Analysis of Port of Cleveland Container Market

Prepared for:
Cleveland-Cuyahoga County Port Authority

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Table of Contents

I. Introduction, Overview and Approach

Martin Associates was retained by the Cleveland-Cuyahoga County Port Authority to investigate the market potential of developing a container terminal at the Port of Cleveland. This analysis focuses on the trends in containerized shipping and the factors that will contribute to future container growth at Atlantic Coast ports, the potential to develop a feeder service to serve the local Cleveland market via the Port of Cleveland.

This analysis assesses the historical and current trends in the US and East Coast container trades. Historically, containerized traffic has not been handled on the Great Lakes primarily due to the limited draft and seasonal shipping service on the St. Lawrence Seaway. A potential feeder service into the Port of Cleveland is evaluated in terms of cost (ocean, terminal, truck and rail) and transit time in comparison with competing coastal ports. An assessment of other key factors, such as frequency of service is also addressed. Finally, an identification of the likelihood of success is determined

This market assessment is based on interviews as well as published data. Interviews were conducted with (but not limited to) key shipping lines calling Atlantic Coast ports, terminal operators, rail service providers, trucking/drayage companies. In addition to the interview process, data was also collected from Martin Associates' in-house data bases, American Association of Port Authorities (AAPA), US Army Corps of Engineers Waterborne Commerce Statistics Center, individual port statistics/port websites, published ocean carrier transit times and US Maritime Administration.

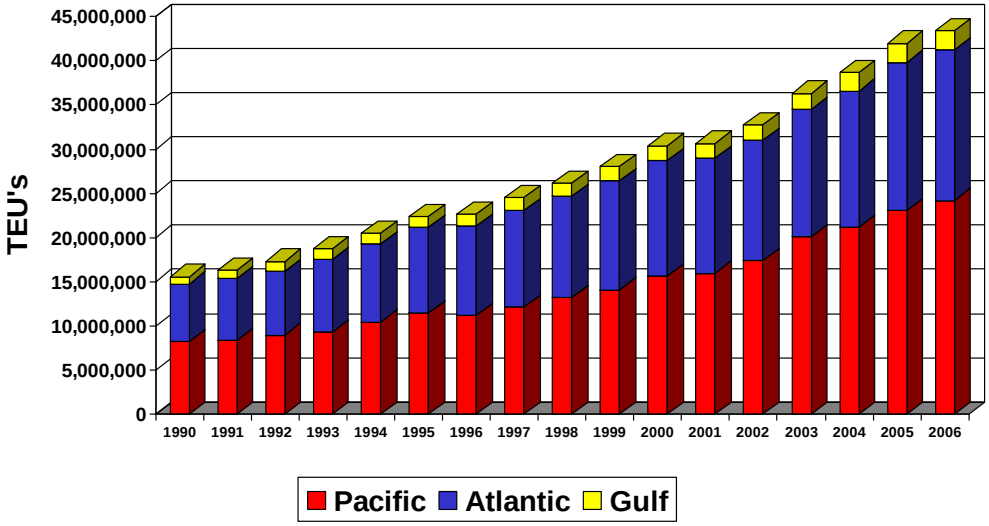
II. Overview of Containerized Cargo Activity

Due to the recent trends and shifts in the import container trade, and the accompanying growth in port development, specifically on the Atlantic Coast, an analysis of the US and Atlantic Coast container markets are presented.

1. The United States and Atlantic Coast Container Markets

Since 1990, containerized cargo handled at the US ports increased from 15.6 million TEU's to nearly 43.4 million TEU's in 2006. This accounts for an average annual growth rate of 6.6% annually over the period. Exhibit 1 shows the growth in containerized cargo at the key port ranges in the United States—the Pacific Coast Port Range, the Atlantic Coast Port Range and the Gulf Coast Port Range. The Pacific Coast Ports have shown slightly higher growth over the 16 year period, with a 7.0% growth.

Exhibit 1 - Total Containerized Cargo Activity by Port Range (TEU's)

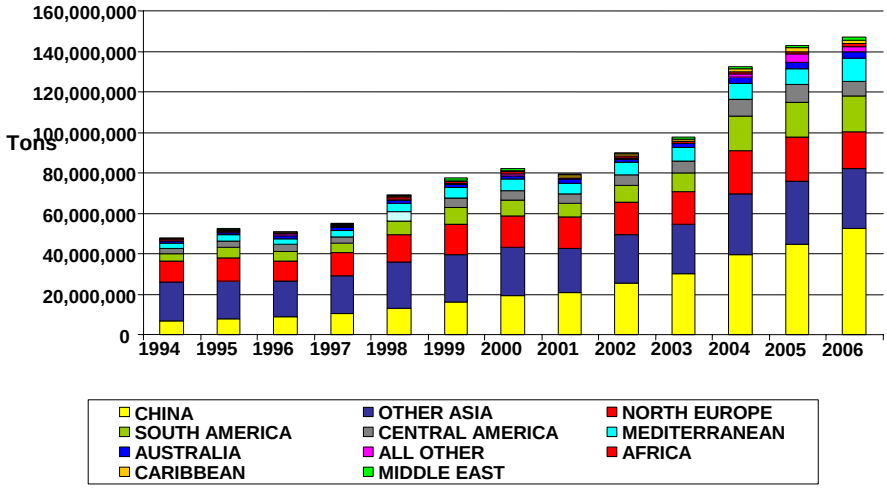


Source: American Association of Port Authorities

The growth in container trade has been driven by imported cargo, which has shown a 9.8% annual growth rate since 1994, and since 2003, the growth rate of containerized imported tonnage has averaged 14.7% annually. Imported containerized cargo tonnage is shown in Exhibit 2, which also presents the growth in container tonnage into the US by World Trade Area[1]. As this Exhibit also shows, the growth in imported containers has been driven by the growth in trade with China.

[1] It is to be emphasized that the containerized activity by trade lane is expressed in terms of tonnage rather than container moves or TEU's, since the international trade data only focuses on containerized tonnage and does not include empty container moves.

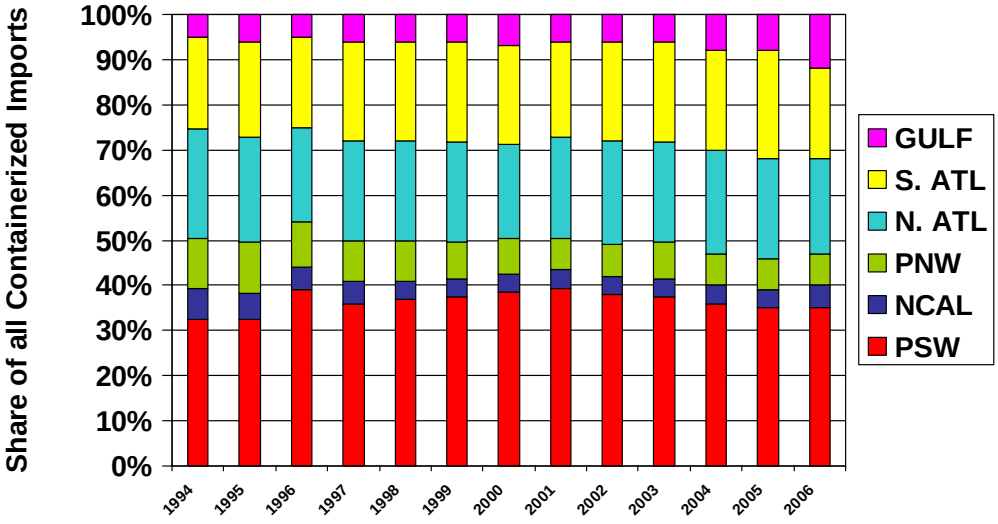
Exhibit 2 - Imported Containerized Cargo Tonnage by Overseas Trading Area



Source: US Maritime Administration, Foreign Trade Statistics

The West Coast ports have handled about 46% of all imports into the United States, followed by the South Atlantic ports (from Norfolk to Miami) which handled 24% of total containerized imported tonnage. The North Atlantic Ports handled about 22% of total imported containerized tonnage. Exhibit 3 shows the distribution of the imported containerized cargo tonnage by port range.

Exhibit 3 - Imported Containerized Tonnage by Port Range



Source: US Maritime Administration, Foreign Trade Statistics

Within the West Coast Ports, the San Pedro Bay Ports of Los Angeles and Long Beach handle about 35% of the imported Asian containerized cargo. This dominance of the Asian trade by the West Coast Ports, and in particular the Ports of Los Angeles and Long Beach, particularly in the late 1990's through 2002, was driven by the fact that

importers viewed these ports as the major port linkage in the supply chain of imported cargo.

Prior the mid- to late-1990's, the steamship lines determined the port routings and importers were essentially "port blind" as they selected an ocean carrier, and the carrier decided which port the cargo would be discharged and how the cargo would be delivered to the customer. However, as the concentration of large importers such as Wal*Mart, Target, Cost Plus, etc. increased in the late-1990's, these importers invested in large distribution centers in the Los Angeles/Long Beach area to serve as points in the importers' logistic supply chains. As these importers gained bargaining power in terms of contract negotiations with the ocean carriers, they were able to "demand" a San Pedro Bay port routing from the carriers. Hence, with the development of the distribution centers and cross dock operations[2] in the San Pedro Bay region, the concentration of imported Asian containers at the Ports of Los Angeles and Long Beach increased. Furthermore, the railroads providing intermodal services at the San Pedro Ports further increased investment in rail trackage and intermodal yards to facilitate the flow of containers from the Los Angeles area to the key Midwestern and Eastern consumption centers such as Chicago, Memphis, St. Louis, New York, Atlanta, Columbus, etc. This concentration of containerized cargo import activity continued to increase until several events occurred.

These events are the impact of 9/11 on the distribution supply chain, the 2002 West Coast Port shutdown, and major congestion issues that arose in 2004 due to rail meltdowns at the San Pedro Bay ports. As a result of these events, there has been an increased focus on diversification of containerized cargo via various US Ports. This is evident by the growth in container volume at the North Atlantic, South Atlantic and Gulf Coast ports.

The growth of all water service from Asia to the Atlantic Coast and Gulf Coast ports has been increasing significantly since 2002. There are two all water routings that are available for all water services – the Panama Canal and the Suez Canal. Each of the routings provides advantages and disadvantages to the use of the intermodal cargo (railed from the West Coast ports). For example, the current dimensions of the Panama Canal limit the size (width and depth) of the vessels that can transit the Canal, and also the transit time using an all water service to an Atlantic Coast port followed by a rail move to a Midwestern consumption point is longer than using an intermodal move via a West Coast Port. This longer transit time from Asia results in increased inventory carrying costs, and is more pronounced for higher value cargo than for lower value cargo. In addition, ocean carriers prefer to internalize the revenue for the entire trip from Asia to the Atlantic Coast rather than sharing the revenue with a rail carrier from the West Coast to an Atlantic Coast consumption point. However, changes are in play to improve the current negatives of using the Panama Canal. The Canal will be enlarged within the next 10 years, allowing for the transit of much larger container vessels, which in turn tend to have a lower per unit operating cost than smaller container vessels. In addition, the ocean carriers are introducing more direct all-water services that are improving the transit times using all water routings from Asia. Underscoring the focus on all water container services via the Panama Canal is the fact that during the first quarter

[2] Cross-dock or transload operations refer to the activity whereby marine containers are stripped and the contents are loaded into larger 45 and 53 ft. domestic trailers as the Asian cargo tends to cube out rather than weight out. The use of the domestic containers reduces the effective surface transportation cost per ton or unit, as more cargo can be placed into these large trailers without causing the trucks to be in an overweight situation.

of 2007, container vessel transits via the Panama Canal were nearly 13% higher than for the same period in 2006. This is in contrast to the less than 3% annualized growth rate realized by the San Pedro Bay Ports in 2007.

With respect to the Suez Canal, the dimensions of this canal do not limit the size of the container ships that can transit, but there is some concern over political instability in the region. The Suez routing from Asia to the Atlantic Coast is longer than via the Panama Canal, but as production centers shift to South Asia and India, this routing can in some cases provide very competitive transit times to the use of the trans-pacific routings and the use of intermodal moves from the West Coast to the Atlantic Coast. In addition, ocean carriers are increasing India-Europe express services, with the use of Mediterranean ports for transshipment centers for cargo destined further to the US and Europe. The Suez routing is becoming particularly attractive as the production centers are shifting into India and Vietnam. Supporting this growth in production centers in India is the fact that the Indian Government, along with private sector interests, are investing heavily in port infrastructure to accommodate the growth in India. Indian Government investment is estimated at $12.5 billion and private sector investment is estimated at another $8.5 billion. Between April 2006 and June, 2007, containerized cargo moving via the Suez Canal has grown at an annual rate of 18%.

2. Growth in Port-Related Distribution Center Activity

A key driver in the growth of Asian trade at Atlantic Coast ports (using the Panama Canal and the Suez Canal) is the increased focus on the development of distribution centers by major importers. This trend toward distribution centers development has resulted from the desire of the importers to diversify the logistics systems, particularly in light of the 2002 West Coast Port Shutdown, which caused major supply chain disruptions on the key importers and exporters supply chains. Specific examples of near-port Distribution Center development are documented below:

The Georgia Port Authority (Port of Savannah) has attracted 19 distribution centers totaling 15 million SF including:

- Advanced Auto Parts;
- Target (2.1 Million SF);
- IKEA (1.7 Million SF);
- Bass Pro Shops;
- Best Buy;
- Pirelli Tires NA;
- Federal Express;
- Lowes;
- The Home Depot (1.4 million SF);
- Wal*Mart (Savannah & Statesboro = 3.3 million SF); and
- Oneida.

The Virginia Port Authority has also been aggressively pursuing the development of distribution centers. Current distribution centers in the Hampton Roads area and the Front Royal area (which is the location of the Virginia Port Authority's inland port) include:

- Target (1.5 million SF and expanding);
- Wal*Mart Distribution center – 1 million SF initially and expanded to 3 million SF;
- Cost Plus expanded to 1.1 million SF;
- Dollar Tree;
- QVC;
- Home Depot at Front Royal; and
- Family Dollar at Front Royal.

Similar distribution center development is also occurring in Houston, fueling growth in Asian cargo imports at the Port of Houston. These developments include:

- Cedar Crossing area site of 4 million SF distribution center for Wal*Mart;
- Home Depot potential development; and
- 8,000 acres of land available for DC and industrial development.

Other ports including Charleston, Wilmington (NC), Baltimore and New York are also aggressively pursuing distribution center development.

With respect to Florida, such development is also occurring in the Jacksonville area with the recent announcement of Asian carriers such as MOL and Hanjin to begin service in Jaxport.

3. Development and Densification of Container Terminal Capacity

In response to the distribution center development and the growth in all water service is the development of new container terminal capacity on the Atlantic and Gulf Coasts. These developments include:

- Jacksonville - MOL/TRAPAC 150+ acres at Dames Point;
- Savannah - 500 acre potential terminal at Kings Island;
- Charleston - 286 acre, 3 berth development at Charleston Naval Base Complex;
- Jasper County Property - Joint GPA/SCSPA development 1,800+ acres;
- Wilmington, NC – 600-acre South Port Complex;
- Norfolk - 291-acre APM Terminal at Portsmouth; Craney Island – 600 acres;
- Baltimore – 400 acres long-term development of Sparrows Point;
- Philadelphia – 125+ acre Southport development;
- Wilmington, DE 200 acre terminal potential;
- New York - Express rail projects; $1 billion investment program in terminals, channel deepening and transportation infrastructure;
- Melford Nova Scotia - potential development up to 1.5 million TEU facility;
- Mobile - Choctaw Point; and
- Houston – Bayport development.

In addition to these noted terminal development plans, the ports on the Atlantic Coast operate at approximately 3,200 TEU's per acre – well below the current level of 5,500 TEU's per acre at the container terminals in the Ports of Los Angeles and Long Beach. Furthermore, the development of new terminals will aim for densification well above that benchmark. For example, the APM facility at Portsmouth, VA has been designed with the potential to attain 13,000-15,000 TEU's per acre.

Exhibit 4 depicts the Atlantic Coast current densifications by Port, while Exhibit 5 presents the significant capacity enhancements planned for the Atlantic Coast. The column labeled "*Current Capacity with Densification"* assumes 5,500 TEU's per acre are achieved and *"Current Densified + Planned Potential"* column represents the near, medium and long term development plans.

Exhibit 4 - Current Densification of Atlantic Coast Ports

PORT	2006 TEU'S	ACREAGE	TEU/ACRE*
MONTREAL	**1,288,910**	**185**	**6,967**
HALIFAX	**530,722**	**162**	**3,276**
BOSTON	**200,113**	**101**	**1,981**
NEW YORK/NEW JERSEY	**5,320,143**	**1,261**	**4,219**
PHILADELPHIA	**247,211**	**228**	**1,084**
BALTIMORE	**627,951**	**354**	**1,774**
NORFOLK	**2,092,799**	**619**	**3,381**
WILMINGTON, NC	**177,634**	**100**	**1,776**
CHARLESTON	**1,968,474**	**395**	**4,983**
SAVANNAH	**2,160,168**	**1,200**	**1,800**
JACKSONVILLE	**768,239**	**215**	**3,573**
PALM BEACH	**244,002**	**30**	**8,133**
PORT EVERGLADES	**864,030**	**275**	**3,142**
MIAMI	**976,514**	**261**	**3,741**
TOTAL EAST COAST	**17,466,910**	**5,386**	**3,243**
***BASED ON GROSS ACREAGE**			

Source: AAPA, Martin Associates and port interviews

Exhibit 5 - Planned Container Capacity Excluding South Florida (TEU'S)

PORT	2006 TEU HANDLED	CURRENT CAPACITY WITH DENSIFICATION	CURRENT DENSIFIED + PLANNED/POTENTIAL
MONTREAL	1,288,910	1,500,000	1,500,000
HALIFAX	530,722	1,200,000	2,000,000
NOVA SCOTIA (MELFORD)			1,500,000
MASSPORT	200,113	555,500	720,500
PONYNJ	5,320,143	6,935,500	7,930,500
PHILADELPHIA	247,211	1,254,000	1,941,500
WILMINGTON, DE	262,856	300000	1,362,856
BALTIMORE	627,951	2,282,500	4,482,500
NORFOLK	2,092,799	3,404,500	9,012,500
WILMINGTON, NC	177,634	327,634	2,550,000
CHARLESTON	1,968,474	2,172,500	8,922,500
SAVANNAH	2,160,168	6,600,000	6,600,000
JACKSONVILLE	768,239	1,182,500	2,282,500
TOTAL EAST COAST	**15,645,220**	**27,714,634**	**50,805,356**

Source: AAPA, Martin Associates and port interviews

These previous two exhibits demonstrate that the vast majority of Atlantic Coast ports are able to increase densification by terminal improvements and the near- and long-term planned capacities indicate that Atlantic Coast ports will not likely become capacity constrained in the long-term. Assuming these terminal developments come to

fruition and assuming a robust 6% annual growth rate, the Atlantic Coast ports would not become capacity constrained until 2026.

Accompanying the development of new container capacity is the growth of private sector investments in marine terminal capacity. Historically, port investment in the United States has been from the public sector, mostly by port authorities issuing bonds to fund the developments. However, recently, private entities have become a force in terminal development. For example, AP Moeller has developed its own terminal at Portsmouth, VA and has invested in the Mobile Choctaw Point Terminal. Stevedoring Services of America, (SSA) has invested in a proprietary terminal at the Port of Tacoma, and has recently been purchased by Goldman Sachs. AIG has purchased the Dubai Ports US Holdings for over $1 billion, as well as AMPORTS (a major car import processing operation) and Marine Terminal Corporation. The Ontario Teachers Pension Fund has invested in several container terminals in New York, as well as in Vancouver, BC. Deutsch Bank has purchased Maher Terminals, which in turn has developed a terminal at Prince Rupert, BC. Other key investors in port infrastructure include Morgan Stanley, Macquarie Bank, Babcock & Brown and Goldman Sachs.

III. Port of Cleveland Feeder Service Assessment

This section details a potential feeder operation through the Port of Cleveland to serve the local Cleveland market in terms of routing, cost and transit time in comparison to other competing coastal ports.

1. Overview and Description of Potential Feeder Service

The potential to serve the local Cleveland consumption market via the Port of Cleveland would rely on the development of a feeder service from a coastal port. The draft and size limitations of the St. Lawrence Seaway are not conducive to direct calls by larger vessels that are typically in service, specifically from Asian and European routings. Therefore, a prototype feeder service has been developed to identify the potential to compete against current coastal routings from key world origins.

The prototype feeder service analyzed in this report (Halifax-Cleveland Feeder) is based on the following assumptions:

- The Port of Halifax would be the coastal port of entry;
- Containers bound for the Cleveland market would be discharged in Halifax and reloaded onto a vessel destined for the Port of Cleveland via the St. Lawrence Seaway;
- The feeder vessel used in the prototype cost analysis would operate at a capacity of 150 containers each way;
- Round trip transit time for the feeder vessel would be estimated at nearly 14 days; and
- Containers would then be discharged at the Port of Cleveland for final distribution in the Cleveland hinterland.

However, in order to be successful, the potential feeder operation must be able to compete on both a transit time and total delivered cost per container in comparison to competing ports serving the local Cleveland market.

2. Halifax-Cleveland Feeder Transit Time Analysis

Currently the Cleveland and Midwest container markets are served by various ports of entry including the San Pedro Bay ports of Los Angeles and Long Beach, Pacific Northwest ports of Seattle and Tacoma and Atlantic coast ports of Montreal, New York and Norfolk. Therefore, a Port of Cleveland feeder transit time must be competitive with all these key port ranges.

The transit time analysis prepared in this section focuses on developing total logistics transit time from key world origins to the local Cleveland hinterland. The total logistic transit time includes the ocean voyage from overseas port of origin the inland component – either truck or intermodal rail to a Cleveland destination. The transit times by world area were based on actual vessel sailing schedules by key ocean carriers serving these areas. The world origins used in this analysis were selected by key port areas that are key sources of containerized imports into the United States. Hong Kong represents the China market while Singapore represents the Asian transshipment

market; Madras (India) offers a representation of the South Asia and India Sub Continent (ISC) market; Dubai (United Arab Emirates) is a key port in the Middle East transshipment market; Marseille (France) represents the European Market while Antwerp (Netherlands) is a representative port form the Northern European market.

For consistency, Martin Associates calculated the Halifax-Cleveland Feeder transit times based on the sources of actual vessel sailing schedules to Halifax as those used in the coastal port analysis. In addition, the discharge of the container and reload to the feeder vessel at the Port of Halifax has been estimated at 1.5 days and the Seaway voyage to the Port of Cleveland has been estimated at 5.25 days.

Exhibit 6 illustrates the total transit time in days from key world origin to the local Cleveland hinterland. The least transit time is highlighted in yellow.

Exhibit 6 – Transit Time Comparison Halifax-Cleveland Feeder
Versus Coastal Ports (Days)

FROM SINGAPORE TO CLEVELAND VIA	Total Transit Time
Pacific Northwest*	30/31
Halifax Direct Feeder	26.75

FROM DUBAI TO CLEVELAND VIA	Total Transit Time
New York	35/41
Halifax Direct Feeder	60.75

FROM HONG KONG TO CLEVELAND VIA	Total Transit Time
San Pedro Bay*	19
Pacific Northwest*	23
Norfolk*	31
Halifax Direct Feeder	38.75

FROM MARSEILLE TO CLEVELAND VIA	Total Transit Time
New York	31
Halifax Direct Feeder	48.75

FROM MADRAS TO CLEVELAND VIA	Total Transit Time
San Pedro Bay	33
Pacific Northwest	43/50
New York	30/31
Halifax Direct Feeder*	30.75

FROM ANTWERP TO CLEVELAND VIA	Total Transit Time
New York*	18
Norfolk*	19
Halifax Direct Feeder*	16.75

* Indicates a direct call from the port of origin to North American port of entry

Based on this methodology, it appears that a Halifax-Cleveland Feeder service can be competitive on the Singapore, Madras and Antwerp trade lanes. The Honk Kong routing, however, is controlled by the San Pedro Bay ports, while Dubai and Marseille are more efficiently served via the Port of New York/New Jersey.

It is important to note that as more express services through the Panama and Suez Canals are put into service, it is likely that all coastal port ranges will become more competitive from a transit time perspective. Similarly, transit times to Halifax are also likely to become more competitive.

3. Halifax-Cleveland Feeder Relative Cost Analysis

Similar to the transit time analysis previously discussed, Martin Associates developed a relative cost analysis based on the same world origins and coastal ports of entry. This analysis figures into account all costs incurred in the total delivered cost of the container including relative voyage (ocean) cost, port and terminal charges for the discharge and handing of the container and the inland transportation cost which includes truck or intermodal rail to the local Cleveland destination.

The following methodology was used to develop the relative cost analysis presented in this section:

- Voyage costs are based on the Martin Associates voyage costing model - which assesses the relative voyage costs based on ocean distance, not actual contract rates between carrier and customer;
- Port and terminal charges which include wharfage, dockage, tug assist, pilotage, stevedoring and handling are based on interviews with terminal operators and stevedores;
- Inland transportation costs which include truck and rail rates from the port of discharge to the final destination are based actual rates provided through interviews with intermodal departments of ocean carriers as well as an in-house database of trucking rates;
- That Halifax-Cleveland Feeder loading and discharge rates are estimated at $150USD at each port; and
- The feeder vessel voyage cost is estimated using the same Martin Associates voyage costing model for a Seaway-sized vessel.

Based on this methodology, the relative total delivered cost per box for world trade lanes are depicted in Exhibit 7. Least cost routing is highlighted in yellow.

Exhibit 7 – Comparison of Halifax-Cleveland Feeder Versus
Coastal Port Total Delivered Relative Cost

FROM HONG KONG TO CLEVELAND	Total Cost	Differential to Least Cost
Halifax/Direct Feeder Service	$4,087	$439
San Pedro Bay - Rail	$3,821	$173
Pacific Northwest - Rail	$3,648	$0
New York -Truck	$3,962	$314
New York - Rail	$3,816	$168
Philadelphia - Truck	$3,820	$172
Norfolk - Rail	$3,803	$155

FROM INDIA TO CLEVELAND	Total Cost	Differential to Least Cost
Halifax/Direct Feeder Service	$3,173	$79
New York Suez - Truck	$3,240	$145
New York Suez - Rail	$3,094	$0
Philadelphia Suez - Truck	$3,140	$45
Norfolk Suez - Rail	$3,167	$73

FROM SINGAPORE TO CLEVELAND	Total Cost	Differential to Least Cost
Halifax/Direct Feeder Service	$3,658	$79
New York Suez - Truck	$3,725	$145
New York Suez - Rail	$3,579	$0
Philadelphia Suez - Truck	$3,625	$45
Norfolk Suez - Rail	$3,653	$74

FROM MEDITERRANEAN TO CLEVELAND	Total Cost	Differential to Least Cost
Halifax/Direct Feeder Service	$1,957	$79
New York -Truck	$2,023	$145
New York - Rail	$1,878	$0
Philadelphia - Truck	$1,922	$44
Norfolk - Rail	$1,951	$73

FROM NORTH EUROPE TO CLEVELAND	Total Cost	Differential to Least Cost
Halifax Direct Feeder Service	$1,738	$47
New York -Truck	$1,836	$145
New York - Rail	$1,691	$0
Philadelphia - Truck	$1,737	$46
Norfolk - Rail	$1,766	$75

Hong Kong cargo destined for Cleveland is more cost effectively served via intermodal connections through Pacific Northwest ports, while the Port of New York/New Jersey holds a cost advantage on all other routings. Again it is to be emphasized that these costs reflect rate relationships based on the vessel cost model, not actual contract rates which will vary on a case by case basis.

A potential advantage for the Halifax-Cleveland Feeder is the elimination of the Harbor Maintenance Tax (HMT). The HMT is collected on US imports at a rate of 0.125% of the value of the cargo. US Census data estimates the value per ton of containerized imports at $3,157/short ton. Based on 22.5 tons per container, this equates to a value of $71,032 per loaded container. The HMT that would be collected equates to $89/container. If the proposed bill in Congress eliminates the HMT for cargo originating in Canada, the feeder service could realize an $89 per container advantage which would make this feeder service more competitive with coastal port costs.

4. Challenges to the Halifax-Cleveland Feeder Service

Given the analyses in the previous two sections of this report, a Halifax-Cleveland Feeder service appears to be competitive from a transit time perspective on the Northern European, Singapore and Indian trade lanes, and while the Halifax-Cleveland Feeder does not hold a distinct relative cost advantage over the Port of New York/New Jersey, the feeder operation appears competitive with other port ranges on all trade routes with the exception of a Hong Kong routing.

However there are challenges that will need to be addressed in order for a successful implementation of such a feeder service.

- Seasonal shipping season through the St. Lawrence Seaway and Welland Canal. This seasonality of the shipping season due to the closure of the locks in winter has historically not been a natural fit from the shippers' perspective. The majority of the contracts between the carriers and the shippers are based on annual or multi-year contracts. It may be costly for a shipper to find space on a vessel loaded at a coastal port for two months out of the year. Shippers will need to contract with carriers that are calling Halifax as well as a coastal port to ensure that a 12-month uninterrupted service would be achieved. Furthermore, it may difficult for a carrier to serve this market, knowing that the vessel will essentially sit idle for a two-month time period, and therefore economies scale granted by a full shipping season and full utilization of capital assets are not realized, resulting in increased operating costs.

- Limited volume of the local Cleveland consumption market. This market is relatively small in terms of a local Cleveland market where the feeder service would have the most potential for success. It is estimated that a 7% market penetration of current US port traffic and Canadian rail traffic from Montreal and Halifax would be necessary to support a bi-weekly feeder service. However these figures increase to 14% in order to support a weekly feeder service. In order to attract a weekly service, two vessels will need to be put into service which would double operating costs and therefore affect the cost passed on to the shipper using the service. Furthermore, attempting to divert Canadian rail traffic that is currently discharged at a Canadian port and railed to the United States for distribution and consumption may be difficult as the CN Rail may compete aggressively to retain this market share into the Midwest.

- Uncertain factors of US and Canadian coastal port capacity enhancements. Previous sections of this report identify the planned capacity and terminal enhancements that are either underway or potentially due to come on line in the medium and long-term. Although Halifax has ample capacity, the port has not grown at the pace of its key competitors in the North Atlantic. Furthermore, other key developments such as Melford in Nova Scotia will compete directly with Halifax for market share, and may hamper the port of Halifax' future growth. However, these terminal developments may also provide feeder service opportunities.

IV. Summary

Southern California ports have historically dominated Asian import traffic; however shifts in logistics pattern are occurring. US Atlantic Coast and Canadian ports will benefit from increased all-water routings through the Suez and Panama Canals as shifts in manufacturing in Asia move toward Viet Nam and India.

In order to accommodate this growth, significant capacity expansion projects are underway or under consideration. US Atlantic Coast Ports and private terminal operators are developing numerous sites as well as densifying current terminal configurations to handle more throughput on the same foot print of land. Based on these capital developments and densification efforts, the Atlantic Coast ports have ample capacity to sustain a 6% CAGR through 2026 @ 5,500TEU/acre and North Atlantic ports can sustain 6% growth through 2023 @ 5,500 TEU/acre.

With respect to serving the local Cleveland market via the Port of Cleveland, it is necessary to rely on the development of a feeder operation. Cost, transit time and frequency of service of a feeder service are among key issues, and a potential service must be competitive to other coastal gateways in all these areas.

The transit time analysis suggests that a Halifax-Cleveland Feeder service, in which the Port of Halifax is the coastal port of discharge with a transshipment to a Seaway sized vessel for final discharge at the Port of Cleveland, can potentially compete on Northern Europe, Singapore and India trade lanes. New York is currently most time efficient routing from Middle East and Mediterranean markets, while the West Coast ports offer the most effective transit time from China, the key trade lane for imported consumer goods. Assuming more express services via the Panama and Suez Canals are put into place transit times for all port ranges will become more competitive. Also, assuming significant volume increases through Halifax, direct calls from all world areas would become more competitive with Port of New York/New Jersey or Norfolk transit times. The current Heartland Corridor Project, which is designed to enable double-stack rail service between Port of Portsmouth, VA and Columbus, OH through the modification of 28 tunnels and modification of other overhead restrictions, resulting in 2-day service to Chicago, will benefit Norfolk/Portsmouth transit times into Columbus.

The ocean voyage component of cost analysis presented in this report has been developed by vessel cost model resulting in a relative cost analysis – not actual contract rates between carriers and shippers, provides order-of-magnitude cost relationships between the total delivered cost of a container at a coastal port versus a Halifax-Cleveland Feeder service. Port charges and inland transportation costs were also developed to identify a total delivered relative cost relationship. Based on this model, the Pacific Northwest can effectively serve the Hong Kong (China) to Cleveland market, while the Port of New York/New Jersey serving the local Cleveland hinterland via intermodal rail appears to have cost advantages in all other world areas. However, rate relationships through Norfolk, Philadelphia and Halifax-Cleveland feeder service are also competitive. The proposed Harbor Maintenance Tax (HMT) exemption for Canadian port cargo would provide a Halifax-Cleveland Feeder with additional $89 per container advantage over US coastal ports, further increasing cost competitiveness of the Halifax-Cleveland Feeder service.

While these analyses maintain that there may be a potential from a transit time and relative cost perspective, challenges of a successful implementation of a Halifax-Cleveland feeder service need to be addressed.

The seasonality of the shipping season the St. Lawrence Seaway and Welland Canal due to the closure of the locks in winter has historically been viewed as a huge disadvantage from carriers and shippers' perspective. Since, the majority of the contracts between the carriers and the shippers are based on annual or multi-year contracts. It may be costly for a shipper to find space on a vessel loaded at a coastal port for two months out of the year. Shippers will need to contract with carriers that are calling Halifax as well as a coastal port to ensure that a 12-month uninterrupted service would be achieved. Also, it would prove difficult to for a carrier to serve this market with the knowledge that the vessel will be displaced from service for two months. Finding supplemental business to utilize the vessel for the balance of the year during the closure would be unlikely.

The Cleveland market is relatively small in terms of a local Cleveland market where the feeder service would have the most potential for success. In order to develop a weekly service, a carrier must dedicate two vessels to meet the transit time and therefore essentially doubling the operating cost of the feeder service.

Furthermore, attempting to divert Canadian rail traffic from the Canadian National Railroad that is currently discharged at a Canadian port and railed to the United States for distribution and consumption may be difficult as the CN would most likely compete aggressively to retain this market share into the Midwest.

The planned capacity and terminal enhancements that are either underway or potentially due to come on line in the medium and long-term may also affect the potential of a feeder service into the Port of Cleveland. While the Port of Halifax currently has ample capacity, the port has not grown at the pace of its key competitors in the North Atlantic, and competition from other potential developments, such as Melford in Nova Scotia, will compete directly with Halifax for this market and may hamper the port of Halifax' future growth, but may also provide potential feeder opportunities.

Based on this analysis and current findings, diversion to a feeder service serving the Port of Cleveland at this time appears to have some merit in terms of transit time and relative cost. However, the development of this type of feeder service will be a challenge as there are many key issues that need to be addressed in order for successful implementation.