



**BUREAU OF EXPLOSIVES
PAMPHLET NO. 6
(1976 Edition)**

**ILLUSTRATING
APPROVED METHODS FOR LOADING AND BRACING CARLOAD
AND LESS THAN CARLOAD SHIPMENTS OF
EXPLOSIVES AND OTHER HAZARDOUS MATERIALS**

**BUREAU OF EXPLOSIVES
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GENERAL INFORMATION

1. The methods shown herein should be considered as minimum requirements for the loading and bracing of Explosives and Other Hazardous Materials.
2. The principles illustrated in the typical bracing details contained herein may be adapted to packages or containers of similar weight and configuration; however, gross weight limitations of braces detailed on Pages 15 and 16 must be complied with.
3. Loading and bracing methods, other than based on the principles or as illustrated herein, should be submitted to the Bureau of Explosives for approval.

GENERAL RULES

1. Cars for loading of Class A Explosives must be thoroughly inspected and certified for such loading by a qualified person of the originating carrier and must conform to provisions of the Department of Transportation regulations governing such inspection and certification.
2. Explosives, Class A, must not be loaded, transported, or stored in cars equipped with any type of lighted heater or open-flame device or electric devices having exposed heating coils or in cars equipped with any apparatus or mechanism utilizing an internal combustion engine in its operation.
3. Explosives, Class A, and initiating or priming explosives, must not be transported in the same car nor with any of the Hazardous Materials, other than explosives, for which labels are prescribed nor with charged electric storage batteries. (See Loading and Storage chart contained in the Department of Transportation Regulations.)
4. All steel cars (i.e., cars with steel lining and steel floors, nailable or non-nailable) must not be used for the loading of bulk explosives such as T.N.T., black powder, dynamite, propellant powders and similar explosives.
5. Cars equipped with bracing devices (belt rails and crossmembers) and load divider cars MUST NOT be used for loading of bulk explosives such as T.N.T., black powder, dynamite, propellant powders and similar explosives, which are liable to sift or become lodged in the belt rails, floor tracks or mechanism of the bracing devices in the event of container failure.
6. Cars for loading of Explosives, Class B, must be in good condition, into which sparks cannot enter and do not require certification.
7. Explosives, Class B, must not be loaded, transported or stored in cars equipped with any type of lighted heater or open-flame device or in cars equipped with any apparatus or mechanism utilizing an internal combustion engine in its operation.
8. Cars for loading of Explosives, Class C, must be in good condition and do not require certification.
9. The weight of the load in or on a car must not exceed the load limit stenciled on the car.
10. The weight of the load on one truck must not exceed one-half (1/2) of the load limit stenciled on the car. In case of doubt, the weight on each truck must be verified by weighing the loaded car.
11. The percentages (see Page 6) of stenciled load limits must not be exceeded for loads located between truck centers, measured lengthwise of car.
12. Combined center of gravity (measured from top of rail) of car and load must not exceed 98". (See Rule 89 - Field Manual - A.A.R. (Mechanical Division) Interchange Rules.)

13. Flammable liquids and flammable compressed gases must not be loaded, transported or stored in cars equipped with any type of lighted heater or open-flame device or in cars equipped with any apparatus or mechanism utilizing an internal combustion engine in its operation.

14. Protruding nails, screws or bolts must be drawn, redriven and/or tightened and pieces of metal must be removed from car walls or floor. (See Nail Finder on Page 7.)

15. Cars having corrugated or pressed metal ends which are not lined, or where the lining is such that packages will not bear throughout their entire end surface, and cars with bowed ends must be boarded up at the inside of the ends to the height of the load. (See Gate Details on Page 11 and typical application of same on Page 12.)

16. Boxes of Explosives or Other Hazardous Materials may be loaded cross-wise or lengthwise of the car (see Page 8), but not so that the ends of wooden boxes will bear against the sides of fibreboard boxes or so that the ends of any box will cause a high pressure on a small area of another box in the same row of the load. Lightly constructed and/or fibreboard boxes should be separated from more substantially constructed boxes by use of a divider. (See Detail on Page 13 and illustration of application on Page 12.) Packages marked "This Side Up" or "This End Up" must be so loaded.

17. When the width of the car exceeds the total width of the packages in a stack across the car, excess space must be treated as illustrated on Page 9.

18. All lost space, particularly lengthwise, must be avoided by compactly loading and exerting pressure on each package toward the end of the car as each package is being loaded. All voids lengthwise of the load, which might develop by loading odd numbers of packages or packages of uneven lengths, must be filled with adequately fabricated space fillers or random length solid fill.

19. Packages of Explosives or Other Hazardous Materials must not be loaded in the car area opposite the doors unless doorway protection is provided. (See Page 14.) Plug doors in cars so equipped will be protected from pressure of lading loaded directly adjacent thereto by use of door spanner lumber. No dunnaging material will be nailed to plug doors unless the doors are equipped with an adequate nailing strip.

20. Lumber used for blocking and bracing must be sound, free from cross-grain knots, knot holes and checks or splits which impair the strength of the material or interfere with adequate nailing. The sizes of material shown in the typical illustrations and details herein are allowable minimums and while lumber of wider and/or longer dimension is acceptable, use of thicker material should be considered in conjunction with increased nailing requirements. (See Page 7.) Floor blocking in cars with nailable steel floors should be extended to insure adequate nailing (see Pages 15, 16 and 21).

21. Nails must be used in sufficient number and of a length to provide penetration of both the blocking lumber and a minimum of 2/3 of the car floor or car lining. To avoid splitting of the blocking lumber, nails must not be too large and should be used in a staggered pattern rather than along one grain. Whenever possible, nails should be driven straight and "toe-nailing" should be avoided. When driving nails near packages of Explosives, extreme care must be exercised to see that the nails are not directed, and not likely to be deflected, towards the packages of Explosives. Nails may be common or cement coated.

TERMINOLOGY

ROW- PACKAGES EXTENDING LENGTHWISE OF THE CAR, PARALLEL TO THE SIDES AND ONE PACKAGE IN WIDTH.

LAYER- A COURSE OR STRATUM OF THE LOAD PARALLEL TO THE CAR FLOOR AND ONE PACKAGE IN HEIGHT.

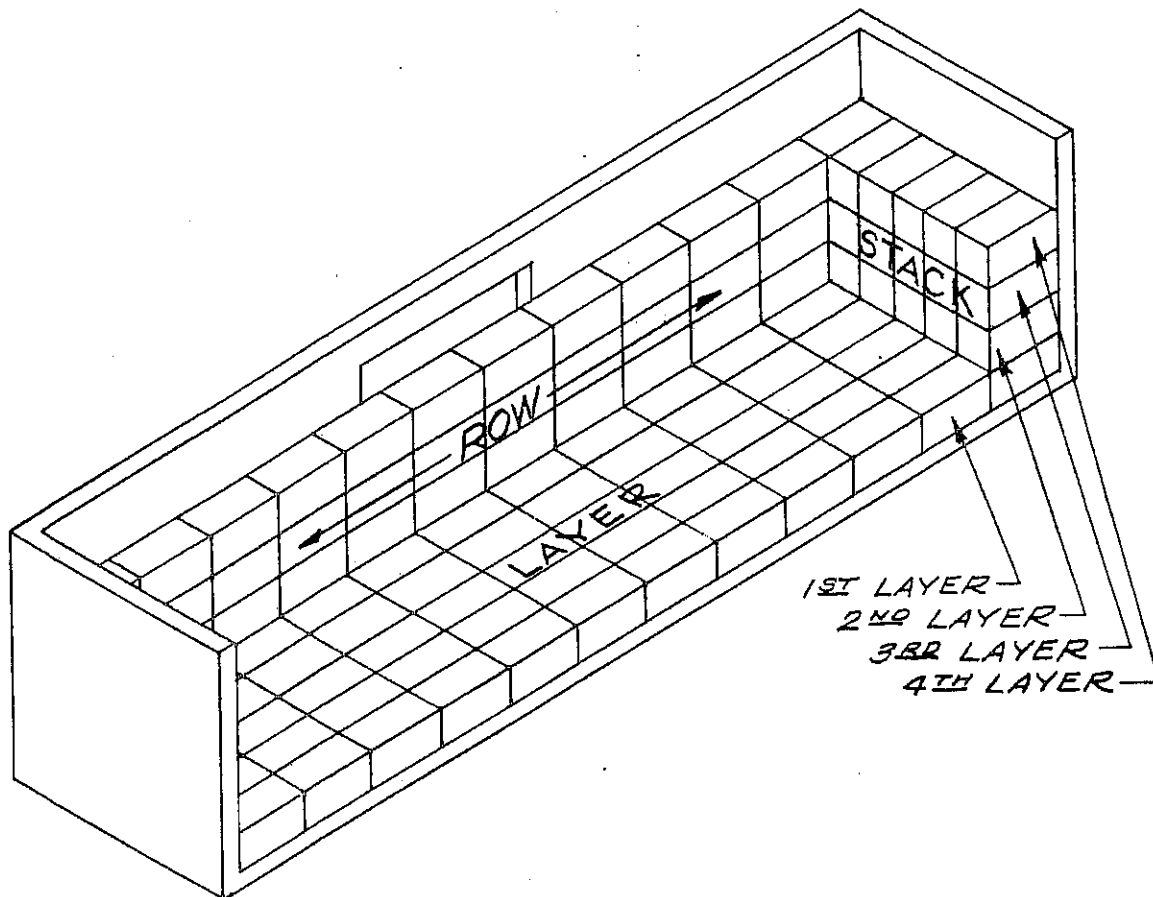
FIRST LAYER- THE LAYER OF PACKAGES RESTING ON THE CAR FLOOR.

INCOMPLETE LAYER- A LAYER, USUALLY THE TOP LAYER, IN WHICH THERE IS A SMALLER NUMBER OF PACKAGES THAN IN THE FULL LAYERS.

STACK- PACKAGES EXTENDING FROM ONE SIDE OF THE CAR TO THE OTHER, PARALLEL TO THE END OF THE CAR AND ONE PACKAGE IN LENGTH.

SPACE FILLERS- THOSE STRUCTURES, FRAMES, OR STRIPS USED TO FILL SPACE THROUGHOUT THE LOAD IN ORDER TO OBTAIN FULL END AREA WHICH MAY DEVELOP AS THE RESULT OF VARIOUS LENGTHS AND WIDTHS OF PACKAGES.

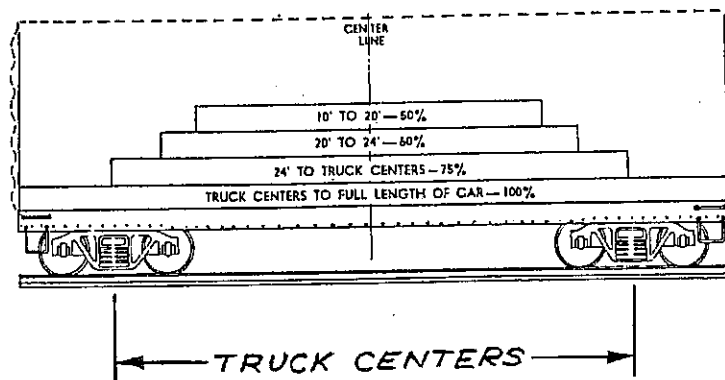
DIVIDED LOAD- A LOAD SEPARATED INTO TWO UNITS AT THE DOORWAY BY A CENTER GATE OR CENTER BRACE



THE WEIGHT OF LOAD IN OR ON A CAR MUST NOT EXCEED THE LOAD LIMIT STENCILED ON CAR.

THE WEIGHT OF LOAD ON ONE TRUCK MUST NOT EXCEED ONE-HALF OF THE LOAD LIMIT STENCILED ON CAR. IN CASE OF DOUBT, THIS SHOULD BE VERIFIED BY WEIGHING.

THE PERCENTAGES OF STENCILED LOAD LIMITS, AS SHOWN BELOW, MUST NOT BE EXCEEDED FOR LOADS LOCATED BETWEEN TRUCK CENTERS, MEASURED LENGTHWISE OF CAR, UNLESS CAR OWNER HAS OTHERWISE DESIGNATED BY NOTE IN THE "OFFICIAL EQUIPMENT REGISTER" THAT THESE PERCENTAGES MAY BE CHANGED.

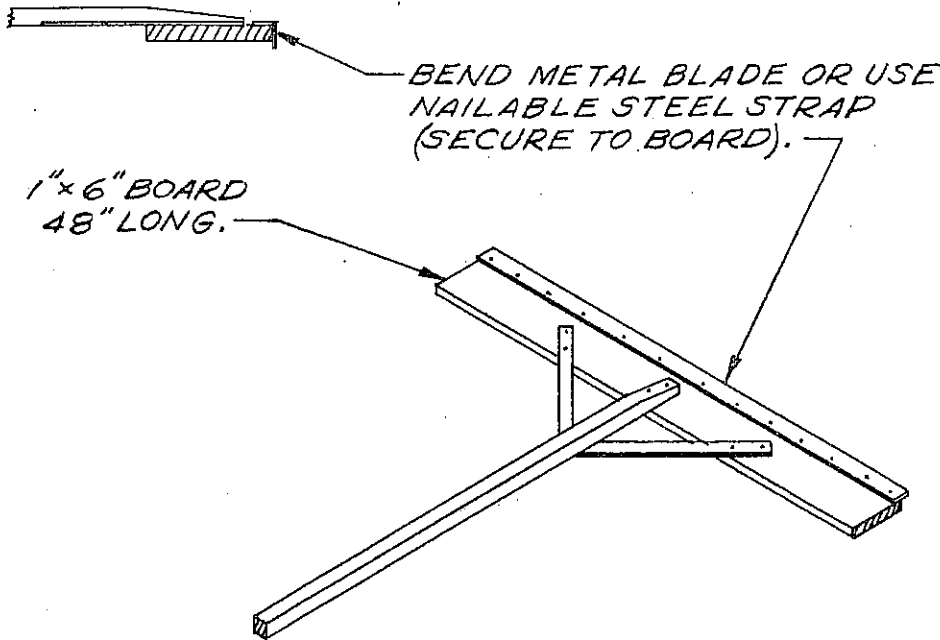


WEIGHT OF MATERIAL LOADED IN EITHER END BETWEEN TRUCK CENTERS AND END OF CAR MUST NOT EXCEED 15% OF STENCILED LOAD LIMIT FOR CARS BUILT PRIOR JANUARY 1, 1966, AND 25% FOR CARS BUILT SUBSEQUENT JANUARY 1, 1966.

FOR PROPER DISTRIBUTION OF WEIGHT CROSSWISE OF CAR, THE LOAD MUST BE LOCATED SO THAT THE WEIGHT ALONG BOTH SIDES OF CAR IS ABOUT EQUAL FOR THE ENTIRE LENGTH OF THE LOAD.

WEIGHT DISTRIBUTION

NAIL FINDER



NOTE - PROTRUDING NAILS, STAPLES, STEEL STRAP ANCHORS, OR OTHER PROJECTIONS ON SIDEWALLS, ENDS, DOOR POSTS, STUDDING OR FLOORS, LIABLE TO PUNCTURE PACKAGES, PARTICULARLY THOSE IN BAGS OR FIBERBOARD BOXES, MUST BE REMOVED BEFORE LOADING CARS.

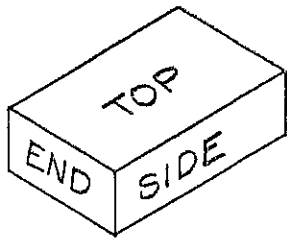
THE NAIL FINDER ILLUSTRATED ABOVE MAY BE USED IN LOCATING SUCH PROJECTIONS.

<u>SIZE</u>	<u>LENGTH</u>	<u>SIZE</u>	<u>LENGTH</u>	<u>SIZE</u>	<u>LENGTH</u>
6d	2"	10d	3"	30d	4½"
7d	2¼"	12d	3¼"	40d	5"
8d	2½"	16d	3½"	50d	5½"
9d	2¾"	20d	4"	60d	6"

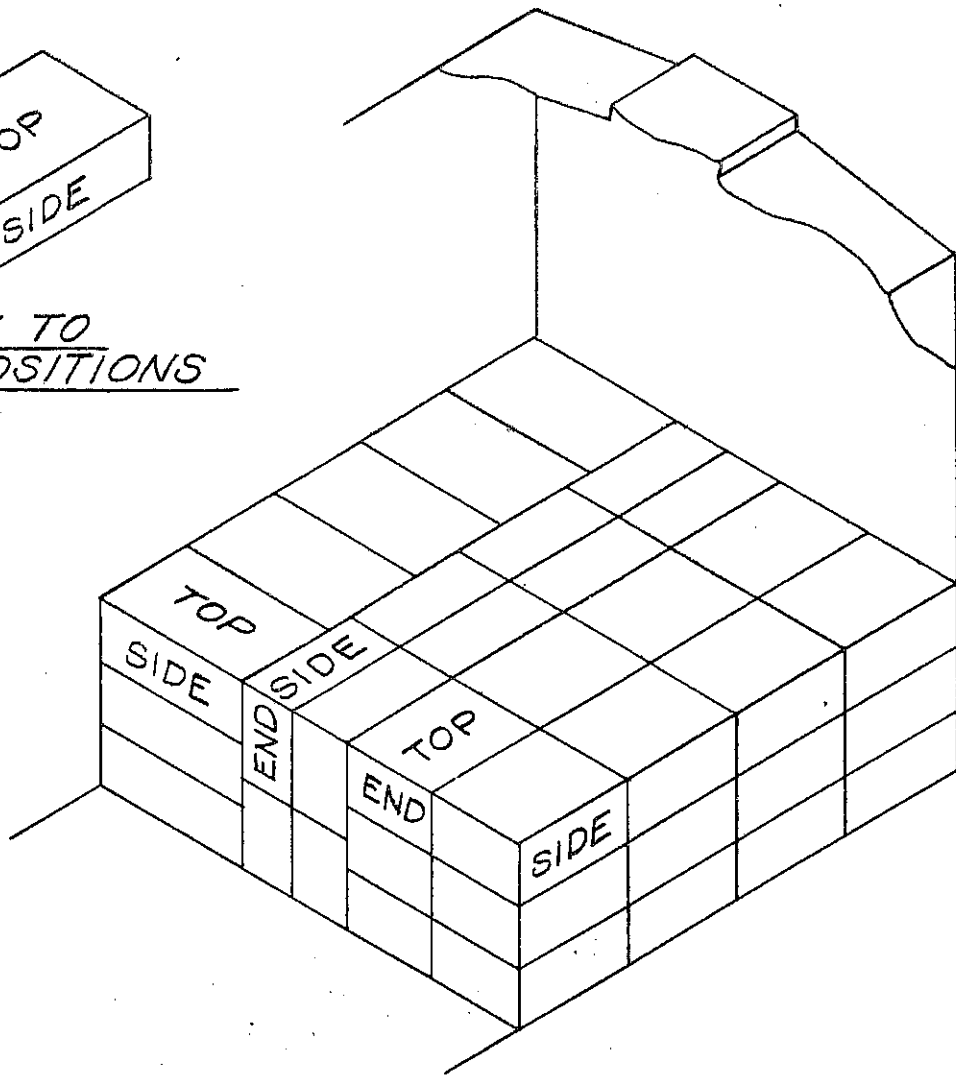
NAIL SIZE CHART

NOTE - NAILING REQUIREMENTS STATED IN THIS PAMPHLET ARE BASED ON THE USE OF COMMON OR CEMENT-COATED NAILS OF THE SIZES SPECIFIED. SELECTION OF THE PROPERLY SIZED NAILS FOR USE WITH DUNNAGE OF A THICKNESS GREATER THAN THE MINIMUMS SHOWN HEREIN, SHOULD BE MADE FROM THE ABOVE CHART, SEE GENERAL RULES 20 AND 21, PAGE 4.

NOMINAL 2" LUMBER SHOULD BE NAILED TO THE CAR FLOOR WITH 16d (3½") NAILS FOR THE FIRST THICKNESS AND 40d (5") NAILS FOR EACH ADDITIONAL THICKNESS. USE 10d (3") NAILS FOR NAILING 2" LUMBER TO SIDE WALLS.



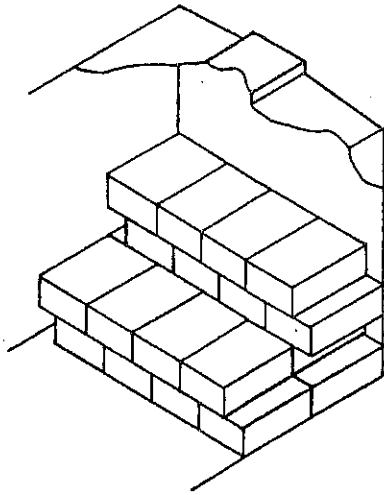
KEY TO
BOX POSITIONS



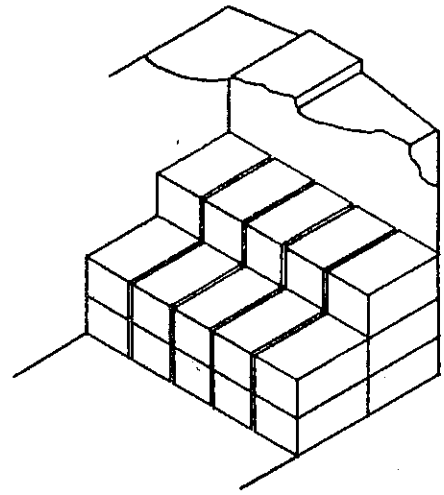
USE OF COMBINATIONS
OF BOX POSITIONS

NOTE:

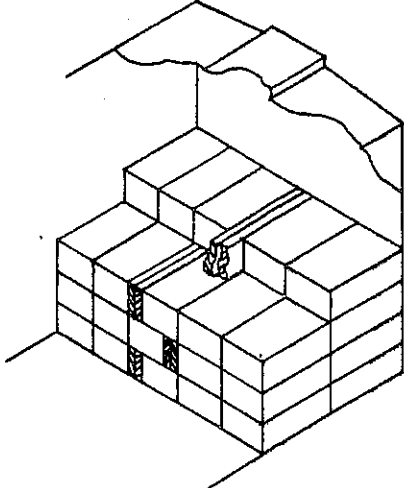
BOXED EXPLOSIVES OR OTHER HAZARDOUS MATERIALS MAY BE LOADED IN CARS USING ANY ONE OR COMBINATION OF POSITIONS SHOWN UNLESS THE BOX IS SPECIFICALLY MARKED "THIS SIDE UP". BOXES MUST NOT BE LOADED SO THAT THE ENDS OF WOODEN BOXES BEAR AGAINST THE SIDES OF FIBERBOARD BOXES, OR SO THAT THE END OF ANY BOX WILL CAUSE A HIGH PRESSURE ON A SMALL AREA OF ANOTHER BOX, WITHIN THE SAME ROW OF THE LOAD.



ALTERNATING LAYERS AGAINST OPPOSITE SIDES OF CAR

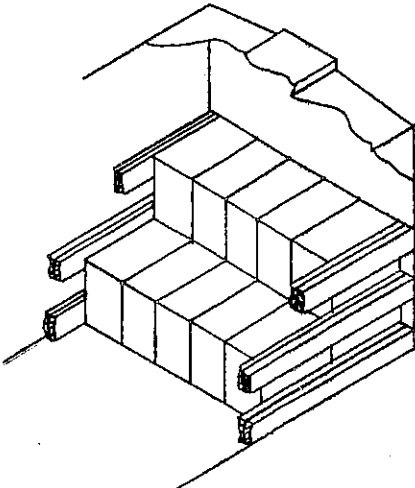


DISTRIBUTION OF SPACE ACROSS WIDTH OF LOAD



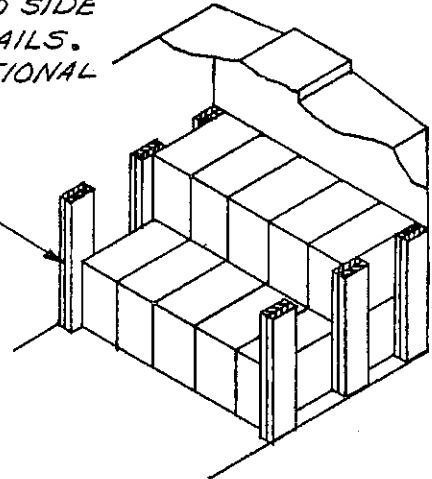
CENTER FILLER

EXCESS SPACE ACROSS WIDTH OF CAR MUST NOT EXCEED ONE-THIRD THE WIDTH OF A BOX, AND MAY BE TREATED AS SHOWN ABOVE. SPACE GREATER THAN ONE-THIRD BOX WIDTH WILL BE FILLED BY DEPICTED METHODS OR COMBINATIONS THEREOF.



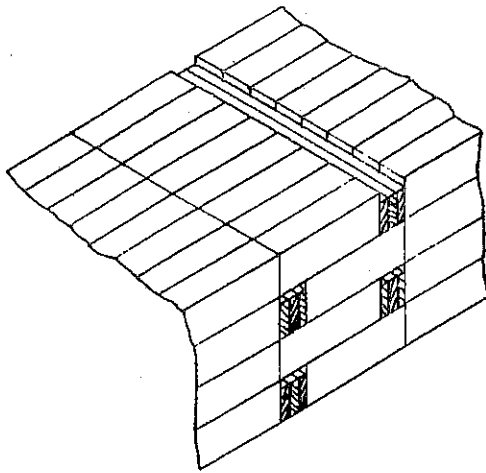
SIDEWALL HORIZONTAL FILLER

NAIL 1ST PIECE TO SIDE WALL W/10d (3") NAILS. NAIL EACH ADDITIONAL PIECE W/12d (3 1/4") NAILS.



SIDEWALL VERTICAL FILLER

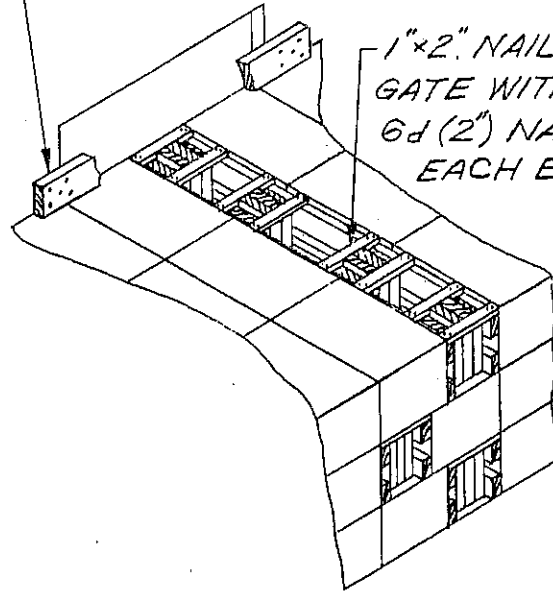
EXCESS SPACE ACROSS CAR



STAGGERED
SOLID CENTER FILL

FOR USE WHEN SPACE
AT CENTER IS LESS
THAN 8".

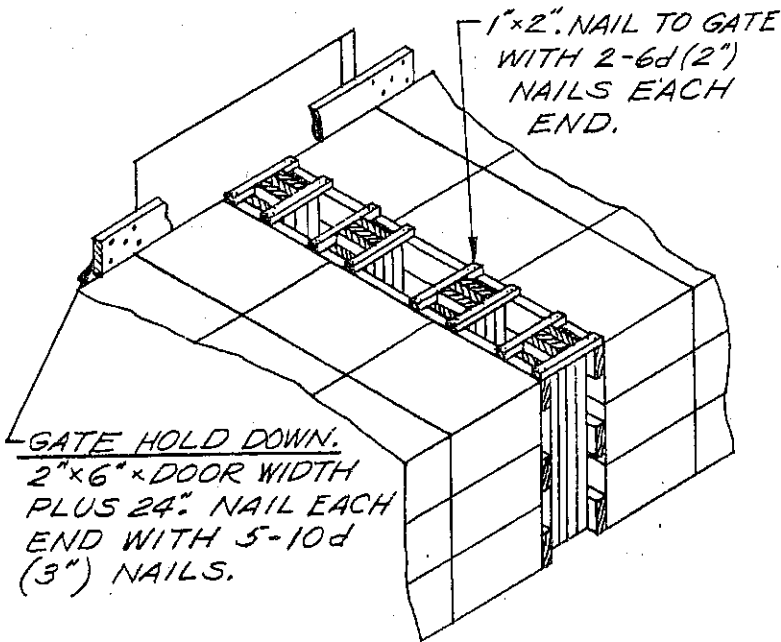
GATE HOLD DOWN, 2" x 6" x DOOR
WIDTH PLUS 24". NAIL EACH
END WITH 5-10d (3") NAILS.



1" x 2" NAIL TO
GATE WITH 2-
6d (2") NAILS
EACH END.

SHORT WEDGED
CENTER GATES

FOR USE WHEN SPACE
AT CENTER IS 8" TO 20"
AND LOAD IS GREATER
THAN 48" IN HEIGHT.



GATE HOLD DOWN,
2" x 6" x DOOR WIDTH
PLUS 24". NAIL EACH
END WITH 5-10d
(3") NAILS.

1" x 2" NAIL TO GATE
WITH 2-6d (2")
NAILS EACH
END.

FOR DETAILS OF CENTER
GATES, SEE PAGE 11.

WEDGED CENTER GATES

FOR USE WHEN SPACE AT CENTER
IS 8" TO 20" AND LOAD IS 48" OR
LESS IN HEIGHT.

GATE HOLD DOWN. 2"x6"x
DOOR WIDTH PLUS 24."
NAIL W/5-10d(3")
NAILS EACH
END.

2"x6" STRUTS DOUBLED. CUT TO
FIT LAMINATE W/1-10d(3")
NAIL EVERY 5". TOENAIL TO
GATE VERTICAL W/2-12d(3 1/4") EACH
END.

DO NOT NAIL STRUTS TO
CAR FLOOR.

STRUTS LONGER
THAN 48" SHOULD
BE BRACED VER-
TICALLY & HOR-
IZONTALLY AT
CENTER TO PRE-
VENT SPRINGING.

STRUTS MAY
BE EITHER 4"x4"
OR DOUBLED 2"x6"
MATERIAL.

CENTER GATE. SEE
DETAIL BELOW.

STRUT BRACED
CENTER GATES

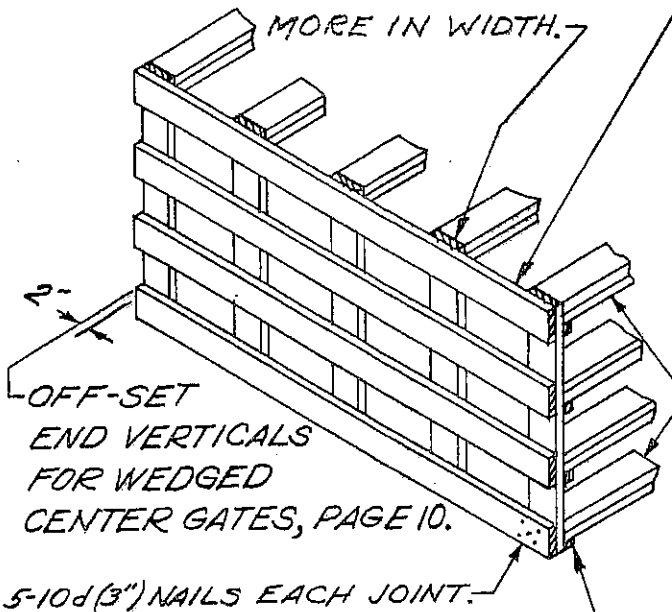
RECOMMENDED WHEN
SPACE AT CENTER
EXCEEDS 20"

VERTICALS. 2"x6"x LOAD HEIGHT.
LOCATE AT ENDS OF GATE AND
SPACE REMAINING EQUALLY.
4(MIN) REQUIRED FOR LOADS
4 BOXES OR LESS IN WIDTH. 5
REQUIRED FOR LOADS 5 BOXES OR
MORE IN WIDTH.

HORIZONTALS. 2"x6" x CAR
WIDTH MINUS 1/2". LOCATE AT
BOTTOM OF LOAD & CENTER ON
ALTERNATING JOINTS FORMED
BY LAYERS OF LOAD IN ORDER
TO CONTACT EACH LAYER. SOLID
FACED GATES SHOULD BE USED
FOR LIGHTLY CONSTRUCTED
OR FIBER BOARD BOXES.

STRUTS. LOCATE AT TOP & BOT-
TOM OF GATE. ALL STRUTS SHALL
BE ALIGNED WITH HORIZONTALS.
INTERMEDIATE STRUTS SHOULD
BE AS EQUALLY SPACED AS
ALIGNMENT PERMITS.

2"x2" x GATE WIDTH. LOCATE TO
PROVIDE PROPER STRUT SPACING.
NAIL WITH 2-10d(3") NAILS EACH
JOINT.



DETAIL OF CENTER
GATE

USE OF CENTER GATE IS PREFERRED TO ALIGN HEAVILY BOWED END WALL, TO OBTAIN A FLUSH BEARING SURFACE, SHIM MATERIAL SHOULD BE NAILED TO THE VERTICALS OF THE GATE AND/OR END WALL. RANDOM LENGTH MATERIAL, PROPERLY SECURED, MAY BE USED FOR CARS WITH SLIGHTLY BOWED ENDS.

DIVIDER. SEE DETAIL ON PAGE 13.

DOORWAY PROTECTION. SEE DETAIL ON PAGE 14.

GATE HOLD DOWN. SEE PAGE 11.

STEPPED-DOWN LOAD.

SHIM.

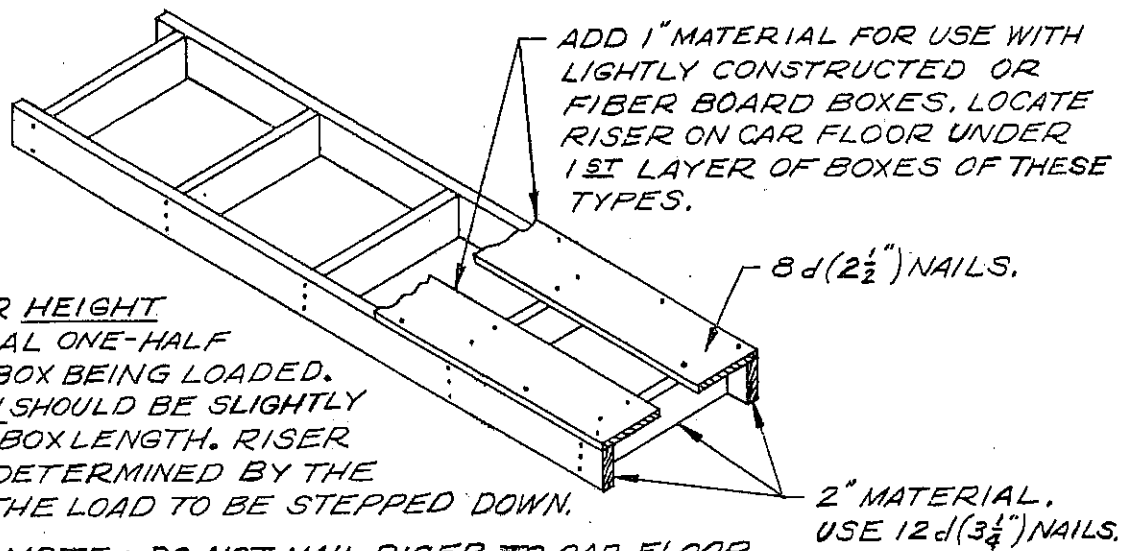
RISER. SEE DETAIL ON PAGE 13.

SEE PAGE 9 FOR METHODS OF TREATING EXCESS SPACE ACROSS WIDTH OF CAR.

FOR COMBINATIONS OF BOX POSITIONS SEE PAGE 8.

STRUT BRACED CENTER GATES. FOR DETAIL OF GATE, SEE PAGE 11. FOR VARIOUS METHODS OF CENTER BLOCKING, SEE PAGES 10 AND 11.

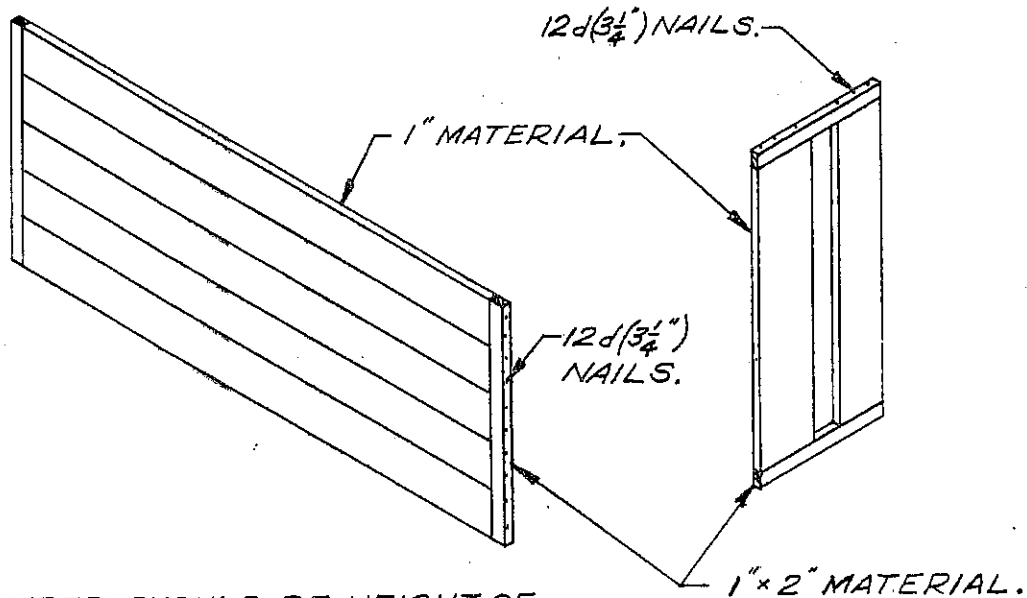
TYPICAL CARLOADING OF BOX PACKED ITEMS
(ILLUSTRATING VARIOUS LOADING PROCEDURES)



NOTE: RISER HEIGHT SHOULD EQUAL ONE-HALF HEIGHT OF BOX BEING LOADED. RISER WIDTH SHOULD BE SLIGHTLY LESS THAN BOX LENGTH. RISER LENGTH IS DETERMINED BY THE WIDTH OF THE LOAD TO BE STEPPED DOWN.

NOTE: DO NOT NAIL RISER TO CAR FLOOR.

RISER DETAIL
 (FOR STEPPED-DOWN LOADS.)
 SEE PAGES 12 AND 17 FOR APPLICATION.



NOTE: DIVIDER SHOULD BE HEIGHT OF LOAD. DIVIDER LENGTH IS DETERMINED BY WIDTH OF LOAD TO BE SEPARATED. WHEN HEIGHT OF DIVIDER IS GREATER THAN WIDTH, POSITION 1" x 2" CLEATS AT TOP AND BOTTOM. USE DIVIDERS WITH LIGHTLY CONSTRUCTED OR FIBER BOXES. SEE PAGE 12 FOR APPLICATION.

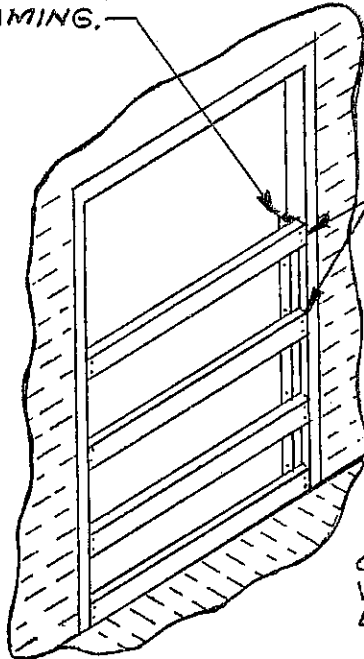
NOTE: 1/2" (MIN) PLYWOOD MAY BE USED IN LIEU OF DEPICTED DIVIDER.

DIVIDER DETAIL

2"x3" FRAMING.

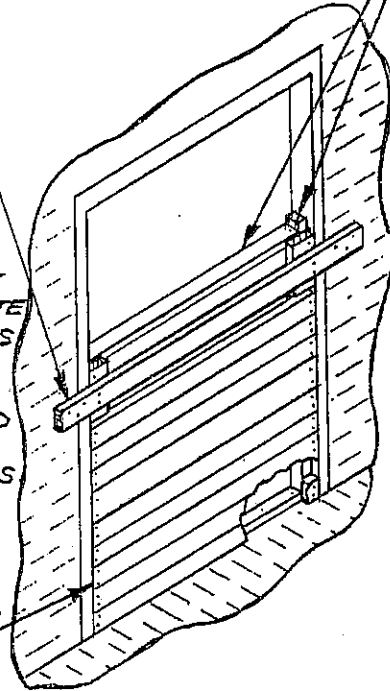
THIS PIECE IS ABOVE THE LOAD. USE AS GATE HOLD DOWN FOR CENTER BLOCKING.

2"x3" FRAMING.



1"x6" OR 2"x6" MATERIAL. POSITION AT TOP AND BOTTOM OF LOAD AND AT THE JOINTS OF ALTERNATE LAYERS FOR LOADS OF WOODEN OR METAL BOXES. FOR PALLETS AND SKIDDED UNITS, USE TWO (2) PIECES PER LAYER.

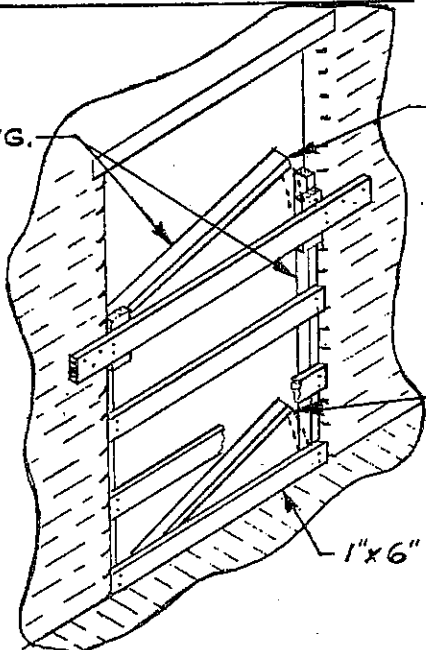
2" MATERIAL, 3" OR GREATER IN WIDTH. CONSTRUCT LOAD HEIGHT.



FOR USE WITH DOOR POSTS OF WOOD, OR STEEL WITH HOLES FOR NAILING.

FOR USE WITH SQUARED STEEL DOOR POSTS WITHOUT NAILING HOLES.

2"x3" FRAMING.



WEDGE FIT.

SOLID-FACED GATES AS SHOWN ABOVE ARE REQUIRED FOR LOADS OF FIBERBOARD BOXES AND OTHER LIGHTLY CONSTRUCTED BOXES AND CONTAINERS.

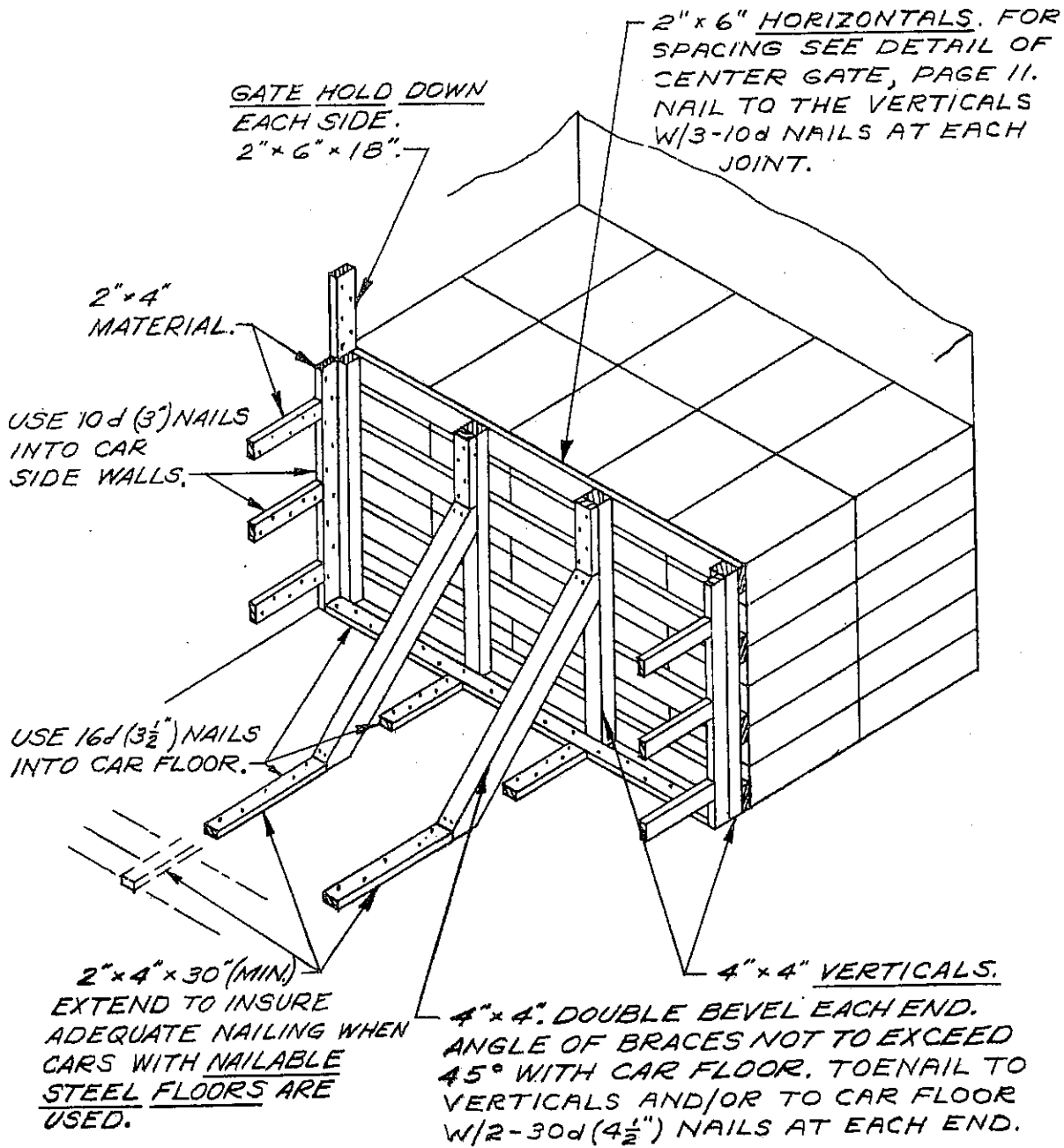
FOR STEEL THRESHOLDS, CUT SLIGHTLY LONGER THAN MEASURED AND WEDGE INTO PLACE.

1"x6" OR 2"x6" MATERIAL.

FOR USE WITH ROUNDED STEEL DOOR POSTS.

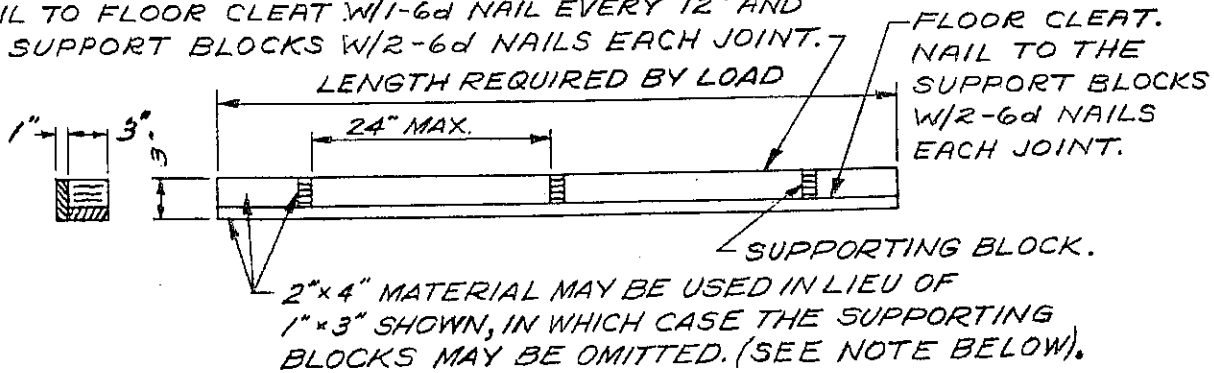
NOTE:
FOR CARS EQUIPPED WITH PLUG DOORS, SEE GENERAL RULE 19 ON PAGE 4.

DOORWAY PROTECTION



END BRACE
FOR LCL SHIPMENTS NOT EXCEEDING 5000
POUNDS

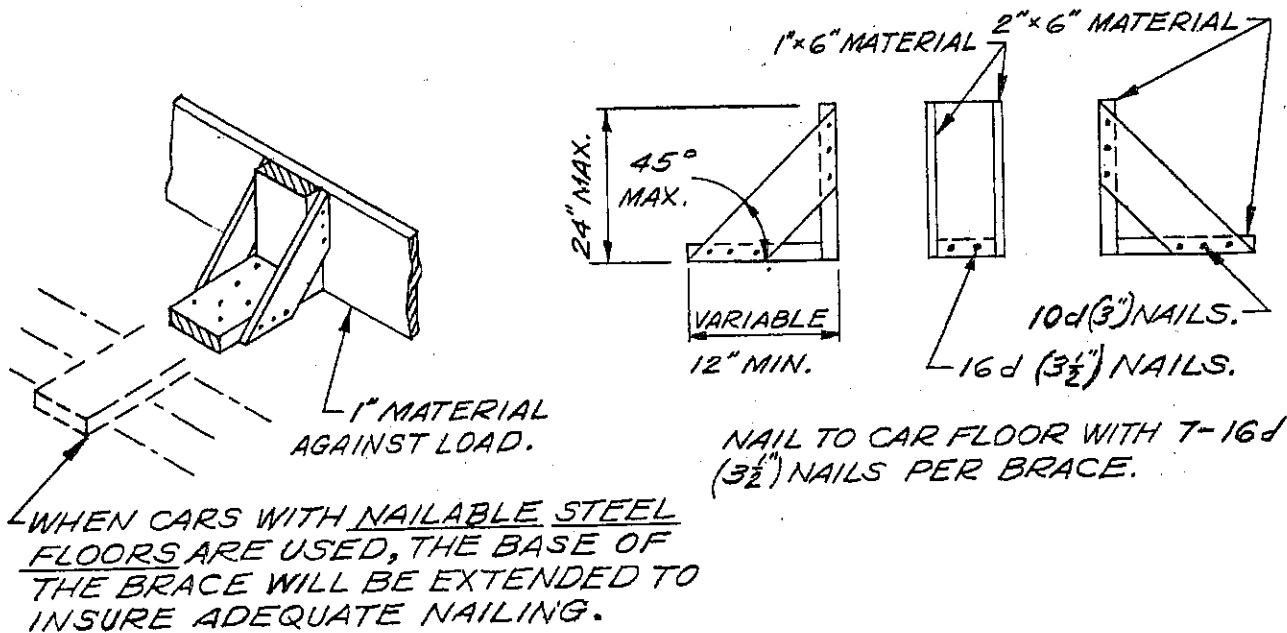
NAIL TO FLOOR CLEAT W/1-6d NAIL EVERY 12" AND TO SUPPORT BLOCKS W/2-6d NAILS EACH JOINT.



LUMBER SIZES SHOWN ARE NOMINAL. NAIL TOGETHER WITH 10d (3") NAILS, IF 2" MATERIAL IS USED.

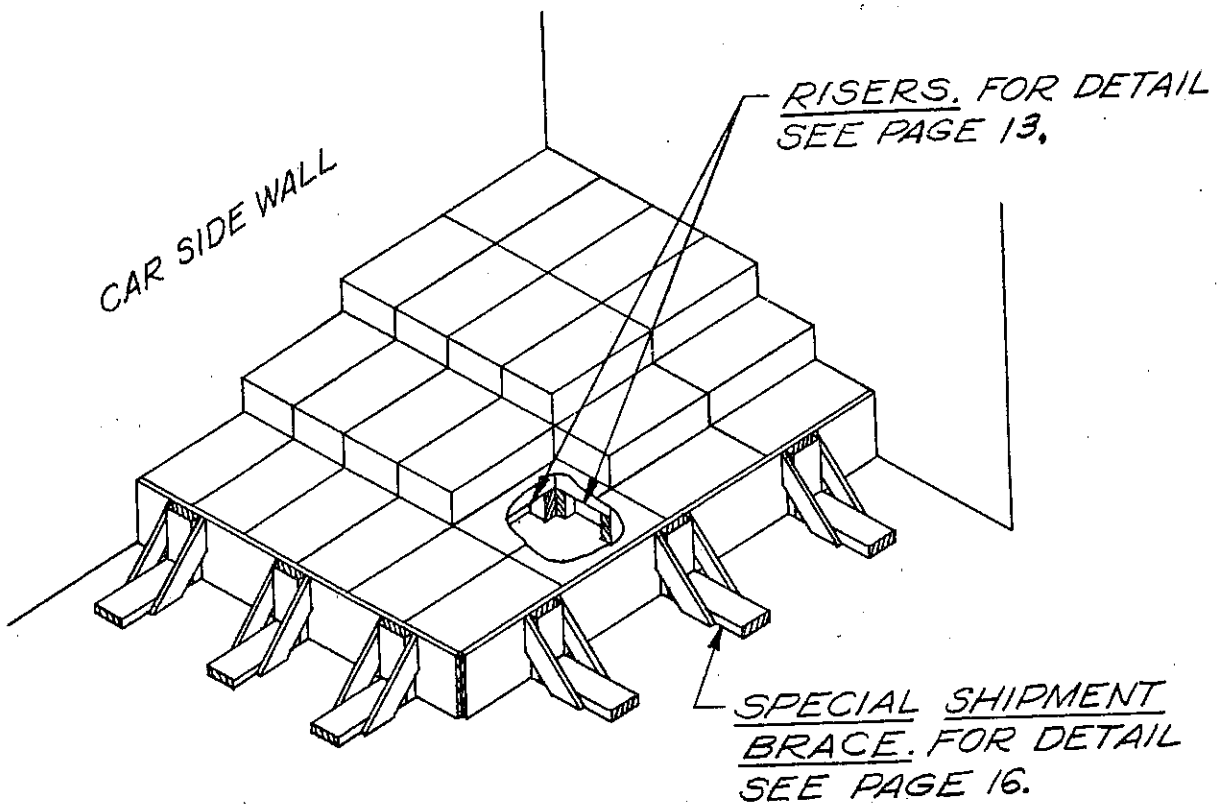
NOTE: STANDARD SHIPMENT BRACE MAY NOT BRACE MORE THAN 800 LBS PER FOOT OF LENGTH WHEN BRACE EXTENDS ACROSS ENTIRE WIDTH OF CAR. BRACE IS LIMITED TO 500 LBS PER FOOT OF LENGTH WHEN IT DOES NOT EXTEND ACROSS ENTIRE WIDTH OF CAR. WHEN USED AS AN END BRACE, NAIL TO CAR FLOOR W/7-10d (3") NAILS (STAGGERED) PER FOOT OF LENGTH. WHEN USED AS A SIDE BRACE, NAIL TO FLOOR W/4-10d (3") NAILS PER FOOT OF LENGTH. WHEN BRACE IS CONSTRUCTED OF 2"x4" MATERIAL AS STATED ABOVE, NAIL TO FLOOR WITH 16d (3½") NAILS.

STANDARD SHIPMENT BRACE

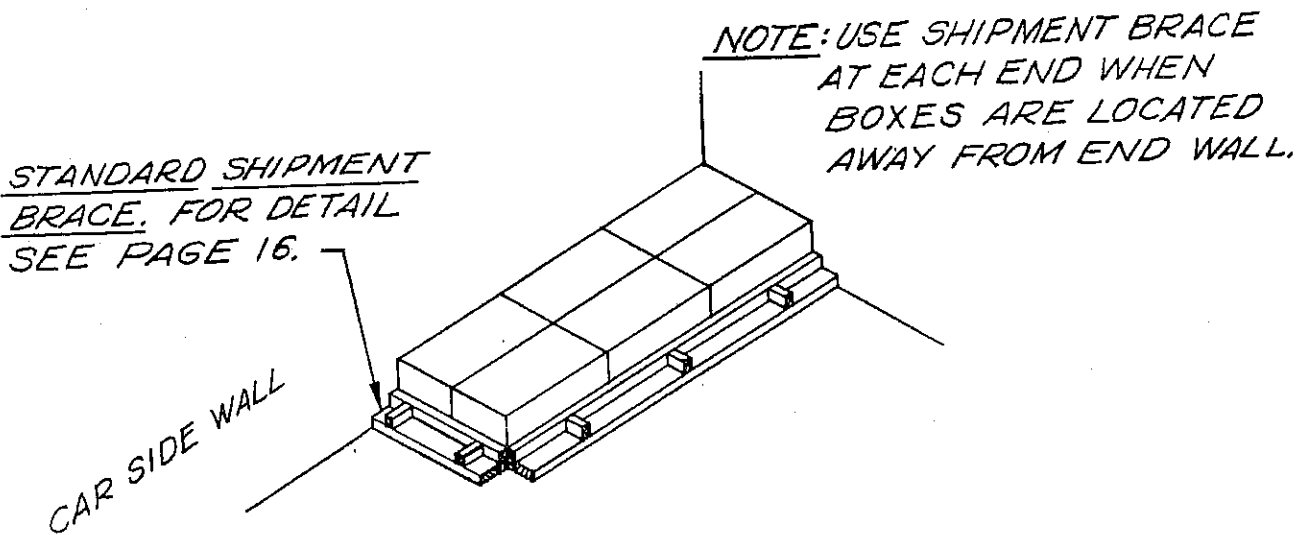


NOTE: EACH BRACE WILL SUPPORT 2000 LBS. SPACING OF BRACES NOT TO EXCEED 24" CENTER TO CENTER. A MINIMUM OF 2 BRACES WILL BE USED ON SURFACES 18"-30" WIDE. LOAD WEIGHT AND/OR WIDTH WILL DETERMINE NUMBER AND SPACING OF BRACES.

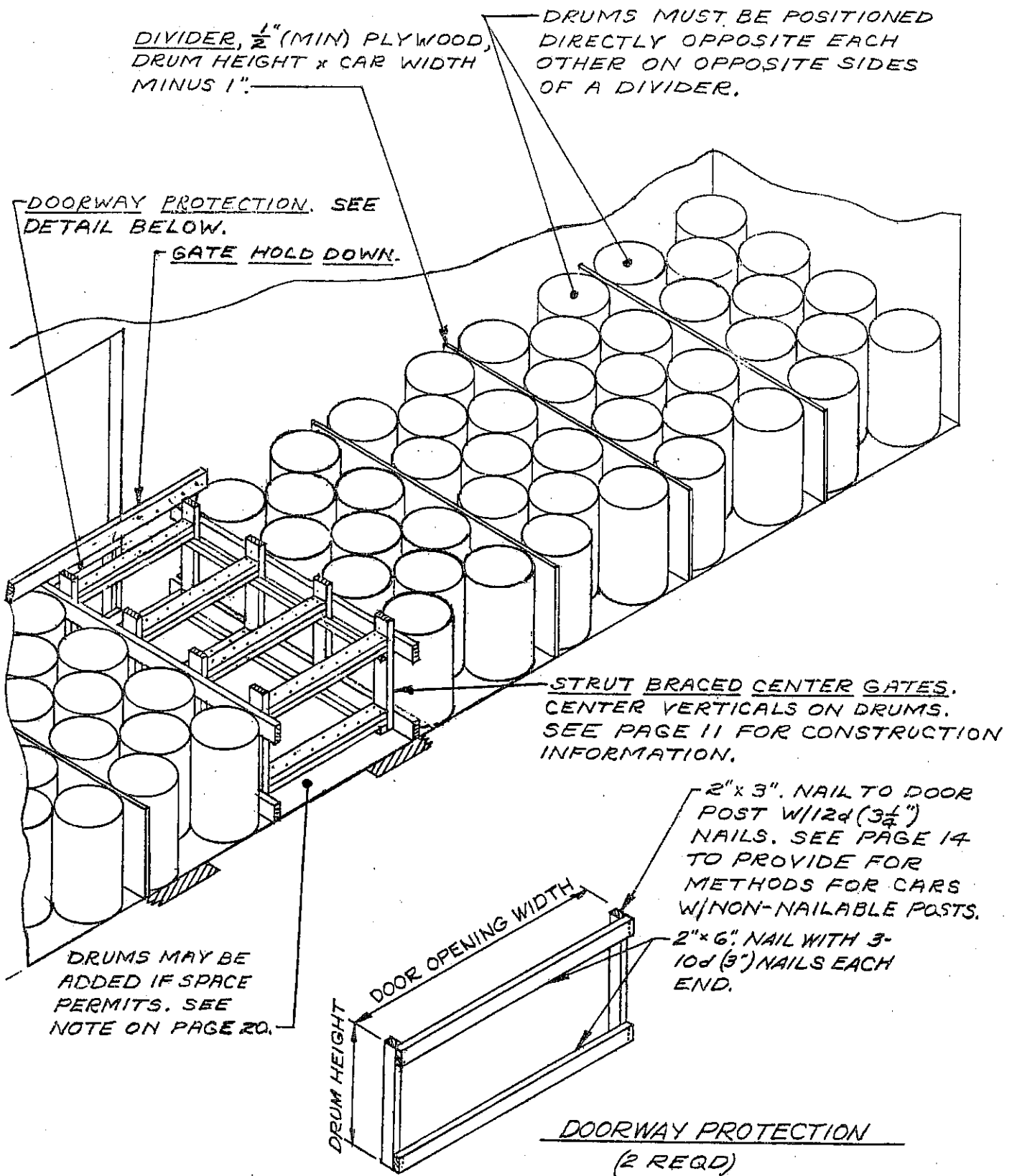
SPECIAL SHIPMENT BRACE



TYPICAL LCL BLOCKING
FOR LARGE QUANTITIES OF
BOXES



TYPICAL LCL BLOCKING
FOR SMALL QUANTITIES OF
BOXES



TYPICAL CARLOAD OF HAZARDOUS MATERIALS
IN TIGHT HEAD DRUMS

DRUMS MUST BE POSITIONED DIRECTLY OPPOSITE EACH OTHER ON OPPOSITE SIDES OF A DIVIDER.

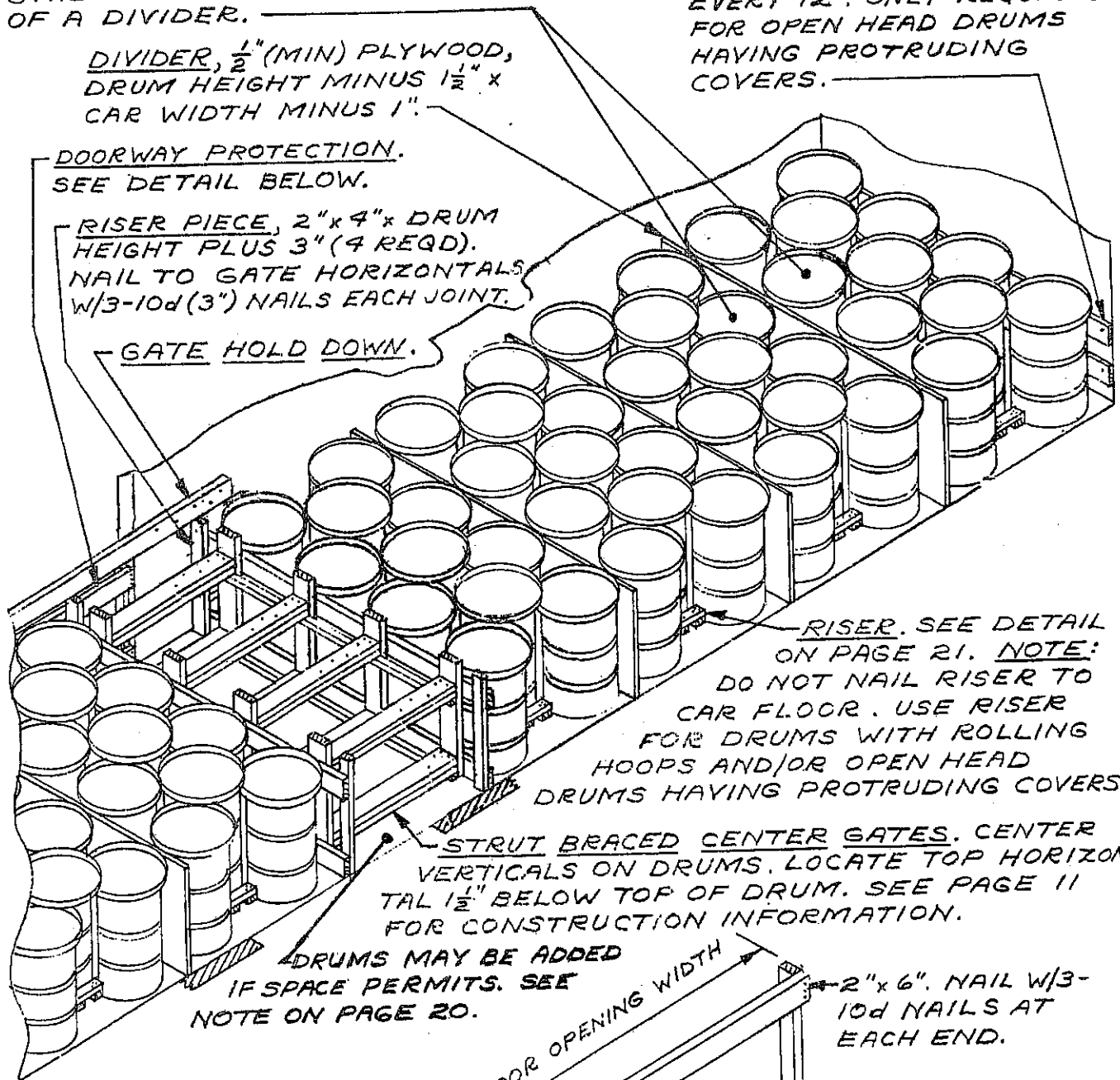
END WALL BATTEN, 1" x 6" x CAR WIDTH - 1". NAIL TO CAR END WALL W/ 1-6d (2") NAIL EVERY 12". ONLY REQUIRED FOR OPEN HEAD DRUMS HAVING PROTRUDING COVERS.

DIVIDER, $\frac{1}{2}$ " (MIN) PLYWOOD, DRUM HEIGHT MINUS $1\frac{1}{2}$ " x CAR WIDTH MINUS 1".

DOORWAY PROTECTION. SEE DETAIL BELOW.

RISER PIECE, 2" x 4" x DRUM HEIGHT PLUS 3" (4 REQD). NAIL TO GATE HORIZONTALS W/ 3-10d (3") NAILS EACH JOINT.

GATE HOLD DOWN.



RISER. SEE DETAIL ON PAGE 21. NOTE: DO NOT NAIL RISER TO CAR FLOOR. USE RISER FOR DRUMS WITH ROLLING HOOPS AND/OR OPEN HEAD DRUMS HAVING PROTRUDING COVERS.

STRUT BRACED CENTER GATES. CENTER VERTICALS ON DRUMS. LOCATE TOP HORIZONTAL $1\frac{1}{2}$ " BELOW TOP OF DRUM. SEE PAGE 11 FOR CONSTRUCTION INFORMATION.

DRUMS MAY BE ADDED IF SPACE PERMITS. SEE NOTE ON PAGE 20.

2" x 6". NAIL W/ 3-10d NAILS AT EACH END.

2" x 3". NAIL TO DOOR POST W/ 12d (3 $\frac{1}{2}$ ") NAILS. SEE PAGE 14 TO PROVIDE FOR METHODS FOR CARS WITH NON-NAIL-ABLE DOOR POSTS.

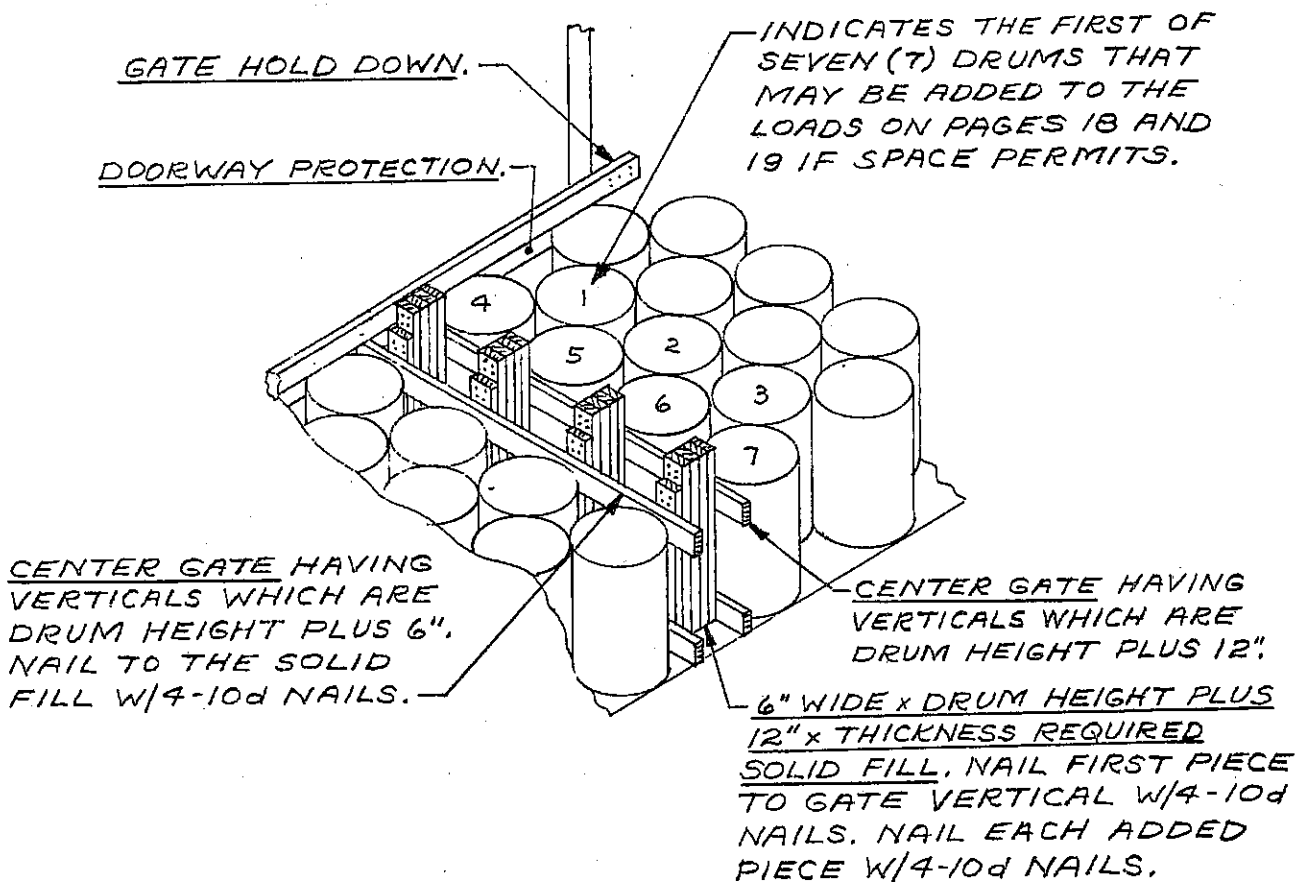
DRUM HEIGHT MINUS $1\frac{1}{2}$ "

DOORWAY PROTECTION (2 REQD)

TYPICAL CARLOAD OF HAZARDOUS MATERIALS IN OPEN HEAD DRUMS

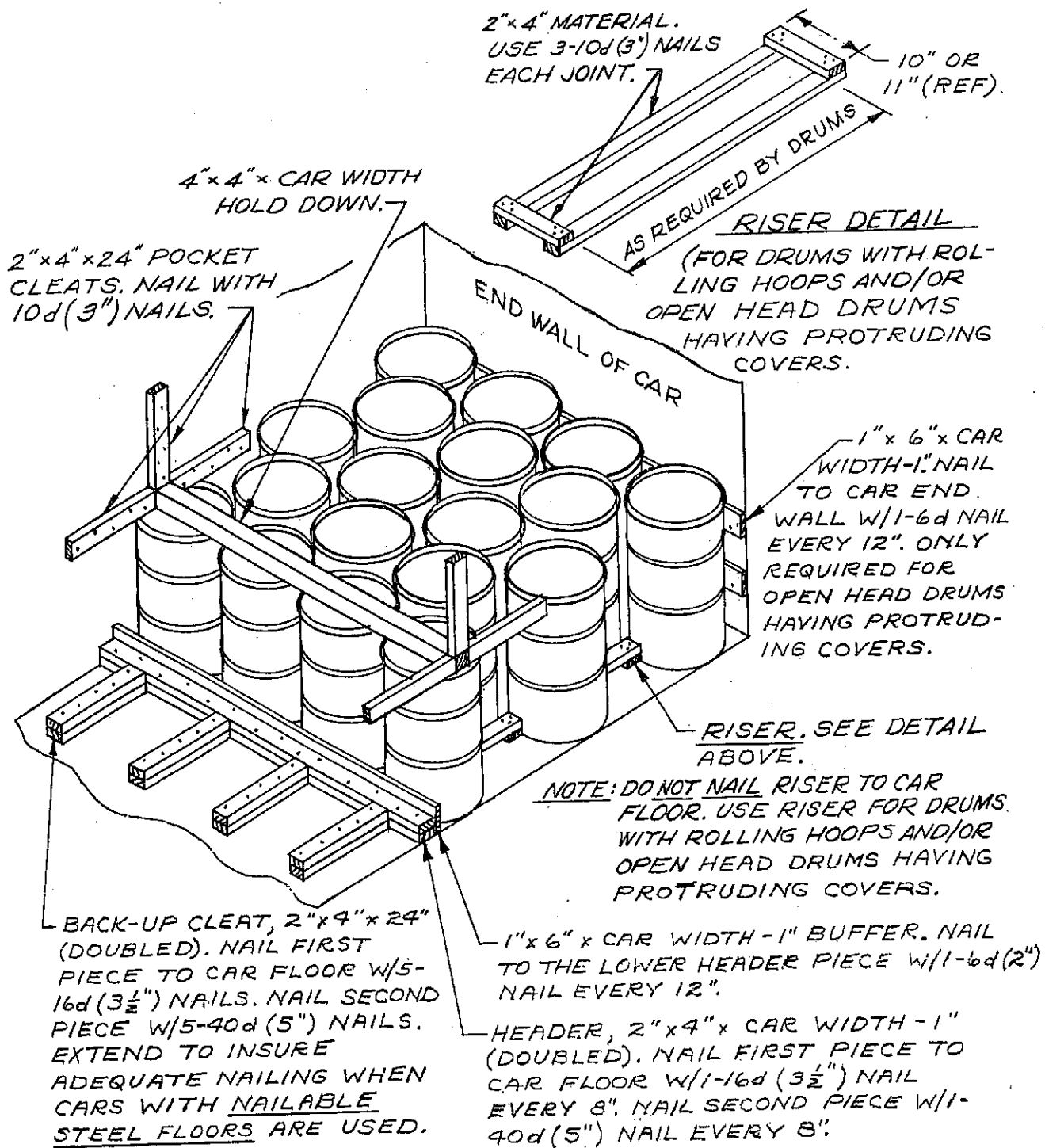
NOTE:

IF SPACE PERMITS, TWO STACKS (7 DRUMS) MAY BE ADDED TO EITHER OF THE LOADS DEPICTED ON PAGES 18 AND 19. CAUTION: DO NOT ADD ONLY 3 DRUMS OR ONLY 4 DRUMS. IN LIEU OF BRACING THE LOAD WITH STRUTS, SOLID FILL TYPE BRACING MAY BE INSTALLED, AS FOLLOWS: OMIT THE STRUT LEDGERS FROM BOTH CENTER GATES. INCREASE THE HEIGHT OF VERTICAL PIECES BY 6" ON ONE GATE, AND LAMINATE EACH PIECE OF 6" WIDE FILL OF THE SAME LENGTH TO THIS EXTENSION OR TO A PREVIOUSLY INSTALLED PIECE. SEE THE DETAIL BELOW FOR A TYPICAL INSTALLATION. IF DESIRED, PLYWOOD ($\frac{1}{2}$ " MIN) MAY BE SUBSTITUTED FOR THE HORIZONTAL PIECES OF THE CENTER GATES.



SOLID FILL TYPE BLOCKING

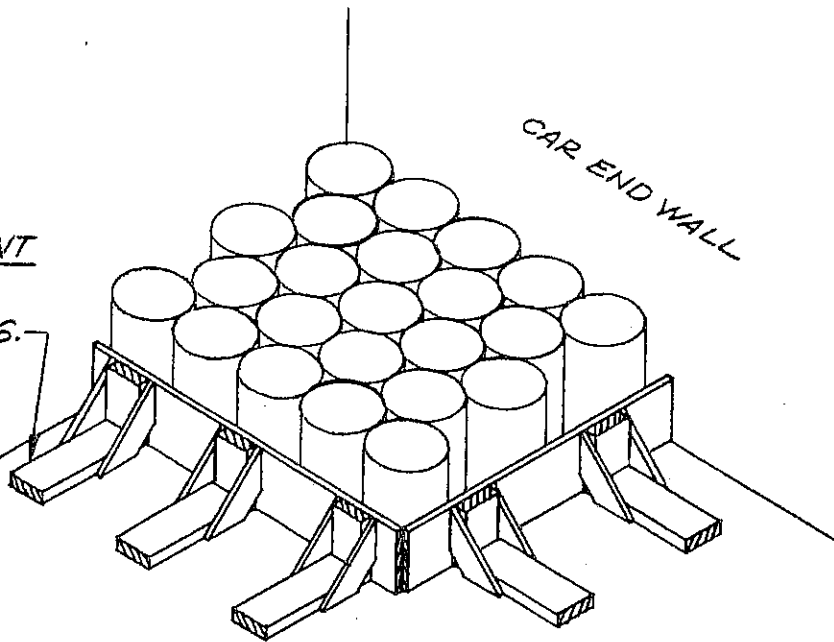
SEE NOTE ABOVE.



TYPICAL LCL OF HAZARDOUS MATERIALS
IN DRUMS

SPECIAL SHIPMENT
BRACE. FOR
DETAIL SEE PAGE 16.

CAR
SIDE WALL

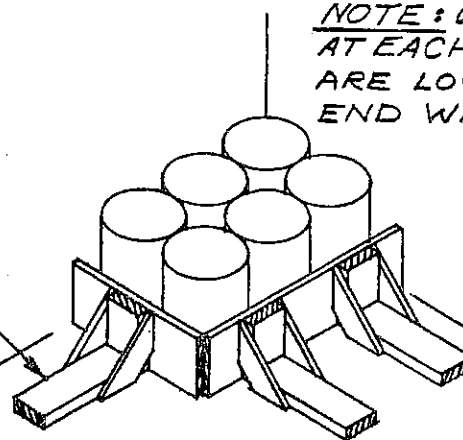


TYPICAL LCL BLOCKING FOR
LARGE QUANTITIES OF DRUMS NOT
EXCEEDING 15 GALLONS CAPACITY

NOTE: USE SHIPMENT BRACE
AT EACH END WHEN DRUMS
ARE LOCATED AWAY FROM
END WALL.

SPECIAL SHIPMENT
BRACE. FOR DETAIL
SEE PAGE 16.

CAR SIDE WALL



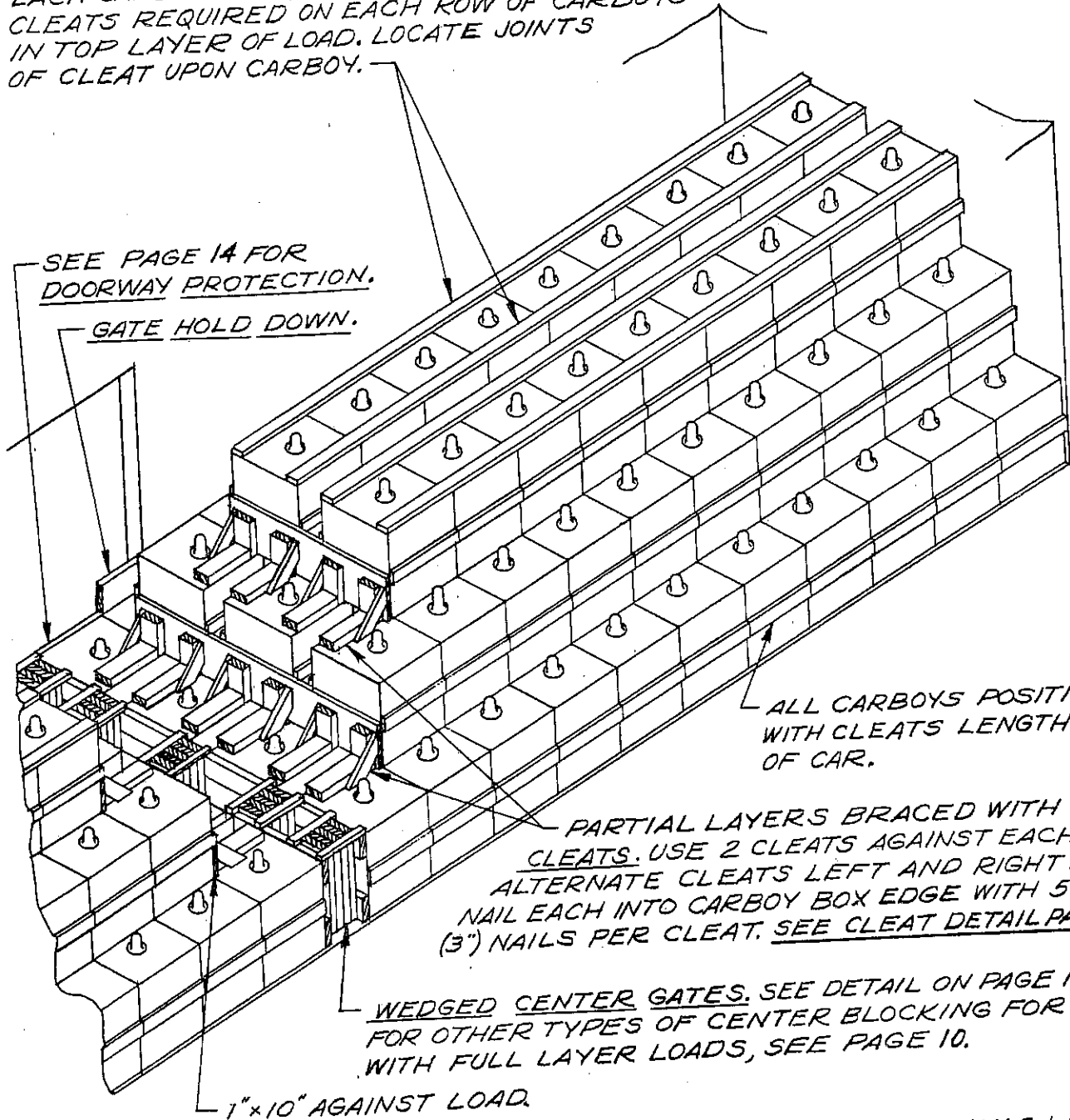
CAR END WALL

TYPICAL LCL BLOCKING FOR
SMALL QUANTITIES OF DRUMS NOT
EXCEEDING 15 GALLONS CAPACITY

NOTE: COMPLETELY BOXED CARBOYS MAY BE LOADED IN ACCORDANCE WITH THE METHOD SHOWN FOR BOXED ITEMS. SEE PAGE 12.

1" x 3" CONTINUOUS CLEAT. NAIL TO EDGE OF EACH CARBOY WITH 3-10d (3") NAILS. TWO (2) CLEATS REQUIRED ON EACH ROW OF CARBOYS IN TOP LAYER OF LOAD. LOCATE JOINTS OF CLEAT UPON CARBOY.

SEE PAGE 14 FOR DOORWAY PROTECTION.
GATE HOLD DOWN.



ALL CARBOYS POSITIONED WITH CLEATS LENGTHWISE OF CAR.

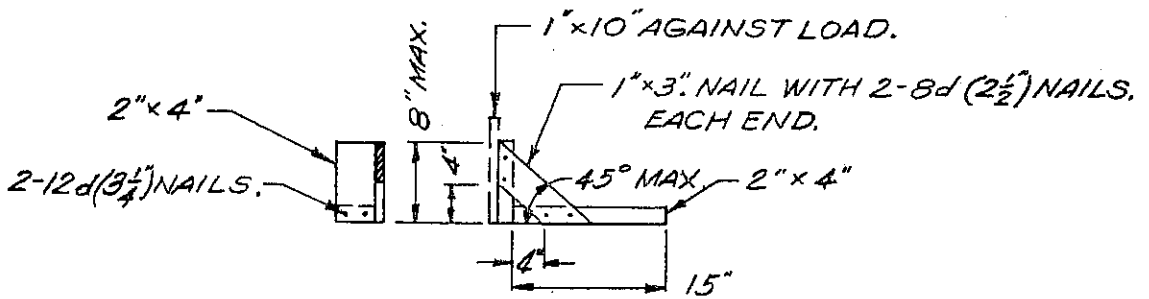
PARTIAL LAYERS BRACED WITH CLEATS. USE 2 CLEATS AGAINST EACH ROW. ALTERNATE CLEATS LEFT AND RIGHT HAND. NAIL EACH INTO CARBOY BOX EDGE WITH 5-10d (3") NAILS PER CLEAT. SEE CLEAT DETAIL PAGE 24.

WEDGED CENTER GATES. SEE DETAIL ON PAGE 11. FOR OTHER TYPES OF CENTER BLOCKING FOR USE WITH FULL LAYER LOADS, SEE PAGE 10.

1" x 10" AGAINST LOAD.

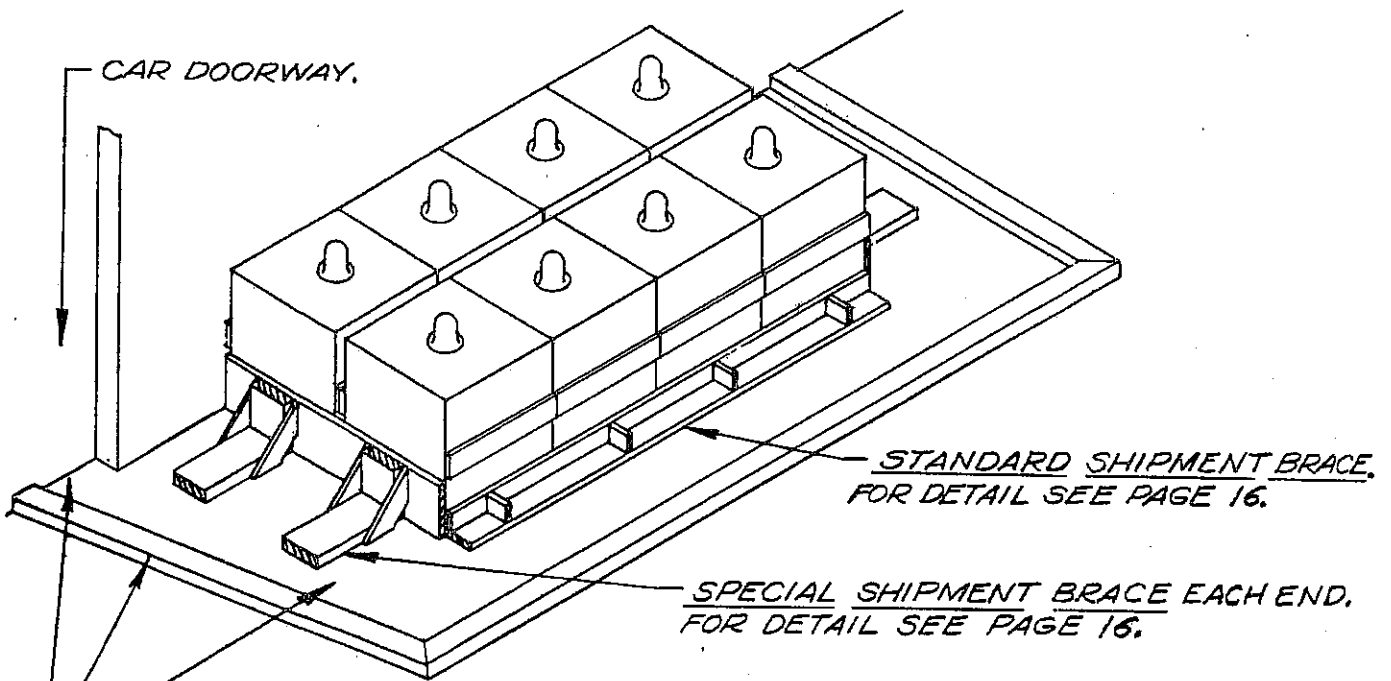
NOTE: CARBOYS OF NITRIC MUST NOT BE LOADED HIGHER THAN 2 LAYERS.

TYPICAL CARLOAD OF CARBOYS 1A



DETAIL OF CLEAT

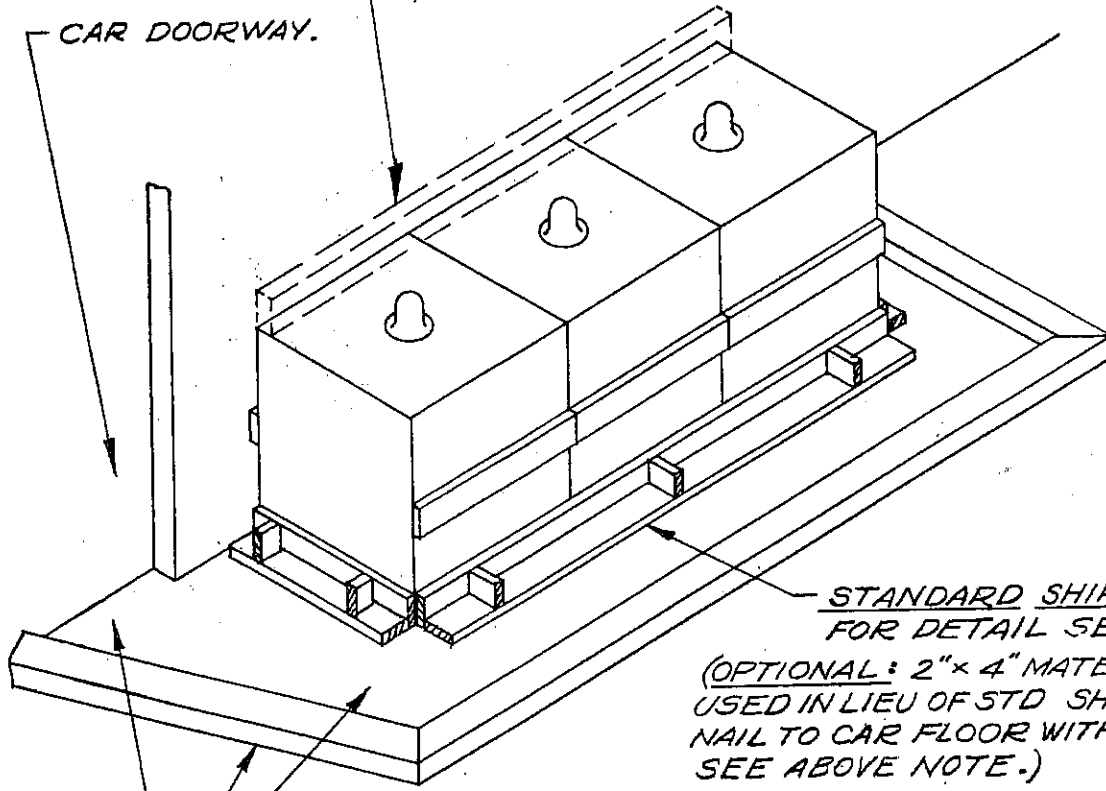
USE FOR BRACING PARTIAL LAYERS OF CARBOYS AS SHOWN ON PAGE 23. A MINIMUM OF 2 CLEATS WILL BE USED IN ANY INSTANCE.



WOODEN STRIPS 2" (MIN) HIGH. NAIL TO CAR FLOOR APPROXIMATELY 8" FROM CARBOYS. ARRANGE STRIPS SO THAT THE LIQUID FROM A BROKEN CARBOY WILL DRAIN TOWARD THE DOORWAY AND OUTSIDE THE CAR. THE SPACE BETWEEN THE STRIPS AND THE BRACES MUST BE COVERED WITH CLEAN, DRY SAND OR EARTH 1" (MIN) THICK. SAWDUST OR OTHER COMBUSTIBLE MATERIAL MUST NOT BE USED.

TYPICAL LCL BLOCKING FOR LARGE QUANTITIES OF CARBOYS

NOTE: USE 2" x 4" HOLD DOWN BOARD WHEN OPTIONAL 2" x 4" FLOORLINE BLOCKING IS USED. NAIL TO SIDEWALL WITH 10d (3") NAILS.

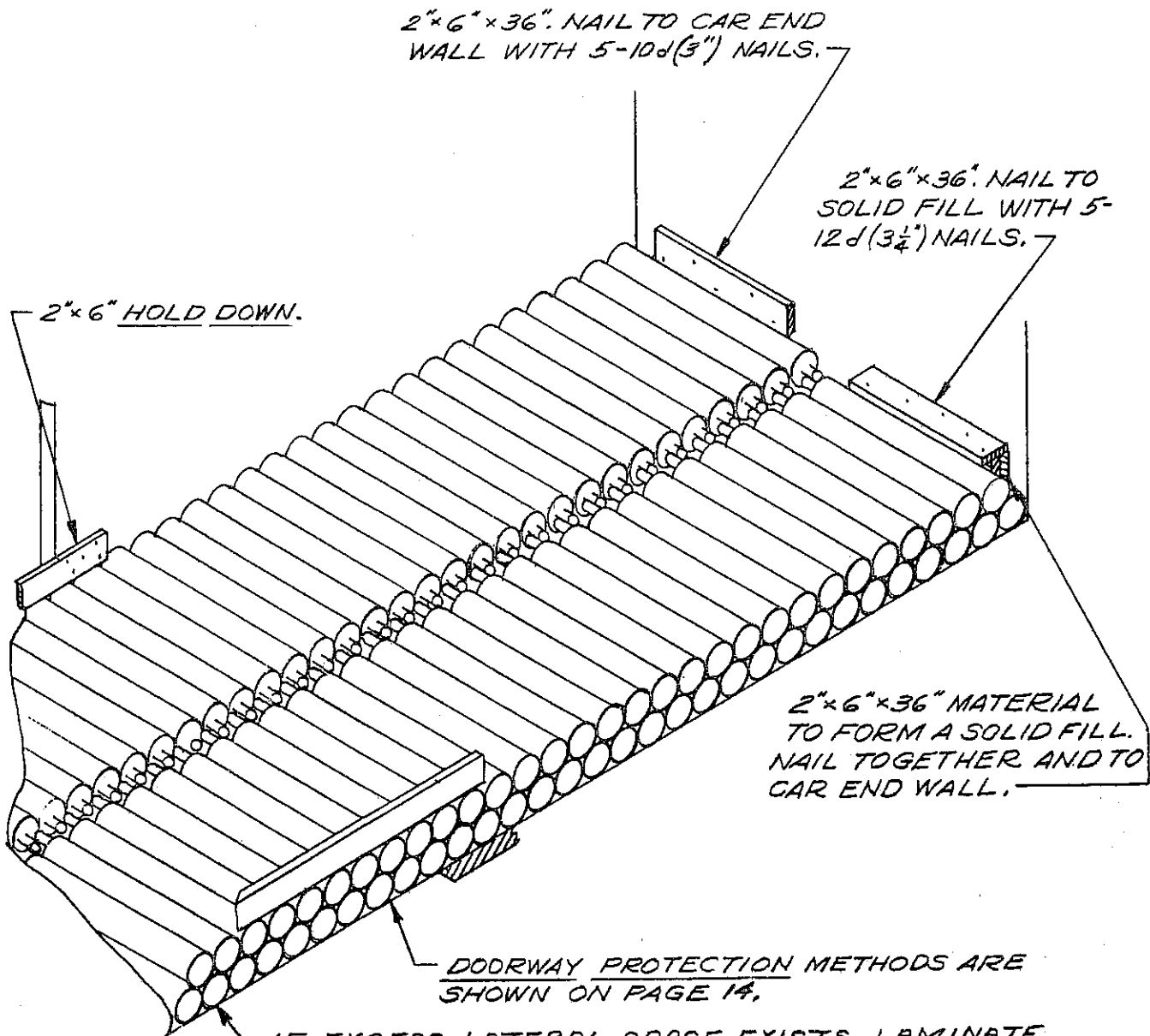


STANDARD SHIPMENT BRACE.
FOR DETAIL SEE PAGE 16.

(OPTIONAL: 2" x 4" MATERIAL MAY BE USED IN LIEU OF STD SHIPMENT BRACE. NAIL TO CAR FLOOR WITH 16d (3 1/2") NAILS. SEE ABOVE NOTE.)

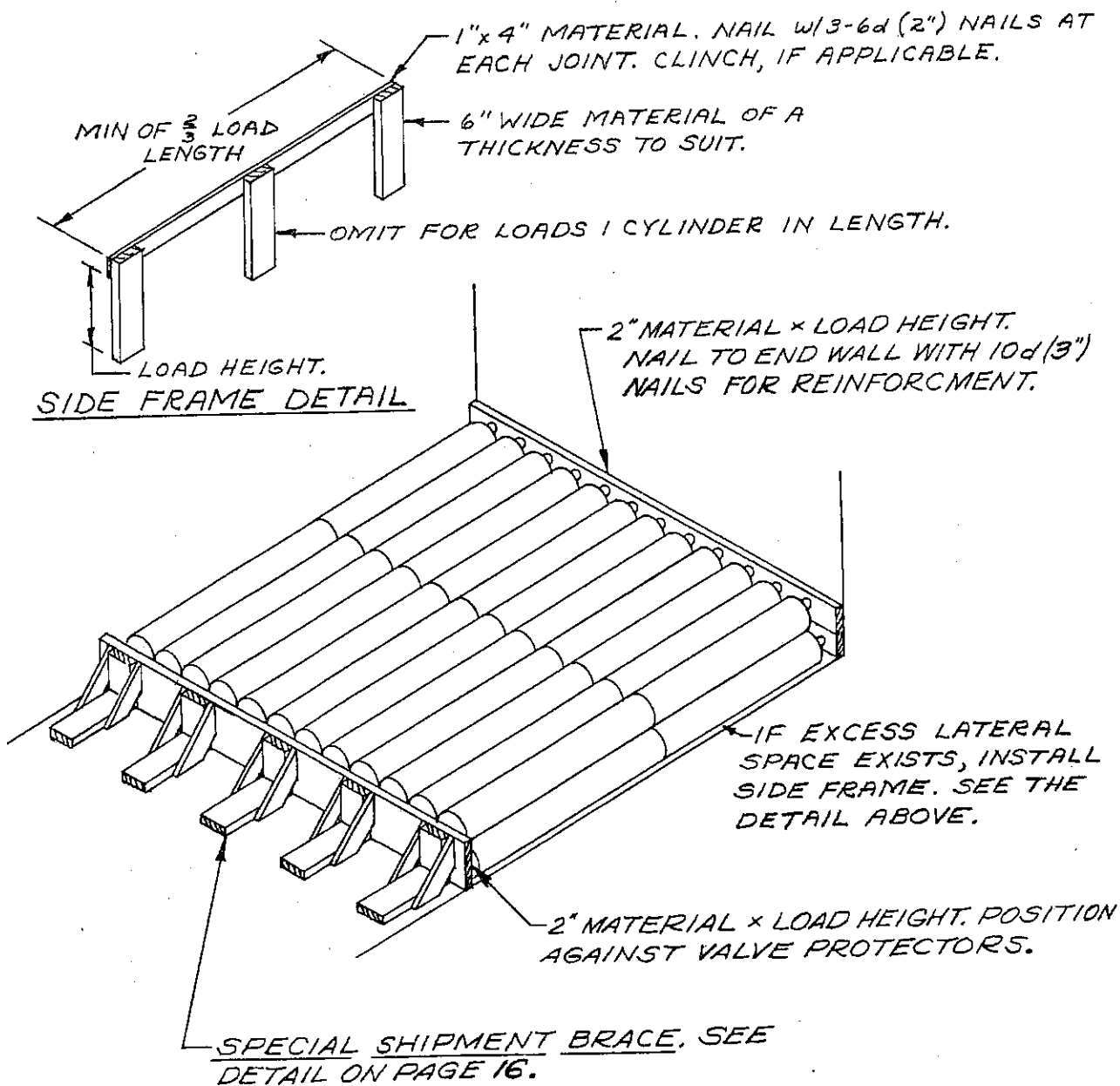
WOODEN STRIPS 2" (MIN) HIGH. NAIL TO CAR FLOOR APPROXIMATELY 8" FROM CARBOYS. ARRANGE STRIPS SO THAT THE LIQUID FROM A BROKEN CARBOY WILL DRAIN TOWARD THE DOORWAY AND OUTSIDE THE CAR. THE SPACE BETWEEN THE STRIPS AND THE BRACES MUST BE COVERED WITH CLEAN, DRY SAND OR EARTH 1" (MIN) THICK. SAWDUST OR OTHER COMBUSTIBLE MATERIAL MUST NOT BE USED.

TYPICAL LCL BLOCKING FOR SMALL
QUANTITIES OF CARBOYS



IF EXCESS LATERAL SPACE EXISTS, LAMINATE 4" WIDE FILL MATERIAL OF SUFFICIENT THICKNESS TO CAR SIDEWALL. CENTER ON A LAYER AND NAIL TO CAR WALL W/I-APPLICABLY SIZED NAIL EVERY 24". NOTE: MATERIAL OF EQUAL THICKNESS MUST ALSO BE LAMINATED TO THE ADJACENT HOLD DOWN.

TYPICAL CARLOAD OF
CYLINDERS OF COMPRESSED GASES



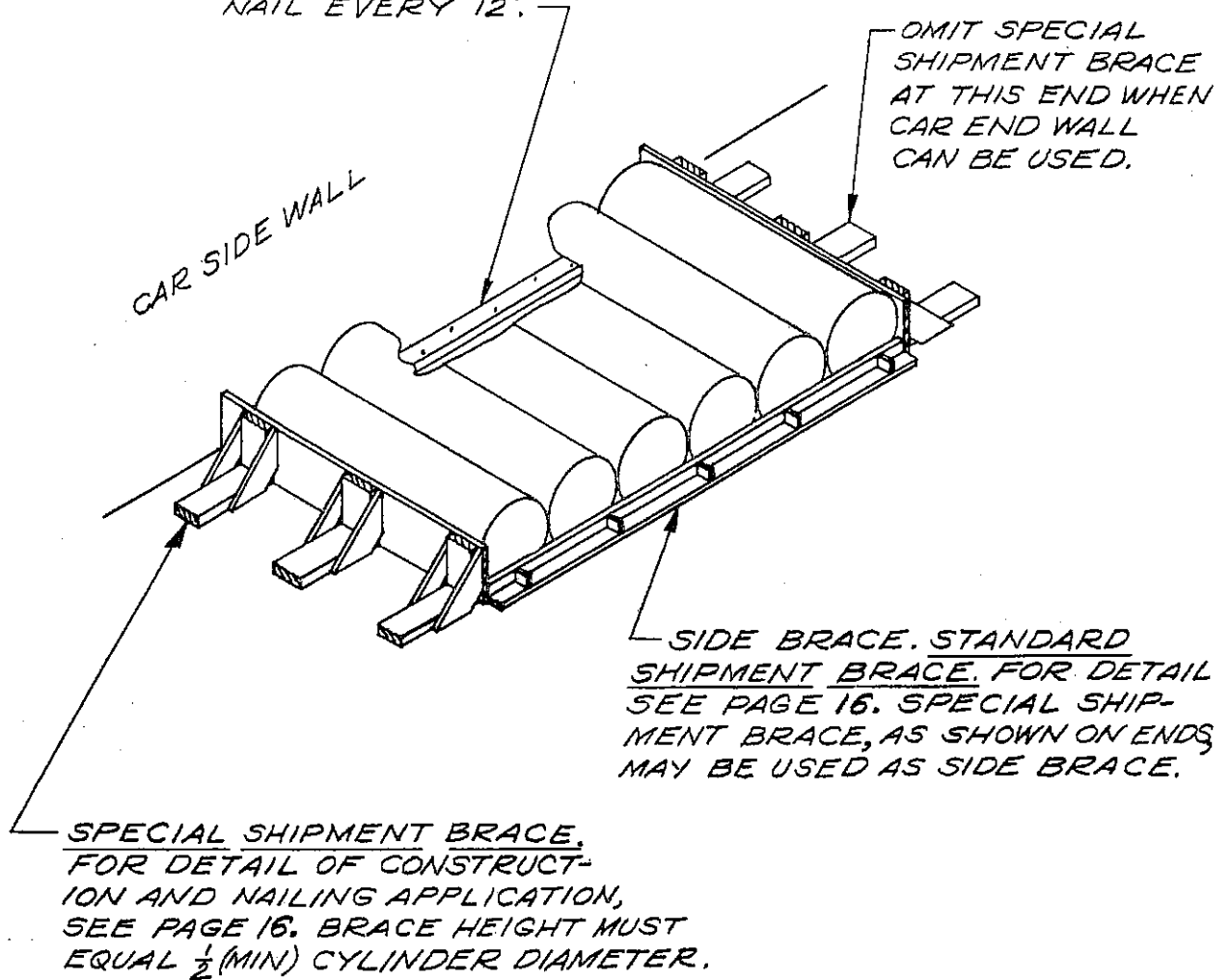
NOTE: SHORT CYLINDERS OF LARGER DIAMETER MAY BE STOOD UPRIGHT ON THEIR BASES. USE END BRACE AS SHOWN ON PAGE 15 OR USE SPECIAL SHIPMENT BRACE IF HEIGHT PERMITS. CARE MUST BE USED TO AVOID DAMAGE TO CYLINDER VALVES AND VALVE PROTECTORS.

TYPICAL LCL BLOCKING FOR LARGE QUANTITIES OF CYLINDERS OF COMPRESSED GASES

2" x 4" SIDE BRACE. PREPOSITION TO PROVIDE VALVE CLEARANCE OF SIDE WALL. NAIL TO CAR FLOOR WITH 1-16d (3½") NAIL EVERY 12".

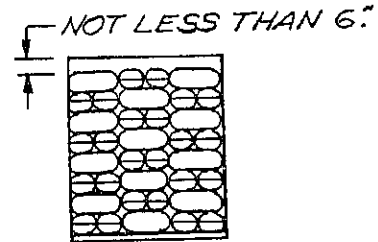
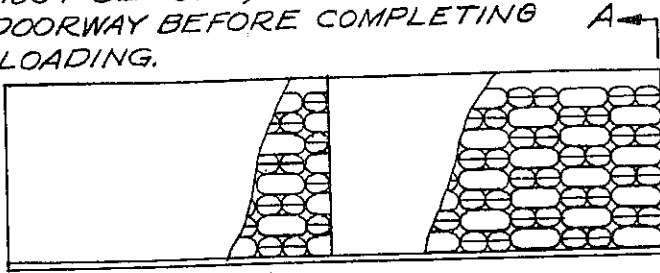
OMIT SPECIAL SHIPMENT BRACE AT THIS END WHEN CAR END WALL CAN BE USED.

CAR SIDE WALL



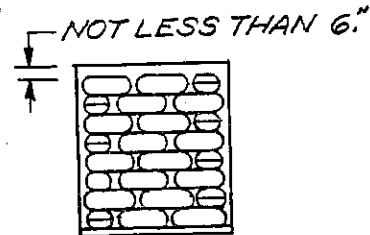
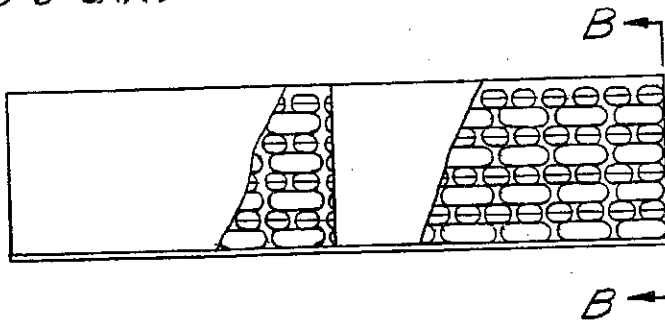
TYPICAL LCL BLOCKING FOR SMALL QUANTITIES OF CYLINDERS OF COMPRESSED GASES

CHARCOAL, SCREENINGS OR GROUND, CRUSHED, GRANULATED OR PULVERIZED CHARCOAL, IN BAGS, WHEN LOADED FOR SHIPMENT MUST BE LAID HORIZONTALLY IN THE CAR, AND SO PILED THAT THERE WILL BE SPACES FOR EFFICIENT AIR CIRCULATION. THESE SPACES MUST BE NOT LESS THAN 4 INCHES WIDE, THE BAGS MUST NOT BE PILED CLOSER THAN 6 INCHES FROM THE TOP OF THE CAR. A TIGHT CAR MUST BE USED, AND ANY LOOSE MATERIAL MUST BE REMOVED FROM THE DOORWAY BEFORE COMPLETING THE LOADING.

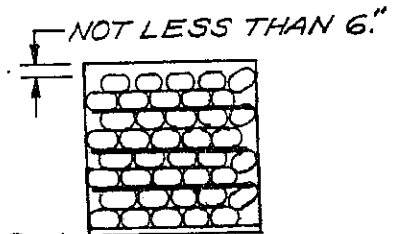
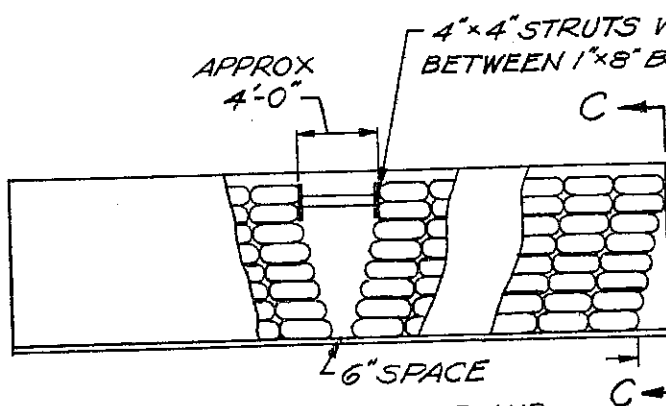


SECTION A·A

NO MORE THAN 26,000 LBS OF SCREENINGS, GROUND, CRUSHED, GRANULATED, OR PULVERIZED CHARCOAL SHALL BE LOADED IN A 40'-6" CAR AND 40,000 POUNDS IN A 50'-6" CAR.



SECTION B·B



SECTION C·C

IF BAGS ARE NOT COMPACTLY FILLED AND CLOSED SO AS TO AVOID FREE SPACE WITHIN, TRANSVERSE WOODEN STRIPS OF NOT LESS THAN 1" x 3" MATERIAL (CAR WIDTH) MUST BE LAID BETWEEN BAGS APPROXIMATELY 2 FEET APART VERTICALLY AND LONGITUDINALLY. SEE SECTION C·C. REFER TO PAGE 14 FOR DOORWAY PROTECTION METHODS.

CARLOADING OF CHARCOAL, SCREENINGS OR GROUND, CRUSHED, GRANULATED, OR PULVERIZED CHARCOAL

PAPER PROTECTION. LINE WALLS AND COVER FLOOR WITH ONE THICKNESS OF 50- POUND BASIS KRAFT OR TWO THICKNESSES OF 30- POUND BASIS KRAFT. EXTEND HEIGHT OF PAPER TO PERMIT FOLDING OVER LOAD.

APPROXIMATELY ONE BAG LENGTH.

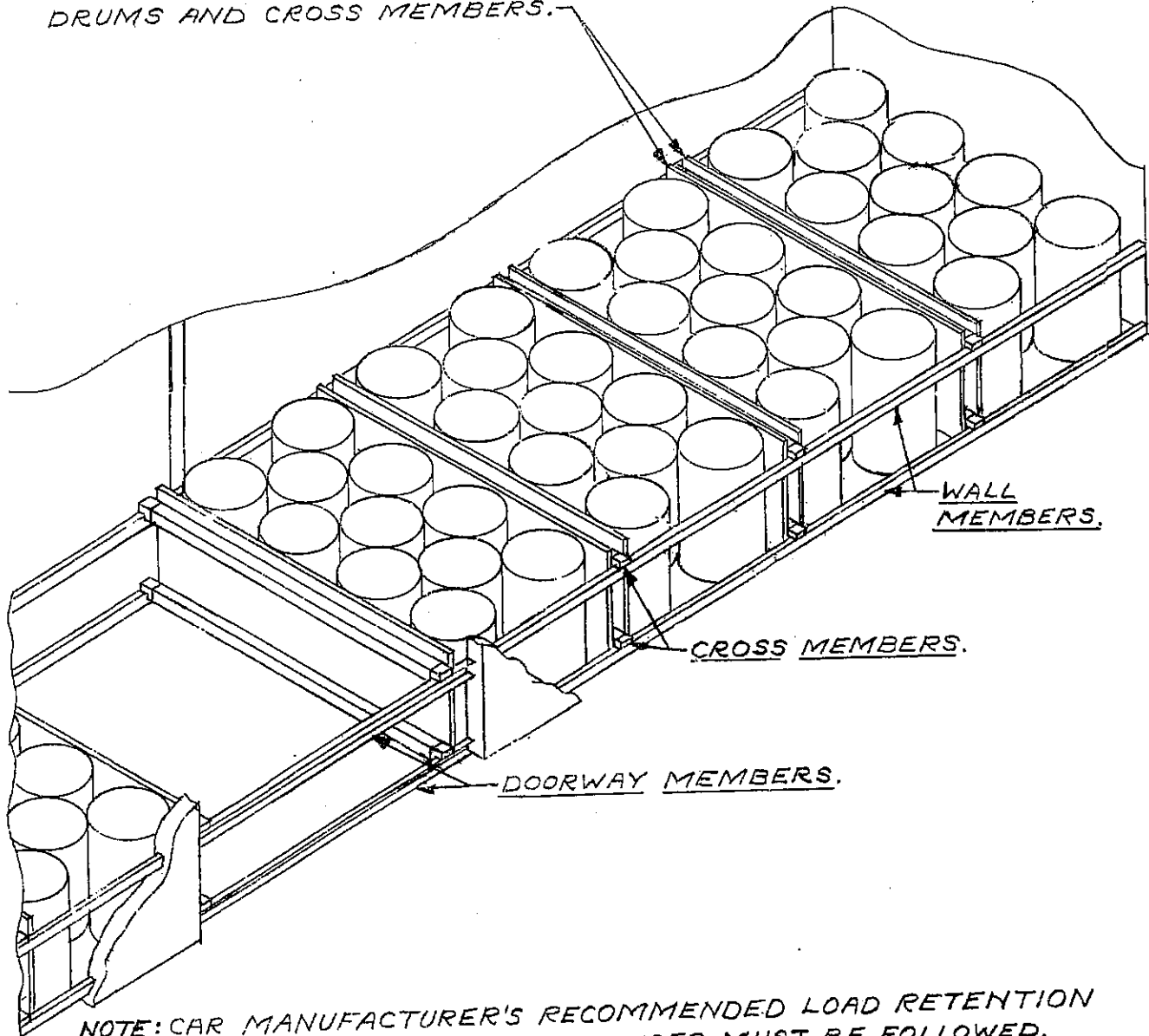
DOORWAY PROTECTION.
SEE PAGE 14.

APPROXIMATELY ONE-HALF BAG LENGTH.

POSITION BAGS LENGTHWISE IN CENTER OF TOP LAYER.

TYPICAL CARLOADING OF HAZARDOUS MATERIALS (OTHER THAN CHARCOAL) IN BAGS. (BRICK WALL METHOD)

GATES, $\frac{1}{2}$ " (MIN) PLYWOOD, DRUM HEIGHT x CAR WIDTH MINUS 1". POSITION BETWEEN DRUMS AND CROSS MEMBERS.



NOTE: CAR MANUFACTURER'S RECOMMENDED LOAD RETENTION RATINGS FOR THE BRACING DEVICES MUST BE FOLLOWED.

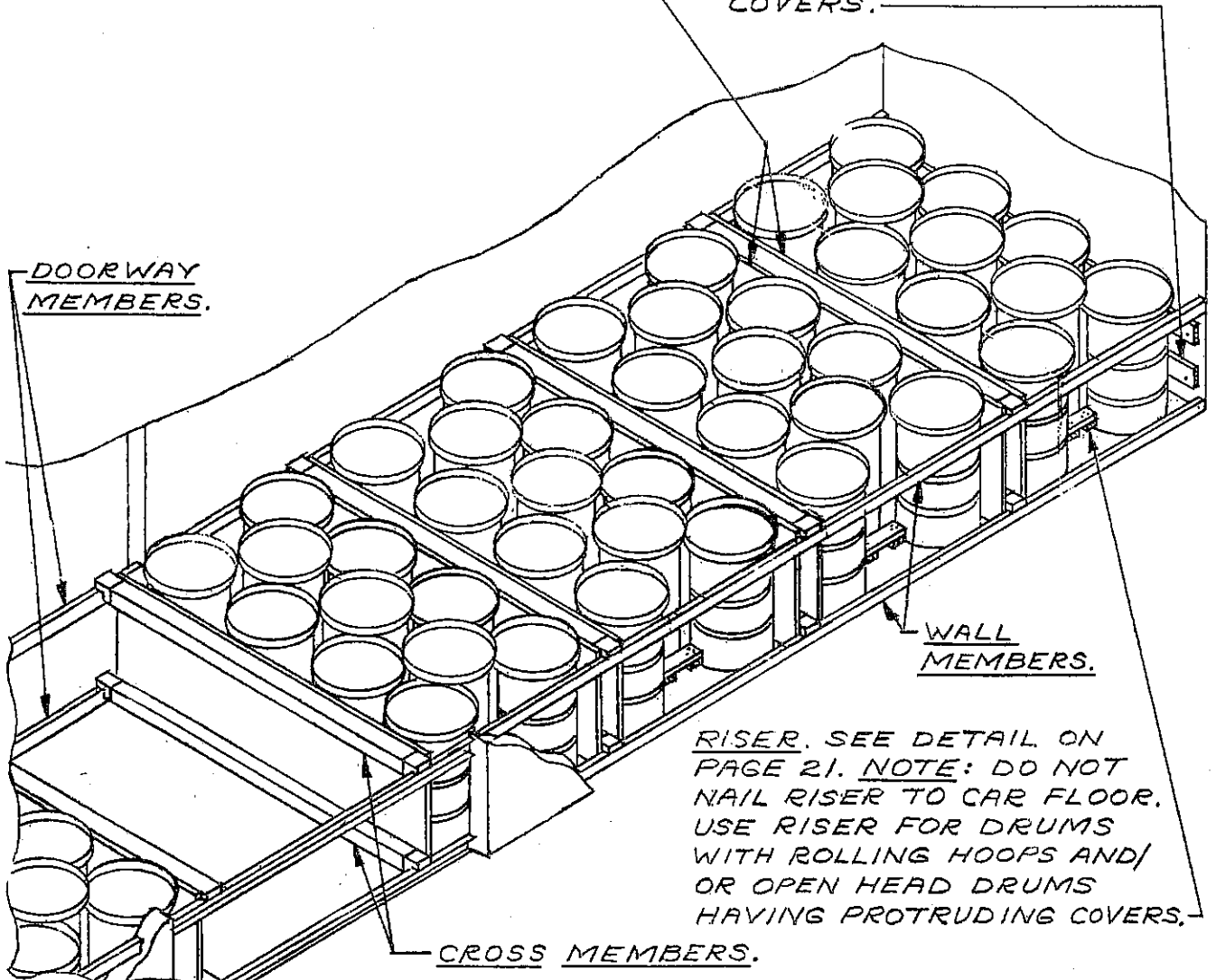
NOTE: CARS EQUIPPED WITH BRACING DEVICES MUST NOT BE USED FOR SHIPMENTS OF EXPLOSIVES SUCH AS DYNAMITE, T.N.T., AND SIMILAR EXPLOSIVES WHICH ARE LIABLE TO SIFT OR BECOME LODGED IN THE MECHANISM OF THE BRACING DEVICE IN THE EVENT OF CONTAINER FAILURE.

NOTE: ALL UNUSED PARTS OF THE BRACING DEVICE MUST BE STORED WITHIN THE CAR AND SECURED IN PLACE SO THAT THEY CANNOT DAMAGE THE LADING.

TYPICAL CARLOAD OF HAZARDOUS MATERIALS IN TIGHT HEAD DRUMS IN CARS EQUIPPED WITH BRACING DEVICES

GATES, $\frac{1}{2}$ " (MIN) PLYWOOD, DRUM HEIGHT MINUS $1\frac{1}{2}$ " x CAR WIDTH MINUS 1". POSITION BETWEEN DRUMS AND CROSS MEMBERS.

END WALL BATTEN, 1" x 6" x CAR WIDTH - 1". NAIL TO CAR END WALL W/1-6d (2") NAIL EVERY 12". ONLY REQUIRED FOR OPEN HEAD DRUMS HAVING PROTRUDING COVERS.



NOTE: CAR MANUFACTURERS RECOMMENDED LOAD RETENTION RATINGS FOR THE BRACING DEVICES MUST BE FOLLOWED.

NOTE: CARS EQUIPPED WITH BRACING DEVICES MUST NOT BE USED FOR SHIPMENTS OF EXPLOSIVES SUCH AS DYNAMITE, T.N.T., AND SIMILAR EXPLOSIVES WHICH ARE LIABLE TO SIFT OR BECOME LODGED IN THE MECHANISM OF THE BRACING DEVICE IN THE EVENT OF CONTAINER FAILURE.

NOTE: ALL UNUSED PARTS OF THE BRACING DEVICE MUST BE STORED WITHIN THE CAR AND SECURED IN PLACE SO THAT THEY CANNOT DAMAGE THE LADING.

TYPICAL CARLOAD OF HAZARDOUS MATERIALS IN OPEN HEAD DRUMS IN CARS EQUIPPED WITH BRACING DEVICES

GENERAL RULES - Use of load divider equipped box cars

1. Box cars equipped with load dividers manufactured by Evans, Equipco and Preco and with under-car or end-of-car cushioning permitting at least 15" of travel have been tested and are approved for loading Hazardous Materials
2. Load divider equipped box cars with drain holes must have said drains plugged with a non-flammable material prior to being used for loading of those materials classified as Flammable under provisions of the Department of Transportation regulations.
3. Load divider equipped box cars must not be used for loading of bulk explosives such as dynamite, black powder, propellant explosives (smokeless powder), tetryl and similar explosives which are liable to sift or become lodged in the mechanism of the load divider bulkheads in the event of container failure.
4. Prior to loading, the load divider bulkhead, locking mechanism and locking pins of load divider equipped box cars must be carefully inspected and if any defects are noted, the car shall not be used for loading of Hazardous Materials.
5. Load divider equipped box cars with adjustable side fillers that have 3/8" or thicker panels may be used; however, these side fillers will not be used for lateral blocking; they must be retracted and locked against the side wall.
6. Lading presenting an area of concentrated force on the load divider bulkhead (example: steel drums) and prior to positioning and locking the bulkhead, shall have a 1/2" x car width -1" plywood gate installed between the last lading stack and the bulkhead (see Pages 34 and 35).
7. Load divider bulkheads must fit snugly against the lading. Additional fill material must be secured to the plywood gates to ensure a tight load before securing and locking the load divider bulkheads.
8. Lading will not be loaded in the doorway area and load divider bulkheads will be secured and locked against the lading to the rear of the doorposts of the car.
9. After the load divider bulkheads are positioned and the locking pins are engaged in the holes of the rails, the locking pins must be inspected to ensure that the pins are fully engaged in the locking holes. If present debris must be removed from beneath the locking holes selected for securing the load divider bulkheads.

GENERAL INFORMATION

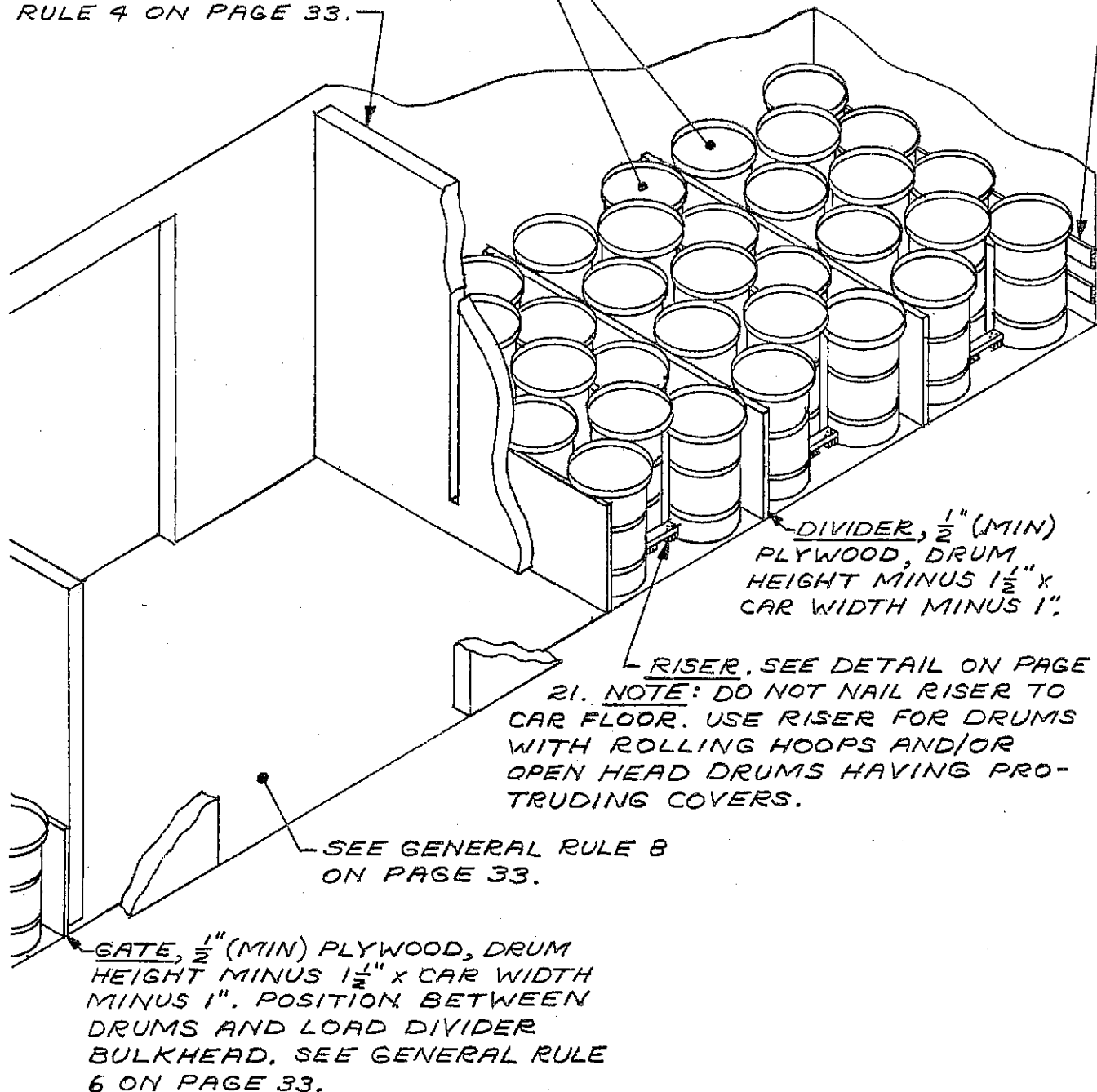
A typical illustration of a partial carload of 55 gallon open head steel drums in a load divider equipped box car is depicted on Page 34. Inasmuch as decking between layers is required when loading on more than one (1) layer (see illustration on Page 35), those open head drums with rolling hoops and/or protruding covers and requiring use of risers, will not be loaded on more than one (1) layer.

A typical illustration of a partial carload of 55 gallon tight head steel drums in a load divider equipped box car is depicted on Page 35. Loading on two (2) layers is shown; however, such loading can only be employed if the gross weight of the drums is such that the load limit of the car will not be exceeded and the drums are so loaded that the load on one truck will not exceed one-half (1/2) the load limit of the car (see Page 6). Decking is required between layers. Partial second layers are not authorized. Drums on a second layer must not be loaded in voids; the same loading pattern used on the floor layer must be duplicated on the second layer.

DRUMS MUST BE POSITIONED DIRECTLY OPPOSITE EACH OTHER ON OPPOSITE SIDES OF A DIVIDER.

END WALL BATTEN, 1" x 6" x CAR WIDTH - 1". NAIL TO CAR END WALL W/1-6d (2") NAIL EVERY 12". ONLY REQUIRED FOR OPEN HEAD DRUMS HAVING PROTRUDING COVERS.

INDICATES LOAD DIVIDER BULKHEAD. SEE GENERAL RULE 4 ON PAGE 33.

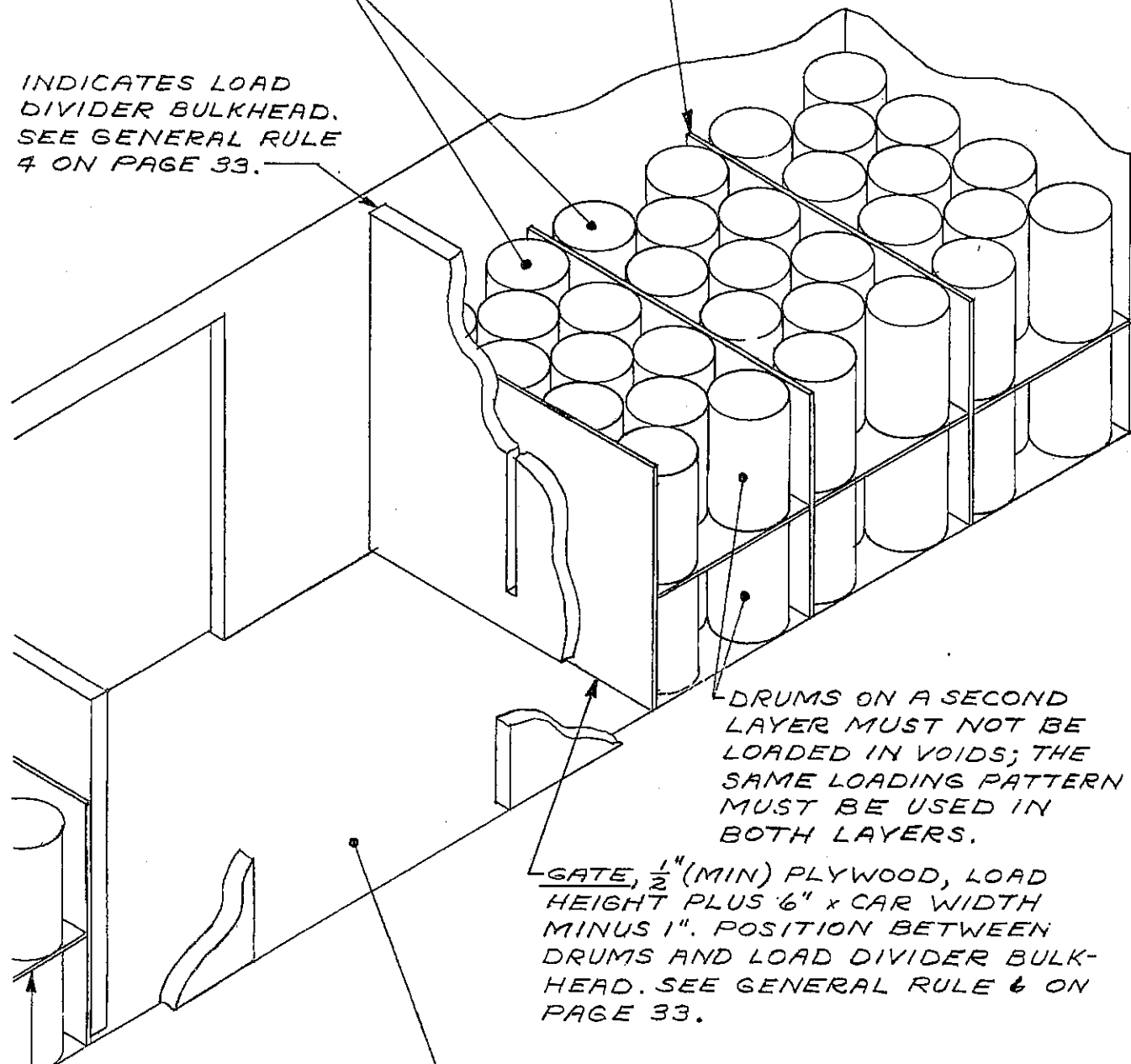


TYPICAL CARLOAD OF HAZARDOUS MATERIALS
IN OPEN HEAD DRUMS IN CARS EQUIPPED
WITH LOAD DIVIDER BULKHEADS

DRUMS MUST BE POSITIONED DIRECTLY OPPOSITE EACH OTHER ON OPPOSITE SIDES OF A DIVIDER.

DIVIDER, $\frac{1}{2}$ " (MIN) PLYWOOD, LOAD HEIGHT x CAR WIDTH MINUS 1".

INDICATES LOAD DIVIDER BULKHEAD. SEE GENERAL RULE 4 ON PAGE 33.



DRUMS ON A SECOND LAYER MUST NOT BE LOADED IN VOIDS; THE SAME LOADING PATTERN MUST BE USED IN BOTH LAYERS.

GATE, $\frac{1}{2}$ " (MIN) PLYWOOD, LOAD HEIGHT PLUS 6" x CAR WIDTH MINUS 1". POSITION BETWEEN DRUMS AND LOAD DIVIDER BULKHEAD. SEE GENERAL RULE 6 ON PAGE 33.

SEE GENERAL RULE 8 ON PAGE 33.

DECKING, $\frac{1}{2}$ " (MIN) PLYWOOD, LENGTH OF BAY x CAR WIDTH MINUS 1"

TYPICAL CARLOAD OF HAZARDOUS MATERIALS
IN TIGHT HEAD DRUMS IN CARS EQUIPPED
WITH LOAD DIVIDER BULKHEADS