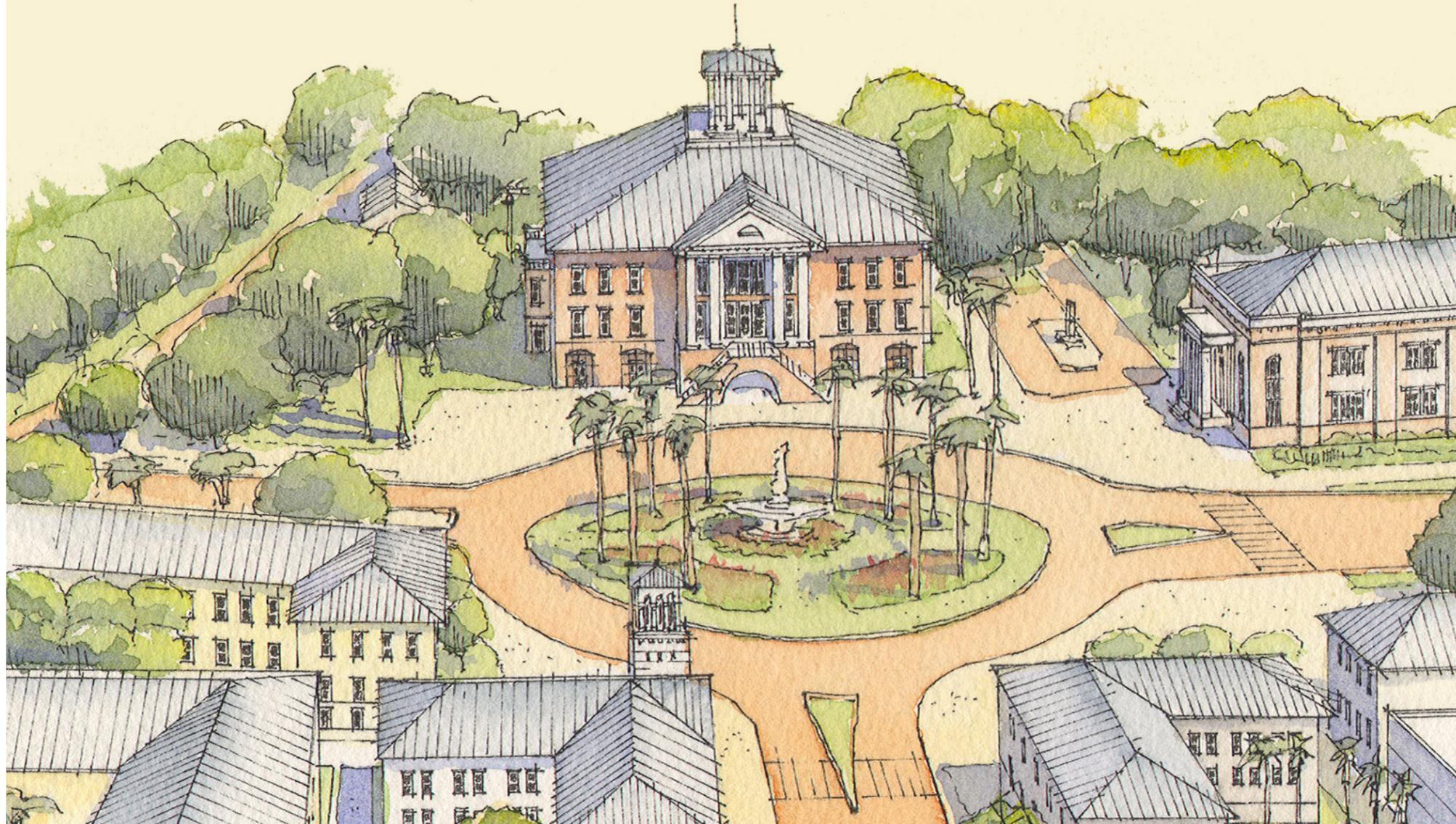


BOUNDARY STREET MASTER PLAN

June 2006



THE BOUNDARY STREET MASTER PLAN

was created by:

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Hundreds of Beaufort Citizens



EXECUTIVE SUMMARY

Why a Plan?

Boundary Street is the entrance to the city. Its current state, as a typical commercial strip corridor, does not enhance Beaufort's overall character and charm — rather it serves as a relatively poor gateway into the historic city.

This plan is a comprehensive strategy for growth and redevelopment of the corridor; it seeks to improve the safety and operational efficiency for all modes of travel, while creating a more economically productive address. The plan envisions that Boundary Street can be more than just improved — it can be one of the most memorable streets in America.

How was this plan created?

“Designing in public”, the team of planners, engineers, architects, and economists conducted an open planning process in September 2005 to identify the ideas, needs and concerns of the community; over 300 interested residents and stakeholders participated.

FIRST PRINCIPLES OF THIS PLAN

- Interconnect it all:

A network of interconnected blocks and streets can disperse everyday trips; in particular, a parallel street system must be created running east-west so that all trips do not use Boundary Street.

- Create traffic capacity and safety and character: *Boundary Street can be transformed into an urban street address that is conducive to a wider variety of economically productive uses instead of the narrow mix of a typical suburban strip; this can be accomplished within an engineering strategy that builds capacity and improves safety.*

- Plan for feasible, phase-able pieces:

Complete transformation of the corridor will not happen overnight, so the plan is designed to be broken down into small components that can be redeveloped as the market demands.

- Make Boundary Street a walkable 'great street': *Boundary Street should be rebuilt according to a design that is more in concert with the lasting features of Downtown, balancing the needs of pedestrians and motorists.*

- Grow a mix of uses and mix of housing types: *The corridor should support not just retailing and hotels, but also housing, workplaces, offices, green spaces, and civic uses; a mix of uses is essential to conquering transportation problems.*

- Assemble a green network; link marsh views: *A continuous marshfront park should be created along Battery Creek; a town square, village green or central park should also be established.*

- Grow a memorable entrance to town: *The intersections where Boundary Street meets Robert Smalls Parkway and Ribaut Road should be reorganized in a way that evokes the civic art of Beaufort, and addresses traffic concerns, by rebuilding the geometry of the intersections and carefully situating landmark structures.*

Transportation

Engineers recognized a fundamental tension between the need to move large volumes of traffic and the desire to create a walkable environment that extends the benefits of the historic town's form; the plan calls for balancing this tension by incorporating classic multi-way boulevard concepts into the Boundary Street context. A conceptual design is included.

Modern roundabouts are recommended for the Robert Smalls Parkway and Ribaut Road intersections, and extensive analysis has been performed to confirm their workability; information is provided to explain why the roundabouts are preferred. Designs are included for conventional signalized intersections, should City leaders decide the roundabout concept is too extraordinary.

A street map indicates how to shape the thoroughfare network north of Boundary Street as redevelopment occurs.

Implementation

The plan lays out a series of steps to be undertaken to realize the vision. First among these is adopting a Form-Based Code.

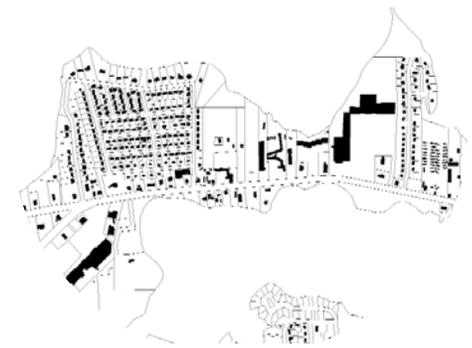
The Implementation section of the plan spells out future planning tasks, promotional tasks, and a series of funding mechanisms for public capital improvements and private development.

Big Moves

- Create special gateways to the city
- Locate civic buildings at prominent positions along the corridor
- Assemble a series of redevelopment sites
- Convert strip shopping centers to town blocks
- Transform busy intersections to make them pedestrian friendly
- Preserve natural views
- Form a parallel street network

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research & analysis 1

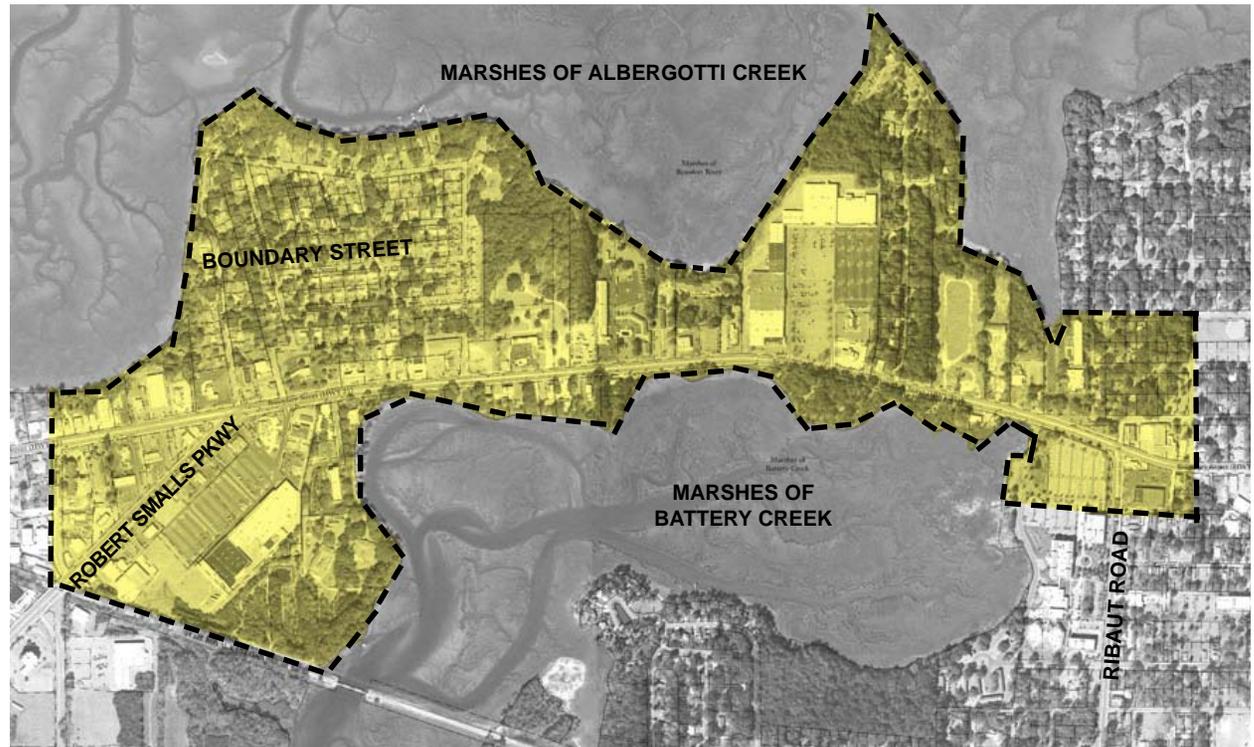
"Boundary Street is a crucial area of Beaufort because it is an entranceway, first of all, and secondly, it has the great promise of once again becoming a vital economic area of the City."

– Mayor Bill Rauch

September 29, 2005, Work-in-Progress Presentation

Boundary Street (U.S. Highway 21) is one of the most important streets in Beaufort. The street is an entrance to the city and a major element in the regional transportation network of surrounding Beaufort County. Realizing the importance of Boundary Street on the local and regional level, the City, County, and Beaufort residents recognized the need to join together to create a comprehensive strategy for growth and redevelopment of the corridor. The Boundary Street Master Plan seeks to improve safety and traffic flow, while balancing the needs of vehicles and pedestrians. In doing so, this document represents a cohesive plan for the future of the corridor which details specific design solutions and a feasible implementation strategy.

In 2005 the City of Beaufort and Beaufort County, along with the town planning firm of Dover, Kohl & Partners, worked together to create a plan for the redevelopment of the Boundary Street corridor. The planning process for the corridor began with a review of all relevant previous plans and studies and a detailed analysis of the study area. This chapter details the analysis of Boundary Street; the chapters following describe the community charrette and resulting plan.



An aerial view of the study area

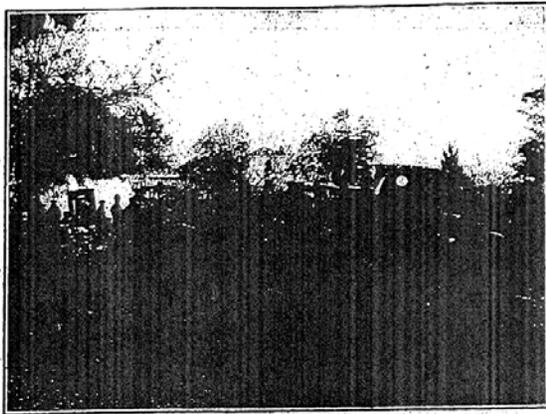
BOUNDARY STREET ANALYSIS

The study area defined for the Boundary Street Master Plan is bound by Palmetto Street to the east and Robert Smalls Parkway (SC 170) to the west. The area is bordered on the north by the marshes of Albergotti Creek and on the south by Battery Creek. Boundary Street (U.S. Highway 21) is the primary entrance to the City of Beaufort and the National Landmark Historic District. The County Government Center anchors the east end of the study area; the Beaufort Plaza shopping center is located at the west end. The Boundary Street corridor serves as an essential element in the regional road network, yet the design and physical form

characterizes the roadway as a suburban arterial a poor demonstration of Beaufort's overall character and charm. A comprehensive strategy for the future of this important corridor is needed to address the physical form and redevelopment of the corridor, as well as its ability to handle continued traffic capacity.

The thorough examination of background information, combined with photographing existing conditions and analyzing base maps, prepared the planning team for creating a workable plan for Boundary Street.

Beaufort Continues to Improve Her Streets



The picture showing the remainder of Boundary Street being graveled with "Augusta Gravel," which consists of thirteen hundred and fifty feet. Last year eleven hundred and sixty feet of this street was relocated and graveled eliminating a bad curve and connecting up with the State Highway. It is the purpose of the city to gravel Bladen Street from Boundary Street to Bay Street, which consists of two thousand three hundred and ninety-five feet. This work is being done by the city forces at an economical cost, due to the fact that the Street Department is equipped with modern equipment. When this improvement is completed this will allow Beaufort to boast of being one of the few towns in the State of South Carolina with a hard surface road the entire way into the town. This is a very important improvement as Boundary Street is

St. Peter's church is the oldest Catholic church in the diocese of Charleston. The present structure is the original church built before

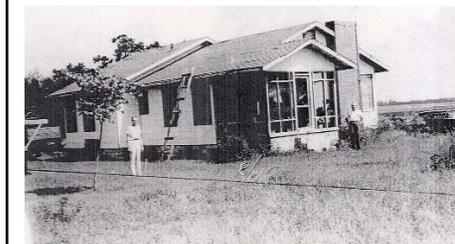
the main entrance to the town and Bladen Street is the main entrance to Bay Street, which is paved with brick. Rebuilding Boundary Street with gravel does not mean that this is the end of its improvement. Plans are being made to plant Palmetto trees along the borders from the city limits to Bladen Street. This is not necessary along Bladen Street as it is well planted with trees.

The financing of this project was made possible by the aid of the Beaufort County Highway Commissioners, namely: F. W. Schepher, Jr., William N. Levin, W. J. Thomas, James G. Huston, H. R. Williams and W. J. Fripp. Due to the efficient manner in which these gentlemen handled the finances of our much talked of highway from Beaufort to Yemassee, there was a surplus after the final settlement was made, part of which has been given to the city and adding the like amount it has enabled the city to make this improvement. The city officials wish to thank the Commissioners for the public spirit shown in this matter and also take the liberty to thank them in behalf of the citizens of Beaufort!

Beaufort Gazette, December 11, 1924



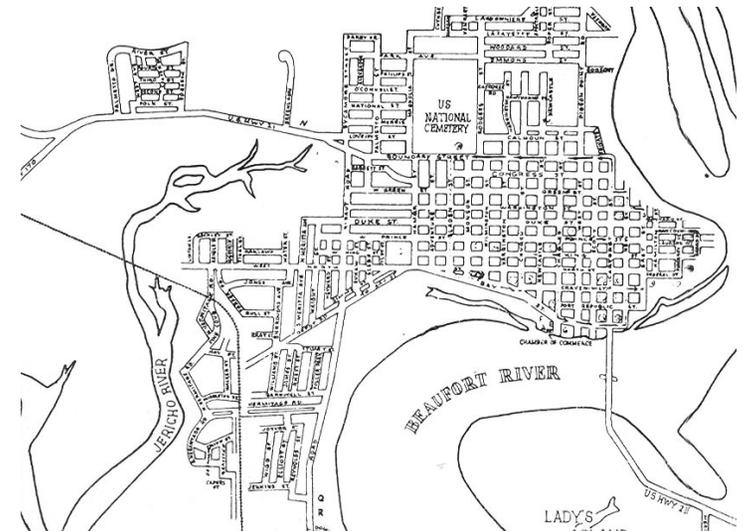
First palmetto trees planted along Boundary Street, approximately 1940.



South Carolina Department of Transportation (SCDOT) workers documenting the rights-of-way for the widening of Ribaut Road and Boundary Street, 1959 – 1969.

STUDYING THE PAST

Once a shell road leading to the center of town (Downtown and The Point), Boundary Street has been repeatedly repaved and widened during decades of growth and development. Prior to creating the plan for the future of Boundary Street, the design team researched the history of the corridor by reviewing the City's collection of historic maps and photographs. From its inception, Boundary Street has served as a primary transportation route connecting Downtown Beaufort with the region. Once the boundary line of the town, the evolution of the corridor as a central element in the City is a representation of the continued growth of Beaufort.



City street map showing Boundary Street as an entrance to Downtown.

ANALYSIS OF EXISTING CONDITIONS

The Boundary Street we know today was developed in the 1960s for highway-style commercial development. Commercial uses still dominate the area. Buildings are typically one story tall, with the occasional building reaching two stories, and are set back from the roadway, often behind an expanse of parking. Buildings along the south side of the corridor turn their backs to Battery Creek. On the north side of the road most marsh views are obstructed by the backs of buildings. Numerous curb cuts line the roadway while a center turn lane extends along the entire length of the study area. Portions of narrow sidewalk line the corridor and crosswalks occur in limited locations. Walking and driving the study area, team members photographed the corridor and its neighborhoods, civic buildings, and open spaces to document the existing conditions of Boundary Street.

Land uses in the study area include a number of restaurants (including many fast food establishments with drive-through facilities), motels, a church, several gas stations/convenience stores, banks, professional offices, pockets of single-family residential neighborhoods, and various retail uses. While most of the commercial uses are located on individual lots, the area contains two shopping centers – Beaufort Plaza and Jean Ribaut Square. The Boundary Street study area also contains archeological sites (Battery Saxton, a Civil War battery) and a historically significant African-American cemetery, 16 Gate.

The images on the next two pages document the existing conditions of Boundary Street.



Aerial images are useful for understanding the natural boundaries of the corridor. Above, an aerial view of the study area looking west



Aerial view of the study area, looking east



Aerial view of the study area, looking southwest, with the County Government Complex on the lower left

Boundary Street



Beaufort Plaza



South of Boundary



Jean Ribaut Square



Municipal Center

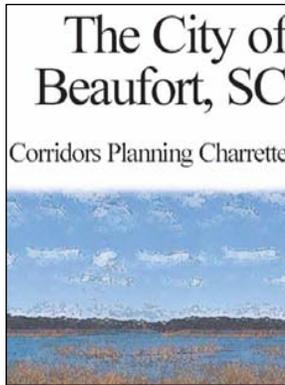
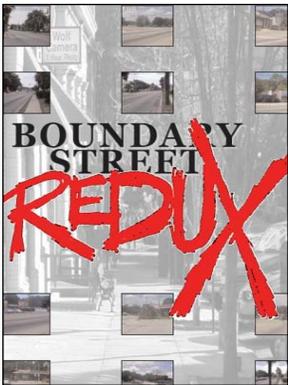
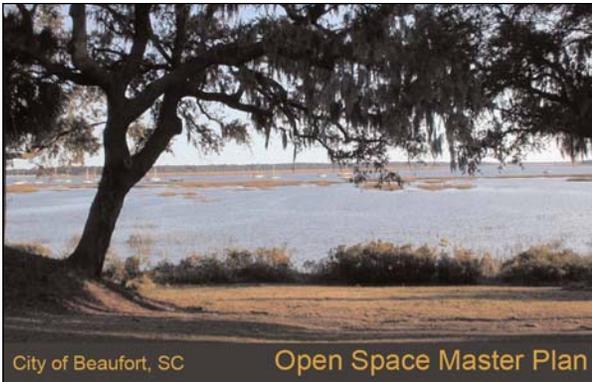


Neighbors

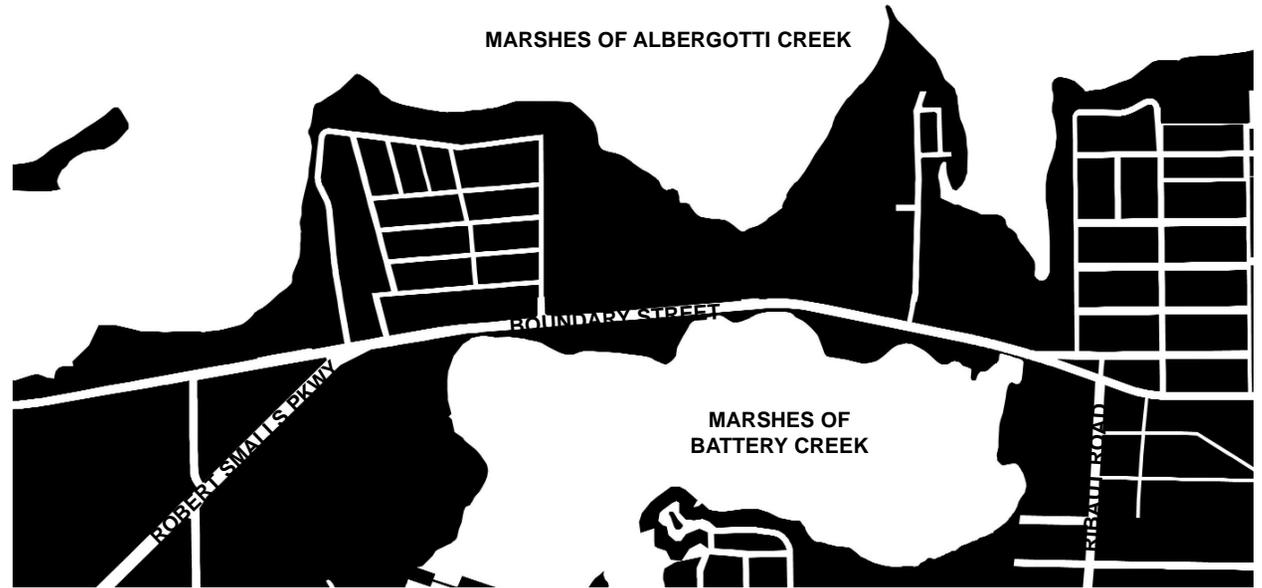


ANALYSIS DIAGRAMS

In addition to photographing the study area, the team analyzed past studies of the area, the City's Unified Development Ordinance, recent development proposals, traffic accident data, and other relevant background information. The reports and plans helped the team to better understand recent efforts to revitalize the corridor and community involvement in creating such plans. Using the City's Geographic Information Systems (GIS) data, the team created a series of analysis diagrams to better understand the dynamics of the planning area.



The team reviewed all previous studies relating to Boundary Street.



STREET NETWORK DIAGRAM

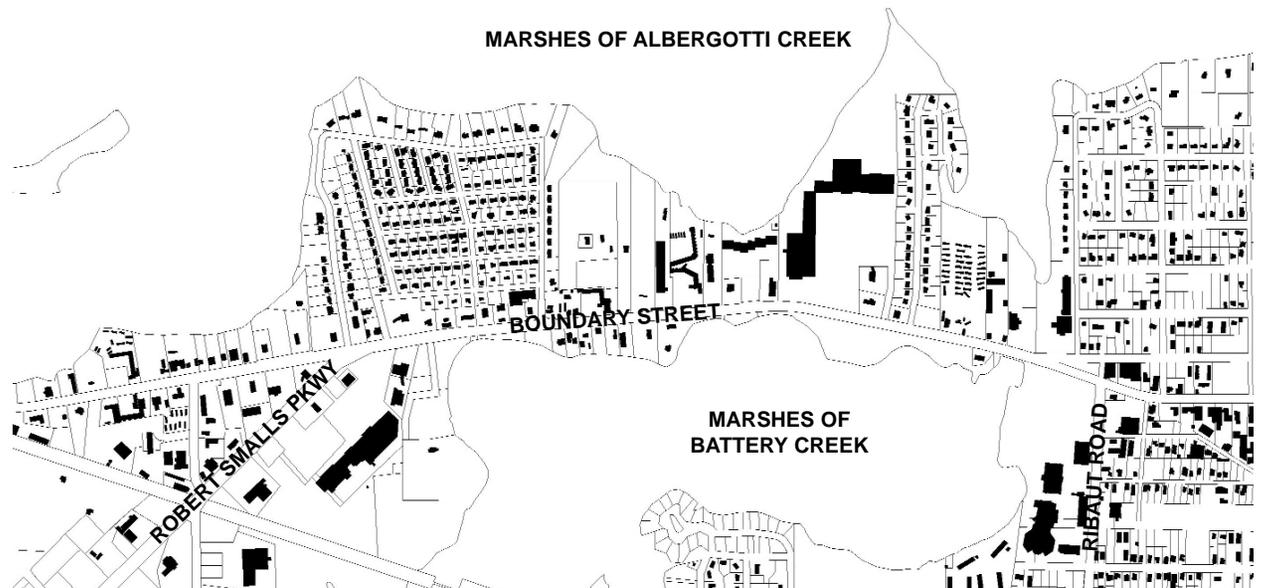
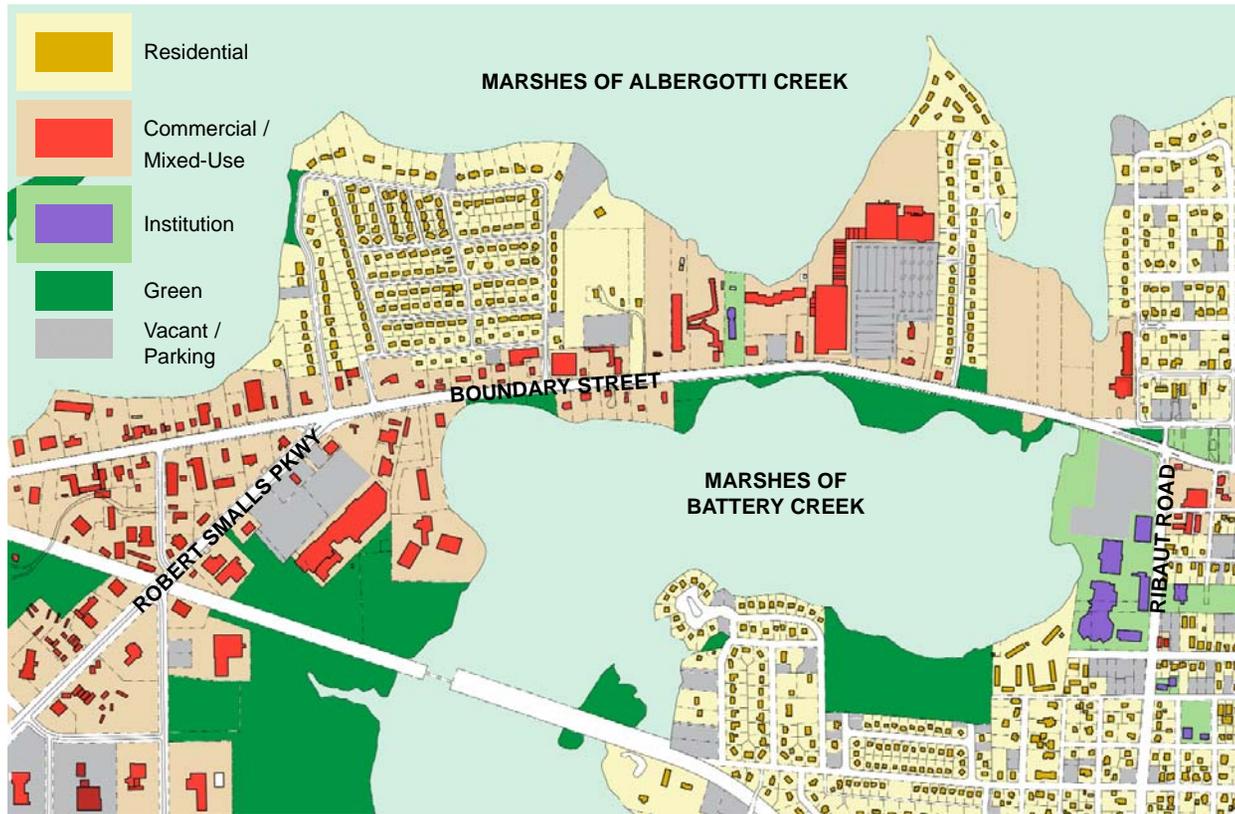


FIGURE GROUND



LAND USE

The following land use diagrams demonstrate a variety of development conditions which exist along the corridor. These diagrams, or X-rays, are helpful to better understanding the current land development dynamics of Boundary Street. For the most part, uses are separated and commercial buildings line the street. The land use diagrams are also useful in documenting vacant land and surface parking lots, both of which have the potential to become development sites.



RESIDENTIAL



COMMERCIAL



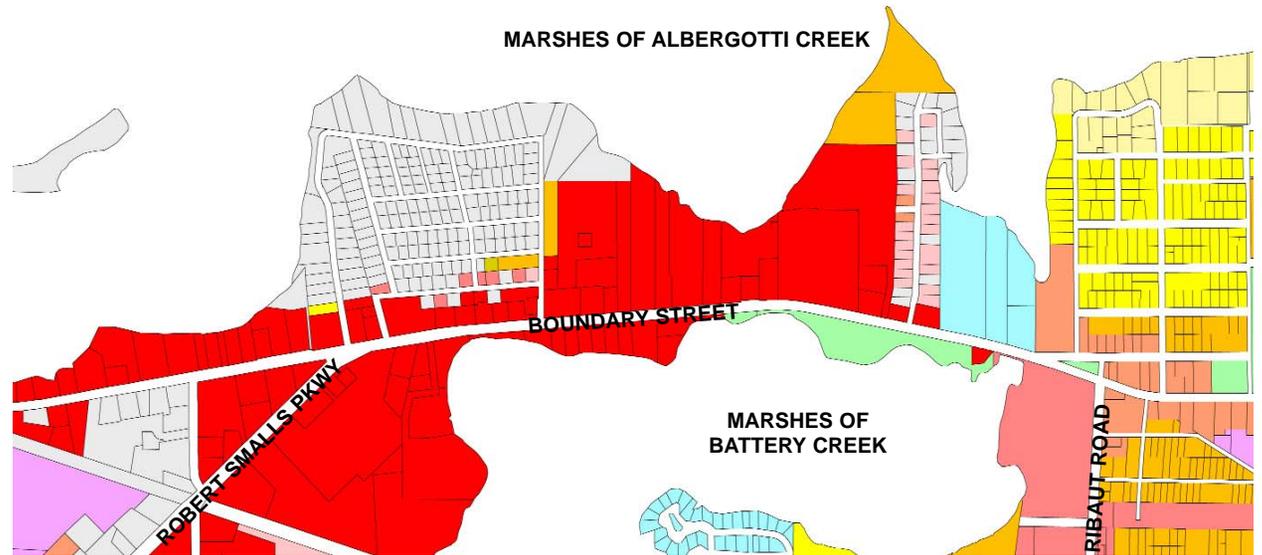
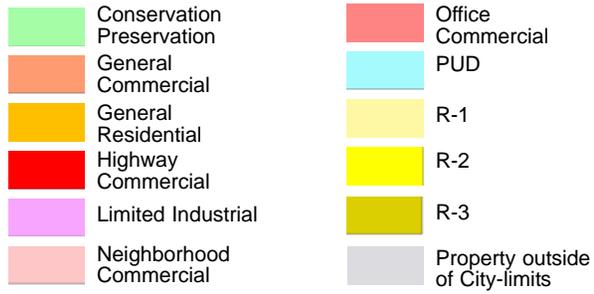
OPEN SPACE AND INSTITUTIONAL



VACANT LAND AND PARKING LOTS

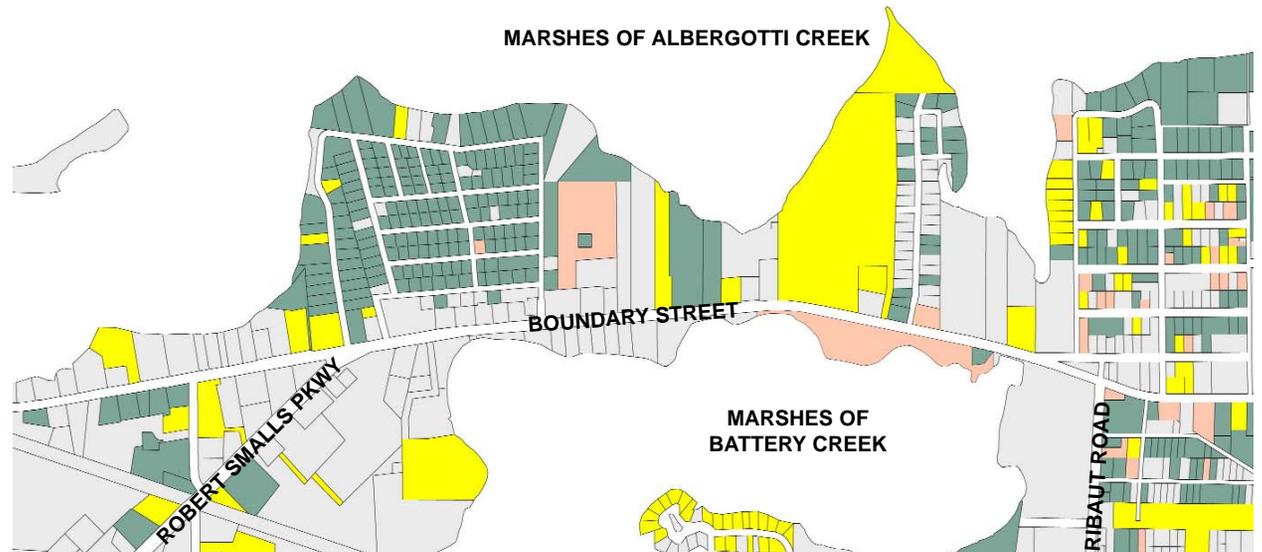
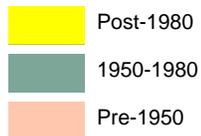
ZONING

Properties located along the Boundary Street corridor are primarily zoned Highway Commercial.



DATE OF CONSTRUCTION

A large amount of development along the corridor occurred between 1950 and 1980.



SCALE COMPARISONS

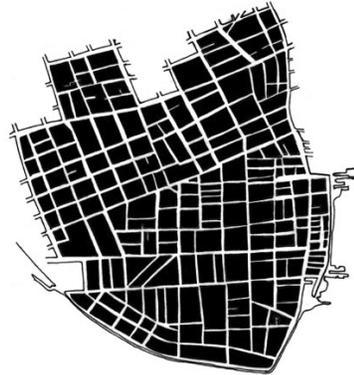
Scale comparisons helped the planners and community participants to better understand the scale of Boundary Street in relation to other memorable corridors and great places. Below is Boundary Street at the same scale as other well-known towns and corridors. The scale comparisons give light to the vast amount of land available for redevelopment along the corridor, and make vivid one key source of the corridor's traffic problems, its sparse road network.



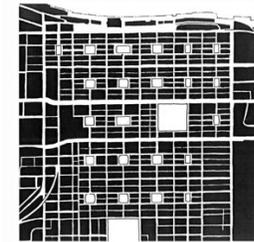
Boundary Street



Historic Downtown
Beaufort, SC



Broad Street
Charleston, SC



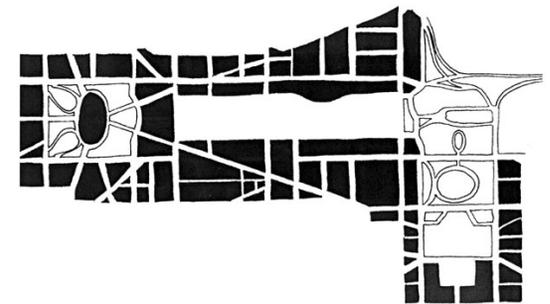
Broughton Street
Savannah, GA



Monument Avenue
Richmond, VA



Commonwealth Avenue
Boston, MA



The Mall
Washington, DC

PRELIMINARY ECONOMIC AND MARKET ANALYSIS

The Preliminary Economic and Market Analysis was conducted to identify a range of redevelopment and marketing strategies for the Boundary Street Redevelopment Area. The comprehensive analysis consisted of local demographic and market research as well as an analysis of emerging national retail and redevelopment trends. The present and projected future conditions of the Boundary Street corridor commercial market area were considered, as well as residential market issues and the neighborhoods in the redevelopment area. The following key elements are included in the Preliminary Economic and Market Analysis:

- An inventory of the existing businesses and properties (occupied and vacant) in the Boundary Street Redevelopment Area.
- Demographic profile and analysis of the City of Beaufort, Beaufort County and the determined trade area relative to the study area.
- Information gathered from interviews with several local business owners, real estate agents and similar knowledgeable professionals.
- Research of retail sales and economic trends.
- Analysis to indicate potential market support for redevelopment in the project area.

Summary of Findings

There are many identifiable strengths of the Boundary Street corridor related to the corridor's specific attributes (existing infrastructure, high traffic volumes, etc.) as well as strengths that are more broadly associated with Beaufort and Beaufort County (environment, high growth rate etc.). Though there are weaknesses to overcome, a visionary approach to redevelopment can realize and even surpass the calculated potential in terms of demand for additional housing units and

commercial space. It is conservatively estimated that approximately 160 new housing units can be absorbed in the city of Beaufort on an annual basis, and due to the limited amount of land available for development in the city, it is reasonable to assume that a significant portion of that development can be incorporated into Boundary Street redevelopment projects. On the commercial side, an equally conservative demand model suggests that nearly 90,000 square feet of additional space could be supported by the trade area in the current market, and that an additional 50,000 square feet can be supported for each future 5-year period. Replacement of existing obsolete commercial space would be in addition to these estimated demand levels.

A recent study performed by the Beaufort Regional Chamber of Commerce explores the possibility of a meeting and performing arts hall within the Boundary Street Redevelopment Area. Based on the current and projected economic growth of the area, a performing arts center would greatly benefit the local economy and add to the diverse mix of uses along the corridor.

Beyond the obvious benefits of successful redevelopment in the Boundary Street corridor area for property owners, businesses, and residents, multiple benefits would be realized for the City of Beaufort in general. The current state of the Boundary Street corridor, a typical commercial strip environment, does not enhance the overall character and charm of the city rather it serves as a relatively poor entrance gateway into the historic city for thousands of people each day. Comprehensive redevelopment of this key corridor will be an enhancement for the entire City of Beaufort.



Examples of existing commercial establishments on Boundary Street



creating the plan 2

The plan for Boundary Street was created through teamwork and collaboration.



Working together as a community is the best way to guide growth and assure quality development for future generations of Beaufort residents; the Boundary Street Master Plan demonstrates just this kind of teamwork.

"Designing in public," the Dover-Kohl team conducted an open planning process in September 2005 to identify the ideas, needs and concerns of the community. Participants helped to create the Boundary Master Plan through an intensive design event called a *charrette*. Over the course of seven days, the community and the team of design professionals worked to design the plan. Over 300 interested residents and stakeholders participated in the planning process, including property owners, neighbors, business people, developers, elected officials, appointed officials, City and County staff, and community leaders.



What is a Charrette?

Charrette is a French word that translates as "little cart." At the leading architecture school of the 19th century, the *Ecole des Beaux-Arts* in Paris, students would be assigned a tough design problem to work out under pressure of time. They would continue sketching as fast as they could, even as little carts—charrettes—carried their drawing boards away to be judged and graded. Today, "charrette" has come to describe a rapid, intensive, and creative work session in which a design team focuses on a particular design problem and arrives at a collaborative solution. Charrettes are product-oriented. The public charrette is fast becoming a preferred way to face the planning challenges confronting American communities.



CHARRETTE PREPARATION

Prior to the charrette, the Dover-Kohl team focused their efforts on gathering base information and studying the existing physical conditions of the area. This included learning about local history, reviewing previous plans and studies, examining existing City ordinances and land development regulations, and analyzing the physical, social, and economic characteristics of Boundary Street. A more detailed overview of the team's review of background information can be found in Chapter 1.

Members of the team visited Beaufort throughout the summer of 2005 and met with City officials, City and County staff, property owners, business owners, and other local stakeholders in preparation for the charrette. The meetings and interviews helped the team to better understand the dynamics of Boundary Street and gain full appreciation for the corridor's role in the city and region. Team members met with City staff to further understand previous planning efforts and met with City officials to better gauge the leadership's vision and ideas for the future of the corridor.

A key element in preparing for the charrette was generating public awareness. City staff spread the word about the Boundary Street planning process by including ads in the local newspaper, posting public notices, generating extensive mailings, and by placing a large sign at the corner of Ribaut Road and Boundary Street announcing the charrette events.



Tree-lined streets of Savannah



The beautiful sideyard houses of Newport



Colonial architecture from Beaufort



A traditional Beaufort cottage



Measuring Boundary Street's sidewalks



Walking Boundary Street

STUDY TOURS

To further understand the planning context of Boundary Street, the team arrived a few days prior to the start of the charrette to allow time to study and tour the corridor and its surroundings, including Savannah, Bluffton, Port Royal, Downtown Beaufort, and Beaufort County. The study tours clarified Boundary Street's important place within the City and surrounding region and enhanced the team's understanding of current issues, concerns, and redevelopment prospects. The team examined the corridor and intersecting streets on foot and by car, noting areas of particular interest or concern. With base maps in hand, the planners and designers analyzed the existing urban fabric, paying careful attention to street connections, pedestrian safety, and redevelopment opportunities.

Team members walked and photographed the corridor, noting building form, building placement, architectural character, street design, and marsh views. Particular attention was devoted to analyzing the existing conditions of the future Beaufort City Hall site, Jean Ribaut Square, and Beaufort Plaza to prepare for the creation of redevelopment scenarios for the three properties. On base maps of the existing conditions, team members highlighted potential areas for infill development, street improvements, and unique conditions and characteristics of Boundary Street, such as the magnificent marsh views.



The Kick-off Presentation marked beginning of the charrette.



Victor Dover began the hands-on session with a few ground rules.

THE CHARRETTE

On Friday, September 23, 2005, a Community Kick-off Presentation marked the start of the charrette. Residents, City leaders, and local stakeholders gathered at the Beaufort Arsenal for an evening presentation. An introduction was provided by Mayor Rauch as he welcomed the Dover, Kohl team and emphasized the importance of Beautiful citizens to participate in the planning process. Victor Dover, principal of Dover, Kohl & Partners and charrette leader, then outlined the challenge for participants during the charrette week. He stressed the importance of citizen involvement throughout the process to ensure the creation of a plan truly representative of community ideals. Victor emphasized that the plan for Boundary Street would be created with the community, for the community. He provided background information on traditional town building, redevelopment, Smart Growth principles, and preserving community character. Victor introduced other members of the team, including Rick Hall of Hall Planning & Engineering, who spoke about advances in transportation planning and showcased examples of livable streets across the country. At the end of the presentation attendees were able to ask the consultant team questions about the process and project. Approximately 100 citizens attended the Kick-off Presentation, eager to work together to create a plan for the corridor.

On Saturday, September 24, over 75 community members gathered at the cafeteria in the Beaufort Elementary School for the Hands-on Design Session. The event began with a short introduction and briefing by Victor Dover to further explain the challenge for participants, orient participants to base maps, and set ground rules and goals for the session. Working in small groups of approximately eight people per table, participants gathered around tables to draw and share their varied ideas for the future of Boundary Street.

ONE WORD that comes to mind about Boundary Street:

NOW: Cars

IN THE FUTURE: People!
(In my vision)

ONE WORD that comes to mind about Boundary Street:

NOW: THREATENING

IN THE FUTURE: SERENE
(In my vision)

ONE WORD that comes to mind about Boundary Street:

NOW: disconnected

IN THE FUTURE: Community-based
(In my vision)

ONE WORD that comes to mind about Boundary Street:

NOW: Boring

IN THE FUTURE: Spectacular
(In my vision)

At the Kick-off Presentation, residents were asked to write one word to describe Boundary Street now, and how they envision the area in the future.

Each table was equipped with base maps, markers, scale bars, scale comparisons, and aerial photos of the study area. A facilitator from the Dover-Kohl team or a local planning volunteer was assigned to each table to assist participants in the design exercises.

During the first part of the table sessions, community members identified the important issues associated with the overall future of the corridor. Participants actively drew on base maps to illustrate how they might like to see the corridor evolve in the future by describing the uses, open spaces, building design, landscaping, street design, transportation, parking, and services for Boundary Street.

During the second part of the workshop participants focused on specific redevelopment areas along the corridor. Each table worked on one or all of these "close-up" areas – the future City Hall site, Jean Ribaut Square, and/or Beaufort Plaza. At the end of the workshop, a spokesperson from each table reported their table's ideas for the overall plan for Boundary Street, as well as the detailed redevelopment plans, to the entire assembly. Of the many ideas heard, some of the most widely shared ideas included:

- Make the corridor more pedestrian and bicyclist friendly.
- Provide green space along the corridor; protect and preserve views of the marsh.
- Pursue the concept of roundabouts at the SC 170 and Ribaut Road intersections of Boundary Street.
- Provide a mix of uses and a mix of housing types along the corridor.
- Create an attractive entry/gateway to Beaufort.
- Provide an interconnected street network.



Residents worked together, sharing ideas for the future of Boundary Street.



One representative from each table presented their work to the entire group.



The goal of the hands-on session was to forge an initial consensus and develop an overall community vision for Boundary Street. In addition to the group presentations, each participant filled out an exit survey at the end of the session. The survey responses reveal the ideas of the many individuals that participated.

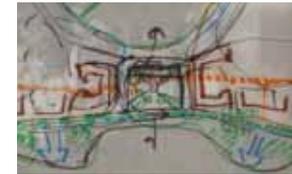
From Sunday, September 25 through Thursday, September 29 the design team continued to work with the community in an open design studio in the Friends' Room at the Beaufort Arsenal.

Citizens and local leaders were encouraged to stop by the studio throughout the week to check the status of the plan, provide further input, and to make sure the design team was on the right track. The convenient location of the studio at the Arsenal, as well as the immense community interest, led over 100 people to participate throughout the week. The table drawings and plans from the Saturday design session were placed around the room for easy review as new people became involved. While community members visited the studio, the design team continued to analyze the information gathered at the hands-on session and site analysis in order to formulate the initial concepts for the plan.

The team was tasked with synthesizing the many ideas heard from the community throughout the week into a single cohesive master plan. The planners and designers created lists, computer visualizations, diagrams, drawings, and plans, working to combine and refine the ideas. Working in Beaufort allowed the design team ready access to the study area during all hours and on different days of the week. The planners observed day-to-day traffic patterns, public uses, and other details of everyday life along Boundary Street.



A sample of the drawings produced during the hands-on session



Residents and interested citizens stopped by the design studio to check the progress of the plan and share ideas.



Meetings during the week helped to shape the details of the technical plan.





Local leaders visited the studio throughout the week to monitor the progress of the plan.



The team digitalized all images for the Work-In-Progress presentation.

In addition to the public design studio, members of the design team met with specific stakeholders and experts in scheduled technical meetings. The meetings were used to answer design questions, discuss the draft plan, and further gain input in regards to details associated with the redevelopment of the corridor. The scheduled technical meetings included sessions with City and County staff, elected officials, appointed officials, the City's City Hall architects, the Greater Beaufort Chamber of Commerce, South Carolina Department of Transportation (SCDOT), and property owners. The technical meetings helped to further shape the detailed elements of the plan and to ensure that the ideas being processed were balanced by awareness of many viewpoints.

The charrette week ended with an evening "Work-in-Progress" presentation on Thursday, September 29 at a special City Council meeting. Over 100 citizens gathered at the County Council Chambers for the presentation, eager to hear and see how the planners and designers were able to synthesize the community's ideas into the vision for the future of Boundary Street. After an introduction by the Mayor, Victor Dover began the presentation with a summary of the week's events, then presented sketches and computer visualizations illustrating the hypothetical future build-out of the corridor. Focusing on specific areas, Victor walked the audience through a "future tour" showing both short and long-term changes that are possible under the plan. Renderings showed "before and after" illustrations of possible redevelopment scenarios. Transportation and roadway improvements were illustrated, demonstrating how balance can be reached between traffic capacity and walkability. At the end of the presentation, a survey was distributed to gauge the community's opinion on the ideas presented that evening.

AFTER THE CHARRETTE

At the conclusion of the week-long charrette, the design team departed Beaufort and returned home to their offices. Over a period of six weeks the illustrative master plan produced during the charrette was refined and this report was created. The plan documents were then submitted for City and community review. The following report represents the community's desires and goals for the future of Boundary Street within a workable framework of specific implementation measures.



Mayor Rauch welcomed the community at the Work-In-Progress Presentation.



Victor Dover presented sketches and computer visualizations illustrating the hypothetical future build-out of the corridor.

Work-in-Progress Survey Results:

At the end of the presentation an exit survey was distributed for additional feedback. 30 surveys were returned from citizens who attended the Work-in-Progress Presentation.

Do you think the plan is generally on the right track?

Yes = 95%

Maybe = 2%

No = 3%



Over 100 citizens attended the Work-in-Progress Presentation.



Residents studied the details of the plan.

Boundary Street Master Plan
Work-in-Progress Presentation, September 29, 2005

What events did you participate in during the charrette week?

Community Kick-off Presentation Yes No
Friday, September 23

Hands-on Design Session Yes No
Saturday, September 24

Open Design Studio Yes No
Sunday, Sept. 25 - Thursday, Sept. 29

Community Open House Yes No
Tuesday, September 27

Of the many ideas you heard tonight, which idea should be made a top priority?

MIXED USE ; INTERCONNECTED

Are there any elements of your vision for the future of Boundary Street we might have missed?

HOW DOES IT RELATE TO OTHER AREAS OF CITY ; AND COUNTY THAT ALLOW STUDY AREA.

Do you think the plan is generally on the right track?

YES

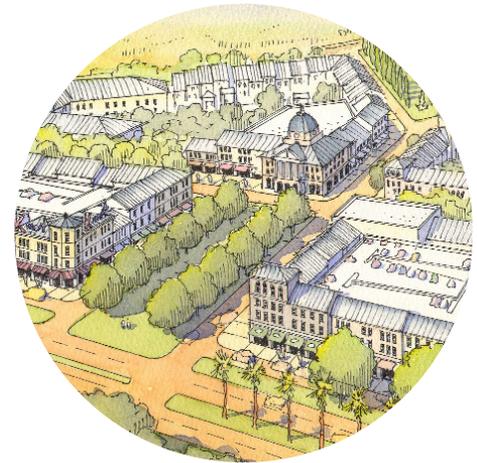
GOOD GRAPHIC PRESENTATION - PEOPLE FRIENDLY

Please write additional comments on back of sheet. Thanks for your help and your ideas!
Please leave this on the table at the door or fax it to us at 525-7034.

Sample exit survey response



The team answered questions at the end of the Work-In-Progress Presentation.



first principles 3

Through the charrette process, the community and design team arrived at a series of basic urban design, transportation, and policy principles to guide the redevelopment of the Boundary Street area. Shaped from input by Beaufort citizens during the charrette, the "First Principles" embody the citizenry's vision for the future of the corridor. The First Principles summarize the results of the open planning process and promote responsible growth and development. The principles apply to Boundary Street, but are also essential planning principles that should apply to the redevelopment of corridors throughout the region. Boundary Street has the opportunity to become a model example for corridor redevelopment.

This chapter presents the broad scope of the community's vision for Boundary Street; specific design components of each principle are further described and illustrated in Chapter 4. General guidance on implementing each principle is included; detailed implementation strategies can be found in Chapter 6.

FIRST PRINCIPLES

- I. *Interconnect it all*
- II. *Create traffic capacity & safety & character*
- III. *Plan for feasible, phase-able pieces*
- IV. *Make Boundary Street a walkable 'great street'*
- V. *Grow a mix of uses & mix of housing types*
- VI. *Assemble a green network; link marsh views*
- VII. *Grow a memorable entrance to town*



-  Mixed-Use
-  Institutional
-  Residential
-  Green Space

The *Illustrative Master Plan* was created during the charrette. The plan synthesizes community ideas and depicts the idealized build-out for Boundary Street. This map is for illustrative purposes and is not a regulating document. The Illustrative Master Plan identifies key opportunity parcels for potential development, redevelopment, and conservation.



The existing street network (highlighted in blue) along the Boundary Street corridor.

I. INTERCONNECT IT ALL

Boundary Street is one long road that connects Beaufort County and the surrounding region with historic Downtown Beaufort. Boundary Street serves as a regional connection east and west, but the block and street network north and south of the corridor is fairly disconnected. The existing pattern of disjointed blocks and limited street connections reflects the fingers of marsh which pinch the landforms alongside portions of the corridor. While this natural barrier of marshes limits block and street connections, much of the disconnectedness is a result of strip-commercial development.



New streets (highlighted in orange) complete the network of streets, adding multiple options for travel.

The current development pattern along the corridor is a showcase of conventional sprawl development where land uses are separated from one another and spread out in an auto-only setup – and virtually every auto trip, even a short one, ends up requiring a drive along the regional road corridor. From team observations and community input both before and during the charrette, it is apparent and essential that Beaufort residents need more than that single way to get from one place to another. A complete street network of interconnected blocks and streets can disperse everyday trips along Boundary Street through various street alternatives. In particular, a parallel street system must be created running east-west so that all daily trips, especially very local ones, do not have to use Boundary Street.

Providing for improved connections does not just mean providing for better vehicular connections. Connections also mean providing for walkability. Beyond that, the revitalized corridor should also offer the kind of connectedness that one gets from getting to know neighbors encountered on a regular basis in a coherent environment, as well as the kind of connectedness that imparts a personal sense of awareness of, and relationship to, the surrounding natural setting. This increased sense of connection to one's community means incorporating things like gathering places and a pedestrian-friendly street network in the plan.

II. CREATE TRAFFIC CAPACITY & SAFETY & CHARACTER

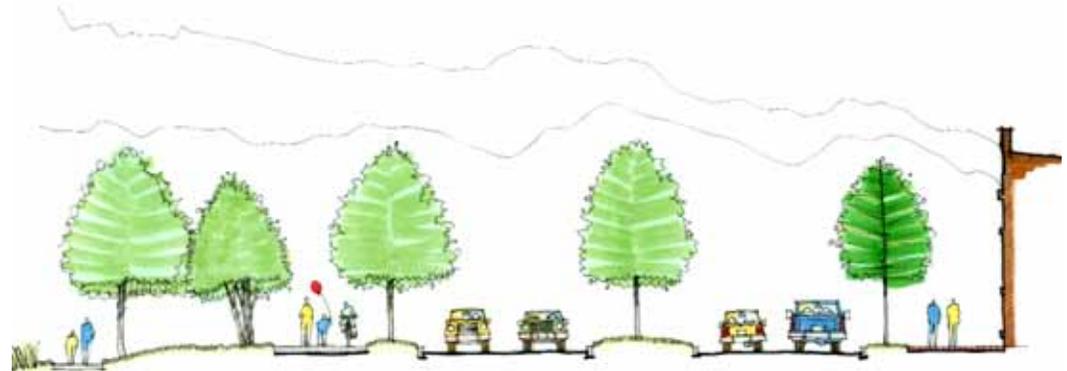
As Beaufort plans for its future, being able to move automobiles and emergency vehicles along Boundary Street is very important. It is right to maintain traffic capacity and improve it as possible; but, safety for both vehicles and pedestrians should be increased and a beautiful place created as the corridor evolves in the future. Boundary Street should remain a central organizing element to the Beaufort transportation network, yet the corridor should be able to handle more than traffic capacity. The future Boundary Street should be a place of improved safety and community character.

In its current configuration, Boundary Street is primarily an instrument for moving cars. Businesses, and the overall physical design and layout of buildings along the corridor, are organized in a manner which cater to the automobile. The emphasis on the automobile, and moving people from here to there, has a negative impact on safety, walkability, and the general appearance of the corridor as a welcoming entrance to town.

Beaufort can still have a road that is good at moving cars, trucks, and emergency vehicles, but this road can also be safe and provide a workable balance between automobiles and pedestrians – it is possible for Boundary Street to become such a street. In doing so, Boundary Street can be transformed to an urban street address that is conducive to a wide, synergistic variety of productive businesses instead of the narrow mix of economic activities that are drawn to a typical strip. By focusing on Boundary Street as more than just a thoroughfare to move cars, the corridor can become a vital economic resource to the City.

By having a variety of businesses with addresses on and adjacent to Boundary Street – rather than the narrow mix currently found along the corridor, there will be the great potential for job creation, increased tax base, and the creation of a real place – a place where people will want to be, rather than just drive-by. It will take a lot of work, but the citizens of Beaufort should not have to choose between automobile dominance, walkability, or a prosperous street. Beaufort can have all three if people will continue to work together to shape the improved future of Boundary Street.

Boundary Street must look beyond being characterized as just an auto-dominated roadway.



Proposed section for Boundary Street, without frontage road.



Proposed section for Boundary Street, with frontage road.



Jean Ribaut Square, existing conditions



In the near term, a portion of the parking lot is transformed to a central green space with a civic anchor.



In the future, Jean Ribaut Square is divided into a series of interconnected streets and blocks.

III. PLAN FOR FEASIBLE, PHASE-ABLE PIECES

The plan for Boundary Street illustrates the hypothetical build-out of the corridor and the properties along this important roadway. Understanding that the complete transformation of the corridor will not happen overnight, the plan for Boundary Street is designed to be implemented over a long period of time. The plan can be considered as the "100 year" plan; however, regardless of how long it takes to reach the end vision, the plan encompasses the ideals and desires of the community for how the corridor should evolve over time.

During the charrette, the design team worked with the City and property owners to discuss and strategize on how properties along the corridor

can be redeveloped. From the various discussions, the design team worked to create a plan that can be broken down into pieces so that when the time is right, portions of the land along the corridor can be redeveloped. This long-term approach to phased, incremental growth allows for infill development and redevelopment to happen naturally as opportunities arise. By having a plan in place for Boundary Street, the corridor can change and grow over time; the end result will be a livable, economically vital corridor which is representative of the community's goals for the area.



Over time, Jean Ribaut Square is redeveloped as a vibrant neighborhood center along the corridor.

IV. MAKE BOUNDARY STREET A WALKABLE 'GREAT STREET'

At the start of the planning process for Boundary Street and through the duration of the charrette, Beaufort residents were charged to dream big, to imagine what they would really like Boundary Street to become. By thinking big and working together to create a vision for the corridor, Beaufort residents expressed their desires for Boundary Street to emerge as a “great street” – a world class great street worthy of its location in such a special southern town.

In order to transform Boundary Street to a great street, Beaufort citizens and leaders can no longer think of Boundary Street as the forgotten space out beyond town, the "wild west" just outside historic Beaufort. Beaufort can no longer think of the Boundary Street corridor as the forgotten space where from design, zoning, and engineering points of view, anything goes. Instead, Boundary Street and its neighborhoods should be viewed as a protected, cherished part of town that is to be built carefully – built more in concert with the lasting town building techniques of Downtown and less like suburban sprawl. This change in mindset from viewing the corridor as a neglected part of the city to a cherished component of town is the primary ingredient needed to transform Boundary Street from a conventional strip-corridor to a great street.



Boundary Street, existing conditions, 2005.

It is not surprising that, given their multiple roles in urban life, streets require and use vast amounts of land. In the United States, from 25 to 35 percent of a city's developed land is likely to be in public right-of-way, mostly streets. If we can develop and design streets so that they are wonderful, fulfilling places to be, community building places, attractive public places for all people of cities and neighborhoods, then we will have successfully designed about 1/3 of the city directly and will have an immense impact on the rest.

- Allan Jacobs, *Great Streets*



Boundary Street, in the future: a new street design (including street trees to separate pedestrians from moving vehicles) creates a comfortable pedestrian environment.

V. GROW A MIX OF USES & MIX OF HOUSING TYPES

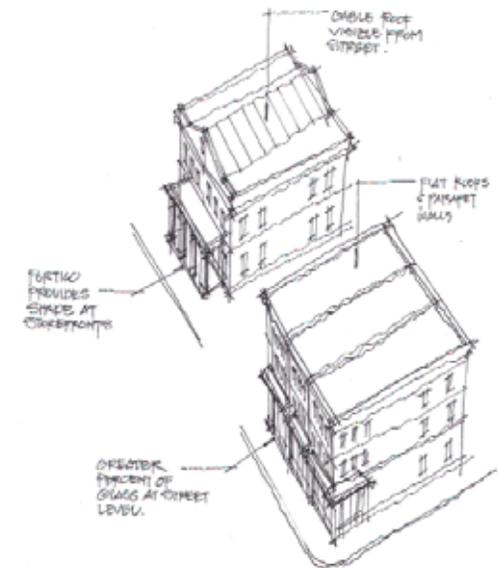
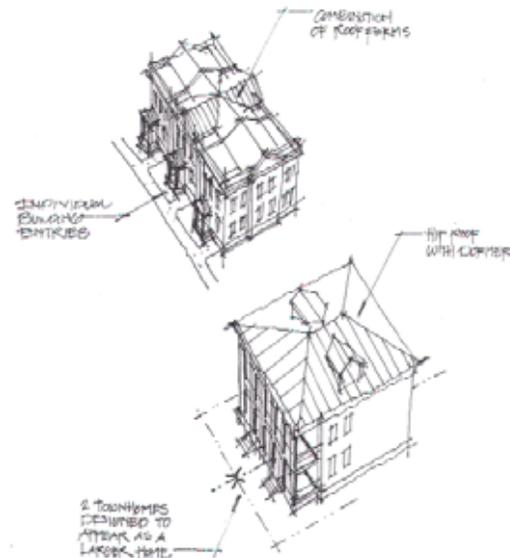
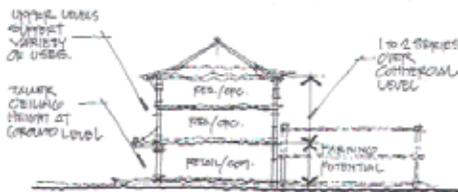
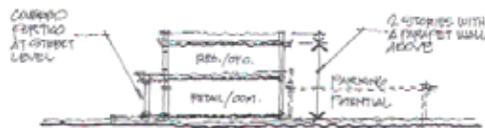
To make Boundary Street functional as it grows, it is important that the corridor not just support retailing or hotels, but also support housing and workplaces, offices, green spaces, and civic uses. The future of Boundary Street must include a mix of uses.

A mix of uses is essential to conquering transportation problems. The traffic in the Lowcountry is becoming legendary. As population increases a little, growth in traffic congestion seems to practically skyrocket. The reason that Beaufort and the surrounding county and towns are experiencing increased traffic congestion is because land uses are all separated. This separation of land uses requires multiple long car trips to get the errands of daily life accomplished and, since the highly traveled streets are poorly interconnected and rarely unburdened by parallel routes, everyone seems to need the same road at the same time.

If 1) land uses are mixed and 2) streets are interconnected in parallel routes north and south of Boundary Street, Beaufort would be doing the two things that matter the absolute most to managing traffic congestion—more than any road widening project ever could.

Beaufort has always been a place where rich and poor live side by side; where people of modest means live in the same town with the richest of rich – and that is a good thing. Beaufort can keep this great quality of community character, even as property values rise throughout town, if a mix of housing types is provided in the new settlements along Boundary Street. Providing a mix of hous-

ing types requires some flexibility in the City's thinking about land development, about density, and about how close together things are. This flexibility may exceed that seen in the historic district in coming years, but that is appropriate; Boundary Street can serve as a place where the city can allow smart, sensible developments that are nevertheless difficult to achieve in the sensitive national landmark historic district, including denser and moderately taller buildings. This revitalization can also be accomplished without unnecessarily displacing anyone. If the citizens of Beaufort and its leaders and investors will join in this together, they can demonstrate their teamwork by mixing housing opportunities along Boundary Street and its environs.



Potential building types for infill development all demonstrate the importance of street oriented architecture.

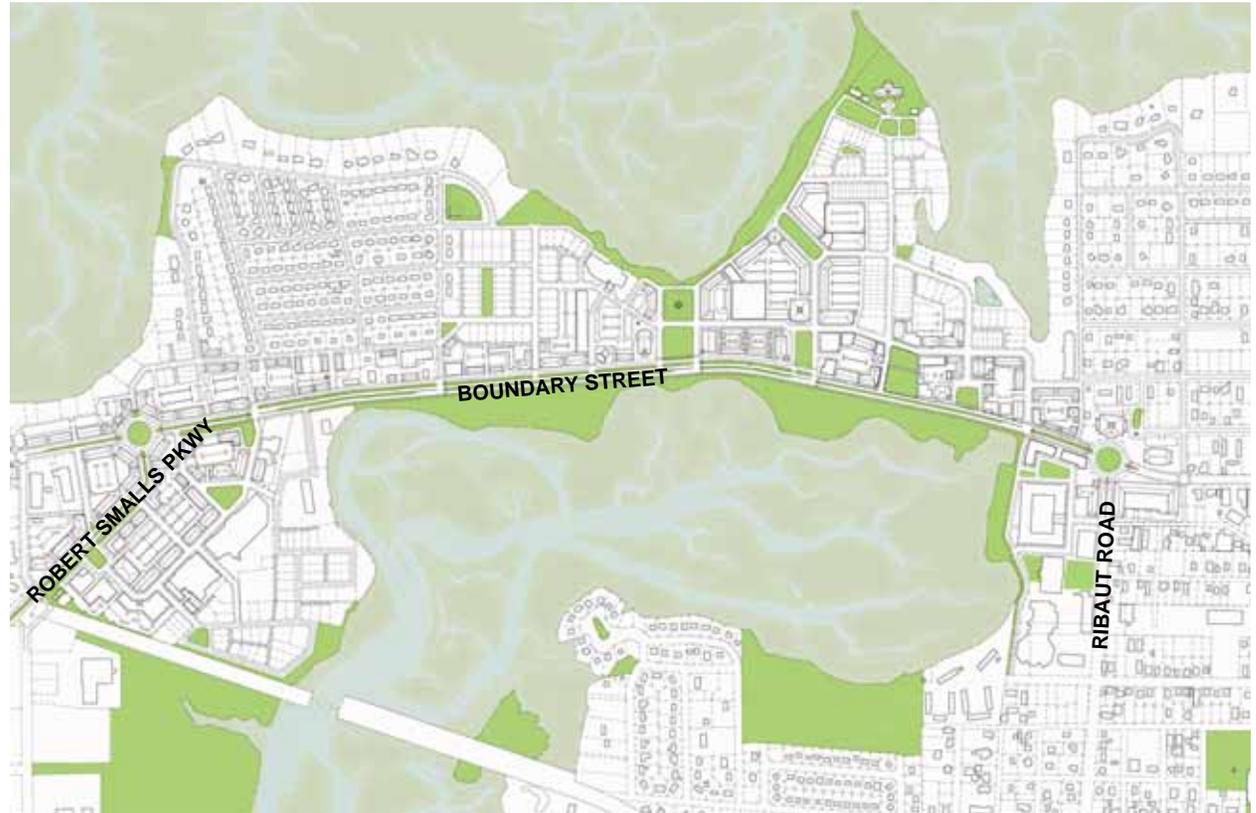
VI. ASSEMBLE A GREEN NETWORK; LINK MARSH VIEWS

The City's Open Space Master Plan has a big-picture vision for creating a "greener" Beaufort and part of that vision is focused on the south side of Boundary Street. The Open Space Master Plan is incorporated into the Boundary Street plan where it appropriately recommends gradually assembling a continuous linear marsh front park along Battery Creek.

In addition to a great marsh front park, citizens expressed a great ambition for a different kind of green space, like a town square or village green kind of place. A series of squares, plazas that could be beneficial to property owners, but also allow the city to assemble a better green network are included in the plan for Boundary Street. The illustrative plan depicts a series of such spaces, including some that are simple to accomplish as part of large-scale redevelopment approvals and others that will take strategic cooperation and patience to realize.



A new central park might be located along Boundary Street, providing a view to marshes to the north and south.



The above diagram illustrates the network of green spaces provided throughout the Boundary Street corridor in the master plan.



Views out to the marshes from Boundary Street



Postcard image: sun setting over the marshes



Ribaut Road and Boundary Street, existing conditions



In the future a roundabout is placed at the intersection and a complete Municipal Complex is formed with the build-out of the County Government Center and the addition of Beaufort City Hall at the terminus of Ribaut Road.



VII. GROW A MEMORABLE ENTRANCE TO TOWN

All of the First Principles go together to create a memorable entrance to town. Creating this great entrance goes beyond just transforming the physical characteristics of the roadway and adjacent properties; it also includes transforming the big, busy, angry, noisy intersections along the corridor. The plan for Boundary Street looks to how to organize those intersections in a way that evoke the civic art and community character that Beaufort citizens cherish.



The new City Hall at the intersection of Boundary Street and Ribaut Road can become a formal entrance to Beaufort.

FIRST PRINCIPLES — GETTING THERE

The following steps are necessary to achieve the first principles of the plan:

- a. Adopt the Boundary Street Master Plan
- b. Adopt the Boundary Street Form Based Code
- c. Promote the Boundary Street Master Plan and Continue to build public support for the redevelopment of Boundary Street.
- d. Continue to coordinate the multiple City and County agencies that will impact implementation.

Additional Implementation Strategies are included in Chapters 4 and 6.



growing the corridor 4

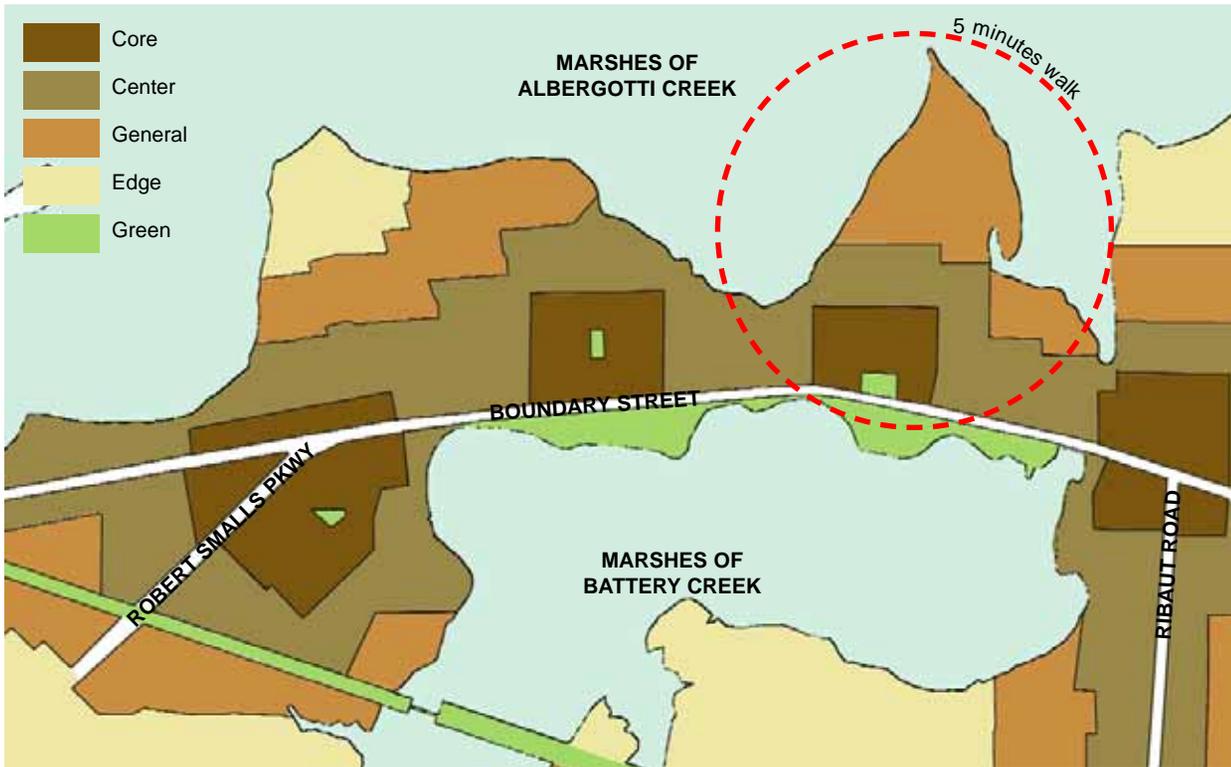
The plan for Boundary Street sets forth a coordinated strategy to guide appropriate growth and infill development along the corridor. The plan illustrates the idea of special gateways to the city, locating civic buildings at prominent positions along the corridor, assembling a series of redevelopment sites, transforming intersections, preserving natural views, and reorganizing streets to form a parallel street network. These ideas, or "Big Moves", are the main ideas that are used to implement the First Principles. The Big Moves are noted in the plan (page 4.4 and 4.5) and are further described throughout this chapter.

The plan for Boundary Street calls for the corridor to mature around a series of special centers. These centers are located at key intersections and each center forms the foundation of a complete corridor. This chapter explains in detail the evolution these centers and includes specific recommendations for Beaufort Plaza, Jean Ribaut Square, Marsh Gardens, and the Municipal Center.

BIG MOVES

- *Create special gateways to the city*
- *Locate civic buildings at prominent positions along the corridor*
- *Assemble a series of redevelopment sites*
- *Convert strip shopping centers to town blocks*
- *Transform busy intersections to be pedestrian friendly*
- *Preserve natural views*
- *Reorganize streets to form a parallel street network*





The diagram above showcases how the redevelopment of the Boundary Street area should be organized into 4 complete centers. Each center has core, center, general, and edge areas. Each of these categories displays a distinct physical character varying in the types of buildings, intensity of development, scale and to some extent, the appropriate land uses. The core is the location of the most intense development. where the edge is usually where development is least intense.

The special centers along the corridor are approximately a 5 minute walk from center to edge. If streets are walkable, most people will walk a distance of approximately ¼ mile (1320 feet or 5 minutes) before turning back or opting to drive or ride a bike rather than walk. Most neighborhoods built before World War II are about ¼ mile across. This dimension is a recurring characteristic of the way people have settled towns for centuries. This distance relates to the manner in which people typically define the edges of their own neighborhoods.

Of course, neighborhoods are not necessarily circular in design, nor is that desirable. The ¼ mile radius is a benchmark for creating a neighborhood unit that is manageable in size and feel and is inherently walkable. Neighborhoods of many shapes and sizes can satisfy the ¼ mile radius test. Boundary Street demonstrates the ¼ mile radius principle with several distinct neighborhoods or quarters that combine to form a complete corridor. The Illustrative Master Plan shows how to reinforce the identity and completeness of each of Boundary Street's neighborhoods with infill development and redevelopment.

Great neighborhoods have a wide cross section of uses that vary in intensity from center to edge. The center of a neighborhood is usually developed in a mixed-use manner with more intense uses than the general and edge area. This delicate gradient from center to edge provides visual variety as well as a variety of housing and commercial options.



ILLUSTRATIVE MASTER PLAN



Growing New Neighborhoods
Strategic infill along vacant parcels can provide a variety of housing types and mix of uses, while also increasing the tax base.

Preserve Views
Marshfront views can be preserved and enhanced along the corridor.

"Boulevard-style" Slow Lane
A "boulevard-style" slow lane with on-street parking creates a pedestrian-friendly and business-friendly environment along Boundary Street without sacrificing capacity for vehicles.

Special Intersections
The addition of roundabouts at two key locations (the intersections with Ribaut Road and Robert Smalls Parkway) will improve traffic flow and safety at these special intersections.

Street Trees and Proper Sidewalks
Street trees and proper sidewalks along existing and new streetscapes create desirable addresses and enhance the pedestrian environment.



Waterfront Redevelopment
 The point at the end of Greenlawn Drive can be redeveloped as a resort hotel or other landmark use.

Scenic Drive
 A scenic drive would run along Albergotti Creek, adding marsh views and a more complete street network north of Boundary Street.

Central Park
 A central park could link views to both marshes, and provide a central gathering space.

Convert Strip Centers to Town Blocks
 Tired strip shopping centers can be converted into town blocks, reintegrating retail into a normal pattern of town streets and blocks.

Parallel Road Network
 A parallel road network provides multiple options for travel along the corridor.

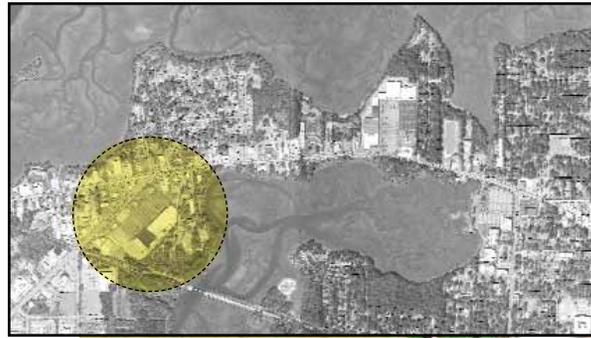
Parks and Squares
 "Window" squares provide views from Boundary Street into surrounding development, as well as offer open views to the marshes.

Civic Buildings Positioned Correctly
 Civic buildings can be positioned in key locations to provide a formal entrance into town.

SPECIAL PLACES

BEAUFORT PLAZA

Beaufort Plaza is located at the intersection of Boundary Street and Robert Smalls Parkway. Beaufort Plaza in its current configuration is a typical strip commercial shopping center with buildings set behind a large expanse of parking. Today the shopping center is fairly active; the center contains a variety of uses such as a bank, office supply store, U.S. Postal Service distribution center, as well as the only movie theater within the city limits. The shopping center marks the western boundary of the study area and has the great potential to be transformed as a memorable gateway into town.



Above, existing conditions: Beaufort Plaza, 2005
Left, plan for redevelopment of the Beaufort Plaza over time into a series of walkable, mixed-use blocks and lots



Existing conditions: Beaufort Plaza, 2005

The Boundary Street Master Plan shows one of many ways that the Beaufort Plaza can be reconfigured and redeveloped over time. Understanding that redevelopment will occur over many years due to existing leases and market feasibility, the plan for Beaufort Plaza is designed to include a phase-able strategy to accommodate the transformation of the property over time. Organizing the property into an interconnected street and block network, the plan demonstrates how existing buildings can be incorporated into the long-term plan for the shopping center. (However, re-using the existing buildings in this way should be considered an option, not a regulatory requirement.) As opportunities for redevelopment and infill development arise, development should be centralized into a specific area rather than scattered throughout the property. In doing so, the property owner as well as Beaufort residents can realize the physical vision of how the shopping center can evolve from a typical strip commercial space to a livable, memorable center. A mix of uses should



Initial phases of redevelopment: The roundabout improves circulation in the area; infill development begins on a few parcels.

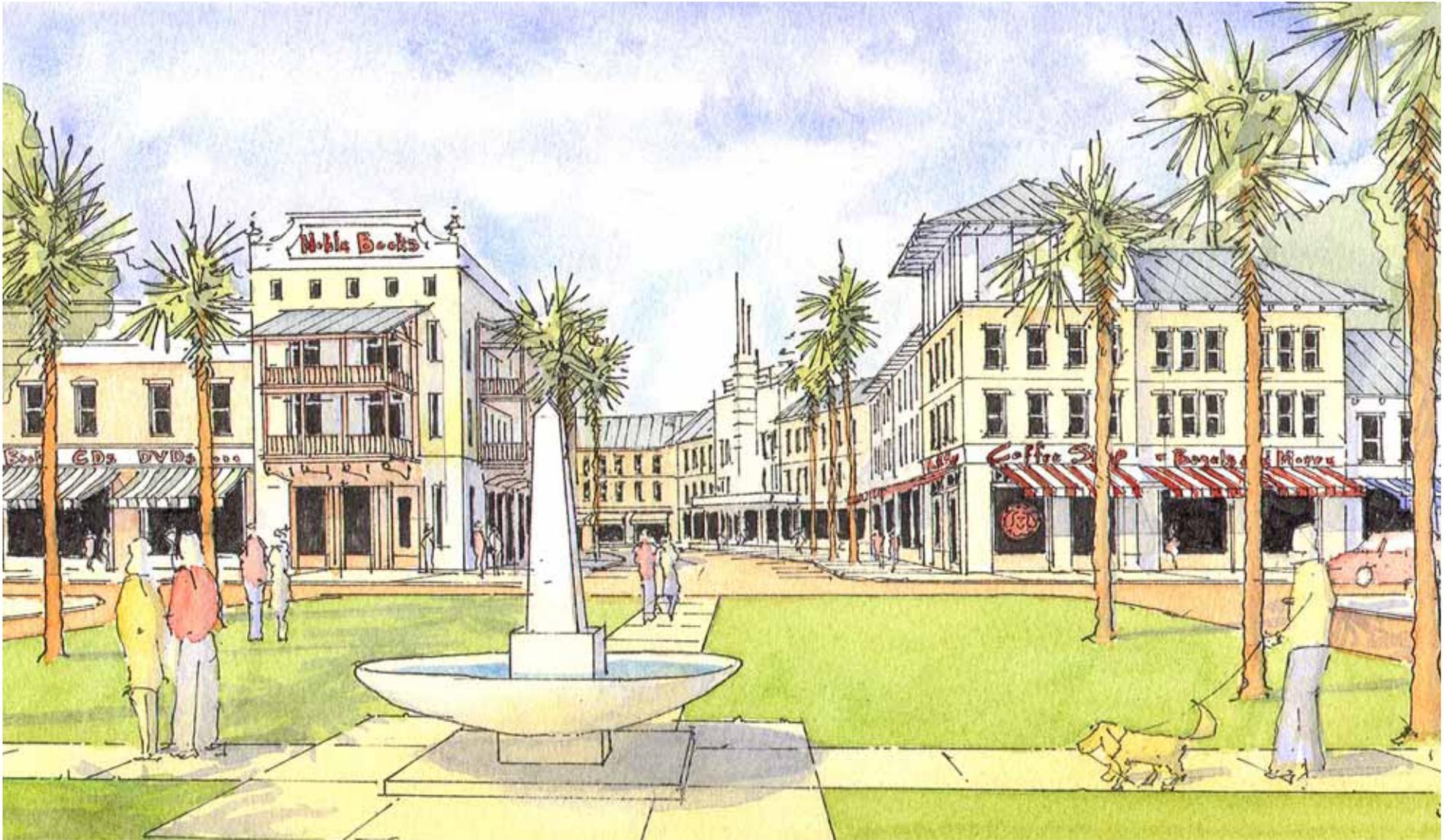
be accommodated throughout the site, providing for continued retail opportunities while also allowing for residential and office components.

An essential element in the transformation of the shopping center is the way parking is handled on the site. Today there is surface parking in the front of the buildings. In order to accommodate a large expanse of parking, the buildings are set back far from the street. Parking is single-purpose, meaning that the available parking only serves individual businesses; there is little to no shared parking, with each store in the center having reserved parking for their establishment. The handling of parking on the Beaufort Plaza site needs to evolve from a suburban strip model of parking requirements and dimensions to one that accommodates a more urban, mixed-use environment. The plan for the future of the shopping center calls for shared parking and for parking to be handled on-street (on existing and new streets) as well as in midblock structures.



Future build-out: The new network of blocks and streets is completed at Beaufort Plaza.

The plan for Beaufort Plaza also looks to improve and enhance Robert Smalls Parkway. Over time the street should be modified to provide a bend in the alignment of the road so that the intersection is realigned and moved to the west. At this new intersection there is the opportunity to include a roundabout to improve traffic circulation and to enhance the intersection as a memorable gateway into town. Neil Road would be reconfigured so that the intersection with SC 170 is rationalized, and there is the opportunity for the placement of signature buildings at the intersection of Neil Road and Boundary Street. Neil Road is also improved to allow for an appropriate connection with a proposed bike and walking trail along the old Port Royal Railroad right of way.



The image above shows the view looking from Robert Smalls Parkway into the redeveloped Beaufort Plaza. A new square and street fill in the lost space of the parking lot found there today. The movie theater marquee serves as a focal image along the street, drawing people in from Boundary Street and Robert Smalls Parkway. Street oriented architecture is essential to securing a mix of uses, sustaining customer interest, and adapting to changing uses over time; street oriented architecture supports retail on the ground floor with other uses above, like offices and apartments.



A variety of housing types are envisioned as part of the redevelopment of the Beaufort Plaza site and the development of adjacent properties. Neighborhood infill along the corridor will provide pockets of walkable, bike-able neighborhoods where residents can access the benefits of Boundary Street without their cars. Strategic infill can add to the tax base while also providing a mix of housing types. In the image above, homes face the marshfront, allowing public access to the natural beauty of the marsh. Homes are mixed in size and type, offering a variety of housing opportunities for a range of income levels.

The intersection of Boundary Street and Robert Smalls Parkway moves cars along these busy corridors, but also serves as the western gateway to town. In order to enhance the intersection, while continuing to handle traffic flow, a roundabout could be placed at the realigned intersection. By replacing the traffic signals and adding a roundabout to the intersection, the need for turn lanes is reduced since a roundabout allows vehicles to make turns or go straight. A two-lane roundabout is proposed for the intersection of Boundary Street and Robert Smalls Parkway.

A roundabout accommodates traffic flow and capacity while allowing safer conditions for pedestrians. With a roundabout, pedestrians have fewer traffic lanes to cross and traffic moves slower around a roundabout than a busy intersection. All drivers slow down to enter into a roundabout because the configuration forces cars to slow down to 18 to 20 mph while maneuvering around the roundabout. Slower travel speeds and less lanes to cross offers pedestrians a great way to safely cross the corridor.

Roundabout





While it is recommended that the City, County, and property owners pursue a roundabout at the intersection of Boundary Street and Robert Smalls Parkway, the design team also explored the physical and functional impacts of having the intersection remain signalized. When the two scenarios are compared, the roundabout option provides a more appropriate balance between automobiles and pedestrians. If the intersection remains signalized, cars will pass through at higher speeds while the actual volume of cars moving along the intersection will not increase. The street pavement would need to be widened to provide for additional turn lanes, making for higher speeds and difficult conditions for pedestrians to safely cross the corridor.

Either option, the roundabout or signalized intersection, are workable in the plan, but the City, County, property owners, and Beaufort residents need to have a calm, productive community conversation about the physical character of the intersection.

Signalized intersection

BEAUFORT PLAZA — GETTING THERE

The following steps are necessary to achieve the proposed vision for Beaufort Plaza:

- a. Adopt the Boundary Street Master Plan.
- b. Adopt the Boundary Street Form Based Code.
- c. Confirm physical and regulatory conditions.
- d. Target businesses to locate in the redeveloped Beaufort Plaza.
- e. Form a Boundary Street Business Improvement District (BID).
- f. Initiate a Small Business Investment Corporation (SBIC) to attract businesses to the Boundary Street redevelopment area.

Key Project: Transportation Enhancements to Robert Smalls Parkway and Boundary Street at edges of Beaufort Plaza (streetscape and roundabout/intersection improvements).

- a. Coordinate planning and design for transportation enhancements with property and business owners.
- b. Use surplus Tax Increment Financing (TIF) 2 funds for Preliminary Engineering of transportation enhancement projects.
- c. Apply for funding from SCDOT and allocate County Transportation Impact Fee revenues for implementation of transportation enhancements.

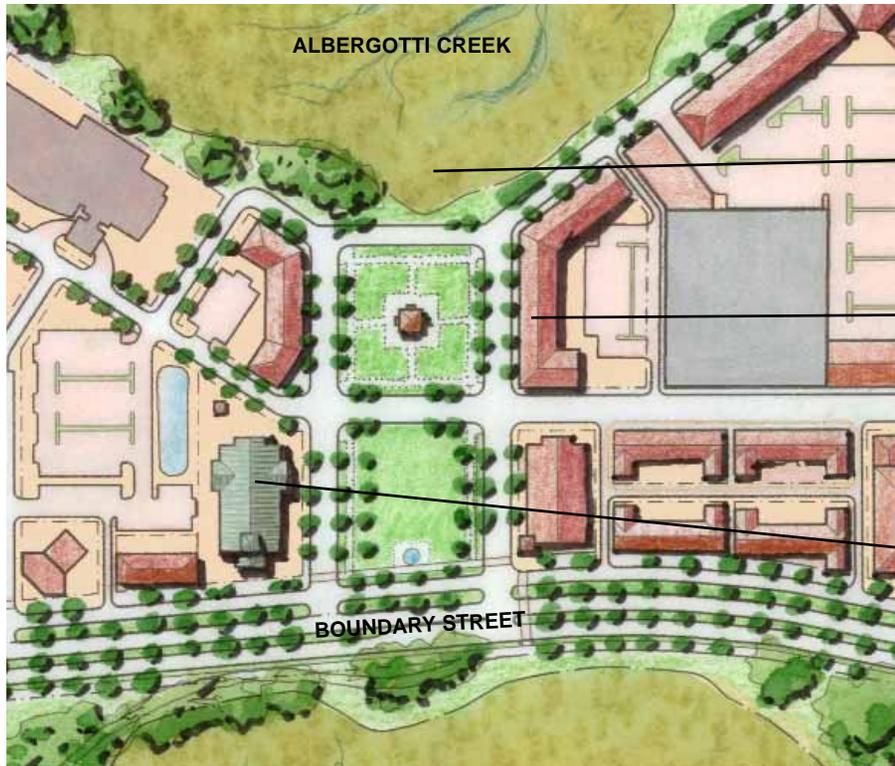
Redevelopment Opportunity: Explore the potential for redevelopment of Beaufort Plaza to include a major tourism/entertainment/recreation attraction.

- a. Explore the potential marketability of different types of attractions at this location (new theater, museum, cultural center, etc.).
- b. Explore the potential to use South Carolina Tourism Infrastructure Development Grant Funds to support a major project as an anchor to Beaufort Plaza redevelopment.

Additional Implementation Strategies are included in Chapter 6.



The relationship of the central park to Downtown Beaufort



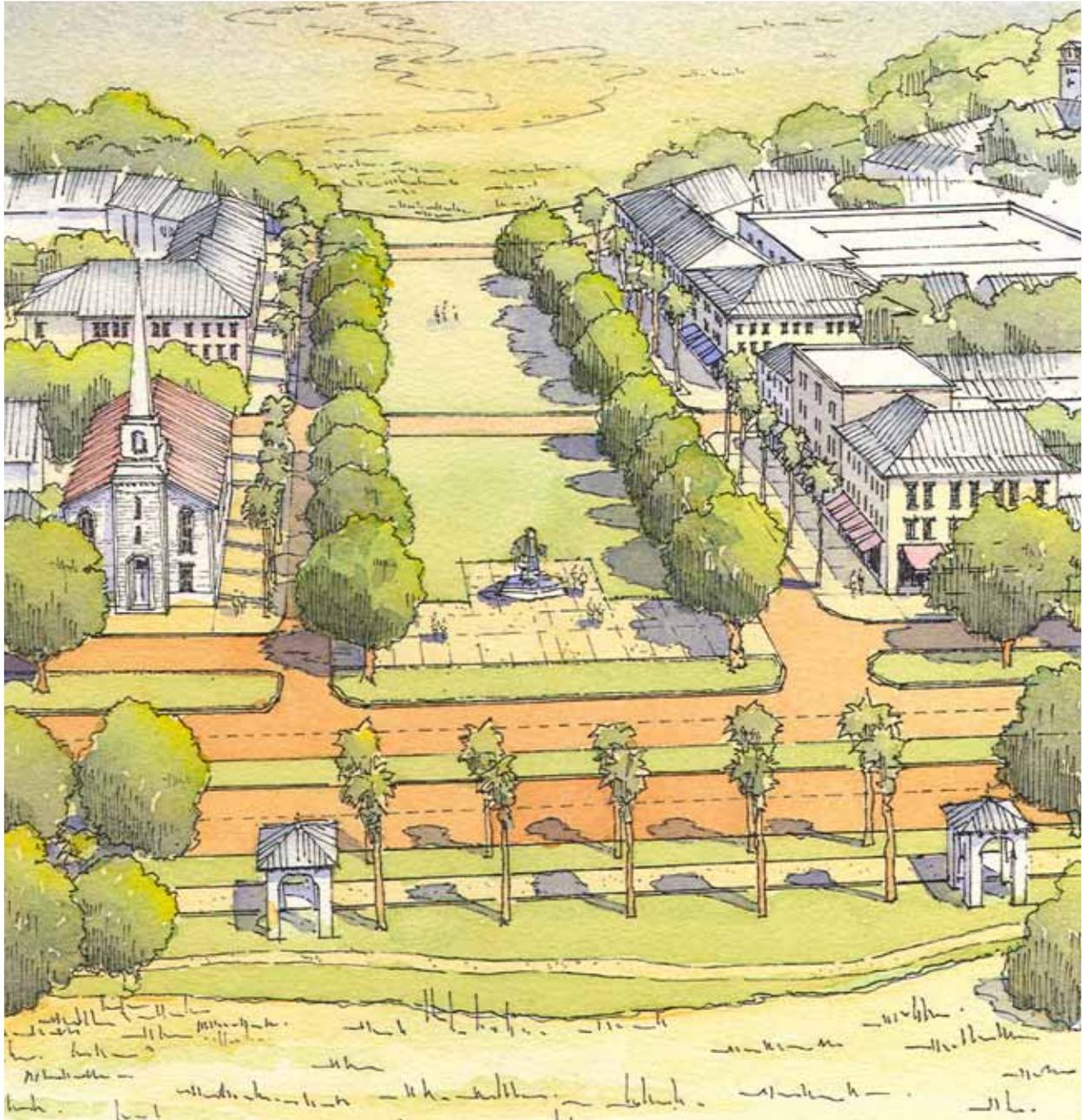
Plan of the proposed central park

CENTRAL PARK

Downtown Beaufort and The Point contain cherished community parks and open spaces. The City is currently undergoing improvements to the beautiful waterfront space at Henry Chambers Park. Like Downtown, green space along Boundary Street is essential in maintaining the community character Beaufort residents value. Waterfront park space south of Boundary Street should be acquired to accommodate walking and biking trails and to preserve views of the marsh. In addition to adding park space its is important that 16 Gate Cemetery be carefully preserved.

While the preservation of 16 Gate Cemetery and the formation of a green space south of Boundary Street are important, there are no central gathering places existing or planned along the corridor. As properties along Boundary Street accommodate additional development and redevelopment, the corridor will see an increase in residents and business users. To better serve community needs, the plan for Boundary Street includes the creation of a central park where the marshes of Albergotti Creek and Battery Creek are closest together. This central park space could offer open views from marsh to marsh, while allowing for a gathering space for a community events.

The creation of a central park space is likely to be the hardest, longest term, most dramatic item of the plan because the proposed park space is currently occupied by a condominium. Understanding that the formation of the central park may take decades to complete, the City and property owners should work together to reconfigure the land, create a central park, and replace existing buildings with denser, mixed-use buildings along the park.



Aerial view of a new central park, providing views to the marshes north and south of Boundary Street

CENTRAL PARK — GETTING THERE

The following steps are necessary to achieve the proposed vision for the Central Park:

- a. Adopt the Boundary Street Master Plan.
- b. Adopt the Boundary Street Form Based Code.
- c. Acquire the necessary land needed for the Central Park.
- d. Secure funding from City Parks and Tourism Fund and South Carolina Department of Parks, Recreation, and Tourism Fund.
- e. Initiate a Small Business Investment Corporation (SBIC) to assist with relocation of existing businesses to keep them in the Boundary Street redevelopment area.
- f. Consider establishment of a new Tax Increment Financing (TIF) district comprised of those properties in the Boundary Street area that were not included in TIF 2. TIF revenues could be used to fund public improvements such as park development and streetscapes.

Key Challenge: Coordinating the buyout and redevelopment of the Carolina Cove condominium property.

- a. Establish an ongoing discussion with the Carolina Cove condominium owners association about joint redevelopment planning to work towards a mutually agreeable redevelopment strategy.
- b. Secure access and develop a multi-use trail along the Albergotti Creek marsh frontage behind Carolina Cove in the near term.
- c. Involve foundations, such as the Trust for Public Land, that are actively involved in promoting parks and open space.

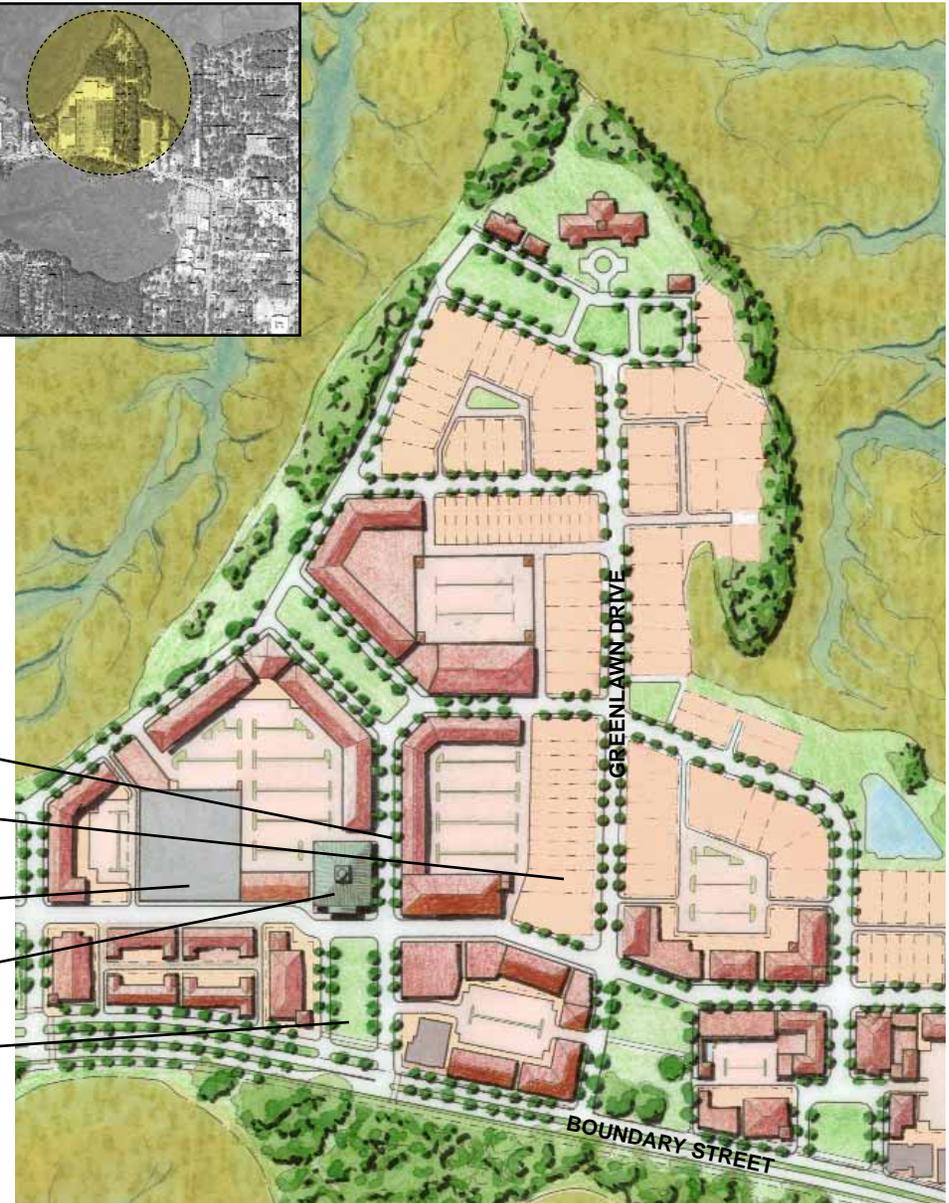
Additional Implementation Strategies are included in Chapter 6.

JEAN RIBAUT SQUARE

Jean Ribaut Square is an "L-shaped" strip shopping center located a few blocks west of the intersection of Boundary Street and Ribaut Road. The shopping center, in its current configuration, includes a Kmart, Bi-Lo grocery store, Stein Mart clothing store, several eating establishments, and other retail stores. The shopping center is not an empty plaza and does not appear to be a dying piece of real estate. This real estate, however, does have the opportunity to become much more than a strip commercial shopping center. With appropriate, phase-able planning and development, Jean Ribaut Square can be transformed into a mixed-use center of streets and blocks.



Existing conditions:
Jean Ribaut Square, 2005



Proposed build-out of the Jean Ribaut Square area over time



Existing conditions: Jean Ribaut Square, 2005



Existing conditions: Jean Ribaut Square, 2005



Initial phases of redevelopment: The parking lot begins to be redeveloped with buildings defining new streets, with parking located on-street and within the new blocks.

The plan for Jean Ribaut Square provides for a workable strategy to redevelop the property over time. There are many issues affecting the redevelopment of the site, including long-term leases and natural constraints, yet if the City, County, and property owner work together the plan for the future of this important piece of property along Boundary Street can be realized.



Future build-out: Additional buildings complete the build-out of the area as a pedestrian-friendly, walkable environment.

Existing Conditions: The blank walls of Jean Ribaut Square front Boundary Street.



Initial Improvements: Overhead utility wires are removed; the geometry of the street is reconfigured to accommodate a center median green strip, sidewalk and frontage road with parallel parking on the north side of Boundary Street. In doing so, the framework for a classic boulevard emerges.



Continued Improvements: Street trees, street lights, and a pedestrian path are added to the south side of Boundary Street.





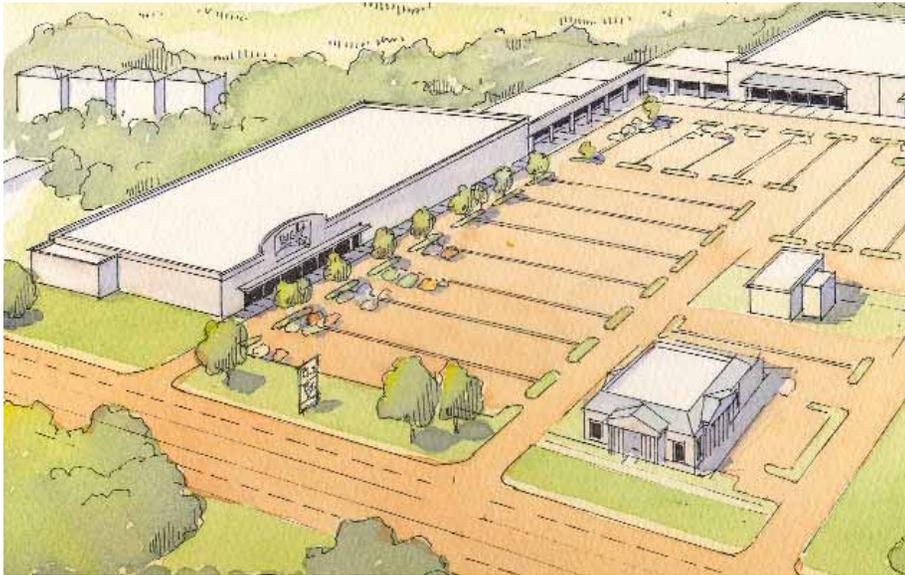
Left:

Long-term: Street trees and additional landscaping are added while the blank walls of Jean Ribaut Square are transformed into vibrant, mixed-use buildings which address the street.

Below:

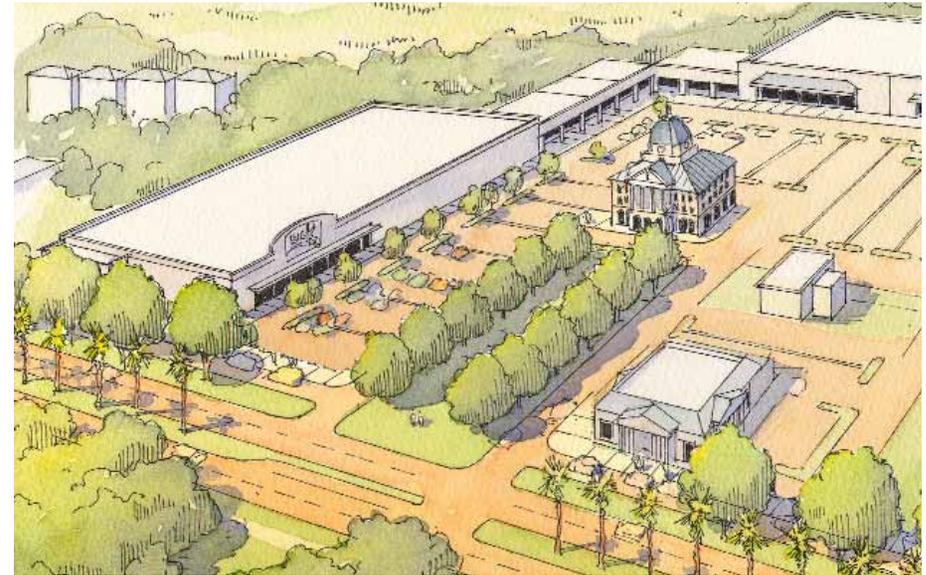
End Result: The transformation is complete with new street-oriented buildings and street trees creating a walkable environment along the north side of Boundary Street.



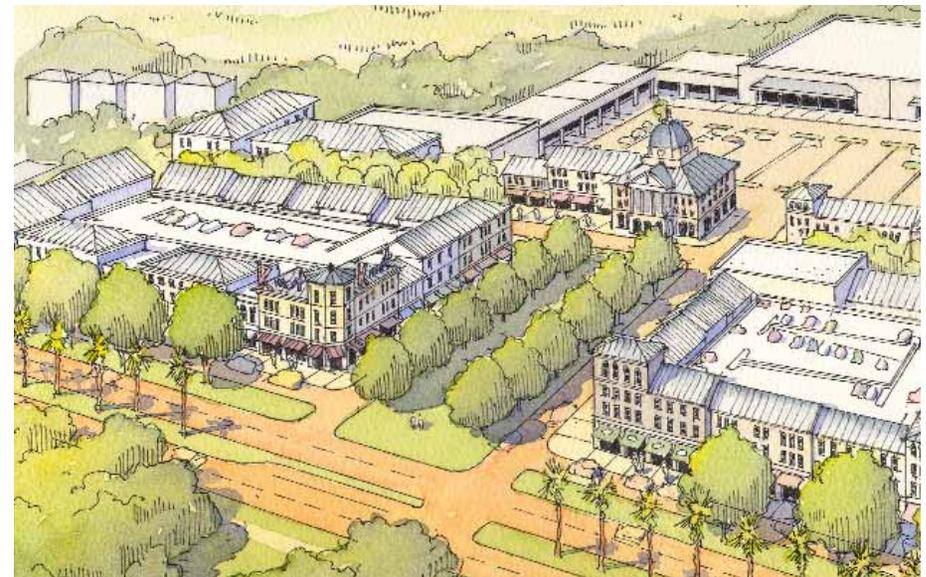


Existing conditions: Jean Ribaut Square, 2005

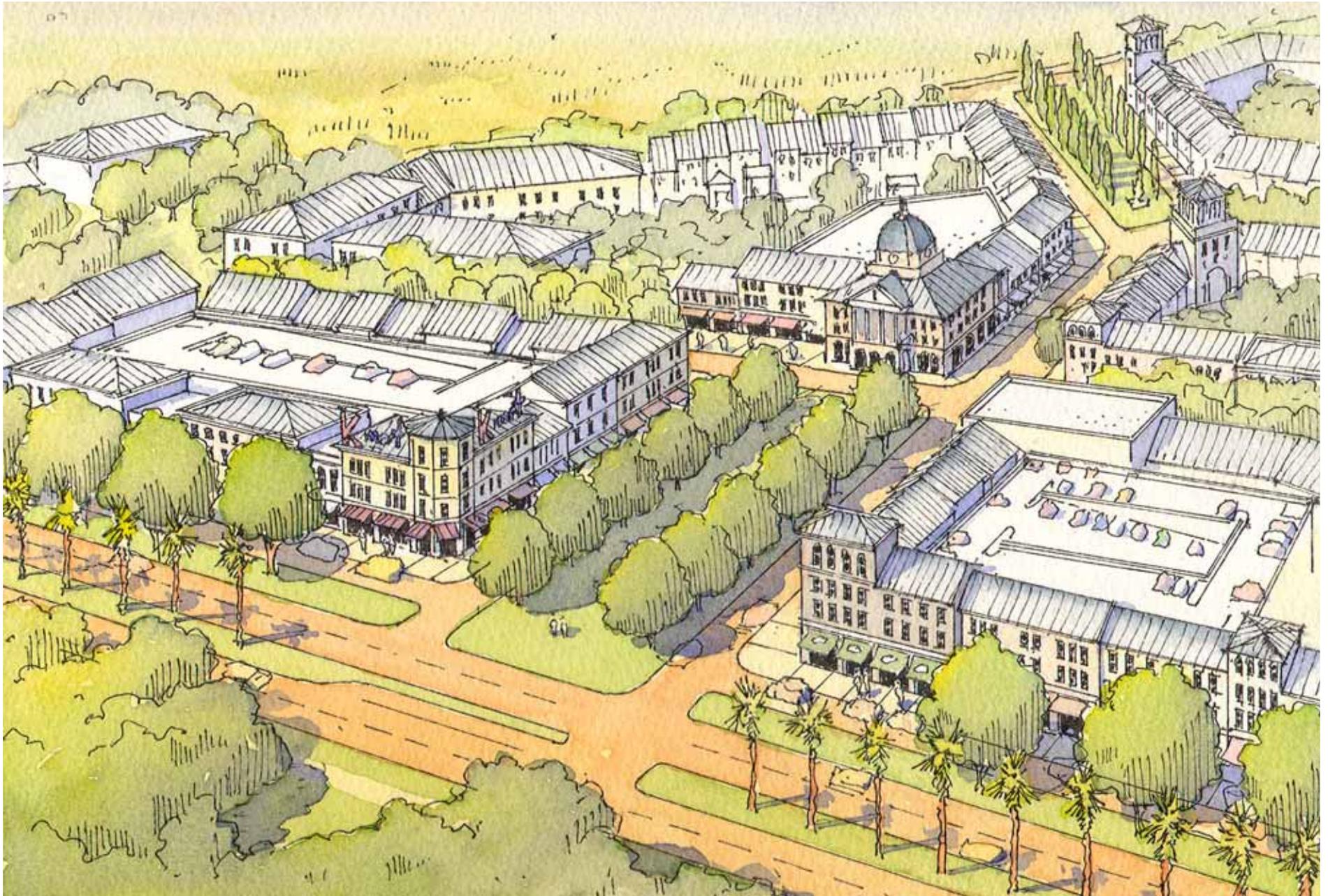
A challenge associated with the redevelopment of Jean Ribaut Square is that the property is located at one of the narrowest places along the corridor. Both north and south of Boundary Street the marshes of Albergotti Creek and Battery Creek constrain the width of the street and the depth of adjacent properties. The community has expressed the desire to see a parallel road network created north of Boundary Street. The challenge in the redevelopment of Jean Ribaut Square is to plan accordingly for the integration of this parallel road while also working within the confines of the marshes. In its proposed location in the plan, the parallel road would bisect the Kmart building. The Kmart building is an impediment to the creation of the parallel road and the parallel road is essential to the revitalization of the corridor. In order to transform the strip shopping center into a piece of town, the City, County, and property owner must work together to establish the parallel street. The real power of real estate in the Boundary Street area will become apparent when the parallel street is built and adjacent properties are redeveloped facing the new parallel street address.



Initial improvements include the formation of a block and street network with a central town green, a grand civic building, and a frontage road along the north side of Boundary Street.



A new parallel road bisects the existing Kmart building and provides for an additional east - west connection north of Boundary Street. Infill redevelopment continues on incremental parcels. A new main street is formed perpendicular to Boundary Street with multi-story buildings fronting onto the green and parking accommodated on-street and in mid-block parking locations.



Jean Ribaut Square is fully transformed into a functioning piece of town.



The view looking north from Boundary Street towards the redeveloped Jean Ribaut Square shows a new east - west connection and mixed-use, multi-story buildings lining the streets.

JEAN RIBAUT SQUARE — GETTING THERE

The following steps are necessary to achieve the proposed vision for Jean Ribaut Square:

- a. Adopt the Boundary Street Master Plan.
- b. Adopt the Boundary Street Form Based Code.
- c. Confirm physical and regulatory conditions.
- d. Target businesses to locate in redeveloped Jean Ribaut Square.
- e. Form a Boundary Street Business Improvement District (BID).
- f. Initiate a Small Business Investment Corporation (SBIC) to attract businesses to the Boundary Street redevelopment area.
- g. Consider establishment of a new TIF district comprised of those properties in the Boundary Street area that were not included in TIF 2. TIF revenues could be used to fund public improvements such as park development and streetscapes.

Key Project: Transportation Enhancements to Boundary Street and transportation network (streetscape and road construction).

- a. Coordinate planning and design for transportation enhancements with property and business owners.
- b. Use surplus TIF 2 funds for Preliminary Engineering of transportation enhancement projects.
- c. Apply for funding from SCDOT and allocate County Transportation Impact Fee revenues for implementation of transportation enhancements.
- d. Secure access and develop a multi-use trail along the Albergotti Creek marsh frontage behind Carolina Cove in the near term.

Redevelopment Opportunity: Provide assistance and incentives in support of redevelopment of the shopping center.

- a. Assist the property owner in discussions/negotiations with major tenants regarding redevelopment plans.

Additional Implementation Strategies are included in Chapter 6.

MARSH GARDENS

Marsh Gardens is a Planned Unit Development currently approved to the east of Jean Ribaut Square. The plan for the site calls for appropriate infill development to accommodate a mix of housing types and some small-scale mixed-use development.

GREENLAWN DRIVE

Greenlawn Drive, nestled between Jean Ribaut Square and Marsh Gardens, should be carefully redeveloped with live-work units and townhomes. A tremendous opportunity exists to revitalize Greenlawn Drive into a great street. At the Marsh Pointe site, at the end of Greenlawn Drive, the City should work with the Beaufort Housing Authority to look for alternative locations along the Boundary Street corridor to provide ample housing for the residents currently living in the 13 duplexes.

The waterfront redevelopment at the Marsh Pointe site should take a form that maximizes its scenery and public enjoyment of the unique marshfront setting. This should include a landmark use, with architecture that anticipates post-card-quality photographs from across the water and welcoming public space along the marsh. These will become symbols of Beaufort. The landmark use could be a luxury hotel, residential development, or a civic use such as a performing arts hall or meeting center.



Proposed build-out of Marsh Gardens and Greenlawn Drive



Existing conditions: Marsh Gardens area, 2005

- Waterfront redevelopment
- Residential
- Rowhouse / live-work units
- Mid-block parking
- Commercial / mixed-use
- Neighborhood green
- Cemetery



Marsh Gardens emerges as a mixed-use neighborhood along the corridor.

MARSH GARDENS AND GREENLAWN DRIVE — GETTING THERE

The following steps are necessary to achieve the proposed vision for Marsh Gardens and Greenlawn Drive:

- a. Adopt the Boundary Street Master Plan.
- b. Adopt the Boundary Street Form Based Code.
- c. Confirm physical and regulatory conditions.
- d. Target businesses to locate in redeveloped Marsh Gardens.
- e. Form a Boundary Street Business Improvement District (BID).
- f. Purchase Marsh Pointe (located at the end of Greenlawn Drive) from the Beaufort Housing Authority.
- g. Use low-income housing tax credits to provide a mix of housing in the Marsh Gardens development.
- h. Initiate a Small Business Investment Corporation (SBIC) to attract businesses to the Boundary Street redevelopment area.
- i. Consider establishment of a new TIF district comprised of those properties in the Boundary Street area that were not included in TIF 2. TIF revenues could be used to fund public improvements such as park development and streetscapes.
- j. Secure access and develop a multi-use trail along the Albergotti Creek marsh frontage.

Additional Implementation Strategies are included in Chapter 6.

MUNICIPAL CENTER

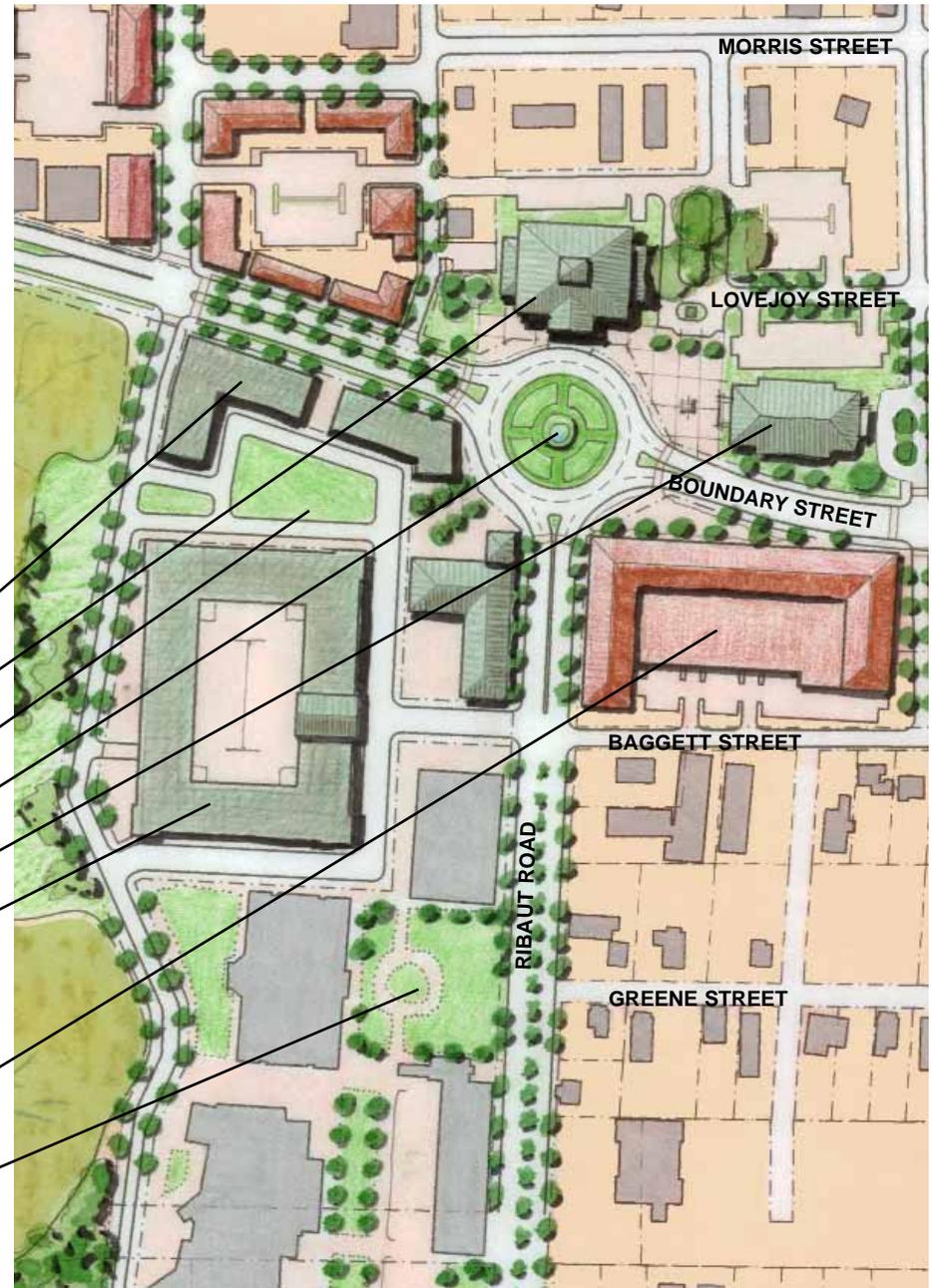
The intersection of Ribaut Road and Boundary Street marks the eastern edge of the study area and is the primary entranceway into Downtown Beaufort. In its current configuration the intersection is fairly wide due to the need for multiple turning lanes; buildings are set back from this busy intersection. Home to Robert Smalls High School in the 1960s, the southwest corner of the intersection is now occupied by the County Government Complex; a grocery store and restaurant are located on the southeast corner. Vacant parcels occupy the northern side of Boundary Street and a few blocks off of the corridor is the Higginsonville neighborhood.

With the location of the County Government Complex at the corner of this central intersection, and the imminent need to redevelop the parcels along Boundary Street, the City has purchased the parcel of land which terminates Ribaut Road to build a new City Hall and Police Station. The location of City Hall along Boundary Street will spur additional redevelopment opportunities and create a complete civic space of City and County government offices.



Existing conditions: Municipal Center area, 2005

- Government buildings along Boundary Street
- Beaufort City Hall
- Municipal Plaza
- Roundabout
- Police Station
- Mid-block parking wrapped by multi-story municipal building
- Urban grocery store
- Existing County Government Complex



Proposed build-out of the Municipal Center area over time



Existing conditions: Municipal Center area, 2005



Initial phases of redevelopment: The new City Hall terminates the view down Ribaut Road; infill of the County Government Complex parking lot begins to define the street edge. The lost space of the County's surface parking lot is transformed into structured parking lined with shops, restaurants, offices, and even residences. A green space is added offering extended marsh front views and multi-story buildings frame the green space and help to create a compact urban environment at this important intersection.



Future build-out: Additional buildings define the street edge, transforming the character of this area.

The change over time sequence demonstrates how the intersection of Ribaut Road and Boundary Street can be transformed from the suburban pattern of development to a special space shaped by civic buildings. The existing conditions of the intersection demonstrate the suburban development idea of a building here and a building there, all buildings relatively far apart from the intersection and one another. The corners of this important intersection feel vacant as buildings are set far back from the street behind a vast expanse of surface parking.

With plans to relocate City Hall from Downtown to Boundary Street, there is the immediate opportunity to revamp the intersection to create a memorable urban space and proud gateway to town. By building buildings closer to the intersection, this special space can be created. The placement and design of the new City Hall has the unique opportunity to set the course for redevelopment of the intersection as well as the rest of the corridor.

The plan for City Hall provides a workable configuration for City facilities that nestles right into the larger master plan for Boundary Street and fits with adjacent redevelopment to the south and infill opportunities to the southwest. The plan for the new civic building respects the character of the surrounding neighborhood and provides additional street and sidewalk connections to and from the neighborhoods.



Existing Conditions: Buildings are setback far from the intersection.



Initial Improvements: Overhead utility lines are buried and the City Hall is correctly positioned at the terminus of Ribaut Road.



Continued Improvements: A roundabout is installed as a traffic solution and central focal point along the corridor. Street trees, wider sidewalks, and on-street parallel parking begin to create a pedestrian-friendly environment.



Long Term: To further complete the evolution of the intersection as a memorable gateway into town, the southeast corner is be redeveloped to include a greater mix of uses and street oriented architecture.



End Result: Infill development on the County's parking lot completes the street scene and fully transforms the intersection.



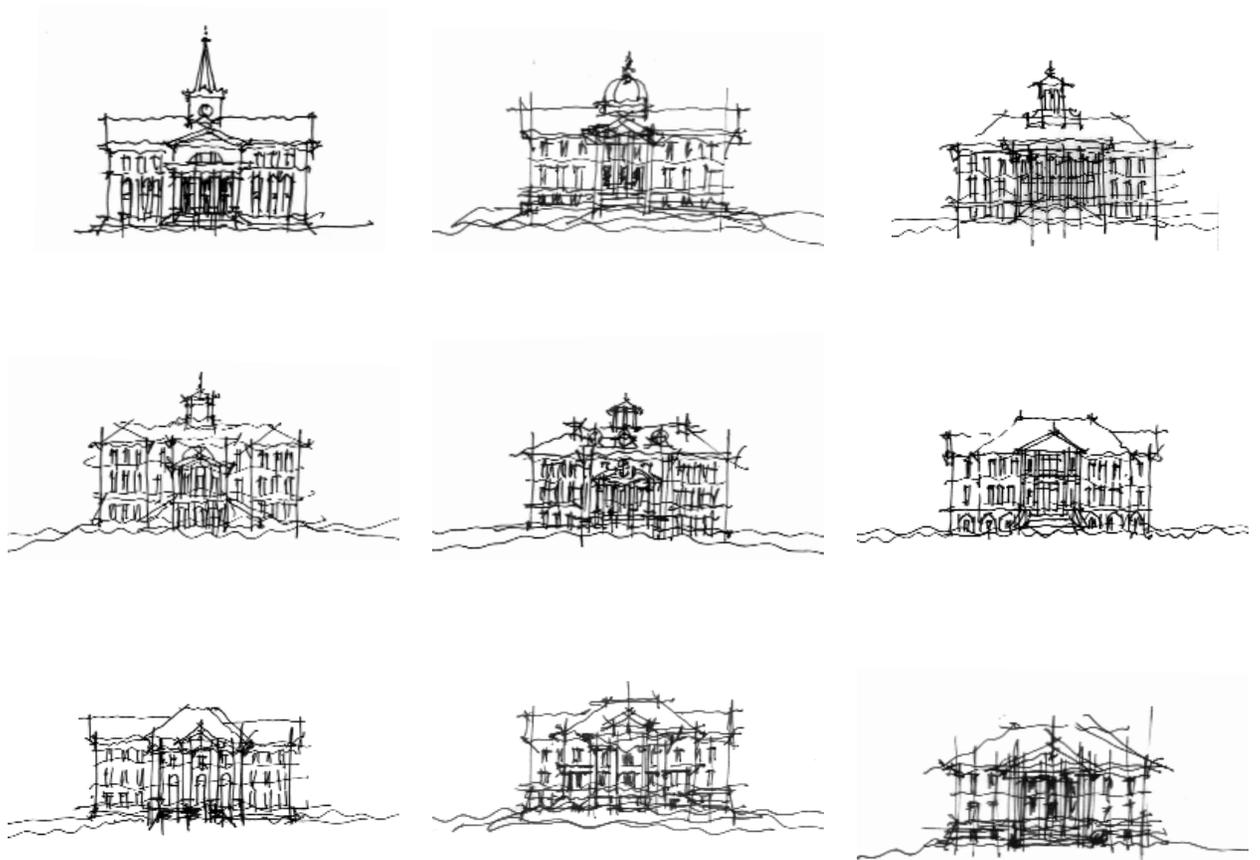
View terminating Ribaut Road



View looking east on Boundary Street towards the new Beaufort Police Station

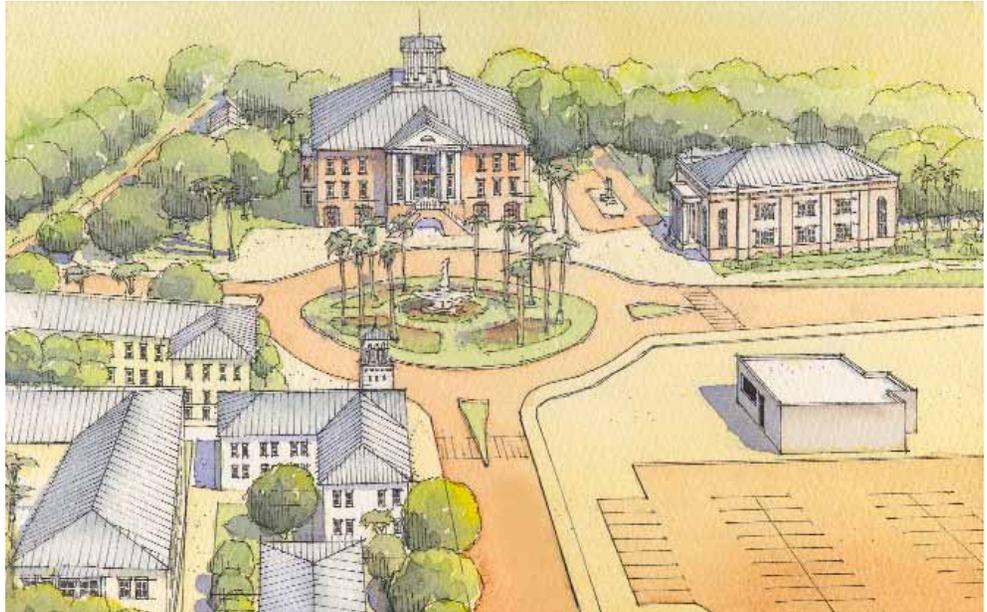
Many different designs are possible for the new City Hall. No matter which architectural solution is selected, the building should be located where it terminates the axis of view from Ribaut Road. The building should proudly reflect the character, quality and ideals of the Beaufort community. While the architectural style of the building may vary, a few primary requirements are necessary. The building should be made a proper scale, which means it needs to have enough height to command a presence on the intersection. The structure should not be made cheaply; the building should be long lasting, and the investment should be made with long life-cycle costs in mind, not just initial construction cost.

The new City Hall will serve as a welcome to the city. It should exemplify serious, upright architecture like the best civic buildings in the Lowcountry's traditional towns. To be worthy of historic Beaufort, the architecture should feature properly researched, correct classical detailing, not a thin or stripped-down corporate facsimile.





A view of the new City Hall building and proposed roundabout at the intersection of Ribaut Road and Boundary Street

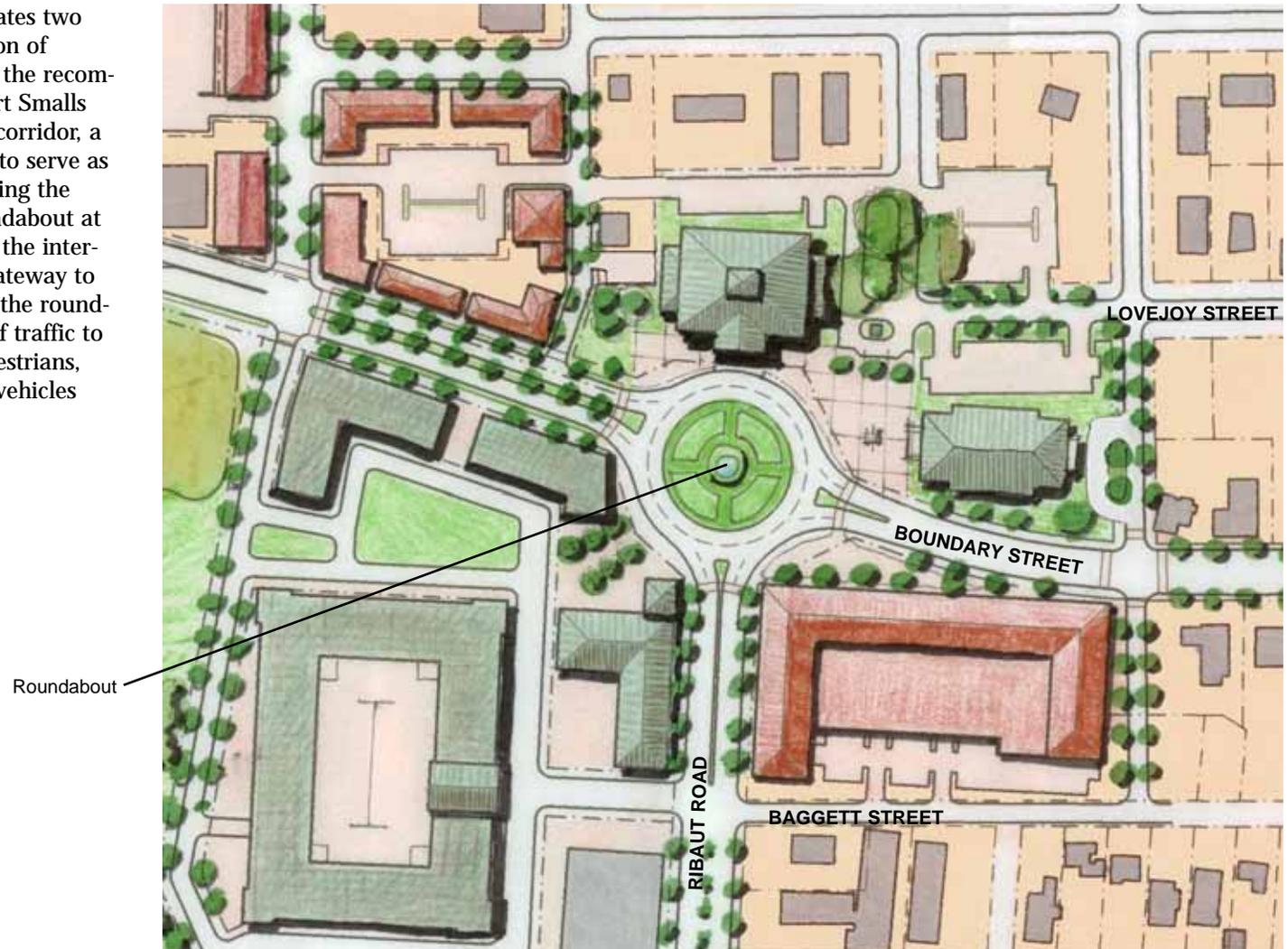


Incremental redevelopment begins to transform the character of the intersection.



Over time, the intersection of Ribaut Road and Boundary Street is fully redeveloped into a complete urban space and memorable gateway into town.

The Boundary Street Master Plan illustrates two possibilities for improving the intersection of Ribaut Road and Boundary Street. Like the recommendations for the intersection of Robert Smalls Parkway as the western gateway of the corridor, a roundabout is proposed at Ribaut Road to serve as the eastern gateway to town. By removing the existing traffic signal and placing a roundabout at the intersection, the civic importance of the intersection is enhanced and a memorable gateway to the city is formed. For vehicular travel, the roundabout would allow for the steady flow of traffic to enter and exit the roundabout. For pedestrians, the roundabout alternative would slow vehicles and allow for safer pedestrian crossings.



A 2-lane roundabout at the intersection of Boundary Street and Ribaut Road would improve circulation and provide safer conditions for pedestrians to cross the road.



Another possible alternative for managing the busy intersection is to keep the intersection signalized. In order to keep the traffic signals and maintain traffic flow and capacity, the intersection would have to be widened and additional lanes added. While crosswalks would be added, the signalized intersection would remain difficult for pedestrians to cross.

It is recommended that the City, County, and adjacent property owners pursue the roundabout option to transform the intersection of Ribaut Road and Boundary Street into a memorable gateway. Additional information on this recommendation can be found in Chapters 5 and 6.

Signalized intersection

The signalized intersection of Boundary Street and Ribaut Road could remain, however additional travel lanes would make the corridor even more difficult for pedestrians to cross.

MUNICIPAL CENTER — GETTING THERE

The following steps are necessary to achieve the proposed vision for the Municipal Center area:

- a. Adopt the Boundary Street Master Plan.
- b. Adopt the Boundary Street Form Based Code.
- c. Confirm physical and regulatory conditions.
- d. Apply for grants from Federal and State Departments of Transportation.

Key Project: Transportation Enhancements to Boundary Street and Ribaut Road (roundabout, streetscape and road construction).

- a. Coordinate design and construction of transportation enhancements with City Hall design and construction.
- b. Use surplus TIF 2 funds for Preliminary Engineering of transportation enhancement projects.
- c. Apply for funding from SCDOT and allocate County Transportation Impact Fee revenues for implementation of transportation enhancements.

Key Project: Build a proud Beaufort City Hall

- a. Locate the City Hall so that it terminates the axis of view from Ribaut Road.
- b. The structure should not be made cheaply; the building should be long lasting, and the investment should be made with long life-cycle costs in mind, not just initial construction cost.
- c. Build a structure that represents the ideals of the Beaufort community. The building should exemplify serious, upright architecture like the best civic buildings in the Lowcountry's traditional towns

Redevelopment Opportunity: Foster redevelopment of property to the south and southwest of the planned City Hall site.

- a. Coordinate with property and business owners to promote redevelopment of the Piggly-Wiggly property, exploring various incentive opportunities.
- b. Coordinate with Beaufort County to promote infill development on the County Government Complex parking areas.

Additional Implementation Strategies are included in Chapter 6.



transportation analysis 5

The Boundary Street Master Plan provides for the organized redevelopment of the corridor and addresses specific recommendations for the physical improvement of the roadway. Through careful planning and engineering, the street can become a "great street"; a street that handles the movement of automobiles while also providing a memorable civic space representative of the character of Beaufort.

During the September design charrette, Hall Planning & Engineering (HPE), traffic engineering, worked as a central component in the design process to further transform the character of this important Beaufort roadway. The charrette included interviews with stakeholders to identify transportation issues, as well as an examination by HPE of the area's transportation context. HPE studied traffic speeds and street designs in a sample of Beaufort locations, conducted interviews with City Public Works, Fire Department, Police Department, County staff, and South Carolina Department of Transportation (SCDOT), and prepared a Synchro computer analysis of the Boundary Street corridor.

This chapter highlights specific roadway improvements; additional information on the transportation analysis can be found in Appendix B.

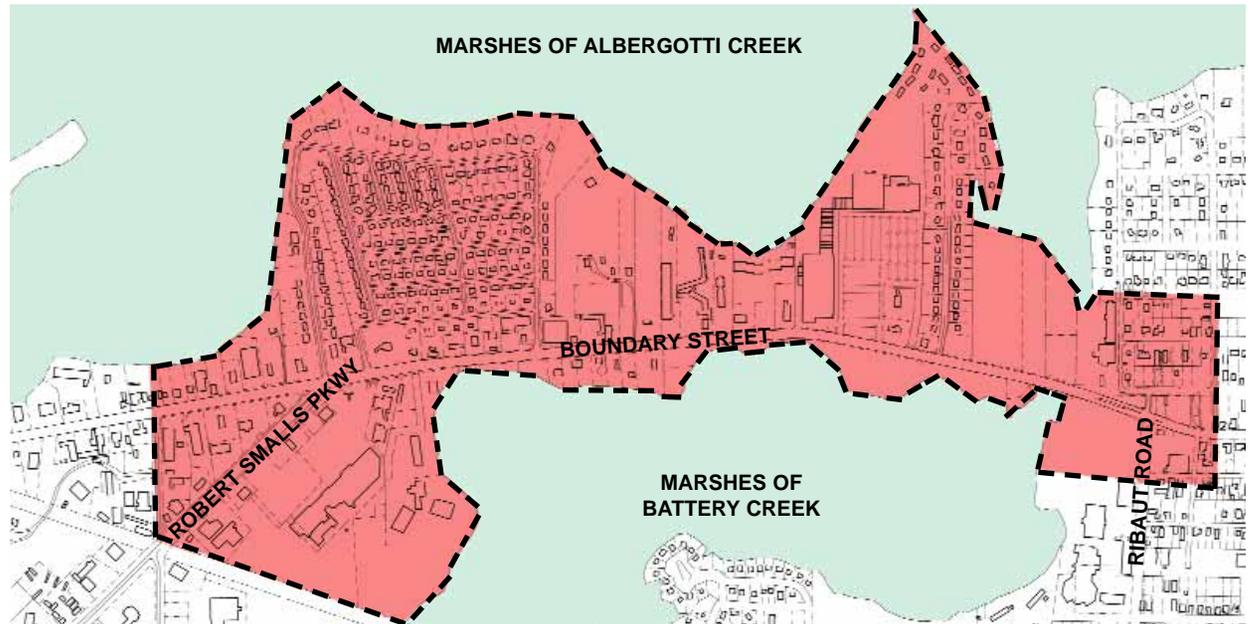


Figure 1: Location and context of study area (dashed line shows project limits)

The Transportation Challenge

Boundary Street serves as a major transportation corridor, running west from the City limits east to Downtown Beaufort (Figure 1), connecting to Lady's Island and points further east. Ribaut Road, the eastern terminus of the study area, as well as Robert Smalls Parkway, the western terminus of the study area, both carry traffic to and from Downtown Beaufort and the region. Significantly, the intersection of Ribaut Road and Boundary Street is the planned location of the new Beaufort City Hall and Police Department.

From a transportation planning context, HPE recognizes a fundamental tension in the design of Boundary Street between the need to move large volumes of traffic and the desire to create a walkable thoroughfare extending the walkability of the historic old town; the design challenge of the charrette was to balance this tension.

The planning team has identified the following issues as relevant to meeting this challenge:

1. Identify a specific vision for Boundary Street urban design patterns
2. Improving the intersections at Robert Smalls Parkways and Ribaut Road
3. Completing a thoroughfare network north of Boundary Street
4. Providing for emergency access and hurricane evacuation
5. Providing for traffic movement along Boundary Street



Boundary Street existing conditions, 2005

1. Identify a specific vision for Boundary Street urban design patterns

Much of America's suburban land development pattern results from street and highway networks dictating its structure. Highways designated as arterials change little as they approach developed areas. Generally speeds drop from 55 to 45 or 35 mph, but on-street parking is usually not allowed in emerging areas and is often removed from older areas. Arterial street designs, by definition, tend to exclude intersections with side streets of limited volume, leading to longer block size (600 to 1,000 feet and higher) and higher speeds 45 mph or more, both of which cause difficulty for pedestrians. The arterial design concept emerged from a rural heritage and rarely serves urban peak travel demand well due to exclusive reliance on the single facility serving a single mode of travel – the motor vehicle.

To achieve urban places that encourage (and thrive with) pedestrians, bicycles, and transit vehicles as part of the mobility mix, the patterns of proposed development must be specified first, during the community planning stage. Then, transportation plans for balanced mobility can be crafted with walkability considered first and vehicle mobility sec-



ond. This is not to imply that motor vehicle mobility will be dramatically reduced, but that pedestrians, being exposed to the open environment are more vulnerable than when they are drivers, and solutions for their comfort are more complex. Often, greater walkability yields only small reductions in vehicle capacity, even though vehicle speeds are lower. Generally more streets per square mile result from a more open network and drivers can avoid the degree of peak hour congestion that occurs when a limited number of large streets break down (see Figure 1).

Boundary Street is currently configured as a post-WWII twentieth century suburban arterial design, with four 12' lanes of traffic, occasional medians, no on-street parking, and speeds in the 40 mph range. Five-foot wide sidewalks are provided on both sides of the street, but the entire 1.2 mile corridor is interrupted by only 5 traffic signals (including one each at Ribaut Road and Robert Smalls Parkway), limiting crossing opportunities for pedestrians. Bicycling is possible, as the design team confirmed by bicycling the corridor during the AM peak hour, but the lack of bicycle lanes tends to discourage cyclists from using the street for bicycling. Instead,

local cyclists resort to using the sidewalk along Boundary Street. Sidewalk riding is unsafe and problematic for many reasons, but one reason specifically reported by local cyclists is the inability for two cyclists to pass each other on the 5' wide Boundary Street sidewalks. Therefore, the overall level of bicycling mobility along Boundary Street is considered suboptimal, and many local cyclists seem to consider Boundary Street hazardous for bicycling (based on comments during the charrette.)

Land use development today consists of conventional strip-center, automobile-oriented land uses and urban design, with large parking lots between the street and the front doors of buildings. Signalized intersections are infrequent, by design, to provide a greater automobile level of service. There are no continuous streets parallel to Boundary Street within the study corridor, requiring all local traffic to use Boundary Street for all movements.

Development to the south of Boundary Street is severely constrained by the presence of Battery Creek, which lies adjacent to the right-of-way (ROW) in some locations. Existing development on the south side is confined to a few small-footprint business such as a gas station, a fast-food restaurant, and a narrow, linear cemetery. The long-term vision for this area is to eventually remove many active land uses and maintain the south-side views to Battery Creek as a linear park.

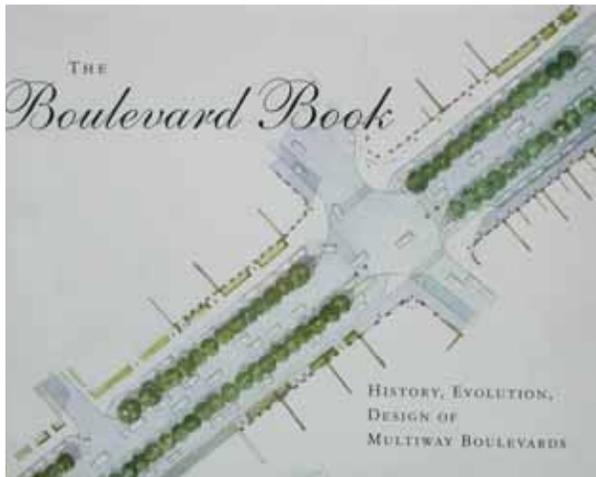
The area north of Boundary Street, however, has greater development potential. Existing development in this area is a mix of retail, hotels, night clubs, and residential development. Marsh Gardens, currently under development near the east end of the study corridor is designed as a New Urbanist development with a walkable street design, and could easily be tied into Boundary Street in a walkable context.

Boundary Street has three major problems:

1. It serves double duty as both a through-moving arterial and a locally-circulating street;
2. It encourages only one travel mode by discouraging walking, cycling, and transit; and,
3. It is geographically constrained by the marshes.

From a transportation design perspective, the existing development and design constraints indicate Boundary Street has the potential to become a “Drive” thoroughfare type. A Drive thoroughfare is used when development is limited to one side of the street, with a natural area or scenic view on the other side of the street. However, Boundary Street also serves as a primary connector, as described above, carrying a large volume of traffic, which indicates a “Boulevard” or “Avenue” as an appropriate thoroughfare design.

The urban design vision for Boundary Street, as described by the community and refined by the design team during the charrette, is for the street to



The Boulevard Book by Allen Jacobs and Elizabeth McDonald

become a more walkable thoroughfare with on-street parking, short block faces, buildings oriented to the street, and a grid or network of thoroughfares north of Boundary Street to provide better local circulation. This urban design vision is also an important part of the transportation design criteria for Boundary Street, along with the existing development and constraints described above. The on-street parking vision, for instance, conflicts with the transportation goal of keeping Boundary Street as an arterial road, and without on-street parking, street-fronting buildings are much less feasible.

To balance the vision and the constraints, the proposed design of Boundary Street is a type of Multiway Boulevard. A typical street section for a generic multiway boulevard design is included in Figure 2 along with a discussion of Multiway Boulevards in general; the specific multiway boulevard design proposed for Boundary Street is also discussed.

General Description of Multiway Boulevards

A multiway boulevard is a street design that can simultaneously handle large volumes of through traffic while encouraging street-front development appropriate for a town center. The concept and operating characteristics of multiway boulevards are described comprehensively by Allen Jacobs and Elizabeth McDonald in *The Boulevard Book*, the source for much of the information related here.

The multiway boulevard is a time-tested concept found worldwide. Several fine examples were built at the end of the 19th century in New York, and modern multiway boulevards have been constructed in Chico, California and San Francisco, California.

Structure of a Multiway Boulevard

The center of a multiway boulevard is comprised of 4 or 6 lanes. These lanes serve the traditional function of an arterial street - to move automobiles as quickly and safely as possible. The generic section of a multiway boulevard is shown in Figure . The center lanes are considered the "motor vehicle realm", and most design considerations follow the motor vehicle mobility function, just as with contemporary arterial design. A key concession to pedestrians is that speeds are managed in the 30-35 mph range by techniques such as narrower lanes and shorter blocks.

On either side of the center lanes are very wide park-like medians with shared-use paths, a one-way access lane, a lane of on-street parking, a wide sidewalk, and street-front buildings. Some variations have parking on both sides of the one-way access lanes, depending on development intensity. The one-way access lanes are designed for speeds of 15 mph. This area, from the inner edge of the median adjacent to the center travel lanes to the front of the buildings, is considered the "pedestrian realm". Within this area, design considerations place the pedestrian function first, with great walkability as the primary design goal. Although not shown in the street section, but illustrated in Figure 2, the network of streets behind the buildings provides for local circulation. Boundary Street would require a similar network of streets on the north side.

Function of a Multiway Boulevard

Each element of the multiway boulevard is illustrated in Figure 4 and the function is described below:

1. Center through lanes: These lanes do the "heavy-lifting" of traffic movement, allowing large volumes of traffic to pass through the area. They also bring potential customers within viewing distance of the shops and storefronts built along the one-way side streets.

2. Wide park-like median: These side medians mark the beginning of the pedestrian realm. Planted rows of trees provide enclosure, helping to manage center street speeds. The median provides shade and protection for pedestrians and the shared-use path allows bicycling, roller-blading, and strolling, with ample benches and pedestrian features. The median is a centerpiece of the town center design, much as a park would be in a traditional town design such as Savannah, GA.

3. One-way access lanes: The one-way access lanes, in plan view of the multiway boulevard, are essentially parking access lanes. These lanes are parallel to the central lanes and are oriented generally perpendicular to the arterial street. These one-way connections serve the following functions:

- Provide a quiet street for the store fronts facing the arterial, analogous to a park view main street due to the wide median
- Provide vital on-street parking and pedestrian connections between blocks
- Allow locally circulating traffic to make easy right-hand turns while circling the block, looking for parking
- Allow local traffic to access parking without getting on the arterial street



Figure 2: Perspective of town center street network adjacent to tree-lined multiway boulevard

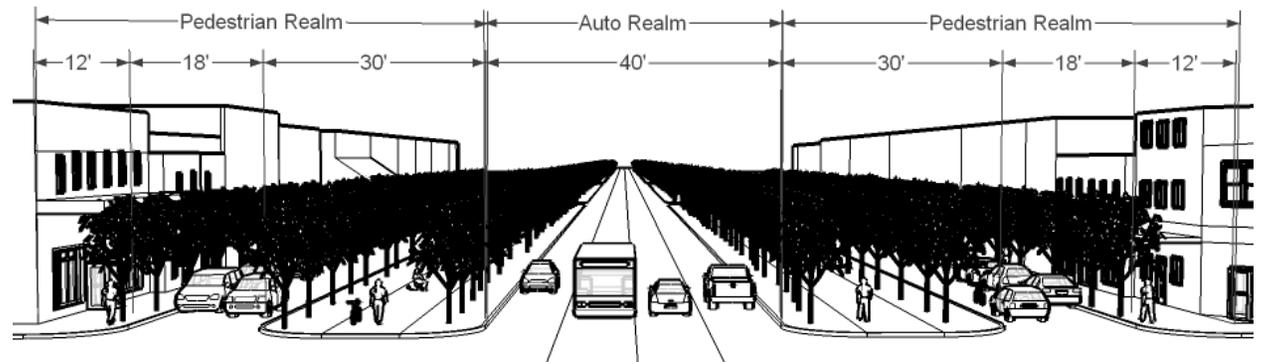


Figure 3: Multiway boulevard structure

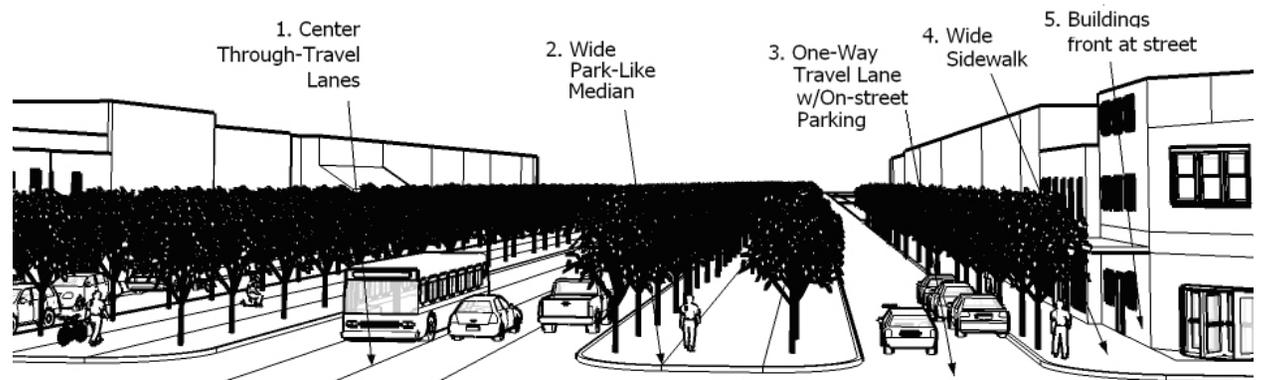


Figure 4: Components of a multiway boulevard

4. Wide sidewalk: Sidewalks adjacent to parking allow pedestrian traffic to circulate freely between store fronts and the median park area. The wide sidewalks provide necessary space for pedestrian shopping and travel needs while still leaving room for a few sidewalk café tables, a sidewalk sale rack of clothes or table of used books, and of course street trees and plantings.

5. Store fronts: Provide economic viability for the town center. On-street parking goes away as speeds are increased to 40 or even 55 mph, destroying the viability of Main Street shops. New development located far from the street requires substantial amounts of parking and infrastructure, all of which are beyond the means of local businesses.

Store fronts along the multiway boulevards are provided with the best of both worlds - reasonable access to pass-by traffic, and a calmed, walkable lane front that functions like the old traditional downtown park street. The store fronts also send a clear message that this is the "town center", a message that is difficult to convey with conventional arterial design.

The Boundary Street Multiway Boulevard Design

The design constraints of Boundary Street, primarily the lack of developable land to the south and ROW constraints along some sections to the north, require modifications to the general multiway boulevard section. The proposed Boundary Street Multiway Boulevard section is shown as Figure 5. The key differences are:

- Development along only one side of the boulevard
- Addition of a center median
- Discontinuous side access streets



Boulevard precedent: The Esplanade, Chico



Boulevard precedent: Ocean Parkway, Brooklyn

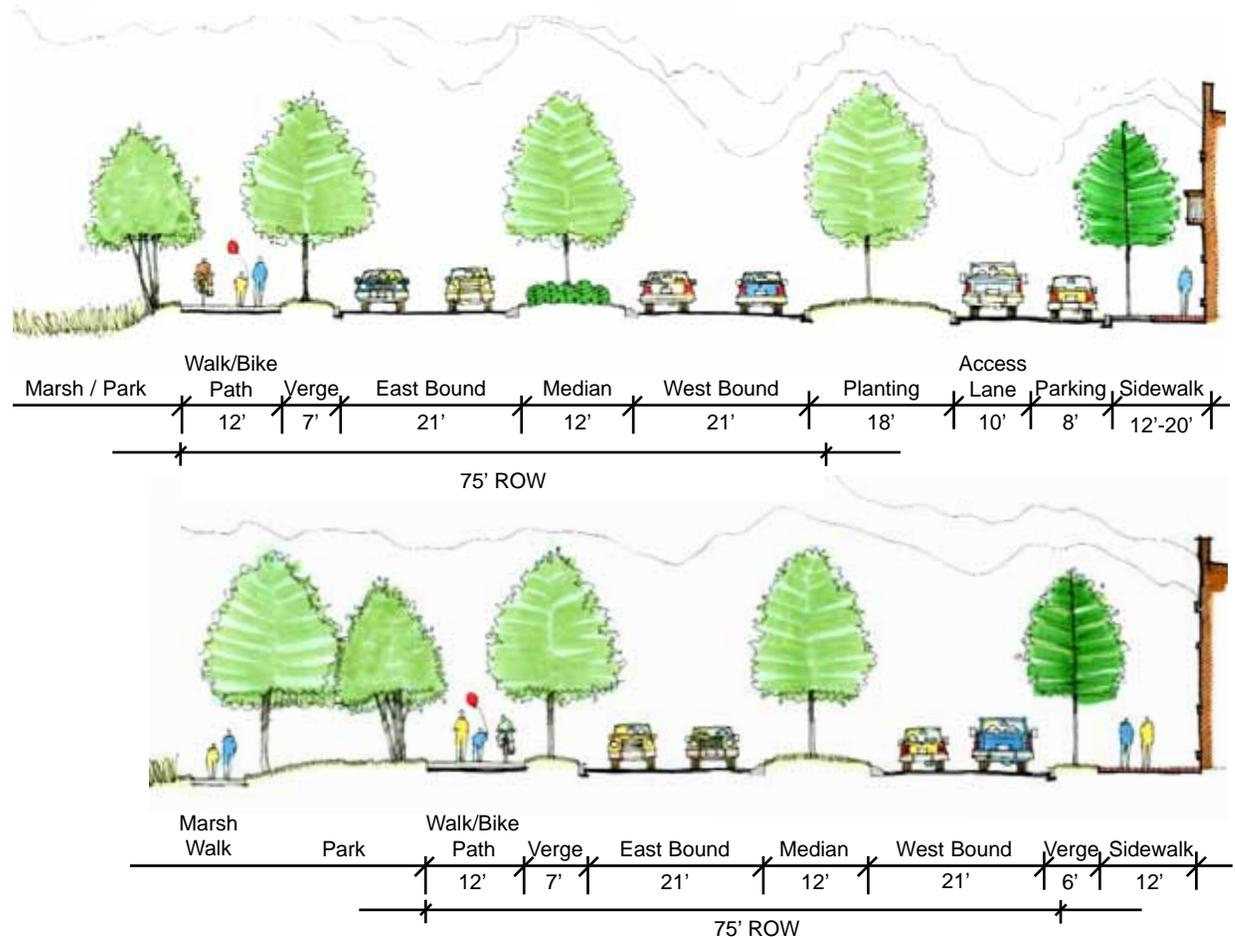


Figure 5: Boundary Street multiway boulevard sections

2. Intersections at SC 170 and Ribaut Road

The two intersections marking the east and west boundaries of the study area, Ribaut Road and Robert Smalls Parkway (SC 170), serve vital transportation functions and are envisioned as gateways to a redeveloped Boundary Street corridor. The intersection of SC 170 and Boundary Street is dominated by a large strip mall to the southeast. The developer of this strip mall has indicated a strong interest in redeveloping in a New Urbanist context, which would provide an excellent anchor for walkable development at the west end of the corridor.

The Ribaut Road intersection is targeted for the construction of a new Beaufort City Hall, which also provides strong opportunities for creating an anchor for walkable development on the east end of the study corridor.

Traffic signals and roundabouts were both identified as possible intersection treatments during the charrette. Signalized intersections were evaluated under the Synchro analysis. The analysis indicated that the Ribaut Road intersection operates acceptably at LOS C in 2025 with either the existing street network or the recommended street network. The SC 170/Robert Smalls Parkway intersection operates at LOS E under the recommended street network (the addition of Westview Street accommodated the new traffic growth. This intersection performed at LOS F without Westview Street in the existing street network analysis (see Table 4).

Roundabout Analysis

Given the importance of these intersections and the apparent opportunities for exceptionally walkable design, HPE explored the concept of constructing roundabouts at these intersections. The round-

about idea emerged from the community design session and was further refined and explored during the course of the charrette. Two major advantages of using roundabouts versus conventional traffic signals at these intersections are the increased walkability of the intersections and the greater sense of place provided by a roundabout. Walkability at a roundabout is increased because traffic speeds are lower at the approaches and exits, and pedestrians have fewer lanes of traffic to cross at one time. Roundabouts provide a greater sense of place because of their novelty and greater opportunities for urban design (statuary, fountains, or landscaping can be placed in the center of the roundabout, although care must be taken to preserve adequate sight lines.) Roundabout design and function is described in the FHWA publication FHWA-RD-00-067 Roundabouts: An Informational Guide.

Based on the traffic volumes, the recommended design for both roundabouts was a double-lane configuration. HPE compared the volumes and performance of a potential double lane roundabout on Boundary Street with the much-studied and well-understood double lane roundabout in Clearwater, Florida. Also, based on feedback and recommendations from local participants in Beaufort, HPE traveled to Hilton Head Island to observe and document performance of the traffic circle at Sea Pines Boulevard and a double-lane roundabout at Hilton Head Plantation.

The Sea Pines circle (not a roundabout) was efficient for traffic but measured speeds were far in excess of pedestrian friendly levels (as high as 30 mph on the exits). The Hilton Head Plantation roundabout performed at pedestrian-friendly speeds, however, its capacity was lower than required for Boundary Street.

During the charrette, the performance of the potential roundabouts was tested using Synchro (TM, TrafficWare, Inc.) traffic microsimulation software. The Synchro analysis indicated that the roundabouts have potential for successful operation. Additional, more detailed analysis of the roundabouts was conducted by Alternative Street Designs, Inc., using aaSIDRA, a roundabout-specific traffic analysis program. This analysis indicated that both roundabouts (Ribaut Road and Robert Smalls Parkway) would continue to function at LOS B even with a 20% increase in traffic over present levels. SCDOT traffic projections indicate this traffic level will not occur until 2025. With a 20% increase in traffic, the analysis indicates that a right-turn bypass lane would need to be constructed on the south leg of the SC 170/Robert Smalls Parkway roundabout. The Roundabout Analysis documentation is included in Appendix B.

Roundabout Capacity: A double-lane roundabout, such as the ones proposed for Boundary Street, have a design capacity of approximately 4,000 vehicles per hour, although this capacity can go higher depending on the actual design of the roundabout. The SC 170 Roundabout, for example, has a bypass lane on the southeast quadrant that substantially increases its capacity over a standard roundabout. The roundabout in Clearwater,

Table 1: Roundabout Performance Summary 2025 PM Peak

Inter-section	Total Entering PM Pk Hour Volume	Average Vehicle Delay (seconds)	Maximum Queue (vehicles)	LOS
Ribaut Road	4,180	11	9	B
SC 170	5,145	19	22	B



Hilton Head Plantation roundabout



Clearwater two-lane roundabout



Sea Pines traffic circle

Florida, for instance, has been counted carrying 4,430 trips an hour during peak use without bypass lanes.

Bicyclists in Roundabouts: Bicyclists are sometimes concerned about travel through a roundabout, especially if they have experience with the much larger and faster traffic circles found in New England. In fact, modern roundabouts such as those proposed for Boundary Street are much safer for bicyclists than traffic signals. This is due to the slower traffic speeds found in a roundabout. Entering and circulating at 20 mph or less, automobiles can easily share space with bicycles traveling through a roundabout. To traverse the roundabout, the cyclist simply travels through in the vehicle lane just like an automobile. Cyclists who are uncomfortable sharing the road with automobiles may, alternatively, go around the roundabout using the sidewalk system as a pedestrian.

Pedestrians with Visual Impairment: The Access Board, which sets the policy for the Americans with Disabilities Act, has issued recent guidance indicating that properly designed single-lane roundabouts are safe for persons with visual impairment. Multi-lane roundabouts are still under study to determine if a similar endorsement

is warranted. However, compared to signalized intersections, traffic speeds at a roundabout reach a maximum of 20 mph, which results in a much greater opportunity for drivers to see and respond to pedestrians, as well as reducing the severity of any crash that may occur. In a double lane roundabout, pedestrians cross the street behind the second car in the traffic queue, using a clearly marked crosswalk. Traffic speeds are slow enough, sight distance is adequate, and the direction of the driver's is directed to allow exiting drivers to clearly see and respond to pedestrians. Observation of the Clearwater roundabout indicates that drivers will stop for pedestrians in roundabout environment, due in part to these factors.

At traffic signals, however, legally-crossing pedestrians are often at risk from right-on-red turning drivers, who are looking left for approach vehicles and may not see a pedestrian in the crosswalk in time to avoid a crash. And when the traffic signal is green, cars may travel at or above the speed limit through the intersection, greatly increasing the odds of death or serious injury to the pedestrian if a crash should occur.

Construction of Multi-lane Roundabouts with FHWA Funding: To date, FHWA (the Federal Highway

Administration) has funded multilane roundabouts in California, Kansas, and Arizona. FHWA's guide on roundabouts (called Roundabouts: An Informational Guide) provides details for the construction of multilane roundabouts, including the treatment of pedestrian traffic at these roundabouts.

Right of Way (ROW) Requirements for a Roundabout: Physical design of either roundabout on Boundary Street is conceptual at best at this level of analysis, but typical double-lane roundabouts are designed with a diameter of about 140', according to Alternative Street Designs, the company that conducted the roundabout analysis. Additional ROW would be required for sidewalks, any necessary bypass lanes, or other requirements, per the final design of the roundabout.

The recommended Boundary Street network can be served by either signalized intersections at each end, or by roundabouts. Based on input from the community and further analysis, it is recommended that the City, County, and property owners embrace a street network with roundabouts at the intersections of Boundary Street and Ribaut Road and Boundary Street and Robert Smalls Parkway (SC 170).

3. Completing a Thoroughfare Network North of Boundary Street

Based on community input during the charrette and several previous plans completed by the City, the entire Boundary Street corridor is targeted for redevelopment in a more walkable context. The new design is envisioned to reflect the historic design of old Beaufort, and the new Marsh Gardens development is being proposed consistent with this vision. From a transportation design perspective, the key feature of this vision is a network or grid of walkable streets to be constructed north of Boundary Street. This network will allow local traffic to circulate without using Boundary Street, which will be more convenient for local traffic as well as allow through-traffic on Boundary Street to operate more efficiently. The plan created by the design team indicates proposed locations for new streets on this network (Figure 6). Some of these streets can be developed more quickly than others.

As these streets are constructed, they must be built as walkable thoroughfares. Figures 8-15 are proposed sections for the streets (section drawings prepared by Seamon, Whiteside, & Associates).

In addition to the design of the streets themselves, the street network as a whole must be constructed in a walkable fashion. To be walkable, the streets need short block faces (400'-500' max), narrower lane widths (10' maximum), and frequent intersections. If the Multiway Boulevard plan is used, not all of the intersections with Boundary Street will require signals, but signalized intersections will be needed at intervals of no more than 1000' on average, to avoid creating too much congestion at any single intersection. The effect of the intersections on Boundary Street traffic flow is discussed under item 5.



Figure 6: Plan for Boundary Street showing the proposed street network north of the corridor

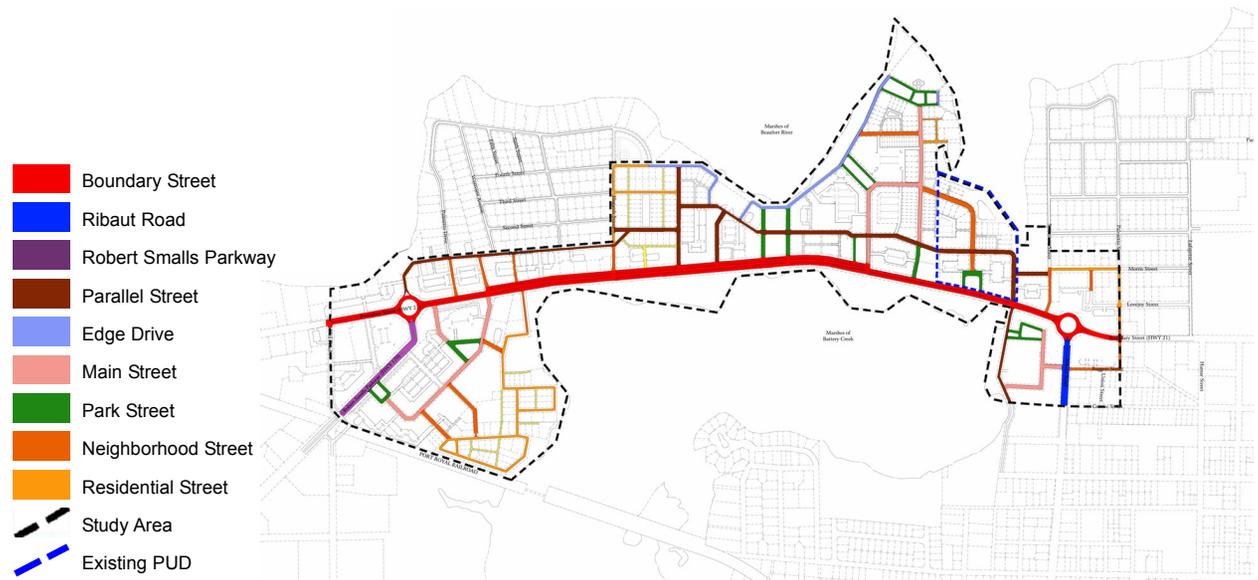


Figure 7: Regulating Plan

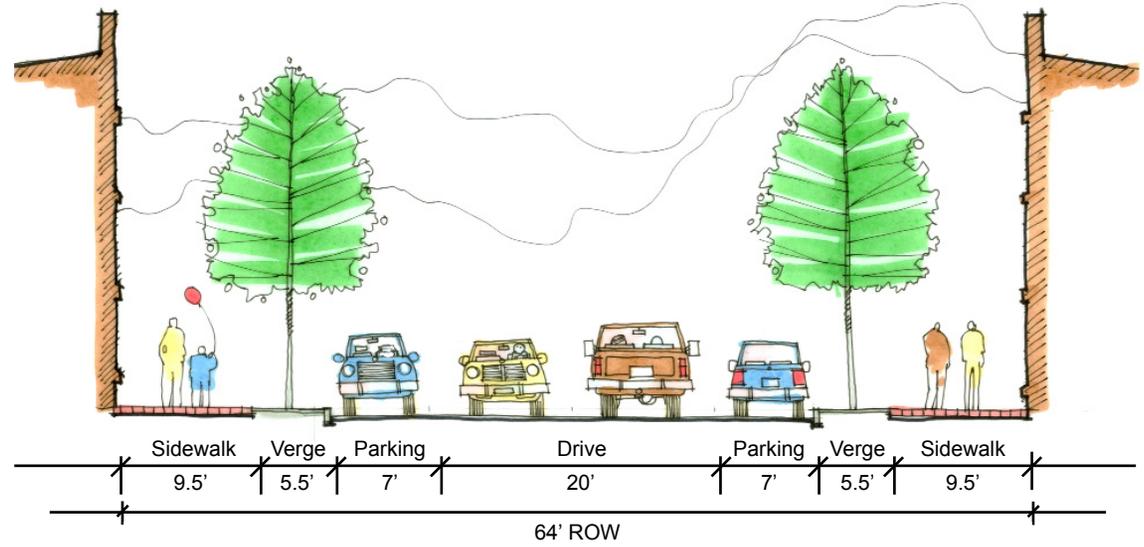


Figure 8: Main street section

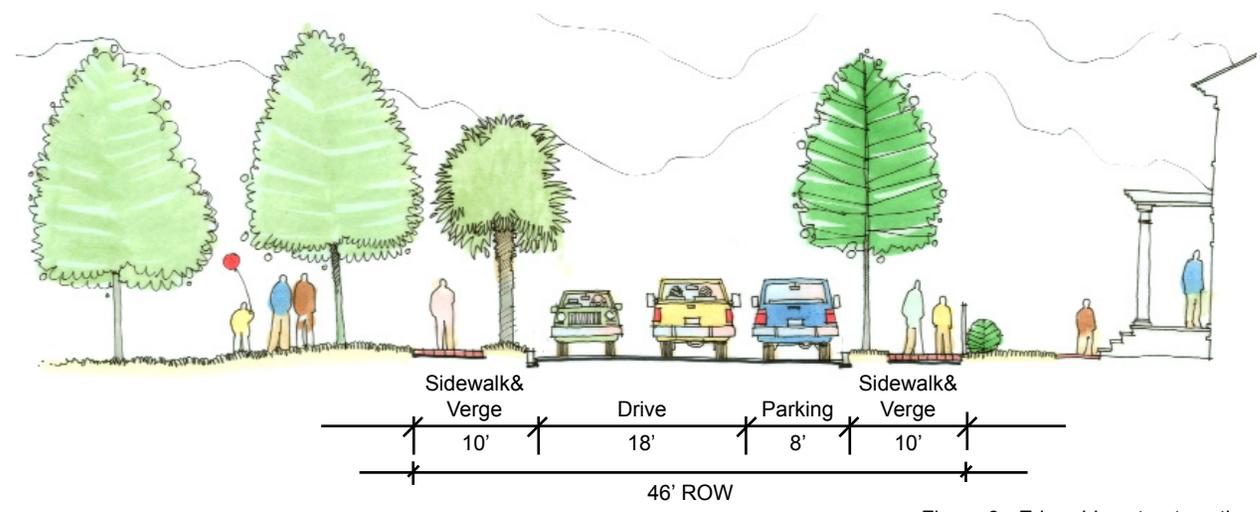


Figure 9: Edge drive street section

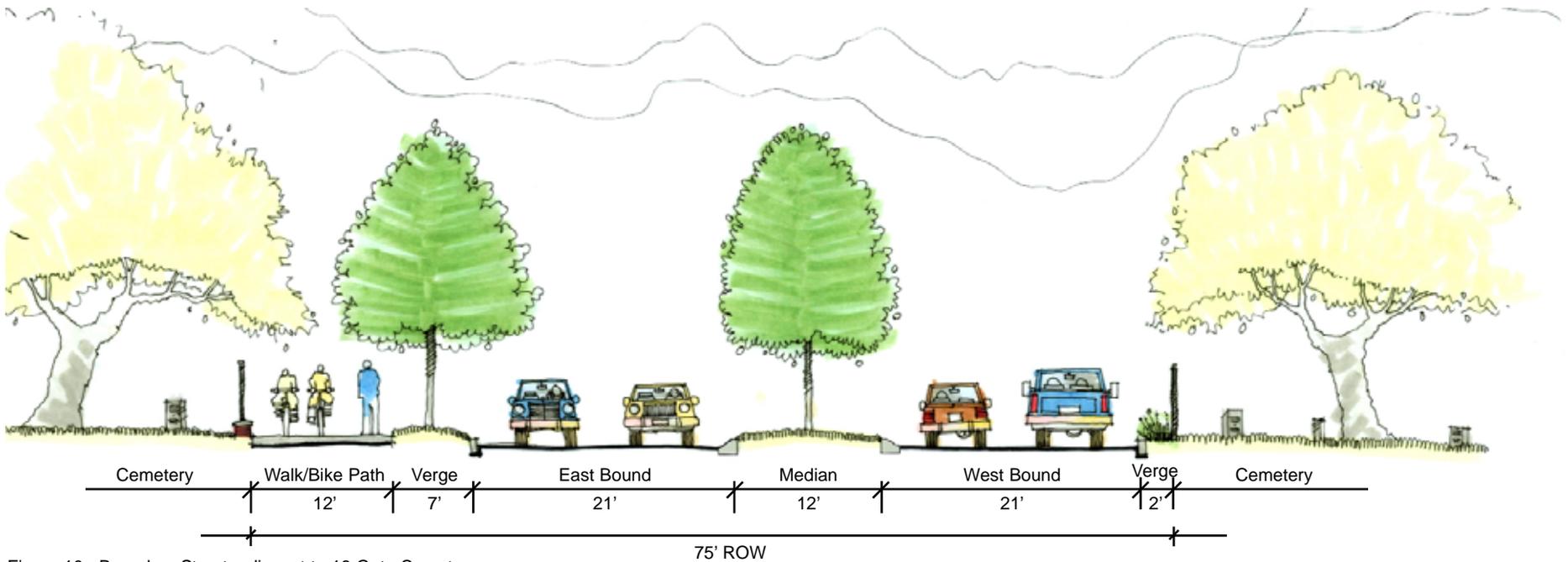


Figure 10: Boundary Street, adjacent to 16 Gate Cemetery

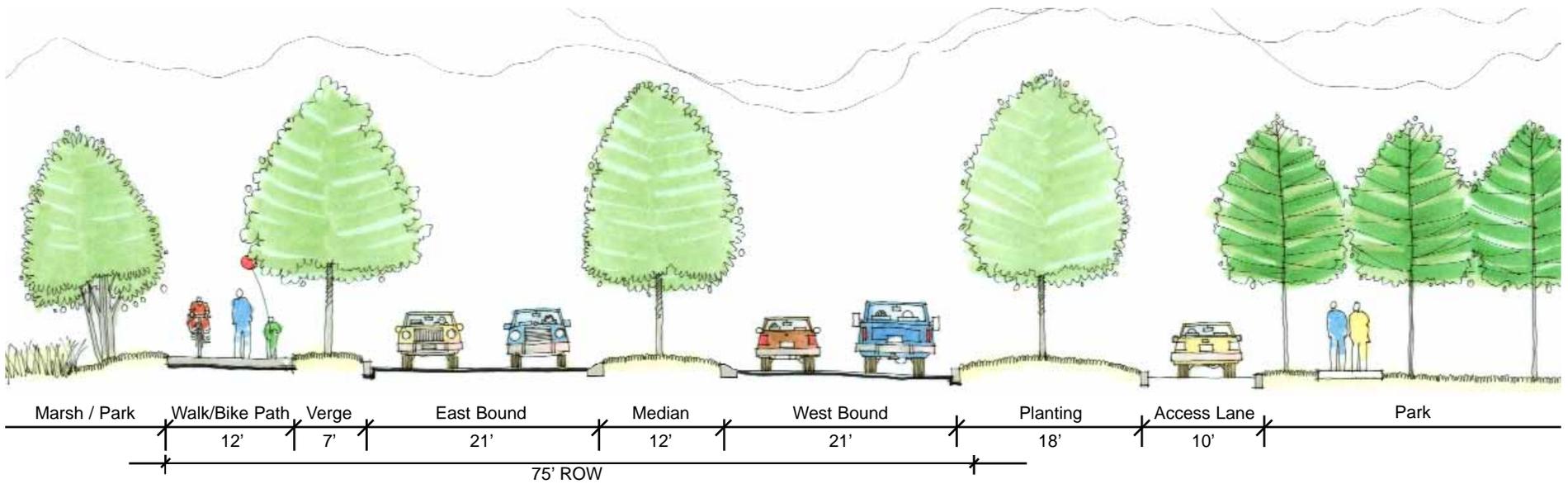


Figure 11: Boundary Street, at the central park

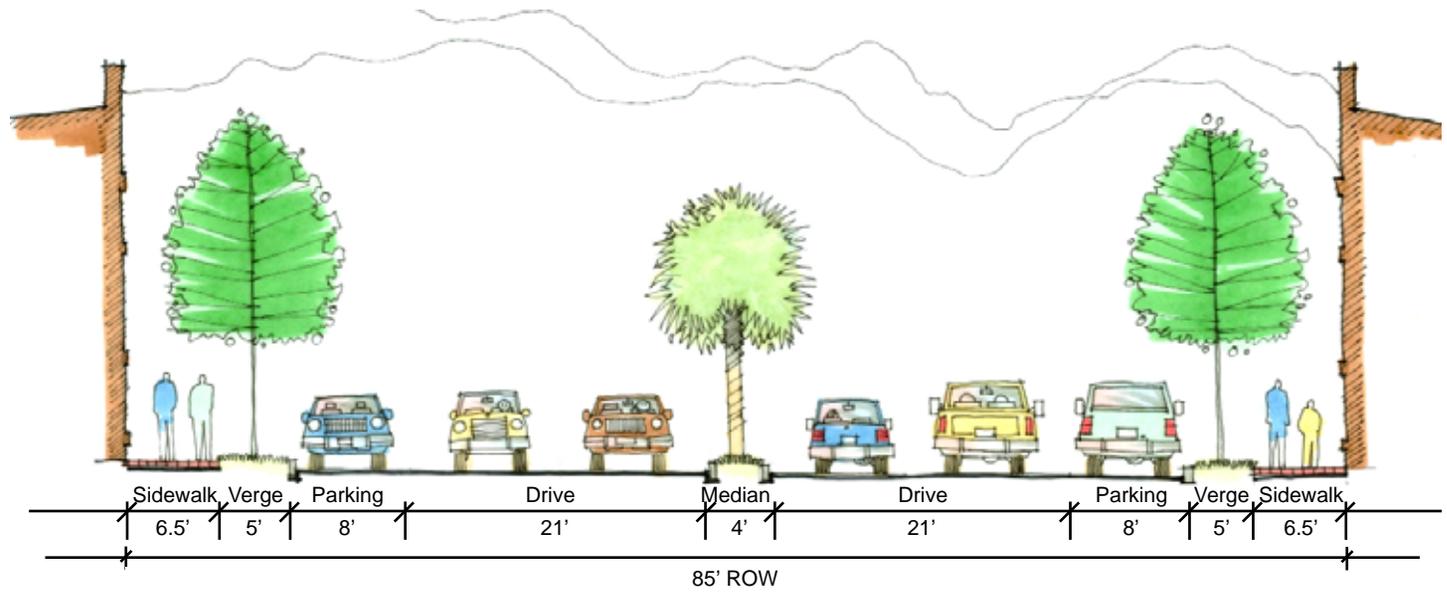


Figure 13: Section at Ribaut Road

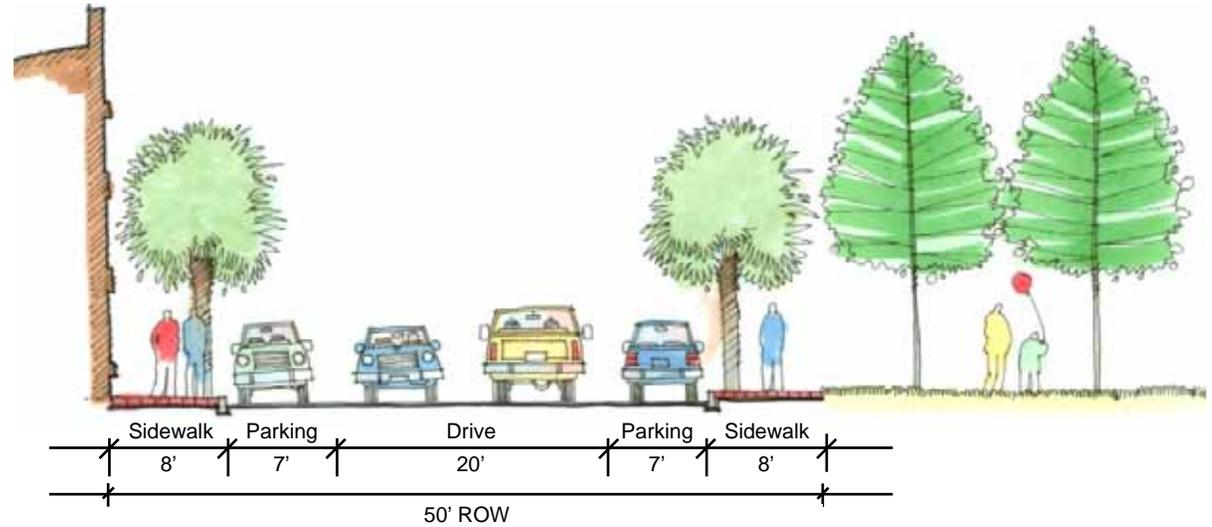


Figure 11: Section at Greenlawn Drive

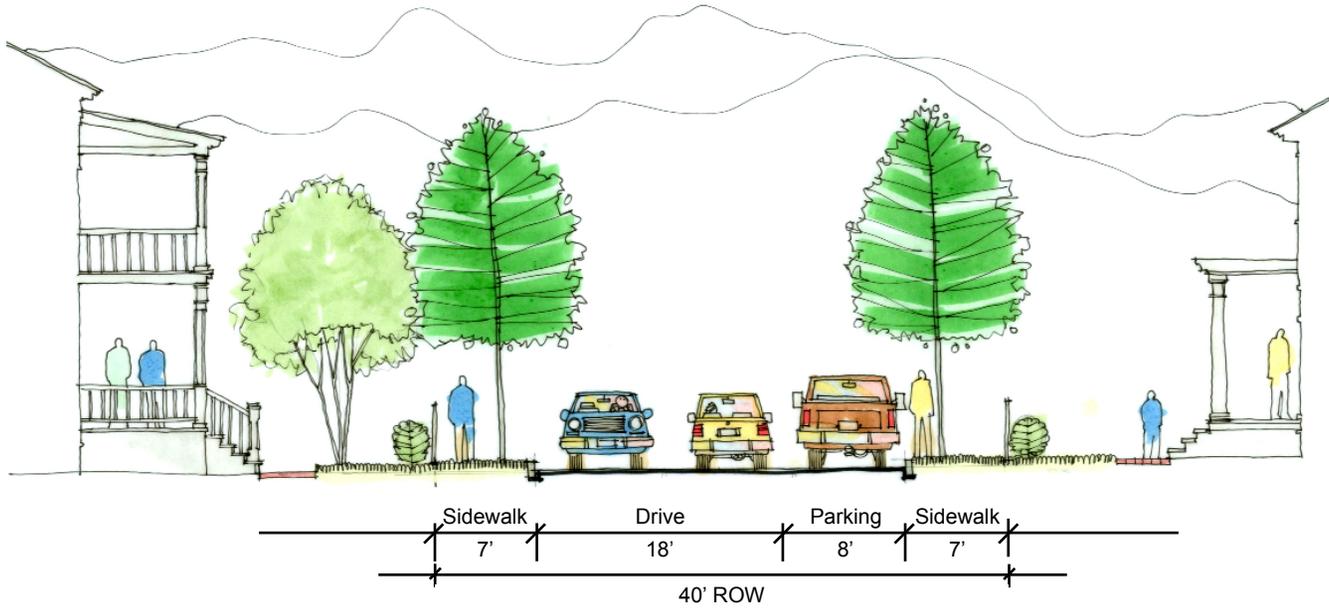


Figure 14: Neighborhood street section

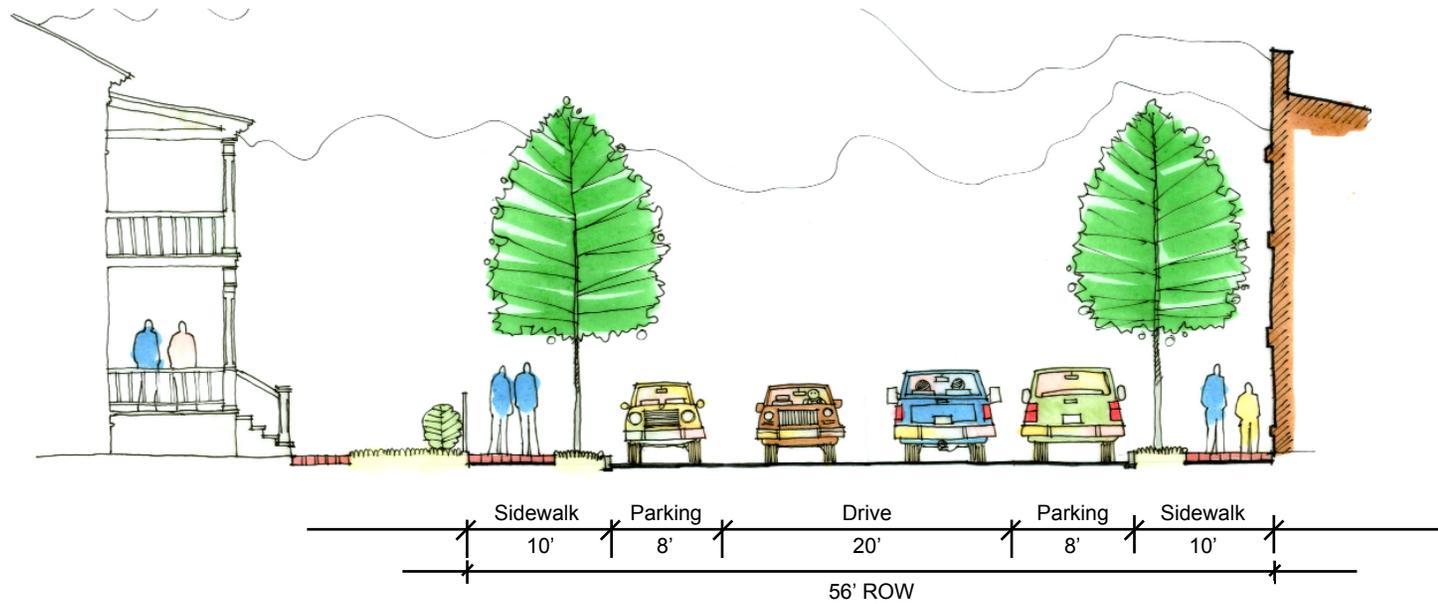


Figure 15: Parallel street section

4. Emergency Access and Hurricane Evacuation

As mentioned in the beginning of this section, Boundary Street serves as the only street connecting old Beaufort and Lady's Island to points west of Beaufort and SC 170. Consequently, Boundary Street is very important as an emergency access route and as a hurricane evacuation route. Any plans or modifications to Boundary Street must address these two functions, and the need to serve these two functions serves as a design constraint on Boundary Street.

Rail-Trail Possibility

One intriguing possible solution to this design constraint is the creation of an additional route serving the emergency access and evacuation route function. The idea of using an existing rail corridor connecting SC 170 to Ribaut Road south of Boundary Street was brought up during the charrette (see Figure 16). HPE physically examined the rail corridor and learned that the existing railroad bridge was carrying train traffic until a year or so ago (Figure 17). Based on this very cursory analysis, further exploration of this route is warranted. The proposed solution to be tested is a single paved lane that could be used as a rail-trail shared use path and also as an emergency services route. Ambulances and fire response vehicles could use this path to bypass Boundary Street entirely when answering calls along SC 170 and points south, or to avoid congestion on Boundary Street. In addition, this path could be used as a hurricane evacuation route if necessary.

The City should reexamine this corridor every few years to determine its appropriateness for use as a full city street.

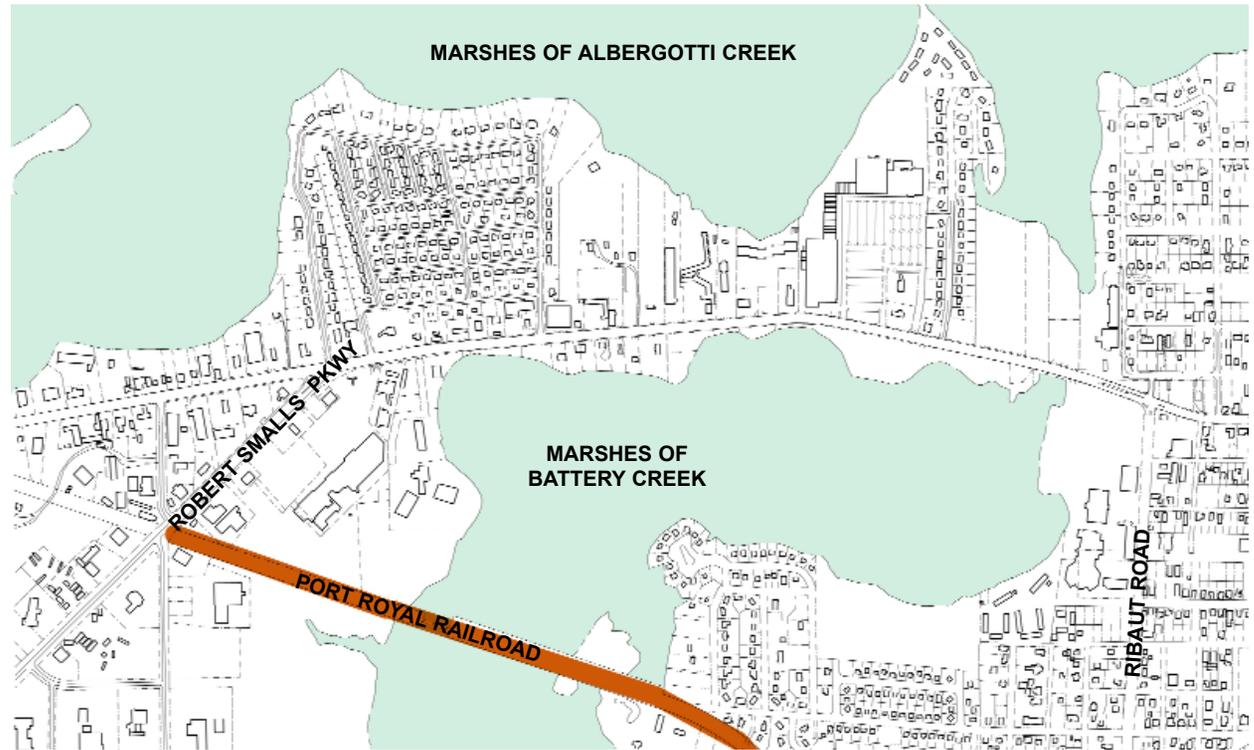


Figure 16: Rail corridor with possible use as alternative emergency route

Boundary Street Emergency Access

Along Boundary Street itself, emergency service providers expressed concern over the loss of the center turn lane on several portions of the corridor, if the medians were installed as recommended. The fire department also expressed concern with the ability to maneuver its largest truck through the north side street system, if the streets were constructed to walkable thoroughfare standards with narrow lanes and on-street parking.

Access along Boundary Street during an emergency situation, given the construction of medians, appears to be no different from emergency access in other cities and locations where medians are employed. In these situations, the emergency vehicle typically travels down the opposing traffic

lane (in fact, the local ambulance service indicated this is often their preference as well during heavy traffic.) Traffic in the opposing traffic lane clearly sees the approaching emergency service vehicle and pulls over to the side as necessary.

To address the concerns of ambulance drivers regarding this scenario the preferred treatment is to use a mountable curb in the median and reinforce the inner two feet of the median perimeter to allow an ambulance to safely mount the median and bypass traffic if necessary.

In addition to the mountable curb in the median, the City, County, and Beaufort Fire Department should work together to fund (or find funding



Figure 17: Port Royal railroad looking northwest

sources) to install pre-emptive traffic signals along the corridor. The devices would allow ambulances and other emergency vehicles to change the traffic signals to green as they approach - changing the signals governing cross-traffic and oncoming traffic to red. The ability to control the traffic signals along Boundary Street would offer emergency vehicles safer and faster access to needed locations.

As Beaufort continues to grow and expand, a fire station should be considered at the western end of Boundary Street. A fire station in this area would decrease the response time and service the western areas of the City.

Street Network North of Boundary Street: Emergency Access

To ensure adequate access along the street network proposed to the north side of Boundary Street (see Figure 6) for the larger trucks, HPE used the AutoTurn program to test any intersections in the plan that might pose a turning problem for the largest trucks used by the Beaufort Fire Department. AutoTurn is a computer simulation program that allows the operator to simulate



Beaufort emergency vehicles

driving a vehicle through an AutoCAD street network. HPE constructed a fire truck based on specifications provided by the Beaufort Fire Department for use in the AutoTurn program.

As a result of performing this type of analysis on a number of traditional neighborhood design street plans, HPE has found that truck turning problems most commonly occur at intersections that have one or more of the following features:

- Bulbouts
- The intersection of two arrow (9' or narrower) one-lane streets
- Turns requiring turning movements greater than 90 degrees

The draft street design for the north side street network had very few of these features. Bulb-outs were not used, being unnecessary in the low-speed street, narrow street designs; lane widths were 9' or greater and had at least two lanes; and the intersections did not require turns greater than 90 degrees - with one exception. During a redesign of one intersection, the designer had to shorten the approach to the intersection, creating a sharp turn on the intersection approach/exit. HPE used AutoTurn to test the intersection and



AutoTurn Diagram

determined that even in this configuration, the fire truck was able to make the turn with no difficulty.

Boundary Street Hurricane Evacuation

Hurricane evacuation is a vital function of the Boundary Street corridor. None of the proposed modifications to the corridor will reduce the ability of Boundary Street to serve as an evacuation route. The installation of medians along the corridor may in fact assist in evacuation by streamlining traffic flow and limiting intersection turning movements. The provision of a parallel street as part of the north side street network is not calculated as being part of the evacuation network, but it will presumably allow any local traffic circulation to occur off the evacuation route, thereby reducing traffic congestion along this route. The eventual removal of south side land uses will eliminate conflicts as well, which should result in a smoother flow of traffic.

5. Boundary Street Traffic Movement

A primary concern of several stakeholders, including the Beaufort County Engineering Department and the South Carolina Department of Transportation (SCDOT), is the continued ability of Boundary Street to carry existing and projected traffic, and to improve the capacity of Boundary Street in the study area. The existing traffic along Boundary Street is indicated in Figure 18.

Development Assumptions

For purposes of transportation analysis, the amount of future development along the corridor had to be estimated. For analysis purposes, a first-cut 20-year build-out development program was prepared by the planning team. The development program is shown as Table 1. For the entire corridor, additional development is assumed to include 500 additional townhouse units, 44 single family units, 42,000 sq ft of office, and 170,000 sq ft of commercial space.

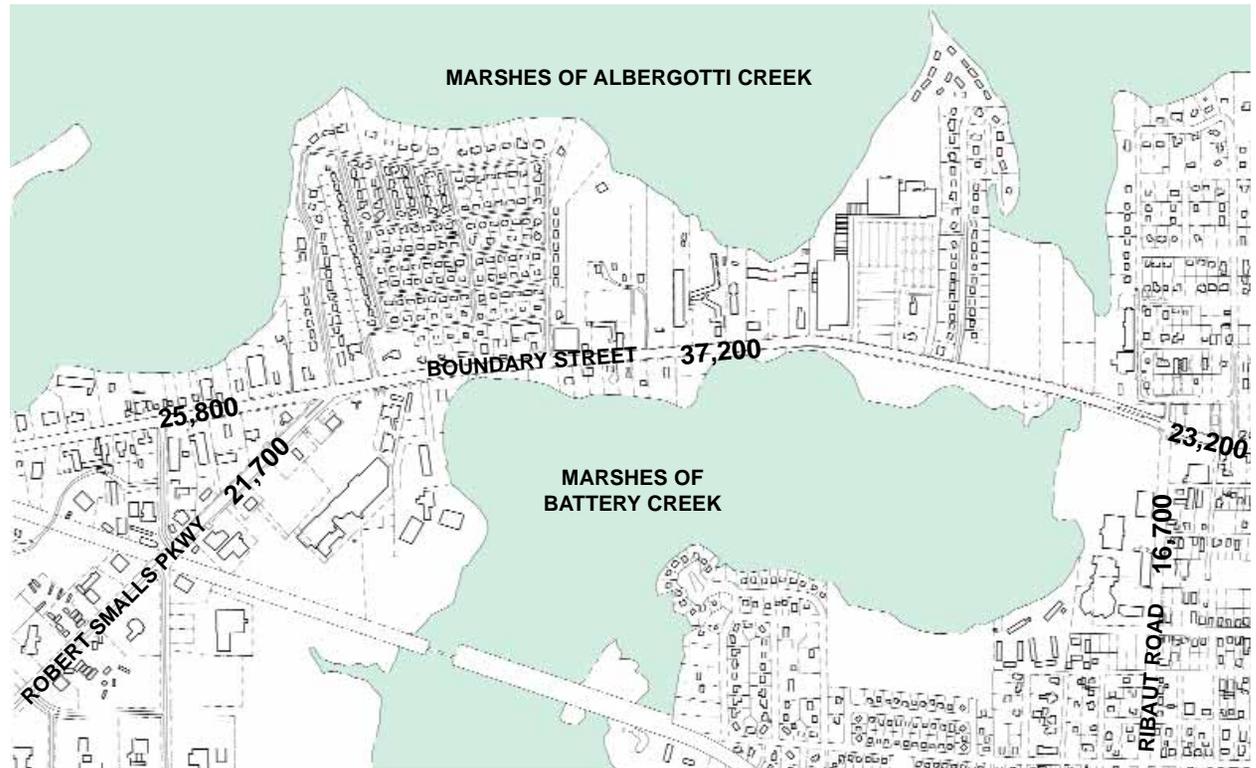
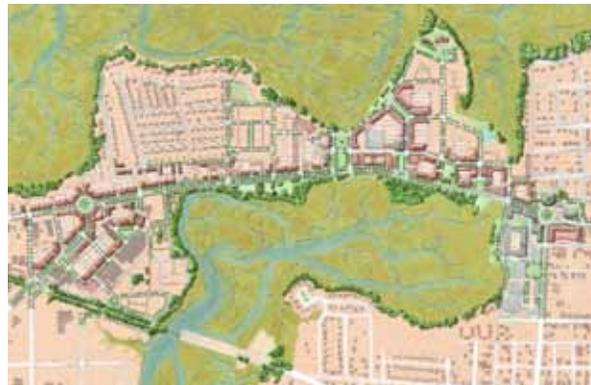


Figure 18: Existing traffic counts on Boundary Street



Existing land use



Boundary Street master plan

Table 2: Land uses

Land Use	Units and Square Footage
Single Family Lots	44 Units
Residential Condo/Townhouses	500 Units
Total Residential	544 Units
Government Office	42,000 sqft
Town Center Commercial	170,000 sqft
Total Commercial/Civic	212,000 sqft

Trip Generation and Distribution

The Institute of Transportation Engineers (ITE) Trip Generation Manual, 7th Edition, was used to generate trips based on the development program. Trip generation provides estimated entering and exiting trips, which are further refined by application of internal capture and pass by factors. In multi-use developments, trips between the given land uses (internal trips) can be accomplished on site without impacting the external road system. Since Boundary Street will be multi-use development, an internal capture rate was applied to reflect internal travel. Internal capture assumptions were applied for each individual land use, based on the degree to which travelers would logically move between origins and destinations on site (see Appendix B). Overall, the internal capture rate for mixed-use development along Boundary Street was estimated to be 26%.

Pass-by trips represent an intermediate stop on the way from an origin to a primary trip destination. These are not "new" trips on the roadway. For the trip generation step, pass-by capture rates were drawn, where available, from Trip Generation Handbook: An ITE Recommended Practice (Institute of Transportation Engineers; March, 2001). Commercial uses are expected to draw 34% of their trips from Boundary Street's existing and future traffic flow. These trips will then depart, traveling in the same general direction as the previous leg of their primary trip.

The trip generation analysis indicated that future development along Boundary Street will generate 693 new PM peak hour trips, of which 352 will be entering the area and 341 will be exiting. The trips were distributed on the transportation network using the distribution percentages indicated in Figure 19. The distributed trips were then placed into a computer program for more refined analysis, as described in Appendix B.

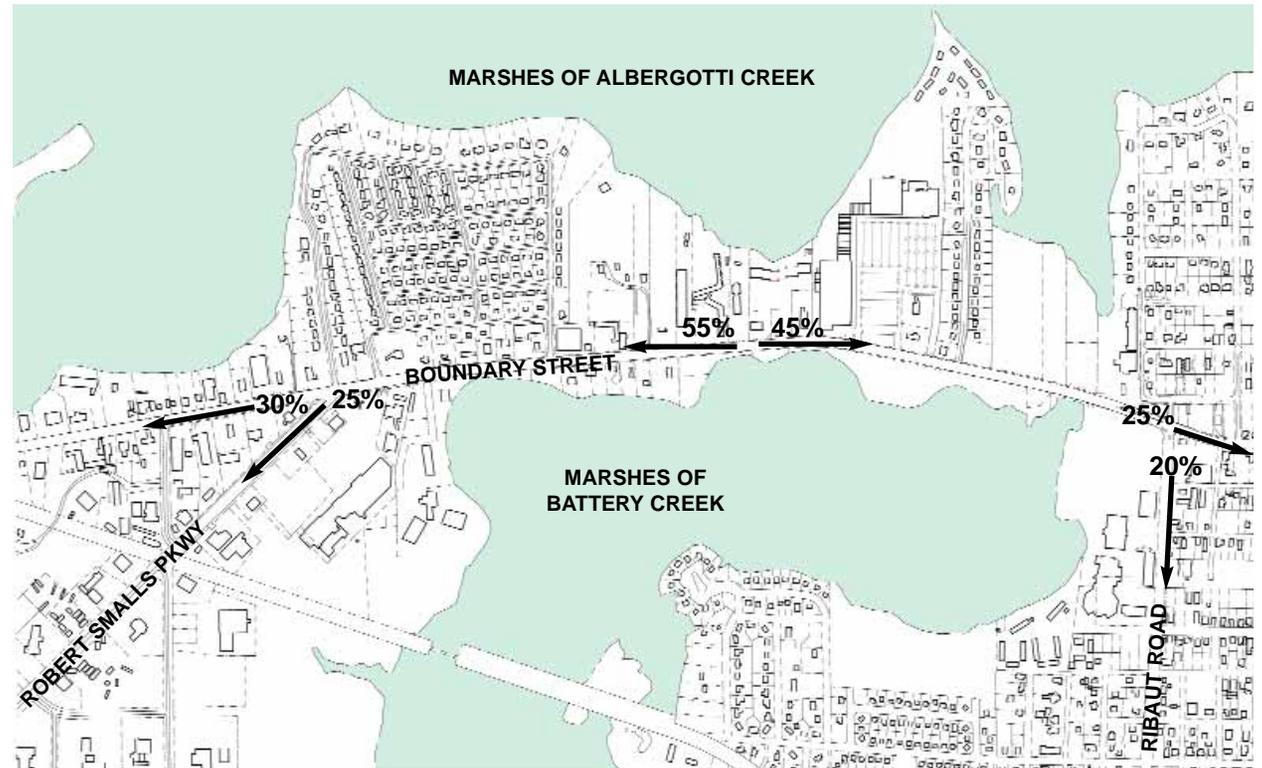


Figure 19: Boundary Street trip distribution pattern

SYNCHRO Analysis

HPE used Synchro (TrafficWare, Inc), a traffic microsimulation program, to analyze the impacts of additional traffic growth on Boundary Street. The existing traffic on Boundary Street was first grown by 20% using the network growth function in Synchro, to simulate the 20 year background growth along the corridor (traffic projections provided by SCDOT indicate a 20% growth in traffic by 2025). The additional trips generated by proposed development along the corridor were then added to this amount.

For this analysis, the two primary effectiveness measures were the intersection level of service (LOS) and the arterial level of service (LOS). These are letter-grade measurements of how well the intersections and arterials function. The LOS is a single letter that reflects a variety of different measurements, including travel delay, queuing at intersections, vehicles versus capacity, travel speed, and many others.

The LOS letters, which range from A through F, are similar to but not analogous to letter grades on a school report card. Essentially, LOS A indicates a street or intersection that is lightly-used and possesses much more capacity than needed for existing traffic. Often such streets or intersections are on low-volume streets, or perhaps on a newly-constructed street or intersection that has not yet filled with traffic. LOS B and C indicate progressively busier intersections or streets that may also have greater capacity than is needed for current traffic demands.

LOS D and E indicate intersections or streets that are approaching or have reached their traffic-handling capacity. These intersections or streets are very busy and move higher volumes of traffic.

Because streets and intersections are expensive to build and maintain, many if not most cities specify LOS D or E as the minimum acceptable LOS on their transportation network. Operating at LOS D or E ensures that streets and intersections are performing at their most effective traffic-handling capacity.

LOS F indicates a street or intersection operating beyond capacity. Such intersections and streets will have long lines of traffic at peak hours of the day and are generally viewed as being overloaded. Transportation planners and traffic engineers generally attempt to keep intersections and streets from operating at LOS F; however, in some instances operating at LOS F may be preferable to a street improvement, such as adding travel lanes, when such improvements would harm the urban or historic character of an area. In such instances, travelers must accept a trade-off of congestion and traffic delay in exchange for the preservation of the other desirable qualities of the area.

The Synchro analysis for Boundary Street evaluated two traffic networks. First, the existing network, which assumes a Boundary Street essentially unchanged except for additional development (Figure 20). The second network was designed during the charrette, and differs primarily through the addition of 1 traffic signal, the realignment of SC 170/Robert Smalls Parkway at Boundary Street, and the creation of new street (called Westview in the analysis) to the east of the realigned Boundary Street (Figure 21). Traffic for these networks was the same and consisted of the 20 year "background growth" projections from SCDOT plus additional trips from the 20 year build-out of the Boundary Street Master Plan.

The Synchro analysis indicated that both networks perform with a total corridor Level of Service of "D", which is a generally accepted LOS for an urban arterial segment. Arterial LOS is summarized in Table 3. Intersection LOS was also similar between the two networks, with all but one intersection operating at LOS C or better. The intersection LOS performance is shown in Table 4. The intersection of SC 170 and Boundary Street operates at LOS F under the existing network, and at LOS E under the charrette network. The difference in these two intersections is that the second network includes an additional street, which reduces traffic at the SC 170/Boundary Street intersection. The Synchro reports are included in Appendix B.

Table 3: Boundary Street 2025 arterial LOS PM peak direction WB

Segment	Existing Network 2025	Proposed Network 2025
Total Corridor	D	D
Robert Smalls/SC 170	F	F
Westview Street	N/A	F
Hogarth Street	C	D
Road A / Kmart	B	C
Marsh	D	D
Ribaut Road	F	F
Bladen Street	C	B

Table 4: Boundary intersection 2025 LOS PM peak

Intersection	Existing Network 2025	Proposed Network 2025
Total Corridor	F	E
Robert Smalls/SC 170	N/A	C
Westview Street	C	B
Hogarth Street	B	B
Road A / Kmart	C	C
Marsh	C	C
Ribaut Road	A	A

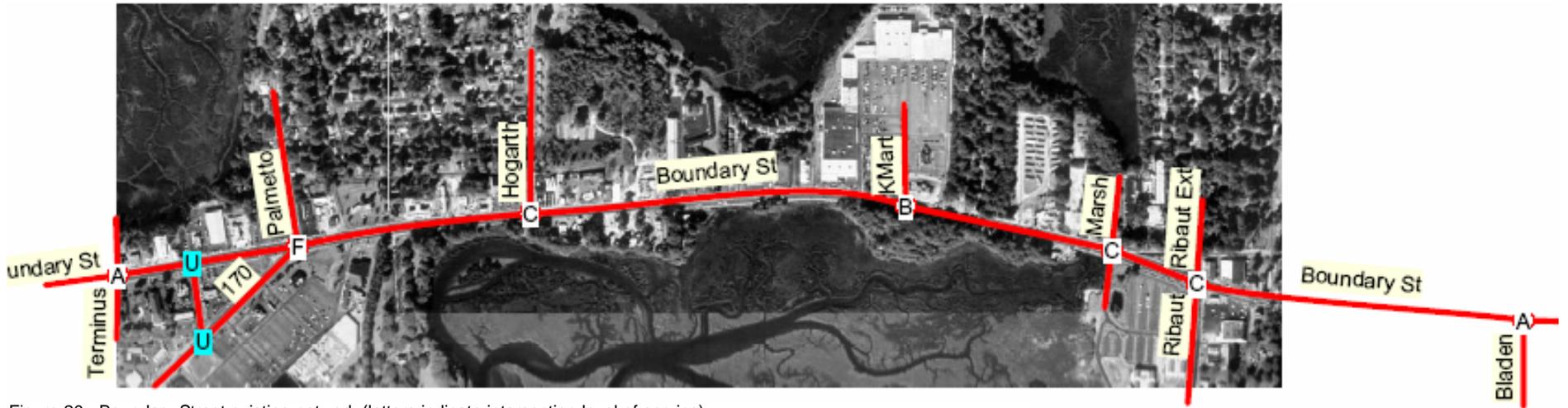


Figure 20: Boundary Street existing network (letters indicate intersection level of service)

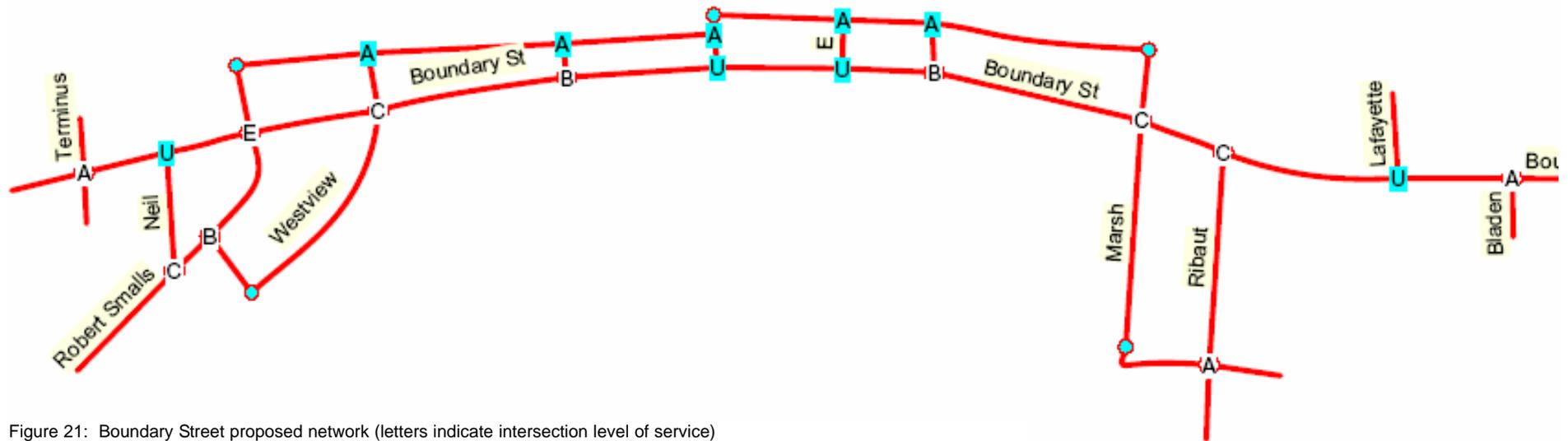


Figure 21: Boundary Street proposed network (letters indicate intersection level of service)

Phasing of Boundary Street Improvements

Boundary Street has several constraints that limit application of the complete Multiway Boulevard model, as discussed above. The south side of the street is essentially constrained from any development at all, for instance, and the ROW available along Boundary Street is constrained in the areas indicated in Figure 1 by cemeteries and the proximity of Battery Creek. To address these constraints, HPE recommends phasing the transformation of Boundary Street into a multiway boulevard. The proposed (listed in order of priority) phasing program is provided below.

1. Designate the proposed alignments of all new streets, paths, and medians and begin reserving or purchasing right-of-way (ROW). Some portions of Boundary Street will be redeveloped by the government; others will be created as part of public-private partnership in the redevelopment process. However, nothing will be done unless the proposed new alignments are identified and incorporated into local planning documents. Over the course of time, these plans will provide for the gradual construction of the Boundary Street improvements.

2. Create north-side street grid. The streets that, when connected, provide an alternative parallel route north of Boundary Street should be prioritized for designation, acquisition, and construction first. The sequence of tasks can happen in order, or simultaneously. This process can begin at the same time as the installation of medians and the shared use path.

3. Install mountable medians and create shared use path. Redevelopment of the commercial portion of Boundary Street will take decades to complete. In the interim, however, medians and the shared use path increase the traffic flow along Boundary Street and provide greater multimodal transportation opportunities. The use of medians will limit left-turning ability along Boundary Street, and the planting of the medians will help calm traffic speeds to a more walkable 30-35 mph, while allowing for emergency vehicle access. The shared-use path along the south side of the street will provide a much-needed transportation route for bicyclists who are uncomfortable sharing the road with cars (cyclists who are trained and comfortable doing so can still use Boundary Street as they would any street.) In addition, the planted medians down the center of Boundary and the plantings between the shared use path and the street will convey an immediate indication that change is coming to Boundary Street.

4. Install pre-emptive traffic signals. All traffic signals along Boundary Street should be installed with pre-emptive signal technology, allowing emergency vehicles to change the signals when needed.

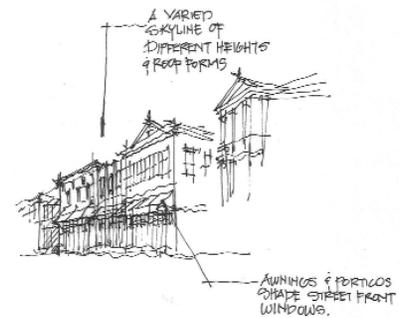
5. Improve the intersections at Ribaut Road and SC 170. Whether constructed as double lane roundabouts or as conventional traffic signals, these intersections set the stage for the entire corridor. Improvements to these intersections should occur prior to any other physical changes to Boundary Street.

6. Create north-side access streets. ROW constraints along Boundary Street preclude installation of a complete multiway boulevard section along the entire study corridor. However, those sections that can be re-constructed with a side access street are indicated in the plan, and these sections should be constructed as the land on that side of the street becomes available (either through redevelopment or through eminent domain.) As redevelopment of the north side commercial property occurs, the access streets will be in place and can provide a "Main Street" for new development along Boundary Street.

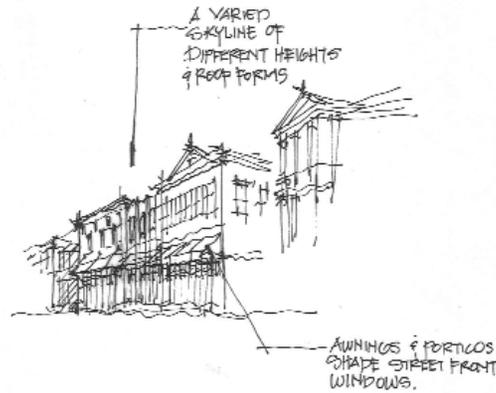
TRANSPORTATION IMPROVEMENTS — GETTING THERE

The following steps are necessary to achieve the transportation improvements:

- a. Designate the proposed alignments of all new streets, paths, and medians and begin reserving or purchasing right-of-way
- b. Improve the intersections at Ribaut Road and Robert Smalls Parkway (SC 170).
- c. Install medians and create shared use path.
- d. Create north-side access streets.
- e. Create north-side street grid.
- f. Install pre-emptive traffic signals.



implementation 6



A **Form Based Code** is a land development regulatory tool that places primary emphasis on the physical form of the built environment with the end goal of producing a specific type of "place". Conventional zoning strictly controls land-use, through abstract regulatory statistics, which can result in very different physical environments. The base principle of form based coding is that design is more important than use. Simple and clear graphic prescriptions for building height, how a building is placed on site, and building elements (such as location of windows, doors, etc.) are used to control development. Land use is not ignored, but regulated using broad parameters that can better respond to market economics, while also prohibiting undesirable uses.

The community vision for Boundary Street has been documented in the preceding chapters of this report through plans, illustrations, and text. This chapter identifies the necessary steps for realizing the place depicted in the imagery, transforming the community vision into a built reality. The following steps address policy recommendations, regulatory changes, public-private partnerships, neighborhood revitalization mechanisms, economic development goals, and funding options.

POLICY AND REGULATORY CHANGES

1. Adopt the Boundary Street Master Plan

The City of Beaufort should adopt the Boundary Street Master Plan, giving the plan official standing. Adopting the plan sends an important message to property owners and residents that the political decision makers support the Boundary Street Master Plan.

2. Adopt Boundary Street Form Based Code

Appropriate zoning that is supportive of community endorsed planning policies can encourage development by providing clarity and certainty. A zoning process that requires additional hearings and variances increases the risk of time and money to developers. By establishing clear zoning standards that support the City's vision and provide a visual guide to design criteria, investors can be certain that their project will be approved. Neighbors can also be assured that what will develop will be desirable, not harmful, to the Boundary Street area. The City's Unified Development Ordinance should be amended to include a Form Based Code that will support Boundary Street redevelopment.

A Form Based Code for the Boundary Street corridor would allow by-right development of property in congruence with standards set forth in the code. The new code would streamline the process of getting projects approved because of the investment in public process and consensus that the Boundary Street Master Plan incorporates.

3. Appoint a Development Coordinator

The City should create a Development Coordinator staff position to begin the implementation of the Boundary Street Master Plan. This person should have a full understanding of the principles and intent of the plan. The Development Coordinator would oversee the application of the Form Based Code and the streamlining of the permit processes in the Boundary Street corridor area. This person would also work with developers and property owners to strategize on redevelopment opportunities along the corridor.

PLANNING STRATEGIES

4. Citywide Housing Strategy

In order to address the issues inherent in redevelopment, a citywide housing strategy is necessary. Adding specificity to the housing section of the Comprehensive Plan, the strategy should evaluate how and where to increase housing and the types of housing needed to accommodate the current and future housing market. Such a strategy should provide market-feasible locations for a mix and range of types that will attract a diverse range of residents and help to stabilize neighborhoods.

The Beaufort Housing Authority should be integrally involved in the development of an official housing strategy.

5. Coordinated Planning for Areas Outside of the Boundary Street Corridor

Because areas within and outside of Beaufort's city limits are part of the primary market area that will sustain and add new retail in the Boundary Street area, it is critical to coordinate planning in the interest of Boundary Street redevelopment. Specifically, planning is needed to curb the continued sprawl of commercial development outward from the City along highway corridors. The City must engage in joint planning efforts with Beaufort County and Port Royal to establish policies that will guide new commercial and mixed-use development in northern Beaufort County away from greenfield sites and into designated redevelopment areas such as Boundary Street.

6. Conduct Annual Inventories of Land Uses

An annual inventory of land use allows prospective developers and businesses to understand the supply and thus the need or demand for various land uses. The inventories should include housing, retail, office, industrial, and warehouse uses, among others. The inventories would show opportunities in the market as well as trends of current redevelopment. The City should conduct annual inventories of its land use using the City's Geographic Information System (GIS) system.

7. Confirm Physical and Regulatory Conditions

The Boundary Street Master Plan was created with limited information and accuracy regarding rights-of-way, property lines, existing building locations, easements, utility limitations, and covenants tied to individual properties. As site-

specific applications come forward and City improvements are undertaken, modifications will be necessary due to accurate surveys and specific site analysis. Part of the process of carrying out the Boundary Street Master Plan should involve regular updates of the City's GIS system with information on the physical conditions of individual properties as development occurs.

8. Establish a Parcel Assembly Program

The City and Redevelopment Commission have the ability to consolidate parcels of land for the purposes of redevelopment and economic development. One strategy for encouraging new development is the identification of opportunity sites and the consolidation of parcels to allow development at a scale that offers feasibility to the type of use desired. Alternatively, the City could establish a land bank with funding from local business owners. The land bank would then use revolving funds to acquire and assemble key sites and solicit preferred development alternatives. It is suggested that the City, the Redevelopment Commission, and other economic development partners collaborate on the formation of a land bank to acquire key opportunity parcels along the Boundary Street corridor to preserve them for appropriate and supportive development. The City should use its GIS capability to identify opportunity sites.

9. Develop an Infill Development Strategy

A strategy should be developed to target vacant, underutilized or "soft" properties that detract from the quality of Boundary Street. Vacant land and derelict buildings offer opportunities for change and redevelopment. In order to seize these opportunities it is necessary to inventory and map the locations of vacant land and derelict buildings and then target new users and promote the inventoried opportunities to new investors. The City can

use its extensive GIS system to begin to identify a list of properties that might benefit from infill development; this can be done as a part of the annual inventory of land use.

10. Parking

In order for the basic urban design nature of the Boundary Street corridor to change with redevelopment, the nature of parking in the area must change as well. The existing large surface parking lots that lie between the roadway and commercial buildings must give way to mixed-use development that is oriented to the street and pedestrian-friendly. On-street parking must be encouraged wherever possible, and private parking facilities must be located behind buildings, to the interior of blocks, or within structured parking decks that are designed to be compatible with pedestrian-oriented streets.

Regarding the type of parking to be provided, on-street, parallel parking is the most pedestrian-friendly form of parking. It provides direct access to the adjacent commercial establishments and provides a traffic calming effect on urban streets. Surface parking lots, while they provide low cost vehicle storage, are detrimental to the walkability of streets.



On-street parking should be encouraged

PROMOTE BOUNDARY STREET

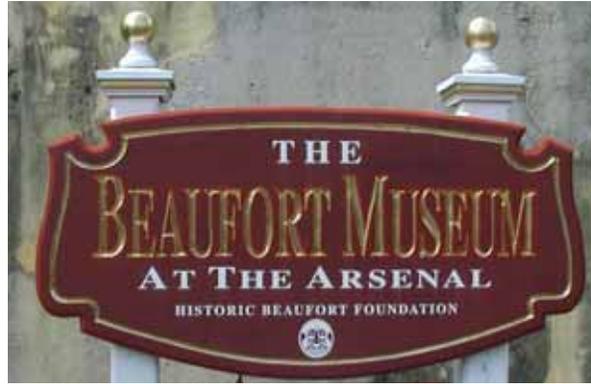


11. Promote the Boundary Street Master Plan

Continuing to spread the word about this plan and successful initial projects is vital for implementation. A variety of media should be used: brochures, websites, or television are some common methods. Promote the plan so that it will take on a life of its own and continue to work for the Boundary Street corridor for years to come.

12. Business Location

As each component of the Boundary Street Master Plan is implemented, a detailed list of the businesses and services to target for locating (or relocating) in the Boundary Street area is imperative. One or more new national tenants may be sought to "anchor" the Boundary Street corridor. This takes focus and tenacity as well as the right market numbers to get the attention of national retailers. Besides the national tenants, Beaufort should look for local tenants that will open a second location on Boundary Street. These successful business owners could ride the popular support for their current location into a new venue. As part of attracting both local and national tenants to Boundary Street, the City should offer opportunities for incubating businesses and allowing them to move to larger locations as they grow.



13. Historic Beaufort Foundation

The Historic Beaufort Foundation plays a significant role in the preservation of historic assets in Beaufort and the promotion of Beaufort as a prime destination for heritage tourism. While the Boundary Street corridor is not inherently historic in conventional terms (preserved historic structures or landscapes) the corridor does serve as the primary entrance to the City and its National Historic District. The Historic Beaufort Foundation should take a keen interest in improvements to the Boundary Street corridor as they will ultimately enhance the historic district as well.

14. Celebrate

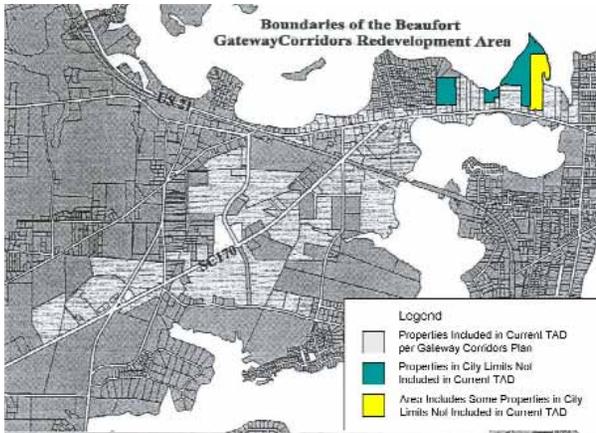
It is important to celebrate Beaufort's uniqueness and discover ways to promote Boundary Street's strengths. With a high degree of community input in the charrette process, the message is clear that Beaufort citizens are proud of their community. The Boundary Street Master Plan should serve to fit all the pieces together to continue to make Beaufort a first-rate city.

FUNDING MECHANISMS: CAPITAL IMPROVEMENTS

To achieve the goals of the Boundary Street Master Plan, a variety of funding sources will need to be tapped. Beaufort has already begun to access public funding mechanisms for redevelopment (Tax Increment Financing, or TIF) based on a redevelopment plan that was established in 2000. The City's Transportation Impact Fee is another key source of funding that can assist with needed improvements identified in the Master Plan. Other funding options for capital improvements, such as Business Improvement Districts, grants from public and private sources, general obligation bonds approved by the public, donations, and general fund expenditures, should all be explored as options for funding implementation. The following descriptions provide additional detail about potential financial assistance for public capital improvement projects.

15. Tax Increment Financing

Tax Increment Financing (TIF) is the use of incremental taxes from increases in property value to fund redevelopment district costs. The funds can be used as a revenue stream for issuing and paying bonds that finance projects within the defined district that are consistent with a redevelopment plan. Revenue bonds funded by tax increment do not constitute a portion of the public debt secured by the general fund, and are tax exempt for state and municipal tax purposes. As property values rise, any tax collected in excess (the increment) of the original tax on the basis is placed into a "special fund", as specified in the legislation. The monies in the special fund can be used to pay debt service on revenue bonds.



The South Carolina state legislature has approved a legal basis for Redevelopment Planning and Tax Increment Financing (South Carolina Code of Law: Section 31, Chapter 6). The law outlines the procedures for the creation of redevelopment districts that are funded through the issuance of revenue bonds supported by the tax increment of new development or redevelopment. The City of Beaufort prepared the Gateway Corridors Redevelopment Plan in accordance with South Carolina guidelines in 1999, and a tax allocation district (TIF II) has been established based on this plan.

In addition to tax increment revenue and financing options, the creation of a Redevelopment District allows the city to use certain redevelopment powers to carry out the purposes of the district. The City is allowed to sell, lease or mortgage any property acquired for the purposes of implementing the plan. The City may also use eminent domain to achieve redevelopment purposes. The funding from the District may be used for organizing and creating the district, property acquisition, capital improvements, creation of parks, constructing community centers and other public

buildings, relocation of displaced persons, and other uses listed in the legislation. The legislation also allows the City to accept and place in the special fund grants from other government entities and donations and grants from private sources.

Until the TIF II sunset in 2017, the City should use surplus tax increment revenues to fund a variety of redevelopment initiatives. The Beaufort Redevelopment Commission has been charged with researching and recommending redevelopment projects within the City, including coordination, review, and recommendation of redevelopment plans for projects to City Council. The Commission also is able to facilitate negotiations necessary for the execution of redevelopment plans, and can oversee project implementation. The City Council should oversee use of the surplus tax increment revenues on an annual basis, with assistance and recommendations by the Redevelopment Commission. Recommendations for ways to use these funds include the following:

- *Matching local funds for Federal grants* - Many Federal funding programs require a local match to Federal funds. In the case of the Transportation Enhancement (TE) program administered by SCDOT, a minimum of 20% of a project cost must be covered by local match funding. Historically, TE funding has been limited to \$1 million per project in Federal funding, requiring a minimum local match of \$250,000. The Boundary Street Master Plan provides an excellent basis for TE funding application.
- *Preliminary Engineering costs for capital improvement projects* - While the construction cost of many recommended capital improvement projects will exceed the annual TIF II surplus, the up front costs for engineering and environmental clearance of some such projects could be

covered by surplus funds from a single year. With locally funded project engineering documents, the City will be well positioned to compete for State funding for construction phase work on major transportation improvements.

- *Public/Private Partnership Efforts* - When considered in its entirety, the redevelopment of the Boundary Street corridor will be an initiative requiring cooperative public/private efforts. The public and private sectors will partner in many different ways. Most redevelopment of private property that will occur will require improvements to public infrastructure or construction within public rights-of-way. In some cases, it may be worthwhile for the City to contribute funding to infrastructure projects associated with property redevelopment as an incentive for positive change.

There are certain portions of the Boundary Street study area, both within and outside of the City's limits that were not included in the defined Redevelopment Area of the Gateway Corridors Redevelopment Plan. Within the City's current limits there are over 35 acres in this circumstance, including the Marsh Pointe public housing development and an adjacent undeveloped parcel to the south (8 acres), the northern portion of Jean Ribaut Square (10.7 acres), the Carolina Cove property (4.2 acres), and approximately 12.4 acres that are to the east of Hogarth Street north of Boundary Street. Much of this area is undeveloped or underdeveloped and the plan recommends significant change. While the tax increment revenue potential from these properties is not as great as that from the existing tax allocation district, a revenue stream could result from a new tax allocation district, particularly in cases where there is little existing development. How-

ever, in order for such a district to be established, the City would be required to secure the support of Beaufort County and the Beaufort County School Board. Careful consideration should be given before proceeding with the establishment of an additional tax allocation district.

16. Transportation Impact Fees

Beaufort County has established an impact fee on new development with revenues dedicated to transportation improvement projects. These revenues must be used to fund expansions to the transportation system needed to accommodate growth, and may not be used to correct current deficiencies. The City has 2 approved projects on the County's program for funding transportation improvements with impact fee revenues. These include \$3,750,500 for Boundary Street capacity improvements and \$4,550,000 for Boundary Street connectivity plan implementation. The funds can be used for construction as well as administrative costs such as for bond issuance, planning and engineering. It is anticipated that bonds for these projects will be issued in the near future based on projected impact fee revenues, with a repayment period of fifteen years.

17. Storm Water Utility Fund

This fund accounts for the proceeds from a special property tax assessment restricted for making storm water drainage improvements. In fiscal year 2004, storm water utility revenue exceeded \$225,000 though expenditures exceeded revenues. In the long term, the storm water utility fund can provide assistance to Boundary Street area capital improvements that involve storm water infrastructure.

18. Parks and Tourism Fund

This special revenue fund is used to account for the proceeds from local accommodations, hospitality and property transfer fees, which are restricted for expenses incurred by the City of Beaufort in serving tourists and non-residents. From the 2% local hospitality tax on food and beverage sales by restaurants within the City, revenues are restricted so that a minimum of 2.2% must be allocated for tourism enhancing projects recommended by the Beaufort Hospitality Association, 2.9% must be allocated to the Greater Beaufort Chamber of Commerce for advertising, and 3.3% must be allocated to a special maintenance account to be used in support of tourism.

Based on the fiscal year 2004 budget, Parks and Tourism Funds exceeded \$1.6 million, and the total fund balance at the end of the fiscal year was \$1.65 million. According to budget reporting, approximately \$650,000 was spent on public infrastructure and maintenance projects. This fund can become a source for future projects in the Boundary Street area.

19. Land Acquisition Fund

According to City Council resolution, 50% of a General Fund current year surplus in excess of 8% of the current year budget is to be placed in an account restricted for land acquisition. At the end of fiscal year 2004, the fund balance was over \$650,000. This amount will likely fluctuate significantly from year to year as opportunities for land acquisition are realized. The land acquisition fund can be a key source for strategic property acquisition needed to forward redevelopment efforts.

20. General Obligation Bonding

According to South Carolina general statutes, a municipality can issue general obligation debt up to a level not exceeding 8% of the total assessed taxable value of property. For fiscal year 2004, the limit for general obligation debt in Beaufort was nearly \$3.5 million. At that time, the City's outstanding general obligation bond debt totaled \$160,000 which is the remainder of an \$800,000 bond from 1990. The final payment for this bond will be made on March 1, 2006. Unlike tax increment financing, general obligation bonding is not restricted to a specified area and does not require the approval of Beaufort County or the Beaufort County School Board. Because the security for general obligation bonds is the full faith and credit of the city, local decisions to use general obligation bonding are significant. It should be considered that the redevelopment of the Boundary Street corridor is of critical importance to many aspects of the City's long term prosperity and the City's general obligation bonding capacity should be used to foster redevelopment and public improvements.

21. Local Option and Capital Projects Sales Tax

In recent years, there have been two attempts to establish a local option sales tax in Beaufort County by referendum. The most recent, in 2004, failed by a narrow margin. There are ongoing discussions about future attempts to pass a local option sales tax referendum. Due to the tourist-oriented nature of the Beaufort economy, it can be anticipated that a local option sales tax would be heavily supported by visitors to the area. Local Option Sales Tax proceeds would be required to contribute first to local property tax reduction (71% of tax revenues). Capital Projects Sales Tax revenues would be available for capital improvement project funding. The City should encourage establishment of sales taxes for the benefit of

Boundary Street redevelopment, and should carefully monitor State property tax legislation due to its potential impact on local sales tax initiatives.

22. Municipal Improvement Districts

A Municipal Improvement District (MID) is a special taxing district created with the consent of its property owners that allows the City to levy a tax to pay for specific services and improvements agreed upon by the City and property owners. MID's are used to pay for such things as street cleaning and maintenance of special features, programs such as planters and street furnishings, maintenance of parking areas, etc. The City should work to coordinate property owners in support of establishing a MID for the Boundary Street corridor.

23. Federal and State Grants

There are a number of Federal and State grant sources available for infrastructure development in support of redevelopment purposes.

Departments of Transportation

Federal and State Departments of Transportation are of great importance to any roadway or streetscape improvement project, and can provide funding for conventional projects and innovative transportation research and implementation of alternative transportation. In addition to the standard procedure of Transportation Improvement Project (TIP) listing, transportation enhancement funding has been provided for under recent federal legislation (ISTEA, TEA-21) as a set-aside dedicated to projects such as trails and streetscape enhancements. Beaufort has received such funding in the past for special projects (Woods Memorial Bridge Walkway ISTEA grant, Bladen Street TEA-21 grant). The Boundary Street Master Plan should be included in future funding applications to secure

dollars for the redevelopment of the corridor. The redevelopment master plan for Boundary Street should assist with future funding applications.

24. South Carolina Department of Commerce

The South Carolina Department of Commerce oversees awards of Federal Community Development Block Grants (CDBG) funding to local governments for purposes ranging from Commercial Revitalization to Community Infrastructure to Neighborhood Revitalization. The purpose of the CDBG program is to provide decent housing, economic opportunities, a suitable living environment primarily for people with low to moderate incomes.

Grants are awarded to local governments for projects that meet one of three objectives:

- Benefit low and moderate income persons
- Aid in the prevention or elimination of slums and blighted conditions
- Meet other urgent community development needs where existing conditions are an immediate threat to the public health and welfare and where other finances are not readily available to meet such needs.

CDBG recipients for the most recent awards (December, 2004) included the towns of Bluffton (neighborhood housing infrastructure) and Port Royal (sewer line extension) in Beaufort County. Of specific relevance to the Boundary Street corridor, eleven grants totaling over \$5.1 million were awarded for Commercial Revitalization projects including streetscape and façade improvements. The City should explore eligibility of the Boundary Street corridor for similar grant opportunities in the future.

25. Coordinating Council for Economic Development

The South Carolina Coordinating Council for Economic Development was established in 1986 to foster improved coordination of economic development efforts by those state agencies involved in the recruitment of new business and the expansion of current enterprises throughout the state. The Council is currently comprised of the heads of the ten state agencies concerned with economic development. The agency heads are either board chairman or cabinet officials, and they meet quarterly to conduct Council business.

Tourism Infrastructure Development Grants, administered by the Coordinating Council for Economic Development, support new or expanding tourism or recreation facilities, or designated development areas through infrastructure projects. The Tourism Infrastructure funding is generated from a share of the state admissions tax on qualified tourism or recreation establishments.

Eligible projects for grant funding include new or expanding tourism or recreation facilities or designated development areas with an investment of at least \$20 million in land and new capital assets. An investment period cannot exceed five years (60 consecutive months). A designated development area may have more than one investment period; however, the investment periods cannot overlap. Only the projects that open within the \$20 million/five-year investment period will qualify the local government for this incentive. New projects located within an established designated development area must initiate a new investment period and create an additional \$20 million to qualify. The full \$20 million investment must be made prior to qualifying for this incentive. Funds included in the minimum investment may be for public or private funds, or a combination of both. In achieving the minimum investment requirement,

secondary support facilities (hotels, food, and retail services) that are located within or adjacent to the major tourism or recreation facility/area and directly supports the qualified development, may also be included in the total investment. Due to the nature of proposed redevelopment along the Boundary Street corridor, Beaufort may become eligible for Tourism Infrastructure Development Grant assistance.

26. South Carolina Department of Parks, Recreation and Tourism

Park and Recreation Development Fund

The Park & Recreation Development Fund provides technical assistance and administers grant programs for development of public recreational opportunities throughout the state. All grant programs administered by this office are reimbursable funds from various sources with specific qualifications and restrictions. The nature of the fund is a non-competitive program and funds are available to eligible local governmental entities within each county area for development of new public recreation facilities or enhancement/renovations to existing facilities. Projects need endorsement of a majority weighted vote factor of the County Legislative Delegation Members. Grant awards can cover up to 80% of a project cost and require a minimum 20% local match. The grant cycle for new project consideration is monthly and the application deadline is the 10th of each month. Eligible entities are notified of new fund allocation amounts each July.

Land and Water Conservation Fund (LWCF)

The Land & Water Conservation Fund provides technical assistance and administers grant programs for development of public recreational opportunities throughout the state. All grant programs administered by this office are reimbursable

funds from various sources with specific qualifications and restrictions. LWCF is intended for land acquisition or facility development for outdoor recreation. Awards are on a competitive basis and applications are graded using an Open Project Selection Process reviewed by a grading team. Grant awards can cover up to 50% of a project cost, requiring a minimum 50% local match. The grant cycle is annual, and eligible governments are notified in December of each year.

Recreational Trails Program

The Recreational Trails Program provides technical assistance and administers grant programs for development of public recreational opportunities throughout the state. The Recreational Trails funding is intended for trails development for motorcycles, ATV's, mountain bikes, equestrians or hikers. Awards are made on a competitive basis to qualified private organizations, local government entities, and State or Federal agencies. Applications are graded using an Open Project Selection process. Grant awards can cover up to 80% of a project cost and require a minimum 20% local match. Applications are solicited annually in September and are due on October 31.

Recreation Land Trust Fund

The Recreation Land Trust Fund provides grant funding that can only be used for the acquisition of land for the purpose of public recreation. Awards are made on a competitive basis to eligible governmental entities. Applications are graded using an open project selection process. Grant awards can cover up to 50% of the cost of a land purchase and require a minimum 50% local match. Eligible government entities are notified of the opportunity to apply for funding each December and applications are due annually in March.

27. Private and Foundation Grants

Private and foundation grants are available through application by the City, community development corporations and other community oriented non-profit organizations. Finding grants can be daunting as there are literally thousands of foundations and grant givers; most organizations that rely upon such funding hire what is termed a "development specialist" to research grants and write proposals.

Foundation grants are more commonly available for purposes such as greenspace preservation and parks development than for infrastructure development. Organizations such as the Trust for Public Land, for example, are often able to purchase land in time-sensitive circumstances and transfer ownership to a city or redevelopment agency under circumstances that the land will remain as permanent greenspace.

FUNDING MECHANISMS: PRIVATE DEVELOPMENT AND ECONOMIC DEVELOPMENT

To fully realize the redevelopment potential of Boundary Street, funding assistance for private development and economic development will be important as a supplement to private capital for redevelopment projects. Economic development assistance opportunities applicable to the Boundary Street corridor include Low-Income Housing Tax Credits, Federal Loan Guarantees to financial institutions, Federal matching funds for Small Business Investment Corporations, Federal funding to assist local Community Development Corporations, revolving loan funds set up by local financing institutions for redevelopment and business creation (to help satisfy Community Reinvestment Act obligations), and standard financing for market rate development. The following descriptions provide additional detail about potential financial assistance for private redevelopment and economic development initiatives.

28. U.S. Treasury Community Development Financial Institutions Fund

The Community Development Financial Institutions Fund (the Fund) was created for the purpose of promoting economic revitalization and community development through investment in and assistance to community development financial institutions (CDFIs). The Fund was established under the Reigle Community Development and Regulatory Improvement Act of 1994.

The Fund achieves its purpose by promoting access to capital and local economic growth in the following ways: 1) through its CDFI Program by directly investing in, supporting and training CDFIs that provide loans, investments, financial services and technical assistance to underserved

populations and communities; 2) through its New Markets Tax Credit (NMTTC) Program by providing an allocation of tax credits to community development entities (CDEs) which enable them to attract investment from the private-sector and reinvest these amounts in low-income communities; 3) through its Bank Enterprise Award (BEA) Program by providing an incentive to banks to invest in their communities and in other CDFIs; and 4) through its Native Initiatives, by taking action to provide financial assistance, technical assistance, and training to Native CDFIs and other Native entities proposing to become or create Native CDFIs.

Though eligibility for financial assistance from the Fund is limited, much of the Boundary Street area (within census tract 00600, generally north of Boundary Street) is eligible to for the Financial Assistance program. Since its creation, the Fund has made \$729 million in awards to community development organizations and financial institutions. Approximately \$22 million was available in fiscal year 2005. Some examples of organizations that have received funding recently include the following:

- Self-Help Ventures Fund, Durham, NC, received \$2 million in 2004 to assist with its not-for-profit community development loans that finance home purchases, businesses and community facilities.
- Richmond Economic Development Corporation of Richmond, VA received \$700,000 in 2004 to support local business loan activities.

Entities with eligibility to receive and administer CDFI funding should be recruited to participate in the redevelopment of portion of the Boundary Street corridor that qualifies under the CDFI Financial Assistance program.

29. Tax Credits

Tax credits can be very powerful funding incentives for private development. There are three basic credits available now that have application in redevelopment: New Market tax credits; Federal Historic Rehabilitation tax credit; and Low-Income Housing Tax credits. The rules for tax credit investment are laid out in the U.S. Internal Revenue Code. Tax credits allow a dollar for dollar reduction in tax (not income) and thus are of use to anyone with a need for tax reduction. Tax credits are often sold (securitized) to investors, allowing non-profits and project owners unable to use them to gain funding for construction and other allowable project costs.

New Market Tax Credits

New Market Tax Credits permits taxpayers to receive a credit against Federal income taxes for making qualified equity investments in designated Community Development Entities (CDEs). The credit was authorized by Congressional House Bill 12392, which outlines the availability and terms of use for the tax credit (more information can be found at www.cdfifund.gov). New market tax credits require the designation of eligible census tracts by the federal government. Beaufort's Boundary Street area does not include any census tracts designated as being eligible for these credits. The City should work to have the Boundary Street redevelopment area designated to become eligible for New Market Tax Credits.

Low-Income Housing Tax Credits

Low-Income Housing Tax Credits (LIHTC's) can be used for providing housing to households at or below 60% of median income and provide either 4% or 8% credits. The median household income by household size is calculated every year by the U.S. Department of Housing and Urban Development. It is not necessary for all units in a building to be affordable to receive the tax credit; the credit applies only to those units that are eligible. To receive the credit, the units must be kept affordable for fifteen years to receive ten years of tax credits. Boundary Street redevelopment projects that include housing should be encouraged to contribute to the goal of a mixed-income community, and the use of LIHTC's can help to make it financially feasible to include affordable housing.

An information program to familiarize developers and property owners with tax credit opportunities should be undertaken by the City. This could be performed effectively as an addition to the City web site, which is already an excellent resource. Elements would include explanations of the credits, links to credit websites, and downloadable information and application forms. Pro forma templates for calculating tax credits would also be useful for those not familiar with credits.

30. Small Business Investment Corporations

Small Business Investment Corporations (SBIC's) are business development venture funds for business creation and development that are regulated by the Small Business Administration. The federal government will match local funding at a three to one ratio. What this means is that if local investors, banks and others form a SBIC with \$1 million in start-up funding, it may be possible to get grants of up to \$3 million to match. Since the Boundary Street Master Plan calls not only for infrastructure, but also new businesses to provide the services that are desired by residents, the formation and operation of a Beaufort SBIC could be a means for creating and retaining business in the Boundary Street area. SBIC's are allowed to use funds for investment in small business and to act as an advisory resource. This means that the SBIC employees could fund and advise businesses on issues such as effective use of information technology, effective retailing practices, financial management, employee management, efficient use of resources, etc.

It is suggested that the City, the Chamber of Commerce, Greater Beaufort-Hilton Head Economic Development Authority and local businesses collaborate in the formation of an SBIC. Because of the Federal program offering three-to-one leveraging of local funding, SBIC's can be more effective in using local funds than business assistance organizations that do not have access to the program.

31. Revolving Funds

A Revolving Fund is a low-interest financing pool set up by local lenders acting together to meet Community Reinvestment Act (CRA) obligations. The funds are not grants; borrowers are expected to pay back the loans to finance future loans. The funds can have specific investment criteria regarding the type of lending that will be underwritten. In addition to meeting CRA obligations, revolving funds also generate customer loyalty to participating institutions and serve to keep local money from interest payments and administration costs in local circulation. The City should meet with local lenders to assess the potential for a revolving fund to assist with Boundary Street corridor redevelopment.

32. South Carolina State Tax Credits and Incentives

The State of South Carolina has established several tax credits and related incentives for certain development purposes. These state initiated tax credits and incentives relate primarily to income taxes for South Carolina businesses and individuals.

Job Tax Credits

South Carolina provides a tax credit against South Carolina income tax or insurance premium tax for a business creating new jobs in the state. Corporations, sole proprietorships, partnerships, S corporations and limited liability companies are eligible for the credit. To qualify for job tax credits, a business must be of a certain type and it must create and maintain a required minimum number of new, full time jobs at the time a new facility (or expansion) is initially staffed. The tax credit for each new job in Beaufort County is \$2,500 per year. The credit is available for five years.

Businesses that can qualify for job tax credits

include those engaged in manufacturing, processing, tourism, warehousing, distribution, research and development, certain service related facilities, corporate offices, and technology intensive facilities. In general, employment must be increased by a monthly average of ten new full time employees to qualify for the credit, except in the case of hotels (20 new jobs required) and some service businesses.

Economic Impact Zone Investment Credits

Beaufort County is classified by the state as an Economic Impact Zone county. As a result, tax credits are available for qualified manufacturing and productive equipment properties being placed in service. Though this tax credit is intended primarily for the benefit of industrial-type development, there may be applications to potential Boundary Street corridor development projects.

Corporate Headquarters Credit

South Carolina allows a corporation a credit against corporate income tax or corporate license fees for establishing a corporate headquarters in South Carolina or expanding or adding to an existing corporate headquarters. The credit is equal to either 20% of qualifying real property and direct construction or lease costs. To be eligible, at least 75 new full time jobs must be created that have an average compensation level of more than 1.5 times the state per capita income average.

Corporate Headquarters, Corporate Office Facility and Distribution Facility Exemptions

South Carolina provides for a five year exemption from county property taxes (not including school and municipal taxes) for new corporate headquarters, corporate offices, distribution facilities, and all additions to existing corporate headquarters, office facilities or distribution facilities under conditions that the value of construction be \$50,000

or more and that 75 or more full time jobs are added in South Carolina. A municipality may also exempt a qualifying corporation from municipal taxes under this provision.

Credit for Infrastructure Construction

South Carolina allows a corporation a credit against corporate income tax equal to 50% of the expenses or contributions for building or improving any single infrastructure project. The credit is limited to \$10,000 per year. Any unused credit up to \$30,000 may be carried forward three years. Eligible infrastructure projects include water and sewer lines, related facilities, and roads that are ultimately dedicated to public use.

Infrastructure Incentive for Tourism and Recreation Facilities

Related to the Tourism Infrastructure Development Grants program, an incentive has been established in support of development of major tourism and recreation facilities. For qualifying facilities, 25% of the admissions tax collected at a facility can be remitted to the municipality for a period of 15 years. An additional 25% of the admissions tax must be remitted to the Infrastructure Fund administered by the Coordinating Council for Economic Development at the State Department of Commerce.

Qualifying projects for this incentive include major tourism or recreation facilities where an investment of \$20 million or more is made, or a tourism or recreation facility that is located in a major tourism or recreation area. In this case, the area must be designated by the local government as a development area and there may be one or more tourism or recreation facilities with a combined investment of at least \$20 million. Secondary support facilities such as hotels, restau-

rants, and retail services located in the area of the facility may be included as part of the aggregate investment.

Qualifying tourism or recreation facility types include theme parks, amusement parks, museums (historical, educational or trade-related), botanical or zoological gardens, aquariums, cultural centers, theaters, motion picture production studios, convention centers, arenas, auditoriums, golf courses, spectator sports facilities, or similar establishments that collect admissions tax. Qualifying designated development areas may include downtown districts, historic districts, waterfront redevelopment areas, military redevelopment areas or similar. The City should research and initiate the designation of Boundary Street as an applicable development area.

Conservation Credit

South Carolina allows a tax credit for taxpayers who voluntarily convey land, or interests in land, to a qualified conservation organization. The credit may be up to \$250 per acre of qualifying property, not to exceed a total credit of \$52,500 per year.



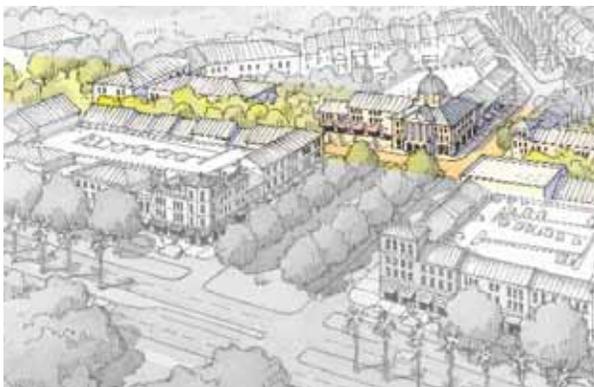
KEY CAPITAL IMPROVEMENT PROJECTS

As described in previous sections of this report, the master plan for redevelopment of the Boundary Street corridor includes a wide variety of improvements to area infrastructure. These improvements will be phased over several years, with some relying on coordinated private-sector development activities.

The following are general descriptions of key capital improvement projects that will be required to realize implementation of the Boundary Street Master Plan. The improvements are listed in order of priority, yet it should be understood that as funding becomes available, projects could happen simultaneously. Budget estimates associated with each identified project are based on general assumptions of construction cost at 2005 levels and do not account for right-of-way acquisition where necessary.

1. Creating a Parallel Street Network

A key recommendation of the Boundary Street Master Plan is the enhancement of the road network to the north of Boundary Street. In order to allow for an improved distribution of traffic flow, several connections must be made with a new parallel road. A major east to west oriented frontage road on the north side of Boundary Street is proposed. Excluding right-of-way acquisition, the total cost of new roadway construction is estimated to be within the range of \$7 million to \$8 million.



View of a parallel street north of Boundary Street



Typical section of the parallel street

2. Boundary Street: Landscaped Median

For the most part, Boundary Street is recommended to maintain the existing roadway width and curb lines. A raised, landscaped median with curbing is recommended as a means to change the nature of the roadway, replacing the existing "suicide lane" that extends the length of the corridor. The cost of adding a landscaped median, where recommended along the corridor, is estimated within the range of \$4.5 to \$5 million.



A landscaped median and street trees are added to Boundary Street.



An aerial view of Boundary Street and Jean Ribaut Square



3. Streetscape Improvements: Boundary Street

In conjunction with the addition of a landscaped median and north-side frontage road to Boundary Street, roadway streetscaping will be required on the north and south sides of the roadway, generally extending west from Ribaut Road to Neil Road. Streetscape improvements will include sidewalk construction and reconstruction, pedestrian lighting, street trees, and furnishings. Exclusive of any right-of-way acquisition requirements, the cost of streetscape improvements to the Boundary Street corridor is estimated to be within the range of \$4.5 million to \$5.5 million.



Section of Boundary Street showing streetscape improvements



A landscaped medians separates fast fast lanes from slower moving traffic.

**4. Intersection Improvements:
Boundary Street at Robert Smalls Parkway and
Boundary Street at Ribaut Road**

Major modifications are required at two locations: Boundary Street at Robert Smalls Parkway (SC 170) and Boundary Street at Ribaut Road. Multi-lane roundabouts are recommended as replacements for the existing signalized intersections. The City should explore the roundabout option and complete a detailed site survey and preliminary design work to further determine the cost associated with each.



The roundabout would improve circulation of at the intersection of Robert Smalls Parkway.



A view of the new City Hall building and proposed roundabout at the intersection of Ribaut Road and Boundary Street.



5. Trail South of Boundary Street

A combination trail (walking, biking, etc.) parallel to Boundary Street on the south is recommended to provide public access along the banks overlooking Battery Creek and preserve views of the marsh. Excluding acquisition requirements for property, right-of-way or easements, the estimated cost for construction of the trail (approximately 1,000 linear feet) is \$400,000.



Proposed houses near Beaufort Plaza should face the marsh, allowing public access to the natural beauty of the marsh.



Section of the trail, south of Boundary Street

6. Central Park

Proposed as a redevelopment of the current general location of Riverview Baptist Church, Carolina Cove, Enmark Gas and La Hacienda Mexican Restaurant, implementation of the "Central Park" concept will require a highly coordinated effort. Land acquisition, transfer, and construction of surrounding mixed-use structures will by far be the most significant cost factors in the development of the park. Actual park construction cost for the approximately 4 acre area, exclusive of costs for land and demolition, are estimated to be in the range of \$2 million to \$3 million.



Aerial view of the central park



A regional diagram showing the relation of the central park to Downtown Beaufort.

Preliminary Economic and Market Analysis



appendix **A**

THE PRELIMINARY ECONOMIC AND MARKET ANALYSIS

The Preliminary Economic and Market Analysis is intended to identify a range of redevelopment and marketing strategies for the Boundary Street Redevelopment Area. The comprehensive analysis consists of local demographic and market research as well as an analysis of emerging national retail and redevelopment trends. The present and projected future conditions of the Boundary Street corridor commercial market area have been considered, as well as residential market issues and the neighborhoods in the redevelopment area. The following key elements are included in the Preliminary Economic and Market Analysis:

- An inventory of the existing businesses and properties (occupied and vacant) in the Boundary Street corridor study area.
- Demographic profile and analysis of the City of Beaufort, Beaufort and the determined trade area relative to the study area.
- Information gathered from interviews with several local business owners, real estate agents and similar knowledgeable professionals.
- Research of retail sales and economic trends.
- Analysis to indicate potential market support for redevelopment in the project area.



Summary of Findings

There are many identifiable strengths of the Boundary Street corridor related to the corridor's specific attributes (existing infrastructure, high traffic volumes, etc.) as well as strengths that are more broadly associated with Beaufort and Beaufort County (environment, high growth rate etc.). Though there are weaknesses to overcome, a visionary approach to redevelopment can realize and even surpass the calculated potential in terms of demand for additional housing units and commercial space. It is conservatively estimated that approximately 160 new housing units can be absorbed in the city of Beaufort on an annual basis, and due to the limited amount of land available for development in the city, it is reasonable to assume that a significant portion of that development can be incorporated into Boundary Street redevelopment projects. On the commercial side, an equally conservative demand model suggests that nearly 90,000 square feet of additional space could be supported by the trade area in the current market, and that an additional 50,000 square feet can be supported for each future 5-year period. Replacement of existing obsolete commercial space would be in addition to these estimated demand levels.

Beyond the obvious benefits of successful redevelopment in the Boundary Street corridor area for property owners, businesses, and residents, multiple benefits would be realized for the City of Beaufort in general. The current state of the Boundary Street corridor, a typical commercial strip environment, does not enhance the overall character and charm of the city rather it serves as a relatively poor entrance gateway into the historic city for thousands of people each day. Comprehensive redevelopment of this key corridor will be an enhancement for the entire City of Beaufort.



RESEARCH AND ANALYSIS

Within the identified study area, the Boundary Street corridor is generally comprised of numerous small to medium-sized commercial properties, two larger retail centers, a large government center (Beaufort County) and three small neighborhood areas with single-family homes. This section includes information concerning existing properties and businesses, accessibility and visibility issues, and planned/potential development activity in the study area.

Existing Residential Properties

Residential properties are located in three concentrations along the north side of the Boundary Street corridor in the study area. These three neighborhoods are referred to locally as Polk Village, Greenlawn Drive and Higginsonville.

Polk Village - The largest neighborhood within the study area, Polk Village, is actually located outside of the Beaufort city limits near the west end of the Boundary Street corridor. Bounded by Palmetto Drive, Riverbank Drive and Hogarth Street, this neighborhood consists of approximately 180 single family homes and 11 duplexes. There are only approximately 5 vacant lots in the neighborhood, and there are only two homes currently listed for sale, an indication of relative stability. Lots in the neighborhood range from 7,500 square feet (75'X100' - 1/6 acre) to over one acre, with the average lot being 11,250 square feet (75'X150' - 1/4 acre). A windshield survey of these homes reveals a variety of conditions, ranging from a relatively poor level of maintenance to nicely manicured lawns. Most homes range from approximately 900 to 1200 square feet in size, with a few homes over 2,000 square feet. Based on MLS sales data for the past few years, the range of home values in this neighborhood is between \$39,000 and \$204,000 (for a relatively large home on a large lot with tidal creek access), with the median sales price being \$85,350 and the average sales price \$99,000.

Greenlawn Drive - Greenlawn Drive extends north from Boundary Street to Albergotti Creek, east of Jean Ribaut Square. Greenlawn Drive was once lined with approximately 40 1960s, ranch-style homes, but recent acquisition of many of the structures has led to demolition. At the end of Greenlawn Drive is the Marsh Point affordable housing development, comprised of 13-acre Marsh



Gardens mixed use project on Boundary Street (east of Greenlawn Drive) has also planned to redevelop the Greenlawn Drive neighborhood. Many homes have been purchased (reportedly in the range of \$125,000) and 303 Associates has also pursued acquisition of the Marsh Point property from the Beaufort Housing Authority, though negotiations stalled in the past when the housing authority's asking price for the property was above \$3 million. Once acquisition and assembly is complete, 303 Associates redevelopment plans call for multi-story live-work units and new homes that will be linked to Jean Ribaut Square and the new Marsh Gardens development.

Higginsonville and Pigeon Point - Known as Higginsonville, the western end of the Pigeon Point neighborhood is located at the east end of the Boundary Street corridor study area. Pigeon Point is a large neighborhood area, and Higginsonville includes only about one quarter of the homes in the Higginsonville/Pigeon Point area, west of the National Cemetery. Similar to Polk Village, lot sizes range from about 7,500 square feet to over an acre, however the larger lots are primarily to the east in the Pigeon Point area. Higginsonville has remained stable in terms of residents and development while the Pigeon



Point area has been "on the rise" in terms of rehabilitation and restoration of homes as well as increase in value. The range of recent sales prices in Higginsonville and Pigeon Point, according to MLS, is from \$44,000 to \$625,000 (a "tear down" new large home on a marsh view lot in Pigeon Point was the most expensive), with the average sales price being \$139,500. Some lots in the Higginsonville area have good marsh views, however none have water access. The majority of marsh view lots with tidal creek access are farther to the east in Pigeon Point along Wilson Drive and near Pigeon Point Park.

Other Area Residential - Behind Beaufort Plaza and the recently developed Hampton Inn, an assisted living facility called Summit Place was developed in 1999. Summit Place has capacity for 61 residents. The property is approximately 6 acres in size and includes three buildings. The property has nearly 600 feet of frontage on the Battery Creek marsh which has been preserved in a natural state. Plans were developed in the past for an additional two buildings on the property, however at the current time there is no indication that those buildings will be developed.

Existing Businesses Inventory

MACTEC completed a windshield survey of Boundary Street corridor businesses in August, 2005. Table 1.1 includes a complete listing of these existing businesses, along with identification of business categories. The identified categories include the following (percentage of total in parentheses): Services (8%), Retail (34%), Restaurants (18%), Professional Offices (12%), Hotels (5%), Auto-oriented (9%), Banks (5%), Government (4%) and miscellaneous other (5%).

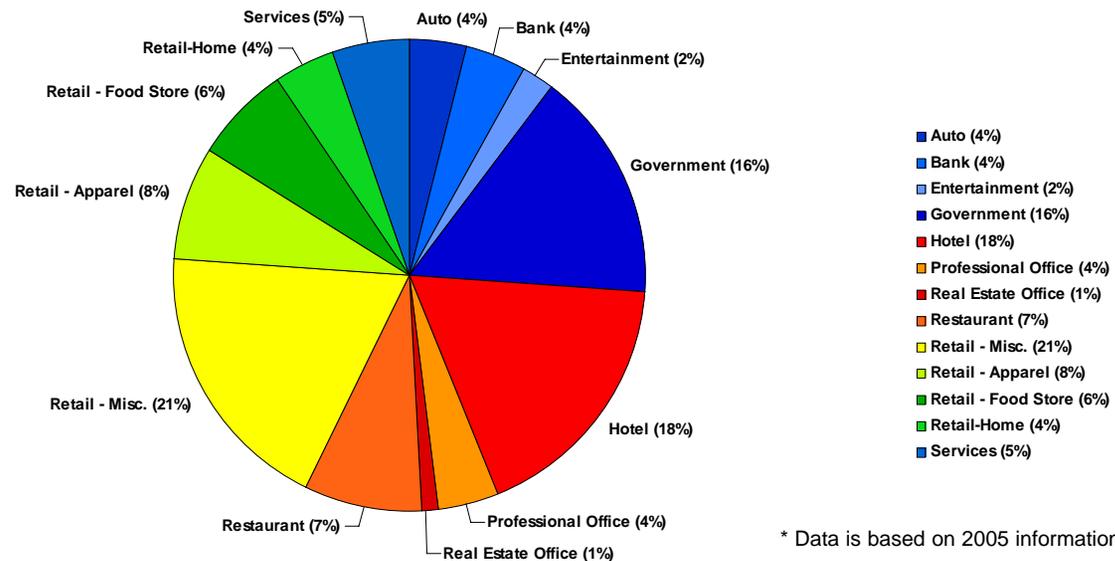
The businesses along the corridor serve local as well as visiting customers. The influence of MCAS Beaufort has contributed to the number of economy hotels and restaurants along the corridor. These tourist-oriented businesses are collectively targeting a different tourist demographic than are the hotels and restaurants of the Beaufort historic district. Likewise, the retailers along Boundary Street differ significantly from historic district retailers. Boundary Street retailers are mostly national chain stores, and it is likely that their primary competition comes from the newer commercial centers (Wal-Mart) along SC 170 southwest of the City.

Despite the fact that several properties are visibly in need of upgrade and repair, it is evident that vacancy is at a very low rate along the Boundary Street corridor. There are no apparent vacancies at Beaufort Plaza, and at the Jean Ribaut Square shopping center, only two storefronts are not currently open, both of which display "Coming Soon" signs and evidence of interior renovations. Along the corridor, fewer than 10 properties were observed to be vacant and/or for sale. Included among these is a new development currently under construction that is promoting available retail/office space at pre-construction.

Table 1.1: Boundary Street Corridor Study Area Business Inventory - Data

Category	Number of Establishments	Square Footage
Auto (11)	11	40,300
Bank (6)	6	45,600
Entertainment (1)	1	20,000
Government (4)	4	173,000
Hotel (8)	8	186,000
Professional Office (13)	13	46,300
Real Estate Office (3)	3	12,000
Restaurant (23)	23	79,100
Retail - Misc. (26)	26	207,400
Retail - Apparel (9)	9	82,200
Retail - Food Store (5)	5	66,700
Retail-Home (6)	6	43,000
Services (15)	15	57,100

Chart 1.1: Estimated Commercial Square Feet by Establishment Type



* Data is based on 2005 information.

<u>Business Name</u>	<u>Business Type</u>	<u>Business Name</u>	<u>Business Type</u>	<u>Business Name</u>	<u>Business Type</u>
1 ITS Data	Services	54 Block Buster	Retail	107 U.S. Post Office	Government
2 Title Max	Services	55 Big Lots	Retail	108 County Complex	Government
3 Ace Cash Express	Services	56 Aaron's Cents	Retail	109 Municipal Complex Property	Government
4 Ladies Fitness	Services	57 Citi Trends	Retail	110 Armed Forces Recruiting Center	Government
5 American General	Services	58 Dollar General	Retail	111 City of Beaufort Municipal Court	Government
6 Check Into Cash	Services	59 Oakman Beauty Supply	Retail	112 Beaufort Plaza Theater	Entertainment
7 Best Nails	Services	60 Seafood Market	Retail	113 Riverview Baptist Church	Church
8 Carolina Moving & Storage	Services	61 Martinis of Beaufort	Restaurant	114 Regions Bank	Bank
9 Cash Advance	Services	62 Huddle House	Restaurant	115 Bank of America	Bank
10 Pioneer Credit	Services	63 Wendy's	Restaurant	116 Islands Community Bank	Bank
11 Payday Check Cash	Services	64 Outback Steak	Restaurant	117 Citi Financial	Bank
12 Check Advance	Services	65 Pub	Restaurant	118 Palmetto State Bank	Bank
13 Dry Clean USA	Services	66 Burger King	Restaurant	119 Regional Finance Corporation	Bank
14 Laundromat	Services	67 McDonald's	Restaurant	120 Sun Com	Auto
15 Graybar Electric	Services	68 Bar	Restaurant	121 Hess Mart Gas	Auto
16 United Way Service Center	Services	69 Pizza Hut	Restaurant	122 Auto Repair Shop	Auto
17 Look 'N Good	Retail	70 Captain D's	Restaurant	123 Linex Auto	Auto
18 3-D Gold (Boundary Street- West End)	Retail	71 Kentucky Fried Chicken	Restaurant	124 Discount Auto Center	Auto
19 All Page	Retail	72 Chic-Fil-A	Restaurant	125 Car Quest	Auto
20 Beaufort Medical Equipment	Retail	73 Jade Garden Chinese	Restaurant	126 Auto Transmission Center	Auto
21 Farmers Home Furniture	Retail	74 Chinatown Restaurant	Restaurant	127 Butler Used Cars	Auto
22 Piggly Wiggly	Retail	75 Fortune Cookie Chinese Restaurant	Restaurant	128 Car Wash	Auto
23 Liquor	Retail	76 Beef O' Bradys	Restaurant	129 Taylor Motors Inc.	Auto
24 Liquor Store	Retail	77 La Hacienda Mexican	Restaurant	130 Exxon	Auto
25 Spotted Dog Marketplace (Coming Soon)	Retail	78 Taco Bell	Restaurant	131 Enmark Gas	Auto
26 Big K-Mart	Retail	79 Substation II	Restaurant		
27 Rentway	Retail	80 TCBY	Restaurant		
28 Florist	Retail	81 Hometown USA Restaurant & Bar	Restaurant		
29 It's Fashion	Retail	82 Waffle House	Restaurant		
30 Shoe Show	Retail	83 Applebee's	Restaurant		
31 Glamour Beauty Supply	Retail	84 Focal Point Vision Center	Professional Office		
32 Beaufort Bookstore	Retail	85 Omni Health	Professional Office		
33 Sprint	Retail	86 Chiropractic	Professional Office		
34 Alltel	Retail	87 H & R Block	Professional Office		
35 Steinmart	Retail	88 Barber Shop	Professional Office		
36 Bi-Lo	Retail	89 Beaufort County First Steps	Professional Office		
37 Furniture Mart	Retail	90 Home Mortgage Corporation	Professional Office		
38 Sunglass Wearhouse	Retail	91 A.T. Gollibugh Realty	Professional Office		
39 Music Tek (Robert Smalls Parkway)	Retail	92 FedSource	Professional Office		
40 Pawn Shop	Retail	93 Z Prather Realty	Professional Office		
41 Army Game Store	Retail	94 Palmetto Shores Property Management	Professional Office		
42 Video House	Retail	95 Miracle-Ear	Professional Office		
43 Smith's Appliance	Retail	96 Kevin Cain, CPA, LLC CPA	Professional Office		
44 Shell Gas	Retail	97 Davidovic Law Firm	Professional Office		
45 Audio Video	Retail	98 Liberty Tax	Professional Office		
46 Wireless World	Retail	99 The Gullah Times	Professional Office		
47 Goodwill	Retail	100 Hampton Inn	Hotel		
48 Carpet	Retail	101 Ramada Inn	Hotel		
49 Extreme Audio	Retail	102 Country Inn & Suites	Hotel		
50 One Step Wireless	Retail	103 America's Best Inn	Hotel		
51 Sprint	Retail	104 Atlantic Inn	Hotel		
52 Burke's Outlet	Retail	105 Comfort Inn	Hotel		
53 Staples	Retail	106 Econo Lodge	Hotel		



Study Area Accessibility and Traffic

The Boundary Street corridor, located at the entrance to the City of Beaufort, is a very accessible location in Beaufort County. SC 170 is the primary access to Beaufort from the mainland and is heavily used by local residents and commuters as well as tourists traveling to or through the city. Several tourist destinations and barrier islands such as Fripp Island lie beyond Beaufort and are accessed by SC 170 and the Woods Memorial Bridge.

As evidenced by recent traffic counts, the Boundary Street corridor is the most heavily traveled arterial in the Beaufort area. While other corridors, such as SC 802, are experiencing more rapid increases in traffic volume, the Boundary Street corridor in the study area is projected to maintain among the heaviest volumes of traffic through the year 2020. Thus, in terms of traffic volume, the corridor will continue to be strong and supportive of retail and commercial development, with AADT in the range of 40,000.

Table 1.3: Annual Average Daily Traffic Counts at Boundary Street

Station ID	Route	Location	1990 AADT	2004 AADT	Actual Change (1990 - 2004)	Projected Change (2004 - 2020)
117	US 21	Trask Pkwy bet. SC280 & MCAS	18,742	31,900	+70.2%	+38.9%
119	US 21	Trask Pkwy bet. SC170 & SC280	27,148	25,800	-4.9%	-5.0%
121	US 21	Boundary near J. Ribaut Sq.	32,408	37,200	+14.8%	+15.1%
127	US 21	Boundary @ Cemetery	13,294	23,200	+74.5%	+33.1%
177	SC 170	Smalls Pkwy @Beaufort Plaza	15,775	21,700	+37.5%	+48.3%
211	US 21	Ribaut Road S of Boundary	16,226	16,700	+2.9%	+14.2%
219	US 802	McTeer Bridge to Lady's Island	8,857	21,000*	+137.1%*	+82.8%*

Source: SCDOT Counts 1990-2004

*AADT for McTeer Bridge location is 2002, and projected change is 2002-2020.



Study Area Visibility

The Boundary Street corridor study area is a highly visible location in the City of Beaufort. The majority of auto trips entering and leaving Beaufort from the mainland use the SC 170 route, and there is also an increasing amount of traffic on Highway 21 between the city and MCAS Beaufort. Most of the commercial property adjacent to the Boundary Street road corridor is easily visible from the corridor. Portions of the corridor have substantial depth from the roadway, such as Beaufort Plaza, where there is relatively good visibility due to the level terrain. There are other portions of the corridor that are essentially a narrow land bridge where the picturesque salt marshes are also visible from the roadway.



Planned/Potential Development Activity

Some significant development activity is underway in the study area. On the north side of Boundary Street to the east of Greenlawn Drive, land is being cleared for a 13-acre mixed-use commercial development called Marsh Gardens, with approximately 750 feet of Boundary Street frontage. Land assembly is also occurring on Greenlawn Drive in anticipation of redevelopment that will replace 1960's era houses with higher density residences and live-work units. Beaufort-based 303 Associates is the developer.

A major City-sponsored development is being planned for the east end of the study area corridor. At the major intersection of Boundary Street and Ribaut Road, the City of Beaufort is planning to construct a new municipal complex. The design of this project is underway, and significant roadway modifications are involved as well.

There is the potential for redevelopment within the two major shopping centers on the Boundary Street corridor, Beaufort Plaza and Jean Ribaut Square. In both cases, landowners are interested in seeing the auto-oriented shopping centers take on a more pedestrian-friendly urban form. Two factors that will impact the extent and timing of redevelopment of these centers are market support and existing tenant leases. Even with a market that is favorable to redevelopment, it is not likely that existing leases with major national chain tenants will be broken in the interest of redevelopment. It is more likely that redevelopment in these centers will take place incrementally as leases expire and opportunities arise.

Directly south of Beaufort Plaza there are 2 areas of potential development. A 35-acre parcel of property directly abuts the railroad right-of-way which has recently been approved for develop-

ment as the Live Oaks at Battery Creek, a 98-unit single-family development. Located to the south of that property is an area commonly known as "The Bostick Property" that totals 127 acres. This land is currently in unincorporated Beaufort County. It is comprised of a 100-acre tract located east of Salem Road on Battery Creek and a 27-acre tract is located west of Salem Road. The current zoning of these properties is Suburban under the County zoning. In addition to these properties, there are other parcels of significant size adjacent and also accessible by Salem Road that have great development potential in the near term.



Trade Area Definition and Profile of Demographics, Housing and Economics

Three geographic areas of analysis are considered for trade area analysis purposes. At the most broad level, statistics for Beaufort County are pertinent to the study area. City of Beaufort statistics and trends are also assessed for comparison, however the true trade area extends somewhat beyond the city limits of Beaufort. For this reason, a trade area has been estimated based on area zip code boundaries. Four zip codes comprise an area that is approximately a seven mile radius centered on the study area. Zip codes 29901 and 29902 include the City of Beaufort and St. Helena's Island to the east, and the majority of the corridor is within 29902. Zip code 29906 extends west from the intersection of SC 170 and Highway 21 and includes MCAS Beaufort. Zip code 29935 is the City of Port Royal, adjacent to the south of Beaufort. For reasons of distance and accessibility, is it reasonable to consider these areas as the trade area for the Boundary Street corridor.

Population

According to total population, Beaufort County ranks 11th in the state of South Carolina out of 46 counties. The county has consistently been at the top of the list of the fastest growing counties in the state, and Census estimates suggest that the county population has increased by approximately 12% between 2000 and 2004. Only one larger South Carolina county, York, has grown at a comparable rate to Beaufort during this period.

Though the county seat of Beaufort County, the City of Beaufort is not the largest municipality in the county. The Town of Hilton Head Island has nearly three times the population of Beaufort and is the 9th largest city in South Carolina. Beaufort ranks 30th among South Carolina cities, and Census population estimates suggest that the city's growth rate has been negative between 2000 and 2004 in contrast with local projections for continued population growth.

Population Growth Projections

The City of Beaufort Comprehensive Plan includes future population projections that have been adopted by the City. First developed in 1998 and based on Census data from 1990 and prior years, these projections have been determined to be relatively accurate and appropriate for continued use.

Based on actual 2000 Census data, it appears that the pre-2000 projections for City and County population were somewhat low. The above future population projections for years 2010 and 2020, therefore, should be considered as conservative projections. It is likely that the City and County will exceed these levels. According to Census estimates, Beaufort County's population is already nearing the projected level for 2010.

Table 2.1: 2000 - 2004 Population Estimates of Beaufort County and Municipalities

Rank	Geographic area	Population Estimates					Estimates Base	Census 2000
		July 1, 2004	July 1, 2003	July 1, 2002	July 1, 2001	July 1, 2000	April 1, 2000	April 1, 2000
11	Beaufort County	135,725	132,439	129,873	125,429	122,008	120,944	120,937
9	Hilton Head Island town, Beaufort County	34,371	34,499	34,531	34,001	33,969	33,862	33,862
30	Beaufort city, Beaufort County	12,289	12,343	12,417	12,369	12,507	12,511	12,950
37	Port Royal town, Beaufort County	9,188	9,227	8,786	8,763	8,806	8,803	3,950
110	Bluffton town, Beaufort County	2,259	1,978	1,829	1,706	1,530	1,481	1,275

Source: U.S. Census Bureau

*Rank refers to comparative size ranking among all South Carolina jurisdictions

Table 2.2: Future Population Projections

Year	City of Beaufort	% Change	Beaufort County	% Change
1990	9,576		86,425	
2000	12,950	35.2%	120,937	39.9%
2010	15,331	18.3%	138,369	14.4%
2020	18,652	21.7%	168,336	21.7%

Source: 1990 and 2000 U.S. Census, City of Beaufort Comprehensive Plan

Racial Composition

The population of Beaufort and Beaufort County is today more racially and ethnically diverse than at any time previous. While there has been a net increase in the number of residents that classify themselves as white along with the overall City population growth since 1980, other racial and ethnic groups have grown at a faster rate. In the 1990's, the black population grew at a much faster rate than the white population, and the rates of growth of "other" races and the Hispanic community has been fastest by far. As the economy continues to grow and expand, it can be expected that the Beaufort population will continue to diversify.

Age

According to the City of Beaufort Comprehensive Plan, the age distribution of the city's population is fairly typical at the present. The local population is impacted by several factors. Beaufort's retirement age population has continued to grow, but at a reduced pace in comparison with past decades. Historically, the 20 to 34 year old age cohort trended downward due to out-migration for educational and employment purposes. By annexing MCAS Beaufort, the City has statistically shown a significant increase in this age cohort, however this does not reflect a dramatic influx of people of that age cohort to the area. It is likely that the continuity of activity at MCAS Beaufort and the influence of the University of South Carolina Beaufort will have a positive effect on the City's demographics into the future.

Education

The level of educational attainment of the Beaufort population has improved significantly in recent decades, according to data presented in the City's Comprehensive Plan. Overall, rates of high-school dropout are down while rates of college achievement are up. This demonstrated improvement in educational attainment, coupled with the expansion of higher education offerings in the City at the University of South Carolina Beaufort, is a very positive sign for the economic development potential of the city.

Household Growth, Size and Composition

Household trends for the City of Beaufort are expected to continue into the future. In general, the number of households continues to steadily increase along with population growth, and the average household size continues to steadily decrease, reaching a level in the City of 2.37 persons per household in 2000. Comparatively, the average household size in 2000 was higher for Beaufort County as a whole (2.51 persons per household). It is expected that Beaufort's average household size will continue to decrease as there are increasing numbers of small households (elderly couples or singles) in the future.



Household Income

Median household income in the City, reported at \$36,500 in 2000, has generally increased consistently with the state average for South Carolina while the overall Beaufort County median household income level has increased at a much higher rate over the past 20 years, reaching almost \$47,000 in 2000. The development of resort communities on Hilton Head Island and elsewhere in Beaufort County has attracted many high-income retirees. Although there is a higher percentage of households with median incomes of \$100,000 or more in the City of Beaufort than the state average, the city does have a slightly higher percentage of the population with median income levels less than \$25,000 when compared with the state. According to the Comprehensive Plan, the City recognizes a need to attract and maintain professional jobs as a strategy to raise household income levels.



Housing Units, Types and Building Permit Activity

There were 5,134 housing units in the City of Beaufort in 2000, according to the Census bureau. This represents a 24% increase from 1990, and there were steady and consistent increases in prior decades as well.

Estimates for total housing units in the years from 2000 to 2004 show that Beaufort County has continued to steadily add housing units at a rate of approximately 4% growth per year during this time period.

The City of Beaufort's housing stock is comprised predominantly of single family detached houses, with styles ranging from large ante-bellum mansions to more modest bungalows and ranches. There are relatively few manufactured homes in Beaufort, compared with Beaufort County and the state as a whole. Just over 20% of the city's housing is multi-family, and there is a higher percentage of multi-family housing in the city than unincorporated Beaufort County or state average.

Consistent with recent housing unit estimates, building permit activity in Beaufort County has continued at a very high level during the past five years. The City of Beaufort has issued building permits at a much slower rate, in comparison. For the five years from 2000 through 2004, Beaufort County issued 9,181 single family residential building permits compared to 303 in the city. A total of 9,817 housing units were permitted in the county, equaling over 16% of the total number of housing units in the county in 2000. In the city, the 339 total units permitted represents only 6.6% of the total number of units in the city in 2000.

According to construction cost reporting, the average estimated single family cost per unit was

\$192,200 in the county and \$163,900 in the city. There were few multi-family building permits in the county and city in comparison with the numbers of single family permits. Interestingly, in the unincorporated county the average number of units per multi-family permit (five or more family) was over 17 while the comparable number for the city was just over 5. These building permit trends clearly demonstrate the strong level of building activity and demand in Beaufort County and also the relatively limited share of that development activity that is occurring in the City of Beaufort.



Table 2.4: Privately-Owned Residential Building Permits - City

City of Beaufort			2000-2004
Type of Unit	Building	Units	Construction cost
Single Family	303	303	\$49,657,975
Two Family	2	4	\$409,947
Three and Four Family	0	0	\$0
Five or More Family	6	32	\$1,271,682
Total	311	339	\$51,339,604
Source: U.S. Census Bureau			



Table 2.5: Privately-Owned Residential Building Permits - County

Unincorporated Beaufort County			2000-2004
Type of Unit	Building	Units	Construction cost
Single Family	9181	9181	\$1,764,975,408
Two Family	25	50	\$4,742,916
Three and Four Family	3	12	\$1,453,104
Five or More Family	33	574	\$30,369,392
Total	9239	9817	\$1,801,540,820
Source: U.S. Census Bureau			



Table 2.3: Beaufort County Housing Estimates 2000-2004

Annual Estimates of Housing Units for Beaufort County SC: April 1, 2000 to July 1, 2004							
Geographic Area	Housing unit estimates					April 1, 2000	
	July 1, 2004	July 1, 2003	July 1, 2002	July 1, 2001	July 1, 2000	Estimates base	Census
Beaufort County	71,080	68,472	65,969	63,950	61,191	60,511	60,509

Housing Occupancy and Tenure

Trends for housing occupancy and tenure in the City of Beaufort are very positive. In 2000, the overall housing vacancy rate was less than 10%. Of occupied housing units in 2000, the ratio of owner-occupied to renter-occupied housing was approximately 60% to 40%. This is improved over 1990, when the ratio was nearly 53% owner to 47% rental. On the rental side, there is some evidence of improved stability among tenants, with nearly 45% of tenants remaining in a rental unit for more than 5 years. Because there has been relatively little development of multi-family rental units in Beaufort over the past 15 years and overall rental vacancy rates remain very low (5.4% in 2000), it is a reasonable conclusion that demand is strong for rental housing and that there may currently be an undersupplying, particularly at affordable housing levels.

Housing Age, Value and Affordability

As an historic community, the housing stock in Beaufort is expectedly aged in comparison with Beaufort County and South Carolina averages. Today, as much as 40% of the homes in Beaufort are historic by age standards (50+ years old), in comparison with 10% of the overall housing for Beaufort County. Many of these historic homes in Beaufort are of great value and have been extensively restored and renovated, though this is more true for some neighborhoods than others and there remain neighborhoods with housing that does not meet current market standards. Many of the housing units in Boundary Street corridor neighborhoods (Polk Village, Greenlawn Drive, Pigeon Point) do not meet current market standards while others, particularly those with larger lots and marsh views, have been renovated and upgraded.

The value of housing in Beaufort has steadily appreciated over several decades. The Census bureau reported that the median Beaufort house value in 2000 was \$111,600. Though higher than the statewide median value, this was just over half of the Beaufort County median value of \$213,000 in 2000. According to the Beaufort Comprehensive Plan, a significant portion of the city's housing can be considered as affordable. Approximately 64% if housing units were valued at less than \$150,000 in 2000, which was considered affordable for households earning middle-class wages. However, the Census bureau estimated in 2000 that approximately 26% of the owner-occupied households in the city were cost burdened, meaning that 30% or more of monthly income was required for mortgage and selected housing expenses. This compares with approximately 25% of Beaufort County homeowners and 19% of South Carolina homeowners.

Based on reported income levels in 2000, 33% of households in Beaufort could afford a new home valued at approximately \$190,000 or more. The basis for this calculation is consideration of a \$160,000 mortgage and 20% down payment. The monthly mortgage payment, considering a 7% interest rate and 30 year period, would be approximately \$1,050 or 25% of gross income at the level of \$50,000. While incomes have risen with inflation, it is likely that new home prices in Beaufort are rising at a significantly faster rate. Therefore, it is expected that there will continue to be a challenge in Beaufort to provide affordable new housing opportunities for the lower two-thirds of the income spectrum.

Economic and Employer Trends

In addition to the decennial census of the population, the US Census Bureau conducts an economic census at regular periods. Economic Census data are available at the county and city levels for 1997 and 2002. The most recent available comprehensive economic census data at the zip code level is from 1997, however County Business Patterns data summaries of employer trends have been prepared by the Census annually following the 1997 economic census, and these reports are available at the zip code level for the years 1998-2002. The following is a summary analysis of economic data for Beaufort County, the City of Beaufort, and the defined trade area, which includes zip codes 29901, 29902, 29906 and 29935.

County and City Summary

From 1997 to 2002, there were some very significant changes in the local economies of Beaufort County and the City of Beaufort. The tables below provide comparative analyses that reveal these changes, and sections 2.11.3 through 2.11.6 (below) include more detailed descriptions of these trends in key industry sectors.

In summary, it is evident that certain sectors of the local economy are growing rapidly, consistent with the population growth that has been experienced, while other economic sectors are stagnant or declining. For example, the total payroll of the Health Care sector in Beaufort County increased 269% from 1997 to 2002 while the payroll of the Manufacturing sector decreased 1.6%. This is somewhat consistent with national trends of recent health care industry boom and manufacturing decline

Chart 2.1: Annual Sales Data Comparison - City of Beaufort and Beaufort County

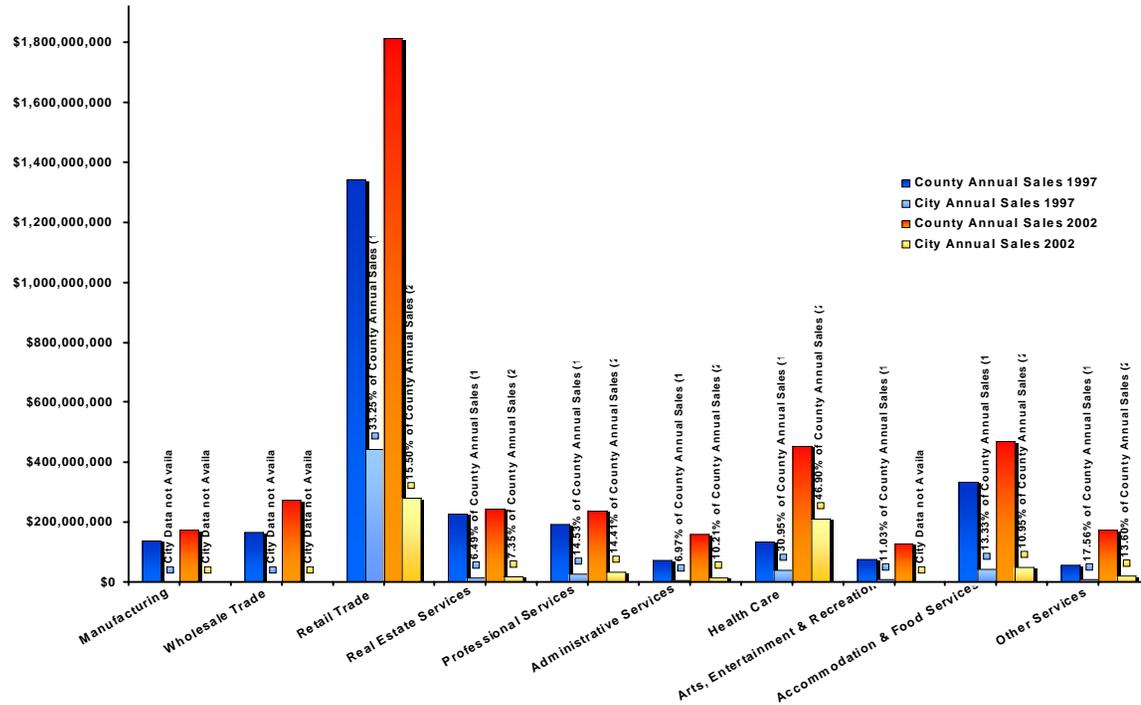


Table 2.6: Beaufort County Economic Comparison - 1997 and 2002

Industry Classification	Annual Payroll 1997	Annual Payroll 2002	% Change	Annual Sales 1997	Annual Sales 2002	% Change
Manufacturing	\$28,716,000	\$28,257,000	-1.60%	\$137,548,000	\$174,260,000	26.69%
Wholesale Trade	\$15,214,000	\$20,630,000	35.60%	\$169,405,000	\$274,352,000	61.95%
Retail Trade	\$129,174,000	\$182,897,000	41.59%	\$1,340,911,000	\$1,814,560,000	35.32%
Real Estate Services	\$44,261,000	\$54,328,000	22.74%	\$230,999,000	\$246,124,000	6.55%
Professional Services	\$85,152,000	\$109,716,000	28.85%	\$192,967,000	\$240,268,000	24.51%
Administrative Services	\$26,193,000	\$61,095,000	133.25%	\$74,756,000	\$161,822,000	116.47%
Health Care	\$50,423,000	\$186,215,000	269.31%	\$134,821,000	\$456,374,000	238.50%
Arts, Entertainment & Recreation	\$20,337,000	\$43,319,000	113.01%	\$76,596,000	\$128,303,000	67.51%
Accommodation & Food Services	\$93,239,000	\$131,997,000	41.57%	\$337,616,000	\$469,756,000	39.14%
Other Services	\$18,321,000	\$60,971,000	232.79%	\$58,933,000	\$174,965,000	196.89%

Trade Area Summary

A summary review of data reveals that the identified trade area experienced a net loss of eight business establishments from 1998 to 2002, with 1,110 identified establishments remaining in 2002. There was a net increase in the number of establishments from 1999 to 2001, however the economic conditions in 2001-2002 led to a loss of more than 70 establishments in one year. Similarly, the total number of employees in the trade area declined significantly from 2001 to 2002, a loss of 532, but the 12,357 trade area employees in 2002 represents a net gain of 145 over 1998.

Despite relative stagnation in employment growth over the 5-year period, the total annual payroll of the trade area increased steadily with the exception of a small net loss from 2001 to 2002. The rate of increase in trade area annual payroll averaged approximately \$10 million per year for the 1998 to 2002 period, with total annual payroll in 2002 reaching \$297.4 million.

County Business Patterns data for the trade area also provide information about multiple industry classifications within the local economy. Relative to the Boundary Street corridor, four industry classifications have been analyzed in some detail: Retail Trade, Professional/Scientific/Technical Services, Accommodations/Food Services and Other Services. These industry areas are perceived to be the most closely related to the general nature of the businesses along the Boundary Street corridor.

Table 2.7: City of Beaufort Economic Comparison - 1997 and 2002

Industry Classification	Annual Payroll 1997	Annual Payroll 2002	% Change	Annual Sales 1997	Annual Sales 2002	% Change
Manufacturing	x	x		x	x	
Wholesale Trade	x	x		x	x	
Retail Trade	\$33,445,000	\$22,927,000	-31.45%	\$445,814,000	\$281,259,000	-36.91%
Real Estate Services	\$2,423,000	\$3,112,000	28.44%	\$14,995,000	\$18,100,000	20.71%
Professional Services	\$12,304,000	\$15,349,000	24.75%	\$28,046,000	\$34,627,000	23.47%
Administrative Services	\$1,947,000	\$5,310,000	172.73%	\$5,208,000	\$16,526,000	217.32%
Health Care	\$18,651,000	\$92,642,000	396.71%	\$41,728,000	\$214,046,000	412.96%
Arts, Entertainment & Recreation	\$1,859,000	x		\$8,448,000	x	
Accommodation & Food Services	\$11,888,000	\$12,994,000	9.30%	\$44,991,000	\$51,445,000	14.35%
Other Services	\$3,396,000	\$6,272,000	84.69%	\$10,351,000	\$23,798,000	129.91%

Table 2.8: County to City Comparison - 1997 and 2002

Industry Classification	Annual Payroll 1997	Annual Payroll 2002	% Change	Annual Sales 1997	Annual Sales 2002	% Change
Manufacturing	x	x		x	x	
Wholesale Trade	x	x		x	x	
Retail Trade	25.89%	12.54%	-13.36%	33.25%	15.50%	-17.75%
Real Estate Services	5.47%	5.73%	0.25%	6.49%	7.35%	0.86%
Professional Services	14.45%	13.99%	-0.46%	14.53%	14.41%	-0.12%
Administrative Services	7.43%	8.69%	1.26%	6.97%	10.21%	3.25%
Health Care	36.99%	49.75%	12.76%	30.95%	46.90%	15.95%
Arts, Entertainment & Recreation	9.14%	x	x	11.03%	x	X
Accommodation & Food Services	12.75%	9.84%	-2.91%	13.33%	10.95%	-2.37%
Other Services	18.54%	10.29%	-8.25%	17.56%	13.60%	-3.96%

Retail Trade Sector

In the area of Retail Trade, the trade area was relatively stagnant from 1998 to 2002, with a net loss of 3 retail establishments. There was slow growth from 1999 to 2001 to a high of 244 retail establishments, then a decline to 226 in 2002. These 226 retail establishments represented approximately 28% of all retail in Beaufort County (total of 817 establishments). The majority of retail establishment losses were smaller firms (less than 10 employees), though there was also a significant decline in the number of large retail employers. There were 7 retail employers with over 100 employees in 1998, but only 3 in 2002. It is likely that the number of large and small retailers has increased post-2002 due to the expansion of commercial development on SC 170 (Lowe's and Wal-Mart area).

Retail sales in Beaufort Count increased by over 35% from 1997 to 2002, reaching \$1,814,560,000. Comparably, the retail sales total in the City of Beaufort declined by almost 37% during the same period, falling to \$281,259,000 in 2002. Within this brief period, the City of Beaufort's share of retail sales in Beaufort County declined from over 33% to 15.5%. These dramatic statistical changes reflect the fact that a tremendous amount of new retail development has occurred in Beaufort County while many retail establishments in Beaufort have lost market share. That the trade area trends do not mimic city trends is due to the fact that commercial development has occurred on the outskirts of the city in newly developing areas.

Professional/Scientific/Technical and Other Services Sectors

Though the Retail Trade sector has the largest number of establishments in the trade area, the combination of Professional/Scientific/Technical Services and Other Services totaled 243 establishments in 2002, 17 more than Retail Trade. The 243 establishments represented approximately 32% of all services in Beaufort County (760 total establishments). The strength of the Services sector of the trade area economy is consistent with nationwide trends. During the 1998 to 2002 time period, there was steady slow growth in this industry sector in the trade area, with all firms having fewer than 100 employees and most fewer than 20 employees.

Professional Services sales/receipts in Beaufort County increased by over 24.5% from 1997 to 2002, reaching \$240,268,000. Comparably, the Professional Services sales total in the City of Beaufort increased almost 23.5% during the same period, reaching \$34,627,000 in 2002. Unlike the Retail sector, the city has maintained its share of the Professional Services sector in Beaufort County during the analysis period.



Accommodations/Food Services Sectors

The Accommodations/Food Services sector of the trade area economy experienced steady growth between 1998 and 2002. The 109 establishments in the trade area in 2002 represented approximately 29% of the Beaufort County total (374 establishments). Within the sector, there was a net increase in the number of firms with fewer than 20 employees, a decline in the number of firms with between 20 and 100 employees, and an increase in the number of firms with between 100 and 250 employees. Due to the attractiveness of the Beaufort area for tourists and the influence of area military bases, it can be expected that the Accommodations/Food Services sector will continue to grow in the trade area.

Accommodations/Food Services sales in Beaufort County increased by over 39% from 1997 to 2002, reaching \$469,756,000. Comparably, the sales total in the City of Beaufort increased over 14% during the same period, reaching \$51,445,000 in 2002. The city's share of the Accommodations/Food Services sector in Beaufort County declined modestly from 13.3% in 1997 to just below 11% in 2002.



Other Industry Sectors

Other industry sectors in the trade area that are not expected to have a significant influence on the Boundary Street corridor include Finance/Insurance, Real Estate, Manufacturing and Construction. There are several banks located along the Boundary Street corridor, which fall within the Finance/Insurance sector. This sector has been steady with a small number of new firms, all with fewer than 50 employees. The Real Estate sector had a net loss in the number of firms, but there are very few Real Estate offices located along the corridor. The Construction industry has fluctuated from year to year, but experienced little net growth between 1998 and 2002. Possibly the most significant losses in the trade area occurred in the Manufacturing sector, where there was a net decrease from 27 firms in 1998 to 18 in 2002. Indicative of the decline of Manufacturing in the local economy is the fact that there were no firms with more than 50 employees in 2002 whereas there were 4 in 1998.

In the industry sectors defined as Administrative Services and Health Care, Beaufort County and the City of Beaufort have experienced dramatic increases in annual payroll and sales. Remarkably, Health Care sales in the City of Beaufort increased almost 413% during the period from 1997 to 2002 to reach \$214,046,000. The city's share of the Health Care industry in Beaufort County increased by almost 16% which was by far the greatest gain the city had in any classification. Administrative Services was also a growth sector for the city, with an increase in sales of 217% and a slight increase in share of the County's total sales.

Business/Real Estate Stakeholder Interview Findings and Market Performance

To provide corroboration to data findings, in-depth interviews have been conducted with individuals who are knowledgeable about real estate and development trends in Beaufort. Most interviews were conducted in August, 2005. While the input gathered from these interviews is documented in the following sections, efforts have been made to preserve the anonymity of interviewees. The information gathered from interviewees has been supplemented by information from local real estate-related publications (Homes of Beaufort, HomeReview, etc.) and other local data sources.

Residential Market

Interviews with local experts revealed a consensus opinion that residential is the strongest component of the local real estate market. There is perceived strong demand for new residential properties at all levels of the market, from "affordable" housing to high-end, luxury units.

Current Market Demand Level

Of all real estate categories in Beaufort, demand for residential properties has remained the strongest. The high demand level is leading to expansion of the market beyond the typical single family detached units to attached and multi-family development. Several factors are contributing to the high demand level for residential, not the least of which is the fact that MCAS Beaufort avoided any consideration by BRAC for closure or reduction of force. It is perceived that closure of the base would be detrimental, particularly to the rental market.

Though demand is perceived to be very strong for conventional residential types (single family, attached, multi-family apartments), there are mixed opinions about the level of demand for less conventional residential units such as live/work units and second floor residences (lofts) above ground floor commercial. It is agreed that these housing types are marketable in the Beaufort historic district, and there are developments in progress. However there is mixed indication of marketability for live/work units and lofts in the Boundary Street corridor area, mostly due to the lack of an attractive urban/village environment such as exists in the historic district. Residential development that is situated a block off of Boundary Street is likely to be marketable, however residential development on the corridor itself is perceived as much less marketable.

While residential demand is strong at many price ranges, it is strongest at home prices under \$185,000 which is difficult to achieve with new construction due to the cost of land. This demand for more affordable housing will tend to be met by development of land outside of the city, particularly in northern Beaufort County, where land prices are lower. From a market standpoint, it is uncertain whether higher density housing development in the City of Beaufort can capture a large portion of the housing market that, for price reasons, is expanding out into the county.

Residential Sales Price Trends

Home prices in Beaufort have continued to rise as market demand has remained strong. New single-family homes constructed in Beaufort are generally selling in the \$250,000 price range. While homes in this price range sell easily, it is clear from demographic analysis that many Beaufort families do not have adequate household income levels to afford a new single family home. New homes in the price range from \$120,000 to \$200,000 would be much more in line with income levels, however land prices and the limited availability of land for new residential construction in Beaufort drive prices to higher levels. Lower new housing costs can be achieved through higher density developments, and there appears to be some receptivity to attached housing in the market, which is more feasible at price levels below \$200,000.

Rental Properties

The rental housing market is strongly attached to MCAS Beaufort, and as such it is not a luxury level market but rather more on the level of workforce housing level. Rental rates for higher end apartments can reach \$1,000 or more monthly, but most apartments are under that level. It is common for single family homes in the City to rent for \$900 per month. Almost all high-end properties in Beaufort are owner-occupied, though some are seasonal or second-homes.

Retail Market

Interviews with local experts suggest some uncertainty about the strength of the retail market. There has been some general decline in local retail, but there is positive perception of the potential for retail development and improvement of the quality of retail in the city and along the Boundary Street corridor.

Retail Demand and Trends

The majority of Beaufort shoppers tend towards what has become conventional retail: big box national chain retailers. There is a limited demand for all aspects of the retail market but new big boxes. Despite this, there is the opportunity for retailers to succeed in Beaufort across the spectrum, with the exception of the top 20% of luxury retailers and the top 25% of high-end restaurants. The Boundary Street corridor is attractive to a wide range of retailers for several reasons. The demographics of Beaufort are positive and supportive of quality retailers who understand the marketplace (such as Talbots). Also, the traffic counts on Boundary Street west of Charles Drive are significantly higher than anywhere else in the City, a factor that is considered critical to retail success.

Retail is currently in a state of flux in Beaufort. Some major retailers (Target) reportedly want to get into the city while others (Winn-Dixie) are closing or moving out for various reasons. Also, Beaufort, like so many communities, suffers from the Wal-Mart syndrome. There is the potential for two retail environments to exist, though, with the Wal-Mart center area accommodating highway commercial and the Boundary Street area taking on more of an urban feel. There is a limit to the retail demand, however, and it will be important

for the city and county to check commercial sprawl away from the city in order to encourage redevelopment of areas like Boundary Street.

Retail Nodes/Centers

The west end of the Boundary Street corridor, generally surrounding the intersection of SC 170 and Highway 21, is currently a retail node that is anchored by Beaufort Plaza shopping center. The potential exists to enhance this area into a mixed-use hub. For this to take place, some or much of the new retail development that is locating farther south on SC 170 needs to be encouraged to locate in redevelopment areas in this node and elsewhere along Boundary Street. It is noted that the 1998 Beaufort Comprehensive Plan recommended the node surrounding SC 170 and Highway 21 as a "new town center" area and the Future Land Use Concept Map of the 2004 Comprehensive Plan Update describes this area as a Commercial Mixed Use District center.

In the eastern half of the Boundary Street corridor, another retail node exists at Jean Ribaut Square. Like Beaufort Plaza, this retail center is auto-oriented and anchored by large retailers (K-Mart, SteinMart and Bi-Lo). Also recognized as a Commercial Mixed Use District center in the Comprehensive Plan, plans are underway to redevelop portions of the area (Greenlawn Drive) and construction has begun on Boundary Street frontage immediately to the east. With redevelopment and improved linkages between residential and commercial properties, a mixed use node is achievable at this location as well.

Retail Rental Rates

On the Boundary Street corridor currently, retail rental rates are low and expectations are low. Rates currently range from a low end of \$3/sq.ft. in bargain store-type space to around \$10/sq.ft. (gross-no utilities) for office and restaurant space. Rates in the range of \$20/sq.ft. (triple-net) could be achieved today in the Boundary Street corridor area if the overall environment were consistent with the proposed vision for a pedestrian-oriented, neo-traditional, mixed-use center. That rental level (\$20/sq. ft.) can be achieved in new high-end retail space in the historic district, though many tenants on Bay Street are currently only paying in the \$10 to \$12 per square foot range due to the quality of space and the inability of tenants to pay higher rates. In general, owners on Bay Street are raising rents up to \$17-\$18/sq.ft. when possible due to the dramatically increasing value of the land and historic buildings. There may be a growing mismatch between the rates that are demanded due to rising real estate values and the ability of tenants to pay those rates.

Retail Special Interest: Major National Bookseller

One desirable retail establishment identified by a stakeholder in the charrette process is a major retail bookseller. These stores typically locate in prime retail centers, with many located in regional malls. Increasingly, major retail booksellers are serving as anchors to neighborhood shopping centers or even stand alone stores.

Three prominent national brands are Barnes and Noble, Borders and Books-A-Million. Of these three book retailers, only one (Barnes and Noble) currently has a location in Beaufort County, on Hilton Head Island. Borders has no locations

within 100 miles of Beaufort, and Books-A-Million has two locations approximately 50 miles from Beaufort; one in Charleston and one in Savannah.

Because the Books-A-Million chain has a southeast focus and is headquartered in Birmingham, Alabama, research focused on identification of a community with similar demographics as Beaufort which has a Books-A-Million store. The city of LaGrange, Georgia, has a Books-A-Million store located in a relatively small local mall, West Georgia Commons Mall, and reasonable comparisons can be made, as described below.

General Comparative Analysis: LaGrange, GA and Beaufort, SC

The city of LaGrange is located approximately 60 miles southwest of Atlanta and is situated several miles to the west of I-85 near the Alabama state line. LaGrange is also approximately 30 miles north of Columbus, Georgia, a city of 185,000. The population of LaGrange is approximately 26,500 and the total population of Troup County, where LaGrange is the county seat, is approximately 60,000. Median household income in LaGrange was just under \$30,000 in 1999 while the Troup County median household income level was just under \$36,000. Median age in LaGrange in 2000 was 31.9 and the Troup County median age was 34.6.

In comparison with LaGrange, Beaufort is not as near to a state capitol (Columbia is about 100 miles away) but is similarly distanced from a major city, Savannah, which is approximately 40 miles away and has a population of about 130,000. Beaufort is farther distanced from I-95, but a heavy volume of traffic passes through the city on state highways. Beaufort's population is about half that of LaGrange, but the city of

LaGrange is larger than Beaufort in land area. When the Beaufort/Boundary Street estimated trade area (approximately seven mile radius of northern Beaufort County) is considered, it compares with Troup County which is slightly larger (8 to 10 mile radius). All of Troup County had fewer than 22,000 households in 2000, while the Beaufort trade area is estimated closer to 18,500. When all of Beaufort County is considered, there were over 45,500 households in 2000.

In addition to comparable population and household numbers, the Beaufort area compares very well with LaGrange in terms of income and age statistics. In 1999, the median household income in Beaufort was \$36,500 in comparison with just under \$30,000 for LaGrange, and the Beaufort County median income was over \$47,000 compared to less than \$35,500 for Troup County. The median age in Beaufort and LaGrange are similar, 31.2 and 31.9 respectively, and Beaufort County's median age (36) is slightly higher than that of Troup County (34.6) due to the influence of retiree immigration to the South Carolina coast.

These basic considerations suggest that the market in Beaufort would be favorable for a Books-A-Million store to locate based on comparison with one of the communities that currently has a Books-A-Million location. It is reasonable to expect that the Boundary Street corridor would be an ideal location for such a retailer and that the existing Barnes and Noble store on Hilton Head Island currently has very little competition in the robust local market.

Confirmation of Findings: Retail Bookseller Industry Interview

In order to gather additional pertinent information and check assumptions about Beaufort's presumed attractiveness to a national retail bookseller, attempts were made to interview representatives of the three major booksellers. A successful contact was made with a Southeast representative of the Barnes and Noble chain. While it was not possible to engage in a detailed discussion, the representative did indicate that Barnes and Noble is interested in the Beaufort area and may look to locate a new store in Beaufort within the next few years. This information is taken as a positive indicator of Beaufort's attractiveness from a demographic standpoint. The question that is yet to be answered in reference to Boundary Street redevelopment is what will be required to attract Barnes and Noble or a similar retailer to choose to locate in this context as opposed to a greenfield commercial corridor location on the outskirts of Beaufort

Office/Industrial Market

The office market in Beaufort is relatively narrow. There are few large firms in the Beaufort area and it is not anticipated that corporate or regional offices of significant size will locate in Beaufort for reasons of accessibility and workforce depth. However, there is a deep market in Beaufort for "executive suites" and similar office spaces of less than 7,000 square feet. Many professionals who have relocated residence to Beaufort for quality of life reasons also would like to have high-quality, but relatively small office suites. The preference for many such entrepreneurs is ownership of a condominium office rather than paying traditional office rent, as the office real estate can contribute to an investment portfolio.

The industrial market in Beaufort is not spoken of as highly significant. As far as "industries" are concerned, the military influence on Beaufort is immense. There is little apparent potential for growth of traditional manufacturing or distribution industries in the City of Beaufort.

Other Market Considerations

The environmental assets of the Beaufort area and their impact on redevelopment potential must not be underestimated. The history and environment of Beaufort contribute to the value of property for residential and commercial use, to the tourism industry, to recreation, and to the overall quality of life enjoyed by residents. The tourism industry, in particular, is strongly related to the quality of the environment, including Beaufort's historic and cultural resources.

Along the Boundary Street corridor, there are many opportunities for redevelopment that can better capitalize on environmental assets, particularly views over the picturesque tidal marshes of Battery Creek and Albergotti Creek. As redevelopment occurs and, inevitably, density increases, it will be critical to guide design so that the essential visual quality of the environment is not compromised. In fact, in many cases there will be the opportunity to dramatically improve this visual quality over current circumstances. At Jean

Ribaut Square, for example, the marsh frontage of the property is occupied by the service access road and the backs of buildings. Redevelopment of this property can both capitalize on the marsh frontage that is now ignored and also dramatically improve views from across the marsh.

Though there are not adequate land areas for major redevelopment-enhancing recreation amenities such as golf courses, there does exist the potential to develop and enhance boat access by means of piers reaching to navigable waters. Currently, there are a few such piers extending into the marsh from homes on Riverbank Drive. It is uncertain whether there is potential for any "deep water" access from any Boundary Street properties, but the development of any level of water access should be of considerable value to the marketability of redevelopment projects.

Summary Study Area and Trade Area Analysis: Market Potential

The following summary of market potential for development relevant to the Boundary Street corridor is organized into two sections: residential and commercial development potential.

Residential Development Potential Summary

Demographic and development trends, as well as the opinions of local real estate specialists who have been interviewed, all point to the strength of the residential development market in Beaufort County and the City of Beaufort. This factor is of key importance to redevelopment planning for the Boundary Street corridor. The following sections summarize the perceived strengths, weaknesses and essential characteristics of the residential development potential for the corridor.

Strengths

Demographic Trends - The continued rapid growth of population in Beaufort County is largely a result of more broad demographic trends. The rapid expansion of the affluent 55 and older households segment in the U.S. during the next decade will provide a key demographic push for the further development of coastal areas like Beaufort County as second home and/or retirement locations. Just in South Carolina, the number of households in the 55 and older age category with incomes in excess of \$50,000 was 154,604 in 2000. Data on second home demand from American Resort Development Association indicates that 15% of households with incomes of \$50,000 or more own second homes. Thus, in 2000 there were over 23,000 income-qualified 55+ households in South Carolina likely to own or seek a second home. Beaufort, already positioned as the South Carolina county with the highest income level among older households, is well positioned to take advantage of this trend.

Community Identity - The City of Beaufort has a well-established identity as an attractive historic community. Beaufort is the type of place that people visit as tourists and find themselves looking for a home to buy due to the charm of the environment. The ongoing efforts of the City, the Chamber of Commerce and other organizations help to broadly promote the community's identity and attract visitors.

Supportive Public Policy and Regulations - Though land prices are escalating and creating challenges to build housing that is affordable to working families, the City of Beaufort's regulations are apparently not an impediment to residential

development potential. The fact that the city is sponsoring redevelopment planning efforts is a positive indication that local public policy will support redevelopment initiatives.

Economic Stability - The fact that MCAS Beaufort and other area military installations avoided any consideration of closure or realignment in the recent BRAC process bodes well for the stability of Beaufort and the housing market. Aside from the military, there are no single large industries in the area that have the potential to close and dramatically impact the stability of the population or housing market.

Education and Employment Opportunities - As the Beaufort area continues to grow, opportunities for education and employment are growing as well. In the past Beaufort has suffered from younger residents moving away for education and job opportunities. This will continue to happen because Beaufort will not reach the status of a metropolitan area in the foreseeable future, however improved opportunities will help the housing market.

Existing Infrastructure and Land Suitable for Development - Though the Boundary Street corridor is a redevelopment opportunity and for various reasons more costly than greenfield development, there is existing infrastructure to support development. This is not the case in much of Beaufort County which, as a result of the coastal geography, is not easily served by roads, water and sewer. Even the simple amount of dry land for development is limited in this environment, limiting the amount of developable land.

Weaknesses

Land Costs - The cost of land has risen in Beaufort such that it is difficult to build new single family homes that are affordable to more than a minority of the population. Because the general nature of the Boundary Street corridor is commercial, land values are elevated to commercial levels. A density level that is greater than what is common in Beaufort will be required in many circumstances in order to make residential development an economically feasible component of redevelopment.

Local Preferences and Expectations - Though there are exceptions, the vast majority of the Beaufort housing market is single family detached residences. There is evidence of growing market acceptance for town homes or "lofts" in or near the historic district, but the marketability of higher density, attached or loft housing in the Boundary Street corridor study area is relatively untested.

Perception and Corridor Environment - Community perception of the Boundary Street corridor, particularly at the western end, is not necessarily good. There is perception of crime and lower-quality business establishments. There is also an unattractive strip commercial environment that is auto-oriented and relatively unfriendly to pedestrians.

Lack of Community Amenities - Within the Boundary Street corridor area, there are no parks and few public spaces. Open areas of commercial developments are devoted entirely to parking. And there are no schools, playgrounds or other community facilities within walking distance. While the amenities of historic Beaufort are nearby, it will be necessary for amenities to be developed in the corridor area to support significant residential development.

Essential Characteristics

Some essential characteristics for residential development/redevelopment in the Boundary Street corridor area include the following:

- Create a place that people will want to live. Much of the dramatic rise in values of homes and neighborhoods in the historic Beaufort area has to do with the overall quality of the place and its attractiveness for living. Much work must be done to create the similar quality of environment in the Boundary Street area. This will include significant improvements to existing infrastructure and aesthetics as well as the addition of community amenities in the area.
- Include a mixture of housing types and values. Analysis of the residential real estate market and demographic statistics suggests that there is room for a wider variety of housing choices in Beaufort. There is also a demand and need for housing development that includes a mixture of cost levels. The notion of a mixed-income community is an appropriate consideration for redevelopment of the Boundary Street area.

Housing Development Demand Analysis

Rental Housing Demand - To estimate the annual demand for new rental housing in the City of Beaufort, three sources of housing demand were considered. These sources are 1) population growth based projections for new rental housing units, 2) existing rental households becoming owner-occupied households, and 3) existing owner-occupied households becoming renters. Additionally, the propensity of households in transition to move within the same area was used to determine the effective demand for additional rental housing caused by current owners in the area becoming renters in the same area. The relative strength or weakness of these sources is based on factors obtained from the 2003 American Housing Survey, the 2000 Census, and current demographic conditions in the area.

As shown on Table 4.1, the statistical model projects no demand for additional rental housing in Beaufort. Factors not considered by this model, such as the age, condition and marketability of existing rental housing, may significantly degrade the accuracy of this projection, as there is some strong evidence for demand in the market for new rental housing. In the future, it is likely that there will be market support for replacement of older rental properties with development of new rental housing that is of a better quality than the existing rental stock. Recent construction has not significantly addressed this potential opportunity, as trends (2000-2004) for building permits in Beaufort have been heavily weighted towards single family home construction, with nearly ten times as many permits issued for single family homes as for multi-family units.

Ownership Housing Demand - Due to shifting demographics and household compositions, housing preferences are changing. As the percentage of families with children decreases, the preference for single family homes on large lots may also be decreasing. Other new housing trends include the desire for pedestrian-friendly neighborhoods and connectivity of uses. This has led to the recent increase in mixed-use development in many parts of the country, such as the integration of housing with retail and office space. The market in Beaufort is perceived as being open to varied types of ownership housing, including mixed-use development with residential components. To determine the demand for ownership housing in Beaufort, the three market segments were reviewed: 1) population growth based projection for new owner-occupied housing units, 2) existing owner households remaining owner-occupied, and 3) existing renters becoming owners. The projected annual number of new housing units for the study area was used as a base number and the analysis took into consideration a number of trends supported by the 2000 Census and the 2003 American Housing Survey. Analysis shows an annual demand for over 160 new ownership housing units in Beaufort (Table 4.2). Due to the fact that there is little undeveloped land in the City of Beaufort that is candidate for new residential development, it is reasonable to assume that a significant portion of this projected demand can be met by adding housing in the Boundary Street area, particularly if this housing development is coupled with area improvements and development of amenities that will attract prospective home buyers.

Table 4.1: Rental Housing Demand - Sources of Demand

New Renter Households		Less Existing Renter Households Becoming Owners		Existing Owner Households Becoming Renters		TOTAL			
1	Annual new households	117	2	Beaufort existing renter households	1906	2	Beaufort existing owner households	2692	
2	x Demonstrated renter propensity	42%	3	x demonstrated annual renter turnover	34%		x demonstrated annual owners in turnover	8%	
	= New renter households	49		renter households in turnover	639		owner hh in turnover	205	
			4	x renter households becoming owners	22%	5	x demonstrated annual owners becoming renters	22%	
				= renter households becoming owners	137		= existing homeowners becoming renters	44	
						6	% renting in Beaufort	50%	
							= demand for rental units	22	
		49			-137			22	
								22	

- 1 Extrapolated from city average annual housing unit growth rate of 2.28% exhibited between 1980 and 2000.
- 2 From 2000 Census
- 3 American Housing Survey for USA, 2003
- 4 American Housing Survey for USA, 2003 adjusted due to military influence and local housing costs
- 5 American Housing Survey for USA, 2003
- 6 Estimated based on American Housing Survey of percentage of movers who relocate within same area, adjusted for military influence

Table 4.2: Annual Sources of Demand for Owner Housing

New Owner Households		Existing Owners Households		Existing Renters Becoming Owners		TOTAL				
1	Annual New Households for Beaufort	117	3	Beaufort Existing Owner HH (2000)	269	6	Beaufort Existing Renter Households	1906		
2	Demonstrated Owner Propensity	59%	4	x demonstrated Annual Owner Turnover	8%	7	Demonstrated Annual Renter Turnover	34%		
	= New Owner Households	68.4		= HH in Turnover	296		= Renter HH in Turnover	639		
			5	- owners Becoming Renters	64	8	x Renter HH Becoming Owners	22%		
			9	- owners staying owners moving out of Beaufort	207		= Renter HH Becoming Owners	137		
						10	= renters buying units in Beaufort	69		
		68			25			69		
								69		162

- 1 Extrapolated from city average annual housing unit growth rate of 2.28% exhibited between 1980 and 2000.
- 2 Based on 2000 Census Data - 58.5% of occupied housing units in Beaufort are owner-occupied
- 3 2000 Census existing housing units owner occupied
- 4 American Housing Survey for USA, 2003
- 5 American Housing Survey for USA, 2003
- 6 2000 Census existing housing units renter occupied
- 7 American Housing Survey for USA, 2003
- 8 American Housing Survey for USA, 2003
- 9 Estimate based on American Housing Survey of percentage of homeowner movers who relocate out of area (70%)
- 10 Estimate based on American Housing Survey of percentage of rental movers who relocate in same area (50%)

Commercial Development Potential Summary

Boundary Street is primarily a commercial environment. Though an infusion of residential and mixed-use development into the area will be of great benefit, it is critical that the corridor be significantly redeveloped from a commercial standpoint as well.

The corridor has many strengths that are supportive of significant commercial and mixed-use redevelopment as well as several weaknesses that pose challenges to effecting redevelopment. The following are characterizations of key strengths and weaknesses identified through this analysis.

Strengths

Local Economic and Employment Growth - Beaufort County has continued to prosper economically, and certain sectors of the City of Beaufort's economy have seen significant growth as well. In particular, strong growth trends have been seen in the Health Care and Services industries which help to provide a growing job base, including some high-paying professional jobs, in the local economy.

Central Regional Location - Beaufort is centrally located in Beaufort County, and is easily accessible for a large portion of the county's growing population. And unlike some new commercial development areas in Beaufort County, the Boundary Street corridor is directly adjacent to a large and relatively dense residential population.

Accessibility and Traffic - As evidenced by traffic count data, the Boundary Street corridor carries a heavy amount of traffic on a daily basis. While this can be a challenge from a design standpoint,

in terms of commercial development potential the traffic level is a great advantage. And due to the geography of Beaufort County with its limited number of bridges, the Boundary Street corridor will continue to serve as a gateway not only to Beaufort but to the barrier islands beyond Woods Memorial Bridge, bringing many non-Beaufort residents past its businesses every day.

Large Land Parcels for Redevelopment - Unlike the Beaufort historic district, there are large parcels along and adjacent to the Boundary Street corridor that are candidate for redevelopment. Whether redeveloped in part or as a whole, these large parcels offer opportunities for a variety of building types and store sizes to be constructed, whereas the small parcels in the historic district constrain the potential for redevelopment.

Marsh Views and Access - Though there is only limited access to tidal creek waterways from the Boundary Street corridor, there are many vistas to picturesque salt marshes from the public right-of-way as well as from private property. In most cases, the existing development turns its back on these views, but redevelopment can capitalize on these opportunities through better design and planning.

Proponents of Redevelopment and Willing Investors - The current redevelopment activity on the Boundary Street corridor (Marsh Gardens - 303 Associates) is evidence that there are developers in Beaufort who are both willing and capable to undertake significant redevelopment projects.

Weaknesses

Negative Retail Trends - Beaufort experienced a dramatic recent decline in its retail activity, according to the 1997 and 2002 Economic Census statistics. Undoubtedly there are outside influences that have contributed to this, but the fact remains that retail trade has grown steadily in Beaufort County while it has declined significantly in the city. Action will be required to reverse this trend.

Fractured Land Ownership - Aside from Beaufort Plaza and Jean Ribaut Square, the existing commercial parcels on the Boundary Street corridor are typically small and there are many owners. Some land assembly for redevelopment is occurring, however much more will be required in order to adequately transform the corridor so as to meet its potential.

Major Leases - While long term leases for anchor stores are good business for shopping center owners, they can also pose an impediment to redevelopment efforts. The leases that are held by some of the major retailers in Beaufort Plaza and Jean Ribaut Square may serve to postpone redevelopment efforts, or require redevelopment of those properties to occur incrementally.

Limited Road Network - While the high traffic volumes on Boundary Street are good for business in many respects, the lack of a more complete road network limits the redevelopment potential of the area. Investment in infrastructure to support redevelopment can mitigate this weakness.

Obsolete Buildings and Development Types - Part of the reason that the City of Beaufort has lost a significant amount of retail market share in Beaufort County can be attributed to the relative obsoles-

cence of the commercial properties and buildings along Boundary Street. Newer and differently styled retail centers are attracting customers away from the corridor's older shopping centers and stand alone businesses. The Boundary Street corridor may have to "reinvent" itself in order to become attractive to customers and desirable retailers.

Easy Options for Commercial Sprawl - As evidenced by recent years' development farther south on SC 170, commercial sprawl has impacted Beaufort. For as long as it is easy for commercial development to extend farther out across the county and be less centralized, it will be difficult to lure businesses back in the city to support redevelopment efforts. This is essentially an economic and land development policy issue, and adjustments must be made in the equations so that redevelopment is the more attractive alternative for commercial development. The City must engage in joint planning efforts with Beaufort County and Port Royal to establish policies that will guide new commercial and mixed-use development in northern Beaufort County away from greenfield sites and into designated redevelopment areas such as Boundary Street.

Essential Characteristics

The strengths and weaknesses of the Boundary Street corridor suggest several key characteristics for its successful commercial redevelopment:

Redevelopment must be visionary. - To successfully redevelop the Boundary Street corridor and restore it to the level of a prominent and highly desirable location in Beaufort County, a bold vision is required. It will not do to simply upgrade and bring the area up to current standards. Rather, the redevelopment approach must change the corridor into an area that will be an invigorating commercial environment for decades to come.

Character is a key component. - Beaufort is a highly attractive and desirable community largely due to the unique character of its environment and historic/cultural resources. The Boundary Street corridor, conversely, has little in the way of unique character: it differs little from a commercial corridor that might be found anywhere. With redevelopment, the Boundary Street corridor must be infused with character that is authentic and rooted in the unique environment, history and style of Beaufort.

Variety must be accommodated. - In many respects, the Boundary Street corridor must allow for a wide variety of uses. Unlike the Beaufort historic district, there is space in the Boundary Street area for large as well as small retailers. Both must be accommodated and, through innovative design, pedestrians and cyclists must be accommodated as well as cars.

Coordination is critical for success. - There are many stakeholders that must coordinate efforts in order to achieve the level of redevelopment needed to revitalize Boundary Street. Strong leadership will be needed for the long term to see efforts through to fruition.

Retail Development Demand Analysis

A retail development demand analysis model (see tables 4.3 - 4.7) has been constructed based on existing retail space in the study area, projected trends for the community and industry standards. Currently, there is approximately 535,000 square feet of commercial space in the study area. Based on the current estimated household statistics and assumptions about the defined trade area, the potential exists to support an additional 88,000 square feet. This estimate is based on the amount of space that would be required to capture the estimated \$22.5 million in potential sales that the study area is not currently capturing from the trade area marketplace. When future growth projections to the benchmark years 2010 and 2020 are considered, the model suggests that an additional 48,000 square feet can be supported by 2010 and an additional 97,500 above that in 2020. These estimates for current and future potential retail expansion are exclusive of any replacement of currently existing retail space that has become obsolete due to age or condition. While this demand analysis model is not intended to be a precise tool for predicting exact demand levels, it does demonstrate a general level of demand for retail and commercial expansion in the study area based on reasonable and statistical assumptions about the local trade area.

Table 4.3: Approximate Retail Sales and Space in Study Area

Types of Establishment	Estimated 2005 Retail Sales for Study Area	1. Estimated Average Sales Per Square Foot	2. Estimated Current Square Footage
Food Store	\$31,373,679.00	\$470.37	66,700
Apparel and Accessory Stores	\$16,436,712.00	\$199.96	82,200
Home Furniture, Furnishings and Equipment	\$6,792,280.00	\$157.96	43,000
Eating and Drinking Places	\$15,485,407.00	\$195.77	79,100
Miscellaneous Retail	\$39,696,360.00	\$191.40	207,400
Personal Services	\$16,123,898.00	\$282.38	57,100
TOTAL			535,500

1. Source: Dollars and Cents of Downtown/Intown Shopping Centers (1993 ULI Report) - figures for inner suburb neighborhood shopping centers. Figures inflated to 2005 dollars using Bureau of Labor Statistics inflation calculator

2. MACTEC estimates based on Beaufort basemaps, aerial photography and windshield survey in August, 2005.

Table 4.4: Current Retail Sales Potential within Trade Area

Category	Est. 2005 Annual Retail Sales for Study Area	Households in Trade Area	Typical Annual Expenditure per Household	Potential Sales	Surplus / Leakage
Food Stores	\$31,373,679	18,323	\$3,558	\$65,193,234	\$33,819,555
Apparel and Accessory Stores	\$16,436,712	18,323	\$1,856	\$34,007,488	\$17,570,776
Home Furniture, Furnishings and Equipment	\$6,792,280	18,323	\$1,252	\$22,940,396	\$16,148,116
Eating and Drinking Places	\$15,485,407	18,323	\$2,566	\$47,016,818	\$31,531,411
Miscellaneous Retail	\$39,696,360	18,323	\$756	\$13,852,188	\$25,844,172
Personal Services	\$16,123,898	18,323	\$616	\$11,286,968	\$4,836,930
				TOTAL	\$68,388,756

2. Source: MACTEC Estimate based on 2000 Census and growth trend projection

3. Sources: 2000 Census average household income for City of Beaufort - \$36,532 & 2001 DoL Consumer Expenditure Report, Table 2 for incomes between \$30,000 and \$39,999 – adjusted for inflation using Bureau of Labor Statistics inflation calculator.

4. Source: Dollars and Cents of Downtown/Intown Shopping Centers (1993 ULI Report) - figures for inner suburb neighborhood shopping centers. Figures inflated to 2005 dollars using Bureau of Labor Statistics inflation calculator

Table 4.6: Projected Potential for Additional Retail Square Footage in 2010

Category	Approximate 2000 Trade Area Population	1. Estimated 2010 Population	Estimated New/Lost Persons	2. Estimated New Households in 2010	Typical Expenditure per Household	Estimate of Additional Retail Sales	3. Avg. Sales per Sq. Foot	Estimated Additional Square Feet to Accommodate Population Change	4. Potential New Square Footage in Study Area
Food Stores	52,474	59,296	6,822	2,729	\$3,558	\$9,708,530	\$470	20,640	8,256
Apparel and Accessory Stores	52,474	59,296	6,822	2,729	\$1,856	\$5,064,371	\$200	25,327	10,131
Home Furniture, Furnishings, Equipment	52,474	59,296	6,822	2,729	\$1,252	\$3,416,267	\$158	21,627	8,651
Eating and Drinking Places	52,474	59,296	6,822	2,729	\$2,566	\$7,001,711	\$196	35,765	14,306
Miscellaneous Retail	52,474	59,296	6,822	2,729	\$756	\$2,062,858	\$191	10,778	4,311
Personal Services	52,474	59,296	6,822	2,729	\$616	\$1,680,847	\$282	5,952	2,381
TOTALS						28934583			48,036

1. Source: Based on 1.32% annual growth rate experience in trade area between 1990 and 2000 Census

2. Source: Average household size of 2.5 for Beaufort County reported by the 2000 Census

3. Source: Dollars and Cents of Downtown/Intown Shopping Centers (1993 ULI Report) - figures for inner suburb neighborhood shopping centers. Figures inflated to 2005 dollars using Bureau of Labor Statistics inflation calculator

4. Source: MACTEC estimate of capture rates at 40% based on share of trade area establishments

Table 4.7: Projected Potential for Additional Retail Square Footage in 2020

Category	Approximate 2000 Trade Area Population	1. Projected 2020 Trade Area Population	Estimated New/Lost Persons	2. Estimated New Households in 2020	Typical Expenditure per Household	Estimated New Retail Sales	3. Avg. Sales per Sq. Foot	Estimated New Square Feet to Accommodate Population Change	4. Potential New Square Footage in Study Area
Food Stores	52,474	66,327	13,853	5,541	\$3,558	\$19,715,783	\$470	41,915	16,766
Apparel and Accessory Stores	52,474	66,327	13,853	5,541	\$1,856	\$10,284,568	\$200	51,433	20,573
Home Furniture, Furnishings, Equipment	52,474	66,327	13,853	5,541	\$1,252	\$6,937,651	\$158	43,920	17,568
Eating and Drinking Places	52,474	66,327	13,853	5,541	\$2,566	\$14,218,859	\$196	72,630	29,052
Miscellaneous Retail	52,474	66,327	13,853	5,541	\$756	\$4,189,188	\$191	21,887	8,755
Personal Services	52,474	66,327	13,853	5,541	\$616	\$3,413,413	\$282	12,088	4,835
TOTALS						58,759,462			97,550

1. Source: Based on 1.32% annual growth rate experienced by area between 1990 and 2000 Census

2. Source: Average household size of 2.5 for Beaufort County reported by the 2000 Census

3. Source: Dollars and Cents of Downtown/Intown Shopping Centers (1993 ULI Report) - figures for inner suburb neighborhood shopping centers. Figures inflated to 2005 dollars using Bureau of Labor Statistics inflation calculator

4. Source: Based local estimate capture rates of 40%

Synchro Traffic Analysis

June 2006



appendix **B**

I. Roundabout Analysis – Alternate Street Designs, Inc.

Movement Summary

BOUNDARY/RIBAUT EXISTING TWO LANE RBT +20 PERCENT

two left turn lanes from south

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Prop. Queued	Eff. Stop Rate	Aver Speed (mph)
BOUNDARY SOUTH										
32	L	957	2.0	0.608	19.2	LOS B	166	0.84	1.06	27.4
33	R	95	2.1	0.609	11.6	LOS B	166	0.84	1.02	30.6
Approach		1052	2.0	0.608	18.5	LOS B	166	0.84	1.05	27.6
RIBAUT EAST										
22	L	70	1.4	0.737	19.1	LOS B	187	0.89	1.09	27.5
21	T	1170	2.0	0.734	11.1	LOS B	205	0.89	1.01	30.7
Approach		1240	1.9	0.735	11.6	LOS B	205	0.89	1.01	30.5
RIBAUT WEST										
11	T	1016	2.0	0.591	5.8	LOS A	178	0.36	0.45	33.3
13	R	873	1.9	0.592	5.8	LOS A	178	0.33	0.45	33.3
Approach		1888	2.0	0.592	5.8	LOS A	178	0.35	0.45	33.3
All Vehicles		4180	2.0	0.737	10.7	LOS B	205	0.63	0.77	30.8



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Movement Summary

BOUNDARY/RIBAUT EXISTING TWO LANE RBT

Subtitle

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Prop. Queued	Eff. Stop Rate	Aver Speed (mph)
South Approach										
32	L	798	2.0	0.731	19.1	LOS B	239	0.85	1.10	27.5
33	R	79	2.5	0.110	8.8	LOS A	16	0.61	0.73	32.1
Approach		878	2.1	0.731	18.1	LOS B	239	0.83	1.06	27.8
East Approach										
22	L	59	1.7	0.702	23.6	LOS C	242	1.00	1.16	25.6
21	T	975	1.9	0.707	15.7	LOS B	272	1.00	1.12	28.4
Approach		1034	1.9	0.706	16.1	LOS B	272	1.00	1.12	28.3
West Approach										
11	T	847	2.0	0.490	5.7	LOS A	133	0.29	0.44	33.6
13	R	727	2.1	0.490	5.7	LOS A	133	0.27	0.44	33.6
Approach		1575	2.0	0.489	5.7	LOS A	133	0.28	0.44	33.6
All Vehicles		3487	2.0	0.731	11.9	LOS B	272	0.63	0.80	30.2



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Movement Summary

BOUNDARY AND US 170/B STREET EXISTING TRAFFIC 2 LANE RBT

Subtitle

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Prop. Queued	Eff. Stop Rate	Aver Speed (mph)
BOUNDARY SOUTH										
32	L	267	1.9	0.537	16.5	LOS B	103	0.79	0.98	28.6
31	T	109	1.8	0.537	9.6	LOS A	103	0.79	0.84	31.3
33	R	811	2.0	0.847	12.6	LOS B	278	0.94	1.16	30.0
Approach		1187	1.9	0.847	13.2	LOS B	278	0.89	1.09	29.7
B STREET EAST										
22	L	561	2.0	0.750	15.8	LOS B	279	0.81	0.84	28.6
21	T	1245	2.0	0.750	9.6	LOS A	279	0.83	0.83	31.1
23	R	1	50.0	0.667	10.0	LOS A	271	0.84	0.91	31.1
Approach		1808	2.0	0.750	11.5	LOS B	279	0.82	0.83	30.2
B STREET NORTH										
42	L	27	3.6	0.206	21.7	LOS C	36	0.89	0.97	26.3
41	T	54	1.9	0.205	14.4	LOS B	45	0.92	0.95	29.1
43	R	82	2.4	0.206	13.3	LOS B	45	0.97	0.97	29.6
Approach		164	2.4	0.205	15.1	LOS B	45	0.94	0.96	28.8
B STREET WEST										
12	L	1	50.0	0.667	17.3	LOS B	160	0.84	1.01	28.2
11	T	1023	2.0	0.589	10.0	LOS A	172	0.84	0.88	31.1
13	R	104	1.9	0.591	9.6	LOS A	172	0.84	0.86	31.1
Approach		1128	2.0	0.589	10.0	LOS A	172	0.84	0.88	31.1
All Vehicles		4287	2.0	0.847	11.7	LOS B	279	0.85	0.92	30.3



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Movement Summary

BOUNDARY AND US170/B St EXISTING TRAFFIC PLUS 20 PERCENT

Subtitle

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Prop. Queued	Eff. Stop Rate	Aver Speed (mph)
BOUNDARY SOUTH										
32	L	321	1.9	0.371	15.2	LOS B	75	0.84	0.86	28.5
31	T	130	2.3	0.137	7.9	LOS A	28	0.80	0.65	31.2
33	R	973	2.0	0.960	23.9	LOS C	531	1.00	1.50	24.5
Approach		1424	2.0	0.960	20.4	LOS C	531	0.94	1.28	25.9
B STREET EAST										
22	L	673	1.9	0.922	19.9	LOS B	494	0.98	1.09	27.1
21	T	1493	2.0	0.922	14.4	LOS B	494	0.99	1.15	29.1
23	R	1	50.0	1.000	15.1	LOS B	475	1.00	1.22	28.5
Approach		2169	2.0	0.922	16.1	LOS B	494	0.99	1.13	28.4
B STREET NORTH										
42	L	33	3.0	0.485	45.7	LOS D	97	0.99	1.08	19.1
41	T	65	1.5	0.481	37.8	LOS D	128	0.99	1.09	20.2
43	R	98	2.0	0.483	35.4	LOS D	128	1.00	1.10	20.6
Approach		196	2.0	0.482	38.0	LOS D	128	1.00	1.09	20.2
B STREET WEST										
12	L	1	50.0	1.000	27.4	LOS C	366	1.00	1.24	24.1
11	T	1227	2.0	0.846	19.5	LOS B	413	1.00	1.26	26.6
13	R	125	2.4	0.846	18.6	LOS B	413	1.00	1.24	26.8
Approach		1356	2.1	0.846	19.4	LOS B	413	1.00	1.26	26.6
All Vehicles		5145	2.0	1.000	19.0	LOS B	531	0.98	1.20	26.8



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II. SYNCHRO: Existing Network, Future Traffic

Arterial Level of Service
Boundary Street Study
Existing Network +20% Traffic + Project Trips
12/16/2005

Arterial Level of Service, EB Boundary St

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Terminus	II	40	10.8	0.4	11.3	0.09	30.2	B
170	II	40	25.3	98.7	124.0	0.23	6.7	F
Hogarth	II	40	35.7	13.2	48.9	0.36	26.5	C
KMart	II	40	45.4	12.7	58.1	0.49	30.3	B
Marsh	II	40	29.9	17.4	47.3	0.27	20.7	D
Ribaut	II	40	13.6	27.3	40.9	0.12	10.4	F
Bladen	II	35	38.0	8.4	46.4	0.35	27.3	C
Total	II		198.8	178.1	376.9	1.92	18.3	D

Arterial Level of Service, WB Boundary St

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bladen	II	35	15.2	10.5	25.7	0.12	17.0	E
Ribaut Ext	II	35	38.0	29.7	67.7	0.35	18.7	D
Marsh	II	40	13.6	23.1	36.7	0.12	11.6	F
KMart	II	40	29.9	20.1	50.0	0.27	19.6	D
Hogarth	II	40	45.4	27.7	73.1	0.49	24.1	C
Palmetto	II	40	35.7	45.8	81.5	0.36	15.9	E
Terminus	II	40	25.3	0.5	25.8	0.23	32.1	B
Total	II		203.1	157.4	360.5	1.94	19.4	D

Lanes, Volumes, Timings
Boundary Street Study
Existing Network +20% Traffic + Project Trips
12/16/2005

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	SBR2	NEL2	NEL	NER
Lane Configurations	↔	↕↕	↔	↔↔	↕↕	↔	↔	↔	↔	↔	↔	↔↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		200	200			0	0	0			0
Storage Lanes	1		1	2			0	1	0			0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50		50			50	50
Trailing Detector (ft)	0	0	0	0	0	0		0			0	0
Turning Speed (mph)	15		9	15			9	15	9	9	15	15
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.91
Ped Bike Factor			0.87		0.99		0.82				0.76	0.78
Frt			0.850		0.996		0.903					0.850
Flt Protected	0.950			0.950			0.986				0.950	
Satd. Flow (prot)	1770	3539	1583	3433	3505	0	1360	0	0	0	1770	2882
Flt Permitted	0.091			0.083			0.986				0.950	
Satd. Flow (perm)	170	3539	1375	300	3505	0	1360	0	0	0	1338	2250
Right Turn on Red			Yes			Yes		Yes		Yes		Yes
Satd. Flow (RTOR)			71		3		12					682
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			40		30				30	
Link Distance (ft)		714			1904		1081				919	
Travel Time (s)		12.2			32.5		24.6				20.9	
Volume (vph)	17	1011	100	530	1285	34	45	70	45	350	90	926
Confl. Peds. (#/hr)	100		50	100		50			100	100		50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	22	1319	130	691	1676	44	59	91	59	457	117	1208
Lane Group Flow (vph)	22	1319	130	691	1720	0	209	0	0	0	574	1208
Turn Type	Perm		Perm	pm+pt		Prot		Split		Perm		Perm
Protected Phases		2		1	6		7			8	8	
Permitted Phases	2		2	6								8
Detector Phases	2	2	2	1	6		7			8	8	8
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0			4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	8.0	20.0		20.0			20.0	20.0	20.0
Total Split (s)	48.0	48.0	48.0	22.0	70.0	0.0	20.0	0.0	0.0	40.0	40.0	40.0
Total Split (%)	36.9%	36.9%	36.9%	16.9%	53.8%	0.0%	15.4%	0.0%	0.0%	30.8%	30.8%	30.8%
Maximum Green (s)	44.0	44.0	44.0	18.0	66.0		16.0			36.0	36.0	36.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5			3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5			0.5	0.5	0.5
Lead/Lag	Lag	Lag	Lag	Lead			Lead			Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes			Yes			Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0			3.0	3.0	3.0
Recall Mode	None	None	None	None	None		None			Max	Max	Max
Walk Time (s)	5.0	5.0	5.0	5.0	5.0		5.0			5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0		11.0		11.0			11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0		0			0	0	0
Act Effect Green (s)	44.0	44.0	44.0	66.0	66.0		16.0			36.0	36.0	36.0
Actuated g/C Ratio	0.34	0.34	0.34	0.51	0.51		0.12			0.28	0.28	0.28
v/c Ratio	0.38	1.10	0.25	1.18	0.97		1.17			1.17	1.08	1.08
Control Delay	55.2	98.7	16.0	132.1	45.8		168.1			138.8	72.0	72.0

2: Boundary St & Palmetto
Hall Planning and Engineering

Synchro 6 Report
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Synchro 6 Report
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Lanes, Volumes, Timings
Boundary Street Study

Existing Network +20% Traffic + Project Trips
12/16/2005

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕↕	↕↕		↕	↕
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200			0	0	0
Storage Lanes	1			0	1	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.995		0.933	
Flt Protected	0.950				0.975	
Satd. Flow (prot)	1770	3539	3522	0	1694	0
Flt Permitted	0.061				0.975	
Satd. Flow (perm)	114	3539	3522	0	1694	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			10		11	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	40	40			30	
Link Distance (ft)		1904	2579		1125	
Travel Time (s)		32.5	44.0		25.6	
Volume (vph)	35	1710	1894	63	59	58
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	46	2230	2470	82	77	76
Lane Group Flow (vph)	46	2230	2552	0	153	0
Turn Type	Perm					
Protected Phases		4	8		6	
Permitted Phases	4					
Minimum Split (s)	20.0	20.0	20.0		20.0	
Total Split (s)	70.0	70.0	70.0	0.0	20.0	0.0
Total Split (%)	77.8%	77.8%	77.8%	0.0%	22.2%	0.0%
Maximum Green (s)	66.0	66.0	66.0		16.0	
Yellow Time (s)	3.5	3.5	3.5		3.5	
All-Red Time (s)	0.5	0.5	0.5		0.5	
Lead/Lag						
Lead-Lag Optimize?						
Walk Time (s)	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	
Pedestrian Calls (#/hr)	0	0	0		0	
Act Effct Green (s)	66.0	66.0	66.0		16.0	
Actuated g/C Ratio	0.73	0.73	0.73		0.18	
v/c Ratio	0.55	0.86	0.99		0.49	
Control Delay	35.6	13.2	27.7		37.1	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	35.6	13.2	27.7		37.1	
LOS	D	B	C		D	
Approach Delay		13.7	27.7		37.1	
Approach LOS		B	C		D	
Stops (vph)	26	1382	1801		117	
Fuel Used(gal)	1	46	72		3	
CO Emissions (g/hr)	77	3189	5034		206	

4: Boundary St & Hogarth
Hall Planning and Engineering

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Lanes, Volumes, Timings
Boundary Street Study

Existing Network +20% Traffic + Project Trips
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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕↕	↕↕		↕	↕
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200			0	0	0
Storage Lanes	1			0	1	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	
Trailing Detector (ft)	0	0	0		0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Frt			0.998		0.958	
Flt Protected	0.950				0.967	
Satd. Flow (prot)	1770	3539	3532	0	1726	0
Flt Permitted	0.087				0.967	
Satd. Flow (perm)	162	3539	3532	0	1726	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			4		12	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	40	40			30	
Link Distance (ft)		2579	1436		708	
Travel Time (s)		44.0	24.5		16.1	
Volume (vph)	20	1500	1666	23	149	67
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	26	1957	2173	30	194	87
Lane Group Flow (vph)	26	1957	2203	0	281	0
Turn Type	Perm					
Protected Phases		4	8			
Permitted Phases	4				6	
Detector Phases	4	4	8		6	
Minimum Initial (s)	4.0	4.0	4.0		4.0	
Minimum Split (s)	20.0	20.0	20.0		20.0	
Total Split (s)	50.0	50.0	50.0	0.0	20.0	0.0
Total Split (%)	71.4%	71.4%	71.4%	0.0%	28.6%	0.0%
Maximum Green (s)	46.0	46.0	46.0		16.0	
Yellow Time (s)	3.5	3.5	3.5		3.5	
All-Red Time (s)	0.5	0.5	0.5		0.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Recall Mode	None	None	None		None	
Walk Time (s)	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	
Pedestrian Calls (#/hr)	0	0	0		0	
Act Effct Green (s)	43.8	43.8	43.8		13.8	
Actuated g/C Ratio	0.67	0.67	0.67		0.21	
v/c Ratio	0.24	0.83	0.94		0.76	
Control Delay	11.6	12.7	20.1		38.4	
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	11.6	12.7	20.1		38.4	

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Hall Planning and Engineering

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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
LOS	B	B	C		D	
Approach Delay		12.7	20.1		38.4	
Approach LOS		B	C		D	
90th %ile Green (s)	46.0	46.0	46.0		16.0	
90th %ile Term Code	Max	Max	Max		Max	
70th %ile Green (s)	46.0	46.0	46.0		16.0	
70th %ile Term Code	Max	Max	Max		Max	
50th %ile Green (s)	46.0	46.0	46.0		16.0	
50th %ile Term Code	Max	Max	Max		Max	
30th %ile Green (s)	46.0	46.0	46.0		13.5	
30th %ile Term Code	Hold	Hold	Max		Gap	
10th %ile Green (s)	34.8	34.8	34.8		8.3	
10th %ile Term Code	Hold	Hold	Gap		Gap	
Stops (vph)	13	1224	1483		217	
Fuel Used(gal)	1	48	43		5	
CO Emissions (g/hr)	42	3367	2978		325	
NOx Emissions (g/hr)	8	655	579		63	
VOC Emissions (g/hr)	10	780	690		75	
Dilemma Vehicles (#)	0	132	147		0	
Queue Length 50th (ft)	4	288	384		106	
Queue Length 95th (ft)	18	397	#638		#206	
Internal Link Dist (ft)		2499	1356		628	
Turn Bay Length (ft)	200					
Base Capacity (vph)	110	2401	2397		419	
Starvation Cap Reductn	0	0	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.24	0.82	0.92		0.67	

Intersection Summary

Area Type: Other
 Cycle Length: 70
 Actuated Cycle Length: 65.7
 Natural Cycle: 70
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.94
 Intersection Signal Delay: 17.9 Intersection LOS: B
 Intersection Capacity Utilization 77.6% ICU Level of Service D
 Analysis Period (min) 15
 90th %ile Actuated Cycle: 70
 70th %ile Actuated Cycle: 70
 50th %ile Actuated Cycle: 70
 30th %ile Actuated Cycle: 67.5
 10th %ile Actuated Cycle: 51.1
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.



Lanes, Volumes, Timings
Boundary Street Study

Existing Network +20% Traffic + Project Trips
12/16/2005

	↖	→	↗	↖	←	↖	↖	↖	↖	↖	↖	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕	↗	↖	↕	↗	↖	↕	↗	↖	↕	↗
Ideal Flow (vphp)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	0	150	0	150	0	0	150	0	150	0	150
Storage Lanes	1	0	1	0	1	0	0	1	0	1	0	1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15	9	15	9	15	9	15	9	15	9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.995	0.999	0.850	0.984	0.850	0.984	0.850	0.984	0.850	0.984	0.850	0.984
Fit Protected	0.950	0.950	0.976	0.950	0.976	0.950	0.976	0.950	0.976	0.950	0.976	0.950
Satd. Flow (prot)	1770	3522	0	1770	3536	0	0	1818	1583	0	1833	1583
Fit Permitted	0.080	0.080	0.784	0.080	0.784	0.080	0.784	0.080	0.784	0.080	0.784	0.080
Satd. Flow (perm)	149	3522	0	149	3536	0	0	1460	1583	0	1328	1583
Right Turn on Red		Yes										
Satd. Flow (RTOR)	9	2	17	9	11	17	9	11	17	9	11	17
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	40	40	30	40	30	40	30	40	30	40	30	40
Link Distance (ft)	1436	624	405	1436	507	1436	507	1436	507	1436	507	1436
Travel Time (s)	24.5	10.6	9.2	24.5	11.5	24.5	11.5	24.5	11.5	24.5	11.5	24.5
Volume (vph)	10	1566	50	23	1703	14	104	109	163	30	60	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	13	2043	65	30	2221	18	136	142	213	39	78	78
Lane Group Flow (vph)	13	2108	0	30	2239	0	0	278	213	0	117	78
Turn Type	Perm											
Protected Phases	4	8	8	4	2	2	2	6	6	6	6	6
Permitted Phases	4	4	8	8	2	2	2	6	6	6	6	6
Detector Phases	4	4	8	8	2	2	2	6	6	6	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	54.0	54.0	0.0	54.0	54.0	0.0	21.0	21.0	21.0	21.0	21.0	21.0
Total Split (%)	72.0%	72.0%	0.0%	72.0%	72.0%	0.0%	28.0%	28.0%	28.0%	28.0%	28.0%	28.0%
Maximum Green (s)	50.0	50.0	50.0	50.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	Max							
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effct Green (s)	49.5	49.5	49.5	49.5	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
Actuated g/C Ratio	0.66	0.66	0.66	0.66	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
v/c Ratio	0.13	0.90	0.30	0.95	0.83	0.57	0.39	0.21	0.39	0.21	0.39	0.21
Control Delay	8.2	17.4	14.9	23.1	51.3	30.4	29.1	22.6	29.1	22.6	29.1	22.6
Queue Delay	0.0	0.2	0.0	5.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	8.2	17.6	14.9	28.9	51.3	30.5	29.1	22.6	29.1	22.6	29.1	22.6

13: Boundary St & Marsh
Hall Planning and Engineering

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Lanes, Volumes, Timings
Boundary Street Study

Existing Network +20% Traffic + Project Trips
12/16/2005

	↖	→	↗	↖	←	↖	↖	↖	↖	↖	↖	↖
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	A	B	B	C	D	C	C	C	C	C	C	C
Approach Delay	17.6	28.7	42.2	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5	26.5
Approach LOS	B	C	D	C	C	C	C	C	C	C	C	C
90th %ile Green (s)	50.0	50.0	50.0	50.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
90th %ile Term Code	Max	Max	Max	Max	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
70th %ile Green (s)	50.0	50.0	50.0	50.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
70th %ile Term Code	Max	Max	Max	Max	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
50th %ile Green (s)	50.0	50.0	50.0	50.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
50th %ile Term Code	Max	Max	Max	Max	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
30th %ile Green (s)	50.0	50.0	50.0	50.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
30th %ile Term Code	Max	Max	Max	Max	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
10th %ile Green (s)	47.5	47.5	47.5	47.5	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
10th %ile Term Code	Hold	Hold	Gap	Gap	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR	MaxR
Stops (vph)	6	1433	16	1589	218	158	90	51	90	51	90	51
Fuel Used (gal)	0	40	0	34	5	3	2	1	2	1	2	1
CO Emissions (g/hr)	14	2785	25	2378	328	189	109	63	109	63	109	63
NOx Emissions (g/hr)	3	542	5	463	64	37	21	12	21	12	21	12
VOC Emissions (g/hr)	3	645	6	551	76	44	25	15	25	15	25	15
Dilemma Vehicles (#)	0	126	0	132	0	0	0	0	0	0	0	0
Queue Length 50th (ft)	2	363	5	424	124	81	46	25	46	25	46	25
Queue Length 95th (ft)	10	#514	25	#687	#252	148	93	60	93	60	93	60
Internal Link Dist (ft)	1356	544	325	427	427	427	427	427	427	427	427	427
Turn Bay Length (ft)	150	150	150	150	150	150	150	150	150	150	150	150
Base Capacity (vph)	99	2351	99	2358	333	374	303	370	303	370	303	370
Starvation Cap Reductn	0	0	0	110	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	27	0	0	0	1	1	0	1	0	1	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.13	0.91	0.30	1.00	0.83	0.57	0.39	0.21	0.39	0.21	0.39	0.21
Intersection Summary												
Area Type:	Other											
Cycle Length:	75											
Actuated Cycle Length:	74.5											
Natural Cycle:	75											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.95											
Intersection Signal Delay:	25.3						Intersection LOS: C					
Intersection Capacity Utilization:	86.6%						ICU Level of Service E					
Analysis Period (min):	15											
90th %ile Actuated Cycle:	75											
70th %ile Actuated Cycle:	75											
50th %ile Actuated Cycle:	75											
30th %ile Actuated Cycle:	75											
10th %ile Actuated Cycle:	72.5											
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												

13: Boundary St & Marsh
Hall Planning and Engineering

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Lanes, Volumes, Timings
Boundary Street Study

Existing Network +20% Traffic + Project Trips
12/16/2005

Splits and Phases: 13: Boundary St & Marsh



Lanes, Volumes, Timings
Boundary Street Study

Existing Network +20% Traffic + Project Trips
12/16/2005

	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕	↔	↔	↕	↔	↔	↕	↔	↔	↕	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150		150	150			0	100		0	0	0
Storage Lanes	1		1	1			0	1		0	0	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50		50	50		50	50	
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	
Turning Speed (mph)	15		9	15			9	15		9	15	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	0.95	0.95	0.95	1.00	1.00	1.00	1.00
Friction			0.850		0.998			0.972			0.965	
Fit Protected	0.950			0.950			0.950	0.962			0.978	
Satd. Flow (prot)	1770	3539	1583	1770	3532	0	1681	1655	0	0	1758	0
Fit Permitted	0.083			0.113			0.950	0.962			0.732	
Satd. Flow (perm)	155	3539	1583	210	3532	0	1681	1655	0	0	1316	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			556		1			10			9	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		40			35			30			30	
Link Distance (ft)		624			1858			830			577	
Travel Time (s)		10.6			36.2			18.9			13.1	
Volume (vph)	15	879	675	60	947	10	734	11	73	12	8	7
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	20	1147	880	78	1235	13	957	14	95	16	10	9
Lane Group Flow (vph)	20	1147	880	78	1248	0	553	513	0	0	35	0
Turn Type	Perm		Perm	Perm			Split			Perm		
Protected Phases		4			8		2	2			6	
Permitted Phases	4		4	8						6		
Detector Phases	4	4	4	8	8		2	2		6	6	
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0		4.0	4.0	
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0		20.0	20.0		20.0	20.0	
Total Split (s)	58.0	58.0	58.0	58.0	58.0	0.0	42.0	42.0	0.0	20.0	20.0	0.0
Total Split (%)	48.3%	48.3%	48.3%	48.3%	48.3%	0.0%	35.0%	35.0%	0.0%	16.7%	16.7%	0.0%
Maximum Green (s)	54.0	54.0	54.0	54.0	54.0		38.0	38.0		16.0	16.0	
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5		3.5	3.5	
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5		0.5	0.5	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None		Max	Max		Min	Min	
Walk Time (s)	5.0	5.0	5.0	5.0	5.0		5.0	5.0		5.0	5.0	
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0		11.0	11.0		11.0	11.0	
Pedestrian Calls (#/hr)	0	0	0	0	0		0	0		0	0	
Act Effect Green (s)	45.7	45.7	45.7	45.7	45.7		38.5	38.5			7.8	
Actuated g/C Ratio	0.44	0.44	0.44	0.44	0.44		0.37	0.37			0.07	
v/c Ratio	0.29	0.74	0.87	0.85	0.81		0.89	0.83			0.33	
Control Delay	32.0	27.3	20.2	89.9	29.7		51.6	45.0			47.4	
Queue Delay	0.0	0.6	0.7	0.0	0.2		8.5	3.6			0.0	
Total Delay	32.0	27.9	20.8	89.9	30.0		60.1	48.6			47.4	

Lanes, Volumes, Timings
Boundary Street Study

Existing Network +20% Traffic + Project Trips
12/16/2005

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS	C	C	C	F	C		E	D				D
Approach Delay		24.9				33.5			54.6			47.4
Approach LOS		C			C				D			D
90th %ile Green (s)	54.0	54.0	54.0	54.0	54.0		38.0	38.0		11.3	11.3	
90th %ile Term Code	Max	Max	Max	Max	Max		MaxR	MaxR		Gap	Gap	
70th %ile Green (s)	54.0	54.0	54.0	54.0	54.0		38.0	38.0		9.2	9.2	
70th %ile Term Code	Max	Max	Max	Max	Max		MaxR	MaxR		Gap	Gap	
50th %ile Green (s)	54.0	54.0	54.0	54.0	54.0		38.0	38.0		7.6	7.6	
50th %ile Term Code	Hold	Hold	Hold	Max	Max		MaxR	MaxR		Gap	Gap	
30th %ile Green (s)	40.3	40.3	40.3	40.3	40.3		38.0	38.0		5.9	5.9	
30th %ile Term Code	Hold	Hold	Hold	Gap	Gap		MaxR	MaxR		Gap	Gap	
10th %ile Green (s)	29.2	29.2	29.2	29.2	29.2		38.0	38.0		5.5	5.5	
10th %ile Term Code	Gap	Gap	Gap	Hold	Hold		MaxR	MaxR		Gap	Gap	
Stops (vph)	14	824	328	55	937		411	381				25
Fuel Used(gal)	0	18	10	3	29		11	9				1
CO Emissions (g/hr)	23	1288	697	188	2055		763	663				41
NOx Emissions (g/hr)	5	251	136	37	400		148	129				8
VOC Emissions (g/hr)	5	298	162	44	476		177	154				10
Dilemma Vehicles (#)	0	48	0	0	53		0	0				0
Queue Length 50th (ft)	8	320	210	45	364		407	360				18
Queue Length 95th (ft)	33	421	#475	#145	477		#675	#604				51
Internal Link Dist (ft)		544			1778			750				497
Turn Bay Length (ft)	150		150	150			100					
Base Capacity (vph)	75	1708	1052	101	1706		622	618				197
Starvation Cap Reductn	0	231	35	0	0		0	0				0
Spillback Cap Reductn	0	0	0	0	81		52	51				3
Storage Cap Reductn	0	0	0	0	0		0	0				0
Reduced v/c Ratio	0.27	0.78	0.87	0.77	0.77		0.97	0.90				0.18

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 104.2
 Natural Cycle: 120
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.89
 Intersection Signal Delay: 34.7 Intersection LOS: C
 Intersection Capacity Utilization 79.2% ICU Level of Service D
 Analysis Period (min) 15
 90th %ile Actuated Cycle: 115.3
 70th %ile Actuated Cycle: 113.2
 50th %ile Actuated Cycle: 111.6
 30th %ile Actuated Cycle: 96.2
 10th %ile Actuated Cycle: 84.7
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
Boundary Street Study

Existing Network +20% Traffic + Project Trips
12/16/2005

Splits and Phases: 6: Boundary St & Ribaut Ext



Lanes, Volumes, Timings
Boundary Street Study

Existing Network +20% Traffic + Project Trips
12/16/2005

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↘	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50			50	50	
Trailing Detector (ft)	0			0	0	
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt					0.932	
Flt Protected					0.976	
Satd. Flow (prot)	3539	0	0	3539	1694	0
Flt Permitted					0.976	
Satd. Flow (perm)	3539	0	0	3539	1694	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)					18	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	35			35	35	
Link Distance (ft)	1858			640	592	
Travel Time (s)	36.2			12.5	11.5	
Volume (vph)	925	0	0	1030	50	50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	1207	0	0	1343	65	65
Lane Group Flow (vph)	1207	0	0	1343	130	0
Turn Type						
Protected Phases	4			8	2	
Permitted Phases						
Detector Phases	4			8	2	
Minimum Initial (s)	4.0			4.0	4.0	
Minimum Split (s)	20.0			20.0	20.0	
Total Split (s)	20.0	0.0	0.0	20.0	20.0	0.0
Total Split (%)	50.0%	0.0%	0.0%	50.0%	50.0%	0.0%
Maximum Green (s)	16.0			16.0	16.0	
Yellow Time (s)	3.5			3.5	3.5	
All-Red Time (s)	0.5			0.5	0.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0	3.0	
Recall Mode	None			None	Min	
Walk Time (s)	5.0			5.0	5.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	16.0			16.0	7.5	
Actuated g/C Ratio	0.51			0.51	0.24	
v/c Ratio	0.67			0.75	0.31	
Control Delay	8.4			10.5	10.8	
Queue Delay	0.0			0.0	0.0	
Total Delay	8.4			10.5	10.8	
LOS	A			B	B	
Approach Delay	8.4			10.5	10.8	

8: Boundary St & Bladen
Hall Planning and Engineering

Synchro 6 Report
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Lanes, Volumes, Timings
Boundary Street Study

Existing Network +20% Traffic + Project Trips
12/16/2005

	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Approach LOS	A			B	B	
90th %ile Green (s)	16.0			16.0	10.1	
90th %ile Term Code	Max			Max	Gap	
70th %ile Green (s)	16.0			16.0	8.4	
70th %ile Term Code	Max			Max	Gap	
50th %ile Green (s)	16.0			16.0	7.3	
50th %ile Term Code	Max			Max	Gap	
30th %ile Green (s)	16.0			16.0	6.3	
30th %ile Term Code	Hold			Max	Gap	
10th %ile Green (s)	16.0			16.0	5.5	
10th %ile Term Code	Hold			Max	Gap	
Stops (vph)	723			823	78	
Fuel Used(gal)	22			15	1	
CO Emissions (g/hr)	1554			1017	95	
NOx Emissions (g/hr)	302			198	19	
VOC Emissions (g/hr)	360			236	22	
Dilemma Vehicles (#)	169			191	0	
Queue Length 50th (ft)	62			73	15	
Queue Length 95th (ft)	125			#160	38	
Internal Link Dist (ft)	1778			560	512	
Turn Bay Length (ft)						
Base Capacity (vph)	1801			1801	688	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.67			0.75	0.19	

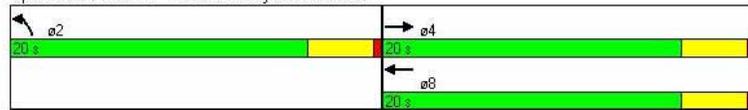
Intersection Summary

Area Type:	Other
Cycle Length:	40
Actuated Cycle Length:	31.5
Natural Cycle:	50
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.75
Intersection Signal Delay:	9.6
Intersection LOS:	A
Intersection Capacity Utilization:	47.8%
ICU Level of Service:	A
Analysis Period (min):	15
90th %ile Actuated Cycle:	34.1
70th %ile Actuated Cycle:	32.4
50th %ile Actuated Cycle:	31.3
30th %ile Actuated Cycle:	30.3
10th %ile Actuated Cycle:	29.5
#	95th percentile volume exceeds capacity, queue may be longer.
	Queue shown is maximum after two cycles.

8: Boundary St & Bladen
Hall Planning and Engineering

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Splits and Phases: 8: Boundary St & Bladen



III. PROPOSED NETWORK, Future Traffic

Arterial Level of Service
Boundary Street Study
New Network Signals Plus 20% Growth and Project Trips
12/16/2005

Arterial Level of Service: EB Boundary St

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Terminus	II	40	10.8	0.4	11.3	0.09	30.2	B
Robert Smalls	II	40	25.3	57.2	82.5	0.23	10.0	F
Westview	II	35	17.8	22.9	40.7	0.14	12.6	F
Hogarh	II	35	27.3	12.2	39.5	0.22	19.9	D
Road A	II	35	50.7	13.8	64.5	0.49	27.5	C
Marsh	II	35	31.6	18.1	49.7	0.27	19.2	D
Ribaut	II	35	14.8	38.1	52.9	0.12	8.1	F
Bladen	II	35	38.0	6.9	44.9	0.35	28.2	B
Total	II		216.4	169.6	386.0	1.91	17.8	D

Arterial Level of Service: WB Boundary St

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
Bladen	II	35	15.2	7.8	23.0	0.12	19.0	D
Ribaut	II	35	38.0	14.6	52.6	0.35	24.1	C
Marsh Rd	II	35	14.8	23.2	38.0	0.12	11.2	F
Road A	II	35	31.6	22.5	54.1	0.27	17.7	D
Hogarh	II	35	50.7	22.7	73.4	0.49	24.2	C
Westview	II	35	27.3	14.0	41.3	0.22	19.1	D
Road B	II	35	17.8	27.3	45.1	0.14	11.3	F
Terminus	II	40	25.3	0.6	25.9	0.23	32.0	B
Total	II		220.7	132.7	393.4	1.94	19.8	D

Lanes, Volumes, Timings
Boundary Street Study
New Network Signals Plus 20% Growth and Project Trips
12/16/2005

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↕↕	↔	↔↔	↕↕	↔	↔	↕	↔↔	↔	↕	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200		150	200		0	150		300	0		100
Storage Lanes	1		1	2		0	0		2	0		1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	0.95	1.00	1.00	0.88	1.00	1.00	1.00
Ped Bike Factor			0.86		0.99			0.96	0.77		0.93	0.86
Frnt			0.850		0.996			0.850			0.850	
Flt Protected	0.950			0.950			0.966		0.976			0.976
Satd. Flow (prot)	1770	3539	1583	3433	3504	0	0	1799	2787	0	1818	1583
Flt Permitted	0.077			0.071				0.966	0.976			0.976
Satd. Flow (perm)	143	3539	1361	257	3504	0	0	1726	2152	0	1689	1361
Right Turn on RED			Yes			Yes		Yes		Yes		Yes
Satd. Flow (RTOR)			54		3			725				65
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)				40		35		30				30
Link Distance (ft)				714		750		876				492
Travel Time (s)				12.2		14.6		19.9				11.2
Volume (vph)	17	1011	100	530	1285	34	240	100	826	25	25	50
Confl. Peds. (#/hr)	100		50	100		50	50		100	100		50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	22	1319	130	691	1676	44	313	130	1077	33	33	65
Lane Group Flow (vph)	22	1319	130	691	1720	0	0	443	1077	0	66	65
Turn Type	Perm		Perm	pm+pt		Split		Perm	custom		Perm	
Protected Phases		2		1	6		8	8		7	7	
Permitted Phases	2		2	6			8	8	8	7	7	7
Detector Phases	2	2	2	1	6		8	8	8	7	7	7
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0		4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	8.0	20.0		20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	56.0	56.0	56.0	27.0	83.0	0.0	37.0	37.0	37.0	20.0	20.0	20.0
Total Split (%)	40.0%	40.0%	40.0%	19.3%	59.3%	0.0%	26.4%	26.4%	26.4%	14.3%	14.3%	14.3%
Maximum Green (s)	52.0	52.0	52.0	23.0	79.0		33.0	33.0	33.0	16.0	16.0	16.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5		0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lag	Lag	Lag	Lead			Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None		Max	Max	Max	None	None	None
Walk Time (s)	5.0	5.0	5.0	5.0	5.0							
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0							
Pedestrian Calls (#/hr)	0	0	0	0	0							
Act Effect Green (s)	52.0	52.0	52.0	79.0	79.0		33.0	33.0		10.2	10.2	
Actuated g/C Ratio	0.39	0.39	0.39	0.59	0.59		0.25	0.25		0.08	0.08	
v/c Ratio	0.40	0.96	0.23	0.99	0.83		1.00	1.00		0.48	0.40	
Control Delay	56.6	57.2	17.6	73.2	27.3		93.6	44.4		70.8	20.5	

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	12.8	0.0	0.0	7.7			0.0	55.6		2.0	0.0
Total Delay	56.6	69.9	17.6	73.2	35.0			93.6	100.0		72.9	20.5
LOS	E	E	B	E	D			F	F		E	C
Approach Delay	65.1			46.0			98.2			46.9		
Approach LOS	E			D			F			D		
90th %ile Green (s)	52.0	52.0	52.0	23.0	79.0			33.0	33.0	14.3	14.3	14.3
90th %ile Term Code	Max	Max	Max	Max	Max			MaxR	MaxR	Gap	Gap	Gap
70th %ile Green (s)	52.0	52.0	52.0	23.0	79.0			33.0	33.0	11.9	11.9	11.9
70th %ile Term Code	Max	Max	Max	Max	Max			MaxR	MaxR	MaxR	Gap	Gap
50th %ile Green (s)	52.0	52.0	52.0	23.0	79.0			33.0	33.0	10.2	10.2	10.2
50th %ile Term Code	Max	Max	Max	Max	Hold			MaxR	MaxR	MaxR	Gap	Gap
30th %ile Green (s)	52.0	52.0	52.0	23.0	79.0			33.0	33.0	8.6	8.6	8.6
30th %ile Term Code	Max	Max	Max	Max	Hold			MaxR	MaxR	MaxR	Gap	Gap
10th %ile Green (s)	52.0	52.0	52.0	23.0	79.0			33.0	33.0	6.2	6.2	6.2
10th %ile Term Code	Max	Max	Max	Max	Hold			MaxR	MaxR	MaxR	Gap	Gap
Stops (vph)	18	1076	47	470	1244			354	358		55	13
Fuel Used(gal)	1	31	1	16	27			13	18		2	1
CO Emissions (g/hr)	35	2136	103	1150	1867			875	1237		130	69
NOx Emissions (g/hr)	7	416	20	224	363			170	241		25	13
VOC Emissions (g/hr)	8	495	24	267	433			203	287		30	16
Dilemma Vehicles (#)	0	43	0	0	56			0	0		0	0
Queue Length 50th (ft)	14	585	43	261	606			~390	~232		56	0
Queue Length 95th (ft)	#52	#782	95	#415	772			#641	#426		106	47
Internal Link Dist (ft)	634		670			796			412			
Turn Bay Length (ft)	200		150		200		300			100		
Base Capacity (vph)	55	1371	560	696	2064			442	1076		208	213
Starvation Cap Reductn	0	0	0	0	320			0	0		0	0
Spillback Cap Reductn	0	81	0	0	0			0	138		66	0
Storage Cap Reductn	0	0	0	0	0			0	0		0	0
Reduced v/c Ratio	0.40	1.02	0.23	0.99	0.99			1.00	1.15		0.46	0.31

Intersection Summary

Area Type: Other

Cycle Length: 140

Actuated Cycle Length: 134.2

Natural Cycle: 140

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.00

Intersection Signal Delay: 65.4

Intersection Capacity Utilization 95.6%

Intersection LOS: E

ICU Level of Service F

Analysis Period (min) 15

90th %ile Actuated Cycle: 138.3

70th %ile Actuated Cycle: 135.9

50th %ile Actuated Cycle: 134.2

30th %ile Actuated Cycle: 132.6

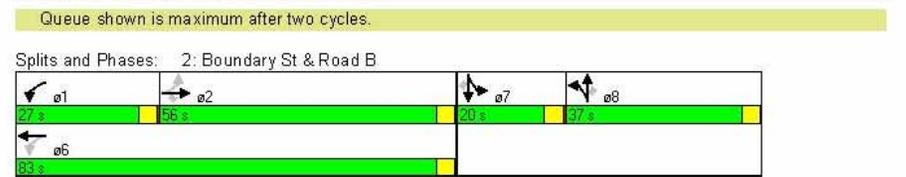
10th %ile Actuated Cycle: 130.2

~ Volume exceeds capacity, queue is theoretically infinite.

Queue shown is maximum after two cycles.

95th percentile volume exceeds capacity, queue may be longer.

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Lanes, Volumes, Timings
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑↑	↑↑		↑	↑		↑	↑	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	0	200	0	0	150	0	150	0	150	0
Storage Lanes	0	0	0	2	0	0	1	0	1	0	1	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)		50		50	50		50	50		50	50	
Trailing Detector (ft)		0		0	0		0	0		0	0	
Turning Speed (mph)	15		9	15		9	15		9	15		9
Lane Util. Factor	1.00	0.95	1.00	0.97	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bke Factor							0.92	0.87		0.86	0.95	
Frt							0.900			0.925		
Flt Protected				0.950			0.950			0.950		
Satd. Flow (prot)	0	3539	0	3433	3539	0	1770	1458	0	1770	1634	0
Flt Permitted				0.062			0.578			0.635		
Satd. Flow (perm)	0	3539	0	224	3539	0	995	1458	0	1014	1634	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)							74			26		
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35			35		30		30		30	
Link Distance (ft)		750			1154		1637		418			
Travel Time (s)		14.6			22.5		37.2		9.5			
Volume (vph)	0	1661	0	150	1761	0	75	50	100	20	20	20
Confl. Peds. (#/hr)	100		50	100		50	50		100	100		50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	0	2167	0	196	2297	0	98	65	130	26	26	26
Lane Group Flow (vph)	0	2167	0	196	2297	0	98	195	0	26	52	0
Turn Type				pm+pt			pm+pt			Perm		
Protected Phases		4		3	8		5	2		6		6
Permitted Phases				8			2			6		
Detector Phases		4		3	8		5	2		6		6
Minimum Initial (s)		4.0		4.0	4.0		4.0	4.0		4.0		4.0
Minimum Split (s)		20.0		8.0	20.0		8.0	20.0		20.0		20.0
Total Split (s)	0.0	64.0	0.0	8.0	72.0	0.0	8.0	28.0	0.0	20.0	20.0	0.0
Total Split (%)	0.0%	64.0%	0.0%	8.0%	72.0%	0.0%	8.0%	28.0%	0.0%	20.0%	20.0%	0.0%
Maximum Green (s)		60.0		4.0	68.0		4.0	24.0		16.0		16.0
Yellow Time (s)		3.5		3.5	3.5		3.5	3.5		3.5		3.5
All-Red Time (s)		0.5		0.5	0.5		0.5	0.5		0.5		0.5
Lead/Lag		Lag		Lead			Lead			Lag		Lag
Lead-Lag Optimize?		Yes		Yes			Yes			Yes		Yes
Vehicle Extension (s)		3.0		3.0	3.0		3.0	3.0		3.0		3.0
Recall Mode		None		None	None		None	None		None		None
Walk Time (s)		5.0		5.0	5.0		5.0	5.0		5.0		5.0
Flash Dont Walk (s)		11.0		11.0	11.0		11.0	11.0		11.0		11.0
Pedestrian Calls (#/hr)		0		0	0		0	0		0		0
Act Effect Green (s)		60.2		68.2	68.2		14.7	14.5		8.3		8.3
Actuated g/C Ratio		0.66		0.75	0.75		0.16	0.16		0.09		0.09
v/c Ratio		0.92		0.63	0.86		0.51	0.66		0.28		0.30
Control Delay		22.9		17.5	14.0		43.3	32.6		46.6		27.9

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Lanes, Volumes, Timings
Boundary Street Study

New Network Signals Plus 20% Growth and Project Trips
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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay		2.2		0.0	0.9		1.0	0.0		0.0	0.1	
Total Delay		25.1		17.5	14.9		44.2	32.6		46.6	27.9	
LOS		C		B	B		D	C		D	C	
Approach Delay		25.1		15.1			36.5			34.2		
Approach LOS		C		B			D			C		
90th %ile Green (s)		60.0		4.0	68.0		4.0	21.1		13.1	13.1	
90th %ile Term Code		Max		Max	Max		Max	Gap		Hold	Hold	
70th %ile Green (s)		60.0		4.0	68.0		4.0	17.3		9.3	9.3	
70th %ile Term Code		Max		Max	Max		Max	Hold		Gap	Gap	
50th %ile Green (s)		60.0		4.0	68.0		4.0	15.7		7.7	7.7	
50th %ile Term Code		Max		Max	Max		Max	Hold		Gap	Gap	
30th %ile Green (s)		60.0		4.0	68.0		4.0	14.2		6.2	6.2	
30th %ile Term Code		Max		Max	Hold		Max	Hold		Gap	Gap	
10th %ile Green (s)		60.0		4.0	68.0		0.0	5.6		5.6	5.6	
10th %ile Term Code		Max		Max	Hold		Skip	Gap		Hold	Hold	
Stops (vph)		1494		55	1351		75	101		25	27	
Fuel Used (gal)		31		3	34		3	5		0	1	
CO Emissions (g/hr)		2191		179	2362		189	330		31	40	
NOx Emissions (g/hr)		426		35	460		37	64		6	8	
VOC Emissions (g/hr)		508		41	547		44	77		7	9	
Dilemma Vehicles (#)		106		0	110		0	0		0	0	
Queue Length 50th (ft)		525		13	424		50	64		15	14	
Queue Length 95th (ft)		#869		#54	#741		96	136		40	49	
Internal Link Dist (ft)		670		1074			1557			338		
Turn Bay Length (ft)				200			150			150		
Base Capacity (vph)		2347		310	2660		192	406		165	288	
Starvation Cap Reductn		95		0	0		0	0		0	0	
Spillback Cap Reductn		0		0	148		17	0		0	15	
Storage Cap Reductn		0		0	0		0	0		0	0	
Reduced v/c Ratio		0.96		0.63	0.91		0.56	0.48		0.16	0.19	
Intersection Summary												
Area Type:	Other											
Cycle Length:	100											
Actuated Cycle Length:	90.8											
Natural Cycle:	100											
Control Type:	Actuated-Uncoordinated											
Maximum v/c Ratio:	0.92											
Intersection Signal Delay:	21.0						Intersection LOS: C					
Intersection Capacity Utilization:	90.2%						ICU Level of Service E					
Analysis Period (min):	15											
90th %ile Actuated Cycle:	97.1											
70th %ile Actuated Cycle:	93.3											
50th %ile Actuated Cycle:	91.7											
30th %ile Actuated Cycle:	90.2											
10th %ile Actuated Cycle:	81.6											
# 95th percentile volume exceeds capacity, queue may be longer.												
Queue shown is maximum after two cycles.												

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Hall Planning and Engineering

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Splits and Phases: 4: Boundary St & Westview



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↔	↕	↕	↔	↔	↔
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200			0	0	0
Storage Lanes	1			0	1	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	
Trailing Detector (ft)	0	0	0		0	
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor			0.99		0.99	
Frt			0.994		0.932	
Flt Protected	0.950				0.976	
Satd. Flow (prot)	1770	3539	3476	0	1677	0
Flt Permitted	0.061				0.976	
Satd. Flow (perm)	114	3539	3476	0	1670	0
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			12		9	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		1154	1066		242	
Travel Time (s)		22.5	20.8		5.5	
Volume (vph)	15	1660	1800	75	60	60
Confl. Peds. (#/hr)	100			100	5	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	20	2165	2348	98	78	78
Lane Group Flow (vph)	20	2165	2446	0	156	0
Turn Type	Perm					
Protected Phases		4	8		6	
Permitted Phases	4					
Detector Phases	4	4	8		6	
Minimum Initial (s)	4.0	4.0	4.0		4.0	
Minimum Split (s)	20.0	20.0	20.0		20.0	
Total Split (s)	70.0	70.0	70.0	0.0	20.0	0.0
Total Split (%)	77.8%	77.8%	77.8%	0.0%	22.2%	0.0%
Maximum Green (s)	66.0	66.0	66.0		16.0	
Yellow Time (s)	3.5	3.5	3.5		3.5	
All-Red Time (s)	0.5	0.5	0.5		0.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	
Recall Mode	None	None	None		Max	
Walk Time (s)	5.0	5.0	5.0		5.0	
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	
Pedestrian Calls (#/hr)	0	0	0		0	
Act Effct Green (s)	65.3	65.3	65.3		16.0	
Actuated g/C Ratio	0.73	0.73	0.73		0.18	
v/c Ratio	0.24	0.84	0.96		0.51	
Control Delay	11.9	12.2	22.7		37.9	

Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Delay	0.0	0.0	0.0		0.0	
Total Delay	11.9	12.2	22.7		37.9	
LOS	B	B	C		D	
Approach Delay		12.2	22.7		37.9	
Approach LOS		B	C		D	
90th %ile Green (s)	66.0	66.0	66.0		16.0	
90th %ile Term Code	Max	Max	Max		MaxR	
70th %ile Green (s)	66.0	66.0	66.0		16.0	
70th %ile Term Code	Max	Max	Max		MaxR	
50th %ile Green (s)	66.0	66.0	66.0		16.0	
50th %ile Term Code	Hold	Hold	Max		MaxR	
30th %ile Green (s)	66.0	66.0	66.0		16.0	
30th %ile Term Code	Hold	Hold	Max		MaxR	
10th %ile Green (s)	62.5	62.5	62.5		16.0	
10th %ile Term Code	Hold	Hold	Gap		MaxR	
Stops (vph)	7	1284	1694		121	
Fuel Used(gal)	0	31	40		2	
CO Emissions (g/hr)	17	2181	2829		143	
NOx Emissions (g/hr)	3	424	550		28	
VOC Emissions (g/hr)	4	505	656		33	
Dilemma Vehicles (#)	0	105	120		0	
Queue Length 50th (ft)	3	367	542		76	
Queue Length 95th (ft)	16	481	#374		138	
Internal Link Dist (ft)		1074	986		162	
Turn Bay Length (ft)	200					
Base Capacity (vph)	84	2595	2552		308	
Starvation Cap Reductn	0	0	0		0	
Spillback Cap Reductn	0	0	0		0	
Storage Cap Reductn	0	0	0		0	
Reduced v/c Ratio	0.24	0.83	0.96		0.51	

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	89.3
Natural Cycle:	90
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.96
Intersection Signal Delay:	18.4
Intersection Capacity Utilization:	82.8%
Analysis Period (min):	15
90th %ile Actuated Cycle:	90
70th %ile Actuated Cycle:	90
50th %ile Actuated Cycle:	90
30th %ile Actuated Cycle:	90
10th %ile Actuated Cycle:	86.5
# 95th percentile volume exceeds capacity, queue may be longer.	
Queue shown is maximum after two cycles.	

Splits and Phases: 10: Boundary St & Hogarth



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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗	↖	↗	↖	↗
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	200			0	0	0
Storage Lanes	1			0	1	1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50		50	50
Trailing Detector (ft)	0	0	0		0	0
Turning Speed (mph)	15			9	15	9
Lane Util. Factor	1.00	0.95	0.95	0.95	1.00	1.00
Ped Bike Factor			0.99		0.99	0.98
Frt			0.996			0.850
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	3539	3503	0	1770	1583
Flt Permitted	0.087				0.950	
Satd. Flow (perm)	162	3539	3503	0	1758	1554
Right Turn on Red				Yes		Yes
Satd. Flow (RTOR)			8			8
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)		35	35		30	
Link Distance (ft)		652	1401		352	
Travel Time (s)		12.7	27.3		8.0	
Volume (vph)	5	1500	1630	45	40	149
Confl. Peds. (#/hr)	100			100	5	5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	7	1957	2126	59	52	194
Lane Group Flow (vph)	7	1957	2185	0	52	194
Turn Type	Perm					Perm
Protected Phases		4	8		6	
Permitted Phases	4					6
Detector Phases	4	4	8		6	6
Minimum Initial (s)	4.0	4.0	4.0		4.0	4.0
Minimum Split (s)	20.0	20.0	20.0		20.0	20.0
Total Split (s)	50.0	50.0	50.0	0.0	20.0	20.0
Total Split (%)	71.4%	71.4%	71.4%	0.0%	28.6%	28.6%
Maximum Green (s)	46.0	46.0	46.0		16.0	16.0
Yellow Time (s)	3.5	3.5	3.5		3.5	3.5
All-Red Time (s)	0.5	0.5	0.5		0.5	0.5
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0
Recall Mode	None	None	None		Max	Max
Walk Time (s)	5.0	5.0	5.0		5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0		11.0	11.0
Pedestrian Calls (#/hr)	0	0	0		0	0
Act Effect Green (s)	45.8	45.8	45.8		16.0	16.0
Actuated g/C Ratio	0.66	0.66	0.66		0.23	0.23
v/c Ratio	0.07	0.84	0.95		0.13	0.54
Control Delay	6.0	13.8	22.5		22.5	29.0

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Hall Planning and Engineering

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Lanes, Volumes, Timings
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Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Queue Delay	0.0	0.0	0.0		0.0	0.0
Total Delay	6.0	13.8	22.5		22.5	29.0
LOS	A	B	C		C	C
Approach Delay		13.8	22.5		27.6	
Approach LOS		B	C		C	
90th %ile Green (s)	46.0	46.0	46.0		16.0	16.0
90th %ile Term Code	Max	Max	Max		MaxR	MaxR
70th %ile Green (s)	46.0	46.0	46.0		16.0	16.0
70th %ile Term Code	Max	Max	Max		MaxR	MaxR
50th %ile Green (s)	46.0	46.0	46.0		16.0	16.0
50th %ile Term Code	Max	Max	Max		MaxR	MaxR
30th %ile Green (s)	46.0	46.0	46.0		16.0	16.0
30th %ile Term Code	Hold	Hold	Max		MaxR	MaxR
10th %ile Green (s)	44.8	44.8	44.8		16.0	16.0
10th %ile Term Code	Hold	Hold	Gap		MaxR	MaxR
Stops (vph)	3	1274	1537		39	148
Fuel Used(gal)	0	23	41		1	2
CO Emissions (g/hr)	4	1616	2873		40	165
NOx Emissions (g/hr)	1	314	559		8	32
VOC Emissions (g/hr)	1	374	666		9	38
Dilemma Vehicles (#)	0	124	137		0	0
Queue Length 50th (ft)	1	288	380		18	71
Queue Length 95th (ft)	5	397	#633		44	132
Internal Link Dist (ft)		572	1321		272	
Turn Bay Length (ft)	200					
Base Capacity (vph)	106	2326	2305		406	362
Starvation Cap Reductn	0	0	0		0	0
Spillback Cap Reductn	0	0	0		0	0
Storage Cap Reductn	0	0	0		0	0
Reduced v/c Ratio	0.07	0.84	0.95		0.13	0.54
Intersection Summary						
Area Type:	Other					
Cycle Length:	70					
Actuated Cycle Length:	69.8					
Natural Cycle:	70					
Control Type:	Actuated-Uncoordinated					
Maximum v/c Ratio:	0.95					
Intersection Signal Delay:	18.9			Intersection LOS: B		
Intersection Capacity Utilization:	75.9%			ICU Level of Service D		
Analysis Period (min):	15					
90th %ile Actuated Cycle:	70					
70th %ile Actuated Cycle:	70					
50th %ile Actuated Cycle:	70					
30th %ile Actuated Cycle:	70					
10th %ile Actuated Cycle:	68.8					
# 95th percentile volume exceeds capacity, queue may be longer.	Queue shown is maximum after two cycles.					

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Hall Planning and Engineering

Synchro 6 Report
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Splits and Phases: 5: Boundary St & Road A



	↖	→	↘	↙	←	↗	↖	↗	↘	↙	↘	↙
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗	↖	↖	↖↗	↖	↖	↖	↖	↖	↖	↖
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	0	150	0	150	0	0	0	150	0	150	0
Storage Lanes	1	0	1	0	1	0	0	0	1	0	1	0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	0	50	50	0	0	0	50	50	0	50
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Turning Speed (mph)	15	9	15	9	15	9	15	9	15	9	15	9
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	1.00
Ped Bike Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.91	0.96	0.91	0.99	0.95
Fr _t	0.995	0.995	0.995	0.999	0.999	0.999	0.850	0.850	0.850	0.850	0.850	0.850
Fit Protected	0.950	0.950	0.950	0.950	0.950	0.950	0.976	0.976	0.976	0.976	0.983	0.983
Satd. Flow (prot)	1770	3512	0	1770	3527	0	0	1818	1583	0	1831	1583
Fit Permitted	0.066	0.066	0.066	0.066	0.066	0.066	0.795	0.795	0.795	0.795	0.725	0.725
Satd. Flow (perm)	123	3512	0	123	3527	0	0	1428	1433	0	1331	1499
Right Turn on Red		Yes										
Satd. Flow (RTOR)	8	8	8	2	2	2	16	16	16	16	8	8
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	35	35	35	35	35	35	30	30	30	30	30	30
Link Distance (ft)	1401	1401	1401	625	625	625	1624	1624	1624	1624	507	507
Travel Time (s)	27.3	27.3	27.3	12.2	12.2	12.2	36.9	36.9	36.9	36.9	11.5	11.5
Volume (vph)	10	1566	50	23	1703	14	104	109	163	25	50	50
Confl. Peds. (#/hr)	100	100	25	25	100	50	50	50	50	50	50	25
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	13	2043	65	30	2221	18	136	142	213	33	65	65
Lane Group Flow (vph)	13	2108	0	30	2239	0	0	278	213	0	98	65
Turn Type	Perm											
Protected Phases	4	4	8	8	8	2	2	2	6	6	6	6
Permitted Phases	4	4	8	8	8	2	2	2	6	6	6	6
Detector Phases	4	4	8	8	8	2	2	2	6	6	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
Total Split (s)	65.0	65.0	0.0	65.0	65.0	0.0	25.0	25.0	25.0	25.0	25.0	25.0
Total Split (%)	72.2%	72.2%	0.0%	72.2%	72.2%	0.0%	27.8%	27.8%	27.8%	27.8%	27.8%	27.8%
Maximum Green (s)	60.5	60.5	60.5	60.5	60.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	Max						
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Act Effect Green (s)	59.6	59.6	59.6	59.6	59.6	21.0	21.0	21.0	21.0	21.0	21.0	21.0
Actuated g/C Ratio	0.67	0.67	0.67	0.67	0.67	0.24	0.24	0.24	0.24	0.24	0.24	0.24
v/c Ratio	0.16	0.89	0.37	0.94	0.37	0.82	0.61	0.61	0.61	0.31	0.18	0.18
Control Delay	10.4	18.1	21.0	23.2	21.0	53.8	36.6	36.6	36.6	31.8	26.4	26.4

Lanes, Volumes, Timings
Boundary Street Study

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Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Delay	0.0	0.0		0.0	19.2			0.0	0.0		0.0	0.0
Total Delay	10.4	18.1		21.0	42.3			53.8	36.6		31.8	26.4
LOS	B	B		C	D			D	D		C	C
Approach Delay		18.1			42.1			46.3			29.6	
Approach LOS		B			D			D			C	
90th %ile Green (s)	60.5	60.5		60.5	60.5			20.5	20.5	20.5	20.5	20.5
90th %ile Term Code	Max	Max		Max	Max			MaxR	MaxR	MaxR	MaxR	MaxR
70th %ile Green (s)	60.5	60.5		60.5	60.5			20.5	20.5	20.5	20.5	20.5
70th %ile Term Code	Max	Max		Max	Max			MaxR	MaxR	MaxR	MaxR	MaxR
50th %ile Green (s)	60.5	60.5		60.5	60.5			20.5	20.5	20.5	20.5	20.5
50th %ile Term Code	Max	Max		Max	Max			MaxR	MaxR	MaxR	MaxR	MaxR
30th %ile Green (s)	60.5	60.5		60.5	60.5			20.5	20.5	20.5	20.5	20.5
30th %ile Term Code	Hold	Hold		Max	Max			MaxR	MaxR	MaxR	MaxR	MaxR
10th %ile Green (s)	53.6	53.6		53.6	53.6			20.5	20.5	20.5	20.5	20.5
10th %ile Term Code	Hold	Hold		Gap	Gap			MaxR	MaxR	MaxR	MaxR	MaxR
Stops (vph)	6	1445		18	1620			224	161		73	43
Fuel Used(gal)	0	38		0	31			9	6		2	2
CO Emissions (g/hr)	13	2631		27	2181			615	418		170	107
NOx Emissions (g/hr)	3	512		5	424			120	81		33	21
VOC Emissions (g/hr)	3	610		6	506			142	97		39	25
Dilemma Vehicles (#)	0	108		0	114			0	0		0	0
Queue Length 50th (ft)	2	441		6	515			151	101		46	26
Queue Length 95th (ft)	12	577		34	#794			#286	177		92	60
Internal Link Dist (ft)		1321			545			1544			427	
Turn Bay Length (ft)	150			150				150			50	
Base Capacity (vph)	83	2383		83	2391			339	352		316	362
Starvation Cap Reductn	0	0		0	233			0	0		0	0
Spillback Cap Reductn	0	4		0	0			0	0		0	0
Storage Cap Reductn	0	0		0	0			0	0		0	0
Reduced v/c Ratio	0.16	0.89		0.36	1.04			0.82	0.61		0.31	0.18

Intersection Summary

Area Type:	Other
Cycle Length:	90
Actuated Cycle Length:	88.6
Natural Cycle:	90
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.94
Intersection Signal Delay:	32.0
Intersection Capacity Utilization:	94.2%
Analysis Period (min):	15
90th %ile Actuated Cycle:	90
70th %ile Actuated Cycle:	90
50th %ile Actuated Cycle:	90
30th %ile Actuated Cycle:	90
10th %ile Actuated Cycle:	83.1
#	95th percentile volume exceeds capacity, queue may be longer.
	Queue shown is maximum after two cycles.

Lanes, Volumes, Timings
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Splits and Phases: 13: Boundary St & Marsh Rd



Lanes, Volumes, Timings
Boundary Street Study

New Network Signals Plus 20% Growth and Project Trips
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	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑	↘	↑↑	↗	↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		150	150		0	200
Storage Lanes		1	1		0	1
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50	50	50	50	50	50
Trailing Detector (ft)	0	0	0	0	0	0
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	0.95	1.00	1.00	0.95	0.97	1.00
Ped Bk Factor		0.82			0.72	0.82
Frt		0.850			0.850	
Flt Protected			0.950		0.950	
Satd. Flow (prot)	3539	1583	1770	3539	3433	1583
Flt Permitted			0.114		0.950	
Satd. Flow (perm)	3539	1302	212	3539	2467	1302
Right Turn on Red		No				No
Satd. Flow (RTOR)						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	35			35	30	
Link Distance (ft)	625			1088	1523	
Travel Time (s)	12.2			21.2	34.6	
Volume (vph)	879	675	60	947	734	73
Confl. Peds. (#/hr)		100	100		100	100
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	1147	880	78	1235	957	95
Lane Group Flow (vph)	1147	880	78	1235	957	95
Turn Type		pm+ov	pm+pt			Perm
Protected Phases	4	2	3	8	2	
Permitted Phases		4	8			2
Detector Phases	4	2	3	8	2	2
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0
Total Split (s)	35.0	35.0	20.0	55.0	35.0	35.0
Total Split (%)	38.9%	38.9%	22.2%	61.1%	38.9%	38.9%
Maximum Green (s)	31.0	31.0	16.0	51.0	31.0	31.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag	Lag		Lead			
Lead-Lag Optimize?	Yes		Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	Min	None	None	Min	Min
Walk Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Flash Dont Walk (s)	11.0	11.0	11.0	11.0	11.0	11.0
Pedestrian Calls (#/hr)	100	100	100	100	100	100
Act Effct Green (s)	28.5	56.4	42.4	42.7	27.9	27.9
Actuated g/C Ratio	0.36	0.71	0.52	0.54	0.35	0.35
v/c Ratio	0.90	0.86	0.21	0.65	0.80	0.21
Control Delay	38.1	21.3	10.3	14.6	31.0	22.5

Lanes, Volumes, Timings
Boundary Street Study

New Network Signals Plus 20% Growth and Project Trips
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	→	↘	↙	←	↖	↗
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Queue Delay	0.0	0.0	0.0	0.2	0.3	0.0
Total Delay	38.1	21.3	10.3	14.8	31.3	22.5
LOS	D	C	B	B	C	C
Approach Delay	30.8			14.6	30.5	
Approach LOS	C			B	C	
90th %ile Green (s)	31.0	31.0	16.0	51.0	31.0	31.0
90th %ile Term Code	Max	Max	Ped	Hold	Max	Max
70th %ile Green (s)	31.0	31.0	16.0	51.0	31.0	31.0
70th %ile Term Code	Max	Max	Ped	Hold	Max	Max
50th %ile Green (s)	31.0	31.0	16.0	51.0	31.0	31.0
50th %ile Term Code	Max	Max	Ped	Hold	Max	Max
30th %ile Green (s)	31.0	31.0	16.0	51.0	31.0	31.0
30th %ile Term Code	Max	Max	Ped	Hold	Max	Max
10th %ile Green (s)	15.7	14.1	0.0	15.7	14.1	14.1
10th %ile Term Code	Gap	Gap	Skip	Hold	Gap	Gap
Stops (vph)	881	503	30	717	738	59
Fuel Used (gal)	20	11	1	18	20	2
CO Emissions (g/hr)	1368	766	66	1237	1404	123
NOx Emissions (g/hr)	266	149	13	241	273	24
VOC Emissions (g/hr)	317	177	15	287	325	28
Dilemma Vehicles (#)	65	0	0	67	0	0
Queue Length 50th (ft)	328	248	19	228	252	38
Queue Length 95th (ft)	#465	#524	38	293	328	75
Internal Link Dist (ft)	545			1008	1443	
Turn Bay Length (ft)		150	150			200
Base Capacity (vph)	1388	988	416	2098	1335	506
Starvation Cap Reductn	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	248	73	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.83	0.89	0.19	0.67	0.76	0.19
Intersection Summary						
Area Type:	Other					
Cycle Length:	90					
Actuated Cycle Length:	79.6					
Natural Cycle:	90					
Control Type:	Actuated-Uncoordinated					
Maximum v/c Ratio:	0.90					
Intersection Signal Delay:	25.9			Intersection LOS: C		
Intersection Capacity Utilization:	68.3%			ICU Level of Service C		
Analysis Period (min):	15					
90th %ile Actuated Cycle:	90					
70th %ile Actuated Cycle:	90					
50th %ile Actuated Cycle:	90					
30th %ile Actuated Cycle:	90					
10th %ile Actuated Cycle:	37.8					
# 95th percentile volume exceeds capacity, queue may be longer.						
Queue shown is maximum after two cycles.						

Splits and Phases: 6: Boundary St & Ribaut



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑			↑↑	↑↑	↑↑
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Leading Detector (ft)	50			50	50	
Trailing Detector (ft)	0			0	0	
Turning Speed (mph)		9	15		15	9
Lane Util. Factor	0.95	1.00	1.00	0.95	1.00	1.00
Frt					0.932	
Flt Protected					0.976	
Satd. Flow (prot)	3539	0	0	3539	1694	0
Flt Permitted					0.976	
Satd. Flow (perm)	3539	0	0	3539	1694	0
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)					48	
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Link Speed (mph)	35			35	30	
Link Distance (ft)	770			640	417	
Travel Time (s)	15.0			12.5	9.5	
Volume (vph)	925	0	0	1030	50	50
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	120%	120%	120%	120%	120%	120%
Adj. Flow (vph)	1207	0	0	1343	65	65
Lane Group Flow (vph)	1207	0	0	1343	130	0
Turn Type						
Protected Phases	4			8	2	
Permitted Phases						
Detector Phases	4			8	2	
Minimum Initial (s)	4.0			4.0	4.0	
Minimum Split (s)	20.0			20.0	20.0	
Total Split (s)	30.0	0.0	0.0	30.0	20.0	0.0
Total Split (%)	60.0%	0.0%	0.0%	60.0%	40.0%	0.0%
Maximum Green (s)	26.0			26.0	16.0	
Yellow Time (s)	3.5			3.5	3.5	
All-Red Time (s)	0.5			0.5	0.5	
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0			3.0	3.0	
Recall Mode	None			None	Min	
Walk Time (s)	5.0			5.0	5.0	
Flash Dont Walk (s)	11.0			11.0	11.0	
Pedestrian Calls (#/hr)	0			0	0	
Act Effct Green (s)	20.0			20.0	7.6	
Actuated g/C Ratio	0.56			0.56	0.21	
v/c Ratio	0.61			0.68	0.33	
Control Delay	6.9			7.8	12.0	
Queue Delay	0.0			0.0	0.0	
Total Delay	6.9			7.8	12.0	
LOS	A			A	B	
Approach Delay	6.9			7.8	12.1	

Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Approach LOS	A		A		B	
90th %ile Green (s)	26.0			26.0	10.9	
90th %ile Term Code	Max			Max	Gap	
70th %ile Green (s)	25.9			25.9	8.8	
70th %ile Term Code	Hold			Gap	Gap	
50th %ile Green (s)	20.3			20.3	7.1	
50th %ile Term Code	Hold			Gap	Gap	
30th %ile Green (s)	16.4			16.4	5.9	
30th %ile Term Code	Hold			Gap	Gap	
10th %ile Green (s)	12.9			12.9	5.5	
10th %ile Term Code	Hold			Gap	Gap	
Stops (vph)	608			722	66	
Fuel Used(gal)	12			13	1	
CO Emissions (g/hr)	861			916	73	
NOx Emissions (g/hr)	167			178	14	
VOC Emissions (g/hr)	199			212	17	
Dilemma Vehicles (#)	141			158	0	
Queue Length 50th (ft)	61			72	13	
Queue Length 95th (ft)	130			153	49	
Internal Link Dist (ft)	690			560	337	
Turn Bay Length (ft)						
Base Capacity (vph)	2215			2215	651	
Starvation Cap Reductn	0			0	0	
Spillback Cap Reductn	0			0	0	
Storage Cap Reductn	0			0	0	
Reduced v/c Ratio	0.54			0.61	0.20	

Intersection Summary

Area Type:	Other
Cycle Length:	50
Actuated Cycle Length:	35.9
Natural Cycle:	50
Control Type:	Actuated-Uncoordinated
Maximum v/c Ratio:	0.68
Intersection Signal Delay:	7.6
Intersection LOS:	A
Intersection Capacity Utilization:	47.8%
ICU Level of Service:	A
Analysis Period (min):	15
90th %ile Actuated Cycle:	44.9
70th %ile Actuated Cycle:	42.7
50th %ile Actuated Cycle:	35.4
30th %ile Actuated Cycle:	30.3
10th %ile Actuated Cycle:	26.4

Splits and Phases: 23: Boundary St & Bladen

