

APPROVED BY
BUREAU OF EXPLOSIVES

D M Hoody

DATE 11-21-94

LOADING AND BRACING (CL & LCL) IN BOXCARS[⊕] OF BLU-107/B (DURANDAL) WEAPONS PACKED IN CNU-381/E SHIPPING AND STORAGE CONTAINERS

INDEX

ITEM	PAGE(S)
GENERAL NOTES	2-4
MATERIAL SPECIFICATIONS	2
CONTAINER DETAIL	5
64-UNIT LOAD IN A 60'-8" LONG BY 9'-6" WIDE CONVENTIONAL BOXCAR	6,7
52-UNIT LOAD IN A 50'-6" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR	8,9
52-UNIT LOAD IN A 50'-6" LONG BY 9'-4" WIDE BOXCAR EQUIPPED WITH LOAD DIVIDER BULKHEADS	10,11
DETAILS	12-15
TYPICAL LCL PROCEDURES FOR CONVENTIONAL BOXCARS	16-21
PROVISIONS FOR BOXCARS EQUIPPED WITH LOAD DIVIDER BULKHEADS	22,23

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

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DO NOT SCALE

PROJECT SP 228-92

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 BLU-107/B (DURANDAL) WEAPONS PACKED IN CNU-381/E CONTAINER. SEE THE CONTAINER DETAIL ON PAGE 5. SUBSEQUENT REFERENCE TO CONTAINER MEANS THE CNU-381/E CONTAINER WITH CONTENTS.
- 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 THE BLU-107/B DURANDAL WEAPONS 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. 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 14 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. NOTICE: DUE TO THE LENGTH OF THE DURANDAL CONTAINER, THE DOORS ON THE SIDE OPPOSITE THE LOADING SIDE OF THE CAR MUST BE OPEN DURING LOADING AND/OR UNLOADING OPERATIONS. THIS WILL ALLOW THE CONTAINER END TO PROTRUDE THRU THE OPPOSITE DOOR OPENING DURING THE TURNING OF THE CONTAINER FOR POSITIONING CROSSWISE IN THE ENDS OF THE CAR, OR FOR REMOVAL.
- G. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN CARS WHICH ARE PARTIALLY LOADED WITH BLU-107/B DURANDAL WEAPONS 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.
- 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 15 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.

(CONTINUED ON PAGE 3)

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MATERIAL SPECIFICATIONS

- LUMBER - - - - - : SEE TM 743-200-1 (DUNNAGE LUMBER) AND FED SPEC MM-L-751.
- NAILS - - - - - : FED SPEC FF-N-105; COMMON.
- STRAPPING, STEEL - - : ASTM D3953; FLAT STRAPPING, TYPE 1 OR 2, 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.

GENERAL NOTES

(FOR CONVENTIONAL TYPE BOXCARS)

- Q. 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.
- R. NOTICE: WHEN POSITIONING CONTAINERS IN A CAR, THEY SHOULD BE PLACED TIGHTLY AGAINST A CAR ENDWALL 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 SHOULD BE USED AGAINST THE SQUARE STOCK WHICH ENCIRCLES THE CONTAINER AND IS THE STRONG POINT OF THE CONTAINER. PADDING, OF 2" THICK LUMBER OR ANY OTHER MATERIAL OF SIMILAR CONSISTENCY, SHOULD BE PLACED BETWEEN THE JACK AND THE LADING.
- S. 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 ④ AND ⑤ 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.
- T. 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 15 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.
- U. WHERE 2" X 2" PIECES ARE SPECIFIED FOR STRUT LEDGERS, 2" X 4" MATERIAL MAY BE SUBSTITUTED, IF DESIRED.
- V. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTIONS WHICH ARE IMMEDIATELY ADJACENT TO THE DEPICTED OUTLOADING METHODS.

GENERAL NOTES

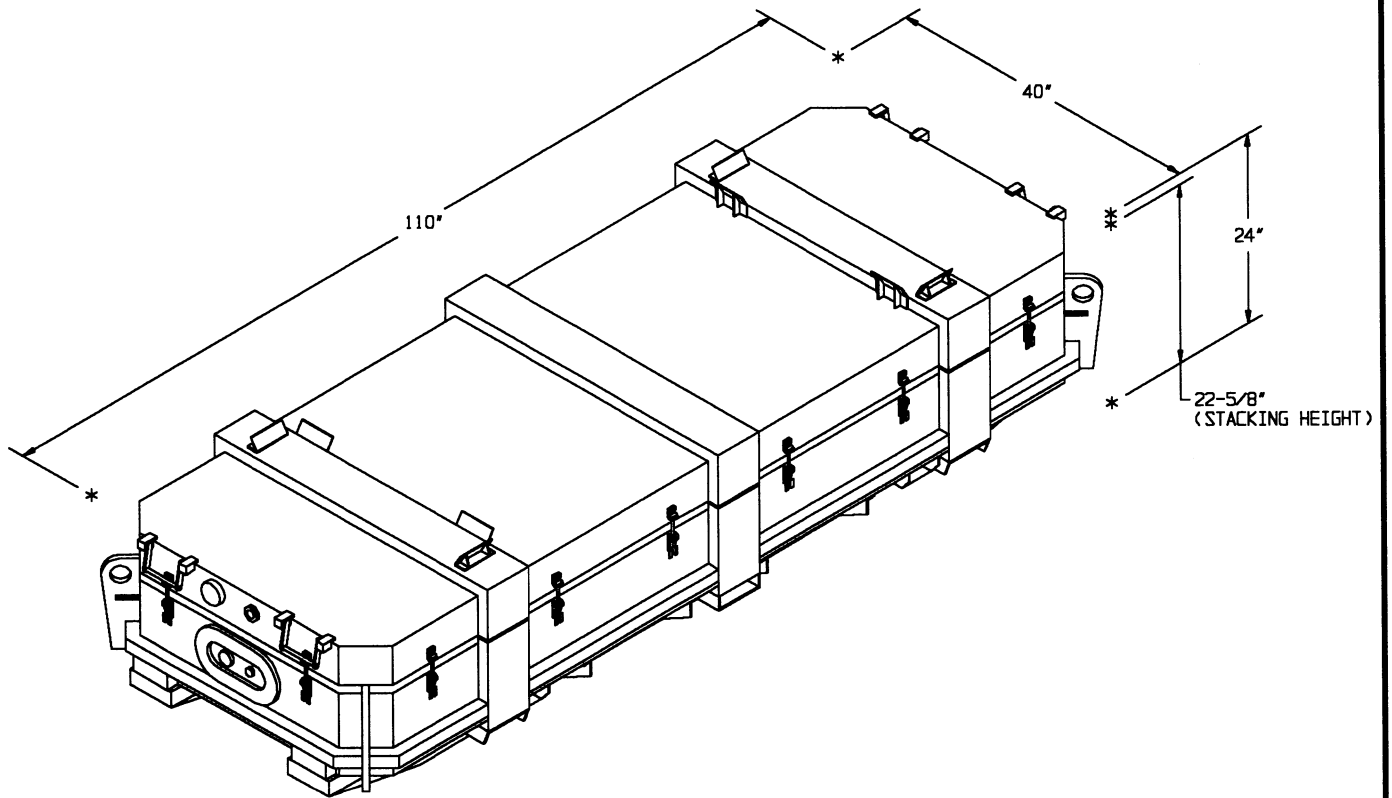
(FOR CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS)

- AA. **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.
- BB. 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 DURANDAL WEAPONS. **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.
- CC. 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 23 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 23, THE "FILL PIECE" MATERIAL IS NOT REQUIRED.
- DD. **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.
- EE. A "STRUT ASSEMBLY" MUST BE INSTALLED BETWEEN THE LOAD DIVIDER BULKHEADS IF THE CAR CONTAINS HAZARD CLASS AND DIVISION 1.1, 1.2, OR 1.3 EXPLOSIVES AND THE LOAD IN EITHER END OF THE CAR WEIGHS 50,000 POUNDS OR MORE. A STRUT ASSEMBLY IS NOT REQUIRED FOR LOADS OF HAZARD CLASS AND DIVISION 1.4 EXPLOSIVES. NOTE THAT THE STRUT ASSEMBLY MAY BE OMITTED FROM LOADS OF HAZARD CLASS AND DIVISION 1.1, 1.2, OR 1.3 EXPLOSIVES WEIGHING 50,000 POUNDS WHEN THE LADING AND ADEQUATE BLOCKING AND BRACING ARE POSITIONED TO COMPLETELY FILL THE SPACE BETWEEN THE INSTALLED BULKHEADS AS SPECIFIED IN GENERAL NOTE "FF-3" AT RIGHT. DETAILS OF STRUT ASSEMBLIES FOR USE BETWEEN 2-PIECE BULKHEADS AND BETWEEN 1-PIECE BULKHEADS ARE SHOWN ON PAGE 22.

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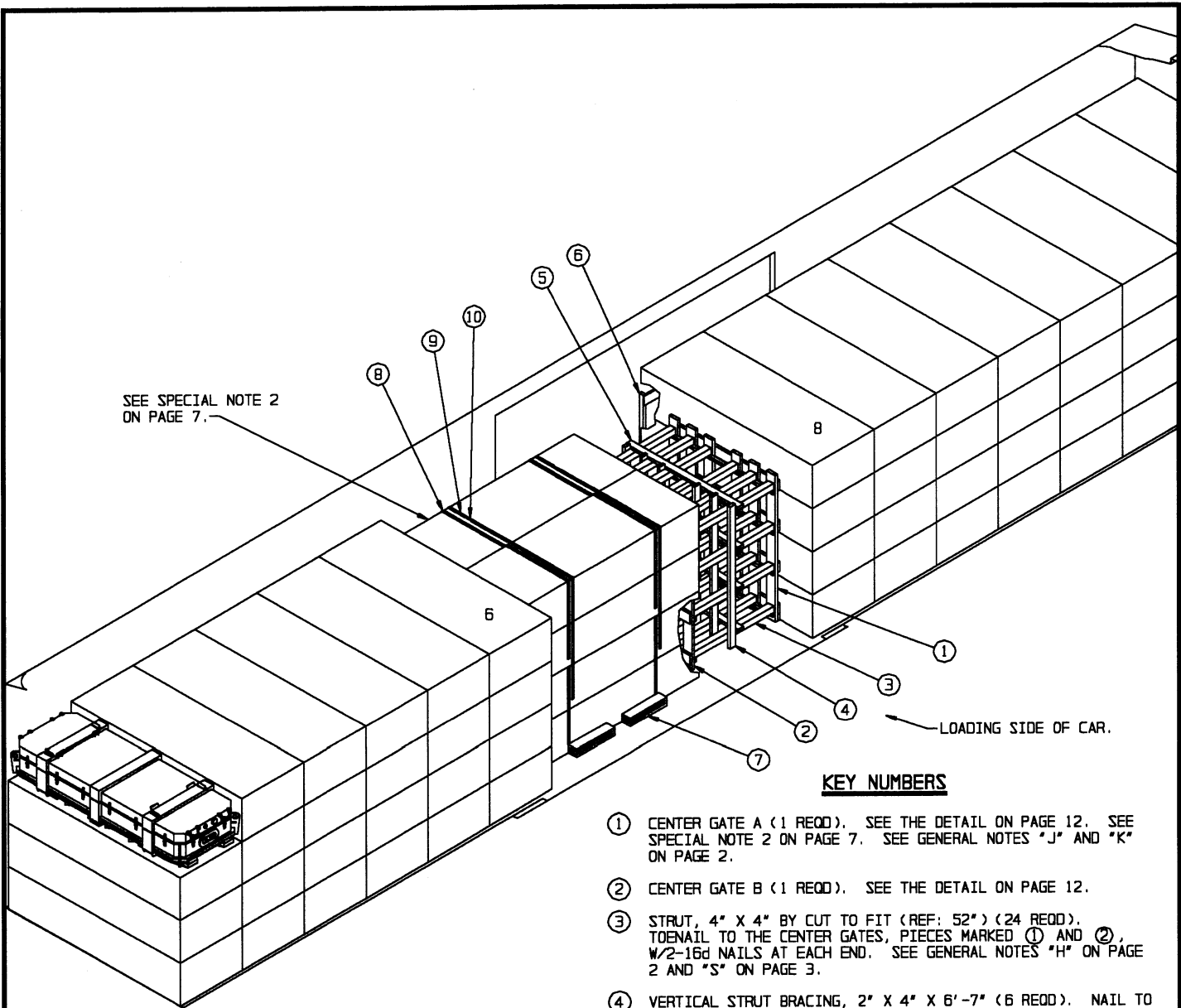
(GENERAL NOTES CONTINUED)

- FF. 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 METHOD OF OMITTING A CONTAINER DEPICTED ON PAGE 16 MAY BE USED TO ADJUST A LOAD QUANTITY DOWNWARD BY OTHER THAN A MULTIPLE OF A LOAD UNIT.
 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, TWO-HIGH, OR THREE-HIGH LOADING PATTERN. INSTALL CENTER GATES AND STRUTS AS SHOWN ON PAGE 6 OR 8 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 LCL BRACES AS SHOWN ON PAGE 17 OR WITH KNEE BRACE ASSEMBLIES, AS SHOWN ON PAGE 18.
- GG. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTION WHICH IS IMMEDIATELY ADJACENT TO THE DEPICTED OUTLOADING METHOD. SEE PAGE 11.



CNU-381/E CONTAINER DETAILS

CUBE ----- 61.1 CUBIC FEET (APPROX)
 GROSS WEIGHT ----- 2,050 POUNDS (APPROX)



SEE SPECIAL NOTE 2
ON PAGE 7.

ISOMETRIC VIEW

KEY NUMBERS

- ① CENTER GATE A (1 REQD). SEE THE DETAIL ON PAGE 12. SEE SPECIAL NOTE 2 ON PAGE 7. SEE GENERAL NOTES "J" AND "K" ON PAGE 2.
- ② CENTER GATE B (1 REQD). SEE THE DETAIL ON PAGE 12.
- ③ STRUT, 4" X 4" BY CUT TO FIT (REF: 52") (24 REQD). TOENAIL TO THE CENTER GATES, PIECES MARKED ① AND ②, W/2-16d NAILS AT EACH END. SEE GENERAL NOTES "H" ON PAGE 2 AND "S" ON PAGE 3.
- ④ VERTICAL STRUT BRACING, 2" X 4" X 6'-7" (6 REQD). NAIL TO THE STRUTS, PIECES MARKED ③, W/3-10d NAILS AT EACH JOINT. SEE GENERAL NOTE "T" ON PAGE 3.
- ⑤ HORIZONTAL STRUT BRACING, 2" X 4" X 72" (4 REQD). NAIL TO THE STRUTS, PIECES MARKED ③, W/3-10d NAILS AT EACH JOINT.
- ⑥ DOORWAY PROTECTION (1 REQD). SEE THE DETAIL ON PAGE 13. NAIL TO THE DOORPOSTS W/12d NAILS. SEE SPECIAL NOTE 3 ON PAGE 7.
- ⑦ DOORWAY SIDE BLOCKING, 2" X 6" X 24" (TRIPLED) (4 REQD). POSITION AGAINST FORK OPENING OF THE CONTAINER, CENTERED BETWEEN CHANNELS ON BOTTOM OF CONTAINER, AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/4-16d NAILS. NAIL EACH ADDITIONAL PIECE TO THE FIRST IN A LIKE MANNER.
- ⑧ UNITIZING STRAP, 1-1/4" X .035" OR .031" X 15'-6" LONG STEEL STRAPPING (8 REQD). INSTALL TO UNITIZE TWO LENGTHWISE-POSITIONED CONTAINERS. POSITION STRAPPING THRU THE STRUCTURAL CHANNEL NEXT TO THE SKID OF A LOWER CONTAINER AND EXTEND AROUND THE CONTAINERS. SEE SPECIAL NOTE 5 ON PAGE 7.
- ⑨ BUNDLING STRAP, 1-1/4" X .035" OR .031" X 26'-0" LONG STEEL STRAPPING (2 REQD). INSTALL TO ENCIRCLE THE TOP THREE LAYERS OF LENGTHWISE CONTAINERS. POSITION STRAPPING THRU THE STRUCTURAL CHANNEL NEXT TO THE SKID OF THE SECOND-LAYER CONTAINER AND EXTEND AROUND THE TOP THREE LAYERS OF CONTAINERS.
- ⑩ SEAL FOR 1-1/4" STEEL STRAPPING (20 REQD, 2 PER STRAP). SEE GENERAL NOTE "L" ON PAGE 2 AND THE "END-OVER-END LAP JOINT DETAILS" ON PAGE 15.

LOADING SIDE OF CAR.

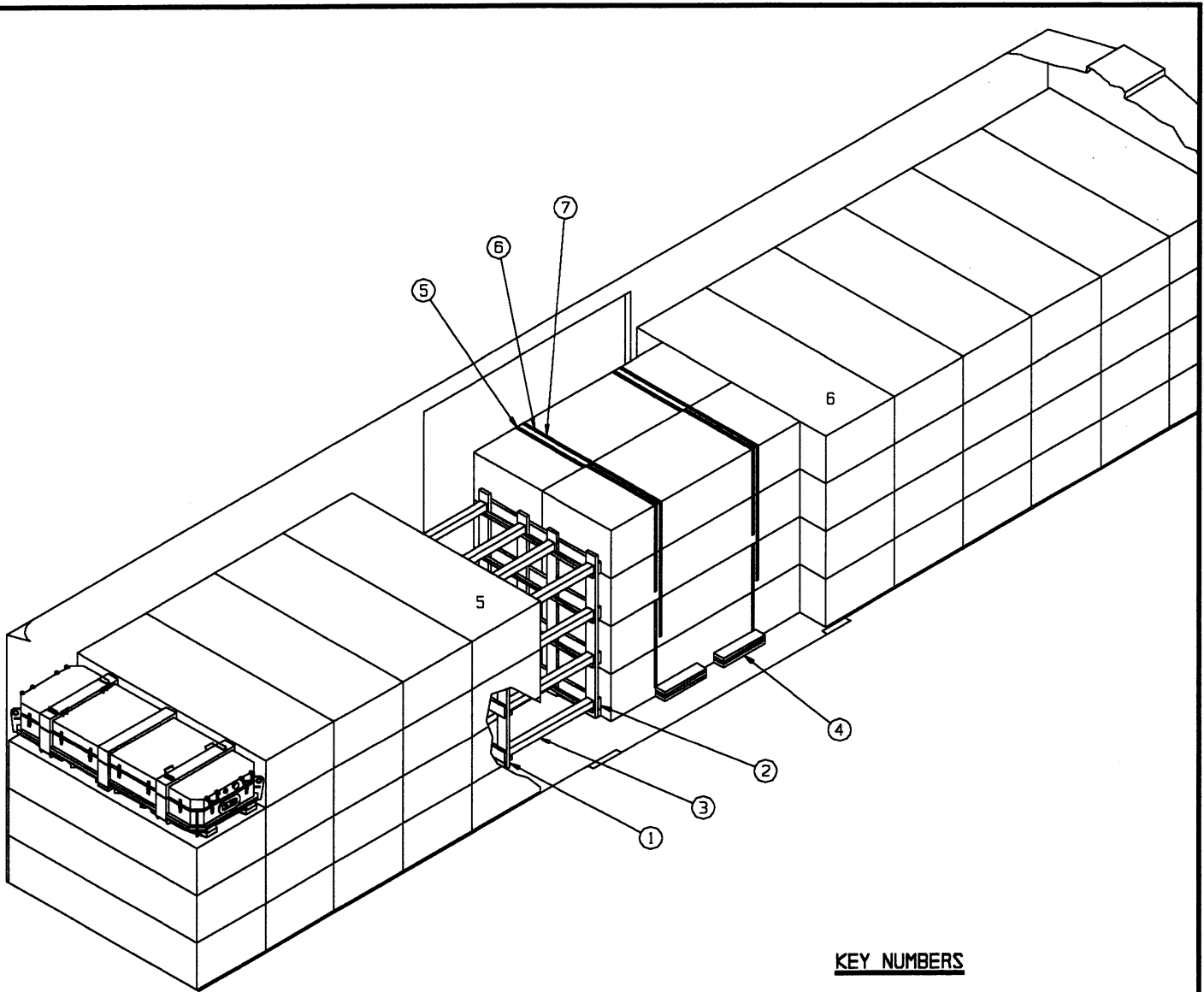
SPECIAL NOTES:

1. A 64-UNIT LOAD IS SHOWN IN A 60'-8" LONG BY 9'-6" WIDE BOXCAR EQUIPPED WITH 15'-0" WIDE STAGGERED DOOR OPENINGS. CARS OF OTHER SIZES, 9'-4" MINIMUM WIDTH, AND CARS HAVING OTHER WIDTH DOOR OPENINGS CAN BE USED. SEE SPECIAL NOTES 3 AND 4.
2. THE CONTAINER STACK NUMBER 8 AND THE LENGTHWISE-POSITIONED CONTAINER STACKS SHOULD BOTH BE CENTERED IN THE WIDTH OF THE CAR AS NEARLY AS POSSIBLE TO PROVIDE PROPER ALIGNMENT OF CENTER GATES "A" AND "B".
3. FOR THE 15'-0" WIDE STAGGERED DOOR OPENINGS SHOWN, THE DOORWAY PROTECTION, PIECE MARKED (6), IS REQUIRED FOR THE AUXILIARY DOOR OPENING ON THE SIDE OPPOSITE THE LOADING SIDE, IF IT IS A SLIDING DOOR TYPE. IF THE AUXILIARY DOOR OPENING HAS A PLUG TYPE DOOR, THE DOORWAY PROTECTION IS NOT REQUIRED. IF THE CAR FURNISHED FOR LOADING IS EQUIPPED WITH 16'-0" WIDE THRU SLIDING DOORS, PIECES MARKED (6) WILL BE REQUIRED FOR THE RIGHT HAND DOOR OPENING ON THE LOADING SIDE OF THE CAR AND FOR THE LEFT HAND OPENING ON THE SIDE OPPOSITE THE LOADING SIDE, AS VIEWED FROM THE OUTSIDE OF THE CAR. SEE SPECIAL NOTE 6.
4. IF THE CAR FURNISHED IS EQUIPPED WITH 10'-0" WIDE THRU DOOR OPENINGS, THE LOAD PATTERN SHOULD BE CHANGED. SEVEN CONTAINER STACKS SHOULD BE LOADED IN EACH END OF THE CAR. EIGHT CONTAINERS CAN THEN BE LOADED LENGTHWISE IN THE DOORWAY AREA. THRU DOOR OPENINGS AS NARROW AS 8'-0" CAN BE USED, BUT LOADING WILL BE MORE DIFFICULT.
5. TO FACILITATE LOADING, THE LENGTHWISE CONTAINERS IN THE DOORWAY AREA SHOULD BE UNITIZED IN STACKS OF TWO CONTAINERS PRIOR TO PLACING IN THE CAR.
6. DOORWAY PROTECTION, PIECE MARKED (6), IS REQUIRED FOR ALL CROSSWISE STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OF A CAR EQUIPPED WITH SLIDING DOORS OR WHICH EXTEND INTO THE DOORWAY AREA OF THE CAR BY ONE-HALF OR MORE OF THE STACK LENGTH (CONTAINER WIDTH).
7. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED BY OMITTING ONE OR MORE CONTAINER STACKS FROM THE END PORTIONS OF THE LOAD, OR THE ENTIRE ONE, TWO, OR THREE TOP TIERS CAN BE OMITTED. ONE CONTAINER CAN BE OMITTED BY EMPLOYING THE PROCEDURES ON PAGE 16. FOR OTHER METHODS OF REDUCING A LOAD, REFER TO THE TYPICAL LCL PROCEDURES ON PAGES 17 THRU 21 FOR GUIDANCE.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
1" X 6"	28	14
2" X 2"	46	16
2" X 3"	17	9
2" X 4"	76	51
2" X 6"	151	151
4" X 4"	104	139
NAILS	NO. REQD	POUNDS
6d (2")	24	1/4
10d (3")	444	7
12d (3-1/4")	12	1/4
16d (3-1/2")	144	3-1/4
STEEL STRAPPING, 1-1/4" -- 176' REQD ----- 26 LBS		
SEAL FOR 1-1/4" STRAPPING -- 20 REQD ----- 1 LB		

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
CONTAINERS	64	131,200 LBS
DUNNAGE		798 LBS
TOTAL WEIGHT		131,998 LBS (APPROX)



ISOMETRIC VIEW

KEY NUMBERS

- ① CENTER GATE A (1 REQD). SEE THE DETAIL ON PAGE 12. SEE SPECIAL NOTE 2 ON PAGE 9. SEE GENERAL NOTES "J" AND "K" ON PAGE 2.
- ② CENTER GATE B (1 REQD). SEE THE DETAIL ON PAGE 12.
- ③ STRUT, 4" X 4" BY CUT TO FIT (REF: 50") (16 REQD). TOENAIL TO THE CENTER GATES, PIECES MARKED ① AND ②, W/2-16d NAILS AT EACH END. SEE GENERAL NOTES "H" ON PAGE 2 AND "S" ON PAGE 3.
- ④ DOORWAY SIDE BLOCKING, 2" X 6" X 24" (TRIPLED) (4 REQD). POSITION AGAINST FORK OPENING OF THE CONTAINER, CENTERED BETWEEN CHANNELS ON BOTTOM OF CONTAINER, AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/4-16d NAILS. NAIL EACH ADDITIONAL PIECE TO THE FIRST IN A LIKE MANNER.
- ⑤ UNITIZING STRAP, 1-1/4" X .035" OR .031" X 15'-6" LONG STEEL STRAPPING (8 REQD). INSTALL TO UNITIZE TWO LENGTHWISE-POSITIONED CONTAINERS. POSITION STRAPPING THRU THE STRUCTURAL CHANNEL NEXT TO THE SKID OF A LOWER CONTAINER AND EXTEND AROUND THE CONTAINERS. SEE SPECIAL NOTE 3 ON PAGE 9.
- ⑥ BUNDLING STRAP, 1-1/4" X .035" OR .031" X 26'-0" LONG STEEL STRAPPING (2 REQD). INSTALL TO ENIRCLE THE TOP THREE LAYERS OF LENGTHWISE CONTAINERS. POSITION STRAPPING THRU THE STRUCTURAL CHANNEL NEXT TO THE SKID OF THE SECOND-LAYER CONTAINER AND EXTEND AROUND THE TOP THREE LAYERS OF CONTAINERS.
- ⑦ SEAL FOR 1-1/4" STEEL STRAPPING (20 REQD, 2 PER STRAP). SEE GENERAL NOTE "L" ON PAGE 2 AND THE "END-OVER-END LAP JOINT DETAILS" ON PAGE 15.

SPECIAL NOTES:

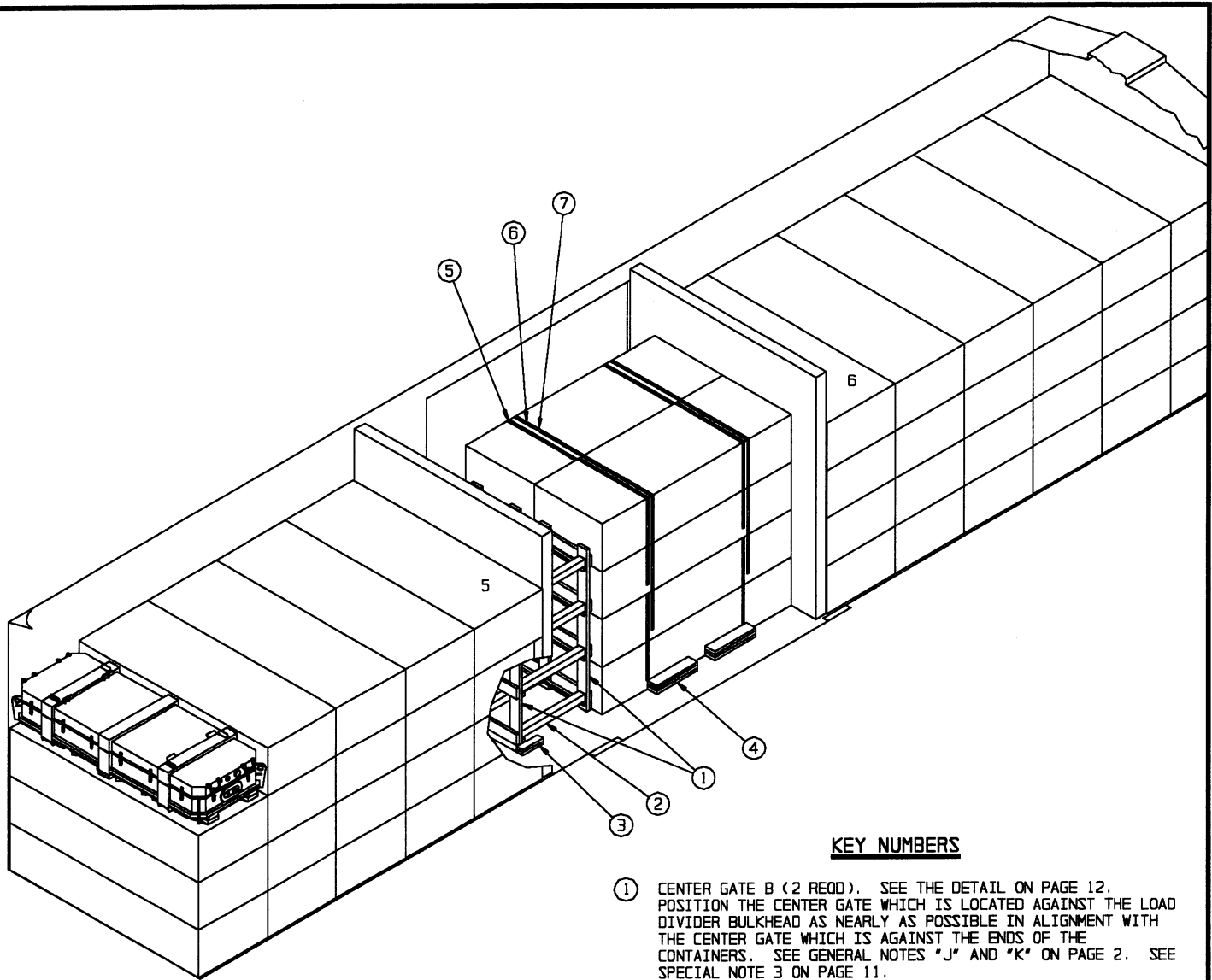
1. A 52-UNIT LOAD IS SHOWN IN A 50'-6" LONG BY 9'-4" WIDE BOXCAR EQUIPPED WITH 10'-0" WIDE THRU DOOR OPENINGS. CARS OF OTHER LENGTHS, WIDER CARS, AND CARS HAVING OTHER WIDTH DOOR OPENINGS CAN BE USED. THRU DOOR OPENINGS LESS THAN 10'-0" WIDE CANNOT BE USED.
2. THE CONTAINER STACK NUMBER 5 AND THE LENGTHWISE-POSITIONED CONTAINER STACKS SHOULD BOTH BE CENTERED IN THE WIDTH OF THE CAR AS NEARLY AS POSSIBLE TO PROVIDE PROPER ALIGNMENT OF THE CENTER GATES "A" AND "B".
3. TO FACILITATE LOADING, THE LENGTHWISE CONTAINERS IN THE DOORWAY AREA SHOULD BE UNITIZED IN STACKS OF TWO CONTAINERS PRIOR TO PLACING IN THE CAR.
4. DOORWAY PROTECTION, SHOWN AS PIECE MARKED ⑥ ON PAGE 6, IS REQUIRED FOR ALL CROSSWISE STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OF A CAR EQUIPPED WITH SLIDING DOORS OR WHICH EXTEND INTO THE DOORWAY AREA OF THE CAR BY ONE-HALF OR MORE OF THE STACK LENGTH (CONTAINER WIDTH). THIS SITUATION WOULD ONLY OCCUR IN A CAR EQUIPPED WITH STAGGERED DOOR OPENINGS. SEE THE "DOORWAY PROTECTION" DETAIL ON PAGE 13.
5. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED BY OMITTING ONE OR MORE CONTAINER STACKS FROM THE END PORTIONS OF THE LOAD. NOTE THAT STRUT BRACING WILL THEN BE REQUIRED. SEE PIECES MARKED ④ AND ⑤ ON PAGE 6 FOR GUIDANCE. OR, THE ENTIRE ONE, TWO, OR THREE TOP TIERS CAN BE OMITTED. ONE CONTAINER CAN BE OMITTED BY EMPLOYING THE PROCEDURES ON PAGE 16. FOR OTHER METHODS OF REDUCING A LOAD, REFER TO THE TYPICAL LCL PROCEDURES ON PAGES 17 THRU 21 FOR GUIDANCE.
6. IF A 40'-6" LONG CAR IS FURNISHED FOR LOADING, FORTY CONTAINERS CAN BE SHIPPED. LOADING MAY BE DIFFICULT, AND WILL BE EXTREMELY DIFFICULT IF THE DOOR OPENINGS ARE NOT AT LEAST 10'-0" WIDE. CARS WITH STAGGERED DOOR OPENINGS WOULD FACILITATE LOADING.

BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
2" X 2"	46	16
2" X 3"	4	2
2" X 4"	13	9
2" X 6"	124	124
4" X 4"	67	90
NAILS	NO. REQD	POUNDS
10d (3")	208	3-1/4
16d (3-1/2")	112	2-1/2
STEEL STRAPPING, 1-1/4" -- 176' REQD ----- 26 LBS		
SEAL FOR 1-1/4" STRAPPING -- 20 REQD ----- 1 LB		

LOAD AS SHOWN

<u>ITEM</u>	<u>QUANTITY</u>	<u>WEIGHT (APPROX)</u>
CONTAINER -----	52 -----	106,600 LBS
DUNNAGE -----	-----	515 LBS
<hr/>		
TOTAL WEIGHT -----	-----	107,115 LBS (APPROX)



ISOMETRIC VIEW

KEY NUMBERS

- ① CENTER GATE B (2 REQD). SEE THE DETAIL ON PAGE 12. POSITION THE CENTER GATE WHICH IS LOCATED AGAINST THE LOAD DIVIDER BULKHEAD AS NEARLY AS POSSIBLE IN ALIGNMENT WITH THE CENTER GATE WHICH IS AGAINST THE ENDS OF THE CONTAINERS. SEE GENERAL NOTES "J" AND "K" ON PAGE 2. SEE SPECIAL NOTE 3 ON PAGE 11.
- ② STRUT, 4" X 4" BY CUT TO FIT (REF: 38") (16 REQD). TOENAIL TO THE CENTER GATES, PIECES MARKED ①, W/2-16d NAILS AT EACH END. SEE GENERAL NOTES "H" ON PAGE 2 AND "S" ON PAGE 3.
- ③ CENTER GATE STOP PIECE, 2" X 4" X 12" (DOUBLED) (2 REQD). POSITION AGAINST THE OUTER VERTICAL PIECE OF THE CENTER GATE, PIECE MARKED ①, WHICH IS AGAINST THE LOAD DIVIDER BULKHEAD. NAIL THE FIRST PIECE TO THE CAR FLOOR W/2-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER.
- ④ DOORWAY SIDE BLOCKING, 2" X 6" X 24" (TRIPLED) (4 REQD). POSITION AGAINST FORK OPENING OF THE CONTAINER, CENTERED BETWEEN CHANNELS ON BOTTOM OF CONTAINER, AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/4-16d NAILS. NAIL EACH ADDITIONAL PIECE TO THE FIRST IN A LIKE MANNER.
- ⑤ UNITIZING STRAP, 1-1/4" X .035" OR .031" X 15'-6" LONG STEEL STRAPPING (8 REQD). INSTALL TO UNITIZE TWO LENGTHWISE-POSITIONED CONTAINERS. POSITION STRAPPING THRU THE STRUCTURAL CHANNEL NEXT TO THE SKID OF A LOWER CONTAINER AND EXTEND AROUND THE CONTAINERS. SEE SPECIAL NOTE 4 ON PAGE 11.
- ⑥ BUNDLING STRAP, 1-1/4" X .035" OR .031" X 26'-0" LONG STEEL STRAPPING (2 REQD). INSTALL TO ENCIRCLE THE TOP THREE LAYERS OF LENGTHWISE CONTAINERS. POSITION STRAPPING THRU THE STRUCTURAL CHANNEL NEXT TO THE SKID OF THE SECOND-LAYER CONTAINER AND EXTEND AROUND THE TOP THREE LAYERS OF CONTAINERS.
- ⑦ SEAL FOR 1-1/4" STEEL STRAPPING (20 REQD, 2 PER STRAP). SEE GENERAL NOTE "L" ON PAGE 2 AND THE "END-OVER-END LAP JOINT DETAILS" ON PAGE 15.

**52-UNIT LOAD IN A 50'-6" LONG BY 9'-4"
WIDE BOXCAR EQUIPPED WITH LOAD DIVIDER BULKHEADS**

SPECIAL NOTES:

1. A 52-UNIT LOAD IS SHOWN IN A 50'-6" LONG BY 9'-4" WIDE CUSHIONED BOXCAR EQUIPPED WITH LOAD DIVIDER BULKHEADS AND WITH 10'-0" WIDE THRU DOOR OPENINGS. CARS OF OTHER DIMENSIONS (9'-4" MINIMUM WIDTH) AND CARS HAVING OTHER WIDTH DOOR OPENINGS (8'-0" MINIMUM) CAN BE USED. SEE GENERAL NOTES "AA" THRU "EE" ON PAGE 4.
2. A TYPICAL LOAD IS SHOWN ON PAGE 10. A MAXIMUM OF 64 CONTAINERS FOR AN APPROXIMATE LADING WEIGHT OF 131,200 POUNDS CAN BE LOADED IN A 60'-8" LONG CAR, OR 40 CONTAINERS FOR A LADING WEIGHT OF 82,000 POUNDS CAN BE LOADED IN A 40'-6" LONG CAR, WHEN USING THE DEPICTED LOADING PROCEDURES.
3. THE CENTER GATE B, PIECE MARKED ①, WHICH IS TO BE POSITIONED AGAINST THE LOAD DIVIDER BULKHEAD, MUST HAVE THE GATE HOLD DOWN PIECES OMITTED. THE FILL PIECES ARE NOT REQUIRED AND MAY ALSO BE OMITTED, IF DESIRED.
4. TO FACILITATE LOADING, THE LENGTHWISE CONTAINERS IN THE DOORWAY AREA SHOULD BE UNITIZED IN STACKS OF TWO CONTAINERS PRIOR TO PLACING IN THE CAR.
5. IF THE CAR FURNISHED FOR LOADING IS EQUIPPED WITH 15'-0" WIDE STAGGERED DOOR OPENINGS, THE LOAD PATTERN SHOULD BE CHANGED. IN A 60'-8" LONG CAR, SIX CONTAINER STACKS SHOULD BE LOADED IN THE NEAR END OF THE CAR AND EIGHT CONTAINER STACKS CAN THEN BE LOADED IN THE OPPOSITE END OF THE CAR, ALONG WITH THE EIGHT LENGTHWISE CONTAINERS IN THE DOORWAY AREA. IN A 40'-6" LONG CAR WITH 15'-0" WIDE STAGGERED DOOR OPENINGS, THREE CONTAINER STACKS SHOULD BE LOADED IN THE NEAR END OF THE CAR AND FIVE CONTAINER STACKS CAN THEN BE LOADED IN THE OPPOSITE END OF THE CAR, ALONG WITH EIGHT LENGTHWISE CONTAINERS IN THE DOORWAY AREA.
6. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED BY OMITTING THE LENGTHWISE CONTAINER STACKS FROM THE DOORWAY AREA. THE LOAD CAN BE REDUCED BY MULTIPLES OF FOUR CONTAINERS BY OMITTING ONE OR MORE CONTAINER STACKS FROM EITHER OF THE END PORTIONS OF THE LOAD. ONE CONTAINER CAN BE OMITTED BY EMPLOYING THE PROCEDURES SHOWN ON PAGE 16.
7. IF THE CAR BEING LOADED IS EQUIPPED WITH STAGGERED DOOR OPENINGS AND THE DOORS ARE OF THE SLIDING TYPE, DOORWAY PROTECTION IS REQUIRED FOR ALL CROSSWISE CONTAINER STACKS WHICH ARE COMPLETELY WITHIN THE DOOR OPENING OR WHICH EXTEND INTO THE DOOR OPENING BY ONE-HALF OR MORE OF THE STACK LENGTH (CONTAINER WIDTH). SEE THE "DOORWAY PROTECTION" DETAIL ON PAGE 13.

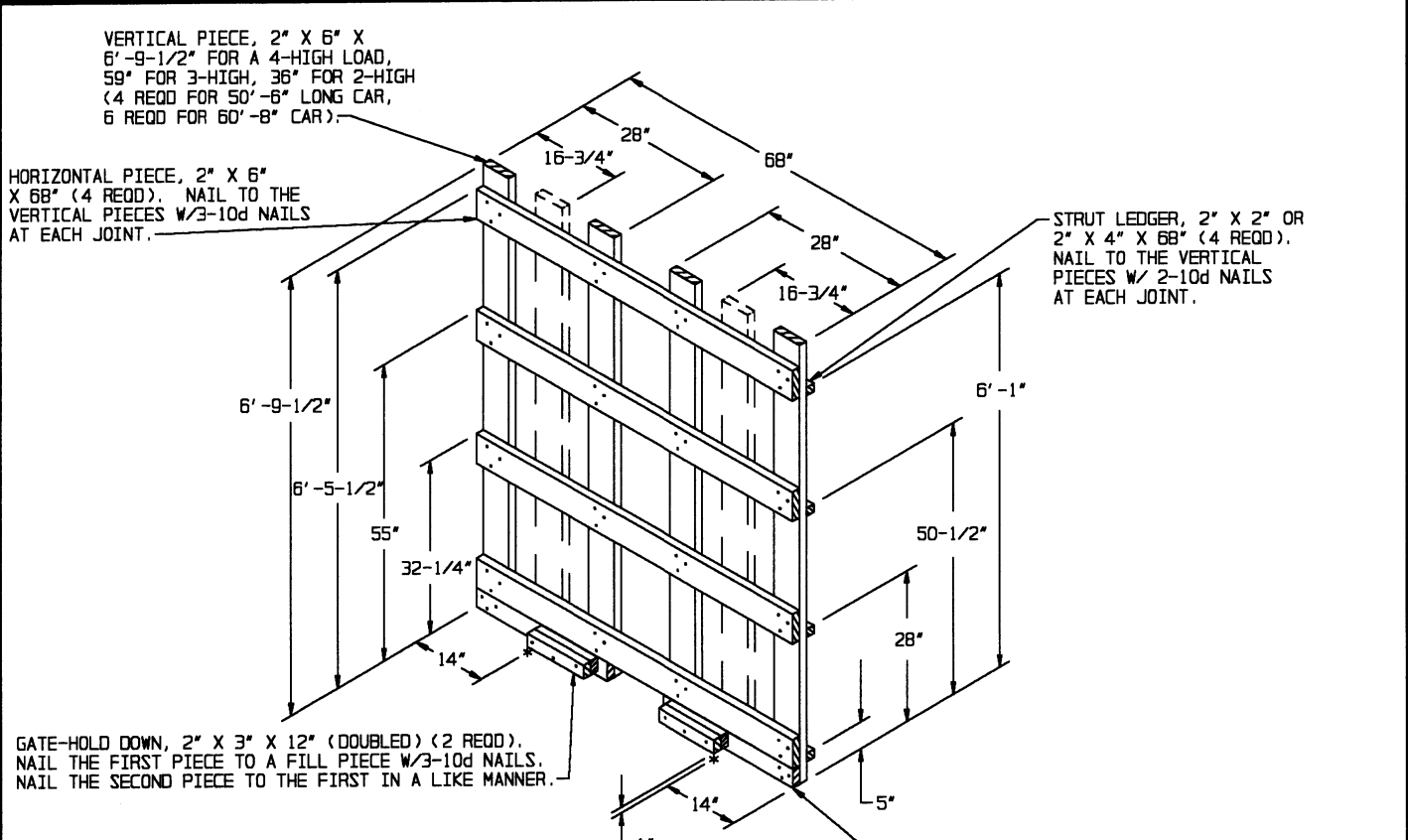
BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
2" X 2"	46	16
2" X 4"	20	14
2" X 6"	124	124
4" X 4"	51	68
NAILS	NO. REQD	POUNDS
10d (3")	208	3-1/4
16d (3-1/2")	120	2-3/4
STEEL STRAPPING, 1-1/4" -- 176' REQD ----- 26 LBS		
SEAL FOR 1-1/4" STRAPPING - 20 REQD ----- 1 LB		

LOAD AS SHOWN

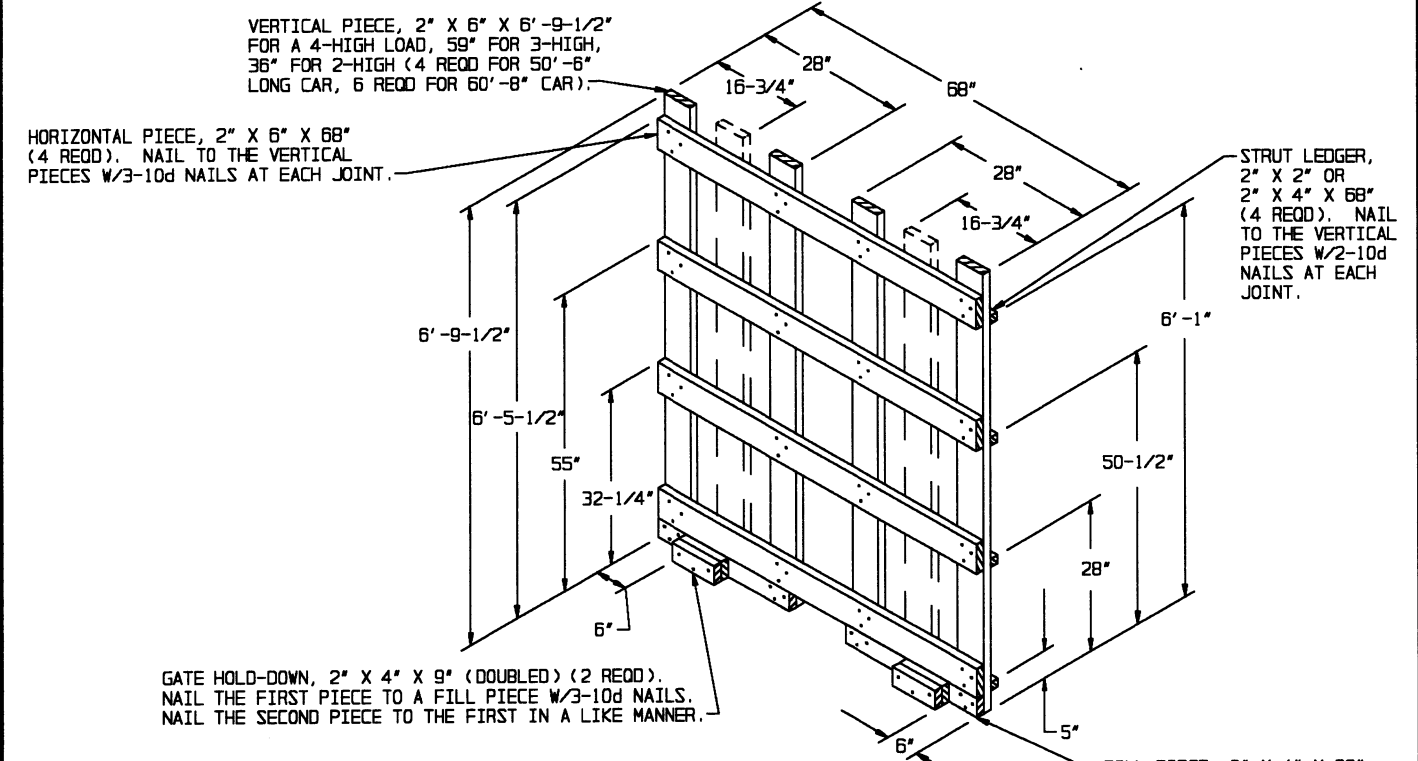
ITEM	QUANTITY	WEIGHT (APPROX)
CONTAINER	52	106,600 LBS
DUNNAGE		477 LBS
TOTAL WEIGHT		107,077 LBS (APPROX)

52-UNIT LOAD IN A 50'-6" LONG BY 9'-4" WIDE BOXCAR EQUIPPED WITH LOAD DIVIDER BULKHEADS



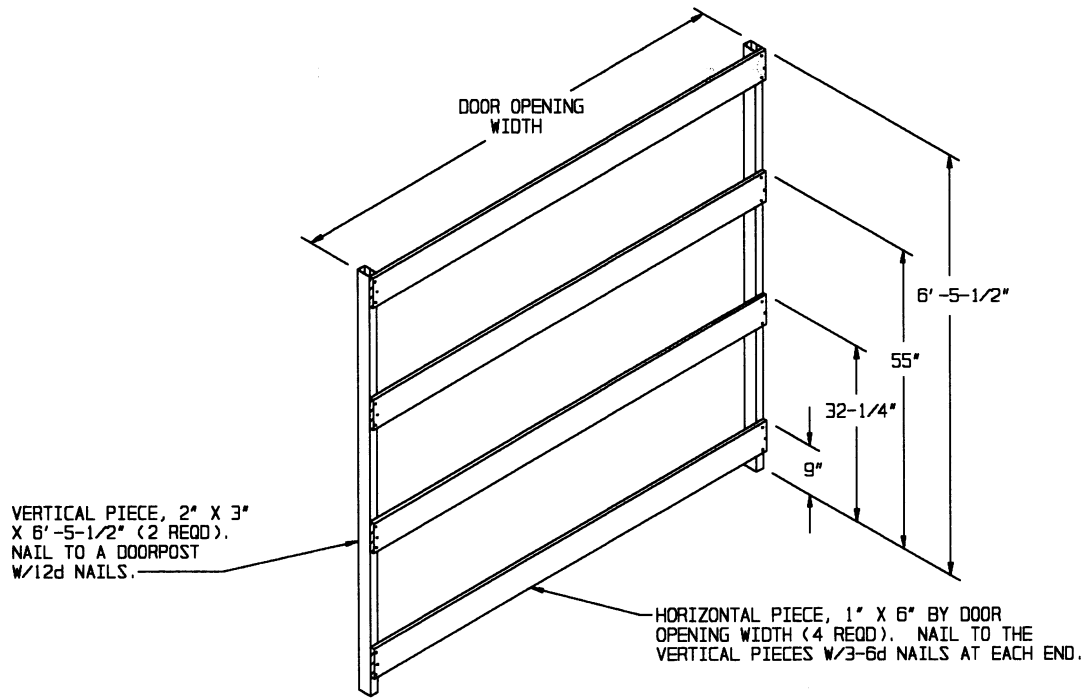
CENTER GATE A

THIS CENTER GATE IS DESIGNED FOR USE AGAINST THE SIDE OF A CONTAINER STACK.

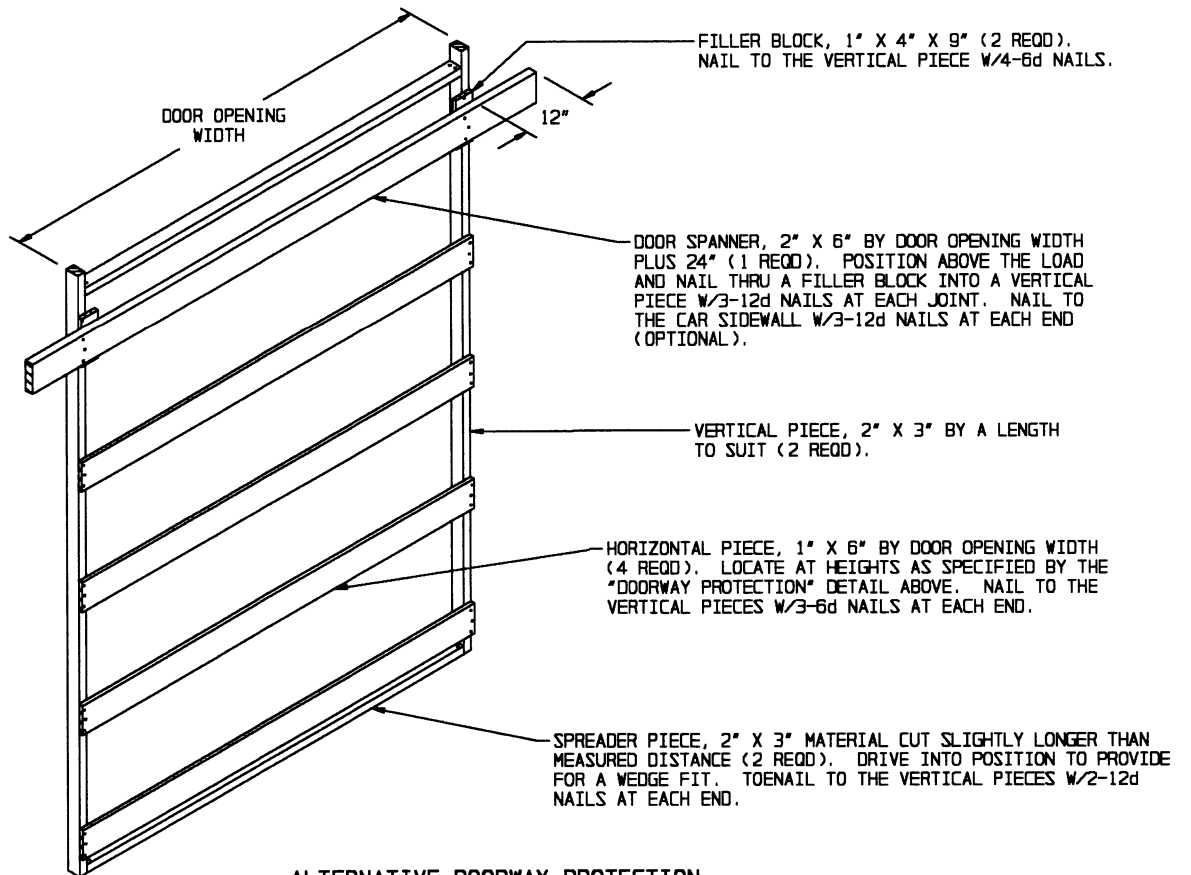


CENTER GATE B

THIS CENTER GATE IS DESIGNED FOR USE AGAINST THE ENDS OF LENGTHWISE-POSITIONED CONTAINERS.



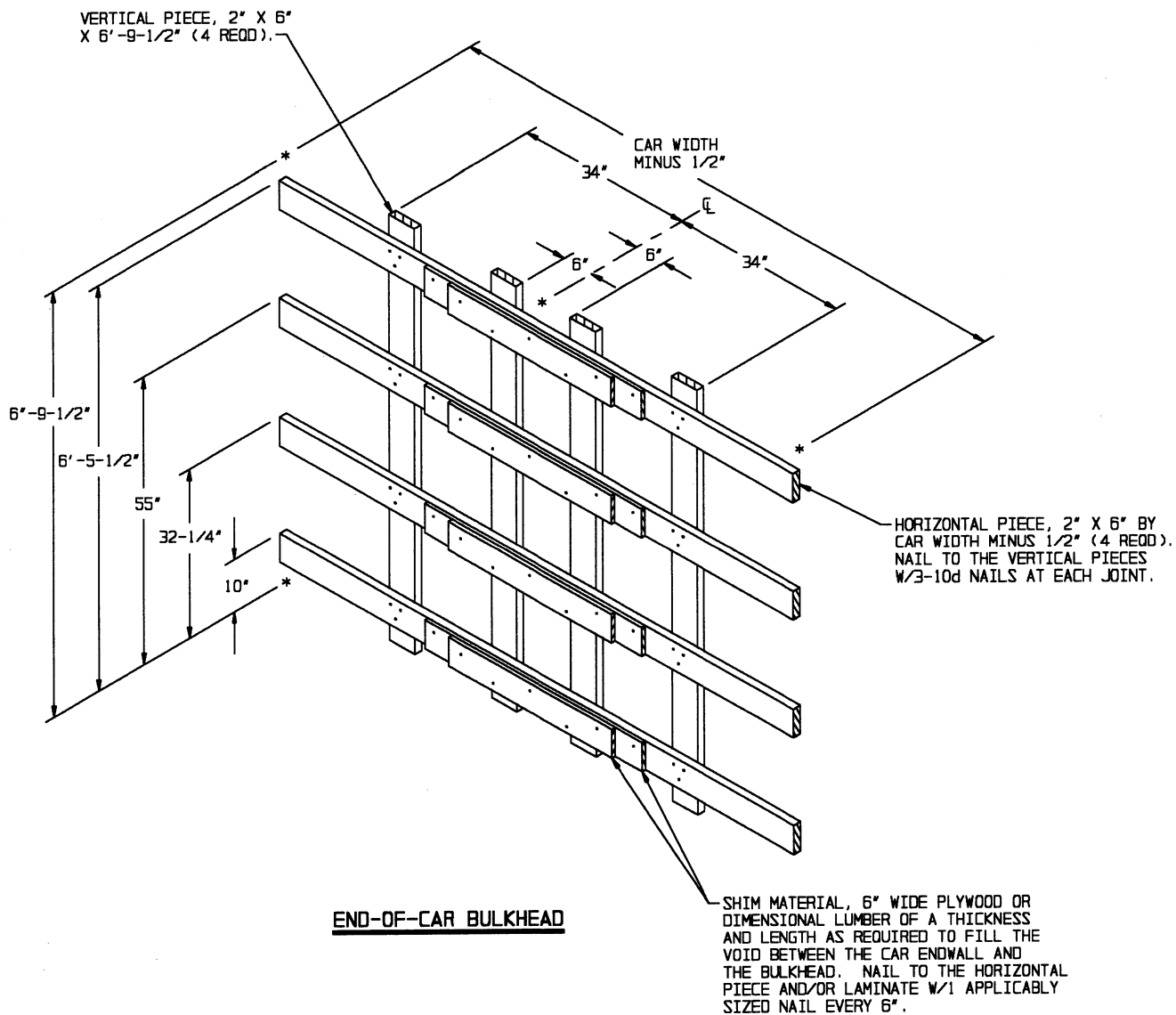
DOORWAY PROTECTION



ALTERNATIVE DOORWAY PROTECTION

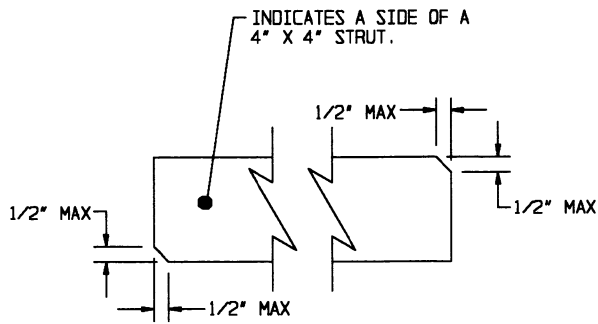
THIS METHOD OF DOORWAY PROTECTION IS FOR USE IN CARS EQUIPPED WITH CONVENTIONAL SLIDING AUXILIARY DOORS WHEN THE DOOR POSTS ARE NOT AVAILABLE.

DOORWAY PROTECTION DETAILS



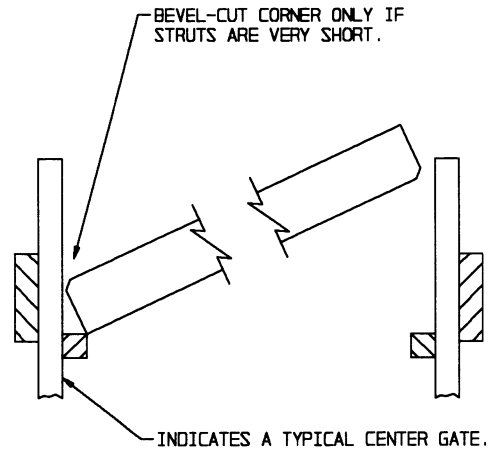
END-OF-CAR BULKHEAD

DETAIL



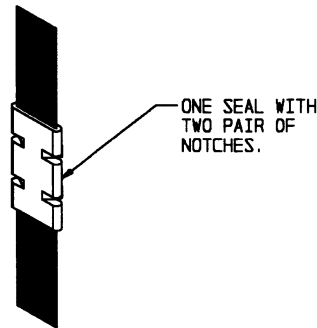
BEVEL-CUT

BEVEL CUTTING THE STRUTS AS SPECIFIED WILL FACILITATE INSTALLING THE STRUTS WITH A "DRIVE FIT". CAUTION: DO NOT BEVEL A CORNER MORE THAN ONE-HALF INCH (1/2"). THIS DETAIL IS APPLICABLE FOR THE DEPICTED 4" X 4" STRUTS.



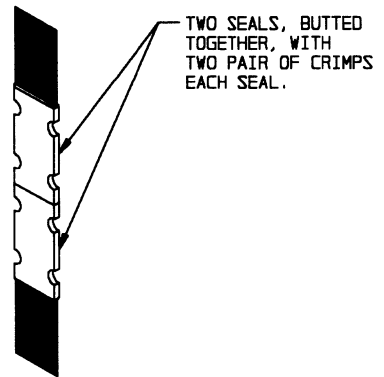
STRUT INSTALLATION

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



STRAP JOINT A

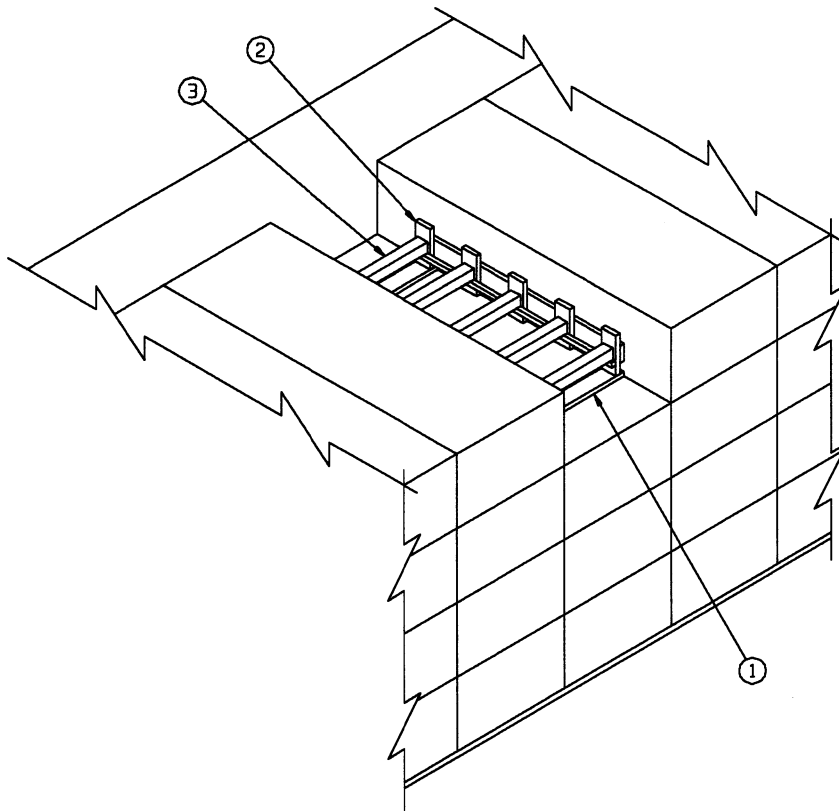
METHOD OF SECURING A STRAP JOINT WHEN USING A NOTCH-TYPE SEALER.



STRAP JOINT B

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

END-OVER-END LAP JOINT DETAILS



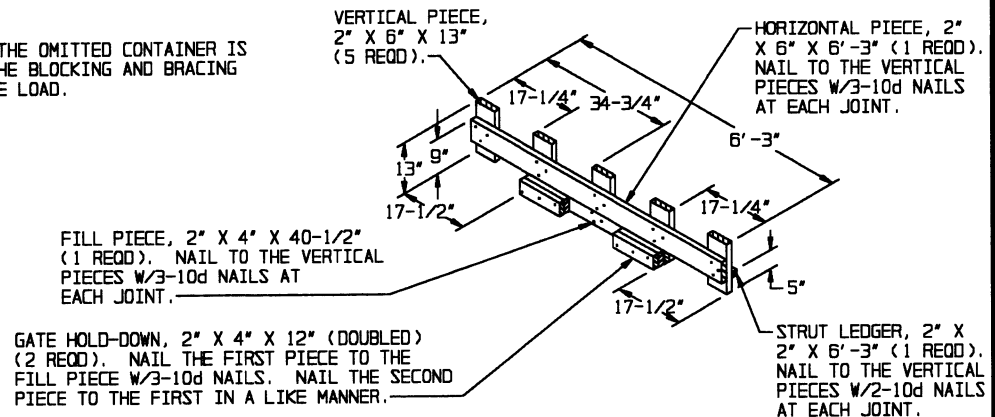
ISOMETRIC VIEW

KEY NUMBERS

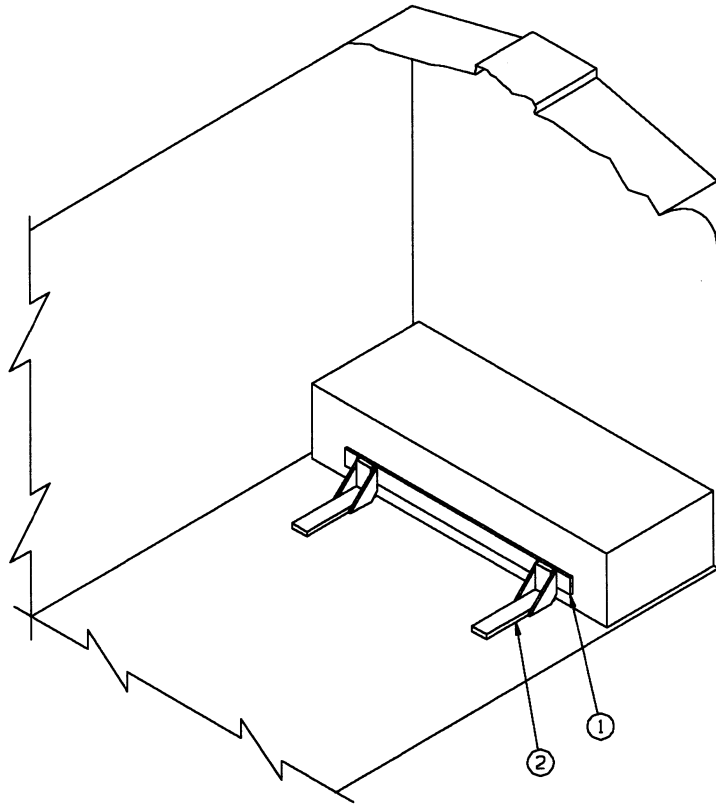
SPECIAL NOTES:

1. A PARTIAL VIEW OF A 9'-6" WIDE CONVENTIONAL BOXCAR IS SHOWN. CARS OF OTHER WIDTHS (9'-4" MINIMUM) MAY ALSO BE USED.
2. THIS PROCEDURE IS APPLICABLE ONLY FOR THE OMISSION OF A CONTAINER FROM A CROSSWISE-CONTAINER PORTION OF A LOAD. DO NOT USE WITHIN THE CONTAINERS-LENGTHWISE LOAD UNIT.
3. A CROSSWISE-POSITIONED CONTAINER OMITTED FROM THE TOP LAYER OF A 4-LAYER LOAD IS SHOWN AS TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR THE OMISSION OF A TOP-LAYER CONTAINER FROM A 3-LAYER OR 2-LAYER LOAD.
3. THE OMITTED CONTAINER PROCEDURES SHOULD BE APPLIED NEAR THE CENTER OF THE CAR LENGTH. ALSO, THERE SHOULD BE AT LEAST ONE LOAD UNIT BETWEEN THE OMITTED CONTAINER AND THE CENTER GATE.
4. ONLY THE BLOCKING AND BRACING FOR THE OMITTED CONTAINER IS SHOWN. REFER TO PAGE 6 OR 8 FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.

- ① SUPPORT PIECE, 2" X 6" X 40" (2 REQD). POSITION ON TOP OF THE CONTAINER, ONE UNDER EACH OUTER VERTICAL PIECE OF THE SPACER GATE, PIECE MARKED ②.
- ② SPACER GATE (2 REQD). SEE THE DETAIL BELOW. POSITION TO CENTER ON THE LENGTH OF THE CONTAINER. SEE GENERAL NOTES "J" AND "K" ON PAGE 2.
- ③ STRUT, 4" X 4" BY CUT TO FIT (REF: 34") (5 REQD). TOENAIL TO THE SPACER GATES, PIECES MARKED ②, W/2-16d NAILS AT EACH END.



SPACER GATE



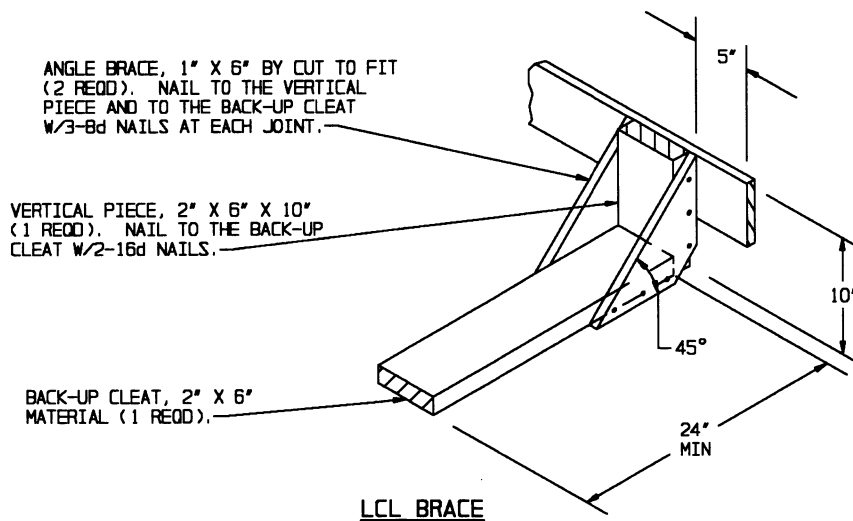
ISOMETRIC VIEW

SPECIAL NOTES:

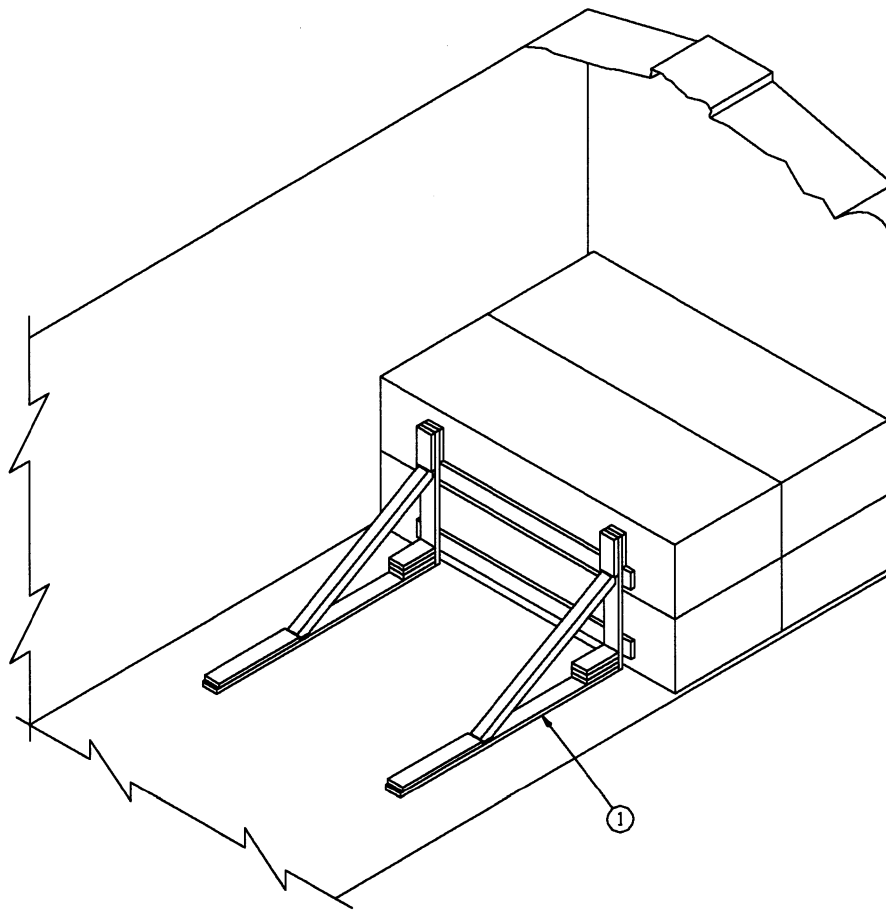
1. A 9'-6" WIDE CONVENTIONAL TYPE BOXCAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS (9'-4" MINIMUM) CAN BE USED.
2. TWO LCL BRACES AS APPLIED FOR LONGITUDINAL BRACING WILL RETAIN TWO CONTAINERS. A MINIMUM OF TWO BRACES WILL BE USED. IF THREE CONTAINERS ARE TO BE SHIPPED, ADD AN LCL BRACE TO ALIGN WITH THE CENTER SUPPORT FRAME OF THE CONTAINER. TWO LCL BRACES MAY BE POSITIONED SIDE BY SIDE AT ONE OR MORE LOCATIONS AND CENTERED ON THE SUPPORT FRAMES TO RETAIN ADDITIONAL CONTAINERS, NOT TO EXCEED SIX.

KEY NUMBERS

- ① HORIZONTAL PIECE, 1" X 6" X 7'-0" (1 REQD). NAIL TO THE LCL BRACES W/3-6d NAILS AT EACH JOINT. SEE GENERAL NOTES "J" AND "K" ON PAGE 2.
- ② LCL BRACE (2 REQD). SEE THE DETAIL BELOW. POSITION AS SHOWN, ALIGNED WITH THE SUPPORT FRAMES OF THE CONTAINER. NAIL TO THE CAR FLOOR W/7-16d NAILS. SEE GENERAL NOTE "Q" ON PAGE 3. SEE SPECIAL NOTE 2 AT LEFT.



TYPICAL LCL LOAD USING LCL BRACE METHOD OF PARTIAL-LAYER BRACING



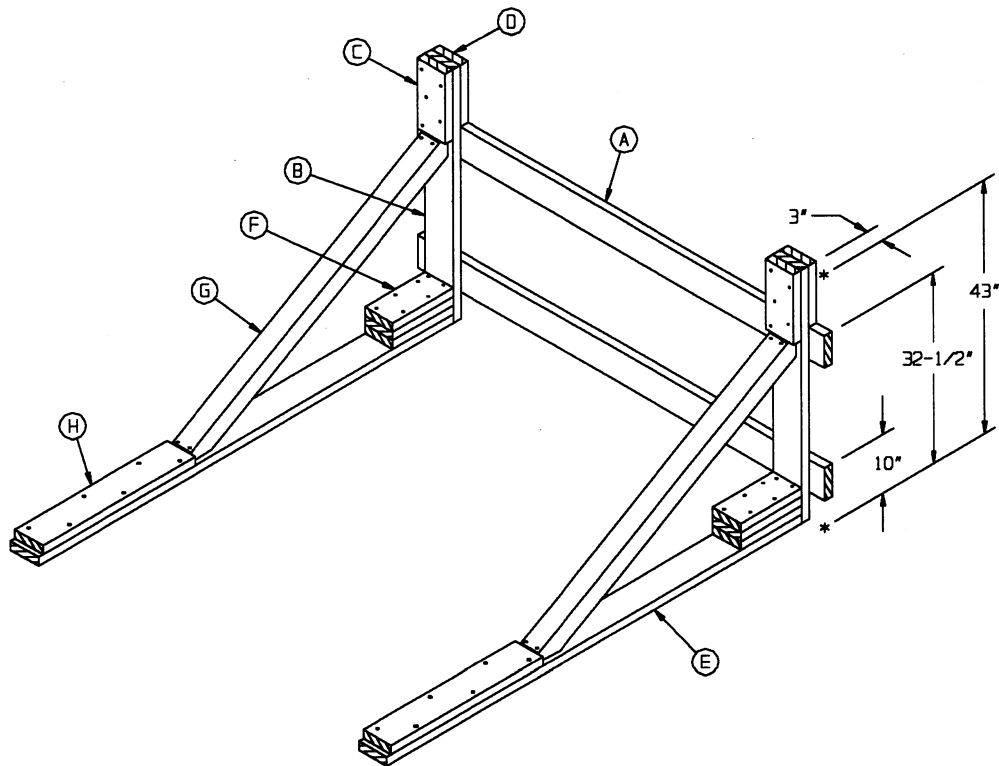
ISOMETRIC VIEW

KEY NUMBERS

SPECIAL NOTES:

1. A 4-UNIT LOAD IS SHOWN IN A 9'-6" WIDE CONVENTIONAL BOXCAR. CARS OF OTHER WIDTHS (9'-4" MINIMUM) CAN BE USED.
2. THE TOTAL KNEE BRACE ASSEMBLY IS ADEQUATE FOR RETAINING A MAXIMUM LCL LOAD OF NOT MORE THAN 8,500 POUNDS, OR FOUR CONTAINERS. SIX CONTAINERS CAN BE SHIPPED BY ADDING ONE "KNEE" POSITIONED TO ALIGN WITH THE CENTER SUPPORT FRAME OF THE CONTAINER.

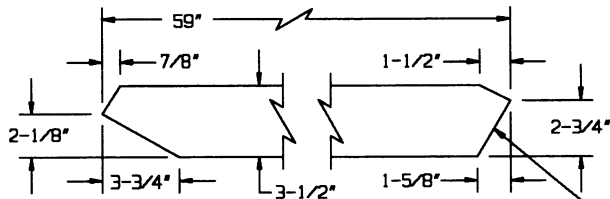
- ① KNEE BRACE ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 19 AND SPECIAL NOTE 2 AT LEFT. SEE GENERAL NOTES "J" AND "K" ON PAGE 2.



ISOMETRIC VIEW

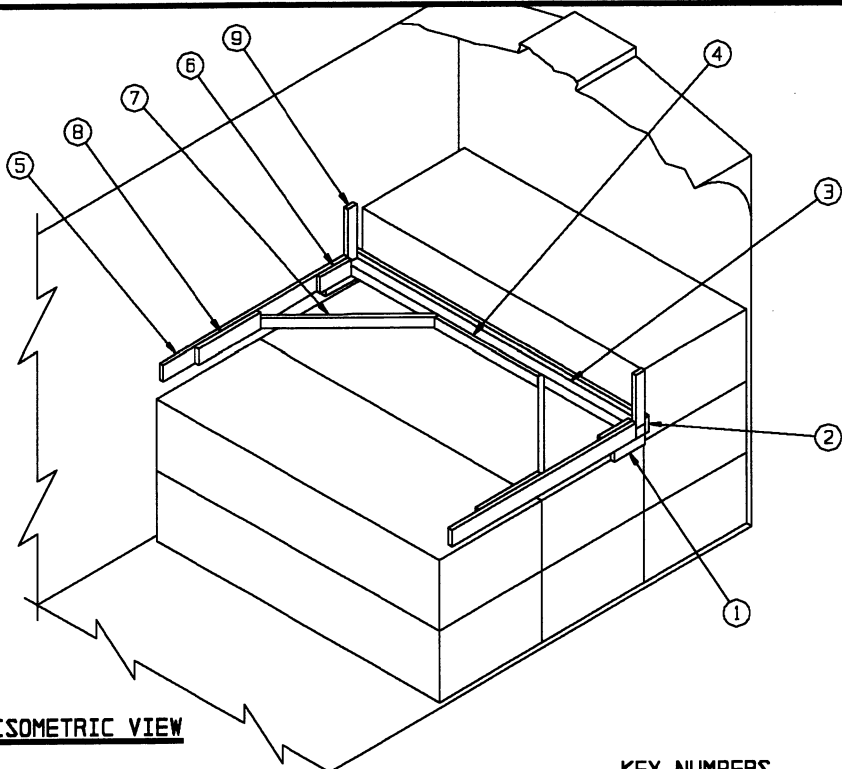
KEY LETTERS

- (A) LOAD BEARING PIECE, 2" X 6" X 6'-8" (2 REQD). NAIL TO THE VERTICAL PIECES, PIECES MARKED (B), W/3-10d NAILS AT EACH JOINT. SEE GENERAL NOTES "J" AND "K" ON PAGE 2.
- (B) VERTICAL PIECE, 2" X 6" X 43" (2 REQD). LOCATE 3" FROM ENDS OF LOAD BEARING PIECES, PIECES MARKED (A). NAIL TO THE FLOOR CLEAT, PIECE MARKED (E), W/2-16d NAILS.
- (C) HOLD-DOWN CLEAT, 2" X 6" X 12" (2 REQD). NAIL TO A VERTICAL PIECE, PIECE MARKED (B), W/5-10d NAILS.
- (D) REINFORCING PIECE, 2" X 6" X 10-1/2" (2 REQD). POSITION IN CONTACT WITH PIECE MARKED (A) AND NAIL TO A VERTICAL PIECE, PIECE MARKED (B), W/5-10d NAILS.
- (E) FLOOR CLEAT, 2" X 6" X 6'-10" (2 REQD). NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8". SEE GENERAL NOTE "O" ON PAGE 3.
- (F) POCKET CLEAT, 2" X 6" X 12" (TRIPLED) (2 REQD). NAIL THE FIRST PIECE TO A FLOOR CLEAT, PIECE MARKED (E), W/5-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST AND THE THIRD PIECE TO THE SECOND IN A LIKE MANNER. TOENAIL THE TOP PIECE TO A VERTICAL PIECE, PIECE MARKED (B), W/2-10d NAILS.
- (G) BRACE, 4" X 4" X 59" (2 REQD). SEE THE DETAIL AT LEFT FOR BEVEL CUTS REQUIRED. TOENAIL TO THE VERTICAL PIECE AND FLOOR CLEAT, PIECES MARKED (B) AND (E), W/2-16d NAILS AT EACH END.
- (H) 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 A VERTICAL PIECE MARKED (B)



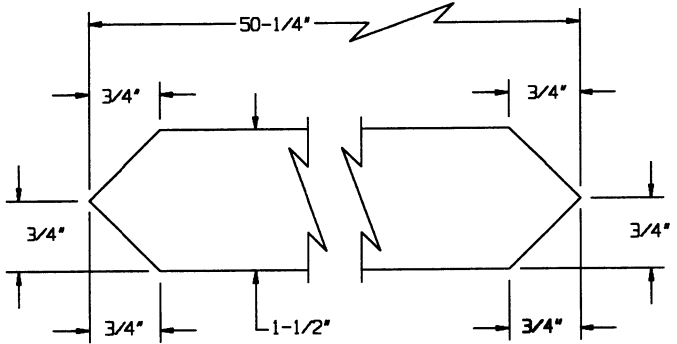
ISOMETRIC VIEW

KEY NUMBERS

SPECIAL NOTES:

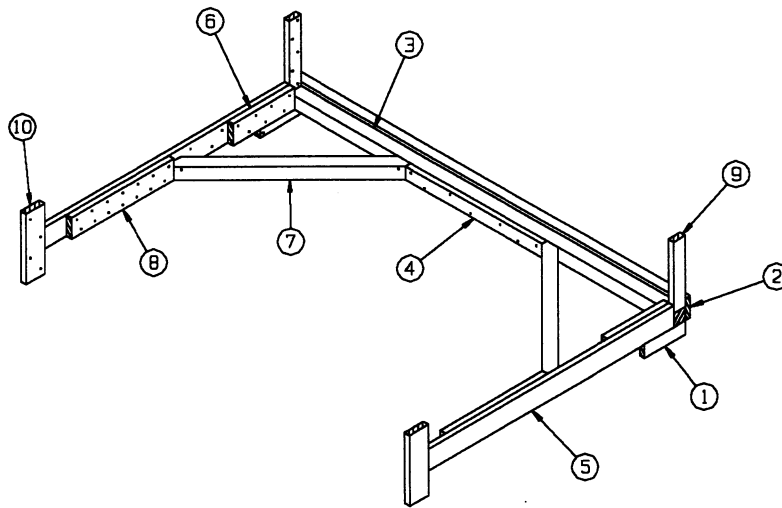
1. A 9'-6" WIDE WOOD-LINED (SIDEWALLS) CONVENTIONAL BOXCAR IS SHOWN WITH A TYPICAL K-BRACE. WOOD-LINED CARS OF OTHER WIDTHS (9'-4" MINIMUM) CAN BE USED.
2. THE K-BRACE METHOD OF PARTIAL-LAYER (TIER) BRACING SHOWN MAY BE USED IN A WOOD-LINED CAR FOR THE SECUREMENT OF A PARTIAL TOP TIER, BE IT A FIRST, SECOND, THIRD, OR FOURTH TIER. THE TYPE "A" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN 4,000 POUNDS (APPROX). THIS WILL BE NOT MORE THAN TWO CONTAINERS. IF IT IS NECESSARY TO BLOCK A HEAVIER LOAD, REFER TO THE DETAIL ON PAGE 21.
3. CAUTION: SOME CARS ARE NOT SUITED FOR THE APPLICATION OF "PARTIAL-LAYER BRACING" BECAUSE THE LENGTH OF THE PARTIAL TIER TO BE SHIPPED AND/OR THE SIZE OR CONFIGURATION OF THE CAR DOORS WILL NOT PERMIT PROPER INSTALLATION OF THE SPECIFIED K-BRACE DUNNAGE. PIECES MARKED ①, ②, ③, ⑥, AND ⑨ MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDEWALL. IT IS ALRIGHT FOR THE ENDS OF THE DIAGONAL BRACES, PIECES MARKED ⑦, TO BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE ADJACENT PIECE MARKED ⑤ MUST BE DOUBLED AND EXTENDED ACROSS AND FAR ENOUGH PAST THE DOOR OPENING (REF: 60") TO PROVIDE FOR THE SPECIFIED NAILING OF EACH PIECE. LAMINATE THE SECOND PIECE OF THE DOUBLED PIECE MARKED ⑤ TO THE FIRST W/16d NAILS. CLINCH THOSE NAILS WHICH PROTRUDE THRU THE HORIZONTAL WALL CLEAT WITHIN THE DOOR OPENING. NOTE THAT THE DIAGONAL BRACE WILL BE 49-1/8" LONG IN LIEU OF 50-1/4" WHEN PIECE MARKED ⑤ IS DOUBLED.
4. THE CENTER CLEAT, SHOWN AS PIECE MARKED ④, WILL BE 38" LONG FOR A 9'-4" WIDE CAR.

- ① SUPPORT CLEAT, 2" X 4" X 12" (2 REQD). POSITION HORIZONTALLY AS SHOWN, 2" (5-1/2" TO THE TOP) ABOVE THE BODY OF THE CONTAINER. NAIL TO THE CAR SIDEWALL W/4-12d NAILS. SEE GENERAL NOTES "J" AND "K" ON PAGE 2. SEE SPECIAL NOTE 3 AT LEFT.
- ② LOAD BEARING PIECE, 2" X 6" BY CAR WIDTH IN LENGTH (CUT TO FIT) (1 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/1-12d NAIL EVERY 6".
- ③ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH IN LENGTH (CUT TO FIT) (1 REQD).
- ④ CENTER CLEAT, 2" X 4" X 40" (1 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/7-16d NAILS. SEE SPECIAL NOTE 4 AT LEFT.
- ⑤ HORIZONTAL WALL CLEAT, 2" X 6" X 72" (2 REQD). NAIL TO THE CAR SIDEWALL W/16-12d NAILS.
- ⑥ POCKET CLEAT, 2" X 6" X 12" (2 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/4-16d NAILS.
- ⑦ DIAGONAL BRACE, 2" X 4" X 50-1/4" (2 REQD). SEE THE DETAIL BELOW FOR BEVEL CUTS REQUIRED. TOENAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, AND TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/2-16d NAILS AT EACH END.
- ⑧ BACK-UP CLEAT, 2" X 6" X 24" (2 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/8-16d NAILS.
- ⑨ HOLD-DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.



DIAGONAL BRACE

SEE SPECIAL NOTE 3 ABOVE.



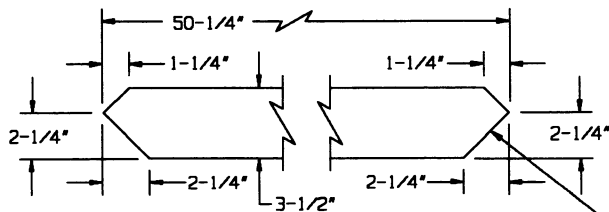
ISOMETRIC VIEW

SPECIAL NOTES:

1. THE TYPE "B" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN 7,000 POUNDS. THIS WILL BE NOT MORE THAN THREE CONTAINERS. IF THE PARTIAL TIER TO BE BRACED IS ONLY ONE CONTAINER, THE TYPE "A" K-BRACE DEPICTED ON PAGE 20 MAY BE USED.
2. **CAUTION:** SOME CARS ARE NOT SUITED FOR THE APPLICATION OF "PARTIAL-LAYER BRACING" BECAUSE THE LENGTH OF THE PARTIAL TIER TO BE SHIPPED AND/OR THE SIZE OR CONFIGURATION OF THE CAR DOORS WILL NOT PERMIT PROPER INSTALLATION OF THE SPECIFIED K-BRACE DUNNAGE. PIECES MARKED ①, ②, ③, ⑥, ⑨, AND ⑩, MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDEWALL. IT IS ALRIGHT FOR THE ENDS OF THE DIAGONAL BRACES, PIECES MARKED ⑦, TO BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE ADJACENT PIECE MARKED ⑤ MUST BE DOUBLED AND EXTENDED ACROSS AND FAR ENOUGH PAST THE DOOR OPENING (REF: 54") TO PROVIDE FOR THE SPECIFIED NAILING OF EACH PIECE. LAMINATE THE SECOND PIECE OF THE DOUBLED PIECE MARKED ⑤ TO THE FIRST W/16-16d NAILS. CLINCH THOSE NAILS WHICH PROTRUDE THRU THE HORIZONTAL WALL CLEAT WITHIN THE DOOR OPENING. NOTE THAT THE DIAGONAL BRACE, PIECE MARKED ⑦, WILL BE 49-1/8" LONG IN LIEU OF 50-1/4" WHEN PIECE MARKED ⑤ IS DOUBLED.
3. THE CENTER CLEAT, SHOWN AS PIECE MARKED ④, WILL BE 38" LONG FOR A 9'-4" WIDE CAR, AND 40" FOR A 9'-6" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.
4. REFER TO PAGE 20 FOR A TYPICAL INSTALLATION OF A K-BRACE.

KEY NUMBERS

- ① SUPPORT CLEAT, 2" X 4" X 12" (2 REQD). POSITION HORIZONTALLY AS SHOWN, 2" (5-1/2" TO THE TOP) ABOVE THE BODY OF THE CONTAINER. NAIL TO THE CAR SIDEWALL W/4-12d NAILS. SEE GENERAL NOTES "J" AND "K" ON PAGE 2. SEE SPECIAL NOTE 2 AT LEFT.
- ② LOAD BEARING PIECE, 2" X 6" BY CAR WIDTH IN LENGTH (CUT TO FIT) (1 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/1-12d NAIL EVERY 6".
- ③ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH IN LENGTH (CUT TO FIT) (1 REQD).
- ④ CENTER CLEAT, 2" X 4" X 40" (1 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/7-16d NAILS. SEE SPECIAL NOTE 3 AT LEFT.
- ⑤ HORIZONTAL WALL CLEAT, 2" X 6" X 72" (2 REQD). NAIL TO THE CAR SIDEWALL W/16-12d NAILS.
- ⑥ POCKET CLEAT, 2" X 6" X 18" (2 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/7-16d NAILS.
- ⑦ DIAGONAL BRACE, 4" X 4" X 50-1/4" (2 REQD). SEE THE DETAIL BELOW FOR BEVEL CUTS REQUIRED. TOENAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, AND TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/1-60d NAIL AT EACH END.
- ⑧ BACK-UP CLEAT, 2" X 6" X 30" (2 REQD). NAIL TO A HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/14-16d NAILS.
- ⑨ HOLD-DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑩ VERTICAL BACK-UP CLEAT, 2" X 6" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/4-12d NAILS.

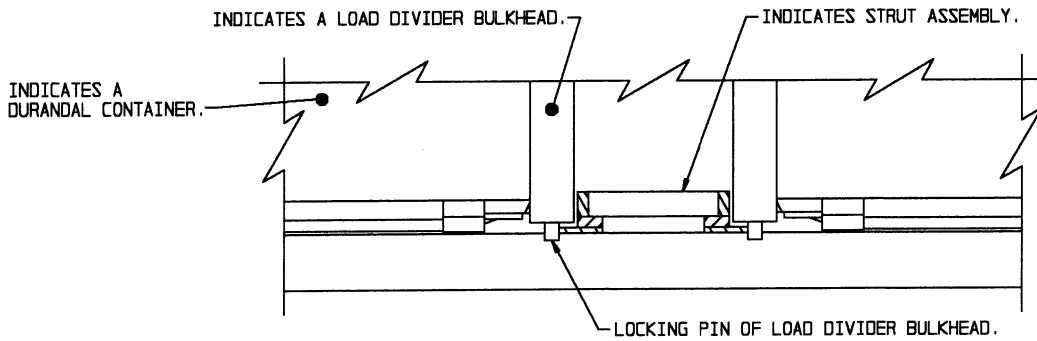


DIAGONAL BRACE

SEE SPECIAL NOTE 2 ABOVE.

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

TYPE "B" K-BRACE

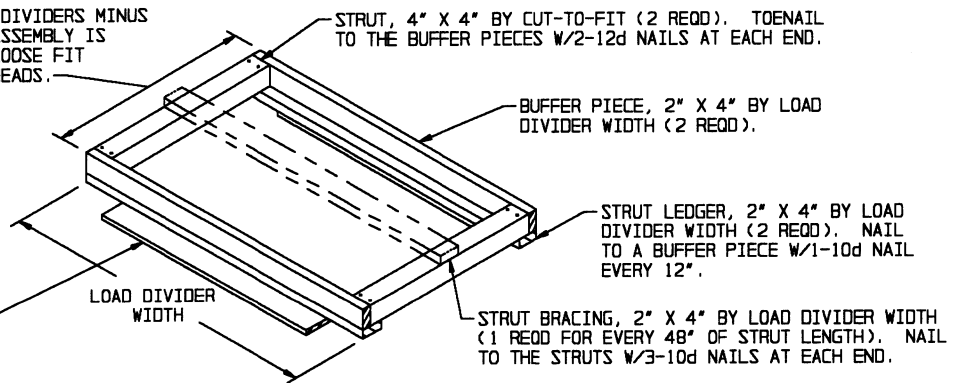


INSTALLATION OF STRUT ASSEMBLY

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".

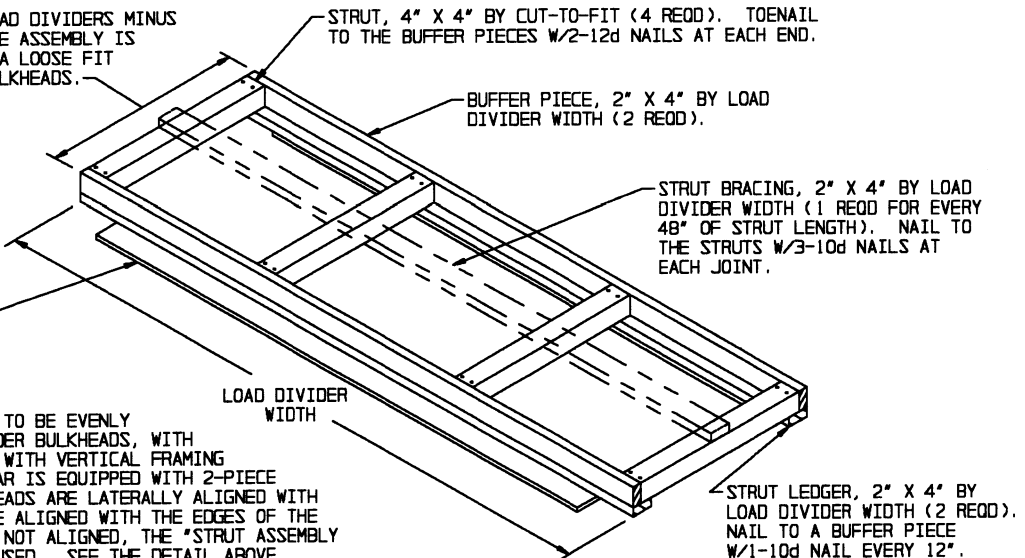


STRUT ASSEMBLY FOR 2-PIECE BULKHEADS

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".

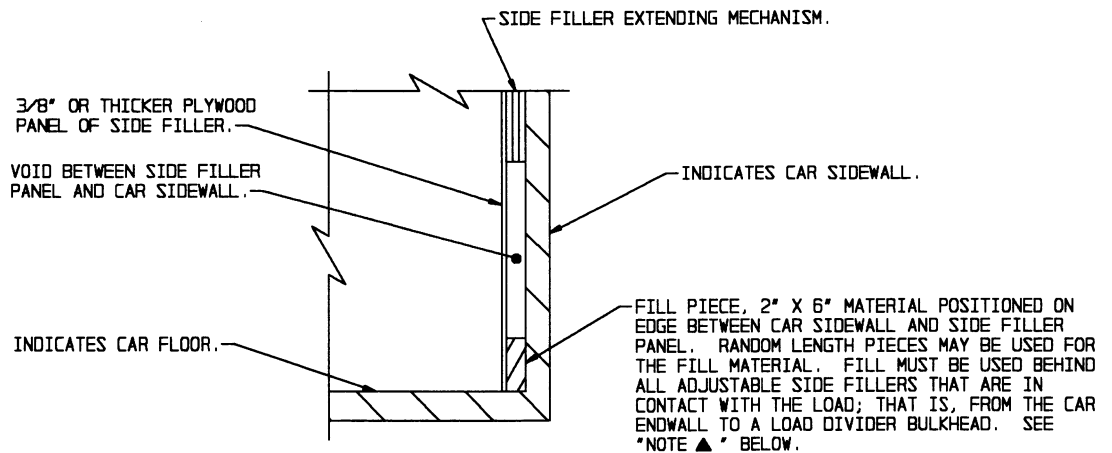


NOTE ▲:

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.

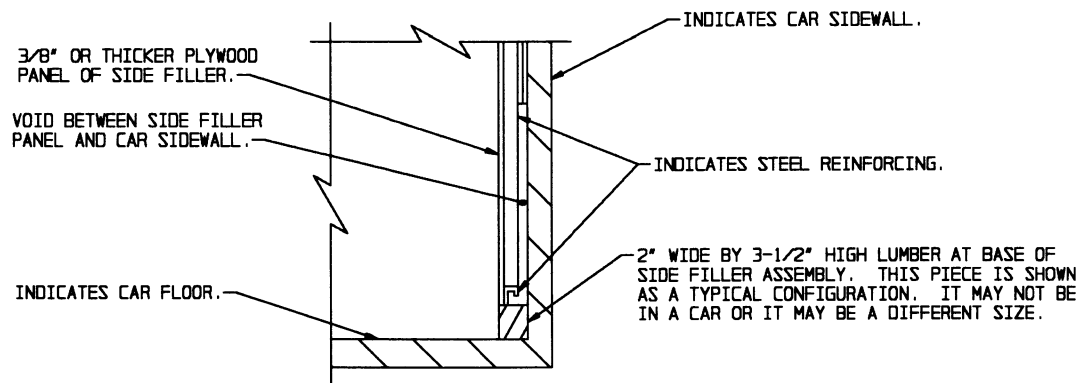


TYPICAL TYPE A

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.

