City of Wilmington
Development Services

Adopted
November 2004

CAROLINA BEACH Road Corridor Plan

Resolution

City Council
City of Wilmington
North Carolina

Introduced By: Sterling B. Cheatham, City Manager **Date:** 11/03/2004

Resolution Adopting the Corridor Plans for Carolina Beach Road, College Road, Market Street and Oleander Drive as Part of the Future Land Use Plan (OBG-7-1004)

LEGISLATIVE INTENT/PURPOSE:

WHEREAS the City began extensive efforts to develop a comprehensive Future Land Use Plan in early 2003; and

WHEREAS during 2003 and 2004, over 700 citizens provided their input on the future of Wilmington at one or more of the 90 Future Land Use Plan meetings held for that purpose; and

WHEREAS as part of the process, 10 meetings were held specifically for citizen input on the Corridor Plans; and

WHEREAS during the meetings, citizens clearly indicated their desire for safe, uncongested and more attractive roadways; and

WHEREAS the Corridor Plans are intended to guide the physical development of these major thoroughfares by describing how, why, when and where to build or preserve aspects of the corridors in order to meet the expectations of our citizens; and

WHEREAS amendments to the text of the Corridor Plans will follow the same process as amendments to the City Code and amendments to the map series of the Corridor Plans will follow the same process as amendments to the official City Zoning Maps; and

WHEREAS on October 6, 2004, the Wilmington Planning Commission unanimously recommended adoption of the Corridor Plans; and

WHEREAS the City Council has taken due notice of comments from the public, interested parties and the Wilmington Planning Commission.

CERTIFIED TO BE A TRUE COPY
CITY CLERK

THEREFORE, BE IT RESOLVED:

THAT the Carolina Beach Road, College Road, Market Street and Oleander Drive Corridor Plans for the City of Wilmington, North Carolina, as submitted to the Wilmington City Council on

November 3, 2004, are hereby adopted.

Spence H. Broadhurst, Mayor

Adopted at a regular meeting
on November 3, 2004.

ATTEST:
City Clerk

APPROVED AS TO FORM:
Attorney

Oleander Drive Corridor Plan

Acknowledgements

Wilmington City Council
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Carolina Beach Road Corridor Plan

Introduction

Less congestion! More attractiveness! These are the common themes of extensive community input regarding the City's major road corridors. However, Wilmington is mostly built out and land use and transportation patterns are well established along our thoroughfares. As a result, it will be a great challenge to make these roads less congested and more attractive because there are few easy and inexpensive solutions when it comes to quality redevelopment of established areas.

The physical city we live in today is nothing more than an accumulation of material investment choices over an extended period of time. The appearance and function of our road corridors is simply an accurate reflection of the care and wisdom, or lack thereof, of all the people who have ever lived here.

The view from our major roads is the most common way residents see their community and the means by which visitors decide if it is worth stopping to visit. Publicly-owned road rights-of-way are the places that communities can most directly control and improve. It is clear from the community input that the major road corridors of Wilmington need better care and wisdom.

Image 1: Carolina Beach Road north end

Image 2: Carolina Beach Road south end

Purposes of the Plan

This Plan provides strategies to make Carolina Beach Road less congested and more attractive. In addition, the Plan helps implement the City's Strategic Plan by strengthening the economic and fiscal impact of commercial development along the corridor. The Plan supports and enhances the *Future Land Use Plan* by providing more specific policy guidance for future rezoning proposals and long-term capital expenditures.

Carolina Beach Road History

The Carolina Beach Road study area from S. 3rd Street to St. Andrews Drive is 4.2 miles long and is state-maintained. The northern section of Carolina Beach Road was originally constructed in the 1910s. It became a 16-foot-wide paved road in 1928 and was widened to 18 feet in 1929. In 1959, the road was widened to a 68-foot curb and gutter cross-section. Today, the roadway serves approximately 35,000 vehicles a day. Carolina Beach Road is an important north-south route for local commuters to and from other major corridors and commercial areas. It also serves as a link to the State Port, as well as to Carolina Beach, Kure Beach, Fort Fisher and the North Carolina Aquarium at Fort Fisher, which are popular tourist destinations.

Corridor Planning Philosophies

The Carolina Beach Road Corridor Plan was developed with the same basic philosophies as the *Future Land Use Plan* – providing a balance of practical and idealistic strategies that promote high quality redevelopment.

Balancing Practical and Idealistic Strategies

The Carolina Beach Road Plan attempts to balance strategies for an ideal future with practical strategies that have a realistic chance to be implemented in the next five to ten years. The citizens of Wilmington clearly do not like unattractive, congested roads lined with generic strip commercial development. However, change to decades of market preferences and regulatory standards that created the current situation will have to be gradual.

Proven strategies for public investment to enhance corridor aesthetics are costly. For example, the cost of burying unattractive overhead power lines is prohibitive along major roads and the cost to build and maintain frontage roads and attractive landscaped medians and plazas is high. Without creative financing tools such as tax increment financing or state and federal grants and revenues, the City will have to pay for many of these improvements. The North Carolina Department of Transportation (NCDOT) has provided substantial funding for road improvements in the area and ongoing partnerships will be necessary when funding opportunities are available. However, the City cannot expect NCDOT to fully fund all desired improvements to Carolina Beach Road.

Typical regulatory approaches to corridor improvement including elimination of pole signs, architectural standards for buildings and down-zoning strips between commercial nodes will be extremely controversial in Wilmington. Many land owners and developers have made investment decisions based on current standards. The economic market guiding development in this area is not densely populated and wealthy enough to ensure a return on investment under different, higher quality standards. Regulatory changes will have to be carefully implemented over time and will probably begin by simply attempting to screen some of the unattractive areas with more extensive landscaping.

The Plan proposes taking small steps towards the ideal future to ensure broad community support. A more progressive use of public investment and regulatory best practices should be considered when the Plan is evaluated annually coinciding with updates to the City's capital improvements program and the *Future Land Use Plan*.

Gradual introduction of these strategies will increase their chances of successful implementation in Wilmington. However, failure to eventually embrace these standard and innovative approaches will have long-term negative impacts. The community must be willing to support change or accept the consequences of inaction including traffic congestion, greater costs to provide public services, decaying commercial areas and ultimately a decline in the overall quality of life provided by the City.

Improve the Quality of Development

During the community input process, citizens clearly expressed the desire to improve the attractiveness and quality of the City. Lack of quality development, particularly along major roads, was consistently listed as the greatest concern. There was consensus from community input that people wanted greater quality development even if costs were eventually passed on to them.

While the private market has shown some signs of supporting higher quality development, significant improvement (attractive architecture, extensive landscaping, multi-story development, innovative stormwater management, attractive ground signs, varied uses and more efficient site development patterns) is only seen in a few areas of the City. There is very little beyond generic corporate and local commercial development along most of the major roads.

There are several aging commercial areas along Carolina Beach Road that are expected to redevelop over the next decade. However, current regulations are not sufficient to lead to noticeable improvement of the corridor. As a result, the typical redevelopment project is essentially the replacement of 1960s and 1970s generic development with newer generic development. For example, corner gas stations are being replaced with corner drug stores with no noticeable change in attractiveness or traffic impact.

Some older commercial areas along Carolina Beach Road will face challenges to redevelop because they were originally built under older, more lenient regulations. Communities are occasionally tempted to lower modern landscaping, stormwater and parking requirements to encourage redevelopment of these areas. However, as with the *Future Land Use Plan*, the Carolina Beach Road Corridor Plan philosophy is that existing standards should not be lowered to influence private development. It is preferable to utilize incentives for quality redevelopment in priority areas or to wait on the private market to drive redevelopment. Redevelopment without improvements to land use patterns or quality of development will defeat the purpose of the Plan to make Carolina Beach Road more attractive and keep its traffic flow efficient.

Community Input

Extensive community input on desired improvements to major roads was part of the *Future Land Use Plan* process including one meeting dedicated solely to preferences for the future of Carolina Beach Road. During 2003-2004, over 600 people participated in more than 80 community meetings. Nearly 700 additional people participated in a phone survey as part of the Coastal Area Management Act (CAMA) environmental plan update. The CAMA survey included several questions that mirrored the corridor and land use questions used during the *Future Land Use Plan* meetings. Improving the overall attractiveness of the City and reducing traffic congestion were two of the highest ranked issues in the survey.

Image 3: Corridor Plan Meeting August 2004

Traffic congestion has been one of the biggest concerns of our residents for many years. Other transportation-related concerns were poor traffic circulation or connectivity between developments, lack of vision from public officials concerning the relationship between development and traffic flow, unsafe and insufficient bicycle and pedestrian facilities along the major corridors and the lack of an accessible transit system.

The primary reasons citizens like living in Wilmington are the beach, the mild climate and the historic downtown riverfront. Citizens seem more willing to tolerate less than ideal development conditions and inconveniences in the community because of the desirable natural and historic features. However, citizens still desire a more attractive community with enhanced landscaping and more aesthetically pleasing architecture.

Existing Conditions Analysis

Land Use and Zoning

Carolina Beach Road is substantially built out north of the Independence Boulevard intersection area, with the only significant vacant land located at the Medical Center Drive intersection and the former Palomino Club site near Shipyard Boulevard. There are approximately 67 acres of vacant land with frontage on Carolina Beach Road from the Independence Boulevard intersection south to the city limits. There are large vacant tracts, approximately 280 acres, of land near Carolina Beach Road that have frontage on Independence Boulevard. The development of this area will impact Carolina Beach Road

The land use patterns along the Carolina Beach Road corridor are very diverse including everything from industrial and light industrial uses to single family residential. Zoning along the road reflects the varied land use patterns with residential, Community Services (CS) and Community Business (CB) each accounting for over 20% of the corridor's zoning. There is a large (100+ acre) mixed-use project south of George Anderson Drive that accounts for 13% of the zoning along the road.

Commercial uses along Carolina Beach Road are currently all community scale and the only regional traffic on the road is through traffic to the Port, the beaches or to the Monkey Junction regional node south of the City limits. However, the Independence Boulevard intersection is planned as a future regional node. Residential uses are concentrated at the Sunset Park neighborhood and south of Independence Boulevard.

Image 4: Auto sales use

Image 5: Office use

The road contains a higher concentration of light industrial/heavy commercial uses than other major roads in Wilmington. The term heavy commercial refers to commercial uses such as automobile repair, warehouses and other uses that may have building appearance, outdoor storage or noise more similar to industrial uses than typical commercial uses like restaurants, retail and banks. There is a healthy market

demand for heavy commercial uses in Wilmington and they are appropriate along Carolina Beach Road. However, aesthetics and compatibility with adjacent uses are common issues in areas with high concentrations of this type of use.

There have been some land use transitions along the corridor but with no substantial change to the development pattern. Notable changes include a growing number of used car dealers north of Shipyard Boulevard and some shifts from heavy commercial to community scale retail near Medical Center Drive. Future transitions away from heavy commercial uses are likely if the Cape Fear Skyway bridge is built and connected to Independence Boulevard near the Carolina Beach Road intersection. Also, transition to multi-family or low intensity commercial uses is possible in the aging residential areas south of Independence Boulevard.

Image 6: Example of neighborhood commercial use

There are several redevelopment opportunities along the corridor primarily in aging areas between 3rd Street and Independence Boulevard. Existing market area demographics and the current unattractive appearance may limit redevelopment until the Cape Fear Skyway bridge is constructed.

Development of vacant land (infill) at Medical Center Drive, Independence Boulevard and south of George Anderson Drive is anticipated in the next 20 years. The type and extent of this new development will depend on the status of the Cape Fear Skyway bridge project. The remaining vacant land along Carolina Beach Road is not as likely to develop as heavy commercial due to existing zoning, current market conditions, and the location of much of the land at major intersections. Office or retail development is anticipated.


Image 7: Example of heavy commercial use

Transportation

Carolina Beach Road is a five-lane (two travel lanes in each direction and a two-way center turn lane) major arterial road. The area south of George Anderson Drive is four lanes with a grass median. The majority of the road functions at an unacceptable level of service (LOS)

of E. LOS is based on federal standards for volume to capacity ratios (LOS is defined in the Appendix).

Carolina Beach Road has a total of 294 driveways with an average of 60 driveways per mile. The average of the four corridors studied in 2004 (Carolina Beach Road, College Road, Market Street, Oleander Drive) is 60 driveways per mile. A lot of the commercial businesses are not internally connected so traffic must enter Carolina Beach Road to access neighboring businesses. Also, there are a large number of non-standard driveways. Many large commercial trucks use Carolina Beach Road as a route to the State Port and to access other areas of the region.

Image 8: Sidewalk facilities at north end of Carolina Beach Road


Image 9: Example of multiple driveways

Most of the area near 3rd Street has sidewalks but areas further south offer minimal pedestrian facilities. Pedestrian crosswalks, especially in the older area near Sunset Park neighborhood, are in need of improvements. The large width, high speeds and the heavy traffic flows are major challenges for pedestrians attempting to cross Carolina Beach Road.

From 3rd Street to Holbrook Avenue there are 12 bus stops. There are no bus stops south of Holbrook Avenue. The Cape Fear Public Transportation Authority has general plans to expand public transit service to the Carolina Beach area in the near future. See the Short Range Public Transportation Master Plan for more details about public transit in Wilmington.

In order to more effectively study the transportation systems impacting the City's major road corridors, a composite index of transportation factors was developed. This index, the Transportation Performance Index (TPI), goes beyond the typical evaluation of how fast traffic can be moved through a corridor or a simple volume and capacity analysis. The TPI quantifies the various parameters that determine the quality of service citizens' experience as they travel the primary road corridors,

and allows for the comparison of relative needs between corridors and sections of corridors for prioritizing future improvements. TPI parameters include volume to capacity ratios, signal progression, number of driveways, medians/center turn lanes, bus stops, sidewalks, and crashes. The TPI was created to identify and prioritize corridor sections for improvements as funding becomes available. In order to arrive at potential solutions to improve the operation of these primary road corridors, the contributing factors were analyzed by identifying corridor components and ranking them by the criteria established in the TPI. The details of the TPI are included in the Plan's appendices.

Carolina Beach Road scored well in the TPI, with the best performing areas located between Holbrook Avenue and the southern city limits. This high rating is due to the segment's low crash rates and low volume to capacity ratio. The northern portion between Southern Boulevard and Holbrook Avenue was rated the worst on Carolina Beach Road because of the high frequency of driveways and no median.

Aesthetics

Most of Carolina Beach Road is generally unattractive due to the lack of landscaping, poor screening of outdoor storage of heavy equipment, numerous large pole signs and generic architecture including metal buildings. Parts of the roadway including the Sunset Park neighborhood are attractive with landscaping and mature trees.

The corridor plan takes a practical approach to make incremental improvements in aesthetics as opportunities arise through redevelopment, new development, NCDOT projects, and City capital projects. Overhead utility lines are a primary source of visual clutter, but because of high costs it is not practical to consider placing them underground for the entire corridor. Current cost estimates for burying power lines range from $500,000 to $3,000,000 per mile compared to $120,000 per mile for installing overhead lines. Other meaningful improvements in appearance will require financial investment by the City as well as the private sector. Existing regulations do not effectively address building design and sign clutter and there is no easy and low-cost solution to substantially improve the appearance of the corridor. Thus, without market-driven regulatory changes or substantial public investment, aesthetics will not noticeably improve.

Image 10: Example of a parking lot with no landscaping

Image 11: Example of quality landscaping

Corridor Enhancement Strategies

Carolina Beach Road enhancement strategies include guidance for future rezonings and capital investment. The strategies also include suggestions for regulatory change. The strategies are intended to make the road less congested and more attractive and to encourage redevelopment that strengthens the local economy.

Carolina Beach Road is essentially fully developed on the northern end, so it will take higher quality site-by-site redevelopment and public investment in sidewalks, medians, turn lanes, alleys and landscaping to see meaningful improvements in attractiveness. Significantly improving Carolina Beach Road will likely take many years and will require cooperation with private landowners, the North Carolina Department of Transportation (NCDOT), and the Metropolitan Planning Organization (MPO). The Plan recognizes that it has taken time to grow into what we are today and that changes will take time to implement and will not occur overnight.

Strategies for Zoning Changes

1. Heavy commercial is an acceptable use and the Commercial Services District (CS) is an acceptable zoning designation from Southern Boulevard to just north of Independence Boulevard. Existing heavy commercial uses are viable in this area and contribute to Wilmington's economy, with some supported by the State Port. Rezoning to CS will generally be supported; however, this area may transition to higher commercial uses if the Cape Fear Skyway bridge is constructed.

2. Support nodal multi-story office/commerce center/mixed-use development at the Independence Boulevard intersection. Emphasis should be placed on increased internal traffic circulation and an internal collector roadway with coordinated and attractive site design and building architecture, increased landscaping and open space, and fewer, smaller and more attractive signs. Refer to the Infill Section in the *Future Land Use Plan* for recommended uses on the vacant parcels.

3. Rezoning the long, narrow single-family lots that front on Carolina Beach Road near the Independence Boulevard intersection to multi-family or office and institutional should be supported only if the lots are combined to create a unified development with full internal circulation.

4. Encourage Office and Institutional (O&I) uses on the large vacant property zoned Community Business (CB) that is north of the Echo Farms Golf Course. Retail needs for the southern section from Independence Boulevard will likely be adequately served by the future development at the Independence Boulevard node and the Fairfield Park mixed-use project; therefore, additional retail is not needed along the southern section and would generally create more traffic congestion than O&I uses.

5. Encourage redevelopment with less intense uses such as offices and multi-family residential in areas between nodes. High traffic-generating retail and services should be directed to nodal areas.

Strategies for Capital Improvements

Where possible, specific cost estimates are included with the strategy. General costs for other items are included in the Appendix.

1. Create and fund a redevelopment incentive program that focuses on the *Future Land Use Plan* priority redevelopment areas but is also applicable to other areas. This program will

provide specific standards for desired redevelopment (mix and type of uses, signage, architecture, landscaping, site design) and establish cost-sharing levels for infrastructure improvements such as deceleration lanes, traffic signals, turn lanes, medians, alleys, frontage roads, sidewalks/multi-use paths and other access management improvements that would be required for development approval. The heavy commercial area between Southern Boulevard and Marion Drive is a priority redevelopment area.

2. Create and fund an access management incentive program to retrofit existing development. The program will provide specific standards for cost sharing of improvements including but not limited to deceleration lanes, medians, median opening controls, driveway closures, alleys, frontage roads, signal coordination and interconnections between businesses. Precedence should be given to *Future Land Use Plan* priority redevelopment areas and areas of greatest need as identified in the Transportation Performance Index.

3. Secondary to the sidewalk priority areas in the *Future Land Use Plan*, sidewalk priority areas on Carolina Beach Road should focus on the area between Bordeaux Avenue and Independence Boulevard and at bus stops.

   Estimated cost: The estimated cost to construct sidewalks between Bordeaux Avenue and Independence Boulevard is $1,000,000. The total length of this project is 1.78 miles. Right-of-way or easements for the sidewalks are approximately $100,000 of this amount. The project also includes the installation of street trees where there are no existing trees. The cost of the trees and right-of-way required for their installation is approximately $350,000 of the total cost. Public Services staff assigned maintenance responsibilities for street trees and plazas are currently working at full capacity. Options to be considered for maintenance should include contracting the maintenance, investigating the potential for a public/private partnership, or the hiring of additional staff.

4. Install a median from S. 3rd Street to Independence Boulevard. If major issues with right-of-way or maintenance costs make the landscaped median too costly, a raised concrete median should be constructed.

   Estimated cost: The estimated cost of installing a landscaped median from Southern Boulevard to Independence Boulevard is $4,250,000. This assumes there is sufficient right-of-way and that there will not be significant utility relocations. Public Services' staff which maintains the medians and other city landscaped areas are currently working at maximum capacity levels. Additional staff, contracting for maintenance, or some type of public/private partnership will be required.

5. Where right of way permits and NCDOT will allow, landscape to help screen utility poles without interfering with their operation and maintenance.

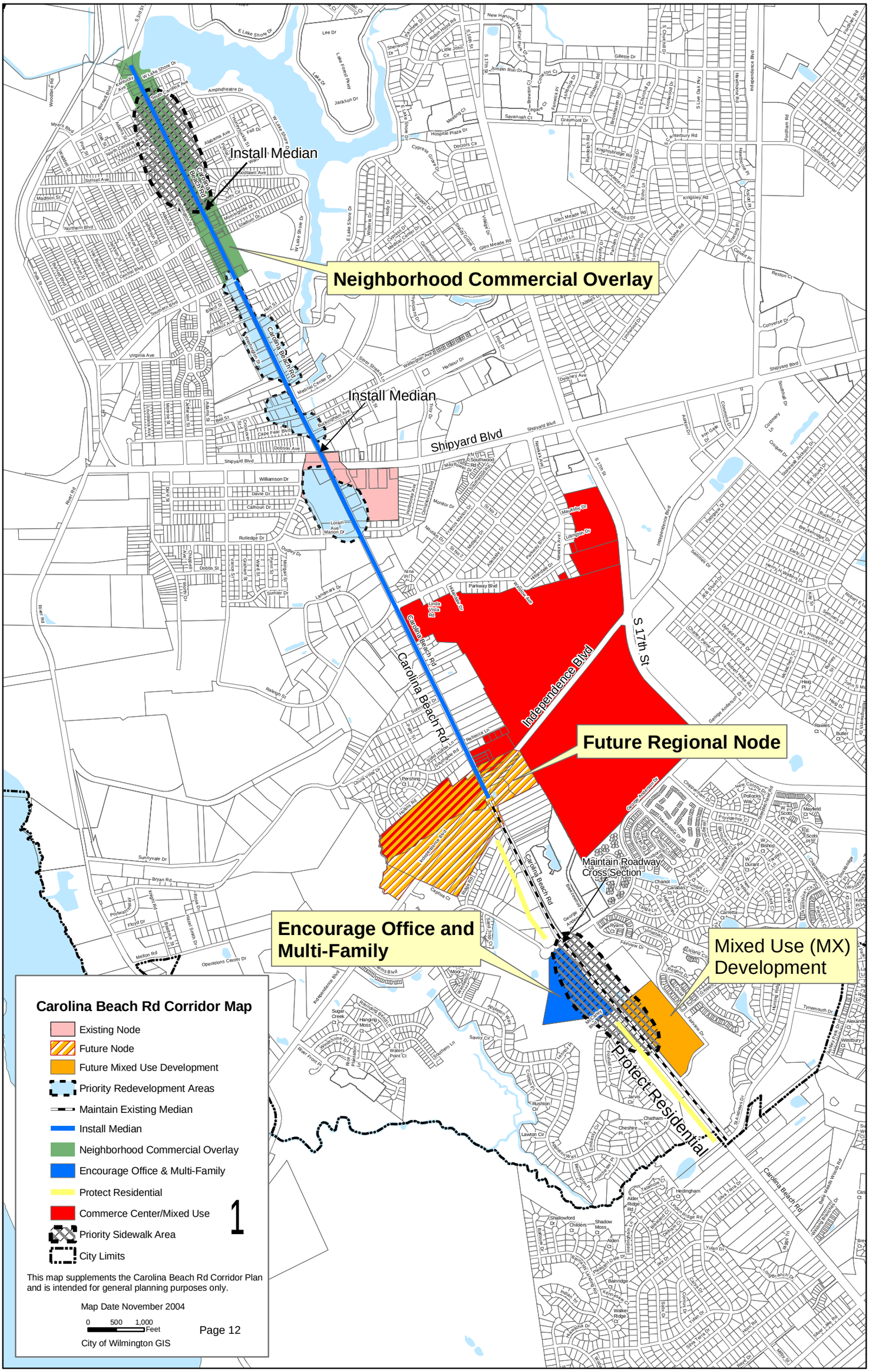
Strategies for Regulatory Changes

1. Create a neighborhood commercial overlay district between South 3rd Street and Southern Boulevard. The purpose of the district is to return this area to its original function as a neighborhood commercial center. The emphasis will be on improving the overall aesthetics through enhanced landscaping and site and building design and on improving pedestrian amenities such as sidewalks and crosswalks. Public and private investment is necessary to be successful.

2. Regulatory changes to require enhanced development standards will be controversial in the development community. These changes should be studied and introduced gradually. Initially, increased street buffer landscaping should be considered to help screen unattractive areas of the road.

3. After additional community input specifically geared to code changes, consider regulatory changes including prohibition of pole signs and development of codified architectural guidelines. These changes may apply to base zoning districts or may only be applied to properties fronting on a major thoroughfare as part of an overlay district. A Community Appearance Commission could be considered to assist with development review along the major road corridor areas.

4. Increase connectivity between commercial properties by reducing the number of allowed driveways and requiring properties to internally connect as redevelopment occurs, especially in and near the nodal areas, to improve traffic flow. Provide additional connections from the rear of the property if possible.


Install Median
Neighborhood Commercial Overlay
Install Median
Shipyard Blvd
Future Regional Node
Maintain Roadway Cross Section
Encourage Office and Multi-Family
Mixed Use (MX) Development
Protect Residential
Carolina Beach Rd
Independence Blvd
S 17th St
Carolina Beach Rd Corridor Map
Existing Node
Future Node
Future Mixed Use Development
Priority Redevelopment Areas
Maintain Existing Median
Install Median
Neighborhood Commercial Overlay
Encourage Office & Multi-Family
Protect Residential
Commerce Center/Mixed Use
Priority Sidewalk Area
City Limits
1
This map supplements the Carolina Beach Rd Corridor Plan and is intended for general planning purposes only.
Map Date November 2004
0 500 1,000 Feet
City of Wilmington GIS

Appendix A: Existing Conditions

Figure AA.1: Aerial Map of Area A (2004)

Area A

South 3rd Street to Southern Boulevard

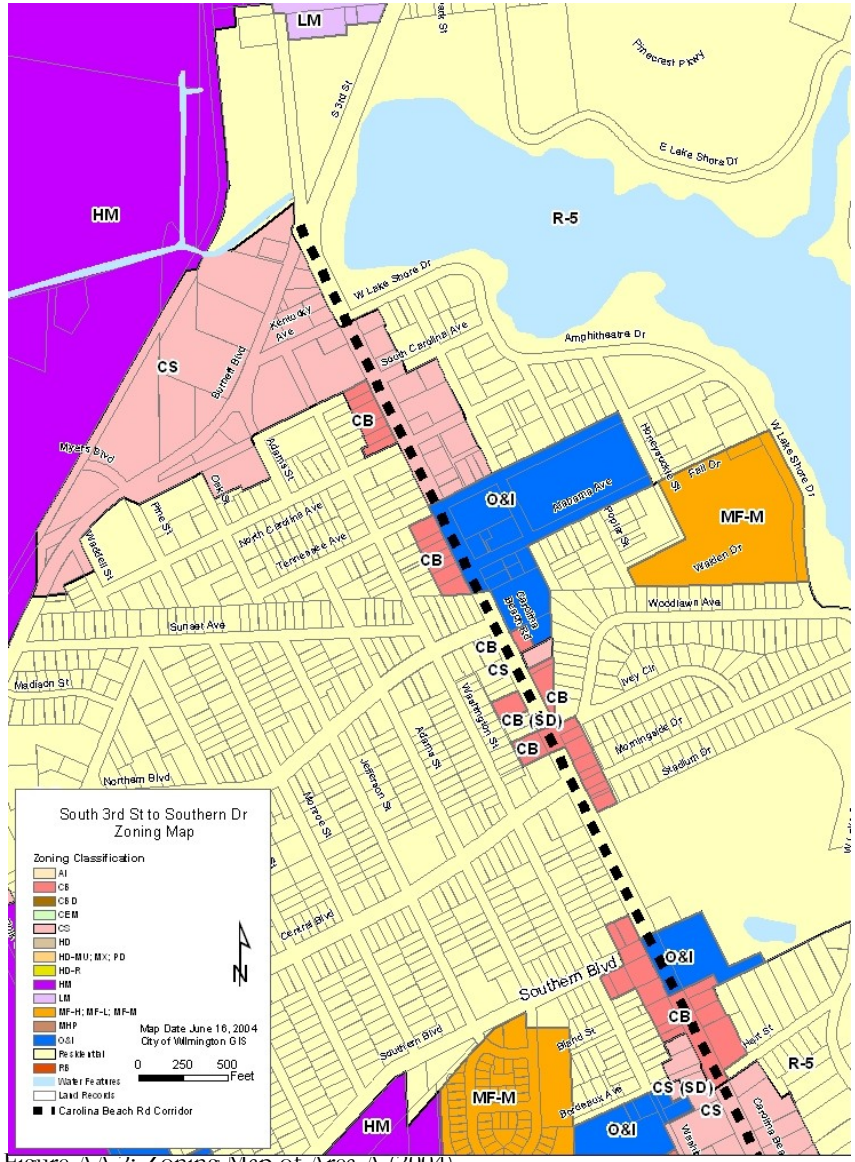


Figure AA.2: Zoning Map of Area A (2004)

Figure AA.3: Existing Land Use Map of Area A (2004)

A. Area A – S. 3rd Street to Southern Boulevard

a. Land Use and Zoning

- Varied uses
- Zoning is primarily Office and Institutional (O&I), Community Business (CB), and Commercial Services with some Single- and Multi-Family Residential (R-5, R-7, R-10, MF-M)
- Heavy manufacturing zoning district located along Cape Fear River, adjacent to corridor
- Commercial uses include: gas stations, offices, restaurants, auto sales, banks, City Municipal Legion Stadium
- Traditional 1930s to 1960s grid street pattern
- Older buildings close to roadway and grouped close together with some shared walls, parking on side
- Newer buildings generally stand alone with parking in front
- Buildings generally between 1,500 to 3,000 square feet, with occasional larger buildings
- Some former residences converted to commercial uses
- 3 small vacant residential lots

b. Transportation

- Four travel lanes
- Center two-way turning lane
- Some on-street parking
- Sidewalks on majority of roadway
- 4 out of 9 cross-streets unaligned
- Some deceleration lanes

c. Aesthetics

- Mixture of architectural styles including, but not limited to:
    - Metal siding
    - Converted residences

Image AA.1: View north toward S. 3rd Street. Typical sidewalk and buffer conditions; prominence of utility poles and signage.

Image AA.2: View south toward Southern Boulevard. shows the unprotected center two-way turning lane and the prominence of utility poles and lines.

  - 1930s to 1950s
  - Modern
- Generally low to moderate levels of landscaping
- 3 billboards
- Several large signs
- Wooden utility poles present along road, unscreened
- Very few street trees

Image AA.3: A view of the typical pedestrian environment. Power poles and signage are predominant, while no landscaping or other amenities are offered.

Figure AB.1: Aerial Map of Area B (2004)

Area B

Southern Boulevard to Marion Drive

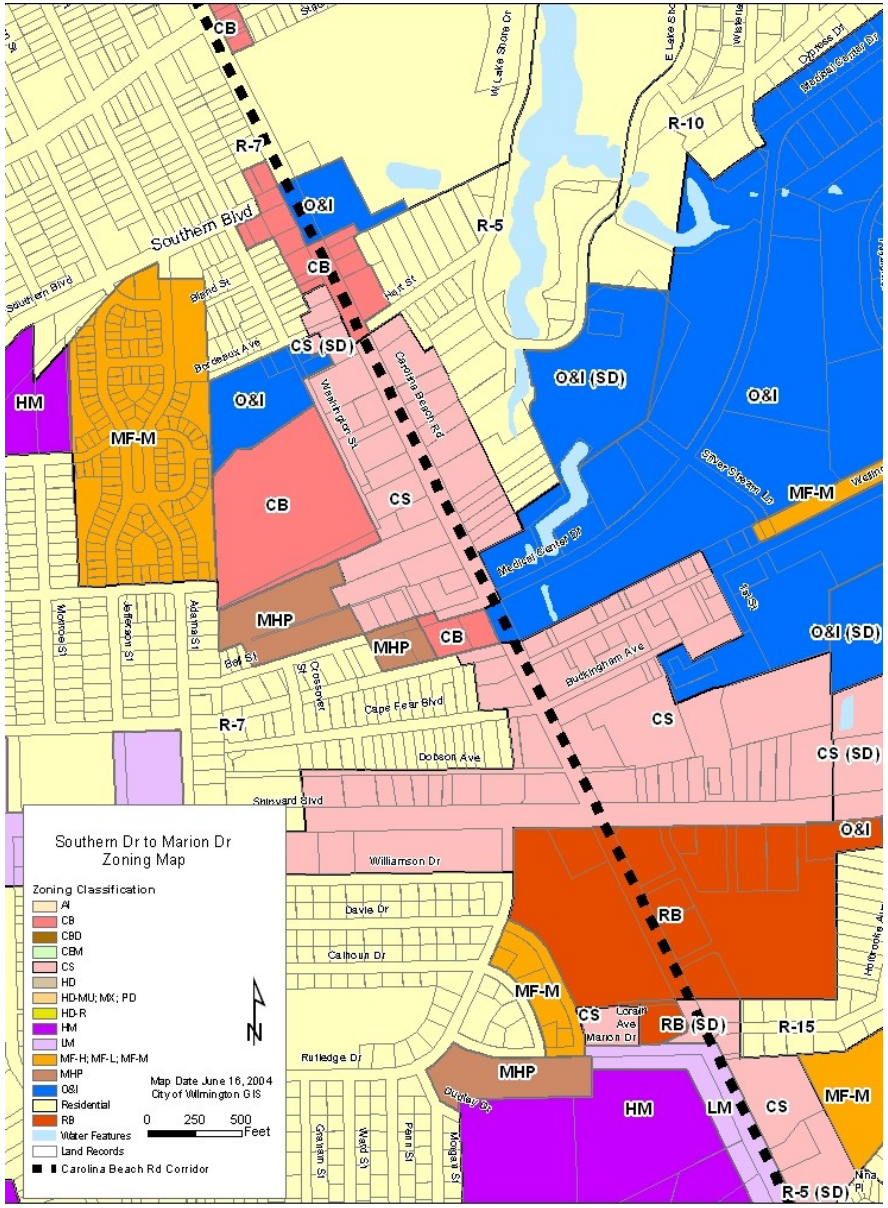


Figure AB.2: Zoning Map of Area B (2004)

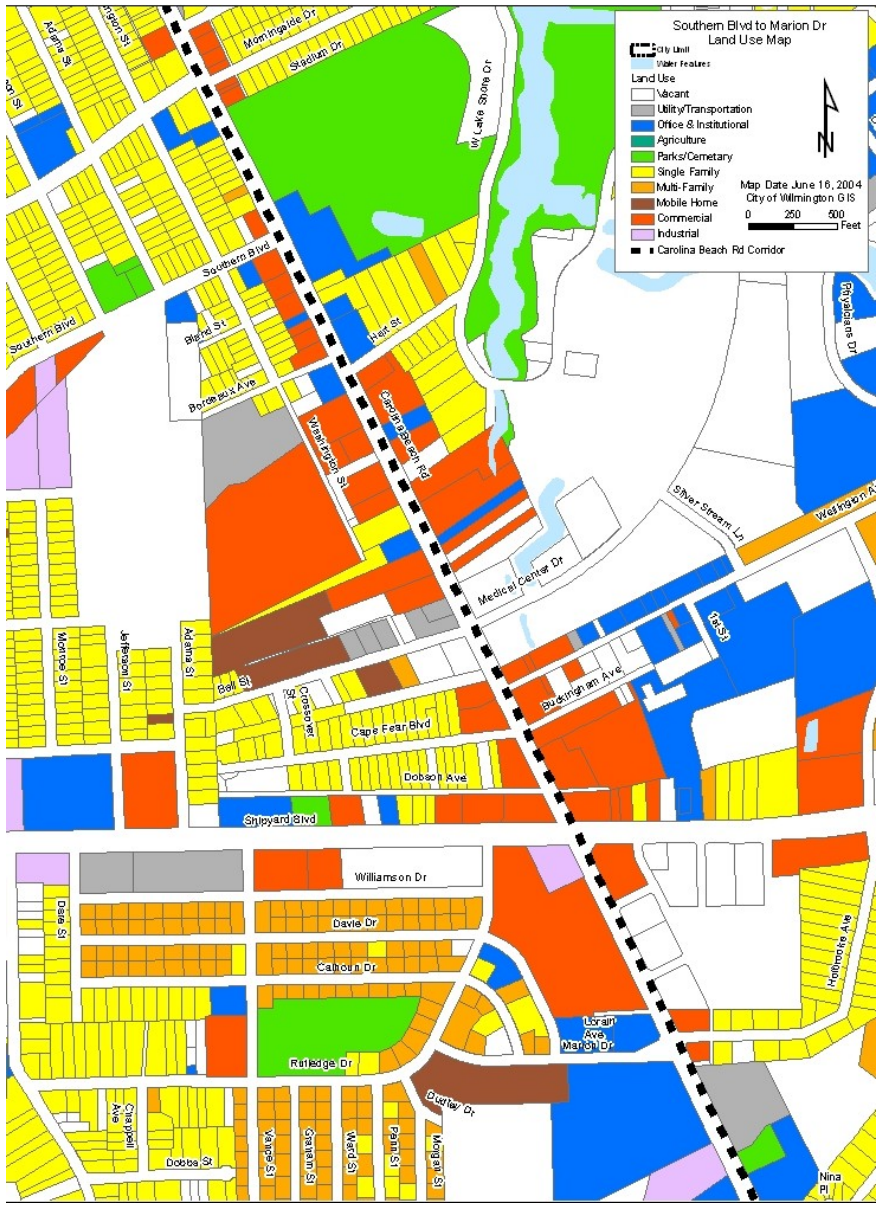


Figure AB.3: Existing Land Use Map of Area B (2004)

B. Area B – Southern Boulevard to Marion Drive

a. Land Use and Zoning

- Almost entirely commercial uses
- Zoning is primarily Community Business (CB) and Regional Business (RB), with some areas of Office and Institutional (O&I) and Commercial Services (CS)
- Single- and Multi-Family Residential (R-5, R-7, R-10, R-15, and MF-M) and Light Manufacturing (LM) are adjacent to the corridor
- Medical uses adjacent to corridor around Physician's Drive
- Strip development fronted with parking lots predominant
- Commercial uses include, but are not limited to: chiropractic office, insurance sales, auto sales, auto repair, restaurants, fast food, variety stores
- Retail uses located at or near commercial nodes experience high turnover rates
- 2 former residences converted to commercial uses
- 130 unit single-family development under construction at Sunset South
- 13 undeveloped lots, including one 14-acre lot on the corner of Shipyard Boulevard and Carolina Beach Road
- Low building density

b. Transportation

- 4 travel lanes
- Center two-way turning lane
- Sidewalks generally absent
- Curb-cuts present for each property
- No cross-access between businesses
- Some unaligned cross-streets

Image AB.1 This photo shows a residence located next to a commercial use with differing architectural styles.

Image AB.2 This view south near Shipyard Boulevard illustrates the unprotected center two-way turning lane and the prominence of utility poles and lines.

c. Aesthetics

- Mixture of architectural styles including, but not limited to:
  - Modern, post 1960s
- Parking areas predominant along road, mostly unscreened
- Buildings relatively far apart
- Landscaping varies from non-existent to moderate
- Lack of mature trees
- Numerous large signs
- 2 billboards
- Wooden utility poles line both sides of road, unscreened
- Taller high-voltage transmission green poles and lines begin at Bordeaux Avenue on west side of road
- Very few street trees

Image AB.3: View north from Wellington Avenue. Uneven development, prominent utility poles and lines, and large signage.

Image AB.4: Mixed architectural styles, with a converted residence directly adjacent to a metal siding building, contribute to a haphazard, uncoordinated appearance.

Figure AC.1: Aerial Map of Area C (2004)

Area C

Marion Drive to Independence Boulevard

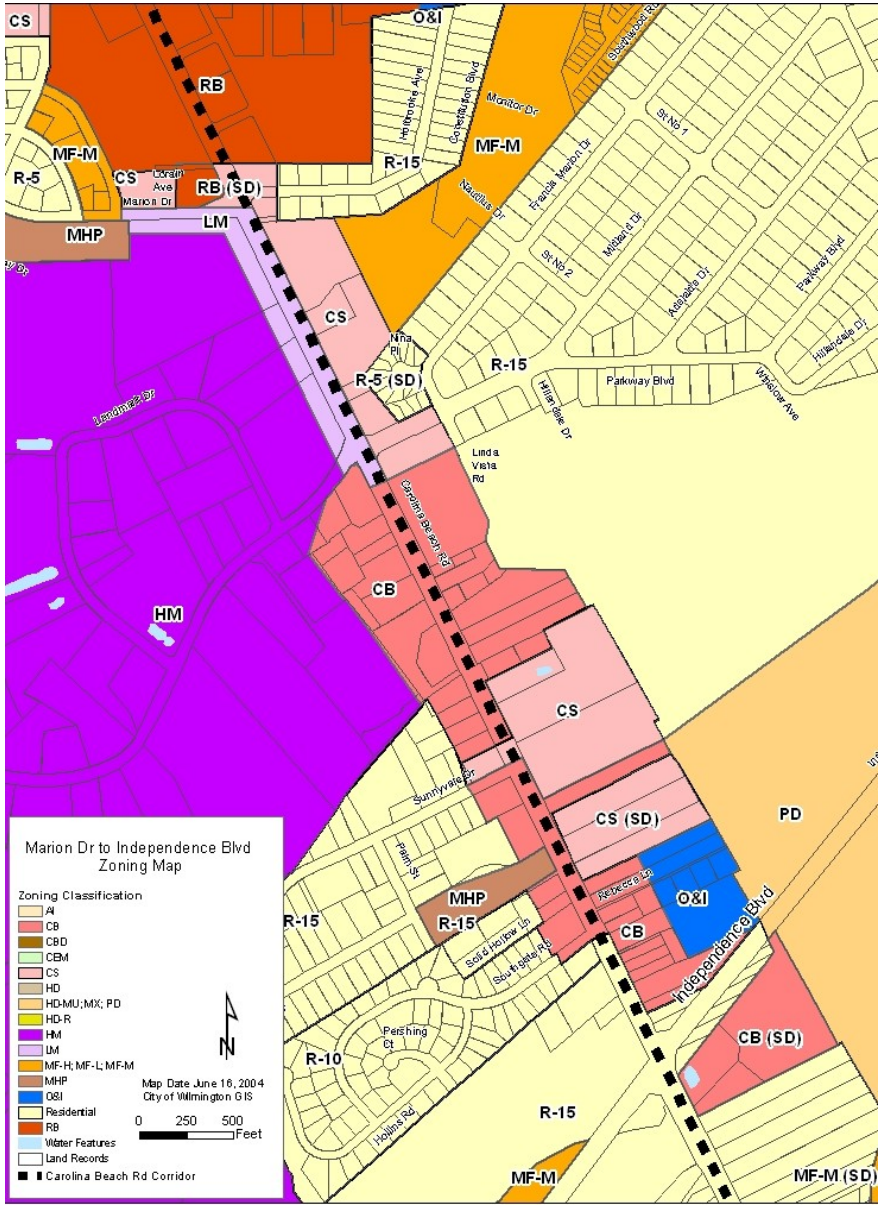


Figure AC.2: Zoning Map of Area C (2004)

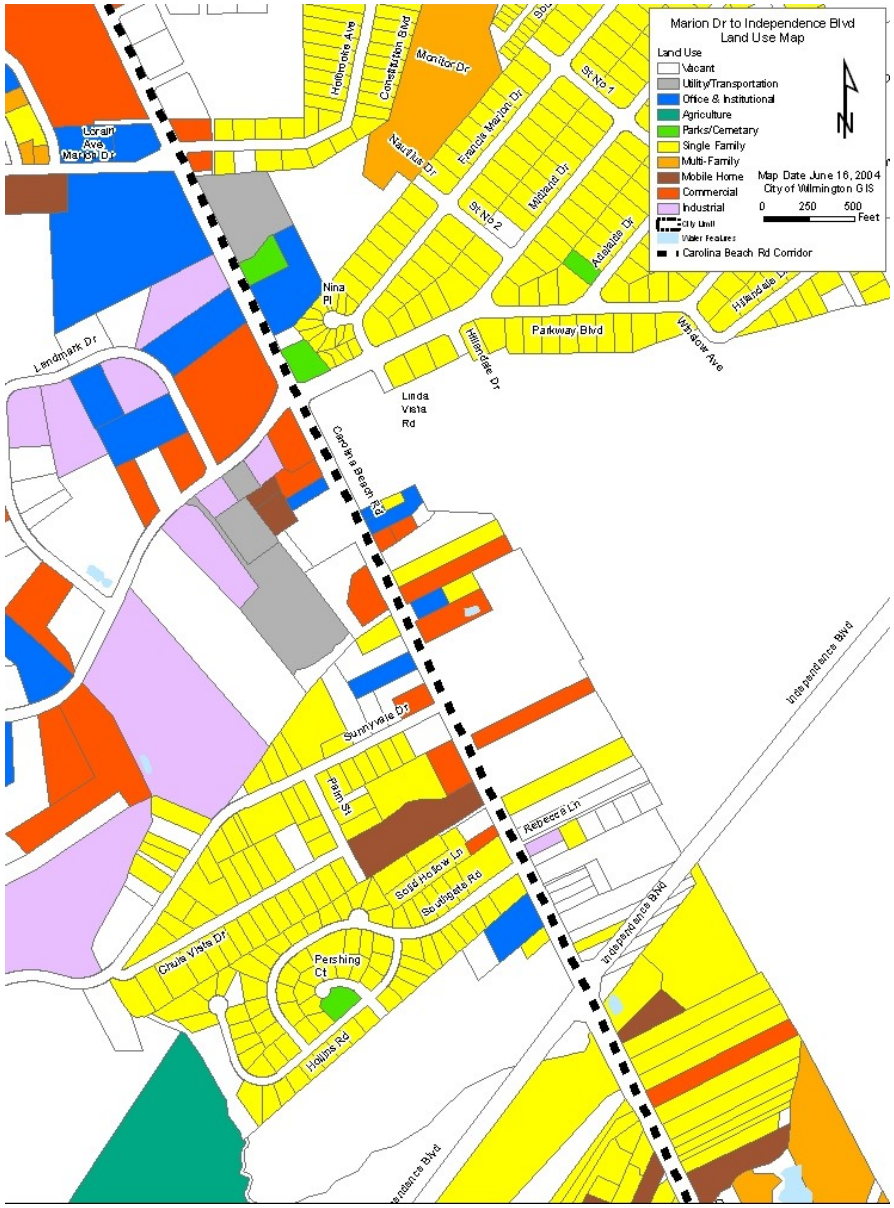


Figure AC.3: Existing Land Use Map of Area C (2004)

C. Area C – Marion Drive to Independence Boulevard

a. Land Use and Zoning

- Commercial uses
- Zoning is primarily Commercial Services (CS) and Community Business (CB), with some Office and Institutional (O&I).
- Heavy Manufacturing (HM) zoning adjacent to corridor on the west
- Residential areas (R-10, R-15, MF-M, MHP, and PD) adjacent to corridor
- Approximately 40% of land is undeveloped
- One 325-acre vacant parcel is zoned for single-family and planned-unit development
- Strip development pattern
- Some former residences converted to commercial uses
- Low building density, relative to downtown

b. Transportation

- 4 travel lanes
- Center two-way turning lane, deceleration lanes at some intersections
- Sidewalks mostly absent
- Curb-cuts present for each property
- Some unaligned cross-streets
- No cross-access between businesses

c. Aesthetics

- Minimal landscaping
- Numerous large signs; 3 billboards
- Wooden utility poles line both sides of road
- Taller high-voltage transmission poles present on west side of road
- Street trees present on most residential properties but few commercial properties

Image AC.1 Example of common strip style development with parking next to roadway and minimal landscaping.

Image AC.1 View toward Raleigh Street / Parkway Boulevard intersection showing left-turn lane.

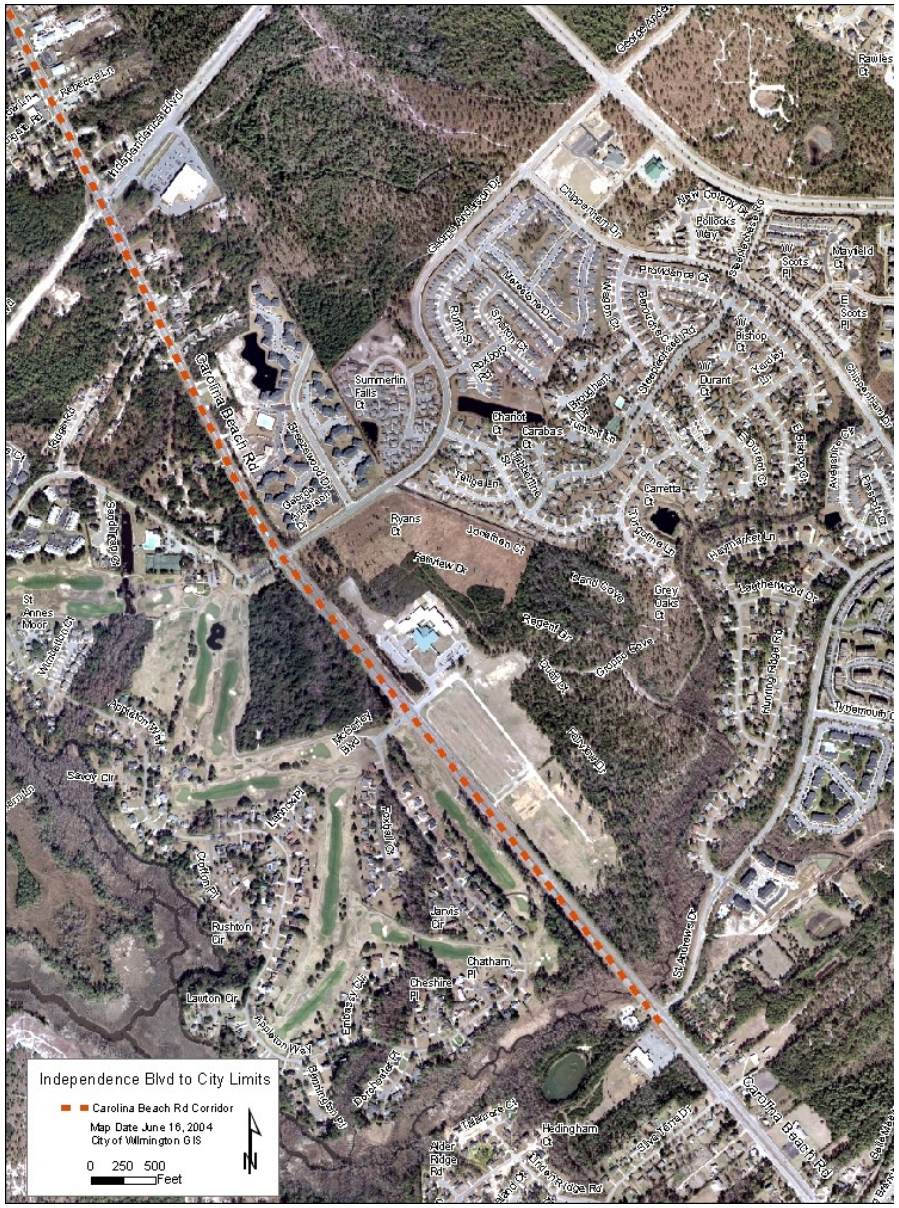


Figure AD.1: Aerial Map of Area D (2004)

Area D

Independence Boulevard to City Limits

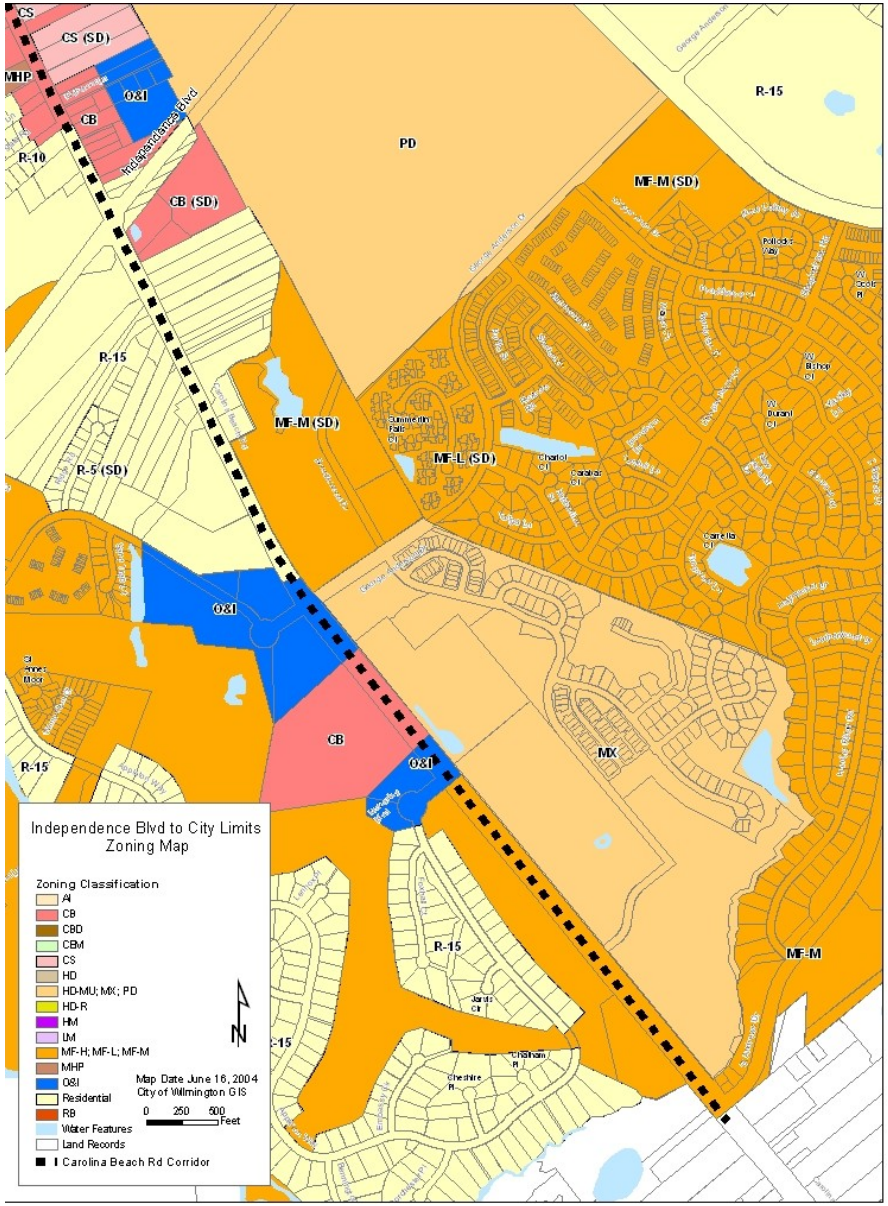


Figure AD.2: Zoning Map of Area D (2004)

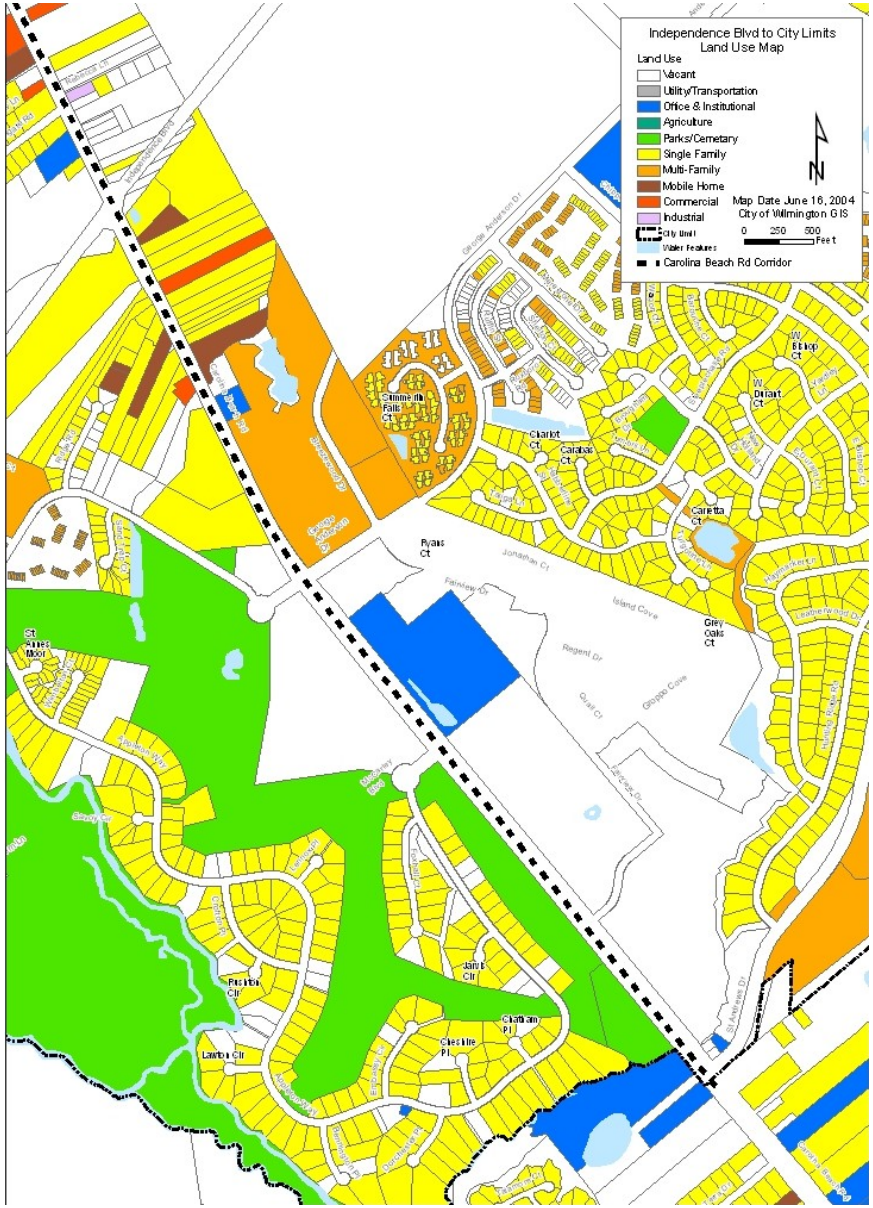


Figure AD.3: Existing Land Use Map of Area D (2004)

D. Area D – Independence Boulevard to City Limits

a. Land Use and Zoning

- Mostly residential uses; three commercial buildings
- Zoning is primarily Single-Family Residential (R-15 and MHP) and Multi-Family Residential (MF-M) with some Office and Institutional (O&I), Community Business (CB), and Mixed Use (MX)
- Planned Development area (PD) adjacent to corridor
- Approximately 33% undeveloped

b. Transportation

- 4 travel lanes
- Rural divided highway cross-section
- Center two-way turning lane in some areas
- Grassy median in some areas; 50-foot curbed median north of George Anderson Drive intersection
- Minimal sidewalks; relatively few curb-cuts
- Deceleration lanes at major intersections

c. Aesthetics

- Parking areas front commercial properties
- Residential and undeveloped parcels have moderate to high levels of landscaping and/or vegetation
- Few large signs
- Wooden utility poles line both sides of the road, generally unscreened
- Taller high-voltage transmission poles present on west side of road
- Street trees present on most residential and undeveloped properties (except one large vacant parcel), but present on only a few commercial properties

Image AD.1 Commercial use fronted by parking.

Image AD.2 Independence Boulevard intersection with left-turning lane.

Appendix B: Inventories

1. Zoning Inventory

Table B.1: Zoning Percentages

Area	Residential (Res)	Mixed (MX)	Office & Institutional (O&I)	Community Business (CB)	Regional Business (RB)	Commercial Services (CS)	Heavy Manufacturing (HM)	Total
A. S. 3rd St. to Southern Blvd.	44%	0%	9%	27%	0%	20%	0%	100%
B. Southern Blvd. to Marion Dr.	0%	0%	9%	13%	23%	55%	0%	100%
C. Marion Drive to Independence Blvd.	12%	0%	0%	46%	0%	27%	15%	100%
D. Independence Blvd. to City Limits	49%	37%	7%	7%	0%	0%	0%	100%
Percent of Road Length	29%	13%	6%	22%	5%	22%	3%	100%

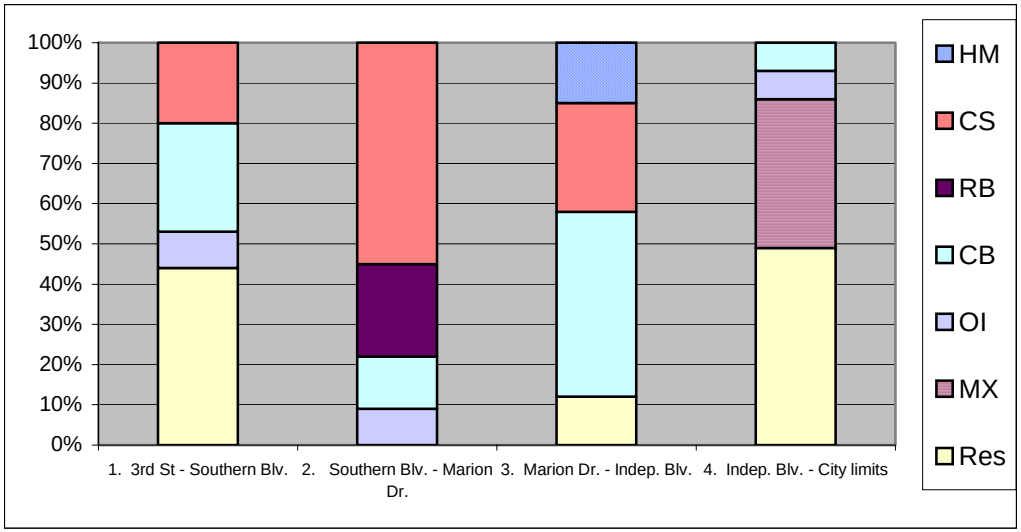


Figure B.1: Zoning Percentages Graph

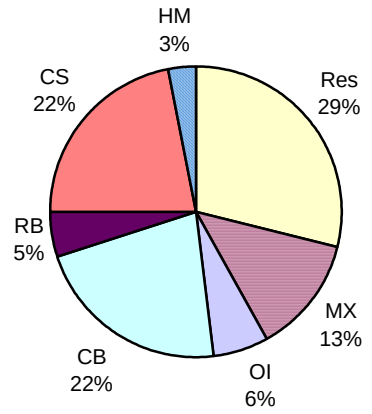


Figure B.2: Zoning Percentages Chart

Table B.2: Development Pattern Summary	
Area	**Summary**
A. S. 3rd St. to Southern Blvd.	• Traditional 1930s to 1960s "grid street" pattern • Some attached buildings close to street • Strip development with large parking lots • Stand-alone buildings with large parking lots • Buildings relatively close together
B. Southern Blvd. to Marion Dr.	• Modern, post-1960s strip commercial development • Buildings spaced farther apart
C. Marion Dr. to Independence Blvd.	• Modern, post-1960s strip commercial development • Buildings spaced farther apart
D. Independence Blvd. to City Limits	• Residential

Table B.3: Vacancies	
Area	**Vacant Parcels**
A. S. 3rd St. to Southern Blvd.	0
B. Southern Blvd. to Marion Dr.	6
C. Marion Dr. to Independence Blvd.	16
D. Independence Blvd. to City Limits	5

2. Traffic Management Inventory

Table B.4: Driveway Curb-Cuts and Medians

Area	Driveways	Distance Between Driveways	Driveways/ Mile	Medians
A. S. 3rd St. to Southern Blvd.	75	58 feet	91	None
B. Southern Blvd. to Marion Dr.	90	56 feet	94	None
C. Marion Dr. to Independence Blvd.	86	60 feet	88	None
D. Independence Blvd. to City Limits	43	178 feet	29	Grassy median between George Anderson Drive to City Limits

Table B.5: Pedestrian and Transit Inventory

Area	Bus Stops	Signals	Sidewalk Inventory		Sidewalk Coverage	Notes
A. S. 3rd St. to Southern Blvd.	6	4	L side 4043 ft. R side 3838 ft.	Total: 7881 ft.	89%	Mainly traditional style development with a "grid street" pattern and some residential
B. Southern Blvd. to Marion Dr.	6	1	L side 1122 ft. R side 2436 ft.	Total: 3558 ft.	35%	Strip development - commercial
C. Marion Dr. to Independence Blvd.	0	2	Left side 0 ft. R side 1861 ft	Total: 1861 ft.	18%	Strip development - commercial
D. Independence Blvd. to City Limits	0	3	0	Total: 0	0%	Mainly residential and vacant land
Total	**12**	**10**		**13300 ft. 2.5 miles**	**7.4 %**	

3. Aesthetic Inventory

Table B.6: Billboards and Signs				
Area	**Billboards**	**Detached Signs**	**Distance Between Signs**	**Signs / Mile**
A. S. 3rd St. to Southern Blvd.	3	21	209 feet	25
B. Southern Blvd. to Marion Dr.	1	52	97 feet	54
C. Marion Dr. to Independence Blvd.	3	40	129 feet	41
D. Independence Blvd. to City Limits	0	10	766 feet	7

Table B.7: Architecture Summary	
Area	**Summary**
A. S. 3rd St. to Southern Blvd.	• Some attached buildings close to street • Strip development with large parking lots • Stand-alone buildings with large parking lots • Buildings relatively close together
B. Southern Blvd. to Marion Dr.	• Modern, post-1960s strip commercial development • Buildings spaced farther apart
C. Marion Dr. to Independence Blvd.	• Modern, post-1960s strip commercial development • Buildings spaced farther apart
D. Independence Blvd. to City Limits	• Residential

Table B.8: Street Trees and Utility Poles and Lines		
Area	**Street Trees**	**Utility Poles and Lines**
A. S. 3rd St. to Southern Blvd.	Present on residential and commercial parcels	Both sides of road Wooden
B. Southern Blvd. to Marion Dr.	Present on residential parcels	Both sides of road Wooden and high-voltage
C. Marion Dr. to Independence Blvd.	Present on residential and vacant parcels	Both sides of road Wooden and high-voltage
D. Independence Blvd. to City Limits	Present on residential and vacant parcels	Both sides of road Wooden and high-voltage

Appendix C: Traffic Operations

1. History

Carolina Beach Road was originally paved (bituminous surface treatment) at 16' width in 1928. The road was paved to 18' width in 1929. In 1959, the road was widened to a 68' curb and gutter cross-section.

2. Traffic Operations

Traffic operations on Carolina Beach Road exceed acceptable congestion thresholds in at least one peak travel time at locations along much of the length of this principal arterial street. Acceptable traffic flow in an urban area is generally defined as Level of Service "D" or above. Level of Service directly corresponds to average seconds of delay experienced by each vehicle (See Table C.3).

The critical determinant of the Level of Service on an urban arterial road with signal spacing generally less than one-half mile is determined primarily by signal progression. Signal progression refers to how platoons, or groups of vehicles, move continuously down an arterial with signal coordination minimizing the number of times the vehicles must stop. Therefore, the average travel speed is the critical measure for these sections of arterials to measure the overall performance of traffic flow rather than looking at the average delay at any one of the signalized intersections at any one point along the corridor. Traffic analysis of the Carolina Beach Road corridor between and including the signalized intersections at Burnett Boulevard/Front Street/S. 3rd Street to the north and Southern Boulevard to the south must be considered as a cohesive unit.

However, the capacity for the entire corridor is affected by turning movements onto and from Carolina Beach Road and the un-signalized intersections and driveways. Deceleration lanes, two-way left-turning lanes, right-turn lanes, median controls, and minimization

Table C.1: General Information

Section	% Growth 1991-2001	Through Travel Lanes
S. 3rd St. to Southern Blvd.	21%	4
Southern Blvd. to Marion Dr.	21%	4
Marion Dr. to Independence Blvd.	64%	4
Independence Blvd. to City Limits	34%	4

Table C.2: Current Pavement Widths

Road Portion	Width
A. S. 3rd St. to Southern Blvd.	68'
B. Southern Blvd. to Marion Dr.	68'
C. Marion Dr. to Independence Blvd.	68'
D. Independence Blvd. to City Limits	68'

Table C.3: Levels of Service at Signalized Intersections

Levels of service	Seconds of Control Delay per Vehicle
A	<= 10
B	>10 and <= 20
C	>20 and <=35
D	>35 and <=55
E	>55 and <= 80
F	>80

Note: Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay.

of access points become important factors in traffic operations, as well. Providing cross-access or rear-access between adjacent developments improves traffic operations and safety by minimizing the number of times vehicles must enter and interrupt the traffic flow on the arterial. Generally, cross-access and rear-access provisions are very limited on Carolina Beach Road north of Shipyard Boulevard. This means that traffic must repeatedly enter, exit, and re-enter the Carolina Beach Road traffic stream to reach multiple destinations.

By definition, an arterial primarily serves through traffic. Obviously, urban and suburban arterials also commonly provide primary access to commercial development. So, the mission of arterials is in conflict with providing access to development. To the extent that a healthy balance can be achieved between these competing demands determines the "traffic health" of the corridor.

It should be noted that delay experienced by vehicles at minor intersection approaches and driveways entering Carolina Beach Road are likely to be at a Level of Service "F" in the peak periods of traffic flow in particular. This is expected and considered normal for such a facility as Carolina Beach Road. The objectives of traffic operations and improvements are aimed at reducing the average delay for ALL users of the transportation facility. At any given time, minor traffic movements and flows will experience delays that seem "unacceptable" to a particular motorist; however, for purposes of traffic analysis, this is considered normal in the interest of the larger, predominant traffic flow.

The Carolina Beach Road arterial traffic operations were simulated using existing traffic signal timings and counts taken in 2002 at the critical intersections of Burnett Boulevard/S. 3rd Street/Front Street, Shipyard Boulevard, and Independence Boulevard. Table C.4 shows the level of delay at these critical

Table C.4: Critical Intersection Performance

Intersection	A.M. (730-830) 132 sec. cycle	P.M. (1630-1730) 132 sec. cycle
Burnett Boulevard/S. 3rd Street/Front Street	37.9 (D)	45.3 (D)
Shipyard Boulevard	44.4 (D)	50.9 (D)
Independence Boulevard	22.7 (C)	47.0 (D)

Note: All intersection movements, measured in seconds of delay per vehicle, with Level of Service in parenthesis

intersections analyzed individually and including the delay to motorists on the cross streets. Note that the signal phasing and timings were pulled from the coordinated traffic progression plan.

Given the assumptions described above, the sections of Carolina Beach Road demarcated for purposes of this report are shown in Table C.4 and C.6, with an estimation of their average volumes and capacities. Volume-to-capacity ratio is a measure of the potential level-of-service of a given roadway section. As noted previously, other factors enter into the consideration of levels of service. Where signal spacing is close enough to benefit from signal coordination, traffic progression is the key element. Average travel speed compared to posted speed is also indicative of levels of congestion, or perhaps speeding in times of less congestion. In all cases, turn-lane provisions and their corresponding signal phasing and timings are also critical at all signalized intersections. For all roadway sections, access provisions and traffic movement conflicts affect the traffic flow and levels of service that can be provided.

Table C.5 System-wide Delay

A.M.	P.M.
17.2(B)	21.4(C)

Note: Table reflects average delay experienced by vehicles entering the artery from any approach, including side streets. Table applies to Carolina Beach Road between and including 3rd St./Burnett Blvd. and George Anderson Blvd.

This arterial roadway was designed to handle the load of beach traffic when US 421 was the link to Carolina Beach and Kure Beach prior to I-40 opening. As such, it still has excess capacity throughout most of the day. Although congestion is notable at the intersections with Burnett Boulevard, Shipyard Boulevard, and Independence Boulevard during peak periods of traffic, this corridor is generally much less congested than the Oleander Drive, Market Street, and College Road corridors.

Table C.6: Generalized Volumes and Capacities

Area	Volume (2002)	Capacity	Volume/ Capacity Ratio
South 3rd St. to Southern Blvd.	30,000	29,000	1.03
Southern Blvd. to Marion Dr.	28,000	35,000	0.80
Marion Dr. to Independence Blvd.	26,500	35,000	0.76
Independence Blvd. to City Limits	26,500	35,000	0.76

At Burnett Boulevard, the transition to Front Street is somewhat awkward, as well as the skewed design of this intersection.

At Shipyard Boulevard, the presence of trucks exiting the port from the eastbound left lane requires a significant amount of time due to the operational characteristics of the heavy trucks. The driveways on

Carolina Beach Road immediately to the north of Shipyard Boulevard create friction and potential safety issues for the northbound flow of traffic. The southern most McDonald's driveway should be reviewed for possible closure.

At Independence Boulevard, the westbound left turns are the heaviest movement. As development occurs on Independence Boulevard and River Road to the west, this intersection is expected become more critical than Shipyard Boulevard for the progression of traffic in the corridor. A westbound double left turn lane will be warranted as this area develops. Also, a potential Southern Bridge over the Cape Fear River just to the west of this intersection will certainly require major expansion of capacity at this location.

a. Driveway and Deceleration Lane Analysis

Table B.4 in Appendix B shows that driveways are found on average every 100 feet with an average range between 56 feet to 178 feet between driveways.

Frequent driveways (i.e. every 100 feet) on an arterial road such as Carolina Beach Road are not desirable because vehicles exiting or entering the arterial slow traffic flow and create safety concerns.

As a point of comparison, Mayfaire, the new mixed-use development project located on Military Cutoff Road has 5 driveways along 6,030 feet of road frontage, with spacing between driveways ranging from 600 to 1,900 feet, with an average of 1,040 feet between driveways. This is approximately 10 times the average distance between driveways on Carolina Beach Road. Although it is neither expected nor likely that an older corridor such as Carolina Beach Road would ever have driveway spacing reduced to the level of a new development such as this, it is illustrative of the difference.

Table C.7: General Speed Information

Section	Posted Speed Limit (mph)	Average Travel Progression Speed NB/SB Peak Directions (mph)
S. 3rd St. to Southern Blvd.	40	40/40
Southern Blvd. to Marion Dr.	40	40/40
Marion Dr. to Independence Blvd.	45	45/45
Independence Blvd. to City Limits	45	45/45

b. Carolina Beach Road Vehicle Crash History

Traffic volumes, traffic movement conflicts, and roadway design are factors in traffic safety and accident or "crash" rates. Summary traffic crash data were compared for the years 1991 and 2001 (Table C.8). A "strip analysis" was run on each section of Carolina Beach Road. This strip analysis summarizes vehicle accidents by type for this time period. A composite analysis was done on the entire Carolina Beach Road corridor as well.

The data shows a relatively consistent crash rate in1991 and 2001. The vehicle crash rate is a measure of the relative safety of a roadway and is defined in terms of the number of crashes per hundred million vehicle miles. The section from Southern Boulevard to Holbrook Avenue showed by far the highest crash rate. This section contains a continuous two-way center turn lane and a very high number of closely spaced commercial driveways.

Table C.8: Carolina Beach Road Crash History

Carolina Beach Road From Third Street to Southern Blvd

Year	Volume	Total	Rate	Fatal	Injury	Prop Damage	Night Accs	Wet Accs	Alcohol	Angle	Left Turn	Pedestrian	Rear End	Right Turn	Sideswipe
1991	27,200	29	108	0	13	16	11	6	1	3	3	0	11	1	2
1996	30,900	64	220	0	28	36	10	20	4	12	13	1	20	3	5
2001	33,000	34	126	0	16	18	8	9	1	8	2	1	13	0	7

Carolina Beach Road From Southern Blvd to Holbrook Ave

Year	Volume	Total	Rate	Fatal	Injury	Prop Damage	Night Accs	Wet Accs	Alcohol	Angle	Left Turn	Pedestrian	Rear End	Right Turn	Sideswipe
1991	26,700	41	401	0	18	23	5	10	3	8	10	1	14	1	1
1996	26,200	60	798	0	33	27	8	10	1	6	18	0	20	4	4
2001	32,400	31	300	1	14	17	10	8	2	5	5	1	11	1	3

Carolina Beach Road From Holbrook to Independence Blvd

Year	Volume	Total	Rate	Fatal	Injury	Prop Damage	Night Accs	Wet Accs	Alcohol	Angle	Left Turn	Pedestrian	Rear End	Right Turn	Sideswipe
1991	15,500	16	221	0	8	8	6	1	0	3	4	1	5	0	2
1996	23,300	30	238	0	17	13	3	3	0	8	2	0	11	3	2
2001	25,400	13	117	0	4	9	4	0	0	3	0	0	6	2	1

Carolina Beach Road From Independence Blvd to City Limits

Year	Volume	Total	Rate	Fatal	Injury	Prop Damage	Night Accs	Wet Accs	Alcohol	Angle	Left Turn	Pedestrian	Rear End	Right Turn	Sideswipe
1991	20,300	13	120	0	3	10	4	4	0	2	2	0	2	0	2
1996	22,600	32	257	1	17	15	5	3	0	5	7	0	12	2	1
2001	27,200	12	81	0	6	6	2	1	0	3	3	0	4	0	1

Entire Corridor: Carolina Beach Road From Third Street to City Limits

Year	Average ADT	Total	Rate	Fatal	Injury	Prop Damage	Night Accs	Wet Accs	Alcohol	Angle	Left Turn	Pedestrian	Rear End	Right Turn	Sideswipe
1991	22,400	99	285	0	42	57	26	22	6	15	18	2	33	2	6
1996	25,800	171	427	1	82	88	24	33	6	31	33	1	56	11	11
2001	29,500	99	217	1	40	58	24	21	2	19	11	2	37	4	14

3. Public Transit

Public transit is an important aspect of managing traffic flow on the major corridors. Generally, the City is adequately served by bus service; however, there are plans outlined in the Transit Master Plan to serve the region including areas in New Hanover County, such as Wrightsville and Carolina Beach and the Monkey Junction shopping area. The Cape Fear Public Transportation Authority, known as Wave Transit, determines bus routes and the number and location of stops based on need and demand, impacts on traffic flow, and the density of uses in a particular area that would be patronized by riders.

The Transit Master Plan provides the Transit Authority with an array of new service recommendations and enhancements to existing services with an increased number of transportation options. Key features in the operation of the future system are the two transit centers (primary) and three satellite transfer stations (secondary). The five facilities include the following:

Transit Centers (primary)

- Downtown Wilmington Multi-modal Transportation Center
- Market Station-joint administrative, maintenance and transfer facility

Satellite Transfer Stations (secondary)

- Oleander Station
- Monkey Junction Station
- Mayfaire Station

In general these stations are identified where multiple routes converge in the vicinity of a commercial center. Co-locating a satellite transfer station with a potential destination has proven to be a successful strategy in other areas to bolster ridership and system visibility. The exact location of each of these facilities as well as amenities will need to be determined through additional study and coordination with property owners, the Transit Authority and staff and will be implemented as funding becomes available. Amenities at these locations are likely to include:

- Shelters
- Informational boards/posts
- Benches
- Route information and maps
- Bus pull-outs

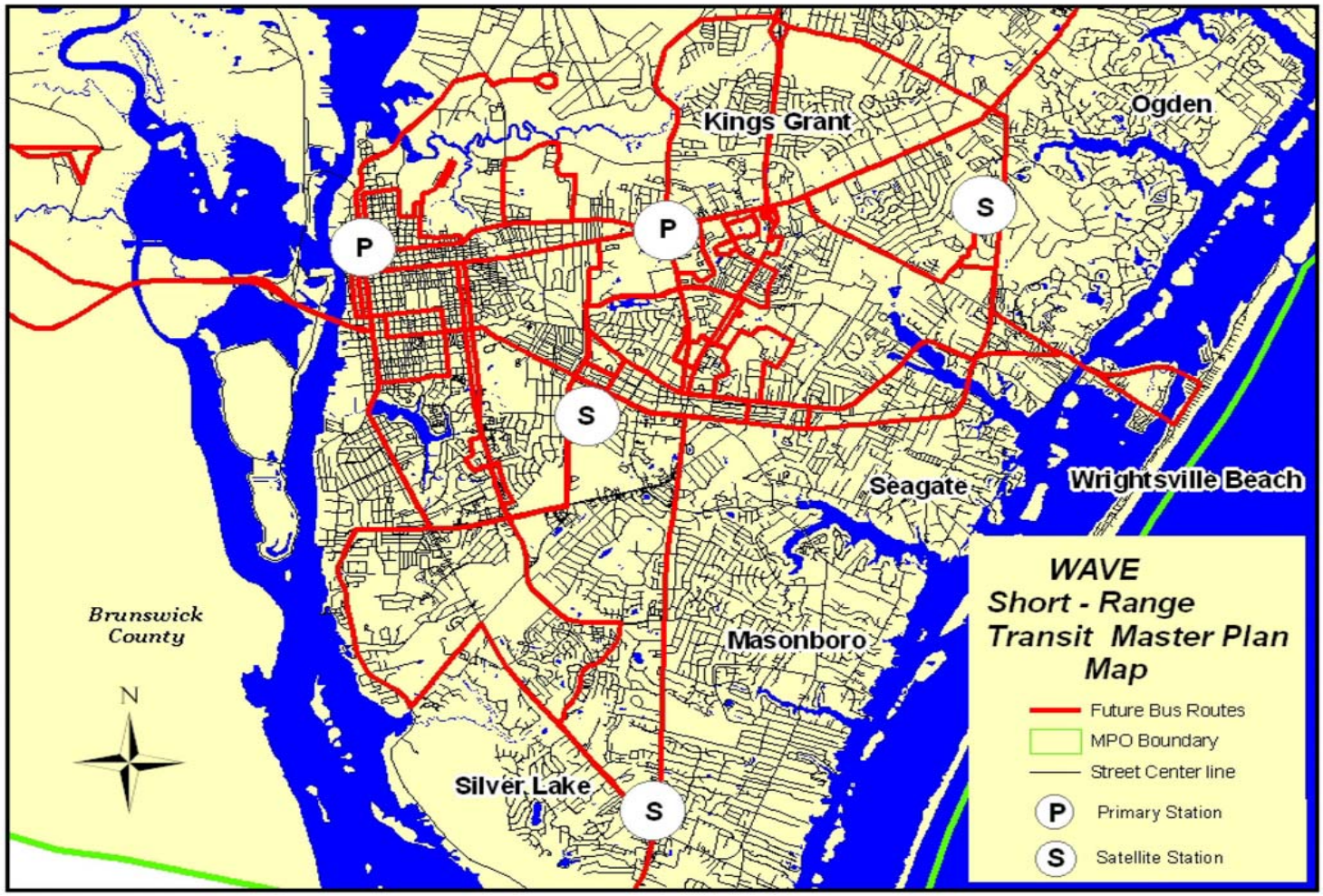


Figure C.1: Short-Range Transit Plan Map

Transportation Performance Index

	Segment No.	Segment Name	Segment Length (mi.)	Segment Volume	Segment Capacity	Segment V/C Ratio	Segment V/C LOS	AM Pk Hr Signal Progression Delay/Vehicle	AM Pk Hr Signal Progression LOS	PM Pk Hr Signal Progression Delay/Vehicle	PM Pk Hr Signal Progression LOS	Traffic Signals	High Generator Commercial Driveways	Low Generator Commercial Driveways	Residential Driveways	Total Driveways	High Generator Commercial Driveways per mile	Low Generator Commercial Driveways per mile	Residential Driveways per mile	Driveways per mile	Median coverage	TWCTL	Sidewalk Coverage	Bus stops	Bus stops per mile	Crashes	Crashes per MVMT	Avg Crash Rate	TPI	LOS Pts (v/c) (20-30%)	AM Pk Hr Signal Progression Pts (0/5%)	PM Pk Hr Signal Progression Pts (0/5%)	Driveway Pts. (20%)	Median Pts (20%)	Crash Pts (20%)	Sidewalks (5%)	Bus Stops (5%)
1		**College Road**																																			
2	College #1	MLK to Oriole Dr.	1.200	47,700	53,000	0.90	E	25.8	C	27.2	C	2	10	3	0	17	8	3	0	14.17	100%	0%	0%	0	0.00	42	222.35	282.72	66	2.9	10.0	10.0	4.9	10.00	10.0	0	0
3	College #2	Oriole Dr to Wilshire Blvd	1.600	55,000	56,500	0.97	E	25.8	C	27.2	C	4	56	3	0	64	35	2	0	40.00	100%	0%	18%	9	5.63	190	654.27	282.72	21	0.8	10.0	10.0	-6.4	10.00	-1.3	1.8	7.03
4	College #3	Wilshire Blvd to Holly Tree	1.700	50,000	46,000	1.09	F	25.8	C	27.2	C	5	44	16	2	69	26	9	1	40.59	13%	87%	14%	11	6.47	198	705.88	264.33	5	-0.9	10.0	10.0	-4.5	3.04	-2.7	1.4	8.09
5	College #4	Holly Tree to Lansdowne Rd	1.500	40,000	37,500	1.07	F	N/A	N/A	N/A	N/A	1	23	5	36	70	15	3	24	46.67	100%	0%	5%	0	0.00	68	343.43	282.72	40	-0.7	0.0	0.0	3.1	10.00	7.9	0.5	0
6		**Carolina Beach Road**																																			
7	Carolina Beach #1	3rd to Southern Blvd.	0.830	30,000	36,500	0.82	E	10.3	B	16.3	B	4	8	42	18	75	10	51	22	90.36	0%	100%	89%	6	7.23	34	413.78	264.33	43	5.1	10.0	10.0	0.8	2.00	4.3	8.9	9.04
8	Carolina Beach #2	Southern Blvd to Holbrook Ave	0.953	28,000	36,500	0.77	D	10.3	B	16.3	B	1	53	34	0	90	56	36	0	94.44	0%	100%	35%	6	6.30	31	352.04	264.33	21	6.7	10.0	10.0	-12.7	2.00	6.7	3.5	7.87
9	Carolina Beach #3	Holbrook Ave to Independence Blvd	0.978	26,500	37,500	0.71	D	N/A	N/A	N/A	N/A	2	12	51	10	86	12	52	10	87.93	0%	100%	18%	0	0.00	13	152.00	264.33	50	8.4	0.0	0.0	0.1	2.00	10.0	1.8	0
10	Carolina Beach #4	Independence Blvd to City Limits	1.450	26,500	37,500	0.71	D	N/A	N/A	N/A	N/A	3	11	18	12	43	8	12	8	29.66	73%	37%	0%	0	0.00	12	94.64	282.72	71	8.4	0.0	0.0	4.6	8.05	10.0	0	0
11		**Market Street**																																			
12	Market #1	17th to Colonial Drive	0.890	31,000	33,500	0.93	E	101.2	F	34.8	C	2	2	7	24	38	2	8	27	42.70	0%	0%	76%	11	12.36	86	944.57	740.59	42	2.1	-4.2	10.0	6.0	0.00	7.2	7.6	10
13	Market #2	Colonial Drive to Barclay Hills Dr	0.938	37,000	36,500	1.01	F	18.8	B	27.2	C	0	36	23	8	68	38	25	9	72.49	0%	100%	94%	10	10.66	61	532.61	264.33	7	-0.1	10.0	10.0	-8.2	2.00	-0.1	9.4	10
14	Market #3	Barclay Hills Dr to Lullwater Dr	0.710	48,500	36,500	1.33	F	18.8	B	27.2	C	2	45	7	0	55	63	10	0	77.46	0%	100%	82%	13	18.31	111	976.81	264.33	-25	-3.3	10.0	10.0	-13.5	2.00	-6.8	8.2	7.11
15	Market #4	Lullwater Dr to Cardinal Dr	1.616	45,000	36,500	1.23	F	18.8	B	27.2	C	4	38	37	0	79	24	23	0	48.89	0%	100%	25%	4	2.48	171	712.57	264.33	-3	-2.3	10.0	10.0	-4.5	2.00	-2.8	2.5	3.09
16	Market #5	Cardinal Dr to Station Rd	1.504	41,000	36,500	1.12	F	N/A	N/A	N/A	N/A	0	25	94	3	104	17	63	2	69.15	0%	100%	2%	0	0.00	56	275.20	264.33	17	-1.2	0.0	0.0	-1.3	2.00	9.6	0.2	0
17	Market #6	Station Rd to Military Cutoff Rd	0.594	34,500	36,500	0.95	E	N/A	N/A	N/A	N/A	1	12	10	1	35	20	17	2	58.92	0%	100%	0%	0	0.00	60	887.22	264.33	1	1.6	0.0	0.0	1.5	2.00	-5.4	0	0
18		**Oleander Drive**																																			
19	Oleander #1	Dawson St to Independence Blvd	1.250	32,000	33,500	0.96	E	23.1	C	34.7	C	4	15	4	37	60	12	3	30	48.00	0%	0%	68%	14	11.20	32	242.42	740.59	49	1.3	10.0	10.0	3.9	0.00	10.0	6.8	10
20	Oleander #2	Independence Blvd to College Rd	1.290	32,500	54,500	0.60	C	23.1	C	34.7	C	6	84	1	0	95	65	1	0	73.64	100%	0%	39%	15	11.63	70	505.95	282.72	33	10.0	10.0	10.0	-13.9	10.00	2.1	3.9	10
21	Oleander #3	College Rd to Hawthorne Dr	1.750	35,000	36,500	0.96	E	N/A	N/A	N/A	N/A	3	4	28	69	144	2	16	39	82.29	17%	83%	15%	0	0.00	58	286.95	264.33	40	1.2	0.0	0.0	5.6	3.36	9.1	1.5	0
22	Oleander #4	Hawthorne Dr to Wrightsville Ave	1.780	38,000	36,500	1.04	F	N/A	N/A	N/A	N/A	2	31	72	12	140	17	40	7	78.65	0%	100%	0%	0	0.00	42	188.16	264.33	25	-0.4	0.0	0.0	1.1	2.00	10.0	0	0
	Average																			60.89					5.13												

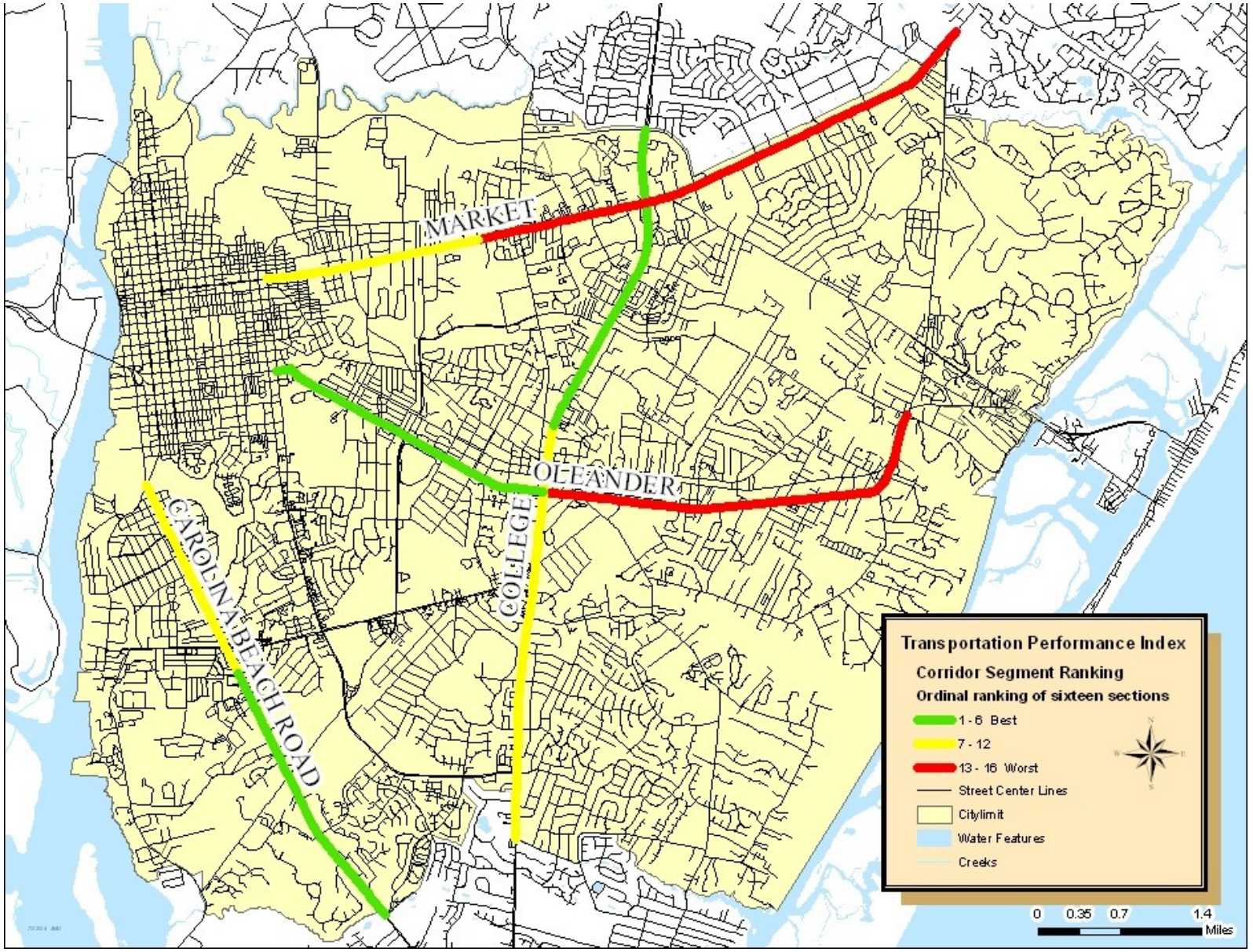


Figure C.3: Transportation Performance Index Map

Appendix D: Capital Improvement Costs

Table D.1: Estimated Capital Improvement Costs				
Items	**Low End Estimates**	**High End Estimates**	**Units**	**Comments**
Tree Plantings and Landscaping	$5	$25	Per Linear Foot	Low end is trees only; High end is trees, sod, irrigation, & shrubs. Assumes sufficient r/w.
Turn Lanes	$40,000	$100,000	Each	Assumes sufficient r/w and no major utility relocations or drainage work.
Traffic Signal	$100,000	$200,000	Each	Assumes sufficient r/w and no major utility relocations or drainage work.
Landscaped Center Medians	$300	$500	Per Linear Foot	Assumes sufficient r/w, high end includes moderate drainage and/or utility relocation cost. Cost per foot can be higher if extensive drainage work and/or utility relocation is required. Recommend that a minimum of 1000 feet be installed per project.
Alleys - New 2-way	$150	$200	Per Linear Foot	Does not include right-of-way. Assumes no major drainage cost.
Alley - Ex. 1-way modified to 2-way	$75	$200	Per Linear Foot	Does not include right-of-way. Assumes no major drainage cost.
Frontage Road (Separated from parking)	$150	$250	Per Linear Foot	Does not include right-of-way. Assumes no major drainage cost.
Frontage Road	$10	$150	Per Linear Foot	Does not include easements, high end assumes crossing vacant tracts where

(Within Parking Lots)				there are no improvements to mark or upgrade.
Installation of Sidewalks	$20	$50	Per Linear Foot	Does not include right-of-way. Assumes no major drainage cost.
Installation of Multi-Use Paths	$25	$75	Per Linear Foot	Does not include right-of-way. Assumes no major drainage cost.
Installation of Pedestrian Signals	$2,500	$5,000	Per Intersection	Assumes traffic signals exist at the intersection. Also, on NCDOT streets there are strict warrants that must be met for pedestrian signals to be allowed.
Additional Markings For Crosswalks	$500	$1,000	Per Intersection	Includes additional thermoplastic markings on pavement and on concrete portion of median at crosswalks.