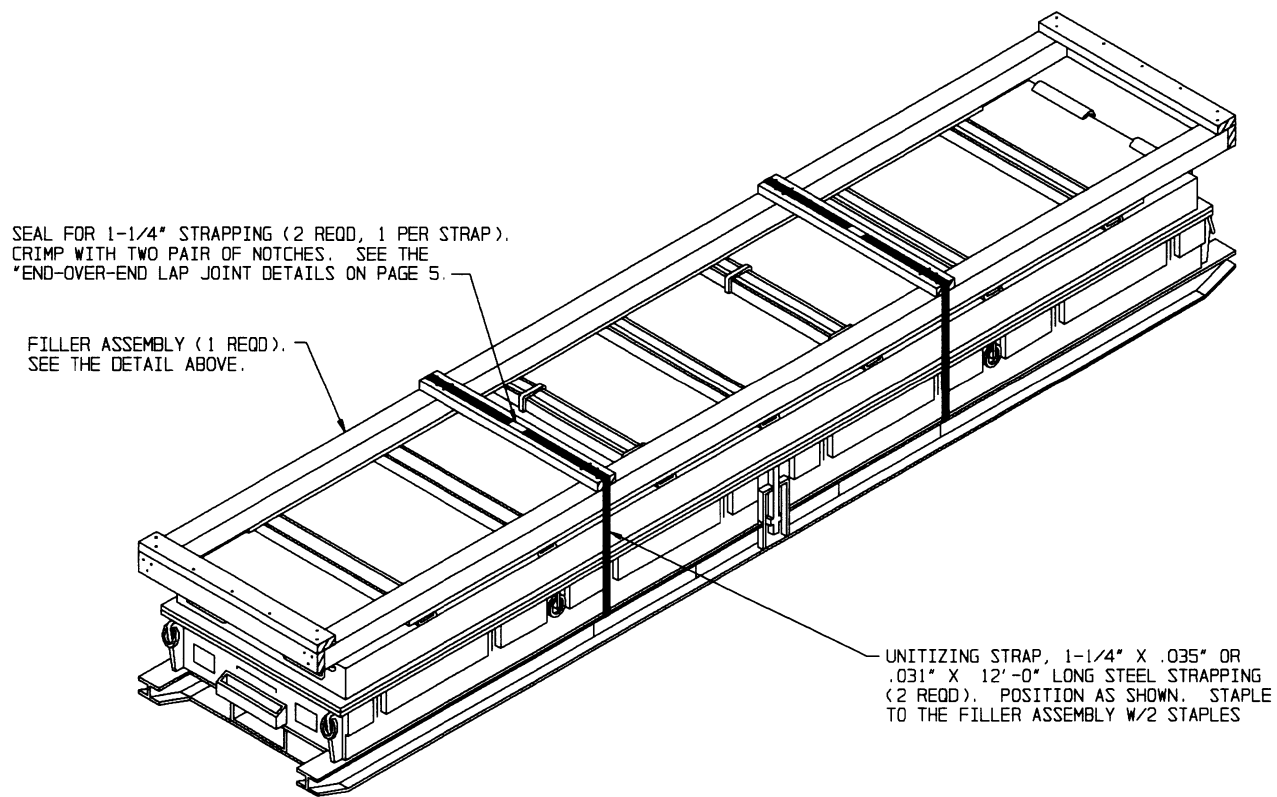
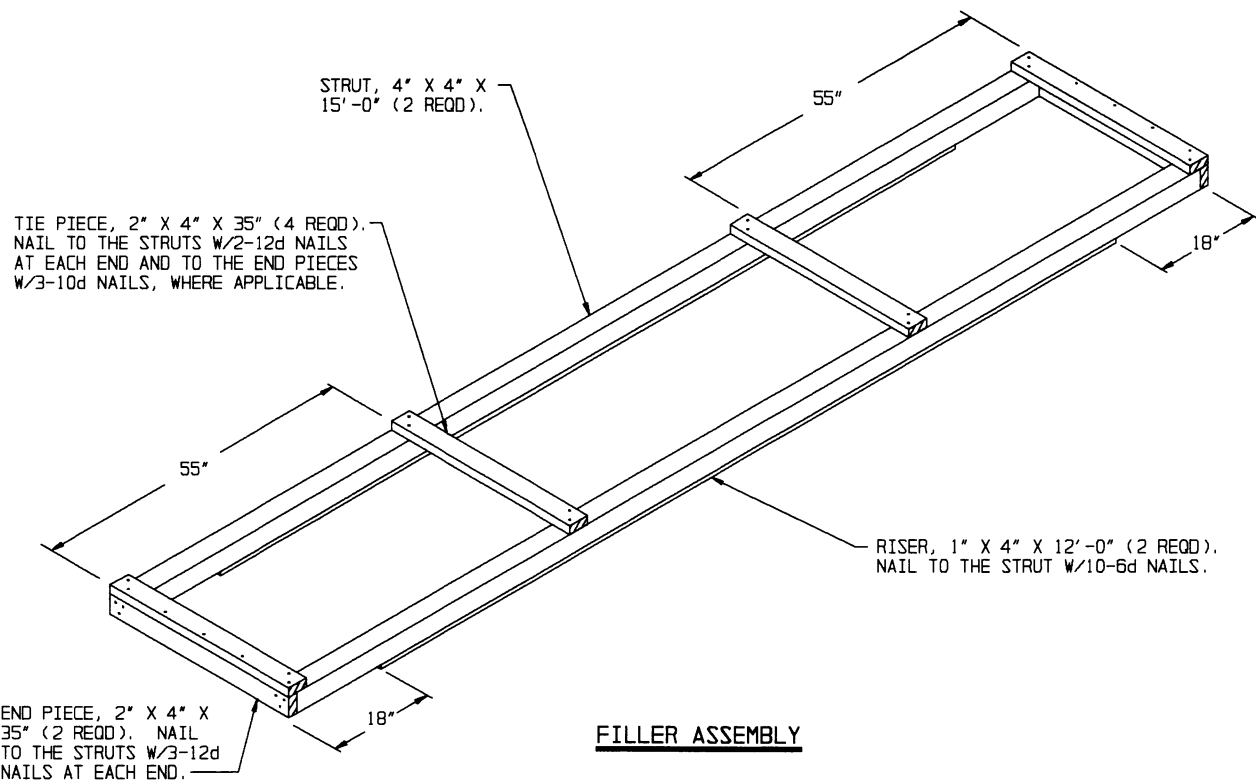
ISOMETRIC VIEW

SPECIAL NOTES:

1. A PORTION OF A 9'-4" WIDE CONVENTIONAL BOXCAR IS SHOWN TO PORTRAY THE METHOD OF OMITTING THE CENTER ROW OF CONTAINERS FROM THE TOP LAYER.
2. THE PROCEDURES FOR THE ADJUSTMENT OF A LOAD QUANTITY BY THE OMISSION OF THE CENTER ROW OF CONTAINERS FROM THE TOP LAYER OF A 4-HIGH LOAD IS SHOWN AS TYPICAL. THE PRINCIPLES MAY ALSO BE APPLIED FOR A 3-HIGH OR 2-HIGH LOAD.
3. ALL THE BLOCKING AND BRACING PIECES WHICH ARE NECESSARY TO PERMIT THE OMISSION OF THE CENTER ROW OF CONTAINERS ARE SHOWN. NOTE THAT IF THE ENTIRE CENTER ROW IS OMITTED, 6 ANTI-SWAY BRACES, SHOWN AS PIECES MARKED ⑥, WILL BE REQUIRED. THESE WILL BE INSTALLED BETWEEN THE TOP AND BOTTOM LAYER CONTAINERS.
4. IF NAILED FLOORLINE BLOCKING AND DOORWAY PROTECTION STRAPS ARE USED AS SHOWN BY KEY NUMBERS ④, ⑥, ⑦, AND ⑧ ON PAGE 8, "STRAPPING ASSEMBLY B" DETAILED ON PAGE 17 MUST BE POSITIONED UNDER THE DOORWAY PROTECTION STRAP.
5. ANTI-SWAY BRACES, SHOWN AS PIECES MARKED ⑥, ARE ONLY REQUIRED WHEN THE CENTER STACK IS ONE LAYER. IF THE CENTER CONTAINER STACKS ARE TWO OR THREE LAYERS, THEY WILL PROVIDE SWAY BRACING FOR THE OUTER CONTAINER STACKS IN A LOAD UNIT.

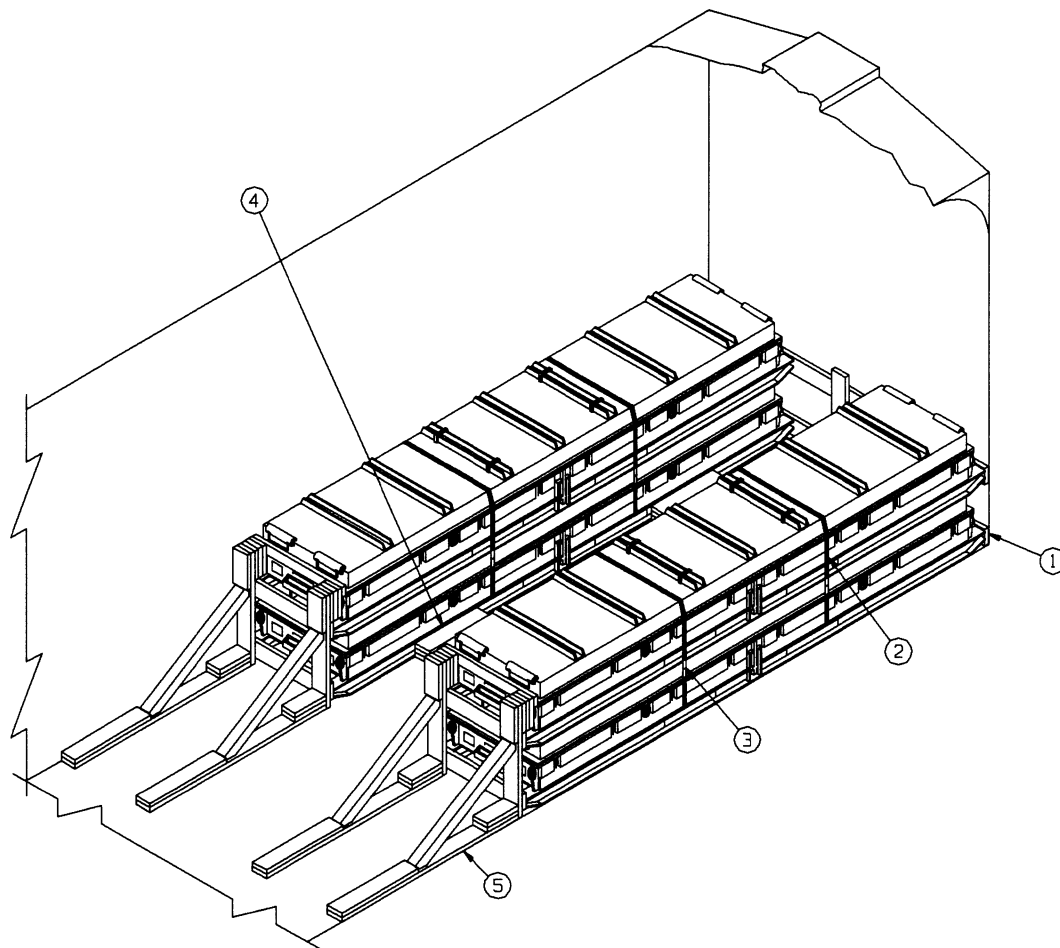
KEY NUMBERS

- ① ENDWALL/SEPARATOR GATE (3 REOD). SEE THE DETAIL ON PAGE 15. POSITION WITH THE HORIZONTAL PIECES AGAINST THE CAR ENDWALL OR AWAY FROM THE INSTALLED CONTAINERS. SEE SPECIAL NOTE 2 ON PAGE 7.
- ② UNITIZING STRAP, 1-1/4" X .035" OR .031" X 17'-6" LONG STEEL STRAPPING (18 REOD). INSTALL TO ENCIRCLE THE THREE LOWER CONTAINERS OF A STACK AS SHOWN. SEE SPECIAL NOTE 3 ON PAGE 7.
- ③ SEAL FOR 1-1/4" STRAPPING (60 REOD). CRIMP EACH SEAL WITH TWO PAIR OF CRIMPS. SEE THE "END-OVER-END LAP JOINT DETAILS" ON PAGE 5.
- ④ UNITIZING STRAP, 1-1/4" X .035" OR .031" X 14'-0" LONG STEEL STRAPPING (12 REOD). INSTALL TO ENCIRCLE THE TWO UPPER CONTAINERS OF A STACK AS SHOWN.
- ⑤ ANTI-CHAFING ASSEMBLY (6 REOD). SEE THE DETAIL ON PAGE 16.
- ⑥ ANTI-SWAY BRACE (3 REOD). SEE THE DETAIL ON PAGE 17. INSTALL BETWEEN LATERALLY ADJACENT TOP-LAYER CONTAINERS. SEE SPECIAL NOTE 5 AT LEFT.
- ⑦ CENTER GATE (2 REOD). SEE THE DETAIL ON PAGE 15. SEE SPECIAL NOTE 4 ON PAGE 7.
- ⑧ STRUT, 4" X 4" BY CUT-TO-FIT (REF: 58-1/2") (22 REOD). TOENAIL TO PIECES MARKED ⑥ W/2-16d NAILS AT EACH END. SEE GENERAL NOTES "T" AND "U" ON PAGE 3.
- ⑨ VERTICAL STRUT BRACING, 2" X 4" X 68" (6 REOD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑩ HORIZONTAL STRUT BRACING, 2" X 4" X 9'-2" (4 REOD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑪ DOORWAY PROTECTION (4 REOD). SEE THE DETAIL ON PAGE 16. NAIL TO THE DOOR POSTS W/12d NAILS. SEE SPECIAL NOTE 5 ON PAGE 7.



APPLICATION OF FILLER ASSEMBLY

THE FILLER ASSEMBLY IS TO BE USED IN THE TOP LAYER OF A LOAD ONLY, PREFERABLY NEXT TO A CENTER GATE IF USED IN A CONVENTIONAL BOXCAR.

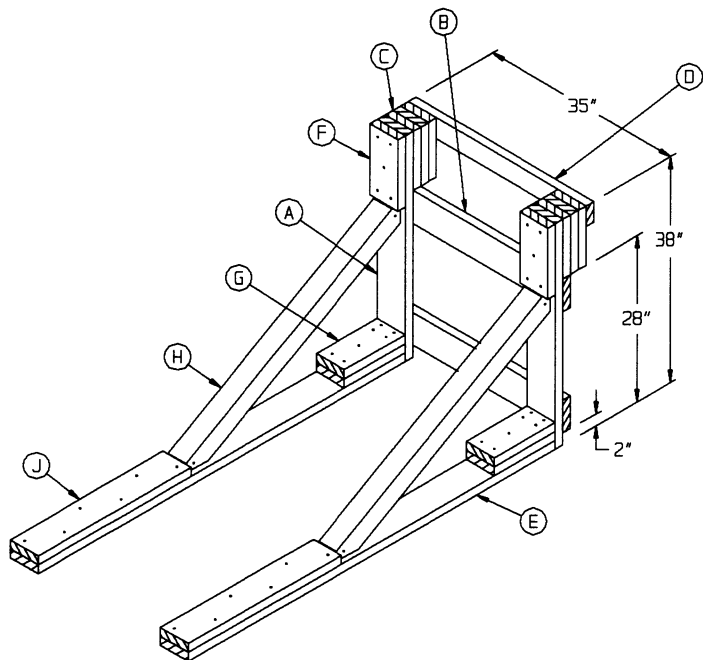


SPECIAL NOTES:

1. A 4-UNIT LOAD IS SHOWN IN A 9'-4" WIDE CONVENTIONAL BOXCAR USING THE KNEE BRACE METHOD OF LOAD RESTRAINT. CARS OF OTHER WIDTHS 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/SEPARATOR GATE, PIECE MARKED ①. POSITION AT THE HEIGHTS SPECIFIED FOR THE ENDWALL/SEPARATOR GATE HORIZONTAL PIECES AND NAIL TO THE CAR ENDWALL W/1-10d NAIL EVERY 12".
3. IF DESIRED, AN ANTI-SWAY BRACE MAY BE INSTALLED BETWEEN LATERALLY ADJACENT CONTAINERS IN THE BOTTOM LAYER IN LIEU OF USING THE NAILED SIDE BLOCKING, PIECES MARKED ④. SEE THE DETAIL ON PAGE 17.
4. ONE KNEE BRACE ASSEMBLY IS ADEQUATE FOR RETAINING A MAXIMUM LCL LOAD OF NOT MORE THAN 8,500 POUNDS.

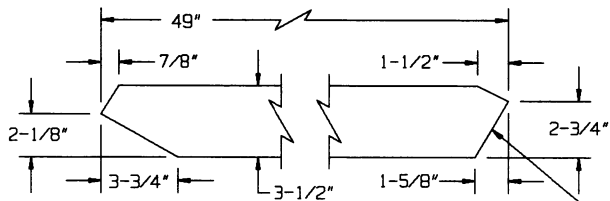
KEY NUMBERS

- ① ENDWALL/SEPARATOR GATE (1 REQD). SEE THE DETAIL ON PAGE 15. SEE SPECIAL NOTE 2 AT LEFT.
- ② UNITIZING STRAP, 1-1/4" X .035" OR .031" X 14'-0" LONG STEEL STRAPPING (4 REQD). INSTALL THROUGH THE FORK POCKET OF THE BOTTOM CONTAINER AND TO ENCIRCLE A STACK OF TWO CONTAINERS. SEE THE "UNITIZATION PROCEDURES" ON PAGE 4.
- ③ SEAL FOR 1-1/4" STEEL STRAPPING (8 REQD, 2 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE "END-OVER-END LAP JOINT" DETAILS ON PAGE 5.
- ④ SIDE BLOCKING, 2" X 6" X 24" (TRIPLED) (4 REQD). POSITION AT THE END OF A FORK POCKET AND TO EXTEND TOWARD THE ADJACENT END OF THE CONTAINER. NAIL THE FIRST PIECE TO THE CAR FLOOR W/6-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST AND THE THIRD PIECE TO THE SECOND IN A LIKE MANNER. SEE SPECIAL NOTE 3 AT LEFT.
- ⑤ KNEE BRACE ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 13 FOR CONSTRUCTION SPECIFICATIONS AND NAILING REQUIREMENTS.



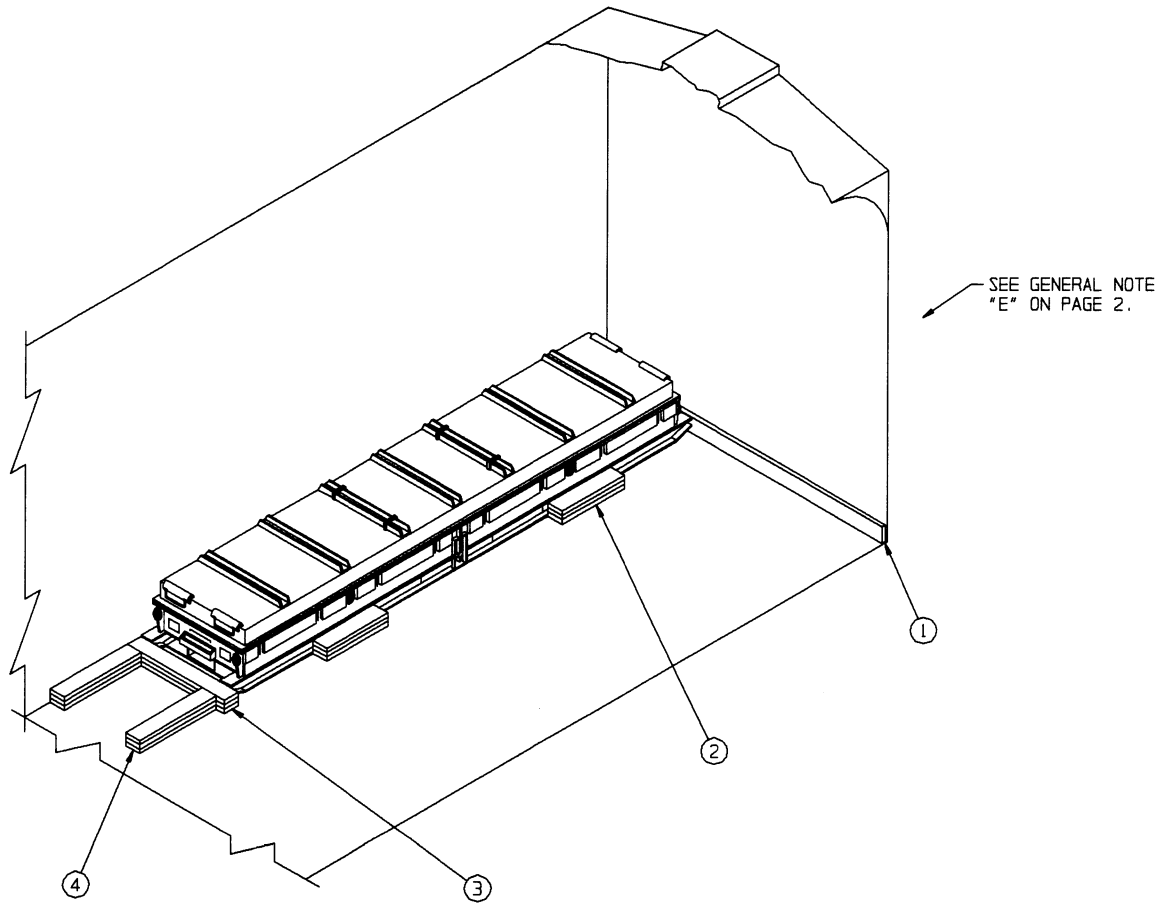
KEY LETTERS

- (A) VERTICAL PIECE, 2" X 6" X 38" (2 REQD). NAIL TO THE FLOOR CLEAT, PIECE MARKED (E), W/2-16d NAILS. SEE GENERAL NOTES "J" AND "K" ON PAGE 2.
- (B) LOAD BEARING PIECE, 2" X 6" X 35" (2 REQD). NAIL TO THE VERTICAL PIECES, PIECE MARKED (A), W/3-10d NAILS AT EACH JOINT.
- (C) SUPPORT BLOCK, 2" X 6" X 10" (TRIPLED) (2 REQD). POSITION IN CONTACT WITH PIECE MARKED (B) AND NAIL THE FIRST PIECE TO A VERTICAL PIECE, PIECE MARKED (A), W/5-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST AND THE THIRD PIECE TO THE SECOND IN A LIKE MANNER.
- (D) SUPPORT PIECE, 2" X 4" X 35" (1 REQD). NAIL TO THE SUPPORT BLOCK, PIECE MARKED (C), W/3-10d NAILS AT EACH JOINT.
- (E) FLOOR CLEAT, 2" X 6" X 6'-0" (2 REQD). NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8". SEE GENERAL NOTE "R" ON PAGE 3.
- (F) HOLD-DOWN CLEAT, 2" X 6" X 12" (2 REQD). NAIL TO THE VERTICAL PIECE, PIECE MARKED (A), W/5-10d NAILS.
- (G) POCKET CLEAT, 2" X 6" X 12" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE FLOOR CLEAT, PIECE MARKED (E), W/5-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. TOENAIL TO THE VERTICAL PIECE W/2-16d NAILS.
- (H) BRACE, 4" X 4" X 49" (2 REQD). SEE THE DETAIL AT LEFT FOR BEVEL CUTS REQUIRED. TOENAIL TO THE VERTICAL PIECE AND FLOOR CLEAT, PIECES MARKED (A) AND (E), W/2-16d NAILS AT EACH JOINT.
- (J) BACK-UP CLEAT, 2" X 6" X 30" (2 REQD). NAIL TO THE FLOOR CLEAT, PIECE MARKED (E), W/6-40d NAILS.



BRACE
4" X 4" MATERIAL

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



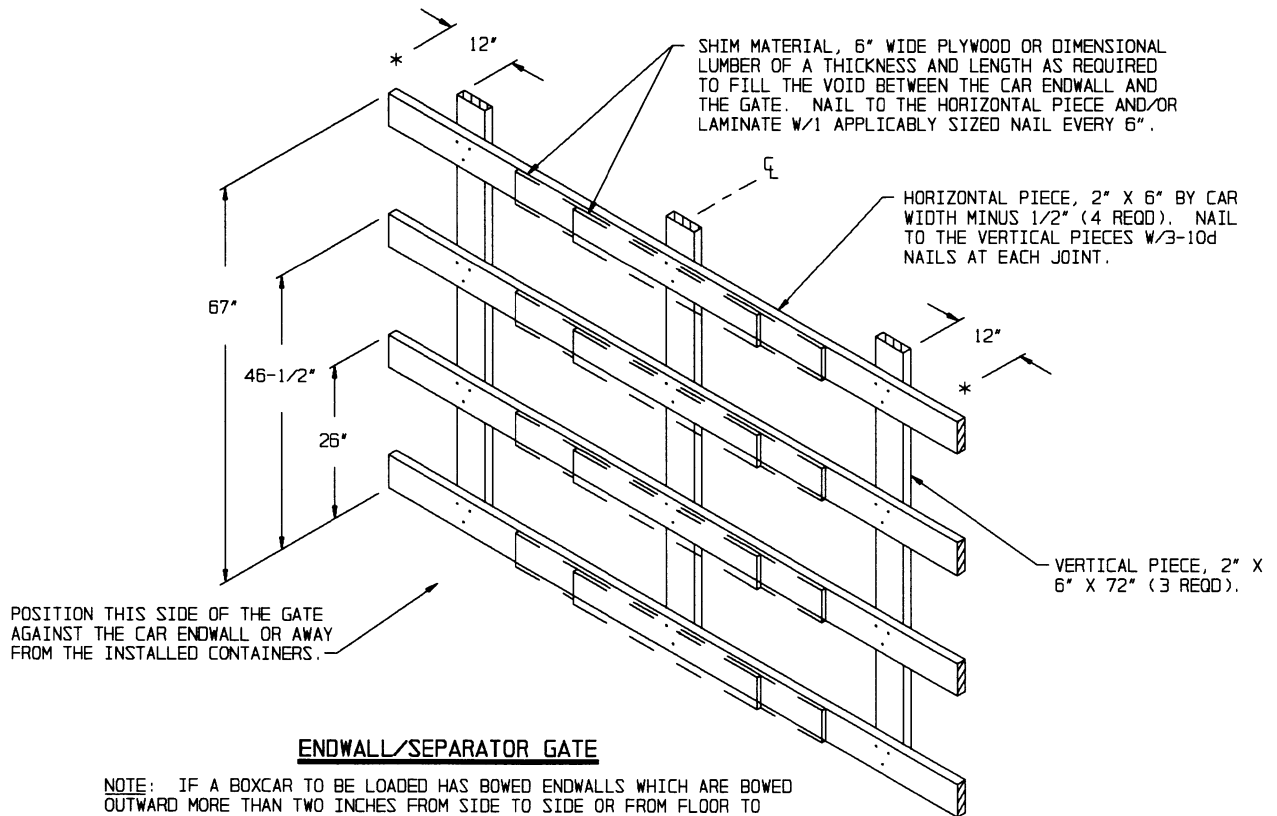
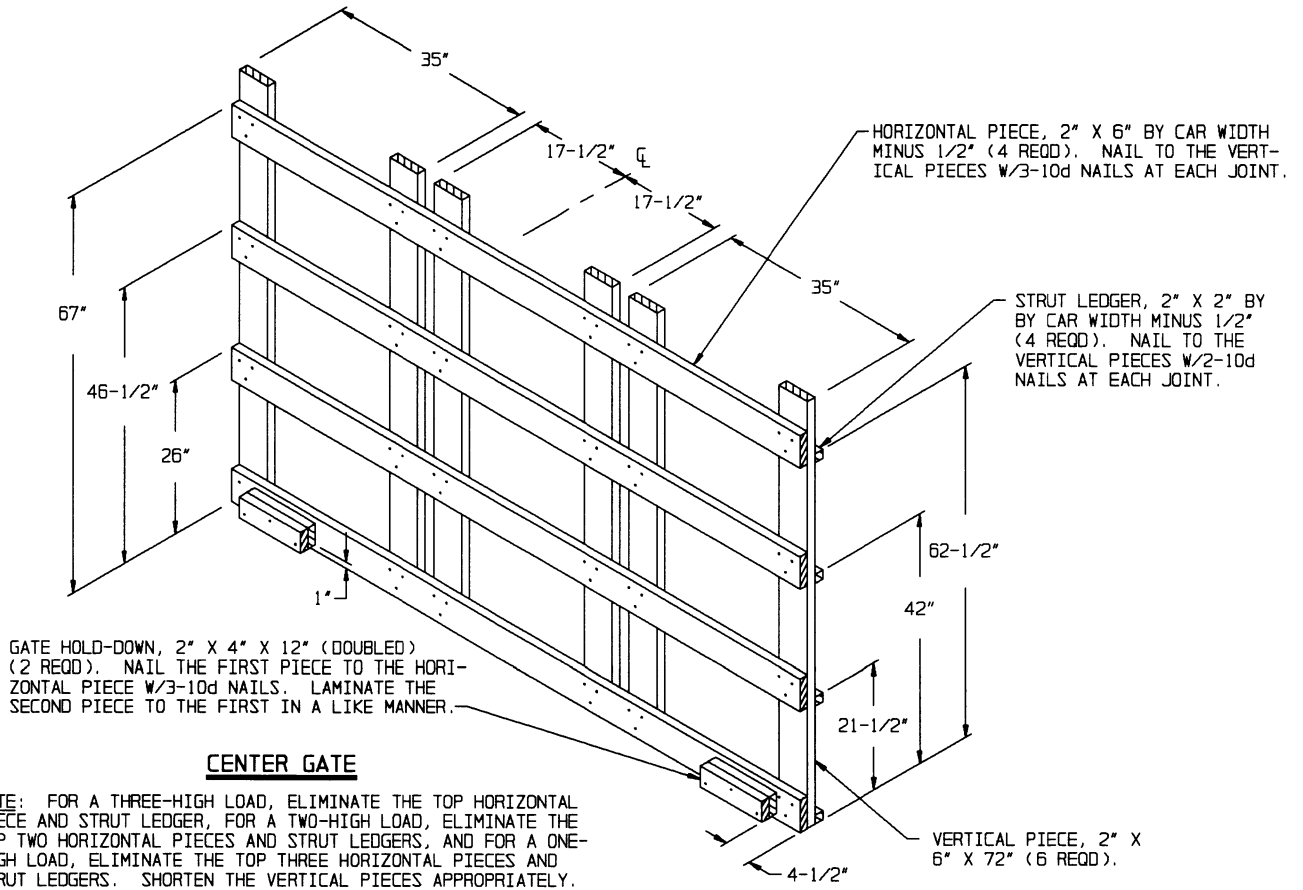
ISOMETRIC VIEW

SPECIAL NOTES:

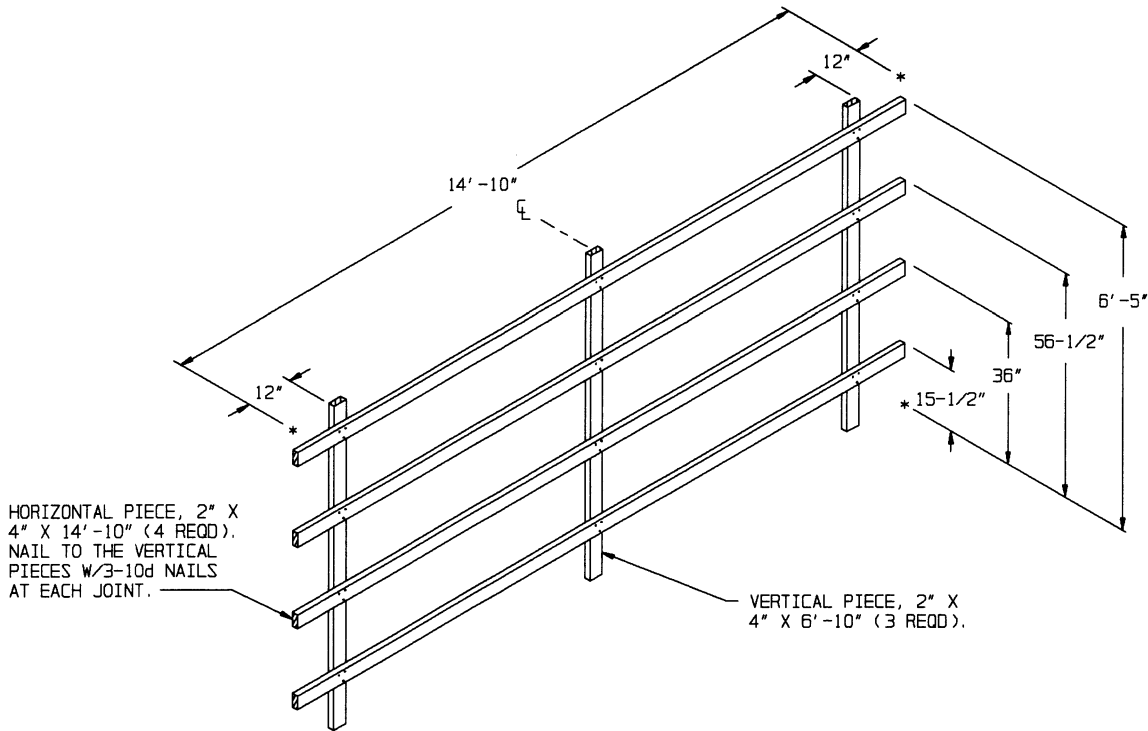
1. A 9'-2" WIDE CONVENTIONAL BOXCAR IS SHOWN. CARS OF OTHER DIMENSIONS CAN BE USED.
2. THE PROCEDURES SHOWN ARE ONLY FOR USE IN BOXCARS HAVING WOODEN OR NAILABLE METAL FLOORS. SEE GENERAL NOTE "R" ON PAGE 3.
3. IF THE CAR TO BE LOADED HAS NAILABLE ENDWALLS, THE ENDWALL BEARING PIECE MAY BE SHORTENED TO 38" AND NAILED TO THE ENDWALL W/4-10d NAILS.
4. THE CONTAINER MAY BE POSITIONED ANYWHERE IN THE CAR. IF THE CONTAINER IS NOT POSITIONED AGAINST THE END AND SIDEWALLS OF THE CAR, ADDITIONAL SIDE BLOCKING, HEADERS, AND/OR BACKUP CLEATS WILL BE REQUIRED, AND THE ENDWALL BEARING PIECE MAY BE ELIMINATED, DEPENDING ON THE LOCATION WITHIN THE CAR.
5. IF MORE THAN ONE CONTAINER IS TO BE TRANSPORTED, THE LOAD SHOULD BE FORMED IN ROWS, WITH THE CONTAINERS POSITIONED AGAINST OPPOSITE SIDEWALLS.
6. THE LOAD AS SHOWN IS ADEQUATE FOR RETAINING 9,000 POUNDS, OR THREE CONTAINERS, LONGITUDINALLY.

KEY NUMBERS

- ① ENDWALL BEARING PIECE, 2" X 6" BY CAR WIDTH MINUS 1" (1 REQD). POSITION BETWEEN THE CONTAINER SKIDS AND THE CAR ENDWALL. SEE SPECIAL NOTE 3 AT LEFT.
- ② SIDE BLOCKING, 2" X 6" X 24" (TRIPLED) (2 REQD). POSITION TO EXTEND FROM A FORK POCKET TOWARD THE ADJACENT END OF A CONTAINER. NAIL THE FIRST PIECE TO THE CAR FLOOR W/6-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST AND THE THIRD PIECE TO THE SECOND IN A LIKE MANNER.
- ③ HEADER, 2" X 6" X 38" (TRIPLED) (1 REQD). INSTALL AGAINST THE CONTAINER SKIDS. NAIL THE FIRST PIECE TO THE CAR FLOOR W/6-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST W/6-40d NAILS. NAIL THE THIRD PIECE TO THE SECOND IN A LIKE MANNER.
- ④ BACK-UP CLEAT, 2" X 6" X 30" (TRIPLED) (2 REQD). INSTALL AGAINST THE HEADER, PIECE MARKED ③, AND IN LINE WITH THE CONTAINER SKIDS. NAIL THE FIRST PIECE TO THE CAR FLOOR W/6-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST W/6-40d NAILS. NAIL THE THIRD PIECE TO THE SECOND IN A LIKE MANNER.

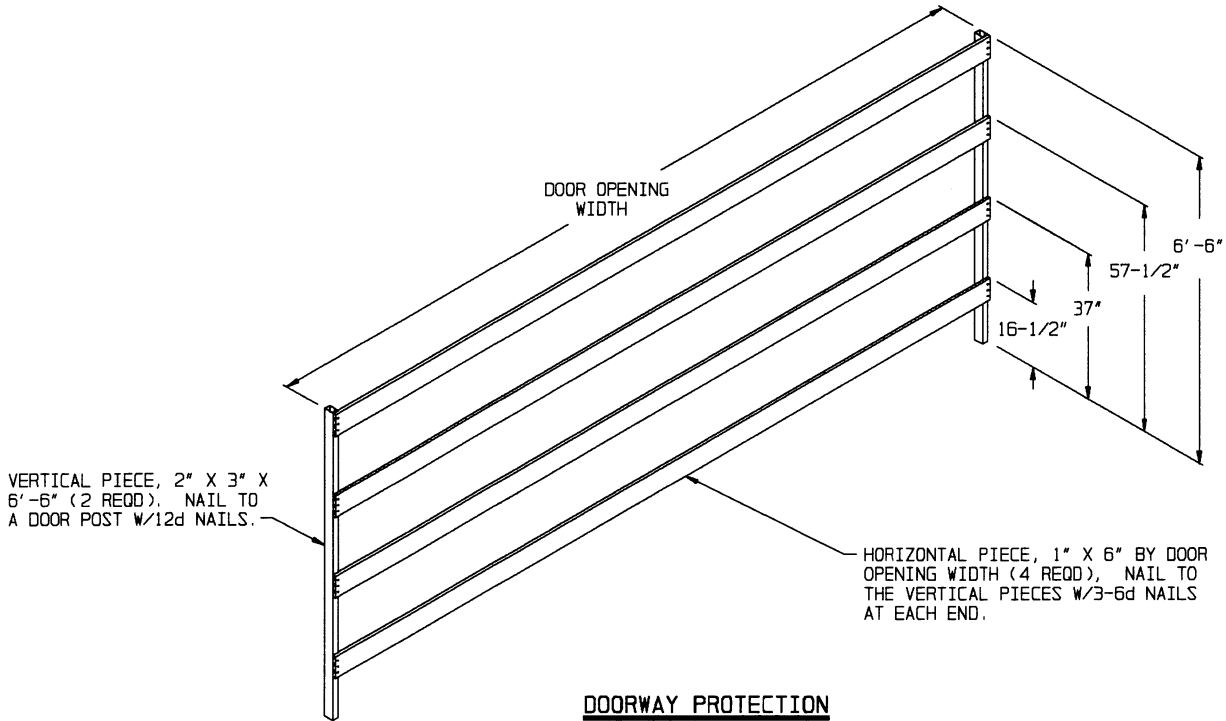


DETAILS



ANTI-CHAFING ASSEMBLY

THE ANTI-CHAFING ASSEMBLY SHOWN ABOVE IS FOR USE IN A 9'-4" WIDE CAR. FOR A 9'-2" WIDE CAR, USE 1" X 4" PIECES INSTEAD OF 2" X 4" PIECES. FOR A 9'-6" WIDE CAR, INSTALL ADDITIONAL HORIZONTAL PIECES ON THE OPPOSITE SIDE OF THE VERTICAL PIECES AT THE HEIGHTS OF THE HORIZONTAL PIECES PRESCRIBED ABOVE.

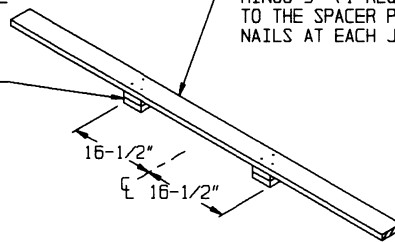


DOORWAY PROTECTION

NOTE: FOR A THREE-HIGH LOAD, ELIMINATE THE TOP HORIZONTAL PIECE, FOR A TWO-HIGH LOAD, ELIMINATE THE TOP TWO HORIZONTAL PIECES, AND FOR A ONE-HIGH LOAD, ELIMINATE THE TOP THREE HORIZONTAL PIECES. SHORTEN THE VERTICAL PIECES APPROPRIATELY.

SPACER PIECE 2" X 6" BY CUT-TO-FIT BETWEEN LATERALLY ADJACENT CONTAINERS (DOUBLED) (2 REQD). LAMINATE THE FIRST PIECE TO THE SECOND W/2-10d NAILS.

2" X 6" BY TRAILER WIDTH MINUS 3" (1 REQD). NAIL TO THE SPACER PIECES W/3-10d NAILS AT EACH JOINT.



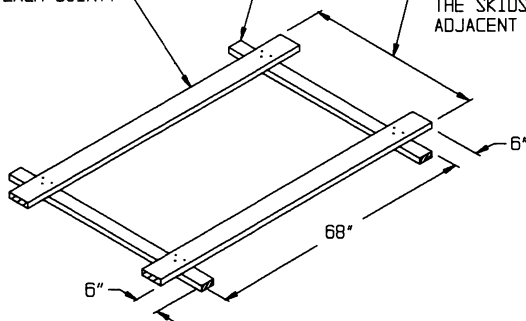
SPACER ASSEMBLY A

THIS ASSEMBLY IS FOR USE UNDER A DOORWAY PROTECTION STRAP WHICH IS INSTALLED AROUND CONTAINERS IN THE DOORWAY AREA OF A LOAD THAT HAS THREE CONTAINERS ACROSS AS SHOWN ON PAGE 8.

BUFFER PIECE, 2" X 6" X 48" (2 REQD). NAIL TO THE RETAINER PIECES W/3-10d NAILS AT EACH JOINT.

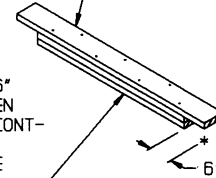
RETAINER PIECE, 2" X 4" BY A LENGTH TO SUIT (2 REQD).

FABRICATE TO FIT BETWEEN THE SKIDS OF LATERALLY ADJACENT CONTAINERS.



ANTI-SWAY BRACE

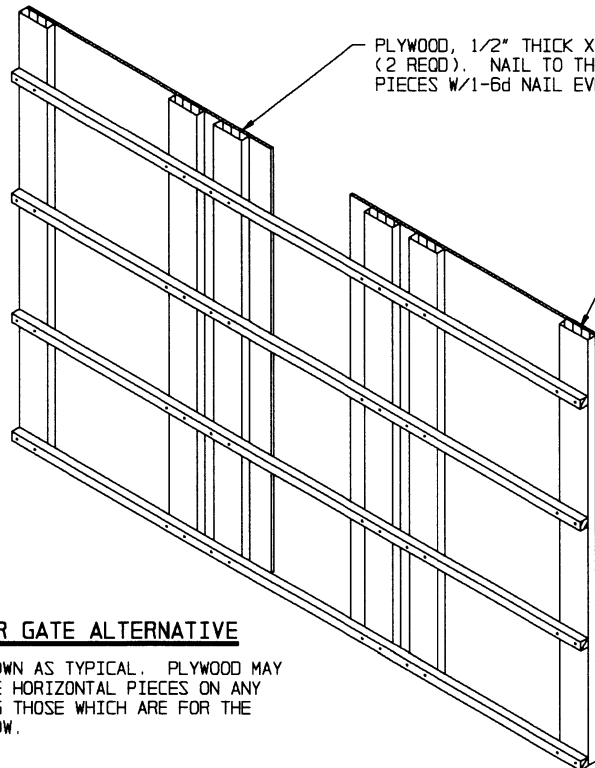
RETAINER PIECE, 2" X 6" BY LENGTH TO SUIT (1 REQD). CENTER ON THE SPACER PIECE AND NAIL W/7-10d NAILS.



SPACER PIECE, 2" X 6" BY CUT-TO-FIT BETWEEN LATERALLY ADJACENT CONTAINERS (DOUBLED) (1 REQD). LAMINATE THE FIRST PIECE TO THE SECOND W/7-10d NAILS.

SPACER ASSEMBLY B

THIS ASSEMBLY IS FOR USE UNDER A DOORWAY PROTECTION STRAP WHICH IS INSTALLED AROUND CONTAINERS IN THE DOORWAY AREA OF A LOAD WITH THE CENTER ROW OMITTED.



PLYWOOD, 1/2" THICK X 48" X 72" (2 REQD). NAIL TO THE VERTICAL PIECES W/1-6d NAIL EVERY 6".

INDICATES A CENTER GATE WITH THE HORIZONTAL PIECES OMITTED (1 REQD). SEE THE "CENTER GATE" DETAIL ON PAGE 15 FOR LOCATION OF THE VERTICAL PIECES, STRUT LEDGERS, AND GATE HOLD-DOWN PIECES.

PLYWOOD CENTER GATE ALTERNATIVE

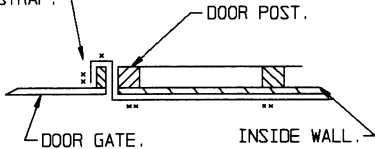
THE CENTER GATE IS SHOWN AS TYPICAL. PLYWOOD MAY BE USED IN LIEU OF THE HORIZONTAL PIECES ON ANY CENTER GATE, INCLUDING THOSE WHICH ARE FOR THE BRACING OF A SINGLE ROW.

DETAILS

HORIZONTAL PIECE, 1" X 6" BY DOOR OPENING WIDTH (1 REQD PER LAYER). NAIL TO THE VERTICAL PIECES W/3-6d NAILS AT EACH END. SEE THE "DOORWAY PROTECTION" DETAIL ON PAGE 16 FOR HEIGHT LOCATIONS.

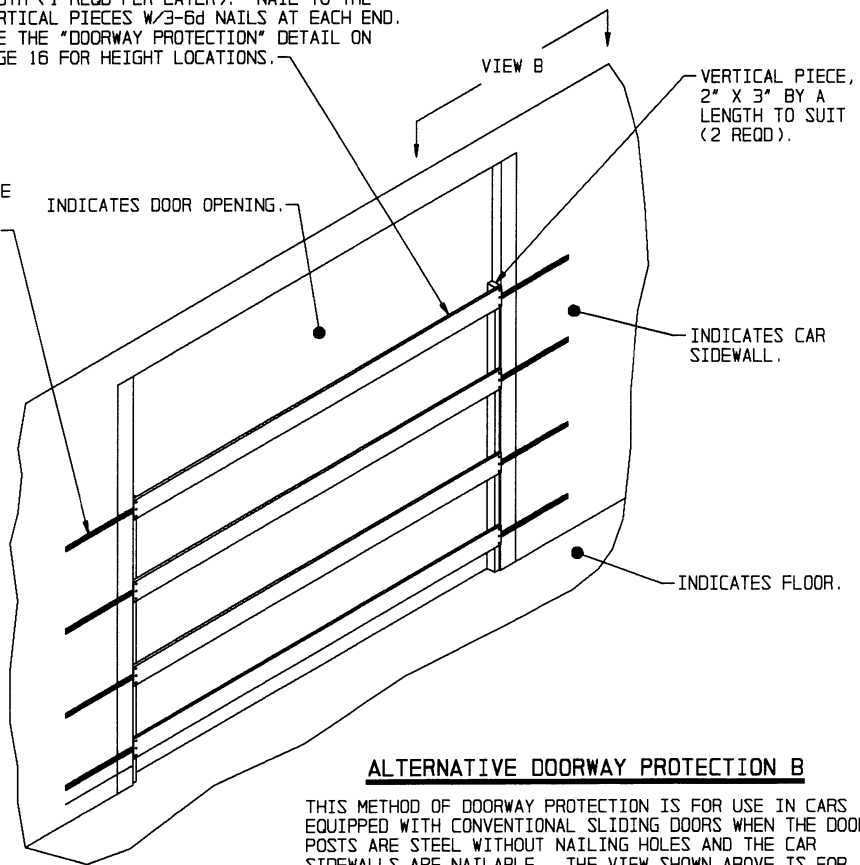
DOORWAY PROTECTION-GATE STRAP, 1-1/4" X .035" X 3'-0" (REF) NAIL-ON TYPE STEEL STRAPPING (2 REQD PER LAYER OF LOAD). NAIL TO GATE AND CAR SIDEWALL AS SHOWN IN "VIEW B" BELOW. NOTE THAT TYPE 1 STRAPPING MAY BE PUNCHED FOR NAILING IF TYPE 2 STRAPPING IS NOT AVAILABLE.

INDICATES LOCATION OF 7 (MIN) 4d NAILS PER STRAP.



VIEW B

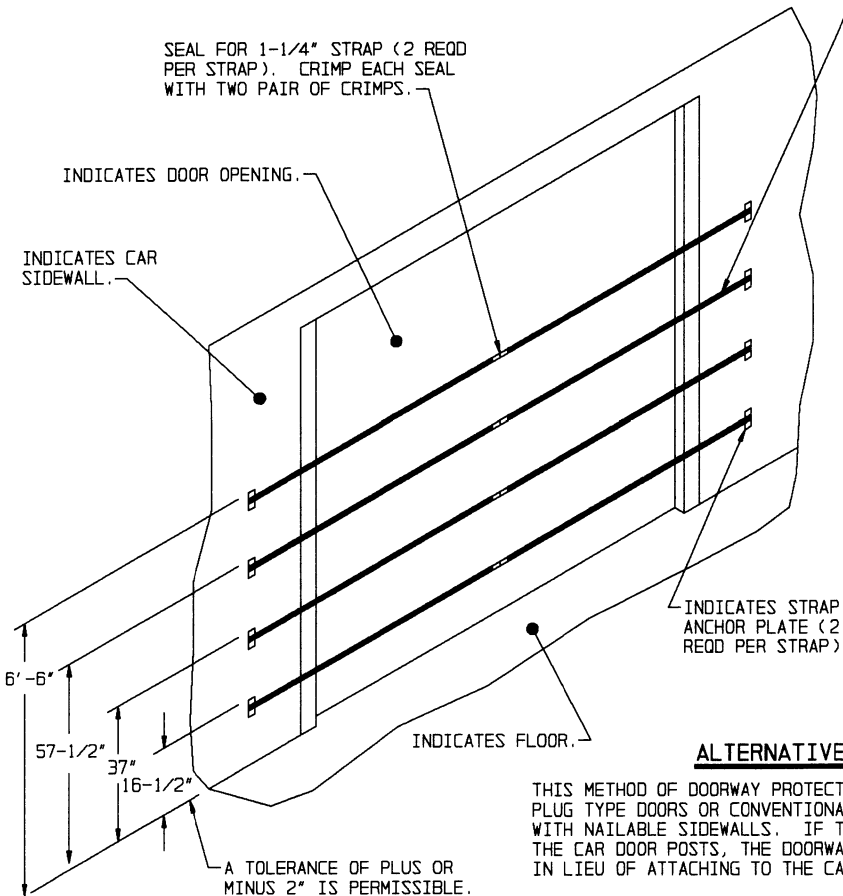
THIS VIEW DEPICTS THE LOCATION OF THE NAILS FOR SECURING THE DOORWAY PROTECTION GATE STRAP. NOTE THAT THE STRAPS MUST BE APPLIED TO THE CAR SIDEWALL PRIOR TO POSITIONING THE ADJACENT UNITS.



ALTERNATIVE DOORWAY PROTECTION B

THIS METHOD OF DOORWAY PROTECTION IS FOR USE IN CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS WHEN THE DOOR POSTS ARE STEEL WITHOUT NAILING HOLES AND THE CAR SIDEWALLS ARE AVAILABLE. THE VIEW SHOWN ABOVE IS FOR A FOUR-LAYER LOAD.

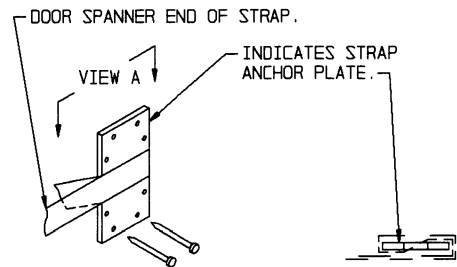
SEAL FOR 1-1/4" STRAP (2 REQD PER STRAP). CRIMP EACH SEAL WITH TWO PAIR OF CRIMPS.



ALTERNATIVE DOORWAY PROTECTION C

THIS METHOD OF DOORWAY PROTECTION MAY BE USED 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.

DOORWAY PROTECTION STRAP, 1-1/4" X .035" OR .031" STEEL STRAPPING BY DOOR OPENING WIDTH PLUS 8'-0" IN LENGTH (1 REQD PER LAYER). INSTALL FROM TWO PIECES. THREAD ONE END THRU A STRAP ANCHOR PLATE AS SHOWN BY THE "APPLICATION OF STRAPPING TO STRAP ANCHOR PLATE" DETAILS BELOW. NAIL STRAP ANCHOR PLATE TO CAR SIDEWALL W/4 SIGNODE MICRO-LOCK NAILS.



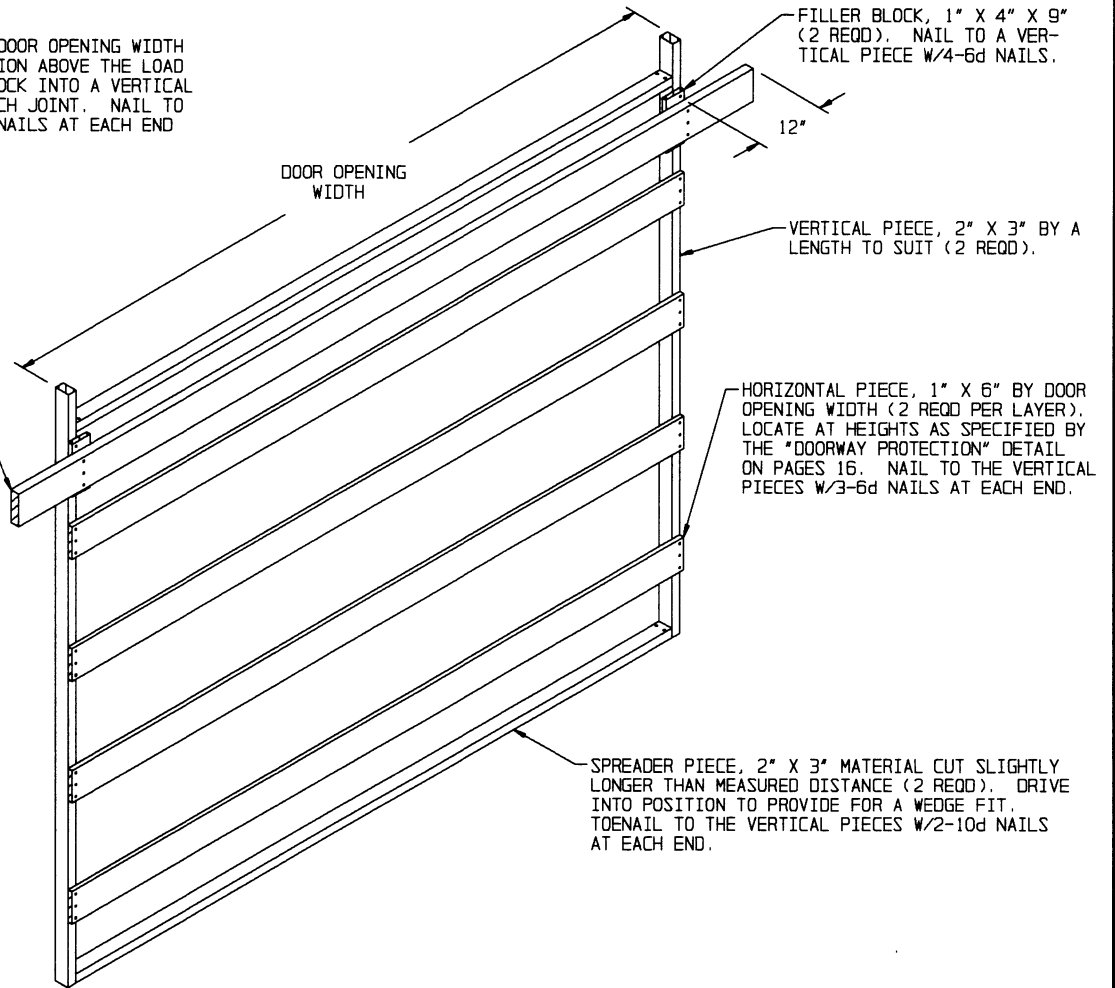
ISOMETRIC VIEW

VIEW A

APPLICATION OF STRAPPING TO STRAP ANCHOR PLATE

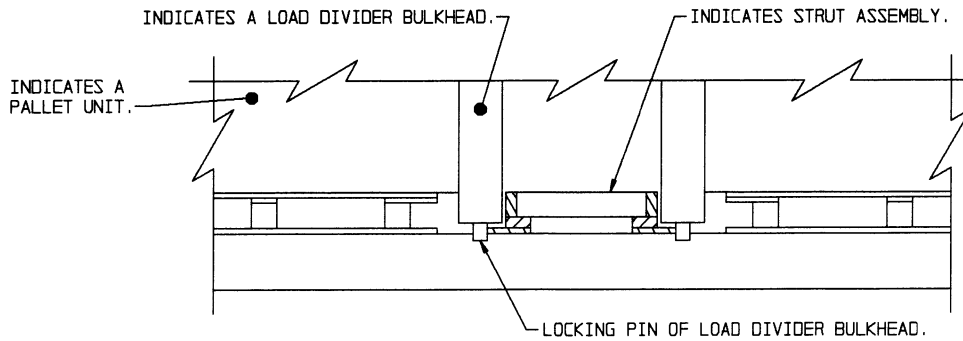
THESE VIEWS DEPICT THE PROPER THREADING OF A DOORWAY PROTECTION STRAP THRU AN ANCHOR PLATE.

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).



ALTERNATIVE DOORWAY PROTECTION C

THIS METHOD OF DOORWAY PROTECTION 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 "ALTERNATIVE DOORWAY PROTECTION B" DETAIL ON PAGE 18 FOR GUIDANCE.

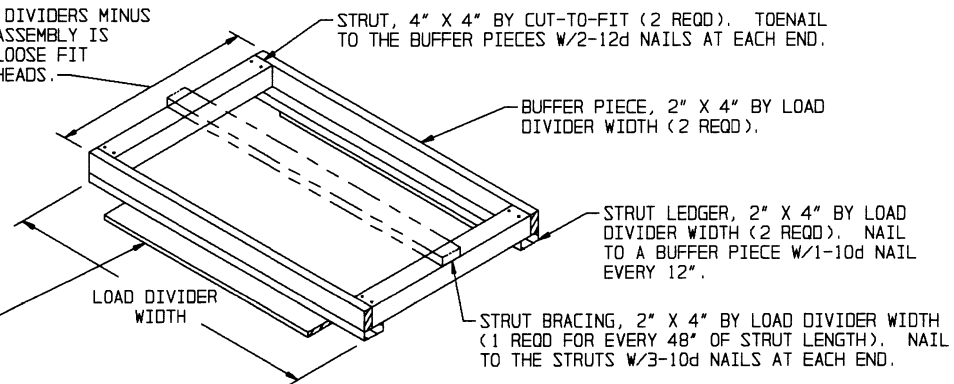


INSTALLATION OF STRUT ASSEMBLY

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

FABRICATE TO FIT BETWEEN LOAD DIVIDERS MINUS 1/2" TO 3/4". CAUTION: THE ASSEMBLY IS INTENTIONALLY DESIGNED FOR A LOOSE FIT BETWEEN THE LOAD DIVIDER BULKHEADS.

HOLD DOWN, 1" X 8" BY CUT-TO-FIT BETWEEN LOCKING PINS AT EACH SIDE OF THE LOAD DIVIDER (2 REQD). NAIL TO THE STRUT LEDGER W/1-6d NAIL EVERY 12".

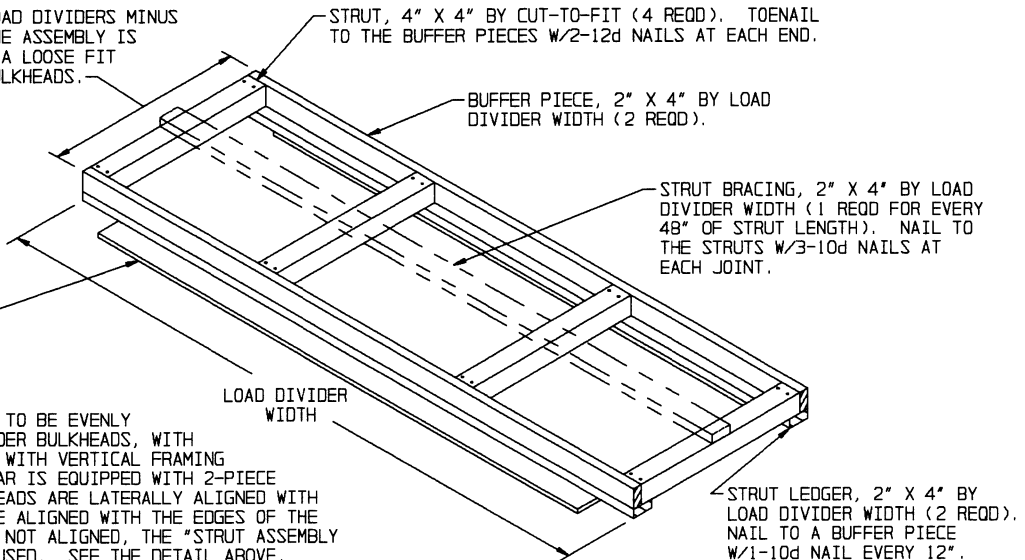


STRUT ASSEMBLY FOR 2-PIECE BULKHEADS

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

FABRICATE TO FIT BETWEEN LOAD DIVIDERS MINUS 1/2" TO 3/4". CAUTION: THE ASSEMBLY IS INTENTIONALLY DESIGNED FOR A LOOSE FIT BETWEEN THE LOAD DIVIDER BULKHEADS.

HOLD DOWN, 1" X 8" BY CUT-TO-FIT BETWEEN LOCKING PINS AT EACH SIDE OF THE LOAD DIVIDER (2 REQD). NAIL TO THE STRUT LEDGER W/1-6d NAIL EVERY 12".

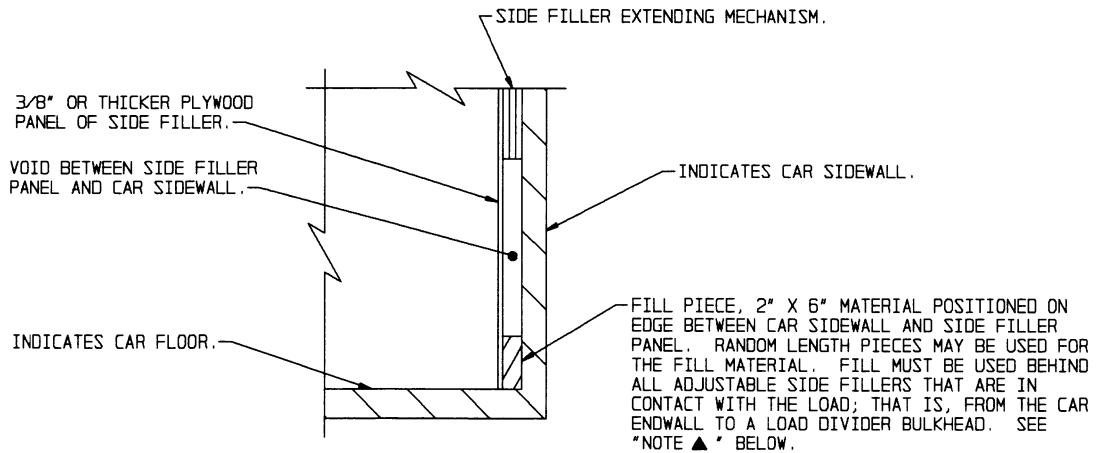


NOTE ▲:

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

STRUT ASSEMBLY FOR 1-PIECE BULKHEADS

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

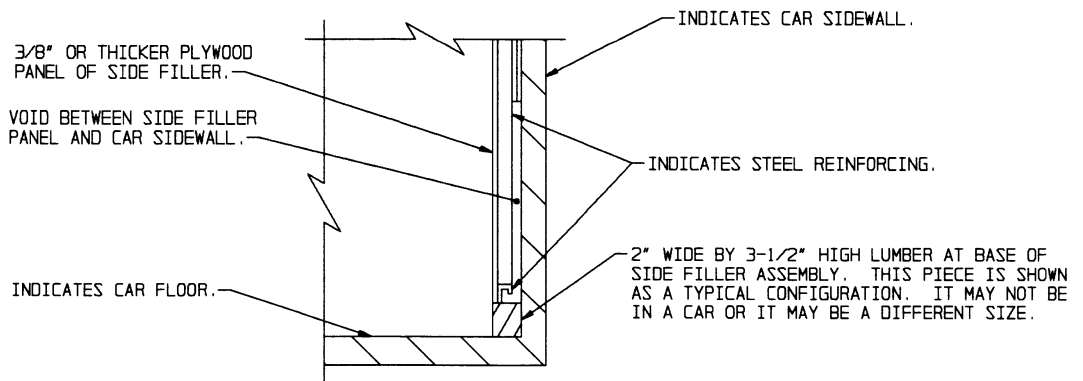


TYPICAL TYPE A

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.

