

Dock System Guide

Planning and Designs

BLUE GIANT®



OVERVIEW

The efficient flow of products in and out of facilities is critical in today's highly competitive world. Special attention must be given to the loading dock area design for this to happen. A number of factors must be considered when coordinating dock heights and door sizes, and when selecting the proper loading dock equipment.

Today's workplace will not tolerate unsafe work practices. Planners must ensure that the loading dock area is not just efficient, but also safe. Installing loading dock safety equipment is just the first step towards minimizing hazardous and costly accidents. The loading dock personnel must then be educated and trained on how to use the equipment and identify the warning signals. If a person does not fully understand a particular piece of equipment they are unlikely to use it properly. It is the employer's responsibility to ensure proper training is provided for the loading dock workers. Authorized Blue Giant Representatives can provide employers with recommendations and after-sales training to ensure proper equipment selection and use.

Throughout the planning process, future requirements should always be addressed. The need for more door openings and more storage capability should be incorporated into the layout of the new building prior to its construction to save a great deal of cost and frustration later. Planners should also consider future changes to the loading dock application when deciding on the size and capacity of the loading dock equipment.



This guide was created to assist in the design of the loading dock area and the selection of the loading dock equipment. If you need assistance, please contact your authorized Blue Giant representative.

The major areas of consideration are:

1. **Dock Area Design**
2. **Dock Levelers**
3. **Dock Bumpers**
4. **Vehicle Restraints**
5. **Other Safety Equipment**
6. **Dock Seals/Shelters**
7. **Elevating Docks**

We encourage the use of this planning guide to ensure an effective and safe loading dock area.

Additional information on Blue Giant products and how to locate an authorized Blue Giant dealer can be found on our web site.

www.BlueGiant.com

Blue Giant also manufactures a wide range of Class III industrial trucks for efficient and safe material handling within the facility.

LOADING DOCK AREA DESIGN

Designing the dock area requires the consideration of the following variables:

- 1) Trailer configurations
- 2) Dock approach
- 3) Apron space
- 4) Dock positioning
- 5) Dock height
- 6) Door size.

TRAILER CONFIGURATIONS

Truck Bed Height

A typical loading dock may at some point service every type of vehicle on the road. It is essential to recognize the characteristics of the trailers that will be visiting the loading dock with the highest frequency. This determines the most appropriate design for the dock itself. Secondary consideration must be given to vehicles that visit the dock with less frequency. If it is a captive fleet (only one style of trailer) being serviced at the facility, then the choice of design is simple. However, due to the range of vehicles utilized by freight companies and product suppliers, it is vital to consider all of the possible variations that can occur.

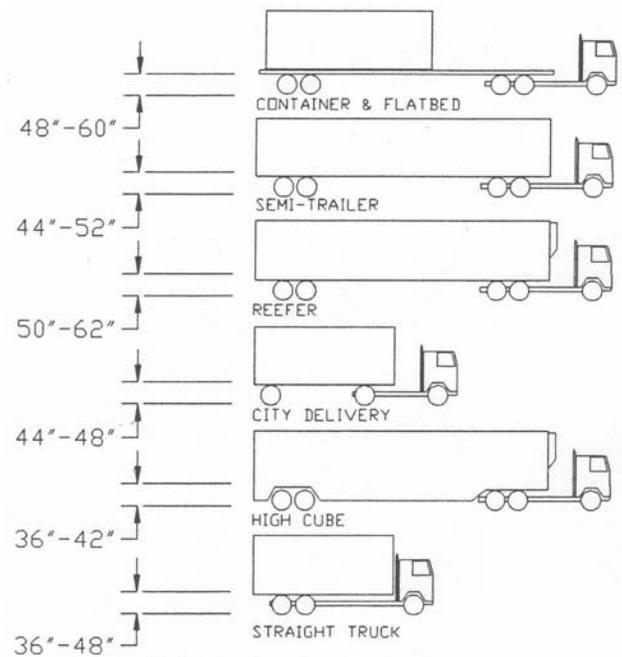


Figure 1
Heights of Various Trailers

	TRUCK BED HEIGHT TOTAL RANGE		OVERAL ALL TRUCK HEIGHT TOTAL RANGE	
	MIN	MAX	MIN	MAX
CONTAINER	56"	62"	12'-2"	13'-6"
REEFER	50"	62"	12'-6"	13'-6"
DOUBLE AXLE SEMI-TRAILER	44"	52"	12'-0"	13'-6"
CITY DELIVERY	44"	48"	11'-0"	12'-6"
HIGH CUBE VAN	36"	42"	13'-0"	13'-6"
FURNITURE VAN	24"	36"	13'-0"	13'-6"
STEP VAN	20"	30"	8'-6"	10'-0"
PANEL TRUCK	20"	24"	8'-0"	9'-0"
STRAIGHT TRUCK	36"	48"	10'-6"	12'-0"
FLATBEDS	48"	60"	-	-
SPECIAL				

Figure 2

LOADING DOCK AREA DESIGN

SEA CONTAINERS

Facilities that must accommodate sea container freight need to be particularly flexible. Sea containers and refrigerated containers can have trailer heights of up to 62". At the same time these facilities may service frequent deliveries/pickups by tailgate trucks and low bed trucks. The height difference can be as extreme as 30" at the low end and 62" at the high end. Consideration must be given to multi height dock designs or the installation of equipment such as a hydraulic truck leveler or an elevating dock.

Figure 1 is a listing of typical container sizes.

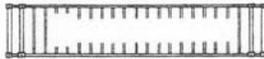
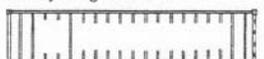
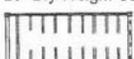
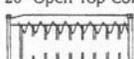
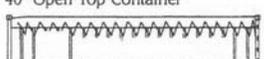
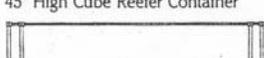
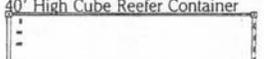
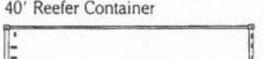
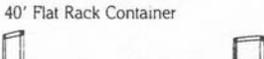
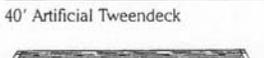
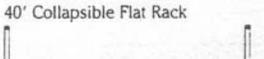
EQUIPMENT	INTERIOR DIMENSIONS	DOOR OPENING
45' High Cube Container 	L: 13.582 m W: 2.347 m H: 2.690 m	44' 6 1/2" 7' 8 1/4" 8' 10"
40' High Cube Container 	L: 12.056 m W: 2.347 m H: 2.684 m	39' 6 1/2" 7' 8 1/4" 8' 9 1/2"
40' Dry Freight Container 	L: 12.051 m W: 2.340 m H: 2.380 m	39' 6 1/2" 7' 8" 7' 9 1/2"
20' Dry Freight Container 	L: 5.919 m W: 2.340 m H: 2.380 m	19' 5" 7' 8" 7' 9 1/2"
20' Open Top Container 	L: 5.919 m W: 2.340 m H: 2.286 m	19' 5" 7' 8" 7' 6"
40' Open Top Container 	L: 12.043 m W: 2.338 m H: 2.272 m	39' 6" 7' 8" 7' 5 1/4"
45' High Cube Reefer Container 	L: 13.102 m W: 2.294 m H: 2.509 m	42' 11 13/16" 7' 6 5/16" 8' 2 3/4"
40' High Cube Reefer Container 	L: 11.557 m W: 2.286 m H: 2.491 m	37' 11" 7' 6" 8' 2"
40' Reefer Container 	L: 11.207 m W: 2.246 m H: 2.183 m	36' 9" 7' 4" 7' 2"
20' Flat Rack Container 	L: 5.702 m W: 2.438 m H: 2.327 m	18' 8 1/2" 8' 7' 7 1/2"
40' Flat Rack Container 	L: 11.820 m W: 2.148 m H: 2.095 m	38' 9 1/4" 7' 6" 6' 10 1/2"
40' Artificial Tweendeck 	L: 12.065 m W: 2.216 m	39' 7" 7' 3 1/4"
40' Collapsible Flat Rack 	L: 12.08 m W: 2.126 m H: 2.043 m	39' 7 1/2" 6' 11 1/2" 6' 8 1/4"

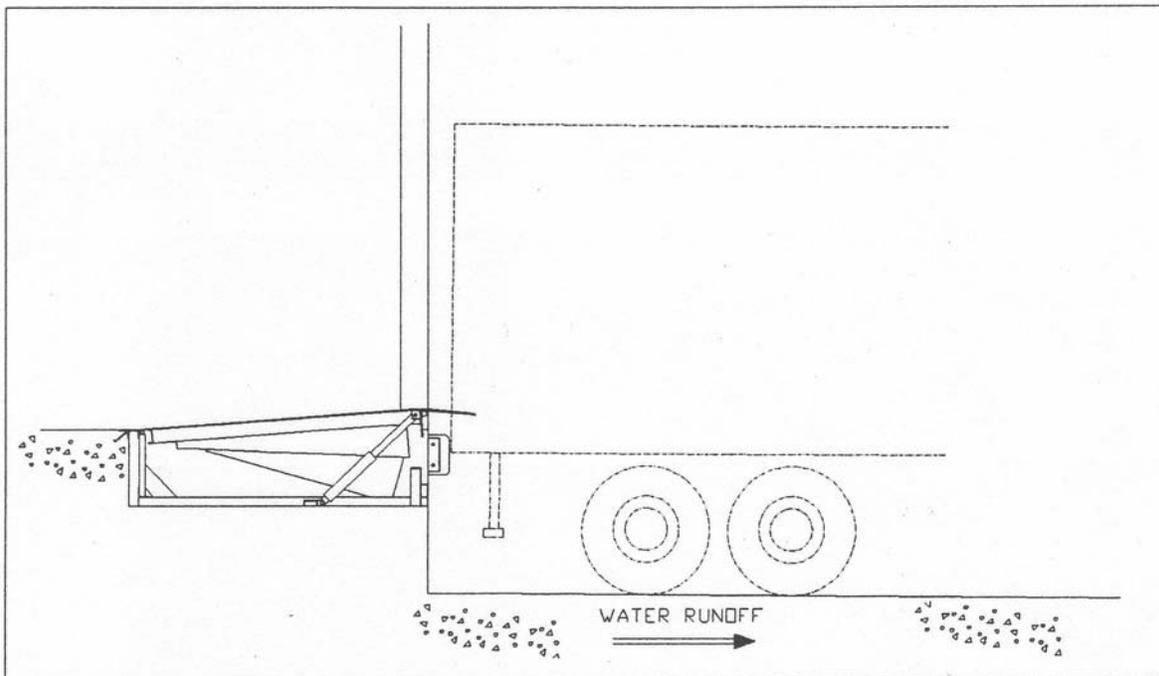
Figure 1
Container Sizes

LOADING DOCK AREA DESIGN

DOCK APPROACH

The dock approach is the topographical configuration of the area used when backing vehicles into position. This area can be a level, depressed (angled toward the building), or inclined approach (slightly angled away from the building).

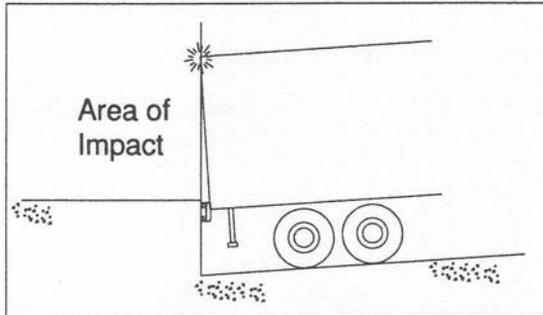
An ideal design is a slightly inclined approach that does not inhibit the positioning of trailers, but allows water runoff away from the building (Figure 1). This also helps prevent the potential of damage to the building from trailers that are severely angled when positioned by jockey trucks.



Inclined Dock Approach

LOADING DOCK AREA DESIGN

Declined approach areas are constructed when the floor of the building is even with the exterior grade level. To achieve a proper dock height for truck loading/unloading operations, the approach to the dock needs to be built incorporating a decline to the building.



Declined Approach

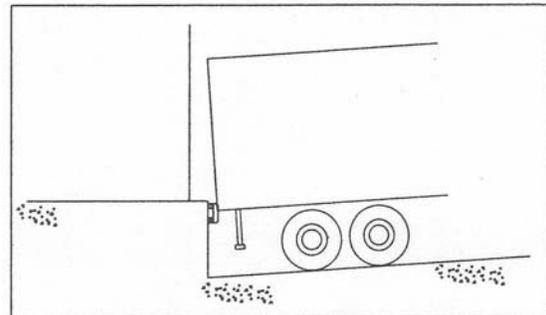
There are some issues of concern with a declined approach to the dock. These include: difficult snow removal, water drainage, buildup of debris, and high impact forces to the dock. There is also the potential for serious damage to the building wall from impact by the top of the trailer. Approaching trucks can generate severe impact forces from only a short distance. Increased bumper projection or a projected dock must be provided to avoid building damage.

Special considerations must be made when incorporating other loading dock equipment with a declined dock approach. Dock seals need to be tapered to match the angle of the trailer. If the seals are not tapered, effective sealing will not be accomplished and dock seal damage is likely. Vehicle restraints must also be projected sufficiently to ensure proper operation and safety.

Before planning a declined approach, consider the above factors and consult a Blue Giant Sales Representative.

Overcoming impact to the building wall is easily accomplished.

For new construction projects, the dock can be projected sufficiently to prevent the top of the trailer from impacting the building wall.



Overcoming Dock Approach Impact

When reconstructing an existing building, it may not be possible to project the dock. In that situation, it is best to project the bumpers by use of build-out blocks. The build-out blocks should be manufactured and supplied by the manufacturer of the dock levelers.

Required projection is determined based on the percentage of grade. To calculate the grade, measure the difference in height from the dock to a fixed point approximately 50' directly out from the dock. Divide the height difference by the length measured, using inches (eg. 18" difference over 600" distance. $18/600 = .03 \times 100 = 3\%$ grade)

Declined approaches should not exceed a 10% grade for proper and efficient dock operations.

Use the following chart to select the proper dock projection.

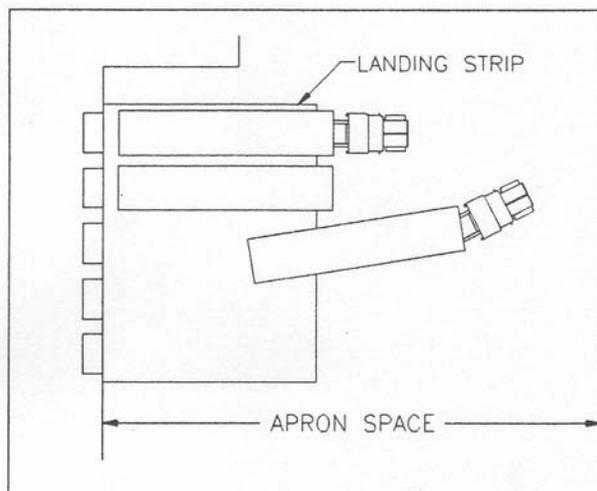
Pit Projection for Decline Drive							
Percent of Driveway Grade	0%	1%	2%	3%	4%	5%	..10%
Pit Projection	0"	2"	3"	4"	5"	6"	.. 12"

LOADING DOCK AREA DESIGN

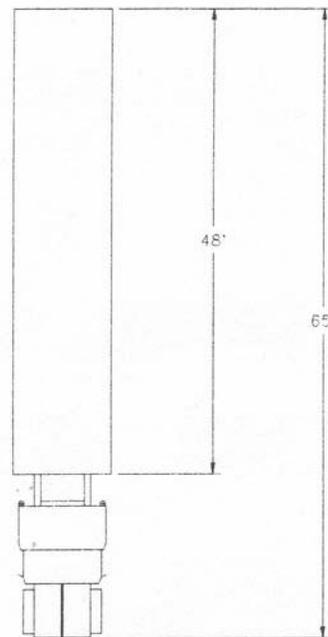
APRON SPACE

The configuration of the area required to maneuver and position trailers into place is called the apron space. Planning apron space requires recognizing trailer movement and the amount of room it takes to achieve that movement. Traffic flow and vehicle length are key factors for consideration (ie. a truck with an overall length of 65' requires a minimum apron space of 135').

If the area is to be surfaced with asphalt, a concrete landing strip must be poured. In warm temperatures, the landing strip will prevent the trailer's landing gear from sinking into the asphalt when spotted. Size the landing strip for the longest trailer that will visit the dock less 7 feet. Gravel-covered apron space should be avoided because it creates uneven, unsafe conditions.

**Landing Strip and Apron Space**

A simple guideline for determining apron space is to take the longest possible truck length and multiply by two. It is also recommended to add a safety factor of about 5' - 10' depending on available room.

**Calculating Apron Space**

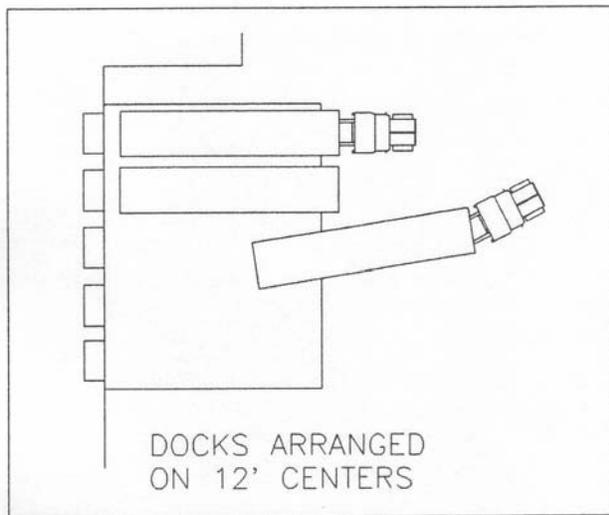
Remember to always use the overall vehicle length dimension. Keep in mind that trailer jockey trucks should not be used to determine apron space because they require substantially less room to maneuver than standard double axle truck trailers.

We recommend consulting with an authorized Blue Giant Representative when planning apron space.

LOADING DOCK AREA DESIGN

DOCK POSITIONING

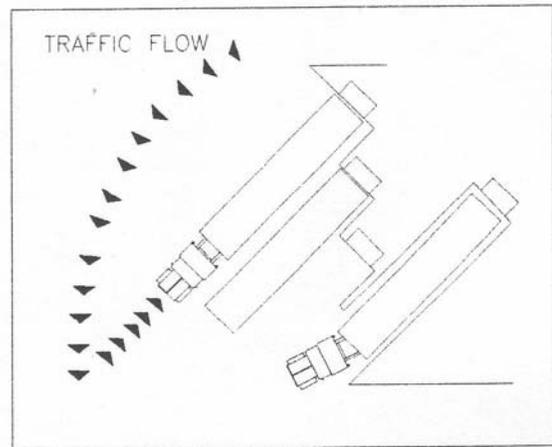
Dock positioning involves the physical layout of the dock doors and levelers. The most common dock arrangement is a flush wall with doors spaced on at least 12' centers (Figure 1). If special trailers frequent the facility, door spacing may need to be increased. Twelve-foot centers allow for an overall truck width of 10' including side mirrors. Narrower spacing is possible when room is limited. When incorporating narrower centers, give consideration to common member dock seals and shelters.



Docks Arranged on 12' Centers

Enclosed docks are generally used when climate control, product protection, security, and overhead lift capabilities are required. They are not a common choice due to high construction costs and vehicle exhaust pollution considerations.

Where space is limited for vehicle positioning, a sawtooth dock arrangement may offer the solution. The building wall is generally set back leaving the dock open and unsheltered from the outside environment. For that reason, a canopy should be utilized to offer worker and product protection. One disadvantage of sawtooth docks is the amount of internal floor space taken up.



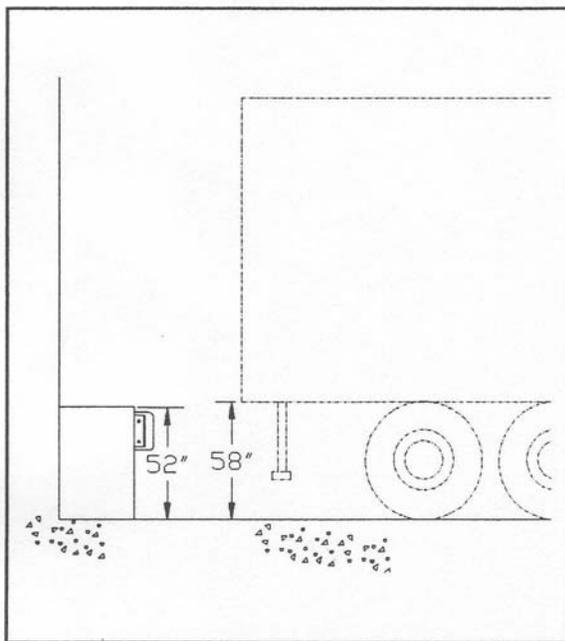
Sawtooth Dock Arrangement

LOADING DOCK AREA DESIGN

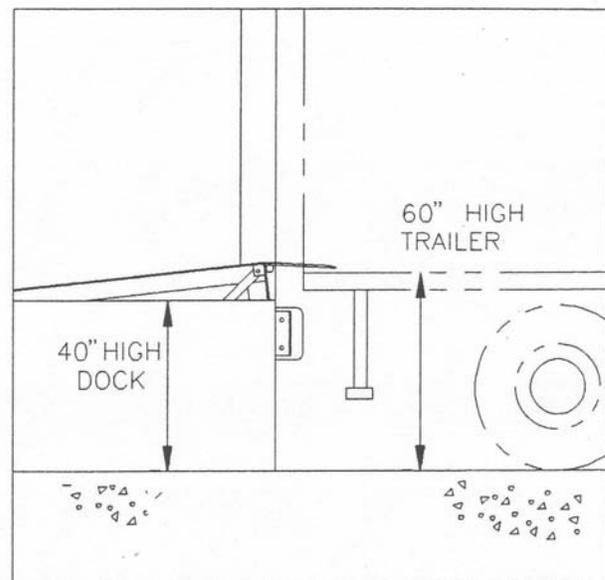
DOCK HEIGHT

Dock height will determine the grade percentage from dock to vehicle. The general selection criteria are the maximum grade percentage from dock to vehicle: when using electric powered handling equipment it is 10%, and for gas or diesel powered equipment 15%. Exceeding these grade percentages may result in equipment "hang up", damage to handling equipment and load spillage.

Discussed earlier in the guide, vehicle beds range from 30" to 62" in height. The question is: what vehicles will be serviced at the facility with the greatest frequency? Once this is determined, all or a majority of the docks should be made to accommodate this bed height.

**Dock & Vehicle Height Differential**

A dock area should be flexible enough to accommodate any vehicle. The most common dock height is 48" – 52".

**Figure 2**

Substantial height differences between dock and trailer can create severe dock leveler grades, decreasing the overall effectiveness of the operation.

Improper applications and use of dock levelers when there is a severe grade difference can lead to damage and premature failure of the dock levelers. Customized dock levelers can be made to suit unique applications and offset the height difference.

LOADING DOCK AREA DESIGN

DOOR SIZES

Selecting the proper door size is essential when planning the loading dock. Improperly sized doors can create logistic headaches, reduced efficiency, and product damage. Consideration must be given to both the variety of trailers that will visit the dock and the loading method of the product.

Planning now for possible future changes can save time, money, and frustration.

Door Width

The majority of trucks on the road today are at least 8' wide, and an increasing number are 8'6" wide. An 8' door width can service these trucks, but maneuvering room is limited. Another concern of 8' door widths is off-center truck positioning. This can lead to further reductions in efficiency and even create the need for repositioning of the vehicle.

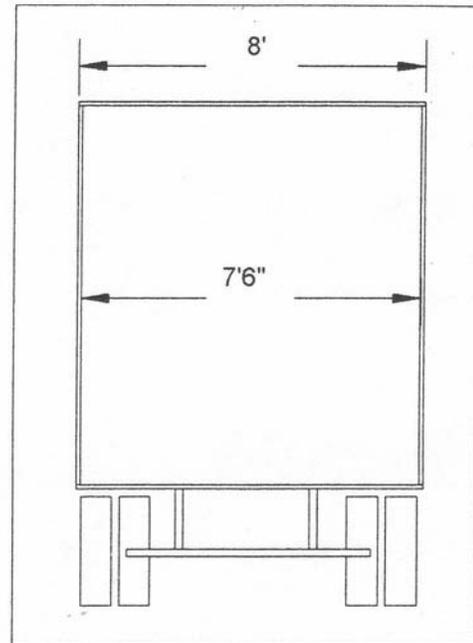
Ideally, nine-foot wide doors should be used to service 8'6" wide trailers. Side-by-side palletizing is simplified and the potential for product damage is significantly reduced. Nine-foot wide doors can also accommodate the unplanned servicing of many oversized loads.

For special applications with oversized loads, a 10' wide door can be incorporated.

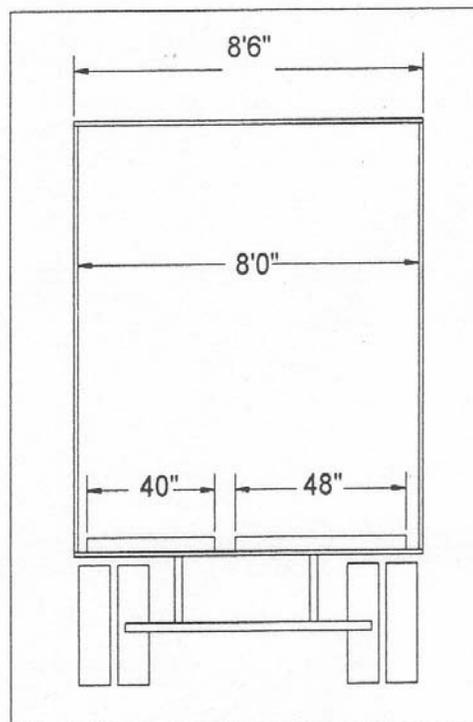
Wider doors require more building space which can create a problem when room is restricted.

Keep in mind the maximum overall limits for trailer size are 8'-6" wide x 13'-6" high (different in some states). Flat bed carriers are able to exceed the maximum width dimensions (special permits are required).

Door should be spaced on 12' centers to accommodate the majority of vehicles, the use of dock seals / shelters, and the mounting of two-way communication light systems.



Standard Trailer Sizes for over the road vans are 8' to 8'-6" wide.



LOADING DOCK AREA DESIGN

DOOR HEIGHTS

Trailers can range in height from flatbed units (approximately 48") to closed vans (162" from ground level). The highest internal height for product loading is approximately 114" high.

Depending on the application, there are three basic door heights that are typically specified. Keep in mind that the common dock height is 48" - 52".

Eight foot (96") high doors can accommodate many loading/unloading operations, but do not facilitate full floor to ceiling loading of product (Figure 1). The need to optimize the available height in a trailer when loading product in an effort to minimize freight costs, this need makes the 8' high door a less desirable choice.

A nine foot (108") high door permits improved floor to ceiling loading of product (Figure 2) because a higher load can easily pass under the door opening. Fuller and tighter loading is possible with a reduced risk of product damage due to product impact with the door header. The nine foot height is a popular door height because it suits a wide range of applications. However, trailers with lower heights may create a gap at the top of a 9' door. This gap can be sealed with an appropriately sized dock seal or shelter.

A third typical door height is ten feet (120").

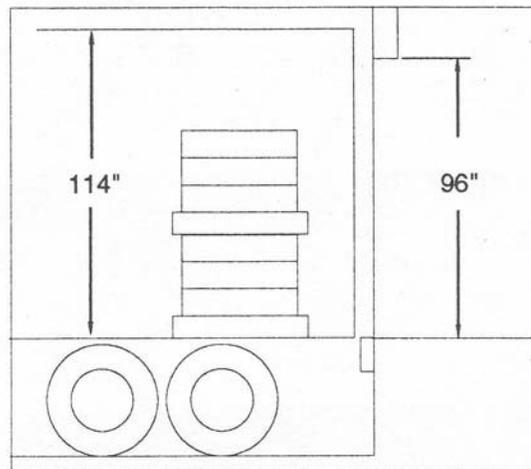


Figure 1
Eight foot (96") high doors can accommodate many loading operators when loading operations where height is not critical to product arrangement.

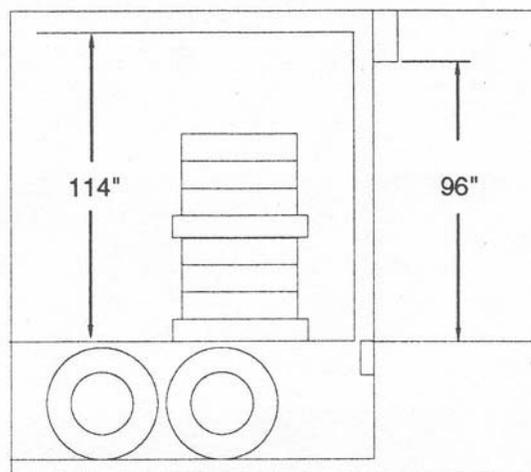


Figure 2
Improved space utilization and reduced product damage result with nine foot (108") high doors.

LOADING DOCK AREA DESIGN

The most versatile door size is 10' (120") high. This height will service the full range of loading / unloading operations (Figure 1). Ten foot high doors will accommodate trailers of all heights up to and including high cube trailers and high cube sea containers.

Special consideration should be given when choosing a dock seal or shelter for a 10' high door. A dock shelter with a 10' high door provides the greatest degree of unobstructed access to the rear of the trailer.

Door sizes can be specified to any configuration required. Keep in mind the product characteristics and possibility of future change.

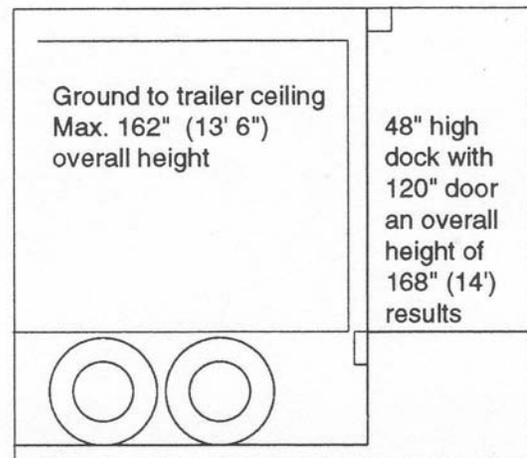


Figure 1

Ten foot (120") high doors are versatile and suitable for all loading / unloading operations.

DOCK LEVELERS

A dock leveler is a fixed bridge designed to permit the safe and efficient flow of goods into and out of a building. In order to accomplish this, a dock leveler must be able to support extremely heavy loads, service a wide range of truck heights, and compensate for tilted trucks.

There two basic types of dock levelers based on the method of activation. Mechanical dock levelers are spring biased upwards and incorporate a hold down mechanism, while hydraulic units are powered by an electro-hydraulic system. While the initial cost of a mechanical dock leveler is less than a hydraulic unit, the long term operating cost for a hydraulic dock leveler is generally lower.

MECHANICAL DOCK LEVELERS

Mechanical dock levelers are suitable for the majority of applications. Routine maintenance and lubrication are essential to maintain peak performance. A major benefit of mechanical levelers is the elimination of costly electrical provisions and hookups. Once installed, they will continue to operate even in the event of power failure.

Mechanical dock levelers are operated by pulling the ring of the release chain. This disengages the hold down device and permits the lifting mechanism to raise the leveler deck and extend and lock the lip in position. The attendant then "walks down" the deck until the extended lip of the leveler rests on the vehicle bed.

When the loading / unloading operation is completed, the operator pulls the ring on the release chain to again release the hold down to partially raise the deck (only if the unit was servicing below dock level). The lip will return to the pendant (retracted) position and the operator will then walk the deck down into the stored position.



Mechanical Dock Leveler

An important feature of both the hydraulic and mechanical units must be the ability to "float" up/down with the vehicle bed.

Many trucks are canted to one side due to unevenly distributed loads. Tilt allows dock levelers to compensate for this canted condition. Without tilt, the dock leveler lip would not lie flush with the trailer bed. Tilt is important when a fork lift is backing out of a trailer as it prevents damage to the fork lift tires, drive train and transmission. Unlike other manufacturers, every Blue Giant dock leveler comes standard with maintained tilt.

SAFETY FEATURES

Mechanical Fallsafe

Mechanical safety legs will prevent the deck from falling much below dock level (only if the leveler is operating above level). The legs must be manually released to allow below level servicing. Although safety legs are a means of improving safety, it can be better addressed by the use of hydraulic dock levelers with hydraulic fallsafe.

Full Range Toe Guards

Full range toe guards completely close off the sides of mechanical dock levelers when the deck is in the fully raised position. Full range toe guards eliminate the potential pinch points that are created at the sides of the deck as it is lowered for operation. This feature is standard on hydraulic units.

DOCK LEVELERS

HYDRAULIC DOCK LEVELERS

Hydraulic units, although initially more costly, require less routine maintenance than mechanical units, and offer many long-term benefits. Heavy load, high usage, and severe condition applications are best suited to hydraulic dock levelers. Increased safety and user preference are also important considerations.

Hydraulic dock levelers are simple to operate and require no bending or pulling on the part of the operator. Activation is simply achieved through the use of constant pressure push button controls.

Safety concerns are more thoroughly addressed by using hydraulic levelers due to the flexibility of the electro/hydraulic power source. Hydraulic units also facilitate interlock capabilities to other equipment such as vehicle restraints, inflatable dock seals/shelters, overhead doors etc.

SAFETY FEATURES

Auto Return

Auto return is a safety feature that automatically returns the leveler to its stored position (level with the floor) when a truck pulls away. Why is this important? Hydraulic dock levelers are downward biased. A hydraulic dock leveler moves up due to the energizing of the hydraulic system. The weight of the leveler and gravity move it downward. A hydraulic dock leveler in its raised position will lower unless it is supported by hydraulic pressure, the truck bed or some other mechanical device (maintenance stand). For a leveler without Auto Return, when loading / unloading operations are complete and the truck pulls away, the deck and lip of a positioned leveler lower and come to rest on the leveler's bottom support stops. This creates a potentially dangerous recess in the dock floor. With Auto Return, the leveler automatically returns to the "parked" position.



Hydraulic Dock Leveler

OTHER SAFETY FEATURES

Emergency Deck Stop

The deck stop safety feature allows the operator to stop the deck immediately in any position by pushing a red mushroom button on the control panel. The deck stop is also used in conjunction with independent lip control functions.

Hydraulic Fallsafe

Fallsafe protection is provided by a velocity fuse which is on the base of the hydraulic cylinder. When a loading vehicle is on the deck of the leveler and the truck pulls away, the velocity fuse will lock the cylinder and hold the deck in place. The velocity fuse stops the leveler from lowering so the loading vehicle does not roll off the dock.

Interlock Features

Hydraulic dock levelers can be interlocked to other pieces of the loading dock equipment, such as vehicle restraints and overhead doors. When interlocked to a vehicle restraint, the dock leveler cannot operate unless the trailer is properly restrained. A key override switch is incorporated to allow independent equipment operation if the trailer cannot be restrained. Interlocking the loading dock equipment increases safety at the loading dock.

DOCK LEVELERS

INSTALLATION STYLES

There are two installation methods for both hydraulic and mechanical dock levelers:

- 1) Preformed pit
- 2) Pour in place

Both styles have particular advantages depending on the application.

Preformed Pit

The majority of dock levelers are installed into pits that are formed into the concrete dock ahead of time. Preformed pits are sized to suit the specific dimensions of the dock levelers selected for the building. Pre-forming the pits allows the building floor and loading dock area to be poured at the contractor's schedule. Pit style units have less of an initial equipment cost than pour in place but require more time and cost to form the pit and install the dock leveler. This makes pit mounted levelers more costly overall than pour in place units.

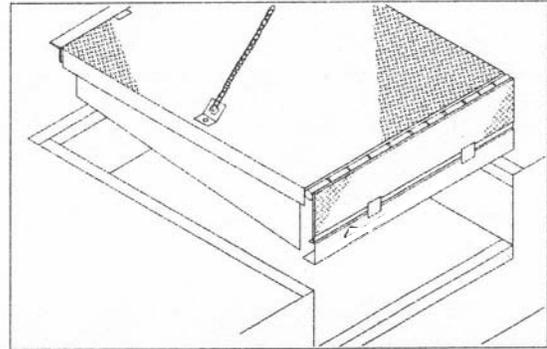


Figure 1
Sufficient Curb Angle
must be provided for proper installation.

DOCK LEVELERS

Pour in Place

Some customers prefer pour in place installations for the reduced installation time and cost. A notch is made in the foundation wall for the leveler to be positioned into prior to the floor being poured (Figure 1).

A concrete slab should be made for the leveler to set on during installation. The slab will offer greater support and the leveler can be lagged to it to prevent shifting (Figure 2). Concrete can then be poured around the pan to the finished floor level.

Pit Kits

The best features of both styles can be obtained by using Blue Giant Pit Kits during installation. A Pit Kit is a set of pre-fabricated steel panels that are bolted together on site to yield a true square pit for less money than wood forms. For more information request Blue Giant bulletin "Dock Leveler Pit Kit".

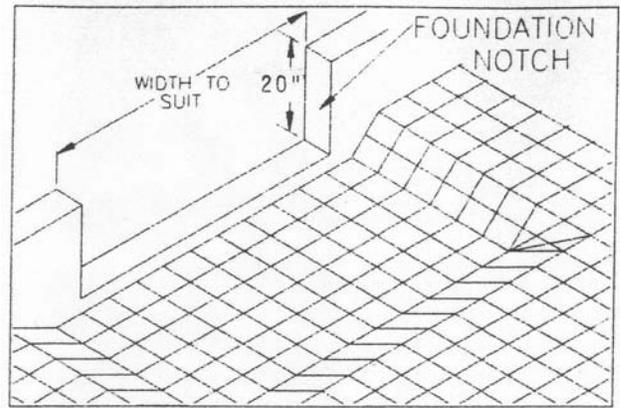


Figure 1
Pour in Place Installation (1)

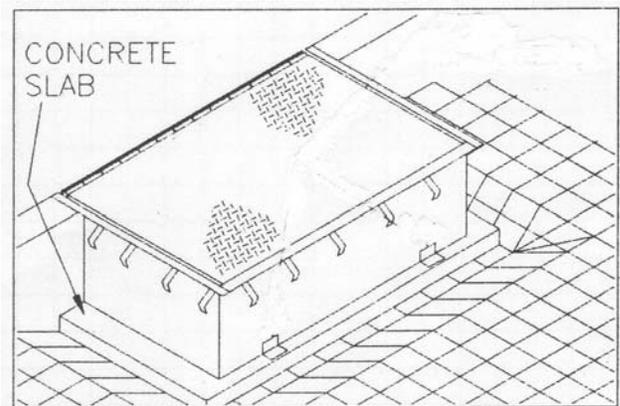


Figure 2
Pour in Place Installation (2)

DOCK LEVELERS

WIDTHS AND LENGTHS

Width Selection

Most manufacturers offer three standard widths in mechanical and hydraulic dock levelers: 6' wide, 6.5' wide and 7' wide, nominal. The 6' wide units are the most common and can accommodate the majority of applications (Figure 1).

With the advent of wider trailers and side-by-side pallet arrangements, there is a trend toward 6.5' and 7' wide levelers. The 7' wide units provide the best access for end loading side-by-side pallets (Figure 2). Blue Giant recommends that the lip be tapered at the end from 7' to 6.5' wide to accommodate narrow trailers. However, due to the standard trailer width increasing to 96" internally, tapering the lip is not always necessary. Maintaining the width allows maximum maneuvering and eliminates the drop off area created by tapering the lip.

A 6.5' wide dock leveler often serves as a good "in between" size (Figure 3). It is becoming a popular choice for those applications requiring wider levelers.

Blue Giant manufactures standard and customized dock leveler widths to suit any application including other manufacturers' existing pits.

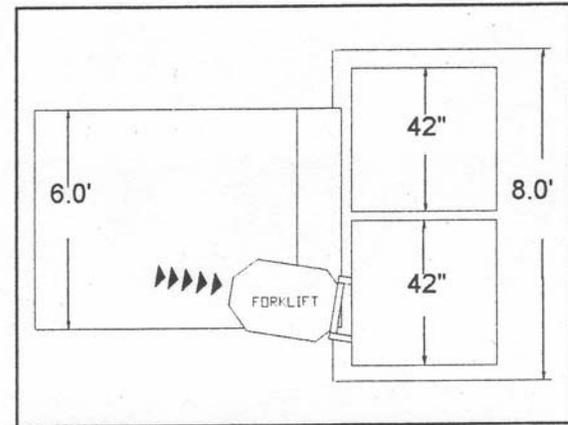


Figure 1
Six foot wide Dock Leveler

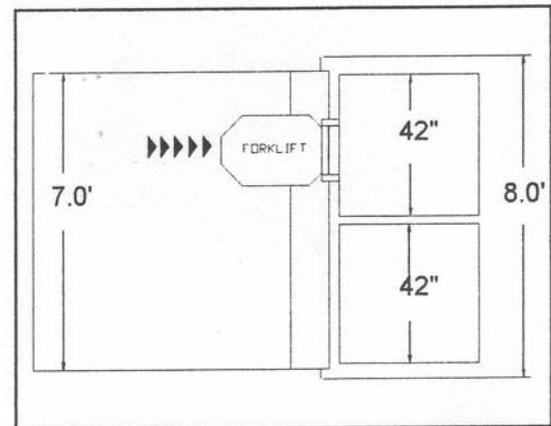


Figure 2
Seven foot wide Dock Leveler

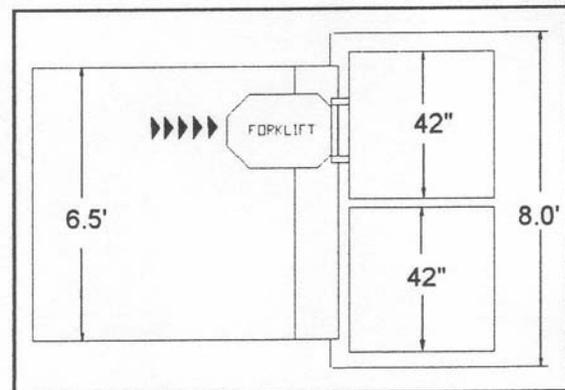


Figure 3
Six and a half foot wide Dock Leveler

DOCK LEVELERS

Length Selection

Proper selection of the leveler length will ensure many benefits such as:

- 1) Increased safety
- 2) Maximized dock leveler life
- 3) Maximized tire life for loading vehicles
- 4) Reduced potential for goods spillage and damage
- 5) Maximized loading vehicle life
- 6) Maintained efficiency levels.

Improper selection of a length that is too short will negatively affect the above items. When all other selection criteria are met, it is true to say: the longer the leveler, the longer the *life* due to less slope *and impact*

Pit style dock levelers are available in standard lengths from 5' to 12' long.

The most popular length is 8', which accommodates the majority of applications. However, the length of the dock leveler should be in direct relation to the maximum height difference between the loading dock and the vehicle bed. Less height difference means a smoother transition between the building and the loading vehicle.

Loading vehicles are designed for general use at certain grades. The following chart depicts the grades in relation to height difference and dock leveler length.

OVERALL DECK LENGTH			
HEIGHT DIFFERENTIAL	6' LONG	8' LONG	10' LONG
2"	2.6%	2.0%	1.6%
4"	5.3%	4.0%	3.3%
6"	8.0%	6.1%	4.9%
8"	10.7%	8.1%	6.5%
10"	13.3%	10.1%	8.1%
12"	20.5%	12.1%	13.0%

Normal Maximum Grade Operation

- Manual Pallet Truck - 7%
- Electric Pallet Truck - 10%
- Internal Combustion Fork Lift - 15%

Consult *Manufacturer's Specs. for Maximum Grade Recommendations.*

Keep in mind that these are normal maximum recommendations and can vary depending on equipment specifications, or changes through design modifications.

Another consideration when selecting leveler lengths is *under* clearance. The greater the height difference, the greater the chance for the *hang up* of loading vehicles with low under clearance such as manual pallet trucks. Plan the dock leveler length to achieve a smooth transition and to accommodate the range of loading vehicles that may be used.

DOCK LEVELERS

DETERMINING CAPACITY

Selecting the proper capacity for the leveler can be confusing due to the variables that must be addressed. Dock leveler manufacturers have different terminology to describe capacity such as rated load, dynamic capacity, rollover capacity, etc., which can add to the confusion. To ensure proper capacity selection, consider these factors:

- 1) What is the configuration and gross weight of the loading vehicle? Specify the number, size and arrangement of the vehicle wheels.
- 2) What is the gross weight of the largest load? (no matter how infrequent).
- 3) What is the height difference between the vehicles and the dock?
- 4) At what speed are the vehicles traveling?
- 5) What is the frequency of use?

A simple guideline exists to calculate the safest dock leveler capacity for light to normal usage. Add the gross weight of the vehicle and the gross weight of the load (Figure 1). Multiply that by 2.5. (i.e. 8,000 lbs. forklift gross weight + 4,000 lbs. gross load = 12,000 lbs. x 2.5 = 30,000 lbs.).

If the manufacturer does not offer that exact capacity, use the next higher capacity. For normal to heavy usage, a multiplier of 3 to 4 should be applied.

Specifying a capacity higher than the calculated requirements will further extend the life expectancy of the dock leveler. Select the dock leveler to offer a minimum of 10 years of service life.

Dock levelers are designed to withstand dynamic forces generated when the loading vehicle makes contact with the inclined leveler. The impact force can be many times greater than the actual gross load due to the speed at which it is traveling. Three-wheeled loading vehicles or narrow wheels greatly increase pin-point loading and should be accounted for by further increasing the leveler capacity. A dock leveler with a minimum capacity of 30,000 lbs. is recommended regardless of gross load.

This guideline will work in the majority of applications when the grade is less than 7%, the speed does not exceed 5 mph, and the frequency is not more than 8 trucks per door per day, 20 rollover cycles per vehicle. The rated capacity may be adversely affected by unique loading or operating conditions.

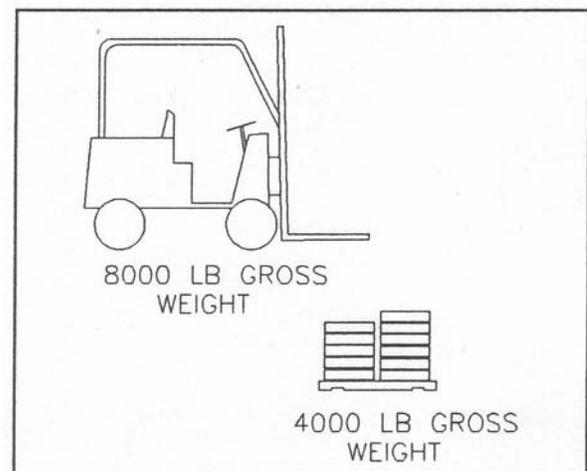


Figure 1
Calculating Dock Leveler Capacity

For applications of higher frequency, greater grade, and higher speeds, a multiplier of 4 to 5 times the total gross load should be used. Unusual conditions can lessen the effectiveness of this guideline. When in doubt, always specify a higher capacity.

DOCK LEVELERS

OPTIONAL FEATURES

There are many available features for dock levelers that should be considered to ensure the overall effectiveness of the installation.

Increased Lip Length

Dock levelers are normally supplied with a 16" lip plate that will suit the majority of applications. Lip length can be increased to 18" to 20" or even longer on special hydraulic dock levelers. A longer lip projects out further from the dock face. Increased lip projection is necessary to deal with bumper projections of more than 4", substantial dock and truck bed height differences, *setback* internal truck beds - typical with refrigerated trucks/trailers (Figure 1).

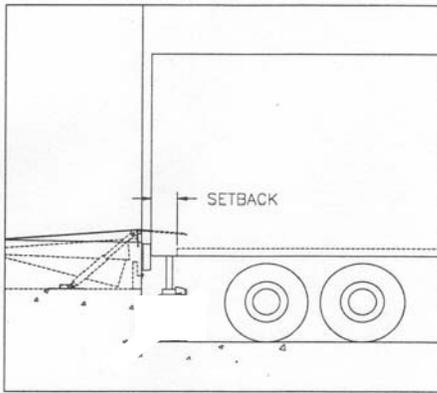


Figure 1
Setback Internal Truck Bed

When loading/unloading a truck/trailer with a setback internal truck bed, the lip must be sized to ensure lip contact with the internal bed. Should the lip not project over the internal setback and therefore rests on the step below the internal truck bed, the material handling equipment will strike the edge of the step up to the bed on every entry making product transfer both rough and inefficient.

Side / Rear Weatherseal

Strips of neoprene are attached along the sides and/or rear of the deck assembly to improve climate control. Brush seal is another type of weatherseal. It is the preferred weatherseal when rodent entry into the facility is a concern.

Foam Insulated Decks

A uniform layer of spray foam insulation is applied to the underside of the dock leveler deck. The foam insulation prevents warm outside air or inside air from cooling and forming condensation on the deck.

Galvanizing

Hot dip galvanizing is a process used to achieve the optimal finish. The individual leveler components are galvanized before assembly for total protection. This option is common for facilities that handle corrosive substances or are located near a harsh environment such as salt water. Food processing plants also utilize galvanized dock levelers because of corrosive substances and the need for frequent wash downs.

Clean-Pit Design

Clean-pit levelers are mainly utilized in the food industry when contamination is a concern. This design has no frame assembly and allows complete cleaning or wash down of the pit. Another method of assuring easy pit cleaning is utilizing a self-supporting open pit design. With this design, the necessary pit construction is completed when the pits are poured.

Form filled out by: _____ of (Company Name) _____

Phone: _____ Fax No: _____ Date completed: _____

Form filled out for (Company name) if different than above: _____

Contact name at this company: _____ Phone: _____ Fax _____

<u>Fork Truck(s) Details</u>	<u>Largest Truck Details</u>	<u>Other Trucks</u>	<u>Other Trucks</u>	<u>Other Trucks</u>
Rider (R) or Walk behind (W)	_____	_____	_____	_____
Quantity	_____	_____	_____	_____
Capacity	_____	_____	_____	_____
Gross truck weight including any attachments	_____	_____	_____	_____
Maximum load weight	_____	_____	_____	_____
Maximum Speed(MPH) across dock leveler	_____	_____	_____	_____
Average speed	_____	_____	_____	_____
Tire type - Solid (S) Pneumatic (P)	_____	_____	_____	_____
Inches from load centerline to front axle centerline	_____	_____	_____	_____
4 Wheel or 3 wheel truck	_____	_____	_____	_____
Propulsion type - Manual (M) Electric (E) Internal Combustion (C)	_____	_____	_____	_____

Loading Dock Details

Use different columns when details are different (eg. Dock in different location). If all docks are the same, just fill out the first column.

Quantity	_____	_____	_____	_____
Dock height (difference in inches from dock floor to finished outside grade)	_____	_____	_____	_____
Truck bed heights to be serviced				
Maximum	_____	_____	_____	_____
Minimum	_____	_____	_____	_____
Average	_____	_____	_____	_____
Inside Truck Widths				
Maximum	_____	_____	_____	_____
Minimum	_____	_____	_____	_____
Would wider dock leveler (6.5 - 7 ft) help? (Y/N)	_____	_____	_____	_____
Truck approach to dock? Incline (I) Decline (D) Level (L)	_____	_____	_____	_____
Will fork trucks be turning on top of leveler (Y/N)?	_____	_____	_____	_____

What is "Float" (change in inches in truck bed height as truck suspension compresses and raises from weight of forklift driving in and out of truck across dock)

Maximum _____
Average _____

Facility Type

Warehouse _____ Factory _____

Truck terminal _____

Other (explain) _____

Do different docks service different situations? (ie. different truck heights or extra heavy loads) (Y/N Explain) _____

Could different docks service specific different situations? (Y/N Explain) _____

Other comments: _____

Present loading docks (if any)

Quantity of leveler(s) required _____ Quantity of leveler(s) presently installed at same site _____

If there are levelers presently installed supply information below:

	<u>Unit to be replaced</u>	<u>Other units</u>		
Manufacturer name	_____	_____	_____	_____
Model	_____	_____	_____	_____
Pit width	_____	_____	_____	_____
Pit depth	_____	_____	_____	_____
Capacity	_____	_____	_____	_____
Hydraulic (H) Mechanical (M)	_____	_____	_____	_____
Voltage (if hydraulic)	_____	_____	_____	_____
Structural condition Good (G) Okay (O) Bad (B)	_____	_____	_____	_____
Construction details - lip length	_____	_____	_____	_____
Lip thickness (inches)	_____	_____	_____	_____
Hinge spool diameter	_____	_____	_____	_____
Deck thickness	_____	_____	_____	_____

Additional comments: _____

DOCK LEVELERS

EDGE OF DOCKS (MINIDOKS)

One of the alternatives to recessed pit style dock levelers is an edge of dock leveler (EOD). EODs are usually mounted to the face of the loading dock and secured to a curb channel imbedded in the concrete. They are a practical, safe, and economical alternative to dock plates or pit levelers if the height difference between the dock and trailer bed is minimal.

EOD's are limited in their ability to service variances in trailers' heights. They are available in standard capacities to 30,000 lbs.

There are two actuating methods available for EOD's: mechanical, or hydraulic.

It is not recommended to use an EOD for height differences of more than 2" above or below dock level.

Common widths for EOD's are 72" wide and 78" wide. Selection of width is based primarily on the loading method of the products. The 72" wide models offer the most flexibility for loading, but the 66" wide model is the most common choice.

Note: Use of manual hand pallet carts with even a 2" height difference between the dock and trailer can be difficult. When using an edge of dock with a manual hand cart product transfer, the dock and trailer should be at the same level.



Mechanical EOD is activated by the operator pulling the lip and deck into the raised or extended position. The lip is then lowered down onto the trailer bed. After the trailer departs, the EOD retracts into its lowered position behind the bumpers.

Hydraulic EOD is activated by the operator depressing the control button to raise the lip. Once fully extended, the operator releases the button and the unit lowers to rest on the trailer bed. After trailer departure, the unit retracts to its stored position.

DOCK LEVELERS

VERTICAL STORING DOCK LEVELERS

As its name indicates, this design of dock leveler is vertical when in the stored or parked position. When servicing a trailer, it is lowered at a controlled rate until it rests on the bed of the trailer. After the loading/unloading operations are finished, the operator activates the raise button to bring the leveler back to the vertical (stored) position. A dual storage locking system comprised of an electro/ hydraulic and mechanical lock should be incorporated for additional safety when stored. Also, an emergency stop button should be provided to halt the lowering of the deck if necessary.

Vertical storing levelers are commonly used for food storage or processing facilities. Open pit or ledge installation makes it easy to keep the dock area clean and maintain standards. The overhead doors can be closed and secured down to the concrete surface resulting in better climate control, security, and reduced access by vermin and insects.

Efficiency can also be increased with these levelers. Since they are set back from the dock face, the trailer can be positioned and then the hinged trailer doors opened. This eliminates the need to maneuver, get out and open the doors, and position at the dock.

When the overhead door is closed and the leveler is in the vertical position, it acts as a visual barrier. Consequently, the overhead doors are protected against damage from loading vehicle impacts.



Vertical Storing Dock Leveler

Determining the size and capacity required for a vertical storing leveler is much the same as for conventional dock levelers.

Vertical storing levelers are generally utilized in nominal lengths of 5' and 6'. This is due to the amount of space they will take up inside and outside the building. Eight-foot long units and specials are available. Capacities range from 25,000 lbs. to 50,000 lbs.

It is also common to equip the units with 4" high runoff guards along the length of both sides. This will increase the safety of the loading/unloading operation.

DOCK BUMPERS

Each dock must be equipped with a form of dock bumper to protect the building from vehicle impact damage. Keep in mind that an approaching vehicle can generate up to 300,000 lbs. of impact force. Several styles of bumper are available to suit application requirements.

For typical level approach applications, bumper projection should be specified at not less than 4". For recessed docks or special applications, additional projection or build-out boxes may be required.

The two most common styles of bumpers are molded rubber (Figure 1) and laminated rubber (Figure 2).

Steel face bumpers are used for high frequency or heavy impact applications, or where jockey trucks are used for trailer positioning (Figure 3). A steel plate face on the bumper offers protection against the unusual wear and biting out of the rubber created by this procedure.

Steel spring bumpers can be used for greater protection from wear and impact forces (Figure 4). A piece of formed spring steel is mounted to a backing plate and secured to the dock wall. The spring steel absorbs the impacts and protects against continual wear.

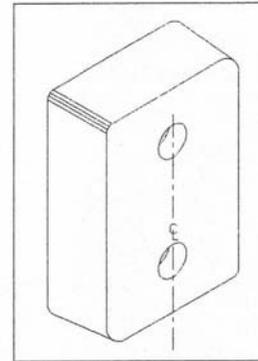


Figure 1
Fabric reinforced masticated rubber,
shaped with lag bolt holes

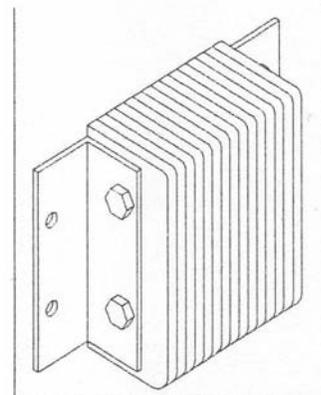


Figure 2
Fabric reinforced rubber pads, laminated
and secured between steel angles

VEHICLE RESTRAINTS

VEHICLE RESTRAINTS

It happens at the best of loading docks. Vehicle creep. Unscheduled truck departures. Careless parking. In a busy shipping area, there can be up to 100 opportunities per day, per single loading dock, for the most serious forklift mishap to occur.

The most common style of vehicle restraint is a face-mount design. Acting on the trailer's ICC bar, it is an effective means of restraining the majority of the trailers. Face mount restraints have four main functions:

- 1) Prevent premature trailer departure.
- 2) Limit trailer creep away from the dock.
- 3) Restrict trailer movement to keep the extended lip of the dock leveler in place on the floor of the trailer.
- 4) Prevents trailer theft

When selecting a face-mount vehicle restraint it is important to consider the operating range required, restraining capacity, and the flexibility needed to adapt to the wide variety of trailer ICC bars. The restraint must also be designed to withstand the environment in which it is installed: the location of the vehicle restraint is one of the harshest and least maintained in the average facility.

Normal operating range is from 12" to 30". Special designs can be made to accommodate unique applications requiring more range.

For facilities which service trailers with unusually low or high ICC bars, contact a Blue Giant Sales Representative to determine the best restraint solution for this type of application.



Figure 1
Face-Mount Vehicle Restraint
Pull Away Force

Most vehicle restraints will offer a restraining capacity of 35,000 lbs. (i.e. it would take at least 35,000 lbs. of pull force to potentially cause the unit to release its hold).

Recessed Pit Vehicle Restraints

Some manufacturers offer a recessed vehicle restraint that store in a pit under the dock leveler. While effective, these units require an expensive storage pit to be constructed underneath the dock leveler.

VEHICLE RESTRAINTS

TYPES OF VEHICLE RESTRAINTS

Face-mount vehicle restraints are available with various operating mechanisms.

In most cases, the restraining arms of vehicle restraints are positioned by an electro-mechanical or an electro-hydraulic operating device.

Restraints are also available which are positioned manually by the dock attendant who uses a bar to both engage and disengage the restraining arms of the restraint.

Irrespective of the type of restraint installed at a dock, it is imperative that the operation - the engaging / disengaging of the restraint is easy and uncomplicated. A "user-friendly", simple to use vehicle restraint will facilitate the regular use of the restraint by the dock attendant.

Face-mount vehicle restraints are easily installed and maintained. Because these restraints are externally mounted and easily installed, they also are readily relocated if necessary.

The ML10 is a manually operated mechanical vehicle restraint. It features a rugged structural design for reliable performance. It is easy to operate. The ML10 is easily installed and requires no electrical hook-up.

Blue Giant's ML10 is an effective and economical way to enhance loading dock safety.



Figure 1
The Blue Giant Vehicle Restraint can be interconnected to other dock equipment



OTHER SAFETY EQUIPMENT

COMMUNICATION LIGHTS

Communication light packages are standard features with most manufacturers' vehicle restraints, and are important factors in the overall safety of the loading dock. If the communication system is not a standard feature offered by a particular manufacturer then it should be requested as an optional item.

A two-way communication system consists of: an outside signal light, one regular and one reversible instruction sign (Figure 1), an interior control panel, and a sign indicating to the operator to load/unload on the green light only.

Two-way communication packages are standard with Blue Giant TL-85 Hydraulic Vehicle Restraint Systems.

A vehicle restraint should also incorporate an interlock feature to tie it to the operation of a hydraulic dock leveler. If the vehicle is not restrained, the dock leveler cannot be activated. This means that if the vehicle does not have an ICC bar or it is impossible for the vehicle restraint to restrain it, the dock attendant must use an alternate method to restrain the truck/trailer (i.e. manual wheel chocks). The attendant then must turn the control to the over ride position in order for the dock leveler to operate. In such cases, the vehicle's wheels should be chocked and precaution should be taken when loading / unloading.

BARRIERS

Loading dock barriers prevent forklifts from accidentally rolling off the end of the dock leveler onto concrete loading apron below when a trailer is not present. These barriers can take several forms including sentry gates to plates that extend from the dock leveler. Barriers are not intended to stop forklifts at speeds higher than 4 mpg. It is important to check manufacturer specifications. Blue Giant manufactures the Door and Dock Guard which prevents accidental roll off and damage to the door.



Figure 1
Outside Signal Lights and Signs

MANUAL WHEEL CHOCKS

The wheel chock is the oldest form of safety device to guard against premature truck departure and trailer creep. All loading docks areas must have wheel chocks available to chock tires. Tapered blocks with a length of chain are placed in front of the vehicle wheels once positioned. There are many disadvantages to using manual wheel chocks:

- 1) Loading dock personnel may find them convenient and not use them.
- 2) If the chocks are stolen, the trailer cannot be secured.
- 3) The time necessary for manual positioning of chocks can add up to a significant expense in man-hours.

SEALS / SHELTERS

The purpose of installing dock seals or shelters is to maintain the internal climate of the facility and protect against product damage.

Use of these products has many benefits such as:

- 1) **Energy Loss Savings** - Reduces heating and cooling costs by maintaining interior temperature control.
- 2) **Safe Working Conditions** - Keeps weather out; eliminates rain, ice and snow from loading areas, improving dock safety.
- 3) **Merchandise Protection** - Protects valuable products against damaging heat, cold, rain, snow and wind. Minimizes vermin entry.
- 4) **Security** - Helps to eliminate pilferage of goods and unauthorized entry into loading/unloading areas.
- 5) **Efficiency** - Seals and shelters improve the loading dock environment. Worker morale and productivity are related directly to the work place environment and its safety.
- 6) **Return on Investment** - The dock seal/shelter can pay for itself in a matter of months with the cost savings it generates in energy retention.
- 7) **Increased Storage Capabilities**
Positioned trailers at a loading dock can become secure, temperature-controlled extensions of the facility.

Dock shelters are applicable to virtually any size door but generally are installed on doors from 9' wide x 9' high to 12' wide x 12' high.



Figure 1
Dock Seals

SEALS / SHELTERS

SELECTION CRITERIA

The first and most important aspect of successful dock seal/shelter installation is proper selection. Improper consideration of the selection criteria not only results in a poor installation, but can lead to damage and reduced efficiency.

The following criteria must be considered:

- 1) Configuration of trucks to be sealed
- 2) Grade of approach
- 3) Size of the overhead door
- 4) Dock bumper projection'
- 5) Dock height
- 6) Seal/shelter mounting surface.

Configuration of Trucks to be Sealed

Dimensions to consider are:

- 1) Normal width of trucks serviced
- 2) Normal height of trucks serviced
- 3) Truck bumper projection
- 4) Normal truck bed heights.

Note: If there are trucks / trailers to be serviced with dimensions that are greatly different from normal, they should also be considered.

Grade of Approach

(Level, declined, or inclined)

If required, seals can be tapered to ensure parallel compression along the entire face of the side pads, thereby creating an effective seal.

Size of Overhead Door to be Sealed. The size of the door opening determines the most suitable models of seals or shelters.

Dock Bumper Projection is the difference in inches from the face of the wall to the front face of the dock bumper. On declined approaches, the bumper projection must be sufficient to eliminate the potential of trucks impacting the upper wall.

Dock Height is the difference in height from the finished grade to the top of the dock floor.

Seal/Shelter Mounting Surface. Wall construction, strength, and type may determine the style of seal/shelter to be specified. Inflatable dock seals are best suited in applications where the wall is not designed to accept higher compression forces of conventional seals or shelters.

SEALS / SHELTERS

SIZE SELECTION

When specifying dock seal/shelter sizes, keep in mind one goal: effectively sealing the majority of vehicles that will be serviced at the loading dock.

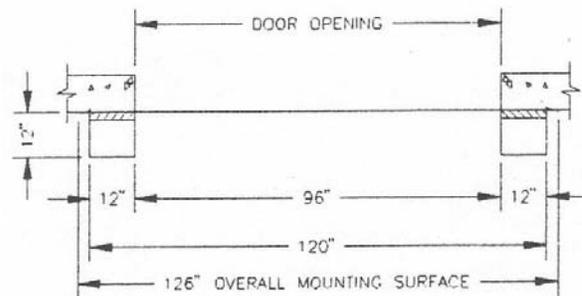
In most cases, it is not practical to install a variety of dock seal configurations to accommodate the uncommon trailer sizes. For that reason, it is important to ensure that what is specified will seal the majority of vehicles.

The first step is to determine the size of trailer that frequents the loading dock most.

Generally, the most common trailer will be approximately 13'-6" high from ground level and have an outside trailer width of 96" to 102".

A standard goal is to maintain the inside seal opening at 90" to 96" wide, the height at approximately 12' to 13', and the clear door height at a minimum of 96".

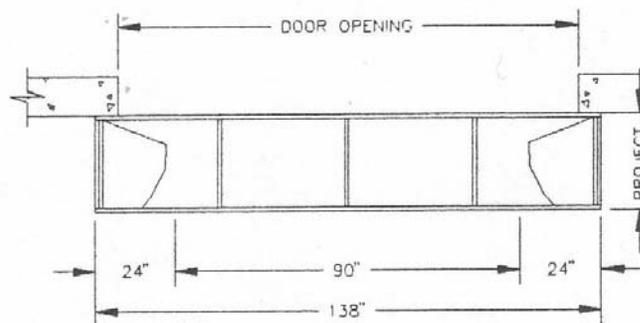
Projection of the dock seal should be sized to allow 4" to 6" of seal compression before the trailer contacts the bumper. Projection of dock shelters typically ranges between 18" and 24" to allow sufficient trailer penetration.



**STANDARD UNIT DETAIL
PLAN VIEW**

Figure 1

Dock seal for an 8' wide door. Side pads can be beveled to close the door opening down or to accommodate wider doors.

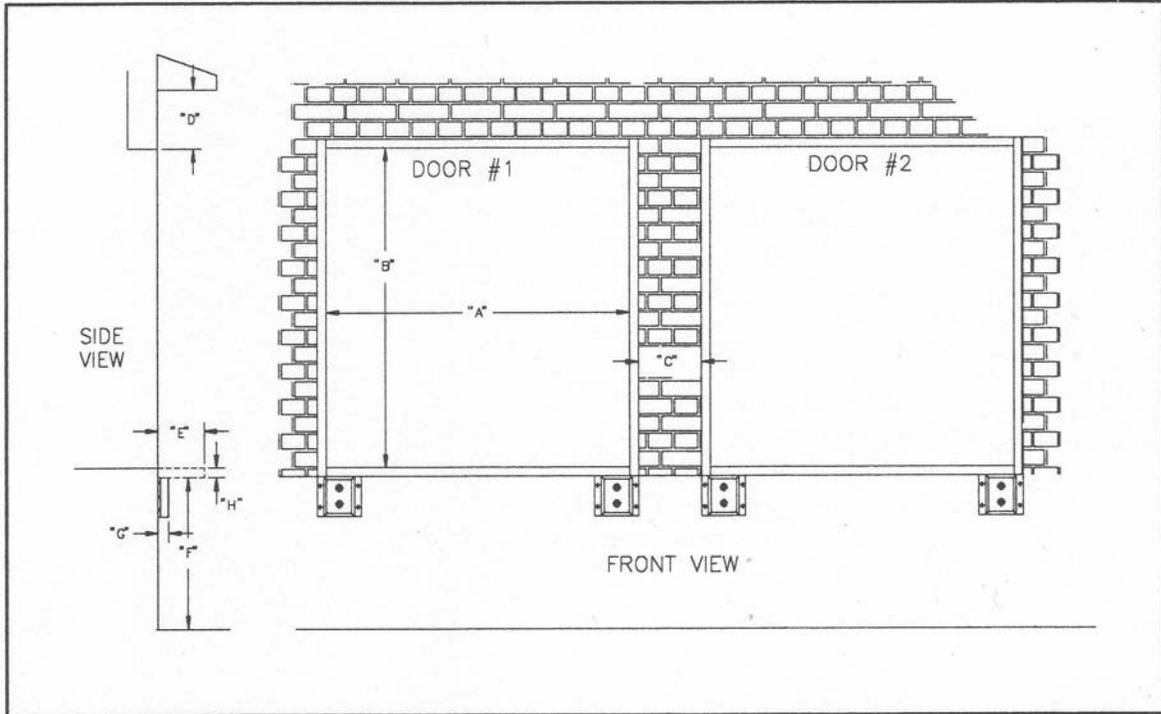


**STANDARD UNIT DETAIL
PLAN VIEW**

Figure 2

Dock shelter for a 10' wide door. For dock shelters the opening should be closed down to 90" wide x 90" high to allow sufficient vehicle penetration.

**DOCK SEALS and SHELTERS
DOOR and DOCK SURVEY
(See Following Page for Truck Information)**



DIMENSIONS

A. Door Width _____	Number of Doors _____
B. Door Height _____	Type of Building _____
C. Distance Between Doors _____	Type of Jambs _____
D. Clearance Above Doors _____	Dock Levelers Pit _____
E. Projection of Dock Foundation _____	EOD _____
F. Dock Height _____	Dock Boards, Plates _____
G. Dock Bumper Projection _____	Dock Bumpers _____
H. Height of Dock Foundation Projection _____	Size _____ Condition _____

RECOMMENDATION

Seal _____ Other _____	Overhead Projection
Shelter _____	Yes _____ No _____

DOCK LIFTS

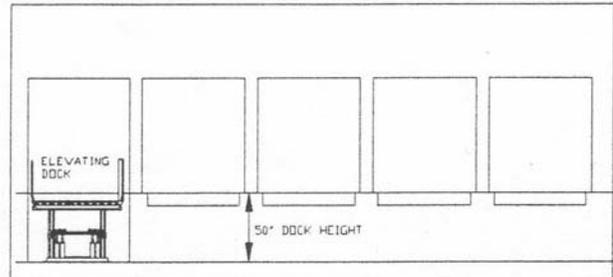
ELEVATING DOCK (DOCK LIFTS)

A simple and flexible means of accommodating vehicle height variations is the installation of a hydraulic elevating dock (Figure 1). Elevating docks can be built in virtually any size and capacity required for the application. They provide the ability to service trucks at any height and can also offer access to ground level for fork trucks. Pit mounted elevating docks are capable of height adjustments between 0" and 60". Their only disadvantage is that they must cycle up and down every trip into and out of the trailer. Greater efficiency can be achieved by utilizing an elevating dock wide enough to allow side-by-side pallet loading.

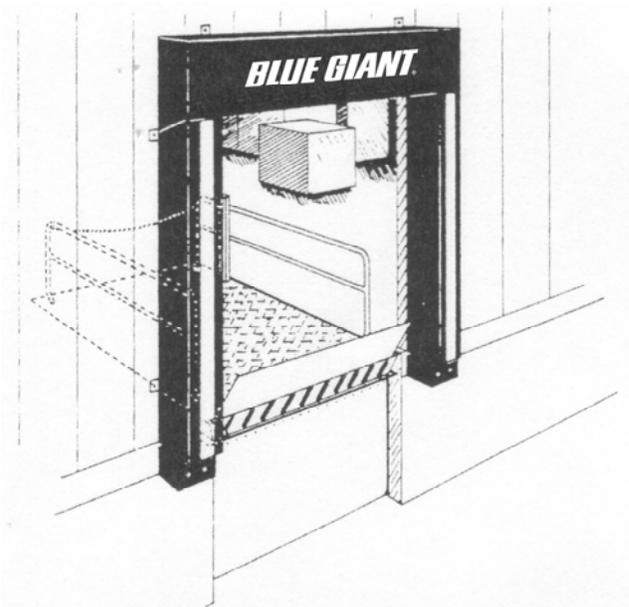


It is common for an elevating dock to be set into a three-sided pit, recessed into the dock wall (Figure 2). It can also be mounted at the face of the dock, but may be an unwanted obstruction.

Elevating docks are also available in a low-profile design to facilitate ground to truck loading/unloading without the necessity of a pit. This is particularly beneficial when dealing with a hand pallet truck and low volume product movement.



**Figure 1
Hydraulic Elevating Dock**



**Figure 2
Three Sided Pit Installation**

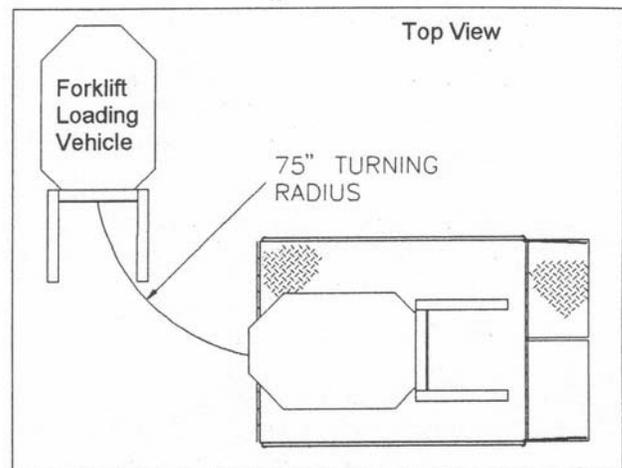
DOCK LIFTS

When incorporating an elevating dock into the overall dock design, it is important to choose a unit that will offer the greatest flexibility for the loading operations. Efficiency should always be one of the most considered factors. Elevating docks must be raised and lowered for each product transfer from dock to trailer; consequently they are less efficient than dock levelers.

Consider these factors when selecting an elevating dock:

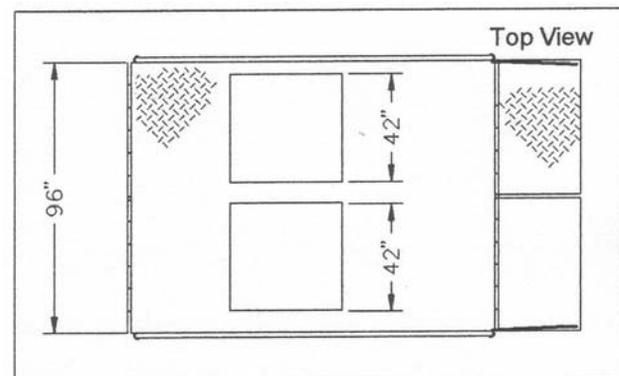
- 1) **Deck size.** It is essential to ensure there is sufficient room on the deck to accommodate vehicle/product turning radius and overall length. Determine the required radius needed to maneuver the loading vehicle when loading/unloading product. This should be the basis for selecting deck size. Side-by-side pallet loading onto the elevating dock will increase the efficiency of the operation. Two pallet loads are placed onto the deck and then positioned for loading or unloading. One trip can achieve what would otherwise take two. However, the deck must be wide and long enough to accommodate this type of loading.

Common deck sizes range from 72" wide x 96" long to 96" wide x 144" long. Larger and smaller sizes are available.



Loading Vehicle Turing Radius

A vehicle with loads that require a 75" turning radius will need an 84" wide deck size to allow access without damage to equipment and product.

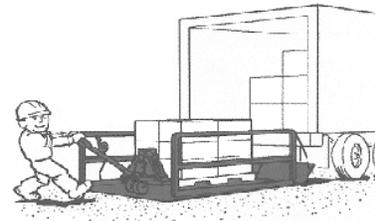


Side-by-Side Pallet Loading

A 96" wide deck will accommodate most side-by-side pallet loading operations.

DOCK LIFTS

2) **Lifting Capacity.** Capacity selection for elevating docks is straightforward, but should be given careful consideration. Elevating docks are not subject to dynamic loads like dock levelers. The elevating dock must be capable of lifting the total gross load of the vehicle and product. For applications of higher frequency such as 20 times per day, it is recommended to overrate the capacity to prolong the unit's life. If side-by-side pallet loading is a possibility, the capacity should be determined based on the heaviest possible load. Make sure the unit selected offers axle load capacity respective to the axle loading characteristics of the vehicle. Some vehicles may have an axle load that is the equivalent of 80% of the gross load. Capacities are available from 3,000 lbs. to 25,000 lbs. and higher.



3) **Lifting Speed.** The lifting speed is determined by the size and capacity of the elevating dock and the size of the power pack. Power packs are available in virtually any horsepower. Selecting a small power pack to save money can result in a substantial loss of efficiency. Specify the desired speed at which you want the lift to operate. A recommended time for full lift is 20 - 30 seconds. Lowering times should also be considered.

To determine the proper elevating dock requirements for your application, contact a Blue Giant Sales Representative.

For further information, request a Blue Giant Elevating Dock product brochure.



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BLUE GIANT EQUIPMENT CORPORATION

BLUE GIANT offers a full line of Dock Levelers, Dock Safety Equipment, Accessories, Ergonomic and Scissor Lift Equipment, and Industrial Trucks. Concurrent with our continuing product Improvement program, specifications are subject to change without notice. Please contact BLUE GIANT for latest information. Some features illustrated may be optional in certain market areas.

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