APPROVED BY
HAZARDOUS MATERIALS SYSTEMS
(BOE) ASSOCIATION OF AMERICAN
RAILROADS
DATE 2/21/89

LOADING AND BRACING (CL & LCL) IN BOX CARS ⌖ OF PALLETIZED BINARY CHEMICAL PROJECTILE, 155 MM, GB2, M687, UPLOADED WITH M21 (OPA) CANISTER

INDEX

⌖ INCLUDES PROCEDURES FOR CONVENTIONAL TYPE BOX CARS AND CUSHIONED BOX CARS EQUIPPED WITH LOAD-DIVIDERS.

DO NOT SCALE

REVISIONS	DRAFTSMAN pt	PROJ ENG MWD/WRF
	CHECKER GRG	LOG ENGRG OFFICE

APPROVED, U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND

APPROVED BY ORDER OF COMMANDING GENERAL, U.S. ARMY MATERIEL COMMAND (AMC)
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL

U.S. ARMY AMC DRAWING
MARCH 1989

CLASS	DIVISION	DRAWING	FILE
19	48	4560	CB 5PE1

PROJECT CB 40-77

GENERAL NOTES

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

B. THE OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE FOR THE 155MM, GB2, M687 BINARY CHEMICAL PROJECTILE UPLOADED WITH THE M21 (OPA) CANISTER, PALLETIZED EIGHT PER PALLET. SEE THE PICTORIAL VIEW ON PAGE 3 FOR SIZE AND WEIGHT.

C. THE OUTLOADING PROCEDURES SPECIFIED HEREIN ARE BASED ON 50'-6" LONG AND 60'-8" LONG BY 9'-2" WIDE (INSIDE DIMENSION) BOX CARS WITH WOOD LINED SIDEWALLS AND 10'-0" WIDE THRU DOOR OPENINGS. WIDER CARS AND CARS WITH THRU DOOR OPENINGS LESS THAN 10'-0" WIDE MAY BE USED. CARS WITH DOUBLE DOOR OPENINGS CANNOT BE USED. DOORS MAY BE OF THE CONVENTIONAL SLIDING TYPE OR PLUG TYPE. IF THE CAR HAS PLUG TYPE DOORS AND THE LENGTH OF THE LOAD REQUIRES USE OF DOORWAY PROTECTION, THE CAR MUST HAVE NAILABLE WALLS AND A MINIMUM INSIDE WIDTH OF 9'-3" TO PERMIT INSTALLATION OF THE DOORWAY PROTECTION AS DETAILED ON PAGE 26. SEE GENERAL NOTE "M" FOR ADDITIONAL GUIDANCE.

D. ALL METAL CARS SHOULD NOT BE USED, HOWEVER, IF CARS WITH WOOD LINED SIDEWALLS ARE NOT AVAILABLE, AN ALL METAL CAR MAY BE USED BY LINING THE SIDEWALLS WITH PLYWOOD AND ASSURING A MINIMUM INSIDE DIMENSION OF 9'-2" TO ACCOMMODATE A FULL LOAD. SEE THE "SIDEWALL LINING" DETAIL ON PAGE 24.

E. THE PROCEDURES DEPICTED ON PAGES 4 THRU 9 ARE FOR SHIPMENTS IN CONVENTIONAL BOX CARS, WHEREAS, THE PROCEDURES SHOWN ON PAGES 10 AND 11 APPLY TO SHIPMENTS IN CUSHIONED BOX CARS EQUIPPED WITH LOAD-DIVIDER BULKHEADS, HOWEVER, ONLY THOSE LOAD-DIVIDER EQUIPPED CARS WHICH SATISFY THE SPECIFICATIONS CONTAINED ON PAGE 11 CAN BE USED. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTIONS WHICH ARE IMMEDIATELY ADJACENT TO THE DEPICTED OUTLOADING METHOD.

F. IF THE CAR IS EQUIPPED WITH PLUG TYPE DOORS, AFTER THE DOORS 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 THROUGH THE HOLES IN THE DOOR LATCH ASSEMBLY ONE OR MORE TIMES, AND THE WIRE ENDS WILL BE TWISTED TOGETHER.

G. 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 FOR FULL OR PARTIAL CARLOADS MUST BE FOLLOWED AS CLOSELY AS POSSIBLE FOR BLOCKING, BRACING AND STAYING OF THE DESIGNATED ITEMS.

H. OTHER TYPES OF LADING ITEMS MAY BE LOADED INTO BOX CARS WHICH ARE PARTIALLY LOADED WITH THE DESIGNATED ITEMS, PROVIDING THE TOTAL LOAD IS COMPATIBLE, EXISTING DIRECTIVES ARE NOT VIOLATED, AND THE OTHER LADING ITEMS ARE BLOCKED, AND BRACED TO EQUAL THE BLOCKING AND BRACING CRITERIA SPECIFIED HEREIN.

J. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-1/2" THICK BY 3-1/2" WIDE AND 1" X 6" MATERIAL IS ACTUALLY 3/4" THICK BY 5-1/2" WIDE.

K. NOTICE: A STAGGERED NAILING PATTERN WILL BE USED WHEREVER POSSIBLE WHEN NAILS ARE DRIVEN INTO JOINTS OF DUNNAGE ASSEMBLIES. ALSO, A STAGGERED NAILING PATTERN WILL BE USED WHEN DUNNAGE IS NAILED TO THE FLOOR OF THE TRANSPORTING VEHICLE, OR WHEN LAMINATING DUNNAGE. 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. SEE GENERAL NOTE "N" AT RIGHT. ALSO SEE GENERAL NOTE "P" AT RIGHT.

L. THE SELECTION OF RAILCARS FOR TRANSPORT OF THE DESIGNATED ITEMS WILL BE IN ACCORDANCE WITH HAZARDOUS MATERIALS REGULATIONS OF DOT AND AR 55-355, CHAPTER 29, FOR EXPLOSIVES OR OTHER DANGEROUS ARTICLES, IN FULL. 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. SEE THE "END-OF-CAR BULKHEAD" DETAIL AND SPECIAL NOTES ON PAGE 24.

M. DOORWAY PROTECTION IS REQUIRED WHEN ANY UNIT EXTENDS MORE THAN 4" INTO THE DOORWAY AREA. IT SHOULD BE NOTED THAT FOR THE LOADS DEPICTED ON PAGES 4, 8, AND 10, DOORWAY PROTECTION MAY NOT BE REQUIRED IF THE 50'-6" LONG CAR HAS THRU DOOR OPENINGS A MAXIMUM OF 8'-0" WIDE, DOES NOT HAVE A BOWED END-WALL, AND THE LADING IS LONGITUDINALLY TIGHT IN BOTH ENDS OF THE CAR.

(CONTINUED AT RIGHT)

(GENERAL NOTES CONTINUED)

N. POWER DRIVEN STAPLES MAY BE USED AS ALTERNATIVE FASTENERS FOR NAILS WHEN CONSTRUCTING DUNNAGE ASSEMBLIES WHICH ARE TO BE USED IN THE DELINEATED LOADS SHOWN THROUGHOUT THIS DRAWING. THE STAPLES TO BE USED MUST BE EQUAL IN LENGTH TO THE SPECIFIED NAIL SIZE AND MUST BE SUBSTITUTED ON A ONE STAPLE FOR ONE NAIL BASIS. STAPLES WHICH ARE 2-1/2" OR LESS IN LENGTH SHOULD BE IN ACCORDANCE WITH FEDERAL SPECIFICATION FF-N-105 AS NEARLY AS PRACTICABLE. STAPLES WHICH ARE LONGER THAN 2-1/2" WILL BE A COMMERCIAL GRADE, OF A QUALITY EQUIVALENT TO THOSE MANUFACTURED BY SENCO PRODUCTS INCORPORATED. NOTE: STAPLES WILL NOT BE SUBSTITUTED FOR NAILS IN ANY LOAD RESTRAINING FLOOR DUNNAGE APPLICATION.

O. 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 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 LOADS AND DETAILS ON PAGES 20 THRU 23.

P. PORTIONS OF THE CARS, SUCH AS SIDEWALLS, END WALLS, AND ROOFS, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.

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

MATERIAL SPECIFICATIONS

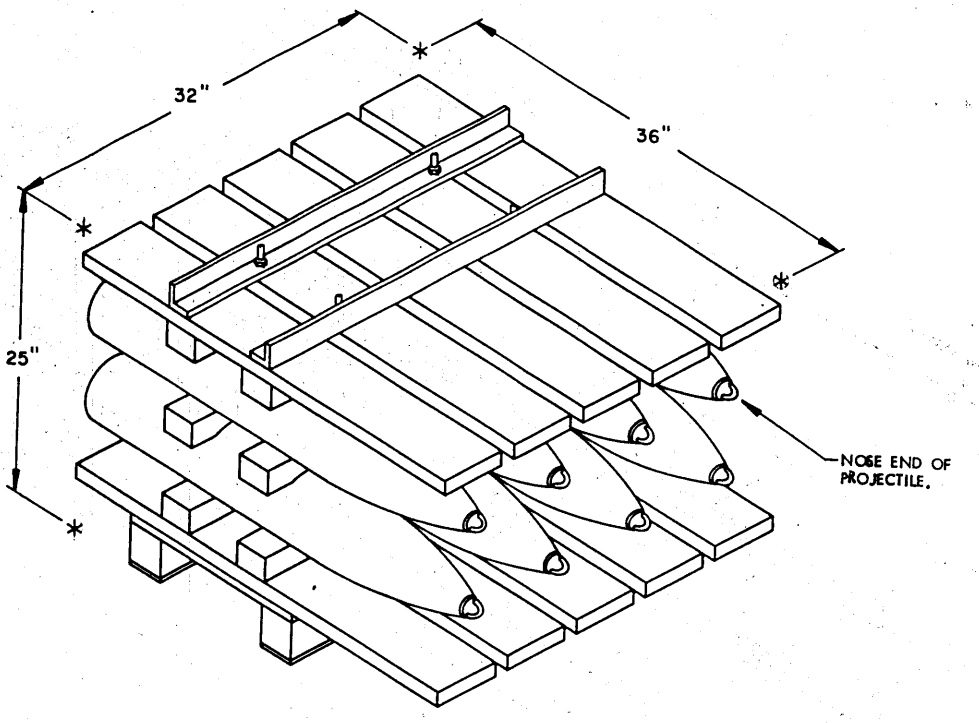
LUMBER ----------: SEE TM 743-200-1, DUNNAGE LUMBER; FED SPEC MM-L-751.

NAILS ----------: FED SPEC FF-N-105, COMMON.

STRAPPING, STEEL ----: CLASS 1, TYPE I, OR IV, HEAVY DUTY, FINISH A, B, (GRADE 2), OR C; FED SPEC QQ-S-781.

STRAP SEALS ---------: TYPE D, STYLE I, II, OR IV, CLASS H, FINISH A, B (GRADE 2), OR C; FED SPEC QQ-S-781.

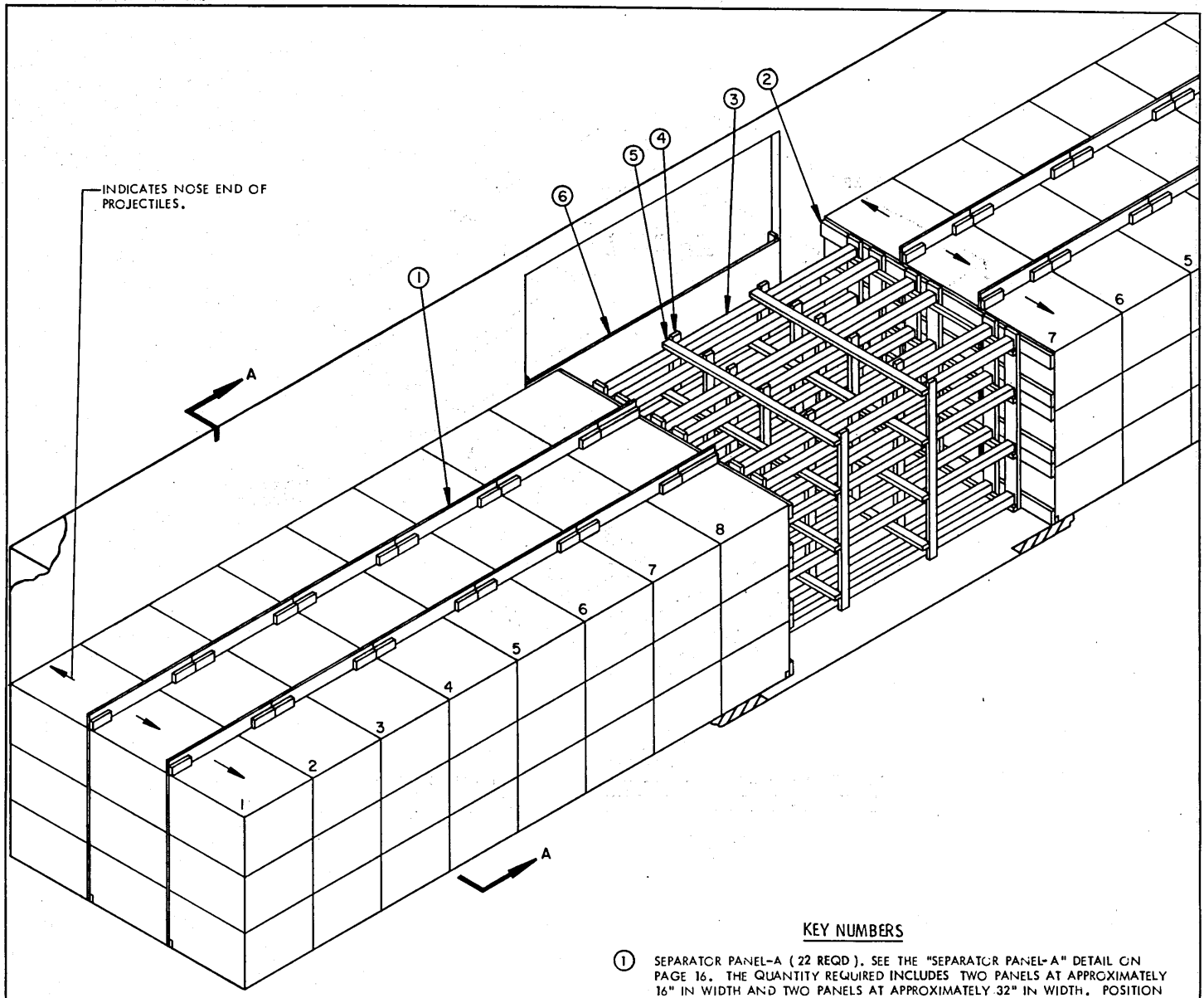
PLYWOOD ----------: GROUP B OR C, GRADE C-D (EXTERIOR). FED SPEC NN-P-530. IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER EXTERIOR GRADE MAY BE SUBSTITUTED.



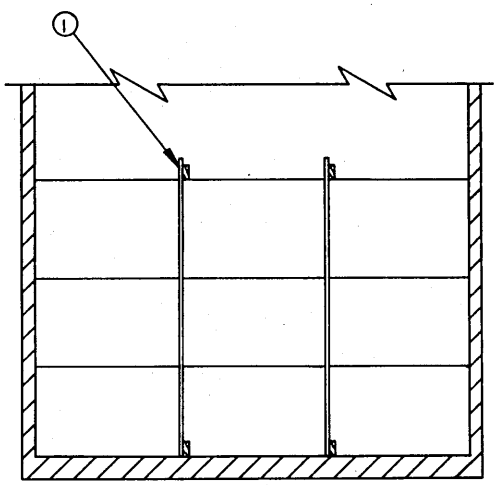
PALLET UNIT

PROJECTILE W/OPA CANISTER ---------- 8 EACH @ 83 LBS (APPROX)
CUBE ---------- 16.7 CUBIC FEET (APPROX)
GROSS WEIGHT ---------- 784 LBS (APPROX).

(STACKING HEIGHT 23")



ISOMETRIC VIEW



SECTION A-A

KEY NUMBERS

(1) SEPARATOR PANEL-A (22 REQD). SEE THE "SEPARATOR PANEL-A" DETAIL ON PAGE 16. THE QUANTITY REQUIRED INCLUDES TWO PANELS AT APPROXIMATELY 16" IN WIDTH AND TWO PANELS AT APPROXIMATELY 32" IN WIDTH. POSITION LENGTHWISE IN THE CAR BETWEEN ROWS OF PALLET UNITS AS SHOWN. SEE SPECIAL NOTE 8 ON PAGE 5 FOR WIDER CAR REQUIREMENTS.

(2) CENTER GATE (2 REQD, 1 RIGHT HAND, 1 LEFT HAND). SEE THE "CENTER GATE-A" DETAIL ON PAGE 16.

(3) STRUT , 4" X 4" BY CUT TO FIT (REF: 10'-0") (24 REQD). TOENAIL TO PIECES MARKED (2) W/2-16d NAILS AT EACH END.

(4) VERTICAL STRUT BRACING, 2" X 4" X 72" (12 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.

(5) HORIZONTAL STRUT BRACING, 2" X 4" X 7'-0" (8 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.

(6) DOORWAY PROTECTION (2 REQD). SEE THE "DOORWAY PROTECTION" DETAIL ON PAGE 17. NAIL TO THE DOOR POSTS W/12d NAILS. SEE GENERAL NOTE "M" ON PAGE 2 AND SPECIAL NOTE 10 ON PAGE 5.

SPECIAL NOTES:

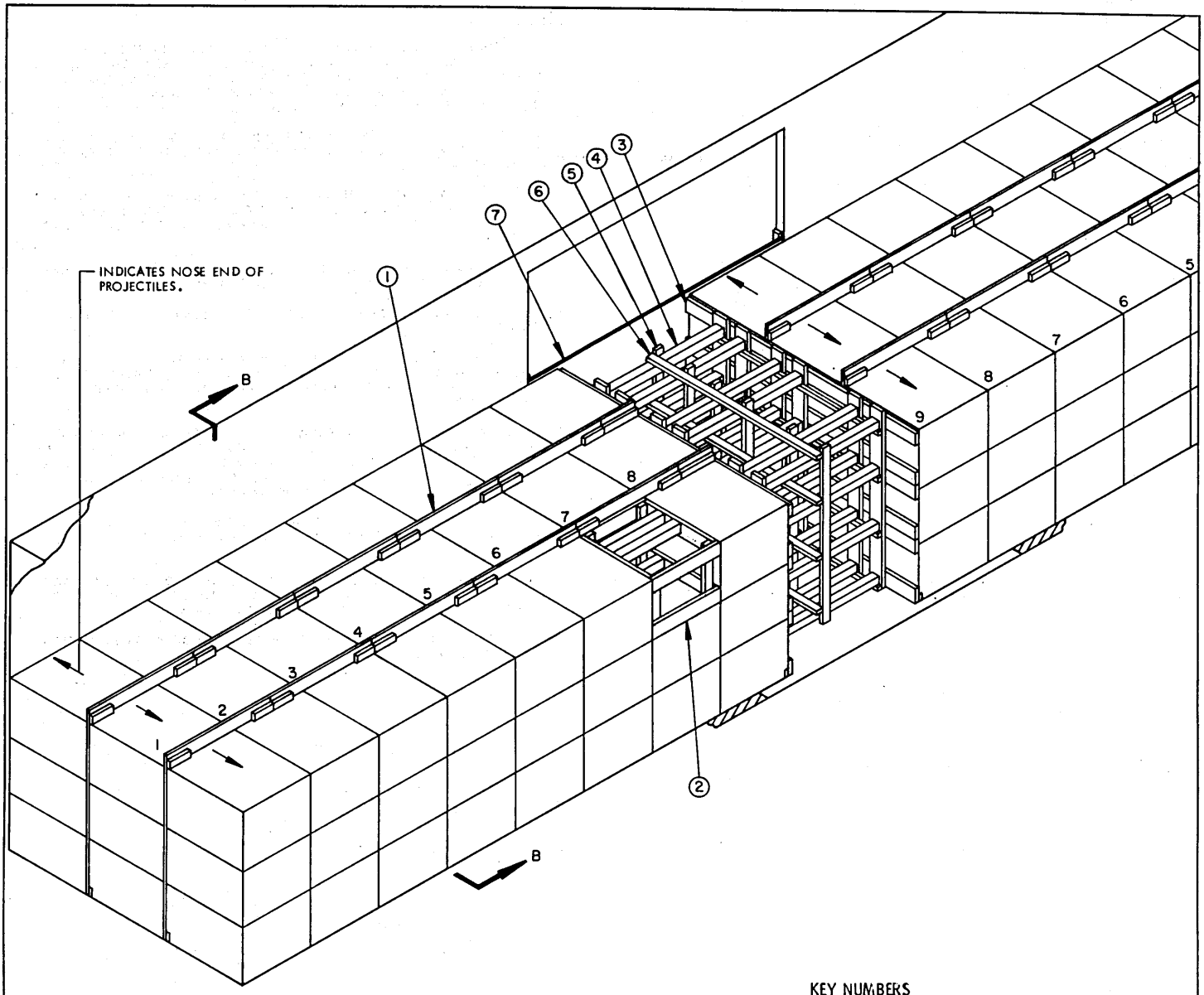
1. A 135-UNIT 3-LAYER LOAD IS SHOWN IN A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR HAVING A 10'-0" WIDE THROUGH DOOR OPENING WITH CONVENTIONAL SLIDING DOOR AND WOOD LINED SIDE WALLS. WIDER AND/OR LONGER CARS CAN BE USED. CARS WITH DOOR OPENINGS LESS THAN 10'-0" WIDE CAN BE USED. CARS WITH DOUBLE DOORS CANNOT BE USED.
2. THE 15 STACKS SHOWN CAN BE LOADED USING A STANDARD FRONT-LOADER FORKLIFT TRUCK. THE LOAD LIMIT OF THE CAR MUST BE NOT LESS THAN 116,000 POUNDS.
3. IF A FRONT/SIDE LOADER FORKLIFT TRUCK IS AVAILABLE FOR USE, UP TO 17 STACKS CAN BE LOADED IN A 50'-6" LONG CAR. A 16 STACK 3-LAYER LOAD REQUIRES A CAR WITH A LOAD LIMIT THE SAME AS FOR A 15 STACK LOAD AS STATED ABOVE.
4. FOR A 17 STACK 3-LAYER LOAD, SEE PAGES 6 AND 7 WHICH REQUIRES A CAR WITH A LOAD LIMIT OF NOT LESS THAN 129,000 POUNDS.
5. FOR A 4-LAYER LOAD, SEE THE PROCEDURES AND SPECIAL NOTES ON PAGES 8 AND 9.
6. IF LESS THAN A FULL LOAD QUANTITY IS TO BE SHIPPED, ONE OR MORE UNITS MAY BE OMITTED FROM THE TOP LAYER BY SUBSTITUTING A "FILLER ASSEMBLY" FOR EACH OMITTED UNIT AS DEPICTED ON PAGE 6 AND AS SPECIFIED IN SPECIAL NOTE 4 ON PAGE 7.
7. A 153-UNIT LOAD CAN BE SHIPPED USING THESE PROCEDURES AND ADDING A PARTIAL FOURTH LAYER CONSISTING OF 9 UNITS ADDED IN EACH END OF THE CAR USING THE "K-BRACE" METHOD OF PARTIAL LAYER BRACING AS SPECIFIED ON PAGES 18 AND 19. HOWEVER, THE CAR MUST HAVE NAILABLE WALLS AND A LOAD LIMIT OF NOT LESS THAN 129,000 POUNDS.
8. IF THE CAR TO BE LOADED IS 9'-4" WIDE OR WIDER, SEPARATOR PANEL-B, AS DETAILED ON PAGE 24, MUST BE USED IN LIEU OF SEPARATOR PANEL-A, PIECE MARKED ① .
9. CENTER GATE-C, AS DETAILED ON PAGE 25, WILL BE USED IN THE DOORWAY AREA FOR A 2-LAYER LOAD OR FOR A 2-LAYER LOAD WITH A PARTIAL THIRD LAYER USING THE K-BRACE METHOD SPECIFIED ON PAGE 18.
10. IF THE CAR HAS PLUG-TYPE DOORS, SEE PAGE 26 FOR DOORWAY PROTECTION REQUIREMENTS AND DETAILS.

BILL OF MATERIAL

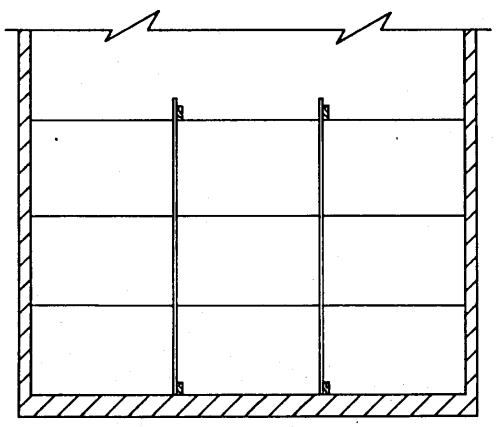
LUMBER	LINEAR FEET	BOARD FEET
2" X 2"	56	19
2" X 3"	28	14
2" X 4"	272	182
2" X 6"	182	182
4" X 4"	240	320
NAILS	**NO. REQD**	**POUNDS**
6d (2")	332	2
10d (3")	612	9-1/2
12d (3-1/4")	28	1/2
16d (3-1/2")	104	2-1/4
PLYWOOD, 1/2"----------627 SQ FT REQD----------862 LBS		

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNITS	135	105,840 LBS
DUNNAGE		2,310 LBS
TOTAL WEIGHT		108,150 LBS (APPROX)



ISOMETRIC VIEW



SECTION B-B

KEY NUMBERS

(1) SEPARATOR PANEL-A (24 REQD). SEE THE "SEPARATOR PANEL-A" DETAIL ON PAGE 16. THE QUANTITY REQUIRED INCLUDES TWO PANELS AT APPROXIMATELY 16" IN WIDTH. POSITION LENGTHWISE IN THE CAR BETWEEN ROWS OF PALLET UNITS AS SHOWN. SEE SPECIAL NOTE 8 ON PAGE 5 FOR WIDER CAR REQUIREMENTS.

(2) FILLER ASSEMBLY (1 REQD). SEE THE "FILLER ASSEMBLY" DETAIL ON PAGE 17 AND SPECIAL NOTE 4 ON PAGE 7.

(3) CENTER GATE (2 REQD, 1 LEFT HAND, 1 RIGHT HAND). SEE THE "CENTER GATE-A" DETAIL ON PAGE 16.

(4) STRUT, 4" X 4" BY CUT TO FIT (REF: 56") (24 REQD). TOENAIL TO PIECES MARKED (3) W/2-16d NAILS AT EACH END.

(5) VERTICAL STRUT BRACING, 2" X 4" X 72" (6 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.

(6) HORIZONTAL STRUT BRACING, 2" X 4" X 7'-0" (4 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.

(7) DOORWAY PROTECTION (2 REQD). SEE THE "DOORWAY PROTECTION" DETAIL ON PAGE 17. NAIL TO THE DOOR POSTS W/12d NAILS. SEE GENERAL NOTE "M" ON PAGE 2 AND SPECIAL NOTE 5 ON PAGE 7.

SPECIAL NOTES:

1. A 152-UNIT 3-LAYER LOAD IS SHOWN IN A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR HAVING 10'-0" WIDE THROUGH DOOR OPENINGS WITH CONVENTIONAL SLIDING DOORS AND WOOD LINED SIDE-WALLS. WIDER AND/OR LONGER CARS CAN BE USED. CARS WITH DOOR OPENINGS LESS THAN 10'-0" WIDE CAN BE USED, HOWEVER, CARS WITH DOUBLE DOORS CANNOT BE USED.

2. FOR THE LOAD AS SHOWN, THE LOAD LIMIT OF THE CAR TO BE USED MUST BE NOT LESS THAN 128,000 POUNDS.

3. LOADING OPERATIONS WILL REQUIRE USE OF A FRONT/SIDE LOADER FORKLIFT TRUCK FOR PLACEMENT OF TWO OF THE STACKS IN THE DOORWAY AREA OF A 50'-6" LONG CAR. ONLY 15 STACKS CAN BE PLACED WITH A CONVENTIONAL FRONT LOADER FORKLIFT. SEE THE LOAD ON PAGES 4 AND 5.

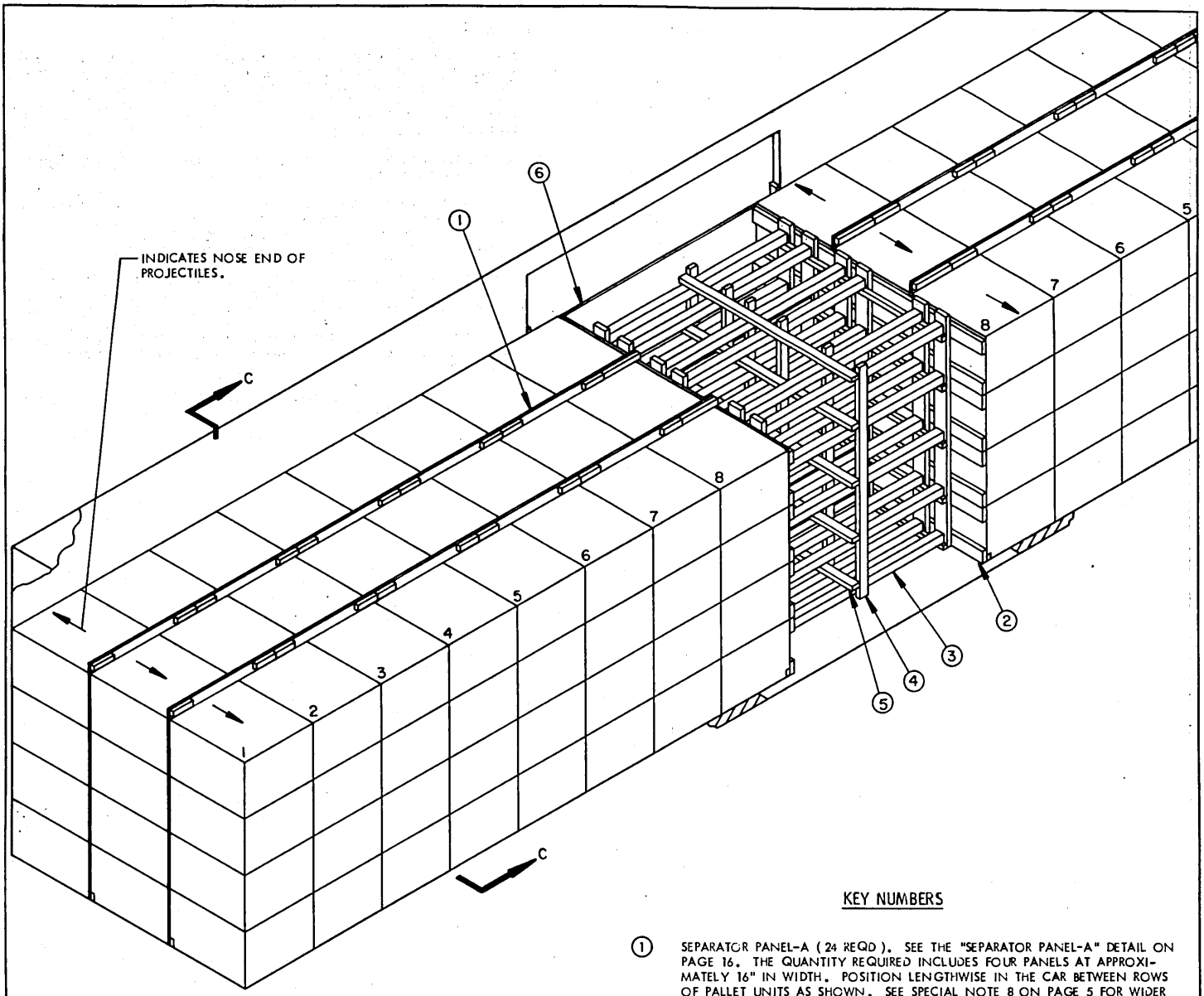
4. PROCEDURES FOR AN OMITTED UNIT ARE DEPICTED, HOWEVER, THE LOCATION OF THE OMITTED UNIT AND FILLER ASSEMBLY WILL BE AS NEAR TO THE DOOR OPENING AS POSSIBLE WITHOUT PROJECTING INTO THE DOORWAY AREA, BUT MUST NOT BE ADJACENT TO A CENTER GATE. FILLER ASSEMBLIES WILL ONLY BE PLACED IN THE TOP LAYER OF A LOAD. MORE THAN ONE FILLER ASSEMBLY MAY BE USED BUT MUST NOT BE LONGITUDINALLY ADJACENT TO ANOTHER FILLER ASSEMBLY.

5. IF THE CAR HAS PLUG-TYPE DOORS, SEE PAGE 26 FOR DOORWAY PROTECTION REQUIREMENTS AND DETAILS.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
2" X 2"	56	19
2" X 3"	28	14
2" X 4"	228	152
2" X 6"	199	199
4" X 4"	122	163
NAILS	NO. REQD	POUNDS
6d (2")	348	2-1/4
10d (3")	536	8-1/4
12d (3-1/4")	28	1/2
16d (3-1/2")	104	2-1/4
PLYWOOD, 1/2"----------695 SQ FT REQD----------956 LBS		

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNITS	152	119,168 LBS
DUNNAGE		2,063 LBS
TOTAL WEIGHT		121,231 LBS (APPROX)



ISOMETRIC VIEW

KEY NUMBERS

① SEPARATOR PANEL-A (24 REQD). SEE THE "SEPARATOR PANEL-A" DETAIL ON PAGE 16. THE QUANTITY REQUIRED INCLUDES FOUR PANELS AT APPROXIMATELY 16" IN WIDTH. POSITION LENGTHWISE IN THE CAR BETWEEN ROWS OF PALLET UNITS AS SHOWN. SEE SPECIAL NOTE 8 ON PAGE 5 FOR WIDER CAR REQUIREMENTS.

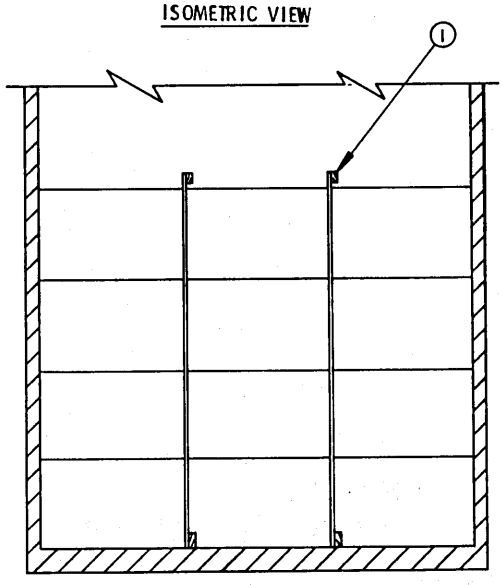
② CENTER GATE (2 REQD, 1 RIGHT HAND, 1 LEFT HAND). SEE THE "CENTER GATE B" DETAIL ON PAGE 25.

③ STRUT, 4" X 4" BY CUT TO FIT (REF: 7'-4") (30 REQD). TOENAIL TO PIECES MARKED ② W/2-16d NAILS AT EACH END.

④ VERTICAL STRUT BRACING, 2" X 4" X 8'-0" (6 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.

⑤ HORIZONTAL STRUT BRACING, 2" X 4" X 7'-0" (5 REQD). NAIL TO THE STRUTS W/3-10d NAILS AT EACH JOINT.

⑥ DOORWAY PROTECTION (2 REQD). SEE THE "DOORWAY PROTECTION" DETAIL ON PAGE 17. NAIL TO THE DOOR POSTS W/12d NAILS. SEE GENERAL NOTE "M" ON PAGE 2 AND SPECIAL NOTE 5 ON PAGE 9.



SECTION C-C

SPECIAL NOTES:

1. A 192-UNIT 4-LAYER LOAD IS SHOWN IN A 50'-6" LONG BY 9'-2" WIDE CONVENTIONAL BOX CAR HAVING 10'-0" WIDE THROUGH DOOR OPENINGS WITH CONVENTIONAL SLIDING DOORS AND WOOD LINED SIDE-WALLS. WIDER AND/OR LONGER CARS CAN BE USED. CARS WITH DOOR OPENINGS LESS THAN 10'-0" WIDE CAN BE USED, HOWEVER, CARS WITH DOUBLE DOORS CANNOT BE USED.

2. FOR THE LOAD AS SHOWN, THE LOAD LIMIT OF THE CAR TO BE USED MUST BE NOT LESS THAN 154,000 POUNDS.

3. LOADING OPERATIONS WILL REQUIRE USE OF A FRONT/SIDE LOADER FORKLIFT TRUCK FOR PLACEMENT OF ONE OF THE STACKS IN THE DOORWAY AREA, OF A 50'-6" LONG CAR. ONLY 15 STACKS CAN BE PLACED WITH A CONVENTIONAL FRONT LOADER FORKLIFT AND WILL REQUIRE LONGER STRUTS, PIECES MARKED (3) AND TWO SETS OF STRUT BRACING, PIECES MARKED (4) AND (5). TWO 32" WIDE SEPARATOR PANELS WILL BE SUBSTITUTED FOR TWO 16" AND TWO 48" WIDE SEPARATOR PANELS, PIECES MARKED (1).

4. IF LESS THAN A FULL LOAD QUANTITY OF UNITS IS TO BE SHIPPED, A "FILLER ASSEMBLY", AS DETAILED ON PAGE 17, MAY BE SUBSTITUTED IN THE TOP LAYER FOR EACH OMITTED UNIT, HOWEVER, THE REQUIREMENTS OF SPECIAL NOTE 4 ON PAGE 7 WILL APPLY. QUANTITIES MAY ALSO BE REDUCED BY USE OF THE K-BRACE METHOD FOR PARTIAL-LAYER BLOCKING OF THE TOP LAYER IN EITHER OR BOTH ENDS OF THE CAR, AS DETAILED ON PAGES 18 AND 19.

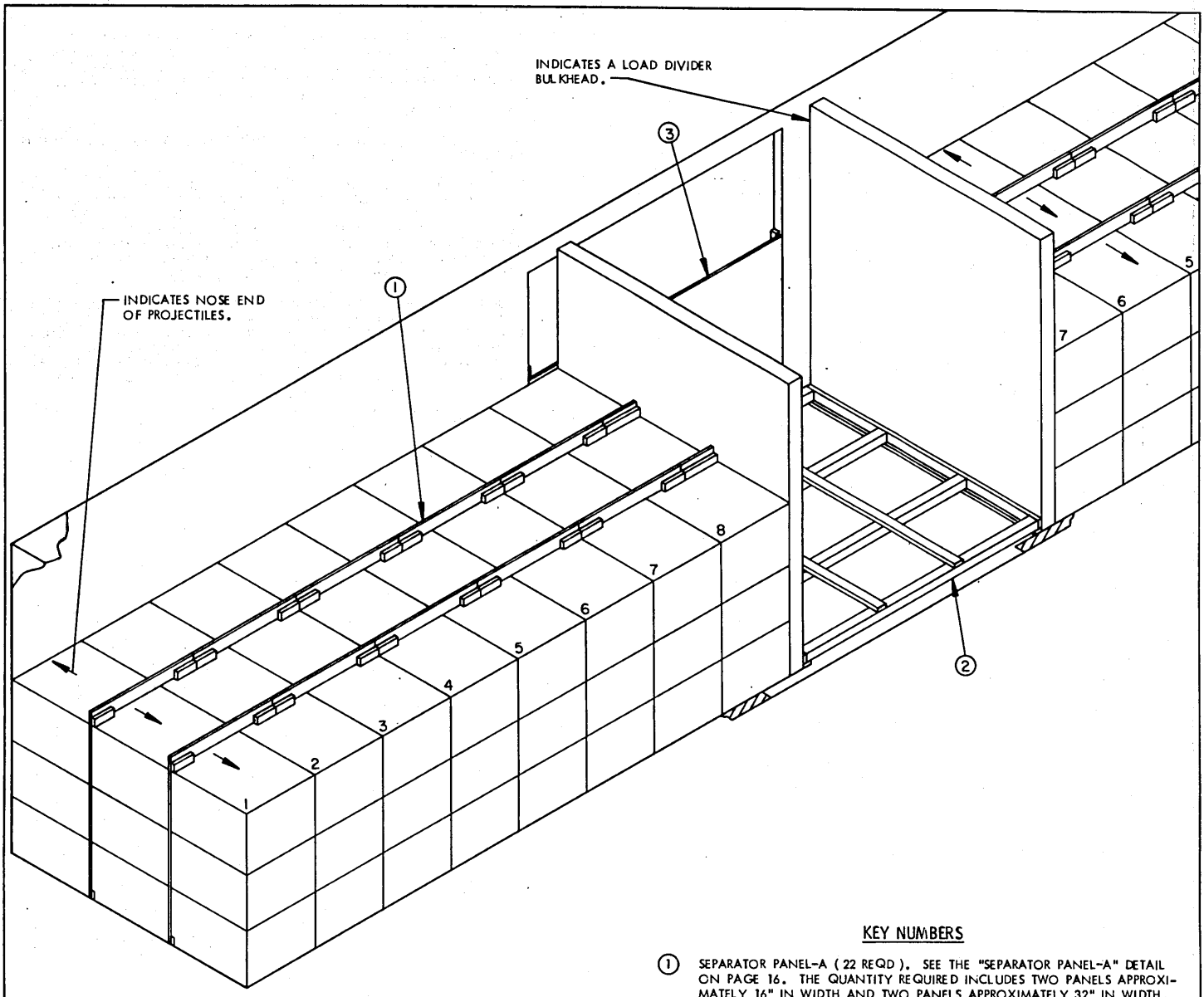
5. IF THE CAR HAS PLUG-TYPE DOORS, SEE PAGE 26 FOR DOORWAY PROTECTION REQUIREMENTS AND DETAILS.

BILL OF MATERIAL		
LUMBER	LINEAR FEET	BOARD FEET
2" X 2"	70	24
2" X 3"	72	36
2" X 4"	216	144
2" X 6"	243	243
4" X 4"	220	294
NAILS	NO. REQD	POUNDS
6d (2")	390	2-1/2
10d (3")	600	9-1/4
12d (3-1/4")	28	1/2
16d (3-1/2")	140	3-1/4
PLYWOOD, 1/2"----------843 SQ FT REQD----------1,160 LBS		

LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNITS	192	150,528 LBS
DUNNAGE		2,658 LBS
TOTAL WEIGHT		153,186 LBS (APPROX)

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



ISOMETRIC VIEW

KEY NUMBERS

(1) SEPARATOR PANEL-A (22 REQD). SEE THE "SEPARATOR PANEL-A" DETAIL ON PAGE 16. THE QUANTITY REQUIRED INCLUDES TWO PANELS APPROXIMATELY 16" IN WIDTH AND TWO PANELS APPROXIMATELY 32" IN WIDTH. POSITION LENGTHWISE IN THE CAR BETWEEN ROWS OF PALLET UNITS AS SHOWN. SEE SPECIAL NOTE 8 ON PAGE 5 FOR WIDER CAR REQUIREMENTS.

(2) STRUT ASSEMBLY (1 REQD). SEE THE "STRUT ASSEMBLY FOR 1-PIECE BULKHEADS" DETAIL ON PAGE 12. INSTALL BETWEEN THE LOAD DIVIDER BULKHEADS. SEE SPECIAL NOTE 7 ON PAGE 11.

(3) DOORWAY PROTECTION (2 REQD). SEE THE "DOORWAY PROTECTION" DETAIL ON PAGE 17. NAIL TO THE DOOR POSTS W/12d NAILS. SEE GENERAL NOTE "M" ON PAGE 2 AND SPECIAL NOTE 10 ON PAGE 11.

135-UNIT LOAD IN A 50'-6" LONG BY 9'-2" WIDE BOX CAR EQUIPPED WITH LOAD DIVIDERS

SPECIAL NOTES:

1. A 135-UNIT, 3-LAYER LOAD IS SHOWN IN A 50'-6" LONG BY 9'-2" WIDE CUSHIONED BOX CAR EQUIPPED WITH LOAD DIVIDERS, WOOD LINED SIDEWALLS AND 10'-0" WIDE THROUGH DOOR OPENINGS. WIDER AND/OR LONGER CARS MAY BE USED. CARS HAVING THROUGH DOOR OPENINGS LESS THAN 10'-0" WIDE MAY BE USED, HOWEVER, CARS WITH DOUBLE DOORS CANNOT BE USED.

2. IF AN ALL METAL CAR IS FURNISHED FOR USE, THE SIDEWALLS MUST BE LINED WITH 1/2" PLYWOOD, AS DETAILED ON PAGE 24, AND PROVIDE A MINIMUM INSIDE WIDTH DIMENSION OF 9'-2".

3. CAUTION: FOR CUSHIONED BOX CARS EQUIPPED WITH LOAD DIVIDER BULKHEADS, ONLY CARS EQUIPPED WITH LOAD DIVIDERS MANUFACTURED BY EVANS, EQUIPCO, OR PRECO MAY BE USED. LOAD DIVIDERS MANUFACTURED BY TRANSCO ARE NOT ACCEPTABLE, WHETHER OF ALUMINUM OR STEEL CONSTRUCTION. THE DEPICTED PROCEDURES ARE APPLICABLE FOR CARS OF VARIOUS LENGTHS AND WIDTHS. THE AAR MECHANICAL DESIGNATION CLASS FOR THESE CARS, AS IDENTIFIED IN "THE OFFICIAL RAILWAY EQUIPMENT REGISTER" WILL BE RBL, XL, OR XLI.

4. THE USE OF LOAD DIVIDER EQUIPPED CARS WILL ELIMINATE THE NEED FOR CENTER GATES AND STRUTS, 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 THE DESIGNATED UNITS. NOTICE: ONLY CUSHIONED CARS THAT HAVE SLIDING CENTER SILL TYPE CUSHIONING DEVICES OR END-OF-CAR TYPE DEVICES WHICH HAVE AT LEAST FIFTEN INCHES (15") OF TRAVEL ARE ACCEPTABLE. CAUTION: THE WEIGHT OF THE LOAD TO BE RETAINED BY ONE LOAD DIVIDER BULKHEAD MUST NOT EXCEED ONE-HALF OF THE LOAD LIMIT WHICH IS STENCILED ON THE SIDE OF THE CAR.

5. 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 AND PROVIDE A MINIMUM INSIDE WIDTH DIMENSION OF 9'-2" 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 14 FOR GUIDANCE. IF THE BACK OF THE SIDE FILLER PANELS ARE REINFORECD WITH VERTICAL AND HORIZONTAL STEEL MEMBERS AS SHOWN IN THE "TYPICAL TYPE B" VIEW ON PAGE 14, THE "FILL PIECE" MATERIAL IS NOT REQUIRED.

6. 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.

7. A "STRUT ASSEMBLY" MUST BE INSTALLED BETWEEN THE LOAD DIVIDER BULKHEADS IF THE LOAD IN EITHER END OF THE CAR WEIGHS 50,000 POUNDS OR MORE. DETAILS FOR USE BETWEEN 2-PIECE BULKHEADS AND BETWEEN 1-PIECE BULKHEADS ARE SHOWN ON PAGE 12. 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 13 FOR GUIDANCE.

(CONTINUED AT RIGHT)

(SPECIAL NOTES CONTINUED)

8. FOR THE LOAD AS SHOWN, THE LOAD LIMIT OF THE CAR MUST BE NOT LESS THAN 116,000 POUNDS.

9. FOURTEEN STACKS (7 EACH END) CAN BE LOADED WITH A CONVENTIONAL FRONT LOADING FORKLIFT TRUCK. HOWEVER, DUE TO THE THICKNESS OF THE LOAD DIVIDERS, THE 15 STACKS AS SHOWN WILL REQUIRE USE OF A FRONT/SIDE LOADER FORKLIFT FOR PLACING THE LAST STACK IN THE DOORWAY AREA. IF DESIRED, 16 STACKS (8 EACH END) CAN BE LOADED WITH A FRONT/SIDE LOADER IN A CAR HAVING A LOAD LIMIT OF 116,000 POUNDS OR MORE.

10. IF THE CAR HAS PLUG-TYPE DOORS, SEE PAGE 26 FOR DOORWAY PROTECTION REQUIREMENTS AND DETAILS.

11. THESE PROCEDURES ALSO APPLY TO A 4-LAYER LOAD, HOWEVER, PIECES MARKED (1) AND (3) WILL BE AS DETAILED FOR A 4-HIGH LOAD. THE LOAD LIMIT OF THE CAR MUST BE NOT LESS THAN 152,000 POUNDS.

12. IF NECESSARY, TO SATISFY THE QUANTITY OF UNITS TO BE SHIPPED, A PARTIAL LAYER MAY BE LOADED IN EITHER OR BOTH ENDS OF THE CAR BY APPLYING THE K-BRACE METHOD OF PARTIAL LAYER BRACING AS DETAILED ON PAGES 18 AND 19. HOWEVER, THE CAR MUST HAVE NAILABLE WALLS.

13. ONE OR MORE UNITS MAY BE OMITTED FROM THE TOP LAYER BY SUBSTITUTING A "FILLER ASSEMBLY" AS DETAILED ON PAGE 17, FOR EACH OMITTED UNIT AS DEPICTED IN THE LOAD ON PAGE 6. THE REQUIREMENTS OF SPECIAL NOTE 4 ON PAGE 7 WILL ALSO APPLY.

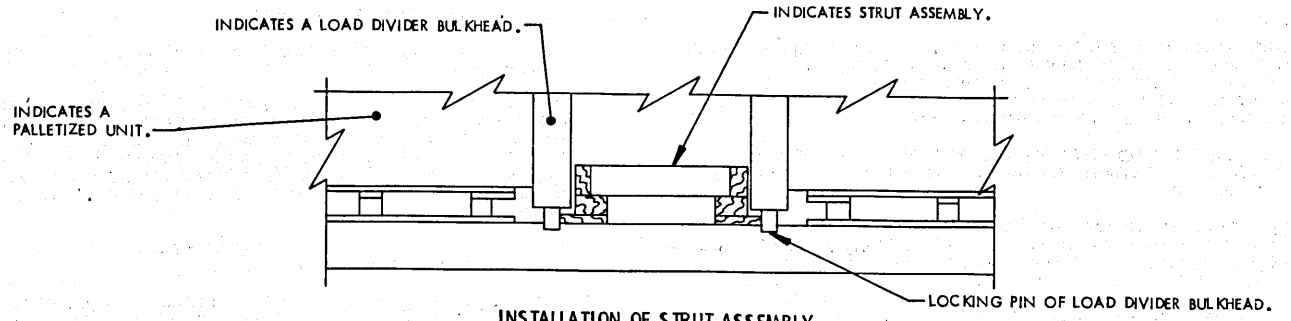
14. THESE PROCEDURES ARE ALSO APPLICABLE FOR SHIPMENT OF A 3-LAYER 171 UNIT OR 180 UNIT LOAD IN A 60'-8" LONG CUSHIONED BOX CAR EQUIPPED WITH LOAD DIVIDER BULKHEADS AS SHOWN IN THE "LOADING PLAN" ON PAGE 15.

BILL OF MATERIAL

LUMBER	LINEAR FEET	BOARD FEET
1" X 8"	17	12
2" X 3"	24	12
2" X 4"	198	132
4" X 4"	37	50
NAILS	**NO. REQD**	**POUNDS**
6d (2")	344	2-1/4
10d (3")	44	3/4
12d (3-1/4")	44	3/4
PLYWOOD, 1/2" ---------- 627 SQ FT REQD ---------- 862 LBS		

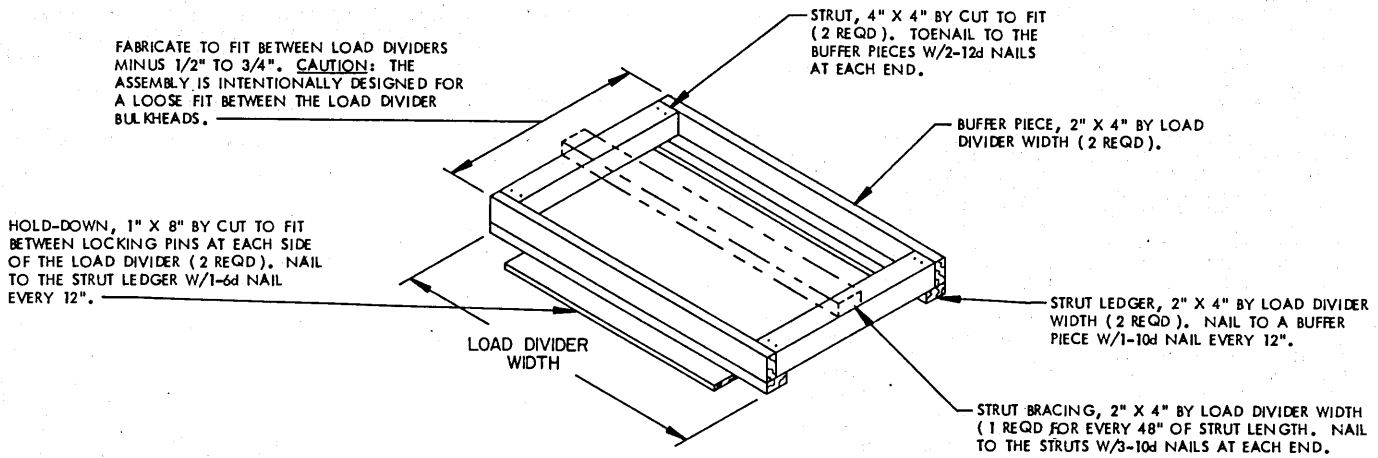
LOAD AS SHOWN

ITEM	QUANTITY	WEIGHT (APPROX)
PALLET UNITS	135	105,840 LBS
DUNNAGE		1,278 LBS
TOTAL WEIGHT		107,118 LBS



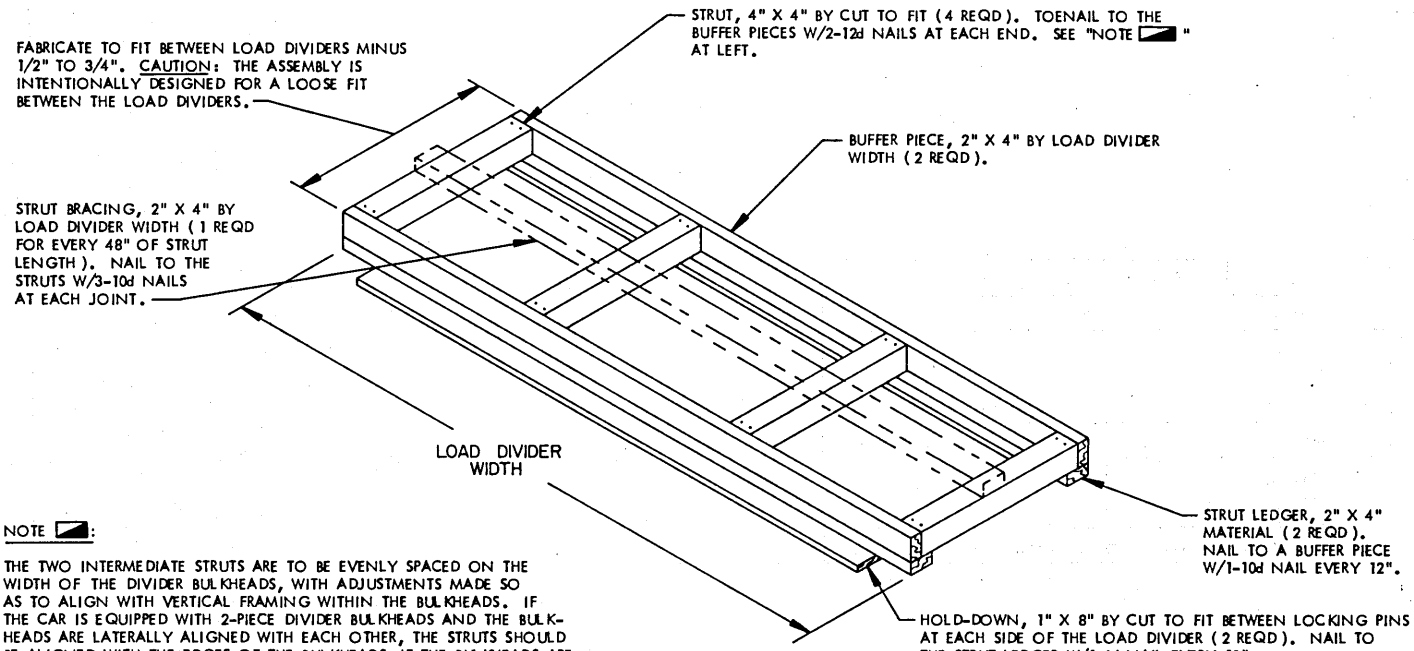
INSTALLATION OF STRUT ASSEMBLY

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. NOTE: TWO (2) ASSEMBLIES AS SHOWN ARE REQUIRED FOR A 2-PIECE BULKHEAD IF NOT LATERALLY ALIGNED. SEE "NOTE ◪" BELOW.

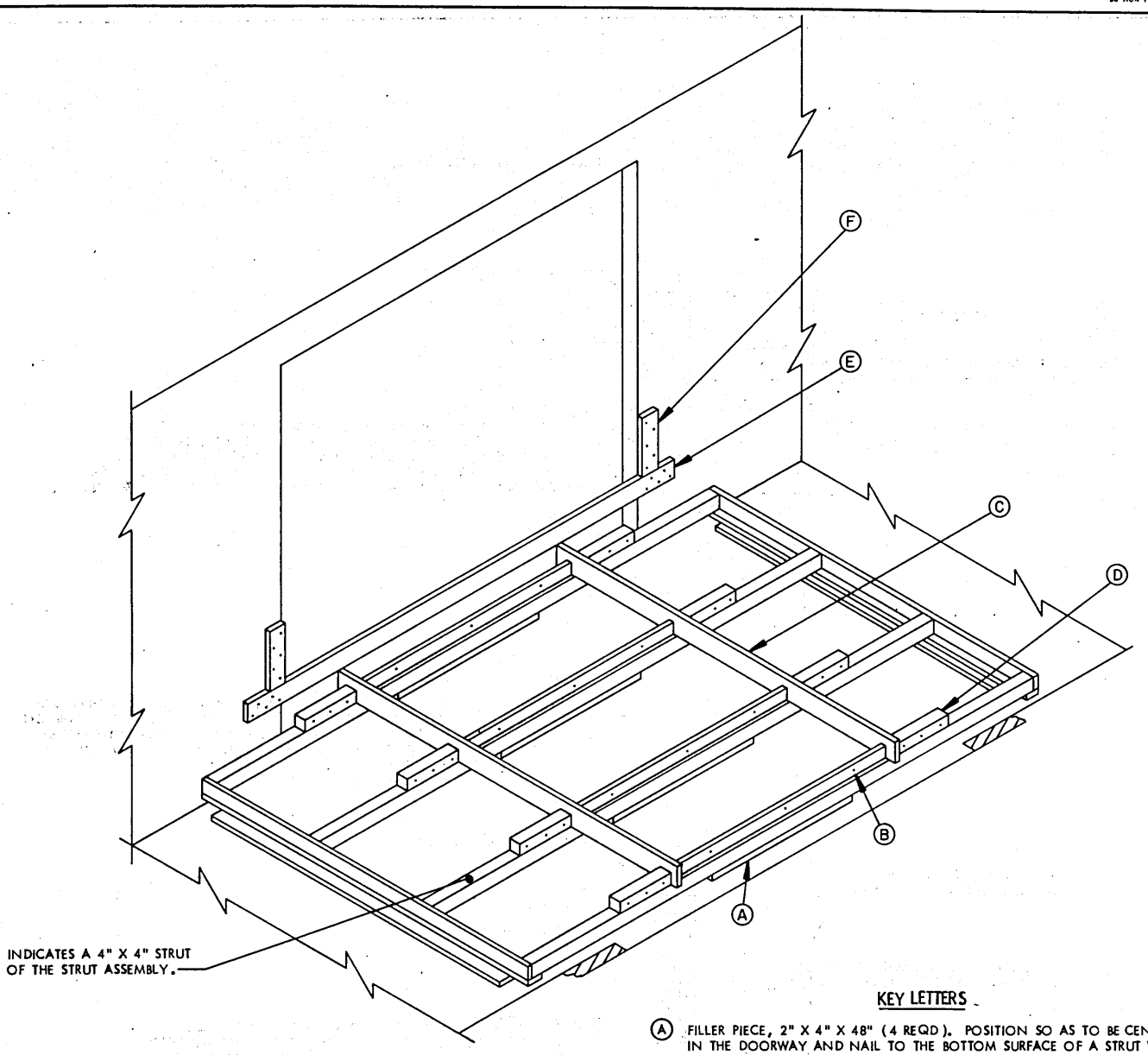


NOTE ◪:

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

STRUT ASSEMBLY FOR 1-PIECE BULKHEADS

A STRUT ASSEMBLY IS REQUIRED WHEN THE LOAD BEHIND EITHER LOAD DIVIDER BULKHEAD EXCEEDS 50,000 POUNDS OF 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.



ISOMETRIC VIEW OF STRUT ASSEMBLY HOLD-DOWN

THIS ISOMETRIC VIEW DEPICTS 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.

KEY LETTERS

(A) FILLER PIECE, 2" X 4" X 48" (4 REQD). POSITION SO AS TO BE CENTERED IN THE DOORWAY AND NAIL TO THE BOTTOM SURFACE OF A STRUT W/4-10d NAILS.

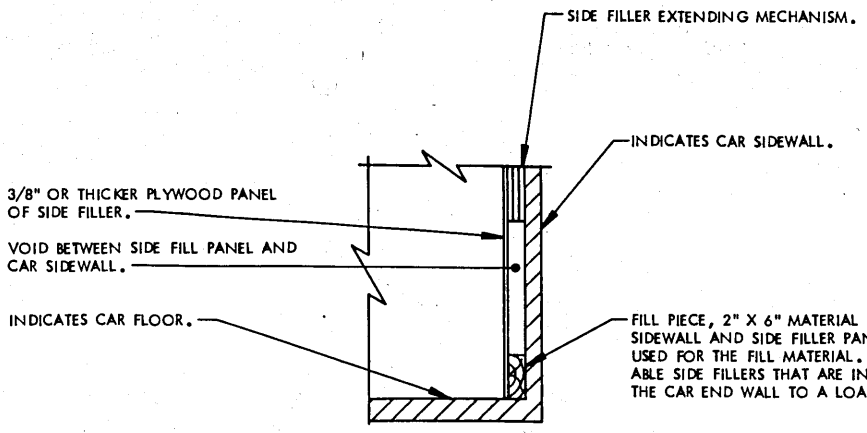
(B) SPACER PIECE, 2" X 4" X 72" (4 REQD). POSITION ON EDGE AND SO AS TO BE CENTERED IN THE DOORWAY AREA AND TOENAIL TO A STRUT W/3-12d NAILS ON EACH SIDE.

(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 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.

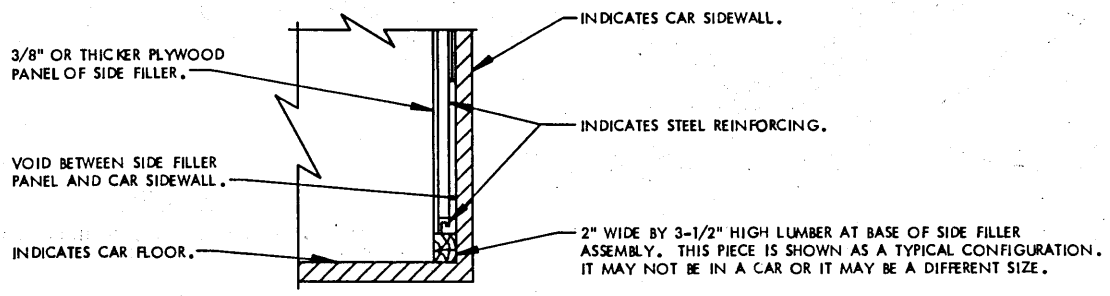


TYPICAL TYPE A

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

NOTE ◑ :

NAILING OF "FILL PIECES" IS NOT REQUIRED EXCEPT THAT EACH "FILL PIECE" LOCATED NEAREST THE DOOR OPENINGS OF THE CAR WILL BE SECURED AGAINST LONGITUDINAL MOVEMENT W/1-6d NAIL DRIVEN THROUGH THE SIDE FILLER PANEL AND INTO THE "FILL PIECE".

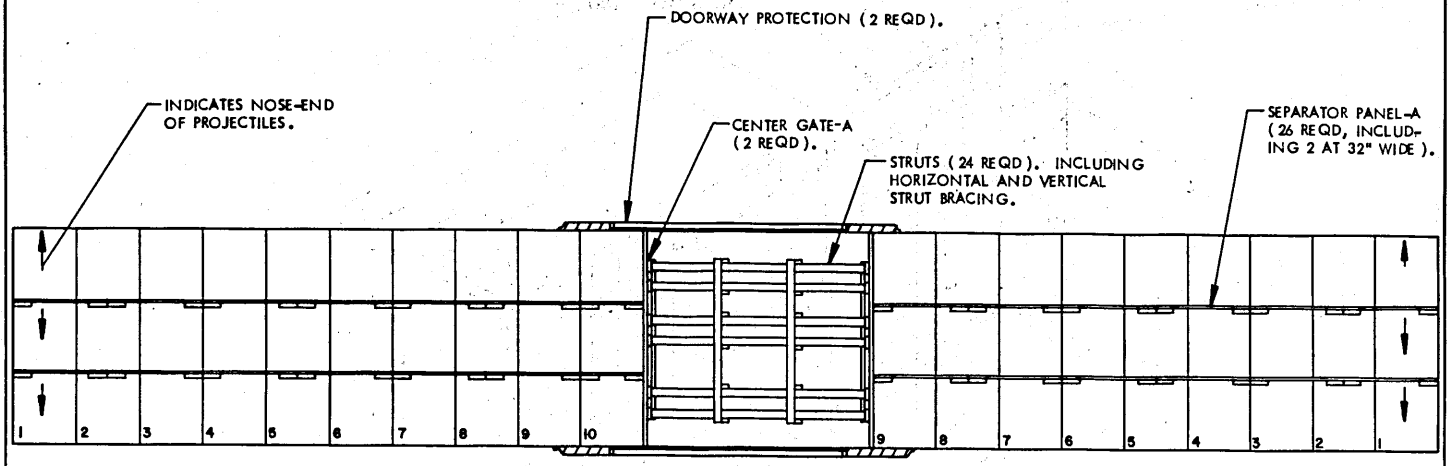


TYPICAL TYPE B

THIS VIEW SHOWS A TYPICAL SECTION OF A CAR EQUIPPED WITH HEAVY DUTY, STEEL REINFORCED, ADJUSTABLE SIDE FILLERS. A "FILL PIECE", AS SHOWN IN THE "TYPICAL TYPE A" DETAIL ABOVE, IS NOT REQUIRED IN CARS SO EQUIPPED. SEE THE SPECIAL NOTE BELOW.

SPECIAL NOTE:

FOR THE LOADS DEPICTED IN THIS DRAWING, THE INSIDE WIDTH OF THE CAR BETWEEN ADJUSTABLE SIDE FILLERS MUST BE NOT LESS THAN 9'-2.

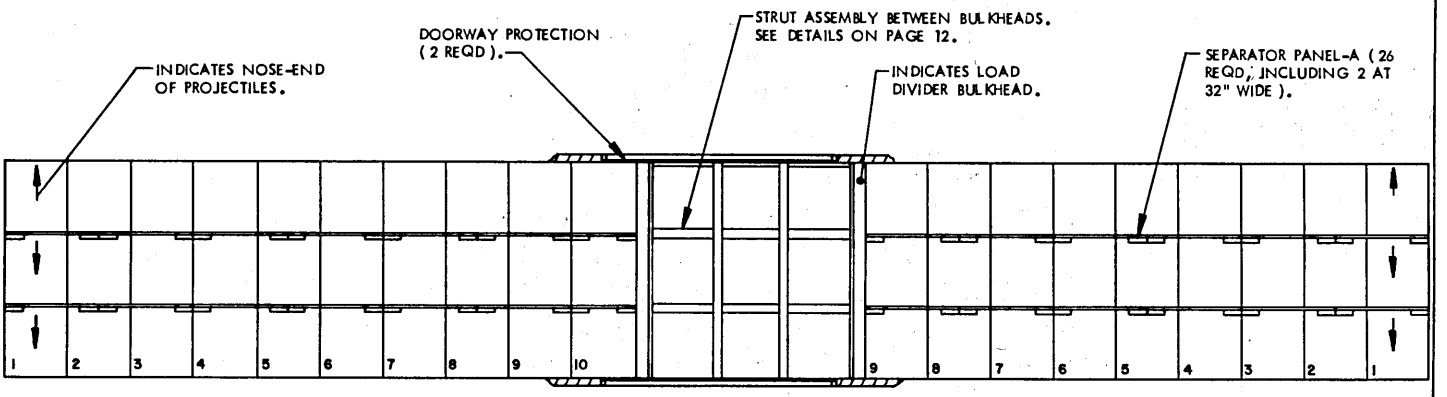


LOADING PLAN

A 171-UNIT (3 LAYER) LOAD IS SHOWN IN A 60'-8" LONG X 9'-2" WIDE CONVENTIONAL BOX CAR HAVING A LOAD LIMIT OF NOT LESS THAN 144,000 POUNDS. THE "KEY NUMBERS" AND "SPECIAL NOTES" ON PAGES 4 AND 5 APPLY TO THIS LOAD. ALSO, SEE SPECIAL NOTES BELOW AND GENERAL NOTES ON PAGE 2.

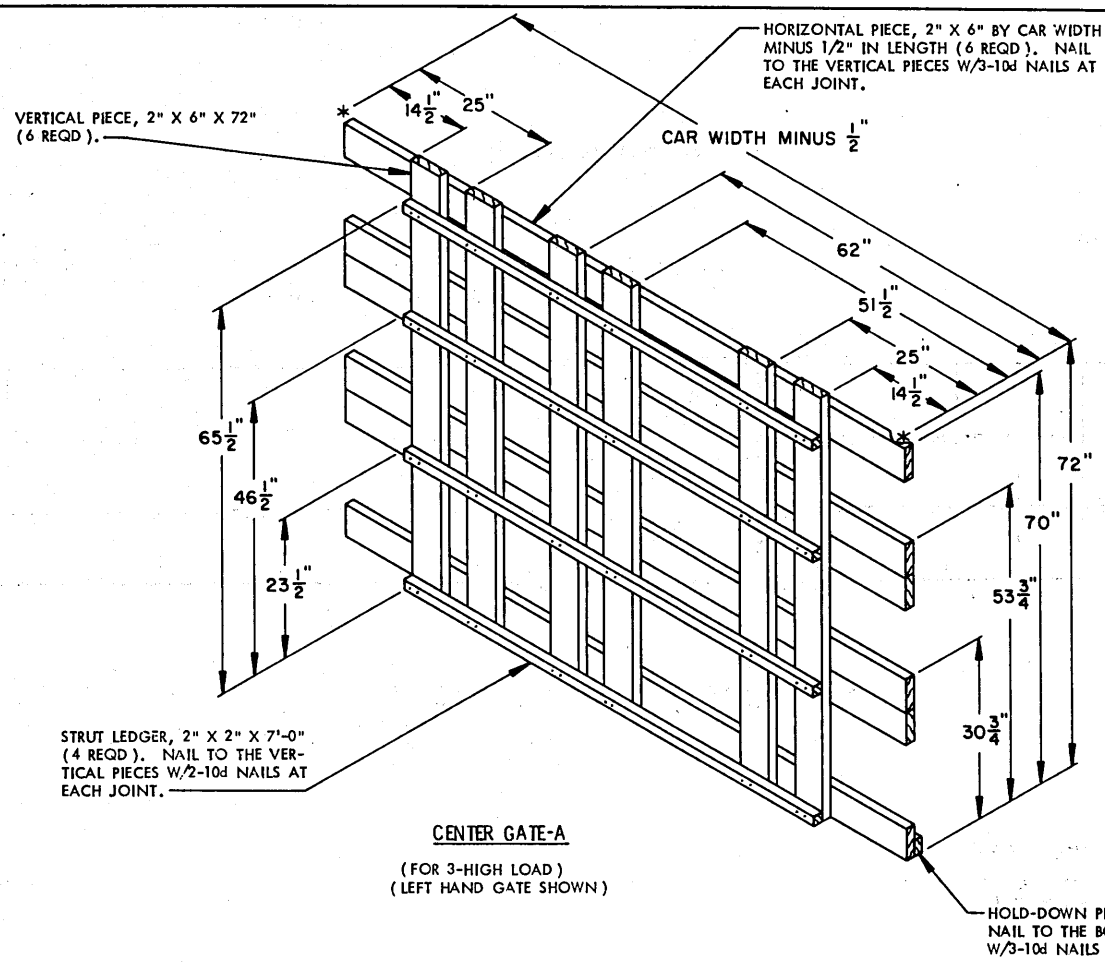
SPECIAL NOTES:

1. ALL CARS MUST HAVE WOOD LINED SIDEWALLS.
2. IF A FRONT/SIDE LOADER-FORKLIFT TRUCK IS AVAILABLE, A 180-UNIT (3 LAYER) LOAD CAN BE SHIPPED WITH 10 STACKS POSITIONED IN EACH END OF THE CAR.



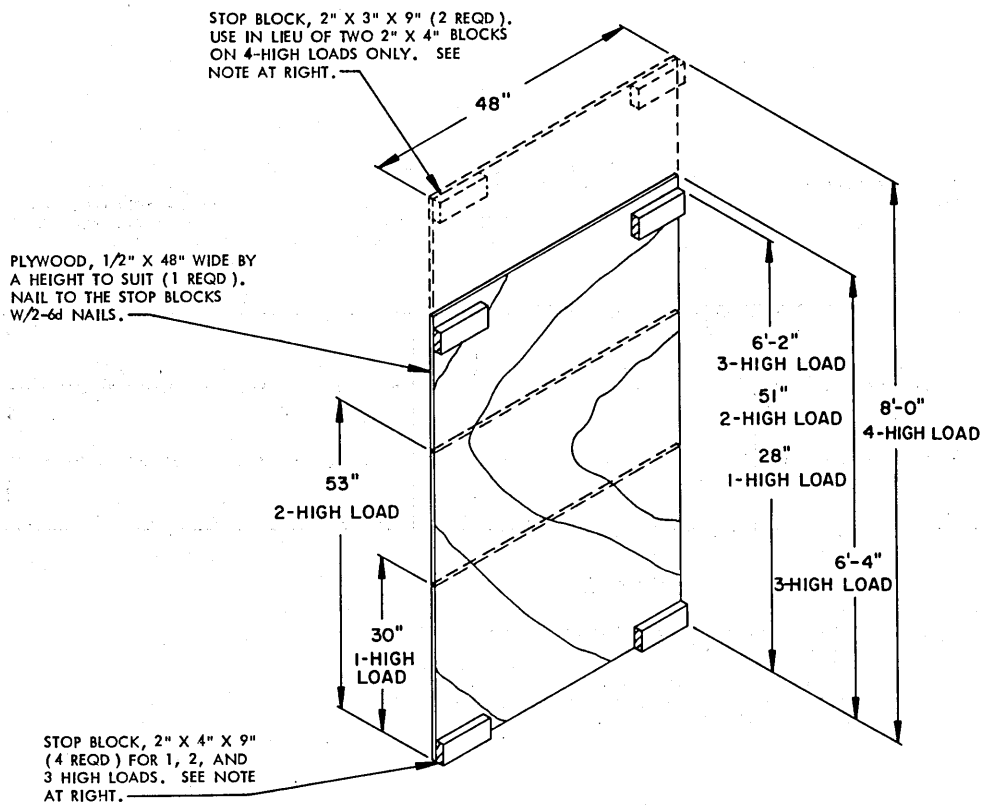
LOADING PLAN

A 171-UNIT (3 LAYER) LOAD IS SHOWN IN A 60'-8" LONG X 9'-2" WIDE BOX CAR EQUIPPED WITH LOAD DIVIDER BULKHEADS AND HAVING A LOAD LIMIT OF NOT LESS THAN 144,000 POUNDS. THE "KEY NUMBERS" AND "SPECIAL NOTES" ON PAGES 10 AND 11 APPLY TO THIS LOAD. ALSO, SEE SPECIAL NOTES ABOVE AND GENERAL NOTES ON PAGE 2.



CENTER GATE-A

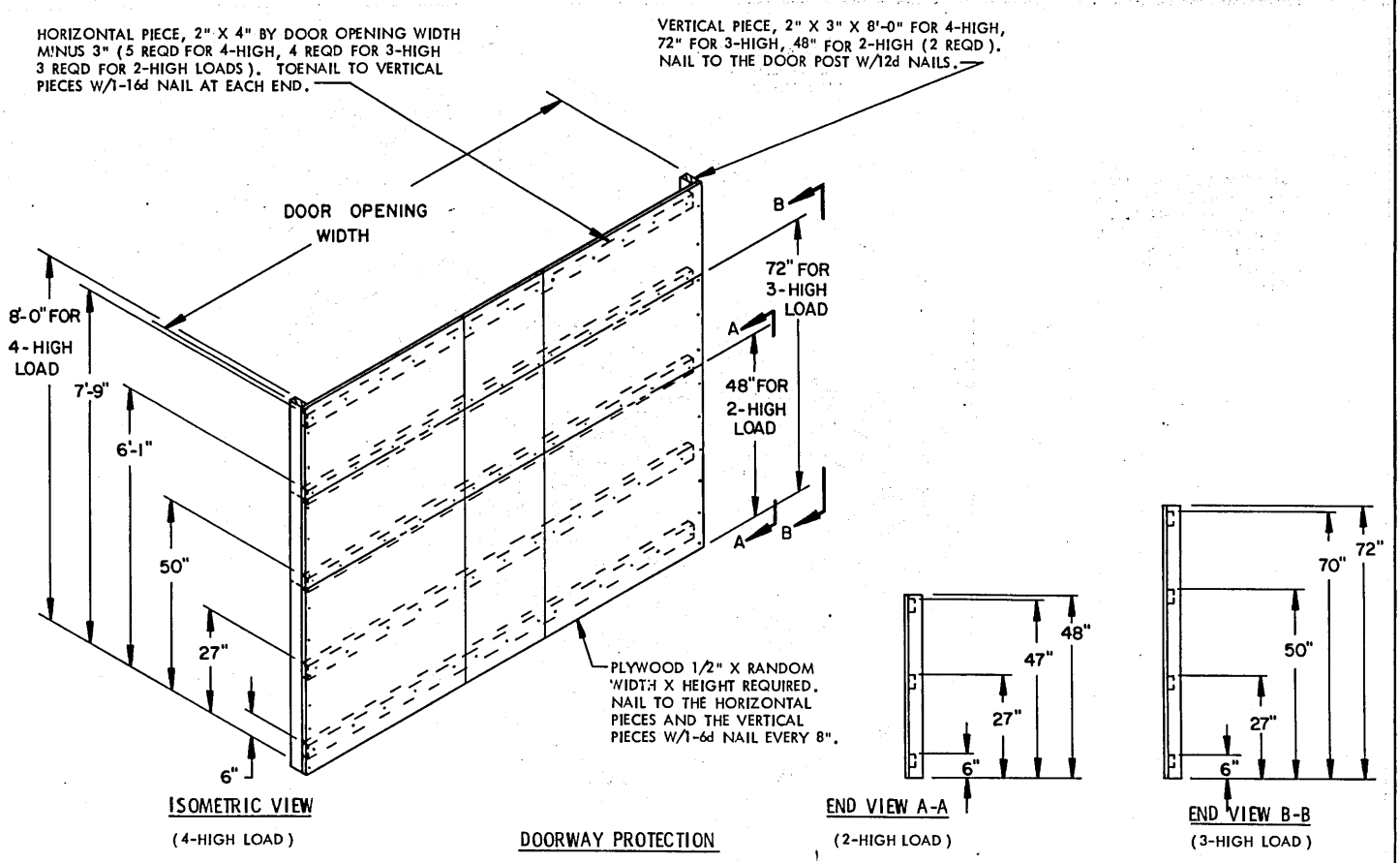
(FOR 3-HIGH LOAD)
(LEFT HAND GATE SHOWN)



NOTE: IF THE LOAD REQUIRES USE OF 16" WIDE SEPARATOR PANELS, TWO STOP BLOCKS 16" LONG SHOULD BE USED AND NAILED W/3-6d NAILS EACH.

SEPARATOR PANEL - A

(FOR USE BETWEEN ROWS OF PALLETS IN 9'-2" WIDE CARS)



ISOMETRIC VIEW

(4-HIGH LOAD)

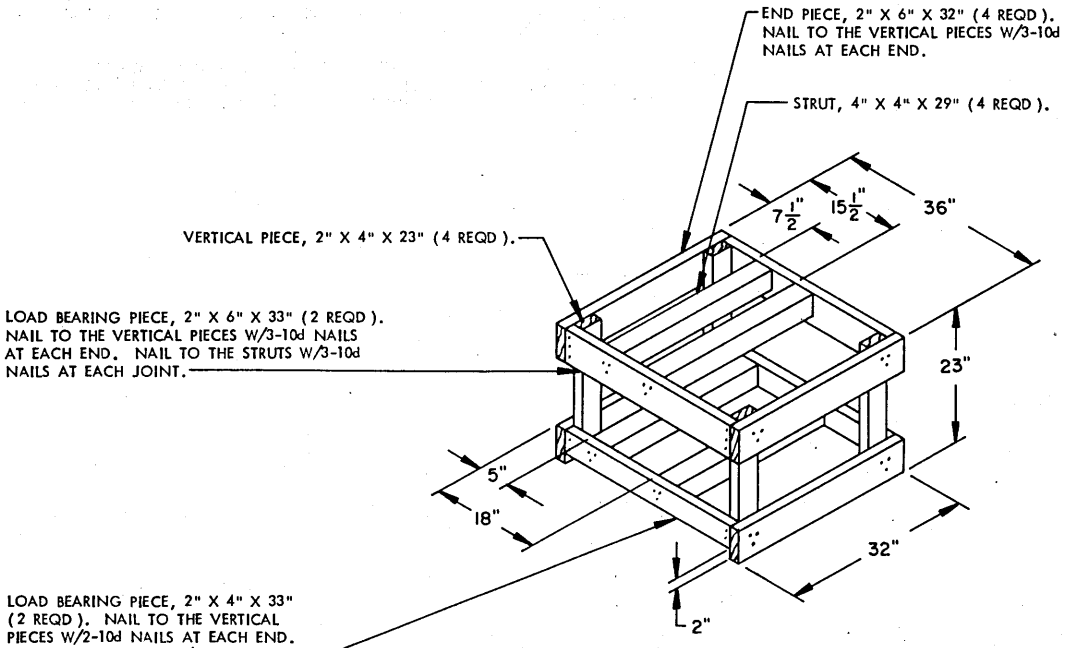
END VIEW A-A

(2-HIGH LOAD)

END VIEW B-B

(3-HIGH LOAD)

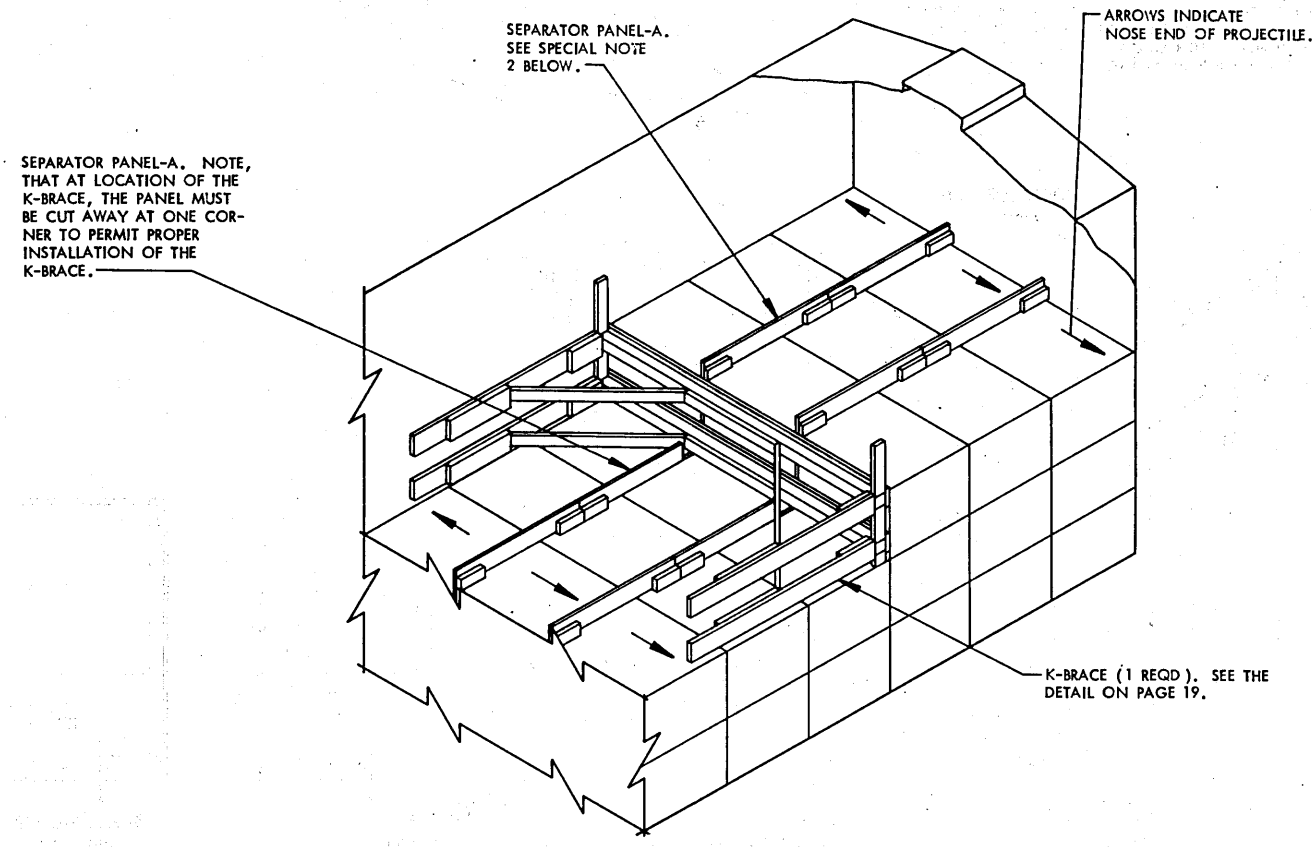
DOORWAY PROTECTION



FILLER ASSEMBLY

(FOR AN OMITTED UNIT)

DETAILS

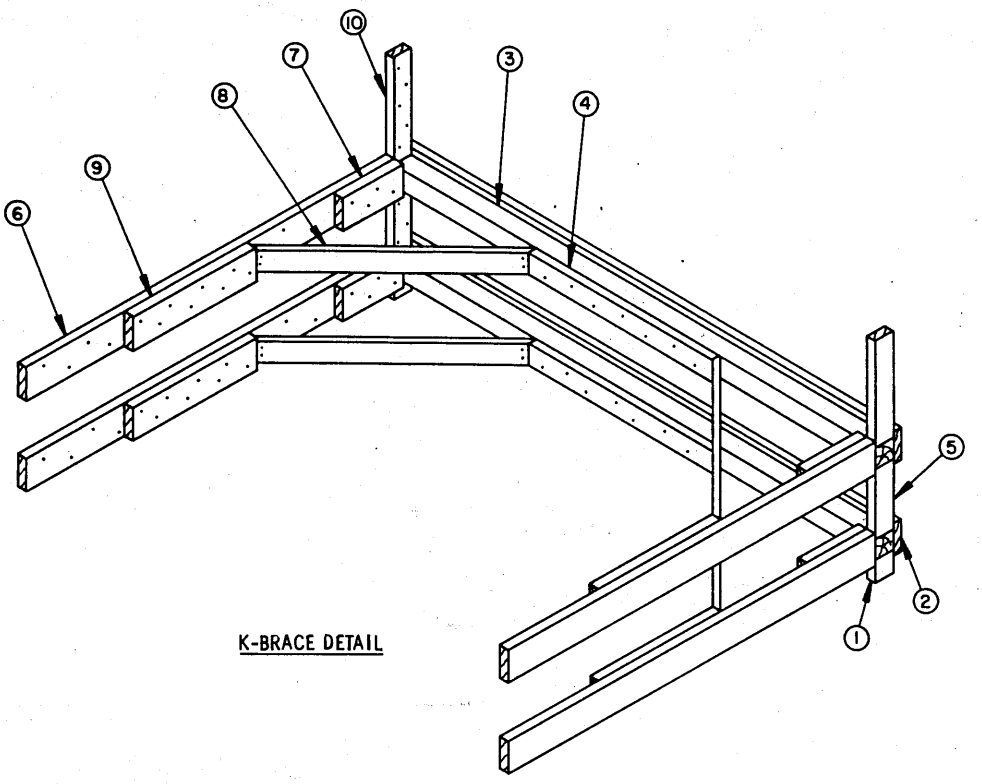


ISOMETRIC VIEW

SPECIAL NOTES:

1. A TYPICAL LCL LOAD IS SHOWN IN A 9'-2" WIDE CAR WITH NAILABLE WOODEN SIDEWALLS. THE LOAD DEPICTS THE K-BRACE METHOD OF BRACING A PARTIAL THIRD LAYER. THE K-BRACE SHOWN IS ADEQUATE FOR RETAINING A PARTIAL LAYER OF NOT MORE THAN 8,000 POUNDS, AND MAY BE USED FOR ANY TOP LAYER OF A LOAD IN EITHER OR BOTH ENDS OF THE CAR.
2. IF WIDER CARS ARE TO LOADED, USE OF SEPARATOR PANEL-B WILL BE REQUIRED. SEE THE DETAIL ON PAGE 24.
3. THE CENTER CLEAT, SHOWN AS PIECE MARKED ④ ON PAGE 19, WILL BE 36" LONG FOR A 9'-2", AND 38" LONG FOR A 9'-4" WIDE CAR. ADJUST THE LENGTH PROPORTIONATELY FOR CARS OF OTHER WIDTHS. CARS NARROWER THAN 9'-2" CANNOT BE USED.

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



K-BRACE DETAIL

KEY NUMBERS

(1) SUPPORT CLEAT, 2" X 4" X 4" (2 REQD). POSITION ON TOP OF LOWER LAYER UNIT SO AS TO SUPPORT PIECE MARKED (3). NAIL TO THE CAR SIDE-WALL W/2-12d NAILS.

(2) LOAD BEARING PIECE, 2" X 6" BY CAR WIDTH IN LENGTH (CUT-TO-FIT) (2 REQD). CENTER ON AND NAIL TO THE CROSS CAR BRACE, PIECE MARKED (3) W/1-12d NAIL EVERY 6".

(3) CROSS CAR BRACE, 4" X 4" BY CAR WIDTH IN LENGTH (CUT-TO-FIT) (2 REQD).

(4) CENTER CLEAT, 2" X 4" X 36" (2 REQD). CENTER ON AND NAIL TO THE CROSS CAR BRACE, PIECE MARKED (3), W/7-16d NAILS. SEE SPECIAL NOTE 3 ON PAGE 18.

(5) SPACER CLEAT, 2" X 4" X 12" (2 REQD). NAIL TO THE CAR SIDEWALL W/4-12d NAILS.

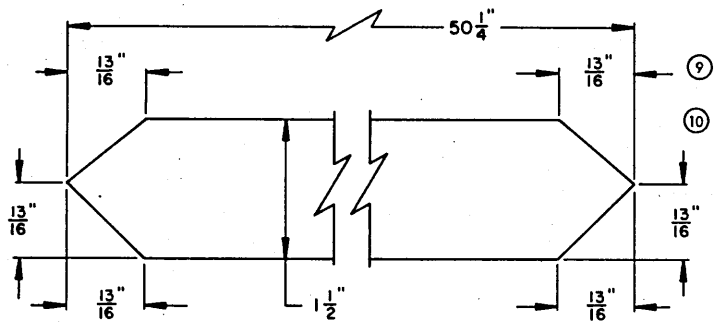
(6) HORIZONTAL WALL CLEAT, 2" X 6" X 72" (4 REQD). NAIL TO THE CAR SIDEWALL W/16-12d NAILS.

(7) POCKET CLEAT, 2" X 6" X 12" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED (6), W/4-16d NAILS.

(8) DIAGONAL BRACE, 2" X 4" X 50-1/4" (4 REQD). SEE THE DETAIL AT LEFT FOR BEVEL CUTS REQUIRED. TOENAIL TO THE CROSS CAR BRACE, PIECE MARKED (3), AND TO THE HORIZONTAL WALL CLEAT, PIECE MARKED (6), W/2-16d NAILS AT EACH END.

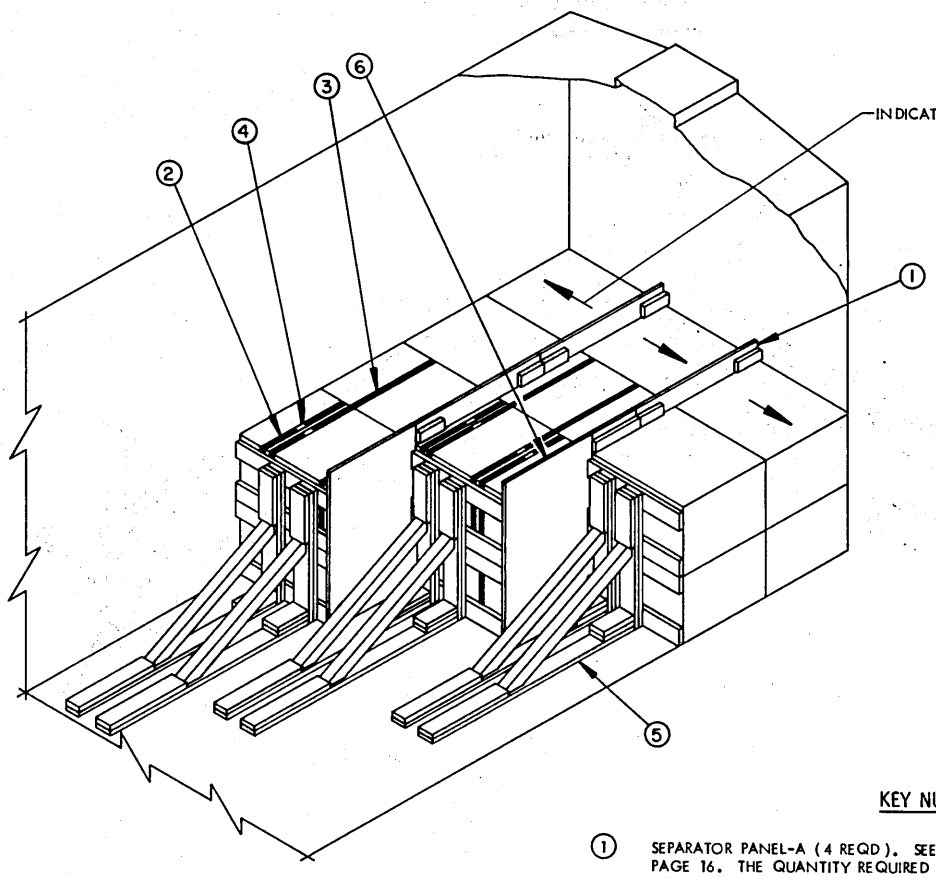
(9) BACK-UP CLEAT, 2" X 6" X 24" (4 REQD). NAIL TO THE HORIZONTAL WALL CLEAT, PIECE MARKED (6), W/8-16d NAILS.

(10) HOLD DOWN CLEAT, 2" X 4" X 18" (2 REQD). NAIL TO THE CAR SIDEWALL W/5-12d NAILS.



DIAGONAL BRACE

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



ISOMETRIC VIEW

SPECIAL NOTES:

1. AN 18-UNIT LCL LOAD IS SHOWN IN A 9'-2" WIDE BOX CAR HAVING A WOOD OR NAILABLE METAL FLOOR AND WOOD LINED SIDEWALLS.

2. EACH KNEE BRACE ASSEMBLY AS DETAILED ON PAGE 21 IS ADEQUATE FOR RETAINING A MAXIMUM LCL LOAD OF 8,500 POUNDS. IT SHOULD BE NOTED THAT THE VERTICAL PIECES OF THE ASSEMBLY MUST BE LOCATED TOWARD THE BASE END OF THE PROJECTILES. THEREFORE, THE LOAD AS SHOWN WILL REQUIRE 1 RIGHT HAND AND 2 LEFT HAND ASSEMBLIES.

KEY NUMBERS

(1) SEPARATOR PANEL-A (4 REQD). SEE THE "SEPARATOR PANEL-A" DETAIL ON PAGE 16. THE QUANTITY REQUIRED INCLUDES ONE PANEL AT APPROXIMATELY 16" IN WIDTH. POSITION LENGTHWISE IN THE CAR BETWEEN ROWS OF PALLET UNITS AS SHOWN. SEE SPECIAL NOTE 8 ON PAGE 5 FOR WIDER CAR REQUIREMENTS.

(2) UNITIZING STRAP, 1-1/4" X .035" OR .031" X 14'-0" LONG STEEL STRAPPING (4 REQD). INSTALL TO ENCIRCLE FIRST AND SECOND LAYER UNITS.

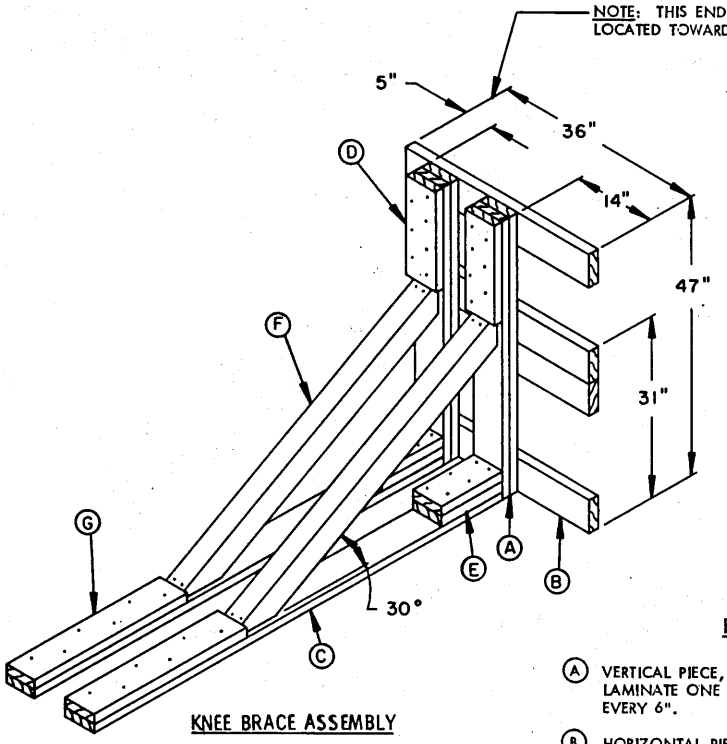
(3) BUNDLING STRAP, 1-1/4" X .035" OR .031" X 16'-0" LONG STEEL STRAPPING (4 REQD). PREPOSITION AND INSTALL TO ENCIRCLE TWO LONGITUDINALLY ADJACENT SECOND LAYER UNITS.

(4) SEAL FOR 1-1/4" STEEL STRAPPING (8 REQD, 1 PER STRAP JOINT). DOUBLE NOTCH EACH SEAL.

(5) KNEE BRACE ASSEMBLY (3 REQD). SEE THE "KNEE BRACE ASSEMBLY" DETAIL ON PAGE 21, SPECIAL NOTE 2 AT LEFT, AND GENERAL NOTE "O" ON PAGE 2.

(6) END PANEL, 1/2" PLYWOOD X 33-1/2" WIDE X 53" HIGH (2 REQD). NAIL ONE VERTICAL EDGE OF PANEL TO THE ENDS OF THE HORIZONTAL LOAD BEARING PIECES OF THE KNEE BRACE ASSEMBLY W/2-10d NAILS AT EACH JOINT.

TYPICAL LCL LOAD USING KNEE BRACE METHOD OF PARTIAL LAYER BRACING



KNEE BRACE ASSEMBLY

(LEFT HAND ASSEMBLY SHOWN. SEE SPECIAL NOTE 2 ON PAGE 20).

KEY LETTERS

(A) VERTICAL PIECE, 2" X 6" X 47" (DOUBLED) (2 REQD). LAMINATE ONE PIECE TO THE OTHER W/1-10d NAIL EVERY 6".

(B) HORIZONTAL PIECE, 2" X 6" X 36" (4 REQD). NAIL TO THE VERTICAL PIECES W/3-10d NAILS AT EACH JOINT.

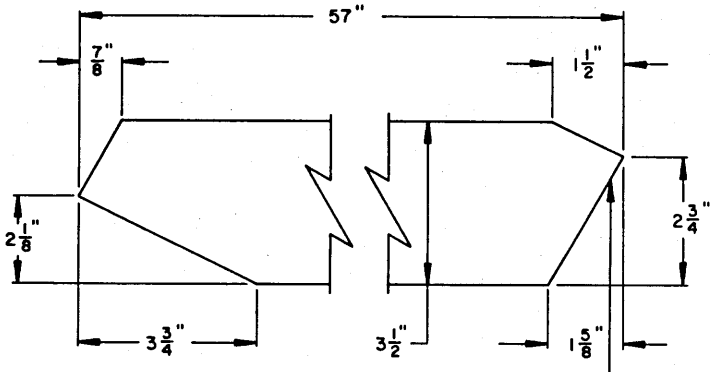
(C) FLOOR CLEAT, 2" X 6" X 6'-8" (2 REQD). ALIGN WITH A VERTICAL PIECE AND NAIL TO THE CAR FLOOR W/1-16d NAIL EVERY 8". SEE GENERAL NOTE "O" ON PAGE 2.

(D) HOLD DOWN CLEAT, 2" X 6" X 17" (2 REQD). NAIL TO A VERTICAL PIECE W/7-10d NAILS.

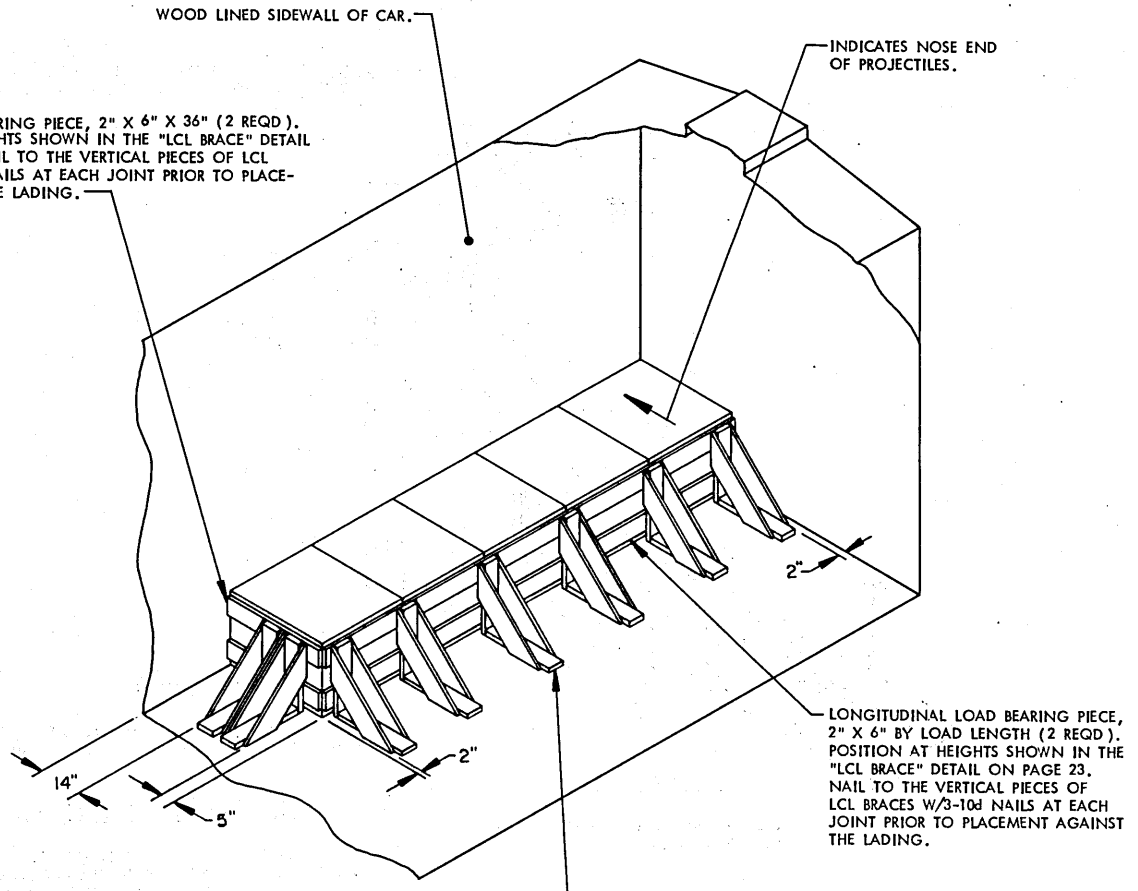
(E) POCKET CLEAT, 2" X 6" X 12" (DOUBLED) (2 REQD). NAIL THE FIRST PIECE TO THE FLOOR CLEAT, PIECE MARKED (C), W/4-16d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER AND TOENAIL IT TO THE VERTICAL PIECE, PIECE MARKED (A), W/2-16d NAILS.

(F) BRACE, 4" X 4" X 57" (2 REQD). SEE THE DETAIL BELOW FOR THE 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.



BRACE



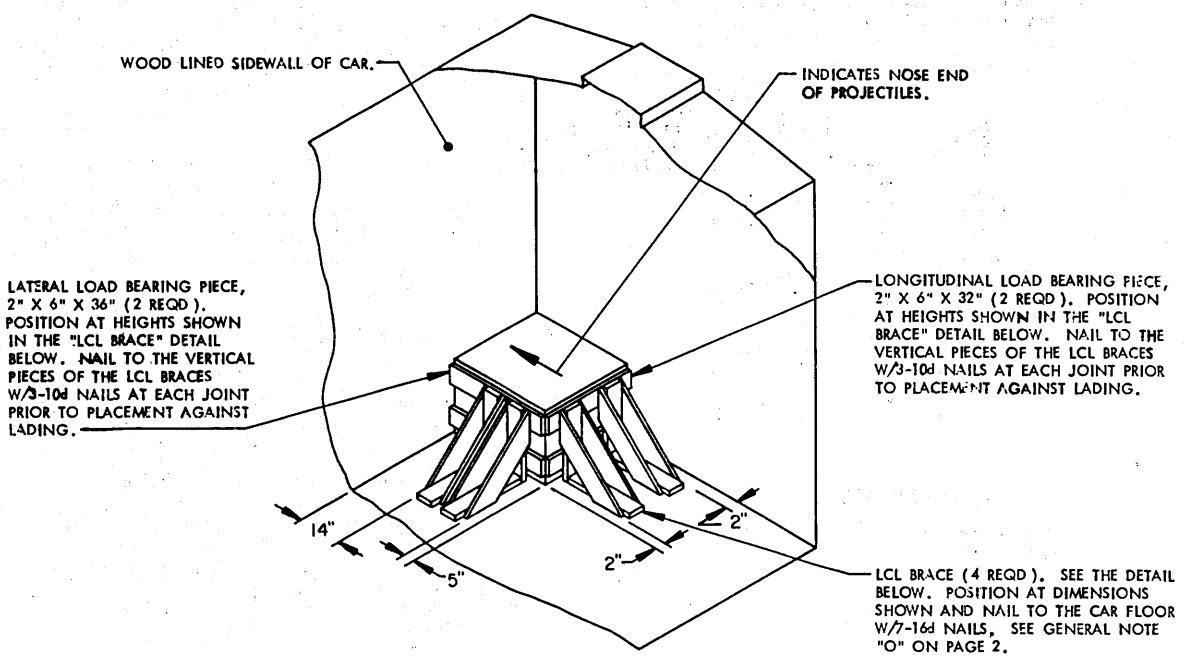
ISOMETRIC VIEW

SPECIAL NOTES:

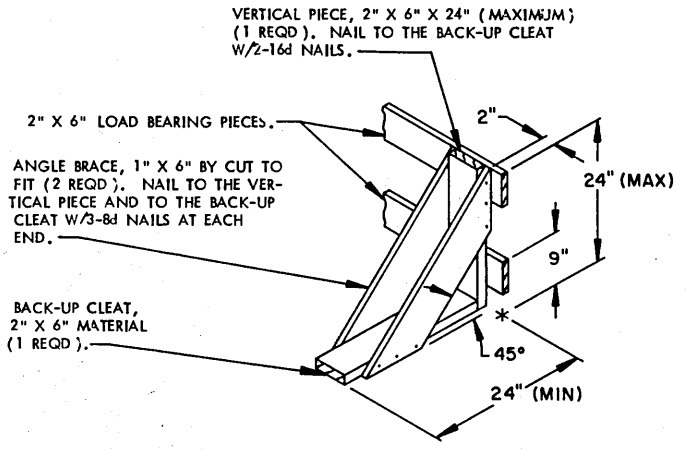
1. A 5-UNIT LOAD IS SHOWN IN A CONVENTIONAL TYPE BOX CAR HAVING WOOD LINED SIDEWALLS AND A WOOD OR NAILABLE METAL FLOOR.

2. EACH LCL BRACE AS APPLIED FOR LONGITUDINAL BRACING WILL RETAIN 2,300 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.

TYPICAL LCL 5-UNIT LOAD USING LCL BRACE METHOD OF PARTIAL LAYER BRACING

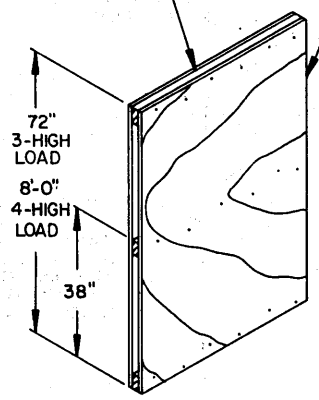


ISOMETRIC VIEW



LCL BRACE

TYPICAL LCL 1-UNIT LOAD USING LCL BRACE METHOD OF PARTIAL LAYER BRACING

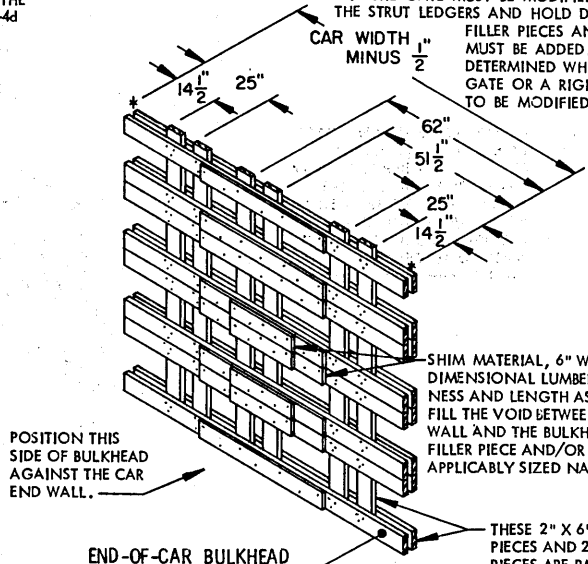


SEPARATOR PANEL-B

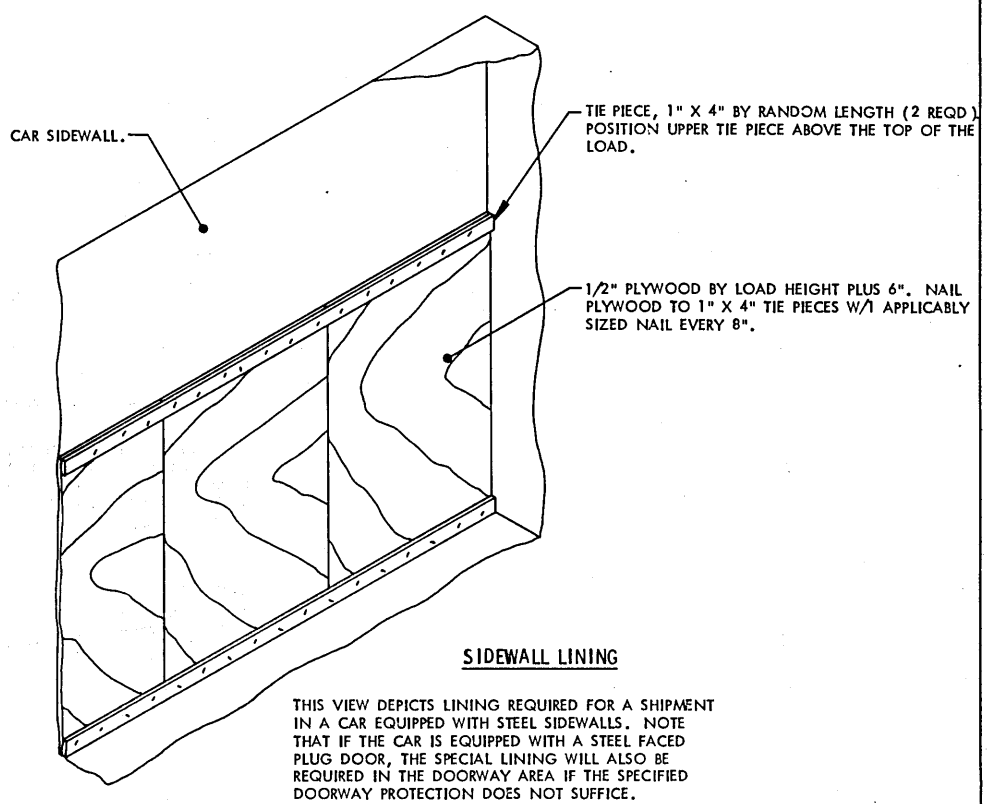
(FOR USE BETWEEN ROWS OF PALLETS IN 9'-4" WIDE OR WIDER CARS).

NOTE:

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. THE BULKHEAD MAY BE FABRICATED BY MODIFYING A CENTER GATE FOR THE NUMBER OF LAYERS TO BE LOADED. THE BULKHEAD DEPICTED IS TYPICAL AND IS SHOWN AS A MODIFIED LEFT-HAND CENTER GATE-B FOR A 4 LAYER LOAD AS DETAILED ON PAGE 25. THE GATE MUST BE MODIFIED BY OMITTING THE STRUT LEDGERS AND HOLD DOWN PIECES. FILLER PIECES AND SHIM MATERIAL MUST BE ADDED. IT MUST BE DETERMINED WHETHER A LEFTHAND GATE OR A RIGHTHAND GATE IS TO BE MODIFIED.

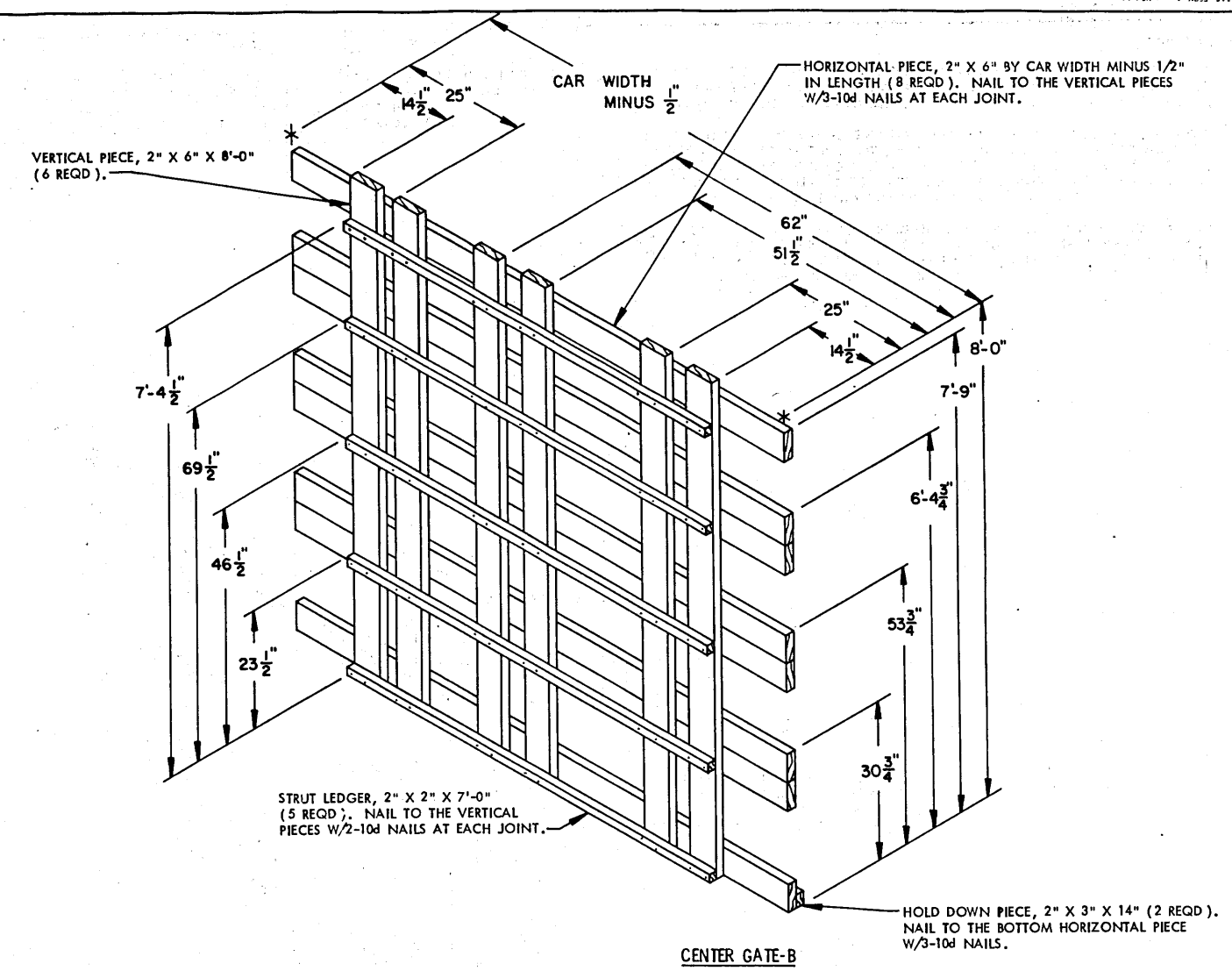


END-OF-CAR BULKHEAD



SIDEWALL LINING

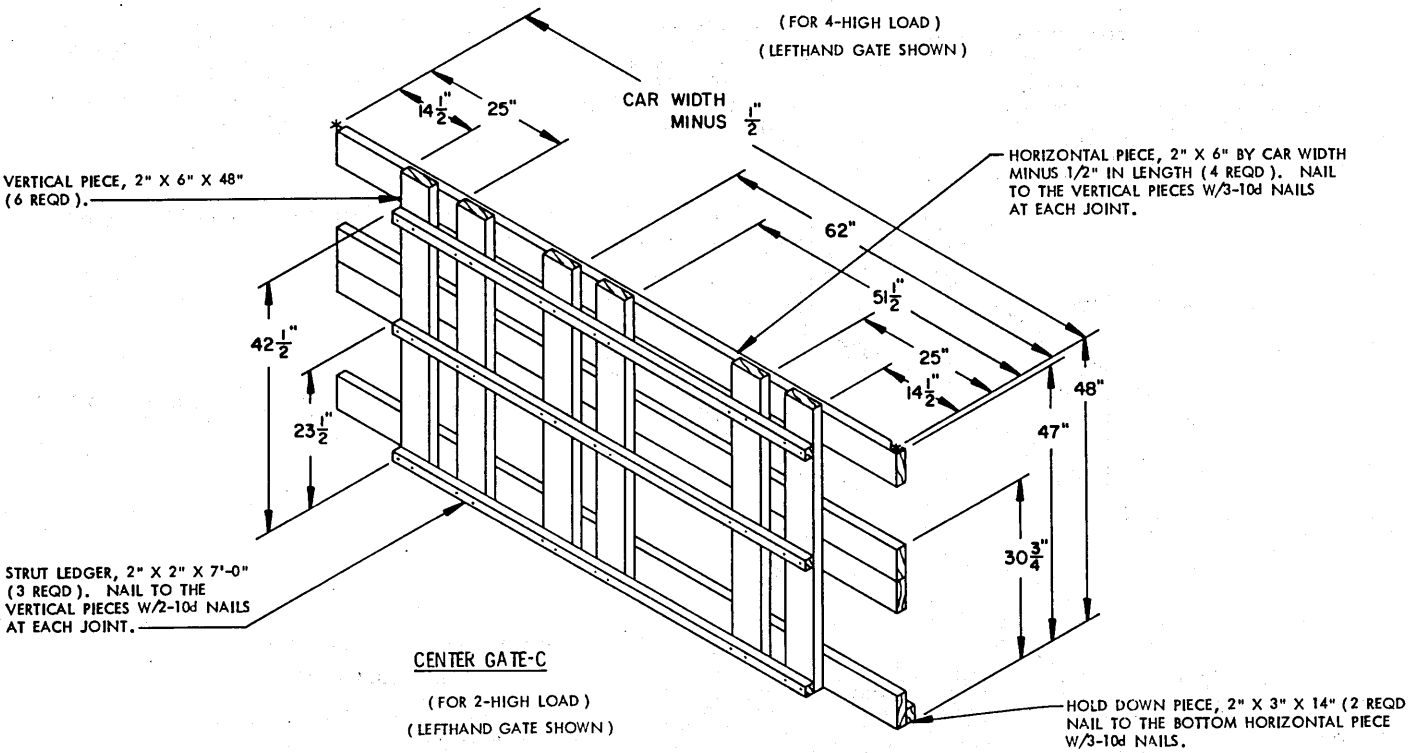
THIS VIEW DEPICTS LINING REQUIRED FOR A SHIPMENT IN A CAR EQUIPPED WITH STEEL SIDEWALLS. NOTE THAT IF THE CAR IS EQUIPPED WITH A STEEL FACED PLUG DOOR, THE SPECIAL LINING WILL ALSO BE REQUIRED IN THE DOORWAY AREA IF THE SPECIFIED DOORWAY PROTECTION DOES NOT SUFFICE.



CENTER GATE-B

(FOR 4-HIGH LOAD)

(LEFTHAND GATE SHOWN)



CENTER GATE-C

(FOR 2-HIGH LOAD)

(LEFTHAND GATE SHOWN)

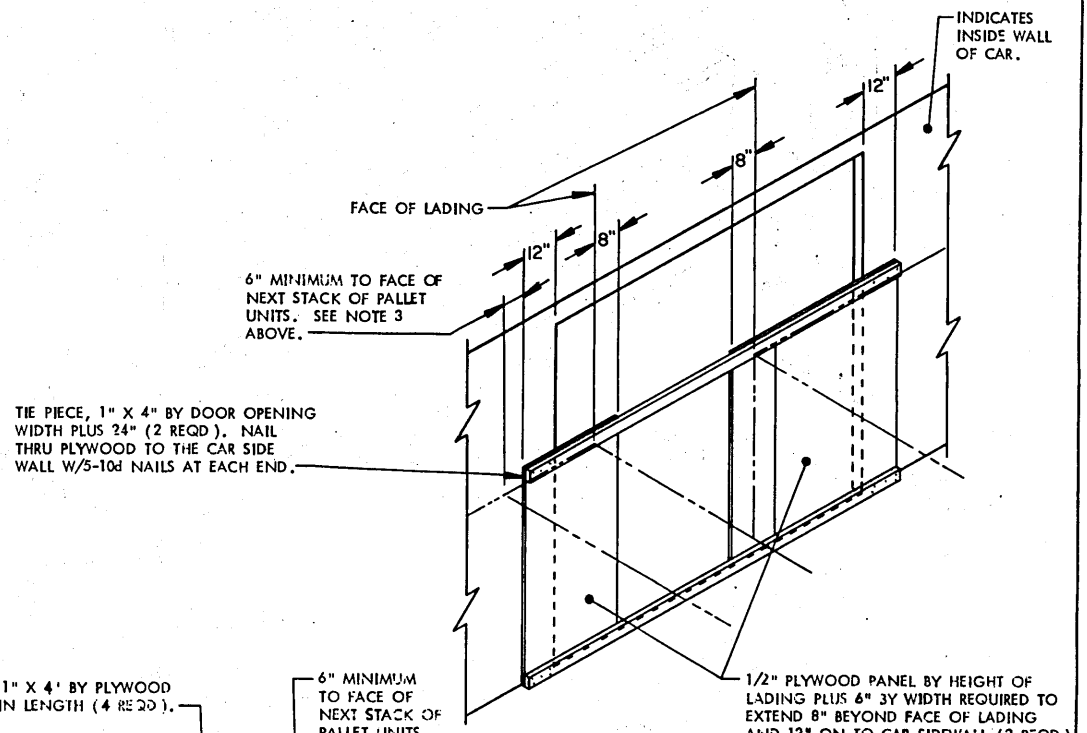
SPECIAL NOTES:

1. THE DOORWAY PROTECTION SPECIFIED ON THIS PAGE APPLIES ONLY TO BOX CARS EQUIPPED WITH PLUG TYPE DOORS. THE CAR MUST HAVE NAILABLE SIDEWALLS AND AN INSIDE WIDTH OF NOT LESS THAN 9'-3". SEE GENERAL NOTE "M" ON PAGE 2.
2. THE DOORWAY PROTECTION ON THE LOADING SIDE OF THE CAR MUST BE INSTALLED AFTER THE CAR HAS BEEN LOADED. THEREFORE, TO PERMIT PLACEMENT OF THE PLYWOOD PANELS, THE LADING EXTENDING INTO THE DOORWAY AREA OR WITHIN 18" FROM THE DOOR OPENING MUST BE POSITIONED TO ALLOW APPROXIMATELY 3/4" TO 1" SPACE BETWEEN THE LADING AND SIDEWALL/PLUG DOOR OF THE CAR.
3. THE END OF THF PLYWOOD PANEL ON EITHER SIDE OF THE DOOR OPENING MUST NOT BE NEARER THAN 6" TO THE FACE OF THE NEXT STACK OF PALLET UNITS. IF THE SPACE IS LESS THAN 6", THE WIDTH OF THE PANEL MUST BE INCREASED SO AS TO HAVE 9" OF CONTACT WITH THE SIDES OF UNITS IN THAT STACK.

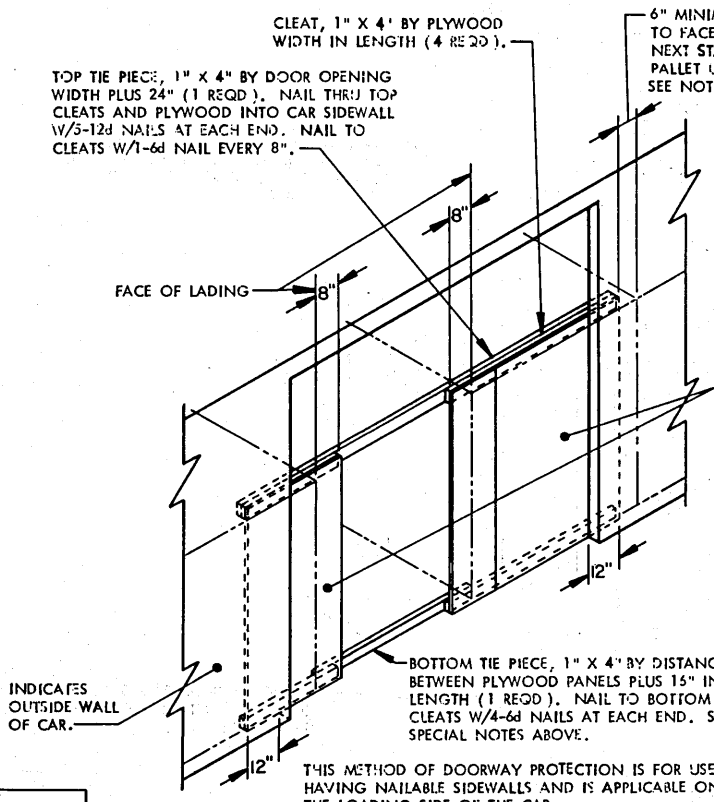
(CONTINUED AT RIGHT)

(SPECIAL NOTES CONTINUED)

4. TO PROVIDE CLEARANCE BETWEEN THE DOORWAY PROTECTION AND CENTER GATES, THE LENGTH OF THE BOTTOM HORIZONTAL PIECE OF THE GATES MUST BE CAR WIDTH MINUS 5". THE HOLD DOWN PIECES SHOULD BE 11" LONG. ALL OTHER HORIZONTAL PIECES MUST BE CAR WIDTH MINUS 2".



THIS METHOD OF DOORWAY PROTECTION IS FOR USE IN CARS HAVING NAILABLE SIDEWALLS AND IS APPLICABLE ONLY FOR THE SIDE OPPOSITE THE LOADING SIDE OF THE CAR.



THIS METHOD OF DOORWAY PROTECTION IS FOR USE IN CARS HAVING NAILABLE SIDEWALLS AND IS APPLICABLE ONLY FOR THE LOADING SIDE OF THE CAR.

DOORWAY PROTECTION FOR CARS WITH PLUG TYPE DOORS

SEE GENERAL NOTES "C", "F" AND "M" ON PAGE 2, AND SPECIAL NOTES ABOVE.

DETAILS