


APPROVED BY  
 BUREAU OF EXPLOSIVES  
*A. F. Krauss*  
 SUPERVISOR, MILITARY & INTERMODAL SERVICES  
 DATE 5/14/75

# LOADING AND BRACING (CL & LCL) IN BOX CARS OF BOXED AMMUNITION AND COMPONENTS ON SKIDDED BASES

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 THIS OUTLOADING PROCEDURE DRAWING INCLUDES PROCEDURES FOR CONVENTIONAL TYPE BOX CARS, BOX CARS EQUIPPED WITH MECHANICAL BRACING DEVICES OF VARIOUS DESIGN AND MANUFACTURE, AND CUSHIONED BOX CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.

THIS DRAWING SUPERSEDES IN PART DRAWING 19-48-4020-1-2-5-11PA1001, DATED 1 DECEMBER 1961, AND THE REVISIONS THERETO.

**DO NOT SCALE**

REVISIONS			DRAFTSMAN <i>RSA</i>	PROJ. ENG. <i>RHA</i>
			CHECKER <i>RSB</i>	LOC. ENGINEERING OFFICE <i>John Johnson</i>
			APPROVED	<i>Robert V. Smith</i> APPROVED BY ORDER OF COMMANDING GENERAL U. S. ARMY MATERIEL COMMAND
				<i>A. H. Ehinger</i> USAMC AMMO CENTER
			<b>U. S. ARMY MATERIEL COMMAND</b>	
			JULY 1975	
			CLASS	DIVISION
			DRAWING	FILE
			19	48
			4123	5PA1003

## 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. THIS DRAWING IS APPLICABLE FOR AMMUNITION ITEMS, OTHER THAN AMMUNITION WITH WHITE PHOSPHOROUS ( WP ) FILLER, PACKED IN WOODEN OR WIREBOUND BOXES RANGING IN LENGTH FROM TWENTY-SEVEN INCHES ( 27" ) TO NINETY-SEVEN INCHES ( 97" ) AND ASSEMBLED ON A SKID BASE.
- C. REFER TO THE APPLICABLE AMC 19-48 SERIES DRAWING FOR TABULAR DATA LISTING OF AMMUNITION ITEMS AND FOR UNITIZATION PROCEDURES.
- D. MATERIAL, DESIGN, AND CONSTRUCTION SPECIFICATIONS FOR THE CURRENT SKID BASES ARE SHOWN IN MIL-S-50786 ( AR ) TITLED, "SKID BASE, WOOD, FOR STORAGE AND SHIPMENT OF BOXED AMMUNITION", OR REVISIONS THERETO. THE SKIDDED UNITS WHICH ARE DETAILED WITHIN THE OUTLOADING PROCEDURES HEREIN ARE SHOWN AS BEING ASSEMBLED ON THE TYPE I SKID BASE. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS ASSEMBLED ON THE TYPE IA OR TYPE II BASE, OR FOR UNITS ASSEMBLED ON A SKID BASE CONSTRUCTED IN ACCORDANCE WITH DRAWING D-AMXSV-4163 AND REVISIONS THERETO.
- E. THE OUTLOADING PROCEDURES DEPICTED WITHIN THIS DOCUMENT ARE APPLICABLE FOR SHIPMENTS IN CONVENTIONAL TYPE BOX CARS, FOR SHIPMENTS IN BOX CARS EQUIPPED WITH VARIOUS TYPES OF SELF-CONTAINED MECHANICAL BRACING DEVICES, AND FOR SHIPMENTS IN CUSHIONED BOX CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS. FOR SPECIFIC GUIDANCE PERTAINING TO OUTLOADING IN CONVENTIONAL TYPE BOX CARS, REFER TO THE GENERAL NOTES ON PAGE 4. SPECIFIC GUIDANCE FOR OUTLOADING IN BOX CARS EQUIPPED WITH MECHANICAL BRACING DEVICES IS DELINEATED BY THE GENERAL NOTES ON PAGE 90. REFER TO PAGE 98 FOR SPECIFIC GUIDANCE RELATIVE TO OUTLOADING IN LOAD DIVIDER CARS. SEE GENERAL NOTE "L" AT RIGHT.
- F. EXCEPT FOR PLYWOOD, DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 1" X 6" MATERIAL IS ACTUALLY 3/4" THICK BY 5-1/2" OR 5-5/8" WIDE AND 2" X 4" MATERIAL IS ACTUALLY 1-1/2" THICK BY 3-1/2" WIDE OR 1-5/8" THICK BY 3-5/8" WIDE.
- G. 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.
- H. PORTIONS OF THE BOX CARS, SUCH AS SIDEWALLS, END WALLS, AND ROOFS, AND PORTIONS OF THE BLOCKING AND BRACING COMPONENTS, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- J. WHEN STEEL STRAPPING IS SEALED AT AN END-OVER-END LAP JOINT, A MINIMUM OF TWO ( 2 ) SEALS, BUTTED TOGETHER, WITH TWO ( 2 ) PAIR OF CRIMPS PER SEAL MUST BE USED TO SEAL THE JOINT.
- K. WHEN REFERRING TO THE UNIT LENGTH OR UNIT WIDTH, THE LENGTH OF THE BOXES CONSTITUTES THE WIDTH OF THE UNIT. SEE THE TYPICAL UNIT DETAILS ON PAGE 3.
- L. ALL THE LOADS SHOWN HEREIN ARE TYPICAL. BECAUSE OF THIS FACT IT IS MOST LIKELY THAT THE ACTUAL QUANTITY THAT IS TO BE SHIPPED WILL NOT BE DEPICTED IN ANY OF THE LOADING PROCEDURES HEREIN. A LOAD PLAN SHOULD BE DEVELOPED WHICH WILL BE THE MOST EFFICIENT AS TO THE AMOUNT OF DUNNAGE REQUIRED AND THE EASE OF LOADING, FOR THE QUANTITY THAT IS TO BE SHIPPED, USING THE LOAD PLANNING GUIDANCE CHARTS IN CONJUNCTION WITH THE DEPICTED LOADING PROCEDURES. LOAD PLANNING GUIDANCE CHARTS FOR CONVENTIONAL BOX CARS ARE SHOWN ON PAGE 5, AND CHARTS 1, 3 AND 4 ON THAT PAGE CAN BE USED FOR CARS EQUIPPED WITH MECHANICAL BRACING DEVICES. CHARTS 3 AND 4 ON PAGE 5, IN CONJUNCTION WITH THE LOAD PLANNING GUIDANCE CHARTS ON PAGE 99, CAN BE USED FOR CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS. IN ORDER TO MAINTAIN SIMILARITY FROM ONE LOAD TO ANOTHER, THOSE INSTALLATIONS WHICH MAKE MULTIPLE SHIPMENTS OF THE SAME ITEM IN THE SAME LENGTH BOX CARS HAVING LIKE FEATURES SHOULD MAKE AN ACTUAL PENCILLED SKETCH OF THE LOAD. USING THE VARIOUS LOAD PATTERNS AND OUTLOADING PROCEDURES SHOWN HEREIN AS GUIDANCE, THE SKETCH WOULD DEPICT A COMBINATION WHICH WOULD BE MOST ADVANTAGEOUS AS FAR AS EASE OF LOADING AND EFFICIENT USE OF DUNNAGE IS CONCERNED FOR THE SPECIFIC ITEM THAT IS TO BE SHIPPED.
- M. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN CARS WHICH ARE PARTIALLY LOADED WITH SKIDDED UNITS OF AMMUNITION 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. REFER TO THE "SHIPMENT OF MIXED ITEMS" PROCEDURES ON PAGES 84 THRU 88 FOR GUIDANCE IN LOADING MIXED ITEMS IN CONVENTIONAL BOX CARS AND IN CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS. MIXED ITEMS TO BE SHIPPED IN CARS EQUIPPED WITH MECHANICAL BRACING DEVICES MUST BE SEPARATELY BLOCKED, USING THE PROCEDURES SHOWN ON PAGES 92 THRU 97 AS GUIDANCE.

( CONTINUED AT RIGHT )

## MATERIAL SPECIFICATIONS

LUMBER ----- : SEE TM 743-200-1, DUNNAGE LUMBER; FED SPEC MM-L-751.

NAILS ----- : COMMON, CEMENT COATED OR CHEMICALLY ETCHED, FED SPEC FF-N-105.  
ALT: ANNULAR-RING TYPE NAIL OF SAME SIZE.

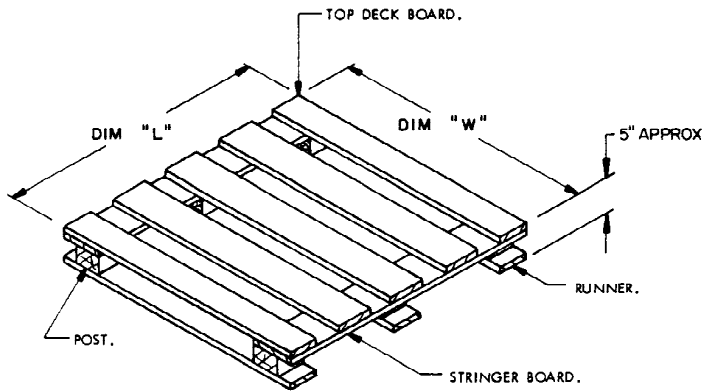
STRAPPING ----- : TYPE I OR IV, FINISH A OR B; REF FED SPEC QQ-S-781.

STRAP SEAL;  
STRAP STAPLE -- : COMMERCIAL GRADE.

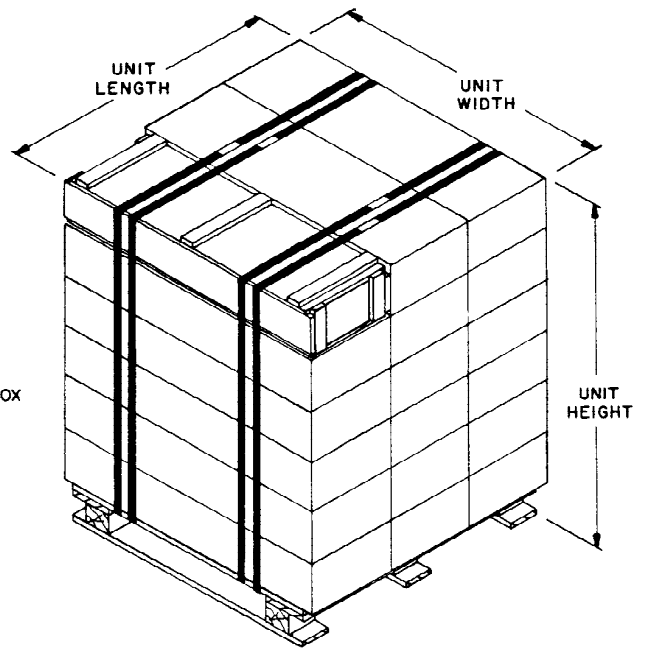
PLYWOOD ----- : GROUP B OR C, GRADE \*C-D ( EXTERIOR ). FED SPEC NN-P-530.

WIRE ----- : FED SPEC QQ-W-461.

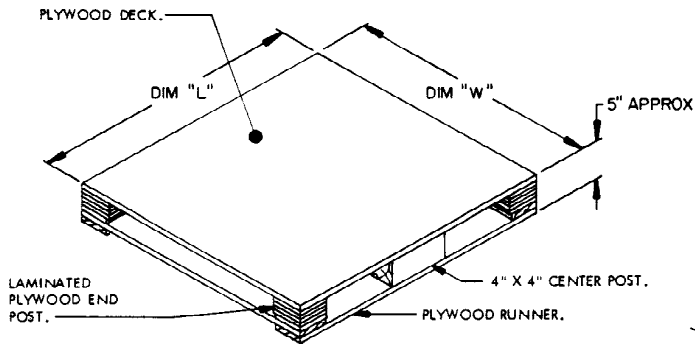
\*IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER EXTERIOR GRADE MAY BE SUBSTITUTED.



TYPE II SKID BASE

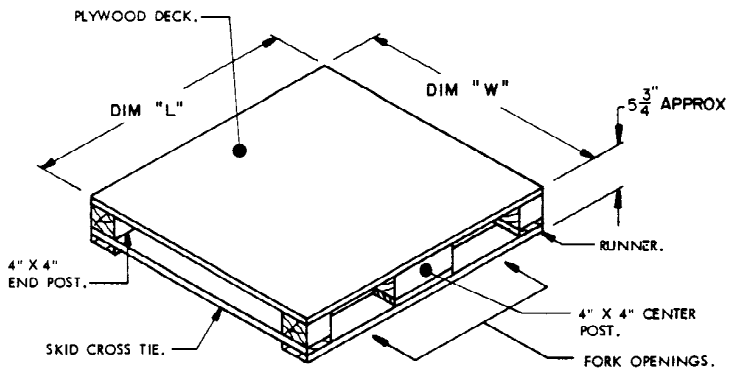


TYPICAL UNIT ON TYPE II BASE

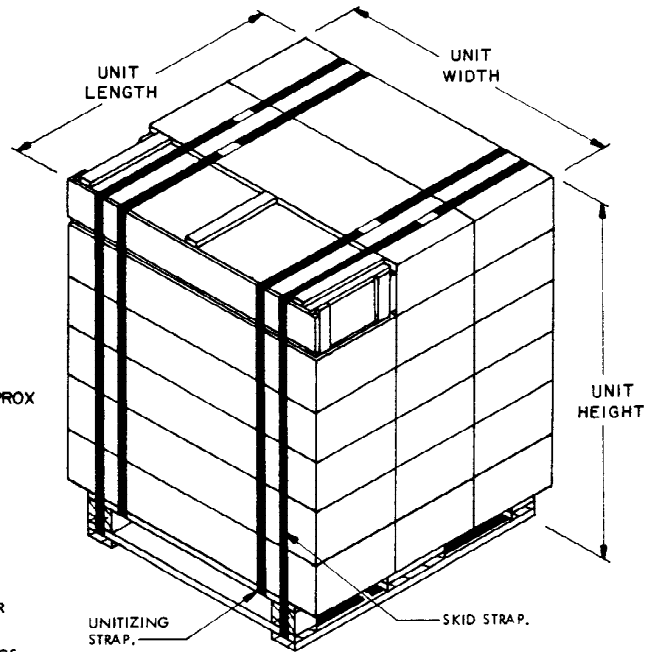


TYPE IA SKID BASE

UNIT IS ASSEMBLED ON THE SKID BASE IN THE SAME MANNER AS FOR THE TYPE I SKID BASE.



TYPE I SKID BASE



TYPICAL UNIT ON TYPE I BASE

**GENERAL NOTES**

(FOR CONVENTIONAL TYPE BOX CARS)

- A. THE OUTLOADING PROCEDURES SPECIFIED ON PAGES 6 THRU 27, 29, AND 62 THRU 88 ARE FOR CONVENTIONAL TYPE BOX CARS. FOR THE FULL LOADS, 50'-6" LONG BY 9'-2" OR 9'-4" WIDE CARS ARE SHOWN; HOWEVER, THE PROCEDURES ARE ALSO APPLICABLE FOR CARS WHICH ARE 8'-6" THRU 9'-6" WIDE (EXCEPT AS NOTED) AND ALSO MAY BE USED FOR CARS WHICH ARE 40'-6" LONG, 60'-8" LONG, OR OF OTHER LENGTHS.
- B. BOX CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS HAVE BEEN SHOWN. HOWEVER, THE DEPICTED OUTLOADING PROCEDURES ARE ALSO APPLICABLE FOR 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.
- C. THE SELECTION OF RAIL CARS FOR THE TRANSPORT OF SKIDDED UNITS OF AMMUNITION ITEMS 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.
- D. WHEN SELECTING RAIL CARS, EVERY EFFORT SHOULD BE MADE TO OBTAIN BOX CARS THAT DO NOT HAVE BOWED END WALLS. CARS WITH BOWED ENDS CAN BE USED, HOWEVER, IF AN END WALL IS BOWED OUTWARD MORE THAN TWO INCHES (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 51 FOR GUIDANCE.
- E. NOTICE: WHEN POSITIONING SKIDDED UNITS IN A CAR THEY SHOULD BE PLACED TIGHTLY AGAINST A CAR SIDEWALL AND/OR AGAINST A LATERALLY ADJACENT UNIT, AS APPLICABLE, 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 SKIDDED UNITS INTO THEIR FINAL SHIPPING POSITION. A HYDRAULIC JACK IS RECOMMENDED FOR THIS OPERATION. CAUTION: WHEN USING A JACK TO COMPACT A LOAD, THE JACK MUST BE USED AGAINST STRONG POINTS OF THE SKIDDED UNITS, SUCH AS THE JOINTS BETWEEN THE LAYERS OF BOXES ON THE UNIT. PADDING, OF 2-INCH (2") THICK LUMBER OR ANY OTHER MATERIAL OF SIMILAR CONSISTENCY, SHOULD BE PLACED BETWEEN THE JACK AND THE LADING.
- F. THE NUMBER OF LADING UNITS MAY BE ADJUSTED TO FIT THE SIZE OF THE BOX CAR 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 RAIL CAR IN COMPLIANCE WITH THE WEIGHT DISTRIBUTION REQUIREMENTS OF THE AAR. SEE GENERAL NOTE "M".
- G. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN CARS WHICH ARE PARTIALLY LOADED WITH SKIDDED UNITS OF AMMUNITION 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.
- H. 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 "G" ON PAGE 2.
- J. THE USE OF AN OFFSET LOADING PATTERN WILL FACILITATE LOADING AND UNLOADING OPERATIONS IN THE DOORWAY AREA OF THE CAR. WHEN POSSIBLE TO DO SO, 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 OR THREE MORE LOAD UNITS IN ONE END THAN IN THE OTHER IS CONSIDERED TO BE AN OFFSET LOAD. SEE GENERAL NOTE "M".
- K. 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 (ALSO SHOWN ON OTHER PAGES). THESE PIECES ARE 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 STRUTS AS DEPICTED. STRUT BRACING WILL BE EQUALLY EFFECTIVE IF APPLIED TO THE UNDER SIDE OF THOSE STRUTS.
- L. ALL FULL CAR LOADS SHOWN HEREIN ARE TYPICAL, HOWEVER, THE PROCEDURES ARE ADAPTABLE TO THE SIZE OF THE UNIT TO BE SHIPPED. THE NUMBER OF UNITS ACROSS THE CAR WILL BE AS SHOWN FOR A LOAD, ALTHOUGH THE SIZE MAY VARY. THE NUMBER OF UNITS IN LENGTH OF THE CAR WILL BE DEPENDENT UPON THE LENGTH OR WIDTH, AS APPLICABLE, OF THE UNIT, AND THE NUMBER OF TIERS WILL BE BASED UPON THE HEIGHT AND/OR WEIGHT OF THE UNIT BEING LOADED. THE QUANTITIES SHOWN: I.e. THE LESS THAN CAR LOAD VIEWS ARE ALSO TYPICAL AND MAY BE ADJUSTED TO SUIT.

(GENERAL NOTES CONTINUED)

M. THE LOAD LIMIT OF A CAR MUST NOT BE EXCEEDED. LIKEWISE, THE LOAD IN ONE END OF A CAR MUST NOT EXCEED ONE-HALF OF THE LOAD LIMIT WHICH IS STENCILED ON THE OUTSIDE OF THE CAR. THE CENTER OF GRAVITY (CG) OF A LOAD HAVING AN EQUAL NUMBER OF UNITS IN EACH END OF THE CAR WILL BE AT THE LONGITUDINAL CENTER OF THE CAR AND THEREFORE THE TOTAL WEIGHT OF THE LADING AND DUNNAGE MAY EQUAL BUT MUST NOT EXCEED THE STENCILED LOAD LIMIT. HOWEVER, FOR A LOAD CONSTRUCTED IN AN OFFSET LOADING PATTERN, THE CG WILL BE LOCATED TOWARD THE LONG-LOAD END FROM THE LONGITUDINAL CENTER OF THE CAR SO NATURALLY THE LONG-LOAD END WILL BE THE HEAVIEST. THE TOTAL WEIGHT OF THE LADING AND DUNNAGE MUST THEN BE SOMETHING LESS THAN THE STENCILED LOAD LIMIT. TO DETERMINE THE PORTION OF THE WEIGHT OF THE OFFSET SECTION OF THE LOAD WHICH WILL BE TRANSMITTED TO EACH END OF A CAR, THE FOLLOWING GUIDANCE IS PRESENTED.

1. FOR A SHIPMENT CONSISTING OF AN EVEN NUMBER OF LOAD UNITS LONG LOADED IN AN OFFSET PATTERN, THE LONG PORTION OF A LOAD WILL BE TWO (2) LOAD UNITS LONGER THAN THE SHORT PORTION. THE CG OF THE OFFSET PORTION WILL BE AT THE JOINT BETWEEN THOSE TWO UNITS. MEASURE THE DISTANCE FROM THE CENTER OF THE CAR LENGTH TO THE JOINT BETWEEN THOSE UNITS. REFER TO THE "WEIGHT DISTRIBUTION" CHART BELOW AND READ UNDER THE PROPER CAR SIZE HEADING AND OPPOSITE THE DIMENSION NEAREST TO THAT MEASURED, THE PERCENTAGE OF THE OFFSET PORTION OF THE LOAD (TWO LOAD UNITS IN THIS CASE) WHICH IS ON THE LONG-LOAD END OF THE CAR. MULTIPLY THIS PERCENTAGE FIGURE TIMES THE WEIGHT OF THE OFFSET PORTION OF THE LOAD AND ADD THE PRODUCT TO THE WEIGHT OF THE SHORT-LOAD END OF THE LOAD. DOUBLE THIS SUM TO DETERMINE THE MINIMUM LOAD LIMIT OF THE CAR TO BE USED FOR A SHIPMENT.
2. FOR A SHIPMENT CONSISTING OF AN UNEVEN NUMBER OF LOAD UNITS OVER 33" LONG (LENGTH OR WIDTH OF A SKIDDED UNIT), THE LONG PORTION OF THE LOAD WILL BE ONE (1) LOAD UNIT LONGER THAN THE SHORT PORTION. THE CG OF THE OFFSET PORTION WILL BE AT THE CENTER OF THAT LOAD UNIT. A SHIPMENT CONSISTING OF AN UNEVEN NUMBER OF LOAD UNITS 33" OR LESS IN LENGTH MAY BE THREE (3) LOAD UNITS LONGER IN ONE END THAN THE OTHER. THE CG OF THE OFFSET PORTION WILL BE AT THE CENTER OF THE SECOND OF THOSE THREE LOAD UNITS. MEASURE THE DISTANCE FROM THE CENTER OF THE CAR LENGTH TO THE CENTER OF THE ONE LOAD UNIT OR THE CENTER OF THE SECOND OF THE THREE, AS APPLICABLE. REFER TO THE "WEIGHT DISTRIBUTION" CHART BELOW AND READ UNDER THE PROPER CAR SIZE HEADING AND OPPOSITE THE DIMENSION NEAREST TO THAT MEASURED, THE PERCENTAGE OF THE OFFSET PORTION OF THE LOAD WHICH IS ON THE LONG-LOAD END OF THE CAR. MULTIPLY THIS PERCENTAGE FIGURE TIMES THE WEIGHT OF THE OFFSET PORTION OF THE LOAD AND ADD THE PRODUCT TO THE WEIGHT OF THE SHORT-LOAD END OF THE LOAD. DOUBLE THIS SUM TO DETERMINE THE MINIMUM LOAD LIMIT OF THE CAR TO BE USED FOR A SHIPMENT.

WEIGHT DISTRIBUTION			
DISTANCE FROM CENTER OF CAR TO CG * OF OFFSET UNITS	PERCENT OF WEIGHT OF OFFSET UNITS ON HEAVY END OF CAR		
	40'-6" CAR	50'-6" CAR	60'-8" CAR
6"	51.5	51.2	51.1
9"	52.9	51.9	51.6
12"	53.2	52.5	52.1
15"	54.1	53.1	52.7
18"	55.0	53.7	53.2
21"	55.8	54.4	53.8
24"	56.5	55.0	54.3
27"	57.3	55.6	54.9
30"	58.0	56.1	55.4
33"	58.9	56.8	55.9
36"	59.7	57.4	56.5
39"	60.5	58.2	57.0
42"	61.3	59.0	57.6
45"	62.2	59.4	58.1
48"	63.0	59.8	58.6
54"	64.5	61.0	59.7
60"	66.2	62.2	60.8

\*CENTER OF GRAVITY.

N. TO ACHIEVE A TIGHTLY BLOCKED LOAD, A STRUT WILL BE CUT SLIGHTLY LONGER THAN THE MEASURED DISTANCE BETWEEN THE STRUT BEARING AREAS ON THE TWO CENTER GATES. ONE END OF THE STRUT, OR ONE END OF THE LOWER STRUT IF DOUBLED 4" X 4" STRUTS ARE BEING USED, WILL BE POSITIONED AT ITS BEARING AREA JUST ABOVE THE STRUT LEDGER ON ONE GATE, THEN THE OTHER END, WHICH CAN BE BEVELED ON THE LOWER CORNER IF DESIRED, WILL BE DRIVEN DOWNWARD UNTIL IT CONTACTS THE STRUT LEDGER ON THE OTHER GATE. EACH END OF THE STRUT (BOTH PIECES IF DOUBLED STRUTS ARE BEING USED) WILL BE TOSENIALED 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 57 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.

O. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTIONS WHICH ARE IMMEDIATELY ADJACENT TO THE DEPICTED OUTLOADING METHODS.

(CONTINUED AT RIGHT)

SPECIAL NOTES:

( SPECIAL NOTES CONTINUED )

- THE FOLLOWING SPECIAL NOTES AND THE FOUR (4) CHARTS BELOW ARE PRESENTED AS GUIDANCE IN THE SELECTION OF A LOAD PATTERN, AND IN DETERMINING THE QUANTITY OF UNITS WHICH CAN BE LOADED IN A CONVENTIONAL BOX CAR, BASED ON THE SIZE AND WEIGHT OF THE SKIDDED UNIT TO BE LOADED.
- CHART NO. 1 MAY BE USED IN SELECTING A LOAD PATTERN, SUCH AS 2-WIDE, 3-WIDE, OR 4-WIDE, FOR THE WIDTH OF THE CAR WHICH IS TO BE LOADED. THE LOAD PATTERN WILL BE BASED EITHER ON THE UNIT LENGTH ACROSS THE CAR (BOXES LENGTHWISE IN THE CAR) OR ON THE UNIT WIDTH ACROSS THE CAR (BOXES CROSSWISE IN THE CAR), DEPENDENT UPON THE LENGTH OR WIDTH DIMENSIONS OF THE UNIT TO BE LOADED. UNIT SIZE RANGES AND LOAD PATTERNS FOR FIVE OF THE MOST POPULAR CAR WIDTHS ARE GIVEN. CARS OF OTHER WIDTHS MAY BE USED, OF COURSE, AND THE SIZE RANGE OF UNITS WHICH CAN BE LOADED IN THE VARIOUS PATTERNS CAN BE CALCULATED. THE SMALLER FIGURE SHOWN FOR UNIT SIZE RANGE IS BASED ON THE MINIMUM UNIT LENGTH OR WIDTH, AS APPLICABLE, AND THE LARGER FIGURE IS CALCULATED ON THERE BEING AT LEAST ONE INCH (1") EXCESS LATERAL SPACE REMAINING IN THE CAR AFTER THE UNITS ARE POSITIONED.
- CHART NO. 2 MAY BE USED IN DETERMINING THE QUANTITY OF UNITS WHICH CAN BE POSITIONED WITHIN THE LENGTH OF A CAR. SEPARATE COLUMNS ARE SHOWN FOR THREE OF THE MOST POPULAR CAR LENGTHS. CARS OF OTHER INSIDE LENGTHS MAY BE USED, OF COURSE, BUT THE UNIT SIZE RANGE FOR THE NUMBER OF UNITS LONG WILL HAVE TO BE CALCULATED. THE UNIT SIZE RANGE FOR EACH OF THE SPECIFIED CAR LENGTHS IS BASED ON HAVING A 24" LONG VOID AREA NEAR THE CENTER OF THE CAR LENGTH FOR THE INSTALLATION OF CENTER GATES AND STRUTS. IT IS POSSIBLE TO INSTALL BLOCKING AND BRACING IN A SPACE WHICH IS LESS THAN 24" LONG (18" BEING ABOUT THE MINIMUM WORKABLE SPACE) AND IT IS PERMISSIBLE TO CONSTRUCT LOADS THAT HAVE MORE THAN A 24" VOID SPACE.
- CHART NO. 3 MAY BE USED IN DETERMINING THE NUMBER OF TIERS WHICH CAN BE LOADED IN A CAR, BASED ONLY UPON THE HEIGHT OF THE UNIT. THREE DIFFERENT LOAD HEIGHTS ARE GIVEN FOR GUIDANCE. THE ACTUAL NUMBER OF TIERS WHICH CAN BE LOADED WILL BE BASED ON SEVERAL FACTORS, SUCH AS THE HEIGHT OF THE DOORS ON THE CAR, THE WEIGHT OF THE UNITS, AND THE QUANTITY THAT IS TO BE SHIPPED.
- CHART NO. 4 MAY BE USED AS GUIDANCE IN DETERMINING THE QUANTITY OF UNITS WHICH CAN BE LOADED IN A CAR, BASED ONLY UPON THE WEIGHT OF THE UNIT. THE "UNIT WEIGHT IN LBS" COLUMN SPECIFIES WEIGHTS RANGING FROM 250 POUNDS, THE APPROXIMATE MINIMUM, TO 2,250 POUNDS, THE APPROXIMATE MAXIMUM, BY ONE HUNDRED POUND INCREMENTS. COLUMNS ARE SHOWN FOR FOUR (4) DIFFERENT CAPACITY CARS. THE MAXIMUM QUANTITY THAT CAN BE LOADED FOR A UNIT WHICH WEIGHS SOMEWHERE BETWEEN THE EVEN FIGURES GIVEN WILL HAVE TO BE INTERPOLATED. FOR EXAMPLE, APPROXIMATELY 225 SKIDDED UNITS WEIGHING 450 POUNDS EACH CAN BE LOADED IN A CAR OF A 100,000 POUND CAPACITY. NOTE THAT THE QUANTITIES SPECIFIED FOR A GIVEN UNIT WEIGHT ARE FOR GUIDANCE ONLY. THE ACTUAL QUANTITY WHICH MAY BE LOADED WILL BE ONE OR MORE UNITS LESS THAN THE SPECIFIED QUANTITY, IF THE DUNNAGE WEIGHT FOR A LOAD IS MORE THAN THE DIFFERENCE BETWEEN THE "CAPACITY" AND THE "LOAD LIMIT" OF A CAR, WHICH IT MOST LIKELY WILL BE. THE LOAD LIMIT OF A CAR MUST NOT BE EXCEEDED, SO THE NUMBER OF UNITS WILL NEED TO BE ADJUSTED DOWNWARD ACCORDINGLY.

( CONTINUED AT RIGHT )

CHART NO. 1					
SIZE RANGE OF UNITS PER LOAD PATTERN					
CAR WIDTH	NO. OF ROWS	UNIT SIZE RANGE*			
		BOXES LENGTHWISE IN CAR		BOXES CROSSWISE IN CAR	
		UNIT LENGTH	LOAD PAGE	UNIT WIDTH	LOAD PAGE
8'-6"	2-WIDE	25" TO 47"	14	27" TO 50-1/2"	6
	3-WIDE	25" TO 33-5/8"	16 OR 18	27" TO 33-5/8"	8
	4-WIDE	25" TO 25-1/4"	20	---	---
8'-9"	2-WIDE	25" TO 47"	14	27" TO 52"	6
	3-WIDE	25" TO 34-5/8"	16 OR 18	27" TO 34-5/8"	8
	4-WIDE	25" TO 26"	20	---	---
9'-2"	2-WIDE	25" TO 47"	14	27" TO 54-1/2"	6
	3-WIDE	25" TO 36-1/4"	16 OR 18	27" TO 36-1/4"	8
	4-WIDE	25" TO 27-1/4"	20	27" TO 27-1/4"	10
9'-4"	2-WIDE	25" TO 47"	14	27" TO 55-1/2"	6
	3-WIDE	25" TO 37"	16 OR 18	27" TO 37"	8
	4-WIDE	25" TO 27-3/4"	20	27" TO 27-3/4"	10
9'-6"	2-WIDE	25" TO 47"	14	27" TO 56-1/2"	6
	3-WIDE	25" TO 37-5/8"	16 OR 18	27" TO 37-5/8"	8
	4-WIDE	25" TO 28-1/4"	20	27" TO 28-1/4"	10

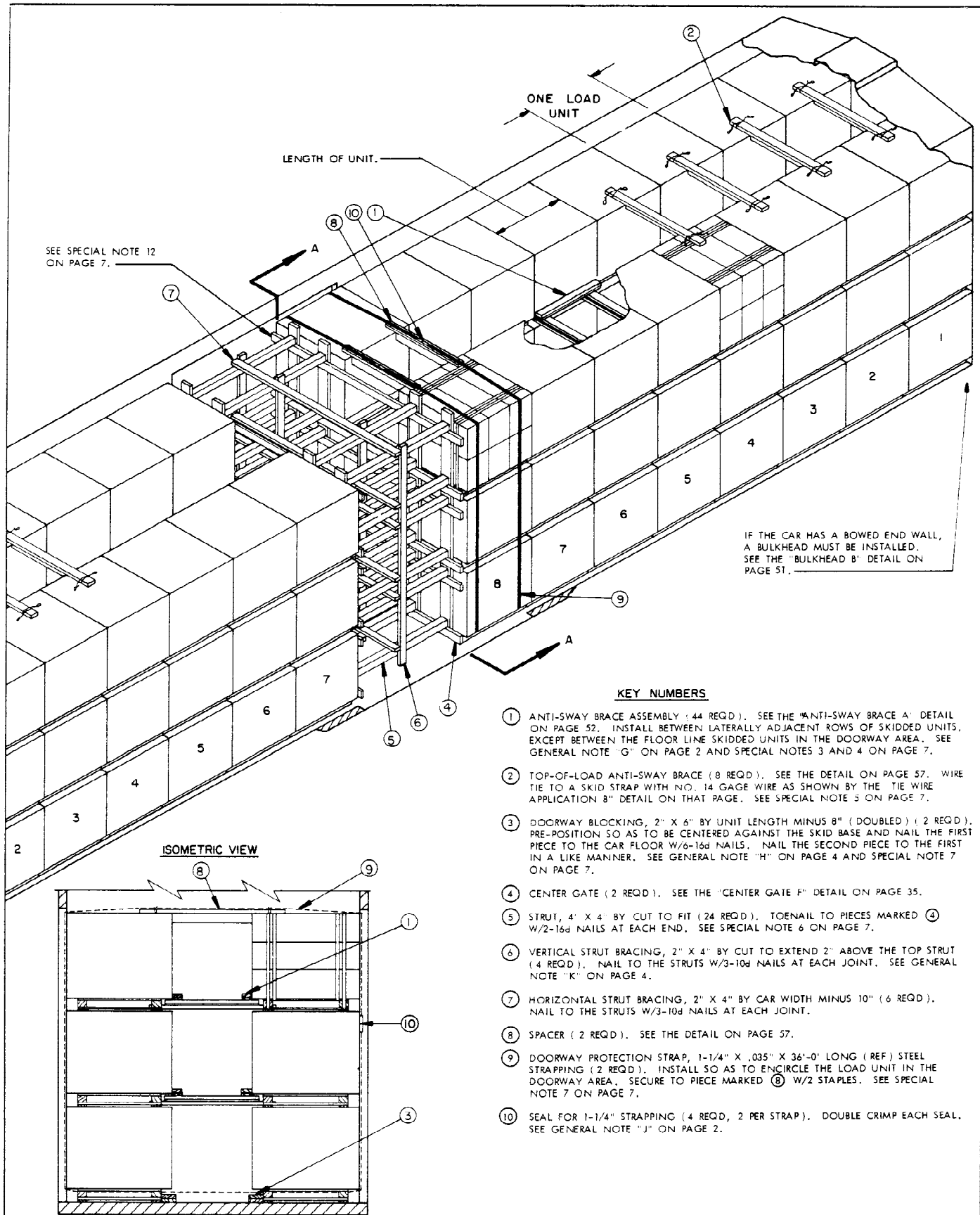
\*BASED ON 1" MINIMUM SPACE ACROSS CAR.

CHART NO. 2			
UNITS IN LENGTH OF CONVENTIONAL BOX CAR			
NO. OF UNITS LONG	UNIT SIZE RANGE, LENGTH OR WIDTH		
	40'-6" BOX CAR (462" LOAD LENGTH)	50'-6" BOX CAR (582" LOAD LENGTH)	60'-8" BOX CAR (704" LOAD LENGTH)
26	---	---	27"
25	---	---	27-1/8" TO 28"
24	---	---	28-1/8" TO 29-1/4"
23	---	25" TO 26-1/4"	29-3/8" TO 30-1/2"
22	---	26-3/8" TO 26-7/8"	30-5/8" TO 32"
21	---	27" TO 27-5/8"	32-1/8" TO 33-3/8"
20	---	27-3/4" TO 29"	33-1/2" TO 35-1/8"
19	25" TO 25-1/2"	29-1/8" TO 30-1/2"	35-1/4" TO 37"
18	25-5/8" TO 26-7/8"	30-5/8" TO 32-1/8"	37-1/8" TO 39"
17	27" TO 27-1/8"	32-1/4" TO 34-1/8"	39-1/8" TO 41-3/8"
16	27-1/4" TO 28-3/4"	34-1/4" TO 36-1/4"	41-1/2" TO 44"
15	28-7/8" TO 30-3/4"	36-3/8" TO 38-3/4"	44-1/8" TO 46-7/8"
14	30-7/8" TO 33"	38-7/8" TO 41-1/2"	47" TO 50-1/4"
13	33-1/8" TO 35-1/2"	41-5/8" TO 44-5/8"	50-3/8" TO 54-1/8"
12	35-5/8" TO 38-1/2"	44-3/4" TO 48-1/2"	54-1/4" TO 58-1/2"
11	38-5/8" TO 42"	48-5/8" TO 52-7/8"	58-5/8" TO 64"
10	42-1/8" TO 46-1/8"	53" TO 58-1/8"	64-1/8" TO 70-3/8"
9	46-1/4" TO 51-3/8"	58-1/4" TO 64-5/8"	70-1/2" TO 78-1/4"
8	51-1/2" TO 57-3/4"	64-3/4" TO 72-3/4"	78-3/8" TO 88"
7	57-7/8" TO 66"	72-7/8" TO 83-1/8"	OVER 88"
6	66-1/8" TO 77"	OVER 83-1/8"	
5	77-1/8" TO 92"		
4	OVER 92"		

CHART NO. 3			
MAX. NO. OF TIERS IN BOX CAR			
NO. OF LAYERS	UNIT HEIGHT RANGE		
	8'-6" HIGH LOAD	9'-2" HIGH LOAD	9'-8" HIGH LOAD
7	---	13-7/8" TO 15-5/8"	14-1/2" TO 16-3/8"
6	14-5/8" TO 17"	15-3/4" TO 18-1/4"	16-1/2" TO 19-1/8"
5	17-1/8" TO 20-3/8"	18-3/8" TO 22"	19-1/4" TO 23"
4	20-1/2" TO 25-1/2"	22-1/8" TO 27-1/2"	23-1/8" TO 28-7/8"
3	25-5/8" TO 34"	27-5/8" TO 36-5/8"	29" TO 38-1/2"
2	34-1/8" TO 51"	36-3/4" TO 55"	OVER 38-1/2"
1	OVER 51"	OVER 55"	---

CHART NO. 4				
MAX. NO. OF UNITS PER CAR BY WEIGHT				
UNIT WEIGHT IN LBS	NO. OF UNITS			
	100,000 LB CAPACITY CAR	120,000 LB CAPACITY CAR	140,000 LB CAPACITY CAR	150,000 LB CAPACITY CAR
250	400	480	560	600
300	333	400	466	500
400	250	300	350	375
500	200	240	280	300
600	166	200	233	250
700	142	171	200	214
800	125	150	175	187
900	111	133	155	166
1,000	100	120	140	150
1,100	90	109	127	136
1,200	83	100	116	125
1,300	75	92	107	115
1,400	71	85	100	107
1,500	66	80	93	100
1,600	62	75	87	93
1,700	58	70	82	88
1,800	55	66	77	83
1,900	52	63	73	78
2,000	50	60	70	75
2,100	47	57	66	71
2,200	45	54	63	68
2,250	44	53	62	66

CAUTION: THE LOAD LIMIT OF A CAR MUST NOT BE EXCEEDED.



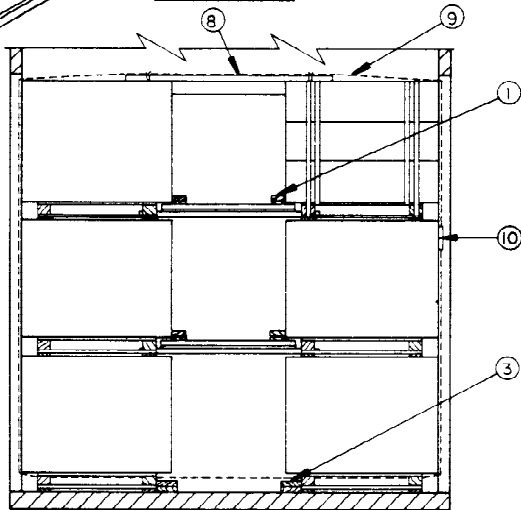
SEE SPECIAL NOTE 12  
ON PAGE 7.

IF THE CAR HAS A BOWED END WALL,  
A BULKHEAD MUST BE INSTALLED.  
SEE THE "BULKHEAD B" DETAIL ON  
PAGE 51.

**KEY NUMBERS**

- ① ANTI-SWAY BRACE ASSEMBLY (44 REQD.). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 52. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF SKIDDED UNITS, EXCEPT BETWEEN THE FLOOR LINE SKIDDED UNITS IN THE DOORWAY AREA. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTES 3 AND 4 ON PAGE 7.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (8 REQD.). SEE THE DETAIL ON PAGE 57. WIRE TIE TO A SKID STRAP WITH NO. 14 GAGE WIRE AS SHOWN BY THE TIE WIRE APPLICATION "B" DETAIL ON THAT PAGE. SEE SPECIAL NOTE 5 ON PAGE 7.
- ③ DOORWAY BLOCKING, 2" X 6" BY UNIT LENGTH MINUS 8" (DOUBLED) (2 REQD.). PRE-POSITION SO AS TO BE CENTERED AGAINST THE SKID BASE AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/6-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE GENERAL NOTE "H" ON PAGE 4 AND SPECIAL NOTE 7 ON PAGE 7.
- ④ CENTER GATE (2 REQD.). SEE THE "CENTER GATE F" DETAIL ON PAGE 35.
- ⑤ STRUT, 4" X 4" BY CUT TO FIT (24 REQD.). TOENAIL TO PIECES MARKED ④ W/2-16d NAILS AT EACH END. SEE SPECIAL NOTE 6 ON PAGE 7.
- ⑥ VERTICAL STRUT BRACING, 2" X 4" BY CUT TO EXTEND 2" ABOVE THE TOP STRUT (4 REQD.). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT. SEE GENERAL NOTE "K" ON PAGE 4.
- ⑦ HORIZONTAL STRUT BRACING, 2" X 4" BY CAR WIDTH MINUS 10" (6 REQD.). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑧ SPACER (2 REQD.). SEE THE DETAIL ON PAGE 57.
- ⑨ DOORWAY PROTECTION STRAP, 1-1/4" X .035" X 36'-0" LONG (REF) STEEL STRAPPING (2 REQD.). INSTALL SO AS TO ENCIRCLE THE LOAD UNIT IN THE DOORWAY AREA. SECURE TO PIECE MARKED ⑧ W/2 STAPLES. SEE SPECIAL NOTE 7 ON PAGE 7.
- ⑩ SEAL FOR 1-1/4" STRAPPING (4 REQD., 2 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "J" ON PAGE 2.

**ISOMETRIC VIEW**



**SECTION A-A**

TYPICAL 2-WIDE LOAD (BOXES CROSSWISE) IN A  
50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR

SPECIAL NOTES:

(SPECIAL NOTES CONTINUED)

1. A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOX CAR EQUIPPED WITH 8'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER DOOR OPENINGS CAN BE USED.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL 2-WIDE LOAD ON PAGE 6 HAS OVERALL DIMENSIONS OF 36-3/8" LONG BY 39-3/4" WIDE BY 37-1/2" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER LENGTHS, AND FOR UNITS HAVING WIDTHS OF FROM 27" THRU 54-1/2" IN A 9'-2" WIDE CAR OR FROM 27" THRU 55-1/2" IN A 9'-4" WIDE CAR. BASED ON A DOOR HEIGHT OF 9'-8", FULL LOADS OF UNITS WHICH ARE MORE THAN 38-1/2" IN HEIGHT WILL BE LIMITED TO NOT MORE THAN TWO (2) TIERS.
3. THE ANTI-SWAY BRACE A, SHOWN IN THE LOAD VIEW AS PIECE MARKED (1), IS DESIGNED FOR USE WITHIN LOADS OF CROSSWISE-POSITIONED BOXES WHEN THE UNITS ARE ASSEMBLED ON THE TYPE I OR TYPE II SKID BASE, OR THE TYPE II SKID BASE WHEN THE BOXES DO NOT HAVE TOP CLEATS, OR THE SKID BASE DEPICTED BY DRAWING D-AMXSV-4163. THE ANTI-SWAY BRACE B WILL BE USED FOR UNITS ASSEMBLED ON THE TYPE II SKID BASE WHEN THE BOXES HAVE TOP CLEATS. SEE PAGE 52 FOR DETAILS OF THE ANTI-SWAY BRACE ASSEMBLIES.
4. THE ANTI-SWAY BRACING MAY BE OMITTED IF THE SPACE BETWEEN LATERALLY ADJACENT UNITS IS NOT MORE THAN THE DISTANCE SPECIFIED IN THE "ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 52, FOR THE TYPE OF SKID BASE BEING LOADED. IF THE EXCESS SPACE EXCEEDS THE MAXIMUM ALLOWABLE, ANTI-SWAY BRACES MUST BE POSITIONED BETWEEN ALL LATERALLY ADJACENT SKIDDED UNITS, EXCEPT THE FLOOR LINE UNITS WHICH ARE COMPLETELY IN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE UNIT LENGTH. IF THE CAR BEING LOADED HAS NAILABLE SIDEWALLS, A SMALL EXCESS LATERAL SPACE CAN BE FILLED BY APPLYING ONE OR MORE LAMINATIONS OF ONE INCH (1") AND/OR TWO INCH (2") LUMBER TO ONE OR TO BOTH SIDEWALLS OF THE CAR IN LIEU OF USING PIECES MARKED (1). INSTALL HORIZONTALLY SO AS TO CONTACT THE TOP AND BOTTOM LAYERS OF BOXES ON THE UNITS AND NAIL TO THE CAR SIDEWALL WITH ONE APPLICABLY SIZED NAIL EVERY 24".
5. TOP-OF-LOAD ANTI-SWAY BRACES MUST BE INSTALLED IN EACH END OF A CAR. THE QUANTITY NEEDED IS DEPENDENT UPON THE DIMENSION OF THE UNIT WHICH IS POSITIONED LENGTHWISE IN THE CAR, AND UPON THE LENGTH OF THE CAR BEING LOADED. REFER TO THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57 FOR GUIDANCE.
6. FOUR (4) LOAD BLOCKING 4" X 4" STRUTS FOR EACH ROW/TIER ARE ADEQUATE FOR RETAINING EIGHT (8) SKIDDED UNITS HAVING A WEIGHT OF NOT MORE THAN 1,513 POUNDS EACH. REFER TO THE "STRUTTING REQUIREMENTS" CHART ON PAGE 50 FOR GUIDANCE AS TO THE MAXIMUM WEIGHT PER UNIT WHEN THE LOAD IN THE LONG END OF THE CAR IS MORE OR LESS THAN EIGHT UNITS IN LENGTH. THE "ALT STRUTTING VIEW A" AND "ALT STRUTTING VIEW B" AT THE TOP OF PAGE 50 DEPICT INSTALLATION GUIDANCE FOR 4" X 6" ON-EDGE STRUTS AND DOUBLED 4" X 4" STRUTS, RESPECTIVELY. THESE STRUTS MAY BE REQUIRED FOR THE BRACING OF A HEAVIER LOAD, IN LIEU OF THE SINGLE 4" X 4" STRUTS SHOWN IN THE LOAD VIEW.
7. DOORWAY PROTECTION IS REQUIRED FOR ALL THE LOAD UNITS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OF A CAR OR WHICH EXTEND INTO THE DOORWAY BY ONE-HALF OR MORE OF THE UNIT LENGTH. DOORWAY PROTECTION WILL CONSIST OF NAILED-DOWN BLOCKING BETWEEN THE STACKS, AND STEEL STRAPPING EN CIRCLING THE LOAD UNIT. TWO (2) STRAPS ARE REQUIRED AROUND A LOAD UNIT WHICH IS NOT RETAINED BY AT LEAST SIX INCHES (6") OF THE CAR SIDEWALL ON BOTH SIDES OF THE LOAD, AND ONE (1) STRAP IS REQUIRED AROUND A LOAD UNIT WHICH IS RETAINED BY AT LEAST SIX INCHES (6") BUT LESS THAN HALF OF THE UNIT LENGTH. REFER TO PAGES 54, 55, AND 56 FOR ALTERNATIVE DOORWAY PROTECTION PROCEDURES.
8. THE DEPICTED LOAD CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED. A 3-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF SIX (6) UNITS OR A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF FOUR (4) UNITS BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD. OR, ONE OR MORE UNITS CAN BE OMITTED FROM A TIER BY INSTALLING GATES AND STRUTS IN THE PLACE OF AN OMITTED UNIT, SIMILAR TO THE METHOD SHOWN ON PAGE 103 OR, IF THE DESIRED QUANTITY CANNOT BE ATTAINED BY OMITTING AN ENTIRE TIER, UNITS CAN BE RETAINED IN BOTH ENDS OF THE CAR WITH KNEE BRACES AS SHOWN ON PAGES 58 AND 59. OR; UNITS CAN BE RETAINED IN ONE OR BOTH ENDS OF A CAR WITH RISERS AS SHOWN ON PAGE 64, OR WITH K-BRACES AS SHOWN ON PAGE 74 PROVIDING THE CAR HAS NAILABLE SIDEWALLS, OR WITH BULKHEAD GATES AND STRAPS IF THE CAR IS EQUIPPED WITH ANCHOR DEVICES AS SHOWN ON PAGE 68. ANY APPLICABLE COMBINATION OF THESE PROCEDURES FOR ADJUSTING A LOAD MAY ALSO BE USED TO ATTAIN THE DESIRED QUANTITY. THE COMBINATION LOADING PROCEDURES SHOWN ON PAGES 26 AND 27 MAY BE MORE ADVANTAGEOUS THAN ANY OF THE AFOREMENTIONED LOAD-REDUCING PROCEDURES AND SHOULD BE INVESTIGATED PRIOR TO MAKING A SELECTION DECISION. SEE SPECIAL NOTE 11 BELOW.
9. AS APPLICABLE, IT IS TO BE NOTED THAT IN A 9'-2" WIDE CAR THE UNITS WHICH HAVE A WIDTH OF 36-1/4" OR LESS, AND IN A 9'-4" WIDE CAR THE UNITS WHICH HAVE A WIDTH OF 37" OR LESS, CAN BE LOADED IN LARGER QUANTITIES IF THE 3-WIDE LOADING PROCEDURES SHOWN ON PAGES 8 AND 9 ARE EMPLOYED. STILL LARGER QUANTITIES CAN BE ATTAINED BY USING THE 4-WIDE LOADING PROCEDURES SHOWN ON PAGES 10 AND 11 IF THE UNIT WIDTHS ARE 27-1/4" OR LESS AND 27-3/4" OR LESS IN 9'-2" AND 9'-4" WIDE CARS, RESPECTIVELY.
10. IF UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF BOXES ARE TO BE TRANSPORTED, REFER TO PAGES 78 AND 79 FOR SHIPPING GUIDANCE.
11. IN ADDITION TO THOSE LOAD-ADJUSTING PROCEDURES SPECIFIED WITHIN SPECIAL NOTE 8 ABOVE, THE PROCEDURES SHOWN BY THE "TYPICAL ALT LOAD PATTERN C" VIEW ON PAGE 29 MAY BE APPLIED FOR INCREASING A LOAD QUANTITY. CAUTION: PATTERN C REQUIRES THAT THE TOTAL OF THREE UNIT LENGTHS BE LESS THAN THE WIDTH OF THE CAR BY 1" OR MORE. ANOTHER LOAD-ADJUSTING PROCEDURE, WHICH IS SHOWN ON PAGE 61, CAN BE USED AS GUIDANCE FOR OMITTING TWO (2) SKIDDED UNITS FROM A LOAD UNIT ADJACENT TO THE CENTER BLOCKING.
12. CONSTRUCTION OF THE CENTER GATE F, SHOWN IN THE LOAD VIEW AS PIECE MARKED (4), IS BASED ON THE WIDTH AND HEIGHT OF THE SKIDDED UNIT TO BE SHIPPED AND UPON THE INSIDE WIDTH OF THE CAR TO BE LOADED. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED AS AN ALTERNATIVE. IN LIEU OF EACH CENTER GATE F, INSTALL TWO (2) GATES SHOWN AS CENTER GATE P ON PAGE 45. AFTER THE GATES AND THE STRUTS HAVE BEEN INSTALLED, THE SPLIT GATES MUST BE TIED TOGETHER AS DEPICTED BY THE "TIE PIECE A" APPLICATION "C" DETAIL ON PAGE 47.

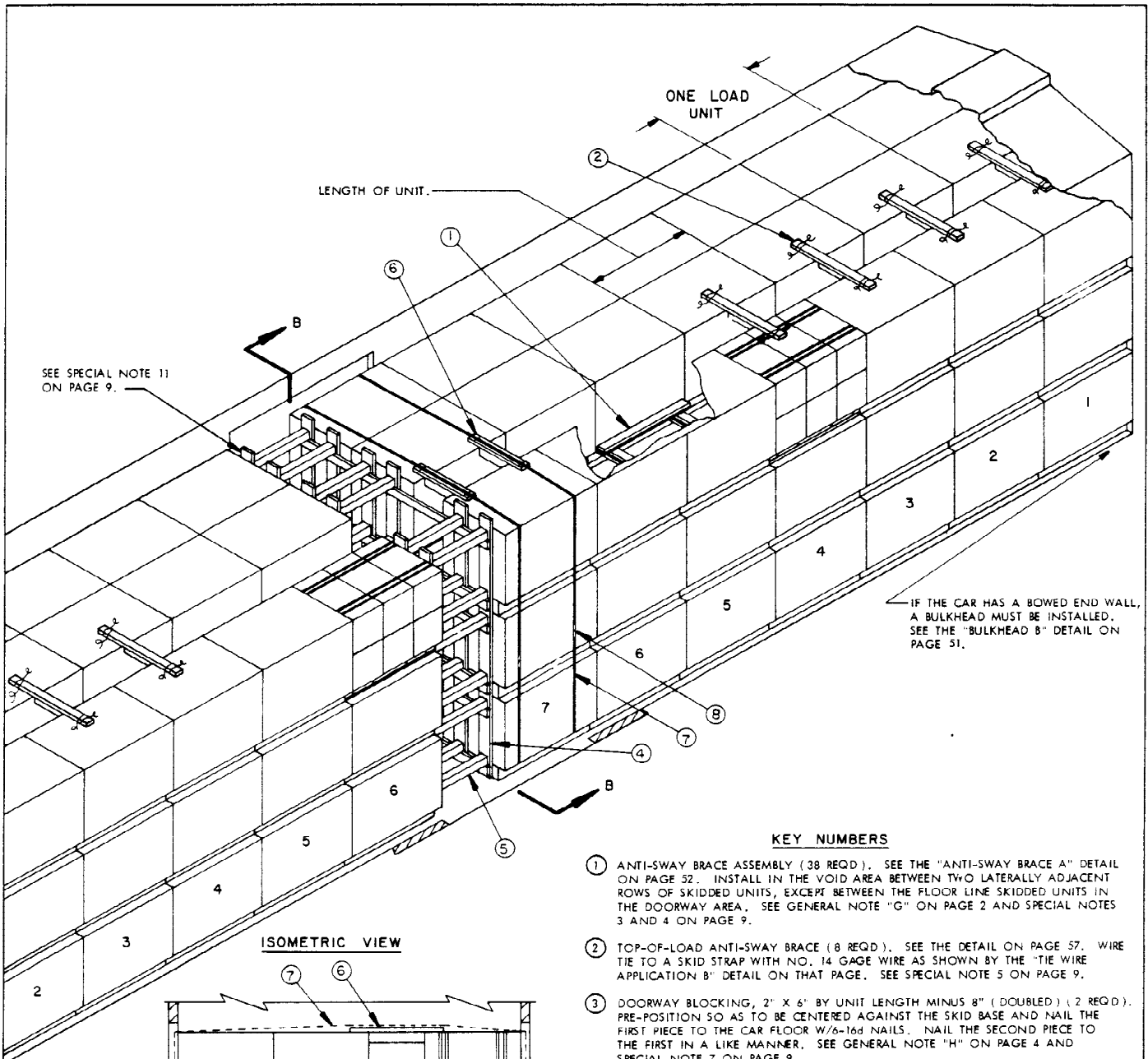
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BILL OF MATERIAL (TYPICAL)		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	491	163
2" X 3"	16	8
2" X 4"	810	540
2" X 6"	77	77
4" X 4"	116	155
NAILS	NO. REQD	POUNDS
10d (3")	640	10
12d (3-1/4")	196	3
16d (3-1/2")	144	3-1/4
20d (4")	352	11-1/2
STEEL STRAPPING, 1-1/4" X .035" -----	72' REQD	11 LBS
SEAL FOR 1-1/4" STRAPPING -----	4 REQD	NIL
STAPLES FOR 1-1/4" STRAPPING -----	4 REQD	NIL
WIRE, NO. 14 GAGE -----	32' REQD	NIL

LOAD AS SHOWN (TYPICAL)

ITEM	QUANTITY	WEIGHT (APPROX)
SKIDDED UNIT -----	90	136,170 LBS
DUNNAGE -----		2,395 LBS
TOTAL WEIGHT -----		138,565 LBS

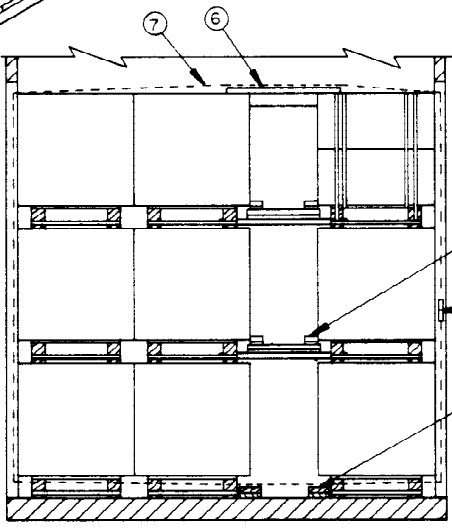
TYPICAL 2-WIDE LOAD (BOXES CROSSWISE) IN A  
50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR



SEE SPECIAL NOTE 11 ON PAGE 9.

IF THE CAR HAS A BOWED END WALL, A BULKHEAD MUST BE INSTALLED. SEE THE "BULKHEAD B" DETAIL ON PAGE 51.

**ISOMETRIC VIEW**



**SECTION B-B**

**KEY NUMBERS**

- ① ANTI-SWAY BRACE ASSEMBLY (38 REQD). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 52. INSTALL IN THE VOID AREA BETWEEN TWO LATERALLY ADJACENT ROWS OF SKIDDED UNITS, EXCEPT BETWEEN THE FLOOR LINE SKIDDED UNITS IN THE DOORWAY AREA. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTES 3 AND 4 ON PAGE 9.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (8 REQD). SEE THE DETAIL ON PAGE 57. WIRE TIE TO A SKID STRAP WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION B" DETAIL ON THAT PAGE. SEE SPECIAL NOTE 5 ON PAGE 9.
- ③ DOORWAY BLOCKING, 2" X 6" BY UNIT LENGTH MINUS 8" (DOUBLED) (2 REQD). PRE-POSITION SO AS TO BE CENTERED AGAINST THE SKID BASE AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/6-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE GENERAL NOTE "H" ON PAGE 4 AND SPECIAL NOTE 7 ON PAGE 9.
- ④ CENTER GATE (2 REQD). SEE THE "CENTER GATE G" DETAIL ON PAGE 36.
- ⑤ STRUT, 4" X 4" BY CUT TO FIT (36 REQD). TOENAIL TO PIECES MARKED ④ W/2-16d NAILS AT EACH END. SEE GENERAL NOTE "K" ON PAGE 4, AND SPECIAL NOTE 6 ON PAGE 9.
- ⑥ SPACER (2 REQD). SEE THE DETAIL ON PAGE 57.
- ⑦ DOORWAY PROTECTION STRAP, 1-1/4" X .035" X 38'-0" LONG (REF) STEEL STRAPPING (2 REQD). INSTALL SO AS TO ENCLOSE THE LOAD UNIT IN THE DOORWAY AREA. SECURE TO PIECE MARKED ⑥ W/2 STAPLES. SEE SPECIAL NOTE 7 ON PAGE 9.
- ⑧ SEAL FOR 1-1/4" STRAPPING (4 REQD, 2 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "J" ON PAGE 2.

TYPICAL 3-WIDE LOAD (BOXES CROSSWISE) IN A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR



SPECIAL NOTES:

(SPECIAL NOTES CONTINUED)

1. A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOX CAR EQUIPPED WITH 6'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER DOOR OPENINGS CAN BE USED.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL 3-WIDE LOAD ON PAGE 8 HAS OVERALL DIMENSIONS OF 44-1/4" LONG BY 30-5/8" WIDE BY 36-3/4" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER LENGTHS, AND FOR UNITS HAVING WIDTHS OF FROM 27" THRU 36-1/4" IN A 9'-2" WIDE CAR OR FROM 27" THRU 37" IN A 9'-4" WIDE CAR. BASED ON A DOOR HEIGHT OF 9'-8", FULL LOADS OF UNITS WHICH ARE MORE THAN 38-1/2" IN HEIGHT WILL BE LIMITED TO NOT MORE THAN TWO (2) TIERS.
3. THE ANTI-SWAY BRACE A, SHOWN IN THE LOAD VIEW AS PIECE MARKED ①, IS DESIGNED FOR USE WITHIN LOADS OF CROSSWISE-POSITIONED BOXES WHEN THE UNITS ARE ASSEMBLED ON THE TYPE I OR TYPE JA SKID BASE, OR THE TYPE II SKID BASE WHEN THE BOXES DO NOT HAVE TOP CLEATS, OR THE SKID BASE DEPICTED BY DRAWING D-AMXSV-4163. THE ANTI-SWAY BRACE B WILL BE USED FOR UNITS ASSEMBLED ON THE TYPE II SKID BASE WHEN THE BOXES HAVE TOP CLEATS. SEE PAGE 52 FOR DETAILS OF THE ANTI-SWAY BRACE ASSEMBLIES.
4. THE ANTI-SWAY BRACING MAY BE OMITTED IF THE TOTAL EXCESS SPACE ACROSS THE CAR IS NOT MORE THAN THE DISTANCE SPECIFIED IN THE "ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 52, FOR THE TYPE OF SKID BASE BEING LOADED. IF THE EXCESS SPACE EXCEEDS THE MAXIMUM ALLOWABLE, ANTI-SWAY BRACES MUST BE POSITIONED IN THE VOID AREA BETWEEN TWO ROWS OF LATERALLY ADJACENT UNITS AT ALL LOCATIONS EXCEPT BETWEEN THE FLOOR LINE UNITS WHICH ARE COMPLETELY IN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE UNIT LENGTH. IF THE CAR BEING LOADED HAS NAILABLE SIDEWALLS, A SMALL EXCESS LATERAL SPACE CAN BE FILLED BY APPLYING ONE OR MORE LAMINATIONS OF ONE INCH (1") AND/OR TWO INCH (2") LUMBER TO ONE OR TO BOTH SIDEWALLS OF THE CAR IN LIEU OF USING PIECE MARKED ①. INSTALL HORIZONTALLY SO AS TO CONTACT THE TOP AND BOTTOM LAYERS OF BOXES ON THE UNITS AND NAIL TO THE CAR SIDEWALL WITH ONE APPLICABLY SIZED NAIL EVERY 24".
5. TOP-OF-LOAD ANTI-SWAY BRACES MUST BE INSTALLED IN EACH END OF A CAR. THE QUANTITY NEEDED IS DEPENDENT UPON THE DIMENSION OF THE UNIT WHICH IS POSITIONED LENGTHWISE IN THE CAR, AND UPON THE LENGTH OF THE CAR BEING LOADED. REFER TO THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57 FOR GUIDANCE.
6. FOUR (4) LOAD BLOCKING 4" X 4" STRUTS FOR EACH ROW/TIER ARE ADEQUATE FOR RETAINING SEVEN (7) SKIDDED UNITS HAVING A WEIGHT OF NOT MORE THAN 1,750 POUNDS EACH. REFER TO THE "STRUTTING REQUIREMENTS" CHART ON PAGE 50 FOR GUIDANCE AS TO THE MAXIMUM WEIGHT PER UNIT WHEN THE LOAD IN THE LONG END OF THE CAR IS MORE OR LESS THAN SEVEN UNITS IN LENGTH. THE "ALT STRUTTING VIEW A" AND "ALT STRUTTING VIEW B" AT THE TOP OF PAGE 50 DEPICT INSTALLATION GUIDANCE FOR 4" X 6" ON-EDGE STRUTS AND DOUBLED 4" X 4" STRUTS, RESPECTIVELY. THESE STRUTS MAY BE REQUIRED FOR THE BRACING OF A HEAVIER LOAD, IN LIEU OF THE SINGLE 4" X 4" STRUTS SHOWN IN THE LOAD VIEW.
7. DOORWAY PROTECTION IS REQUIRED FOR ALL THE LOAD UNITS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OF A CAR OR WHICH EXTEND INTO THE DOORWAY BY ONE-HALF OR MORE OF THE UNIT LENGTH. DOORWAY PROTECTION WILL CONSIST OF NAILED-DOWN BLOCKING BETWEEN THE STACKS, AND STEEL STRAPPING ENCIRCLING THE LOAD UNIT. TWO (2) STRAPS ARE REQUIRED AROUND A LOAD UNIT WHICH IS NOT RETAINED BY AT LEAST SIX INCHES (6") OF THE CAR SIDEWALL ON BOTH SIDES OF THE LOAD, AND ONE (1) STRAP IS REQUIRED AROUND A LOAD UNIT WHICH IS RETAINED BY AT LEAST SIX INCHES (6") BUT LESS THAN HALF OF THE UNIT LENGTH. REFER TO PAGES 54, 55 AND 56 FOR ALTERNATIVE DOORWAY PROTECTION PROCEDURES.
8. THE DEPICTED LOAD CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED. A 3-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF NINE (9) UNITS OR A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF SIX (6) UNITS BY OMITTING ONE (1) LOAD UNIT FROM THE CENTER PORTION OF THE LOAD. OR, ONE OR MORE UNITS CAN BE OMITTED FROM A TIER BY INSTALLING GATES AND STRUTS IN THE PLACE OF AN OMITTED UNIT, SIMILAR TO THE METHOD SHOWN ON PAGE 103 OR THE 2-WIDE LOADING PROCEDURES SHOWN ON PAGES 6 AND 7 MAY BE EMPLOYED. OR, IF THE DESIRED QUANTITY CANNOT BE ATTAINED BY OMITTING AN ENTIRE TIER, UNITS CAN BE RETAINED IN BOTH ENDS OF THE CAR WITH KNEE BRACES AS SHOWN ON PAGES 58 AND 59. OR, UNITS CAN BE RETAINED IN ONE OR BOTH ENDS OF A CAR WITH RISERS AS SHOWN ON PAGE 64, OR WITH K-BRACES AS SHOWN ON PAGE 74 PROVIDING THE CAR HAS NAILABLE SIDEWALLS, OR WITH BULKHEAD GATES AND STRAPS IF THE CAR IS EQUIPPED WITH ANCHOR DEVICES AS SHOWN ON PAGE 68. ANY APPLICABLE COMBINATION OF THESE PROCEDURES FOR ADJUSTING A LOAD MAY ALSO BE USED TO ATTAIN THE DESIRED QUANTITY. SEE SPECIAL NOTE 12 BELOW.
9. AS APPLICABLE, IT IS TO BE NOTED THAT IN A 9'-2" WIDE CAR THE UNITS WHICH HAVE A WIDTH OF 27-1/4" OR LESS, AND IN A 9'-4" WIDE CAR THE UNITS WHICH HAVE A WIDTH OF 27-3/4" OR LESS, CAN BE LOADED IN LARGER QUANTITIES IF THE 4-WIDE LOADING PROCEDURES SHOWN ON PAGES 10 AND 11 ARE EMPLOYED.
10. IF UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF BOXES ARE TO BE TRANSPORTED, REFER TO PAGES 78 AND 79 FOR SHIPPING GUIDANCE.
11. CONSTRUCTION OF THE CENTER GATE G, SHOWN IN THE LOAD VIEW AS PIECE MARKED ④, IS BASED ON THE WIDTH AND HEIGHT OF THE SKIDDED UNIT TO BE SHIPPED AND UPON THE INSIDE WIDTH OF THE CAR TO BE LOADED. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED AS AN ALTERNATIVE. IN LIEU OF EACH CENTER GATE G, INSTALL THREE (3) GATES SHOWN AS CENTER GATE P ON PAGE 45. AFTER THE GATES AND STRUTS HAVE BEEN INSTALLED, THE SPLIT GATES MUST BE TIED TOGETHER AS DEPICTED BY THE "TIE PIECE APPLICATION D" DETAIL ON PAGE 47.
12. IN ADDITION TO THOSE LOAD-ADJUSTING PROCEDURES SPECIFIED WITHIN SPECIAL NOTE 8 ABOVE, THE PROCEDURES SHOWN ON PAGE 61 CAN BE USED AS GUIDANCE FOR OMITTING THREE (3) SKIDDED UNITS FROM A LOAD UNIT ADJACENT TO THE CENTER BLOCKING. ALSO IN ADDITION, THE ENTIRE CENTER ROW OF THE TOP TIER (13 UNITS IN THE DEPICTED LOAD) CAN BE OMITTED. INCREASE THE WIDTH OF THE ANTI-SWAY BRACE ASSEMBLIES, PIECES MARKED ①, IN THE TOP TIER. ALSO INCREASE THE LENGTH OF THE TOP-OF-LOAD ANTI-SWAY BRACES, PIECES MARKED ②, AND THE SPACERS, PIECES MARKED ③. NOTE THAT THE FOUR (4) APPLICABLE STRUTS, PIECES MARKED ④, MAY BE OMITTED.

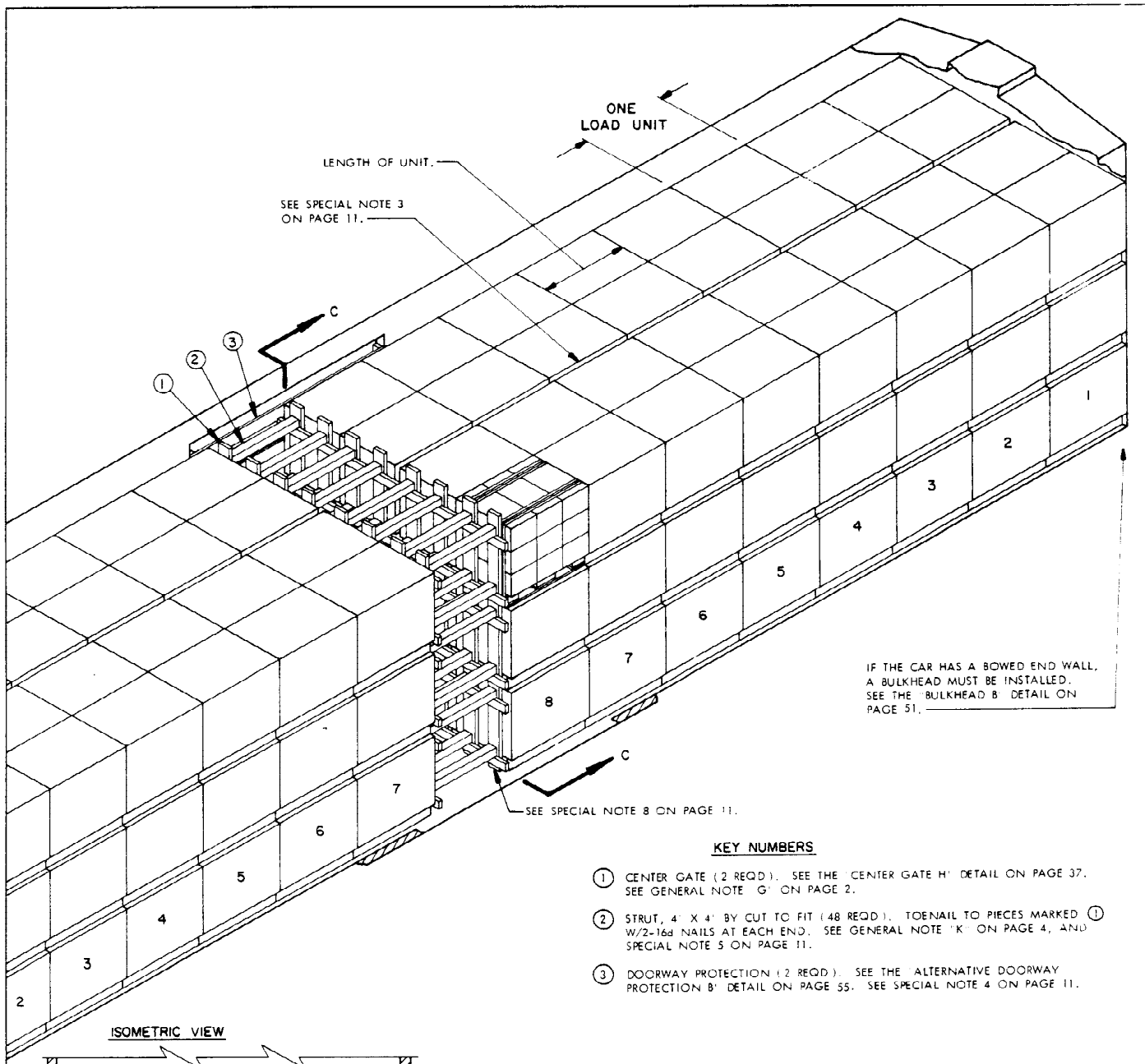
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BILL OF MATERIAL (TYPICAL)		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	373	124
2" X 4"	685	456
2" X 6"	113	113
4" X 4"	86	115
NAILS	NO. REQD	POUNDS
10d (3")	144	1-3/4
12d (3-1/4")	218	3-3/4
16d (3-1/2")	165	3-3/4
20d (4")	304	11
STEEL STRAPPING, 1-1/4" X .035" -----	76' REQD -----	11 LBS
SEAL FOR 1-1/4" STRAPPING -----	4 REQD -----	NIL
STAPLE FOR 1-1/4" STRAPPING -----	4 REQD -----	NIL
WIRE, NO. 14 GAGE -----	32' REQD -----	NIL

LOAD AS SHOWN (TYPICAL)

ITEM	QUANTITY	WEIGHT (APPROX)
SKIDDED UNIT -----	11/ -----	140,400 LBS
DUNNAGE -----	-----	2,040 LBS
TOTAL WEIGHT -----		142,440 LBS

TYPICAL 3-WIDE LOAD (BOXES CROSSWISE) IN A  
50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR



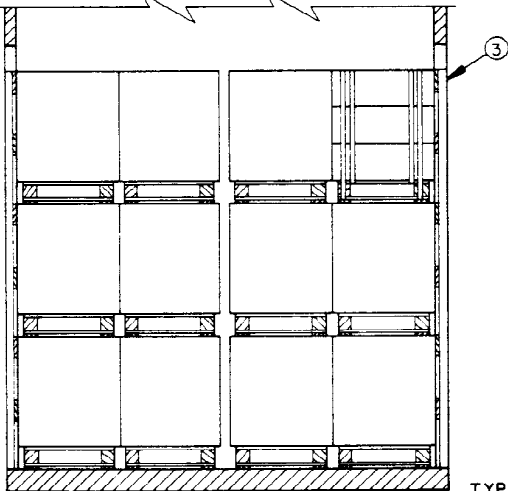
IF THE CAR HAS A BOWED END WALL, A BULKHEAD MUST BE INSTALLED. SEE THE BULKHEAD B' DETAIL ON PAGE 51.

SEE SPECIAL NOTE 8 ON PAGE 11.

**KEY NUMBERS**

- ① CENTER GATE (2 REQD.). SEE THE 'CENTER GATE H' DETAIL ON PAGE 37. SEE GENERAL NOTE 'G' ON PAGE 2.
- ② STRUT, 4' X 4' BY CUT TO FIT (48 REQD.). TOENAIL TO PIECES MARKED ① W/2-16d NAILS AT EACH END. SEE GENERAL NOTE 'K' ON PAGE 4, AND SPECIAL NOTE 5 ON PAGE 11.
- ③ DOORWAY PROTECTION (2 REQD.). SEE THE 'ALTERNATIVE DOORWAY PROTECTION B' DETAIL ON PAGE 55. SEE SPECIAL NOTE 4 ON PAGE 11.

**ISOMETRIC VIEW**



TYPICAL 4-WIDE LOAD (BOXES CROSSWISE) IN A 50'-6" LONG BY 9'-4" WIDE CONVENTIONAL BOX CAR

**SPECIAL NOTES:**

( SPECIAL NOTES CONTINUED )

1. A 50'-6" LONG BY 9'-4" WIDE CONVENTIONAL TYPE BOX CAR EQUIPPED WITH 8'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING DOOR OPENINGS OF OTHER WIDTHS CAN BE USED.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL 4-WIDE LOAD ON PAGE 10 HAS OVERALL DIMENSIONS OF 38-1/4" LONG BY 27-1/4" WIDE BY 35-3/4" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER LENGTHS, AND FOR UNITS HAVING WIDTHS OF FROM 27" THRU 27-1/4" IN A 9'-2" WIDE CAR OR FROM 27" THRU 27-3/4" IN A 9'-4" WIDE CAR. BASED ON A DOOR HEIGHT OF 9'-8", FULL LOADS OF UNITS WHICH ARE MORE THAN 38-1/2" IN HEIGHT WILL BE LIMITED TO NOT MORE THAN TWO (2) TIERS.
3. ANTI-SWAY BRACING BETWEEN LAYERS, AND TOP-OF-LOAD ANTI-SWAY BRACING ARE NOT SHOWN FOR THE DEPICTED 4-WIDE LOAD; HOWEVER, THEY MAY BE REQUIRED, DEPENDING UPON THE WIDTH OF THE UNIT, THE TYPE OF SKID BASE, AND THE WIDTH OF THE CAR BEING LOADED. REFER TO THE "ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 52 FOR GUIDANCE. IF ANTI-SWAY BRACING IS REQUIRED, REFER TO THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57 FOR GUIDANCE AS TO THE QUANTITY OF BRACES WHICH MUST BE INSTALLED IN EACH END OF THE CAR. IF THE CAR HAS AVAILABLE SIDEWALLS, A SMALL EXCESS LATERAL SPACE CAN BE FILLED BY APPLYING ONE OR MORE LAMINATIONS OF ONE INCH (1") AND/OR TWO INCH (2") LUMBER TO ONE OR TO BOTH SIDEWALLS OF THE CAR IN LIEU OF USING THE ANTI-SWAY BRACES. INSTALL HORIZONTALLY SO AS TO CONTACT THE TOP AND BOTTOM LAYERS OF BOXES ON THE UNITS AND NAIL TO THE CAR SIDEWALL WITH ONE APPLICABLY SIZED NAIL EVERY 24".
4. DOORWAY PROTECTION IS REQUIRED FOR ALL THE LOAD UNITS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY BY ONE-HALF OR MORE OF THE UNIT LENGTH. DOORWAY PROTECTION FOR A 4-WIDE LOAD IN A CAR EQUIPPED WITH CONVENTIONAL SLIDING DOORS MUST BE OF THE WOODEN DOOR GATE TYPE AS SHOWN; THE NAILED-DOWN DOORWAY BLOCKING AND STRAPPING METHOD CANNOT BE USED. HOWEVER, IF THE CAR BEING USED IS EQUIPPED WITH PLUG DOORS, THE DOORWAY-AREA LOAD UNITS MUST BE ENCIRCLED WITH 1-1/4" X .035" STEEL STRAPPING. TWO (2) STRAPS ARE REQUIRED AROUND A LOAD UNIT WHICH IS NOT RETAINED BY AT LEAST SIX INCHES (6") OF THE CAR SIDEWALL ON BOTH SIDES OF THE LOAD, AND ONE (1) STRAP IS REQUIRED AROUND A LOAD UNIT WHICH IS RETAINED BY AT LEAST SIX INCHES (6") BUT LESS THAN HALF OF THE UNIT LENGTH. A SPACER WILL NOT BE USED UNDER THESE STRAPS. REFER TO PAGES 54, 55, AND 56 FOR ALTERNATIVE DOORWAY PROTECTION PROCEDURES.
5. FOUR (4) LOAD BLOCKING 4" X 4' STRUTS FOR EACH ROW/TIER ARE ADEQUATE FOR RETAINING EIGHT (8) SKIDDED UNITS HAVING A WEIGHT OF NOT MORE THAN 1,513 POUNDS EACH. REFER TO THE "STRUTTING REQUIREMENTS" CHART ON PAGE 50 FOR GUIDANCE AS TO THE MAXIMUM WEIGHT PER UNIT WHEN THE LOAD IN THE LONG END OF THE CAR IS MORE OR LESS THAN EIGHT UNITS IN LENGTH. THE "ALT STRUTTING VIEW A" AND "ALT STRUTTING VIEW B" AT THE TOP OF PAGE 50 DEPICT INSTALLATION GUIDANCE FOR 4" X 6" ON-EDGE STRUTS AND DOUBLED 4" X 4" STRUTS, RESPECTIVELY. THESE STRUTS MAY BE REQUIRED FOR THE BRACING OF A HEAVIER LOAD, IN LIEU OF THE SINGLE 4" X 4" STRUTS SHOWN IN THE LOAD VIEW.
6. THE DEPICTED LOAD CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED. A 3-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF TWELVE (12) UNITS OR A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF EIGHT (8) UNITS BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD. OR, ONE OR MORE UNITS CAN BE OMITTED FROM A TIER BY INSTALLING GATES AND STRUTS IN THE PLACE OF AN OMITTED UNIT, SIMILAR TO THE METHOD SHOWN ON PAGE 103. OR, EITHER THE 3-WIDE LOADING PROCEDURES SHOWN ON PAGES 8 AND 9 OR THE 2-WIDE PROCEDURES SHOWN ON PAGES 6 AND 7 MAY BE USED. OR, IF THE DESIRED QUANTITY CANNOT BE ATTAINED BY OMITTING AN ENTIRE TIER, UNITS CAN BE RETAINED IN BOTH ENDS OF THE CAR

- WITH KNEE BRACES AS SHOWN ON PAGES 58 AND 59. OR, UNITS CAN BE RETAINED IN ONE OR BOTH ENDS OF A CAR WITH RISERS AS SHOWN ON PAGE 64, OR WITH K-BRACES AS SHOWN ON PAGE 74 PROVIDING THE CAR HAS AVAILABLE SIDEWALLS, OR WITH BULKHEAD GATES AND STRAPS IF THE CAR IS EQUIPPED WITH ANCHOR DEVICES AS SHOWN ON PAGE 68. ANY APPLICABLE COMBINATION OF THESE PROCEDURES FOR ADJUSTING A LOAD MAY ALSO BE USED TO ATTAIN THE DESIRED QUANTITY. SEE SPECIAL NOTE 9 BELOW.
7. IF UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF BOXES ARE TO BE TRANSPORTED, REFER TO PAGES 78 AND 79 FOR SHIPPING GUIDANCE.
8. CONSTRUCTION OF THE CENTER GATE H, SHOWN IN THE LOAD VIEW AS PIECE MARKED ①, IS BASED ON THE WIDTH AND HEIGHT OF THE SKIDDED UNIT TO BE SHIPPED AND UPON THE INSIDE WIDTH OF THE CAR TO BE LOADED. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED AS AN ALTERNATIVE. IN LIEU OF EACH CENTER GATE H, INSTALL FOUR (4) GATES SHOWN AS CENTER GATE P ON PAGE 45. AFTER THE GATES AND STRUTS HAVE BEEN INSTALLED, THE SPLIT GATES MUST BE TIED TOGETHER SIMILAR TO THE PROCEDURES DEPICTED BY THE "TIE PIECE APPLICATION D" DETAIL ON PAGE 47.
9. IN ADDITION TO THOSE LOAD-ADJUSTING PROCEDURES SPECIFIED WITHIN SPECIAL NOTE 6 AT LEFT, THE PROCEDURES SHOWN ON PAGE 61 CAN BE USED AS GUIDANCE FOR OMITTING FOUR (4) SKIDDED UNITS FROM A LOAD UNIT ADJACENT TO THE CENTER BLOCKING. ALSO IN ADDITION, ONE OR TWO ENTIRE CENTER ROWS OF THE TOP TIER (15 OR 30 UNITS IN THE DEPICTED LOAD) CAN BE OMITTED. INSTALL ANTI-SWAY BRACE ASSEMBLIES, SHOWN AS PIECES MARKED ① ON PAGE 8, IN THE PLACE OF THE OMITTED UNITS. NOTE THAT FOUR (4) STRUTS, PIECES MARKED ② IN THE LOAD VIEW ON PAGE 10, MAY BE OMITTED FOR EACH ROW OF UNITS THAT IS OMITTED.

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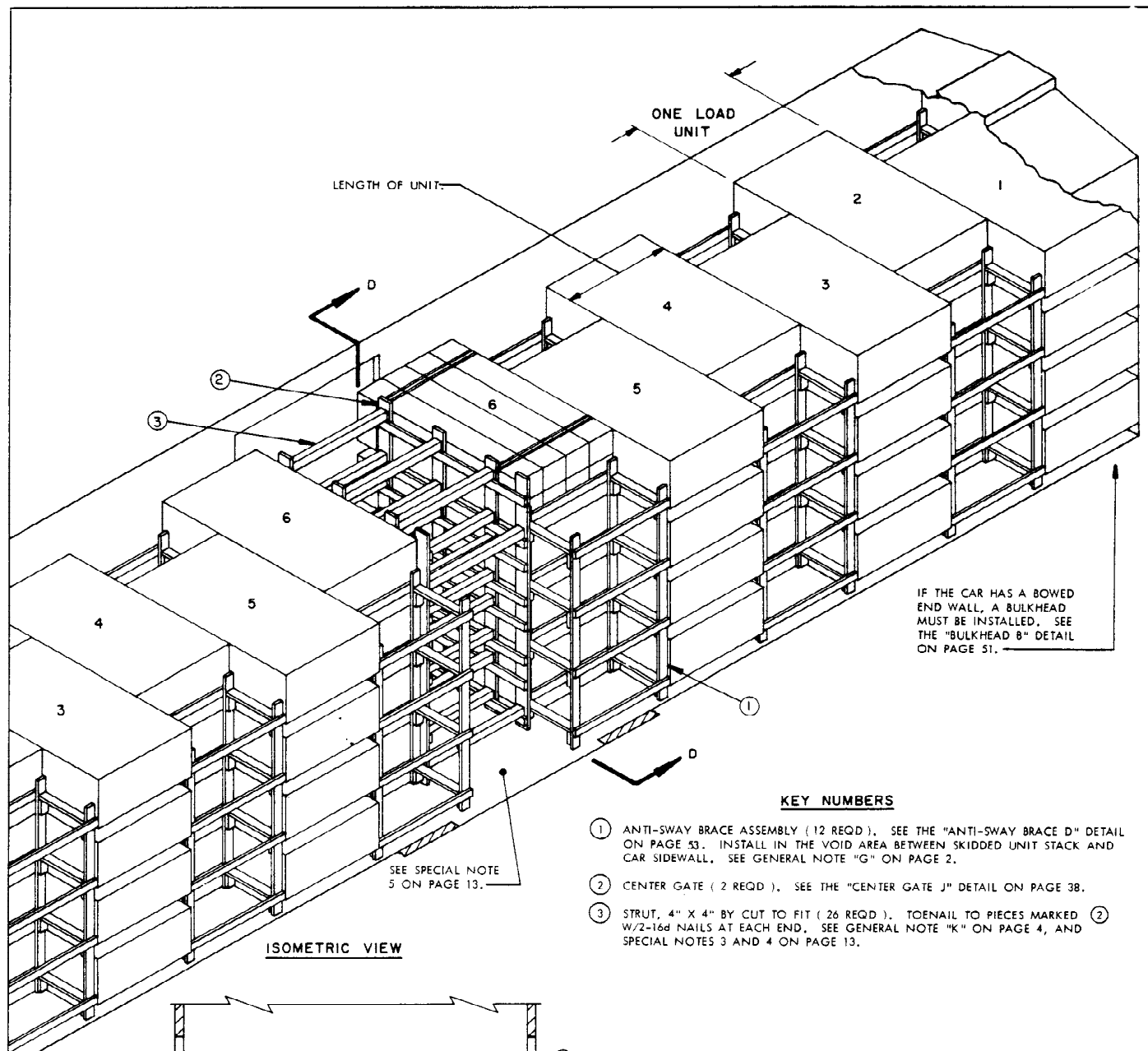
BILL OF MATERIAL (TYPICAL)		
LUMBER	LINEAR FEET	BOARD FEET
1" X 6"	96	48
2" X 3"	12	6
2" X 4"	136	91
2" X 6"	73	73
4" X 4"	136	181
NAILS	NO. REQD	POUNDS
6d (2")	72	1
10d (3")	132	2
16d (3-1/2")	192	4-1/4

**LOAD AS SHOWN ( TYPICAL )**

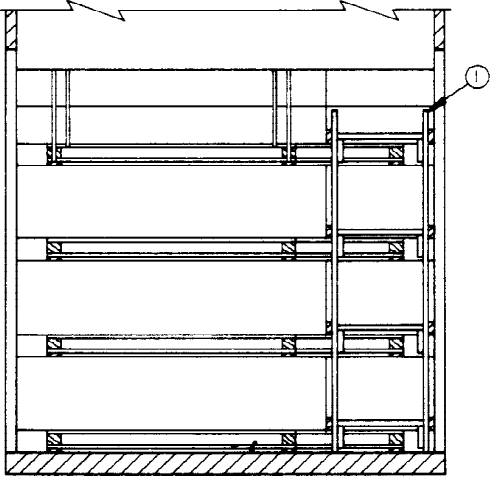
ITEM	QUANTITY	WEIGHT ( APPROX )
SKIDDED UNIT	180	139,860 LBS
DUNNAGE		1,004 LBS
TOTAL WEIGHT		140,864 LBS

TYPICAL 4-WIDE LOAD (BOXES CROSSWISE) IN A  
50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR

TYPICAL 4-WIDE LOAD (BOXES CROSSWISE) IN A  
50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR



**ISOMETRIC VIEW**



**SECTION D-D**

TYPICAL 1-WIDE LOAD (BOXES CROSSWISE) IN A  
50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR

**KEY NUMBERS**

- ① ANTI-SWAY BRACE ASSEMBLY ( 12 REQD ). SEE THE "ANTI-SWAY BRACE D" DETAIL ON PAGE 53. INSTALL IN THE VOID AREA BETWEEN SKIDDED UNIT STACK AND CAR SIDEWALL. SEE GENERAL NOTE "G" ON PAGE 2.
- ② CENTER GATE ( 2 REQD ). SEE THE "CENTER GATE J" DETAIL ON PAGE 38.
- ③ STRUT, 4" X 4" BY CUT TO FIT ( 26 REQD ). TOENAIL TO PIECES MARKED ② W/2-16d NAILS AT EACH END. SEE GENERAL NOTE "K" ON PAGE 4, AND SPECIAL NOTES 3 AND 4 ON PAGE 13.

SEE SPECIAL NOTE 5 ON PAGE 13.

IF THE CAR HAS A BOWED END WALL, A BULKHEAD MUST BE INSTALLED. SEE THE "BULKHEAD B" DETAIL ON PAGE 51.

**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOX CAR EQUIPPED WITH 6'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER DOOR OPENINGS CAN BE USED.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL 1-WIDE LOAD ON PAGE 12 HAS OVERALL DIMENSIONS OF 46" LONG BY 81-1/2" WIDE BY 26" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER LENGTHS, AND FOR UNITS HAVING WIDTHS OF 80" OR MORE, BASED ON A DOOR HEIGHT OF 9'-8". FULL LOADS OF UNITS WHICH ARE MORE THAN 28-7/8" IN HEIGHT WILL BE LIMITED TO NOT MORE THAN THREE (3) TIERS AND UNITS WHICH ARE MORE THAN 38-1/2" IN HEIGHT WILL BE LIMITED TO NOT MORE THAN TWO (2) TIERS.
3. SIX (6) LOAD-BLOCKING 4" X 4" STRUTS FOR EACH TIER ARE ADEQUATE FOR RETAINING THE MAXIMUM SIZE 1-WIDE LOAD THAT CAN BE LOADED IN A CAR.
4. TWO (2) OF THE STRUTS IN THE DEPICTED LOAD ARE INSTALLED FOR THE PURPOSE OF RETAINING THE ANTI-SWAY BRACE ASSEMBLIES. IF A TWO OR THREE TIER LOAD IS TO BE SHIPPED, THE UPPER OF THESE TWO STRUTS SHOULD BE INSTALLED ON THE LOWER STRUT LEDGER OF THE UPPERMOST TIER.
5. DOORWAY PROTECTION MUST BE INSTALLED IF A LOAD UNIT EXTENDS INTO THE DOORWAY OPENING BY MORE THAN 4". REFER TO PAGES 54, 55 AND 56 FOR DOORWAY PROTECTION PROCEDURE GUIDANCE. LOCATE THE HORIZONTAL PIECES OF THE DOORWAY PROTECTION GATES ( OR THE STRAPS IF ALTERNATIVE DOORWAY PROTECTION IS USED ) SO AS TO ALIGN WITH THE HORIZONTAL PIECES OF THE ANTI-SWAY BRACE D ASSEMBLY.
6. FOR THE 1-WIDE LOADING PROCEDURES DEPICTED ON PAGE 12, IT IS MANDATORY THAT THE LOAD UNITS ADJACENT TO THE CENTER GATES BE LOCATED DIRECTLY OPPOSITE EACH OTHER. THIS WILL PROVIDE FOR PROPER INSTALLATION OF THE STRUTS, PIECES MARKED (3). TO ENSURE PROPER LOCATION OF THE LOAD UNITS ADJACENT TO THE CENTER GATES, LOADS WHICH HAVE THE SAME QUANTITY OF LOAD UNITS IN EACH END OF THE CAR OR WHICH HAVE TWO MORE LOAD UNITS IN ONE END THAN IN THE OTHER MUST HAVE THE FIRST LOAD UNIT IN EACH END POSITIONED AGAINST THE SAME CAR SIDEWALL, EITHER BOTH AGAINST THE NEAR WALL OR BOTH AGAINST THE FAR WALL. FOR LOADS WHICH HAVE ONE MORE LOAD UNIT IN ONE END OF THE CAR THAN IN THE OTHER, THE LOAD UNITS IN OPPOSITE ENDS MUST BE POSITIONED AGAINST OPPOSITE SIDEWALLS OF THE CAR.
7. THE DEPICTED LOAD CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED. A 4, 3, OR 2-TIER LOAD CAN BE REDUCED BY 4, 3, OR 2 UNITS BY OMITTING A LOAD UNIT FROM THE CENTER PORTION OF THE LOAD. CAUTION: REFER TO SPECIAL NOTE 6 ABOVE FOR GUIDANCE AS TO PROPER POSITIONING OF THE LOAD UNITS. OR; IF THE DESIRED QUANTITY CANNOT BE ATTAINED BY OMITTING AN ENTIRE TIER, UNITS CAN BE RETAINED IN ONE OR BOTH ENDS OF THE CAR WITH RISERS AS SHOWN ON PAGE 64 (ADJUST HEIGHT OF THE ANTI-SWAY BRACE D TO SUIT), OR WITH K-BRACES AS SHOWN ON PAGE 74 PROVIDING THE CAR HAS AVAILABLE SIDEWALLS. ANY APPLICABLE COMBINATION OF THESE PROCEDURES FOR ADJUSTING A LOAD MAY ALSO BE USED TO ATTAIN THE DESIRED QUANTITY.
8. IF UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF BOXES ARE TO BE TRANSPORTED, REFER TO PAGES 78 AND 79 FOR SHIPPING GUIDANCE.

**BILL OF MATERIAL (TYPICAL)**

LUMBER	LINEAR FEET	BOARD FEET
2" X 3"	22	11
2" X 4"	1157	771
2" X 6"	72	72
4" X 4"	98	131
NAILS	NO. REQD	POUNDS
10d (3")	1488	23
16d (3-1/2")	104	2-1/2

**LOAD AS SHOWN (TYPICAL)**

ITEM	QUANTITY	WEIGHT (APPROX)
SKIDDED UNIT	48	106,368 LBS
DUNNAGE		2,488 LBS
<b>TOTAL WEIGHT</b>		<b>108,856 LBS</b>
DUNNAGE		2,488 LBS
<b>TOTAL WEIGHT</b>		<b>108,856 LBS</b>

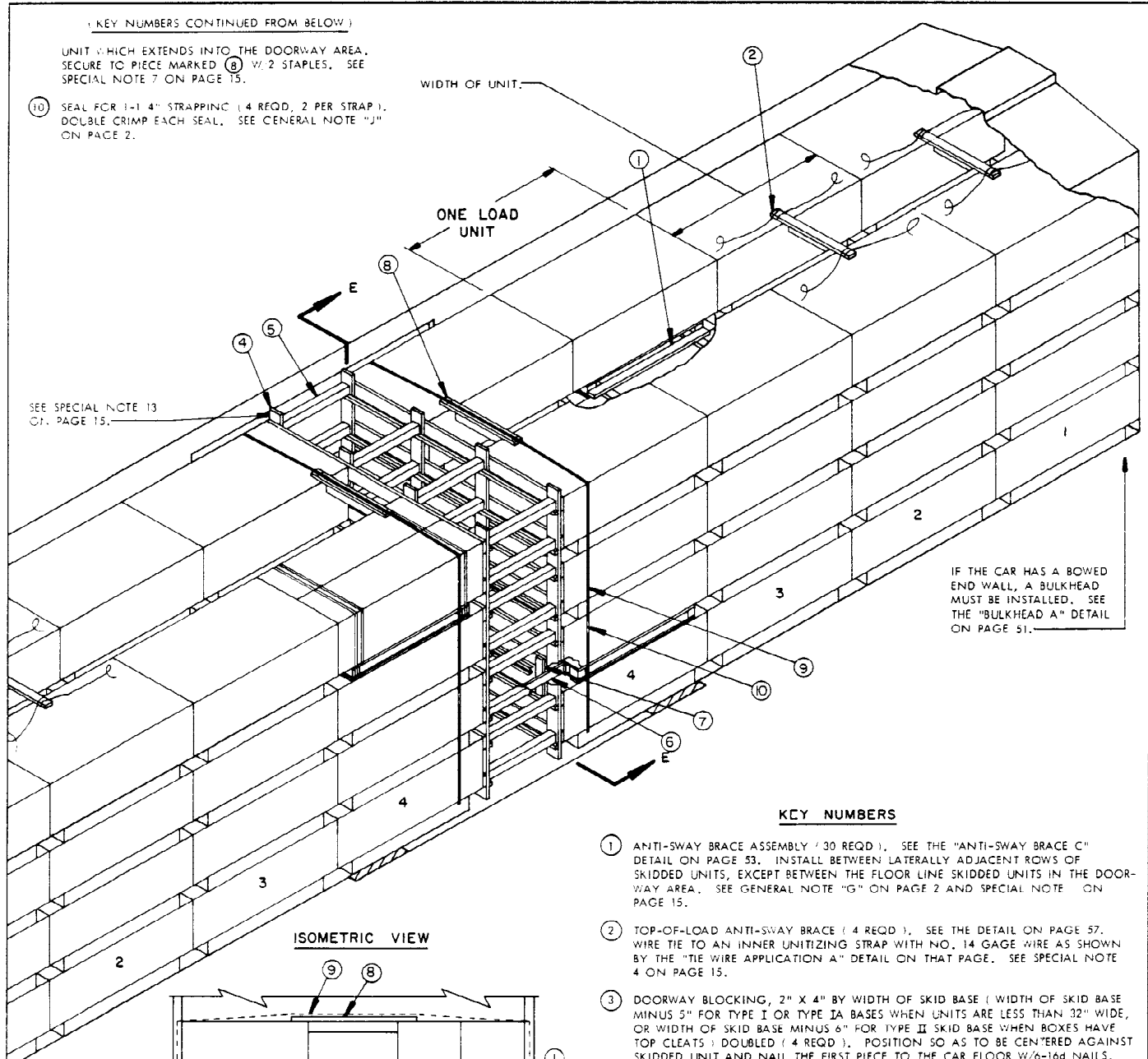
**TYPICAL 1-WIDE LOAD (BOXES CROSSWISE) IN A  
50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR**

(KEY NUMBERS CONTINUED FROM BELOW)

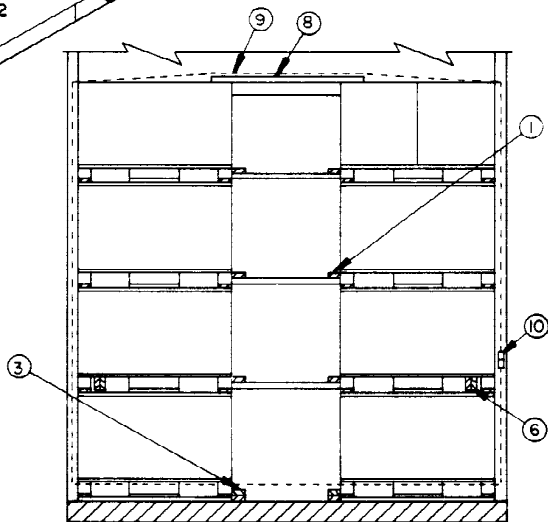
UNIT WHICH EXTENDS INTO THE DOORWAY AREA, SECURE TO PIECE MARKED (8) W/ 2 STAPLES. SEE SPECIAL NOTE 7 ON PAGE 15.

(10) SEAL FOR 1-1/4" STRAPPING (4 REQD, 2 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "J" ON PAGE 2.

SEE SPECIAL NOTE 13 (C), PAGE 15.



ISOMETRIC VIEW



SECTION E-E

**KEY NUMBERS**

- (1) ANTI-SWAY BRACE ASSEMBLY (30 REQD). SEE THE "ANTI-SWAY BRACE C" DETAIL ON PAGE 53. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF SKIDDED UNITS, EXCEPT BETWEEN THE FLOOR LINE SKIDDED UNITS IN THE DOORWAY AREA. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTE "ON" ON PAGE 15.
- (2) TOP-OF-LOAD ANTI-SWAY BRACE (4 REQD). SEE THE DETAIL ON PAGE 57. WIRE TIE TO AN INNER UNITIZING STRAP WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON THAT PAGE. SEE SPECIAL NOTE 4 ON PAGE 15.
- (3) DOORWAY BLOCKING, 2" X 4" BY WIDTH OF SKID BASE (WIDTH OF SKID BASE MINUS 5" FOR TYPE I OR TYPE IA BASES WHEN UNITS ARE LESS THAN 32" WIDE, OR WIDTH OF SKID BASE MINUS 6" FOR TYPE II SKID BASE WHEN BOXES HAVE TOP CLEATS) DOUBLED (4 REQD). POSITION SO AS TO BE CENTERED AGAINST SKIDDED UNIT AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/6-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE GENERAL NOTE "H" ON PAGE 4 AND SPECIAL NOTE 7 ON PAGE 15.
- (4) CENTER GATE (2 REQD). SEE THE "CENTER GATE A" DETAIL ON PAGE 30.
- (5) STRUT, 4" X 4" BY CUT TO FIT (32 REQD). TOENAIL TO PIECES MARKED (4) W/2-16d NAILS AT EACH END. SEE GENERAL NOTE "K" ON PAGE 4, AND SPECIAL NOTES 5 AND 6 ON PAGE 15.
- (6) GATE HOLD-DOWN ASSEMBLY (2 REQD). SEE THE "GATE HOLD-DOWN ASSEMBLY A" DETAIL ON PAGE 48. POSITION TO EXTEND UNDER SKIDDED UNITS AND NAIL TO PIECES MARKED (4) W/2-10d NAILS AT EACH JOINT. SEE THE "INSTALLATION OF GATE HOLD DOWN" DETAIL ON PAGE 48 FOR GUIDANCE. SEE SPECIAL NOTE 8 ON PAGE 15.
- (7) GATE HOLD DOWN RETAINER PIECE, 2" X 4" BY A LENGTH TO SUIT (4 REQD). POSITION AGAINST PIECE MARKED (6) AND NAIL TO THE HORIZONTAL PIECES OF A CENTER GATE W/3-10d NAILS AT EACH END.
- (8) SPACER (2 REQD). SEE THE DETAIL ON PAGE 57.
- (9) DOORWAY PROTECTION STRAP, 1-1/4" X .035" X 38'-0" LONG (REF) STEEL STRAPPING (2 REQD). INSTALL SO AS TO ENIRCLE THE END OF A LOAD

(CONTINUED ABOVE)

**SPECIAL NOTES:**

( SPECIAL NOTES CONTINUED )

1. A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOX CAR EQUIPPED WITH 10'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING DOOR OPENINGS OF OTHER WIDTHS CAN BE USED, EXCEPT THAT CARS HAVING NARROWER DOOR OPENINGS CANNOT BE USED FOR THE DEPICTED LOAD.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL 2-WIDE LOAD ON PAGE 14 HAS OVER-ALL DIMENSIONS OF 40-3/8" LONG BY 71-1/16" WIDE BY 28-1/2" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER WIDTHS, AND FOR UNITS HAVING LENGTHS OF FROM 25" THRU 46". BASED ON A DOOR HEIGHT OF 9'-8", FULL LOADS OF UNITS WHICH ARE MORE THAN 28-7/8" HIGH WILL BE LIMITED TO NOT MORE THAN THREE (3) TIERS AND UNITS WHICH ARE MORE THAN 38-1/2" IN HEIGHT WILL BE LIMITED TO NOT MORE THAN TWO (2) TIERS.
3. ANTI-SWAY BRACES MUST BE INSTALLED BETWEEN ALL Laterally ADJACENT SKIDDED UNITS, EXCEPT THE FLOOR LINE UNITS WHICH ARE COMPLETELY IN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE UNIT WIDTH.
4. TOP-OF-LOAD ANTI-SWAY BRACES MUST BE INSTALLED IN EACH END OF A CAR. THE QUANTITY NEEDED IS DEPENDENT UPON THE DIMENSION OF THE UNIT WHICH IS POSITIONED LENGTHWISE IN THE CAR, AND UPON THE LENGTH OF THE CAR BEING LOADED. REFER TO THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57 FOR GUIDANCE.
5. FOUR (4) LOAD BLOCKING 4" X 4" STRUTS FOR EACH ROW/TIER ARE ADEQUATE FOR RETAINING FOUR (4) SKIDDED UNITS HAVING A WEIGHT OF NOT MORE THAN 3,026 POUNDS EACH. REFER TO THE "STRUTTING REQUIREMENTS" CHART ON PAGE 50 FOR GUIDANCE AS TO THE MAXIMUM WEIGHT PER UNIT WHEN THE LOAD IN THE LONG END OF THE CAR IS MORE OR LESS THAN FOUR UNITS IN LENGTH. THE "ALT STRUTTING VIEW C" AND "ALT STRUTTING VIEW D" AT THE BOTTOM OF PAGE 50 DEPICT INSTALLATION GUIDANCE FOR 4" X 6" ON-EDGE STRUTS AND DOUBLED 4" X 4" STRUTS, RESPECTIVELY. THESE STRUTS MAY BE REQUIRED FOR THE BRACING OF A HEAVIER LOAD, IN LIEU OF THE SINGLE 4" X 4" STRUTS SHOWN IN THE LOAD VIEW.
6. TO FACILITATE THE INSTALLATION OF THE GATE HOLD DOWN ASSEMBLY, PIECE MARKED (6), WHEN STRUT BRACING PIECES ARE REQUIRED, THE STRUTS WHICH ARE INSTALLED BETWEEN THE OUTWARD VERTICAL PIECES OF THE CENTER GATES SHOULD BE CENTERED AT LEAST ONE-HALF INCH (1/2") OUTWARD OF THE VERTICAL CENTER LINE OF THE ADJACENT VERTICAL PIECE OF THE GATE.
7. DOORWAY PROTECTION IS REQUIRED FOR ALL THE LOAD UNITS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY BY ONE-HALF OR MORE OF THE UNIT WIDTH. DOORWAY PROTECTION WILL CONSIST OF NAILED-DOWN BLOCKING BETWEEN THE STACKS, AND STEEL STRAPPING ENCIRCLING THE LOAD UNIT. TWO (2) STRAPS ARE REQUIRED AROUND A LOAD UNIT WHICH IS NOT RETAINED BY AT LEAST SIX INCHES (6") OF THE CAR SIDEWALL ON BOTH SIDES OF THE LOAD, AND ONE (1) STRAP IS REQUIRED AROUND A LOAD UNIT WHICH IS RETAINED BY AT LEAST SIX INCHES (6") BUT LESS THAN HALF OF THE UNIT WIDTH. REFER TO PAGES 54, 55, AND 56 FOR ALTERNATIVE DOORWAY PROTECTION PROCEDURES.
8. DOOR SPANNER TYPE GATE HOLD DOWN MAY BE USED IN LIEU OF PIECES MARKED (6) AND (7) SHOWN IN THE LOAD VIEW ON PAGE 14, PROVIDING THE CAR BEING LOADED HAS NAILABLE SIDEWALLS. SEE THE PROCEDURES SHOWN ON PAGE 49 FOR GUIDANCE. CAUTION: DOOR SPANNER TYPE GATE HOLD DOWN MUST NOT BE USED WHEN AN EXCESS SPACE ACROSS THE WIDTH OF THE CAR IS FILLED BY NAILING LUMBER TO THE CAR SIDEWALL.
9. THE DEPICTED LOAD CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED. A 4-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF EIGHT (8) UNITS, A 3-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF SIX (6) UNITS, AND A 2-TIER LOAD

10. AS APPLICABLE, IT IS TO BE NOTED THAT IN A 9'-2" WIDE CAR THE UNITS WHICH HAVE A LENGTH OF 36-1/4" OR LESS, AND IN A 9'-4" WIDE CAR THE UNITS WHICH HAVE A LENGTH OF 37" OR LESS, CAN BE LOADED IN LARGER QUANTITIES IF THE 3-WIDE LOADING PROCEDURES ON PAGES 16 AND 17 ARE EMPLOYED. IF THE UNITS TO BE SHIPPED ARE OF SUCH A WEIGHT THAT THE QUANTITY OF STRUTS SHOWN ON PAGE 16 IS NOT ADEQUATE, THE LOADING PROCEDURES ON PAGES 18 AND 19 WILL APPLY. STILL LARGER QUANTITIES CAN BE ATTAINED BY USING THE 4-WIDE LOADING PROCEDURES SHOWN ON PAGES 20 AND 21 IF THE UNIT LENGTHS ARE 27-1/4" OR LESS AND 27-3/4" OR LESS IN 9'-2" AND 9'-4" WIDE CARS, RESPECTIVELY. SEE SPECIAL NOTE 12 BELOW.
11. IF UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF BOXES ARE TO BE TRANSPORTED, REFER TO PAGES 78, 80, AND 81 FOR SHIPPING GUIDANCE.
12. IN ADDITION TO THOSE LOAD-ADJUSTING PROCEDURES SPECIFIED WITHIN SPECIAL NOTE 9 ABOVE, THE PROCEDURES SHOWN BY THE "TYPICAL ALT LOAD PATTERN A" OR THE "TYPICAL ALT LOAD PATTERN B" VIEWS ON PAGE 29 MAY BE APPLIED FOR INCREASING A LOAD QUANTITY. CAUTION: PATTERN A REQUIRES THAT TWO UNIT WIDTHS BE LESS THAN THE WIDTH OF THE CAR BY 1" OR MORE, AND IN ADDITION, PATTERN B REQUIRES THAT THE TOTAL OF THREE UNIT LENGTHS BE LESS THAN THE CAR WIDTH BY 1" OR MORE.
13. CONSTRUCTION OF THE CENTER GATE A, SHOWN IN THE LOAD VIEW AS PIECE MARKED (4), IS BASED ON THE LENGTH AND HEIGHT OF THE SKIDDED UNIT TO BE SHIPPED AND UPON THE INSIDE WIDTH OF THE CAR TO BE LOADED. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED AS AN ALTERNATIVE. IN LIEU OF EACH CENTER GATE A, INSTALL TWO (2) GATES SHOWN AS CENTER GATE M ON PAGE 42. AFTER THE GATES AND STRUTS HAVE BEEN INSTALLED, THE SPLIT GATES MUST BE TIED TOGETHER AS DEPICTED BY THE "TIE PIECE APPLICATION A" DETAIL ON PAGE 46.
14. IN ADDITION TO THOSE LOAD-ADJUSTING PROCEDURES SPECIFIED WITHIN SPECIAL NOTE 9 AT LEFT, THE PROCEDURES SHOWN ON PAGE 61 CAN BE USED AS GUIDANCE FOR OMITTING TWO (2) SKIDDED UNITS FROM A LOAD UNIT ADJACENT TO THE CENTER BLOCKING.

( CONTINUED AT RIGHT )

BILL OF MATERIAL ( TYPICAL )		
LUMBER	LINEAR FEET	BOARD FEET
2" X 2"	73	24
2" X 4"	378	252
2" X 6"	152	152
4" X 4"	93	124
NAILS	NO. REQD	POUNDS
10d ( 3" )	360	5-3/4
12d ( 3-1/4" )	12	1/4
16d ( 3-1/2" )	224	5
STEEL STRAPPING, 1-1/4" X .035" -----76' REQD-----11 LBS		
SEAL FOR 1-1/4" STRAPPING ----- 4 REQD----- NIL		
STAPLES ----- 4 REQD----- NIL		
WIRE, NO. 14 GAGE -----80' REQD----- NIL		

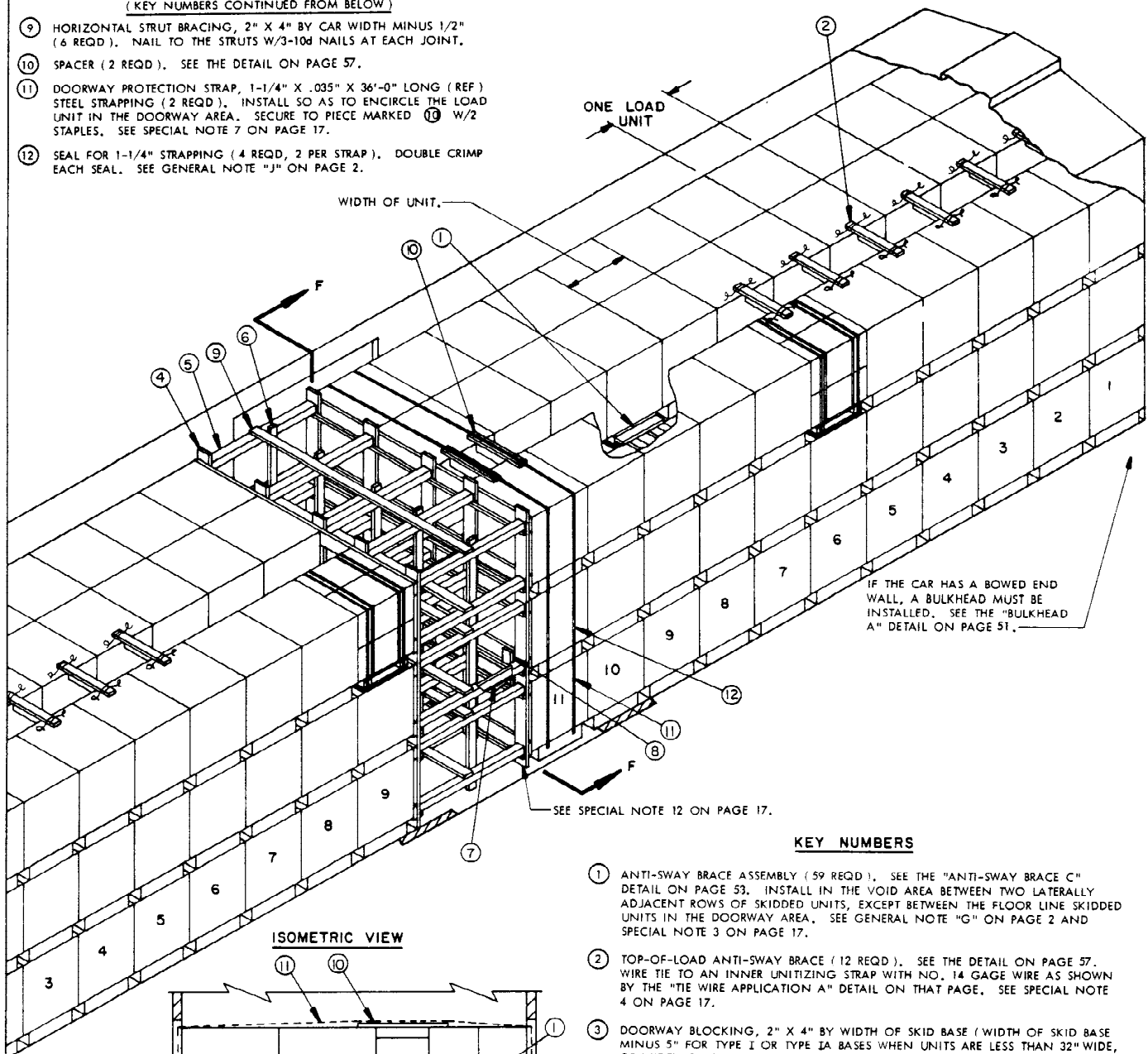
**LOAD AS SHOWN ( TYPICAL )**

ITEM	QUANTITY	WEIGHT ( APPROX )
SKIDDED UNIT-----	64-----	134,400 LBS
DUNNAGE-----	-----	1,402 LBS
TOTAL WEIGHT-----		135,802 LBS

**TYPICAL 2-WIDE LOAD (BOXES LENGTHWISE) IN A  
50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR**

(KEY NUMBERS CONTINUED FROM BELOW)

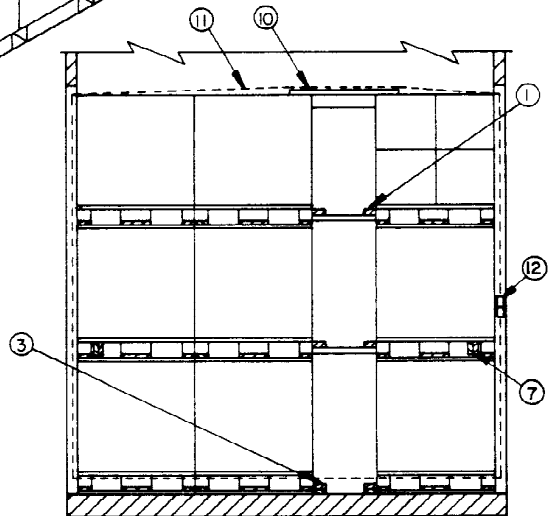
- 9 HORIZONTAL STRUT BRACING, 2" X 4" BY CAR WIDTH MINUS 1/2" (6 REQD.). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- 10 SPACER (2 REQD.). SEE THE DETAIL ON PAGE 57.
- 11 DOORWAY PROTECTION STRAP, 1-1/4" X .035" X 36'-0" LONG (REF) STEEL STRAPPING (2 REQD.). INSTALL SO AS TO ENCIRCLE THE LOAD UNIT IN THE DOORWAY AREA. SECURE TO PIECE MARKED 19 W/2 STAPLES. SEE SPECIAL NOTE 7 ON PAGE 17.
- 12 SEAL FOR 1-1/4" STRAPPING (4 REQD., 2 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "J" ON PAGE 2.



IF THE CAR HAS A BOWED END WALL, A BULKHEAD MUST BE INSTALLED. SEE THE "BULKHEAD A" DETAIL ON PAGE 51.

SEE SPECIAL NOTE 12 ON PAGE 17.

ISOMETRIC VIEW



SECTION F-F

KEY NUMBERS

- 1 ANTI-SWAY BRACE ASSEMBLY (59 REQD.). SEE THE "ANTI-SWAY BRACE C" DETAIL ON PAGE 53. INSTALL IN THE VOID AREA BETWEEN TWO LATERALLY ADJACENT ROWS OF SKIDDED UNITS, EXCEPT BETWEEN THE FLOOR LINE SKIDDED UNITS IN THE DOORWAY AREA. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTE 3 ON PAGE 17.
- 2 TOP-OF-LOAD ANTI-SWAY BRACE (12 REQD.). SEE THE DETAIL ON PAGE 57. WIRE TIE TO AN INNER UNITIZING STRAP WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON THAT PAGE. SEE SPECIAL NOTE 4 ON PAGE 17.
- 3 DOORWAY BLOCKING, 2" X 4" BY WIDTH OF SKID BASE (WIDTH OF SKID BASE MINUS 5" FOR TYPE I OR TYPE IA BASES WHEN UNITS ARE LESS THAN 32" WIDE, OR WIDTH OF SKID BASE MINUS 6" FOR TYPE II SKID BASE WHEN BOXES HAVE TOP CLEATS) DOUBLED (2 REQD.). POSITION SO AS TO BE CENTERED AGAINST SKIDDED UNIT AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/6-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE GENERAL NOTE "H" ON PAGE 4 AND SPECIAL NOTE 7 ON PAGE 17.
- 4 CENTER GATE (2 REQD.). SEE THE "CENTER GATE B" DETAIL ON PAGE 31.
- 5 STRUT, 4" X 4" BY CUT TO FIT (30 REQD.). TOENAIL TO PIECES MARKED 4 W/2-16d NAILS AT EACH END. SEE GENERAL NOTE "K" ON PAGE 4, AND SPECIAL NOTES 5 AND 6 ON PAGE 17.
- 6 VERTICAL STRUT BRACING, 2" X 4" BY CUT TO EXTEND 2" ABOVE THE TOP STRUT (5 REQD.). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- 7 GATE HOLD-DOWN ASSEMBLY (2 REQD.). SEE THE "GATE HOLD DOWN ASSEMBLY A" DETAIL ON PAGE 48. POSITION TO EXTEND UNDER SKIDDED UNITS AND NAIL TO PIECES MARKED 4 W/2-10d NAILS AT EACH JOINT. SEE THE "INSTALLATION OF GATE HOLD DOWN" DETAIL ON PAGE 48 FOR GUIDANCE. SEE SPECIAL NOTE 8 ON PAGE 17.
- 8 GATE HOLD DOWN RETAINER PIECE, 2" X 4" BY A LENGTH TO SUIT (4 REQD.). POSITION AGAINST PIECE MARKED 7 AND NAIL TO THE HORIZONTAL PIECES OF A CENTER GATE W/3-10d NAILS AT EACH END.

(CONTINUED ABOVE)

TYPICAL 3-WIDE LOAD (BOXES LENGTHWISE, 10 STRUTS/TIER) IN A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR



**SPECIAL NOTES:**

**(SPECIAL NOTES CONTINUED)**

- A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOX CAR EQUIPPED WITH 6'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER DOOR OPENINGS CAN BE USED.
- THE SKIDDED UNIT SHOWN IN THE TYPICAL 3-WIDE LOAD ON PAGE 16 HAS OVERALL DIMENSIONS OF 31" LONG BY 27-3/8" WIDE BY 36-1/4" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER WIDTHS, AND FOR UNITS HAVING LENGTHS OF FROM 25" THRU 36-1/4" IN A 9'-2" WIDE CAR OR FROM 25" THRU 37" IN A 9'-4" WIDE CAR. BASED ON A DOOR HEIGHT OF 9'-8", FULL LOADS OF UNITS WHICH ARE MORE THAN 38-1/2" IN HEIGHT WILL BE LIMITED TO NOT MORE THAN TWO (2) TIERS.
- ANTI-SWAY BRACING IS NOT REQUIRED IF THE TOTAL EXCESS SPACE ACROSS THE WIDTH OF THE CAR IS 2-1/4" OR LESS FOR LOADS OF BOXES WHICH HAVE VERTICAL END CLEATS, OR 3" OR LESS FOR LOADS OF WIREBOUND BOXES OR BOXES NOT HAVING VERTICAL END CLEATS. ANTI-SWAY BRACE E, AS DETAILED ON PAGE 53, MAY BE USED FOR FILLING AN EXCESS SPACE OF FROM 2-1/4" TO 6". OR, IF THE CAR BEING LOADED HAS NAILABLE SIDEWALLS, ONE OR MORE LAMINATIONS OF ONE INCH (1") AND/OR TWO INCH (2") LUMBER MAY BE APPLIED TO ONE OR BOTH SIDEWALLS IN LIEU OF USING ANTI-SWAY BRACE E. INSTALL HORIZONTALLY SO AS TO CONTACT THE TOP AND BOTTOM LAYERS OF BOXES ON THE UNITS AND NAIL TO THE CAR SIDEWALL WITH ONE APPLICABLY SIZED NAIL EVERY 24". IF THE TOTAL EXCESS SPACE IS MORE THAN 6", ANTI-SWAY BRACE C SHOULD BE INSTALLED IN THE VOID AREA BETWEEN TWO ROWS OF LATERALLY ADJACENT UNITS AT ALL LOCATIONS EXCEPT BETWEEN THE FLOOR LINE UNITS WHICH ARE COMPLETELY IN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE UNIT WIDTH.
- TOP-OF-LOAD ANTI-SWAY BRACES MUST BE INSTALLED IN EACH END OF A CAR. THE QUANTITY NEEDED IS DEPENDENT UPON THE DIMENSION OF THE UNIT WHICH IS POSITIONED LENGTHWISE IN THE CAR, AND UPON THE LENGTH OF THE CAR BEING LOADED. REFER TO THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57 FOR GUIDANCE.
- TEN (10) LOAD-BLOCKING 4" X 4" STRUTS FOR EACH TIER ARE ADEQUATE FOR RETAINING THIRTY-THREE (33) SKIDDED UNITS HAVING A WEIGHT OF NOT MORE THAN 557 POUNDS EACH. IF THE THIRTY-THREE UNITS BEING SHIPPED ARE HEAVIER, THE LOADING PROCEDURES SHOWN ON PAGES 18 AND 19 MAY BE USED IN LIEU OF THE DEPICTED PROCEDURES, OR THE STRUTTING MUST BE INCREASED. THE "ALT STRUTTING VIEW C" AND "ALT STRUTTING VIEW D" AT THE BOTTOM OF PAGE 50 DEPICT INSTALLATION GUIDANCE FOR 4" X 6" ON-EDGE STRUTS AND DOUBLED 4" X 4" STRUTS, RESPECTIVELY. THESE STRUTS MAY BE REQUIRED FOR THE BRACING OF A HEAVIER LOAD, IN LIEU OF THE SINGLE 4" X 4" STRUTS SHOWN IN THE LOAD VIEW. THE MAXIMUM WEIGHT PER SKIDDED UNIT BASED ON THE NUMBER OF LOAD UNITS IN THE LONG END OF THE CAR, IS AS FOLLOWS:

NO. OF LOAD UNITS IN LONG END OF CAR	MAXIMUM WEIGHT PER SKIDDED UNIT USING SINGLE 4" X 4" STRUTS	MAXIMUM WEIGHT PER SKIDDED UNIT USING 4" X 6" ON-EDGE STRUTS	MAXIMUM WEIGHT PER SKIDDED UNIT USING DOUBLED 4" X 4" STRUTS
16	382 LBS	601 LBS	765 LBS
15	408 LBS	641 LBS	816 LBS
14	437 LBS	687 LBS	875 LBS
13	471 LBS	740 LBS	942 LBS
12	510 LBS	802 LBS	1,021 LBS
11	557 LBS	875 LBS	1,113 LBS
10	612 LBS	962 LBS	1,225 LBS
9	680 LBS	1,069 LBS	1,361 LBS
8	756 LBS	1,203 LBS	1,513 LBS
7	875 LBS	1,375 LBS	1,750 LBS
6	1,021 LBS	1,604 LBS	2,042 LBS
5	1,224 LBS	1,924 LBS	2,450 LBS
4	1,512 LBS	2,406 LBS	3,026 LBS

(CONTINUED AT RIGHT)

BILL OF MATERIAL (TYPICAL)		
LUMBER	LINEAR FEET	BOARD FEET
2" X 2"	110	37
2" X 4"	416	277
2" X 6"	216	216
4" X 4"	135	180
NAILS	NO. REQD	POUNDS
10d ( 3" )	1288	20
12d ( 3-1/4" )	28	1/2
16d ( 3-1/2" )	144	3-1/4
STEEL STRAPPING, 1-1/4" X .035"-----72' REQD-----		11 LBS
SEAL FOR 1-1/4" STRAPPING -----	4 REQD-----	NIL
STAPLES FOR 1-1/4" STRAPPING -----	4 REQD-----	NIL
WIRE, NO. 14 GAGE -----92' REQD-----		NIL

- TO FACILITATE THE INSTALLATION OF THE GATE HOLD-DOWN ASSEMBLY, PIECE MARKED (7), WHEN STRUT BRACING PIECES ARE REQUIRED, THE STRUTS WHICH ARE INSTALLED BETWEEN THE OUTWARD VERTICAL PIECES OF THE CENTER GATES SHOULD BE CENTERED AT LEAST ONE-HALF INCH (1/2") OUTWARD OF THE VERTICAL CENTER LINE OF THE ADJACENT VERTICAL PIECE OF THE GATE.
- DOORWAY PROTECTION IS REQUIRED FOR ALL THE LOAD UNITS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY BY ONE-HALF OR MORE OF THE UNIT WIDTH. DOORWAY PROTECTION WILL CONSIST OF NAILED-DOWN BLOCKING BETWEEN THE STACKS, AND STEEL STRAPPING ENCIrcLING THE LOAD UNIT. TWO (2) STRAPS ARE REQUIRED AROUND A LOAD UNIT WHICH IS NOT RETAINED BY AT LEAST SIX INCHES (6") OF THE CAR SIDEWALL ON BOTH SIDES OF THE LOAD, AND ONE (1) STRAP IS REQUIRED AROUND A LOAD UNIT WHICH IS RETAINED BY AT LEAST SIX INCHES (6") BUT LESS THAN HALF OF THE UNIT WIDTH. REFER TO PAGES 54, 55, AND 56 FOR ALTERNATIVE DOORWAY PROTECTION PROCEDURES.
- DOOR SPANNER TYPE GATE HOLD DOWN MAY BE USED IN LIEU OF PIECES MARKED (7) AND (8) SHOWN IN THE LOAD VIEW ON PAGE 16, PROVIDING THE CAR BEING LOADED HAS NAILABLE SIDEWALLS. SEE THE PROCEDURES SHOWN ON PAGE 49 FOR GUIDANCE. CAUTION: DOOR SPANNER TYPE GATE HOLD DOWN MUST NOT BE USED WHEN AN EXCESS SPACE ACROSS THE WIDTH OF THE CAR IS FILLED BY NAILING LUMBER TO THE CAR SIDEWALL.
- THE DEPICTED LOAD CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED. A 3-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF NINE (9) UNITS OR A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF SIX (6) UNITS BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD. OR, ONE OR MORE UNITS CAN BE OMITTED FROM A TIER BY INSTALLING GATES AND STRUTS IN THE PLACE OF AN OMITTED UNIT, SIMILAR TO THE METHOD SHOWN ON PAGE 103. OR, THE 2-WIDE LOADING PROCEDURES SHOWN ON PAGES 14 AND 15 MAY BE EMPLOYED. OR, IF THE DESIRED QUANTITY CANNOT BE ATTAINED BY OMITTING AN ENTIRE TIER, UNITS CAN BE RETAINED IN BOTH ENDS OF THE CAR WITH KNEE BRACES AS SHOWN ON PAGES 58 AND 59. OR, UNITS CAN BE RETAINED IN ONE OR BOTH ENDS OF A CAR WITH RISERS AS SHOWN ON PAGE 64, OR WITH K-BRACES AS SHOWN ON PAGE 74 PROVIDING THE CAR HAS NAILABLE SIDEWALLS, OR WITH BULKHEAD GATES AND STRAPS IF THE CAR IS EQUIPPED WITH ANCHOR DEVICES AS SHOWN ON PAGE 68. ANY APPLICABLE COMBINATION OF THESE PROCEDURES FOR ADJUSTING A LOAD MAY ALSO BE USED TO ATTAIN THE DESIRED QUANTITY. SEE SPECIAL NOTE 13 BELOW.
- AS APPLICABLE, IT IS TO BE NOTED THAT IN A 9'-2" WIDE CAR THE UNITS WHICH HAVE A LENGTH OF 27-1/4" OR LESS, AND IN A 9'-4" WIDE CAR THE UNITS WHICH HAVE A LENGTH OF 27-3/4" OR LESS, CAN BE LOADED IN LARGER QUANTITIES IF THE 4-WIDE LOADING PROCEDURES SHOWN ON PAGES 20 AND 21 ARE EMPLOYED.
- IF UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF BOXES ARE TO BE TRANSPORTED, REFER TO PAGES 78, 80, AND 81 FOR SHIPPING GUIDANCE.
- CONSTRUCTION OF THE CENTER GATE B, SHOWN IN THE LOAD VIEW AS PIECE MARKED (4), IS BASED ON THE LENGTH AND HEIGHT OF THE SKIDDED UNIT TO BE SHIPPED AND UPON THE INSIDE WIDTH OF THE CAR TO BE LOADED. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED AS AN ALTERNATIVE. IN LIEU OF EACH CENTER GATE B, INSTALL ONE (1) GATE SHOWN AS CENTER GATE M ON PAGE 42 AND ONE (1) GATE SHOWN AS CENTER GATE N ON PAGE 43. AFTER THE GATES AND STRUTS HAVE BEEN INSTALLED, THE SPLIT GATES MUST BE TIED TOGETHER SIMILAR TO THE PROCEDURES DEPICTED BY THE "TIE PIECE APPLICATION A" DETAIL ON PAGE 46.
- IN ADDITION TO THOSE LOAD-ADJUSTING PROCEDURES SPECIFIED WITHIN SPECIAL NOTE 9 ABOVE, THE PROCEDURES SHOWN ON PAGE 61 CAN BE USED AS GUIDANCE FOR OMITTING THREE (3) SKIDDED UNITS FROM A LOAD UNIT ADJACENT TO THE CENTER BLOCKING. ALSO IN ADDITION, THE ENTIRE CENTER ROW OF THE TOP TIER (20 UNITS IN THE DEPICTED LOAD) CAN BE OMITTED. INCREASE THE WIDTH OF THE ANTI-SWAY BRACE ASSEMBLIES, PIECES MARKED (1), IN THE TOP TIER. ALSO INCREASE THE LENGTH OF THE TOP-OF-LOAD ANTI-SWAY BRACES, PIECES MARKED (2), AND THE SPACERS, PIECES MARKED (10). NOTE THAT THE TWO (2) CENTER STRUTS, PIECES MARKED (5), MAY BE OMITTED FROM THE BLOCKING FOR THE TOP TIER.

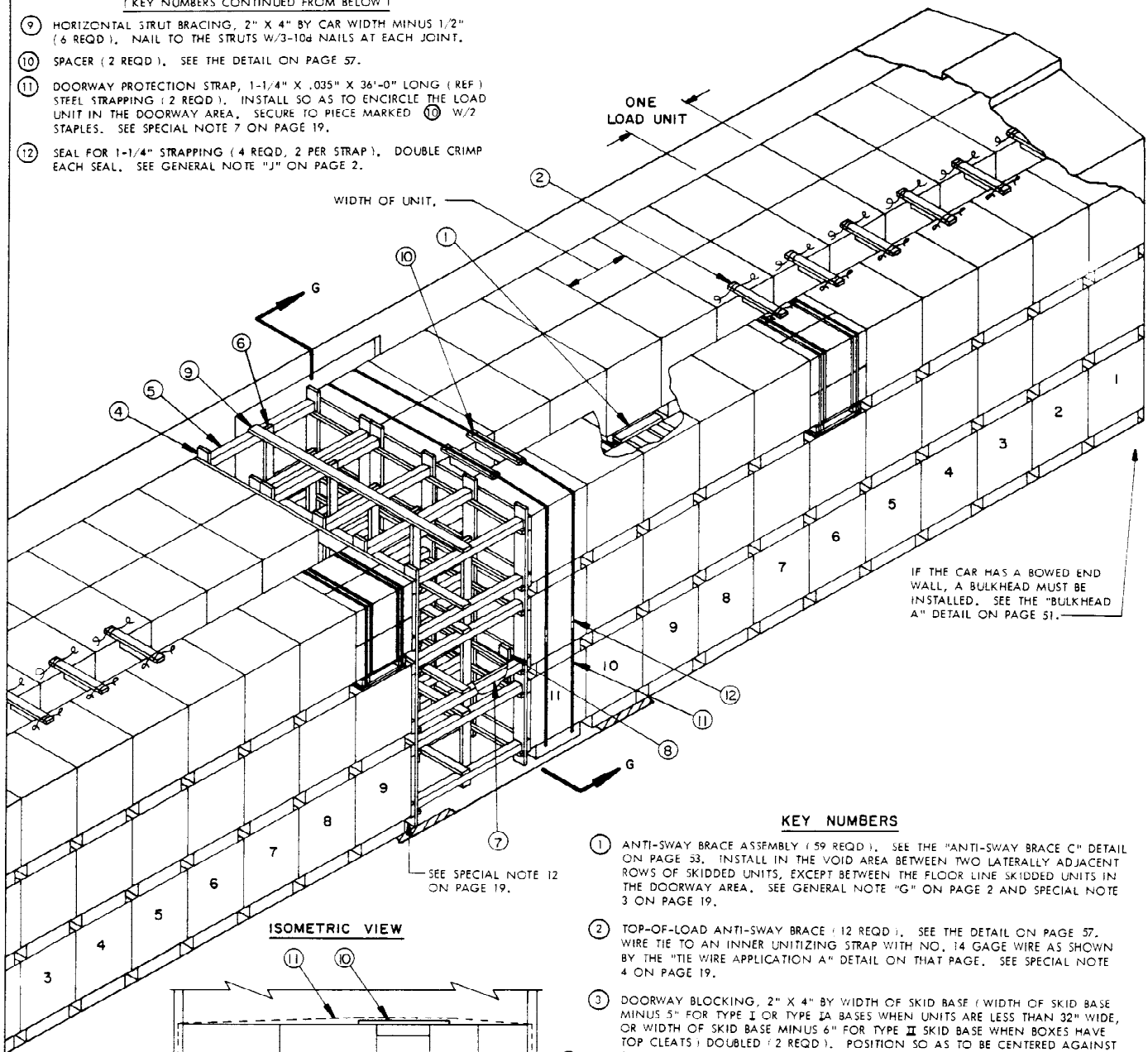
**LOAD AS SHOWN (TYPICAL)**

ITEM	QUANTITY	WEIGHT (APPROX)
SKIDDED UNIT-----	180	100,260 LBS
DUNNAGE-----		1,810 LBS
TOTAL WEIGHT-----		102,070 LBS

TYPICAL 3-WIDE LOAD (BOXES LENGTHWISE, 10 STRUTS/TIER) IN A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR

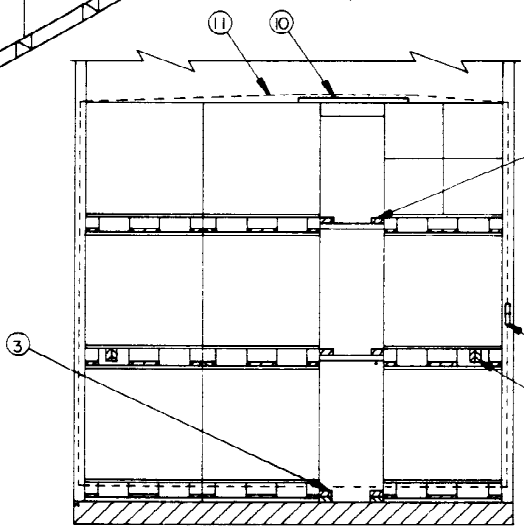
[ KEY NUMBERS CONTINUED FROM BELOW ]

- ⑨ HORIZONTAL STRUT BRACING, 2" X 4" BY CAR WIDTH MINUS 1/2" ( 6 REQ'D ). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑩ SPACER ( 2 REQ'D ). SEE THE DETAIL ON PAGE 57.
- ⑪ DOORWAY PROTECTION STRAP, 1-1/4" X .035" X 36'-0" LONG ( REF ) STEEL STRAPPING ( 2 REQ'D ). INSTALL SO AS TO ENCIRCLE THE LOAD UNIT IN THE DOORWAY AREA. SECURE TO PIECE MARKED ⑩ W/2 STAPLES. SEE SPECIAL NOTE 7 ON PAGE 19.
- ⑫ SEAL FOR 1-1/4" STRAPPING ( 4 REQ'D, 2 PER STRAP ). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "J" ON PAGE 2.



IF THE CAR HAS A BOWED END WALL, A BULKHEAD MUST BE INSTALLED. SEE THE "BULKHEAD A" DETAIL ON PAGE 51.

**ISOMETRIC VIEW**



**SECTION G-G**

**KEY NUMBERS**

- ① ANTI-SWAY BRACE ASSEMBLY ( 59 REQ'D ). SEE THE "ANTI-SWAY BRACE C" DETAIL ON PAGE 53. INSTALL IN THE VOID AREA BETWEEN TWO LATERALLY ADJACENT ROWS OF SKIDDED UNITS, EXCEPT BETWEEN THE FLOOR LINE SKIDDED UNITS IN THE DOORWAY AREA. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTE 3 ON PAGE 19.
- ② TOP-OF-LOAD ANTI-SWAY BRACE ( 12 REQ'D ). SEE THE DETAIL ON PAGE 57. WIRE TIE TO AN INNER UNITIZING STRAP WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON THAT PAGE. SEE SPECIAL NOTE 4 ON PAGE 19.
- ③ DOORWAY BLOCKING, 2" X 4" BY WIDTH OF SKID BASE ( WIDTH OF SKID BASE MINUS 5" FOR TYPE I OR TYPE 2A BASES WHEN UNITS ARE LESS THAN 32" WIDE, OR WIDTH OF SKID BASE MINUS 6" FOR TYPE II SKID BASE WHEN BOXES HAVE TOP CLEATS ) DOUBLED ( 2 REQ'D ). POSITION SO AS TO BE CENTERED AGAINST SKIDDED UNIT AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/6-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE GENERAL NOTE "H" ON PAGE 4 AND SPECIAL NOTE 7 ON PAGE 19.
- ④ CENTER GATE ( 2 REQ'D ). SEE THE "CENTER GATE C" DETAIL ON PAGE 32.
- ⑤ STRUT, 4" X 4" BY CUT TO FIT ( 36 REQ'D ). TOFNAIL TO PIECES MARKED ④ W/2-16d NAILS AT EACH END. SEE GENERAL NOTE "K" ON PAGE 4, AND SPECIAL NOTES 5 AND 6 ON PAGE 19.
- ⑥ VERTICAL STRUT BRACING, 2" X 4" BY CUT TO EXTEND 2" ABOVE THE TOP STRUT ( 6 REQ'D ). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑦ GATE HOLD-DOWN ASSEMBLY ( 2 REQ'D ). SEE THE "GATE HOLD DOWN ASSEMBLY A" DETAIL ON PAGE 48. POSITION TO EXTEND UNDER SKIDDED UNITS AND NAIL TO PIECES MARKED ④ W/2-10d NAILS AT EACH JOINT. SEE THE "INSTALLATION OF GATE HOLD DOWN" DETAIL ON PAGE 48 FOR GUIDANCE. SEE SPECIAL NOTE 8 ON PAGE 19.
- ⑧ GATE HOLD DOWN RETAINER PIECE, 2" X 4" BY A LENGTH TO SUIT ( 4 REQ'D ). POSITION AGAINST PIECE MARKED ⑦ AND NAIL TO THE HORIZONTAL PIECES OF A CENTER GATE W/3-10d NAILS AT EACH END.

( CONTINUED ABOVE )

TYPICAL 3'-WIDE LOAD (BOXES LENGTHWISE, 12 STRUTS/TIER) IN A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR

SPECIAL NOTES:

( SPECIAL NOTES CONTINUED )

1. A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOX CAR EQUIPPED WITH 6'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER DOOR OPENINGS CAN BE USED.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL 3-WIDE LOAD ON PAGE 18 HAS OVERALL DIMENSIONS OF 31" LONG BY 27-3/8" WIDE BY 36-1/4" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER WIDTHS, AND FOR UNITS HAVING LENGTHS OF FROM 25" THRU 36-1/4" IN A 9'-2" WIDE CAR OR FROM 25" THRU 37" IN A 9'-4" WIDE CAR. BASED ON A DOOR HEIGHT OF 9'-8", FULL LOADS OF UNITS WHICH ARE MORE THAN 38-1/2" IN HEIGHT WILL BE LIMITED TO NOT MORE THAN TWO ( 2 ) TIERS.
3. ANTI-SWAY BRACING IS NOT REQUIRED IF THE TOTAL EXCESS SPACE ACROSS THE WIDTH OF THE CAR IS 2-1/4" OR LESS FOR LOADS OF BOXES WHICH HAVE VERTICAL END CLEATS, OR 3" OR LESS FOR LOADS OF WIREBOUND BOXES OR BOXES NOT HAVING VERTICAL END CLEATS. ANTI-SWAY BRACE E, AS DETAILED ON PAGE 53, MAY BE USED FOR FILLING AN EXCESS SPACE OF FROM 2-1/4" TO 6". OR, IF THE CAR BEING LOADED HAS NAILABLE SIDEWALLS, ONE OR MORE LAMINATIONS OF ONE INCH ( 1" ) AND/OR TWO INCH ( 2" ) LUMBER MAY BE APPLIED TO ONE OR BOTH SIDEWALLS IN LIEU OF USING ANTI-SWAY BRACE E. INSTALL HORIZONTALLY SO AS TO CONTACT THE TOP AND BOTTOM LAYERS OF BOXES ON THE UNITS AND NAIL TO THE CAR SIDEWALL WITH ONE APPLICABLY SIZED NAIL EVERY 24". IF THE TOTAL EXCESS SPACE IS MORE THAN 6", ANTI-SWAY BRACE C SHOULD BE INSTALLED IN THE VOID AREA BETWEEN TWO ROWS OF LATERALLY ADJACENT UNITS AT ALL LOCATIONS EXCEPT BETWEEN THE FLOOR LINE UNITS WHICH ARE COMPLETELY IN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE UNIT WIDTH.
4. TOP-OF-LOAD ANTI-SWAY BRACES MUST BE INSTALLED IN EACH END OF A CAR. THE QUANTITY NEEDED IS DEPENDENT UPON THE DIMENSION OF THE UNIT WHICH IS POSITIONED LENGTHWISE IN THE CAR, AND UPON THE LENGTH OF THE CAR BEING LOADED. REFER TO THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 37 FOR GUIDANCE.
5. FOUR ( 4 ) LOAD BLOCKING 4" X 4" STRUTS FOR EACH ROW/TIER ARE ADEQUATE FOR RETAINING ELEVEN ( 11 ) SKIDDED UNITS HAVING A WEIGHT OF NOT MORE THAN 1,113 POUNDS EACH. REFER TO THE "STRUTTING REQUIREMENTS" CHART ON PAGE 50 FOR GUIDANCE AS TO THE MAXIMUM WEIGHT PER UNIT WHEN THE LOAD IN THE LONG END OF THE CAR IS MORE OR LESS THAN ELEVEN UNITS IN LENGTH. THE "ALT STRUTTING VIEW C" AND "ALT STRUTTING VIEW D" AT THE BOTTOM OF PAGE 50 DEPICT INSTALLATION GUIDANCE FOR 4" X 6" ON-EDGE STRUTS AND DOUBLED 4" X 4" STRUTS, RESPECTIVELY. THESE STRUTS MAY BE REQUIRED FOR THE BRACING OF A HEAVIER LOAD. IN LIEU OF THE SINGLE 4" X 4" STRUTS SHOWN IN THE LOAD VIEW.
6. TO FACILITATE THE INSTALLATION OF THE GATE HOLD-DOWN ASSEMBLY, PIECE MARKED ( 7 ), WHEN STRUT BRACING PIECES ARE REQUIRED, THE STRUTS WHICH ARE INSTALLED BETWEEN THE OUTWARD VERTICAL PIECES OF THE CENTER GATES SHOULD BE CENTERED AT LEAST ONE-HALF INCH ( 1/2" ) OUTWARD OF THE VERTICAL CENTER LINE OF THE ADJACENT VERTICAL PIECE OF THE GATE.
7. DOORWAY PROTECTION IS REQUIRED FOR ALL THE LOAD UNITS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY BY ONE-HALF OR MORE OF THE UNIT WIDTH. DOORWAY PROTECTION WILL CONSIST OF NAILED-DOWN BLOCKING BETWEEN THE STACKS, AND STEEL STRAPPING ENCIRCLING THE LOAD UNIT. TWO ( 2 ) STRAPS ARE REQUIRED AROUND A LOAD UNIT WHICH IS NOT RETAINED BY AT LEAST SIX INCHES ( 6" ) OF THE CAR SIDEWALL ON BOTH SIDES OF THE LOAD, AND ONE ( 1 ) STRAP IS REQUIRED AROUND A LOAD UNIT WHICH IS RETAINED BY AT LEAST SIX INCHES ( 6" ) BUT LESS THAN HALF OF THE UNIT WIDTH. REFER TO PAGES 54, 55, AND 56 FOR ALTERNATIVE DOORWAY PROTECTION PROCEDURES.
8. DOOR SPANNER TYPE GATE HOLD DOWN MAY BE USED IN LIEU OF PIECES MARKED ( 7 ) AND ( 8 ) SHOWN IN THE LOAD VIEW ON PAGE 18, PROVIDING THE CAR BEING LOADED HAS NAILABLE SIDEWALLS. SEE THE PROCEDURES SHOWN ON PAGE 49 FOR GUIDANCE. CAUTION: DOOR SPANNER TYPE GATE HOLD DOWN MUST NOT BE USED WHEN AN EXCESS SPACE ACROSS THE WIDTH OF THE CAR IS FILLED BY NAILING LUMBER TO THE CAR SIDEWALL.
9. THE DEPICTED LOAD CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED. A 3-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF NINE ( 9 ) UNITS OR A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF SIX ( 6 ) UNITS BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD. OR, ONE OR MORE UNITS CAN BE OMITTED FROM A TIER BY INSTALLING GATES AND STRUTS IN THE PLACE OF AN OMITTED UNIT, SIMILAR TO THE METHOD SHOWN ON PAGE 103. OR, THE 2-WIDE LOADING PROCEDURES SHOWN ON PAGES 14 AND 15 MAY BE EMPLOYED. OR; IF THE DESIRED QUANTITY CANNOT BE ATTAINED BY OMITTING AN ENTIRE TIER, UNITS CAN BE RETAINED IN BOTH ENDS OF THE CAR WITH KNEE BRACES AS SHOWN ON PAGES 77 AND 59. OR, UNITS CAN BE RETAINED IN ONE OR BOTH ENDS OF A CAR WITH RISERS AS SHOWN ON PAGE 64, OR WITH K-BRACES AS SHOWN ON PAGE 74 PROVIDING THE CAR HAS NAILABLE SIDEWALLS, OR WITH BULKHEAD GATES AND STRAPS IF THE CAR IS EQUIPPED WITH ANCHOR DEVICES AS SHOWN ON PAGE 68. ANY APPLICABLE COMBINATION OF THESE PROCEDURES FOR ADJUSTING A LOAD MAY ALSO BE USED TO ATTAIN THE DESIRED QUANTITY. SEE SPECIAL NOTE 13 BELOW.
10. AS APPLICABLE, IT IS TO BE NOTED THAT IN A 9'-2" WIDE CAR THE UNITS WHICH HAVE A LENGTH OF 27-1/4" OR LESS, AND IN A 9'-4" WIDE CAR THE UNITS WHICH HAVE A LENGTH OF 27-3/4" OR LESS, CAN BE LOADED IN LARGER QUANTITIES IF THE 4-WIDE LOADING PROCEDURES SHOWN ON PAGES 20 AND 21 ARE EMPLOYED.
11. IF UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF BOXES ARE TO BE TRANSPORTED, REFER TO PAGES 78, 80, AND 81 FOR SHIPPING GUIDANCE.
12. CONSTRUCTION OF THE CENTER GATE C, SHOWN IN THE LOAD VIEW AS PIECE MARKED ( 4 ), IS BASED ON THE LENGTH AND HEIGHT OF THE SKIDDED UNIT TO BE SHIPPED AND UPON THE INSIDE WIDTH OF THE CAR TO BE LOADED. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED AS AN ALTERNATIVE. IN LIEU OF EACH CENTER GATE C, INSTALL THREE ( 3 ) GATES SHOWN AS CENTER GATE M ON PAGE 42. AFTER THE GATES AND STRUTS HAVE BEEN INSTALLED, THE SPLIT GATES MUST BE TIED TOGETHER AS DEPICTED BY THE "TIE WIRE APPLICATION B" DETAIL ON PAGE 46.
13. IN ADDITION TO THOSE LOAD-ADJUSTING PROCEDURES SPECIFIED WITHIN SPECIAL NOTE 9 ABOVE, THE PROCEDURES SHOWN ON PAGE 61 CAN BE USED AS GUIDANCE IN OMITTING THREE ( 3 ) SKIDDED UNITS FROM A LOAD UNIT ADJACENT TO THE CENTER BLOCKING. ALSO IN ADDITION, THE ENTIRE CENTER ROW OF THE TOP TIER ( 20 UNITS IN THE DEPICTED LOAD ) CAN BE OMITTED. INCREASE THE WIDTH OF THE ANTI-SWAY BRACE ASSEMBLIES, PIECES MARKED ( 1 ), IN THE TOP TIER. ALSO INCREASE THE LENGTH OF THE TOP-OF-LOAD ANTI-SWAY BRACES, PIECES MARKED ( 2 ), AND THE SPACERS, PIECES MARKED ( 10 ). NOTE THAT THE FOUR ( 4 ) APPLICABLE STRUTS, PIECES MARKED ( 5 ), MAY BE OMITTED.

( CONTINUED AT RIGHT )

BILL OF MATERIAL ( TYPICAL )		
LUMBER	LINEAR FEET	BOARD FEET
2" X 2"	110	37
2" X 4"	428	285
2" X 6"	222	222
4" X 4"	161	215
NAILS	NO. REQD	POUNDS
10d ( 3" )	1222	19
12d ( 3-1/4" )	28	1/2
16d ( 3-1/2" )	24	1/2
STEEL STRAPPING, 1-1/4" X .035" -----	72' REQD -----	11 LBS
SEAL FOR 1-1/4" STRAPPING -----	4 REQD -----	NIL
STAPLES FOR 1-1/4" STRAPPING -----	4 REQD -----	NIL
WIRE, NO. 14 GAGE -----	96' REQD -----	NIL

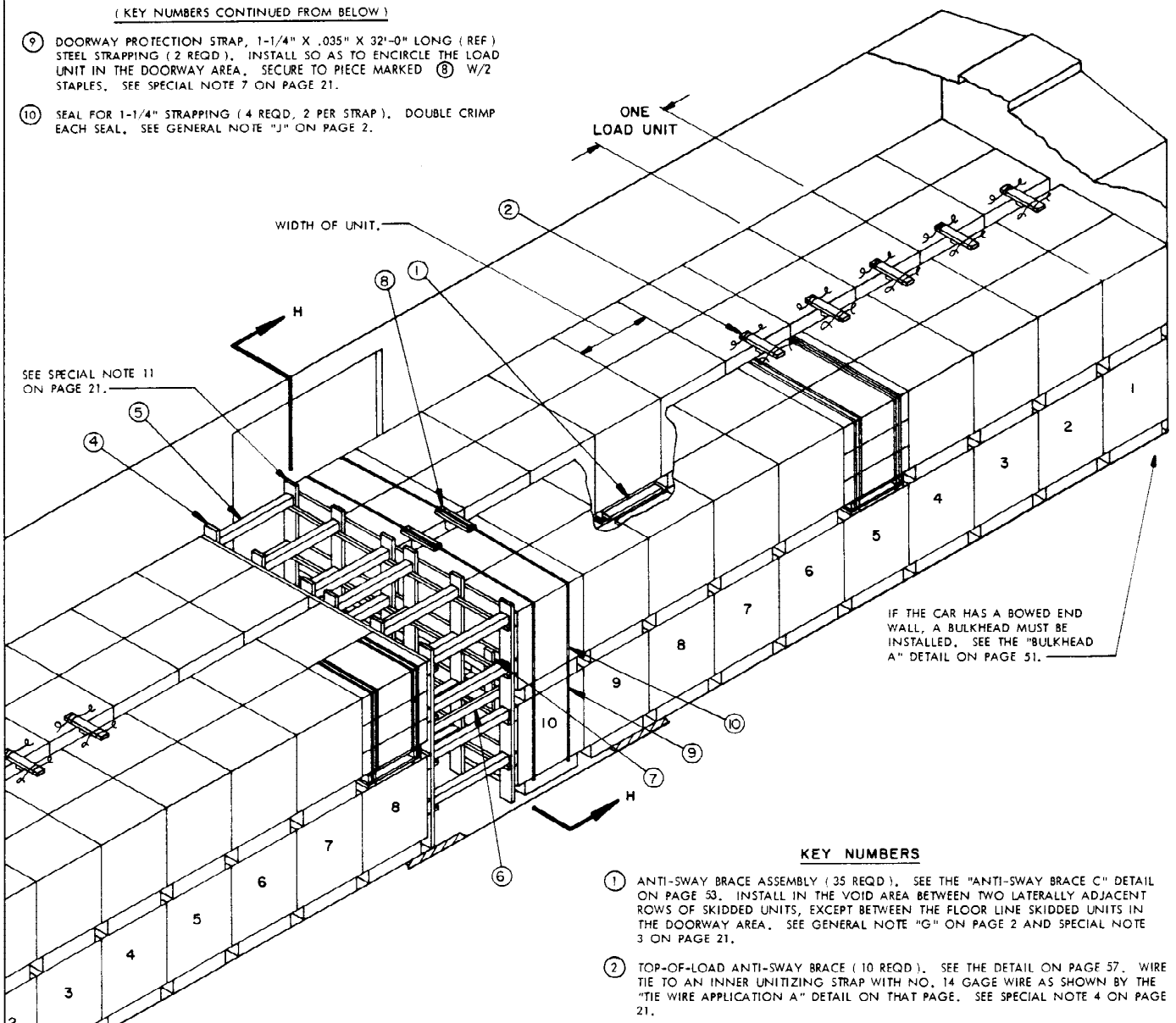
LOAD AS SHOWN ( TYPICAL )

ITEM	QUANTITY	WEIGHT ( APPROX )
SKIDDED UNIT -----	180 -----	139,860 LBS
DUNNAGE -----	-----	1,928 LBS
TOTAL WEIGHT -----	-----	141,788 LBS

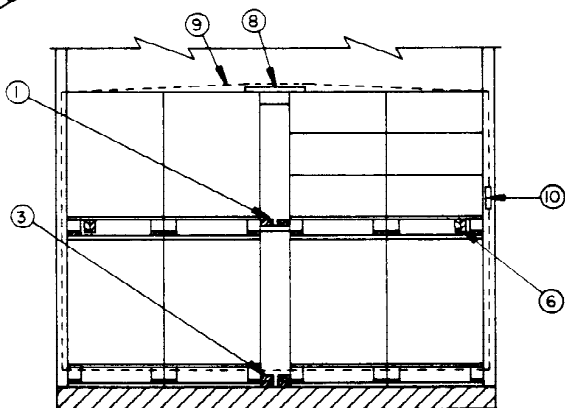
TYPICAL 3-WIDE LOAD (BOXES LENGTHWISE, 12 STRUTS/TIER) IN A  
50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR

( KEY NUMBERS CONTINUED FROM BELOW )

- 9 DOORWAY PROTECTION STRAP, 1-1/4" X .035" X 32'-0" LONG ( REF ) STEEL STRAPPING ( 2 REQD ). INSTALL SO AS TO ENCIROLE THE LOAD UNIT IN THE DOORWAY AREA. SECURE TO PIECE MARKED 8 W/2 STAPLES. SEE SPECIAL NOTE 7 ON PAGE 21.
- 10 SEAL FOR 1-1/4" STRAPPING ( 4 REQD, 2 PER STRAP ). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "J" ON PAGE 2.



ISOMETRIC VIEW



SECTION H-H

KEY NUMBERS

- 1 ANTI-SWAY BRACE ASSEMBLY ( 35 REQD ). SEE THE "ANTI-SWAY BRACE C" DETAIL ON PAGE 53. INSTALL IN THE VOID AREA BETWEEN TWO LATERALLY ADJACENT ROWS OF SKIDDED UNITS, EXCEPT BETWEEN THE FLOOR LINE SKIDDED UNITS IN THE DOORWAY AREA. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTE 3 ON PAGE 21.
- 2 TOP-OF-LOAD ANTI-SWAY BRACE ( 10 REQD ). SEE THE DETAIL ON PAGE 57. WIRE TIE TO AN INNER UNITIZING STRAP WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON THAT PAGE. SEE SPECIAL NOTE 4 ON PAGE 21.
- 3 DOORWAY BLOCKING, 2" X 4" BY WIDTH OF SKID BASE ( WIDTH OF SKID BASE MINUS 5" FOR TYPE I OR TYPE IA BASES WHEN UNITS ARE LESS THAN 32" WIDE, OR WIDTH OF SKID BASE MINUS 6" FOR TYPE II SKID BASE WHEN BOXES HAVE TOP CLEATS ) DOUBLED ( 2 REQD ). POSITION SO AS TO BE CENTERED AGAINST SKIDDED UNIT AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/6-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE GENERAL NOTE "H" ON PAGE 4 AND SPECIAL NOTE 7 ON PAGE 21.
- 4 CENTER GATE ( 2 REQD ). SEE THE "CENTER GATE D" DETAIL ON PAGE 33.
- 5 STRUT, 4" X 4" BY CUT TO FIT ( 24 REQD ). TOENAIL TO PIECES MARKED 4 W/2-16d NAILS AT EACH END. SEE GENERAL NOTE "K" ON PAGE 4, AND SPECIAL NOTES 5 AND 6 ON PAGE 21.
- 6 GATE HOLD-DOWN ASSEMBLY ( 2 REQD ). SEE THE "GATE HOLD-DOWN ASSEMBLY A" DETAIL ON PAGE 48. POSITION TO EXTEND UNDER SKIDDED UNITS AND NAIL TO PIECES MARKED 4 W/2-10d NAILS AT EACH JOINT. SEE THE "INSTALLATION OF GATE HOLD DOWN" DETAIL ON PAGE 48 FOR GUIDANCE. SEE SPECIAL NOTE 8 ON PAGE 21.
- 7 GATE HOLD DOWN RETAINER PIECE, 2" X 4" BY A LENGTH TO SUIT ( 4 REQD ). POSITION AGAINST PIECE MARKED 6 AND NAIL TO THE HORIZONTAL PIECES OF A CENTER GATE W/3-10d NAILS AT EACH END.
- 8 SPACER ( 2 REQD ). SEE THE DETAIL ON PAGE 57.

( CONTINUED ABOVE )

TYPICAL 4-WIDE LOAD (BOXES LENGTHWISE) IN A  
50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR

SPECIAL NOTES:

( SPECIAL NOTES CONTINUED )

1. A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOX CAR EQUIPPED WITH 6'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER DOOR OPENINGS CAN BE USED.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL 4-WIDE LOAD ON PAGE 20 HAS OVERALL DIMENSIONS OF 25-1/2" LONG BY 31-1/4" WIDE BY 40-1/4" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER WIDTHS, AND FOR UNITS HAVING LENGTHS OF FROM 25" THRU 27-1/4" IN A 9'-2" WIDE CAR OR FROM 25" THRU 27-3/4" IN A 9'-4" WIDE CAR. BASED ON A DOOR HEIGHT OF 9'-8", FULL LOADS OF UNITS WHICH ARE MORE THAN 38-1/2" IN HEIGHT WILL BE LIMITED TO NOT MORE THAN TWO (2) TIERS.
3. ANTI-SWAY BRACING IS NOT REQUIRED IF THE TOTAL EXCESS SPACE ACROSS THE WIDTH OF THE CAR IS 2-1/4" OR LESS FOR LOADS OF BOXES WHICH HAVE VERTICAL END CLEATS, OR 3" OR LESS FOR LOADS OF WIREBOUND BOXES OR BOXES NOT HAVING VERTICAL END CLEATS. ANTI-SWAY BRACE E, AS DETAILED ON PAGE 53, MAY BE USED FOR FILLING AN EXCESS SPACE OF FROM 2-1/4" TO 6". OR, IF THE CAR BEING LOADED HAS NAILABLE SIDEWALLS, ONE OR MORE LAMINATIONS OF ONE INCH (1") AND/OR TWO INCH (2") LUMBER MAY BE APPLIED TO ONE OR BOTH SIDEWALLS IN LIEU OF USING ANTI-SWAY BRACE E. INSTALL HORIZONTALLY SO AS TO CONTACT THE TOP AND BOTTOM LAYERS OF BOXES ON THE UNITS AND NAIL TO THE CAR SIDEWALL WITH ONE APPLICABLY SIZED NAIL EVERY 24". IF THE TOTAL EXCESS SPACE IS MORE THAN 6", ANTI-SWAY BRACE C SHOULD BE INSTALLED IN THE VOID AREA BETWEEN TWO ROWS OF LATERALLY ADJACENT UNITS AT ALL LOCATIONS EXCEPT BETWEEN THE FLOOR LINE UNITS WHICH ARE COMPLETELY IN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE UNIT WIDTH.
4. TOP-OF-LOAD ANTI-SWAY BRACES MUST BE INSTALLED IN EACH END OF A CAR. THE QUANTITY NEEDED IS DEPENDENT UPON THE DIMENSION OF THE UNIT WHICH IS POSITIONED LENGTHWISE IN THE CAR, AND UPON THE LENGTH OF THE CAR BEING LOADED. REFER TO THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57 FOR GUIDANCE.
5. TWELVE (12) LOAD-BLOCKING 4" X 4" STRUTS FOR EACH TIER ARE ADEQUATE FOR RETAINING FORTY (40) SKIDDED UNITS HAVING A WEIGHT OF NOT MORE THAN 612 POUNDS EACH. IF THE FORTY UNITS ARE HEAVIER, THE STRUTTING MUST BE INCREASED. THE "ALT STRUTTING VIEW C" AND "ALT STRUTTING VIEW D" AT THE BOTTOM OF PAGE 50 DEPICT INSTALLATION GUIDANCE FOR 4" X 6" ON-EDGE STRUTS AND DOUBLED 4" X 4" STRUTS, RESPECTIVELY. THESE STRUTS MAY BE REQUIRED FOR THE BRACING OF A HEAVIER LOAD, IN LIEU OF THE SINGLE 4" X 4" STRUTS SHOWN IN THE LOAD VIEW. THE MAXIMUM WEIGHT PER SKIDDED UNIT BASED ON THE NUMBER OF LOAD UNITS IN THE LONG END OF THE CAR, IS AS FOLLOWS:

NO. OF LOAD UNITS IN LONG END OF CAR	MAXIMUM WEIGHT PER SKIDDED UNIT USING SINGLE 4" X 4" STRUTS	MAXIMUM WEIGHT PER SKIDDED UNIT USING 4" X 6" ON-EDGE STRUTS	MAXIMUM WEIGHT PER SKIDDED UNIT USING DOUBLED 4" X 4" STRUTS
16	392 LBS	601 LBS	765 LBS
15	408 LBS	641 LBS	816 LBS
14	437 LBS	687 LBS	875 LBS
13	471 LBS	740 LBS	942 LBS
12	510 LBS	802 LBS	1,021 LBS
11	557 LBS	875 LBS	1,113 LBS
10	612 LBS	962 LBS	1,225 LBS
9	680 LBS	1,069 LBS	1,361 LBS
8	756 LBS	1,203 LBS	1,513 LBS
7	875 LBS	1,375 LBS	1,750 LBS
6	1,021 LBS	1,604 LBS	2,042 LBS
5	1,224 LBS	1,924 LBS	2,450 LBS
4	1,512 LBS	2,406 LBS	3,026 LBS

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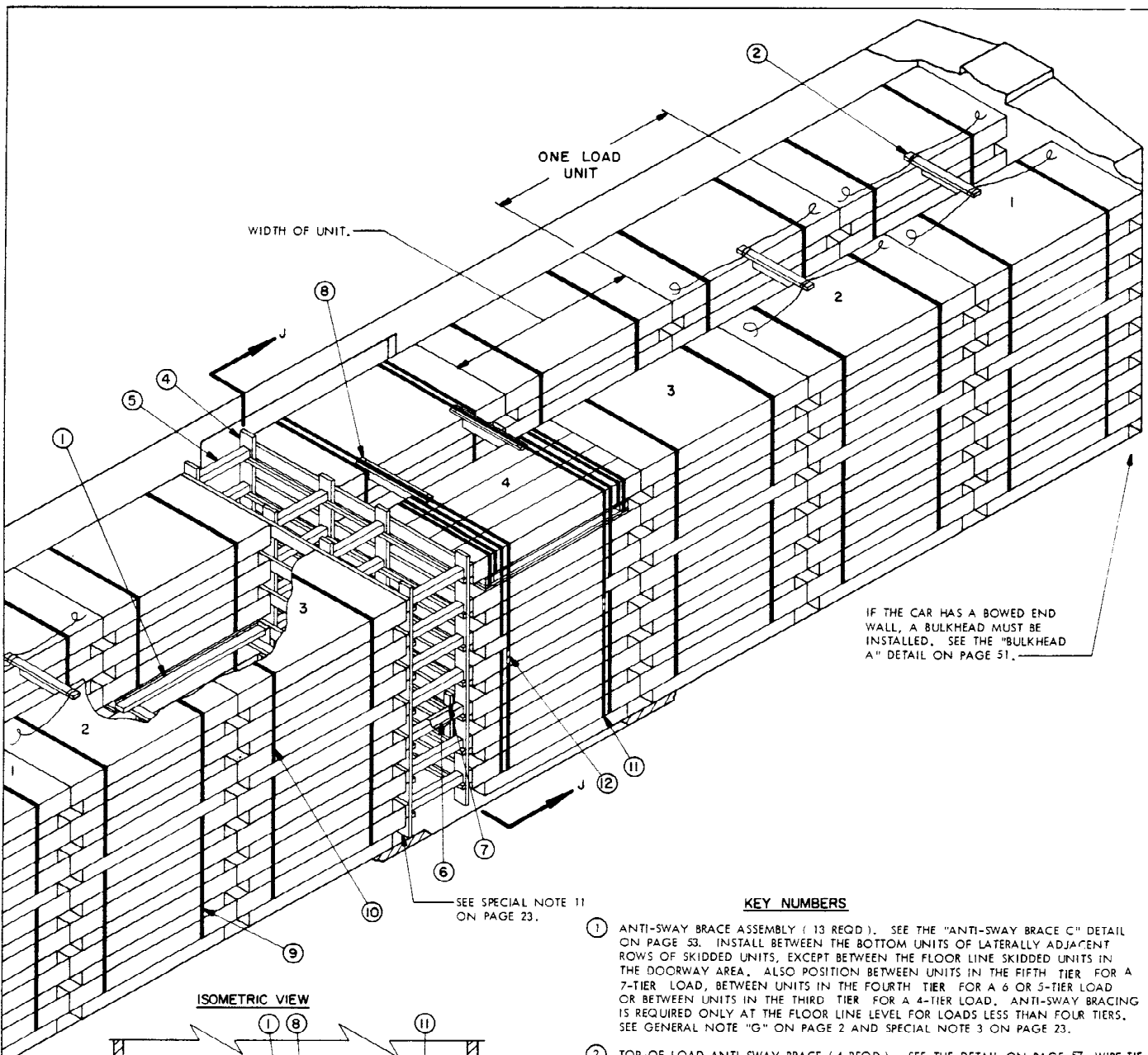
6. TO FACILITATE THE INSTALLATION OF THE GATE HOLD DOWN ASSEMBLY, PIECE MARKED (6), WHEN STRUT BRACING PIECES ARE REQUIRED, THE STRUTS WHICH ARE INSTALLED BETWEEN THE OUTWARD VERTICAL PIECES OF THE CENTER GATES SHOULD BE CENTERED AT LEAST ONE-HALF INCH (1/2") OUTWARD OF THE VERTICAL CENTER LINE OF THE ADJACENT VERTICAL PIECE OF THE GATE.
7. DOORWAY PROTECTION IS REQUIRED FOR ALL THE LOAD UNITS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY BY ONE-HALF OR MORE OF THE UNIT WIDTH. DOORWAY PROTECTION FOR A 4-WIDE LOAD IN A CAR EQUIPPED WITH CONVENTIONAL SLIDING DOORS AND IN WHICH THERE IS LESS THAN 3-1/2" EXCESS SPACE ACROSS THE WIDTH OF THE CAR MUST BE OF THE WOODEN DOOR GATE TYPE OR ONE OF THE ALTERNATIVES AS DETAILED ON PAGES 54, 55, AND 56. IF THERE IS LESS THAN 3-1/2" EXCESS SPACE IN A CAR EQUIPPED WITH PLUG DOORS, DOORWAY PROTECTION FOR THE DOORWAY AREA LOAD UNITS MAY BE PROVIDED BY ENCIRCLING WITH STEEL STRAPPING IN LIEU OF USING THE REFERENCED ALTERNATIVE PROCEDURES. IN A CAR IN WHICH THERE IS 3-1/2" OR MORE OF EXCESS SPACE ACROSS THE WIDTH OF THE CAR, DOORWAY PROTECTION SHOULD CONSIST OF NAILED-DOWN BLOCKING BETWEEN THE STACKS AND STEEL STRAPPING ENCIRCLING THE LOAD UNIT. TWO (2) STRAPS ARE REQUIRED AROUND A LOAD UNIT WHICH IS NOT RETAINED BY AT LEAST SIX INCHES (6") OF THE CAR SIDEWALL ON BOTH SIDES OF THE LOAD, AND ONE (1) STRAP IS REQUIRED AROUND A LOAD UNIT WHICH IS RETAINED BY AT LEAST SIX INCHES (6") BUT LESS THAN HALF OF THE UNIT WIDTH.
8. DOOR SPANNER TYPE GATE HOLD DOWN MAY BE USED IN LIEU OF PIECES MARKED (6) AND (7) SHOWN IN THE LOAD VIEW ON PAGE 20, PROVIDING THE CAR BEING LOADED HAS NAILABLE SIDEWALLS. SEE THE PROCEDURES SHOWN ON PAGE 49 FOR GUIDANCE. CAUTION: DOOR SPANNER TYPE GATE HOLD DOWN MUST NOT BE USED WHEN AN EXCESS SPACE ACROSS THE WIDTH OF THE CAR IS FILLED BY NAILING LUMBER TO THE CAR SIDEWALL.
9. THE DEPICTED LOAD CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED. A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF FOUR (4) UNITS BY OMITTING ONE OR MORE LOAD UNITS FROM THE CENTER PORTION OF THE LOAD. OR, ONE OR MORE UNITS CAN BE OMITTED FROM A TIER BY INSTALLING GATES AND STRUTS IN THE PLACE OF AN OMITTED UNIT, SIMILAR TO THE METHOD SHOWN ON PAGE 103. OR, EITHER THE 3-WIDE LOADING PROCEDURES SHOWN ON PAGES 16 AND 17 OR 18 AND 19, AS APPLICABLE, OR THE 2-WIDE LOADING PROCEDURES SHOWN ON PAGES 14 AND 15 MAY BE USED. OR IF THE DESIRED QUANTITY CANNOT BE ATTAINED BY OMITTING AN ENTIRE TIER, UNITS CAN BE RETAINED IN BOTH ENDS OF THE CAR WITH KNEE BRACES AS SHOWN ON PAGES 58 AND 59. OR; UNITS CAN BE RETAINED IN ONE OR BOTH ENDS OF A CAR WITH RISERS AS SHOWN ON PAGE 64, OR WITH K-BRACES AS SHOWN ON PAGE 74 PROVIDING THE CAR HAS NAILABLE SIDEWALLS, OR WITH BULKHEAD GATES AND STRAPS IF THE CAR IS EQUIPPED WITH ANCHOR DEVICES AS SHOWN ON PAGE 68. ANY APPLICABLE COMBINATION OF THESE PROCEDURES FOR ADJUSTING A LOAD MAY ALSO BE USED TO ATTAIN THE DESIRED QUANTITY. SEE SPECIAL NOTE 12 BELOW.
10. IF THE UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF BOXES ARE TO BE TRANSPORTED, REFER TO PAGES 78, 80, AND 81 FOR SHIPPING GUIDANCE.
11. CONSTRUCTION OF THE CENTER GATE D, SHOWN IN THE LOAD VIEW AS PIECE MARKED (4), IS BASED ON THE LENGTH AND HEIGHT OF THE SKIDDED UNIT TO BE SHIPPED AND UPON THE INSIDE WIDTH OF THE CAR TO BE LOADED. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED AS AN ALTERNATIVE. IN LIEU OF EACH CENTER GATE D, INSTALL TWO (2) GATES SHOWN AS CENTER GATE N ON PAGE 43. AFTER THE GATES AND STRUTS HAVE BEEN INSTALLED, THE SPLIT GATES MUST BE TIED TOGETHER SIMILAR TO THE PROCEDURES DEPICTED BY THE "TIE PIECE APPLICATION A" DETAIL ON PAGE 46.
12. IN ADDITION TO THOSE LOAD-ADJUSTING PROCEDURES SPECIFIED WITHIN SPECIAL NOTE 9 ABOVE, THE PROCEDURES SHOWN ON PAGE 61 CAN BE USED AS GUIDANCE IN OMITTING FOUR (4) SKIDDED UNITS FROM A LOAD UNIT ADJACENT TO THE CENTER BLOCKING. ALSO IN ADDITION, ONE OR TWO ENTIRE CENTER ROWS OF THE TOP TIER (18 OR 36 UNITS IN THE DEPICTED LOAD) CAN BE OMITTED. INCREASE THE WIDTH OF THE ANTI-SWAY BRACE ASSEMBLIES, PIECES MARKED (1), IN THE TOP TIER. ALSO INCREASE THE LENGTH OF THE TOP-OF-LOAD ANTI-SWAY BRACES, PIECES MARKED (8). NOTE THAT FOUR (4) STRUTS, PIECES MARKED (5), MAY BE OMITTED FOR EACH ROW OF UNITS THAT IS OMITTED.

BILL OF MATERIAL ( TYPICAL )		
LUMBER	LINEAR FEET	BOARD FEET
2" X 2"	37	12
2" X 4"	192	128
2" X 6"	79	79
4" X 4"	77	103
NAILS	NO. REQD	POUNDS
10d (3")	608	10
12d (3-1/4")	24	1/2
16d (3-1/2")	120	3
STEEL STRAPPING, 1-1/4" X .035"-----	64' REQD-----	7 LBS
SEAL FOR 1-1/4" STRAPPING-----	4 REQD-----	NIL
STAPLES FOR 1-1/4" STRAPPING-----	4 REQD-----	NIL
WIRE, NO. 14 GAGE-----	80' REQD-----	NIL

LOAD AS SHOWN ( TYPICAL )

ITEM	QUANTITY	WEIGHT ( APPROX )
SKIDDED UNIT-----	144-----	88,128 LBS
DUNNAGE-----	-----	925 LBS
TOTAL WEIGHT-----	-----	89,053 LBS

TYPICAL 4-WIDE LOAD (BOXES LENGTHWISE) IN A  
50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR



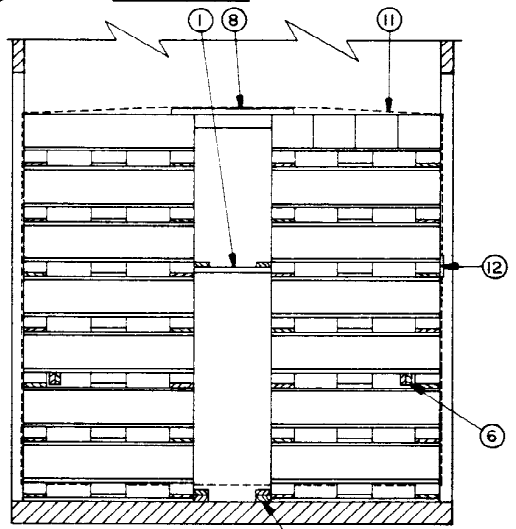
IF THE CAR HAS A BOWED END WALL, A BULKHEAD MUST BE INSTALLED. SEE THE "BULKHEAD A" DETAIL ON PAGE 51.

SEE SPECIAL NOTE 11 ON PAGE 23.

**KEY NUMBERS**

- ① ANTI-SWAY BRACE ASSEMBLY ( 13 REQD ). SEE THE "ANTI-SWAY BRACE C" DETAIL ON PAGE 53. INSTALL BETWEEN THE BOTTOM UNITS OF LATERALLY ADJACENT ROWS OF SKIDDED UNITS, EXCEPT BETWEEN THE FLOOR LINE SKIDDED UNITS IN THE DOORWAY AREA. ALSO POSITION BETWEEN UNITS IN THE FIFTH TIER FOR A 7-TIER LOAD, BETWEEN UNITS IN THE FOURTH TIER FOR A 6 OR 5-TIER LOAD OR BETWEEN UNITS IN THE THIRD TIER FOR A 4-TIER LOAD. ANTI-SWAY BRACING IS REQUIRED ONLY AT THE FLOOR LINE LEVEL FOR LOADS LESS THAN FOUR TIERS. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTE 3 ON PAGE 23.
- ② TOP-OF-LOAD ANTI-SWAY BRACE ( 4 REQD ). SEE THE DETAIL ON PAGE 57. WIRE TIE TO AN INNER UNITIZING STRAP WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON THAT PAGE. SEE SPECIAL NOTE 4 ON PAGE 23.
- ③ DOORWAY BLOCKING, 2" X 4" BY WIDTH OF SKID BASE ( WIDTH OF SKID BASE MINUS 5" FOR TYPE I OR TYPE IA BASES WHEN UNITS ARE LESS THAN 32" WIDE, OR WIDTH OF SKID BASE MINUS 6" FOR TYPE II SKID BASE WHEN BOXES HAVE TOP CLEATS ) DOUBLED ( 2 REQD ), POSITION SO AS TO BE CENTERED AGAINST SKIDDED UNIT AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/6-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE GENERAL NOTE "H" ON PAGE 4 AND SPECIAL NOTE 7 ON PAGE 23.
- ④ CENTER GATE ( 2 REQD ). SEE THE "CENTER GATE E" DETAIL ON PAGE 34.
- ⑤ STRUT, 4" X 4" BY CUT TO FIT ( 28 REQD ), TOENAIL TO PIECES MARKED ④ W/2-16d NAILS AT EACH END. SEE GENERAL NOTE "K" ON PAGE 4, AND SPECIAL NOTES 5 AND 6 ON PAGE 23.
- ⑥ GATE HOLD-DOWN ASSEMBLY ( 2 REQD ). SEE THE "GATE HOLD DOWN ASSEMBLY A" DETAIL ON PAGE 48. POSITION TO EXTEND UNDER SKIDDED UNITS AND NAIL TO PIECES MARKED ④ W/2-10d NAILS AT EACH JOINT. SEE THE "INSTALLATION OF GATE HOLD DOWN" DETAIL ON PAGE 48 FOR GUIDANCE. SEE SPECIAL NOTE 8 ON PAGE 23.

**ISOMETRIC VIEW**



**SECTION J-J** ③ TYPICAL 2-WIDE LOAD (BOXES LENGTHWISE, 1-LAYER UNIT) IN A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR

( CONTINUED ON PAGE 23 )

**SPECIAL NOTES:**

( SPECIAL NOTES CONTINUED )

1. A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOX CAR EQUIPPED WITH 8'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING DOOR OPENINGS OF OTHER WIDTHS CAN BE USED, EXCEPT THAT CARS HAVING NARROWER DOOR OPENINGS CANNOT BE USED FOR THE DEPICTED LOAD.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL 2-WIDE LOAD SHOWN ON PAGE 22 HAS OVERALL DIMENSIONS OF 44" LONG BY 82" WIDE BY 15" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER LENGTHS AND WIDTHS PROVIDED THAT THERE IS ONLY ONE (1) LAYER OF BOXES ON THE UNIT AND THE BOXES ARE NOT HIGHER THAN 16-1/2". IF THE BOXES ON A UNIT HAVE A HEIGHT OF MORE THAN 16-1/2", THE LOADING PROCEDURES SHOWN ON PAGES 14 AND 15 MUST BE USED.
3. ANTI-SWAY BRACES MUST BE INSTALLED IN ALL LOAD UNITS BETWEEN THE LAYERS AS SPECIFIED BY KEY NUMBER ①, AND BETWEEN ALL THE FLOOR LINE UNITS EXCEPT THE ONES WHICH ARE COMPLETELY IN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE UNIT WIDTH.
4. TOP-OF-LOAD ANTI-SWAY BRACES MUST BE INSTALLED IN EACH END OF A CAR. THE QUANTITY NEEDED IS DEPENDENT UPON THE DIMENSION OF THE UNIT WHICH IS POSITIONED LENGTHWISE IN THE CAR, AND UPON THE LENGTH OF THE CAR BEING LOADED. REFER TO THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57 FOR GUIDANCE.
5. TWO (2) LOAD-BLOCKING STRUTS FOR EACH ROW/TIER ARE ADEQUATE FOR RETAINING FOUR (4) SKIDDED UNITS HAVING A WEIGHT OF NOT MORE THAN 1,531 POUNDS EACH. IF A ROW/TIER CONTAINS FOUR (4) HEAVIER UNITS, 4" X 6" ON-EDGE STRUTS OR DOUBLED 4" X 4" STRUTS MUST BE USED. THE "ALT STRUTTING VIEW C" AND "ALT STRUTTING VIEW D" AT THE BOTTOM OF PAGE 50 DEPICT INSTALLATION GUIDANCE FOR 4" X 6" ON-EDGE STRUTS AND DOUBLED 4" X 4" STRUTS, RESPECTIVELY. THESE STRUTS MAY BE REQUIRED FOR THE BRACING OF A HEAVIER LOAD, IN LIEU OF THE SINGLE 4" X 4" STRUTS SHOWN IN THE LOAD VIEW. THE MAXIMUM WEIGHT PER SKIDDED UNIT BASED ON THE NUMBER OF LOAD UNITS IN THE LONG END OF THE CAR, IS AS FOLLOWS:

NO. OF LOAD UNITS IN LONG END OF CAR	MAXIMUM WEIGHT PER SKIDDED UNIT USING SINGLE 4" X 4" STRUTS	MAXIMUM WEIGHT PER SKIDDED UNIT USING 4" X 6" ON-EDGE STRUTS	MAXIMUM WEIGHT PER SKIDDED UNIT USING DOUBLED 4" X 4" STRUTS
16	382 LBS	601 LBS	765 LBS
15	408 LBS	641 LBS	816 LBS
14	437 LBS	687 LBS	875 LBS
13	471 LBS	740 LBS	942 LBS
12	510 LBS	802 LBS	1,021 LBS
11	556 LBS	875 LBS	1,113 LBS
10	612 LBS	962 LBS	1,225 LBS
9	680 LBS	1,069 LBS	1,361 LBS
8	765 LBS	1,203 LBS	1,531 LBS
7	875 LBS	1,375 LBS	1,750 LBS
6	1,021 LBS	1,604 LBS	2,042 LBS
5	1,225 LBS	1,925 LBS	2,450 LBS
4	1,531 LBS	2,406 LBS	3,063 LBS
3	2,042 LBS	3,208 LBS	4,084 LBS

6. TO FACILITATE THE INSTALLATION OF THE GATE HOLD DOWN ASSEMBLY, PIECE MARKED ⑥, WHEN STRUT BRACING PIECES ARE REQUIRED, THE STRUTS WHICH ARE INSTALLED BETWEEN THE OUTWARD VERTICAL PIECES OF THE CENTER GATES SHOULD BE CENTERED AT LEAST ONE-HALF INCH (1/2") OUTWARD OF THE VERTICAL CENTER LINE OF THE ADJACENT VERTICAL PIECE OF THE GATE.

( CONTINUED AT RIGHT )

7. DOORWAY PROTECTION IS REQUIRED FOR ALL LOAD UNITS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY BY ONE-HALF OR MORE OF THE UNIT WIDTH. DOORWAY PROTECTION WILL CONSIST OF NAILED-DOWN BLOCKING BETWEEN THE STACKS, AND STEEL STRAPPING ENCIRCLING THE LOAD UNIT. TWO (2) STRAPS ARE REQUIRED AROUND A LOAD UNIT WHICH IS NOT RETAINED BY AT LEAST SIX INCHES (6") OF THE CAR SIDEWALL ON BOTH SIDES OF THE LOAD, AND ONE (1) STRAP IS REQUIRED AROUND A LOAD UNIT WHICH IS RETAINED BY AT LEAST SIX INCHES (6") BUT LESS THAN HALF OF THE UNIT WIDTH. REFER TO PAGES 54, 55, AND 56 FOR ALTERNATIVE DOORWAY PROTECTION PROCEDURES.
8. DOOR SPANNER TYPE GATE HOLD DOWN MAY BE USED IN LIEU OF PIECES MARKED ⑥ AND ⑦ SHOWN IN THE LOAD VIEW ON PAGE 22, PROVIDING THE CAR BEING LOADED HAS AVAILABLE SIDEWALLS. SEE THE PROCEDURES SHOWN ON PAGE 49 FOR GUIDANCE. CAUTION: DOOR SPANNER TYPE GATE HOLD DOWN MUST NOT BE USED WHEN AN EXCESS SPACE ACROSS THE WIDTH OF THE CAR IS FILLED BY NAILING LUMBER TO THE CAR SIDEWALL.
9. THE DEPICTED LOAD CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED. ONE OR MORE LOAD UNITS CAN BE OMITTED FROM THE CENTER AREA OF A CAR. OR, ONE OR MORE UNITS CAN BE OMITTED FROM A TIER BY INSTALLING GATES AND STRUTS IN THE PLACE OF AN OMITTED UNIT, SIMILAR TO THE METHOD SHOWN ON PAGE 103. OR, IF THE DESIRED QUANTITY CANNOT BE ATTAINED BY OMITTING AN ENTIRE TIER, UNITS CAN BE RETAINED IN BOTH ENDS OF THE CAR WITH KNEE BRACES AS SHOWN ON PAGES 58 AND 59. NOTE THAT THE KNEE BRACE METHOD IS LIMITED TO UNITS WHICH ARE AT LEAST 23" HIGH. OR, UNITS CAN BE RETAINED IN ONE OR BOTH ENDS OF A CAR WITH RISERS AS SHOWN ON PAGE 64, OR WITH K-BRACES AS SHOWN ON PAGE 74 PROVIDING THE CAR HAS AVAILABLE SIDEWALLS, OR WITH BULKHEAD GATES AND STRAPS IF THE CAR IS EQUIPPED WITH ANCHOR DEVICES AS SHOWN ON PAGE 68. ANY APPLICABLE COMBINATION OF THESE PROCEDURES FOR ADJUSTING A LOAD MAY ALSO BE USED TO ATTAIN THE DESIRED QUANTITY. SEE SPECIAL NOTE 12 BELOW.
10. IF UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF BOXES ARE TO BE TRANSPORTED, REFER TO THE APPLICABLE AMC 19-48 SERIES DRAWING FOR CONSTRUCTION DETAILS OF FILLER ASSEMBLIES TO BE USED IN PROVIDING FOR A FULL LAYER ON THE UNITS.
11. CONSTRUCTION OF THE CENTER GATE E, SHOWN IN THE LOAD VIEW AS PIECE MARKED ④, IS BASED ON THE LENGTH AND HEIGHT OF THE SKIDDED UNIT TO BE SHIPPED AND UPON THE INSIDE WIDTH OF THE CAR TO BE LOADED. FOR EASE OF HANDLING, SPLIT CENTER GATES, WHICH ARE NOT DEPENDENT UPON THE WIDTH OF THE CAR, MAY BE USED AS AN ALTERNATIVE. IN LIEU OF EACH CENTER GATE E, INSTALL TWO (2) GATES SHOWN AS CENTER GATE O ON PAGE 44. AFTER THE GATES AND STRUTS HAVE BEEN INSTALLED, THE SPLIT GATES MUST BE TIED TOGETHER AS DEPICTED BY THE "TIE PIECE APPLICATION A" DETAIL ON PAGE 46.
12. IN ADDITION TO THOSE LOAD-ADJUSTING PROCEDURES SPECIFIED WITHIN SPECIAL NOTE 9 ABOVE, THE PROCEDURES SHOWN ON PAGE 51 CAN BE USED AS GUIDANCE IN OMITTING TWO (2) SKIDDED UNITS FROM A LOAD UNIT ADJACENT TO THE CENTER BLOCKING.

( KEY NUMBERS CONTINUED FROM PAGE 22 )

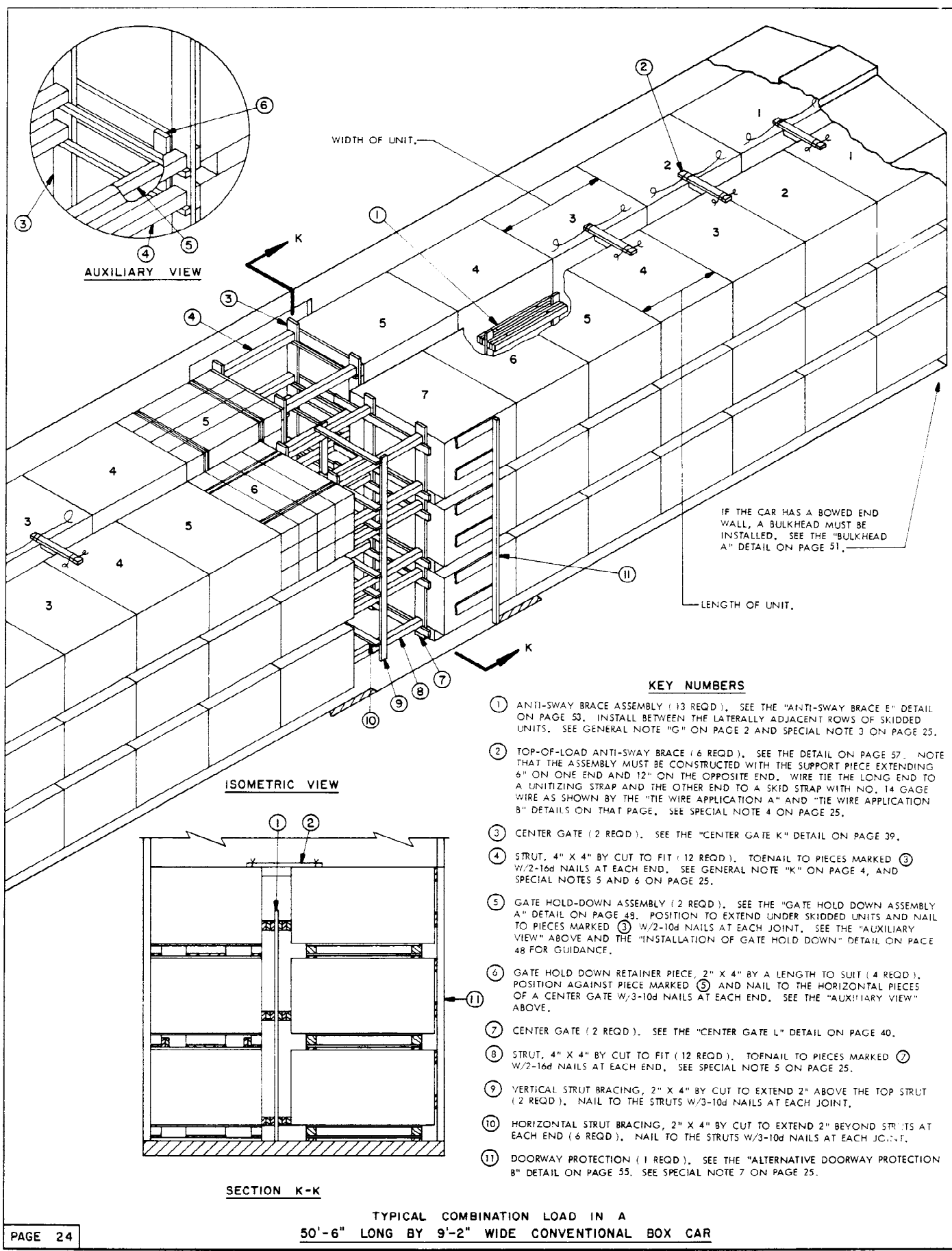
- ⑦ GATE HOLD DOWN RETAINER PIECE, 2" X 4" BY A LENGTH TO SUIT ( 4 REQD ), POSITION AGAINST PIECE MARKED ⑥ AND NAIL TO THE HORIZONTAL PIECES OF A CENTER GATE W/3-10d NAILS AT EACH END.
- ⑧ SPACER ( 2 REQD ). SEE THE DETAIL ON PAGE 57.
- ⑨ STACK UNITIZING STRAP, 1-1/4" X .035" X 18'-0" LONG ( REF ) STEEL STRAPPING ( 28 REQD ). INSTALL TO ENCIRCLE THE LOWER FOUR CONTAINERS FOR A 7 TIER LOAD, THE LOWER THREE CONTAINERS FOR A 6 OR 5 TIER LOAD, AND TO ENCIRCLE ALL THE CONTAINERS FOR A LOAD OF 4 TIERS OR LESS.
- ⑩ STACK UNITIZING STRAP, 1-1/4" X .035" X 15'-6" LONG ( REF ) STEEL STRAPPING ( 28 REQD ). INSTALL TO ENCIRCLE THE REMAINING CONTAINERS OF A STACK.
- ⑪ DOORWAY PROTECTION STRAP, 1-1/4" X .035" X 37'-0" LONG ( REF ) STEEL STRAPPING ( 2 REQD ). INSTALL SO AS TO ENCIRCLE THE LOAD UNIT IN THE DOORWAY AREA. SECURE TO PIECE MARKED ⑧ W/2 STAPLES. SEE SPECIAL NOTE 7 ON PAGE 23.
- ⑫ SEAL FOR 1-1/4" STRAPPING ( 116 REQD, 2 PER STRAP ). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "J" ON PAGE 2.

BILL OF MATERIAL ( TYPICAL )		
LUMBER	LINEAR FEET	BOARD FEET
2" X 2"	128	43
2" X 4"	289	193
2" X 6"	209	209
4" X 4"	67	89
NAILS	NO. REQD	POUNDS
10d ( 3" )	338	5-1/4
12d ( 3-1/4" )	6	1/4
16d ( 3-1/2" )	136	3
STEEL STRAPPING, 1-1/4" X .035" -----	1,012' REQD ----	338 LBS
SEAL FOR 1-1/4" STRAPPING -----	116 REQD ----	6 LBS
STAPLES FOR 1-1/4" STRAPPING -----	4 REQD ----	NIL
WIRE, NO. 14 GAGE -----	93' REQD ----	NIL

**LOAD AS SHOWN ( TYPICAL )**

ITEM	QUANTITY	WEIGHT ( APPROX )
SKIDDED UNIT -----	98 -----	148,274 LBS
DUNNAGE -----	-----	1,687 LBS
TOTAL WEIGHT -----	-----	149,961 LBS

TYPICAL 2-WIDE LOAD (BOXES LENGTHWISE, 1-LAYER UNIT) IN A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR



WIDTH OF UNIT.

IF THE CAR HAS A BOWED END WALL, A BULKHEAD MUST BE INSTALLED. SEE THE "BULKHEAD A" DETAIL ON PAGE 51.

LENGTH OF UNIT.

AUXILIARY VIEW

ISOMETRIC VIEW

SECTION K-K

**KEY NUMBERS**

- ① ANTI-SWAY BRACE ASSEMBLY ( 13 REQD ). SEE THE "ANTI-SWAY BRACE E" DETAIL ON PAGE 53. INSTALL BETWEEN THE LATERALLY ADJACENT ROWS OF SKIDDED UNITS. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTE 3 ON PAGE 25.
- ② TOP-OF-LOAD ANTI-SWAY BRACE ( 6 REQD ). SEE THE DETAIL ON PAGE 57. NOTE THAT THE ASSEMBLY MUST BE CONSTRUCTED WITH THE SUPPORT PIECE EXTENDING 6" ON ONE END AND 12" ON THE OPPOSITE END. WIRE TIE THE LONG END TO A UNITIZING STRAP AND THE OTHER END TO A SKID STRAP WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" AND "TIE WIRE APPLICATION B" DETAILS ON THAT PAGE. SEE SPECIAL NOTE 4 ON PAGE 25.
- ③ CENTER GATE ( 2 REQD ). SEE THE "CENTER GATE K" DETAIL ON PAGE 39.
- ④ STRUT, 4" X 4" BY CUT TO FIT ( 12 REQD ). TOENAIL TO PIECES MARKED ③ W/2-16d NAILS AT EACH END. SEE GENERAL NOTE "K" ON PAGE 4, AND SPECIAL NOTES 5 AND 6 ON PAGE 25.
- ⑤ GATE HOLD-DOWN ASSEMBLY ( 2 REQD ). SEE THE "GATE HOLD DOWN ASSEMBLY A" DETAIL ON PAGE 48. POSITION TO EXTEND UNDER SKIDDED UNITS AND NAIL TO PIECES MARKED ③ W/2-10d NAILS AT EACH JOINT. SEE THE "AUXILIARY VIEW" ABOVE AND THE "INSTALLATION OF GATE HOLD DOWN" DETAIL ON PAGE 48 FOR GUIDANCE.
- ⑥ GATE HOLD DOWN RETAINER PIECE, 2" X 4" BY A LENGTH TO SUIT ( 4 REQD ). POSITION AGAINST PIECE MARKED ⑤ AND NAIL TO THE HORIZONTAL PIECES OF A CENTER GATE W/3-10d NAILS AT EACH END. SEE THE "AUXILIARY VIEW" ABOVE.
- ⑦ CENTER GATE ( 2 REQD ). SEE THE "CENTER GATE L" DETAIL ON PAGE 40.
- ⑧ STRUT, 4" X 4" BY CUT TO FIT ( 12 REQD ). TOENAIL TO THE HORIZONTAL PIECES MARKED ⑦ W/2-16d NAILS AT EACH END. SEE SPECIAL NOTE 5 ON PAGE 25.
- ⑨ VERTICAL STRUT BRACING, 2" X 4" BY CUT TO EXTEND 2" ABOVE THE TOP STRUT ( 2 REQD ). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑩ HORIZONTAL STRUT BRACING, 2" X 4" BY CUT TO EXTEND 2" BEYOND STRUTS AT EACH END ( 6 REQD ). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑪ DOORWAY PROTECTION ( 1 REQD ). SEE THE "ALTERNATIVE DOORWAY PROTECTION B" DETAIL ON PAGE 55. SEE SPECIAL NOTE 7 ON PAGE 25.

TYPICAL COMBINATION LOAD IN A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR



1. A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOX CAR EQUIPPED WITH 6'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER DOOR OPENINGS CAN BE USED.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL COMBINATION LOAD ON PAGE 24 HAS OVERALL DIMENSIONS OF 42-1/2" LONG BY 55-3/4" WIDE BY 36-1/8" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER SIZES, WITH SOME LIMITATIONS. THE SUM OF THE UNIT LENGTH AND THE UNIT WIDTH MUST BE LESS THAN THE INSIDE WIDTH OF THE CAR TO BE LOADED. ALSO, THE WIDTH OF THE UNIT SHOULD BE GREATER THAN 54-1/2", WHICH WOULD BE TOO WIDE TO FIT TWO UNITS ACROSS A CAR, AND THE LENGTH OF THE UNIT SHOULD BE GREATER THAN 36-1/4". UNITS HAVING A LENGTH DIMENSION LESS THAN 36-1/4" OR HAVING A WIDTH DIMENSION LESS THAN 54-1/2" CAN BE LOADED IN LARGER QUANTITIES IF THE 3-WIDE AND 2-WIDE LOADING PROCEDURES AS SHOWN ON PAGES 16 AND 6, RESPECTIVELY, ARE USED.
3. THE ANTI-SWAY BRACE E, SHOWN IN THE LOAD VIEW AS PIECE MARKED (1), IS DESIGNED FOR USE WITHIN COMBINATION LOADS, AND IS APPLICABLE FOR USE WITH ALL SKIDDED UNITS REGARDLESS OF THE TYPE OF BASE UPON WHICH THE UNITS ARE ASSEMBLED. IF THE CAR BEING LOADED HAS NAILABLE SIDEWALLS, A SMALL EXCESS LATERAL SPACE CAN BE FILLED BY APPLYING ONE OR MORE LAMINATIONS OF ONE INCH (1") AND/OR TWO INCH (2") LUMBER TO ONE OR TO BOTH SIDEWALLS OF THE CAR IN LIEU OF USING ANTI-SWAY BRACE E. INSTALL HORIZONTALLY SO AS TO CONTACT THE TOP AND BOTTOM LAYERS OF BOXES ON THE LIMITS AND NAIL TO THE CAR SIDEWALL WITH ONE APPLICABLY SIZED NAIL EVERY 24". IF THE TOTAL EXCESS SPACE ACROSS THE WIDTH OF THE CAR IS 2-1/4" OR LESS FOR LOADS OF BOXES WHICH HAVE VERTICAL END CLEATS, OR IS 2" OR LESS FOR LOADS OF WIREBOUND BOXES OR BOXES NOT HAVING VERTICAL END CLEATS, ANTI-SWAY BRACING IS NOT REQUIRED.
4. TOP-OF-LOAD ANTI-SWAY BRACES MUST BE INSTALLED IN EACH END OF A CAR. THE QUANTITY NEEDED IS DEPENDENT UPON THE DIMENSION OF THE UNIT WHICH IS POSITIONED LENGTHWISE IN THE CAR, AND UPON THE LENGTH OF THE CAR BEING LOADED. REFER TO THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57 FOR GUIDANCE.
5. FOUR (4) LOAD BLOCKING 4" X 4" STRUTS FOR EACH ROW/TIER ARE ADEQUATE FOR RETAINING SEVEN (7) SKIDDED UNITS HAVING A WEIGHT OF NOT MORE THAN 1,750 POUNDS EACH. REFER TO THE "STRUTTING REQUIREMENTS" CHART ON PAGE 50 FOR GUIDANCE AS TO THE MAXIMUM WEIGHT PER UNIT WHEN THE LOAD IN THE LONG END OF THE CAR IS MORE OR LESS THAN SEVEN UNITS IN LENGTH. THE "ALT STRUTTING VIEW A" AND "ALT STRUTTING VIEW B" AT THE TOP OF PAGE 50 DEPICT INSTALLATION GUIDANCE FOR 4" X 6" ON-EDGE STRUTS AND DOUBLED 4" X 4" STRUTS, RESPECTIVELY, FOR USE BETWEEN CENTER GATES K, PIECES MARKED (3). THE "ALT STRUTTING VIEW C" AND "ALT STRUTTING VIEW D" AT THE BOTTOM OF PAGE 50 DEPICT INSTALLATION GUIDANCE FOR 4" X 6" ON-EDGE STRUTS AND DOUBLED 4" X 4" STRUTS, RESPECTIVELY, FOR USE BETWEEN CENTER GATES L, PIECES MARKED (7). THESE STRUTS MAY BE REQUIRED FOR THE BRACING OF A HEAVIER LOAD, IN LIEU OF THE SINGLE 4" X 4" STRUTS SHOWN IN THE LOAD VIEW.
6. TO FACILITATE INSTALLATION OF THE GATE HOLD DOWN ASSEMBLY, PIECE MARKED (5), WHEN STRUT BRACING PIECES ARE REQUIRED, THE STRUTS, PIECES MARKED (4), SHOULD BE CENTERED AT LEAST ONE-HALF INCH (1/2") OUTWARD OF THE VERTICAL CENTER LINE OF THE ADJACENT VERTICAL PIECE OF THE GATE.
7. DOORWAY PROTECTION IS REQUIRED FOR ALL SKIDDED UNIT STACKS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY BY ONE-HALF OR MORE OF THE STACK DIMENSION WHICH IS LENGTHWISE IN THE CAR. DOORWAY PROTECTION (IF REQUIRED) FOR THE SIDE OPPOSITE THE LOADING SIDE OF A COMBINATION LOAD SHOULD BE EITHER THE WOODEN DOOR GATE TYPE AS SHOWN ON THE LOADING SIDE, OR THE "ALTERNATIVE DOORWAY PROTECTION A-1" OR THE "ALTERNATIVE DOORWAY PROTECTION A-2" PROCEDURES

DEPICTED ON PAGE 54, IF THE CAR IS EQUIPPED WITH CONVENTIONAL SLIDING DOORS. IN LIEU OF THE WOODEN DOOR GATE ON THE LOADING SIDE, THE "ALTERNATIVE DOORWAY PROTECTION A-3" PROCEDURES SHOWN ON PAGE 54 MAY BE USED. "ALTERNATIVE DOORWAY PROTECTION C" AND "ALTERNATIVE DOORWAY PROTECTION D" ON PAGES 55 AND 56 DEPICT METHODS OF SECURING DOOR GATES IN CARS WITH NON-NAILABLE POSTS. IF THE CAR IS EQUIPPED WITH PLUG DOORS, THE NAILED-DOWN BLOCKING AND STEEL STRAPPING METHOD OR ELSE THE "ALTERNATIVE DOORWAY PROTECTION E" PROCEDURES ON PAGE 56 MUST BE USED IN LIEU OF THE WOODEN DOOR GATE. IF THE NAILED-DOWN BLOCKING AND STEEL STRAPPING METHOD IS USED AND ONLY A LOADING-SIDE BLOCKING REQUIRES DOORWAY PROTECTION, THE NAILED-DOWN BLOCKING WILL BE APPLIED AGAINST THE OPPOSITE-SIDE UNIT. IF STACKS ON BOTH SIDES OF THE CAR REQUIRE DOORWAY PROTECTION, NAILED-DOWN BLOCKING MUST ALSO BE PRE-POSITIONED TO CONTACT THE SKID BASE OF THE LOADING-SIDE UNIT. NOTE THAT THE NAILED-DOWN DUNNAGE WILL BE INSTALLED UNDER THE ANTI-SWAY BRACE E, AND IF NECESSARY, ONE VERTICAL PIECE OF THAT BRACE MAY BE CUT OFF SO AS TO REST ON TOP OF THE NAILED BLOCKING. THE DOORWAY AREA STACKS, ONE LENGTHWISE AND ONE CROSSWISE, MUST THEN BE SECURED WITH STEEL STRAPPING. APPLY TWO (2) STRAPS IF THE STACKS ON BOTH SIDES OF THE CAR ARE NOT RETAINED BY AT LEAST SIX INCHES (6") OF A CAR SIDEWALL, AND APPLY ONE (1) STRAP IF ONE OR BOTH STACKS ARE RETAINED BY AT LEAST SIX INCHES (6") BUT LESS THAN HALF OF THE DIMENSION OF THE UNIT WHICH IS LENGTHWISE IN THE CAR.

8. THE DEPICTED LOAD CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED. A 3-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF THREE (3) UNITS OR A 2-TIER LOAD CAN BE REDUCED BY A MULTIPLE OF TWO (2) UNITS BY OMITTING ONE OR MORE STACKS FROM THE CENTER PORTION OF THE LOAD. OR, ONE OR MORE UNITS CAN BE OMITTED FROM A TIER BY INSTALLING GATES AND STRUTS IN THE PLACE OF AN OMITTED UNIT, SIMILAR TO THE METHOD SHOWN ON PAGE 103. A COMBINATION OF THESE PROCEDURES FOR ADJUSTING A LOAD MAY ALSO BE USED TO ATTAIN THE DESIRED QUANTITY.
9. IF UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF BOXES ARE TO BE TRANSPORTED, REFER TO PAGES 78 THRU 81 FOR SHIPPING GUIDANCE.

( CONTINUED AT RIGHT )

BILL OF MATERIAL ( TYPICAL )		
LUMBER	LINEAR FEET	BOARD FEET
2" X 2"	28	9
2" X 4"	333	222
2" X 6"	127	127
4" X 4"	92	123
NAILS	NO. REQD	POUNDS
10d ( 3" )	432	6-3/4
12d ( 3-1/4" )	12	1/4
16d ( 3-1/2" )	96	2-1/4
WIRE, NO. 14 GAGE ----- 78' REQD -----		1-1/4 LBS

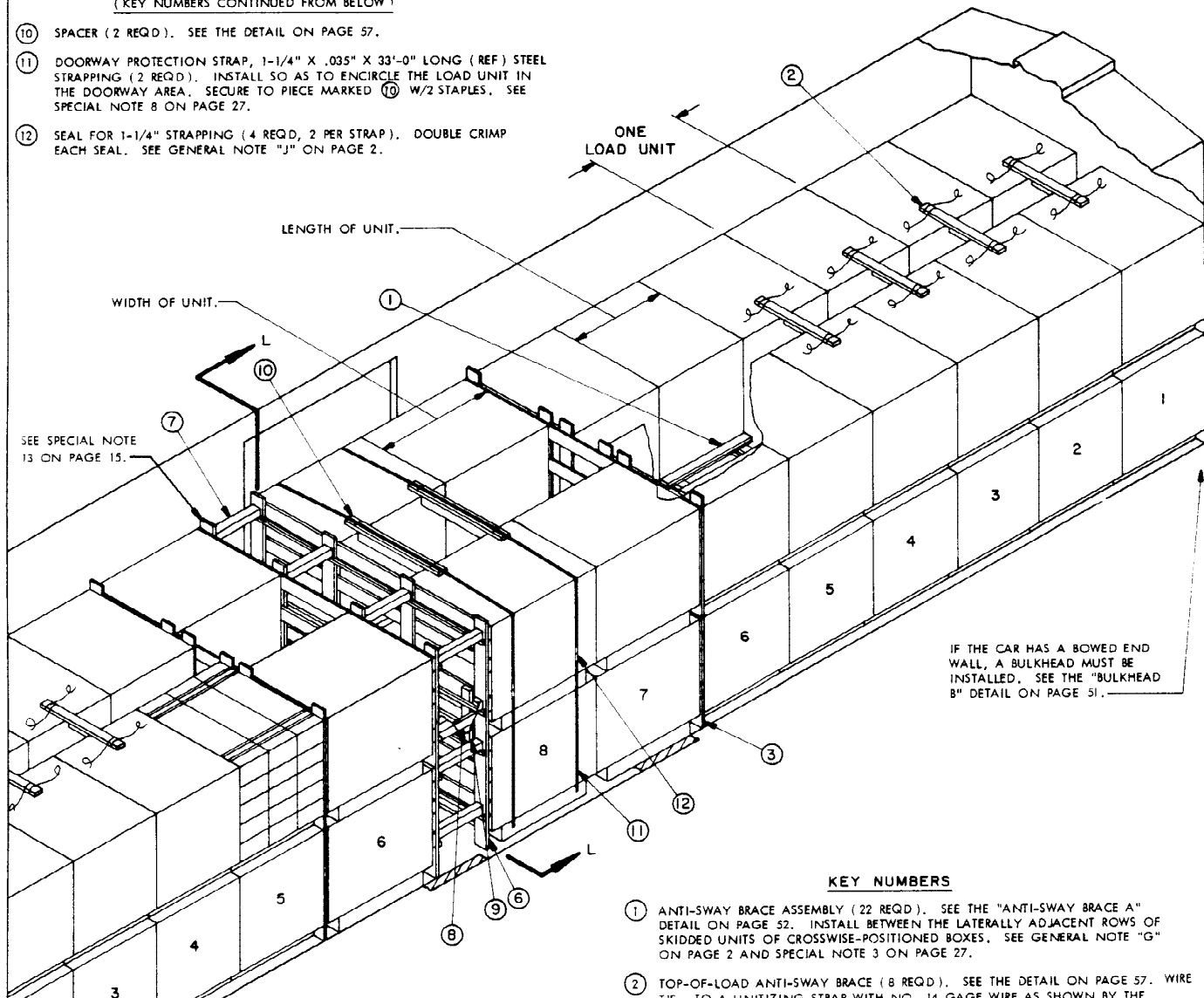
**LOAD AS SHOWN ( TYPICAL )**

ITEM	QUANTITY	WEIGHT ( APPROX )
SKIDDED UNIT ----- 69 -----		120,750 LBS
DUNNAGE -----		1,112 LBS
TOTAL WEIGHT -----		121,862 LBS

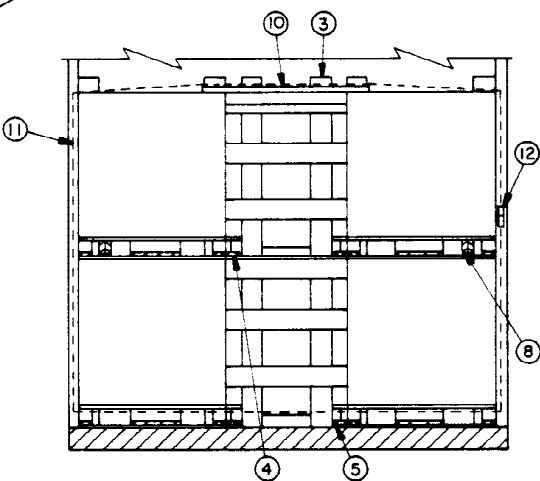
TYPICAL COMBINATION LOAD IN A  
50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR

(KEY NUMBERS CONTINUED FROM BELOW)

- ⑩ SPACER (2 REQ'D). SEE THE DETAIL ON PAGE 57.
- ⑪ DOORWAY PROTECTION STRAP, 1-1/4" X .035" X 33'-0" LONG (REF) STEEL STRAPPING (2 REQ'D). INSTALL SO AS TO ENCIRCLE THE LOAD UNIT IN THE DOORWAY AREA. SECURE TO PIECE MARKED ⑩ W/2 STAPLES. SEE SPECIAL NOTE 8 ON PAGE 27.
- ⑫ SEAL FOR 1-1/4" STRAPPING (4 REQ'D, 2 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "J" ON PAGE 2.



ISOMETRIC VIEW

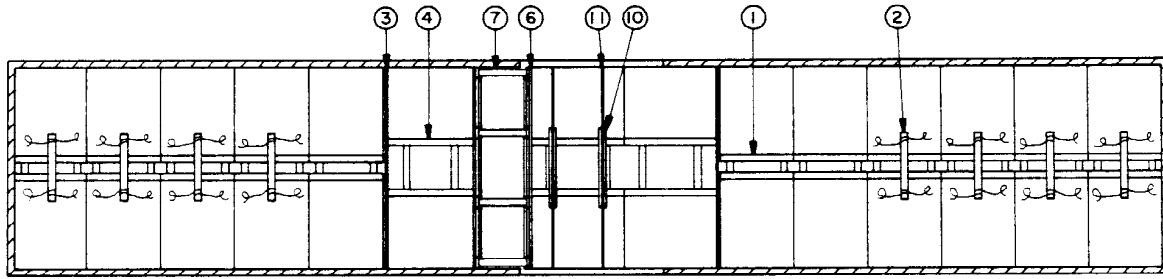


SECTION L-L

TYPICAL COMBINATION LOAD IN A (CONTINUED ABOVE)

KEY NUMBERS

- ① ANTI-SWAY BRACE ASSEMBLY (22 REQ'D). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 52. INSTALL BETWEEN THE LATERALLY ADJACENT ROWS OF SKIDDED UNITS OF CROSSWISE-POSITIONED BOXES. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTE 3 ON PAGE 27.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (8 REQ'D). SEE THE DETAIL ON PAGE 57. WIRE TIE TO A UNITIZING STRAP WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION B" DETAIL ON THAT PAGE. SEE SPECIAL NOTE 4 ON PAGE 27.
- ③ SEPARATOR GATE (2 REQ'D). SEE THE DETAIL ON PAGE 28. POSITION WITH THE VERTICAL PIECES AGAINST THE ALREADY-LOADED UNITS.
- ④ ANTI-SWAY BRACE ASSEMBLY (5 REQ'D). SEE THE "ANTI-SWAY BRACE C" DETAIL ON PAGE 53. INSTALL BETWEEN THE LATERALLY ADJACENT ROWS OF SKIDDED UNITS OF LENGTHWISE POSITIONED BOXES, EXCEPT BETWEEN THE FLOOR LINE SKIDDED UNITS IN THE DOORWAY AREA. SEE SPECIAL NOTE 5 ON PAGE 27.
- ⑤ DOORWAY BLOCKING, 2" X 4" BY WIDTH OF SKID BASE (WIDTH OF SKID BASE MINUS 5" FOR TYPE I OR TYPE IA BASES WHEN UNITS ARE LESS THAN 32" WIDE, OR WIDTH OF SKID BASE MINUS 6" FOR TYPE II SKID BASE WHEN BOXES HAVE TOP CLEATS) DOUBLED (2 REQ'D). POSITION SO AS TO BE CENTERED AGAINST SKIDDED UNIT AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/6-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE GENERAL NOTE "H" ON PAGE 4 AND SPECIAL NOTE 8 ON PAGE 27.
- ⑥ CENTER GATE (2 REQ'D). SEE THE "CENTER GATE A" DETAIL ON PAGE 30.
- ⑦ STRUT, 4" X 4" BY CUT TO FIT (16 REQ'D). TOENAIL TO PIECES MARKED ④ W/2-16d NAILS AT EACH END. SEE GENERAL NOTE "K" ON PAGE 4 AND SPECIAL NOTES 6 AND 7 ON PAGE 27.
- ⑧ GATE HOLD-DOWN ASSEMBLY (2 REQ'D). SEE THE "GATE HOLD-DOWN ASSEMBLY A" DETAIL ON PAGE 48. POSITION TO EXTEND UNDER SKIDDED UNITS AND NAIL TO PIECES MARKED ⑤ W/2-10d NAILS AT EACH JOINT. SEE THE "INSTALLATION OF GATE HOLD-DOWN" DETAIL ON PAGE 48 FOR GUIDANCE. SEE SPECIAL NOTE 9 ON PAGE 27.
- ⑨ GATE HOLD DOWN RETAINER PIECE, 2" X 4" BY A LENGTH TO SUIT (4 REQ'D). POSITION AGAINST PIECE MARKED ⑧ AND NAIL TO THE HORIZONTAL PIECES OF A CENTER GATE W/3-10d NAILS AT EACH END.



PLAN VIEW

SPECIAL NOTES:

(SPECIAL NOTES CONTINUED)

1. A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL TYPE BOX CAR EQUIPPED WITH 6'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER DOOR OPENINGS CAN BE USED.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL COMBINATION LOAD ON PAGE 26 HAS OVERALL DIMENSIONS OF 39" LONG BY 48-5/8" WIDE BY 48-5/8" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER SIZES. HOWEVER, THE PURPOSE OF THIS TYPE OF COMBINATION LOADING IS TO INCREASE OR REDUCE THE QUANTITY OF UNITS IN A LOAD AND/OR TO SHORTEN THE LENGTH OF THE LOAD-BLOCKING STRUTS, AND THERE IS NO ADVANTAGE UNLESS THE WIDTH OF THE UNIT MEASURES MORE THAN THE LENGTH BY AN APPRECIABLE AMOUNT. NOTE THAT THE WIDTH OF THE UNIT MUST NOT BE MORE THAN 54-1/2" IN A 9'-2" WIDE CAR NOR MORE THAN 55-1/2" IN A 9'-4" WIDE CAR.
3. THE ANTI-SWAY BRACE A, SHOWN IN THE LOAD VIEW AS PIECE MARKED ①, IS DESIGNED FOR USE WITHIN THE CROSSWISE-POSITIONED BOX PORTIONS OF THE LOAD WHEN THE UNITS ARE ASSEMBLED ON THE TYPE I OR TYPE IA SKID BASE, OR THE TYPE II SKID BASE WHEN THE BOXES DO NOT HAVE TOP CLEATS, OR THE SKID BASE DEPICTED BY DRAWING D-AMXSV-4163. THE ANTI-SWAY BRACE B WILL BE USED FOR UNITS ASSEMBLED ON THE TYPE II SKID BASE WHEN THE BOXES HAVE TOP CLEATS. SEE PAGE 52 FOR DETAILS OF THE ANTI-SWAY BRACE ASSEMBLIES. THE ANTI-SWAY BRACING MAY BE OMITTED IF THE SPACE BETWEEN LATERALLY ADJACENT UNITS OF CROSSWISE-POSITIONED BOXES IS NOT MORE THAN THE DISTANCE SPECIFIED IN THE "ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 52, FOR THE TYPE OF SKID BASE BEING LOADED. IF THE EXCESS SPACE EXCEEDS THE MAXIMUM ALLOWABLE, ANTI-SWAY BRACES MUST BE POSITIONED BETWEEN ALL LATERALLY ADJACENT UNITS OF CROSSWISE-POSITIONED BOXES.
4. TOP-OF-LOAD ANTI-SWAY BRACES, SHOWN AS PIECES MARKED ②, ARE REQUIRED BETWEEN LATERALLY ADJACENT UNITS IN EACH END OF A CAR WHEN THE LATERAL SPACE BETWEEN UNITS IS LARGE ENOUGH TO REQUIRE AN ANTI-SWAY BRACE, PIECE MARKED ①. REFER TO THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57 FOR GUIDANCE AS TO THE QUANTITY OF BRACES WHICH MUST BE INSTALLED IN EACH END OF THE CAR.
5. THE ANTI-SWAY BRACE C, SHOWN IN THE LOAD VIEW AS PIECE MARKED ④, IS DESIGNED FOR USE WITHIN THE LENGTHWISE-POSITIONED BOX PORTION OF THE LOAD. ANTI-SWAY BRACE C MUST BE INSTALLED BETWEEN ALL LATERALLY ADJACENT SKIDDED UNITS HAVING LENGTHWISE-POSITIONED BOXES, EXCEPT THE FLOOR LINE UNITS WHICH ARE COMPLETELY IN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE UNIT WIDTH.
6. FOUR (4) LOAD BLOCKING 4" X 4" STRUTS FOR EACH ROW/TIER ARE ADEQUATE FOR RETAINING EIGHT (8) SKIDDED UNITS HAVING A WEIGHT OF NOT MORE THAN 1,513 POUNDS EACH. REFER TO THE "STRUTTING REQUIREMENTS" CHART ON PAGE 50 FOR GUIDANCE AS TO THE MAXIMUM WEIGHT PER UNIT WHEN THE LOAD IN THE LONG END OF THE CAR IS MORE OR LESS THAN EIGHT UNITS IN LENGTH. THE "ALT STRUTTING VIEW C" AND "ALT STRUTTING VIEW D" AT THE BOTTOM OF PAGE 50 DEPICT INSTALLATION GUIDANCE FOR 4" X 6" ON-EDGE STRUTS AND DOUBLED 4" X 4" STRUTS, RESPECTIVELY. THESE STRUTS MAY BE REQUIRED FOR THE BRACING OF A HEAVIER LOAD, IN LIEU OF THE SINGLE 4" X 4" STRUTS SHOWN IN THE LOAD VIEW.
7. TO FACILITATE THE INSTALLATION OF THE GATE HOLD-DOWN ASSEMBLY, PIECE MARKED ③, WHEN STRUT BRACING PIECES ARE REQUIRED, THE STRUTS WHICH ARE INSTALLED BETWEEN THE OUTWARD VERTICAL PIECES OF THE CENTER GATES SHOULD BE CENTERED AT LEAST ONE-HALF INCH (1/2") OUTWARD OF THE VERTICAL CENTER LINE OF THE ADJACENT VERTICAL PIECES OF THE GATE.
8. DOORWAY PROTECTION IS REQUIRED FOR ALL THE LOAD UNITS WHICH ARE COMPLETELY WITHIN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE UNIT WIDTH. DOORWAY PROTECTION WILL CONSIST OF NAILED-DOWN BLOCKING BETWEEN THE STACKS AND STEEL STRAPPING ENCIRCLING THE LOAD UNIT. TWO (2) STRAPS ARE REQUIRED AROUND A LOAD UNIT WHICH IS NOT RETAINED BY AT LEAST 6" OF THE CAR SIDEWALL ON BOTH SIDES OF THE LOAD, AND ONE (1) STRAP IS REQUIRED AROUND A LOAD UNIT WHICH IS RETAINED BY AT LEAST SIX INCHES (6") BUT LESS THAN HALF OF THE UNIT WIDTH. REFER TO PAGES 54, 55, AND 56 FOR ALTERNATIVE DOORWAY PROTECTION PROCEDURES.
9. DOOR SPANNER TYPE GATE HOLD DOWN MAY BE USED IN LIEU OF PIECES MARKED ③ AND ④ SHOWN IN THE LOAD VIEW ON PAGE 26, PROVIDING THE CAR BEING LOADED HAS NAILABLE SIDEWALLS. SEE THE PROCEDURES SHOWN ON PAGE 49 FOR GUIDANCE.
10. THE DEPICTED LOAD CAN BE REDUCED BY POSITIONING MORE UNITS SO THAT THE BOXES ON THE UNITS ARE LENGTHWISE IN THE CAR AND REDUCING THE NUMBER OF UNITS WHICH ARE LOADED SO THAT THE BOXES ON THE UNITS ARE CROSSWISE IN THE CAR. SEE THE TYPICAL LOAD PATTERN VIEWS ON PAGE 29 FOR GUIDANCE IN DEVELOPING COMBINATION LOADS FOR THE PURPOSE OF ADJUSTING LOAD QUANTITIES.
11. IF UNITS WHICH DO NOT CONTAIN A FULL QUANTITY OF BOXES ARE TO BE TRANSPORTED, REFER TO PAGES 78 THRU 81 FOR SHIPPING GUIDANCE.

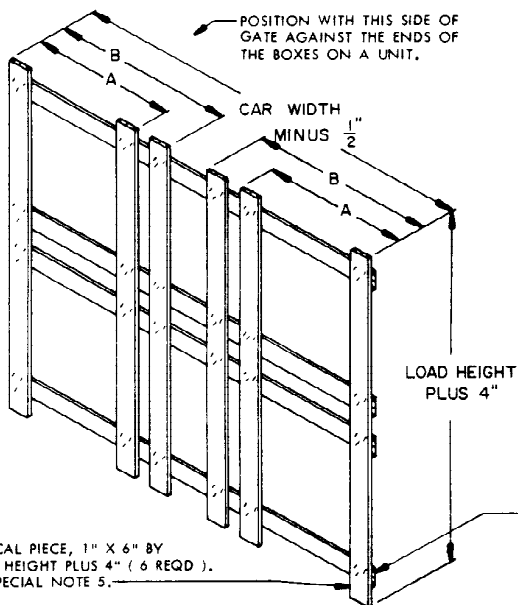
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BILL OF MATERIAL (TYPICAL)		
LUMBER	LINEAR FEET	BOARD FEET
1" X 6"	143	72
2" X 2"	73	25
2" X 4"	268	181
2" X 6"	380	380
4" X 4"	34	45
NAILS	NO. REQD	POUNDS
6d (2")	264	1-3/4
10d (3")	456	7-3/4
16d (3-1/2")	242	5-1/4
STEEL STRAPPING, 1-1/4" X .035"-----	66' REQD	7-1/4 LBS
SEAL FOR 1-1/4" STRAPPING-----	4 REQD	NIL
STAPLE FOR 1-1/4" STRAPPING-----	4 REQD	NIL
WIRE, NO. 14 GAGE-----	24' REQD	NIL

LOAD AS SHOWN (TYPICAL)

ITEM	QUANTITY	WEIGHT (APPROX)
SKIDDED UNIT	56	84,728 LBS
DUNNAGE		1,780 LBS
<b>TOTAL WEIGHT</b>		<b>86,508 LBS</b>

TYPICAL COMBINATION LOAD IN A  
50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR



VERTICAL PIECE, 1" X 6" BY LOAD HEIGHT PLUS 4" ( 6 REQD ). SEE SPECIAL NOTE 5.

HORIZONTAL PIECE, 1" X 6" BY CAR WIDTH MINUS 1/2" IN LENGTH ( 4 REQD ). NAIL TO THE VERTICAL PIECES W/3-6d NAILS AT EACH JOINT AND CLINCH. SEE SPECIAL NOTES 3 THRU 6.

### SEPARATOR GATE

AN ISOMETRIC VIEW OF A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL.

GATE CONSTRUCTION DIMENSIONAL CHART	
LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A	LENGTH OF SKIDDED UNIT.
B	WIDTH OF SKIDDED UNIT.
C	11-1/2". SEE SPECIAL NOTE 3.
D	TOP OF FIRST TIER.
E	11-1/2" ABOVE TOP OF FIRST TIER.
F	TOP OF SECOND TIER.
G	4"

### ( SPECIAL NOTES CONTINUED )

### SPECIAL NOTES:

1. THE SEPARATOR GATES SHOWN ARE APPLICABLE FOR USE IN BOX CAR LOADS WHEN THE UNITS ARE LOADED IN A "COMBINATION LOAD" PATTERN. SEE THE TYPICAL LOAD VIEWS ON PAGES 26 AND 27 AND THE "ALT LOADING PATTERN" PLAN VIEWS ON PAGE 29. THE ISOMETRIC VIEW ABOVE DEPICTS A GATE FOR A TYPICAL 2-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR ONE AND TWO TIERS.
2. THE GATE DIMENSIONS REPRESENTED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE LENGTH, WIDTH, OR HEIGHT OF THE SKIDDED UNIT BEING LOADED.
3. AS A MINIMUM, HORIZONTAL PIECES ARE REQUIRED AT OR NEAR THE TOP AND BOTTOM OF EACH TIER OF UNITS. FOR UNITS WHICH HAVE FOUR OR MORE LAYERS OF BOXES PER UNIT, ADDITIONAL HORIZONTAL PIECES MUST BE APPLIED TO ENSURE THAT EVERY LAYER IS RETAINED BY A HORIZONTAL PIECE. REFER TO PAGE 41 FOR GUIDANCE IN DETERMINING HORIZONTAL PIECE LOCATION AND QUANTITY REQUIREMENTS.
4. A SEPARATOR GATE IS TO BE USED BETWEEN LONGITUDINALLY ADJACENT LOAD UNITS WHEN THE BOXES ON THOSE UNITS ARE POSITIONED IN OPPOSITE DIRECTIONS (LENGTHWISE ON ONE SIDE OF THE SEPARATOR GATE AND CROSSWISE ON THE OTHER). THE GATE CAN BE CONSTRUCTED FROM 1" X 6" MATERIAL, UNLESS THE DIFFERENCE BETWEEN THE LENGTH AND WIDTH OF THE UNIT IS 12" OR GREATER, IN WHICH CASE THE HORIZONTAL PIECES MUST BE 2" X 6" MATERIAL IN LIEU OF THE SPECIFIED 1" X 6" MATERIAL. NAIL THE VERTICAL PIECES TO THE SPECIFIED HORIZONTAL PIECES W/5-6d NAILS AT EACH JOINT IN LIEU OF THE SPECIFIED NAILING.

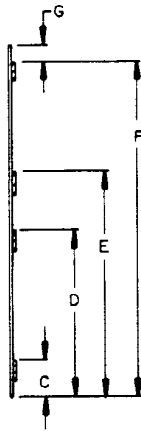
5. A SEPARATOR GATE IS ALSO TO BE USED BETWEEN LONGITUDINALLY ADJACENT LOAD UNITS OF UNLIKE ITEMS, AS SHOWN IN THE VIEWS ON PAGES 84 THRU 88. THE GATE WILL BE CONSTRUCTED WITH BOTH THE VERTICAL PIECES AND HORIZONTAL PIECES (SEE SPECIAL NOTE 3 AT LEFT) BEING 2" X 6" MATERIAL AND WILL BE NAILED W/3-10d NAILS AT EACH JOINT, IN LIEU OF USING THE SPECIFIED 1" X 6" MATERIAL AND NAILING. WHEN THE UNITS ON OPPOSITE SIDES OF THE SEPARATOR GATE ARE POSITIONED IN OPPOSITE DIRECTIONS, THE DIMENSIONS SHOWN BY THE ISOMETRIC VIEW ABOVE ARE APPLICABLE. IF THE UNITS ON OPPOSITE SIDES ARE BOTH POSITIONED SO THAT THE BOXES ARE CROSSWISE IN THE CAR, THE INTERMEDIATE VERTICAL PIECES AT LOCATIONS MARKED "A" ARE NOT REQUIRED AND MAY BE OMITTED. IF THE UNITS ON OPPOSITE SIDES OF THE GATE ARE BOTH POSITIONED SO THAT THE BOXES ARE LENGTHWISE IN THE CAR, THE INTERMEDIATE VERTICAL PIECES AT LOCATIONS MARKED "B" ARE NOT REQUIRED AND MAY BE OMITTED. HOWEVER, IN ORDER TO PROVIDE CONTACT WITH THE BOXES ON BOTH SIDES OF THE GATE, THE AREA BETWEEN THE VERTICAL PIECES AT EACH END OF DIMENSION "A" MUST BE FILLED BY LAMINATING 1" X 6" MATERIAL TO THE HORIZONTAL PIECES AT ALL LOCATIONS.
6. FOR EASE OF HANDLING, A SEPARATOR GATE CAN BE MADE IN TWO PIECES IN LIEU OF CONSTRUCTING IT TO BE ONE-HALF INCH ( 1/2" ) LESS IN WIDTH THAN THE INSIDE WIDTH OF THE CAR TO BE LOADED. EACH SECTION SHOULD BE CONSTRUCTED AS WIDE AS THE WIDTH OF THE SKIDDED UNIT TO BE LOADED ( DIMENSION B ), WHEN IT IS FOR USE IN LOADS HAVING ONLY TWO ROWS OF UNITS WHICH ARE POSITIONED WITH THE BOXES LENGTHWISE IN THE CAR. SEE THE "TYPICAL ALT LOAD PATTERN A" ON PAGE 29 AND THE LOAD VIEW ON PAGE 26. WHEN A PORTION OF THE LOAD CONSISTS OF THREE ROWS OF UNITS WHICH ARE POSITIONED WITH THE BOXES LENGTHWISE IN THE CAR, EACH SECTION OF THE GATE SHOULD BE CONSTRUCTED AT LEAST FOUR INCHES ( 4" ) WIDER THAN DIMENSION B. PRIOR TO FINAL POSITIONING IN THE CAR, THE TWO SECTIONS MUST BE TIED TOGETHER AT TOP AND BOTTOM WITH A PROPER LENGTH TIE PIECE OF 1" X 6" MATERIAL. NAIL THE TIE PIECE TO THE HORIZONTAL PIECES OF THE GATES W/4-6d NAILS AT EACH END AND CLINCH. NOTE THAT IF THE WIDTH OF THE UNIT IN A LOAD CONTAINING A 3-WIDE PORTION IS SUCH THAT THERE IS LESS THAN EIGHT INCHES ( 8" ) LATERAL VOID BETWEEN THE ROWS IN THE 2-WIDE PORTION, A ONE-PIECE SEPARATOR GATE MUST BE USED.

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### END VIEW

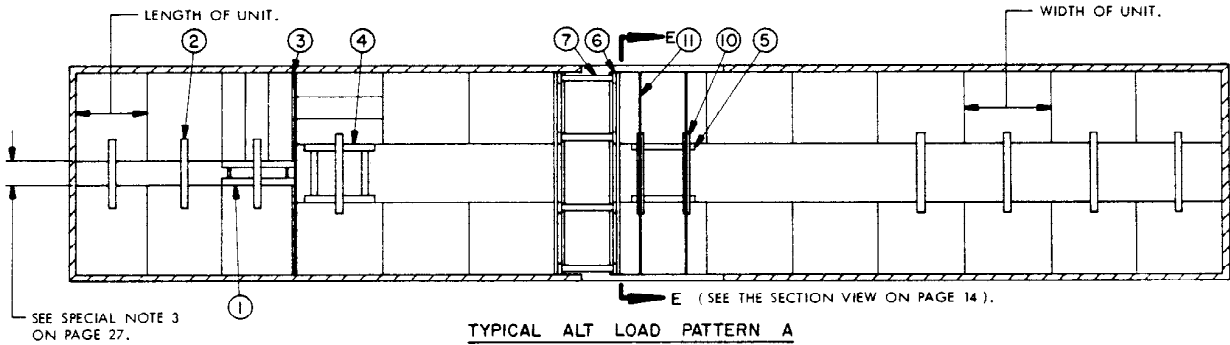
THIS GATE IS FOR LOADS WHICH ARE ONE ( 1 ) UNIT HIGH.



### END VIEW

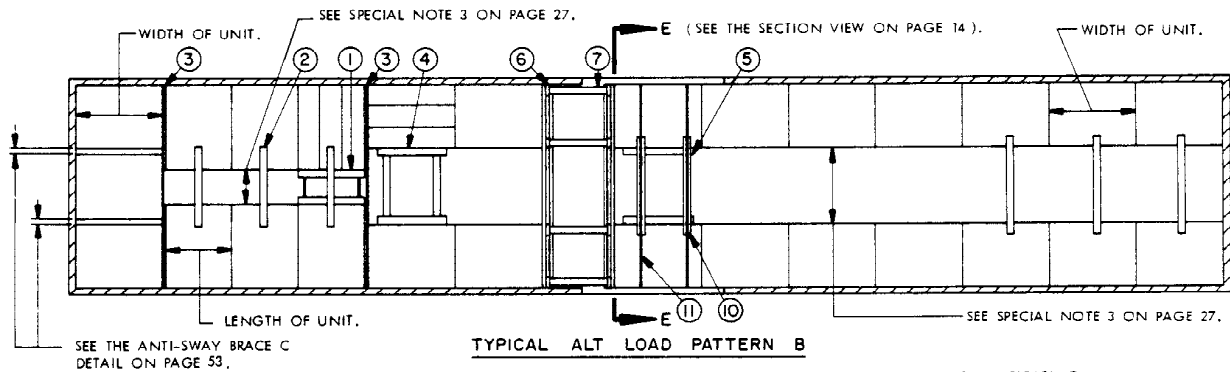
THIS GATE IS FOR LOADS WHICH ARE TWO ( 2 ) UNITS HIGH.

### SEPARATOR GATE



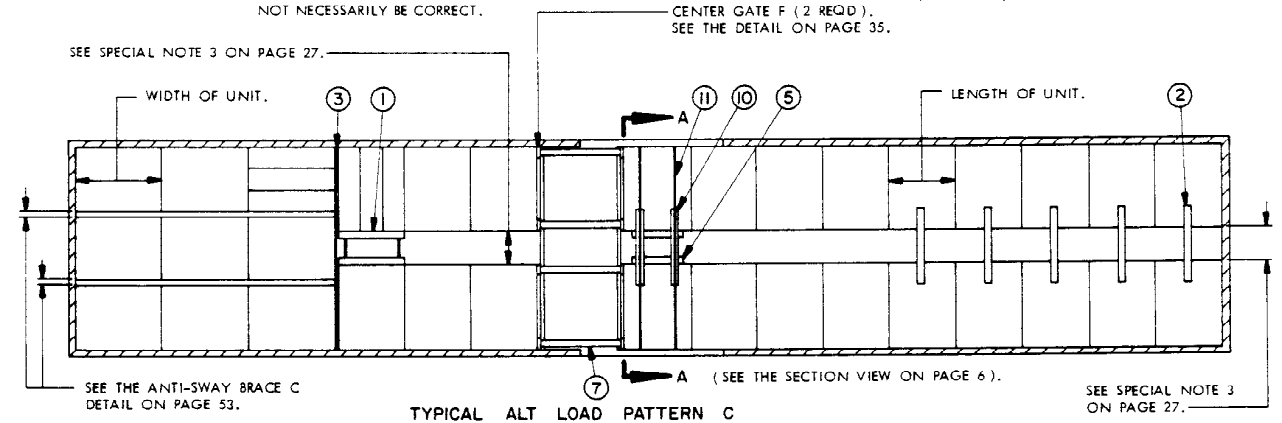
**TYPICAL ALT LOAD PATTERN A**

THIS PLAN VIEW DEPICTS A METHOD OF INCREASING THE LOAD QUANTITY OVER THE AMOUNT WHICH CAN BE POSITIONED USING THE PROCEDURES FOR A 2-WIDE LOAD (BOXES LENGTHWISE) AS SHOWN ON PAGES 14 AND 15. THE SKIDDED UNIT SHOWN IS 39" LONG BY 48-5/8" WIDE. THE DEPICTED LOADING PATTERN IS ALSO APPLICABLE FOR OTHER UNITS WHICH ARE WIDER THAN THEY ARE LONG. THE ONLY RESTRICTION IS THAT THE UNIT MUST BE OF A SIZE THAT THE TOTAL OF TWO UNIT WIDTHS IS LESS THAN THE INSIDE WIDTH OF THE CAR BY 1" OR MORE. TWENTY-SIX (26) SKIDDED UNITS IN ONE TIER ARE SHOWN. THAT QUANTITY CAN BE INCREASED BY POSITIONING MORE UNITS SO THAT THE BOXES ARE CROSSWISE IN THE CAR AND POSITIONING LESS UNITS WITH THE BOXES LENGTHWISE IN THE CAR. THE "KEY NUMBERS" ON PAGE 26 ARE APPLICABLE FOR THE PIECES IDENTIFIED IN THE VIEW ABOVE, HOWEVER, THE SPECIFIED QUANTITIES WILL NOT NECESSARILY BE CORRECT.



**TYPICAL ALT LOAD PATTERN B**

THIS PLAN VIEW DEPICTS A METHOD OF OBTAINING AN ODD QUANTITY IN A TIER AND ALSO INCREASING THE LOAD QUANTITY OVER THE AMOUNT WHICH CAN BE POSITIONED USING THE PROCEDURES FOR A 2-WIDE LOAD (BOXES LENGTHWISE) AS SHOWN ON PAGES 14 AND 15. THE SKIDDED UNIT SHOWN IS 34" LONG BY 46" WIDE. THE DEPICTED LOADING PATTERN IS ALSO APPLICABLE FOR OTHER UNITS WHICH ARE WIDER THAN THEY ARE LONG. THE ONLY RESTRICTIONS ARE THAT THE UNIT MUST BE OF A SIZE THAT THE TOTAL OF THREE UNIT LENGTHS IS LESS THAN THE INSIDE WIDTH OF THE CAR BY 1" OR MORE, AND THE TOTAL OF TWO UNIT WIDTHS IS ALSO LESS THAN THE INSIDE WIDTH OF THE CAR BY 1" OR MORE. TWENTY-SEVEN (27) SKIDDED UNITS ARE SHOWN. THAT QUANTITY CAN BE INCREASED BY POSITIONING MORE UNITS AS IN THE 3-WIDE PORTION OF THE LOAD, AND/OR BY POSITIONING MORE UNITS SO THAT THE BOXES ARE CROSSWISE IN THE CAR, AND POSITIONING LESS UNITS WITH THE BOXES LENGTHWISE IN THE CAR. THE "KEY NUMBERS" ON PAGE 26 ARE APPLICABLE FOR THE PIECES IDENTIFIED IN THE VIEW ABOVE, HOWEVER, THE SPECIFIED QUANTITIES WILL NOT NECESSARILY BE CORRECT.

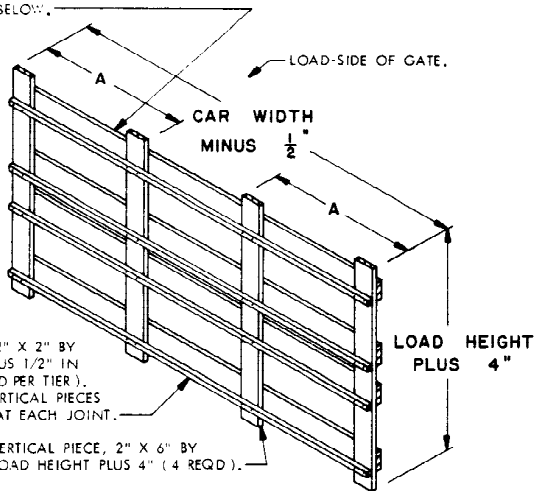


**TYPICAL ALT LOAD PATTERN C**

THIS PLAN VIEW DEPICTS A METHOD OF OBTAINING AN ODD QUANTITY IN A TIER AND ALSO INCREASING THE LOAD QUANTITY OVER THE AMOUNT WHICH CAN BE POSITIONED USING THE PROCEDURES FOR A 2-WIDE LOAD (BOXES CROSSWISE) AS SHOWN ON PAGES 6 AND 7. THE SKIDDED UNIT SHOWN IS 34" LONG BY 46" WIDE. THE DEPICTED LOADING PATTERN IS ALSO APPLICABLE FOR OTHER UNITS WHICH ARE WIDER THAN THEY ARE LONG. THE ONLY RESTRICTION IS THAT THE TOTAL OF THREE UNIT LENGTHS IS LESS THAN THE INSIDE WIDTH OF THE CAR BY 1" OR MORE. THIRTY-THREE (33) SKIDDED UNITS ARE SHOWN. THAT QUANTITY CAN BE INCREASED BY POSITIONING MORE UNITS AS IN THE 3-WIDE PORTION OF THE LOAD AND POSITIONING LESS UNITS WITH THE BOXES CROSSWISE IN THE CAR. THE "KEY NUMBERS" ON PAGE 26 ARE APPLICABLE FOR THE PIECES IDENTIFIED IN THE VIEW ABOVE, HOWEVER, THE SPECIFIED QUANTITIES WILL NOT NECESSARILY BE CORRECT.

TYPICAL COMBINATION LOADS IN  
50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CARS

HORIZONTAL PIECE, 2" X 6" BY CAR WIDTH MINUS 1/2" IN LENGTH (AS REQD.). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT. SEE SPECIAL NOTES 4, 6, AND 7 BELOW.



STRUT LEDGER, 2" X 2" BY CAR WIDTH MINUS 1/2" IN LENGTH (2 REQD PER TIER). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH JOINT.

VERTICAL PIECE, 2" X 6" BY LOAD HEIGHT PLUS 4" (4 REQD.).

**CENTER GATE A**

AN ISOMETRIC VIEW OF A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL.

GATE CONSTRUCTION DIMENSIONAL CHART	
LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A B C, E, G, J D, F, H K L M, O, R, T N, P, S	FOR UNITS CONSISTING OF 2 OR 4 LAYERS OF BOXES, OR 6 LAYERS OF BOXES MORE THAN 6" HIGH. LENGTH OF SKIDDED UNIT. 11-1/4". SEE SPECIAL NOTE 4. TOP OF TIER. 11-1/4" ABOVE TOP OF NEXT LOWER TIER. 4". SEE SPECIAL NOTE 5. 7". SEE SPECIAL NOTE 5. 4-1/2" BELOW TOP OF TIER. 7" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 3.
A B C, E, G, J D, F, H K L M, O, R, T N, P, S	FOR UNITS CONSISTING OF 3 OR 5 OR 7 LAYERS OF BOXES LENGTH OF SKIDDED UNIT. BOX HEIGHT PLUS 8". SEE SPECIAL NOTE 4. TOP OF TIER. BOX HEIGHT PLUS 8" ABOVE TOP OF NEXT LOWER TIER. 4". SEE SPECIAL NOTE 5. BOX HEIGHT PLUS 3-1/2". SEE SPECIAL NOTE 5. 4-1/2" BELOW TOP OF TIER. BOX HEIGHT PLUS 3-1/2" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 3.
A B C, E, G, J D, F, H K L M, O, R, T N, P, S	FOR UNITS CONSISTING OF 6 LAYERS OF BOXES 6" OR LESS IN HEIGHT, OR 8 LAYERS OF BOXES. LENGTH OF SKIDDED UNIT. BOX HEIGHT PLUS 8". SEE SPECIAL NOTE 4. BOX HEIGHT MINUS 2-3/4" BELOW TOP OF TIER. BOX HEIGHT PLUS 8" ABOVE TOP OF NEXT LOWER TIER. 4". BOX HEIGHT PLUS 3-1/2". SEE SPECIAL NOTE 5. BOX HEIGHT PLUS 1-3/4" BELOW TOP OF TIER. BOX HEIGHT PLUS 3-1/2" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 3.

**SPECIAL NOTES:**

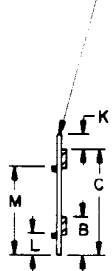
1. THE CENTER GATES SHOWN ON THIS PAGE ARE APPLICABLE FOR USE IN BOX CAR LOADS WHERE THE WIDTH OF THE UNIT IS PARALLEL WITH THE SIDEWALLS OF A CAR (BOXES ON A UNIT LENGTHWISE IN A CAR). THE GATES ARE DESIGNED FOR THE BRACING OF TWO (2) ROWS OF UNITS, ONE AGAINST EACH SIDEWALL. SEE THE TYPICAL LOAD VIEW ON PAGE 14. THE "ISOMETRIC VIEW" ABOVE DEPICTS A GATE FOR A TYPICAL 2-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR LOADS OF ONE THRU FOUR TIERS.
2. THE GATE DIMENSIONS REPRESENTED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE LENGTH OR HEIGHT OF THE SKIDDED UNIT BEING LOADED, OR THE HEIGHT OF A BOX IN A UNIT.
3. WHEN MAKING A SET OF TWO GATES FOR A LOAD CONSISTING OF TWO OR MORE TIERS, IT WILL BE NECESSARY TO LEAVE THE THIRD, FIFTH, AND/OR SEVENTH LEVELS OF STRUT LEDGERS OFF OF ONE GATE UNTIL THE SECOND, FOURTH, AND/OR SIXTH LEVELS, RESPECTIVELY, OF LOAD BLOCKING STRUTS HAVE BEEN INSTALLED. WHEN MAKING GATES FOR A LOAD OF LOW-HEIGHT SKIDDED UNITS, IT MAY BE NECESSARY TO LEAVE ALL BUT THE BOTTOM STRUT LEDGER OFF OF ONE GATE UNTIL THE NEXT LOWER LEVEL OF STRUTS HAS BEEN INSTALLED.
4. AS A MINIMUM, HORIZONTAL PIECES ARE REQUIRED AT OR NEAR THE TOP AND THE BOTTOM OF EACH TIER OF UNITS. FOR UNITS WHICH HAVE FOUR OR MORE LAYERS OF BOXES PER UNIT, ADDITIONAL HORIZONTAL PIECES MUST BE APPLIED TO ENSURE THAT EVERY LAYER IS RETAINED BY A HORIZONTAL PIECE. REFER TO PAGE 41 FOR GUIDANCE IN DETERMINING HORIZONTAL PIECE LOCATION AND QUANTITY REQUIREMENTS.

(SPECIAL NOTES CONTINUED)

5. ALL STRUT LEDGER HEIGHTS EXCEPT "N" MUST BE LOWERED BY 1-1/4" WHEN 4" X 6" ON-EDGE STRUTS ARE TO BE USED; LEDGER HEIGHTS MUST BE LOWERED BY 2" AND DIMENSION "K" MUST BE INCREASED TO 6" WHEN DOUBLED 4" X 4" STRUTS ARE TO BE USED. FOR UNITS CONSISTING OF 2 OR 4 LAYERS OF BOXES OR 6 LAYERS OF BOXES MORE THAN 6" HIGH, DIMENSION "D" MUST BE INCREASED 1-1/4" WHEN 4" X 6" ON-EDGE STRUTS ARE TO BE USED OR MUST BE INCREASED 2" WHEN DOUBLED 4" X 4" STRUTS ARE TO BE USED.
6. THE CENTER GATES MUST BE CONSTRUCTED ONE-HALF INCH (1/2") LESS IN WIDTH THAN THE MEASURED DISTANCE BETWEEN THE DOOR SPANNER PIECES IF THE DOORWAY PROTECTION PROCEDURES DEPICTED ON PAGE 54 ARE USED IN LIEU OF THE DOORWAY PROTECTION SHOWN IN THE LOAD VIEW ON PAGE 6 AS PIECES MARKED (3), (4), AND (5), OR IN LIEU OF ANY OF THE ALTERNATIVE METHODS SHOWN ON PAGES 55 AND 56.
7. FOR EASE OF HANDLING, SPLIT GATES, CONSTRUCTED IN ACCORDANCE WITH THE "CENTER GATE M" DETAIL ON PAGE 42, MAY BE USED AS AN ALTERNATIVE TO CENTER GATE A. USE TWO (2) GATES, TIED TOGETHER AS SHOWN BY THE "TIE PIECE APPLICATION A" DETAIL ON PAGE 46.

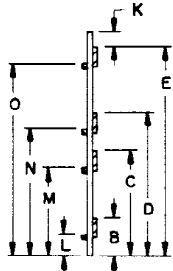
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REFER TO SPECIAL NOTES 4 AND 5 ON PAGE 61 AND THE DETAILS ON PAGES 62 AND 63 FOR REQUIREMENTS APPLICABLE TO 1-TIER GATES.



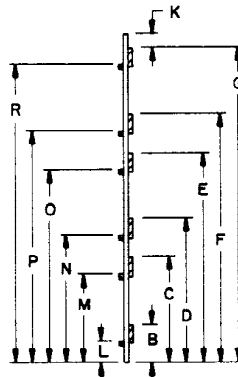
**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE ONE (1) UNIT HIGH.



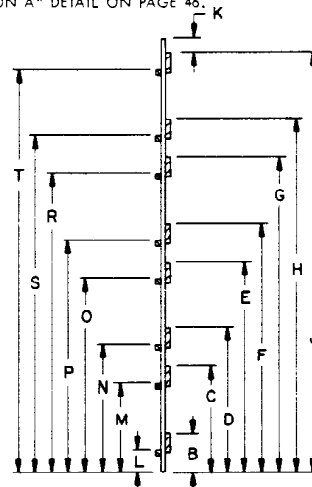
**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE TWO (2) UNITS HIGH.



**END VIEW**

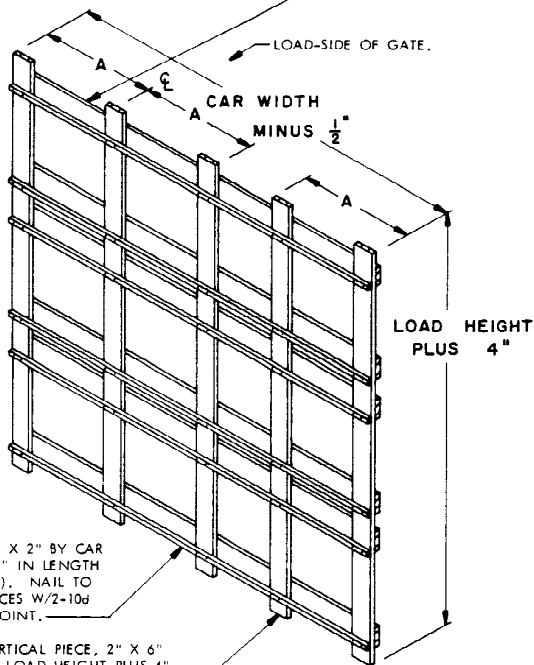
THIS GATE IS FOR LOADS WHICH ARE THREE (3) UNITS HIGH.



**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE FOUR (4) UNITS HIGH.

HORIZONTAL PIECE, 2" X 6" BY CAR WIDTH MINUS 1/2" IN LENGTH (AS REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT. SEE SPECIAL NOTES 4, 6, AND 7 BELOW.



STRUT LEDGER, 2" X 2" BY CAR WIDTH MINUS 1/2" IN LENGTH (2 REQD PER TIER). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH JOINT.

VERTICAL PIECE, 2" X 6" BY LOAD HEIGHT PLUS 4" (5 REQD).

### CENTER GATE B

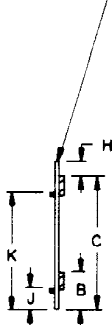
AN ISOMETRIC VIEW OF A GATE FOR A 3-TIER LOAD IS SHOWN AS TYPICAL. NOTE THAT ONE RIGHT HAND AND ONE LEFT HAND GATE ARE REQUIRED FOR A LOAD.

#### SPECIAL NOTES:

1. THE CENTER GATES SHOWN ON THIS PAGE ARE APPLICABLE FOR USE IN BOX CAR LOADS WHERE THE WIDTH OF A UNIT IS PARALLEL WITH THE SIDEWALLS OF A CAR (BOXES ON A UNIT LENGTHWISE IN A CAR). THE GATES ARE DESIGNED FOR THE BRACING OF THREE (3) ROWS OF UNITS, ONE AGAINST ONE SIDEWALL AND TWO ALONG THE OPPOSITE SIDE OF THE CAR. SEE THE TYPICAL LOAD VIEW ON PAGE 16. THE "ISOMETRIC VIEW" ABOVE DEPICTS A GATE FOR A TYPICAL 3-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR LOADS OF ONE THRU THREE TIERS.
2. THE GATE DIMENSIONS REPRESENTED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE LENGTH OR HEIGHT OF THE SKIDDED UNIT BEING LOADED, OR THE HEIGHT OF A BOX IN A UNIT.

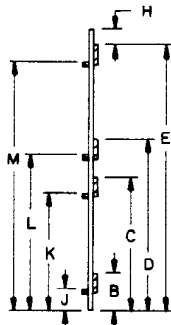
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REFER TO SPECIAL NOTES 4 AND 5 ON PAGE 61 AND THE DETAILS ON PAGES 62 AND 63 FOR REQUIREMENTS APPLICABLE TO 1-TIER GATES.



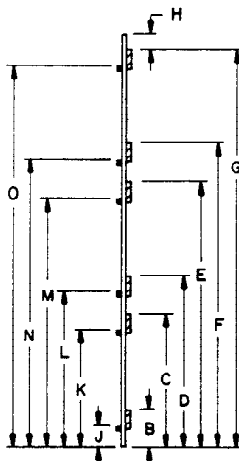
END VIEW

THIS GATE IS FOR LOADS WHICH ARE ONE (1) UNIT HIGH.



END VIEW

THIS GATE IS FOR LOADS WHICH ARE TWO (2) UNITS HIGH.



END VIEW

THIS GATE IS FOR LOADS WHICH ARE THREE (3) UNITS HIGH.

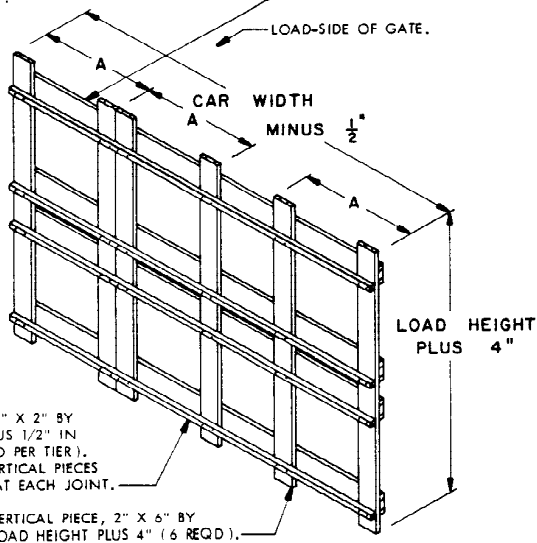
### CENTER GATE B

GATE CONSTRUCTION DIMENSIONAL CHART	
LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A B C, E, G D, F H J K, M, O L, N	FOR UNITS CONSISTING OF 2 OR 4 LAYERS OF BOXES, OR 6 LAYERS OF BOXES MORE THAN 6" HIGH. LENGTH OF SKIDDED UNIT. 11-1/4". SEE SPECIAL NOTE 4. TOP OF TIER. 11-1/4" ABOVE TOP OF NEXT LOWER TIER. 4". SEE SPECIAL NOTE 5. 7". SEE SPECIAL NOTE 5. 4-1/2" BELOW TOP OF TIER. 7" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 3.
A B C, E, G D, F H J K, M, O L, N	FOR UNITS CONSISTING OF 3 OR 5 OR 7 LAYERS OF BOXES. LENGTH OF SKIDDED UNIT. BOX HEIGHT PLUS 8". SEE SPECIAL NOTE 4. TOP OF TIER. BOX HEIGHT PLUS 8" ABOVE TOP OF NEXT LOWER TIER. 4". SEE SPECIAL NOTE 5. BOX HEIGHT PLUS 3-1/2". SEE SPECIAL NOTE 5. 4-1/2" BELOW TOP OF TIER. BOX HEIGHT PLUS 3-1/2" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 3.
A B C, E, G D, F H J K, M, O L, N	FOR UNITS CONSISTING OF 6 LAYERS OF BOXES 6" OR LESS IN HEIGHT, OR 8 LAYERS OF BOXES. LENGTH OF SKIDDED UNIT. BOX HEIGHT PLUS 8". SEE SPECIAL NOTE 4. BOX HEIGHT MINUS 2-3/4" BELOW TOP OF TIER. BOX HEIGHT PLUS 8" ABOVE TOP OF NEXT LOWER TIER. 4". BOX HEIGHT PLUS 3-1/2". SEE SPECIAL NOTE 5. BOX HEIGHT PLUS 1-3/4" BELOW TOP OF TIER. BOX HEIGHT PLUS 3-1/2" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 3.

(SPECIAL NOTES CONTINUED)

3. WHEN MAKING A SET OF TWO GATES FOR A LOAD CONSISTING OF TWO OR THREE TIERS, IT WILL BE NECESSARY TO LEAVE THE THIRD AND/OR FIFTH LEVELS OF STRUT LEDGERS OFF OF ONE GATE UNTIL THE SECOND AND/OR FOURTH LEVELS, RESPECTIVELY, OF LOAD BLOCKING STRUTS HAVE BEEN INSTALLED. WHEN MAKING GATES FOR A LOAD OF LOW-HEIGHT SKIDDED UNITS, IT MAY BE NECESSARY TO LEAVE ALL BUT THE BOTTOM STRUT LEDGER OFF OF ONE GATE UNTIL THE NEXT LOWER LEVEL OF STRUTS HAS BEEN INSTALLED.
4. AS A MINIMUM, HORIZONTAL PIECES ARE REQUIRED AT OR NEAR THE TOP AND THE BOTTOM OF EACH TIER OF UNITS. FOR UNITS WHICH HAVE FOUR OR MORE LAYERS OF BOXES PER UNIT, ADDITIONAL HORIZONTAL PIECES MUST BE APPLIED TO ENSURE THAT EVERY LAYER IS RETAINED BY A HORIZONTAL PIECE. REFER TO PAGE 41 FOR GUIDANCE IN DETERMINING HORIZONTAL PIECE LOCATION AND QUANTITY REQUIREMENTS.
5. ALL STRUT LEDGER HEIGHTS EXCEPT "L" MUST BE LOWERED BY 1-1/4" WHEN 4" X 6" ON-EDGE STRUTS ARE TO BE USED; LEDGER HEIGHTS MUST BE LOWERED BY 2" AND DIMENSION "H" MUST BE INCREASED TO 6" WHEN DOUBLED 4" X 4" STRUTS ARE TO BE USED. FOR UNITS CONSISTING OF 2 OR 4 LAYERS OF BOXES OR 6 LAYERS OF BOXES MORE THAN 6" HIGH, DIMENSION "D" MUST BE INCREASED 1-1/4" WHEN 4" X 6" ON-EDGE STRUTS ARE TO BE USED OR MUST BE INCREASED 2" WHEN DOUBLED 4" X 4" STRUTS ARE TO BE USED.
6. THE CENTER GATES MUST BE CONSTRUCTED ONE-HALF INCH (1/2") LESS IN WIDTH THAN THE MEASURED DISTANCE BETWEEN THE DOOR SPANNER PIECES IF THE DOORWAY PROTECTION PROCEDURES DEPICTED ON PAGE 54 ARE USED IN LIEU OF THE DOORWAY PROTECTION SHOWN IN THE LOAD VIEW ON PAGE 16 AS PIECES MARKED (9), (10), AND (11), OR IN LIEU OF ANY OF THE ALTERNATIVE METHODS SHOWN ON PAGES 55 AND 56.
7. FOR EASE OF HANDLING, SPLIT GATES, ONE CONSTRUCTED IN ACCORDANCE WITH THE "CENTER GATE M" DETAIL ON PAGE 42 AND ONE IN ACCORDANCE WITH THE "CENTER GATE N" DETAIL ON PAGE 43, MAY BE USED AS AN ALTERNATIVE TO CENTER GATE B. TIE THE GATES TOGETHER SIMILAR TO THE PROCEDURES SHOWN BY THE "TIE PIECE APPLICATION A" DETAIL ON PAGE 46.

HORIZONTAL PIECE, 2" X 6" BY CAR WIDTH MINUS 1/2" IN LENGTH (AS REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT. SEE SPECIAL NOTES 4, 6, AND 7 BELOW.



**CENTER GATE C**

AN ISOMETRIC VIEW OF A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL. NOTE THAT ONE RIGHT HAND AND ONE LEFT HAND GATE ARE REQUIRED FOR A LOAD.

STRUT LEDGER, 2" X 2" BY CAR WIDTH MINUS 1/2" IN LENGTH (2 REQD PER TIER). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH JOINT.

VERTICAL PIECE, 2" X 6" BY LOAD HEIGHT PLUS 4" (6 REQD).

GATE CONSTRUCTION DIMENSIONAL CHART	
LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A B C, E, G D, F H J K, M, O L, N	FOR UNITS CONSISTING OF 2 OR 4 LAYERS OF BOXES, OR 6 LAYERS OF BOXES MORE THAN 6" HIGH. LENGTH OF SKIDDED UNIT. 11-1/4". TOP OF TIER. SEE SPECIAL NOTE 4. 11-1/4" ABOVE TOP OF NEXT LOWER TIER. 4". SEE SPECIAL NOTE 5. 7". SEE SPECIAL NOTE 5. 4-1/2" BELOW TOP OF TIER. 7" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 3.
A B C, E, G D, F H J K, M, O L, N	FOR UNITS CONSISTING OF 3 OR 5 OR 7 LAYERS OF BOXES. LENGTH OF SKIDDED UNIT. BOX HEIGHT PLUS 8". TOP OF TIER. SEE SPECIAL NOTE 4. BOX HEIGHT PLUS 8" ABOVE TOP OF NEXT LOWER TIER. 4". SEE SPECIAL NOTE 5. BOX HEIGHT PLUS 3-1/2". SEE SPECIAL NOTE 5. 4-1/2" BELOW TOP OF TIER. BOX HEIGHT PLUS 3-1/2" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 3.
A B C, E, G D, F H J K, M, O L, N	FOR UNITS CONSISTING OF 6 LAYERS OF BOXES 6" OR LESS IN HEIGHT, OR 8 LAYERS OF BOXES. LENGTH OF SKIDDED UNIT. BOX HEIGHT PLUS 8". BOX HEIGHT MINUS 2-3/4" BELOW TOP OF TIER. SEE SPECIAL NOTE 4. BOX HEIGHT PLUS 8" ABOVE TOP OF NEXT LOWER TIER. 4". BOX HEIGHT PLUS 3-1/2". SEE SPECIAL NOTE 5. BOX HEIGHT PLUS 1-3/4" BELOW TOP OF TIER. BOX HEIGHT PLUS 3-1/2" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 3.

(SPECIAL NOTES CONTINUED)

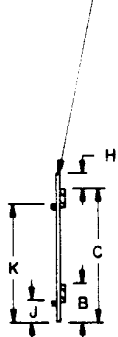
**SPECIAL NOTES:**

1. THE CENTER GATES SHOWN ON THIS PAGE ARE APPLICABLE FOR USE IN BOX CAR LOADS WHERE THE WIDTH OF THE UNIT IS PARALLEL WITH THE SIDEWALLS OF A CAR (BOXES ON A UNIT LENGTHWISE IN A CAR). THE GATES ARE DESIGNED FOR THE BRACING OF THREE (3) ROWS OF UNITS, ONE AGAINST ONE SIDEWALL AND TWO ALONG THE OPPOSITE SIDE OF THE CAR. SEE THE TYPICAL LOAD VIEW ON PAGE 18. THE "ISOMETRIC VIEW" ABOVE DEPICTS A GATE FOR A TYPICAL 2-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR LOADS OF ONE THRU THREE TIERS.
2. THE GATE DIMENSIONS REPRESENTED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE LENGTH OR HEIGHT OF THE SKIDDED UNIT BEING LOADED, OR THE HEIGHT OF A BOX IN A UNIT.
3. WHEN MAKING A SET OF TWO GATES FOR A LOAD CONSISTING OF TWO OR THREE TIERS OF UNITS, IT WILL BE NECESSARY TO LEAVE THE THIRD AND/OR FIFTH LEVELS OF STRUT LEDGERS OFF OF ONE GATE UNTIL THE SECOND AND/OR FOURTH LEVELS, RESPECTIVELY, OF LOAD BLOCKING STRUTS HAVE BEEN INSTALLED. WHEN MAKING GATES FOR A LOAD OF LOW-HEIGHT SKIDDED UNITS, IT MAY BE NECESSARY TO LEAVE ALL BUT THE BOTTOM STRUT LEDGER OFF OF ONE GATE UNTIL THE NEXT LOWER LEVEL OF STRUTS HAS BEEN INSTALLED.

4. AS A MINIMUM, HORIZONTAL PIECES ARE REQUIRED AT OR NEAR THE TOP AND THE BOTTOM OF EACH TIER OF UNITS. FOR UNITS WHICH HAVE FOUR OR MORE LAYERS OF BOXES PER UNIT, ADDITIONAL HORIZONTAL PIECES MUST BE APPLIED TO ENSURE THAT EVERY LAYER IS RETAINED BY A HORIZONTAL PIECE. REFER TO PAGE 41 FOR GUIDANCE IN DETERMINING HORIZONTAL PIECE LOCATION AND QUANTITY REQUIREMENTS.
5. ALL STRUT LEDGER HEIGHTS EXCEPT "L" MUST BE LOWERED BY 1-1/4" WHEN 4" X 6" ON-EDGE STRUTS ARE TO BE USED; LEDGER HEIGHTS MUST BE LOWERED BY 2" AND DIMENSION "H" MUST BE INCREASED TO 6" WHEN DOUBLED 4" X 4" STRUTS ARE TO BE USED. FOR UNITS CONSISTING OF 2 OR 4 LAYERS OF BOXES OR 6 LAYERS OF BOXES MORE THAN 6" HIGH, DIMENSION "D" MUST BE INCREASED 1-1/4" WHEN 4" X 6" ON-EDGE STRUTS ARE TO BE USED OR MUST BE INCREASED 2" WHEN DOUBLED 4" X 4" STRUTS ARE TO BE USED.
6. THE CENTER GATES MUST BE CONSTRUCTED ONE-HALF INCH (1/2") LESS IN WIDTH THAN THE MEASURED DISTANCE BETWEEN THE DOOR SPANNER PIECES IF THE DOORWAY PROTECTION PROCEDURES DEPICTED ON PAGE 54 ARE USED IN LIEU OF THE DOORWAY PROTECTION SHOWN IN THE LOAD VIEW ON PAGE 18 AS PIECES MARKED (3), (10), AND (11), OR IN LIEU OF ANY OF THE ALTERNATIVE METHODS SHOWN ON PAGES 55 AND 56.
7. FOR EASE OF HANDLING, SPLIT GATES, CONSTRUCTED IN ACCORDANCE WITH THE "CENTER GATE M" DETAIL ON PAGE 42, MAY BE USED AS AN ALTERNATIVE TO CENTER GATE C. USE THREE (3) GATES, TIED TOGETHER AS SHOWN BY THE "TIE PIECE APPLICATION B" DETAIL ON PAGE 46.

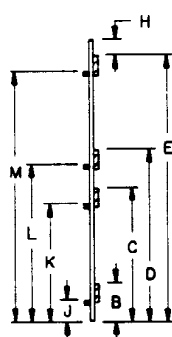
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REFER TO SPECIAL NOTES 4 AND 5 ON PAGE 61 AND THE DETAILS ON PAGES 62 AND 63 FOR REQUIREMENTS APPLICABLE TO 1-TIER GATES.



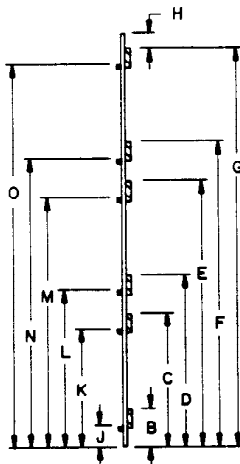
**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE ONE (1) UNIT HIGH.



**END VIEW**

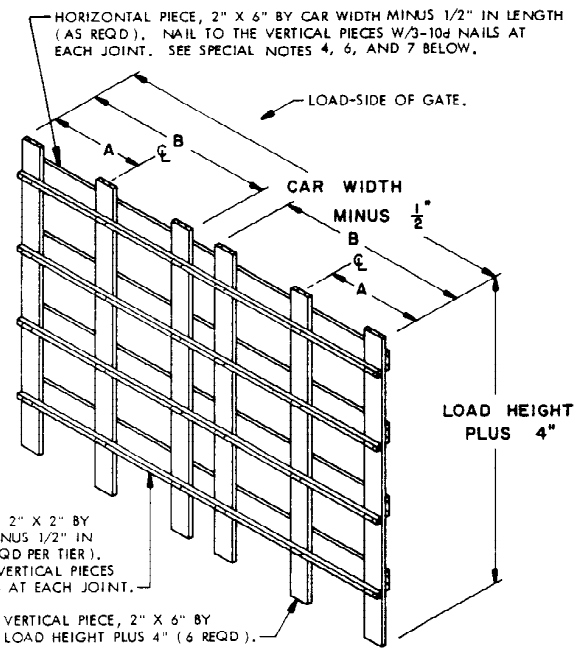
THIS GATE IS FOR LOADS WHICH ARE TWO (2) UNITS HIGH.



**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE THREE (3) UNITS HIGH.





STRUT LEDGER, 2" X 2" BY CAR WIDTH MINUS 1/2" IN LENGTH (2 REQD PER TIER). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH JOINT.

VERTICAL PIECE, 2" X 6" BY LOAD HEIGHT PLUS 4" (6 REQD).

**CENTER GATE D**

AN ISOMETRIC VIEW OF A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL.

GATE CONSTRUCTION DIMENSIONAL CHART	
LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A B C D, F E G H J, L K	FOR UNITS CONSISTING OF 2 OR 4 LAYERS OF BOXES, OR 6 LAYERS OF BOXES MORE THAN 6" HIGH. LENGTH OF SKIDDED UNIT. TWICE THE LENGTH OF A SKIDDED UNIT. 11-1/4". TOP OF TIER. SEE SPECIAL NOTE 4. 11-1/4" ABOVE TOP OF FIRST TIER. 4". SEE SPECIAL NOTE 5. 7". SEE SPECIAL NOTE 5. 4-1/2" BELOW TOP OF TIER. 7" ABOVE TOP OF FIRST TIER. SEE SPECIAL NOTE 3.
A B C D, F E G H J, L K	FOR UNITS CONSISTING OF 3 OR 5 OR 7 LAYERS OF BOXES. LENGTH OF SKIDDED UNIT. TWICE THE LENGTH OF A SKIDDED UNIT. BOX HEIGHT PLUS 8". TOP OF TIER. SEE SPECIAL NOTE 4. BOX HEIGHT PLUS 8" ABOVE TOP OF FIRST TIER. 4". SEE SPECIAL NOTE 5. BOX HEIGHT PLUS 3-1/2". SEE SPECIAL NOTE 5. 4-1/2" BELOW TOP OF TIER. BOX HEIGHT PLUS 3-1/2" ABOVE TOP OF FIRST TIER. SEE SPECIAL NOTE 3.
A B C D, F E G H J, L K	FOR UNITS CONSISTING OF 6 LAYERS OF BOXES 6" OR LESS IN HEIGHT, OR 8 LAYERS OF BOXES. LENGTH OF SKIDDED UNIT. TWICE THE LENGTH OF A SKIDDED UNIT. BOX HEIGHT PLUS 8". BOX HEIGHT MINUS 2-3/4" BELOW TOP OF TIER. SEE SPECIAL NOTE 4. BOX HEIGHT PLUS 8" ABOVE TOP OF FIRST TIER. 4". BOX HEIGHT PLUS 3-1/2". SEE SPECIAL NOTE 5. BOX HEIGHT PLUS 1-3/4" BELOW TOP OF TIER. BOX HEIGHT PLUS 3-1/2" ABOVE TOP OF FIRST TIER. SEE SPECIAL NOTE 3.

**SPECIAL NOTES:**

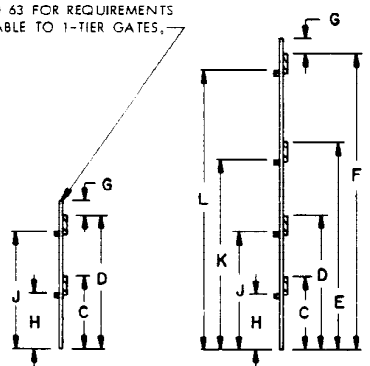
1. THE CENTER GATES SHOWN ON THIS PAGE ARE APPLICABLE FOR USE IN BOX CAR LOADS WHERE THE WIDTH OF THE UNIT IS PARALLEL WITH THE SIDEWALLS OF A CAR (BOXES ON A UNIT LENGTHWISE IN A CAR). THE GATES ARE DESIGNED FOR THE BRACING OF FOUR (4) ROWS OF UNITS, TWO ALONG EACH SIDE OF THE CAR. SEE THE TYPICAL LOAD VIEW ON PAGE 20. THE "ISOMETRIC VIEW" ABOVE DEPICTS A GATE FOR A TYPICAL 2-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR LOADS OF ONE AND TWO TIERS.
2. THE GATE DIMENSIONS REPRESENTED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE LENGTH OR HEIGHT OF THE SKIDDED UNIT BEING LOADED, OR THE HEIGHT OF A BOX IN A UNIT.
3. WHEN MAKING A SET OF TWO GATES FOR A LOAD CONSISTING OF TWO TIERS OF UNITS, IT WILL BE NECESSARY TO LEAVE THE THIRD LEVEL OF STRUT LEDGERS OFF OF ONE GATE UNTIL THE SECOND LEVEL OF LOAD BLOCKING STRUTS HAS BEEN INSTALLED. WHEN MAKING GATES FOR A LOAD OF LOW-HEIGHT SKIDDED UNITS, IT MAY BE NECESSARY TO LEAVE ALL BUT THE BOTTOM STRUT LEDGER OFF OF ONE GATE UNTIL THE NEXT LOWER LEVEL OF STRUTS HAS BEEN INSTALLED.

( SPECIAL NOTES CONTINUED )

4. AS A MINIMUM, HORIZONTAL PIECES ARE REQUIRED AT OR NEAR THE TOP AND THE BOTTOM OF EACH TIER OF UNITS. FOR UNITS WHICH HAVE FOUR OR MORE LAYERS OF BOXES PER UNIT, ADDITIONAL HORIZONTAL PIECES MUST BE APPLIED TO ENSURE THAT EVERY LAYER IS RETAINED BY A HORIZONTAL PIECE. REFER TO PAGE 41 FOR GUIDANCE IN DETERMINING HORIZONTAL PIECE LOCATION AND QUANTITY REQUIREMENTS.
5. STRUT LEDGER HEIGHTS "H", "J" AND "L" MUST BE LOWERED BY 1-1/4" WHEN 4" X 6" ON-EDGE STRUTS ARE TO BE USED; LEDGER HEIGHTS MUST BE LOWERED BY 2" AND DIMENSION "C" MUST BE INCREASED TO 6" WHEN DOUBLED 4" X 4" STRUTS ARE TO BE USED. FOR UNITS CONSISTING OF 2 OR 4 LAYERS OF BOXES OR 6 LAYERS OF BOXES MORE THAN 6" HIGH, DIMENSION "E" MUST BE INCREASED 1-1/4" WHEN 4" X 6" ON-EDGE STRUTS ARE TO BE USED OR MUST BE INCREASED 2" WHEN DOUBLED 4" X 4" STRUTS ARE TO BE USED.
6. THE CENTER GATES MUST BE CONSTRUCTED ONE-HALF INCH (1/2") LESS IN WIDTH THAN THE MEASURED DISTANCE BETWEEN THE DOOR SPANNER PIECES IF THE DOORWAY PROTECTION PROCEDURES DEPICTED ON PAGE 54 ARE USED IN LIEU OF THE DOORWAY PROTECTION SHOWN IN THE LOAD VIEW ON PAGE 20 AS PIECES MARKED (3), (8), AND (9), OR IN LIEU OF ANY OF THE ALTERNATIVE METHODS SHOWN ON PAGES 55 AND 56.
7. FOR EASE OF HANDLING, SPLIT GATES, CONSTRUCTED IN ACCORDANCE WITH THE "CENTER GATE N" DETAIL ON PAGE 43, MAY BE USED AS AN ALTERNATIVE TO CENTER GATE D. USE TWO (2) GATES, TIED TOGETHER SIMILAR TO THE PROCEDURES SHOWN BY THE "TIE PIECE APPLICATION A" DETAIL ON PAGE 46.

( CONTINUED AT RIGHT )

REFER TO SPECIAL NOTES 4 AND 5 ON PAGE 61 AND THE DETAILS ON PAGES 62 AND 63 FOR REQUIREMENTS APPLICABLE TO 1-TIER GATES.



**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE ONE (1) UNIT HIGH.

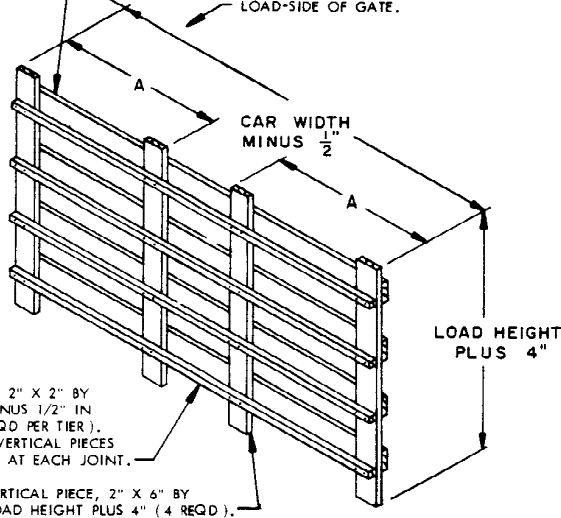
**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE TWO (2) UNITS HIGH.

**CENTER GATE D**

HORIZONTAL PIECE, 2" X 6" BY CAR WIDTH MINUS 1/2" IN LENGTH (1 REQD PER TIER). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

SEE SPECIAL NOTES 5 AND 6 BELOW.  
LOAD-SIDE OF GATE.



STRUT LEDGER, 2" X 2" BY CAR WIDTH MINUS 1/2" IN LENGTH (1 REQD PER TIER). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH JOINT.

VERTICAL PIECE, 2" X 6" BY LOAD HEIGHT PLUS 4" (4 REQD).

**CENTER GATE E**

AN ISOMETRIC VIEW OF A GATE FOR A 4-TIER LOAD IS SHOWN AS TYPICAL.

GATE CONSTRUCTION DIMENSIONAL CHART	
LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
FOR UNITS CONSISTING OF 1 LAYER OF BOXES	
A	LENGTH OF SKIDDED UNIT.
B, C, D, E	TOP OF TIER.
F, G, H	TOP OF TIER.
J	4". SEE SPECIAL NOTE 4.
K, L, M, N	4-1/2" BELOW TOP OF TIER. SEE SPECIAL NOTES 3 AND 4.
O, P, Q	4-1/2" BELOW TOP OF TIER. SEE SPECIAL NOTES 3 AND 4.

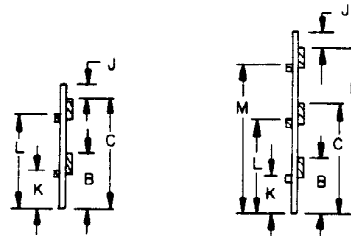
( SPECIAL NOTES CONTINUED )

- STRUT LEDGER HEIGHTS REPRESENTED BY THE LETTERS "K" THRU "P" AND "R" BE LOWERED BY 1" WHEN 4" X 6" ON-EDGE STRUTS ARE USED; LEDGER HEIGHTS MUST BE LOWERED BY 1-3/4" WHEN DOUBLED 4" X 4" STRUTS ARE USED, AND DIMENSION "J" MUST BE INCREASED TO 6".
- THE CENTER GATES MUST BE CONSTRUCTED ONE-HALF INCH ( 1/2" ) LESS IN WIDTH THAN THE MEASURED DISTANCE BETWEEN THE DOOR SPANNER PIECES IF THE DOORWAY PROTECTION PROCEDURES DEPICTED ON PAGE 54 ARE USED IN LIEU OF THE DOORWAY PROTECTION SHOWN IN THE LOAD VIEW ON PAGE 22 AS PIECES MARKED ③, ④, AND ①, OR IN LIEU OF ANY OF THE ALTERNATIVE METHODS SHOWN ON PAGES 55 AND 56.
- FOR EASE OF HANDLING, SPLIT GATES, CONSTRUCTED IN ACCORDANCE WITH THE "CENTER GATE O" DETAIL ON PAGE 44, MAY BE USED AS AN ALTERNATIVE TO CENTER GATE E. USE TWO ( 2 ) GATES, TIED TOGETHER AS SHOWN BY THE "TIE PIECE APPLICATION A" DETAIL ON PAGE 46.

SPECIAL NOTES:

- THE CENTER GATES SHOWN ON THIS PAGE ARE APPLICABLE FOR USE IN BOX CAR LOADS OF UNITS CONSISTING OF ONLY ONE LAYER OF BOXES AND WHERE THE WIDTH OF THE UNIT IS PARALLEL WITH THE SIDEWALLS OF A CAR ( BOXES ON A UNIT LENGTHWISE IN A CAR ). THE GATES ARE DESIGNED FOR THE BRACING OF TWO ( 2 ) ROWS OF UNITS, ONE AGAINST EACH SIDEWALL. SEE THE TYPICAL LOAD VIEW ON PAGE 22. THE "ISOMETRIC VIEW" ABOVE DEPICTS A GATE FOR A TYPICAL 4-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR LOADS OF TWO THRU SEVEN TIERS.
- THE GATE DIMENSIONS REPRESENTED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE LENGTH OR HEIGHT OF THE SKIDDED UNIT BEING LOADED.
- WHEN MAKING A SET OF TWO GATES FOR A LOAD OF LOW-HEIGHT SKIDDED UNITS, IT MAY BE NECESSARY TO LEAVE ALL BUT THE BOTTOM STRUT LEDGERS OFF OF ONE GATE UNTIL THE NEXT LOWER LEVEL OF STRUTS HAS BEEN INSTALLED.

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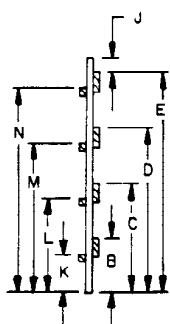


END VIEW

THIS GATE IS FOR LOADS WHICH ARE TWO ( 2 ) UNITS HIGH.

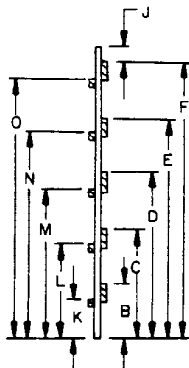
END VIEW

THIS GATE IS FOR LOADS WHICH ARE THREE ( 3 ) UNITS HIGH.



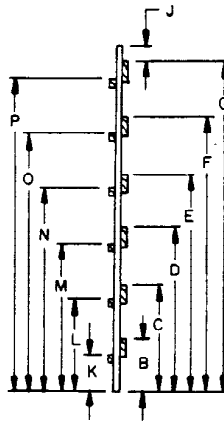
END VIEW

THIS GATE IS FOR LOADS WHICH ARE FOUR ( 4 ) UNITS HIGH.



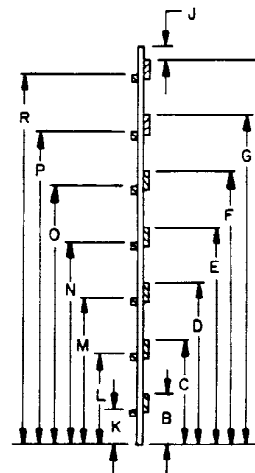
END VIEW

THIS GATE IS FOR LOADS WHICH ARE FIVE ( 5 ) UNITS HIGH.



END VIEW

THIS GATE IS FOR LOADS WHICH ARE SIX ( 6 ) UNITS HIGH.



END VIEW

THIS GATE IS FOR LOADS WHICH ARE SEVEN ( 7 ) UNITS HIGH.

SEE SPECIAL NOTE 6.

STRUT LEDGER, 2" X 4" BY CAR WIDTH MINUS 1/2" IN LENGTH (2 REQD PER TIER). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT. SEE SPECIAL NOTE 7 BELOW.

CAR WIDTH MINUS 1/2"

LOAD-SIDE OF GATE.

LOAD HEIGHT PLUS 4"

VERTICAL PIECE, 2" X 6" BY LOAD HEIGHT PLUS 4" (4 REQD).

SEE "VIEW A" BELOW FOR LOCATION OF GATE HOLD DOWN AND LATERAL BLOCKING CLEATS.

GATE HOLD DOWN, 2" X 3" BY A LENGTH TO SUIT (RIP TO 2-1/4" FOR TYPE IA BASE) DOUBLED (2 REQD). NAIL THE FIRST PIECE TO GATE VERTICAL PIECES W/3-10d NAILS AT EACH END. NAIL THE SECOND PIECE TO THE FIRST W/1-10d NAIL EVERY 6" (6 NAILS MAX). SEE "VIEW A" BELOW FOR LOCATION GUIDANCE.

**CENTER GATE F**

AN ISOMETRIC VIEW OF A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL.

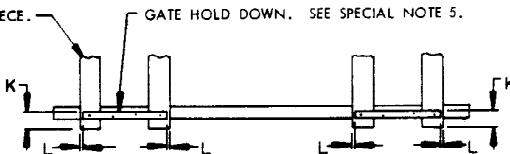
GATE CONSTRUCTION DIMENSIONAL CHART	
LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A	DISTANCE FROM END OF BOX TO SKID BASE PLUS 3" FOR TYPE I AND TYPE IA BASES, OR PLUS 5" FOR TYPE II BASE.
B	"W" DIMENSION (WIDTH) OF SKID BASE MINUS 6" FOR TYPE I AND TYPE IA BASES, OR MINUS 10" FOR TYPE II BASE.
C	LOAD HEIGHT PLUS 4".
D	6".
E, G	4-1/2" BELOW TOP OF TIER. SEE SPECIAL NOTE 4.
F, H	6" ABOVE TOP OF NEXT LOWER TIER.
J	8-1/2". SEE SPECIAL NOTE 4.
K	4-3/4" FOR TYPE I BASE, 4" FOR TYPE IA OR TYPE II BASE. SEE SPECIAL NOTE 5.
L	1".

(SPECIAL NOTES CONTINUED)

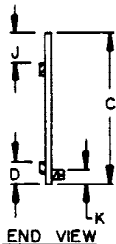
**SPECIAL NOTES:**

1. THE CENTER GATES SHOWN ON THIS PAGE ARE APPLICABLE FOR USE IN BOX CAR LOADS WHERE THE LENGTH OF THE UNIT IS PARALLEL WITH THE SIDEWALLS OF A CAR (BOXES ON A UNIT CROSSWISE IN A CAR). THE GATES ARE DESIGNED FOR THE BRACING OF TWO (2) ROWS OF UNITS, ONE AGAINST EACH SIDEWALL. SEE THE TYPICAL LOAD VIEW ON PAGE 6. THE "ISOMETRIC VIEW" ABOVE DEPICTS A GATE FOR A TYPICAL 2-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR LOADS OF ONE THRU THREE TIERS.
2. THE GATE DIMENSIONS REPRESENTED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE WIDTH OR HEIGHT OF THE SKIDDED UNIT BEING LOADED.
3. WHEN MAKING A SET OF TWO GATES FOR A LOAD CONSISTING OF TWO OR THREE TIERS OF UNITS, IT WILL BE NECESSARY TO LEAVE THE THIRD AND/OR FIFTH LEVELS OF STRUT LEDGERS OFF OF ONE GATE UNTIL THE SECOND AND/OR FOURTH LEVELS, RESPECTIVELY, OF LOAD BLOCKING STRUTS HAVE BEEN INSTALLED.
4. STRUT LEDGER HEIGHTS REPRESENTED BY THE LETTERS "E" AND "G" MUST BE LOWERED BY 2" AND DIMENSION "J" MUST BE INCREASED TO 10-1/2" WHEN 4" X 6" ON-EDGE STRUTS ARE USED, OR HEIGHTS "E" AND "G" MUST BE LOWERED BY 3-1/2" AND DIMENSION "J" MUST BE INCREASED TO 12" WHEN DOUBLED 4" X 4" STRUTS ARE USED.
5. DOOR SPANNER PIECES MAY BE APPLIED IN LIEU OF USING DOUBLED 2" MATERIAL NAILED TO THE GATE VERTICAL PIECES TO PROVIDE CENTER GATE HOLD DOWN, AS LONG AS THE CAR BEING LOADED HAS AVAILABLE SIDEWALLS. REFER TO PAGE 49 FOR GUIDANCE.
6. THE CENTER GATES MUST BE CONSTRUCTED ONE-HALF INCH (1/2") LESS IN WIDTH THAN THE MEASURED DISTANCE BETWEEN THE DOOR SPANNER PIECES IF THE DOORWAY PROTECTION PROCEDURES DEPICTED ON PAGE 54 ARE USED IN LIEU OF THE DOORWAY PROTECTION SHOWN IN THE LOAD VIEW ON PAGE 6 AS PIECES MARKED ③, ⑧, AND ⑨, OR IN LIEU OF ANY OF THE ALTERNATIVE METHODS SHOWN ON PAGES 55 AND 56.

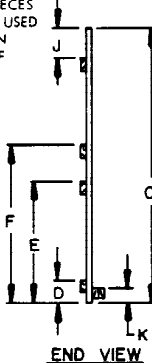
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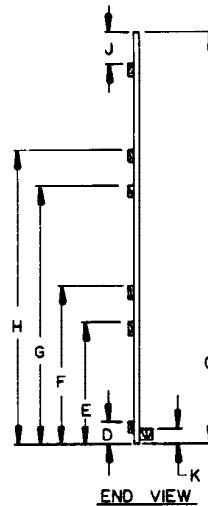
**VIEW A**



THIS GATE IS FOR LOADS WHICH ARE ONE (1) UNIT HIGH.

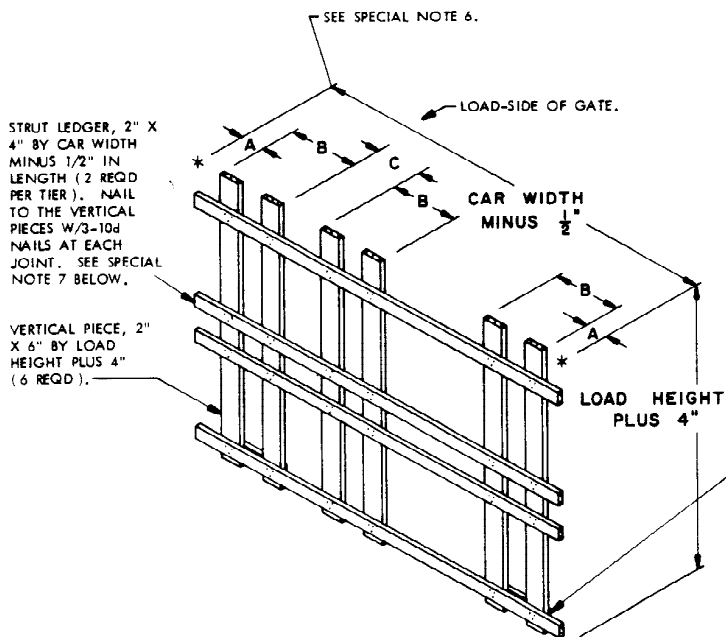


THIS GATE IS FOR LOADS WHICH ARE TWO (2) UNITS HIGH.



THIS GATE IS FOR LOADS WHICH ARE THREE (3) UNITS HIGH.

**CENTER GATE F**



GATE CONSTRUCTION DIMENSIONAL CHART	
LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A	DISTANCE FROM END OF BOX TO SKID BASE, PLUS 3" FOR TYPE I AND TYPE IA BASES, OR PLUS 5" FOR TYPE II BASE.
B	"W" DIMENSION (WIDTH) OF SKID BASE MINUS 6" FOR TYPE I AND TYPE IA BASES, OR MINUS 10" FOR TYPE II BASE.
C	TWICE THE DISTANCE FROM BOX END TO SKID BASE PLUS 6" FOR TYPE I AND IA BASES, OR PLUS 10" FOR TYPE II BASE.
D	LOAD HEIGHT PLUS 4".
E	6".
F, H	4-1/2" BELOW TOP OF TIER. SEE SPECIAL NOTE 4.
G, J	6" ABOVE TOP OF NEXT LOWER TIER.
K	8-1/2". SEE SPECIAL NOTE 4.
L	4-3/4" FOR TYPE I BASE, 4" FOR TYPE IA OR TYPE II BASE. SEE SPECIAL NOTE 5.
M	1".

GATE HOLD DOWN, 2" X 3" BY A LENGTH TO SUIT ( RIP TO 2-1/4" FOR TYPE IA BASE ) DOUBLED ( 2 REQD ). NAIL THE FIRST PIECE TO GATE VERTICAL PIECES W/3-10d NAILS AT EACH END. NAIL THE SECOND PIECE TO THE FIRST W/1-10d NAIL EVERY 6" ( 6 NAILS MAX ). SEE "VIEW A" BELOW FOR LOCATION GUIDANCE.

( SPECIAL NOTES CONTINUED )

- WHEN MAKING A SET OF TWO GATES FOR A LOAD CONSISTING OF TWO OR THREE TIERS OF UNITS, IT WILL BE NECESSARY TO LEAVE THE THIRD AND FIFTH LEVELS OF STRUT LEDGERS OFF OF ONE GATE UNTIL THE SECOND AND FOURTH LEVELS, RESPECTIVELY, OF LOAD BLOCKING STRUTS HAVE BEEN INSTALLED.
- STRUT LEDGER HEIGHTS REPRESENTED BY THE LETTERS "F" AND "H" MUST BE LOWERED BY 2" AND DIMENSION "K" MUST BE INCREASED TO 10-1/2" WHEN 4" X 6" ON-EDGE STRUTS ARE USED, OR HEIGHTS "F" AND "H" MUST BE LOWERED BY 3-1/2" AND DIMENSION "K" MUST BE INCREASED TO 12" WHEN DOUBLED 4" X 4" STRUTS ARE USED.
- DOOR SPANNER PIECES MAY BE APPLIED IN LIEU OF USING DOUBLED 2" MATERIAL NAILED TO THE GATE VERTICAL PIECES TO PROVIDE CENTER GATE HOLD DOWN, AS LONG AS THE CAR BEING LOADED HAS AVAILABLE SIDEWALLS. REFER TO PAGE 49 FOR GUIDANCE.
- THE CENTER GATES MUST BE CONSTRUCTED ONE-HALF INCH ( 1/2" ) LESS IN WIDTH THAN THE MEASURED DISTANCE BETWEEN THE DOOR SPANNER PIECES IF THE DOORWAY PROTECTION PROCEDURES DEPICTED ON PAGE 54 ARE USED IN LIEU OF THE DOORWAY PROTECTION SHOWN IN THE LOAD VIEW ON PAGE 8 AS PIECES MARKED ( 3 ), ( 6 ), AND ( 7 ), OR IN LIEU OF ANY OF THE ALTERNATIVE METHODS SHOWN ON PAGES 55 AND 56.
- FOR EASE OF HANDLING, SPLIT GATES, CONSTRUCTED IN ACCORDANCE WITH THE "CENTER GATE P" DETAIL ON PAGE 45, MAY BE USED AS AN ALTERNATIVE TO CENTER GATE G. USE THREE ( 3 ) GATES, TIED TOGETHER AS SHOWN BY THE "TIE PIECE APPLICATION D" DETAIL ON PAGE 47.

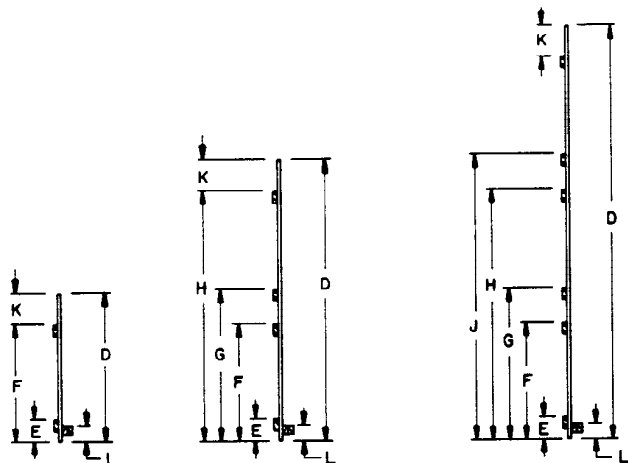
**CENTER GATE G**

AN ISOMETRIC VIEW OF A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL. NOTE THAT ONE RIGHT HAND AND ONE LEFT HAND GATE ARE REQUIRED FOR A LOAD.

**SPECIAL NOTES:**

- THE CENTER GATES SHOWN ON THIS PAGE ARE APPLICABLE FOR USE IN BOX CAR LOADS WHERE THE LENGTH OF THE UNIT IS PARALLEL WITH THE SIDEWALLS OF A CAR ( BOXES ON A UNIT CROSSWISE IN A CAR ). THE GATES ARE DESIGNED FOR THE BRACING OF THREE ( 3 ) ROWS OF UNITS, ONE AGAINST ONE SIDEWALL AND TWO ALONG THE OPPOSITE SIDE OF THE CAR. SEE THE TYPICAL LOAD VIEW ON PAGE 8. THE "ISOMETRIC VIEW" ABOVE DEPICTS A GATE FOR A TYPICAL 2-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR LOADS OF ONE THRU THREE TIERS.
- THE GATE DIMENSIONS REPRESENTED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE WIDTH OR HEIGHT OF THE SKIDDED UNIT BEING LOADED.

( CONTINUED AT RIGHT )



**END VIEW**

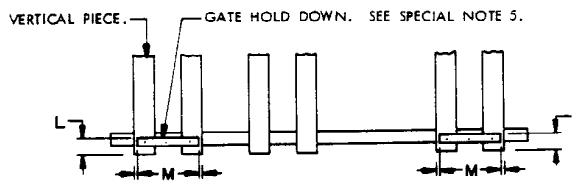
**END VIEW**

**END VIEW**

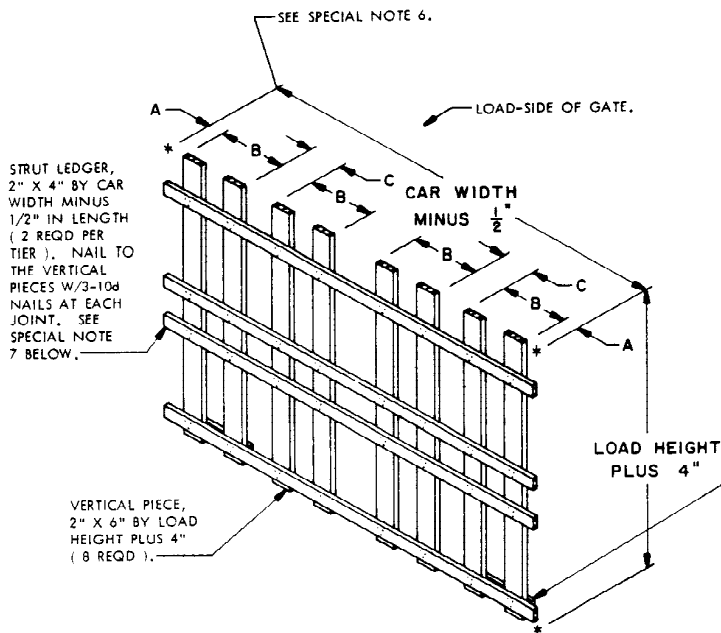
THIS GATE IS FOR LOADS WHICH ARE ONE ( 1 ) UNIT HIGH.

THIS GATE IS FOR LOADS WHICH ARE TWO ( 2 ) UNITS HIGH.

THIS GATE IS FOR LOADS WHICH ARE THREE ( 3 ) UNITS HIGH.



**VIEW A**



GATE CONSTRUCTION DIMENSIONAL CHART	
LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A	DISTANCE FROM END OF BOX TO SKID BASE, PLUS 3" FOR TYPE I AND TYPE IA BASES, OR PLUS 5" FOR TYPE II BASE.
B	"W" DIMENSION ( WIDTH ) OF SKID BASE MINUS 6" FOR TYPE I AND IA BASES, OR MINUS 10" FOR TYPE II BASE.
C	TWICE THE DISTANCE FROM BOX END TO SKID BASE PLUS 6" FOR TYPE I AND IA BASES, OR PLUS 10" FOR TYPE II BASE.
D	LOAD HEIGHT PLUS 4".
E	6".
F, H	4-1/2" BELOW TOP OF TIER. SEE SPECIAL NOTE 4.
G, J	6" ABOVE TOP OF NEXT LOWER TIER.
K	8-1/2". SEE SPECIAL NOTE 4.
L	4-3/4" FOR TYPE I BASE, 4" FOR TYPE IA OR TYPE II BASE. SEE SPECIAL NOTE 5.
M	1".

**CENTER GATE H**

AN ISOMETRIC VIEW OF A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL.

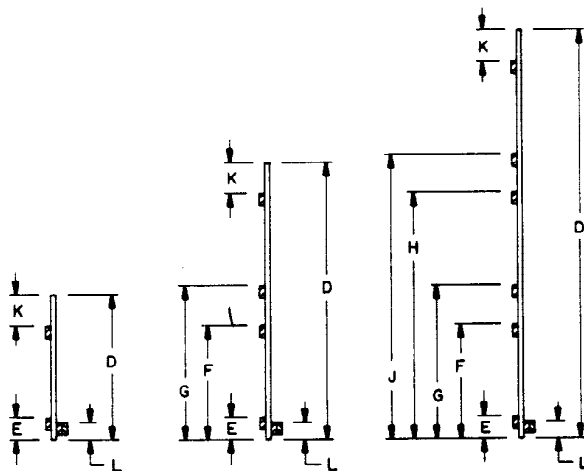
( SPECIAL NOTES CONTINUED )

7. FOR EASE OF HANDLING, SPLIT GATES, CONSTRUCTED IN ACCORDANCE WITH THE "CENTER GATE P" DETAIL ON PAGE 45 MAY BE USED AS AN ALTERNATIVE TO CENTER GATE H. USE FOUR ( 4 ) GATES, TIED TOGETHER SIMILAR TO THE PROCEDURES SHOWN BY THE "TIE PIECE APPLICATION D" DETAIL ON PAGE 47.

**SPECIAL NOTES:**

1. THE CENTER GATES SHOWN ON THIS PAGE ARE APPLICABLE FOR USE IN BOX CAR LOADS WHERE THE LENGTH OF THE UNIT IS PARALLEL WITH THE SIDEWALLS OF A CAR ( BOXES ON A UNIT CROSSWISE IN A CAR ). THE GATES ARE DESIGNED FOR THE BRACING OF FOUR ( 4 ) ROWS OF UNITS, TWO ALONG EACH SIDE OF THE CAR. SEE THE TYPICAL LOAD VIEW ON PAGE 10. THE "ISOMETRIC VIEW" ABOVE DEPICTS A GATE FOR A TYPICAL 2-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR LOADS OF ONE THRU THREE TIERS.
2. THE GATE DIMENSIONS REPRESENTED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE WIDTH OR HEIGHT OF THE SKIDDED UNIT BEING LOADED.
3. WHEN MAKING A SET OF TWO GATES FOR A LOAD CONSISTING OF TWO OR THREE TIERS OF UNITS, IT WILL BE NECESSARY TO LEAVE THE THIRD AND FIFTH LEVELS OF STRUT LEDGERS OFF OF ONE GATE UNTIL THE SECOND AND FOURTH LEVELS, RESPECTIVELY, OF LOAD BLOCKING STRUTS HAVE BEEN INSTALLED.
4. STRUT LEDGER HEIGHTS REPRESENTED BY THE LETTERS "F" AND "H" MUST BE LOWERED BY 2" AND DIMENSION "K" MUST BE INCREASED TO 10-1/2" WHEN 4" X 6" ON-EDGE STRUTS ARE USED, OR HEIGHTS "F" AND "H" MUST BE LOWERED BY 3-1/2" AND DIMENSION "K" MUST BE INCREASED TO 12" WHEN DOUBLED 4" X 4" STRUTS ARE USED.
5. DOOR SPANNER PIECES MAY BE APPLIED IN LIEU OF USING DOUBLED 2" MATERIAL NAILED TO THE GATE VERTICAL PIECES TO PROVIDE CENTER GATE HOLD DOWN, AS LONG AS THE CAR BEING LOADED HAS AVAILABLE SIDEWALLS. REFER TO PAGE 49 FOR GUIDANCE.
6. THE CENTER GATES MUST BE CONSTRUCTED ONE-HALF INCH ( 1/2" ) LESS IN WIDTH THAN THE MEASURED DISTANCE BETWEEN THE DOOR SPANNER PIECES IF THE DOORWAY PROTECTION PROCEDURES DEPICTED ON PAGE 54 ARE USED IN LIEU OF THE DOORWAY PROTECTION SHOWN IN THE LOAD VIEW ON PAGE 10 AS PIECES MARKED ( 3 ), OR IN LIEU OF ANY OF THE ALTERNATIVE METHODS SHOWN ON PAGES 55 AND 56.

( CONTINUED AT LEFT )



**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE ONE ( 1 ) UNIT HIGH.

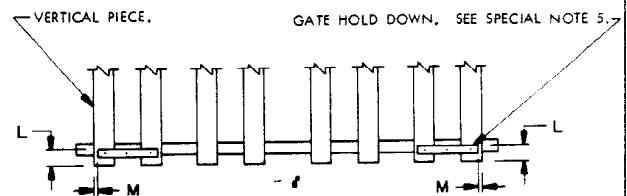
**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE TWO ( 2 ) UNITS HIGH.

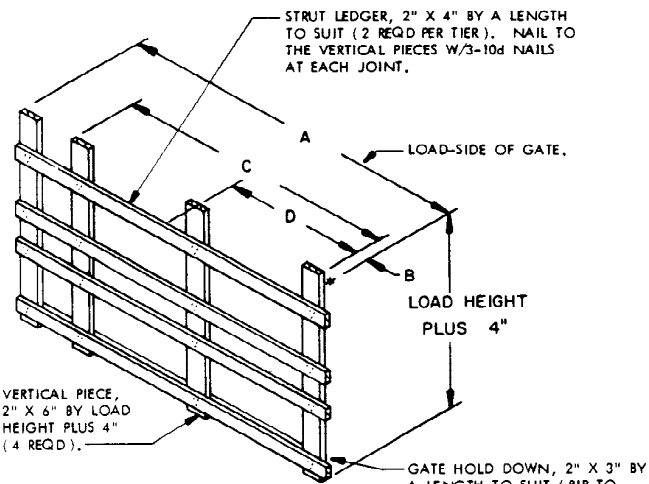
**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE THREE ( 3 ) UNITS HIGH.

**CENTER GATE H**



**VIEW A**



**CENTER GATE J**

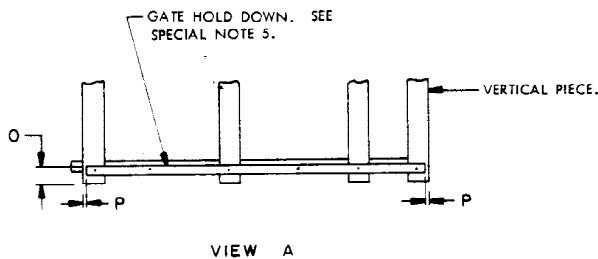
AN ISOMETRIC VIEW OF A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL. NOTE THAT ONE RIGHT HAND AND ONE LEFT HAND GATE ARE REQUIRED FOR A LOAD.

GATE HOLD DOWN, 2" X 3" BY A LENGTH TO SUIT (RIP TO 2-1/4" FOR TYPE IA BASE) DOUBLED (1 REQD.). NAIL THE FIRST PIECE TO GATE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT. NAIL THE SECOND PIECE TO THE FIRST W/6-10d NAILS. SEE "VIEW A" BELOW FOR LOCATION GUIDANCE.

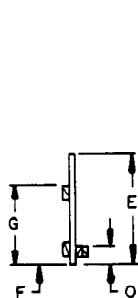
GATE CONSTRUCTION DIMENSIONAL CHART	
LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A	SKID BASE WIDTH PLUS 12" FOR TYPE I AND TYPE IA BASES, OR PLUS 4" FOR TYPE II BASE.
B	3" FOR TYPE I AND TYPE IA BASES, OR 5" FOR TYPE II BASE.
C	"W" DIMENSION (WIDTH) OF SKID BASE MINUS 6" FOR TYPE I AND TYPE IA BASES, OR MINUS 10" FOR TYPE II BASE.
D	ONE-HALF OF "C" DIMENSION.
E	LOAD HEIGHT PLUS 4".
F	6".
G, J, L	4-1/2" BELOW TOP OF TIER. SEE SPECIAL NOTE 4.
H, K, M	6" ABOVE TOP OF NEXT LOWER TIER.
N	8-1/2".
O	4-3/4" FOR TYPE I BASE, OR 4" FOR TYPE IA OR TYPE II BASE. SEE SPECIAL NOTE 5.
P	1".

**SPECIAL NOTES:**

1. THE CENTER GATES SHOWN ON THIS PAGE ARE APPLICABLE FOR USE IN BOX CAR LOADS WHERE THE LENGTH OF THE UNIT IS PARALLEL WITH THE SIDEWALLS OF A CAR (BOXES ON A UNIT CROSSWISE IN A CAR). THE GATES ARE DESIGNED FOR THE BRACING OF ONE (1) ROW OF UNITS POSITIONED ALTERNATELY AGAINST OPPOSITE SIDES OF THE CAR. SEE THE TYPICAL LOAD VIEW ON PAGE 12. THE "ISOMETRIC VIEW" ABOVE DEPICTS A GATE FOR A TYPICAL 2-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR LOADS OF ONE THRU FOUR TIERS.
2. THE GATE DIMENSIONS REPRESENTED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE WIDTH OR HEIGHT OF THE SKIDDED UNIT BEING LOADED.
3. WHEN MAKING A SET OF TWO GATES FOR A LOAD CONSISTING OF TWO OR MORE TIERS OF UNITS, IT WILL BE NECESSARY TO LEAVE THE THIRD, FIFTH, AND/OR SEVENTH LEVELS OF STRUT LEDGERS OFF OF ONE GATE UNTIL THE SECOND, FOURTH, AND/OR SIXTH LEVELS, RESPECTIVELY, OF LOAD BLOCKING STRUTS HAVE BEEN INSTALLED. WHEN MAKING GATES FOR A LOAD OF LOW-HEIGHT SKIDDED UNITS, IT MAY BE NECESSARY TO LEAVE ALL BUT THE BOTTOM STRUT LEDGER OFF OF ONE GATE UNTIL THE NEXT LOWER LEVEL OF STRUTS HAS BEEN INSTALLED.
4. STRUT LEDGER HEIGHTS REPRESENTED BY THE LETTERS "G", "J", AND "L" MUST BE LOWERED BY 2" AND DIMENSION "N" MUST BE INCREASED TO 10-1/2" WHEN 4" X 6" ON-EDGE STRUTS ARE USED, OR HEIGHTS "G", "J", AND "L" MUST BE LOWERED BY 3-1/2" AND DIMENSION "N" MUST BE INCREASED TO 12" WHEN DOUBLED 4" X 4" STRUTS ARE USED.
5. DOOR SPANNER PIECES MAY BE APPLIED IN LIEU OF USING DOUBLED 2" MATERIAL NAILED TO THE GATE VERTICAL PIECES TO PROVIDE CENTER GATE HOLD DOWN, AS LONG AS THE CAR BEING LOADED HAS AVAILABLE SIDEWALLS. REFER TO PAGE 49 FOR GUIDANCE.

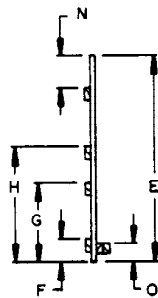


**VIEW A**



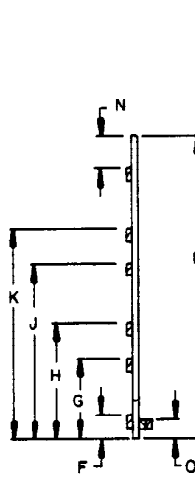
**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE ONE (1) UNIT HIGH.



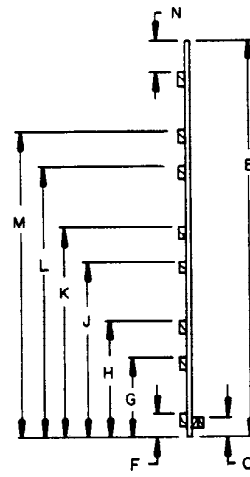
**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE TWO (2) UNITS HIGH.



**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE THREE (3) UNITS HIGH.



**END VIEW**

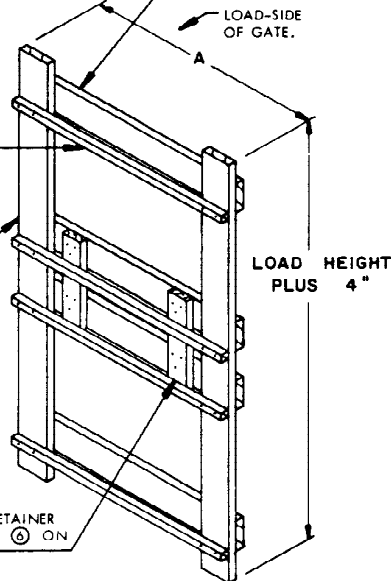
THIS GATE IS FOR LOADS WHICH ARE FOUR (4) UNITS HIGH.

HORIZONTAL PIECE, 2" X 6" BY UNIT LENGTH (AS REQD.), NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT. SEE SPECIAL NOTE 4 BELOW.

STRUT LEDGER, 2" X 2" BY UNIT LENGTH (2 REQD PER TIER). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH END.

VERTICAL PIECE, 2" X 6" BY LOAD HEIGHT PLUS 4" (2 REQD.).

GATE HOLD DOWN RETAINER PIECE (PIECE MARKED  $\odot$  ON PAGE 24).



### CENTER GATE K

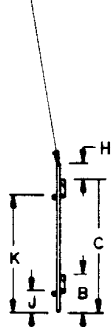
AN ISOMETRIC VIEW OF A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL.

#### SPECIAL NOTES:

1. THE CENTER GATES SHOWN ON THIS PAGE ARE APPLICABLE FOR USE IN BOX CAR LOADS HAVING TWO ROWS OF UNITS, ONE ROW LENGTHWISE AND ONE ROW CROSSWISE. CENTER GATE K IS DESIGNED FOR THE BRACING OF THE ROW OF UNITS HAVING THE WIDTH OF THE UNIT PARALLEL WITH THE SIDEWALLS OF A CAR (BOXES ON A UNIT LENGTHWISE IN A CAR). SEE THE TYPICAL LOAD VIEW ON PAGE 24. THE "ISOMETRIC VIEW" ABOVE DEPICTS A GATE FOR A TYPICAL 2-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR LOADS OF ONE THRU THREE TIERS.
2. THE GATE DIMENSIONS INDICATED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE LENGTH OR HEIGHT OF THE SKIDDED UNIT BEING LOADED, OR THE HEIGHT OF A BOX IN A UNIT.

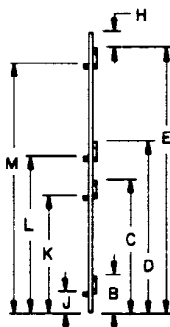
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REFER TO SPECIAL NOTES 4 AND 5 ON PAGE 61 AND THE DETAILS ON PAGES 62 AND 63 FOR REQUIREMENTS APPLICABLE TO 1-TIER GATES.



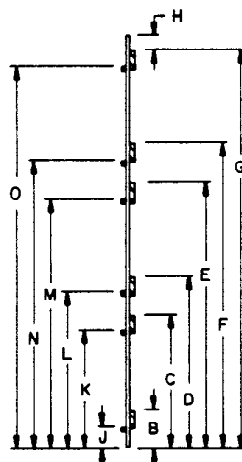
#### END VIEW

THIS GATE IS FOR LOADS WHICH ARE ONE (1) UNIT HIGH.



#### END VIEW

THIS GATE IS FOR LOADS WHICH ARE TWO (2) UNITS HIGH.



#### END VIEW

THIS GATE IS FOR LOADS WHICH ARE THREE (3) UNITS HIGH.

### CENTER GATE K

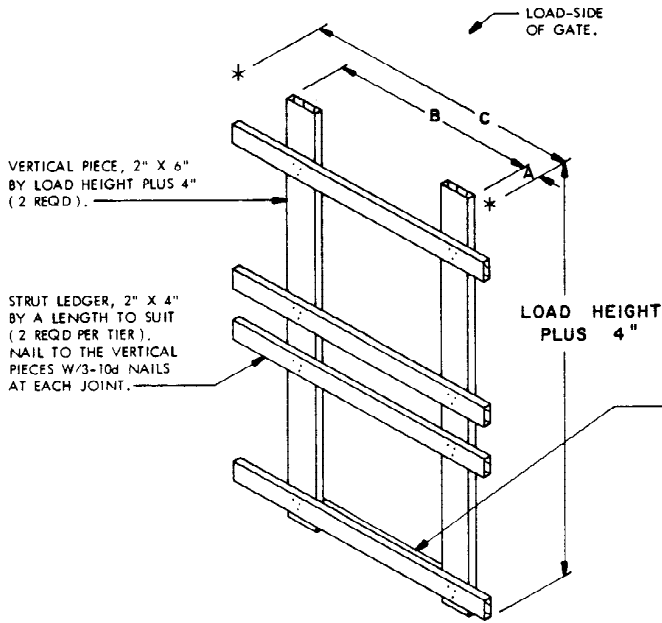
GATE CONSTRUCTION DIMENSIONAL CHART	
LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A B C, E, G D, F H J K, M, O L, N	FOR UNITS CONSISTING OF 2 OR 4 LAYERS OF BOXES, OR 6 LAYERS OF BOXES MORE THAN 6" HIGH. LENGTH OF SKIDDED UNIT. 11-1/4". TOP OF TIER. SEE SPECIAL NOTE 4. 11-1/4" ABOVE TOP OF NEXT LOWER TIER. 4". SEE SPECIAL NOTE 5. 7". SEE SPECIAL NOTE 5. 4-1/2" BELOW TOP OF TIER. 7" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 3.
A B C, E, G D, F H J K, M, O L, N	FOR UNITS CONSISTING OF 3 OR 5 OR 7 LAYERS OF BOXES. LENGTH OF SKIDDED UNIT. BOX HEIGHT PLUS 8". TOP OF TIER. SEE SPECIAL NOTE 4. BOX HEIGHT PLUS 8" ABOVE TOP OF NEXT LOWER TIER. 4". SEE SPECIAL NOTE 5. BOX HEIGHT PLUS 3-1/2". SEE SPECIAL NOTE 5. 4-1/2" BELOW TOP OF TIER. BOX HEIGHT PLUS 3-1/2" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 3.
A B C, E, G D, F H J K, M, O L, N	FOR UNITS CONSISTING OF 6 LAYERS OF BOXES 6" OR LESS IN HEIGHT, OR 8 LAYERS OF BOXES. LENGTH OF SKIDDED UNIT. BOX HEIGHT PLUS 8". BOX HEIGHT MINUS 2-3/4" BELOW TOP OF TIER. SEE SPECIAL NOTE 4. BOX HEIGHT PLUS 8" ABOVE TOP OF NEXT LOWER TIER. 4". BOX HEIGHT PLUS 3-1/2". SEE SPECIAL NOTE 5. BOX HEIGHT PLUS 1-3/4" BELOW TOP OF TIER. BOX HEIGHT PLUS 3-1/2" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 3.

(SPECIAL NOTES CONTINUED)

3. WHEN MAKING A SET OF TWO GATES FOR A LOAD CONSISTING OF TWO OR THREE TIERS OF UNITS, IT WILL BE NECESSARY TO LEAVE THE THIRD AND/OR FIFTH LEVELS OF STRUT LEDGERS OFF OF ONE GATE UNTIL THE SECOND AND/OR FOURTH LEVELS, RESPECTIVELY, OF LOAD BLOCKING STRUTS HAVE BEEN INSTALLED. WHEN MAKING GATES FOR A LOAD OF LOW-HEIGHT SKIDDED UNITS, IT MAY BE NECESSARY TO LEAVE ALL BUT THE BOTTOM STRUT LEDGER OFF OF ONE GATE UNTIL THE NEXT LOWER LEVEL OF STRUTS HAS BEEN INSTALLED.
4. AS A MINIMUM, HORIZONTAL PIECES ARE REQUIRED AT OR NEAR THE TOP AND THE BOTTOM OF EACH TIER OF UNITS. FOR UNITS WHICH HAVE FOUR OR MORE LAYERS OF BOXES PER UNIT, ADDITIONAL HORIZONTAL PIECES MUST BE APPLIED TO ENSURE THAT EVERY LAYER IS RETAINED BY A HORIZONTAL PIECE. REFER TO PAGE 41 FOR GUIDANCE IN DETERMINING HORIZONTAL PIECE LOCATION AND QUANTITY REQUIREMENTS.
5. ALL STRUT LEDGER HEIGHTS EXCEPT "L" MUST BE LOWERED BY 1-1/4" WHEN 4" X 6" ON-EDGE STRUTS ARE TO BE USED; LEDGER HEIGHTS MUST BE LOWERED BY 2" AND DIMENSION "H" MUST BE INCREASED TO 6" WHEN DOUBLED 4" X 4" STRUTS ARE TO BE USED. FOR UNITS CONSISTING OF 2 OR 4 LAYERS OF BOXES OR 6 LAYERS OF BOXES MORE THAN 6" HIGH, DIMENSION "D" MUST BE INCREASED 1-1/4" WHEN 4" X 6" ON-EDGE STRUTS ARE TO BE USED OR MUST BE INCREASED 2" WHEN DOUBLED 4" X 4" STRUTS ARE TO BE USED.

**GATE CONSTRUCTION DIMENSIONAL CHART**

LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A	3" FOR TYPE I AND TYPE IA BASES, OR 5" FOR TYPE II BASE.
B	"W" DIMENSION (WIDTH) OF SKID BASE MINUS 6" FOR TYPE I AND TYPE IA BASES, OR MINUS 10" FOR TYPE II BASE.
C	"W" DIMENSION (WIDTH) OF SKID BASE PLUS 12" FOR TYPE I AND TYPE IA BASES, OR PLUS 8" FOR TYPE II BASE.
D	LOAD HEIGHT PLUS 4".
E	6".
F, H	4-1/2" BELOW TOP OF TIER. SEE SPECIAL NOTE 4.
G, J	6" ABOVE TOP OF NEXT LOWER TIER.
K	8-1/2". SEE SPECIAL NOTE 4.
L	4-3/4" FOR TYPE I BASE, 4" FOR TYPE IA OR TYPE II BASE. SEE SPECIAL NOTE 5.
M	1".



GATE HOLD DOWN, 2" X 3" BY A LENGTH TO SUIT (RIP TO 2-1/4" FOR TYPE IA BASE) DOUBLED (1 REQD). NAIL THE FIRST PIECE TO GATE VERTICAL PIECES W/3-10d NAILS AT EACH END. NAIL THE SECOND PIECE TO THE FIRST W/1-10d NAIL EVERY 6" (6 NAILS MAX). SEE "VIEW A" BELOW FOR LOCATION GUIDANCE.

**CENTER GATE L**

AN ISOMETRIC VIEW OF A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL. NOTE THAT ONE RIGHT HAND AND ONE LEFT HAND GATE ARE REQUIRED FOR A LOAD.

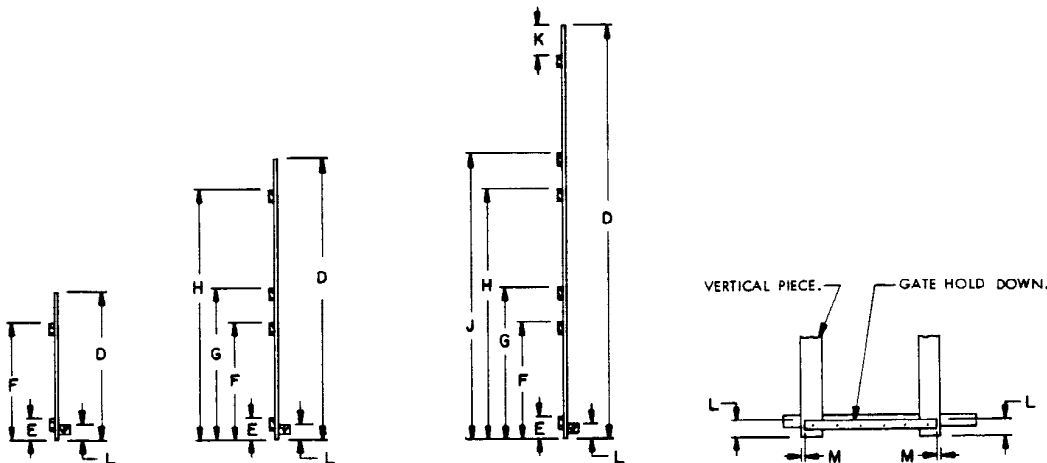
( SPECIAL NOTES CONTINUED )

**SPECIAL NOTES:**

1. THE CENTER GATES SHOWN ON THIS PAGE ARE APPLICABLE FOR USE IN BOX CAR LOADS HAVING TWO ROWS OF UNITS, ONE ROW LENGTHWISE AND ONE ROW CROSSWISE. CENTER GATE L IS DESIGNED FOR THE BRACING OF THE ROW OF UNITS HAVING THE LENGTH OF THE UNIT PARALLEL WITH THE SIDEWALLS OF A CAR (BOXES ON A UNIT CROSSWISE IN A CAR). SEE THE TYPICAL LOAD VIEW ON PAGE 24. THE "ISOMETRIC VIEW" ABOVE DEPICTS A GATE FOR A TYPICAL 2-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR LOADS OF ONE THRU THREE TIERS.

2. THE GATE DIMENSIONS INDICATED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE WIDTH OR HEIGHT OF THE SKIDDED UNIT BEING LOADED.
3. WHEN MAKING A SET OF TWO GATES FOR A LOAD CONSISTING OF TWO OR THREE TIERS OF UNITS, IT WILL BE NECESSARY TO LEAVE THE THIRD AND/OR FIFTH LEVELS OF STRUT LEDGERS OFF OF ONE GATE UNTIL THE SECOND AND/OR FOURTH LEVELS, RESPECTIVELY, OF LOAD BLOCKING STRUTS HAVE BEEN INSTALLED. WHEN MAKING GATES FOR A LOAD OF LOW-HEIGHT SKIDDED UNITS, IT MAY BE NECESSARY TO LEAVE ALL BUT THE BOTTOM STRUT LEDGER OFF OF ONE GATE UNTIL THE NEXT LOWER LEVEL OF STRUTS HAS BEEN INSTALLED.
4. STRUT LEDGER HEIGHTS REPRESENTED BY THE LETTERS "F" AND "H" MUST BE LOWERED BY 2" AND DIMENSION "K" MUST BE INCREASED TO 10-1/2" WHEN 4" X 6" ON-EDGE STRUTS ARE USED, OR HEIGHTS "F" AND "H" MUST BE LOWERED BY 3-1/2" AND DIMENSION "K" MUST BE INCREASED TO 12" WHEN DOUBLED 4" X 4" STRUTS ARE USED.

( CONTINUED AT RIGHT )



**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE ONE (1) UNIT HIGH.

**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE TWO (2) UNITS HIGH.

**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE THREE (3) UNITS HIGH.

**VIEW A**



SPECIAL NOTES:

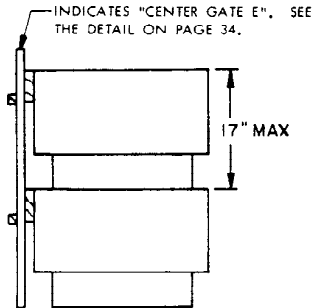
( SPECIAL NOTES CONTINUED )

1. THE VIEWS ON THIS PAGE ARE PRESENTED AS GUIDANCE IN DETERMINING THE REQUIRED QUANTITY OF HORIZONTAL PIECES PER TIER FOR CENTER GATES TO BE USED FOR THE BRACING OF SKIDDED UNITS WHICH ARE POSITIONED IN A CAR WITH THE WIDTH OF THE UNITS PARALLEL WITH THE SIDEWALLS OF THE CAR (BOXES LENGTHWISE IN THE CAR). A TIER IS IDENTIFIED AS THE PORTION OF A LOAD CONSISTING OF ONE SKIDDED UNIT IN HEIGHT BY THE NUMBER OF SKIDDED UNITS ACROSS THE CAR AND LOADED THRU THE FULL LENGTH OF THE CAR. THE VIEWS ALSO INDICATE THE PROPER POSITIONING OF THE HORIZONTAL PIECES IN EACH TIER FOR UNITS CONSISTING OF FROM ONE THRU EIGHT LAYERS OF BOXES.

2. THE DIMENSIONS FOR THE HEIGHT LOCATIONS OF THE TOP AND BOTTOM HORIZONTAL PIECES FOR A GATE, AND THE LOCATION AND QUANTITY OF VERTICAL PIECES FOR A GATE, ARE SPECIFIED BY THE CENTER GATE A THRU CENTER GATE E DETAILS ON PAGES 30 THRU 34, THE CENTER GATE K DETAIL ON PAGE 39, AND/OR THE CENTER GATE M THRU CENTER GATE O DETAILS ON PAGES 42 THRU 44.

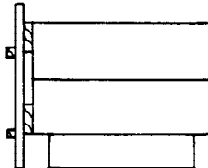
3. THE VIEWS ON THIS PAGE ARE ALSO APPLICABLE TO THE POSITIONING AND QUANTITY REQUIREMENTS FOR HORIZONTAL PIECES ON THE SEPARATOR GATE WHICH IS USED IN THE COMBINATION LOADS SHOWN ON PAGES 26 AND 29. SEE THE "SEPARATOR GATE" DETAIL ON PAGE 28.

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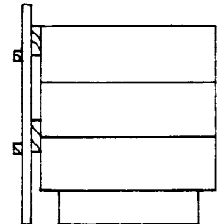
**1 LAYER PER UNIT**

TWO ( 2 ) TIERS OF SKIDDED UNITS HIGH, AS SHOWN, IS THE MINIMUM NUMBER THAT CAN BE BLOCKED AND BRACED USING CENTER GATES, WHEN ONLY ONE ( 1 ) HORIZONTAL PIECE PER TIER IS USED FOR UNITS HAVING ONE LAYER OF BOXES. IF THE BOXES ARE MORE THAN 11" HIGH, TWO ( 2 ) HORIZONTAL PIECES PER TIER ARE REQUIRED.



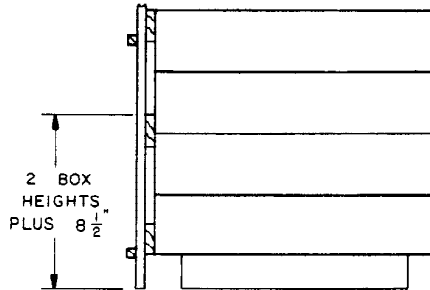
**2 LAYERS PER UNIT**

TWO ( 2 ) HORIZONTAL PIECES PER TIER ARE REQUIRED FOR UNITS HAVING TWO LAYERS OF BOXES. TWO ( 2 ) HORIZONTAL PIECES PER TIER ARE ALSO REQUIRED FOR UNITS HAVING ONE LAYER OF BOXES WHICH ARE MORE THAN 11" HIGH.



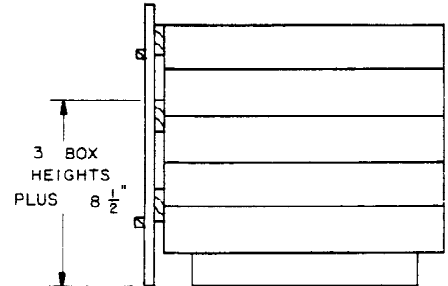
**3 LAYERS PER UNIT**

TWO ( 2 ) HORIZONTAL PIECES PER TIER, ONE CENTERED ON A JOINT AND ONE AT THE TOP, ARE REQUIRED FOR UNITS HAVING THREE LAYERS OF BOXES.



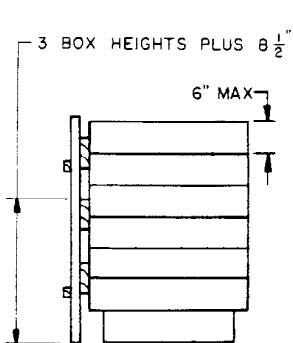
**4 LAYERS PER UNIT**

THREE ( 3 ) HORIZONTAL PIECES PER TIER ARE REQUIRED FOR UNITS HAVING FOUR LAYERS OF BOXES.



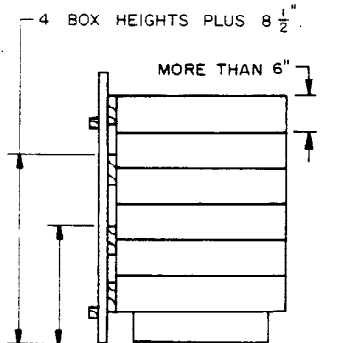
**5 LAYERS PER UNIT**

THREE ( 3 ) HORIZONTAL PIECES PER TIER, TWO CENTERED ON THE JOINTS AND ONE AT THE TOP, ARE REQUIRED FOR UNITS HAVING FIVE LAYERS OF BOXES.



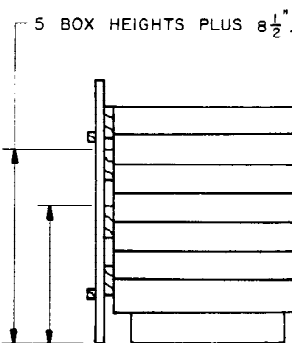
**6 LAYERS PER UNIT**

THREE ( 3 ) HORIZONTAL PIECES PER TIER, CENTERED ON THE JOINTS AS SHOWN, ARE ADEQUATE FOR UNITS HAVING SIX LAYERS OF BOXES, PROVIDING THE HEIGHT OF THE INDIVIDUAL BOXES IS NOT MORE THAN 6".



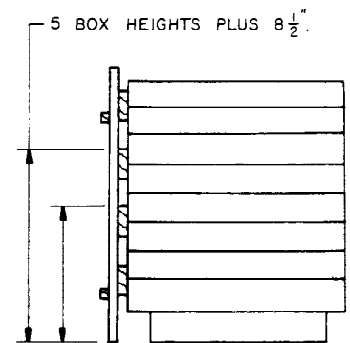
**6 LAYERS PER UNIT**

FOUR ( 4 ) HORIZONTAL PIECES PER TIER ARE REQUIRED FOR UNITS HAVING SIX LAYERS OF BOXES WHEN THE HEIGHT OF THE INDIVIDUAL BOXES IS MORE THAN 6".



**7 LAYERS PER UNIT**

FOUR ( 4 ) HORIZONTAL PIECES PER TIER CENTERED ON THE JOINTS EXCEPT FOR THE TOP PIECE, ARE REQUIRED FOR UNITS HAVING SEVEN LAYERS OF BOXES.



**8 LAYERS PER UNIT**

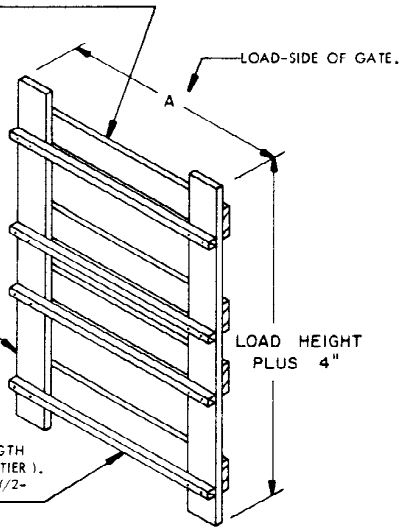
FOUR ( 4 ) HORIZONTAL PIECES PER TIER, CENTERED ON THE JOINTS AS SHOWN, ARE ADEQUATE FOR UNITS HAVING EIGHT LAYERS OF BOXES.

**CENTER GATE HORIZONTAL PIECE REQUIREMENTS**

HORIZONTAL PIECE, 2" X 6" BY LENGTH OF SKIDDED UNIT (AS REQD.), NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH END. SEE SPECIAL NOTE 4 BELOW.

VERTICAL PIECE, 2" X 6" BY LOAD HEIGHT PLUS 4" (2 REQD.).

STRUT LEDGER, 2" X 2" BY LENGTH OF SKIDDED UNIT (2 REQD PER TIER). NAIL TO THE VERTICAL PIECES W/2-10d NAILS AT EACH END.



**CENTER GATE M**

AN ISOMETRIC VIEW OF A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL.

**GATE CONSTRUCTION DIMENSIONAL CHART**

LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A B C, E, G, J D, F, H K L M, O, R, T N, P, S	FOR UNITS CONSISTING OF 2 OR 4 LAYERS OF BOXES, OR 6 LAYERS OF BOXES MORE THAN 6" HIGH. LENGTH OF SKIDDED UNIT. 11-1/4". SEE SPECIAL NOTE 5. TOP OF TIER. 11-1/4" ABOVE TOP OF NEXT LOWER TIER. 4". SEE SPECIAL NOTE 6. 7". SEE SPECIAL NOTE 6. 4-1/2" BELOW TOP OF TIER. 7" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 4.
A B C, E, G, J D, F, H K L M, O, R, T N, P, S	FOR UNITS CONSISTING OF 3 OR 5 OR 7 LAYERS OF BOXES. LENGTH OF SKIDDED UNIT. BOX HEIGHT PLUS 8". SEE SPECIAL NOTE 5. TOP OF TIER. BOX HEIGHT PLUS 8" ABOVE TOP OF NEXT LOWER TIER. 4". SEE SPECIAL NOTE 6. BOX HEIGHT PLUS 3-1/2". SEE SPECIAL NOTE 6. 4-1/2" BELOW TOP OF TIER. BOX HEIGHT PLUS 3-1/2" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 4.
A B C, E, G, J D, F, H K L M, O, R, T N, P, S	FOR UNITS CONSISTING OF 6 LAYERS OF BOXES 6" OR LESS IN HEIGHT, OR 8 LAYERS OF BOXES. LENGTH OF SKIDDED UNIT. BOX HEIGHT PLUS 8". SEE SPECIAL NOTE 5. BOX HEIGHT MINUS 2-3/4" BELOW TOP OF TIER. BOX HEIGHT PLUS 8" ABOVE TOP OF NEXT LOWER TIER. 4". BOX HEIGHT PLUS 3-1/2". SEE SPECIAL NOTE 6. BOX HEIGHT PLUS 1-3/4" BELOW TOP OF TIER. BOX HEIGHT PLUS 3-1/2" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 4.

( SPECIAL NOTES CONTINUED )

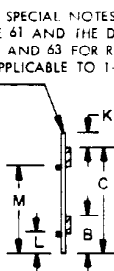
**SPECIAL NOTES:**

1. THE CENTER GATES SHOWN ON THIS PAGE ARE APPLICABLE FOR USE IN BOX CAR LOADS WHERE THE WIDTH OF THE UNIT IS PARALLEL WITH THE SIDEWALLS OF A CAR (BOXES ON A UNIT LENGTHWISE IN A CAR). THE "ISOMETRIC VIEW" ABOVE DEPICTS A GATE FOR A TYPICAL 2-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR LOADS OF ONE THRU FOUR TIERS.
2. CENTER GATE M IS A "SPLIT" GATE AND IS DESIGNED FOR THE BRACING OF ONE (1) ROW OF UNITS. TWO (2) GATES MAY BE USED AS AN ALTERNATIVE TO EACH CENTER GATE A WHICH IS DETAILED ON PAGE 30. TIE THE GATES TOGETHER AS SHOWN BY THE "TIE PIECE APPLICATION A" DETAIL ON PAGE 46. ONE (1) GATE USED IN CONJUNCTION WITH THE CENTER GATE N DETAILED ON PAGE 43 MAY BE USED AS AN ALTERNATIVE TO EACH CENTER GATE B WHICH IS DETAILED ON PAGE 31. TIE THE GATES TOGETHER SIMILAR TO THE PROCEDURES SHOWN BY THE "TIE PIECE APPLICATION A" DETAIL ON PAGE 46. THREE (3) GATES MAY BE USED AS AN ALTERNATIVE TO EACH CENTER GATE C WHICH IS DETAILED ON PAGE 32. TIE THE GATES TOGETHER AS SHOWN BY THE "TIE PIECE APPLICATION B" DETAIL ON PAGE 46.
3. THE GATE DIMENSIONS REPRESENTED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE LENGTH OR HEIGHT OF THE SKIDDED UNIT BEING LOADED, OR THE HEIGHT OF A BOX IN A UNIT.
4. WHEN MAKING A SET OF TWO GATES FOR A LOAD CONSISTING OF TWO OR MORE TIERS, IT WILL BE NECESSARY TO LEAVE THE THIRD, FIFTH, AND/OR SEVENTH LEVELS OF STRUT LEDGERS OFF OF ONE GATE UNTIL THE SECOND, FOURTH, AND/OR SIXTH LEVELS, RESPECTIVELY, OF LOAD BLOCKING STRUTS HAVE BEEN INSTALLED. WHEN MAKING GATES FOR A LOAD OF LOW-HEIGHT SKIDDED UNITS, IT MAY BE NECESSARY TO LEAVE ALL BUT THE BOTTOM STRUT LEDGER OFF OF ONE GATE UNTIL THE NEXT LOWER LEVEL OF STRUTS HAS BEEN INSTALLED.

5. AS A MINIMUM, HORIZONTAL PIECES ARE REQUIRED AT OR NEAR THE TOP AND THE BOTTOM OF EACH TIER OF UNITS. FOR UNITS WHICH HAVE FOUR OR MORE LAYERS OF BOXES PER UNIT, ADDITIONAL HORIZONTAL PIECES MUST BE APPLIED TO ENSURE THAT EVERY LAYER IS RETAINED BY A HORIZONTAL PIECE. REFER TO PAGE 41 FOR GUIDANCE IN DETERMINING HORIZONTAL PIECE LOCATION AND QUANTITY REQUIREMENTS.
6. ALL STRUT LEDGER HEIGHTS EXCEPT "N" MUST BE LOWERED BY 1-1/4" WHEN 4" X 6" ON-EDGE STRUTS ARE TO BE USED; LEDGER HEIGHTS MUST BE LOWERED BY 2" AND DIMENSION "K" MUST BE INCREASED TO 6" WHEN DOUBLED 4" X 4" STRUTS ARE TO BE USED. FOR UNITS CONSISTING OF 2 OR 4 LAYERS OF BOXES OR 6 LAYERS OF BOXES MORE THAN 6" HIGH, DIMENSION "D" MUST BE INCREASED 1-1/4" WHEN 4" X 6" ON-EDGE STRUTS ARE TO BE USED OR MUST BE INCREASED 2" WHEN DOUBLED 4" X 4" STRUTS ARE TO BE USED.

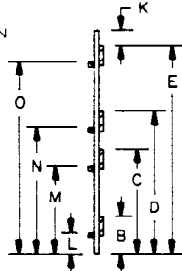
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REFER TO SPECIAL NOTES 4 AND 5 ON PAGE 61 AND THE DETAILS ON PAGES 62 AND 63 FOR REQUIREMENTS APPLICABLE TO 1-TIER GATES.



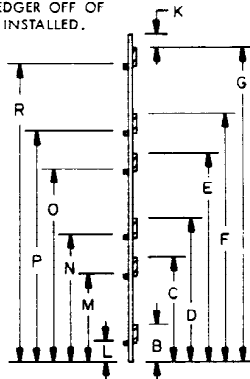
**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE ONE (1) UNIT HIGH.



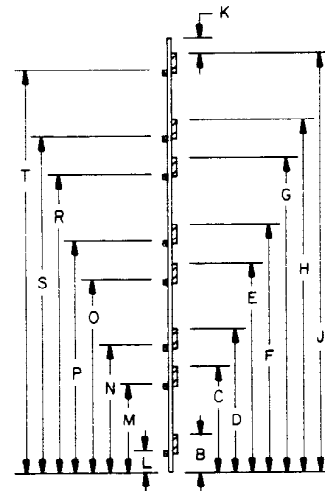
**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE TWO (2) UNITS HIGH.



**END VIEW**

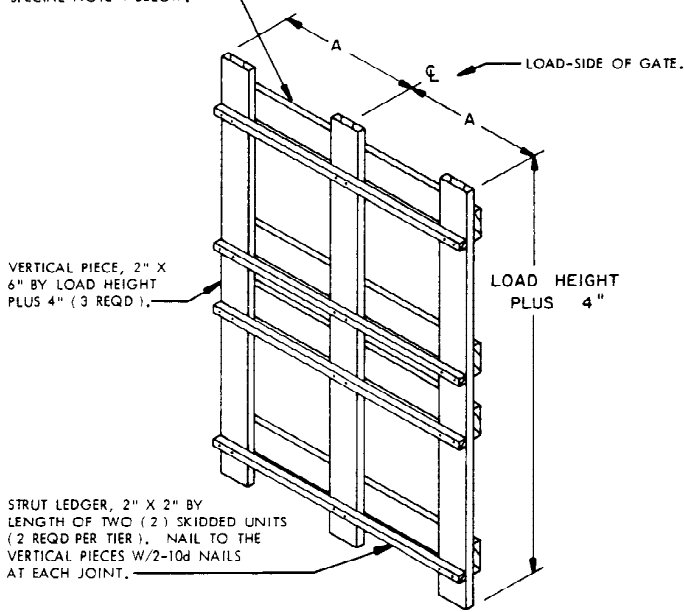
THIS GATE IS FOR LOADS WHICH ARE THREE (3) UNITS HIGH.



**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE FOUR (4) UNITS HIGH.

HORIZONTAL PIECE, 2" X 6" BY LENGTH OF TWO (2) SKIDDED UNITS (AS REQD.). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT. SEE SPECIAL NOTE 4 BELOW.



**CENTER GATE N**

AN ISOMETRIC VIEW OF A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL.

**SPECIAL NOTES:**

1. THE CENTER GATES SHOWN ON THIS PAGE ARE APPLICABLE FOR USE IN BOX CAR LOADS WHERE THE WIDTH OF A UNIT IS PARALLEL WITH THE SIDEWALLS OF A CAR (BOXES ON A UNIT LENGTHWISE IN A CAR). THE "ISOMETRIC VIEW" ABOVE DEPICTS A GATE FOR A TYPICAL 2-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR LOADS OF ONE THRU THREE TIERS.
2. CENTER GATE N IS A "SPLIT" GATE AND IS DESIGNED FOR THE BRACING OF TWO (2) ROWS OF UNITS WHICH ARE POSITIONED SIDE-BY-SIDE, WITH THE MIDDLE VERTICAL PIECE OF THE GATE BEING CENTERED ON THE JOINT BETWEEN THE ROWS. ONE (1) GATE USED IN CONJUNCTION WITH THE CENTER GATE M DETAILED ON PAGE 42 MAY BE USED AS AN ALTERNATIVE TO EACH CENTER GATE B WHICH IS DETAILED ON PAGE 31. TWO (2) GATES MAY BE USED AS AN ALTERNATIVE TO EACH CENTER GATE D WHICH IS DETAILED ON PAGE 33. TIE THE GATES TOGETHER SIMILAR TO THE PROCEDURES SHOWN BY THE "TIE PIECE APPLICATION A" DETAIL ON PAGE 46.

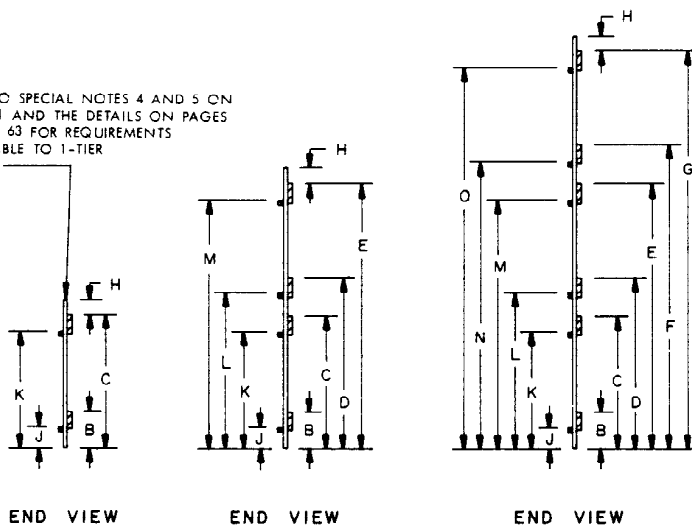
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GATE CONSTRUCTION DIMENSIONAL CHART	
LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A B C, E, G D, F H J K, M, O L, N	FOR UNITS CONSISTING OF 2 OR 4 LAYERS OF BOXES, OR 6 LAYERS OF BOXES MORE THAN 6" HIGH. LENGTH OF SKIDDED UNIT. 11-1/4". SEE SPECIAL NOTE 5. TOP OF TIER. 11-1/4" ABOVE TOP OF NEXT LOWER TIER. 4". SEE SPECIAL NOTE 6. 7". SEE SPECIAL NOTE 6. 4-1/2" BELOW TOP OF TIER. 7" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 4.
A B C, E, G D, F H J K, M, O L, N	FOR UNITS CONSISTING OF 3 OR 5 OR 7 LAYERS OF BOXES. LENGTH OF SKIDDED UNIT. BOX HEIGHT PLUS 8". SEE SPECIAL NOTE 5. TOP OF TIER. BOX HEIGHT PLUS 8" ABOVE TOP OF NEXT LOWER TIER. 4". SEE SPECIAL NOTE 6. BOX HEIGHT PLUS 3-1/2". SEE SPECIAL NOTE 6. 4-1/2" BELOW TOP OF TIER. BOX HEIGHT PLUS 3-1/2" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 4.
A B C, E, G D, F H J K, M, O L, N	FOR UNITS CONSISTING OF 6 LAYERS OF BOXES 6" OR LESS IN HEIGHT, OR 8 LAYERS OF BOXES. LENGTH OF SKIDDED UNIT. BOX HEIGHT PLUS 8". SEE SPECIAL NOTE 5. BOX HEIGHT MINUS 2-3/4" BELOW TOP OF TIER. BOX HEIGHT PLUS 8" ABOVE TOP OF NEXT LOWER TIER. 4". BOX HEIGHT PLUS 3-1/2". SEE SPECIAL NOTE 6. BOX HEIGHT PLUS 1-3/4" BELOW TOP OF TIER. BOX HEIGHT PLUS 3-1/2" ABOVE TOP OF NEXT LOWER TIER. SEE SPECIAL NOTE 4.

(SPECIAL NOTES CONTINUED)

3. THE GATE DIMENSIONS REPRESENTED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE LENGTH OR HEIGHT OF THE SKIDDED UNIT BEING LOADED, OR THE HEIGHT OF A BOX IN A UNIT.
4. WHEN MAKING A SET OF TWO GATES FOR A LOAD CONSISTING OF TWO OR THREE TIERS, IT WILL BE NECESSARY TO LEAVE THE THIRD AND/OR FIFTH LEVELS OF STRUT LEDGERS OFF OF ONE GATE UNTIL THE SECOND AND/OR FOURTH LEVELS, RESPECTIVELY, OF LOAD BLOCKING STRUTS HAVE BEEN INSTALLED. WHEN MAKING GATES FOR A LOAD OF LOW-HEIGHT SKIDDED UNITS, IT MAY BE NECESSARY TO LEAVE ALL BUT THE BOTTOM STRUT LEDGER OFF OF ONE GATE UNTIL THE NEXT LOWER LEVEL OF STRUTS HAS BEEN INSTALLED.
5. AS A MINIMUM, HORIZONTAL PIECES ARE REQUIRED AT OR NEAR THE TOP AND THE BOTTOM OF EACH TIER OF UNITS. FOR UNITS WHICH HAVE FOUR OR MORE LAYERS OF BOXES PER UNIT, ADDITIONAL HORIZONTAL PIECES MUST BE APPLIED TO ENSURE THAT EVERY LAYER IS RETAINED BY A HORIZONTAL PIECE. REFER TO PAGE 41 FOR GUIDANCE IN DETERMINING HORIZONTAL PIECE LOCATION AND QUANTITY REQUIREMENTS.
6. ALL STRUT LEDGER HEIGHTS EXCEPT "L" MUST BE LOWERED BY 1-1/4" WHEN 4" X 6" ON-EDGE STRUTS ARE TO BE USED; LEDGER HEIGHTS MUST BE LOWERED BY 2" AND DIMENSION "H" MUST BE INCREASED TO 6" WHEN DOUBLED 4" X 4" STRUTS ARE TO BE USED. FOR UNITS CONSISTING OF 2 OR 4 LAYERS OF BOXES OR 6 LAYERS OF BOXES MORE THAN 6" HIGH, DIMENSION "D" MUST BE INCREASED 1-1/4" WHEN 4" X 6" ON-EDGE STRUTS ARE TO BE USED OR MUST BE INCREASED 2" WHEN DOUBLED 4" X 4" STRUTS ARE TO BE USED.

REFER TO SPECIAL NOTES 4 AND 5 ON PAGE 61 AND THE DETAILS ON PAGES 62 AND 63 FOR REQUIREMENTS APPLICABLE TO 1-TIER GATES.



**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE ONE (1) UNIT HIGH.

**END VIEW**

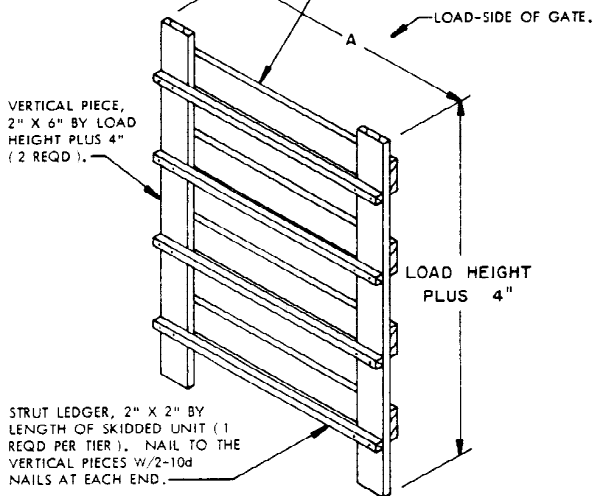
THIS GATE IS FOR LOADS WHICH ARE TWO (2) UNITS HIGH.

**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE THREE (3) UNITS HIGH.

**CENTER GATE N**

HORIZONTAL PIECE, 2" X 6" BY LENGTH OF SKIDDED UNIT (1 REQD PER TIER). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH END.



**CENTER GATE O**

AN ISOMETRIC VIEW OF A GATE FOR A 4-TIER LOAD IS SHOWN AS TYPICAL.

**SPECIAL NOTES:**

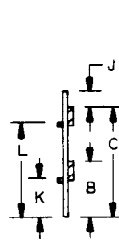
1. THE CENTER GATES SHOWN ON THIS PAGE ARE APPLICABLE FOR USE IN BOX CAR LOADS OF UNITS CONSISTING OF ONLY ONE LAYER OF BOXES AND WHERE THE WIDTH OF THE UNIT IS PARALLEL WITH THE SIDEWALLS OF A CAR (BOXES ON A UNIT LENGTHWISE IN A CAR). THE "ISOMETRIC VIEW" ABOVE DEPICTS A GATE FOR A TYPICAL 4-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR LOADS OF TWO THRU SEVEN TIERS.
2. CENTER GATE O IS A "SPLIT" GATE AND IS DESIGNED FOR THE BRACING OF ONE (1) ROW OF UNITS. TWO (2) GATES MAY BE USED AS AN ALTERNATIVE TO EACH CENTER GATE E WHICH IS DETAILED ON PAGE 34. TIE THE GATES TOGETHER SIMILAR TO THE PROCEDURES SHOWN BY THE "TIE PIECE APPLICATION A" DETAIL ON PAGE 46.
3. THE GATE DIMENSIONS REPRESENTED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE LENGTH OR HEIGHT OF THE SKIDDED UNIT BEING LOADED.
4. WHEN MAKING A SET OF TWO GATES FOR A LOAD OF LOW-HEIGHT SKIDDED UNITS, IT MAY BE NECESSARY TO LEAVE ALL BUT THE BOTTOM STRUT LEDGERS OFF OF ONE GATE UNTIL THE NEXT LOWER LEVEL OF STRUTS HAS BEEN INSTALLED.

(CONTINUED AT RIGHT)

GATE CONSTRUCTION DIMENSIONAL CHART	
LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A	FOR UNITS CONSISTING OF 1 LAYER OF BOXES LENGTH OF SKIDDED UNIT. TOP OF TIER. TOP OF TIER. 4". SEE SPECIAL NOTE 5. 4-1/2" BELOW TOP OF TIER. SEE SPECIAL NOTES 4 AND 5. 4-1/2" BELOW TOP OF TIER. SEE SPECIAL NOTES 4 AND 5.
B, C, D, E	
F, G, H	
J	
K, L, M, N	
O, P, R	

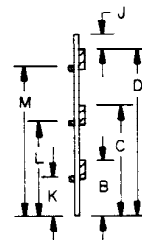
(SPECIAL NOTES CONTINUED)

5. STRUT LEDGER HEIGHTS REPRESENTED BY THE LETTERS "K" THRU "P" AND "R" MUST BE LOWERED BY 1" WHEN 4" X 6" ON-EDGE STRUTS ARE USED; LEDGER HEIGHTS MUST BE LOWERED BY 1-3/4" WHEN DOUBLED 4" X 4" STRUTS ARE USED, AND DIMENSION "J" MUST BE INCREASED TO 6".



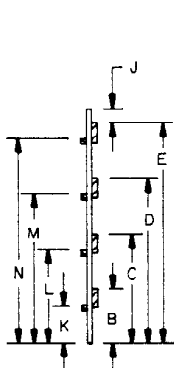
**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE TWO (2) UNITS HIGH.



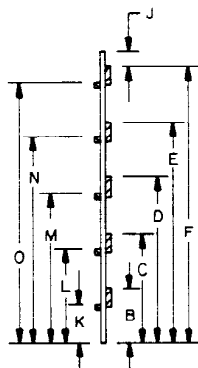
**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE THREE (3) UNITS HIGH.



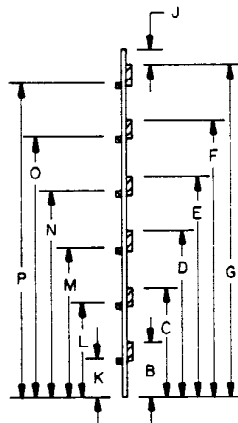
**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE FOUR (4) UNITS HIGH.



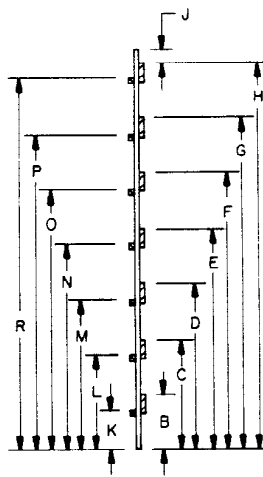
**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE FIVE (5) UNITS HIGH.



**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE SIX (6) UNITS HIGH.

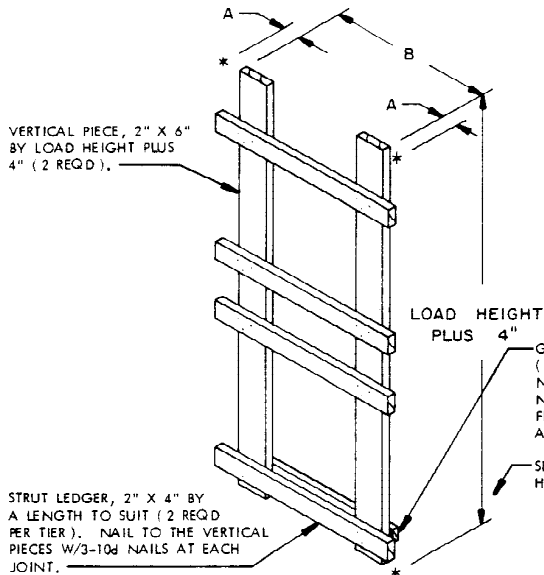


**END VIEW**

THIS GATE IS FOR LOADS WHICH ARE SEVEN (7) UNITS HIGH.

**CENTER GATE O**

GATE CONSTRUCTION DIMENSIONAL CHART	
LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A	3". SEE SPECIAL NOTE 4.
B	"W" DIMENSION (WIDTH) OF SKID BASE MINUS 6" FOR TYPE I AND TYPE IA BASES, OR MINUS 10" FOR TYPE II BASE. LOAD HEIGHT PLUS 4".
C	6".
D, G	4-1/2" BELOW TOP OF TIER. SEE SPECIAL NOTE 6.
E, H	6" ABOVE TOP OF NEXT LOWER TIER.
F, J	8-1/2". SEE SPECIAL NOTE 6.
K	4-3/4" FOR TYPE II BASE, 4" FOR TYPE IA OR TYPE I BASE. SEE SPECIAL NOTE 7.
L	1".



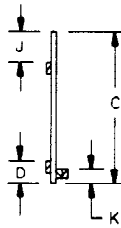
### CENTER GATE P

AN ISOMETRIC VIEW OF A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL.

#### SPECIAL NOTES:

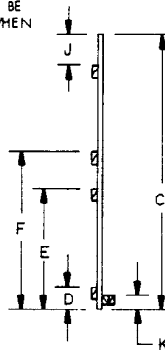
1. THE CENTER GATES SHOWN ON THIS PAGE ARE APPLICABLE FOR USE IN BOX CAR LOADS OF UNITS WHERE THE LENGTH OF THE UNIT IS PARALLEL WITH THE SIDEWALLS OF A CAR (BOXES ON A UNIT CROSSWISE IN A CAR). THE "ISOMETRIC VIEW" ABOVE DEPICTS A GATE FOR A TYPICAL 2-TIER LOAD. THE "END VIEW" SKETCHES BELOW REPRESENT GATES FOR LOADS OF ONE THRU THREE TIERS.
2. CENTER GATE P IS A "SPLIT" GATE AND IS DESIGNED FOR THE BRACING OF ONE (1) ROW OF UNITS. TWO (2) GATES MAY BE USED AS AN ALTERNATIVE TO EACH CENTER GATE F WHICH IS DETAILED ON PAGE 35. TIE THE GATES TOGETHER AS SHOWN BY THE "TIE PIECE APPLICATION C" DETAIL ON PAGE 47. THREE (3) GATES MAY BE USED AS AN ALTERNATIVE TO EACH CENTER GATE G WHICH IS DETAILED ON PAGE 36 AND/OR FOUR (4) GATES MAY BE USED AS AN ALTERNATIVE TO EACH CENTER GATE H WHICH IS DETAILED ON PAGE 37. TIE THE GATES TOGETHER AS SHOWN BY, OR SIMILAR TO, THE "TIE PIECE APPLICATION D" DETAIL ON PAGE 47.
3. THE GATE DIMENSIONS REPRESENTED BY LETTERS ON THE VIEWS ARE SPECIFIED IN THE "GATE CONSTRUCTION DIMENSIONAL CHART" ABOVE, EITHER AS A FIXED FIGURE OR AS A FIGURE BASED UPON THE WIDTH OR HEIGHT OF THE SKIDDED UNIT BEING LOADED.
4. THREE INCHES (3") IS SPECIFIED FOR DIMENSION "A" TO LESSEN THE SPLITTING OF THE STRUT LEDGER. HOWEVER, THE 3" IS NOT MANDATORY; THIS DIMENSION CAN BE REDUCED UP TO TWO INCHES IF SUCH REDUCTION WILL PERMIT THE USE OF NOMINAL-LENGTH CUT PIECES.
5. WHEN MAKING A SET OF TWO GATES FOR A LOAD CONSISTING OF TWO OR THREE TIERS OF UNITS, IT WILL BE NECESSARY TO LEAVE THE THIRD AND/OR FIFTH LEVELS OF STRUT LEDGERS OFF OF ONE GATE UNTIL THE SECOND AND/OR FOURTH LEVELS, RESPECTIVELY, OF LOAD BLOCKING STRUTS HAVE BEEN INSTALLED.
6. STRUT LEDGER HEIGHTS REPRESENTED BY THE LETTERS "E" AND "G" MUST BE LOWERED BY 2" AND DIMENSION "J" MUST BE INCREASED TO 10-1/2" WHEN 4" X 6" ON-EDGE STRUTS ARE USED, OR HEIGHTS "E" AND "C" MUST BE LOWERED BY 3-1/2" AND DIMENSION "J" MUST BE INCREASED TO 12" WHEN DOUBLED 4" X 4" STRUTS ARE USED.

(CONTINUED AT RIGHT)



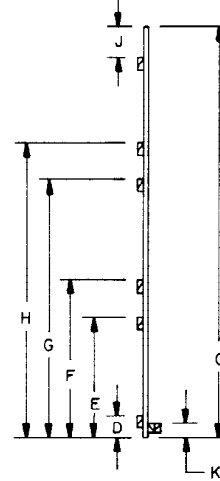
END VIEW

THIS GATE IS FOR LOADS WHICH ARE ONE (1) UNIT HIGH.



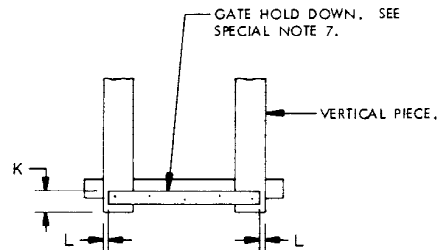
END VIEW

THIS GATE IS FOR LOADS WHICH ARE TWO (2) UNITS HIGH.

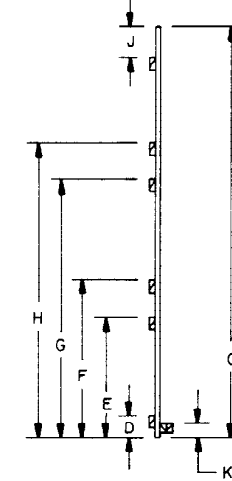


END VIEW

THIS GATE IS FOR LOADS WHICH ARE THREE (3) UNITS HIGH.



VIEW A

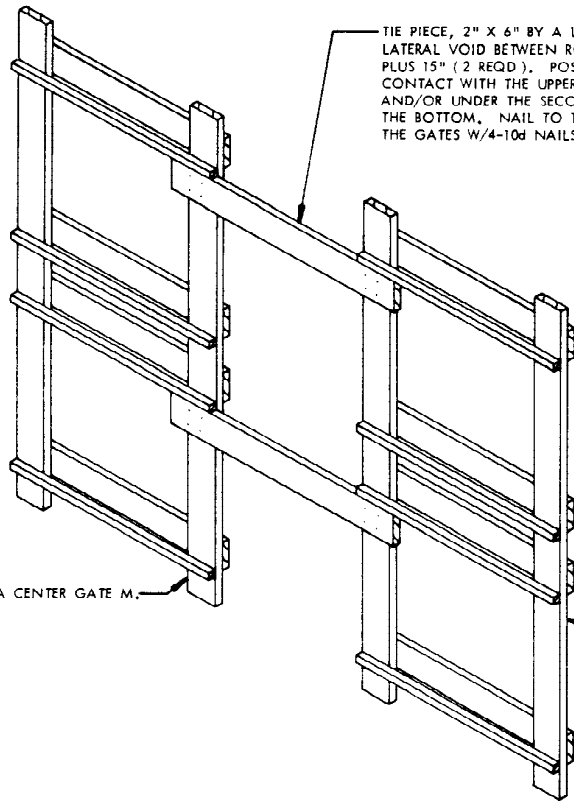


END VIEW

THIS GATE IS FOR LOADS WHICH ARE THREE (3) UNITS HIGH.

(SPECIAL NOTES CONTINUED)

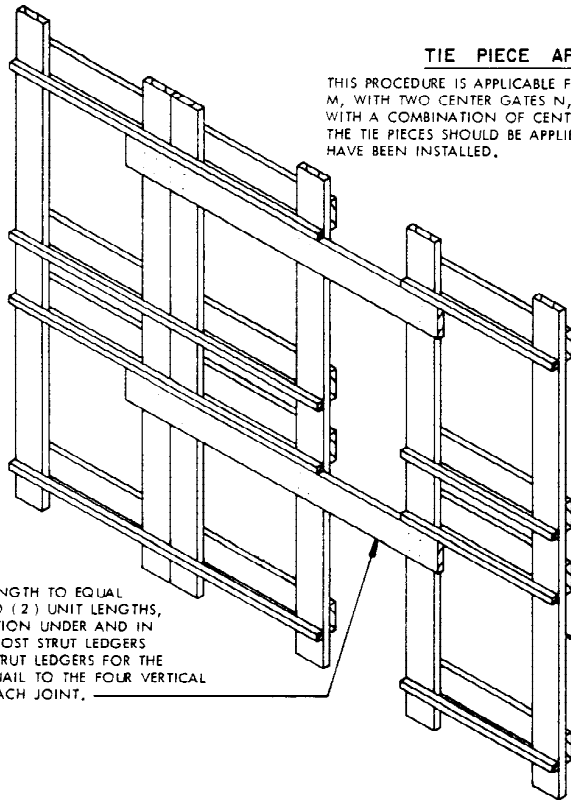
7. GATE HOLD DOWN AND LATERAL BLOCKING CLEATS MUST BE APPLIED TO THE TWO OUTWARD GATES IN EACH END OF A LOAD. WHEN MAKING GATES FOR 3-WIDE OR 4-WIDE LOADS, THE CLEATS MAY BE OMITTED FROM THE CENTRALLY-LOCATED GATES. NOTE THAT DOOR SPANNER TYPE CENTER GATE HOLD DOWNS CANNOT BE USED IN LIEU OF THE DOUBLED 2" MATERIAL NAILED TO THE VERTICAL PIECES OF CENTER GATE P.



TIE PIECE, 2" X 6" BY A LENGTH TO EQUAL THE LATERAL VOID BETWEEN ROWS OF SKIDDED UNITS, PLUS 15" (2 REQD). POSITION UNDER AND IN CONTACT WITH THE UPPERMOST STRUT LEDGERS AND/OR UNDER THE SECOND STRUT LEDGERS FROM THE BOTTOM. NAIL TO THE VERTICAL PIECES OF THE GATES W/4-10d NAILS AT EACH JOINT.

INDICATES A CENTER GATE M.

INDICATES A CENTER GATE M. A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL.



#### TIE PIECE APPLICATION A

THIS PROCEDURE IS APPLICABLE FOR USE WITH TWO CENTER GATES M, WITH TWO CENTER GATES N, WITH TWO CENTER GATES O, OR WITH A COMBINATION OF CENTER GATES M AND N. NOTE THAT THE TIE PIECES SHOULD BE APPLIED AFTER THE GATES AND STRUTS HAVE BEEN INSTALLED.

TIE PIECE, 2" X 6" BY A LENGTH TO EQUAL THE CAR WIDTH MINUS TWO (2) UNIT LENGTHS, PLUS 15" (2 REQD). POSITION UNDER AND IN CONTACT WITH THE UPPERMOST STRUT LEDGERS AND/OR UNDER THE TOP STRUT LEDGERS FOR THE BOTTOM TIER OF UNITS. NAIL TO THE FOUR VERTICAL PIECES W/4-10d NAILS AT EACH JOINT.

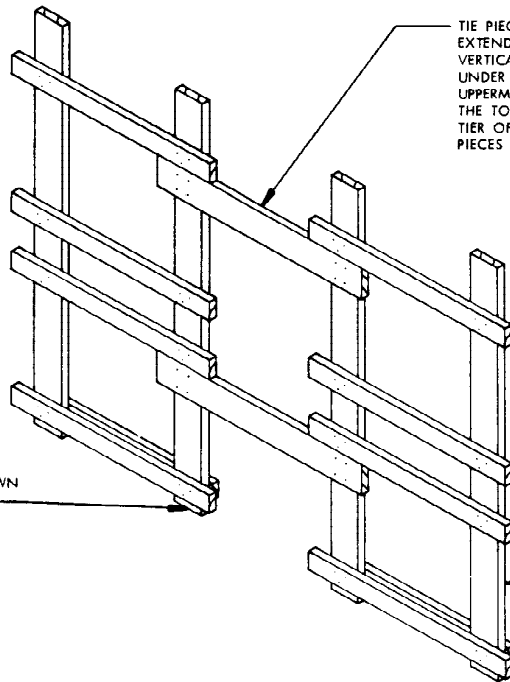
INDICATES A CENTER GATE M. A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL.

#### TIE PIECE APPLICATION B

THIS PROCEDURE IS APPLICABLE FOR USE WITH THREE CENTER GATES M. NOTE THAT THE TIE PIECES SHOULD BE APPLIED AFTER THE GATES AND STRUTS HAVE BEEN INSTALLED.

#### TIE PIECE APPLICATIONS

INDICATES A CENTER GATE P. A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL.



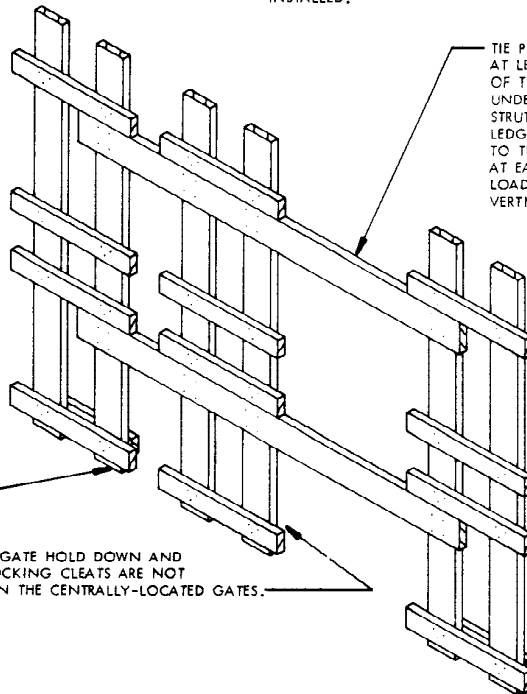
TIE PIECE, 2" X 6" BY A LENGTH TO EXTEND AT LEAST 2" BEYOND THE GATE VERTICAL PIECES ( 2 REQD ). POSITION UNDER AND IN CONTACT WITH THE UPPERMOST STRUT LEDGERS AND/OR UNDER THE TOP STRUT LEDGERS FOR THE BOTTOM TIER OF UNITS. NAIL TO THE VERTICAL PIECES W/4-10d NAILS AT EACH JOINT.

INDICATES A CENTER GATE P.

### TIE PIECE APPLICATION C

THIS PROCEDURE IS APPLICABLE FOR USE WITH TWO CENTER GATES P. NOTE THAT THE TIE PIECES SHOULD BE APPLIED AFTER THE GATES AND STRUTS HAVE BEEN INSTALLED.

INDICATES A CENTER GATE P. A GATE FOR A 2-TIER LOAD IS SHOWN AS TYPICAL.



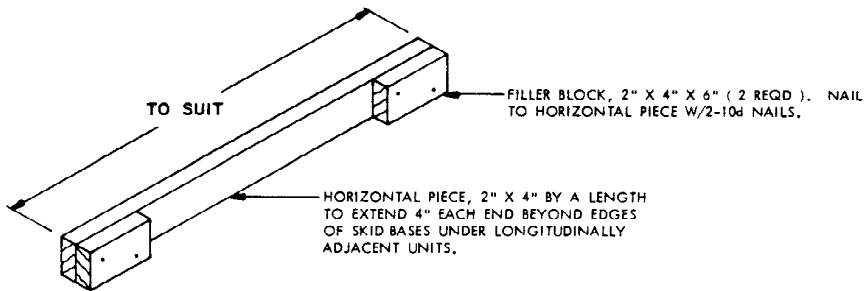
TIE PIECE, 2" X 6" BY A LENGTH TO EXTEND AT LEAST 2" BEYOND THE GATE VERTICAL PIECES OF THE OUTERMOST GATES ( 2 REQD ). POSITION UNDER AND IN CONTACT WITH THE UPPERMOST STRUT LEDGERS AND/OR UNDER THE TOP STRUT LEDGERS FOR THE BOTTOM TIER OF UNITS. NAIL TO THE FOUR VERTICAL PIECES W/4-10d NAILS AT EACH JOINT. NOTE THAT FOR A 4-WIDE LOAD, THE TIE PIECES WILL BE NAILED TO SIX VERTICAL PIECES.

NOTE THAT GATE HOLD DOWN AND LATERAL BLOCKING CLEATS ARE NOT REQUIRED ON THE CENTRALLY-LOCATED GATES.

### TIE PIECE APPLICATION D

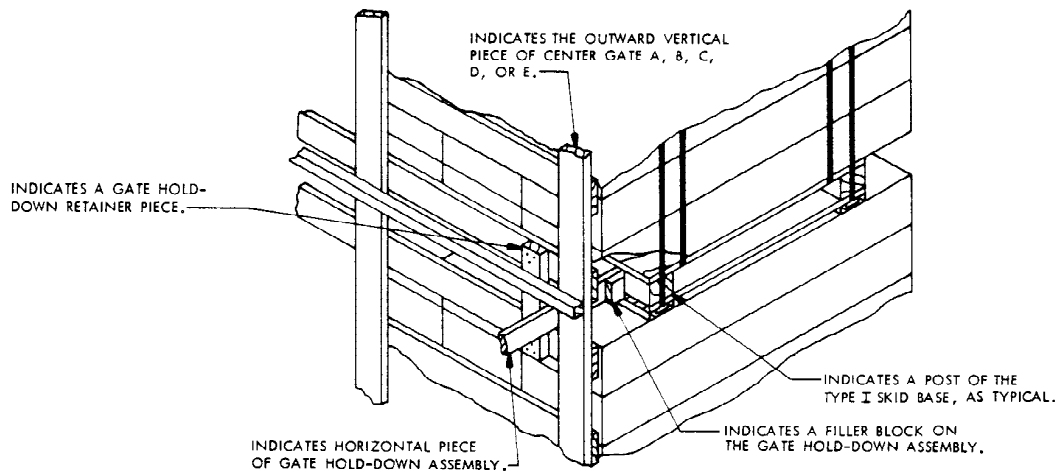
THIS PROCEDURE IS APPLICABLE FOR USE WITH THREE CENTER GATES P. THE PRINCIPLES CAN BE APPLIED FOR USE WITH FOUR CENTER GATES P. NOTE THAT THE TIE PIECES SHOULD BE APPLIED AFTER THE GATES AND STRUTS HAVE BEEN INSTALLED.

## TIE PIECE APPLICATIONS



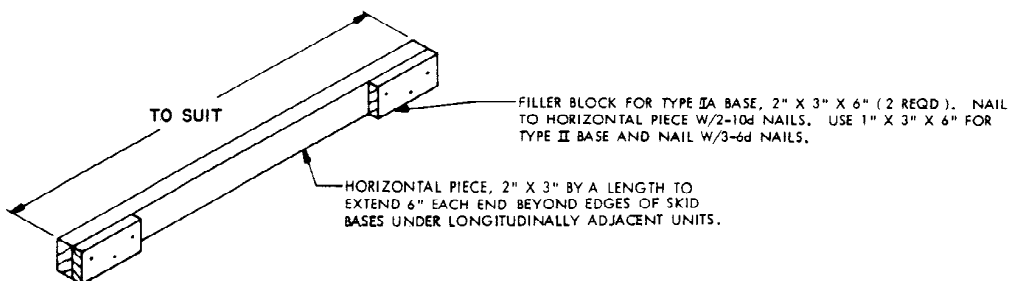
#### GATE HOLD-DOWN ASSEMBLY A

THIS ASSEMBLY IS DESIGNED FOR USE IN LOADS OF SKIDDED UNITS ASSEMBLED ON THE TYPE I SKID BASE.



#### INSTALLATION OF GATE HOLD DOWN

THIS VIEW DEPICTS A "GATE HOLD-DOWN ASSEMBLY A" INSTALLED UNDER A TYPE I SKID BASE, AS USED IN CONJUNCTION WITH CENTER GATES A THRU E ( PRINCIPLES ALSO APPLICABLE FOR CENTER GATE K ) FOR LOADS OF SKIDDED UNITS HAVING THE BOXES LENGTHWISE IN THE CAR. A "GATE HOLD-DOWN ASSEMBLY B" WILL BE INSTALLED UNDER A TYPE IA OR TYPE II SKID BASE IN A SIMILAR MANNER. NOTE THAT THESE PRINCIPLES ARE ALSO APPLICABLE FOR THE INSTALLATION OF GATE HOLD DOWNS FOR THE "SPLIT" GATES, GATES M, N, AND O.



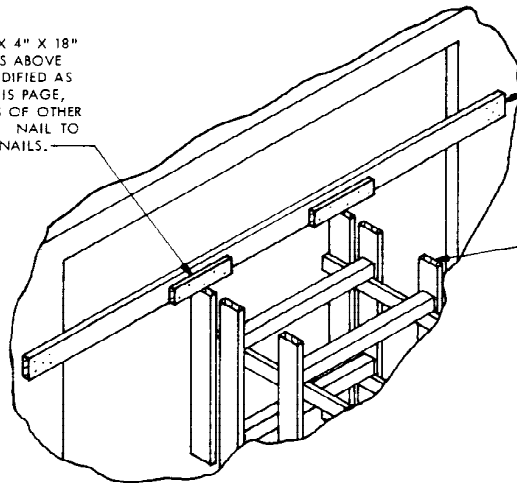
#### GATE HOLD-DOWN ASSEMBLY B

THIS ASSEMBLY IS DESIGNED FOR USE IN LOADS OF SKIDDED UNITS ASSEMBLED ON THE TYPE IA AND TYPE II SKID BASES.



GATE HOLD-DOWN CLEAT, 2" X 4" X 18" (4 REQD). CENTER THE CLEATS ABOVE THE RISER PIECES OF GATES MODIFIED AS SHOWN AT THE BOTTOM OF THIS PAGE, OR ABOVE THE VERTICAL PIECES OF OTHER CENTER GATES, AS APPLICABLE. NAIL TO A GATE HOLD DOWN W/5-10d NAILS.

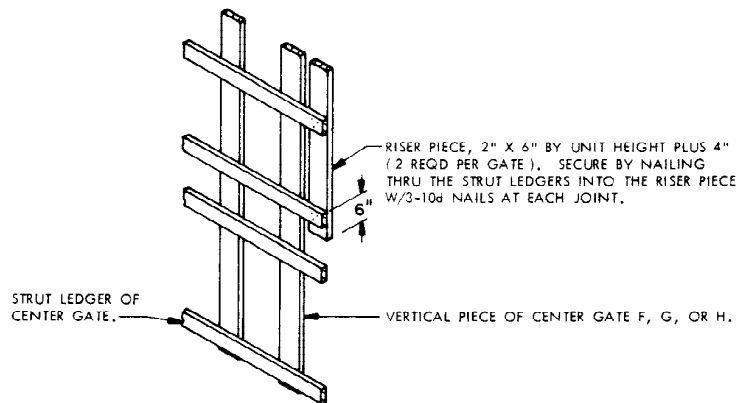
GATE HOLD DOWN, 2" X 6" BY DOOR OPENING WIDTH PLUS 24" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS AT EACH END.



INDICATES A TYPICAL CENTER GATE F, G OR H, MODIFIED AS SHOWN AT THE BOTTOM OF THIS PAGE.

#### ALT GATE HOLD DOWN

THIS VIEW DEPICTS AN ALTERNATIVE METHOD OF CENTER GATE HOLD DOWN WHICH CAN BE USED IF DESIRED. THIS METHOD MAY BE APPLIED IN LIEU OF USING THE GATE HOLD-DOWN ASSEMBLY A (OR B, AS APPLICABLE) DETAILED ON PAGE 48 WHICH IS USED IN CONJUNCTION WITH CENTER GATES A THRU E FOR LOADS OF LENGTHWISE-POSITIONED BOXES SHOWN ON THE EVEN NUMBERED PAGES 14 THRU 22. THIS METHOD MAY ALSO BE USED IN LIEU OF USING THE DOUBLED 2" X 3" PIECES WHICH ARE NAILED TO THE BOTTOM OF THE VERTICAL PIECES OF CENTER GATES F, G, OR H FOR LOADS OF CROSSWISE POSITIONED BOXES SHOWN ON PAGES 6, 8, AND 10.



RISER PIECE, 2" X 6" BY UNIT HEIGHT PLUS 4" (2 REQD PER GATE). SECURE BY NAILING THRU THE STRUT LEDGERS INTO THE RISER PIECE W/3-10d NAILS AT EACH JOINT.

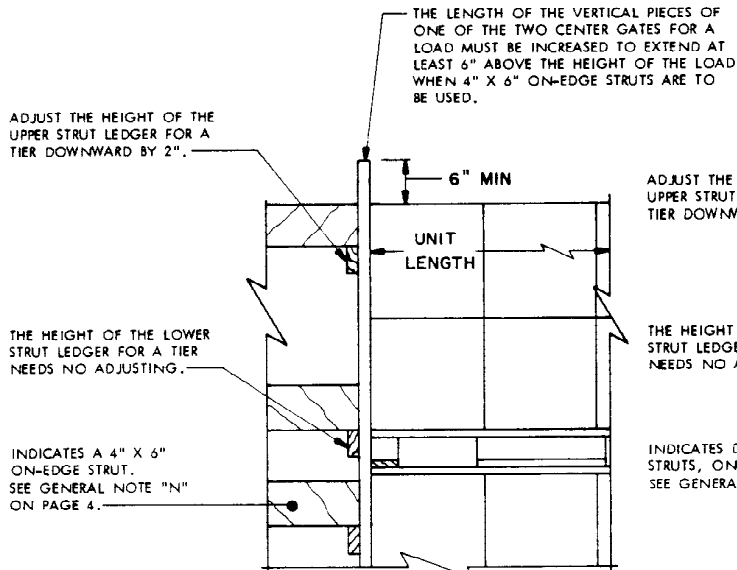
STRUT LEDGER OF CENTER GATE.

VERTICAL PIECE OF CENTER GATE F, G, OR H.

#### CENTER GATE MODIFICATION

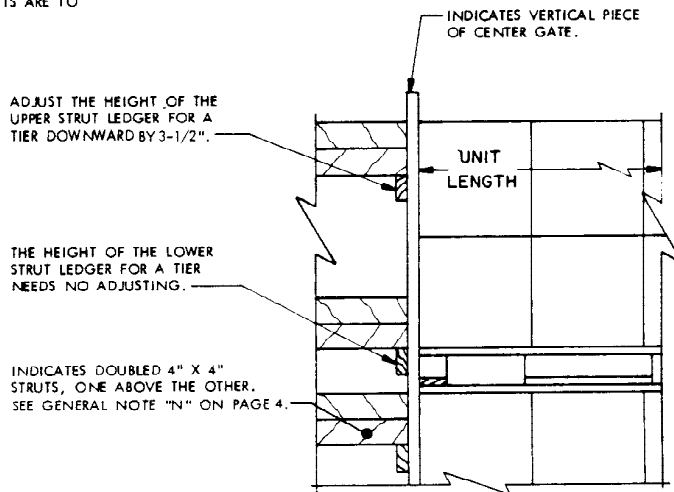
THE MODIFICATION PROCEDURES SHOWN IN THIS VIEW ARE APPLICABLE FOR THE CENTER GATES WHICH ARE USED AGAINST UNITS HAVING THE BOXES CROSSWISE IN THE CAR. THESE GATES ARE IDENTIFIED AS CENTER GATES F, G, AND H AND ARE DETAILED ON PAGES 35, 36, AND 37. THEY ARE SHOWN IN THE LOADS ON PAGES 6, 8, AND 10. THE ADDITION OF THE RISER PIECE WILL PROVIDE A MEANS FOR CONTACTING THE GATE WITH THE GATE HOLD DOWN AS SHOWN IN THE "ALT GATE HOLD DOWN" DETAIL AT THE TOP OF THIS PAGE.

#### ALT GATE HOLD DOWN



**ALT STRUTTING VIEW A**

APPLICABLE FOR CENTER GATES F, G, H, AND L SHOWN IN THE LOADS ON PAGES 6, 8, 10, AND 24, WHEN THE WEIGHT OF THE LOAD IN THE LONG END OF A CAR REQUIRES THE USE OF 4" X 6" ON-EDGE STRUTS. ALSO APPLICABLE FOR CENTER GATE P SHOWN ON PAGE 45.

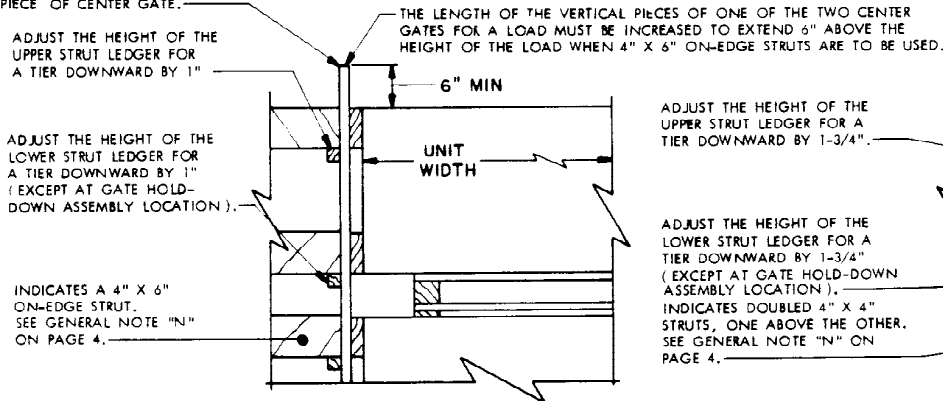


**ALT STRUTTING VIEW B**

APPLICABLE FOR CENTER GATES F, G, H, AND L SHOWN IN THE LOADS ON PAGES 6, 8, 10, AND 24, WHEN THE WEIGHT OF THE LOAD IN THE LONG END OF A CAR REQUIRES THE USE OF DOUBLED 4" X 4" STRUTS. ALSO APPLICABLE FOR CENTER GATE P SHOWN ON PAGE 45.

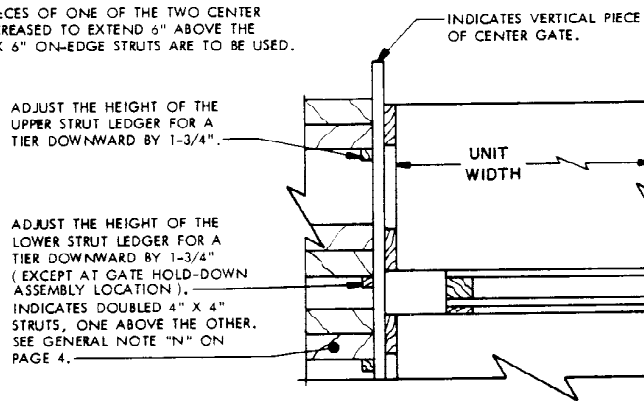
STRUTTING REQUIREMENTS PER ROW/TIER			
NO. OF LOAD UNITS IN LONG END OF CAR	MAXIMUM WEIGHT PER SKIDDED UNIT USING FOUR SINGLE 4" X 4" STRUTS	MAXIMUM WEIGHT PER SKIDDED UNIT USING FOUR 4" X 6" ON-EDGE STRUTS	MAXIMUM WEIGHT PER SKIDDED UNIT USING FOUR DOUBLED 4" X 4" STRUTS
16	765 LBS	1,203 LBS	1,530 LBS
15	816 LBS	1,283 LBS	1,632 LBS
14	875 LBS	1,375 LBS	1,750 LBS
13	942 LBS	1,480 LBS	1,884 LBS
12	1,021 LBS	1,604 LBS	2,042 LBS
11	1,113 LBS	1,750 LBS	2,226 LBS
10	1,225 LBS	1,925 LBS	2,450 LBS
9	1,361 LBS	2,139 LBS	2,722 LBS
8	1,513 LBS	2,406 LBS	3,026 LBS
7	1,750 LBS	2,750 LBS	3,500 LBS
6	2,042 LBS	3,208 LBS	4,084 LBS
5	2,450 LBS	3,850 LBS	-----
4	3,026 LBS	-----	-----

INDICATES VERTICAL PIECE OF CENTER GATE.



**ALT STRUTTING VIEW C**

APPLICABLE FOR CENTER GATES A THRU D SHOWN IN THE LOADS ON THE EVEN NUMBERED PAGES 14 THRU 20, AND FOR CENTER GATE K SHOWN IN THE LOAD ON PAGE 24. ALSO APPLICABLE FOR CENTER GATES M AND N SHOWN ON PAGES 42 AND 43.



**ALT STRUTTING VIEW D**

APPLICABLE FOR CENTER GATES A THRU D SHOWN IN THE LOADS ON THE EVEN NUMBERED PAGES 14 THRU 20, AND FOR CENTER GATE K SHOWN IN THE LOAD ON PAGE 24. ALSO APPLICABLE FOR CENTER GATES M AND N SHOWN ON PAGES 42 AND 43.

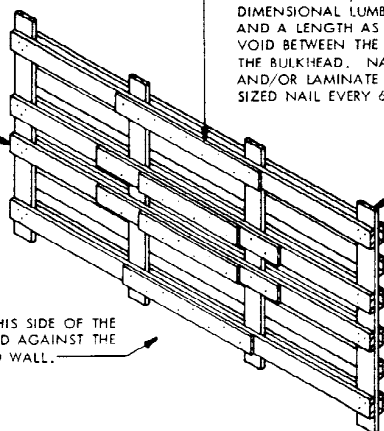
FILLER PIECE, 2" X 6" BY CAR WIDTH MINUS 1/2" IN LENGTH (2 REQD PER TIER). ALIGN WITH THE TOP AND BOTTOM GATE HORIZONTAL PIECES OF EACH TIER. NAIL TO THE VERTICAL PIECES OF THE BULKHEAD W/3-10d NAILS AT EACH JOINT.

PLACE THIS SIDE OF THE BULKHEAD AGAINST THE CAR END WALL.

SHIM MATERIAL, 6" WIDE PLYWOOD OR DIMENSIONAL LUMBER OF A THICKNESS AND A LENGTH AS REQUIRED TO FILL THE VOID BETWEEN THE CAR END WALL AND THE BULKHEAD. NAIL TO A FILLER PIECE AND/OR LAMINATE W/1-APPLICABLY SIZED NAIL EVERY 6".

A MODIFIED CENTER GATE A FOR A 2-WIDE BY 2-HIGH LOAD IS SHOWN AS TYPICAL.

LOAD-SIDE OF BULKHEAD.



#### BULKHEAD A

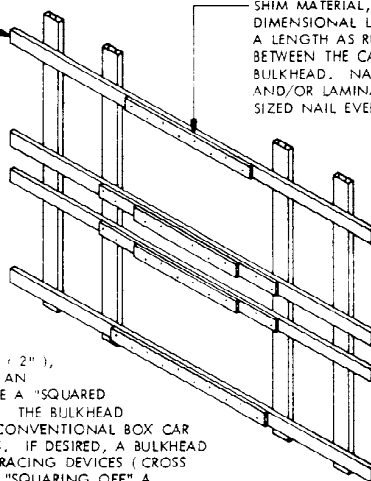
THIS BULKHEAD IS APPLICABLE FOR USE AT THE END OF A CAR WHEN THE SKIDDED UNITS ARE POSITIONED WITH THE WIDTH OF THE UNIT PARALLEL TO THE SIDEWALLS OF THE CAR (BOXES ON A UNIT LENGTHWISE IN THE CAR). THE BULKHEAD IS ALSO APPLICABLE FOR USE AT THE END OF THE COMBINATION LOAD SHOWN ON PAGE 24.

A MODIFIED CENTER GATE F IS SHOWN AS TYPICAL.

PLACE THIS SIDE OF THE BULKHEAD AGAINST THE CAR END WALL.

SHIM MATERIAL, 4" WIDE PLYWOOD OR DIMENSIONAL LUMBER OF A THICKNESS AND A LENGTH AS REQUIRED TO FILL THE VOID BETWEEN THE CAR END WALL AND THE BULKHEAD. NAIL TO A STRUT LEDGER AND/OR LAMINATE W/1-APPLICABLY SIZED NAIL EVERY 6".

LOAD-SIDE OF BULKHEAD.

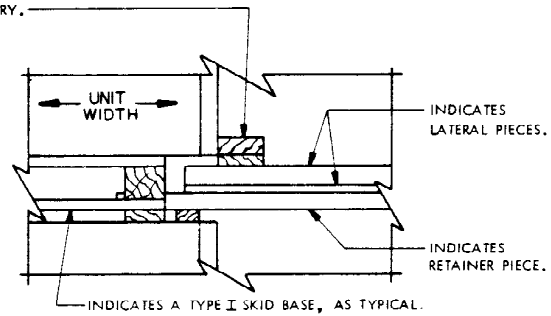
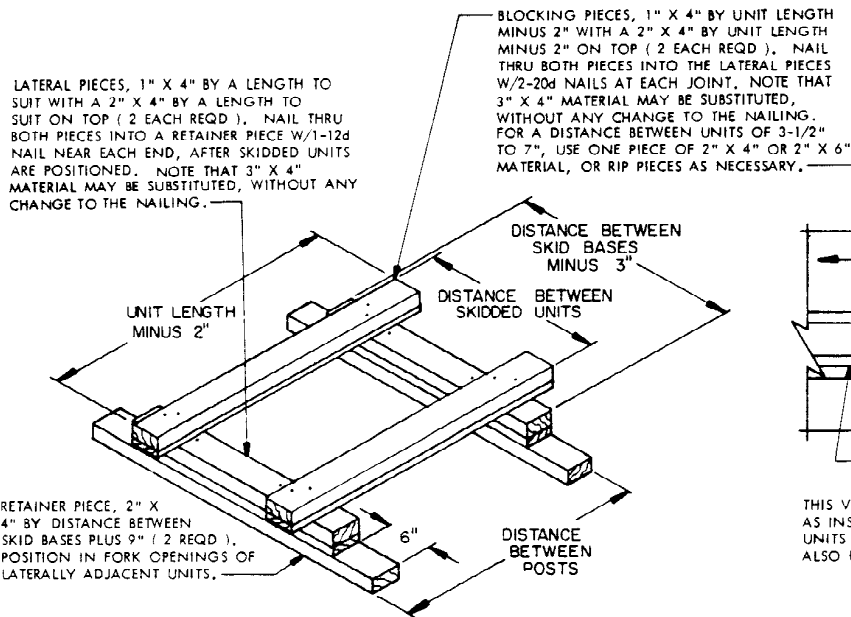


#### SPECIAL NOTES:

1. IF A BOX CAR TO BE LOADED HAS BOWED END WALLS WHICH ARE BOWED OUTWARD MORE THAN TWO INCHES (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. THE BULKHEAD IS APPLICABLE FOR USE AT THE END OF A LOAD IN A CONVENTIONAL BOX CAR OR IN A CAR EQUIPPED WITH LOAD DIVIDER BULKHEADS. IF DESIRED, A BULKHEAD MAY BE USED IN A CAR EQUIPPED WITH MECHANICAL BRACING DEVICES (CROSS MEMBERS) IN LIEU OF USING THE CROSS MEMBERS FOR "SQUARING OFF" A CAR END WALL.
2. IF THE END WALL OF A CAR MUST BE "SQUARED OFF" FOR A LOAD OF SKIDDED UNITS WHICH ARE TO BE POSITIONED WITH THE WIDTH OF THE UNIT PARALLEL TO THE SIDEWALLS OF THE CAR (BOXES ON A UNIT LENGTHWISE IN THE CAR), THE PROCEDURES DEPICTED BY THE "BULKHEAD A" DETAIL AT THE TOP OF THE PAGE WILL BE APPLIED. THE BULKHEAD CONSISTS OF THE CENTER GATE WHICH WILL BE USED FOR BLOCKING AND BRACING THE COMPLETED LOAD, MODIFIED FOR USE AT THE END OF THE CAR BY OMITTING THE STRUT LEDGERS AND ADDING FILLER PIECES AND SHIM MATERIAL AS SHOWN. A MODIFIED CENTER GATE A FOR A 2-WIDE BY 2-HIGH LOAD IS SHOWN AS TYPICAL.
3. IF THE END WALL OF A CAR MUST BE "SQUARED OFF" FOR A LOAD OF SKIDDED UNITS WHICH ARE TO BE POSITIONED WITH THE LENGTH OF THE UNIT PARALLEL TO THE SIDEWALLS OF THE CAR (BOXES ON A UNIT CROSSWISE IN THE CAR), THE PROCEDURES DEPICTED BY THE "BULKHEAD B" DETAIL ABOVE WILL BE APPLIED. THE BULKHEAD CONSISTS OF THE CENTER GATE WHICH WILL BE USED FOR BLOCKING AND BRACING THE COMPLETED LOAD, MODIFIED FOR USE AT THE END OF THE CAR BY ADDING SHIM MATERIAL AS SHOWN. A MODIFIED CENTER GATE F FOR A 2-WIDE BY 2-HIGH LOAD IS SHOWN AS TYPICAL.
4. THE "BULKHEAD A" ASSEMBLY WILL BE USED IF THE END OF A CAR MUST BE "SQUARED OFF" FOR A LOAD OF SKIDDED UNITS WHICH ARE TO BE POSITIONED AS IN THE COMBINATION LOAD SHOWN ON PAGE 24. REFER TO THE "CENTER GATE K" DETAIL ON PAGE 39 FOR HEIGHT LOCATION DIMENSIONS APPLICABLE TO THE POSITIONING OF THE HORIZONTAL PIECES OF THE BULKHEAD AND FOR THE LOCATION OF THE TWO VERTICAL PIECES WHICH WILL ALIGN WITH THE ROW OF UNITS HAVING THE LENGTH OF THE BOXES IN THE UNIT LENGTHWISE IN THE CAR. REFER TO THE "CENTER GATE L" DETAIL ON PAGE 40 FOR DIMENSIONAL GUIDANCE APPLICABLE TO THE LOCATION OF THE TWO VERTICAL PIECES OF THE PORTION OF THE BULKHEAD WHICH WILL ALIGN WITH THE ROW OF UNITS HAVING THE LENGTH OF THE BOXES IN THE UNIT CROSSWISE IN THE CAR.

#### BULKHEAD B

THIS BULKHEAD IS APPLICABLE FOR USE AT THE END OF A CAR WHEN THE SKIDDED UNITS ARE POSITIONED WITH THE LENGTH OF THE UNIT PARALLEL TO THE SIDEWALLS OF THE CAR (BOXES ON A UNIT CROSSWISE IN THE CAR).



**INSTALLATION VIEW**

THIS VIEW DEPICTS AN ANTI-SWAY BRACE AS INSTALLED BETWEEN LATERALLY ADJACENT UNITS IN AN UPPER TIER. THE ASSEMBLY IS ALSO USED BETWEEN FIRST-TIER UNITS.

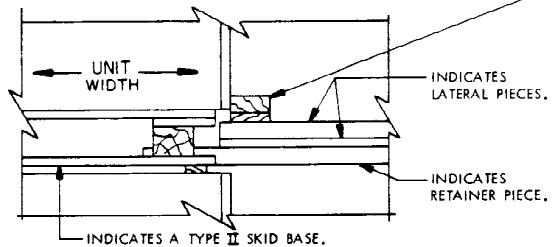
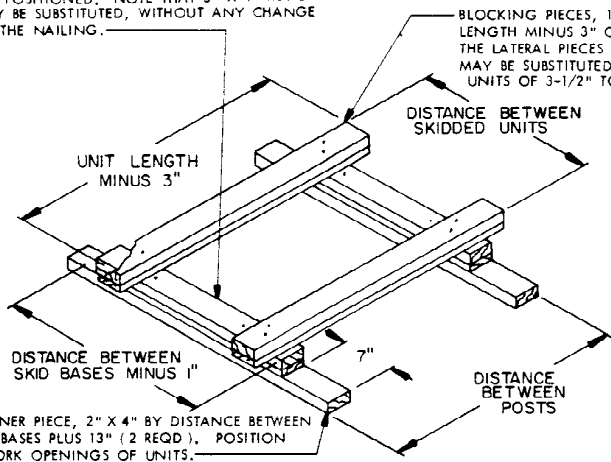
**ANTI-SWAY BRACE A**

FOR USE BETWEEN ENDS OF BOXES ON UNITS ASSEMBLED ON THE TYPE I OR TYPE IA SKID BASES OR THE TYPE II SKID BASE WHEN THE BOXES DO NOT HAVE TOP CLEATS. THE ANTI-SWAY BRACE IS ALSO APPLICABLE FOR USE WITH THE SKID BASE DEPICTED BY DRAWING D-AMXSV-4163 AND THE REVISIONS THERETO. SEE THE CHART AT THE RIGHT FOR ADDITIONAL GUIDANCE. THIS ANTI-SWAY BRACE MAY BE PRE-ASSEMBLED, EXCEPT FOR THE "BLOCKING PIECES" WHICH MUST BE INSTALLED IN PLACE.

\* THE MAXIMUM TOTAL LATERAL VOIDS SPECIFIED IN THE CHART AT RIGHT ARE APPLICABLE ONLY FOR THE UPPER TIERS OF A LOAD. FOR A FULL OR PARTIAL 1-TIER LOAD, OR FOR THE 1-HIGH PORTION OF A LOAD CONTAINING A PARTIAL SECOND TIER, A SIX INCH (6") TOTAL LATERAL VOID IS PERMISSIBLE.

ANTI-SWAY BRACE REQUIREMENTS			
UNIT WIDTH ACROSS CAR	MAXIMUM TOTAL LATERAL VOID ALLOWED WITHOUT USING ANTI-SWAY BRACING*		
	TYPE II W/O TOP CLEATS, TYPE I AND TYPE IA, AND DWG D-AMXSV-4163, REV D	TYPE II FOR BOXES W/TOP CLEATS	BASIC DRAWING D-AMXSV-4163 AND REV. A
27"	3-1/2"	5"	4-1/2"
28"	4"	5"	4-3/4"
29"	4-1/2"	5"	4-3/4"
30"	5"	5"	5"
31"	5-1/2"	5"	5"
32"	6"	5"	5-1/4"
33"	6"	5"	5-1/4"
34"	6"	5"	5-1/2"
35"	6"	5"	5-1/2"
36"	6"	5"	5-1/2"
37"	6"	5"	5-3/4"
38"	6"	5"	5-3/4"
39" AND WIDER	6"	5"	6"

LATERAL PIECES, 1" X 4" BY A LENGTH TO SUIT WITH A 2" X 4" BY LENGTH TO SUIT ON TOP ( 2 EACH REQD ). NAIL THRU BOTH PIECES INTO A RETAINER PIECE W/1-12d NAIL NEAR EACH END. AFTER SKIDDED UNITS ARE POSITIONED. NOTE THAT 3" X 4" MATERIAL MAY BE SUBSTITUTED, WITHOUT ANY CHANGE TO THE NAILING.

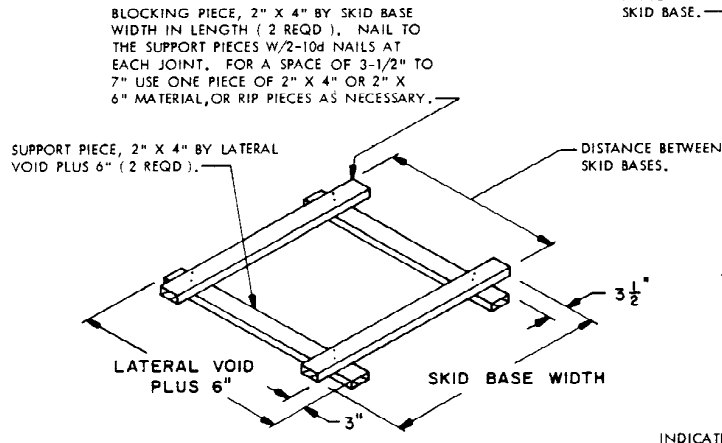


**INSTALLATION VIEW**

THIS VIEW DEPICTS AN ANTI-SWAY BRACE B AS INSTALLED BETWEEN LATERALLY ADJACENT UNITS IN AN UPPER TIER. THE ASSEMBLY IS ALSO USED BETWEEN FIRST-TIER UNITS.

**ANTI-SWAY BRACE B**

FOR USE BETWEEN ENDS OF BOXES ON UNITS ASSEMBLED ON THE TYPE II SKID BASE WHEN THE BOXES HAVE TOP CLEATS. SEE THE CHART ABOVE AT THE RIGHT FOR ADDITIONAL GUIDANCE. NOTE THAT THIS ANTI-SWAY BRACE MUST BE ASSEMBLED IN PLACE.



BLOCKING PIECE, 2" X 4" BY SKID BASE WIDTH IN LENGTH ( 2 REQD ). NAIL TO THE SUPPORT PIECES W/2-10d NAILS AT EACH JOINT. FOR A SPACE OF 3-1/2" TO 7" USE ONE PIECE OF 2" X 4" OR 2" X 6" MATERIAL, OR RIP PIECES AS NECESSARY.

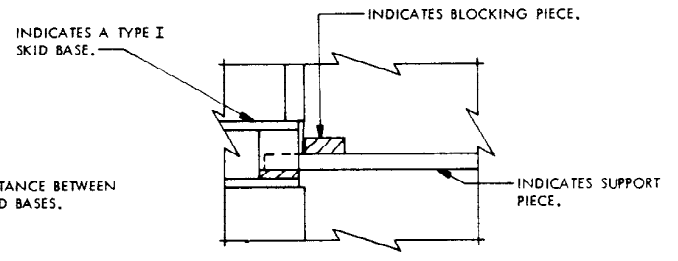
SUPPORT PIECE, 2" X 4" BY LATERAL VOID PLUS 6" ( 2 REQD ).

DISTANCE BETWEEN SKID BASES.

LATERAL VOID PLUS 6" SKID BASE WIDTH

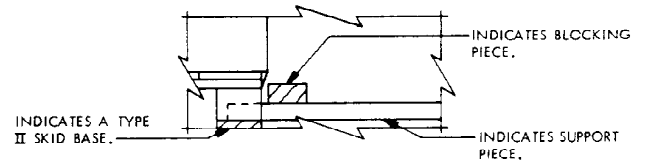
**ANTI-SWAY BRACE C**

FOR USE BETWEEN SIDES OF BOXES ON UNITS ASSEMBLED ON ANY TYPE OF SKID BASE. THIS ANTI-SWAY BRACE MUST BE ASSEMBLED IN PLACE. FOR A LATERAL VOID SPACE OF LESS THAN 4" THE ANTI-SWAY BRACE E SHOWN BELOW MAY BE USED. NOTE THAT THE MAXIMUM TOTAL LATERAL VOID ALLOWED WITHOUT USING ANTI-SWAY BRACING IS 2-1/4".



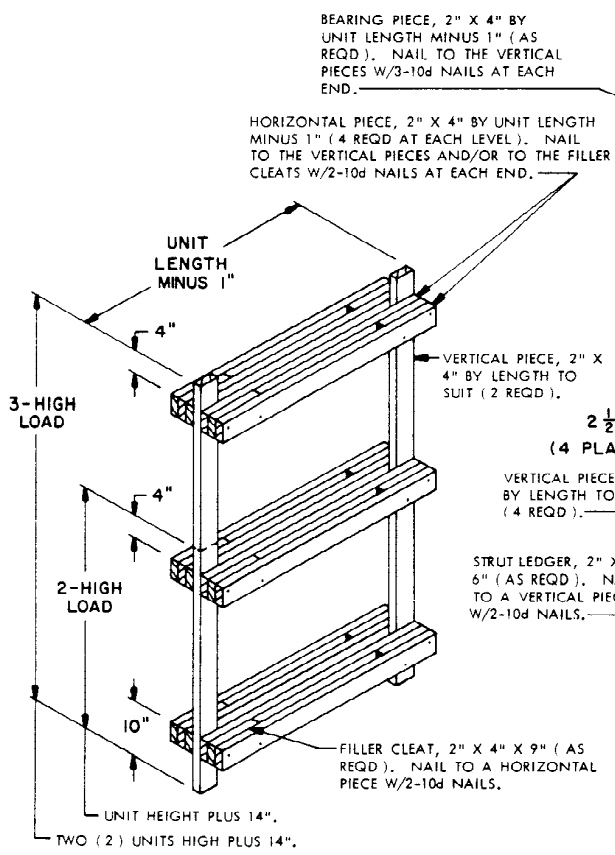
**INSTALLATION VIEW**

THIS VIEW DEPICTS AN ANTI-SWAY BRACE C AS INSTALLED BETWEEN LATERALLY ADJACENT UNITS ASSEMBLED ON TYPE I SKID BASES.



**INSTALLATION VIEW**

THIS VIEW DEPICTS AN ANTI-SWAY BRACE C AS INSTALLED BETWEEN LATERALLY ADJACENT UNITS ASSEMBLED ON TYPE II SKID BASES.



BEARING PIECE, 2" X 4" BY UNIT LENGTH MINUS 1" ( AS REQD ). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH END.

HORIZONTAL PIECE, 2" X 4" BY UNIT LENGTH MINUS 1" ( 4 REQD AT EACH LEVEL ). NAIL TO THE VERTICAL PIECES AND/OR TO THE FILLER CLEATS W/2-10d NAILS AT EACH END.

UNIT LENGTH MINUS 1"

3-HIGH LOAD

2-HIGH LOAD

UNIT HEIGHT PLUS 14". TWO ( 2 ) UNITS HIGH PLUS 14".

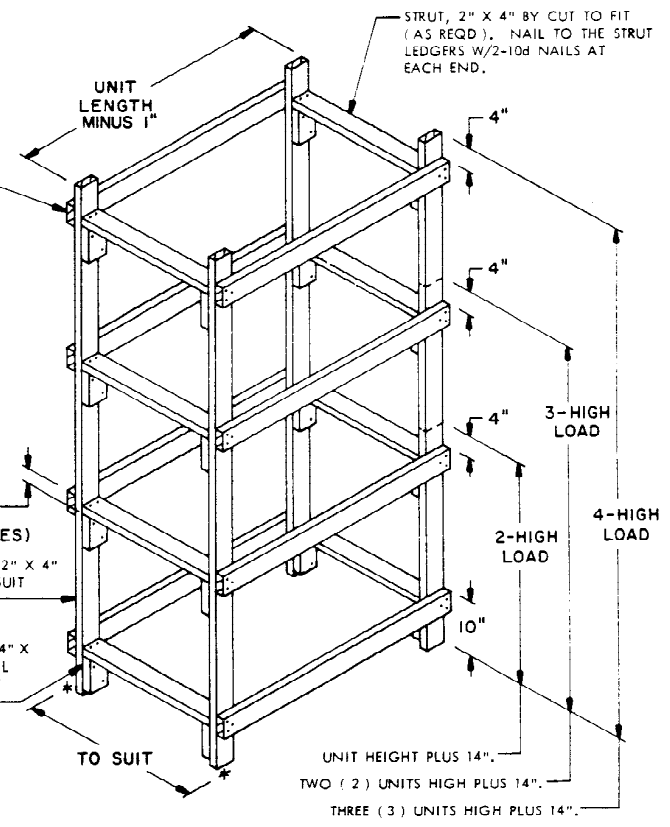
VERTICAL PIECE, 2" X 4" BY LENGTH TO SUIT ( 2 REQD ).

( 4 PLACES )

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

STRUT LEDGER, 2" X 4" X 6" ( AS REQD ). NAIL TO A VERTICAL PIECE W/2-10d NAILS.

FILLER CLEAT, 2" X 4" X 9" ( AS REQD ). NAIL TO A HORIZONTAL PIECE W/2-10d NAILS.



STRUT, 2" X 4" BY CUT TO FIT ( AS REQD ). NAIL TO THE STRUT LEDGERS W/2-10d NAILS AT EACH END.

UNIT LENGTH MINUS 1"

3-HIGH LOAD

2-HIGH LOAD

4-HIGH LOAD

UNIT HEIGHT PLUS 14". TWO ( 2 ) UNITS HIGH PLUS 14". THREE ( 3 ) UNITS HIGH PLUS 14".

TO SUIT

**ANTI-SWAY BRACE D**

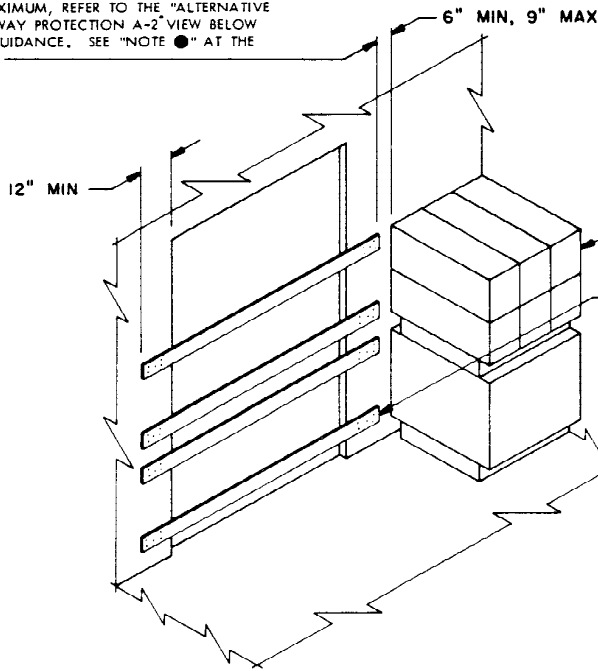
FOR USE IN THE 1-WIDE LOAD SHOWN ON PAGE 12.

**ANTI-SWAY BRACE E**

FOR USE IN THE COMBINATION LOAD SHOWN ON PAGE 24. THIS ASSEMBLY MAY ALSO BE USED IN LIEU OF ANTI-SWAY BRACE A, B, OR C WHEN THE LATERAL SPACE BETWEEN UNITS IS LESS THAN 4" BY OMITTING THE OUTER HORIZONTAL PIECES AND THE FILLER CLEATS, AND ADJUSTING THE THICKNESS OF THE VERTICAL PIECES AND THE REMAINING HORIZONTAL PIECES, AS NECESSARY.

**ANTI-SWAY BRACES**

IF THE SPACE WILL BE MORE THAN THE 9" MAXIMUM, REFER TO THE "ALTERNATIVE DOORWAY PROTECTION A-2" VIEW BELOW FOR GUIDANCE. SEE "NOTE ●" AT THE RIGHT.

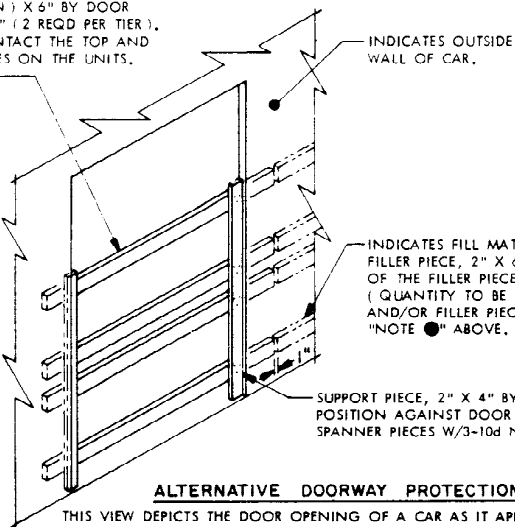


**ALTERNATIVE DOORWAY PROTECTION A-1**

THIS METHOD OF DOORWAY PROTECTION IS FOR USE IN CARS HAVING NAILABLE SIDEWALLS AND EQUIPPED WITH CONVENTIONAL SLIDING DOORS, AND IS APPLICABLE ONLY FOR THE SIDE OPPOSITE THE LOADING SIDE OF THE CAR. THE METHOD CAN ALSO BE USED IN CARS EQUIPPED WITH PLUG DOORS; HOWEVER, A METHOD OTHER THAN THE "ALTERNATIVE DOORWAY PROTECTION A-3" PROCEDURES BELOW MUST BE USED ON THE LOADING SIDE OF THE CAR, SUCH AS THE "ALTERNATIVE DOORWAY PROTECTION E" PROCEDURES ON PAGE 56 OR THE NAILED-DOWN BLOCKING AND STEEL STRAPPING METHOD DEPICTED IN MOST LOADS.

DOOR SPANNER, 1" X 6" BY DOOR OPENING WIDTH PLUS 24" (2 REQD PER TIER). POSITION SO AS TO CONTACT THE TOP AND BOTTOM LAYERS OF BOXES ON THE UNITS. NAIL TO THE CAR SIDEWALL W/5-6d NAILS AT EACH END. SEE "NOTE ●" ABOVE.

DOOR SPANNER, 2" (MIN) X 6" BY DOOR OPENING WIDTH PLUS 24" (2 REQD PER TIER). POSITION SO AS TO CONTACT THE TOP AND BOTTOM LAYERS OF BOXES ON THE UNITS. SEE "NOTE ●" ABOVE.



**ALTERNATIVE DOORWAY PROTECTION A-3**

THIS VIEW DEPICTS THE DOOR OPENING OF A CAR AS IT APPEARS WHEN LOOKING AT IT FROM OUTSIDE OF THE CAR. THE METHOD OF DOORWAY PROTECTION IS FOR USE IN CARS HAVING NAILABLE SIDEWALLS AND EQUIPPED WITH CONVENTIONAL SLIDING DOORS, AND IS APPLICABLE FOR THE LOADING SIDE OF THE CAR. NOTE THAT THE ADJACENT SKIDDED UNITS MUST BE POSITIONED APPROXIMATELY 1-3/4" (REF) FROM THE CAR SIDEWALL (1/4" MORE THAN THE THICKNESS OF THE DOOR SPANNER PIECES) TO FACILITATE THE INSTALLATION OF THOSE DOOR SPANNER PIECES.

NOTE ● :

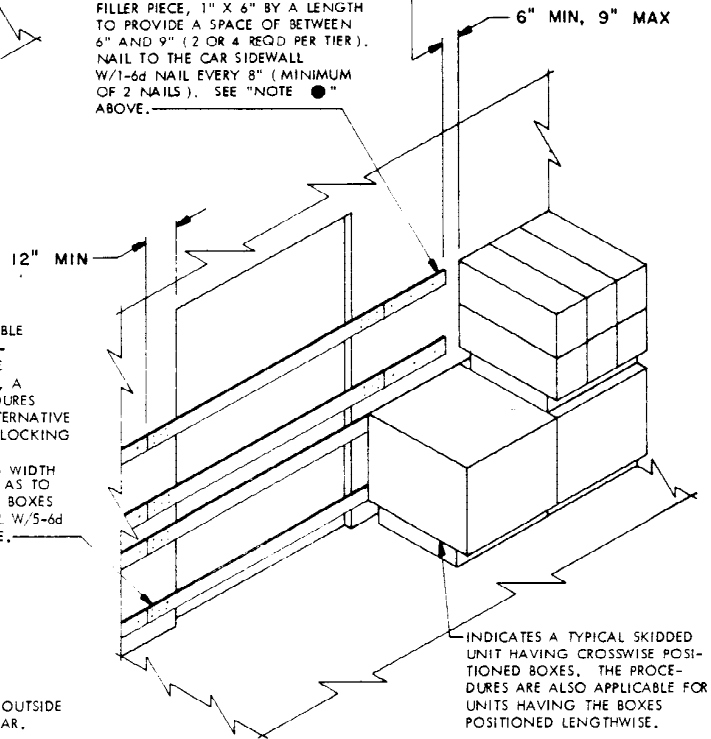
THE TOLERANCE DIMENSION (6" MIN, 9" MAX) IS ALLOWED TO PROVIDE FOR CLEARANCE DURING THE NORMAL LONGITUDINAL SHIFTING OF A LOAD IN TRANSIT; AND IS APPLICABLE WHEN ANTI-SWAY BRACING IS USED FOR A LOAD AND ALSO WHEN THE EXCESS SPACE ACROSS THE CAR IS SMALL ENOUGH THAT ANTI-SWAY BRACING OF ANY KIND IS NOT REQUIRED. IF AN EXCESS LATERAL SPACE IS FILLED BY NAILING LUMBER TO THE CAR SIDEWALL, THE DOOR SPANNERS WILL BE POSITIONED TO BUTT AGAINST THE FILL MATERIAL AND THE TOLERANCE DIMENSION WILL NOT APPLY. ALSO, THE FILLER PIECES SHOWN IN THE ALTERNATIVE DOORWAY PROTECTION A-2 VIEW WILL NOT BE USED. NOTE THAT THE THICKNESS OF THE DOOR SPANNER PIECES MUST EQUAL THE THICKNESS OF THE LUMBER FILL MATERIAL THAT IS NAILED TO THE CAR SIDEWALL.

INDICATES A TYPICAL SKIDDED UNIT HAVING CROSSWISE POSITIONED BOXES. THE PROCEDURES ARE ALSO APPLICABLE FOR UNITS HAVING THE BOXES POSITIONED LENGTHWISE.

DOOR SPANNER, 1" X 6" BY DOOR OPENING WIDTH PLUS 24" (MIN) (2 REQD PER TIER). POSITION SO AS TO CONTACT THE TOP AND BOTTOM LAYERS OF BOXES ON THE UNITS. NAIL TO THE CAR SIDEWALL W/5-6d NAILS AT EACH END. SEE "NOTE ●" ABOVE.

SEE "NOTE ●" ABOVE.

FILLER PIECE, 1" X 6" BY A LENGTH TO PROVIDE A SPACE OF BETWEEN 6" AND 9" (2 OR 4 REQD PER TIER). NAIL TO THE CAR SIDEWALL W/1-6d NAIL EVERY 8" (MINIMUM OF 2 NAILS). SEE "NOTE ●" ABOVE.



**ALTERNATIVE DOORWAY PROTECTION A-2**

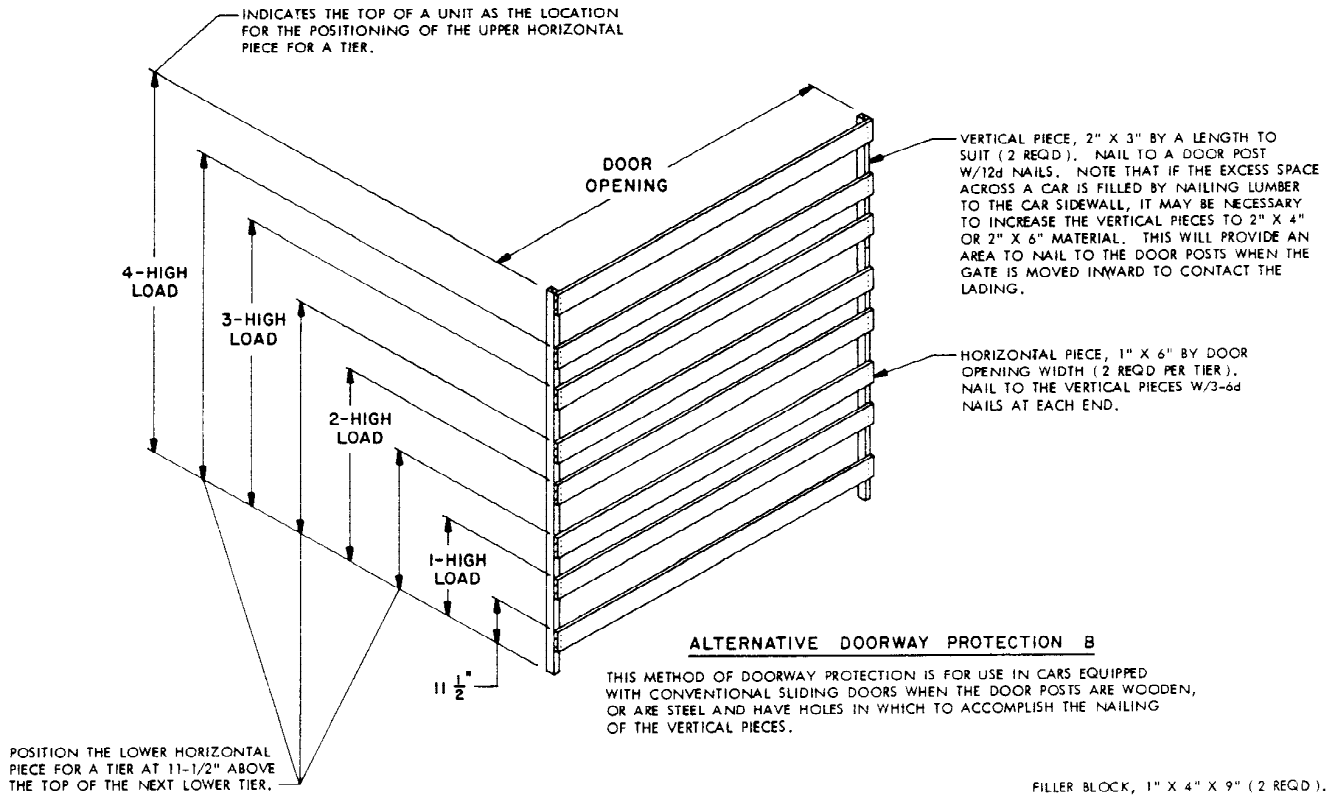
THIS METHOD OF DOORWAY PROTECTION IS FOR USE IN CARS HAVING NAILABLE SIDEWALLS AND EQUIPPED WITH CONVENTIONAL SLIDING DOORS, AND IS APPLICABLE ONLY FOR THE SIDE OPPOSITE THE LOADING SIDE OF THE CAR. SEE THE NOTE UNDER THE "A-1" PROCEDURES.

INDICATES OUTSIDE WALL OF CAR.

INDICATES FILL MATERIAL NAILED TO THE SIDEWALL, OR A FILLER PIECE, 2" X 6" BY A LENGTH TO EQUAL THE LENGTH OF THE FILLER PIECE ON THE OPPOSITE SIDEWALL MINUS 1" (QUANTITY TO BE THE SAME AS FOR THE DOOR SPANNERS AND/OR FILLER PIECES ON THE OPPOSITE SIDEWALL). SEE "NOTE ●" ABOVE.

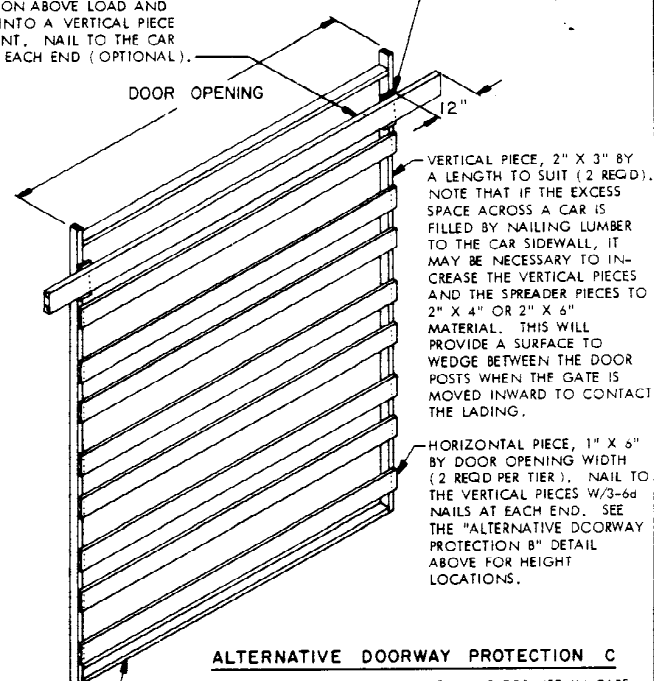
SUPPORT PIECE, 2" X 4" BY A LENGTH TO SUIT (2 REQD). POSITION AGAINST DOOR POST AND NAIL TO THE DOOR SPANNER PIECES W/3-10d NAILS AT EACH JOINT.

INDICATES A TYPICAL SKIDDED UNIT HAVING CROSSWISE POSITIONED BOXES. THE PROCEDURES ARE ALSO APPLICABLE FOR UNITS HAVING THE BOXES POSITIONED LENGTHWISE.



DOOR SPANNER, 2" X 6" BY DOOR OPENING WIDTH PLUS 24" (1 REQD). POSITION ABOVE LOAD AND NAIL THRU A FILLER BLOCK INTO A VERTICAL PIECE W/3-12d NAILS AT EACH JOINT. NAIL TO THE CAR SIDEWALL W/3-12d NAILS AT EACH END (OPTIONAL).

FILLER BLOCK, 1" X 4" X 9" (2 REQD). NAIL TO A VERTICAL PIECE W/4-6d NAILS.



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 D" VIEW ON PAGE 56 FOR GUIDANCE. NOTE THAT THE DOOR SPANNER IN THIS DETAIL MAY BE USED AS A GATE HOLD DOWN PIECE FOR THE "ALT GATE HOLD DOWN" METHOD SHOWN ON PAGE 49.

SPREADER PIECE, 2" X 3" MATERIAL CUT SLIGHTLY LONGER THAN MEASURED DISTANCE (2 REQD). DRIVE INTO POSITION TO PROVIDE FOR A WEDGE FIT. TOENAIL TO THE VERTICAL PIECES W/2-12d NAILS AT EACH END.

DOORWAY PROTECTION SELECTION GUIDANCE	ALTERNATIVE DOORWAY PROTECTION						
	A-1	A-2	A-3	B	C	D	E
NAILABLE DOOR POSTS REQUIRED	NO	NO	NO	YES	N.O.	NO	NO
NAILABLE SIDEWALLS REQUIRED	YES	YES	YES	NO	NO	YES	YES
USE IN CARS EQUIPPED WITH SLIDING DOORS	YES	YES	YES	YES	YES	YES	NO
USE IN CARS EQUIPPED WITH PLUG DOORS	YES	YES	NO	NO	NO	NO	YES
USE ON LOADING SIDE OF CAR	NO	NO	YES	YES	YES	YES	YES
USE ON SIDE OPPOSITE LOADING SIDE OF CAR	YES	YES	NO	YES	YES	YES	YES
USE IN LOADS CONTAINING ANTI-SWAY BRACING	YES	YES	YES	YES	YES	YES	YES
USE IN LOADS HAVING FILL MATERIAL NAILED TO WALL	YES	NO	YES	YES	YES	NO	NO
USE IN LOADS IN WHICH NO LATERAL BLOCKING IS REQUIRED	IF ROOM	IF ROOM	IF ROOM	YES	YES	YES	YES

**DOORWAY PROTECTION**

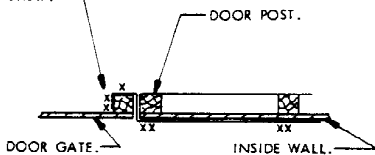
HORIZONTAL PIECE, 1" X 6" BY DOOR OPENING WIDTH (2 REQD PER TIER). - NAIL TO THE VERTICAL PIECES W/3-6d NAILS AT EACH END. SEE THE "ALTERNATIVE DOORWAY PROTECTION B" DETAIL ON PAGE 55 FOR HEIGHT LOCATIONS.

VIEW B

VERTICAL PIECE, 2" X 3" BY A LENGTH TO SUIT (2 REQD).

DOORWAY-PROTECTION-GATE STRAP, 1-1/4" X .035" X 3'-0" (REF) NAIL-ON TYPE STEEL STRAPPING (4 REQD FOR A 1 OR 2-TIER LOAD, 6 REQD FOR A 3-TIER LOAD, 8 REQD FOR A 4-TIER LOAD). NAIL TO GATE AND CAR SIDEWALL AS SHOWN BY THE "VIEW B" SKETCH BELOW. NOTE THAT TYPE 1 STRAPPING MAY BE PUNCHED FOR NAILING IF TYPE 2 STRAPPING IS NOT AVAILABLE.

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



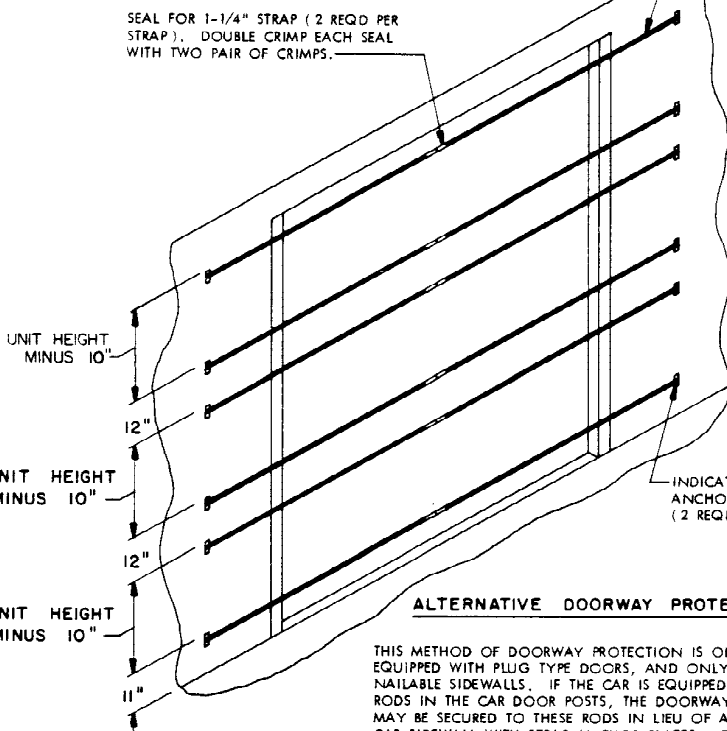
VIEW B

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

**ALTERNATIVE DOORWAY PROTECTION D**

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.

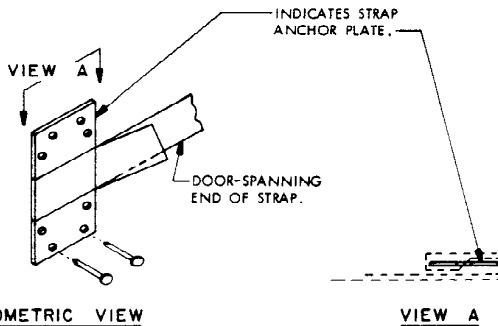
SEAL FOR 1-1/4" STRAP (2 REQD PER STRAP). DOUBLE CRIMP EACH SEAL WITH TWO PAIR OF CRIMPS.



**ALTERNATIVE DOORWAY PROTECTION E**

THIS METHOD OF DOORWAY PROTECTION IS ONLY FOR USE IN CARS EQUIPPED WITH PLUG TYPE DOORS, AND ONLY IF THE CAR HAS NAILABLE SIDEWALLS. IF THE CAR IS EQUIPPED WITH SPECIAL ANCHOR RODS IN THE CAR DOOR POSTS, THE DOORWAY PROTECTION STRAPS MAY BE SECURED TO THESE RODS IN LIEU OF ATTACHING TO THE CAR SIDEWALL WITH STRAP ANCHOR PLATES. CAUTION: THIS METHOD OF DOORWAY PROTECTION WILL NOT BE USED IN CARS EQUIPPED WITH CONVENTIONAL SLIDING DOORS.

DOORWAY PROTECTION STRAP, 1-1/4" X .035" STEEL STRAPPING BY DOOR OPENING WIDTH PLUS 8'-0" IN LENGTH (2 REQD PER TIER). INSTALL FROM TWO (2) PIECES. THREAD ONE END THRU A STRAP ANCHOR PLATE AS SHOWN BY THE "APPLICATION OF STRAPPING TO STRAP ANCHOR PLATE" DETAILS BELOW. NAIL STRAP ANCHOR PLATE TO CAR SIDEWALL W/4-SIGNODE NUMBER 27 RINGLOCK NAILS.



ISOMETRIC VIEW

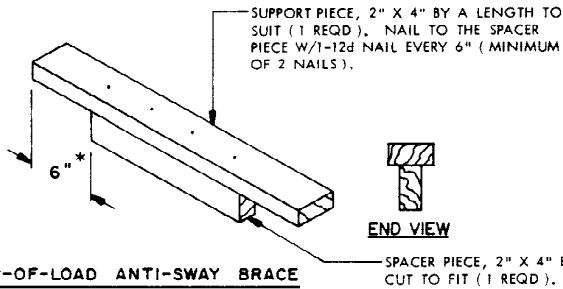
VIEW A

**APPLICATION OF STRAPPING TO STRAP ANCHOR PLATE**

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

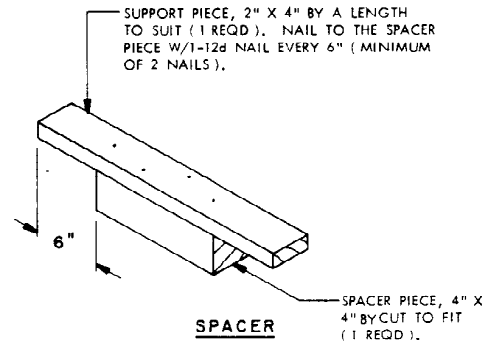


\* THIS DIMENSION WILL BE 6", AS SHOWN, FOR BRACES TO BE USED WITHIN LOADS OF LENGTHWISE-POSITIONED BOXES, AND 12" FOR LOADS OF CROSSWISE-POSITIONED BOXES.



**TOP-OF-LOAD ANTI-SWAY BRACE**

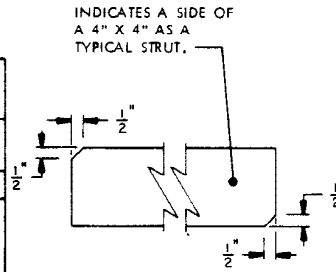
THIS ASSEMBLY IS DESIGNED FOR USE BETWEEN THE TOPS OF LATERALLY ADJACENT SKIDDED UNIT STACKS IN EACH END OF A CAR TO PREVENT UNITS FROM TOPPLING INTO THE VOID AREA. THE ASSEMBLY WILL BE WIRE TIED TO UNIT STRAPS TO PREVENT DISPLACEMENT.



**SPACER**

THIS ASSEMBLY IS DESIGNED FOR USE BETWEEN THE TOPS OF LATERALLY ADJACENT SKIDDED UNIT STACKS IN THE DOORWAY AREA OF A CAR IN CONJUNCTION WITH DOORWAY PROTECTION STRAPS. THE STRAPPING WILL BE STAPLED TO THE SPACER TO PREVENT DISPLACEMENT.

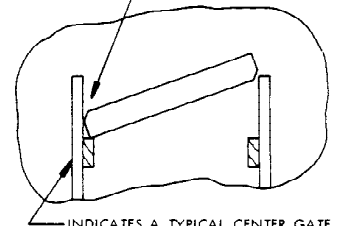
TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS		
NO. OF LOAD UNITS IN EACH END OF CAR THAT REQUIRE BRACING	LENGTH OR WIDTH DIMENSION OF UNIT LENGTHWISE IN CAR	
	40' AND 50' CARS	60' CARS
7	----	UP TO 28"
6	UP TO 28"	OVER 28" TO 33"
5	OVER 28" TO 35"	OVER 33" TO 40"
4	OVER 35" TO 44"	OVER 40" TO 52"
3	OVER 44" TO 61"	OVER 52" TO 73"
2	OVER 61"	OVER 73"



**BEVEL CUT**

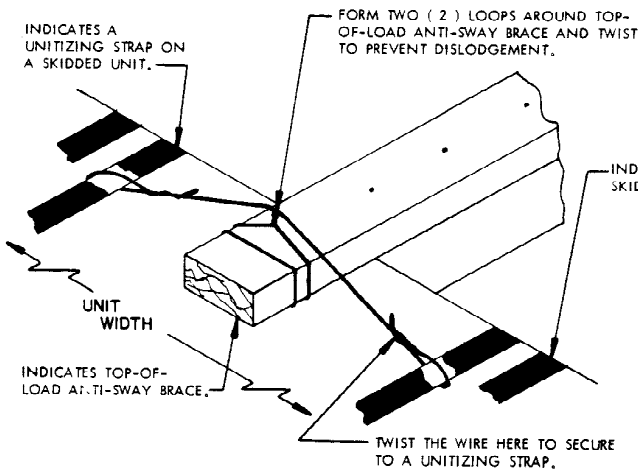
BEVEL CUTTING THE STRUTS AS SPECIFIED WILL FACILITATE INSTALLING THE STRUTS WITH A "DRIVE FIT". **CAUTION:** DO NOT BEVEL A CORNER MORE THAN ONE-HALF INCH (1/2").

BEVEL-CUT THIS CORNER ONLY IF STRUTS ARE VERY SHORT.



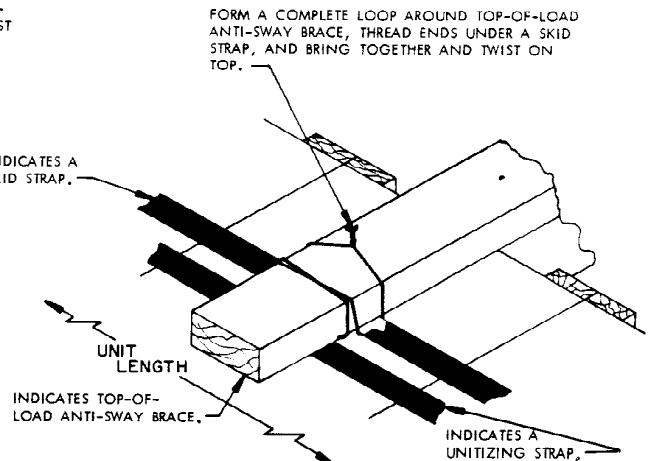
**STRUT INSTALLATION**

SEE GENERAL NOTE "N" ON PAGE 4 FOR ADDITIONAL STRUT INSTALLATION GUIDANCE.



**TIE WIRE APPLICATION A**

THIS VIEW DEPICTS THE SECUREMENT OF A TOP-OF-LOAD ANTI-SWAY BRACE TO THE TOP OF A SKIDDED UNIT BY WIRE TYING TO THE UNITIZING STRAPS WITH NO. 14 GAGE WIRE. THIS PROCEDURE IS APPLICABLE FOR UNITS POSITIONED WITH THE BOXES LENGTHWISE IN THE CAR.



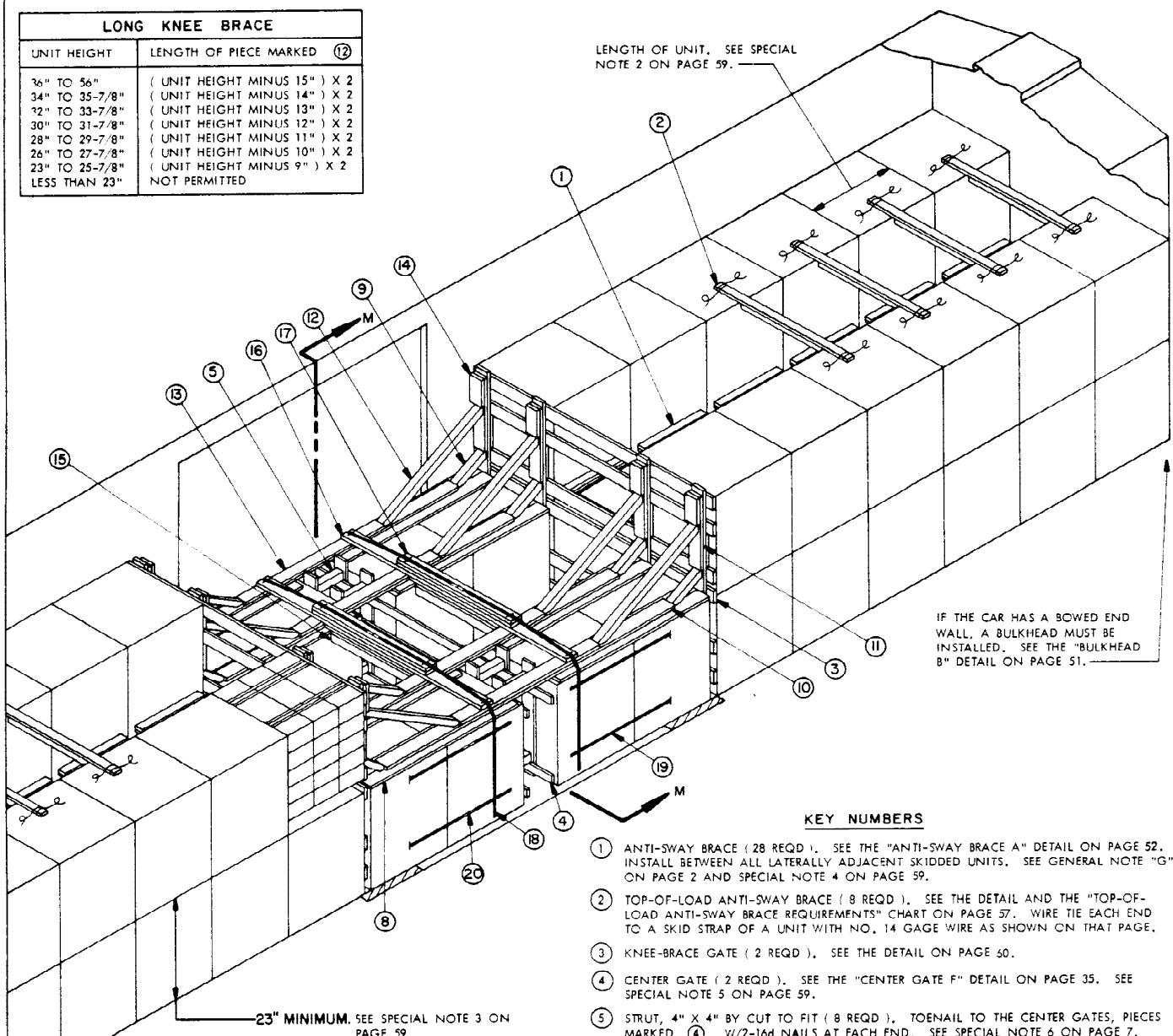
**TIE WIRE APPLICATION B**

THIS VIEW DEPICTS THE SECUREMENT OF A TOP-OF-LOAD ANTI-SWAY BRACE TO THE TOP OF A SKIDDED UNIT BY WIRE TYING TO THE SKID STRAP WITH NO. 14 GAGE WIRE. THIS PROCEDURE IS APPLICABLE FOR UNITS POSITIONED WITH THE BOXES CROSSWISE IN THE CAR.

### LONG KNEE BRACE

UNIT HEIGHT	LENGTH OF PIECE MARKED ⑫
36" TO 56"	( UNIT HEIGHT MINUS 15" ) X 2
34" TO 35-7/8"	( UNIT HEIGHT MINUS 14" ) X 2
32" TO 33-7/8"	( UNIT HEIGHT MINUS 13" ) X 2
30" TO 31-7/8"	( UNIT HEIGHT MINUS 12" ) X 2
28" TO 29-7/8"	( UNIT HEIGHT MINUS 11" ) X 2
26" TO 27-7/8"	( UNIT HEIGHT MINUS 10" ) X 2
23" TO 25-7/8"	( UNIT HEIGHT MINUS 9" ) X 2
LESS THAN 23"	NOT PERMITTED

LENGTH OF UNIT. SEE SPECIAL NOTE 2 ON PAGE 59.

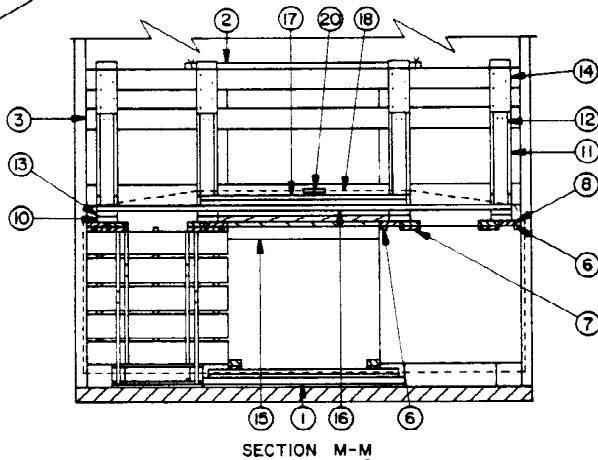


IF THE CAR HAS A BOWED END WALL, A BULKHEAD MUST BE INSTALLED. SEE THE "BULKHEAD B" DETAIL ON PAGE 51.

#### KEY NUMBERS

- ① ANTI-SWAY BRACE ( 28 REQD ). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 52. INSTALL BETWEEN ALL LATERALLY ADJACENT SKIDDED UNITS. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTE 4 ON PAGE 59.
- ② TOP-OF-LOAD ANTI-SWAY BRACE ( 8 REQD ). SEE THE DETAIL AND THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57. WIRE TIE EACH END TO A SKID STRAP OF A UNIT WITH NO. 14 GAGE WIRE AS SHOWN ON THAT PAGE.
- ③ KNEE-BRACE GATE ( 2 REQD ). SEE THE DETAIL ON PAGE 50.
- ④ CENTER GATE ( 2 REQD ). SEE THE "CENTER GATE F" DETAIL ON PAGE 35. SEE SPECIAL NOTE 5 ON PAGE 59.
- ⑤ STRUT, 4" X 4" BY CUT TO FIT ( 8 REQD ). TOENAIL TO THE CENTER GATES, PIECES MARKED ④, W/2-16d NAILS AT EACH END. SEE SPECIAL NOTE 6 ON PAGE 7.
- ⑥ FILLER PIECE, 1" X 2" BY LENGTH OF PIECE MARKED ⑧ ( 8 REQD ). POSITION FLUSH WITH ONE EDGE AND NAIL TO A BEARING PIECE, PIECE MARKED ⑧, W/1-6d NAIL EVERY 12". SEE THE "SECTION M-M VIEW AT LEFT FOR LOCATION GUIDANCE. SEE SPECIAL NOTE 6 ON PAGE 59.
- ⑦ FILLER PIECE, 1" X 6" BY LENGTH OF PIECE MARKED ⑧ ( 8 REQD ). NAIL TO A BEARING PIECE, PIECE MARKED ⑧, W/1-6d NAIL EVERY 12".
- ⑧ BEARING PIECE, 2" X 6" BY CUT TO FIT BETWEEN PIECES MARKED ③ AND ④ MINUS 3" ( 16 REQD ). POSITION TWO ( 2 ) EACH SIDE BY SIDE SO AS TO HAVE THE ENDS CENTERED AGAINST A VERTICAL PIECE OF THE KNEE-BRACE GATE, PIECE MARKED ③. TOENAIL TO THE VERTICAL PIECE W/1-12d NAIL.
- ⑨ SHORT KNEE BRACE, 4" X 4" X 20" ( 8 REQD ). SEE THE "KNEE BRACE" DETAIL ON PAGE 50. TOENAIL TO PIECES MARKED ③ AND ⑧ W/2-16d NAILS AT EACH END.
- ⑩ BACK-UP CLEAT, 2" X 6" BY CUT TO FIT BETWEEN PIECES MARKED ⑨ ( 4 REQD ). NAIL TO EACH PIECE MARKED ⑧ W/1-10d NAIL EVERY 12".
- ⑪ HOLD-DOWN CLEAT, 2" X 6" BY UNIT HEIGHT MINUS 9" ( 8 REQD ). NAIL TO PIECE MARKED ③ W/12-10d NAILS.
- ⑫ LONG KNEE BRACE, 4" X 4" BY CUT TO FIT ( 8 REQD ). SEE THE "KNEE BRACE" DETAIL ON PAGE 50 FOR DIMENSIONS OF BEVEL CUTS. SEE THE "LONG KNEE BRACE" CHART ABOVE FOR LENGTH OF BRACE. TOENAIL TO PIECES MARKED ⑩ AND ⑪ W/2-16d NAILS AT EACH END.
- ⑬ BACK-UP CLEAT, 2" X 6" BY CUT TO FIT BETWEEN PIECES MARKED ⑫ ( 4 REQD ). NAIL TO PIECE MARKED ⑩ W/1-10d NAIL EVERY 6".
- ⑭ HOLD-DOWN CLEAT, 2" X 6" X 12" ( 8 REQD ). NAIL TO PIECE MARKED ⑪ W/5-16d NAILS.

#### ISOMETRIC VIEW



SECTION M-M

( CONTINUED ON PAGE 59 )

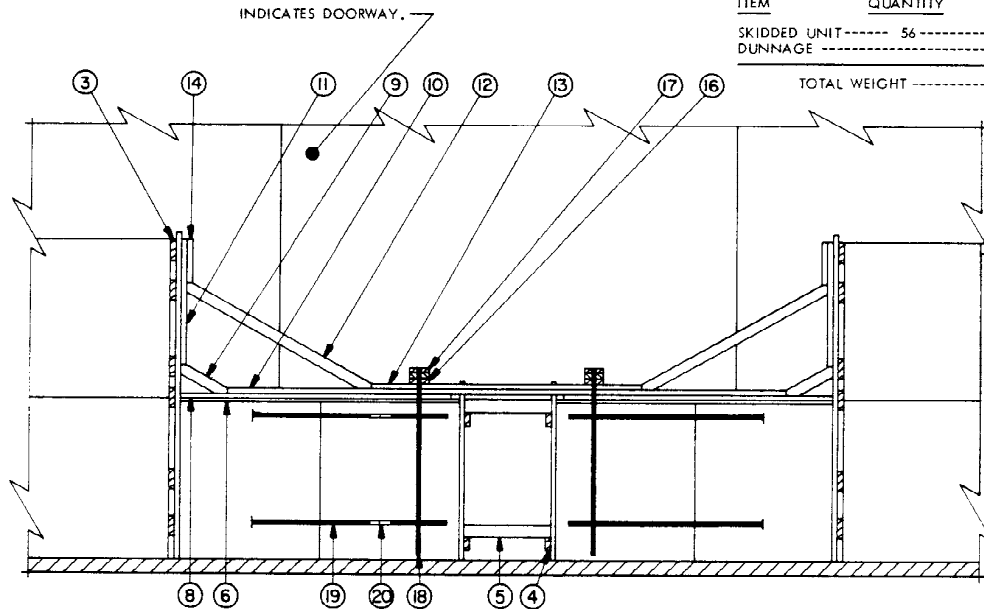
TYPICAL LCL LOAD USING UPPER-LAYER KNEE BRACE METHOD OF PARTIAL-LAYER (TIER) BRACING

ITEM QUANTITY WEIGHT (APPROX)

SKIDDED UNIT----- 56----- 102,648 LBS

DUNNAGE----- 2----- 2,935 LBS

TOTAL WEIGHT----- 105,583 LBS



PARTIAL ELEVATION VIEW

( KEY NUMBERS CONTINUED FROM PAGE 58 )

( SPECIAL NOTES CONTINUED )

- 15 SPACER ASSEMBLY ( 2 REQD ). SEE THE DETAIL ON PAGE 60. NAIL TO PIECES MARKED 8 W/2-10d NAILS AT EACH END.
- 16 CROSS BRACE, 2" X 6" BY CAR WIDTH MINUS 6" ( 2 REQD ). NAIL TO PIECES MARKED 13 W/3-16d NAILS AT EACH JOINT. SEE SPECIAL NOTE 7 AT THE RIGHT.
- 17 STRAPPING BOARD, 2" X 6" BY WIDTH OF LATERAL VOID PLUS 16" ( DOUBLED ) ( 2 REQD ). NAIL THE FIRST PIECE TO PIECE MARKED 16 W/1-10d NAIL EVERY 12" ( 2 MIN ). NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER.
- 18 HOLD-DOWN STRAP, 1-1/4" X .035" X 28'-0" LONG ( REF ) STEEL STRAPPING ( 2 REQD ). INSTALL SO AS TO ENIRCLE THE SKIDDED UNITS, CROSS BRACE, AND STRAPPING BOARD. STAPLE TO STRAPPING BOARD W/2 STAPLES AND TO THE CROSS BRACE W/1 STAPLE AT EACH END.
- 19 DOORWAY STRAP, 1-1/4" X .035" X 14'-0" LONG STEEL STRAPPING ( 4 REQD ). INSTALL FROM TWO ( 2 ) 7'-0" LONG PIECES. SEE SPECIAL NOTE 8 AT RIGHT.
- 20 SEAL FOR 1-1/4" STEEL STRAPPING ( 20 REQD, 4 PER DOORWAY STRAP, 2 PER HOLD-DOWN STRAP ). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "J" ON PAGE 2.

## SPECIAL NOTES:

- A 50'-6" LONG BY 9'-6" WIDE CONVENTIONAL TYPE ALL-METAL BOX CAR EQUIPPED WITH 10'-0" WIDE DOOR OPENINGS IS SHOWN. ALL-METAL OR WOOD-LINED CARS OF OTHER DIMENSIONS AND CARS HAVING OTHER WIDTH DOOR OPENINGS CAN BE USED.
- THE KNEE BRACE METHOD OF PARTIAL-LAYER BRACING MAY BE USED IN ALL-METAL CARS OR IN WOOD-LINED CARS FOR THE SECUREMENT OF A PARTIAL TOP TIER OF NOT MORE THAN 22,000 POUNDS IN EACH END OF A CAR. THE TOP  
( CONTINUED AT RIGHT )

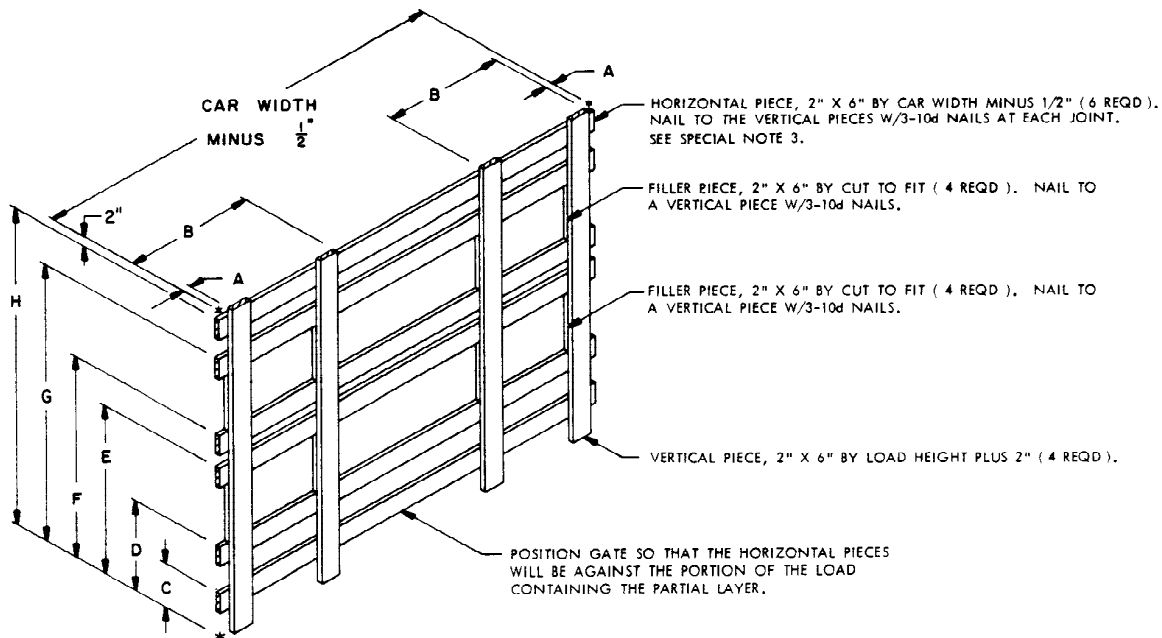
TIER CAN BE A SECOND TIER, THIRD TIER, OR OTHER, AS LONG AS ALL THE LOWER TIERS ARE FULL TIERS BLOCKED AND BRACED USING CENTER GATES AND STRUTS. KNEE BRACING IS LIMITED TO LOADS HAVING TWO ROWS OF SKIDDED UNITS, ONE ALONG EACH CAR SIDEWALL. THE UNITS MAY HAVE THE BOXES ON THE UNIT CROSSWISE, AS SHOWN, OR WITH MINOR ADJUSTMENTS AS SPECIFIED WITHIN SPECIAL NOTES 4 THRU 6, MAY HAVE THE BOXES ON THE UNIT LENGTHWISE IN THE CAR.

- THE SKIDDED UNIT SHOWN IN THE TYPICAL LCL LOAD ON PAGE 58 HAS OVERALL DIMENSIONS OF 36-1/2" LONG BY 37" WIDE BY 43" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER LENGTHS, AND FOR UNITS HAVING WIDTHS OF FROM 27" THRU 54-1/2" IN A 9'-2" WIDE CAR, THRU 55-1/2" IN A 9'-4" WIDE CAR, OR WIDTHS THRU 56-1/2" IN A 9'-6" WIDE CAR. WITH MINOR ADJUSTMENTS, THE PROCEDURES ARE APPLICABLE FOR ANY LENGTH OR WIDTH UNIT TURNED 90° TO THAT SHOWN. CAUTION: THE KNEE BRACE METHOD CANNOT BE USED FOR SKIDDED UNITS WHICH ARE LESS THAN 23" IN HEIGHT.
- THE ANTI-SWAY BRACES, PIECES MARKED 1, MAY BE OMITTED IF THE SPACE BETWEEN LATERALLY ADJACENT UNITS IS NOT MORE THAN THE DISTANCE SPECIFIED IN THE "ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 52, FOR THE TYPE OF SKID BASE BEING LOADED. SEE SPECIAL NOTE 3 ON PAGE 7 FOR GUIDANCE AS TO THE PROPER ANTI-SWAY BRACE TO BE USED FOR UNITS HAVING THE BOXES CROSSWISE. IF THE UNITS ARE LOADED WITH THE BOXES LENGTHWISE IN THE CAR, ANTI-SWAY BRACE C WILL BE USED IN LIEU OF THE DEPICTED ASSEMBLY.
- THE CENTER GATE F SHOWN IN THE LOAD VIEW IS APPLICABLE FOR THE 2-WIDE ( BOXES CROSSWISE ) LOAD SHOWN. IF THE PARTIAL-LAYER BRACING SHOWN IS TO BE APPLIED FOR A 2-WIDE ( BOXES LENGTHWISE ) LOAD, "CENTER GATE A" WILL BE USED IN LIEU OF "CENTER GATE F". NOTE THAT THE VERTICAL PIECES OF "CENTER GATE A", AND IN SOME INSTANCES THE VERTICAL PIECES OF "CENTER GATE F", MUST BE CUT OFF APPROXIMATELY 1" ABOVE THE TOP OF THE TIER ( AFTER THE STRUTS HAVE BEEN INSTALLED ) TO PROVIDE CLEARANCE FOR INSTALLATION OF THE KNEE BRACE PIECES.
- THE FILLER PIECES, PIECES MARKED 6 AND 7, ARE TO PROVIDE FOR THE LEVELING OF PIECES MARKED 8 WHICH MAY BE PARTIALLY RESTING ON THE TOP CLEATS OF THE BOXES, AND WILL THEREFORE NOT BE REQUIRED WHEN SHIPPING UNITS OF BOXES WHICH DO NOT HAVE TOP CLEATS. WHEN THE LOAD CONSISTS OF TOP-CLEATED BOXES POSITIONED LENGTHWISE IN THE CAR, THE FILLER PIECES MUST BE CUT TO A LENGTH TO FIT LOOSELY BETWEEN THE TOP CLEATS OF THE BOXES ON EACH OF THE UNITS UNDER PIECES MARKED 8.
- A MINIMUM OF TWO ( 2 ) SETS OF SPACER ASSEMBLIES, CROSS BRACES, STRAPPING BOARDS, AND HOLD-DOWN STRAPS, PIECES MARKED 15 THRU 18, ARE REQUIRED. FOR THOSE LOADS IN WHICH THE TOP TIER IS MORE THAN TWO UNITS SHORTER IN EACH END THAN THE NEXT LOWER TIER, AN ADDITIONAL SET OF THOSE PIECES MUST BE INSTALLED FOR EACH LOAD UNIT BETWEEN A CENTER GATE AND THE LOAD UNIT WHICH IS UNDER THE LOWER END OF THE LONG KNEE BRACES ( 48" MAX SPACING ). NOTE THAT THE STRAPPING MUST BE THREADED THRU THE BASE PRIOR TO FINAL POSITIONING OF THOSE UNITS WHICH ARE NOT IN THE DOORWAY.
- DOORWAY PROTECTION IS PROVIDED BY THE DOORWAY STRAPS, PIECES MARKED 19 ( F. PLUG DOORS ONLY ), SECURED TO SPECIAL ANCHOR RODS IN THE CAR DOOR POSTS. IF THE CAR HAS SLIDING DOORS, OR HAS NO ANCHOR RODS, DOORWAY PROTECTION MUST BE PROVIDED BY SOME OTHER MEANS. SEE PIECES MARKED 3 AND 9 ON PAGE 6 AND SPECIAL NOTE 7 ON PAGE 7. NOTE THAT THE HOLD-DOWN STRAPS, PIECES MARKED 18, WILL ALSO PROVIDE FOR DOORWAY PROTECTION IF DOORWAY BLOCKING, PIECES MARKED 3 ON PAGE 6, IS SUBSTITUTED FOR THE ANTI-SWAY BRACES, PIECES MARKED 1, BETWEEN THOSE UNITS IN THE DOORWAY. THE SPACER ASSEMBLY, PIECE MARKED 15, WILL BE USED UNDER ALL DOORWAY PROTECTION STRAPS IN LIEU OF THE SPACER SHOWN ON PAGE 6.

## BILL OF MATERIAL ( TYPICAL )

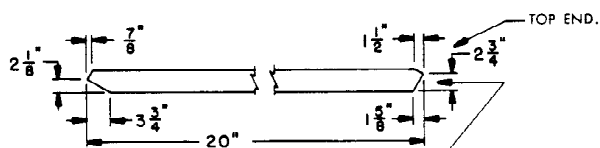
LUMBER	LINEAR FEET	BOARD FEET
1" X 2"	48	8
1" X 4"	374	125
1" X 6"	48	24
2" X 3"	11	6
2" X 4"	800	534
2" X 6"	365	365
4" X 4"	70	94
NAILS	NO. REQD	POUNDS
6d ( 2" )	80	1/2
10d ( 3" )	544	8-1/2
12d ( 3-1/4" )	128	2-1/4
16d ( 1-1/2" )	240	5-1/4
20d ( 4" )	224	8
STEEL STRAPPING, 1-1/4" X .035"-----	112' REQD	16 LBS
SEAL FOR 1-1/4" STRAPPING-----	20 REQD	4 LBS
STAPLE FOR 1-1/4" STRAPPING-----	8 REQD	NIL
WIRE, NO. 14 GAGE-----	32' REQD	NIL

TYPICAL LCL LOAD USING UPPER-LAYER KNEE BRACE METHOD OF PARTIAL-LAYER (TIER) BRACING



### KNEE-BRACE GATE

THIS GATE IS DESIGNED FOR USE IN THE LOAD SHOWN ON PAGE 58 AND IS IDENTIFIED THEREIN AS PIECE MARKED ③.



### KNEE BRACE

THE SHORT KNEE BRACE, PIECE MARKED ⑨ ON PAGE 58, IS 20" LONG. SEE THE "LONG KNEE BRACE" CHART ON PAGE 58 FOR LENGTH OF PIECE MARKED ⑫.

POSITION WITH THIS FACE AGAINST VERTICAL PIECE OF KNEE BRACE GATE, OR AGAINST PIECE MARKED ⑪ AS APPLICABLE.

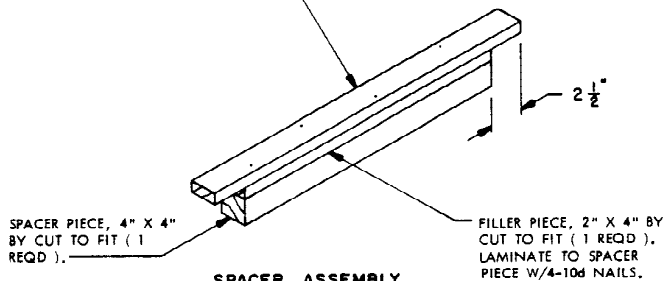
### GATE CONSTRUCTION DIMENSIONAL CHART

LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A	2-1/2"
B	LENGTH OR WIDTH OF UNIT MINUS 5-1/2".
C	11-1/4". SEE SPECIAL NOTE 3.
D	ONE-HALF THE UNIT HEIGHT PLUS 6" FOR UNITS CONSISTING OF 3 OR 4 LAYERS OF BOXES, OR TWO BOX HEIGHTS PLUS 8-3/4" FOR UNITS CONSISTING OF 5 OR MORE LAYERS OF BOXES. HORIZONTAL PIECE NOT REQUIRED AT THIS LOCATION FOR UNITS CONSISTING OF 1 OR 2 LAYERS.
E	UNIT HEIGHT PLUS 2-3/4". SEE SPECIAL NOTE 3.
F	UNIT HEIGHT PLUS 11-1/4".
G	LOAD HEIGHT MINUS 10" FOR UNITS 36" TO 56" HIGH, LOAD HEIGHT MINUS 8" FOR UNITS 32" TO 35-7/8" HIGH, OR LOAD HEIGHT MINUS 6" FOR UNITS LESS THAN 32" IN HEIGHT.
H	LOAD HEIGHT.

### SPECIAL NOTES:

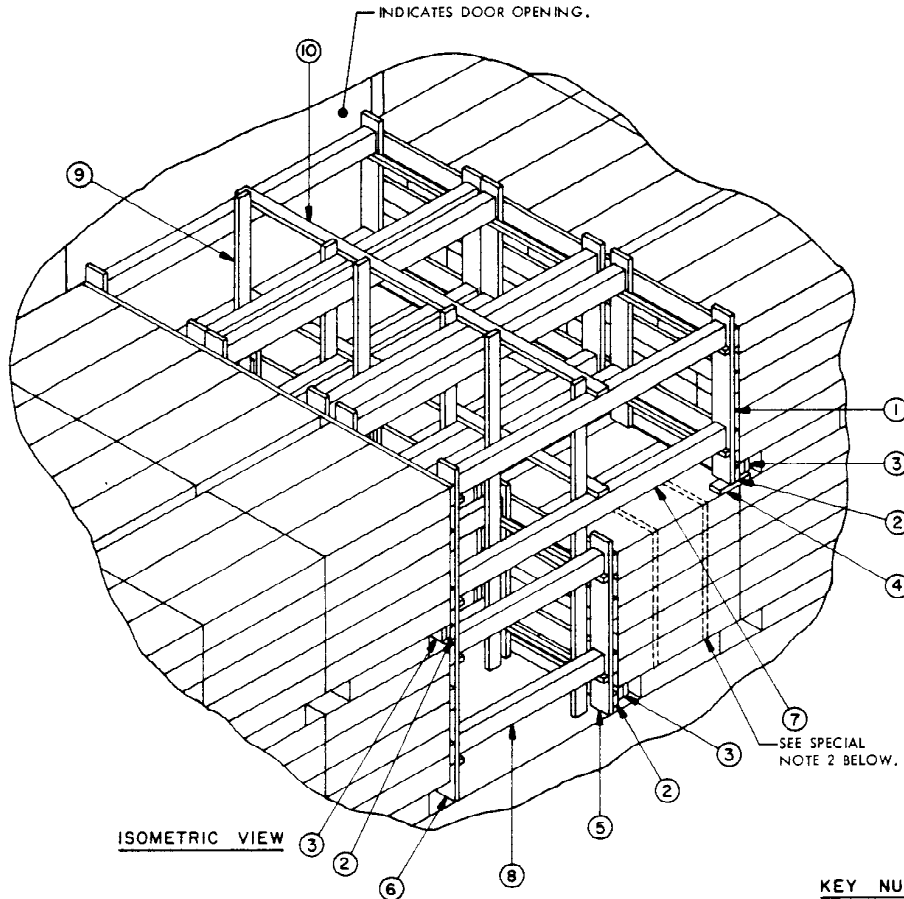
1. KNEE-BRACE GATES ARE FOR USE IN THE LOAD SHOWN ON PAGES 58 AND 59 FOR THE BRACING OF A PARTIAL TIER OF SKIDDED UNITS WHICH ARE 23" OR MORE IN HEIGHT.
2. THE KNEE-BRACE GATE SHOWN IS DESIGNED FOR BRACING A PARTIAL SECOND TIER OF A LOAD WHEN THE FIRST TIER IS COMPLETELY OR ALMOST COMPLETELY FILLED, AS TYPICALLY SHOWN IN THE LOAD ON PAGE 58. THE PRINCIPLES OF THE GATE DESIGN ARE ALSO APPLICABLE FOR THE CONSTRUCTION OF GATES FOR THE BRACING OF ANY PARTIAL TOP TIER.
3. FOR A KNEE-BRACE GATE FOR USE IN A LOAD CONSISTING OF MORE THAN TWO TIERS, THE LOWER PORTION OF THE GATE SHOWN SHOULD BE EXTENDED SO THAT THE DIMENSIONS MARKED "C" AND "D" FOR EACH ADDED TIER WILL BE THE SAME DISTANCE ABOVE THE NEXT LOWER TIER AS THEY ARE ABOVE THE CAR FLOOR FOR THE GATE SHOWN. DIMENSION "E" WILL BE UNIT HEIGHT FOR ALL TIERS EXCEPT THE TIER IMMEDIATELY BELOW THE PARTIAL TOP TIER. DIMENSION "F" WILL BE 11-1/4" ABOVE THE TOP OF THE NEXT LOWER TIER. ALL THE OTHER DIMENSIONS WILL BE AS INDICATED IN THE CHART ABOVE.

SUPPORT PIECE, 2" X 4" BY WIDTH OF VOID BETWEEN ROWS OF UNITS PLUS 5" (1 REQD). LAMINATE TO THE FILLER PIECE W/4-10d NAILS.



### SPACER ASSEMBLY

THIS ASSEMBLY IS DESIGNED FOR USE IN THE LOAD ON PAGE 58 AND IS IDENTIFIED THEREIN AS PIECE MARKED ⑬.



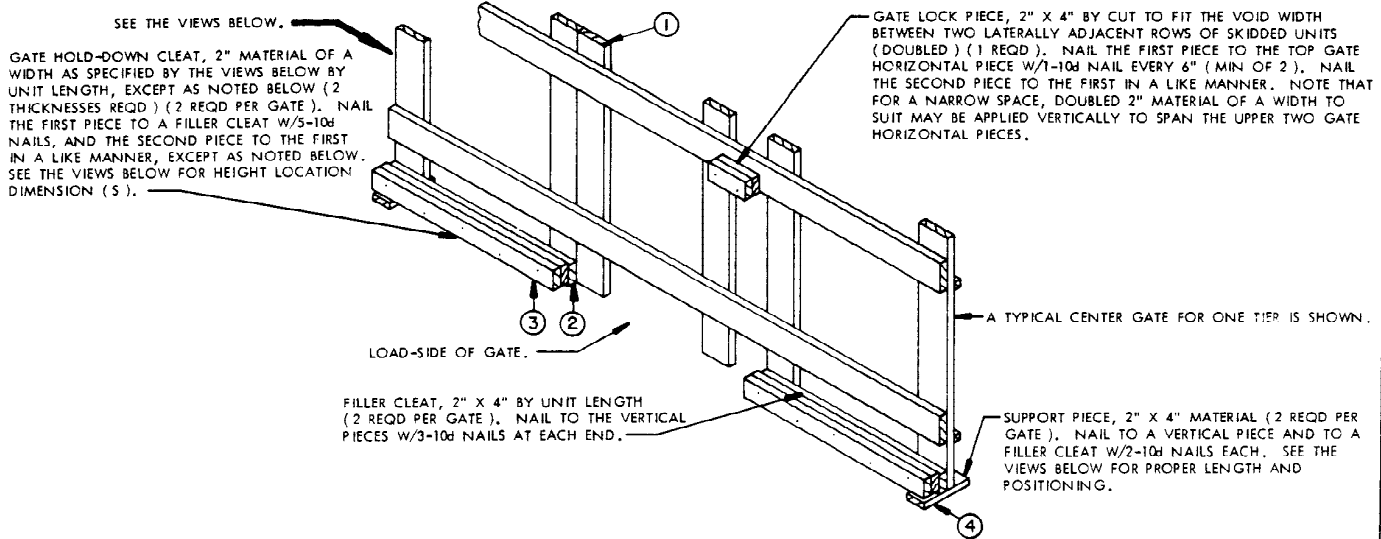
ISOMETRIC VIEW

**KEY NUMBERS**

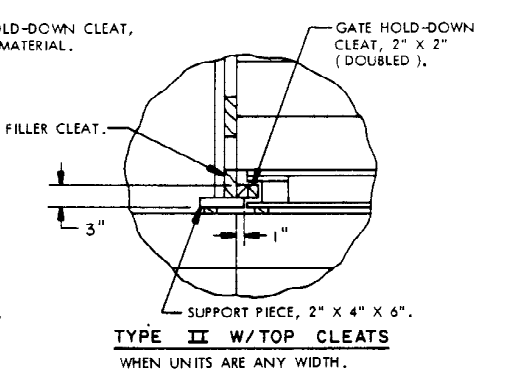
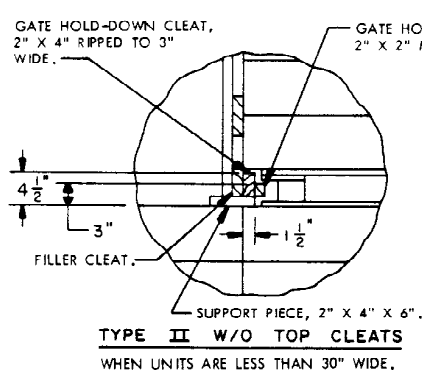
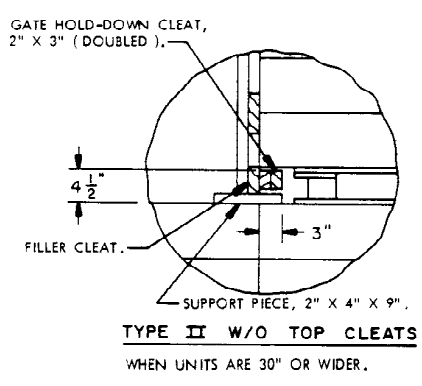
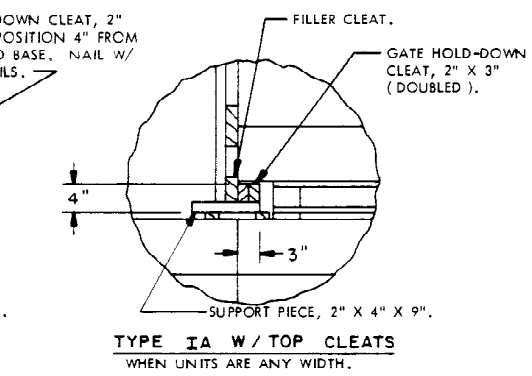
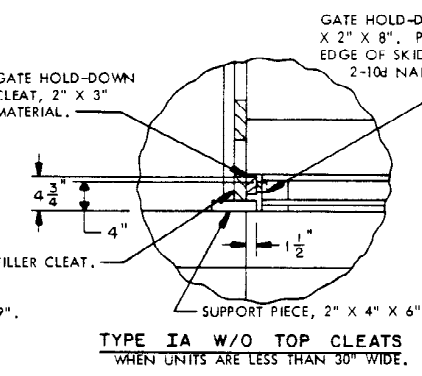
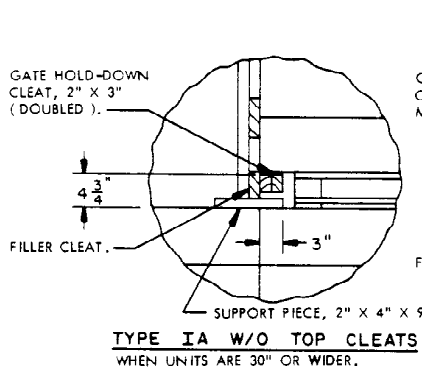
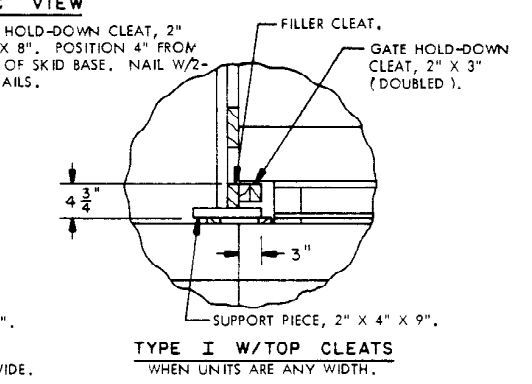
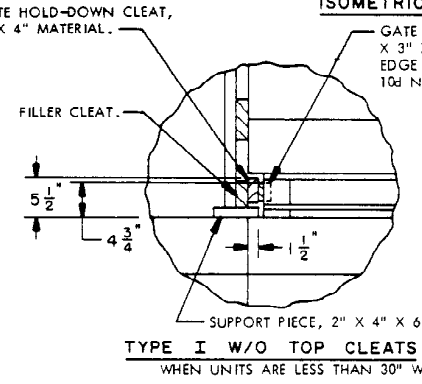
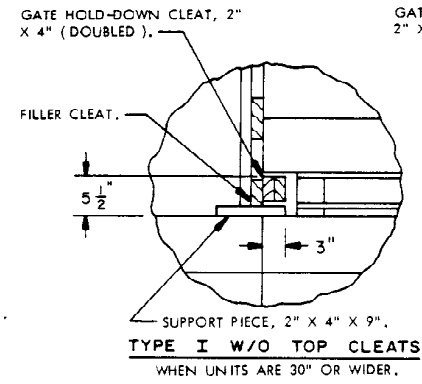
- ① CENTER GATE FOR UPPER TIER (1 REQD). SEE THE "CENTER GATE C" DETAIL ON PAGE 32 FOR CONSTRUCTION DIMENSIONS. SEE THE DETAILS ON PAGE 62 FOR GUIDANCE IN THE INSTALLATION OF PIECES MARKED ②, ③, AND ④. SEE SPECIAL NOTE 3 AT LEFT.
- ② FILLER CLEAT, 2" X 4" BY UNIT LENGTH (6 REQD). SEE SPECIAL NOTES 4 AND 5 AT LEFT.
- ③ GATE HOLD-DOWN CLEAT (6 REQD).
- ④ SUPPORT PIECE, 2" X 4" MATERIAL (2 REQD).
- ⑤ CENTER GATE FOR BOTTOM TIER (1 REQD). SEE THE "CENTER GATE C" DETAIL ON PAGE 32 FOR CONSTRUCTION DIMENSIONS. SEE THE DETAILS ON PAGE 63 FOR GUIDANCE IN THE INSTALLATION OF PIECES MARKED ② AND ③.
- ⑥ CENTER GATE FOR TWO TIERS HIGH (1 REQD). SEE THE "CENTER GATE C" DETAIL ON PAGE 32. APPLY PIECES MARKED ② AND ③ SO AS TO BE UNDER THE SECOND-TIER UNITS, SIMILAR TO THE APPLICATION SHOWN BY THE DETAILS ON PAGE 63.
- ⑦ STRUT, 4" X 6" BY CUT TO FIT (12 REQD). TOENAIL TO PIECES MARKED ① AND ⑥ W/2-10d NAILS AT EACH END. SEE SPECIAL NOTE 6 ON THIS PAGE.
- ⑧ STRUT, 4" X 6" BY CUT TO FIT (12 REQD). TOENAIL TO PIECES MARKED ⑤ AND ⑥ W/2-10d NAILS AT EACH END.
- ⑨ VERTICAL STRUT BRACING, 2" X 4" BY CUT TO EXTEND 3" ABOVE THE TOP STRUT (6 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.
- ⑩ HORIZONTAL STRUT BRACING, 2" X 4" BY CAR WIDTH MINUS 1/2" IN LENGTH (2 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.

**SPECIAL NOTES:**

1. THE PROCEDURES FOR THE ADJUSTMENT OF A LOAD QUANTITY BY THE OMISSION OF THE TOP TIER FROM A 3-WIDE LOAD UNIT ARE SHOWN AS TYPICAL. THE PRINCIPLES MAY ALSO BE APPLIED FOR THE OMISSION OF THE TOP TIER FROM A 2-WIDE OR A 4-WIDE LOAD UNIT OF EITHER LENGTHWISE-POSITIONED OR CROSSWISE-POSITIONED BOXES.
2. ONLY THE BLOCKING AND BRACING PIECES WHICH ARE NECESSARY TO PERMIT THE OMISSION OF THE UNITS FROM THE TOP TIER ARE SHOWN. THE ANTI-SWAY BRACING AND TOP-OF-LOAD ANTI-SWAY BRACING, AS REQUIRED, AND THE DOORWAY PROTECTION BLOCKING ARE NOT DEPICTED. REFER TO THE APPLICABLE LOAD PAGE FOR THE SPECIFICATIONS FOR THOSE ITEMS.
3. THE CENTER GATE C USED IS ONLY APPLICABLE FOR THE PARTICULAR LOAD DEPICTED. THE PROPER CENTER GATE TO BE USED WILL DEPEND UPON THE LOAD PATTERN OF THE LOAD IN WHICH THE QUANTITY IS BEING ADJUSTED.
4. THE METHOD OF CENTER GATE HOLD DOWN USED WITHIN THE FULL LOADS OF LENGTHWISE-POSITIONED BOXES (2" X 4" OR 2" X 3" MATERIAL ON EDGE AS PART OF AN ASSEMBLY WHICH EXTENDS UNDER SECOND-TIER UNITS ADJACENT TO THE CENTER GATES) CANNOT BE USED FOR 1-TIER LOADS OR FOR GATES IN THE TOP 1-TIER PORTIONS OF A LOAD. PIECES MARKED ② AND ③ SHOWN ABOVE, AND ALSO PIECE MARKED ④ FOR A GATE IN A TOP TIER, ARE TO BE USED IN LIEU THEREOF. PIECES MARKED ② AND ③ MUST ALSO BE USED ON THE 2-TIER GATE, PIECE MARKED ⑥ IN THE ABOVE LOAD. WHEN ADJUSTING A LOAD OF CROSSWISE-POSITIONED BOXES, THE GATE HOLD DOWN PIECES ARE A PART OF THE APPLICABLE GATES AND THEY CAN BE USED WITHOUT ALTERATION.
5. THE TYPE OF SKID BASE ON WHICH THE UNITS ARE ASSEMBLED, THE LENGTH OF THE BOXES ON THE UNIT, AND/OR WHETHER OR NOT THE BOXES HAVE TOP CLEATS, WILL CAUSE A VARIANCE IN THE APPLICATION OF HOLD DOWNS AND/OR SUPPORT PIECES FOR THE CENTER GATES IN A 1-TIER PORTION OF A LOAD. REFER TO PAGE 62 FOR GUIDANCE IN APPLYING HOLD DOWNS AND SUPPORT PIECES TO A 1-TIER GATE FOR USE IN THE TOP TIER OF A LOAD. REFER TO PAGE 63 FOR GUIDANCE IN APPLYING HOLD DOWNS TO A 1-TIER GATE FOR USE IN THE BOTTOM TIER OF A LOAD.
6. THE LENGTH OF THE LOWER LEVEL OF STRUTS AND/OR WIDTH OF THE OMITTED UNITS MAY REQUIRE THAT MORE THAN ONE SET OF VERTICAL STRUT BRACING BE INSTALLED. TO PROTECT THE LADING FROM BEING PUNCTURED WHEN A SET OF VERTICAL STRUT BRACING IS INSTALLED ABOVE THE LOWER TIERS OF A LOAD, A SUITABLE LENGTH PAD OF 2" X 4" OR 2" X 6" MATERIAL MUST BE POSITIONED UNDER AND SECURED TO EACH APPLICABLE VERTICAL STRUT BRACING PIECE.



**ISOMETRIC VIEW**



SEE THE VIEWS BELOW.

GATE HOLD-DOWN CLEAT, 2" MATERIAL OF A WIDTH AS SPECIFIED BY THE VIEWS BELOW BY UNIT LENGTH, EXCEPT AS NOTED BELOW (2 THICKNESSES REQD) (2 REQD PER GATE). NAIL THE FIRST PIECE TO A FILLER CLEAT W/5-10d NAILS, AND THE SECOND PIECE TO THE FIRST IN A LIKE MANNER, EXCEPT AS NOTED BELOW. SEE THE VIEWS BELOW FOR HEIGHT LOCATION DIMENSION (5).

GATE LOCK PIECE, 2" X 4" BY CUT TO FIT THE VOID WIDTH BETWEEN TWO LATERALLY ADJACENT ROWS OF SKIDDED UNITS (DOUBLED) (1 REQD). NAIL THE FIRST PIECE TO THE TOP GATE HORIZONTAL PIECE W/1-10d NAIL EVERY 6" (MIN OF 2). NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. NOTE THAT FOR A NARROW SPACE, DOUBLED 2" MATERIAL OF A WIDTH TO SUIT MAY BE APPLIED VERTICALLY TO SPAN THE UPPER TWO GATE HORIZONTAL PIECES.

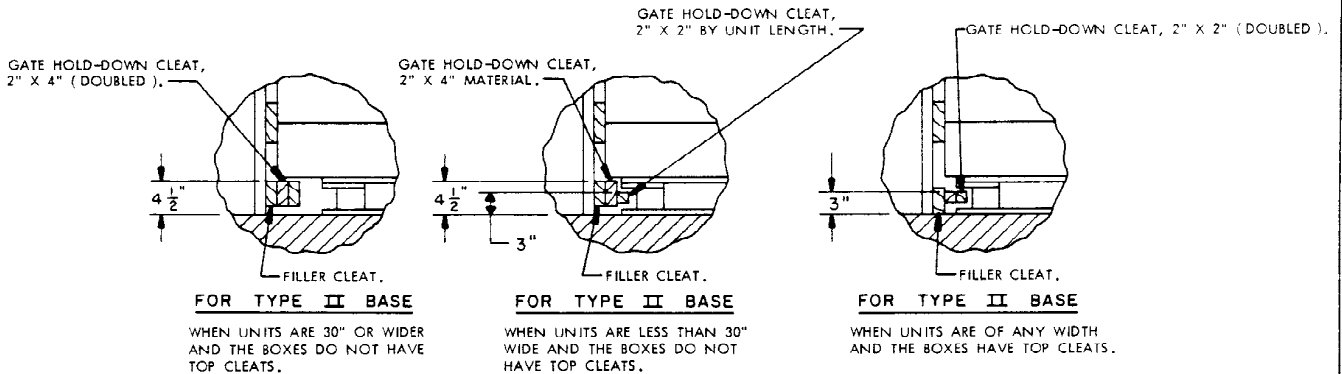
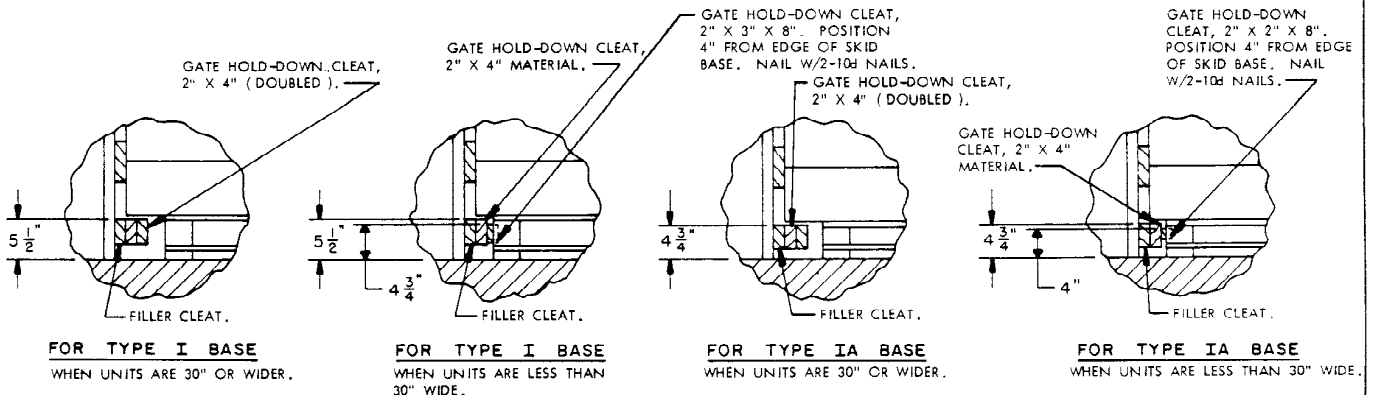
LOAD-SIDE OF GATE.

A TYPICAL CENTER GATE FOR ONE TIER IS SHOWN.

FILLER CLEAT, 2" X 4" BY UNIT LENGTH (2 REQD PER GATE). NAIL TO THE VERTICAL PIECES W/ 3-10d NAILS AT EACH END.

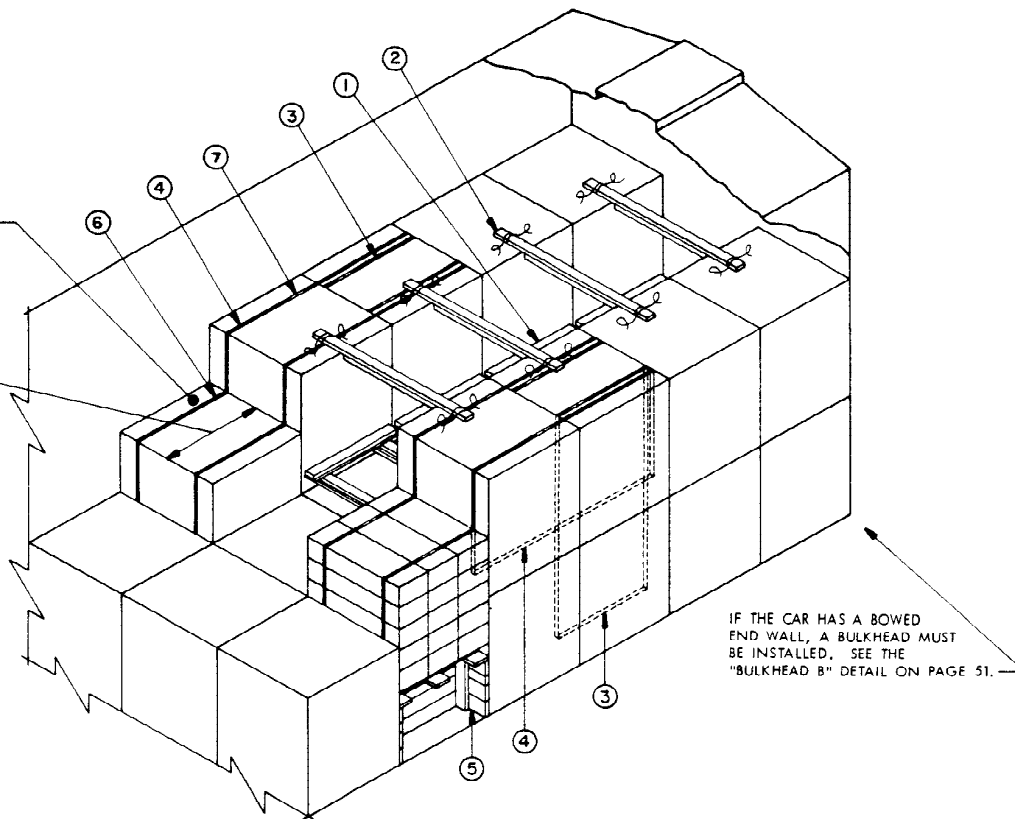
**ISOMETRIC VIEW**

DEPICTED ABOVE IS A TYPICAL CENTER GATE, WITH THE HOLD DOWNS SHOWN WHICH ARE APPLICABLE FOR USE WHEN THE UNITS BEING BRACED ARE 30" OR WIDER AND ARE ASSEMBLED ON THE TYPE I SKID BASE.



THE UNIT STRAPS ARE OMITTED FOR CLARITY.

LENGTH OF UNIT, SEE SPECIAL NOTE 4 ON PAGE 65.



IF THE CAR HAS A BOWED END WALL, A BULKHEAD MUST BE INSTALLED. SEE THE "BULKHEAD B" DETAIL ON PAGE 51.

ISOMETRIC VIEW

KEY NUMBERS

- ① ANTI-SWAY BRACE ( 4 REQD ). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 52. INSTALL BETWEEN THE LATERALLY ADJACENT ROWS OF SKIDDED UNITS IN THE SECOND LAYER. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTE 5 ON PAGE 69.
- ② TOP-OF-LOAD ANTI-SWAY BRACE ( 4 REQD ). SEE THE DETAIL AND THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57. WIRE TIE EACH END TO A SKID STRAP OF A UNIT WITH NO. 14 GAGE WIRE AS SHOWN ON THAT PAGE.
- ③ VERTICAL UNITIZING STRAP, 1-1/4" X .035" X 22'-0" LONG ( REF ) STEEL STRAPPING ( 4 REQD, 2 PER STACK ). INSTALL SO AS TO ENCIRCLE THE TWO SKIDDED UNITS, AND SEAL THE JOINT W/2 SEALS, PRIOR TO FINAL POSITIONING OF THE STACK IN THE CAR. SEE SPECIAL NOTE 8 ON PAGE 65.
- ④ HORIZONTAL UNITIZING STRAP, 1-1/4" X .035" X 21'-0" LONG ( REF ) STEEL STRAPPING ( 4 REQD ). PRE-POSITION AROUND THE TOP UNIT OF THE UNITIZED 2-HIGH STACK. INSTALL SO AS TO ENCIRCLE THE TWO LONGITUDINALLY ADJACENT SKIDDED UNITS, AND SEAL THE JOINT W/2 SEALS.
- ⑤ RISER ( 2 REQD ). SEE THE "RISER A" DETAIL ON PAGE 66. SEE SPECIAL NOTE 6 ON PAGE 65.
- ⑥ REINFORCING STRAP, 1-1/4" X .035" X 14'-0" LONG ( REF ) STEEL STRAPPING ( 4 REQD ). INSTALL NEAR POSTS OF SKID BASE AND SO AS TO ENCIRCLE THE SKIDDED UNIT. SEAL THE JOINT W/2 SEALS.
- ⑦ SEAL FOR 1-1/4" STRAPPING ( 24 REQD, 2 PER STRAP ). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "J" ON PAGE 2.



SPECIAL NOTES:

( SPECIAL NOTES CONTINUED )

1. A 9'-6" WIDE CONVENTIONAL TYPE ALL-METAL BOX CAR IS SHOWN. ALL-METAL OR WOOD-LINED CARS OF OTHER WIDTHS CAN BE USED.
2. THE RISER METHOD OF PARTIAL-LAYER BRACING MAY BE USED IN ALL-METAL CARS OR IN WOOD-LINED CARS FOR THE SECUREMENT OF A PARTIAL TOP TIER OF NOT MORE THAN 16,000 POUNDS (2,000 POUNDS IN EACH ROW WHICH IS RETAINED BY A RISER). THE TOP TIER CAN BE A SECOND TIER, THIRD TIER, OR OTHER. HOWEVER, THE RISERS MUST ALWAYS BE POSITIONED ON THE CAR FLOOR.
3. THE SKIDDED UNIT SHOWN IN THE TYPICAL LCL LOAD ON PAGE 64 HAS OVERALL DIMENSIONS OF 36-1/2" LONG BY 37" WIDE BY 43" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER SIZES.
4. THE LOAD PATTERN FOR A LOAD, SUCH AS 2-WIDE, 3-WIDE, OR 4-WIDE, WILL DEPEND UPON THE DIMENSION OF THE UNIT WHICH IS POSITIONED ACROSS THE CAR. A 3-WIDE ( BOXES CROSSWISE ) LOAD IS SHOWN AS TYPICAL. THE LOADING PRINCIPLES CAN BE ADAPTED FOR PARTIAL-LAYER BRACING FOR ANY OF THE LOADS SHOWN ON PAGES 6 THRU 22.
5. ANTI-SWAY BRACING FOR A LOAD MAY BE OMITTED IF THE SPACE BETWEEN LATERALLY ADJACENT UNITS IS NOT MORE THAN THE DISTANCE SPECIFIED IN THE "ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 52, FOR THE TYPE OF SKID BASE BEING LOADED. SEE SPECIAL NOTE 3 ON PAGE 7 FOR GUIDANCE AS TO THE PROPER ANTI-SWAY BRACE TO BE USED FOR UNITS HAVING THE BOXES CROSSWISE. IF THE UNITS ARE LOADED WITH THE BOXES LENGTHWISE IN THE CAR, ANTI-SWAY BRACE C WILL BE USED IN LIEU OF THE DEPICTED ASSEMBLY WHEN ANTI-SWAY BRACING IS REQUIRED.
6. THE PROPER RISER TO BE USED IN A LOAD WILL BE DEPENDENT UPON THE TYPE OF SKID BASE BEING LOADED AND/OR THE CONFIGURATION OF THE BOXES IN THE UNIT. THE "RISER A" SHOWN IN THE LOAD VIEW IS DESIGNED FOR USE WITH SKIDDED UNITS WHICH ARE TO BE POSITIONED WITH THE BOXES CROSSWISE IN THE CAR WHEN THE BOXES ARE ASSEMBLED ON THE TYPE I OR IA SKID BASES OR ON THE SKID BASE DEPICTED BY DRAWING D-AMXSV-4163. THE "RISER B" IS FOR USE WITH UNITS POSITIONED SO THAT THE BOXES ARE CROSSWISE IN THE CAR WHEN THE BOXES HAVE TOP CLEATS AND ARE ASSEMBLED ON THE TYPE II SKID BASE. THE "RISER C" IS ALSO FOR USE WITH UNITS POSITIONED SO THAT THE BOXES ARE CROSSWISE IN THE CAR BUT WHEN THE BOXES ARE WITHOUT TOP CLEATS AND ARE ASSEMBLED ON THE TYPE II SKID BASE. SEE THE RISER DETAILS ON PAGE 66 FOR CONSTRUCTION GUIDANCE. WHEN SKIDDED UNITS ARE POSITIONED SO THAT THE BOXES ARE LENGTHWISE IN THE CAR, "RISER D" WILL BE USED IF THE BOXES ARE ASSEMBLED ON THE TYPE II SKID BASE, AND "RISER E" WILL BE USED IF THE BOXES ARE ASSEMBLED ON THE TYPE I OR TYPE IA SKID BASES OR ON THE SKID BASE DEPICTED BY DRAWING D-AMXSV-4163. SEE THE RISER DETAILS ON PAGE 67 FOR CONSTRUCTION GUIDANCE. SEE SPECIAL NOTE 7 BELOW.
7. IN LIEU OF CONSTRUCTING RISER ASSEMBLIES TO BE USED FOR THE BRACING OF AN LCL LOAD AS SHOWN ON PAGE 64, PARTIAL-HEIGHT SKIDDED UNITS MAY BE USED AS RISER UNITS. A SKIDDED UNIT TO BE USED IN LIEU OF A RISER MUST HAVE THE EXACT NUMBER OF LAYERS OF BOXES AS SPECIFIED IN THE "RISER UNITS" CHART BELOW, BASED ON THE NUMBER OF LAYERS IN THE BASIC UNIT ( THE UNITS IN THE BALANCE OF THE LOAD ). NEWLY-FORMED UNITS MUST BE ASSEMBLED ON THE SAME TYPE SKID BASE AS THE UNITS IN THE REMAINDER OF THE CAR, AND ALSO MUST HAVE SKID STRAPS AND UNITIZING STRAPS APPLIED IN THE SAME QUANTITY AND IN THE SAME POSITION. IF ALREADY-ASSEMBLED UNITS ARE BROKEN DOWN TO FORM RISER UNITS, THE SEALS ON THE SKID STRAPS AND ON THE UNITIZING STRAPS OF THE PARENT UNIT SHOULD BE CUT OFF AND THE STRAPS RE-TENSIONED AND SEALED AFTER REMOVING THE REQUIRED NUMBER OF LAYERS OF BOXES. SKIDDED UNITS CONSISTING OF AN EVEN NUMBER OF LAYERS OF BOXES CAN BE DIVIDED EQUALLY TO FORM TWO RISER UNITS. SKIDDED UNITS CONSISTING OF AN ODD NUMBER OF LAYERS CAN BE BROKEN DOWN TO FORM TWO RISER UNITS WITH ONE LAYER REMAINING. THIS REMAINING LAYER CAN BE COMBINED WITH OTHER REMAINING LAYERS TO FORM A RISER UNIT, OR CAN BE ASSEMBLED ON A SKID BASE AND SECURED ON TOP OF THE UPPER LAYER IN A LOAD AS SHOWN BY THE "SECUREMENT OF PARTIAL UNIT ON TOP" DETAIL ON PAGE 78. IF ONE OR MORE TOP LAYERS ARE ROBBED FROM A FULL UNIT OF CROSSWISE-POSITIONED BOXES IN MAKING UP RISER UNITS, THE REMAINING LESS-THAN-FULL UNIT CAN BE PLACED WITHIN THE LOAD, FOLLOWING THE PROCEDURES SHOWN BY THE "POSITIONING OF PARTIAL UNIT ( BOXES CROSSWISE ) WITHIN A TIER" DETAIL ON PAGE 79, PROVIDING THE NUMBER OF LAYERS OF BOXES ON A UNIT IS NOT LESS THAN THE MINIMUM SPECIFIED IN THE "PARTIAL UNIT WITHIN A TIER ( LAYER )" CHART ON THAT PAGE. IF UNITS ARE POSITIONED IN THE CAR SO THAT THE BOXES ARE LENGTHWISE AND ONE OR MORE TOP LAYERS ARE REMOVED TO MAKE UP A RISER UNIT, THE REMAINING LESS-THAN-FULL UNIT CAN BE PLACED WITHIN THE LOAD. HOWEVER, A FILLER

MUST BE CONSTRUCTED TO TAKE THE PLACE OF THE REMOVED LAYERS. REFER TO THE "POSITIONING OF PARTIAL UNIT ( BOXES LENGTHWISE ) WITHIN A TIER" DETAIL AND THE ACCOMPANYING SPECIAL NOTES ON PAGE 80 FOR GUIDANCE. NOTE THAT THE SHIPPING PAPERS FOR A LOAD MUST BE PROPERLY ANNOTATED TO DENOTE THE PRESENCE OF THESE PARTIAL UNITS.

8. THE POSITIONING OF THE VERTICAL UNITIZING STRAPS AND THE HORIZONTAL UNITIZING STRAPS, PIECES MARKED ③ AND ④, RESPECTIVELY, IS APPLICABLE FOR LCL LOADS WHICH ARE AT LEAST TWO LOAD UNITS LONG IN THE UPPERMOST TIER. IF THE UPPERMOST TIER IS ONLY ONE LOAD UNIT IN LENGTH, PIECE MARKED ③ WILL BE INSTALLED SO AS TO ENCIRCLE A STACK IN THAT LOAD UNIT, AND PIECES MARKED ④ WILL NOT BE REQUIRED.

( SPECIAL NOTES CONTINUED AT RIGHT )

RISER UNITS	
NO. OF LAYERS IN BASIC UNIT	NO. OF LAYERS TO BE USED FOR A RISER UNIT
2	1
3	1
4	2
5	2
6	3
7	3
8	4

DECKING, 2" X 6" BY UNIT WIDTH IN LENGTH (3 REQD.). NAIL TO THE CROSS BRACES W/2-10d NAILS AT EACH JOINT.

CROSS-BRACE CLEAT, 2" X 4" BY CUT TO FIT (4 REQD.). NAIL TO THE CROSS BRACES W/3-10d NAILS AT EACH JOINT.

STOP PIECE, 2" X 2" BY UNIT LENGTH MINUS 1/2" (1 REQD.). NAIL TO THE DECKING PIECES W/2-10d NAILS AT EACH JOINT.

BOX END TO SKID BASE PLUS 1"

BOX END TO SKID BASE MINUS 1/2"

LATERAL-PIECE CLEAT, 2" X 4" BY CUT TO FIT (4 REQD.). NAIL TO THE LATERAL PIECES W/3-10d NAILS AT EACH JOINT.

ONE-HALF UNIT HEIGHT

POSITION RISER SO THAT THIS SIDE IS ADJACENT TO THE CAR SIDEWALL.

UNIT LENGTH MINUS 1/2"

CROSS BRACE, 2" THICK BY UNIT LENGTH MINUS 3-1/2" BY A WIDTH AS REQUIRED TO PROVIDE FOR A HEIGHT OF 1-1/2" LESS THAN ONE-HALF THE UNIT HEIGHT (2 REQD.).

UNIT WIDTH

LATERAL PIECE, 2" THICK BY UNIT WIDTH IN LENGTH BY A WIDTH AS REQUIRED TO PROVIDE FOR A HEIGHT OF 1-1/2" LESS THAN ONE-HALF THE UNIT HEIGHT (2 REQD.). NAIL TO THE CROSS-BRACE CLEATS W/10d NAILS AS SHOWN.

### RISER A

THIS RISER IS DESIGNED FOR USE WITHIN LOADS OF SKIDDED UNITS HAVING THE BOXES CROSSWISE IN THE CAR, WHEN THE BOXES ARE ASSEMBLED ON THE TYPE I OR TYPE IA SKID BASE OR ON THE SKID BASE DEPICTED BY DRAWING D-AMXSV-4163. SEE SPECIAL NOTES 6 AND 7 ON PAGE 65.

CROSS BRACE, 2" THICK BY UNIT LENGTH MINUS 3-1/2" BY A WIDTH AS REQUIRED TO PROVIDE FOR A HEIGHT OF 1-1/2" LESS THAN ONE-HALF THE UNIT HEIGHT (2 REQD.).

- A PLUS OR MINUS 2" TOLERANCE IS PERMISSIBLE ON THIS HEIGHT DIMENSION FOR RISERS A, B, AND C.

LATERAL PIECE, 2" THICK BY UNIT WIDTH IN LENGTH BY A WIDTH AS REQUIRED TO PROVIDE FOR A HEIGHT OF 1-1/2" LESS THAN ONE-HALF THE UNIT HEIGHT (2 REQD.). NAIL TO THE CROSS-BRACE CLEATS W/10d NAILS AS SHOWN.

DECKING, 2" X 6" BY UNIT WIDTH IN LENGTH (3 REQD.). NAIL TO THE CROSS BRACES W/2-10d NAILS AT EACH JOINT.

CROSS BRACE, 2" THICK BY UNIT LENGTH MINUS 3-1/2" BY A WIDTH AS REQUIRED TO PROVIDE FOR A HEIGHT OF 1-1/2" LESS THAN ONE-HALF THE UNIT HEIGHT (2 REQD.).

CROSS-BRACE CLEAT, 2" X 4" BY CUT TO FIT (4 REQD.). NAIL TO THE CROSS BRACES W/3-10d NAILS AT EACH JOINT.

BOX END TO SKID BASE PLUS 4"

STOP PIECE, 2" X 2" BY UNIT LENGTH MINUS 1/2" (1 REQD.). NAIL TO THE DECKING PIECES W/2-10d NAILS AT EACH JOINT.

BOX END TO SKID BASE MINUS 1/2"

LATERAL PIECE, 2" THICK BY UNIT WIDTH IN LENGTH BY A WIDTH AS REQUIRED TO PROVIDE FOR A HEIGHT OF 1-1/2" LESS THAN ONE-HALF THE UNIT HEIGHT (2 REQD.). NAIL TO THE CROSS-BRACE CLEATS W/10d NAILS AS SHOWN.

LATERAL-PIECE CLEAT, 2" X 4" BY CUT TO FIT (4 REQD.). NAIL TO THE LATERAL PIECES W/3-10d NAILS AT EACH JOINT.

POSITION RISER SO THAT THIS SIDE IS ADJACENT TO THE CAR SIDEWALL.

UNIT WIDTH

UNIT LENGTH MINUS 1/2"

### RISER C

THIS RISER IS DESIGNED FOR USE WITHIN LOADS OF SKIDDED UNITS HAVING THE BOXES CROSSWISE IN THE CAR, WHEN THE BOXES DO NOT HAVE TOP CLEATS AND ARE ASSEMBLED ON THE TYPE II SKID BASE. SEE SPECIAL NOTES 6 AND 7 ON PAGE 65.

CROSS-BRACE CLEAT, 2" X 4" BY CUT TO FIT (4 REQD.). NAIL TO THE CROSS BRACES W/3-10d NAILS AT EACH JOINT.

BOX END TO SKID BASE PLUS 4"

STOP PIECE, 1" X 1" BY UNIT LENGTH MINUS 1/2" (1 REQD.). NAIL TO THE DECKING PIECES W/2-6d NAILS AT EACH JOINT.

LATERAL-PIECE CLEAT, 2" X 4" BY CUT TO FIT (4 REQD.). NAIL TO THE LATERAL PIECES W/3-10d NAILS AT EACH JOINT.

ONE-HALF UNIT HEIGHT

UNIT WIDTH

UNIT LENGTH MINUS 1/2"

POSITION RISER SO THAT THIS SIDE IS ADJACENT TO THE CAR SIDEWALL.

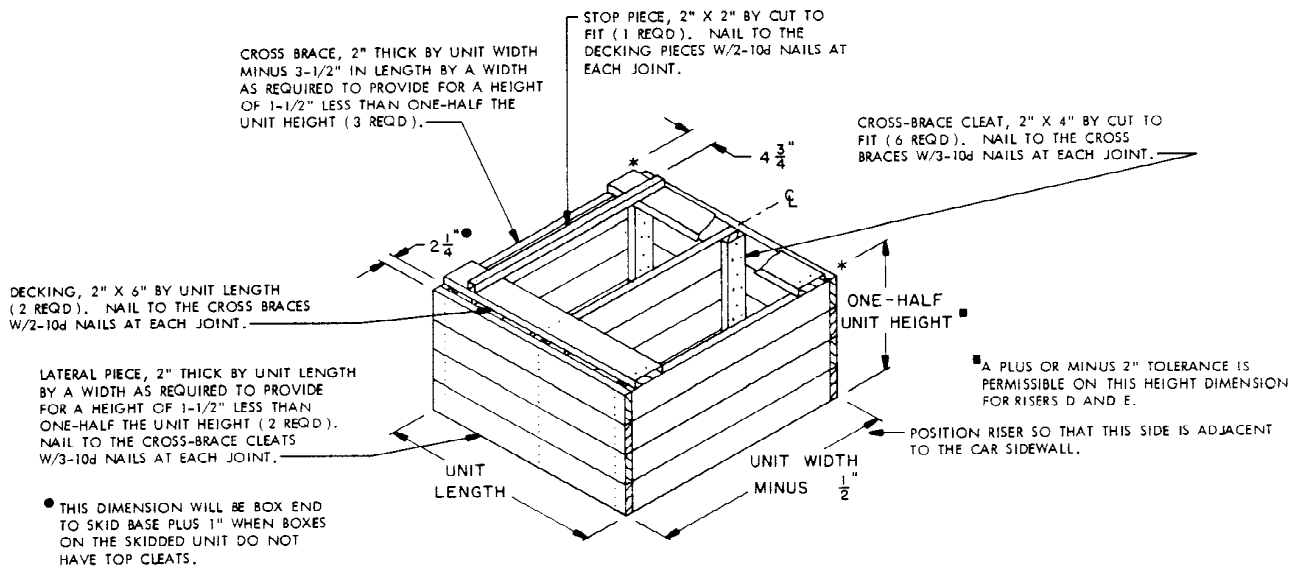
### RISER B

THIS RISER IS DESIGNED FOR USE WITHIN LOADS OF SKIDDED UNITS HAVING THE BOXES CROSSWISE IN THE CAR, WHEN THE BOXES HAVE TOP CLEATS AND ARE ASSEMBLED ON THE TYPE II SKID BASE. SEE SPECIAL NOTES 6 AND 7 ON PAGE 65.

ONE-HALF UNIT HEIGHT

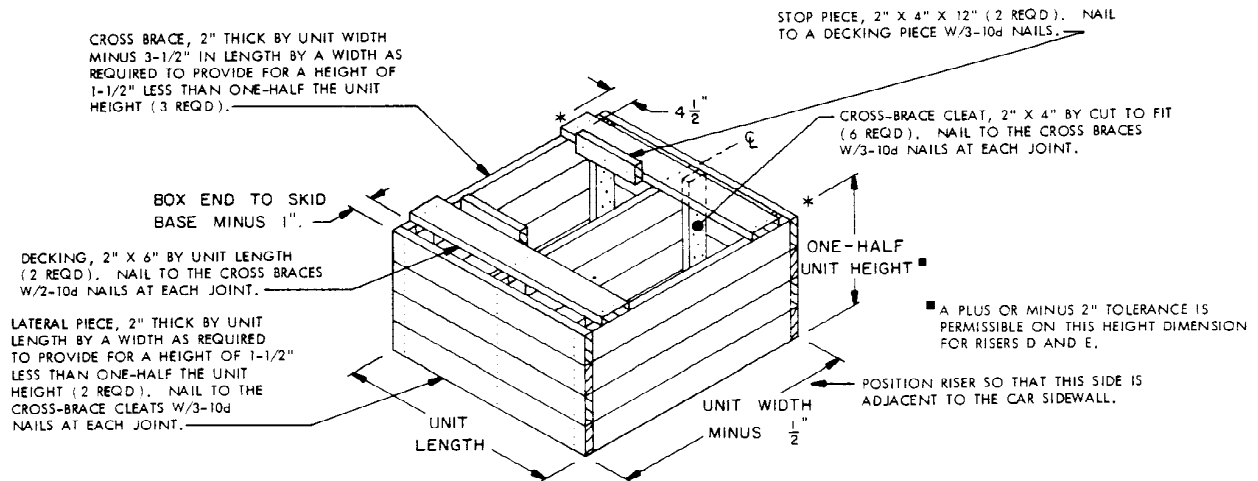
UNIT WIDTH

UNIT LENGTH MINUS 1/2"



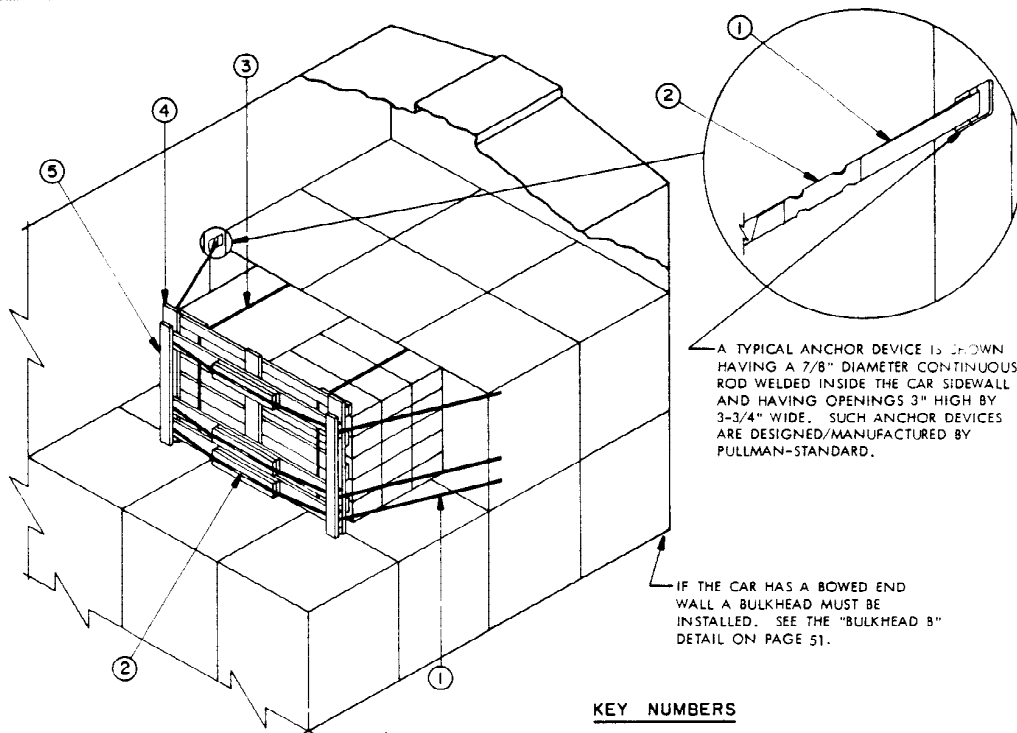
### RISER D

THIS RISER IS DESIGNED FOR USE WITHIN LOADS OF SKIDDED UNITS HAVING THE BOXES LENGTHWISE IN THE CAR, WHEN THE BOXES ARE ASSEMBLED ON THE TYPE II SKID BASE. SEE SPECIAL NOTES 6 AND 7 ON PAGE 65.



### RISER E

THIS RISER IS DESIGNED FOR USE WITHIN LOADS OF SKIDDED UNITS HAVING THE BOXES LENGTHWISE IN THE CAR, WHEN THE BOXES ARE ASSEMBLED ON THE TYPE I OR IA SKID BASE OR ON THE SKID BASE DEPICTED BY DRAWING D-AMXSV-4163. SEE SPECIAL NOTES 6 AND 7 ON PAGE 65.



A TYPICAL ANCHOR DEVICE IS SHOWN HAVING A 7/8" DIAMETER CONTINUOUS ROD WELDED INSIDE THE CAR SIDEWALL AND HAVING OPENINGS 3" HIGH BY 3-3/4" WIDE. SUCH ANCHOR DEVICES ARE DESIGNED/MANUFACTURED BY PULLMAN-STANDARD.

IF THE CAR HAS A BOWED END WALL A BULKHEAD MUST BE INSTALLED. SEE THE "BULKHEAD B" DETAIL ON PAGE 51.

**KEY NUMBERS**

**SPECIAL NOTES:**

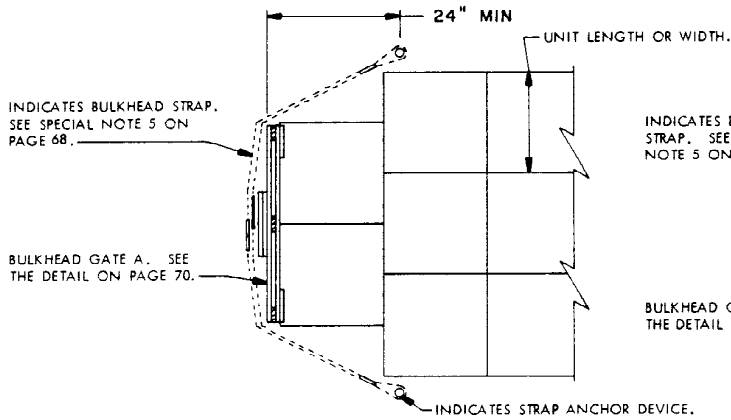
**ISOMETRIC VIEW**

1. A 9'-6" WIDE ALL-METAL BOX CAR EQUIPPED WITH STRAP ANCHOR DEVICES AND HAVING AN AAR MECHANICAL DESIGNATION CLASS OF XL IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED.
2. THE LOAD SHOWN DEPICTING THE BULKHEAD GATE METHOD OF PARTIAL-LAYER (TIER) BRACING IS TYPICAL. THE PROCEDURES ARE APPLICABLE FOR UNITS HAVING THE BOXES EITHER CROSSWISE OR LENGTHWISE (UNLESS OTHERWISE STATED) AND FOR VARIOUS LOAD PATTERNS. REFER TO PAGE 69 FOR LOAD PATTERN VIEWS, THEIR APPLICATION, AND ANY LIMITATIONS WHICH MUST BE OBSERVED.
3. A BULKHEAD GATE USED IN CONJUNCTION WITH THREE (3) BULKHEAD STRAPS WILL RETAIN UP TO 18,000 POUNDS OF LADING; A BULKHEAD GATE WITH TWO (2) STRAPS WILL RETAIN NOT MORE THAN 12,000 POUNDS.
4. THE ANCHOR DEVICES TO BE USED FOR THE ATTACHMENT OF THE BULKHEAD STRAPS FOR THE SECUREMENT OF A 2-WIDE PORTION OF A 3-WIDE LOAD MUST BE LOCATED AT LEAST 24" TOWARD THE CAR END WALL FROM THE OPPOSITE-THE-LOAD SIDE OF THE BULKHEAD GATE. THE ANCHOR DEVICES FOR ALL THE OTHER LOAD PATTERNS MUST BE LOCATED AT LEAST 6" TOWARD THE CAR END WALL FROM THE OPPOSITE-THE-LOAD SIDE OF THE BULKHEAD GATE.
5. BULKHEAD STRAPS WILL BE TWO INCH (2") WIDE STEEL STRAPPING; 1-1/4" STRAPPING MUST NOT BE USED. A BULKHEAD STRAP WILL BE OF A LENGTH TO SUIT AND WILL BE THREADED THRU THE ANCHOR DEVICE (PRIOR TO POSITIONING THE ADJACENT UNITS) FAR ENOUGH TO PROVIDE FOR ONE LEG BEING APPROXIMATELY 48" LONGER THAN THE OTHER. THE STRAP ATTACHED TO THE MATING ANCHOR DEVICE WILL HAVE THE OPPOSITE LEG EXTENDING 48". THE TWO LEGS OF EACH HALF OF A STRAP WILL BE SECURED NEAR THE ANCHOR DEVICE WITH ONE DOUBLE CRIMPED SEAL. NOTE THAT THIS SEAL MUST BE POSITIONED EITHER CLOSE ENOUGH TO OR FAR ENOUGH AWAY FROM THE ANCHOR DEVICE SO AS NOT TO BE AT THE POINT WHERE THE STRAP BENDS AROUND THE END OF THE BULKHEAD GATE OR AROUND THE CORNER OF THE ADJACENT UNIT. THE STRAP ENDS OF EACH PAIR OF LONG AND SHORT LEGS WILL BE SECURED WITH TWO (2) SEALS BUTTED TOGETHER AND DOUBLE CRIMPED.
6. THE PROPER BULKHEAD GATE TO BE USED FOR A LOAD WILL BE DEPENDENT UPON THE CONFIGURATION OF THE LOAD. BULKHEAD GATE A IS FOR USE AGAINST A 2-WIDE PORTION OF A LOAD WHEN THERE IS NO LATERAL VOID. BULKHEAD GATE C WILL BE USED FOR 2-WIDE LOADS HAVING A LATERAL VOID, AND BULKHEAD GATE B IS FOR USE AGAINST LOADS WHICH ARE THREE UNITS WIDE. IF THE LADING WEIGHT TO BE RETAINED REQUIRES THE ADDITION OF A STRAPPING BOARD AT HEIGHT "J" TO EITHER OF THE GATES ONLY SHOWING TWO STRAPPING BOARDS, A HORIZONTAL PIECE MUST BE PRESENT (OR ADDED) AT HEIGHT "F" TO PROVIDE PROPER BEARING ON UNIT.
7. THE STRAPPING BOARDS ON A BULKHEAD GATE ARE TO BE ALIGNED AS NEARLY AS POSSIBLE WITH THE ANCHOR DEVICES IN THE CAR TO WHICH THE BULKHEAD STRAPS ARE ATTACHED. A TOLERANCE IS ALLOWED ON DIMENSIONS "G", "H", AND "J" TO PROVIDE FOR THIS ALIGNMENT.

- ① BULKHEAD STRAP, 2" X .050" X 34'-0" LONG (REF) STEEL STRAPPING (3 REQD). INSTALL FROM TWO EQUAL LENGTH PIECES. SEE THE "LOAD PATTERN/STRAP APPLICATION PLAN A" ON PAGE 69 FOR INSTALLATION GUIDANCE. SEE SPECIAL NOTES 3 THRU 5 AT LEFT.
- ② SEAL FOR 2" STRAPPING (18 REQD, 6 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "J" ON PAGE 2.
- ③ BUNDLING STRAP, 1-1/4" X .035" X 15'-0" LONG (REF) STEEL STRAPPING (2 REQD). ENCIRCLE SKIDDED UNIT AND HORIZONTAL PIECES OF THE BULKHEAD GATE. SEAL THE STRAP JOINT W/1 SEAL.
- ④ BULKHEAD GATE (1 REQD). SEE THE "BULKHEAD GATE A" DETAIL ON PAGE 70. SEE SPECIAL NOTE 6 AT LEFT.
- ⑤ STRAP RETAINER, 2" X 4" BY A LENGTH TO SUIT (2 REQD). NAIL TO THE BULKHEAD GATE W/2-12d NAILS ABOVE AND BELOW EACH BULKHEAD STRAP.
- ⑥ SEAL FOR 1-1/4" STEEL STRAPPING (2 REQD, 1 PER STRAP). DOUBLE CRIMP EACH SEAL.

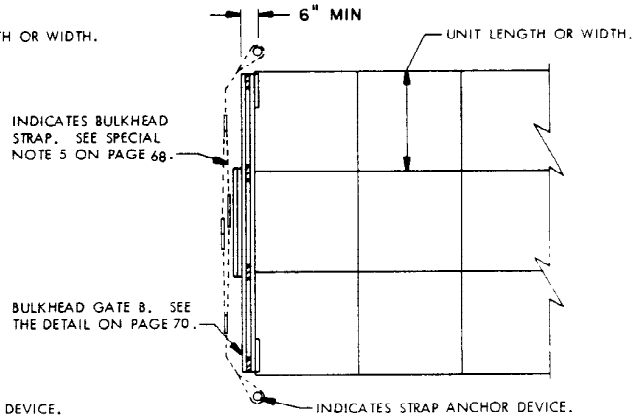
MINIMUM UNIT DIMENSION							
UNIT POSITION	SKID BASE TYPE	CAR WIDTH FOR PLAN A			CAR WIDTH FOR PLAN B		
		9'-2"	9'-4"	9'-6"	9'-2"	9'-4"	9'-6"
BOXES CROSSWISE	TYPE I, IA, II (BOXES W/O TOP CLEATS) AND DRAWING D-AMXSV-4163	31"	31-1/2"	32"	33"	34"	35"
BOXES CROSSWISE	TYPE II (WITH TOP CLEATED BOXES)	29-5/8"	30-1/8"	30-5/8"	34"	34-3/4"	35-1/2"
BOXES LENGTHWISE	TYPE I, IA, AND DRAWING D-AMXSV-4163	29"	29-1/2"	30"	34"	34-3/4"	35-1/2"
BOXES LENGTHWISE	TYPE II (BOXES WITH OR W/O TOP CLEATS)	NOT TO BE USED			35-1/2"	36"	36-1/2"

TYPICAL LCL LOAD USING BULKHEAD GATE METHOD OF PARTIAL-LAYER (TIER) BRACING



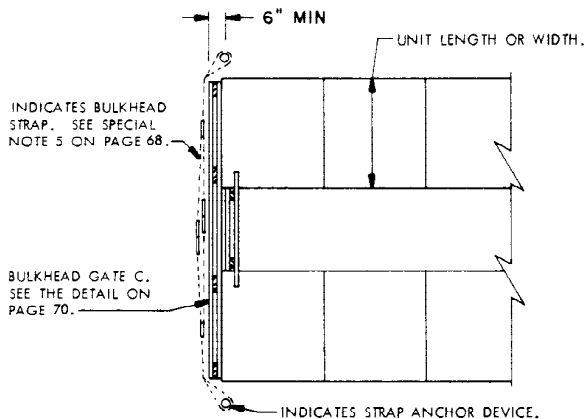
**LOAD PATTERN/STRAP INSTALLATION PLAN A**

THIS LOAD PATTERN IS APPLICABLE FOR A PARTIAL TIER OF SKIDDED UNITS HAVING THE BOXES EITHER CROSSWISE OR LENGTHWISE IN THE CAR, DEPENDING UPON THE POSITION OF THE BOXES IN THE BALANCE OF THE LOAD, WHEN THE UNITS ARE LOADED IN THREE ROWS AND THE QUANTITY REQUIRED IS TWO MORE THAN A MULTIPLE OF THREE. THE UNITS ADJACENT TO THE BULKHEAD GATE WILL BE CENTERED IN THE WIDTH OF THE CAR AS SHOWN. IN ORDER TO ENSURE STABILITY FOR THESE CENTERED UNITS, THERE IS A LIMITATION AS TO THE MINIMUM LENGTH OF THE UNITS IN A LOAD HAVING BOXES LENGTHWISE (IF PERMITTED AT ALL) AND A MINIMUM WIDTH OF UNITS IN A LOAD HAVING BOXES CROSSWISE. SEE THE "MINIMUM UNIT DIMENSION" CHART ON PAGE 68 FOR GUIDANCE. THE MAXIMUM LENGTH OR WIDTH UNITS WHICH CAN BE LOADED WILL BE AS SPECIFIED WITHIN "CHART NO. 1" ON PAGE 5. SEE SPECIAL NOTE 5 ON PAGE 68 FOR BULKHEAD STRAP INSTALLATION GUIDANCE.



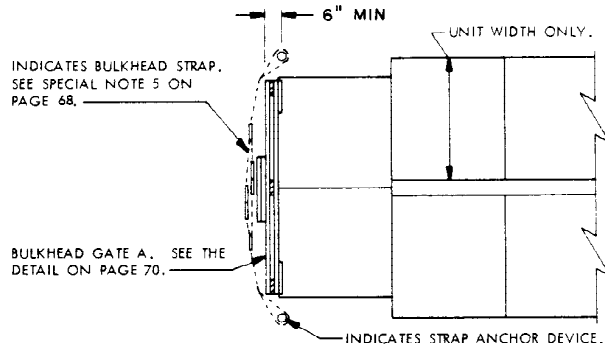
**LOAD PATTERN/STRAP INSTALLATION PLAN B**

THIS LOAD PATTERN IS APPLICABLE FOR A PARTIAL TIER OF SKIDDED UNITS HAVING THE BOXES EITHER CROSSWISE OR LENGTHWISE IN THE CAR, DEPENDING UPON THE POSITION OF THE BOXES IN THE BALANCE OF THE LOAD, WHEN THE UNITS ARE LOADED IN THREE ROWS AND THE QUANTITY REQUIRED IS A MULTIPLE OF THREE. THE UNITS ADJACENT TO THE BULKHEAD GATE WILL BE CENTERED IN THE WIDTH OF THE CAR. IN ORDER TO ENSURE STABILITY FOR THESE CENTERED UNITS, THERE IS A LIMITATION AS TO THE MINIMUM LENGTH OF THE UNITS IN A LOAD HAVING BOXES LENGTHWISE AND A MINIMUM WIDTH OF UNITS IN A LOAD HAVING BOXES CROSSWISE. SEE THE "MINIMUM UNIT DIMENSION" CHART ON PAGE 68 FOR GUIDANCE. THE MAXIMUM LENGTH OR WIDTH UNITS WHICH CAN BE LOADED WILL BE AS SPECIFIED WITHIN "CHART NO. 1" ON PAGE 5. SEE SPECIAL NOTE 5 ON PAGE 68 FOR BULKHEAD STRAP INSTALLATION GUIDANCE.



**LOAD PATTERN/STRAP INSTALLATION PLAN C**

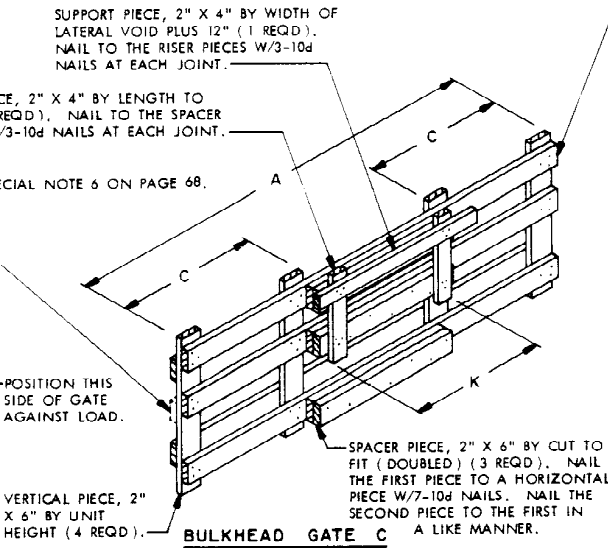
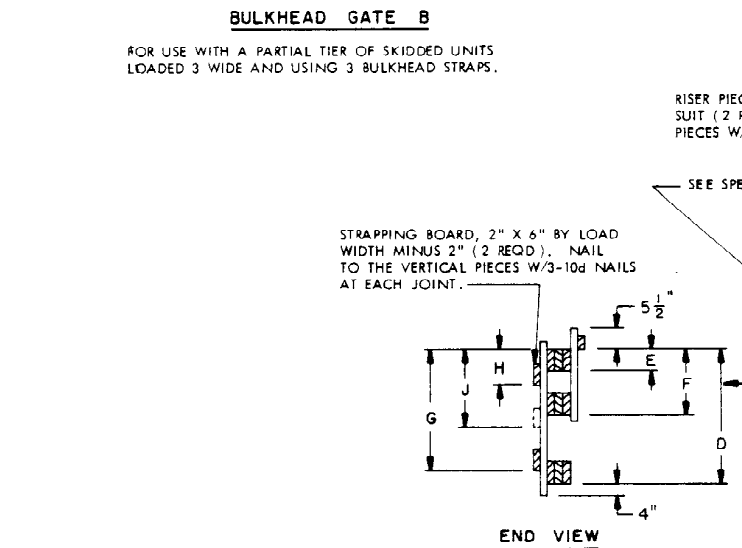
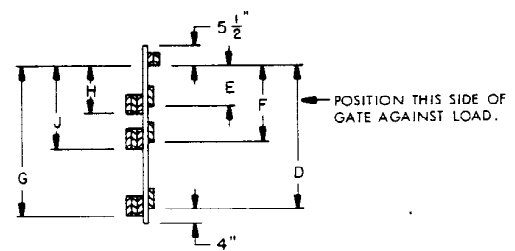
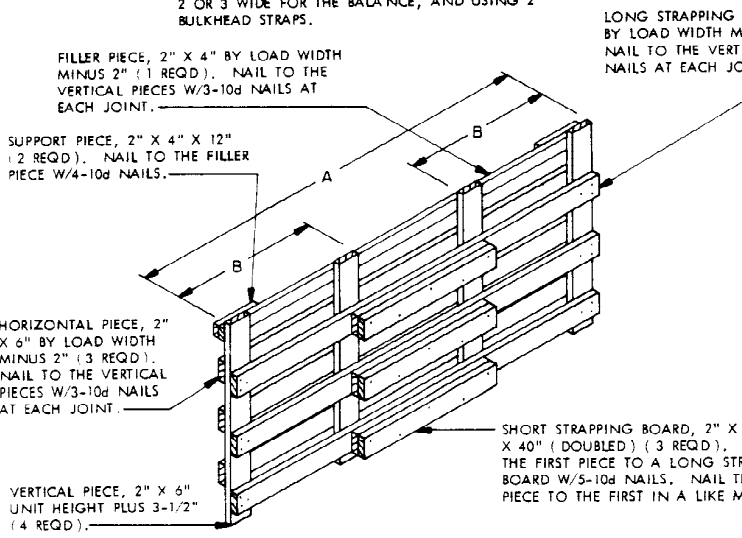
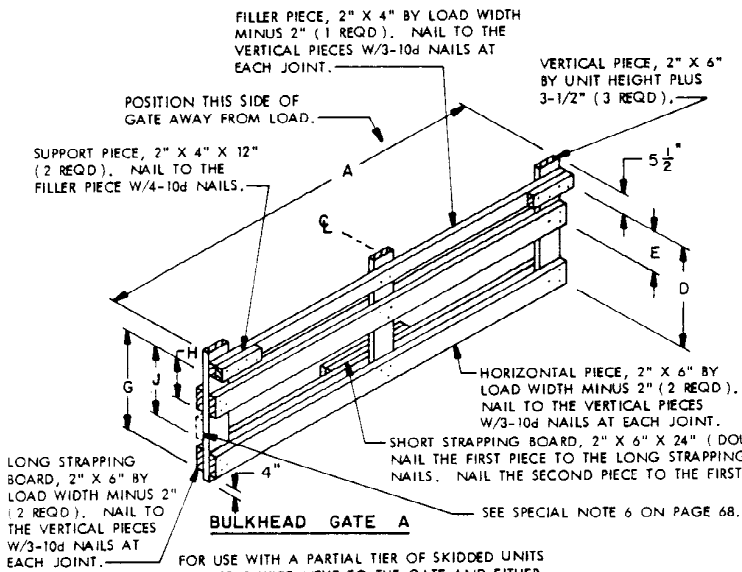
THIS LOAD PATTERN IS APPLICABLE FOR A PARTIAL TIER OF SKIDDED UNITS LOADED IN TWO ROWS, ONE AGAINST EACH CAR SIDEWALL, WHEN THERE IS A VOID SPACE BETWEEN THE ROWS WHICH IS LARGE ENOUGH TO REQUIRE ANTI-SWAY BRACING. SEE THE "ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 52 OR THE NOTE UNDER "ANTI-SWAY BRACE C" ON PAGE 53 FOR GUIDANCE. THE BOXES ON THE UNIT MAY BE EITHER CROSSWISE OR LENGTHWISE, DEPENDING UPON THE POSITION OF THE BOXES IN THE BALANCE OF THE LOAD. THE TIER OR TIERS BELOW THE ONE BEING RETAINED BY THE STRAPPED BULKHEAD MAY ALSO BE TWO UNITS WIDE, OR MAY BE THREE UNITS WIDE, SIZE PERMITTING. SEE SPECIAL NOTE 5 ON PAGE 68 FOR BULKHEAD STRAP INSTALLATION GUIDANCE.

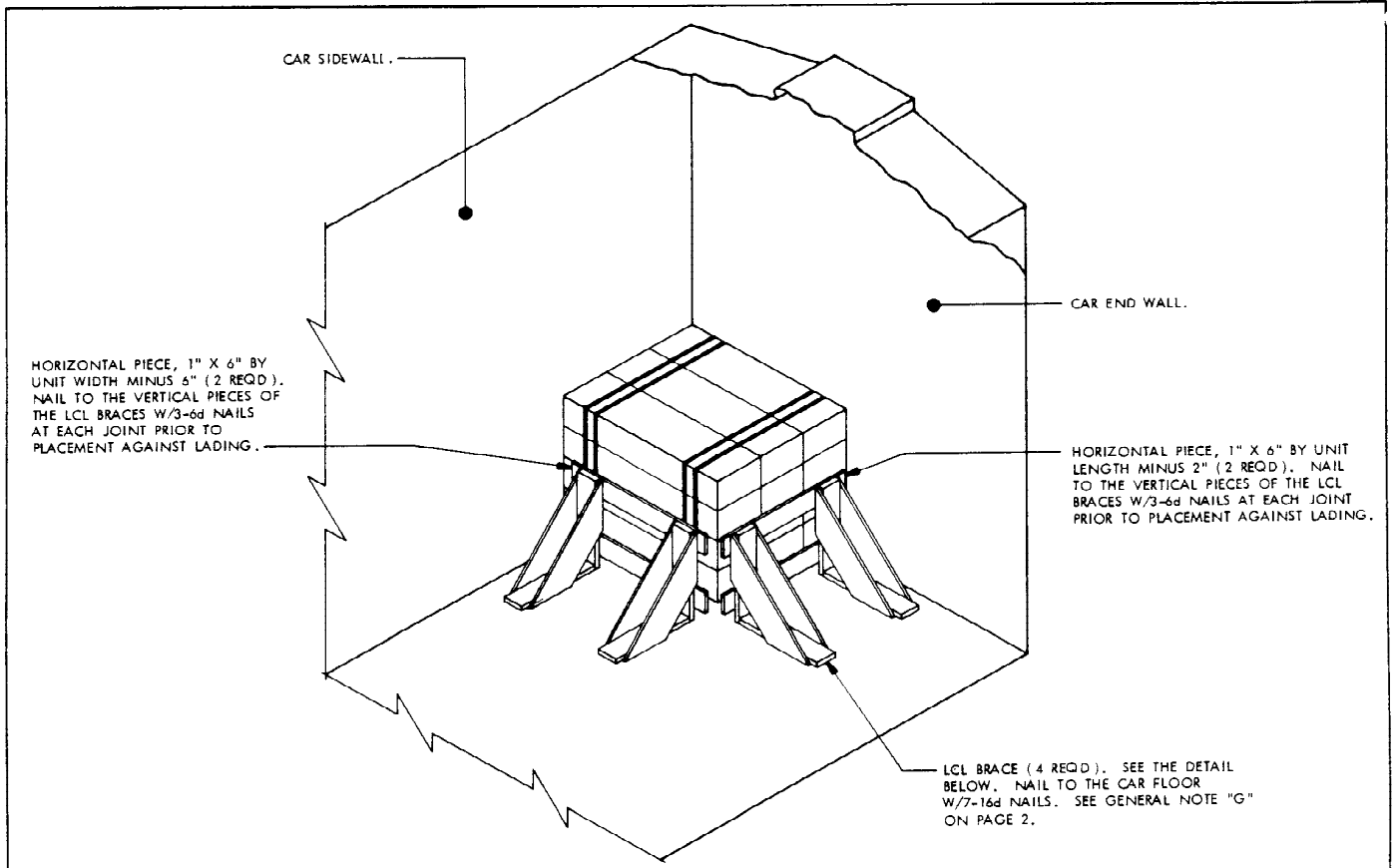


**LOAD PATTERN/STRAP INSTALLATION PLAN D**

THIS LOAD PATTERN IS APPLICABLE FOR A PARTIAL TIER OF SKIDDED UNITS HAVING THE BOXES CROSSWISE IN THE CAR WHEN THE UNITS ARE LOADED IN TWO ROWS, ONE AGAINST EACH CAR SIDEWALL, AND WHEN THE VOID SPACE BETWEEN THE ROWS IS NOT WIDE ENOUGH TO REQUIRE ANTI-SWAY BRACING. SEE THE "ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 52 FOR GUIDANCE AS TO THE MINIMUM WIDTH UNIT WHICH CAN BE LOADED WITHOUT THE USE OF ANTI-SWAY BRACES. SEE "CHART NO. 1" ON PAGE 5 FOR THE MAXIMUM WIDTH UNIT WHICH CAN BE LOADED. SEE SPECIAL NOTE 5 ON PAGE 68 FOR BULKHEAD STRAP INSTALLATION GUIDANCE.

GATE CONSTRUCTION DIMENSIONAL CHART	
LOCATION IDENTITY	DESCRIPTION FOR POSITIONING LUMBER IN ASSEMBLY
A	LOAD WIDTH MINUS 2".
B	UNIT LENGTH OR WIDTH PLUS 1-3/4".
C	UNIT LENGTH OR WIDTH MINUS 1".
D	UNIT HEIGHT MINUS 6".
E	5-1/2" FOR UNITS CONSISTING OF 4 OR LESS LAYERS; 1 BOX HEIGHT PLUS 2-3/4" FOR UNITS CONSISTING OF 5 OR MORE LAYERS.
F	3 BOX HEIGHTS PLUS 2-3/4" FOR UNITS CONSISTING OF 5 OR MORE LAYERS; 2 BOX HEIGHTS PLUS 2-3/4" FOR 4-LAYER UNITS; 1-1/2 BOX HEIGHTS PLUS 2-3/4" FOR 3-LAYER UNITS; 1 BOX HEIGHT PLUS 2-3/4" FOR 2-LAYER UNITS.
G	DIMENSION "D" (PLUS 2" OR MINUS 4" TOLERANCE).
H	DIMENSION "E" (PLUS 4" OR MINUS 2" TOLERANCE).
J	DIMENSION "F" (PLUS OR MINUS 4" TOLERANCE).
K	WIDTH OF LATERAL VOID MINUS 4".

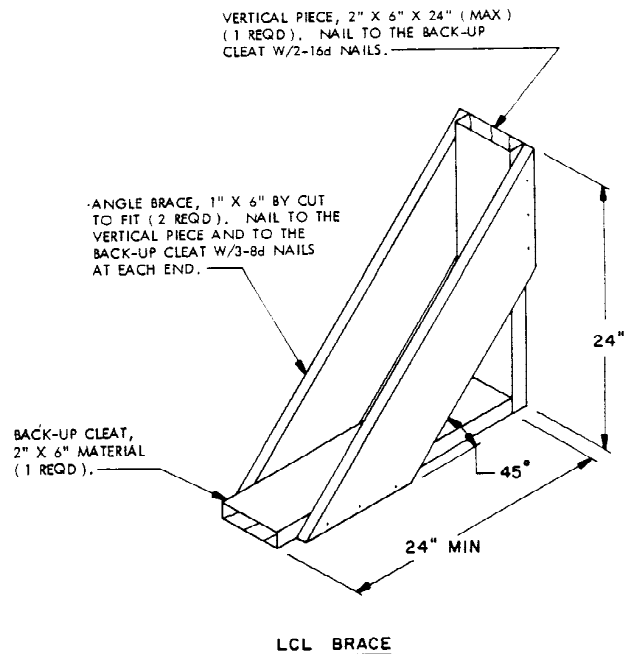




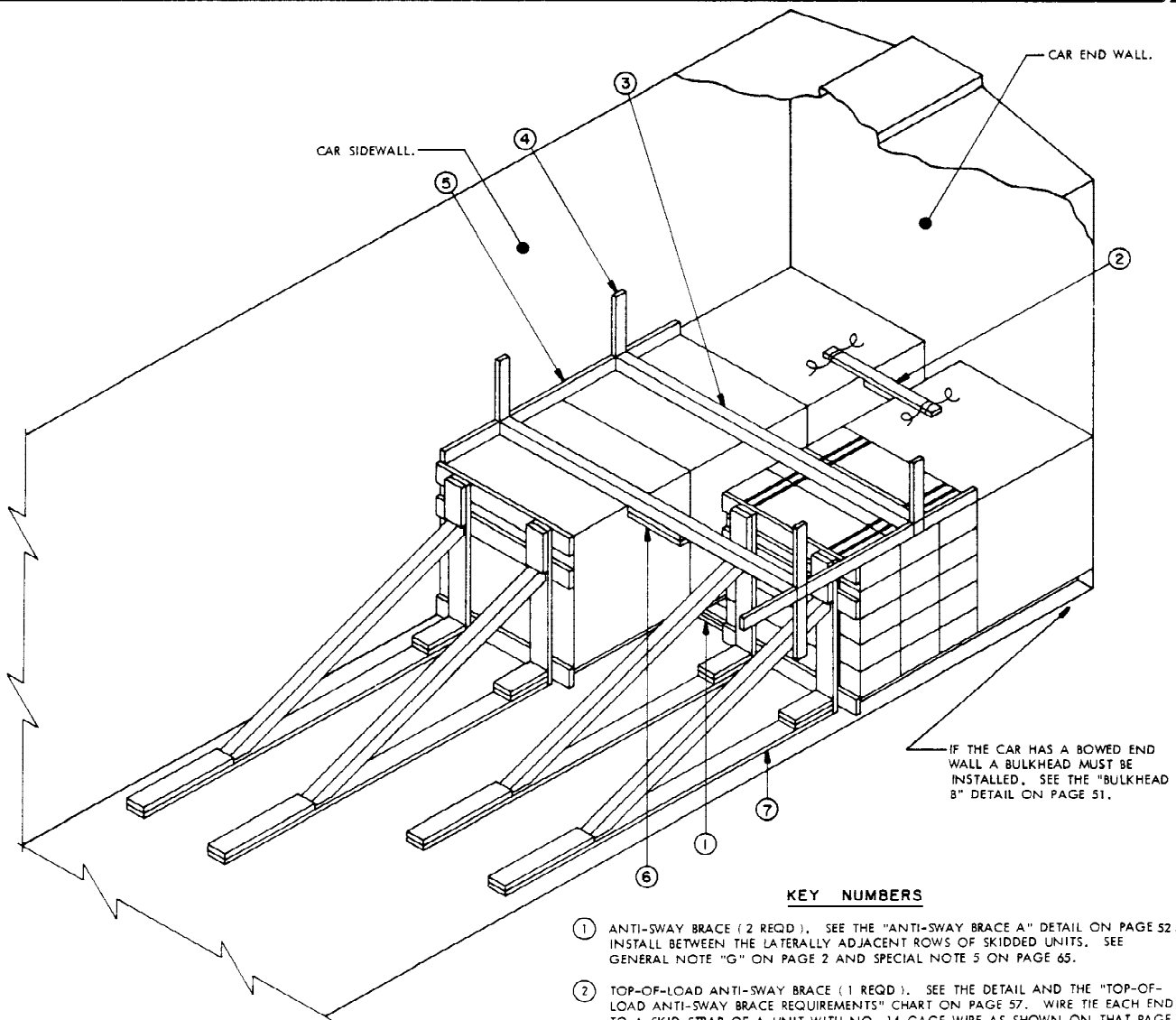
**ISOMETRIC VIEW**

**SPECIAL NOTES:**

1. AN 8'-6" WIDE CONVENTIONAL TYPE BOX CAR HAVING A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED. SEE GENERAL NOTE "H" ON PAGE 4.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL LCL LOAD HAS OVERALL DIMENSIONS OF 39" LONG BY 47" WIDE BY 39-1/2" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER SIZES, EXCEPT AS SPECIFIED IN SPECIAL NOTE 5 BELOW.
3. THE LOAD SHOWN DEPICTING THE LCL BRACE METHOD OF PARTIAL-LAYER BRACING (BOTTOM TIER ONLY) IS TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR UNITS HAVING THE BOXES LENGTHWISE, AND FOR OTHER QUANTITIES AS LONG AS THE CAPACITY OF THE BRACES IS NOT EXCEEDED. SEE SPECIAL NOTE 4.
4. EACH LCL BRACE AS APPLIED FOR LONGITUDINAL BRACING WILL RETAIN 2,000 POUNDS OF LADING. A MINIMUM OF TWO (2) BRACES MUST BE USED FOR LONGITUDINAL BRACING. EACH LCL BRACE AS APPLIED FOR LATERAL BRACING WILL SUPPORT 8,000 POUNDS OF LADING.
5. LCL BRACES MAY BE USED FOR BRACING ANY SKIDDED UNITS WHICH ARE NOT MORE THAN 44" IN HEIGHT. FOR UNITS OVER 44" HIGH, USE THE PROCEDURES SHOWN ON PAGES 72 AND 73.



**TYPICAL LCL LOAD USING LCL BRACE METHOD OF PARTIAL-LAYER (TIER) BRACING**



ISOMETRIC VIEW

SPECIAL NOTES:

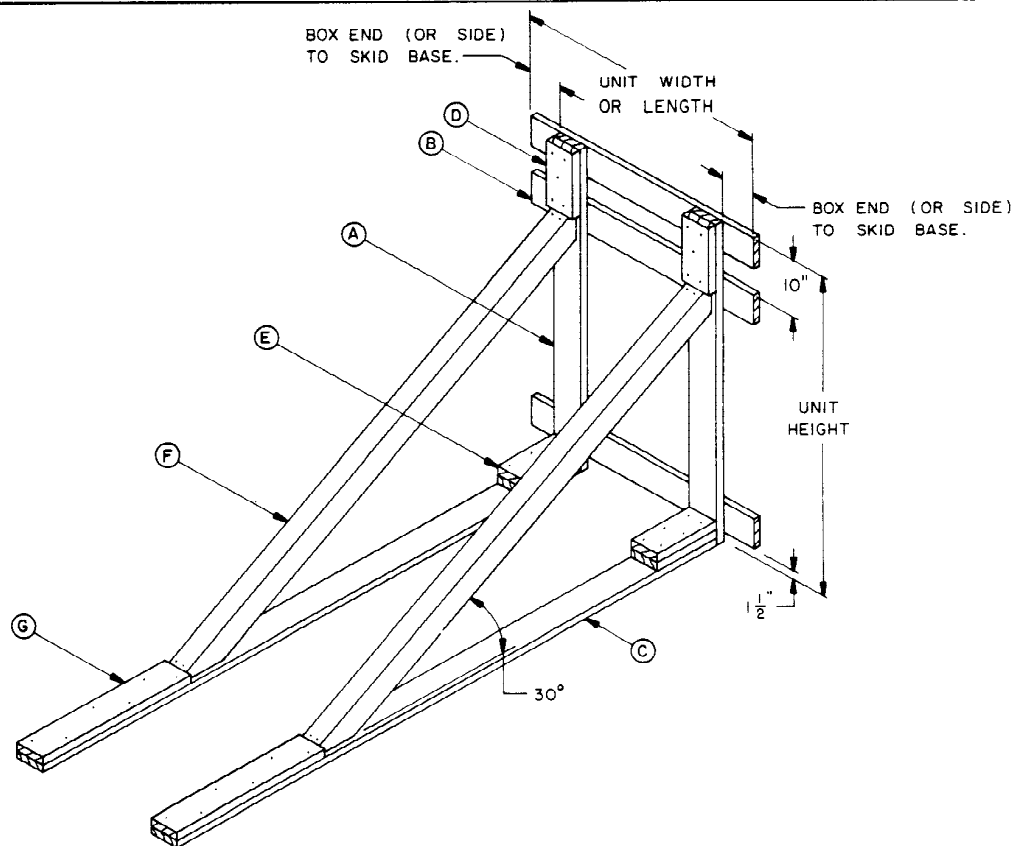
1. AN 8'-6" WIDE CONVENTIONAL TYPE BOX CAR HAVING NAILABLE SIDEWALLS AND A WOOD OR NAILABLE METAL FLOOR IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED. SEE GENERAL NOTE "H" ON PAGE 4.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL LCL LOAD HAS OVERALL DIMENSIONS OF 39" LONG BY 47" WIDE BY 46" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER SIZES, EXCEPT AS SPECIFIED IN SPECIAL NOTE 5 BELOW.
3. THE LOAD SHOWN DEPICTING THE KNEE BRACE METHOD OF PARTIAL-LAYER BRACING (BOTTOM TIER ONLY) IS TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR OTHER QUANTITIES AND FOR UNITS HAVING THE BOXES EITHER CROSSWISE OR LENGTHWISE. SEE SPECIAL NOTE 4.
4. A KNEE BRACE ASSEMBLY WILL BE USED FOR EACH ROW OF SKIDDED UNITS. ONE (1) KNEE BRACE ASSEMBLY IS ADEQUATE FOR RETAINING A MAXIMUM LCL LOAD OF 8,500 POUNDS.
5. KNEE BRACE ASSEMBLIES MAY BE USED FOR BRACING ANY SKIDDED UNITS WHICH ARE 30" OR GREATER IN HEIGHT. FOR UNITS LESS THAN 30" HIGH, USE THE PROCEDURES SHOWN ON PAGE 71.

KEY NUMBERS

- ① ANTI-SWAY BRACE (2 REQD). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 52. INSTALL BETWEEN THE LATERALLY ADJACENT ROWS OF SKIDDED UNITS. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTE 5 ON PAGE 65.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (1 REQD). SEE THE DETAIL AND THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57. WIRE TIE EACH END TO A SKID STRAP OF A UNIT WITH NO. 14 GAGE WIRE AS SHOWN ON THAT PAGE.
- ③ HOLD-DOWN, 4" X 4" BY CAR WIDTH IN LENGTH (CUT TO FIT) (2 REQD). INSTALL ACROSS THE SKIDDED UNITS WHICH ARE ADJACENT TO THE KNEE BRACE ASSEMBLIES.
- ④ POCKET CLEAT, 2" X 4" X 18" (9 REQD). NAIL TO THE CAR SIDEWALL W/5-10d NAILS.
- ⑤ SPACER CLEAT, 2" X 4" BY UNIT LENGTH MINUS 3-1/2" OR UNIT WIDTH MINUS 3-1/2", AS APPLICABLE (2 REQD). NAIL TO THE CAR SIDEWALL W/5-10d NAILS.
- ⑥ SIDE BLOCKING, 2" X 4" X 18" (DOUBLED) (1 REQD). POSITION AGAINST THE SKIDDED UNIT AND NAIL THE FIRST PIECE TO THE HOLD-DOWN, PIECE MARKED ③, W/5-12d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER.
- ⑦ KNEE BRACE ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 73 FOR CONSTRUCTION SPECIFICATIONS AND NAILING REQUIREMENTS.

TYPICAL LCL LOAD USING FIRST-LAYER KNEE BRACE METHOD OF PARTIAL-LAYER (TIER) BRACING

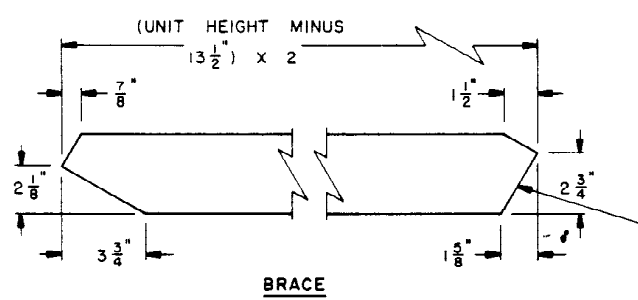




**KNEE BRACE ASSEMBLY**

**KEY LETTERS**

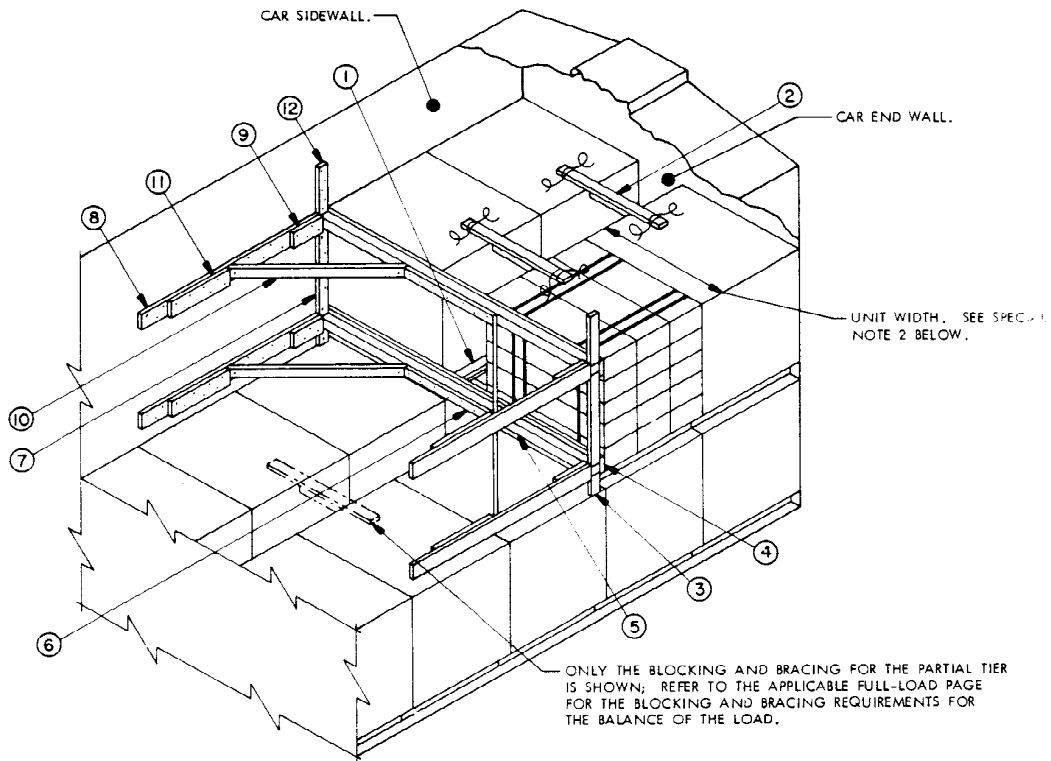
- (A) VERTICAL PIECE, 2" X 6" BY LOAD HEIGHT (2 REQD).
- (B) HORIZONTAL PIECE, 2" X 6" BY SKIDDED UNIT WIDTH OR LENGTH (3 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.
- (C) FLOOR CLEAT, 2" X 6" BY LENGTH TO SUIT (.87 OR 7/8 TIMES LENGTH OF PIECE MARKED (F), PLUS 30" IF 2 REQD). ALIGN WITH A VERTICAL PIECE AND NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8".
- (D) HOLD-DOWN CLEAT, 2" X 6" X 12" (2 REQD). NAIL TO A VERTICAL PIECE W/3-10d NAILS.
- (E) POCKET CLEAT, 2" X 6" X 12" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE FLOOR CLEAT, PIECE MARKED (C), W/4-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER AND TOENAIL IT TO THE VERTICAL PIECE, PIECE MARKED (A), W/2-16d NAILS.
- (F) BRACE, 4" X 4" BY CUT TO FIT (UNIT HEIGHT MINUS 13-1/2", TIMES 2) : 2 REQD. SEE THE DETAIL AT LEFT FOR BEVEL CUTS REQUIRED. TOENAIL TO THE VERTICAL PIECE AND TO THE FLOOR CLEAT, PIECES MARKED (A) AND (C), W/2-16d NAILS AT EACH END.
- (G) BACK-UP CLEAT, 2" X 6" X 30" (2 REQD). NAIL TO THE FLOOR CLEAT, PIECE MARKED (C), W/6-40d NAILS.



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

**BRACE**

**KNEE BRACE ASSEMBLY**



ISOMETRIC VIEW

SPECIAL NOTES:

1. A 9'-2" WIDE CONVENTIONAL WOOD-LINED BOX CAR IS SHOWN. WOOD-LINED CARS OF OTHER WIDTHS CAN BE USED.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL LCL LOAD HAS OVERALL DIMENSIONS OF 39" LONG BY 47" WIDE BY 48" HIGH AND IS POSITIONED SO THAT THE BOXES ARE CROSSWISE IN THE CAR. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER SIZES AND FOR UNITS HAVING THE BOXES LENGTHWISE IN THE CAR.
3. THE LOAD PATTERN FOR A LOAD, SUCH AS 2-WIDE, 3-WIDE, OR 4-WIDE, WILL DEPEND UPON THE DIMENSION OF THE UNIT WHICH IS POSITIONED ACROSS THE CAR. A 2-WIDE (BOXES CROSSWISE) LOAD IS SHOWN AS TYPICAL. THE LOADING PRINCIPLES CAN BE ADAPTED FOR PARTIAL-LAYER BRACING FOR ANY OF THE LOADS SHOWN ON PAGES 6 THRU 22.
4. THE K-BRACE METHOD OF PARTIAL-LAYER (TIER) BRACING SHOWN MAY BE USED IN WOOD-LINED CARS FOR THE SECUREMENT OF A PARTIAL TOP TIER, BE IT A SECOND TIER, THIRD TIER, OR OTHER. THE TYPE "A" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN 8,000 POUNDS. IF IT IS NECESSARY TO BLOCK A HEAVIER LOAD, REFER TO THE DETAILS ON PAGES 75, 76, AND 77 FOR SELECTION OF THE APPLICABLY SIZED K-BRACE TO USE AND THE DESIGN SPECIFICATIONS FOR THE BRACE.
5. **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 ③, ④, ⑤, ⑦, ⑨ AND ⑫ MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDEWALL. IT IS ALRIGHT FOR THE ENDS OF THE DIAGONAL BRACES MARKED ⑩ TO BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE ADJACENT PIECE MARKED ⑥ MUST BE DOUBLED AND EXTENDED ACROSS AND FAR ENOUGH PAST

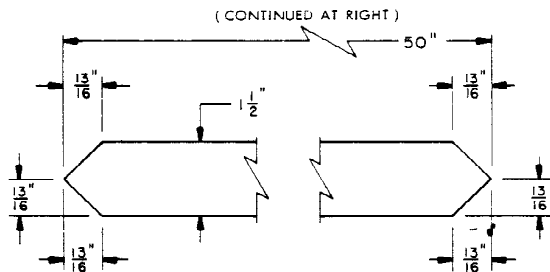
KEY NUMBERS

- ① ANTI-SWAY BRACE ASSEMBLY (2 REQ'D). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 52. INSTALL BETWEEN THE LATERALLY ADJACENT ROWS OF SKIDDED UNITS. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTE 5 ON PAGE 65.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (2 REQ'D). SEE THE DETAIL AND THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57. WIRE TIE EACH END TO A SKID STRAP OF A UNIT WITH NO. 14 GAGE WIRE AS SHOWN ON THAT PAGE. NOTE THAT THE QUANTITY IS ONLY FOR THE PARTIAL-TIER UNITS.
- ③ SUPPORT CLEAT, 2" X 4" X 7" (2 REQ'D). NAIL TO THE CAR SIDEWALL W/2-12d NAILS. SEE SPECIAL NOTE 5 AT LEFT.
- ④ HORIZONTAL PIECE, 2" X 6" BY CAR WIDTH IN LENGTH (CUT TO FIT) (2 REQ'D). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ⑤, W/1-12d NAIL EVERY 6".
- ⑤ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH IN LENGTH (CUT TO FIT) (2 REQ'D).
- ⑥ CENTER CLEAT, 2" X 4" X 36" (2 REQ'D). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ⑤, W/7-16d NAILS. SEE SPECIAL NOTE 6 BELOW.
- ⑦ SPACER CLEAT, 2" X 4" BY UNIT HEIGHT MINUS 15" (2 REQ'D). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑧ HORIZONTAL WALL CLEAT, 2" X 6" X 72" (4 REQ'D). NAIL TO THE CAR SIDEWALL W/16-12d NAILS.
- ⑨ POCKET CLEAT, 2" X 6" X 12" (2 REQ'D). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑧, W/4-16d NAILS.
- ⑩ DIAGONAL BRACE, 2" X 4" X 50-1/4" (4 REQ'D). SEE THE DETAIL AT LEFT FOR BEVEL CUTS REQUIRED. TOENAIL TO THE CROSS CAR BRACE, PIECE MARKED ④, AND TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑧, W/2-16d NAILS AT EACH END.
- ⑪ BACK-UP CLEAT, 2" X 5" X 24" (4 REQ'D). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑧, W/8-16d NAILS.
- ⑫ HOLD-DOWN CLEAT, 2" X 4" X 18" (2 REQ'D). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.

(SPECIAL NOTES CONTINUED)

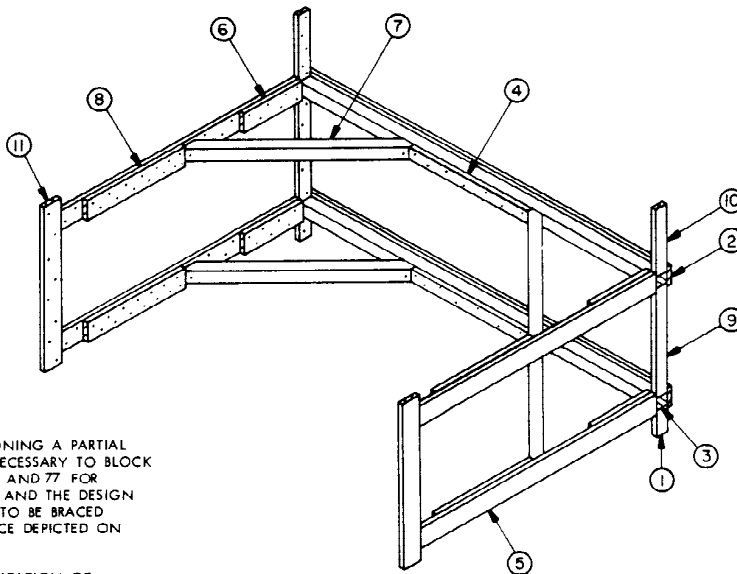
THE DOOR OPENING (REF 60'), TO PROVIDE FOR THE SPECIFIED NAILING OF EACH PIECE, LAMINATE THE SECOND PIECE OF THE DOUBLED PIECE MARKED ⑥ TO THE FIRST W/16-16d NAILS. CLINCH THOSE NAILS WHICH PROTRUDE THRU THE HORIZONTAL WALL CLEAT WITHIN THE DOOR OPENING. NOTE THAT THE DIAGONAL BRACE WILL BE 49-1/8" LONG IN LIEU OF 50-1/4" WHEN PIECE MARKED ⑥ IS DOUBLED.

6. THE CENTER CLEAT, SHOWN AS PIECE MARKED ⑥, WILL BE 28" LONG FOR AN 8'-6" WIDE CAR, 36" LONG FOR A 9'-2", AND 38" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.



DIAGONAL BRACE

TYPICAL LCL LOAD USING K-BRACE METHOD OF PARTIAL-LAYER (TIER) BRACING



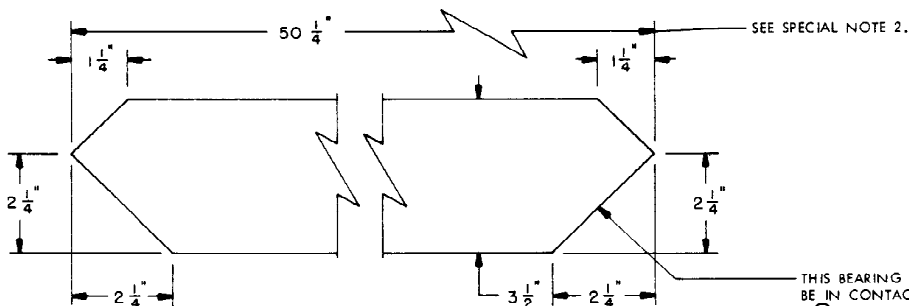
**SPECIAL NOTES:**

1. THE TYPE "B" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN 14,000 POUNDS. IF IT IS NECESSARY TO BLOCK A HEAVIER LOAD, REFER TO THE DETAILS ON PAGES 76 AND 77 FOR SELECTION OF THE APPLICABLY SIZED K-BRACE TO USE AND THE DESIGN SPECIFICATIONS FOR THE BRACE. IF THE PARTIAL TIER TO BE BRACED WEIGHS 8,000 POUNDS OR LESS, THE TYPE "A" K-BRACE DEPICTED ON PAGE 74 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, ④, ⑨, ⑩ AND ⑪ 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 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 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 28" LONG FOR AN 8'-6" WIDE CAR, 36" LONG FOR A 9'-2", AND 38" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.
4. REFER TO PAGE 74 FOR A TYPICAL INSTALLATION OF A K-BRACE.

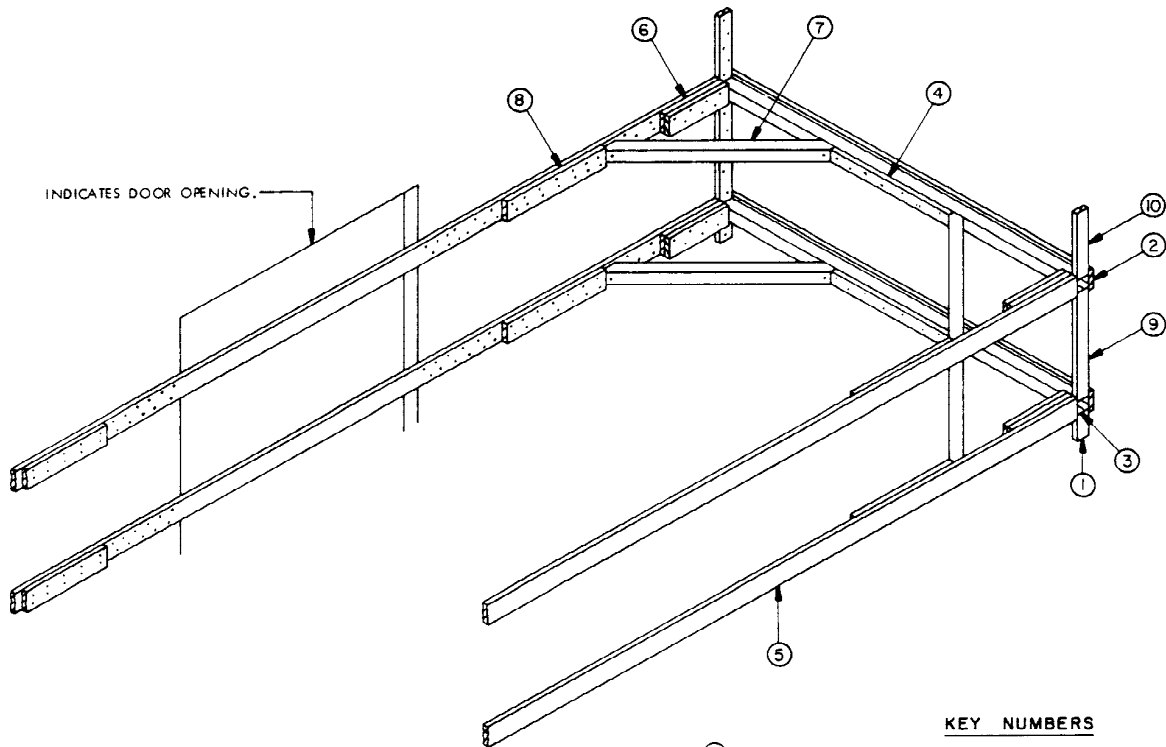
**ISOMETRIC VIEW**

**KEY NUMBERS**

- ① SUPPORT CLEAT, 2" X 4" X 7" (2 REQD). NAIL TO THE CAR SIDEWALL W/2-12d NAILS. SEE SPECIAL NOTE 2 AT LEFT.
- ② LOAD BEARING PIECE, 2" X 6" BY CAR WIDTH (CUT TO FIT) (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/1-12d NAIL EVERY 6". SEE GENERAL NOTE "G" ON PAGE 2.
- ③ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH (CUT TO FIT) (2 REQD).
- ④ CENTER CLEAT, 2" X 4" X 36" (2 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" (4 REQD). NAIL TO THE CAR SIDEWALL W/16-12d NAILS.
- ⑥ POCKET CLEAT, 2" X 6" X 18" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/7-16d NAILS.
- ⑦ DIAGONAL BRACE, 4" X 4" X 50-1/4" (4 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" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/14-16d NAILS.
- ⑨ SPACER CLEAT, 2" X 4" BY UNIT HEIGHT MINUS 15" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑩ HOLD-DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑪ VERTICAL BACK-UP CLEAT, 2" X 6" BY UNIT HEIGHT (2 REQD). NAIL TO THE CAR SIDEWALL W/8-12d NAILS.



**DIAGONAL BRACE**



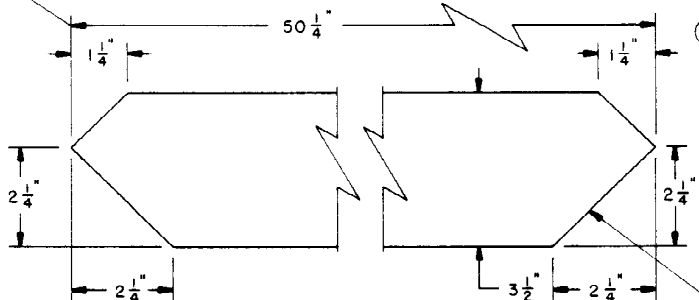
ISOMETRIC VIEW

SPECIAL NOTES:

1. THE TYPE "G" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN 20,000 POUNDS. IF IT IS NECESSARY TO BLOCK A HEAVIER LOAD, REFER TO THE DETAIL ON PAGE 77 FOR THE APPLICABLY SIZED K-BRACE TO USE AND THE DESIGN SPECIFICATIONS FOR THE BRACE. IF THE PARTIAL TIER TO BE BRACED WEIGHS BETWEEN 8,000 POUNDS AND 14,000 POUNDS, THE TYPE "B" K-BRACE DEPICTED ON PAGE 75 MAY BE USED. IF THE PARTIAL TIER TO BE BRACED WEIGHS 8,000 POUNDS OR LESS, THE TYPE "A" K-BRACE DEPICTED ON PAGE 74 WILL BE ADEQUATE.
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 JOINAGE. PIECES MARKED ①, ②, ③, ④, ⑤, ⑥, ⑦ 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 MARKED ⑦ TO BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE ADJACENT PIECE MARKED ⑤ MUST BE DOUBLED. LAMINATE THE SECOND PIECE TO THE FIRST W/40-16d 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.

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SEE SPECIAL NOTE 2.



DIAGONAL BRACE

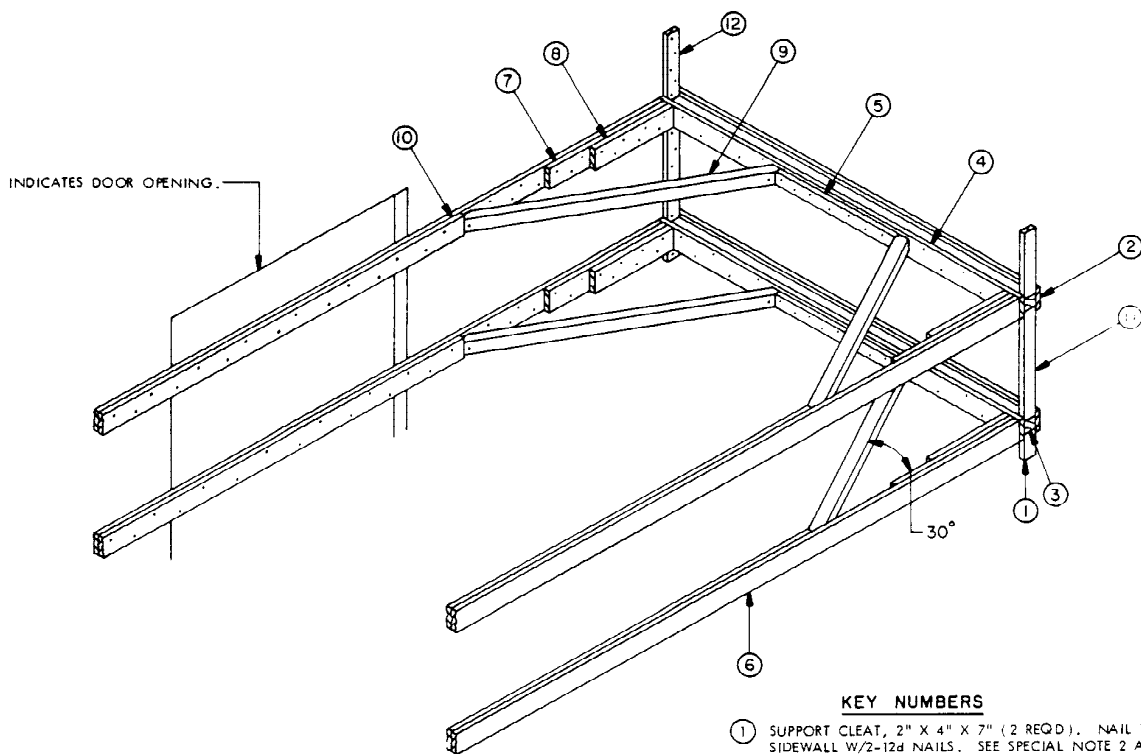
KEY NUMBERS

- ① SUPPORT CLEAT, 2" X 4" X 7" (2 REQD). NAIL TO THE CAR SIDEWALL W/2-12d NAILS. SEE SPECIAL NOTE 2 AT LEFT.
- ② LOAD BEARING PIECE, 2" X 6" BY CAR WIDTH (CUT FO FIT) (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/1-12d NAIL EVERY 6". SEE GENERAL NOTE "G" ON PAGE 2.
- ③ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH (CUT FO FIT) (2 REQD).
- ④ CENTER CLEAT, 2" X 4" X 36" (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/7-16d NAILS. SEE SPECIAL NOTE 3 BELOW.
- ⑤ HORIZONTAL WALL CLEAT, 2" X 6" BY CUT TO FIT (4 REQD). A CLEAT WILL BE OF A LENGTH AS NECESSARY TO EXTEND ACROSS AND FAR ENOUGH PAST THE DOOR OPENING TO CONTACT PIECE MARKED ③ OF THE K-BRACE IN THE OPPOSITE END OF THE CAR. NAIL TO THE CAR SIDEWALL W/40-12d NAILS.
- ⑥ POCKET CLEAT, 2" X 6" X 18" (DOUBLED) (4 REQD). NAIL THE FIRST PIECE TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/7-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER.
- ⑦ DIAGONAL BRACE, 4" X 4" X 50-1/4" (4 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" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑤, W/14-16d NAILS.
- ⑨ SPACER CLEAT, 2" X 4" BY UNIT HEIGHT MINUS 15" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑩ HOLD-DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.

(SPECIAL NOTES CONTINUED)

3. THE CENTER CLEAT, SHOWN AS PIECE MARKED ④, WILL BE 28" LONG FOR AN 8'-6" WIDE CAR, 36" LONG FOR A 9'-2", AND 38" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.
4. CAUTION: A TYPE "C" K-BRACE MUST BE USED IN BOTH ENDS OF THE CAR; THE BRACE IS NOT DESIGNED FOR USE IN ONLY ONE END. NOTE THAT EXCEPT FOR PIECES MARKED ⑤, THE QUANTITIES SPECIFIED ARE APPLICABLE ONLY FOR THE BRACE IN ONE END.

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



ISOMETRIC VIEW

SPECIAL NOTES:

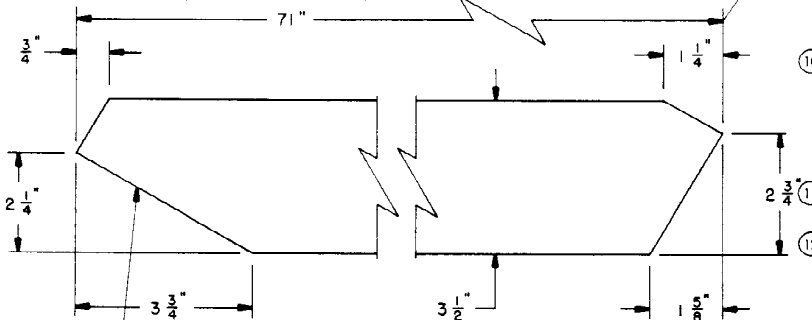
1. THE TYPE "D" K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL TIER OF NOT MORE THAN 25,000 POUNDS. IF THE PARTIAL TIER TO BE BRACED WEIGHS BETWEEN 14,000 POUNDS AND 20,000 POUNDS, THE TYPE "C" K-BRACE DEPICTED ON PAGE 76 MAY BE USED. FOR A PARTIAL TIER OF 8,000 POUNDS TO 14,000 POUNDS, THE TYPE "B" K-BRACE DEPICTED ON PAGE 75 MAY BE USED. IF THE PARTIAL TIER TO BE BRACED WEIGHS 8,000 POUNDS OR LESS, THE TYPE "A" K-BRACE DEPICTED ON PAGE 74 WILL BE ADEQUATE.
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, ④, ⑦, ⑧, ⑩ AND ⑫ MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDEWALL. IT IS ALRIGHT FOR THE ENDS OF THE DIAGONAL BRACES MARKED ⑨ TO BEAR IN FRONT OF A DOOR OPENING, HOWEVER, THE ADJACENT PIECE MARKED ⑥ MUST BE DOUBLED. LAMINATE THE SECOND PIECE TO THE FIRST W/40-16d NAILS. CLINCH THOSE NAILS WHICH PROTRUDE THRU THE HORIZONTAL WALL CLEAT WITHIN THE DOOR OPENING. NOTE THAT THE DIAGONAL BRACE WILL BE 70-1/4" LONG IN LIEU OF 71" LONG WHEN PIECE MARKED ③ IS DOUBLED.
3. THE CENTER CLEAT, SHOWN AS PIECE MARKED ⑤, WILL BE 28" LONG FOR AN 8'-6" WIDE CAR, 36" LONG FOR A 9'-2", AND 38" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS.

SEE SPECIAL NOTE 2.

KEY NUMBERS

- ① SUPPORT CLEAT, 2" X 4" X 7" (2 REQD). NAIL TO THE CAR SIDEWALL W/2-12d NAILS. SEE SPECIAL NOTE 2 AT LEFT.
- ② LOAD BEARING PIECE, 2" X 5" BY CAR WIDTH (CUT TO FIT) (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/1-12d NAIL EVERY 6". SEE GENERAL NOTE "G" ON PAGE 2.
- ③ CROSS CAR BRACE, 4" X 4" BY CAR WIDTH (CUT TO FIT) (2 REQD).
- ④ HORIZONTAL PIECE, 2" X 6" BY CAR WIDTH (CUT TO FIT) (2 REQD). NAIL TO THE CROSS CAR BRACE, PIECE MARKED ③, W/1-12d NAIL EVERY 6".
- ⑤ CENTER CLEAT, 2" X 4" X 36" (2 REQD), NAIL TO THE HORIZONTAL PIECE, PIECE MARKED ④, W/7-16d NAILS. SEE SPECIAL NOTE 3 AT LEFT.
- ⑥ HORIZONTAL WALL CLEAT, 2" X 6" BY CUT TO FIT (4 REQD). A CLEAT WILL BE OF A LENGTH AS NECESSARY TO EXTEND ACROSS AND FAR ENOUGH PAST THE DOOR OPENING TO CONTACT PIECE MARKED ④ OF THE K-BRACE IN THE OPPOSITE END OF THE CAR. NAIL TO THE CAR SIDEWALL W/40-12d NAILS.
- ⑦ POCKET CLEAT, 2" X 6" X 36" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑥, W/10-16d NAILS.
- ⑧ POCKET CLEAT, 2" X 6" X 24" (4 REQD). NAIL TO THE POCKET CLEAT, PIECE MARKED ⑦, W/7-16d NAILS.
- ⑨ DIAGONAL BRACE, 4" X 4" X 71" (4 REQD). SEE THE DETAIL BELOW FOR BEVEL CUTS REQUIRED. TOENAIL TO THE HORIZONTAL PIECE, PIECE MARKED ④, AND TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑥, W/1-60d NAIL AT EACH END.
- ⑩ BACK-UP CLEAT, 2" X 6" BY CUT TO FIT (4 REQD). A CLEAT WILL BE OF A LENGTH AS NECESSARY TO EXTEND TO CONTACT THE DIAGONAL BRACE, PIECE MARKED ⑨, IN THE OPPOSITE END OF THE CAR. NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED ⑥, W/18-16d NAILS. CLINCH THOSE NAILS WHICH PROTRUDE THRU THE HORIZONTAL WALL CLEAT WITHIN THE DOOR OPENING, IF APPLICABLE.
- ⑪ SPACER CLEAT, 2" X 4" BY UNIT HEIGHT MINUS 15" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.
- ⑫ HOLD-DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.

(CONTINUED AT RIGHT)



DIAGONAL BRACE

THIS BEARING SURFACE MUST BE POSITIONED SO AS TO BE IN CONTACT WITH A HORIZONTAL WALL CLEAT, PIECE MARKED ⑥

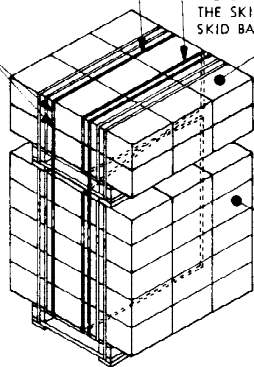
(SPECIAL NOTES CONTINUED)

4. CAUTION: A TYPE "D" K-BRACE MUST BE USED IN BOTH ENDS OF THE CAR. THE BRACE IS NOT DESIGNED FOR USE IN ONLY ONE END. NOTE THAT EXCEPT FOR PIECES MARKED ② AND ⑩, THE QUANTITIES SPECIFIED ARE APPLICABLE ONLY FOR THE BRACE IN ONE END.

VERTICAL UNITIZING STRAP, 1-1/4" X .035" BY LENGTH TO SUIT STEEL STRAPPING (2 REQD). POSITION NEAR POSTS OF SKID BASE.

FIGURE-8 UNITIZING STRAP, 1-1/4" X .035" BY LENGTH TO SUIT STEEL STRAPPING (1 REQD). POSITION NEAR THE CENTER OF UNIT WIDTH. NOTE THAT THE STRAP PASSES UNDER THE SKID CROSS TIE PIECE OF THE SKID BASE FOR THE TOP UNIT.

INDICATES TWO (2) 1-1/4" STRAP SEALS.



INDICATES A TYPICAL 2-LAYER SKIDDED UNIT.

24" MAX

INDICATES A LOWER-TIER SKIDDED UNIT.

### SECUREMENT OF PARTIAL UNIT ON TOP

THE SKIDDED UNITS SHOWN IN THE VIEW ABOVE ARE TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR OTHER SKIDDED UNIT CONFIGURATIONS HAVING CROSSWISE-POSITIONED BOXES AND FOR UNITS HAVING LENGTHWISE-POSITIONED BOXES. NOTE THAT THE DESCRIPTION FOR POSITIONING OF THE FIGURE-8 UNITIZING STRAP IS ONLY APPLICABLE FOR UNITS HAVING CROSSWISE-POSITIONED BOXES AND ASSEMBLED ON THE TYPE I AND TYPE IA SKID BASES. FOR UNITS ON THESE BASES HAVING LENGTHWISE-POSITIONED BOXES, THE FIGURE-8 UNITIZING STRAP WILL BE LOCATED ADJACENT TO THE CENTER POST OF THE SKID BASE, AND WILL PASS OVER THE RUNNER OF THE SKID BASE. FOR UNITS ASSEMBLED ON TYPE II SKID BASES AND HAVING CROSSWISE-POSITIONED BOXES, THE FIGURE-8 UNITIZING STRAP WILL PASS UNDER THE RUNNER OF THE SKID BASE, AND FOR LENGTHWISE-POSITIONED BOXES WILL BE LOCATED ADJACENT TO THE CENTER POST.

#### SPECIAL NOTES:

1. SHIPMENTS OF SKIDDED UNITS OF AMMUNITION AND OR COMPONENTS SHOULD CONSIST OF FULL-HEIGHT AND FULL-LAYER UNITS TO THE MAXIMUM EXTENT POSSIBLE. HOWEVER, THE END OF A LOT, OR THE QUANTITY OF ITEMS NEEDED TO FILL A REQUISITION MAY NECESSITATE THE SHIPMENT OF ONE OR MORE LESS-THAN-FULL SKIDDED UNITS WITHIN A LOAD. THE PROCEDURES ON THIS PAGE AND ON PAGES 79 THRU 81 ARE PRESENTED AS GUIDANCE IN THE SHIPMENT OF THESE PARTIAL UNITS.
2. A LESS-THAN-FULL-HEIGHT SKIDDED UNIT, WHICH IS TO BE SHIPPED ON TOP OF A LOAD (CAR HEIGHT PERMITTING) IN ACCORDANCE WITH THE PROCEDURES DELINEATED ON THIS PAGE, MAY HAVE THE BOXES ON THE UNIT EITHER CROSSWISE AS SHOWN OR LENGTHWISE, HOWEVER, THE UNITS MUST NOT BE MORE THAN 24" IN HEIGHT. REFER TO THE "PARTIAL UNIT ON TOP OF LOAD" CHART AT THE UPPER RIGHT FOR GUIDANCE AS TO THE MAXIMUM PERMISSIBLE NUMBER OF LAYERS IN A UNIT WHICH IS TO BE STRAPPED ON TOP OF THE LOAD, BASED ON THE HEIGHT OF THE BOXES AND THE NUMBER OF LAYERS IN THE UNIT TO WHICH THE PARTIAL UNIT IS TO BE SECURED.
3. IF THE PARTIAL UNIT TO BE SHIPPED IS GREATER THAN 24" IN HEIGHT, THE PROCEDURES SHOWN ON THE FOLLOWING PAGES WILL APPLY. THE PROCEDURES SHOWN ON PAGE 79 ARE APPLICABLE IF THE BOXES ON THE UNIT ARE CROSSWISE IN THE CAR, AND THE PROCEDURES DEPICTED ON PAGES 80 AND 81 WILL BE EMPLOYED IF THE BOXES ON THE PARTIAL UNIT ARE LENGTHWISE IN THE CAR.
4. A LOW-HEIGHT (24" MAX) LESS-THAN-FULL-HEIGHT SKIDDED UNIT CAN BE SHIPPED BY POSITIONING IT EITHER ON THE TOP TIER OF A LOAD (CAR HEIGHT PERMITTING) OR ON THE TOP OF THE LOWER PORTION OF A LOAD WHEN THE LOAD CONTAINS A PARTIAL TIER IN THE END OF THE CAR. THE PARTIAL UNIT WILL BE STRAPPED TO THE SKIDDED UNIT DIRECTLY BELOW WITH TWO (2) VERTICAL UNITIZING STRAPS AND A FIGURE-8 UNITIZING STRAP. SEE THE "SECUREMENT OF PARTIAL UNIT ON TOP" VIEW ABOVE FOR GUIDANCE. PLACEMENT WITHIN THE LENGTH OF THE CAR IS OPTIONAL, ALTHOUGH NEAR THE DOORWAY AREA IS RECOMMENDED AS LONG AS IT IS NOT WITHIN A LOAD UNIT WHICH IS TO BE ENCIRCLED WITH DOORWAY PROTECTION STRAPS.
5. LEFTOVER BOXES, IN AN AMOUNT WHICH IS LESS THAN THE QUANTITY IN ONE LAYER OF A UNIT, CAN BE SECURED TO THE TOP OF A PARTIAL UNIT FOR SECUREMENT ON TOP OF A LOAD, WITH THESE LIMITATIONS:
  - A. THE HEIGHT OF THE PARTIAL UNIT, WITH THE LEFTOVER BOXES ADDED, MUST NOT EXCEED 24" IN HEIGHT.
  - B. LEFTOVER BOXES ON TOP OF A PARTIAL UNIT ARE APPLICABLE FOR CONUS AND CONUS RAILROAD SHIPMENTS FROM DEPOT TO DEPOT OR FROM DEPOTS TO POSTS, CAMPS, AND STATIONS, OR UPON APPROVAL FROM HIGHER HEADQUARTERS, FOR SHIPMENTS FROM LOAD, ASSEMBLY, AND PACK PLANTS TO DEPOTS. CAUTION: A LOAD CONTAINING LEFTOVER BOXES IN AN AMOUNT WHICH IS LESS THAN A FULL LAYER, AND SECURED TO THE TOP OF A PARTIAL UNIT, MUST NOT BE DESTINED FOR SHIPMENT OVERSEAS BY WATER CARRIER.
  - C. THE LEFTOVER BOXES MUST BE SECURED TO THE PARTIAL UNIT WITH THEIR OWN STRAPPING, SEPARATE FROM THE STRAPS FOR THE PARTIAL UNIT. SEE THE DETAILS ON PAGE 82 FOR GUIDANCE IN STRAP APPLICATION.

( SPECIAL NOTES CONTINUED AT RIGHT )

PARTIAL UNIT ON TOP OF LOAD	
NO. OF LAYERS IN UNIT BELOW	MAXIMUM NUMBER OF LAYERS WHICH CAN BE STRAPPED ON TOP OF LOAD.
1	NOT APPLICABLE.
2	1 LAYER OF BOXES IF 18" OR LESS IN HEIGHT. FOR BOXES OVER 18" HIGH, "SQUARE OUT" UNIT WITH FILLER "A" AND PLACE PARTIAL UNIT WITHIN TOP TIER OF LOAD, EITHER CROSSWISE OR LENGTHWISE. (SEE SPECIAL NOTE 4 ON PAGE 79).
3	2 LAYERS OR BOXES IF 9" OR LESS IN HEIGHT. 1 LAYER OF BOXES IF OVER 9" HIGH.
4 THRU 8	3 LAYERS OF BOXES IF 6" OR LESS IN HEIGHT. 2 LAYERS OF BOXES IF OVER 6" BUT NOT MORE THAN 9" 1 LAYER OF BOXES IF OVER 9" HIGH. NOTE: FOR 4 LAYERS OF BOXES, SHIP IN TWO (2) 2-LAYER UNITS ON TOP OF LOAD. FOR 3 LAYERS OF BOXES OVER 6" HIGH, SHIP IN ONE (1) EACH 1-LAYER AND 2-LAYER UNITS ON TOP OF LOAD. FOR 2 LAYERS OF BOXES OVER 9" HIGH, SHIP IN TWO (2) 1-LAYER UNITS ON TOP OF LOAD.

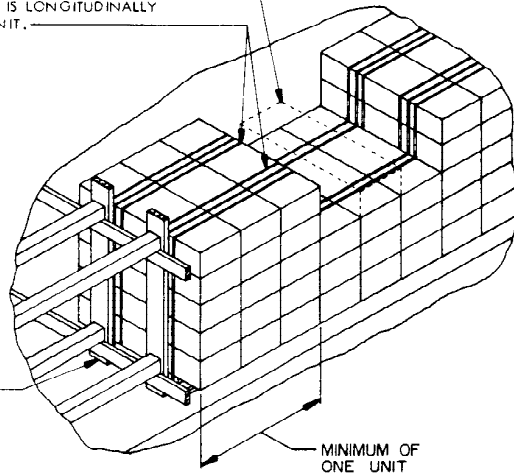
( SPECIAL NOTES CONTINUED )

6. THE "SHIPMENT OF PARTIAL UNITS" PROCEDURES ON THIS PAGE ARE APPLICABLE FOR LOADS IN CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS AS WELL AS FOR LOADS IN CONVENTIONAL BOX CARS. THE DEPICTED PROCEDURES WILL NOT BE USED FOR SHIPMENTS OF PARTIAL UNITS IN CARS EQUIPPED WITH MECHANICAL BRACING DEVICES. PARTIAL UNITS ON TOP OF A TIER MUST BE BLOCKED AND BRACED IN ACCORDANCE WITH THE PROCEDURES DEPICTED WITHIN THAT PORTION OF THIS DRAWING.

TWO (2) ADDITIONAL 1-1/4" X .035" BY LENGTH TO SUIT UNITIZING STRAPS MUST BE APPLIED AROUND EACH SKIDDED UNIT WHICH IS LONGITUDINALLY ADJACENT TO A PARTIAL UNIT.

SEE SPECIAL NOTE 5 BELOW.

INDICATES A TYPICAL CENTER GATE. SEE SPECIAL NOTE 7.



**POSITIONING OF PARTIAL UNIT (BOXES CROSSWISE) WITHIN A TIER**

THE SKIDDED UNITS SHOWN IN THE VIEW ABOVE ARE TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR OTHER SKIDDED UNIT CONFIGURATIONS HAVING CROSSWISE-POSITIONED BOXES. REFER TO PAGE 80 FOR PROCEDURES APPLICABLE FOR SKIDDED UNIT CONFIGURATIONS HAVING LENGTHWISE-POSITIONED BOXES.

PARTIAL UNIT WITHIN A TIER (LAYER)	
NO. OF LAYERS IN ADJACENT UNITS.	MINIMUM NO. OF LAYERS WHICH CAN BE SHIPPED WITHIN A TIER.
1	NOT APPLICABLE
2	CANNOT BE USED (SEE NOTE 4)
3	2 LAYERS
4	3 LAYERS
5	3 LAYERS
6	4 LAYERS
7	5 LAYERS
8	5 LAYERS

( SPECIAL NOTES CONTINUED )

**SPECIAL NOTES:**

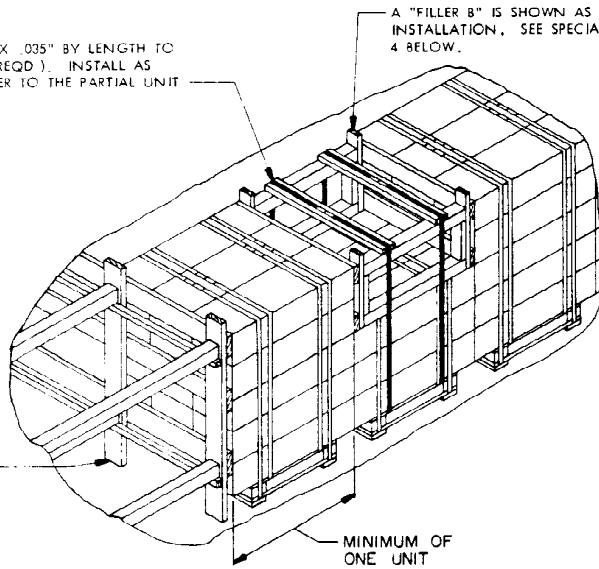
- SHIPMENTS OF SKIDDED UNITS OF AMMUNITION AND/OR COMPONENTS SHOULD CONSIST OF FULL-HEIGHT AND FULL-LAYER UNITS TO THE MAXIMUM EXTENT POSSIBLE. HOWEVER, THE END OF A LOT, OR THE QUANTITY OF ITEMS NEEDED TO FILL A REQUISITION MAY NECESSITATE THE SHIPMENT OF ONE OR MORE LESS-THAN-FULL SKIDDED UNITS WITHIN A LOAD. THE PROCEDURES SHOWN ON THIS PAGE AND ON THE OPPOSITE PAGE, AND ON PAGES 80 AND 81, ARE PRESENTED AS GUIDANCE IN THE SHIPMENT OF THESE PARTIAL UNITS.
- A LESS-THAN-FULL-HEIGHT SKIDDED UNIT OF CROSSWISE-POSITIONED BOXES WHICH IS TO BE SHIPPED WITHIN A TIER HAS A LIMITATION AS TO THE MINIMUM NUMBER OF FULL LAYERS OF BOXES. THE HEIGHT OF THE PARTIAL UNIT MUST BE AT LEAST 66 PERCENT (2/3) OF THE HEIGHT OF THE LONGITUDINALLY ADJACENT UNITS. REFER TO THE "PARTIAL UNIT WITHIN A TIER (LAYER)" CHART ABOVE FOR GUIDANCE AS TO THE MINIMUM NUMBER OF LAYERS OF BOXES PERMISSIBLE IN THE PARTIAL UNIT, BASED ON THE NUMBER OF LAYERS IN THE LONGITUDINALLY ADJACENT UNITS.
- IF THE PARTIAL UNIT TO BE SHIPPED CONSISTS OF LESS FULL LAYERS OF BOXES THAN THE MINIMUM NUMBER PERMISSIBLE WHICH IS SPECIFIED WITHIN THE CHART ABOVE, THAT PARTIAL UNIT MAY BE SECURED ON TOP OF THE LOAD AS SHOWN ON PAGE 78 (CAR HEIGHT PERMITTING). NOTE THAT IF THE HEIGHT OF THE PARTIAL UNIT EXCEEDS THE 24" MAXIMUM SPECIFIED FOR THAT PROCEDURE, THE PARTIAL UNIT MUST BE BROKEN DOWN INTO TWO (2) UNITS AND SECURED SEPARATELY.
- ALL LESS-THAN-FULL-HEIGHT SKIDDED UNITS WHICH ARE TO BE SHIPPED WITHIN A TIER AS SHOWN ABOVE MUST CONSIST OF FULL LAYERS OF BOXES TO A HEIGHT AT LEAST 2/3 THE HEIGHT OF THE LONGITUDINALLY ADJACENT UNITS. NOTE THAT FOR A PARTIAL UNIT WHICH IS ONE LAYER OF BOXES IN HEIGHT ADJACENT TO 2-LAYER UNITS, IT WILL BE NECESSARY TO SECURE A FILLER "A" TO THE TOP. FILLER ASSEMBLIES, AS DETAILED ELSEWHERE, CAN BE INSTALLED IN THE PLACE OF BOXES WHEN THERE ARE NOT SUFFICIENT BOXES TO PROVIDE FOR A FULL LAYER. REFER TO THE APPLICABLE AMC 19-48 SERIES DRAWING FOR DETAILS APPLICABLE TO THE CONSTRUCTION OF THE FILLER ASSEMBLIES TO BE USED IN THE PLACE OF ONE OR MORE OMITTED BOXES. PROPER PLACEMENT OF THE FILLERS WITHIN THE UNITS, AND THE SECUREMENT OF THE FILLERS ARE ALSO DEPICTED WITHIN THAT DRAWING.
- LEFTOVER BOXES, IN AN AMOUNT WHICH IS NOT MORE THAN THE QUANTITY IN ONE LAYER OF A UNIT, CAN BE SECURED TO THE TOP OF A PARTIAL UNIT FOR PLACEMENT WITHIN A TIER, WITH THESE LIMITATIONS:
  - LEFTOVER BOXES ON TOP OF A PARTIAL UNIT ARE APPLICABLE FOR CONUS AND OCCNUS RAILROAD SHIPMENTS FROM DEPOT TO DEPOT OR FROM DEPOTS TO POSTS, CAMPS, AND STATIONS, OR, UPON APPROVAL FROM HIGHER HEAD-QUARTERS, FOR SHIPMENTS FROM LOAD, ASSEMBLE, AND PACK PLANTS TO DEPOTS. CAUTION: A LOAD CONTAINING LEFTOVER BOXES IN AN AMOUNT WHICH IS LESS THAN A FULL LAYER, AND SECURED TO THE TOP OF A PARTIAL UNIT, MUST NOT BE DESTINED FOR SHIPMENT OVERSEAS BY WATER CARRIER.
  - THE LEFTOVER BOXES MUST BE SECURED TO THE PARTIAL UNIT WITH THEIR OWN STRAPPING, SEPARATE FROM THE STRAPS FOR THE PARTIAL UNIT. SEE THE DETAILS ON PAGE 82 FOR GUIDANCE IN STRAP APPLICATION.
- A NEARLY-FULL-HEIGHT LESS-THAN-FULL-SIZE UNIT, OR A FULL HEIGHT UNIT HAVING LESS THAN A COMPLETE QUANTITY OF CROSSWISE-POSITIONED BOXES IN THE TOP LAYER, CAN BE SHIPPED WITHIN A TIER OF A LOAD. CAUTION: THE PARTIAL UNIT MUST BE LOCATED IN THE TOP TIER OF A LOAD; OTHER UNITS MUST NOT BE PLACED ON TOP OF THE PARTIAL UNIT. THE PARTIAL UNIT SHOULD BE PLACED IN THE LOAD SO THAT THERE IS AT LEAST ONE (1) FULL-HEIGHT UNIT BETWEEN IT AND THE CENTER GATE. HOWEVER, THE PARTIAL UNIT IS NOT TO BE WITHIN A LOAD UNIT WHICH IS TO BE ENCIRCLED WITH DOORWAY PROTECTION STRAPS. THE ONLY ADDITIONAL DUNNAGE NEEDED IS THE FOUR (4) 1-1/4" X .035" UNITIZING STRAPS WHICH MUST BE APPLIED, TWO (2) TO EACH OF THE UNITS LONGITUDINALLY ADJACENT TO THE PARTIAL UNIT. SEE THE "POSITIONING OF PARTIAL UNIT (BOXES CROSSWISE) WITHIN A TIER" VIEW ABOVE FOR GUIDANCE.
- THE "POSITIONING OF PARTIAL UNIT (BOXES CROSSWISE) WITHIN A TIER" VIEW ABOVE DEPICTS A PORTION OF A CONVENTIONAL BOX CAR LOAD. HOWEVER, THE "SHIPMENT OF PARTIAL UNITS" PROCEDURES ON THIS PAGE ARE ALSO APPLICABLE FOR LOADS IN CARS EQUIPPED WITH MECHANICAL BRACING DEVICES AS WELL AS FOR LOADS IN CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.

( SPECIAL NOTES CONTINUED AT RIGHT )

UNITIZING STRAP, 1-1/4" X .035" BY LENGTH TO SUIT STEEL STRAPPING (2 REQD.). INSTALL AS SHOWN TO SECURE A FILLER TO THE PARTIAL UNIT

A "FILLER B" IS SHOWN AS A TYPICAL INSTALLATION. SEE SPECIAL NOTE 4 BELOW.

INDICATES A TYPICAL CENTER GATE. SEE SPECIAL NOTE 6



POSITIONING OF PARTIAL UNIT (BOXES LENGTHWISE) WITHIN A TIER

THE SKIDDED UNITS SHOWN IN THE VIEW ABOVE ARE TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR OTHER SKIDDED UNIT CONFIGURATIONS HAVING LENGTHWISE-POSITIONED BOXES. REFER TO PAGE 79 FOR PROCEDURES APPLICABLE FOR SKIDDED UNIT CONFIGURATIONS HAVING CROSSWISE-POSITIONED BOXES.

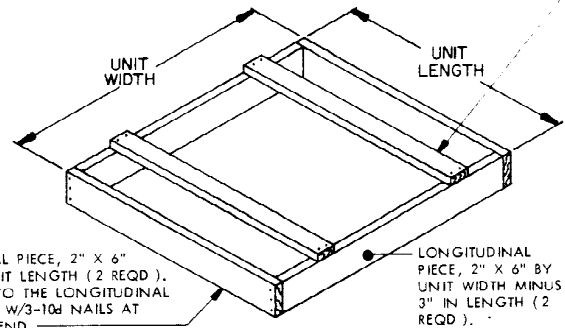
SPECIAL NOTES:

( SPECIAL NOTES CONTINUED )

1. SHIPMENTS OF SKIDDED UNITS OF AMMUNITION AND/OR COMPONENTS SHOULD CONSIST OF FULL-HEIGHT AND FULL-LAYER UNITS TO THE MAXIMUM EXTENT POSSIBLE. HOWEVER, THE END OF A LOT, OR THE QUANTITY OF ITEMS NEEDED TO FILL A REQUISITION, MAY NECESSITATE THE SHIPMENT OF ONE OR MORE LESS-THAN-FULL SKIDDED UNITS WITHIN A LOAD. THE PROCEDURES ON THIS PAGE AND ON THE OPPOSITE PAGE, AND ON PAGES 78 AND 79, ARE PRESENTED AS GUIDANCE IN THE SHIPMENT OF THESE PARTIAL UNITS.
2. A LESS-THAN-FULL HEIGHT SKIDDED UNIT OF LENGTHWISE-POSITIONED BOXES WHICH IS TO BE SHIPPED WITHIN A TIER HAS NO LIMITATIONS AS TO THE MINIMUM OR MAXIMUM NUMBER OF LAYERS OF BOXES ON THE PARTIAL UNIT. HOWEVER, IF THE HEIGHT OF THE PARTIAL UNIT DOES NOT EXCEED 24" IT MAY BE MORE ADVANTAGEOUS TO USE THE "PARTIAL UNIT ON TOP OF LOAD" PROCEDURES ON PAGE 78 ( CAR HEIGHT PERMITTING ) IN LIEU OF THOSE DEPICTED ON THIS PAGE.
3. ALL FULL-HEIGHT SKIDDED UNITS, AND ALL LESS-THAN-FULL HEIGHT SKIDDED UNITS, WHICH ARE TO BE SHIPPED WITHIN A TIER AS SHOWN ABOVE MUST CONSIST OF FULL LAYERS OF BOXES. FILLER ASSEMBLIES CAN BE INSTALLED IN THE PLACE OF BOXES WHEN THERE ARE NOT SUFFICIENT BOXES TO PROVIDE FOR A FULL LAYER. REFER TO THE APPLICABLE AMC 19-48 SERIES DRAWING FOR DETAILS APPLICABLE TO THE CONSTRUCTION OF THE FILLER ASSEMBLIES TO BE USED IN THE PLACE OF ONE OR MORE OMITTED BOXES. PROPER PLACEMENT OF THE FILLERS WITHIN THE UNITS, AND THE SECUREMENT OF THE FILLERS ARE ALSO DEPICTED WITHIN THAT DRAWING.
4. A LESS-THAN-FULL-HEIGHT SKIDDED UNIT, WHEN POSITIONED SO THE BOXES ARE LENGTHWISE IN THE CAR, MUST HAVE A FILLER ASSEMBLY SECURED TO THE TOP OF IT. THIS FILLER ASSEMBLY WILL PROVIDE LONGITUDINAL BRACING FOR THE LENGTHWISE-POSITIONED BOXES ON THE LONGITUDINALLY ADJACENT UNITS WHICH EXTEND ABOVE THE HEIGHT OF THE PARTIAL UNIT BEING SHIPPED. THE "FILLER A" ASSEMBLY DETAILED AT RIGHT IS FOR USE WHEN THE PARTIAL UNIT IS ONE LAYER OF BOXES LESS IN HEIGHT THAN THE ADJACENT UNITS. THE "FILLER B" ASSEMBLY SHOWN ON PAGE 81 IS APPLICABLE FOR USE WHEN THE PARTIAL UNIT CONSISTS OF EITHER TWO OR THREE LESS LAYERS THAN THE ADJACENT FULL-HEIGHT UNITS. THE "FILLER C" ASSEMBLY ON PAGE 81 WILL BE USED WHEN FOUR LAYERS ARE OMITTED. NOTE THAT IF THE TOP LAYER OF THE PARTIAL UNIT CONTAINS ONE OR MORE FILLERS (AS DETAILED IN THE APPLICABLE AMC 19-48 SERIES DRAWING) IN THE PLACE OF OMITTED BOXES, SUFFICIENT DUNNAGE MATERIAL (AS REQUIRED) MUST BE POSITIONED ON AND NAILED TO THOSE FILLERS TO PROVIDE AN EVEN BEARING SURFACE FOR THE INSTALLATION OF "FILLER A", "FILLER B", OR "FILLER C", AS APPLICABLE. ALSO NOTE THAT THE FILLERS SPECIFIED ON THIS PAGE AND THE FOLLOWING PAGE FOR PROVIDING A FULL-HEIGHT UNIT, AND THOSE FILLERS SPECIFIED IN THE REFERENCED DRAWING FOR PROVIDING A FULL TOP LAYER OF BOXES ON A PARTIAL UNIT, MAY BE REMOVED WHEN A SHIPMENT REACHES DESTINATION. OR IF DESIRED, THE FILLERS MAY REMAIN WITH THE UNIT DURING STORAGE IF APPLICABLE FOR POSSIBLE USE IN A FUTURE SHIPMENT.
5. A NEARLY-FULL-HEIGHT LESS-THAN-FULL-SIZE UNIT, OR A FULL HEIGHT UNIT HAVING LESS THAN A COMPLETE QUANTITY OF LENGTHWISE-POSITIONED BOXES IN THE TOP LAYER, CAN BE SHIPPED WITHIN A TIER OF A LOAD. CAUTION: THE PARTIAL UNIT MUST BE LOCATED IN THE TOP TIER OF A LOAD; OTHER UNITS MUST NOT BE PLACED ON TOP OF THE PARTIAL UNIT. THE PARTIAL UNIT SHOULD BE PLACED IN THE LOAD SO THAT THERE IS AT LEAST ONE (1) FULL-HEIGHT UNIT BETWEEN IT AND THE CENTER GATE; HOWEVER, THE PARTIAL UNIT IS NOT TO BE WITHIN A LOAD UNIT WHICH IS TO BE ENCIRCLED WITH DOORWAY PROTECTION STRAPS. SEE THE "POSITIONING OF PARTIAL UNIT (BOXES LENGTHWISE) WITHIN A TIER" VIEW ABOVE FOR GUIDANCE.

6. THE "POSITIONING OF PARTIAL UNIT (BOXES LENGTHWISE) WITHIN A TIER" VIEW ABOVE DEPICTS A PORTION OF A CONVENTIONAL BOX CAR LOAD. HOWEVER, THE "SHIPMENT OF PARTIAL UNITS" PROCEDURES ON THIS PAGE ARE ALSO APPLICABLE FOR LOADS IN CARS EQUIPPED WITH MECHANICAL BRACING DEVICES AS WELL AS FOR LOADS IN CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.

STRAPPING BOARD, 2" X 4" BY UNIT LENGTH (2 REQD.). POSITION SO AS TO ALIGN THE INDICATED EDGE WITH THE INNER EDGE OF A SKID BASE POST. NAIL TO THE LONGITUDINAL PIECES W/2-10d NAILS AT EACH END.



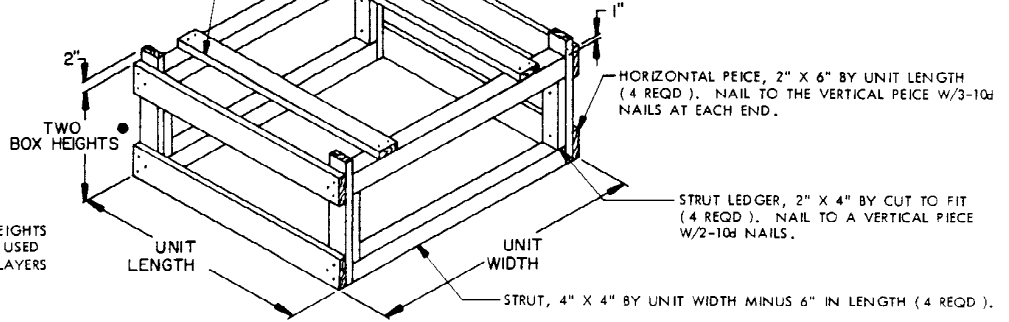
FILLER A

THIS FILLER IS DESIGNED FOR USE IN THE PLACE OF ONE (1) LAYER OF BOXES OMITTED FROM A SKIDDED UNIT.



STRAPPING BOARD, 2" X 4" BY UNIT LENGTH (2 REQD). POSITION SO AS TO ALIGN THE INDICATED EDGE WITH THE INNER EDGE OF A SKID BASE POST. NAIL TO THE STRUTS W/2-10d NAILS AT EACH END.

VERTICAL PIECE, 2" X 4" BY A LENGTH TO SUIT (4 REQD). NAIL TO THE STRUTS W/3-12d NAILS AT EACH JOINT.



THIS DIMENSION WILL BE "TWO BOX HEIGHTS PLUS 2-3/4" WHEN THE FILLER IS TO BE USED IN THE PLACE OF THREE (3) OMITTED LAYERS OF BOXES.

**FILLER B**

THIS FILLER, AS SHOWN, IS DESIGNED FOR USE IN THE PLACE OF TWO (2) LAYERS OF BOXES OMITTED FROM A SKIDDED UNIT. THE FILLER WHEN MODIFIED AS NOTED AT LEFT ABOVE CAN BE USED IN THE PLACE OF THREE (3) OMITTED LAYERS OF BOXES.

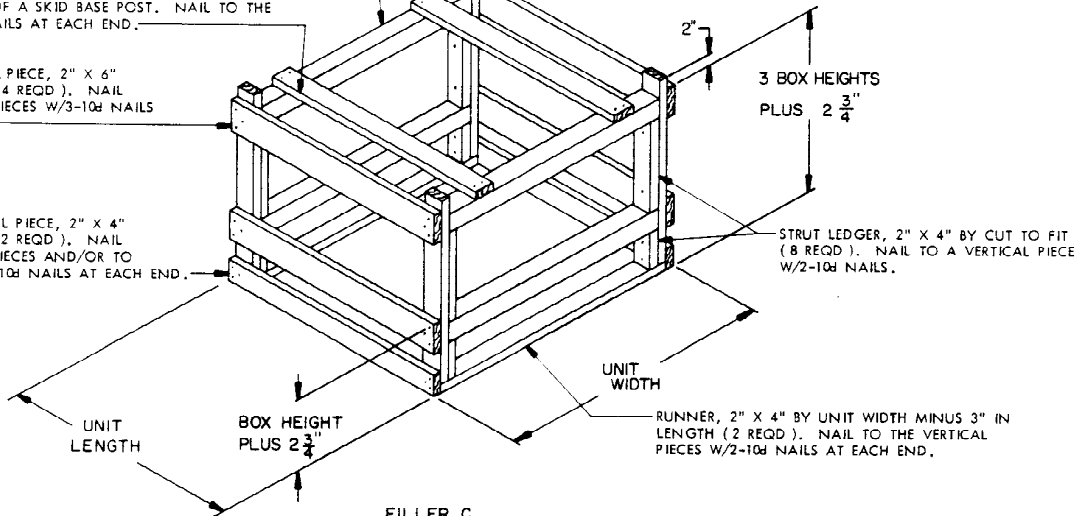
STRAPPING BOARD, 2" X 4" BY UNIT LENGTH (2 REQD). POSITION SO AS TO ALIGN THE INDICATED EDGE WITH THE INNER EDGE OF A SKID BASE POST. NAIL TO THE STRUTS W/2-10d NAILS AT EACH END.

STRUT, 4" X 4" BY UNIT WIDTH MINUS 6" IN LENGTH (4 REQD).

VERTICAL PIECE, 2" X 4" BY A LENGTH TO SUIT (4 REQD). NAIL TO THE STRUTS W/3-12d NAILS AT EACH JOINT.

UPPER HORIZONTAL PIECE, 2" X 6" BY UNIT LENGTH (4 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH END.

LOWER HORIZONTAL PIECE, 2" X 4" BY UNIT LENGTH (2 REQD). NAIL TO THE VERTICAL PIECES AND/OR TO THE RUNNERS W/3-10d NAILS AT EACH END.



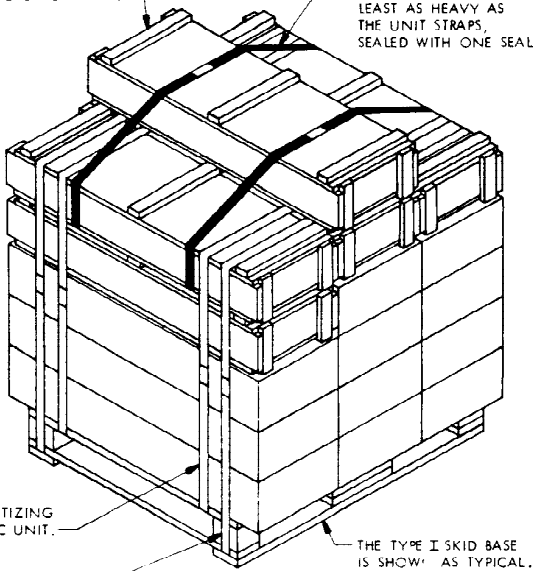
**FILLER C**

THIS FILLER IS DESIGNED FOR USE IN THE PLACE OF FOUR (4) LAYERS OF BOXES OMITTED FROM A SKIDDED UNIT.

**FILLERS**

INDICATES ONE (1) LEFTOVER BOX AS A TYPICAL QUANTITY.

INDICATES UNITIZING STRAP, OF A SIZE AT LEAST AS HEAVY AS THE UNIT STRAPS, SEALED WITH ONE SEAL.



INDICATES UNITIZING STRAP OF BASIC UNIT.

INDICATES SKID STRAP.

THE TYPE I SKID BASE IS SHOWN AS TYPICAL.

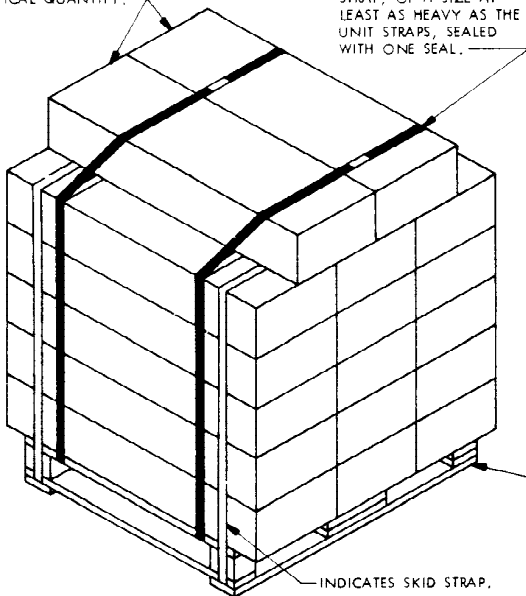
#### SECUREMENT OF TOP-CLEATED BOXES

#### SPECIAL NOTES:

1. SHIPMENTS OF SKIDDED UNITS OF AMMUNITION AND/OR COMPONENTS SHOULD CONSIST OF FULL-HEIGHT UNITS TO THE MAXIMUM EXTENT POSSIBLE. HOWEVER, THE END OF A LOT OR THE QUANTITY OF ITEMS NEEDED TO FILL A REQUISITION, MAY NECESSITATE THE SHIPMENT OF ONE OR MORE LEFTOVER BOXES. LEFTOVER BOXES ARE DESCRIBED AS A QUANTITY OF BOXES WHICH IS INSUFFICIENT TO FORM A FULL-LAYERED PARTIAL UNIT FOR SHIPMENT EITHER ON TOP OF A LOAD AS SHOWN ON PAGE 78 OR WITHIN A TIER AS SHOWN ON PAGE 79. THEY ARE USUALLY BOXES OF THE SAME AMMUNITION ITEM AS THE BALANCE OF THE LOAD ALTHOUGH THEY MAY BE ANY OTHER COMPATIBLE ITEM.
2. SHIPMENT OF LEFTOVER BOXES IS APPLICABLE FOR CONUS AND OCONUS RAILROAD SHIPMENTS FROM DEPOT TO DEPOT OR FROM DEPOTS TO POSTS, CAMPS, AND STATIONS, OR, UPON APPROVAL FROM HIGHER HEADQUARTERS, FOR SHIPMENTS FROM LOAD, ASSEMBLE, AND PACK PLANTS TO DEPOTS. CAUTION: A LOAD CONTAINING LEFTOVER BOXES IN AN AMOUNT WHICH IS LESS THAN A FULL LAYER, AND SECURED TO THE TOP OF A FULL OR PARTIAL UNIT, MUST NOT BE DESTINED FOR SHIPMENT OVERSEAS BY WATER CARRIER.
3. THE PROCEDURES ON THIS PAGE ARE PRESENTED AS GUIDANCE IN THE SECUREMENT OF LEFTOVER BOXES FOR SHIPMENT. THE VIEW AT TOP LEFT DEPICTS ONE LEFTOVER BOX SECURED TO A FULL-HEIGHT UNIT WHEN THE BOXES ON THE UNIT HAVE TOP CLEATS. THE VIEW AT LEFT BELOW DEPICTS TWO LEFTOVER BOXES SECURED TO A FULL-HEIGHT UNIT WHEN THE BOXES ON THE UNIT DO NOT HAVE TOP CLEATS. THE QUANTITIES SHOWN ARE TYPICAL. THE PROCEDURES ARE ALSO APPLICABLE FOR SECUREMENT OF LEFTOVER BOXES TO PARTIAL UNITS FOR SHIPMENT ON TOP OF A LOAD. SEE SPECIAL NOTE 5 ON PAGE 78 FOR LIMITATIONS. IN ADDITION, THE PROCEDURES ARE APPLICABLE FOR SECURING LEFTOVER BOXES TO A PARTIAL UNIT OF CROSSWISE-POSITIONED BOXES FOR SHIPMENT WITHIN A TIER. SEE SPECIAL NOTE 5 ON PAGE 79 FOR LIMITATIONS.
4. THE QUANTITY OF LEFTOVER BOXES WHICH CAN BE SECURED TO FULL OR PARTIAL UNITS MAY VARY FROM ONE TO NOT MORE THAN THE QUANTITY IN ONE LAYER ON THE UNIT. IN OTHER WORDS, NOT MORE THAN THREE BOXES CAN BE STRAPPED TO A 3-BOX LONG UNIT. LEFTOVER BOXES MUST NOT BE STACKED. IF THE QUANTITY OF LEFTOVER BOXES TO BE SHIPPED IS MORE THAN THE QUANTITY IN ONE FULL LAYER, BOXES MUST BE STRAPPED TO MORE THAN ONE UNIT.
5. LEFTOVER BOXES MUST BE SECURED TO A FULL OR PARTIAL UNIT WITH A MINIMUM OF TWO (2) PIECES OF STEEL STRAPPING (SEPARATE FROM UNIT STRAPS) OF A SIZE AT LEAST AS HEAVY AS THE STRAPPING USED TO SECURE THE BOXES ON THE SKIDDED UNIT UNDERNEATH THE LEFTOVER BOXES TO THE SKID BASE. THE "SECUREMENT OF TOP-CLEATED BOXES" DETAIL ABOVE DEPICTS A TYPICAL STRAP APPLICATION FOR BOXES HAVING TOP CLEATS. THREAD A STRAP UNDER THE TOP LAYER OF BOXES, AS NEAR AS PRACTICAL TO THE ADJACENT UNIT STRAP, EN-CIRCLE THE LEFTOVER BOXES, TENSION, AND SEAL THE JOINT WITH ONE DOUBLE CRIMPED SEAL. THE "SECUREMENT OF NON-TOP-CLEATED BOXES" DETAIL AT LEFT DEPICTS A TYPICAL STRAP APPLICATION FOR BOXES WHICH DO NOT HAVE TOP CLEATS. THREAD A STRAP UNDER THE PLYWOOD DECK OR TOP DECK BOARDS (AS APPLICABLE) AS NEAR AS PRACTICAL TO A SKID BASE POST, COMPLETELY EN-CIRCLE THE SKIDDED UNIT AND THE LEFTOVER BOXES, TENSION, AND SEAL THE JOINT WITH ONE DOUBLE CRIMPED SEAL.

INDICATES TWO (2) LEFTOVER BOXES AS A TYPICAL QUANTITY.

INDICATES UNITIZING STRAP, OF A SIZE AT LEAST AS HEAVY AS THE UNIT STRAPS, SEALED WITH ONE SEAL.

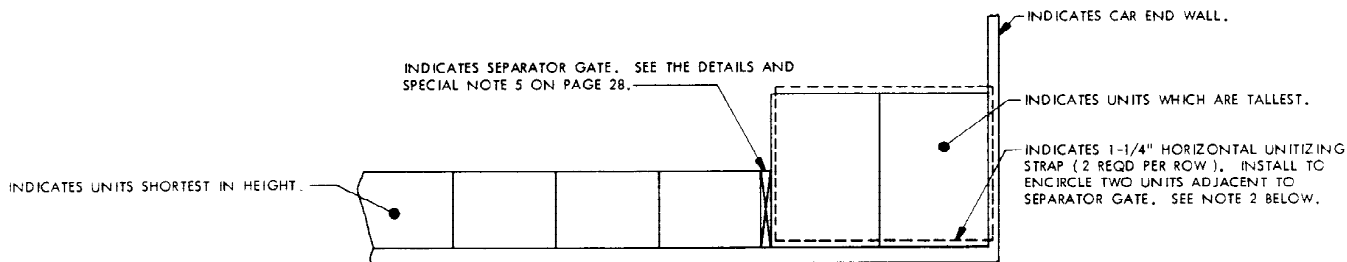


THE TYPE I SKID BASE IS SHOWN AS TYPICAL.

INDICATES SKID STRAP.

#### SECUREMENT OF NON-TOP-CLEATED BOXES

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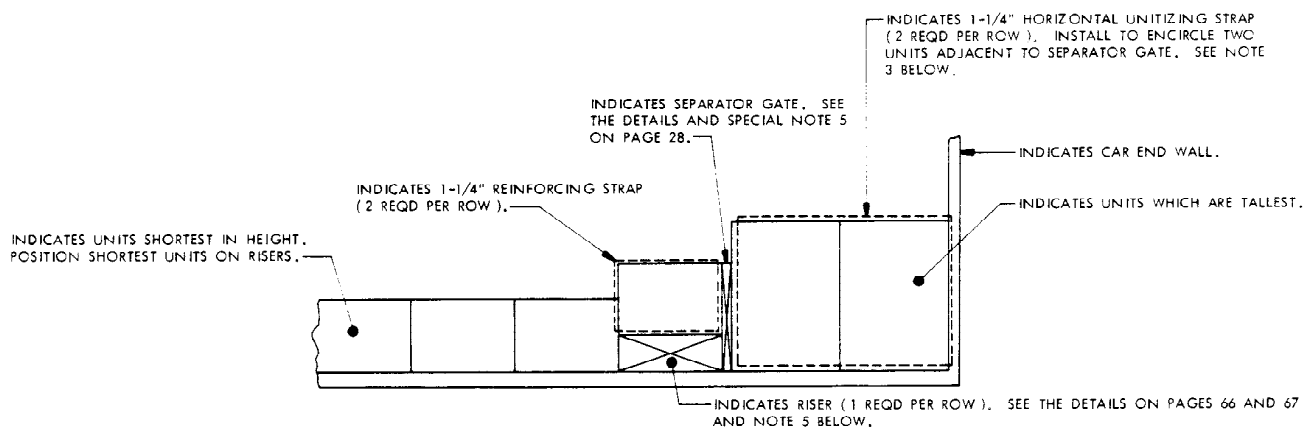


### NO-RISER METHOD IN 1-TIER LOAD

HEIGHT OF TALL UNIT	MIN HEIGHT OF SHORT UNIT	
	WITH TALL UNITS STRAPPED	WITH TALL UNITS NOT STRAPPED
56"	28"	44"
55"	27-1/2"	43"
54"	27"	42"
53"	26-1/2"	41"
52"	26"	40"
51"	25-1/2"	39"
50"	25"	38"
49"	24-1/2"	37"
48"	24"	36"
47"	23-1/2"	35"
46"	23"	34"

#### REQUIREMENTS AND LIMITATIONS:

1. THE TALLEST UNITS WILL BE POSITIONED IN THE END OF THE CAR.
2. THE HORIZONTAL UNITIZING STRAPS SHOWN ARE REQUIRED WHEN THE TALLEST UNITS IN THE END OF THE CAR EXTEND MORE THAN 12" ABOVE THE SHORTER UNITS. EACH ROW OF TALLER UNITS IS THEN LIMITED TO NOT MORE THAN 8,000 POUNDS. IF THE TALLER UNITS EXTEND ABOVE THE SHORTER UNITS BY 12" OR LESS, THE STRAPPING IS NOT REQUIRED AND THERE IS NO WEIGHT LIMITATION. SEE THE CHART AT LEFT FOR GUIDANCE.
3. A SEPARATOR GATE WILL BE POSITIONED BETWEEN THE UNLIKE ITEMS. THE GATE WILL BE CONSTRUCTED WITH 2" X 6" VERTICAL PIECES AND HORIZONTAL PIECES. SEE SPECIAL NOTE 5 ON PAGE 28 FOR CONSTRUCTION GUIDANCE.

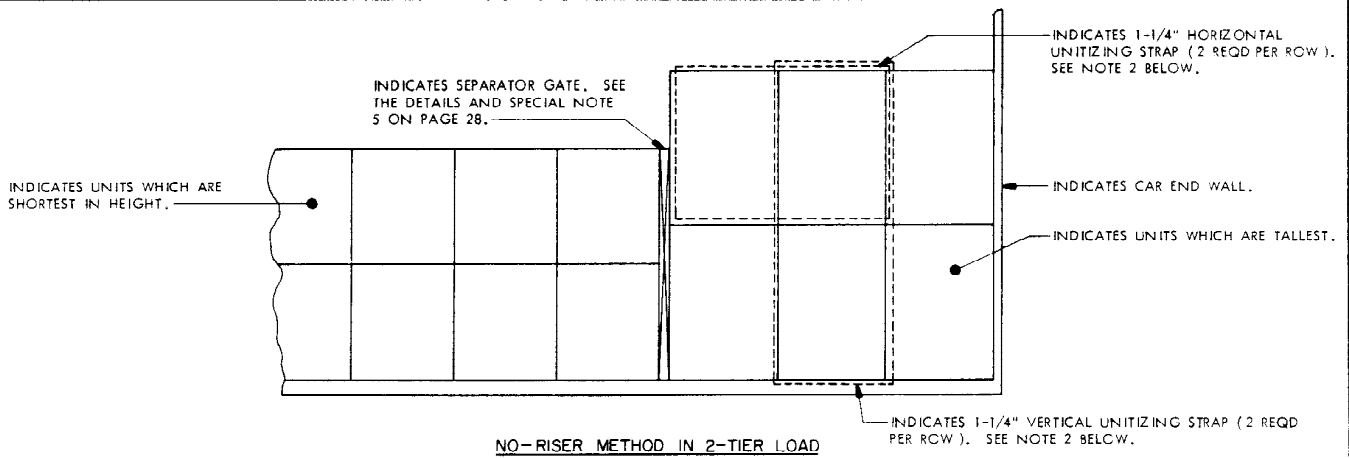


### RISER METHOD IN 1-TIER LOAD

HEIGHT OF TALL UNIT	MIN HEIGHT OF SHORT UNIT	
	WITH TALL UNITS STRAPPED	WITH TALL UNITS NOT STRAPPED
56"	19"	29-1/4"
55"	18-3/8"	28-3/4"
54"	18"	28"
53"	17-3/4"	27-3/8"
52"	17-3/8"	26-3/4"
51"	17"	26"
50"	16-3/4"	25-3/8"
49"	16-3/8"	24-3/4"
48"	16"	24"

#### REQUIREMENTS AND LIMITATIONS:

1. THE TALLEST UNITS WILL BE POSITIONED IN THE END OF THE CAR.
2. EACH ROW OF TALLER UNITS IS LIMITED TO NOT MORE THAN 8,000 POUNDS.
3. THE HORIZONTAL UNITIZING STRAPS SHOWN ARE REQUIRED WHEN THE TALLEST UNITS IN THE END OF THE CAR EXTEND MORE THAN 12" ABOVE THE SHORTER UNITS ON THE RISERS. IF THE TALLER UNITS EXTEND ABOVE THE UNITS ON THE RISERS BY 12" OR LESS, THE HORIZONTAL UNITIZING STRAPS ARE NOT REQUIRED. SEE THE CHART AT LEFT FOR GUIDANCE.
4. A SEPARATOR GATE WILL BE POSITIONED BETWEEN THE UNLIKE ITEMS. THE GATE WILL BE CONSTRUCTED WITH 2" X 6" VERTICAL PIECES AND HORIZONTAL PIECES. SEE SPECIAL NOTE 5 ON PAGE 28 FOR CONSTRUCTION GUIDANCE.
5. A RISER WILL BE POSITIONED UNDER EACH SHORT UNIT WHICH IS TO BE ADJACENT TO THE SEPARATOR GATE, AND TWO (2) REINFORCING STRAPS WILL BE INSTALLED SO AS TO ENCIRCLE EACH UNIT WHICH IS ON A RISER.

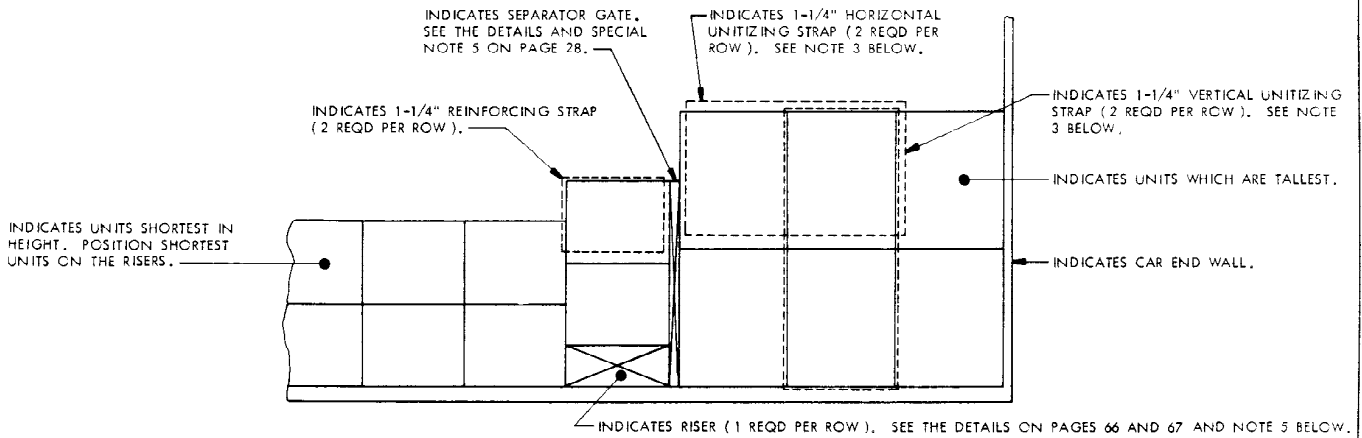


**NO-RISER METHOD IN 2-TIER LOAD**

HEIGHT OF TALL UNIT	MIN HEIGHT OF SHORT UNIT	
	WITH TALL UNITS STRAPPED	WITH TALL UNITS NOT STRAPPED
56"	42"	50"
55"	41-1/4"	49"
54"	40-1/2"	48"
53"	39-3/4"	47"
52"	39"	46"
51"	38-1/4"	45"
50"	37-1/2"	44"
49"	36-3/4"	43"
48"	36"	42"
47"	35-1/4"	41"
46"	34-1/2"	40"
45"	33-3/4"	39"
44"	33"	38"
43"	32-1/4"	37"

**REQUIREMENTS AND LIMITATIONS:**

1. THE TALLEST UNITS WILL BE POSITIONED IN THE END OF THE CAR.
2. THE HORIZONTAL UNITIZING STRAPS AND VERTICAL UNITIZING STRAPS SHOWN ARE REQUIRED WHEN THE STACKS OF TALLEST UNITS IN THE END OF THE CAR EXTEND MORE THAN 12" ABOVE THE STACKS OF SHORTER UNITS. EACH ROW OF TALLER UNITS IS THEN LIMITED TO NOT MORE THAN 8,000 POUNDS IN THE TOP TIER. IF THE TALLER UNITS EXTEND ABOVE THE SHORTER UNITS BY 12" OR LESS, THE HORIZONTAL AND VERTICAL UNITIZING STRAPS ARE NOT REQUIRED AND THERE IS NO WEIGHT LIMITATION. SEE THE CHART AT LEFT FOR GUIDANCE.
3. A SEPARATOR GATE WILL BE POSITIONED BETWEEN THE UNLIKE ITEMS. THE GATE WILL BE CONSTRUCTED WITH 2" X 6" VERTICAL PIECES AND HORIZONTAL PIECES. SEE SPECIAL NOTE 5 ON PAGE 28 FOR CONSTRUCTION GUIDANCE.

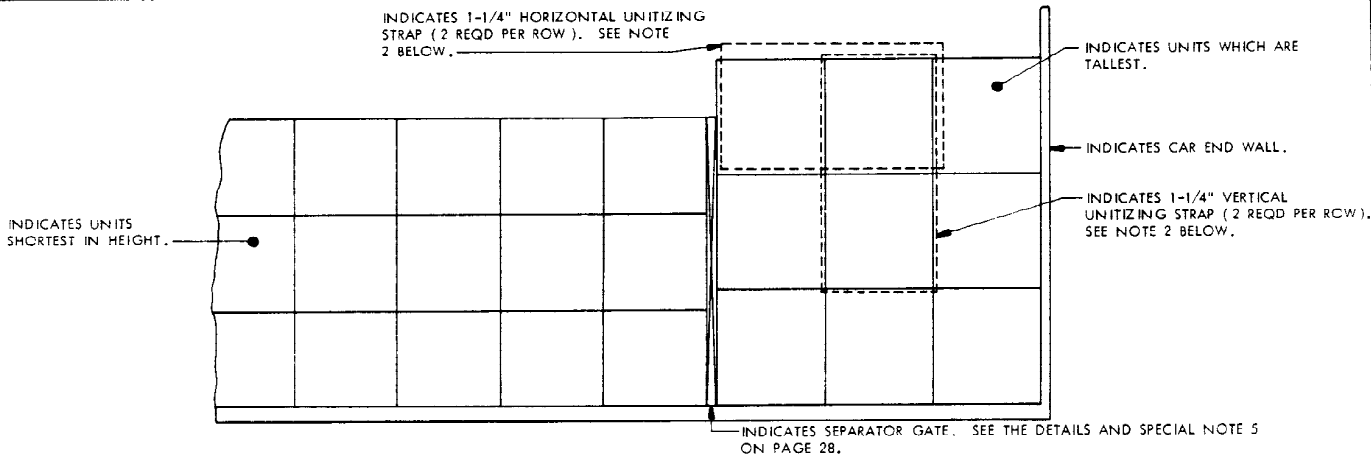


**RISER METHOD IN 2-TIER LOAD**

HEIGHT OF TALL UNIT	MIN HEIGHT OF SHORT UNIT	
	WITH TALL UNITS STRAPPED	WITH TALL UNITS NOT STRAPPED
56"	34"	40"
55"	33"	39-1/4"
54"	32-1/4"	38-1/2"
53"	32"	37-3/4"
52"	31-1/4"	37"
51"	30-3/4"	36"
50"	30"	35-1/4"
49"	29-1/2"	34-1/2"
48"	29"	33-3/4"
47"	28-1/4"	33"
46"	27-1/2"	32"
45"	27"	31-1/4"
44"	26-1/2"	30-1/2"
43"	25-3/4"	29-3/4"

**REQUIREMENTS AND LIMITATIONS:**

1. THE TALLEST UNITS WILL BE POSITIONED IN THE END OF THE CAR.
2. EACH ROW OF TALLER UNITS IS LIMITED TO NOT MORE THAN 8,000 POUNDS IN THE TOP TIER.
3. THE HORIZONTAL UNITIZING STRAPS AND VERTICAL UNITIZING STRAPS SHOWN ARE REQUIRED WHEN THE STACKS OF TALLEST UNITS IN THE END OF THE CAR EXTEND MORE THAN 12" ABOVE THE STACKS OF SHORTER UNITS ON THE RISERS. IF THE TALLER UNITS EXTEND ABOVE THE UNITS ON THE RISERS BY 12" OR LESS, THE HORIZONTAL AND VERTICAL UNITIZING STRAPS ARE NOT REQUIRED. SEE THE CHART AT LEFT FOR GUIDANCE.
4. A SEPARATOR GATE WILL BE POSITIONED BETWEEN THE UNLIKE ITEMS. THE GATE WILL BE CONSTRUCTED WITH 2" X 6" VERTICAL PIECES AND HORIZONTAL PIECES. SEE SPECIAL NOTE 5 ON PAGE 28 FOR CONSTRUCTION GUIDANCE.
5. A RISER WILL BE POSITIONED UNDER EACH SHORT UNIT STACK WHICH IS TO BE ADJACENT TO THE SEPARATOR GATE, AND TWO (2) REINFORCING STRAPS WILL BE INSTALLED SO AS TO ENCIRCLE EACH TOP UNIT OF EACH STACK WHICH IS ON A RISER.

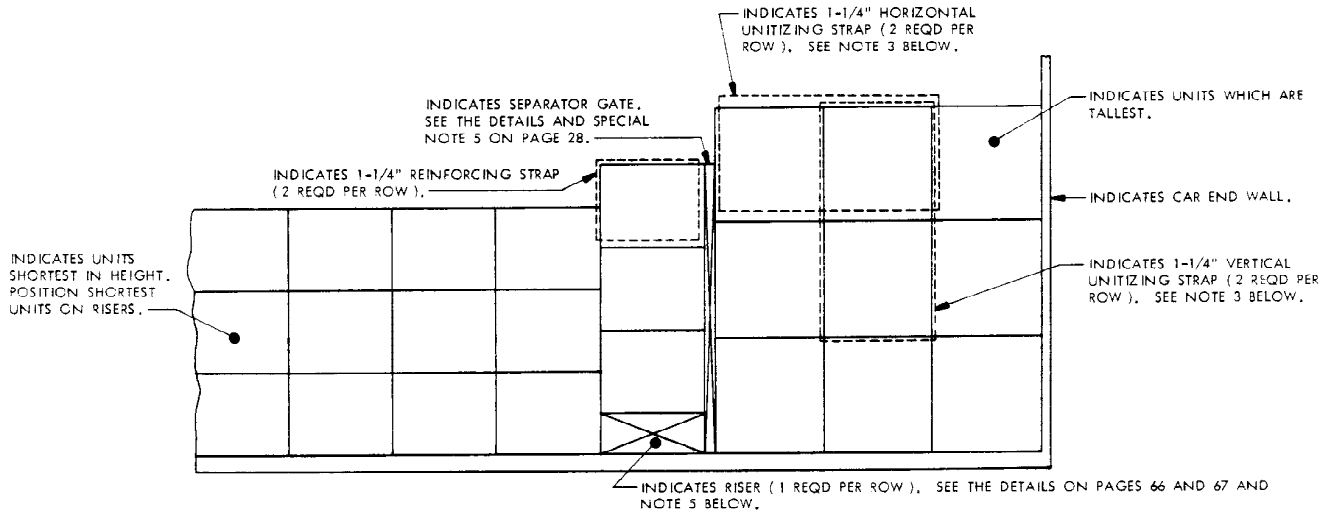


**NO-RISER METHOD IN 3-TIER LOAD**

HEIGHT OF TALL UNIT	MIN HEIGHT OF SHORT UNIT	
	WITH TALL UNITS STRAPPED	WITH TALL UNITS NOT STRAPPED
44"	36-5/8"	40"
43"	35-3/4"	39"
42"	35"	38"
41"	34-1/8"	37"
40"	33-1/4"	36"
39"	32-1/2"	35"
38"	31-5/8"	34"
37"	30-3/4"	33"
36"	30"	32"
35"	29-1/4"	31"
34"	28-1/4"	30"
33"	27-1/2"	29"

**REQUIREMENTS AND LIMITATIONS:**

1. THE TALLEST UNITS WILL BE POSITIONED IN THE END OF THE CAR.
2. THE HORIZONTAL UNITIZING STRAPS AND VERTICAL UNITIZING STRAPS SHOWN ARE REQUIRED WHEN THE STACKS OF TALLEST UNITS IN THE END OF THE CAR EXTEND MORE THAN 12" ABOVE THE STACKS OF SHORTER UNITS. EACH ROW OF TALLER UNITS IS THEN LIMITED TO NOT MORE THAN 8,000 POUNDS IN THE TOP TIER. IF THE TALLER UNITS EXTEND ABOVE THE SHORTER UNITS BY 12" OR LESS, THE HORIZONTAL AND VERTICAL UNITIZING STRAPS ARE NOT REQUIRED AND THERE IS NO WEIGHT LIMITATION. SEE THE CHART AT LEFT FOR GUIDANCE.
3. A SEPARATOR GATE WILL BE POSITIONED BETWEEN THE UNLIKE ITEMS. THE GATE WILL BE CONSTRUCTED WITH 2" X 6" VERTICAL PIECES AND HORIZONTAL PIECES. SEE SPECIAL NOTE 5 ON PAGE 28 FOR CONSTRUCTION GUIDANCE.

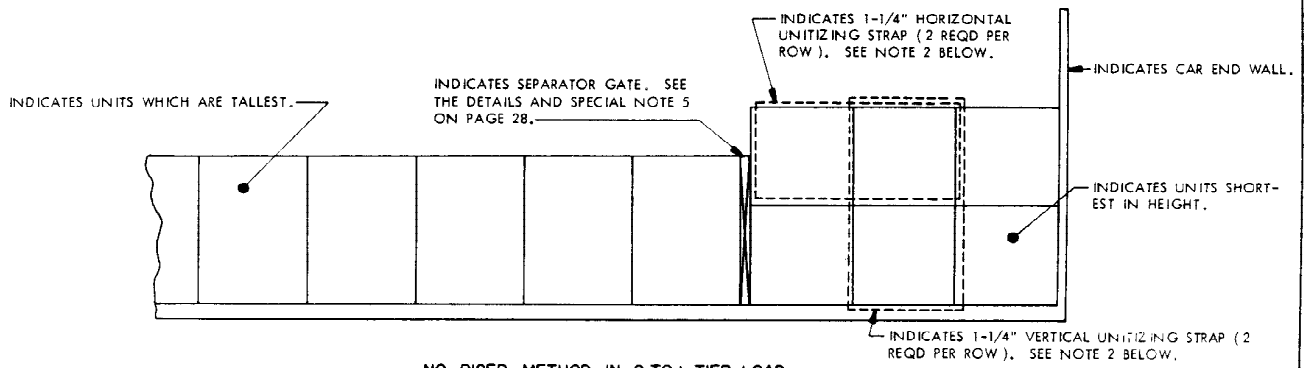


**RISER METHOD IN 3-TIER LOAD**

HEIGHT OF TALL UNIT	MIN HEIGHT OF SHORT UNIT	
	WITH TALL UNITS STRAPPED	WITH TALL UNITS NOT STRAPPED
44"	31-3/8"	34-1/4"
43"	30-5/8"	33-1/2"
42"	30"	32-1/2"
41"	29-1/4"	31-5/8"
40"	28-1/2"	30-3/4"
39"	27-3/4"	30"
38"	27-1/8"	29-1/8"
37"	26-3/8"	28-1/4"
36"	25-5/8"	27-3/8"
35"	25"	26-1/2"
34"	24-1/4"	25-5/8"
33"	23-1/2"	24-3/4"

**REQUIREMENTS AND LIMITATIONS:**

1. THE TALLEST UNITS WILL BE POSITIONED IN THE END OF THE CAR.
2. EACH ROW OF TALLER UNITS IS LIMITED TO NOT MORE THAN 8,000 POUNDS IN THE TOP TIER.
3. THE HORIZONTAL UNITIZING STRAPS AND VERTICAL UNITIZING STRAPS SHOWN ARE REQUIRED WHEN THE STACKS OF TALLEST UNITS IN THE END OF THE CAR EXTEND MORE THAN 12" ABOVE THE STACKS OF SHORTER UNITS ON THE RISERS. IF THE TALLER UNITS EXTEND ABOVE THE UNITS ON THE RISERS BY 12" OR LESS, THE HORIZONTAL AND VERTICAL UNITIZING STRAPS ARE NOT REQUIRED. SEE THE CHART AT LEFT FOR GUIDANCE.
4. A SEPARATOR GATE WILL BE POSITIONED BETWEEN THE UNLIKE ITEMS. THE GATE WILL BE CONSTRUCTED WITH 2" X 6" VERTICAL PIECES AND HORIZONTAL PIECES. SEE SPECIAL NOTE 5 ON PAGE 28 FOR CONSTRUCTION GUIDANCE.
5. A RISER WILL BE POSITIONED UNDER EACH SHORT UNIT STACK WHICH IS TO BE ADJACENT TO THE SEPARATOR GATE, AND TWO (2) REINFORCING STRAPS WILL BE INSTALLED SO AS TO ENCIRCLE EACH TOP UNIT OF EACH STACK WHICH IS ON A RISER.

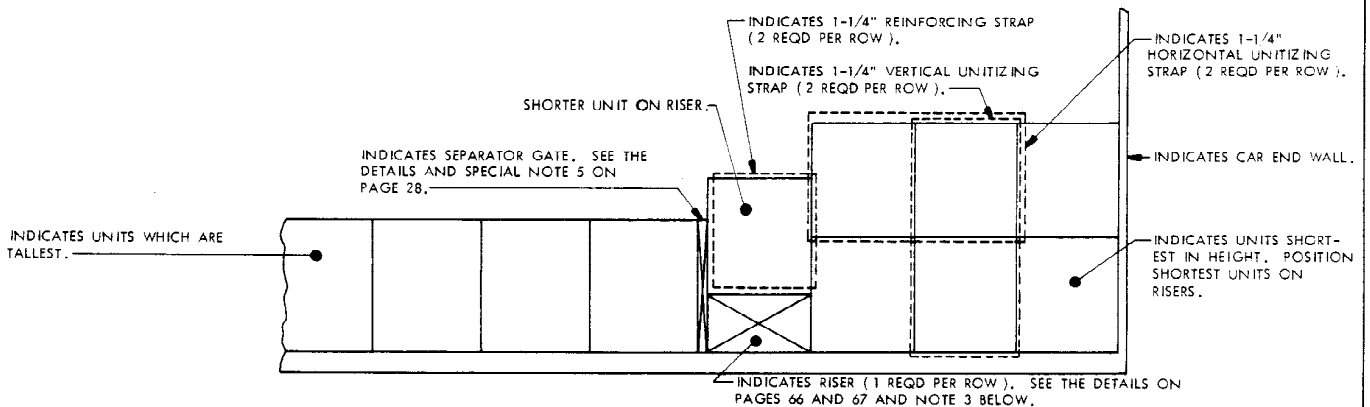


### NO-RISER METHOD IN 2 TO 1-TIER LOAD

HEIGHT OF TALL UNIT	MAX HEIGHT OF SHORT UNIT	
	WITH SHORT UNITS STRAPPED	WITH SHORT UNITS NOT STRAPPED
56"	37-1/4"	34"
55"	36-5/8"	33-1/2"
54"	36"	33"
53"	35-1/4"	32-1/2"
52"	34-5/8"	32"
51"	34"	31-1/2"
50"	33-1/4"	31"
49"	32-5/8"	30-1/2"
48"	32"	30"
47"	31-1/4"	29-1/2"
46"	30-5/8"	29"
45"	30"	28-1/2"
44"	29-1/4"	28"
43"	28-5/8"	27-1/2"
42"	28"	27"
41"	27-1/4"	26-1/2"
40"	26-5/8"	26"

### REQUIREMENTS AND LIMITATIONS:

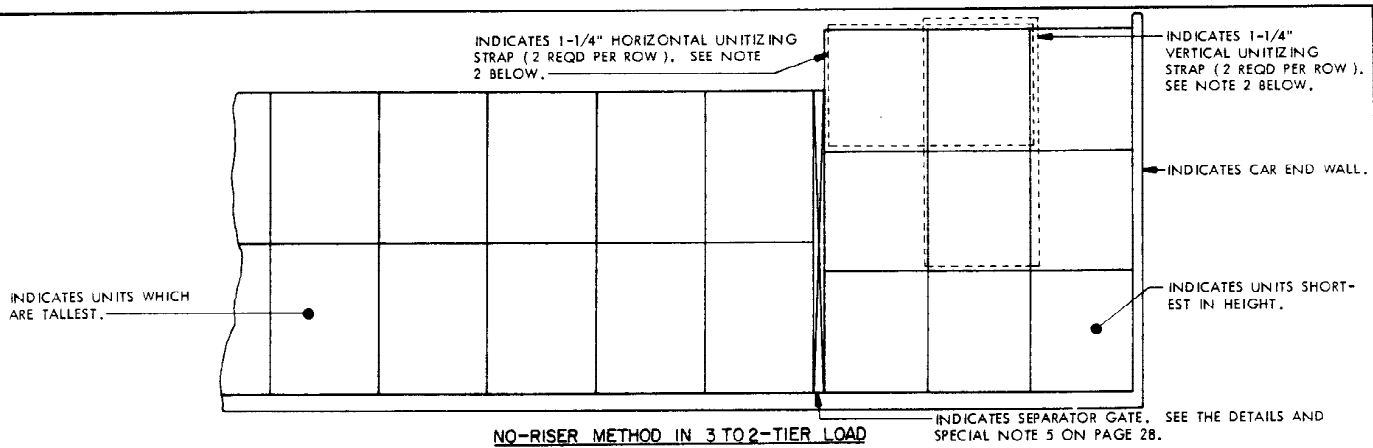
1. THE UNITS WHICH ARE SHORTEST IN HEIGHT WILL BE POSITIONED IN THE END OF THE CAR.
2. THE HORIZONTAL UNITIZING STRAPS AND VERTICAL UNITIZING STRAPS SHOWN ARE REQUIRED WHEN THE STACKS OF SHORTEST UNITS IN THE END OF THE CAR EXTEND MORE THAN 12" ABOVE THE ONE TIER OF TALLER UNITS. EACH ROW OF SHORTER UNITS IS THEN LIMITED TO NOT MORE THAN 8,000 POUNDS IN THE TOP TIER. IF THE STACKS OF SHORTER UNITS EXTEND ABOVE THE TALLER UNITS BY 12" OR LESS, THE HORIZONTAL AND VERTICAL UNITIZING STRAPS ARE NOT REQUIRED AND THERE IS NO WEIGHT LIMITATION. SEE THE CHART AT LEFT FOR GUIDANCE.
3. A SEPARATOR GATE WILL BE POSITIONED BETWEEN THE UNLIKE ITEMS. THE GATE WILL BE CONSTRUCTED WITH 2" X 6" VERTICAL PIECES AND HORIZONTAL PIECES. SEE SPECIAL NOTE 5 ON PAGE 28 FOR CONSTRUCTION GUIDANCE.



### RISER METHOD IN 2 TO 1-TIER LOAD

### REQUIREMENTS AND LIMITATIONS:

1. THE UNITS WHICH ARE SHORTEST IN HEIGHT WILL BE POSITIONED IN THE END OF THE CAR.
2. EACH ROW OF SHORTER UNITS IS LIMITED TO NOT MORE THAN 8,000 POUNDS IN THE TOP TIER.
3. A RISER WILL BE POSITIONED UNDER EACH SHORT UNIT WHICH IS TO BE ADJACENT TO THE SEPARATOR GATE, AND TWO (2) REINFORCING STRAPS WILL BE INSTALLED SO AS TO ENCIRCLE EACH UNIT WHICH IS ON A RISER.
4. A SEPARATOR GATE WILL BE POSITIONED BETWEEN THE UNLIKE ITEMS. THE GATE WILL BE CONSTRUCTED WITH 2" X 6" VERTICAL PIECES AND HORIZONTAL PIECES. SEE SPECIAL NOTE 5 ON PAGE 28 FOR CONSTRUCTION GUIDANCE.



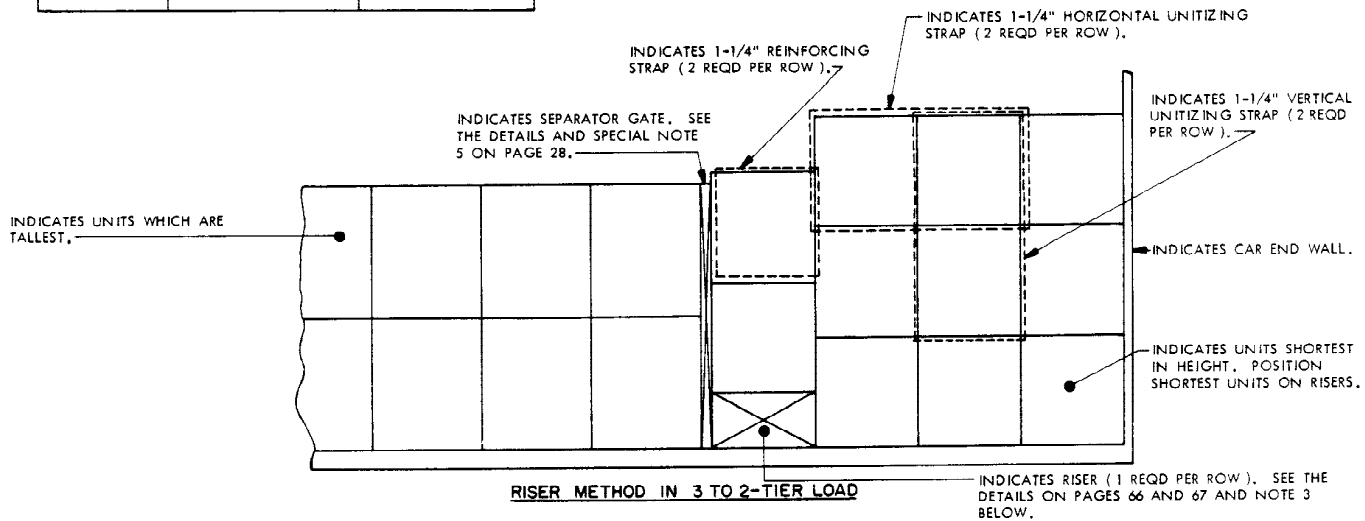
**NO-RISER METHOD IN 3 TO 2-TIER LOAD**

INDICATES SEPARATOR GATE. SEE THE DETAILS AND SPECIAL NOTE 5 ON PAGE 28.

HEIGHT OF TALL UNIT	MAX HEIGHT OF SHORT UNIT	
	WITH SHORT UNITS STRAPPED	WITH SHORT UNITS NOT STRAPPED
56"	44-3/4"	41-1/4"
55"	44"	40-5/8"
54"	43-3/8"	40"
53"	42-3/8"	39-1/4"
52"	41-1/2"	38-5/8"
51"	40-3/4"	38"
50"	40"	37-1/4"
49"	39-1/8"	36-5/8"
48"	38-3/8"	36"
47"	37-1/2"	35-1/4"
46"	36-3/4"	34-5/8"
45"	36"	34"
44"	35-1/8"	33-1/4"
43"	34-3/8"	32-5/8"
42"	33-1/2"	32"
41"	32-3/4"	31-1/4"
40"	32"	30-5/8"

**REQUIREMENTS AND LIMITATIONS:**

1. THE UNITS WHICH ARE SHORTEST IN HEIGHT WILL BE POSITIONED IN THE END OF THE CAR.
2. THE HORIZONTAL UNITIZING STRAPS AND VERTICAL UNITIZING STRAPS SHOWN ARE REQUIRED WHEN THE STACKS OF SHORTEST UNITS IN THE END OF THE CAR EXTEND MORE THAN 12" ABOVE THE STACKS OF TALLER UNITS. EACH ROW OF SHORTER UNITS IS THEN LIMITED TO NOT MORE THAN 8,000 POUNDS IN THE TOP TIER. IF THE STACKS OF SHORTER UNITS EXTEND ABOVE THE STACKS OF TALLER UNITS BY 12" OR LESS, THE HORIZONTAL AND VERTICAL UNITIZING STRAPS ARE NOT REQUIRED AND THERE IS NO WEIGHT LIMITATION. SEE THE CHART AT LEFT FOR GUIDANCE.
3. A SEPARATOR GATE WILL BE POSITIONED BETWEEN THE UNLIKE ITEMS. THE GATE WILL BE CONSTRUCTED WITH 2" X 6" VERTICAL PIECES AND HORIZONTAL PIECES. SEE SPECIAL NOTE 5 ON PAGE 28 FOR CONSTRUCTION GUIDANCE.



**RISER METHOD IN 3 TO 2-TIER LOAD**

INDICATES RISER (1 REQD PER ROW). SEE THE DETAILS ON PAGES 66 AND 67 AND NOTE 3 BELOW.

**REQUIREMENTS AND LIMITATIONS:**

1. THE UNITS WHICH ARE SHORTEST IN HEIGHT WILL BE POSITIONED IN THE END OF THE CAR.
2. EACH ROW OF SHORTER UNITS IS LIMITED TO NOT MORE THAN 8,000 POUNDS IN THE TOP TIER.
3. A RISER WILL BE POSITIONED UNDER EACH SHORTER UNIT STACK WHICH IS TO BE ADJACENT TO THE SEPARATOR GATE, AND TWO (2) REINFORCING STRAPS WILL BE INSTALLED SO AS TO ENCIRCLE EACH TOP UNIT OF EACH STACK WHICH IS ON A RISER.
4. A SEPARATOR GATE WILL BE POSITIONED BETWEEN THE UNLIKE ITEMS. THE GATE WILL BE CONSTRUCTED WITH 2" X 6" VERTICAL PIECES AND HORIZONTAL PIECES. SEE SPECIAL NOTE 5 ON PAGE 28 FOR CONSTRUCTION GUIDANCE.



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## GENERAL NOTES

FOR BOX CARS EQUIPPED WITH MECHANICAL BRACING DEVICES )

A. THE OUTLOADING PROCEDURES SPECIFIED ON PAGES 92 THRU 97 ARE FOR BOX CARS EQUIPPED WITH MECHANICAL BRACING DEVICES, AND MAY BE ADAPTED AS REQUIRED TO FACILITATE THE USE OF BOX CARS EQUIPPED WITH VARIOUS TYPES OF SELF-CONTAINED MECHANICAL BRACING DEVICES. HOWEVER, FIXED OR ADJUSTABLE WALL MEMBERS AND DOORWAY MEMBERS WITHIN THESE CARS MUST PROVIDE FOR THE INSTALLATION OF LOAD BLOCKING CROSS MEMBERS AT THE HEIGHTS SPECIFIED. CAUTION: BOX CARS EQUIPPED WITH MEMBERS WHICH DO NOT MEET THE LOCATION REQUIREMENTS MUST NOT BE USED.

- FOR BLOCKING THE LOADS WHICH ARE DEPICTED, A CROSS MEMBER WILL NOT BE RELIED UPON TO RETAIN MORE LADING ON EITHER SIDE THAN AS SPECIFIED BY THE "MAXIMUM WEIGHT OF UNITS PER TIER/BAY" CHART BELOW. VOIDS LENGTHWISE WITHIN THE LOAD MUST BE HELD TO A MINIMUM AND CROSS MEMBERS MUST BE PLACED AGAINST THE LADING AS TIGHTLY AS THE SPACING OF THE LOCKING HOLES IN THE WALL MEMBERS PERMIT. LOCKING BARS OR LEVER JACKS SHOULD BE USED FOR THIS PURPOSE. AN ADDITIONAL 1/2" OF ADJUSTMENT CAN BE MADE BY TURNING A CROSS MEMBER END-FOR-END WHEN LOCKING PINS ON THE MEMBER ARE OFF-CENTER. NOTE: IT IS RECOMMENDED THAT EACH CROSS MEMBER BE INSTALLED WITH THE ENDS ATTACHED AS NEARLY AS POSSIBLE IN "MATED" POSITIONS AT EQUAL HEIGHTS AND AT EQUAL DISTANCES FROM THE END OF THE CAR.
- CAUTION: ALL BLOCKING AND BRACING COMPONENTS IN EMPTY CARS AND ALL UNUSED COMPONENTS IN LOADED CARS MUST BE "SECURED" FOR SHIPMENT ---ADJUSTABLE WALL MEMBERS TO VERTICAL WALL ATTACHMENT RAILS, AND CROSS MEMBERS TO ADJUSTABLE WALL MEMBERS OR TO FIXED HORIZONTAL WALL MEMBERS OR TO DOORWAY MEMBERS, AND DOORWAY MEMBERS TO DOOR POSTS. COMPONENTS ASSIGNED TO EACH CAR MUST REMAIN THEREWITH EVEN THOUGH UNUSED DURING SOME SHIPMENTS.
- IF A CAR HAS A "BOWED END", RATHER THAN SQUARING OFF THE END BY INSTALLING DUNNAGE, ADDITIONAL CROSS MEMBERS CAN BE INSTALLED NEAR THE END WALL OF THE CAR TO PROVIDE A "SQUARED" END. THESE CROSS MEMBERS SHOULD BE INSTALLED AT THE SAME HEIGHTS AS THE CROSS MEMBERS USED THROUGHOUT THE LOAD AS BLOCKING MEMBERS.

B. IN A CAR EQUIPPED WITH ADJUSTABLE WALL MEMBERS, PROVIDING THE FIXED WALL MEMBERS WHICH ARE PRESENT IN SOME "ADJUSTABLE" CARS ARE NOT PROPERLY POSITIONED TO PROVIDE SIDE BEARING SURFACES BETWEEN THE UNITS AND THE CAR SIDEWALLS, ADJUSTABLE WALL MEMBERS (AS REQUIRED) MUST BE INSTALLED TO PROVIDE A MINIMUM OF ONE SURFACE AREA FOR SIDE BEARING AT SOME LOCATION WITHIN THE UPPER HALF OF EACH UNIT.

C. THE SELECTION OF RAIL CARS FOR THE TRANSPORT OF SKIDDED UNITS OF AMMUNITION ITEMS 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.

D. NOTICE: A SHIPMENT WILL BE POSITIONED IN THE RAIL CAR IN COMPLIANCE WITH THE WEIGHT DISTRIBUTION REQUIREMENTS OF THE AAR. THE NUMBER OF UNITS MAY BE ADJUSTED TO FIT THE SIZE OF THE BOX CAR BEING LOADED OR THE QUANTITY TO BE SHIPPED; HOWEVER, THE APPROVED METHODS CONTAINED IN THIS DRAWING FOR BLOCKING, BRACING, AND STAYING OF THE DESIGNATED ITEM MUST BE FOLLOWED AS CLOSELY AS POSSIBLE.

E. THE LOAD LIMIT OF A CAR MUST NOT BE EXCEEDED. LIKEWISE, THE LOAD IN ONE END OF A CAR MUST NOT EXCEED ONE-HALF OF THE LOAD LIMIT WHICH IS STENCILED ON THE OUTSIDE OF THE CAR. THE CENTER OF GRAVITY (CG) OF A LOAD HAVING AN EQUAL NUMBER OF UNITS IN EACH END OF THE CAR WILL BE AT THE LONGITUDINAL CENTER OF THE CAR AND THEREFORE THE TOTAL WEIGHT OF THE LADING AND DUNNAGE MAY EQUAL BUT MUST NOT EXCEED THE STENCILED LOAD LIMIT. HOWEVER, FOR A LOAD CONSTRUCTED IN AN OFFSET LOADING PATTERN, THE CG WILL BE LOCATED TOWARD THE LONG-LOAD END FROM THE LONGITUDINAL CENTER OF THE CAR SO NATURALLY THE LONG-LOAD END WILL BE THE HEAVIEST. THE TOTAL WEIGHT OF THE LADING AND DUNNAGE MUST THEN BE SOMETHING LESS THAN THE STENCILED LOAD LIMIT. TO DETERMINE THE PORTION OF THE WEIGHT OF THE OFFSET SECTION OF THE LOAD WHICH WILL BE TRANSMITTED TO EACH END OF A CAR, THE FOLLOWING GUIDANCE IS PRESENTED.

1. FOR A SHIPMENT CONSISTING OF AN EVEN NUMBER OF LOAD UNITS LONG LOADED IN AN OFFSET PATTERN, THE LONG PORTION OF A LOAD WILL BE TWO (2) LOAD UNITS LONGER THAN THE SHORT PORTION. THE CG OF THE OFFSET PORTION WILL BE AT THE JOINT BETWEEN THOSE TWO UNITS. MEASURE THE DISTANCE FROM THE CENTER OF THE CAR LENGTH TO THE JOINT BETWEEN THOSE UNITS. REFER TO THE WEIGHT DISTRIBUTION CHART BELOW AND READ UNDER THE PROPER CAR SIZE HEADING AND OPPOSITE THE DIMENSION NEAREST TO THAT MEASURED, THE PERCENTAGE OF THE OFFSET PORTION OF THE LOAD (TWO LOAD UNITS IN THIS CASE) WHICH IS ON THE LONG-LOAD END OF THE CAR. MULTIPLY THIS PERCENTAGE FIGURE TIMES THE WEIGHT OF THE OFFSET PORTION OF THE LOAD AND ADD THE PRODUCT TO THE WEIGHT OF THE SHORT-LOAD END OF THE LOAD. DOUBLE THIS SUM TO DETERMINE THE MINIMUM LOAD LIMIT OF THE CAR TO BE USED FOR A SHIPMENT.

2. FOR A SHIPMENT CONSISTING OF AN UNEVEN NUMBER OF LOAD UNITS OVER 33" LONG (LENGTH OR WIDTH OF A SKIDDED UNIT), THE LONG PORTION OF THE LOAD WILL BE ONE (1) LOAD UNIT LONGER THAN THE SHORT PORTION. THE CG OF THE OFFSET PORTION WILL BE AT THE CENTER OF THAT LOAD UNIT. A SHIPMENT CONSISTING OF AN UNEVEN NUMBER OF LOAD UNITS 33" OR LESS IN LENGTH MAY BE THREE (3) LOAD UNITS LONGER IN ONE END THAN THE OTHER. THE CG OF THE OFFSET PORTION WILL BE AT THE CENTER OF THE SECOND OF THOSE THREE LOAD UNITS. MEASURE THE DISTANCE FROM THE CENTER OF THE CAR LENGTH TO THE CENTER OF THE ONE LOAD UNIT OR THE CENTER OF THE SECOND OF THE THREE, AS APPLICABLE. REFER TO THE "WEIGHT DISTRIBUTION" CHART BELOW AND READ UNDER THE PROPER CAR SIZE HEADING AND OPPOSITE THE DIMENSION NEAREST TO THAT MEASURED, THE PERCENTAGE OF THE OFFSET PORTION OF THE LOAD WHICH IS ON THE LONG-LOAD END OF THE CAR. MULTIPLY THIS PERCENTAGE FIGURE TIMES THE WEIGHT OF THE OFFSET PORTION OF THE LOAD AND ADD THE PRODUCT TO THE WEIGHT OF THE SHORT-LOAD END OF THE LOAD. DOUBLE THIS SUM TO DETERMINE THE MINIMUM LOAD LIMIT OF THE CAR TO BE USED FOR A SHIPMENT.

F. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN A CAR WHICH IS PARTIALLY LOADED WITH THE DESIGNATED ITEM, 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.

G. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTIONS WHICH ARE IMMEDIATELY ADJACENT TO THE DEPICTED OUTLOADING METHODS.

WEIGHT DISTRIBUTION			
DISTANCE FROM CENTER OF CAR TO CG * OF OFFSET UNITS	PERCENT OF WEIGHT OF OFFSET UNITS ON HEAVY END OF CAR		
	40'-6" CAR	50'-6" CAR	60'-8" CAR
6"	51.5	51.2	51.1
9"	52.9	51.9	51.6
12"	53.2	52.5	52.1
15"	54.1	53.1	52.7
18"	55.0	53.7	53.2
21"	55.8	54.4	53.8
24"	56.5	55.0	54.3
27"	57.3	55.6	54.9
30"	58.0	56.1	55.4
33"	58.9	56.8	55.9
36"	59.7	57.4	56.5
39"	60.5	58.2	57.0
42"	61.3	59.0	57.6
45"	62.2	59.4	58.1
48"	63.0	59.8	58.6
54"	64.5	61.0	59.7
60"	66.2	62.2	60.8

(CONTINUED AT RIGHT)

\*CENTER OF GRAVITY.

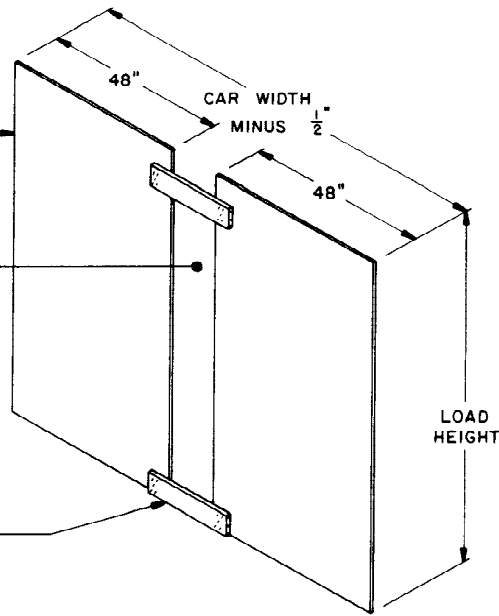
## MAXIMUM WEIGHT OF UNITS PER TIER/BAY

NO. OF UNITS	LOAD PATTERN	WEIGHT RANGE OF UNITS USING 1 CROSS MEMBER	WEIGHT RANGE OF UNITS USING 2 CROSS MEMBERS	WEIGHT RANGE OF UNITS USING 3 CROSS MEMBERS
12	2 WIDE BY 6 LONG	333 LBS OR LESS	666 LBS OR LESS	1,000 LBS OR LESS
12	3 WIDE BY 4 LONG	333 LBS OR LESS	666 LBS OR LESS	1,000 LBS OR LESS
12	4 WIDE BY 3 LONG	333 LBS OR LESS	666 LBS OR LESS	1,000 LBS OR LESS
10	2 WIDE BY 5 LONG	334 LBS TO 400 LBS	667 LBS TO 800 LBS	1,001 LBS TO 1,200 LBS
9	3 WIDE BY 3 LONG	401 LBS TO 444 LBS	801 LBS TO 888 LBS	1,201 LBS TO 1,333 LBS
8	2 WIDE BY 4 LONG	445 LBS TO 500 LBS	889 LBS TO 1,000 LBS	1,334 LBS TO 1,500 LBS
8	4 WIDE BY 2 LONG	445 LBS TO 500 LBS	889 LBS TO 1,000 LBS	1,334 LBS TO 1,500 LBS
6	2 WIDE BY 3 LONG	501 LBS TO 666 LBS	1,001 LBS TO 1,333 LBS	1,501 LBS TO 2,000 LBS
6	3 WIDE BY 2 LONG	501 LBS TO 666 LBS	1,001 LBS TO 1,333 LBS	1,501 LBS TO 2,000 LBS
4	2 WIDE BY 2 LONG	667 LBS TO 1,000 LBS	1,334 LBS TO 2,000 LBS	2,001 LBS TO 3,000 LBS
4	4 WIDE BY 1 LONG	667 LBS TO 1,000 LBS	1,334 LBS TO 2,000 LBS	2,001 LBS TO 3,000 LBS
3	3 WIDE BY 1 LONG	1,001 LBS TO 1,333 LBS	2,001 LBS TO 2,666 LBS	3,001 LBS TO 4,000 LBS
2	2 WIDE BY 1 LONG	1,334 LBS TO 2,000 LBS	2,667 LBS TO 4,000 LBS	-----

PLYWOOD, 1/2" THICK BY 48" WIDE BY LOAD HEIGHT IN LENGTH (2 REQD). NAIL TO THE TIE-PIECES W/5-6d NAILS AT EACH JOINT AND CLINCH.

NOTE THAT THIS VOID SPACE MUST BE FILLED WITH A STRIP OF PLYWOOD WHEN GATE IS TO BE USED FOR LOADS OF MORE THAN TWO ROWS OF UNITS.

TIE-PIECE, 1" X 6" BY A LENGTH TO SUIT (2 REQD). POSITION ONE AT THE BOTTOM OF GATE AND ONE UNDER THE TOP CROSS MEMBER.



#### LOAD BEARING GATE A

IF PLYWOOD IS NOT AVAILABLE, OR IF DESIRED, A GATE CONSTRUCTED WITH DIMENSIONAL LUMBER MAY BE USED. SEE THE "LOAD BEARING GATE B" DETAIL BELOW.

VERTICAL PIECE, 2" X 6" BY LOAD HEIGHT. REQUIREMENTS FOR EACH ROW OF SKIDDED UNITS ARE AS FOLLOWS:

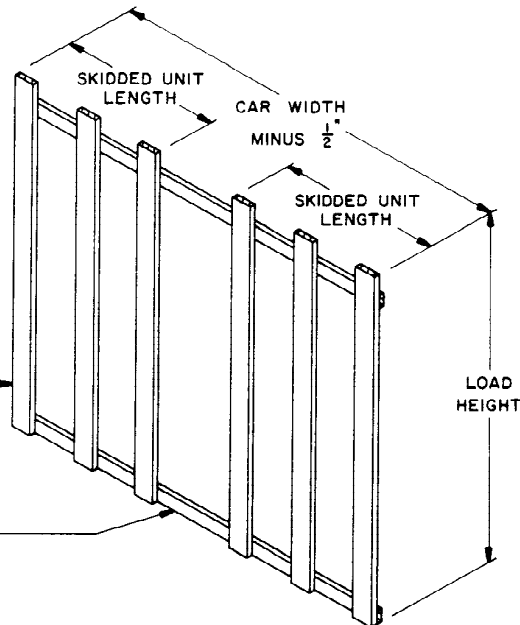
2 REQD FOR UNITS HAVING 1 OR 2 BOXES LONG. POSITION AT EDGES OF UNIT.

3 REQD FOR UNITS HAVING 3 OR 4 BOXES LONG. POSITION 1 AT EACH EDGE OF UNIT AND 1 AT CENTER OF UNIT LENGTH.

3 REQD FOR UNITS HAVING 5 OR 6 BOXES LONG. POSITION 1 AT JOINT OF FIRST AND SECOND BOXES FROM EACH EDGE, AND 1 AT CENTER OF UNIT.

4 REQD FOR UNITS HAVING 7 BOXES LONG. POSITION 1 AT JOINT OF FIRST AND SECOND BOXES FROM EACH EDGE, AND 1 AT JOINT OF THIRD AND FOURTH BOXES FROM EACH EDGE.

TIE-PIECE, 2" X 4" BY CAR WIDTH MINUS 1/2" (2 REQD). POSITION ONE AT THE BOTTOM OF GATE AND ONE UNDER THE TOP CROSS MEMBER. NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.



#### LOAD BEARING GATE B

THIS GATE MAY BE USED IN LIEU OF THE PLYWOOD GATE SHOWN ABOVE. THE TYPICAL GATE SHOWN IS FOR USE WITHIN LOADS OF TWO ROWS OF UNITS HAVING FROM 3 TO 6 BOXES LONG ON THE UNIT. ADJUST THE QUANTITY OF VERTICAL PIECES AS NECESSARY TO SUIT THE UNITS BEING LOADED.

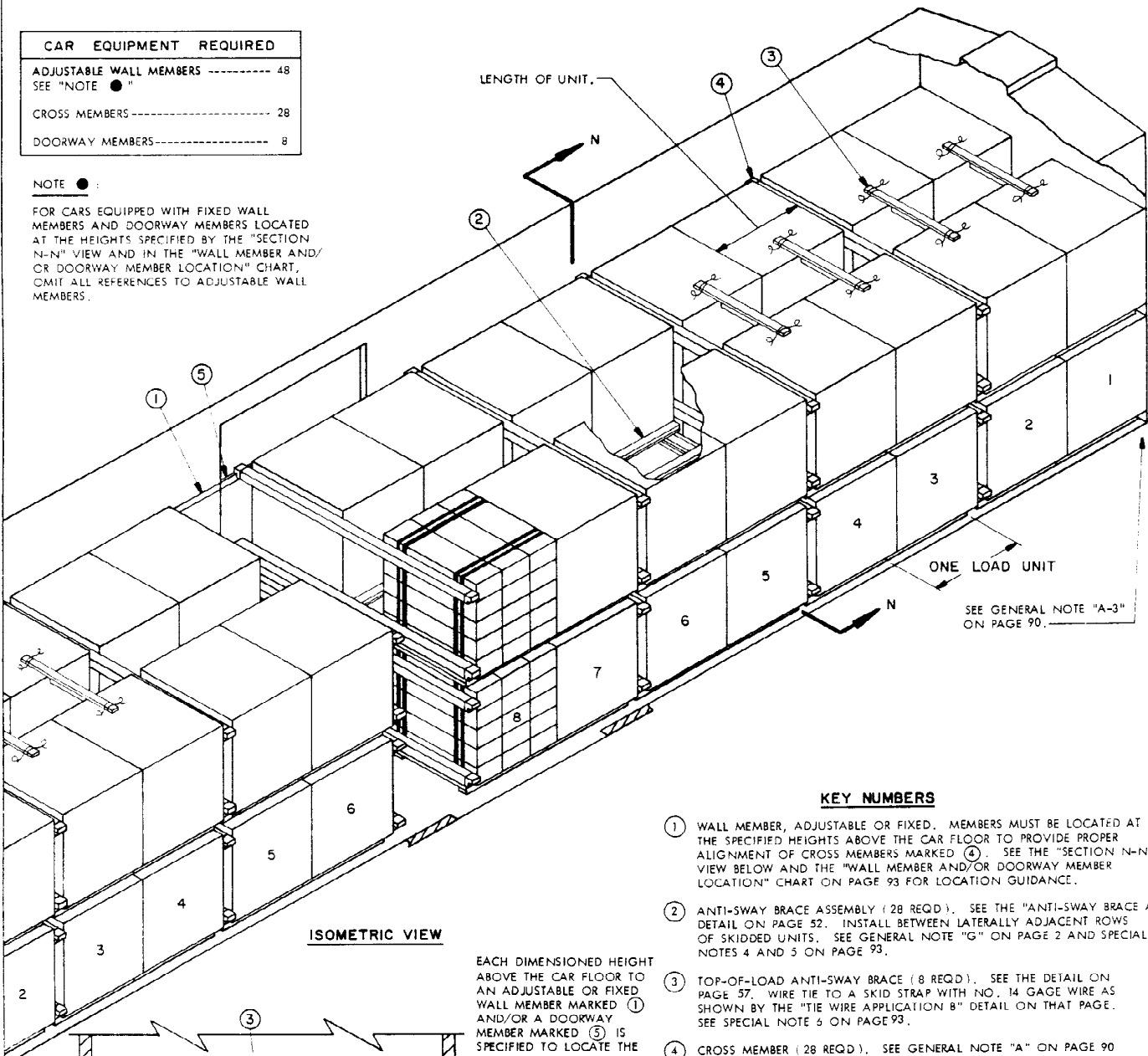
#### LOAD BEARING GATES

**CAR EQUIPMENT REQUIRED**

ADJUSTABLE WALL MEMBERS -----	48
SEE "NOTE ●"	
CROSS MEMBERS -----	28
DOORWAY MEMBERS -----	8

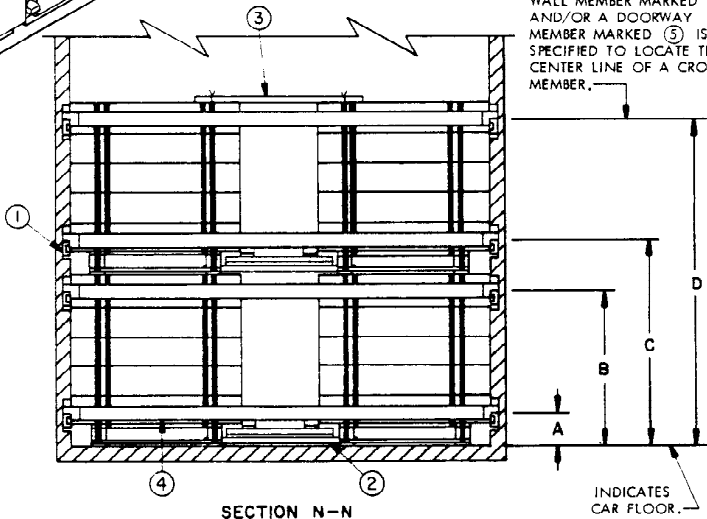
**NOTE ● :**

FOR CARS EQUIPPED WITH FIXED WALL MEMBERS AND DOORWAY MEMBERS LOCATED AT THE HEIGHTS SPECIFIED BY THE "SECTION N-N" VIEW AND IN THE "WALL MEMBER AND/OR DOORWAY MEMBER LOCATION" CHART, OMIT ALL REFERENCES TO ADJUSTABLE WALL MEMBERS.



**ISOMETRIC VIEW**

EACH DIMENSIONED HEIGHT ABOVE THE CAR FLOOR TO AN ADJUSTABLE OR FIXED WALL MEMBER MARKED ① AND/OR A DOORWAY MEMBER MARKED ⑤ IS SPECIFIED TO LOCATE THE CENTER LINE OF A CROSS MEMBER.



**SECTION N-N**

TYPICAL 2-WIDE LOAD (BOXES CROSSWISE) IN A 50'-6" LONG BOX CAR EQUIPPED WITH MECHANICAL BRACING DEVICES HAVING ADJUSTABLE OR FIXED WALL MEMBERS

**KEY NUMBERS**

- ① WALL MEMBER, ADJUSTABLE OR FIXED. MEMBERS MUST BE LOCATED AT THE SPECIFIED HEIGHTS ABOVE THE CAR FLOOR TO PROVIDE PROPER ALIGNMENT OF CROSS MEMBERS MARKED ④. SEE THE "SECTION N-N" VIEW BELOW AND THE "WALL MEMBER AND/OR DOORWAY MEMBER LOCATION" CHART ON PAGE 93 FOR LOCATION GUIDANCE.
- ② ANTI-SWAY BRACE ASSEMBLY (28 REQD.). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 52. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF SKIDDED UNITS. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTES 4 AND 5 ON PAGE 93.
- ③ TOP-OF-LOAD ANTI-SWAY BRACE (8 REQD.). SEE THE DETAIL ON PAGE 57. WIRE TIE TO A SKID STRAP WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION B" DETAIL ON THAT PAGE. SEE SPECIAL NOTE 6 ON PAGE 93.
- ④ CROSS MEMBER (28 REQD.). SEE GENERAL NOTE "A" ON PAGE 90 AND SPECIAL NOTE 8 ON PAGE 93.
- ⑤ DOORWAY MEMBER (8 REQD.). SEE THE "SECTION N-N" VIEW BELOW AND THE "WALL MEMBER AND/OR DOORWAY MEMBER LOCATION" CHART ON PAGE 93 FOR LOCATION GUIDANCE.

**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-0" WIDE ( INSIDE CLEARANCE ) BOX CAR EQUIPPED WITH ADJUSTABLE AND/OR FIXED WALL MEMBERS, AND WITH 6'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER DOOR OPENINGS CAN BE USED.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL 2-WIDE LOAD ON PAGE 92 HAS OVERALL DIMENSIONS OF 39" LONG BY 44-1/2" WIDE BY 47" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER LENGTHS, AND FOR UNITS HAVING WIDTHS OF FROM 27" THRU 53-1/2" IN A 9'-0" WIDE CAR OR FROM 27" THRU 54-1/2" IN A 9'-2" WIDE CAR. BASED ON A DOOR HEIGHT OF 9'-8", FULL LOADS OF UNITS WHICH ARE MORE THAN 38-1/2" IN HEIGHT WILL BE LIMITED TO NOT MORE THAN TWO ( 2 ) TIERS. SEE SPECIAL NOTE 3.
3. A 2-WIDE LOAD IS SHOWN AS TYPICAL. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR 3-WIDE AND/OR 4-WIDE LOADS. DEPENDING UPON THE INSIDE WIDTH OF THE CAR TO BE LOADED, IT MAY BE POSSIBLE TO FORM THREE ROWS IF UNITS ARE APPROXIMATELY 36" WIDE OR LESS, OR FOUR ROWS IF UNITS ARE APPROXIMATELY 27" WIDE. IF THE UNITS TO BE LOADED ARE WIDER THAN 1/2" LESS THAN ONE-HALF OF THE INSIDE WIDTH CLEARANCE OF THE CAR, THE UNLOADING PROCEDURES ON PAGES 94 AND 95 MUST BE EMPLOYED.
4. THE ANTI-SWAY BRACE A, SHOWN IN THE LOAD VIEW AS PIECE MARKED ②, IS DESIGNED FOR USE WITHIN LOADS OF CROSSWISE-POSITIONED BOXES WHEN THE UNITS ARE ASSEMBLED ON THE TYPE I OR TYPE IA SKID BASE, OR ON THE TYPE II SKID BASE WHEN THE BOXES DO NOT HAVE TOP CLEATS, OR ON THE SKID BASE DEPICTED BY DRAWING D-AMX5V-4163. THE ANTI-SWAY BRACE B WILL BE USED FOR UNITS ASSEMBLED ON THE TYPE II SKID BASE WHEN THE BOXES HAVE TOP CLEATS. SEE PAGE 52 FOR DETAILS OF THE ANTI-SWAY BRACE ASSEMBLIES.
5. THE ANTI-SWAY BRACING MAY BE OMITTED IF THE SPACE BETWEEN LATERALLY ADJACENT UNITS IS NOT MORE THAN THE DISTANCE SPECIFIED IN THE "ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 52,, FOR THE TYPE OF SKID BASE BEING LOADED.
6. TOP-OF-LOAD ANTI-SWAY BRACES MUST BE INSTALLED IN EACH END OF A CAR. THE QUANTITY NEEDED IS DEPENDENT UPON THE DIMENSION OF THE UNIT WHICH IS POSITIONED LENGTHWISE IN THE CAR, AND UPON THE LENGTH OF THE CAR BEING LOADED. REFER TO THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57 FOR GUIDANCE.
7. THE DEPICTED LOAD CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED. A LOAD MAY BE REDUCED BY ONE LOAD UNIT OR BY ONE TIER OF A LOAD UNIT BY OBVIOUS MEANS. FOR GUIDANCE IN OMITTING A SINGLE UNIT FROM A LOAD, REFER TO PAGE 96.
8. SKIDDED UNITS CAN BE POSITIONED IN CONFIGURATIONS OTHER THAN THE TYPICAL TWO LONG AND TWO HIGH WITHIN A BAY AS SHOWN ON PAGE 92, DEPENDING UPON THE WEIGHT OF THE UNIT BEING LOADED. THE CONFIGURATION SHOWN IS ADEQUATE FOR UNITS WHICH WEIGH NOT MORE THAN 2,000 POUNDS. UNITS WHICH ARE HEAVIER WILL EITHER BE LIMITED TO ONE UNIT IN LENGTH IN A BAY OR ELSE AN ADDITIONAL CROSS MEMBER MUST BE INSTALLED FOR EACH TIER/BAY. SKIDDED UNITS WEIGHING 1,350 POUNDS OR LESS CAN BE POSITIONED WITH MORE UNITS LONG IN EACH BAY. SEE THE "MAXIMUM WEIGHT OF UNITS PER TIER/BAY" CHART ON PAGE 90 FOR GUIDANCE. GUIDANCE IS ALSO PRESENTED IN THAT CHART FOR THE MAXIMUM WEIGHTS AND NUMBER LONG PER BAY OF SKIDDED UNITS WHICH CAN BE LOADED IN 3-WIDE OR 4-WIDE LOADING PATTERNS. FOR THOSE FEW UNITS WHICH ARE ONLY ONE BOX IN HEIGHT, EACH TIER/BAY MAY BE BRACED USING 1 CROSS MEMBER. THIS CROSS MEMBER MUST BE POSITIONED AGAINST THE UPPER THIRD OF THE UNIT HEIGHT AS INDICATED BY LOCATION IDENTITY "B" AND/OR "D" IN THE "WALL MEMBER AND/OR DOORWAY MEMBER LOCATION" CHART AT LEFT.

**WALL MEMBER AND/OR DOORWAY MEMBER LOCATION**

LOCATION IDENTITY	DESCRIPTION OF LOCATION
A	8" MIN AND NOT MORE THAN 1/2 THE HEIGHT OF THE SKIDDED UNIT.
B	2" DOWN FROM THE TOP OF THE FIRST-TIER SKIDDED UNIT AND NOT LOWER THAN 2/3 OF THE SKIDDED UNIT HEIGHT.
C	8" ABOVE THE BOTTOM OF THE SECOND-TIER SKIDDED UNIT TO NOT MORE THAN 1/2 OF THE SKIDDED UNIT HEIGHT IN THE SECOND TIER.
D	2" DOWN FROM THE TOP OF THE SECOND-TIER SKIDDED UNIT AND NOT LOWER THAN 2/3 THE HEIGHT OF THE SKIDDED UNIT HEIGHT IN THE SECOND TIER.

**NOTE:** IF THE LOAD IS MORE THAN TWO ( 2 ) TIERS HIGH, FOLLOW SIMILAR PROCEDURES FOR THE ADDED TIER(S). SEE SPECIAL NOTE 8 AT RIGHT.

BILL OF MATERIAL ( TYPICAL )		
LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	299	100
2" X 4"	537	358
NAILS	NO. REQD	POUNDS
12d ( 3-1/4" )	152	2-3/4
20d ( 4" )	224	8
WIRE, NO. 14 GAGE ----- 40' REQD ----- 1 LB		

**LOAD AS SHOWN ( TYPICAL )**

ITEM	QUANTITY	WEIGHT ( APPROX )
SKIDDED UNIT -----	56 -----	108,080 LBS
DUNNAGE -----	-----	1,157 LBS
<b>TOTAL WEIGHT -----</b>		<b>109,237 LBS</b>

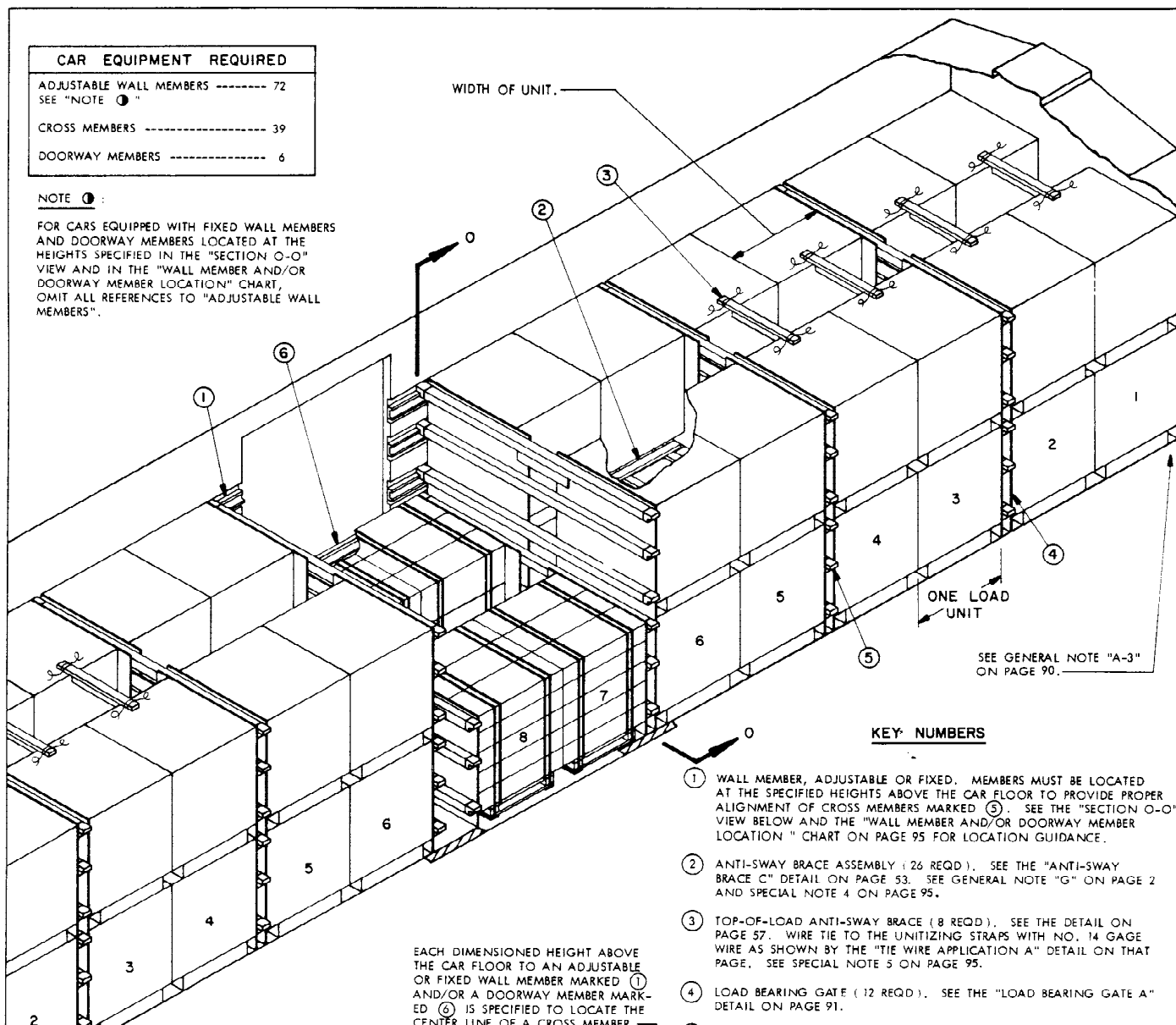
**TYPICAL 2-WIDE LOAD (BOXES CROSSWISE) IN A 50'-6" LONG BOX CAR  
EQUIPPED WITH MECHANICAL BRACING DEVICES HAVING ADJUSTABLE OR FIXED WALL MEMBERS**

**CAR EQUIPMENT REQUIRED**

ADJUSTABLE WALL MEMBERS -----	72
CROSS MEMBERS -----	39
DOORWAY MEMBERS -----	6

**NOTE 1:**

FOR CARS EQUIPPED WITH FIXED WALL MEMBERS AND DOORWAY MEMBERS LOCATED AT THE HEIGHTS SPECIFIED IN THE "SECTION O-O" VIEW AND IN THE "WALL MEMBER AND/OR DOORWAY MEMBER LOCATION" CHART, OMIT ALL REFERENCES TO "ADJUSTABLE WALL MEMBERS".

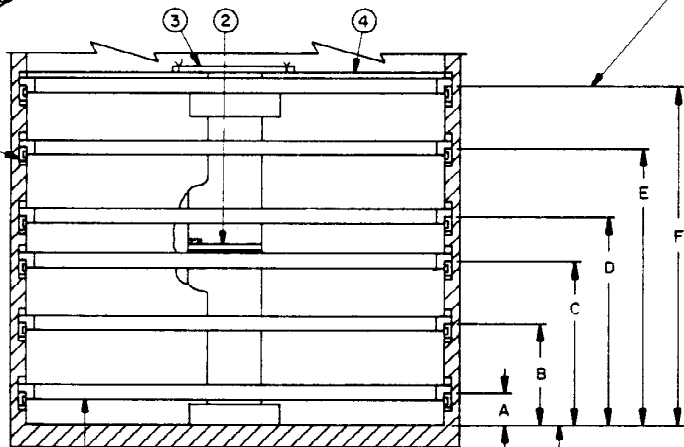


**ISOMETRIC VIEW**

EACH DIMENSIONED HEIGHT ABOVE THE CAR FLOOR TO AN ADJUSTABLE OR FIXED WALL MEMBER MARKED ① AND/OR A DOORWAY MEMBER MARKED ⑥ IS SPECIFIED TO LOCATE THE CENTER LINE OF A CROSS MEMBER.

**KEY: NUMBERS**

- ① WALL MEMBER, ADJUSTABLE OR FIXED. MEMBERS MUST BE LOCATED AT THE SPECIFIED HEIGHTS ABOVE THE CAR FLOOR TO PROVIDE PROPER ALIGNMENT OF CROSS MEMBERS MARKED ⑤. SEE THE "SECTION O-O" VIEW BELOW AND THE "WALL MEMBER AND/OR DOORWAY MEMBER LOCATION" CHART ON PAGE 95 FOR LOCATION GUIDANCE.
- ② ANTI-SWAY BRACE ASSEMBLY (26 REQD). SEE THE "ANTI-SWAY BRACE C" DETAIL ON PAGE 53. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTE 4 ON PAGE 95.
- ③ TOP-OF-LOAD ANTI-SWAY BRACE (8 REQD). SEE THE DETAIL ON PAGE 57. WIRE TIE TO THE UNITIZING STRAPS WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON THAT PAGE. SEE SPECIAL NOTE 5 ON PAGE 95.
- ④ LOAD BEARING GATE (12 REQD). SEE THE "LOAD BEARING GATE A" DETAIL ON PAGE 91.
- ⑤ CROSS MEMBER (39 REQD). SEE GENERAL NOTE "A" ON PAGE 90 AND SPECIAL NOTES 7 AND 8 ON PAGE 95.
- ⑥ DOORWAY MEMBER (6 REQD). SEE THE "SECTION O-O" VIEW BELOW AND THE "WALL MEMBER AND/OR DOORWAY MEMBER LOCATION" CHART ON PAGE 95 FOR LOCATION GUIDANCE.



**SECTION O-O**

INDICATES CAR FLOOR.

TYPICAL 2-WIDE LOAD (BOXES LENGTHWISE) IN A 50'-6" LONG BOX CAR EQUIPPED WITH MECHANICAL BRACING DEVICES HAVING ADJUSTABLE OR FIXED WALL MEMBERS

**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-0" WIDE (INSIDE CLEARANCE) BOX CAR EQUIPPED WITH ADJUSTABLE AND/OR FIXED WALL MEMBERS, AND WITH 6'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING WIDER DOOR OPENINGS CAN BE USED.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL 2-WIDE LOAD ON PAGE 94 HAS OVERALL DIMENSIONS OF 43" LONG BY 40" WIDE BY 47" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER WIDTHS, AND FOR UNITS HAVING LENGTHS OF FROM 25" THRU 46". BASED ON A DOOR HEIGHT OF 9'-8". FULL LOADS OF UNITS WHICH ARE MORE THAN 38-1/2" IN HEIGHT WILL BE LIMITED TO NOT MORE THAN TWO (2) TIERS. SEE SPECIAL NOTES 3 AND 9.
3. A 2-WIDE LOAD IS SHOWN AS TYPICAL. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR 3-WIDE AND/OR 4-WIDE LOADS. DEPENDING UPON THE INSIDE WIDTH OF THE CAR TO BE LOADED, IT MAY BE POSSIBLE TO FORM THREE ROWS IF UNITS ARE APPROXIMATELY 36" LONG OR FOUR ROWS IF UNITS ARE APPROXIMATELY 27" OR LESS IN LENGTH.
4. ANTI-SWAY BRACING MUST BE INSTALLED BETWEEN ALL Laterally ADJACENT SKIDDED UNITS IN A 2-WIDE LOAD. FOR 3-WIDE AND/OR 4-WIDE LOADS, ANTI-SWAY BRACING IS NOT REQUIRED IF THE TOTAL EXCESS SPACE ACROSS THE WIDTH OF THE CAR IS 2-1/4" OR LESS FOR LOADS OF BOXES WHICH HAVE VERTICAL END CLEATS, OR 3" OR LESS FOR LOADS OF WIREBOUND BOXES OR BOXES NOT HAVING VERTICAL END CLEATS. ANTI-SWAY BRACE E, AS DETAILED ON PAGE 53, MAY BE USED FOR FILLING AN EXCESS SPACE OF FROM 2-1/4" TO 6" IN LIEU OF USING ANTI-SWAY BRACE C, IF DESIRED.
5. TOP-OF-LOAD ANTI-SWAY BRACES MUST BE INSTALLED IN EACH END OF A CAR. THE QUANTITY NEEDED IS DEPENDENT UPON THE DIMENSION OF THE UNIT WHICH IS POSITIONED LENGTHWISE IN THE CAR, AND UPON THE LENGTH OF THE CAR BEING LOADED. REFER TO THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57 FOR GUIDANCE.
6. THE DEPICTED LOAD CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED. A LOAD MAY BE REDUCED BY ONE LOAD UNIT OR BY ONE TIER OF A LOAD UNIT BY OBVIOUS MEANS. FOR GUIDANCE IN OMITTING A SINGLE UNIT FROM A LOAD, REFER TO PAGES 96 AND 97.
7. SKIDDED UNITS CAN BE POSITIONED IN CONFIGURATIONS OTHER THAN THE TYPICAL TWO LONG AND TWO HIGH WITHIN A BAY AS SHOWN ON PAGE 94, DEPENDING UPON THE WEIGHT OF THE UNIT BEING LOADED. THE CONFIGURATION SHOWN IS ADEQUATE FOR UNITS WHICH WEIGH NOT MORE THAN 3,000 POUNDS. SKIDDED UNITS WEIGHING 2,000 POUNDS OR LESS CAN BE POSITIONED WITH MORE UNITS LONG IN EACH BAY. SEE THE "MAXIMUM WEIGHT OF UNITS PER TIER/BAY" CHART ON PAGE 90 FOR GUIDANCE. GUIDANCE IS ALSO PRESENTED IN THAT CHART FOR THE MAXIMUM WEIGHTS AND NUMBER LONG PER BAY OF SKIDDED UNITS WHICH CAN BE LOADED IN 3-WIDE OR 4-WIDE LOADING PATTERNS.
8. LOADS MAY BE BUILT USING TWO CROSS MEMBERS PER TIER/BAY IN LIEU OF THE THREE PER TIER/BAY SHOWN. POSITION THESE CROSS MEMBERS AGAINST THE LADING AS SPECIFIED BY LOCATION IDENTITIES "A", "C", "D" AND "E". FOR THOSE FEW UNITS WHICH ARE ONLY ONE BOX IN HEIGHT, EACH TIER/BAY MAY BE BRACED USING 1 CROSS MEMBER. THIS CROSS MEMBER MUST BE POSITIONED AGAINST THE UPPER THIRD OF THE UNIT HEIGHT AS INDICATED BY LOCATION IDENTITIES "C" AND/OR "E" IN THE "WALL MEMBER AND/OR DOORWAY MEMBER LOCATION" CHART AT LEFT. REFER TO THE "MAXIMUM WEIGHT OF UNITS PER TIER/BAY" CHART ON PAGE 90 FOR GUIDANCE AS TO THE MAXIMUM WEIGHT PER UNIT DEPENDING UPON THE LOAD PATTERN BEING USED.
9. THE GATES WHICH ARE REQUIRED BETWEEN THE LADING AND THE CROSS MEMBERS CAUSE THESE OUTLOADING PROCEDURES TO BE RATHER UNECONOMICAL. THEREFORE, THESE PROCEDURES SHOULD ONLY BE USED WHEN THE UNITS TO BE SHIPPED ARE TOO WIDE TO BE LOADED IN TWO ROWS AS SHOWN IN THE LOAD ON PAGE 92.

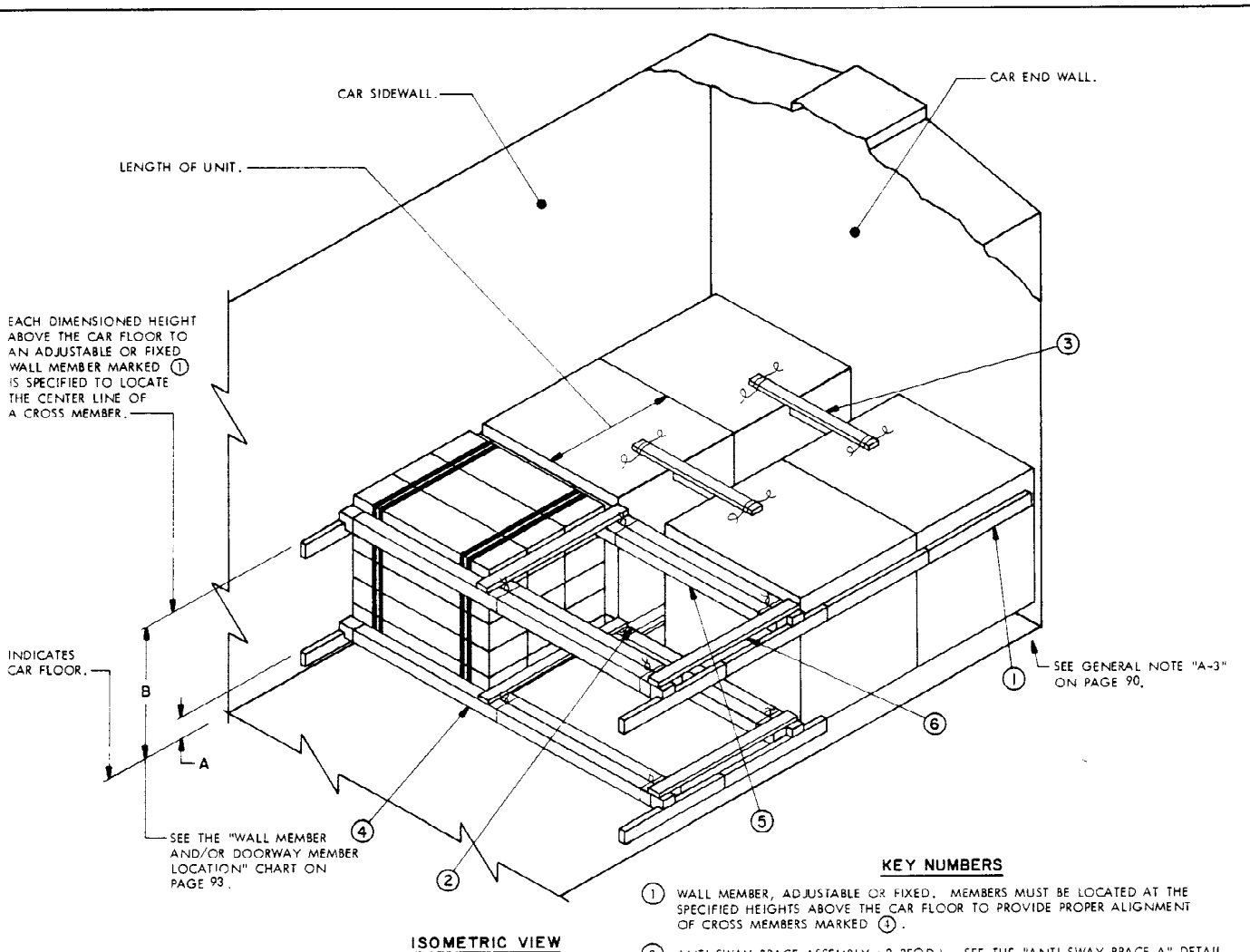
WALL MEMBER AND/OR DOORWAY MEMBER LOCATION	LOCATION IDENTITY	DESCRIPTION OF LOCATION
	A	8" MIN AND NOT MORE THAN 1/2 THE HEIGHT OF THE SKIDDED UNIT.
	B	POSITION BETWEEN "A" AND "C". SEE SPECIAL NOTE 8.
	C	2" DOWN FROM THE TOP OF THE FIRST-TIER SKIDDED UNIT AND NOT LOWER THAN 2/3 OF THE SKIDDED UNIT HEIGHT.
	D	8" ABOVE THE BOTTOM OF THE SECOND-TIER SKIDDED UNIT TO NOT MORE THAN 1/2 OF THE SKIDDED UNIT HEIGHT IN THE SECOND TIER.
	E	POSITION BETWEEN "D" AND "F". SEE SPECIAL NOTE 8.
	F	2" DOWN FROM THE TOP OF THE SECOND-TIER SKIDDED UNIT AND NOT LOWER THAN 2/3 OF THE HEIGHT OF THE SKIDDED UNIT HEIGHT IN THE SECOND TIER.
<b>NOTE:</b>		IF THE LOAD IS MORE THAN TWO (2) TIERS HIGH, FOLLOW SIMILAR PROCEDURES FOR THE ADDED TIER(S).

BILL OF MATERIAL (TYPICAL)		
LUMBER	LINEAR FEET	BOARD FEET
1" X 6"	48	24
2" X 4"	289	193
NAILS	NO. REQD	POUNDS
6d (2")	240	1-1/2
10d (3")	208	3-1/4
12d (3-1/4")	40	3/4
PLYWOOD, 1/2" ----- 704 SQ FT REQD -----		1,012 LBS

**LOAD AS SHOWN (TYPICAL)**

ITEM	QUANTITY	WEIGHT (APPROX)
SKIDDED UNIT -----	52 -----	105,040 LBS
DUNNAGE -----	-----	1,560 LBS
TOTAL WEIGHT -----		106,600 LBS

TYPICAL 2-WIDE LOAD (BOXES LENGTHWISE) IN A 50'-6" LONG BOX CAR  
EQUIPPED WITH MECHANICAL BRACING DEVICES HAVING ADJUSTABLE OR FIXED WALL MEMBERS



**ISOMETRIC VIEW**

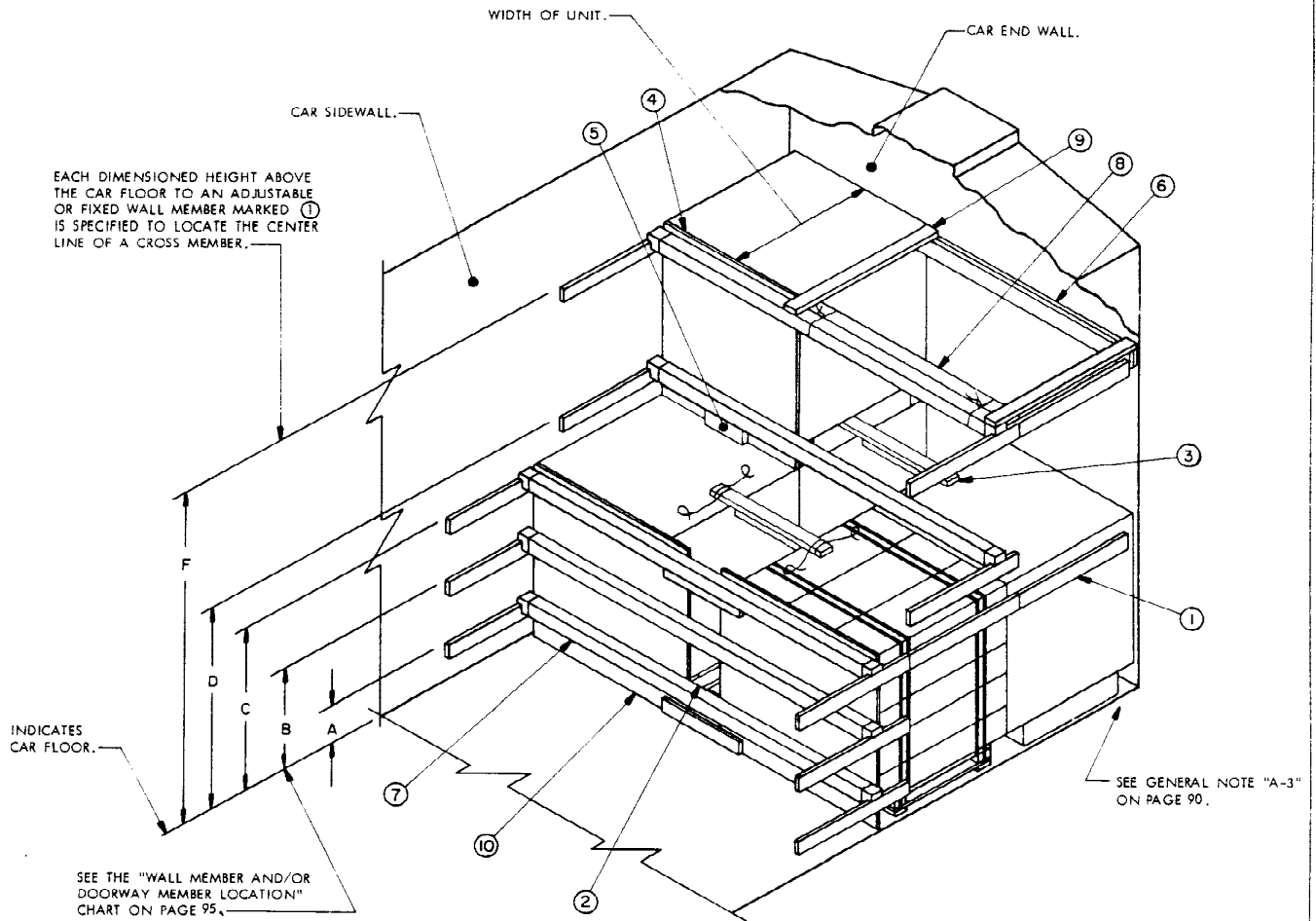
**SPECIAL NOTES:**

1. THE SKIDDED UNIT SHOWN HAS OVERALL DIMENSIONS OF 38-1/2" LONG BY 45" WIDE BY 46" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER LENGTHS AND FOR UNITS HAVING WIDTHS OF FROM 27" THRU 53-1/2" IN A 9'-0" WIDE CAR OR FROM 27" THRU 54-1/2" IN A 9'-2" WIDE CAR.
2. A 2-WIDE LCL LOAD IS SHOWN AS TYPICAL. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR 3-WIDE LOADS IF THE UNITS ARE APPROXIMATELY 36" WIDE OR LESS, OR FOR 4-WIDE LOADS IF THE UNITS ARE APPROXIMATELY 27" WIDE. IF THE UNITS TO BE LOADED ARE WIDER THAN 1/2" LESS THAN ONE-HALF OF THE INSIDE WIDTH CLEARANCE OF THE CAR, THE OUTLOADING PROCEDURES ON PAGE 97 MUST BE EMPLOYED.
3. FIVE (5) UNITS ARE SHOWN AS A TYPICAL LOAD QUANTITY. THE NUMBER OF UNITS CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED.
4. SKIDDED UNITS CAN BE POSITIONED IN CONFIGURATIONS OTHER THAN THE TWO LONG PER BAY AS SHOWN, DEPENDING UPON THE WEIGHT OF THE UNIT BEING LOADED. SEE THE "MAXIMUM WEIGHT OF UNITS PER TIER/BAY" CHART ON PAGE 90 FOR GUIDANCE.

**KEY NUMBERS**

- ① WALL MEMBER, ADJUSTABLE OR FIXED. MEMBERS MUST BE LOCATED AT THE SPECIFIED HEIGHTS ABOVE THE CAR FLOOR TO PROVIDE PROPER ALIGNMENT OF CROSS MEMBERS MARKED ④.
- ② ANTI-SWAY BRACE ASSEMBLY (2 REQ'D). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 52. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF SKIDDED UNITS. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTES 4 AND 5 ON PAGE 93.
- ③ TOP-OF-LOAD ANTI-SWAY BRACE (2 REQ'D). SEE THE DETAIL ON PAGE 57. WIRE TIE TO A SKID STRAP WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION B" DETAIL ON THAT PAGE. SEE SPECIAL NOTE 6 ON PAGE 93.
- ④ CROSS MEMBER (4 REQ'D). SEE GENERAL NOTE "A" ON PAGE 90 AND SPECIAL NOTE 4 AT LEFT.
- ⑤ SIDE BLOCKING, 4" X 4" BY CUT TO FIT BETWEEN SKIDDED UNIT AND CAR SIDEWALL (4 REQ'D). WIRE TIE TO CROSS MEMBER W/2 WRAPS OF NO. 14 GAGE WIRE AT EACH END.
- ⑥ SUPPORT PIECE, 2" X 4" BY CUT TO FIT (REF UNIT LENGTH PLUS 7") (4 REQ'D). NAIL TO PIECES MARKED ⑤ W/3-12d NAILS AT EACH JOINT.





**SPECIAL NOTES:**

1. THE SKIDDED UNIT SHOWN HAS OVERALL DIMENSIONS OF 43" LONG BY 40" WIDE BY 47" HIGH. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR UNITS OF OTHER DIMENSIONS. NOTE THAT THESE PROCEDURES SHOULD ONLY BE USED WHEN THE UNITS TO BE SHIPPED ARE TOO WIDE TO BE LOADED IN TWO ROWS AS SHOWN IN THE LCL LOAD ON PAGE 96.
2. A 2-WIDE LOAD IS SHOWN AS TYPICAL. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR 3-WIDE LOADS IF THE UNITS ARE APPROXIMATELY 36" LONG OR LESS, OR FOR 4-WIDE LOADS IF THE UNITS ARE APPROXIMATELY 27" LONG OR LESS.
3. FIVE (5) UNITS ARE SHOWN AS A TYPICAL LOAD QUANTITY. THE NUMBER OF UNITS CAN BE ADJUSTED TO SUIT THE QUANTITY TO BE SHIPPED. NOTE THAT THE METHOD OF OMITTING A SECOND-LAYER UNIT AS SHOWN IS ONLY APPLICABLE FOR USE AT THE END OF A CAR AND ONLY WHEN THE END WALLS ARE AVAILABLE.
4. IF PLYWOOD IS NOT AVAILABLE FOR THE LOAD BEARING PIECE, PIECE MARKED (4), A GATE CONSTRUCTED OF DIMENSIONAL LUMBER MAY BE SUBSTITUTED. SEE THE "LOAD BEARING GATE B" DETAIL ON PAGE 91 FOR CONSTRUCTION GUIDANCE. OMIT THE PIECES MARKED (4) AND (5) SHOWN.
5. SKIDDED UNITS CAN BE POSITIONED IN CONFIGURATIONS OTHER THAN THE TWO LONG PER BAY AS SHOWN, DEPENDING UPON THE WEIGHT OF THE UNIT BEING LOADED. SEE THE "MAXIMUM WEIGHT OF UNITS PER TIER/BAY" CHART ON PAGE 90 FOR GUIDANCE.

**ISOMETRIC VIEW**

**KEY NUMBERS**

- (1) WALL MEMBER, ADJUSTABLE OR FIXED. MEMBERS MUST BE LOCATED AT THE SPECIFIED HEIGHTS ABOVE THE CAR FLOOR TO PROVIDE PROPER ALIGNMENT OF CROSS MEMBERS MARKED (7).
- (2) ANTI-SWAY BRACE ASSEMBLY (2 REQD). SEE THE "ANTI-SWAY BRACE C" DETAIL ON PAGE 53. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF SKIDDED UNITS. SEE GENERAL NOTE "G" ON PAGE 2.
- (3) TOP-OF-LOAD ANTI-SWAY BRACE (2 REQD). SEE THE DETAIL ON PAGE 57. WIRE TIE TO THE UNITIZING STRAPS WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON THAT PAGE. SEE SPECIAL NOTE 5 ON PAGE 95.
- (4) LOAD BEARING PIECE, PLYWOOD, 1/2" THICK BY UNIT LENGTH IN WIDTH BY UNIT HEIGHT IN LENGTH (1 REQD). NAIL TO PIECE MARKED (5) W/4-6d NAILS. SEE SPECIAL NOTE 4 AT LEFT.
- (5) LOAD BEARING PIECE HOLD DOWN, 2" X 4" X 12" (1 REQD).
- (6) SIDE BLOCKING, 2" X 4" BY CUT TO FIT (DOUBLED) (1 REQD). NAIL THE FIRST PIECE TO THE CAR END WALL W/7-10d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER.
- (7) CROSS MEMBER (5 REQD). SEE GENERAL NOTE "A" ON PAGE 90. SEE SPECIAL NOTE 5 AT LEFT.
- (8) SIDE BLOCKING, 4" X 4" BY CUT TO FIT (1 REQD). WIRE TIE TO CROSS MEMBER W/2 WRAPS OF NO. 14 GAGE WIRE AT EACH END.
- (9) SUPPORT PIECE, 2" X 4" BY CUT TO FIT (REF UNIT WIDTH PLUS 4") (2 REQD). NAIL TO PIECES MARKED (6) AND (8) W/3-12d NAILS AT EACH JOINT.
- (10) LOAD BEARING GATE (1 REQD). SEE THE "LOAD BEARING GATE A" DETAIL ON PAGE 91.

TYPICAL LCL (5-UNIT LOAD) IN A BOX CAR EQUIPPED WITH MECHANICAL BRACING DEVICES HAVING ADJUSTABLE OR FIXED WALL MEMBERS

**GENERAL NOTES**

( FOR CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS )

- A. THE OUTLOADING PROCEDURES SPECIFIED ON PAGES 100 THRU 103 ARE FOR CUSHIONED BOX CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS. **CAUTION:** 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.
- B. 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 BOX CAR 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 AMMUNITION ITEMS.
- C. LOAD DIVIDER CARS MAY BE EQUIPPED EITHER WITH CONVENTIONAL SLIDING DOORS OR 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.
- D. THE SELECTION OF RAIL CARS FOR THE TRANSPORT OF SKIDDED UNITS OF AMMUNITION ITEMS 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. **NOTICE:** ONLY CUSHIONED CARS THAT HAVE SLIDING CENTER SILL TYPE CUSHIONING DEVICES OR END-OF-CAR TYPE DEVICES WHICH HAVE AT LEAST FIFTEEN INCHES ( 15" ) OF TRAVEL ARE ACCEPTABLE.
- E. WHEN SELECTING RAILCARS, EVERY EFFORT SHOULD BE MADE TO OBTAIN BOX CARS THAT DO NOT HAVE BOWED END WALLS. CARS WITH BOWED ENDS CAN BE USED, HOWEVER, IF AN END WALL IS BOWED OUTWARD MORE THAN ONE AND ONE-HALF INCHES ( 1-1/2" ), 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 51 FOR GUIDANCE.
- F. IF NAILING TO A CAR SIDEWALL IS NOT REQUIRED, BOX CARS 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 106 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 106, THE "FILL PIECE" MATERIAL IS NOT REQUIRED.
- G. **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.
- H. A "STRUT ASSEMBLY" MUST BE INSTALLED BETWEEN THE LOAD DIVIDER BULKHEADS IF THE CAR CONTAINS CLASS A OR CLASS B 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 CLASS C EXPLOSIVES. NOTE THAT THE STRUT ASSEMBLY MAY BE OMITTED FROM LOADS OF CLASS A OR B 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 "J-3" AT RIGHT. DETAILS OF STRUT ASSEMBLIES FOR USE BETWEEN 2-PIECE BULKHEADS AND BETWEEN 1-PIECE BULKHEADS ARE SHOWN ON PAGE 104. IN THE EVENT THAT A STRUT ASSEMBLY IS OF SUCH A LENGTH THAT THE 4" X 4" STRUTS OF THE ASSEMBLY ARE LONGER THAN 12'-0", A SPECIAL HOLD-DOWN ASSEMBLY MUST BE USED. SEE THE "STRUT ASSEMBLY HOLD-DOWN" DETAILS ON PAGE 105 FOR GUIDANCE.
- J. THE NORMAL LOADING PATTERN IN CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS IS TO POSITION THE LADING BETWEEN A CAR END WALL AND A LOAD DIVIDER BULKHEAD IN FULL LAYERS. OBVIOUSLY, A LOAD QUANTITY MUST THEN BE A MULTIPLE OF THE NUMBER OF SKIDDED UNITS 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. ONE OR MORE RISERS CAN BE POSITIONED WITHIN A LOAD TO INCREASE OR DECREASE A LOAD QUANTITY. SEE THE RISER DETAILS ON PAGES 66 AND 67 AND THE PROCEDURES ON PAGE 64 DEPICTING THE TYPICAL INSTALLATION OF RISERS.

( CONTINUED AT RIGHT )

**( GENERAL NOTES CONTINUED )**

- 2. THE "GATES AND STRUTS" METHOD OF OMITTING A SKIDDED UNIT MAY BE USED TO ADJUST A LOAD QUANTITY DOWNWARD BY OTHER THAN A MULTIPLE OF A LOAD UNIT. SEE THE PROCEDURES ON PAGE 103 FOR GUIDANCE.
- 3. 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 EVEN LAYERS WHICH ARE ONE OR MORE LESS IN HEIGHT THAN THE LOAD IN THE ENDS OF THE CAR. INSTALL CENTER GATES, STRUTS, AND GATE HOLD DOWNS AS SHOWN IN THE APPLICABLE CONVENTIONAL BOX CAR 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 71, OR WITH KNEE BRACE ASSEMBLIES AS SHOWN ON PAGES 72 AND 73.
- 5. IF THE CAR HEIGHT PERMITS, AND IF SUFFICIENT SPACE IS NOT AVAILABLE BETWEEN THE LOAD DIVIDER BULKHEADS FOR THE PLACEMENT OF A UNIT, ONE ( 1 ) TOP-LAYER UNIT MAY BE ADDED IN EACH CORNER OF THE CAR, AS NECESSARY TO OBTAIN A DESIRED QUANTITY. EACH OF THESE ADDED UNITS MUST BE SECURED TO THE UNIT(S) DIRECTLY BENEATH WITH TWO ( 2 ) VERTICAL UNITIZING STRAPS AND ONE ( 1 ) FIGURE-8 UNITIZING STRAP. IF TWO UNITS ARE LOADED IN ONE END OF A CAR, AN ANTI-SWAY BRACE, AS DETAILED ON PAGE 52 OR 53, WILL BE INSTALLED BETWEEN THEM. IF ONLY ONE UNIT IS LOADED IN AN END OF A CAR, LATERAL BRACING WILL BE PROVIDED BY INSTALLING TOP-OF-LOAD ANTI-SWAY BRACES AS SHOWN BY THE PROCEDURES ON PAGE 102.
- K. **CAUTION:** CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS MUST NOT BE USED FOR SHIPMENT OF EXPLOSIVES SUCH AS DYNAMITE, TNT, BLACK POWDER, SMOKELESS POWDER ( PROPELLANT EXPLOSIVES ), TERYL AND SIMILAR EXPLOSIVES ( EXCEPT AS A COMPONENT PART OF AMMUNITION OR PROPELLING CHARGES ) WHICH ARE LIABLE TO SIFT OR BECOME LODGED IN THE MECHANISM OF THE LOADING AND BRACING DEVICE IN THE EVENT OF A CONTAINER FAILURE.
- L. THE NUMBER OF LADING UNITS MAY BE ADJUSTED TO FIT THE SIZE OF THE BOX CAR 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 RAIL CAR IN COMPLIANCE WITH THE WEIGHT DISTRIBUTION REQUIREMENTS OF THE AAR. SEE GENERAL NOTE "P".
- M. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN CARS WHICH ARE PARTIALLY LOADED WITH SKIDDED UNITS OF AMMUNITION 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.
- N. 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 A FULL LOAD AND TO THE NAILING TO THE CAR FLOOR OF LCL BRACES AND/OR KNEE BRACE ASSEMBLIES IF USED. 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 "G" ON PAGE 2.
- O. THE USE OF AN OFFSET LOADING PATTERN WILL FACILITATE LOADING AND UNLOADING OPERATIONS IN THE DOORWAY AREA OF THE CAR. WHEN POSSIBLE TO DO SO, 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 OR THREE MORE LOAD UNITS IN ONE END THAN IN THE OTHER, IS CONSIDERED TO BE AN OFFSET LOAD. SEE GENERAL NOTE "P".
- P. **CAUTION:** THE TOTAL WEIGHT OF A LOAD IN A CAR MUST NOT EXCEED THE LOAD LIMIT WHICH IS STENCILED ON THE SIDE OF THE CAR. ALSO, THE LOAD WEIGHT ON ONE TRUCK MUST NOT EXCEED ONE-HALF OF THE STENCILED LOAD LIMIT. THE CENTER OF GRAVITY ( CG ) OF A LOAD HAVING AN EQUAL NUMBER OF UNITS IN EACH END OF THE CAR WILL BE AT THE LONGITUDINAL CENTER OF THE CAR AND THEREFORE THE TOTAL WEIGHT OF THE LADING AND DUNNAGE MAY EQUAL BUT MUST NOT EXCEED THE STENCILED LOAD LIMIT. HOWEVER, FOR A LOAD CONSTRUCTED IN AN OFFSET LOADING PATTERN, THE CG WILL BE LOCATED TOWARD THE LONG-LOAD END FROM THE LONGITUDINAL CENTER OF THE CAR SO NATURALLY THE LONG-LOAD END WILL BE THE HEAVIEST. THE TOTAL WEIGHT OF THE LADING AND DUNNAGE MUST THEN BE SOMETHING LESS THAN THE STENCILED LOAD LIMIT. TO DETERMINE THE PORTION OF THE WEIGHT OF THE OFFSET SECTION OF THE LOAD WHICH WILL BE TRANSMITTED TO EACH END OF A CAR, THE FOLLOWING GUIDANCE IS PRESENTED.
  - 1. FOR A SHIPMENT CONSISTING OF AN EVEN NUMBER OF LOAD UNITS LONG LOADED IN AN OFFSET PATTERN, THE LONG PORTION OF A LOAD WILL BE TWO ( 2 ) LOAD UNITS LONGER THAN THE SHORT PORTION. THE CG OF THE OFFSET PORTION WILL BE AT THE JOINT BETWEEN THOSE TWO UNITS. MEASURE THE DISTANCE FROM THE CENTER OF THE CAR LENGTH TO THE JOINT BETWEEN THOSE UNITS. REFER TO THE WEIGHT DISTRIBUTION CHART ON PAGE 98 READ UNDER THE PROPER CAR SIZE HEADING AND OPPOSITE THE DIMENSION NEAREST TO THAT MEASURED, THE PERCENTAGE OF THE OFFSET PORTION OF THE LOAD ( TWO LOAD UNITS IN THIS CASE ) WHICH IS ON THE LONG-LOAD END OF THE CAR. MULTIPLY THIS PERCENTAGE FIGURE TIMES THE WEIGHT OF THE OFFSET PORTION OF THE LOAD AND ADD THE PRODUCT TO THE WEIGHT OF THE SHORT-LOAD END OF THE LOAD. DOUBLE THIS SUM TO DETERMINE THE MINIMUM LOAD LIMIT OF THE CAR TO BE USED FOR A SHIPMENT.

( CONTINUED ON PAGE 99 )

- FOR A SHIPMENT CONSISTING OF AN UNEVEN NUMBER OF LOAD UNITS OVER 33" LONG ( LENGTH OR WIDTH OF A SKIDDED UNIT ), THE LONG PORTION OF THE LOAD WILL BE ONE ( 1 ) LOAD UNIT LONGER THAN THE SHORT PORTION. THE CG OF THE OFFSET PORTION WILL BE AT THE CENTER OF THAT LOAD UNIT. A SHIPMENT CONSISTING OF AN UNEVEN NUMBER OF LOAD UNITS 33" OR LESS IN LENGTH MAY BE THREE ( 3 ) LOAD UNITS LONGER IN ONE END THAN THE OTHER. THE CG OF THE OFFSET PORTION WILL BE AT THE CENTER OF THE SECOND OF THOSE THREE LOAD UNITS. MEASURE THE DISTANCE FROM THE CENTER OF THE CAR LENGTH TO THE CENTER OF THE ONE LOAD UNIT OR THE CENTER OF THE SECOND OF THE THREE, AS APPLICABLE. REFER TO THE "WEIGHT DISTRIBUTION" CHART BELOW AND READ UNDER THE PROPER CAR SIZE HEADING AND OPPOSITE THE DIMENSION NEAREST TO THAT MEASURED, THE PERCENTAGE OF THE OFFSET PORTION OF THE LOAD WHICH IS ON THE LONG-LOAD END OF THE CAR. MULTIPLY THIS PERCENTAGE FIGURE TIMES THE WEIGHT OF THE OFFSET PORTION OF THE LOAD AND ADD THE PRODUCT TO THE WEIGHT OF THE SHORT-LOAD END OF THE LOAD. DOUBLE THIS SUM TO DETERMINE THE MINIMUM LOAD LIMIT OF THE CAR TO BE USED FOR A SHIPMENT.

- THE FOLLOWING SPECIAL NOTES AND THE TWO ( 2 ) CHARTS BELOW, IN CONJUNCTION WITH TWO SPECIAL NOTES AND CHARTS ON PAGE 5, ARE PRESENTED AS GUIDANCE IN THE SELECTION OF A LOAD PATTERN, AND IN DETERMINING THE QUANTITY OF UNITS WHICH CAN BE LOADED IN A CAR EQUIPPED WITH LOAD DIVIDER BULKHEADS, BASED ON THE SIZE AND WEIGHT OF THE SKIDDED UNIT TO BE LOADED.
- CHART NO. 1 MAY BE USED IN SELECTING A LOAD PATTERN, SUCH AS 2-WIDE, 3-WIDE, OR 4-WIDE, FOR THE WIDTH OF THE CAR WHICH IS TO BE LOADED. THE LOAD PATTERN WILL BE BASED EITHER ON THE UNIT LENGTH ACROSS THE CAR ( BOXES LENGTHWISE IN THE CAR ) OR ON THE UNIT WIDTH ACROSS THE CAR ( BOXES CROSSWISE IN THE CAR ), DEPENDENT UPON THE LENGTH OR WIDTH DIMENSIONS OF THE UNIT TO BE LOADED. UNIT SIZE RANGES AND LOAD PATTERNS FOR FIVE OF THE MOST POPULAR CAR WIDTHS ARE GIVEN. CARS OF OTHER WIDTHS MAY BE USED, OF COURSE, AND THE SIZE RANGE OF UNITS WHICH CAN BE LOADED IN THE VARIOUS PATTERNS CAN BE CALCULATED. THE SMALLER FIGURE SHOWN FOR UNIT SIZE RANGE IS BASED ON THE MINIMUM UNIT LENGTH OR WIDTH, AS APPLICABLE, AND THE LARGER FIGURE IS CALCULATED ON THERE BEING AT LEAST ONE INCH ( 1" ) EXCESS LATERAL SPACE REMAINING IN THE CAR AFTER THE UNITS ARE POSITIONED.
- CHART NO. 2 MAY BE USED IN DETERMINING THE QUANTITY OF UNITS WHICH CAN BE POSITIONED WITHIN THE LENGTH OF A CAR. SEPARATE COLUMNS ARE SHOWN FOR THREE OF THE MOST POPULAR CAR LENGTHS. CARS OF OTHER INSIDE LENGTHS MAY BE USED, OF COURSE, BUT THE UNIT SIZE RANGE FOR THE NUMBER OF UNITS LONG WILL HAVE TO BE CALCULATED. THE UNIT SIZE RANGE FOR EACH OF THE SPECIFIED CAR LENGTHS IS BASED ON HAVING A SPACE APPROXIMATELY 38" LONG NEAR THE CENTER OF THE CAR LENGTH, WHICH ALLOWS 6" EACH FOR THE THICKNESS OF THE TWO BULKHEADS AND A 26" SPACE FOR MANIPULATION OF THE BULKHEAD OPERATING LEVER. THIS 26" ALLOWANCE MAY BE REDUCED TO JUST A FEW INCHES IF THE BULKHEADS ARE OPERABLE FROM THE EDGE OF THE BULKHEAD.
- REFER TO SPECIAL NOTE 4 AND "CHART NO. 3" ON PAGE 5 FOR GUIDANCE IN DETERMINING THE NUMBER OF TIERS WHICH CAN BE LOADED IN A CAR.
- REFER TO SPECIAL NOTE 5 AND "CHART NO. 4" ON PAGE 5 FOR GUIDANCE IN DETERMINING THE QUANTITY OF UNITS WHICH CAN BE LOADED IN A CAR, BASED ONLY UPON THE WEIGHT OF THE UNIT.

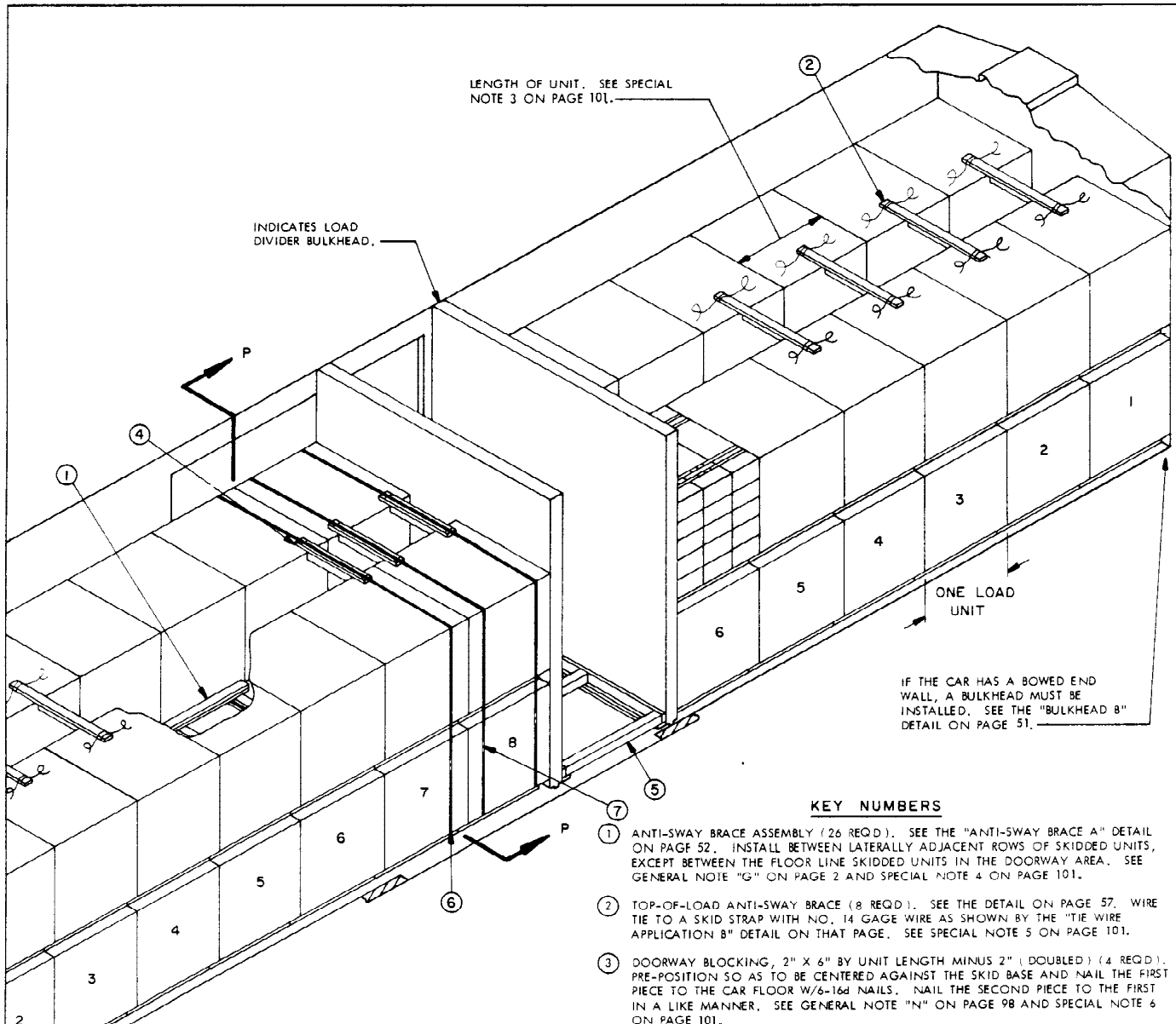
WEIGHT DISTRIBUTION			
DISTANCE FROM CENTER OF CAR TO CG* OF OFFSET UNITS	PERCENT OF WEIGHT OF OFFSET UNITS ON HEAVY END OF CAR		
	40'-6" CAR	50'-6" CAR	60'-8" CAR
6"	51.5	51.2	51.1
9"	52.9	51.9	51.6
12"	53.2	52.5	52.1
15"	54.1	53.1	52.7
18"	55.0	53.7	53.2
21"	55.8	54.4	53.8
24"	56.5	55.0	54.3
27"	57.3	55.6	54.9
30"	58.0	56.1	55.4
33"	58.9	56.8	55.9
36"	59.7	57.4	56.5
39"	60.5	58.2	57.0
42"	61.3	59.0	57.6
45"	62.2	59.4	58.1
48"	63.0	59.8	58.6
54"	64.5	61.0	59.7
60"	66.2	62.2	60.8

\*CENTER OF GRAVITY.

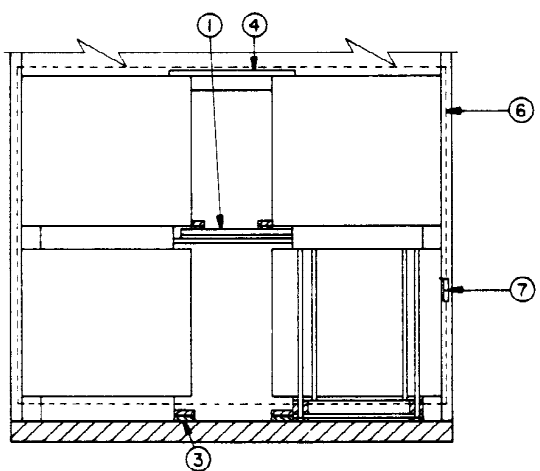
CHART NO. 1					
SIZE RANGE OF UNITS PER LOAD PATTERN					
CAR WIDTH	NO. OF ROWS	UNIT SIZE RANGE*			
		BOXES LENGTHWISE IN CAR		BOXES CROSSWISE IN CAR	
		UNIT LENGTH	LOAD PAGES	UNIT WIDTH	LOAD PAGES
9'-0"	2-WIDE	25" TO 47"	14 AND 86	27" TO 53-1/2"	6 AND 100
	3-WIDE	25" TO 35-5/8"	16 AND 86	27" TO 35-5/8"	8 AND 100
	4-WIDE	25" TO 26-3/4"	20 AND 86	---	---
9'-2"	2-WIDE	25" TO 47"	14 AND 86	27" TO 54-1/2"	6 AND 100
	3-WIDE	25" TO 36-1/4"	16 AND 86	27" TO 36-1/4"	8 AND 100
	4-WIDE	25" TO 27-1/4"	20 AND 86	27" TO 27-1/4"	10 AND 100
9'-3"	2-WIDE	25" TO 47"	14 AND 86	27" TO 55"	6 AND 100
	3-WIDE	25" TO 36-5/8"	16 AND 86	27" TO 36-5/8"	8 AND 100
	4-WIDE	25" TO 27-1/2"	20 AND 86	27" TO 27-1/2"	10 AND 100
9'-6"	2-WIDE	25" TO 47"	14 AND 86	27" TO 55-1/2"	6 AND 100
	3-WIDE	25" TO 37"	16 AND 86	27" TO 37"	8 AND 100
	4-WIDE	25" TO 27-3/4"	20 AND 86	27" TO 27-3/4"	10 AND 100
9'-6"	2-WIDE	25" TO 47"	14 AND 86	27" TO 56-1/2"	6 AND 100
	3-WIDE	25" TO 37-5/8"	16 AND 86	27" TO 37-5/8"	8 AND 100
	4-WIDE	25" TO 28-1/4"	20 AND 86	27" TO 28-1/4"	10 AND 100

\* BASED ON 1" MINIMUM SPACE ACROSS CAR.

CHART NO. 2			
UNITS IN LENGTH OF LOAD DIVIDER CAR			
NO. OF UNITS LONG	UNIT SIZE RANGE, LENGTH OR WIDTH		
	40'-6" BOX CAR ( 448" LOAD LENGTH )	50'-6" BOX CAR ( 568" LOAD LENGTH )	60'-8" BOX CAR ( 690" LOAD LENGTH )
27	---	---	25" TO 25-1/2"
26	---	---	25-5/8" TO 26-1/2"
25	---	---	26-5/8" TO 27-1/2"
24	---	---	27-5/8" TO 28-3/4"
23	---	---	28-7/8" TO 30"
22	---	25" TO 25-3/4"	30-1/8" TO 31-1/4"
21	---	25-7/8" TO 27"	31-3/8" TO 32-3/4"
20	---	27-1/8" TO 28-3/8"	32-7/8" TO 34-1/2"
19	---	28-1/2" TO 29-7/8"	34-5/8" TO 36-1/4"
18	25" TO 25-5/8"	30" TO 31-1/2"	36-3/8" TO 38-1/4"
17	25-3/4" TO 26-1/4"	31-5/8" TO 33-3/8"	38-3/8" TO 40-1/2"
16	26-3/8" TO 28"	33-1/2" TO 35-1/2"	40-5/8" TO 43-1/8"
15	28-1/8" TO 29-3/4"	35-5/8" TO 37-3/4"	43-1/4" TO 46"
14	29-7/8" TO 32"	37-7/8" TO 40-1/2"	46-1/8" TO 49-1/4"
13	32-1/8" TO 34-3/8"	40-5/8" TO 43-5/8"	49-3/8" TO 53"
12	34-1/2" TO 37-1/4"	43-3/4" TO 47-1/4"	53-1/8" TO 57-1/2"
11	37-3/8" TO 40-5/8"	47-3/8" TO 51-5/8"	57-5/8" TO 62-5/8"
10	40-3/4" TO 44-3/4"	51-3/4" TO 56-3/4"	62-3/4" TO 69"
9	44-7/8" TO 49-3/4"	56-7/8" TO 63"	69-1/8" TO 76-5/8"
8	49-7/8" TO 56"	63-1/8" TO 71"	76-3/4" TO 86-1/4"
7	56-1/8" TO 64"	71-1/8" TO 81-1/8"	OVER 86-1/4"
6	64-1/8" TO 74-5/8"	81-1/4" TO 94-5/8"	
5	74-3/4" TO 89-1/2"	OVER 94-5/8"	
4	OVER 89-1/2"		



ISOMETRIC VIEW



SECTION P-P

KEY NUMBERS

- ① ANTI-SWAY BRACE ASSEMBLY (26 REQD.). SEE THE "ANTI-SWAY BRACE A" DETAIL ON PAGE 52. INSTALL BETWEEN LATERALLY ADJACENT ROWS OF SKIDDED UNITS, EXCEPT BETWEEN THE FLOOR LINE SKIDDED UNITS IN THE DOORWAY AREA. SEE GENERAL NOTE "G" ON PAGE 2 AND SPECIAL NOTE 4 ON PAGE 101.
- ② TOP-OF-LOAD ANTI-SWAY BRACE (8 REQD.). SEE THE DETAIL ON PAGE 57. WIRE TIE TO A SKID STRAP WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE WIRE APPLICATION B" DETAIL ON THAT PAGE. SEE SPECIAL NOTE 5 ON PAGE 101.
- ③ DOORWAY BLOCKING, 2" X 6" BY UNIT LENGTH MINUS 2" (DOUBLED) (4 REQD.). PRE-POSITION SO AS TO BE CENTERED AGAINST THE SKID BASE AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/6-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE GENERAL NOTE "N" ON PAGE 98 AND SPECIAL NOTE 6 ON PAGE 101.
- ④ SPACER (3 REQD.). SEE THE DETAIL ON PAGE 57.
- ⑤ STRUT ASSEMBLY (1 REQD.). SEE THE DETAIL ON PAGE 104. SEE GENERAL NOTE "H" ON PAGE 98.
- ⑥ DOORWAY PROTECTION STRAP, 1-1/4" X .035" X 36'-0" LONG (REF) STEEL STRAPPING (3 REQD.). INSTALL SO AS TO ENIRCLE THE LOAD UNIT IN THE DOORWAY AREA. SECURE TO PIECE MARKED ④ W/2 STAPLES. SEE SPECIAL NOTE 6 ON PAGE 101.
- ⑦ SEAL FOR 1-1/4" STRAPPING (6 REQD., 2 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "J" ON PAGE 2.

TYPICAL 2-WIDE LOAD (BOXES CROSSWISE) IN A 50'-6" LONG BOX CAR EQUIPPED WITH LOAD DIVIDERS

**SPECIAL NOTES:**

1. A 50'-6" LONG BY 9'-2" WIDE CUSHIONED BOX CAR EQUIPPED WITH LOAD DIVIDER BULKHEADS, AND WITH 10'-0" WIDE DOOR OPENINGS IS SHOWN. CARS OF OTHER DIMENSIONS AND CARS HAVING NARROWER OR WIDER DOOR OPENINGS CAN BE USED.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL 2-WIDE (BOXES CROSSWISE) LOAD ON PAGE 100 HAS OVERALL DIMENSIONS OF 39" LONG BY 44-1/2" WIDE BY 47" HIGH.
3. A 2-WIDE LOAD (BOXES CROSSWISE) IS SHOWN AS TYPICAL. THE DEPICTED PROCEDURES ARE ALSO APPLICABLE FOR 1-WIDE, 3-WIDE, AND 4-WIDE LOADS (BOXES CROSSWISE) AND FOR 2-WIDE, 3-WIDE, AND 4-WIDE LOADS (BOXES LENGTHWISE). IN OTHER WORDS, ANY OF THE TYPICAL CONVENTIONAL BOX CAR LOADS SHOWN ON THE EVEN NUMBERED PAGES 6 THRU 22, AND OTHER LOADS USING THOSE PROCEDURES, MAY BE SHIPPED IN CARS EQUIPPED WITH LOAD DIVIDERS. THE COMBINATION LOAD SHOWN ON PAGE 24 CAN BE SHIPPED IN A LOAD DIVIDER CAR, HOWEVER, GATES AND STRUTS, OR A GATE AND SOLID FILL, MUST BE INSTALLED ON THE SHORT-LOAD SIDE TO PROVIDE FOR AN EVEN SURFACE FOR THE LOAD DIVIDER BULKHEAD. IF THE CAR BEING USED IS EQUIPPED WITH 2-PIECE BULKHEADS, THE FILL MATERIAL WILL NOT BE REQUIRED, HOWEVER, THE BOXES-LENGTHWISE SIDE OF A LOAD MUST BE LONGER THAN THE BOXES-CROSSWISE SIDE IN ORDER TO PERMIT POSITIONING OF THE BULKHEADS AGAINST THE LADING.
4. THE ANTI-SWAY BRACE A, SHOWN IN THE LOAD VIEW AS PIECE MARKED ①, IS DESIGNED FOR USE WITHIN LOADS OF CROSSWISE-POSITIONED BOXES. SEE SPECIAL NOTES 3 AND 4 ON PAGE 7 FOR GUIDANCE AS TO APPLICATION AND REQUIREMENTS. IF THE LOAD CONSISTS OF UNITS HAVING LENGTHWISE-POSITIONED BOXES, ANTI-SWAY BRACE C WILL BE USED IN LIEU OF ANTI-SWAY BRACE A. SEE THE DETAIL ON PAGE 53 FOR CONSTRUCTION GUIDANCE. INSTALL BETWEEN ALL LATERALLY ADJACENT SKIDDED UNITS, EXCEPT THE FLOOR LINE UNITS WHICH ARE COMPLETELY IN THE DOORWAY AREA OR WHICH EXTEND INTO THE DOORWAY AREA BY ONE-HALF OR MORE OF THE UNIT WIDTH. IF THE COMBINATION LOAD IS TO BE SHIPPED, ANTI-SWAY BRACE E WILL BE USED IN LIEU OF ANTI-SWAY BRACE A. SEE THE DETAIL ON PAGE 53 FOR CONSTRUCTION GUIDANCE. INSTALL BETWEEN THE LATERALLY ADJACENT ROWS OF SKIDDED UNITS. SEE SPECIAL NOTE 3 ON PAGE 25 FOR GUIDANCE AS TO APPLICATION AND REQUIREMENTS.
5. TOP-OF-LOAD ANTI-SWAY BRACES MUST BE INSTALLED IN EACH END OF A CAR. THE QUANTITY NEEDED IS DEPENDENT UPON THE DIMENSION OF THE UNIT WHICH IS POSITIONED LENGTHWISE IN THE CAR, AND UPON THE LENGTH OF THE CAR BEING LOADED. REFER TO THE "TOP-OF-LOAD ANTI-SWAY BRACE REQUIREMENTS" CHART ON PAGE 57 FOR GUIDANCE.
6. FOR LOADS OF LENGTHWISE-POSITIONED BOXES, THE DOORWAY BLOCKING, PIECE MARKED ②, WILL BE 2" X 4" BY WIDTH OF SKID BASE. DOORWAY PROTECTION GATES WILL BE USED FOR A COMBINATION LOAD IF THE CAR IS EQUIPPED WITH CONVENTIONAL SLIDING DOORS. FOR A COMBINATION LOAD IN A CAR EQUIPPED WITH PLUG DOORS, INSTALL NAILED-DOWN BLOCKING BETWEEN LATERALLY ADJACENT UNITS AND ENIRCLE THE UNITS WITH STRAPS, SIMILAR TO THE INSTALLATION OF PIECES MARKED ③ AND ④ ON PAGE 100.

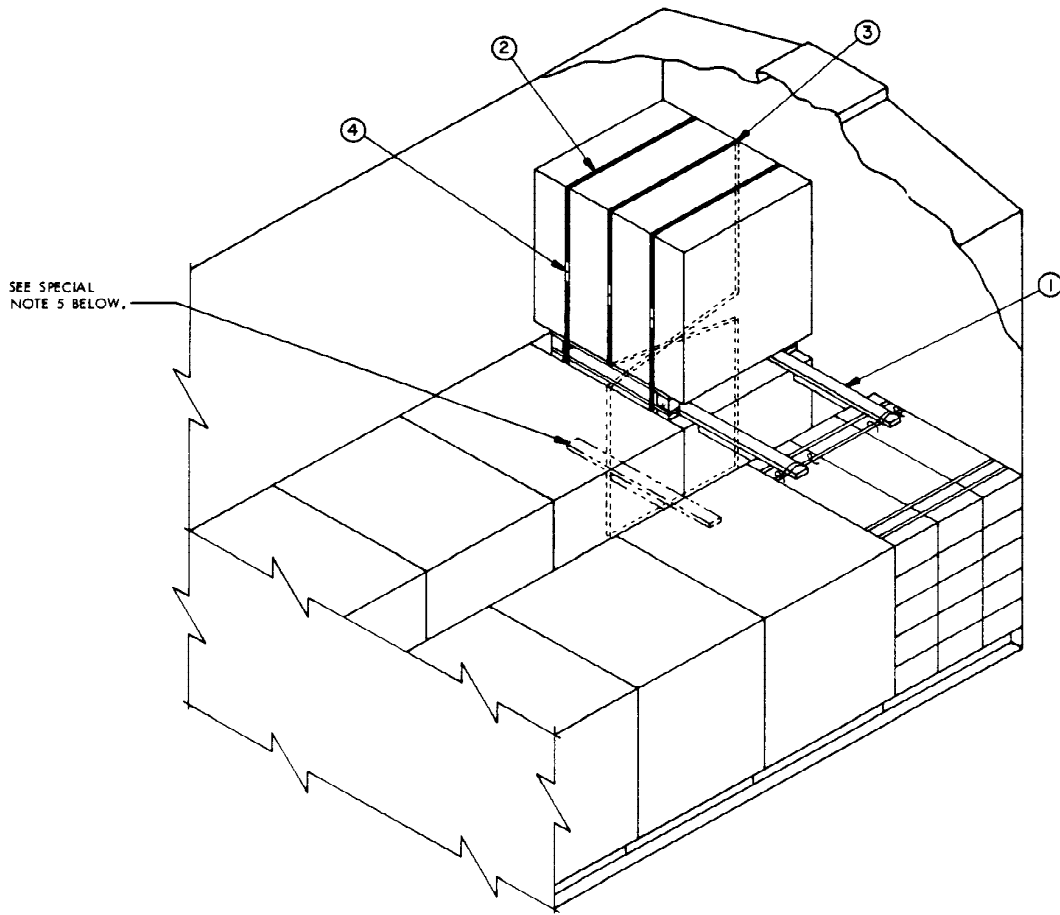
**BILL OF MATERIAL ( TYPICAL )**

LUMBER	LINEAR FEET	BOARD FEET
1" X 4"	291	97
1" X 8"	16	11
2" X 4"	555	370
2" X 6"	10	10
4" X 4"	20	27
NAILS	NO. REQ'D	POUNDS
6d (2")	14	1/4
10d (3")	18	1/2
12d (3-1/4")	191	3-1/4
16d (3-1/2")	24	3/4
20d (4")	368	13-1/4
STEEL STRAPPING, 1-1/4" X .035" -----	108' REQ'D -----	16 LBS
SEAL FOR 1-1/4" STEEL STRAPPING --	6 REQ'D -----	NIL
STAPLE FOR 1-1/4" STEEL STRAPPING --	6 REQ'D -----	NIL

**LOAD AS SHOWN ( TYPICAL )**

ITEM	QUANTITY	WEIGHT ( APPROX )
SKIDDED UNIT -----	56 -----	108,080 LBS
DUNNAGE -----	-----	1,306 LBS
<b>TOTAL WEIGHT -----</b>		<b>109,386 LBS</b>

**TYPICAL 2-WIDE LOAD (BOXES CROSSWISE) IN A 50'-6" LONG  
BOX CAR EQUIPPED WITH LOAD DIVIDERS**



**ISOMETRIC VIEW**

**SPECIAL NOTES:**

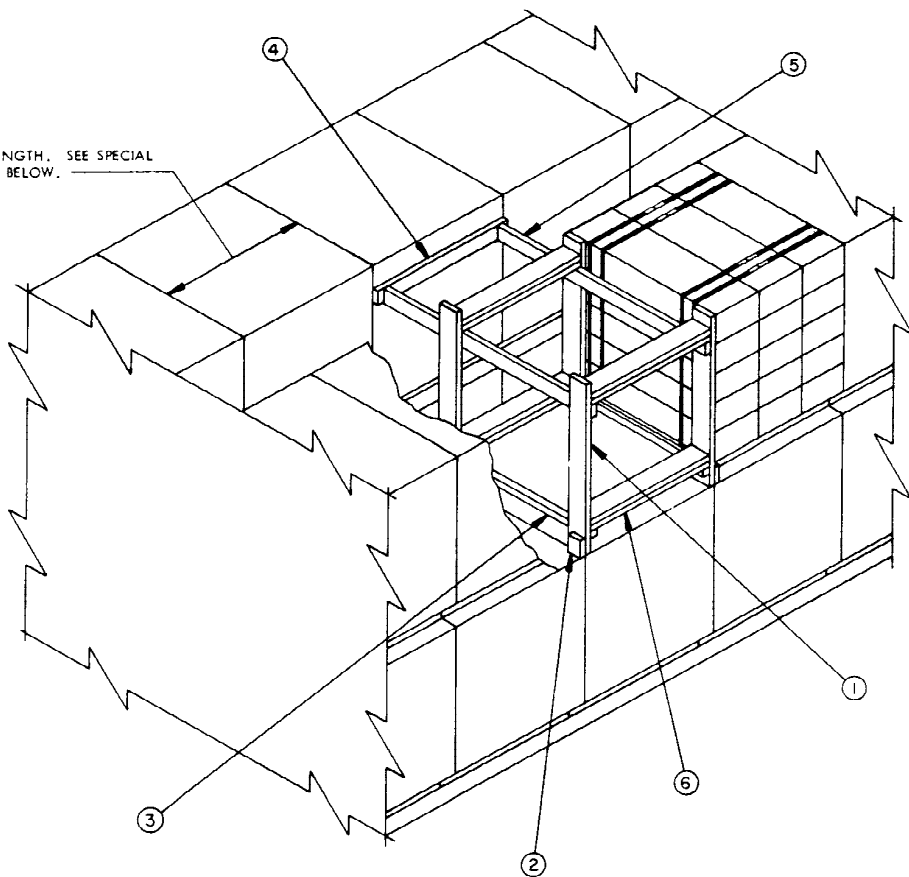
1. A 9'-2" WIDE CUSHIONED BOX CAR WHICH IS EQUIPPED WITH LOAD DIVIDER BULKHEADS IS SHOWN. CUSHIONED CARS OF OTHER WIDTHS CAN BE USED.
2. THE SKIDDED UNIT SHOWN IN THE TYPICAL LCL LOAD HAS OVERALL DIMENSIONS OF 39" LONG BY 45" WIDE BY 48" HIGH. THE PROCEDURES ARE ALSO APPLICABLE FOR OTHER SIZE UNITS HAVING THE BOXES CROSSWISE IN THE CAR AS WELL AS FOR UNITS HAVING THE BOXES LENGTHWISE IN THE CAR.
3. THIS METHOD OF PARTIAL-LAYER (TIER) BRACING (ADDING A UNIT IN THE TOP TIER) IS ONLY APPLICABLE FOR USE IN CUSHIONED BOX CARS.
4. A SECOND-LAYER UNIT IS SHOWN AS TYPICAL, ALTHOUGH THE PROCEDURES ARE APPLICABLE FOR ANY TOP TIER, BE IT A THIRD, FOURTH, OR OTHER. THE QUANTITY OF UNITS IS LIMITED TO ONE (1) IN EACH CORNER OF A CAR. IF TWO UNITS ARE LOADED, ONE EACH IN LATERALLY OPPOSITE CORNERS, THE PROPER ANTI-SWAY BRACING WILL BE INSTALLED BETWEEN THE SKID BASES AND ONE (1) TOP-OF-LOAD ANTI-SWAY BRACE WILL BE POSITIONED BETWEEN THE TOPS OF THE UNITS IN LIEU OF THE TWO AT THE LOCATION SHOWN.
5. ONLY THE BLOCKING AND BRACING FOR THE PARTIAL TIER IS SHOWN; REFER TO PAGE 100, OR TO THE APPLICABLE PAGE IN THE CONVENTIONAL BOX CAR PORTION OF THIS DRAWING, FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.

**KEY NUMBERS**

- ① TOP-OF-LOAD ANTI-SWAY BRACE (2 REQD). SEE THE DETAIL ON PAGE 57. POSITION BETWEEN THE TOPS OF LATERALLY ADJACENT UNITS, TO INCLUDE THE ONE WHICH IS DIRECTLY BELOW THE LONE UNIT IN THE TOP TIER. POSITION ONE END OF THE ASSEMBLY IN CONTACT WITH, AND WIRE TO, A CORNER POST WITH NO. 14 GAGE WIRE. WIRE TIE THE OPPOSITE END TO A SKID STRAP WITH NO. 14 GAGE WIRE AS SHOWN BY THE "TIE-WIRE APPLICATION B" DETAIL ON PAGE 57. IF THE SKIDDED UNITS ARE POSITIONED WITH THE BOXES LENGTHWISE IN THE CAR, WIRE TIE THE OPPOSITE END OF THE ASSEMBLY TO A UNITIZING STRAP IN A MANNER SIMILAR TO THAT SHOWN BY THE "TIE WIRE APPLICATION A" DETAIL ON THAT PAGE.
- ② VERTICAL UNITIZING STRAP, 1-1/4" X .035" X 24'-0" LONG (REF) STEEL STRAPPING (2 REQD). INSTALL SO AS TO ENCIRCLE THE TOP-TIER UNIT AND THE UNIT DIRECTLY BENEATH.
- ③ FIGURE-8 UNITIZING STRAP, 1-1/4" X .035" X 25'-0" LONG (REF) STEEL STRAPPING (1 REQD). POSITION NEAR THE CENTER OF THE UNIT WIDTH (OR LENGTH, IF APPLICABLE). NOTE THAT THE STRAP PASSES UNDER THE SKID CROSS TIE PIECE OF THE SKID BASE FOR THE TOP UNIT, WHEN THE SKIDDED UNITS ARE POSITIONED AS SHOWN. SEE THE "SECUREMENT OF PARTIAL UNIT ON TOP" DETAIL ON PAGE 78 FOR ADDITIONAL GUIDANCE.
- ④ SEAL FOR 1-1/4" STRAPPING (6 REQD, 2 PER STRAP). DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "J" ON PAGE 2.

**TYPICAL LCL (ADDED-UNIT IN THE TOP TIER) IN A  
BOX CAR EQUIPPED WITH LOAD DIVIDERS**

UNIT LENGTH. SEE SPECIAL NOTE 2 BELOW.



**ISOMETRIC VIEW**

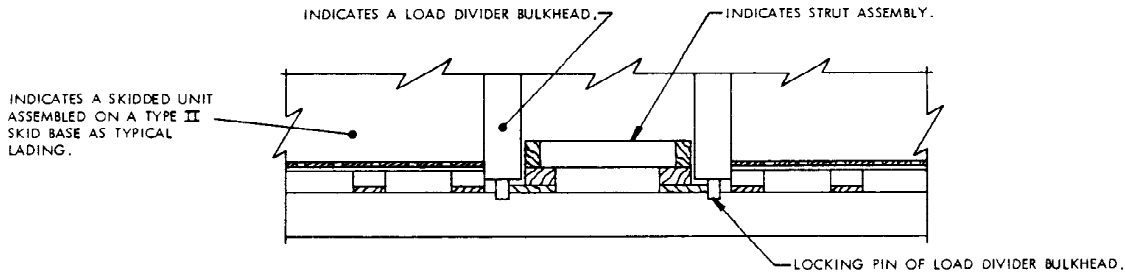
**KEY NUMBERS**

**SPECIAL NOTES:**

1. A PARTIAL VIEW OF A 9'-2" WIDE BOX CAR WHICH IS EQUIPPED WITH LOAD DIVIDER BULKHEADS IS SHOWN. CARS OF OTHER WIDTHS CAN BE USED.
2. THE SKIDDED UNIT SHOWN HAS OVERALL DIMENSIONS OF 39" LONG BY 45" WIDE BY 48" HIGH. THE PROCEDURES ARE ALSO APPLICABLE FOR OTHER SIZE UNITS HAVING THE BOXES CROSSWISE IN THE CAR AS WELL AS FOR UNITS HAVING THE BOXES LENGTHWISE IN THE CAR.
3. THIS METHOD OF PARTIAL-LAYER ( TIER ) BRACING ( OMITTING A UNIT FROM THE TOP TIER ) IS APPLICABLE FOR USE IN CONVENTIONAL BOX CARS AS WELL AS IN CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS.
4. THE OMISSION OF A SECOND-TIER UNIT OF A 2-WIDE LOAD IS SHOWN AS TYPICAL. THE PROCEDURES ARE APPLICABLE FOR ANY TOP TIER, BE IT A THIRD, FOURTH, OR OTHER, AND MAY ALSO BE ADAPTED FOR USE IN 3-WIDE AND 4-WIDE LOADS.
5. THE OMITTED-UNIT PROCEDURE SHOULD BE APPLIED NEAR THE CENTER OF THE CAR LENGTH, BUT NOT IN THE DOORWAY AREA OF THE CAR. ALSO, THERE SHOULD BE AT LEAST ONE ( 1 ) LOAD UNIT BETWEEN THE OMITTED UNIT AND A LOAD DIVIDER BULKHEAD, OR BETWEEN THE OMITTED UNIT AND A CENTER GATE FOR A LOAD IN A CONVENTIONAL BOX CAR.
6. STRUTS MAY BE 4" X 4" MATERIAL IN LIEU OF 2" X 6", IF DESIRED, WHEN THE PROCEDURES ARE USED IN A CAR EQUIPPED WITH LOAD DIVIDER BULKHEADS. WHEN THE PROCEDURES ARE USED IN A CONVENTIONAL BOX CAR LOAD, THE STRUTS SHOULD BE THE SAME AS ARE USED BETWEEN THE CENTER GATES. FOR EXAMPLE, IF 4" X 5" ON-EDGE STRUTS ARE USED AS CENTER BLOCKING, 4" X 6" ON-EDGE STRUTS SHOULD ALSO BE USED FOR THE OMITTED UNIT BLOCKING. NOTE THAT THE HEIGHT OF THE SIDE BLOCKING/STRUT LEDGER, PIECE MARKED ⑤, WILL NEED TO BE ADJUSTED TO SUIT.
7. ONLY THE BLOCKING AND BRACING FOR THE OMITTED UNIT IS SHOWN; REFER TO THE APPLICABLE LOAD PAGE FOR THE BLOCKING AND BRACING REQUIREMENTS FOR THE BALANCE OF THE LOAD.
8. WHEN UNITS OF CROSSWISE-POSITIONED BOXES ASSEMBLED ON THE TYPE I OR TYPE IA SKID BASES ARE 35" OR LESS IN WIDTH, IT WILL BE NECESSARY TO RIP THE WIDTH OF THE HOLD DOWN, PIECE MARKED ②, TO SUIT. THIS GUIDANCE IS ALSO APPLICABLE TO SKIDDED UNITS OF TOP-CLEATED BOXES ASSEMBLED ON THE TYPE II SKID BASES.

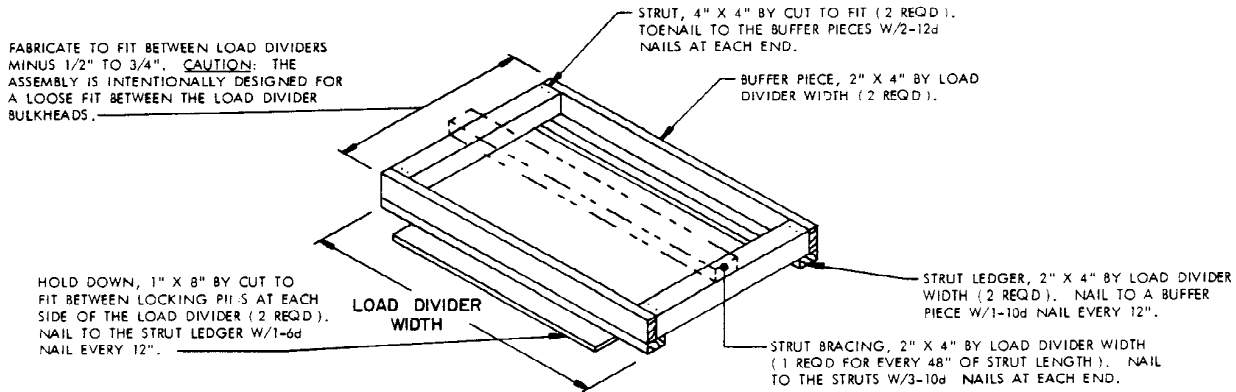
- ① VERTICAL PIECE, 2" X 6" BY UNIT HEIGHT ( 4 REQ'D ).
- ② HOLD-DOWN, 2" X 4" X 5" ( 4 REQ'D ). NAIL TO THE VERTICAL PIECE, PIECE MARKED ①, W/2-10d NAILS. SEE SPECIAL NOTE 8.
- ③ STRUT LEDGER, 2" X 2" BY UNIT WIDTH OR LENGTH, AS APPLICABLE ( 2 REQ'D ). POSITION SO THE TOP IS 6" ABOVE THE BOTTOM OF THE VERTICAL PIECES, PIECES MARKED ①, AND NAIL W/2-10d NAILS AT EACH END.
- ④ BEARING PIECE, 2" X 4" BY UNIT LENGTH OR WIDTH, AS APPLICABLE ( 1 REQ'D ). NAIL TO THE SIDE BLOCKING/STRUT LEDGERS, PIECES MARKED ③, W/2-10d NAILS AT EACH JOINT.
- ⑤ SIDE BLOCKING/STRUT LEDGER, 2" X 4" BY CUT TO FIT BETWEEN THE BEARING PIECE, PIECE MARKED ④, AND THE CAR SIDEWALL ( 2 REQ'D ). POSITION SO THE TOP IS 4-1/2" BELOW THE TOP OF THE VERTICAL PIECES, PIECES MARKED ①, AND NAIL W/3-10d NAILS AT EACH JOINT. SEE SPECIAL NOTE 6 AT LEFT.
- ⑥ STRUT, 2" X 6" BY UNIT LENGTH MINUS 3" OR UNIT WIDTH MINUS 3", AS APPLICABLE ( DOUBLED ) ( 4 REQ'D ). LAMINATE W/1-10d NAIL EVERY 6". TOENAIL THE TOP PIECE TO THE VERTICAL PIECES, PIECES MARKED ①, W/2-12d NAILS AT EACH END. SEE SPECIAL NOTE 6 AT LEFT.

TYPICAL LCL ( OMITTED UNIT FROM THE TOP TIER )  
IN A BOX CAR EQUIPPED WITH LOAD DIVIDERS



### INSTALLATION OF STRUT ASSEMBLY

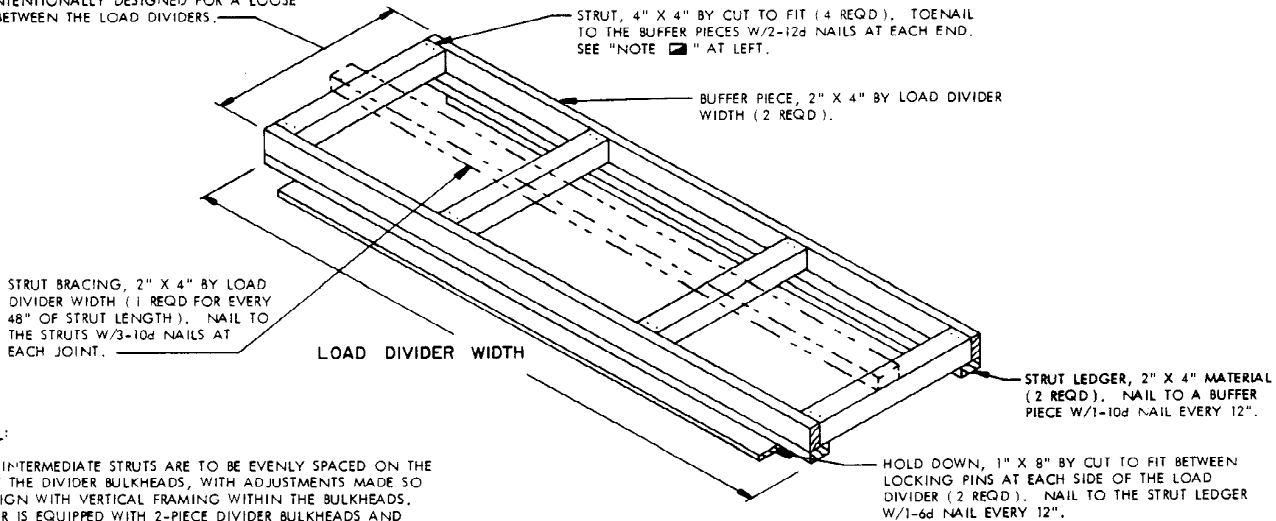
THIS VIEW SHOWS THE STRUT ASSEMBLY INSTALLED BETWEEN THE LOAD DIVIDER BULKHEADS. NOTE THE 1/2" TO 3/4" (TOTAL) SPACE INTENTIONALLY PROVIDED BETWEEN THE ASSEMBLY AND THE BULKHEADS.



### STRUT ASSEMBLY FOR 2-PIECE BULKHEADS

A STRUT ASSEMBLY IS REQUIRED WHEN THE LOAD BEHIND EITHER LOAD DIVIDER BULKHEAD EXCEEDS 50,000 POUNDS OF CLASS A OR CLASS B EXPLOSIVES. A STRUT ASSEMBLY IS NOT REQUIRED FOR LOADS OF CLASS C EXPLOSIVES, REGARDLESS OF THE WEIGHT OF THE LOAD. IF A STRUT ASSEMBLY IS LONGER THAN 12'-0", THE ASSEMBLY MUST BE HELD DOWN IN THE CENTER. SEE THE DETAILS ON PAGE 105 FOR GUIDANCE.

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 DIVIDERS.



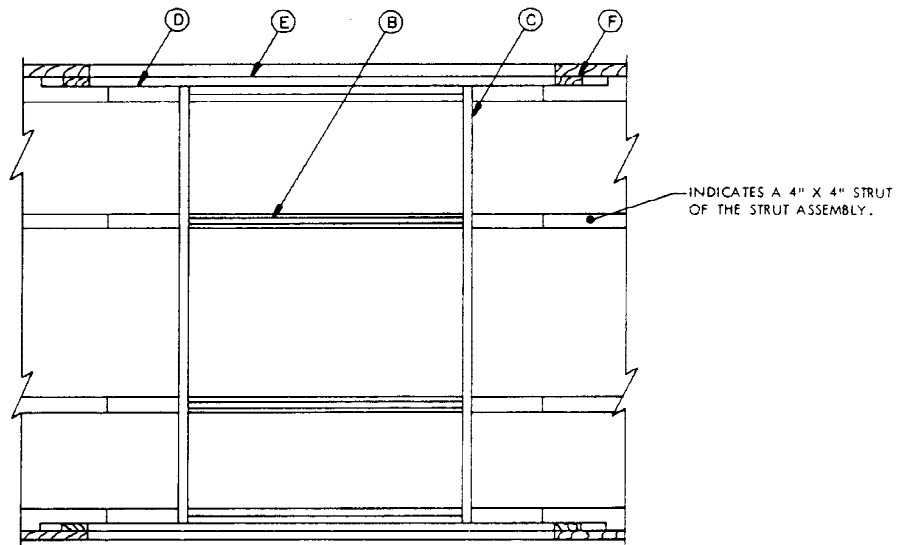
#### NOTE [ ]:

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

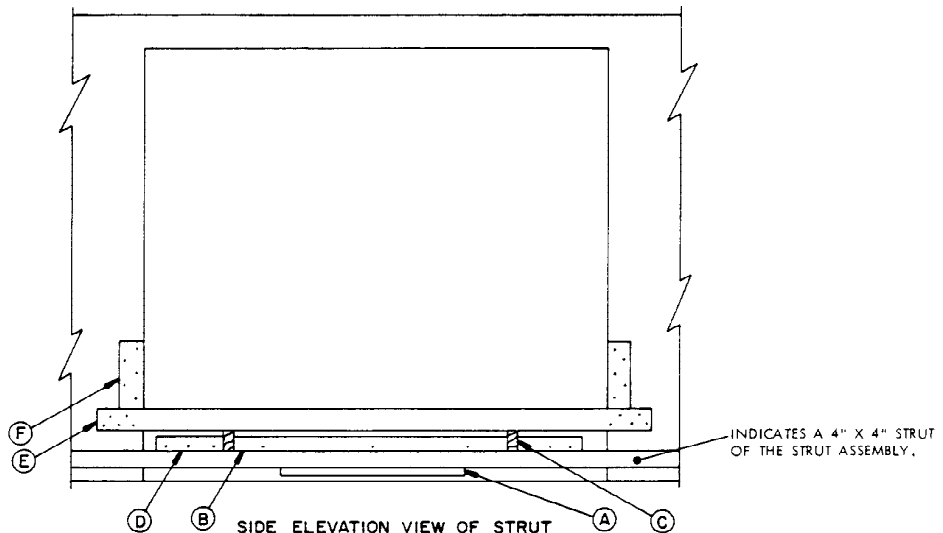
A STRUT ASSEMBLY IS REQUIRED WHEN THE LOAD BEHIND EITHER LOAD DIVIDER BULKHEAD EXCEEDS 50,000 POUNDS OF CLASS A OR CLASS B EXPLOSIVES. A STRUT ASSEMBLY IS NOT REQUIRED FOR LOADS OF CLASS C EXPLOSIVES, REGARDLESS OF THE WEIGHT OF THE LOAD. IF A STRUT ASSEMBLY IS LONGER THAN 12'-0", THE ASSEMBLY MUST BE HELD DOWN IN THE CENTER. SEE THE DETAILS ON PAGE 105 FOR GUIDANCE.





**PLAN VIEW OF STRUT  
ASSEMBLY HOLD DOWN**

THIS PLAN VIEW AND THE SIDE ELEVATION VIEW BELOW DEPICT THE HOLD-DOWN BLOCKING WHICH IS REQUIRED WHEN THE STRUTS OF THE "STRUT ASSEMBLY" USED IN A LOAD DIVIDER CAR ARE LONGER THAN 12'-0". NOTE THAT THE SPECIAL STRUT HOLD-DOWN AND THE STRUT ASSEMBLY ARE ONLY REQUIRED IF THE LOAD BEHIND EITHER DOOR IS MORE THAN 50,000 POUNDS, AND ONLY FOR LOADS OF CLASS A OR CLASS B EXPLOSIVES.

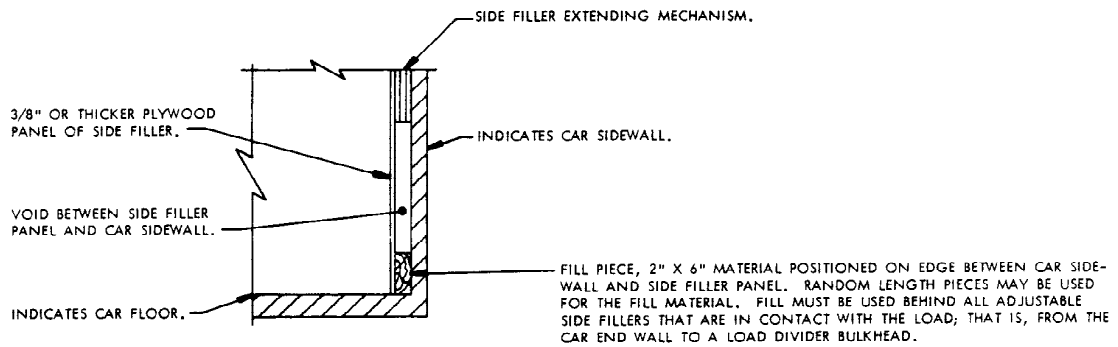


**SIDE ELEVATION VIEW OF STRUT  
ASSEMBLY HOLD DOWN**

**KEY LETTERS**

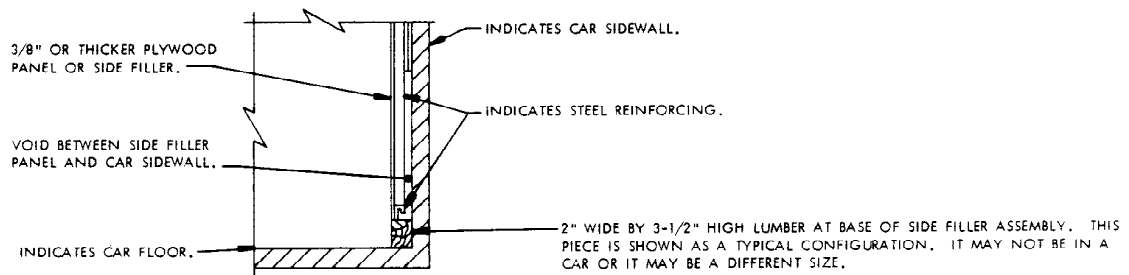
- (A) FILLER PIECE, 2" X 4" X 48" ( 4 REQD ). POSITION SO AS TO BE CENTERED IN THE DOORWAY AREA AND NAIL TO THE BOTTOM SURFACE OF A STRUT W/4-10d NAILS.
- (B) SPACER PIECE, 2" X 4" X 72" ( 4 REQD ). POSITION ON EDGE AND SO AS TO BE CENTERED IN THE DOORWAY AREA AND TOENAIL TO A STRUT W/3-12d NAILS ON EACH SIDE.
- (C) HOLD-DOWN PIECE, 2" X 6" BY CAR WIDTH ( CUT TO FIT IF THE CAR HAS PLUG DOORS, OR 2" X 6" BY CAR WIDTH PLUS 4" IF THE CAR HAS CONVENTIONAL SLIDING DOORS ) ( 2 REQD ). NAIL TO EACH PIECE MARKED (B) W/2-12d NAILS AND TOENAIL TO THE STRUTS W/2-12d NAILS AT EACH JOINT.
- (D) BRACE PIECE, 4" X 4" X 18" ( 8 REQD ). POSITION AGAINST A PIECE MARKED (C) AND TOENAIL TO A STRUT W/3-12d NAILS ON EACH SIDE.
- (E) DOOR SPANNER PIECE, 2" X 6" BY DOOR OPENING WIDTH PLUS 24" ( 2 REQD ). NAIL TO A CAR DOOR POST/SIDE WALL OR TO A NAILING STRIP W/5-12d NAILS AT EACH END.  
**NOTE:** PRIOR TO NAILING THESE PIECES IN PLACE, THE STRUTS OF THE STRUT ASSEMBLY ARE TO BE PRESSED DOWNWARD UNTIL THE PIECES MARKED (A) ARE TOUCHING OR ARE ALMOST TOUCHING THE FLOOR OF THE CAR.
- (F) HOLD-DOWN CLEAT, 2" X 6" X 18" ( 4 REQD ). NAIL TO A CAR DOOR POST/SIDE WALL OR TO A NAILING STRIP W/5-12d NAILS.

**STRUT ASSEMBLY HOLD DOWN**



**TYPICAL TYPE A**

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



**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.

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