

TECHNICAL MANUAL

TRANSPORTABILITY GUIDANCE

**(CHAPARRAL AIR DEFENSE GUIDED
MISSILE SYSTEM)**

**GUIDED MISSILE SYSTEM, INTERCEPT-AERIAL,
M-54 (FSN 1425-937-4040)**

**CARRIER, GUIDED MISSILE EQUIPMENT, SELF-PROPELLED,
M730 (FSN 1450-930-8749)**

**GUIDED MISSILE SYSTEM, INTERCEPT-AERIAL, CARRIER-
MOUNTED, M48 (FSN 1425-937-3859)**

**SHOP EQUIPMENT, GUIDED MISSILE SYSTEM,
AN/TSM-95 (FSN 4935-168-9970)**

**SHOP EQUIPMENT, GUIDED MISSILE SYSTEM,
AN/TSM-96 (FSN 4935-880-4782)**

**GUIDED MISSILE, INTERCEPT-AERIAL, MIM-72A IN
M-570 CONTAINER (FSN 1410-930-8358)**

**GUIDED MISSILE, INTERCEPT-AERIAL, MIM-72B IN
M-570 CONTAINER (FSN 1410-421-1632)**

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 GUIDED MISSILE, INTERCEPT-AERIAL, MIM-72A IN M-570
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 CONTAINER (FSN 1410-421-1632)**

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CHAPTER 1

INTRODUCTION

1-1. Purpose and Scope

a. This manual provides, transportability guidance for logistic handling and movement of the major end items comprising the CHAPARRAL Air Defense Guided Missile System.

b. The intent of this manual is to provide transportation officers down to division level and other personnel engaged in or responsible for movement or providing transportation services with information considered appropriate to insure safe transport of the system items. Significant technical and physical characteristics as well as safety considerations required for worldwide movement by the various modes of transportation are included. For transportation purposes, the M48 and M730 are considered similar, having the same self-propelled carrier. The M730 is a bare carrier and the M48 is the M730 with the M-54. The AN/TSM-95 and AN/TSM-96 are considered similar, having the same basic container. Where differences occur, each model is listed separately in paragraph 2-3. When considered necessary, metric equivalents are given in parentheses following the dimension or other measurement.

1-2. Reporting of Recommendations and Comments

The reporting of errors, omissions, and recommendations for improving this manual by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes

to Publications) and forwarded to Director, US Army Transportation Engineering Agency, Military Traffic Management and Terminal Service, ATTN: MTT-GDP, P.O. Box 6276, Newport News, Va. 23606.

1-3. Safety

Appropriate precautionary measures required during movement of the items are contained in chapter 3.

1-4. Definition of Notes, Cautions, and Warnings

Throughout this manual, notes, cautions, and warnings emphasize important or critical guidance. They are used for the following conditions:

a. *Note.* Guidance which is essential to be highlighted.

b. *Caution.* Guidance which if not strictly observed will result in damage to or destruction of equipment or materiel.

c. *Warning.* Guidance which if not correctly followed will result in personnel injury or loss of life.

1-5. Destruction of Materiel to Prevent Enemy Use

In the event the items being transported must be destroyed to prevent enemy use, refer to the following publications: TM 9-1450-585-10 and TM 9-1425-585-14.

CHAPTER 2

TRANSPORTABILITY DATA

Section I. GENERAL

2-1. Scope

This chapter provides a general description of the items, identification photographs, and tabulated transportability characteristics and data which are necessary for movement of the items.

2-2. Descriptions

a. The guided missile system, intercept-aerial, M-54 (fig 2-1) is designed to store, transport, aim, and launch the CHAPARRAL missile, MIM-72A and MIM-

72B. The major assemblies include a base, which contains the major supporting subsystems; and four missile launch rails, each carrying a missile, which is mounted on the turret section of the mount. When dismantled from the carrier the M-54 is operable with jack set, launching station (ground emplacement kit). When the M-54 is mounted on the M730, the complete system is designated carrier-mounted intercept-aerial guided missile system, M48. On the top surface of the base, near each corner, are provisions for the installation of hoisting rings which are used in loading the item into the M730.

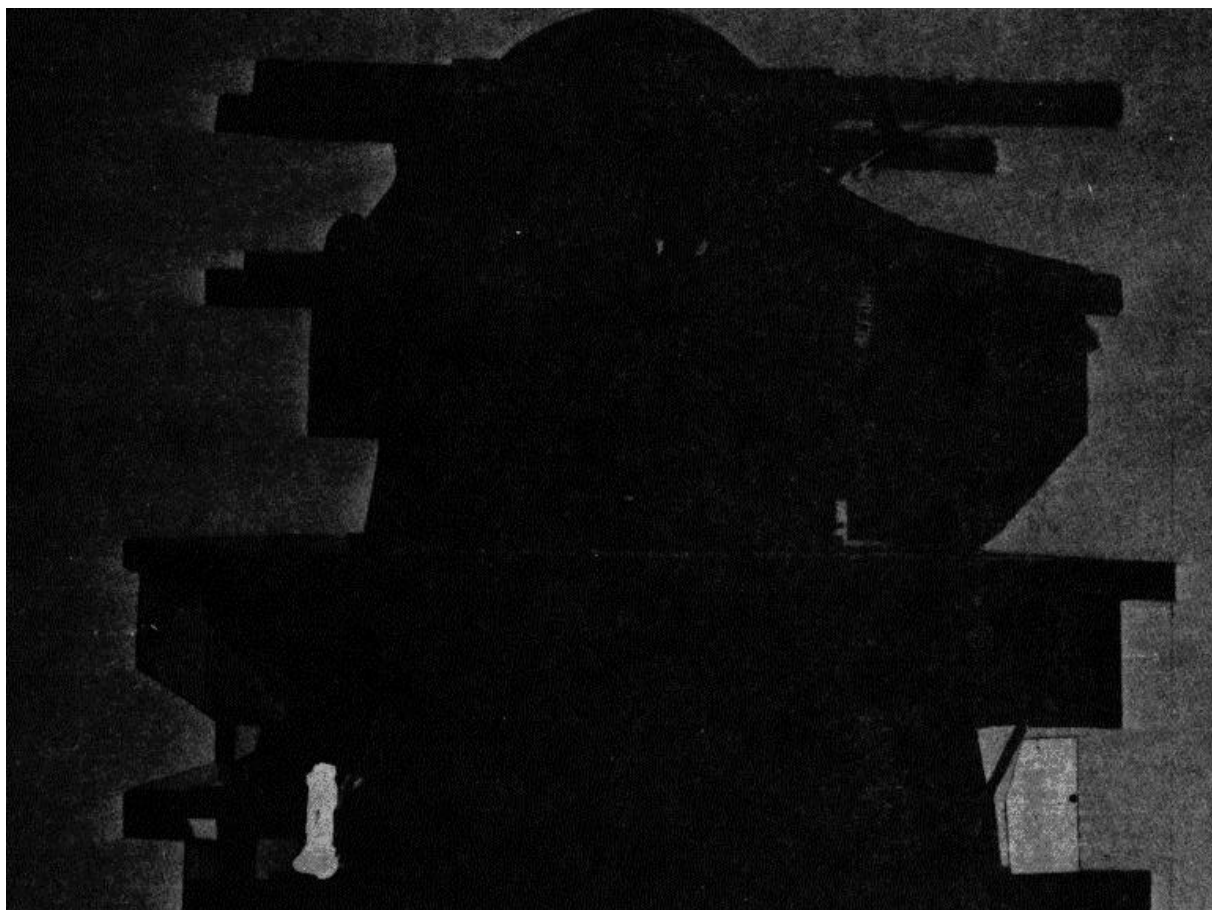


Figure 2-1. Guided missile system, intercept-aerial, M-54.

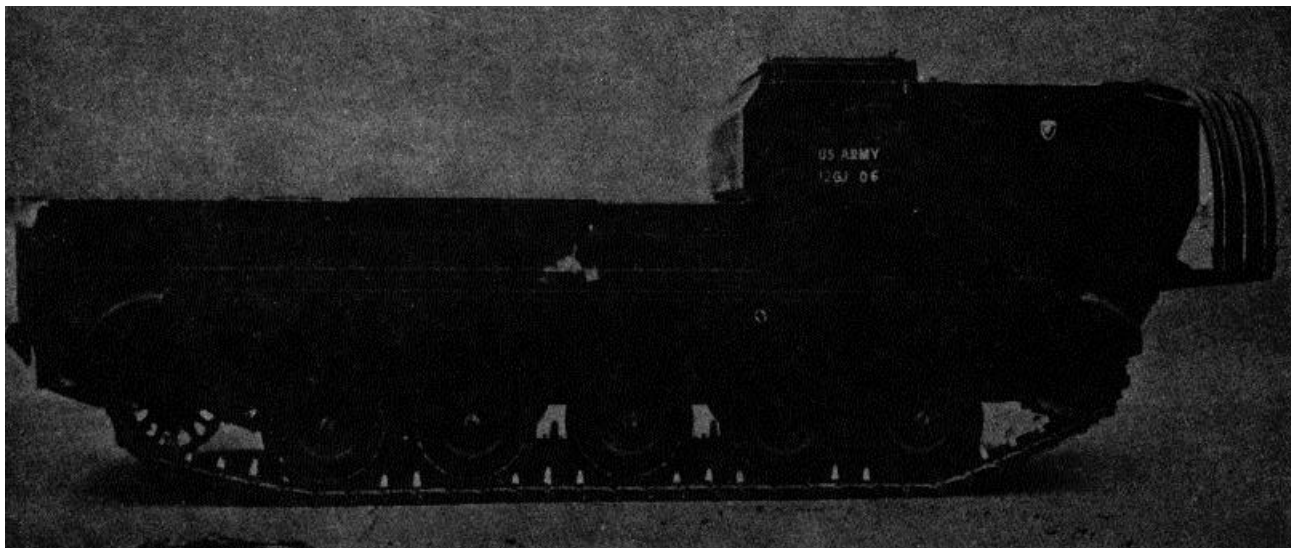


Figure 2-2. Carrier, guided missile equipment, self-propelled, M730.

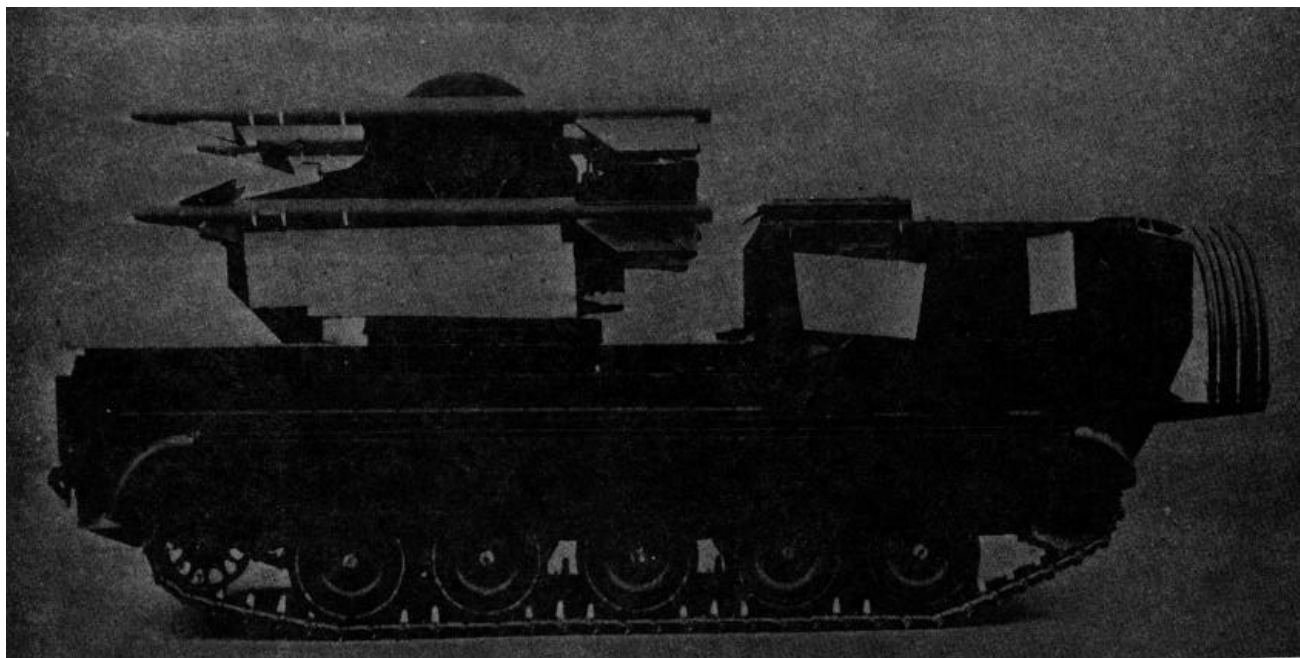


Figure 2-3. Guided missile system , intercept-aerial, carrier-mounted, M48.

b. The carrier, guided missile equipment, self-propelled, M730 (fig 2-2) is a full-tracked, lightweight, unarmored vehicle for carrying an operational Chaparral aerial intercept guided missile subsystem and launching its missiles. The carrier is air-transportable, but not air-droppable, and is capable of fording water to a maximum of 30 inches without installation of flotation curtains. With flotation curtains installed, the carrier is

amphibious. It can be operated over cross-country terrain and improved highways. The hull of the carrier is constructed of lightweight aluminum welded into a compact watertight unit. The personnel and driver's cab extends across the full width of the carrier in front. The cargo compartment extends the full width across the carrier and

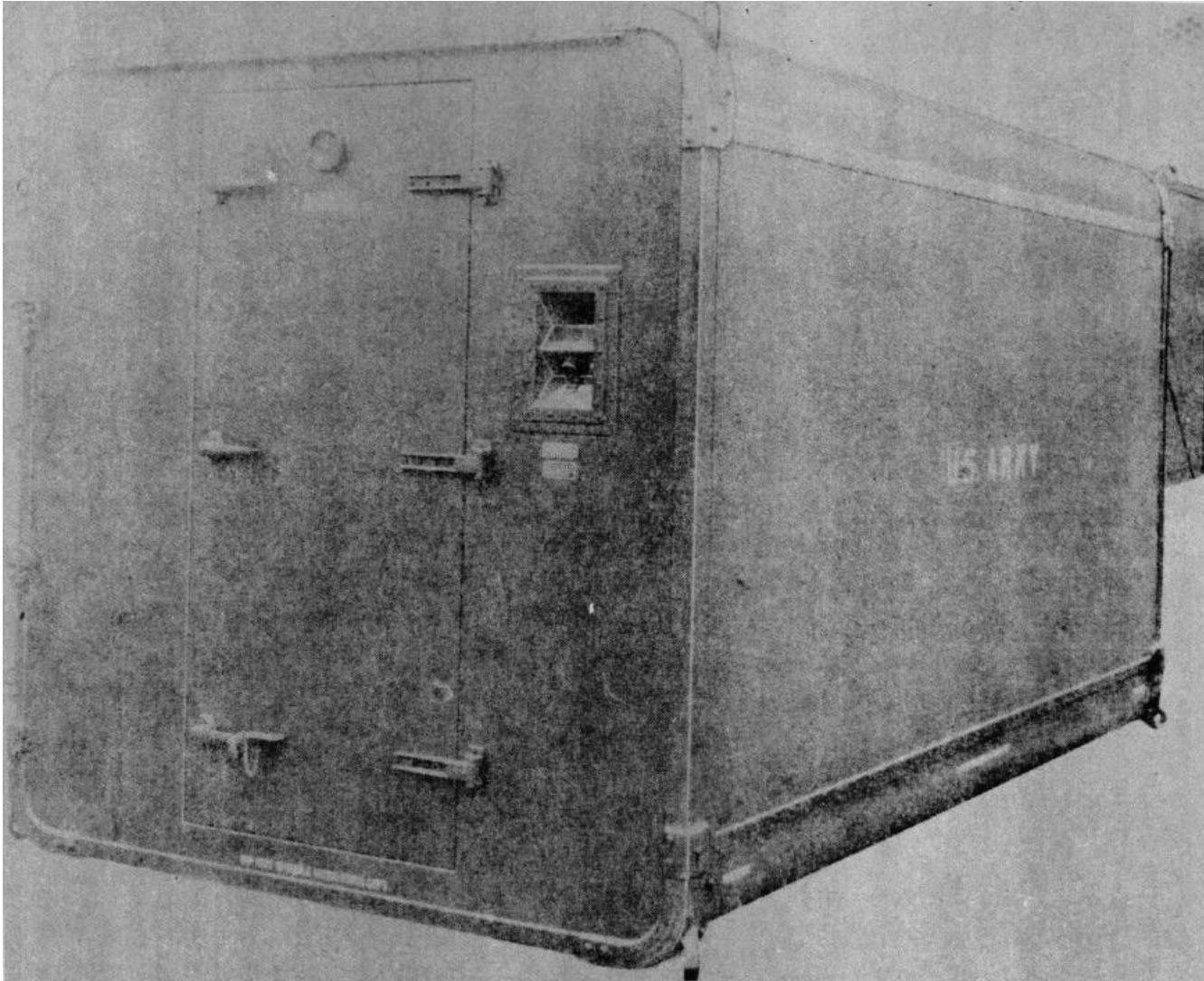


Figure 2-4. Shop equipment, guided missile system, AN/TSM-95 and AN/TSM-96.

lengthwise from the power plant (located behind the driver) compartment to the tailgate.

c. The guided missile system, intercept-aerial, carrier-mounted, M48, is shown in figure 2-3. The M48 consists of the M54 mounted in the cargo compartment of the M730.

d. The shop equipment, guided missile system, AN/TSM-95 (fig 2-4) is an all-mode transportable shop that is airtight and environmentally controlled by heater/air conditioner. It houses the necessary tools and test equipment required for operator and organizational maintenance of the intercept-aerial, M-54. The all-metal container is provided with lifting and tiedown provisions

located on the top four corners, and on the lower side corners are provisions for towing and tying down.

e. The shop equipment, guided missile system, AN/TSM-96 provides the facilities and electronic equipment necessary to fault-isolate launching station major assemblies and test equipment. The all-metal container is similar to the AN/TSM-95 (fig 2-4).

f. The guided missile, intercept-aerial, MIM-72A and MIM-72B are infrared, heat-seeking missiles, for ground-to-air launching. The missile is aimed by the gunner, who keeps his optical sight aligned with the target. The missile guides on the target's heat source automatically. It is shipped in the container, shipping and storage, guided missile, M-570 (fig 2-5).

Section II. CHARACTERISTICS AND RELATED DATA OF ITEMS

2-3. General

The following data pertain to the identified basic items. Subsequent chapters show, where appropriate, dimensional data and weight for the items when configured for movement by a particular mode of transportation. Data are the latest available; weights and measurements are approximate.

Note. Whenever weight and/or measurements are critical factors for transportability purposes, each item should be weighed and measured.

a. Guided missile system, intercept-aerial, M-54 (launching station).

Federal Stock
 Number..... 1425-937-4040
 Measurements:
 Length 128.5 in. (3.26 m)
 Width..... 94.5 in. (2.40 m)
 Height..... 83.8 in. (2.13 m)
 Volume 588.9 cu ft (16.67 cu m)
 Weight 9,720 lb (4,409 kg)
 Center of gravity:
 Vertical (from interface) 33.8 in. (0.86 m)
 Longitudinal (from front) 60.0 in. (1.52 m)

b. Carrier, guided missile equipment, self-propelled, M730.

Federal Stock
 Number 1450-930-8749
 Measurements:
 Length, maximum, overall 238.5 in. (6.06 m)
 Minimum (less bow

storage
 brackets) 229.9 in. (5.84 m)
 Width, maximum, overall 105.8 in. (2.69 m)
 Minimum (less track shrouds, covers, and exhaust duct)..... 100.0 in. (2.54 m)
 Height, maximum (with cab) 105.5 in. (2.68 m)
 Minimum (less cab and blast covers) 77.5 in. (1.97 m)
 Volume:
 Operational..... 1,540.6 cu ft (43.60 cu m)
 Reduced..... 1,031.1 cu ft (29.18 cu m)
 Weight:
 Net* 14,691 lb (6,664 kg)
 Air transport** 13,886 lb (6,299 kg)
 Ground pressure:
 Loaded weight..... 7.5 psi (5.27 kg/sq cm)
 Net weight..... 4.4 psi (3.09 kg/sq cm)
 Center of gravity net weight:

*Net weight: Carrier fully equipped and serviced for operation, with driver but without payload of crew, guided missiles, and launching equipment.

**Air transportable weight: Carrier fully serviced with 20 percent fuel, less: driver, crew, guided missiles, and launching equipment.

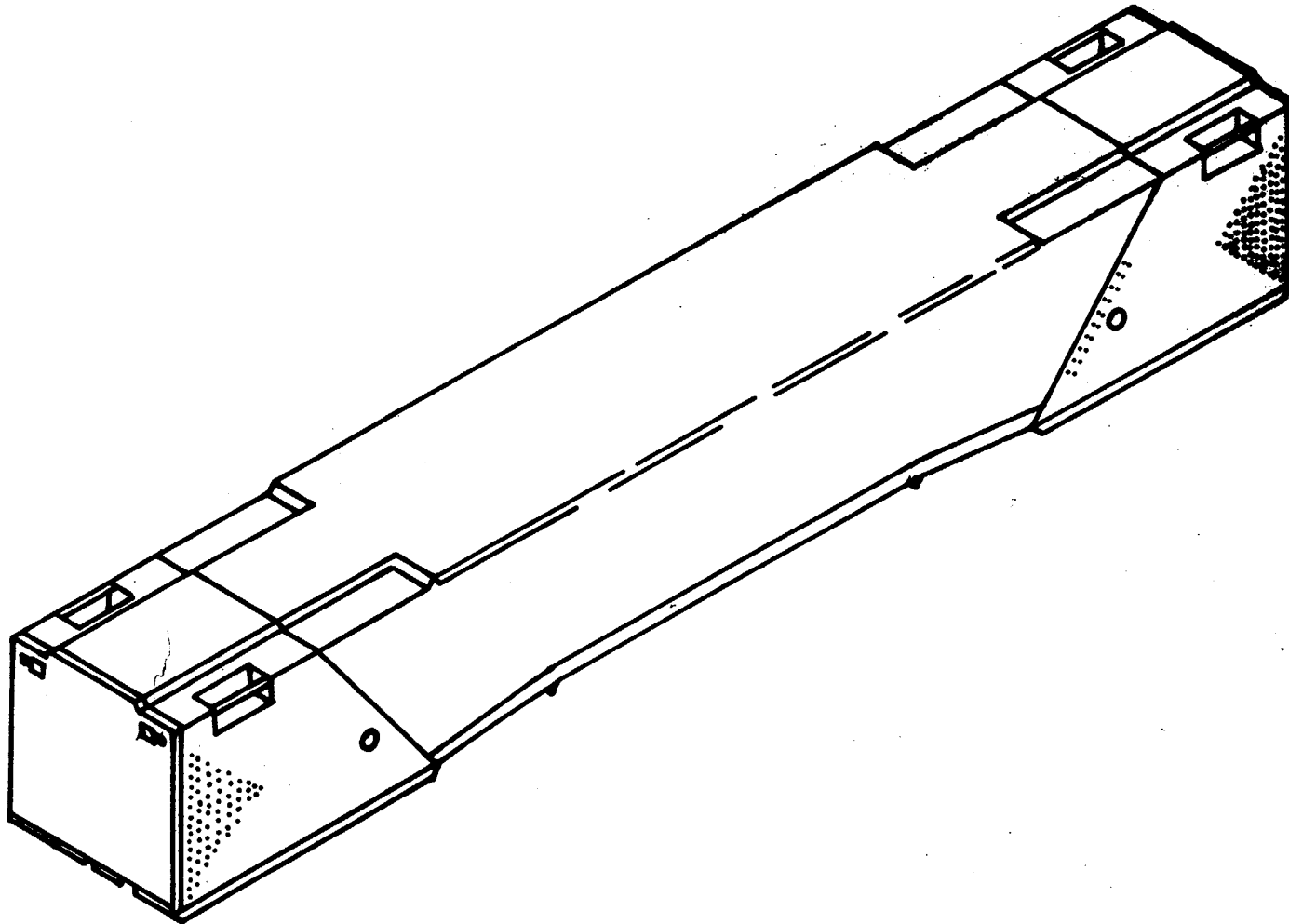


Figure 2-5. Guided missile, intercept-aerial, MIM-72A or MIM 72B in M-570 container.

Above ground 31.5 in. (0.80 m)
 From centerline
 of drive
 sprocket 62.5 in. (1.59 m)
 Ground clearance -- 16.0 in. (0.41 m)
 Cab capacity:
 Crew 1
 Passengers 4
 Vehicle weight
 classification:
 Empty 7
 Soils trafficability
 data (para 5-2):
 Item at unloaded
 weight plus
 driver VCI 39
 Performance on land:
 Vertical obstacle
 ability 24 in. (0.61 m)
 Maximum trench
 crossing
 ability 66 in. (1.68 m)
 Minimum turn-
 ing radius
 (differential
 steering) 24 ft (7.32 m)
 Minimum turn-
 ing radius
 (pivot steer-
 ing) 14 ft (4.27 m)
 Maximum speed
 (forward)
 (2-3 range) 38 mph (61.14 kmph)
 Maximum speed
 (reverse) 9.2 mph (14.70 kmph)
 Maximum towed
 load 14,500 lb (6,577 kg)
 Maximum ford-
 ing depth (w/o
 flotation cur-
 tain installed) 40 in. (1.02 m)
 Cruising range 300 mi. (482.70 km)
 Maximum grade-
 ability (as-
 cending or
 descending) 0 percent
 Maximum side
 slope ability 30 percent
 Performance on
 water:
 Maximum ford-
 ing depth (w/
 flotation cur-
 tain installed) unlimited
 Maximum speed
 (forward) 3 mph (5.56 kmph)

Loaded free-
 board-static
 (limited to 1-
 foot waves) 15 mph (27.78 kmph)
 Fuel compartment:
 Refill 100 US gal (378.50 l)
 Dry 105 US gal (397.431 l)
 c. Guided missile system, intercept-aerial,
 carrier-mounted, M48.
 Federal Stock
 Number 1425-937-3859
 Measurements:
 Length, maxi-
 mum, overall 238.5 in. (6.05 m)
 Minimum
 (less bow
 storage
 brack-
 ets) 229.9 in. (5.84 m)
 Width, maximum
 overall 105.8 in. (2.69 m)
 Minimum
 (less track
 shrouds,
 covers,
 and ex-
 haust
 duct) 100.0 in. (2.54 m)
 Height, maxi-
 mum (with
 cargo cover) 114.0 in. (2.90 m)
 Minimum
 (less cargo
 cover) 107.1 in. (2.72 m)
 Volume:
 Operational -- 1,563.9 cu ft (44.26 cu
 m)
 Reduced 1,425.0 cu ft (40.33 cu m)
 Weight:
 Operational 22,976 lb (1,042 kg)
 Shipping
 configuration 23,776 lb (1,078 kg)
 Center of gravity:
 Above ground:
 Operational 46.3 in. (1.18 m)
 Shipping
 configura-
 tion - 46.8 in. (1.19 m)
 From front of
 carrier:
 Operational 128.5 in. (3.26 m)
 Shipping
 configura-
 tion 147.0 in. (3.73 m)
 Soils trafficability
 data (para 5-2):
 Items at operational weight
 plus driver VCI 47

Vehicle weight
 classification
 loaded 11

Note

See paragraph 2-3b for data on the M730 which is applicable to the M48.

d. Shop equipment, guided missile system, AN/

TSM-95.

Federal Stock

Number 4935-168-9970

Measurements:

Length 178.0 in. (4.52 m)
 Width 83.0 in. (2.11 m)
 Height 87.0 in. (2.21 m)
 Volume..... 743.8 cu ft (21.05 cu m)
 Weight 4,970 lb (2,254 kg)

Center of gravity:

Vertical 37.5 in. (0.95 m)

Longitudinal

(from door) 93.6 in. (2.38 m)

e. Shop, equipment, guided missile system, AN/

TSM-96.

Federal stock

number 4935-880-4782

Measurements:

Length 181.0 in. (4.60 m)
 Width 83.0 in. (2.11 m)
 Height 87.0 in. (2.21 m)

Volume 756.4 cu ft (21.41 cu m)
 Weight 4,970 lb (2,254 kg)

Center of gravity:

Vertical..... 44.2 in. (1.12 m)

Longitudinal

(from front

end) -..... 83.5 in. (2.12 m)

f. Guided missile, intercept-aerial, MIM-72A or

MIM-72B in M-570 container.

Federal Stock

Number 1410-930-8358

Federal Stock

Number 1410-421-1632

Measurements:

Length 125.0 in. (3.18 m)
 Width 18.0 in. (0.46 m)
 Height 19.0 in. (0.48 m)
 Volume..... 24.7 cu ft (0.70 cu m)
 Weight 300 lb (136 kg)

2-4. CONUS Freight Classification

The determination of appropriate rail and motor freight classification descriptions and proper classification item numbers is the responsibility of the Installation Transportation Officer issuing the bill of lading for shipment of the item(s).

CHAPTER 3

SAFETY

3-1. General

General safety considerations and precautions for movement are as follows:

- a. When backing the carrier, insure that no personnel or obstructions are behind it.
- b. Do not walk under any items while they are being lifted by crane or other means.
- c. Fire extinguishers, other than system extinguishers, must be readily available during all loading and off-loading operations.
- d. Check each vehicle to insure that all loose items are appropriately secured in accordance with applicable regulations (app).
- e. Do not leave vehicle unattended while engine is running.
- f. If track is thrown while operating vehicle, do not apply brakes unless absolutely necessary. Allow vehicle to coast to a stop.
- g. Insure adequate ventilation while carrier engine is running; carbon monoxide poisoning can be deadly.

Warning.

The M8A3 air filter unit will not protect user against carbon monoxide.

3-2. Hazardous Materials

Shipment of hazardous materials by all modes of commercial transportation within CONUS will be made in accordance with the requirements outlined in chapter 216 of AR 55-355, Military Traffic Management Regulation. It is mandatory that the utmost care and prudence be exercised by everyone engaged in the handling and transport of all kinds of explosives, ammunition, and ammunition components. In the event the transport of ammunition or explosives is authorized:

- a. The missile shipping and storage container will provide adequate shock and vibration protection during transport, provided the containers are securely tied down and braced in accordance with prescribed procedures.
- b. The temperature limits on the missile or ammunition containers must not be exceeded.

Warning

No smoking in crew compartment of the vehicle when it is loaded with ammunition.

Warning.

Insure that class A explosives used in the missiles are shipped with compatible classes. DO NOT mix noncompatible classes of explosives or hazardous munitions (app).

CHAPTER 4 AIR TRANSPORTABILITY GUIDANCE

Section I. GENERAL

4-1. Scope

This chapter provides air transportability guidance for movement of the CHAPARRAL guided missile system. It covers significant technical and physical characteristics, safety considerations, and prescribes materials required.

4-2. Maximum Utilization of Aircraft

Additional cargo and/or personnel within load limits and restrictions prescribed by pertinent safety regulations (app) can be transported.

Section II. EXTERNAL TRANSPORT BY US ARMY AIRCRAFT

4-3. Applicability

a. All the items listed in paragraph 2-3 are too large and/or heavy for external transport by US Army fixed wing aircraft except the MIM-72A or MIM-72B round in M-570 container.

b. All items listed in paragraph 2-3 except the M-48 can be transported externally by the CH-47 or CH-54 helicopters.

4-4. Load Descriptions

The CHAPARRAL missile system loads are rigged for external transport using either aerial delivery cargo slings or a 15,000-pound-capacity multileg (chainleg) sling set, as indicated. Descriptions of the loads and slings used are as follows:

a. *Load 1.* Guided missile system, intercept aerial, M-54, using aerial delivery cargo slings.

b. *Load 2.* Guided missile system, intercept aerial, M-54, using a 15,000-pound-capacity multileg (chainleg) sling set.

c. *Load 3.* Shop equipment, guided missile system, AN/TSM-95 or AN/TSM-96, in modified S141G shelter, using a 15,000-pound-capacity multileg (chainleg) sling set.

d. *Load 4.* Guided missile, intercept-aerial, MIM-72A or MIM-72B in M-570 container (12 rounds), using aerial delivery cargo slings.

Note

The nomenclature, dimensions, weight, and center of gravity of the CHAPARRAL missile system loads for external lift are given in table 4-1. For a detailed description of the CHAPARRAL missile system, refer to TM 9-1440-585-12.

Warning

The high noise level of CH 47 helicopter turbine engines can cause permanent damage to the ear. Personnel working in the vicinity will wear earplugs and avoid entering engine noise-danger area. External cargo hookup personnel will wear

goggles and protective headgear (hard hat (steel helmet) or flight helmet).

Warning

Always assume that a charge of static electricity is present on the helicopter. Use of some type of discharge apparatus (fig 37, TM 55-450-8) to ground the hook and discharge electricity is necessary to prevent shock when the hook is touched. After discharge of electricity, the hook is grasped quickly and firmly and held, if possible, until the hookup is completed. If contact with the hook is lost after initial grounding, the hook must be grounded again before it is touched. Do not use the item as a ground contact. Ground the load after flight to discharge accumulated static electricity.

Note

Caution should be exercised in transporting external cargo, as flight may be affected by the size, weight and shape of the cargo load. The recommended airspeed with each load is up to 80 knots. Higher speeds cause load instability.

4-5. Load 1-Guided Missile System, Intercept Aerial, M-54,, Using Aerial Delivery Cargo Slings

a. *Materials.*

(1) Two 3-foot, 3-loop, aerial delivery cargo slings (FSN 1670-753-3788).

(2) Eight 16-foot, 3-loop, aerial delivery cargo slings (FSN 1670-823-5042).

(3) Two type-IV link assemblies (FSN 1670-783-5988).

Table 4-1. Characteristics of Chaparral Missile System Loads for External Lift.

| Nomenclature | Dimensions | | | | Center of gravity of item | |
|---|---------------------|--------------------|---------------------|---------------------|--|------------------------------|
| | Length (in. (m)) | Width (in. (m)) | Height (in. (m)) | Weight (lb (kg)) | L—Longitudinal in. (m) V—Vertical in. (m) | |
| Guided missile system, intercept-aerial, M-54 | 140 (3.56) | 106 (2.69) | 100 (2.54) | 10,361 (4,699) | L—60.0 (1.50) V—33.8 (0.86) | From front From interface |
| Shop equipment, guided missile system, AN/TSM-95 | 190.0 (4.83) | 83.3 (2.12) | 87.4 (2.22) | 4,150 (1,868) | L—84 (2.13) V—37.5 (0.95) | |
| Shop equipment, guided missile system, AN/TSM-96 | 190.0 (4.83) | 83.3 (2.12) | 87.4 (2.22) | 4,900 (2,205) | L—87 (2.24) V—44.2 (1.12) | |
| 12 Rounds, guided missile, intercept-aerial, MIM-72A or MIM-72B in M-570 containers | 125.0 (3.18) | 72.0 (1.83) | 58 (1.47) | 3,420 (1,551)** | L—62.5 (1.59) V—30.0 (0.76) | From aft From bottom |

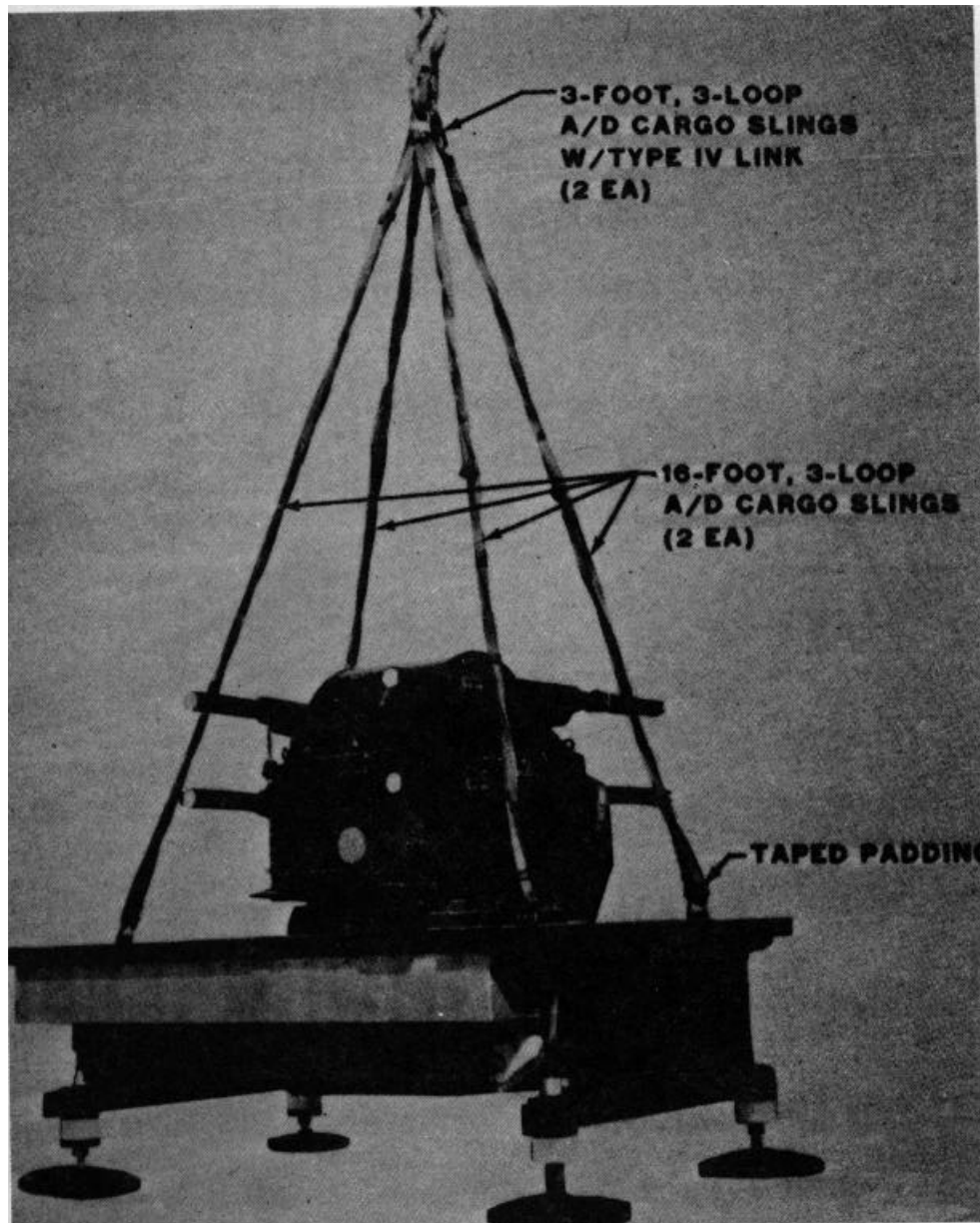


Figure 4-1. Load 1, guided missile system, intercept-aerial, M-54, rigged for external air transport with air delivery cargo slings. Note position of turret in relation to sling legs.

(4) Two-inch pressure-sensitive tape (FSN 8135-558-5016), as required.

(5) Cushioning material, cellulose wadding (FSN 8135-558-0823), as required.

b. Preparation and Rigging.

(1) Prepare the M-54 for transport in accordance with TM 9-1440-585-12 and TM 91425-585-14.

(2) Insure that storage doors are latched.

(3) Rotate firing turret 90 degrees clockwise from normal traveling position. Lock in place.

(4) Rig the load as shown in figure 4-1.

(5) Twist the eight sling legs one turn per 3 feet of sling. Pass two 3-foot slings through the free ends of the eight twisted sling legs. Form a loop sling using type-IV link assemblies. Tape link assembly.

(6) Cluster and tape sling legs (breakaway technique) to prevent fouling during lift-off.

(7) Two men can prepare the M-54 for external transport in approximately 20 minutes.

c. Derigging. Two men can derig the load in approximately 15 minutes.

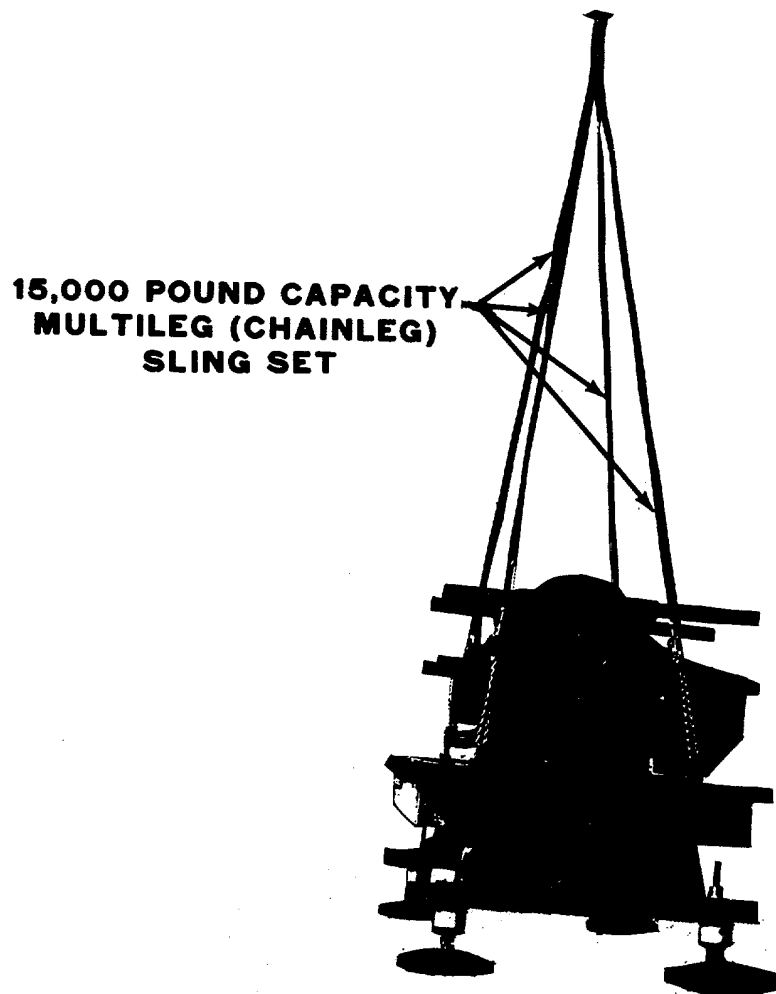


Figure 4-2. Load 2, guided missile system, intercept-aerial, M-54, rigged for external transport with one 15,000-pound-capacity multileg (chainleg) sling set.

4-6. Load 2-Guided Missile System InterceptAerial, M-54, Using 15,000-Pound-Capacity Multileg (Chainleg) Sling Set

a. Materials.

- (1) One 15,000-pound-capacity multileg (chainleg) sling set (FSN 1670-902-3080).
- (2) Two-inch pressure sensitive tape (FSN 8135-266-5016), as required.

b. Preparation and Rigging,

- (1) Prepare the M-54 for transport in accordance with TM 9-1440-585-12 and TM 91425-585-14.
- (2) Insure that storage compartment doors are latched.
- (3) Rotate firing turret 90 degrees clockwise from normal traveling position. Lock in place.
- (4) Attach chain sling to four lifting eyes of M-54. Hook chain in grab link at the fourth chain link from the free end of the chain.

- 4-4 (5) Cluster and tape sling legs (breakaway technique) to prevent fouling during lift-off.

- (6) Rig the M-54 as shown in figure 4-2.

- (7) Two men can prepare the M-54 for external transport in 20 minutes.

c. Derigging.

- Two men can derig the M-54 in approximately 5 minutes.

4-7. Load 3-Shop Equipment, Guided Missile, AN/TSM-95 or AN/TSM-96, in Modified S141G Shelter, Using 15,000-Pound-Capacity Multileg (Chainleg) Sling Set

a. Materials.

- (1) One 15,000-pound-capacity multileg (chainleg) sling set (FSN 1670-902-3080).
- (2) Two-inch pressure-sensitive tape (FSN 8135-266-5016), as required.

b. Preparation and Rigging.

- (1) Insure that shelter door is closed and

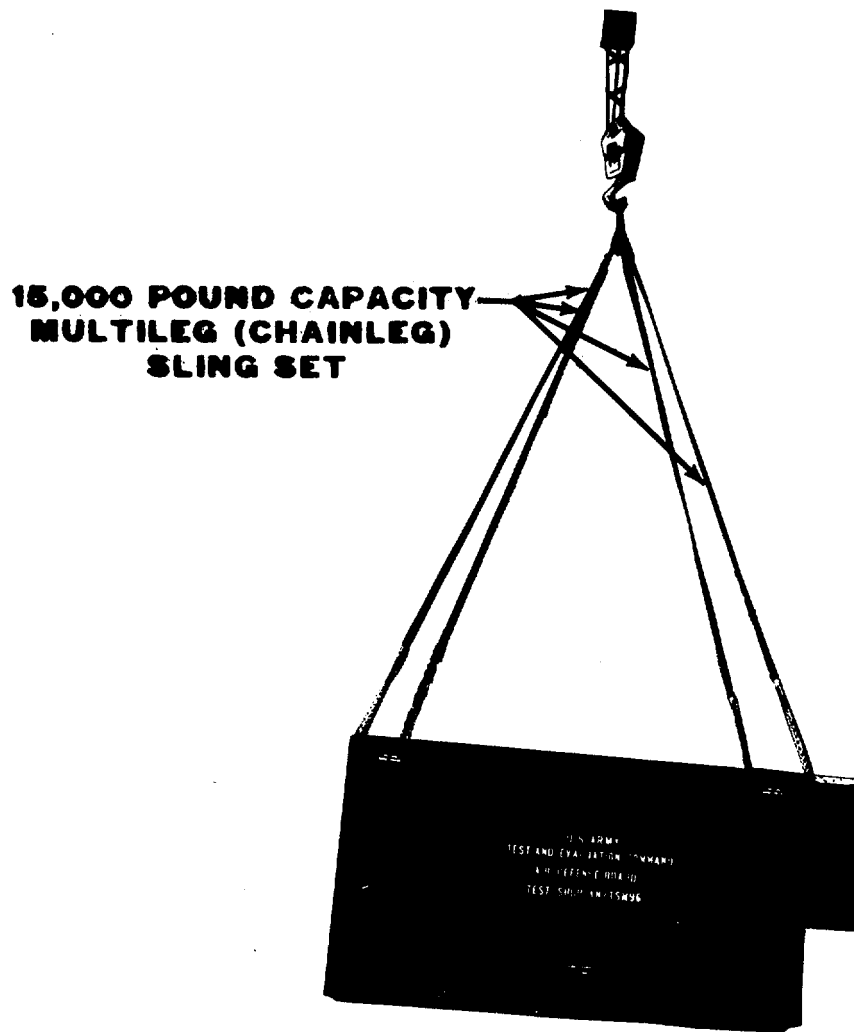


Figure 4-. Load 3, shop equipment, guided missile system, AN/TSM-95 or AN/TSM-98, rigged for external air transport with 15,000-pound-capacity multileg (chainleg) sling set.

latched after insuring all materiel inside is secured.

(2) Rig the AN/TSM-95 or AN/TSM-96 as shown in figure 43.

(3) Attach chainleg of sling to four lifting eyes on shelter. Hook chain up in grab link at the fourth chain link from the free end of the chain.

(4) Two men can prepare the AN/TSM-95 or AN/TSM-96 for external transport in 10 minutes.

c. Derigging. Two men can derig the load in approximately 5 minutes.

4-8. Load 4-Guided Missile, Intercept-Aerial, MIM-7.2A or MIM-72B Rounds in M-570 Containers (12 Rounds), Using Air Delivery Cargo Slings Note. Each restraining strap that passes around the longer dimension of the stack requires the addition of a 60-inch strap to provide the proper length.

Note.

The top two outside M-570 containers are positioned with the

bottom sides facing out, allowing sling legs to press against a firm surface where they pass over the top of the stack (fig 4-4).

a. Materials.

(1) One 3-foot, 3-loop, aerial delivery cargo sling (FSN 1670-753-3788).

(2) Four 20-foot, 3-loop, aerial delivery cargo slings (FSN 1670-823-5043).

(3) Two 9-foot, 3-loop, aerial delivery cargo slings (FSN 1670-753-3631).

(4) Eighteen 15-foot tiedown straps (FSN 1670-360-0540).

(5) Three straps, webbing, 60 inches (FSN 1670-738-5878).

(6) Three type-IV link assemblies (FSN 1670-783-5988).

(7) Twelve load binders (FSN 3990-3600248).

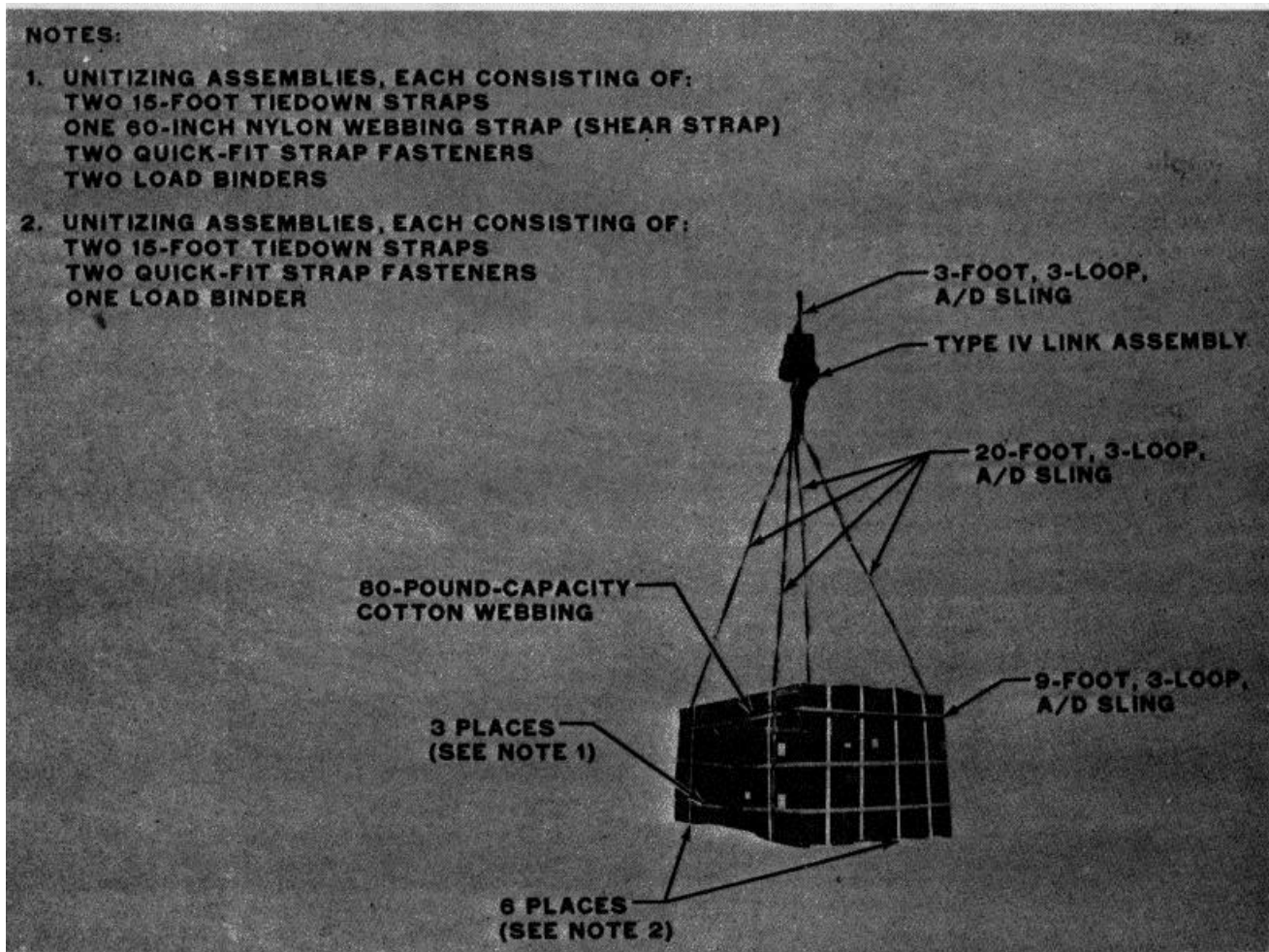


Figure 4-4. Load 4, M-570 containers rigged for external air transport.

(8) One piece 3/4-by 48-by 96-inch plywood or pallet.

(9) Webbing, cotton, 80-pound, as required (FSN 8305-268-2411).

(10) Eighteen quick-fit cargo tiedown strap fasteners (FSN 1670-360-0340).

(11) Two-inch pressure-sensitive tape, as required (FSN 7510-663-0196).

(12) 550-pound-capacity nylon cord, natural, type III, as required (FSN 4020-240-2146).

b. Preparation and Rigging.

(1) Prepare and rig the M-570 container load in accordance with figure 4-4.

(2) Stack the containers four wide and three high on the plywood which is positioned on top of coupled slings and tiedown straps.

(3) Secure the entire load by means of the cargo straps, load binders, and quick fit fasteners.

Six retaining strap sets consists of two 15-foot 46 tiedown straps, one load binder, and two quick fit fasteners. Three retaining strap sets consists of two 15-foot tiedown straps, one 60-inch webbing strap, two load binders, and two quick fit fasteners.

(4) Place a 9-foot sling around each end of the stack, passing the sling legs through the end of the 9-foot slings. Secure the sling legs in the opposite direction with 80-pound cotton webbing.

(5) Secure the strap and slings with nylon cord to insure against slippage.

(6) Twist the four sling legs one turn per 3 feet of sling. Pass a 3-foot sling through the free ends of the five twisted sling legs. Form a loop sling using the type-IV link assembly. Tape link assembly.

(7) Cluster and tape sling legs (breakaway technique) to prevent fouling during lift-off.

(8) Four men can prepare and rig the con

tainers for external transport in approximately 30 minutes.

c. *Derigging*. Three men can derig the container load in approximately 15 minutes.

Section III. INTERNAL TRANSPORT BY US ARMY AIRCRAFT

4-9. Applicability

The items listed in paragraph 2-3 are too large and/or heavy for internal transport by either US Army fixed wing aircraft or helicopters except the MIM-72A and MIM-72B rounds in the M570 containers.

4-10. Typical Loading

For examples, see figure 4-5 and table 4-2.

Section IV. TRANSPORT BY US AIR FORCE AIRCRAFT

4-11. Applicability

a. The items listed in paragraph 2-3 can be transported, without major sectionalization, by US Air Force C-130, C-141, and C-5 aircraft, however, only the M48 in the C-130 has been test loaded. Procedures for transport by air in this manual, therefore, cover only the M48 in the C-130 airplane. When the other items have been test loaded, they will be added to this publication.

Table 4-2. Typical Tiedown Data for 12 MIM-72A or MIM-72B Rounds in M-570 Containers Stacked and Tied Down

| Tiedown fitting | | Tiedown device* | | Attach to item |
|-----------------|----------|-----------------|----------|---|
| row designation | capacity | type(s) | capacity | |
| B1 to B5 | 5,000 | CGU-1/B | 5,000 | Over top end to end |
| C1 to CS | 5,000 | CGU-1/B | 5,000 | Over top end to end |
| D1 to D5 | 5,000 | CGU-1/B | 5,000 | Over top end to end |
| A2 to E2 | 5,000 | CGU-1/B | 5,000 | Over top side to side |
| A3 to E3 | 10,000 | CGU-1/B | 5,000 | Over top side to side |
| A4 to E4 | 5,000 | CGU-1/B | 5,000 | Over top (interlaced with handles of containers) side to side |

*HCU-7/E net on side and HCU-15/C net on top of load may be substituted for CGU-1/B device.

Note.

These data provide only 4g forward restraint.

With mixed passenger and cargo loads with passengers seated forward of the cargo, the forward restraint shall be a minimum of 8g's.

b. The loads described in this section are not maximum loads. Total cargo loads and operating range in nautical miles are identified in AR 7039. Additional cargo and/or personnel within allowable load limits and restrictions prescribed by pertinent safety regulations (app) can be transported.

c. Figure 4-6 and table 4-3 depict the location and devices for the-transport of the M-48 in the US Air Force C-130 airplane. The restraint factors (g-loads) for minimum acceptable condition specified for crew and passenger safety in event of a controlled emergency landing are identified in AR 7039.

d. The airplane commander must insure that the number and type of tiedown devices are as prescribed in this manual and that the tiedown devices are secured to tiedown fittings of at least the same strength and in the same locations relative to those shown in the tiedown diagrams.

Note.

Remove dual rail system from

airplane floors as required or applicable.

Note.

All items should be marked with weight and center of gravity prior to being delivered to the airplanes loading.

Note.

The amount of rolling and parking shoring required will depend on the items' tiedown point in the respective airplane. See data for M48 for required shoring in a C-130 airplane (para 4-11c).

Note.

Time to load and unload the items is variable. An approximate time for four men to load and tie down the M48 is 45 minutes, and 20 minutes to unload.

4-12. Loading the M48 in C-130 Airplane

a. Materials.

- (1) Shoring, 2by 12-inch lumber, 172 linear feet.
- (a) Four pieces, 2by 12by 240-inch, parking shoring.
- (b) Four pieces, 2by 12by 180-inch, rolling shoring.
- (c) Four pieces, 2by 12by 96-inch, rolling shoring.

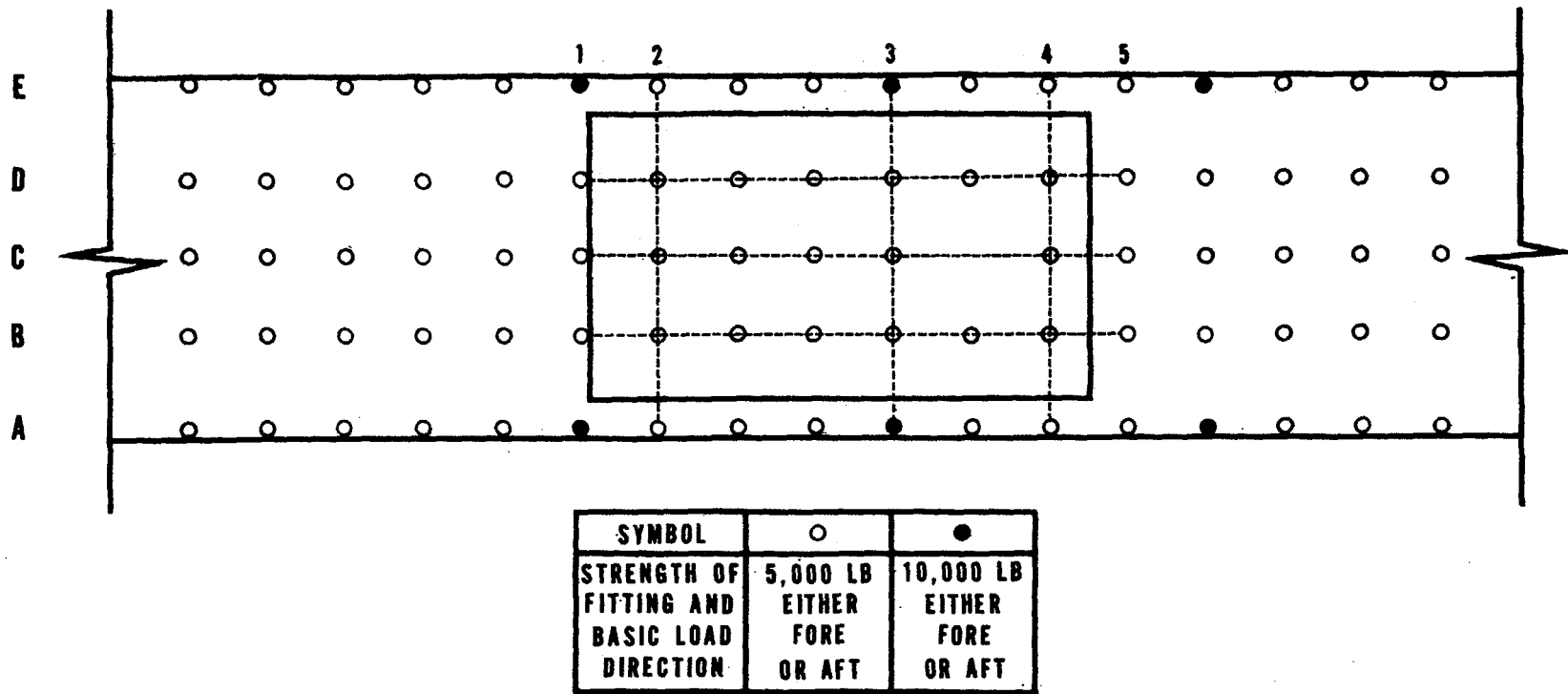
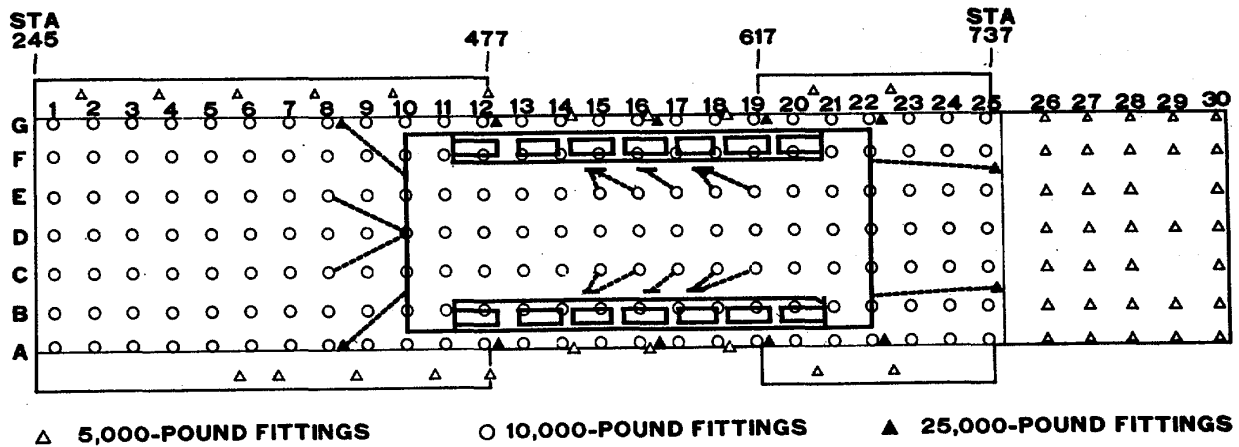


Figure 4-5. Typical load of 12 MIM-72A or MIM-72B rounds in the M-570 containers loaded and tied down in aircraft with 20-inch tiedown fittings grid pattern.



| DESCRIPTION OF ITEM | ITEM FACING | Location of reference point | | LOCATION OF CG | APPROX WT (LB) |
|-------------------------|-------------|-----------------------------|---------|----------------|----------------|
| | | Reference point | Station | | |
| M48 CHAPARRAL FIRE UNIT | RT | RT 000 | 400 | 000 | 20,000* |

Figure 4-6. M48 Chaparral fire unit in US Air Force C-130 airplane.

Table 4-3. Tiedown Data for M48 in C-130 Airplane

| Tiedown fitting no. | Capacity of tiedown fitting in 1,000 lb | Type* device | Attach to item |
|---------------------|---|--------------|--|
| G8 | 25 | MB-2 | Left rear towing shackle. |
| C8 | 10 | MB-1 | Towing pintle. |
| E8 | 10 | MB-1 | Towing pintle. |
| C15 | 10 | MB-1 | Right rear tiedown point beneath hull. |
| E15 | 10 | MB-1 | Left rear tiedown point beneath hull. |
| C16 | 10 | MB-1 | Right rear tiedown point beneath hull. |
| E16 | 10 | MB-1 | Left rear tiedown point beneath hull. |
| C17 | 10 | MB-1 | Right center tiedown point beneath hull. |
| E17 | 10 | MB-1 | Left center tiedown point beneath hull. |
| C18 | 40 | MB-1 | Right front tiedown point beneath hull. |
| E18 | 10 | MB-1 | Left front tiedown point beneath hull. |
| C19 | 10 | MB-1 | Right front tiedown point beneath hull. |
| E19 | 10 | MB-1 | Left front tiedown point beneath hull. |
| B25 | 25 | MB-2 | Right front towing shackle. |
| F25 | 25 | MB-2 | Left front towing shackle. |

*C2 tiedown device may be substituted for the MB-1. MB-2 and D-1 tiedown devices are interchangeable.

(2) Nylon cord, type-III, 550-pound-capacity, as required.

(3) MB-1 or C-2 tiedown devices, 12 each.

(4) MB-2 or D-1 tiedown devices, 4 each.

(5) Clevis assembly (shackles), FSN 1670090-5354, or equal, for front and rear towing and tiedown provisions, 4 each.

b. Preparation and loading.

(1) Remove, for separate stowage inside the item or airplane, the cargo compartment bows and canvas.

(2) Insure that fuel tank is not more than three-fourths full.

(3) Remove antennae and stow in driver compartment.

(4) Remove front and rear top fins from top two missiles and stow in fin compartment.

(5) Remove required number of 463L rail system from airplane floor and secure same after loading.

(6) Position ramp extensions to match vehicle tracks.

(7) Position two rows of shoring from ground into airplane; lay each row two boards wide so that vehicle tracks will ride on shoring. Extend the shoring to desired tiedown point in airplane. The 180-inch shoring goes over the ramp, the 240-inch shoring is placed at the tiedown position, and the 96-inch shoring is used as running shoring.

(8) Using experienced driver and guides, back vehicle into the airplane to the tiedown position (fig. 4-6). Place transmission in neutral and set brakes. Remove and secure excess shoring in airplane.

c. *Tie Down.* Tie down item in accordance with tiedown diagram and data, figure 4-6 and table 4-3. Table 4-3 lists the tiedown devices required, the location of the tiedown points on the item, and the aircraft tiedown fittings to which the devices are secured.

d. *Time Required.* Four men can prepare, load, and tie down the item in approximately 1 hour.

e. *Off-Loading.* The off-loading procedures are the reverse of the loading procedures. Four men can off-load the item in approximately 20 minutes.

CHAPTER 5

TRANSPORTABILITY GUIDANCE OFF-ROAD AND HIGHWAY

Section I. GENERAL

5-1. Scope

This chapter provides highway and off-road transportability guidance of the Chaparral guided missile system. It covers significant technical and physical characteristics and prescribes the materials and guidance required to prepare, load, and off-load the items. The M48 and M730 exceed the legal width limitations in CONUS for movement over public highways. When moving under their own power or when loaded on a semitrailer, highway permits will be required. These items also exceed the recommended width limitations in overseas areas, and special routing may be required. The procedures for obtaining special

permits in CONUS are outlined in AR 55-162 and associated Army area regulations.

5-2. Safety

In addition to the safety precautions contained in chapter 3, when the guided missile, interceptaerial, MIM-72A or MIM-72B in M-570 container is shipped in military vehicle over public highways in CONUS, movement is subject to all the safety laws, rules, and regulations applicable to commercial carrier. In overseas areas such movements are governed by theater regulations.

Section II. MOVEMENT CONSIDERATIONS

5-3. Movement on Own Tracks

The M48 and M730 can move over highways under their own power; however, normally, highway moves are made with the items loaded on a military or commercial lowbed semitrailer of adequate capacity. The items have excellent off-road mobility. For item cone index, see paragraph 2-3. A vehicle cone index (VCI) is a number which tests have proven can be related to the characteristics of a particular vehicle. This number, when used in connection with the rating 'cone index (of the soil), can forecast the ability of that vehicle to cross fine-grained soil. The rating cone index is obtained by use of the cone penetrometer and its associated equipment. See TM 5330, chapter 9 for use of the equipment in the field and for interpretation of index numbers.

5-4. Movement by Semitrailer

All referenced items can be transported over highways by semitrailers of adequate capacity and size. The equipment can be transported by a tractor-semitrailer combination that does not exceed the length limitations for movement in CONUS and the recommended length limitations in overseas areas.

5-5. Preparation of Items

The degree of preparation for the items prior to being transported by semitrailers is dependent upon the operational commitment.

Note 1. The following figures were extracted from US Army Material Command missile loading drawings. References to page numbers in the notes within the figures refer to the number listed in the lower right or left-hand corner of each figure.

2. Alternative method for loading the M-54 onto trailers is uncrated and mounted on skid base. (See fig 7-2 sheets 3 and 4 for examples.) While in this configuration it will exceed CONUS legal width limitations (para 5-3).

3. Dimensional and weight data are located in the General Notes on the US Army Material Command missile loading drawings.

5-6. Loading on Flatbed Semitrailers

The items may be placed in the tiedown position on the semitrailer by a crane. After placement at the tiedown position, the items will be secured in accordance with the following figures:

GENERAL NOTES

- A.
- B. THE LOAD AS SHOWN IS BASED ON A FLAT BED OR "LOW-BOY" TRAILER, 8'-0" WIDE WITH A WOOD OR A WOOD AND METAL FLOOR. TRAILERS WITH ALL METAL FLOORS WILL NOT BE USED. ONLY ONE (1) UNIT OF LADING IS SHOWN; HOWEVER, MULTIPLES OF UNITS, AS SHOWN OR DISSIMILAR IN NATURE, MAY BE LOADED ON A TRAILER. THE NUMBER OF UNITS TO BE LOADED ON A TRAILER WILL BE DEPENDENT ON THE SIZE OF THE TRAILER USED OR THE QUANTITIES OF UNITS TO BE SHIPPED WITH THE VIEW OF FULL UTILIZATION OF CARRIER EQUIPMENT. **CAUTION:** THE LOADS AS SHOWN MAY REQUIRE "CLEARANCE" CONSIDERATION BECAUSE OF EXCESSIVE LADING SIZE.
- C. ONLY TRAILERS CAPABLE OF SAFELY TRANSPORTING THE LADING TO DESTINATION WITHOUT DAMAGE WILL BE SELECTED. TRAILERS SELECTED MUST HAVE "SOUND" FLOORS WHICH PROVIDE NAIL RETENTION PROPERTIES EQUAL TO OR BETTER THAN SPECIFIED DUNNAGE LUMBER, AND A SUFFICIENT NUMBER OF ANCHORING FACILITIES OF A STRENGTH EQUAL TO OR BETTER THAN SPECIFIED LADING TIEDOWN ASSEMBLIES (SEE SPECIAL PROVISIONS OF GENERAL NOTE "G" BELOW).
- D. SHIPMENT GROSS WEIGHT, AXLE DISTRIBUTION OF LADING WEIGHT, AND OVERALL DIMENSIONS MUST MEET STATE LAW REQUIREMENTS.
- E. LADING DATA:
 ITEM DIMENSIONS ----- 10'-8-1/2" LONG BY 7'-10-3/8" WIDE BY 6'-11-3/4" (7'-3-3/4" W/BLOCKS) HIGH.
 ITEM GROSS WEIGHT ---- 9,720 POUNDS (APPROX).
- F. WHEN STEEL STRAPPING IS SEALED AT AN END-OVER-END LAP JOINT, A MINIMUM OF TWO (2) SEALS, BUTTED TOGETHER, WITH TWO (2) PAIR OF CRIMPS PER SEAL MUST BE USED TO SEAL THE JOINT.
- G. IF THE STAKE POCKETS AND/OR ANCHOR DEVICES ON A TRAILER ARE NOT PROPERLY LOCATED TO PERMIT SECURING OF THE TWO INCH (2") STEEL STRAPPING AS SHOWN, OR IF THE POCKETS AND/OR ANCHOR DEVICES ARE NOT EQUAL TO OR GREATER THAN THE STRENGTH OF THE 2" TIEDOWN STRAPS, STRAPPING MAY BE APPLIED TO FORM A COMPLETE LOOP WHICH ENCOMPASSES BOTH THE LADING AND THE TRAILER FRAME AND/OR BED. **CAUTION:** WHEN INSTALLING A TIEDOWN STRAP WHICH ENCOMPASSES BOTH LADING AND TRAILER FRAME AND/OR BED, AVOID TRAILER WHEELS, FIFTH WHEEL PLATE, CONTROLS, AND APPURTENANCES; AND USE PADS ON ALL SHARP EDGES AS CUSHIONING FOR THE STRAPPING. **NOTE:** PROVISIONS OF GENERAL NOTE "F" ABOVE WILL ALSO APPLY.
- H. REFER TO ORD DWG 19-48-C-ORDJU-588, "WIRE ROPE AND ANNEALED WIRE APPLICATION METHODS FOR SECURING LADING ON RAIL & MOTOR CARRIER EQUIP", FOR PROPER TIE DOWN APPLICATION, EXCEPT NUTS ON CABLE CLIPS WILL BE TIGHTENED TO A TORQUE OF 35 TO 40 FOOT POUNDS.
- J. WIRE ROPE CABLE TENSIONING CAN BE ACCOMPLISHED BY EMPLOYING TWO (2) CABLE "GRIPPERS" AND AN APPLICABLY SIZED "COME-A-LONG" TYPE MECHANICAL HOIST.
- K. **NOTICE:** LADING WILL NOT BE SECURED BY CHAINS AND/OR LOAD BINDERS IN LIEU OF SPECIFIED DUNNAGE.
- L. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 2" X 6" MATERIAL IS ACTUALLY 1-5/8" THICK BY 5-5/8" WIDE AND 6" X 6" MATERIAL IS ACTUALLY 5-1/2" THICK BY 5-1/2" WIDE.
- M. **NOTICE:** 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 "APPLICATION OF STAGGERED NAILING PATTERN" ON PAGE 4.

MATERIAL SPECIFICATIONS

- LUMBER** -----: DOUGLAS FIR OR COMPARABLE LUMBER WITH STRAIGHT GRAIN AND FREE OF MATERIAL DEFECTS. REF: FED SPEC MM-L-751.
- NAILS** -----: COMMON, CEMENT COATED OR CHEMICALLY ETCHED. REF: FED SPEC FF-N-105. ALT: ANNULAR-RING TYPE NAIL OF SAME SIZE.
- ROPE** -----: STEEL WIRE, PLAIN, PREFORMED, REGULAR LAY, 6.56 TONS, 6 X 19, FLEXIBLE IWRC, MACWHYTE WIRE ROPE CO. (OR EQUAL). REF: FED SPEC RR-W-410.
- CLIPS** -----: "U" BOLT, CROSBY, HEAVY DUTY (OR EQUAL).
- STRAPPING, STEEL** -: TYPE I OR IV, CLASS A OR C. REF: FED SPEC QQ-5-781. (FOR FSN SEE SB-38-100).
- STRAP SEAL; STRAP STAPLE; STAKE POCKET PROTECTOR**: COMMERCIAL GRADE.

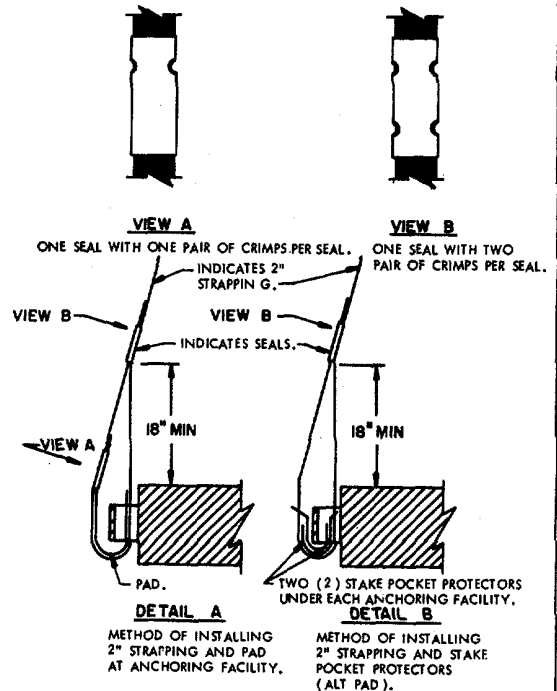


Figure 5-1. Blocking and tiedown diagrams for guided missile system, intercept-aerial, M-54 (Sheet 1 of 4).

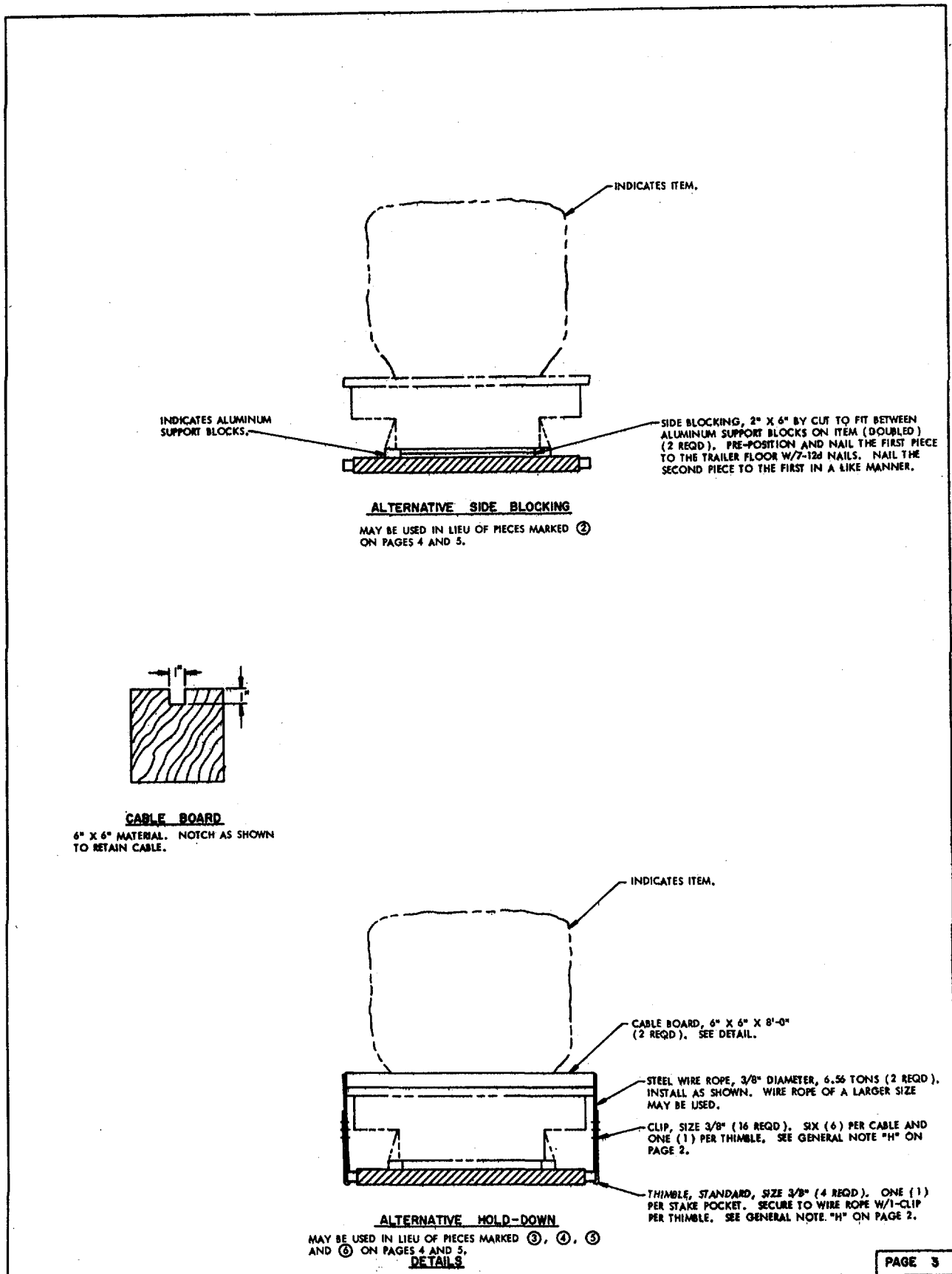


Figure 5-1. Blocking and tiedown diagrams for guided missile system, intercept-aerial, M-54 (Sheet 2 of 4).

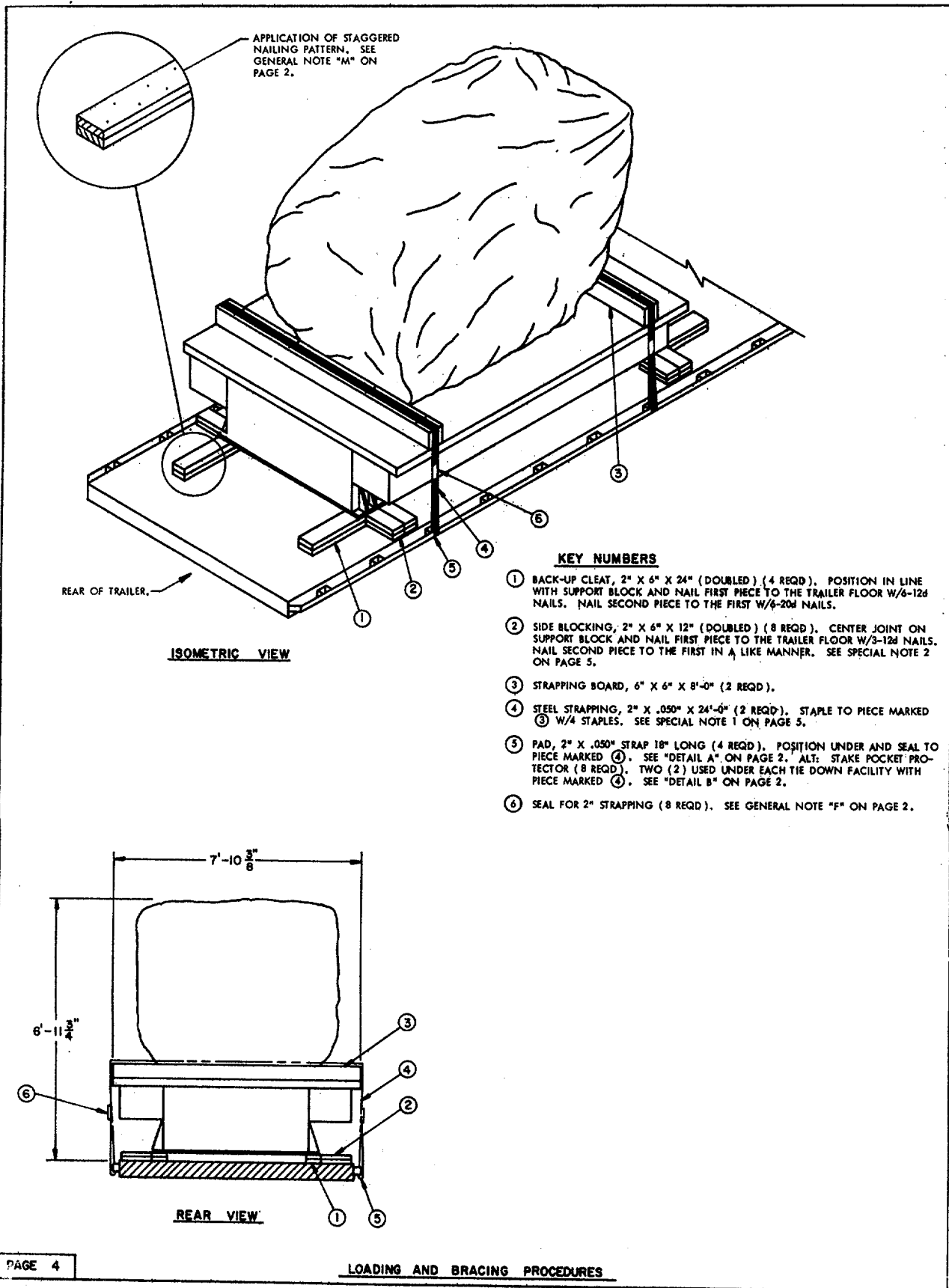
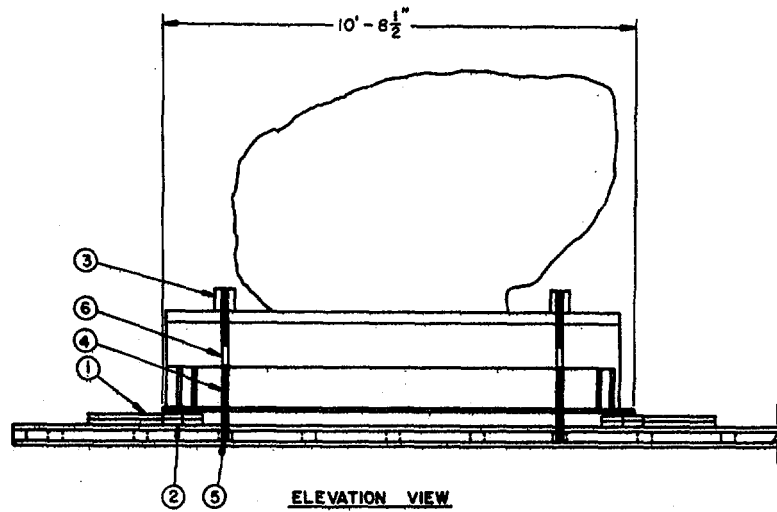


Figure 5-1. Blocking and tiedown diagrams for guided missile system, intercept-aerial, M-54 (Sheet 3 of 4).



SPECIAL NOTES

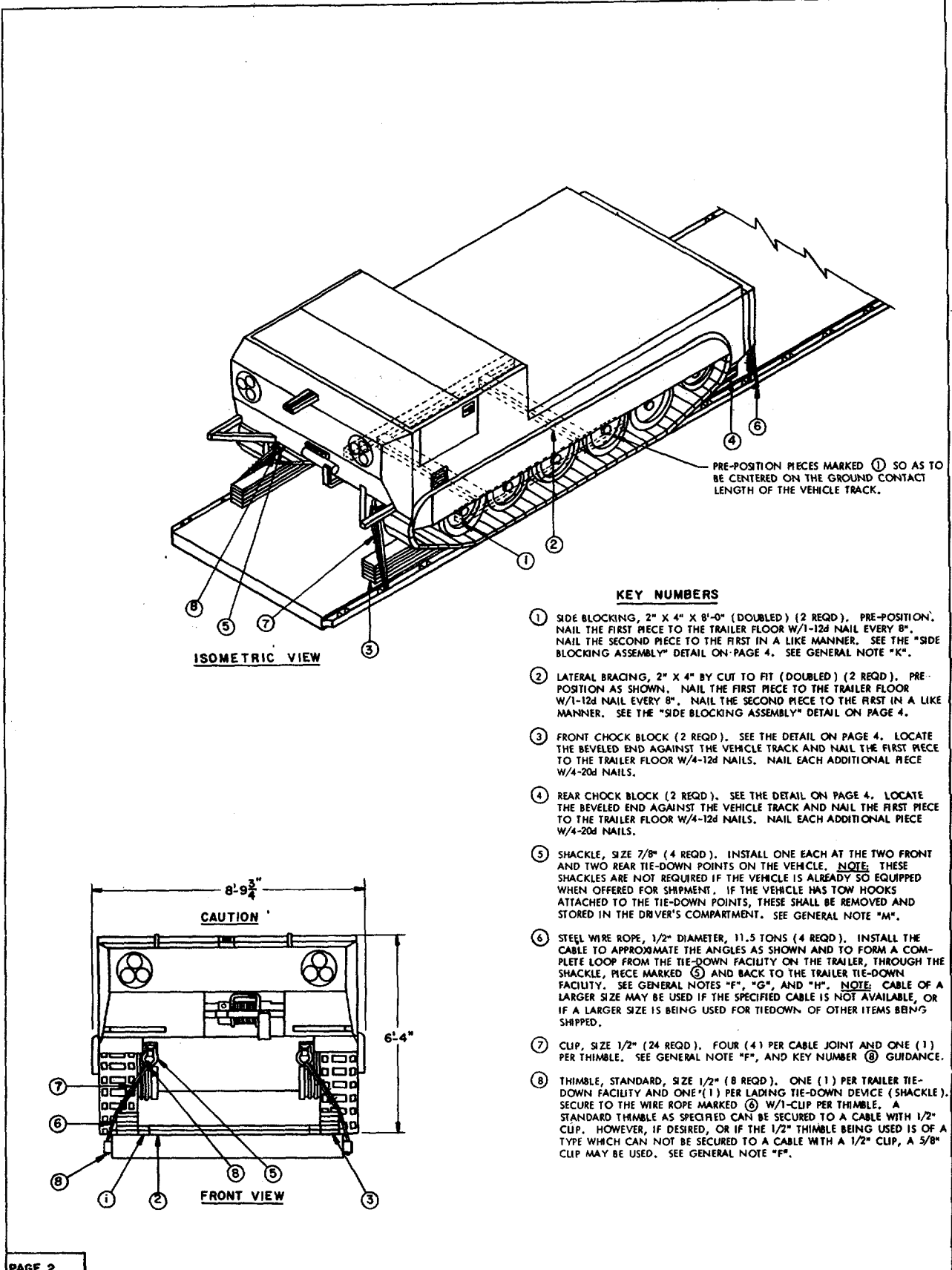
1. 3/8" CABLE (OR LARGER) MAY BE USED IN LIEU OF 2" STRAPPING SHOWN AS PIECE MARKED ①. SEE GENERAL NOTES "H" AND "J" ON PAGE 2. SEE "ALTERNATIVE HOLD-DOWN" DETAIL ON PAGE 3.
2. PRE-POSITIONED SIDE BLOCKING MAY BE USED IN LIEU OF PIECES MARKED ②. SEE "ALTERNATIVE SIDE BLOCKING" DETAIL ON PAGE 3.
3. ITEM MUST BE LOCATED ON TRAILER RELATIVE TO LOCATION OF STAKE POCKETS SO THAT WHEN PIECES MARKED ③ THROUGH ⑥ ARE APPLIED THEY WILL BE IN THE SAME GENERAL LOCATION RELATIVE TO THE ITEM AS SHOWN.

| BILL OF MATERIAL | | |
|-----------------------------|-------------|------------|
| LUMBER | LINEAR FEET | BOARD FEET |
| 2" X 6" | 32 | 32 |
| 6" X 6" | 16 | 48 |
| NAILS | NO. REQD | POUNDS |
| 12d (3-1/4") | 72 | 1-1/4 |
| 20d (4") | 24 | 1 |
| STEEL STRAPPING, 2" X .090" | 48' REQD | 14 LBS |
| SEAL FOR 2" STRAPPING | 8 REQD | 2 LBS |
| STAPLE FOR 2" STRAPPING | 8 REQD | NIL |

LOAD AS SHOWN

| ITEM | QUANTITY | WEIGHT (APPROX) |
|------------------|----------|-----------------|
| INTERCEPT AERIAL | | |
| XM54 | 1 | 9,720 LBS |
| DUNNAGE | | 220 LBS |
| TOTAL WEIGHT | | 9,940 LBS |

Figure 5-1. Blocking and tiedown diagrams for guided missile system, intercept-aerial, M-54 (Sheet 4 of 4).

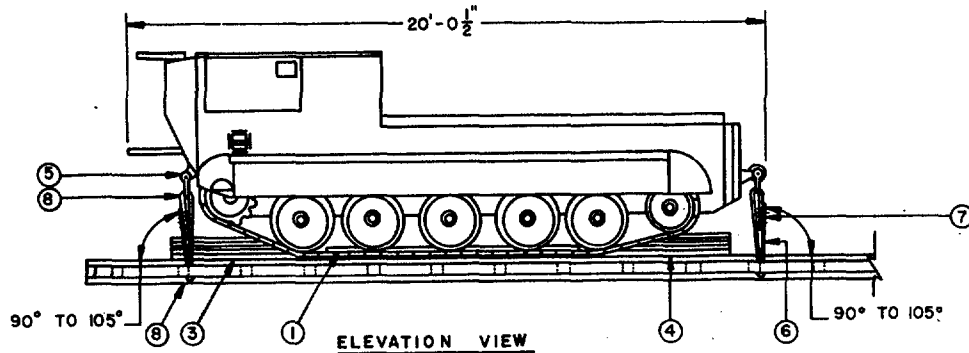


PRE-POSITION PIECES MARKED ① SO AS TO BE CENTERED ON THE GROUND CONTACT LENGTH OF THE VEHICLE TRACK.

KEY NUMBERS

- ① SIDE BLOCKING, 2" X 4" X 8'-0" (DOUBLED) (2 REQD). PRE-POSITION. NAIL THE FIRST PIECE TO THE TRAILER FLOOR W/1-12d NAIL EVERY 8". NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE THE "SIDE BLOCKING ASSEMBLY" DETAIL ON PAGE 4. SEE GENERAL NOTE "K".
- ② LATERAL BRACING, 2" X 4" BY CUT TO FIT (DOUBLED) (2 REQD). PRE-POSITION AS SHOWN. NAIL THE FIRST PIECE TO THE TRAILER FLOOR W/1-12d NAIL EVERY 8". NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE THE "SIDE BLOCKING ASSEMBLY" DETAIL ON PAGE 4.
- ③ FRONT CHOCK BLOCK (2 REQD). SEE THE DETAIL ON PAGE 4. LOCATE THE BEVELED END AGAINST THE VEHICLE TRACK AND NAIL THE FIRST PIECE TO THE TRAILER FLOOR W/4-12d NAILS. NAIL EACH ADDITIONAL PIECE W/4-20d NAILS.
- ④ REAR CHOCK BLOCK (2 REQD). SEE THE DETAIL ON PAGE 4. LOCATE THE BEVELED END AGAINST THE VEHICLE TRACK AND NAIL THE FIRST PIECE TO THE TRAILER FLOOR W/4-12d NAILS. NAIL EACH ADDITIONAL PIECE W/4-20d NAILS.
- ⑤ SHACKLE, SIZE 7/8" (4 REQD). INSTALL ONE EACH AT THE TWO FRONT AND TWO REAR TIE-DOWN POINTS ON THE VEHICLE. **NOTE:** THESE SHACKLES ARE NOT REQUIRED IF THE VEHICLE IS ALREADY SO EQUIPPED WHEN OFFERED FOR SHIPMENT. IF THE VEHICLE HAS TOW HOOKS ATTACHED TO THE TIE-DOWN POINTS, THESE SHALL BE REMOVED AND STORED IN THE DRIVER'S COMPARTMENT. SEE GENERAL NOTE "M".
- ⑥ STEEL WIRE ROPE, 1/2" DIAMETER, 11.5 TONS (4 REQD). INSTALL THE CABLE TO APPROXIMATE THE ANGLES AS SHOWN AND TO FORM A COMPLETE LOOP FROM THE TIE-DOWN FACILITY ON THE TRAILER, THROUGH THE SHACKLE, PIECE MARKED ⑤ AND BACK TO THE TRAILER TIE-DOWN FACILITY. SEE GENERAL NOTES "E", "G", AND "H". **NOTE:** CABLE OF A LARGER SIZE MAY BE USED IF THE SPECIFIED CABLE IS NOT AVAILABLE, OR IF A LARGER SIZE IS BEING USED FOR TIEDOWN OF OTHER ITEMS BEING SHIPPED.
- ⑦ CLIP, SIZE 1/2" (24 REQD). FOUR (4) PER CABLE JOINT AND ONE (1) PER THIMBLE. SEE GENERAL NOTE "F", AND KEY NUMBER ⑧.
- ⑧ THIMBLE, STANDARD, SIZE 1/2" (8 REQD). ONE (1) PER TRAILER TIE-DOWN FACILITY AND ONE (1) PER LADING TIE-DOWN DEVICE (SHACKLE). SECURE TO THE WIRE ROPE MARKED ⑥ W/1-CLIP PER THIMBLE. A STANDARD THIMBLE AS SPECIFIED CAN BE SECURED TO A CABLE WITH 1/2" CLIP. HOWEVER, IF DESIRED, OR IF THE 1/2" THIMBLE BEING USED IS OF A TYPE WHICH CAN NOT BE SECURED TO A CABLE WITH A 1/2" CLIP, A 5/8" CLIP MAY BE USED. SEE GENERAL NOTE "F".

Figure 5-2. Blocking and tiedown diagrams for carrier, guided missile equipment, self-propelled, M730 (Sheet 1 of 3). 5-6



(GENERAL NOTES CONTINUED)

M. MORE DISTANCE MAY BE REQUIRED BETWEEN THE DRILLED PADS AT THE OPEN END OF A SHACKLE SO THAT IT WILL FIT PROPERLY OVER THE THICKNESS OF THE TOWING/TIEDOWN BRACKET ON THE VEHICLE. TO PROVIDE THE NEEDED CLEARANCE, EQUAL AMOUNTS OF MATERIAL MAY BE REMOVED FROM THE SHACKLE PADS BY GRINDING OR MACHINING.

GENERAL NOTES

- A.
- B. THE LOAD AS SHOWN IS BASED ON A FLAT BED OR "LOW-BOY" TRAILER 8'-0" WIDE WITH A WOOD OR A WOOD AND METAL FLOOR. TRAILERS WITH ALL METAL FLOORS WILL NOT BE USED. ONLY ONE UNIT OF LADING IS SHOWN; HOWEVER, MULTIPLES OF UNITS, AS SHOWN OR DISSIMILAR IN NATURE, MAY BE LOADED ON A TRAILER. THE NUMBER OF UNITS TO BE LOADED ON A TRAILER WILL BE DEPENDENT ON THE SIZE OF THE TRAILER USED OR THE QUANTITIES OF UNITS TO BE SHIPPED, WITH THE VIEW OF FULL UTILIZATION OF CARRIER EQUIPMENT. **CAUTION:** THE LOAD AS SHOWN MAY REQUIRE "CLEARANCE" CONSIDERATION BECAUSE OF EXCESSIVE LADING WIDTH.
- C. ONLY TRAILERS CAPABLE OF SAFELY TRANSPORTING THE LADING TO THE DESTINATION WITHOUT DAMAGE WILL BE SELECTED. TRAILERS SELECTED MUST HAVE "SOUND" FLOORS WHICH PROVIDE NAIL RETENTION PROPERTIES EQUAL TO OR BETTER THAN THE SPECIFIED DUNNAGE LUMBER, AND A SUFFICIENT NUMBER OF TIE-DOWN FACILITIES OF A STRENGTH EQUAL TO OR BETTER THAN THE SPECIFIED LADING TIE-DOWN ASSEMBLIES.
- D. SHIPMENT GROSS WEIGHT, AXLE DISTRIBUTION OF LADING WEIGHT, AND OVERALL DIMENSIONS MUST MEET STATE LAW REQUIREMENTS.
- E. LADING DATA:
 ITEM DIMENSIONS ----- 20'-0-1/2" LONG X 8'-9-3/4" WIDE X 6'-4" HIGH.
 ITEM GROSS WEIGHT ----- 16,233 POUNDS (APPROX).
- F. REFER TO ORD DWG 19-48-C-ORDJU-588, "WIRE ROPE AND ANNEALED WIRE APPLICATION METHODS FOR SECURING LADING ON RAIL & MOTOR CARRIER EQUIP", FOR PROPER TIE-DOWN APPLICATION.
- G. LADING WILL NOT BE SECURED BY CHAINS AND/OR LOAD BINDERS IN LIEU OF SPECIFIED DUNNAGE.
- H. TO ACHIEVE PROPER CABLE TENSION, EMPLOY TWO (2) CABLE "GRIPPERS" AND AN APPLICABLY SIZED "COME-A-LONG" TYPE MECHANICAL HOIST. **NOTE:** CABLES WILL BE TENSIONED SUFFICIENTLY TO CAUSE THE BODY OF THE TRACK VEHICLE TO DEPRESS APPROXIMATELY ONE INCH (1").
- J. **CAUTION:** IT IS RECOMMENDED THAT THE CABLE TIE-DOWNS BE INSTALLED TO APPROXIMATE THE ANGLES SHOWN; HOWEVER, IF PLACEMENT OF THE TRANSPORTER TIE-DOWN FACILITIES PREVENTS THIS, CARE MUST BE EXERCISED TO ENSURE THAT THE CABLE TIE-DOWNS ON THE SAME SIDE OF THE LADING ARE INSTALLED SO THEIR RETENTION FORCES ACT IN OPPOSITE LONGITUDINAL DIRECTIONS.
- K. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-5/8" THICK BY 3-5/8" WIDE.
- L. **NOTE:** A STAGGERED NAILING PATTERN WILL BE USED WHEN DUNNAGE IS NAILED TO THE FLOOR OF THE TRANSPORTING VEHICLE, OR WHEN LAMINATING DUNNAGE. ALSO, 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.

| BILL OF MATERIAL | | |
|-----------------------------------|-------------|------------|
| LUMBER | LINEAR FEET | BOARD FEET |
| 2" X 4" | 53 | 36 |
| 2" X 8" | 65 | 87 |
| NAILS | NO. REQD | POUNDS |
| 12d (3-1/4") | 96 | 1-3/4 |
| 20d (4") | 64 | 2-1/2 |
| ROPE, STEEL WIRE, 1/2" DIA | 48' REQD | 21 LBS |
| CLIP, 1/2" | 24 REQD | 11 LBS |
| CLIP, 5/8" (ALT FOR 1/2", 8 REQD) | | 5 LBS |
| THIMBLE, STANDARD, 1/2" | 8 REQD | 2 LBS |
| SHACKLE, 7/8" | 4 REQD | 9 LBS |

MATERIAL SPECIFICATIONS

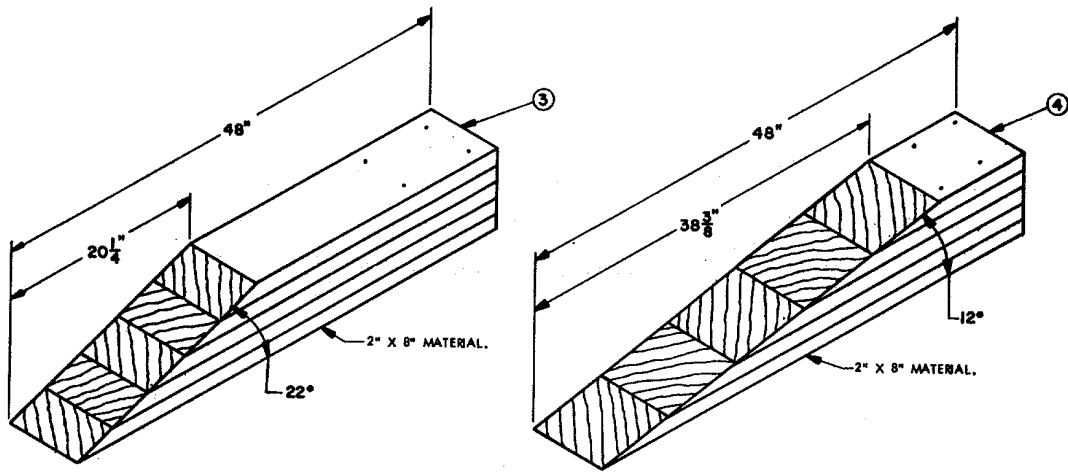
- LUMBER:** DOUGLAS FIR OR COMPARABLE LUMBER WITH STRAIGHT GRAIN AND FREE OF MATERIAL DEFECTS. REF: FED SPEC MM-L-751.
- NAILS:** COMMON, CEMENT COATED OR CHEMICALLY ETCHED. REF: FED SPEC FF-N-105. ALT: ANNULAR-RING TYPE NAIL OF SAME SIZE.
- ROPE:** STEEL WIRE, PLAIN, PREFORMED, REGULAR LAY, 11.5 TONS, 6 X 19, FLEXIBLE IWRC, MACWHYTE WIRE ROPE CO. (OR EQUAL). REF: FED SPEC FF-W-410.
- CLIP:** "U" BOLT, CROSBY, HEAVY DUTY (OR EQUAL).
- SHACKLE:** TYPE IV, CLASS 4; FED SPEC RR-C-271.

(CONTINUED AT LEFT)

LOAD AS SHOWN

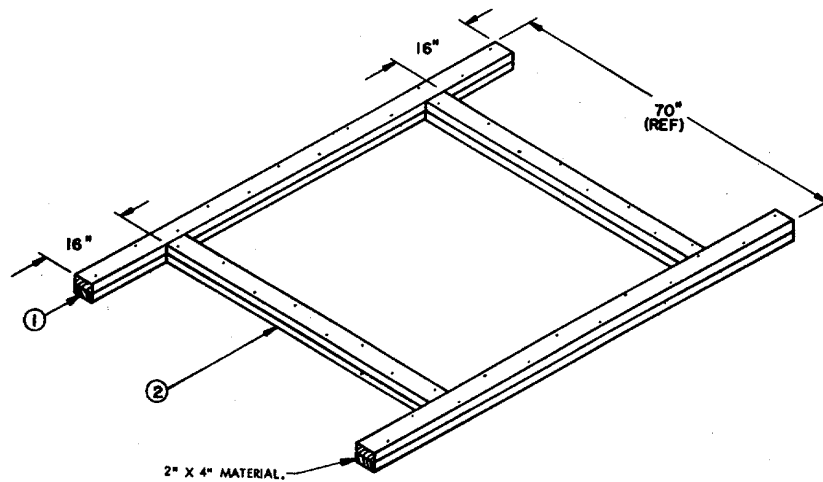
| ITEM | QUANTITY | WEIGHT (APPROX) |
|----------------------|----------|-------------------|
| XM730, TRACK VEHICLE | | |
| W/O FIRE UNIT | 1 | 16,233 LBS |
| DUNNAGE | | 360 LBS |
| TOTAL WEIGHT | | 16,593 LBS |

Figure 5-2. Continued. (Sheet 2 of 3.)



FRONT CHOCK BLOCK
 REFER TO KEY NUMBER ③
 ON PAGE 2 FOR NAILING
 SPECIFICATIONS.

REAR CHOCK BLOCK
 REFER TO KEY NUMBER ④
 ON PAGE 2 FOR NAILING
 SPECIFICATIONS.



SIDE BLOCKING ASSEMBLY
 REFER TO KEY NUMBERS ① AND
 ② ON PAGE 2 FOR NAILING
 SPECIFICATIONS.

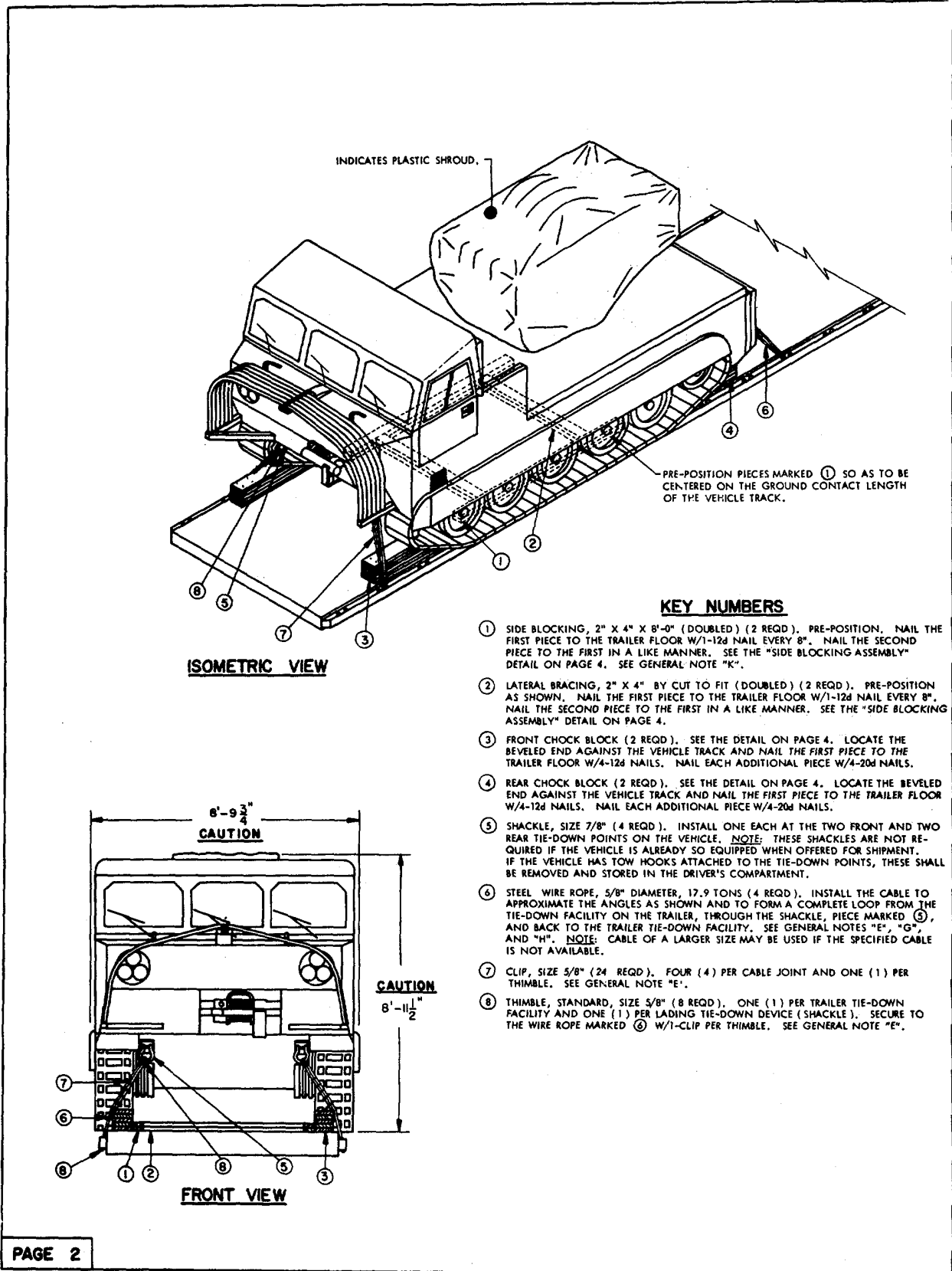
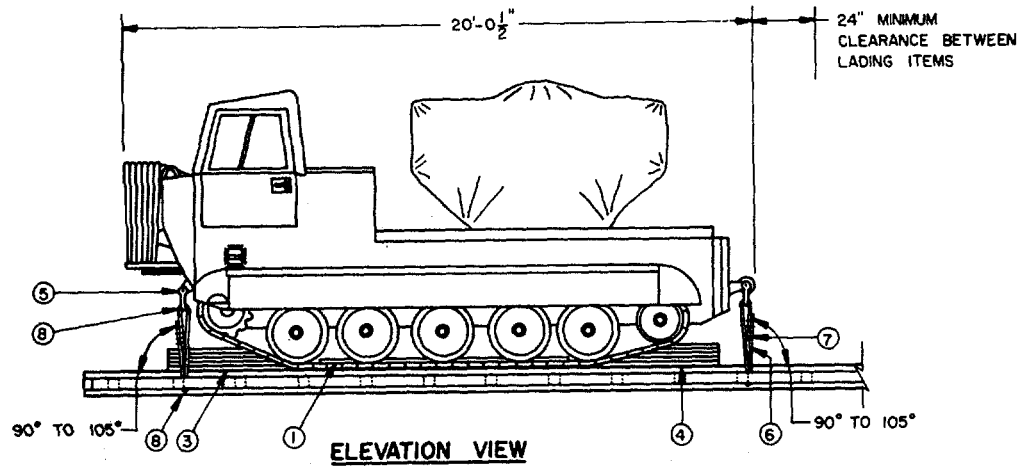


Figure 5-3. Blocking and tiedown diagrams for carrier, guided missile system, intercept-aerial, carrier-mounted M48 (Sheet 1 of 3.)



GENERAL NOTES

- A. THE LOAD AS SHOWN IS BASED ON A FLAT BED OR "LOW-BOY" TRAILER 8'-0" WIDE WITH A WOOD OR A WOOD AND METAL FLOOR. TRAILERS WITH ALL METAL FLOORS WILL NOT BE USED. ONLY ONE UNIT OF LADING IS SHOWN; HOWEVER, MULTIPLES OF UNITS, AS SHOWN OR DISSIMILAR IN NATURE, MAY BE LOADED ON A TRAILER. THE NUMBER OF UNITS TO BE LOADED ON A TRAILER WILL BE DEPENDENT ON THE SIZE OF THE TRAILER USED OR THE QUANTITIES OF UNITS TO BE SHIPPED, WITH THE VIEW OF FULL UTILIZATION OF CARRIER EQUIPMENT. **CAUTION:** THE LOAD AS SHOWN MAY REQUIRE "CLEARANCE" CONSIDERATION BECAUSE OF EXCESSIVE LADING WIDTH AND HEIGHT.
- B. ONLY TRAILERS CAPABLE OF SAFELY TRANSPORTING THE LADING TO THE DESTINATION WITHOUT DAMAGE WILL BE SELECTED. TRAILERS SELECTED MUST HAVE "SOUND" FLOORS WHICH PROVIDE NAIL RETENTION PROPERTIES EQUAL TO OR BETTER THAN THE SPECIFIED DUNNAGE LUMBER, AND A SUFFICIENT NUMBER OF TIE-DOWN FACILITIES OF A STRENGTH EQUAL TO OR BETTER THAN THE SPECIFIED LADING TIE-DOWN ASSEMBLIES.
- C. SHIPMENT GROSS WEIGHT, AXLE DISTRIBUTION OF LADING WEIGHT, AND OVERALL DIMENSIONS MUST MEET STATE LAW REQUIREMENTS.
- D. LADING DATA:
 ITEM DIMENSIONS ----- 20'-0-1/2" LONG X 8'-9-3/4" WIDE X 8'-11-1/2" HIGH.
 ITEM GROSS WEIGHT ----- 26,800 POUNDS (APPROX).
- E. REFER TO ORD DWG 19-48-C-ORDJU-588, "WIRE ROPE AND ANNEALED WIRE APPLICATION METHODS FOR SECURING LADING ON RAIL & MOTOR CARRIER EQUIP.", FOR PROPER TIE-DOWN APPLICATION, EXCEPT THE NUTS ON 5/8" CABLE CLIPS WILL BE TIGHTENED TO A TORQUE OF 85 TO 95 FOOT POUNDS.
- F. LADING WILL NOT BE SECURED BY CHAINS AND/OR LOAD BINDERS IN LIEU OF SPECIFIED DUNNAGE.
- G. TO ACHIEVE PROPER CABLE TENSION, EMPLOY TWO (2) CABLE "GRIPPERS" AND AN APPLICABLY SIZED "COME-A-LONG" TYPE MECHANICAL HOIST. **NOTE:** CABLES WILL BE TENSIONED SUFFICIENTLY TO CAUSE THE BODY OF THE TRACK VEHICLE TO DEPRESS APPROXIMATELY ONE INCH (1").
- H. **CAUTION:** IT IS RECOMMENDED THAT THE CABLE TIE-DOWNS BE INSTALLED TO APPROXIMATE THE ANGLES SHOWN; HOWEVER, IF PLACEMENT OF THE TRANSPORTER TIE-DOWN FACILITIES PREVENTS THIS, CARE MUST BE EXERCISED TO ENSURE THAT THE CABLE TIE-DOWNS ON THE SAME SIDE OF THE LADING ARE INSTALLED SO THEIR RETENTION FORCES ACT IN OPPOSITE LONGITUDINAL DIRECTIONS.
- J. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-5/8" THICK BY 3-5/8" WIDE.
- K. **NOTICE:** A STAGGERED NAILING PATTERN WILL BE USED WHEN DUNNAGE IS NAILED TO THE FLOOR OF THE TRANSPORTING VEHICLE, OR WHEN LAMINATING DUNNAGE. ALSO, 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.

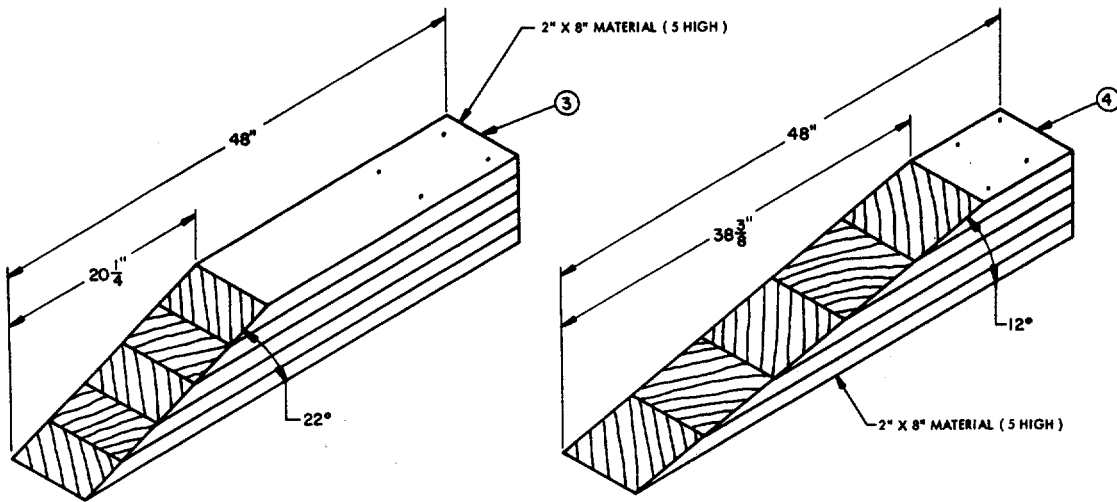
| BILL OF MATERIAL | | |
|----------------------------|-------------|------------|
| LUMBER | LINEAR FEET | BOARD FEET |
| 2" X 4" | 53 | 36 |
| 2" X 8" | 65 | 87 |
| NAILS | NO. REQD | POUNDS |
| 12d (3-1/4") | 96 | 1-3/4 |
| 20d (4") | 64 | 2-1/2 |
| ROPE, STEEL WIRE, 5/8" DIA | 48' REQD | 33 LBS |
| CLIP, 5/8" | 24 REQD | 15 LBS |
| THIMBLE, STANDARD, 5/8" | 8 REQD | 3 LBS |
| SHACKLE, 7/8" | 4 REQD | 9 LBS |

MATERIAL SPECIFICATIONS

- LUMBER** -- DOUGLAS FIR OR COMPARABLE LUMBER WITH STRAIGHT GRAIN AND FREE OF MATERIAL DEFECTS. REF: FED SPEC MM-L-751.
- NAILS** -- COMMON, CEMENT COATED OR CHEMICALLY ETCHED. REF: FED SPEC FF-N-105. ALT: ANNULAR-RING TYPE NAIL OF SAME SIZE.
- ROPE** -- STEEL WIRE, PLAIN, PREFORMED, REGULAR LAY, 17.9 TONS, 6 X 19, FLEXIBLE IWRC, MACWHYTE WIRE ROPE CO. (OR EQUAL). REF: FED SPEC RR-W-410.
- CLIP** --- "U" BOLT, CROSBY, HEAVY DUTY (OR EQUAL).
- SHACKLE:** MIL-S-5675A.

LOAD AS SHOWN

| ITEM | QUANTITY | WEIGHT (APPROX) |
|------------------------|----------|-------------------|
| GMSIA, CARRIER MOUNTED | 1 | 26,800 LBS |
| DUNNAGE | | 373 LBS |
| TOTAL WEIGHT | | 27,173 LBS |

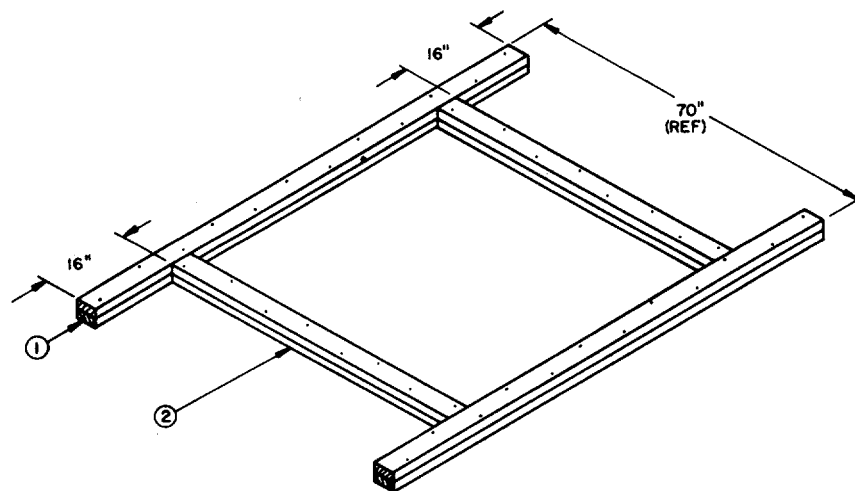


FRONT CHOCK BLOCK

REFER TO KEY NUMBER ③ ON PAGE 2 FOR NAILING SPECIFICATIONS.

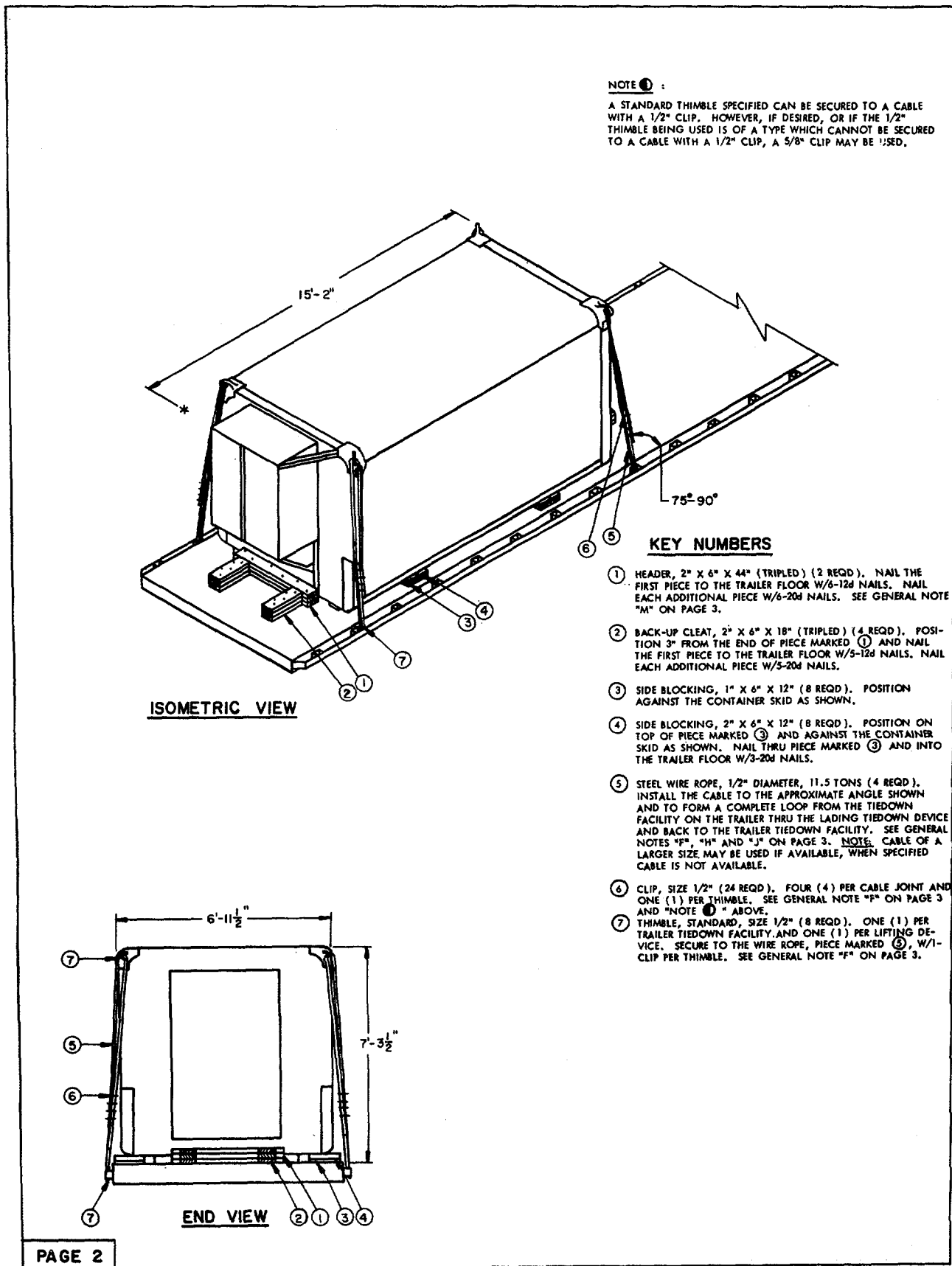
REAR CHOCK BLOCK

REFER TO KEY NUMBER ④ ON PAGE 2 FOR NAILING SPECIFICATIONS.



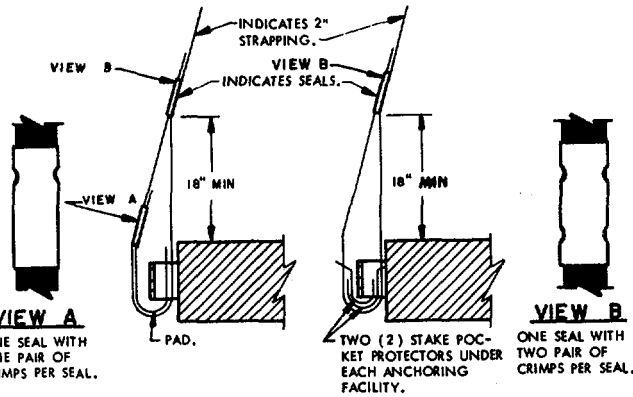
SIDE BLOCKING ASSEMBLY

REFER TO KEY NUMBERS ① AND ② ON PAGE 2 FOR NAILING SPECIFICATIONS.



PROJECT GSE 452-67

Figure 5-4. Blocking and tiedown diagrams for shop equipment, guided missile system, AN/TSM-95 and/or AN/TSM-96 (Sheet 1 of 3.)



VIEW A
ONE SEAL WITH ONE PAIR OF CRIMPS PER SEAL.

DETAIL A

METHOD OF INSTALLING 2" STRAPPING AND PAD AT ANCHORING FACILITY.

VIEW B
TWO (2) STAKE POCKET PROTECTORS UNDER EACH ANCHORING FACILITY.

DETAIL B

METHOD OF INSTALLING 2" STRAPPING AND STAKE POCKET PROTECTORS (ALT PAD).

GENERAL NOTES

- A.
- B. EACH LOAD AS SHOWN IS BASED ON A FLAT BED OR "LOW-BOY" TRAILER 8'-0" WIDE WITH A WOOD OR A WOOD AND METAL FLOOR. TRAILERS WITH ALL METAL FLOORS WILL NOT BE USED. ONLY ONE UNIT OF LADING IS SHOWN; HOWEVER, MULTIPLES OF UNITS, AS SHOWN OR DISSIMILAR IN NATURE, MAY BE LOADED ON A TRAILER. THE NUMBER OF UNITS TO BE LOADED ON A TRAILER WILL BE DEPENDENT ON THE SIZE OF THE TRAILER USED OR THE QUANTITIES OF UNITS TO BE SHIPPED WITH THE VIEW OF FULL UTILIZATION OF CARRIER EQUIPMENT. **CAUTION:** THE LOAD AS SHOWN ON PAGE 4, CRATED, MAY REQUIRE "CLEARANCE" CONSIDERATION BECAUSE OF EXCESSIVE LADING SIZE.
- C. ONLY TRAILERS CAPABLE OF SAFELY TRANSPORTING THE LADING TO DESTINATION WITHOUT DAMAGE WILL BE SELECTED. TRAILERS SELECTED MUST HAVE "SOUND" FLOORS WHICH PROVIDE NAIL RETENTION PROPERTIES EQUAL TO OR BETTER THAN THE SPECIFIED DUNNAGE LUMBER, AND A SUFFICIENT NUMBER OF TIEDOWN FACILITIES OF A STRENGTH EQUAL TO OR BETTER THAN SPECIFIED LADING TIEDOWN ASSEMBLIES.
- D. SHIPMENT GROSS WEIGHT, AXLE DISTRIBUTION OF LADING WEIGHT AND OVERALL DIMENSIONS MUST MEET STATE LAW REQUIREMENTS.
- E. LADING DATA (UNCRATED):
ITEM DIMENSIONS ----- 15'-2" LONG X 6'-11-1/2" WIDE X 7'-3-1/2" HIGH.
ITEM GROSS WEIGHT ---- 6,500 POUNDS (APPROX).
- LADING DATA (CRATED):
ITEM DIMENSIONS ----- 16'-5-1/2" LONG X 7'-6" WIDE X 7'-11" HIGH.
ITEM GROSS WEIGHT ---- 8,785 POUNDS (APPROX).
- F. REFER TO ORD DWG 19-48-C-ORDJU-588, "WIRE ROPE AND ANNEALED WIRE APPLICATION METHODS FOR SECURING LADING ON RAIL & MOTOR CARRIER EQUIP," FOR PROPER TIEDOWN APPLICATION.
- G. LADING WILL NOT BE SECURED BY CHAINS AND/OR LOAD BINDERS IN LIEU OF SPECIFIED DUNNAGE.
- H. **CAUTION:** IT IS RECOMMENDED THAT CABLE BE INSTALLED TO APPROXIMATE ANGLE SHOWN; HOWEVER, IF PLACEMENT OF TRANSPORTER TIEDOWN FACILITIES PREVENTS THIS, CARE MUST BE EXERCISED TO ENSURE THAT CABLES ON THE SAME SIDE OF THE LADING ARE INSTALLED SO THEIR RETENTION FORCES ACT IN OPPOSITE LONGITUDINAL DIRECTION---CONTACT OF CABLE WITH THE EDGE OF THE LADING IS PROHIBITED.
- J. TO ACHIEVE PROPER CABLE TENSION, EMPLOY TWO (2) CABLE "GRIPPERS" AND AN APPLICABLY SIZED "COME-A-LONG" TYPE MECHANICAL HOIST.
- K. WHEN ANY STRAP IS SEALED AT AN END-OVER-END LAP JOINT, A MINIMUM OF TWO (2) SEALS, BUTTED TOGETHER, WITH TWO (2) PAIR OF CRIMPS PER SEAL MUST BE USED TO SEAL THE JOINT.
- L. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 1" X 6" MATERIAL IS ACTUALLY 3/4" THICK BY 5-5/8" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-5/8" THICK BY 5-5/8" WIDE.
- M. 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.

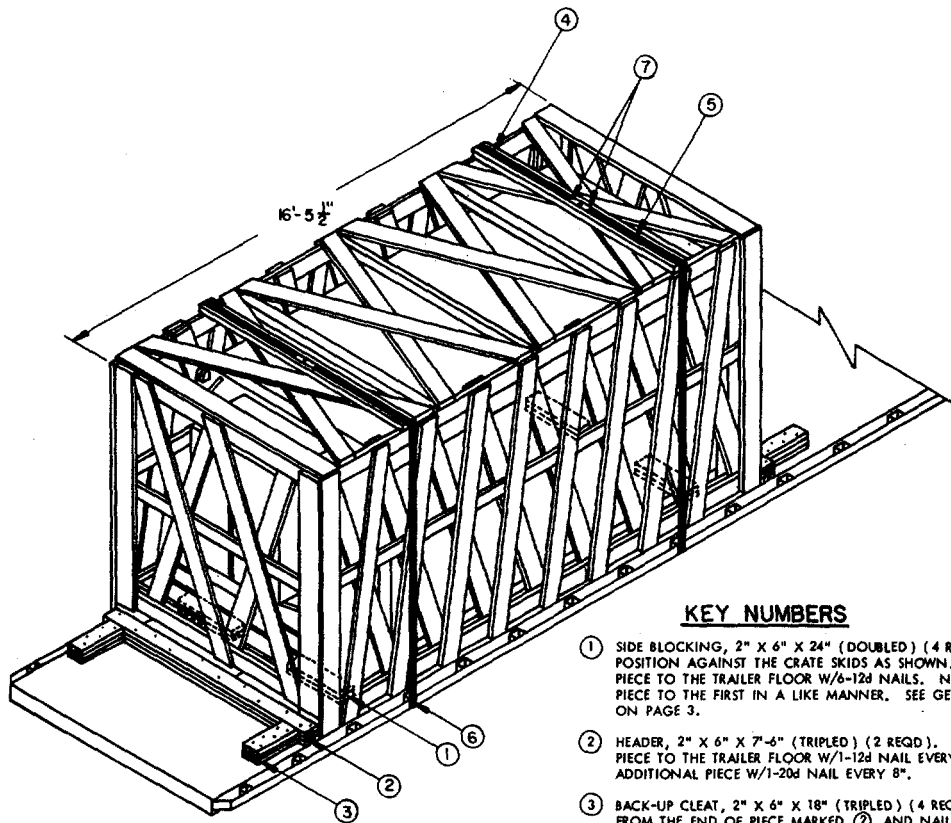
| BILL OF MATERIAL | | |
|--|-------------|------------|
| LUMBER | LINEAR FEET | BOARD FEET |
| 1" X 6" | 8 | 4 |
| 2" X 6" | 48 | 48 |
| NAILS | NO. REQD | POUNDS |
| 12d (3-1/4") | 38 | 3/4 |
| 20d (4") | 88 | 3 |
| ROPE, STEEL WIRE, 1/2" DIA ----- 90' REQD ----- 40 LBS | | |
| CLIP, 1/2" ----- 24 REQD ----- 10.5 LBS | | |
| CLIP, 5/8" (ALT FOR 1/2", 8 REQD) ----- 5 LBS | | |
| THIMBLE, STANDARD, 1/2" ----- 8 REQD ----- 2.5 LBS | | |

MATERIAL SPECIFICATIONS

- LUMBER** ----- DOUGLAS FIR OR COMPARABLE LUMBER WITH STRAIGHT GRAIN AND FREE OF MATERIAL DEFECTS. REF: FED SPEC MM-L-751.
- NAILS** ----- COMMON, CEMENT COATED OR CHEMICALLY ETCHED. REF: FED SPEC FF-N-105. ALT: ANNULAR-RING TYPE NAIL OF SAME SIZE.
- ROPE** ----- STEEL WIRE, PLAIN, PREFORMED, REGULAR LAY, 11.5 TONS, 6 X 19, FLEXIBLE IWRC, MACWHYTE WIRE ROPE CO (OR EQUAL). REF: FED SPEC RR-W-410.
- CLIPS** ----- "U" BOLT, CROSBY, HEAVY DUTY (OR EQUAL).
- STRAPPING, STEEL** ----- TYPE I OR IV, CLASS A, B, OR C. REF: FED SPEC QQ-5-781.
- STRAP SEAL; STRAP STAPLE; STAKE**
- POCKET PROTECTOR** ----- COMMERCIAL GRADE.

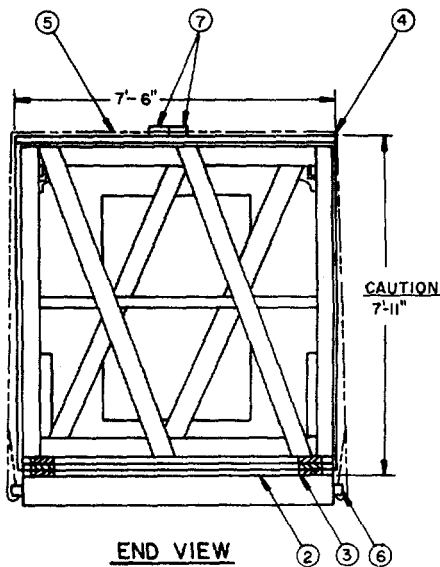
LOAD AS SHOWN

| ITEM | QUANTITY | WEIGHT (APPROX) |
|----------------------------|----------|-----------------|
| ORGANIZATIONAL MAINTENANCE | | |
| SHOP SET | 1 | 6,500 LBS |
| DUNNAGE | | 184 LBS |
| TOTAL WEIGHT | | 6,684 LBS |



KEY NUMBERS

- ① SIDE BLOCKING, 2" X 6" X 24" (DOUBLED) (4 REQD). PRE-POSITION AGAINST THE CRATE SKIDS AS SHOWN. NAIL THE FIRST PIECE TO THE TRAILER FLOOR W/6-12d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE GENERAL NOTE "M" ON PAGE 3.
- ② HEADER, 2" X 6" X 7'-6" (TRIPLED) (2 REQD). NAIL THE FIRST PIECE TO THE TRAILER FLOOR W/1-12d NAIL EVERY 8". NAIL EACH ADDITIONAL PIECE W/1-20d NAIL EVERY 8".
- ③ BACK-UP CLEAT, 2" X 6" X 18" (TRIPLED) (4 REQD). POSITION 3" FROM THE END OF PIECE MARKED ② AND NAIL THE FIRST PIECE TO THE TRAILER FLOOR W/5-12d NAILS. NAIL EACH ADDITIONAL PIECE W/5-20d NAILS.
- ④ STRAPPING BOARD, 2" X 6" X 7'-7-1/2" (2 REQD).
- ⑤ HOLD-DOWN STRAP, 2" X .050" X 33'-0" STEEL STRAPPING (2 REQD). INSTALL EACH STRAP FROM TWO (2) 16'-6" LONG PIECES, STAPLE TO PIECE MARKED ④ W/4-2" STAPLES.
- ⑥ PAD, 2" X .050" STRAP 18" LONG (4 REQD). POSITION UNDER AND SEAL TO PIECE MARKED ⑤. SEE "DETAIL A" ON PAGE 3. ALT: STAKE POCKET PROTECTOR (8 REQD). TWO (2) USED UNDER EACH TIEDOWN FACILITY WITH PIECE MARKED ⑤. SEE "DETAIL B".
- ⑦ SEAL FOR 2" STRAPPING (12 REQD). EXCEPT FOR THE SEALS USED TO SECURE THE PADS, DOUBLE CRIMP EACH SEAL. SEE GENERAL NOTE "K" ON PAGE 3.



END VIEW

BILL OF MATERIAL

| LUMBER | LINEAR FEET | BOARD FEET |
|-----------------------------|-------------|------------|
| 2" X 6" | 95 | 95 |
| NAILS | NO. REQD | POUNDS |
| 12d (3-1/4") | 90 | 1-1/2 |
| 20d (4") | 84 | 3 |
| STEEL STRAPPING, 2" X .050" | 72 REQD | 24 LBS |
| SEAL FOR 2" STRAPPING | 12 REQD | 3 LBS |
| STAPLE FOR 2" STRAPPING | 8 REQD | NIL |

LOAD AS SHOWN

| ITEM | QUANTITY | WEIGHT (APPROX) |
|--------------------------|----------|------------------|
| ORGANIZATION MAINTENANCE | | |
| SHOP SET (CRATED) | 1 | 8,785 LBS |
| DUNNAGE | | 270 LBS |
| TOTAL WEIGHT | | 9,055 LBS |

5-7. Loading in Closed- or Open-Top Semitrailer

The M-570 shipping and storage container with guided missile may be loaded into the semitrailers with the aid of forklifts. Loading procedures will be in accordance with the following figures:

Note

These documents include procedures for conventional type trailers equipped with mechanical

bracing devices as approved by the Bureau of Explosives, Association of American Railroads.

Caution

Procedures shown for mechanical bracing devices equipped trailers are *only* applicable for highway movement, *NOT* for container/trailer-on-flat-car movements.

GENERAL NOTES

- A.
- B. THE OUTLOADING PROCEDURES SPECIFIED HEREIN ARE APPLICABLE TO SHIPMENTS LOADED WITHIN VARIOUS SIZES OF CLOSED OR OPEN TOP VAN SEMITRAILERS, AND ARE FOR THE CHAPARRAL MISSILE WHEN PACKAGED IN THE M570 SHIPPING AND STORAGE CONTAINER. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH CONTENTS.
- C. FOR DETAILS OF THE CONTAINER, SEE DRAWING NO. 11074004.
CONTAINER DIMENSIONS ----- 125" LONG X 18" WIDE X 11" HIGH.
GROSS WEIGHT ----- 280 POUNDS (APPROX).
TARE WEIGHT ----- 95 POUNDS (APPROX).
CUBE ----- 24.74 CUBIC FEET.
- D. THE DESIGNATED ITEM IS A DOT CLASS "A" EXPLOSIVE. THE OUTLOADING PROCEDURES SPECIFIED HEREIN CAN ALSO BE UTILIZED FOR THE SHIPMENT OF THE DEPICTED CONTAINERS WHEN THEY ARE EMPTY OR LOADED WITH AN ITEM WHICH IS IDENTIFIED DIFFERENTLY BY NOMENCLATURE THAN THE ITEM DESIGNATED WITHIN THE TITLE OF THIS DOCUMENT.
- E. THE LOAD AS SHOWN ON PAGES 4 AND 5 IS BASED ON A 33'-0" LONG HIGH-VOLUME VAN TRAILER WHICH DOES NOT HAVE REAR CORNER POSTS, WHICH IS 7'-0" WIDE BY 8'-0" HIGH (INSIDE DIMENSIONS) AND WHICH HAS A WOOD, OR A WOOD AND METAL, OR A METAL FLOOR. CAUTION: IF THE TRAILER BEING USED IS TO BE LOADED THROUGH THE REAR DOOR OPENING, THE HEIGHT OF THE DOOR OPENING, MEASURED FROM THE TRAILER FLOOR TO THE TOP FRAME MEMBER, MUST BE AT LEAST NINETY-FOUR INCHES (94") TO ALLOW FOR THE PLACEMENT OF THE TOP LAYER CONTAINERS OF THE REAR LOAD UNIT. THE DELINEATED PROCEDURES ARE ALSO APPLICABLE TO LONGER TRAILERS AND TO TRAILERS WHICH ARE NINETY-FOUR INCHES (94") AND UPWARD IN HEIGHT, AND TO TRAILERS WHICH HAVE REAR CORNER POSTS. HOWEVER, IF THE TRAILER BEING USED HAS REAR CORNER POSTS AND IS NOT AT LEAST 33'-0" LONG, THE 1" X 4" HORIZONTAL PIECES ON THE MOST REARWARD GATE IN THE LOAD CANNOT BE NAILED IN PLACE UNTIL AFTER THE "SEPARATOR ASSEMBLIES" OF THE GATE HAVE BEEN PLACED INTO POSITION.
- F. THE LOAD AS SHOWN ON PAGES 6 AND 7 IS BASED ON A 33'-0" LONG VAN TRAILER WHICH DOES NOT HAVE REAR CORNER POSTS, WHICH IS 7'-4" WIDE BY 7'-6" HIGH (INSIDE DIMENSIONS) AND WHICH HAS A WOOD, OR A WOOD AND METAL, OR A METAL FLOOR. THE DELINEATED PROCEDURES ARE ALSO APPLICABLE TO LONGER TRAILERS, TO TRAILERS OF ANY WIDTH, TO TRAILERS WHICH ARE SEVENTY-SIX INCHES (76") AND UPWARD IN HEIGHT AND TO TRAILERS WHICH HAVE REAR CORNER POSTS.
- G. IF A TRAILER IS BEING USED TO SHIP A 4-LAYER LOAD AND IT CONTAINS A MECHANICAL LOAD-BLOCKING SYSTEM WHICH CONFORMS TO SPECIFICATIONS SET FORTH WITHIN THE BUREAU OF EXPLOSIVES PAMPHLET 6C AND THE APPENDICES THERETO, THE MECHANICAL SYSTEM MAY BE USED IN ACCORDANCE WITH PROCEDURES DELINEATED ON PAGE 7 OF THIS DOCUMENT, IN LIEU OF REAR-OF-LOAD BLOCKING SPECIFIED FOR THE LOADS DEPICTED HEREIN.
- H. SELECTION OF A VEHICLE TO BE USED TO TRANSPORT THE DESIGNATED ITEM MUST COMPLY WITH AR 35-355, CHAPTER 213, FOR EXPLOSIVES AND OTHER DANGEROUS ARTICLES, IN FULL.
- J. GROSS WEIGHT AND AXLE DISTRIBUTION OF WEIGHT FOR A LOAD WILL BE THE RESPONSIBILITY OF THE CARRIER. THE CARRIER WILL ADVISE THE SHIPPER OF THE APPLICABLE LOADING REQUIREMENTS AND THE SHIPPER WILL LOAD ACCORDINGLY. NOTICE: A SHIPMENT WILL BE POSITIONED IN THE TRAILER CONSISTENT WITH THE STATE WEIGHT LAWS.

(CONTINUED AT RIGHT)

(GENERAL NOTES CONTINUED)

- K. THE APPROVED BLOCKING, BRACING, AND STAYING METHODS FOR THE LOADS SPECIFIED HEREIN MUST BE FOLLOWED. THE NUMBER OF UNITS MAY BE ADJUSTED TO FIT THE SIZE OF THE VEHICLE TO BE LOADED OR THE QUANTITY TO BE SHIPPED FOR A LOAD QUANTITY OTHER THAN SPECIFIED, THE APPROVED METHODS MUST BE FOLLOWED, AS CLOSELY AS POSSIBLE.
- L. FOR TRAILERS NOT EQUIPPED WITH REAR CORNER POSTS, REAR BLOCKING MUST CONTACT CLOSED DOORS.
- M. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN A TRAILER WHICH IS PARTIALLY LOADED WITH THE DESIGNATED ITEM, 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.
- N. EXCEPT FOR PLYWOOD, DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 1" X 4" MATERIAL IS ACTUALLY 3/4" THICK BY 3-5/8" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-5/8" THICK BY 5-5/8" WIDE.
- O. IT IS THE RESPONSIBILITY OF A SHIPPER TO PROVIDE THE "CONTAINER PROTECTOR" ASSEMBLY AS DETAILED ON PAGE 3.
CAUTION: OUTLOADING MUST NOT BE ATTEMPTED WITHOUT USING A CONTAINER PROTECTOR BOARD.
- P. 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, A NAILING PATTERN FOR AN UPPER PRICE OF LAMINATED DUNNAGE WILL BE ADJUSTED AS REQUIRED SO THAT A NAIL FOR THAT PRICE WILL NOT BE DRIVEN THROUGH ONTO OR RIGHT BESIDE A NAIL IN A LOWER PRICE.
- R. PORTIONS OF THE TRAILER BODIES DEPICTED WITHIN THIS DOCUMENT, SUCH AS ONE OF THE SIDE WALLS, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.
- S. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "CONTAINER HANDLING INSTRUCTIONS" ON PAGE 3 AND TO THE "SPECIAL NOTES" SECTIONS WHICH ARE IMMEDIATELY ADJACENT TO THE OUTLOADING METHODS DELINEATED HEREIN.

MATERIAL SPECIFICATIONS

- LUMBER ----- : SEE TM 743-200-1, DUNNAGE LUMBER; FED SPEC MM-L-751.
- PLYWOOD ----- : GROUP B OR C, GRADE* C-C (EXTERIOR); FED SPEC NN-P-530.
FSN 5300-051-1198.
* IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER EXTERIOR GRADE MAY BE SUBSTITUTED.
- NAILS ----- : COMMON, CEMENT COATED OR CHEMICALLY ETCHED,
FED SPEC FF-N-105.
ALT: ANNULAR-RING TYPE NAIL OF THE SAME SIZE.
- WIRE ----- : ANNEALED, BLACK; FED SPEC QQ-W-461.
- STRAPPING, STEEL ----- : TYPE I OR IV, CLASS A OR B, FED SPEC QQ-5-781.
FOR FSN SEE 38-38-100.
- ANTI-CHAFING MATERIAL: NEUTRAL BARRIER MATERIAL, MIL-8-121 (OR EQUAL).
- HARDBOARD ----- : FED SPEC LLL-H-35.
- STRAP SEAL,
STRAP STAPLE ----- : COMMERCIAL GRADE.

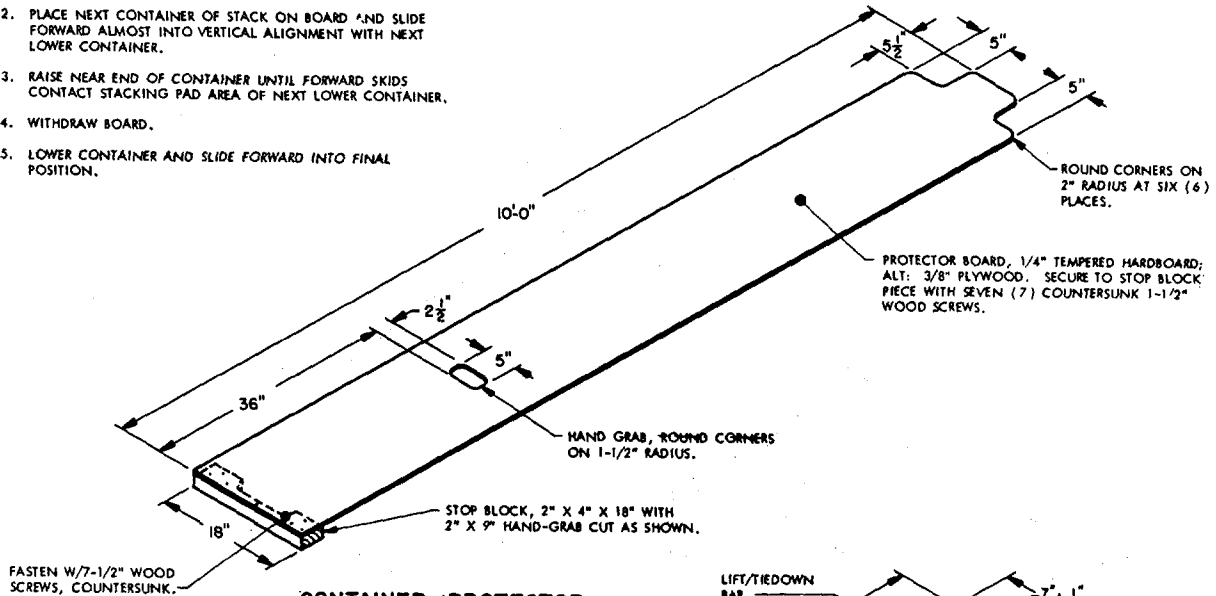
PAGE 2

PROJECT **BM-586-67**

Figure 5-5. Blocking and bracing diagrams for guided missile, M-570 container (sheet 1 of 13).

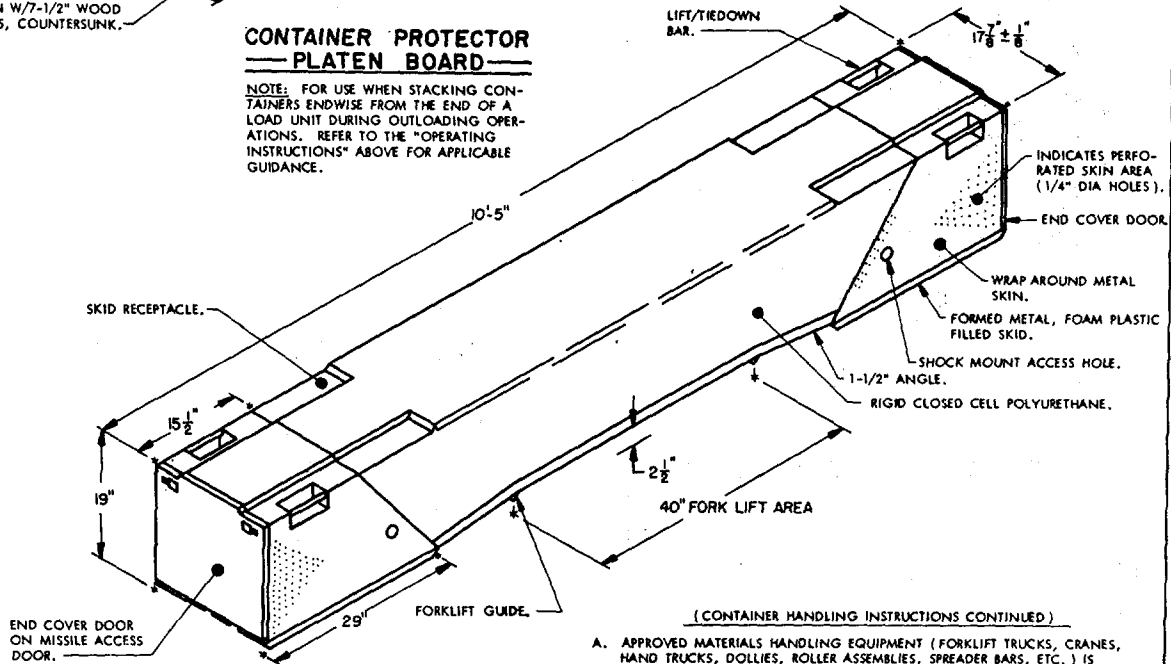
OPERATING INSTRUCTIONS

1. PLACE BOARD ON TOP OF PARTIALLY FORMED ST/CK.
2. PLACE NEXT CONTAINER OF STACK ON BOARD AND SLIDE FORWARD ALMOST INTO VERTICAL ALIGNMENT WITH NEXT LOWER CONTAINER.
3. RAISE NEAR END OF CONTAINER UNTIL FORWARD SKIDS CONTACT STACKING PAD AREA OF NEXT LOWER CONTAINER.
4. WITHDRAW BOARD.
5. LOWER CONTAINER AND SLIDE FORWARD INTO FINAL POSITION.



**CONTAINER PROTECTOR
— PLATEN BOARD —**

NOTE: FOR USE WHEN STACKING CONTAINERS ENDWISE FROM THE END OF A LOAD UNIT DURING UNLOADING OPERATIONS. REFER TO THE "OPERATING INSTRUCTIONS" ABOVE FOR APPLICABLE GUIDANCE.



CONTAINER DETAIL

CONTAINER HANDLING INSTRUCTIONS

1. CAUTION: EXTREME CARE MUST BE EXERCISED DURING UNLOADING OPERATIONS TO PREVENT DAMAGE TO THE EXPOSED PLASTIC AREAS OF THE CONTAINER. PLASTIC AREAS WILL NOT BE STEPPED ON, WALKED ON, PRIED AGAINST, STRUCK OR GOUGED WITH HAND TOOLS OR MATERIALS HANDLING EQUIPMENT, OR BUMPED AGAINST PROTRUSIONS.
2. IT IS RECOMMENDED THAT THE CONTAINERS BE MANUALLY STACKED WITHIN THE TRANSPORTING TRAILER. TO FACILITATE COMPLIANCE WITH THIS RECOMMENDATION, THE "CONTAINER PROTECTOR" BOARD AS SHOWN ABOVE MUST BE USED WHEN PLACING THE UPPER CONTAINERS OF A STACK AND WHEN FORMING THE LAST STACK BUILT WITHIN A LOAD UNIT.
3. ONLY APPROVED AND APPROPRIATELY SIZED MATERIALS HANDLING EQUIPMENT WILL BE USED FOR HANDLING THE DEPICTED CONTAINER.

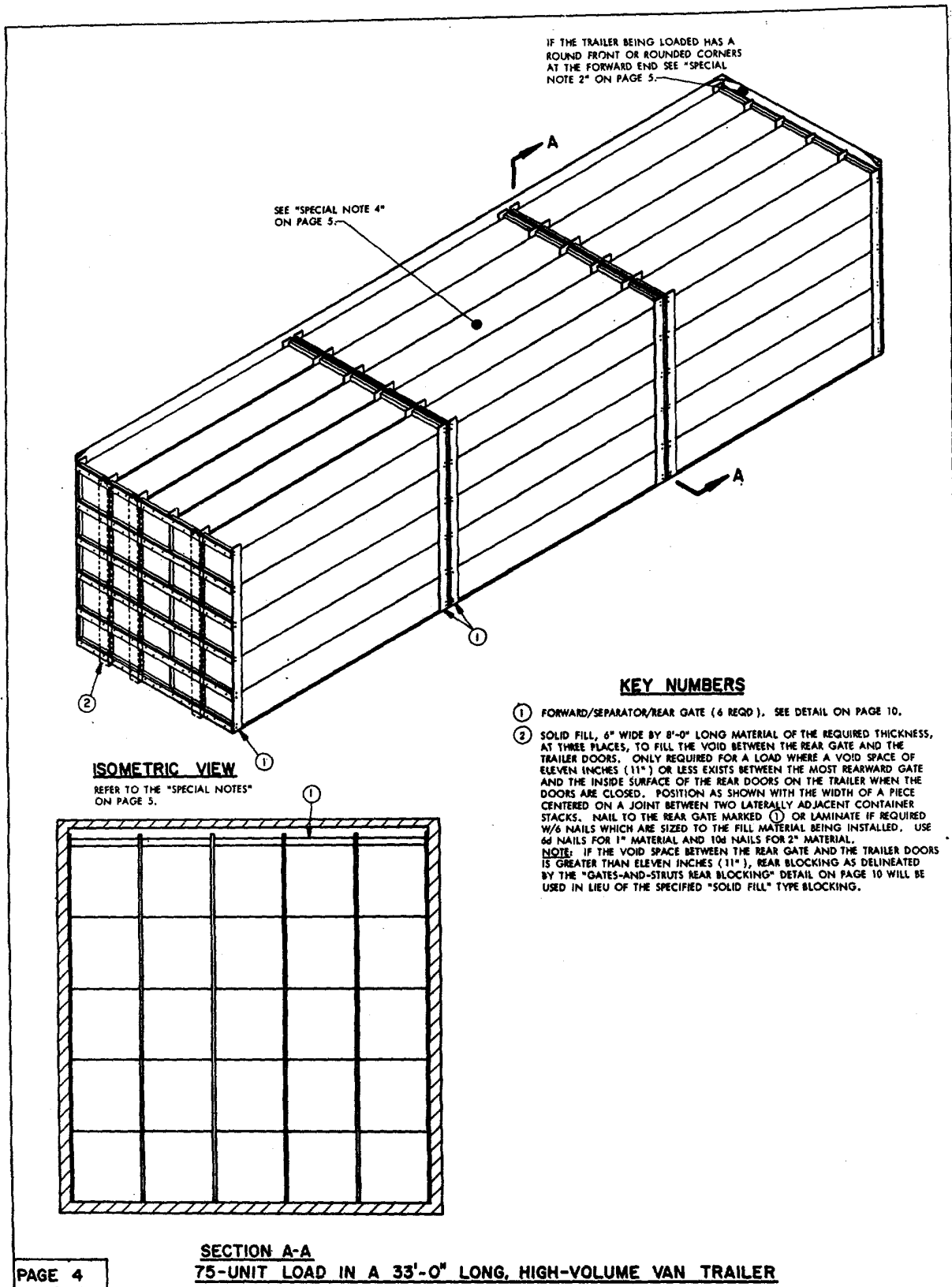
(CONTAINER HANDLING INSTRUCTIONS CONTINUED)

- A. APPROVED MATERIALS HANDLING EQUIPMENT (FORKLIFT TRUCKS, CRANES, HAND TRUCKS, DOLLIES, ROLLER ASSEMBLIES, SPREADER BARS, ETC.) IS SPECIFIED ELSEWHERE.
- B. PRECAUTIONARY HANDLING TECHNIQUES NORMALLY EMPLOYED FOR THE TYPE OF COMMODITY INVOLVED OR AS SPECIFIED ELSEWHERE OR HEREIN WILL BE OBSERVED.
- C. IF HANDLING IS ACCOMPLISHED WITH A FORKLIFT TRUCK, CONTAINERS SHOULD BE HANDLED FROM A SIDE POSITION. CAUTION: THE USUALLY APPLIED END-HANDLING IS NOT PERMITTED; HOWEVER, FORK TINES MAY BE PLACED UNDER THE SKIDS FROM AN END DIRECTION. CARE MUST BE EXERCISED WHEN INSERTING FORKS UNDER OR WITHDRAWING FORKS FROM UNDER A CONTAINER, TO PREVENT DAMAGE TO THE CONTAINERS BY THE FORK TINES OR THE FORKLIFT PACKAGE GUARD.
- D. IF A SINGLE CONTAINER IS HANDLED BY SLINGING, THE SLING MAY BE ATTACHED TO THE LIFTING POINTS ON THE CONTAINER. HOWEVER, IF A STACK OF TWO OR MORE CONTAINERS IS HANDLED BY SLINGING, THE SLING USED MUST BE OF SUCH A DESIGN THAT LIFTING IS DONE ON THE BOTTOM OF THE LOWEST CONTAINER, AND ADDITIONALLY, CONTAIN BOTH LENGTHWISE AND CROSSWISE SPREADER BARS WHICH ARE RIGGED SO AS TO PREVENT DAMAGE TO A CONTAINER BY THE SLING LEGS.

CONTAINER DETAIL AND HANDLING INSTRUCTIONS

PROJECT QM-586-67

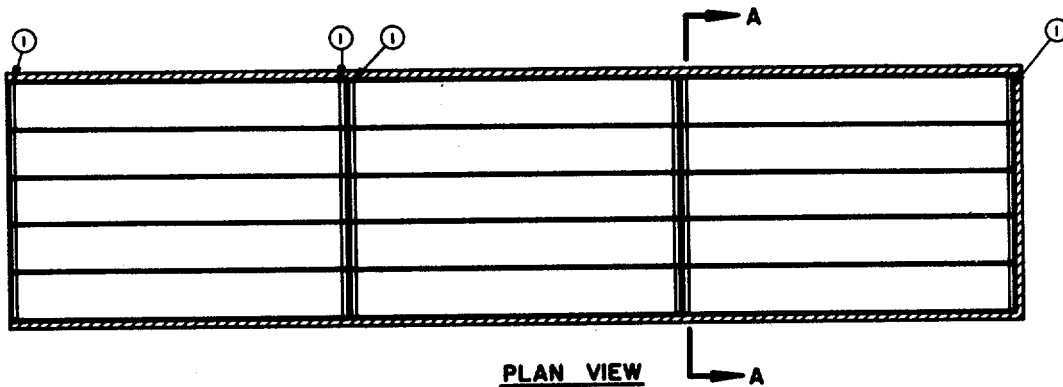
Figure 5-5-Continued. (Sheet 2 of 13.)



PAGE 4

PROJECT GM-586-67

Figure 5-5-Continued. (Sheet 3 of 13.)



SPECIAL NOTES

1. A 33'-0" LONG TRAILER IS SHOWN WHICH IS 7'-9" WIDE BY 8'-4" HIGH (INSIDE DIMENSIONS), IS EQUIPPED WITH A SQUARE FRONT AND DOES NOT HAVE REAR CORNER POSTS. THE DEPICTED LOAD CAN BE SHIPPED IN A TRAILER WHICH IS LONGER THAN SHOWN.
2. A SQUARE FRONT TRAILER IS SHOWN IN THE LOAD VIEWS. IF THE TRAILER TO BE USED HAS ROUNDED CORNERS AT THE FORWARD END, THE MINIMUM LENGTH TRAILER THAT CAN BE USED IS 34'-0"; OR IF THE TRAILER HAS A ROUND FRONT, THE MINIMUM LENGTH TRAILER THAT CAN BE USED IS 36'-0". IF THE TRAILER HAS EITHER, A ROUND FRONT OR ROUNDED CORNERS AT THE FORWARD END, REFER TO PAGE 13 FOR "FORWARD BLOCKING" SPECIFICATIONS WHICH MUST BE USED.
3. IF THE TRAILER BEING LOADED IS EQUIPPED WITH REAR CORNER POSTS AND IS NOT AT LEAST 33'-0" LONG, THE 1" X 4" HORIZONTAL PIECES ON THE MOST REARWARD GATE IN THE LOAD CANNOT BE NAILED IN PLACE UNTIL AFTER THE "SEPARATOR ASSEMBLIES" OF THE GATE HAVE BEEN PLACED IN POSITION.
4. IF THE DELINEATED OUTLOADING METHOD IS USED FOR SHIPMENT OF A LOAD WHICH CONTAINS A LOAD UNIT OF TWENTY-FOUR (24) CONTAINERS INSTEAD OF THE TWENTY-FIVE (25) CONTAINERS AS SHOWN, TO SATISFY A LESS-THAN-FULL-LOAD QUANTITY, THE FOUR-HIGH CONTAINER STACK MUST CONTAIN A "FILLER ASSEMBLY" AS DEPICTED ON PAGE 14, IN PLACE OF EACH OMITTED CONTAINER. ALSO, FOR EACH OMITTED CONTAINER, TWO "FILLER BLOCKS", 2" X 4" X 18", MUST BE USED BETWEEN THE "SEPARATOR ASSEMBLIES" OF THE GATES. NAIL TO THE "SPACER PIECE" OF THE GATES W/3-10d NAILS. THIS WILL PROVIDE SIDE BEARING FOR THE CONTAINER (S) Laterally ADJACENT TO THE "FILLER ASSEMBLY".

BILL OF MATERIAL

| LUMBER | LINEAR FEET | BOARD FEET |
|----------------------------|-------------|------------|
| 1" X 4" | 278 | 93 |
| 2" X 4" | 270 | 180 |
| NAILS | NO. REQD | POUNDS |
| 6d (2") | 972 | 5-3/4 |
| PLYWOOD, 1/4" X 4" X 8'-0" | 12 REQD | 23 LBS |
| PLYWOOD, 1/2" X 4" X 8'-0" | 24 REQD* | 92 LBS |

*IF 1/2" PLYWOOD IS NOT AVAILABLE, SUBSTITUTE DOUBLED THICKNESS OF 1/4" PLYWOOD.

LOAD AS SHOWN

| ITEM | QUANTITY | WEIGHT (APPROX) |
|---------------------|----------|-------------------|
| CONTAINER | 75 | 21,000 LBS |
| W/MISSILE | | 804 LBS |
| DUNNAGE | | |
| TOTAL WEIGHT | | 21,804 LBS |

75-UNIT LOAD IN A 33'-0" LONG, HIGH-VOLUME VAN TRAILER

PAGE 5

PROJECT 9M-585-67

Figure 5-5-Continued. (Sheet 4 of 13.)

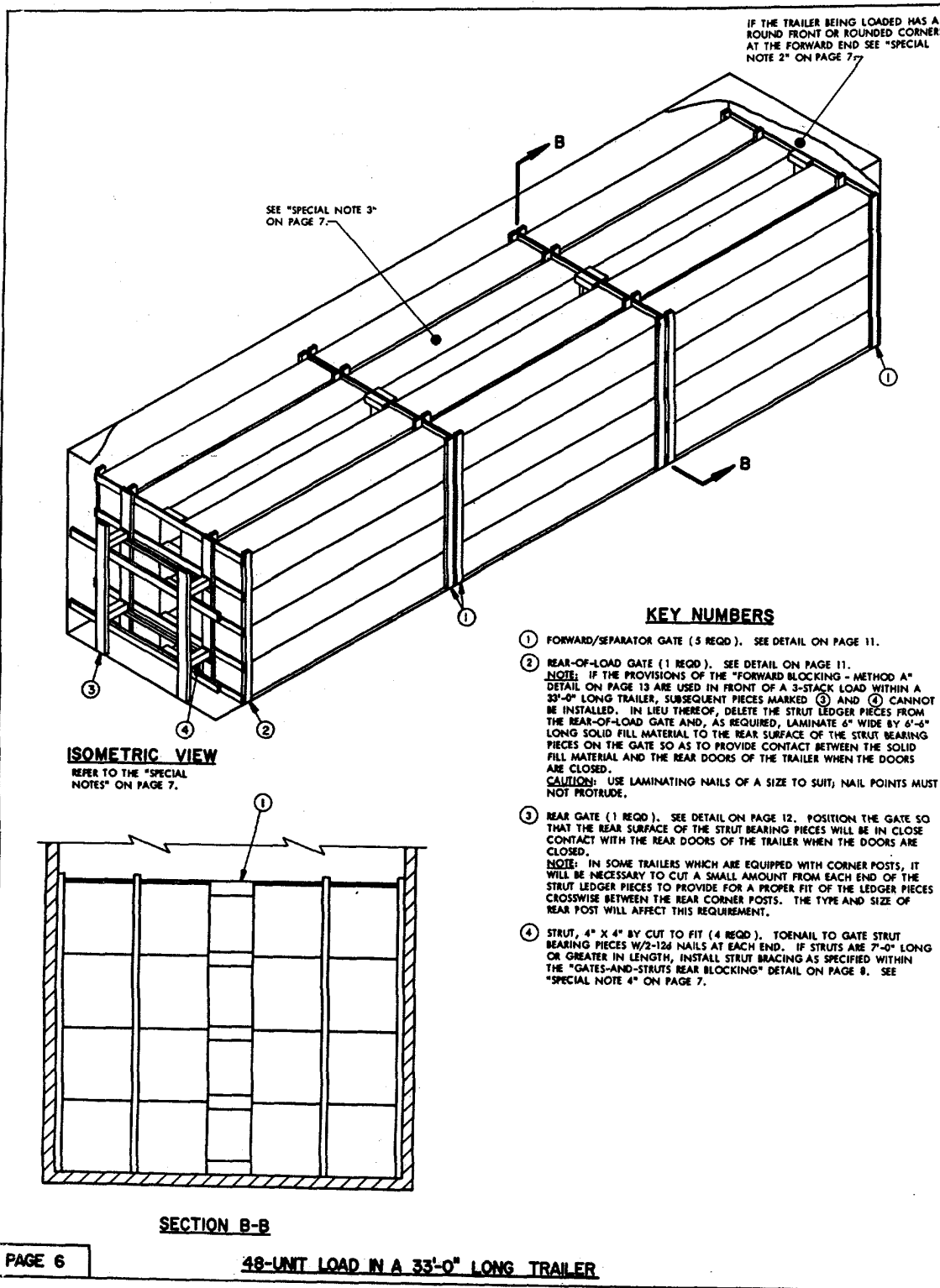


Figure 6-5-Continued. (Sheet 5 of 13.)

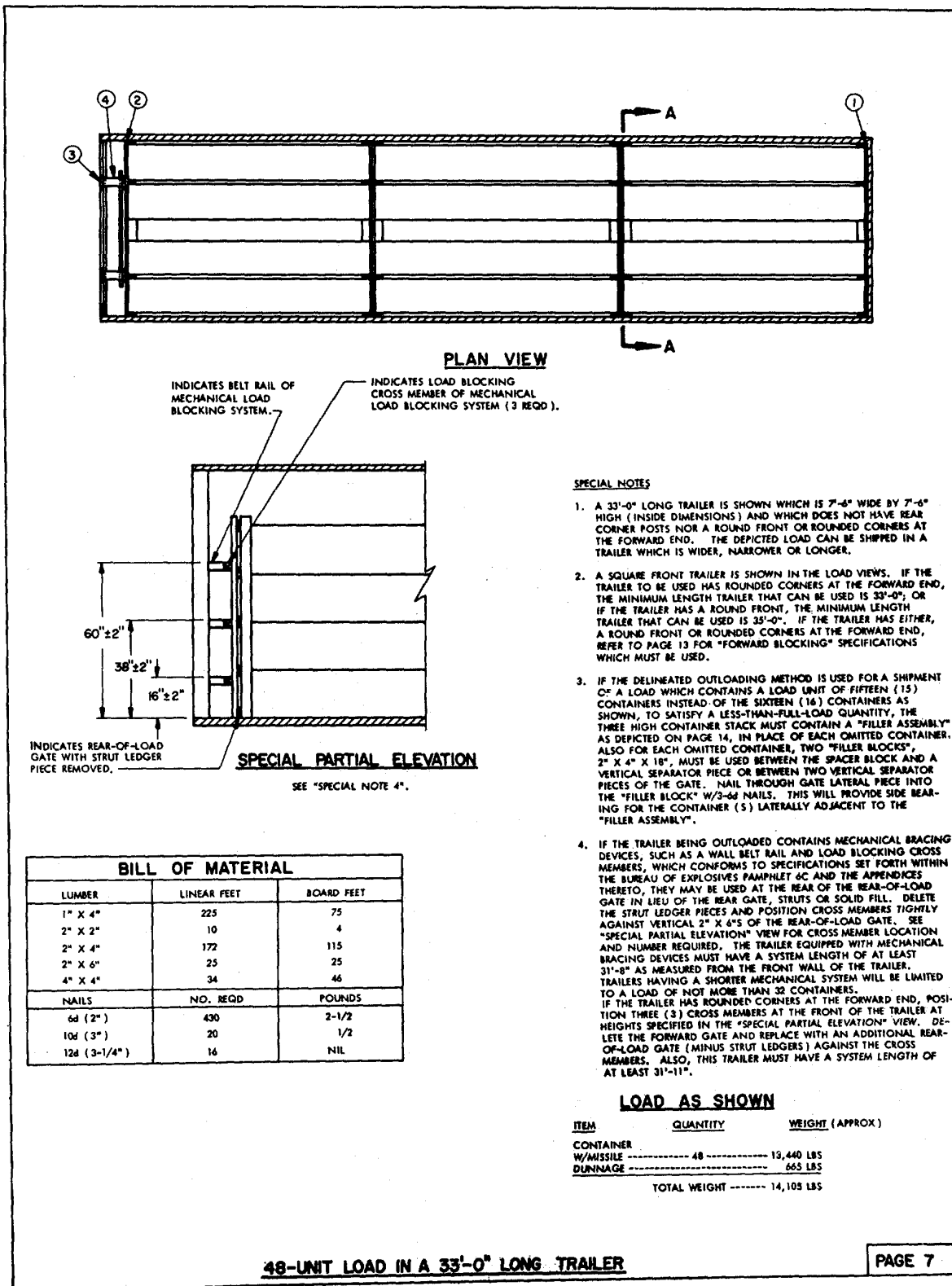
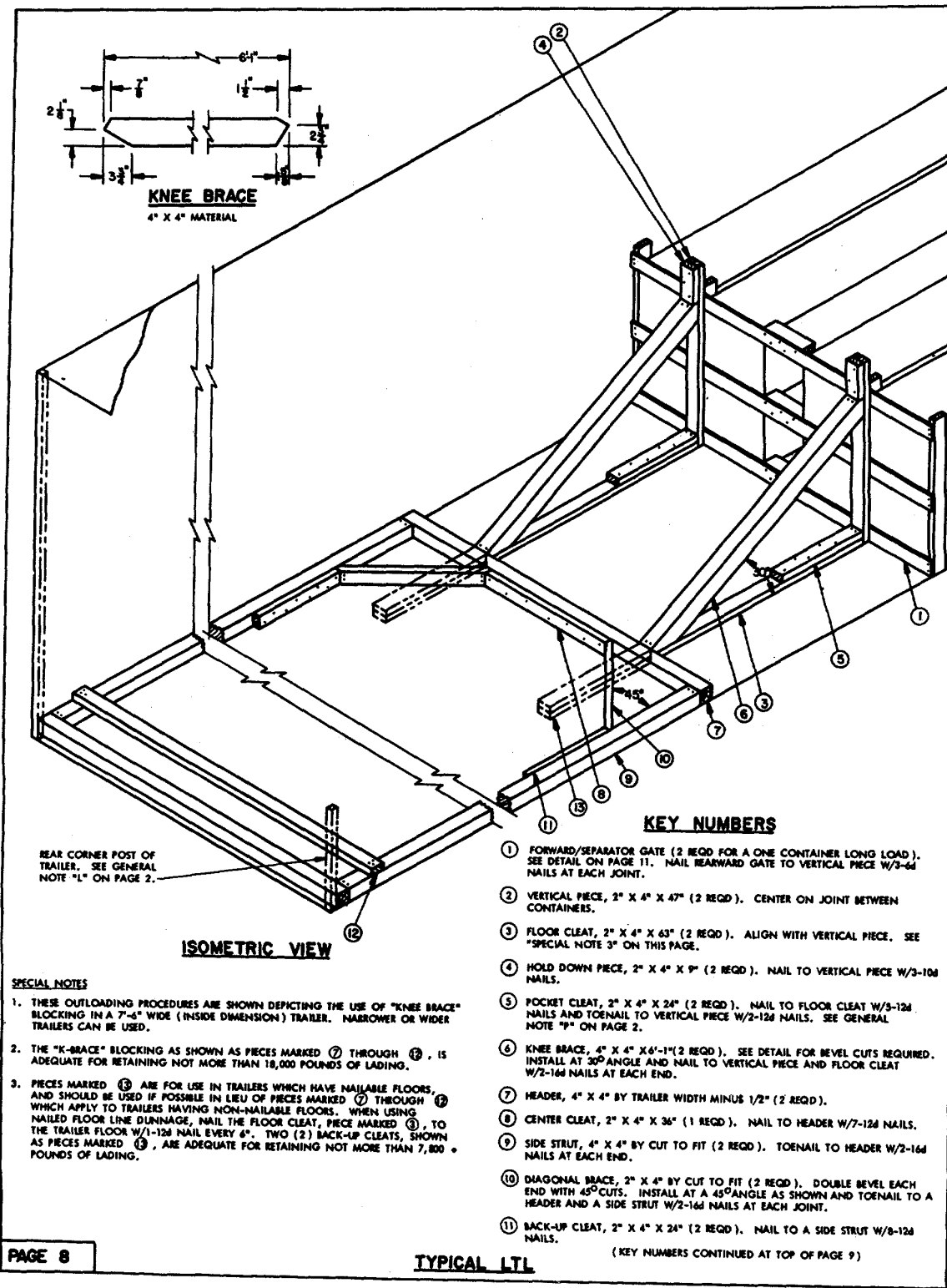


Figure 5-5-Continued. (Sheet 6 to 13.)



KNEE BRACE
4" X 4" MATERIAL

ISOMETRIC VIEW

KEY NUMBERS

REAR CORNER POST OF TRAILER. SEE GENERAL NOTE "L" ON PAGE 2.

SPECIAL NOTES

1. THESE UNLOADING PROCEDURES ARE SHOWN DEPICTING THE USE OF "KNEE BRACE" BLOCKING IN A 7'-6" WIDE (INSIDE DIMENSION) TRAILER. NARROWER OR WIDER TRAILERS CAN BE USED.
2. THE "K-BRACE" BLOCKING AS SHOWN AS PIECES MARKED ⑦ THROUGH ⑩, IS ADEQUATE FOR RETAINING NOT MORE THAN 18,000 POUNDS OF LADING.
3. PIECES MARKED ③ ARE FOR USE IN TRAILERS WHICH HAVE NAILABLE FLOORS, AND SHOULD BE USED IF POSSIBLE IN LIEU OF PIECES MARKED ⑦ THROUGH ⑩ WHICH APPLY TO TRAILERS HAVING NON-NAILABLE FLOORS. WHEN USING NAILABLE FLOOR LINE DUNNAGE, NAIL THE FLOOR CLEAT, PIECE MARKED ③, TO THE TRAILER FLOOR W/1-12d NAIL EVERY 6". TWO (2) BACK-UP CLEATS, SHOWN AS PIECES MARKED ⑪, ARE ADEQUATE FOR RETAINING NOT MORE THAN 7,800 POUNDS OF LADING.

- ① FORWARD/SEPARATOR GATE (2 REQD FOR A ONE CONTAINER LONG LOAD). SEE DETAIL ON PAGE 11. NAIL REARWARD GATE TO VERTICAL PIECE W/3-6d NAILS AT EACH JOINT.
- ② VERTICAL PIECE, 2" X 4" X 47" (2 REQD). CENTER ON JOINT BETWEEN CONTAINERS.
- ③ FLOOR CLEAT, 2" X 4" X 63" (2 REQD). ALIGN WITH VERTICAL PIECE. SEE "SPECIAL NOTE 3" ON THIS PAGE.
- ④ HOLD DOWN PIECE, 2" X 4" X 9" (2 REQD). NAIL TO VERTICAL PIECE W/3-10d NAILS.
- ⑤ POCKET CLEAT, 2" X 4" X 24" (2 REQD). NAIL TO FLOOR CLEAT W/3-12d NAILS AND TOENAIL TO VERTICAL PIECE W/2-12d NAILS. SEE GENERAL NOTE "9" ON PAGE 2.
- ⑥ KNEE BRACE, 4" X 4" X 6'-1" (2 REQD). SEE DETAIL FOR BEVEL CUTS REQUIRED. INSTALL AT 30° ANGLE AND NAIL TO VERTICAL PIECE AND FLOOR CLEAT W/2-16d NAILS AT EACH END.
- ⑦ HEADER, 4" X 4" BY TRAILER WIDTH MINUS 1/2" (2 REQD).
- ⑧ CENTER CLEAT, 2" X 4" X 36" (1 REQD). NAIL TO HEADER W/7-12d NAILS.
- ⑨ SIDE STRUT, 4" X 4" BY CUT TO FIT (2 REQD). TOENAIL TO HEADER W/2-16d NAILS AT EACH END.
- ⑩ DIAGONAL BRACE, 2" X 4" BY CUT TO FIT (2 REQD). DOUBLE BEVEL EACH END WITH 45° CUTS. INSTALL AT A 45° ANGLE AS SHOWN AND TOENAIL TO A HEADER AND A SIDE STRUT W/2-16d NAILS AT EACH JOINT.
- ⑪ BACK-UP CLEAT, 2" X 4" X 24" (2 REQD). NAIL TO A SIDE STRUT W/8-12d NAILS.

(KEY NUMBERS CONTINUED AT TOP OF PAGE 9)

TYPICAL LTL

PROJECT 9M-586-87

Figure 5-5-Continued. (Sheet 7 of 13.)

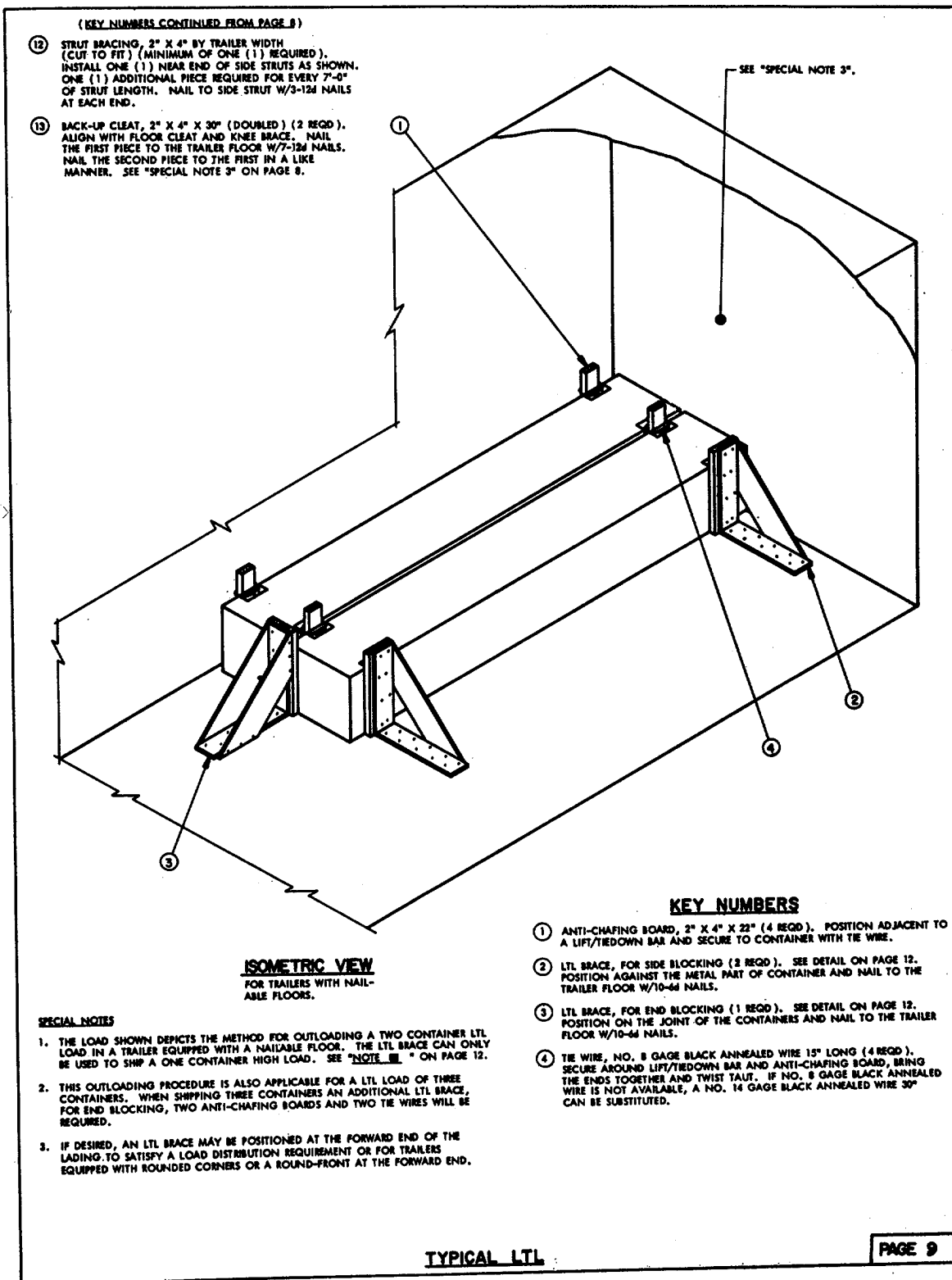
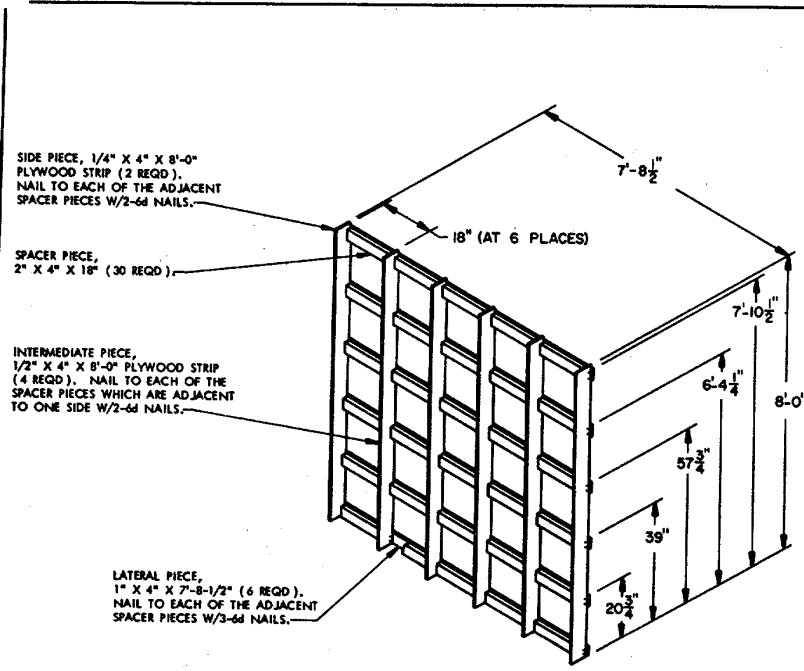


Figure 5-5-Continued. (Sheet 8 of 13.)



SIDE PIECE, 1/4" X 4" X 8'-0"
PLYWOOD STRIP (2 REQD).
NAIL TO EACH OF THE ADJACENT
SPACER PIECES W/2-6d NAILS.

SPACER PIECE,
2" X 4" X 18" (30 REQD)

INTERMEDIATE PIECE,
1/2" X 4" X 8'-0" PLYWOOD STRIP
(4 REQD). NAIL TO EACH OF THE
SPACER PIECES WHICH ARE ADJACENT
TO ONE SIDE W/2-6d NAILS.

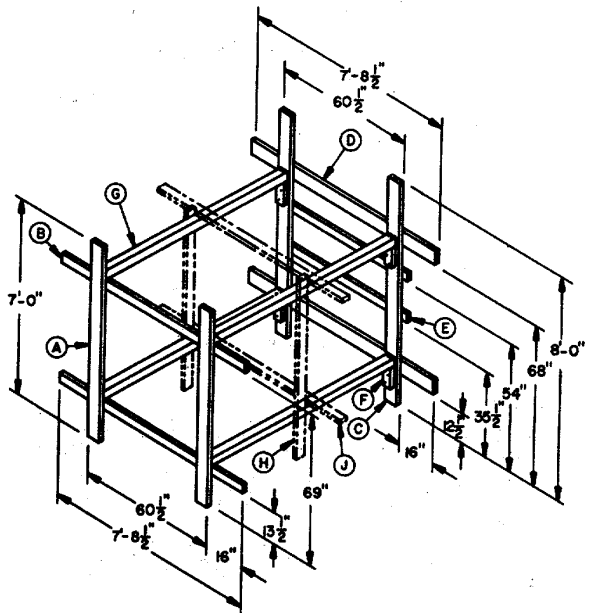
LATERAL PIECE,
1" X 4" X 7'-8-1/2" (6 REQD).
NAIL TO EACH OF THE ADJACENT
SPACER PIECES W/3-6d NAILS.

FORWARD/SEPARATOR/REAR GATE

NOTES:
A GATE/STRUT TYPE OF REAR BLOCKING AS SHOWN BELOW WILL BE USED WITHIN A HIGH-VOLUME VAN TRAILER LOAD WHEN THE UNOCCUPIED SPACE BETWEEN THE MOST REARWARD GATE AND THE INSIDE SURFACE OF THE TRAILER DOORS MEASURES ELEVEN INCHES (11") OR MORE.
THE BLOCKING ASSEMBLY AS SHOWN IS DESIGNED FOR USE WITH A 3-LAYER LOAD. FOR A REDUCED HEIGHT LOAD, CONSTRUCT THE REAR BLOCKING TO SUIT, FOLLOWING THE DELINEATED PRINCIPLES. FOR A 3-LAYER OR 4-LAYER LOAD, THE STRUTS SHOULD ALIGN ON THE JOINTS BETWEEN THE FIRST AND SECOND LAYERS AND BETWEEN THE TOP AND THE NEXT-TO-TOP LAYERS. FOR A 2-LAYER LOAD, THE TWO UPPER LEVEL STRUTS SHOULD ALIGN ON THE JOINT BETWEEN LAYERS AND THE TWO LOWER LEVEL STRUTS WILL BE PLACED ON THE FLOOR OF THE TRAILER, WITHOUT STRUT LEDGERS, BUT WITH AN ADDITIONAL 2" X 4" BY TRAILER WIDTH PIECE PLACED ON EDGE ON TOP OF THE STRUTS AT THE REARWARD END AND NAILED TO THE VERTICAL PIECES OF THE REAR GATE. REGARDLESS OF THE HEIGHT OF THE FORWARD GATE, THE TWO TOP/BOTTOM HORIZONTAL PIECES OF 2" X 4" X 7'-8-1/2" MATERIAL MUST ALWAYS BE USED, AND PLACED SO AS TO PROVIDE BEARING BEHIND THE FORWARD ENDS OF THE STRUTS; THE USE OF AND THE NUMBER OF INTERMEDIATE HORIZONTAL PIECES WILL DEPEND ON THE HEIGHT OF THE LOAD BEING BLOCKED.

KEY LETTERS

- (A) REAR GATE VERTICAL, 2" X 6" X 7'-0" (2 REQD).
- (B) REAR GATE STRUT LEDGER, 2" X 4" X 7'-8-1/2" (2 REQD). NAIL TO PIECES MARKED (A) W/3-10d NAILS AT EACH JOINT.
- (C) FORWARD GATE VERTICAL, 2" X 6" X 8'-0" (2 REQD).
- (D) FORWARD GATE TOP/BOTTOM HORIZONTAL, 2" X 6" X 7'-8-1/2" (2 REQD). NAIL TO PIECES MARKED (C) W/3-10d NAILS AT EACH JOINT.
- (E) FORWARD GATE INTERMEDIATE HORIZONTAL, 2" X 4" X 66" (2 REQD). NAIL TO PIECES MARKED (C) W/3-10d NAILS AT EACH END.
- (F) STRUT LEDGER BLOCK, 2" X 4" X 9" (4 REQD). POSITION FOR HORIZONTAL ALIGNMENT OF A PIECE MARKED (G), AND NAIL TO A PIECE MARKED (C) W/3-10d NAILS.
- (G) STRUT, 4" X 4" MATERIAL OF A LENGTH TO SUIT (4 REQD). POSITION AS SHOWN AND TOENAIL TO THE VERTICAL PIECES ON THE FORWARD AND REAR GATES W/2-12d NAILS AT EACH END. THE STRUTS SHOULD BE OF A LENGTH SO THAT WHEN THEY ARE INSTALLED THE REAR SURFACE OF THE VERTICAL PIECES ON THE REAR GATE WILL BE IN CLOSE CONTACT WITH THE REAR DOORS OF THE TRAILER WHEN THE DOORS ARE CLOSED.
- (H) VERTICAL STRUT BRACING PIECE, 2" X 4" X 6'-6" (2 REQD). POSITION AS SHOWN AND NAIL TO THE STRUTS W/3-12d NAILS AT EACH JOINT. NOTE: THIS AND THE NEXT PIECE CALLED OUT ARE ONLY REQUIRED FOR STRUTS WHICH ARE 7'-0" LONG OR GREATER IN LENGTH. A SET OF STRUT BRACING IS REQUIRED FOR EVERY 7'-0" OF STRUT LENGTH.
- (J) LATERAL STRUT BRACING PIECE, 2" X 4" BY TRAILER WIDTH IN LENGTH (2 REQD). POSITION AS SHOWN AND NAIL TO THE STRUTS W/3-12d NAILS AT EACH JOINT.



GATES-AND-STRUTS REAR BLOCKING

SEE NOTES ABOVE.

PAGE 10

DETAILS

PROJECT 9M-586-67

Figure 5-5-Continued. (Sheet 9 of 13.)

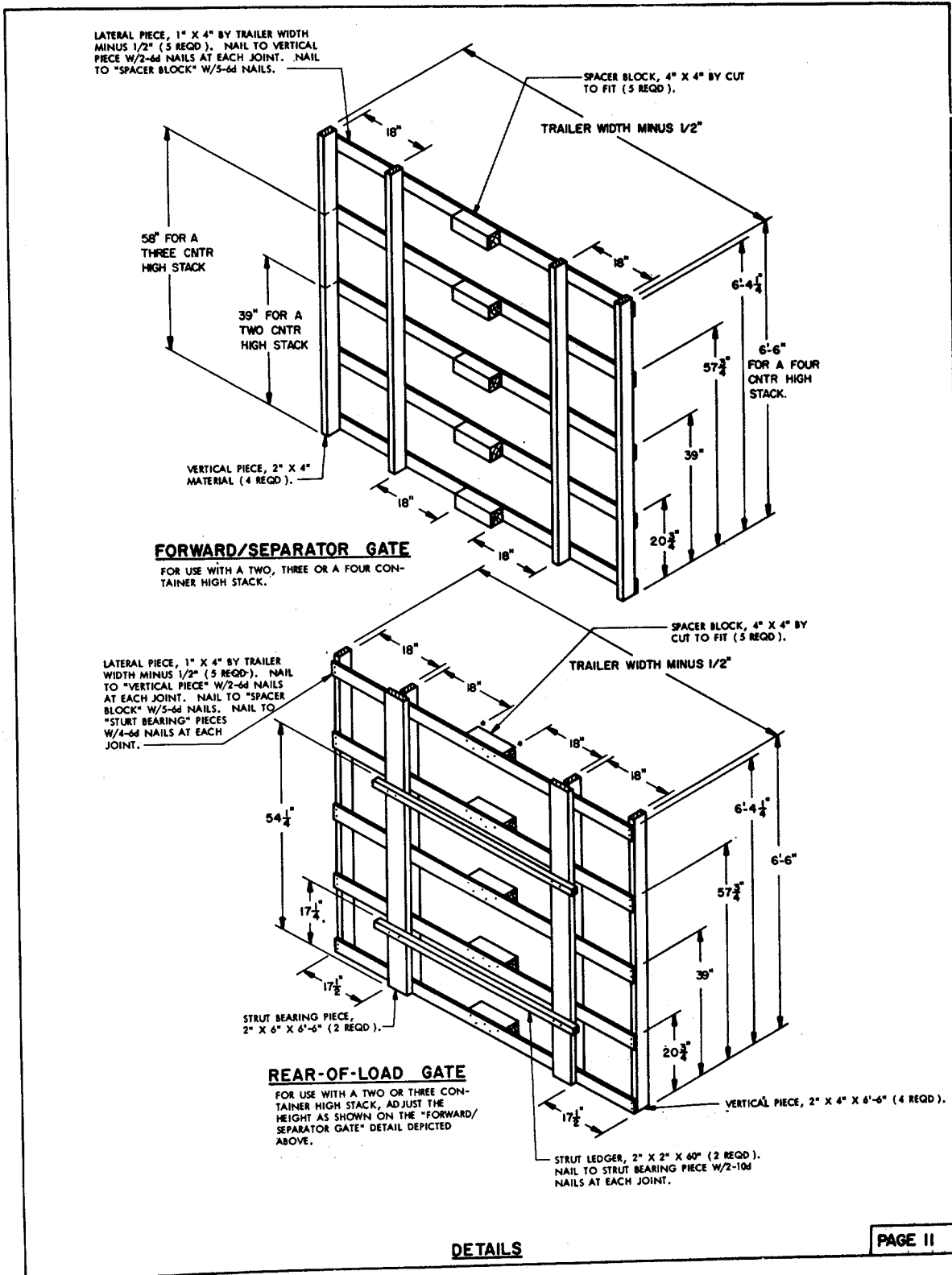
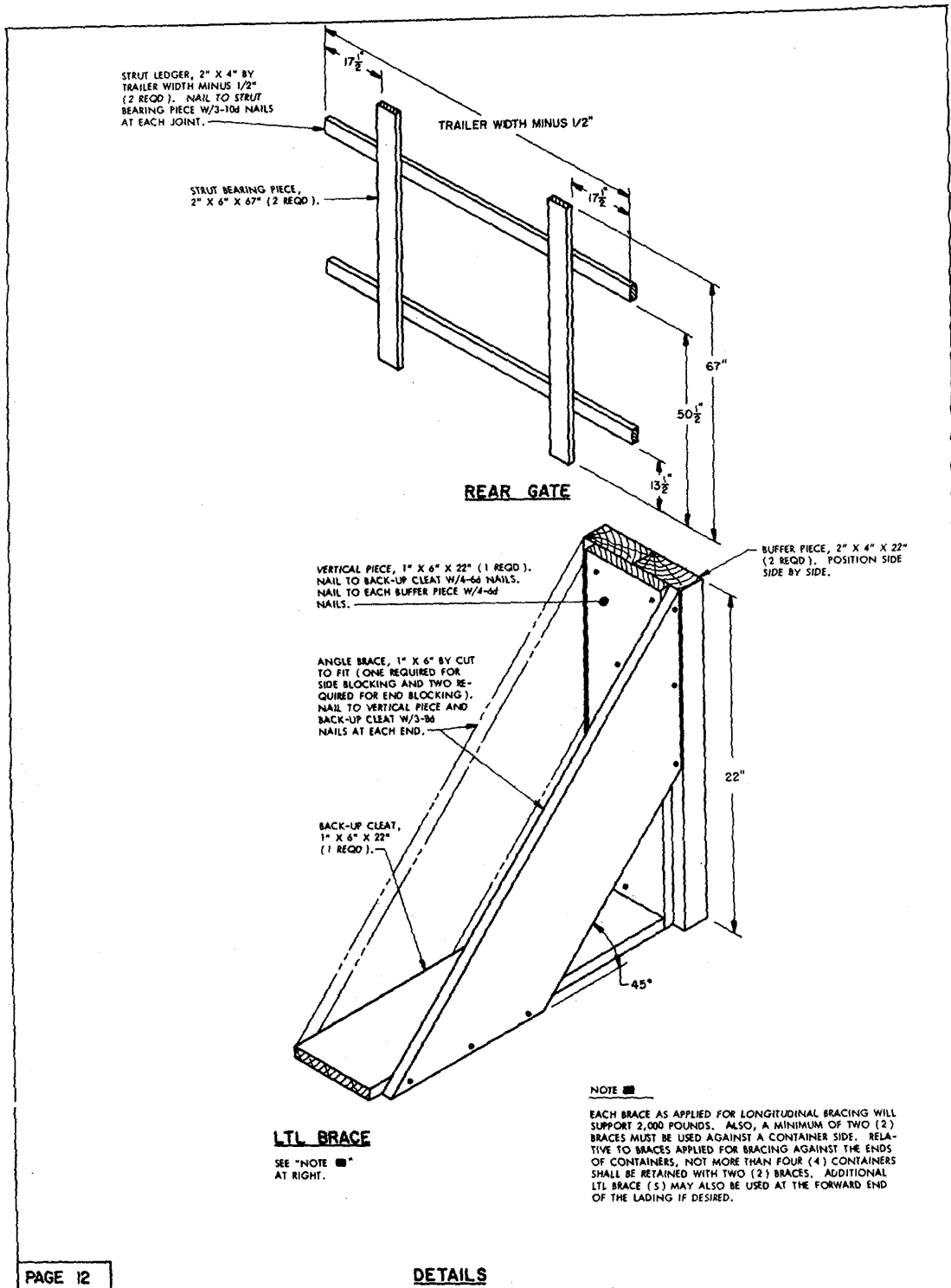
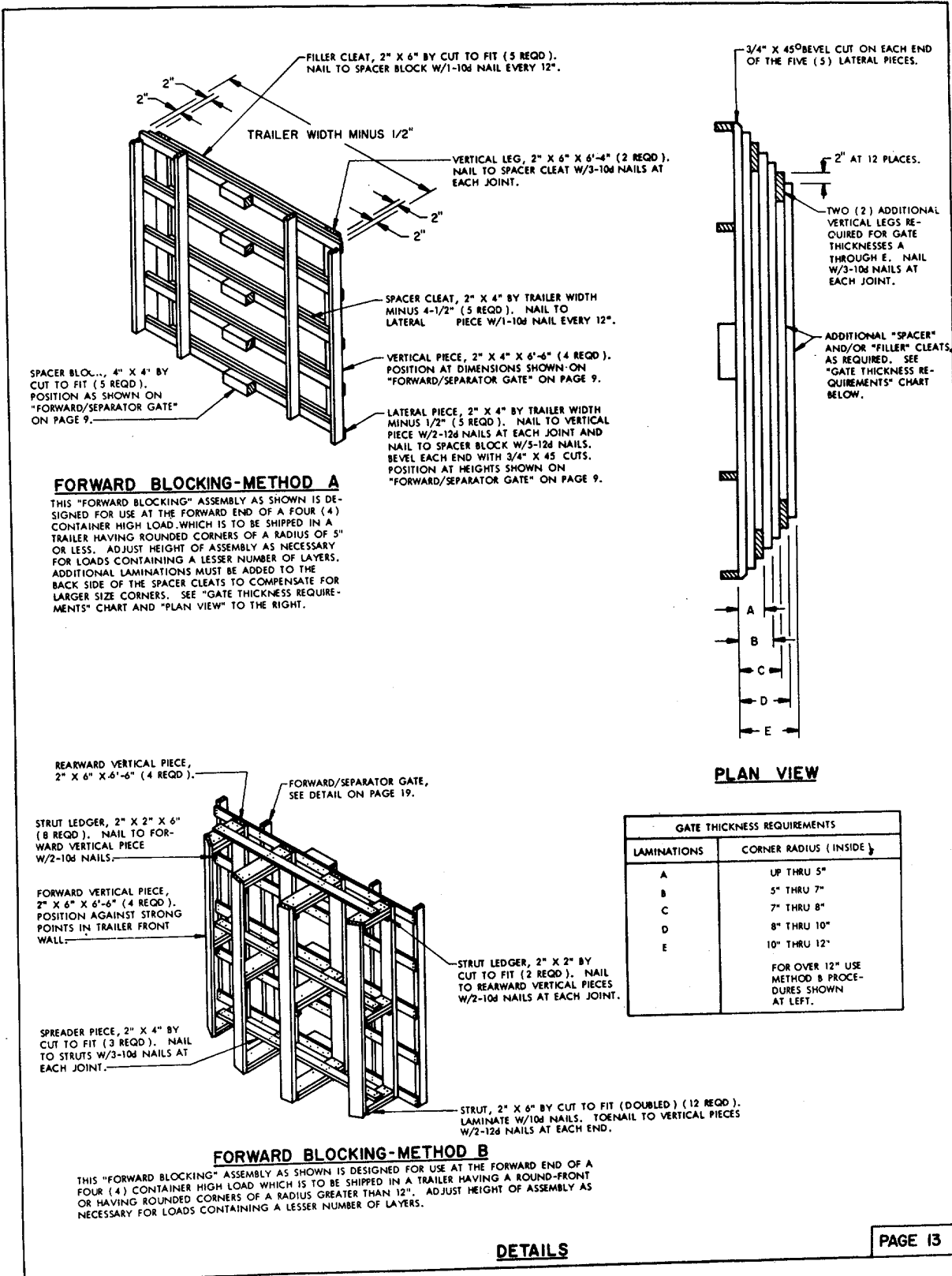


Figure 5-5-Continued. (Sheet 10 of 13.)



PROJECT GM-586-67

Figure 5-5-Continued. (Sheet 11 of 13.)



DETAILS

PAGE 13

PROJECT GM-586-67

Figure 5-5-Continued, (Sheet 12 of 13.)

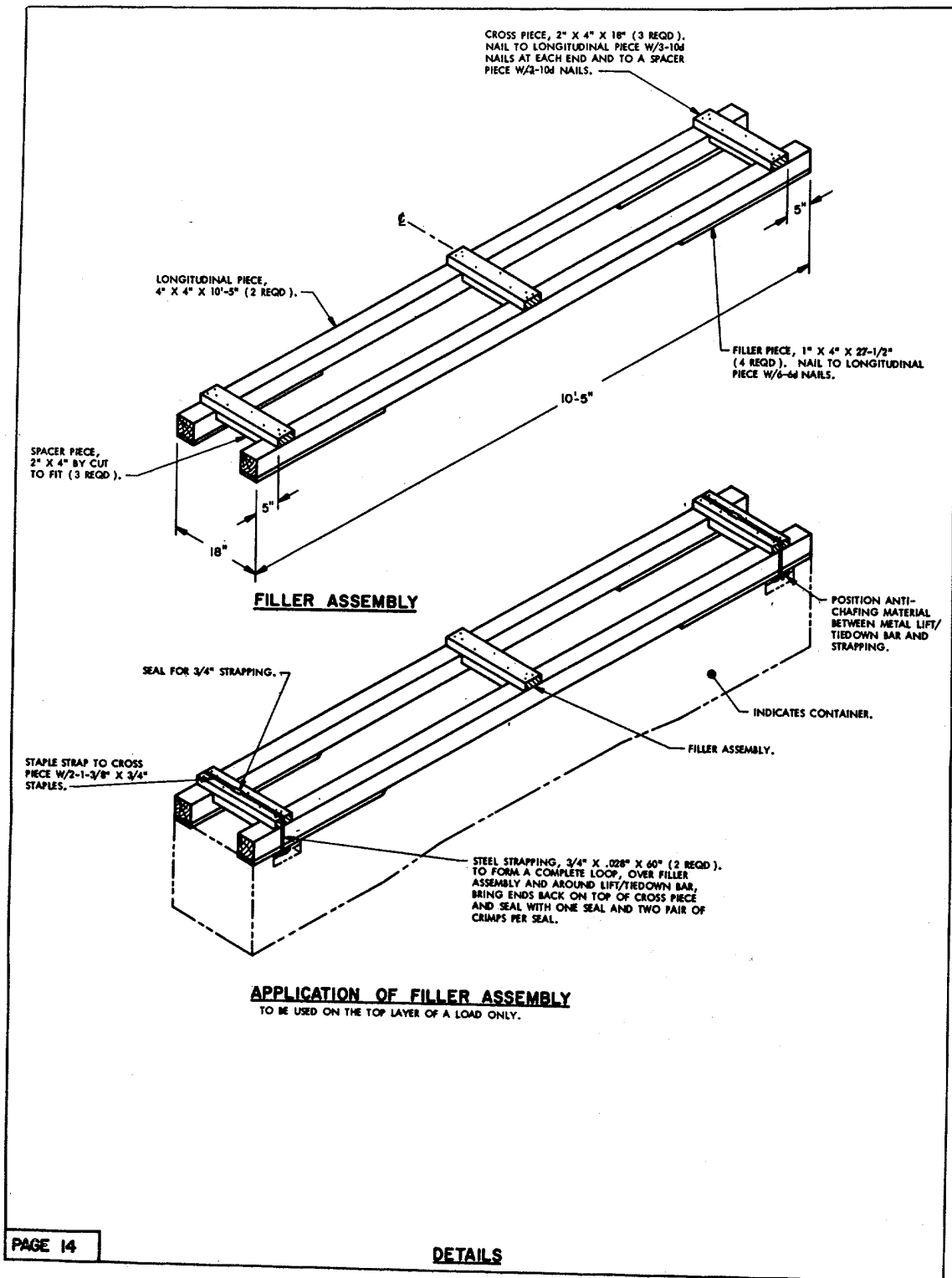


Figure 5-5-Continued. (Sheet 13 of 13.)

GENERAL NOTES

A.

B. THE OUTLOADING PROCEDURES SPECIFIED IN THIS DRAWING ARE APPLICABLE TO THE CHAPARRAL MISSILE, WHEN PACKAGED IN THE M570 SHIPPING AND STORAGE CONTAINER PALLETIZED FOUR PER PALLET UNIT. SUBSEQUENT REFERENCE TO UNIT MEANS THE PALLETIZED UNIT.

C. FOR DETAIL OF PALLET UNIT SEE USAMC DRAWING NUMBER 19-48-5235-GM20P7, AND "PALLET UNIT" VIEW ON PAGE 3.

PALLET UNIT DIMENSIONS --- 128-1/4" LONG BY 36" WIDE BY 43-3/8" HIGH (APPROX.).
 GROSS WEIGHT ----- 1,338 POUNDS (APPROX.).
 CUBE ----- 115.9 CUBIC FEET.

D. THIS ITEM IS A DOT CLASS "A" EXPLOSIVE. THE OUTLOADING PROCEDURES SPECIFIED CAN ALSO BE UTILIZED FOR THE SHIPMENT OF THE DEPICTED CONTAINERS WHEN THEY ARE EMPTY OR LOADED WITH AN ITEM WHICH IS IDENTIFIED DIFFERENTLY BY NOMENCLATURE THAN THE ITEM DESIGNATED WITHIN THE TITLE OF THIS DOCUMENT.

E. SELECTION OF A VEHICLE TO BE USED TO TRANSPORT THE DESIGNATED ITEM MUST COMPLY WITH AR 55-335, CHAPTER 213, FOR EXPLOSIVES AND OTHER DANGEROUS ARTICLES, IN FULL.

F. THE LOADS AS SHOWN ARE BASED ON 40'-0" LONG VAN TRAILERS OF ANY WIDTH, HAVING WOOD, OR WOOD AND METAL, OR METAL FLOORS, AND THEY ARE LIMITED TO HIGHWAY MOVEMENTS ONLY. THE DEPICTED LOADS ARE BASED ON TRAILERS OF THE CONVENTIONAL TYPE OR ARE BASED ON TRAILERS WHICH ARE EQUIPPED WITH VARIOUS TYPES OF SELF-CONTAINED MECHANICAL BRACING DEVICES (CROSS MEMBERS AND WALL MEMBERS).

G. IF A TRAILER BEING USED CONTAINS A MECHANICAL LOAD-BLOCKING SYSTEM WHICH CONFORMS TO SPECIFICATIONS SET FORTH WITHIN THE BUREAU OF EXPLOSIVES PAMPHLET 6C AND THE APPENDICES THERETO, THE MECHANICAL SYSTEM MAY BE USED IN ACCORDANCE WITH PROCEDURES DELINEATED ON PAGE 5 OF THIS DOCUMENT, IN LIEU OF REAR-OF-LOAD BLOCKING SPECIFIED FOR THE DEPICTED LOADS.

H. VOIDS LENGTHWISE WITHIN A LOAD MUST BE HELD TO A MINIMUM. FOR CONVENTIONAL TRAILERS, REAR BLOCKING MUST CONTACT REAR DOORS OF THE TRAILER WHEN THEY ARE CLOSED. FOR TRAILERS EQUIPPED WITH MECHANICAL BRACING DEVICES, THE CROSS MEMBERS MUST BE PLACED AGAINST THE LADING AS TIGHTLY AS THE WALL MEMBER LOCKING HOLE SPACING PERMITS. CROSS MEMBERS WILL BE INSTALLED WITH EACH END ATTACHED AS NEARLY AS POSSIBLE IN "MATED" POSITIONS (AT EQUAL HEIGHTS AND AT EQUAL DISTANCES FROM THE END OF THE TRAILER).

J. MECHANICAL CROSS MEMBERS IN EMPTY TRAILERS AND THOSE UNUSED IN LOADED TRAILERS MUST BE "SECURED" FOR SHIPMENT. COMPONENTS ASSIGNED TO EACH TRAILER MUST REMAIN THEREWITH EVEN THOUGH UNUSED DURING SOME SHIPMENTS.

K. THE GROSS WEIGHT AND AXLE DISTRIBUTION OF WEIGHT FOR A LOAD WILL BE THE RESPONSIBILITY OF THE CARRIER. THE CARRIER WILL ADVISE THE SHIPPER OF THE APPLICABLE LOADING REQUIREMENTS, AND THE SHIPPER WILL LOAD ACCORDINGLY.

L. THE NUMBER OF LADING UNITS MAY BE ADJUSTED TO FIT THE SIZE OF THE TRAILER TO BE LOADED OR THE QUANTITY TO BE SHIPPED AND COMBINATIONS OF THE OUTLOADING PROCEDURES SPECIFIED MAY BE USED. HOWEVER, THE APPROVED METHODS SHOWN MUST BE FOLLOWED AS CLOSELY AS POSSIBLE FOR BLOCKING, BRACING, AND STAYING OF THE DESIGNATED ITEMS.

M. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN A TRAILER WHICH IS PARTIALLY LOADED WITH THE DESIGNATED ITEM, 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.

(CONTINUED AT RIGHT)

MATERIAL SPECIFICATIONS

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

NAILS ----- : COMMON, CEMENT COATED OR CHEMICALLY ETCHED.
 REF: FED SPEC FF-N-105.
 ALT: ANNULAR-RING TYPE NAIL OF SAME SIZE.

STRAPPING STEEL -- : TYPE I OR IV, CLASS A, B, OR C, FED SPEC QQ-S-781.

STRAP SEAL ----- : COMMERCIAL GRADE.

(GENERAL NOTES CONTINUED)

N. **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.

O. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 1" X 4" MATERIAL IS ACTUALLY 3/4" THICK BY 3-5/8" WIDE AND 2" X 6" MATERIAL IS ACTUALLY 1-5/8" THICK BY 5-5/8" WIDE.

P. PORTIONS OF THE TRAILER BODIES DEPICTED WITHIN THIS PROCEDURAL DRAWING, SUCH AS ONE OF THE SIDE WALLS, HAVE NOT BEEN SHOWN IN THE LOAD VIEWS FOR CLARITY PURPOSES.

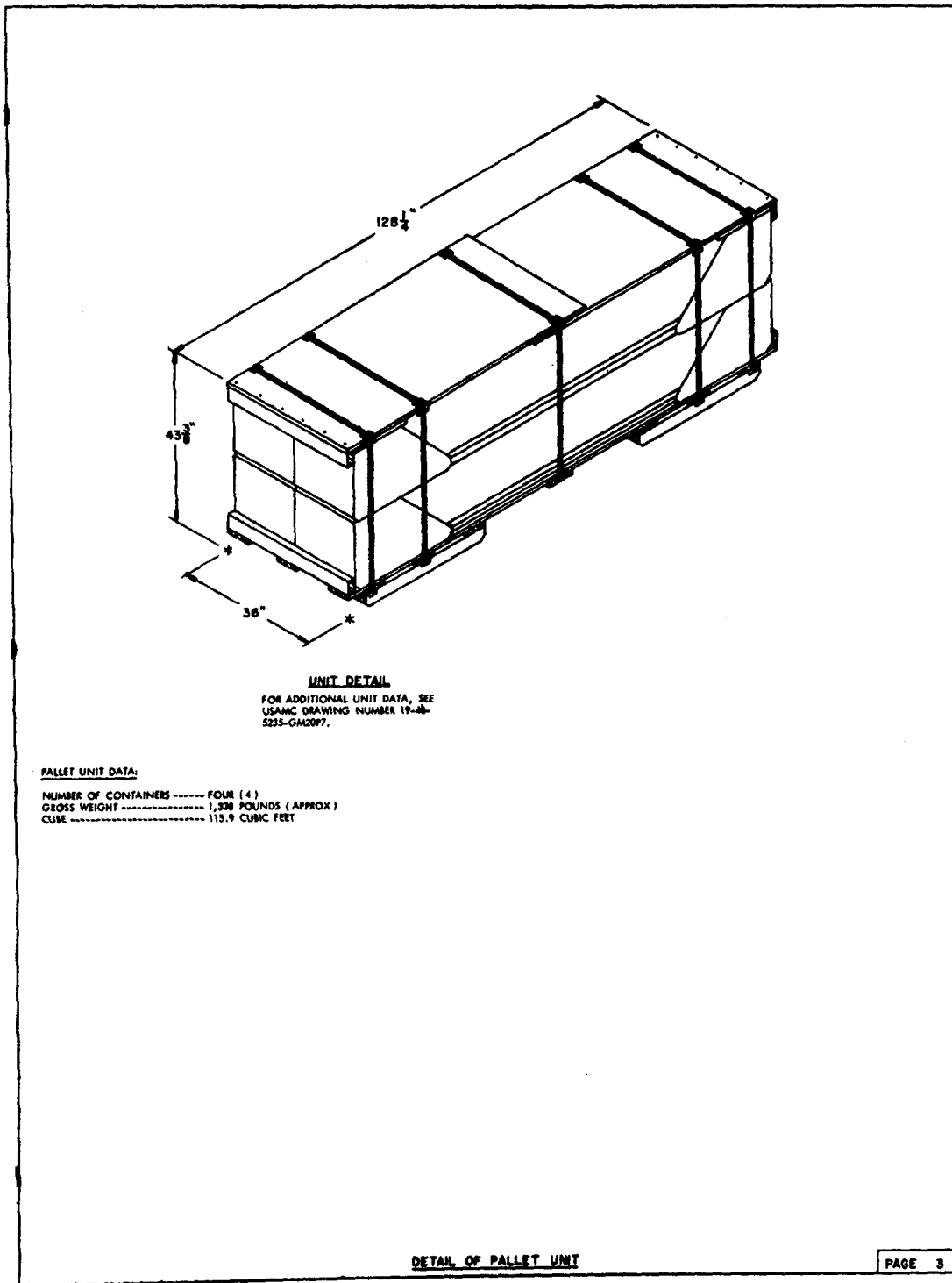
Q. WHEN ANY STRAP IS SEALED AT AN END-OVER-END LAP JOINT, A MINIMUM OF TWO (2) SEALS, BUTTED TOGETHER, WITH TWO (2) PAIRS OF CRIMPS PER SEAL MUST BE USED. CAUTION: EXERCISE CARE DURING STRAP TENSIONING TO PREVENT DAMAGE TO CONTAINERS.

R. FOR ADDITIONAL GUIDANCE, ATTENTION IS DIRECTED TO THE "SPECIAL NOTES" SECTIONS WHICH ARE IMMEDIATELY ADJACENT TO DEPICTED OUTLOADING METHODS.

PAGE 2

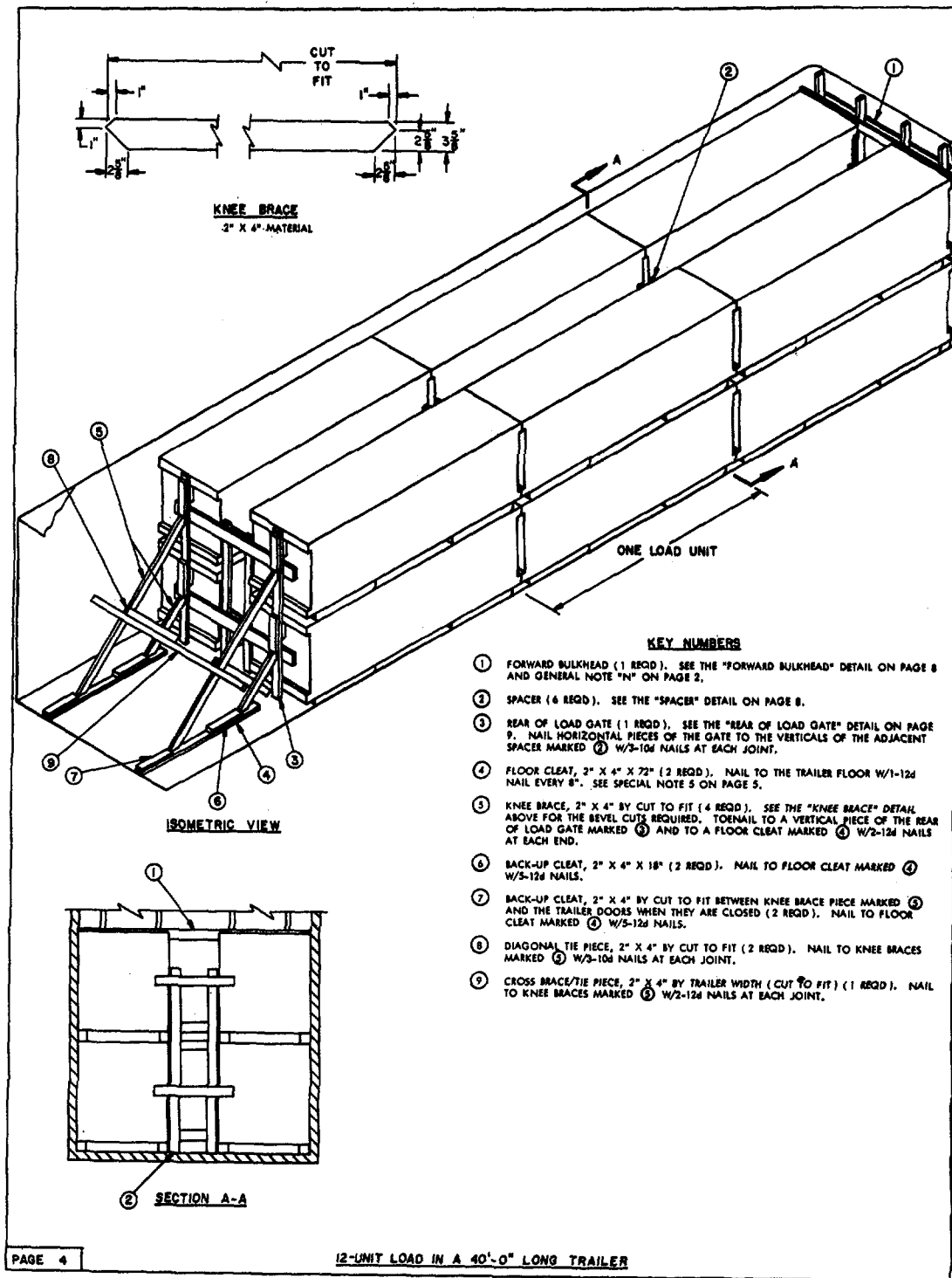
PROJECT GM 831-70

Figure 5-6. Blocking and bracing diagrams for guided missile, in M-570 container (palletized) (sheet 1 of 9).



PROJECT GM 831-70

Figure 5-6-Continued. (Sheet 2 of 9.)



PROJECT 9M 831-70

Figure 5-6-Continued. (Sheet 3 of 9.)

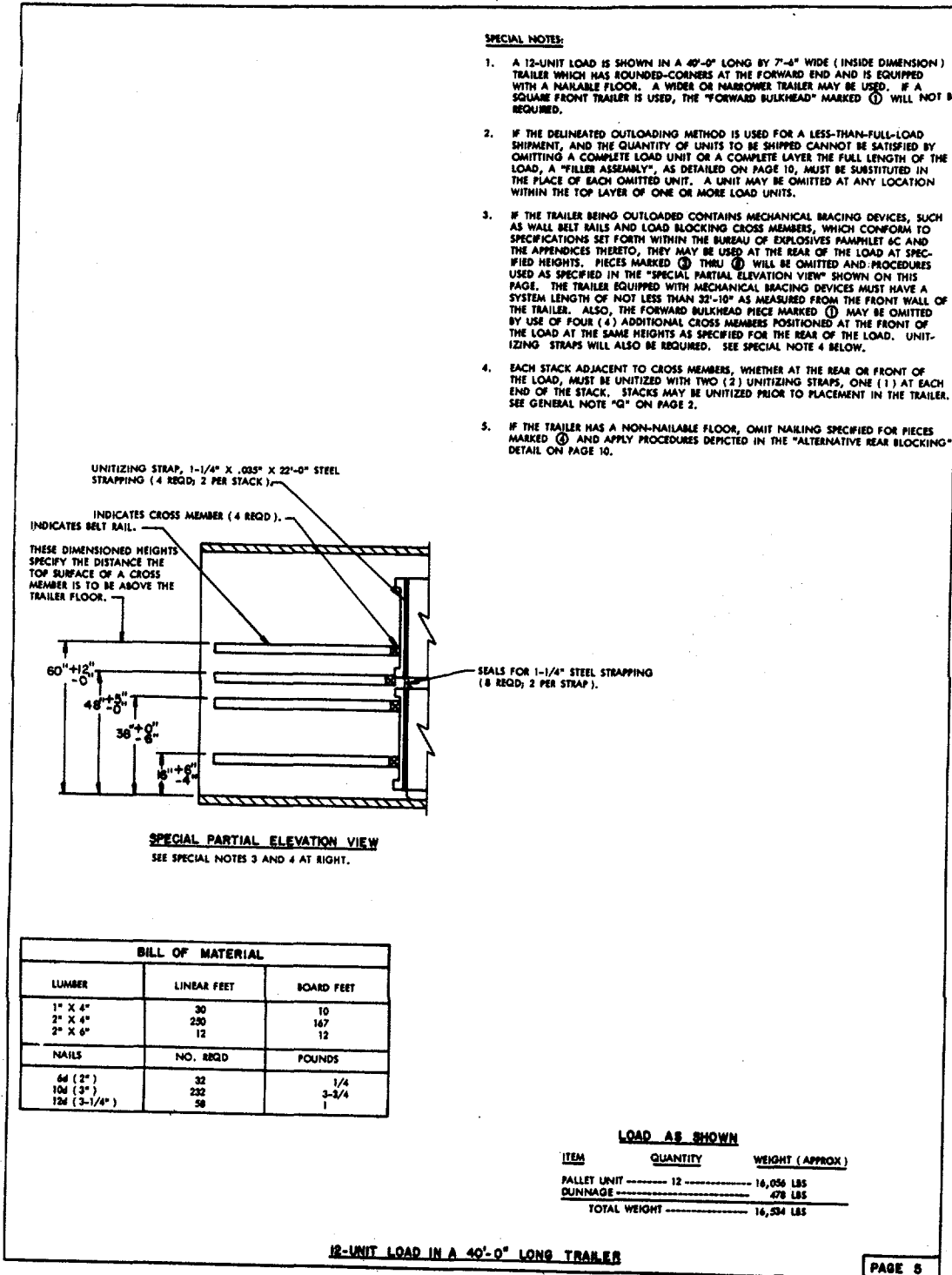
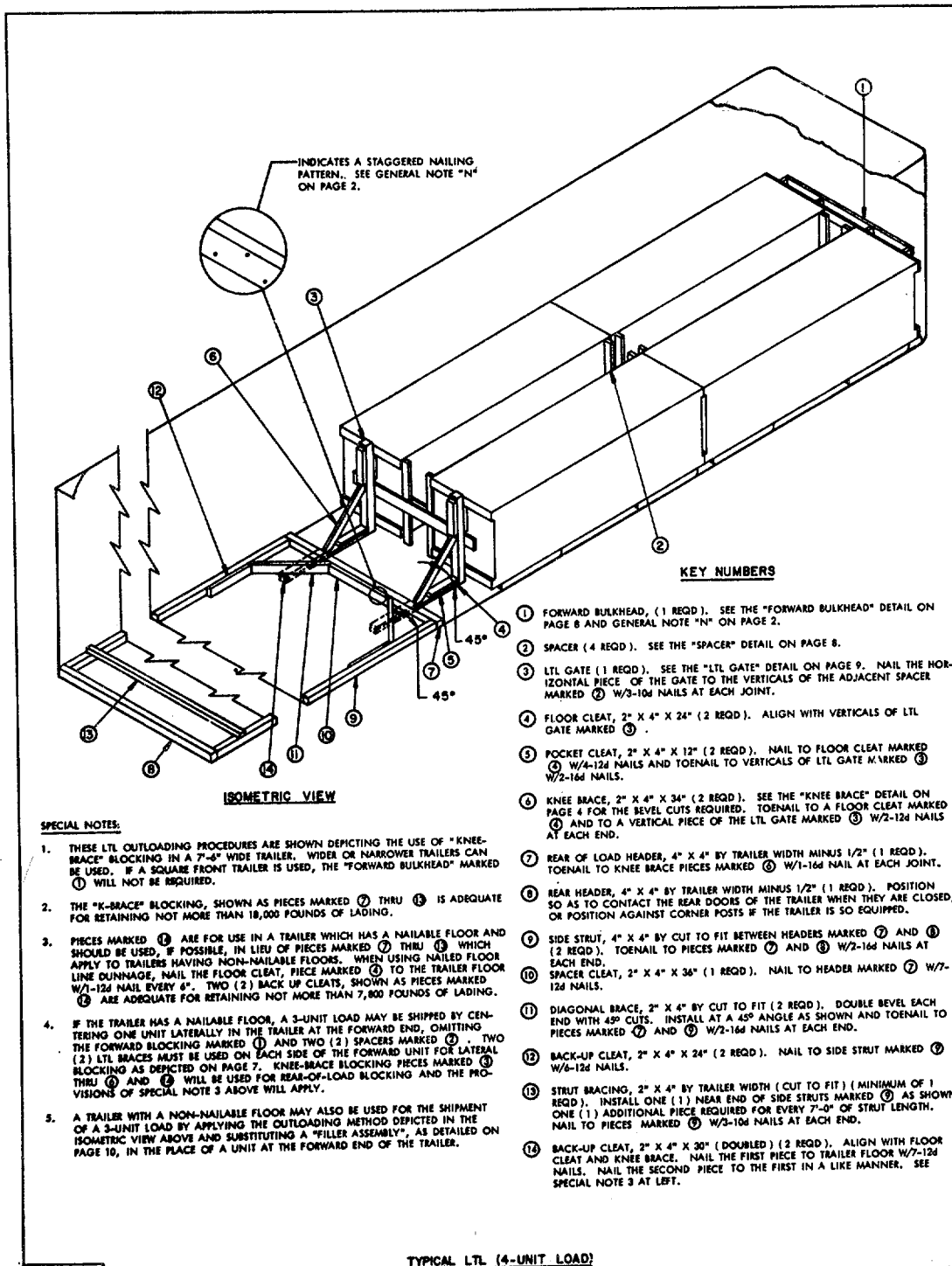


Figure 5-6-Continued. (Sheet 4 of 9.)



SPECIAL NOTES:

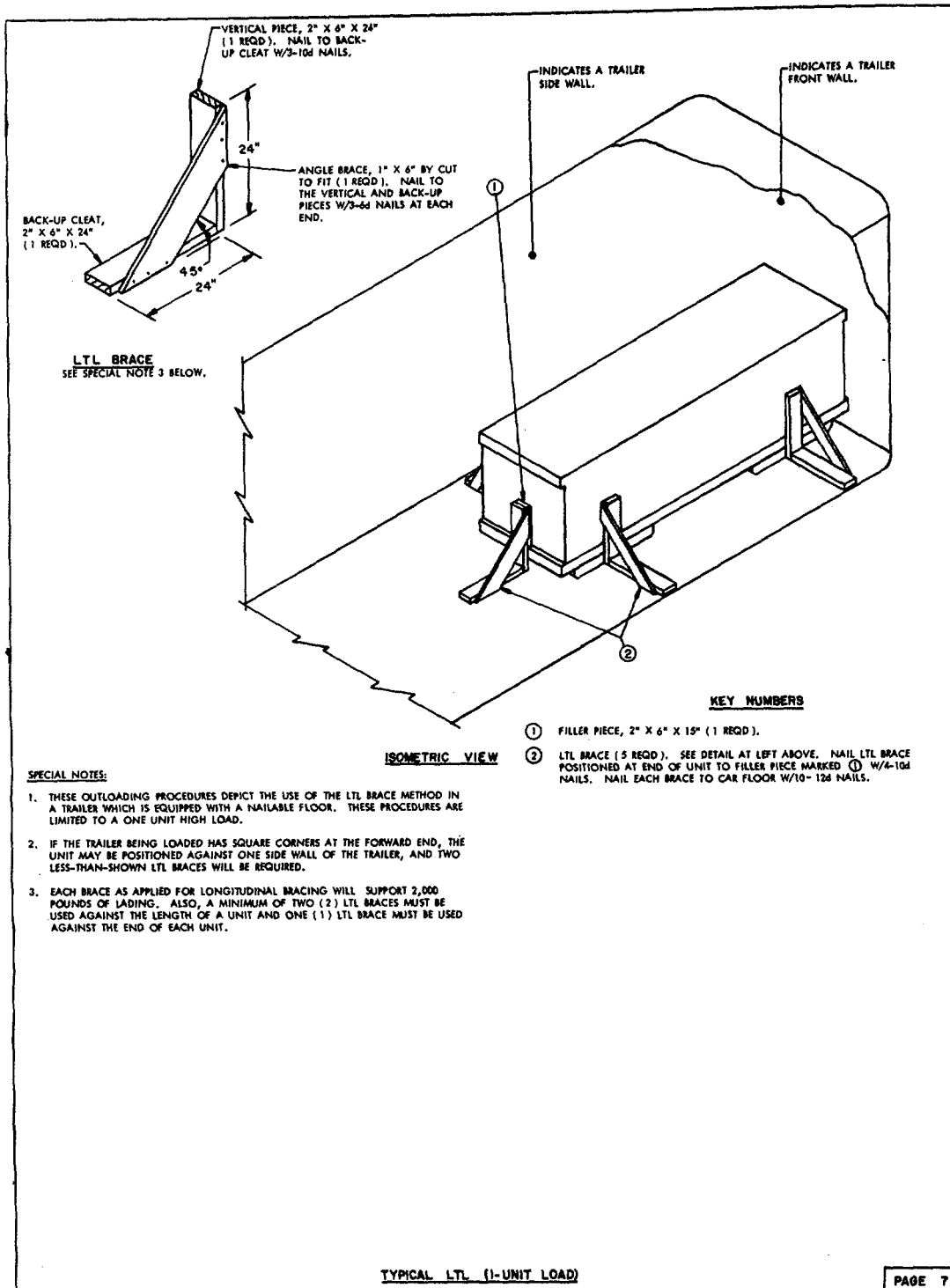
1. THESE LTL OUTLOADING PROCEDURES ARE SHOWN DEPICTING THE USE OF "KNEE-BRACE" BLOCKING IN A 7'-6" WIDE TRAILER. WIDER OR NARROWER TRAILERS CAN BE USED. IF A SQUARE FRONT TRAILER IS USED, THE "FORWARD BULKHEAD" MARKED ① WILL NOT BE REQUIRED.
2. THE "K-BRACE" BLOCKING, SHOWN AS PIECES MARKED ② THRU ⑬ IS ADEQUATE FOR RETAINING NOT MORE THAN 18,000 POUNDS OF LADING.
3. PIECES MARKED ⑭ ARE FOR USE IN A TRAILER WHICH HAS A NAILABLE FLOOR AND SHOULD BE USED, IF POSSIBLE, IN LIEU OF PIECES MARKED ⑦ THRU ⑩ WHICH APPLY TO TRAILERS HAVING NON-NAILABLE FLOORS. WHEN USING NAILABLE FLOOR LINE DUNNAGE, NAIL THE FLOOR CLEAT, PIECE MARKED ④ TO THE TRAILER FLOOR W/7-12d NAIL EVERY 4". TWO (2) BACK UP CLEATS, SHOWN AS PIECES MARKED ⑫ ARE ADEQUATE FOR RETAINING NOT MORE THAN 7,800 POUNDS OF LADING.
4. IF THE TRAILER HAS A NAILABLE FLOOR, A 3-UNIT LOAD MAY BE SHIPPED BY CENTERING ONE UNIT Laterally IN THE TRAILER AT THE FORWARD END, OMITTING THE FORWARD BLOCKING MARKED ① AND TWO (2) SPACERS MARKED ②. TWO (2) LTL BRACES MUST BE USED ON EACH SIDE OF THE FORWARD UNIT FOR LATERAL BLOCKING AS DEPICTED ON PAGE 7. KNEE-BRACE BLOCKING PIECES MARKED ③ THRU ⑫ AND ⑭ WILL BE USED FOR REAR-OF-LOAD BLOCKING AND THE PROVISIONS OF SPECIAL NOTE 3 ABOVE WILL APPLY.
5. A TRAILER WITH A NON-NAILABLE FLOOR MAY ALSO BE USED FOR THE SHIPMENT OF A 3-UNIT LOAD BY APPLYING THE OUTLOADING METHOD DEPICTED IN THE ISOMETRIC VIEW ABOVE AND SUBSTITUTING A "FILLER ASSEMBLY", AS DETAILED ON PAGE 10, IN THE PLACE OF A UNIT AT THE FORWARD END OF THE TRAILER.

PAGE 6

TYPICAL LTL (4-UNIT LOAD)

PROJECT 9M 631-70

Figure 5-6-Continued. (Sheet 5 of 9.)



PROJECT 9M 631-70

Figure 5-6-Continued. (Sheet 6 of 9.)

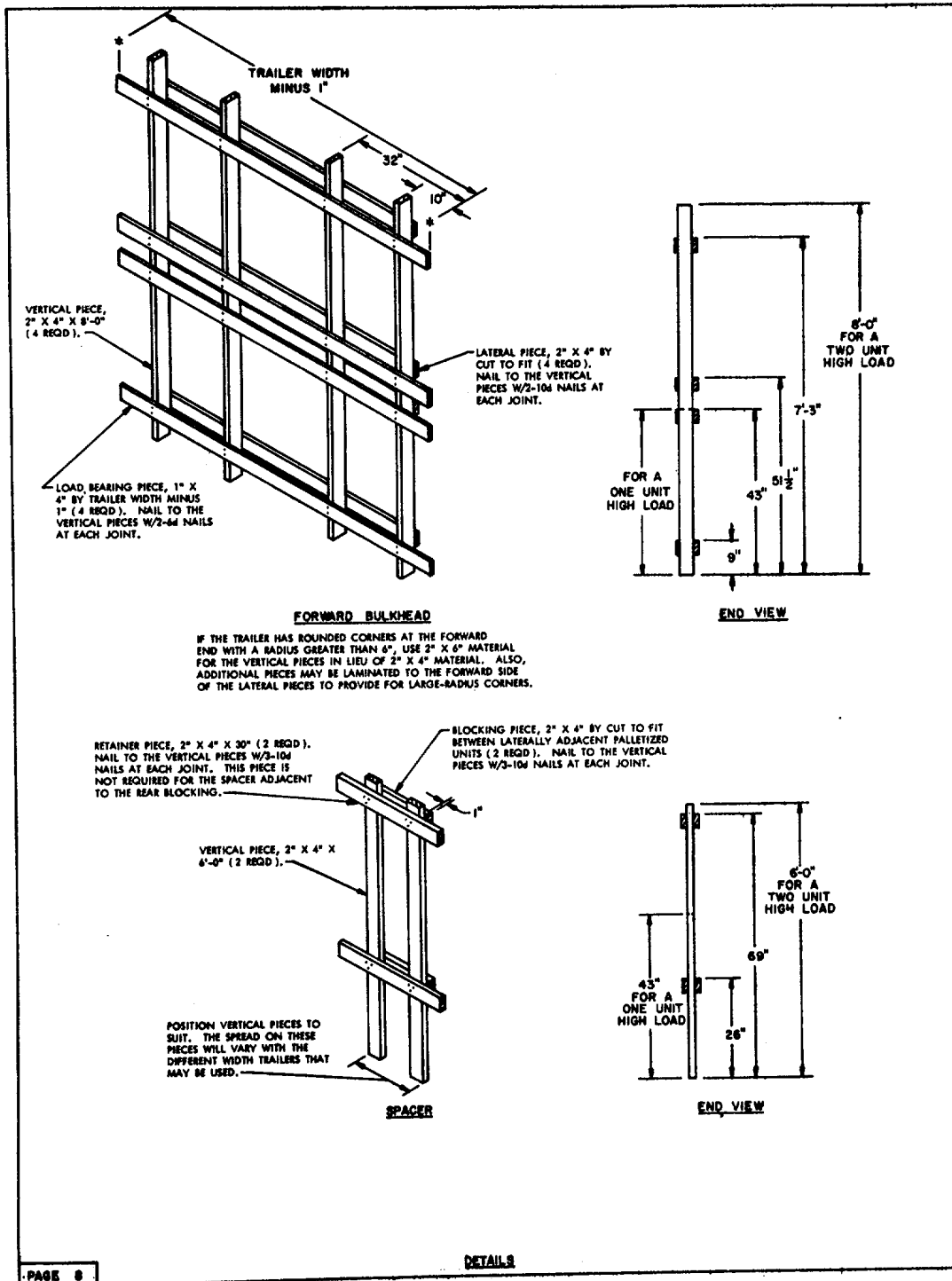
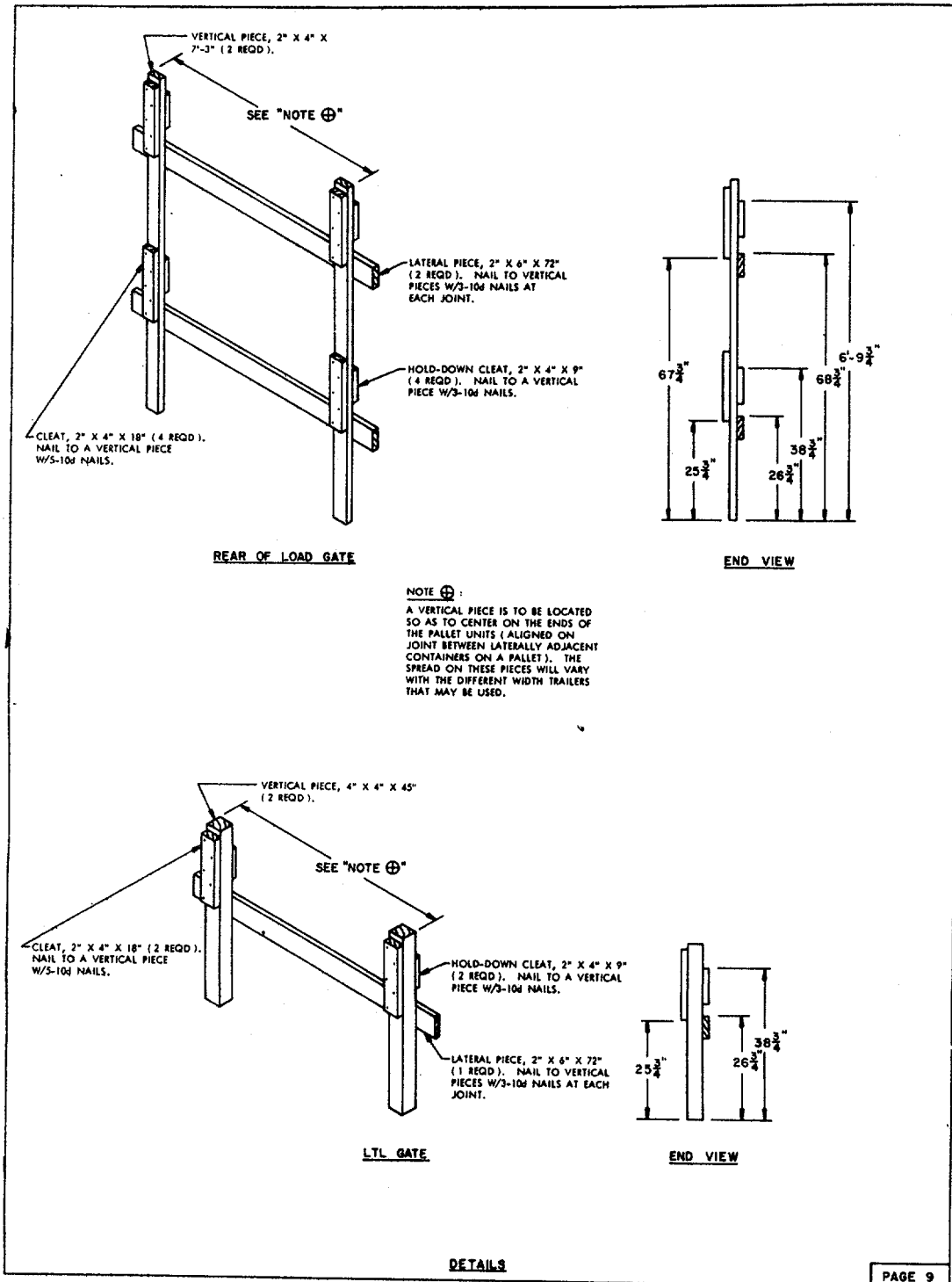
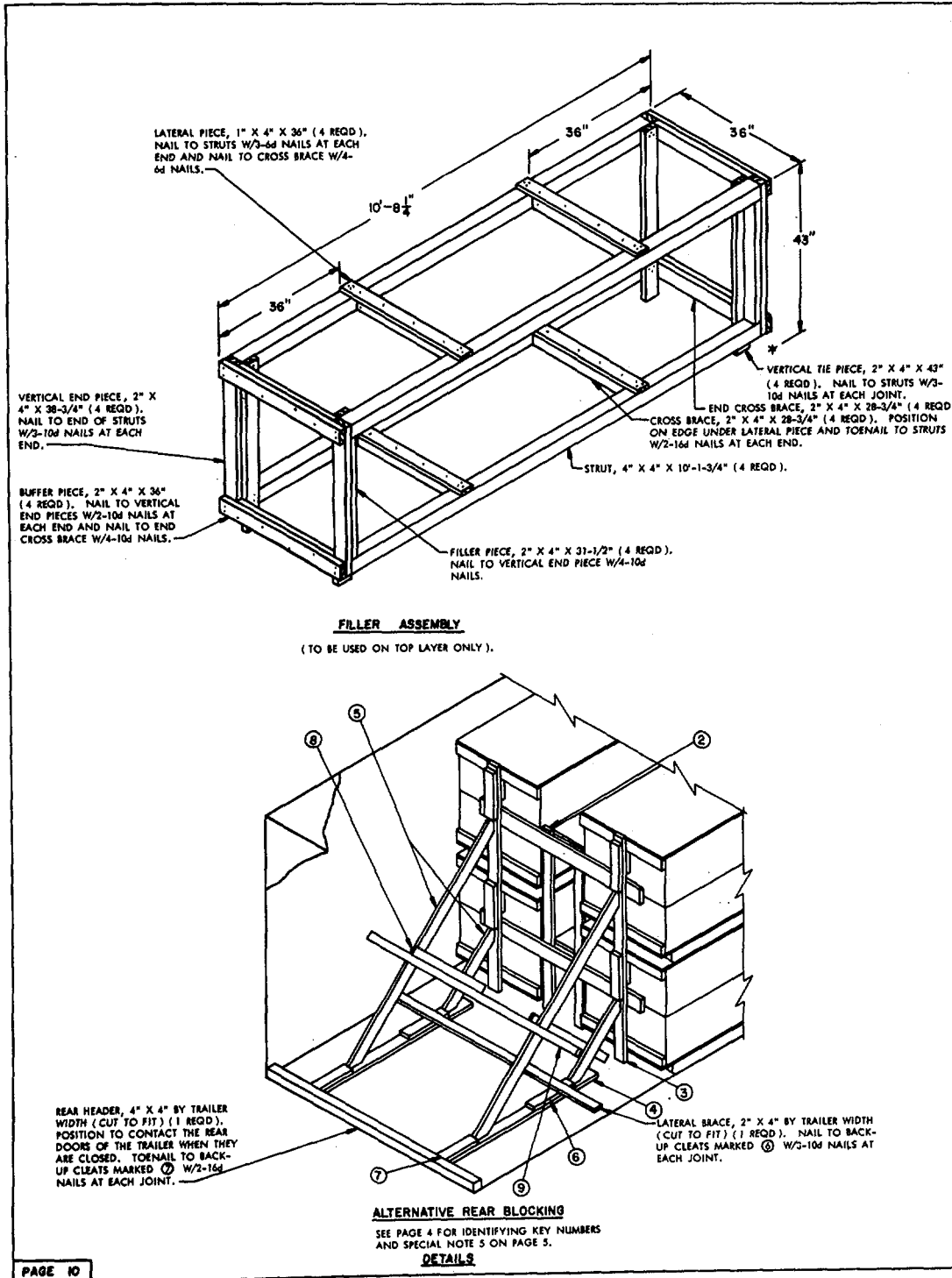


Figure 5-6-Continued. (Sheet 7 of 9.)



PROJECT GM 631-70

Figure 5-6-Continued. (Sheet 8 of 9.)



PAGE 10

PROJECT 9M 631-70

Figure 5-6-Continued. (Sheet 9 of 9.)

CHAPTER 6

MARINE AND TERMINAL TRANSPORTABILITY GUIDANCE

Section I. GENERAL

6-1. Scope

This chapter provides marine and terminal transportability guidance for movement of the Chaparral guided missile system. It covers significant technical and physical characteristics and prescribes the materials and guidance required to prepare, load, and off-load the items.

Note 1.

The methods described in this chapter for lifting and securing items are suggested procedures. Other methods of handling and stowage may be used, providing they will insure safe delivery without damage. 2. The M-54 and M730 are shipped as one unit (M48) in cargo vessels.

6-2. Dimensional Data and Weight for Marine Shipment

a. Guided missile system, intercept-aerial, carrier-mounted, M48.

Measurements:

- Length 229.9 in. (5.84 m)
- Width..... 105.8 in. (2.69 m)
- Height..... 114.0 in. (2.90 m)
- Volume 1,579.1 cu ft (44.69 cu m)

Weight 23,776 lb (1,078 kg)

b. Crated AN/TSM-95.

Measurements:

- Length 178.0 in. (4.52 m)
- Width..... 83.0 in. (2.11 m)
- Height..... 87.0 in. (2.21 m)
- Volume 743.8 cu ft (21.05 cu m)

Weight 4,970 lb (2,254 kg)

c. Crated AN/TSM-96.

Measurements:

- Length 197.4 in. (5.01 m)
- Width 90.9 in. (2.31 m)
- Height 95.3 in. (2.42 m)
- Volume 989.6 cu ft (28.00 cu m)
- Weight 7,551 lb (3,425 kg)

d. Palletized guided missile, intercept-aerial, MIM-72A or MIM-72B in M-570 container.

Measurements:

- Length 128.3 in. (3.26 m)
- Width 36.0 in. (0.91 m)
- Height 43.4 in. (1.10 m)
- Volume 116 cu ft (3.28 cu m)
- Weight (approximately) 1,338 lb (607 kg)

Section II. LOADING AND SECURING

6-3. General Rules for Stowing Tracked Vehicles and Large Boxed or Crated Heavy Equipment

a. Whenever possible, vehicles should receive the protection of below-deck stowage. In general good stowage of vehicles means placing them fore and aft, 4 to 6 inches apart, with similar space between outer vehicles and the sweatboards; protecting breakable parts and noting the disposition of spare parts, usually within or near the vehicles; stowing vehicles in neutral, with brakes on, the battery terminals disconnected, and gasoline drained; and securing them by adequate chocking and lashing. Securing includes chocking the tracks on all four sides so that the vehicle cannot move in any direction; bracing individual vehicle chocks to bulkheads, stanchions, and other vehicle chocks; and lashing the vehicle with wire rope or chain.

Note.

When vehicles are loaded on vessels which are adequately ventilated by power blowers, such as the roll-on/roll-off vessels, gasoline need not be drained from gas tanks.

b. Vehicles should be loaded on vessels in their minimum configuration; that is, reduced height, with or without cargo. The vehicles can be loaded onto landing craft, beach discharge and amphibious lighters, and landing ship tanks under their own power or by crane of adequate capacity. The vehicles can also be loaded under their own power onto the deck of barges from piers when tidal conditions are suitable and ramps are available. The vehicles can be loaded onto seagoing vessels by shore-side or floating cranes of adequate capacity. Jumbo booms and heavy-lift ships' gear

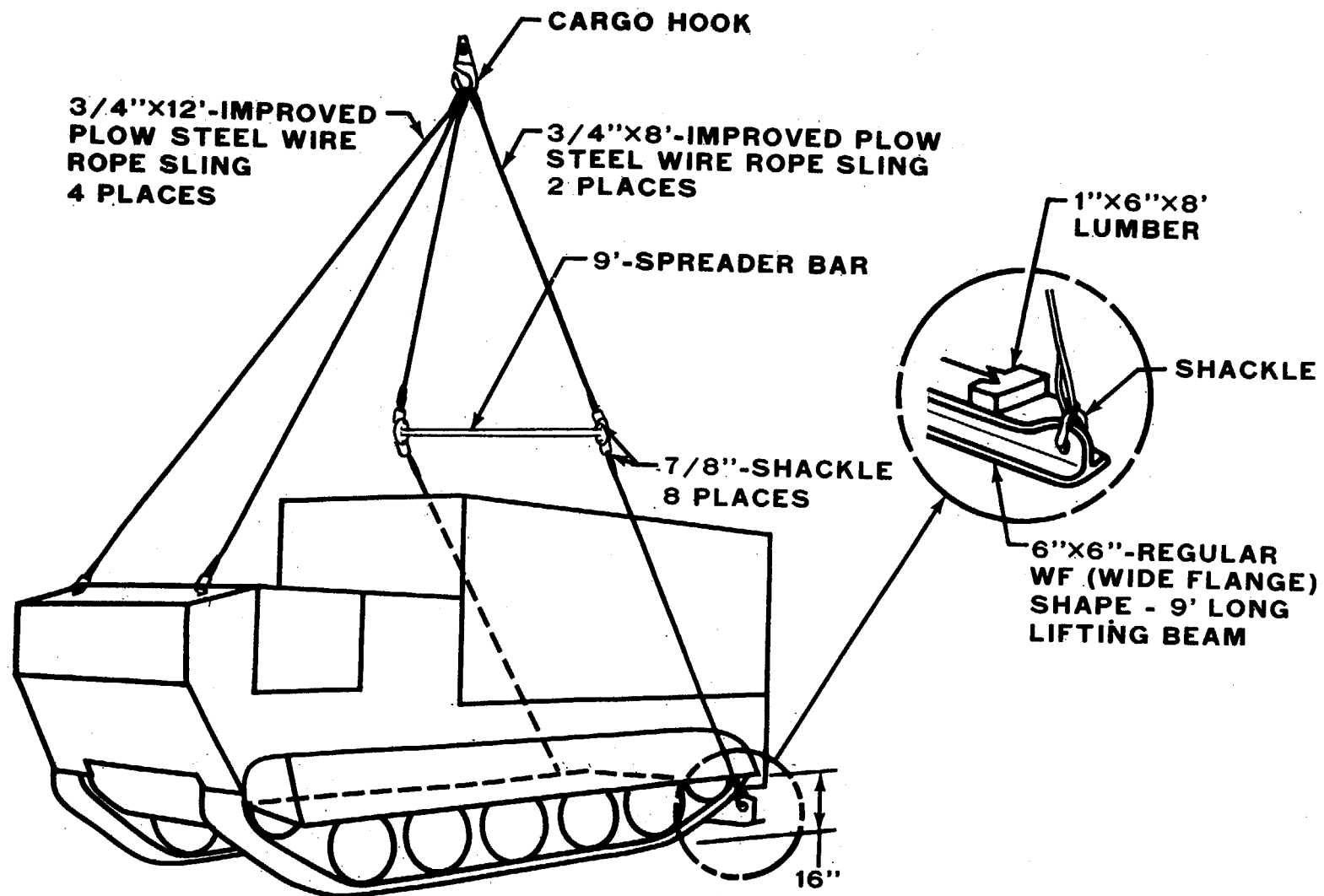


Figure 6-1. Lifting diagram for M48 using lifting beam and wire-rope with spreader bar.

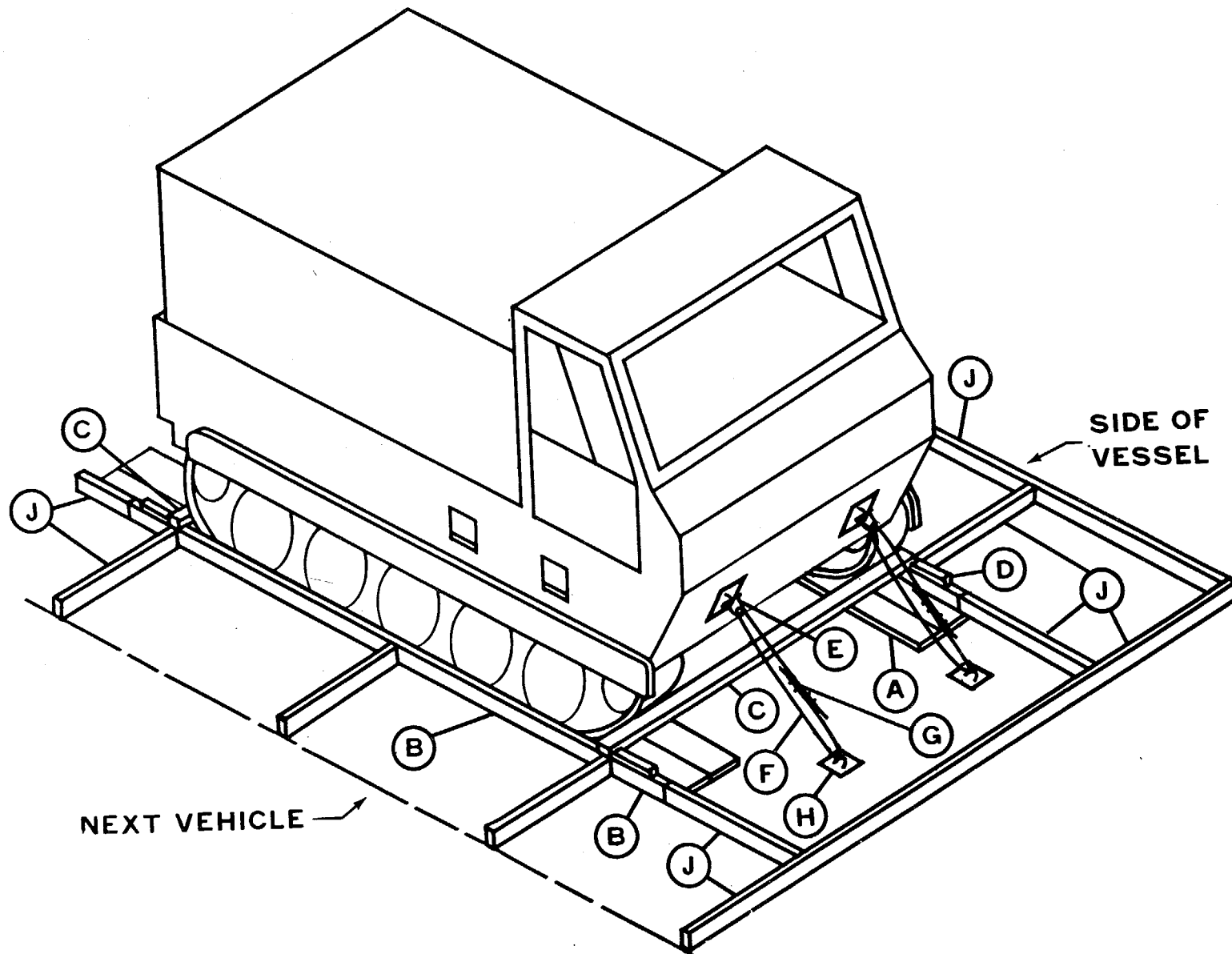


Figure 6-2. Blocking and tiedown of M48 in hold of general cargo vessel.

may be used in loading vehicles onto vessels. The vehicles can, under their own power or towed, be loaded on roll-on/roll-off vessels. For typical lifting diagram, see figure -6-1. Figure 6-2 shows the method for blocking and tying down the M48 in holds of general cargo vessels.

c. Boxed or crated heavy or large equipment is blocked, braced, shored, lashed, and tommed as required to prevent movement. When loading a full hold of large heavy pieces it is advantageous to leave wire slings attached to the last piece loaded for ease in unloading.

6-4. Safety

In addition to the safety precautions contained in chapter 3, the following areas should be noted as applicable:

a. The activity offering the vehicles for transport will notify the carrier in the event ammunition or explosives are to be transported with the vehicles, and compliance with AR 55-228, paragraph 2-7 is mandatory.

b. Vehicles shipped with ammunition will be loaded and secured in accordance with Water Carrier Tariff No. 24.

c. Fire extinguishers must be available during all loading and off-loading operations.

Table 6-1. Bill of Material for Blocking and Tiedown of M48 in General Cargo Vessels (fig 6-2)

| Term | Description | Approximate quantity |
|-----------|--|----------------------|
| Lumber | Douglas-fir, or comparable lumber, straight-grain, free from material defects, Fed Spec MM-I-751c: | |
| | 2 X 4 in.----- | 4 linear ft |
| | 2 X 12 in.----- | 70 linear ft |
| | 4 X 6 in ----- | 150 linear ft |
| Nails | Common, steel; flathead; bright or cement-coated; table X1-b, Fed Spec FF-N-105a; size: 20d ----- | 20 |
| | 40d ----- | 116 |
| Wire rope | 6 X 19; IWRC, improved plow steel; preformed; regular-lay; table X, Fed Spec RR-W-410a; 5/8-in.:----- | 60 ft |
| Clamps | Wire-rope, "U"-bolt clips, saddled, single-grip, steel, Crosby heavy-duty (or equal), Mil Std 16842; 5/8-in.:----- | 16 |
| Clevis | Assembly suspension (shackles), bolt and nut type, large, FSN 1670-090-5354, or equal (for front and rear towing and tiedown provisions) ----- | 4 |

Table 6-2. Application of Materials for Blocking and Tiedown of the M48 in Hold of General Cargo Vessel (fig 6-2)

| Item | No. required | Application |
|------|--------------|--|
| A | 4 | Bearing pieces, 2- X 12-in. X length-to-suit lumber to extend 12 in. beyond ends of tracks. Pre-position on vessel hold floor. Two pieces required under tracks on each side of vehicle. |
| B | 2 | Side blocking, 4- X 6- X 228-in. lumber. Locate one piece against tracks on each side of vehicle. |
| C | 2 | End blocking, 4- X 6- X 112-in. lumber. Locate at front and rear of vehicle against tracks on top of item B. Toenail to item B at each location with four 40d nails. |
| D | 4 | Backup cleat, 2- X 4- X 12-in. lumber. Locate on top of item B against item C. Nail to item B with five 20d nails. |
| E | 4 | Clevis (shackles) (see bill of material). Secure one shackle at each towing lug (two at front and two at rear end of vehicle). |
| F | 4 | Wire rope, 5/8-in., in a complete loop. Secured by clips (item G). Attach to front and rear shackles and padeyes. |
| G | 16 | Clamps, 5/8-in., wire-rope, "U"-bolt clips. Used to secure item F in complete loop. |
| H | 4 | Padeye, four required on floor of vessel. |
| J | as required | Bracing, 4- X 6-in. X length-to-suit. Brace as required against vehicle blocking, side of vessel, or adjacent cargo blocking to immobilize vehicle and blocking. Secure each end to adjacent bracing or blocking detail by toenailing with four 40d nails. |

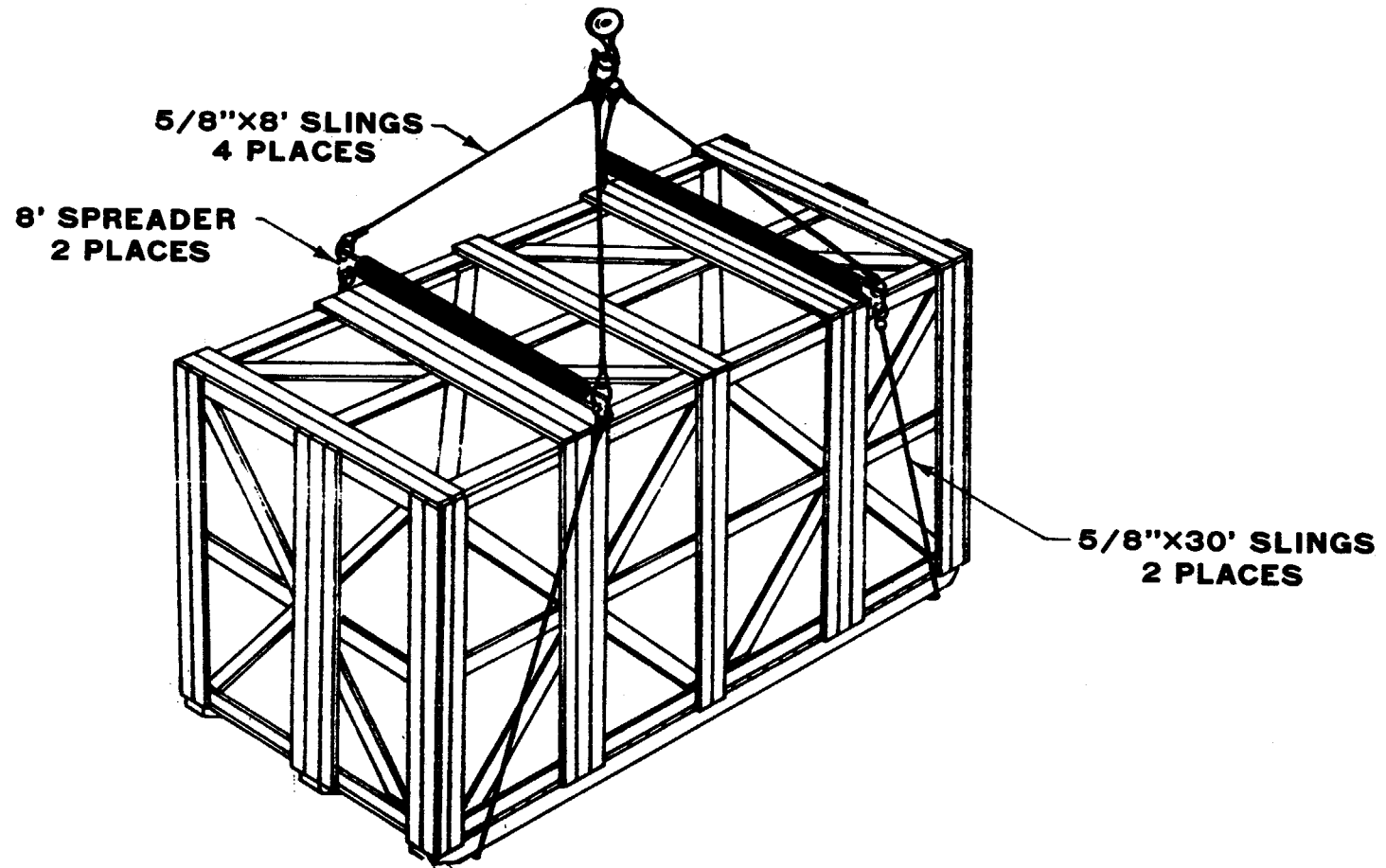


Figure 6-3. Lifting diagram for crated AN/TSM-95 or AN/TSM-96 using wire-rope slings with spreader bars.

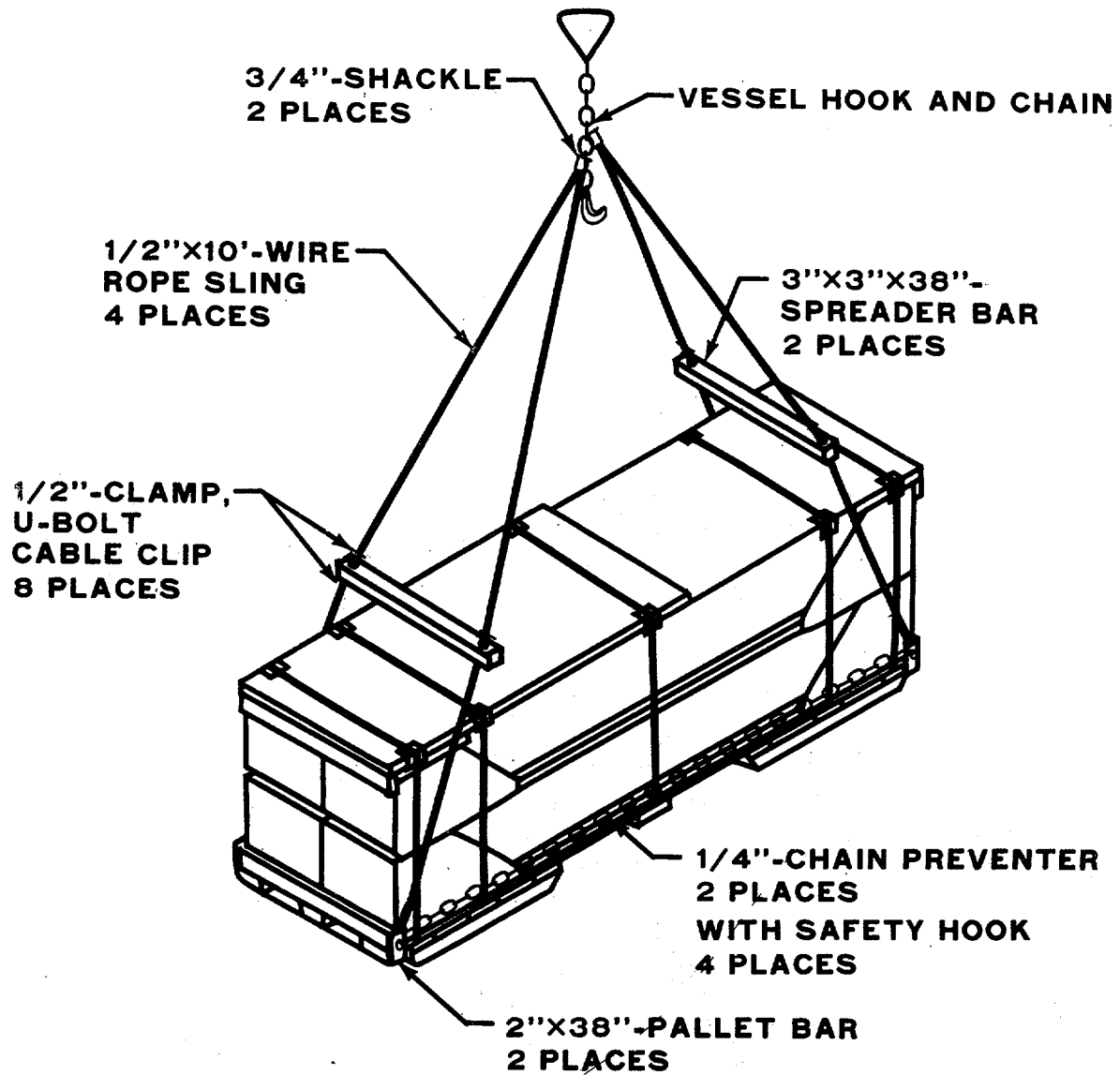


Figure 6-4. Lifting diagram for palletized load of four MIM-72A or MIM-72B missiles in M-570 containers.

CHAPTER 7

RAIL TRANSPORTABILITY GUIDANCE

Section I. GENERAL

7-1. Scope

This chapter provides rail transportability guidance for movement of the Chaparral guided missile system. It covers significant technical and physical characteristics and prescribes the materials and guidance required to prepare, load, tie down, and off-load the items.

Dimensional and weight data are located in the General Notes figures 7-1 through 7-5.

7-2. Maximum Utilization of Railcars

Additional cargo, as approved by the activity offering the items for transport, may be transported with the items.

Section II. TRANSPORT ON CONUS RAILWAYS.

7-3. General

The transportability guidance contained in this section is applicable when the items are transported on CONUS railways. Consideration is given to single and multiple movements on the types of railcars normally used for the movement of these items. All items when loaded on suitable railcars can be transported without sectionalization or major disassembly within the Association of American Railroads Outline Diagram for Single Loads, Without End Overhang, or Open Top Cars as shown in both the Railway Line Clearance Publication and the Official Railway Equipment Register.

code number issued by the AAR to the manufacturer or distributor Banding (strapping) that does not contain the above information will not be accepted by US railroads for securing loads on open-top cars after 1 April 1972.

7-4. Preparation of Items

The degree of preparation for the items prior to being transported by railcar is dependent upon the operational commitment.

7-6. Transport on General-Purpose Flatcars and Boxcars

The number of units to be loaded on a car will be dependent on the size of the car used and the quantities or assortment of units to be shipped with view of full utilization of carrier equipment.

7-5. Loading

a. The M-54, AN/TSM-95, AN-TSM-96, M48, and M730 may be placed in the tiedown position on the railcar by a cranes or the M48 and 7530 may be driven or towed onto a railcar provided a suitable ramp or bridge is available.

b. The MIM-72A or MIM-72B in M-570 container may be loaded into boxcars by the aid of forklift trucks.

c. After loading and placement of M48 or M730 at the tiedown position, handbrakes on vehicles must not be set on G-85 or G-89 cushioned rubrail cars. They may be set on all other types of flatcars. Gearshift levers for automatic or conventional transmissions must be placed and wiretied in neutral position when item is loaded on all types of railcars.

Note

The following figures were extracted from US Army Material Command missile drawings. References to page numbers in the notes within the figures refer to the number listed in the lower right or left-hand corner of each figure.

Note

A staggered nailing pattern will be used when lumber is nailed to the floor of the railcar, or when laminating lumber. Additionally, the nailing pattern for an upper piece of laminated lumber will be adjusted as required so that a nail for that piece will not be driven through, onto, or right beside a nail. in the lower piece of lumber.

Note

AAR loading rules require that high tension banding used for the purpose of securing loads to open-top railcars must bear the name of the manufacturer and/ or distributor, the letters "AAR," and a specific

Note

The preferred method for loading the M-54 on railroad flatcars is uncrated and mounted on skid base, as shown in figure 7-2 sheet 3.

GENERAL NOTES

(GENERAL NOTES CONTINUED)

- A.
- B. THE UNLOADING PROCEDURES SPECIFIED HEREIN ARE APPLICABLE TO SHIPMENTS LOADED WITHIN VARIOUS SIZES OF RAIL CARS, AND ARE FOR THE CHAPARRAL MISSILE WHEN PACKAGED IN THE M570 SHIPPING AND STORAGE CONTAINER. SUBSEQUENT REFERENCE TO CONTAINER HEREIN MEANS THE CONTAINER WITH CONTENTS.
- C. THE LOADS AS SHOWN ARE BASED ON CARS WHICH HAVE VARIOUS WIDTH DOORS OF THE CONVENTIONAL SLIDING TYPE. THE DEPICTED UNLOADING PROCEDURES ARE ALSO APPLICABLE TO CARS WHICH ARE EQUIPPED WITH PLUG DOORS. CAUTION: DUNNAGE MATERIAL MUST NOT BE NAILED TO ANY PLUG DOOR, WHETHER AUXILIARY OR MAIN, AND SPECIAL PROVISIONS MUST BE IMPLEMENTED AS DIRECTED WITHIN THE "SPECIAL NOTES" SECTION WHICH APPLIES TO THE BASIC LOAD INVOLVED. ALSO, AFTER THE PLUG DOORS ON A CAR 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.
- D. FOR DETAILS OF THE CONTAINER, SEE DRAWING NO. 11074804.
CONTAINER DIMENSIONS ----- 125" LONG X 18" WIDE X 19" HIGH.
GROSS WEIGHT ----- 280 POUNDS (APPROX).
TARE WEIGHT ----- 95 POUNDS (APPROX).
CUBE ----- 24.74 CUBIC FEET.
- E. THIS ITEM IS A DOT CLASS "A" EXPLOSIVE. THE UNLOADING PROCEDURES SPECIFIED HEREIN CAN ALSO BE UTILIZED FOR THE SHIPMENT OF THE DEPICTED CONTAINERS WHEN THEY ARE EMPTY OR LOADED WITH AN ITEM WHICH IS IDENTIFIED DIFFERENTLY BY NOMENCLATURE THAN THE ITEM DESIGNATED WITHIN THE TITLE OF THIS DOCUMENT.
- F. NOTICE: A SHIPMENT WILL BE POSITIONED IN THE CAR IN COMPLIANCE WITH THE WEIGHT DISTRIBUTION REQUIREMENTS OF THE AAR. THE APPROVED BLOCKING, BRACING, AND STAYING METHODS FOR THE LOADS SPECIFIED HEREIN MUST BE FOLLOWED. THE NUMBER OF UNITS MAY BE ADJUSTED TO FIT THE SIZE OF THE CAR TO BE LOADED, OR THE QUANTITY TO BE SHIPPED. FOR A LOAD QUANTITY OTHER THAN SPECIFIED, THE APPROVED METHODS MUST BE FOLLOWED AS CLOSELY AS POSSIBLE.
- G. OTHER TYPES OF LADING ITEMS MAY BE LOADED IN BOX CARS WHICH ARE PARTIALLY LOADED WITH ITEMS PACKED IN THESE CONTAINERS, 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.
- H. THE SELECTION OF RAILCARS FOR THE TRANSPORT OF THE DESIGNATED ITEM WILL BE IN ACCORDANCE WITH HAZARDOUS MATERIALS REGULATIONS OF DOT AND AR 55-355, CHAPTER 213, FOR EXPLOSIVES OR OTHER DANGEROUS ARTICLES, IN FULL.
- J. 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 SIDE WALL OF THE CAR, THAT GUIDANCE SHOULD BE APPLIED FOR THE NAILING OF THE APPLICABLE DUNNAGE PIECES. IF THE NAIL SIZE IS NOT SPECIFIED, 30d NAILS SHOULD BE USED.
- K. EXCEPT FOR PLYWOOD, DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-5/8" THICK BY 3-5/8" WIDE AND 1" X 6" MATERIAL IS ACTUALLY 3/4" THICK BY 5-5/8" WIDE.
- L. 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 OR A SIDE WALL 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.

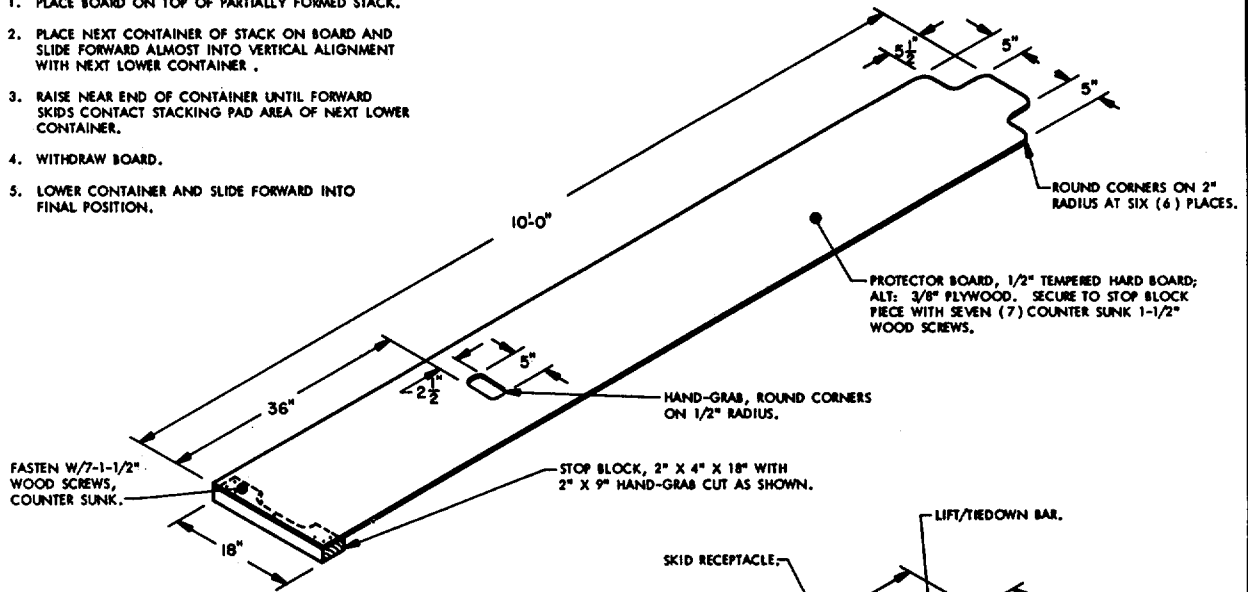
MATERIAL SPECIFICATIONS

- LUMBER ----- : SEE TM 743-200-1, DUNNAGE LUMBER; FED SPEC MM-L-751.
- PLYWOOD ----- : GROUP B OR C, GRADE *C-C (EXTERIOR); FED SPEC NN-P-530.
FSN 5530-051-1198.
* IF SPECIFIED GRADE IS NOT AVAILABLE, A BETTER EXTERIOR GRADE MAY BE SUBSTITUTED.
- NAILS ----- : COMMON, CEMENT COATED OR CHEMICALLY ETCHED,
FED SPEC FF-N-103.
ALT: ANNULAR-RING TYPE NAIL OF SAME SIZE.
- STRAPPING, STEEL ----- : TYPE I OR IV, CLASS A OR B, FED SPEC QQ-5-781.
FOR FSN SEE 58-38-100.
- ANTI-CHAFING MATERIAL: NEUTRAL BARRIER MATERIAL, MIL-B-121 (OR EQUAL).
- HARDBOARD ----- : FED SPEC LLL-H-35.
- STRAP SEALS,
STRAP STAPLES ----- : COMMERCIAL GRADE.

Figure 7-1. Blocking and restraining MIM-72A or MIM-72B in M-570 containers in railroad boxcar (sheet 1 of 13).

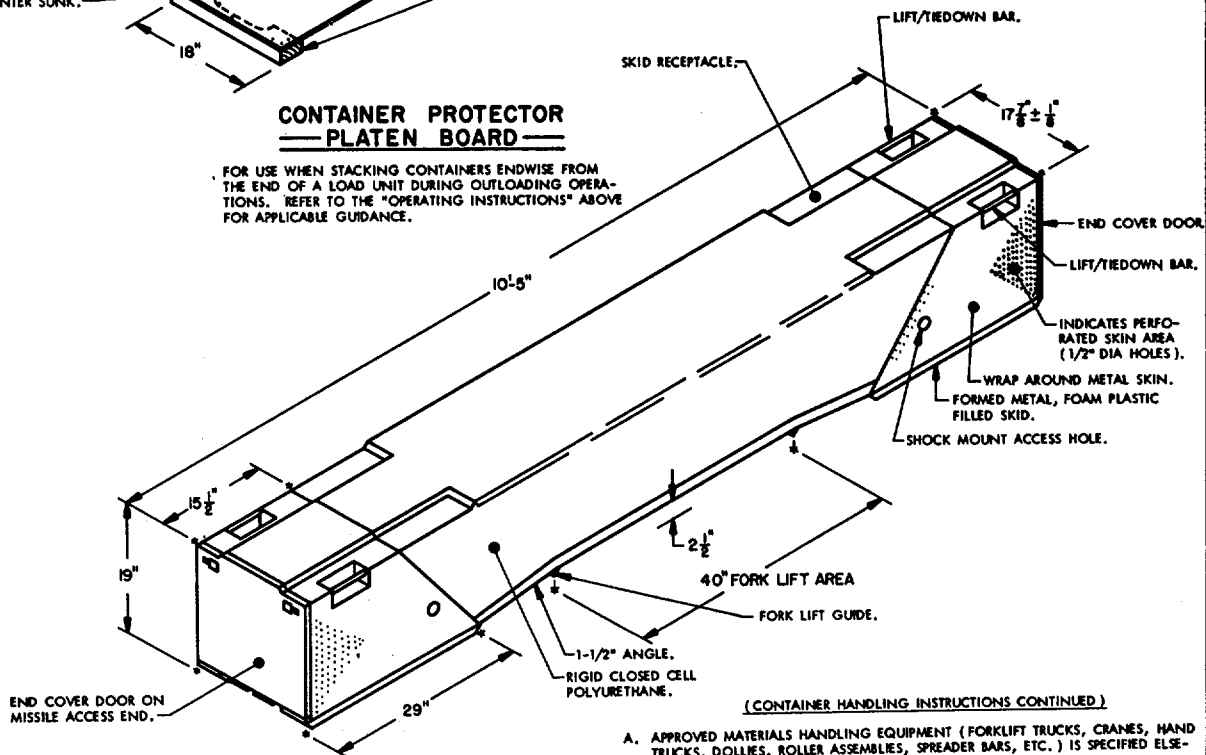
OPERATING INSTRUCTIONS

1. PLACE BOARD ON TOP OF PARTIALLY FORMED STACK.
2. PLACE NEXT CONTAINER OF STACK ON BOARD AND SLIDE FORWARD ALMOST INTO VERTICAL ALIGNMENT WITH NEXT LOWER CONTAINER.
3. RAISE NEAR END OF CONTAINER UNTIL FORWARD SKIDS CONTACT STACKING PAD AREA OF NEXT LOWER CONTAINER.
4. WITHDRAW BOARD.
5. LOWER CONTAINER AND SLIDE FORWARD INTO FINAL POSITION.



**CONTAINER PROTECTOR
— PLATEN BOARD —**

FOR USE WHEN STACKING CONTAINERS ENDWISE FROM THE END OF A LOAD UNIT DURING OUTLOADING OPERATIONS. REFER TO THE "OPERATING INSTRUCTIONS" ABOVE FOR APPLICABLE GUIDANCE.



CONTAINER DETAIL

CONTAINER HANDLING INSTRUCTIONS:

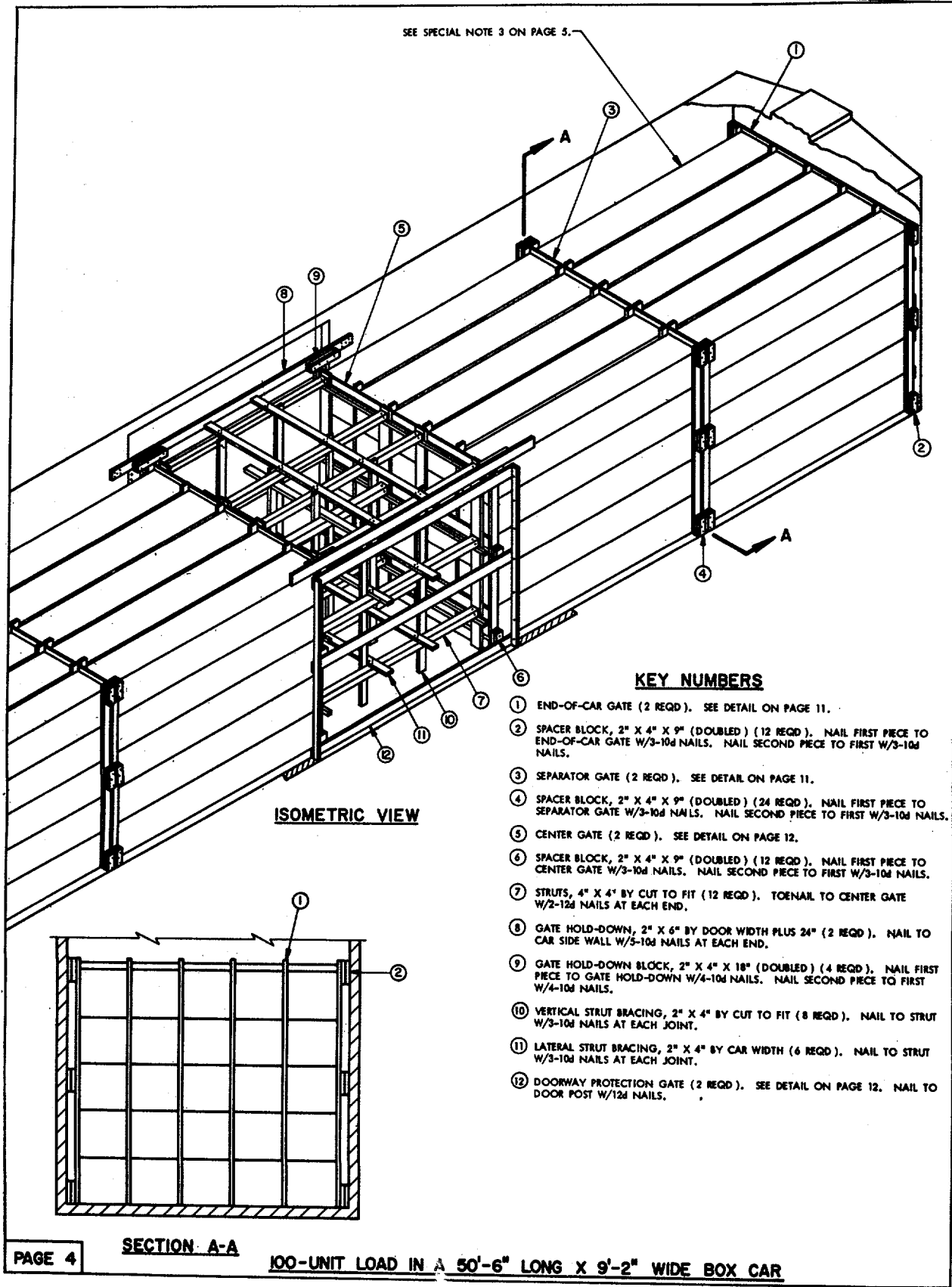
1. **CAUTION:** EXTREME CARE MUST BE EXERCISED DURING OUTLOADING OPERATIONS TO PREVENT DAMAGE TO THE EXPOSED PLASTIC AREAS OF THE CONTAINER. PLASTIC AREAS WILL NOT BE STEPPED ON, WALKED ON, PIED AGAINST, STRUCK OR GOUGED WITH HAND TOOLS OR MATERIALS HANDLING EQUIPMENT, OR BUMPED AGAINST PROTRUSIONS.
2. IT IS RECOMMENDED THAT THE CONTAINERS BE MANUALLY STACKED WITHIN THE RAIL CAR. TO FACILITATE COMPLIANCE WITH THIS RECOMMENDATION, THE "CONTAINER PROTECTOR" BOARD AS SHOWN ABOVE MUST BE USED WHEN PLACING THE UPPER CONTAINERS OF A STACK AND WHEN FORMING THE LAST STACK BUILT WITHIN A LOAD UNIT.
3. ONLY APPROVED AND APPROPRIATELY SIZED MATERIALS HANDLING EQUIPMENT WILL BE USED FOR HANDLING THE DEPICTED CONTAINER.

(CONTAINER HANDLING INSTRUCTIONS CONTINUED)

- A. APPROVED MATERIALS HANDLING EQUIPMENT (FORKLIFT TRUCKS, CRANES, HAND TRUCKS, DOLLIES, ROLLER ASSEMBLIES, SPREADER BARS, ETC.) IS SPECIFIED ELSEWHERE.
- B. PRECAUTIONARY HANDLING TECHNIQUES NORMALLY EMPLOYED FOR THE TYPE OF COMMODITY EMPLOYED OR AS SPECIFIED ELSEWHERE OR HEREIN WILL BE OBSERVED.
- C. IF HANDLING IS ACCOMPLISHED WITH A FORKLIFT TRUCK, CONTAINERS SHOULD BE HANDLED FROM A SIDE POSITION. **CAUTION:** THE USUALLY APPLIED END-HANDLING IS NOT PERMITTED; HOWEVER, FORK TINES MAY BE PLACED UNDER THE SKIDS FROM AN END DIRECTION. CARE MUST BE EXERCISED WHEN INSERTING FORKS UNDER OR WITHDRAWING FORKS FROM UNDER A CONTAINER, TO PREVENT DAMAGE TO THE CONTAINERS BY FORK TINES OR THE FORKLIFT PACKAGE GUARD.
- D. IF A SINGLE CONTAINER IS HANDLED BY SLINGING, THE SLING MAY BE ATTACHED TO THE LIFTING POINTS ON THE CONTAINER. HOWEVER, IF A STACK OF TWO OR MORE CONTAINERS IS HANDLED BY SLINGING, THE SLING USED MUST BE OF SUCH A DESIGN THAT LIFTING IS DONE ON THE BOTTOM OF THE LOWEST CONTAINER, AND ADDITIONALLY, CONTAIN BOTH LENGTHWISE AND CROSSWISE SPREADER BARS WHICH ARE RIGGED SO AS TO PREVENT DAMAGE TO A CONTAINER BY THE SLING LEGS.

CONTAINER DETAIL AND HANDLING INSTRUCTIONS

Figure 7-1--Continued. (Sheet 2 of 13.)



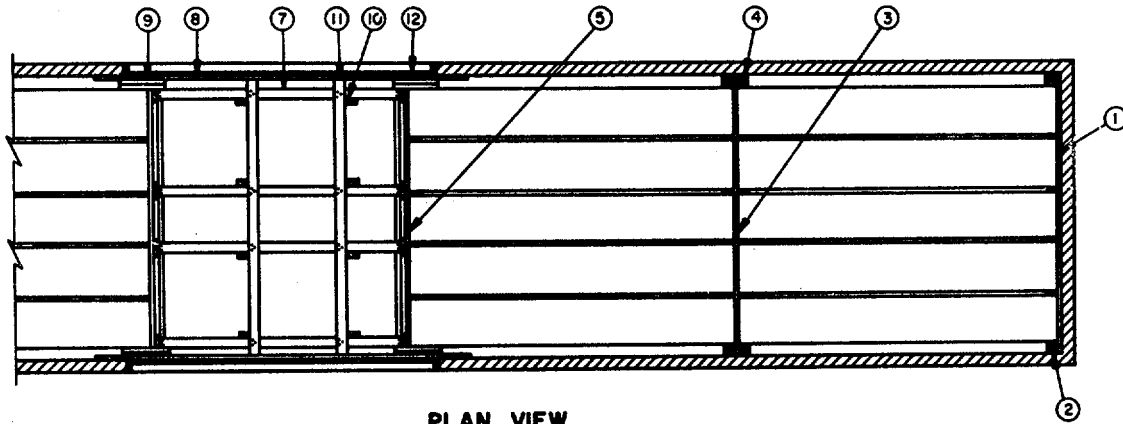
PAGE 4

SECTION A-A

100-UNIT LOAD IN A 50'-6" LONG X 9'-2" WIDE BOX CAR

PROJECT GM-585-67

Figure 7-1-Continued. (Sheet 3 of 13.)



PLAN VIEW

SPECIAL NOTES:

1. A 50'-6" LONG X 9'-2" WIDE (INSIDE CLEARANCE) CONVENTIONAL TYPE BOX CAR EQUIPPED WITH A 10'-0" WIDE SINGLE DOOR OPENING IS SHOWN. A FULL CARLOAD CANNOT BE LOADED INTO A CAR WHICH HAS DOOR OPENINGS LESS THAN 10'-0".
2. A WIDER OR NARROWER CAR CAN BE USED FOR SHIPPING THE DEPICTED LOAD. A 9'-6" WIDE BOX CAR IS THE PREFERRED WIDTH CAR FOR SHIPPING THIS ITEM. IF A DIFFERENT WIDTH CAR IS USED, THICKNESS OR NUMBER OF THE SPACER BLOCKS, PIECES MARKED ②, ④, AND ⑥ MUST BE ADJUSTED TO PROVIDE FOR A "TIGHT" LOAD ACROSS THE WIDTH OF THE CAR.
3. IF THE DELINEATED OUTLOADING METHOD IS USED FOR THE SHIPMENT OF A LOAD WHICH CONTAINS A LOAD UNIT OF TWENTY-FOUR (24) INSTEAD OF TWENTY-FIVE (25) ITEMS AS SHOWN, TO SATISFY A LESS-THAN-CARLOAD QUANTITY, THE FOUR HIGH CONTAINER STACK MUST CONTAIN A "FILLER ASSEMBLY", AS DEPICTED ON PAGE 14, IN PLACE OF EACH OMITTED CONTAINER. ALSO, FOR EACH OMITTED CONTAINER, TWO "FILLER BLOCKS", 2" X 4" X 18-1/4", MUST BE USED BETWEEN THE VERTICAL PIECES OF THE END-OF-CAR GATE AND THE SEPARATOR GATE. NAIL THRU THE GATE HORIZONTAL PIECES INTO THE "FILLER BLOCK" W/5-6d NAILS.
4. SEVENTY-FIVE (75) CONTAINERS CAN BE LOADED IN A 40'-6" LONG X 9'-2" WIDE BOX CAR, AND BLOCKED AND BRACED FOR SHIPMENT BY THE DELINEATED PROCEDURES. ADJUST QUANTITIES OF BLOCKING MATERIAL TO SATISFY THE REQUIREMENTS OF THE SHORTER CAR. **NOTE:** CARS WITH 8'-0" WIDE OR WIDER DOOR OPENINGS CAN BE USED.
5. A CAR EQUIPPED WITH STAGGERED DOOR OPENING MAY BE USED TO SHIP THE DEPICTED LOAD. IF A CAR IS EQUIPPED WITH PLUG DOORS, SEE "DOORWAY PROTECTION PROVISIONS FOR CARS EQUIPPED WITH PLUG DOORS" DETAILS ON PAGE 13. WHEN THIS DETAIL IS USED, DELETE CONVENTIONAL TYPE DOORWAY PROTECTION AND SPACER BLOCKS, 2" X 4" X 9", FROM CENTER GATES AS REQUIRED. SEE GENERAL NOTE "C" ON PAGE 2.

BILL OF MATERIAL

| LUMBER | LINEAR FEET | BOARD FEET |
|--------------|-------------|------------|
| 1" X 6" | 262 | 131 |
| 2" X 2" | 51 | 17 |
| 2" X 3" | 32 | 16 |
| 2" X 4" | 587 | 391 |
| 2" X 6" | 156 | 156 |
| 4" X 4" | 97 | 129 |
| NAILS | NO. REQD | POUNDS |
| 6d (2") | 24 | NIL |
| 10d (3") | 772 | 12 |
| 12d (3-1/4") | 224 | 3-3/4 |
| 16d (3-1/2") | 96 | 2 |

LOAD AS SHOWN

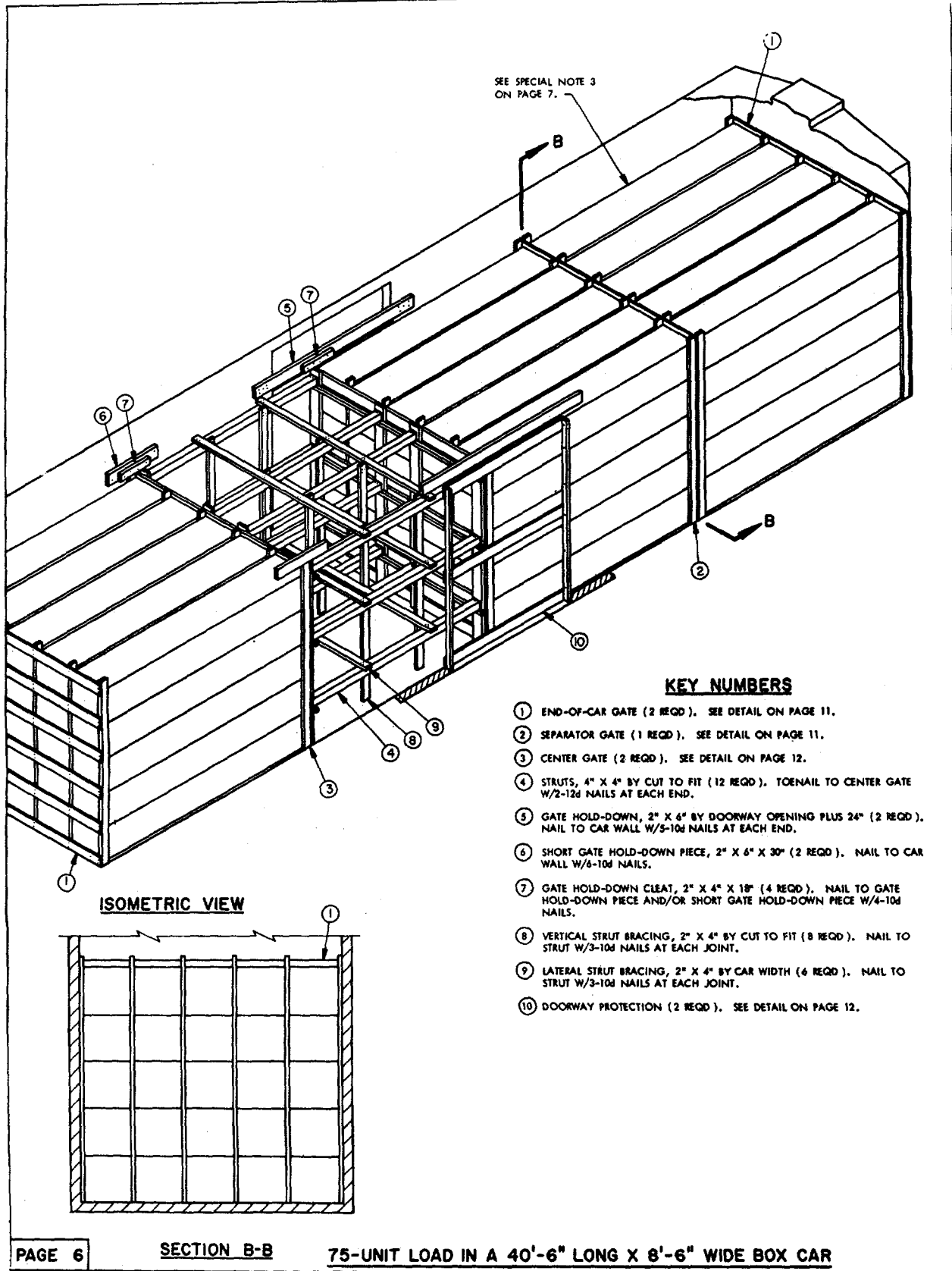
| ITEM | QUANTITY | WEIGHT (APPROX) |
|------------------------|----------|-------------------|
| CONTAINER WITH MISSILE | 100 | 28,000 LBS |
| DUNNAGE | | 2,116 LBS |
| TOTAL WEIGHT | | 30,116 LBS |

100-UNIT LOAD IN A 50'-6" LONG X 9'-2" WIDE BOX CAR

PAGE 5

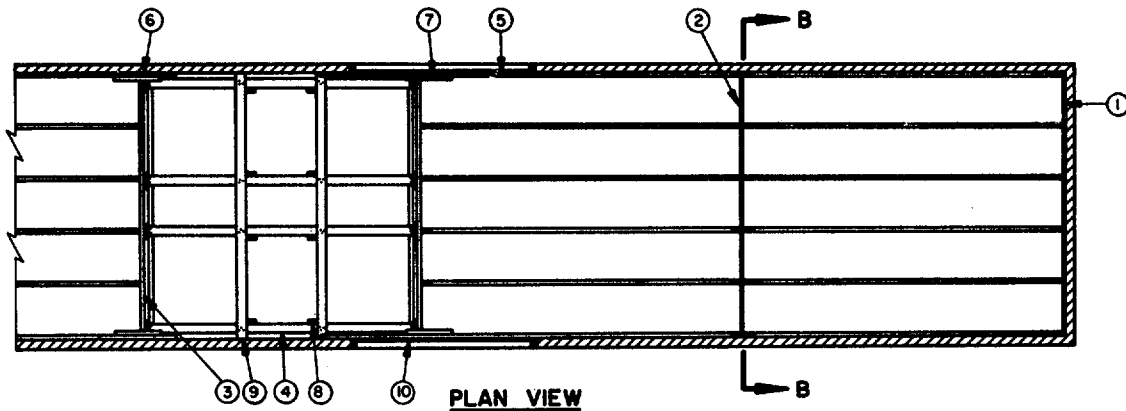
PROJECT **GM-585-67**

Figure 7-1--Continued. (Sheet 4 of 13.)



PROJECT GM-585-67

Figure 7-1-Continued. (Sheet 5 of 13.)



PLAN VIEW

SPECIAL NOTES:

1. A 40'-6" LONG X 8'-6" WIDE (INSIDE CLEARANCE) CONVENTIONAL TYPE BOX CAR EQUIPPED WITH A 6'-0" WIDE SINGLE DOOR OPENING IS SHOWN.
2. A WIDER CAR CAN BE USED FOR SHIPPING THE DEPICTED LOAD. A 8'-6" WIDE BOX CAR IS THE PREFERRED WIDTH CAR FOR SHIPPING THIS ITEM. IF A WIDER CAR IS USED, SPACER BLOCKS AS DEPICTED ON PAGES 4 AND 5 MUST BE USED TO PROVIDE FOR A "TIGHT" LOAD ACROSS THE WIDTH OF THE CAR.
3. IF THE DELINEATED OUTLOADING METHOD IS USED FOR THE SHIPMENT OF A LOAD WHICH CONTAINS A LOAD UNIT OF TWENTY-FOUR (24) INSTEAD OF TWENTY-FIVE (25) ITEMS AS SHOWN, TO SATISFY A LESS-THAN-CARLOAD QUANTITY, THE FOUR HIGH CONTAINER STACK MUST CONTAIN A "FILLER ASSEMBLY", AS DEPICTED ON PAGE 14, IN PLACE OF EACH OMITTED CONTAINER. ALSO, FOR EACH OMITTED CONTAINER, TWO FILLER BLOCKS, 2" X 4" X 18-1/4", MUST BE USED BETWEEN THE VERTICAL PIECES OF THE END-OF-CAR GATE AND THE SEPARATOR GATE IN PLACE OF THE OMITTED CONTAINER. NAIL THRU THE GATE HORIZONTAL PIECES INTO THE "FILLER BLOCK" W/5-6d NAILS.
4. A CAR EQUIPPED WITH WIDER DOORS OR STAGGERED DOOR OPENING MAY BE USED TO SHIP THE DEPICTED LOAD. WHEN OUTLOADING THE DEPICTED LOAD IN A CAR EQUIPPED WITH PLUG DOORS, USING DOORWAY PROTECTION DEPICTED ON PAGE 13, THE CAR MUST BE AT LEAST 8'-10" WIDE. "SPACER BLOCKS", 2" X 4" X 9", WILL THEN BE REQUIRED ON END-OF-CAR GATES AND THE SEPARATOR GATE TO FILL THE WIDTH OF THE CAR AS DEPICTED ON PAGES 4 AND 5. SEE GENERAL NOTE "C" ON PAGE 2.. SPACER BLOCKS MAY BE REQUIRED ON THE CENTER GATES, ALSO.

BILL OF MATERIAL

| LUMBER | LINEAR FEET | BOARD FEET |
|--------------|-------------|------------|
| 1" X 6" | 188 | 94 |
| 2" X 2" | 51 | 17 |
| 2" X 3" | 32 | 16 |
| 2" X 4" | 409 | 270 |
| 2" X 6" | 153 | 153 |
| 4" X 4" | 103 | 137 |
| NAILS | NO. REQD | POUNDS |
| 6d (2") | 24 | NIL |
| 10d (3") | 532 | 8-1/2 |
| 12d (3-1/4") | 80 | 1-1/2 |
| 16d (3-1/2") | 90 | 2 |

LOAD AS SHOWN

| ITEM | QUANTITY | WEIGHT (APPROX) |
|------------------------|----------|-------------------|
| CONTAINER WITH MISSILE | 75 | 21,000 LBS |
| DUNNAGE | | 1,730 LBS |
| TOTAL WEIGHT | | 22,730 LBS |

75-UNIT LOAD IN A 40'-6" LONG X 8'-6" WIDE BOX CAR

PAGE 7

PROJECT 9M-595-67

Figure 7-1-Continued. (Sheet 6 of 13.)

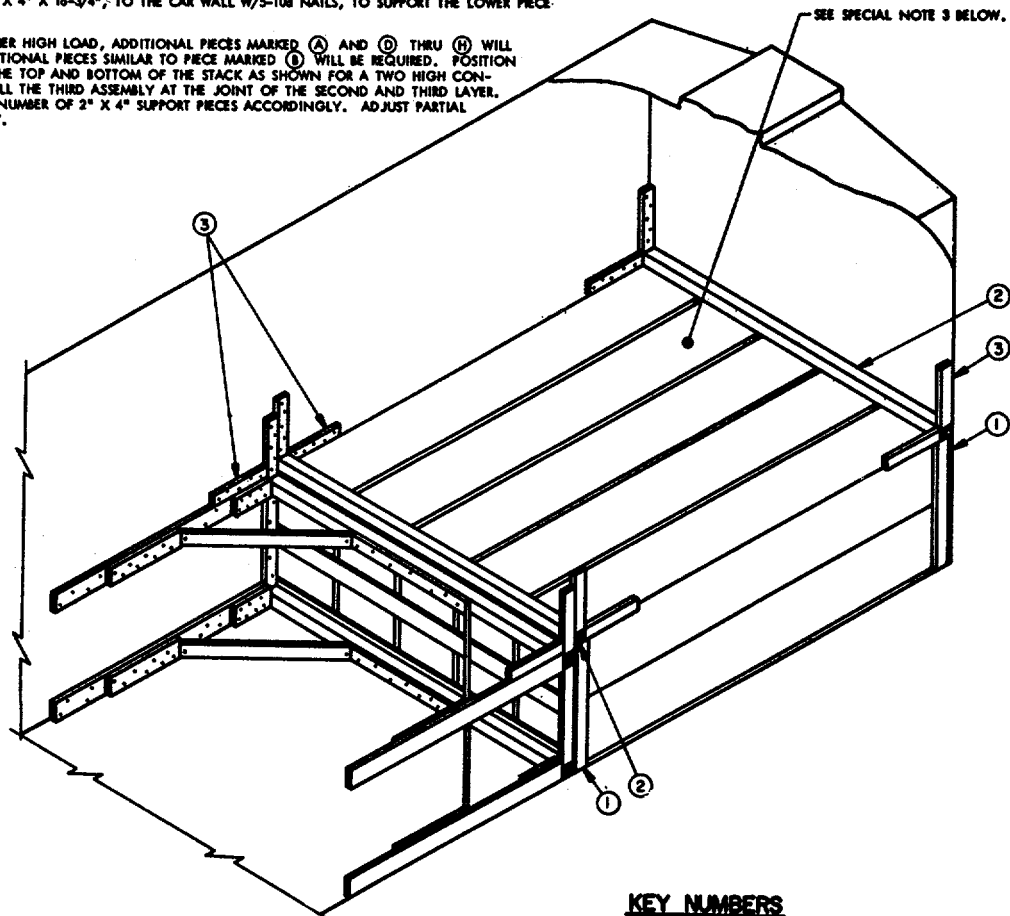
NOTE

A K-BRACE ASSEMBLY AS SHOWN IS ADEQUATE FOR RETAINING A MAXIMUM PARTIAL LAYER LOAD OF 6,000 POUNDS. **NOTE:** IF IT IS NECESSARY TO BLOCK A HEAVIER LOAD, REFER TO DRAWING 19-48-4016-5M1001 FOR THE APPLICABLY SIZED K-BRACE TO USE AND THE DESIGN SPECIFICATIONS FOR THE BRACE.

CAUTION: SOME CARS ARE NOT SUITED FOR THE APPLICATION OF "PARTIAL LAYER BRACING", BECAUSE THE LENGTH OF THE PARTIAL LAYER TO BE SHIPPED AND/OR THE SIZE OR CONFIGURATION OF THE CAR DOORS WILL NOT PERMIT PROPER INSTALLATION OF THE SPECIFIED K-BRACE DUNNAGE. PIECES MARKED (A), (B), (C), AND (D) OR THE COMPARABLE PIECES ON A HEAVIER BRACE MUST BE SUPPORTED AT THE SIDES OF A CAR BY A CAR SIDE WALL. IT IS ALRIGHT FOR THE END OF A DIAGONAL BRACE TO BEAR IN FRONT OF A DOOR OPENING; HOWEVER, THE ADJACENT PIECE MARKED (D) OR THE COMPARABLE PIECE ON A HEAVIER BRACE MUST BE DOUBLED AND EXTEND ACROSS AND FAR ENOUGH PAST THE DOOR OPENING TO PROVIDE FOR THE SPECIFIED NAILING OF EACH PIECE.

FOR A THREE (3) CONTAINER HIGH LOAD INCREASE THE LENGTH OF PIECE MARKED (D) TO 32" AND POSITION PIECE MARKED (A) AT THE TOP OF THE THIRD LAYER AND AT THE JOINT BETWEEN THE FIRST AND SECOND LAYERS. NAIL A SUPPORT PIECE, 2" X 4" X 16-3/4", TO THE CAR WALL W/5-10# NAILS, TO SUPPORT THE LOWER PIECE MARKED (A).

FOR A FOUR (4) CONTAINER HIGH LOAD, ADDITIONAL PIECES MARKED (A) AND (D) THRU (H) WILL BE REQUIRED. ALSO, ADDITIONAL PIECES SIMILAR TO PIECE MARKED (B) WILL BE REQUIRED. POSITION A PIECE MARKED (A) AT THE TOP AND BOTTOM OF THE STACK AS SHOWN FOR A TWO HIGH CONTAINER STACK, AND INSTALL THE THIRD ASSEMBLY AT THE JOINT OF THE SECOND AND THIRD LAYER. ADJUST THE LENGTH AND NUMBER OF 2" X 4" SUPPORT PIECES ACCORDINGLY. ADJUST PARTIAL LAYER GATE ACCORDINGLY.



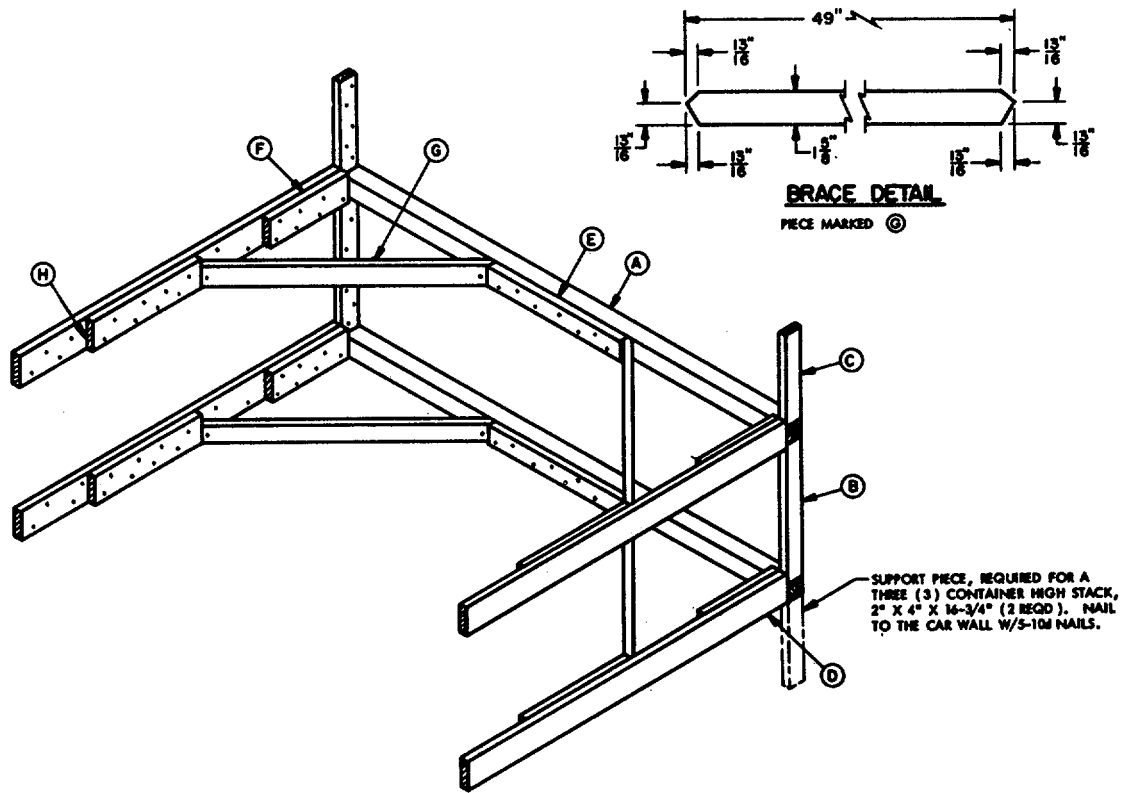
KEY NUMBERS

- ① PARTIAL LAYER GATE (2 REQD.). SEE DETAIL ON PAGE 9.
- ② CONTAINER HOLD-DOWN, 4" X 4" BY CAR WIDTH (2 REQD.).
- ③ POCKET CLEAT, 2" X 4" X 18" (10 REQD.). NAIL TO CAR SIDE WALL W/5-10# NAILS EACH.
- ④ K-BRACE (1 REQD.). SEE DETAIL AND NOTES ON PAGE 9 AND ABOVE.

SPECIAL NOTES:

ISOMETRIC VIEW

1. A TEN-UNIT LOAD IS DEPICTED IN AN 8'-4" WIDE (INSIDE CLEARANCE) CONVENTIONAL TYPE BOX CAR. THE LOAD IS BASED ON A 40'-4" LONG (INSIDE CLEARANCE) WITH AN 6'-0" DOOR OPENING. FOR CARS WITH GREATER WIDTH DOOR OPENINGS SEE "CAUTION" NOTE ABOVE.
2. A WIDER CAR CAN BE USED FOR SHIPPING THE DEPICTED LOAD. A 8'-4" WIDE BOX CAR IS THE PREFERRED WIDTH CAR FOR SHIPPING THIS ITEM. IF A WIDER CAR IS USED, SPACER BLOCKS AS DEPICTED ON PAGES 4 AND 5 MUST BE USED TO PROVIDE FOR A "TIGHT" LOAD ACROSS THE WIDTH OF THE CAR.
3. IF THE DELINEATED OUTLOADING METHOD IS USED FOR THE SHIPMENT OF A LOAD WHICH CONTAINS A LOAD UNIT OF NINE (9) INSTEAD OF TEN (10) ITEMS AS SHOWN, TO SATISFY A LESSER ICL QUANTITY, THE ONE HIGH CONTAINER STACK MUST CONTAIN A "FILLER BLOCK", AS DEPICTED ON PAGE 14, IN PLACE OF EACH OMITTED CONTAINER. ALSO, FOR EACH OMITTED CONTAINER, TWO SPACER BLOCKS, 2" X 4" X 18-1/4", MUST BE USED BETWEEN THE VERTICAL PIECES OF THE PARTIAL LAYER GATES. NAIL THRU THE GATE HORIZONTAL PIECES INTO THE SPACER BLOCK W/5-6# NAILS.

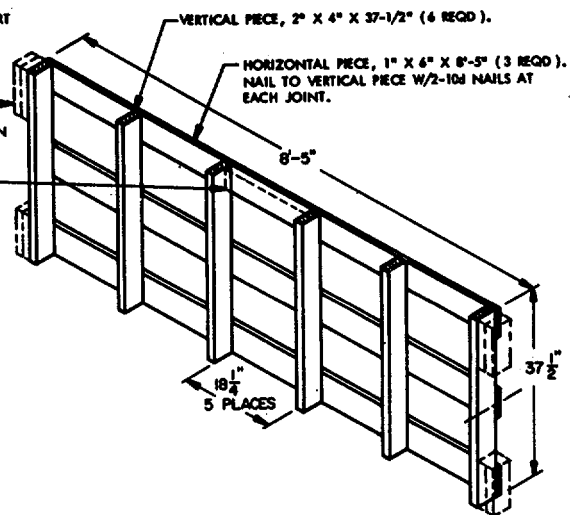


K-BRACE

SEE K-BRACE LUMBER AND NAILING CHART BELOW AND "NOTE (C)" ON PAGE 8.

LOCATION OF SPACER BLOCKS, IF REQUIRED.

LOCATION OF "FILLER BLOCK" WHEN USED WITH "FILLER ASSEMBLY" TO SATISFY PROVISIONS IN "SPECIAL NOTE 3" ON PAGE 8.



| K-BRACE LUMBER AND NAILING DATA | | | | |
|---------------------------------|--|----------|-----------|--------------------------|
| PC MK | LUMBER SIZE | NO. REQD | NAIL TO | NUMBER AND SIZE OF NAILS |
| (A) | 4" X 4" BY CAR WIDTH | 2 | --- | --- |
| (B) | 2" X 4" X 30" | 2 | CAR WALL | 6-10d |
| (C) | 2" X 4" X 18" | 2 | CAR WALL | 5-10d |
| (D) | 2" X 6" X 72" | 4 | CAR WALL | 16-12d |
| (E) | SEE * BELOW | 2 | (A) | 7-12d |
| (F) | 2" X 6" X 18" | 4 | (D) | 7-16d |
| (G) | 2" X 4" MATERIAL SEE BRACE DETAIL ABOVE | 4 | (A) & (D) | 1-16d EACH END |
| (H) | 2" X 6" X 30" | 4 | (D) | 8-16d |

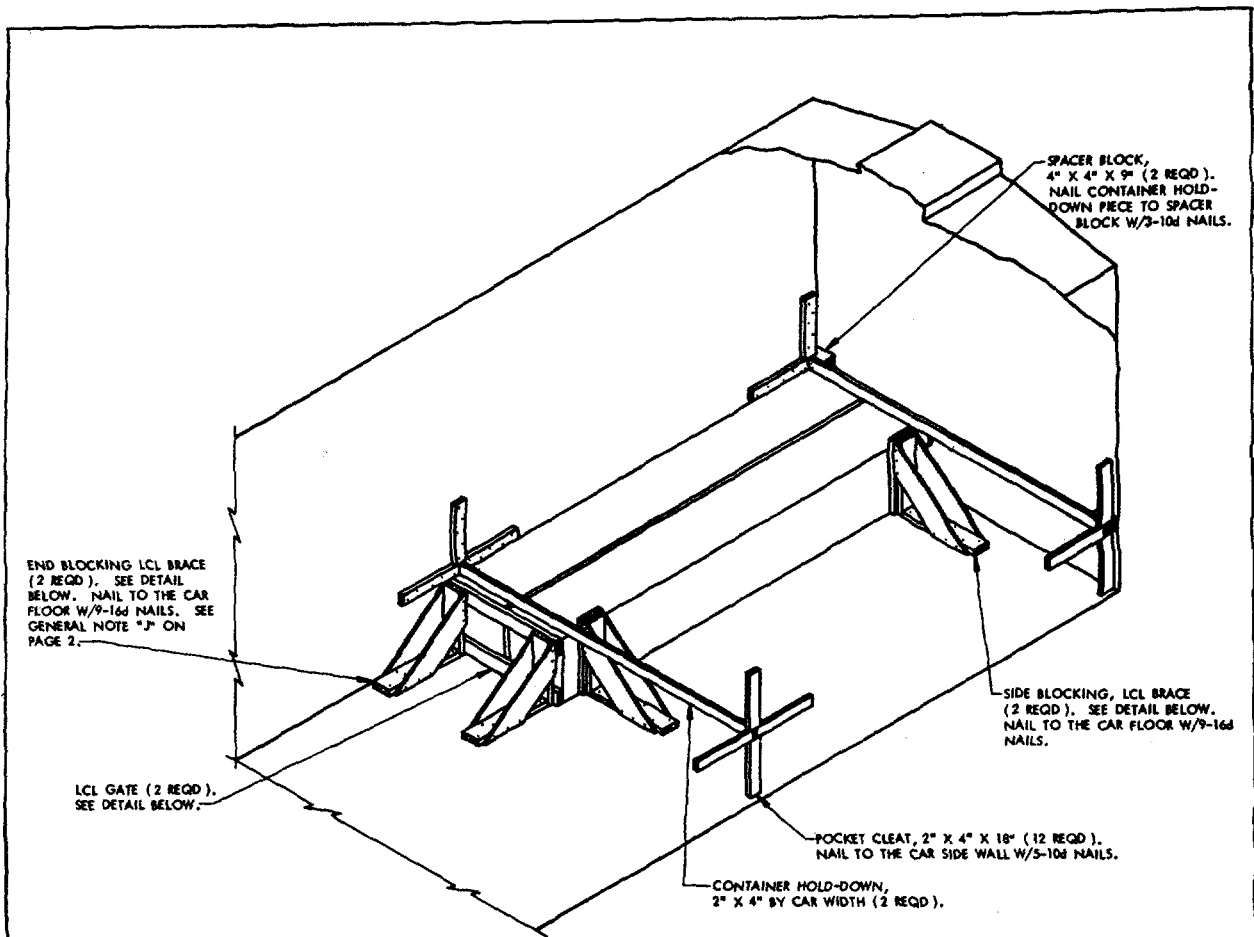
* 30" FOR 8'-6" WIDE CAR
 38" FOR 9'-2" WIDE CAR
 40" FOR 9'-4" WIDE CAR

PARTIAL LAYER GATE

FOR A TWO CONTAINER HIGH STACK SEE "NOTE (C)" ON PAGE 11, AND SPECIAL NOTE 2 ON PAGE 8.

PARTIAL LAYER BRACING

Figure 7-1-Continued. (Sheet 8 of 13.)



ISOMETRIC VIEW

TWO-UNIT LOAD

NOTE 9:

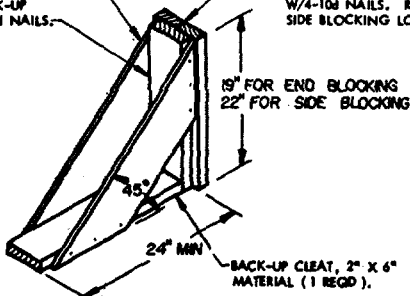
EACH BRACE AS APPLIED FOR LONGITUDINAL OR LATERAL BRACING WILL SUPPORT 2,000 OR 8,000 POUNDS OF LADING RESPECTIVELY. A MINIMUM OF TWO (2) BRACES MUST BE USED IN THEIR RESPECTIVE DIRECTIONS. FOR A THREE OR FOUR WIDE LOAD THREE LCL BRACES MUST BE USED FOR END BLOCKING. FOR A FIVE WIDE LOAD FOUR LCL BRACES MUST BE USED FOR END BLOCKING. MODIFY LCL GATE AS REQUIRED.

ANGLE BRACE, 1" X 6" X CUT TO FIT (2 REQD). NAIL TO VERTICAL AND BACK-UP CLEAT W/3-8d NAILS AT EACH END.

VERTICAL, 2" X 6" MATERIAL (1 REQD). NAIL TO BACK-UP CLEAT W/2-16d NAILS.

BUFFER PIECE, 2" X 4" X 22" (2 REQD). POSITION PIECES SIDE BY SIDE, AND NAIL EACH PIECE TO THE VERTICAL PIECE W/4-10d NAILS. REQUIRED FOR SIDE BLOCKING LCL BRACE ONLY.

19" FOR END BLOCKING
22" FOR SIDE BLOCKING

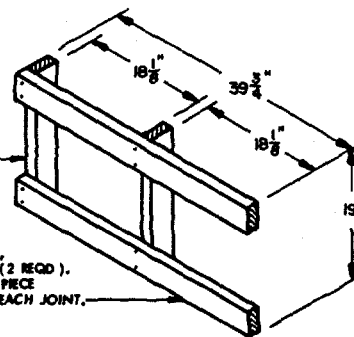


LCL BRACE

USE FOR ONE (1) CONTAINER HIGH LOADS ONLY.

VERTICAL PIECE, 2" X 4" X 19" (2 REQD).

HORIZONTAL PIECE, 2" X 4" X 39-3/4" (2 REQD). NAIL TO VERTICAL PIECE W/2-12d NAILS AT EACH JOINT.



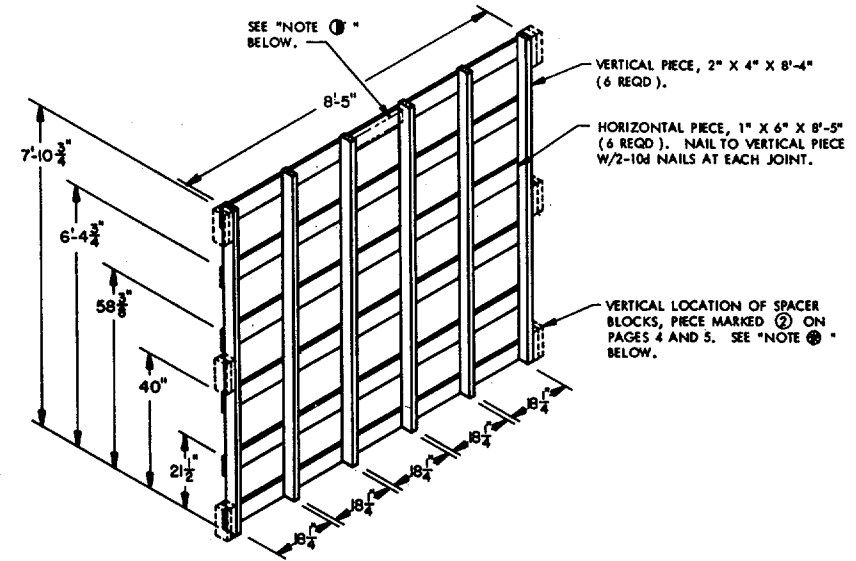
LCL GATE

PAGE 10

TYPICAL LCL (2-UNIT LOAD)

PROJECT **GM-585-57**

Figure 7-1-Continued, (Sheet 9 of 13.)



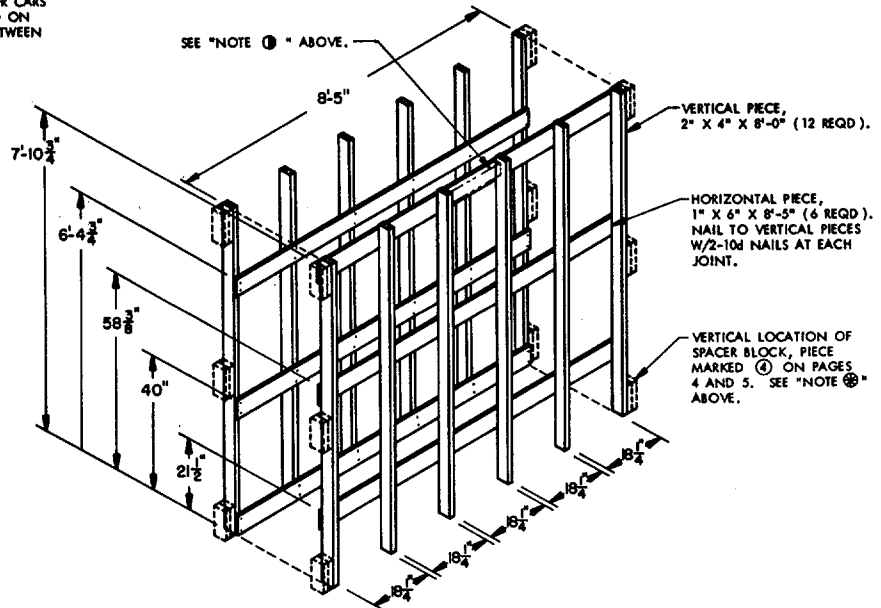
END-OF-CAR GATE

NOTE 1

SPACER BLOCKS, 2" X 4" X 9" ARE REQUIRED TO FILL THE VOID IN CARS THAT ARE GREATER THAN 8'-6" WIDE. THE NUMBER AND THICKNESS OF THESE BLOCKS CAN BE VARIED IN DIFFERENT WIDTH CARS TO MAINTAIN ONE INCH (1") OR LESS VOID ACROSS THE WIDTH OF A CAR, EXCEPT FOR GATES IN A CAR EQUIPPED WITH PLUG DOORS. WHEN USING "DOORWAY PROTECTION" PROVISIONS FOR CARS EQUIPPED WITH PLUG DOORS," DETAIL DEPICTED ON PAGE 13 THE GATES WILL FORM A SNUG FIT BETWEEN THE DOOR SPANNER PIECES.

NOTE 2

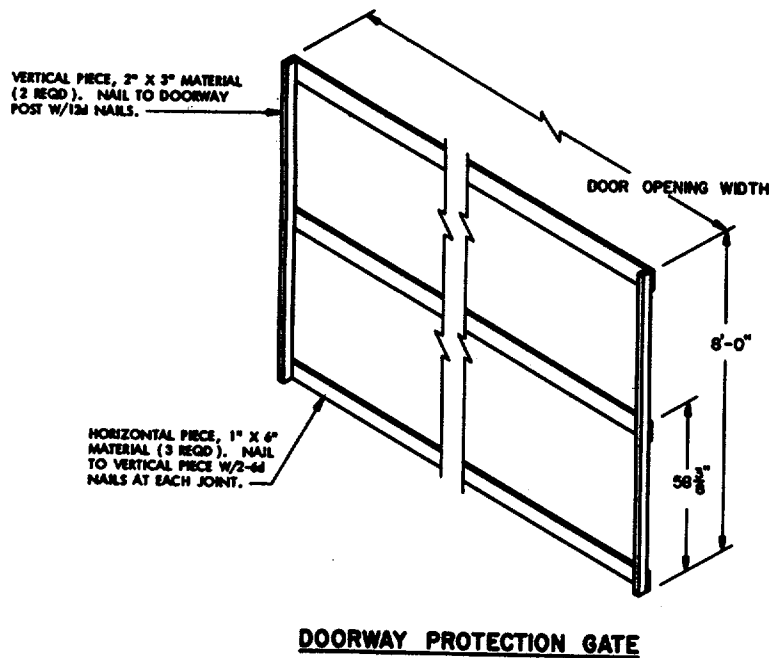
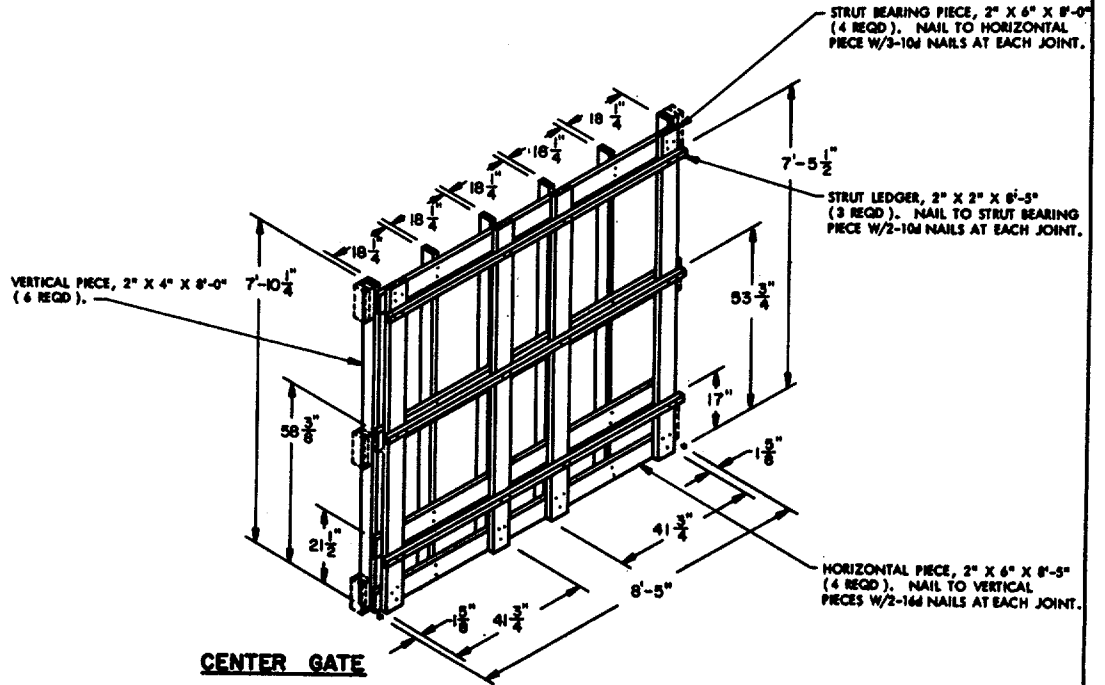
LOCATION OF "FILLER BLOCK" WHEN USED WITH "FILLER ASSEMBLY" TO SATISFY PROVISIONS IN "SPECIAL NOTE 3" ON PAGES 5 AND 7.



SEPARATOR GATE

NOTE: THE SEPARATOR GATE IS TO BE CONSTRUCTED IN TWO PARTS AND POSITIONED IN THE CAR BACK TO BACK AS SHOWN.

Figure 7-1-Continued. (Sheet 10 of 13.)



NOTE: DOORWAY PROTECTION DUNNAGE AS SHOWN IS NOT REQUIRED IF ALL OF THE DOORS IN A CAR ARE OF THE PLUG TYPE. HOWEVER, THE CRITERIA SET FORTH WITHIN GENERAL NOTE "D" ON PAGE 2 WILL APPLY.

NOTE: WHEN A CAR HAS DOOR POSTS WHICH DO NOT PROVIDE FOR ADEQUATE SECUREMENT OF THE GATE AS SHOWN BY THE SPECIFIED NAILING METHOD, REFER TO DRAWING 19-48-1634-5A29 OR TO "BUREAU OF EXPLOSIVES PAMPHLET NO. 6" FOR ALTERNATIVE GATE SECURING METHODS OR DOORWAY PROTECTION SPECIFICATIONS.

NOTE:

WHEN OUTLOADING BOX CARS EQUIPPED WITH PLUG DOORS, PROVISIONS AS SHOWN BELOW MUST BE USED.

STEP 1 - PRIOR TO LOADING IN THE DOOR AREA, POSITION THREE DOOR SPANNER PIECES, 2" X 6" BY DOOR WIDTH PLUS 24", ACROSS DOOR OPENING AS DEPICTED ON OPPOSITE LOADING SIDE OF CAR. NAIL TO THE CAR WALL W/3-10d NAILS AT EACH END. LOCATE LOCATOR BLOCKS ON LOADING SIDE OF CAR AND NAIL TO THE CAR WALL.

STEP 2 - AFTER ALL CONTAINERS ARE LOADED AND ALL CENTER BLOCKING INSTALLED, THE DOOR SPANNER PIECES SHOWN IN STEP 2 CAN BE INSTALLED.

CAUTION: CARE MUST BE EXERCISED TO ASSURE A TIGHT FIT FOR CENTER GATE (5) ACROSS THE WIDTH BETWEEN DOOR SPANNER PIECES ON EACH SIDE OF CAR. THIS CAN BE ACCOMPLISHED BY INCREASING THE SIZE OR NUMBER OF SPACER BLOCKS ATTACHED TO THE CENTER GATE (5). SEE GENERAL NOTE "C" ON PAGE 2.

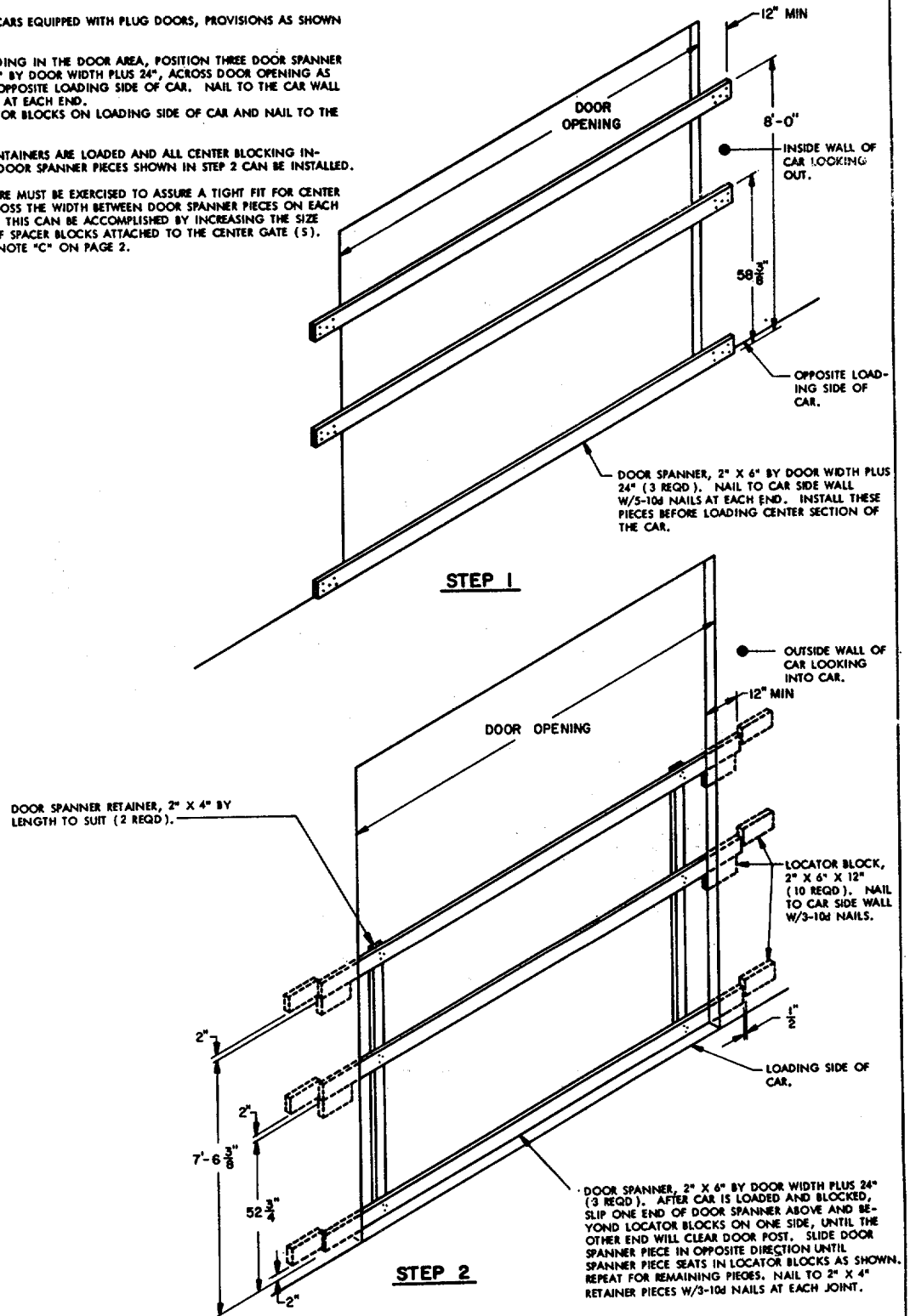


Figure 7-1-Continued. (Sheet 12 of 13.)

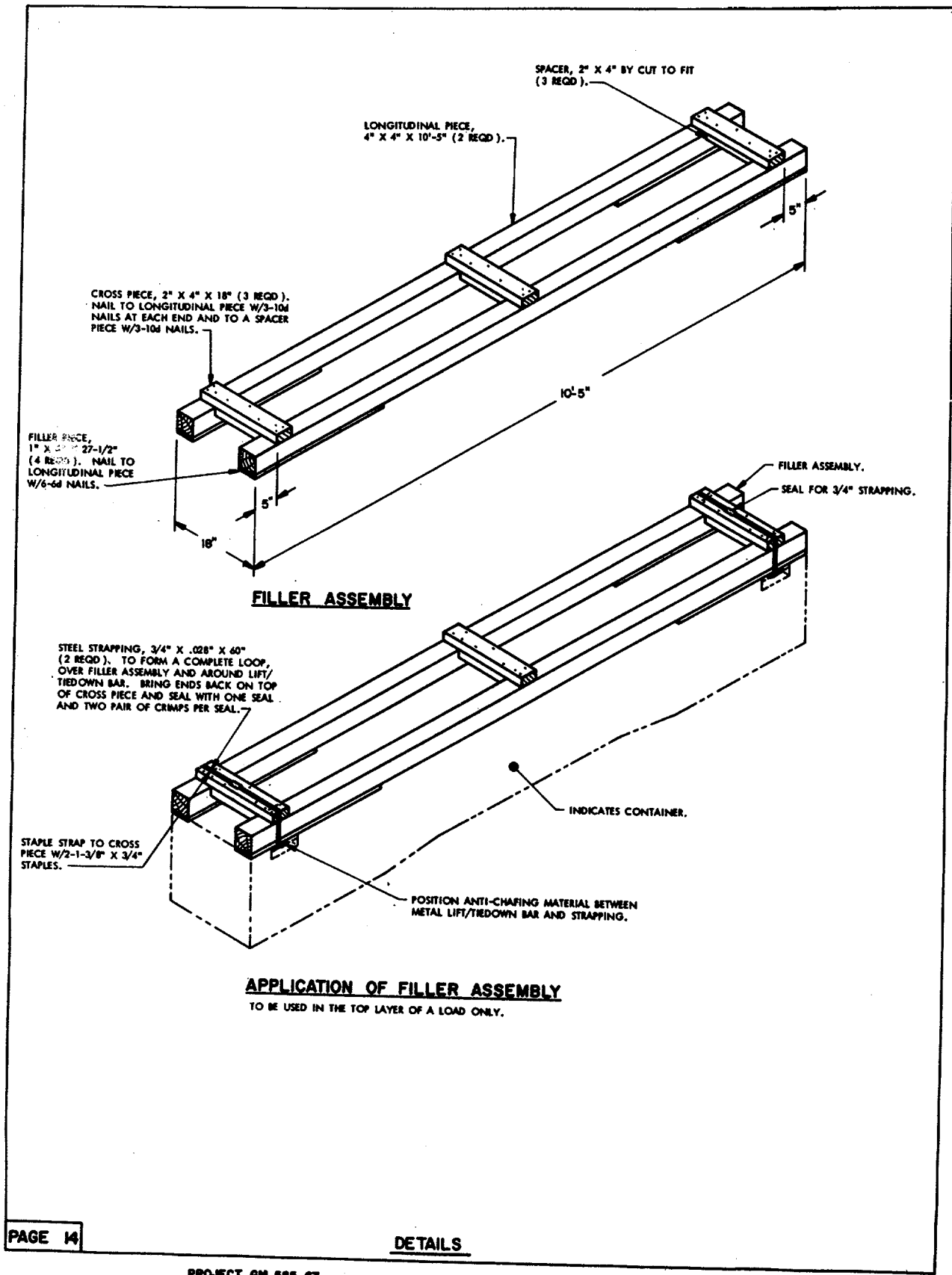


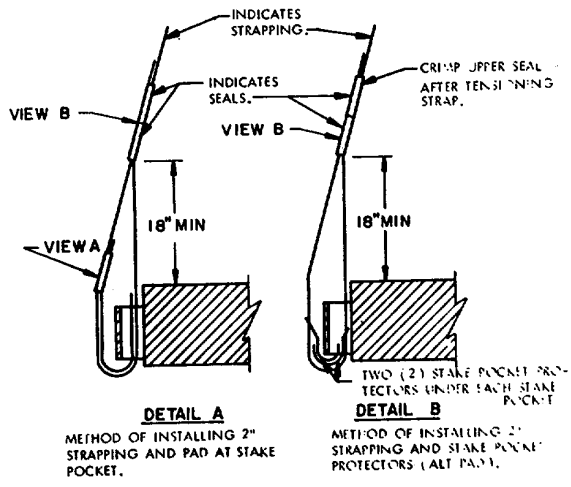
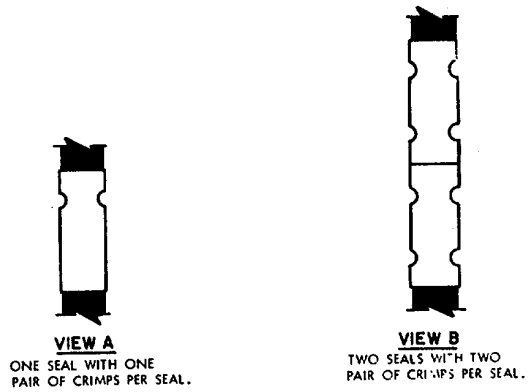
Figure 7-1-Continued. (Sheet 13 of 13.)

GENERAL NOTES

- A.
- B. THE LOADS SHOWN ON PAGES 4 THRU 7 ARE BASED ON FLAT CARS 10'-0" WIDE (PLATFORM). THE LOADS SHOWN ON PAGES 8 THRU 10 ARE BASED ON FLAT CARS 9'-2" WIDE (PLATFORM). WIDER CARS CAN BE USED. ONLY ONE UNIT OF LADING IS SHOWN; HOWEVER, MULTIPLES OF UNITS, AS SHOWN OR DISSIMILAR IN NATURE, MAY BE LOADED ON A CAR IF SPACE PERMITS. THE NUMBER OF UNITS TO BE LOADED ON A CAR WILL BE DEPENDENT ON THE SIZE OF THE CAR USED OR THE QUANTITIES OF UNITS TO BE SHIPPED WITH THE VIEW OF FULL UTILIZATION OF CARRIER EQUIPMENT.
- C. LADING DATA (UNCRATED-MOUNTED ON SKID BASE):
 ITEM DIMENSIONS ----- 11'-10-3/4" LONG BY 8'-8" WIDE BY 7'-11-1/4" HIGH.
 ITEM GROSS WEIGHT ----- 10,924 POUNDS (APPROX).

 LADING DATA (UNCRATED-MOUNTED ON ALUMINUM BLOCKS):
 ITEM DIMENSIONS ----- 10'-8-1/2" LONG BY 7'-10-3/8" WIDE BY 7'-3-3/4" HIGH.
 ITEM GROSS WEIGHT ----- 9,720 POUNDS (APPROX).

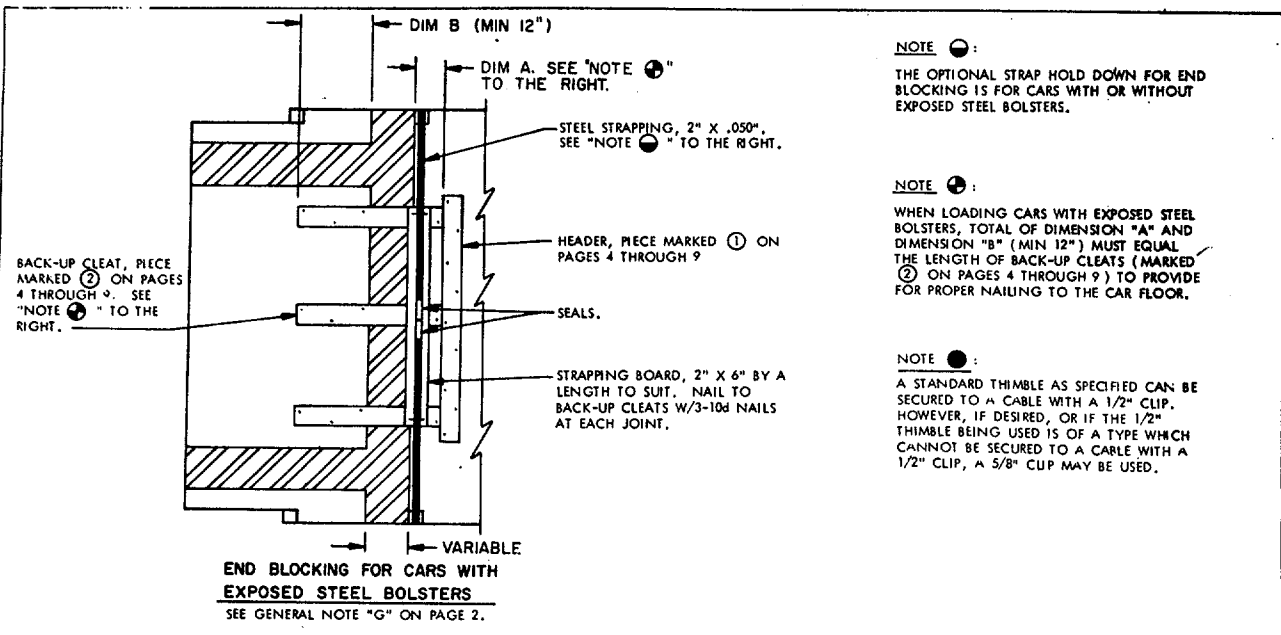
 LADING DATA (CRATED):
 ITEM DIMENSIONS ----- 11'-1-3/4" LONG BY 8'-9" WIDE BY 8'-6-7/8" HIGH.
 ITEM GROSS WEIGHT ----- 12,270 POUNDS (APPROX).
- D. REFER TO ORD DWG 19-48-C-ORDJU-588, "WIRE ROPE AND ANNEALED WIRE APPLICATION METHODS FOR SECURING LADING ON RAIL & MOTOR CARRIER EQUIP", FOR PROPER TIE DOWN APPLICATION.
- E. REFER TO ASSOCIATION OF AMERICAN RAILROADS MANUAL, "GENERAL RULES GOVERNING THE LOADING OF COMMODITIES ON OPEN TOP CARS", FOR APPLICABLE LOADING RULES; PREFACE, 1-A, 2, 3, 4, 5, 9, 14, AND 15.
- F. WIRE ROPE CABLE TENSIONING CAN BE ACCOMPLISHED BY EMPLOYING TWO (2) CABLE "GRIPPERS" AND AN APPLICABLY SIZED "COME-A-LONG" TYPE MECHANICAL HOIST.
- G. ONLY CARS WITH "SOUND" FLOORS WILL BE USED. CARS WITH STEEL FLOOR ENDS AND/OR EXPOSED STEEL BOLSTERS WHICH INTERFERE WITH PROPER POSITIONING OR NAILING OF THE DUNNAGE WILL NOT BE USED. SEE "END BLOCKING FOR CARS WITH EXPOSED STEEL BOLSTERS" DETAIL ON PAGE 3.
- H. WHEN ANY STRAP IS SEALED AT AN END-OVER-END LAP JOINT, OR AS SHOWN IN DETAILS "A" AND "B" BELOW, A MINIMUM OF TWO (2) SEALS (BUTTED TOGETHER) WITH TWO (2) PAIRS OF CRIMPS PER SEAL MUST BE USED.
- J. CAUTION: STAKE POCKETS WILL BE USED FOR ALL TIE DOWN STRAPPING WHENEVER POSSIBLE. DO NOT USE SWIVEL RING TYPE ANCHOR DEVICES. IF OTHER TYPES ARE USED, THEY MUST BE OF SUFFICIENT WIDTH TO RECEIVE 2" STRAP.
- K. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE UNLESS OTHERWISE DIMENSIONED. FOR EXAMPLE, 2" X 6" MATERIAL IS ACTUALLY 1-5/8" THICK BY 5-5/8" WIDE AND 6" X 6" MATERIAL IS ACTUALLY 5-1/2" THICK BY 5-1/2" WIDE.
- L. NOTICE: 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 "APPLICATION OF STAGGERED NAILING PATTERN" ON PAGE 4.



MATERIAL SPECIFICATIONS

- LUMBER** ----- : DOUGLAS FIR OR COMPARABLE LUMBER WITH STRAIGHT GRAIN AND FREE OF MATERIAL DEFECTS. REF: FED SPEC MM-L-751.
- NAILS**----- : COMMON, CEMENT COATED OR CHEMICALLY ETCHED. REF: FED SPEC FF-N-105. ALT: ANNULAR-RING TYPE NAIL OF SAME SIZE.
- ROPE**----- : STEEL WIRE, PLAIN, PREFORMED, REGULAR LAY, 11.5 TONS, 6 X19, FLEXIBLE IWRC, MACWHYTE WIRE ROPE CO. (OR EQUAL). REF: FED SPEC RR-W-410.
- CLIPS**----- : "U" BOLT, CROSBY, HEAVY DUTY (OR EQUAL).
- STRAPPING, STEEL** ----- : TYPE I OR IV, CLASS A OR C. REF: FED SPEC QQ-5-781. (FOR FSN SEE SB-38-100).
- STRAP SEAL; STRAP STAPLE;**
STAKE POCKET PROTECTOR: COMMERCIAL GRADE.

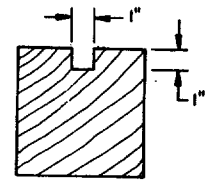
Figure 7-2. Blocking and restraining M-54 on railroad flatcar with wooden floor: Uncrated, mounted on skid base; Crated; and Uncrated, mounted on aluminum blocks (sheet 1 of 9).



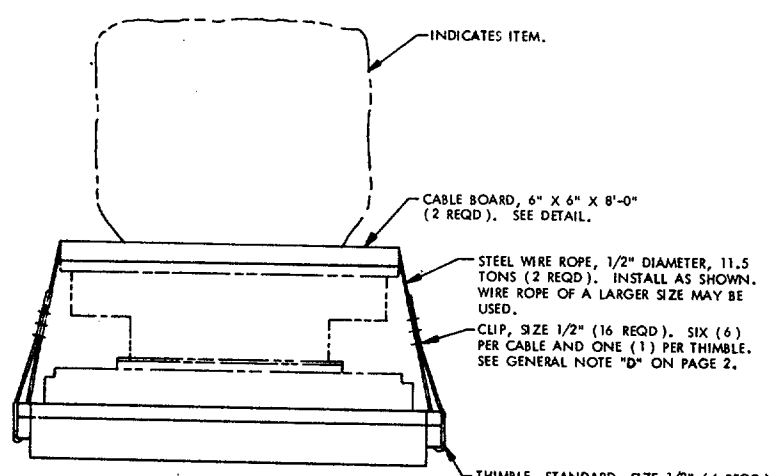
NOTE 1:
THE OPTIONAL STRAP HOLD DOWN FOR END BLOCKING IS FOR CARS WITH OR WITHOUT EXPOSED STEEL BOLSTERS.

NOTE 2:
WHEN LOADING CARS WITH EXPOSED STEEL BOLSTERS, TOTAL OF DIMENSION "A" AND DIMENSION "B" (MIN 12") MUST EQUAL THE LENGTH OF BACK-UP CLEATS (MARKED 2 ON PAGES 4 THROUGH 9) TO PROVIDE FOR PROPER NAILING TO THE CAR FLOOR.

NOTE 3:
A STANDARD THIMBLE AS SPECIFIED CAN BE SECURED TO A CABLE WITH A 1/2" CLIP. HOWEVER, IF DESIRED, OR IF THE 1/2" THIMBLE BEING USED IS OF A TYPE WHICH CANNOT BE SECURED TO A CABLE WITH A 1/2" CLIP, A 5/8" CUP MAY BE USED.



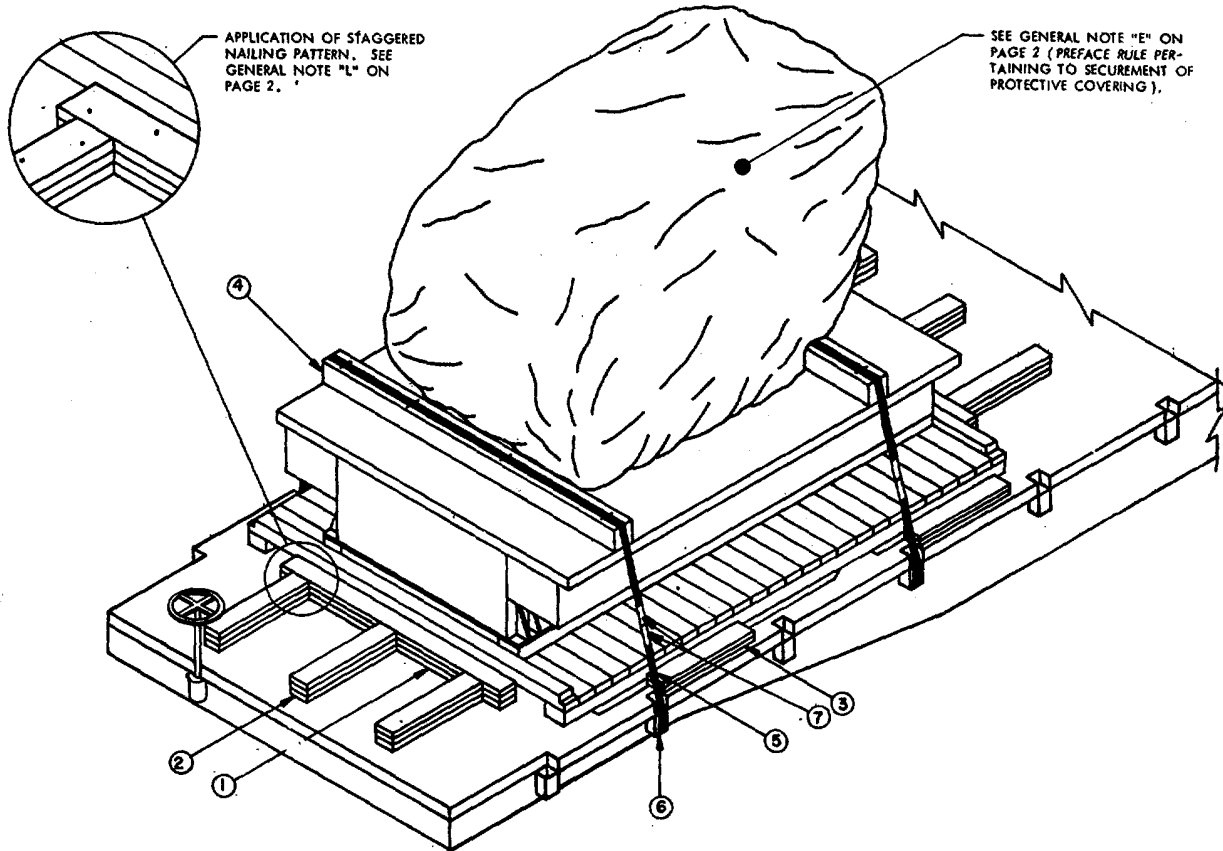
CABLE BOARD
6" X 6" MATERIAL. NOTCH AS SHOWN TO RETAIN CABLE.



ALTERNATIVE HOLD-DOWN
MAY BE USED IN LIEU OF PIECES MARKED 4, 5, 6 AND 7 ON PAGES 4, 5, 8 AND 9.

DETAILS

Figure 7-2-Continued. (Sheet 2 of 9.)



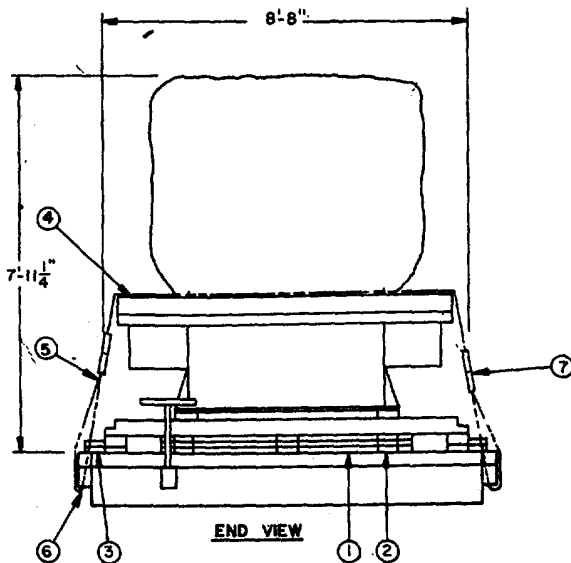
APPLICATION OF STAGGERED NAILING PATTERN. SEE GENERAL NOTE "L" ON PAGE 2.

SEE GENERAL NOTE "E" ON PAGE 2 (PREFACE RULE PERTAINING TO SECUREMENT OF PROTECTIVE COVERING).

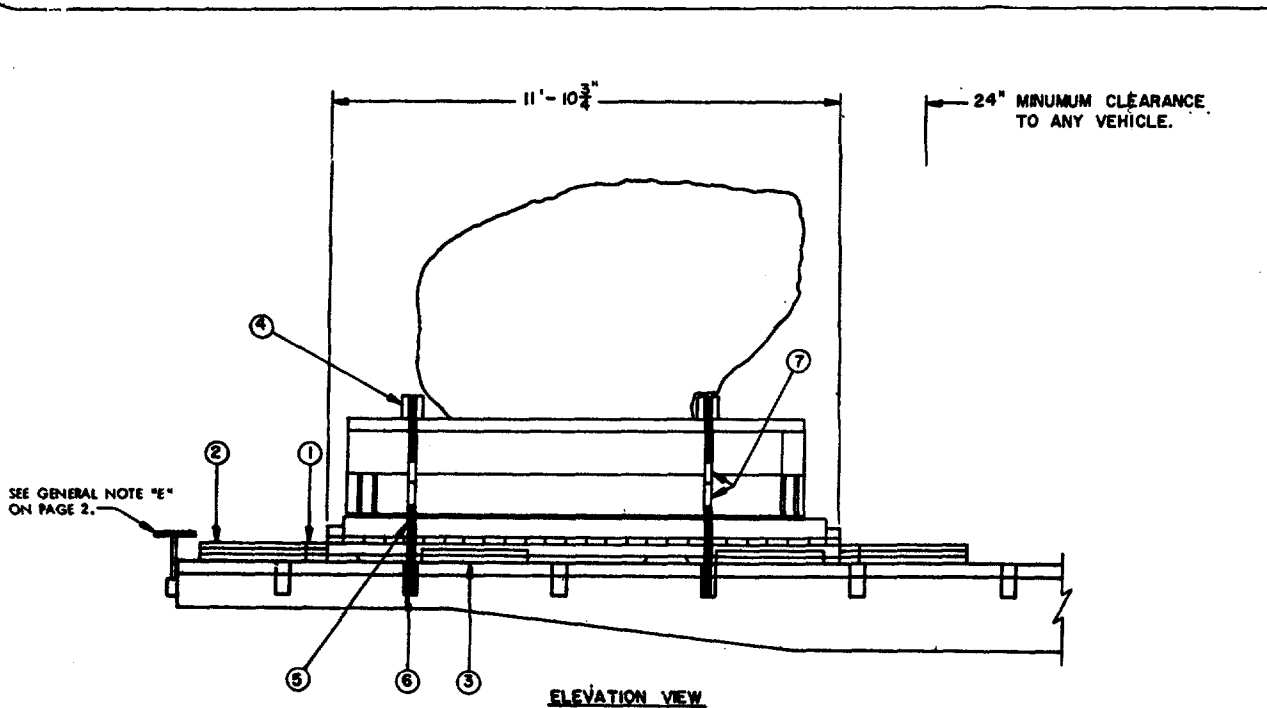
ISOMETRIC VIEW

KEY NUMBERS

- ① HEADER, 2" X 6" X 72" (TRIPLED) (2 REQD.). NAIL THE FIRST PIECE TO THE CAR FLOOR W/9-30d NAILS. NAIL EACH ADDITIONAL PIECE W/9-60d NAILS.
- ② BACK-UP CLEAT, 2" X 6" X 30" (TRIPLED) (6 REQD.). POSITION IN LINE WITH ITEM SKID AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/5-30d NAILS. NAIL EACH ADDITIONAL PIECE W/5-60d NAILS.
- ③ SIDE BLOCKING, 2" X 6" X 30" (DOUBLED) (4 REQD.). POSITION AGAINST ITEM SKID AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/5-30d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER.
- ④ STRAPPING BOARD, 6" X 6" X 8'-0" (2 REQD.).
- ⑤ STEEL STRAPPING, 2" X .050" X 32'-0" (2 REQD.). STAPLE TO PIECE MARKED ④ W/4 STAPLES. SEE SPECIAL NOTE 2 ON PAGE 5.
- ⑥ PAD, 2" X .050" STRAP 24" LONG (4 REQD.). POSITION UNDER AND SEAL TO PIECE MARKED ⑤. SEE "DETAIL A" ON PAGE 2. ALL STAKE POCKET PROTECTOR, SIGNODE NO. 1 (OR EQUAL) (8 REQD.). TMC () USED UNDER EACH STAKE POCKET WITH PIECE MARKED ⑤. SEE "F A B" ON PAGE 2.
- ⑦ SEAL FOR 2" STRAPPING (12 REQD.). SEE GENERAL NOTE "H" ON PAGE 2.



END VIEW



SPECIAL NOTES

1. A ONE (1) UNIT LOAD IS SHOWN ON A 10'-0" WIDE (PLATFORM) FLAT CAR WITH STAKE POCKETS SPACED 42" ON CENTER. A WIDER OR NARROWER (9'-2" MINIMUM) FLAT CAR MAY BE USED.
2. 1/2" CABLE (OR LARGER) MAY BE USED IN LIEU OF 2" STRAPPING SHOWN AS PIECE MARKED ⑤. SEE GENERAL NOTES "D", "E", AND "F" ON PAGE 2. SEE "ALTERNATIVE HOLD-DOWN" DETAIL ON PAGE 3.
3. IF THE FLAT CAR BEING LOADED HAS EXPOSED BOLSTERS, SEE "END-BLOCKING FOR CARS WITH EXPOSED STEEL BOLSTERS" DETAIL ON PAGE 3, FOR SPECIAL GUIDANCE WHICH MAY PERMIT USE OF SOME CARS THAT HAVE EXPOSED STEEL COMPONENTS.
4. ITEM MUST BE LOCATED ON CAR RELATIVE TO LOCATION OF STAKE POCKETS SO THAT WHEN PIECES MARKED ① THROUGH ⑦ ARE APPLIED THEY WILL BE IN THE SAME GENERAL LOCATION RELATIVE TO THE ITEM AS SHOWN.

| BILL OF MATERIAL | | |
|-----------------------------|-------------|------------|
| LUMBER | LINEAR FEET | BOARD FEET |
| 2" X 6" | 83 | 83 |
| 6" X 6" | 16 | 48 |
| NAILS | NO. REQD | POUNDS |
| 30d (4-1/2") | 88 | 4-1/2 |
| 60d (6") | 96 | 9-3/4 |
| STEEL STRAPPING, 2" X .050" | 72' REQD | 25 LBS |
| SEAL FOR 2" STRAPPING | 12 REQD | 4 LBS |
| STAPLE FOR 2" STRAPPING | 8 REQD | NIL |

LOAD AS SHOWN

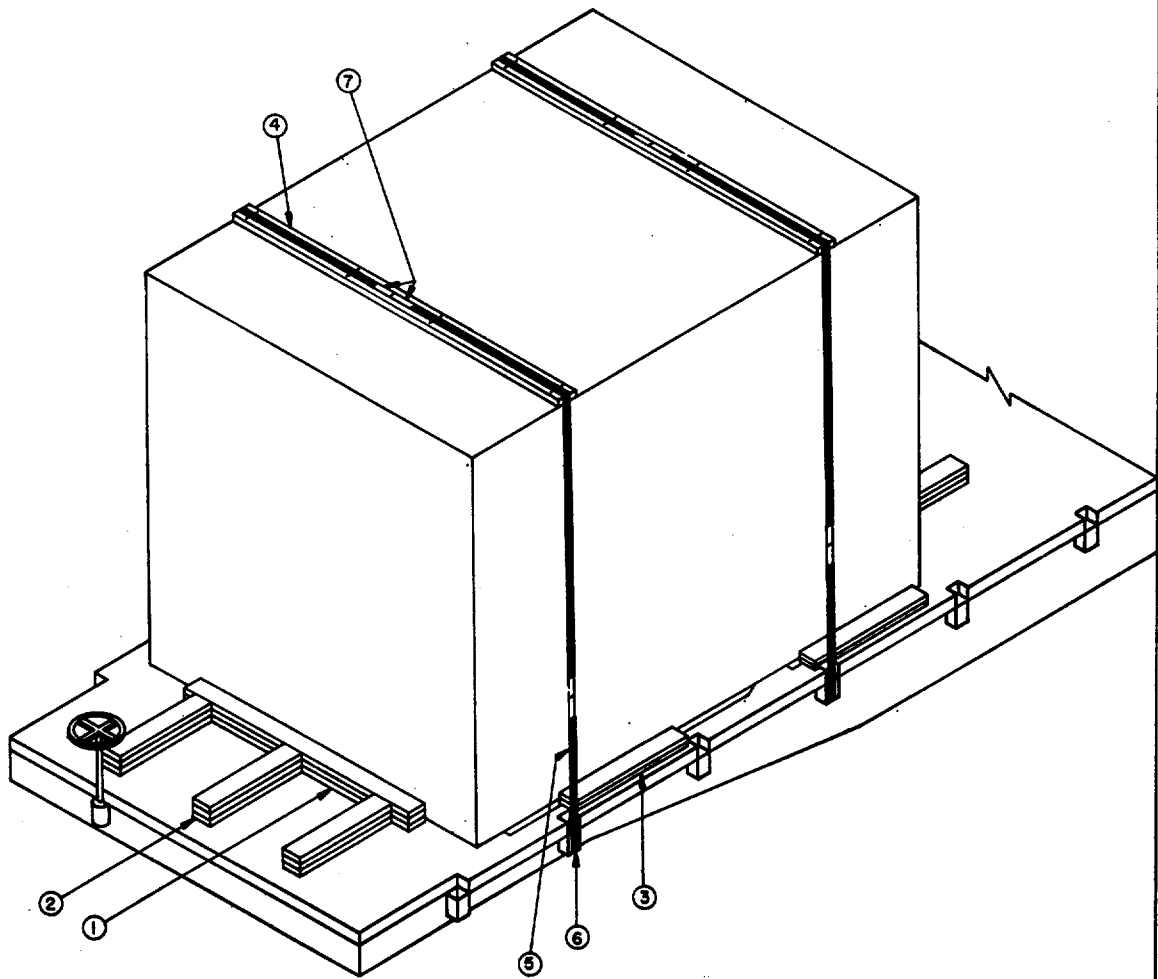
| ITEM | QUANTITY | WEIGHT (APPROX) |
|---------------------|----------|-------------------|
| INTERCEPT AERIAL | | |
| XM54 (UNCRATED) | 1 | 10,924 LBS |
| DUNNAGE | | 370 LBS |
| TOTAL WEIGHT | | 11,294 LBS |

UNCRATED-MOUNTED ON SKID BASE

PAGE 5

PROJECT GSE 413-87

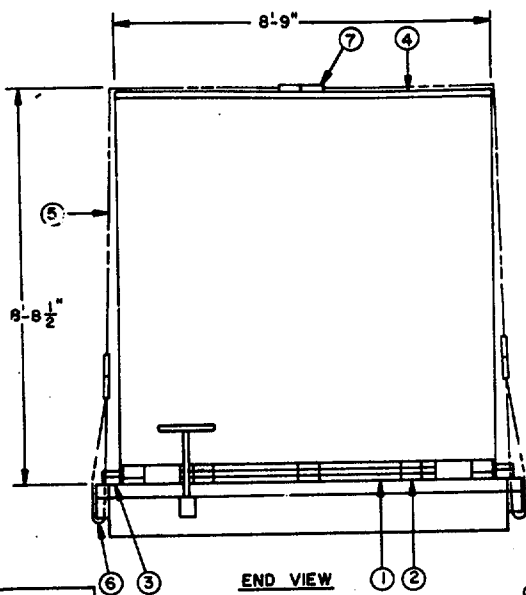
Figure 7-2-Continued. (Sheet 4 of 9.)



ISOMETRIC VIEW

KEY NUMBERS

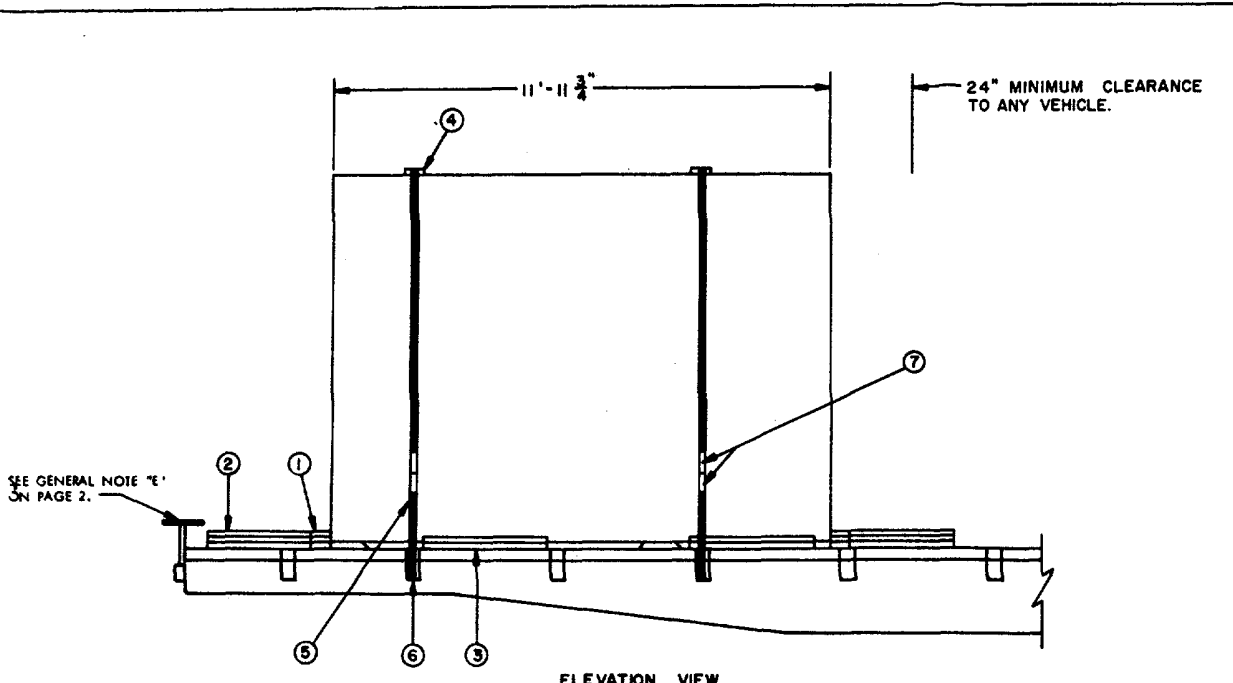
- ① HEADER, 2" X 6" X 72" (TRIPLED) (2 REQD.). NAIL THE FIRST PIECE TO THE CAR FLOOR W/9-30d NAILS. NAIL EACH ADDITIONAL PIECE W/9-6cJ NAILS.
- ② BACK-UP CLEAT, 2" X 6" X 30" (TRIPLED) (6 REQD.). POSITION IN LINE WITH ITEM SKIDS AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/5-30d NAILS. NAIL EACH ADDITIONAL PIECE W/5-60d NAILS.
- ③ SIDE BLOCKING, 2" X 6" X 36" (DOUBLED) (4 REQD.). POSITION AGAINST ITEM SKID AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/6-30d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER.
- ④ STRAPPING BOARD, 2" X 6" BY CRATE WIDTH (2 REQD.).
- ⑤ STEEL STRAPPING, 2" X .050" X 40'-0" (2 REQD.). STAPLE TO PIECE MARKED ④ W/4 STAPLES.
- ⑥ PAD, 2" X .050" STRAP 24" LONG (4 REQD.). POSITION UNDER AND SEAL TO PIECE MARKED ③. SEE "DETAIL A" ON PAGE 2. ALT: STAKE POCKET PROTECTOR, SIGNODE NO. 1 (OR EQUAL) (8 REQD.). TWO (2) USED UNDER EACH STAKE POCKET WITH PIECE MARKED ③. SEE "DETAIL B" ON PAGE 2.
- ⑦ SEAL FOR 2" STRAPPING (16 REQD.). SEE GENERAL NOTE "H" ON PAGE 2



PAGE 6

PROJECT GSE 413-67

Figure 7-2-Continued. (Sheet 5 of 9.)



SPECIAL NOTES

1. A ONE (1) UNIT LOAD IS SHOWN ON A 10'-0" WIDE (PLATFORM) FLAT CAR WITH STAKE POCKETS SPACED 42" ON CENTER. A WIDER FLAT CAR AND A CAR WITH POCKETS SPACED OTHER THAN SHOWN MAY BE USED.
2. IF THE FLAT CAR BEING LOADED HAS EXPOSED BOLSTERS, SEE "END BLOCKING FOR CARS WITH EXPOSED STEEL BOLSTERS" DETAIL ON PAGE 3, FOR SPECIAL GUIDANCE WHICH MAY PERMIT USE OF SOME CARS THAT HAVE EXPOSED STEEL COMPONENTS.
3. ITEM MUST BE LOCATED ON CAR RELATIVE TO LOCATION OF STAKE POCKETS SO THAT WHEN PIECES MARKED (4) THROUGH (7) ARE APPLIED THEY WILL BE IN THE SAME GENERAL LOCATION RELATIVE TO THE ITEM AS SHOWN.

| BILL OF MATERIAL | | |
|-----------------------------|-------------|------------|
| LUMBER | LINEAR FEET | BOARD FEET |
| 2" X 6" | 105 | 105 |
| NAILS | | |
| | NO. REQD | POUNDS |
| 30d (4-1/2") | 96 | 5 |
| 60d (6") | 96 | 9-3/4 |
| STEEL STRAPPING, 2" X .050" | 88' REQD | 29 LBS |
| SEAL FOR 2" STRAPPING | 12 REQD | 4 LBS |
| STAPLE FOR 2" STRAPPING | 8 REQD | NIL |

LOAD AS SHOWN

| ITEM | QUANTITY | WEIGHT (APPROX) |
|------------------|----------|-----------------|
| INTERCEPT AERIAL | | |
| XMS4 (CRATED) | 1 | 12,270 LBS |
| DUNNAGE | | 321 LBS |
| TOTAL WEIGHT | | 12,591 LBS |

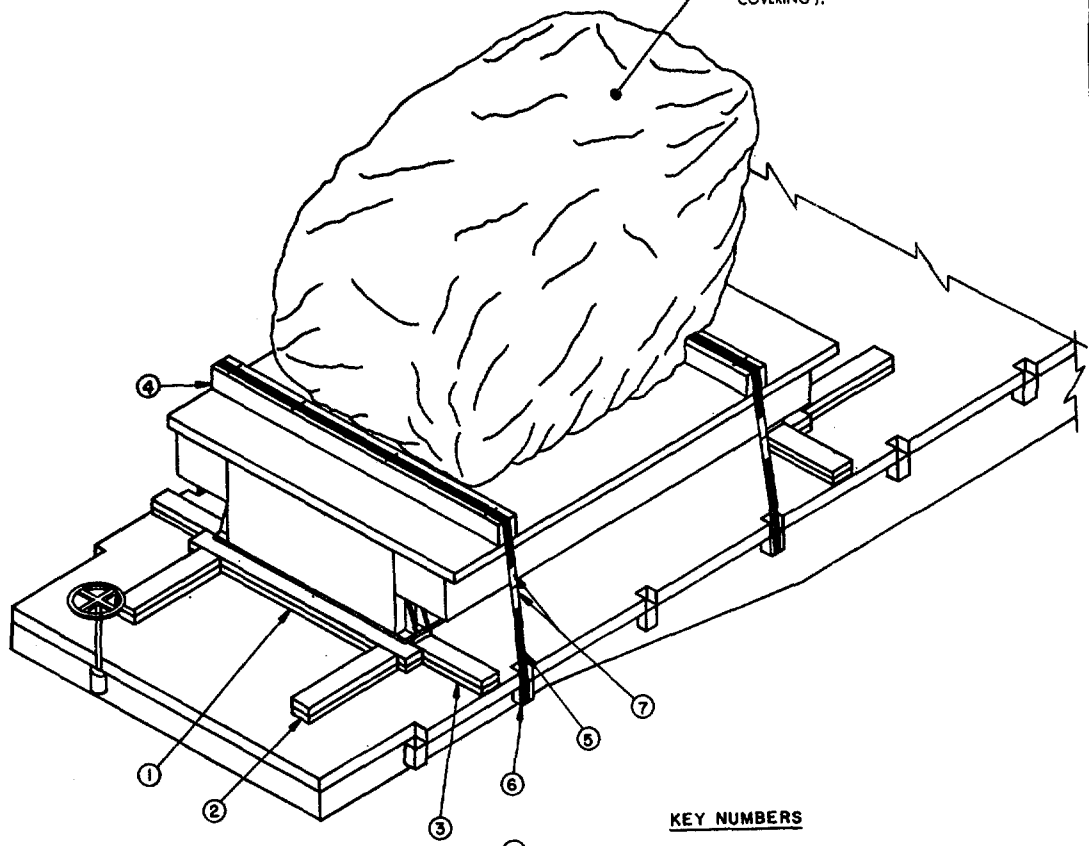
CRATED

PAGE 7

PROJECT **GSE 413-67**

Figure 7-2-Continued. (Sheet 6 of 9.)

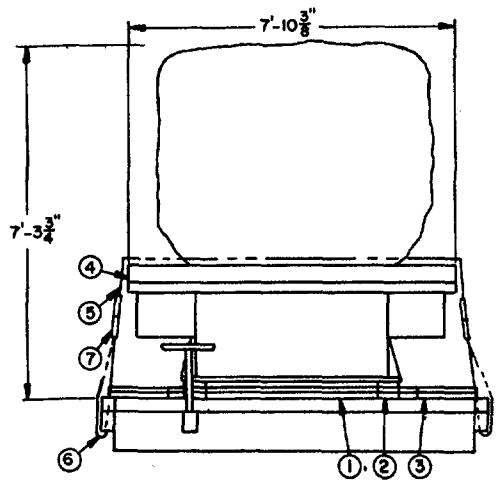
SEE GENERAL NOTE "E" ON PAGE 2
(PREFACE RULE PERTAINING TO
SECUREMENT OF PROTECTIVE
COVERING).



ISOMETRIC VIEW

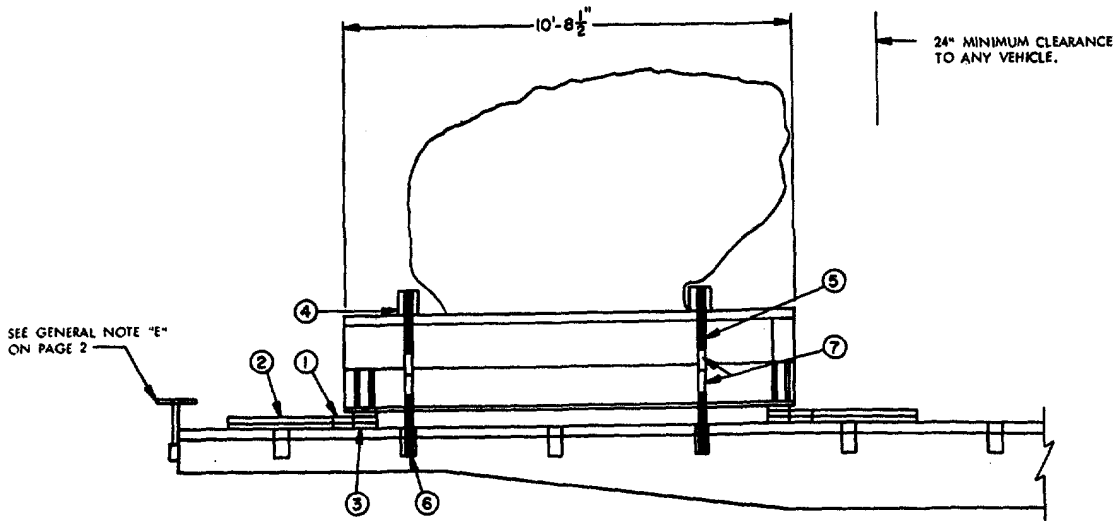
KEY NUMBERS

- ① HEADER, 2" X 6" X 72" (DOUBLED) (2 REQD). POSITION AGAINST ALUMINUM BLOCKS. NAIL THE FIRST PIECE TO THE CAR FLOOR W/9-30d NAILS. NAIL THE SECOND PIECE TO THE FIRST W/9-60d NAILS. SEE SPECIAL NOTE 5.ON PAGE 9.
- ② BACK-UP CLEAT, 2" X 6" X 30" (DOUBLED) (4 REQD). POSITION IN LINE WITH ALUMINUM BLOCKS AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/5-30d NAILS. NAIL THE SECOND PIECE TO THE FIRST W/5-60d NAILS. SEE SPECIAL NOTE 5.ON PAGE 9.
- ③ SIDE BLOCKING, 2" X 6" X 22" (DOUBLED) (4 REQD). POSITION AGAINST ALUMINUM BLOCK AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/4-30d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER.
- ④ STRAPPING BOARD, 6" X 6" X 8'-0" (2 REQD).
- ⑤ STEEL STRAPPING, 2" X .050" X 32'-0" (2 REQD). STAPLE TO PIECE MARKED ④ W/4 STAPLES. SEE SPECIAL NOTE 2 AND 4 ON PAGE 9.
- ⑥ PAD, 2" X .050" STRAP 26" LONG (4 REQD). POSITION UNDER AND SEAL TO PIECE MARKED ③. SEE "DETAIL A" ON PAGE 2. ALT: STAKE POCKET PROTECTORS, SIGMODE NO. 1 (OR EQUAL) (8 REQD). TWO (2) USED UNDER EACH STAKE POCKET WITH PIECE MARKED ⑤. SEE "DETAIL B" ON PAGE 2.
- ⑦ SEAL FOR 2" STRAPPING (12 REQD). SEE ORIGINAL NOTE "H" ON PAGE 2.



END VIEW

Figure 7-2-Continued.(Sheet 7 of 9.)



ELEVATION VIEW

SPECIAL NOTES:

1. A ONE (1) UNIT LOAD IS SHOWN ON A 9'-2" WIDE (PLATFORM) FLAT CAR WITH STAKE POCKETS SPACED 42" ON CENTER. A WIDER FLAT CAR MAY BE USED.
2. 1/2" CABLE (OR LARGER) MAY BE USED IN LIEU OF 2" STRAPPING SHOWN AS PIECE MARKED ⑤. SEE GENERAL NOTES "D", "E", AND "F" ON PAGE 2. SEE "ALTERNATIVE HOLD-DOWN" DETAIL ON PAGE 3.
3. IF THE FLAT CAR BEING LOADED HAS EXPOSED BOLSTERS, SEE "END BLOCKING FOR CARS WITH EXPOSED STEEL BOLSTERS" DETAIL ON PAGE 3, FOR SPECIAL GUIDANCE WHICH MAY PERMIT USE OF SOME CARS THAT HAVE EXPOSED STEEL COMPONENTS.
4. ITEM MUST BE LOCATED ON CAR RELATIVE TO LOCATION OF STAKE POCKETS SO THAT WHEN PIECES MARKED ④ THROUGH ⑦ ARE APPLIED THEY WILL BE IN THE SAME GENERAL LOCATION RELATIVE TO THE ITEM AS SHOWN.
5. THIS ITEM MAY BE BLOCKED BY THE USE OF PRE-POSITIONED HEADERS AND BACK-UP CLEATS AS SHOWN IN THE "PLAN VIEW" ON PAGE 10.

BILL OF MATERIAL

| LUMBER | LINEAR FEET | BOARD FEET |
|-------------------------|-------------|------------|
| 2" X 6" | 59 | 59 |
| 6" X 6" | 16 | 48 |
| NAILS | NO REQD | POUNDS |
| 30d (4-1/2") | 70 | 3-1/2 |
| 60d (6") | 38 | 4 |
| STRAPPING, 2" X .050" | 72' REQD | 25 LBS |
| SEAL FOR 2" STRAPPING | 12 REQD | 4 LBS |
| STAPLE FOR 2" STRAPPING | 8 REQD | NIL |

LOAD AS SHOWN

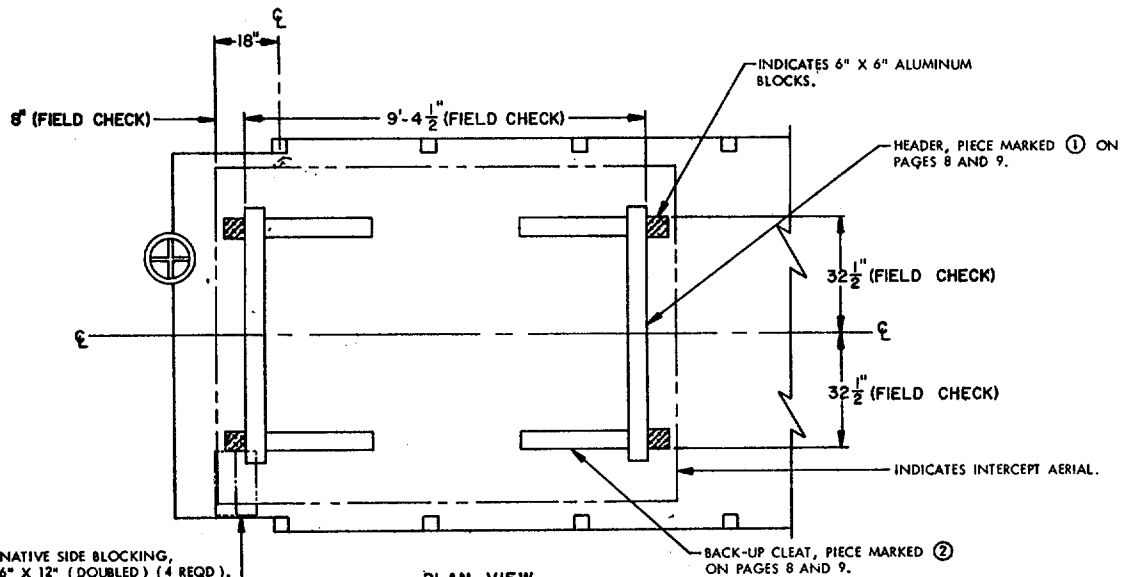
| ITEM | QUANTITY | WEIGHT (APPROX) |
|----------------------|----------|-----------------|
| INTERCEPT AERIAL --- | --- | 9,720 LBS |
| XMS4 (UNCRATED) | --- | --- |
| DUNNAGE | --- | 304 LBS |
| TOTAL WEIGHT | | 10,024 LBS |

UNCRATED-MOUNTED ON ALUMINUM BLOCKS

PAGE 9

PROJECT GSE 413-67

Figure 7-2-Continued. (Sheet 8 of 9.)



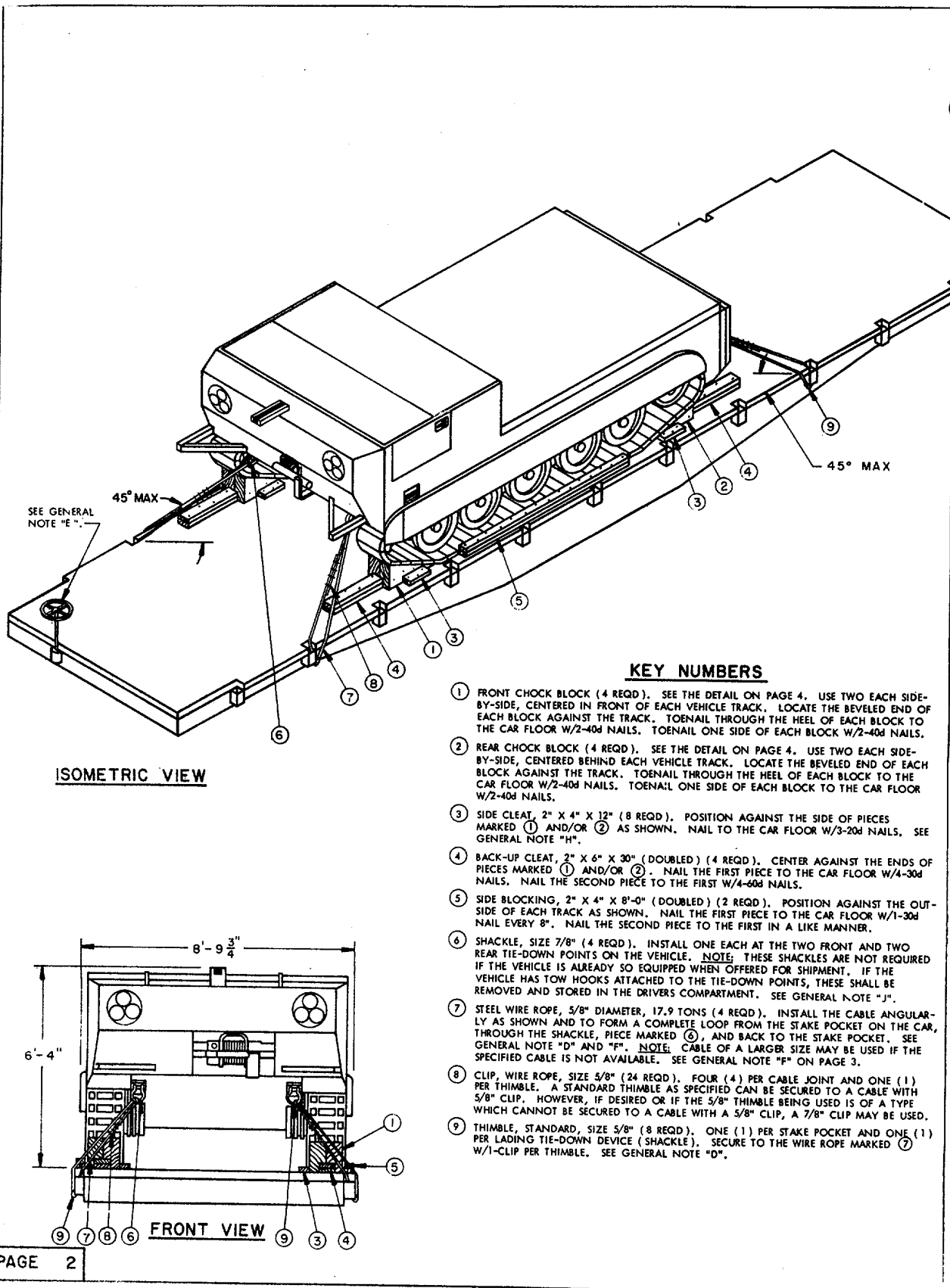
ALTERNATIVE SIDE BLOCKING, 2" X 6" X 12" (DOUBLED) (4 REQD). NAIL THE FIRST PIECE TO THE CAR FLOOR W/2-30d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER. SEE SPECIAL NOTE 2 ON THIS PAGE.

PLAN VIEW

THE VIEW ABOVE DEPICTS THE USE OF PRE-POSITIONED DUNNAGE FOR THE LOAD SHOWN ON PAGES 8 AND 9.

SPECIAL NOTES:

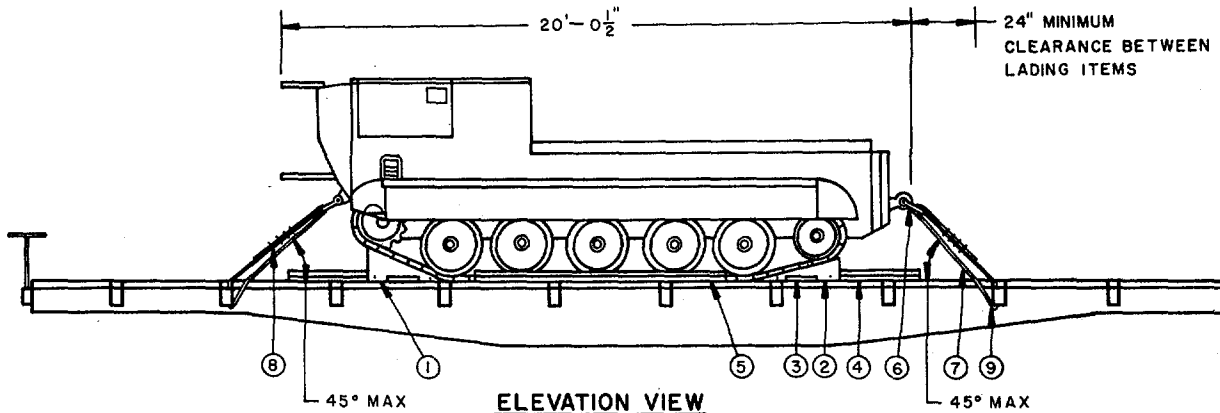
1. A ONE (1) UNIT LOAD, DEPICTING THE USE OF PRE-POSITIONED HEADERS AND BACK-UP CLEATS, IS SHOWN ON A 9'-2" WIDE (PLATFORM) FLAT CAR WITH STAKE POCKETS SPACED 42" ON CENTER. A WIDER CAR MAY BE USED.
2. WHEN LOADING THE ITEM AS CLOSE TO THE END OF THE CAR AS SHOWN ABOVE, THE SIDE BLOCKING POSITIONED NEAR THE END OF THE CAR MAY BE SHORTENED TO 2" X 6" X 12" (DOUBLED) (4 REQD). SEE 'PLAN VIEW' ABOVE. IT WILL ALSO BE NECESSARY TO SHORTEN THE HEADER AT THIS LOCATION TO PROVIDE ROOM FOR THE SIDE BLOCKING. ALL OTHER SIDE BLOCKING WILL BE THE SAME AS PIECE MARKED ③ ON PAGES 8 AND 9.
3. SEE PIECES MARKED ④ THROUGH ⑦ ON PAGES 8 AND 9 FOR ITEM HOLD-DOWN PROCEDURES.



KEY NUMBERS

- ① FRONT CHOCK BLOCK (4 REQD). SEE THE DETAIL ON PAGE 4. USE TWO EACH SIDE-BY-SIDE, CENTERED IN FRONT OF EACH VEHICLE TRACK. LOCATE THE BEVELED END OF EACH BLOCK AGAINST THE TRACK. TOENAIL THROUGH THE HEEL OF EACH BLOCK TO THE CAR FLOOR W/2-40d NAILS. TOENAIL ONE SIDE OF EACH BLOCK W/2-40d NAILS.
- ② REAR CHOCK BLOCK (4 REQD). SEE THE DETAIL ON PAGE 4. USE TWO EACH SIDE-BY-SIDE, CENTERED BEHIND EACH VEHICLE TRACK. LOCATE THE BEVELED END OF EACH BLOCK AGAINST THE TRACK. TOENAIL THROUGH THE HEEL OF EACH BLOCK TO THE CAR FLOOR W/2-40d NAILS. TOENAIL ONE SIDE OF EACH BLOCK TO THE CAR FLOOR W/2-40d NAILS.
- ③ SIDE CLEAT, 2" X 4" X 12" (8 REQD). POSITION AGAINST THE SIDE OF PIECES MARKED ① AND/OR ② AS SHOWN. NAIL TO THE CAR FLOOR W/3-20d NAILS. SEE GENERAL NOTE "H".
- ④ BACK-UP CLEAT, 2" X 6" X 30" (DOUBLED) (4 REQD). CENTER AGAINST THE ENDS OF PIECES MARKED ① AND/OR ②. NAIL THE FIRST PIECE TO THE CAR FLOOR W/4-30d NAILS. NAIL THE SECOND PIECE TO THE FIRST W/4-60d NAILS.
- ⑤ SIDE BLOCKING, 2" X 4" X 8'-0" (DOUBLED) (2 REQD). POSITION AGAINST THE OUT-SIDE OF EACH TRACK AS SHOWN. NAIL THE FIRST PIECE TO THE CAR FLOOR W/1-30d NAIL EVERY 8". NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER.
- ⑥ SHACKLE, SIZE 7/8" (4 REQD). INSTALL ONE EACH AT THE TWO FRONT AND TWO REAR TIE-DOWN POINTS ON THE VEHICLE. NOTE: THESE SHACKLES ARE NOT REQUIRED IF THE VEHICLE IS ALREADY SO EQUIPPED WHEN OFFERED FOR SHIPMENT. IF THE VEHICLE HAS TOW HOOKS ATTACHED TO THE TIE-DOWN POINTS, THESE SHALL BE REMOVED AND STORED IN THE DRIVERS COMPARTMENT. SEE GENERAL NOTE "J".
- ⑦ STEEL WIRE ROPE, 5/8" DIAMETER, 17.9 TONS (4 REQD). INSTALL THE CABLE ANGULARLY AS SHOWN AND TO FORM A COMPLETE LOOP FROM THE STAKE POCKET ON THE CAR, THROUGH THE SHACKLE, PIECE MARKED ⑥, AND BACK TO THE STAKE POCKET. SEE GENERAL NOTE "D" AND "F". NOTE: CABLE OF A LARGER SIZE MAY BE USED IF THE SPECIFIED CABLE IS NOT AVAILABLE. SEE GENERAL NOTE "F" ON PAGE 3.
- ⑧ CLIP, WIRE ROPE, SIZE 5/8" (24 REQD). FOUR (4) PER CABLE JOINT AND ONE (1) PER THIMBLE. A STANDARD THIMBLE AS SPECIFIED CAN BE SECURED TO A CABLE WITH 5/8" CLIP. HOWEVER, IF DESIRED OR IF THE 5/8" THIMBLE BEING USED IS OF A TYPE WHICH CANNOT BE SECURED TO A CABLE WITH A 5/8" CLIP, A 7/8" CLIP MAY BE USED.
- ⑨ THIMBLE, STANDARD, SIZE 5/8" (8 REQD). ONE (1) PER STAKE POCKET AND ONE (1) PER LADING TIE-DOWN DEVICE (SHACKLE). SECURE TO THE WIRE ROPE MARKED ⑦ W/1-CLIP PER THIMBLE. SEE GENERAL NOTE "D".

Figure 7-3. Block and restraining M730 on railroad flatcar with wooden floor (sheet 1 of 3).



ELEVATION VIEW

GENERAL NOTES

- A.
- B. THE LOAD AS SHOWN IS BASED ON A FLAT CAR 9'-2" WIDE (PLATFORM). WIDER CARS CAN BE USED. ONLY ONE UNIT OF LADING IS SHOWN; HOWEVER, MULTIPLES OF UNITS, AS SHOWN OR DISSIMILAR IN NATURE, MAY BE LOADED ON A CAR. THE NUMBER OF UNITS TO BE LOADED ON A CAR WILL BE DEPENDENT ON THE SIZE OF THE CAR USED OR THE QUANTITIES OF UNITS TO BE SHIPPED, WITH THE VIEW OF FULL UTILIZATION OF CARRIER EQUIPMENT.
- C. LADING DATA:
ITEM DIMENSIONS ----- 20'-0-1/2" LONG X 8'-9-3/4" WIDE X 6'-4" HIGH.
ITEM GROSS WEIGHT ----- 16,233 POUNDS (APPROX).
- D. REFER TO ORD DWG 19-48-C-ORDJU-588, "WIRE ROPE AND ANNEALED WIRE APPLICATION METHODS FOR SECURING LADING ON RAIL & MOTOR CARRIER EQUIP", FOR PROPER TIEDOWN APPLICATION.
- E. REFER TO ASSOCIATION OF AMERICAN RAILROADS MANUAL "GENERAL RULES GOVERNING THE LOADING OF COMMODITIES ON OPEN TOP CARS", FOR APPLICABLE LOADING RULES: PREFACE 1-A, 2, 3, 4, 5, 9, 14, 15, AND 19-A.
- F. TO ACHIEVE PROPER CABLE TENSION, EMPLOY TWO (2) CABLE "GRIPPERS" AND AN APPLICABLY SIZED "COME-A-LONG" TYPE MECHANICAL HOIST. NOTE: CABLES WILL BE TENSIONED SUFFICIENTLY TO CAUSE THE BODY OF THE TRACK VEHICLE TO DEPRESS APPROXIMATELY ONE INCH (1").
- G. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE UNLESS OTHERWISE DIMENSIONED. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-5/8" THICK BY 3-5/8" WIDE.
- H. NOTICE: A STAGGERED NAILING PATTERN WILL BE USED WHEN NAILING DUNNAGE TO THE FLOOR OF THE TRANSPORTING VEHICLE, OR WHEN LAMINATING DUNNAGE. ALSO, 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.
- J. MORE DISTANCE MAY BE REQUIRED BETWEEN THE DRILLED PADS AT THE OPEN END OF A SHACKLE SO THAT IT WILL FIT PROPERLY OVER THE THICKNESS OF THE TOWING/TIEDOWN BRACKET ON THE VEHICLE. TO PROVIDE THE NEEDED CLEARANCE, EQUAL AMOUNTS OF MATERIAL MAY BE REMOVED FROM THE SHACKLE PADS BY GRINDING OR MACHINING.

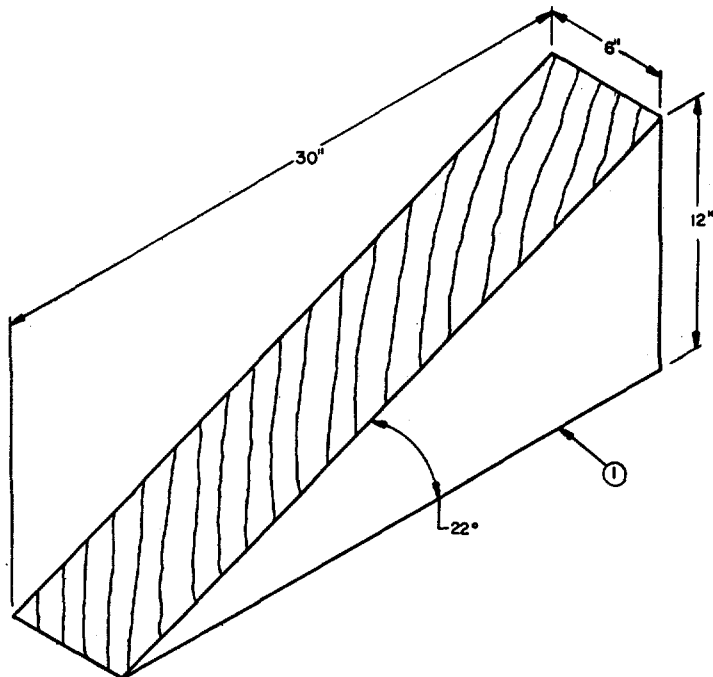
| BILL OF MATERIAL | | |
|----------------------------|-------------|------------|
| LUMBER | LINEAR FEET | BOARD FEET |
| 2" X 4" | 40 | 27 |
| 2" X 6" | 20 | 20 |
| 6" X 8" | 6 | 24 |
| 6" X 12" | 5 | 30 |
| NAILS | NO. REQD | POUNDS |
| 30d (4-1/2") | 88 | 4-1/2 |
| 40d (5") | 32 | 2 |
| 60d (6") | 16 | 1-3/4 |
| ROPE, STEEL WIRE, 5/8" DIA | 70' REQD | 48 LBS |
| CLIP, 5/8" | 24 REQD | 15 LBS |
| CLIP, 7/8" (ALT FOR 5/8") | 24 REQD | 23 LBS |
| THIMBLE, STANDARD, 5/8" | 8 REQD | 2 LBS |
| SHACKLE, 7/8" | 4 REQD | 9 LBS |

MATERIAL SPECIFICATIONS

- LUMBER** -- DOUGLAS FIR OR COMPARABLE LUMBER WITH STRAIGHT GRAIN AND FREE OF MATERIAL DEFECTS. REF: FED SPEC MM-L-751.
- NAILS** -- COMMON, CEMENT COATED OR CHEMICALLY ETCHED. REF: FED SPEC FF-N-105. ALT: ANNULAR-RING TYPE NAIL OF THE SAME SIZE.
- ROPE** -- STEEL WIRE, PLAIN, PREFORMED, REGULAR LAY, 17.9 TONS, 6 X 19, FLEXIBLE IWRC, MACWHYTE WIRE ROPE CO. (OR EQUAL). REF: FED SPEC RR-W-410.
- CLIPS** -- "U" BOLT, CROSBY, HEAVY DUTY (OR EQUAL).
- SHACKLE** -- TYPE IV, CLASS 4; FED SPEC RR-C-271.

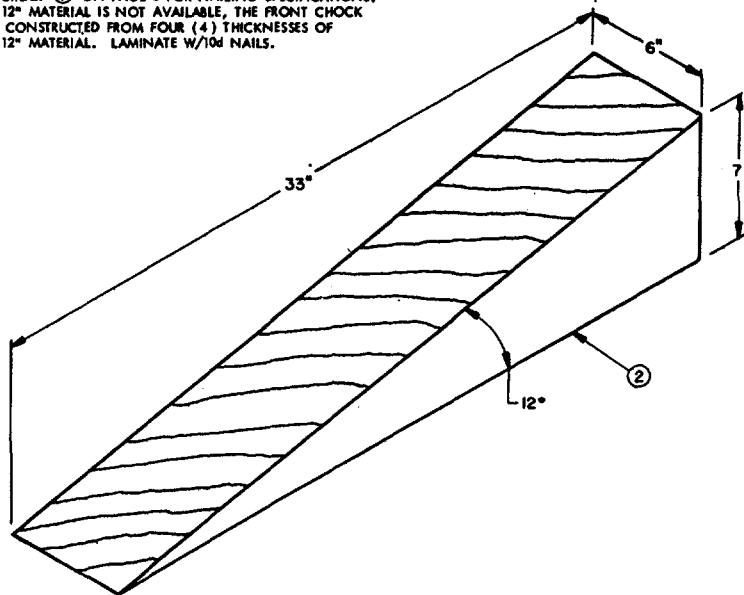
LOAD AS SHOWN

| ITEM | QUANTITY | WEIGHT (APPROX) |
|--------------|----------|-----------------|
| XM730, | MTD -- 1 | 16,233 LBS |
| DUNNAGE | | 335 LBS |
| TOTAL WEIGHT | | 16,568 LBS |



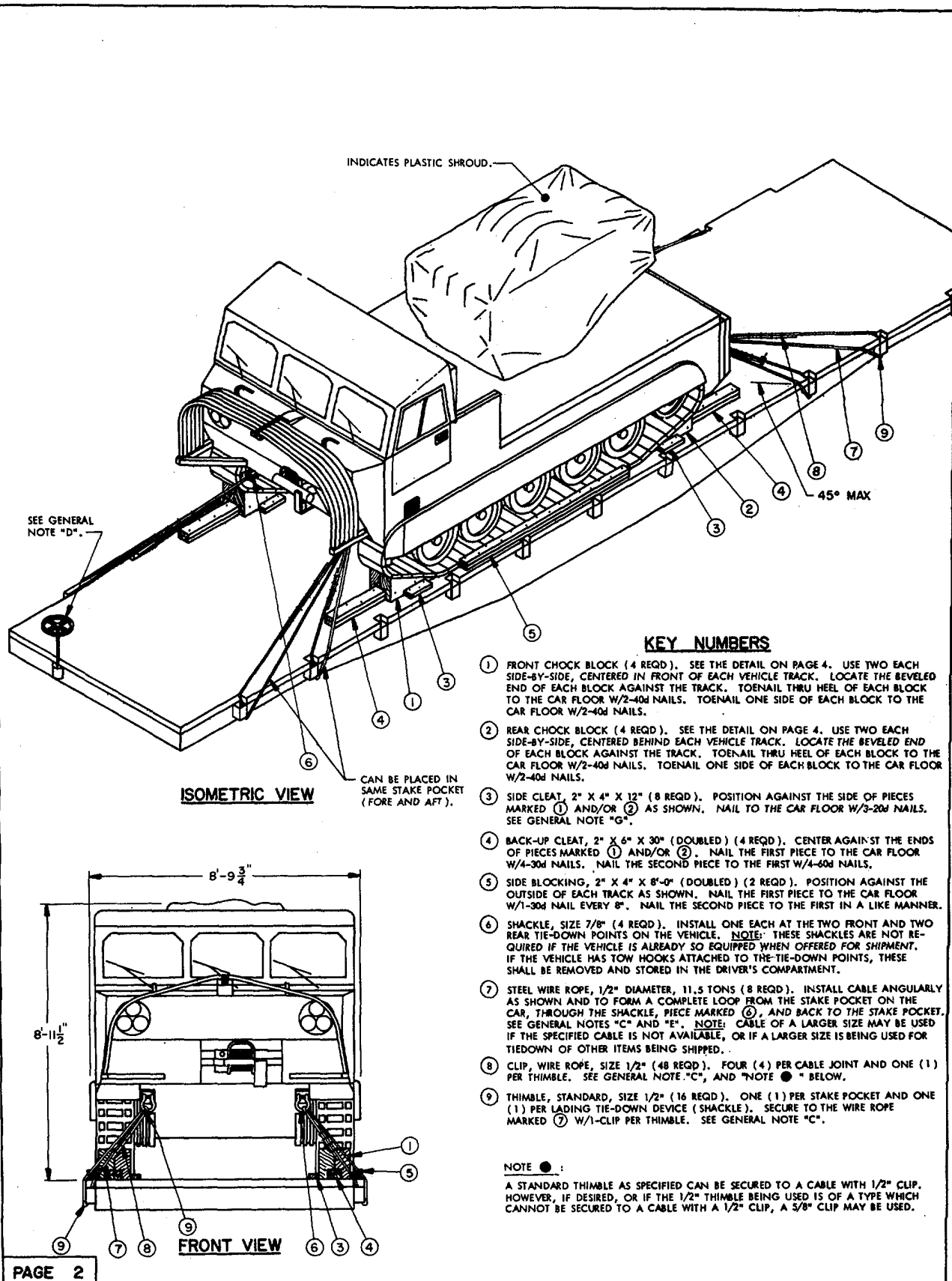
FRONT CHOCK BLOCK

REFER TO KEY NUMBER ① ON PAGE 2 FOR NAILING SPECIFICATIONS.
 NOTE: IF 6" X 12" MATERIAL IS NOT AVAILABLE, THE FRONT CHOCK BLOCKS MAY BE CONSTRUCTED FROM FOUR (4) THICKNESSES OF NOMINAL 2" X 12" MATERIAL. LAMINATE W/10d NAILS.



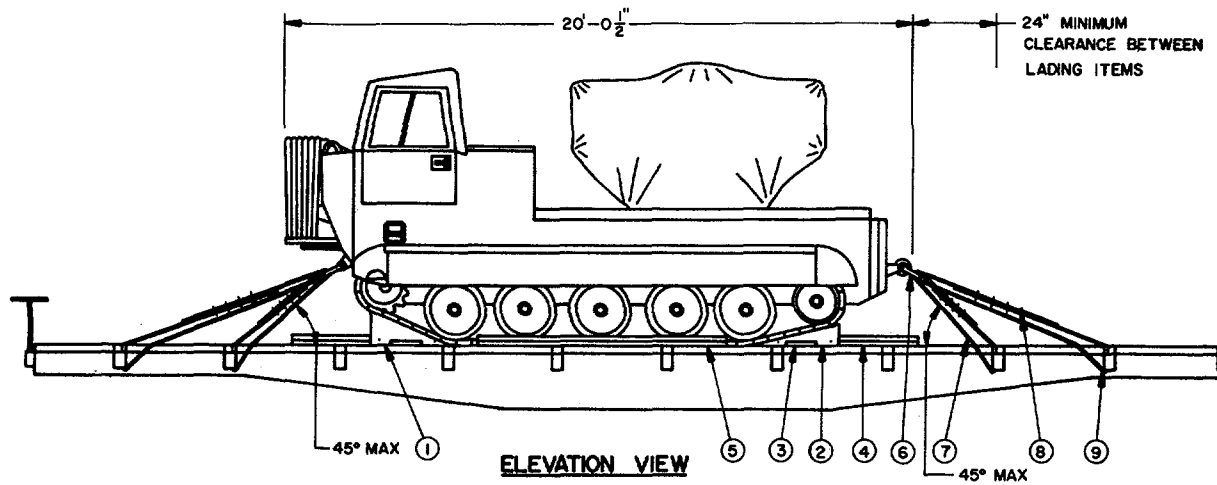
REAR CHOCK BLOCK

REFER TO KEY NUMBER ② ON PAGE 2 FOR NAILING SPECIFICATIONS.
 NOTE: IF 6" X 8" MATERIAL IS NOT AVAILABLE, THE REAR CHOCK BLOCKS MAY BE CONSTRUCTED FROM FOUR (4) THICKNESSES OF NOMINAL 2" X 8" MATERIAL. LAMINATE W/10d NAILS.



PROJECT GSE 409-67

Figure 7-4. Blocking and restraining M48 on railroad flatcar with wooden floor (sheet 1 of 3).



ELEVATION VIEW

GENERAL NOTES

- A. THE LOAD AS SHOWN IS BASED ON A FLAT CAR 9'-2" WIDE (PLATFORM). WIDER CARS CAN BE USED. ONLY ONE UNIT OF LADING IS SHOWN; HOWEVER, MULTIPLES OF UNITS, AS SHOWN OR DISSIMILAR IN NATURE, MAY BE LOADED ON A CAR. THE NUMBER OF UNITS TO BE LOADED ON A CAR WILL BE DEPENDENT ON THE SIZE OF THE CAR USED OR THE QUANTITIES OF UNITS TO BE SHIPPED, WITH THE VIEW OF FULL UTILIZATION OF CARRIER EQUIPMENT.
- B. LADING DATA:
 ITEM DIMENSIONS ----- 20'-0-1/2" LONG X 8'-9-3/4" WIDE X 8'-11-1/2" HIGH.
 ITEM GROSS WEIGHT ----- 26,800 POUNDS (APPROX).
- C. REFER TO ORD DWG 19-48-C-ORDJU-588, "WIRE ROPE AND ANNEALED WIRE APPLICATION METHODS FOR SECURING LADING ON RAIL & MOTOR CARRIER EQUIP.", FOR PROPER TIE DOWN APPLICATION.
- D. REFER TO ASSOCIATION OF AMERICAN RAILROADS MANUAL, "GENERAL RULES GOVERNING THE LOADING OF COMMODITIES ON OPEN TOP CARS", FOR APPLICABLE LOADING RULES: PREFACE, 1-A, 2, 3, 4, 5, 9, 14, 15, AND 19-A.
- E. TO ACHIEVE PROPER CABLE TENSION, EMPLOY TWO (2) CABLE "GRIPPERS" AND AN APPLICABLY SIZED "COME-A-LONG" TYPE MECHANICAL HOIST. **NOTE:** CABLES WILL BE TENSIONED SUFFICIENTLY TO CAUSE THE BODY OF THE TRACK VEHICLE TO DEPRESS APPROXIMATELY ONE INCH (1").
- F. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE UNLESS OTHERWISE DIMENSIONED. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-5/8" THICK BY 3-5/8" WIDE.
- G. **NOTICE:** A STAGGERED NAILING PATTERN WILL BE USED WHEN NAILING DUNNAGE TO THE FLOOR OF THE TRANSPORTING VEHICLE, OR WHEN LAMINATING DUNNAGE. ALSO, 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.

| BILL OF MATERIAL | | |
|-----------------------------------|-------------|------------|
| LUMBER | LINEAR FEET | BOARD FEET |
| 2" X 4" | 40 | 27 |
| 2" X 6" | 20 | 20 |
| 6" X 8" | 6 | 24 |
| 6" X 12" | 5 | 30 |
| NAILS | NO. REQD | POUNDS |
| 30d (4-1/2") | 88 | 4-1/2 |
| 40d (5") | 32 | 2 |
| 60d (6") | 16 | 1-3/4 |
| ROPE, STEEL WIRE, 1/2" DIA | 160 REQD | 70 LBS |
| CLIP, 1/2" | 48 REQD | 21 LBS |
| CLIP, 5/8" (ALT FOR 1/2", 8 REQD) | | 5 LBS |
| THIMBLE, STANDARD, 1/2" | 16 REQD | 4 LBS |
| SHACKLE, 7/8" | 4 REQD | 9 LBS |

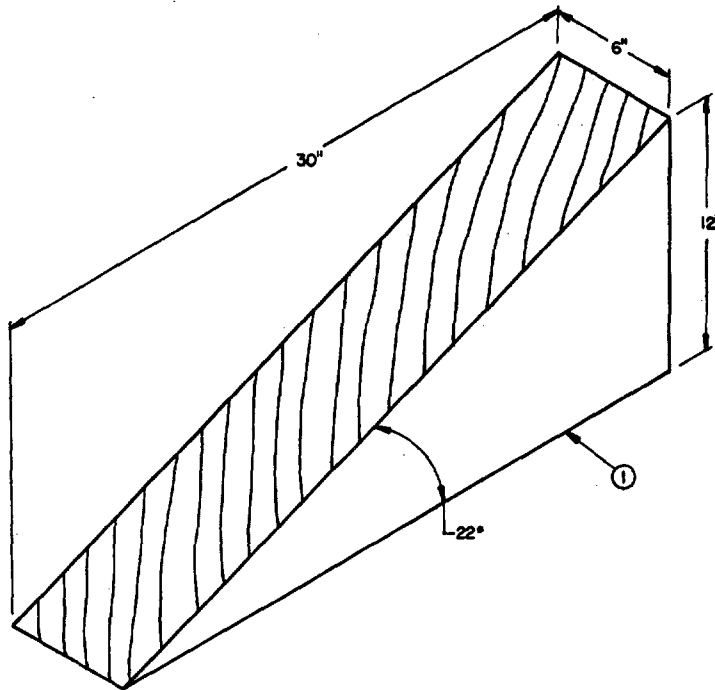
MATERIAL SPECIFICATIONS

- LUMBER:** DOUGLAS FIR OR COMPARABLE LUMBER WITH STRAIGHT GRAIN AND FREE OF MATERIAL DEFECTS. REF: FED SPEC MM-L-751.
- NAILS:** COMMON, CEMENT COATED OR CHEMICALLY ETCHED. REF: FED SPEC FF-N-105. ALT: ANNULAR-RING TYPE NAIL OF THE SAME SIZE.
- ROPE:** STEEL WIRE, PLAIN, PREFORMED, REGULAR LAY, 11.5 TONS, 6 X 19, FLEXIBLE IWRC, MACWHYTE WIRE ROPE CO. (OR EQUAL). REF: FED SPEC RR-W-410.
- CLIPS:** "U" BOLT, CROSBY, HEAVY DUTY (OR EQUAL).
- SHACKLE:** MIL-S-5675A.

LOAD AS SHOWN

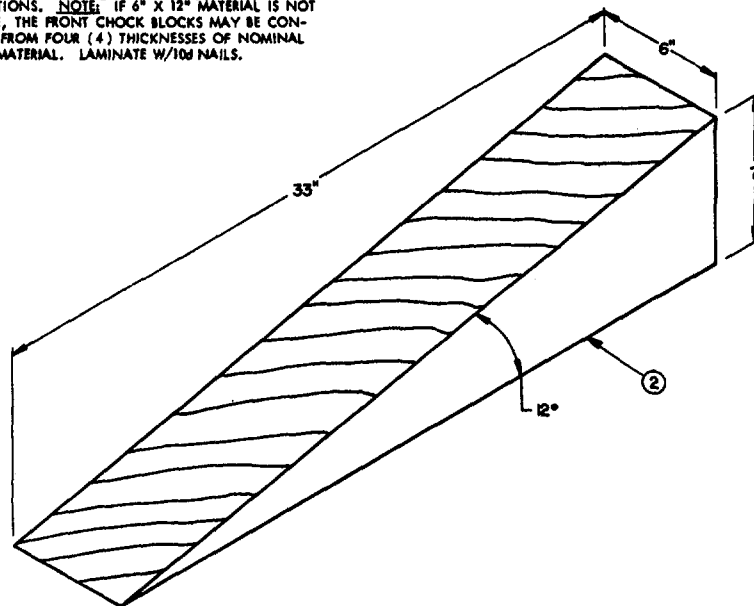
| ITEM | QUANTITY | WEIGHT (APPROX) |
|------------------------|----------|-------------------|
| GMSIA, CARRIER MOUNTED | 1 | 26,800 LBS |
| DUNNAGE | | 365 LBS |
| TOTAL WEIGHT | | 27,165 LBS |

Figure 7-4-Continued. (Sheet 2 of 3.)



FRONT CHOCK BLOCK

REFER TO KEY NUMBER ① ON PAGE ② FOR NAILING SPECIFICATIONS. NOTE: IF 6" X 12" MATERIAL IS NOT AVAILABLE, THE FRONT CHOCK BLOCKS MAY BE CONSTRUCTED FROM FOUR (4) THICKNESSES OF NOMINAL 2" X 12" MATERIAL. LAMINATE W/10d NAILS.



REAR CHOCK BLOCK

REFER TO KEY NUMBER ② ON PAGE 2 FOR NAILING SPECIFICATIONS. NOTE: IF 6" X 8" MATERIAL IS NOT AVAILABLE, THE REAR CHOCK BLOCKS MAY BE CONSTRUCTED FROM FOUR (4) THICKNESSES OF NOMINAL 2" X 8" MATERIAL. LAMINATE W/10d NAILS.

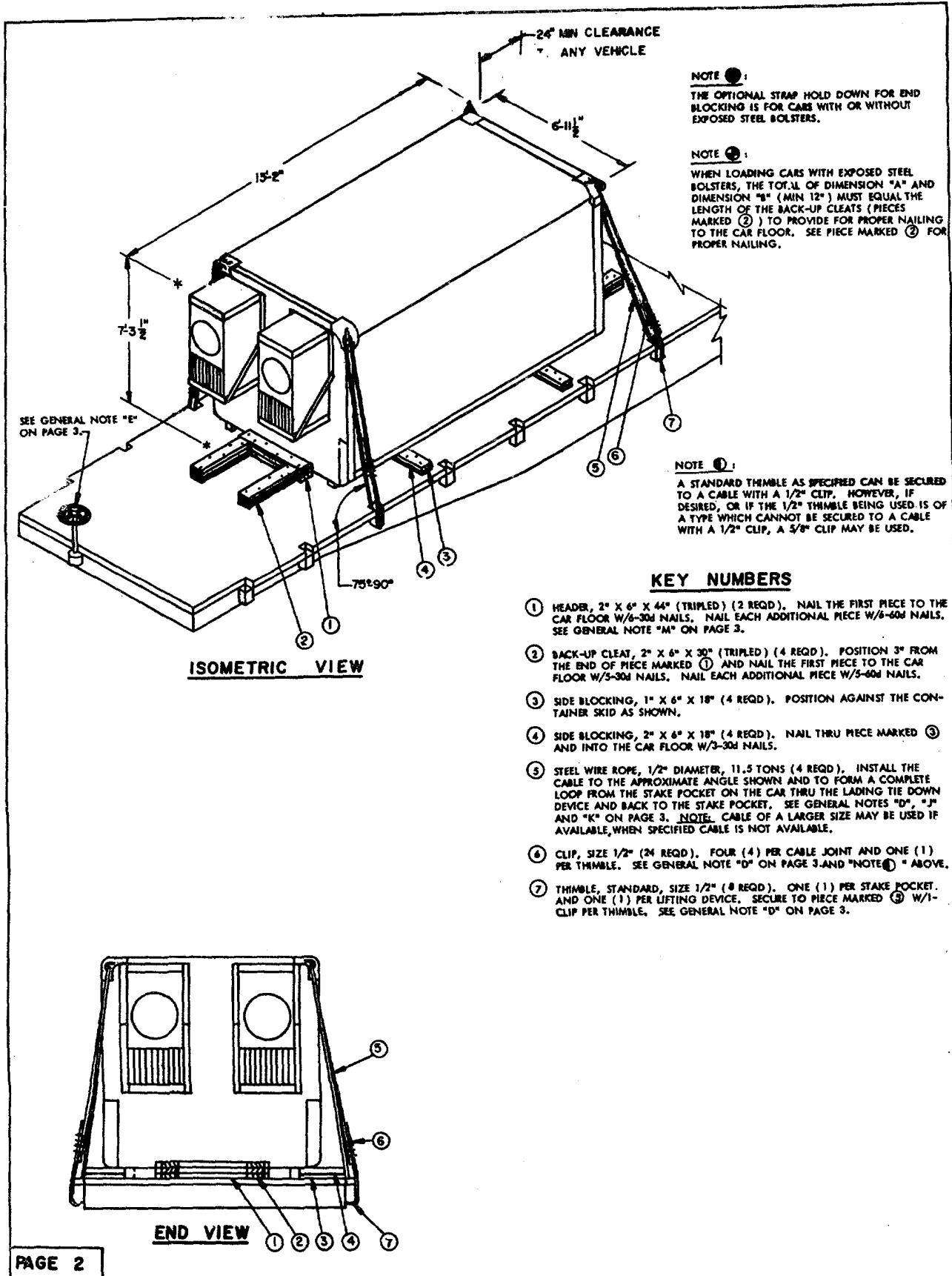
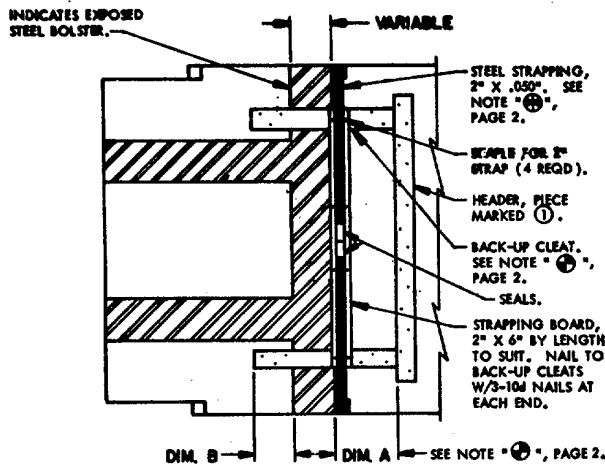


Figure 7-5. Blocking and restraining AN/TSM-95 or AN/TSM-96 on railroad flatcar with wooden floor (sheet 1 of 3).



TYPICAL END BLOCKING FOR CARS WITH EXPOSED STEEL BOLSTERS

SEE GENERAL NOTE "F". THE BLOCKING AS SHOWN IS APPLICABLE FOR THE CRATED ITEM. ADJUST AS NECESSARY FOR THE UNCRATED LOAD ON PAGE 2.

GENERAL NOTES

- A.
- B. THE LOADS AS SHOWN ARE BASED ON FLAT CARS 8'-6" WIDE (PLATFORM); WIDER CARS CAN BE USED. ONLY ONE UNIT OF LADING IS SHOWN IN EACH LOAD VIEW; HOWEVER, MULTIPLES OF UNITS, AS SHOWN OR DISSIMILAR IN NATURE, MAY BE LOADED ON A CAR. THE NUMBER OF UNITS TO BE LOADED ON A CAR WILL BE DEPENDENT ON THE SIZE OF THE CAR USED OR THE QUANTITIES OF UNITS TO BE SHIPPED WITH THE VIEW OF FULL UTILIZATION OF CARRIER EQUIPMENT.
- C. LADING DATA (UNCRATED):
ITEM DIMENSIONS ----- 15'-2" LONG X 6'-11-1/2" WIDE X 7'-3-1/2" HIGH.
ITEM GROSS WEIGHT ---- 3,855 POUNDS (APPROX).
- LADING DATA (CRATED):
ITEM DIMENSIONS ----- 16'-5-1/2" LONG X 7'-6" WIDE X 7'-11" HIGH.
ITEM GROSS WEIGHT ---- 6,140 POUNDS (APPROX).
- D. REFER TO ORD DWG 19-48-C-ORDJU-588, "WIRE ROPE AND ANNEALED WIRE APPLICATION METHODS FOR SECURING LADING ON RAIL & MOTOR CARRIER EQUIP", FOR PROPER TIEDOWN APPLICATION.
- E. REFER TO ASSOCIATION OF AMERICAN RAILROADS MANUAL, "GENERAL RULES GOVERNING THE LOADING OF COMMODITIES ON OPEN TOP CARS", FOR APPLICABLE LOADING RULES; PREFACE, 1-A, 2, 3, 4, 5, 9, 14 AND 15.
- F. ONLY CARS WITH "SOUND" FLOORS WILL BE USED. CARS WITH STEEL FLOOR ENDS AND/OR EXPOSED STEEL BOLSTERS WHICH INTERFERE WITH PROPER POSITIONING OR NAILING OF THE DUNNAGE WILL NOT BE USED. SEE "END BLOCKING FOR CARS WITH EXPOSED STEEL BOLSTERS" DETAIL ABOVE, FOR APPLICATION OF DUNNAGE METHODS WHICH PERMIT THE USE OF SOME CARS THAT HAVE EXPOSED STEEL COMPONENTS.
- G. WHEN ANY STRAP IS SEALED AT AN END-OVER-END LAP JOINT, OR AS SHOWN IN DETAILS "A" AND "B" ON PAGE 4, A MINIMUM OF TWO (2) SEALS, BUTTED TOGETHER, WITH TWO (2) PAIR OF CRIMPS PER SEAL MUST BE USED.
- H. CAUTION: STAKE POCKETS WILL BE USED FOR ANCHORING TIEDOWN STRAPPING WHENEVER POSSIBLE. DO NOT USE SWIVEL RING TYPE ANCHOR DEVICES. IF OTHER TYPES ARE USED, THEY MUST BE OF SUFFICIENT WIDTH TO RECEIVE 2" STRAPPING, AND ALSO BE OF A DESIGN WHICH WILL PROVIDE A BEARING SURFACE ACROSS THE FULL WIDTH OF THE STRAPPING THAT WILL NOT DEFORM A STRAP, ESPECIALLY AT THE EDGES, WHEN IT IS TENSIONED.
- J. TO ACHIEVE PROPER CABLE TENSION, EMPLOY TWO (2) CABLE "GRIPPERS" AND AN APPLICABLY SIZED "COME-A-LONG" TYPE MECHANICAL HOIST.
- K. CAUTION: IT IS RECOMMENDED THAT CABLE BE INSTALLED TO THE APPROXIMATE ANGLE SHOWN; HOWEVER, IF PLACEMENT OF THE CAR STAKE POCKETS PREVENTS THIS, CARE MUST BE EXERCISED TO ENSURE THAT THE CABLES ON THE SAME SIDE OF THE LADING BE INSTALLED SO THEIR RETENTION FORCES ACT IN OPPOSITE LONGITUDINAL DIRECTIONS --- CONTACT OF THE CABLE WITH THE EDGE OF THE LADING IS PROHIBITED.

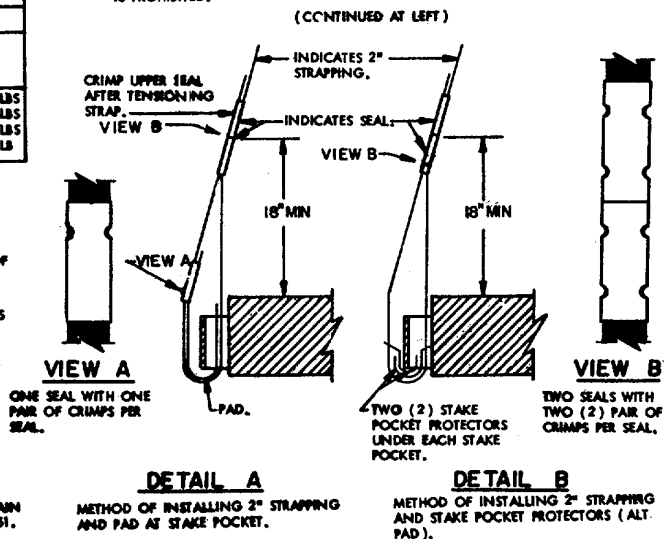
| BILL OF MATERIAL | | |
|-----------------------------------|-------------|------------|
| LUMBER | LINEAR FEET | BOARD FEET |
| 1" X 6" | 6 | 3 |
| 2" X 6" | 58 | 58 |
| NAILS | NO. REQD | POUNDS |
| 30d (4-1/2") | 44 | 2-1/4 |
| 60d (6") | 64 | 6-1/2 |
| ROPE, STEEL WIRE, 1/2" | 100' REQD | 44 LBS |
| CLIP, 1/2" | 24 REQD | 10.5 LBS |
| CLIP, 5/8" (ALT FOR 1/2", 8 REQD) | | 5 LBS |
| THIMBLES, STANDARD, 1/2" | 8 REQD | 2.5 LB |

(GENERAL NOTES CONTINUED)

- L. DUNNAGE LUMBER SPECIFIED THROUGHOUT THIS PROCEDURAL DRAWING IS OF NOMINAL SIZE UNLESS OTHERWISE DIMENSIONED. FOR EXAMPLE, 2" X 4" MATERIAL IS ACTUALLY 1-5/8" THICK BY 5-5/8" WIDE.
- M. NOTICE: 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.

MATERIAL SPECIFICATIONS

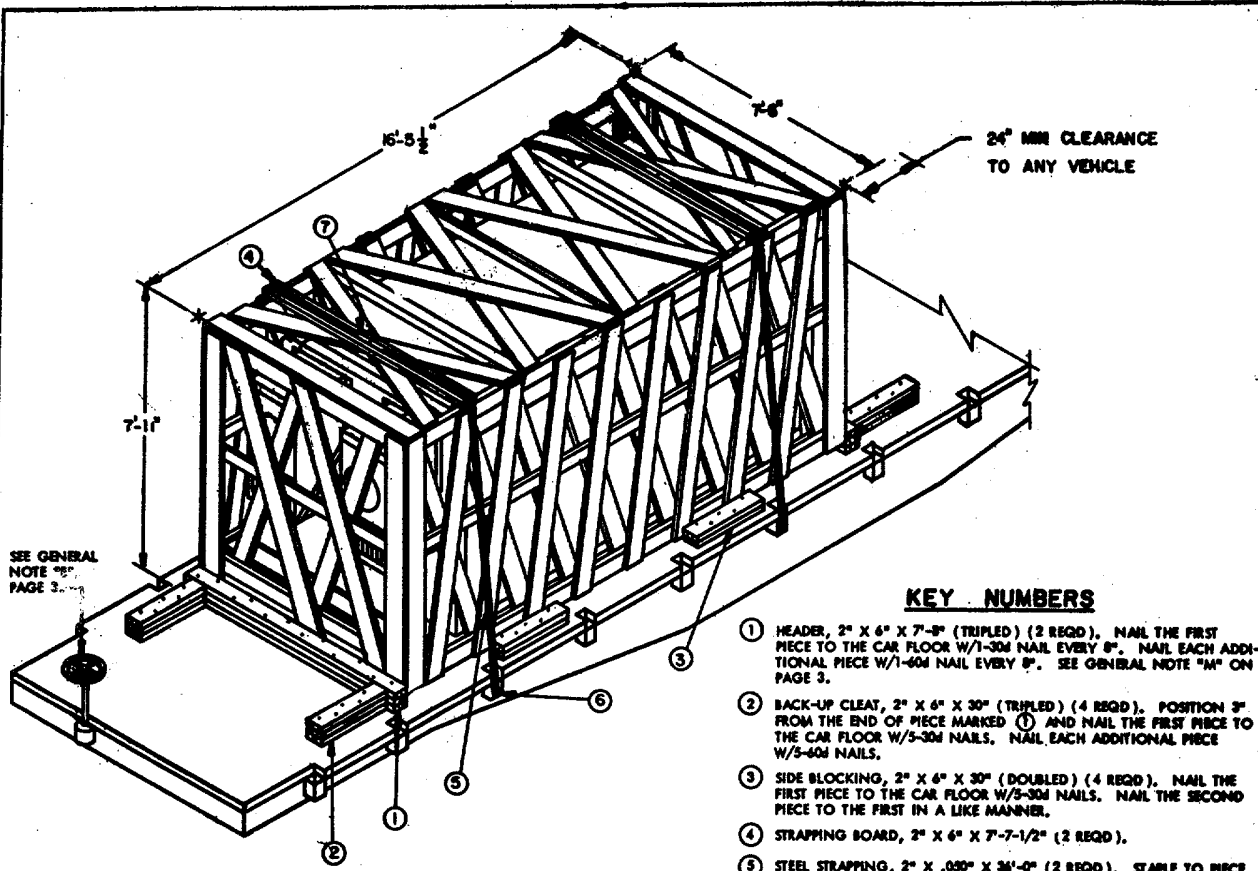
- LUMBER ----- DOUGLAS FIR OR COMPARABLE LUMBER WITH STRAIGHT GRAIN AND FREE OF MATERIAL DEFECTS. REF: FED SPEC MM-L-751.
- NAILS ----- COMMON, CEMENT COATED OR CHEMICALLY ETCHED. REF: FED SPEC FF-N-105. ALT: ANNULAR-RING TYPE NAIL OF SAME SIZE.
- ROPE ----- STEEL WIRE, PLAIN, PREFORMED, REGULAR LAY, 11.5 TONS, 6 X 19, FLEXIBLE WRC, MACWHYTE WIRE ROPE CO (OR EQUAL). REF: FED SPEC RR-W-418.
- CLIPS ----- "U" BOLT, CROSBY, HEAVY DUTY (OR EQUAL).
- STRAPPING, STEEL ----- TYPE I OR IV, CLASS A, B, OR C. REF: FED SPEC QQ-9-789.
- SEAL STRAP STAKE POCKET PROTECTOR ----- COMMERCIAL GRADE.



LOAD AS SHOWN

| ITEM | QUANTITY | WEIGHT (APPROX) |
|---------------------|----------|------------------|
| SUPPORT MAINTENANCE | 1 | 3,855 LBS |
| SHOP SET | | 154 LBS |
| DUNNAGE | | |
| TOTAL WEIGHT | | 4,009 LBS |

Figure 7-5-Continued. (Sheet 2 of 3.)

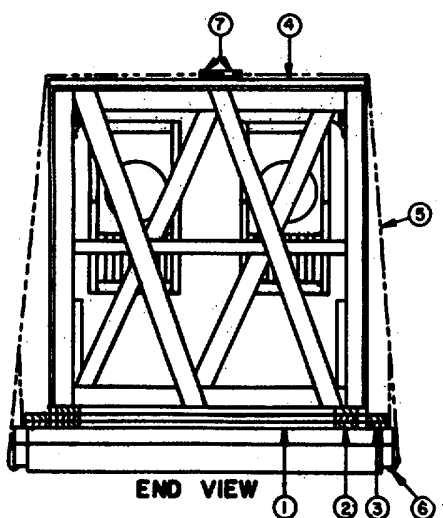


ISOMETRIC VIEW

KEY NUMBERS

- ① HEADER, 2" X 6" X 7'-8" (TRIPLED) (2 REQD). NAIL THE FIRST PIECE TO THE CAR FLOOR W/1-30d NAIL EVERY 8". NAIL EACH ADDITIONAL PIECE W/1-60d NAIL EVERY 8". SEE GENERAL NOTE "M" ON PAGE 3.
- ② BACK-UP CLEAT, 2" X 6" X 30" (TRIPLED) (4 REQD). POSITION 3" FROM THE END OF PIECE MARKED ① AND NAIL THE FIRST PIECE TO THE CAR FLOOR W/5-30d NAILS. NAIL EACH ADDITIONAL PIECE W/5-60d NAILS.
- ③ SIDE BLOCKING, 2" X 6" X 30" (DOUBLED) (4 REQD). NAIL THE FIRST PIECE TO THE CAR FLOOR W/5-30d NAILS. NAIL THE SECOND PIECE TO THE FIRST IN A LIKE MANNER.
- ④ STRAPPING BOARD, 2" X 6" X 7'-7-1/2" (2 REQD).
- ⑤ STEEL STRAPPING, 2" X .030" X 36"-0" (2 REQD). STAPLE TO PIECE MARKED ④ W/4 STAPLES.
- ⑥ PAD, 2" X .050" STRAP 24" LONG (4 REQD). POSITION UNDER AND SEAL TO PIECE MARKED ⑤. SEE "DETAIL A" ABOVE. ALT: STAKE POCKET PROTECTOR (8 REQD). TWO (2) USED UNDER EACH TIE-DOWN FACILITY WITH PIECE MARKED ⑤. SEE "DETAIL B" ABOVE.
- ⑦ SEAL FOR 2" STRAPPING (12 REQD). SEE GENERAL NOTE "G" ON PAGE 3.

SEE GENERAL NOTE "B" PAGE 3.



END VIEW

BILL OF MATERIAL

| LUMBER | LINEAR FEET | BOARD FEET |
|-----------------------------|-------------|------------|
| 2" X 6" | 104 | 104 |
| NAILS | NO. REQD | POUNDS |
| 30d (4-1/2") | 86 | 4-1/4 |
| 60d (6") | 92 | 9 |
| STEEL STRAPPING, 2" X .030" | 82 REQD | 27 LBS |
| SEALS FOR 2" STRAPPING | 16 REQD | 3 LBS |
| STAPLES FOR 2" STRAPPING | 8 REQD | NIL |

LOAD AS SHOWN

| ITEM | QUANTITY | WEIGHT (APPROX) |
|---------------------------------------|----------|------------------|
| SUPPORT MAINTENANCE SHOP SET (CRATED) | 1 | 6,140 LBS |
| DUNNAGE | | 303 LBS |
| TOTAL WEIGHT | | 6,443 LBS |

Figure 7-5-Continued. (Sheet 3 of 3.)

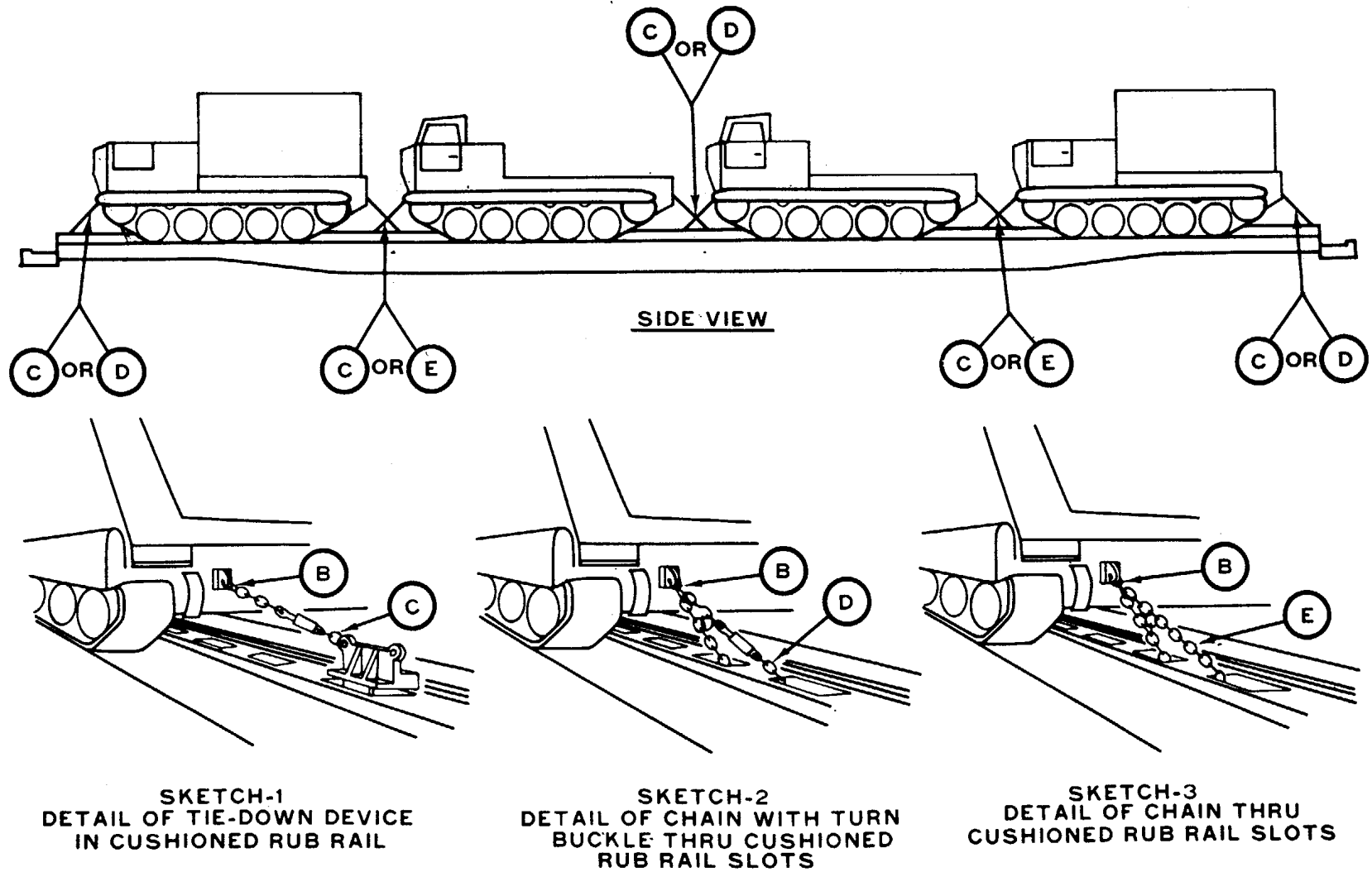
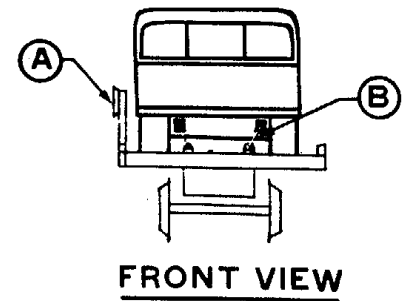
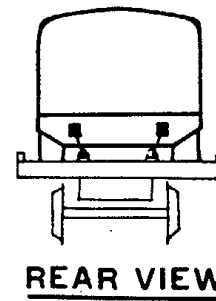
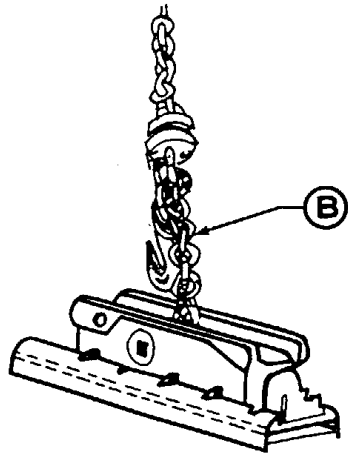
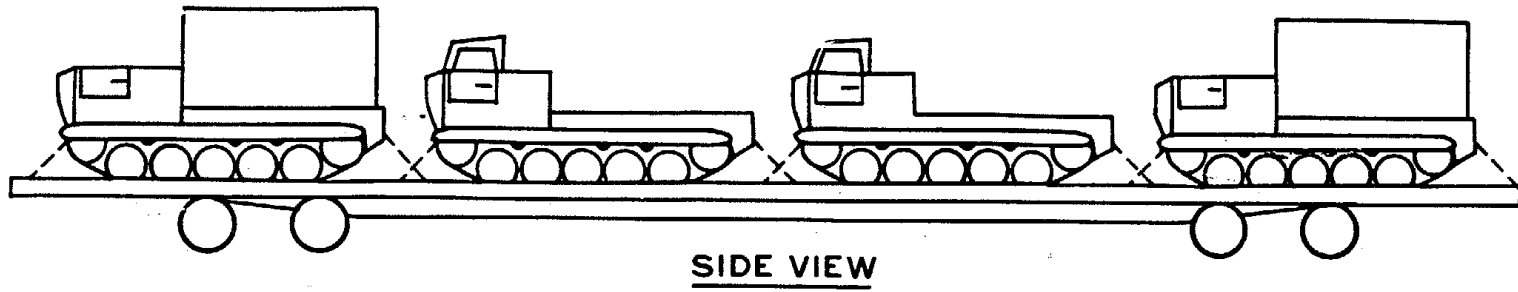


Figure 7-6. Restraining M730 or M48 on cushioned rub-rail flatcars.
7-33



TIEDOWN

Figure 7-7. Restraining M730 or M48 on ATTX,ITTX, HTTX,TTDX, or similar type cars equipped with center tiedown rails running the entire length of the car.

7-7. Transport on Special-Purpose Flatcars

Special-purpose flatcars equipped with chain tiedowns provide economies in loading costs and often a savings in transportation charges, provided full utilization of the loadable space is made. When such cars are available from the rail carriers and full utilization can be made, they should be used. For detailed information and quantities to be loaded on each type of car, see figure 7-6, table 7-1, figure 7-7, and table 7-2.

Table 7-1. Application of Materials for Tiedown of M48 or M730 on CONUS G-85 or G-89 Cushioned Rub-Rail Flatcar (fig 7-6)

| Item | No. Required | 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 | 4 ea unit | Shackles. For vehicles having a 1-in.-dia hole in the towing brackets, use a 1-in.-dia pin with a 7/8-in., steel, galvanized-coated anchor shackle. For vehicles having a larger hole in the towing bracket, use an appropriate size pin and shackle. Attach the shackle to the towing bracket and secure the pin with a cotter key. |
| C | 4 ea unit | Brandon single chain tiedown device, 3/4-in.-dia excelloy chain, or similar, proof-tested at 27,500 lb. Attach to vehicle tiedown provision and to the rub-rail of the car as shown in sketch 1, fig 7-6. Substitute, if desired, items D and E in lieu of item C. See general instructions below for further details. |
| D | 2 ea unit when required | 1/2-in.-dia alloy chain with turnbuckle prom-tested at 22,500 lb. Attach to the vehicle tiedown provision and to the rub-rail of the car as shown in sketch 2, fig 7-6. See general instructions below for further details. |
| E | 2 ea unit when required | 1/2-in.-dia alloy chain proof tested at 22,500 lb. Attach to the vehicle tiedown provision and to the rub-rail of the car as shown in sketch 3, fig 7-6. See general instructions below for further details. |

General Instructions

1. Shippers should specify cars equipped with tiedown devices in the quantity required for items B and C (see sketches 1 and 2 in fig 7-6) when ordering specialized TM 55-1425-585-15-1 freight equipment. In the event that conventional chain tiedowns are supplied in lieu of devices

specified, two of the four tiedowns required for each vehicle must have adjustable turnbuckle equipped with a safety-lock device located in the chain for tensioning purposes (see sketch 3 of fig 7-6). The chains must be applied in the following manner:

- a. Attach the two chain tiedowns without the turnbuckle (see sketch 3 of fig 7-6) to one end of the vehicle and to the car tiedown facility. Pull as tight as possible by hand, and attach the hook to the appropriate link of the chain.
- b. 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.

2. 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 tiedown facility. The angle of the tiedown should be as close to 45° as possible.

3. Hand brakes on vehicles must not be set when vehicles are shipped on G-85 or G-89 cushioned rub-rail flatcars.

4. Gearshift levers for automatic or conventional transmissions must be wire-tied in the neutral position.

5. 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.

6. 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.

7. When conventional chains are tensioned, care should be taken to avoid tensioning to such an extent that the 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 a hammer or bar to eliminate any possible misalignment of links. Further tightening may be required to take up any slack that develops due to link alignment.

8. 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 rubrail. 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.

9. Method of loading as shown is applicable to vehicles weighing up to 25,000 lb. The following vehicles in the quantity shown can be loaded on an 85-foot, or longer, cushioned rub-rail equipped, or similar, railroad car with center sill tiedown positions running the entire length of the car:

| Vehicle | No. per car | |
|--|-------------|-------|
| | 85-ft | 89-ft |
| Guided missile system, intercept-aerial carrier-mounted, M48 | 3 | 4 |
| Carrier, guided missile equipment, self-propelled, M730 | 3 | 4 |

NOTE

Loading Rules 1-A, 2, 4, 165, 19-A, and 19-C appearing in section I of the *Rules Governing the Loading of Commodities on Open Top Cars* published by the Association of American Railroads provide applicable guidelines and are mandatory in application.

Table 7-2. Application of Materials for Tiedown of Vehicles on CONUS ATTX, ITTX, HTTX, TTDX, or Similar-type Flatcar Equipped With Center Tiedown Rails Running Entire Length of Car (fig 7-7)

| Item | No. Required | 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 | 4 ea unit | Steel chain, 1/2-in.-dia, alloy, proof-tested at a minimum of 22,500 lb for M730; 1/2-in.-dia excelloy, or comparable, steel chain, proof-tested at a minimum of 27,500 lb for M48. |

General Instructions

1. Shippers should specify cars equipped with tiedown

devices in the quantity shown in item B when ordering specialized railway equipment.. When carrier furnishes cars that do not have built-in chains and tensioning devices, chains and turnbuckles of appropriate size and strength will be used in lieu thereof for securement of vehicles. Load binders are not to be used in lieu of turnbuckles to tension tiedown chains.

2. 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 from the vehicle tiedown point to the car tiedown facility. The angle of the tiedown must be as close to 45° as possible.

3. Hand brakes must be set on all vehicles.

4. Gearshift levers on vehicles equipped with automatic or standard transmission must be wire-tied in the neutral position.

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

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

NOTE

Loading Rules 1-A, 2, 4, 5, 16, 19-A, and 19-C appearing in section I of the *Rules Governing the Loading of Commodities on Open Top Cars* published by the Association of American Railroads provide applicable guidelines and are mandatory in application.

Section III. TRANSPORT ON FOREIGN RAILWAYS

7-8. General

The transportability guidance contained in this section is applicable when the vehicles are transported on foreign railways. Consideration is given to single and multiple vehicle movements on the types of railcars normally used for the movement of these types of vehicles. The vehicles, when loaded on a suitable railcar, can be transported in their reduced height configuration without restrictions within European countries complying with the International Loading Gauge (formerly Berne International), the majority of the countries in the Middle East and South America, and Australia, India, and Pakistan. In the Middle East and South America, the clearances vary by country, and each country will require a separate check. In Australia, India, and Pakistan, wide-or broad-gauge railways provide adequate clearances. Because of the various designation systems used by different countries, foreign railcars are not easily classified. In addition, clearances vary, in many cases, from one country to the next and within one country; consequently, evaluation of transportability capability must be made on an individual basis.

The M-54, AN/TSM-95, and AN/TSM-96 can also be loaded on foreign railroad flatcars and the MIM-72A or MIM-72B in M-570 containers can be loaded into foreign railroad boxcars. The methods for securing these items are similar to securing the items on American railroad cars.

7-9. Transport on US Army Foreign Service Flatcars

a. General. The Chaparral system pieces can be transported on a number of US Army-owned foreign service flatcars. These flatcars are exclusively for the transport of US military materiel. Table 7-3 represents a few of the flatcar available in Europe which are suitable for transportation of the Chaparral system.

b. Materials. The materials required for blocking and tiedown of the items on US Army foreign service flatcars are essentially the same as those used for transporting the items within CONUS. For general guidance, refer to figure 7-2 sheets 1 through 9 and figure 7-5 sheets 1 through 3.

Table 7-3. Characteristics of European Flatcars Available for Transportation of the Chaparral

| Flatcar designation | Capacity | Length | Width | Platform height* |
|---------------------|----------------------|---------------------------|-----------------------------|-----------------------------|
| FF | 50-ton (45.36 MT) | 40-ft. 9-in. (12.42 m) | 8-ft. 7 1/8-in. (2.62 m) | 4-ft. 1 1/8-in. (1.25 m) |
| SSY | 55-ton (49.90 MT) | 31-ft. 2-in. (9.50 m) | 10-ft. 4-in. (3.15 m) | 4-ft. 2 3/4-in. (1.29 m) |
| SSYS | 66-ton (59.88 MT) | 31-ft. 2-in. (9.50 m) | 10-ft. 4-in. (3.15 m) | 4-ft. 2 3/4-in. (1.29 m) |
| SSYM | 88-ton (79.83 MT) | 39-ft. 9-in. (11.90 m) | 10-ft. 4-in. (3.15 m) | 4-ft. 3 1/2-in. (1.31 m) |
| FFLM | 90-ton (81.65 MT) | 46-ft. 8-in. (14.42 m) | 10-ft. 3-in. (3.12 m) | 4-ft. 2 3/4-in. (1.29 m) |

*Above top of rail.

APPENDIX REFERENCES

- | | |
|----------------------------------|---|
| 1. Field Manuals (FM) | |
| FM 1-100 | Army Aviation Utilization |
| FM 5-36 | Route Reconnaissance and Classification |
| FM 55-15 | Transportation Reference Data |
| 2. Supply Bulletins | |
| SB 760-20 | Adopted Items of Material and Army Reportable Items |
| 3. Air Force Manuals | |
| TO 1-1B-40 | Handbook of Weight and Balance Data |
| TO 1C-130-9 | Cargo Loading Manual USAF Series C-180 Aircraft |
| 4. Arm Regulation (AR) | |
| AR 5529 | Military Convoy Operations in CONUS |
| AR 55-162 | Permit for Oversize, Overweight, or Other Special Military Movements on Public Highways in the Contiguous States and District of Columbia |
| AR 70-39 | Criteria for Air Transport and Airdrop Material |
| AR 95-16 | Weight and Balance-Army Aircraft |
| AR 385-40 | Accident Reporting and Records |
| AR 746-1 | Color, Marking, and Preparation of Equipment for Shipment |
| 5. Technical Manuals (TM) | |
| TM 5-330 | Planning and Design of Roads (Vehicle Cone Index) |
| TM 5-725 | Rigging |
| TM 9-1410-585-14 | (Chaparral Air Defense Guided Missile System) Operator, Organizational, DS and GS Maintenance Manual: Intercept-Aerial Guided Missile MIM- 72A and MIM-72B; and. Guided Missile Trainer M80 . |
| TM 9-1425-585-14 | Operator, Organizational, DS and GS Maintenance. Manual: General Main- tenance; Service Upon Receipt; Shipping and Storage; and Demolition to Prevent Enemy Use |
| TM 9-1440-585-12 | Operator and Organizational Manual: Intercept-Aerial Guided Missile System (Launching Station) |
| TM 9-1450-585-10 | Operator's Manual, Carrier, Guided Missile Equipment, Self-Propelled: M730 |
| TM 94935-585-14/1 | Operator Organizational, DS and GS Maintenance Manual: Support Main- tenance Guided Missile System Shop Equipment AN/TSM-96 |
| TM 9-4935-587-12 | Operator and Organizational Maintenance Manual: Organizational Main- tenance Guided Missile System Shop Equipment AN/TSM-95 |
| TM 38-250 | Packaging and Handling of Dangerous-Materials for Transportation by Military Aircraft |
| TM 55-208 | Railway Equipment Characteristics Data |
| TM 55-312 | Military Convoy Operations in CONUS |
| TM 55-405-9 | Weight and Balance |
| TM 55-450-8 | External-Transport Procedures |
| TM 55-450-10/1- | Air Transport of Supplies and Equipment Standard Loads in US Air |
| AFM 76-3 | Force C-130 Airplane |
| TM 55-450-11 | Air Transport of Supplies and Equipment: Helicopter External Loads, Rigged with Air Delivery Equipment, June 1968 |
| TM 55-450-12 | Air Transport of Supplies and Equipment Helicopter External Loads for Sling, Nylon and Chain, Multiple Leg (15,000-pound capacity) |

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| TM 55-500 | Marine Equipment Characteristics and Data |
| TM 55-518 | Military Stevedoring |
| TM 55-1520-209-10 | Operator's Manual US Army Model CH-47A Helicopter |
| TM 5566-1520-217-10 | Operator's Manual Army Model CH-64A and CH-54B Helicopter |
| TM 55-1520-227-10 | Operator's Manual US Army. Model CH-47B and CH-47C Helicopter |
| TM 57-210 | Air Movement of Troops and Equipment |

NOTE

Air Force Technical Orders which have not been integrated into the Department of the Army publications system may be requisitioned through the Adjutant General Office in accordance with AR 810-71.

6. Other Publications and Source of Procurement

Association of American Railroads Rules Governing the Loading of Commodities on Open Top Cars

Section No. 1-General Rules

Section No. 6-Rules Governing the Loading of Department of Defense Material

Mr. E. T. Zasadil, Secretary

The Association of American Railroads

59 East Van Buren Street

Chicago, Illinois 60605

Rail Carriers' Tariff No. 23 or reissues thereof-Hazardous Materials Regulations of the Department of Transportation Including Specifications For Shipping Containers.

R. M. Graziano, Agent

American Railroad Building

1920 L Street N.W.

Washington, D.C. 20036

Water Carrier Tariff No. 24 or reissues thereof-Regulations Governing The Transportation Or Storage Of Explosives Or Other Dangerous Articles Or Substances, And Combustible Liquids On Board Vessels.

R. M. Graziano, Agent

American Railroads Building

1920 L Street N.W.

Washington, D.C. 20036

Motor Carriers' Explosives And Dangerous Articles Tariff No. 14 or reissues thereof-Department Of Transportation Regulations Governing Transportation Of Explosives And Other Dangerous Articles By Motor, Rail And Water Including Specifications For Shipping Containers.

William Herbold, Issuing Officer

1616 P Street, N.W.

Washington, D.C. 20086

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