

# The Dock Area

## Layout / Design and Productivity

"Your Warehouse's Most Valuable Real Estate"

The most valuable piece of real estate in your entire warehouse is your dock area. Everything in the warehouse came in across the dock. Everything that leaves the warehouse goes out across the dock. Therefore, nothing happens within your operation without passing through the dock area. Unfortunately, loading docks generally receive, at best, only token consideration in most layout and design efforts.

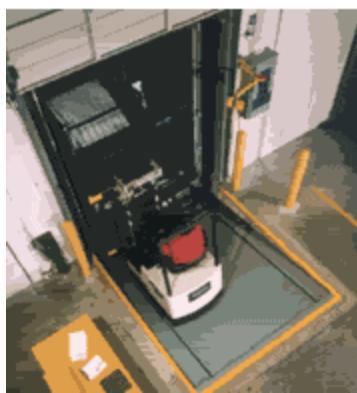


Photo courtesy The Serco Company

The objective of this article is to answer the most often asked questions about docks:

What is the right number of docks?

- Where should they be located?
- What type of docks are the best?
- How large should the shipping and receiving area be?
- What material handling equipment should I buy?
- What should or shouldn't be in the dock area?
- Are there safety issues to address?
- What is the target dock productivity rate?
- Are there improvement opportunities for existing dock areas?

### A Changing Purpose

The role of the warehouse has changed and with it the use and activities of the shipping and receiving dock areas have also changed. Most distribution facilities are no longer the "traditional warehouse" (a repository of inventory that comes to rest for a long period of time), but rather are logistics utilities where goods are coming and going at a much faster rate. Just-in-time inventory practices have drastically changed the number, type, and use of docks and the dock area. Docks today must be much more flexible, as well as more efficient in order to accommodate the increased number and types of receipts and shipments. The traditional

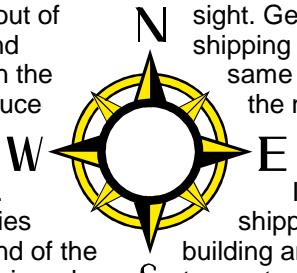
standard trailers are being replaced by high cube vans making smaller pick ups and deliveries as well as, high cube trailers, low boys, intermodal containers, and an array of different sized and shaped vehicles. These new vehicles, and the conversion from larger to smaller receipts and shipments, require docks and dock areas to be designed with greater flexibility and in many cases, require different docks to accommodate the various types of receipts and shipments.

### Number of docks

The number of docks required is determined by a combination of factors: number of receipts and shipments, type of loading and unloading (floor loaded, pallet loaded, hand stacked, slip sheet, lumpers, drivers, dock workers, conveyor, etc.), types and sizes of vehicles, number and timing of carriers, and different areas in which materials will be utilized, stored or prepared for shipment. Based upon the various characteristics one dock position should be allowed for each seven hours of planned activity per shift allowing for an 87.5% utilization rate. Remember that the greater the number of operating shifts on which shipping and/or receiving is conducted, the lower the total number of doors that are required. Thus ten docks will become the equivalent of twenty if utilized on two shifts versus one.

### Location of docks

Traditionally docks were located in the rear of a facility and out of sight. Generally shipping docks were all located in the same area, in order to reduce the need for duplicate



supervision. In some larger facilities building and receiving would be at one end of the building, at the other, in order to create a flow-through material movement.

But today, given the move to just-in-time inventories and the tendency for shipments to be in close proximity to the manufacturing location, more and more facilities are being constructed with multiple shipping and receiving docks.

These multiple docks drastically reduce the flow of materials within a facility by having goods arrive where they are going to be used, and departing from where they are completed.

### Types of Docks

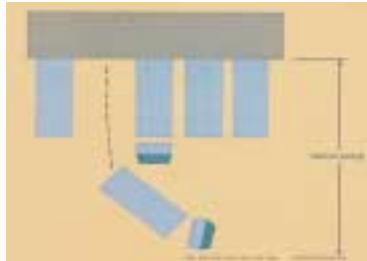
Saw tooth docks are useful when a site does not have sufficient exterior area to maneuver vehicles in and out of the docks. They optimize the amount of distance from the edge of the building to the end of the property line or the end of the paved area. This, though, is at the cost of utilizing additional dock space and thus reducing the number of docks and interior space that can be used around the docks as a result of the saw toothed pattern. Straight docks, on the other hand, optimize interior space.

Open docks are impractical in most environments, and even where they can be used, they need to be evaluated as to their benefit versus potential theft and malicious damage.

Interior docks provide protection from the elements (keeping out the rain, and snow) and protect products from potential loss. These issues have more importance in some areas than others. Interior docks, however, come at a considerable cost of lost space, increased energy consumption, ventilation (vehicle fumes), and drainage (water and melted snow runoff) requirements.

### Dock Approach Areas

The dock approach area will require adequate space for the maneuvering of the largest vehicles. With some states allowing 57' trailers, a yard area must accommodate the potential 57' trailer with a conventional tractor, which together could exceed 75'. Such vehicles require not only more room to



maneuver, but extended landing pads to accommodate the longer trailer length. The concrete landing strip probably will need to extend a minimum of 50' from the dock edge and most probably need to run to within 15' of the dock edge in order to accommodate the various trailer lengths that may be dropped at the dock.

### Shipping and Receiving Staging Areas

Shipping and receiving staging areas are often the first victims of contraction when other operations or functions require increased space. The sizing of a receiving area is dependent upon three principle elements: (1) the type of functions to be conducted, (2) the volume of goods handled and, (3) the frequency of shipments and

receipts and number of items. Likewise the type, frequency, size, number of ship-to locations, delivery sequence, and shipping and loading time window dictate its size requirements.

Staging area sizing must be at a minimum 15 to 40 linear feet of clear space from the doors to the storage area is required. The general rule of thumb for sizing a receiving staging area is to allow square footage equal to the footprint surface of the average receipt vehicle times the number of receipts anticipated at the peak of activity. This allows for the receipts to be off loaded upon arrival and held in a controlled receiving area until they can be inspected and accepted into inventory. Similarly, an operation that requires shipments to be consolidated for carrier pick ups at day's end must allow a shipping staging area equal to the square footage of the peak number of outbound pallets to be shipped. Such rules of thumb are only for staging space requirements and exclude the space requirements for return goods handling, packing, damage goods, packaging materials, pallet storage, battery charging area, truckers lounge, shipping office or trash handling.

### Dock Doors

New laws and technology have allowed vehicles to be taller, wider, lower, and are in a constant state of change. This has caused traditional sized dock doors to become obsolete. Doors need to be high enough to off load the tallest loads and wide enough to accommodate various trailer widths while still allowing the removal of the rearmost pallet without unreasonable maneuvering.

### Dock Equipment

What is the right equipment for your dock area? That depends upon many factors including the size of your facility and staffing level, volume, type and frequency of receipts and shipments, receiving functions, inspection requirements, specifics of special handling needs, and budgetary considerations.

In the process of dock layout and design one must examine specific equipment needs, such as:

- **Dock Levelers** (mechanical, power assisted, hydraulic) and/or dock plates: evaluate the cost of each alternative and the varying heights that will need to be bridged, width requirements and number of times the dock bridging will be required.
- **Dock Lights**: evaluate the natural light available, type of vehicles to be loaded and unloaded, length of time vehicles will be at dock,

- need for an external light source required in vehicles.
- **Dock Locks / Wheel Chocks:** evaluate the number of vehicles, frequency of arrivals and departures, variety of vehicle types, and potential safety issues.
  - **Dock Seals:** evaluate costs of various alternatives and the environmental conditions, potential pest infestation and/or potential contamination or temperature impact to products being handled.
  - **Dock Material Handling Equipment** such as pallet jacks, powered dock trucks, powered conveyors, and/or hand loading and unloading: evaluate the volumes and physical characteristics of goods to be handled, cost and availability of labor, space, speeds desired, and equipment costs

Numerous other design elements and factors must be taken into account in the selection of specific dock equipment and in order to best address these. A material handling equipment supplier should be consulted.

#### **What To Have and Not Have in the Dock Area**

- Trucker's lounges are important and require an allotted space, (typically a minimum of 120 sq. ft. and 20+ sq. ft. per additional driver) in order to control the driver's whereabouts while on your property. Such areas should contain a pay phone and a restroom. Restricting the driver's access to other areas will help avoid unnecessary contact with employees, lessen potential theft opportunities, and limit accident liability.
- Trash handling is a reality, and while not a direct activity of the dock area, space must be allocated for it and generally one or more dock positions or dock door knock-outs are usually devoted to a dumpster or trash compactor.
- If your operations require reverse logistics functions, these too must be evaluated for specifics to include environmental considerations.
- While not the intended purpose of the dock area, it often becomes a gathering area for pallet storage, broken and scrap pallets, pallet repairs, and pallet exchange programs. Providing that the space is available and it does not interfere with the real purpose of the docks, these activities can be accommodated, although one must remember that this is the facility's most prime real estate.
- Battery charging areas are important, but should not be placed in the path of dock traffic or intrude into required staging areas.
- Return goods is another often forgotten function that requires significant space which must be planned for and cannot merely be permitted to come to rest in the dock area.
- Packing areas should be located adjacent to the shipping dock area to minimize material movement, but not in, or absorbing the shipping dock staging area.

- Packaging materials must be kept in close proximity to the packing area, but must be planned for and not be permitted to absorb dock staging and/or buffer areas.
- Receiving offices are yet another overlooked necessity in the dock area. These offices, while essential, rob an operation of precious square footage if not planned for.

#### **Dock Safety**

The majority of serious warehouse accidents occur in or near the dock area. According to OSHA more than 10% of all forklift accidents alone result from poor dock layout and over crowded conditions. Without well thought out layouts, good safety practices, staff training and management attention these same problem conditions could well exist in your operation.

#### **Dock Productivity**

Warehouse productivity which includes dock productivity, is a very complicated issue because of the differences of activities, types of receiving and shipping units, types of material handled, sizes of individual receipts/ shipments and types of loading and unloading. Despite the old adage that "a warehouse is a warehouse," one size does not fit all.



Even in comparing two warehouses in the same industry, productivity will often vary due to the differences in volumes and types of activity in each facility. The only accurate productivity benchmarks are those developed specifically for that operation based upon the applicable activities, type, volume, and equipment used.

#### **Improvement Opportunities for New and Existing Facilities**

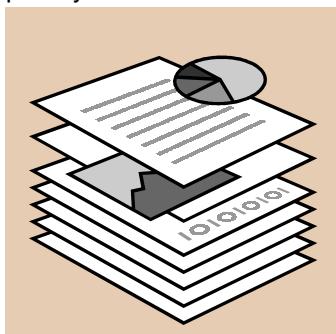
Some of the general opportunities in dock layout and design include:

- Cube utilization, i.e. racking the unused area above dock doors to accommodate pallets for re-palletization and/or pallet exchange.
- Overflow inventories, used equipment, unresolved returns, recalls, defective goods awaiting disposition, promotional materials and other "temporary" storage items should not be stored in the dock areas.
- Adequate lighting is mandatory (dock lights should be installed for use inside trailers) to assure accuracy and improve productivity.

- Storage areas adjoining the dock area should be perpendicular to the dock in order to minimize bottlenecks and maximize productivity.
- Unauthorized personnel should be restricted access to the dock areas. Dock areas are not the place for uninvited sales solicitations, informal group meetings, drivers break time and/or the collection of sales samples.
- Scheduling can increase productivity by reducing congestion and permitting better labor and other resource utilization.
- ASNs allow pre-receiving preparation such as label printing, pre-assigned holding areas or storage slots, and/or in transit receiving and inspections.
- Utilization of bar code scanning for shipping and receiving posting, and check-in.
- Staff training - OSHA requires a comprehensive training program of all dock employees to include dock equipment, safety, and emergency procedures.
- The correct material handling equipment for the job.

### **It's Not Done Without The Paperwork**

Any dock operation is incomplete without an adequate set of support systems with which to plan and schedule future shipping and receiving activities, manage labor, track productivity, direct put away, schedule equipment maintenance and manage transportation. Such a system or systems must be fully integrated with the rest of the organizations information systems.



### **Planning Horizon**

The planning horizon for most all facility design requirements including dock requirements should be based upon a forecast of volume and anticipated business activity five to seven years forward, not merely upon current needs. Often, delays in budgetary approval, zoning, or construction may cause the building's operation to begin as long as two or more years after its original space design is defined.

### **Conclusion**

Dock space is a precious resource and must be treated accordingly. You'll seldom get the opportunity to recoup such space after its been claimed for another purpose. So, it best be well planned, equipped, and equally well utilized.

### **ABOUT THE AUTHOR**

Thomas L. Freese is principal of Freese & Associates, Inc. a management and logistics consulting firm in Chagrin Falls, Ohio. Mr. Freese received his B.S. in business administration and marketing, and an M.B.A. with a concentration in business logistics, from The Ohio State University. His experience spans a wide spectrum of products and industries, from bulk chemicals to consumer goods, frozen fruit, and fresh poultry. He has consulted to numerous manufacturers, wholesalers, and retailers. He is an active member of the Association of Transportation Law, Logistics and Policy (ATLLP), the Council of Logistics Management (CLM), and Warehousing Education and Research Council (WERC). He is a frequent speaker at professional conferences and seminars and has contributed articles to the *Journal of Business Logistics, Traffic Management, Food Business, and Distribution Center Management*. His chapter on "Warehouse Site Selection" appears in *The Logistics Handbook* published by Free Press and his chapter on "Third Party Warehousing" is a part of *The Warehouse Management Handbook*, Tompkins Press.

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