TRAILER REPAIR AND MODIFICATION

Adopted: 2011
Revised: 2016

IMPLEMENTED 06/2016

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LIST OF FIGURES

1.0 SCOPE

1.1 The appropriate design standards for rail intermodal trailers are outlined in the AAR *Manual of Standards and Recommended Practices*, Specification M-931. These inspection, repair, and modification recommendations are applicable to privately owned highway trailers that do not meet the requirements of Specification M-931 and are placed into intermodal service.

1.2 This document presents the minimum trailer inspection, repair, and modification recommendations to ensure appropriate trailer condition for safe and efficient rail intermodal service. Inspection and repair recommendations focus on the structural integrity of certain trailer components to maximize trailer performance in intermodal operations. Minimum modifications are intended to reduce risk of damage during rail car loading/unloading and to minimize modification cost and weight.

1.3 It is not intended that these recommended modifications be used for trailers dedicated to intermodal trailer-on-flatcar (TOFC) service. Trailers dedicated to TOFC service must comply with Specification M-931.

2.0 TRAILER INSPECTION & REPAIR

2.1 Trailer Structure

Trailers consist of several structural components that are integral to safe intermodal operation. These components consist of bottom rail, top rail, side panel, and roof. The stresses on these components differ between rail movement and over-the-road movement. Structural components must be systematically inspected and properly repaired to prevent complete trailer failure in intermodal transit. Manufacturer's recommendations for all repairs must be followed. It is imperative that each area of defect be carefully evaluated and proper repair or replacement made.

Fig. 2.1 Complete trailer failure

Structural components are defined below:

- Bottom rail—the main longitudinal frame member located at the lower edge of the trailer to connect the side wall and floor structures.
- Top rail—the main longitudinal frame member located at the upper edge of the trailer to connect the roof and side wall structures.
- Side panel—a section of material used to cover the exterior of a trailer and designed to withstand localized lifting forces.
- Roof —the upper portion of the trailer envelope that contributes to the structural integrity of the trailer side and end walls. Compromised roof durability can cause trailer failure and damage to interior components and lading.

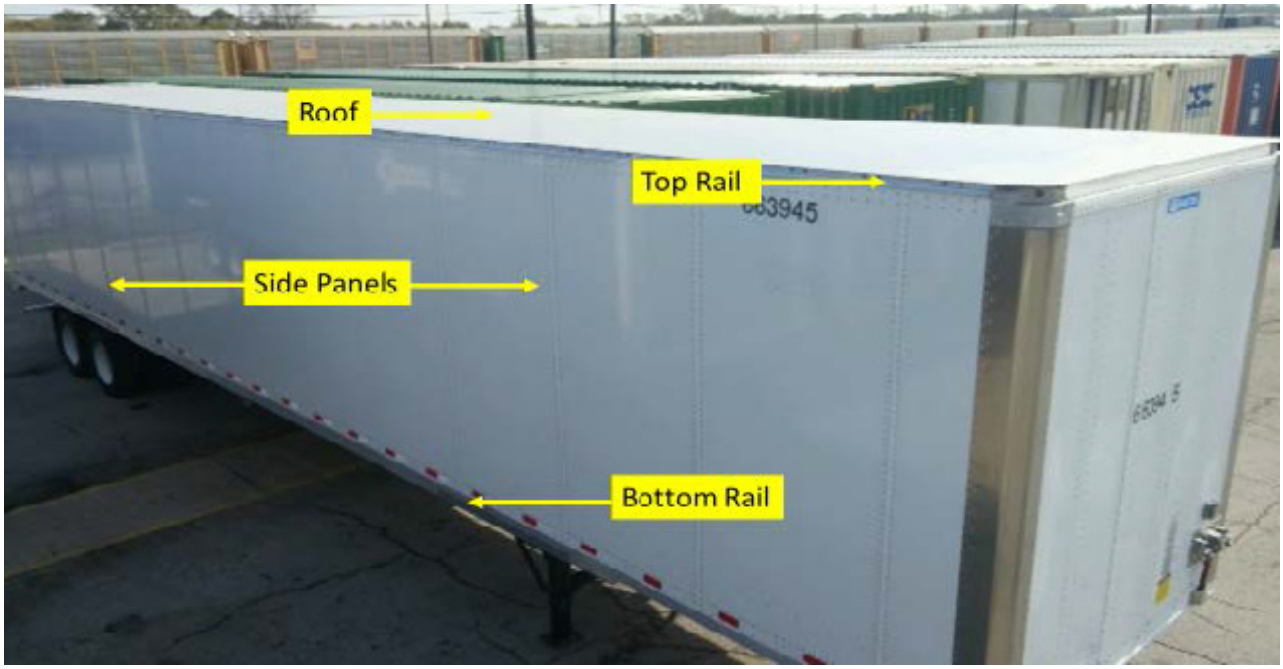
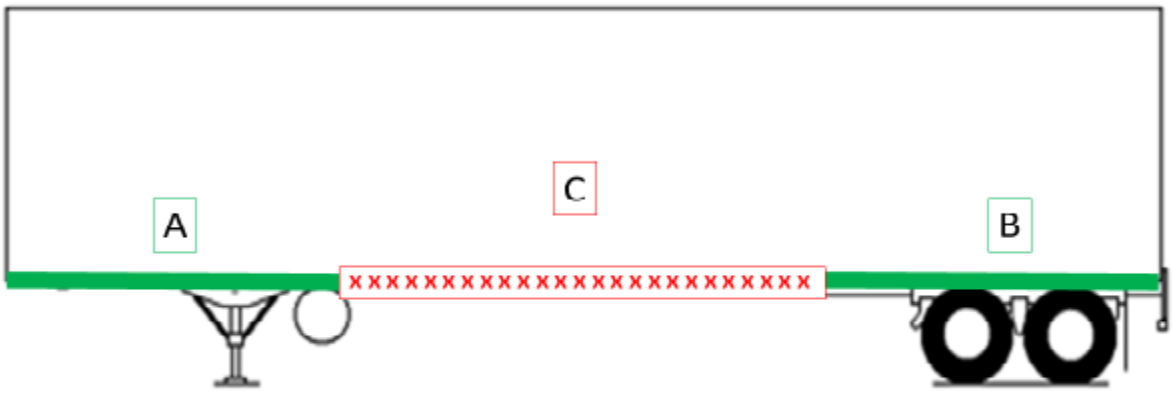


Fig. 2.2 Trailer structural components

2.2 Bottom Rail

2.2.1 Manufacturer's recommendations for bottom rail repairs must be followed. Bottom rail section repairs must add adequate strength to the defective area.

2.2.2 A rail section shall not exceed 25% of the overall length of trailer and must be located within 25% of the trailer length from the front or rear of trailer only. No rail sections are allowed in the center of a trailer.



A	A single bottom rail section is allowed in the front 25% of trailer length, if there is no splice in the rear of the trailer. Section must start at front of trailer.
B	A single bottom rail section is allowed in the rear 25% of trailer length, if there is no splice in the front of the trailer. Section must start at rear of trailer.
C	No bottom rail sections allowed in the center 50% of trailer length.

Fig. 2.3 Bottom rail section repair

2.2.3 A splice plate must be used to overlap and join rail section repair and original bottom rail. The splice plate must extend a minimum of three crossmembers. The splice plate must be made of steel and/or aluminum, and insulating tape must be used between aluminum and steel components to prevent electrolytic corrosion.

2.2.4 Bottom rail must be free of breaks/cracks, deformation, securement defects, electrolytic corrosion, and improper repairs.

2.2.4.1 Bottom Rail Breaks/Cracks

Fig. 2.4 Bottom rail break

Fig. 2.5 Bottom rail crack

2.2.4.2 Bottom Rail Deformation

Fig. 2.6 Bottom rail deformation

Fig. 2.7 Bottom rail deformation

2.2.4.3 Joining of dissimilar metals involves procedures that will prevent or control corrosion that may occur in certain conditions. Improper or no application of protective coatings between dissimilar metals can leave the materials open to severe electrolytic corrosion. Electrolytic corrosion can weaken and compromise the bottom rail and securement.

Fig. 2.8 Electrolytic corrosion

Fig. 2.9 Electrolytic corrosion

2.2.4.4 Bottom Rail Securement Defects

Fig. 2.10 Securement defect—missing rivets

Fig. 2.11 Securement defect—broken rivets

2.2.4.5 Improper repair to bottom rails will directly affect the structural integrity of a trailer. Welding of an aluminum bottom rail is prohibited on trailers moving in rail service. Welded or bolt-on-bottom rail patches are improper repairs. Manufacturer's recommendations must be followed for proper sectioning of defective bottom rails.

Fig. 2.12 Improper repair—welded

Fig. 2.13 Improper repair—welded

Fig. 2.14 Improper repair—welded patch

Fig. 2.15 Improper repair—welded patch

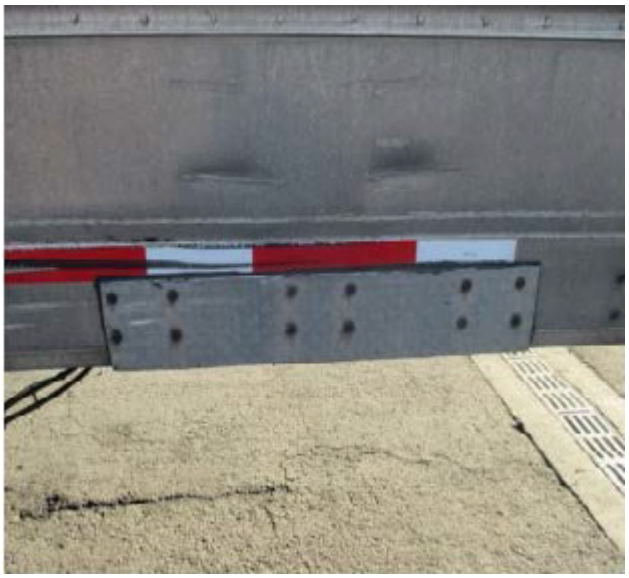


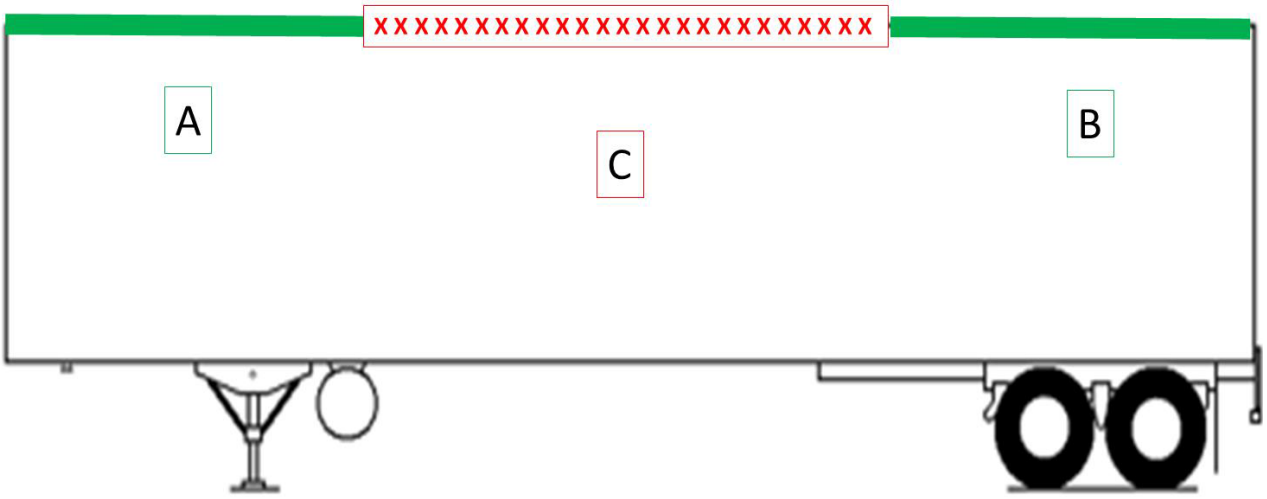
Fig. 2.16 Improper Repair—bolted patch

Fig. 2.17 Improper section repair

2.3 Top Rail

2.3.1 Manufacturer's recommendations for top rail repairs must be followed. Top rail section repairs must add adequate strength to the defective area.

2.3.2 A rail section shall not exceed 25% of overall length of trailer and must be located within 25% of the trailer length from the front or rear of trailer only. No rail sections are allowed in the center of a trailer.



A	A single top rail section is allowed in the front 25% of trailer length, if there is no splice in the rear of the trailer. Section must start at front of trailer.
B	A single top rail section is allowed in the rear 25% of trailer length, if there is no splice in the front of the trailer. Section must start at rear of trailer.
C	No top rail sections allowed in the center 50% of trailer length.

Fig. 2.18 Top rail section repair

2.3.3 A splice plate must be used to overlap and join rail section repair and original top rail. The splice plate must span a minimum of two posts. The splice plate must be made of steel and/or aluminum. and insulating tape must be used between aluminum and steel components to prevent electrolytic corrosion. Splice plates on the top rail (per manufacturer's specifications) can be installed on either the interior or exterior of the rail.

2.3.4 Top rail must be free of breaks/cracks, deformation, securement defects, electrolytic corrosion, and improper repairs.

2.3.4.1 Top Rail Breaks/Cracks

Fig. 2.19 Top rail break

Fig. 2.20 Top rail crack

Fig. 2.21 Top rail broken

Fig. 2.22 Top rail broken

2.3.4.2 Top Rail Deformation

Fig. 2.23 Top rail deformation

Fig. 2.24 Top rail deformation

2.3.4.3 Joining of dissimilar metals involves procedures that will prevent or control corrosion that may occur in certain conditions. Improper or no application of protective coatings between dissimilar metals can leave the materials open to severe electrolytic corrosion. Electrolytic corrosion can weaken and compromise the top rail and securement.

2.3.4.4 Top rails must be secured per manufacturer's recommendation with at least a 3/8 in. huckbolt or grade #5 hex head. Trailer top rails cannot have broken or missing securements.

2.3.4.5 Improper repair to the top rails will directly affect the structural integrity of the trailer. Welding of an aluminum top rail is prohibited on trailers moving in rail service. Welded or bolt on top rail patches are improper repairs. Manufacturer recommendations should be followed for proper sectioning of defective top rails.

Fig. 2.25 Top rail improper repair—spliced at center

Fig. 2.26 Top rail improper repair—splice plate does not span two posts

2.4 Side Panels

2.4.1 Material selected for replacing side wall panels shall comply with the manufacturer's recommendation. Corrugated or smooth panel construction must be mated under all circumstances, including patches. Aluminum and steel panel patches shall be the same thickness as the original.

2.4.2 Side panels must be free from breaks/cracks, deformation, securement defects, and improper repairs.

2.4.2.1 Side Panel Breaks /Cracks

Fig. 2.27 Side panel breaks/cracks

Fig. 2.28 Side panel breaks/cracks

2.4.2.2 Side Panel Deformation

Fig. 2.29 Side panel deformation

Fig. 2.30 Side panel deformation

2.4.2.3 Solid (buck) rivets are used in applications where reliability and safety count. Solid (buck) rivets should be used within the structural parts, such as side panels.

2.4.2.3.1 Side Panel Securement Defects

Fig. 2.31 Side panel securement defect

Fig. 2.32 Side panel securement defect

2.4.2.4 A patch cannot extend from one panel to another.

2.4.2.4.1 Side Panel Improper Repairs

Fig. 2.33 Side panel improper repair

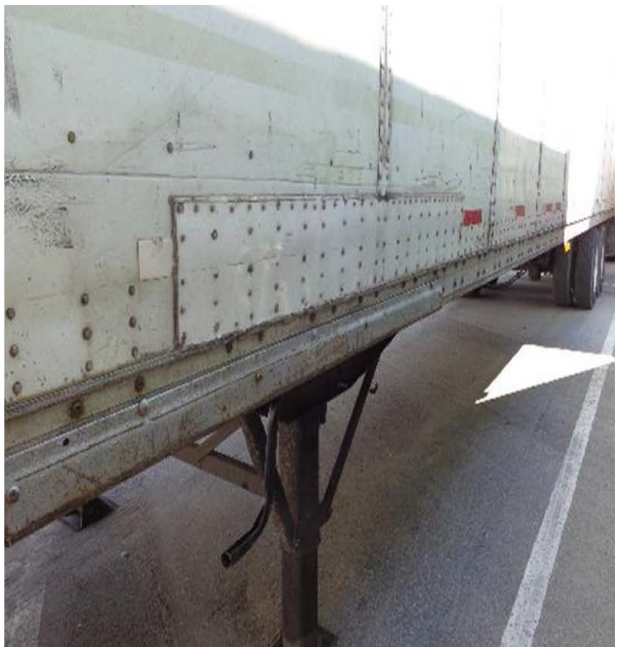


Fig. 2.34 Side panel improper repair

2.5 Roof

2.5.1 Correct materials and good workmanship can determine if there will be load damage caused by weather. Material selected for replacing roof shall comply with the manufacturer's recommendation. Aluminum or fiberglass construction must be mated under all circumstances, including patches. Aluminum and fiberglass patches shall be the same thickness as the original.

2.5.2 Roof patch cannot exceed 12 in. × 36 in.

Fig. 2.35 Roof sheet patch exceeds 12 in. × 36 in.

Fig. 2.36 Roof sheet patch exceeds 12 in. × 36 in.

2.5.3 If the area of the roof to be sectioned exceeds 30% of the roof, the entire roof must be replaced. No more than two sections shall make up the entire roof.

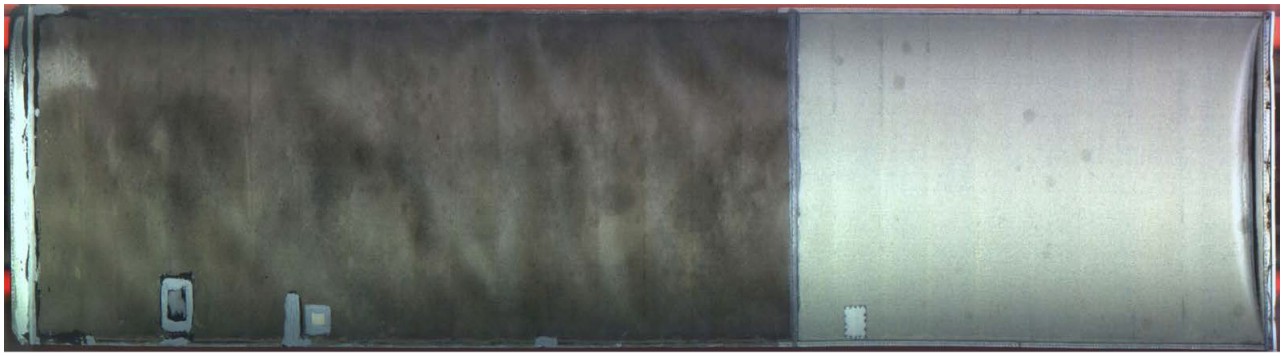


Fig. 2.37 Roof section exceeds 30% of entire roof

2.5.4 Roof sheet must be free of flex cracks and improper repairs.

2.5.4.1 Roof Sheet Flex Cracks

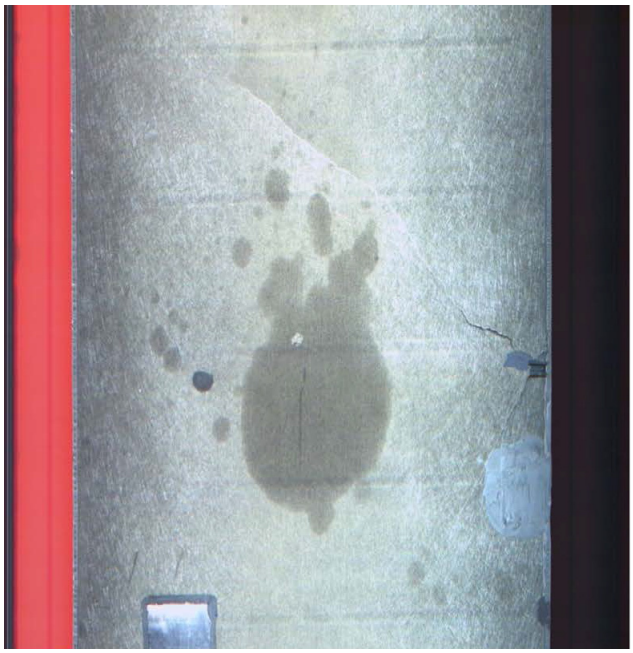


Fig. 2.38 Roof sheet—flex crack

Fig. 2.39 Roof sheet—flex crack

2.5.4.2 Roof Sheet Improper Repairs

Fig. 2.40 Roof sheet—improper repair: patch material must be same as roof sheet material

Fig. 2.41 Roof sheet—improper repair

3.0 KINGPIN

3.1 Upper Coupler and Kingpin Assembly

3.1.1 The upper coupler and kingpin assembly must meet the following requirements:

- Meet operational conditions of the rail mode listed in Specification M-931 (current version), Table 4.1 (see Fig. 3.1).
- Be constructed with hardness of 380–420 BHN to a minimum depth of 1/16 in., starting from the upper portion of the shoulder to the bottom lip.
- Meet requirements of SAE Standard J-700, latest revision.
- Be located in accordance with truck tractor semi-trailer interchange coupling dimensions shown in SAE J-701, latest revision.

	Operational Data		
Condition	**Force and Direction**	**Derivation**	**Frequency of Load**
1.	Shear load horizontal, 3.7 MGW fore and aft	Humping	Once in life of trailer on railcar
2.	Shear load horizontal, 0.4 MGW fore and aft	Normal operation	Routine cycling
3.	Side sway torque, 2 in. × MGW	Sway on railcar	Intermittent, 100 cycles/day; 100 days/year; 10 years
4.	Vertical at kingpin center, 0.335 MGW to 0.67 MGW	Normal operation, 0.67 to 1.33 of 0.5 MGW kingpin load	Routine cycling
5.	1.0 MGW at kingpin center, vertical, up and down	Extreme bump, 2 × 0.5 MGW kingpin load	Once in life of trailer on railcar
6.	Vertical applied 16 in. aft of kingpin center, 0 MGW to 0.55 MGW up	Loading of trailer on car. 1.1 × 0.5 MGW kingpin load	Routine cycling; 100 cycles/year; 10 years
7.	Vertical applied on bottom side rail lifting shoes, 0.425 MGW to 0.5 MGW	Straddle lifting in terminal. 1.7 MGW with 1.0 MGW on front pair of shoes	Routine cycling

Fig. 3.1 Load conditions for trailers up to 65,000-lb maximum gross weight (MGW) (from *MSRP* Specification M-931, Table 4.1)

3.1.2 The bottom surface of the upper coupler assembly must be designed to provide protection to cross members, air lines, etc., during all normal TOFC operations.

3.1.3 Truck tractor and railcar hitches must be able to be raised to and lowered from the kingpin with no interference with the trailer underframe or attachments.

3.1.4 Passage for air and electrical lines must be designed in a manner that permits easy removal and replacement of lines. Fig. 3.2 displays a trailer kingpin.

Fig. 3.2 Kingpin

3.2 Kingpin-Setting Decals

3.2.1 Decals depicting kingpin setting should be installed on all trailers with kingpin settings less than or greater than 36 in. (measured from the kingpin center to the foremost part of the trailer).

3.2.2 On trailers with nose-mounted temperature control units, the decal must include the kingpin setting and the foremost protrusion, including the temperature control unit ("forward extension").

3.2.3 Decals should indicate this dimension and be installed on both sides of the trailer at kingpin locations.

3.2.4 The lettering should be a minimum of 4 in. in height.

3.3 Anti-Hook Plate

3.3.1 A plate should be installed to protect cross members, air lines, and electrical wiring from damage during coupling and uncoupling operation to stanchion on railcar. Figs. 3.3 and 3.4 display examples of anti-hook plates.

Fig. 3.3 Anti-hook plate—front view

Fig. 3.4 Anti-hook plate—side view

3.3.2 Plate should be a minimum of 24 in. wide and approximately 36 in. long.

3.3.3 Plate should be designed to provide protection during all intermodal operating conditions.

4.0 LIFT RECOMMENDATIONS

4.1 Lift Pads

4.1.1 Trailers will be subject to lifting from the bottom by means of mechanized overhead or side-loading equipment at four lift points. Figs. 4.1 and 4.2 display front and rear lift pads.

Fig. 4.1 Front lift pad

Fig. 4.2 Rear lift pad

4.1.2 Four lift points should be identified by the trailer manufacturer.

4.1.3 Lift pads are nonstructural attachments at the bottom side rails that protect cross members, bottom rails, side walls, and mechanical fasteners from being damaged by lift shoe contact.

4.1.4 Pads should consist of solid steel material and be permanently affixed.

4.1.5 Lift pads should be designed to serve the intended life of the trailer, excluding accidental damage.

4.1.6 Pads should be fastened to trailer in a manner that prohibits damage of lift pads from lift device or lift device shoe contact.

4.1.7 See Fig. 4.4, “Lift pad diagrams,” for lift pad dimensions and placement.

4.1.8 Lift pads should be a minimum of 5 ft in length on trailers less than 48 ft and a minimum of 10 ft in length on trailers 48 ft and greater.

4.1.9 Horizontal bearing surface should extend inward from the vertical side plane a minimum of 6 in.

4.1.10 Vertical bearing surface should extend upward from the bottom side rail a minimum of 2 1/4 in.

4.1.11 The front lift pad should be positioned directly in front of the landing legs and extend toward the front of the trailer (from the front of the landing leg toward the kingpin).

4.1.12 Pads should not be located above a crank shaft unless the crank shaft is recessed at least 8 in.

4.1.13 Where trailers have off-set bottom rail forward of landing legs, the front lift pad should be positioned on both sides of the off-set in the bottom rail, as shown in Fig. 4.3.

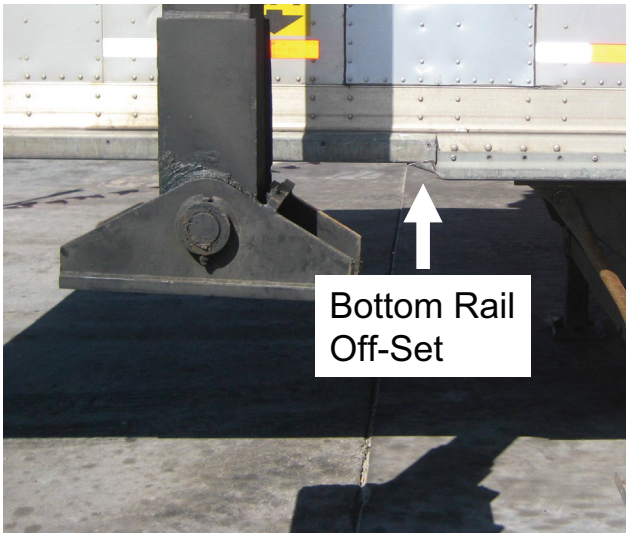
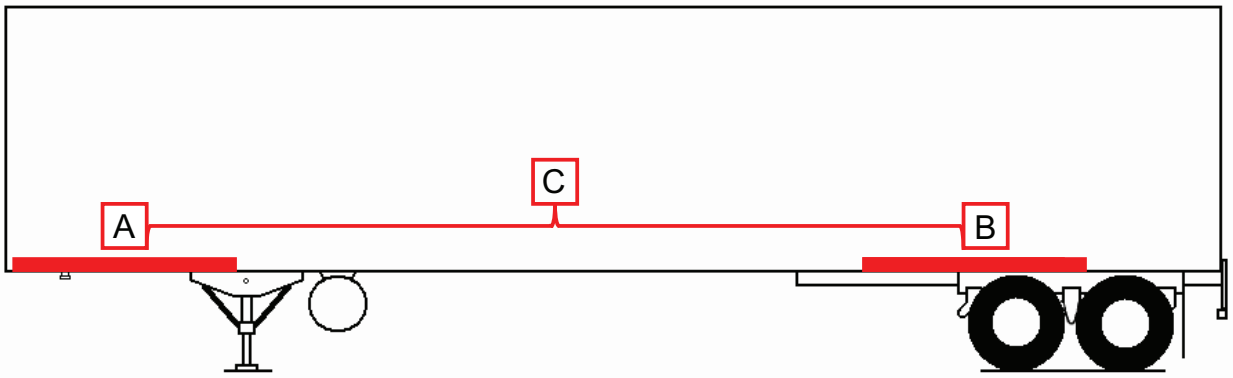
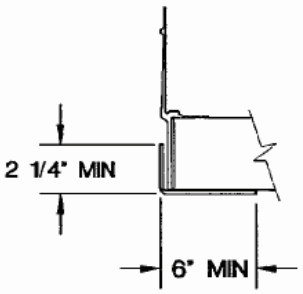


Fig. 4.3 Bottom rail off-set

4.1.14 Once the front lift pad is positioned forward of the landing legs, the center of the rear lift pad will be spaced from the center of the front lift pad based on trailer length. See Fig. 4.4 for lift pad spacing.





Note	Description	28 ft	45 ft	48 ft and Longer
A	Front lift pad	Minimum 5 ft in length		Minimum 10 ft in length
		The entire lift pad should be placed forward of the landing gear.		
B	Rear lift pad	Minimum 5 ft in length		Minimum 10 ft in length
		The front edge of the rear lift pad should not be placed forward of the sliding tandem assembly.		
C	Centerline distance between lift pads	15 ft	30 ft	35 ft

Fig. 4.4 Lift pad diagrams

4.2 Lift Point Decals

4.2.1 Decals should be installed above lift pads at all four lift locations to provide the lift operator clear visibility to lift points. Fig. 4.5 displays examples of lift point decals.

Fig. 4.5 Lift point decals

4.2.2 Decal lettering should be a minimum of 4 in. high.

4.2.3 Decals should not be placed over the area of the crank shaft, mid-turn signals, or belly mounted fuel tanks.

4.2.4 In Fig. 4.6, the lift point was identified directly above the crank shaft and handle, creating a damage risk to these components by inadvertent contact with lift device shoes.

Fig. 4.6 Incorrect lift point

5.0 TOP RAIL

5.1 Top Rail Protectors

5.1.1 Top rail protectors are nonstructural attachments that provide protection to the top rail and roof edge from contact with lifting device arms.

5.1.2 Top rail protectors should be designed and attached to serve the normal life of the trailer, excluding accidental damage.

5.1.3 Top rail protectors should be attached in a manner that protects top rail protector fasteners.

5.1.4 Top rail protectors should consist of solid steel material.

5.1.5 An 8 in. space may be provided where the intermediate side marker lamp is recessed in the top rail.

5.1.6 Trailers that are 28 ft long should have two top rail protectors. Each top rail protector should measure a minimum of 8 ft long.

5.1.7 Top rail protectors should be positioned in line with the outboard edge of lift pads on 28 ft trailers. See Fig. 5.3, "Top rail protector diagrams—28 ft trailers."

5.1.8 Trailers 40 ft and longer should have a single top rail protector that measures a minimum of 20 ft long. See Fig. 5.1.

5.1.9 Top rail protectors should be centered between lift pad centers on 40 ft and greater trailers. See Fig. 5.4, "Top rail protector diagrams—trailers 40 ft or greater in length."

5.1.10 In Fig. 5.2, note that a top rail protector is not present. Without protection, this top rail is at risk from damage from inadvertent contact during lifting operations.

Fig. 5.1 Top rail protector—trailers longer than 40 ft

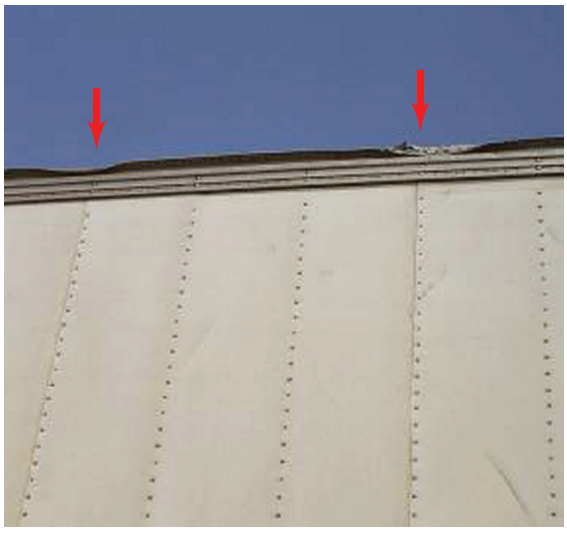


Fig. 5.2 Top rail without protection

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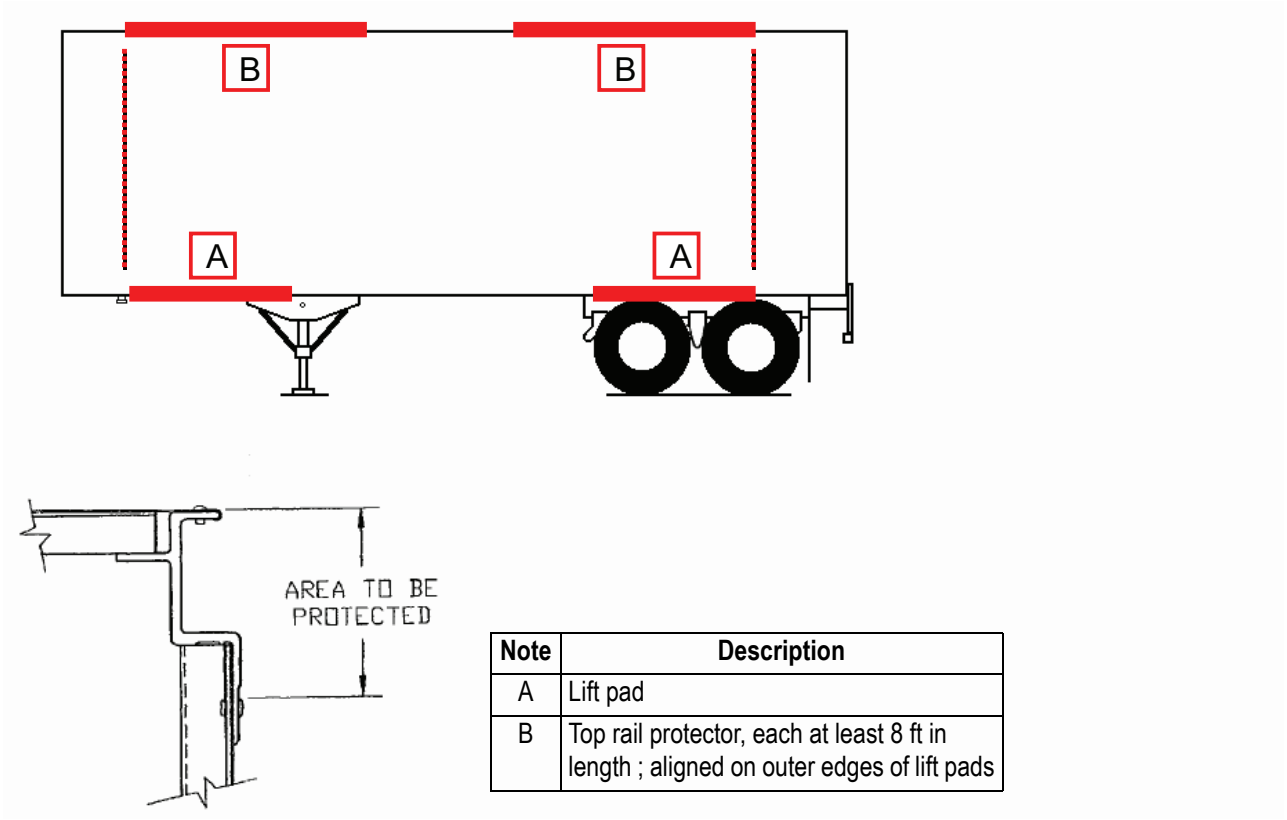
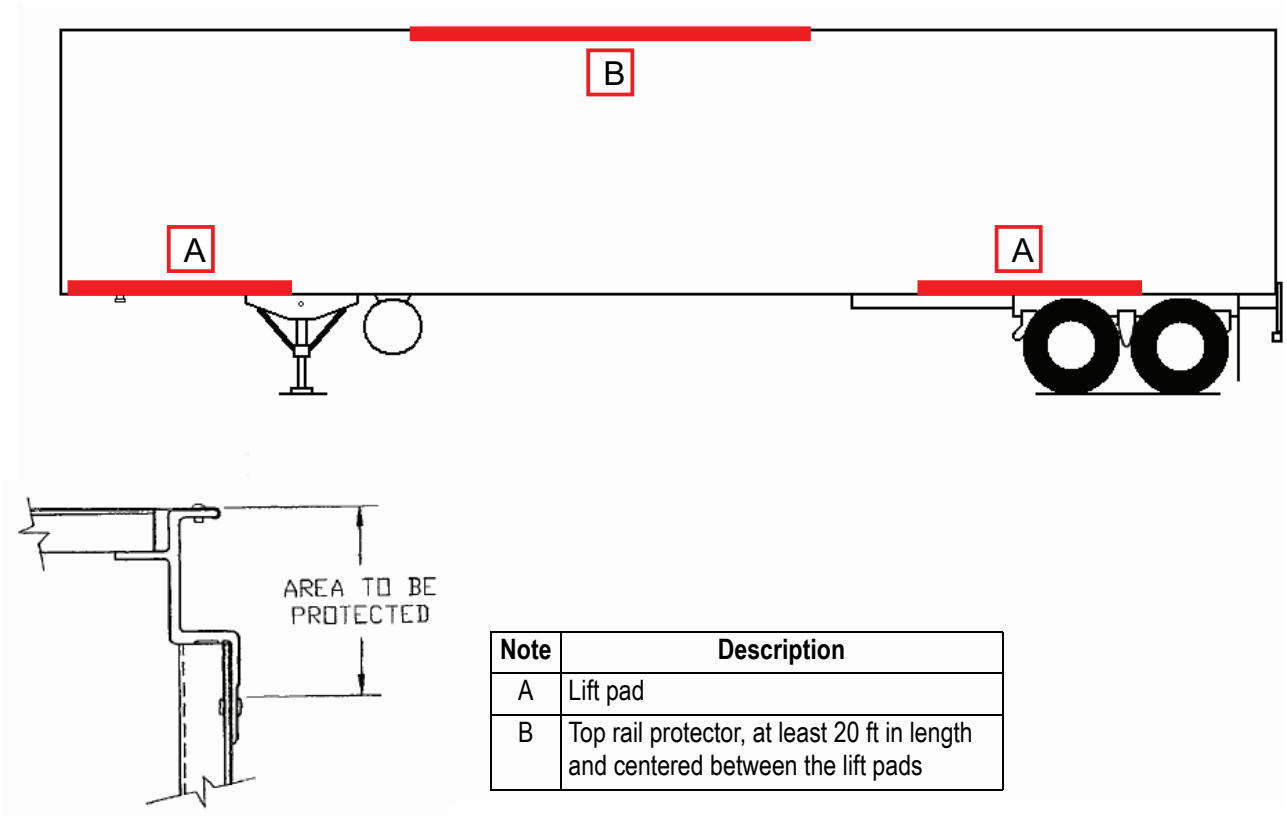


Note	Description
A	Lift pad
B	Top rail protector, each at least 8 ft in length ; aligned on outer edges of lift pads

Fig. 5.3 Top rail protector diagrams—28 ft trailers



Note	Description
A	Lift pad
B	Top rail protector, at least 20 ft in length and centered between the lift pads

Fig. 5.4 Top rail protector diagrams—trailers 40 ft or greater in length

6.0 LIGHTS

6.1 Intermediate Turn Signal Lights

6.1.1 Lights should be positioned in the middle of the trailer and not underneath the lift points or lift pads. See Fig. 6.1.

6.1.2 Lights should be recessed a minimum of 8 in. inboard of the trailer bottom rail. See Fig. 6.2.

6.1.3 Lights placed beneath lift points or lift pads may be torn off from lift device shoe contact.

Fig. 6.1 Light correctly positioned away from lift points

Fig. 6.2 Light recessed at least 8 in. from bottom rail

7.0 TRAILER NOSE

7.1 Glad Hands

7.1.1 Glad hands should be recessed in the nose of the trailer to avoid damage during rail intermodal operations. See Fig. 7.1.

Fig. 7.1 Recessed glad hands

7.1.2 Glad hands that fold away or retract when not hooked to a tractor are acceptable when glad hands cannot be recessed.

7.1.3 Glad hands that protrude from the trailer nose when not in use are at risk for impact damage. See Fig. 7.2.

Fig. 7.2 Protruding glad hands

7.2 Manifest Box

7.2.1 Manifest box should be recessed in the nose of the trailer to protect against damage during rail intermodal operations. See Fig. 7.3.

Fig. 7.3 Recessed manifest box

7.2.2 If the manifest box cannot be recessed, a low-profile manifest box should be used.

7.2.3 The manifest box in Fig. 7.4 is not recessed and is at risk for impact damage.

Fig. 7.4 Exposed manifest box

8.0 FUEL SYSTEM

8.1 Belly mounted fuel tanks and fuel tank spouts should be a minimum of 8 in. inboard of the bottom rail to prevent contact from lift device shoes. See Fig. 8.1.

Fig. 8.1 Fuel tank properly recessed from bottom rail

8.2 Fuel tank should be located away from lift points where possible.

8.3 A 100 gal fuel tank is the optimal size, so that a refrigerated trailer unit can run for multiple days while traveling in rail intermodal service.

8.4 A 75 gal fuel tank is the minimum size that should be used in rail intermodal service.

8.5 The fuel tank in Fig. 8.2 did not have sufficient clearance from the outer edge of the trailer side. The crane shoe impacted the fuel tank nozzle. The fuel tank nozzle separated from the fuel tank, causing an environmental condition with a release of fuel.

Fig. 8.2 Fuel tank damaged as a result of insufficient clearance

9.0 REFRIGERATION UNIT

9.1 The extension of the refrigeration unit beyond the nose of the trailer creates increased risk of impact damage to the refrigeration unit.

9.2 The refrigeration unit creates very close clearances with adjacent trailers during the unloading and loading process.

9.3 Protective cages minimize unit damage from inadvertent impact from an adjacent trailer during the unloading and loading process. See Fig. 9.1.

Fig. 9.1 Protective cages

10.0 TRAILER SKIRTS

10.1 Trailer skirts must be located behind landing legs and in front of the forward position of tandems. See Figs. 10.1, 10.2, and 10.3.

Fig. 10.1 Trailer skirt—rear view

Fig. 10.2 Trailer skirt—forward view

Fig. 10.3 Trailer skirt—inboard view

10.2 Trailer skirts must be affixed to the trailer so that there is no interference with identified lift points.

10.3 Trailer skirts must be 6 in. above street level to avoid contact with rail car components.

11.0 TRAILER HEIGHT

11.1 Fig. 11.1 displays the potential for crane contact with the roof of excess height trailers.

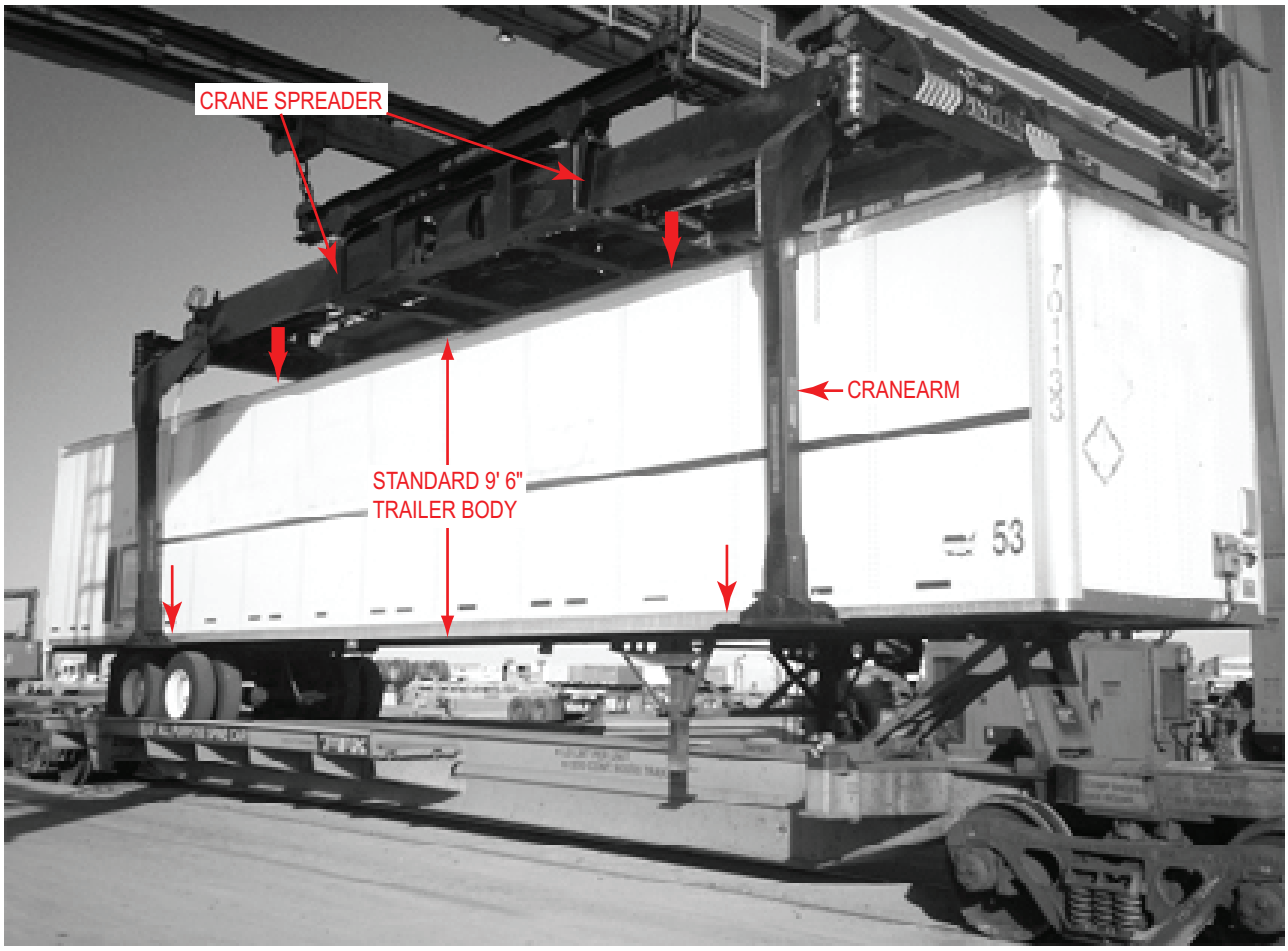


Fig. 11.1 Standard trailer body height

11.2 Trailer bodies exceeding standard 9 ft 6 in. height require crane arms to be lowered to clear the trailer bottom. As arms are positioned lower, the crane spreader also is positioned closer to the trailer roof, creating a greater potential for contact.

12.0 TRAILER SUPPORT

12.1 Trailer support must comply with *MSRP* Specification M-931. Figs. 12.1 and 12.2 display trailer support structure and assembly.

Fig. 12.1 Trailer support structure

Fig. 12.2 Landing gear assembly

12.2 Fig. 12.3 displays language from *MSRP* Specification M-931 (current version) that pertains to trailer support.

4.2.4 Trailer Support
4.2.4.1 General
4.2.4.1.1 In this specification, the term trailer support includes both landing gear assemblies (with axles, wheels, and/or sand shoes, etc.), bracing, mounting brackets, fasteners connecting these items, and that portion of the trailer to which landing gear and bracing are attached.
4.2.4.1.2 The trailer support is to be considered as a complete system, with due regard given to interaction of various components.
4.2.4.2 Design Requirements
4.2.4.2.1 Location
Landing gear shall be located from the centerline of the kingpin in keeping with the truck tractor semitrailer interchange coupler dimensions shown in SAE J-701, latest revision, and shall provide a stable support for the trailer.
4.2.4.2.2 Manual Landing Gears
Where manually operated landing gears are used, they must be of the two-speed type.
4.2.4.2.3 Wheels or Pads and Axles
Landing gear shall be equipped with wheels or pads and axles, if used.
4.2.4.2.4 Location Envelope
The permissible envelope for location of landing gear feet relative to the trailer kingpin is shown in Fig. 12.5.
4.2.4.2.5 Road Clearance
There may be no cross-axle or bracing that results in less than 12 in. of normal road clearance.
4.2.4.2.6 Dimensions
The vertical height of the mounting bracket shall provide fully extended and fully retracted dimensions as shown in Fig. 12.6.
4.2.4.2.7 Mounting Holes
The mounting bracket shall contain mounting holes located in the pattern shown in Fig. 12.7.
4.2.4.2.8 Securement
Landing gear and all bracing attachments shall be secured by mechanical fasteners. All fasteners shall incorporate a locking feature in their design.
4.2.4.3 Capacity Requirements
4.2.4.3.1 Lifting Capacity
Lifting capacity of both landing gears together shall be 58% MGW minimum with 1,200 in. ·lb torque delivered at the input shaft.
4.2.4.3.2 Dynamic Capacity
Trailer support must withstand without damage 4,000 cycles of application of 0.5 MGW for trailers of up to 65,000 lb MGW. Except for tank trailers, loads shall be evenly distributed to the front and rear, but not directly over landing gear, as shown in Fig. 12.1. Trailer support must withstand 10 nominal 3-in. free drops onto landing gear with the trailer uniformly loaded to produce a static load equal to 0.5 MGW on the trailer support.
4.2.4.4 Static Capacity
4.2.4.4.1 Trailer support must be designed to withstand a 0.43 MGW horizontal load applied parallel to the longitudinal axis of the trailer. This load is to be applied at midpoint on the centerline of the axle or within 1 in. of the bottom of the landing gear inner leg (not including the foot member) for models without axles, and with the landing gear extended the distance required to locate the upper coupler plate 48 in. above ground level. See Fig. 12.2.
4.2.4.4.2 Trailer support must be designed to withstand a 0.3 MGW horizontal load applied in a direction 90° to the longitudinal axis of the trailer. A 0.2 MGW shall be applied to the outside of a leg pushing inward, and a 0.1 MGW shall be applied to the inside of the other leg pushing outward. These loads are to be applied at midpoint on the centerline of the axle, or within 1 in. of the bottom of the landing gear inner leg (not including the foot member) for models without axles, and with the landing gear leg extended the distance required to locate the upper coupler plate 48 in. above ground level. See Fig. 12.3.
4.2.4.5 Durability of Landing Gear
Landing gear must be designed to lift 0.54 MGW for 200 cycles a distance of 3 in. per cycle.

Fig. 12.3 Trailer support (from Specification M-931)

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13.0 AIR RIDE SUSPENSION

Extension stops or other means should be installed to prevent damage to air bags and shock absorbers.

14.0 GROUND CLEARANCE

Air brake and suspension components should be mounted so that there is a 10 in. minimum clearance from the road surface.

15.0 PLATE TRAILER STIFFENERS

Plate trailers should have heavy duty stiffeners to minimize side wall deflection during loading and unloading. It is necessary to ensure that shoes on lift equipment will have 100% contact inboard of the bottom rail when lifting.

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