# Port of Cleveland
# Capacity Assessment

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Developed for:

PORT OF CLEVELAND
Cleveland - Cuyahoga County Port Authority

Submitted by:

TRANSYSTEMS CORPORATION

## INTRODUCTION

The Cleveland Cuyahoga County Port Authority commissioned TranSystems Corporation to assist in evaluating the current capacity of the existing port facilities, including the Docks 20 – 32 east of the river and the Cleveland Bulk Terminal (CBT) west of the river. This study is to assist the Port Authority and it's Planning Partners, the City of Cleveland, Cuyahoga County and other regional and local planning and development agencies in evaluating the impact of reducing some of the Port's cargo-handling facilities to provide development and increased public access opportunities along the Cleveland waterfront.

### Evaluation Process

The key to the feasibility of any reconfiguration of the Port of Cleveland is to provide facilities that will support the Port's current operations and cargo throughput volumes as well as its future needs. Amenities offered to Port customers at their current location should continue to be made.

Critical steps in the evaluation process include understanding the Port facilities current and historical operations, identifying the existing Port facilities capacity, and reconfirming and adjusting current and projected cargo throughput volumes. From the above elements, the Cleveland Cuyahoga County Port Authority and its regional and local development and planning partners can assess the impacts of the reduction of cargo-handling facilities.

TranSystems Corporation developed the Port's 1998 Master Plan, which used the same capacity analysis models and routines to determine the existing throughput capacity of the Port. In addition, the previous work efforts involved a detailed market assessment, involving contact to all major industries in the Cleveland area and research of historical trends, to assess the projected cargo throughput base and growth factors. Using those statistical baselines, a Master Plan for port development until the year 2025 was developed to map out a plan for increasing the port's throughput capacity as required by market demand. Since the Master Plan, several identified projects have been completed, such as the pavement and construction of Dock 20, the removal of the huletts and abandoned buildings at the Cleveland Bulk Terminals, and the new Shoreway interchange at West 3rd. Another project that is being completed, but was not specifically addressed by the Master Plan, is the installation of some of the bulk handling equipment from Lorain. In addition, some Master Plan components have not been implemented as of today, but are still relevant and discussed later in the report and include a warehouse on Dock 20, truck access to the bulk facility, and the development of the fallow part of Whiskey Island for increased cargo handling capacity.

## Current Port Operations

***The Port of Cleveland***, part of the Great Lakes maritime industry, is an ideal import and export gateway into and from the U.S. manufacturing heartland because of its closer proximity to Europe than East Coast ports such as Norfolk and Baltimore, the elimination of U.S. Seaway tolls, and the superb rail connections. Historically interlake trade, in particular iron ore, have been the predominant cargos in the Great Lakes since the construction of the Soo Canal linking the iron ore deposits of Michigan, Wisconsin, and Minnesota with Southern Ohio coal. The international import trade, including steel, in the Great Lakes started in 1959 with the opening of the St. Lawrence Seaway and provides a lower cost backhaul route for United States grain exports, assisting in higher grain prices for Midwestern American farmers.

More specific to our Northeast Ohio region, the Port of Cleveland is an import destination port. A 1997 Economic Impact Report of the Port of Cleveland's Maritime Operations completed by The Urban Center of the Levin College of Urban Affairs of Cleveland State University, found that 90% of all cargo into the Port of Cleveland has a final destination within 75 miles of Cleveland – the true definition of a destination port. The regional economic impact of the Port of Cleveland, in particular the economic benefits from a destination port, is discussed later in the impact section of this report.

The Port of Cleveland is located on Lake Erie's waterfront, spanning both sides of the Cuyahoga River, and has handled steel, iron ore, limestone and other domestic bulk cargo since the early 1800s. The Cleveland Harbor is protected by a six mile breakwall and has a 27 foot water depth allowing it to accommodate all ships that pass through Seaway locks. This and its on-dock, Foreign Trade Zone create a top notch, cost effective vehicle for international trade with local manufacturers.

***Docks 20-32*** located just east of the Cuyahoga River receive steel and other break-bulk cargoes mainly in the international trade and include a cement facility and stone operation. Docks 20-32 currently have over 7,800 linear feet of dock space, which is divided among 12 berths. Cargo is stored in 417,000 square feet of warehouse space, which has indoor rail loading and unloading capability, and on associated available open storage space.

The cement facility is located on the south end of Dock 20 and the stone operation is located on the north end of Dock 20. Both are operated under separate leases with the Port Authority. The cement facility is currently under a long-term lease situation, but the stone operation is year to year.

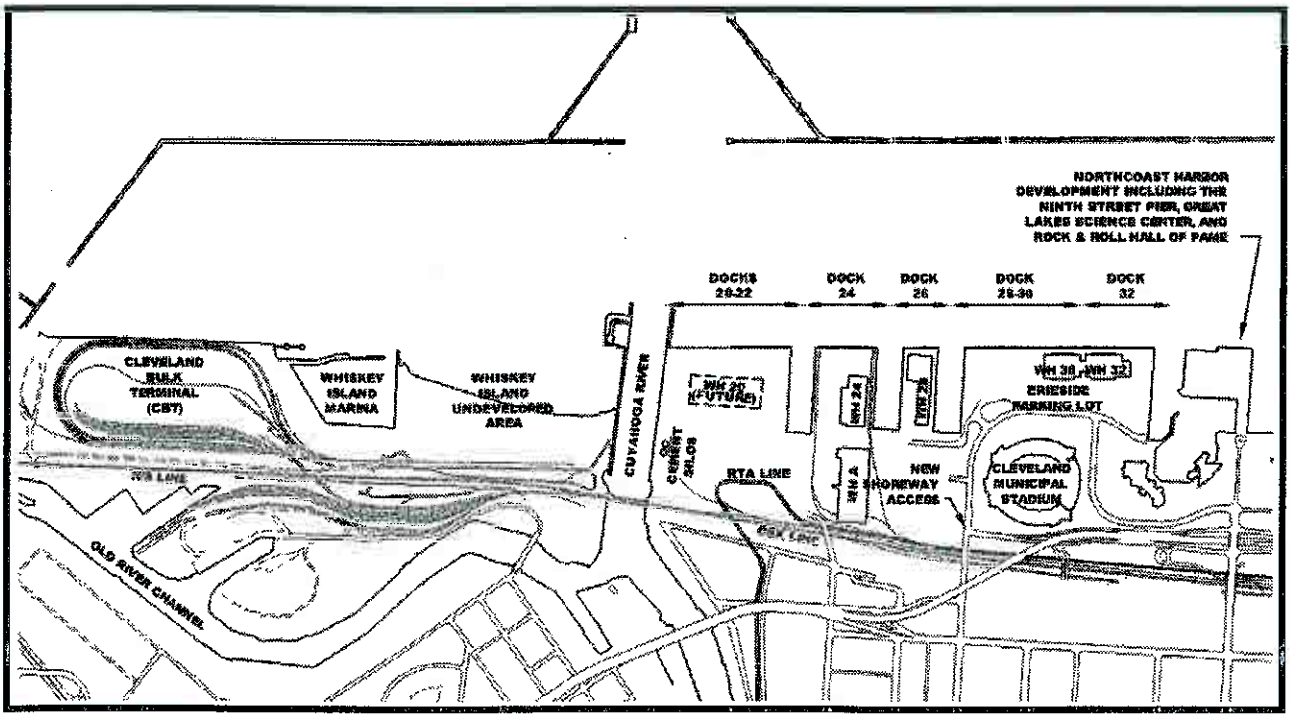
Two separate stevedoring companies operate the steel and other break-bulk facilities at Docks 20-32, providing the Port's customers a competitive market. One stevedore operates two warehouses, and the other operates one warehouse

with the remaining two warehouses shared by the two companies. Each stevedoring company owns their own yard equipment and shares the recently overhauled Port owned "Buckeye Booster", which is a 150-ton heavy lift crane located at Dock 28 West.

***The Cleveland Bulk Terminals (CBT)*** located west of the Cuyahoga River on Whiskey Island at the west end of the break wall receives bulk cargo such as iron ore. The CBT has 1,850 linear feet of dock space and 46 acres of open cargo storage space. Oglebay-Norton Company is the operator of the CBT under a long-term lease with the Port Authority and owns all operator yard equipment.

Currently under construction is the relocation of some of the bulk handling equipment components from Lorain to the CBT property. This will provide conveyor loading from the CBT bulk storage area to waterborne barges and vessels. The conveyor system will primarily be used for transfer of iron ore pellets from dockside storage piles to a river-going barge for delivery to ISG Corporation. There is no current truck access to the CBT facility. Although a single lane truck access under the Norfolk Southern mainline tracks was planned, it was postponed due to the bulk handling equipment project.

**Current Facilities Map**



## CAPACITY ANALYSIS

### Existing Facilities Capacity Model

***Model Architecture***

TranSystems has created a series of computer models which calculate the practical throughput capability for all types of marine terminals. These include container, break-bulk, neo bulk, auto, intermodal rail, dry bulk, liquid bulk, and warehousing, as well as for passenger facilities. These models were based on a component evaluation technique developed by the U.S. Marine Administration, refined to a standard of accuracy which was carefully matched to actual historical records for existing marine terminals, and is updated annually by TranSystems. Repeated use of the models on over 300 national and international projects has stimulated continual upgrades to the models. Seasonal and operational peaks and slow periods are typical of all maritime-related businesses and are directly incorporated into the models.

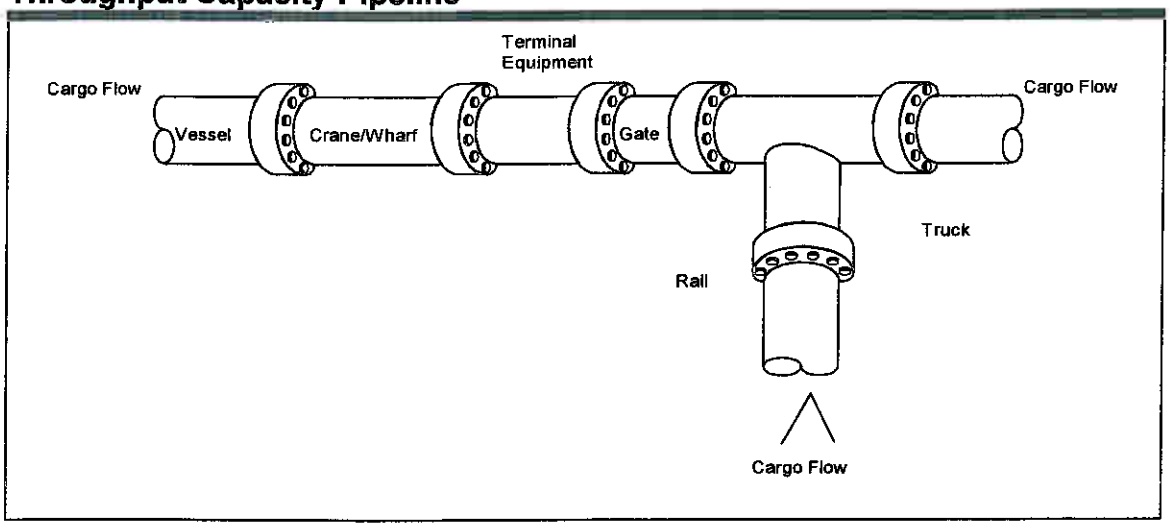
The computerized models replicate an entire port terminal as six maritime facility components that affect cargo throughput. The six facility components are listed below:

- Vessel arrival and berth availability
- Cargo transfer at the wharf apron
- Apron-to-storage transfer
- Storage yard capacity and dwell time
- Storage-to-inland transfer
- Gate size and processing

Separating the port terminal into the above components allows the model operator to determine which component is the limiting component. If one component of the port terminal has a much lower capacity than the others, the entire facility must slow to the throughput capacity of that particular component.

It may be helpful to imagine the port terminal components as valves in a section of pipe, as shown below. The graphic illustrates that each valve in the system affects the overall throughput of the pipe and that the system will function at the lowest throughput valve in the system. Thus, it does not matter that valve one allows 20 gallons per minute if valve four only allows 4 gallons per minute; the total system will only allow 4 gallons per minute. The same is true for port terminal operations. If the storage capacity of a given port terminal is far less than the rest of the system, the entire terminal will operate at the capacity of the storage component. Ideally, each terminal component has roughly the same throughput capacity; however, this balance is not always easy to achieve.

**Throughput Capacity Pipeline**




***Information Sources***

The capacity model development process began with the study team establishing a detailed understanding of the Port facilities current operations. By using the break-bulk and bulk models developed for the 1998 Master Plan as the base, the team replicated the current terminal operations and analyzed its current cargo handling capacity.

The TranSystems Throughput Capacity Models are very detailed and require large amounts of input data. This data is supplied by three primary files contained in the model structure: the Inventory File, the What-If File, and the Operations Data File.

The information contained in the Inventory File is designed to gather basic port operating parameters and procedures. For the Port of Cleveland Master Plan, this information was obtained by the project team through a series of terminal questionnaires designed to collect the data required for the model analysis. This information was then supplemented with interviews of port staff as well as terminal operators and shippers. For the current analysis, all previous information obtained via the questionnaires and interviews was reviewed and confirmed with the appropriate operating staff. The Inventory File is the first place that the model looks to find information.

The What-If File is where variable information about the terminal is supplied. In this section, the user can test different scenarios of terminal operation and see the results of different combinations of terminal improvements. Information in the What-If File will override data contained in the Inventory File. For the Port of Cleveland, this file was used to look at capacity with planned and potential changes to existing infrastructure.

The Operations Data File contains the model's default data and is where the model will look for information not supplied in previous files. The data contained in the Operations Data File is based on typical port terminal operations. The information in this file will be overridden by data in either the Inventory or What-If Files.

The Port of Cleveland has two primary types of cargo: bulk and break-bulk/steel. The nature of these cargoes required TranSystems to develop a separate set of models for each type. These two coincide with the physical split in the Port's operations. Thus, the break-bulk/steel operations at Docks 20-32 are examined in one model, and the bulk operations at CBT are examined in the other. To accurately represent the operations at Docks 20-32, the project team created a model for each dock, except in cases where two docks essentially function as one port terminal. The CBT terminal was modeled as one facility. In addition, to augment the break-bulk steel operation model, each storage warehouse was modeled individually. The capacity of each warehouse was based on handling and storing three different types of typical cargo – steel coil, steel rod, and other general break-bulk.

Based on the above information required by the model and gathered by TranSystems, the models utilized the following key assumptions.

- Existing facilities were inventoried as they are currently, with the inclusion of the bulk handling equipment installation at CBT and the completion of the new State Route 2 – Port of Cleveland Interchange Modification, also referred to as the new Shoreway entrance. Both of these infrastructure improvement projects are in the construction phase and will be implemented.
- Removal of bulk stone handling capabilities from Dock 20-22.
- Cement operations will remain on Dock 20.
- As part of a lease agreement with the Browns (ending in 2010), the Port Authority is required to provide 2600 parking spaces adjacent to the stadium for special events. This parking is currently provided with 400 dedicated spaces in the Erieside Lot (fenced area north of the stadium) and 2200 temporary spaces in the open areas of Docks 20-32.
- A peaking factor based on current port operations, especially the typical surge in late year prior to the winter shutdown of the St. Lawrence Seaway and Soo Canal. Peaking is especially critical for weather affected operations. Both CBT and Docks 20-32 are limited in their import operations when the lake freezes over. (Both operations continue to discharge cargo from storage.)
- Of the present steel imports, at least 50% are required to be stored in a sheltered warehouse due to customers, especially the auto makers, demanding higher quality steel.
- Storage dwell times average 30 days. The "just-in-time" warehousing revolution has placed a larger storage burden on destination import

facilities. Industry has chosen to reduce their onsite storage requirements by bringing the imported parts and product into their facility "just-in-time" for the manufacturing process. This has shifted the storage burden to the destination of import facilities like the Port of Cleveland.

- Utilized the current 50/50 split of warehouse storage of steel coil and steel rod, with a small allocation for general cargo based on current and forecast percentages. One of the critical components to a break-bulk capacity analysis is an understanding of the different cargos and the impact of each on the available storage. Each commodity has a different cubic density and stacking requirements. For instance, a hot-rolled steel coil weighs up to 15 times as much as steel rod, but the rod can be stacked much higher in the warehouse. Looking at Warehouse A, the following is a chart showing the difference in tonnage capacity based on three different scenarios:

| % Steel Coil | % Steel Rod | Capacity | Comment |
|---|---|---|---|
| 50% | 50% | 240,000 | Current operational split |
| 100% | 0% | 360,000 | Coils are much heavier but cannot be stored as high or as densely as rod. |
| 0% | 100% | 120,000 | Rod is much lighter but is stored higher and more dense than coil. |

From the above, it is easy to see that the capacity of the Port be based on the actual cargo types. While an overall increase in the percentage of wire rod handled by the Port in a season could diminish the overall total break-bulk tonnage, *it would not follow that the Port now has more available capacity.* The capacity model would need to be adjusted to the revised cargo split to adequately determine the utilization of the available capacity of the Port.

- CBT handling only three different commodities; presently two grades of iron ore and iron ore concentrate. The critical component that typically yields the greatest change to the overall capacity of a bulk terminal is the total number of different type of commodities handled by the facility. The overall capacity of a bulk facility is inversely proportional to the number of commodities shown. In other words, as each new commodity – different gradation of ore or stone, salt, etc. -- is introduced to the facility, the overall capacity diminishes.

***Model Results***

The models provide output in the form of the "Maximum Practical Capacity" for each terminal. The term maximum practical capacity, or MPC, refers to

estimated annual throughput volumes that represent the high end of a realistic operating scenario. In practice, operating at a level equivalent to the MPC for any significant period of time is typically considered impractical, uneconomical, and/or unsafe. For practical purposes, the throughput capacity of a terminal is more reasonably approximated at 75% of the terminal's MPC. This figure, referred to as "Sustainable Practical Capacity" (SPC), is the practical throughput capacity a facility can reasonably be expected to operate at over a sustained period of time. For planning purposes, a reasonable approach is to develop facilities to meet SPC.

The MPC/SPC relationship is analogous to a speedometer on a motor vehicle. For example, assume the speedometer shows a maximum speed of 120 miles per hour. In optimal driving conditions and with the equipment at top running condition, the vehicle can operate at 120 miles per hour. This speed would represent the MPC of the vehicle. However, most of the time, due to driving conditions, etc., the vehicle can normally operate at 60 miles per hour. This lower speed would represent the SPC of the vehicle. Marine terminals, as a general rule, do not operate at the MPC level most of the time. Therefore, the SPC level is used for planning and evaluation purposes.

With this in mind, the capacity model results for the Port of Cleveland's existing facilities presented below are the SPC throughput capacity volumes, equaling 75% of the MPC.

**Summary of Existing Throughput Capacities (SPC)**

| Cargo Type | Facility Name | Quantity | Units |
|---|---|---|---|
| Break-bulk/Steel | Dock 20-22 | 150,000 | Short tons |
| Break-bulk/Steel | Dock 24 | 430,000 | Short tons |
| Break-bulk/Steel | Dock 26 | 140,000 | Short tons |
| Break-bulk/Steel | Dock 28-30 | 180,000 | Short tons |
| Break-bulk/Steel | Dock 32 | 180,000 | Short tons |
| **Break-bulk/Steel** | **Total** | **1,080,000** | **Short tons** |
| **Bulk** | **CBT** | **6,000,000** | **Short tons** |

Comparing the results back to the Master Plan capacity analysis, there has been a reduction in the overall Break-bulk/Steel capacity on Docks 20-32 but an increase in the Bulk capacity at CBT. This was for the following reasons:

- While the Master Plan assessment acknowledged the stadium parking requirement by identifying the ability to handle up to 2700 spaces within the existing infrastructure, the plan was completed prior to the realization of the stadium and associated parking. Therefore, at the time of the Master Plan capacity analysis, the area associated with the parking requirement was too nebulous to accurately define to include the reduction in open storage space within the reported capacities. Currently, after

three full seasons of stadium usage with associated parking, the affected areas are definable from past utilization. We have deducted those areas from the overall available open storage during the months of stadium usage (August - December) because operational experience from the past three years have demonstrated it is not feasible to store cargo in the parking areas during heavy stadium event usage periods. (Typical open storage dwell times exceed the amount of available time between stadium events during the football season.) This effect is further compounded by the typical timing of stadium events, as they occur in the fall months when the greatest peaking of cargo flows into the facility happen due to the January to March shipping hiatus.

- The Break-bulk/Steel capacity per acre has increased due to the current cargo mix at the facility. As discussed above in the information sources section, the overall capacity of a break-bulk facility depends on the particular cargos handled.
- The CBT bulk capacity increase is directly associated with the installation of the bulk handling equipment, allowing for better storage and material handling capabilities.

To better determine where the Port should focus any efforts for throughput capacity improvements, the specific model results for each facility component need to be analyzed. The figure below shows the capacity of each of the six major terminal components and how each compares to the other five. The limiting component for each terminal is shown in both type.

**Existing Terminal Throughput Capacity (SPC in short tons)**

| Terminal Component | Docks 20-32 | CBT |
|---|---|---|
| Component 1: Berth and Apron Activities | 5,530,000 | 16,560,000 |
| Component 2: Ship to Apron Transfer | 6,100,000 | 20,722,000 |
| Component 3: Apron to Storage Transfer | 21,100,000 | [1] |
| **Component 4: Storage** | **1,080,000** | **6,000,000** |
| Component 5: Inland Transfer | 2,808,000 | 2,246,000 [3] |
| Component 6: Gate Processing | 3,650,000 | [2] |

1 Cargo at the CBT is currently stored on the wharf apron. The introduction of the conveyor system from Lorain will have not change this operation.

2 The CBT is currently a ship to ship or ship to rail operation and has no gate.

3 Inland transfer is only ship to rail transfer capabilities. Since current operations only anticipates 1,500,000 ton a year to move ship to rail, this number is not the limiting component. Changes could possibly be made to the operating scenario of the rail loading component, such as adding additional loaders, prior to needing infrastructure improvements.

In both cases, storage is the limiting factor for current operations. Thus, the Port should focus any throughput capacity improvement efforts on the storage capacity of its facilities.

**Planned Maritime Development Impact**

The Master Plan development identified the potential for a new warehouse located on Dock 20-22, identified as Warehouse 20. We investigated the potential impact to overall break-bulk capacity using the following assumptions:

- Total area of 144,000 square feet. (240 feet by 600 feet)
- Three bays with an overhead bridge crane in the central bay.

The following chart summarizes the impact to the capacity at Dock 20-22 and overall capacity of the break-bulk facilities if the warehouse was constructed.

**Summary of Throughput Capacities with Warehouse 20 (SPC)**

| Capacity with the construction of Warehouse 20 | Revised Break-bulk Capacity | Units |
|---|---|---|
| Dock 20-22 | 350,000 | Short tons |
| Break-bulk/Steel Total | 1,280,000 | Short tons |

**Non-Maritime Development Impact**

Upon completion of modeling the existing facility, TranSystems considered alternatives currently under discussion with the City of Cleveland that will impact the overall capacity of the Dock 20-32 area.

The City of Cleveland has expressed an immediate interest in pursuing non-maritime cargo-handling activities on Dock 32 and a future interest in expanding the non-maritime cargo-handling activities to Dock 28-30. This area has been identified as potential for city-led development.

The following chart summarizes the impact to the Break-bulk/Steel capacity east of the Cuyahoga River with the elimination of maritime activities on only Dock 32, as well as Dock 28-30 and Dock 32.

**Summary of Throughput Capacities with City Development (SPC)**

| Scenario | Revised Overall Break-bulk Capacity East of the Cuyahoga River | Units |
|---|---|---|
| Dock 32 for City Development | 900,000 | Short tons |
| Dock 28-30 and Dock 32 for City Development | 720,000 | Short tons |

**Ferry Service Capacity Impact**

The Port Authority is currently preparing authorization for an implementation study to provide a Ro-Pax (Roll on-Roll off Passenger) ferry service for Cleveland. While not a detailed implementation plan, for purposes of this report it was necessary to establish basic parameters for a service. TranSystems utilized a Cleveland Lake Erie Ferry Service Feasibility Study completed in 1999 by TranSystems Corporation and Leeper, Cambridge & Campbell to estimate the requirements for a ferry service. This estimation can then be used to assist the Port Authority in determining the effects of locating a ferry terminal on existing property.

***Ferry Service Requirements***
From the feasibility study, we are basing our estimate of land, water, and adjacent transportation needs on the following assumptions:

- It will be a combination passenger / auto / truck service capable of handling up to 800 passengers with 300 autos or 75 trucks (or a combination of autos and trucks) in a single passage.
- Start-up operations will be only one round trip daily, but future space should be allocated for multiple trips and/or destinations as the market determines.
- The vessel of choice is an European-hybrid design with bow and stern loading.
- The associated terminal and administrative building should have adequate waiting facilities to hold 800 passengers, with a restaurant and gift shops. In addition, it needs adequate space for all administrative functions, including customs. As this will be the "entryway" for visitors into Cleveland, all efforts should be made to welcome tourists.
- Outbound queuing area for autos and trucks waiting to board vessel for transit. Additional inbound queuing area for autos and trucks waiting to process customs.
- Passenger only auto parking and area for bus and taxi drop-off.
- Storage area for cargo trucks and trailers.

From the above, TranSystems estimates that the following land, water, and transportation access requirements be considered for a ferry:

- Minimum of 12 to 16 acres start-up facility with additional expansion abilities.
- Minimum docking space for a 400 to 600 foot vessel with abilities to handle either fore/aft or bow/stern loading.
- Easy and convenient access to both freeway system for trucks and local transportation alternatives for tourists.

***Possible Ferry Service Locations***

Reviewing the available land resources at the Port of Cleveland and the requirements listed above, we suggest that the best location for a ferry terminal within the existing infrastructure would be on Docks 28-30. This is in general concurrence with the Master Plan suggested location, Dock 32, but recognizes a greater area needed for development than anticipated in the Master Plan, and the anticipated usage of Dock 32 by the city for development and public lakeshore access. (The Ferry Feasibility Study was concluded after the Master Plan development.) This suggestion is based on the following reasons:

- Docks 28-32 are adjacent to the Northcoast Harbor development. A ferry service would provide an excellent transition between the Northcoast Harbor area and the cargo-handling port facilities. In addition, it would provide an excellent entrance gateway for tourists by being so near to the Northcoast Harbor attractions.
- Excellent existing land connections to the freeway and local transit options.
- The location isolates the ferry passenger activities from the cargo-handling area of port operations, but provides access to the cargo-handling area for utilization by the truck cargo component of the ferry service.

If Docks 28-30 and Dock 32 were changed from cargo-handling facilities to a non-maritime use for city development purposes, we investigated the ability of the Port to handle a ferry service within the rest of their infrastructure, Dock 20 and Dock 26 in particular. We would not recommend either Dock 20 or Dock 26 be considered without finding additional steel cargo handling resources to supplement the loss of either area. The resultant steel handling capacity (as shown in the following chart) is less than the worst year to date and less than half of the historical average. *The implementation of the ferry service on either Dock 20 or Dock 26 would require a decision to sacrifice steel cargo handling capabilities.* The following are additional reservations we have against a ferry service being located on Dock 20 or Dock 26 besides the large detrimental impact to the cargo-handling capacity of the port.

- The location and traffic patterns would have to be such that there was no intermingling of ferry passenger cars and port operations. *Non-operational vehicles, such as passengers using the ferry terminal, in cargo-handling areas creates unsafe working conditions and must be avoided.* In addition, the ferry terminal must utilize a different entrance to not cause an adverse impact on the regular trucks entering and leaving the port with break-bulk cargos.
- The ferry terminal cannot share a berth with a break-bulk cargo handling facility. A break-bulk vessel is typically in the port for a minimum of 24 hours for unloading, while a ferry service will be in port at least twice daily.
- There is a concern about the ability of the Port to have sufficient space to meet the stadium parking contractual requirement with a ferry service.

The following chart summarizes the impact to the Break-bulk/Steel capacity east of the Cuyahoga River with the elimination of maritime cargo-handling activities on only Dock 32, as well as Dock 28-30 and Dock 32.

**Summary of Throughput Capacities with a Ferry Terminal (SPC)**

| Scenario | Revised Overall Break-bulk Capacity East of the Cuyahoga River | Units |
|---|---|---|
| Dock 28-30 for Ferry Service and Dock 32 for development and increased public lakefront access | 720,000 | Short tons |
| Dock 28-30 and Dock 32 for development and increased public lakefront access with a Ferry Service located within Docks 20-26 | 370,000 | Short tons |

Other ferry terminal location alternatives, were considered, including a non-lakefront location The requirements remain the same as outlined earlier. Caution should be exercised in placing the facility up the Cuyahoga River. It takes 2 hours to negotiate the river and lift bridges up the Cuyahoga to reach the ISG area, which would double the transit time for the voyage and possibly eliminate the potential for a second round trip daily with the same vessel. Obviously locations closer to the mouth of the Cuyahoga would result in less time required, but any location of sufficient size in the Flats or Old River Basin area should be evaluated against current development proposals and existing traffic problems in those areas.

The facility could be located on Lake Erie in another location than on the existing Port property, but additional research would need to be completed to determine where land would be available and the impacts of possibly relocating the service outside of the downtown area. We anticipate that the proposed ferry implementation study will assist in addressing the best location for the ferry service.

## PROJECTED CARGO THROUGHPUT VOLUMES

Projected cargo throughput volumes identified in the Master Plan were re-evaluated based on the Port of Cleveland's actual cargo volumes since the completion of the Master Plan. This re-evaluation involved comparing the Master Plan cargo forecast projections against the actual cargo volumes from 1997 to 2002 for the Port's two primary types of cargo: bulk and break-bulk/steel.

The cargo volumes listed below only include the volume handled on Port Authority property – Docks 20-32 and CBT, not at private facilities. Typically, Docks 20-32 predominantly handle break-bulk cargo while CBT only handles bulk cargo.

**Cargo Volumes by Year (short tons)**

| Year | Break-bulk (Actual) | Bulk (Actual) | Break-bulk (Forecast) | Bulk (Forecast) |
|---|---|---|---|---|
| **1990** | 773,922 | 3,038,535 | | |
| **1991** | 913,670 | 2,852,675 | | |
| **1992** | 435,286 | 2,700,842 | | |
| **1993** | 764,843 | 2,069,184 | | |
| **1994** | 869,669 | 1,899,989 | | |
| **1995** | 779,314 | 1,531,985 | | |
| **1996** | 1,158,056 | 1,809,000 | | |
| **1997** | 1,045,377 | 1,521,729 | 1,053,338 | 1,809,000 |
| **1998** | 1,182,792 | 1,239,551 | 1,084,948 | 6,809,000 |
| **1999** | 721,369 | 934,306 | 1,117,506 | 6,924,753 |
| **2000** | 949,552 | 1,028,500 | 1,151,041 | 7,042,474 |
| **2001** | 364,602 | 1,139,238 [1] | 1,162,605 | 7,162,196 |
| **2002** | 444,202 (est.) | 1,167,009 [1,2] | 1,174,286 | 7,283,953 |

[1] To augment the diminished break-bulk steel imports, the Port Authority leased a portion of Dock 20 to Kenmore Stone on a yearly basis. Also, the Port Authority has a long term lease for the cement facility on Dock 20. In 2002, these bulk commodities produced 403,169 tons of cargo and in 2001 produced 401.885 tons of cargo which moved through Docks 20-32 rather than CBT.

[2] Bulk volume for 2002 does not include CBT tonnage for December 2002.

The market assessment portion of the Master Plan also investigated the possibility of ro-ro (roll on-roll off) and container cargo, including recycled materials, being handled by the Port of Cleveland. While the Master Plan identified a small portion of ro-ro and container cargo as possibly being captured by the Port, these cargos have not materialized in a substantial fashion to date. While from previous experience with maritime opportunities, we can foresee the possibility of ro-ro and container markets developing, for instance through the ferry or feeder barge service supported by aggressive marketing techniques, it is not within the scope of this analysis to do a market assessment to accurately

define a projected forecast volume for such cargo. Since even the amount projected in the Master Plan is such a small portion of the overall volume, we have not included it in the present study. Historically, the Port of Cleveland has handled various cargos, from lumber to popcorn, and it is vital for its growth, and the growth of Cleveland, that the Port maintains the ability to adapt to future capacity demand from existing or future customers. The Port Authority may want to consider an update to the Master Plan market assessment to more accurately understand what possibilities are available to capture such cargo through aggressive marketing strategies.

***Break-bulk (Steel and Other General)***

The noticeable trend is the diminution of cargo volume after a record 1998 year and good 2000 year. Understanding that the majority of the break-bulk cargo is steel (over 99%), the cargo volume change reflects the status of the steel industry. The dip between 1998 and 2000 demonstrate a typical flux in the steel industry, as is also shown in 1991 to 1994. With recent years, to assist the declining domestic steel industry facing low-cost imported foreign steel from over-stocked manufacturers, the government has placed higher restrictions and tariffs on imported steel. Another break-bulk steel port reported a decline in cargo of over 54% from 1999 to 2001 in a press release. For the purposes of this evaluation, it is assumed that as the domestic and foreign steel industry recovers, the flow of fairly traded imports will return to late 1990's levels to support the United States manufacturing industry, as seems to be indicated by a stronger 2$^{nd}$ half of 2002.

For the current forecast projection, TranSystems reassessed the base cargo volume for 2003. Given the current steel situation, it would be unrealistic to expect a full recovery in a single year. Therefore, we anticipate 2 to 3 years before the steel import cargo will fully recover. From that recovery point, anticipated to be 1,000,000 ton in 2005, we used the same annual growth midpoint between the medium to high forecast projection scenarios through the year 2025 as the Master Plan, as this study did not involve a detailed market assessment to re-evaluate the projection scenarios. Given the difference in the Cleveland market and economy since 1998, especially with ISG, it may be beneficial for the Port Authority to authorize an update of the market assessment and corresponding projection scenarios.

***Bulk***

The large difference in the Master Plan projected volumes versus actual cargo volumes for the bulk over the past several years is due to not constructing the truck access or improved storage handling facilities to capture some of the existing cargo destined for a private facility up river. The 1998 Master Plan had anticipated the construction of a truck access route under the N/S mainline, which is required to have the ability to move cargo in and out of the facility via truck.

The current forecast projection for CBT is based on the actual cargo anticipated for 2003. From discussions with Oglebay-Norton, it is anticipated that they will transfer between 3,850,000 ton and 4,300,000 ton of iron ore (two grades) and iron concentrate next season. The predominant change in the cargo volume forecast is from the installation of the bulk handling equipment at the CBT property. Up until the installation of this equipment, the pellets for the ISG Corporation (previously LTV), were transshipped in Lorain. The addition of the ISG pellet will increase the estimated cargo for CBT by 2.2 to 2.8 million ton a year. (1.2 million ton of pellets will be sent directly to ISG without any transfer at the CBT facility.) CBT will continue to supply iron ore pellets to Weirton, West Virginia and iron ore concentrate to a local manufacturer via rail transfer.

From a 2003 base of 4,300,000, we applied the same annual growth midpoint between the medium to high forecast projection scenarios. The Master Plan forecast looked at the growth of all bulk cargos, including iron ore, stone, cement, sand & salt, grain and liquid bulk. Once again, given the changes in the Cleveland economy and infrastructure on CBT, it may be beneficial for the Port Authority to reassess the market forecast projection scenarios.

The following chart outlines the projected growth of Break-bulk / Steel and Bulk cargos based on the above discussion:

| Year | Break-bulk/Steel Forecast Projection Based on an Annual Growth of 2% | Bulk Forecast Projection Based on an Annual Growth of 2.5% |
|---|---|---|
| **2003** | 652,000 tons | 4,300,000 tons |
| **2004** | 877,000 tons | 4,407,500 tons |
| **2005** | 1,002,070 tons | 4,517,688 tons |
| **2010** | 1,106,539 tons | 5,111,349 tons |
| **2015** | 1,221,914 tons | 5,783,022 tons |
| **2020** | 1,345,868 tons | 6,542,959 tons |
| **2025** | 1,485,947 tons | 7,402,757 tons |

As discussed above, steel import cargo tends to be very cyclical, but the forecast annual growth uses a standard growth rate. The annual growth rates for both break-bulk / steel and bulk take into consideration the cyclical nature of any commodity and use a percentage that averages out the highs and lows over the duration of a cycle.

## CAPACITY VERSUS DEMAND

### Results

The following graphs compare the sustainable practical capacity results for both break-bulk and bulk cargos as obtained from the models to the projected cargo throughput volumes to determine in what year the Port could anticipate a capacity shortfall, assuming the specific components of each scenario below occurred today.

***Break-bulk/Steel – Docks 20-32***

Several scenarios were discussed for the break-bulk steel facility, which we have summarized into the following chart. Since the nature of the steel industry is cyclical, the range of years shown are based the projected cargo throughput volumes and then a reduction in the projected cargo throughput volumes of 30% to account for a possible presence of "down" cycle in the steel import industry during the year(s) in which the Port could anticipate being at capacity. In addition, it is important to reiterate that the facility break-bulk/steel capacity is based on the specific weights and sizes of the current steel cargo moving through the facility and that any changes in the cargo, such as different steel types or the addition of a completely different cargo, may alter the facility capacity.

| Scenario | Description | Facility Break-bulk / Steel Capacity (short tons) | Year Capacity Exceeded |
|---|---|---|---|
| **Scenario 1** | Existing facility | 1,080,000 | 2010-2021 |
| **Scenario 2** | Existing facility with the construction of Warehouse 20 | 1,280,000 | 2018-2025+ |
| **Scenario 3** | Existing facility without Dock 32 (Dock 32 for development and increased public lakefront access) | 900,000 | 2005-2010 |
| **Scenario 4** | Existing facility without Dock 32 and with the construction of Warehouse 20 (Dock 32 for development and increased public lakefront access) | 1,100,000 | 2010-2023 |
| **Scenario 5** | Existing facility without Dock 32 and without Dock 28-30 (Dock 28-30 and Dock 32 for development and increased public lakefront access or for Ferry Service) | 720,000 | 2004-2005 |

| Scenario | Description | Facility Break-bulk / Steel Capacity (short tons) | Year Capacity Exceeded |
|---|---|---|---|
| **Scenario 6** | Existing facility without Dock 32, without Dock 28-30, and with the construction of Warehouse 20 (Dock 28-30 and Dock 32 for development and increased public lakefront access or for Ferry Service) | 920,000 | 2005-2014 |
| **Scenario 7** | Existing facility without Dock 32, without Dock 28-30, and with a ferry service located in Docks 20-26 (Dock 28-30 and Dock 32 development and increased public lakefront access) | 370,000 | Present day |

The above analysis demonstrates that the Port of Cleveland should immediately begin to identify areas for potential operational or infrastructure improvements if any property is used for City Development purposes.

***Bulk – CBT Facility***

Only one scenario was discussed for the CBT facility, which has the facility with a 6,000,000 short ton capacity when continuing to handle only three commodities. It is estimated that the addition of a fourth product will reduce the capacity to below the expected volume for 2003. *Therefore, CBT is at capacity with three commodities and cannot handle the addition of any new commodities and customers, including the relocation of the bulk stone from Dock 20.* Consideration should begin to be made for future changes in the CBT infrastructure to improve capacity by allowing for the addition of new commodities. Such actions could include construction of a berthing slip or conveyor system for better backland storage utilization or expansion of wharf side storage. Any improvements must also consider the implementation of a truck access under the N/S mainline, as many bulk cargos – such as relocated stone from a up river facility – would require a truck egress route.

**Impacts**

***Local and Regional Economic Impact***

In 1999, the Port Authority commissioned an update study by the Urban Center at the Levin College of Urban Affairs at Cleveland State University, of the Economic Impact Study of the Port of Cleveland's Maritime Operations. Looking at all maritime operations, including the private river docks, the study determined an overall direct, indirect, and induced "port industry" impact of 4,800 jobs, $441

million in spending, and $156 million in personal income.. These numbers did not include any impact from the manufacturing industry, such as automobile and steel, which rely on the Port. Furthermore, it is difficult to enumerate the impact a facility like the Port of Cleveland provides when recruiting new industry to the area.

In addition, the Saint Lawrence Seaway Development Corporation authorized an Economic Impact Study of the Great Lakes St. Lawrence Seaway System. The study was completed in 2001 by Martin Associates. The Seaway study estimated the economic impacts of the Great Lakes St. Lawrence Seaway System on 16 representative U.S. port communities, including Cleveland and Toledo. The Seaway study did include the impact from the associated manufacturing industry. The interesting comparison of the Seaway statistics is between the Port of Cleveland and the Port of Toledo. As discussed earlier, the Port of Cleveland is a destination port, where a predominance of the cargo has a final destination within the economic region. The Port of Toledo is a transit port, where most of the cargo is transferred to rail or highway systems for a final destination outside of the economic region. Typically the Port of Toledo handles more cargo volume per year than the Port of Cleveland, primarily in bulk cargos. The following chart summarizes the difference in the economic impact for the two regions:

| Port | Direct and Induced Jobs | Personal Income (in millions) | Associated Business Revenue (in millions) | Federal, State, and Local Tax Revenue (in millions) |
|---|---|---|---|---|
| **Port of Cleveland** | 10,999 | $571.0 | $882.6 | $202.1 |
| **Port of Toledo** | 3,703 | $182.6 | $198.0 | $64.6 |

*As a destination port, a change in the cargo volume at the Port of Cleveland has the potential for a greater impact on the regional economy than if it were a transit port.*

Another critical component of the Economic Impact Study of the Great Lakes St. Lawrence Seaway System report is the difference in job and economic impact per ton between bulk commodities, such as iron ore and gravel, and iron and steel products. The study determined that steel generates significantly more jobs and revenues per ton than bulk cargos. Jobs shown per 1,000 tons below are only direct jobs (such as dock workers, freight forwarders, truckers) and do not include indirect or induced jobs (such as manufacturing jobs). In addition, is it also important to note that the indirect jobs supported by steel imports – such as coils used in automotive manufacturing – tend to have a greater economic impact than jobs supported by bulk cargos – such as aggregate used in construction. The revenue per ton shown is the revenues generated from providing maritime

services and does not include the value of the cargo shipped in the calculation. Following is chart summarized from the Seaway report that outlines the difference in jobs and revenues for five typical commodities:

| Commodity | Jobs / 1,000 Tons | Revenue / Ton |
|---|---|---|
| **Steel** | 1.07 | $156 |
| **General Cargo** | 0.33 | $73 |
| **Ore** | 0.22 | $11 |
| **Cement** | 0.21 | $16 |
| **Stone/Aggregates** | 0.20 | $14 |

The difference in the jobs and revenue per ton is directly related to the more intensive handling practices break-bulk cargos (such as steel and general cargos) require than bulk cargos. With self-unloading vessels, bulk cargos require much less manpower to unload, also reducing the amount of charges a port can assess the shipping line.

The above assessment demonstrates the difference in destination versus transit port and the difference in economic and job impact for various commodities. It is critical to understand that the steel import cargos provides a greater impact per ton than all other Great Lakes cargos.

In addition to the potential impacts of diminished cargo handling capacity eliminating current jobs, the future ability of the Port to assist the region in planning efforts may be comprimised. With CBT at capacity, the Port is handicapped in assisting the city in Flats development by not having the facility available to relocate bulk operations to the lakefront. In addition, while steel handling may currently account for 98% of the break-bulk and general cargo activity, it is important to the economic growth of the region that the Port have the flexibility to modify its operations to support an additional commodity that a new industry may provide. The need for flexibility is further reinforced by a recent article in the Great Lakes Seaway Review discussing the concept of "modal shift", or the migration of cargo from one mode of transportation to another. A recent Ohio Department of Transporation study indicates that freight truck traffic will increase by 64 percent by 2020, and that without "mitigation" gridlock hours will increase by 82 percent. A previous modal shift study by the Great Lakes Commission demonstrated that commercial vessels are safer, used less fuel, and were better for reducing noise and congestion than similar rail or truck movements. The modal shift study is to be updated this year. The Port of Cleveland could be considered a gateway to enhance modal shift of cargo to water and should have the facilities available to assist local, regional, and state planning and economic development efforts.

***Special Events and Function Impact***

In addition to regular maritime activities, the Port of Cleveland has played host to several special events in the past, most focused on the Dock 32 area. These events draw public, including out-of-town tourists, to the Northcoast Harbor area.

- Annual Power Boat Race. This event is staged in the protected harbor with parking and seating provided on Port property, typically on Dock 32 although recently Dock 20-22 and Dock 28-30 were utilized because of Dock 32 already being in use for another event.
- Tall Ships. Thousands of people visit the water front along Dock 32 to visit the touring sailing vessels. During this time, Dock 32 is converted into a staging area for visitors boarding and observing the vessels.
- Gravity Games. For six weeks, the Dock 32 area was used by the Gravity Games to construct the various ramps and equipment for the contests and then was an event site for the Games. This nationally televised event brought positive media attention to the Cleveland area.

The Port Authority and the City of Cleveland have already committed to these activities for next summer, but the Port Authority should examine its ability to host any further activities elsewhere on it's cargo-handling property in the event of the loss of Dock 32 to City Development opportunities.

## Capacity Improvement Alternatives

Because of the anticipated cargo shortfalls shown above, we propose some alternative ideas that may be further pursued by the Port Authority to enhance the capacity for both break-bulk and bulk cargos. Some of the ideas relate directly back to the Master Plan.

***Whiskey Island Development***

The Master Plan identified the eastern portion of Whiskey Island, currently held by private investors, as the area for future expansion of the Port. For purposes of this report, we are assuming that only the portion of Whiskey Island currently occupied by the private marina will remain available to the Port for expansion and the undeveloped portion of Whiskey Island will be turned over to the City of Cleveland for park development. This is in concurrence with a current arrangement being pursued by the Port Authority and the City of Cleveland.

If the Port Authority decides to develop the marina portion of Whiskey Island for cargo-handling purposes, we suggest that they develop the area for additional bulk handling facilities, which are identified as needed by 2017. The addition of a slip similar to that shown in the Master Plan would allow for a better storage utilization of the existing CBT backlands and allow for more berthing opportunities. The marina area is small and it would be difficult to attract a stevedore with the very limited break-bulk capacity that would be available.

Furthermore, break-bulk operations would require the construction of a two-lane truck access under the Norfolk Southern mainline to the Willow Street bridge. We also considered the opportunities for locating the ferry terminal in the marina portion of Whiskey Island. We would recommend against this location because of the poor land transportation connections for both trucks and tourists.

The usage of the fallow land east of the marina on Whiskey Island was not considered. If it were to be available for Port cargo-handling development, we would continue to recommend the development alternative shown in the Master Plan for a break-bulk/steel and other miscellaneous cargo facility. Since the undeveloped portion of Whiskey Island was the location identified in the Master Plan for growth of Port facilities to meet anticipated future demand, the loss of the undeveloped portion of Whiskey Island will leave the Port of Cleveland without an identified area for expansion, a critical element for the continued viability of Port cargo-handling operations.

***Operational Adjustments***

One of the critical components to the capacity of the Port of Cleveland, like most all maritime operations, is the dwell time of the cargo. As discussed above, the Port of Cleveland is a destination port, which while providing a greater economic impact for the area, requires a longer dwell time for the cargo. While a reduction in the dwell time can significantly increase the capacity of the port, the overall impact must be considered. As discussed earlier, this is a result of the logistics revolution of "just-in-time" deliveries. Customers have come to expect that the Port can handle the warehousing of their cargo for up to 30 days, and would welcome the opportunity for even longer dwell times. A change in policy requiring the cargo to leave the facility sooner may cause existing customers to send their cargo elsewhere and has a negative impact on attracting new customers. This also has the potential for a negative impact to the regional economy, as manufacturers prefer to be close to their import destination and may consider other locations for their operations if the Port of Cleveland cannot meet their dwell time expectations.

***Future Elimination or Reconfiguration of Stadium Parking***

Another option to increase capacity is to eliminate or reconfigure the stadium parking. The Port Authority is under contract with Browns to provide parking until January 2010. A study could be conducted to consider the impact to the Port's finances and cargo-handling capacity by either eliminating the parking (after 2010) to increase cargo handling-capabilities or to construct a parking garage to consolidate parking into a smaller footprint. At this time, stadium parking is an important revenue source for the Port and any adjustments must take either the loss of revenue or infrastructure construction and maintenance costs into consideration.

***Non-Waterfront Land Alternatives for Cargo Capacity***

The desire for recreational and commercial development of prime lakefront real estate in Cleveland and the associated impact to cargo-handling maritime operations is shared by many communities. Combining the desire to minimize necessary lakefront land area for cargo-handling operations with the increasing need for longer storage time has led maritime facilities to consider non-water front storage options.

One option is the generation of an inland storage facility connected to the waterfront by a dedicated, direct rail access, or shuttle train. This concept can be applied to several degrees. At one extreme, there is no storage provided on the water-front property. All cargos are immediately loaded onto rail car and shipped inland to the storage facilities. From that extreme, other options are for limited water-front storage abilities, limiting cargo dwell to 5 days after which it is either put on rail car for transportation to inland storage facilities or removed from site by the customer. Another component that must be realized is an efficient and accurate data/information management system to integrate and manage multiple transportation assets such as the dockside unloading, shuttle train, and warehousing. The inland storage facility must have good land transportation access to rail and highway systems. Furthermore, since this concept typically requires multiple movements of a shipment, increasing port handling costs, the final costs to the consumer may increase. This possible cost increase should be quantified and customer impacts considered. While a barge connection (rather than rail) to an inland facility located up the Cuyahoga River may be considered, it must account for the increased river traffic and the subsequent possible negative impact on Flat's development and lift structure maintenance.

TranSystems has explored options similar to the one outlined above, including a plan for the Port of New Orleans called the Millennium Port Concept. Past experience has shown that many diverse elements must be coordinated to construct a successful inland facility, including the incorporation of existing port operations from stevedores to customers, proposed rail or other transportation system components, generation of a vessel to warehouse to customer integrated information system, and identifying potential impacts to city and neighborhood planning and development organizations. We recommend that all of the above components be critically evaluated by the Port Authority and its local and regional planning partners to determine the ultimate viability of an inland storage facility.

***New Waterfront Land Alternatives for Cargo Capacity***

Besides looking inland, the Port Authority may want to consider looking out into the harbor. Specifically, to develop new land masses in the Cleveland harbor area to support maritime operations. This would require the careful selection of an offshore site to ensure the ability to construct the same access to rail and highway transportation services and to not impede current commercial and recreational maritime operations. The most economical solution may be to build

up the land mass from dredged materials, but the timeframe of that construction needs to be considered against when the facility would be needed.

**Summary**

The removal of existing facilities will have a significant impact on Port cargo-handling capabilities, perhaps as soon as 2005. In addition, the regional economic impacts caused by the Port Authority's inability to handle the cargo volumes should be considered. It may be advisable for the Port of Cleveland and it's regional planning and development partners to conduct a more in-depth study of the possible economic impacts if the Port was unable to handle all of the cargo demand.

There are several ways in which the Port of Cleveland, with the assistance of the City of Cleveland, Cuyahoga County and other planning and development agencies, may be able to increase capacity. Since most of these ideas require a long duration to achieve final results, the Port of Cleveland and it's Planning Partners should immediately begin to consider how different alternatives could be developed and implemented. If we act today, the opportunity may be available to achieve a long-term solution that preserves the economic impact of the Port of Cleveland and still allows for the new development and increased public access to the lakefront.