

# Manual Contents

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## Introduction

Totem Ocean Trailer Express has always taken pride in the safe handling of our customers' cargo. As part of our stated Quality Program Goals to deliver freight "on time" and "damage free" we are forever striving to improve our loading and securement procedures. We have almost 30 years of experience both from Operations in Tacoma and Anchorage and the Officers and Crews of our ships. Our intention is to provide a manual that can be easily used and is as up-to-date as possible.

Minimum Standards for using chains or straps for securing flatbed loads are contained in the Federal Motor Carrier Safety Administrations Final Rules (49 CFR 393.100-136). Details of these rules can be found at [www.fmcsa.dot.gov](http://www.fmcsa.dot.gov). Customers should conform to these rules prior to reviewing the following pages.

The number of chains and binders and/or straps recommended assumes a single piece load that will not easily slide or shift on the trailer. This is not usually the case with consolidated loads. Therefore additional chains and binders are normally required to better stabilize the load.

What follows are guidelines for the shipper in preparing his cargo for transportation aboard our vessels. A few general principals are worth bearing in mind before reviewing the illustrations that follow, and prior to loading any shipment destined for highway, rail or water.

1. *An ounce of prevention is worth a pound of cure.* Whatever savings might conceivably be had in labor and materials by failure to prepare a load at origin, will be offset by the expense and uncertainty associated with damaged cargo, the filing and settling of claims, and the dissatisfaction of a customer at destination.
2. While loading precautions are emphasized in the winter months (when storms are more likely), rough weather must be expected at any time when shipping across the North Pacific or the Gulf of Alaska.
3. All flatbed loads are inspected by TOTE's gate. Adequate unitizing as the freight is loaded, along with effective tie-downs and bracing, is almost always safer and more secure.
4. It is reasonable to expect vessels transiting the Tacoma/Anchorage route across the North Pacific to roll 20 degrees on a routine basis for the entire ship transit. Rolls of 35-40 degrees are not uncommon in the winter season. The vagaries of this weather are unpredictable so all loads should be secured to withstand the extremes.

5. A shipment left on the dock to be reworked is always better than one scattered about the deck for the same reason.
6. No matter how tightly loads are winched, straps will stretch when subjected to high stress associated with vessel rolling (especially “snap rolls”). Chains will not stretch. Whenever possible, the shipment should be packaged in such a way and with sturdy enough material that it can be secured with chains.
7. The established standards for highway transportation are federal law as required by 49 CFR Parts 392 and 393. These rules should be considered as a starting point for ocean transport, but are not always sufficient to expect safe arrival at destination. Motion and acceleration are different during ocean transport compared to highway transport.
8. The higher a load and the more pieces stacked on one another, the more likely it is to shift no matter how many straps, chains, etc., are put on it. At some point (usually lower than the overall height restriction), shifting becomes almost inevitable. The use of dunnage and/or stakes substantially reduces this problem.

TOTE desires to deliver your cargo in good condition. This can best be assured by carefully loading, securing and preparing each trailer for the ocean.

To develop these securement guidelines, suggestions and rules were taken from the railroad, trucking and water transportation industries.

## General Rules

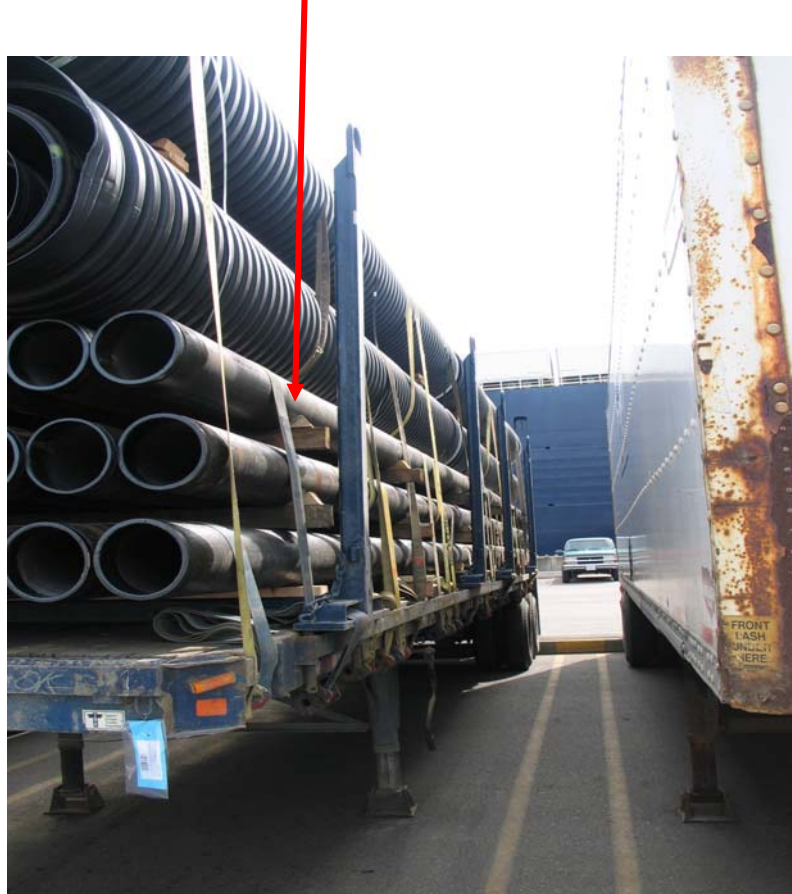
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1. Safety to the public, customer, and shipment is the most important subject to be considered in the application of these rules. When in doubt as to their interpretation, users must apply to a higher authority to insure the safest course is followed.
2. TOTE personnel may request additional securement at any time.
3. Dunnage should be of good quality and of sufficient size and number to easily support the load.
4. All loose or unsecured items such as container locks, straps or unused dunnage should be removed or stowed prior to transport.
5. Straps should be rated appropriately for the load carried and should be free from cuts, holes, tears or other defects. Straps may not be twisted in a manner that lessens their rated strength.
6. Straps should have softeners applied where passing over sharp objects.
7. Loads should be arranged with the heavier pieces on the bottom and the lighter ones on top.
8. The center of gravity should be within 96 inches (8 feet) from ground level.
9. Products equipped with tires must have chocks secured against leading and trailing edges of tires. Chocks must be in good condition and secured properly.



**Chock at trailing edge of tire.**

10. Loads of pipe or similar products must have chocks nailed to the ends of all dunnage and dunnage should be arranged in a vertical manner.



## General Dimensional Guidelines

The diagrams shown in this section reflect general clearances and are provided as guidelines only.

- All oversize loads must be approved in advance.
- All requirements are applicable for both Ponce Class (old) ships or Orca Class (new) ships unless otherwise stated.
- For a quote and additional information, contact Customer Service.

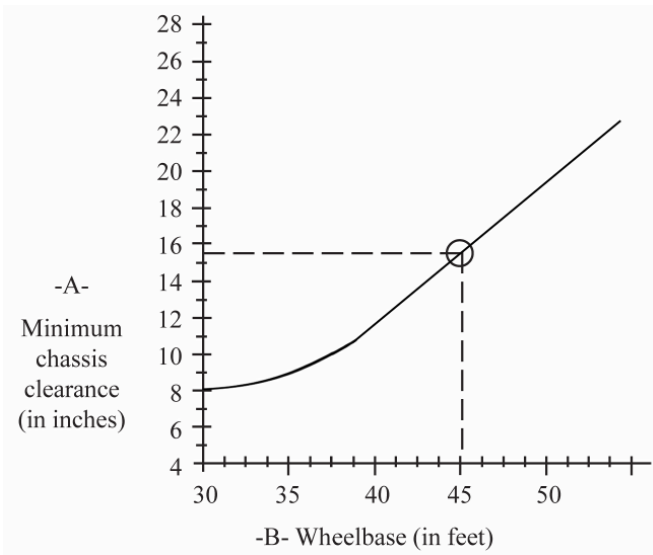
### Overhead Clearance

- ***Orca Class***
  - Up to 19 feet will be considered on special arrangements using the forward ramps in both Tacoma and Anchorage.
  - Drawings need to be submitted to Operations for any oversize load.
- ***Ponce Class***
  - There is unlimited overhead clearance on special arrangement using the forward ramps in both Tacoma and Anchorage.
  - Drawings need to be submitted to Operations for any oversize load.

### Overwidth Clearance

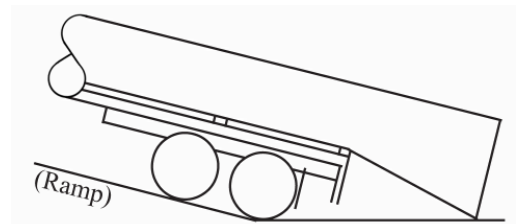
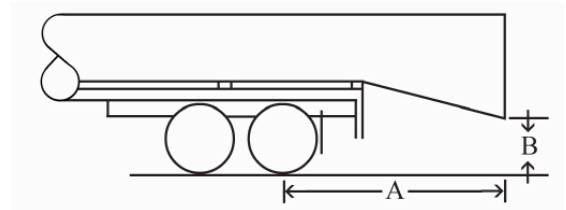
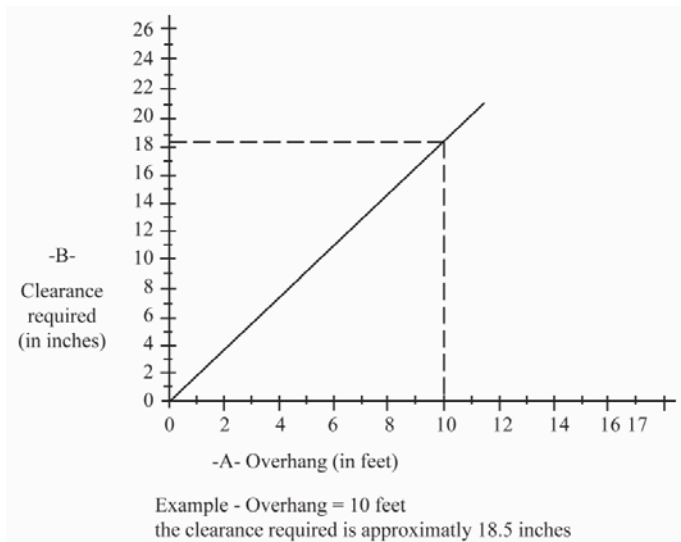
- Anything over 14 feet wide needs Operations approval.

## Chassis Ground Clearance



Example - A vehicle or trailer 45'0" between axles requires a minimum ground clearance of 15 3/4"

## Rear Overhang Clearance



## Enclosed Trailers

- Alaska and Washington State Trailer Weight Restrictions should be adhered to. [www.wadot.wa.gov/commercialvehicle](http://www.wadot.wa.gov/commercialvehicle)  
[www.dot.stateak.us/](http://www.dot.stateak.us/)
- The center of gravity should be less than 8 feet from the ground.
- Load cargo tight and secure, nose to rear. When the ship is rolling, top-heavy cargo that is loosely loaded will rock from side to side so severely that the trailer could tear loose from its lashing, or the sides of the trailer could be damaged by the cargo within.
- Cargo must be loaded evenly to distribute weight front to rear. Do not load trailers side or top heavy.
- In winter months, added dunnage and reduced load height is important to loading integrity.
- Proper blocking and securement for loading reels, pipe, poles or lumber is essential as this type of freight loose inside a trailer during a storm will tear out the sides, doors and /or nose.
- Do not load loose steel in an enclosed trailer. Steel can easily slide forward through the nose or back through the doors while loading or offloading a vessel, and cause injury.
- **If you have any questions regarding hazardous materials, contact your nearest TOTE customer service representative.**

- Pallets should be of sound construction and free of defects such as protruding nails or broken boards.



- Pallets should have the load uniformly distributed, with the load secured to the pallet as a package and then the entire package secured to the platform.



- **Load Planning**

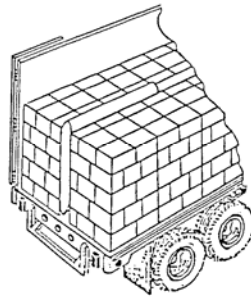
- Plan load so it can be securely braced to prevent lengthwise and crosswise movement. There should be no movement of lading in any direction. The picture below illustrates an improperly braced load.



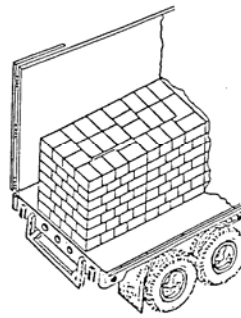
- Cargo must be loaded evenly to distribute weight front-to-rear and side-to-side.



- ⇒ Do not load trailers side or top heavy.
- ⇒ If load does not cover entire length of floor, distribute the weight equally between the rear tires and the fifth wheel.
- ⇒ Make sure weight is distributed crosswise.



Correct

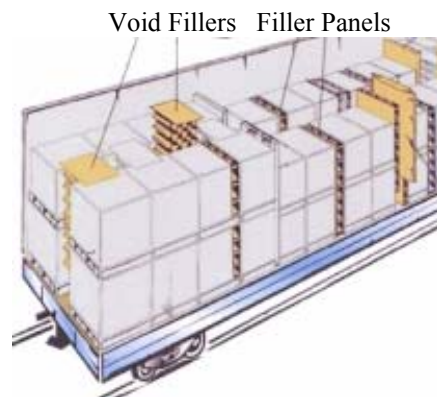


Incorrect

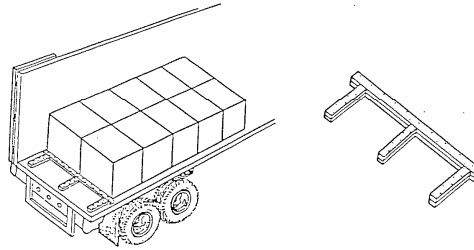
- Rear doors are strongest at the hinge area, weakest at the center. Load as indicated above.
- Do not load commodities which are obviously unsuited for movement in vans or which may contaminate a van and make it unfit for future loads, such as hides, manure, etc.

▪ **Cargo Restraint**

- Cargo that is likely to roll must be restrained by chocks, wedges, a cradle or other equivalent means to prevent rolling.
- Consideration must be given to cargo moving in all six directions while onboard a TOTE ship – left, right, up, down, forward, and back. The gravitational force within a trailer can be from -0.1 to 2.1 times the force of gravity, and the horizontal motions created onboard a ship can be much greater than those encountered on a highway.
- Cargo placed beside each other and secured by transverse tiedowns must be (1) placed in direct contact with each other and (2) prevented from shifting towards each other while in transit.
- Various cardboard fillers or pallets in the center of a load can be used to secure a load from side to side.



- Bracing methods
  - ⇒ **Floor Blocking**



Commodities which are only one layer high or which are secured by some unitizing method (such as stretch wrapping) can often be floor-blocked to prevent lengthwise movement. Use of 2x4 or 2x6 lumber, securely affixed to the floor with 16d nails and reinforced by backup cleats is appropriate.

- ⇒ **Logistic Posts/Pogos/Logistic Baskets**

Cargo can be restrained with the use of logistic posts, logistic rails, and/or baskets.



Pogo

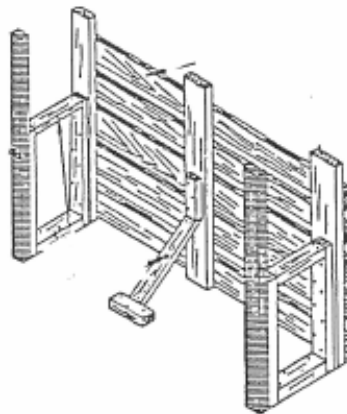
Logistic Post

⇒ **Built-In Bracing System**



In trailers equipped with logistic rails on the sidewalls, a wooden gate or pallets may be placed against the face of the load, affixed with 1 ¼ inch steel straps, nylon straps, or logistic post and anchored to the logistic rails. Tighten straps around gate or pallets.

⇒ **Rigid Bracing**



A gate may be built from 2x4 or 2x6 lumber, placed against the face of the load, and secured with floor blocking and diagonal bracing, as shown above.

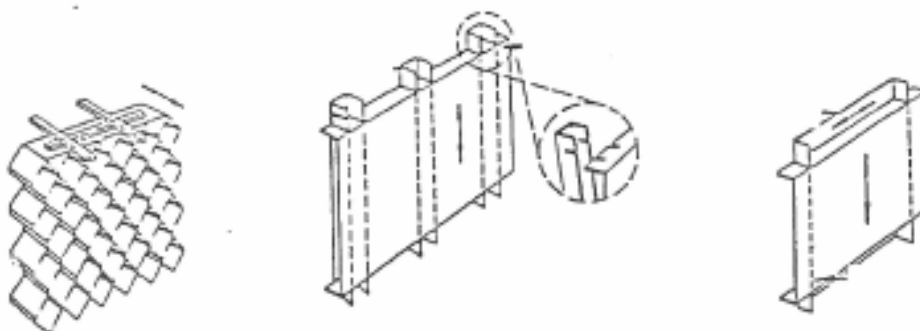
⇒ **Constructing A Gate With Pallets**

Both built-in-braced and rigid-braced loads need a gate between the load and the bracing. This can be constructed from 2x4 and 2x6 lumber or, if the face of the load is low, from wood pallets. The pallets need to be in good condition with no broken boards or loose nails. Stand the pallets with the top deck (which usually has the most boards) against the face of the load, nail them together with 2x4s and 16d nails. Tighten the strapping or apply floor diagonal bracing.



⇒ **Crosswise Bracing**

Small, crosswise voids may be left in a load without filling or bracing them, depending on the commodity. Never leave an unfilled void large enough to affect the weight distribution in the trailer or cause damage to the lading should the load move in transit.



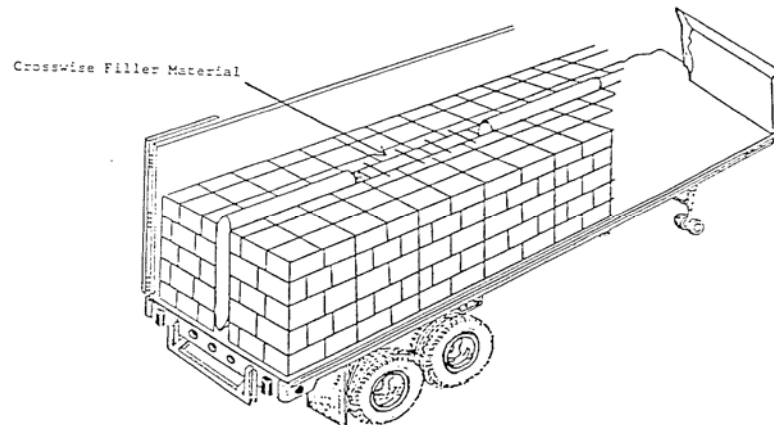
**Examples of other approved methods of preventing crosswise movement.**

⇒ **Plastic Wrapping**



Plastic stretch and shrink wrap are not approved as a sole means of securement, but you may use them to help prevent movement. If you plastic wrap a unit on a wood pallet, make sure the wrap also encloses the pallet base to help keep the product on the pallet.

⇒ **Inflatable Dunnage**



Inflatable dunnage (ID) is a method that provides some restraint against lengthwise movement, especially when used in combination with other methods, such as plastic wrapping. Inflatable dunnage as a sole means of restraint should not be used for cargo shipped on TOTE vessels. If utilized, use one 2-ply bag placed down the center of the load as shown above, inflating it to no more than 1.5 psi and measuring the pressure with an accurate gauge. The bag tends to retard lengthwise movement by pushing the lading against the sides of the van, however, too much pressure will damage both the load and the walls.

Brace heavy loads with two bags, one between rows at the rear and one between rows toward the center of the van.



An example of IDs used throughout a consolidated load.

⇒ **Unitizing**

Depending on the commodity and ease of handling, unitized banding is an excellent method of securing loads that are made up of multiple levels, or contain varying shapes within the load. Lengthwise movement can be prevented by unitizing all or part of a load.

Multiple layer loads require unitized banding with strapping or similar materials. Individual pieces of a load or separate bundles of material should be stacked with blocking and separators.

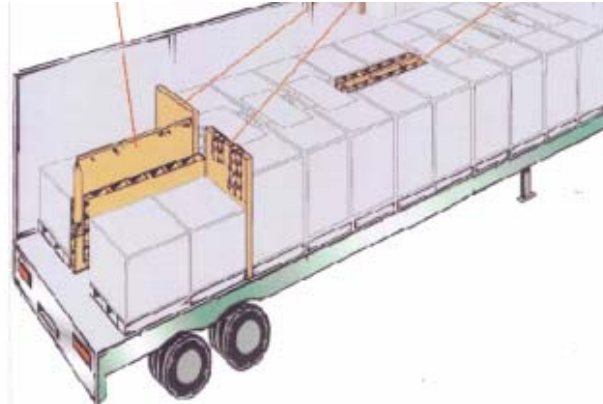


Although on a flatbed, this is a good example of unitizing a load.

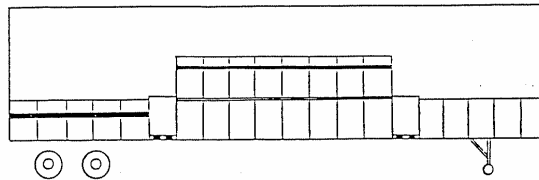
⇒ **Incomplete Layers**

Do not overload the trailer. Compute the total weight of the shipment. If the load must be loaded with an incomplete layer, plywood or Pal Kor board may be used, front to rear.

**Incomplete Layer**  
**Pal Kor Bracing**                      **Void Filler**



**Case goods** should be loaded with only one incomplete layer. Brace it with upright sheets of material such as Pal Kor or Wood Kor.



**Drums** should have each floor stack next to the partial layer raised on 2x4s. Then the layer should be unitized with 1 1/4 inch steel strap.

⇒ **Solid Load**

To make a successful solid load, fill ALL the lengthwise space with product or fillers.

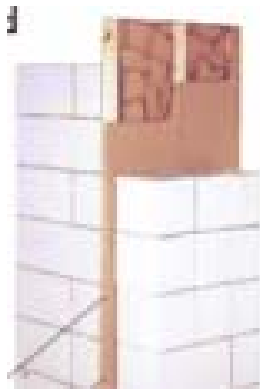
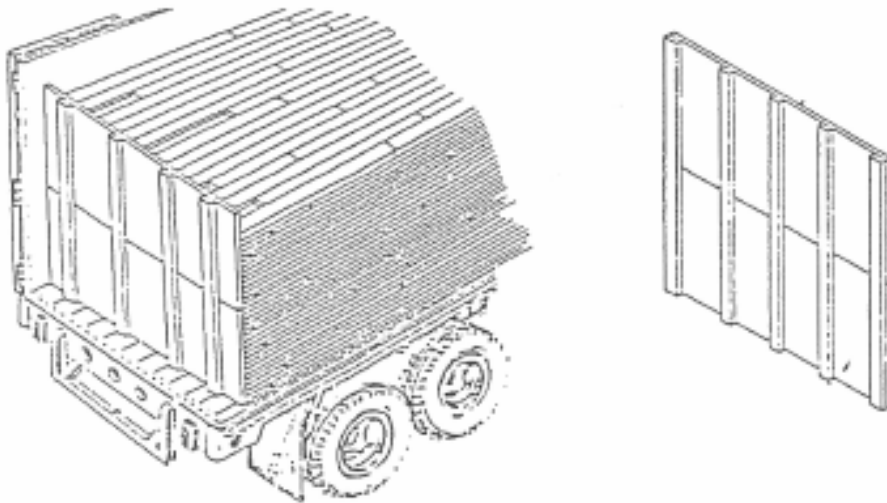
- Stepped-down loads and incomplete layers are not suitable for water movement.
- Trailer walls cannot hold wood bracing.
- Floors in enclosed vans can have blocking nailed to them.



## Dimensional Lumber In Enclosed Trailer

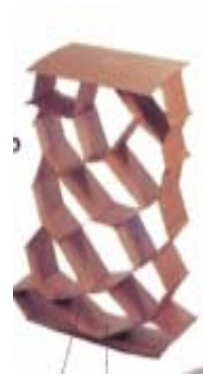
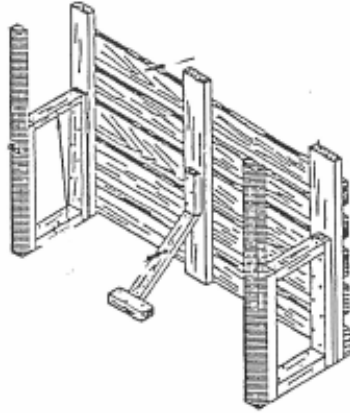
Dimensional lumber may be loaded in closed vans.

- Load lumber tightly, both lengthwise and crosswise.
- Place lumber against the front of the van. If the van has a damaged or missing front wall lining, place a separator of particleboard, plywood or other suitable material between the lumber and the front wall.
- When loading is complete, remove the rollers and other devices used during loading.
- If the distance between the end of the load and the van doors is four inches or less, apply a constructed or purchased bulkhead.



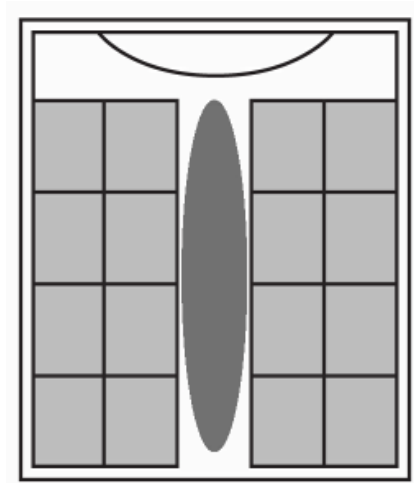
**Bulkhead Panels**

- If the distance between the end of the load and the van door is more than four inches, use a suitable void filler or rear gate. Pallets may be used.



**Void Filler**

- Inflatable dunnage (ID) may be used to secure a load, under the following rules:
  - Load down each side of the van, leaving a void which will not exceed 12 inches AFTER inflation of the bags.
  - Use a dunnage bag which is approximately the height of the load, placing it between sheets of buffer material of sufficient strength to prevent chafing and puncturing of the ID by the lumber.
  - Prior to inflation, make sure the ID is at least 1” above the floor.
  - Using an approved inflator, and measuring pressure with an accurate gauge. Bags should be inflated to manufacturers’ recommended inflation pressure, but in no case should that be more than 1.5 psi. Below is an example of ID securing a load side-to-side.



## Insulated Trailers



TOTE's insulated trailers are designed and constructed with heat tape in the walls, roof, floor, and nose. This equipment is also designed to allow loading of hazardous materials with no danger of an ignition spark.

Insulated trailers are used when cargo is booked as Keep From Freezing (KFF). The KFF season spans September 30 – April 20 of each year. This service must be requested at the time of booking. Cargo that needs KFF protection can be mixed with cargo that does not need KFF protection. Contact Customer Service for details.



When loading an insulated trailer follow the same guidelines listed in the Enclosed Trailer section. It is the same type of freight and the same rules apply. Keep the center of gravity not more than 8 feet from the ground. Freight should be kept tight and secure.

**Under no circumstances are nails to be driven into the walls, floor or nose of an insulated trailer.**

## Refrigerated Trailers



TOTE's refrigerated trailers are capable of maintaining temperatures from minus 20 degrees Fahrenheit to plus 70 degrees Fahrenheit, even on those occasions when the outside temperature drops to minus 40 degrees in Fairbanks.

Available are UDG/UEE 385 and Thermo-King NWD 50 refrigeration units that are designed to eliminate possible freeze damage while carrying sensitive produce. Featured with the equipment is the Partlow Recorder, a solid state electronic temperature controller and mechanical temperature recorder.

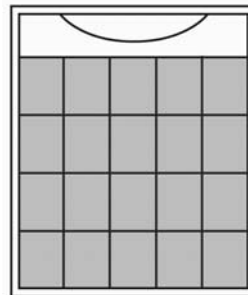


### ■ Temperature Setting

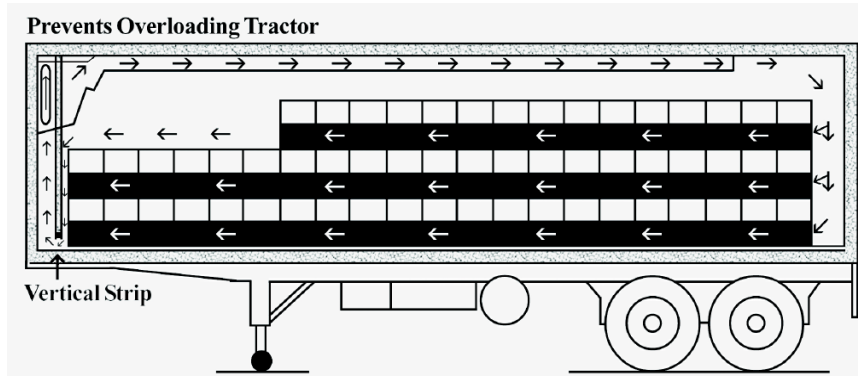
- ⇒ To maintain a fresh appearance, prevent decay and extend the market life of most fresh fruits and vegetables, the pulp temperature of such products cannot vary more than 5 degrees from the requested temperature.
- ⇒ The interior of the trailer should be pre-cooled during warm weather to reduce the demands on the refrigeration system. Before loading, set the thermostat at the desired temperature, close the doors of the trailer and run the refrigeration unit for approximately 20 minutes.

### ■ Loading

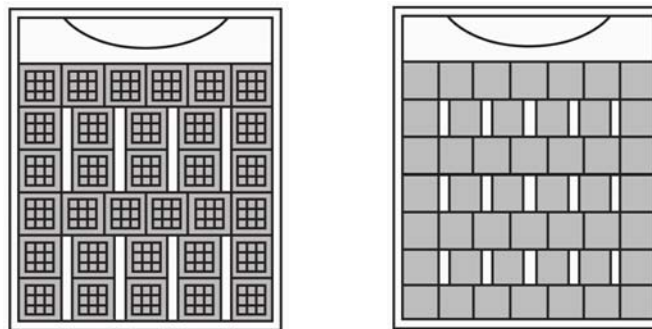
- ⇒ ***DO NOT*** load any closer than 9 inches from the ceiling of the trailer, and keep in mind the load weight should be distributed evenly throughout the trailer.
- ⇒ Alaska and Washington State Trailer Weight Restrictions should be adhered to. [www.wadot.wa.gov/commercialvehicle](http://www.wadot.wa.gov/commercialvehicle)  
[www.dot.stateak.us/](http://www.dot.stateak.us/)
- ⇒ Frozen products should be loaded tightly with as little contact with the walls as possible to allow cold air to circulate around the load. Blocking and bracing are important to prevent cargo from shifting. At the end of the last stack, load locks should be applied to prevent damage.
- ⇒ **Under no circumstances are nails to be driven into the walls, floor, or nose of a refrigerated trailer.**



⇒ All sensitive chill cargo must be loaded in a pattern to allow an airflow pattern with continuous lengthwise air channels between rows in every other layer.



1. Construct the first row on the floor in a solid stack pattern.
2. The remaining layers should have continuous lengthwise air channels between the boxes in alternate layers. Pallets work well as dunnage to separate layers.
3. Note the vertical strips attached to the bulkhead. Do not block air returning to the blower.



Alternate loading patterns

#### ■ **Fueling**

- ⇒ Each reefer is pre-tripped by TOTE prior to dispatching to customers for loading. This pre-trip includes filling the fuel tank.
- ⇒ One tank of fuel will last between 40-72 hours depending on the outside temperature.
- ⇒ It is the shipper's responsibility to refuel the tanks when needed after receiving the trailer.

- **The Refrigeration Unit Manual** is available on the TOTE website, [www.totemocean.com](http://www.totemocean.com) (Forms/Brochures) through Account Executives, Customer Service, and Maintenance personnel and details how to load and operate refrigeration equipment.

## Securement Equipment

### Blocking



**Block**



**Double Cut Wedge Block**



**Single Cut Wedge**



**Chock**

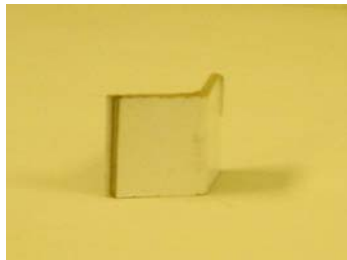
- Blocks should preferably be made of plastic or hardwood.
- Blocks must be free of defects such as large knots and splits.
- Blocking must be as wide as it is high.
- Blocking greater than 5 inches tall may be constructed by securely nailing multiple pieces together.
- Two nails should be evenly spaced, equal to the thickness of the blocking, from the end. Additional nails must be applied less than ten inches apart for the full length of the piece.
- **Double cut wedge blocks** are typically used as wheel chocks on vehicles and also for locating and securing large diameter pipe.
- **Double and single cut wedge blocks** must be secured to deck with at least 4 nails widely spaced to resist twisting. Nails should be large enough to penetrate 1 ½ inches into the deck.
- Single cut wedges used for end blocking must have the long side against the deck.
- Plastic or wooden **chocks** are both acceptable for use on separators or for pipe shipments.
- Chocks must be positioned firmly against the sides of the pipe.

## Synthetic Webbing



- Woven polyester straps may be used.
- Straps must be in good condition.
- Softeners must protect the straps from any sharp points or edges.
- Unused strap is to be secured or stored to prevent it from coming loose.

## Softeners



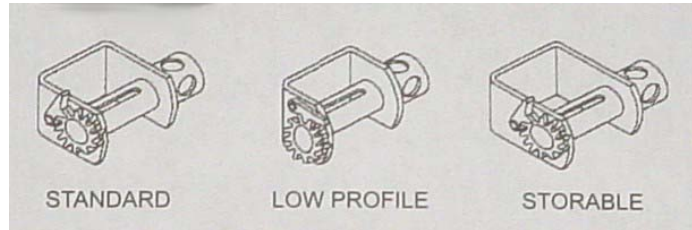
- Softeners can be made of used rubber hose; cardboard; old, defective straps; or carpet. If cardboard softeners are used, the customer should be aware that they are susceptible to decomposition due to moisture.
- Softeners are to be placed between high tension steel bands; nonmetallic bands; synthetic web straps; wire rope/cable, chains and binders, and other types of securement; and sharp edges or points to protect the load and securement pieces from damage.
- Softeners must also be placed between wire rope/cables where they intersect to avoid chaffing.
- Softeners should be secured in such a fashion as to avoid displacement should the load shift during transit.

## Winches And Other Components

- Winches, ratchets, hook eyes, connecting chain, etc., must be equal or exceed minimum breaking strength of webbing being used.

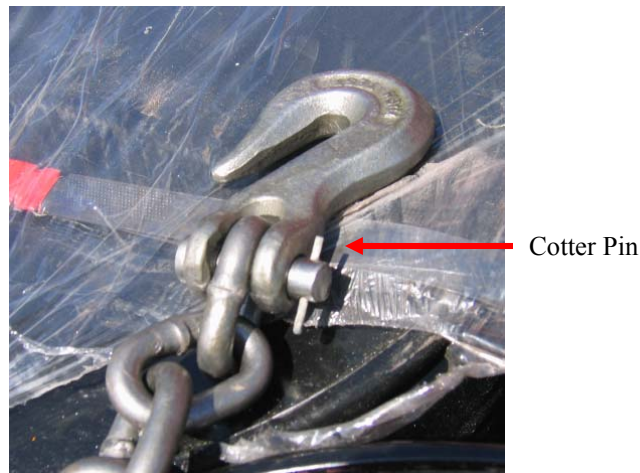


- A winch bar such as the one illustrated above should be used.



- Winches should be in good working order with no sharp edges or defects that may harm the webbing.

## Chains and Binders



- Chains must be free of cracks, bent or twisted links, gouges or pits, knots, or portions subjected to high temperature.
- If hooks are pinned to the chain, they must be adequately secured.



- **Approved load binders**

- Binder must be equipped with two grab hooks.
- Grab hooks should be compatible with the size of the chain being used.
- Welding of binders to chain is prohibited.



**Ratchet Type**



**Lever Type**



**Turnbuckle Type**

- ⇒ Turnbuckle binders must be secured to prevent loosening during transit by using jam nuts on the shafts or using wire when there is a hole in the shaft for that purpose.
- ⇒ Softeners should be used where chains may damage a load or where a load may damage a chain.

## Securement Standards

Minimum Standards for using chains or straps for securing flatbed loads are contained in the Federal Motor Carrier Safety Administrations Final Rules (49 CFR 393.100-136) . Customer should conform to these rules prior to reviewing the following pages.

The number of chains and binders and/or straps recommended assumes a single piece load that will not easily slide or shift on the trailer. This is not usually the case with consolidated loads. Therefore additional chains and binders are normally required to better stabilize the load.

### ▪ Minimum Working Load Limit for Cargo Securement Devices and Systems

- 49 CFR 393.106 requires the aggregate working load limit of any securement system used to secure an article or group of articles against movement must be at least one-half the weight of the article or group of articles. The aggregate working load limit is the sum of:

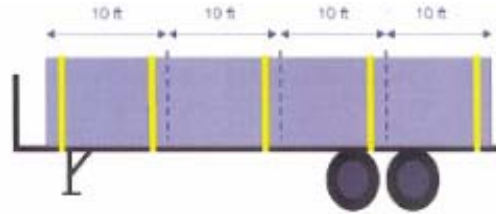
- ⇒ One-half the working load limit of each tiedown that goes from anchor point on the trailer to an attachment point on an article of cargo; and
- ⇒ The working load limit for each tiedown that goes from an anchor point on the vehicle, through, over, or around the cargo and then attaches to another anchor point on the trailer.

*EXAMPLE:* A minimum of four tiedowns with a working load limit of 5,000 pounds would be needed to secure cargo on a flatbed trailer that weighs 40,000 pounds ( $4 \times 5,000 = 20,000 = 40,000/2$ ).

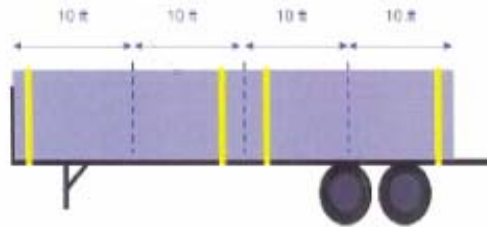
- Working Load Limits (WLL) are provided for all types of securement devices in Tables to 393.108.

### ▪ Minimum Number of Tiedowns

- In addition to 393.106, 393.108 states that the minimum number of tiedowns required to secure an article or group of articles against movement depends on the length of the article(s) being secured.
- When an article of cargo is **not** blocked or positioned to prevent movement in the forward direction by a headerboard, bulkhead, other cargo that is positioned to prevent movement, or other appropriate blocking devices, it must be secured by at least:



- ⇒ Two tiedowns if the article is 5 feet or less in length and more than 1,110 pounds in weight; or greater than 5 feet in length but less than 10 feet, regardless of weight.



- ⇒ When an article of cargo is longer than ten (10) feet in length, it must be secured by 2 tiedowns for the first 10 feet of length, and 1 additional tiedown for every 10 feet of length, or fraction thereof, beyond the first 10 feet.

*EXAMPLE:* The minimum tiedowns required to secure steel piping, 23 foot long, would be four (4). Two tiedowns for the first 10 feet, one (1) for the next 10 feet, and 1 additional tiedown for the remaining 3 foot fraction.

- When an article of cargo **is** blocked, braced, or immobilized to prevent movement in the forward direction by a headerboard, bulkhead, or other articles that are adequately secured, it must be secured by at least 1 tiedown for every 10 feet of article length, or fraction thereof.

## ▪ Straps

- Straps are rated differently than chains. The material typically used is 5/32" in thickness. Manufacturing standards are found in *Web Sling and Tiedown Association's Recommended Standard Specification of Synthetic Web Tiedowns*, WSTDA-T1, 1998.
- All straps should be carefully inspected before use. Inspect straps for cuts, frays, broken or loose stitching.
- More straps than might be normally used are appropriate when the load will be moving over the ocean. Straps should be attached to the frame on the flatbed when possible or to the rub rail when necessary.

## Flatbed Trailers



- When planning a load, dunnage used properly helps to protect the customer's freight from damage.
- Guidelines for loading various commodities are illustrated in this manual. If you require help in planning a load, contact TOTE's Customer Service Department.
- The following rules apply:
  - Overhang over the front and rear of the trailer makes up the load length. The load cannot exceed 18 inches over the front of the trailer.
  - Dunnage is considered part of the load.
  - Any load more than 14 feet high must be cleared through Terminal Operations.
  - If a vehicle or its load exceeds the following dimensions and cannot be reduced, a permit is required to move on Washington and Alaska highways.

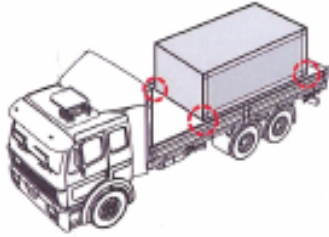
Width : 8 feet, 6 inches  
Height : 14 feet  
Length : 53 feet (single trailing unit)

- When loads require permits, TOTE must be notified at the time of booking, or when the trailer is released for pick up.
- Alaska and Washington State Trailer Weight Restrictions should be adhered to. [www.wadot.wa.gov/commercialvehicle](http://www.wadot.wa.gov/commercialvehicle)  
[www.dot.stateak.us/](http://www.dot.stateak.us/)
- Clear plastic may be used to protect a load from the marine environment. The protective plastic should be pulled taught and rolled around a thin wooden board. The board is then nailed to the deck of the flatbed. **NOTE:** If the plastic is not see-through, the edge must remain at least 1 and ½ feet above the flatbed deck so the securment is visible.

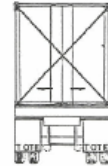


## Intermodal Containers on Flatbed

### ■ Securement of loaded intermodal containers on flatbed:



- All four corner of the intermodal container should rest upon the trailer deck.
- Secure container to trailer deck with two chains and binders at each end criss-crossed upper left to lower right and upper right to lower left.



- One chain, front and rear must be pulled through the lower container corner casings. Chain must be secured to D rings on frame of trailer or stake pockets, if available. Do not secure to rub rail.



- Chains and straps must restrain the container from any movement.

# Stretch Trailers

- TOTE has trailers available that can stretch from 40 feet to 65 feet in 5-foot increments.
- Chain tiedowns must be of sufficient capacity and be tightly secured.
- **Rigid and self-supporting load**
  - A legal weight of 48,000 pounds can be carried.



- **Flexible load**
  - Please consult the following table of weights for applicable lengths.

**Flexible Non Self-Supporting Loads in Pounds**

Overall Length in Feet	40 Feet – 65 Feet	45 Feet – 75 Feet
45 feet	50,000 pounds	-----
50 feet	40,000 pounds	45,000 pounds
55 feet	32,000 pounds	35,000 pounds
60 feet	28,000 pounds	28,000 pounds
65 feet	25,000 pounds	25,000 pounds
70 feet	----	21,000 pounds
75 feet	----	18,000 pounds



**Support load over suspension and king pin areas**



**Note 1 & 2**

**Note 1 & 2**

**Stretch-beam area is not load-bearing.**

**Note 1:** Dunnage must be used for blocking to avoid damage to the inner sections of the beams.

**Note 2:** Position dunnage as far away from the open section as possible to avoid breaking the neck and the front of the rear section.

## Low Boys



TOTE has 40-foot, step-deck low boys in its fleet. The main deck is 29 feet, 8 inches long; 8 feet wide; and 3 feet high.

These trailers can move freight that is 10 feet, 6 inches high; and 30 feet long on the ground. If larger low boys are required, TOTE can make them available.

When shipping with low boys, exact size measurements are required including the length, width and ground clearance of the low boy from the king pin to the center of the rear axle. If the load has rear overhang, then ground clearance is required from the center of the rear axle to the rear of the overhang. The front overhang cannot exceed 18 inches.





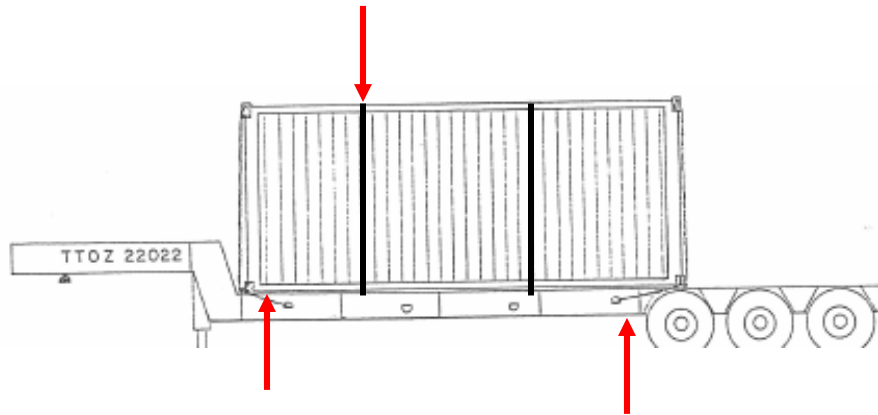
## Intermodal Container on Lowboy

### ■ Securement of container to lowboy

- Position container on lowboy to distribute weight.
- Two chains and binders at each end criss-crossed from upper left to lower right and upper right to lower left.



- Straps must restrain the container from any movement.



- Pull chain through holes in lower castings and secure to D rings.

## Dimensional Lumber



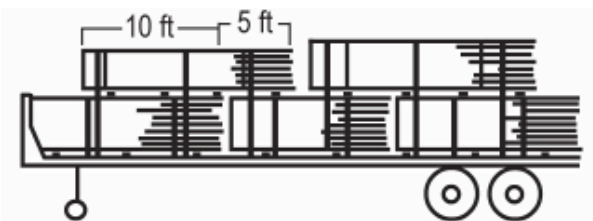
**Step 1. Cross Pieces:** 2x4 or 2x6, full width of trailer. Use 2 per pile (10 feet long or less). Add 1 for each additional length up to 10 feet.



**Step 2. Bundles, Lower Layer:** Each bundle must have 2 straps securing it to the trailer bed.



**Step 3. Bundles, Upper Layer:** Use cross pieces between layers. See Step 1.



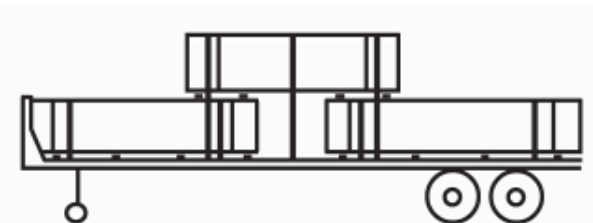
**Step 4. Straps:**

Each bundle must be secured to the bed with 2 straps per 10 feet of lumber. Add 1 strap for each additional length up to 5 feet.



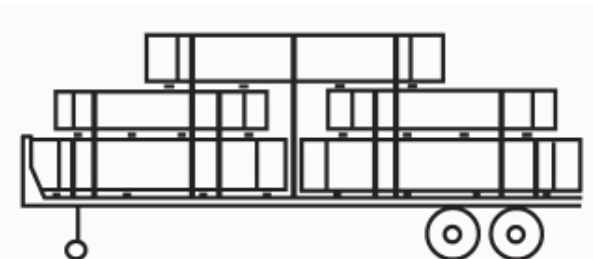
**Step 5. Top Layer Securement**

When loading 3 or more layers, 2x4 or 2x6 dunnage must be placed between the 2<sup>nd</sup> and 3<sup>rd</sup> layer. Bundles must be secured to the trailer bed as in Step 4.



**Step 6. Void Lower Layer.**

The vacant space must not exceed one quarter of the length of the second layer. The top package must be centered over the void and secured with 4" straps.

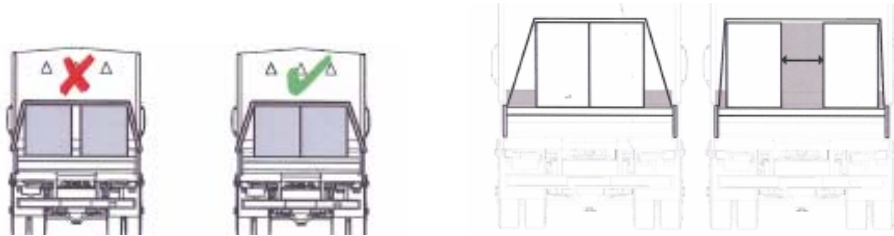


**Step 7. Void Second Layer.**

When the load is 3 layers, vacant space is permitted in the lower layer. Secure the top bundle with 3 straps every 10 feet. Add 1 strap for each additional length up to 5 feet.

▪ **Positioning of bundles**

- Bundles placed side by side should either be placed in direct contact with each other or separated by appropriate dunnage to bundles from shifting towards each other..

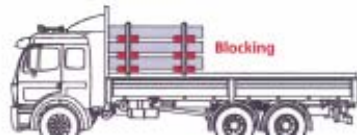


▪ **Additional positioning and securing features for bundles in two or more tiers**

- Block bundles with stakes on the sides of the vehicle to prevent side-to-side movement.



- Use blocking or high friction devices between the tiers use to help prevent side-to-side movement



⇒ High friction devices include friction mat, cleated mat, other specialized equipment.



## Steel Pipe and Drill Stem

*Securement is solely the customer's responsibility. Any damage to the cargo because of securement is sole responsibility of the customer and becomes their liability.*

*Any exceptions to the securement procedures outline herein shall be authorized only by express consent of TOTE OPERATIONS MANAGEMENT.*

- **Based on the length of product, the following minimum equipment and dunnage are required.**

<u>Pipe Length</u>	<u>Dunnage per Layer</u>	<u>Chocks per Layer</u>	<u>Chains &amp; Binders</u> Every layer for ≥ 12" dia pipe	<u>Chains &amp; Binders</u> Every <u>2</u> layers <12" dia pipe
< 24'	3	6	4	4
25' – 30'	4	8	4	4
31' – 34'	5	8	4	4
35' – 45'	5	10	5	5
>45'	5	10	6	6

Note: The topmost layer of pipe will have an additional 2 chains over the top.

- 4 inch nylon straps with a rated capacity of 12,000 pounds or greater in good condition (not frayed or torn) may be supplemented in addition to the required chains and binders.

*When loading pipe the following guidelines must be followed:*

- **Dunnage**



- Wood dunnage must be a minimum of 4" x 4" or equivalent (2ea, 2" x 4" nailed together will suffice).
- Wood dunnage must be in good condition. No soft wood will be allowed (must be a good grade of hardwood. Smaller landscape timbers with rounded sides are not acceptable).

▪ **Chocks**

- Chocks at a minimum should be fashioned from:
  - ⇒ 4"x 4" beveled wood for pipe over 6"
  - ⇒ 2"x 4" beveled wood for pipe 6" or less
  - ⇒ commercial grade plastic chocks
- After the load is secured the chocks must be tight to the pipe and secured with suitable fasteners.
- Wooden chocks should always be the same width as the dunnage to which they are fastened. For example, 2"x 4" or 4"x 4" chocks should be used with 4"x 4" dunnage and 2"x 6" or 4"x 6" chocks should be used with 4"x 6" dunnage.
- Chocks must be in good condition after securement, i.e. not split.



▪ **Belly Wraps**

➤



Belly wraps shall be either “butterfly method” (as long as both chains are directly across from one another at each location) or by standard belly wrap procedure (from trailer rail, over the top of layer, back under layer, then over the top of layer and secured to opposite trailer rail).



▪ **Pipe 12 Inches Or Greater In Diameter\***

- Pipe less than 35 feet in length will have a belly wrap on each end and 2 chain and binders over the top for every layer.
- Pipe 35 feet to 45 feet in length will have a belly wrap at each end, 1 in the center and 2 additional chain and binders over the top of the load for every layer.
- Pipe greater than 45 feet in length will have 2 belly wraps on each end, 1 in the center and 3 additional chain and binders over the top of the load for every layer.



▪ **Pipe Less Than 12 Inches In Diameter\***

- Pipe less than 35 feet in length will have a belly wrap on each end and 2 chain and binders over the top for every 2 layers
- Pipe 35 feet to 45 feet in length will have a belly wrap at each end, 1 in the center and 2 additional chain and binders over the top of the load for every 2 layers.
- Pipe greater than 45 feet in length will have 2 belly wraps on each end, 1 in the center and 3 additional chain and binders over the top of the load for every 2 layers.

\* When the chain binders are the widest point outside the framework of the trailer, binder handles shall be secured by wire.

▪ **Stake Pockets and Side Rails**

- Skid/Rub rails may not be used for securement of loads.
- Chains/straps must go between trailer side rail and rub rail, not outside of rub rail (over width loads will be the only exception).
- Stake pockets and side rails in area where chain is attached must be in good condition, i.e. no steel/weld fractures or disfigurement that would not allow for proper connection of the chain or chain hook.
- Chain must be wrapped around stake pocket and either hooked back to pocket or back to the chain.

▪ **Pipe Bunks or Pipe Stakes**

- It is recommended that all pipe flatbed loads of steel pipe and drill stem have pipe bunks or pipe stakes.
- The pipe stakes will be 3" x 1½" x .258" thick (5.0 pounds/foot) steel channel or better.
- When stakes are used they shall be secured across the load to each other, or across the top of trailer load to trailer rail.



▪ **Banded Bundles**

- Banded bundles of steel pipe will be treated as above based upon diameter of bundle.
- Banding should be sufficient so that there is no movement of pipe within the bundles even when subsequent layers are added.



- Above is an excellent example of unitized banding.

▪ **Pipe Which Prohibits Use of Chain for Securement** (Teflon coated, tape coated, concrete encased, etc.)

- Pipe bunks or stakes ***must be*** utilized.
- Nylon straps as described above must be used. When straps are used, the number of straps must be double the amount required for chains previously outlined, and all other rules still apply.

## Corrugated Steel Pipe



- Securement of corrugated steel pipe should follow the guidelines in Steel Pipe section of this manual.
- Pipe should have separators equally spaced along the length of the pipe.
- Separators should be located at least 8 and not more than 18 inches from ends of pipe.
- Wedge blocks must be securely attached to both sides of each end separator. Intermediate separators must have wedges applied to prevent them from migrating out of position.
- Load should be packaged wrapped and unit banded.
- Sufficient securement should be added across the ends of the large pipes to keep the smaller pipes inside from shifting longitudinally, as seen below.



**Correct**



**Incorrect**



## Plastic, Fiberglass, or Composite Pipe

- Softeners may be used to prevent damage to plastic, composite, or fiberglass pipe.



- Bundle wraps should be arranged in a vertical manner.
- Load must be unit banded.
- **Large plastic pipe**
  - Pipe should have separators equally spaced along the length of the pipe.
  - Separators should be arranged in a vertical manner and less than 8 feet apart.
  - Wedge blocks must be securely attached to each end of each separator.
  - Packaged wrapping and unit banding add greatly to the securement of a pipe load.
  - This load has good separator placement and wedge blocks applied. Unit banding of the lower and upper bundles would greatly improve load's stability.
  - Below is an excellent example of securement of large fiberglass pipe.



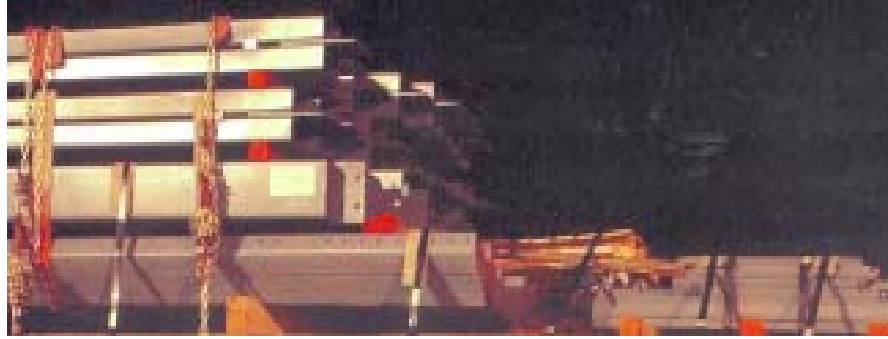
## Structural Steel

Structural steel is inherently a difficult load to secure. Different shapes and sizes, along with the desire to keep a multiple piece load together on a single trailer can be challenging.



### ■ General Rules

- Steel-on-steel is not acceptable.
- The bottom layer of the load should have the widest dimension of the load.
- Chains should be used on all structural steel, plate steel, and beam loads.
- Softeners may be used under the chains for steel susceptible to damage.
- Four inch straps with a rated capacity of 12,000 pounds or greater in good condition (not frayed or torn) may be supplemented in addition to the required chains and binders.
- Steel beams (i.e., “H” or “I” beams) should be blocked in the web and wedged between flanges.
- It is recommended that loads be configured so cargo and lashing remain inside the trailer dimension.



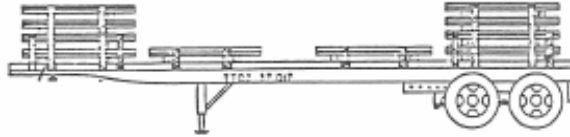
- All products must be secured. Objects on top of structural steel or tucked inside of square tubing is unacceptable, as noted in the picture above.
- Dunnage
  - ⇒ Hardwood is preferable for dunnaging and bracing steel loads, however a good quality fir or better is acceptable.
  - ⇒ Multiple pieces of dunnage must be firmly nailed to each other.



- ⇒ Pallets should not be used as dunnage.
- ⇒ Cross beams should span the entire width of the load when possible.
- Belly wraps or gut wraps shall be utilized at least every 10 feet in length or to the shortest piece in the stack if less than 10 feet.
- Straps, in good condition, may be utilized to secure rebar, however belly wrapping must be done with chain.

## Plate Steel

- Plate steel should have separators equally spaced along the length of the plate steel.
- Place separators between each layer of steel and secure to deck with chain or straps.
- Secure each additional layer with chain or straps.
- Thin gauge plates may be unitized.

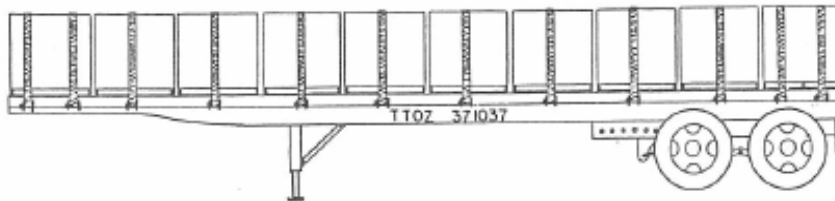


- Plates can be further secured with the use of stakes or bunks.



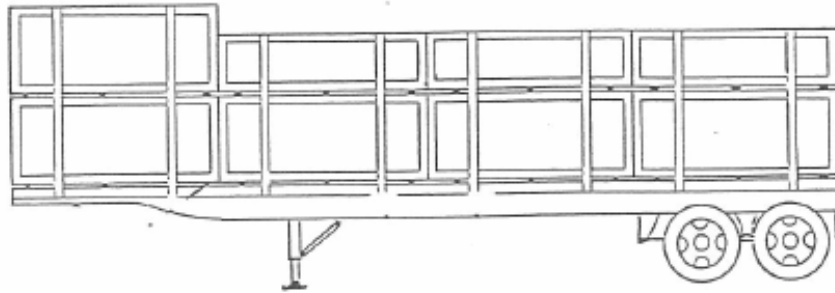
## Nut Plug Medium or Well Drilling Mud

- Medium should be plywood boxed.
- Box should be shrink wrapped to pallet
- Place first box at front of flatbed and tie down with two straps over top of row from side-to-side of trailer.
- If load is solid from front to rear of trailer, secure each row of boxes with one strap over top of row, from side to side of trailer.
- Secure last box with two straps.

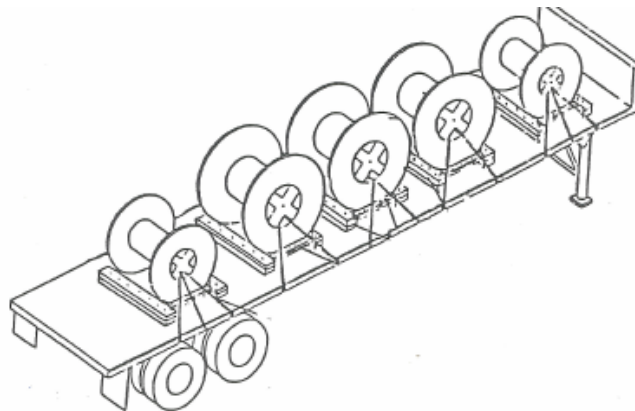


## Small Machinery

- Machinery should be encased in wood crate.
- If crates have no runners under them, place one 2 inch x 4 inch x 8 foot separator every four feet or fraction thereof.
- Secure crates to trailer with two straps for each four feet of crate or fraction thereof.



## Cable on Reels



- Secure each reel from forward, backward, side-to-side movement by nailing blocks to trailer deck.
- Chains must go through the eye of the reel and secure to each side of the flatbed.
- The number of chains is dependent on the size of the reel. TOTE recommends 3 chains per reel, especially on the front and rear rolls.
- If reels are large, more than 3 chains can be used.

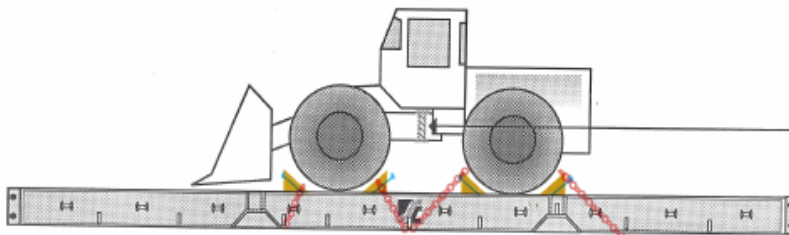
## Heavy Equipment

- This section covers front end loaders, bulldozer, tractors, and power shovels.
- Center the weight load on the trailer.
- Set the parking brake.
- Secure steering.
- Secure all telescoping booms and attachments.

- Lower and secure to the vehicle all accessory equipment (hydraulic shovels, booms, etc.)

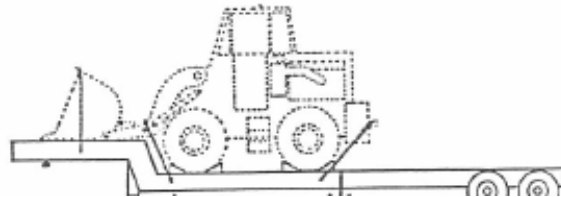


- Place chocks in front and rear of all tires and secure to deck with nails.



- Articulating locking device must be engaged and secured.

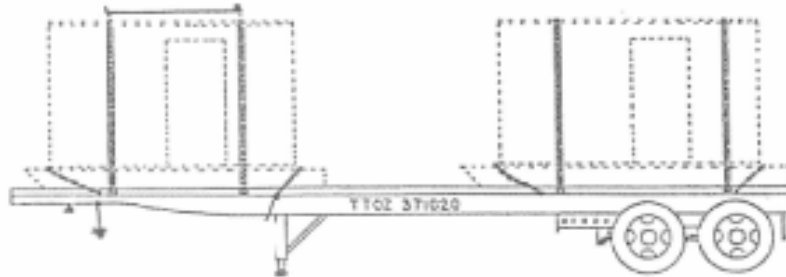
- Place chain around front of unit and pull toward rear.
- Place chain around rear of unit and pull toward front.



- Wherever chains touch unit, use softeners.

## Modules

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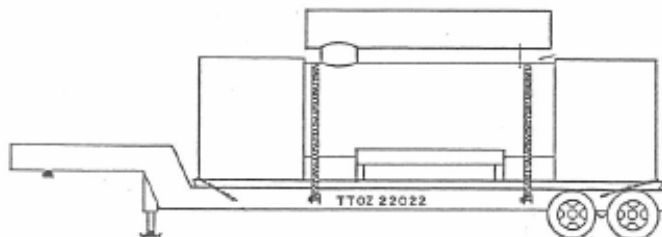


- Position modules on trailer for proper weight distribution.
- Place chain over front and pull to rear of trailer.
- Place chain over rear and pull to front of trailer.
- Place two straps over module and secure to trailer.

## Boiler

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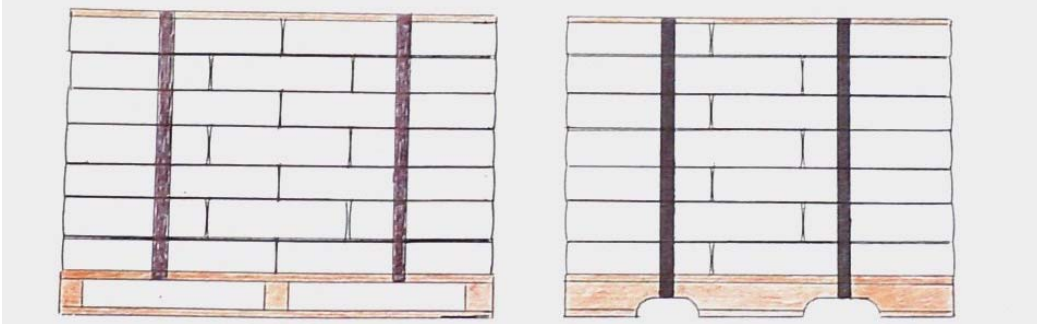
- Boiler should be placed on skidder.
- Set unit on trailer and place chain around front, pulling to rear of trailer.
- Place chain around rear, pulling to front of trailer.
- Place two straps over top of boiler and secure to trailer.



## Bagged Concrete

### ▪ Loading

⇒ Pallet loads of bagged concrete should be stacked in an interlocking pattern.



- ⇒ Stack should be shrink wrapped to pallet.
- ⇒ Use wood softeners on top of bags.
- ⇒ Straps should not dig into the uppermost bags.



An example of straps cutting into bags as wood softeners were not used.



- ⇒ Load weight should be evenly distributed along length of flatbed.



## GLOSSARY

**Anti-Skid Plate** – a metal plate with sharp projections on each side, used between wood members or containers to retard movement.

**Band, High Tension** – steel strapping of various widths and thickness, each with a standard load strength, such as package bands which are used primarily for containing packages, units or portions of a load, and securement bands which are intended to contain the entire load or to secure the load to the car.

**Bearing Pieces** – material placed on the trailer floor, underneath the lading, to facilitate loading or unloading and to distribute weight of lading over the floor of the trailer.

**Blocks** – wood material nailed, bolted or wired in position to secure lading in place.

**Braces** – material used to retain lading or blocking in position.

**Cable** – a lading securement of definite size, composed of a number of twisted strands of a certain number of wires each.

**Cable Clips** – metal fittings equipped with bolt or bolts used to secure cable to trailer or lading.

**Capacity** – as applied to a trailer, the maximum load in pounds which the trailer is designed to carry.

**Carrier** – railroad, trailer owner or supplying cartage company or any other concern engaged in transportation of trailers.

**Chock Block** – concave or mitered blocking pieces used to secure objects in position.

**Clamping Piece** – wood or steel member placed across top of load to keep lading in position, secured to trailer or stake pockets with rods. Also used on machinery or vehicles to secure movable parts.

**Clearance, Lading** – limitations for height and width of trailers and loads, as published in the *Railway Line Clearances*. Special authority must be obtained for handling loads exceeding published clearances and for those which exceed dimensions indicated.

**Cleats** – wooden pieces nailed to the floor to reinforce blocking. Also pieces nailed to the floor or blocking against lading to retain lading in position.

**Cribbing** – metal or wood pieces or framing placed under or against lading to support, stabilize or hold lading in position and secure to prevent displacement.

**Crossties, Side Stake** – wood, wire or metal ties used to keep stakes in position and retain the alignment of the lading.

**Deck** – the wood floor of a trailer or flatbed.

**End Blocking** – blocking used to prevent end movement of lading.

**End Sill** – the transverse member of the under-frame of the trailer extending across ends of all the longitudinal sills.

**Eye Bolt** – closed eye fittings with threaded end used to secure wire and band lading ties.

**Filler** – wood pieces used between trailers and lading, trailer and blocking, or between two sections of blocking or lading, to retain lading and blocking in position.

**Filler, Metal** – metal protectors used under wire or band securements to prevent the failure of the securement as a result of contacting sharp edges of either the trailer or lading.

**Floating Load** – a load in which the lading is prepared into a unit with space between unit and ends of the trailer and end blocking omitted. This type of loading permits the dissipation of impact shock by the lengthwise movement of loading over the floor of the trailer.

**Flooring** – the general term given to the layer of material which is placed on top of the under-frame of a trailer and provides the direct support of lading.

**Guide Strips** – longitudinal pieces secured to the floor of the trailer against the side of the unit or skids to prevent side shifting.

**“J” Bolt** – open end fittings with threaded ends used to secure wire or band ties, or as a direct tie-down securement. The open end closed by the application of a plate over the end and stem of the bolt.

**Lading Strap Anchor** – point of securement provided on trailers for the application of high tension band wire. (Cables, rods or chains are not to be attached to lading strap anchors.)

**Lag Screw** – screw type securement for blocking or as a retarding device between blocking and skids on machinery shipment.

**Laminate** – the use of two or more wood (or wood and steel) members in the makeup of a blocking detail or skid.

**Light Weight** – the weight of any empty trailer.

**Load Cushioner** – a flanged metal seal which is to be crimped to a band and nailed to the car floor for the retardation of longitudinal movement of the load.

**Load Limit** – the maximum load in pounds which the trailer is designed to carry.

**Mechanical Brakeman** – see “Snubber Plates”.

**Metal Blocking** – suitable metal sections which are acceptable as alternates for wood blocking securement.

**Overhanging Load** – the portion of lading extending over the end of the trailer.

**Pallet** – a platform or skid on which lading is placed and secured, used to facilitate handling of small sized commodity shipments by mechanical means.

**Palletized Load** – a method of loading pallets.

**Pile** – a load or portion of load composed of one or more units which may be either located side by side or one on top of another, or both, which may be secured as a single unit.

**Proof Test (Chain)** – tensile test applied to a chain by a manufacturer for the purpose of detecting defects in the material or manufacture. The tensile test indicates the actual load in pounds that the chain will withstand without failure.

**Protection Plates** – metal protectors used under wire or band securements to prevent the failure of the securement as a result of contacting sharp edges of either the trailer or lading.

**Rigid Brace Load** – a load in which the lading is secured by blocking, etc., to prevent any movement of the lading in transit.

**Rotary Machine** – machines designed to rotate totally or in part and necessitate securement of the rotary feature in transportation.

**Separators** – material placed crosswise between layers of load and extending through the full width of the load to facilitate loading and unloading, to provide level support for additional layers, and to provide space for application of load securement items.

**Skids** – a platform composed of two or more longitudinal members and two or more cross members to which lading is attached to facilitate handling and to distribute load weight in transportation, or composed of two or more members secured to lading to facilitate handling.

**Snubbed Load** – a method of loading using anti-skid plates, lay screws or other retarding devices which permit a restricted lengthwise movement of the load.

**Snubber Plates** – slotted metal plates nailed to the floor of the trailer used to retard movement of lading. The retarding action is caused by the frictional resistance of the load securement bands passing through slotted holes in the plate.

**Spacers** – material placed crosswise between layers of pile extending for the width of the pile only to facilitate loading and unloading, and to provide spacer for the application of load securement items.

**Specially Equipped Trailer** – a trailer that has integral devices to either partially or fully secure the lading.

**Stake** – a piece of timber or metal inserted in the stake pocket on sides or ends of open top trailers to hold the load in place, extending slightly higher than top of load.

**Stake Pocket** – a metal receptacle attached to side or ends of open top trailers to receive end of stake used in securing loads.

**Stake, Stub** – a piece of timber or metal inserted in the stake pocket on sides or ends of open top trailers extending sufficiently above floor to provide protection against side or end movement of lading.

**Stickers** – material placed crosswise within bundles extending for width of bundles only, to provide rigidity and prevent slippage of individual pieces within the bundles.

**Tare Weight** – the weight of any empty trailer.

**Thimble** – metal protectors used to prevent cutting or breaking at sharp turns of cable securement.

**Wheel Chocks** – concave or mitered blocking used to secure wheeled units.

**Wire, Common** – soft wire of various sizes used as a lading securement.

**Wire, High Tension** – steel wire of definite size and load strength used as a lading securement.

**Working Load Limit (Chain)** – maximum load in pounds which should ever be applied to chain even when chain is new and when the load is uniformly applied in direct tension to a straight length of chain.

## **CONTACT INFORMATION**

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