The Proposed North Carolina International Terminal

A Perspective

September 21, 2010

Prepared for the Governor’s Logistics Task Force
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Make no small plans, for they have no power to stir the soul.
–Niccolo Machiavelli

Summary

The North Carolina State Ports Authority has purchased a 600-acre undeveloped site on a tributary of the Cape Fear River near Southport, and has begun plans to construct a very-large marine container terminal, to be called the North Carolina International Terminal. The terminal would be larger than any on the east coast of the United States except the combined terminals at Port Elizabeth and Port Newark, New Jersey. Planned capacity is 3,000,000 twenty-foot equivalent units (TEU) per year. The project would include dredging a channel sufficient for deep-draft container ships of the size able to pass through the Panama Canal only after larger locks and other improvements are completed sometime after 2014.

By Executive Order Number 32, Governor Perdue has established the Governor’s Logistics Task Force to develop a logistics plan for North Carolina, which would include consideration of ports such as the proposed North Carolina International Terminal. This report provides information on the plans for the proposed terminal and analysis of its business prospects and relationship of costs to benefits. These are some conclusions:

1. The site selected for the proposed North Carolina International Terminal presents substantial challenges. Access is blocked on two sides by a nuclear power plant and its cooling water canal, requiring a circuitous route south, then west, and then north to reach highway connections and rail facilities. The site lies in the shadow of the largest ammunition transhipment facility in the Western Hemisphere, raising certain security concerns.

2. The terminal is intended for vessels that would draw 50 feet and require an additional four feet of underkeel clearance. The tributary of the Cape Fear River on which the site is located is one to four feet deep. A channel must be dredged to a depth of 54 feet four and half miles to the river mouth and then another 17 miles to deep water. The US Army Corps of Engineers estimates the cost of that dredging to be $1.2 billion.

3. The terminal site is 20 miles from the nearest four-lane highway. To accommodate the 4400 daily truck visits anticipated by the State Ports Authority’s consultants, new roads must be constructed to future interstate highway connections approximately 20 miles away, at a cost of $261 million. Those interstate highways are still in the planning stage.

4. Although a railroad spur terminates near the terminal site, that spur is not a common carrier, but a single track operated by the US Army for ammunition movements. It crosses private property, the nuclear plant site, the ammunition facility, and a region of sinkholes before bisected a residential community. If that spur is available, necessary improvements including ten grade separations (bridges) over the 23-mile length to the CSX Transportation trunk line have been estimated to cost approximately $70 million.

5. The North Carolina State Ports Authority has not conducted any review of environmental effects, although it has spend $6 million for preliminary engineering. The only assessment of environmental impacts has come from resource agency comments to a Corps of
Engineers reconnaissance study of channel dredging and an independent study by a university professor. Both indicate serious and wide-ranging negative environmental effects.

6. All six municipalities of southeastern Brunswick County in the vicinity of the proposed terminal have adopted resolutions opposing the project. Statements of opposition have been issued by the US Congressman for the district and four local environmental organizations.

7. Consultants to the North Carolina State Ports Authority have estimated the cost of the terminal and the land-side infrastructure at $1.84 billion. The US Army Corps of Engineers has estimated the cost of the dredging at $1.2 billion, for a total of slightly more than $3 billion. The State of North Carolina would bear 60% of the dredging cost—$720 million.

8. The model for the North Carolina International Terminal, the AP Moller terminal in Portsmouth, Virginia, was built at a cost of less than $500 million, including infrastructure and channel dredging, but to date has attracted container movements of only about one-third of its initial capacity.

9. The container terminal at the nearby Port of Wilmington moved 225,000 TEU of containers in calendar year 2009, its best year. That is about two-thirds of its current capacity, and represents a market share of about 1.4% of East Coast container movements. The Port of Wilmington offers substantially lower charges than other ports. The revenues of the State Ports sometimes cover operating costs, but do not cover capital costs.

10. A forecast of container movements at the historical rate of growth for the Port of Wilmington, 4.8%, would yield 600,000 TEU in 2030. Improvements are underway to increase the capacity of the terminal to accommodate that traffic.

11. The design capacity of the proposed container terminal is 3,000,000 TEU annually. The business plan prepared by consultants to the State Ports Authority is based on container movements reaching that level in 2030. That would require diverting enough traffic from other ports to achieve a market share of about 6.75% of East Coast container movements, about five times the market share currently enjoyed by the Port of Wilmington.

12. Another consultant to the State Ports Authority, after a comprehensive analysis, concluded that any increase in market share is unlikely, due primarily to geography.

13. The primary benefit of the proposed terminal to users would be shortening the overland trip to markets in eastern North Carolina relative to ports in other States with harbors deep enough for post-Panamax vessels. There would not be savings for other parts of the State.

14. The cost of the proposed terminal and infrastructure would be approximately 20 times the value of the user benefits. The project does not come close to economic feasibility.

15. The environmental effects are entirely negative, and include substantial loss of aquatic and terrestrial habitat, significant risk of groundwater contamination, air pollution, water pollution, destruction and degradation of historic sites and structures, and alteration of the character of a region with an economy based on tourism and recreation.

16. Any decision to spend public funds on container terminals should take into account the effect the subsidy on imports would have on the competitive position of the State’s products.
Introduction

The Governor’s Logistics Task Force

By Executive Order Number 32 on December 8, 2009, Governor Perdue established the Governor’s Logistics Task Force to make recommendations to create an integrated logistics plan for North Carolina. The mandate is very broad, and includes the following:

a. Conduct a thorough inventory and evaluation of existing public and private transportation and commerce assets, including ports, airports, highways, railroads, major distribution centers, and business and industrial parks.

b. Report on the current system of moving goods and people, including the condition of the system, its overall performance, and its safety.

c. Project future needs for the state’s multi-modal transportation system and explore challenges and opportunities for meeting those needs.

d. Identify relevant research and best practices in transportation and logistics from other states.

e. Inventory current laws, rules, policies, processes, and organizational structures that affect the movement of goods and people across the state and make recommendations to improve the safety and efficiency of our transportation system.

f. Explore innovative ideas in transportation and economic development that can support the state’s logistics capacity, including public private partnerships.

g. Make additional short-term and long-term recommendations to create an integrated logistics plan for North Carolina.

This stops short of actually preparing a logistics plan, which would be an exercise for transportation planning professionals and a major project. But the Task Force mission does promise to provide essential information and policies to guide those professionals.

At the end of the short legislative session in June 2010, the General Assembly passed a “Studies bill,” S900, with this provision:

PART XXX. GOVERNOR’S LOGISTICS TASK FORCE TO STUDY COMBINING GLOBAL TRANSPARK AUTHORITY, PORTS AUTHORITY, AND RAILROAD; AND ESTABLISHING SERVICE OF A CLASS I RAIL SERVICE TO THE GLOBAL TRANSPARK AND THE PORTS (McComas)
SECTION 30.1. The Governor’s Logistics Task Force, as established by Executive Order 32, shall study the following issues:

(1) Combining the operations and governing authority of the Global TransPark Authority, the North Carolina Ports Authority, and the North Carolina Railroad to create one entity and one governing body to oversee the combined infrastructure of air cargo, rail, and sea transportation.

(2) Establishing service of a Class I Rail service by more than one railroad to both the Global TransPark and the State Ports.

SECTION 30.2. The Task Force shall report the findings of their study to the Governor, the General Assembly, and the Joint Legislative Transportation Oversight Committee on or before the convening of the 2011 Regular Session of the 2011 General Assembly.

The Statewide Logistics Plan

The starting point for the Governor’s Logistics Task Force is the Statewide Logistics Plan for North Carolina, prepared by a team of professionals for the North Carolina Office of State Budget and Management in 2008. While it is called a plan, it does not have the usual lines on maps, lists of projects, timetables, cost estimates, artist’s renderings. Instead, it is, as its authors admit, a “plan to plan.”

The authors had only two months for the project. Thus the study represents only the first step—information gathering—of what is recognized should be a more lengthy and comprehensive process. The study team reviewed the literature, primarily related to such projects in other states, held “visioning sessions” with representatives of public agencies and private companies, surveyed 600 logistics and trucking firms (receiving 107 responses), interviewed 40 transportation, logistics, trucking, legislative, and state agency representatives, invited presentations from consulting firms, and held team meetings with experts.

Although there was little time to assess and analyze the information and advice thus gathered, the team did present this strong recommendation:

A critical action is creating a “freight logistics authority” that guides, oversees, and helps to synchronize the investments in transportation infrastructure. Comprised of representatives from private industry and public agencies, it works with private industry (e.g., shippers, carriers, logistics managers) and public agencies (e.g., Transportation, Ports, Railroad, Toll Roads, Commerce, Environmental and Natural Resources, and Employment Security) to advise the governor about plans for investments that will improve the state’s prosperity and quality of life.

The report goes on to cite such agencies in other states, such as California and Virginia. The authors do not attempt to specify any organizational elements of the proposed freight logistics authority or its scope and authority, but leaves that to the General Assembly:

Whether North Carolina should create a new agency or coalesce existing ones, or some other option, is something the legislature will have to decide. The
study team’s main recommendation is that the legislature act. Perhaps it should create an office, reporting to the governor, with its own staff, that coordinates the investment decisions of a number of state agencies, especially transportation and commerce. A statewide logistics board would report to the governor and guide and advise the director of this new oversight authority.

This recommendation is quite obviously the genesis of Part XXX of S900, cited above.

The Statewide Logistics Plan also presents a list of seven recommendations for the planning process yet to be implemented:

1. Embolden the knowledge-based economy,
2. Support existing industries,
3. Transform NCDOT into an operations-based agency,
4. Facilitate pass-through traffic,
5. Support import/export activity,
6. Partner with military investments, and
7. Support innovations in transportation infrastructure.

Item 5 includes this recommendation:

Continue to support the development of the North Carolina International Terminal. Redouble efforts to “scope” the port. Carefully determine what customers it should serve and how large it should be. For example, it might strive to compete with Hampton Roads, Charleston, and Savannah, and capitalize on the emerging growth in container traffic entering east-coast ports. It seems like an expensive “me-too” strategy that would involve considerable land use, or a clever plan to move the distribution center logistics activity significantly inland.

A footnote has this warning:

26. The amount of land needed by ports like Norfolk, Charleston, and Savannah to handle millions of TEUs per year is considerable. Aerial images suggest areas the size of metropolitan Raleigh. Whether this is compatible with quality of life expectations along the seacoast or not is unclear.

The information presented on the proposed North Carolina International Terminal was derived from the only source available—the State Ports Authority and its consultants. Although including such information in the report, the authors of the report issued several warnings based on experience in other states:

- Economic forecasts were almost always overly optimistic and did not identify and analyze alternatives.
- All studies had a political hidden agenda that tended to cloud real issues and the final results.
- “State legislatures cannot mandate prosperity,” particularly regarding port projects.
- “Today’s supply chains have too much flexibility built into them that a ‘build it and they will come’ mentality spells disaster.”
This report responds to the first listed duty of the Governor’s Logistics Task Force, that of inventory and evaluation, with respect to the North Carolina International Terminal. Although it has not been built, it is well-defined by preliminary engineering reports. This report also responds to the duty to project future needs and explore challenges and opportunities in meeting those needs, insofar as new port facilities are concerned. It provides a different perspective than that of the State Ports Authority’s consultants, who have been engaged for the engineering work on the project, a potentially lengthy and lucrative contract. It is quite understandable that the firm would present a rosy picture of the prospects of the terminal project, with the blessings and encouragement of the State Ports Authority.
The proposed North Carolina International Terminal would be a special facility for handling only containers in international commerce. It would be the largest such container terminal on the east coast of the United States, except the combined terminal at Port Elizabeth and Port Newark, New Jersey. The North Carolina State Ports Authority has purchased property for the terminal, a 600-acre undeveloped site on the Cape Fear River just north of Southport and 20 miles downriver from the existing Port of Wilmington, with its small container operation.

The preliminary plans, described in the document *Pro Forma Business Plan*, dated March 15, 2008, by CH2M Hill, Inc., consultants to the North Carolina State Ports Authority, describe an automated facility to load and unload containers from the latest generation of very large container ships. The “design vessel,” 1263 feet long, with a beam of 185 feet and draft of 50 feet, would not be able to pass through the Panama Canal, now or after completion of the third series of locks planned for 2014. The enlarged canal would accommodate vessels of 160-foot beam, approximately 50% more than the current maximum.
The capacity of the proposed terminal would be 3,000,000 twenty-foot equivalent units (TEU) of containers annually. Containers in international service are 20 feet or 40 feet long, so TEU is used as a common measure for both. Most containers are 40 feet long; the usual mix yields about 60,000 containers per 100,000 TEU.

Immediately to the north of the site is the Military Ocean Terminal at Sunny Point, the largest ammunition transhipment depot in the Western Hemisphere. Adjoining the site on the west is the Brunswick Nuclear Plant with two nuclear reactors, operated by Progress Energy. The reactors draw cooling water at the rate of a million gallons a minute from the Cape Fear River through a canal bordering the site on the north and west sides. Because that canal cannot be bridged without risk of restricting or contaminating the cooling water flow, the terminal site can only be reached from the south, through the City of Southport.

A shallow tributary of the Cape Fear River bounds the property on the east. Approximately 86 acres of this side of the property is salt marsh, designated as “estuarine wetlands” by the North Carolina Department of Environment and Natural Resources.

Approximately 400 of the 600 acres have been designated as “marsh” by the Brunswick County tax assessor. Nevertheless, the entire site is zoned for industrial use.
The site purchased by the State Ports Authority for the proposed container terminal faces a body of water, a branch of the Cape Fear River, with a depth of one to four feet at low tide. The main channel of the Cape Fear River is approximately one mile to the south. That channel is maintained to a depth of 42 feet and width of 400 to 500 feet from this point to the mouth of the river.

Because the continental shelf falls off only gradually at this point on the coast, the dredged channel extends another six and a half miles out to sea. Because of rough water, the depth is increased to 44 feet and the width to 500 or more feet for this section of the channel.

This depth and width of channel is adequate for “Panamax” vessels, the largest vessels able to transit the Panama Canal today. The “design vessel” used by CH2M Hill, Inc., for the proposed new terminal would be much larger, called “post Panamax.” Those vessels would require a channel 52.5 feet deep (plus a two-foot overdredge) and 600 to 640 feet wide. In order to reach deep water, the channel would have to be extended an additional ten miles out to sea—a total of 17 miles from the river mouth and 22 miles from the terminal site.

The dredging project would involve these elements:

- Removal of 86 acres of salt marsh on the east side of the terminal site and dredging of a large area for vessel berths.

- Dredging a turning basin immediately south of the terminal site, with a connection to the main channel.

- Either widening and deepening the existing channel or constructing a direct channel to the river mouth.

- Widening, deepening and extending the channel 17 miles to water of 55-foot depth.

   The channel in the Cape Fear River describes a sharp “S” turn in the lower reaches, between Southport and Battery Island. That part of the channel does not now conform to the US Army Corps of Engineers standards for channel turns. It can only be navigated by the larger ships by moving outside the marked channel at the entry and exit of the sharpest turn. The river pilots impose limits on the tidal conditions for transit by the deepest draft vessels.

CH2M Hill, Inc., in its studies of infrastructure needs of the proposed container terminal, found that the standards of the Corps of Engineers design manual could not be met for the “design vessel” in the turns of the channel around Battery Island “without causing obvious impacts at the east end of Caswell Beach or the riverfront at Southport.” The consultants therefore proposed a different alignment for the channel to avoid navigation hazards.
That alignment, a straight route east of Battery Island, is shown in the following diagram:

The channel proposed by CH2M Hill, Inc., consultants to the State Ports Authority

The portions of the channel shown in red on this diagram would be entirely new, cut through areas now undisturbed and significant for marine life propagation. Because the existing depths in those areas are very shallow, with large portions exposed at low tide, the slope of the sides of the channel necessary to achieve a 600-foot width at the bottom would produce a channel over 1000 feet wide at the top. Extraordinarily large amounts of material must be removed, and very large, ecologically significant areas would be lost.

The part of the Cape Fear River east of the existing channel, with its islands and mud flats, is part of the Bald Head Island Natural Area, a State reservation, and the John H. Chaffee Coastal Barrier Resource System, a Federal reserve. The use of Federal funds for construction in such reserves is prohibited by law.

Perhaps because of that prohibition, the US Army Corps of Engineers, Wilmington District, has proposed, in a reconnaissance study of the necessary channel improvements for the proposed terminal, enlarging the existing channel between Southport and Battery Island, retaining the “S” curve. That is shown on the following page.
The Corps of Engineers plan would involve increasing the width of the channel to 1100 feet from the existing 400-500 feet. Even so, the resulting turns would not conform to the Corps’ own engineering manual, and would require disinterment of two or possibly three Civil War era wrecks of historical interest, including the CSS North Carolina, one of two ironclads built in Wilmington.

That channel and the new turning basin would be the only deep water in the Cape Fear River. There would be no harbor for vessels awaiting berth space.

As for the remaining part of the channel, the extension from the mouth of the river to deep water, the Corps of Engineers and the consultants to the State Ports Authority agree on the alignment, shown below. It includes a kink to the east to minimize blasting rock.

CH2M Hill, Inc., the consultants to the State Ports Authority proposed a channel of 55 feet depth in this area; the Corps of Engineers study was limited to alternative depths of 52 feet and 50 feet. Even so, rock would be encountered at the lower depths making the project particularly expensive.

The estimate of $1.2 billion for the dredging is based on the Corps of Engineers plan. The dredging plan recommended by CH2M Hill, Inc., would be more expensive, due to the greater depth and the greater amounts of material to be removed for the new channel through shallow and undisturbed areas. Both plans would be environmentally devastating.

A significant issue with any dredging of the Cape Fear River to deeper depths is penetration of the fresh water aquifer that lies under the river and the salt water intrusion that would result. At the terminal site, test wells place the top of the aquifer at 43 feet below sea level. The dredging plan calls for a depth of 55 feet below sea level, well into the aquifer.
The preliminary plans for the North Carolina International Terminal prepared by the consultants to the State Ports Authority specify 4400 truck movements per day at capacity operations. That is about a truck every eight seconds.

The site purchased for the proposed North Carolina International Terminal lies about 20 miles from the nearest four-lane highway. Interstate highways are still in the planning stage: an extension of I140 to US 17 in Leland (shown in light blue at the top of the map below), and US74/76 to the west (off of the map to the north). Those would provide connections to the north and west, but not the south.

The only road access to the site is an extension of East Moore Street from Southport, on the south side of the terminal property. Because of the need to protect the cooling water intake canal for the Brunswick Nuclear Plant from restriction or contamination, any access road must be to the south of the terminal site and the nuclear plant, and must circle around to the west of the nuclear plant property to go north to the planned interstate highways, a distance of approximately 20 miles. CH2M Hill, Inc., in its business plan, recommends a new four-lane highway to those interstate highway connections in the northern part of Brunswick County.

The CH2M Hill, Inc., examined several potential routes for new highways, and selected the purple route shown on the map as the most promising. However, the route would incorporate a
section of NC87 which currently is the only access to the communities of southeast Brunswick County from the north.

The North Carolina Department of Transportation initiated a study in 2010 for highway access to the proposed terminal. The NCDOT study plan included a new route due north (the yellow route) to connect with the proposed Skyway, a bridge across the Cape Fear River below Wilmington. Like the CH2M Hill, Inc., channel proposal, this route is functionally appealing but ecologically awful, passing through sensitive swamp forests unique to the area.

The NCDOT route also includes the stretch of NC 87 that is the primary evacuation route in case of hurricane or nuclear emergency, and connects the high school campus with the population centers.

The cost estimated by CH2M Hill, Inc., for the highway improvements is $261,000,000. NCDOT has not provided any cost estimates, and the study has been suspended.
Railroad Service

The site is also proximate to a railroad line, a single track of 23 miles to a connection to the CSX Transportation, Inc., railroad line at Leland. This line is not a common carrier; it is currently operated by the US Army for ammunition movements to the terminal at Sunny Point, and handles occasional movements for local industry as an accommodation.

From the area of terminal site, the line runs on private property, then crosses the property of the nuclear plant with a bridge over the cooling water discharge canal, then crosses part of the ammunition terminal and a region of sinkholes, then bisects the residential community of Boiling Spring Lakes. There are ten crossings at grade, including the entrances to both the nuclear plant and the ammunition terminal.

CH2M Hill, Inc., in its Pro Forma Business Plan for the proposed terminal, assigns one-half of the container movements to rail. That would require ten to fifteen trains a day, each 10,000 feet long. The availability of this railroad for substantial container traffic has not been determined. Should it be available, CH2M Hill, Inc., recommends improvements to this line and to the CSXT yard at Leland. Such improvements include grade separation (bridges) at ten crossings and a 13,000 foot-long, four-track marshalling yard off of the terminal property. A location has not been proposed.

The CSXT line from Wilmington to Charlotte has been upgraded with clearances adequate for double-stack container trains. This is part of a “National Gateway” plan for container movements to inland points from container terminals in the Southeast. CSXT does not now offer double-stack container service from Wilmington on a regular basis because of inadequate traffic prospects.

Norfolk Southern Railway Company, the other large railroad in the East, has a connection to Wilmington from the north, but it is not rated for double-stack container service. Norfolk Southern also has a project to improve clearances on its system, called the “Heartland Corridor,” but its focus is on service at other container terminals in the East, particularly at Hampton Roads, Virginia.

Norfolk Southern and CSXT both offer double-stack service to the container terminals at Savannah, Charleston, and Hampton Roads. Railroads prefer to concentrate traffic on existing routes and corridors to maximize efficiencies of longer trains.
Environmental Review

The North Carolina State Ports Authority, despite having spent $6 million for preliminary engineering work for the North Carolina International Terminal, has not done any studies of the potential environmental effects of the project. The only inquiry that could be termed “environmental” was an examination of the terminal site to determine its characteristics and to check for contamination.

The US Army Corps of Engineers, Wilmington District, initiated a “reconnaissance study” in 2009, the first step on the way to a larger feasibility study of dredging the Cape Fear River for the channel that would be necessary for the North Carolina International Terminal. The reconnaissance study includes a limited inquiry into the environmental consequences of the project.

The Wilmington District received comments from government agencies and the public, almost entirely negative. The US Fish and Wildlife Service said that “The project, when considered in its entirety, is very likely to result in substantial permanent loss of environmental value and would convert the area from residential use with commerce based on recreation and tourism to an industrial center and transportation hub.” The Service regards the terminal project as having the potential for the broadest geographic impacts of any project ever proposed for North Carolina.

In February 2010, the Wilmington District provided a draft “section 905(b) analysis,” the first part of the reconnaissance study, to the North Carolina Department of Environment and Natural Resources. Although the Wilmington District still has not released that document, putting it in the hands of an agency of the State of North Carolina made it available for discovery under the Public Records law and it was so discovered and posted on the Internet by a citizen group.

The section 905(b) analysis included a brief review of environmental effects. All were negative, some potentially devastating. Negative effects revealed include loss of aquatic and terrestrial habitat (including irreplaceable salt marsh), erosion of beaches, air pollution from vessels and trucks, danger of water pollution from spills, damage to freshwater supplies by dredging penetrating the aquifer, light and noise pollution, and degradation of the human environment.

Later in 2010, the same citizen group that discovered the draft section 905(b) analysis, NoPort Southport NC, Inc., obtained a small grant and contracted with Dr. Michael Mallin of the University of North Carolina Wilmington for a study of the potential environmental effects of the proposed container terminal and its associated infrastructure. Released in August, Dr. Mallin’s report identified these environmental problems with the project:

- Replacing 400 acres of natural habitat with buildings and paved areas would inhibit groundwater recharge, produce contaminated stormwater runoff, and destroy extensive woodlands and wetlands and their function of pollution control and animal habitat.

- Removal of 86 acres of salt marsh and armoring the natural shoreline with 4,600 ft. of hardened dock would remove riparian habitat and lead to erosion of natural areas of shoreline on both sides of the terminal dock.

- Dredging for the channel would destroy shallow water estuarine habitat, create copious amounts of turbidity and suspended solids, impact the intake canal for the nuclear
power plant, increase fecal bacterial pollution resulting in more shellfish bed closures, alter upstream salinities, and increase erosion of the beaches at Bald Head Island.

- The massive increase in large ship traffic would increase local air pollution and water pollution, increase local noise pollution, potentially introduce non-native species in ballast water, and lead to increased mortality of endangered sturgeon.

- Road construction and use would lead to loss of animal habitat (including that of endangered species), fragmentation of plant and animal habitat, introduction of non-native species, disruption of hydrology, and pollution of streams, ponds and marshes.

The Castle Hayne aquifer, regarded as the most important source of groundwater in eastern Brunswick County, lies under the terminal site and the Cape Fear River. Test wells immediately north and south of the site place the top of that aquifer at an elevation of 43 feet below sea level. Dredging a channel to the site would penetrate that aquifer over a broad area and create a hydraulic connection between the aquifer and the Cape Fear River. The implications for the water supply for eastern Brunswick County have not been examined.

Few recognize the unusual and ecologically valuable nature of the Cape Fear region and its sensitivity to damage from reckless development. This map from The Nature Conservancy shows the Cape Fear’s significance as an “biological diversity hotspot.”
The response of the communities in the vicinity of the proposed container terminal is universal dread and loathing.

The City of Southport, where the proposed container terminal would be located, is a historic community of about 2800. An entire district and two public buildings are on the National Register of Historic Places. The City has adopted a resolution of opposition to the proposed terminal.

The City of Boiling Spring Lakes, a slightly larger community that lies athwart the rail line that would serve the proposed terminal and adjoins the route of trucks that would serve the terminal, has also adopted a resolution of opposition.

The other four communities in southeastern Brunswick County, The Village of Bald Head Island and the Towns of Caswell Beach, Oak Island, and St. James, all have adopted resolutions of opposition.

Local environmental groups—the Cape Fear Audubon Society, the Bald Head Island Conservancy, the Coastal Water Watch, and the Cape Fear River Watch—have issued statements of opposition.

The United States Congressman for the district, Mike McIntyre, has issued a statement of opposition.

The North Carolina General Assembly, in the short session in June 2010, included in the budget bill a prohibition against the use of State funds for the proposed container terminal.
The Estimated Cost

CH2M Hill, Inc., in preparing the Pro Forma Business Plan for the North Carolina International Terminal for the NC State Ports Authority, estimated these costs for the proposed terminal and directly-related land side infrastructure:

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal construction</td>
<td>$1,430,229,000</td>
</tr>
<tr>
<td>Development</td>
<td>72,770,000</td>
</tr>
<tr>
<td>Highway improvements</td>
<td>260,826,000</td>
</tr>
<tr>
<td>Railroad improvements</td>
<td>72,779,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$1,836,604,000</strong></td>
</tr>
</tbody>
</table>

This does not include the $30,000,000 already spent for the terminal property and the cost of debt service.

CH2M Hill, Inc., also estimated the cost of the necessary dredging from the terminal site to deep water at $681,325,000. However, in a more recent study, the US Army Corps of Engineers, Wilmington District, estimated the cost of the necessary dredging at $1.2 billion. Including the cost of the property, this would put the aggregate cost of the project at approximately $3,067,000,000.

The business plan prepared by CH2M Hill, Inc. contemplates private financing of the cost of the terminal itself by private financing, involving a long-term concession. Whether such private financing would be forthcoming remains to be seen. Highway and rail improvements would be for the account of the State of North Carolina.

The cost of the initial channel dredging would be shared by the Federal and State governments, in the ratio of 40%/60% at the depth planned (projects for depths less than 45 feet are shared 65/35). This would require the State of North Carolina to provide $720,000,000 for the channel dredging. Federal law provides for deferral of payment by the State of 10% of the cost—$120,000,000—but $600,000,000 would have to be paid by the State as the project is undertaken.

Maintenance dredging, which the Corps of Engineers estimates would be $4.5 million per year, would be shared equally between Federal and State governments (maintenance dredging at shallower depths is paid entirely by the Federal Government). However, this figure appears quite low when compared with recent experience—approximately $14 million for the current maintenance dredging of the existing channel.
The Model for the North Carolina International Terminal

Proponents of the North Carolina International Terminal point to a recent example of a highly automated and very large container terminal: the new terminal at Portsmouth, Virginia, opened by AP Moller, an affiliate of Maersk, the Danish shipping line, in late 2007. This shows the terminal shortly before opening in 2007:

This is a recent aerial photo of the APM terminal at Portsmouth:
Although nearly identical in size and concept, there are some important differences between the APM terminal at Portsmouth and the proposed North Carolina International Terminal at Southport:

### AP Moller Portsmouth

**Size**

The APM terminal was constructed on a 576-acre undeveloped site adjoining the Elizabeth River in Portsmouth, Virginia. The initial phase of construction had a planned capacity of 1,000,000 TEU annually. The second phase would extend the capacity to 2,500,000 TEU.

**Project Cost**

The first phase of construction cost about $450 million. The estimate for the second phase is about $250 million.

**Channel**

The Elizabeth River at the location of the terminal has a channel 55 feet deep. That is connected to the harbor at Hampton Roads and the ocean by a channel maintained at 50-foot depth. Dredging for the berth area was included in the $450,000,000 cost of the entire project.

**Highway connections**

Interstate 64 passes the terminal site. A dedicated interchange was constructed by the State of Virginia for $18.7 million.

**Railroad**

The terminal has railroad facilities on-site, which are connected to trunk lines of both CSX Transportation, Inc., and Norfolk Southern Railway. The State contributed $9.3 for a rail yard.

The APM terminal has not succeeded in attracting more than 300,000 TEU annually, despite being affiliated with the largest shipping line in the world. It was turned over to the Virginia Ports Authority under a long-term lease in July 2010.

Another very large terminal is planned for Craney Island, immediately north of the APM terminal. Craney Island was created from dredging spoil. This terminal would also occupy about 600 acres, and would add 2,500,000 annual TEU capacity to Hampton Roads.

### North Carolina International Terminal

**Size**

The NCIT terminal site is about 600 acres, although 86 acres is salt marsh along the river. The design capacity is 3,000,000 TEU annually.

**Project Cost**

Construction of the terminal is estimated to cost $1.4 billion. This does not include infrastructure costs of an additional $1.5 billion.

**Channel**

The tributary of the Cape Fear River on which the NCIT would be located is one to four feet deep. Dredging a channel to deep water, 22 miles away and 17 miles offshore, is estimated to cost $1.2 billion.

**Highway connections**

The nearest four-lane highway is 20 miles from the Terminal Site. Highway connections to future interstate highways have been estimated to cost $261 million.

**Railroad**

The terminal site is connected to CSX Transportation, Inc., tracks at Ieland by a 23-mile spur owned by the US Department of Defense and several private companies. Necessary improvements would cost $70 million. There would not be a connection to Norfolk Southern.
Intermodal Container Traffic

Intermodal containers, which can be transferred from ship to rail to truck, have transformed the international shipping business. Commodities that once required labor-intensive handling to move in international commerce can now be packed in a container at the inland source and not disturbed until reaching the ultimate destination. The efficiency of this method has opened up international markets and stimulated international trade.

The preponderance of container traffic—the traffic for which the North Carolina International Terminal is intended to service—involves movement of consumer goods from Asia to markets in the United States and Europe. There is also trade between Europe and the United States, and between both continents and South America. There is some export from the United States to Asia, although the latter involves mostly bulk materials—scrap metal and paper, forest products, other raw materials. Many containers go back to Asia empty. The US trade deficit with Asian countries, particularly China, reflects this unbalance. Since China entered the World Trade Organization in 2001, the US trade deficit with China has reached more than a trillion dollars.

Asian containerized goods destined for markets in the eastern US may arrive at West Coast ports and then be shipped by rail to distribution points in the East. This is called the “land bridge.” Containers may also be brought by ship through the Panama Canal and landed at East Coast ports. Most such goods would be taken to truck to ultimate markets in the East, but there is increasing interest in a “reverse land bridge,” in which containers landed at East Coast ports are taken west to inland destinations by rail. Rail is regarded as more economical than trucking for distances greater than 400 miles.

Asian ports and US West Coast ports can accommodate the largest of container ships. Movements from Asia to East Coast ports are currently limited to ships able to transit the Panama Canal—960 feet long, 106 feet in beam, and drawing 39 feet. The larger ships able to call at the West Coast are more efficient, on the basis of cost per container. However, the cost per mile for rail shipment is much higher than for marine transportation, and truck shipment is higher yet, so the analysis of whether to ship a container to an eastern destination through a West Coast port and onward by rail or through an East Coast port can be complex. Time-sensitive movements would favor the rail link from West Coast ports.

The Panama Canal is being enlarged with a third set of locks and other improvements. Ships up 1260 feet in length, 160 feet in beam, and drawing up to 50 feet will be able to transit the canal upon completion. This is planned for 2014.

The increased efficiency of larger container ships then able to call at East Coast ports would add further complexity to the analysis. Add to this the movement of the US population from the Northeast to the South and West, the inevitable increase in the cost of fuel, and pressures to redress the trade imbalance, and the problem becomes very complex indeed.

The operators of ports in the East, nearly all state or multistate agencies, are moving forward with plans for terminal expansion and channel dredging to accommodate the larger vessels. The proposed North Carolina International Terminal is part of that movement.
CH2M Hill, Inc., engineering consultant to the State Ports Authority, has identified the primary competitors of the North Carolina International Terminal to be the container terminals from Virginia to north Florida, as they exist and would be expanded. Those would include the three terminals at Hampton Roads, and the terminals at Charleston, Savannah, and Jacksonville. To some extent, terminals farther north and on the Gulf Coast compete for the same traffic, and even terminals in Canada and Mexico serve eastern and Midwestern markets by rail connections. For example, the new terminal at Lazaro Cardenas in Mexico is closer by rail to Atlanta than California, and Prince Rupert in British Columbia, another new terminal connected to the US Midwest by the Canadian National Railway, is two days sail closer to Asia than California. The former serves cost-sensitive traffic, the latter serves the time-sensitive.

CH2M Hill, Inc., does not mention the container terminal now in operation at Wilmington as a competitor. Its fate after the opening of the proposed new terminal is left unsaid.

The container terminals at Hampton Roads, Charleston, Savannah, and Jacksonville have a combined capacity of approximately ten million twenty-foot equivalent units (TEU) annually. That exceeds the current demand, approximately six million TEU in 2009. Those ports have expansion projects underway to double capacity, to approximately 20 million TEU. Another project at Jasper County, South Carolina (near Savannah, Georgia), may add 1.5 million TEU. This is in addition to the capacity at Wilmington, currently about 350,000 TEU.

At this time, only the terminals on the Chesapeake Bay–Hampton Roads and Baltimore–have the 50-foot channel depth to accommodate the largest of the next generation of deep-draft vessels, expected to pass through the Panama Canal after 2014. However, the ports of Charleston and Savannah have projects underway to dredge to the necessary depth, which projects are planned for completion prior to 2014. Charleston Harbor has a depth of 45 feet now.

Further complexity to the analysis is added by the concept of conforming the ships to the harbors, instead of conforming the harbors to the ships. The wider third locks under construction for the Panama Canal will make possible a new generation of container ships of higher capacity due entirely to wider beam, without deeper draft than the current fleet of Panamax ships. Some industry experts predict expansion of a system of transhipment in the Caribbean—the largest vessels would bring the goods from Asia through the enlarged Panama Canal to transhipment points, where the containers would be transferred to smaller vessels for carriage to various ultimate destinations.
**Historical Growth in Container Movements**

Until early 2008, container traffic at United States and world ports had shown substantial growth, driven first by the development of specialized container ships, terminal handling equipment and railroad equipment, and then by expanding manufacturing capacity in Asia, particularly since China joined the World Trade Organization in 2001.

This graph shows national and regional growth since 1990:

From 1990 through 2007, aggregate container traffic at US ports grew at an average compound annual rate of 6.4%; for Atlantic coast ports, the rate was 6.1%. From 1990 through 2000, the average annual rate of traffic growth at Atlantic coast ports was 7.1%, but the rate for the next seven years dropped to 4.6%.

In 2008 and 2009, most ports reported reduced movements; nationally, container traffic has reverted to the level prior to 2004. Some recovery is expected in 2010, due to inventory rebuilding.

**Container Movements at Wilmington**

The history of container traffic at the Port of Wilmington has greater relevance. The market to be served by the proposed North Carolina International Terminal would be the same market as that served by the container terminal at Wilmington. The new terminal would rely on the same road and rail connections to markets beyond Wilmington, and would compete with the same terminals in other states.

At this time, there are not any competitive disadvantages to the Port of Wilmington due to channel depth. The channel to the Port is maintained at 42 feet, the same as that in Jacksonville and Savannah. Charleston Harbor is deeper, at 45 feet, and Hampton Roads is 50 feet, but depths deeper than 42 feet are not relevant for container traffic in the East because the Panama Canal cannot accommodate vessels of greater than 39-foot draft. Thus the recent history of container movements at the Port of Wilmington is a reasonable indicator of the natural market for a container terminal at the Cape Fear, as dictated by geography, highway and rail infrastructure, and proximity of population centers. Given parity in channel depth, the market share of the Port of Wilmington today represents the market share of the proposed North Carolina International terminal in the future.
This graph shows container traffic at the Port of Wilmington during the period 1990-2009, the same period displayed in the preceding graph for national and regional traffic.

Unlike the relatively consistent annual increases exhibited by national and regional container movements, the container movements during the same period at the Port of Wilmington displayed a period of little growth for a long period, followed by a sudden increase beginning in 2004.

From 1990 through 2003, the container terminal at the Port of Wilmington experienced growth at a compound annual rate of less than 1%, with movements hovering around 100,000 TEU per year. Then in 2004, the trend of container movements abruptly turned up, growing at an average annual rate of 22% for the next three years. Container movements in early 2008 continued to rise, but at a lower rate, reaching a total for 2008 of about 196,000 TEU, an increase of about 2.6% over 2007. In 2009, traffic increased substantially, to 225,000 TEU, completely counter to the national trend.

For the period 1990-2009, the compound annual rate of growth of container traffic at the Port of Wilmington was 4.8%.

This chart shows the relationship of the Port of Wilmington to its peers on the Atlantic coast, in terms of market share:

The difference in patterns of growth between the container terminal at Wilmington and the nation and the region can be explained by two factors: the depth of the channel in the Cape Fear River, and recent aggressive pricing of service by the Port of Wilmington.
During the period shown in the graphs, 1990–2009, the average size of container vessels had been steadily growing. However, the channel in the Cape Fear River, with a depth of 38 feet, could not accommodate the largest vessels in the transpacific/Panama Canal. As deeper draft container ships were put in service in the Asian trade, new traffic moved to other eastern terminals with deeper harbors. In early 2004, the channel in the Cape Fear River was opened at a new depth of 42 feet, admitting the largest vessels able to pass through the Panama Canal. The deeper channel restored Wilmington’s competitive position, and most of the traffic that gradually had been lost to other terminals in the Southeast was regained.

The continued growth in 2008 and 2009, when other terminals in the East experienced reduced traffic, is due to another factor: rates at the container terminal at Wilmington have been cut aggressively. These are the average charges for container movements at the Port of Wilmington in the last three fiscal years (ending June 30 in the year shown):

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Average Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>$82</td>
</tr>
<tr>
<td>2009</td>
<td>81</td>
</tr>
<tr>
<td>2010</td>
<td>78</td>
</tr>
</tbody>
</table>

North Carolina tax law offers a tax credit to North Carolina business taxpayers using the State Ports, which can reduce the charge per container substantially.

In its 2008 *Pro Forma Business Plan*, CH2M Hill, Inc., reported these charges at competitive terminals:

- New York and New Jersey: $300
- Hampton Roads: 280
- Charleston: 250
- Savannah: 200

Charges at those ports have since been cut, however, due to competition for shrinking business after 2008. These current rates have been reported:

- Hampton Roads: $170 to $210
- Savannah: $110 to $120

Substantial price differences remain between the Port of Wilmington and other East coast container terminals. It is unlikely that this pricing advantage can be sustained by the Port of Wilmington. The North Carolina State Ports Authority lost nearly $6 million in fiscal 2010; in fiscal 2009, the loss was $4.3 million. At the same time, ports authorities in other states were able to deliver operating profits and remit funds to their respective state treasuries.

We should assume that the Port of Wilmington cannot be expected to increase its market share of container movements in the future by price competition. It is more likely that Wilmington’s market share would shrink as charges are adjusted to remedy the problem of deficits.

But giving the Port of Wilmington the benefit of the doubt and assuming market share would be retained in the future, we undertake a forecast of the trend for the US Atlantic coast container terminals and use that to forecast movements at the Cape Fear.
Forecasts

A business plan requires an estimate of the business to be done. That involves predictions of future events, an uncertain task. Recent events teach that even the near term is unpredictable, so forecasts for the lifetime of a container terminal fall into the realm of prophesy.

Martin Stopford, a noted maritime economist, examined shipping records back for several centuries, until he could find no more. He determined that the shipping market rose and fell in three discernable cyclic patterns. The longest has a period (distance from peak to peak) of about fifty years, and is driven by expansion and contraction of the world economy, technological change, and political upheavals. All, of course, are unpredictable.

He also notes a short cycle, with a period of about ten years, corresponding to the ebb and flood tides of economic events. Such cycles are more predictable, although few anticipate them in the conduct of their affairs. Finally, there is the annual seasonal cycle, quite predictable and ordinarily considered when deploying assets.

Although the onset of the short cycle and the long cycle are unpredictable, as are their period and amplitude, what is predictable is their occurrence. Thus in any planning for the long term, one must recognize that what goes up must come down, and search for the long-term trend hidden in the waves.

All forecasting techniques depend, to some extent, on extrapolation of historical trends. Some forecasts are just that, simple extrapolation of past trends of container movements into the future. Others are more analytical, such as basing the forecast of container movements on the relationship between container traffic and gross domestic product, and in turn the relationship of gross domestic product to population. But that depends on the accuracy of the predictions of population growth and the stability of the relationships of the variables. All are based on history. And all change.

A common error, often deliberately made, is the use of favorable short-term trends to predict future events. The entire container shipping industry presumed that the growth that occurred in the six years following the entry of China into the World Trade Organization in 2001 would continue forever, and that industry is now struggling with excess capacity of ships and container terminals.

And before the industrialization of China pushed unprecedented volumes of consumer goods into the United States, the container industry was enjoying an adolescent growth spurt, as the relatively new technology was implemented by large investments in container ships, terminals, and railroad equipment, and cargo types, one after another, were shifted from traditional bulk and break-bulk methods to containers. That shift is largely complete.

Thus while the best indicator of what would happen in the future is what has happened in the past, it is necessary to look back far enough to establish the true long-term trends and avoid being misled by short-term transient effects. And there must be some anticipation of major reversals in the future—what comes to mind are the increasing cost and scarcity of petroleum discouraging global carriage of low-value commodities, the increasing burden of trade deficits, and the completion of the shift of bulk commodities to containers. A major factor in the growth of imports from China has been manipulation of the exchange rate of China’s currency into dollars by the Chinese, which is being addressed by diplomatic efforts.
And as living standards and labor rates increase in Asia, the competitive advantage for manufactured products is diminished.

With this preamble, we look at some forecasts

**Forecasts for the Port of Wilmington**

The North Carolina State Ports Authority engaged Moffatt & Nichol, a respected engineering firm, to prepare ten-year forecasts of shipments through both the Port of Wilmington and the Port of Morehead City to support a ten-year financial plan. Those were released in early 2010.

Moffatt & Nichol examined historical patterns of growth in container movements at Wilmington and other regional ports, and found them inconsistent and unsatisfactory for forecasts by simple extrapolation. For example, Moffatt & Nichol found that, over three decades, container movements through the Port of Wilmington grew at an annual rate approximately equal to that of the gross domestic product, approximately 2.4%, while container movements at other regional ports—Savannah, Charleston, and Norfolk—grew at twice the rate of the GDP. Moffatt & Nichol attributed the difference to “the lack of supporting infrastructure needed to make the Port of Wilmington competitive for not only its local markets, but the inland markets as well.”

Clearly, a compound annual growth rate of 2.4% would not support the expansion plans of the client, the North Carolina State Ports Authority, so Moffatt & Nichol looked further. The firm undertook a thorough inquiry as to just what is the market for the Port of Wilmington. The firm established, for the 179 Business Economic Areas (BEAs) in the United States, the supply chain costs for all possible ports of entry and exit for 16 regional trade lanes. Each supply chain cost included all components—ocean freight, port fees, trucking costs, and costs of intermodal rail, if the movement involved rail. This is an example, for the Raleigh Business Economic Area:

![Example – Supply Chain Costs of North Asia Imports to Raleigh: Directly Service](image)
The example shows that Wilmington is the least-cost port for Raleigh. Moffatt & Nichol determined that the Port of Wilmington was in the least-cost supply chain only for Raleigh and four other areas within North Carolina. The State Ports Authority confirmed that 100% of existing container traffic through the Port of Wilmington originated in or was destined for North Carolina.

Moffatt & Nichol further observed that capacity increases at other ports in the region would decrease Wilmington’s share of total container throughput capacity in the Southeast, and concluded that Wilmington’s market would remain within North Carolina. The Port of Wilmington’s opportunity for additional container traffic would have to come from increasing market share within North Carolina.

We note, however, that the Port of Wilmington already offers substantially lower rates than other container ports in the region, and has the benefit of a credit against North Carolina income taxes for its customers. This leaves little opportunity to increase market share.

From this point, the Moffatt & Nichol analysis disappears behind a curtain and emerges in an unexpected place.

Moffatt & Nichol forecasts growth in container traffic through the Port of Wilmington at a compound annual rate of 6.9% from a low point in 2010 to 2019. Although there must be a valid analytical path to this conclusion, a rate of 6.9% over a long term seems a bit optimistic, when we consider these historical rates of annual growth:

- Container traffic at the Port of Wilmington, 1990-2009: 4.8%
- Container traffic at all US ports, 1990-2009: 4.7%
- Container traffic at Atlantic Coast ports, 1990-2009: 4.7%
- All seaborne freight, worldwide, 1975-2006: 3%
- Gross Domestic Product growth in North Carolina: 2.8%.
- Container traffic at the Port of Wilmington, thirty years: 2.4%
- Container traffic at Atlantic Coast ports, 2000-2009: 2.0%
- Population growth in North Carolina: 1.4%.

The container industry has used a rule of thumb for compound annual rate of growth of container moves: twice gross domestic product, which in turn is usually about twice the rate of population growth. That would produce a rate of 5.6%. However, one could speculate (and all of this is speculation) that the factors that cause growth in container movements to exceed gross domestic product by a factor of two, that is, shift of cargoes to containers and consequent reduction in transportation cost, have run their course and future growth may more closely follow growth in GDP. Indeed, it is the use of this rule of thumb that resulted in the over-investment in ships and facilities that now besets the industry. We note here that the long-term rate of growth in all seaborne freight has been 3%, slightly more than growth in Gross Domestic Product.
In developing a business plan, a conservative approach would be necessary in establishing a “base case,” a forecast one could rely on for determining whether the project would provide an adequate return on investment or otherwise produce sufficient benefits to justify the costs. Then a “high case” would be useful for sizing the project, to determine whether the project would have sufficient capacity to handle additional traffic, should it materialize.

Using the actual movements at the container terminal at Wilmington as the starting point, we project movements in the future at two rates:

We use as the “base case” 3%, the annual rate of growth of all seaborne freight from 1975 to 2006, as reported by the Institute for Shipping Economics and Logistics. This rate of growth should be valid in most circumstances over the long term.

Then for the “high case” we use a continuation of the historical growth at 4.8% annual rate, assuming the transient effect of the channel deepening is just that—a transient effect, and disregarding the current downturn as another transient.

The base case yields 420,000 TEU in 2030, slightly more than the existing capacity of the terminal at Wilmington, 350,000 TEU per year. The high case yields 600,000 TEU in 2030, approximately the planned capacity of the container terminal at the Port of Wilmington with improvements now underway. Advanced container handling technology now coming into use at various ports could increase that.

Thus the container terminal at the Port of Wilmington is quite adequate for the container movements reasonably anticipated for the foreseeable future.

The container traffic that would move through a new container terminal on the lower Cape Fear River would be the same. Same market, same infrastructure. The existing and proposed terminals would be only about twenty miles apart. The new terminal would take the place of the old in all respects—market served, road and rail connections. Should the State Ports Authority elect to continue operations at the container terminal at the Port of Wilmington, the new and old terminal would share the same market.
The business plan prepared by CH2M Hill, Inc., for the North Carolina International Terminal is styled a “pro forma” business plan. This qualification is significant; the firm explains that their plan “is intended solely as a presentation of conceptualized data or information, where certain values or concepts are hypothetical or tentative.” There is not any further elaboration of that qualification, or indication of which values or concepts are hypothetical or tentative. However, many conclusions are presented in soft language, such as “demand growth suggests capacity shortfall” and “the North Carolina International Terminal could capture market share.” Such language is entirely appropriate for the nature of the forward-looking statements in the plan.

However hypothetical or tentative, the report includes estimates of container movements through the proposed container terminal at several points in the future, and those projections have then been used as the basis for conclusions as to feasibility. The projections have also been used by Martin Associates, another consultant to the North Carolina State Ports Authority, for estimates of economic impacts of the proposed terminal. Thus the estimates are capable of considerable mischief if incorrect. As the results are presented in various contexts, the hypothetical or tentative nature is often disregarded.

In preparing its projections of container movements through the North Carolina International Terminal in future years, CH2M Hill, Inc., did not use the history of container movements at Wilmington as the starting point and extend the historical growth. Instead, their analysis first, projected growth of container movements for the market served by terminals in the Southeast, and second, estimated market share for the new container terminal.

The graph below shows the CH2M Hill, Inc., “base case” projection of container movements for the North Carolina International Terminal (blue), using this method. (The firm also developed “high case” and “low case” projections for its report.)

The graph also shows the extrapolation of historical movements at the Port of Wilmington at an annual rate of growth of 4.8% (yellow). This lower line represents the same data as presented in the graph on the preceding page, but the vertical scale has been compressed to accommodate the CH2M Hill projection.

By comparison with the projections of the historical trend, the CH2M Hill, Inc., projection of container movements for the proposed North Carolina International Terminal (blue) is so high as to suggest grievous analytical error.
The CH2M Hill, Inc., projection for the year 2030 is 3,000,000 TEU annually; normal growth of the Wilmington market suggests annual movements of about 600,000 TEU. CH2M Hill, Inc., in its Pro Forma Business Plan, does use the word “could” to qualify its statement. But a business plan, particularly one involving public projects, should be conservative. As well as correct.

To find the reason the CH2M Hill, Inc., projection is so much higher than the historical rate of growth, we look at the two components of the CH2M Hill, Inc., projections: the rate of growth, and the market share.

CH2M Hill, Inc., projected increases in demand for container movements in the Southeast to the year 2030 at the rate experienced at East Coast and Gulf Coast ports in the ten years before 2007, approximately 6.3% compound average annual growth rate (at the time this projection was made, the drastic downturn in container movements in 2008 had not yet manifested itself). The consultants also considered a low case of 4.3% compound annual rate, and a high case using a rate of 8.3% for the period 2014–2020 (anticipating a surge after the increase in vessel size capacity at the Panama Canal), then returning to 6.3%. The “base case” for the CH2M Hill projection, displayed in the preceding graph, uses a compound average annual growth rate of 6.3%. That is not substantially different from the 4.8% shown in the graph as an extension of the Wilmington history, which would produce projected container movements of approximately 600,000 TEU in the year 2030. That does not explain the discrepancy.

The second element of the CH2M Hill, Inc., projection is market share. CH2M Hill, Inc., basis its forecast on increasing the market share of the proposed terminal by five times the share that would result from normal growth in the Wilmington market. This increase is based on capacity limitations at other terminals and a “focused marketing strategy.”

We look first at capacity.
Regional Capacity

The container terminals at Hampton Roads, Charleston, Savannah, and Jacksonville handled approximately 7.2 million TEU at the peak in 2007. By 2009, that had fallen to 6 million TEU. The terminal at Wilmington contributed another 0.2 million TEU. The current capacity of the terminals is approximately 10.5 million TEU, a comfortable surplus of capacity.

All of those terminals have expansion plans underway to increase capacity. The table below shows the future capacity, as determined by CH2M Hill, Inc., and by Martin Associates, another consultant to the ports industry:

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Current Capacity (CH2M Hill)</th>
<th>Future Capacity (CH2M Hill)</th>
<th>Potential Capacity (Martin Associates)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charleston</td>
<td>2.0</td>
<td>3.8</td>
<td>8.9</td>
</tr>
<tr>
<td>Hampton Roads</td>
<td>4.9</td>
<td>7.9</td>
<td>9.0</td>
</tr>
<tr>
<td>Jacksonville</td>
<td>0.9</td>
<td>1.7</td>
<td>2.3</td>
</tr>
<tr>
<td>Savannah</td>
<td>2.4</td>
<td>6.5</td>
<td>6.6</td>
</tr>
<tr>
<td>Total</td>
<td>10.2</td>
<td>19.9</td>
<td>26.8</td>
</tr>
</tbody>
</table>

This does not include the 600,000 TEU planned capacity at Wilmington or 1.5 million TEU that would be added at Jasper County, South Carolina, in a project in the planning stages.

The CH2M Hill, Inc., estimates of future capacity are based on projects now underway, and do not take into account productivity improvements. The Martin Associates estimates represent the potential capacity using productivity improvements that would increase the rate of lifts in the existing space. Such improvements, which are being implemented in Europe and Asia, include increased density of storage and techniques to increase velocity of movements, that is, to reduce the time containers are stored. Martin Associates has reported that with such improvements “Atlantic Coast ports will not likely become capacity constrained in the long-term.” We note that this statement was uttered in 2008, before the current downturn manifested itself.

CH2M Hill, Inc., in its Pro Forma Business Plan for the North Carolina International Terminal, uses a compound annual growth rate of 6.3% for its “base case,” and 4.3% for the “low case.” The base case rate represents the average annual rate of growth in container traffic in Gulf Coast and East Coast ports for the ten-year period 1997-2006; the firm supports this by reference to “an industry rule of thumb” of container growth rates of twice the rate of growth of gross domestic product for the period, 3.12%.

The CH2M Hill, Inc., “low case” rate of 4.3% represents the historical average annual rate of growth of movements at regional terminals up to the time the report was written, 2008. This is consistent with the rate of growth at Atlantic coast terminals for the period 2000-2007, 4.6%, and the rate of growth at Wilmington for that period, 4.4%. An important difference
between the base case and the low case is that the base case assumes significant diversion of movements into the Midwest from West Coast ports.

The graph below shows the growth in container movements at south Atlantic terminals at the 6.3% rate and the 4.3% rate:

![Growth in Container Movements](image)

This table shows the dates at which various measures of capacity of south Atlantic container terminals would be reached at various rates of growth:

<table>
<thead>
<tr>
<th></th>
<th>Current Capacity (CH2M Hill)</th>
<th>Future Capacity (CH2M Hill)</th>
<th>Potential Capacity (Martin Associates)</th>
</tr>
</thead>
<tbody>
<tr>
<td>At 6.3% annual growth</td>
<td>2018</td>
<td>2029</td>
<td>2034</td>
</tr>
<tr>
<td>At 4.3% annual growth</td>
<td>2022</td>
<td>2038</td>
<td>2045</td>
</tr>
</tbody>
</table>

Addition of capacity at Jasper County, South Carolina, would extend each date another year.

In these circumstances, the prudent approach to a business plan would be to assume that container terminal capacity in the South Atlantic region, existing and expected, is sufficient to meet demand for the foreseeable future, and that any traffic through the North Carolina International Terminal in excess of the normal Wilmington share must be captured from other terminals in the region by factors other than capacity limitations.
The Potential for Market Capture

With capacity adequate at competitive terminals for the foreseeable future, there would have to be some other reason other terminals would be vulnerable to capture of additional market share by a terminal on the Cape Fear River.

That would not be channel depth. Hampton Roads is now at depth sufficient for 50-foot draft vessels. Charleston Harbor has a depth of 45 feet in channels to the container terminals, and has a project underway to increase that to 50 feet. Georgia also has plans in progress for increasing depth of the channel to Savannah harbor to 48 feet.

As for distance from traffic origination points at foreign ports, CH2M Hill, Inc., in its Pro Forma Business Plan for the North Carolina International Terminal, examined the relative distances by ship to the terminal and to its south Atlantic competitors. These are the findings:

- Compared to the terminals at Hampton Roads in Virginia, the proposed North Carolina International Terminal would offer an advantage of about eight hours in sailing time from the Panama Canal, and would be at a 12-hour disadvantage in sailing time from Europe and the Suez Canal.

- Compared to the terminals to the south, Charleston, Savannah, and Jacksonville, the North Carolina International Terminal would have a few hours sailing time disadvantage with respect to the Panama Canal, but would be closer to Europe and the Suez Canal by about eight hours, more or less.

CH2M Hill, Inc., also examined the distances from the various terminals to markets by road and by rail. These are the findings:

- Compared to the other terminals, the distance by road from the North Carolina International Terminal is shorter to Raleigh, but other terminals are closer by road to other northern, southern, and Midwestern destinations. Even Winston-Salem is closer by road to Hampton Roads in Virginia. The terminal at Charleston is closer to Charlotte, Charleston and Savannah are closer to Atlanta, and Hampton Roads is closer to the markets in the Midwest.

- Compared to the other terminals, the distance by rail from the North Carolina International Terminal is shorter to North Carolina destinations, but other terminals are closer to other northern, southern, and Midwestern destinations. Rail distances usually are considered relevant only for movements more than 400 miles.

Not noted by CH2M Hill, Inc., in its report is the lack of service to the North Carolina International Terminal by Norfolk Southern Railway Company, the competitor of CSX Transportation, Inc., in the East. Both railroads have extensive networks throughout the East and Midwest, and connections to the western roads. The rail connection from the North Carolina Terminal would be to CSXT at Leland. All other terminals in the Southeast are served by both CSXT and Norfolk Southern. Although interchange of traffic from CSXT to Norfolk Southern is possible, the element of competition to assure the best rates and service for the North Carolina International Terminal would be missing.
The incremental cost of a ton-mile by ship is less than that for rail, and the incremental cost for rail is less than that for truck. Thus the lowest cost route would have the shortest road or rail distance, even if the voyage is slightly longer.

Putting these elements together, the only market in which the North Carolina International Terminal would offer reductions in transportation costs, relative to out-of-state terminals, is eastern North Carolina, the traditional market served by the Port of Wilmington. This is also the conclusion Moffatt & Nichol reached with their 2010 least-cost market analysis for the Port of Wilmington.

Even the market share of Wilmington may not be achieved. Distances to all markets from the proposed container terminal would be about 20 miles longer over land than from the existing terminal at Wilmington.

The only other competitive advantage open to the North Carolina International Terminal would be lower rates. However, the CH2M Hill, Inc., Pro Forma Business Plan advises that the rates per container lift at the Port of Wilmington were (in 2008) substantially lower than at other ports in the region, $150 per container at Wilmington versus $220 per container at Charleston and Hampton Roads. However, the financial records of the North Carolina State Ports Authority show that the average charge per container move at Wilmington in fiscal 2008 was $82, and has since fallen to $78. The Port of Wilmington has exhausted any potential for price competition with other ports.

CH2M Hill, Inc., further advises that achieving the rate of return necessary to induce investment in the proposed terminal would require raising the rates to the same level as the other terminals. The consulting firm does not explain how raising prices would increase market share.

Thus the North Carolina International Terminal would not have any advantages in location, access, or pricing over the terminal at the Port of Wilmington, and cannot be expected to achieve any greater market penetration.
A Forecast for the North Carolina International Terminal

The broad range of possible rates of growth considered by experts and the above examination of competitive position of the proposed North Carolina International Terminal suggests that the only prudent method of estimating container movements in the future would be extension of the historical trend for the Port of Wilmington, a compound annual growth rate of 4.8%. But even that would not be used for an investment decision. Because of the uncertainty, any investment would have to be justified by traffic growth at the lower end of the range, perhaps 3% compound annual growth rate, but the facilities should have expansion capacity to accommodate growth at the more optimistic rate.

Such growth is shown above, in the section headed Forecasts for the Port of Wilmington. At 4.8%, the result is an estimate of 600,000 TEU container movements in 2030, whether at the container terminal at the Port of Wilmington or at the proposed container terminal downstream at Southport. Of course, that may be more or less.

Although market factors and geography suggest that container movements at the proposed North Carolina International Terminal would be approximately the same as at an expanded container terminal at Wilmington, there would be one factor in favor of the proposed new terminal—the depth of the channel proposed to serve the terminal.

The container terminal at the Port of Wilmington had lost market share in the period before 2004 because the channel in the Cape Fear River could not accommodate the largest vessels able to transit the Panama Canal. That was remedied in 2004 when the channel was opened at 42 feet depth, and container movements increased dramatically. After completion of the third locks in the Panama Canal (scheduled for 2014), even larger vessels will be able to move through the Canal. If the container vessel fleet serving the Asia/Atlantic coast trade acquires a significant proportion of deep draft, post-Panamax vessels, the Port of Wilmington may again be at a disadvantage because of the 42-foot channel depth in the Cape Fear River. The plans for the new terminal include a deeper channel that would accommodate vessels of 50-foot draft. Competitive terminals also will have such deepwater channels.

This graph shows what may happen. The historical growth of container movements through the Port of Wilmington is plotted to 2009 (green). Container movements are projected thereafter at the same average annual rate of growth, 4.8% (pink). That would continue through 2014.

In 2014, the Panama Canal Authority plans to open larger, deeper locks permitting passage by larger, deeper draft vessels. Those deeper draft vessels could not call at the Port of Wilmington if fully loaded.

So from 2015 onward, we presume some container traffic will be diverted to other ports with deeper harbors. This would repeat the
situation before 2004, when the Port of Wilmington was at a disadvantage because of its shallower harbor. The line on the graph, called “Channel Constrained (pink),” continues from 2014 at an annual growth rate of 1%, the same rate that prevailed for the Port of Wilmington prior to 2004. It reaches 345,000 TEU in 2030.

Then supposing that the North Carolina International Terminal with a deeper channel, sufficient for the new post-Panamax vessels, opens in 2020, we show another line (yellow) representing growth in container movements returning to the level representing 4.8% annual growth. A recapture of lost market share. That continues to 600,000 TEU in 2030.

The difference between the two trend lines after 2020 represents the additional container movements that would be expected at the proposed North Carolina International Terminal with a channel able to accommodate post-Panamax vessels of 50-foot draft. This assumes substantial use of post-Panamax vessels in the Atlantic Coast trade; the actual extent of construction of such vessels and assignment to Atlantic Coast service is unknown. The lower the proportion of such vessels in the fleet, the lower the effect of the deeper channel.

Any difference in annual traffic, about 255,000 TEU in 2030, would be attributable entirely to the new channel. Whether that would justify the expense of dredging the channel, estimated at $1.2 billion, and the development cost of the new terminal and associated highway improvements, another $1.8 billion, is the question.

Prospects for Financing

CH2M Hill, Inc., examined financing alternatives in the Pro Forma Business Plan to cover the cost of terminal construction.

Initial project development costs ($72,770,000) and infrastructure costs ($1.6 billion) would be for the account of state and federal sources. Such costs would not be recovered from revenues, but would have to be justified by public benefits, if any.

For the cost of the terminal itself, $1.4 billion, these alternatives were presented:

- Operation by the North Carolina State Ports Authority, with financing from state funds and a bond issue.
- Granting a long-term concession to a private operator, which would finance the cost of construction and pay a fee to the State Ports Authority.
- Joint venture, a combination of the above.

The consultants selected the long-term concession to a private operator for analysis. The operator would be expected to provide financing for the $1.4 billion construction costs of the terminal itself. The consultants suggested a combination of one-third equity and two-thirds debt. The revenues from the terminal would be the source of equity return and debt service.

The consultants presented economic models showing rates of return for various permutations of the private operator alternative, with coverage for operating costs and debt service. All depend on (a) the demand forecasts coming true, and (b) the proposed terminal achieving the market share forecast. The proposed terminal would have to earn a return on
equity in the range of 15% to 17% in addition to covering interest and principal amortization on debt.

We note that the North Carolina State Ports Authority does not now expect to earn any return on the capital invested in its port facilities. The best it can hope for from revenues is to cover operating expenses, and it has not met that goal in the last two fiscal years. For the cost of capital improvements the Ports Authority looks to the North Carolina General Assembly.

We suggest that the public debt markets would not welcome a debt offering of a terminal company based on forecasts of continued growth in container traffic at extravagant rates for the life of the bonds, and quintupling market share in a competitive market by increasing container handling charges by a factor of three.

A similar attitude would greet an attempt by the North Carolina State Ports Authority to offer bonds based on revenue from the proposed terminal. The Authority's debt would only be an obligation of the Authority itself, not the State of North Carolina. Without an assurance of revenues, the bond market is unlikely to accept the bonds.

The uncertainty of the revenues to support debt can be overcome by debt financing, public or private, supported by the credit of a large terminal company with other operations, or backed by the full faith and credit of the State of North Carolina. One wonders if any terminal company would be that brave, or if the State would be that foolish.
Cost/Benefit Analysis

The Analytical Methods

Investments in public projects, particularly transportation improvement projects, ordinarily do not return the cost directly. Thus the worth of the project must be determined by comparing project costs to potential benefits accruing to users of the project over the life of the project. Such an analysis would determine first, whether such a project deserves public investment, and second, how such a project ranks when compared to other public projects competing for public funds.

There are two distinct methods of economic analysis in current use. They are very different, have different uses, and should not be confused. And very definitely should not be mixed.

A method often encountered is economic impact analysis. This attempts to measure effects of a project on certain regional economic measures, such as employment, wages, and household spending. Two modeling systems are used: IMPLAN, developed and maintained by the Minnesota IMPLAN Group, and REMI PI+, a product of Regional Economic Modeling, Inc. Such an analysis should not be used to evaluate a project for decision whether to proceed. It usually lacks analytical rigor and the parameters measured overlap. Typically, economic impact analysis is used to justify a project already moving forward—a public relations exercise rather than a decision document.

The proper method for decision on a particular project, and for ranking projects, is cost-benefit analysis. Actual savings in costs of transportation to the users of the project and related factors would be measured and compared to the cost of constructing the project. If benefits comfortably exceed costs, the project can be placed in line to go forward. The extent to which benefits exceed costs would determine the project’s position in that line, the priority related to other projects. But if costs exceed benefits, the project should be rejected.

Cost-benefit analysis methods have evolved from their first general use for dams by legislative mandate in the Flood Control Act of 1936. Although traditionally called cost-benefit analysis, the process is now more commonly called benefit/cost analysis by project sponsors. The order of the terms suggests the outcome.

A proper analysis compares the project to a base case, and to alternatives. For example, for an analysis of construction of a new container terminal on the Cape Fear River, the base case would be doing nothing, that is, continuing to maintain the existing channel and container terminal at the Port of Wilmington to handle the relevant traffic.

The costs to be counted are those to be expended by the entities providing the project. In the case of the North Carolina International Terminal, that would be the Federal government, acting through the Corps of Engineers, and the State of North Carolina for the channel dredging, the State of North Carolina for the highway and railroad improvements, and whatever entity finances the construction of the terminal itself. Environmental and social costs, whether or not quantifiable, would not be included, except to the extent of mitigation measures included in the project. Costs would include all to be encountered in the life cycle: planning, construction, maintenance, and deactivation.

The benefits to be counted are those to be received by the users of the project, and those directly affected. For a transportation project, such benefits are usually limited to the
actual reduction in the cost of transportation provided by the project--time and distance saved, economies of scale. The universe of beneficiaries is not limited, but great care must be taken to avoid double-counting. Factors indicating increased economic activity, as are usually reported in an economic impact study, cannot be added to the benefits of reduced transportation costs because it is those benefits that cause the economic activity. Those effects cannot be counted twice.

Such a scope of benefits would also include negative effects. In the calculus of cost-benefit analysis, those are not counted as costs, but as "negative benefits," or "disbenefits," because they fall on the users or society, and not the project sponsor. Such disbenefits might include noise effects, construction delays and dislocations, and habitat and air and water quality impacts. Many negative effects are difficult or impossible to quantify, but the science of ecosystem evaluation has evolved to the point that many environmental effects can be quantified and counted. Some cannot, but should be separately catalogued and considered in a proper decision. The most recent standards of the White House Council on Environmental Quality for evaluation of water resources projects include reckoning of non-quantifiable as well as quantifiable effects of a project.

Direct economic effects would also be counted in the benefits column. Those might be reductions in business operating costs and household cost of living, but only to the extent not included or resulting from the reductions in transportation costs. Benefits must be counted only once--beneficial effects of transportation cost reductions cannot be added to those cost reductions. And only those effects should be counted as benefits (or disbenefits) that involve consumption or savings of real resources with economic value. If money or other resources are merely moved around among members of the affected group, those movements are called "transfer payments" and should not to be counted. Tax revenues are regarded as transfer payments and would not be counted in any accepted method.

Methods of analysis and presentation of results vary, but they all include these steps:

1. Define the ‘base case,” that is, the situation if nothing is done to advance the project.
2. Define the project and its parameters. Typically there are various optional configurations to be considered.
3. Identify and define types of costs and benefits.
4. Measure dollar values and times of occurrence for each cost and benefit, in each case by reference to the base case.
5. Convert to comparable measures by discounting to net present value, total each of costs and benefits, and compare.

There are many accepted procedures for cost-benefit analysis, with variations in factors to be included, discount rates used for present-value determination, and presentation of results. The Corps of Engineers has established its own methods for benefit/cost analysis over the course of many years. The American Association of State Highway Officials has published *A Manual of User Benefit Analysis for Highways* (called the “Redbook”) describing procedures for cost-benefit analysis of highway improvements in considerable detail. The California Department of Transportation has another, but similarly rigorous, method described on its
A major challenge in cost-benefit analysis is the comparison of amounts occurring at different times. Project costs occur at the beginning of the project; benefits occur at times well into the future. Selection of discount rate to bring future amounts to the present for comparison substantially influences the outcome.

Cost-benefit analysis is typically used to make a determination of whether to proceed with a single project; a surplus of benefits over costs suggests that the project should proceed. However, in a situation in which many projects are competing for limited funds, cost-benefit analysis, consistently applied, would permit ranking of projects, so that the projects with the most favorable ratios of costs to benefits would come before the less favorable projects. This would be a more even-handed method of disbursing State funds than such things as seniority of legislative representatives or party affiliations or favors owed or other less visible factors.

**Council on Environmental Quality Initiative**

Traditional methods of cost-benefit analysis, with the emphasis on rigorous quantitative evaluation, typically disregard environmental effects, except to the extent of including on the cost side such measures to mitigate environmental damage as are mandated by law. This has been the method employed by the US Army Corps of Engineers for water resources projects over the years, and it has come under criticism in Congress.

On December 3, 2009, the White House Council on Environmental Quality released the second draft of updated *National Objectives, Principles and Standards for Water and Related Resources Implementation Studies*. The new *Principles and Standards* rank the goal of protecting and restoring the environment equal to the traditional economic objectives. The revised principles consider both monetary and non-monetary benefits to justify and select a project that has the greatest net benefits – regardless of whether those benefits are monetary or non-monetary. For example, the monetary benefits might capture reduced damages measured in dollars while the non-monetary benefits might capture increased fish and wildlife benefits, or biodiversity.

The CEQ sets out these categories and subcategories for evaluation:

(A) Monetary effects. “The beneficial and adverse effects on the economy that can be measured as changes in the value of the output of goods and services, and expressed in monetary units. These can include methods for monetizing non-market goods and services such as ecosystem services and other social effects.”

1. National effects. “Changes in the economic value of the output of goods and services, both market and non-market.”
2. Regional effects. “Changes in the distribution of regional monetary effects.”

(B) Non-monetary effects: “Effects on ecological resources and attributes, risks to humans from natural disasters, and other types of social effects including aesthetics, cultural resources, and the portion of ecosystems that are not successfully monetized.”
1. Natural resources.
2. Public safety.
3. Other social effects.
   (a) urban and community impacts
   (b) life and health impacts
   (c) displacement of people, business and farms
   (d) long-term productivity
   (e) cultural and historic resources
   (f) aesthetics

Category (A) in the CEQ’s procedures recognizes and establishes a role in the process for developing theories of environmental economics and emerging methods of ecosystem evaluation. And to the extent that environmental issues cannot be reduced to dollars and cents, category (B) recognizes the importance of those issues in the evaluation and ranking of transportation projects.

The Base Case

The base case against which costs and benefits of the proposed North Carolina International Terminal would be compared is continuation of the current system of moving containers in and out of North Carolina. That has two elements:

1. Continued use of the Port of Wilmington for such container movements as are most efficiently handled at that port, and continued progress on expansion of the capacity of the container terminal at Wilmington; and

2. Continued reliance on container terminals in neighboring states for those container movements that are most efficiently handled thereby, taking into account the highway and rail connections between those ports and the population centers in North Carolina. The complexity and scope of the national system of container movements must be taken into account, because many containers arrive in North Carolina by rail or truck from West Coast ports.

Moffatt & Nichol, consultants to the North Carolina State Ports Authority, have determined that the container terminal at Wilmington has a current capacity of about 350,000 TEU annually, substantially more than current traffic. The State Ports Authority has in progress an expansion plan to bring that up to 600,000 TEU, which would accommodate container traffic with normal growth to 2030.

As shown above, container terminals in other states have more than adequate capacity at the present time, and with expansion projects currently underway or in the late stages of planning, will have sufficient capacity for all reasonably foreseeable container traffic.

The market would determine how these existing and planned facilities would be used. As developed above, without the proposed North Carolina International Terminal, a certain amount of container traffic after 2014 can be expected to be diverted from Wilmington to facilities in other states with harbors deep enough for post-Panamax vessels. This would involve no cost to the State of North Carolina, and indeed may provide savings, given that the Port of Wilmington requires State subsidy for capital costs and state share of dredging projects.
Costs revisited

Using the estimates of CH2M Hill, Inc., for the North Carolina International Terminal and landside infrastructure, and the estimate of the US Army Corps of Engineers, Wilmington District for channel improvements for the 50’ depth, we have these costs:

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal and infrastructure</td>
<td>$1,850,000,000</td>
</tr>
<tr>
<td>Channel improvements</td>
<td>$1,200,000,000</td>
</tr>
<tr>
<td>Total</td>
<td>$3,050,000,000</td>
</tr>
</tbody>
</table>

The figure for the terminal and infrastructure includes $26 million, representing the present value of the lost income from the funds invested in the terminal site, $30 million. That cost itself is presumed to be recoverable. All figures are rounded.

The Corps of Engineers, in its procedures for cost-benefit studies, uses an annual cost for comparison to benefits. A life of 50 years is assigned to navigation projects, and the cost is amortized over that period using an interest rate prescribed by headquarters and based on the interest cost of US Treasury long-term bonds. For use during 2010, Corps headquarters specifies an interest rate of 4.375% (the lowest in recent history).

- **Annual capital costs amortized over 50 years at 4.375%** $152,000,000
- **Annual maintenance costs** 4,500,000
- **Aggregate annual costs** $156,500,000

Benefits

The analysis and forecast presented above suggests that the proposed new container terminal at Southport would move approximately 600,000 TEU per year in the year 2030. Of that, 255,000 TEU represents movements attributable to the functional advantage of the new terminal, that is, the greater depth of channel that would be available to accommodate post-Panamax vessels that could not reach the Port of Wilmington upriver. The remaining 345,000 TEU would be expected to move through the Port of Wilmington in the same size vessels as used today, and constitutes the “base case,” that is, the situation if the proposed project is not constructed. Benefit calculations should be based on the 255,000 TEU additional movements.

We consider these benefits:

Land transportation savings

That portion of container movements attributable to the deeper channel, about 255,000 TEU for 2030, would otherwise move through container terminals in other ports in the region, Hampton Roads and Charleston. The distance to some markets that would be served by the North Carolina International Terminal from those other terminals is slightly greater, so the North Carolina International Terminal would offer a benefit in reduced cost of land transportation.
We consider these markets:

**Wilmington and southeastern North Carolina.** This market, which is relatively small, is easily served by the container terminal at the Port of Wilmington. The distance to other ports is so much greater that we can treat this market as served solely by a the container terminal at the Port of Wilmington anyway, if the proposed new terminal is not built, and treat the container movements attributable to this market as part of the 345,000 TEU movements that would occur without the proposed new terminal. Thus we do not include these movements in the benefit calculation for the project.

**Charlotte.** This is a major market. The distance from Charlotte to Southport is about the same as the distance from Charlotte to Charleston–210 miles–so there is not any benefit in land transportation for any movements diverted from Charleston to the new terminal. Indeed, the travel time from Charleston to Charlotte is less.

**Winston-Salem and Greensboro.** This is another major market for container movements. But the distance from Winston-Salem to Southport is one mile more than the distance to Portsmouth at Hampton Roads, Virginia–261 miles–so there would not be any benefit in land transportation for container movements diverted from Hampton Roads to a new terminal at Southport.

**Raleigh-Durham.** This market, with a current population of about 1.7 million, is 15 miles closer to Southport than Portsmouth, Virginia. At $1.80 per mile, about $27 would be saved per trip. If we assign all of the projected container movements attributable to proposed new terminal—all 255,000 TEU–to the Raleigh-Durham market, and all go by truck, that would be 200,000 annual trips (including an allowance for empty trips); $5,400,000 would be saved each year.

The aggregate annual savings in land transportation attributable to the proposed new terminal would therefore be $5,400,000. The present value of such savings over fifty years at 4.375% would be $113,600,000.

**Voyage distance from origins and destinations**

The analysis of CH2M Hill, Inc., in its *Pro Forma Business Plan*, reviewed above, shows that the proposed new terminal would offer some advantages over the terminals at ports to the north for voyages from and to Latin America and the Panama Canal, but would be at a disadvantage relative to terminals at ports to the south. Likewise, the proposed new terminal would offer advantages over ports to the south for voyages from and to Europe and through the Suez Canal, but would be at a disadvantage relative to ports to the north. Given this self-cancelling mix of advantages and disadvantages, and the impossibility of determining voyage origins and destinations with any accuracy for the future, we disregard any benefits or disbenefits due to voyage length, compared to such other terminals.

**Voyage shortening**

The location of the proposed new terminal 20 miles downriver from the Port of Wilmington would save approximately three hours sailing time each way for every vessel diverted from the Port of Wilmington to the new terminal.
To give maximum effect to this voyage shortening, we presume that all containers moving through the Cape Fear region would move through the proposed terminal, whether arriving in post-Panamax vessels or smaller vessels, and that the container terminal at Wilmington would be converted for other cargoes.

We cannot convert annual TEUs to vessel calls using vessel capacity because vessels do not discharge the entire cargo at a terminal but make calls at several ports. We look instead to practice. In fiscal 2009, 149 vessel calls at the Port of Wilmington discharged and loaded 194,000 TEU. For the 345,000 TEU we project for the Wilmington container terminal in the design year, 2030, 265 vessels would be presumed to call.

The six-hour shorter sailing time for those vessels, using an average operating cost of $2950 per hour, would save $4,690,000 per year. The present value of the savings over fifty years, using the 4.375% discount rate, would be $98,700,000.

Land transportation disbenefit

The proposed container terminal at Southport would be about 20 miles farther from markets than the terminal at Wilmington, and containers moving through the proposed terminal would have to be carried overland approximately 20 more miles than if moving through the Port of Wilmington. Land transportation, whether by road or rail, is more expensive than marine transportation.

The additional cost of land transportation for those movements must therefore be treated as a negative benefit, or “disbenefit,” and deducted from project benefits.

The estimate of total movements for the design year, 2030, is approximately 600,000 TEU. Of that, approximately 255,000 TEU is attributable to the accessibility of the port by post-Panamax vessels. The remaining 345,000 TEU represents containers that would move through the Port of Wilmington were it to remain as the only terminal on the river. Those container movements would be transferred to the proposed terminal at Southport, and would thus be subject to the costs of carriage of the additional distance by truck or rail.

That converts to approximately 190,000 containers per year, given the mix of 40-foot containers and 20-foot containers that has prevailed at Wilmington.

The railroad route to the Port of Wilmington to the connection to the CSXT trunk line at the Davis yard in Leland is somewhat circuitous, and the proposed terminal is not a significantly greater distance by rail from that yard. We treat the 50% of container movements that CH2M Hill, Inc., assumes will move by rail as having no cost disadvantage due to the location of the proposed terminal

The remaining 50% is assumed to move by truck. We use these assumptions to calculate the cost of the added distance:

Containers per year: 95,000
Proportion of truck trips loaded: 70%
Total truck trips per year: 136,000
Additional distance: 27 miles to I40, 19 miles to US74/76
Trucking cost: $1.80 per mile.
Assuming half of the movements would go to I40 and the other half to US74/76, the additional cost of land transportation would be $5,630,000 per year. The present value over fifty years would be $118,000,000. This disbenefit is more than the savings from voyage shortening.

If rail service is not instituted and all containers must move by truck, the value of this disbenefit would double.

### Aggregate Monetary Effects

This table summarizes the costs and benefits, expressed both as present value and as average annual value:

<table>
<thead>
<tr>
<th></th>
<th>Present Value</th>
<th>Annual Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction of terminal and infrastructure</td>
<td>$3,050,000,000</td>
<td>$152,000,000</td>
</tr>
<tr>
<td>Channel maintenance</td>
<td>94,700,000</td>
<td>4,500,000</td>
</tr>
<tr>
<td>Aggregate costs</td>
<td>$3,144,700,000</td>
<td>$156,500,000</td>
</tr>
<tr>
<td><strong>Benefits</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land transportation savings</td>
<td>$113,600,000</td>
<td>$ 5,400,000</td>
</tr>
<tr>
<td>Voyage shortening</td>
<td>98,700,000</td>
<td>4,690,000</td>
</tr>
<tr>
<td>Land transportation disbenefit</td>
<td>(118,400,000)</td>
<td>( 5,630,000)</td>
</tr>
<tr>
<td>Aggregate benefits</td>
<td>$ 93,900,000</td>
<td>$ 4,460,000</td>
</tr>
</tbody>
</table>

Benefit/cost ratio \(0.05\)

A viable project should have a benefit/cost ratio greater than one, that is, benefits exceed costs. This project would yield benefits of only 1/20th of the costs.

The North Carolina International Terminal has such overwhelming costs and insignificant benefits that it should be discarded with no further inquiry.
**Non-Monetary Effects**

**Natural Resources**

The following effects on natural resources can be anticipated from the proposed container terminal and its land-side infrastructure:

- **Pollution of the Cape Fear River from vessel discharges.** The plans for the proposed terminal do not include pumpout facilities for the vessels, leaving no alternative but to discharge untreated sewage into the river or the sea. Ships also take on and discharge sea water for ballast at each port-of-call. Such ballast discharges are a common source of invasive organisms.

- **Groundwater loss or contamination.** Dredging in the area of the terminal site for vessel berths to any depth contemplated for the project would penetrate the Castle Hayne aquifer over a large area. Depending on the relative pressures of the aquifer and river, that would result in excessive loss of groundwater into the Cape Fear River, or contamination of the groundwater by salt water from the river.

The terminal plans call for storm-water runoff to be collected in a holding pond, which would permit percolation into the underground aquifers. Such storm-water runoff would be contaminated by diesel fuel, motor oil, hydraulic fluid, and whatever substances the containers stored on the site may have acquired on their surfaces in their travels.

- **Air pollution from vessels.** The intention of this project is to facilitate substantial increases in container vessel movements in the Cape Fear River. The amount of additional emissions the area would receive from vessels is a complex problem, due to the uncertainty of estimating future vessel traffic. However, container ships, largely unregulated as to emissions, are notorious polluters. The main propulsion engines are diesels of up to 100,000 horsepower, normally fueled by the least expensive fuel available, high-sulfur residual fuels. Each ship also has auxiliary diesel engines, as many as five, to power on-board electrical equipment. The plans for the container terminal do not include shore power, so those auxiliary diesel engines will be running while a ship is in port. For the nature of air pollution from vessels, see *Floating Smokestacks* and *US Container Ports and Air Pollution: A Perfect Storm*, cited below.

Tugboats would be required for the docking and undocking of vessels calling at the container terminal, to assist in turning the vessels around, and possibly for escort and assistance in negotiating the turns in the channel. Such boats have diesel engines of 3000 to over 6000 horsepower. There are not any plans for tugboat dock facilities, so the tugs may have to travel down the river from their base at Eagles’ Island, near Wilmington. Such tugboats would be subject to regulation as to emissions.

- **Air pollution from terminal equipment.** Preliminary plans for the North Carolina International Terminal facility specify electric gantry cranes and other equipment to handle containers and load trucks, rather than diesel-powered lift trucks. There should be little or no on-site air pollution from this equipment. Loading railcars and certain other activities would require diesel-powered equipment, however.

- **Air pollution from trucks.** The primary air pollution threat (other than vessels calling at the terminal), would come from diesel-powered over-the-road trucks entering and leaving the terminal and idling at gates and loading areas. The consultants to the State...
Ports Authority estimate approximately 4400 truck trips on area roads each day on average would be necessary to carry one-half of the containers moving through the proposed container terminal. Peak movements would be 5700 per day, over 400 per hour. Although tightening of emissions standards for new trucks is scheduled in the period before the terminal would be opened, not all trucks are new. Experience at other terminals shows that most trucks in this service are owned or leased by the drivers and may be up to 30 years old. And the reduction in emissions is not elimination. Substantial emissions of carbon dioxide, carbon monoxide, oxides of nitrogen, unburned hydrocarbons, and particulate matter must be expected from 4400 trucks per day.

- **Air pollution from railroad locomotives.** The consultants to the State Ports Authority have assigned the remaining one-half of container movements at the proposed terminal to rail. They estimate ten trains a day will be necessary on average; peak movements would be fifteen trains per day. Each such train would be 10,000 feet long, typically drawn by three road locomotives of 3000 horsepower or more. Although newer generations of locomotives would offer reduced emissions, locomotives, whether hauling trains or idling in the yard (locomotives normally are left running continuously), present a concentrated source of air pollution not present in the area today.

- **Loss of wetlands habitat at the terminal site.** Eighty-six acres of estuarine wetlands would be removed for vessel berth areas. An additional 20 acres of tidal marsh and ponds would be buried by construction.

- **Loss of terrestrial habitat at the terminal site.** The 500 acres that would be taken for the terminal, and the hundreds of acres that would be taken for rail and highway access, are acres lost to wildlife. In the case of the terminal site, such loss is particularly grievous, because the terminal site is the part of a larger undisturbed area comprising the lands maintained by Progress Energy as a buffer for the Brunswick Nuclear Plant and the “blast zone” for the Military Ocean Terminal at Sunny Point, which zone is also kept in its natural state. The military reservation includes high quality natural areas and the habitats of the red-cockaded woodpecker, the American alligator, and the Cape Fear threetooth, as well as 22 rare plant species. Part of this is a Registered Heritage Area. This is an integrated ecosystem that would be severely damaged by placement of a large industrial enterprise in the middle.

- **Loss of terrestrial habitat to roads.** Although part of the highway access to the terminal site would be by existing roads, widened and improved, most of the 20 miles to adequate highway connections would require new highway alignments. Those new alignments have not been determined, but they must pass through undeveloped areas, woodland and upland marsh, including pocosin. Most of those areas are “Significant Natural Heritage Areas” and some are reserved. Highways are disruptive for wildlife beyond the areas they occupy, because migration and foraging patterns are interrupted. Highways are also sources of contaminated runoff that affects wide areas.

- **Loss of terrestrial habitat to railroad facilities.** The plans of the consultants to the State Ports Authority include a support yard for railroad equipment consisting of four tracks 13,000 feet long and attendant maintenance and storage facilities. The location has not been specified, but the only available locations outside of residential areas are in undeveloped areas of woodlands and upland marsh.
The following effects on natural resources can be anticipated from the channel dredging.

- **Turbidity in the river.** Dredging operations and related blasting churn up sediments, which remain suspended in the water for some time. Although the turbidity from initial construction eventually would be dissipated, the depth of the channel relative to the depth of the surrounding riverbed suggests constant shoaling and correspondingly constant maintenance dredging.

  There are also the continuing effects of propwash of deep draft vessels. This will become a significant issue with 30-foot diameter screws driven by 100,000 horsepower engines, turning near the bottom of the channel.

- **Salt water intrusion upstream.** The proposed channel would present a larger cross-section to tidal flows, with the result that tidal amplitudes upstream would increase, and water of high salt content would reach farther up the Cape Fear River and tidal tributaries.

  The expected results would be changes in vegetation along tidal rivers and creeks, with the loss of certain trees less tolerant of salinity. Town Creek and Rice’s Creek are particularly sensitive, with stands of centuries-old cypress on the banks. To some extent this effect is offset by increases in brackish marsh areas which have significant ecological value. But that would be a change in the ecology of the Cape Fear River estuary.

- **Loss of Habitat.** This project involves extensive dredging and vessel traffic in heretofore undisturbed areas. These are intertidal and shallow soft bottom and shell bottom habitats, which function as primary nursery areas, secondary nursery areas, or special secondary nursery areas. Hundreds of acres of underwater habitat would be lost.

- **Dredging Operations.** Dredging has two impacts on aquatic life. The first is “entrainment,” which means the fish, shellfish, crabs, larvae and other life at and near the bottom get sucked into the dredge and discharged somewhere else. The other is less drastic—turbidity and suspended sediments, which can be lethal to both marine creatures and submerged aquatic vegetation in sufficiently long exposures. Dredging would be continuous, from the start of construction through maintenance forevermore.

- **Change in Water Depth.** Increasing the depth of the river by ten feet changes the light penetration to the bottom and reduces the concentration of dissolved oxygen at the lower depths. Both have an adverse effect on submerged aquatic vegetation and marine life.

- **Spoil disposal.** The proposed channel improvements would involve removal of approximately 43 million cubic yards of material, including 10 million cubic yards of rock, which would have to be deposited somewhere. Some of the material would be beach-quality sand, which could be used for nourishment of nearby beaches.

  Disposal of spoil on islands created for the purpose and at disposal sites out to sea both involve complex problems, mainly involving loss of habitat, exacerbated here by the large amount of material involved.

- **Blasting.** Consultants to the State Ports Authority have determined that rock would be encountered at depths of 36 to 45 feet and below along the route of the channel from the terminal site to approximately 6000 feet beyond the mouth of the river. Approximately
ten million cubic yards of rock would have to be removed, a very substantial amount. Blasting would be required for excavation of rock not removable by dredging alone.

Underwater explosions injure and kill fish, marine mammals, sea turtles and other marine life.

- **Altered circulation.** The proposed channel would substantially alter the current patterns in the lower Cape Fear River and in the ocean immediately south of the mouth of the river. The effects on aquatic life are unknown, but likely to be significant.

- **Spill potential.** The lowest 10 to 20 feet of the channel, from the terminal site to approximately 6000 feet beyond the mouth of the river, would be cut through rock. This would present a hard bottom to vessels and raise the issue of hull damage in case of grounding. In addition, there is the normal hazard of collision. Only a single incident, such as that of the *Cosco Busan* in San Francisco Bay, can cause substantial environmental damage from spill of fuel from container shops, or liquid cargoes from tankships using the same channel. Area beaches and the wetlands along the shore of the Cape Fear River are very vulnerable.

  ![](Spread_of_oil_from_Cosco_Busan_in_San_Francisco_Bay.png)

- **Hazardous cargo loss.** The Cape Fear River is not a deep water harbor. Deep draft vessels would be confined to the channel, and would not have a sheltered anchorage when not actually loading and unloading at the terminal. Waiting vessels would be obliged to remain at least fifteen miles out in the ocean.

  This increases the risk of loss of deck cargo containers, some of which may contain toxic and hazardous substances, in rough weather conditions. Incidents such as the loss of several containers of arsenic trioxide by the *M/V Santa Clara* off the New Jersey coast can cause substantial damage to the ocean ecology and require closing of fisheries for extended periods.

- **Ship strikes.** Aquatic creatures, particularly mammals and reptiles, would be at increased risk from strikes by vessels.
The last remaining population of right whales moves along the coast past the Cape Fear in the annual migration between calving grounds near Georgia and Florida and feeding grounds in the North Atlantic. Ship strikes are a primary cause of right whale mortality. Five species of sea turtles, four endangered or threatened, nest on area beaches and inhabit coastal waters.

- Sand placement. Sand from dredging placed on beaches can adversely affect sea turtles, intertidal microfauna, seabeach amaranthus, shore birds and other organisms. This issue has been addressed in earlier projects, with limited success, and must be addressed here with the benefit of the experience of such projects.

- Erosion. Erosion of beaches and other shoreline areas can result from dredging, alteration of current patterns by reshaping the river and seabed, and wakes and propwash from very large vessels. North Carolina beaches adjoining inlets have required constant renourishment where dredging has created “sediment sinks,” deep trenches that capture sand and prevent the normal and natural regeneration of beaches.

Historical records show that the natural depth at the mouth of the Cape Fear River in Colonial times was about ten feet. Beginning in the nineteenth century, a succession of dredging projects has created a channel 44 feet deep and 500 feet wide. The result is an extreme example of disturbing the natural state of equilibrium of beaches and inlet, creating an artificial situation that can only be sustained by constant dredging and beach nourishment.

The loggerhead sea turtle and green sea turtle, both Federally threatened, nest on the beaches at Bald Head Island and Caswell Beach, on either side of the mouth of the Cape Fear River with its shipping channel. The Federally-threatened piping plover winters in the project area, and the seabeach amaranth, also Federally-threatened, grows on Bald Head Island beaches. The dredging of the channel between those beaches has disrupted the normal movement of sand and sediment along the shore which maintains the beaches, by trapping the material in the dredged trench. The habitat of the threatened species is routinely diminished as the beaches erode into the sea, and then disturbed by the placement of sand dredged from the channel in the course of maintenance dredging. The wider, deeper channel contemplated by the project will exacerbate that problem.

Particularly sensitive is the passage along the west side of Bald Head Island, where the shipping channel has been located to avoid rock formations. Maintenance dredging of that channel in 2009 produced an environmental and public relations calamity when large parts of the beach fell in the dredged trench.
Public Safety

- **Blasting.** The reactors and the above-ground spent fuel storage area of the Brunswick Nuclear Plant are approximately 8000 feet from the location of the berthing area and turning basin for the proposed terminal. Dredging of both would require the removal of extensive rock formations at the lower depths planned, which may require blasting, with unknown but ominous effects on those elements of the plant.

- **Storm surge.** Increasing the channel cross-section would increase the volume and velocity of a storm surge in the Cape Fear River. The Cape Fear is part of “hurricane alley,” subject to category two and three hurricanes at frequent intervals. The Cape Fear River opens to the southeast, the typical direction from which wind and water approach the area in a storm. This would put structures along the river at more risk of damage than they now face, which is considerable. The container terminal itself would be at the end of the channel directing the path of the surge, and the Brunswick Nuclear Plant and the entrance to its cooling water canal are there, too.

- **Hazardous materials at the terminal.** Container terminals routinely handle hazardous materials. Some are solid materials, even solid explosives, packed in ordinary containers. There are special containers for bulk commodities—many very hazardous—in solid, liquid and gas states, some under pressure. A special problem with container terminals is the concentration of such materials. The preliminary design for the North Carolina International Terminal provides for storage of 47,680 twenty-foot equivalent units (TEU), which is about 28,600 containers, given the usual mix of 40-foot and 20-foot containers. Four thousand eight hundred forty TEU of space would be dedicated to hazardous materials. That is about 2900 containers. At typical loadings, perhaps 58,000 tons—116,000,000 pounds—of hazardous material could be in those containers on the terminal site at one time.

  The two nuclear reactors and the above-ground storage facility for spent but radioactive fuel at the Brunswick Nuclear Plant are located approximately 2500 feet from the border of the terminal site.

- **Hazardous materials in transit.** The hazardous materials arriving or departing at the proposed terminal must be carried by truck or rail through the residential communities of Brunswick County and beyond.

- **Highway safety hazards from trucks.** The route to be used by trucks serving the proposed terminal would, in part, be the same route used for commuters from the area to Wilmington, and used by students and faculty at the South Brunswick High School and Middle Schools. Mixing 4400 trucks per day, about one every eight seconds, with that traffic would create abundant opportunities for serious and life-taking accidents.

- **Congestion of evacuation routes.** The road to be shared by passenger car traffic and trucks is also the primary evacuation route for southern Brunswick County in case of hurricanes and nuclear emergencies. The former are common; the latter less so.

- **Terrorist attack.** The proximity of the nation’s primary ammunition terminal and a nuclear plant to the proposed container terminal presents an extraordinary opportunity for terrorist attack, when one considers that very few containers are inspected, and most come from the Far East and some from the Middle East. The Congressional Research Service, in a recent report, even postulated that a simple nuclear device, a *Hiroshima*—
type bomb, could be manufactured using enriched uranium, plutonium not being necessary, and concealed in an ordinary shipping container.

**Cultural and Historic Resources**

- *Damage to archeological sites.* An enlarged channel between Southport and Battery Island would extend about 150 feet on both sides of the existing channel, taking in the sites of four shipwrecks of archeological interest: the *Kate*, the *CSS North Carolina*, the *Belfast*, and the *Fayetteville*. Widening of the channel at the junction with the new channel to the terminal site may also affect the site of the quarantine station constructed in the river in 1895.

  In addition, dredging operations often involve heavy ground tackle set well outside the area to be dredged. In 1995, a 15,000 pound anchor was dropped on the bow of the *CSS North Carolina* to serve as a mooring for barges supporting dredging operations. It was later pulled out through the hull, resulting in the damage shown in this illustration.

![Figure 8](image)

**FIGURE 8.** Plan of the bow of the ironclad *CSS North Carolina* illustrating the damage done by anchoring in the wreck (Image courtesy of Tidewater Atlantic Research, Inc.).

Erosion of the shoreline from ship passage and underwater erosion from dredging has the potential to expose buried archeological sites to damage.

- *Blasting.* The channel passes close by the Price’s Creek lighthouse and the Bald Head light, both of historical interest. Both may be affected by seismic energy from channel blasting.

- *Historic City of Southport.* The historic district of the City of Southport, which is on the National Register of Historic Places, is approximately two miles from the site of the proposed container terminal. The City of Southport is in the path of all truck
movements because other approaches to the terminal site are blocked by the Brunswick Nuclear Plant and its cooling water canal. The cultural and historic resources of this city would not survive the onslaught of trucks and other activities related to the container terminal.

Recreational Resources

- **Incompatible water use.** Just as the container terminal would represent an incompatible land use for the nearby residential areas, the passage of container ships larger than any other vessel afloat through waters frequented by recreational craft is an incompatible water use. The lower Cape Fear River is a link in the Intracoastal Waterway and popular destination, well used by local and transient mariners, some more skilled than others. The September 2009 issue of *Sail* magazine reported: “There are currently 28 marinas and 2500 slips within a 25-mile radius of the proposed port and increased traffic could have a negative effect on recreational boating.”

- **Erosion of beaches.** The same erosion of beaches that affects sea turtles and other marine and terrestrial life would erode the recreational and scenic value of those beaches. At the beginning of the project, the beach quality sand generated by the dredging could be used to enhance the beaches, and indeed the preliminary plans prepared by CH2M Hill, Inc., contemplate such beach nourishment over a wide area. But the project has a very long life, and the permanent effects of the inevitable changes in ocean and river currents are unknown. Experience has shown that sand placed on beaches eventually finds its way back into the trenches dredged in the ocean floor, and must be removed and restored to the beaches in an endless cycle.

Other Social Effects

- **Community Impacts.** The sponsors of the container terminal promise jobs and more jobs, not so much in the terminal, which would be highly automated, but in related activities, such as railroad yards, truck stops, and distribution terminals. Such development, however, does not suit the character of the area. The Fish and Wildlife Service of the US Department of the Interior expressed this concern: “The project, when considered in its entirety, is very likely to result in permanent loss of environmental value and would convert the area from residential use with commerce based on recreation and tourism to an industrial center and transportation hub.” Moreover, the CAMA land use plan recently prepared for Brunswick County identified most of the undeveloped areas in southeast Brunswick County proximate to the terminal site as unsuitable for development, too fragile to support high density uses. Most are areas designated as Natural Heritage Areas.
The promised prosperity is not assured. On the contrary, evidence in other communities around the country shows that rates of unemployment and poverty are higher in districts around container terminals than in surrounding metropolitan areas. A recent national study concluded that “The same ports that serve as ‘economic engines’ for the region and the nation may be the cause of economic decline and deterioration in the immediate areas that surround them.” Lisa M. Grobar, *The Economic Status of Areas Surrounding Major U.S. Container Ports: Evidence and Policy Issues* (2008).

The community of Boiling Spring Lakes is bisected by the railroad line that would serve the proposed terminal. Rail traffic would increase from approximately three relatively short trains per week to ten to fifteen trains of 10,000 feet per day.

- **Noise and Light Pollution.** The container terminal will operate around the clock, 364 days a year. Vessels may call at any time of the day or night. Constant light can confuse animals, particularly birds, and disrupt feeding and breeding. The noise that emanates from large container terminals is equally disruptive and likely to drive away native species. People don’t like it much, either.

- **Life and Health Impacts.** Air pollution from diesel exhaust concentrated in port areas, especially particulate matter, has long been recognized in California as a contributor to respiratory disease and asthma, and responsible for shortening the lives of those who live in areas proximate to the container terminals at Long Beach, Los Angeles and Oakland. Recent reports also document the same effect at other large container terminals around the country.

  The Environmental Protection Agency places a value of $6 million on each avoidable premature death. In testimony before the Senate Environment and Public Works Committee in 2008, Dr. John G. Miller, an emergency physician in San Pedro, California, near the container terminal at Long Beach, attributed 246 of the 1400 premature deaths in a single year from air pollution in southern California to the container terminals at Long Beach and Los Angeles. If a price can be put on those deaths, the price would be $1,476,000,000 per year. Approximately the estimated cost of the container terminal proposed for Southport, every year.

- **Aesthetics.** The photos below show the waterfront at Southport and a typical large container terminal.
Policy Issues

**Foreign ownership of vessels**

The benefits of dredging channels to greater than existing depths are the potential economies of scale from the use of larger and more efficient vessels. All such vessels are foreign-owned, and all such economies accrue to foreign ship-owners. There is not any coastwise container trade through the Cape Fear River and the Port of Wilmington—all container traffic is import-export, and all movements are in foreign-owned and foreign-registered vessels. There is nothing to suggest that future movements will be any different.

The usual presumption is that competition in the shipping business would drive rates down to a level reflecting the economies of using larger vessels, and such rate reductions would be reflected in the prices paid for imports and the amounts received for exports. However, there is no assurance that would happen, and that such economies would result in lower shipping rates and be reflected in commodity prices, partially or entirely. The shipping lines enjoy antitrust immunity under the Shipping Act of 1984, and are free to fix rates among themselves, subject to some regulation by the Federal Maritime Commission. Typically, shipping lines participate in rate conferences for particular markets, at which they agree on rates and terms of service, effectively eliminating competition.

The Ocean Shipping Reform Act of 1998 provided some relief for shippers, by permitting contract rates and special arrangements for particular shippers. However, most of the large shipping lines in the trans-Pacific trade to the west and east coasts of the United States participate in the Transpacific Stabilization Agreement, under which container shipping rates are fixed. Current rates from China are $800 for a 40-foot container to the west coast, $1000 to the east coast.

The most recent downturn in container traffic resulted in surplus vessel capacity and removal of many vessels from service, temporarily or permanently. The resulting shrinkage in capacity has taught the shipping lines that capacity limitations provide the market power to raise and support rates, a lesson they are not likely to forget.

**Import Subsidy**

The public statements of the North Carolina State Ports Authority, claiming jobs to be "supported" or "created" by the proposed container terminal at Southport, recognize the changing character of jobs related to a container terminal and its traffic—logistics (trucking and warehousing) rather than manufacturing. Implicit in this is the recognition that jobs have been lost, and will continue to be lost, because of the imports the container terminal facilitates.


Among the facts reported are these:

- The trade deficit with China has caused 2.4 million workers in the United States to lose their jobs or be displaced since 2001.
95,100 of those lost jobs were in North Carolina. Only seven states, all much more populous, have lost more jobs to the trade deficit with China.

North Carolina ranked second among the states in percentage of job loss attributable to the trade deficit—2.3% of total employment.

Two-thirds of the jobs lost were in manufacturing, which tends to provide higher wages and benefits than other occupations.

The American Manufacturing Trade Action Coalition (www.amtacdc.org) released a report in May 2008 specific to North Carolina, focusing on the loss of jobs in manufacturing and retarded economic growth due to trade deficits. That report points out that, although most of the people losing manufacturing jobs eventually found other work, the new jobs offered lower pay and fewer benefits than jobs in manufacturing. For example, the average annual pay in manufacturing is $58,516, while the average pay in state and local government is $45,099. The average for trucking is $48,930. Warehousing, $41,844. Retail, $27,667.

All of the past job loss in North Carolina cannot be attributed to the container terminal in Wilmington, and all of the future job loss cannot be attributed to expansion of container terminal facilities. Many of the imported goods arrive and will continue to arrive through other ports.

Moreover, container terminals do facilitate exports as well as imports. Public investment in container terminals, to the extent capacity supports exports, is money well spent. But investment to increase capacity beyond that, to facilitate imports in greater quantities, can only damage the economy of the State and the nation.
Glossary

CH2M Hill, Inc.  An engineering and consulting firm, experienced in port construction, engaged by the North Carolina State Ports Authority.


Intermodal.  Spanning more than one mode of transport.  Intermodal containers can be carried on vessels, trucks, and rail cars, and commonly move on all three modes in a single trip from origin to destination.


Moffatt & Nichol.  An engineering and consulting firm, experienced in port matters, engaged by the North Carolina State Ports Authority.

North Carolina State Ports Authority.  A semi-autonomous component of the State of North Carolina. The NCSPA is not part of the administrative branch of government; it is governed by a board of directors appointed by the legislature and the governor.

Panamax.  Largest vessel able to pass through the Panama Canal today.  The Canal limits size to 40-foot draft, 108 feet in beam, and about 960 feet in length.

Post-Panamax.  Vessel larger than Panamax.  Vessels of draft of 50 feet or less and beam of 160 feet or less are sometimes called “new Panamax,” because the expansion of the Panama Canal scheduled for completion in 2014 would accommodate that size.

TEU.  Twenty-foot equivalent unit.  Containers used for international shipments come in various sizes, but the shortest size in common use is 20X8X8.5 feet. Most containers are 40 feet long, or two TEU.  TEU is used to measure vessel capacity.  When used with reference to a terminal size or capacity, the term means TEU per year.
Sources


California Air Resources Board, *Health Effects of Diesel Particulate Matter*.


