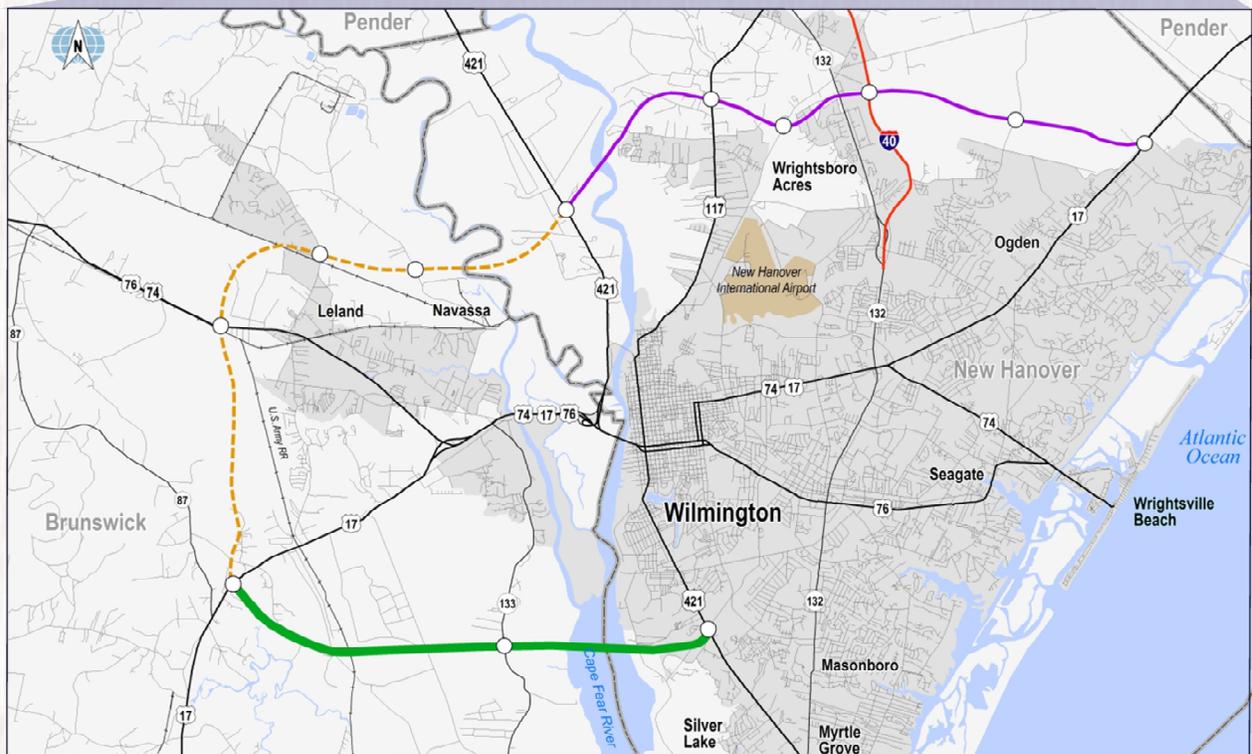
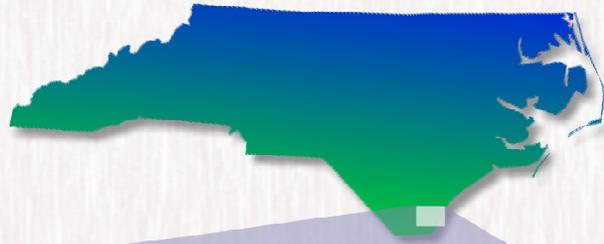


Proposed Cape Fear Skyway Preliminary Traffic and Revenue Study

Final Report



Proposed Cape Fear Skyway Preliminary Traffic and Revenue Study

Final Report

Prepared For



Prepared By





June 15, 2007

Mr. David Joyner
Executive Director
North Carolina Turnpike Authority
5400 Glenwood Avenue
Suite 400
Raleigh, NC 27612

Re: Preliminary Traffic and Revenue Study – Proposed Cape Fear Skyway

Dear Mr. Joyner:

Wilbur Smith Associates (WSA) is most pleased to submit this report summarizing the results of our preliminary traffic and revenue study for the proposed Cape Fear Skyway.

The proposed Cape Fear Skyway would involve construction of approximately nine miles of a new toll facility extending from the City of Wilmington across the Cape Fear River to US 17 in Brunswick County.

Please note that this study was conducted at a preliminary level of detail and is not sufficient to be used in support of actual project financing. The study was based on readily available information and the MPO's travel demand model. Its findings are subject to refinement in more detailed, comprehensive traffic and revenue studies before financing.

Our project manager, David Danforth, and other key members of the project team including Hua Tan, Xiao Cui, Marc Torello, and Chong Qing Wu gratefully acknowledge the assistance provided by NCTA staff, the City of Wilmington, New Hanover County, Brunswick County, the State Ports Authority, and others contacted during the course of the study. We have appreciated this opportunity to be of service to the Authority.

Respectfully submitted,

WILBUR SMITH ASSOCIATES

A handwritten signature in black ink, appearing to read "Ed Regan III", written in a cursive style.

Edward J. Regan, III
Senior Vice President

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CHAPTER 1

INTRODUCTION

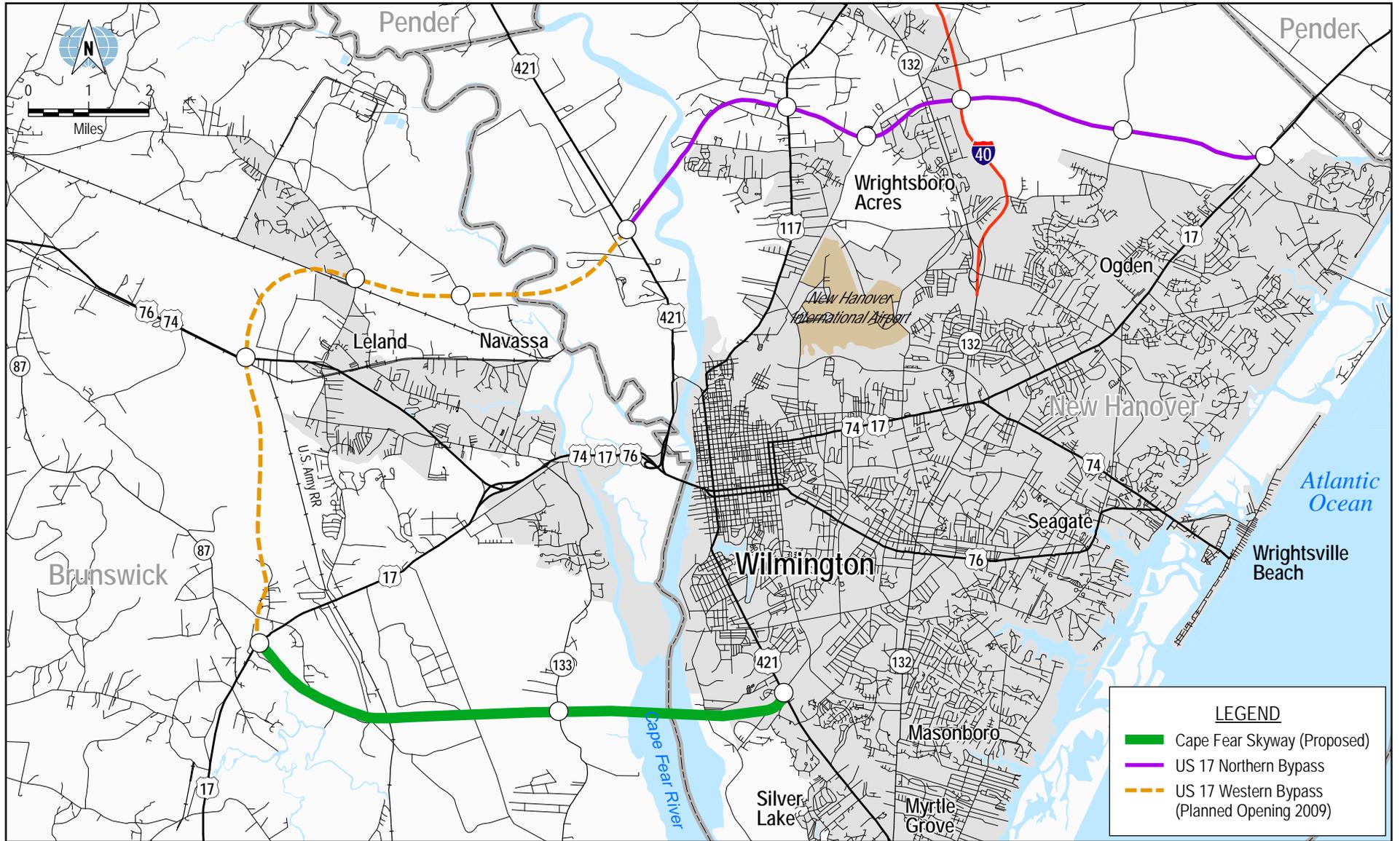
The proposed Cape Fear Skyway is one of several candidate toll facility projects under consideration by the North Carolina Turnpike Authority (NCTA). The primary objective of this study was to determine on a preliminary basis the potential toll revenue that could be expected on the facility.

The study was conducted at a preliminary feasibility study level, commonly referred to as a “level 2” traffic and revenue analysis. This level of analysis is intended to provide preliminary estimates of traffic, revenue and toll rate sensitivity. This level of study is not intended for use in direct support of project financing. A more detailed, comprehensive traffic and revenue study would be required for that purpose.

PROJECT DESCRIPTION

Figure 1-1 depicts the general location of the project and its relationship to the surrounding transportation system. Three bridges currently cross the Cape Fear River: the Cape Fear Memorial Bridge on US 17/74/76, the Isobel Holmes Bridge on US 117, and a bridge on the US 17 Northern Bypass. The Cape Fear Skyway would provide an additional crossing of the Cape Fear River. The majority of the traffic currently crossing the river uses the Cape Fear Memorial Bridge. The new Cape Fear Skyway would provide some travelers with an alternative to the Memorial Bridge for trips between New Hanover County on the east side of the river and Brunswick County on the west side.

The Cape Fear Skyway would begin in Wilmington at the intersection of Independence Boulevard/Carolina Beach Road (US 421) and extend for approximately 9.4 miles to a junction with US 17 and the planned US 17 Western Bypass near NC 87. This route would connect a rapidly growing area of Brunswick County south of US 17 to the south side of the City of



Wilmington. The additional crossing of the river could benefit travelers significantly by providing an alternative to the congested Memorial Bridge.

Of the two other bridges, the US 17 Bypass bridge would be the most significant in affecting potential traffic on the Skyway. The US 17 Northern Bypass begins at US 17 north of Wilmington and terminates at US 421 just west of the Cape Fear River. The US 17 Western Bypass from US 421 to US 17 in Brunswick County is scheduled to be open to traffic in 2009, six years before the projected 2015 opening date of the Skyway. The US 17 Northern and Western Bypass will allow through travelers on US 17 to avoid the Memorial Bridge and the central business district of Wilmington. The Bypass would be toll free, and it is unlikely that many through trips would use either the Memorial Bridge or the Skyway since both of these bridges would connect directly into the city itself.

Two scenarios were analyzed in this study. Both scenarios would follow the same 9.4-mile corridor but would have different numbers of intermediate interchanges. The corridor begins at Independence Boulevard/Carolina Beach Road in Wilmington and terminates at a junction with US 17 and the planned US 17 Western Bypass in Brunswick County. Both scenarios are assumed to be open to traffic by 2015.

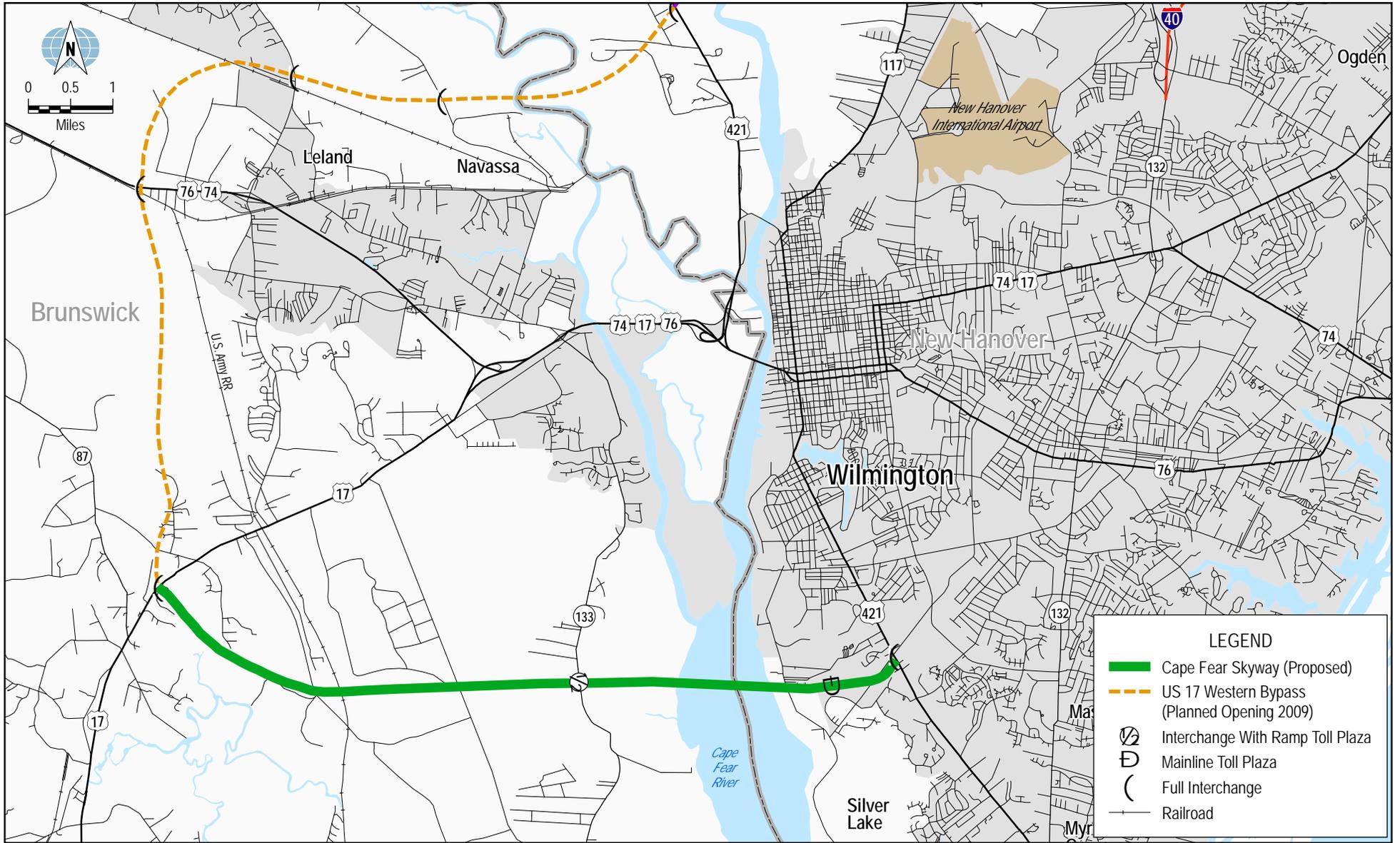
- **Scenario 1 Configuration** –This scenario would have one intermediate interchange at River Road (NC 133).
- **Scenario 2 Configuration** – This scenario would have a second interchange at a future segment of Lanvale Road.

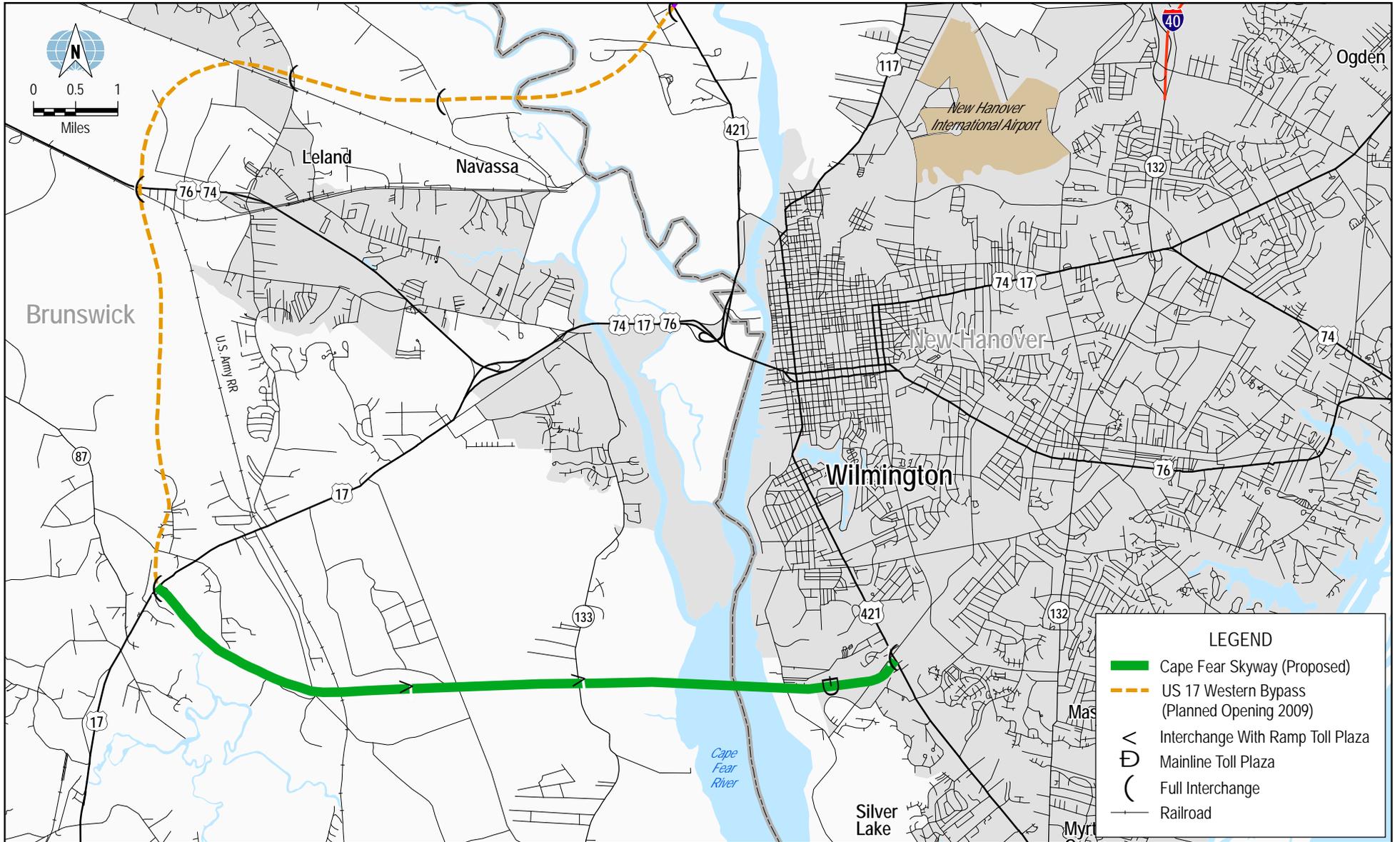
SCENARIO 1 CONFIGURATION

The proposed Cape Fear Skyway, Scenario 1, as shown in Figure 1-2, would extend for approximately 9.4 miles from Independence Boulevard/Carolina Beach Road west to the future junction of US 17 and US 17 Western Bypass. It would have a mainline toll plaza on the Wilmington side of the river and a single tolled interchange at River Road (NC 133). The toll location on the River Road interchange would be on the westbound entrance ramps for the Skyway and the eastbound exit ramps for River Road. By configuring the toll system in this manner, all users of the facility would pay a toll one time.

SCENARIO 2 CONFIGURATION

Figure 1-3 shows Scenario 2 in which an additional interchange would be added at a future segment of Lanvale Road within a proposed major resi-





dential and retail development. This interchange would also have toll ramps covering movements exiting to the east and entering to the west.

SCOPE OF WORK

As a part of this study, inventories of the corridor operating conditions were conducted, including historical traffic counts and speed-delay studies on competing, complementary, and feeder routes within and outside of the traffic impact area. Information on the planned transportation improvement program was reviewed to determine its prospective impact on traffic and revenue potential on the proposed Cape Fear Skyway

Previous reports and study materials related to the proposed Skyway were also reviewed. This information included previous traffic analysis and transportation modeling analysis prepared by the Wilmington Metropolitan Planning Organization (MPO).

TRAFFIC MODEL DEVELOPMENT

Normally in a preliminary study such as this one, the approved regional transportation model is used to assess the potential toll traffic. However, in this case, the travel demand model data sets originally obtained by WSA for this study were developed in 1997 and did not reflect some of the more current information available. A new model was under development for NCDOT, but its completion was not expected before the first quarter of 2007. After reviewing the 1997 model, it was decided to wait until the new model was available because the new model included locations not covered in the earlier model. Therefore WSA obtained the new 2007 model and then conducted the toll analysis using the new model.

The 2007 model incorporates a new Transportation Analysis Zone (TAZ) system as well as new socioeconomic data. The new TAZ system includes areas of Brunswick County that were lightly developed in 1997. These areas are now growing rapidly and are in the same location as the proposed Cape Fear Skyway.

WSA prepared forecasts at 2015, 2020, 2025, and 2030 levels using the 2007 model's forecasts of population and employment and future highway improvements contained in the region's Long Range Transportation Plan. A base year model was calibrated for the immediate project area to achieve the best traffic volume assignments compared to observed traffic counts and observed speeds. The model network included all committed highway improvements as well as the proposed Cape Fear Skyway. The toll collection concept described earlier was developed in consultation

with NCTA and its general engineering consultant, and the facility was coded into the network as a toll facility. Some of the TAZ's from the NCDOT model were divided and some centroid connectors were relocated to better capture the flow of traffic in the area of the Skyway.

Information was also obtained regarding regional and corridor income characteristics to aid in the development of estimated values of time for potential users of the candidate toll facility. This is a critical model parameter for assessing motorists' willingness to pay tolls and for estimating motorists' sensitivity to toll rates. Vehicle operating cost parameters were also established specific to the corridor.

CORRIDOR GROWTH ANALYSIS

Economic growth is a particularly important variable for a start-up toll facility such as the proposed Cape Fear Skyway. The scenario configurations under study would provide significantly improved access to a rapidly developing area within Brunswick County, which, as described further in Chapter 3, is projected to have notable increases in both population and employment over the next 25 years. As such, analysis and validation of the projected economic activity is particularly important. WSA used the regional socioeconomic forecasts prepared for in the new NCDOT 2007 model.

Since this was a preliminary traffic and revenue study, an independent economic analysis was not conducted; however, an independent economic review would be necessary to support project financing.

TRAFFIC AND REVENUE ANALYSIS

The models were used to run a series of traffic assignments with and without the proposed Skyway. In each case, traffic assignments were run on a daily basis. A review was made of the reasonableness of the travel demand estimates, particularly under a toll condition, using various evaluation techniques such as select link, corridor share, and capture rate.

Toll sensitivity curves were developed for Year 2015 to determine optimum toll levels. These optimum rates were then used to conduct traffic assignments for other years.

Based on the results of the traffic modeling analysis, annual estimates of traffic and revenue on the proposed Cape Fear Skyway were developed for the base case condition from opening year 2015 through 2050.

Finally, to enable the formulation of annual traffic and revenue forecasts, revenue estimates in the early years of the projection period were adjusted to reflect “ramp-up,” a pattern of gradual build-up in demand for new toll facilities. This reflects the fact that full demand along a facility is not typically realized on opening day but gradually phases in over a period of two to four years.

REPORT STRUCTURE

The remainder of this report consists of three chapters.

- Chapter 2 presents the traffic conditions in the corridor and surrounding area.
- Chapter 3 describes the socioeconomic characteristics of the corridor.
- Chapter 4 describes the development of the traffic forecast model, assumed roadway improvements, toll scenarios, toll sensitivity, traffic and revenue forecasts, and the net toll operating revenue analysis.

CHAPTER 2

EXISTING TRAFFIC CONDITIONS

To provide a strong basis for the preliminary traffic and revenue analysis, an inventory of existing characteristics and traffic conditions in the project vicinity was developed. Major competing and complementary routes to the proposed Skyway were identified. Speed and delay characteristics were measured to determine existing operating conditions, which is important in terms of calibrating the travel demand model and estimating motorists' willingness to pay tolls.

Available traffic counts were obtained from a number of sources. The traffic count profile was used in calibrating the regional travel demand model to accurately reflect existing conditions. This calibration was intended to reflect existing traffic volumes and to the extent possible, observed operating speeds on existing roadways.

This chapter describes the collection of data used to characterize the operational performance of the existing facilities in the study area. This approach was necessary because the Cape Fear Skyway is a future facility, and the only available data to calibrate the travel demand models were existing facilities, which will compete with the proposed Skyway.

EXISTING HIGHWAY SYSTEM

The proposed Cape Fear Skyway would facilitate movement in an east-west direction between New Hanover County and Brunswick County. The facility would provide access to major employment centers in the City of Wilmington as well as enhance access to the Port of Wilmington and the proposed new port in Brunswick County.

The Cape Fear Skyway would provide a new limited access facility to an area currently served by the following major facilities:

- College Road (NC 132) extends north-south from I-40 through the City of Wilmington and New Hanover County to its terminus at Fort Fisher. It is a four to six-lane roadway with signalized and un-signalized intersections throughout its length. The speed limit is typically 45 mph. Traffic on this facility frequently exceeds capacity and speeds frequently drop significantly below the posted speed limit.
- US 421 provides north to south travel throughout New Hanover County. US 421 is parallel to the Cape Fear River eventually ending at the mouth of the river. It is a divided and undivided four-lane facility with 45 and 55 mph speed limits. Access to downtown Wilmington from US 421 is provided by the Isabel Holmes Bridge and the Cape Fear Memorial Bridge.
- Shipyard Boulevard provides east to west travel from College Road to the Port of Wilmington. It is a divided and undivided four and six-lane roadway with signalized intersections. Posted speed limits are 45 and 55 mph. In general Shipyard Boulevard currently operates at an acceptable level of service.
- US 17/74 (Market Street) provides for travel north and south throughout the city of Wilmington. It also serves as a commuter facility for communities in southern Pender County and eastern New Hanover County. US 17 crosses the Cape Fear River on the Cape Fear Memorial Bridge and then extends southward to South Carolina. It is a divided and undivided four-lane facility with 45 and 55 mph speed limits, but operating speeds are frequently lower than the posted speed limit.
- US 74/76 in the vicinity of the proposed Cape Fear Skyway runs east and west through Wilmington and Brunswick County. US 74/76 crosses the Cape Fear River using the Cape Fear Memorial Bridge and operates at Level of Service F.
- Dawson/Wooster Street is an east-west one-way pair of streets connecting Oleander Drive with the Cape Fear Memorial Bridge. Both are three and four-lane roadways with 45 mph speed limits. The operating speeds of Dawson/Wooster Street is typically lower, however.
- Independence Boulevard is a north-south roadway connecting Market Street and Carolina Beach Road. It is a divided two-lane facility with a 45 mph speed limit. The City of Wilmington is scheduled to widen

Independence Boulevard to four lanes from Carolina Beach Road to Shipyard Boulevard in Fiscal Year 2008.

- Within Wilmington NC 133/211 provides north-south travel between Castle Hayne and Wilmington and US 17 to Southport. It is an undivided two-lane roadway with 45 and 55 mph speed limits. The facility has signalized and un-signalized intersections. It frequently operates below the posted speed limit.
- NC 87 provides north to south travel between US 74/76 and Southport. It is an undivided two-lane roadway with 45 and 55 mph speed limits.
- Martin Luther King Jr. Parkway, a recently completed four-lane controlled access facility, provides east-west connectivity from Eastwood Road to downtown Wilmington. The facility parallels Market Street in the northern portion of the City of Wilmington.

TRAFFIC VOLUMES

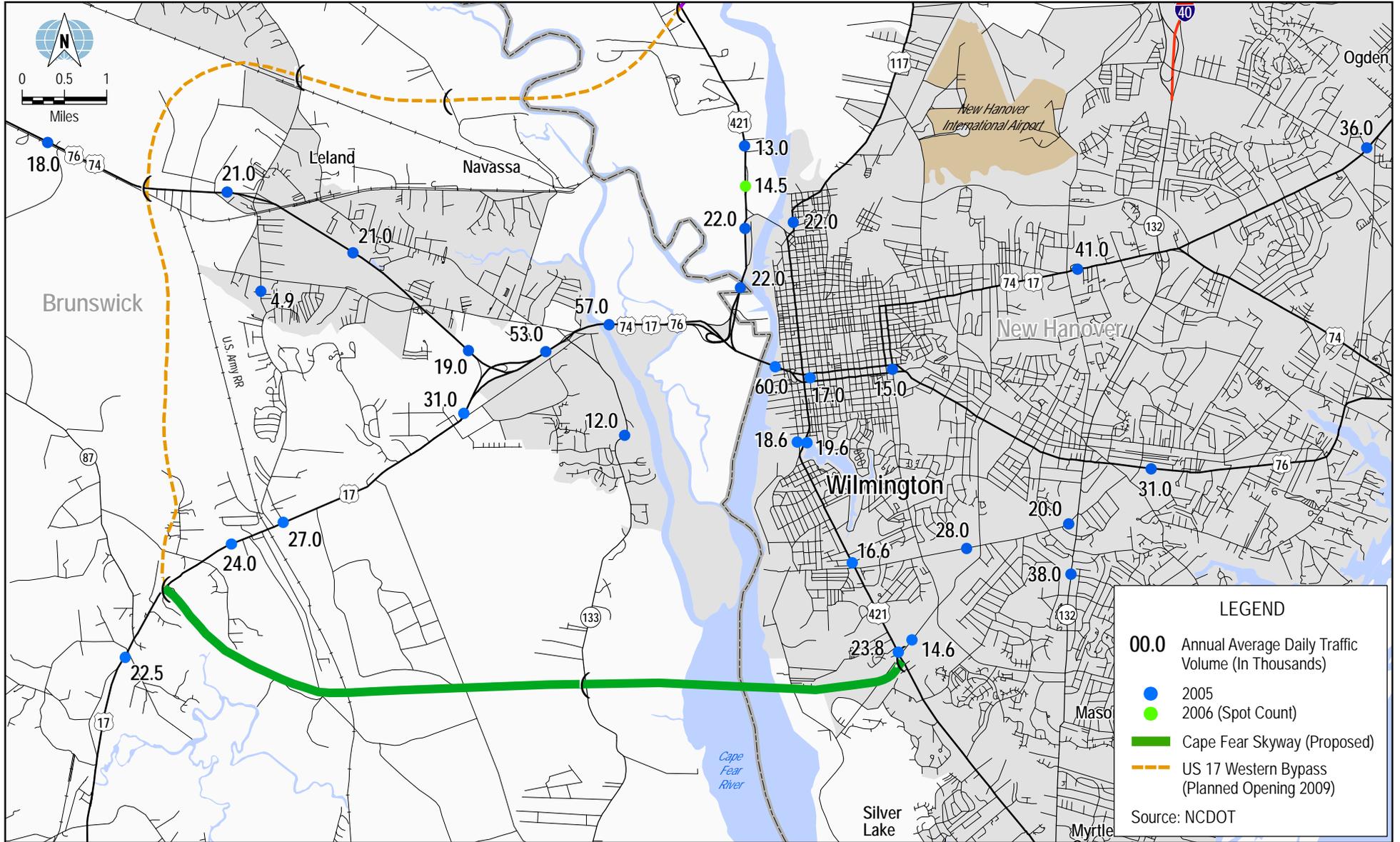
Existing traffic data from the NCDOT database and supplemental data from various other sources were reviewed to aid in the traffic model calibration process. This information was supplemented by speed and delay studies conducted along key roadways within the Cape Fear Skyway study area.

AVERAGE DAILY TRAFFIC

Figure 2-1 shows the locations of daily traffic volume counts within the corridor. All volumes are shown in thousands of vehicles.

East-west traffic volumes from major area roads in 2005 yields combined volume as indicated below:

- | | |
|--|--------------------|
| ▪ US 74/76
west of US 17 | 19,000 vpd; |
| ▪ US 74/76
at Cape Fear Memorial Bridge | 60,000 vpd; |
| ▪ US 76, Oleander Street
east of College Road | 31,000 vpd; |
| ▪ Shipyard Boulevard west of
Independence Boulevard | 28,000 vpd; and |
| ▪ US 17/74 Market Street
east of Kent Avenue | <u>41,000 vpd;</u> |
| Total | 160,000 vpd. |



North-south traffic volumes from major area roads in 2005 yields a combined volume as indicated below:

▪ US 17	
north of NC 87	24,000 vpd;
▪ US 421 south of	
Isobel Holmes Bridge	22,000 vpd;
▪ US 117, Castle Hayne Road	
north of Isobel Holmes Bridge	22,000 vpd; and
▪ NC 133, River Road south	
at US 17/74/76	<u>12,000</u> vpd;
Total	80,000 vpd.

In the vicinity of the termini of the proposed Cape Fear Skyway, average daily traffic volumes in 2005 were 22,500 vpd at US 17 south of NC 87 in Brunswick County and 23,800 vpd at US 421/Carolina Beach Boulevard in New Hanover County.

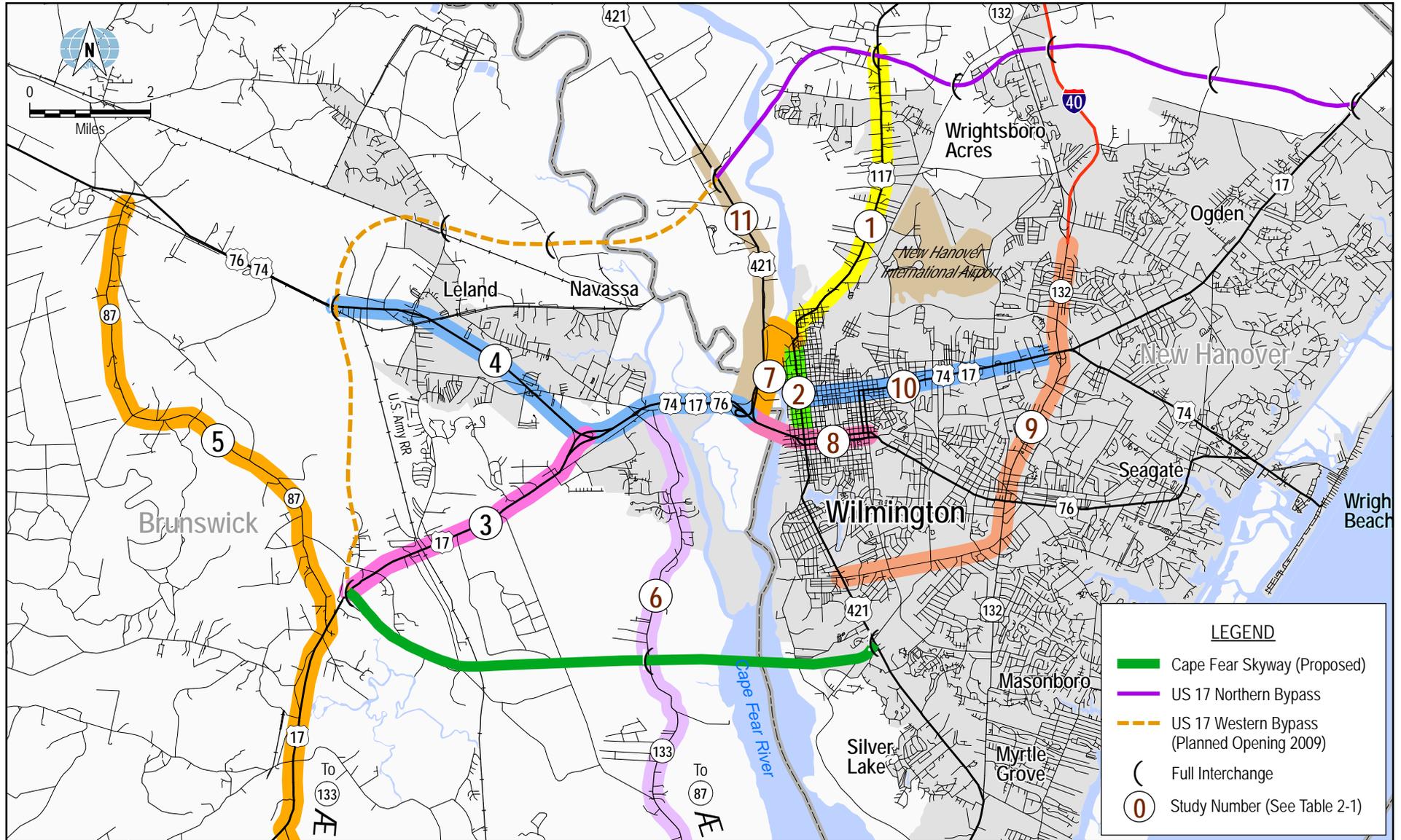
SPEED AND DELAY ANALYSIS

Speed and delay characteristics were measured on major roads in the study area using global positioning system units:

- Castle Hayne Road between Martin Luther King Parkway and Hermitage Road;
- 3rd Street between Parsley Street and Kidder Street;
- US 17 between NC 87 and the junction with US 74;
- US 74 between US 421 and Mt. Misery Road;
- NC 87 between NC 133 and US 74;
- NC 133 between NC 87 and US 17;
- US 421 and the Holmes Bridge between US 17 and North 3rd Street;
- US 17/421 and the one-way pairs of Dawson Street and Wooster Street between the junction with US 421/17/74 and the one-way pairs of 16th Street and 17th Street;
- Shipyard Boulevard and College Road between Carolina Beach Boulevard (US 421) and the terminus of I-40;
- Market Street (US 74/17) between 3rd Street and College Road; and
- US 421 between US 17/74 and Sutton Lake Road.

Figure 2-2 illustrates the location of speed and delay studies. The studies were conducted during peak and off peak periods in order to provide information on average speeds for use in calibrating the traffic model. As shown in Table 2-1, speeds during off-peak periods were generally found to be near the posted speed limits. However, during peak periods, the

Proposed Cape Fear Skyway Preliminary Traffic and Revenue Study



**Table 2-1
Average Speeds on Selected Routes During Peak Periods**

Facility	Start Point	End Point	Map Reference (1)	Direction	Distance	Average Observed Speed	
						AM Peak	PM Peak
Castle Hayne Road (US 117)	Martin Luther King Parkway	Hermitage Road	1	Northbound	5.5	38.9	37.6
Castle Hayne Road (US 117)	Hermitage Road	Martin Luther King Parkway	1	Southbound	5.5	34.3	41.1
3rd Street	Kidder Street	Parsley Street	2	Northbound	2.2	18.7	14.2
3rd Street	Parsley Street	Kidder Street	2	Southbound	2.2	20.7	17.3
Ocean Highway (US 17)	Maco Road (NC 87)	Andrew Jackson Highway (US 74/76)	3	Westbound	5.9	62.4	61.3
Ocean Highway (US 17)	Andrew Jackson Highway (US 74/76)	Maco Road (NC 87)	3	Eastbound	5.9	62.2	60.9
Andrew Jackson Highway (US 74/76)	US 421	Mt. Misery Road	4	Westbound	7.5	61.6	59.4
Andrew Jackson Highway (US 74/76)	Mt. Misery Road	US 421	4	Eastbound	7.5	-	58.9
Bolling Springs Road (NC 87)	River Road (NC 133)	Andrew Jackson Highway (US 74/76)	5	Northbound	30.3	56.8	-
Maco Road (NC 87)	Andrew Jackson Highway (US 74/76)	River Road (NC 133)	5	Southbound	30.3	52.8	-
River Road (NC 133)	Bolling Springs Road (NC 87)	Ocean Highway (US 17)	6	Northbound	20.4	53.5	-
River Road (NC 133)	Ocean Highway (US 17)	Bolling Springs Road (NC 87)	6	Southbound	20.4	55.3	-
US 421 and Isabel Holmes Bridge (US 117)	US 17	North 3rd Street	7	Northbound	2.2	-	39.3
US 421 and Isabel Holmes Bridge (US 117)	North 3rd Street	US 17	7	Southbound	2.2	45.4	-
US 17/421, Dawson Street, Wooster Street	US 421/17/74 Junction	16th Street/17th Street	8	Westbound	2.0	34.7	36.4
US 17/421, Dawson Street, Wooster Street	16th Street/17th Street	US 421/17/74 Junction	8	Eastbound	2.0	32.4	38.3
Shipyard Boulevard/College Road (NC 132)	Carolina Beach Boulevard (US 421)	I-40 Terminus	9	Northbound	7.9	38.5	31.0
Shipyard Boulevard/College Road (NC 132)	I-40 Terminus	Carolina Beach Boulevard (US 421)	9	Southbound	7.9	35.4	31.8
Market Street (US 74/17)	3rd Street	College Road (NC 132)	10	Westbound	4.4	20.0	-
Market Street (US 74/17)	College Road (NC 132)	3rd Street	10	Eastbound	4.4	23.4	-
US 421	Ocean Highway (US 17/74)	Sutton Lake Road	11	Northbound	4.8	54.2	53.2
US 421	Sutton Lake Road	Ocean Highway (US 17/74)	11	Southbound	4.8	50.6	47.6

(1) See Figure 2-2.

speeds were lower particularly in the peak traffic flow direction. For example, the observed morning peak speed eastbound toward Wilmington over the Cape Fear Memorial Bridge was 32.4 mph; the westbound observed speed was 34.7 mph. In the afternoon peak, the average observed speed was 36.4 mph; the eastbound observed speed was 38.3 mph. As indicated earlier, the posted speed limit for the Cape Fear Memorial Bridge is 45 mph. With the Cape Fear Skyway as an alternative route across the river, the time savings that may occur for certain movements is critical for potential traffic using the tolled facility.

CHAPTER 3

■■■■■ CORRIDOR GROWTH REVIEW

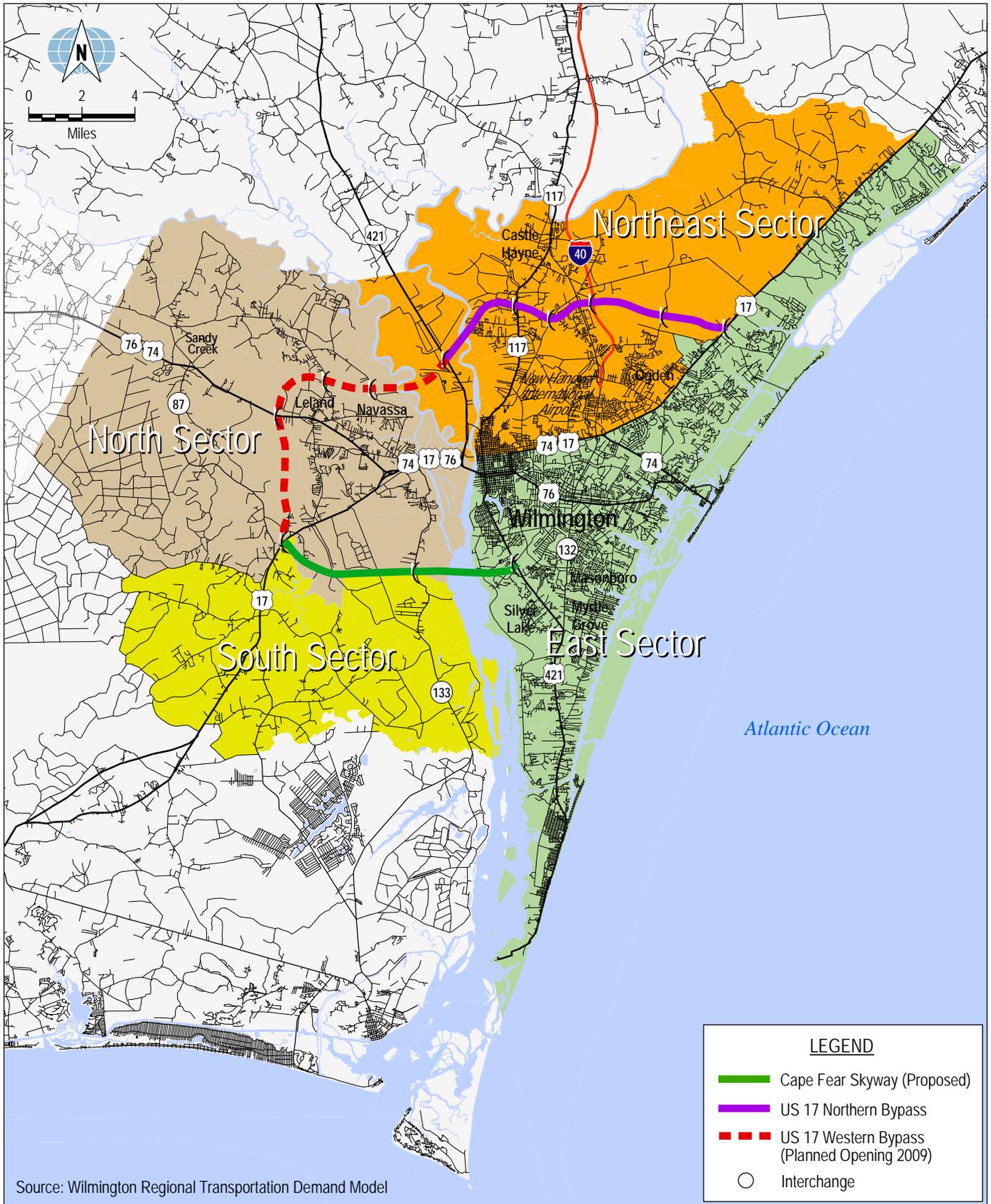
Future economic growth potential is important for the study of any new toll facility. However, for a facility such as the proposed Cape Fear Skyway, the significance of an economic analysis is particularly important because the Skyway would be a new river crossing connecting the rapidly growing area of Brunswick County to the City of Wilmington.

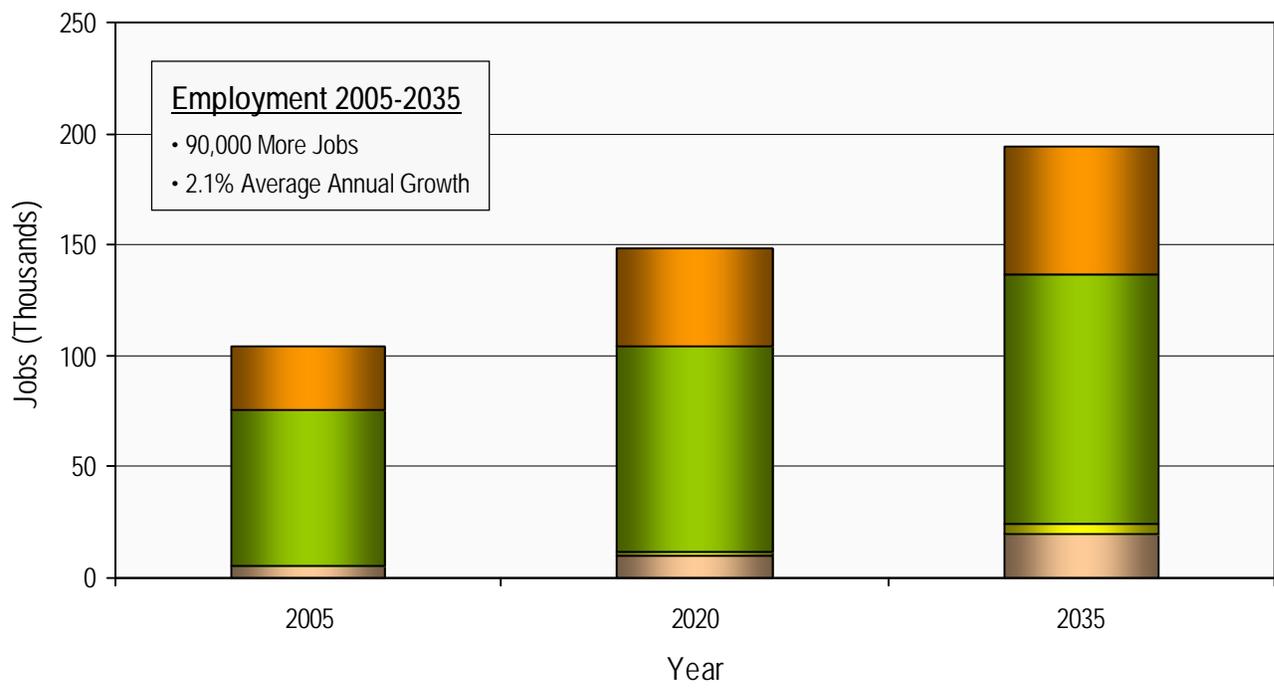
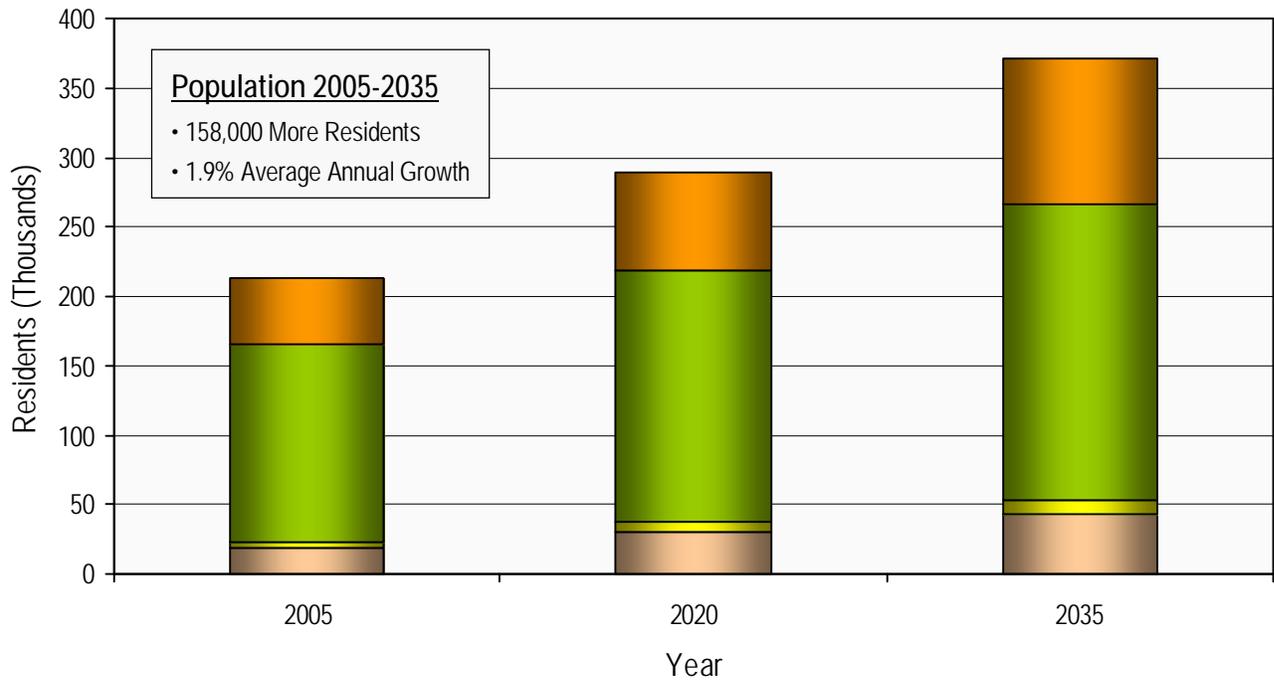
The socioeconomic forecast used in this study was developed by the Wilmington Urban Area Metropolitan Planning Organization in 2007. This forecast projects growth inside the sectors depicted in Figure 3-1. The Wilmington Urban Area was divided into four geographic sectors based on the traffic analysis zones (TAZ's) contained on the 2007 Wilmington Regional Transportation Demand Model. This distinction is important in determining the potential traffic on a facility such as the proposed Cape Fear Skyway because it has the potential to alter regional traffic patterns. An independent economic analysis was not conducted for this preliminary traffic and revenue study; however, an independent economic analysis would be necessary for any study that would be used in support of project financing.

GROWTH TREND PROJECTIONS

The population and employment in the Wilmington Urban Area is expected to increase considerably over the next three decades. Population during this period is expected to grow from around 212,500 in 2005 to nearly 371,000 in 2035. Employment in the Wilmington Urban Area is expected to grow from over 104,500 jobs in 2005 to about 195,000 jobs by 2035. Figure 3-2 illustrates the estimated population and employment growth for the four sectors.

Regionally, this expansion represents an average annual growth rate of 1.9 percent for population, 2.1 percent for employment, and 2.0 percent for





Northeast
 East
 South
 North

Source: Wilmington Regional Transportation Demand Model

the number of households. These annual average growth rates are modest but over time add up to a strong growth for the region.

ECONOMIC INFLUENCE OF WILMINGTON AND NEW HANOVER COUNTY

The eastern terminus of the proposed Cape Fear Skyway is immediately south of the Port of Wilmington, and it is approximately three miles from downtown Wilmington. As a major employment, tourist center and educational center, the City of Wilmington attracts a large number of trips from the surrounding area. Additional visitors from the central and western portions of North Carolina pass through the City of Wilmington as they travel US 74/76 and US 421 to reach Wrightsville and Carolina Beaches.

The City of Wilmington is the largest single municipality in southeast North Carolina. Major employers in the City include pharmaceutical companies, a regional hospital, a community college and the University of North Carolina at Wilmington. The City is also the major retail center of the region with two major commercial centers outside of downtown, the well-established Independence Mall and the ongoing development of Mayfaire, a major neo-traditional commercial center. The City also houses the regional headquarters of several large companies, as well as the main State Port.

Within the region, northwestern Brunswick County is an attractive area for multiple reasons. These include the abundance of developable land and water resources, lower housing costs and lower tax rates. Accordingly, the Wilmington MPO anticipates that employees of the major companies and businesses in the growing Wilmington area will choose to live in Brunswick County.

THE STATE PORT AT WILMINGTON

The State Port of Wilmington is located immediately north of the eastern terminus of the proposed Cape Fear Skyway. The State Port is the largest port in North Carolina and handles freight needs for much of the southeast United States. It was the beneficiary of a recently completed \$272 million dredging project that deepened the navigable channel and turning basin to 42 feet. This enhancement significantly improved the Port's ability to provide access to heavily loaded freighters. The Port handled over 3,000,000 tons of freight, break bulk and bulk freight traffic in Fiscal Year 2005. In addition to the dredging project, the Port recently completed a \$130 million up grade of its freight loading capacity.

While the port has rail access, the State Port Authority does not anticipate that rail access can be expanded enough to accommodate the Port's needs because of the circuitous route of the rail lines linking the Port to the main line across the Cape Fear River. For the foreseeable future, trucks will remain the primary means of carrying freight to and from the existing Port. US 74 is currently the primary means for truck traffic to access the Port.

The North Carolina Ports Authority has announced plans to upgrade its operations at Wilmington. These plans include the addition of a deep water terminal south of the existing facility on the Brunswick County side of the Cape Fear River and the expansion of the existing facility to the south on the New Hanover County side. The Brunswick County expansion is planned to have the capacity to handle two million twenty-foot equivalent units (TEUs) of containerized freight. The portion of the Port on the New Hanover County side which currently handles containerized freight, would be used for general freight movement.

Property for both of these expansion projects has been purchased. Discussions on transportation improvements needed to implement this plan are currently underway. These discussions include an additional road for access to the new Brunswick County facility as well as deepening the channel to 50 feet for access to the new site.

While the Cape Fear region will benefit from the expansion of the State Port at Wilmington, it is anticipated that the expansion will generate additional truck traffic that will require additional transportation network capacity. The proposed Cape Fear Skyway would provide an alternative to the existing Cape Fear Memorial Bridge which currently provides access to the port from the west.

GEOGRAPHICAL SECTORS OF THE STUDY AREA

The North Sector (as illustrated earlier in Figure 3-1) incorporates a portion of the Wilmington Urban Area west of the Cape Fear River. Included in these areas are the Towns of Belville, Leland and Navassa. The western terminus of the proposed Cape Fear Skyway is located between the North and South Sectors.

The South Sector also incorporates a portion of the Wilmington Urban Area west of the Cape Fear River. Included in this area is the Town of Winnabow.

The East Sector is comprised of the peninsula formed by the Cape Fear River and the Atlantic Ocean. This sector includes the City of Wilmington and a portion of unincorporated New Hanover County that follows the coastline into Pender County as far as the Town of Topsail. The northern boundary of this sector is essentially US-17. This sector may be characterized as the most densely developed portion of the urban area. From east to west it includes downtown Wilmington, the densely developed Market Street, Oleander Drive, and Wrightsville Avenue corridors, and the Independence Mall and Mayfaire commercial centers. It also includes the Town of Wrightsville Beach as well as the UNC Wilmington Campus. The eastern terminus of the proposed Cape Fear Skyway is located in this sector at US 17 and US 421 just south of downtown Wilmington.

The Northeast Sector includes the New Hanover International Airport, northern New Hanover County, and a portion of eastern Pender County. The sector is defined by the New Hanover County line on the north, the Cape Fear River on the west, US 17 on the south and eastern Pender County as far as the Town of Topsail to the east.

POPULATION FORECASTS

Table 3-1 summarizes population growth within the sectors in the Wilmington Urban Area based on data contained in the WRTDM.

In 2005 the Wilmington Urban Area had approximately 213,000 people residing within the four sectors defined as being within the metropolitan planning area. By 2035, the population within these sectors is forecast to grow to approximately 371,000 people. The majority of this growth is expected to occur outside of the urban core. Unlike many rapidly developing communities where new growth focused outside the urban core greatly reduces the urban core's percentage of the total population, the Wilmington Urban Area core is expected to absorb much of the area's projected growth. In 2005, the urban core population comprised 89 percent of the region's total population. In 2035 the urban core it is anticipated to comprise 85 percent of the total population.

Figure 3-3 provides a pictorial representation of the projected growth by sector. The East Sector, which contains the eastern terminus of the Cape Fear Skyway, is expected to have the highest population growth increasing by approximately 69,000. Although the East Sector is forecast to add the most population, it would have the lowest growth rate in the region, 1.3 percent annually between 2005 and 2035.

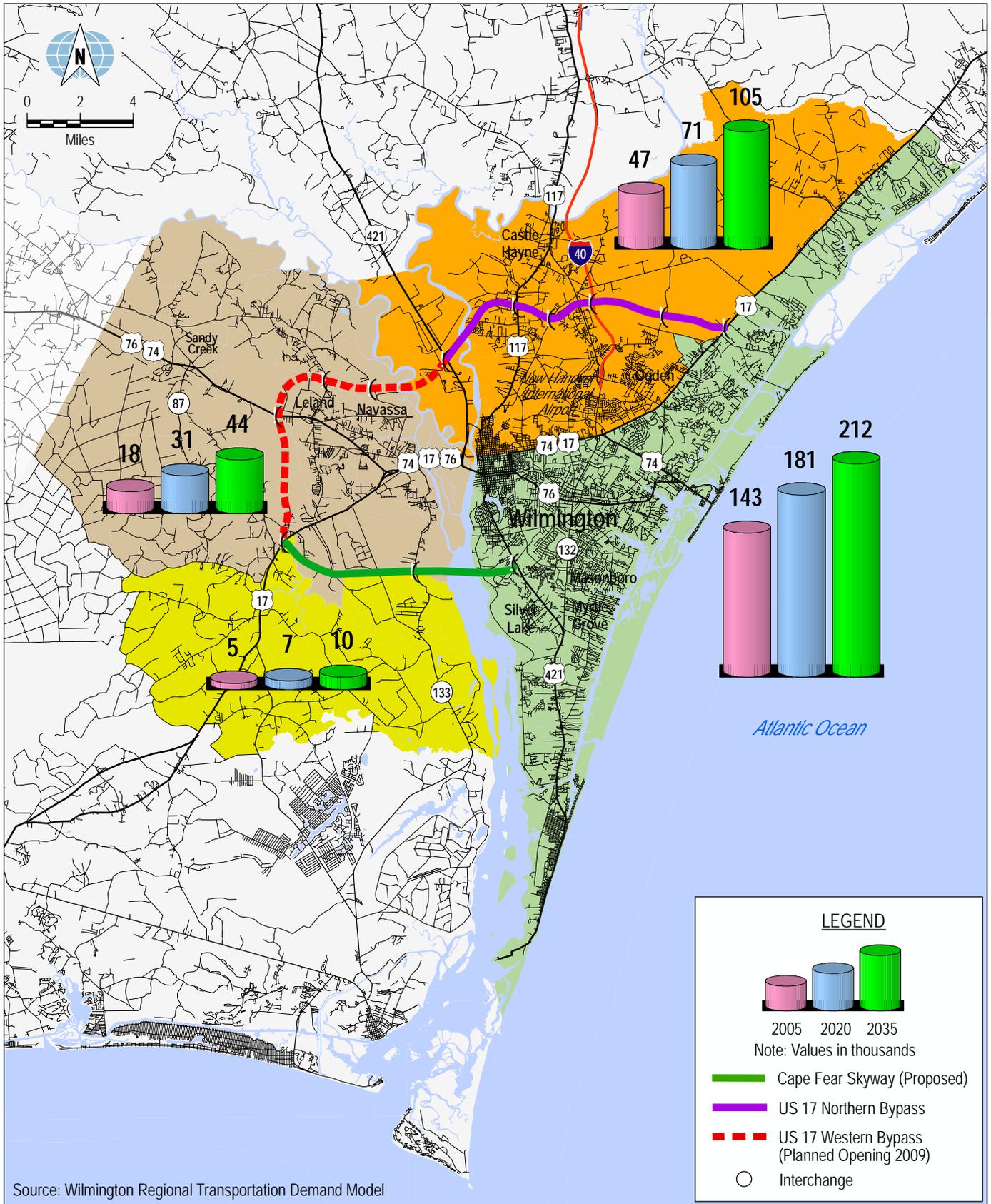
**Table 3-1
Wilmington Urban Area Population Projections**

Sector	2005	Average Annual Growth		2020	Average Annual Growth		2035	Average Annual Growth		Total Growth 2005-2035
		2005-2020	2020-2035		2005-2020	2020-2035		2005-2035		
North	17,993	3.6%	2.4%	30,719	2.4%	43,880	3.0%	143.9%		
South	4,646	2.6%	2.6%	6,778	2.6%	9,998	2.6%	115.2%		
East	143,052	1.6%	1.1%	180,889	1.1%	211,939	1.3%	48.2%		
Northeast	46,993	2.8%	2.6%	71,181	2.6%	104,949	2.7%	123.3%		
Total Population	212,684	2.1%	1.7%	289,567	1.7%	370,766	1.9%	74.3%		

Sector	Net Change in Population		Total Growth 2005-2035
	2005-2020	2020-2035	
North Change	12,726	13,162	25,888
South Change	2,132	3,220	5,352
East Change	37,837	31,049	68,886
Northeast Change	24,188	33,768	57,956
Total Change	76,883	81,199	158,082

Source: Regional Transportation Demand Model

Proposed Cape Fear Skyway Preliminary Traffic and Revenue Study



The North Sector, which contains the western terminus of the Cape Fear Skyway is expected to have the highest population growth rate, approximately 3.0 percent annually. This is due to the relatively undeveloped nature of this sector in 2005. The South Sector and Northwest Sector are forecast to grow 2.6 and 2.7 percent annually respectively.

The North, South, and Northeast Sectors are expected to exhibit growth rates higher the urban area's average of 1.9 percent between 2005 and 2035.

EMPLOYMENT FORECASTS

Table 3-2 summarizes employment growth within the sectors in the Wilmington Urban Area.

In 2005 the Wilmington Urban Area had approximately 104,500 people employed within its four sectors. As shown in Table 3-2 and Figure 3-4, employment is projected to grow strongly going from approximately 104,500 employees in 2005 to about 148,000 employees in 2020. From 2020 to 2035 employment is projected to grow to roughly 195,000 employees. This represents a 2.1 percent average annual growth rate for the period 2005 to 2035.

While employment growth is anticipated throughout the urban area, the North and South Sectors are expected to have the greatest total growth rate of approximately 292 percent and 1,900 percent, respectively.

The most rapid rate of employment growth is predicted for the South Sector with a 10.5 percent average annual growth. The greatest growth would occur between the years 2020 and 2030 (11.7 percent per year). This high growth is expected because of the relatively underdeveloped nature of the South Sector. In 2005, this sector had only 250 jobs according to the regional model.

The East Sector is forecast to grow by nearly 42,000 jobs by 2035, although the East Sector represents the lowest annual growth (1.6 percent annually). This coincides with the lowest annual rate of population growth.

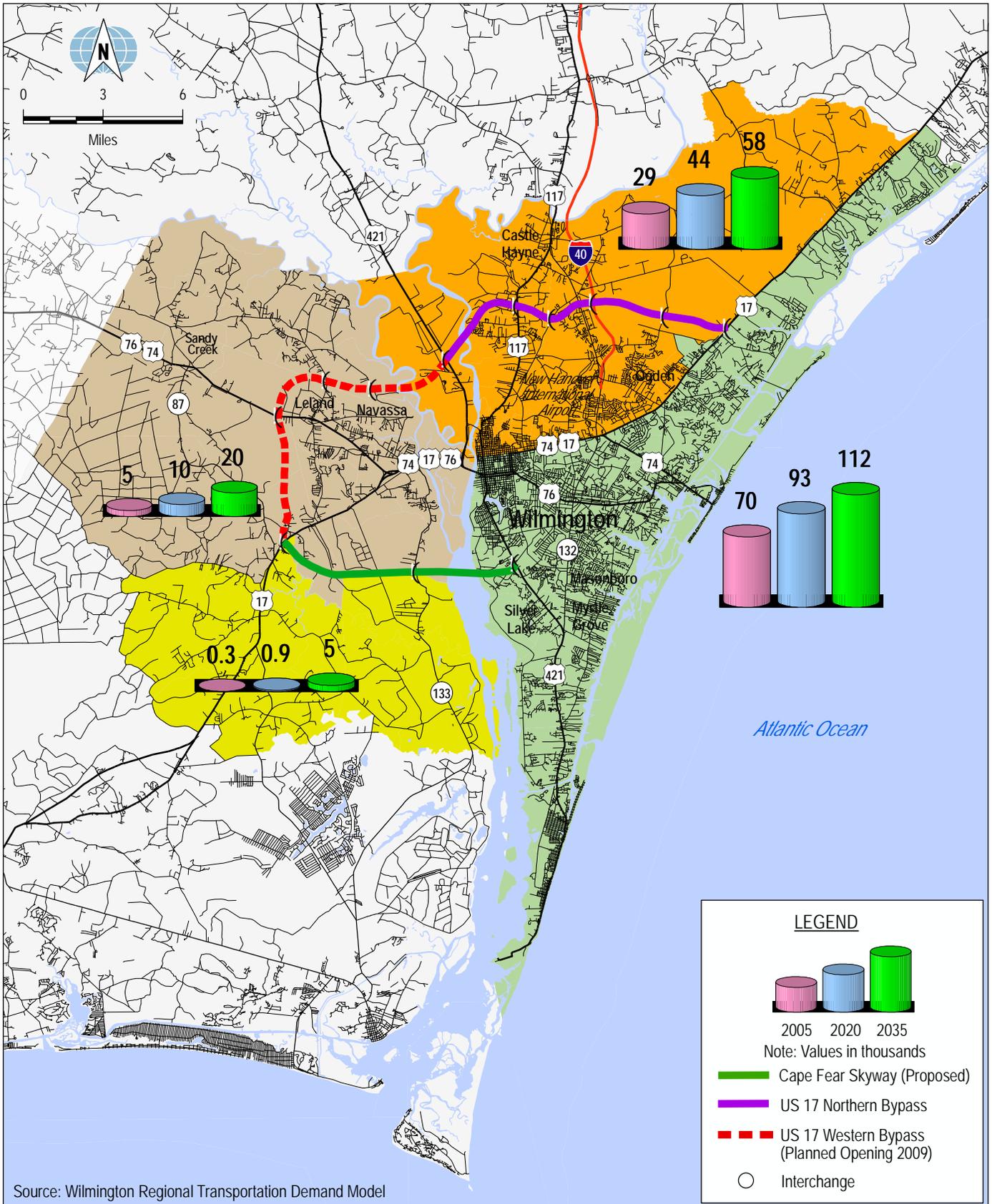
**Table 3-2
Wilmington Urban Area Total Employment Projections**

Sector	2005		2020		2035		2005-2035	
	Average Annual Growth	2005	Average Annual Growth	2020	Average Annual Growth	2035	Average Annual Growth	Total Growth
North	5.0%	4,989	4.4%	10,306	4.7%	19,561	4.7%	292.1%
South	9.3%	250	11.7%	949	10.5%	5,009	10.5%	1902.3%
East	1.9%	70,194	1.2%	92,957	1.6%	111,874	1.6%	59.4%
Northeast	2.7%	29,161	1.9%	43,751	2.3%	58,040	2.3%	99.0%
Total Employment	2.3%	104,594	1.8%	147,962	2.1%	194,484	2.1%	85.9%

Sector	2005-2020		2020-2035		2005-2035	
	Net Change in Employment	Total Growth	Net Change in Employment	Total Growth	Net Change in Employment	Total Growth
North Change	5,316	14,572	9,256	14,572	14,572	14,572
South Change	699	4,759	4,060	4,759	4,759	4,759
East Change	22,763	41,679	18,916	41,679	41,679	41,679
Northeast Change	14,590	28,879	14,289	28,879	28,879	28,879
Total Change	43,368	89,889	46,521	89,889	89,889	89,889

Source: Regional Transportation Demand Model

Proposed Cape Fear Skyway Preliminary Traffic and Revenue Study



HOUSEHOLD FORECASTS

Figure 3-5 and Table 3-3 summarize household growth within the four sectors of the Wilmington Urban Area.

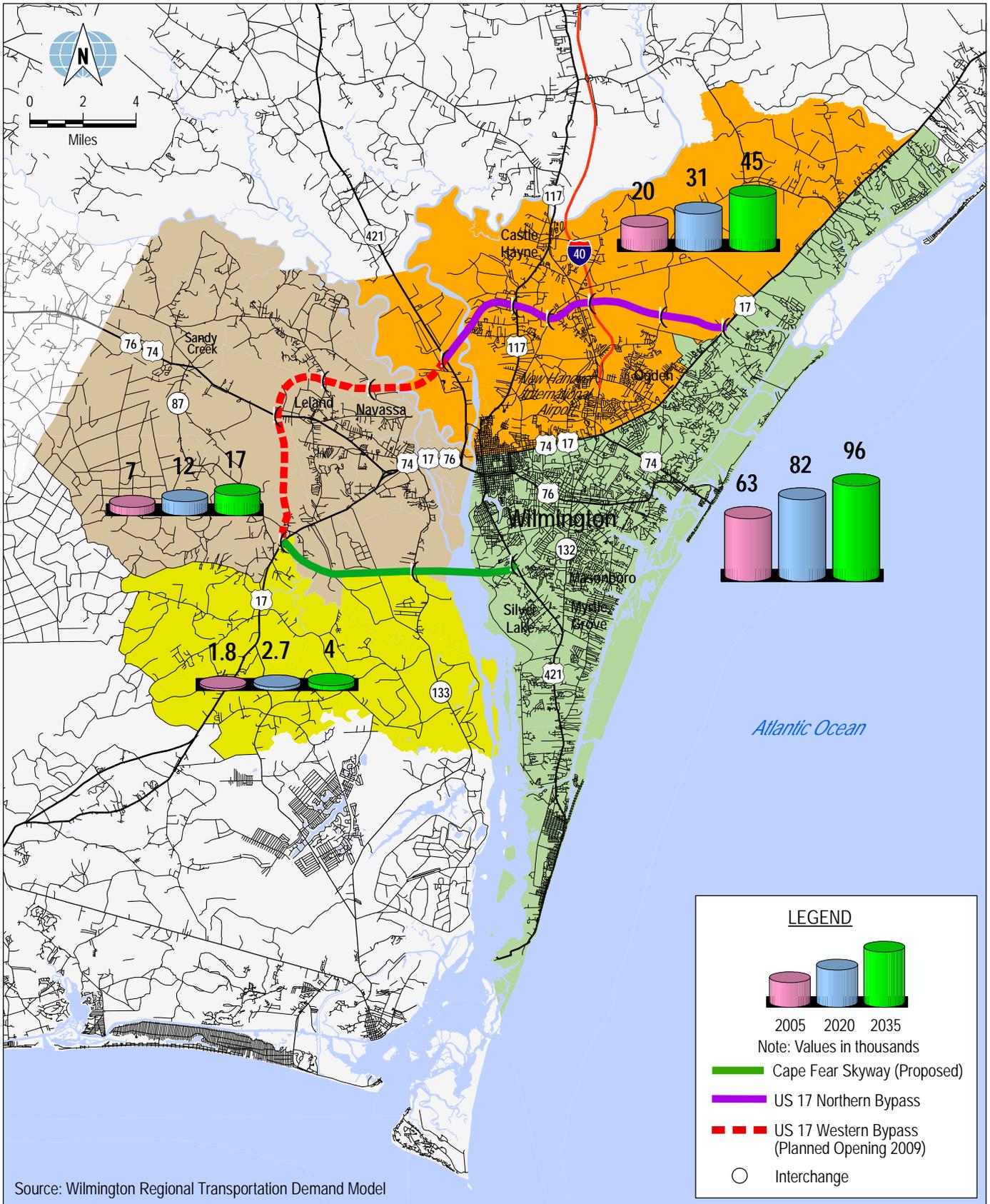
In 2005 a majority of the households were located in the East Sector, which contains a majority of New Hanover County. However, this sector will reflect the lowest annual household growth between 2005 and 2035 (1.4 percent). The sectors west of the Cape Fear River will see the greatest growth over the next 30 years at 5.9 percent annually. The North Sector which contained approximately 6,900 households in 2005 will increase to just under 17,500 households in 2035 (153.9 percent). The South Sector which contained under 1,800 households in 2005 is projected to grow to nearly 4,000 households by 2035, a 124.1 percent increase.

SOCIOECONOMIC CONCLUSIONS

This chapter summarizes the socioeconomic forecasts that underlie the traffic and revenue forecasts presented in the next chapter.

In general, the study area is forecast to exhibit relatively modest economic growth based on the socioeconomic forecasts contained in the WRTDM. The strongest growth over the next 30 years will occur between 2005 and 2020, and is expected in the North and South Sectors, which are comprised of Brunswick County. However while the growth rates in the South Sector are relatively high, the increase in the population, employment and households is small in comparison to increase in the other sectors.

Proposed Cape Fear Skyway Preliminary Traffic and Revenue Study



**Table 3-3
Wilmington Urban Area Total Household Projections**

Sector	2005	Average Annual Growth	2020	Average Annual Growth	2035	Average Annual Growth 2005-2035	Total Growth 2005-2035
North	6,892	3.9%	12,250	2.4%	17,499	3.2%	153.9%
South	1,779	2.8%	2,703	2.6%	3,987	2.7%	124.1%
East	62,567	1.8%	82,276	1.1%	96,293	1.4%	53.9%
Northeast	19,580	3.0%	30,612	2.6%	45,003	2.8%	129.8%
Total Number of Households	90,818	2.3%	127,840	1.6%	162,781	2.0%	79.2%

Net Change in Number of Households

Sector	2005-2020	2020-2035	Total Growth 2005-2035
North Change	5,358	5,249	10,607
South Change	924	1,284	2,208
East Change	19,709	14,017	33,726
Northeast Change	11,032	14,391	25,423
Total Change	37,022	34,941	71,963

Source: Regional Transportation Demand Model

CHAPTER 4

TRAFFIC AND REVENUE ANALYSIS

Chapter 4 presents a summary of the traffic and revenue analysis conducted for the proposed Cape Fear Skyway. In addition to an overview of the travel demand modeling process, this chapter also presents information on the regional highway improvement program, basic assumptions upon which the traffic and revenue forecasts are based, a toll rate sensitivity analysis, and the traffic and revenue forecasts for the proposed Skyway.

TRAFFIC MODEL DEVELOPMENT AND REFINEMENT

The North Carolina Department of Transportation (NCDOT) and the Wilmington Metropolitan Planning Organization (WMPO) have jointly developed a Wilmington Regional Transportation Demand Model (WRTDM) to be used for long-range transportation planning in the region. Certain refinements and adjustments were made to the original WRTDM in order to conduct this analysis. This section describes the model refinement process.

Data obtained from the WRTDM included highway networks and trip tables for 2005, 2020, and 2035 as well as socioeconomic forecasts for each year by traffic analysis zone. The base-year model was calibrated in the immediate project area to achieve the best traffic volume assignments compared to observed traffic counts and observed speeds from speed-delay studies. The model also was updated to reflect the proposed Cape Fear Skyway as a tolled facility as well as the other committed highway improvements such as the US 17 Western Bypass. Intermediate year networks for 2015, 2025, and 2030 were also developed from the 2020 and 2035 networks and published transportation plans covering the intermediate years.

Highways proposed for future improvement in the model were compared with proposed roadway improvements in the TIP and Long Range Transportation Plan (LRTP) developed by the MPO. Special attention was paid to proposed roadway improvements within the study area for the Skyway.

Detailed coding was added to represent the interchanges and toll plaza locations. Some Transportation Analysis Zones (TAZs) in the area of the Skyway interchanges were disaggregated to provide better representation of traffic in the area. Additionally some collector roads in the area of the Skyway interchanges were included.

The base year 2005 model was run using inputs supplied by the NCDOT and the MPO. A series of traffic assignments were compared with ground counts supplied by the NCDOT. Adjustments were made to network speeds and trip tables in the study area in order to improve the calibration of the model in comparison with ground counts, particularly for the three existing bridge crossings.

After calibration was obtained, a series of traffic assignments to the highway network were made for years 2015, 2020, 2025, 2030, and 2035 under no build, toll free, and tolled conditions. Several toll rates were tested for the 2015 opening year in order to estimate the optimum toll rates.

Traffic assignments were made using a diversion assignment technique. This process involved comparing the travel time and distance for trips using the Cape Fear Skyway with trips using the best toll-free alternative routes. The estimated share of total traffic that would be expected to use the facilities was a function of travel time and distance savings, a monetary value placed on these savings and the toll charges being tested in any given assignment. In general, as the total costs to use the proposed Skyway increased in comparison to the best alternative free routes, the share of traffic on the Skyway decreased. At lower toll rates, a higher share would be estimated.

The model also recognized capacity constraints on roadways in the study area. Speeds were adjusted in future conditions to reflect increasing congestion on the toll facility and competing roads. The proposed Skyway was assumed to be four lanes at all locations for purposes of this preliminary analysis.

BASIC ASSUMPTIONS

The preliminary traffic and revenue estimates for the Cape Fear Skyway were predicated on the following basic assumptions, which are considered reasonable for purposes of this preliminary analysis:

1. The Cape Fear Skyway would open to traffic as a tolled facility by January 1, 2015.

2. Roadway improvements included in the current TIP were assumed to be implemented, including the programmed widenings of competing routes. The final segment of the Wilmington Bypass from US 17 in Brunswick County to US 421 in New Hanover County was assumed to open to traffic before the Skway.
3. The environmental analyses for the Cape Fear Skyway would be completed as scheduled.
4. Toll rates and toll plaza locations would be as shown in this chapter.
5. No other competing facilities or additional capacity would be constructed other than those listed in the current Transportation Improvement Plan.
6. For purposes of this preliminary analysis, cash and electronic toll collection options would be available at all toll plaza locations, although it is assumed that at least 75 percent of users would use electronic toll collection.
7. Economic growth in the project study area and associated travel demand would occur as represented in the WRTDM used in this analysis.
8. For purposes of this study, inflation was assumed to average 2.5 percent per year.
9. The Scenario 1 and Scenario 2 toll configurations would be signed and promoted effectively to encourage maximum usage.
10. Motor fuel would remain in adequate supply and no national or regional emergency would arise that would abnormally restrict the use of motor vehicles.

Any significant departure from these basic assumptions could materially affect traffic and revenue potential on the proposed Cape Fear Skyway.

ROADWAY IMPROVEMENTS

People's travel behavior and the number of vehicles that would use the proposed Cape Fear Skyway in the future would be heavily influenced by the operating conditions of other area roadways. The process of transpor-

tation project development and funding makes it impossible to know with certainty which proposed transportation improvements will be implemented and when. However, it is important that reasonable assumptions are made regarding future improvements, since such improvements could have a considerable effect on the number of vehicles using the Skyway.

The WRTDM contains all future highway improvements listed in the MPO's fiscally constrained 2030 Transportation Improvement Program. A list of the planned road improvements that could affect traffic volumes on the Cape Fear Skyway is provided in Table 4-1. The improvement that would have the most impact on the operations of the Cape Fear Skyway would be the completion of the Wilmington Bypass. Presently it extends from US 17 northeast of Wilmington to US 421 near the New Hanover/Brunswick County line. The final segment would begin at US 421 and terminate at US 17 in Brunswick County. It would provide a bypass of the City of Wilmington and the congested Cape Fear Memorial Bridge.

TOLL RATES AND CONFIGURATIONS

Two scenarios were tested for the Cape Fear Skyway. Scenario 1 includes a single mainline plaza and ramp plazas at NC 133 on the Brunswick County side of the river. In Scenario 2, another set of ramp plazas would be constructed at the intersection of the Skyway and an extension of Lanvale Road. The total length of the toll facility would be approximately 9.4 miles. Travelers that used the toll road between NC 133 and Lanvale Road and US 17, but did not cross the bridge into New Hanover County, would use the ramp plazas.

Various toll rates were tested for each scenario in 2015. Mainline plaza passenger car rates ranging from \$1.50 to \$3.25 were analyzed. Ramp plaza sensitivity was tested at rates from \$0.75 to \$1.50.

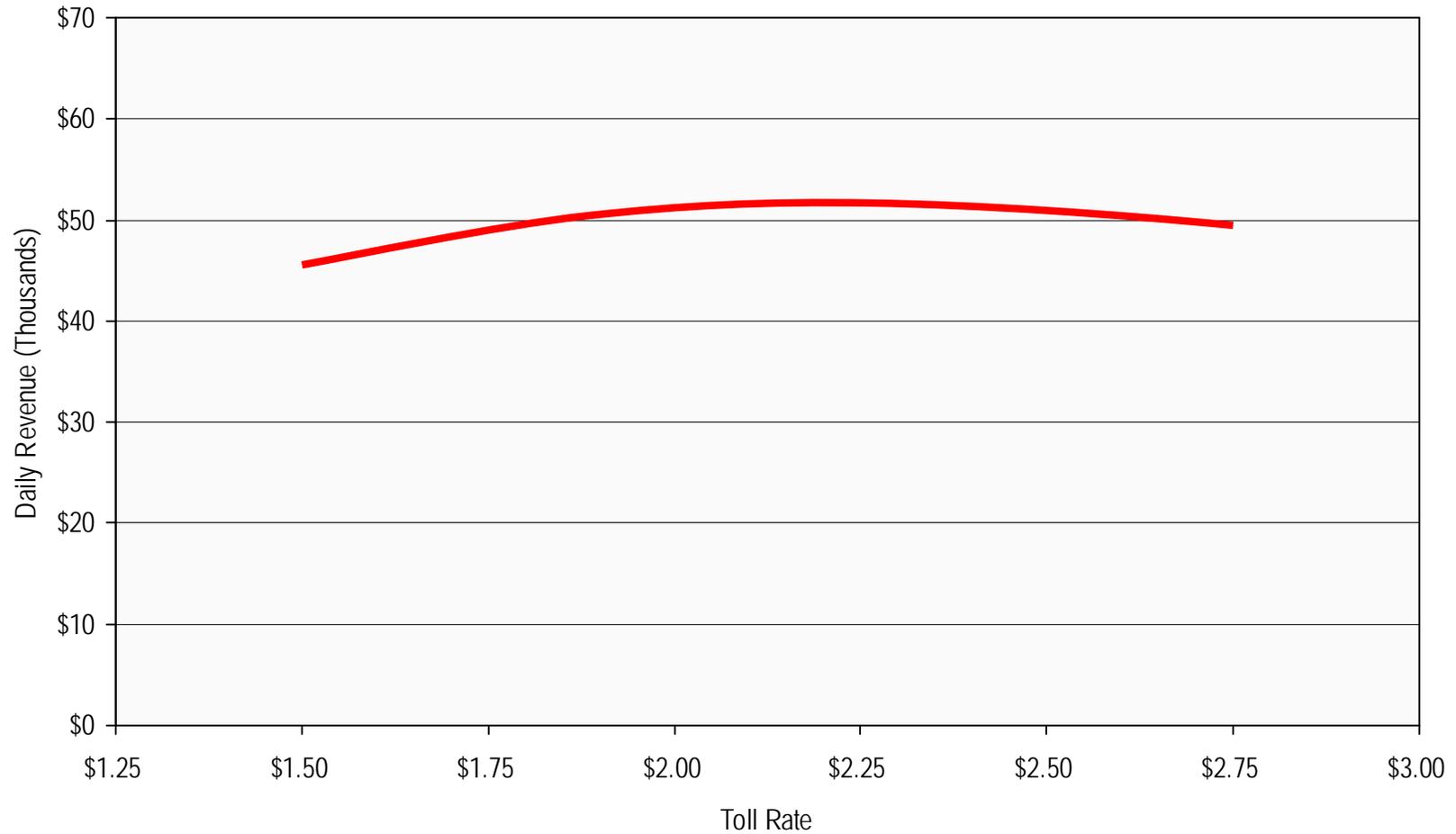
A toll sensitivity curve for the mainline plaza is shown in Figure 4-1. Generally, maximum revenue potential would result at a toll of between \$2.00 and \$2.25. However, only slightly lower revenue would be expected at a toll of \$1.75, which was selected as the optimum rate for the 2015 opening year.

Selecting an opening toll rate slightly below the maximum point on the toll sensitivity curve allows some flexibility in setting future rates. As shown in Table 4-2 the opening year toll rate is on the low end of the range of rates for existing urban toll facilities throughout the United States. This is especially true considering that it represents 2015 rates, or

**Table 4-1
Major Highway Improvements by Year 2015**

Name and Location	Project Description	Year
Brunswick/New Hanover	Wilmington Bypass, US 421 to US 17, New 4 Lane Divided Freeway.	2009
Wilmington	SR 1409 (Military Cutoff Rd) North of US 74 (Eastwood Road) to US 17 (Market Street), Widen to Multi Lanes.	Under Construction
Brunswick	US 74 to US 17, New 4 Lane Divided Freeway.	2009
New Route	US 1409 (Military Cutoff Road) to the Proposed Wilmington Bypass (R-2405). Multi-Lanes on New Location.	Post Years
Wilmington	Martin Luther King, JR. Parkway, US 117 to US 74. Four Lanes Divided on New Location.	Under Construction
Wilmington	NC 133, Martin Luther King, JR, Parkway to SR 1002 (Holly Shelter Road) at Castle Hayne and Along SR 1002 to I-40. Widen to Multi-Lanes.	Post Years
Wilmington	SR 1409 (Military Cutoff Road), Multi-Lanes North of US 74 to US 17. Widen to Multi-Lanes.	Under Construction
Wilmington	Kerr Avenue, Oleander Avenue to Martin Luther King, JR, Parkway. Widen to Multi-Lanes.	2011
Wilmington	SR 2048 (Gordon Road), NC 132 Interchange Ramp to West of US 17 (Market Street). Widen to Multi-Lanes.	Post Years
Wilmington	Independence Boulevard Extension, Randall Parkway to Martin Luther King, JR, Parkway. Multi-Lanes on New Location.	Post Years
NC 132	SR 2649 (MLK, JR, Parkway) to SR 1327 (Gordon Road). Widen to Multi-Lanes.	2015
Blue Clay Road Interchange	SR 1318 (Blue Clay Road) and Wilmington Bypass (R-2633CB). Construct an Interchange.	2015

Source: 2006-2012 Wilmington Metropolitan Planning Organization.



ESTIMATED 2015 MAINLINE PLAZA TOLL SENSITIVITY CURVE
SCENARIO 1

about eight years in the future. Many of the other toll facilities shown in Table 4-2 will likely have toll increases by 2015.

**Table 4-2
Comparison of Bridge/Tunnel Toll Rates for Passenger Cars**

Toll Facility	One-way Toll Rate	Remarks
AK - Whittier Tunnel	\$12.00	Tolled in single direction only
VA - Chesapeake Bay Bridge Tunnel	\$12.00	Tolled in single direction only
FL - Sanibel Causeway and Bridge	\$6.00	Tolled in single direction only
NY/NJ - Lincoln Tunnel, Holland Tunnel, George Washington, Goethals, Outerbridge Crossing and Bayonne Bridges	\$6.00	Each, tolled in single direction only
CA - Golden Gate Bridge	\$5.00	Tolled in single direction only
NY - Verrazano-Narrows, Triborough, Bronx-Whitestone, Queens-Midtown Bridges and Brooklyn-Battery Tunnels	\$4.50	Each, tolled in single direction only
CA - San Francisco-Oakland Bay Bridge	\$4.00	Tolled in single direction only
MO - Lake of the Ozarks Bridge	\$4.00	
MI - Ambassador Bridge	\$3.00	
NJ/PA - Ben Franklin, Betsy Ross, Commodore Barry and Walt Whitman Bridges	\$3.00	Each, tolled in single direction only
NY - Ogdensburg Bridge	\$2.75	
NY/Canada - Peace Bridge	\$2.50	
NJ/PA - Pennsylvania/New Jersey Turnpike Bridge - WB	\$2.40	
NJ/PA - Burlington-Bristol Bridge	\$2.00	Tolled in single direction only
NJ/PA - Tacony Palmyra Bridge	\$2.00	Tolled in single direction only
RI - Pell Bridge	\$2.00	
NC - Proposed Cape Fear Skyway (2015)	\$1.75	
NJ/PA - Pennsylvania/New Jersey Turnpike Bridge - EB	\$1.00	

Source: International Bridge, Tunnel and Turnpike Association

The relatively low optimum toll is a function of the relatively small time savings for major trips movements between New Hanover County and Brunswick County. For many movements in the primary influence area of the Skyway, the time savings are less than five minutes. Travel times for some movements would actually be less by alternative routes such as the Memorial Bridge. Because the Skyway does not provide a large time savings for many movements, the tolls have to be correspondingly lower to attract traffic.

TOLL CONCEPTS AND RATES

For Scenario 1, one mainline toll plaza would be established east of NC 133 and ramp plazas would be established at NC 133. The location of the mainline plaza could be on either side of the Cape Fear River as long as it is between the terminus at Independence Boulevard/US 421 in New Hanover County and NC 133 in Brunswick County. Tolls would also be collected at eastbound off and westbound on ramps at NC 133 for traffic

that would use the toll road without crossing the river. Tolls would not be collected at the project termini at Independence Boulevard/US 421 and at US 17.

Under Scenario 2, a second set of ramp plazas would be constructed at an extension of existing Lanvale Road. These plazas would act in the same manner as the plazas at NC 133, to collect tolls for traffic that would use the toll road without crossing the river.

Table 4-3 summarizes the selected toll rates for the mainline and ramp plazas in future-year dollars. Rates for the mainline plaza would begin at \$1.75 in 2015 and rise to \$3.00 by 2035. Rates at the NC 133 ramp plaza would begin at \$1.00 and rise to \$2.50, and the rates at the Lanvale Road ramp plaza would begin at \$0.50 and rise to \$1.50. The toll plaza locations are arranged so that travelers would pay only once to use the Cape Fear Skyway. Someone using the bridge would pay \$1.75 in 2015. A traveler traveling west on the toll road from NC 133 (and thus not using the bridge) would pay \$1.00. Similarly, a traveler using Lanvale Road in Scenario 2 would pay \$0.50 to use the short segment between Lanvale Road and US 17.

**Table 4-3
Passenger Car Toll Rates**

<u>Year</u>	<u>Cape Fear Skyway Mainline Plaza</u>	<u>NC 133 Ramp Plaza (1)</u>	<u>Lanvale Road Ramp Plaza (2)</u>
2015	\$1.75	\$1.00	\$0.50
2020	\$2.00	\$1.25	\$0.75
2025	\$2.25	\$2.00	\$1.00
2030	\$2.50	\$2.25	\$1.25
2035	\$3.00	\$2.50	\$1.50

(1) NC 133 in both Scenarios 1 and 2.
(1) Lanvale Road in Scenario 2 only.

Figures 4-2 and 4-3 show the rates for each toll plaza for Scenarios 1 and 2, respectively, for the opening year and 2030. All rates are in future-year dollars and adjusted for inflation, which is assumed for this study to average 2.5 percent per year. The increase in tolls between the opening year and the later years of operation is slightly greater than inflation, reflecting the significant increases in traffic demand which would require some level of “real increase” in rates beyond inflation.

Rates shown in these figures are for passenger cars; trucks would have proportionally higher toll rates. In developing revenue estimates for these preliminary study findings, it was assumed that truck rates would average 2.5 times passenger car rates at each toll plaza location.

ESTIMATED AVERAGE DAILY TRAFFIC VOLUMES

Preliminary estimates of average annual daily traffic for the Scenario 1 configuration are shown for years 2015 and 2030 in Figure 4-4. Toll-free traffic would be higher. The traffic volumes shown do not reflect ramp-up effects, which were incorporated into the annual forecasts.

Traffic at the mainline plaza for Scenario 1 is estimated at 23,100 vpd in 2015. By 2030 the traffic at the mainline plaza would rise to 36,200 vpd, an average growth of about 3.0 percent per year.

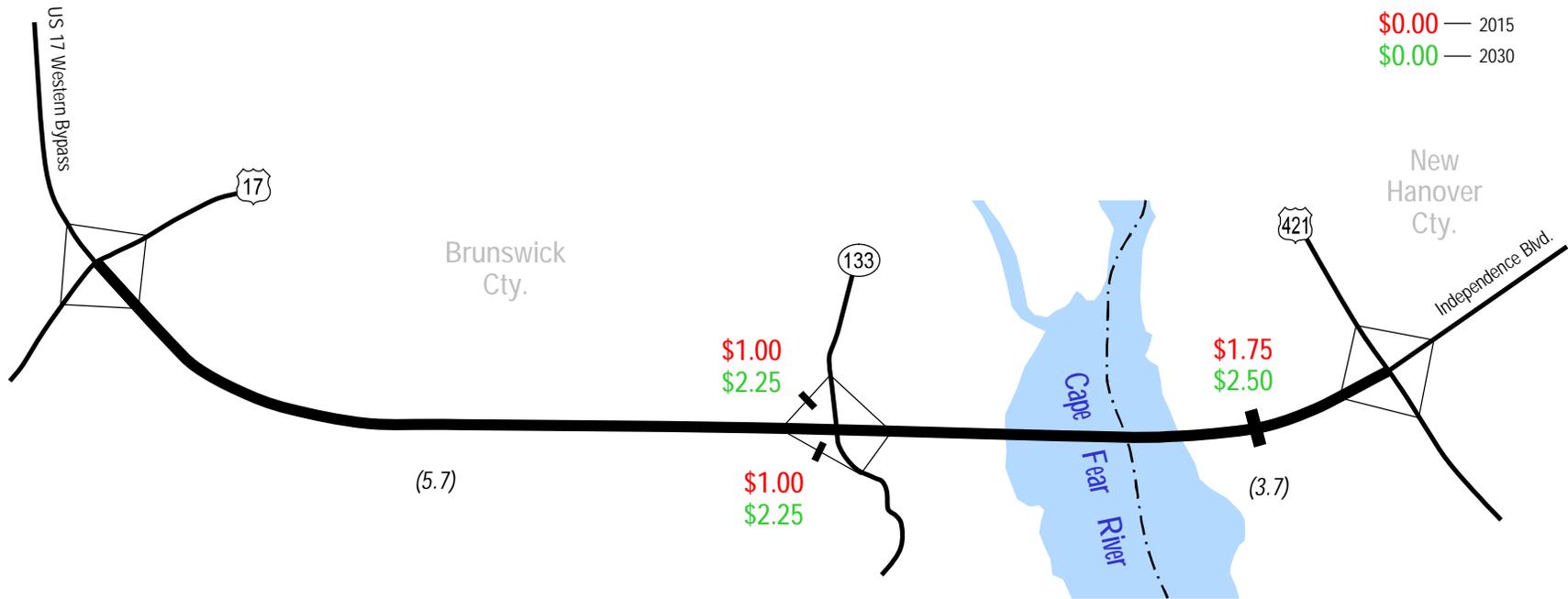
It is important to note the very low volume forecast for westbound on and eastbound off ramps at NC 133. These ramps would generate approximately 600 vpd in 2015 before ramp-up and only 1,000 vpd by 2030. This growth rate is approximately 3.5 percent annually, but the traffic starts from a low base volume. These ramps would provide for movements that would use the toll road but not cross the bridge and thus would provide access to and from US 17 from the neighborhoods along NC 133 and to the west of the interchange. They do not appear to offer significant advantages over toll free alternatives. However, as can be seen in the figure, the traffic at these ramps that would cross the river would be significantly higher. In 2015, the traffic entering and leaving the Skyway at NC 133 and paying the mainline toll is forecast to be 6,400 vpd and to rise to 13,800 vpd in 2030. This traffic to and from NC 133 represents 28 percent of the bridge traffic in 2015 and 38 percent of the traffic in 2030.

Similarly, toll traffic forecasts for Scenario 2 with an additional ramp at Lanvale Road, are presented in Figure 4-5 for year 2015 and 2030. Traffic volumes at the mainline plaza are somewhat higher than for Scenario 1 because of the additional access provided at Lanvale Road. Mainline toll



LEGEND

-  Toll Road
-  Free Road
-  Ramp Toll Plaza
-  Mainline Toll Plaza
-  (0.0) — Distance Between Interchanges (Miles)
-  \$0.00 — 2015
-  \$0.00 — 2030





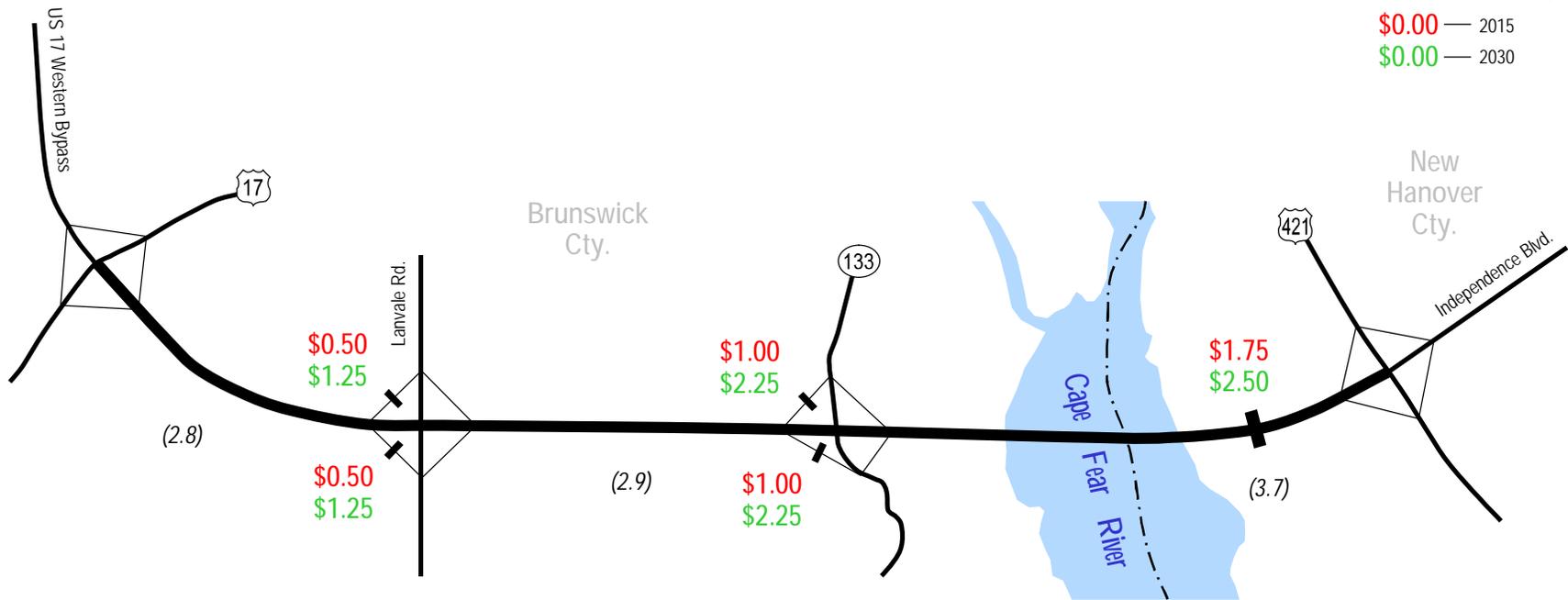
LEGEND

- Toll Road
- Free Road
- Ramp Toll Plaza
- Mainline Toll Plaza
- (0.0)

 Distance Between Interchanges (Miles)
- \$0.00

 2015
- \$0.00

 2030



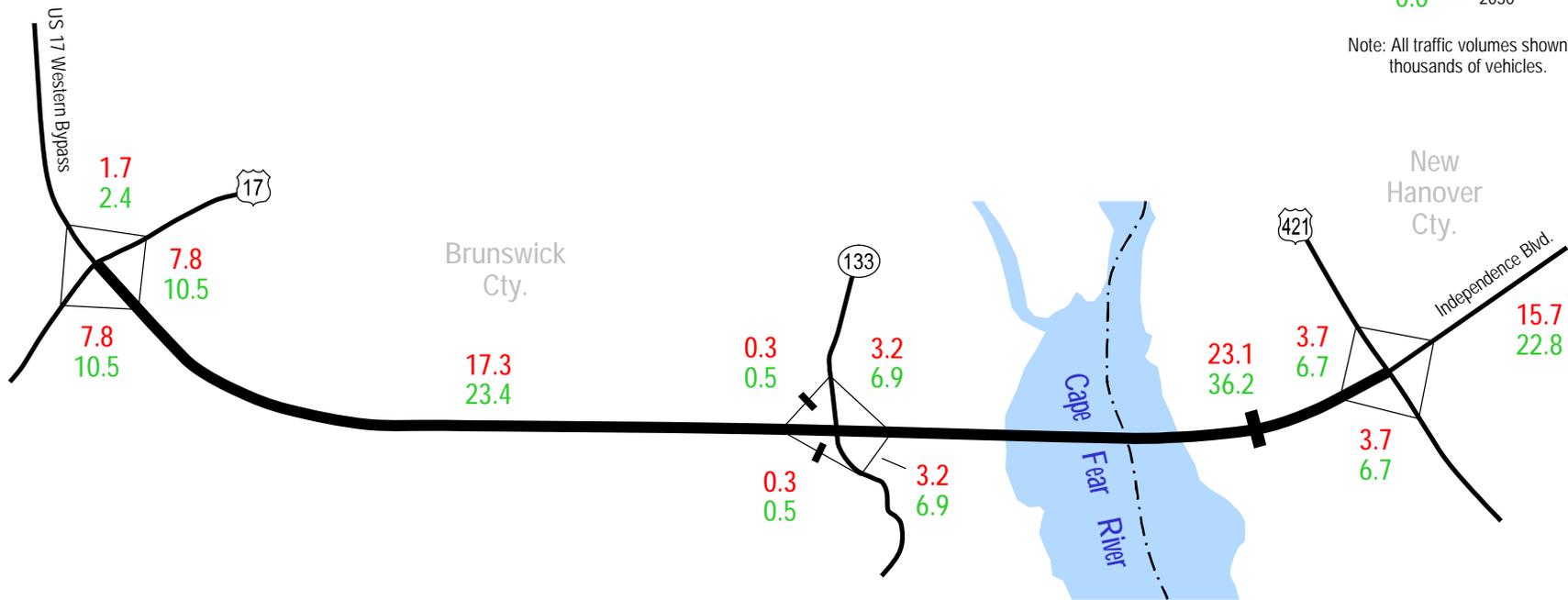


Schematic
Not To Scale

LEGEND

- Toll Road
- Free Road
- Ramp Toll Plaza
- Mainline Toll Plaza
- 0.0 — 2015
- 0.0 — 2030

Note: All traffic volumes shown represent thousands of vehicles.

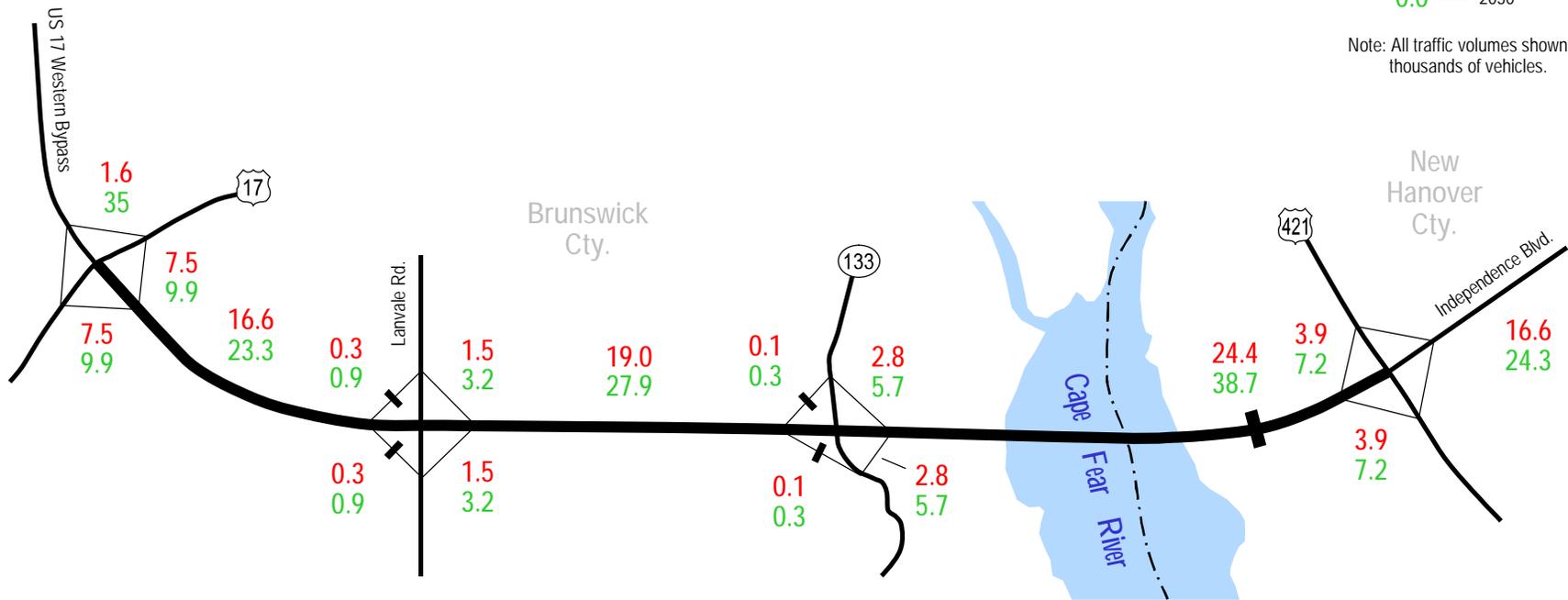




LEGEND

- Toll Road
- Free Road
- Ramp Toll Plaza
- Mainline Toll Plaza
- 0.0 — 2015
- 0.0 — 2030

Note: All traffic volumes shown represent thousands of vehicles.



traffic is forecast to begin at 24,400 vpd in 2015 and rise to 38,700 vpd by 2030, which is an annual growth rate of 3.1 percent.

The ramp toll traffic for NC 133 and Lanvale Road is very low under this scenario also. These two ramps are forecast to generate only 1,800 vpd in 2015 before ramp-up and a little over 2,400 vpd in 2030. The main function of these interchanges would be to provide access to the bridge.

Given the low toll revenues forecasted for the ramp plazas, a value engineering analysis might conclude that either these ramps should not be tolled or not constructed for movements to and from the west. The ramps to and from the east would provide access to the bridge and are important contributors to the total toll revenue. However, the ramps to and from the west are not. More detailed analysis would be necessary before making such a decision.

ESTIMATED DAILY AND ANNUAL TRANSACTIONS AND REVENUE

Table 4-4 shows estimated average daily and annual transactions and revenues for Scenarios 1 and 2 in years 2015 and 2030.

Total daily transactions in 2005 are estimated at 23,599, resulting in average daily revenue of nearly \$50,000 for Scenario 1. Average daily conditions are brought to “annual” levels by using a factor of 365. Annual revenue, before adjusting for ramp-up, is estimated at \$18.1 million. The ramp-up factor in the opening year was 0.61 indicating a 39 percent reduction from nominal revenue estimates. This results in an adjusted opening-year revenue estimate of \$11.0 million in 2015.

Scenario 2 would have somewhat higher traffic and revenue because of the inclusion of a second ramp plaza. Annual revenue is estimated at \$19.1 million before ramp-up and \$11.7 million after ramp-up adjustment.

Similar information is shown for the two scenarios in year 2030. By 2030, annual revenue is estimated at \$41.0 million in Scenario 1 and \$44.4 million in Scenario 2.

**Table 4-4
Estimated Average Daily Transactions and Revenue**

Toll Plaza Location	2015					
	Scenario 1 - Skyway and Interchange at NC 133			Scenario 2 - Skyway and Interchanges at NC 133 and Lanvale Road		
	Average Daily Traffic	Average Toll *	Average Daily Revenue	Average Daily Traffic	Average Toll *	Average Daily Revenue
Skyway Bridge	23,095	\$2.1175	\$48,904	24,444	2.1175	\$51,760
NC 133	504	\$1.2100	610	264	1.2100	319
Lanvale Road				517	0.6050	313
Total Average Daily Traffic and Revenue	23,599		\$49,514	25,225		\$52,392
Annualization Factor (Days)	365		365	365		365
Annual Traffic and Revenue Before Ramp-up	8,614,000		\$18,073,000	9,207,000		\$19,123,000
Ramp-up Factor	0.61		0.61	0.61		0.61
Annual Traffic and Revenue After Ramp-up - 2015	5,254,000		\$11,024,000	5,616,000		\$11,665,000
	2030					
Toll Plaza Location	Scenario 1 - Skyway and Interchange at NC 133			Scenario 2 - Skyway and Interchanges at NC 133 and Lanvale Road		
	Average Daily Traffic	Average Toll *	Average Daily Revenue	Average Daily Traffic	Average Toll *	Average Daily Revenue
Skyway Bridge	36,176	\$3.0250	\$109,432	38,690	\$3.0250	\$117,037
NC 133	1,056	2.7225	2,875	650	2.7225	1,768
Lanvale Road				1,865	1.5125	2,821
Total Average Daily Traffic and Revenue	37,232		\$112,307	41,205		\$121,626
Annualization Factor (Days)	365		365	365		365
Annual Traffic and Revenue - 2030	13,590,000		\$40,992,000	15,040,000		\$44,393,000

* Average toll based on following assumptions:
 Percent Truck = 14 % of total traffic.
 Truck Tolls = 2.5 times higher than car toll.

ESTIMATED ANNUAL TRANSACTIONS AND REVENUE

Preliminary estimates of annual toll revenues were prepared for each of the Scenarios between 2015 and 2050. These estimates were based on the toll rates shown previously; the modeling results for years 2015, 2020, 2025, 2030, and 2035 levels; and the assumed ramp-up years. Intermediate years were estimated through interpolation. Traffic and revenue between 2035 and 2040 and 2040 and 2050 were assumed to grow at constant annual rates.

As shown in Table 4-5, the Scenario 1 opening-year revenue is estimated at about \$11.0 million after ramp-up increasing to \$41.0 million by 2030.

Ramp-up is a phenomenon that occurs on most new start-up toll facilities. High levels of growth may be experienced over the first three years or so of operation as the motoring public gradually becomes aware of the facility and begins using it.

There are a number of reasons for the “ramp-up” phenomenon. For example, since not all motorists who will use the facility are from the local area, it may take several months before certain travelers are aware that the facility is open, or where the facility goes. It will also take several months for the project to begin to appear on new maps and for motorists to become accustomed to using the facility. The duration and level of ramp-up adjustments can be directly affected by a well-conceived promotion and signing program.

For purposes of this study, a 36-month ramp-up period was assumed. The nominal traffic and revenue estimates prepared for the opening three years were adjusted downward to reflect the time it will take to gradually build up demand. For example, in the first year of operation, traffic is estimated to be 61 percent of the baseline estimated result, increasing to about 95 percent by the end of the third full year of operation.

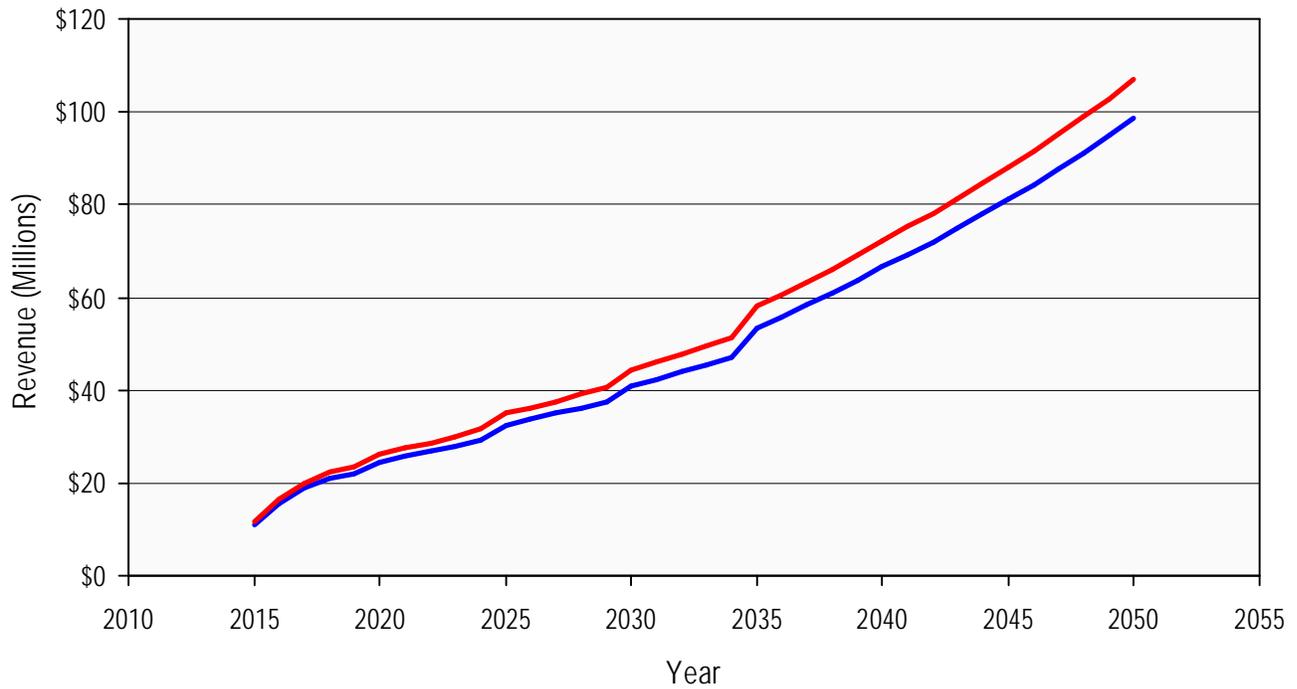
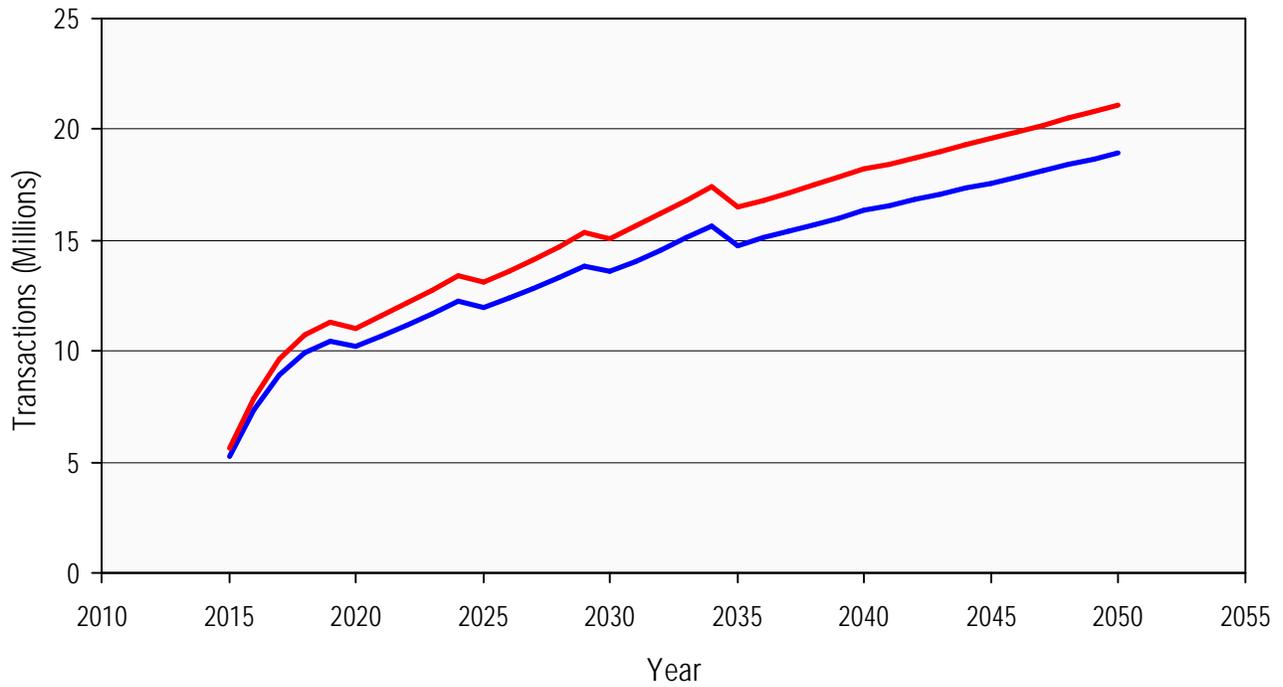
Under Scenario 2, revenue is forecast to increase from \$11.7 million in 2015 to \$44.4 million by 2030. The effects of the additional access provided by a second intermediate interchange are evident.

Figure 4-6 shows the transaction and revenue forecasts in graphical form for the recommended toll rates for Scenarios 1 and 2. As tolls increase, traffic decreases as fewer drivers are willing to pay higher tolls. However, total system revenue would continue to rise until the increasing toll rates

**Table 4-5
Annual Toll Transactions and Gross Revenue Forecasts
Cape Fear Skyway
(Thousands)**

Year	Scenario 1 Skyway and Interchange at NC 133		Scenario 2 Skyway and Interchanges at NC 133 and Lanvale Road	
	Total Transactions	Total Revenue	Total Transactions	Total Revenue
2015	5,254	\$11,024	5,616	\$11,665
2016	7,354	15,428	7,880	16,351
2017	8,968	18,815	9,635	19,973
2018	9,962	20,899	10,731	22,221
2019	10,457	21,936	11,295	23,363
2020	10,220	24,542	11,048	26,189
2021	10,687	25,644	11,583	27,416
2022	11,177	26,800	12,147	28,703
2023	11,692	28,010	12,741	30,054
2024	12,234	29,280	13,367	31,473
2025	11,947	32,441	13,088	34,903
2026	12,394	33,651	13,608	36,241
2027	12,859	34,908	14,152	37,634
2028	13,343	36,215	14,721	39,087
2029	13,846	37,573	15,316	40,601
2030	13,590	40,992	15,040	44,394
2031	14,074	42,410	15,604	46,016
2032	14,576	43,878	16,192	47,701
2033	15,097	45,396	16,803	49,451
2034	15,638	46,967	17,440	51,268
2035	14,804	53,428	16,482	57,988
2036	15,100	55,832	16,812	60,597
2037	15,402	58,345	17,148	63,324
2038	15,710	60,970	17,491	66,173
2039	16,024	63,714	17,841	69,151
2040	16,344	66,581	18,198	72,263
2041	16,590	69,244	18,471	75,154
2042	16,838	72,014	18,748	78,160
2043	17,091	74,895	19,029	81,286
2044	17,347	77,890	19,314	84,537
2045	17,608	81,006	19,604	87,919
2046	17,872	84,246	19,898	91,436
2047	18,140	87,616	20,197	95,093
2048	18,412	91,121	20,499	98,897
2049	18,688	94,765	20,807	102,853
2050	18,968	98,556	21,119	106,967

Note: Forecasts for 2015-2017 reflect an assumed ramp-up to full traffic levels beginning in 2018.



- Scenario 1 – Skyway and single interchange at NC 133
- Scenario 2 – Skyway and interchanges at NC 133 and Lanvale Rd.

resulted in enough drivers choosing the free alternatives to cause a decrease in total revenue.

ESTIMATED NET REVENUE

Table 4-6 provides estimates of annual net revenue. Preliminary estimates of operations and maintenance costs related to toll collection were developed for the analysis, including a nominal fixed component and a variable component per transaction. The nominal fixed component was assumed to increase at 2.5 percent per year for inflation, while a variable component of operating cost increased in proportion with traffic growth. Note, these operating costs do not include costs for roadway maintenance and rehabilitation. Additionally, toll equipment capital costs are not included.

Under Scenario 1, net toll operating revenue is estimated at \$8.9 million in 2015, increasing to \$21.9 million by 2020 and \$37.5 million by 2030. Net toll operating revenue estimates would be slightly higher for the Scenario 2 configuration.

CONCLUSIONS

The conclusions of this preliminary study of the proposed Cape Fear Skyway can be summarized as follows:

- **A New River Crossing Would Be An Important Addition To The Regional Transportation System.** Brunswick County residential growth will continue to put pressure on the existing transportation system because of the importance of providing improved access to the employment centers in New Hanover County and the City of Wilmington.
- **The Cape Fear Skyway Is Likely To Be Used More For Localized Trips Rather Than Regional Or Through Trips.** The location of the Skyway would provide travel time advantages for movements between southern Brunswick County and southern New Hanover County. The more populous areas north of the new bridge would continue to be better served by existing bridges.
- **The Completed Wilmington Bypass Would Also Be An Important Addition To The Regional Transportation System, But It Would Serve A Different Market Than The Cape Fear Skyway.** The Skyway would serve primarily local trips; the Wilmington Bypass is a regional facility. Because the Skyway terminates in the central area of

**Table 4-6
Annual Net Toll Revenue Forecasts
Cape Fear Skyway
(Thousands)**

Year	Scenario 1 Skyway and Interchange at NC 133			Scenario 2 Skyway and Interchanges at NC 133 and Lanvale Road		
	Gross Toll Revenue	Toll Operating Expense	Net Toll Operating Revenue	Gross Toll Revenue	Toll Operating Expense	Net Toll Operating Revenue
2015	\$11,024	\$2,145	\$8,879	\$11,665	\$2,166	\$9,499
2016	15,428	2,316	13,112	16,351	2,348	14,003
2017	18,815	2,460	16,355	19,973	2,500	17,473
2018	20,899	2,568	18,331	22,221	2,614	19,607
2019	21,936	2,647	19,289	23,363	2,697	20,666
2020	24,542	2,683	21,859	26,189	2,733	23,456
2021	25,644	2,763	22,881	27,416	2,817	24,599
2022	26,800	2,845	23,955	28,703	2,903	25,800
2023	28,010	2,931	25,079	30,054	2,993	27,061
2024	29,280	3,019	26,261	31,473	3,087	28,386
2025	32,441	3,059	29,382	34,903	3,127	31,776
2026	33,651	3,144	30,507	36,241	3,217	33,024
2027	34,908	3,232	31,676	37,634	3,310	34,324
2028	36,215	3,322	32,893	39,087	3,405	35,682
2029	37,573	3,416	34,157	40,601	3,504	37,097
2030	40,992	3,465	37,527	44,394	3,552	40,842
2031	42,410	3,560	38,850	46,016	3,652	42,364
2032	43,878	3,658	40,220	47,701	3,755	43,946
2033	45,396	3,759	41,637	49,451	3,861	45,590
2034	46,967	3,863	43,104	51,268	3,971	47,297
2035	53,428	3,886	49,542	57,988	3,987	54,001
2036	55,832	3,979	51,853	60,597	4,081	56,516
2037	58,345	4,074	54,271	63,324	4,178	59,146
2038	60,970	4,171	56,799	66,173	4,278	61,895
2039	63,714	4,270	59,444	69,151	4,379	64,772
2040	66,581	4,372	62,209	72,263	4,484	67,779
2041	69,244	4,472	64,772	75,154	4,585	70,569
2042	72,014	4,574	67,440	78,160	4,688	73,472
2043	74,895	4,678	70,217	81,286	4,794	76,492
2044	77,890	4,785	73,105	84,537	4,903	79,634
2045	81,006	4,894	76,112	87,919	5,014	82,905
2046	84,246	5,006	79,240	91,436	5,127	86,309
2047	87,616	5,120	82,496	95,093	5,243	89,850
2048	91,121	5,237	85,884	98,897	5,362	93,535
2049	94,765	5,357	89,408	102,853	5,484	97,369
2050	98,556	5,480	93,076	106,967	5,609	101,358

Note: Forecasts for 2015-2017 reflect an assumed ramp-up to full traffic levels beginning in 2018.

Wilmington, it does not provide advantages for through trips using US 17 going north or south along the coast. Little traffic is forecast to use both facilities.

- **Value Engineering May Conclude That Tolls Should Not Be Charged At The Two Intermediate Interchanges.** The NC 133 and Lanvale Road Interchanges would provide important revenue-generating access points for travelers who wished to use the Cape Fear Skyway to cross the river. However, further study may conclude that tolling the intermediate interchange ramps for movements within Brunswick County may not be cost effective.

DISCLAIMER

Current professional practices and procedures were used in the development of these preliminary traffic and revenue study findings. However, there is considerable uncertainty inherent in future traffic and revenue forecasts for any toll facility. There may sometimes be differences between forecasted and actual results caused by events and circumstances beyond the control of the forecasters. These differences could be material. Also, it should be recognized that traffic and revenue forecasts in this document are intended to reflect the overall estimated long-term trend. Actual experience in any given year may vary due to economic conditions and other factors.

It is also emphasized that this study is considered preliminary and findings are subject to considerable refinement. It was not performed at a sufficient level of detail to be used in project financing and is not intended for that purpose. Considerably more detailed studies would be required prior to project financing.