

LONG KNEE BRACE, 4" x 4" x CUT TO FIT (8 REQD). SEE DETAIL ON PAGE 14. TOENAIL W/2-16d NAILS AT EACH END.

TOP-OF-LOAD ANTI-SWAY BRACE (8 REQD), SEE THE DETAIL ON PAGE 14. WIRE TIE EACH END TO A SKID STRAP W/NO. 14 GAGE WIRE.

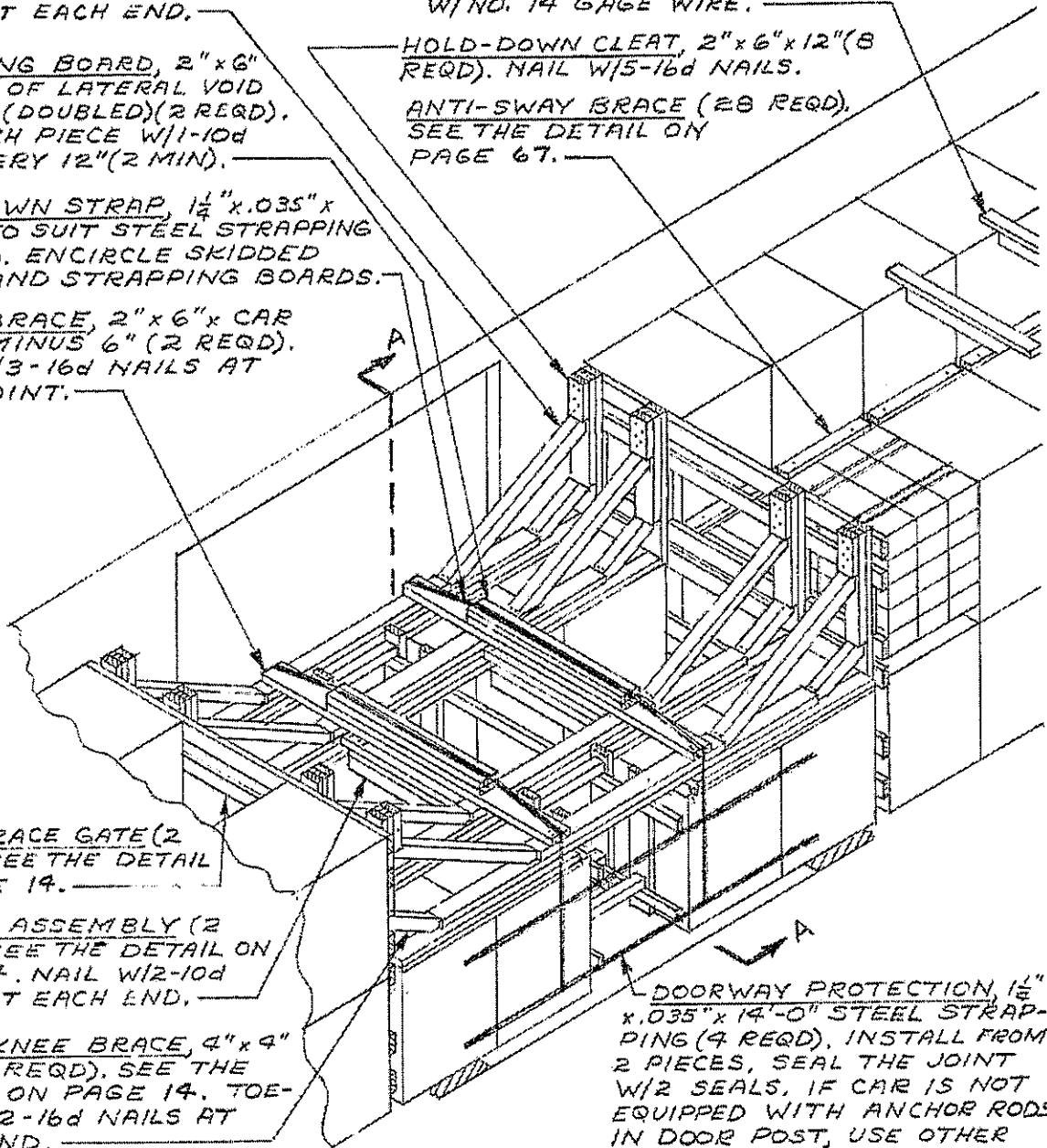
STRAPPING BOARD, 2" x 6" x WIDTH OF LATERAL VOID PLUS 16" (DOUBLED)(2 REQD). NAIL EACH PIECE W/1-10d NAIL EVERY 12"(2 MIN).

HOLD-DOWN CLEAT, 2" x 6" x 12"(8 REQD). NAIL W/5-16d NAILS.

ANTI-SWAY BRACE (28 REQD). SEE THE DETAIL ON PAGE 67.

HOLD-DOWN STRAP, 1 1/2" x .035" x LENGTH TO SUIT STEEL STRAPPING (2 REQD). ENCIRCLE SKIDDED UNITS AND STRAPPING BOARDS.

CROSS BRACE, 2" x 6" x CAR WIDTH MINUS 6" (2 REQD). NAIL W/3-16d NAILS AT EACH JOINT.



KNEE BRACE GATE (2 REQD). SEE THE DETAIL ON PAGE 14.

SPACER ASSEMBLY (2 REQD). SEE THE DETAIL ON PAGE 14. NAIL W/2-10d NAILS AT EACH END.

SHORT KNEE BRACE, 4" x 4" x 20" (8 REQD). SEE THE DETAIL ON PAGE 14. TOENAIL W/2-16d NAILS AT EACH END.

DOORWAY PROTECTION, 1 1/2" x .035" x 14'-0" STEEL STRAPPING (4 REQD). INSTALL FROM 2 PIECES, SEAL THE JOINT W/2 SEALS. IF CAR IS NOT EQUIPPED WITH ANCHOR RODS IN DOOR POST, USE OTHER METHODS DEPICTED ELSEWHERE HEREIN.

NOTE:
THE KNEE BRACES AS SHOWN ARE ADEQUATE FOR RETAINING NOT MORE THAN 20,000 LBS IN EACH END OF A CAR.

NOTE:
THE PRINCIPLES OF BLOCKING AND BRACING SHOWN ABOVE ARE ALSO APPLICABLE FOR PALLET UNITS OF BOXES.

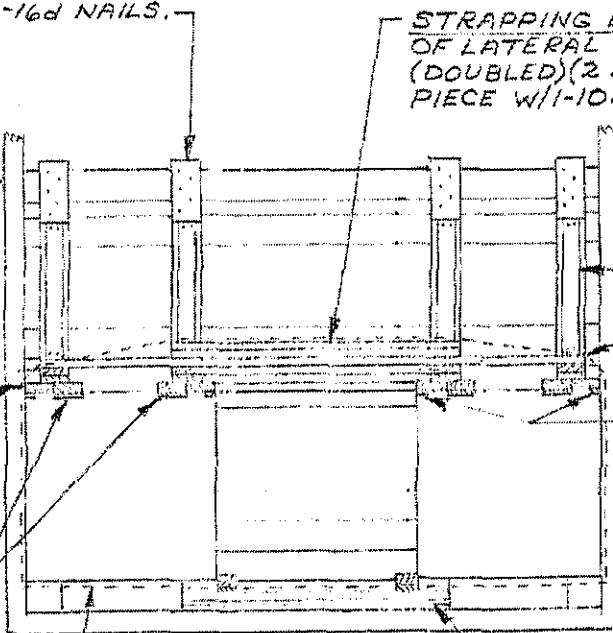
TYPICAL LCL LOAD OF SKIDDED UNITS IN A 9'-2" WIDE ALL-STEEL BOX CAR USING KNEE BRACE METHOD OF PARTIAL-LAYER BRACING

HOLD-DOWN CLEAT, 2" x 6" x 12"
(8 REQD). NAIL W/5-16d NAILS.

STRAPPING BOARD, 2" x 6" x WIDTH
OF LATERAL VOID PLUS 16"
(DOUBLED)(2 REQD). NAIL EACH
PIECE W/1-10d NAIL EVERY 12"

BEARING PIECE, 2" x 6"
x CUT TO FIT BE-
TWEEN CENTER GATE
AND KNEE BRACE
GATE MINUS 3" (16
REQD). POSITION 2
SIDE BY SIDE TO BE
CENTERED AGAINST
VERTICAL OF GATE.
TOENAIL W/1-12d
NAIL EACH.

FILLER PIECE, 1" x 6" x
LENGTH OF BEARING
PIECE (8 REQD). NAIL
W/1-6d NAIL EVERY
12". NOT REQD FOR
BOXES WITHOUT
TOP CLEATS.



LONG KNEE BRACE.

CROSS BRACE.

FILLER PIECE, 1" x 2" x
LENGTH OF BEARING
PIECE (8 REQD). NAIL
W/1-6d NAIL EVERY
12". NOT REQD FOR
BOXES WITHOUT
TOP CLEATS.

HOLD-DOWN STRAP.

SECTION A-A

ANTI-SWAY BRACE.

STRUT, 4" x 4" x CUT TO FIT (8
REQD). TOENAIL TO CENTER
GATE VERTICALS W/2-16d
NAILS AT EACH END.

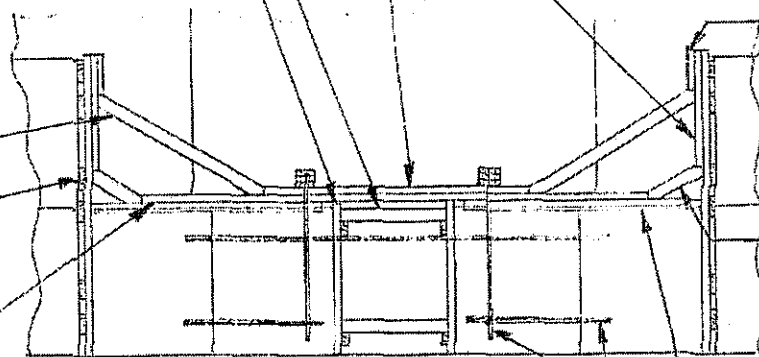
CENTER GATE (2 REQD). SEE
THE DETAIL ON PAGE 67.

BACK-UP CLEAT, 2" x 6" x CUT TO FIT
BETWEEN LONG KNEE BRACES (4 REQD).
NAIL W/1-10d NAIL EVERY 6".

HOLD-DOWN CLEAT, 2" x 6" x UNIT
HEIGHT MINUS 3" (8 REQD). NAIL TO
KNEE BRACE GATE W/12-10d
NAILS.

LONG KNEE
BRACE.

KNEE BRACE
GATE.



HOLD-DOWN
CLEAT, 2" x 6" x
12" (8 REQD).
NAIL W/5-16d
NAILS.

SHORT KNEE
BRACE.

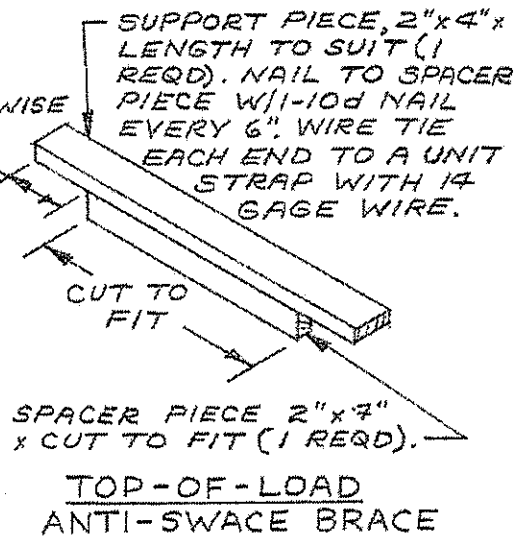
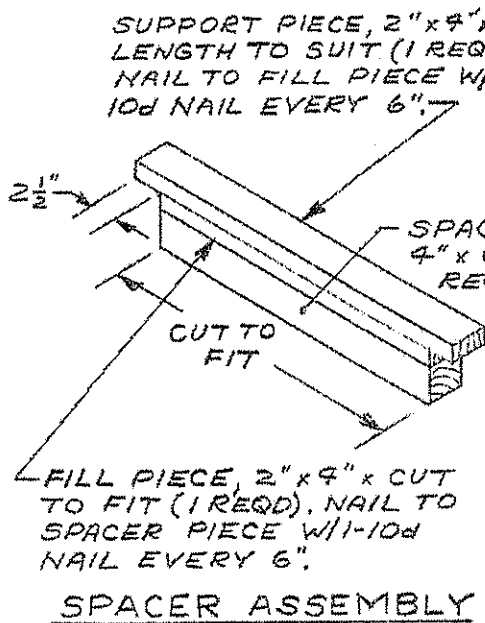
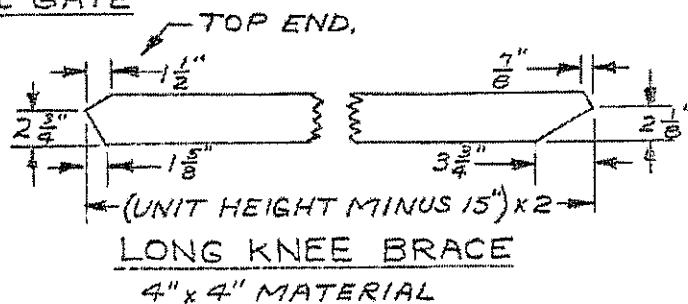
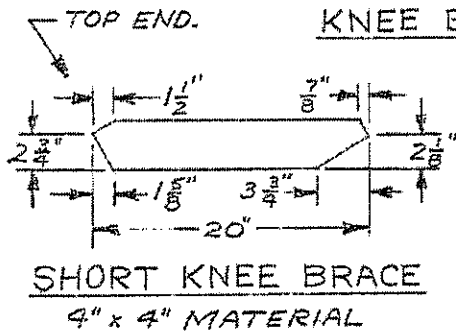
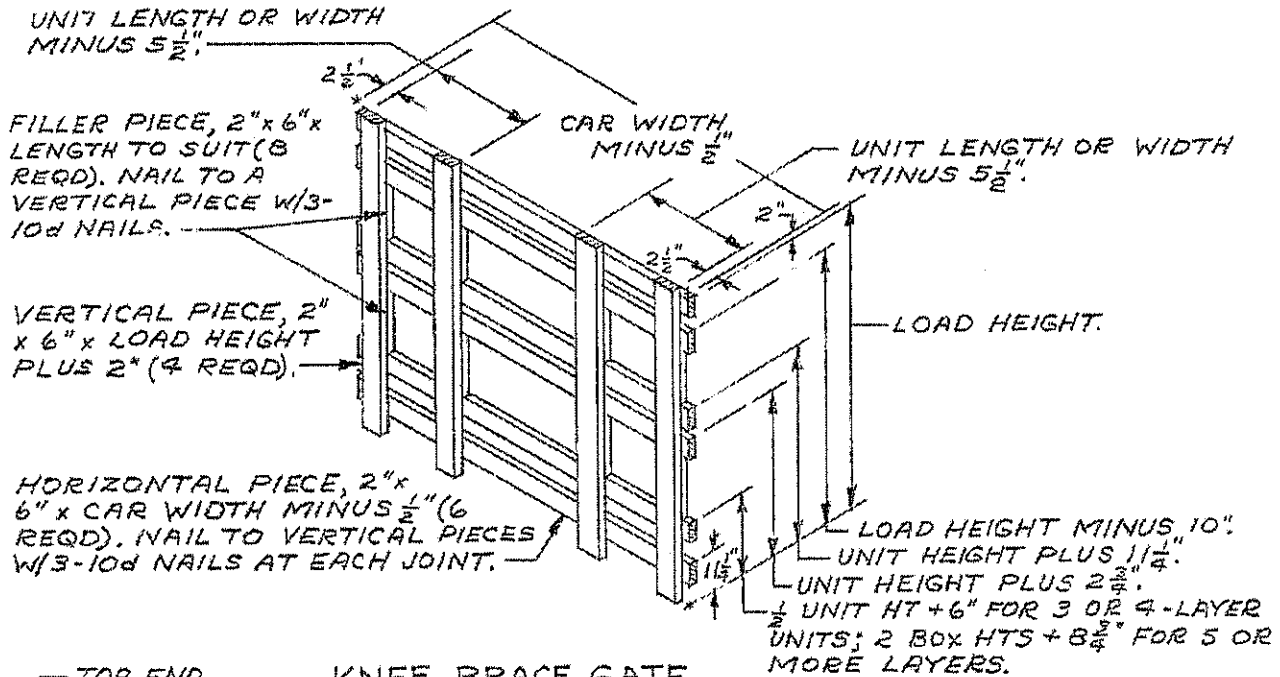
PARTIAL ELEVATION

FILLER PIECE, 1" x 2"
x LENGTH OF BEAR-
ING PIECE (8 REQD).
NAIL W/1-6d NAIL
EVERY 12".

BACK-UP CLEAT, 2" x 6" x CUT TO
FIT BETWEEN THE SHORT KNEE
BRACES (4 REQD). NAIL TO EACH
BEARING PIECE W/1-10d NAIL
EVERY 12".

DOORWAY PROTECTION
STRAP.

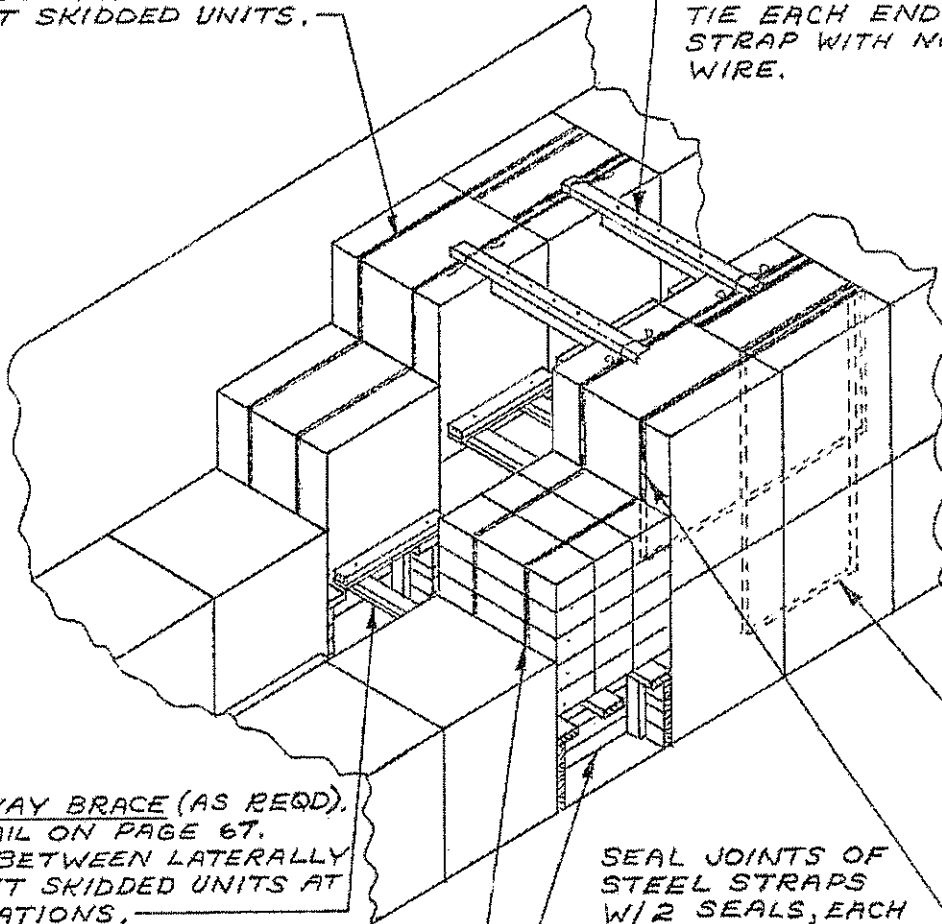
HOLD-DOWN STRAP.



INSTALL BETWEEN LATERALLY ADJACENT SKIDDED UNITS FOR APPROXIMATELY 12'-0" IN EACH END OF A CAR.

BUNDLING STRAP, $1\frac{1}{4}$ " x .035" x LENGTH TO SUIT STEEL STRAPPING (4 REQD). INSTALL TO ENCIRCLE TWO LONGITUDINALLY ADJACENT SKIDDED UNITS.

TOP-OF-LOAD ANTI-SWAY BRACE (AS REQD), SEE THE DETAIL ON PAGE 14. WIRE TIE EACH END TO SKID STRAP WITH NO. 14 GAGE WIRE.



ANTI-SWAY BRACE (AS REQD), SEE DETAIL ON PAGE 67. INSTALL BETWEEN LATERALLY ADJACENT SKIDDED UNITS AT ALL LOCATIONS.

REINFORCING STRAP, $1\frac{1}{2}$ " x .035" x LENGTH TO SUIT STEEL STRAPPING (4 REQD). INSTALL TO ENCIRCLE SKIDDED UNITS WHICH ARE ON RISERS. POSITION NEAR POSTS.

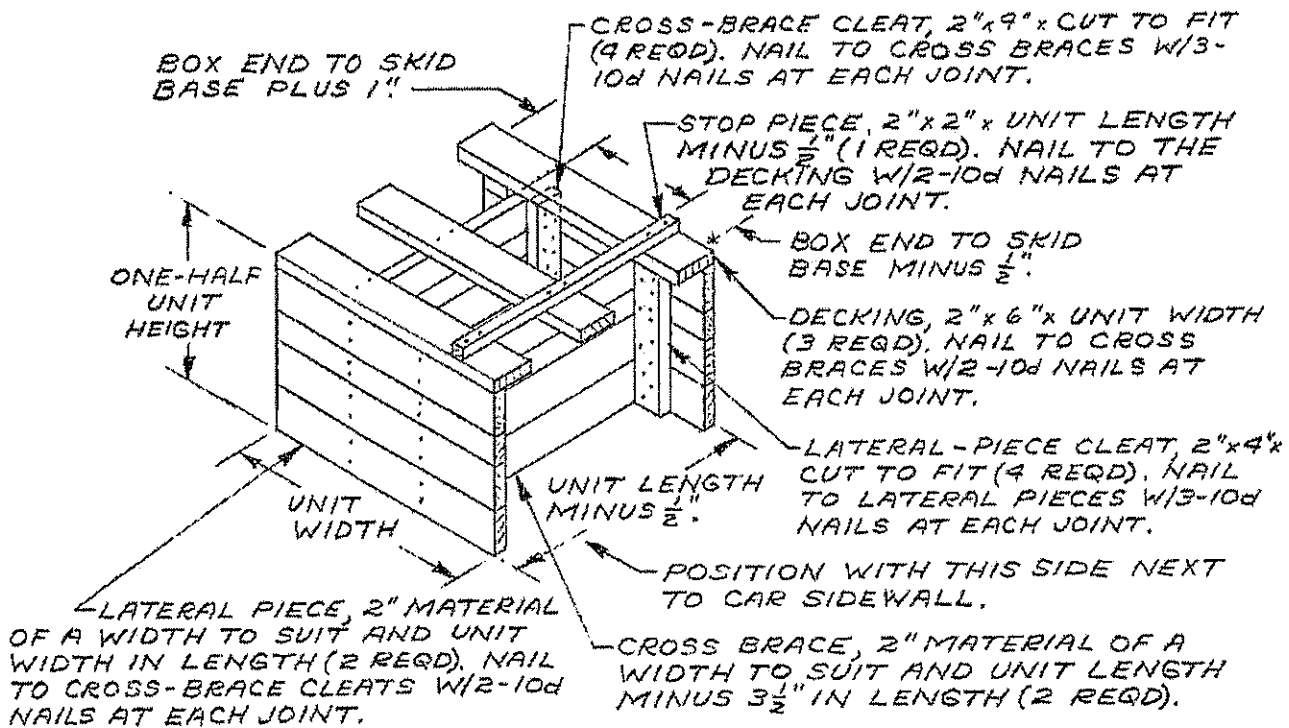
SEAL JOINTS OF STEEL STRAPS W/ 2 SEALS, EACH DOUBLE CRIMPED.

UNITIZING STRAP, $1\frac{1}{2}$ " x .035" x LENGTH TO SUIT STEEL STRAPPING (4 REQD). INSTALL TO ENCIRCLE THE SECOND STACK OF SKIDDED UNITS FROM THE RISERS.

RISER (2 REQD), SEE THE DETAILS ON PAGE 16.

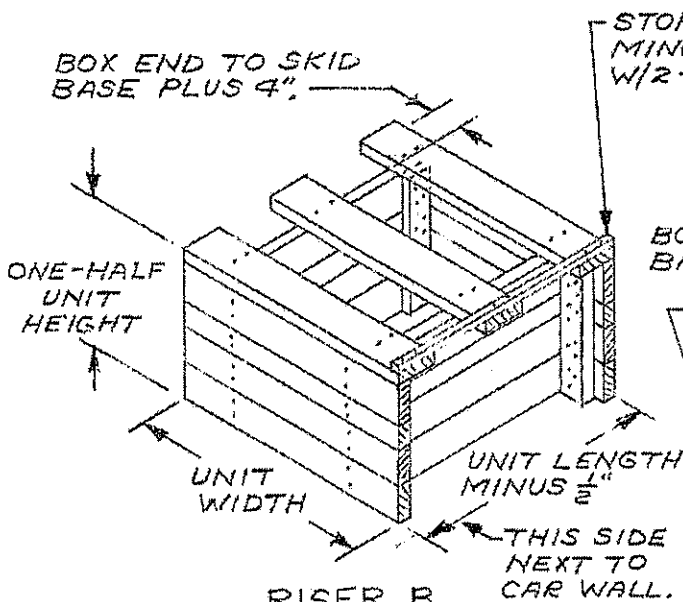
NOTE:
THE PRINCIPLES OF BLOCKING AND BRACING SHOWN ABOVE ARE ALSO APPLICABLE FOR PALLET UNITS OF BOXES. THE LADING WEIGHT RETAINED BY A RISER MUST NOT EXCEED 8,000 POUNDS.

TYPICAL LCL LOAD OF SKIDDED UNITS IN A 9'-2" WIDE ALL-STEEL BOX CAR USING RISER METHOD OF PARTIAL-LAYER BRACING



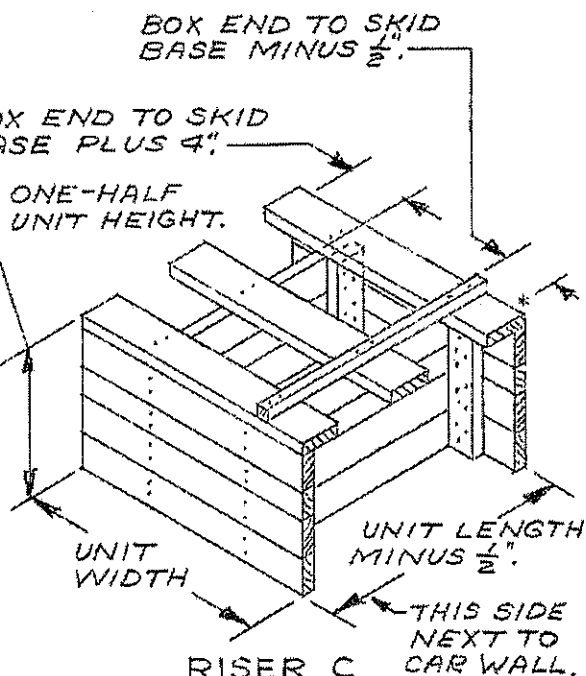
RISER A

FOR TYPE I AND TYPE IA SKID BASES WHEN BOXES ARE CROSSWISE IN CAR.



RISER B

FOR TYPE II SKID BASES WHEN BOXES HAVE TOP CLEATS AND ARE CROSSWISE IN CAR.



RISER C

FOR TYPE II SKID BASES WHEN BOXES DO NOT HAVE TOP CLEATS AND ARE CROSSWISE IN CAR.

NOTE:
FOR MATERIAL NOT SPECIFIED BY THE DETAILS FOR RISER B AND RISER C, REFER TO THE RISER A DETAIL ABOVE.

DECKING, 2" x 6" x UNIT LENGTH (2 REQD). NAIL TO CROSS BRACES W/2-10d NAILS AT EACH JOINT.

CROSS-BRACE CLEAT, 2" x 4" x CUT TO FIT (6 REQD). NAIL TO CROSS BRACES W/3-10d NAILS AT EACH JOINT.

BOX END TO SKID BASE PLUS 1"

STOP PIECE, 2" x 2" x CUT TO FIT (1 REQD). NAIL TO DECKING W/2-10d NAILS AT EACH JOINT.

ONE-HALF UNIT HEIGHT

CROSS BRACE, 2" MATERIAL OF A WIDTH TO SUIT AND UNIT WIDTH MINUS 3 1/2" IN LENGTH (3 REQD).

UNIT LENGTH

UNIT WIDTH MINUS 1/2"

LATERAL PIECE, 2" MATERIAL OF A WIDTH TO SUIT BY UNIT LENGTH (2 REQD). NAIL TO CROSS BRACE CLEATS W/2-10d NAILS AT EACH JOINT.

POSITION WITH THIS SIDE NEXT TO CAR SIDEWALL.

RISER D

FOR TYPE II SKID BASES WHEN BOXES ARE LENGTHWISE IN CAR.

DECKING, 2" x 6" x UNIT LENGTH (2 REQD). NAIL TO CROSS BRACES W/2-10d NAILS AT EACH JOINT.

CROSS-BRACE CLEAT, 2" x 4" x CUT TO FIT (6 REQD). NAIL TO CROSS BRACES W/3-10d NAILS AT EACH JOINT.

BOX END TO SKID BASE MINUS 1"

STOP PIECE, 2" x 4" x 12" (2 REQD). NAIL TO DECKING W/3-10d NAILS.

ONE-HALF UNIT HEIGHT

CROSS BRACE, 2" MATERIAL OF A WIDTH TO SUIT AND UNIT WIDTH MINUS 3 1/2" IN LENGTH (3 REQD).

UNIT LENGTH

UNIT WIDTH MINUS 1/2"

LATERAL PIECE, 2" MATERIAL OF A WIDTH TO SUIT BY UNIT LENGTH (2 REQD). NAIL TO CROSS BRACE CLEATS W/2-10d NAILS AT EACH JOINT.

POSITION WITH THIS SIDE NEXT TO CAR SIDEWALL.

RISER E

FOR TYPE I AND TYPE IA SKID BASES WHEN BOXES ARE LENGTHWISE IN CAR.

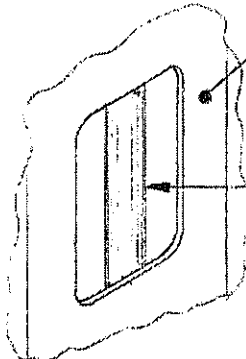
BULKHEAD STRAP, 2" x .050" x LENGTH TO SUIT STEEL STRAPPING (3 REQD), INSTALL FROM TWO (2) PIECES AS SHOWN BY THE "STRAP APPLICATION" VIEW BELOW.

BUNDLING STRAP, 1 1/2" x .035" x LENGTH TO SUIT STEEL STRAPPING (2 REQD), INSTALL SO AS TO ENCIRCLE SKIDDED UNIT AND TO EXTEND BEHIND GATE HORIZONTAL PIECES.

BULKHEAD GATE (1 REQD). SEE THE "BULKHEAD GATE A" DETAIL ON PAGE 19.

STRAP RETAINER, 2" x 4" x LENGTH TO SUIT (2 REQD). NAIL TO BULKHEAD GATE W/ 2-12d NAILS ABOVE AND 2-12d NAILS BELOW EACH BULKHEAD STRAP.

CAR SIDEWALL (INSIDE).



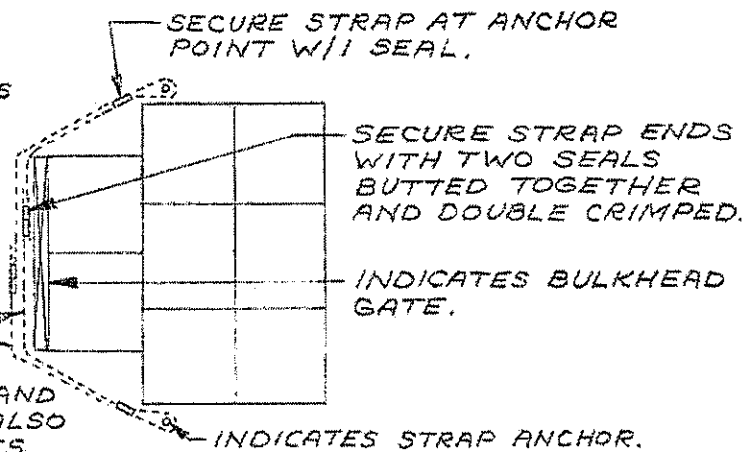
TYPICAL STRAP ANCHOR

7/8" DIAMETER ROUND STOCK WELDED TO CAR SIDEWALL.

NOTE:
A BULKHEAD GATE WITH TWO (2) BULKHEAD STRAPS WILL RETAIN 12,000 POUNDS. A GATE WITH THREE (3) STRAPS WILL RETAIN 18,000 POUNDS.

EACH BULKHEAD STRAP CONSISTS OF TWO PIECES. EACH PIECE IS INSTALLED SO THAT ONE END EXTENDS APPROXIMATELY 48" BEYOND OTHER END SO THAT THE SEALS FOR ONE PAIR OF STRAP ENDS WILL NOT BE APPLIED ON TOP OF THE SEALS FOR THE OTHER PAIR OF STRAP ENDS.

NOTE:
THE PRINCIPLES OF BLOCKING AND BRACING SHOWN ABOVE ARE ALSO APPLICABLE FOR PALLET UNITS OF BOXES.



STRAP APPLICATION

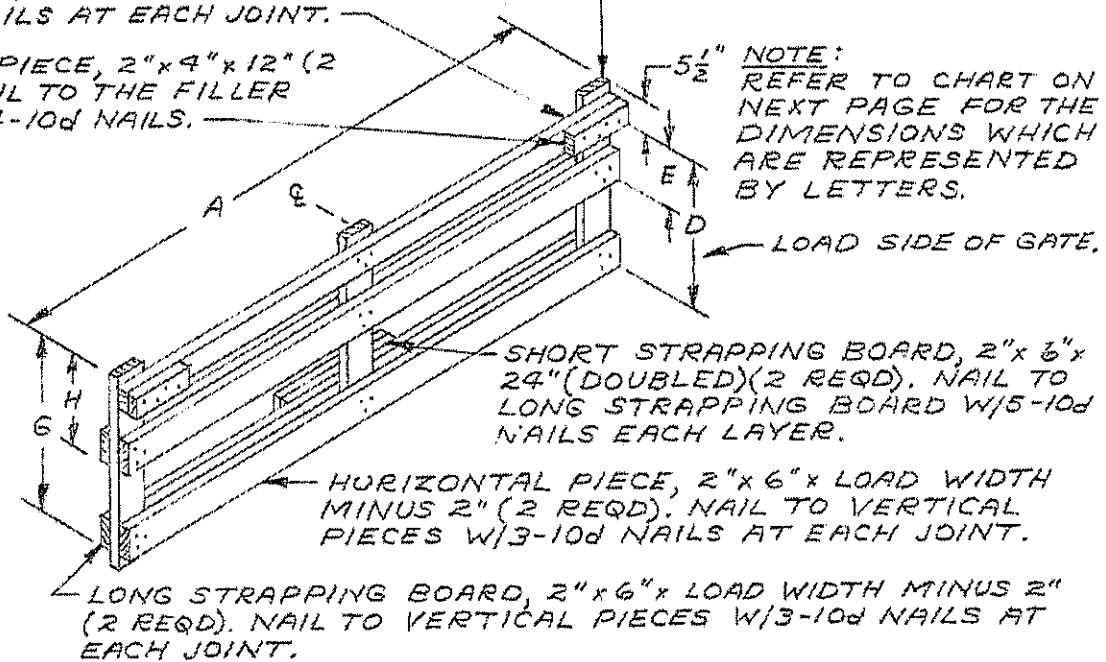
TYPICAL LCL LOAD OF SKIDDED UNITS IN A 9'-6" WIDE ALL-STEEL ANCHOR-EQUIPPED BOX CAR USING BULKHEAD GATE METHOD OF PARTIAL-LAYER BRACING

FILLER PIECE, 2"x4"x LOAD WIDTH MINUS 2" (1 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

SUPPORT PIECE, 2"x4"x 12" (2 REQD). NAIL TO THE FILLER PIECE W/4-10d NAILS.

VERTICAL PIECE, 2"x6"x UNIT HEIGHT PLUS 1 1/2" (3 REQD).

NOTE:
REFER TO CHART ON NEXT PAGE FOR THE DIMENSIONS WHICH ARE REPRESENTED BY LETTERS.

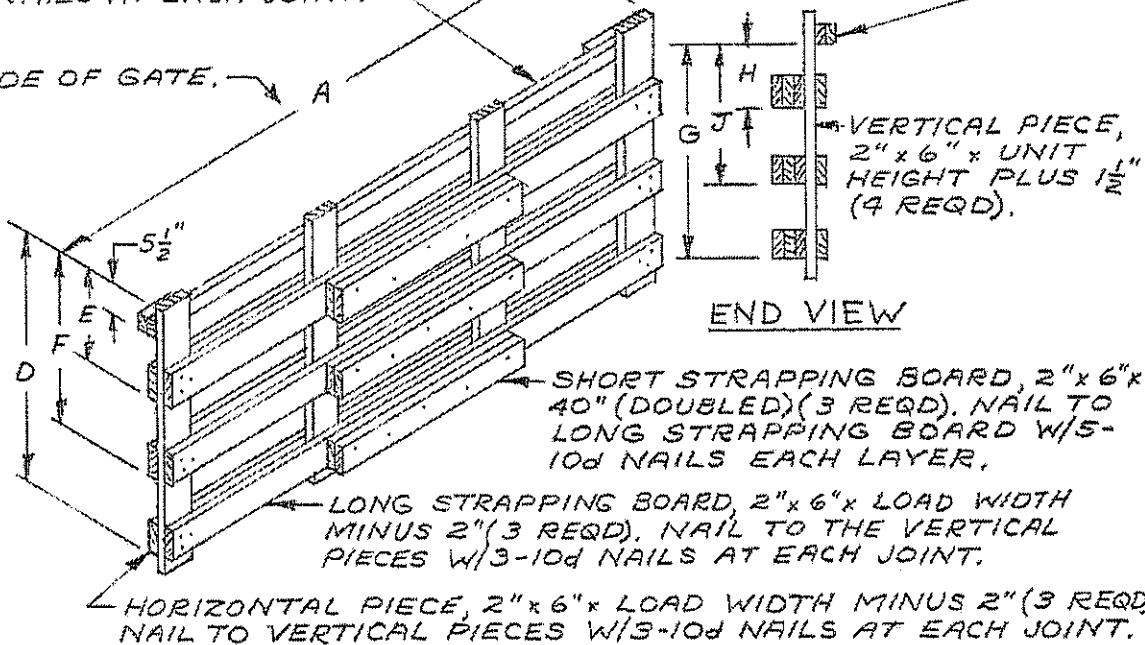


BULKHEAD GATE A
FOR 2-WIDE LOADS W/O A CENTER VOID.

FILLER PIECE, 2"x4"x LOAD WIDTH MINUS 2" (1 REQD). NAIL TO VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

SUPPORT PIECE, 2"x4"x 12" (2 REQD). NAIL TO FILLER PIECE W/4-10d NAILS.

LOAD SIDE OF GATE.

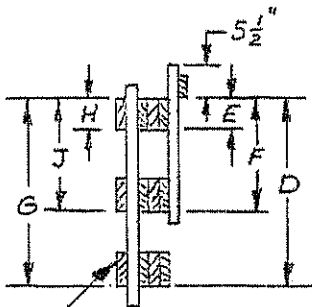


BULKHEAD GATE B
FOR 3-WIDE LOADS HAVING LITTLE OR NO LATERAL VOID.

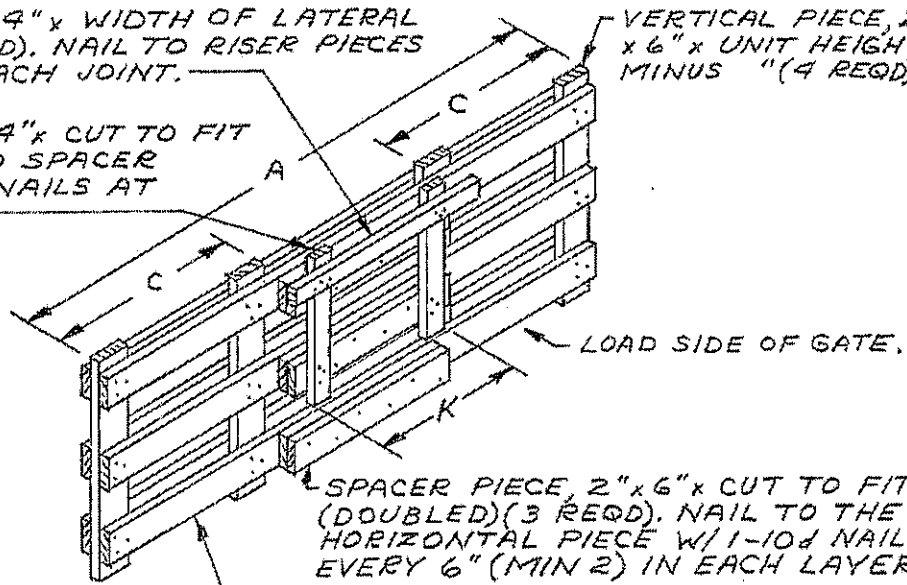
SUPPORT PIECE, 2"x4" x WIDTH OF LATERAL VOID PLUS 12" (1 REQD). NAIL TO RISER PIECES W/3-10d NAILS AT EACH JOINT.

RISER PIECE, 2"x4" x CUT TO FIT (2 REQD), NAIL TO SPACER PIECES W/3-10d NAILS AT EACH JOINT.

VERTICAL PIECE, 2" x 6" x UNIT HEIGHT MINUS 6" (4 REQD).



END VIEW



SPACER PIECE, 2"x6" x CUT TO FIT (DOUBLED) (3 REQD). NAIL TO THE HORIZONTAL PIECE W/1-10d NAIL EVERY 6" (MIN 2) IN EACH LAYER.

HORIZONTAL PIECE, 2"x6" x LOAD WIDTH MINUS 2" (3 REQD), NAIL TO VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

STRAPPING BOARD, 2"x6" x LOAD WIDTH MINUS 2" (3 REQD). NAIL TO VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

BULKHEAD GATE C

FOR 2-WIDE LOADS AGAINST WALL WITH THE CENTER AREA VOID.

BULKHEAD GATE CHART

LOCATION	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. NOT REQUIRED FOR UNITS 1 BOX HIGH.
G	DIMENSION "D" PLUS 2" OR MINUS 4".
H	DIMENSION "E" PLUS 4" OR MINUS 2".
J	DIMENSION "F" PLUS OR MINUS 4".
K	WIDTH OF LATERAL VOID MINUS 4".