Cape Fear Skyway
Preliminary Bridge
Location and Type Study
STIP U-4738

Brunswick and New Hanover Counties

Final

NORTH CAROLINA TURNPIKE AUTHORITY

Prepared for:

March 2009

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1.0 INTRODUCTION

In October 2002, legislation was passed authorizing the creation of the North Carolina Turnpike Authority (NCTA) with the purpose to study, design, plan, construct, promote, own, finance, and operate a system of toll roads, bridges, and/or tunnels supplementing the traditional non-toll transportation system serving the citizens of North Carolina (GS §136-89.182).

In August 2005 and August 2006, legislation was passed authorizing the NCTA to study, plan, develop, and undertake preliminary design work on up to nine toll projects. At the conclusion of these activities, the NCTA is authorized to design, establish, purchase, construct, operate, and maintain several projects, one of which is the Cape Fear Skyway. Toll enforcement legislation was passed in July 2008 authorizing the NCTA to require payment of a toll for the use of a NCTA project by the registered owner of a motor vehicle (GS §136-89.212).

The Cape Fear Skyway project is listed in the 2009-2015 North Carolina Department of Transportation (NCDOT) State Transportation Improvement Program (STIP) as STIP Project No. U-4738, and shown as new location from "US 17 to Independence Boulevard/Carolina Beach Road Intersection – construct a new facility with structure over the Cape Fear River (9.5 miles)". Additionally, the Cape Fear Skyway is included in the Wilmington Urban Area Metropolitan Planning Organization's (WMPO) *2030 Long Range Transportation Plan* (LRTP) (March 2005) as a freeway.

The NCTA is proposing to improve transportation mobility in the area around the City of Wilmington and between southern Brunswick and southern New Hanover Counties, particularly across the Cape Fear River. According to the *Feasibility Study for the Wilmington Southern Bridge from US 17 Bypass near Bishop to US 421* prepared by the NCDOT in August 2003, the project would serve multiple users, including the Port of Wilmington, the military, commuters, and tourists.

The Study Area for the Cape Fear Skyway project consists of a 22,216 acre (35 square miles) area that begins near the communities of Bishop and Spring Hill and ends in the City of Wilmington (pop. 75,838), the largest metropolitan area in the southeastern part of the state. The Study Area is shown on **Figure 1**.

This Preliminary Cape Fear Skyway Bridge Location and Type Study (henceforth referred to as bridge study) will focus on the feasibility, type, and location of the bridge. The type and location of the bridge will ultimately determine the eastern terminus of the proposed roadway project. The Bridge Study Area consists of 8,800 acres (14 square miles) beginning at NC 133 and ending at US 421. The Bridge Study Area is shown on **Figure 2**.

While information included in this study may support findings during the National Environmental Policy Act (NEPA) studies, this bridge study does not equate to a NEPA study. Purpose and Need will still need to be determined, as well as what alternatives will be studied in detail.

1.1 PURPOSE OF PRELIMINARY BRIDGE LOCATION AND TYPE STUDY

The purpose of this bridge study is to identify potential options for the location and type of a bridge that may cross the Cape Fear River as part of the Cape Fear Skyway project. Should a cable-stayed bridge be identified as the preferred bridge type, it would require six months for preliminary design and an additional 12 to 15 months for final design. By determining the bridge

type and bridge location early in the planning process, the design-build stage of the project may be expedited, therefore reducing the critical path of the project as a whole.

The Bridge Study Area was chosen to identify several potential alignments for the proposed Cape Fear Skyway bridge in terms of cost, bridge type, bridge span, environmental constraints, cultural and historic resources, and socioeconomic factors.

The feasibility portion of this bridge study was made up of the following activities, which are described in this report:

- Identification of environmental, cultural and historic, and socioeconomic constraints.
- Identification of bridge types and preliminary route options.
- Use of optional route analysis that considers navigational channel clearances and estimated costs for each bridge type.

The Cape Fear Skyway project is currently in the preliminary planning phase of the National Environmental Policy Act (NEPA) process. A Purpose and Need Statement and Alternatives Analysis are currently being developed for the project.

1.2 PROJECT SETTING

The proposed Cape Fear Skyway is located in Brunswick (population 99,214) and New Hanover (population 190,432) Counties in southeastern North Carolina. Brunswick County is bounded by the Atlantic Ocean, the Cape Fear River, Columbus, Pender, and New Hanover Counties, and South Carolina. The present land area is approximately 850 square miles. New Hanover County is bounded by the Atlantic Ocean, the Cape Fear River, and Brunswick and Pender Counties. The present land area is approximately 200 square miles. The western portion of the Study Area is located near the communities of Bishop and Spring Hill, in northern Brunswick County just west of US 17. The Study Area continues through Leland to cross NC 133, and ends in the City of Wilmington (population 75,838), just east of US 421. **Figure 1** shows the general project location and Study Area.

Brunswick and New Hanover Counties are in the Coastal Plain physiographic region of the state, which is characterized by gently rolling plains and swampy tidewater along the Atlantic Coast. The Study Area consists of several tributaries of Town Creek (Bishop Branch, Morgan Branch, and Goodland Branch), Mallory Creek, Little Mallory Creek, Jackeys Creek, and the Cape Fear River.

Most of the Study Area is in a relatively undeveloped portion of Brunswick County, with the exception of the US 17 corridor between Lanvale Road and US 74/76; however, new residential and commercial development is underway, particularly near the western portion of the Study Area. There are several low-density, single-family neighborhoods near the western portion of the Study Area. The Spring Hill community, a predominantly African-American neighborhood, is located near US 17 and Goodman Road (SR 1414) (Figure 2). A large (5,000 to 6,000 acres) mixed-use development with approximately 12,000 proposed home sites and 300 acres of commercial land is under construction within the Study Area. This proposed development, called Brunswick Forest, is roughly bounded by US 17, NC 133, and Town Creek (**Figure 2**). In addition, local planners indicated that property along NC 133 is experiencing rapid residential development. Much of the land along Town Creek (along the southern boundary of the Study Area) is held in conservation by the North Carolina Coastal Land Trust.

CAPE FEAR SKYWAY

State Transportation Improvement Program
Project No. U-4738

NORTH CAROLINA Turnpike Authority

Legend

- Proposed Wilmington Bypass STIP No. R-2633 (I-140)
- Study Area
- Cape Fear Skyway - Feasibility Study Alignment
- US Highways
- State Highways
- Local Roads
- Railroad
- Streams
- County Boundary
- NC State Ports Authority
- National Register Historic District
- Open Water
- Parks, Gamelands, Protected Lands
- Clarendon Plantation
- Municipal Boundary

N

0 0.5 1 2
Miles
0 2,500 5,000 10,000
Feet

Counties
Brunswick
New Hanover

Cape Fear Skyway Preliminary Bridge Location and Type Study

Figure 1
Study Area

Date: March 2009
This map is for reference only.
Sources: ESRI Inc., CGIA, NCDOT, and URS.

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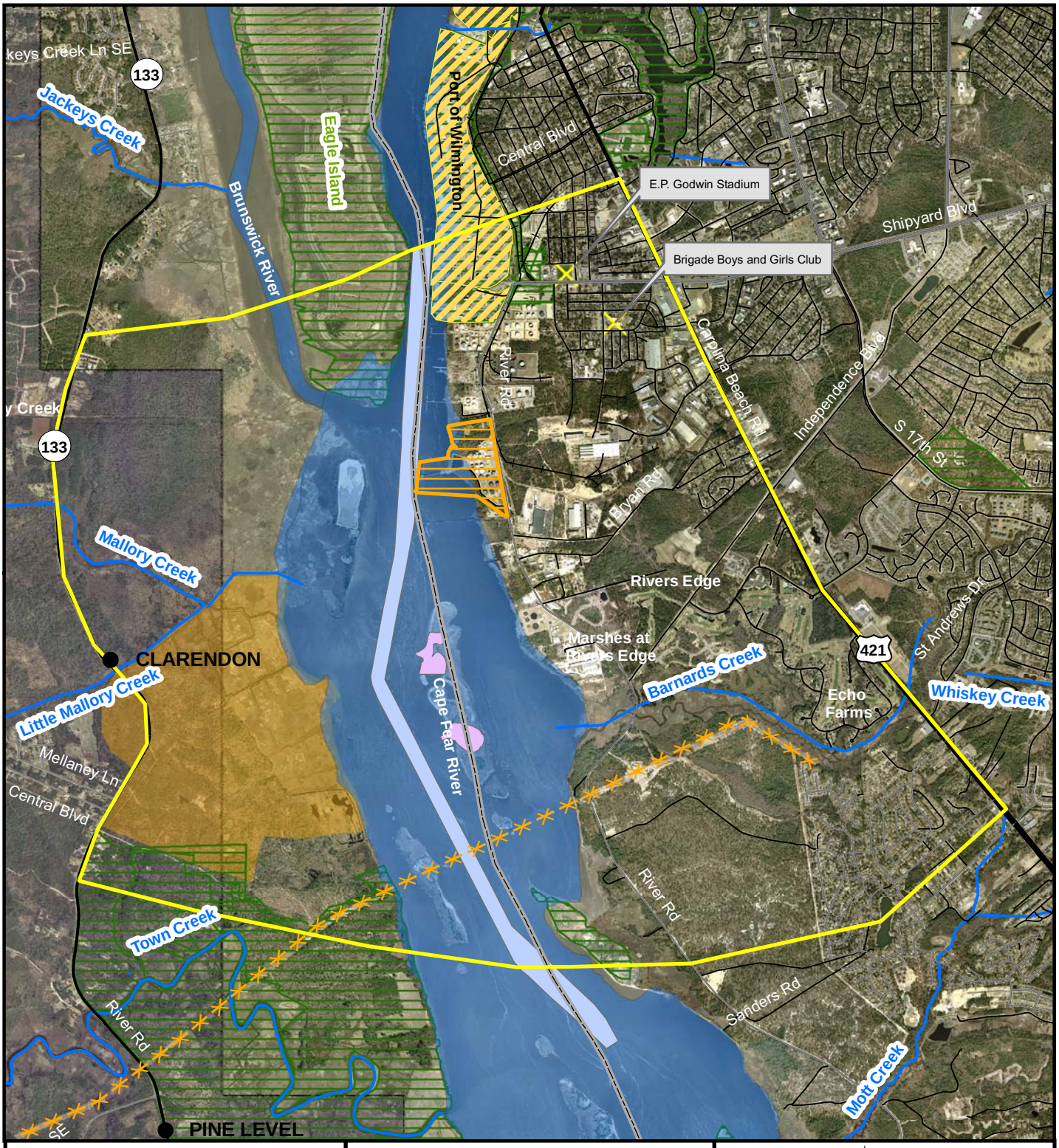

CAPE FEAR SKYWAY

State Transportation Improvement Program
Project No. U-4738

NORTH CAROLINA Turnpike Authority

Legend

- Bridge Study Area
- Exxon Mobil
- Progress Energy Transmission Line
- Interstate Highways
- US Highways
- State Highways
- Local Roads
- Streams
- Railroads
- County Boundary
- Island 13 Mitigation Area
- NC Ports Authority
- Navigational Channel
- Open Water
- Parks, Gamelands, and Protected Lands
- Clarendon Plantation

N

0 0.5 1 Miles

0 2,500 5,000 Feet

Cape Fear Skyway Preliminary Bridge Location and Type Study

Date: February 2009

Figure 2

Bridge Study Area

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The Study Area would terminate in the City of Wilmington, east of US 421. Independence Boulevard, north of Shipyard Boulevard is a heavily traveled commercial street with many commercial centers, restaurants and offices. South of Shipyard Boulevard, Independence Boulevard is more residential in nature and the Echo Farms Country Club and golf course straddles the road.

The Port of Wilmington, operated by the North Carolina State Ports Authority (NCSPA), is located on the eastern bank of the Cape Fear River within the Study Area.

1.3 BRIDGE STUDY AREA

The Bridge Study Area consists of 8,800 acres (14 square miles). NC 133 is the western boundary and US 421 is the eastern boundary. The western portion of the Bridge Study Area remains relatively undeveloped, with a large portion consisting of Cape Fear River floodplains and freshwater marsh. A large historic plantation (Clarendon) occupies the western portion of the Bridge Study Area. The Mallory Creek development is currently under construction near the western edge of the Bridge Study Area. The eastern portion of the Bridge Study Area is heavily developed in the central and northern portions (Port of Wilmington and associated industry). The southern portion is a mixture of undeveloped land consisting of pine forest and what appear to be old logging roads and sand quarries, residential development (Echo Farms and Marshes at Rivers Edge), and a golf course.

Any potential bridge crossing of the Cape Fear River introduces several additional constraints within the Bridge Study Area. The bridge would cross a navigational channel maintained by the US Army Corps of Engineers (USACE). Within the Bridge Study Area, the channel ranges in width between 400 and 500 feet. The channel was first dredged in the late 1960's to a depth of 38 feet. In 1996, the channel was deepened to 42 feet. There are no plans to further deepen the channel. There are several utility lines that utilize the bottom of the channel near the Exxon-Mobil dock. These utilities consist of a natural gas line and AT&T fiber optic cables. Progress Energy owns and maintains 230kV dual overhead transmission lines within the Bridge Study Area. The center span of the dual transmission lines introduces a vertical constraint of 165 feet from mean high water (MHW). Upstream of the Bridge Study Area, the Cape Fear Memorial Bridge maintains a vertical constraint of 135 feet from MHW when open to navigation. The Cape Fear Memorial Bridge is a lift-span bridge, with the main lift-span being approximately 350 feet long. When closed to navigation, passage is constrained to 65 feet from MHW.

2.0 RIVER CROSSING LOCATION OPTIONS

Using land suitability mapping within the Bridge Study Area, potential river crossing locations were identified between NC 133 and US 421. Undeveloped areas, non-wetland areas or areas where wetland systems narrowed, and narrow portions of the Cape Fear River navigational channel, offer the most desirable crossing locations. The crossing locations were developed to avoid physical and environmental constraints, where possible, and to minimize the effects on these constraints where possible. The bridge location is constrained by the Port of Wilmington which, according to Port officials, cannot be traversed due to security reasons. It is also constrained by Eagle Island (a dredge spoil disposal site) and the Progress Energy 230 kV dual transmission lines in the southern portion of the Bridge Study Area.

Three potential river crossing locations have been identified in this bridge study. Each river crossing location is 1,500 feet wide and extends from NC 133 to US 421. The three crossing

locations include the North Option, the South Option, and the Central Option. The three crossing locations are shown on **Figure 3** Figure 3.

2.1 NORTH OPTION

The North Option extends from the northern end of NC 133 within the Bridge Study Area to US 421 at Shipyard Boulevard. From NC 133 it travels in an easterly direction across the tidal freshwater marsh associated with the Cape Fear River. Once south of Eagle Island and the Port of Wilmington, it turns to the north running roughly parallel with River Road. It intersects with Shipyard Boulevard east of the E.P. Godwin Stadium then extends along Shipyard Boulevard to US 421.

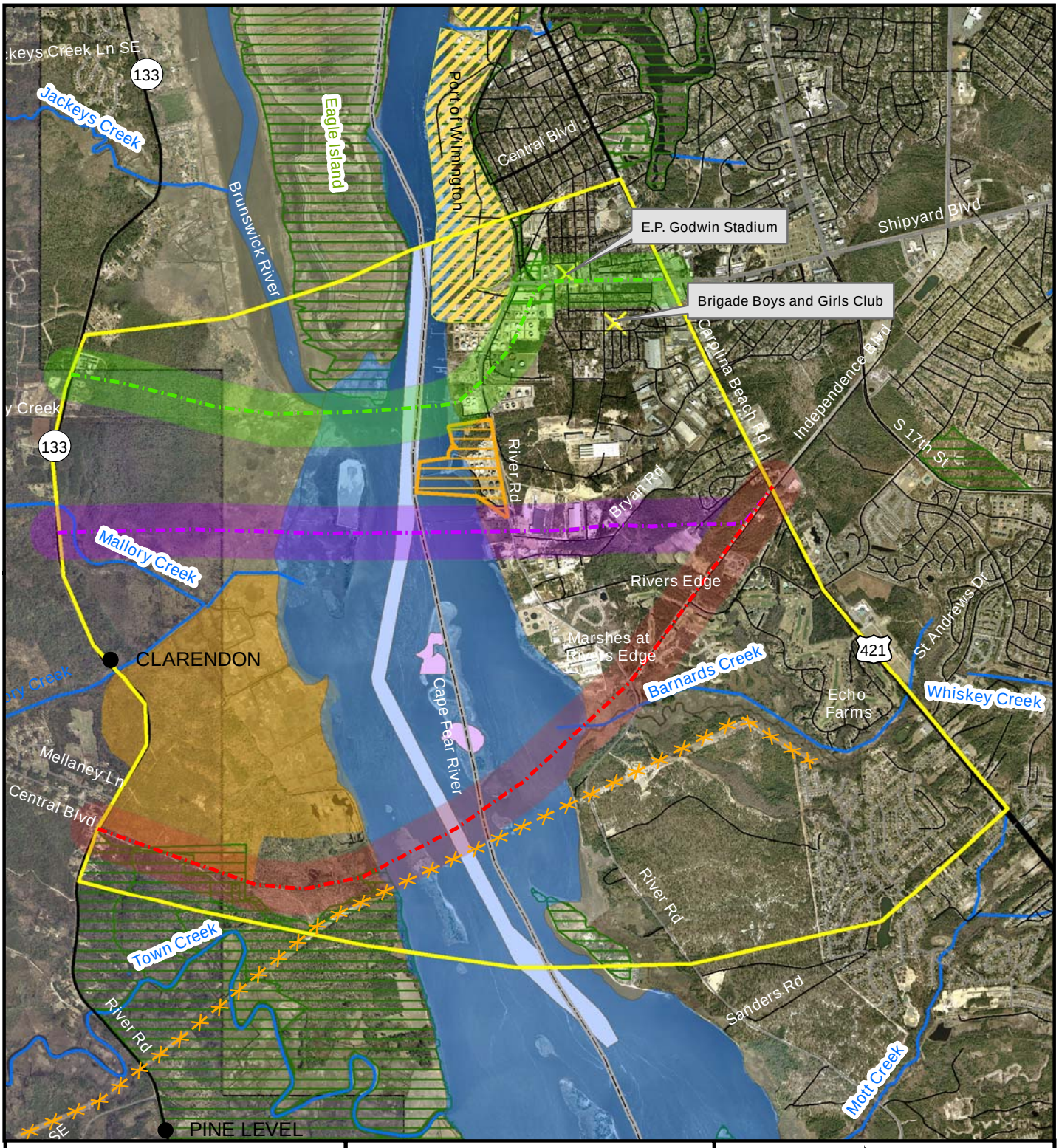
Although this option traverses some of the industries associated with the Port, Port officials have suggested creating even more direct access (via River Road) to the Port of Wilmington from the proposed Cape Fear Skyway in an effort to improve accessibility and mobility of freight services. Port officials suggested that the Cape Fear Skyway is necessary to accommodate growth, and the project has been identified by the NCSPA as a freight corridor priority (*Presentation to 21st Century Transportation Intermodal Committee*, NCSPA, February 2008). The North Option is approximately 3.5 miles in length, and would require additional improvements to River Road.

2.2 SOUTH OPTION

The South Option extends from the southern end of NC 133, just south of Mellaney Lane to Independence Boulevard at US 421. This route passes along old logging roads south of Clarendon Plantation and turns to the north approximately two tenths of a mile north of the Progress Energy 230kv dual transmission lines. This option extends along Independence Boulevard to its intersection with US 421. The South Option is approximately 4.4 miles in length.

2.3 CENTRAL OPTION

The Central Option is very similar to the alignment included in the *Feasibility Study for the Wilmington Southern Bridge from US 17 Bypass near Bishop to US 421* prepared by the NCDOT in August 2003. This option follows the same general route as the feasibility alignment, extending from NC 133 south of Mallory Creek across the Cape Fear River, eventually tying into Bryan Road and extending to the intersection of Independence Boulevard and US 421. The Central Option is approximately 3.8 miles in length.



CAPE FEAR SKYWAY

State Transportation Improvement Program
Project No. U-4738

NORTH CAROLINA Turnpike Authority

Legend

- Bridge Study Area
- Interstate Highways
- US Highways
- State Highways
- Local Roads
- Railroads
- County Boundary
- NC Ports Authority
- Exxon Mobil
- Progress Energy Transmission Line
- Potential 4(f) Property
- North Option
- Central Option
- South Option
- Streams
- Navigational Channel
- Open Water
- Parks, Gamelands, and Protected Lands
- Clarendon Plantation
- Island 13 Mitigation Area

N

0 0.5 1 Miles

0 2,500 5,000 Feet

Cape Fear Skyway Preliminary Bridge Location and Type Study

Date: February 2009

Figure 3

River Crossing Location Options

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3.0 NAVIGATIONAL REQUIREMENTS

Establishing appropriate horizontal and vertical navigational clearances for a new bridge over the Cape Fear River is influenced by several factors. The most important of these factors are:

1) The height of the existing Progress Energy 230kV dual transmission lines that extends across the Cape Fear River in the southern portion of the Bridge Study Area.
2) Anticipated trends in merchant vessel size increases over time calling on the Port of Wilmington.
3) Navigational constraints at competing ports that may influence future vessel size accommodations.
4) The Port's plans to accommodate the potential future fleet.

Naturally, the desire is to provide navigational clearances that will not hinder waterborne commerce, present or future. This desire is complicated by the fact that merchant ship navigation requirements cannot be predicted beyond a decade, as not much is known about new ship designs and orders that may occur beyond that time. Meanwhile, bridges are expected to serve for 50 to 75 years. The approach used in this bridge study evaluated the four factors noted previously to establish appropriate bridge clearances. Clearances are based on available information from the present and the predictable short-term future, navigational channel constraints, and on a rational evaluation of additional clearance height that would take into account long-term trends and developments.

3.1 EXISTING CONDITIONS AT THE PORT OF WILMINGTON

Currently, the only vertical constraint between the Atlantic Ocean and the Port of Wilmington is the Progress Energy 230kV dual transmission lines, with a vertical constraint of 165 feet from MHW. Approximately 2.2 miles north of the Port, the Cape Fear Memorial Bridge has vertical clearances in full open and closed positions to vessels of 135 feet and 65 feet above MHW, respectively. Approximately 8.8 miles north of the Port, the Isabel Holmes Bridge has a vertical clearance in the closed position to vessels of 40 feet above MHW. In the open position, the Isabel Holmes Bridge poses no vertical constraint, as it is a bascule-type drawbridge.

The navigational channel maintained by the USACE originates in the open waters of the Atlantic Ocean approximately 6.7 miles south of the mouth of the Cape Fear River. The channel is dredged to a depth of 44 feet until it reaches Southport (approximately mile marker 2.9). At mile marker 2.9, the channel depth adjusts to 42 feet and remains at 42 feet until well north of the Port at mile marker 27.2. From mile marker 27.2 to mile marker 29.5, the channel depth is 38 feet. Beyond mile marker 29.5, the depth shallows to 34 feet. The USACE has no plans to further deepen the navigational channel within the Cape Fear River. The channel is regularly dredged to maintain the abovementioned depths. The portion of the navigational channel within the Bridge Study Area was last dredged in Spring of 2008.

Within the Bridge Study Area, the navigational channel maintains a width ranging from 400 to 500 feet, and the river width ranges from approximately 3,200 to 7,050 feet from bank to bank.

Section 5.3.5.3, Aquatic Commerce, discusses the current and predicted cargo quantities and characteristics of vessels utilizing the Port of Wilmington. Port officials predict growth in bulk and break bulk cargo and a reduction in container cargo.

The Port hosts approximately six small cruise ships per year. For example, in May of 2008, the 366-foot ship named Bremen called the Port of Wilmington en route from Fort Lauderdale,

Florida to Bar Harbor, Maine. The ship holds 166 passengers. To date, no cruise lines have approached the NCSPA concerning Port accommodation. The current terminal is not equipped to handle passengers, and cruise companies have cited the distance of the Port from open water (approximately 25 miles) and navigational constraints including channel depth and transmission line height for the reason the Port has not been pursued (personal communication, Hufham 2008).

3.2 CHARACTERISTICS OF VESSELS

The following sections describe the characteristics and present, near-term, and long-term trends of vessels likely to visit the Port of Wilmington as well as those vessels in markets targeted by the Port.

3.2.1 CHARACTERISTICS OF THE MERCHANT FLEET

The world's overall merchant shipping fleet comprises a number of specialized fleets of vessel types designed to carry specific cargoes (e.g., containers, bulk cargo, roll-on/roll-off [Ro-Ro], passenger cruise ships). Each of these individual specialized fleets, in turn, comprises vessels of varying sizes and air draft requirements. One observation is clear; however, the historical trend has been toward larger vessels in all categories. This trend is especially marked in cruise ships and container ships. The very largest of the present bulk carriers will probably not be surpassed in size by future vessels.

This evaluation of the characteristics of the merchant fleet included a survey of empirical data relative to the existing and planned (on-order) fleet, with particular emphasis on those vessels serving the south Atlantic Ocean range. In addition, the evaluation includes speculation about long-term trends in merchant vessel size and the issues influencing those trends, particularly at the NCSPA.

3.2.2 PRESENT AND NEAR-TERM CHARACTERISTICS OF MERCHANT VESSELS

The NCSPA shipping logs from Fiscal Years (FY) 2005, 2006, and 2007 were evaluated to determine the maximum vessel size using the North Carolina State Ports within the past three years. A total of 556 ships have used North Carolina State Ports (Wilmington and Morehead City) between FY 2005 and FY 2007. The most common vessels using these ports were general cargo vessels (25 percent), bulk carriers (21 percent), tankers (15 percent), and container ships (9 percent). Various other vessel types make up the remaining 30 percent.

Approximate air draft of vessels using these ports from 2005 to 2007 was calculated by subtracting the amount of water draft in feet from the keel to mast height (KTMH). KTMH was not available for all vessels. For those vessels with air draft information available, general cargo vessels had air drafts ranging from approximately 65 to 127 feet; bulk carrier air drafts ranged from approximately 98 to 111 feet; tankers ranged from approximately 79 to 122 feet; and container ships ranged from approximately 123 to 137 feet. The range of air drafts for ships using the ports from 2005 to 2007 actually exceeds 137 feet, as described below. Coordination with officials from Yang Ming show that some of their vessels calling the Port of Wilmington average 140 to 158 feet of air draft.

The analysis of the data collected in the survey was focused on determining the vertical navigational clearances necessary to allow for the safe and efficient passage of the maximum number of vessels currently in service, planned, and those reasonably projected to be in service in the south Atlantic Ocean range, and specifically at the Port of Wilmington. Based on

telephone interviews with cargo owner/operators, it is difficult to determine the size (number of vessels) of the fleet of cargo vessels in the future because of vessel movements and reactions to market demands and needs. Also, in many cases air draft was not provided due to load and ballast variables. According to local shipping agents, as well as vessel logs from the NCSPA, Yang Ming Marine Transport Corporation currently operates the largest vessels at the Port of Wilmington on a consistent basis. For example, the YM East, a container ship, has a reported air draft of approximately 133 feet. There are eight Yang Ming vessels that currently call the Port of Wilmington every 60 days, and average 140 to 158 feet of air draft. Officials from Yang Ming indicate that few of their container ships currently exceed 158 feet, and if new vessels in the next size-class are ordered in the future, they would probably not exceed 160 feet.

The current cruise fleet of approximately 560 vessels has an average air draft of 131.3 feet and an average beam (width of a ship) of 71.2 feet. The tallest, or greatest air draft, vessel in the cruise ship fleet is operated by Star Clipper Cruises at 226 feet (Star Clipper Cruises, 2008). This vessel is the Star Clipper and is a five-mast sailing cruise ship, which remains exclusively in the eastern Caribbean and is, therefore, not an issue at the Port of Wilmington. Overall, Royal Caribbean operates the largest cruise vessels. The Oasis of the Seas, with a planned launch in December 2009 (Royal Caribbean website: www.royalcaribbean.com), will have an air draft of approximately 230 feet. This is expected to be the largest cruise vessel in the industry. **Table 1** shows some of the larger ocean vessels, and their variety of sizes, being used today.

Table 1: Cargo and Cruise Line Owner/Operators Vessel Characteristics

Owner/Operator Name	Ship Name	Type	Max Air Draft in feet	Max Beam (width of ship) in feet
Italia Marittima Spa	LT Lloydiana	Container	137	106
Italia Marittima Spa	Scotland	Container	127	106
Yang Ming	YM East	Container	133	106
Zim Integrated Shipping	Zim Italia	Container	123	105
Kawasaki Kisen Kaisha Ltd	Manhattan Bridge	Container	128	106
Gear Bulk Pool Ltd	Alouette Arrow	Cargo	104	70
Not available	Atlantic Leader	Cargo	127	76
Folmer & Co.	Danica Four	Cargo	65	34
Saga Forest Carriers Intl.	Saga Spray	Cargo	119	100
National Shipping Arabia	Saudi Hofuf	Ro Ro Cargo	159	106
National Shipping Arabia	Saudi Abha	Ro Ro Cargo	159	106
Saga Forest Carriers Intl.	Saga Merchant	Open Hatch Bulk Carrier	117	101
Saga Forest Carriers Intl.	Saga Minerva	Open Hatch Bulk Carrier	126	101
Champion Tankers	Ionian Trader	Tanker	122	99
Odfjell Tankers	Bow Summer	Tanker	115	106
Jo Tankers	Jo Brevik	Tanker	121	97
Naviera Chilena del Pacifico	Acacia	Bulk Carrier	105	85
Marbulk Shipping	Bahama Spirit	Bulk Carrier	111	105

Table 1: Cargo and Cruise Line Owner/Operators Vessel Characteristics (cont.)

Owner/Operator Name	Ship Name	Type	Max Air Draft in feet	Max Beam (width of ship) in feet
Carnival Cruise Line	Carnival Splendor	Cruise (2,904 passenger capacity)	208	127
Celebrity Cruises	Celebrity Equinox	Cruise (1,950 passenger capacity)	181	106
Cunard Cruise Line	Queen Mary 2	Cruise (3,090 passenger capacity)	205	136
Princess Cruises	Sapphire Princess	Cruise (2,600 passenger capacity)	177	153
Royal Caribbean Cruise Line	Oasis of the Seas*	Cruise (5,400 passenger capacity)	230	160
Viking River Cruises	Inland Cruise Vessels	Cruise (124 to 306 passenger capacity)	23	36
Square Sail	Earl of Pembroke	Sailing Cruise (15 passenger capacity)	93	24

*To be launched in December 2009.
Source: Lloyd's Register Fairplay. www.ships-register.com

3.2.3 LONG-TERM TRENDS IN CRUISE SHIPS

Among the vessels that require the highest air draft clearance per deadweight are the cruise ships. This trend is related to the industry's desire to carry more passengers (larger vessels, generally) and to provide more outside cabin views (higher profiles, specifically). In the highly competitive cruise ship market, such amenities are important. Within the industry, it is anticipated that the cruise ship business will continue to grow into and beyond the foreseeable future. However, no cruise lines have approached the Port of Wilmington to date concerning port accommodations.

The tallest planned cruise vessels are becoming larger to satisfy the demand and needs of the cruise market, as discussed above. Many cruise lines are moving toward maximizing the number of cabins with outside views and private balconies. For example, Royal Caribbean has plans to launch a new ship, the Oasis of the Seas, in 2009. This ship will become the largest cruise vessel in the world, with a passenger carrying capacity of 5,400 guests, and a maximum air draft of 230 feet. However, due to the dynamics of the global marketplace, no cruise line contacted stated that they operate with planning horizons beyond 10 to 12 years.

Several new cruise ships are planned to be launched from 2009 to 2012, totaling over $26 billion in new vessel orders from cruise operators such as Carnival, Celebrity, Oceania, Cunard, Royal Caribbean, and Disney Cruise Lines. With the brisk activity in new ship orders and the optimism about continued growth within the industry, it can be anticipated that the long-term future will include many new, large cruise ship designs.

3.2.4 LONG-TERM TRENDS IN CONTAINER SHIPS

Within the past quarter century, general cargo has increasingly been transported in container ships. Ports have planned and built highly mechanized container terminals to accommodate the specialized handling requirements of containers. The results have been remarkable overall efficiencies, compared to past methods for shipping and handling general cargoes. According to *Propulsion Trends in Container Vessels*, published by MAN Diesel in 2008, as containerized freight has become the trend, the specialized merchant fleet to carry containers has rapidly evolved to larger and larger vessel capacities.

The 2008 world container fleet consists of some 4,272 ships with a combined capacity of close to 11.8 million teu (twenty-foot equivalent unit), and has increased by about 30 percent over the last three years. The ships are growing both in number and size, and the largest container ships delivered in January 2008 have a capacity of approximately 15,500 teu (*Propulsion Trends in Container Vessels*, MAN Diesel, 2008).

The evolution of container ship design is particularly applicable to this discussion of merchant ship vertical clearance requirements because container ships present relatively higher profiles than other cargo vessels of similar deadweight tonnage. Container ships typically carry boxes stacked on deck, with the control bridge superstructure built high enough to provide line-of-sight over the stacked boxes. However, 215 feet of air draft is considered an industry standard for the upper range of vessel development based on the need and desire to serve specific markets, specifically New York Harbor.

According to the NCSPA, as a result of the proposed North Carolina International Port (NCIP), it is predicted that there will be a growth in bulk and breakbulk cargo and a reduction in container cargo at the Port of Wilmington. However, the NCIP is not anticipated to stop all container cargo to Wilmington, especially if the Port offers lower fees and/or specialized operating services. Port officials stated that it is difficult to predict the vertical clearance needs for the proposed bridge, especially if the NCIP becomes a reality (which would greatly reduce the size of ships visiting the Port of Wilmington).

3.2.5 LONG-TERM TRENDS IN BULK CARRIERS

The vessels of the bulk cargo carrier fleet are further specialized for carrying different cargoes (e.g., dry bulk, petroleum, chemicals, ore). The top commodity imported to the Port of Wilmington in 2007 was chemicals, and the top commodity exported was woodpulp. The present top end of that specialized fleet is represented by the Ultra Large Crude Carriers (ULCCs), which are generally defined as those over 320,000 deadweight tonnage (dwt). The largest of these reaches over 550,000 dwt, of which four were built by Chantiers de l' Atlantique. It is not likely that additional ULCCs this large will be constructed in the future. The orders for the last of these mega-giants were made before the oil crisis of 1973 and the last one was delivered in 1979.

Today, and probably in the future, the largest super tankers being built are in the Very Large Crude Carrier (VLCC) range (200,000 to 320,000 dwt). Examples are recently launched VLCCs built by Hyundai Heavy Industries for Concordia Maritime, a Stena company. The design for these 315,000 dwt vessels uses an exceptionally wide beam (almost 230 feet), allowing a relatively shallow-draft hull form and providing 30 percent higher loading capacity per draft than conventional designs. The exceptionally wide beam requires dual rudders and dual engines, which the vessel's designer also touts as a safety feature.

3.2.6 LONG-TERM TRENDS IN MILITARY VESSELS

Currently, Navy vessels from Sunny Point Military Ocean Terminal (approximately 15 miles downstream from the Port of Wilmington) do not travel upstream for repair or fueling (personal communication, Stephanie Ayers, 2008). An evaluation of the long-term future for Navy vessels (and the Port of Wilmington's ability to attract those vessels) is particularly difficult because of the nature of military strategizing. Therefore, clearance requirements for Navy vessels at the Port of Wilmington may not be a determining factor in establishing the top of the bridge clearance height envelope.

3.2.7 ECONOMIC IMPACTS OF THE PORT

The NCSPA is the governing body that administers North Carolina's Port of Wilmington, Port of Morehead City, and inland terminals in Greensboro and Charlotte. The nature of the business is to support economic development in North Carolina through the operation of shipping terminals and the movement of cargo.

Seaport activity impacts local, state, and regional economies by generating direct and indirect jobs, revenue, and taxes. The Port of Wilmington is an international port, owned and operated by the NCSPA. It offers terminal facilities serving military, container, bulk, and breakbulk operations. CSX Transportation (railroad) provides daily service for boxcar, tanker, and general cargo services. The greater economic impact of the Port of Wilmington was measured by examining the number of jobs created, business revenue generated, and the amount of state and local taxes produced by Port activities.

An economic impact report for North Carolina's Ports in Morehead City and Wilmington entitled *The Local and Regional Economic Impact of the North Carolina State Ports Authority* (Martin Associates, 2006) showed the number of state employees at the combined facilities totaled 283. This does not include other direct jobs at the facilities, such as stevedores, terminal operators, trucking firms, steamship agents, freight forwarders, and others on the terminal and involved in maritime activities at the facilities. The study showed that the two ports directly and indirectly support 85,000 jobs, which contribute $299 million annually in state and local tax revenues based on the Ports' fiscal 2005 cargo volumes.

The Port of Wilmington is equipped to handle containerized, bulk and breakbulk cargoes. According to the WMPO's *2030 Long Range Transportation Plan* (WMPO, March 2005), the wharf frontage is approximately 6,800 feet long. The open storage dry bulk facility has the capacity for more than 800 tons of outload per hour with 70,000 tons of storage capacity. The covered dry bulk facility has 2.5 million cubic feet of storage space with an import conveyor system for grain and fertilizers.

Port officials indicated that the number of trucks entering and exiting the Port of Wilmington is expected to more than double by the year 2017 (*Presentation to 21st Century Transportation Intermodal Committee*, NCSPA, February 2008). In addition, cargo volumes at the Port of Wilmington increased approximately 15 percent from 2005 to 2008 (NCSPA website: http://www.ncports.com/_Port_Statistics.htm), and bulk and breakbulk cargo volumes will likely increase by approximately 44 percent between 2009 and 2017 (*10 Year Most Likely Cargo Forecast*, NCSPA, 2008). Growth is occurring because of congestion at western United States ports and increased international trade. Currently, Port traffic is restricted to local roads.

Port of Wilmington officials indicated that there are plans to improve and extend the existing shipyard southward along River Road east of the Cape Fear River. As of November 2008,

NCSPA had begun reconstruction of a second container berth as part of this terminal expansion at the Port.

The NCSPA has proposed to build a new international container terminal in Brunswick County near Southport. The NCIP terminal is proposed about four miles from the mouth of the Cape Fear River. The development of the international terminal is in the initial planning stages, with a build date ranging from 2018 to 2028. While this proposed terminal is anticipated to bring nearly one-half million jobs and billions of dollars in tax revenues (NCSPA website: http://www.ncports.com/_NC_International_Terminal.htm), its proximity to the deepwater of the Atlantic Ocean at the mouth of the Cape Fear River is likely to reduce traffic to the Port of Wilmington, approximately 25 miles upstream.

3.3 MERCHANT VESSELS LIKELY TO CALL THE PORT OF WILMINGTON IN THE FUTURE

One of the main factors determining size and number of vessels likely to call the Port of Wilmington in the future will be determined by the addition of the NCIP in Brunswick County (approximately 25 miles downstream).

The discussion above has summarized what is known and what can be speculated about the future fleet of merchant vessels that may operate in the Port of Wilmington in the future. For this bridge study, the additional unknowns are vessel types that the Port of Wilmington will likely attract and the bridge vertical clearance that will allow them to pass.

A number of considerations influence the assumptions for these unknowns. They include plans for improvements and developments at the Port of Wilmington, the port-selection decision process by vessel owners/operators, and conditions and constraints at competing ports. Each of these considerations is discussed below.

3.3.1 FUTURE PLANS AT THE PORT OF WILMINGTON

At the Port of Wilmington, as at most commercial harbors, port managers and developers have plans and programs that could change the characteristics of merchant shipping navigation needs in the harbor. For this reason, it is important to evaluate present-day and long-term port conditions.

The Port of Wilmington continues to invest in expanding the facility to meet projected growth in international trade. A major container-terminal expansion project is in progress now. A 975,000-square-foot global warehouse/distribution center in Leland Industrial Park, located 10 miles from the Port of Wilmington, is currently being proposed. The project, named The North Carolina Port Industrial Facility, would be the only new, large, institutional grade facility available to support the Port of Wilmington's growing container volumes (NCSPA, 2008).

Cruise vessels are infrequent at the Port of Wilmington, and no cruise lines have approached the NCSPA concerning Port accommodation to date (Hufham, 2008).

The NCSPA predicts growth in bulk and break bulk cargo and a reduction in container cargo at the Port of Wilmington as a result of the proposed NCIP.

3.3.2 OTHER FACTORS INFLUENCING MERCHANT VESSEL SIZE

An important influence on the ultimate size of merchant vessels is the operating restrictions imposed by channel depths and clearances at many major ports. That is, vessel design typically avoids dimensions that would preclude the vessel from calling on major port facilities, particularly at ports that specialize in the cargo type for which the vessel is designed. These include air draft clearances, as well as channel depths.

At many locations, clearances under major bridges will remain the same for many years since the bridges at those ports are recently built and can be expected to remain in place for some time. Examples in the Gulf of Mexico and south Atlantic Ocean can be found at Savannah, GA, Charleston, SC, Jacksonville, FL, and Tampa, FL. **Table 2** provides a summary of existing and planned bridge vertical clearances at 20 major United States and world ports. As can be seen from the data, clearances in the United States above 187 feet are rare.

Table 2: Comparison of Vertical Clearances (Air Draft) for Bridges Crossing Active Shipping Channels

Location	Bridge Name	Crossing	Vertical Clearance (high water) in feet
San Francisco/Oakland, CA	Golden Gate	San Francisco	232
Staten Island/Brooklyn, NY	Verrazano Narrows	New York Harbor	229
Honshu-Shikoku, Japan	Honshu	Akashi Straits	220
Zealand/Funen, Denmark	Great Belt East Bridge	Great Belt	213
Hong Kong	Ting Kau	Rambler Channel	203
Panama Canal Zone	Thatcher	Panama Canal	201
San Diego, CA	Coronado Bay	San Diego Bay	195
Charleston, SC	Ravenel Bridge	Cooper River	187
Sandy Point, MD	William P. Lane Memorial	Chesapeake Bay	187
Baltimore, MD	Outer Harbor Crossing	Patapsco River	185
Los Angeles, CA	Vincent Thomas	Long Beach Harbor	185
Savannah, GA	Talmadge	Savannah River	184
Tampa, FL	Sunshine Skyway	Tampa Bay	175
Sydney, Australia	Sydney Harbor	Sydney Harbor	172
Long Beach, CA	Heim	Long Beach Harbor	163
Jacksonville, FL	Dame Point	St. Johns River	161
Tacoma, WA	Tacoma Narrows	Puget Sound – Narrows	159
New Orleans, LA	Judge William Seeber	Mississippi River	156
Quebec, Canada	Quebec Road	St. Lawrence River	150
New Orleans, LA	Huey P. Long	Mississippi River	133
Norfolk, VA	Chesapeake Bay Bridge Tunnel and Hampton Roads Bridge Tunnel	Chesapeake Bay James River	Unlimited (due to tunnels)

Source: U.S. Coast Guard Bridge Data for U.S. and Foreign Waterway Crossings.

Channel depths also have an important limiting influence on merchant ship dimensions. The utility of a vessel is severely restricted if it is designed with an operating draft so deep that its port choices are limited. As with vertical clearances discussed above, the existing channel depths at many ports are likely to remain the same for many years to come. Channels depths at many ports are now at their cost-effective limit; others are now at their environmentally acceptable maximum depth. While the cost-effectiveness criteria may change in the future, the environmental criteria can only be expected to become more stringent.

Table 3 presents a summary of channel depths and vertical clearance restrictions at a number of world-ranking ports. **Table 4** provides similar data for the major Gulf of Mexico and United States South Atlantic ports.

Table 3: World and U.S. [1] Port Rankings

Port	World Ranking 2006	U.S. Ranking 2006	Existing Channel Depth (low water) (feet)	Planned Channel Depth (feet)	Existing Vertical Restriction (high water) (feet)	Cargo Volume Total (Short Tons in Millions) 2006
Shanghai	1	n/a	38	41	None	591.9
Singapore	2	n/a	[2]	[2]	None	494.4
Rotterdam	3	n/a	72	-	None	417.1
Hong Kong	7	n/a	[2]	[2]	203	262.5
S. Louisiana	12	1	47	-	133	225.5
Houston	14	2	40	45	175	222.1
New York/New Jersey	20	3	40	45	229	157.6
Corpus Christi	48	6	45	52	138	77.6
New Orleans	50	8	45	-	133	76.9

Sources: US Army Corps of Engineers, Navigation Data Center, www.iwr.usace.ary.mil/ndc/wcscportfocus.com
American Association of Port Authorities, www.aapa-ports.org

[1] Only eastern seaboard and gulf coastal ports included.

[2] At Singapore and Hong Kong, cargoes are accommodated at various and separate facilities with differing depths.

Table 4: U.S. Port Rankings – Gulf of Mexico and Southeastern United States

Port	World Ranking 2006	U.S. Ranking 2006	Existing Channel Depth (low water) (feet)	Planned Channel Depth (low water) (feet)	Existing Vertical Restriction (high water) (feet)	Cargo Volume Total (Short Tons in millions) 2006
S. Louisiana, LA	12	1	47	-	133	225.5
Houston, TX	14	2	40	45	175	222.1
Corpus Christi, TX	48	6	45	52	138	77.6
New Orleans, LA	50	8	45	-	133	76.9
Mobile, AL	n/a	10	40	-	None	59.8

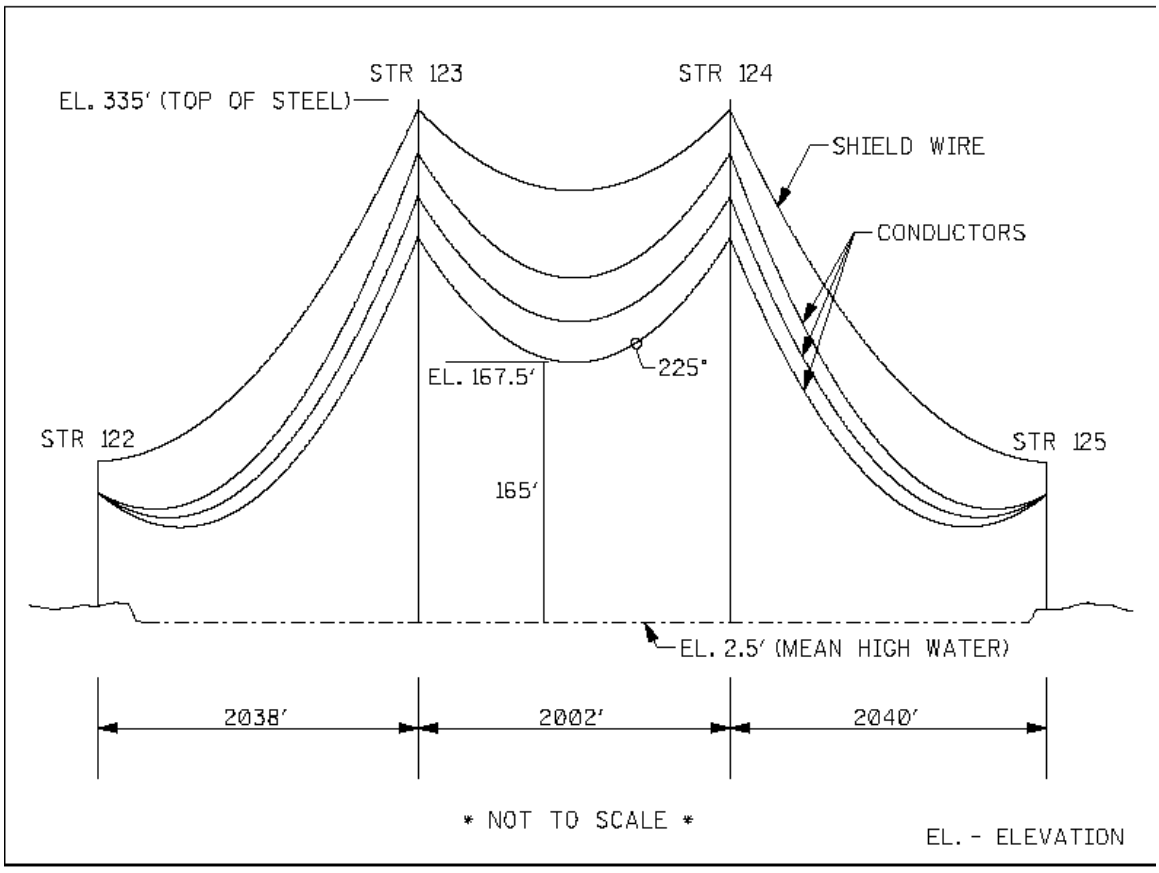
Table 4: U.S. Port Rankings – Gulf of Mexico and Southeastern United States (cont.)

Port	World Ranking 2006	U.S. Ranking 2006	Existing Channel Depth (low water) (feet)	Planned Channel Depth (low water) (feet)	Existing Vertical Restriction (high water) (feet)	Cargo Volume Total (Short Tons in millions) 2006
Lake Charles, LA	n/a	11	40	-	133	58.4
Baton Rouge, LA	n/a	12	45	-	133	56.3
Plaquemines, LA	n/a	13	45	-	135	55.9
Tampa, FL	n/a	16	38	41	175	46.2
Savannah, GA	n/a	24	42	48	184	34.0
Charleston, SC	n/a	30	45	-	150	26.4
Pt. Everglades, FL	n/a	35	44	-	None	24.8
Jacksonville, FL	n/a	36	38	41	161	22.2
Wilmington, NC	n/a	61	42	-	165	3.0

Source: US Army Corps of Engineers, Navigation Data Center http://www.iwr.usace.army.mil/ndc/
American Association of Port Authorities, www.aapa-ports.org

The Port of Wilmington's ability to attract vessels with air drafts exceeding 165 feet is limited due to restrictions from the Progress Energy 230kV dual transmission lines just downstream from the Port. The United States Coast Guard (USCG) and United States Army Corps of Engineers (USACE) designate a maximum air draft of 165 feet at MHW allowed under the 230kV dual transmission lines. The clearance to MHW elevation will vary according to the loading on the lines (i.e., if the lines are heavily loaded, sag is increased, and clearance to the water is decreased), and location under the lines. Standard practice for evaluating conductor clearances relies on assessing the conductor at its maximum operating temperature. The span between Structures 123 and 124 is 2,002 feet in length and has final condition midspan sag of 79 feet, six inches at 225 degrees Fahrenheit, which is the maximum operating temperature. This maximum sag correlates to a vertical clearance of 165 feet at the mean high water elevation (**Figure 4**) in the center of the span. According to officials from Progress Energy, the navigational channel is not in the center of the span and has greater clearance from the mean high water elevation, with a minimum clearance to the lines of approximately 180 feet (at maximum sag). The United States Department of Labor – Occupational Safety and Health Administration (OSHA) regulations state that minimum equipment clearances under 230kV lines must be at least 16 feet due to the potential arc from conductivity between the line charge and a ship's equipment; therefore the vertical clearance at the center of the navigational channel during maximum loading on the lines is approximately 164 feet (180 feet minus the 16 feet of OSHA-required equipment clearance).

Figure 4: Profile View of Downstream Dual 230kV Transmission Lines



Source: Progress Energy, October 6, 2005 (included in Appendix A)

No cruise lines have approached the NCSPA to date concerning Port of Wilmington accommodation. The current terminal is not equipped to handle passengers, and cruise companies have cited the distance of the Port of Wilmington from open water (25 miles) and navigational constraints including channel depth and transmission line height as reasons the Port of Wilmington has not been pursued. If accommodating cruise lines becomes a goal for the Port of Wilmington, the vertical constraint of the 230kV dual transmission lines would become the main issue. Interviews with local shipping companies, docking companies, and river pilot associations on the Cape Fear River indicate that the 230kV dual transmission lines are the only constraint prohibiting bigger vessels, including larger container ships and cruise liners, to come upriver in the future.

In the category of containerized freight, the Port of Wilmington's capability to attract this type of business would be increased if the bridge vertical clearance issue is removed. The majority of existing (and proposed future) ships do not require a navigational channel depth greater than 42 feet, making navigational depth a non-issue. Removal of bridge clearance restrictions would allow ever-larger vessels to enter the Port of Wilmington, whereas they presently are constrained to 164 feet of air draft due to the 230 kV dual transmission lines; however, as mentioned previously, with the construction of the planned NCIP, movement of containerized ships to the Port of Wilmington is expected to decrease in the future.

3.4 BRIDGE STRUCTURE OPTIONS

3.4.1 STRUCTURE TYPES

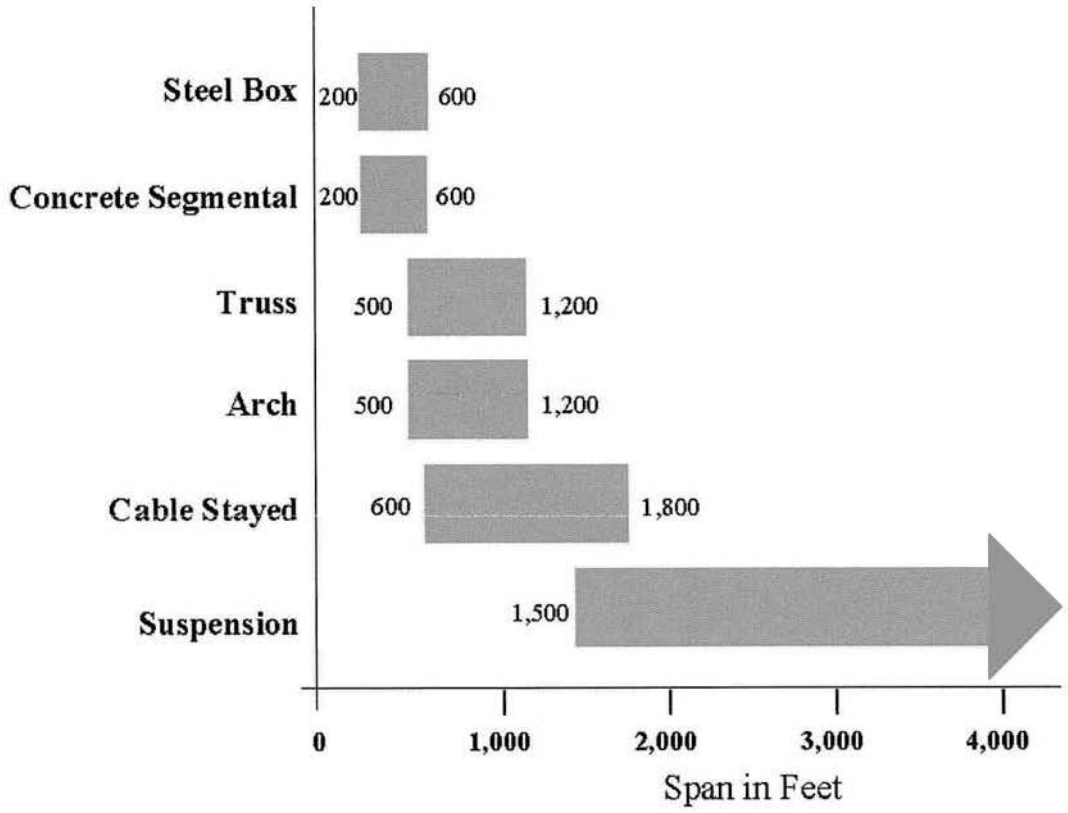
To recommend structure types for a Cape Fear Skyway bridge, assumptions must be made as to span arrangements and structure types to allow for comparative costing of the various river crossing options.

The structure for each of the three crossing options discussed in **Section 2.0** can be divided into four general regions: low-level approach, mid-level approach, high-level approach, and main span unit. It is assumed that the bridge begins and ends when the profile grade line is 20.0 feet above the existing ground line. For the purposes of this bridge study, the low-level approach structure is defined as that portion of the crossing with a profile grade elevation between 20.0 feet and 50.0 feet above existing ground line. The mid-level approach is defined as that portion of the structure with a profile grade elevation between 50.0 feet and 120.0 feet above existing ground line. The high-level approach is defined to include the remaining portion of the approaches that are bounded by the mid-level approaches and the main span unit. Finally, the main span unit is centered about the shipping channel, providing the necessary horizontal and vertical clearances.

In general, as the profile grade elevation increases, the optimum span length would also increase. As a result, the low-level approaches may consist of short span structures in the range of 100 to 150 feet, while the high-level approaches would require intermediate to long span structures with spans in the range of 150 to 300 feet. The main span unit would have the longest span and varies between the different route alternates with a minimum of 784 feet for the North Option, 789 feet for the Central Option, and 684 feet for the South Option, based on the width of the navigational channel.

Figure 5 depicts the range of different bridge types as a function of span length.

Figure 5: Application of Bridge Type by Span Range



Source: Walter Podolny, Jr., Cable-Stayed Bridges State-of-the-Art in the United States from conference proceedings – A seminar series on Cable-Stayed Bridges, October 17-18, 1994, Miami, Florida.

3.4.2 STRUCTURE COSTS

It is recommended that the vertical clearance for a Cape Fear Skyway bridge be set at a minimum of 165 feet and not exceed 187 feet. It is also recommended that the horizontal clearance be a minimum of 800 feet. The following sections discuss the reasoning and potential implications of this recommendation of vertical and horizontal clearances.

The recommendation of vertical clearances is based on a review of air drafts of the merchant and cruise fleet (**Table 1**), bridge heights at other ports (**Tables 2-4**), and the vertical restriction of the Progress Energy 230kV dual transmission lines downstream of the Port of Wilmington. Not all vessels shown in **Table 1** are expected to use the Port of Wilmington in the future, and most future cargo vessels will probably not require air draft exceeding 165 feet. For example, one of the largest and most frequent cargo operators utilizing the Port of Wilmington, Yang Ming, will most likely not require vertical clearance exceeding 165 feet, as discussed in **Section 3.2.2**. The maximum vertical clearance of 187 feet was chosen based on the vertical clearance of the Cooper River Bridge at the Port of Charleston in South Carolina (a competing port).

The recommended horizontal clearance is based on the navigational channel and its associated buffers, or safety setback requirements, established and maintained by the USACE. The

channel ranges from 400 to 500 feet, with a buffer of 142 feet on either side, totaling 284 feet of buffer zone.

Due to the engineering constraints related to crossing the Cape Fear River, it is recommended that a cable-stayed bridge be considered. Providing a minimum 165 feet of operational vertical clearance would require a minimum main span length between 750 and 850 feet.

As can be seen in **Figure 5** there is typically more than one type of structure possible for a given span length. A more detailed discussion of appropriate bridge types and estimated unit prices follows.

3.4.2.1 Main Span Unit Length

Table 5 shows the possible lengths required for the main span unit for each of the three bridge corridors. The USACE maintains a 142-foot buffer on either side of the channel where bridge piers cannot be placed; therefore, 284 feet has been added to channel widths at each corridor location.

Table 5: Main Span Length Required for Bridge

Corridor	Span Length (Channel Width)[1] (feet)	Span Length (Water's Edge to Water's Edge)[2] (feet)	Span Length (Land to Land)[2] (feet)
North Corridor	784	3,200	8,200
Central Corridor	789	3,475	12,500
South Corridor	684	7,050	8,000

[1]Channel width includes the navigational channel width plus the 142-foot buffer. Length based on centerline within Bridge Study Area.

[2]Water's Edge to Water's Edge includes the open water channel of the Cape Fear River at low tide. It does not include tidal marsh area. Land to land includes water's edge to water's edge and all associated tidal marsh (dry land to dry land); Length assumes no piers placed in water.

The bridge span length that would be necessary to clear-span the river, either from water's edge to water's edge or from land to land, is clearly cost prohibitive and therefore piers would need to be placed in the water for the approaches to the main channel span. The minimum main channel span would be the clear-span channel width shown above, plus one-half the width of the bridge foundation on each side. Assuming a 50-foot allowance for the footing width, and accounting for the skew of the crossing, this gives a range of *minimum* main span lengths between about 750 feet and 850 feet within the various options. It should be noted that a perpendicular crossing of the navigable channel is most desirable. This consideration will be incorporated into the design plans as they evolve, if feasible. As can be seen in **Figure 5**, there are several feasible bridge types that support the minimum required span lengths of 750 to 850 feet, including: steel truss, tied arch, and cable-stayed structures that are viable for this span range. There is also a relatively new bridge type, the extradosed prestressed bridge, which is also feasible within this span range. A graphic developed by the Federal Highway Administration (FHWA) illustrates these bridge types (**Figure 6**). The steel box and concrete segmental girder type bridges would likely not be considered feasible due to the significant structural depth required below the profile grade line and the impact this would have on the vertical clearance requirements.

A factor that may promote the use of a bridge span length greater than the minimum value is the accommodation of the vessel collision effects on the structure. Any piers placed within the

waterway and located in sufficient water depth to accommodate the marine traffic (ships or barge tows) must either be designed for vessel collision forces or must be protected from vessel impact. This protection may be by fenders, dolphins, or by artificial islands that ground the vessel. These protection countermeasures can have a significant cost. If the pier can be removed to shallow water by provision of a longer span, then the vessel collision requirements may be avoided or minimized. So, there is a trade-off between bridge cost (that includes the vessel collision countermeasure costs) and span length.

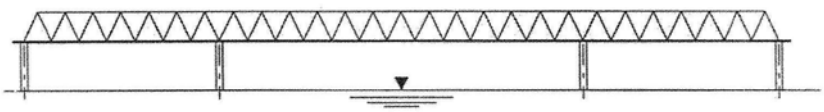
Within the Bridge Study Area, there is an improved channel that provides safe navigation. Outside this channel the water depth decreases fairly rapidly, where most of the crossing may be in water depth less than ten feet. Piers located in this range of water depths would have to be designed for forces from swallow draft vessels (such as barge tows or ballasted small ships). These forces can likely be accommodated in the structure design without the use of costly pier protection devices. Based on review of the National Oceanic and Atmospheric Administration (NOAA) Nautical Charts, it appears that by increasing the main channel span to about 1,200 feet, the main tower foundation can be located in shallow water to protect it from the large impact loading that would result from a fully loaded ship.

The most economical span length should be determined based on an economic evaluation of span length versus cost, considering vessel impact considerations/costs, and actual water depths (with scour potential for affecting these depths). For the purposes of this bridge study, it is reasonable to assume a main span length on the order of 1,200 feet for the main channel, which likely avoids separate pier protection countermeasures. Assuming a cable-stayed bridge alternative (which has historically been shown to be an economical structure type at this span length), then side spans of about one-half of the main span, or 600 feet each could be expected. This gives a three span main channel crossing unit with a combined length of 2,400 feet.

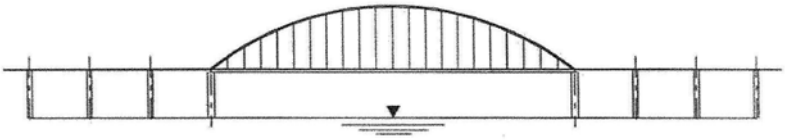
For the purposes of developing comparative cost estimates, a cable-stayed bridge is assumed. This bridge type was chosen because there are a number of recent cable-stayed structures in North America from which historical unit pricing can be derived, as shown in **Table 6**.

The square-foot unit price of these projects is adjusted for inflation by using the March 2008 ENR construction cost index and adjusted geographically by the 2008 RS Means Heavy Construction Cost Data location index. For 600-foot, 1,200-foot, and 1,300-foot main span lengths, a unit cost of approximately $300, $340, and $350 per square foot is estimated, respectively.

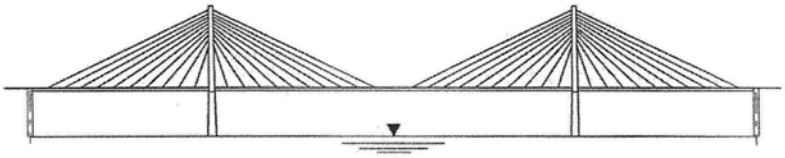
Figure 6: Bridge Types



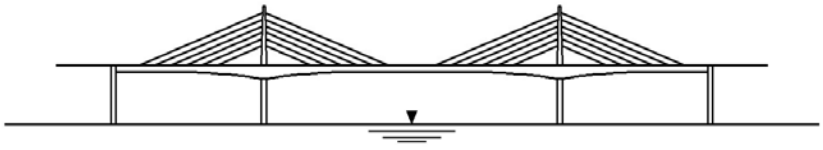
TRUSS BRIDGE



TIED-ARCH BRIDGE



CABLE STAYED BRIDGE



EXTRADOSED - PRESTRESSED BRIDGE

Source: URS Corporation. Feasibility Study for US 181 (Harbor Bridge), Nueces County. Prepared for the Texas Department of Transportation, Corpus Christi District. June 2003.

Table 6: Bid Costs for Recent North American Cable-Stayed Bridges

Structure	Location	Bid Date	Bid Price Million $	Main Span Length (feet)	Total Length (feet)	Deck Width (feet)	Cost (Sq. ft) $	ENR Cost Index	Means Geographic Index	2008 Adjusted Cost (Sq. ft) $
East Huntington	Huntington, WV	1981	$19.3	900	1808	46.5	$230	3535	96.3	$497
Sunshine Skyway	Tampa, FL	1982	$71.1	1200	4000	95	$187	3825	91.3	$394
Annacis	Vancouver, BC	1984	$45.7	1525	2724	105	$160	4148	108.5	$262
Dame Point	Jacksonville, FL	1984	$47.0	1300	2600	105	$172	4148	83.6	$365
Cochrane	Mobile, AL	1985	$32.0	800	1600	82.0	$244	4182	84.3	$509
Fred Hartman	Baytown, TX	1987	$50.0	1250	2214	156	$145	4406	82.6	$293
Talmadge	Savannah, GA	1987	$25.7	1100	2040	75	$168	4406	82.4	$340
James River	Richmond, VA	1988	$11.8	630	1230	128	$75	4519	88.1	$139
Weirton-Stubenville	Stubenville, OH	1988	$30.0	820	1965	92.0	$166	4519	94.7	$285
Burlington	Burlington, Iowa	1990	$28.8	660	1245	84.3	$274	4732	86.2	$494
C&D Canal	Delaware	1991	$24.6	750	1650	127.3	$117	4835	104.5	$171
Clark Bridge	Alton, IL	1991	$34.9	756	1360	108	$238	4835	97.7	$370
Sydney Lanier	Brunswick, GA	1996	$54.3	1250	2496	79.5	$274	5620	82.4	$435
Owensboro	Owensboro, KY	1997	$27.1	1200	2197	75.2	$164	5826	90.4	$229
Maysville	Maysville, KY	1997	$37.0	1050	2100	58.5	$301	5826	90.4	$421
Cape Girardeau	Cape Girardeau, MO	1997	$50.8	1150	2086	93.8	$260	5826	94.2	$348
Charles River	Boston, MA	1997	$87.0	745	1407	185	$334	5826	116.4	$363
U.S. Grant	Portsmouth, OH	2001	$25.9	875	1685	70.0	$220	6334	92.9	$275
Greenville	Greenville, MS	2001	$55.4	1378	2560	95.0	$228	6334	85.3	$311
Maumee	Toledo, OH	2002	$63.2	1225	1825	114.0	$304	6538	99.1	$345
Pomeroy Mason	Pomeroy, OH	2003	$31.1	675	1163	74.1	$355	6695	92.9	$414
kcICON	Kansas City, MO	2007	$41.1	550	800	125.0	$411	7967	102.4	$360

Notes:
Costs adjusted to 2008 cost using ENR March 24, 2008 Cost Report Indices. Reference 2008 index = 8109.
Costs adjusted for geographic cost factors using 2008 Heavy Construction Cost Data (RSMeans, 2007). Costs Referenced to Wilmington, NC, Index = 76.9. A contingency of 18 percent was added to the Adjusted Cost to reflect cost of change orders, claims, etc.

3.4.2.2 Approach Structures

The low-level approach structures would most likely be constructed of short span structures with spans in the range 100 to 150 feet. Candidate superstructure types include prestressed concrete beams and post-tensioned concrete systems including both boxes and beams. Substructure units may consist of either pile bents or rigid frame piers.

The mid- and high-level approach structures would consist of intermediate-to-long span structures. Superstructures may include prestressed concrete beams, both conventional and/or post-tensioned drop in spans, and concrete boxes. Substructure units would be rigid frame piers and would most likely require mid-height bracing due to their height.

There is a large historical record of unit prices for the low-level approach type of structure. It is proposed to assume a price of $90 per square foot for the low-level approaches. For the mid-level approach structures, it is proposed to assume a price of $135 per square foot, while a price of $210 per square foot is proposed for the high-level approaches. These prices are developed from the September 1999 report prepared by the American Segmental Bridge Institute entitled “Cost of Concrete Segmental Bridges over Water, Cable-Stayed Bridges, and Viaducts” with additional updates in the year 2001. As with the main span unit, no allowance for life cycle costs are included in the approach unit prices.

3.4.2.3 Vessel Impact Protection Costs

All three of the bridge crossing corridor options are at various locations on the Cape Fear River. All three options must have piers in the water and would be subject to potential vessel impact forces and require supplementary vessel impact protection systems, as discussed in **Section 3.4.2.1**.

3.4.2.4 Summary

The probable unit construction costs for the bridge structure options were estimated based primarily on historical unit prices of similar type structures. The historical prices have been consistently adjusted to account for both inflation and geographic factors. The unit cost ascertained from historic prices was updated to $300 for approach spans and $340 for main spans for the purposes of this bridge study to reflect current estimates. Based on assumptions of number of lanes, vertical and horizontal clearances, and pier protection considerations, **Table 7** shows the summary of costs for the main and approach spans.

Table 7: Summary of Costs for Main Span and Approach Span Lengths[1]

	165 feet Vertical Clearance				187 feet Vertical Clearance[2]			
	2-800 foot Approach Spans		1,200 foot Main Span		2-800 foot Approach Spans		1,200 foot Main Span	
Lanes on Bridge	4-lane	6-lane	4-lane	6-lane	4-lane	6-lane	4-lane	6-lane
Structure	$38,880,000	$50,400,000	$33,048,000	$42,840,000	$42,180,000	$53,700,000	$36,348,000	$46,140,000
Pier Protection[3]	$16,000,000	$16,000,000	$0	$0	$16,000,000	$16,000,000	$0	$0
Subtotal	$54,880,000	$66,400,000	$33,048,000	$42,840,000	$58,180,000	$69,700,000	$36,348,000	$46,140,000
Contingency (25%)	$13,720,000	$16,600,000	$8,262,000	$10,710,000	$14,545,000	$17,425,000	$9,087,000	$11,535,000
Total[4]	$68,600,000	$83,000,000	$41,310,000	$53,550,000	$72,725,000	$87,125,000	$45,435,000	$57,675,000

[1] Costs based on $300/square foot for 800-foot approach span and $340/square foot for 1,200-foot main span. Square footage cost estimated from historical bid prices from several similar bridges. Cost includes crossing of Cape Fear River between NC 133 and US 421.
[2] The structure cost differential for the two clearance scenarios is $3.3 million.
[3] Assumed 8 dolphins at $2 million each. Mitigation or other environmental impacts not included.
[4] This cost estimate is for range comparisons only and is not based on a detailed evaluation of the bridge cost.
Notes:
4-lane typical section assumes 4 12-ft lanes, 6-ft inside shoulder, and 8-ft outside shoulder. Total width (to back of barriers) = 81 ft.
6-lane typical section assumes 6 12-ft lanes, 6-ft inside shoulder, and 8-ft outside shoulder. Total width (to back of barriers) = 105 ft.

Cost increases for providing 165 feet of vertical clearance compared to providing 187 feet would be incremental due to the need to increase the height of the towers, size/depth of foundations, and stiffening of the span. This is within the range of incremental increases of 10-15 percent. The overall bridge length and cost of the total span will be further defined once detailed study alternatives are developed for the NEPA process.

3.4.3 MOVABLE BRIDGE OPTIONS

Bridge options that span the navigational channel and do not provide the required vertical clearance between high water and the low member of the structure require a movable channel span to allow vessels to pass. Although many types of movable bridges have been constructed in the past 200 years, including significant variations on those types, three distinct movable bridge types have demonstrated sufficient success to warrant some level of consideration. These include the vertical lift bridge, bascule bridge, and swing bridge.

A vertical clearance range of 165 to 187 feet can be accommodated by any of the three most common movable bridge types. The maximum range for existing bridges of this type is about 140 feet. Pushing the vertical clearance requirement to 187 feet on a lift bridge would have a significant impact on the cost and operating cycle time. Furthermore, it would push the bridge beyond the current limits of proven designs. Therefore, for a vertical lift bridge, 187 feet is not considered practical.

For a swing or bascule bridge, unlimited vertical clearance is provided. A horizontal clearance range of a minimum of 750 to 850 feet is beyond the maximum range for existing bascule bridges. The widest bascule bridge in service provides only 262 feet of horizontal channel clearance (Galata Bridge in Istanbul, Turkey). The widest channel ever spanned by a bascule bridge was only 295 feet by a rolling lift bridge constructed over the Tennessee River in 1916. These long bascule bridges are of the double-leaf configuration. The largest single-leaf bascule bridges provide clear channel widths in the range of 200 feet. A bascule bridge is therefore not considered a viable option for this site.

Swing spans typically do not provide channels wider than about 150 feet. However, two rather unique double swing bridges provide wider channels. The George P. Coleman Bridge in Yorktown, Virginia, is a double swing span with 500 feet between pivot piers that provides 450 of horizontal clearance and the Spokane Street Swing Bridge in Seattle, Washington is a double concrete swing span with 480 feet between pivot piers. A double swing bridge would not be a viable concept for this site, considering the horizontal clearance requirement of at least 750 feet.

4.0 SUMMARY OF COORDINATION EFFORTS

4.1 NORTH CAROLINA STATE PORTS AUTHORITY

Close coordination with the NCSPA has been maintained throughout the early planning and engineering studies for the proposed Cape Fear Skyway. A meeting was held with the NCSPA on June 8, 2006 to discuss navigational requirements associated with a bridge crossing for the Cape Fear Skyway. The purpose of the meeting was to solicit information regarding navigational requirements and concerns of the NCSPA with regard to the bridge. Specific constraints to the bridge, transportation issues, and future needs of the Port of Wilmington were discussed. A copy of the meeting minutes is included in **Appendix A**.

Contact with officials from the NCSPA has been maintained throughout the preparation of this bridge study. Port of Wilmington staff has been contacted in regard to vessel and commodity data for the Port, cargo forecasts, and general information about the Port. Telephone logs detailing such correspondence can be found in **Appendix A**.

4.2 UNITED STATES ARMY CORPS OF ENGINEERS – NAVIGATION BRANCH

A meeting was held with the USACE on June 8, 2006 to discuss navigational requirements associated with a bridge crossing for the Cape Fear Skyway. The purpose of the meeting was to solicit information from the USACE regarding navigational requirements, as well as their concerns with the project. Environmental documentation, channel constraints, and bridge locations were discussed. A copy of the meeting minutes is included in **Appendix A**.

Contact with officials from the USACE has been maintained throughout the preparation of this bridge study. USACE staff has been contacted in regard to navigational channel widths and clearances. Telephone logs detailing such correspondence can be found in **Appendix A**.

4.3 UNITED STATES COAST GUARD

Contact with officials from the USCG has been maintained throughout the preparation of this bridge study. Telephone logs detailing such correspondence can be found in **Appendix A**.

4.4 PROGRESS ENERGY

Contact with officials from Progress Energy has been maintained throughout the preparation of this bridge study. Telephone logs detailing such correspondence can be found in **Appendix A**.

4.5 WILMINGTON/CAPE FEAR COAST CONVENTION AND VISITORS BUREAU

Contact with Kim Hufham, President and CEO of the Wilmington/Cape Fear Coast Convention and Visitors Bureau was initiated in June of 2008. Telephone logs detailing such correspondence can be found in **Appendix A**.

5.0 COMPARATIVE ANALYSIS OF RIVER CROSSING OPTIONS

5.1 EVALUATION CRITERIA

This section describes the criteria used to evaluate and compare the three river crossing options for a potential bridge alignment, and to subsequently determine a location for the purposes of estimating costs. Detailed study alternatives will be identified during the NEPA process, which is currently in the early stages. The criteria for evaluating the three river crossing options are in three major categories:

- Traffic/Planning
- Engineering
- Environmental Considerations

Evaluation criteria were both qualitative and quantitative. The qualitative measures were used to compare corridor options in a general manner. For example, construction costs were measured by determining low, moderate, or high impacts. The quantitative measures used

specific units of measurement as they apply to each option. The criteria used in the evaluations are summarized in **Table 8**.

Table 8: Cape Fear River Crossing Options Evaluation Criteria

Impact Criteria	Description of Measure	Unit of Measure
Traffic/Planning		
Adverse impact on existing economic, industrial, and business interests	A determination of the potential for each crossing option to impact economic and business interests.	Low, moderate, high
Compatibility with future local development plans	A determination of how compatible each crossing option is with the New Hanover County, Brunswick County, and City of Wilmington future development plans.	Low, moderate, high
Impacts to future Port of Wilmington operations	A determination of whether each crossing option provides the necessary horizontal and vertical clearance for existing and future Port operations.	Yes or no
Direct impacts to Port of Wilmington operations and accessibility	A determination of the potential for each crossing option to directly impact existing and future Port operations and accessibility.	Low, moderate, high
Access to major evacuation routes	A determination of how each crossing option would function as an additional evacuation route during natural disasters.	Reduced, similar, improved
Engineering		
Capital costs (including construction costs)	A relative comparison of the estimated construction cost of a bridge type.	Low, moderate, high
Vertical clearance	The vertical clearance provided within the navigational channel by each crossing option.	In feet
Horizontal clearance	The horizontal clearance provided within the navigational channel by each crossing option.	In feet
Environmental Considerations		
Socioeconomic impacts	A determination of the potential for each crossing option to impact neighborhoods, alter the local and overall view of the area, and have disproportionate impacts on minority and/or low-income populations in the community.	Low, moderate, high
Section 4(f) of the Department of Transportation Act	A determination of the potential for each crossing option to impact publicly-owned facilities subject to Section 4(f) of the Department of Transportation Act of 1966.	Low, moderate, high
Land trust land	A determination of the potential for each crossing option to impact parks (either directly or by constructive use).	Low, moderate, high

Table 8: Cape Fear River Crossing Options Evaluation Criteria (cont.)

Impact Criteria	Description of Measure	Unit of Measure
Waters of the U.S.	A determination of the potential for each crossing option to directly impact Waters of the U.S.	Low, moderate, high
Aquatic issues	A determination of the potential for each crossing option to impact coastal and aquatic life, such as fisheries nursery areas, essential fish habitat, and aquatic commerce.	Minor, moderate, major
Federal Emergency Management Agency (FEMA) floodplains	A determination of the potential for each crossing option to impact areas within the 100-year floodplain.	Low, moderate, high
Threatened and endangered species	A determination of the potential for each crossing option to impact resident species and/or known threatened and endangered species.	Yes or no
Cultural and historic resources	A determination of the potential for each crossing option to impact recorded historical structures and archaeological sites.	Low, moderate, high

5.2 RIVER CROSSING OPTIONS

Based on the comparative analysis outlined in the section above, the Central Option would be the most suitable river crossing location for a Cape Fear Skyway bridge crossing for the following reasons:

- The North Option would likely result in a high level of impact to commercial, industrial, and residential properties resulting in numerous displacements and higher costs.
- The North Option would likely adversely affect operations and accessibility to the Port of Wilmington.
- The South Option would likely have a high impact to wetlands and streams.
- The South Option would likely have the longest bridge crossing.
- The Central Option would likely have a minimal effect on historic properties and/or archaeological resources. Based on preliminary studies, it has the potential to impact only one National Register of Historic Places (NRHP) listed cultural resource, an archaeological site on the east bank of the Cape Fear River.
- The North Option is likely to impact several known hazardous materials sites associated with the Port of Wilmington.
- The North and South Options traverse publically-owned parkland and land under the oversight of the North Carolina Coastal Land Trust.
- The North Option would likely adversely affect minority and low-income populations.

5.3 ENVIRONMENTAL CONSIDERATIONS

A number of environmental considerations were evaluated with regard to the construction of a Cape Fear Skyway bridge. Pertinent resource categories related to the human and natural environment were investigated to evaluate the magnitude of potential environmental constraints associated with the various crossing options.

5.3.1 SOCIOECONOMIC IMPACTS

There are a number of potential social and economic impacts that could result from a Cape Fear Skyway bridge including: impacts to neighborhoods, altering of local and overall views of the area, and environmental justice issues.

While some displacements are likely as a result of the project, detailed information pertaining to potential displacements has not yet been developed. Residential, industrial, and commercial land uses in the Bridge Study Area primarily include a planned mixed use development (River Lights) in the southeastern portion of the Bridge Study Area; existing medium-density residential neighborhoods such as Mallory Creek off of NC 133 in the western portion of the Bridge Study Area and Rivers Edge in the eastern portion of the Bridge Study Area; industry associated with the Port of Wilmington in the eastern portion of the Bridge Study Area; and open space.

A bridge would become the dominant visual feature in the Bridge Study Area and there are several neighborhoods in the vicinity in both New Hanover County and Brunswick County. While a bridge may not directly impact the communities, it could still result in visual impacts to those communities.

Local economic impacts to property near the project could be positive or negative. Properties near the roadway and throughout the Bridge Study Area could become more accessible, making them more attractive for development; however, noise, air quality, and visual impacts could also be associated with the roadway which could make residential property adjacent to the project less desirable.

Title VI of the Civil Rights Act of 1964, protects individuals from discrimination on the grounds of race, age, color, religion, disability, sex, and national origin. Executive Order 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” provides that each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations. Special populations may include the elderly, children, the disabled, low-income areas, American Indians and other minority groups. Executive Order 12898 requires that Environmental Justice principles be incorporated into all transportation studies, programs, policies and activities. The three environmental principles are: 1) to ensure the full and fair participation of all potentially affected communities in the transportation decision-making process, 2) to avoid, minimize or mitigate disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority or low income populations, 3) to fully evaluate the benefits and burdens of transportation programs, policies, and activities, upon low-income and minority populations.

There is potential to adversely affect minority and/or low-income populations with the project. A neighborhood in the northeastern portion of the Bridge Study Area (within the North Option corridor) was identified during initial field studies as a potential minority and/or low-income

population. Detailed information pertaining to this potential special community will be assessed once detailed study alternatives have been developed.

5.3.2 SECTION 4(F) OF THE DEPARTMENT OF TRANSPORTATION ACT

Section 4(f) of the Department of Transportation Act of 1966, as amended, provides for the protection of certain lands affected by transportation projects. Section 4(f) states that the Secretary of Transportation may not approve any program or project that requires the use of land from a publicly owned park, recreational area, or wildlife and waterfowl refuge of national, state, or local significance (as determined by the official having jurisdiction thereof) or any significant historic site, unless there is no feasible and prudent alternative to the use of such land and the proposed action includes all possible planning to minimize harm.

There are two publicly owned recreational facilities within the Bridge Study Area: Brigade Boys and Girls Club, and E.P. Godwin Stadium (**Figure 7**). In addition, there is one neighborhood north of the Bridge Study Area listed in the NRHP and several other structures and neighborhoods within the Bridge Study Area that are potentially eligible for listing. The E.P. Godwin Stadium is within the North Option corridor, and the Brigade Boys and Girls Club is adjacent to the North Option corridor. Impacts to both of these properties, if any, will be evaluated further once detailed study alternatives have been determined.

There is also one potential (future) public recreational area located within the Bridge Study Area. The 'Flossie Bryant Tract' is a 61-acre parcel adjacent to Independence Boulevard (Figure 7) that has been donated to New Hanover County for use as a park.

The 'Bryant Farm' was awarded to New Hanover County through the will of Ms. Flossie Bryant. Due to restrictions on the property (from the will) it can only be used for urban gardens. The homestead on the property must be preserved and the sister of Ms. Flossie Bryant has a lifetime right to live on the property. New Hanover County has some preliminary plans to enhance garden opportunities for individual urban gardens. At this time, the tract is two-thirds County-owned and 1/3 heir-owned. The tract remains in litigation.

A Cape Fear Skyway bridge could impose visual impacts to public recreational areas and/or historic resources within and adjacent to the Bridge Study Area. Visual impacts will be assessed once detailed study alternatives have been determined.

5.3.3 LAND TRUST LAND

The Clarendon Plantation is a 725-acre tract of land held in conservation by the North Carolina Coastal Land Trust (NCCLT). Features on the land include extensive longleaf pine (*Pinus palustris*) and mixed pine hardwood forests, bluffs along the Cape Fear River, and marshes. Funds for the land were provided by the North Carolina Clean Water Management Trust Fund (CWMTF), the federal Forest Legacy program, the U.S. Fish and Wildlife Service, and private donations from Fred and Alice Stanback.

The Clarendon Plantation is considered to be the "keystone" tract of the NCCLT's Cape Fear Corridor Conservation Initiative because it is the northernmost of a series of properties in eastern Brunswick County that have been conserved since 1995. The land is also considered a potential historic resource due to its history as one of almost 30 plantations along the Cape Fear River where rice was once cultivated (NCCLT website: www.costallandtrust.org).

The Central Option corridor begins just north of the Clarendon Plantation, and the South Option corridor is along the southern portion of the plantation (**Figure 3**). Potential impacts to this property will be assessed once detailed study alternatives have been determined.

5.3.4 WATERS OF THE UNITED STATES

"Waters of the United States" include surface waters and wetlands (inundated or saturated areas that support vegetation typically adapted to wet conditions) as defined in 33 CFR Part 328.3. Impacts to Waters of the United States fall under the jurisdiction of the USACE through Section 404 of the Clean Water Act (33 U.S.C. 1344) and under the jurisdiction of the North Carolina Department of Environment and Natural Resources (NCDENR) – Division of Water Quality (NCDWQ) through the Section 401 Water Quality Certification Process (NC General Statutes Chapter 143 Article 21, Part 1).

The USACE and US Environmental Protection Agency (USEPA) jointly define wetlands as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (33 CFR 328.3; 40 CFR 230.3). Section 404 jurisdictional wetlands are those areas satisfying the technical criteria contained in the USACE's Wetland Delineation Manual (Environmental Laboratory, 1987) and the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (USACE, 2008). According to the USACE's Wetland Delineation Manual, for an area to be considered a "wetland," the following three criteria must be met; (1) presence of hydric soils, (2) presence of hydrophytic vegetation, and (3) evidence of hydrology, including saturated soils, drift lines, sediment deposits, water stained leaves, oxidized rhizospheres, matted vegetation, high water marks on trees, buttressed tree bases, or surface roots.

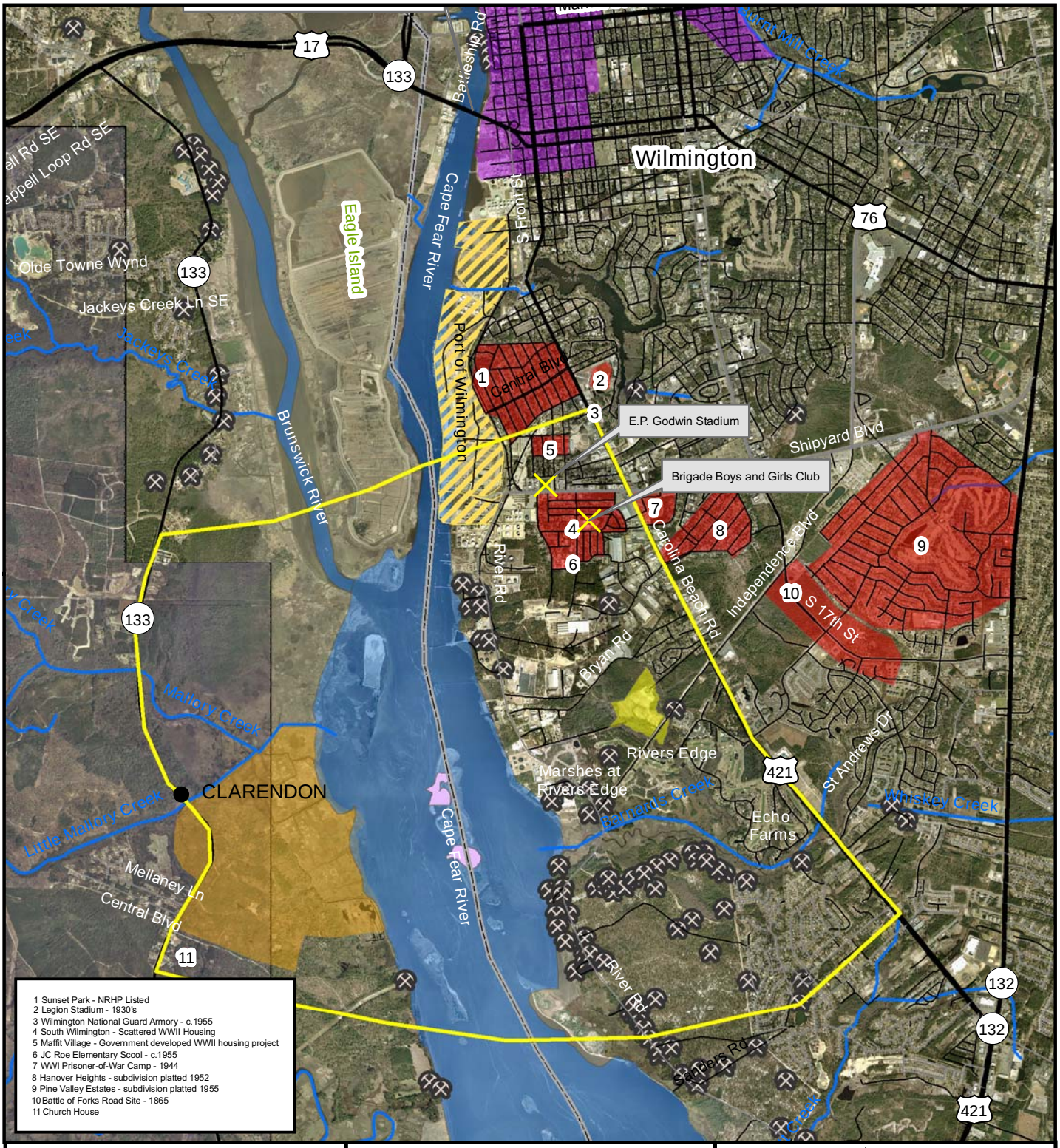
This section generally describes the Bridge Study Area's wetland resources as interpreted through NCDENR - Division of Coastal Management (DCM) wetland mapping and limited field investigations. DCM wetlands categorize wetland areas based on wetland type.

A field visit was made to the Bridge Study Area to examine and confirm occurrence of various wetland features and communities indentified on DCM maps, but no formal field determination or delineation of wetlands was conducted for this bridge study. DCM mapping is shown on **Figure 8**.

The dominant wetland communities present within the Bridge Study Area are Freshwater Marsh associated with the floodplains of the Cape Fear, Northeast Cape Fear, and Brunswick Rivers and Riverine Swamp Forest associated with the large stream systems (Town Creek, Barnards Creek, Mallory Creek).

Impacts to jurisdictional wetlands and streams would likely be unavoidable during construction. These impacts would be associated with the need to place fill material and piers in the Cape Fear, Northeast Cape Fear, and/or Brunswick Rivers and associated floodplains and freshwater tidal marshes containing wetlands. Stream and wetland impacts will be minimized to the largest extent practicable through the use of bridging and pier placement.

Island 13, an island maintained by the USACE that supports two mitigation areas, is located just east of the navigational channel in the southern portion of the Bridge Study Area. According to USACE officials, the island was sculpted for primary nursery areas to mitigate for impacts associated with the deepening of the navigational channel.



CAPE FEAR SKYWAY

State Transportation Improvement Program
Project No. U-4738

NORTH CAROLINA Turnpike Authority

Legend

- Bridge Study Area
- Interstate Highways
- US Highways
- State Highways
- Local Roads
- Potential Historic Resources
- National Register District
- Flossie Bryant Tract
- Archaeological Sites
- Streams
- Railroads
- County Boundary
- Island 13 Mitigation Area
- NC Ports Authority
- Open Water
- Clarendon Plantation

N

0 0.5 1 Miles

0 2,500 5,000 Feet

Cape Fear Skyway Preliminary Bridge Location and Type Study

Date: February 2009

Figure 7

Cultural and Historic Resources

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Quantification of impacts is pending until formal delineations are performed and the design plans for detailed study alternatives and associated structures are complete. The Cape Fear Skyway project is currently in the preliminary planning phase of the NEPA process. A Purpose and Need Statement and Alternatives Analysis are currently being developed for the project.

5.3.5 AQUATIC RESOURCES

5.3.5.1 Fisheries Nursery Areas

NCDENR, Division of Marine Fisheries (DMF) has identified Fisheries Nursery Areas (FNA) within the Bridge Study Area. There are a total of about three square miles of FNA within the Bridge Study Area. The entire lengths of the Cape Fear, Northeast Cape Fear, and Brunswick Rivers within the Bridge Study Area have been designated as FNA. The dredged portion of the navigational channel (used for Port of Wilmington access) is not included. FNA are used to describe areas where the initial post-larval and juvenile development of young finfish and crustaceans in North Carolina occurs. These data represent the locations of primary, secondary, and special secondary nursery areas. These areas represent critical areas for numerous species including finfish and crustaceans, which are of commercial and recreational importance. FNA locations within the Bridge Study Area are shown on **Figure 8**.

5.3.5.2 Essential Fish Habitat

Essential Fish Habitat (EFH) is defined as those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. 1802(10)). EFH is separated into estuarine and marine components. The estuarine component is defined as all estuarine waters and substrates (mud, sand, shell, rock and associated biological communities), including sub-tidal vegetation (grasses and algae) and adjacent inter-tidal vegetation (marshes and mangroves). A Cape Fear Skyway bridge would cross estuarine systems in the Cape Fear River that are designated EFH for the South Atlantic Fishery Management Council's Shrimp, Red Drum, Snapper and Grouper, and Coastal Migratory Pelagics Fishery Management Plans (SAFMC, 1998). This assessment of EFH for a Cape Fear Skyway bridge is being provided in conformance with the 1966 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (Federal Register, Volume 62, No. 244, December 19, 1997). EFH area designations are synonymous to FNA designations discussed above, and shown on **Figure 8**.

In general, if construction results in more or deeper channel dredging of the navigational channel for the Port of Wilmington, it could adversely impact the water quality of the Cape Fear River. The disturbed nature of the possible bridge locations (the channel is periodically dredged for maintenance) results in a lower quality aquatic resource in the main channel; however, FNA is present along the shallow lands and floodplains. Efforts should be taken throughout the planning process to identify construction methods that minimize the potential for water quality and FNA degradation. Some methods may include the placement of piers outside of designated FNA and the disposal of dredge material off-site (if necessary).

5.3.5.3 Aquatic Commerce

The Port of Wilmington is one of the few South Atlantic ports with readily available berths and storage areas for containers and cargo. The location of the NCSPA is based on deepwater access. In 1949, the General Assembly approved the issue of $7.5 million in bonds for construction and improvement of seaports to promote trade throughout the state. Public terminals equipped to handle oceangoing vessels were completed at Wilmington and Morehead City in 1952.

The Port of Wilmington's top commodities and their origins or destinations for Fiscal Year (FY) 07 are shown in **Table 9**. A total of 127 ships or barges used the Port of Wilmington in FY 07.

Table 9: Port of Wilmington Transport Summary for Fiscal Year 07

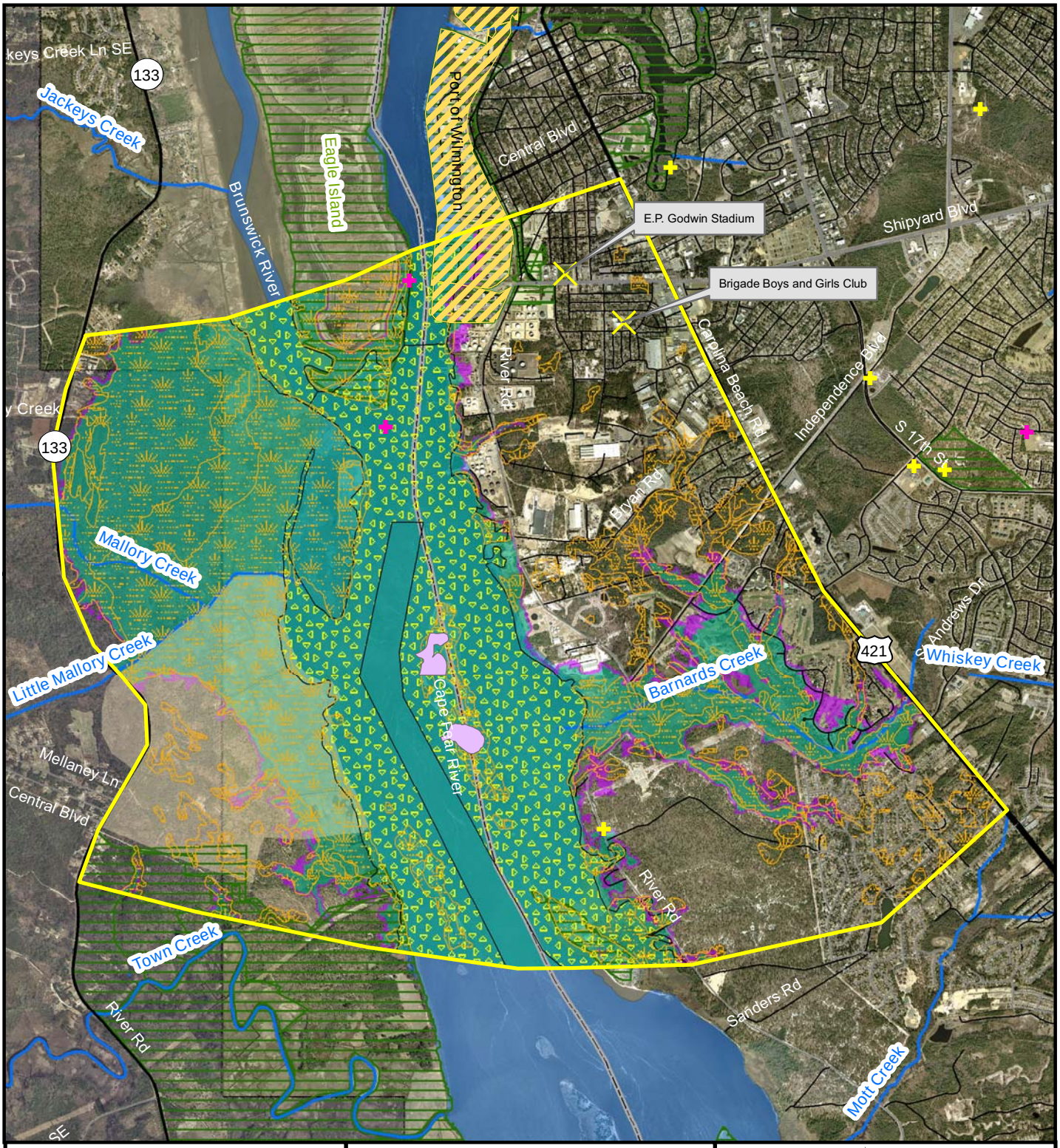
Commodity	Type	Origin/ Destination	Move	% Truck	% Rail	% Barge
Cement	Bulk	Fayetteville NC, Raleigh NC	Import	100	0	0
Coal	Bulk	Wilmington NC	Import	0	0	100
Direct Reduced Iron	Bulk	Georgetown SC	Import	100	0	0
Dry Chemicals	Breakbulk	Wilmington NC	Export	100	0	0
Fertilizer	Bulk	Winston-Salem NC, Burgaw NC, Clinton NC, Lumberton NC	Import	96	4	0
Liquid Chemicals	Bulk	Wilmington NC + Unknown Destinations (90% Interstate)	Import	9	91	0
Lumber	Breakbulk	Charlotte NC, Thomasville NC, Shalebrick NC	Import	83	17	0
Salt	Bulk	Mt. Olive NC	Import	100	0	0
Steel	Breakbulk	Charlotte NC, Petersburg VA	Export	80	20	0
Steel	Breakbulk	Clinton NC, Goldsboro NC, Lexington NC, Russell KY, Nashville TN	Import	56	44	0
Various	Containers	Numerous NC Destinations	Export	100	0	0
Various	Containers	Numerous NC Destinations	Import	100	0	0
Woodpulp	Breakbulk	Riegelwood NC	Export	100	0	0

Source: NC State Ports Authority, Transport Log, FY 2007

5.3.6 FEMA FLOODPLAINS

Floodplains are defined by Executive Order 11988, Floodplain Management, as 'the lowland and relatively flat areas adjoining inland and coastal waters, including floodprone areas of offshore islands, including, at a minimum, that area subject to a one percent or greater chance of flooding in any given year;" i.e., those areas which would be inundated by a 100-year flood.

A large portion of the Bridge Study Area is located within areas mapped on the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Maps (FIRM) as occurring within the 100-year floodplain. The proposed project would likely traverse areas within the 100-year floodplain, as identified by FEMA (shown on **Figure 8**).



CAPE FEAR SKYWAY

State Transportation Improvement Program
Project No. U-4738

NORTH CAROLINA Turnpike Authority

Legend

- Bridge Study Area
- Interstate Highways
- US Highways
- State Highways
- Local Roads
- County Boundary
- Clarendon Plantation
- NC Ports Authority
- Railroads
- Streams
- Open Water
- Potential 4(f) Property

Threatened and Endangered Species

- Endangered
- Federal Species of Concern
- Threatened (Similarity of Appearance)
- Parks, Gamelands, and Protected Lands
- DCM Wetlands
- Fisheries Nursery Area

FEMA Floodplains

- X
- AE

N

0 0.5 1 Miles

0 2,500 5,000 Feet

Cape Fear Skyway Preliminary Bridge Location and Type Study

Date: February 2009

Figure 8

Environmental Features

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Since this project would likely encroach on the 100-year floodplain, it should be evaluated with respect to the following: the level of flooding risk; effects on beneficial floodplain values; the extent to which the project may support incompatible floodplain development; and measures to minimize floodplain impacts and to preserve beneficial floodplain values. The floodplain assessment should state whether the county or other local jurisdiction is a participant in the NFIP and should be included in the NEPA document.

Executive Order 11988, Floodplain Management, requires federal agencies to avoid actions, to the extent practicable, which will result in the location of facilities in floodplains and/or affect floodplain values. As the project progresses, hydraulic studies would be carried out to ensure that the project would not increase base flood elevations to a level that would violate applicable floodplain regulations and ordinances.

5.3.7 THREATENED AND ENDANGERED SPECIES

Species with the federal status of endangered (E), threatened (T), proposed endangered (PE), and proposed threatened (PT) are protected under provisions of the Endangered Species Act (ESA) of 1973 as amended (16 U.S.C. 1531 et. seq.). Any action likely to adversely affect a species classified as federally-protected will be subject to review by the US Fish and Wildlife Service (USFWS). The USFWS and North Carolina Natural Heritage Program (NCNHP) online databases were reviewed for federally-listed species potentially occurring in Brunswick and New Hanover Counties (USFWS website: http://southeast.fws.gov/es/county%20lists.htm, and NCNHP website: http://149.168.1.196/nhp).

There are two documented federally-listed species within the Bridge Study Area: shortnose sturgeon (*Acipenser brevirostrum*) and American alligator (*Alligator mississippiensis*). Because both species are mobile species, there is potential for them to occur within the entire length of the Cape Fear River and, possibly, within the larger streams in the Bridge Study Area. The American alligator is federally-listed as a threatened species due to similarity in appearance [T(S/A)]. A species designated as T(S/A) is not granted the level of USFWS protection considerations afforded to threatened or endangered species during interagency consultations.

Habitat is present and has been previously documented within the Bridge Study Area for the two above-mentioned species as well as several species that have not been documented within the Bridge Study Area. These species include: bald eagle (*Haliaeetus leucocephalus*), red-cockaded woodpecker (*Picoides borealis*), West Indian manatee (*Trichechus manatus*), wood stork (*Mycteria americana*), Cooley's meadowrue (*Thalictrum cooleyi*), and rough-leaved loosestrife (*Lysimachia asperilufolia*).

5.3.8 CULTURAL AND HISTORIC RESOURCES

A preliminary search of files at the North Carolina State Historic Preservation Office (NCHPO) was conducted to determine what, if any, archaeological and architectural resources have been documented within the Bridge Study Area.

5.3.8.1 Archaeological Resources

Seventy previously recorded archaeological sites are located within the Bridge Study Area. One is present in Brunswick County and 69 are located in New Hanover County (Figure 7). However, the large number of sites in New Hanover County is misleading. More sites have been recorded in the smaller section of the Bridge Study Area in New Hanover County simply because a larger amount of systematic, compliance-driven survey work has been conducted

along the Cape Fear River within the county boundaries. It is likely that the west side of the Cape Fear River (in Brunswick County) also contains a large number of unrecorded archaeological sites.

Of the 70 previously recorded archaeological sites, six have been recommended as eligible for the NRHP, one was recommended as potentially eligible, and 37 have been recommended as ineligible for the NRHP. The remaining 26 previously recorded sites have not been evaluated for NRHP eligibility. The six NRHP-eligible sites are 31NH28 (Cold Morning Site), 31NH456/456**, 31NH747, 31NH750, 31NH752, and 31NH755/755**. Site 31NH28 is located on the north side of Barnard's Creek and the other five are located on the east bank of the Cape Fear River, just south of the confluence of Barnard's Creek and the Cape Fear River. The South Option of the Cape Fear River crossing traverses 31NH28, and sites 31NH456/456** and 31NH747 may also be impacted by this alignment depending on final design. The North and Central Options do not impact any sites previously determined eligible for the NRHP, although not all of the sites in the vicinity of these two options have been formally evaluated for NRHP eligibility.

The known sites in the Bridge Study Area consist of a variety of prehistoric and historic sites dating from approximately ca. 8,000 to 10,000 years ago up to the mid-twentieth century. The types of prehistoric sites anticipated in the area, both previously-recorded and unrecorded, could consist of small prehistoric sites in upland settings representing ephemeral campsites (e.g., hunting camps) and specialized activity sites (e.g., resource extraction sites). Larger prehistoric terrestrial sites may also be encountered that represent semi-permanent or year-round villages. Finally, there are a few previously-recorded sand burial mounds in the region, and it is possible others that have not been formally recorded with the state exist. The small and large prehistoric sites would likely be located along upland edges overlooking waterways and tidal flats, particularly where multiple waterways converge (e.g., Mallory Creek/Little Mallory Creek—Cape Fear River confluence; Barnard's Creek—Cape Fear River confluence); it is unlikely that numerous prehistoric sites would be located in low-lying swampy areas, but a few of the region's prehistoric sand burial mounds are recorded in such settings. Historic sites would fit a similar pattern with residential, agricultural, and industrial sites typically located in drier upland settings; however, these sites may have associated elements, such as dyke systems or watercraft landing locations that extend into the swampy lowland areas. Finally, historic shipwrecks and scuttled boats are known to exist along the Cape Fear River channel, and additional, previously unrecorded underwater resources may exist within the Cape Fear River.

The Bridge Study Area is considered a highly sensitive archaeological area. In both historic and prehistoric times, human settlement tended to be located near waterways including major rivers (e.g., Cape Fear River) as well as major tributaries (e.g., Town Creek, Mallory Creek, Barnards Creek). Prehistoric sites also have a high propensity for being located along the margins of major wetlands and adjacent to Carolina Bays, both of which are present in the Bridge Study Area. Historic settlements, particularly plantations, are generally located along the Cape Fear River (primarily along its west bank) and along Town Creek (primarily along its east bank). Underwater resources are located along the Cape Fear River channel, but are unlikely to occur in tributaries of the river.

5.3.8.2 Historic Resources

A search of historic architectural resource data at the NCHPO determined that no NRHP listed or eligible resources exist within the Bridge Study Area. However, the Clarendon Plantation, a

potential historic resource, is located within the Bridge Study Area. This resource has been placed on the North Carolina Study List, which means no specific determination of NRHP eligibility has been conducted, but the plantation must be addressed in any cultural resources study of the area.

URS has identified 11 additional potential historic resources and/or districts within and adjacent to the Bridge Study Area (Figure 7). These mostly consist of early/mid-20th century resources.

5.4 ANALYSIS

The North, Central, and South river crossing location options are described in **Section 2.0**. **Table 10** provides general information with regard to potential impacts associated with these options. This analysis is based on criteria used to evaluate and compare the three river crossing location options for a possible bridge alignment, as described in Section 5.1. Descriptions of each type of impact, as well as the unit of measure used are also described in Section 5.1.

Table 10: Impact Analysis of River Crossing Location Options[1]

Impact Criteria	North Option	Central Option	South Option
Traffic/Planning			
Adverse impact on existing economic, industrial, and business interests	●	◎	◎
Compatibility with future local development plans	◎	●	◎
Impacts to future Port of Wilmington operations	Yes	Yes	Yes
Direct impacts to Port of Wilmington operations and accessibility	●	○	○
Access to major evacuation routes	Improved	Improved	Improved
Engineering			
Capital costs (including construction costs)	●	◎	◎
Vertical clearance	165 to 187 feet	165 to 187 feet	165 to 187 feet
Horizontal clearance	784 feet	789 feet	684 feet
Environmental Considerations			
Socioeconomic Impacts	●	◎	◎
Section 4(f) of the Department of Transportation Act	●	○	◎
Land trust land	◎	None	◎
Waters of the U.S.	◎	◎	◎
Aquatic issues	Major	Major	Major
FEMA floodplains	●	●	●

Table 10: Impact Analysis of River Crossing Location Options[1] (cont.)

Impact Criteria	North Option	Central Option	South Option
Threatened and endangered species	Yes	Yes	Yes
Cultural and historic resources	⭘	○	⭘

[1] Refer to Section 5.1 for description of impact measuring criteria and the units of measure for each category.
Key: Low Impact: ○
Moderate Impact: ⭘
High Impact: ●

5.5 NAVIGATIONAL CLEARANCES

5.5.1 HORIZONTAL CLEARANCE OF BRIDGE

Based on an assumed span length for a bridge, the preliminary recommendation for the horizontal clearance of a potential bridge ranges from 800 to 1,200 feet. Increasing the main span from 800 feet to 1,200 feet would have additional costs, but it would remove the need for separate vessel impact protection, and this may allow the longer span to become more cost effective.

As described in **Section 3.4**, the bridge span length that would be necessary to clear-span the river, either from water's edge to water's edge or from land to land, is clearly cost prohibitive and therefore piers would need to be placed in the water for the approaches to the main channel span. The minimum main channel span would be the clear-span channel width, plus one-half the width of the bridge foundation on each side. Assuming a 50-foot allowance for the footing width, and accounting for the skew of the crossing, this allows for a main span length of about 800 feet for the Central Option. It appears that by increasing the main channel span to about 1,200 feet the main tower foundation could be located in shallow water that would protect them from the large impact loading that would result from a fully loaded ship. This would in turn decrease costs since large pier protection systems would not be needed.

5.5.2 VERTICAL CLEARANCE OF BRIDGE

The preliminary recommendation for the vertical clearance of the bridge is for it to be at least 165 feet, and not to exceed 187 feet. The preliminary recommendation of vertical clearance is based on air drafts of the merchant and cruise fleet (**Table 1**), bridge heights at other ports (**Tables 2-4**), and the vertical restriction of the Progress Energy 230kV dual transmission lines downstream of the Port of Wilmington.

5.6 BRIDGE TYPE

The preliminary recommended bridge type to accommodate the vertical and horizontal clearances recommended in this report is a cable-stayed bridge (**Figure 6**). While there are several bridge types that would support the main span length of 800 to 1,200 feet, such as truss, arch, and suspension bridges, a cable-stayed bridge would likely be the most cost efficient for a main span length of 800 to 1,200 feet. Suspension bridge applications are considered for bridges 1,500 feet in length or more. For the purposes of developing comparative cost estimates for this bridge study, a cable-stayed bridge was assumed because there are a number of recent cable-stayed structures in the United States from which historical unit pricing can be derived, as shown in **Table 6**.

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Appendix A: Meeting Minutes and Records of Conversation

URS

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RECORD OF TELEPHONE CONVERSATION

DATE: 06/13/06	PROJECT NO.
RECORDED BY: Shannon Cox	OWNER/CLIENT: NCTA – Cape Fear Skyway
TALKED WITH: Albert Eby, Director	FROM: WAVE (Cape Fear Public Transportation Authority)
CONTACT INFORMATION: 910-202-2035 P.O. Box 2258 Wilmington, NC 28402 aeby@wavetransit.com	
NATURE OF CALL (INCOMING OR OUTGOING) Out	
MAIN SUBJECT OF CONVERSATION: Community impacts of Cape Fear Skyway.	

I called Mr. Eby to discuss potential community impacts of the Cape Fear Skyway project, and, more specifically, to ask about whether the Cape Fear Skyway might be used for public transportation routes. Mr. Eby indicated that the Skyway has not really been considered as a route for public transportation because of its potential to be a toll road. Currently, the Isabelle Holmes and Memorial bridges are used between New Hanover and Brunswick County as public transportation routes. These bridges are useful as the current populations served by pubic transportation are mainly in Leland and Navassa. The Cape Fear Skyway might be considered as a route for public transportation if development continues in that southern area. At this point, Mr. Eby does not see any community impact from a public transportation perspective.

_____

(Name and Title)

URS

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RECORD OF TELEPHONE CONVERSATION

DATE: 06/13/06	PROJECT NO.
RECORDED BY: Shannon Cox	OWNER/CLIENT: NCTA – Cape Fear Skyway
TALKED WITH: Tom Cunningham, Governmental Affairs and Infrastructure	FROM: Greater Wilmington Chamber of Commerce
CONTACT INFORMATION: 910-762-2611 ext. 204 One Estell Lee Place Wilmington, NC 28401 cunningham@wilmingtonchamber.org	
NATURE OF CALL (INCOMING OR OUTGOING) Out	
MAIN SUBJECT OF CONVERSATION: Community impacts of Cape Fear Skyway.	

I called Mr. Cunningham to discuss potential community impacts of the Cape Fear Skyway project. He indicated that he thinks the project will have all positive impacts and is definitely needed. The biggest plus will be that it will get truck traffic off of local roads. The fixed bridge is also a benefit – the area currently does not have a bridge that will not open and close. The biggest negative is how the project will be paid for. The project (as all major infrastructure projects) will support existing and bring in new business to the area.

(Name and Title)

M E M O R A N D U M

To: Attendees

From: Kiersten R. Giugno

Date: July 17, 2006

Subject: **Minutes of Meeting held June 8, 2006 at 2:00 PM**
North Carolina Turnpike Authority – Cape Fear Skyway Project

Attendees:

Bill Bennett	NC State Ports Authority
Stephanie Ayers	NC State Ports Authority
Layton Bedsole	NC State Ports Authority
Cris Mowrey	NC State Ports Authority
Craig Deal, P.E.	HNTB / GEC for NCTA
Tracy Roberts, AICP	HNTB / GEC for NCTA
Paul Barber P.E.	HNTB / GEC for NCTA
Lonnie I. Brooks. P.E.	NCDOT – Structure Design Unit
David Griffin, CEP	URS Corporation – North Carolina
Kiersten R. Giugno	URS Corporation – North Carolina

A meeting was held at the North Carolina State Ports Authority (NCSPA) in Wilmington to discuss navigational requirements associated with the Cape Fear Skyway. The meeting was opened by T. Roberts with introductions of the attendees. The meeting was turned over to D. Griffin who provided a map overview and brief description of the study area. The Cape Fear Skyway would begin at the proposed US 17 Interchange with the Wilmington Bypass in Brunswick County and extend 9.5 miles in an easterly direction to terminate at US 421 in Wilmington. D. Griffin summarized the status of the Wilmington Bypass project and informed the group that the Final Environmental Impact Statement (EIS) for this project is nearly final. D. Griffin noted the terminus of the Wilmington Bypass, south of the community of Spring Hill, falls within the Preliminary Study Area noted on the map for the proposed Cape Fear Skyway. D. Griffin described the general landscape throughout the Preliminary Study Area.

D. Griffin noted the purpose of the meeting was to solicit information regarding navigational requirements and concerns of the NCSPA. A list of preliminary data needs, included as an attachment to these meeting minutes, was presented to the group to start the discussion. The following topics were discussed by the entire group:

<u>Power Line Constraints</u>
D. Griffin inquired about the existing overhead power line (owned by Progress Energy) crossing the Cape Fear River and whether the line is an existing height constraint for the vessels utilizing the channel. Based on

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discussion, air draft provided by the power line is not a significant constraint for cargo ships; however, it could constrain the height of large cruise vessels that may wish to utilize the channel in the future. Currently, one to six or eight cruise ships dock at the Port each year. To Port official's knowledge, no cruise ships have been prevented from docking at the Port due to the power line clearance constraints. No cruise liners have asked the Port for permission to build a terminal. The air draft issue is not the only constraint affecting cruise ships; cruise liners have to have valid economic reasons to locate and operate a passenger terminal. B. Bennett noted that Progress Energy is not interested in burying the power lines. L. Brooks noted that NCDOT, for maintenance and safety reasons, rarely allows utilities to be attached to bridges (referring to the possibility of relocating the overhead lines). D. Griffin stated that the power line will be addressed in the EIS as an existing constraint but would not be a part of the Skyway project itself.

Vessel Data

Vessel data was requested and discussed. It was noted that tonnage and trade statistics, top five commodities trends for both imports and exports, ten-year vessel trends, top ten trading partners, and the sailing schedule are available at ncports.com. This data will be useful, but does not include physical descriptions of the vessels, which is necessary for evaluating navigational and engineering constraints. C. Mowrey provided an example of available data fields for calling vessels. C. Mowrey agreed to provide the records of vessel calls, which includes some details regarding vessel characteristics that utilize the River. However, Port officials specified that all data requests be directed to Karen Fox, NCSPA Director of Communications.

The North Carolina International Port (NCIP) study includes a market analysis to address the feasibility of a cruise ship facility at the NCIP. However, to date no cruise lines have approached the NCSPA concerning port accommodation. The current terminal is not equipped to handle passengers. The Old Molasses site was discussed as an optional cruise terminal; however, it was identified as having limitations.

Constraints

The following general constraints were noted:

- Most pipelines (e.g., Exxon pipeline) are located under the River just north of the Preliminary Study Area boundary. AT&T owns a submerged fiber optic line. There is also a submerged natural gas line.

- According to the USACE, there are no plans to deepen the River channel.

- Depending on bridge location, property owners east of the River and south of the Port may also have height constraints associated with cranes and conveyors.

- Channel widening may be necessary for two-way passage of large vessels. It was suggested that URS consult with the Cape Fear River and Cape Fear Docking pilots regarding this issue. Pilot contact information is available on the NCSPA website.

- Eagle Island was discussed as a possible pier location for the bridge. However, cargo space is at a premium at the Port and cannot be lost to bridge pier construction and security issues preclude the bridge and ramps from crossing NCSPA property. Port officials prefer that the bridge not pass over the Port but would support locating the bridge as close to the Port as practical.

- According to USACE, Island 13 is a mitigation site and should be avoided.

- Truck weight is a factor in planning the type of bridge. A 15-ton average load is standard for bulk and break bulk cargo. Total Port tonnage can be divided by the 15-ton factor to determine number of truck per year.

Planning and Environmental Documents

There is no Port Master Plan. There are only individual Ports facilities expansion plans. The Container Yard Expansion Plan ($140M project for excess cargo, chassis, and empty containers) was identified as a useful source of information. The Plan is based on a 10- to 15-year demand model and outlines several improvement activities, in particular the purchase of a 90-acre site located on River Road. With regard to the NCIP, 1.4 million TEU at opening is expected to increase to 2 million TEU in the future.

The Radio Island EIS was noted as an additional source of information. C. Mowrey, agreed to locate a copy of the EIS and provide to URS. The letter to Karen Fox shall include a request for the EIS.

As a result of the proposed NCIP, the Wilmington Port predicts growth in bulk and break bulk cargo and a reduction in container cargo. However, the NCIP is not anticipated to stop all container cargo to Wilmington, especially if Wilmington offers lower fees and/or specialized operating services. Port officials felt it was difficult to predict the vertical clearance needs for the proposed bridge, especially if the NCIP becomes a reality (which would greatly reduce the size of ships visiting the Wilmington Port).

Transportation

Truck traffic has been studied in a 2003 or 2004 MPO Study prepared for the Wilmington Urban Area by a consulting firm in Houston, TX. S. Ayers agreed to provide URS with a copy of the study. The letter to Karen Fox shall include a request for the MPO Study. I-40 and US 74 corridor west are the two main arteries serving the area. I-20 completion would serve as another main artery. The main traffic strain is Front Street, Carolina Beach Road and College Road to I-40. The Port would like to see I-40, I-74 (future) and I-20 (future) all tying to I-140 at Wilmington for optimum truck access to and from the Port. Until the Cape Fear Skyway is completed, these roads will all feed via I-140 to a choke point at the Cape Fear Memorial Bridge.

Constraints between the Cape Fear Skyway to Port gates were discussed. Traffic signals are a significant hindrance to truck traffic. A dedicated ramp from the bridge to the Port and an alignment with the fewest stops and turns possible is preferred. NCSPA prefers that Carolina Beach Road not become a main route between the Port and the Cape Fear Skyway.

The City is concerned about truck traffic overwhelming city streets. Front Street will carry increasing truck traffic to the Port's northern gate for bulk and break bulk facilities and to the South Gate via Carolina Beach Road, now that I-140 is complete from US17 North to US421. Shipyard Boulevard currently carries the majority of container traffic to the Port's southern gate. Directing trucks to US 74 routes traffic over the Cape Fear Memorial Bridge.

The Port could support an alternative alignment to the north of the study area over the tip of Eagle Island. Direct access to the Port would be good but should avoid coming over the Port itself due to security concerns. The ideal location is not over the Port but close enough to allow a dedicated truck ramp or controlled access.

On the eastern side of the Cape Fear River – where the bridge would descend to US 421 – the vertical drop would be challenging. Further south in the study area might be better since US 421 bends further away from

the river, allowing greater distance for the bridge's decent.

The NCSPA has an agreement with the City and the Sunset Beach Park Neighborhood to keep container trucks off Burnett Boulevard. Container traffic enters via US 421. Bulk traffic enters via River Road. Carolina Beach Road should not be considered for a truck corridor. Increased development along River Road could also constrain truck traffic. The relocation of River Road has been discussed; however, currently there are no plans for improvements to this road. The Cape Fear Skyway may serve to regenerate this discussion. The possibility of a new road was discussed and should be reviewed in the feasibility study.

Although too early to know for sure, Port officials felt NC 87 would be a potential main route to the proposed NCIP rather than NC 211 or NC 133. It is also possible that a parallel facility could be built adjacent to NC 87. There could also be an exchange of trucks between NCIP and the Wilmington Port.

There are several properties south of the Port which could be evaluated as a potential crossing point for the Skyway.

Ports officials recommend discussing the Cape Fear Skyway with the mayors of Carolina Beach and Kure Beach.

When asked about GIS data, Port officials indicated that the Port utilizes the County's data.

Action Items
URS to meet with Cape Fear River pilots.
URS to meet with Cape Fear Docking pilots.
URS to check with pilots on the maximum vessel passing width needed.
URS to request all data in writing (e.g., Container Yard Expansion Plan Executive Summary, MPO Truck Study, Radio Island EIS, and vessel call data [owner, tons, length, draft, and Lloyd type]) directed to Karen Fox, NCSPA Director of Communication

End of Minutes.

KRG:krg

URS

M E M O R A N D U M

To: Attendees

From: Kiersten R. Giugno

Date: July 17, 2006

Subject: **Minutes of Meeting held June 8, 2006 at 10:00 AM**
North Carolina Turnpike Authority – Cape Fear Skyway Project

Attendees:

Howard Varnam	USACE Wilmington – Navigation Branch
Richard Kimmel	USACE Wilmington – Planning & Environmental Branch
Bob Keistler	USACE Wilmington – Project Management Branch
William Adams	USACE Wilmington – Planning & Environmental Branch
Frank Yelverton	USACE Wilmington – Planning & Environmental Branch
Jimmy Hargrove	USACE Wilmington – Navigation Branch
Dave Timpy	USACE Wilmington – Regulatory Division
Noel Clay	USACE Wilmington – Planning & Environmental Branch
Scott McLendon	USACE Wilmington – Regulatory Division
Craig Deal, P.E.	HNTB / GEC for NCTA
Tracy Roberts, AICP	HNTB / GEC for NCTA
Paul Barber, P.E.	HNTB / GEC for NCTA
Lonnie I. Brooks, P.E.	NCDOT – Structure Design Unit
David Griffin, CEP	URS Corporation – North Carolina
Kiersten R. Giugno	URS Corporation – North Carolina

A meeting was held at the USACE Wilmington Office (69 Darlington Avenue) to discuss navigational requirements associated with the proposed Cape Fear Skyway (TIP U-4738), a candidate toll road project under study by the NC Turnpike Authority. The Cape Fear Skyway would feature a new crossing over the Cape Fear River. The meeting was opened by T. Roberts with introductions of the attendees. The meeting was turned over to D. Griffin who provided a map overview and brief description of the study area. The Cape Fear Skyway would begin at the proposed US 17 Interchange with the Wilmington Bypass in Brunswick County and extend 9.5 miles in an easterly direction to terminate at US 421 in Wilmington. D. Griffin summarized the status of the Wilmington Bypass project and informed the group that the Environmental Impact Statement (EIS) for this project is nearly final. D. Griffin noted the terminus of the Wilmington Bypass, south of the community of Spring Hill, falls within the preliminary study area for the Cape Fear Skyway. D. Griffin described the general landscape throughout the preliminary study area.

D. Griffin noted the purpose of the meeting was to solicit information regarding navigational requirements and concerns of the United States Army Corps of Engineers (USACE). A list of preliminary data needs,

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included as an attachment to these meeting minutes, was presented to the group to start the discussion. The following topics were discussed by the entire group:

Technical and Environmental Documents

It was noted that several environmental documents have been prepared. In the late 1960's the channel, south of Island 13 and the existing power line, was deepened to 38 feet. In 1989 and 1996 Environmental Impact Statements (EIS) were prepared. It was noted that the 1996 EIS and Feasibility Report Volume I is available on the internet. Volumes II and III are not available in pdf; however, the Technical Studies are located within the USACE library. In 2000, an Environmental Assessment (EA) was prepared. This document is available in pdf. URS requested copies of these documents and any other known technical reports that are relevant to the proposed Cape Fear Skyway.

In the mid 1990's, NC-HPO worked with the USACE in defining archaeologically sensitive areas to be studied, which were then surveyed by the USACE. This survey focused on underwater resources and was limited to the channel area (i.e., did not include the River banks). R. Kimmel provided a map of the sensitive areas to T. Roberts, which will be provided to URS.

The 1996 EIS required the preservation of the sensitive biological resources (e.g., fishery and wetland habitats) located on Island 13. The island was sculpted for primary nursery areas to mitigate for impacts associated with the deepening of the Wilmington Harbor. Island 13 is closed to dredge spoil disposal. The USACE prefers this area not be impacted by the proposed Cape Fear Skyway. However, Island 13 is approximately 30 acres and, if necessary, could be spanned but no piers should be placed on the island.

Pursuant to jurisdictional requirements, the USACE has only surveyed the water depths within the federally dedicated channel. These surveys are available on the USACE website at www.saw.usace.army.mil\nav. Water depths are shown from mean lower low water (MLLW). Team members can sign up on this website to receive email alerts when the surveys are updated. Survey data for areas outside the jurisdiction of the USACE (i.e outside the width of the dedicated channel) is not available. A contract with a private surveyor would be required if a bank-to-bank survey is needed.

When the channel was deepened to 42 feet, blasts were set off in cones, which could have caused fractures leaving loose materials within the existing substrate. Approximately 78 blasts were set off downstream from Island 13 and the lower part of Brunswick channel through Keg Island. It was noted that a significant amount of geotechnical data is available. Boring Logs were prepared and are included as Appendix 2 of the 1996 EIS. Additional data has been generated since the aforementioned 1989, 1996, and 2000 reports were prepared. URS requested copies of the relevant data.

Channel Constraints

The 1996 EIS considered deepening the channel two, four and six feet. However, four feet was preferred. As such, the channel is currently 42 feet deep. There are no plans to deepen the channel any further.

A GIS map of the channel, including River widths and buffer areas was reviewed and provided to URS. The paper copy of the map was provided to URS. J. Hargrove agreed to provide URS with the metadata for this GIS map. The majority of the channel is 400 feet wide, with some areas as wide as 500 feet. For the most part, the flared, or wider areas, are along the turns of the River. A buffer area of approximately 142 feet beyond the dedicated channel width is required along both sides of the channel for maintenance activities.

The buffer permits side slopes of approximately 3:1 to the channel bottom. The buffer setback is shown in red on the GIS map reviewed by the group. It is a District policy, signed by the Commander, that piers cannot be located within the buffer area identified for the Cape Fear River.

Several utilities were identified within the River bottom, just north of Island 13, near the Exxon dock. The USACE has information regarding a natural gas line (north of Island 13), paraxylene, and AT&T fiber optic cables in MicroStation format. Progress Energy owns overhead powerlines south of Island 13. J. Hargrove agreed to identify the types of utilities and provide URS with their locations. Utilities are also shown on navigation charts.

The Bridge structure (e.g., abutments, piers, bents) should preferably not be located at a turn in the River due to increased navigation concerns. It was suggested that URS work with the Cape Fear River and Cape Fear Docking pilots regarding pier placement constraints.

The Brunswick River has not been studied by the USACE. The study was limited to channel areas where commercial activity occurs and Brunswick River has none. However, it is understood that sunken WW II era Liberty Ships located in the Brunswick River along the south-western section of Eagle Island represent a potential cultural resources constraint. Underwater archaeological data should be obtained from the archives at Fort Fisher.

Both sides of the River are identified as primary nursery areas. The resource agencies have raised concerns regarding impacts, particularly from noise and vibration, to protected species (including the Short nose sturgeon and West Indian manatee). A red cockaded woodpecker survey (landside) will also likely be needed.

Disposal areas are at a premium and impacts should be avoided or minimized, and these areas should not be lost for use as mitigation sites. Disposal Area #14 located on the west bank of the mouth of the Brunswick River is owned by Bate's Lumber Company and would be a good location for piers but not for mitigation.

Eagle Island (a dredge spoil disposal site) has approximately 30 to 40 feet of soft sediment overlying the bedrock. Constructing the Bridge piers on Eagle Island would reduce potential vessel impacts. Potential vessel soft grounding would result in a decrease in damage to the vessel when compared to striking a pier within the River. However, the difficulties associated with the Bridge and ramps crossing the ship yards and industrial areas of the Wilmington Port were noted. Bridge foundation conditions would also be a challenge – would probably have to bore very deep to reach acceptable bearing conditions. USACE expressed concern over crossing Eagle Island.

The United States Coast Guard (USCG) may have constraints. It was suggested that URS work with the Coast Guard (Bill Brazier, Bridge Department) to incorporate their concerns within the horizontal and vertical constraints context of the navigational channel. The USACE will cooperate with the USCG with regard to prescribed clearances.

Action Items

H. Varnam to provide URS with relevant sections and associated technical reports of the 1989 EIS.
H. Varnam to provide URS with relevant sections and associated technical reports of the 1996 EIS.
H. Varnam to provide URS with a copy of the 2000 EA and relevant technical reports.
J. Hargrove to provide URS with the GIS files of navigational channel geometery for the Cape Fear River (based on map shown during the meeting).

J. Hargrove to provide URS Microstation files of types and location of utilities within the Cape Fear River.
URS to contact Cape Fear River and Cape Fear Docking pilots regarding navigational requirements.
URS to contact United States Coast Guard.

End of Minutes.

KRG:krg

Bill_Bennett@ncports.com
06/14/2007 03:56 PM

To David_Griffin@URSCorp.com
cc Stephanie_Ayers@ncports.com, Layton_Bedsole@ncports.com
bcc
Subject SHIP AIR DRAFT REQUIREMENTS FOR THE CAPE FEAR SKYWAY

History: This message has been forwarded.

Good afternoon, David.

In response to your inquiry about reasonable FREIGHT SHIP requirements for bridge clearance under the proposed Cape Fear Skyway, we think the bridge should have the maximum height possible. For all practical purposes at this point in time, we believe that the bridge should not have a lower clearance than the existing Progress Energy transmission lines. Once you build the bridge, its clearance will set the air draft limits forever, even if the lines are moved or replaced at some time in the future. Having a bridge clearance that is the same height as the lines provides the most flexibility for the near term as well as for future needs; anything else would be unacceptable.

I was able to determine that even allowing for margins of safety for clearance, we would probably never have a FREIGHT SHIP at the *current* Port of Wilmington that needed more than 160' to 165' of air draft. FYI: the ship dimension that corresponds to height above the water line is called air draft. Required clearance for a ship's air draft dimension is usually needed at the highest of high tides, but clearances for ship navigation purposes are frequently measured at Mean Lower Low Water (MLLW).

But the possibilities are many and we need to plan for the future. It is impossible for either of us to predict what will happen 20 or even 50 years from now. Future vessel designs may call for wider versus deeper draft vessels given the draft constraints at a majority of U.S. and foreign ports. This could also impact bridge design and should be considered by designers. Eagle Island could come into play, either as container, general cargo, cruise, or automobile terminal. It became apparent to us that since Progress Energy's power line height already is the controlling limit on air draft, we should not increase the impact. The existing power lines have a clearance of approximately 186' at MLLW. (We can provide you with a survey we did in the past, but you will eventually want to verify that for yourselves.)

PASSENGER SHIPS

We discussed passenger ships at a previous meeting. Our community has an abiding interest in encouraging cruise line operations in Wilmington. Major cruise lines have cited power line clearance as the major obstacle to bringing 2,000+-passenger cruise ships into Wilmington. As I recall, cruise line industry officials told us several years ago that vessels in service at that time required approximately 210' feet of air draft, much higher than the clearance at the Progress Energy transmission lines. I believe we need to resolve this issue before

determining the optimum bridge clearance.

The NC State Ports Authority does not want our requirements to be cited as the reason why the air draft of the Skyway prevented cruise ships from ever making Wilmington a Port-of-Call. This is not a State Ports Authority, or a Wilmington area, or even a NCTA decision. In my opinion, the issue needs to be considered objectively by an independent third party with input from the public, tourism officials, and the commercial and economic development communities in this entire region, if not the entire state. As an indication of how seriously the Ports Authority considers the "need" perceived by the local community, we intend to have a market analysis and feasibility study performed to research the potential for having a cruise ship homeport and or port-of-call associated with the new North Carolina International Port in Brunswick County. Unfortunately, we will not undertake this study for a few years.

I hope this helps.

Bill Bennett, P.E., M.P.A.
Vice President, Planning and Development
North Carolina State Ports Authority
(W) 910-251-7071
(M) 910-297-3118

URS

1600 Perimeter Park Drive, Suite 400
Morrisville, NC 27560
Telephone: (919) 461-1100
Facsimile: (919) 461-1415

RECORD OF TELEPHONE CONVERSATION

DATE:06/04/08	PROJECT NO. 31825110	
RECORDED BY: David Griffin	OWNER/CLIENT: NC Turnpike Authority	
TALKED WITH: Kim Hufham – 910/341.4030	FROM: Wilmington/Cape Fear Coast Convention & Visitors Bureau	
NATURE OF CALL (INCOMING OR OUTGOING) Outgoing		
ROUTE TO: Project File	FOR INFORMATION	FOR ACTION
	Joanna Harrington, URS Tracy Roberts, HNTB Jennifer H Harris, NCTA	
MAIN SUBJECT OF CONVERSATION: Cape Fear Skyway Bridge Study		

I called Kim Hufham, President & CEO of the Wilmington Convention and Visitors Bureau, to discuss Wilmington's history with regard to Wilmington's interest in the cruise line industry.

Kim stated that Wilmington is not actively pursuing cruise lines. Based on interest expressed previously, the cruise lines have a number of issues including: channel depth, the vertical clearance of the electrical lines, and distance from the ocean/"open water" to Wilmington.

Kim stated that the City has hosted smaller cruise line vessels of the 100-150 passenger size. These are itinerary-oriented cruises (e.g., a cruise that targets historic towns and cities with guided tours). They are smaller vessels that can pass under Memorial Bridge (vertical clearance about 110') and berth at the City owned dock along Water Street.

Kim added that "…the NC Port at Wilmington is a cargo port, not a cruise line vessel port." However, Kim added that on October 27, 2008, a cruise ship from Germany will be arriving to the area and docking at the NC Port at Wilmington. (In a follow up call from Kim, she advised that the ship was the AidaAura). Kim said this was a 2,000 passenger ship and that there are tours and activities arranged for the passengers. (Wikipedia says the ship can hold 1,300 passengers and 418 crew. Jane's Merchant Ships states that its water draught is 20.34 feet, well within the channel depth limits – 42 feet. No air draught information is available – but Kim advised that they must have investigated the height versus the powerline clearance – about 175 feet - in order to reach the NC Port at Wilmington.)

I told Kim that we had met with the NCSPA and asked her if there were others she would recommend we contact. In a follow-up call, Kim advised that the Water Street dock was owned and operated by the City of Wilmington – the dock master is RT Jones (910-520-6875). She suggested he might offer more information but she wasn't sure.

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RECORD OF TELEPHONE CONVERSATION

DATE:7/2/08	PROJECT NO. 31825110	
RECORDED BY: Susan Shelingoski	OWNER/CLIENT: NCTurnpike Authority	
TALKED WITH: Stephanie Ayers	FROM: Susan Shelingoski	
NATURE OF CALL (INCOMING OR OUTGOING) Outgoing		
ROUTE TO: Project File	FOR INFORMATION	FOR ACTION
	David Griffin, URS Tracy Roberts, HNTB	
MAIN SUBJECT OF CONVERSATION: Port data – vessels and commodities		

I called Stephanie Ayers (public relations director for the port) at 910-251-7073 to inquire about obtaining port vessel and commodity data for use in the bridge location study. I also asked about the movement of the cranes and the height of the Progress Energy Transmission lines. She informed me that McKim and Creed performed a survey of the channel and the height of the lines while the cranes were being moved up-river.

She gave me John Lenfestey's number 910-251-5673 at the port. He was in charge of the crane movement project.

Stephanie later emailed a response to our conversation that contained the voyage log for FY07 as well as commodities and the cargo forecasts for the coming years. They are saved in the project file under P:\Jobs3\31825110_Skyway\Data Collection\Ports Data. The Port of Wilmington is port # 11.

(Name and Title)

URS

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RECORD OF TELEPHONE CONVERSATION

DATE:7/2/08	PROJECT NO. 31825110	
RECORDED BY: Susan Shelingoski	OWNER/CLIENT: NCTurnpike Authority	
TALKED WITH: John Lenfestey	FROM: Susan Shelingoski	
NATURE OF CALL (INCOMING OR OUTGOING) Outgoing		
ROUTE TO: Project File	FOR INFORMATION	FOR ACTION
	David Griffin, URS Tracy Roberts, HNTB	
MAIN SUBJECT OF CONVERSATION: Progress Energy Transmission Lines		

Mr. Lenfestey 910-251-5673 at NC State Ports was in charge of the crane movement project. He informed me that Progress Energy provided written guidance regarding the transmission lines and ESP performed the survey. He sent both documents via email. They are saved in the project file at P:\Jobs3\31825110_Skyway\Data Collection\Ports Data.

(Name and Title)

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RECORD OF TELEPHONE CONVERSATION

DATE:7/2/08	PROJECT NO. 31825110	
RECORDED BY: Joanna Harrington	OWNER/CLIENT: NCTurnpike Authority	
TALKED WITH: Derek Dossey	FROM: USCG	
NATURE OF CALL (INCOMING OR OUTGOING) Incoming		
ROUTE TO: Project File	FOR INFORMATION	FOR ACTION
	David Griffin, URS Tracy Roberts, HNTB	
MAIN SUBJECT OF CONVERSATION: Cape Fear River navigational channel and vertical clearance		

I spoke to Derek Dossey, Lt. Commander of the USCG branch in Wilmington, to confirm the 165 ft of air draught of the Progress Energy power lines. I also asked if he had any information about the navigational channel widths, and he directed me to the USACE website. He didn't have any files that gave channel widths.

(Name and Title)

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RECORD OF TELEPHONE CONVERSATION

DATE:7/2/08	PROJECT NO. 31825110	
RECORDED BY: Susan Shelingoski	OWNER/CLIENT: NCTurnpike Authority	
TALKED WITH: Wayne Harl	FROM: Susan Shelingoski	
NATURE OF CALL (INCOMING OR OUTGOING) Outgoing		
ROUTE TO: Project File	FOR INFORMATION	FOR ACTION
	David Griffin, URS Tracy Roberts, HNTB	
MAIN SUBJECT OF CONVERSATION: Cape Fear Memorial Bridge		

I called Wayne Harl at NCDOT, Bridge Maintenance group about the height and clearance of the Cape Fear Memorial Bridge. Their clearances are measured at high tide. Closed, the clearance is 65 feet. Open it is 135 feet. The Cape Fear Memorial Bridge is bridge # 13.

(Name and Title)

URS

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RECORD OF TELEPHONE CONVERSATION

DATE:7/2/08	PROJECT NO. 31825110	
RECORDED BY: Susan Shelingoski	OWNER/CLIENT: NCTurnpike Authority	
TALKED WITH: Bill Wilder	FROM: Susan Shelingoski	
NATURE OF CALL (INCOMING OR OUTGOING) Outgoing		
ROUTE TO: Project File	FOR INFORMATION	FOR ACTION
	David Griffin, URS Tracy Roberts, HNTB	
MAIN SUBJECT OF CONVERSATION: Progress Energy Transmission Lines		

I called Bill Wilder in the Transmission Lines (maintenance) department at Progress Energy regarding their lines that cross the Cape Fear River. He informed me that those lines are referred to as the 'Cape Fear River Crossing'. They consist of 2 230kv transmission lines (east and west) that run from the Brunswick Nuclear Plant. The lines were constructed in the 1970's. He is mailing me the original plans for the lines.

The lines constitute ¼ of the total power generated by the Brunswick Plant. Due to their extremely high voltage, a 16-foot clearance is required for any vessel passing under the lines. He is sending the profile of the possible sag and estimated lowest point. The amount of sag depends on the temperature, season, and water elevation. We will need to be careful when determining the maximum clearance height.

(Name and Title)

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RECORD OF TELEPHONE CONVERSATION

DATE:7/2/08	PROJECT NO. 31825110	
RECORDED BY: Joanna Harrington	OWNER/CLIENT: NCTurnpike Authority	
TALKED WITH: Larry Sutherland	FROM: McAllister Towing	
NATURE OF CALL (INCOMING OR OUTGOING) Incoming		
ROUTE TO: Project File	FOR INFORMATION	FOR ACTION
	David Griffin, URS Tracy Roberts, HNTB	
MAIN SUBJECT OF CONVERSATION: Cape Fear River future vessel activity		

I spoke to Larry Sutherland of McAllister Towing in Wilmington, NC to discuss future vessel sizes expected to utilize the Port of Wilmington in the future. He was not aware of any larger vessels that would utilize the port in the future, and recommended I speak to the Cape Fear River Pilot Association for further information.

He did confirm that there is an air draught restriction of 165 feet under the Progress Energy power line.

(Name and Title)

Stephanie_Ayers@ncports.com
07/02/2008 02:30 PM

To susan.shelingoski@urscorp.com
cc Bill_Bennett@ncports.com
bcc
Subject NC State Ports

Susan,

Per our phone conversation, please find the port information requested to complete your Cape Fear Skyway Bridge study for URS.

1. Major commodities at NC State Ports
2. Shipping log for NC State Ports (7/1/2006 - 6/30/2007)
3. Business Forecast for NC State Ports
4. Description of Operations (below)

Also, feel free to search our website (ncports.com) for more info.

Description of Operations

- What is the nature of your business?

The North Carolina State Ports Authority is the governing body that administers the North Carolina's Port of Wilmington, Port of Morehead City and inland terminals in Greensboro and Charlotte. The nature of the business is to support economic development in North Carolina through the operation of shipping terminals and the movement of cargo.

- Describe the products and/or services your company provides?

The Port of Wilmington offers terminal facilities serving military, container, bulk and breakbulk operations. The Port of Morehead City offers terminal facilities serving military, bulk and breakbulk operations. The inland terminal in Charlotte serves the I-85 and I-77 distribution corridors as a neutral container yard operator for container carriers, and serves as a staging area for empty and loaded containers. The inland terminal in Greensboro serves the I-40 and I-85 corridors.

- What is the number of employees employed locally?

As of April 28, 2008, the number of State employees at the combined facilities totaled 283. This does not include other direct jobs at the facilities (like stevedores, terminal operators, trucking firms, steamship agents, freight forwarders and others on the terminal and involved in maritime activities at the facilities). In a study completed by Martin Associates in 2006 the estimated number of direct jobs generated by the Ports Authority (at all facilities) totaled 4,899. In the same calendar year (2006), 84,833 jobs in the state of North Carolina were in some way related to the maritime activity at the Port of Wilmington and the Port of Morehead City.

- Why are you located or have a branch here? Are there any competitive advantages locally over other areas? If so, what are they?

  The location of the North Carolina State Ports Authority is based on deepwater access. In 1949, the General Assembly approved the issue of $7.5 million in bonds for construction and improvement of seaports to promote trade throughout the state. Public terminals equipped to handle oceangoing vessels were completed at Wilmington and Morehead City in 1952.

  Thanks,

Stephanie Ayers
Director of Planning & Development
North Carolina State Ports Authority

910-251-7073


Commodity Transportation.xls


Voyage Log 7_1_2006 thru 6_30_2007.xls


NCSPA Cargo Forecasts.pdf

NCSPA Commodity Transport Summary FY07

COMMODITY	TYPE	PORT	ORG/DEST	MOVE	TRUCK	RAIL	BARGE
Aggregate	Bulk	Morehead City	Morehead City	Import	100%	0%	0%
Borate	Bulk	Morehead City	Blacksburg SC	Import	0%	100%	0%
Cement	Bulk	Wilmington	Fayetteville NC, Raleigh NC	Import	100%	0%	0%
Coal	Bulk	Wilmington	Wilmington NC	Import	0%	0%	100%
DRI	Bulk	Wilmington	Georgetown SC	Import	100%	0%	0%
Dry Chemicals	Breakbulk	Wilmington	Wilmington NC	Export	100%	0%	0%
Fertilizer	Bulk	Morehead City	Aurora NC	Export	97%	3%	0%
Fertilizer	Bulk	Wilmington	Winston-Salem NC, Burgaw NC, Clinton NC, Lumberton NC	Import	96%	4%	0%
Liquid Chemicals	Bulk	Wilmington	Wilmington NC + Unknown Destinations (90% Interstate)	Import	9%	91%	0%
Lumber	Breakbulk	Wilmington	Charlotte NC, Thomasville NC, Shalebrick NC	Import	83%	17%	0%
Lumber	Breakbulk	Morehead City	Salisbury NC, Rocky Point NC, Middlesburg NC, Gold Hill NC	Import	93%	7%	0%
Rubber	Breakbulk	Morehead City	Wilson NC, Fayetteville NC, Asheboro NC, Charlotte NC	Import	99%	1%	0%
Salt	Bulk	Wilmington	Mt. Olive NC	Import	100%	0%	0%
Scrap Iron	Bulk	Morehead City	Hertford, NC	Import	0%	0%	100%
Steel	Breakbulk	Wilmington	Charlotte NC, Petersburg VA	Export	80%	20%	0%
Steel	Breakbulk	Wilmington	Clinton NC, Goldsboro NC, Lexington NC, Russell KY, Nashville TN	Import	56%	44%	0%
Steel	Breakbulk	Morehead City	Mt. Airy NC, Atlanta GA	Import	55%	45%	0%
Sulphur	Bulk	Morehead City	Aurora NC	Import	0%	0%	100%
Various	Containers	Wilmington	Numerous NC Destinations	Export	100%	0%	0%
Various	Containers	Wilmington	Numerous NC Destinations	Import	100%	0%	0%
Woodpulp	Breakbulk	Wilmington	Riegelwood NC	Export	100%	0%	0%

Voyages with restricted len/draft

Port Code	Vessel Name	Vessel Length	Arrive Draft Feet	Arrive Draft Inches	Depart Draft Feet	Depart Draft Inches	Lloyd Vessel Type
11	ADAMASTOS	481	24	0	0	0	BULK CARRIER
11	ANKERGRACHT	426	16	0	27	0	GENERAL CARGO
11	BARBET ARROW	654	34	0	20	0	OPEN HATCH BULK CARRIER
11	BBC HOLLAND	324	14	0	0	0	GENERAL CARGO
11	BBC TRINIDAD	434	24	9	17	4	GENERAL CARGO SHIP
11	BRIDGE ARROW	654	30	0	27	0	OPEN HATCH CARGO SHIP
11	BRIGHT LAKER	607	0	0	29	0	BULK CARRIER
11	CALABRIA	618	31	0	31	0	GENERAL CARGO
11	CANELO ARROW	623	30	0	30	0	GENERAL CARGO
11	CARLOTTA	414	23	0	17	0	GENERAL CARGO
11	CEC CARDIGAN	330	26	2	0	0	GENERAL CARGO
11	CEC CRISTOBAL	330	0	0	21	6	GENERAL CARGO SHIP
11	CISNE BLANCO	572	0	0	24	2	TANKER
11	ESPANIA	607	38	0	0	0	BULK CARRIER
11	FINCH ARROW	601	29	5	24	9	GENERAL CARGO
11	FINNFIGHTER	522	24	0	28	0	M GENERAL CARGO
11	FORTUNE QUEEN	589	0	0	27	0	BULK CARRIER
11	FUNKY	282	18	0	10	0	GENERAL CARGO
11	GB EUROPE	270	0	0	13	0	GENERAL CARGO
11	GDYNIA	738	35	4	22	3	BULK CARRIER
11	GDYNIA	738	37	0	0	0	BULK CARRIER
11	GLOBAL ACE	540	0	0	22	0	OPEN HATCH CARGO SHIIP
11	GLOBAL FORWARDER	525	24	0	25	0	GENERAL CARGO
11	GLORY ATLANTIC	476	25	0	0	0	CEMENT CARRIER
11	GLORY ATLANTIC	476	27	0	18	0	CEMENT CARRIER
11	GLORY ATLANTIC	476	30	0	18	0	CEMENT CARRIER
11	GLORY OCEAN	455	30	0	21	0	CEMENT CARRIER
11	HANJIN OSAKA	950	34	1	32	1	M CONTAINER SHIP
11	HANJIN WILMINGTON	950	34	7	33	4	CONTAINER SHIP
11	HAREFIELD	615	24	0	24	0	GENERAL CARGO
11	JENS MUNK	251	18	0	10	0	M GENERAL CARGO
11	KANG QIANG	623	23	0	24	0	BULK CARRIER
11	KENT TRADER	404	24	0	20	0	GENERAL CARGO
11	KENT VOYAGEUR	489	22	0	23	0	GENERAL CARGO

Voyages with restricted len/draft

Port Code	Vessel Name	Vessel Length	Arrive Draft Feet	Arrive Draft Inches	Depart Draft Feet	Depart Draft Inches	Lloyd Vessel Type
11	KOCHNEV	371	19	0	27	0	GENERAL CARGO
11	LIJNBAANSGRACHT	371	16	0	0	0	GENERAL CARGO
11	LOK MAHESHWARI	605	21	0	16	4	BULK CARRIER
11	LOMBARDIA	618	28	0	28	0	BULK CARRIER
11	LT LLOYDIANA	760	26	0	30	0	CONTAINER SHIP
11	MAGDALENA GREEN	469	0	0	28	0	GENERAL CARGO
11	NORDON	467	29	0	25	0	GENERAL CARGO
11	NORDON	467	29	0	28	0	GENERAL CARGO
11	NORMANDIE	570	26	0	26	0	OPEN HATCH CARGO SHIP
11	ORE HANSA	751	41	0	36	0	BULK CARRIER
11	PAN VOYAGER	590	28	0	27	0	BULK CARRIER
11	PAWITRA NAREE	499	23	6	18	3	BULK CARRIER
11	PETREL ARROW	614	26	0	24	0	M GENERAL CARGO
11	POHANG SENATOR	965	0	0	36	1	CONTAINER SHIP
11	RAMITA NAREE	518	33	4	34	1	BULK CARRIER
11	SAGA BEIJA-FLOR	654	26	0	23	0	OPEN-HATCH BULK CARRIER
11	SAGA MIRANDA	658	30	0	31	0	OPEN HATCH BULK CARRIER
11	SAGA MONAL	656	0	0	24	0	OPEN HATCH BULK CARRIER
11	SAGA MONAL	656	23	0	23	6	OPEN HATCH BULK CARRIER
11	SAGA MORUS	656	26	0	26	0	OPEN HATCH BULK CARRIER
11	SAGA MORUS	656	28	0	25	0	OPEN HATCH BULK CARRIER
11	SAGA MORUS	656	28	0	29	0	OPEN HATCH BULK CARRIER
11	SAGA TIDE	654	28	0	20	0	M BULK CARRIER
11	SAUDI ABHA	816	0	0	27	0	M RO RO CARGO
11	SAUDI DIRIYAH	816	22	9	23	6	M RO RO CARGO
11	SAUDI DIRIYAH	816	26	0	26	0	M RO RO CARGO
11	SAUDI HOFUF	816	0	0	28	0	M RO RO CARGO
11	SAUDI HOFUF	816	26	0	27	0	M RO RO CARGO
11	SAUDI HOFUF	816	26	9	28	2	M RO RO CARGO
11	SAUDI TABUK	816	0	0	28	0	M RO RO CARGO
11	SAUDI TABUK	816	28	2	27	6	M RO RO CARGO
11	SEA LION	290	15	4	15	7	GENERAL CARGO SHIP
11	SOMERSET	539	0	0	22	9	GENERAL CARGO
11	SOMERSET	539	28	8	20	3	GENERAL CARGO

Voyages with restricted len/draft

Port Code	Vessel Name	Vessel Length	Arrive Draft Feet	Arrive Draft Inches	Depart Draft Feet	Depart Draft Inches	Lloyd Vessel Type
11	SOMERSET	539	29	5	26	2	GENERAL CARGO
11	SONGA AMETHYST	377	18	0	18	0	TANKER
11	SPIEGELGRACHT	552	0	0	21	0	GENERAL CARGO
11	STADIONGRACHT	564	24	0	22	0	GENERAL CARGO
11	STAR ALABAMA	556	25	5	28	5	M BULK CARRIER
11	STAR DJERVANGER	600	32	0	22	0	GENERAL CARGO
11	STAR FRASER	614	24	9	24	3	M BULK CARRIER/CONTAINER
11	STAR FUJI	615	28	0	31	0	GENERAL CARGO
11	STAR HARMONIA	650	34	0	37	0	GENERAL CARGO
11	STAR HERANGER	653	28	0	0	0	GENERAL CARGO
11	STAR HERDLA	649	27	0	38	0	GENERAL CARGO
11	STAR HIDRA	650	31	0	38	0	GENERAL CARGO
11	STAR HOSANGER	653	36	1	38	7	GENERAL CARGO
11	STAR ISMENE	605	0	0	27	0	GENERAL CARGO
11	STAR ISOLDANA	607	39	0	39	0	GENERAL CARGO
11	STAR JAPAN	650	30	0	38	0	OPEN HATCH CARGO SHIP
11	STAR OPTIMANA	653	29	0	38	0	OPEN HATCH CARGO SHIP
11	STAR OSHIMANA	653	25	0	25	0	OPEN HATCH BULK CARRIER
11	SYRENA	656	27	0	24	0	OPEN HATCH CARGO SHIP
11	THOR SVENBORG	371	20	0	20	0	GENERAL CARGO
11	TSURU ARROW	656	0	0	30	0	OPEN-HATCH BULK CARRIER
11	WARSAW	700	38	0	0	0	GENERAL CARGO
11	YM EAST	905	36	0	0	0	CONTAINER SHIP
11	YM EAST	905	36	0	38	0	CONTAINER SHIP
11	YM EAST	905	37	0	34	0	CONTAINER SHIP
11	YM HAMBURG	850	35	0	0	0	CONTAINER SHIP
11	YM HAMBURG	850	36	1	0	0	CONTAINER SHIP
11	YM KAOHSIUNG	851	0	0	37	0	CONTAINER SHIP
11	YM KAOHSIUNG	851	33	0	35	0	CONTAINER SHIP
11	YM KAOHSIUNG	851	36	0	0	0	CONTAINER SHIP
11	YM NEW JERSEY	965	35	4	37	1	CONTAINER SHIP
11	YM NORTH	905	34	0	0	0	CONTAINER SHIP
11	YM NORTH	905	37	0	30	0	CONTAINER SHIP
11	YM NORTH	905	37	4	36	7	CONTAINER SHIP

Voyages with restricted len/draft

Port Code	Vessel Name	Vessel Length	Arrive Draft Feet	Arrive Draft Inches	Depart Draft Feet	Depart Draft Inches	Lloyd Vessel Type
11	YM SHANGHAI	850	0	0	37	0	CONTAINER SHIP
11	YM SHANGHAI	850	34	0	36	0	CONTAINER SHIP
11	YM SHANGHAI	850	34	7	34	1	CONTAINER SHIP
11	YM SOUTH	905	35	0	33	0	CONTAINER SHIP
11	YM SOUTH	905	36	7	39	3	CONTAINER SHIP
11	YM SOUTH	905	37	0	0	0	CONTAINER SHIP
11	YM SOUTH	905	37	0	35	0	CONTAINER SHIP
11	YM WEST	905	35	4	0	0	CONTAINER SHIP
11	YM WEST	905	36	0	37	0	CONTAINER SHIP
11	YM ZENITH	905	33	0	33	0	CONTAINER SHIP
11	YM ZENITH	905	36	0	0	0	CONTAINER SHIP
11	YM ZENITH	905	37	0	38	0	CONTAINER SHIP
11	ZIM ALABAMA	709	0	0	29	0	CONTAINER SHIP
11	ZIM ALABAMA	709	26	0	26	0	CONTAINER SHIP
11	ZIM ALABAMA	709	26	0	26	0	CONTAINER SHIP
11	ZIM ISRAEL	774	27	0	27	0	CONTAINER SHIP
11	ZIM ISRAEL	774	30	0	30	0	CONTAINER SHIP
11	ZIM ITALIA	774	0	0	28	0	CONTAINER SHIP
11	ZIM ITALIA	774	25	0	0	0	CONTAINER SHIP
11	ZIM ITALIA	774	26	0	27	0	CONTAINER SHIP
11	ZIM JAPAN	774	24	0	29	0	CONTAINER SHIP
11	ZIM JAPAN	774	29	0	28	0	CONTAINER SHIP
11	ZIM KEELUNG	783	0	0	30	0	CONTAINER SHIP
11	ZIM KEELUNG	783	24	0	0	0	CONTAINER SHIP
11	ZIM XIAMEN	864	27	0	32	0	CONTAINER SHIP
12	ADVANTAGE	561	23	6	23	6	M GENERAL CARRIER
12	ALFRED OLDENDORFF	622	28	10	25	0	BULK CARRIER
12	ASPHALT STAR	599	27	4	23	6	TANKER
12	ASPHALT STAR	599	27	9	25	3	TANKER
12	ATLANTIC FOREST	863	32	2	32	5	BARGE CARRIER
12	AURORA	558	20	7	20	10	TANKER
12	AURORA	558	20	9	20	3	TANKER
12	AURORA	558	21	3	21	8	TANKER
12	AURORA	558	21	9	19	7	TANKER

Voyages with restricted len/draft

Port Code	Vessel Name	Vessel Length	Arrive Draft Feet	Arrive Draft Inches	Depart Draft Feet	Depart Draft Inches	Lloyd Vessel Type
12	AURORA	558	21	10	21	2	TANKER
12	AURORA	558	24	9	25	9	TANKER
12	AURORA	558	25	6	21	10	TANKER
12	AURORA	558	26	5	21	3	TANKER
12	AURORA	558	28	7	21	8	TANKER
12	AURORA	558	29	1	20	9	TANKER
12	AURORA	558	29	2	22	6	TANKER
12	AURORA	558	29	2	23	5	TANKER
12	AURORA	558	29	3	21	5	TANKER
12	AURORA	558	29	4	21	4	TANKER
12	AURORA	558	29	4	21	6	TANKER
12	AURORA	558	29	4	24	9	TANKER
12	AURORA	558	29	8	20	9	TANKER
12	AURORA	558	29	8	21	8	TANKER
12	AURORA	558	30	0	21	10	TANKER
12	AURORA	558	30	5	22	8	TANKER
12	AURORA	558	30	11	21	4	TANKER
12	BAHAMA SPIRIT	615	35	6	22	11	BULK CARRIER
12	BAHAMA SPIRIT	615	36	0	23	0	BULK CARRIER
12	BBC MISSISSIPPI	470	24	9	22	1	GENERAL CARGO
12	BOW ARCHITECT	558	32	3	35	8	TANKER
12	BOW ENGINEER	558	31	5	38	1	TANKER
12	BOW SANTOS	485	27	4	31	0	TANKER
12	BRIGHT LAKER	607	21	1	19	1	BULK CARRIER
12	CONQUEROR	623	27	9	26	9	BULK CARRIER
12	ELPIDA	617	34	6	19	9	BULK CARRIER
12	FAIRCHEM GENESIS	440	18	9	29	9	TANKER
12	GEM OF GOA	574	21	2	36	9	CHEMICAL PRODUCTS TANKER
12	GLOBAL ACE	540	21	9	20	4	OPEN HATCH CARGO SHIIP
12	GULL ARROW	597	27	2	25	3	GENERAL CARGO
12	HALANDRIANI	628	30	6	23	0	BULK CARRIER
12	HALANDRIANI	628	31	6	22	7	BULK CARRIER
12	HORNBILL ARROW	589	30	5	29	2	GENERAL CARGO SHIP
12	HORNBILL ARROW	589	31	2	27	1	GENERAL CARGO SHIP

Voyages with restricted len/draft

Port Code	Vessel Name	Vessel Length	Arrive Draft Feet	Arrive Draft Inches	Depart Draft Feet	Depart Draft Inches	Lloyd Vessel Type
12	JO LIND	599	19	7	34	1	M TANKER
12	KANG SHENG	623	26	6	25	2	BULK CARRIER
12	KESTREL ARROW	681	23	10	23	10	OPEN HATCH BULK CARRIER
12	KITE ARROW	655	34	8	29	7	OPEN HATCH BULK CARRIER
12	KOZNITSA	606	33	3	23	5	BULK CARRIER
12	LIDA	206	10	8	9	8	GENERAL CARGO
12	MARONI	598	29	5	25	6	TANKER
12	MARONI	598	31	5	25	9	TANKER
12	MARONI	598	34	9	33	5	TANKER
12	MAY OLDENDORFF	618	30	2	28	9	BULK CARRIER
12	NAVIOS ALEGRIA	738	41	7	41	3	BULK CARRIER
12	NCC ARAR	522	31	2	34	5	TANKER
12	NICKOLAOS	356	24	3	24	5	GENERAL CARGO
12	ONEGO MERCHANT	389	19	7	15	5	GENERAL CARGO
12	ONEGO TRADER	389	21	9	15	10	GENERAL CARGO
12	ONEGO TRAVELLER	394	23	5	17	7	GENERAL CARGO
12	PAC ACRUX	584	27	6	26	7	GENERAL CARGO
12	PAC ACRUX	584	32	8	26	6	GENERAL CARGO
12	PAC ADARA	587	26	4	24	3	GENERAL CARGO
12	PAC ADARA	587	30	5	25	4	GENERAL CARGO
12	PAC ALKAID	584	27	5	22	5	GENERAL CARGO
12	PAC ALKAID	584	33	1	27	8	GENERAL CARGO
12	PAC ALKAID	584	33	1	30	5	GENERAL CARGO
12	PAC ALNATH	584	26	2	26	2	GENERAL CARGO
12	PAC ALNATH	584	30	8	24	6	GENERAL CARGO
12	PAC ALTAIR	584	31	3	26	2	GENERAL CARGO
12	PAC ALTAIR	584	32	2	29	9	GENERAL CARGO
12	PAC ALTAIR	584	32	3	25	3	GENERAL CARGO
12	PAC ANTARES	584	26	8	23	2	GENERAL CARGO
12	PAC ANTARES	584	34	3	25	10	GENERAL CARGO
12	PAC ATHENA	584	30	4	24	4	GENERAL CARGO
12	PAC ATHENA	584	31	5	27	7	GENERAL CARGO
12	PAC ATHENA	584	31	9	26	6	GENERAL CARGO
12	PAC DENEB	587	29	5	26	6	GENERAL CARGO

Voyages with restricted len/draft

Port Code	Vessel Name	Vessel Length	Arrive Draft Feet	Arrive Draft Inches	Depart Draft Feet	Depart Draft Inches	Lloyd Vessel Type
12	PAC DUBHE	587	28	2	24	4	GENERAL CARGO
12	PAC DUBHE	587	31	5	28	6	GENERAL CARGO
12	PIPIT ARROW	597	23	4	23	6	OPEN HATCH CARGO SHIP
12	PIPIT ARROW	597	30	8	27	9	OPEN HATCH CARGO SHIP
12	PUFFIN ARROW	601	28	4	27	7	GENERAL CARGO
12	RHONE	597	32	8	33	5	M BULK CARRIER
12	SAKAR	553	28	2	19	3	BULK CARRIER
12	SAKAR	553	28	5	18	10	BULK CARRIER
12	SAKAR	553	28	7	18	9	BULK CARRIER
12	SMARAGD	330	15	7	22	8	CONTAINER SHIPP
12	STOLT COURAGE	548	24	8	34	8	TANKER
12	STOLT ENDURANCE	572	23	3	34	8	TANKER
12	STOLT GLORY	572	25	1	32	2	TANKER
12	STOLT SPAN	533	21	3	34	8	TANKER
12	STOLT VALOR	521	23	6	34	8	TANKER
12	STOLT VALOR	521	23	10	34	5	TANKER
12	STOLT VANGUARD	522	22	10	34	10	TANKER
12	STOLT VANGUARD	522	23	10	36	1	TANKER
12	STOLT VIKING	560	25	1	33	9	M TANKER
12	STOLT VIKING	560	26	9	35	4	M TANKER
12	STOLT VIRTUE	521	23	3	34	5	TANKER
12	STOLT VIRTUE	521	23	6	35	8	TANKER
12	STOLT VIRTUE	521	24	6	33	1	TANKER
12	STOLT ZULU	520	22	3	36	9	TANKER
12	TABORA	707	33	5	33	3	TANKER
12	THEKLA	434	41	9	41	6	GENERAL CARGO
12	TOKI ARROW	589	24	6	23	5	OPEN HATCH BULK CARRIER
12	USNS WRIGHT	602	29	8	29	0	S RORO/CONTAINER/GEN CARG
12	VOLA 1	553	28	4	17	4	BULK CARRIER
12	YELLOWKNIFE	622	34	9	22	9	BULK CARRIER
18	ALASKA RAINBOW	516	17	1	32	4	BULK CARRIER
18	ANAXAGORAS	738	24	2	40	9	BULK CARRIER
18	BALSA 53	346	19	4	21	10	GENERAL CARGO
18	BALSA 53	346	20	1	22	3	GENERAL CARGO

Voyages with restricted len/draft

Port Code	Vessel Name	Vessel Length	Arrive Draft Feet	Arrive Draft Inches	Depart Draft Feet	Depart Draft Inches	Lloyd Vessel Type
18	BALSA 57	347	21	3	22	9	GENERAL CARGO
18	BALSA 63	346	18	8	22	9	GENERAL CARGO
18	BALSA 72	325	18	2	22	7	GENERAL CARGO
18	CLIPPER EAGLE	489	18	8	29	9	M BULK CARRIER
18	CLIPPER KIKUSHIO	581	21	3	33	1	OPEN HATCH CARGO SHIP
18	DELFA	629	22	1	40	1	BULK CARRIER
18	FADELSIA	563	21	7	34	8	BULK CARRIER
18	FURNESS LONDON	623	25	3	39	6	BULK CARRIER
18	GERTRUDE OLDENDORFF	563	22	10	34	8	BULK CARRIER
18	GIOVANNA IULIANO	738	27	6	38	9	BULK CARRIER
18	ID SYMPHONY	494	16	1	31	2	BULK CARRIER
18	MERMAID DREAM	609	21	8	39	0	BULK CARRIER
18	PANAGIOTIS I	738	23	10	39	2	BULK CARRIER
18	PINA CAFIERO	738	26	3	37	4	BULK CARRIER
18	PLOYPAILIN NAREE	556	18	2	32	8	BULK CARRIER
18	SAGA DISCOVERY	654	21	7	29	4	OPEN HATCH CARGO SHIP
18	SAGA JANDAIA	654	20	8	35	3	GENERAL CARGO
18	TOP RICH	615	20	9	29	9	BULK CARRIER
18	VOC DAISY	609	19	7	39	1	BULK CARRIER

North Carolina State Ports Authority

10 Year Most Likely Cargo Forecast

Container Activities

	Actual	Budget	Forecast Period								
	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Most likely Forecast	**94,103**	**123,960**	**131,980**	**149,480**	**164,980**	**199,250**	**233,750**	**275,000**	**303,150**	**322,250**	**343,500**

General Terminal Activities

	Actual	Budget	Forecast Period								
	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Port of Wilmington - Most likely											
Breakbulk	897,777	724,000	761,320	870,336	928,513	958,128	1,001,893	1,047,418	1,097,366	1,133,357	1,170,367
Bulk	892,301	1,658,000	1,458,800	1,664,600	1,852,800	1,917,000	1,988,200	1,995,400	2,002,600	2,010,400	2,018,200
Facility Total	1,790,078	2,382,000	2,220,120	2,534,936	2,781,313	2,875,128	2,990,093	3,042,818	3,099,966	3,143,757	3,188,567
Port of Morehead City - Most likely											
Breakbulk	276,129	403,000	430,079	475,343	496,510	520,596	527,615	534,986	543,925	552,052	561,784
Bulk	368,278	571,000	768,200	814,120	817,781	840,788	700,748	704,865	709,148	713,602	718,234
Facility Total	644,407	974,000	1,198,279	1,289,463	1,314,291	1,361,384	1,228,363	1,239,852	1,253,074	1,265,654	1,280,019
Most likely Forecast	**2,434,484**	**3,356,000**	**3,418,399**	**3,824,399**	**4,095,604**	**4,236,512**	**4,218,456**	**4,282,669**	**4,353,039**	**4,409,411**	**4,468,586**

Other Terminal Activities

	Actual	Budget	Forecast Period								
	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Most likely Forecast	**1,970,282**	**1,830,000**	**1,675,000**	**1,831,000**	**1,840,000**	**1,840,000**	**1,997,500**	**1,997,500**	**2,297,500**	**2,297,500**	**2,297,500**

North Carolina State Ports Authority

10 Year Most Likely Cargo Forecast - Detailed

General Terminal Activities

	Budget	Forecast Period								
	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
Port of Wilmington - Most likely										
Breakbulk (ST)										
Woodpulp / Imported Pulp	131,000	68,800	128,000	149,200	151,000	152,200	154,000	155,800	157,600	158,800
Paper Products	-	54,000	78,400	89,200	90,040	104,190	118,020	134,748	136,548	138,348
Metal Products	203,000	187,000	194,400	202,020	209,871	217,965	226,913	236,128	245,625	255,416
Forest Products	360,000	416,000	432,600	449,700	467,325	486,101	505,456	526,019	547,220	569,091
Other (incl Military)	30,000	35,520	36,936	38,393	39,892	41,437	43,029	44,670	46,364	48,712
Total - Breakbulk	724,000	761,320	870,336	928,513	958,128	1,001,893	1,047,418	1,097,366	1,133,357	1,170,367
Bulk (ST)										
Cement	400,000	398,000	484,600	491,200	497,800	505,000	512,200	519,400	527,200	535,000
Salt	20,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000	28,000
Coal	600,000	480,000	480,000	524,000	524,000	548,000	548,000	548,000	548,000	548,000
Replenishable Fuels	-	-	64,000	156,800	156,800	172,800	172,800	172,800	172,800	172,800
Fertilizer	251,000	228,800	228,800	228,800	228,800	228,800	228,800	228,800	228,800	228,800
Feeds	-	60,000	80,000	124,800	148,800	172,800	172,800	172,800	172,800	172,800
Biodiesel	-	88,000	158,400	193,600	227,200	227,200	227,200	227,200	227,200	227,200
Ferrous Scrap and DRI	387,000	176,000	140,800	105,600	105,600	105,600	105,600	105,600	105,600	105,600
Total - Bulk	1,658,000	1,458,800	1,664,600	1,852,800	1,917,000	1,988,200	1,995,400	2,002,600	2,010,400	2,018,200
Port of Morehead City - Most likely										
Breakbulk (ST)										
Rubber	215,000	134,000	129,200	125,000	120,800	117,200	114,200	111,800	108,800	106,400
Metal Products	87,000	95,679	99,503	103,458	107,551	112,389	116,778	121,927	126,643	132,135
Forest Products	48,000	95,200	107,400	111,930	115,997	120,806	125,767	130,885	136,169	141,628
Military - Rolling Stock	8,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000	16,000
Grancrete	40,000	36,000	36,840	37,722	38,648	39,621	40,642	41,714	42,839	44,021
Paper (New Warehouse)	5,000	53,200	86,400	102,400	121,600	121,600	121,600	121,600	121,600	121,600
Total - Breakbulk	403,000	430,079	475,343	496,510	520,596	527,615	534,986	543,925	552,052	561,784
Bulk (ST)										
Fishmeal	15,000	8,800	-	-	-	-	-	-	-	-
Ore	106,000	99,000	99,000	99,000	99,000	99,000	99,000	99,000	99,000	99,000
Scrap Iron/Steel	175,000	308,000	308,000	308,000	308,000	140,000	140,000	140,000	140,000	140,000
Replenishable Fuels	-	102,400	153,600	153,600	172,800	196,800	196,800	196,800	196,800	196,800
Asphalt	75,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000
Aggregate	200,000	184,000	187,520	191,181	194,988	198,948	203,065	207,348	211,802	216,434
Total - Bulk	571,000	768,200	814,120	817,781	840,788	700,748	704,865	709,148	713,602	718,234

Other Terminal Activities

	Budget	Forecast Period								
	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017
PCS Activity - MHC Bulk Facility	1,100,000	930,000	930,000	930,000	930,000	930,000	930,000	930,000	930,000	930,000
PCS Activity - Radio Island	310,000	330,000	330,000	330,000	330,000	337,500	337,500	337,500	337,500	337,500
VOPAK Activity - POW	420,000	415,000	421,000	430,000	430,000	430,000	430,000	430,000	430,000	430,000
Coal - Morehead City	-	-	150,000	150,000	150,000	300,000	300,000	600,000	600,000	600,000
	1,830,000	1,675,000	1,831,000	1,840,000	1,840,000	1,997,500	1,997,500	2,297,500	2,297,500	2,297,500

John_Lenfestey@ncports.com
07/03/2008 09:08 AM

To susan_shelingoski@urscorp.com
cc
bcc
Subject Clearance for Progress Energy 230 kV line

History: This message has been forwarded.

Dear Susan:

I have attached a copy of the official publication from Progress Energy concerning the clearance under the 230 kV overhead line over the Cape Fear River. I have also attached a copy of the survey performed by ESP Associates. Please contact me if you have any questions or need any additional information.

Sincerely,

John R. Lenfestey, P.E.
Senior Project Manager
North Carolina State Ports Authority
(910) 251-5673

Cape Fear River Clearances.pdf VA35-800-CABLECROSSING DIGITAL.dwg

Progress Energy

Date: October 6, 2005

To:

From: Progress Energy Carolinas

Subject: Cape Fear River Crossing

Introduction: Various organizations and customers have requested clearance information and associated costs of raising two Progress Energy Carolinas (PEC) transmission lines that cross the Cape Fear River. Due to the frequency of these inquiries this document was created to provide a concise account and historical record of relevant information. Any questions regarding the information contained herein should be directed to the Eastern Transmission Maintenance Area Manager at 910-383-4105.

Background: PEC owns and operates two overhead transmission lines that cross the Cape Fear River 3.8 miles south of Wilmington, North Carolina. The *Brunswick Plant Unit 1 – Castle Hayne 230 kV East Line* and the *Brunswick Plant Unit 2 – Wilmington Corning Switching Station 230 kV Line* (formerly referred to as the "West Line") both consist of three 2500 MCM 96/19 AACSR conductors. Shielding is provided by one 19#6 Alumoweld overhead ground wire and one 204mm^2 (14 fiber) optical ground wire. From structure 122 to 125 (1.15 miles), the lines share double circuit self-supporting lattice steel towers (see Figure 1).

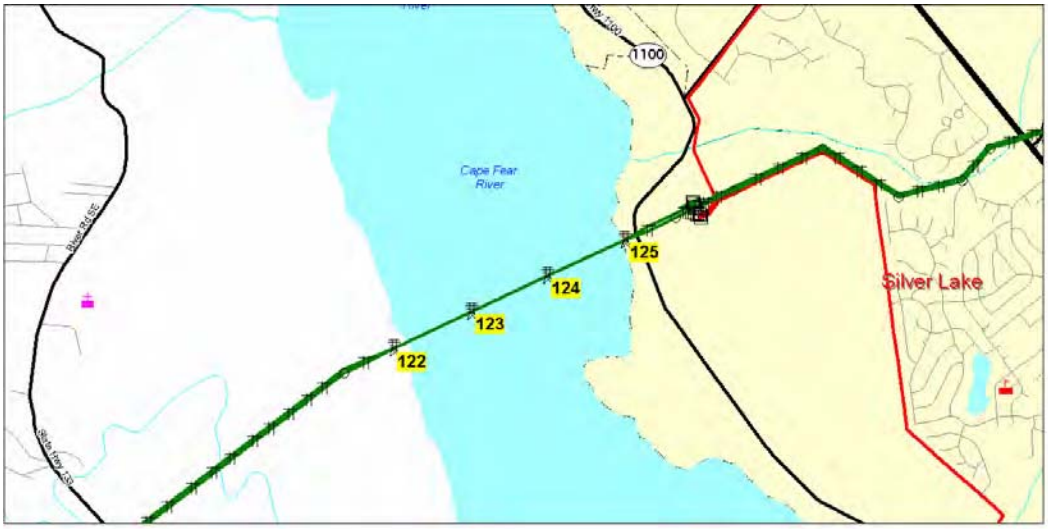


FIGURE 1. Area Map

PEC's right-of-way strip on each side of the Cape Fear River is 170 feet wide. The easement, dated September 1, 1971, from the State of North Carolina for the Cape Fear River crossing is recorded in Book 920, page 93 in the New Hanover Registry. Attached with the easement is the Right-of-Way map, which is listed as drawing number RW-A-2336.

Permits: Fully executed on February 18, 1972 by the Department of the Army Corps of Engineers, permit number 15-72 authorized the construction and maintenance an aerial transmission line river crossing at the specified location. A copy of said permit is in the project file.

Structures 123 and 124 are both 320.5 feet in height. For this reason, aviation warning lights are required. The original lighting system, installed in the 1970's, was difficult to maintain and required the towers to be painted alternating orange and white because the red flashing lights were nighttime only. In 2000, when the towers needed to be repainted, a new aviation warning light system was installed. This new system, which consists of medium intensity white strobe lights that operate 24 hours a day, does not require the towers to be painted. The Federal Aviation Administration (FAA) approved the replacement of the existing system with an L-866 lighting system and issued permits 99-ASO-3288-OE and 99-ASO-3289-OE.

Also, to report tower light alarms to the FAA, PEC is securing FCC Antenna Structure Registration (ASR) numbers.

Clearance: The clearance to mean high water elevation will vary according to the loading on the lines (i.e., if the lines are heavily loaded, sag is increased, and clearance to the water is decreased). Standard practice for evaluating conductor clearances relies on assessing the conductor at its maximum operating temperature.

The span between Structures 123 and 124 is 2,002 feet in length and has final condition midspan sag of 79'-6" at 225 degrees Fahrenheit, which is the maximum operating temperature. This sag correlates to a vertical clearance of 165 feet at the mean high water elevation (see Figure 2).

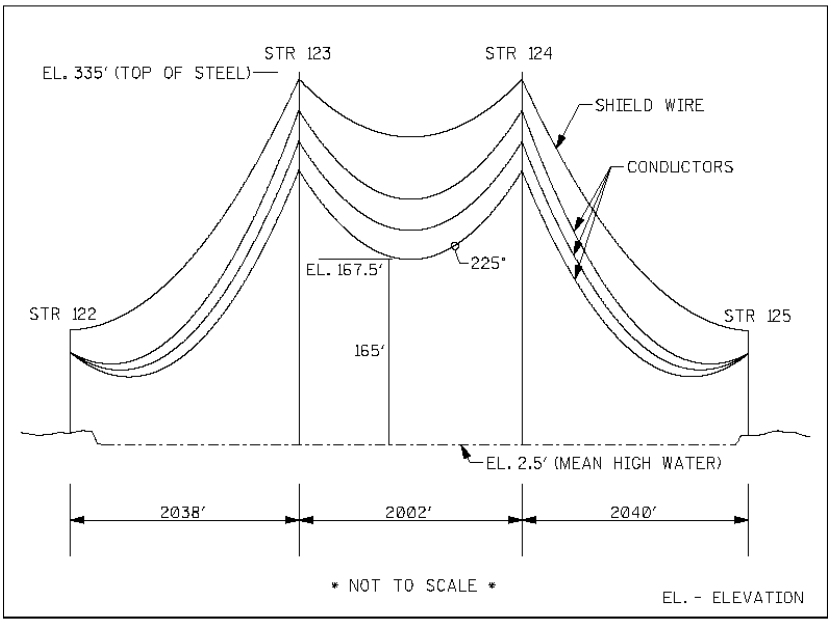


FIGURE 2. Profile view of crossing

Since both of the circuits are 230kV, the minimum equipment clearance is 16 feet (see Figure 3).

Minimum Equipment Clearances

Voltage Range (Phase to Phase)	Minimum Required Equipment Clearance Distance
Operation Near Power Lines:	
Up to 50 KV	10’ 1”
69 KV	10’ 8”
115 KV	12’ 2”
138 KV	13’ 0”
161 KV	13’ 9”
230 KV	16’ 0”
500 KV	25’ 0”

Note: MEC for Operation Near Power Lines = 10’ 0” + 0.4” per KV over 50 KV

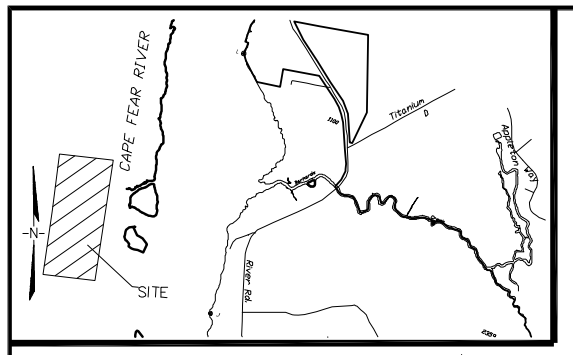
This table (Minimum Equipment Clearances) applies to equipment (such as cranes and forklifts) performing work not associated with energized conductors and equipment.

Reference: OSHA 1910.269

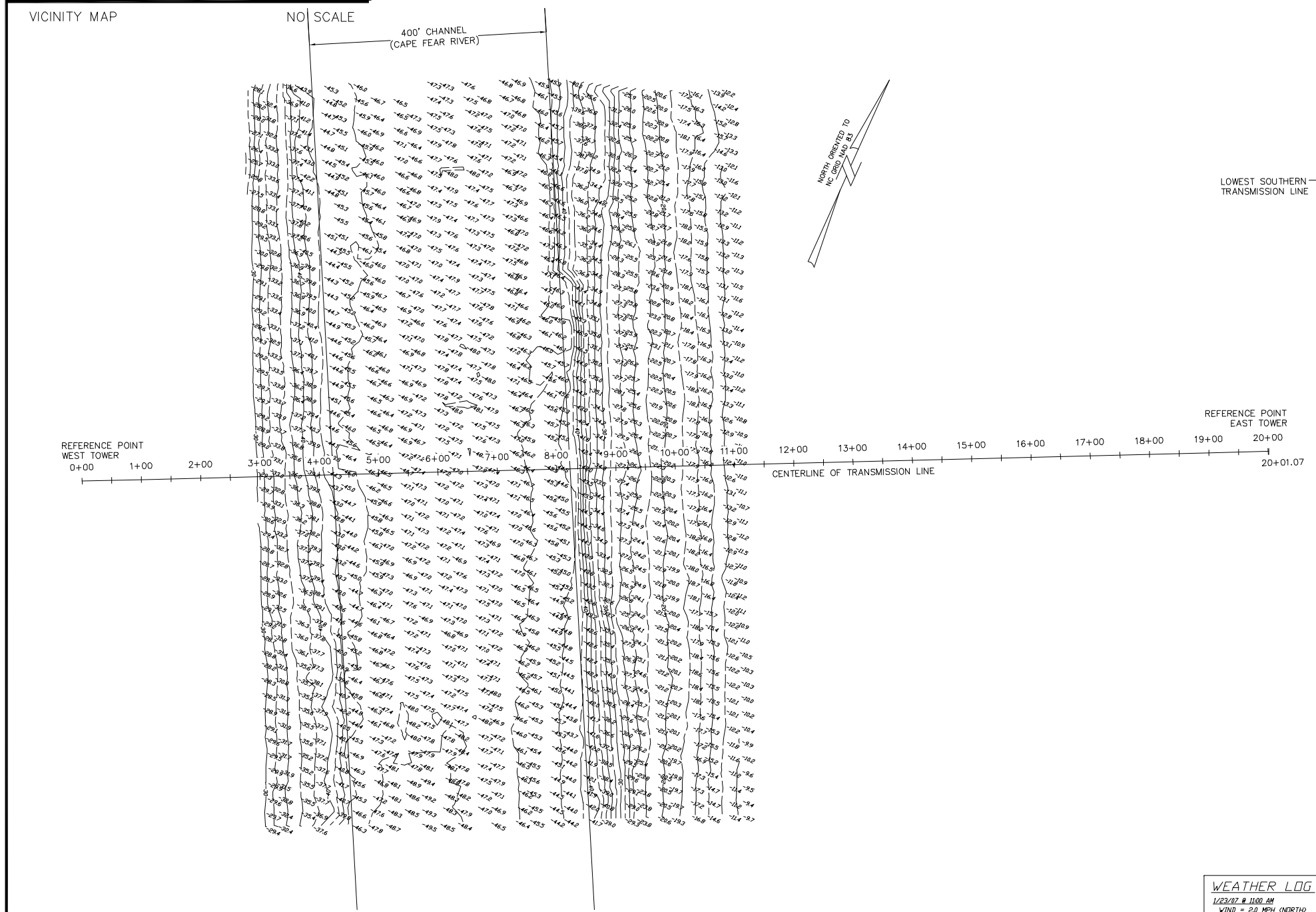
FIGURE 3. PEC minimum equipment clearances

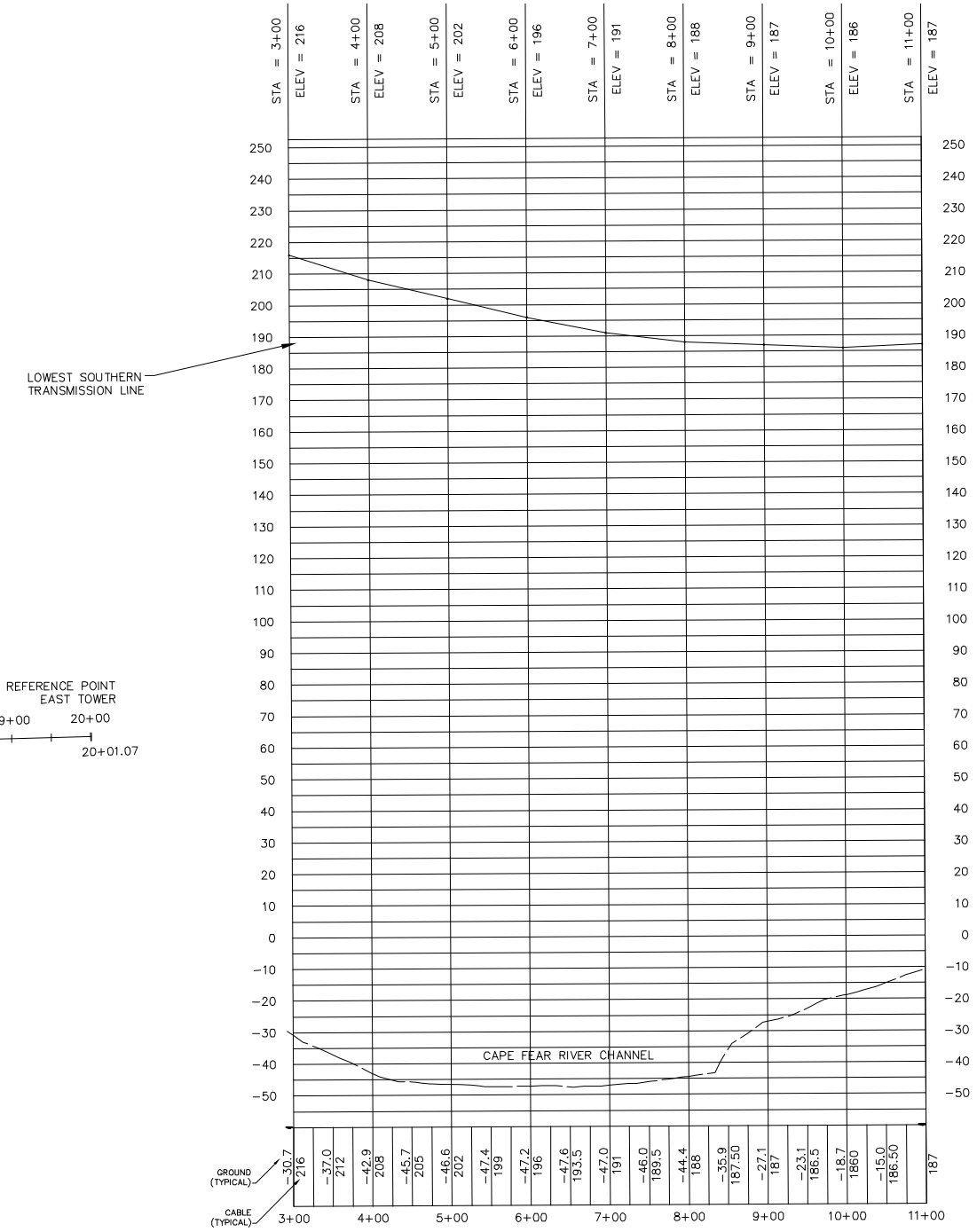
Remediation: A variety of potential remedies, costing into the $10’s of millions, exists with respect to resolving clearance issues over the Cape Fear River. However, due to the proximity of the Brunswick Nuclear Plant, care and significant planning are required for any work on these transmission lines. At the customer’s request, and with customer funding, Progress Energy will perform a detailed study of appropriate alternatives to meet the customer’s needs.

Outages: PEC will only take these lines out of service for scheduled maintenance, necessitating state and federal oversight, or in the event of an emergency.



VICINITY MAP NO SCALE





VERTICAL SCALE: 1"=25'
HORIZONTAL SCALE: 1"=100'

SURVERYOR'S CERTIFICATE:

THIS SURVEY WAS PERFORMED USING A GPS ODOM ECHOTRAC CV UNIT WITH A 24 KHZ TRANSDUCER. HORIZONTAL LOCATIONS ARE BASED ON THE RTK LOCATIONS AND IN NC GRID NAD 83. ALL VERTICAL INFORMATION IS BASED ON COE MONUMENT WILM SP #2 78 LOCATED AT THE NORTH END OF THE PIER. PER INFORMATION PROVIDED BY THE WILMINGTON COE OFFICE THE MSL ELEV. OF 10.888 WITH THE MLLW ELEV. OF 12.388, NAVD 29 DATUM WAS USED. THIS VALUE IS BASED ON THE NOAA MEAN LOWER LOW WATER DEFINITION (MLLW) FOR ALL DREDGING IN THE CAPE FEAR RIVER AND IS ADJUSTED +0.6' FROM PREVIOUS VALUES PER THE COE.

THE INFORMATION INDICATED ON THIS PLAT REPRESENTS THE RESULTS OF SURVEYS MADE ON JANUARY 23 & 24, 2007 AND DEPICT GENERAL CONDITIONS AS OF THOSE DATES. SINCE THESE CONDITIONS ARE CONTINUALLY CHANGING DUE TIDE, CURRENT AND SHOALING CONDITIONS THIS INFORMATION SHOULD NOT BE RELIED IN EXCLUSIVELY.

BAR SCALE 1"=100'
0 25 50 100 200

NOTES:

ONLY THE LOWEST SOUTHERN LINE WAS SURVEYED.

ALL TRANSMISSION LINE ELEVATIONS ARE ROUNDED TO THE NEAREST FOOT

BACKGROUND PER INFORMATION PROVIDED TO ESP ASSOCIATES.

LOCATIONS PER COE MONUMENTS SP #2 AT PORT OF WILMINGTON.

-45.9 ARE ELEVATIONS EXPRESSED IN FEET & TENTHS REFERENCED TO THE MLLV.

WEATHER LOG

1/23/07 @ 1100 AM
WIND = 2.0 MPH (NORTH)
TEMPERATURE = 52.0°F
BAROMETRIC PRESSURE = 30.02
MOSTLY CLOUDY

1/23/07 @ 1240 PM
WIND = 6 MPH (NORTH)
TEMPERATURE = 48.7°F
BAROMETRIC PRESSURE = 30.00
MOSTLY CLOUDY

1/24/07 @ 1257 PM
WIND = 1.2 MPH (NORTH)
TEMPERATURE = 63.1°F
BAROMETRIC PRESSURE = 29.99
PARTLY CLOUDY

1/24/07 @ 130 PM
WIND = 5 MPH (NORTH)
TEMPERATURE = 67.7°F
BAROMETRIC PRESSURE = 29.96
PARTLY CLOUDY

1/24/07 @ 200 PM
WIND = 4.2 MPH (NORTH)
TEMPERATURE = 71.2°F
BAROMETRIC PRESSURE = 29.96
MOSTLY CLOUDY

CALL N.C. ONE-CALL
BEFORE YOU DIG
STOP
800-632-4949
AVOID UTILITY DAMAGE

NO.	DATE	REVISION	BY

HYDROGRAPHIC & TRANSMISSION LINE SURVEY FOR NORTH CAROLINA STATE PORTS AUTHORITY

SHEET 1 OF 1

LOCATED IN WILMINGTON
NEW HANOVER COUNTY
NORTH CAROLINA

CLIENT: NORTH CAROLINA STATE PORTS AUTHORITY
P.O. BOX 9002
WILMINGTON, NC 28402

PROJECT NO VA35.800
SCALE 1"=100'
DATE JANUARY 25, 2007
DRAWN BY RGS/BFF
CHECKED BY RBD
DATE OF SURVEY JANUARY 24, 2007
DRAWING NO VA35-800-CURRENT
SHT 1 1

URS

1600 Perimeter Park Drive, Suite 400
Morrisville, NC 27560
Telephone: (919) 461-1100
Facsimile: (919) 461-1415

RECORD OF TELEPHONE CONVERSATION

DATE:7/14/08	PROJECT NO. 31825110	
RECORDED BY: Joanna Harrington	OWNER/CLIENT: NCTurnpike Authority	
TALKED WITH: Jimmy Hargrove	FROM: Joanna Harrington	
NATURE OF CALL (INCOMING OR OUTGOING) Incoming		
ROUTE TO: Project File	FOR INFORMATION	FOR ACTION
	David Griffin, URS Tracy Roberts, HNTB	
MAIN SUBJECT OF CONVERSATION: Cape Fear River navigational channel		

Jimmy Hargrove returned my call in reference to the Cape Fear River navigational channel widths and buffer widths. He said he couldn't find what map was used in the July 2006 meeting, and subsequently forwarded to URS, but he had an updated pdf of the channel. Along with this pdf, he will also forward the dgn files of the river reaches so that we can measure the channel widths and get minimum horizontal clearances for the Cape Fear Skyway bridge.

(Name and Title)

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RECORD OF TELEPHONE CONVERSATION

DATE:7/17/08	PROJECT NO. 31825110	
RECORDED BY: Joanna Harrington	OWNER/CLIENT: NCTurnpike Authority	
TALKED WITH: Joe Allen	FROM: Joanna Harrington	
NATURE OF CALL (INCOMING OR OUTGOING) Incoming		
ROUTE TO: Project File	FOR INFORMATION	FOR ACTION
	David Griffin, URS Tracy Roberts, HNTB	
MAIN SUBJECT OF CONVERSATION: Cape Fear River future vessel activity		

I spoke to Joe Allen of Wilmington Shipping Company to discuss future vessel sizes expected to utilize the Port of Wilmington in the future. Wilmington Shipping Company is an agent that deals with various cargo companies and the Wilmington dock masters in order to determine which ships are scheduled to come up the Cape Fear River. He confirmed that Yang Ming has the largest vessels using the Port of Wilmington on a regular basis, and suggested I call Jared Holloman or Mike Lanier of Yang Ming to see what their future needs are.

Mr. Allen stated that it's difficult to predict long-term trends in vessel sizes utilizing the port, but he suggested calling the Cape Fear River Pilot Association at 910-457-6909. He also recommended contacting McAllister Towing, a Cape Fear River dock towing company, at 910-762-2630. He said to ask for Larry Southerland.

(Name and Title)

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RECORD OF TELEPHONE CONVERSATION

DATE:7/18/08	PROJECT NO. 31825110	
RECORDED BY: Joanna Harrington	OWNER/CLIENT: NCTurnpike Authority	
TALKED WITH: Jared Holloman	FROM: Yang Ming Corp	
NATURE OF CALL (INCOMING OR OUTGOING) Incoming		
ROUTE TO: Project File	FOR INFORMATION	FOR ACTION
	David Griffin, URS Tracy Roberts, HNTB	
MAIN SUBJECT OF CONVERSATION: Cape Fear River future vessel activity		

I spoke to Jared Holloman from Yang Ming, a large cargo company that utilizes the Port of Wilmington on a regular basis. They have 8 vessels that call the Port of Wilmington every 60 days, 6 of which are relatively the same size, approximately 140 ft of air draught. The two larger vessels that call the port on a regular basis both range from 156-158 ft of air draught.

We discussed Yang Ming's future vessel size, and Mr. Holloman stated that it's hard to predict exactly what vessels they will be using in the future, but that the next largest class of container ships they could in the future wouldn't exceed approximately 160 ft of air draught. The company has been told by the USCG that the maximum air draught cannot exceed 165 ft, so he felt there wouldn't be any issues for vertical clearance in the future. He also said that if the international port opened in the future, most of their container ships would dock there, and not at the Port of Wilmington.

He gave me the number for the commanding office in the Wilmington branch of the USCG at 910-772-2201 to confirm the maximum air draught standards.

(Name and Title)

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RECORD OF TELEPHONE CONVERSATION

DATE:7/24/08	PROJECT NO. 31825110	
RECORDED BY: Joanna Harrington	OWNER/CLIENT: NCTurnpike Authority	
TALKED WITH: Scott Aldridge	FROM: Joanna Harrington	
NATURE OF CALL (INCOMING OR OUTGOING) Incoming		
ROUTE TO: Project File	FOR INFORMATION	FOR ACTION
	David Griffin, URS Tracy Roberts, HNTB	
MAIN SUBJECT OF CONVERSATION: Cape Fear River future vessel activity		

I spoke to Scott Aldridge of the Cape Fear River Pilots Association to discuss future vessel activity on the Cape Fear River. He stated that the only constraint on the river right now is the Progress Energy power lines, and that it would be beneficial for the port to not have this vertical clearance issue. He said that vessels will only continue to get larger, and the Port of Wilmington needs to be able to compete with other ports such as the one in Charleston, SC. The Ravenel Bridge in Charleston, SC has a higher clearance, approximately 200 feet according to Mr. Aldridge, and that the port should not plan for anything lower than that.

(Name and Title)

URS

1600 Perimeter Park Drive, Suite 400
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RECORD OF TELEPHONE CONVERSATION

DATE:8/08/08	PROJECT NO. 31825110	
RECORDED BY: Joanna Harrington	OWNER/CLIENT: NC Turnpike Authority	
TALKED WITH: Jimmy Hargrove	FROM: Joanna Harrington	
NATURE OF CALL (INCOMING OR OUTGOING) Incoming		
ROUTE TO: Project File	FOR INFORMATION	FOR ACTION
	David Griffin, URS Tracy Roberts, HNTB	
MAIN SUBJECT OF CONVERSATION: Cape Fear River depths		

I called Jimmy Hargrove of USACE to inquire about any data the USACE may have on Cape Fear River depths. If we are able to get more detailed information about the depth of the river from bank to bank, we can determine the level of impact protection systems required for the bridge.

According to Mr. Hargrove, USACE does not have any data concerning the entire depth of the river. The USACE is only concerned with the navigational channel and its associated buffers. He has a contact at NOAA that he will call for us, and get back to me if he's able to obtain any files of the entire river's depth.

_____

(Name and Title)

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Facsimile: (919) 461-1415

RECORD OF TELEPHONE CONVERSATION

DATE:8/12/08	PROJECT NO. 31825110	
RECORDED BY: Joanna Harrington	OWNER/CLIENT: NCTurnpike Authority	
TALKED WITH: Stephanie Ayers	FROM: Joanna Harrington	
NATURE OF CALL (INCOMING OR OUTGOING) Outgoing		
ROUTE TO: Project File	FOR INFORMATION	FOR ACTION
	David Griffin, URS Tracy Roberts, HNTB	
MAIN SUBJECT OF CONVERSATION: Military vessel activity at Port of Wilmington		

I called Stephanie Ayers (public relations director for the port) at 910-251-7073 to inquire about the amount of military vessel activity at the Port of Wilmington. Sunny Point Ocean Terminal is just downstream of the port, and it is important for the purposes of the bridge study to note whether naval vessels ever travel to the port for activity or repair.

According to Ms. Ayers, there is absolutely no military vessel activity at the port. Sunny Point has its own repair terminal for the naval vessels.

(Name and Title)

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Morrisville, NC 27560
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Facsimile: (919) 461-1415

RECORD OF TELEPHONE CONVERSATION

DATE:3/23/09	PROJECT NO. 31825110	
RECORDED BY: Joanna Harrington	OWNER/CLIENT: NC Turnpike Authority	
TALKED WITH: Baxter Matheson	FROM: Joanna Harrington	
NATURE OF CALL (INCOMING OR OUTGOING) Outgoing		
ROUTE TO: Project File	FOR INFORMATION	FOR ACTION
	David Griffin, URS Tracy Roberts, HNTB	
MAIN SUBJECT OF CONVERSATION: Progress Energy Transmission Lines		

Bill Wilder of Progress Energy, our previous contact regarding the Progress Energy 230kV dual transmission lines near the Port of Wilmington, recommended I contact Baxter Matheson to clarify exact vertical clearance constraints under the transmission lines. Mr. Matheson is an engineer in the Engineering Unit of Progress Energy, and would know more details of vertical clearances under the transmission lines.

I called Baxter Matheson, and he informed me that there is often confusion regarding vertical clearance under the transmission lines, due to the permit and other documentation that show the maximum sag at 165 feet with a requirement of 16 additional feet of equipment clearance due to conductivity. While these numbers are true, he explained that the maximum sag of 165 feet is actually at the center of the span between the east and west towers holding the lines. The navigational channel is not located under the center span of the transmission lines. Instead, it is actually about 620 feet from the west tower and 1,320 feet from the east tower. Therefore, there is an actual minimum vertical clearance at mean high water (and maximum sag of the transmission lines) of approximately 180 feet for ships in the navigational channel. When you subtract the 16 feet of required equipment clearance, you actually have a minimum vertical clearance of approximately 164 feet.

I told him that we have stated in the Preliminary Bridge Location and Type Study that the minimum vertical clearance of the Cape Fear Skyway bridge crossing is proposed to be 165 feet. He stated that this would make sense considering the minimum of approximately 164 feet at the navigational channel under the transmission lines. He confirmed that 165 feet is the vertical clearance requirement used by the United States Coast Guard. Mr. Matheson also stated that he confirmed with the United States Army Corps of Engineers (USACE) that the vertical clearance under the transmission lines regulated by USACE is 165 feet.