## Case Study
## Port of Pittsburgh Container-on-Barge

The Port of Pittsburgh container-on-barge (COB) inland waterway network embraces the concept of containerized transport of commodities via flat deck barge that traditionally move via road or rail. Currently, commodities transported by barge tend to be low value, bulk goods. However, the use of container barges (flat deck), capable of carrying large numbers of containers and being loaded and unloaded quickly at port, has the potential to change the dynamics of barge transport. Exhibit 6-1 illustrates the inland waterway system with connectivity to the Port of Pittsburgh. Theoretically, all points within this waterway network can be served via COB service provided the origin and destination ports are equipped with container handling and intermodal infrastructure.

**Exhibit 6-1 Inland Waterway System Connecting the Appalachian Region**


Source: Port of Pittsburgh

The containerization of barge traffic allows for the transport of higher value commodities typical of interstate truck traffic. Domestic inland and intercoastal barge freight is no longer limited to

traditional bulk commodities such as coal and scrap iron. Container barges, coupled with efficient intermodal port facilities, will enable the effective transfer of freight from road to water and back. The Port of Pittsburgh, the Port of Albany, New York and a handful of inter-coastal waterway barge operators on the Gulf of Mexico are pioneering this effort in the U.S.

**Progression**

Currently, there are several COB networks or specific routes operating with success. Inland waterways in Europe successfully facilitate containerized barge transport, complete with supporting rail and highway intermodal facilities. However, European COB networks may not be a valid comparison to an Appalachian Region Container-on-Barge network due to the differences in population density and geographic dispersion of industrial centers. Concentrations of population and industry along primary inland waterways are more pronounced in European markets than in the Appalachian Region (and in the rest of the U.S.).

There is currently a single, unsubsidized, operator specializing in the transport of container traffic along the Texas-Louisiana Gulf Coast. Osprey Lines, based in Houston, Texas, utilizes ocean-going barges along the Gulf Coast and traditional barge runs along connected intracoastal waterways. Primary Gulf Coast service is provided between the Ports of Houston and New Orleans. Houston-New Orleans service moves containerized freight that feeds large container ships bound for international destinations.


This Houston-New OrleansHouston round-trip route runs approximately once per week depending upon the volume and ship schedules that drive the traffic. For the year ending December 31, 2002, it is estimated that 50,000 containers have been transported between Houston and New Orleans via barge. Expansion of both routes and schedule are planned, eventually developing into a Gulf of Mexico COB network running from Brownsville, Texas to Mobile, Alabama and points between. Though this service can be considered merely a niche market, it proves the commercial viability of the concept.

The Port of Pittsburgh COB concept for the Appalachian Region's inland waterway relies primarily on existing inland waterway infrastructure. However, an initial investment in port equipment will be necessary to facilitate intermodal transfer of containers. In order to load, unload and position the intermodal containers, each port on the proposed COB system will need to add or upgrade equipment. Container handling equipment such as spreader bars that attach to existing cranes, forklifts and container chassis will be needed. Initial cost estimates for such equipment is 750 thousand to one million dollars per port.

Key destination ports served by Port of Pittsburgh container-on-barge service have been identified as the following:

- Brownsville, TX
- Houston, TX
- New Orleans, LA
- Baton Rouge, LA
- Little Rock, AR
- Tulsa, OK
- Memphis, TN
- St. Louis, MO
- Paducah, KY
- Louisville, KY
- Cincinnati, OH
- Huntington, WV

**Regional Benefits**

A successful Port of Pittsburgh container-on-barge network will offer Appalachia expanded transportation capacity and important new shipping alternatives and efficiencies. Key to the success of the COB program will be the intermodal links between the inland waterway and the region's primary railways and highways, especially ADHS corridors. The following sections present a number of advantages that improved and expanded inland navigation service can bring to the region:

1. Expanded freight capacity and modal options
2. Improved fuel efficiency and operating cost savings
3. Improved Safety
4. Reduced air and environmental impacts

***Expanded Capacity***

The sheer size and capacity of the flat deck container barge is the primary advantage of this mode. Exhibit 6-2 illustrates the capacity of a single barge versus rail and truck equivalents. Note

that a barge movement (depending on size and weight of cargo) can move up to 300 containers in a single run. New intermodal connections with ADHS Corridors, interstate highways, and railways will offer businesses within the Region expanded shipping options, increased capacity, and streamlined transport costs.

**Exhibit 6-2 Cargo Capacity Comparison**

| | | | |
|---|---|---|---|
| **One Barge** | **1 Rail Car** | **100 Car Train Unit** | **Large Semi** |
| **1, 500 Ton** | **100 Ton** | **10, 000 Ton** | **26 Ton** |
| **52, 500 Bu** | **3, 500 Bu** | **350, 000 Bu** | **910 Bu** |
| **453, 600 Gal** | **30,240 Gal** | **3, 024, 000 Gal** | **7, 865 Gal** |

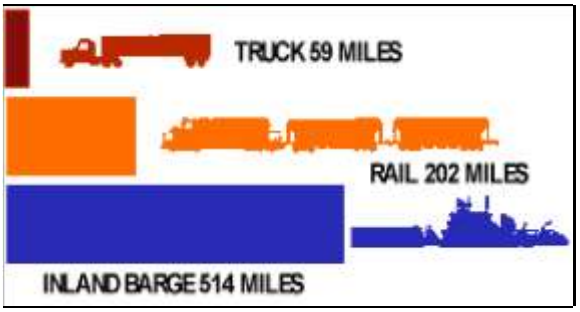
Source: Iowa Department of Transportation, *The Tennessee Tombigbee Waterway Development Authority*

### *Efficiency and Cost*

In terms of fuel usage per ton-mile, barge transport can be the most efficient and cost effective means of moving container traffic. Exhibit 6-3 illustrates the number of miles a ton of freight can be transported per gallon of fuel by truck, rail, and barge.

Additional factors affecting the efficiency of barge transport is the reduced labor requirement of a barge operation. A 300-container barge movement from Pittsburgh, PA to Mobile, AL effectively eliminates the cost of 300 long-haul truck operations.

**Exhibit 6-3 Efficiency Comparison Number of Ton Miles per Gallon of Fuel**




Source: U.S. DOT Maritime Administration, *The Tennessee Tombigbee Waterway Development Authority*

### *Safety*

Safety remains an important consideration when considering the benefits of Appalachian Region barge transport. Again comparing barge transport to truck and rail, Exhibit 6-4 details the number of deaths and injuries per billion ton-miles by mode. Note that deaths and injuries resulting from barge transport are significantly lower than other modes.

**Exhibit 6-4 Safety Comparison Deaths and Injuries per billion ton-miles**

| Mode | Deaths | Injuries |
|---|---|---|
|  | **0.01** | **0.09** |
|  | **1.15** | **21.77** |
|  | **0.84** | **N/A** |

Source: C. Jake Haulk Ph.D. - *Inland Waterways as Vital National Infrastructure: Refuting "Corporate Welfare" Attacks, The Tennessee Tombigbee Waterway Development Authority*

### *Environmental*

As illustrated in Exhibit 6-5, on a per ton-mile basis, barge transport produces the least amount of emissions when compared to rail or truck transport. In an era of growing sensitivity to environmental pollutants, barge transport can offer an environmental alternative to existing transportation modes.

**Exhibit 6-5 Emissions Comparison Pounds of Emissions per Ton-Mile**

| Mode | Hydrocarbons | Carbon Monoxide | Nitrous Oxide |
|---|---|---|---|
|  | **0. 0009** | **0. 0020** | **0. 0053** |
|  | **0. 0046** | **0. 0064** | **0. 0183** |
|  | **0. 0063** | **0. 0190** | **0. 1017** |

Source: C. Jake Haulk Ph.D. - *Inland Waterways as Vital National Infrastructure: Refuting "Corporate Welfare" Attacks, The Tennessee Tombigbee Waterway Development Authority*

**Regional Intermodal Connectivity**

Intermodal connectivity (barge-to-truck, barge-to-rail) for the Port of Pittsburgh is excellent. Pittsburgh is well served by Interstate and ADHS highways, Class I railroads (CSX and Norfolk Southern) and Class II railroads )Bessemer & Lake Erie Railroad Company (Great Lakes Transportation), Buffalo & Pittsburgh Railroad, Inc., Mountain Laurel Railroad Company Pittsburgh (sic) & Shawmut Railroad and Wheeling & Lake Erie Railway Company). Exhibit 6-6 highlights interstate highway access to the Port of Pittsburgh. Note that I-376 becomes US-22, or ADHS Corridor M. Exhibit 6-7 details distance and drive time to ADHS Corridor M and interstate highways from the Port of Pittsburgh. Rail connectivity with the listed railroads is provided directly at the Port of Pittsburgh.

**Exhibit 6-6 Key Port of Pittsburgh Road and Rail Connectors**

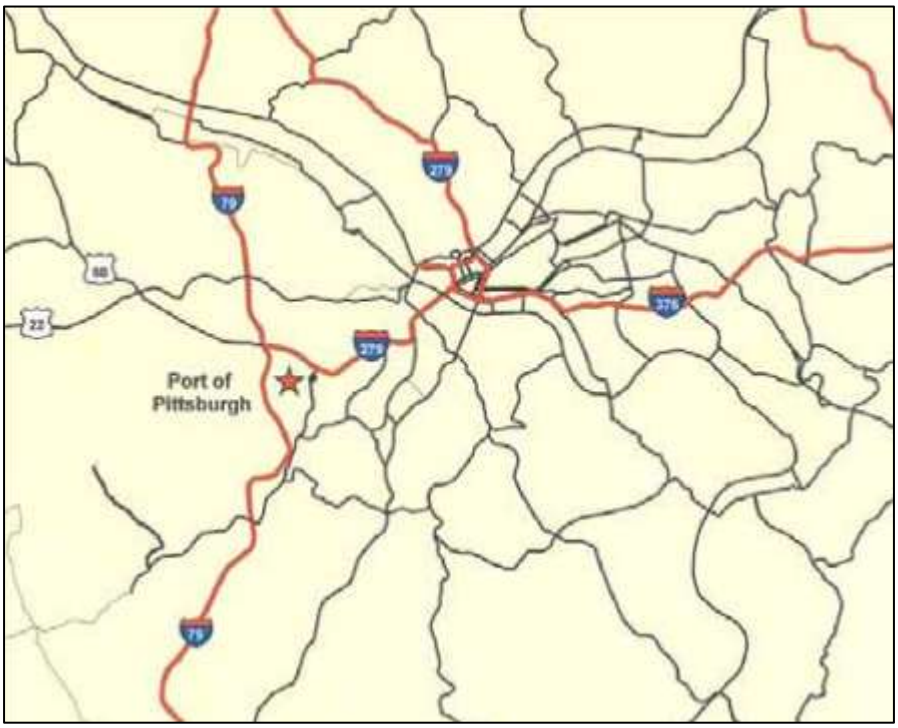



**Exhibit 6-7**
**Port of Pittsburgh**
**ADHS Corridor Proximity**

| ADHS Corridor or Interstate | Distance in Miles to Corridor | Drive time to Corridor |
|---|---|---|
| I-279/I-79 | 1.6 | 3 minutes |

| | | |
|---|---|---|
| Corridor M (US-22) | 5.5 | 9 minutes |
| I-376 | 6.5 | 8 minutes |
| I-70 | 20 | 26 minutes |
| I-76 | 21 | 30 minutes |

Source: WSA

Additional intermodal COB terminals would provide expanded connectivity to the ADHS throughout the Appalachian Region. A potential COB terminal in Huntington, West Virginia area, for example, would provide connection to ADHS Corridor B and Interstate 64, while a Cincinnati, Ohio COB terminal would provide connection to ADHS Corridor D and Interstates 71 and 75.

**Long-Term Direction**

For Port of Pittsburgh COB operations to succeed, COB operations must address the following challenges:

- Door-to-Door Network Development
- Distance and Transit Time
- Port Infrastructure

***Network Development***

Shippers are increasingly demanding door-to-door delivery service versus traditional port-to-port service. This demand is even more acute when dealing with containerized, intermodal freight. Traditional barge operators are currently not equipped to offer door-to-door service. To effectively market and appeal to shipper needs, inland waterway operators must expand service offerings into intermodal drayage operations, offering single-source door-to-door service.

In addition, time-definite service must be available and reliable. While delays may be acceptable in bulk freight transport, higher value containerized freight must be delivered on schedule. Insuring scheduled barge service may involve expanding locks and choke points along the inland waterway system to decrease delay. A second strategy is to restrict the size of container barge runs to two to three barges per run. This could allow them to sometimes bypass congestion at larger lock chambers (required for longer barge runs), by utilizing smaller, less congested secondary lock chambers.

***Distance and Transit Time***

Longer distances between origin and destination points make barge traffic more efficient in terms of both cost and time. Shorter runs proportionally require more staging, load and unload time in relation to actual transit time. If the time a barge spends in port, relative to the time it is in transit can be reduced, the barge operation becomes more efficient in terms of distance covered in a given time period. This efficiency will also translate into cost savings. Since port operations are a fixed cost, a longer run between ports allows the cost to be disbursed over a greater distance, creating a lower per mile cost. The Port of Pittsburgh recognizes the need for longer-distance port-pairs.

***Port Infrastructure***

In order to handle barge container traffic, many traditional barge ports/docks along Appalachian Region inland waterways may need infrastructure improvements, expansion, or both. Traditional barge facilities are designed to primarily handle bulk commodities (i.e., coal, petroleum, scrap iron). To accommodate container traffic and associated barge-to-truck, barge –to-rail, and bargeto-barge transfers, the following improvements must be considered (as briefly addressed in the *Progression* section):

- On and off-load equipment (cranes, forklifts, Ro-Ro capability)
- Container storage and staging areas (land requirements)
- Improved truck and rail access
- Truck queue/waiting areas (land requirements)
- Dredging of key inland waterway segments

Many of these issues, such as dredging and land issues, are currently addressed in the course of facilitating the region's existing inland waterway bulk freight traffic. Still, a variety of lift and storage equipment will need to be made available at port facilities that are accessible by barge rail, and truck for efficient COB operations. Improved flexibility to change equipment modes is important. Either stationary dockside cranes or mobile cranes can be used to load and unload containers. Alternatively, the Ro-Ro system (Roll-On, Roll-Off) uses trailers or containers on chassis. The choice of equipment and its location depends on a full understanding of local conditions, economics, and operation/freight type.

**Question**

**What are the two priorities to develop to be successful here**