

# DEPARTMENT OF THE ARMY TECHNICAL MANUAL

## Transportability Guidance TRUCK, CARGO, 2<sup>1</sup>/<sub>2</sub>-TON, 6X6, M211

Headquarters, Department of the Army, Washington, D.C.

7 March 1968

	Paragraph	Page
Purpose and scope . . . . .	1	1
Description . . . . .	2	1
Modes of transport . . . . .	3	1
Sectionalization . . . . .	4	6
Item characteristics and related dabs.....	5	6
APPENDIX I. RAIL TRANSPORTABILITY GUIDANCE. . . . .	—	

### 1. Purpose and Scope

u. This manual provides transportability guidance for movement of the truck, cargo, 2<sup>1</sup>/<sub>2</sub>ton, 6x6, M211 (fig. 1). It covers significant transportability and safety considerations in the movement of the item by the various modes of transport. Included are side- and end-elevation drawings (figs. 2 and 3) and characteristics of the item.

b. Users of this manual are encouraged to submit recommended changes and comments for its improvement. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons will be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded to the Director, U.S. Army Transportation Engineering Agency, Military Traffic Management and Terminal Service, ATTN: MTT-TG, Fort Eustis, Va. 23604.

### 2. Description

The M211 cargo truck is a medium-weight vehicle used to transport general cargo and personnel. The item is furnished with and without winch which does not, in either case, alter the overall dimensions. For the purpose of transportability guidance, both models are considered dimensionally similar. Where differences occur, each model is listed separately.

### 3. Modes of Transport

#### a. Shipment by Air.

(1) The item is within the dimensional and weight capabilities of the U.S. Army CH-54 helicopter.

(2) The item is within the dimensional and weight capabilities of the C-119 and C-123 U.S. Air Force aircraft.

(3) Based on a typical one-way mission of 2,500 nautical miles (4630 km), the item is within the dimensional and weight capabilities of the C-141 and the C-124-, C-130-, and C-133-series U.S. Air Force aircraft.

*Note.* The maximum U.S. Air Force aircraft cargo weight and range capabilities are based on the following conditions:

- Standard day conditions
- Sea level operating conditions
- Hard-surfaced runways
- No weather alternate required
- No wind conditions
- Fuel reserve
- Constant cruising altitude

In the event one or more of these operating conditions are changed, the maximum cargo load and/or range may be affected.

#### b. Shipment by Highway.

(1) On road. The item can be transported on highway under its own power. Dimensions and weight of the item are within legal limitations for highway movement in CONUS and within the recommended highway limitations in oversea areas. See figure 4 for turning characteristics of the item.

\* This manual supersedes TB 55-24, 20 August 1962.



*Figure 1. Truck, cargo, 2½-ton, 6x6, M211.*

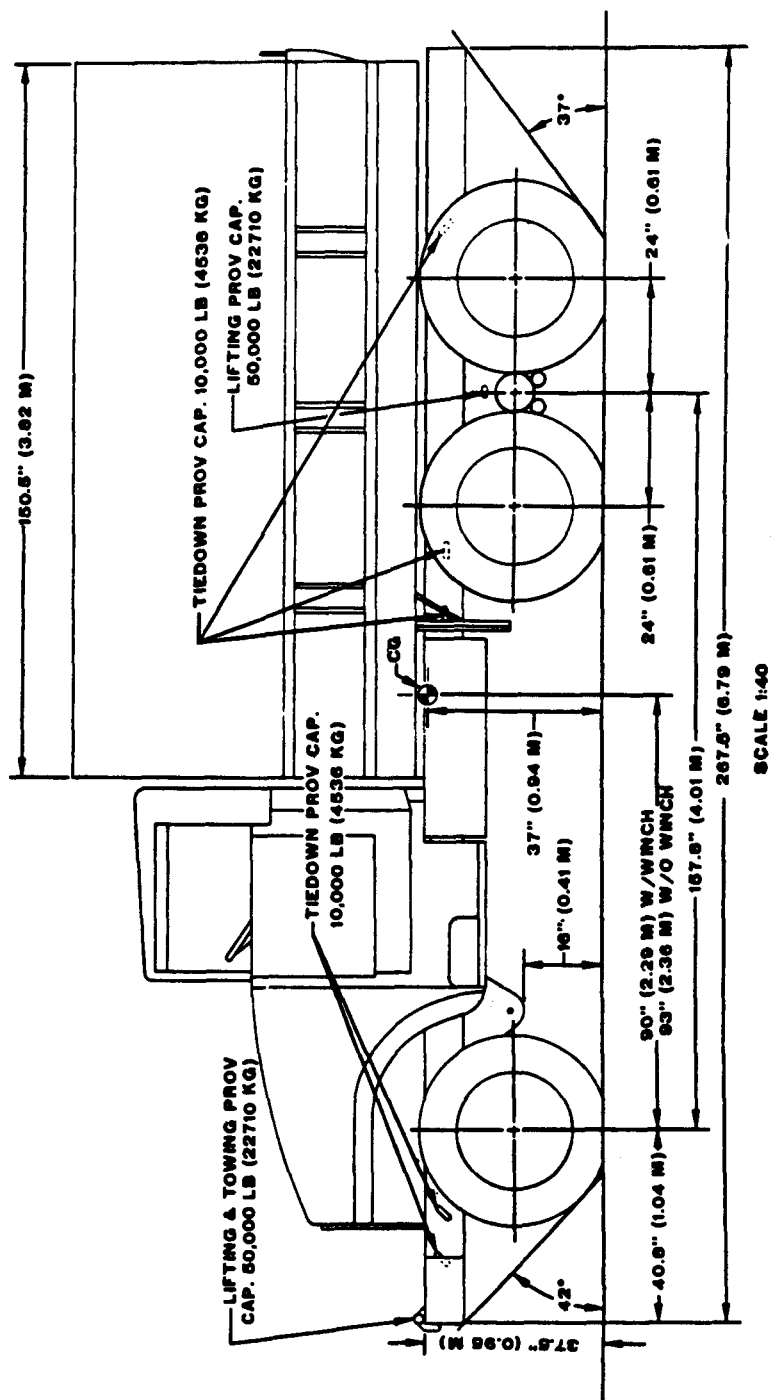


Figure 2. Side elevation.

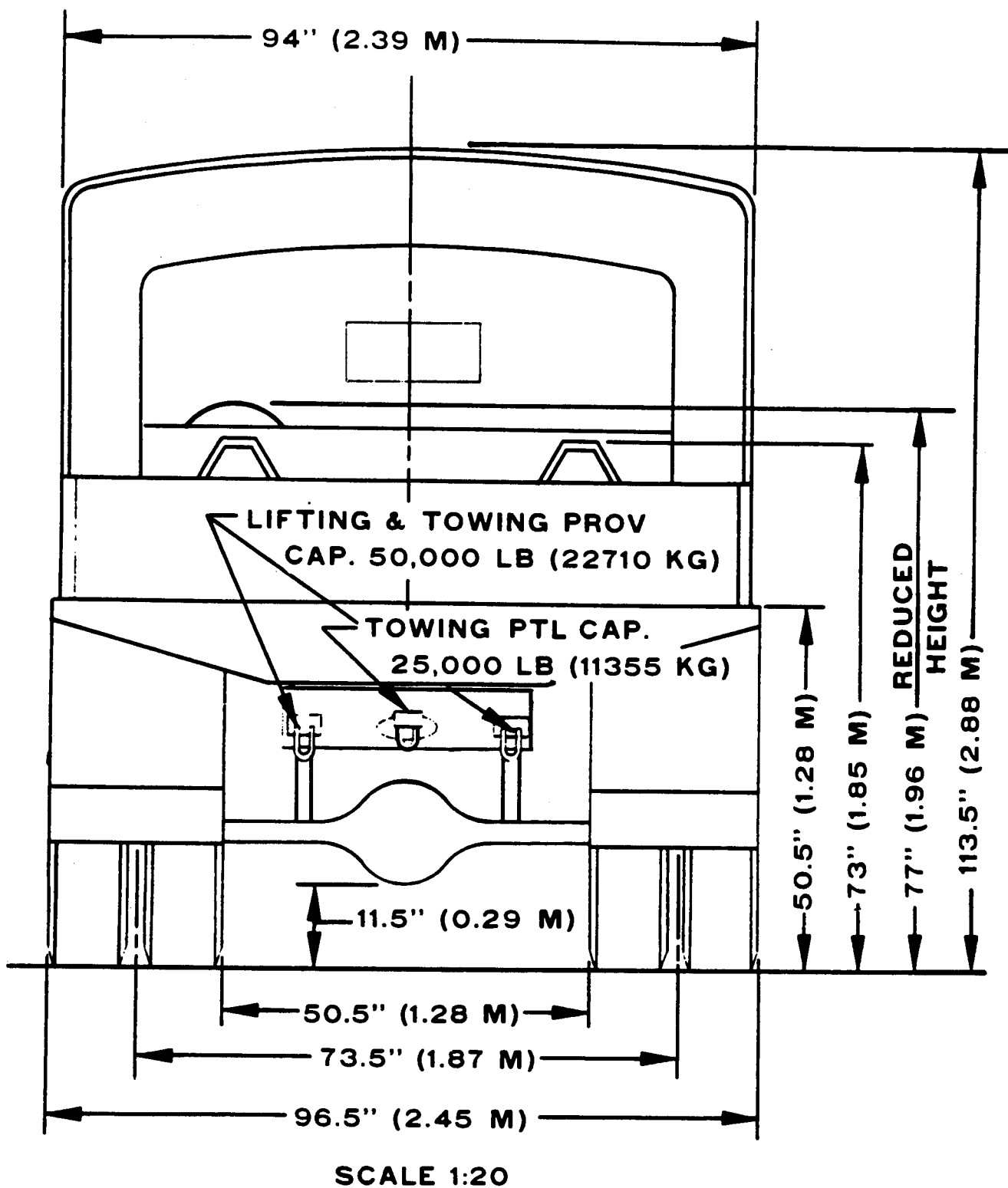


Figure 3. End elevation.

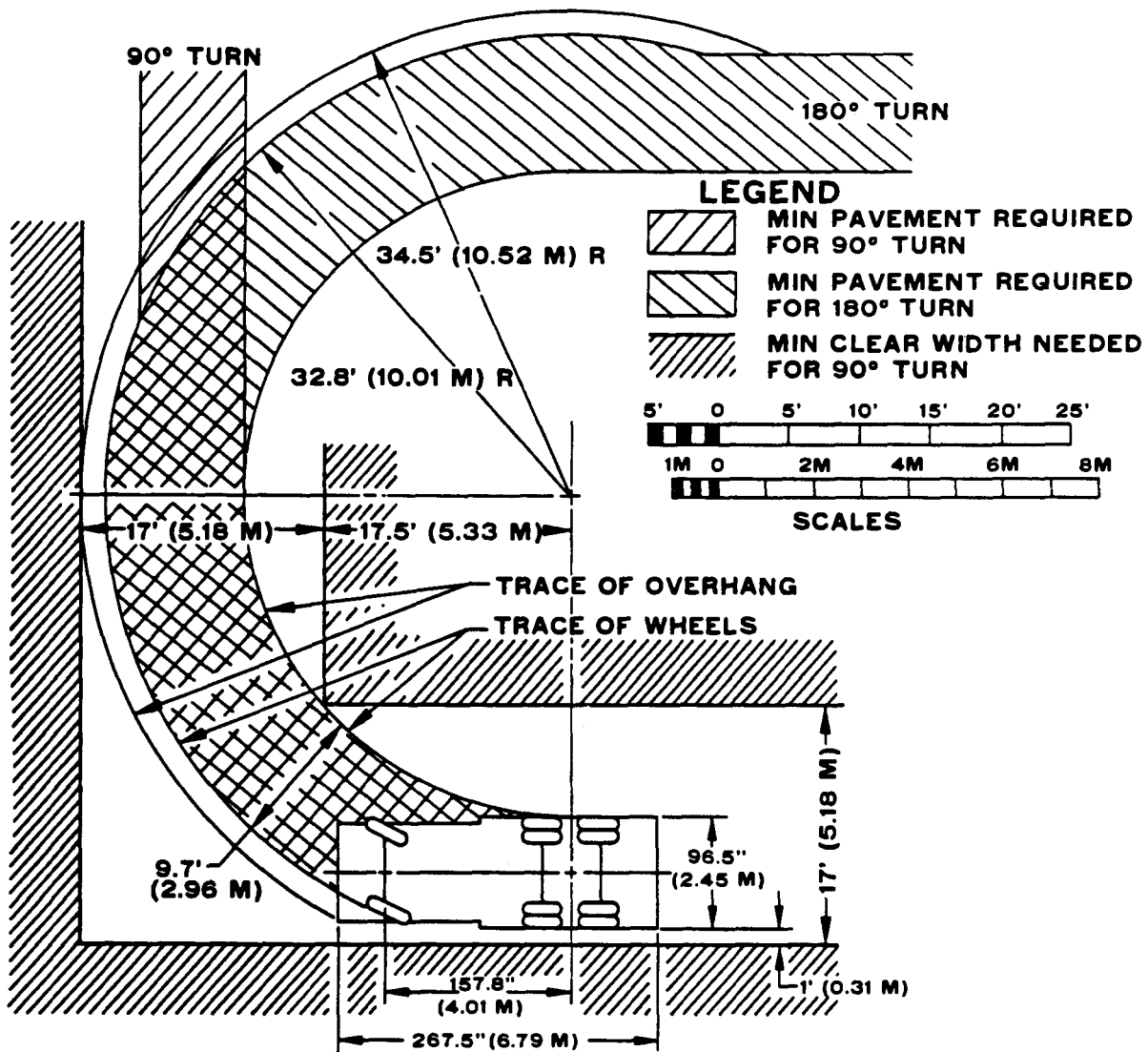


Figure 4. Turning characteristics diagram.

(2) *Off road. Soils trafficability data.* The vehicle cone index (VCI) is a number which tests have proven can be related to the characteristic of a particular vehicle (see para 5). This number, when used in connection with the rating cone index (of the soil), can forecast the ability of that vehicle to repeatedly cross fine-grained soils, and sands with fines, poor] y drained. The rating cone index is obtained by use of the cone penetrometer and its associated equipment. See TB ENG 37 for use of the equipment in the field and for interpretation of index numbers.

c. *Shipment by Rail.* Within CONUS, the item loaded on a railroad flatcar can be transported within the "Outline Diagram for Single Loads, Without End Overhang, on Open Top Cars."\* In countries complying with the Berne International Rail Interchange Agreement, the item can be transported by rail but it exceeds the height limitations; therefore, verification of line clearances will be required. After removal of the tarpaulin and bows, the item can be transported without limitation. See appendix I for information

## 5. Item Characteristics and Related Data

(Data based on item in unloaded condition unless otherwise indicated.)

Nomenclature — Truck, Cargo, 2<sup>1</sup>/<sub>2</sub>Ton, 6x6, M211.

	WWN	WOWN
FAN .....	2320-834-4508	2320-834-4507
LIN .....	X40146.	X40009
Type Classification .....	Standard B	Standard B
Item Weight:		
Front Axle .....	5,740 lb(2604 kg)	5,340 lb(2422 kg)
Bogie .....	7,840 lb (3556 kg)	7,940 lb(3602 kg)
Total .....	13,580lb (6160 kg)	13,280 lb (6024 kg)
Center of Gravity:		
Above Ground .....	37.0 inches (0.94 m)...	37.0 inches (0.94m)
From CL Front kale .....	90.0inches (2.29 m)...	93.0 inches (2.36 m)
Item Dimensions		
Length .....	267.5 inches (6.79m)	
Width .....	96.5 inches (2.45 m)	
Height .....	113.5 inches (2.88m)	
Reduced Height .....	77.0 inches (1.96 m)	
Shipping Data.		
Operational:		
Volume .....	1,695.5 cu ft (48.01 cu m)	
Area. ....	179.3 sq ft (16.66 sq m)	
Reduced :		
Volume .....	1,150.3 cu ft (32.55 cu m)	
Area .....	179.3 sq ft (16.66 sq m)	
Angle of Approach .....	42°	
Angle of Departure .....	37°	

\*Detailed information available in *Railway Line Clearances* publication.

regarding blocking and restraining the item on railroad flatcars and cushioned rub-rail flatcars.

d. *Shipment by Water.* The item can be transported by inland waterway cargo carriers and lighters of adequate capacity, It can also be shipped by Mariner-, Victory-, and Liberty-class seagoing vessels, subject to the following limitations:

Class	Hatch size adequate	Hatch boom adequate	Hatches requiring terminal crane
Mariner No. 2, 3, 4,	5,6,7	5,6	No. 7
Victory All	No. 3,4	No. 1, 2, 5	
Liberty No. 1, 2,	No. 2, 4	No. 1, 5	
4, 5			

## 4. Sectionalization

The overall item height of 113.5 inches (2.88 m) can be reduced to 77 inches (1.96 m) by removing the tarpaulin, bows, and cap top and by folding the windshield. Sectionalization is a routine operation requiring no special tools.

Turning Radii (R&L over front bumper). . . . .	34.5ft (10.52m)
Tire Size . . . . .	9:00 x 20 (0.23 x 0.51 m), 8-ply
Tire Pressure	
Highway . . . . .	50 psi (3.52kg/sq cm)
Cross-Country . . . . .	35 psi (2.46kg/sq cm)
Mud, Sand, and Snow . . . . .	15 psi (1.05 kg/sq cm)
Vehicle Classification	
Unloaded . . . . .	6
With Cross-Country Payload . . . . .	9
With Highway Payload . . . . .	11
Soils Trafficability Data (para 3b(2)):	
1. Truck, Cargo, 2½-Ton, 6x6, M211, WWN, at curb weight plus personnel— 13,980 lb (6205 kg) . . . . .	VCI 53
2. Truck, Cargo, 2½-Ton, 6x6, M211, WWN, at curb weight plus personnel —13,980lb (6341 kg) and cross-country payload of 5,000 lb (2268 kg) . . . . .	VCI 63
CONUS Freight Classification. . . . .	Freight, Automobile
Uniform Freight Classification (UFC) . . . . .	Item 93340
CONUS Freight Classification. . . . .	Freight, Automobiles, NOI
National Motor Freight Classification (NMFC) . . . . .	Item 190190
Publications . . . . .	TM 9-819A TM 9-1819AA, AB, AC TM 9-2320-210-14 TB ENG 37

# APPENDIX I

## RAIL TRANSPORTABILITY GUIDANCE

### Blocking and Restraining Item on Railroad Flatcars With Wooden Floors

#### 1. Bill of Material

	Type of Material	Approximate Quantity
a.	<b>Lumber</b>	
	2- x 4-in.	54 linear ft
	2- x 6-in.	18 linear ft
	& x 8-in.	15 linear ft
b.	<b>Nails</b>	
	12d	30
	20d	72
	40d	60
c.	<b>Wire</b>	
	No. 8 gage, black annealed-finish	300 ft (item E)*
		300 ft (item F)
d.	<b>Wire-Rope</b>	
	1/2-in.-dia	100 ft**
e.	<b>Clamps</b>	
	Wire-rope, 1/2-in.	20**
j.	<b>Thimbles</b>	
	Std, 1/2-in. open-type	8**
g.	<b>Waterproof Paper or Burlap</b>	As required

#### 2. Material Specifications

- a. **Lumber**  
Douglas-fir or comparable lumber with straight grain and free from material defects, fed spec MM-L-751c.
- b. **Nails**  
Common or cement-coated, fed spec FF-N-105a
- c. **Wire**  
No. 8 gage, black annealed-finish, fed spec QQ-W-461
- d. **Wire-Rope and Strand**  
1/2-in., 6x19, IWRC, improved plow steel, preformed, regular-lay, fed spec RR-W-410a
- e. **Clamps**  
Wire-rope, saddled, single grip, steel, MIL-STD 16842

#### 3. Application of Materials (figs. 5,6, and 7)

Item	No. of Pieces	Application
A . . . . .		Brake wheel clearance. Minimum clearance required is 6 in. above, in back of, and on both sides of, and 4 in. underneath wheel.
B	12	Block (sketch 1, fig 6), 6- x 8- x 24-in. Locate 45" portion of block against front and rear of <b>front</b> wheels, in front of inside and outside intermediate wheels, and in back of inside and outside rear wheels. Nail heel of the block to the car floor with three 40d nails and toenail that portion of the block under the tire to the car floor with two 40d nails before items C and D are applied.

\*1Not required if 1/2-in. wire-rope is used for item E.

\*\*Not required if No. 8 gage wire is used for item F.



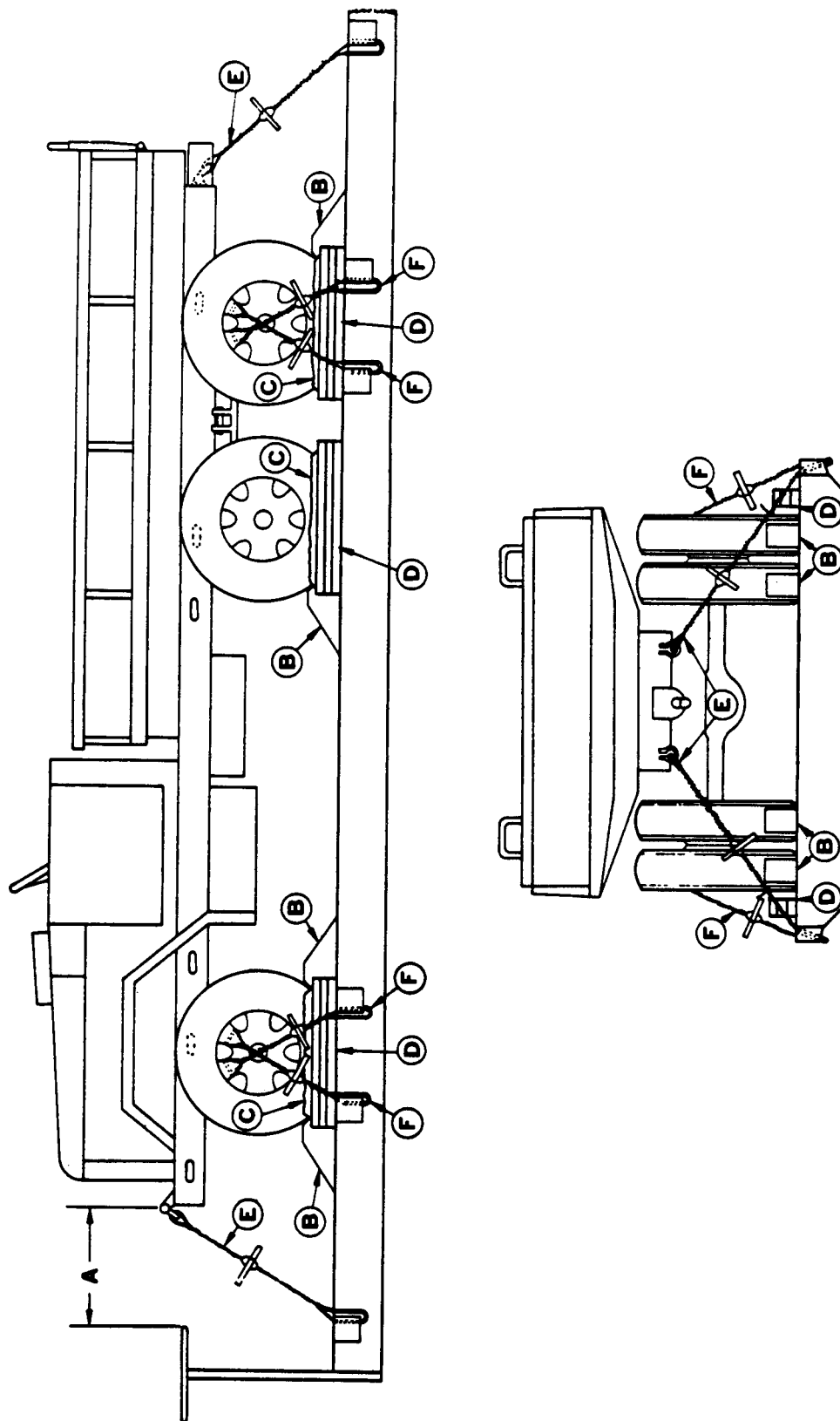
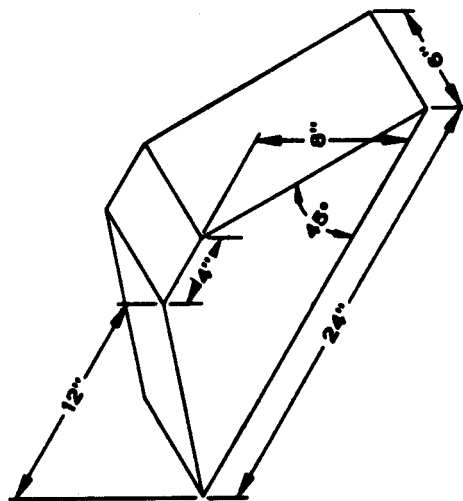
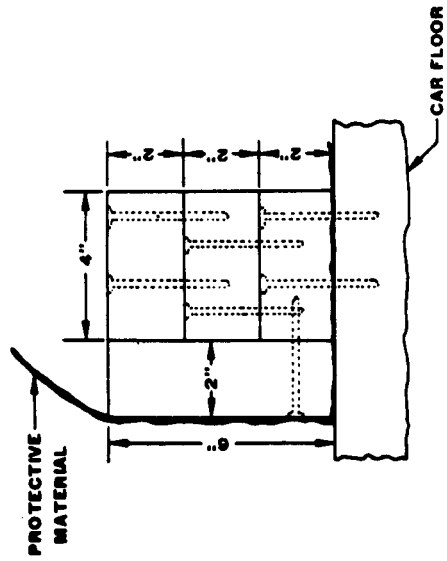


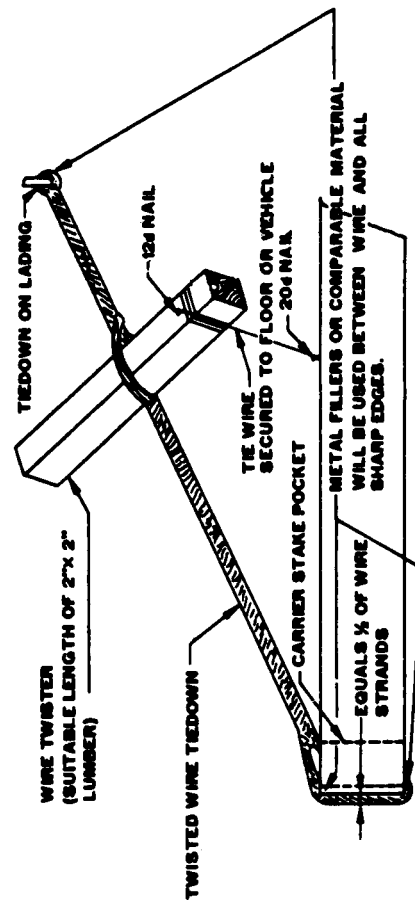
Figure 5. Blocking and restraining diagram.



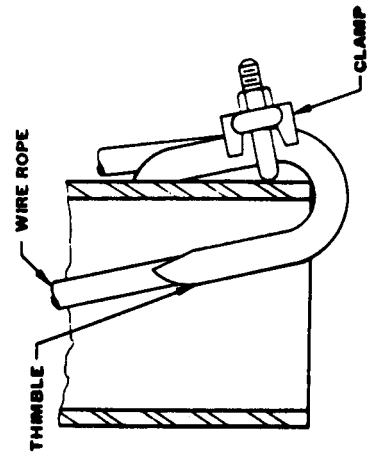
**SKETCH 1**



**SKETCH 2**



**SKETCH 3**



**SKETCH 4**

Figure 6. Blocking and restraining detail diagram.



<i>Item</i>	<i>No. of Pieces</i>	<i>Application</i>
C	1	Suitable material, such as waterproof paper or burlap, etc. Locate bottom portion under item D, the top portion to extend 2 in. above item D (sketch 2, fig. 6).
D	6	Blocks, each to consist of one piece of 2- x 6- x 36-in. lumber and three pieces of 2- x 4- x 36-in. lumber (sketch 2, fig 6). Nail one edge of the 2- x 6- x 36-in. piece to the bottom 2- x 4- x 36-in. piece with five 12d nails Then place against the tire, and nail to the car floor through the 2-x 4-x 36-in. piece with four 20d nails. Nail the other two 2- x 4- x 36-in. pieces to the one below in the same manner.
E	4	Sk <b>strands</b> of No. 8 gage, black annealed-finish wire (see 4c and e below). Attach to the shackles located at each end of the unit and to stake pockets on the same side of the car. Metal fillers sufficient to provide a suitable radius must be used to protect the wire at stake pockets and applied so as to prevent dislodgement. Twist wires taut with a rod, bolt, <b>or</b> suitable length of 2- x 2-in. lumber, and secure to prevent unwinding (sketch 3, fig. 6). Substitute, if desired, 1/2-in. IWRC wire-rope, in a complete loop, and secure with four 1/2-in. wire-rope clamps. Thimble must be used at the stake pocket to protect the wire-rope and secured to the wire-rope with one wire-rope clamp (sketch 4, fig.6).
F	8	Each to consist of six strands of No. 8 gage, black annealed-finish wire. Pass through the spokes or holes in the front and rear wheels and through the car stake pockets (fig. 5 and 7 and para 4c and e below).
W		Wires should be attached to the wheel above the midpoint and the twisted wire tiedowns installed so they form an “X” across the face of the wheel. Twist taut with a rod, bolt, or suitable length of 2- x 2-in. lumber, and secure to prevent unwinding.

4. General Notes

- a. Load as shown is based **on a flatcar** 9 feet 2 inches wide (platform). Cars with wider platforms **may be used**.
- b. All handbrakes will be applied with the hand levers wired or blocked. Gearshift levers for automatic or conventional transmissions must be placed and wire-tied in neutral position. Clutch pedal will be secured in depressed position by wiring to floorboard plate, or by wiring a wood block to the pedal beneath the floorboard.
- c. When No. 8 gage wire is used for tiedown purposes, the wire is to be threaded in a continuous length until all the required number of strands are formed (one complete loop consists of two strands).
- d. Tires are to be inflated to 10 psi above highway operating pressures.
- e. If at any time this vehicle is shipped in a loaded condition and the combined weight of the vehicle and cargo exceeds 22,000 pounds, additional securement will be required as follows: Apply additional wheel tiedowns (item F) to the intermediate wheels, and increase item E to 8 strands of No. 8 gage black annealed-finish wire.
- f. For further details, refer to Association *of* American Railroads (AAR) “Rules Governing the Loading of Commodities on Open Top Cars” and General Rules 4, 5, 9, 10, 14, 16, 19A, and 19B therein.

***Restraining Item on Cushioned Rub-Rail Flatcars***

1. Application

<i>Item</i>	<i>No. of Pieces</i>	<i>Application</i>
A	1	Brake wheel clearance. Minimum clearance required is 6 in. above, in back of, and on both sides of, and 4 in. underneath wheel.
B	1	As required Brandon double chain tiedown device with 1/2-in. dia Excelloy chain, or simid ar, proof-tested at 27,500 lb. Located between the vehicles as shown. Attach one chain around the front axle of one vehicle, and attach the other chain through

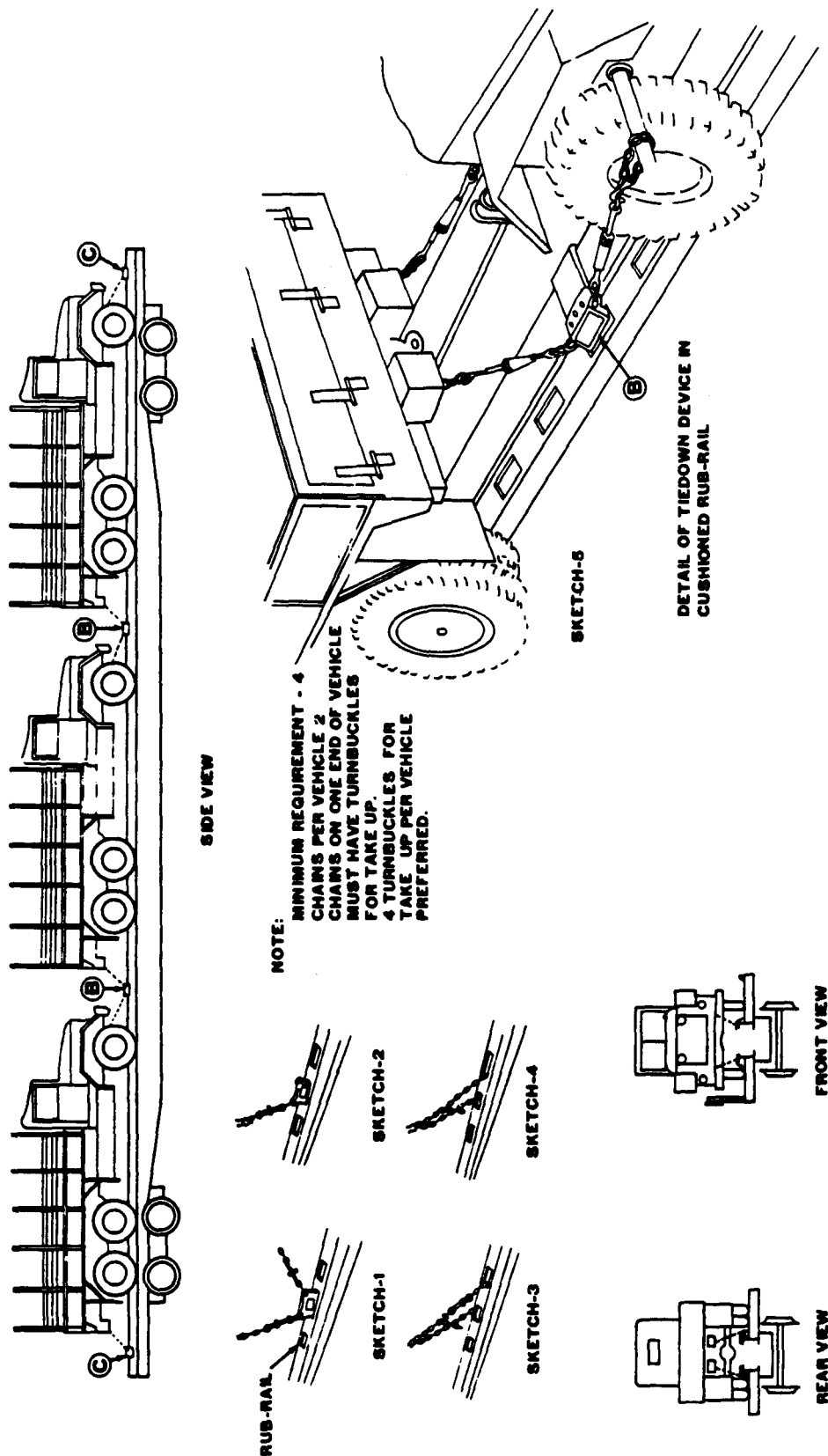


Figure 8. Loading and restraining diagram for cushioned rub-rail flatcar.

C

4

the lifting clevis located at the rear of the other vehicle as shown in sketch 5, fig. 8. Substitute, if desired,  $\frac{1}{2}$ -in. dia chain with grabhook and turnbuckle equipped with a safety-lock device, proof-tested at a minimum of 22,500 lb. Attach one end of the chain to the rub-rail of the car by looping the chain through the slots in the rub-rail. Attach the other end of the chain to the vehicle in the same manner as described above. See 2 below for further details.

Brandon single chain tiedown device with  $\frac{1}{2}$ -in.-dia Excelloy chain, or similar, proof-tested at 27,500 lb. Locate as **shown**. Attach chain around the front axle\* of the first vehicle **facing one end of the car and through the lifting chains** located at the rear of vehicle facing the opposite end of the car. Substitute, if desired,  $\frac{1}{2}$ -in.-dia chain with grabhook and turnbuckle equipped with a safety-lock device, proof-tested at a minimum of 22,500 lb. Attach one end of the chain to the rub-rail of the car by looping the chain through the slots in the rub-rail. Attach the other end of the chain to the vehicle in the same manner as described above. See 2 below for further details,

**\*Caution: Tiedowns installed around front axles must not come in contact with electrical wiring, hydraulic lines, vehicle controls, or other appurtenances. If tiedowns cannot be installed without contact with any of the above-mentioned appurtenances, then point of attachment at the front of the vehicle will be the lifting clevis, the same as at the rear of the vehicle.**

## 2. General Instructions

a. **When ordering** specialized railroad freight equipment, shippers should order cars equipped with tiedown devices in the quantities specified for items B and C (sketches 1 and 2, fig. 8). In the event conventional chain tiedowns are supplied in lieu of the tiedown devices specified, two of the four tiedowns required for each vehicle must have an adjustable turnbuckle equipped with a safety-lock device (see sketch 3, fig. 8) located in the chain for tensioning purposes. The chains must be applied in the following manner.

(1) Attach the two chain tiedowns without the turnbuckle (see sketch 4, fig. 8) to one end of the vehicle and to the car tiedown facility. Pull as tight as possible by hand, and attach the hook to an appropriately located link of the chain.

(2) Attach the two chains with the adjustable turnbuckles to the opposite end of the vehicle and to the car tiedown facility. All four chain tiedowns should then be made taut by tightening the turnbuckles.

**Note. Load binders are not to be used in lieu of turnbuckles to tension tiedown chains.**

b. Vehicles must face in the same direction and be uniformly spaced along the length of the car to allow sufficient space at each end of the car and between the vehicles for securement. Apply tiedowns parallel to each other at the same end of the vehicle and down from the vehicle point of attachment to the car tiedown facility. The angle of the tiedown must not be greater than 45°.

c. Handbrakes on vehicles must not be set.

d. Gearshifts lever for automatic or conventional transmissions must be placed and wire tied in neutral position.

e. Open hooks must be secured with wire over the opening to prevent the hook from becoming disengaged from the chain link to which it is secured.

f. Turnbuckles used to tighten chains must be wired or locked to prevent them from turning during transit unless the turnbuckles are equipped with self-locking devices.

g. When conventional chains are tensioned, care should be taken to avoid tensioning to such extent that rub-rail may start to rise. Brandon, or similar, tiedown devices when attached to the vehicle tiedown shackles should not be tensioned beyond the point where the springs of the vehicle start to compress. After chains are tightened, they should be struck with hammer or bar to eliminate any possible misalignment of links. Further tightening may be required to take up any slack that develops because of link alignment.

h. Brandon tiedown devices are not to be attached to the slots in the cushioned rub-rail adjacent to the position of the recessed trailer hitches. This is to preclude the flange edge of the device, which rests over the inner side of the car's center sill, from coming in contact with any portion of the trailer hitch when in recessed position and thereby restricting the action of the cushioned rub-rail. When placement of vehicles on cars

determines that securement points to the car would fall in this area, conventional chain tiedowns (with or without turnbuckles) attached through the rub-rail slots will be used instead of Brandon devices.

*i.* See Association of American Railroad (AAR) "Rules Governing the Loading of Commodities on

Open Top Cars" and General Rules 4, 5, 7, and 19-A therein for further details.

*j.* Three vehicles can be loaded on an 85-foot, or longer, cushioned rub-rail equipped oar, or similar railroad flatcar, with center tiedown positions running the entire length of the car.

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