APPROVED BY
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DATE 8/6/96

# LOADING AND BRACING (CL & LCL) IN BOXCARS⊕ OF MK20 AND MODS (ROCKEYE II) AND CBU-78/B (GATOR) PACKED IN THE MK18 MOD 0 CRADLE

INDEX



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

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JUNE 1996

| CLASS | DIVISION | DRAWING | FILE |
|---|---|---|---|
| 19 | 48 | 8541 | SP5J9 |

DO NOT SCALE

PROJECT SP 243-92

## GENERAL NOTES

A. THIS DOCUMENT HAS BEEN PREPARED AND ISSUED IN ACCORDANCE WITH AR 740-1 AND AUGMENTS TM 743-200-1 (CHAPTER 5).

B. THE OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE FOR MK20 AND MODS (ROCKEYE II) AND CBU-78/B (GATOR) WHEN PACKED IN THE MK18 MOD 0 CRADLE. SUBSEQUENT REFERENCE TO CRADLE HEREIN MEANS THE MK18 MOD 0 CRADLE WITH CONTENTS.

C. THE OUTLOADING PROCEDURES DEPICTED WITHIN THIS DOCUMENT ARE APPLICABLE FOR SHIPMENTS IN CONVENTIONAL TYPE BOX-CARS AND FOR SHIPMENTS IN CUSHIONED BOXCARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.

D. THE SELECTION OF RAILCARS FOR THE TRANSPORT OF MK18 MOD 0 CRADLES 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 17 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. THE USE OF AN OFFSET LOADING PATTERN FOR THE CONTAINERS-CROSSWISE LOAD WILL FACILITATE LOADING AND UNLOADING OPERATIONS IN THE DOORWAY AREA OF THE CAR. A FULL LOAD SHOULD BE BUILT USING AN OFFSET LOADING PATTERN. FOR INSTANCE, A LOAD CONSISTING OF AN EVEN NUMBER OF LOAD UNITS AND HAVING TWO MORE LOAD UNITS IN ONE END OF THE CAR THAN IN THE OPPOSITE END, OR A LOAD CONSISTING OF AN ODD NUMBER OF LOAD UNITS AND HAVING ONE MORE LOAD UNIT IN ONE END THAN IN THE OTHER IS CONSIDERED TO BE AN OFFSET LOAD.

H. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN CARS WHICH ARE PARTIALLY LOADED WITH CONTAINERS CONTAINING THE DESIGNATED ITEMS, 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. MIXED ITEMS TO BE SHIPPED IN CARS EQUIPPED WITH MECHANICAL BRACING DEVICES MUST BE SEPARATELY BLOCKED, USING THE PROCEDURES SHOWN FOR THESE CARS AS GUIDANCE.

J. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-1/2" THICK BY 3-1/2" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-1/2" THICK BY 5-1/2" WIDE. IF THOSE MEMBERS SPECIFICALLY IDENTIFIED AS "STRUTS" WITHIN THE KEY NUMBERS OF A DEPICTED LOAD ARE SPECIFIED TO BE 4" X 4" MATERIAL, IT IS PERMISSIBLE TO USE TWO LAMINATED PIECES OF 2" X 6" MATERIAL IN LIEU OF EACH 4" X 4" STRUT. DOUBLED 2" X 6" STRUTS WILL BE LAMINATED W/1-10d NAIL EVERY 6".

(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.

SEAL, STRAP - - - -: ASTM D3953; CLASS H, FINISH A, B (GRADE 2), OR C, DOUBLE NOTCH TYPE, STYLE I, II, OR IV.

STRAPPING, STEEL - -: ASTM D3953; FLAT STRAPPING, TYPE 1 OR 2, HEAVY DUTY, FINISH A, B (GRADE 2), OR C.

(GENERAL NOTES CONTINUED)

K. NOTICE: A STAGGERED NAILING PATTERN WILL BE USED WHEREVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES. ALSO, A STAGGERED NAILING PATTERN WILL BE USED WHEN DUNNAGE IS NAILED TO THE FLOOR OR SIDEWALL OF THE TRANSPORTING VEHICLE, OR WHEN LAMINATING DUNNAGE. THE NAILING PATTERN WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL DOES NOT PENETRATE INTO OR NEAR A CRACK BETWEEN FLOOR BOARDS OR SIDEWALL BOARDS. ADDITIONALLY, THE NAILING PATTERN FOR AN UPPER PIECE OF LAMINATED DUNNAGE WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL FOR THAT PIECE WILL NOT BE DRIVEN THROUGH ONTO, OR RIGHT BESIDE A NAIL IN A LOWER PIECE.

L. POWER DRIVEN STAPLES MAY BE USED AS ALTERNATIVE FASTENERS FOR NAILS WHEN CONSTRUCTING DUNNAGE ASSEMBLIES 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.

M. WHEN STEEL STRAPPING IS SEALED AT AN END-OVER-END LAP JOINT, A MINIMUM OF ONE SEAL WITH TWO PAIR OF NOTCHES WILL BE USED TO SEAL THE JOINT WHEN A NOTCH-TYPE SEALER IS BEING USED. A MINIMUM OF TWO SEALS, BUTTED TOGETHER, WITH TWO PAIR OF CRIMPS PER SEAL WILL BE USED TO SEAL THE JOINT WHEN A CRIMP-TYPE SEALER IS BEING USED. REFER TO THE "STRAP JOINT A" AND "STRAP JOINT B" DETAILS ON PAGE 17 FOR GUIDANCE.

N. THROUGHOUT THIS PROCEDURAL DRAWING, PORTIONS OF THE BLOCKING COMPONENTS AND OF THE DEPICTED CARS, SUCH AS A CAR SIDEWALL, HAVE BEEN OMITTED FROM THE LOAD VIEW FOR CLARITY PURPOSES.

O. THE NUMBER OF LADING UNITS MAY BE ADJUSTED TO FIT THE SIZE OF THE BOXCAR BEING LOADED OR THE QUANTITY TO BE SHIPPED, HOWEVER, THE APPROVED METHODS SPECIFIED HEREIN MUST BE FOLLOWED AS CLOSELY AS POSSIBLE FOR BLOCKING, BRACING, AND STAYING OF THE UNITS. NOTICE: A SHIPMENT WILL BE POSITIONED IN THE RAILCAR IN COMPLIANCE WITH THE WEIGHT DISTRIBUTION REQUIREMENTS OF THE AAR.

P. CAUTION: WHEN POWER OR PNEUMATIC NAILERS ARE BEING USED IN THE APPLICATION OF NAILED FLOORLINE BLOCKING OR BRACING, CRADLES BEING LOADED INTO THE CONVEYANCE MUST BE POSITIONED TO ALLOW A CLEAR PATH OF EXIT FOR THE OPERATOR AT ALL TIMES, SHOULD AN EMERGENCY EXIT BECOME NECESSARY.

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

(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 "K" ON PAGE 2.

S. NOTICE: WHEN POSITIONING CRADLES IN A CAR, THEY SHOULD BE PLACED TIGHTLY AGAINST A CAR SIDEWALL AND/OR 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 CRADLES 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 CRADLES, SUCH AS THE ENDS OF THE CRADLE FRAME OR THE SIDE OF THE CRADLE IN THE FORK TINE OPENING AREA. 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. SEE THE "TYPICAL STRUT BRACING" DETAIL ON PAGE 28. 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 CRADLES. 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.

V. WHERE 2" X 2" PIECES ARE SPECIFIED FOR STRUT LEDGERS, 2" X 4" MATERIAL MAY BE SUBSTITUTED, IF DESIRED.

W. 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 COMPLETE ROUNDS. NOTICE: ONLY CUSHIONED CARS THAT HAVE SLIDING CENTER SILL TYPE CUSHIONED DEVICES OR END-OF-CAR TYPE DEVICES WHICH HAVE AT LEAST 15" OF TRAVEL ARE ACCEPTABLE.

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 27 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 27, 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 26.

(CONTINUED AT RIGHT)



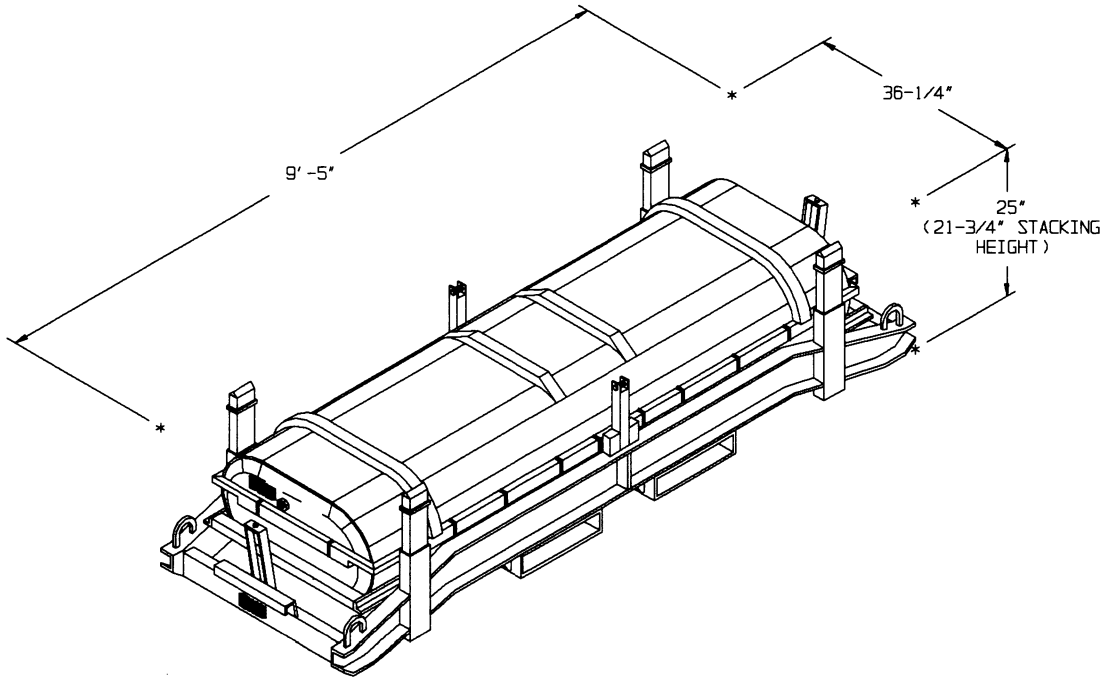
FF. THE NORMAL LOADING PATTERN IN CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS IS TO POSITION THE LADING BETWEEN A CAR ENDWALL AND A LOAD DIVIDER BULKHEAD IN FULL LAYERS. OBVIOUSLY, A LOAD QUANTITY MUST THEN BE A MULTIPLE OF THE NUMBER OF CRADLES WHICH ARE IN ONE LOAD UNIT. A LOAD UNIT IS DEFINED AS A STACK 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 SPACER ASSEMBLY METHOD OF OMITTING A PALLET UNIT MAY BE USED TO ADJUST A LOAD QUANTITY DOWNWARD BY OTHER THAN A MULTIPLE OF A LOAD UNIT. SEE THE "INSTALLATION OF SPACER ASSEMBLY A" DETAIL ON PAGE 19 FOR CROSSWISE CRADLES OR THE "INSTALLATION OF SPACER ASSEMBLY B" DETAIL ON PAGE 20 FOR LENGTHWISE CRADLES.

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 LOADING PATTERN WHICH IS ONE OR MORE LESS LAYERS IN HEIGHT. INSTALL CENTER GATES AND STRUTS AS SHOWN ON PAGE 8 OR 10 OF THE CONVENTIONAL BOXCAR DRAWING HEREIN TO PROVIDE FOR A TIGHT LOAD BETWEEN THE BULKHEADS.

4. 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 25 OR WITH KNEE BRACE ASSEMBLIES, AS SHOWN ON PAGE 22.

GG. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTION WHICH IS IMMEDIATELY ADJACENT TO THE DEPICTED OUTLOADING METHOD.



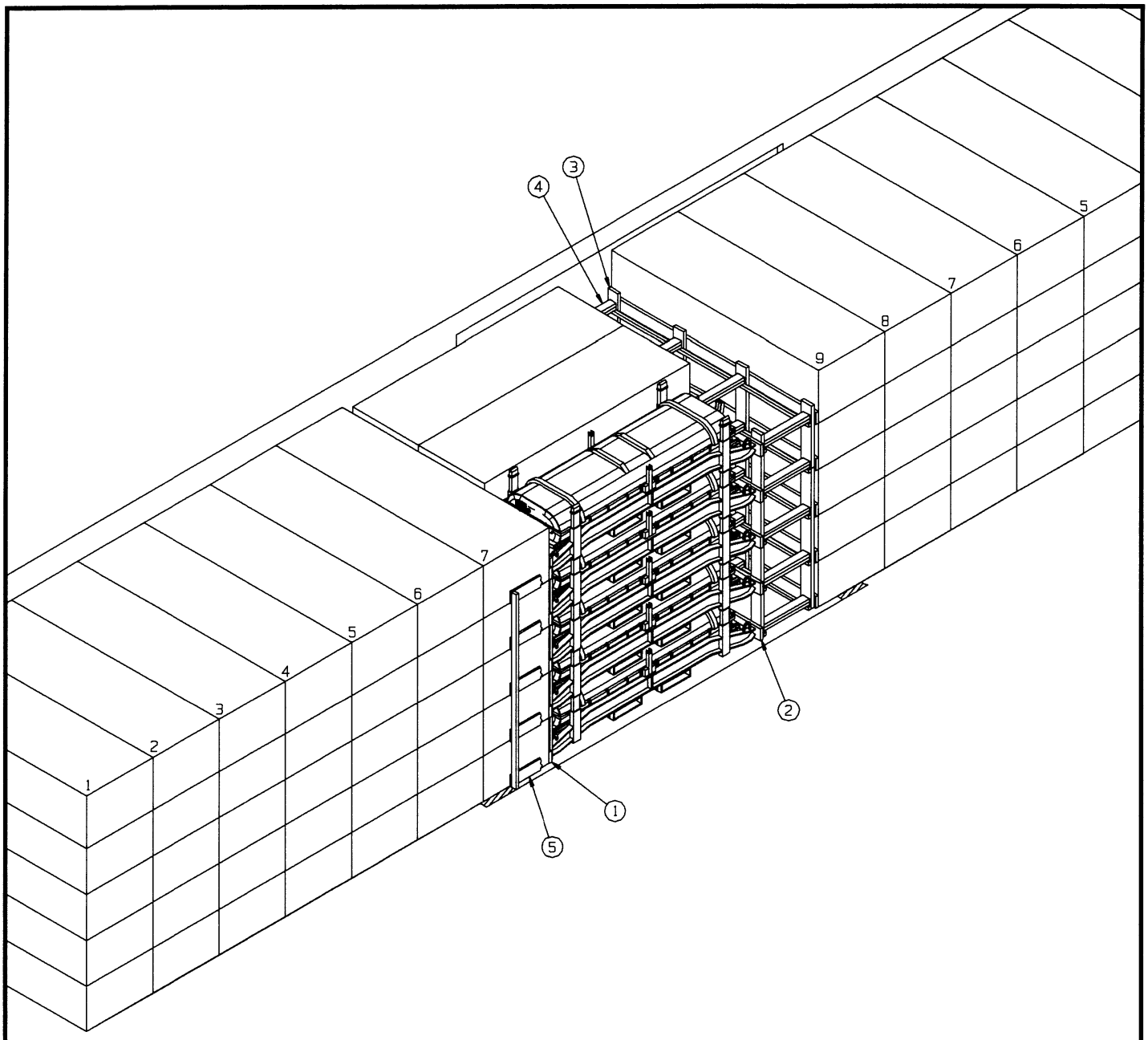

## MK18 MOD 0 CRADLE

GROSS WEIGHT - - - - - - 1,455 LBS (APPROX)
CUBE - - - - - - - - - - 59.3 CUBIC FEET (APPROX)

CRADLE DETAIL



PROJECT SP 243-92




ISOMETRIC VIEW

## KEY NUMBERS

(1) SEPARATOR GATE A (1 REQD). SEE THE DETAIL ON PAGE 14. POSITION WITH THE VERTICAL PIECES AGAINST THE CROSSWISE CONTAINERS. SEE GENERAL NOTES "K" AND "L" ON PAGE 2.

(2) CENTER GATE A (1 REQD). SEE THE DETAIL ON PAGE 14. POSITION AGAINST THE LENGTHWISE CONTAINER STACKS.

(3) CENTER GATE B (1 REQD). SEE THE DETAIL ON PAGE 15. POSITION AGAINST THE CROSSWISE CONTAINER STACK.

(4) STRUT, 2" X 6" BY CUT TO FIT (REF: 26") (DOUBLED) (20 REQD). LAMINATE W//1-10d NAIL EVERY 6". TOENAIL TO THE CENTER GATES, PIECES MARKED (2) AND (3), W/2-12d NAILS AT EACH END. SEE GENERAL NOTES "T" AND "U" ON PAGE 3. SEE SPECIAL NOTE 5 ON PAGE 7.

(5) DOORWAY PROTECTION (2 REQD). SEE THE DETAIL ON PAGE 15. NAIL TO THE DOORPOSTS W/12d NAILS. SEE SPECIAL NOTE 6 ON PAGE 7.



95-UNIT LOAD IN A 60'-8" LONG BY 9'-6" WIDE CONVENTIONAL BOXCAR

SPECIAL NOTES:

1. A 95-UNIT LOAD IS SHOWN IN A 60'-8" LONG BY 9'-6" WIDE CONVENTIONAL BOXCAR EQUIPPED WITH 15'-0" WIDE BY 9'-11" HIGH (MINIMUM) STAGGERED DOOR OPENINGS. CARS OF OTHER LENGTHS MAY BE USED BUT NARROWER CARS CANNOT BE USED FOR THE DEPICTED CONTAINERS-CROSSWISE LOAD.

2. THE DEPICTED LOAD IS SHOWN IN A CAR EQUIPPED WITH 15'-0" WIDE STAGGERED DOOR OPENINGS. THE LOADING PATTERN IS ALSO APPLICABLE FOR CARS EQUIPPED WITH 16'-0" WIDE STAGGERED DOOR OPENINGS. CARS EQUIPPED WITH THRU DOORS FROM 12'-0" TO 16'-0" WIDE MAY BE USED. THE LOADING PATTERN FOR THOSE CARS SHOULD BE EIGHT CROSSWISE LOAD UNITS IN EACH END OF THE CAR WITH ONE LENGTHWISE LOAD UNIT IN THE CENTER. CARS WITH THRU DOORS 10'-0" WIDE WILL NOT LEAVE ROOM FOR THE LOADING CREW TO EXIT THE CAR AFTER INSTALLING THE CENTER GATES AND STRUTS, PIECES MARKED ③ AND ④, AND WILL NOT BE USED.

3. A MAXIMUM OF 75 CRADLES CAN BE LOADED IN A 50-6" LONG BY 9'-6" WIDE CAR USING THE DEPICTED PROCEDURES. IF THE CAR IS EQUIPPED WITH 15'-0" OR 16'-0" WIDE STAGGERED DOOR OPENINGS, THE LOAD SHOULD BE FORMED WITH FIVE CROSSWISE LOAD UNITS IN THE NEAR END AND WITH SEVEN CROSSWISE LOAD UNITS IN THE FAR END AND ONE LOAD UNIT OF LENGTHWISE CONTAINERS. IF THE CAR HAS 10'-0" TO 16'-0" WIDE THRU DOORS, THE LOAD SHOULD BE FORMED WITH SIX CROSSWISE LOAD UNITS IN EACH END OF THE CAR AND ONE LENGTHWISE LOAD UNIT IN THE CENTER. IF A 40'-6" LONG BY 9'-6" WIDE CAR IS AVAILABLE FOR LOADING, 60 CRADLES CAN BE SHIPPED. THE LOADING PATTERN SHOULD BE FORMED WITH FOUR CROSSWISE LOAD UNITS IN THE NEAR END, FIVE CROSSWISE LOAD UNITS IN THE FAR END AND ONE LENGTHWISE LOAD UNIT FOR CARS EQUIPPED WITH STAGGERED DOOR OPENINGS OR WITH THRU DOORS 10'-0" OR WIDER.

4. IF CRADLES ARE FURNISHED IN UNIT LOADS OF TWO AS SHOWN BY NAVAL WEAPONS HANDLING LABORATORY DRAWING WR-54/168, THEY MAY BE SHIPPED. IF INDIVIDUAL CRADLES ARE FURNISHED FOR LOADING, IT IS NOT NECESSARY TO FORM UNIT LOADS PRIOR TO SHIPMENT.

5. IF DESIRED, 4" X 6" STRUTS MAY BE USED IN LIEU OF THE SPECIFIED DOUBLED 2" X 6" STRUTS, PIECES MARKED ④.

6. DOORWAY PROTECTION, PIECES MARKED ⑤, ARE REQUIRED FOR ALL CROSSWISE LOAD UNITS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOOR OPENING BY ONE-HALF OR MORE OF THE LOAD UNIT LENGTH (CONTAINER WIDTH). DOORWAY PROTECTION IS ALSO REQUIRED FOR THE LENGTHWISE LOAD UNIT. IF THE CAR IS EQUIPPED WITH PLUG DOORS FOR EITHER THE MAIN DOORS OR THE AUXILIARY DOORS, REFER TO THE PROCEDURES ON PAGES 12 AND 13 FOR GUIDANCE.

7. THE DEPICTED LOAD CAN BE REDUCED BY MULTIPLES OF FIVE CRADLES TO SUIT THE QUANTITY TO BE SHIPPED BY OMITTING ONE OR MORE CROSSWISE LOAD UNITS FROM THE END PORTIONS OF THE LOAD. OR, THE ENTIRE ONE, TWO, OR MORE TOP LAYERS CAN BE OMITTED. ONE CRADLE CAN BE OMITTED BY EMPLOYING THE PROCEDURES ON PAGE 19. FOR OTHER METHODS OF REDUCING A LOAD, REFER TO THE TYPICAL LCL PROCEDURES ON PAGES 19 THRU 25 FOR GUIDANCE.

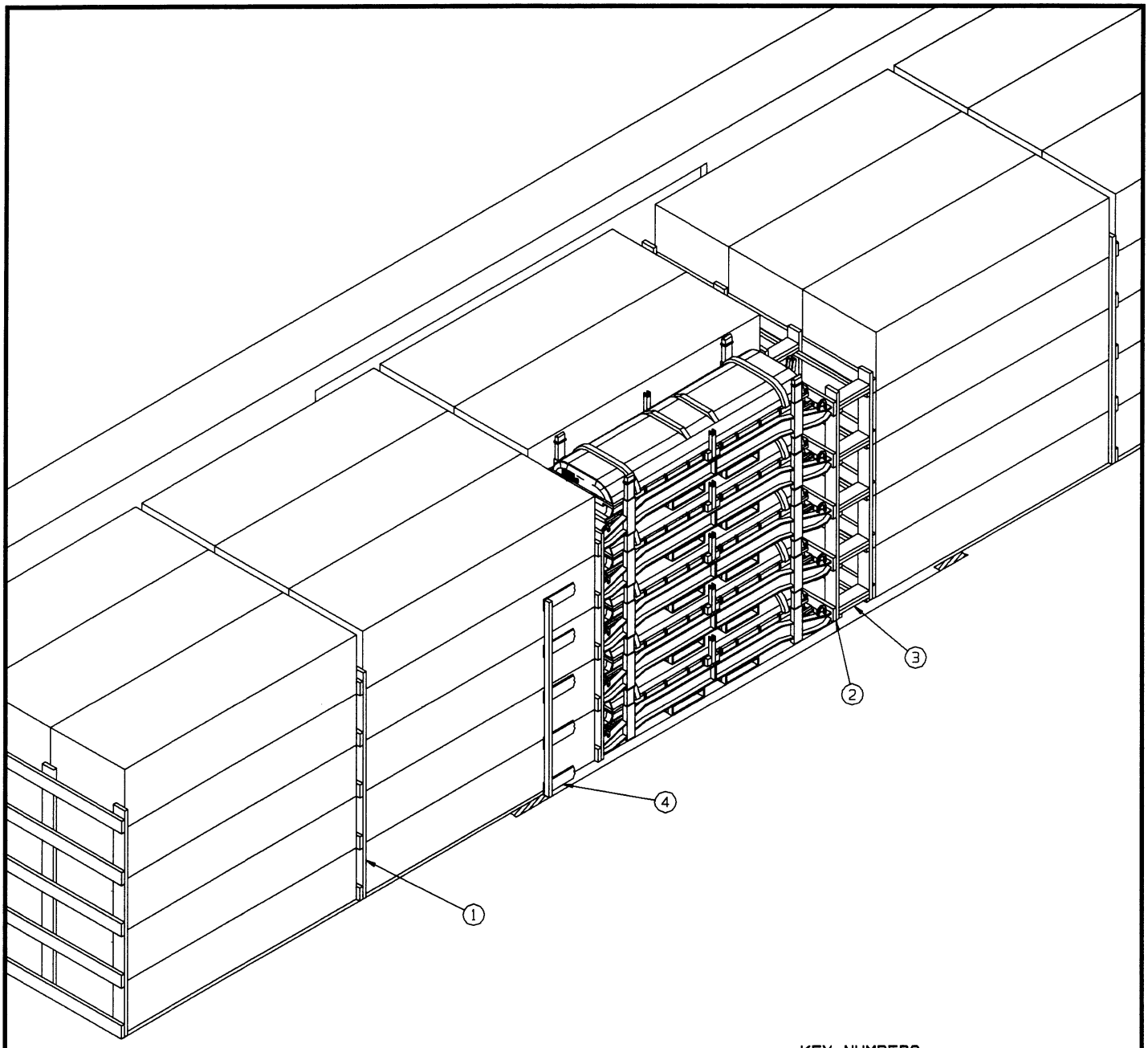
**BILL OF MATERIAL**

| LUMBER | LINEAR FEET | BOARD FEET |
|---|---|---|
| 1" X 6" | 150 | 75 |
| 2" X 2" | 94 | 32 |
| 2" X 3" | 66 | 33 |
| 2" X 4" | 2 | 2 |
| 2" X 6" | 325 | 325 |
| **NAILS** | **NO. REQD** | **POUNDS** |
| 6d (2") | 120 | 3/4 |
| 10d (3") | 358 | 5-1/2 |
| 12d (3-1/4") | 108 | 2 |

**LOAD AS SHOWN**

| ITEM | QUANTITY | WEIGHT (APPROX) |
|---|---|---|
| CRADLE | 95 | 138,225 LBS |
| DUNNAGE | | 940 LBS |
| TOTAL WEIGHT | | 139,165 LBS (APPROX) |

95-UNIT LOAD IN A 60'-8" LONG BY 9'-6" WIDE CONVENTIONAL BOXCAR




ISOMETRIC VIEW

## KEY NUMBERS

(1) SEPARATOR GATE B (5 REQD). SEE THE DETAIL ON PAGE 16. POSITION THE GATES AT THE ENDS OF THE CAR SO THE HORIZONTAL PIECES ARE AGAINST THE CAR END WALL. POSITION THE GATES BETWEEN LOAD UNITS SO THE HORIZONTAL PIECES ARE AGAINST THE ALREADY LOADED CRADLES. SEE GENERAL NOTES "K" AND "L" ON PAGE 2.

(2) CENTER GATE C (2 REQD). SEE THE DETAIL ON PAGE 16.

(3) STRUT, 2" X 6" BY CUT TO FIT (REF: 20") (DOUBLED) (20 REQD). LAMINATE W/1-10d NAIL EVERY 6". TOENAIL TO THE CENTER GATES, PIECES MARKED (2), W/2-12d NAILS AT EACH END. SEE GENERAL NOTES "T" AND "U" ON PAGE 3. SEE SPECIAL NOTE 5 ON PAGE 9.

(4) DOORWAY PROTECTION (2 REQD). SEE THE DETAIL ON PAGE 15. SEE SPECIAL NOTE 6 ON PAGE 9.



75-UNIT LOAD IN A 50'-6" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR

SPECIAL NOTES:

1. A 75-UNIT LOAD IS SHOWN IN A 50'-6" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR EQUIPPED WITH 16'-0" WIDE BY 9'-11" HIGH (MINIMUM) THRU DOOR OPENINGS. CARS OF OTHER LENGTHS AND WIDTHS CAN BE USED.

2. THE DEPICTED LOAD IS SHOWN IN A CAR EQUIPPED WITH 16'-0" WIDE THRU DOOR OPENINGS. THE LOADING PATTERN IS ALSO APPLICABLE FOR A LOAD IN A CAR EQUIPPED WITH 15'-0" OR 16'-0" WIDE STAGGERED DOORS, HOWEVER, LOADING WILL BE DIFFICULT. CARS WITH THRU DOORS LESS THAN 12'-0" WIDE WILL NOT LEAVE ROOM FOR THE LOADING CREW TO EXIT THE CAR AFTER INSTALLING THE CENTER GATES AND STRUTS, PIECES MARKED ② AND ③, AND WILL NOT BE USED.

3. A MAXIMUM OF 90 CRADLES CAN BE LOADED IN A 60'-8" LONG BY 9-4" WIDE CAR USING THE DEPICTED PROCEDURES. THE CAR MUST BE EQUIPPED WITH 15'-0" OR 16'-0" WIDE STAGGERED DOOR OPENINGS AND WILL BE LOADED WITH THREE LOAD UNITS LONG IN EACH END OF THE CAR. IF A 40'-6" CAR IS FURNISHED FOR LOADING, 45 CRADLES CAN BE SHIPPED. A 15'-0" OR 16'-0" STAGGERED DOOR OPENING IS REQUIRED. THE STRUTS, PIECES MARKED ③, WILL BE APPROXIMATELY 11'-0" LONG AND WILL REQUIRE TWO SETS OF STRUT BRACING PIECES. A LOAD IN A 40'-6" CAR IS NOT AN EFFICIENT LOAD AND SHOULD NOT BE USED UNLESS NECESSARY.

4. IF CRADLES ARE FURNISHED IN UNIT LOADS OF TWO AS SHOWN BY NAVAL WEAPONS HANDLING LABORATORY DRAWING WR-54/168, THEY MAY BE SHIPPED. IF INDIVIDUAL CRADLES ARE FURNISHED FOR LOADING, IT IS NOT NECESSARY TO FORM UNIT LOADS PRIOR TO SHIPMENT.

5. IF DESIRED, 4" X 6" STRUTS MAY BE USED IN LIEU OF THE SPECIFIED DOUBLED 2" X 6" STRUTS, PIECES MARKED ③.

6. DOORWAY PROTECTION, PIECES MARKED ④, ARE REQUIRED FOR ALL CROSSWISE LOAD UNITS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOOR OPENING BY ONE-HALF OR MORE OF THE LOAD UNIT (CONTAINER LENGTH). IF THE CAR IS EQUIPPED WITH PLUG DOORS, REFER TO THE PROCEDURES ON PAGES 12 AND 13 FOR GUIDANCE.

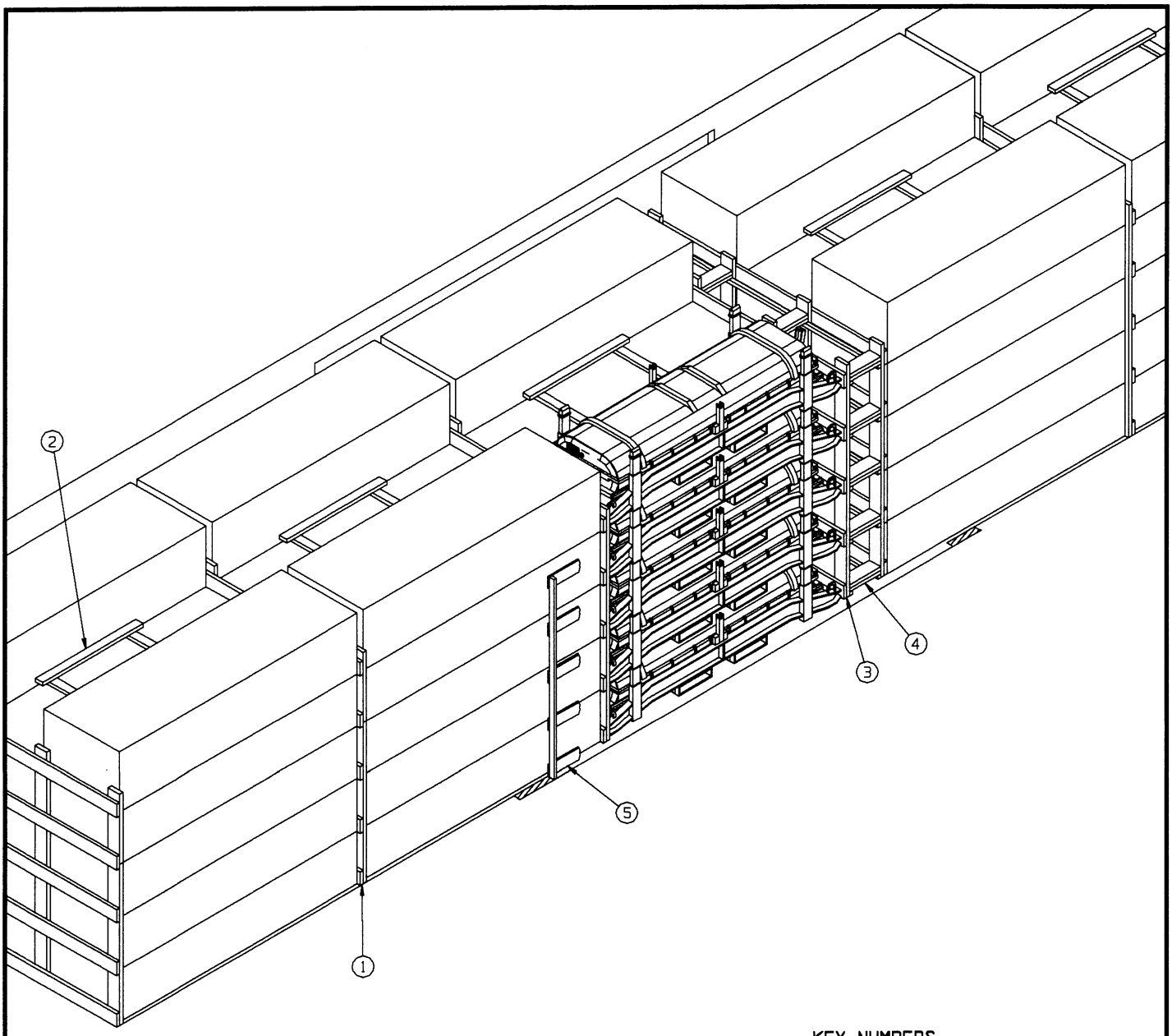
7. THE DEPICTED LOAD CAN BE REDUCED BY MULTIPLES OF 15 CRADLES TO SUIT THE QUANTITY TO BE SHIPPED BY OMITTING ONE, TWO, OR MORE TOP LAYERS. MULTIPLES OF FIVE CRADLES CAN BE OMITTED BY INSTALLING ANTI-SWAY BRACES IN PLACE OF THE CENTER ROW OF CRADLES IN ONE OR MORE LAYERS. ONE CRADLE CAN BE OMITTED BY EMPLOYING THE PROCEDURES ON PAGE 20. FOR OTHER METHODS OF REDUCING A LOAD, REFER TO THE TYPICAL LCL PROCEDURES ON PAGES 19 THRU 25 FOR GUIDANCE.

| BILL OF MATERIAL | | |
|---|---|---|
| LUMBER | LINEAR FEET | BOARD FEET |
| 1" X 6"<br>2" X 2"<br>2" X 3"<br>2" X 4"<br>2" X 6" | 160<br>93<br>62<br>4<br>616 | 80<br>31<br>16<br>3<br>616 |
| NAILS | NO. REQD | POUNDS |
| 6d (2")<br>10d (3")<br>12d (3-1/4") | 120<br>572<br>108 | 3/4<br>9<br>2 |

## LOAD AS SHOWN

| ITEM | QUANTITY | WEIGHT (APPROX) |
|---|---|---|
| CRADLE | 75 | 109,125 LBS |
| DUNNAGE | | 1,562 LBS |
| TOTAL WEIGHT | | 110,687 LBS (APPROX) |

75-UNIT LOAD IN A 50'-6" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR




ISOMETRIC VIEW

## KEY NUMBERS

(1) SEPARATOR GATE B (5 REQD). SEE THE DETAIL ON PAGE 16. POSITION THE GATES AT THE ENDS OF THE CAR SO THE HORIZONTAL PIECES ARE AGAINST THE CAR ENDWALL. POSITION THE GATES BETWEEN LOAD UNITS SO THE HORIZONTAL PIECES ARE AGAINST THE ALREADY-LOADED CRADLES. SEE GENERAL NOTES "K" AND "L" ON PAGE 2.

(2) ANTI-SWAY BRACE (5 REQD). SEE THE DETAIL ON PAGE 17. INSTALL BETWEEN LATERALLY ADJACENT CRADLES IN THE TOP LAYER. SEE SPECIAL NOTE 4 ON PAGE 11.

(3) CENTER GATE C (2 REQD). SEE THE DETAIL ON PAGE 16.

(4) STRUT, 2" X 6" BY CUT TO FIT (REF: 20") (DOUBLED) (20 REQD). LAMINATE W/1-10d NAIL EVERY 6". TOENAIL TO THE CENTER GATES, PIECES MARKED (3), W/2-12d NAILS AT EACH END. SEE GENERAL NOTES "T" AND "U" ON PAGE 3. SEE SPECIAL NOTE 7 ON PAGE 11.

(5) DOORWAY PROTECTION (2 REQD). SEE THE DETAIL ON PAGE 15. SEE SPECIAL NOTE 8 ON PAGE 11.



70-UNIT LOAD IN A 50'-6" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR

SPECIAL NOTES:

1. A 70-UNIT LOAD IS SHOWN IN A 50'-6" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR EQUIPPED WITH 16'-0" WIDE BY 9'-11" HIGH (MINIMUM) THRU DOOR OPENINGS. CARS OF OTHER LENGTHS AND WIDTHS AND CARS HAVING OTHER SIZE DOOR OPENINGS CAN BE USED.

2. THE DEPICTED LOAD IS SHOWN IN A CAR EQUIPPED WITH 16'-0" WIDE THRU DOOR OPENINGS. THE LOADING PATTERN IS ALSO APPLICABLE FOR A LOAD IN A CAR EQUIPPED WITH 15'-0" OR 16'-0" WIDE STAGGERED DOORS, HOWEVER, LOADING WILL BE DIFFICULT. CARS WITH THRU DOORS LESS THAN 12'-0" WIDE WILL NOT LEAVE ROOM FOR THE LOADING CREW TO EXIT THE CAR AFTER INSTALLING THE CENTER GATES AND STRUTS, PIECES MARKED ③ AND ④, AND WILL NOT BE USED.

3. THE PROCEDURES FOR THE ADJUSTMENT OF A LOAD QUANTITY BY THE OMISSION OF THE CENTER ROW OF CRADLES FROM THE TOP LAYER OF A 5-HIGH LOAD ARE SHOWN AS TYPICAL. THE PRINCIPLES MAY ALSO BE APPLIED FOR THE OMISSION OF THE CENTER ROW OF CRADLES FROM A 4-HIGH, 3-HIGH, OR 2-HIGH LOAD.

4. THE ANTI-SWAY BRACES, PIECES MARKED ②, ARE TO BE USED IN THE ENTIRE LENGTH OF A ROW IN THE LAYER IN WHICH THEY ARE INSTALLED. THE ANTI-SWAY BRACES MAY BE USED IN TWO LAYERS, IF DESIRED, TO OBTAIN A DESIRED QUANTITY. A LAYER SHOULD BE OMITTED RATHER THAN USING ANTI-SWAY BRACES IN THREE LAYERS.

5. A QUANTITY OF 84 OR 78 CRADLES CAN BE LOADED IN A 60'-8" LONG BY USING ANTI-SWAY BRACES IN THE PLACE OF ONE OR TWO OMITTED ROWS OF CRADLES. THE DEPICTED 70-UNIT LOAD IN A 50'-6" LONG CAR CAN BE REDUCED TO 65 CRADLES BY OMITTING THE CENTER ROW OF THE FOURTH LAYER. IF A 40'-6" CAR IS FURNISHED FOR LOADING, 42 CRADLES CAN BE SHIPPED BY USING THE DEPICTED PROCEDURES. A LOAD IN A 40'-6" CAR IS NOT AN EFFICIENT LOAD AND SHOULD NOT BE USED UNLESS NECESSARY.

6. IF CRADLES ARE FURNISHED IN UNIT LOADS OF TWO, AS SHOWN BY NAVAL WEAPONS HANDLING LABORATORY DRAWING WR-54/168, THEY MAY BE SHIPPED. IF INDIVIDUAL CRADLES ARE FURNISHED FOR LOADING, IT IS NOT NECESSARY TO FORM UNIT LOADS PRIOR TO SHIPMENT.

7. IF DESIRED, 4" X 6" STRUTS MAY BE USED IN LIEU OF THE SPECIFIED DOUBLED 2" X 6" STRUTS, PIECES MARKED ③.

8. DOORWAY PROTECTION, PIECES MARKED ⑤, ARE REQUIRED FOR ALL LOAD UNITS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOOR OPENING BY ONE-HALF OR MORE OF THE LOAD UNIT (CONTAINER LENGTH). IF THE CAR IS EQUIPPED WITH PLUG DOORS, REFER TO THE PROCEDURES ON PAGES 12 AND 13 FOR GUIDANCE.

9. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED BY OMITTING ONE, TWO, OR MORE TOP LAYERS. ONE CONTAINER CAN BE OMITTED BY EMPLOYING THE PROCEDURES ON PAGE 20. FOR OTHER METHODS OF REDUCING A LOAD, REFER TO THE TYPICAL LCL PROCEDURES ON PAGES 19 THRU 25 FOR GUIDANCE.

| BILL OF MATERIAL | | |
|---|---|---|
| LUMBER | LINEAR FEET | BOARD FEET |
| 1" X 6" | 160 | 80 |
| 2" X 2" | 93 | 31 |
| 2" X 3" | 62 | 16 |
| 2" X 4" | 87 | 58 |
| 2" X 6" | 616 | 616 |
| NAILS | NO. REQD | POUNDS |
| 6d (2") | 120 | 3/4 |
| 10d (3") | 632 | 9-3/4 |
| 12d (3-1/4") | 108 | 2 |

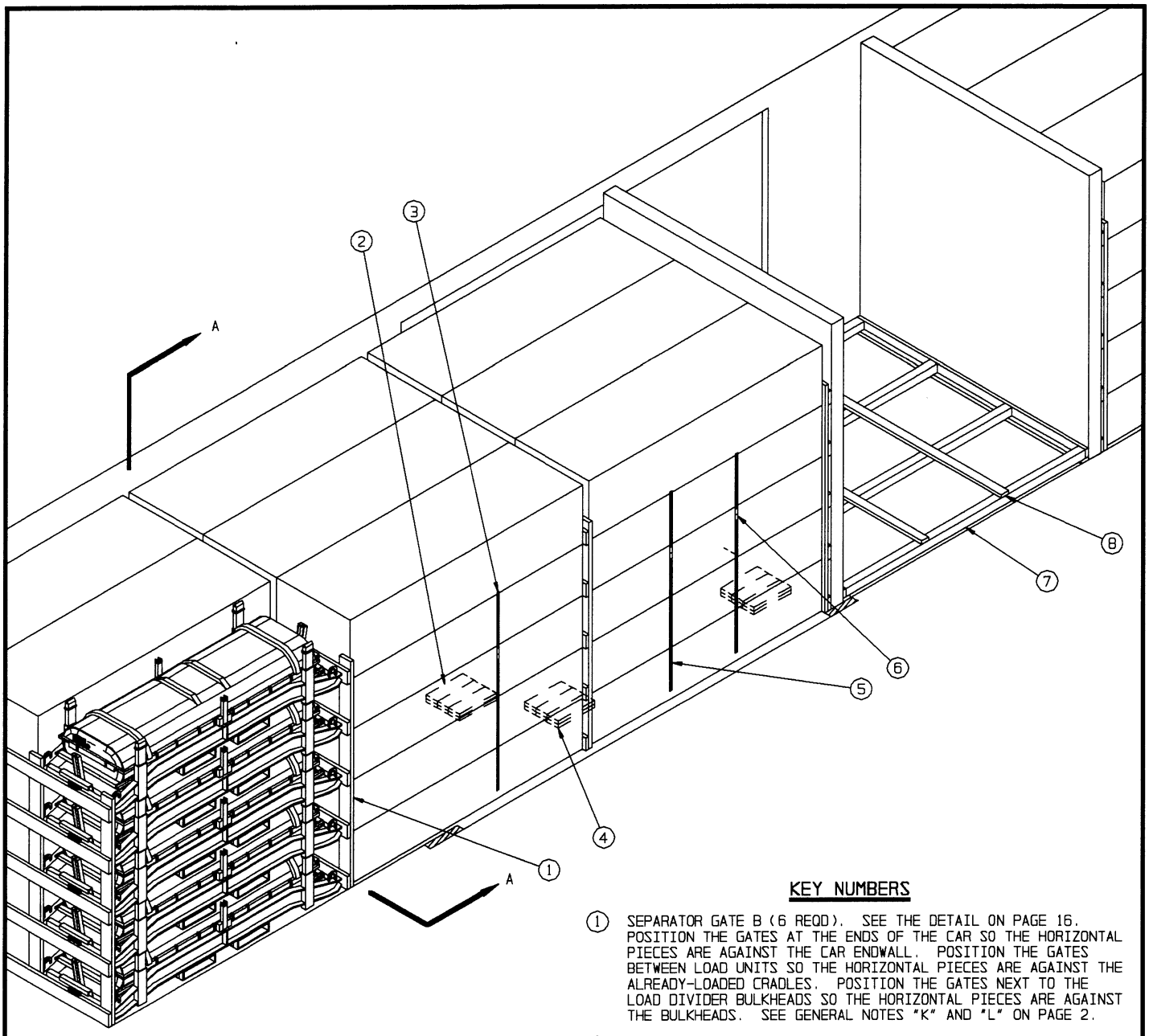
## LOAD AS SHOWN

| ITEM | QUANTITY | WEIGHT (APPROX) |
|---|---|---|
| CRADLE | 70 | 101,850 LBS |
| DUNNAGE | | 1,615 LBS |
| TOTAL WEIGHT | | 103,465 LBS (APPROX) |

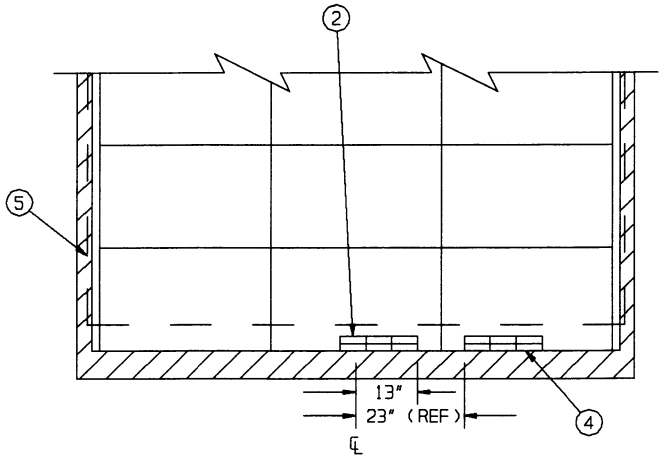
70-UNIT LOAD IN A 50'-6" LONG BY 9'-4" WIDE CONVENTIONAL BOXCAR



PROJECT SP 243-92




ISOMETRIC VIEW




SECTION A-A

## KEY NUMBERS

(1) SEPARATOR GATE B (6 REQD). SEE THE DETAIL ON PAGE 16. POSITION THE GATES AT THE ENDS OF THE CAR SO THE HORIZONTAL PIECES ARE AGAINST THE CAR ENDWALL. POSITION THE GATES BETWEEN LOAD UNITS SO THE HORIZONTAL PIECES ARE AGAINST THE ALREADY-LOADED CRADLES. POSITION THE GATES NEXT TO THE LOAD DIVIDER BULKHEADS SO THE HORIZONTAL PIECES ARE AGAINST THE BULKHEADS. SEE GENERAL NOTES "K" AND "L" ON PAGE 2.

(2) DOORWAY BLOCKING, 2" X 6" X 18" (DOUBLED) (3 REQD). PRE-POSITION AS SHOWN SO AS TO BE APPROXIMATELY 5" FROM THE ENDS OF THE CRADLE AND LATERALLY AS SHOWN BY THE "SECTION A-A" VIEW BELOW. NAIL THE FIRST PIECE TO THE CAR FLOOR W/4-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE SPECIAL NOTE 5 ON PAGE 13. SEE GENERAL NOTE "R" ON PAGE 3.

(3) BUNDLING STRAP, 1-1/4" X .035" OR .031" X 35'-0" LONG STEEL STRAPPING (1 REQD). NOTE: THIS STRAP MUST BE INSTALLED AS LOADING PROGRESSES. INSTALL STRAP SO AS TO EXTEND THRU THE FORK TINE OPENING OF THE BOTTOM CRADLES AND THRU THE FORK TINE OPENINGS OF THE TOP CRADLES TO FORM A COMPLETE LOOP AROUND ALL CRADLES. SEE SPECIAL NOTE 5 ON PAGE 13.

(4) DOORWAY BLOCKING, 2" X 6" X 18" (DOUBLED) (6 REQD). PRE-POSITION 5" FROM THE ENDS OF THE CRADLES AND LATERALLY AS SHOWN BY THE "SECTION A-A" VIEW AT LEFT, THREE PIECES AT EACH LOCATION. NAIL THE FIRST PIECE TO THE CAR FLOOR W/4-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE GENERAL NOTE "R" ON PAGE 3. SEE SPECIAL NOTE 5 ON PAGE 13.

(5) BUNDLING STRAP, 1-1/4" X .035" OR .031" X 35'-0" LONG STEEL STRAPPING (2 REQD). INSTALL TO EXTEND THRU THE FORK TINE OPENINGS OF THE BOTTOM CRADLES AND THRU THE FORK TINE OPENINGS OF THE TOP CRADLES TO FORM A COMPLETE LOOP AROUND ALL THE CRADLES IN THE DOORWAY.

(CONTINUED ON PAGE 13)



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

(KEY NUMBERS FROM PAGE 12 CONTINUED)

⑥ SEAL FOR 1-1/4" STEEL STRAPPING (6 REQD, 2 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "M" ON PAGE 2 AND THE "END-OVER-END LAP JOINT DETAILS" ON PAGE 17.

⑦ STRUT ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 26. INSTALL BETWEEN THE LOAD DIVIDER BULKHEADS. SEE GENERAL NOTE "EE" ON PAGE 4.

⑧ STRUT BRACING, 2" X 4" BY CAR WIDTH MINUS 1/2" (2 REQD). POSITION AS SHOWN AND NAIL TO THE STRUTS OF THE STRUT ASSEMBLY W/3-10d NAILS AT EACH JOINT.

SPECIAL NOTES:

1. A 60-UNIT LOAD IS SHOWN IN A 50'-6' LONG BY 9'-4" WIDE CUSHIONED BOXCAR EQUIPPED WITH LOAD DIVIDER BULKHEADS AND HAVING 15'-0" WIDE BY 9'-11" HIGH (MINIMUM) STAGGERED PLUG DOOR OPENINGS. CARS OF OTHER LENGTHS AND WIDTHS CAN BE USED, AND CARS EQUIPPED WITH SLIDING DOORS CAN BE USED.

2. THE DEPICTED LOAD IS SHOWN IN A CAR EQUIPPED WITH 15'-0" WIDE STAGGERED DOOR OPENINGS. CARS HAVING 16'-0" WIDE STAGGERED OR THRU DOOR OPENINGS CAN BE USED. CARS HAVING 12'-0" WIDE TO 16'-0" WIDE THRU DOOR OPENINGS CAN BE USED. THE LOADING PATTERN SHOWN IS APPLICABLE REGARDLESS OF DOOR SIZE OR CONFIGURATION. CARS WITH THRU DOORS LESS THAN 12'-0" WIDE WILL NOT LEAVE ROOM FOR THE LOADING CREW TO EXIT THE CAR AFTER INSTALLING THE STRUT ASSEMBLY AND STRUT BRACING, PIECES MARKED ⑦ AND ⑧, AND WILL NOT BE USED.

3. A MAXIMUM OF 75 CRADLES CAN BE LOADED IN A 60'-8" LONG CAR USING THE DEPICTED PROCEDURES. CARS WITH DOORS WIDTHS FROM 10'-0" WIDE TO 16'-0" THRU DOORS OR CARS WITH STAGGERED DOOR OPENINGS CAN BE USED. IF A 40'-6" LONG CAR IS FURNISHED FOR LOADING, 45 CRADLES CAN BE LOADED IN CARS WITH 10'-0" OR WIDER THRU DOORS OR IN CARS WITH STAGGERED DOOR OPENINGS.

4. IF CRADLES ARE FURNISHED IN UNIT LOADS OF TWO AS SHOWN BY NAVAL WEAPONS HANDLING LABORATORY DRAWING WR-54/168, THEY MAY BE SHIPPED. IF INDIVIDUAL CRADLES ARE FURNISHED FOR LOADING, IT IS NOT NECESSARY TO FORM UNIT LOADS PRIOR TO SHIPMENT.

5. DOORWAY PROTECTION, PIECES MARKED ② THRU ⑥, ARE REQUIRED FOR ALL LOAD UNITS WHICH ARE COMPLETELY WITHIN THE DOORWAY OR WHICH EXTEND INTO THE DOORWAY BY ONE-HALF OR MORE OF THE CRADLE LENGTH ON EITHER SIDE OF THE CAR. TWO SETS OF DOORWAY BLOCKING, STRAPS AND SEALS ARE REQUIRED IF 6" OR LESS OF THE CRADLE IS IN CONTACT WITH THE CAR SIDEWALL; ONE SET IS REQUIRED IF FROM 6" TO ONE-HALF THE CRADLE IS IN CONTACT WITH THE CAR SIDEWALL.

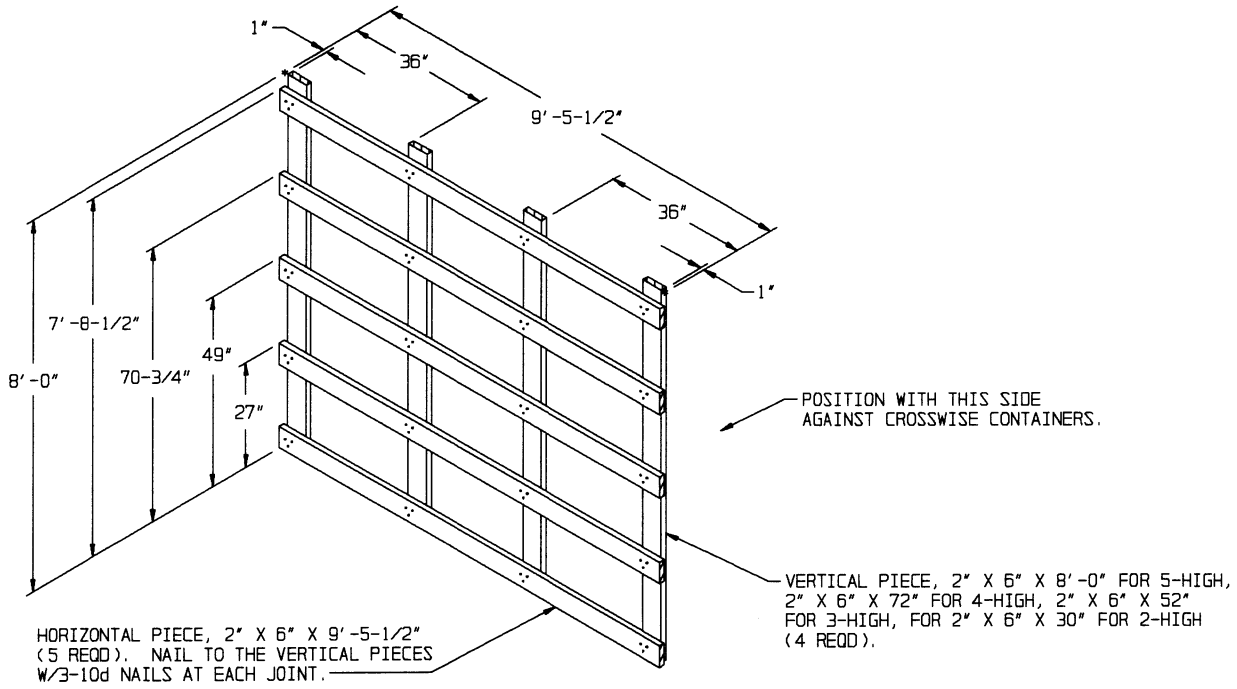
6. THE DEPICTED LOAD CAN BE REDUCED TO SUIT THE QUANTITY TO BE SHIPPED. THE LOAD CAN BE REDUCED BY MULTIPLES OF 15 CRADLES BY OMITTING LOAD UNITS. THE LOAD CAN BE REDUCED BY MULTIPLES OF SIX OR NINE CRADLES BY OMITTING ONE, TWO, OR MORE TOP LAYERS FROM ONE OR BOTH ENDS OF THE LOAD. THE LOAD CAN BE REDUCED BY EITHER TWO, THREE, FOUR OR SIX CRADLES BY INSTALLING ANTI-SWAY BRACES IN THE SHORT OR LONG END OF THE LOAD IN ONE OR TWO LAYERS. ONE CONTAINER CAN BE OMITTED BY EMPLOYING THE PROCEDURES ON PAGE 20.

| BILL OF MATERIAL | | |
|---|---|---|
| LUMBER | LINEAR FEET | BOARD FEET |
| 1" X 8"<br>2" X 4"<br>2" X 6"<br>4" X 4" | 18<br>56<br>472<br>41 | 12<br>38<br>472<br>55 |
| NAILS | NO. REQD | POUNDS |
| 6d (2")<br>10d (3")<br>12d (3-1/4")<br>16d (3-1/2") | 18<br>402<br>16<br>48 | NIL<br>6-1/4<br>1/2<br>1-1/4 |
| STEEL STRAPPING, 1-1/4" - - 105' REQD - - - - 15 LBS<br>SEAL FOR 1-1/4" STRAPPING - - 6 REQD - - - - - NIL | | |

**LOAD AS SHOWN**

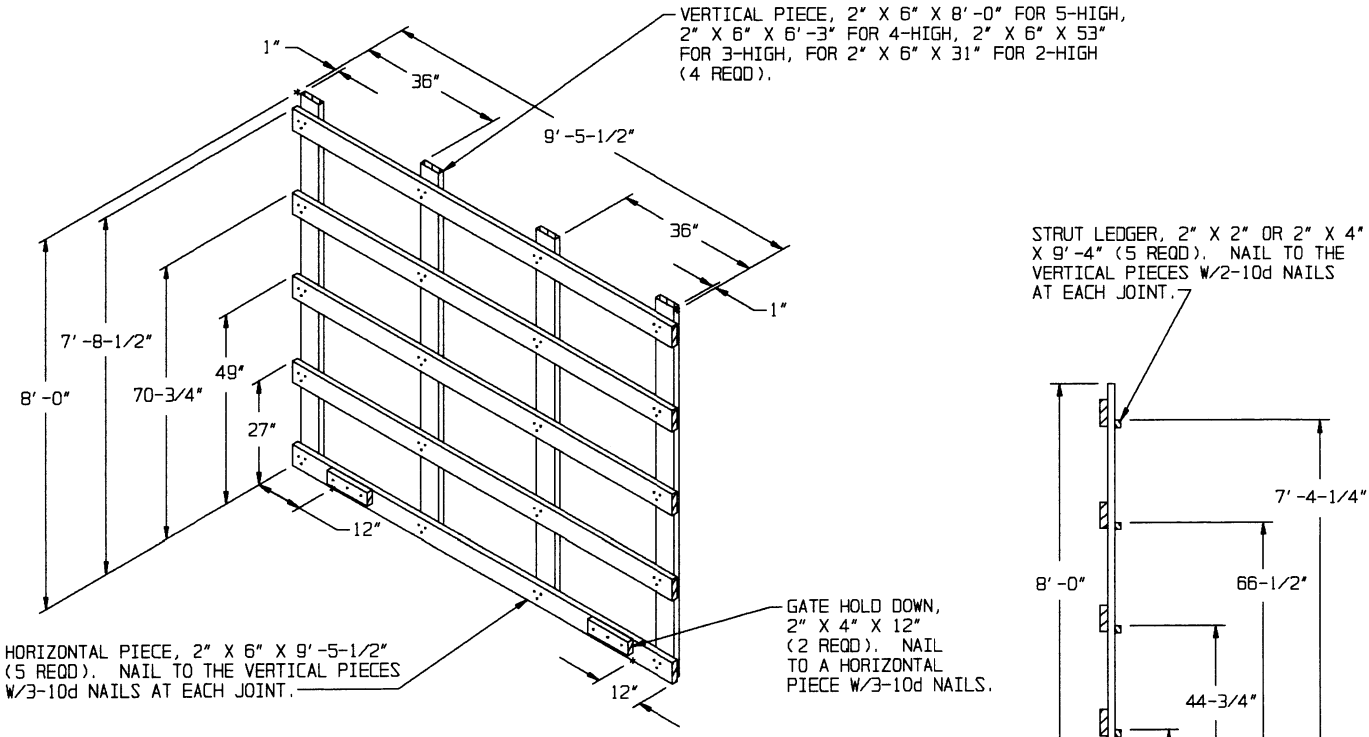
| ITEM | QUANTITY | WEIGHT (APPROX) |
|---|---|---|
| CRADLE | 60 | 87,300 LBS |
| DUNNAGE | | 1,177 LBS |
| TOTAL WEIGHT | | 88,477 LBS (APPROX) |

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




## SEPARATOR GATE A

FOR THE LOAD ON PAGE 6.

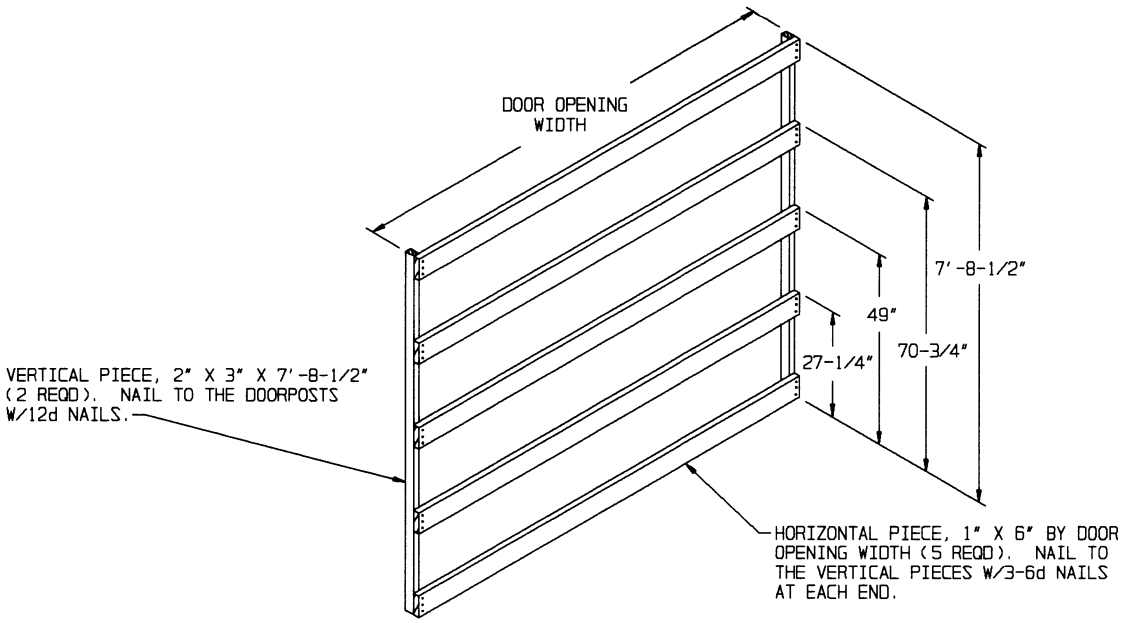



## CENTER GATE A

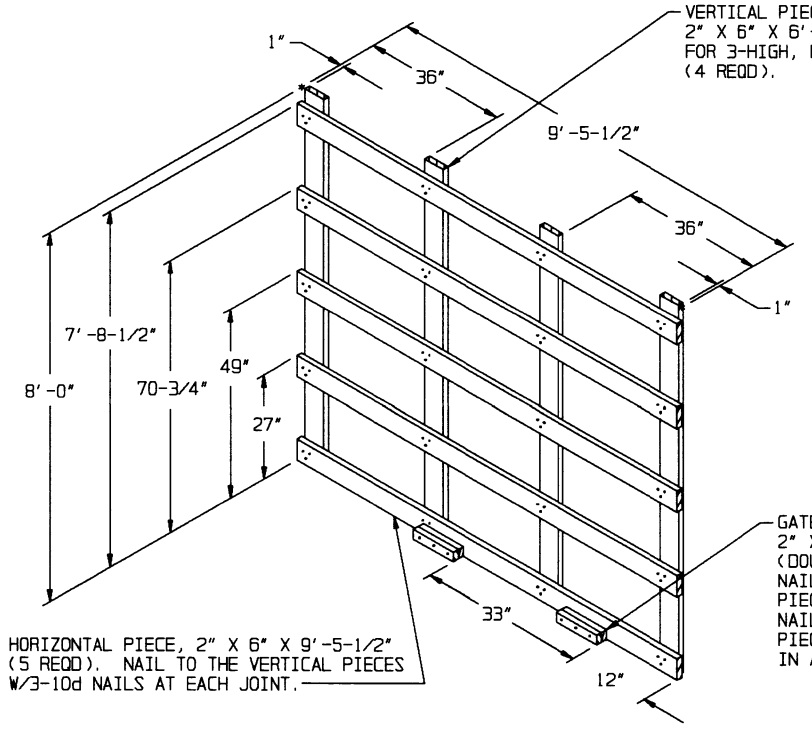
FOR THE LOAD ON PAGE 6.




## END VIEW

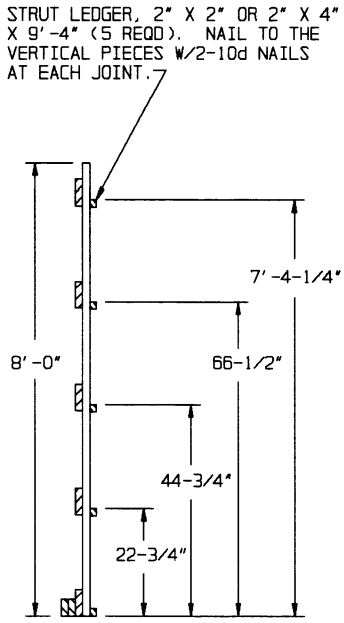



DOORWAY PROTECTION

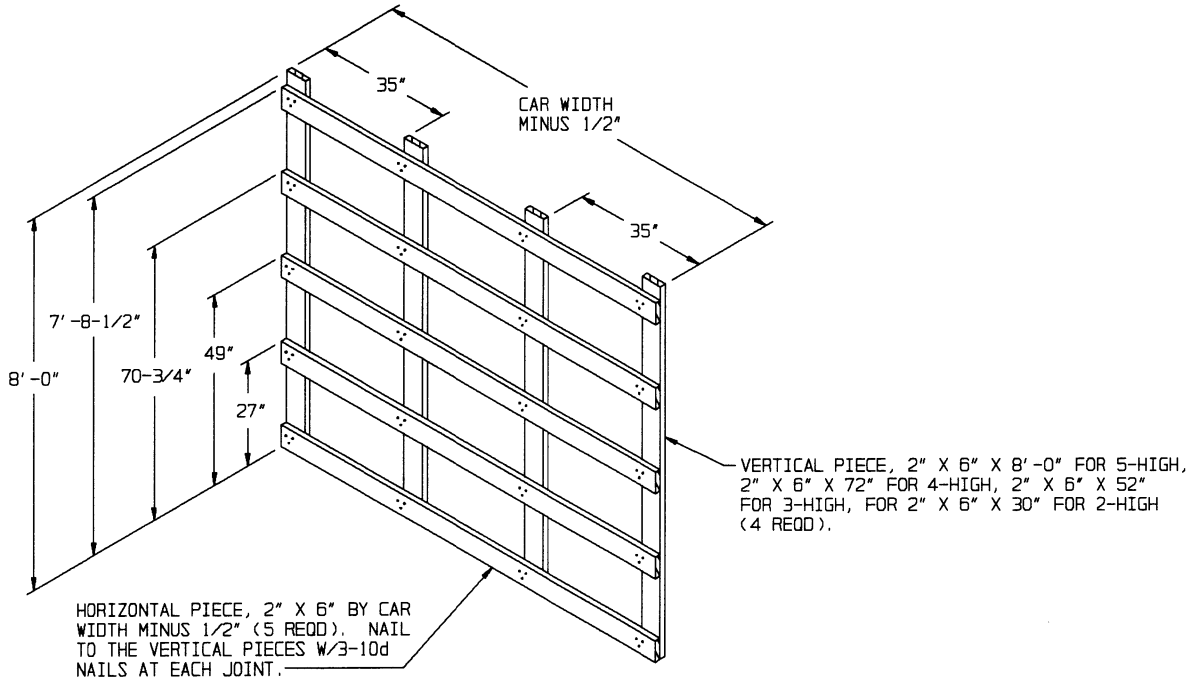



CENTER GATE B

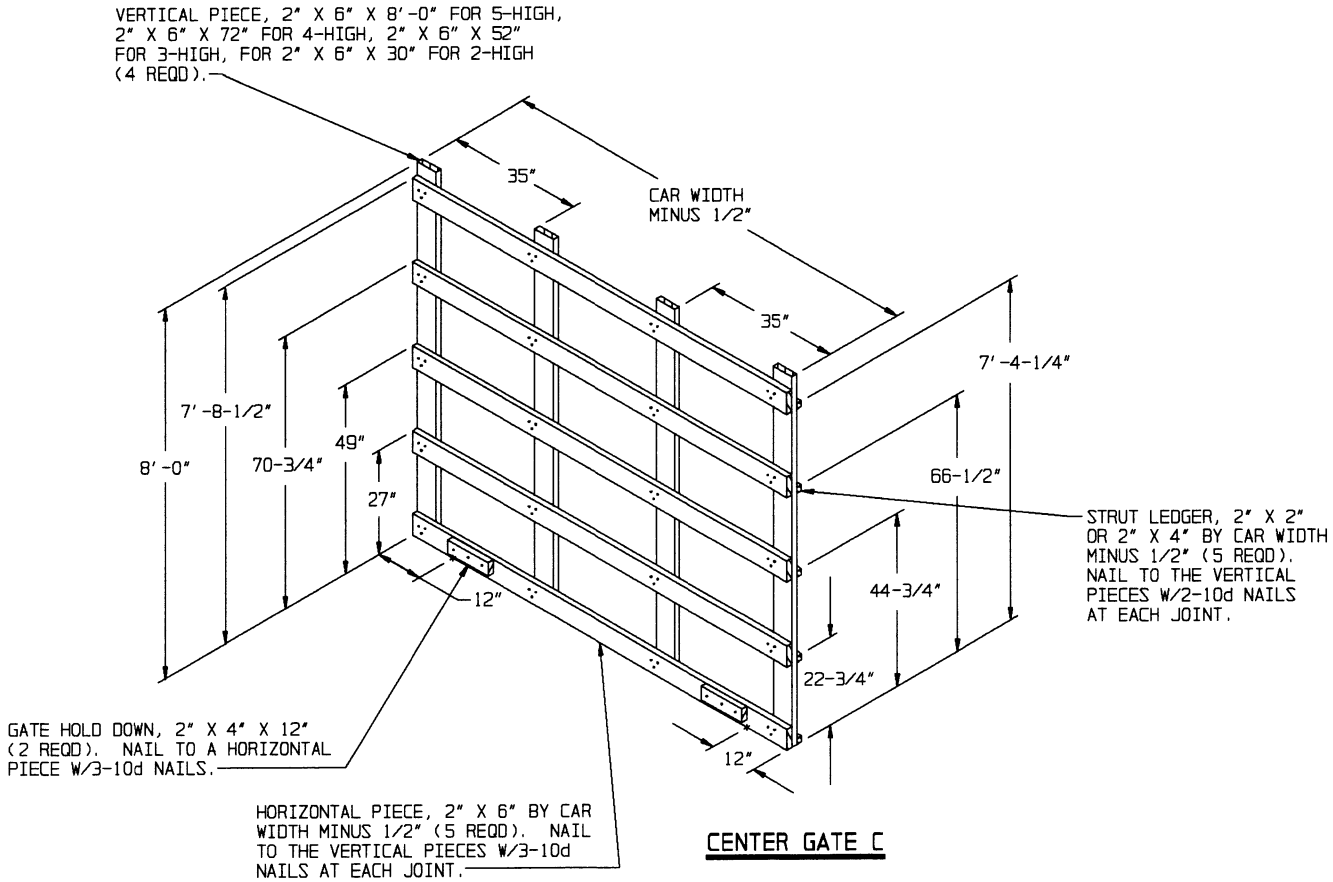
FOR THE LOAD ON PAGE 6.



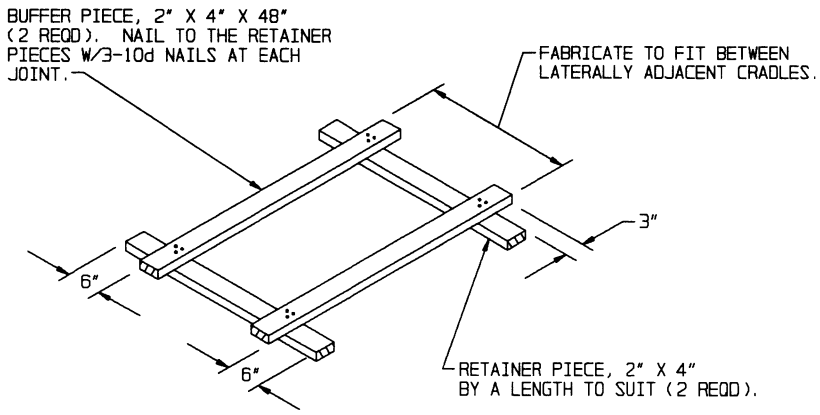

END VIEW



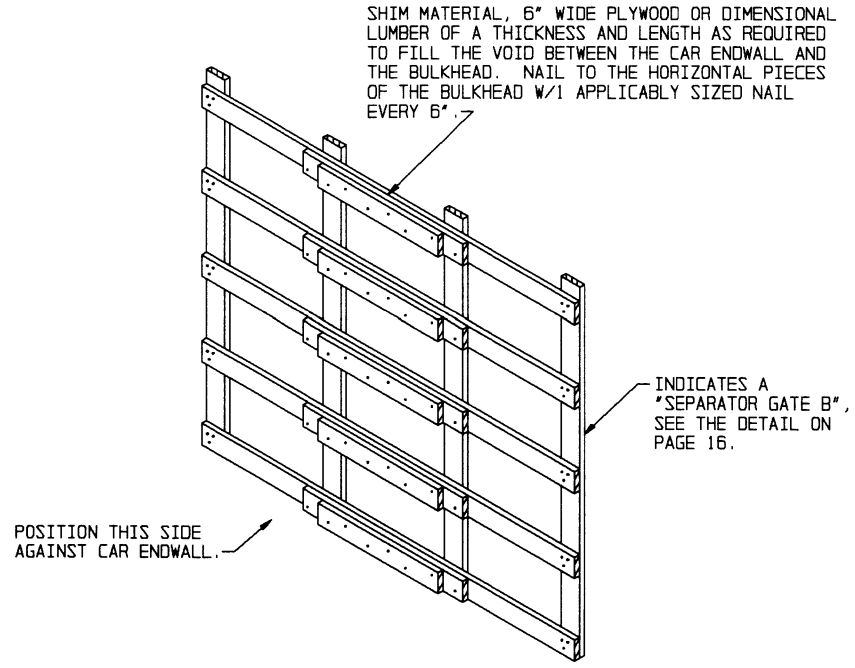

SEPARATOR GATE B



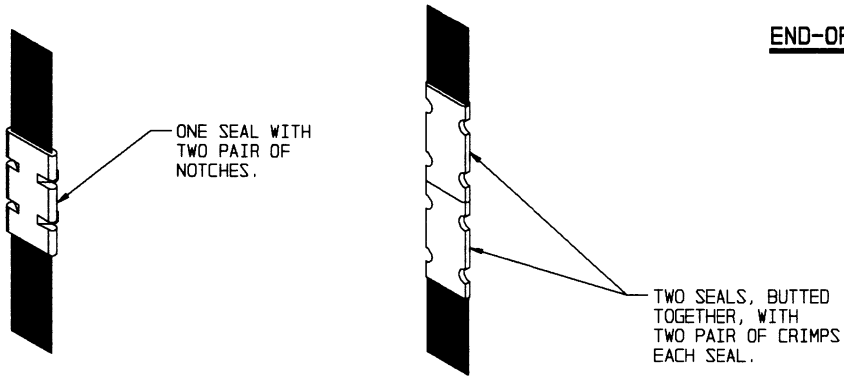

CENTER GATE C




ANTI-SWAY BRACE




END-OF-CAR BULKHEAD



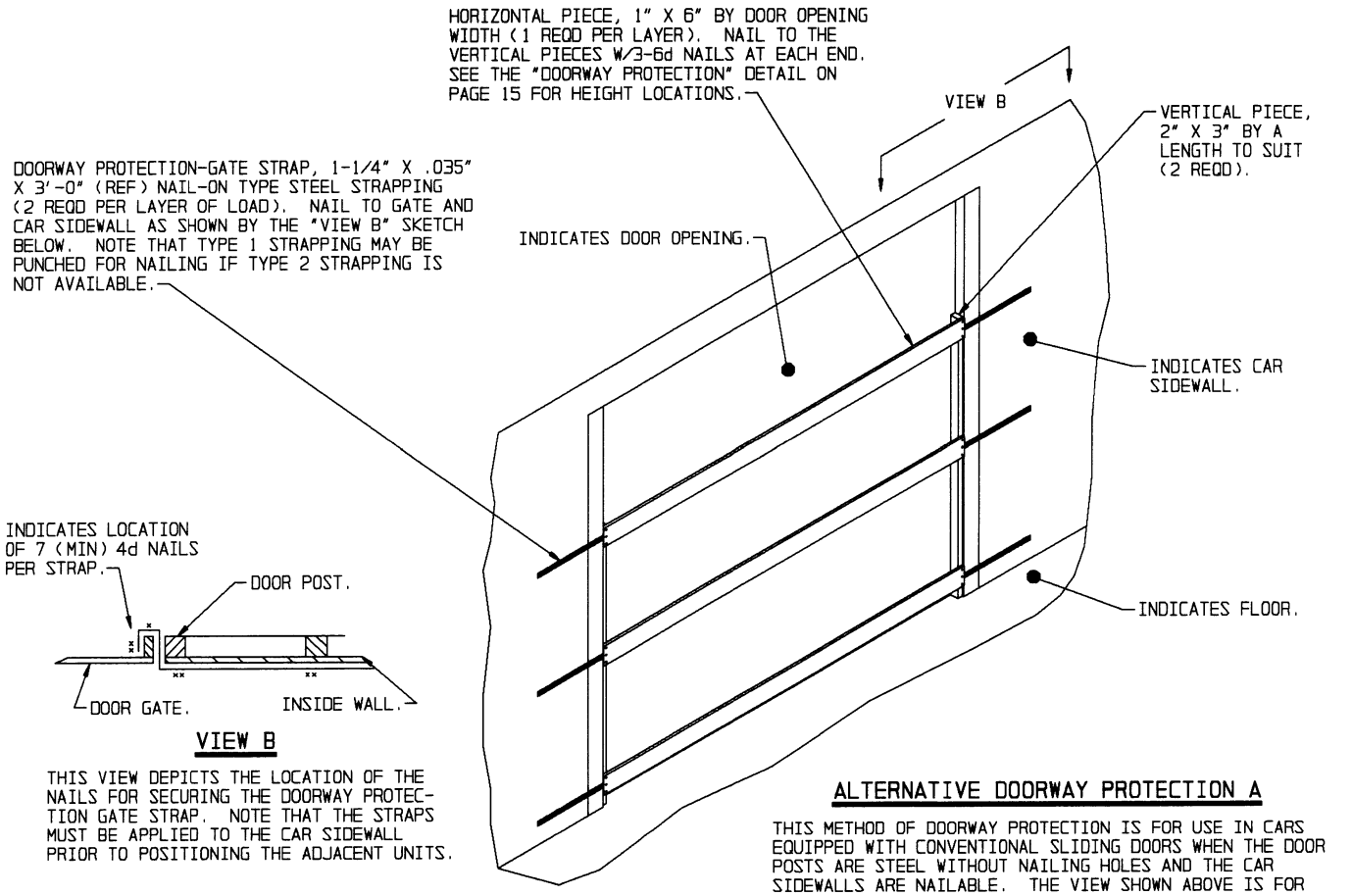

**STRAP JOINT A**

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

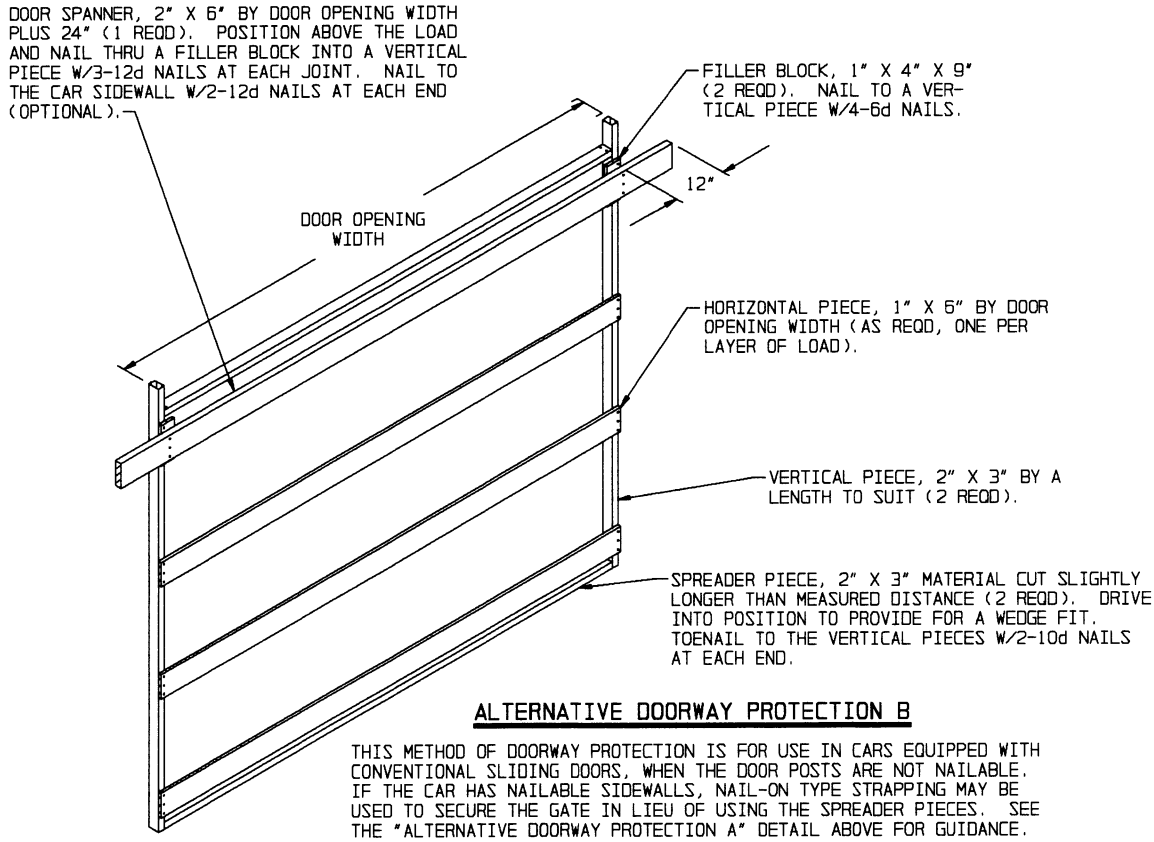



## VIEW B

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 A

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 NAILABLE. THE VIEW SHOWN ABOVE IS FOR A THREE-LAYER LOAD. ADJUST THE QUANTITIES OF HORIZONTAL PIECES AND DOORWAY PROTECTION GATE STRAPS.

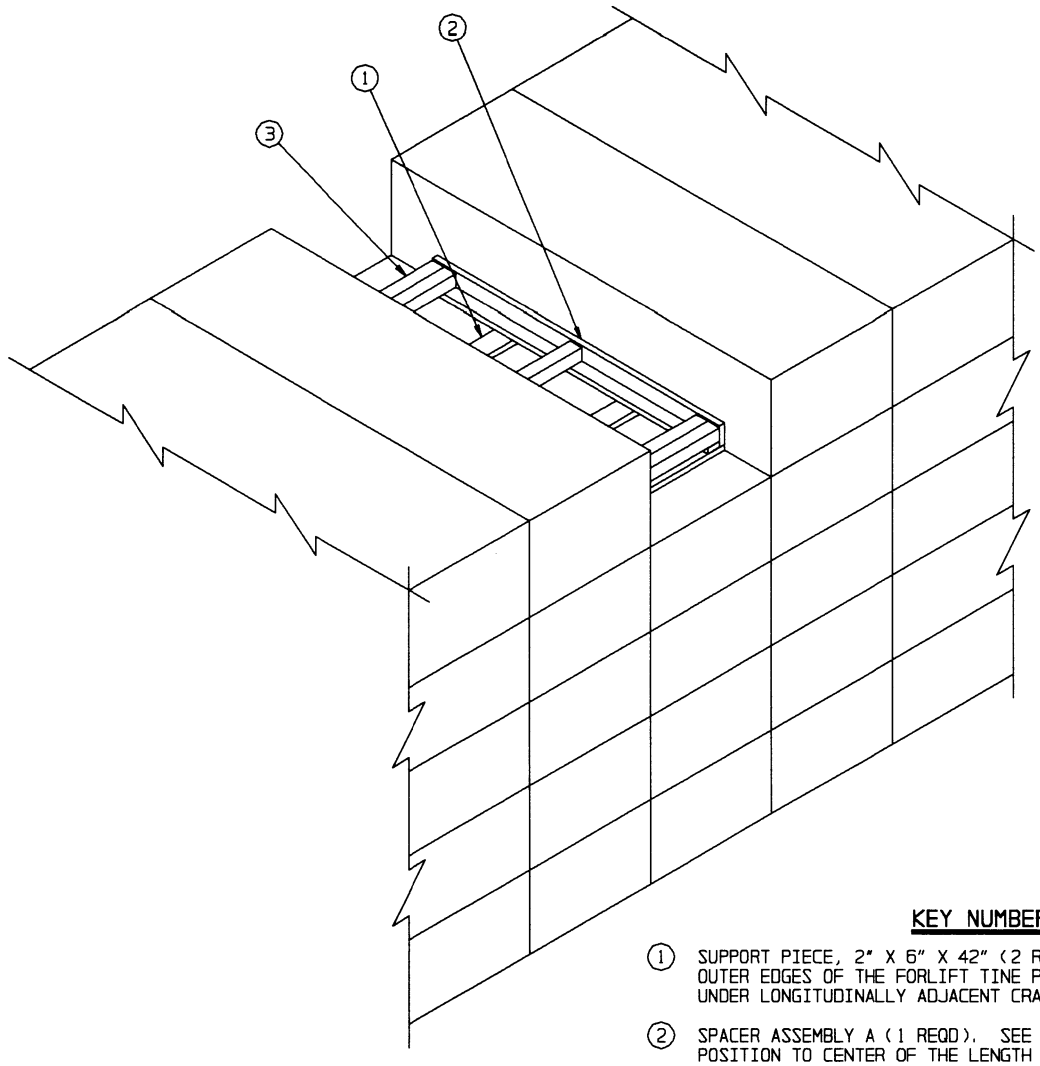



## ALTERNATIVE DOORWAY PROTECTION B

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 A" DETAIL ABOVE FOR GUIDANCE.



# ALTERNATIVE DOORWAY PROTECTION DETAILS




ISOMETRIC VIEW

## KEY NUMBERS

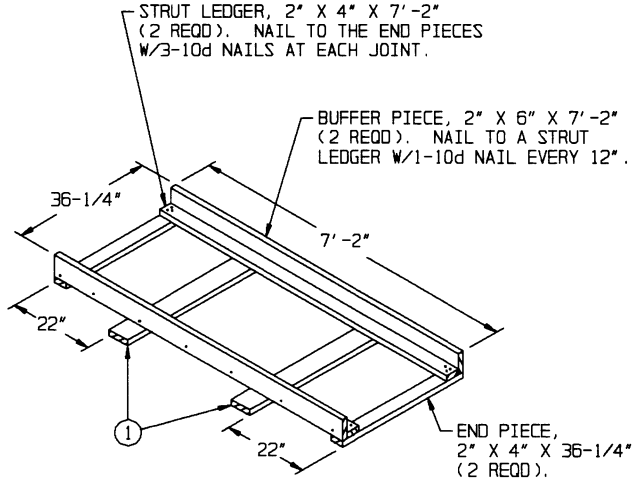
① SUPPORT PIECE, 2" X 6" X 42" (2 REQD). PRE-POSITION AT THE OUTER EDGES OF THE FORLIFT TINE POCKETS AND TO EXTEND 6" UNDER LONGITUDINALLY ADJACENT CRADLES.

② SPACER ASSEMBLY A (1 REQD). SEE THE DETAIL BELOW. POSITION TO CENTER OF THE LENGTH OF THE CRADLES. NAIL TO THE SUPPORT PIECES, PIECES MARKED ①, W/3-10d NAILS AT EACH JOINT. SEE GENERAL NOTES "K" AND "L" ON PAGE 2.

③ STRUT, 4" X 4" X 33-1/4" (5 REQD). POSITION TWO AT EACH END OF THE SPACER ASSEMBLY, PIECE MARKED ②, AND ONE AT THE CENTER. TOENAIL TO THE SPACER ASSEMBLY W/2-16d NAILS AT EACH END.

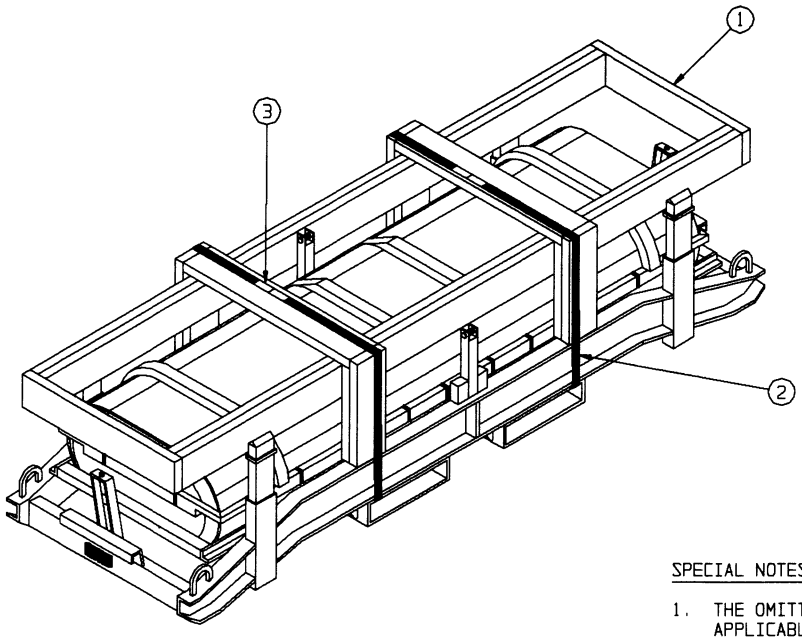
SPECIAL NOTES:

1. A PARTIAL VIEW OF A 9'-6" WIDE CONVENTIONAL BOXCAR IS SHOWN. NARROWER CARS CANNOT BE USED.
2. THIS PROCEDURE IS APPLICABLE ONLY FOR THE OMISSION OF A CRADLE FROM THE CROSSWISE LOAD SHOWN ON PAGE 6. DO NOT USE WITHIN THE CRADLES-LENGTHWISE PORTION OF THAT LOAD OR WITHIN THE LOADS ON PAGES 8, 10, OR 12. REFER TO PAGE 20 FOR GUIDANCE IN THE OMISSION OF A CRADLE FROM THE LOADS ON PAGES 8, 10, OR 12.
3. A CROSSWISE-POSITIONED CRADLE OMITTED FROM THE TOP LAYER OF A 5-LAYER LOAD IS SHOWN AS TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR THE OMISSION OF A TOP-LAYER CRADLE FROM OTHER HEIGHT LOADS.
4. THE OMITTED CRADLE PROCEDURES SHOULD BE APPLIED NEAR THE CENTER OF THE CAR LENGTH IN THE LONG LOAD END OF THE CAR. ALSO, THERE MUST BE AT LEAST ONE CRADLE BETWEEN THE OMITTED CRADLE AND THE CENTER GATE.
5. ONLY THE BLOCKING AND BRACING FOR THE OMITTED CRADLE IS SHOWN. REFER TO PAGE 6 FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.




SPACER ASSEMBLY A

INSTALLATION OF SPACER ASSEMBLY A




## KEY NUMBERS

(1) SPACER ASSEMBLY B (1 REQD). SEE THE DETAIL BELOW. SEE GENERAL NOTES "K" AND "L" ON PAGE 2. SEE SPECIAL NOTE 2 BELOW.

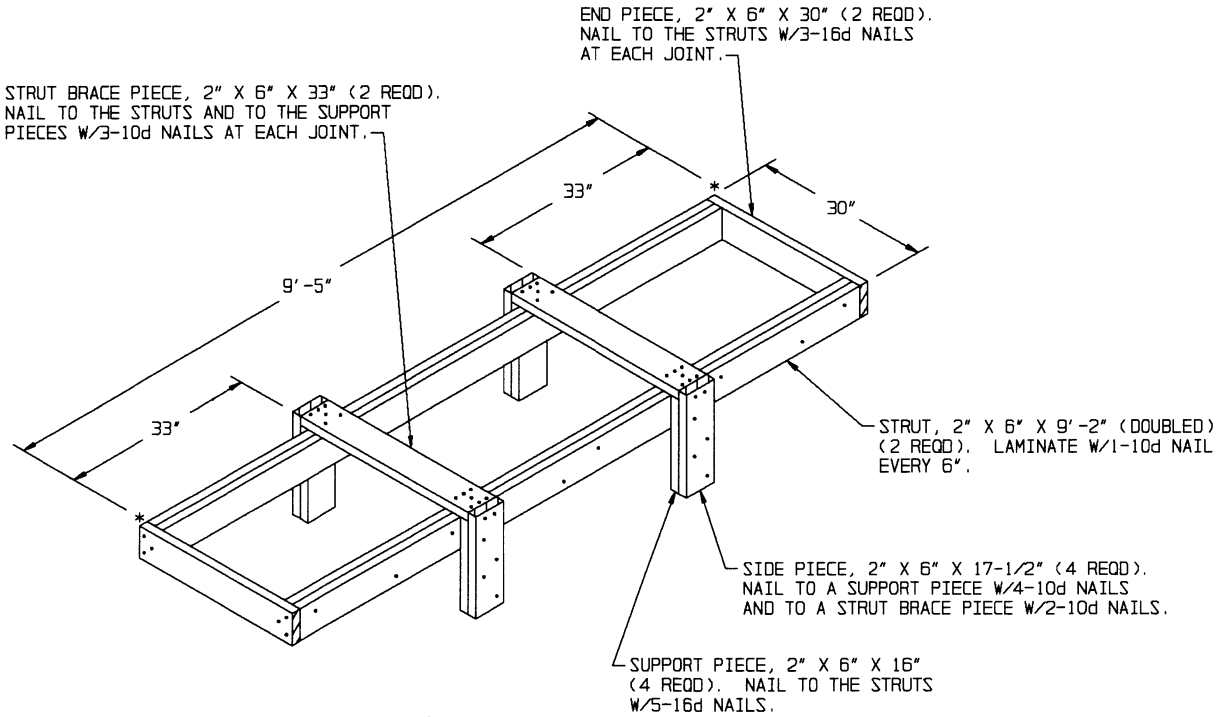
(2) SPACER STRAP, 1-1/4" X .035" OR .031" X 11'-6" STEEL STRAPPING (2 REQD). POSITION THRU THE FORK TINE POCKETS ON THE CRADLE AND EXTEND OVER THE SPACER ASSEMBLY B TO FORM A COMPLETE LOOP.

(3) SEAL FOR 1-1/4" STEEL STRAPPING (4 REQD, 2 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "M" ON PAGE 2 AND THE "END-OVER-END LAP JOINT DETAILS" ON PAGE 17.

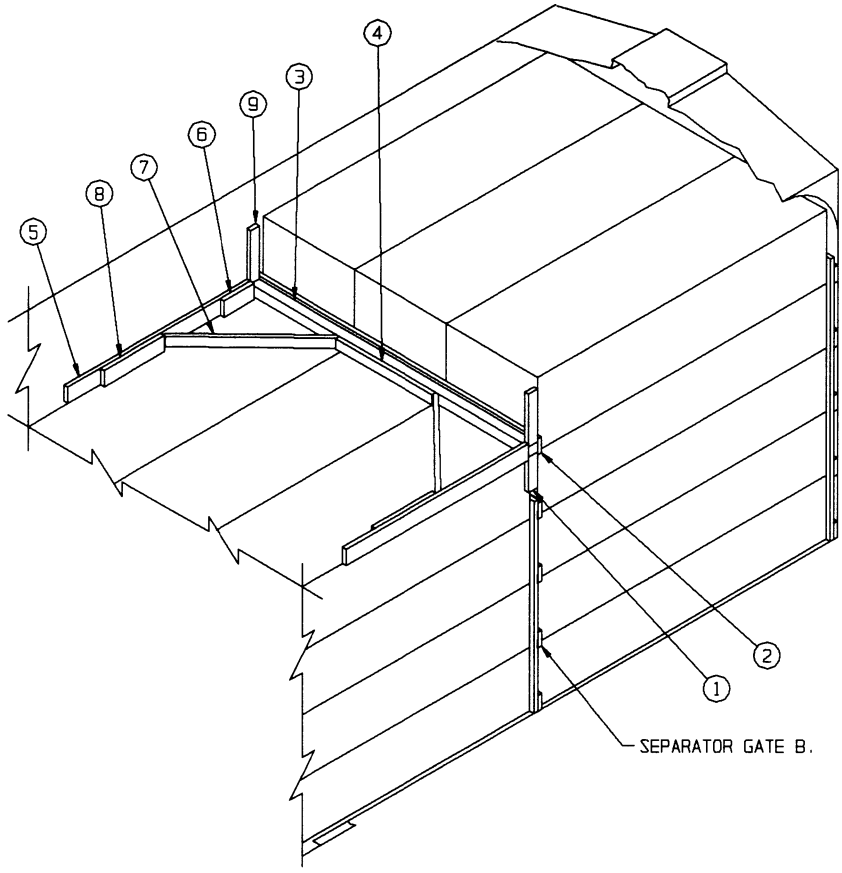
## INSTALLATION OF SPACER ASSEMBLY B

SPECIAL NOTES:

1. THE OMITTED CRADLE PROCEDURES SHOWN ON THIS PAGE ARE APPLICABLE FOR THE OMISSION OF A CRADLE FROM THE CRADLES-LENGTHWISE LOADS SHOWN ON PAGES 8, 10, AND 12. THESE PROCEDURES ARE NOT TO BE USED IN THE LOAD SHOWN ON PAGE 6.
2. THE SPACER ASSEMBLY B IS TO BE USED ONLY IN THE TOP LAYER AND IS TO BE ATTACHED TO A CRADLE PRIOR TO BEING LOADED INTO THE CAR.
3. THE OMITTED CRADLE PROCEDURES SHOULD BE APPLIED NEAR THE CENTER OF THE CAR LENGTH NEXT TO THE CENTER GATE. NOTE THAT THE SEPARATOR GATE B WHICH IS NEXT TO THE SPACER ASSEMBLY B MUST BE POSITIONED SO THE HORIZONTAL PIECES ARE ON THE CENTER-OF-CAR SIDE, ADJACENT TO THE SPACER ASSEMBLY B.
4. ONLY THE BLOCKING AND BRACING FOR THE OMITTED CRADLE IS SHOWN. REFER TO PAGE 8, 10, OR 12 FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.




## SPACER ASSEMBLY B




ISOMETRIC VIEW

SPECIAL NOTES:

1. A 9'-4" WIDE WOOD-LINED (SIDEWALLS) CONVENTIONAL BOXCAR IS SHOWN WITH A TYPICAL K-BRACE. WOOD-LINED CARS OF OTHER WIDTHS (9'-2" 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 THRU A FIFTH TIER. THE TYPE "A" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN APPROXIMATELY 4,000 POUNDS. THIS WILL BE NOT MORE THAN THREE CRADLES.

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 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 OR 36" FOR A 9'-2" CAR.

5. THE PARTIAL TIER CAN BE REDUCED BY ONE CRADLE BY INSTALLING AN ANTI-SWAY BRACE BETWEEN THE TWO OUTER CRADLES. SEE THE DETAIL ON PAGE 17 AND PAGE 10 FOR A TYPICAL INSTALLATION.

KEY NUMBERS

① SUPPORT CLEAT, 2" X 4" X 12" (2 REQD). POSITION VERTICALLY AS SHOWN SO AS TO CENTER THE LOAD BEARING PIECE, PIECE MARKED ②, ON THE ENDS OF THE CRADLE FRAME. NAIL TO THE CAR SIDEWALL W/4-12d NAILS. SEE GENERAL NOTES "K" AND "L" ON PAGE 2.

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 38" (1 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/7-16d NAILS. SEE SPECIAL NOTE 4 AT LEFT.

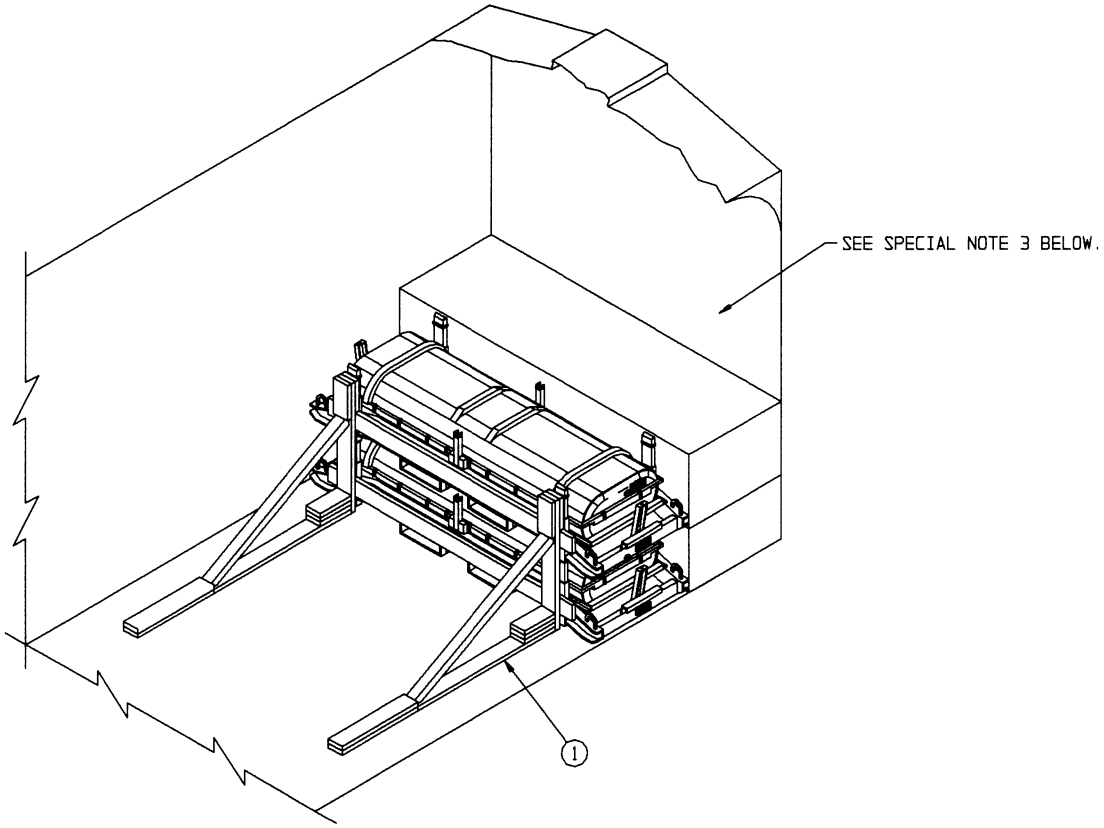
⑤ HORIZONTAL WALL CLEAT, 2" X 6" X 72" (2 REQD). NAIL TO THE CAR SIDEWALL W/16-12d NAILS.

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). DOUBLE BEVEL EACH END WITH 45° CUTS. 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.




ISOMETRIC VIEW

SPECIAL NOTES:

1. A 4-UNIT CROSSWISE LOAD IS SHOWN IN A 9'-6" WIDE CONVENTIONAL BOXCAR. CARS NARROWER THAN 9'-5-1/2" CANNOT BE USED FOR CROSSWISE-POSITIONED CRADLES.

2. THE KNEE BRACE ASSEMBLY WITH TWO "KNEES", AS SHOWN, IS ADEQUATE FOR RETAINING A MAXIMUM LCL LOAD OF NOT MORE THAN 8,500 POUNDS. THIS WILL BE NOT MORE THAN FIVE CRADLES. IF ANOTHER "KNEE" IS ADDED TO ALIGN WITH THE CENTER OF THE CRADLE, A LOAD OF 12,750 POUNDS, OR EIGHT CRADLES, CAN BE RETAINED.

3. IF DESIRED IN 9'-6" WIDE CARS, OR AS NECESSARY IN NARROWER CARS, CRADLES MAY BE POSITIONED LONGITUDINALLY. WHEN LOADING LONGITUDINALLY, AT LEAST ONE MORE "KNEE" MUST BE ADDED IF LOADING THREE CRADLES WIDE. SEE THE DETAILS ON PAGE 24 FOR GUIDANCE. A KNEE BRACE ASSEMBLY WITH THREE "KNEES" IS ADEQUATE FOR RETAINING A MAXIMUM LCL LOAD OF NOT MORE THAN 12,750 POUNDS, OR EIGHT CRADLES. AN ASSEMBLY WITH FOUR "KNEES" IS ADEQUATE FOR 17,000 POUNDS, OR 11 CRADLES. NOTE THAT THE ADDED "KNEES" SHOULD BE POSITIONED TO ALIGN WITH THE ENDS OF THE CRADLE FRAME.

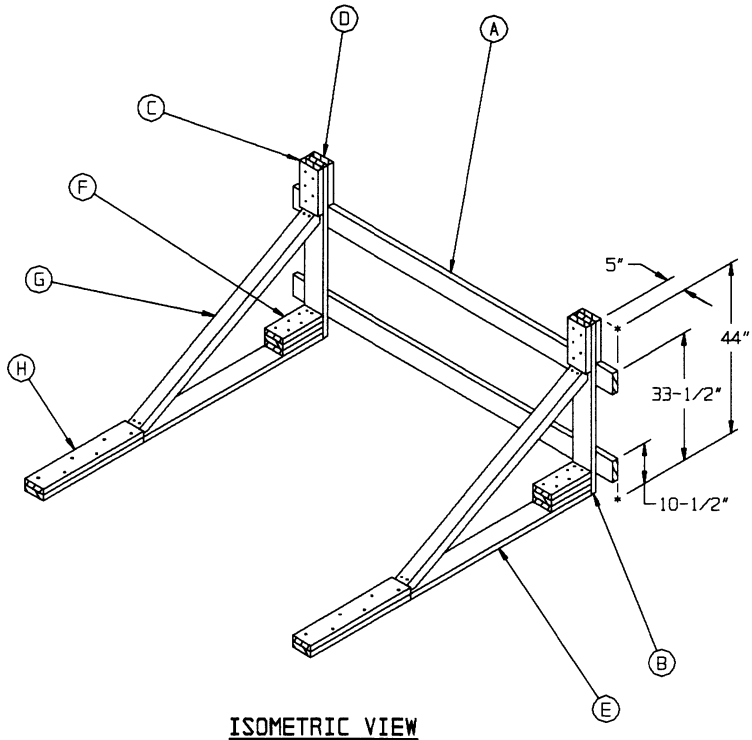
4. KNEE BRACED LOADS ARE LIMITED TO NOT MORE THAN TWO LAYERS.

KEY NUMBER

(1) KNEE BRACE ASSEMBLY (1 REQD). SEE THE DETAIL ON PAGE 23 AND SPECIAL NOTE 3 AT LEFT.



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




**ISOMETRIC VIEW**

(FOR CROSSWISE CRADLES)

## KEY LETTERS

(A) LOAD BEARING PIECE, 2" X 6" X 8'-0" (2 REQD). NAIL TO THE VERTICAL PIECES, PIECES MARKED (B), W/3-10d NAILS AT EACH JOINT. SEE GENERAL NOTES "K" AND "L" ON PAGE 2.

(B) VERTICAL PIECE, 2" X 6" X 44" (2 REQD). LOCATE 5" 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.

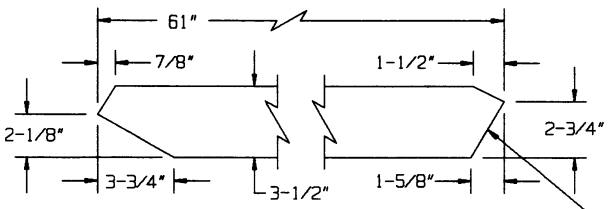
(D) REINFORCING PIECE, 2" X 6" X 10-1/2" (2 REQD). POSITION IN CONTACT WITH PIECE MARKED (A) AND NAIL TO A VERTICAL PIECE, PIECE MARKED (B), W/5-10d NAILS.

(E) FLOOR CLEAT, 2" X 6" X 7'-0" (2 REQD). NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8". SEE GENERAL NOTE "R" 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 TO THE SECOND IN A LIKE MANNER. TOENAIL THE TOP PIECE TO A VERTICAL PIECE, PIECE MARKED (B), W/2-10d NAILS.

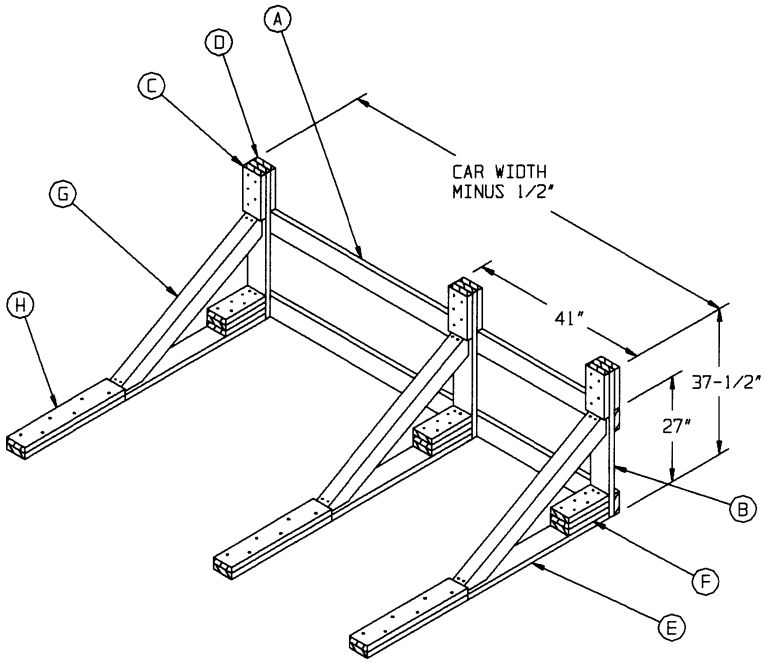
(G) BRACE, 4" X 4" X 61" (2 REQD). SEE THE DETAIL AT LEFT FOR BEVEL CUTS REQUIRED. TOENAIL TO THE VERTICAL PIECE AND TO THE FLOOR CLEAT, PIECES MARKED (B) AND (E), W/2-16d NAILS AT EACH END.

(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)




ISOMETRIC VIEW

(FOR LENGTHWISE CRADLES)

## KEY LETTERS

Ⓐ LOAD BEARING PIECE, 2" X 6" BY CAR WIDTH MINUS 1/2" (2 REQD). NAIL TO THE VERTICAL PIECES, PIECES MARKED Ⓑ, W/3-10d NAILS AT EACH JOINT. SEE GENERAL NOTES "K" AND "L" ON PAGE 2.

Ⓑ VERTICAL PIECE, 2" X 6" X 37-1/2" (3 REQD). LOCATE ONE PIECE 41" FROM THE END OF LOAD BEARING PIECES, PIECES MARKED Ⓐ, AND ONE PIECE AT EACH END. NAIL TO THE FLOOR CLEAT, PIECE MARKED Ⓔ, W/2-16d NAILS.

Ⓒ HOLD-DOWN CLEAT, 2" X 6" X 12" (3 REQD). NAIL TO A VERTICAL PIECE, PIECE MARKED Ⓑ, W/5-10d NAILS.

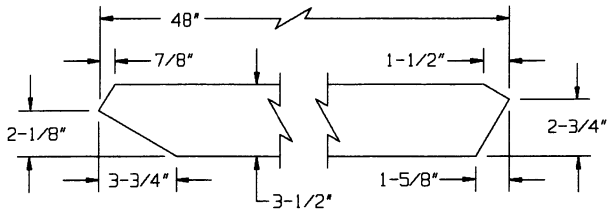
Ⓓ REINFORCING PIECE, 2" X 6" X 10-1/2" (3 REQD). POSITION IN CONTACT WITH PIECE MARKED Ⓐ AND NAIL TO A VERTICAL PIECE, PIECE MARKED Ⓑ, W/5-10d NAILS.

Ⓔ FLOOR CLEAT, 2" X 6" X 72" (3 REQD). NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8". SEE GENERAL NOTE "R" ON PAGE 3.

Ⓕ POCKET CLEAT, 2" X 6" X 12" (TRIPLED) (3 REQD). NAIL THE FIRST PIECE TO A FLOOR CLEAT, PIECE MARKED Ⓔ, W/5-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST AND THE THIRD TO THE SECOND IN A LIKE MANNER. TOENAIL THE TOP PIECE TO A VERTICAL PIECE, PIECE MARKED Ⓑ, W/2-10d NAILS.

Ⓖ BRACE, 4" X 4" X 48" (3 REQD). SEE THE DETAIL AT LEFT FOR BEVEL CUTS REQUIRED. TOENAIL TO THE VERTICAL PIECE AND TO THE FLOOR CLEAT, PIECES MARKED Ⓑ AND Ⓔ, W/2-16d NAILS AT EACH END.

Ⓗ BACK-UP CLEAT, 2" X 6" X 30" (3 REQD). NAIL TO THE FLOOR CLEAT, PIECE MARKED Ⓔ, W/6-40d NAILS.

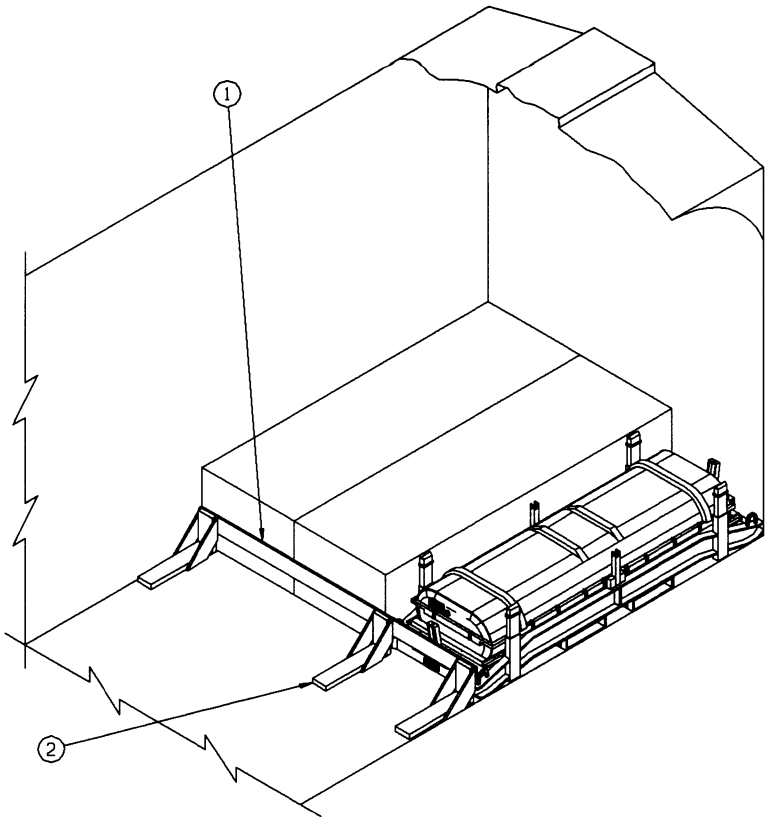



DIAGONAL BRACE

(4" x 4" MATERIAL)



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




ISOMETRIC VIEW

SPECIAL NOTES:

1. A 9'-4" WIDE CONVENTIONAL TYPE BOXCAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS (9'-2" MINIMUM) CAN BE USED.

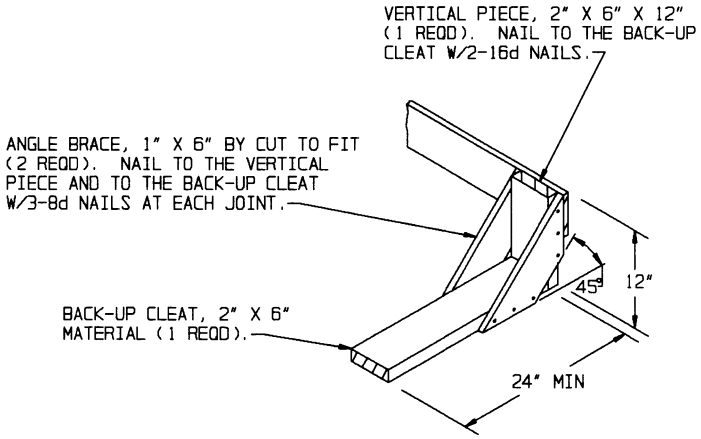
2. IF A 9'-6" WIDE CAR IS FURNISHED FOR LOADING, CRADLES MAY BE POSITIONED CROSSWISE IN THE CAR. THE LCL BRACES WILL THEN BE ALIGNED WITH THE SUPPORT POSTS AND/OR ON THE CENTER OF THE CRADLE IN LIEU OF ALIGNING WITH THE CRADLE FRAME.

3. THREE LCL BRACES AS APPLIED FOR BRACING OF LONGITUDINAL CRADLES WILL RETAIN THREE UNITS. A MINIMUM OF THREE BRACES WILL BE USED FOR THREE LENGTHWISE-POSITIONED CRADLES. TWO LCL BRACES MAY BE USED FOR TWO LENGTHWISE-POSITIONED CRADLES. FIVE CRADLES CAN BE RETAINED WITH FOUR BRACES. IF CRADLES ARE POSITIONED CROSSWISE, TWO BRACES WILL RETAIN THREE CRADLES, THREE BRACES WILL RETAIN FOUR CRADLES, AND FOUR WILL RETAIN FIVE. INSTALL ADDITIONAL LCL BRACES, AS REQUIRED, BASED ON EACH BRACE RETAINING 2,000 POUNDS.

KEY NUMBERS

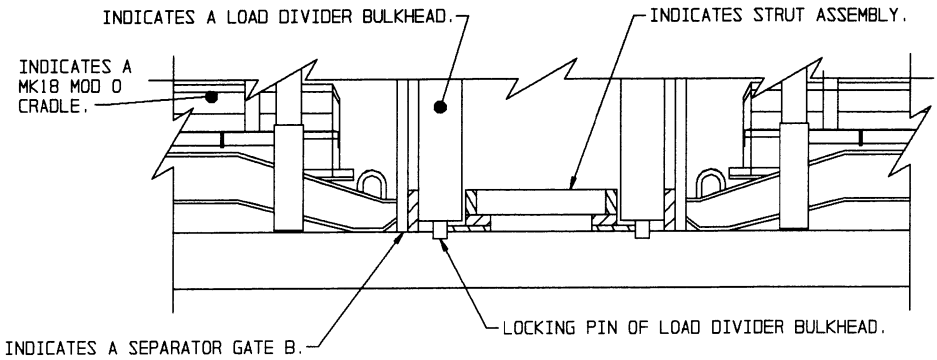
(1) HORIZONTAL PIECE, 1" X 6" BY CAR WIDTH MINUS 1/2" (1 REQD). NAIL TO THE LCL BRACES W/3-6d NAILS AT EACH JOINT. SEE GENERAL NOTE "K" ON PAGE 2.

(2) LCL BRACE (3 REQD). SEE THE DETAIL BELOW. POSITION AS SHOWN, ALIGNED WITH A FRAME MEMBER OF THE CRADLE. NAIL TO THE CAR FLOOR W/7-16d NAILS. SEE GENERAL NOTE "R" ON PAGE 3. SEE SPECIAL NOTE 2 AT LEFT.



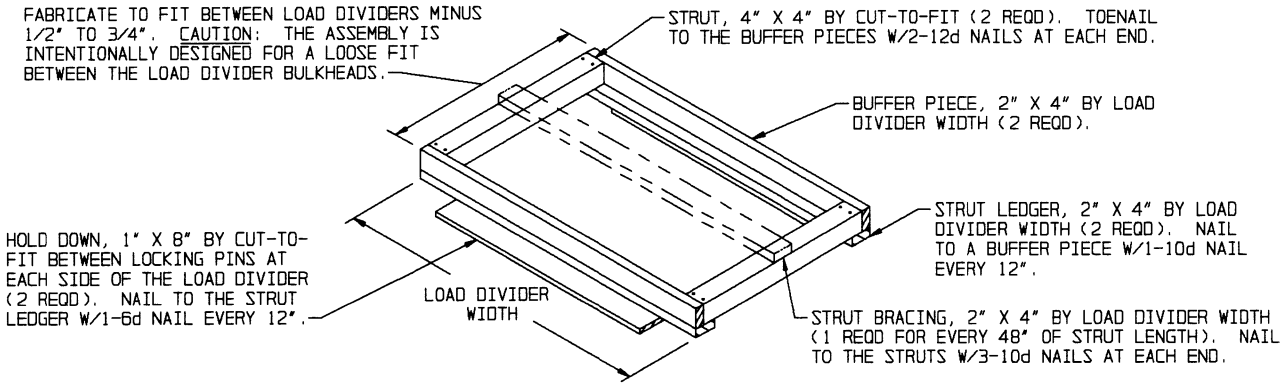

LCL BRACE

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



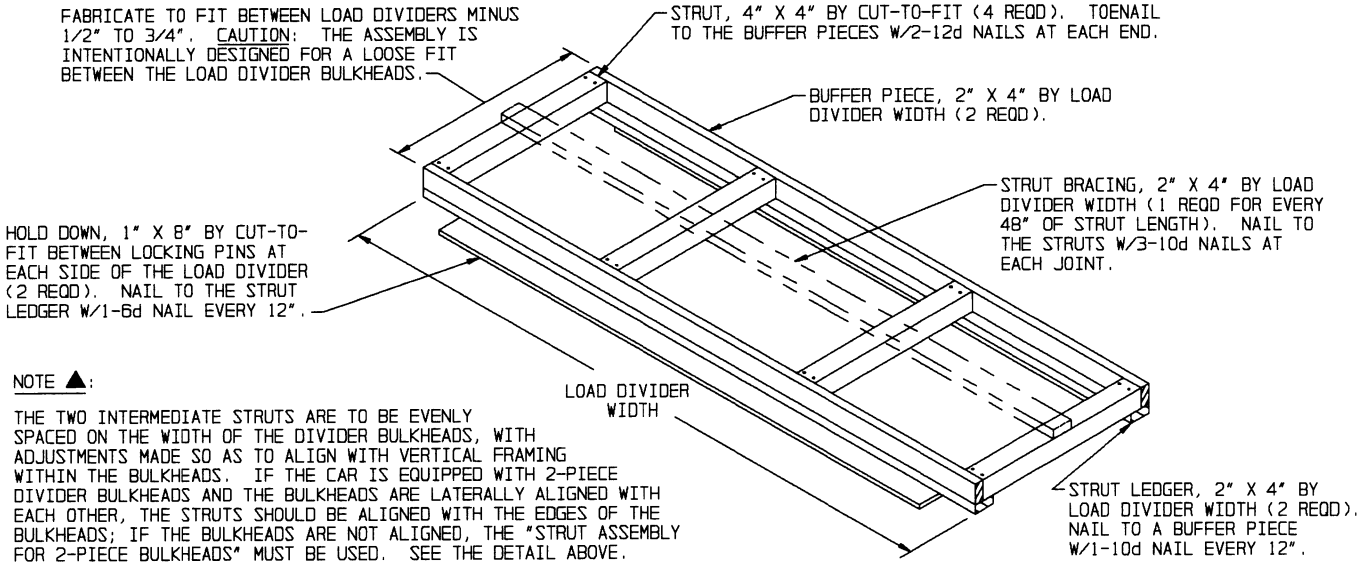

## INSTALLATION OF STRUT ASSEMBLY

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




## STRUT ASSEMBLY FOR 2-PIECE BULKHEADS

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

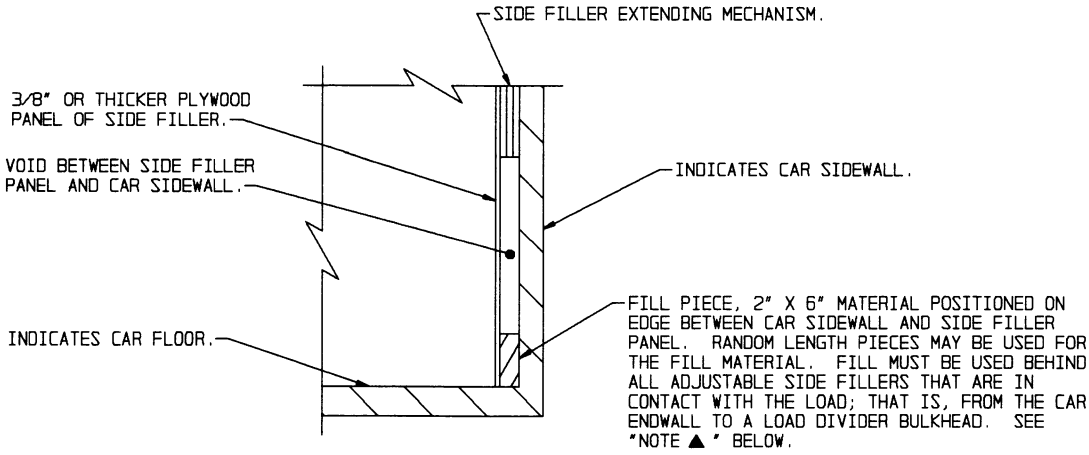



NOTE ▲:

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

## STRUT ASSEMBLY FOR 1-PIECE BULKHEADS

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

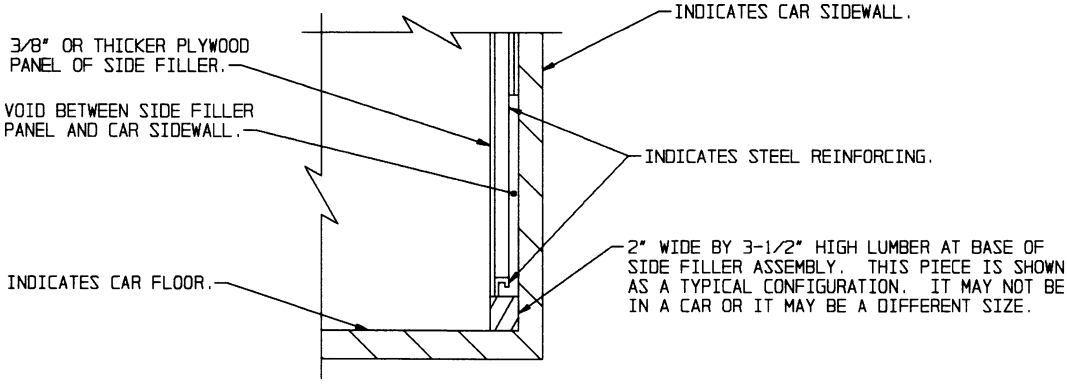



## TYPICAL TYPE A

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

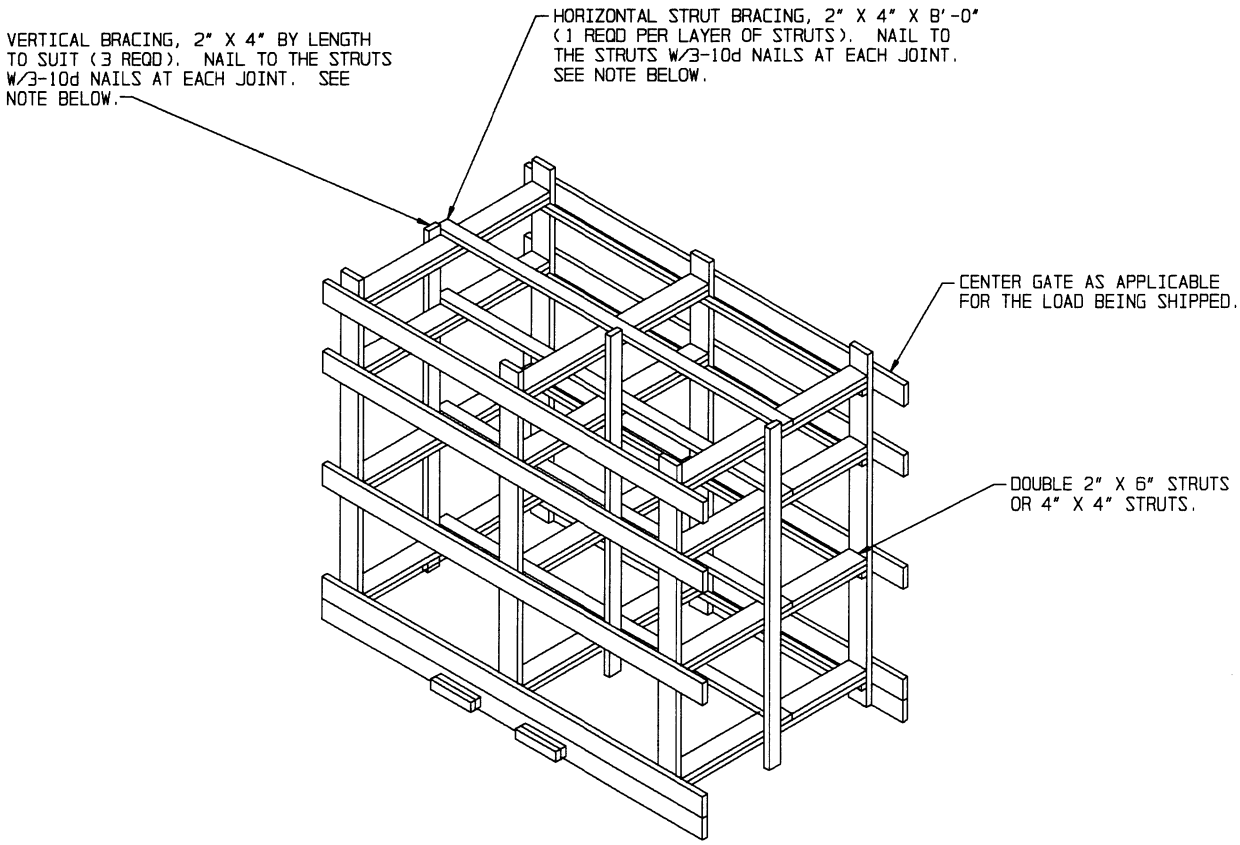
NOTE ▲:

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.




## STRUT BRACING

NOTE: STRUT BRACING IS REQUIRED WHEN STRUTS ARE 48" OR GREATER IN LENGTH. ONE SET OF BRACING IS REQUIRED FOR EVERY 48" OF STRUT LENGTH.