Abstract

Global trade is increasingly a significant part of the United States’ economic well-being. It is estimated that international trade will more than double over the next two decades. The success of international trade transactions for the nation is directly dependent on having an efficient and effective international gateways and an internal intermodal transportation system for freight movement. As population grows, congestion in the transportation system is also becoming problematic.

The Northeast region of the U.S. represents more than 100 million citizens and approximately 40 percent of the nation’s disposable income. This is a region with a high demand for consumer goods and industry materials. Continued expansion of economic prosperity and community and environmental well-being will be dependent on having adequate transportation capacity and efficiencies.

Port authorities are working with other transportation agencies and industry representatives to create the needed added transportation system capacity and provide transportation efficiencies to meet the regional and national demand for handling the growing volumes of international and domestic cargo. Two promising avenues for enhancing goods mobility are the development and application of Intelligent Transportation System technologies and greater utilization of Short Sea Shipping, particularly along the Northeast corridor. These approaches will require new levels of national and regional coordination among public agencies and private entities. Without improvement in cooperation, communication and commitment among the stakeholders, there is a serious risk of increasing congestion and transportation system inefficiencies that will hurt both the Northeast’s economic prosperity, its environment and ultimately the region’s quality of life.

Introduction

Trade has been the principal underpinning for economic growth and development for centuries. In this century, no nation is fully self-sufficient; to some degree, each must depend on international trade. More than 90 percent of international trade is carried by sea (IMO, 2005). International trade has become critical not only for the economic development of global regions but also for a wide range of other factors such as national security, technological sophistication, standard of living, and quality of life that includes community and environmental conditions. The influences of trade are so apparent to political leaders, and particularly to the last several United States federal administrations, that there have been widespread and aggressive efforts to push further expansion of trade agreements between nations.
The United States is the world’s largest economy. In 2005, it accounted for 28 percent of world Gross Domestic Product or GDP (USDOT, 2007). Transportation is the third largest sector of the U.S. economy, behind housing and health care (US Dept of Commerce, 2004). In 2003, transportation-related goods and services contributed approximately 10.5 percent ($1.2 trillion) of the U.S. GDP ($11 trillion) (USDOT, 2005).

The expansion of international transportation services and significance of international trade has precipitously risen over the last several decades. In 1960, international trade only accounted for 9 percent of U.S. GDP. The percentage has grown to 25 percent today and is predicted to reach as much as one-third by 2020 (AAPA, 2007) and 60 percent by 2030 (AASHTO, 2007). Each year since the early 1990s, there has been an increasing portion of our manufactured products coming from overseas, particularly from Far East Asia. The value of U.S. international merchandise trade in 2003 was approximately $2 trillion with a modal split of 41 percent for water, 26.5 percent for air, 20.5 percent for truck, 5 percent for rail, and the remainder divided between pipeline and other miscellaneous conveyances (USDOT, 2005).

**Gateways and Corridors**

The foundation of today’s global trade activities is transportation connectivity, or the ability to link worldwide suppliers with local markets and individual consumers, and the emergence of the standard international cargo container. The increasing number of trade agreements (demanding expanded transportation connectivity) and the growth of outsourcing of manufacturing jobs (increasing the volume of foreign produced merchandise) have driven the need for expansion of transportation capacity. International connectivity for goods movement may be pictured as a global pipeline. The size of the smallest pipe cross-section determines the system’s capacity as it acts as volume constraint for cargo flow. Structurally this pipeline is comprised of the world’s oceans, international gateways (i.e., ports and borders crossing), and internal corridors (including road, rail and inland waterway routes). The transport media is the second ingredient in this global plumbing system. The international container was developed in the 1950s. In the U.S., it started with Malcolm McLean, a trucking entrepreneur, putting 58 containers aboard a refitted tanker ship, the "Ideal-X," and sailing them from Newark to Houston (Broeze, 2002).

It transformed goods movement from a piecemeal activity to a consolidated process that enable tremendous increases in freight flow, as measured by improved transportation productivity (Muller, 1999; Lowe, 2005). Without both international connectivity and the container, today’s global freight transport would be cumbersome, highly inefficient and prohibitively expensive.

The 25 top foreign trade gateways in the U.S. (measured by value) include 11 water ports (both seaports and inland ports), 9 airports, and 5 border crossings (FHWA, 2006). Imports represent about 65 percent of the total movements at these gateways. Coastal water ports (such as Los Angeles/Long Beach and New York/New Jersey) frequently have higher percentages of imports to exports. Measured in tons, the Port of South Louisiana handles the most freight of any water port in the nation. Water ports dominated by domestic trade include St. Louis, MO-IL; Pittsburgh, PA; Huntington, WV-KY-OH, and Valdez, AK. Water ports dominated by foreign trade include Los Angeles, Ca; Freeport, TX; and Beaumont, TX. The top 25 water ports handle about two-thirds of all domestic and foreign goods moved by water (FHWA, 2006). If the
nation’s gateway capacity and internal intermodal connectivity were constrained, it can be 
animated that regional and national economic decline would quickly follow.

Containers are increasingly being used to move all general cargo including merchandise and 
processed materials (Lowe, 2005). Containerized cargo has grown rapidly over the last decade 
and is concentrated at a few large seaports (AAPA, 2006). The Port of Los Angeles handles 
about one-fifth of all U.S. container traffic and with the contribution of Long Beach, these two 
ports share about one-third of all traffic (FHWA, 2006). The Port of New York and New Jersey 
is the third largest container port. Container volumes at these three ports have doubled between 
1995 and 2005 and are expected to continue to grow, doubling again in the coming decade unless 
choked off by congestion.

Unfortunately the U.S. economy is facing a potential significant degradation of its economic 
vitality because of growing congestion and lack of transportation capacity at its gateways and 
along its corridors, particularly with respect to container movements. This lack of capacity is 
painfully apparent at the Southern California ports. Capacity constraints are beginning to be felt 
in the northeast region. The growing influx of international cargo is resulting in increasing 
congestion, particularly in the intermodal movement and distribution of freight to the middle of 
the country from the coastal and border gateways.

Until almost the end of the twentieth century, the logistics pipeline for moving international trade 
was largely uncoordinated. It relied on many modal links that were administered by both public 
and private agents in different jurisdictions. These parties approached intermodality with 
different objectives and economic interests resulting in connectivity inefficiencies (or “friction”) 
within the system. The inefficiency in the system was allowed because there was ample excess 
transport capacity, which absorbed seasonal higher volumes and minimized sporadic delays. 
However with the globalization of manufacturing, there has been a fundamental shift from U.S. 
domestic production of consumer goods to a dependence on global sources resulting in rapid 
growth in the volume of international cargo. Competition among cargo carriers has created new 
alliances and simultaneously economies of scale have favored new mega-transport vehicles and 
vessels. The greater volumes delivered by these larger carriers have diminished the modal 
capacity of the landside systems that must absorb and transfer this loads to discrete inland 
markets. Simultaneously there has been a growth in domestic cargo driven by population 
expansion and losses in redundancy of rail capacity driven by deregulation. Lack of highway 
and rail capacity is creating bottlenecks at key transfer points, and the resulting negative impacts 
are increasingly radiating through the entire distribution system. These negative impacts will not 
just be felt in commercial business terms but also as a constraint on labor availability and new 
job creation.

By volume, more than 99 percent of all international overseas cargo enters the nation through its 
seaport and waterway systems (AAPA, 2007; AASHTO, 2007). On average, each of the fifty 
states relies on one to several of the nation’s 13 to 15 major seaports to handle their imports and 
exports. These cargo flows add up to $5.5 billion worth of goods moving in and out of U.S. 
ports every day (AAPA, 2007). Strategically important imports such as oil and minerals move 
into the country almost exclusively through marine terminals (AASHTO, 2007).
How and where international goods come from the seaports to their first point of rest for integration into the domestic system is becoming crucial to plan and to manage. Retailers are increasingly concerned about the fit between the seaport (and airport gateways) and the efficiency of transportation corridors to their international and regional distribution centers. The corridors and distribution centers must be connected and properly sized to allow efficient, seamless mobility and avoid creating system chokepoints. Unfortunately, chokepoints and congestion plague both passengers and freight on U.S. highways, railways, waterways, and airways as the impacts of this discordant mix of international and domestic movements are increasingly fully felt in a confined system (AASHTO, 2007).

There is a lack of either Federal or regional programs to strategically address these connectivity problems (Pedersen, 2007). Federal policies have promoted global trade but have relied on regional and local investment by states and private businesses to provide the conveyance system for this trade to move and to be distributed. These investments frequently are not coordinated across public agencies or private businesses, reducing connectivity and therefore efficiency and reliability. In fact, the distribution of cargo in the Northeast has become increasingly constricted at chokepoints in the channels, terminals, highways, and railways or at distribution points reducing velocity of cargo movements and increasing logistics costs. The I-95 Corridor Coalition estimates that there are at least 65 major highway bottlenecks at urban Interstate interchanges and over 70 major rail chokepoints along the mid-Atlantic region (Pedersen, 2007). The problem is only mounting. The Coalition’s projections suggest that traffic, especially truck traffic, will almost double and that containerized cargo entering the Northeast will more than double by 2025 significantly increasing regional road and rail congestion.

**Freight Movement**

Historically, freight transportation has been organized around nodes (e.g., ports and depots) and modes (e.g., highway, rail, air and waterway). International freight transportation was organized as a series of individual moves between export nodes, e.g., passed from truck to ship, and the import port to truck or rail at the other shore. The planning, construction, and financing of supporting infrastructure have been separated among public and private entities. Each has focused on their own node and modal stovepipe as part of separate business models. This separation of responsibilities has created transportation inefficiencies along corridors and at modal interfaces as volumes of international cargo have grown. The congestion increases costs, reduces goods movement reliability, and creates negative environmental impacts. Shippers cannot tolerate the added transportation costs in today’s super-competitive marketplace, and the public will not accept growing environmental degradation and health impacts. System integration was crucial, and application of supply chain management tools has transformed the goods movement process (Hensher and Brewer, 2001).

International cargo continues to move from seaports to inland users by barge, truck, rail, and pipeline, but now international shipments are planned and organized as a logistics system where each move is part of a supply chain, and the links are seamless. Having an effective international gateway is no longer simply a matter of having a strong port system; international freight movement is happening within a logistics framework where the port is just one element of the total delivery system (Wakeman, 2001). The competition for business among international
shippers and domestic suppliers is between entire freight logistic systems, not just ports or distribution centers. Imported goods movement is viewed *en total* from initial point of origin to the final destination, which in the U.S. may be a multi-state region.

The same cost pressure is true to a large extent in the domestic trade. Trucking is the essential mobility provider for domestic moves, but seeking greater efficiencies from other modes is increasingly important. Further, intermodalism is increasingly replacing long-distance truck moves for environmental reasons (Lowe, 2005).

It is also from U.S. ports that American made goods are exported overseas after their overland journeys from inland manufacturing plants. In fact, U.S. manufactured exports have increased 82 percent since the end of the last multilateral trade round nearly a decade ago (AAPA, 2007). The port industry, however, does not just embrace the physical handling of cargo and the transport of cargo to and from port terminals; it also requires workers from a myriad of other private enterprises and governmental agencies to ensure the movement of millions of tons of goods through inland corridors and coastal port facilities. These activities generate $18 billion in industry fees and taxes (AAPA, 2007).

**Northeast Region**

*Consumer Demand*

The Northeast (including the northern tier to Chicago), with more than 100 million residents, is the largest consumer market in the United States. This region’s demand is fueled by its residents’ purchasing power, which constitutes approximately 40 percent of the nation’s disposable income. As population grows, so will the volume of goods needed to support them and their businesses. Demand for international goods continues to grow within the Northeast. For example, the 10-county New York Metropolitan region already has the highest volume of freight movement of any metropolitan region in the country but is also seeing its population grow by an estimated 2 million people by 2025. The New York Metropolitan Transportation Council forecasts a 47 percent increase in freight volumes within the region over this time period (Mann, 2005). Consumer demand for international cargo is growing throughout the Northeast.

The primary gateway for these international goods is the nation’s ports including the eight principal North Atlantic ports from Halifax to Norfolk, particularly the Port of New York and New Jersey. The North Atlantic ports along the East Coast are all experiencing significant growth in container traffic since 2000. There has been an approximately 50 percent growth in container export and import movements at these ports from 2000 to 2005. The percent growth for individual ports is displayed at Table 1 (AAPA, 2006).

The Port of New York and New Jersey is the gateway for approximately 50 percent of the total cargo demand for the New York-New Jersey metropolitan region. Of note, the majority of the other half of the goods consumed in the region is transported from the ports in Southern California by mini land-bridge. The point of entry is on the West Coast because a significant portion of this international cargo is coming from the Far East.
Table 1 – Growth in Container Traffic at Northeast Ports
(Percent Growth from 2000 to 2005)

<table>
<thead>
<tr>
<th>Port</th>
<th>Exports</th>
<th>Imports</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York &amp; New Jersey</td>
<td>41</td>
<td>60</td>
<td>54</td>
</tr>
<tr>
<td>Norfolk, VA</td>
<td>31</td>
<td>78</td>
<td>55</td>
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<td>Baltimore, MD</td>
<td>33</td>
<td>58</td>
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</tr>
<tr>
<td>Boston, MA</td>
<td>193</td>
<td>35</td>
<td>77</td>
</tr>
<tr>
<td>Wilmington, DE</td>
<td>40</td>
<td>61</td>
<td>53</td>
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</table>

Prior to 2001, the majority of Asian cargo bound for the Northeast moved primarily through Southern California ports. After the September 11, 2001 tragedy and the port labor unrest in Southern California in the fall of 2002, shippers began to rethink their supply chains. Since then, all water services, using both the Panama Canal and the Suez Canal, have grown significantly. Currently there are 27 all water services destined for the New York region. Shippers are finding these services more reliable, lower cost, and nearly matching the transit times afforded by west coast ports. In 2004, this shift was demonstrated by the emergence of the Far East as the number one source of containers to the Port of New York and New Jersey, accounting for 35 percent of all cargo. Previously, Europe had always been the number one origin of overseas cargo.

• Port of New York and New Jersey

The Port of New York and New Jersey (henceforth the “Port”) is an economic engine. In 2006, the Port moved 31.2 million metric tons of general cargo (i.e., manufactured and processed goods, usually packed in containers), a 10.9 percent increase over 2005 (PANYNJ, 2007). More than 3 million containers went through the Port, a 7.9 percent increase over the previous year. There also was a steady stream of automobile imports and exports. The port handled 852,300 vehicles in 2006, up 18 percent from 2005. Meanwhile, more than 55 million metric tons of oceanborne bulk cargo, such as petroleum products, also passed through the Port, most of it handled at private facilities. Overall, this is $150 billion worth of cargo generating approximately $25 billion of economic activity in the region. This international cargo movement:

- Provided nearly 122,500 direct full-time-equivalent jobs in the region;
- Supported a total of 232,900 full-time-equivalent jobs in the 26-county metropolitan area;
- Generated $12,568 million for port-region workers (33% higher than 2000);
- Contributed state and local tax revenues totaling nearly $2.0 billion in the region; and
- Contributed $3.8 billion to federal tax coffers.

The Port’s container traffic has had an average annual growth of over 7 percent per year for over a decade. It has more than doubled from about 1.3 million total containers in 1996 to 2.8 million in 2005, as shown in Figure 1. At this rate of growth from the new high of 3 million in 2006, the
cargo volumes will double again by 2016. By 2026, the number entering the Port could be approximately 11.6 million containers.

Logistic Pipelines

International freight movement is now part of a global supply chain where logistic providers control the flow. Seaports and their intermodal connectors are part of this logistics system that must provide shippers with low cost, reliability, and cargo velocity to compete effectively. This formula works if there is adequate capacity within the components of the transportation/logistics pipeline to meet the shipping customer’s demands.

A port is just one segment along the pipeline that must move containers swiftly and cost efficiently. It is also a replaceable segment. If a port’s capacity is “narrower” than that of the rest of the pipeline, or if a port impedes the flow of goods in any other way, it can and will be replaced. The pipeline will be rerouted through another seaport that can keep up. The new gateway may be in Canada or to the south, and amid the fierce competition that engulfs the shipping sector, the chances of reconnecting will be slim.

The capacity and scale of this global pipeline is changing with the expansion of global trade. It is being driven by the ever-increasing size of container ships. The ocean carrier industry has been steadily building larger vessels from the 2,500 TEU ships in 1990 to 13,000 TEU mega-ship emerging in 2007 fleet (Barnard, 2007). The savings offered by the economies of scale created by these mega-ships is allowing the carrier industry to drop their costs and to tighten margins. The rest of the delivery system must react and create comparable capacity within the system or face the economic consequences of congestion and diversions. Hence, the entire logistics system for a region (waterways, terminals, intermodal connections and distribution centers) must be expanded and redeveloped. Although the system failure may be regional (as occurred at Southern California ports in Fall 2002), the economic consequences are national in scope.

Infrastructure Investments

The Port Authority of New York and New Jersey (henceforth the “Port Authority”) recognized these changes in the maritime transportation system starting in the mid-1990s. Since then, the Port Authority has been heavily investing in port infrastructure, on both the waterside and on the landside to keep pace with the demands for greater capacity. Over the past five years, the Port Authority has invested $1.1 billion in an unprecedented capital program for port redevelopment. The goal has been to enable the Port of New York and New Jersey to accommodate the steady swell in commerce and the new generation of ships that sail to it.

Dredging

As has been done with many other ports, the Port Authority entered into an agreement with the federal government for dredging of local waterways. The agency agreed to spend in excess of $1.6 billion to deepen and expand the local navigation channels to provide adequate underkeel draft demanded by today’s container ship fleet.
Deepen major shipping channels to 13.7 m (45 feet) in the first phase of an effort to ensure access for the mega-containerships (called Post-Panamax size because they’re too big to fit through the Panama Canal) that have become the industry standard. The Port Authority undertook the job with the U.S. Army Corps of Engineers (USACE) and completed it in 2004 under budget and ahead of schedule. The Port Authority and the USACE have begun construction of new deeper channels to accommodate the new generation of containerships. Deepening of navigation channels to 15.2 m (50 feet) is now underway as is the deepening of terminal berths to lodge the mega-ships. Construction is anticipated to be completed in 2014.

- **Terminals**

Investments (approximately $1 billion) were also made in the redevelopment of the Port Authority’s marine terminals. These investments, which included wharf reconstruction, terminal reconfiguration, paving, and so forth, were coupled with operator activities to increase terminal and rail productivity. The Port’s tenants’ $500 million-plus investment in terminal infrastructure and equipment has improved system performance. Private investments include strengthen of wharves to enable them to deploy bigger, higher-capacity, electrically driven container cranes capable of efficiently working the mega-ships. The operators have also purchased new and more efficient yard equipment to increase productivity, and have constructed new gates structures to reduce delays and increase terminal effectiveness.

- **Rail**

As much as 80 percent of the containerized cargo entering the regional Port complex stays within the New York-New Jersey metropolitan region. However, a significant portion heads inland to Chicago and to Northeastern Canada. Approximately 13 percent of the Port’s cargo moves by rail today, but there are plans and investments being made to increase that proportion to about 25 percent over the next decade.

In the last few years alone, the Port Authority has authorized $600 million for regional rail expansion including the expansion of on-dock rail infrastructure at four of the Port’s terminal facilities to accommodate the unprecedented growth in intermodal rail volumes. International intermodal rail cargo is good business for the Port to handle as it increases the cargo handling capacity of facilities, is environmentally friendly, and meets the needs of port users, i.e., shippers. It also fills a critical role in the national freight distribution chain. However, much of the $530 million investment in on-dock rail is at risk if other funding sources (public or private) are not identified to expand the freight rail system to handle the burgeoning growth in intermodal and other rail cargo. The Port cannot handle the growth expected and reach the capacity potential of the on-dock facilities with the existing freight rail lines beyond the terminals. Trying to do so would be like having a single-lane country road as the primary access to a huge football stadium.

The Port Authority’s Port Inland Distribution Network (PIDN) initiative is a regional approach to encourage the greater use of rail to move boxes within the metropolitan area as well as the Northeast (Ellis, 2005). Federal funding was provided to support the Alameda Corridor in Los Angeles and the Heartland Corridor, which is being built from Norfolk to Columbus and...
Cincinnati. But there are no programmatic mechanisms to fund these types of rail linkages to the hinterland (AASHTO, 2003).

• **Inland Access**

Containerized freight movement is often conceptualized as a “door-to-door” process that moves manufactured goods from the factory to the retail store’s shelf as quickly and efficiently as possible. This movement can be characterized as two transportation segments: an open ocean leg (with the move conducted by steamship), and landside move (using cranes, trucks, trains and possibly barges to the retail “door”). The term “landside or inland” transportation refers to the movement of freight from port facilities to the retail store. From this perspective, the inland move is actually three separate moves or tiers: first from the waterside berth to the terminal gate, next from the gate to the regional warehouse or distribution center, and third from the warehouse to the store. Conceptualizing the freight distribution network in these three tiers offers a representative framework for discussing roles and responsibilities within the landside transportation system. The moves (i.e., Tier I - waterside to port, Tier II - port to first point-of-rest, i.e., whether depot, warehouse or distribution center, and Tier III - to the store) are graphically represented at Figure 2. It displays the Tier I, II and III cargo moves of international freight.

An assessment of carrier costs on the landside was performed and included container handling, transport by truck and rail, local and inland empty repositioning, and equipment maintenance and repair. The assessment culminated in an estimate that these landside cost components made up approximately 55% on the West Coast and 60% on the East Coast of the total cost of delivering ocean borne goods (Pierce, 2006). Twenty to twenty five percent were thought to be concentrated in handling at marine terminals.

In New Jersey, most of the Tier I activities fall within the span-of-control of the Port Authority. The Port Authority has invested approximately $1.5 billion since 2001 in Tier I projects including dredging of navigation channels, redevelopment of terminals, construction of on-dock rail facilities and local road improvements. Currently the Port Authority forecasts an additional $1.7 billion of analysis and infrastructure investments in Tier I and Tier II move capacity and capabilities. Although there Tier II investments incorporated in the Port Authority forecast, for the most part Tier II is the domain of the federal, state and local transportation agencies and their private sector partners.

**Environmental Pressures**

As international cargo volumes continue to grow at ports, the locally impacted communities are increasingly concerned about congestion, water and air pollution, and other environmental impacts that this rapid growth is having on their quality of life. Most recently air quality has become the chief concern, particularly at the San Pedro Bay ports (POLB, 2006). Ports have been forced to develop cold iron capability, terminal operators compelled to meet government mandates for no net increase in air emission levels, (regardless of substantially increased cargo volumes), and ocean carriers required to comply with state regulations on vessel speed and fuel used that are imposed on ships at distances where state jurisdiction is uncertain.
Air quality impact is only one of the categories of environmental issues drawing concern from both the public and transportation agencies. Other major areas of potential environmental impact have been documented for several decades and include:

- Dredging and dredged material disposal;
- Environmental windows for fisheries protection;
- Oil spills and vessel discharges;
- Filling of wetlands;
- Water pollution from yard and industry discharges;
- Invasive species introductions in ballast water;
- Noise and light pollution; and
- Environmental justice issues.

Across the U.S., ports are coming under increasing scrutiny by environmental advocates who claim that their economic benefits are being increasingly offset by their role in degrading the environment and the health of surrounding communities. They allege that ports have slipped through gap resulting from an inadequate regulatory framework (Bailey et al., 2004). Suits filed by environmental interest groups to stop development or limit operations have resulted in certain ports undertaking millions of dollars in environmental enhancements, beyond that required by regulation, to meet court-mandated settlements.

There is increasing pressure from environmental advocacy groups on government regulators to close what they see as the regulatory gap controlling the port industry. The Natural Resources Defense Council (NRDC) alleges: “Marine ports are now among the most poorly regulated sources of pollution in the United States” (Bailey et al., 2004). The NRDC recommends that the Congress, US EPA, US Coast Guard and the States impose regulations governing air emissions from ships, locomotives, on road trucks, non-road cargo handling equipment, baseline levels for storm water effluent, oil spill prevention, ballast water management, and waste discharge (Bailey et al., 2004). Another group, the Bluewater Network, filed suit against EPA for its failure to include large ocean going vessels in its standards for marine diesel engines. EPA subsequently promulgated standards for Category 3 marine diesel engines pursuant to a settlement agreement.

Suits filed by environmental interest groups against federal and state government agencies and port authorities because they have failed to follow the federal or state environmental documentation processes have stopped development projects outright or result in settlements substantially increasing the project’s cost. The NRDC suit against the Port of Los Angeles for failing to conduct a state environmental impact report for the China Shipping Terminal development resulted in a court settlement costing the port $55 million. The Port of Oakland was forced to undertake $9 million in court mandated air mitigation for its Port’s Vision 2000 expansion plan as settlement for a suit brought against it by a local environmental group (Bailey et al., 2004). The current NRDC suit versus the U.S. Army Corps of Engineers over the latter’s failure to follow the federal environmental documentation process when Newark Bay was designated as a study area for the Diamond Shamrock Super Fund site. This suit resulted in a delay of the project and similarly expensive court settlement for the USACE and its local sponsor, the Port Authority of New York and New Jersey.
Addressing environmental issues has moved from a regulatory obligation to a strategic issue for the port and freight transportation industry. In order to continue to expand capacity and to deliver port services to the constantly growing international trade industry, ports are moving to directly address community and environmentalist’s concerns and demands. For example, the Ports of Los Angeles and Long Beach released a plan, the San Pedro Bay Ports Clean Air Action Plan, in June 2006 to address air emissions from their arriving ships, port facilities including terminal equipment, and the truck moves associated with container terminals (POLB, 2006). The plan has a price tag in excess of a billion dollars. However without addressing port related air pollution, these ports are facing stiff public opposition to their expansion desires. The ports, with the participation and cooperation of the staff of the U.S. Environmental Protection Agency, California Air Resources Board and South Coast Air Quality Management District, have developed a cooperative, sweeping, aggressive strategy to significantly reduce the health risks posed by air pollution from port-related sources (POLB, 2006). The ships, trucks, trains and other diesel-powered equipment and harbor craft at the ports are major sources of air pollution in a region that already has some of the worst air quality in the nation. Air pollutants at the ports include nitrogen oxides (NOx), which contributes to smog, and particulate matter (PM), which poses health risks.

The San Pedro Bay Ports Clean Air Action Plan involves hundreds of millions of dollars of investment by the ports, the state, air quality regulatory agencies and the ports industry. It will expedite the introduction of new and innovative methods of reducing emissions prior to that of any federal or state requirements. The measures that will be implemented under the Plan are expected to eliminate more than 50 percent of diesel particulate matter (PM) emissions from port-related sources within the next five years and significantly reduce associated health risks (POLB, 2006). Smog-forming nitrogen oxide (NOx) emissions will be reduced by more than 45 percent, and the plan measures also will result in reductions of other harmful air emissions such as sulfur oxides (SOx). According to the two ports, in five years, under the Plan, diesel PM from all port-related sources would be reduced by a total of 1,200 tons per year, and NOx emissions would be reduced by 12,000 tons per year (POLB, 2006). They are hoping these actions will gain them the regulatory approvals needed to meet their infrastructure expansion requirements forecasted by national cargo growth projections. Without the expansion, congestion in these ports will obviously increase.

Attempting to move from crisis-to-crisis responses, many ports and maritime industries are seeking new management approaches for addressing community and environmental issues. Several management measures to address these issues have been developed including: (1) IMO regulations and guidelines, (2) Port State Regulations, and (3) Environmental Management Systems (EMS) and Port Environmental Management Systems strategies (Palantezias et al., 2006). Being systematic in their approach to environmental issues by integrating these measures into their processes and integrating what have been traditionally-viewed as external needs (and often, as related above, demands) into the Northeast’s transportation infrastructure and business plans, the responsible public and private officials will certainly reduce environmental lawsuits and the resultant project delays and costs.

**Intelligent Technologies**
The ability to increase transportation capacity in the urban areas of the Northeast is almost non-existent. Because of the restricted physical capacity at ports and their intermodal connectors, i.e., road and rail corridors, and the growing environmental pressures, new transportation processes and operational procedures must be considered. Two alternatives that have promise for the dense urban areas of the Northeast are application of intelligent technologies to transportation and greater utilization of coastal shipping services on America’s Marine Highways (MARAD, 2007).

Intelligent Technology System (ITS) is the new technology infrastructure that is achieving major transportation advancements in many urban areas. The introduction of smart technologies, such as E-ZPass or other electronic toll technologies for vehicles have made tremendous improvements for the traveler in terms of trip time and convenience. One of the results of ITS advancements on individual travel is that people expect to know more about their entire trip from pre-planning it, to knowing what is happening as they travel and in searching out alternative routes or modes as necessary. These technologies advancements were initially driven by the private sector investments, fostering the ability of the private sector to provide more transportation services, and thereafter were adopted by government agencies to increase transportation efficiencies. The line between government agencies providing transportation services and the private sector providing them is becoming more blurred.

The application of specific ITS technologies to freight mobility ameliorates the problem of knowing where the goods are within the transportation system. ITS applications include electronic commerce initiatives, global positioning systems, and automated cargo handling technologies. These technologies are making transportation operations more efficient (Sussman, 2005). By creating a link between water, terminal, and landside information systems and processes that facilitate access to critical port information (such as real-time vessel traffic, cargo status, intermodal connections, and highway conditions), freight movement through the nation’s internal intermodal transportation system is becoming more efficient, secure, and cost effective.

Port authorities are considering ITS initiatives to improve marine freight movement. For example, the Port Authority of New York and New Jersey, in the 2002-2004 timeframe, developed and implemented the Freight Information Real-Time System for Transportation (FIRST, www.firstnynj.com) online berth application system (FHWA, 2002). An expansion of the system could provide real-time container status information, vessel arrival and departure information, and real-time port and highway traffic information to all segments of the port community. This ITS application could also provide the technology platform for other initiatives that will improve system transparency, such as:

- Port-wide appointment system and port pass system that would confirm a truck appointment, notify the terminal of the in-bound status, and provide location and ETA, to expedite truck turnaround time within the terminal;
- Port-wide chassis pool that would be managed via a satellite-based tracking and equipment monitoring system, which could improve asset management for both carriers and port operators and maximize on-port land usage;
o Virtual Container Yard (VCY), which is an electronic bulletin board for the off-port exchange of empty containers, would improve asset management and reduce the amount of truck vehicle miles traveled; and

o Trusted Trucker (an operation respond and commercial vehicle inspections tool) would provide police and other first responders with real-time information on commercial vehicles moving to and from the port, including hazardous cargo, driver information, and vehicle information.

There are clearly new opportunities for application of ITS technologies, but there are also challenges with integration of ITS into existing transportation systems. Two issues emerging with respect to ITS applications are institutional compatibility and physical asset life-time compatibility. First, the ITS technologies available to a traveler or freight carrier transcend traditional transportation jurisdictions. This situation requires that the responsible agencies work together to provide seamless travel corridors. Lack of technology standards and communication system compatibility create problems in coordination among these transportation agencies. Whereas a road is a road from one jurisdiction to another and requires no coordination except to meet at the borders, ITS technology allows information on regional or national traffic to be collected, processed, disseminated and used anywhere. To the extent different technologies and communication systems are used, the integration of these data across a region, or the nation, becomes more difficult and more costly.

Regarding the second issue, as the integration of ITS technology with transportation infrastructure projects continues to increase, the old standard for estimating life cycle costs of physical transportation projects will require new thinking on long range planning and budgeting of projects. For example, once a road or bridge is built, maintenance of that facility is not generally required on a daily basis. With technology, however, constant maintenance or monitoring is required. An ITS platform can go down at almost any time. Software/hardware of intelligent technologies require more regular maintenance and are at risk of becoming obsolete long before the infrastructure that they are used to support. This means that different parts of the transportation system will have inconsistent applicability durations and different life-cycle costs.

**Short Sea Ship**

The second promising avenue to enhancing international and domestic freight mobility, particularly along the Northeast corridor, is the utilization of America’s Marine Highways (MARAD, 2007). The East Coast has multiple coastal and inland waterways that can also support freight transportation – waterborne transportation. Along the Northeast Corridor, excess road and rail capacity is being rapidly exhausted by the rising population, which is expected to grow by approximately 25 percent by 2025, and increasing goods volume, estimated to increase by approximately 50 percent. A modal shift by freight to waterways has the potential to mitigate some of the effects of road and rail congestion along the corridor. This modal strategy may effectively increase the available transport capacity for freight is the use of Short Sea Shipping (SSS).

Short Sea Shipping is defined as a barge or ship service (also known as a feeder service) that moves containers between major maritime hubs and smaller ports. The use of short-sea feeder
services is common in Europe to complement existing intermodal terminal operations. The availability of SSS feeder services would reduce highway and rail congestion by providing parallel corridors for international and domestic container moves. In 2003, SSS accounted for 63 percent of the entire volume of goods transported by sea in the European Union (EU-15), totaling over 1.6 billion tons (Xenellis, 2005).

There are over 100 SSS operators within the Northeast region (I-95 Corridor Coalition, 2005). Currently these services do not transport a significant volume of freight moving into or out of the region. They only account for approximately 13 percent of the movements by weight and less than 2 percent of the overall freight shipments by value (I-95 Corridor Coalition, 2005).

Along the East Coast there are several examples of potential short-sea routes including Jacksonville to San Juan, Albany to Boston, or Philadelphia to New York. These routes are defined by current marine operators as shown at Figure 3. To be successful, the routes must be economically competitive and operationally reliable. Even with a good route, it is not always feasible to maintain service. For example, working with the Port of Albany under the PIDN program, the Port Authority of New York and New Jersey launched a container-on-barge service from the NY/NJ port to Albany (Ellis, 2005). Although the service was not sustainable for several reasons, the Port Authority, other ports, and many maritime interests continue to look for innovative ways to use the Marine Highway system and Short Sea Shipping approaches to moving cargo out of port areas and on to inland locations.

Next Steps

To proceed, there needs to be an articulated vision of the future, the contributions to the regional well-being including prosperity and quality of life, and an implementation framework and tools that cut across political, jurisdictional, and industry stovepipes to deliver that vision. Given the difficulty in addressing the freight transportation challenges, it will be critical to gain agreement with other key stakeholders on the application of 24/7 options, modal shifts to sprint rail or coastal barge, truck-only toll roads, and so forth. There are no easy answers to the problems of adequate transportation capacity, new financing for added infrastructure or the community concerns surrounding health and congestion that challenge state agencies, port authorities and international businesses. Nevertheless, the cargo is coming and the current issues faced will only grow if ignored.

The transportation and logistics leadership in the Northeast region recognizes the need for cooperation in the development of transportation solutions in the movement of international cargo from the seaport or airport to the distribution center/warehouse and ultimately to the consumer. Finding the right balance of public and private involvement and investment is critical when working with regional and local government agencies and business interests, particularly when the risk is large and the opportunities great.

The key is an agreed to vision. The way to deliver the regional vision comes from working with others. Whatever the vision that the Northeast adopts, it must be presented to the nation, and the region must seek concurrence among our national transportation partners. The tools to be used include cooperation, communication and collaborations to gain the committed involvement of
federal and other state agencies, international and domestic businesses, and regional stakeholders to achieve the promise of a Northeast transportation vision that offers efficient and effective service, regional prosperity, and environmental responsibility.

**What Could Exist in 2025?**

Projecting into a hopeful view of the future of the Northeast regarding these issues, suppose:

_In 2025, with the guidance of visionary leaders and the commitment of both public and private stakeholders, the Northeast region of the United States could be a key global trading participant. This success would be founded on a broad system of transportation gateways and corridors seamlessly connecting the Northeast to other regions of the nation, North America and the world. Under a National Passenger and Freight Transportation Policy, the region would use both its wealth and intellectual capacity to develop and implement new ITS technologies and SSS application to improving transportation efficiencies and regional prosperity. The use of waterborne freight movements along the East Coast would be fully developed, leaving corridor road and rail capacity available for time sensitivity freight and traveler demands. The key to this success was a Strategic Vision ands Plan developed in the late 2000s. Responsible stakeholders developed the willingness to work together for the region’s and nation’s greater good as well as their individual benefit. The region’s public-private partnerships for infrastructure improvements and integrated operations would not only be beneficial to the local communities and environment where the people and goods movement activities were taking place, but also to other regions of the nation and the world in general. In deed, cooperation, communication, and commitment to address long-term transportation needs beyond 2025 would be manifested in the continued wise planning, construction and financing programs that internalize both community and environmental concerns._

Under these conditions of mutual cooperation, there is a high probability for this bright future. A future filled with the promise of continued public and private benefits provided by achieving system harmony and outstanding performance in the field of transportation and goods movement for the Northeast.

**Conclusions**

Global trade is increasingly a significant part of the United States’ economic well-being. It is estimated that international trade will grow from 25 percent of U.S. Gross Domestic Product today to 60 percent by 2030. The success of international trade transactions for the nation is directly dependent on having an efficient and effective international gateways and an internal intermodal transportation system for freight movement. The Northeast region of the U.S. represents more than 100 million citizens and approximately 40 percent of the nation’s disposable income. This is a region with a high demand for consumer goods and industry materials.

Port authorities are working with other transportation agencies and industry representatives to create the needed added transportation system capacity and provide transportation efficiencies to meet the regional and national demand for handling the growing volumes of international and
domestic cargo. Two promising avenues for enhancing goods mobility are the development and application of Intelligent Transportation System technologies and greater utilization of Short Sea Shipping, particularly along the Northeast corridor. ITS technologies can improve transportation efficiencies by increasing gateway and corridor transparency for management of freight movement. The application of SSS services would reduce highway and rail congestion by providing parallel corridors for international and domestic container moves.

These approaches will require new levels of national and regional coordination among public agencies and private entities. Without improvement in cooperation, communication and commitment among the stakeholders, there is a serious risk of increasing congestion and transportation system inefficiencies that will hurt both the Northeast’s economic prosperity, its environment and ultimately the region’s quality of life.
Bibliography


Figure 1 – Growth in Containerized Cargo Volumes
Figure 2 – International Freight Moves

Tier I Move

Tier II Move

Tier III Move
Figure 3 - American’s Marine Highway Shipping Routes