Final Report

TRAFFIC SIGNAL TIMING STUDY – Ribaut Road and Boundary Street

SCDOT / Beaufort County

Prepared by:

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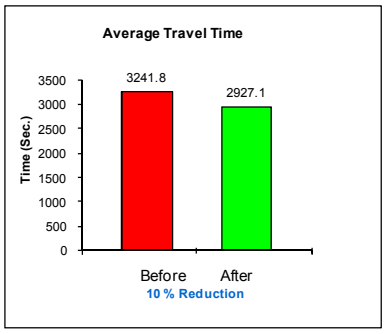
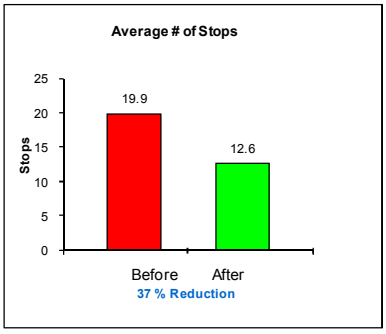
KHA Project Number: 015947012

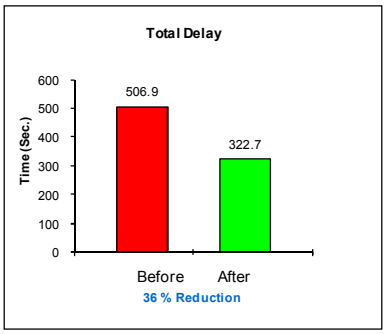
EXECUTIVE SUMMARY

The South Carolina Department of Transportation selected Kimley-Horn and Associates, Inc. (KHA) to optimize and implement new traffic signal timings for the Ribaut Road / Boundary Street system. The project included 15 signals which consisted of, 11 signals along Ribaut Road from Lady's Island Drive to Boundary Street as well as the four signals east of Ribaut Road along Boundary Street to Robert Smalls Parkway (SC 170). The purpose of this study was to improve traffic signal timing along the system, which in turn reduces vehicle emissions, driver delay, and driver stops/starts. The scope of services for this project included data collection, timing plan development, field implementation, development of new and/or updated controller database, a travel time study, and project documentation.

As part of developing and implementing the new signal timing plans, KHA staff performed before and after evaluations. The before and after study included the travel time study, air quality study, and an economic analysis. It should be noted that travel time data was not collected during OFF Peaks, Weekend Peaks or Saturation plans (which are utilized during time periods related to graduation ceremonies at Parris Island) which have also been observed to be operating more efficiently due to implemented timings. The following charts show the average improvements for both north and south directions of travel during the AM, Mid-Day and PM Peak time periods along Ribaut Road / Boundary Street:







Improvements were shown in: travel time, average number of stops, and total delay reductions. Delay incurs direct costs upon motorists in the form of increased fuel consumption and the value of their time wasted while waiting in traffic. Motorists using the corridor during the three peak periods will save 29,400 hours of travel time and 17,640 gallons of gasoline each year because of improved traffic flow due to the new timing plans. Conservatively assuming a vehicle occupancy rate of 1.2, $12.00 per hour for the value of motorists' time and $3.00 per gallon for gasoline, reduced delay of $423,366 and fuel consumption of $52,920 create a total annual savings to motorists on the corridor of $476,287. The improved timing plans has a benefit/cost ratio of 18 : 1. Expressed in another way, the new timing plans pay for themselves approximately every 16 workdays.

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1 INTRODUCTION

South Carolina Department of Transportation selected Kimley-Horn and Associates, Inc. (KHA) to perform traffic signal timing improvements along the Ribaut Road / Boundary Street system. The project lies in northwest Beaufort County. The purpose of this study was to develop and implement multiple optimized signal timing plans for 15 intersections that would improve traffic flow along the study system. Project documentation, to show the results of the study, was also a vital part of the study.

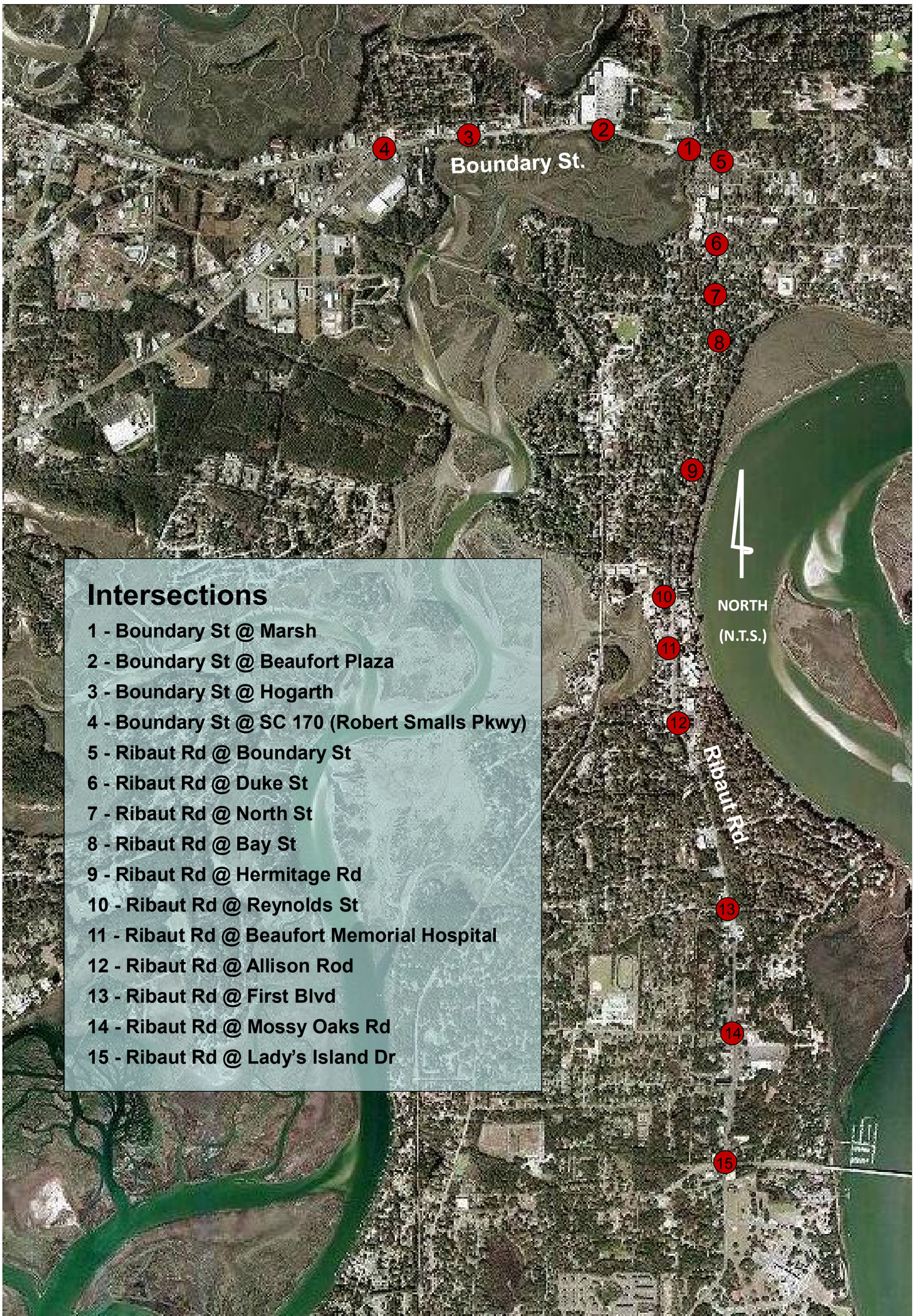
This project includes the following intersections along the Ribaut Road / Boundary Street system:

- Boundary Street @ Marsh
- Boundary Street @ Beaufort Plaza
- Boundary Street @ Hogarth
- Boundary Street @ 170
- Ribaut Road @ Boundary Street
- Ribaut Road @ Duke Street
- Ribaut Road @ North Street
- Ribaut Road @ Bay Street
- Ribaut Road @ Hermitage Road
- Ribaut Road @ Reynolds Street
- Ribaut Road @ Beaufort Memorial Hospital
- Ribaut Road @ Allison Road
- Ribaut Road @ First Boulevard
- Ribaut Road @ Mossy Oaks Road
- Ribaut Road @ Lady's Island Drive

Figure 1 depicts the study corridor and the study intersections.

The primary component of the study was to develop and to field implement optimized traffic signal timings for each intersection. The development of the optimized traffic signal timing plans involved five distinct components – cycle length determination, split allocation, phase sequencing, offset manipulation, and time of day schedule development. These five components were analyzed and developed for each of the 15 intersections and are discussed in the **TIMING PLAN DEVELOPMENT** and **FIELD IMPLEMENTATION** sections of this report.

Finally, the collection of the travel time data and the intersection delay data were tabulated for each of the intersections within the study area. Before and after conditions were determined so that the benefit of the signal timing study could be quantified. Before conditions represent the existing conditions of the intersections and their existing signal timing settings prior to this project, and the after conditions represent the new signal timings developed and implemented in the field. The **BEFORE AND AFTER COMPARISONS** section of this report summarize the methodology used as well as the comparisons of the before and after conditions.



Intersections

1 - Boundary St @ Marsh
2 - Boundary St @ Beaufort Plaza
3 - Boundary St @ Hogarth
4 - Boundary St @ SC 170 (Robert Smalls Pkwy)
5 - Ribaut Rd @ Boundary St
6 - Ribaut Rd @ Duke St
7 - Ribaut Rd @ North St
8 - Ribaut Rd @ Bay St
9 - Ribaut Rd @ Hermitage Rd
10 - Ribaut Rd @ Reynolds St
11 - Ribaut Rd @ Beaufort Memorial Hospital
12 - Ribaut Rd @ Allison Rod
13 - Ribaut Rd @ First Blvd
14 - Ribaut Rd @ Mossy Oaks Rd
15 - Ribaut Rd @ Lady's Island Dr

Kimley-Horn and Associates, Inc.

Traffic Signal Optimization Study for

Ribaut Road / Boundary Street

PROJECT MAP

Figure 1

2 DATA COLLECTION

Data collection efforts for this study included the following:

- Turning Movement Counts (TMC)
- Directional Average Daily Traffic (ADT) tube counts
- Field Inventories
- Field Observations
- Existing Signal Timing Settings
- Travel Time Data (Before and After)

Using the data collected, new timing plans were developed by KHA staff. A total of seven timing plans were developed. These were reviewed and approved by County staff and then were field implemented beginning on February 21, 2011.

Turning Movement Counts

TMC data for this project was supplied to Kimley-Horn by SCDOT. The TMC data was collected during each of the three weekday peak periods covering the hours of 07:00 – 09:00, 11:00 – 13:00, and 14:00 – 18:00. This data was collected on average weekdays with Beaufort County Public Schools in session. This data was compiled and the peak hour within each peak period was identified for each intersection. All TMC data was collected in May, 2010.

ADT Counts

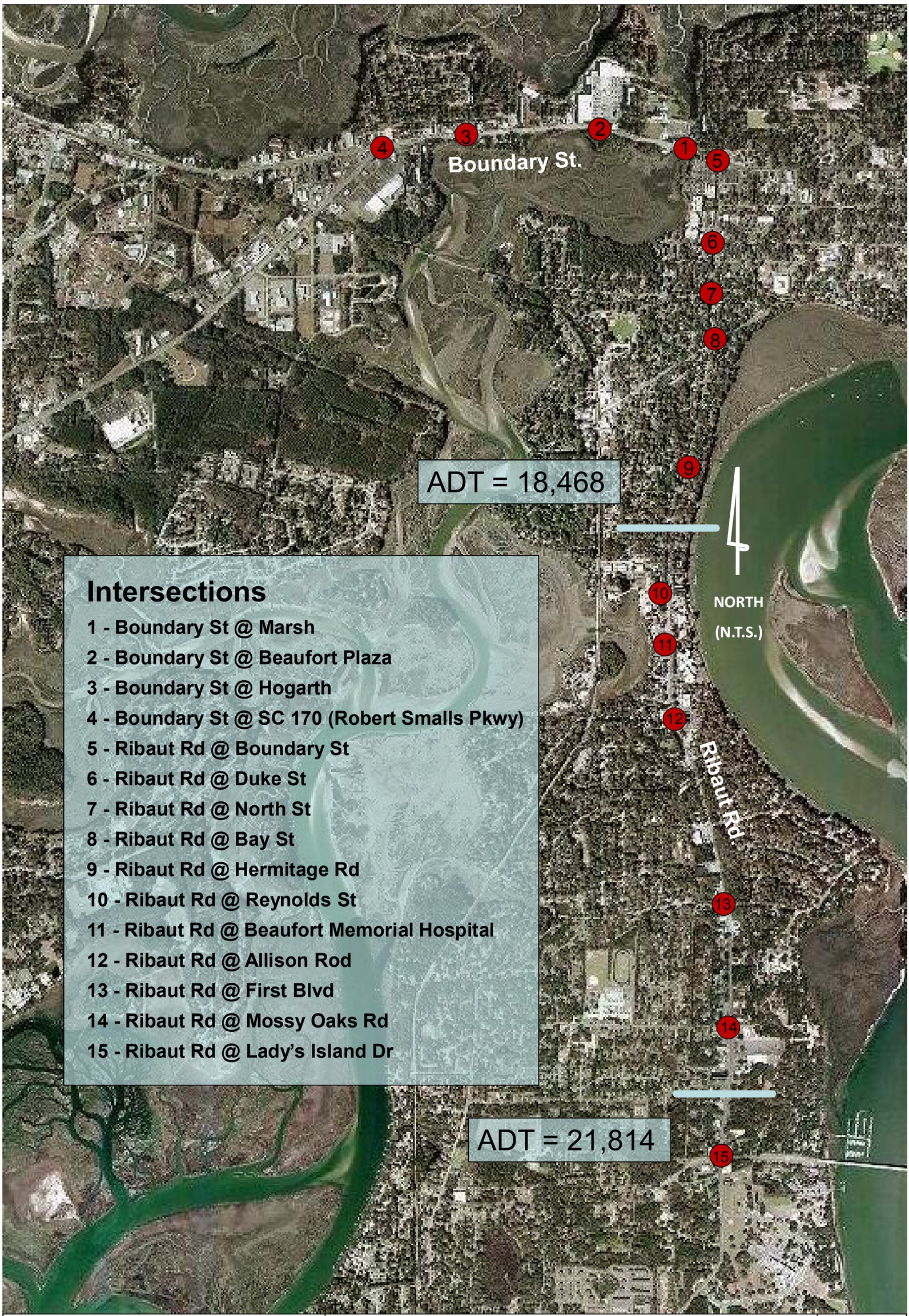
ADT data for this project was supplied to Kimley-Horn by SCDOT. ATD data was collected at two locations for a 48 hour period (Tuesday through Thursday). **Figure 2** shows the location of the ADT tube counts along with the average 24-hour volume collected. This data was collected at mid-block locations.

Field Inventories

The field inventories were performed to collect the geometry of the intersection (including storage bay / taper lengths for auxiliary lanes), record approach grades, confirm signal operations, confirm signal infrastructure, obtain speed limits, and to identify adjacent land uses and physical features. Furthermore, the field inventories were used to observe existing platooning and progression of traffic, observe queuing patterns, monitor traffic flow patterns, and identify any potential atypical lane utilizations.

Existing Signal Timing Settings

Beaufort County staff provided the existing signal timing settings in the form of: *NAZTEC* databases. These databases were used to obtain the pertinent information for each intersection, which was summarized and used to develop the existing conditions model.



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Kimley-Horn and Associates, Inc.

Traffic Signal Optimization Study for

Ribaut Road / Boundary Street

ADT Count Locations

Figure 2

3 EXISTING CONDITIONS

As discussed earlier, there were a number of field observations, traffic counts, signal settings, and miscellaneous data collection efforts undertaken to collect all of the data needed to evaluate the existing conditions. All of this data was compiled in *Synchro/SimTraffic* software, to be used in the analysis.

Existing Signal Operations

Prior to the implementation of the new timings, the 15 signal Ribaut Road / Boundary Street system operated as a coordinated system during certain peak periods throughout the day.

Existing Traffic Flow Patterns

Traffic flow patterns along this corridor are determined from reviewing the turning movement count (TMC) data which were summarized to determine traffic flow patterns. Based upon these volumes, there are slightly distinctive traffic flow patterns during each of the peak periods. During the AM peak period, there is a higher volume of motorists– approximately 55-60 percent of the corridor's total volume– is eastbound on Boundary Street then continuing southbound on Ribaut Road.

Traffic flow is less directional during the MD peak period, with the directional distribution nearly 50 percent in each direction.

For the PM peak period, directional splits are the reverse of those observed during the AM peak. The amount of traffic traveling northbound on Ribaut Road and then westbound on Boundary Street during the PM peak is approximately 55-60 percent of the total traffic on the corridor during that peak.

4 TIMING PLAN DEVELOPMENT

The timing plan development process for each intersection was developed with three key objectives:

1. To progress all through movements on the arterial route
2. To favor progression in the predominant direction
3. To minimize overall system vehicular delay at all signalized intersections

As mentioned in earlier sections, the timing plan development process includes five distinct tasks: cycle length determination, split allocation, offset manipulation, phase sequencing, and time of day clock development. In addition to these five tasks, KHA staff also performed a review of vehicular and pedestrian clearance intervals for each intersection. The following describes the methodology used and the tools utilized in each of the components of the timing plan development process.

Vehicle and Pedestrian Clearance Intervals

As part of this signal timing study, a review of both the vehicle (Yellow and All Red) and pedestrian (WALK, FLASHING DON'T WALK) clearance intervals was performed at each intersection, which was based upon ITE's (Institute of Transportation Engineers) *Manual of Traffic Signal Design, 2nd Edition*. Recommended improvements were presented and discussed with Beaufort County staff. The approved

settings were included by KHA staff and integrated into the local signal controllers as part of the field implementation phase of this project.

Cycle Length Evaluations

Cycle length evaluations were analyzed for the traffic signals along the corridor. The following information was used when determining cycle lengths:

- ADT and TMC count data
- Signal spacing
- Cycle length requirements (minimum and maximum allowable cycle lengths at each intersection)
- Driver expectancy
- Traffic patterns (vehicle platooning)
- Existing features (line of sight, topography, change in arterial cross section)
- *Synchro* coordinatability factors
- Information gathered from the field observations

Time of Day

Time-of-day (TOD) clock settings are used to determine the time frame for each timing plan to be active. TOD clock settings were determined by an analysis of the ADT tube count data in conjunction with the existing TOD clock settings. A TOD clock was established for weekdays, Saturday, and Sunday. The weekday TOD clock settings include AM, MD, PM and OFF peak timing plans. The Saturday TOD clock settings consist of a SAT peak plan. Similarly, the Sunday TOD consists of a separate SUN timing plan. An additional plan was created, to be used during heavy Friday afternoon peaks due to Parris Island graduations. This SATURATION plan can also be called in to handle various unanticipated high volume events. **Table 1** shows TOD clock settings, cycle lengths, and *NAZTEC* plan assignments.

Table 1
Timing Plan Summary

Day	Time Period	Plan		
		Name	Plan Number	Cycle Length
Weekday (M-Th)	0:00 – 06:00	FREE	99	NA
	06:00 – 09:00	AM	2	110
	09:00 – 14:00	MD	3	120
	14:00 – 19:00	PM	6	130
	19:00 – 22:00	OFF	1	90
	22:00 – 0:00	FREE	99	NA
Friday	0:00 – 06:00	FREE	99	NA
	06:00 – 09:00	AM	2	110
	09:00 – 14:30	MD	3	120
	14:30 – 16:00	Saturation	7	160
	16:00 – 19:00	PM	6	130
	19:00 – 22:00	OFF	1	90
	22:00 – 0:00	FREE	99	NA
Saturday	0:00 – 09:00	FREE	99	NA
	09:00 – 18:00	SAT	4	120
	18:00 – 0:00	FREE	99	NA
Sunday	0:00 – 11:00	FREE	99	NA
	11:00 – 18:00	SUN	5	120
	18:00 – 0:00	FREE	99	NA

Split Allocation

Once cycle lengths, zone boundaries, and TOD clock settings were determined, each intersection was evaluated to determine the optimal vehicle split allocations, for each timing plan. Split allocations were determined by using a "uniform arrival approach," which is based upon the Poisson distribution. This methodology calculates mainline left-turn and side street movements based upon the uniform arrival of vehicles. An equal amount of green time is assigned to the first three vehicles in the queue. This is followed by a smaller allocation for the remaining vehicles in the queue, as these vehicles gain momentum, thereby requiring less time to clear the intersection. These values are then tallied with the vehicle clearance intervals and corroborated against the minimum vehicle splits and compared against any pedestrian timing requirements. The chosen splits were then simulated in *SimTraffic* to identify any queuing issues or storage bay spillovers prior to implementation of the timing plans.

Appropriate split determination is important such that mainline coordination improvements are not made at the expense of overall system delay. In essence, proper split allocation is critical to provide sufficient mainline progression, and to provide sufficient split times for all of the remaining intersection movements.

Offset Manipulation

In order to optimize traffic progression along the corridor, the optimal offset at each intersection was determined. The focus on selecting the individual offsets was to maximize the amount of time (greenband width) a platoon of vehicles has to pass through the individual zones without incurring a stop (red indication at a traffic signal). Progression of traffic along the heavier direction of travel was favored based upon the directional distribution of traffic for that time period of the day. Dual progression (equal allotments of greenband widths in both directions) was the goal during the MD, OFF, Saturation, SAT and SUN timing plans.

5 FIELD IMPLEMENTATION

Prior to implementing the newly developed timing plans, KHA staff performed simulations for each timing plan utilizing *SimTraffic*. Progression and platooning of mainline traffic was checked as well as side street and mainline left-turn lane split allocations. The next step was to transfer the timing plan data from *Synchro* into the *NAZTEC* databases. These updated databases were tested by KHA and reviewed and approved by Beaufort County staff. Time-space diagrams were generated using *Synchro* for each timing plan developed. These were instrumental during the field implementation process to give a representation of the timing plans and traffic volumes.

Field implementation began with KHA and Beaufort County staff downloading the new timing plans to the local controllers in the field. Once the data was downloaded and the system was operating with the new timing plans, KHA staff observed the entire corridor during each of the peak periods. All intersections within the system were observed by KHA staff: Monday, February 21, 2011 through Saturday, February 26, 2011. The following items were performed during the field implementation efforts:

- Confirm cycle length and offsets
- Monitor vehicle splits
- Observe progression and platooning of vehicles

- Check for unexpected queuing
- Drive the corridor during each peak period for multiple runs
- Document and relay any changes to Beaufort County staff so that they can be edited and changed during the field implementation process

There were instances during field implementation where offsets, splits, and TOD clock settings were adjusted in order to better accommodate the actual field conditions observed during the field implementation process. These changes were made during fine tuning, observed in the field and updated to the database.

6 BEFORE AND AFTER COMPARISONS

In order to effectively determine whether or not the development and implementation of the new coordinated timing plans were successful, a before and after travel time study was performed. This study provides data that allows for analyses to determine the effectiveness of the new signal timing plans. It is important to note that this study gives "real – world" data and not the output from a model or simulation. It should also be noted that the travel time data was not collected during the weekend or Holiday peak periods.

The data was collected using a GPS antennae connected to a notebook computer, which recorded data points once per second using the Jamar *GPS2LT* data collection software. The floating car method was utilized, by which the data collection vehicle travels with the flow of traffic along the corridor. The data collected was compiled and analyzed using Jamar's *PC-Travel for Windows 1.7.10.*

Date and Time of Studies

All field studies were conducted on non-holiday weekdays omitting Monday and Friday peak periods, in order to observe typical, repeatable traffic patterns. The "before" studies were conducted on the 12th of December in 2010 and the "after" studies were conducted on the 1st of March in 2011. The a.m. peak studies were conducted between 6:00 a.m. and 9:00 a.m., mid-day peak studies were conducted between 11:00 a.m. and 1:00 p.m., and p.m. peak studies were conducted between 3:00 p.m. and 6:00 p.m.

Table 2 shows the results of the travel time study for the Ribaut Road / Boundary Street System, for the AM, MD, and PM peak periods. The data includes the total average travel time in seconds, the average number of stops (being defined as the number of instances that speed drops below five mph), the average speed in mph, and the average total delay (amount of time spent when speed was less than five mph). The percent change is also shown for each criteria mentioned.

The results of the travel time study indicate that significant improvements were realized as a result of the newly implemented signal timing plans. These improvements can be directly attributed to the signal timing, such that any other variable that might affect the travel times did not significantly change from before conditions when compared to the after conditions. For example, the traffic volumes and patterns were the same, the network geometry was the same, the data collection method was the same, and the data was collected during similar time periods.

Table 2
Ribaut Road / Boundary Street
Travel Time Study Results

	AM Peak EASTBOUND / SOUTHBOUND				AM Peak NORTHBOUND / WESTBOUND			
	Travel Time	No. of Stops	Avg. Speed	*Total Delay*	Travel Time	No. of Stops	Avg. Speed	*Total Delay*
Before	546.9	4.0	27.9	*92.0*	499.7	2.7	30.2	*67.8*
After	460.7	1.6	33.1	*30.4*	468.1	1.6	32.2	*58.7*
Difference	86.2	2.4	5.2	*61.6*	31.6	1.1	2.0	*9.1*
% Change	**16%**	**60%**	**19%**	***67%***	**6%**	**41%**	**7%**	***13%***
	MD Peak EASTBOUND / SOUTHBOUND				**MD Peak NORTHBOUND / WESTBOUND**			
	Travel Time	No. of Stops	Avg. Speed	*Total Delay*	Travel Time	No. of Stops	Avg. Speed	*Total Delay*
Before	542.5	3.0	28.1	*75.8*	536.8	3.3	28.1	*78.8*
After	488.8	2.0	31.2	*49.2*	465.8	2.2	32.4	*36.2*
Difference	53.7	1.0	3.1	*26.6*	71	1.1	4.3	*42.6*
% Change	**10%**	**33%**	**11%**	***35%***	**13%**	**33%**	**15%**	***54%***
	PM Peak EASTBOUND / SOUTHBOUND				**PM Peak NORTHBOUND / WESTBOUND**			
	Travel Time	No. of Stops	Avg. Speed	*Total Delay*	Travel Time	No. of Stops	Avg. Speed	*Total Delay*
Before	548.3	3.9	27.8	*84.9*	567.6	3.0	26.6	*107.6*
After	501.0	2.3	30.4	*50.9*	542.7	2.9	27.8	*97.3*
Difference	47.3	1.6	2.6	*34*	24.9	0.1	1.2	*10.3*
% Change	**9%**	**41%**	**9%**	***40%***	**4%**	**3%**	**5%**	***10%***

Air Quality Analysis

An air quality analysis was completed to assess the changes in pollutant emissions from vehicles on the corridor that have resulted from implementation of the new coordinated timing plans.

Ozone is a colorless gas associated with smog conditions formed through a complex photochemical reaction in the atmosphere involving volatile organic compounds (VOCs) and nitrogen oxides (NO_x) both of which are emitted by vehicles. As a result, reductions in VOC and NO_x emissions are necessary in nonattainment areas to reduce ozone concentrations. Carbon monoxide (CO) is a colorless, odorless gas resulting from the incomplete combustion of fuel. CO concentrations are often high near congested roadway intersections where vehicular traffic can cause or contribute to increased CO emissions. The mobile source pollutants of greatest concern are the ozone precursors VOC and NO_x. As a result, the emissions analysis quantifies the expected changes in the mobile source pollutants VOC and NO_x, as well as CO for these corridors.

In computing pollutant emissions for the corridor, Jamar's *PC-Travel for Windows 1.7.10* was utilized. This software was used to analyze and compile the travel time runs. Also, the software was able to compute the before and after air quality data, including VOC, NO_x, and CO.

The *PC-Travel* software package does not collect actual vehicle emissions. Rather, it utilizes collected data and algorithms to calculate theoretical increases and reductions in emissions. These results can often be slightly volatile when looking at a specific set of inputs. For the Ribaut Road / Boundary Street system, these results show a slightly increased level of emissions overall with the implemented timings in place. With the overall improvements in measured travel time, delay and stops, the theoretical minimal increases in emissions are not of concern. The results of the emissions analysis for the Ribaut Road / Boundary Street system are shown in **Table 3**.

Table 3
Ribaut Road / Boundary Street
Emissions Study Results

	AM Peak EASTBOUND / SOUTHBOUND			AM Peak NORTHBOUND / WESTBOUND		
	VOC (g)	CO (g)	NO_x (g)	VOC (g)	CO (g)	NO_x (g)
Before	18.9952	188.3936	10.3475	16.9158	173.4497	8.8089
After	16.7637	179.7208	9.3175	16.2833	178.7599	8.5689
Difference	2.2315	8.6727	1.0300	0.6326	-5.3102	0.2400
% Change	**12%**	**5%**	**10%**	**4%**	**-3%**	**3%**
	MD Peak EASTBOUND / SOUTHBOUND			**MD Peak NORTHBOUND / WESTBOUND**		
	VOC (g)	CO (g)	NO_x (g)	VOC (g)	CO (g)	NO_x (g)
Before	18.1367	176.8603	9.6047	18.7389	183.3652	10.3362
After	18.0450	192.5593	10.2456	18.2150	195.0411	10.7907
Difference	0.0917	-15.6990	-0.6409	0.5238	-11.6759	-0.4545
% Change	**1%**	**-9%**	**-7%**	**3%**	**-6%**	**-4%**
	PM Peak EASTBOUND / SOUTHBOUND			**PM Peak NORTHBOUND / WESTBOUND**		
	VOC (g)	CO (g)	NO_x (g)	VOC (g)	CO (g)	NO_x (g)
Before	18.4577	177.3726	9.847	18.4641	180.1450	9.4505
After	18.0369	185.5937	10.1214	18.9632	193.5432	10.3391
Difference	0.4208	-8.2211	-0.2267	-0.4992	-13.3982	-0.8886
% Change	**2%**	**-5%**	**-2%**	**-3%**	**-7%**	**-9%**

Economic Evaluation

The economic benefits from implementing new signal timing plans along a corridor are multifaceted. One of the primary sources of the economic benefit is due to the reduced road user cost that results from the reduced delay experienced by the motoring public. Other economic benefits are realized from reduced air pollutants and reduced fuel consumption.

By realizing improvements to delay experienced by the motoring public, an economic evaluation may be made to determine the benefit of the improved signal timing plans in terms of annual dollar value. To calculate the cost savings resulting in the reduction of delay by the motoring public, a dollar value must be assigned to the delay.

For the purpose of this study, the cost of delay was assumed to be $12.00 per person/hour. Average vehicle occupancy was assumed to be 1.2. Over the past twelve months, gas prices in the State of South Carolina have ranged from $2.67 to $3.51 a gallon. To be conservative a value of $3.00 a gallon was used in calculating the cost of gas. By using the total delay data obtained from the travel time study, and the above mentioned value of time figures, calculations may be made to find an annual benefit (or cost) of the improved signal timing plans. To perform this calculation, the following equation is used:

$S = R \times V \times D \times O \times C$

Where:

S = Dollars saved
R = Travel time reduction
V = Volume
D = Days timing is in effect
O = Average vehicle occupancy
C = Cost of delay per person

The change in delay is expressed in seconds per vehicle, and is a direct output of the travel time study. The total two hour peak volume for the AM, MD and PM peak periods are collected at every ADT count location. Then, all of the count locations are averaged for that time period. These six hours of the day are considered in the economic analysis. There are 250 peak periods annually. This is determined from the number of weekdays in one year, accounting for holidays.

The annual delay benefit is calculated for each peak period direction of travel (eg: AM peak, (EB)) using the above process. For a one year period, the total benefit realized due to reduced delay to the motoring public is **$476,287**. However, newly implemented signal timing plans will be used, and prove to be beneficial, for a time period longer than one year. Typically the useful life for signal timing plans is believed to be three years. An *ITE Journal* article[1] states, "At a minimum, an operating agency should budget to retime traffic signals at least every three years." Therefore, the overall benefit of delay reduction over three years would be **$1,428,861**. **Appendix B** shows the calculations for the economic analysis. It is important to note that the figures presented here for savings due to delay only take into account the AM, MD and PM peak periods (representing six hours of the day). Delay savings are also realized for portions of the other 18 hours a day, which is not included in the calculations.

[1] Srinivasa Sunkari, PE, "The Benefits of Retiming Traffic Signals," ITE Journal April 2004: 26 – 29.

The cost associated with the improved signal timing plans is simply the fee of the consultant. The total contract value for the signal timing portion of the project is **$78,122.**

Therefore, the one year benefit to cost ratio for this corridor is **6 : 1**. The three year benefit to cost ratio for this corridor is **18 : 1**. **Table 4** presents a summary of the economic analysis for this corridor. As shown, the benefits greatly outweigh the cost for this project.

Table 4
Economic Analysis Results
East-West Park Place Boulevard / Rockbridge Road

Time Frame	**Benefit**	**Cost**	**B:C Ratio**
1 Year	$ 476,287	$ 78,122	**6 : 1**
3 Years	$ 1,428,861	$ 78,122	**18 : 1**

7 RECOMMENDATIONS

The implemented timings provide significant benefits to the driving public. However, there are additional items that need to be documented to ensure that the benefit is continued. These recommendations are as follows:

- Phase 2 Traffic Responsive Implementation – Detector location plans, as well as (TR) Traffic Responsive timing parameters are being prepared in order to be implemented along Ribaut Road as well as Boundary Street. Once implemented, the TR parameters will run in the background of the controllers, allowing data collection and tweaking of the system with no adverse effects on actual traffic. After reviewing the TR background data, the TR parameters will be implemented, allowing the system to automatically respond to changes in traffic patterns.

- The exclusive pedestrian phases at the adjacent intersections of Ribaut @ Memorial Hospital and Ribaut @ Allison can cause issues for progression along Ribaut Road. Signs to direct pedestrian traffic to only use the crossing at the Hospital during peak time periods would help in reducing the delay imposed on traffic when both pedestrian phases are initiated frequently.

- Overhead signage reinforcing the fact that left turns onto Boundary Street from Ribaut Road can be made from both northbound lanes would reduce the lane utilization imbalance and therefore reduce overall delay.

APPENDIX A

Before and After Travel Time Data

PC-Travel Reports for study: Ribaut Rd NB AM

Kimley-Horn
and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB AM**
Study Date **: 3/3/2011**
Page No. **: 2**

Study Summary

Runs Used in This Study

Run Title	Start Date	Start Time	Length	Before/ After	Run Type
Ribaut Rd AM After-NB-001	03/01/11	06:41	22580	After	Secondary
Ribaut Rd AM After-NB-002	03/01/11	07:00	22573	After	Secondary
Ribaut Rd AM After-NB-003	03/01/11	07:23	22540	After	Secondary
Ribaut Rd AM After-NB-004	03/01/11	07:40	22551	After	Secondary
Ribaut Rd AM After-NB-005	03/01/11	08:19	22545	After	Secondary
Ribaut Rd AM After-NB-006	03/01/11	08:39	22522	After	Secondary
Ribaut Rd AM After-NB-007	03/01/11	08:58	22500	After	Secondary
Ribaut Rd AM Before-NB-003	12/08/10	07:09	22277	Before	Secondary
Ribaut Rd AM Before-NB-004	12/08/10	07:39	22402	Before	Secondary
Ribaut Rd AM Before-NB-005	12/08/10	08:00	22295	Before	Secondary
Ribaut Rd AM Before-NB-006	12/08/10	08:24	22227	Before	Secondary
Ribaut Rd AM Before-NB-007	12/08/10	08:44	22205	Before	Secondary
Ribaut Rd AM Before-NB-008	12/08/10	09:07	22265	Before	Secondary

Node Info

#	Len	Name
1	0	Ladys Island
2	2240	Mossy Oaks
3	1947	First
4	3159	Allison
5	687	Hospital
6	1509	Reynolds
7	1955	Hermitage
8	1978	Bay
9	728	North
10	898	Duke
11	1357	Ribaut
12	559	Marsh
13	1390	Beaufort Plaza
14	2315	Hogarth
15	1410	SC 170

Length of Study Route = 22,132 feet

Notes:

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB AM**
Study Date **: 3/3/2011**
Page No. **: 3**

Overall Output Statistics

Node #	Length	Node Name		Travel Time	# of Stops	Avg Speed	Total Delay	Time <= 0 MPH	Time <= 35 MPH	Time <= 55 MPH
1	0	Ladys Island								
2	2240	Mossy Oaks	**Before**	52.0	0.3	29.4	4.3	0.5	29.5	52.0
			After	43.9	0.0	34.8	0.0	0.0	15.9	43.9
			Change	-8.1	-0.3	5.5	-4.3	-0.5	-13.6	-8.1
3	1947	First	**Before**	35.5	0.0	37.4	0.0	0.0	6.2	35.5
			After	33.1	0.0	40.1	0.0	0.0	1.9	33.1
			Change	-2.4	0.0	2.7	0.0	0.0	-4.3	-2.4
4	3159	Allison	**Before**	58.7	0.2	36.7	0.2	0.0	8.0	58.7
			After	56.7	0.1	38.0	1.0	1.0	8.9	56.7
			Change	-2.0	0.0	1.3	0.8	1.0	0.9	-2.0
5	687	Hospital	**Before**	13.8	0.0	33.9	0.3	0.0	6.7	13.8
			After	13.7	0.0	34.2	0.1	0.0	6.3	13.7
			Change	-0.1	0.0	0.3	-0.2	0.0	-0.4	-0.1
6	1509	Reynolds	**Before**	37.3	0.3	27.6	7.2	2.2	21.8	37.3
			After	35.3	0.1	29.2	5.0	3.7	18.9	35.3
			Change	-2.0	-0.2	1.6	-2.2	1.5	-3.0	-2.0
7	1955	Hermitage	**Before**	37.0	0.0	36.0	0.0	0.0	12.5	37.0
			After	34.0	0.0	39.2	0.0	0.0	2.4	34.0
			Change	-3.0	0.0	3.2	0.0	0.0	-10.1	-3.0
8	1978	Bay	**Before**	40.3	0.2	33.4	1.7	0.3	13.0	40.3
			After	35.4	0.0	38.1	0.0	0.0	6.9	35.4
			Change	-4.9	-0.2	4.6	-1.7	-0.3	-6.1	-4.9
9	728	North	**Before**	25.8	0.5	19.2	10.7	4.8	21.2	25.8
			After	19.0	0.3	26.1	4.9	0.9	12.0	19.0
			Change	-6.8	-0.2	6.9	-5.8	-4.0	-9.2	-6.8
10	898	Duke	**Before**	19.2	0.0	31.9	0.2	0.0	13.2	19.2
			After	31.9	0.4	19.2	13.0	8.1	25.0	31.9
			Change	12.7	0.4	-12.7	12.8	8.1	11.8	12.7
11	1357	Ribaut	**Before**	33.2	0.2	27.9	4.0	0.3	27.2	33.2
			After	33.3	0.1	27.8	4.6	1.7	26.9	33.3
			Change	0.1	0.0	-0.1	0.6	1.4	-0.3	0.1
12	559	Marsh	**Before**	44.8	0.5	8.5	31.5	23.8	44.8	44.8
			After	43.3	0.4	8.8	30.1	22.3	42.7	43.3
			Change	-1.5	-0.1	0.3	-1.4	-1.5	-2.1	-1.5
13	1390	Beaufort Plaza	**Before**	35.8	0.3	26.4	7.8	5.2	22.3	35.8
			After	25.3	0.0	37.5	0.0	0.0	4.9	25.3
			Change	-10.5	-0.3	11.0	-7.8	-5.2	-17.5	-10.5
14	2315	Hogarth	**Before**	41.8	0.2	37.7	0.0	0.0	3.7	41.8
			After	39.1	0.0	40.3	0.0	0.0	0.3	39.1
			Change	-2.7	-0.2	2.6	0.0	0.0	-3.4	-2.7
15	1410	SC 170	**Before**	24.3	0.0	39.5	0.0	0.0	2.3	24.3
			After	24.1	0.0	39.8	0.0	0.0	2.6	24.1
			Change	-0.2	0.0	0.3	0.0	0.0	0.2	-0.2
Totals	**22,132**		**Before**	**499.7**	**2.7**	**30.2**	**67.8**	**37.2**	**232.3**	**499.7**
			After	**468.1**	**1.6**	**32.2**	**58.7**	**37.7**	**175.3**	**468.1**
			Change	**-31.5**	**-1.1**	**2.0**	**-9.1**	**0.5**	**-57.0**	**-31.5**

Stats based on 6 BEFORE runs & 7 AFTER runs.
Stops based on a Stop Speed of 5 MPH.
Total Delay based on a Normal Speed of 30 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB AM**
Study Date **: 3/3/2011**
Page No. **: 4**

Fuel Consumption & Emissions

Node #	Length	Node Name		Fuel (gal)	HC (grams)	CO (grams)	NOx (grams)
1	0	Ladys Island					
2	2240	Mossy Oaks	**Before**	0.0222	2.1379	20.8289	1.3431
			After	0.0207	2.0211	22.5097	1.3075
			Change	-0.0014	-0.1168	1.6808	-0.0357
3	1947	First	**Before**	0.0160	1.2951	14.8601	0.6821
			After	0.0158	1.2129	14.7153	0.6315
			Change	-0.0002	-0.0821	-0.1448	-0.0506
4	3159	Allison	**Before**	0.0248	1.6231	18.3234	0.6128
			After	0.0251	1.6660	19.4957	0.6938
			Change	0.0003	0.0429	1.1723	0.0810
5	687	Hospital	**Before**	0.0058	0.4796	4.9777	0.2553
			After	0.0055	0.4376	4.6979	0.2176
			Change	-0.0002	-0.0420	-0.2798	-0.0377
6	1509	Reynolds	**Before**	0.0146	1.2975	12.6276	0.7121
			After	0.0139	1.2393	13.0006	0.6761
			Change	-0.0007	-0.0582	0.3729	-0.0359
7	1955	Hermitage	**Before**	0.0156	1.1751	13.7751	0.5368
			After	0.0166	1.4308	17.9199	0.8293
			Change	0.0010	0.2556	4.1448	0.2925
8	1978	Bay	**Before**	0.0171	1.3768	14.6809	0.7189
			After	0.0151	0.9671	11.4306	0.3573
			Change	-0.0020	-0.4097	-3.2504	-0.3616
9	728	North	**Before**	0.0093	0.9099	7.2302	0.5385
			After	0.0069	0.5929	5.0486	0.3103
			Change	-0.0023	-0.3170	-2.1816	-0.2281
10	898	Duke	**Before**	0.0073	0.5910	6.0106	0.2810
			After	0.0107	1.0215	8.6192	0.5480
			Change	0.0034	0.4305	2.6085	0.2670
11	1357	Ribaut	**Before**	0.0128	1.1133	10.4133	0.6083
			After	0.0119	1.0613	10.3595	0.5457
			Change	-0.0009	-0.0520	-0.0538	-0.0625
12	559	Marsh	**Before**	0.0131	1.5118	12.7233	0.8306
			After	0.0117	1.2939	10.1527	0.6508
			Change	-0.0014	-0.2180	-2.5706	-0.1798
13	1390	Beaufort Plaza	**Before**	0.0145	1.3848	13.9103	0.8161
			After	0.0130	1.3399	16.0228	0.9090
			Change	-0.0016	-0.0449	2.1125	0.0929
14	2315	Hogarth	**Before**	0.0194	1.4005	15.8380	0.6778
			After	0.0183	1.2789	15.8753	0.5849
			Change	-0.0011	-0.1216	0.0374	-0.0929
15	1410	SC 170	**Before**	0.0105	0.6193	7.2502	0.1957
			After	0.0108	0.7200	8.9122	0.3070
			Change	0.0003	0.1007	1.6620	0.1114
Totals	**22,132**		**Before**	**0.2031**	**16.9158**	**173.4497**	**8.8089**
			After	**0.1960**	**16.2833**	**178.7599**	**8.5689**
			Change	**-0.0070**	**-0.6326**	**5.3102**	**-0.2400**

Stats based on 6 BEFORE runs & 7 AFTER runs.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB AM**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Travel Time (sec) by Section

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
			Ribaut Rd AM After-NB-001	Ribaut Rd AM After-NB-002	Ribaut Rd AM After-NB-003	Ribaut Rd AM After-NB-004	Ribaut Rd AM After-NB-005	Ribaut Rd AM After-NB-006	Ribaut Rd AM After-NB-007	Ribaut Rd AM Before-N
1	0	Ladys Island								
2	2240	Mossy Oaks	41	45	42	49	45	44	41	63
3	1947	First	31	32	33	38	34	33	31	39
4	3159	Allison	49	56	53	56	79	55	49	59
5	687	Hospital	12	15	13	14	17	13	12	13
6	1509	Reynolds	25	34	28	29	70	34	27	29
7	1955	Hermitage	31	36	34	33	34	37	33	40
8	1978	Bay	34	34	34	38	40	33	35	37
9	728	North	12	13	12	16	40	12	28	39
10	898	Duke	17	17	57	55	42	16	19	20
11	1357	Ribaut	54	26	26	27	33	39	28	27
12	559	Marsh	24	41	13	84	17	20	104	15
13	1390	Beaufort Plaza	27	26	25	25	24	24	26	26
14	2315	Hogarth	38	42	39	38	37	39	41	39
15	1410	SC 170	25	26	24	22	23	25	24	25
Totals	**22132**		**420**	**443**	**433**	**524**	**535**	**424**	**498**	**471**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB AM**
Study Date **: 3/3/2011**
Page No. **: 6**

Detailed Statistics By Run

Travel Time (sec) by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13
			Ribaut Rd AM Before-NB-004	Ribaut Rd AM Before-NB-005	Ribaut Rd AM Before-NB-006	Ribaut Rd AM Before-NB-007	Ribaut Rd AM Before-NB-008
1	0	Ladys Island					
2	2240	Mossy Oaks	45	67	45	46	46
3	1947	First	35	38	34	34	33
4	3159	Allison	56	54	73	56	54
5	687	Hospital	12	13	18	14	13
6	1509	Reynolds	28	26	29	63	49
7	1955	Hermitage	34	38	34	37	39
8	1978	Bay	38	56	35	36	40
9	728	North	36	14	13	40	13
10	898	Duke	20	17	18	22	18
11	1357	Ribaut	29	33	26	38	46
12	559	Marsh	16	54	94	76	14
13	1390	Beaufort Plaza	27	50	25	61	26
14	2315	Hogarth	40	40	40	53	39
15	1410	SC 170	25	22	23	23	28
Totals	**22132**		**441**	**522**	**507**	**599**	**458**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB AM**
Study Date **: 3/3/2011**
Page No. **: 7**

Detailed Statistics By Run

Number of Stops by Section

Ribaut Rd AM After-NB-001
Ribaut Rd AM After-NB-002
Ribaut Rd AM After-NB-003
Ribaut Rd AM After-NB-004
Ribaut Rd AM After-NB-005
Ribaut Rd AM After-NB-006
Ribaut Rd AM After-NB-007
Ribaut Rd AM Before-N

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
1	0	Ladys Island								
2	2240	Mossy Oaks	0	0	0	0	0	0	0	1
3	1947	First	0	0	0	0	0	0	0	0
4	3159	Allison	0	0	0	0	1	0	0	0
5	687	Hospital	0	0	0	0	0	0	0	0
6	1509	Reynolds	0	0	0	0	1	0	0	0
7	1955	Hermitage	0	0	0	0	0	0	0	0
8	1978	Bay	0	0	0	0	0	0	0	0
9	728	North	0	0	0	0	1	0	1	1
10	898	Duke	0	0	1	1	1	0	0	0
11	1357	Ribaut	1	0	0	0	0	0	0	0
12	559	Marsh	0	1	0	1	0	0	1	0
13	1390	Beaufort Plaza	0	0	0	0	0	0	0	0
14	2315	Hogarth	0	0	0	0	0	0	0	0
15	1410	SC 170	0	0	0	0	0	0	0	0
Totals	**22132**		**1**	**1**	**1**	**2**	**4**	**0**	**2**	**2**

Stops based on a Stop Speed of 5 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB AM**
Study Date **: 3/3/2011**
Page No. **: 8**

Detailed Statistics By Run

Number of Stops by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13
			Ribaut Rd AM Before-NB-004	Ribaut Rd AM Before-NB-005	Ribaut Rd AM Before-NB-006	Ribaut Rd AM Before-NB-007	Ribaut Rd AM Before-NB-008
1	0	Ladys Island					
2	2240	Mossy Oaks	0	1	0	0	0
3	1947	First	0	0	0	0	0
4	3159	Allison	0	0	1	0	0
5	687	Hospital	0	0	0	0	0
6	1509	Reynolds	0	0	0	1	1
7	1955	Hermitage	0	0	0	0	0
8	1978	Bay	0	1	0	0	0
9	728	North	1	0	0	1	0
10	898	Duke	0	0	0	0	0
11	1357	Ribaut	0	0	0	0	1
12	559	Marsh	0	1	1	1	0
13	1390	Beaufort Plaza	0	1	0	1	0
14	2315	Hogarth	0	0	0	1	0
15	1410	SC 170	0	0	0	0	0
Totals	**22132**		**1**	**4**	**2**	**5**	**2**

Stops based on a Stop Speed of 5 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB AM**
Study Date **: 3/3/2011**
Page No. **: 9**

Detailed Statistics By Run

Average Speed (MPH) by Section

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
			Ribaut Rd AM After-NB-001	Ribaut Rd AM After-NB-002	Ribaut Rd AM After-NB-003	Ribaut Rd AM After-NB-004	Ribaut Rd AM After-NB-005	Ribaut Rd AM After-NB-006	Ribaut Rd AM After-NB-007	Ribaut Rd AM Before-N
1	0	Ladys Island								
2	2240	Mossy Oaks	38.1	34.4	36.9	31.6	34.2	35.2	38.3	24.5
3	1947	First	42.8	41.5	40.5	35.2	38.9	40.5	41.8	33.8
4	3159	Allison	43.5	38.6	40.5	38.4	27.2	39.0	44.1	36.8
5	687	Hospital	40.4	30.1	36.8	33.1	27.3	37.4	39.3	34.1
6	1509	Reynolds	41.6	30.2	36.6	35.9	14.9	29.4	38.6	35.5
7	1955	Hermitage	42.8	37.3	39.2	39.6	39.5	36.6	40.8	33.4
8	1978	Bay	39.8	39.8	40.3	36.1	33.4	41.3	38.2	36.8
9	728	North	39.9	38.2	40.1	30.5	12.4	40.8	17.9	12.7
10	898	Duke	37.7	37.8	10.7	11.2	14.9	37.2	32.5	30.5
11	1357	Ribaut	16.6	34.4	35.8	34.9	28.0	24.2	32.2	34.8
12	559	Marsh	16.0	9.8	29.2	4.3	22.9	19.2	3.7	24.5
13	1390	Beaufort Plaza	35.1	35.8	38.8	37.8	39.4	39.3	36.8	36.4
14	2315	Hogarth	41.4	37.6	40.1	42.3	42.9	40.7	38.4	40.4
15	1410	SC 170	39.0	37.0	39.7	42.5	40.9	38.4	40.0	39.5
Totals	**22132**		**36.0**	**34.1**	**34.9**	**28.8**	**28.2**	**35.7**	**30.4**	**32.1**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB AM**
Study Date **: 3/3/2011**
Page No. **: 10**

Detailed Statistics By Run

Average Speed (MPH) by Section

Ribaut Rd AM Before-NB-004
Ribaut Rd AM Before-NB-005
Ribaut Rd AM Before-NB-006
Ribaut Rd AM Before-NB-007
Ribaut Rd AM Before-NB-008

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13
1	0	Ladys Island					
2	2240	Mossy Oaks	34.4	23.1	34.6	33.7	33.4
3	1947	First	38.3	35.4	38.5	38.7	40.1
4	3159	Allison	38.6	39.6	29.5	38.8	40.1
5	687	Hospital	38.2	37.1	26.8	32.9	36.8
6	1509	Reynolds	36.7	38.8	35.2	16.2	20.8
7	1955	Hermitage	39.4	35.2	40.1	36.4	34.5
8	1978	Bay	35.6	24.4	38.3	37.1	34.1
9	728	North	14.0	34.8	36.9	12.4	37.3
10	898	Duke	30.3	35.9	35.4	28.0	33.4
11	1357	Ribaut	32.2	27.8	35.1	24.4	20.3
12	559	Marsh	23.5	7.5	4.0	5.3	26.3
13	1390	Beaufort Plaza	35.3	18.5	38.5	15.2	37.7
14	2315	Hogarth	39.9	40.4	39.9	30.4	39.9
15	1410	SC 170	38.0	43.3	41.3	40.7	34.1
Totals	**22132**		**34.3**	**29.0**	**29.9**	**25.2**	**33.0**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB AM**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Total Delay (sec) by Section

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
			Ribaut Rd AM After-NB-001	Ribaut Rd AM After-NB-002	Ribaut Rd AM After-NB-003	Ribaut Rd AM After-NB-004	Ribaut Rd AM After-NB-005	Ribaut Rd AM After-NB-006	Ribaut Rd AM After-NB-007	Ribaut Rd AM Before-N
1	0	Ladys Island								
2	2240	Mossy Oaks	0	0	0	0	0	0	0	11
3	1947	First	0	0	0	0	0	0	0	0
4	3159	Allison	0	0	0	0	7	0	0	0
5	687	Hospital	0	0	0	0	1	0	0	0
6	1509	Reynolds	0	0	0	0	35	0	0	0
7	1955	Hermitage	0	0	0	0	0	0	0	0
8	1978	Bay	0	0	0	0	0	0	0	0
9	728	North	0	0	0	0	23	0	11	22
10	898	Duke	0	0	36	34	21	0	0	0
11	1357	Ribaut	23	0	0	0	2	7	0	0
12	559	Marsh	11	27	0	71	4	7	91	2
13	1390	Beaufort Plaza	0	0	0	0	0	0	0	0
14	2315	Hogarth	0	0	0	0	0	0	0	0
15	1410	SC 170	0	0	0	0	0	0	0	0
Totals	**22132**		**34**	**27**	**36**	**105**	**93**	**14**	**102**	**35**

Total Delay based on a Normal Speed of 30 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB AM**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Total Delay (sec) by Section

Ribaut Rd AM Before-NB-004
Ribaut Rd AM Before-NB-005
Ribaut Rd AM Before-NB-006
Ribaut Rd AM Before-NB-007
Ribaut Rd AM Before-NB-008

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13
1	0	Ladys Island					
2	2240	Mossy Oaks	0	15	0	0	0
3	1947	First	0	0	0	0	0
4	3159	Allison	0	0	1	0	0
5	687	Hospital	0	0	2	0	0
6	1509	Reynolds	0	0	0	29	14
7	1955	Hermitage	0	0	0	0	0
8	1978	Bay	0	10	0	0	0
9	728	North	19	0	0	23	0
10	898	Duke	0	0	0	1	0
11	1357	Ribaut	0	2	0	7	15
12	559	Marsh	3	40	81	62	1
13	1390	Beaufort Plaza	0	18	0	29	0
14	2315	Hogarth	0	0	0	0	0
15	1410	SC 170	0	0	0	0	0
Totals	**22132**		**22**	**85**	**84**	**151**	**30**

Total Delay based on a Normal Speed of 30 MPH.

PC-Travel Reports for study: Ribaut Rd NB MD

Kimley-Horn
and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB MD**
Study Date **: 3/3/2011**

Study Summary

Runs Used in This Study

Run Title	Start Date	Start Time	Length	Before/ After	Run Type
Ribaut Rd MD After-NB-001	03/01/11	11:10	22386	After	Secondary
Ribaut Rd MD After-NB-002	03/01/11	11:30	22414	After	Secondary
Ribaut Rd MD After-NB-003	03/01/11	11:50	22494	After	Secondary
Ribaut Rd MD After-NB-004	03/01/11	12:18	22486	After	Secondary
Ribaut Rd MD After-NB-005	03/01/11	12:40	22455	After	Secondary
Ribaut Rd MD After-NB-006	03/01/11	13:00	22456	After	Secondary
Ribaut Rd MD Before-NB-001	12/08/10	11:15	22264	Before	Secondary
Ribaut Rd MD Before-NB-002	12/08/10	11:40	22407	Before	Secondary
Ribaut Rd MD Before-NB-003	12/08/10	12:02	22409	Before	Secondary
Ribaut Rd MD Before-NB-004	12/08/10	12:22	22362	Before	Secondary
Ribaut Rd MD Before-NB-005	12/08/10	12:42	22340	Before	Secondary
Ribaut Rd MD Before-NB-006	12/08/10	13:04	22410	Before	Secondary

Node Info

#	Len	Name
1	0	Ladys Island
2	2240	Mossy Oaks
3	1947	First
4	3159	Allison
5	687	Hospital
6	1509	Reynolds
7	1955	Hermitage
8	1978	Bay
9	728	North
10	898	Duke
11	1357	Ribaut
12	559	Marsh
13	1390	Beaufort Plaza
14	2315	Hogarth
15	1410	SC 170

Length of Study Route = 22,132 feet

Notes:

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB MD**
Study Date **: 3/3/2011**
Page No. **: 3**

Overall Output Statistics

Node #	Length	Node Name		Travel Time	# of Stops	Avg Speed	Total Delay	Time <= 0 MPH	Time <= 35 MPH	Time <= 55 MPH
1	0	Ladys Island								
2	2240	Mossy Oaks	**Before**	64.7	0.7	23.6	13.5	3.5	52.0	64.7
			After	42.3	0.0	36.1	0.0	0.0	11.8	42.3
			Change	-22.3	-0.7	12.5	-13.5	-3.5	-40.2	-22.3
3	1947	First	**Before**	42.3	0.0	31.4	1.3	0.0	27.2	42.3
			After	42.2	0.5	31.5	1.3	1.3	17.0	42.2
			Change	-0.2	0.5	0.1	0.0	1.3	-10.2	-0.2
4	3159	Allison	**Before**	66.5	0.3	32.4	2.8	5.5	23.8	66.5
			After	59.3	0.2	36.3	0.0	0.8	15.2	59.3
			Change	-7.2	-0.2	3.9	-2.8	-4.7	-8.7	-7.2
5	687	Hospital	**Before**	24.8	0.3	18.9	9.7	6.7	20.7	24.8
			After	12.5	0.0	37.5	0.0	0.0	2.0	12.5
			Change	-12.3	-0.3	18.6	-9.7	-6.7	-18.7	-12.3
6	1509	Reynolds	**Before**	40.7	0.5	25.3	9.8	3.8	24.3	40.7
			After	30.3	0.0	33.9	0.0	0.0	16.7	30.3
			Change	-10.3	-0.5	8.6	-9.8	-3.8	-7.7	-10.3
7	1955	Hermitage	**Before**	38.3	0.0	34.8	1.2	0.0	9.0	38.3
			After	35.0	0.0	38.1	0.0	0.0	4.8	35.0
			Change	-3.3	0.0	3.3	-1.2	0.0	-4.2	-3.3
8	1978	Bay	**Before**	38.8	0.0	34.7	0.0	0.0	19.0	38.8
			After	34.8	0.0	38.7	0.0	0.0	4.7	34.8
			Change	-4.0	0.0	4.0	0.0	0.0	-14.3	-4.0
9	728	North	**Before**	13.7	0.0	36.3	0.0	0.0	2.8	13.7
			After	13.7	0.0	36.3	0.0	0.0	3.0	13.7
			Change	0.0	0.0	0.0	0.0	0.0	0.2	0.0
10	898	Duke	**Before**	19.2	0.2	31.9	1.0	0.0	8.5	19.2
			After	18.8	0.2	32.5	0.0	0.0	11.8	18.8
			Change	-0.3	0.0	0.6	-1.0	0.0	3.3	-0.3
11	1357	Ribaut	**Before**	45.8	0.5	20.2	15.5	6.0	44.8	45.8
			After	45.7	0.5	20.3	14.5	3.2	45.7	45.7
			Change	-0.2	0.0	0.1	-1.0	-2.8	0.8	-0.2
12	559	Marsh	**Before**	23.0	0.2	16.6	9.8	5.5	23.0	23.0
			After	26.2	0.5	14.6	13.2	3.7	26.2	26.2
			Change	3.2	0.3	-2.0	3.3	-1.8	3.2	3.2
13	1390	Beaufort Plaza	**Before**	35.0	0.3	27.1	5.7	2.0	26.0	35.0
			After	32.7	0.2	29.0	5.0	4.0	17.0	32.7
			Change	-2.3	-0.2	1.9	-0.7	2.0	-9.0	-2.3
14	2315	Hogarth	**Before**	51.0	0.2	30.9	4.0	2.7	22.8	51.0
			After	45.7	0.2	34.6	2.2	1.2	14.0	45.7
			Change	-5.3	0.0	3.6	-1.8	-1.5	-8.8	-5.3
15	1410	SC 170	**Before**	33.0	0.2	29.1	4.5	4.2	14.2	33.0
			After	26.7	0.0	36.1	0.0	0.0	8.3	26.7
			Change	-6.3	-0.2	6.9	-4.5	-4.2	-5.8	-6.3
Totals	**22,132**		**Before**	**536.8**	**3.3**	**28.1**	**78.8**	**39.8**	**318.2**	**536.8**
			After	**465.8**	**2.2**	**32.4**	**36.2**	**14.2**	**198.2**	**465.8**
			Change	**-71.0**	**-1.2**	**4.3**	**-42.7**	**-25.7**	**-120.0**	**-71.0**

Stats based on 6 BEFORE runs & 6 AFTER runs.
Stops based on a Stop Speed of 5 MPH.
Total Delay based on a Normal Speed of 30 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB MD**
Study Date **: 3/3/2011**
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Fuel Consumption & Emissions

Node #	Length	Node Name		Fuel (gal)	HC (grams)	CO (grams)	NOx (grams)
1	0	Ladys Island					
2	2240	Mossy Oaks	**Before**	0.0245	2.4632	21.2549	1.5420
			After	0.0217	2.2257	24.7711	1.5378
			Change	-0.0028	-0.2375	3.5162	-0.0042
3	1947	First	**Before**	0.0188	1.9788	20.8325	1.3258
			After	0.0165	1.2340	13.3227	0.5674
			Change	-0.0023	-0.7448	-7.5098	-0.7583
4	3159	Allison	**Before**	0.0288	2.2795	24.6164	1.1837
			After	0.0298	2.8450	31.2833	1.8938
			Change	0.0010	0.5656	6.6669	0.7100
5	687	Hospital	**Before**	0.0094	1.0072	8.5857	0.6482
			After	0.0057	0.4826	5.4952	0.2753
			Change	-0.0037	-0.5247	-3.0906	-0.3730
6	1509	Reynolds	**Before**	0.0152	1.3382	12.5128	0.7046
			After	0.0121	0.9582	10.5388	0.4621
			Change	-0.0032	-0.3800	-1.9740	-0.2425
7	1955	Hermitage	**Before**	0.0162	1.2914	14.1865	0.6468
			After	0.0172	1.5903	19.8218	0.9719
			Change	0.0009	0.2989	5.6354	0.3251
8	1978	Bay	**Before**	0.0153	1.1634	12.4118	0.5153
			After	0.0151	1.0015	11.7994	0.4053
			Change	-0.0002	-0.1619	-0.6124	-0.1100
9	728	North	**Before**	0.0062	0.5319	6.1024	0.2993
			After	0.0062	0.5618	6.7757	0.3285
			Change	0.0001	0.0299	0.6734	0.0293
10	898	Duke	**Before**	0.0066	0.4102	4.2319	0.0959
			After	0.0065	0.4182	4.5267	0.1136
			Change	-0.0002	0.0081	0.2948	0.0177
11	1357	Ribaut	**Before**	0.0156	1.5664	12.7647	0.9141
			After	0.0151	1.5780	12.3679	0.9522
			Change	-0.0005	0.0116	-0.3968	0.0381
12	559	Marsh	**Before**	0.0080	0.9365	7.5379	0.6164
			After	0.0091	1.1250	7.6458	0.8080
			Change	0.0011	0.1886	0.1079	0.1917
13	1390	Beaufort Plaza	**Before**	0.0135	1.2716	12.1118	0.7327
			After	0.0143	1.5190	16.3987	1.0023
			Change	0.0008	0.2473	4.2868	0.2695
14	2315	Hogarth	**Before**	0.0201	1.6617	16.9682	0.8280
			After	0.0194	1.5607	17.3655	0.8017
			Change	-0.0007	-0.1010	0.3973	-0.0263
15	1410	SC 170	**Before**	0.0117	0.8389	9.2477	0.2833
			After	0.0123	1.1149	12.9284	0.6708
			Change	0.0006	0.2760	3.6807	0.3875
Totals	**22,132**		**Before**	**0.2101**	**18.7389**	**183.3652**	**10.3362**
			After	**0.2009**	**18.2150**	**195.0411**	**10.7907**
			Change	**-0.0091**	**-0.5238**	**11.6759**	**0.4545**

Stats based on 6 BEFORE runs & 6 AFTER runs.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB MD**
Study Date **: 3/3/2011**
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Detailed Statistics By Run

Travel Time (sec) by Section

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
			Ribaut Rd MD After-NB-001	Ribaut Rd MD After-NB-002	Ribaut Rd MD After-NB-003	Ribaut Rd MD After-NB-004	Ribaut Rd MD After-NB-005	Ribaut Rd MD After-NB-006	Ribaut Rd MD Before-NB-001	Ribaut Rd MD Before-N
1	0	Ladys Island								
2	2240	Mossy Oaks	42	44	45	38	40	45	65	74
3	1947	First	47	39	35	44	50	38	53	40
4	3159	Allison	59	65	63	59	54	56	72	58
5	687	Hospital	11	13	15	13	11	12	17	64
6	1509	Reynolds	31	33	27	29	31	31	51	27
7	1955	Hermitage	34	36	33	36	35	36	36	35
8	1978	Bay	33	34	37	37	33	35	40	36
9	728	North	14	13	14	15	13	13	15	14
10	898	Duke	18	17	19	20	20	19	27	17
11	1357	Ribaut	46	41	36	63	37	51	73	27
12	559	Marsh	26	35	37	19	20	20	16	15
13	1390	Beaufort Plaza	26	26	27	62	25	30	27	29
14	2315	Hogarth	41	38	46	66	41	42	42	43
15	1410	SC 170	23	25	30	31	26	25	59	32
Totals	**22132**		**451**	**459**	**464**	**532**	**436**	**453**	**593**	**511**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB MD**
Study Date **: 3/3/2011**
Page No. **: 6**

Detailed Statistics By Run

Travel Time (sec) by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12
1	0	Ladys Island				
2	2240	Mossy Oaks	72	59	64	54
3	1947	First	39	37	41	44
4	3159	Allison	89	51	71	58
5	687	Hospital	12	13	16	27
6	1509	Reynolds	28	26	64	48
7	1955	Hermitage	35	37	35	52
8	1978	Bay	36	45	34	42
9	728	North	13	13	13	14
10	898	Duke	18	19	16	18
11	1357	Ribaut	47	39	37	52
12	559	Marsh	18	18	15	56
13	1390	Beaufort Plaza	30	26	48	50
14	2315	Hogarth	55	43	76	47
15	1410	SC 170	27	26	25	29
Totals	**22132**		**519**	**452**	**555**	**591**

Ribaut Rd MD Before-NB-003
Ribaut Rd MD Before-NB-004
Ribaut Rd MD Before-NB-005
Ribaut Rd MD Before-NB-006

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB MD**
Study Date **: 3/3/2011**
Page No. **: 7**

Detailed Statistics By Run

Number of Stops by Section

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
1	0	Ladys Island								
2	2240	Mossy Oaks	0	0	0	0	0	0	0	1
3	1947	First	1	0	0	1	1	0	0	0
4	3159	Allison	0	1	0	0	0	0	0	0
5	687	Hospital	0	0	0	0	0	0	0	1
6	1509	Reynolds	0	0	0	0	0	0	1	0
7	1955	Hermitage	0	0	0	0	0	0	0	0
8	1978	Bay	0	0	0	0	0	0	0	0
9	728	North	0	0	0	0	0	0	0	0
10	898	Duke	0	0	0	1	0	0	1	0
11	1357	Ribaut	1	0	0	1	0	1	1	0
12	559	Marsh	1	1	1	0	0	0	0	0
13	1390	Beaufort Plaza	0	0	0	1	0	0	0	0
14	2315	Hogarth	0	0	0	1	0	0	0	0
15	1410	SC 170	0	0	0	0	0	0	1	0
Totals	**22132**		**3**	**2**	**1**	**5**	**1**	**1**	**4**	**2**

Ribaut Rd MD After-NB-001
Ribaut Rd MD After-NB-002
Ribaut Rd MD After-NB-003
Ribaut Rd MD After-NB-004
Ribaut Rd MD After-NB-005
Ribaut Rd MD After-NB-006
Ribaut Rd MD Before-NB-001
Ribaut Rd MD Before-N

Stops based on a Stop Speed of 5 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB MD**
Study Date **: 3/3/2011**
Page No. **: 8**

Detailed Statistics By Run

Number of Stops by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12
1	0	Ladys Island				
2	2240	Mossy Oaks	1	1	1	0
3	1947	First	0	0	0	0
4	3159	Allison	1	0	1	0
5	687	Hospital	0	0	0	1
6	1509	Reynolds	0	0	1	1
7	1955	Hermitage	0	0	0	0
8	1978	Bay	0	0	0	0
9	728	North	0	0	0	0
10	898	Duke	0	0	0	0
11	1357	Ribaut	1	0	0	1
12	559	Marsh	0	0	0	1
13	1390	Beaufort Plaza	0	0	1	1
14	2315	Hogarth	0	0	1	0
15	1410	SC 170	0	0	0	0
Totals	**22132**		**3**	**1**	**5**	**5**

Ribaut Rd MD Before-NB-003
Ribaut Rd MD Before-NB-004
Ribaut Rd MD Before-NB-005
Ribaut Rd MD Before-NB-006

Stops based on a Stop Speed of 5 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB MD**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Average Speed (MPH) by Section

Ribaut Rd MD After-NB-001
Ribaut Rd MD After-NB-002
Ribaut Rd MD After-NB-003
Ribaut Rd MD After-NB-004
Ribaut Rd MD After-NB-005
Ribaut Rd MD After-NB-006
Ribaut Rd MD Before-NB-001
Ribaut Rd MD Before-N

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
1	0	Ladys Island								
2	2240	Mossy Oaks	36.5	34.9	34.6	40.6	38.7	34.8	23.7	20.8
3	1947	First	28.3	34.1	37.3	29.9	26.6	34.1	25.2	33.7
4	3159	Allison	37.1	33.2	34.3	36.7	40.2	38.7	29.9	36.8
5	687	Hospital	40.1	36.6	32.1	36.9	40.5	39.0	26.7	7.7
6	1509	Reynolds	33.6	30.9	37.9	34.9	33.3	33.6	20.6	37.2
7	1955	Hermitage	39.3	37.6	40.7	37.2	38.9	37.2	37.4	38.3
8	1978	Bay	40.4	40.0	36.2	36.5	40.8	38.9	33.3	37.0
9	728	North	36.2	37.6	35.4	35.2	37.6	38.1	32.5	35.8
10	898	Duke	33.1	35.1	32.2	28.8	30.0	31.0	22.4	36.4
11	1357	Ribaut	20.0	22.7	25.4	14.7	25.3	18.0	12.6	34.0
12	559	Marsh	15.2	10.9	10.3	20.5	18.7	19.0	23.9	24.9
13	1390	Beaufort Plaza	35.8	37.1	34.8	15.2	38.7	31.9	35.4	32.9
14	2315	Hogarth	39.4	41.6	34.2	23.7	38.2	37.5	37.5	36.9
15	1410	SC 170	40.6	38.3	32.7	31.6	37.5	39.5	16.3	29.8
Totals	**22132**		**33.5**	**33.0**	**32.6**	**28.4**	**34.7**	**33.4**	**25.5**	**29.5**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB MD**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Average Speed (MPH) by Section

Ribaut Rd MD Before-NB-003
Ribaut Rd MD Before-NB-004
Ribaut Rd MD Before-NB-005
Ribaut Rd MD Before-NB-006

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12
1	0	Ladys Island				
2	2240	Mossy Oaks	21.5	25.9	24.3	28.4
3	1947	First	34.3	36.5	31.8	30.7
4	3159	Allison	24.1	42.4	30.6	36.7
5	687	Hospital	38.8	37.7	28.4	18.4
6	1509	Reynolds	37.6	39.0	16.4	20.9
7	1955	Hermitage	38.2	35.7	38.4	25.9
8	1978	Bay	37.4	30.5	38.8	32.0
9	728	North	37.8	36.4	40.6	36.9
10	898	Duke	33.9	32.1	37.8	32.8
11	1357	Ribaut	19.6	23.6	25.1	17.8
12	559	Marsh	21.8	22.3	25.3	7.2
13	1390	Beaufort Plaza	31.9	37.1	19.4	18.5
14	2315	Hogarth	28.7	36.3	21.0	33.4
15	1410	SC 170	34.7	36.7	38.9	33.2
Totals	**22132**		**29.1**	**33.5**	**27.3**	**25.6**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB MD**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Total Delay (sec) by Section

Ribaut Rd MD After-NB-001
Ribaut Rd MD After-NB-002
Ribaut Rd MD After-NB-003
Ribaut Rd MD After-NB-004
Ribaut Rd MD After-NB-005
Ribaut Rd MD After-NB-006
Ribaut Rd MD Before-NB-001
Ribaut Rd MD Before-N

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
1	0	Ladys Island								
2	2240	Mossy Oaks	0	0	0	0	0	0	14	23
3	1947	First	3	0	0	0	5	0	8	0
4	3159	Allison	0	0	0	0	0	0	0	0
5	687	Hospital	0	0	0	0	0	0	1	47
6	1509	Reynolds	0	0	0	0	0	0	16	0
7	1955	Hermitage	0	0	0	0	0	0	0	0
8	1978	Bay	0	0	0	0	0	0	0	0
9	728	North	0	0	0	0	0	0	0	0
10	898	Duke	0	0	0	0	0	0	6	0
11	1357	Ribaut	15	10	5	32	5	20	42	0
12	559	Marsh	13	22	24	6	7	7	3	2
13	1390	Beaufort Plaza	0	0	0	30	0	0	0	0
14	2315	Hogarth	0	0	0	13	0	0	0	0
15	1410	SC 170	0	0	0	0	0	0	27	0
Totals	**22132**		**31**	**32**	**29**	**81**	**17**	**27**	**117**	**72**

Total Delay based on a Normal Speed of 30 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB MD**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Total Delay (sec) by Section

Ribaut Rd MD Before-NB-003
Ribaut Rd MD Before-NB-004
Ribaut Rd MD Before-NB-005
Ribaut Rd MD Before-NB-006

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12
1	0	Ladys Island				
2	2240	Mossy Oaks	21	8	12	3
3	1947	First	0	0	0	0
4	3159	Allison	17	0	0	0
5	687	Hospital	0	0	0	10
6	1509	Reynolds	0	0	29	14
7	1955	Hermitage	0	0	0	7
8	1978	Bay	0	0	0	0
9	728	North	0	0	0	0
10	898	Duke	0	0	0	0
11	1357	Ribaut	16	8	6	21
12	559	Marsh	5	5	2	42
13	1390	Beaufort Plaza	0	0	16	18
14	2315	Hogarth	1	0	23	0
15	1410	SC 170	0	0	0	0
Totals	**22132**		**60**	**21**	**88**	**115**

Total Delay based on a Normal Speed of 30 MPH.

PC-Travel Reports for study: Ribaut Rd NB PM

Kimley-Horn
and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB PM**
Study Date **: 3/3/2011**

Study Summary

Runs Used in This Study

Run Title	Start Date	Start Time	Length	Before/ After	Run Type
Ribaut Rd PM After-NB-001	03/01/11	15:13	22598	After	Secondary
Ribaut Rd PM After-NB-002	03/01/11	15:34	22607	After	Secondary
Ribaut Rd PM After-NB-003	03/01/11	16:07	22687	After	Secondary
Ribaut Rd PM After-NB-004	03/01/11	16:28	22595	After	Secondary
Ribaut Rd PM After-NB-005	03/01/11	16:50	22487	After	Secondary
Ribaut Rd PM After-NB-006	03/01/11	17:17	22427	After	Secondary
Ribaut Rd PM After-NB-007	03/01/11	17:38	22533	After	Secondary
Ribaut Rd PM Before-NB-001	12/08/10	15:11	22288	Before	Secondary
Ribaut Rd PM Before-NB-002	12/08/10	15:42	22279	Before	Secondary
Ribaut Rd PM Before-NB-003	12/08/10	16:07	22252	Before	Secondary
Ribaut Rd PM Before-NB-004	12/08/10	16:31	22209	Before	Secondary
Ribaut Rd PM Before-NB-005	12/08/10	16:53	22229	Before	Secondary
Ribaut Rd PM Before-NB-006	12/08/10	17:22	22333	Before	Secondary
Ribaut Rd PM Before-NB-007	12/08/10	17:45	22375	Before	Secondary

Node Info

#	Len	Name
1	0	Ladys Island
2	2240	Mossy Oaks
3	1947	First
4	3159	Allison
5	687	Hospital
6	1509	Reynolds
7	1955	Hermitage
8	1978	Bay
9	728	North
10	898	Duke
11	1357	Ribaut
12	559	Marsh
13	1390	Beaufort Plaza
14	2315	Hogarth
15	1410	SC 170

Length of Study Route = 22,132 feet

Notes:

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB PM**
Study Date **: 3/3/2011**
Page No. **: 3**

Overall Output Statistics

Node #	Length	Node Name		Travel Time	# of Stops	Avg Speed	Total Delay	Time <= 0 MPH	Time <= 35 MPH	Time <= 55 MPH
1	0	Ladys Island								
2	2240	Mossy Oaks	**Before**	57.6	0.3	26.5	9.0	2.4	41.0	57.6
			After	52.0	0.3	29.4	4.3	2.4	28.6	52.0
			Change	-5.6	0.0	2.8	-4.7	0.0	-12.4	-5.6
3	1947	First	**Before**	37.6	0.0	35.3	0.0	0.0	10.3	37.6
			After	36.7	0.0	36.2	0.0	0.0	9.1	36.7
			Change	-0.9	0.0	0.8	0.0	0.0	-1.1	-0.9
4	3159	Allison	**Before**	65.7	0.3	32.8	5.9	2.4	22.6	65.7
			After	67.1	0.4	32.1	4.9	6.4	22.1	67.1
			Change	1.4	0.1	-0.7	-1.0	4.0	-0.4	1.4
5	687	Hospital	**Before**	28.7	0.1	16.3	14.0	10.3	23.1	28.7
			After	31.1	0.4	15.0	15.6	12.1	27.6	31.1
			Change	2.4	0.3	-1.3	1.6	1.9	4.4	2.4
6	1509	Reynolds	**Before**	31.7	0.0	32.4	1.3	0.0	20.9	31.7
			After	29.9	0.0	34.5	1.1	0.0	13.0	29.9
			Change	-1.9	0.0	2.0	-0.1	0.0	-7.9	-1.9
7	1955	Hermitage	**Before**	38.3	0.0	34.8	0.0	0.0	13.9	38.3
			After	36.9	0.1	36.2	0.3	0.0	8.9	36.9
			Change	-1.4	0.1	1.3	0.3	0.0	-5.0	-1.4
8	1978	Bay	**Before**	47.9	0.4	28.2	6.0	1.9	31.1	47.9
			After	40.1	0.0	33.6	0.1	0.0	20.0	40.1
			Change	-7.7	-0.4	5.4	-5.9	-1.9	-11.1	-7.7
9	728	North	**Before**	20.9	0.3	23.8	5.3	2.3	16.3	20.9
			After	18.7	0.1	26.5	3.0	0.0	15.4	18.7
			Change	-2.1	-0.1	2.7	-2.3	-2.3	-0.9	-2.1
10	898	Duke	**Before**	18.6	0.0	33.0	0.0	0.0	13.9	18.6
			After	21.0	0.1	29.2	2.1	0.9	16.3	21.0
			Change	2.4	0.1	-3.8	2.1	0.9	2.4	2.4
11	1357	Ribaut	**Before**	52.6	0.7	17.6	22.3	11.7	46.1	52.6
			After	63.7	0.9	14.5	34.7	24.6	57.1	63.7
			Change	11.1	0.1	-3.1	12.4	12.9	11.0	11.1
12	559	Marsh	**Before**	38.0	0.3	10.0	25.0	18.3	38.0	38.0
			After	44.0	0.4	8.7	31.0	22.3	43.9	44.0
			Change	6.0	0.1	-1.4	6.0	4.0	5.9	6.0
13	1390	Beaufort Plaza	**Before**	42.3	0.3	22.4	10.9	5.0	37.9	42.3
			After	29.3	0.0	32.4	0.1	0.0	22.9	29.3
			Change	-13.0	-0.3	9.9	-10.7	-5.0	-15.0	-13.0
14	2315	Hogarth	**Before**	51.9	0.1	30.4	1.9	1.0	35.3	51.9
			After	44.4	0.0	35.5	0.0	0.0	17.1	44.4
			Change	-7.4	-0.1	5.1	-1.9	-1.0	-18.1	-7.4
15	1410	SC 170	**Before**	36.0	0.1	26.7	6.1	2.0	26.0	36.0
			After	27.7	0.0	34.7	0.0	0.0	12.3	27.7
			Change	-8.3	-0.1	8.0	-6.1	-2.0	-13.7	-8.3
Totals	**22,132**		**Before**	**567.6**	**3.0**	**26.6**	**107.6**	**57.3**	**376.3**	**567.6**
			After	**542.7**	**2.9**	**27.8**	**97.3**	**68.7**	**314.3**	**542.7**
			Change	**-24.9**	**-0.1**	**1.2**	**-10.3**	**11.4**	**-62.0**	**-24.9**

Stats based on 7 BEFORE runs & 7 AFTER runs.
Stops based on a Stop Speed of 5 MPH.
Total Delay based on a Normal Speed of 30 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB PM**
Study Date **: 3/3/2011**
Page No. **: 4**

Fuel Consumption & Emissions

Node #	Length	Node Name		Fuel (gal)	HC (grams)	CO (grams)	NOx (grams)
1	0	Ladys Island					
2	2240	Mossy Oaks	**Before**	0.0223	2.1588	20.3309	1.2843
			After	0.0222	2.2024	22.0895	1.4050
			Change	-0.0001	0.0436	1.7586	0.1207
3	1947	First	**Before**	0.0170	1.4376	15.5651	0.8067
			After	0.0171	1.5652	17.8113	0.9631
			Change	0.0001	0.1276	2.2463	0.1564
4	3159	Allison	**Before**	0.0258	1.8936	20.7881	0.7836
			After	0.0281	2.2214	24.3635	1.1191
			Change	0.0023	0.3277	3.5753	0.3355
5	687	Hospital	**Before**	0.0092	0.8495	7.4796	0.3925
			After	0.0116	1.4286	12.4603	0.9876
			Change	0.0023	0.5791	4.9807	0.5952
6	1509	Reynolds	**Before**	0.0120	0.9217	9.2628	0.3982
			After	0.0119	0.8996	9.7009	0.4067
			Change	-0.0001	-0.0221	0.4381	0.0085
7	1955	Hermitage	**Before**	0.0161	1.3708	15.6350	0.7313
			After	0.0169	1.4791	17.0691	0.8639
			Change	0.0008	0.1082	1.4341	0.1326
8	1978	Bay	**Before**	0.0185	1.5809	15.3237	0.8295
			After	0.0157	1.2118	12.8187	0.5603
			Change	-0.0027	-0.3690	-2.5050	-0.2692
9	728	North	**Before**	0.0080	0.7955	7.0425	0.4884
			After	0.0072	0.7214	6.1665	0.4580
			Change	-0.0008	-0.0740	-0.8761	-0.0304
10	898	Duke	**Before**	0.0069	0.5229	5.6630	0.2118
			After	0.0082	0.7666	7.7143	0.4383
			Change	0.0013	0.2437	2.0513	0.2265
11	1357	Ribaut	**Before**	0.0151	1.2542	10.9411	0.4219
			After	0.0178	1.6420	14.8307	0.6355
			Change	0.0027	0.3878	3.8896	0.2135
12	559	Marsh	**Before**	0.0114	1.3232	10.4786	0.7664
			After	0.0121	1.3790	10.5736	0.7299
			Change	0.0007	0.0559	0.0950	-0.0365
13	1390	Beaufort Plaza	**Before**	0.0143	1.3489	11.9548	0.7128
			After	0.0120	1.1325	12.2711	0.6610
			Change	-0.0023	-0.2163	0.3163	-0.0518
14	2315	Hogarth	**Before**	0.0214	2.0230	20.1209	1.2166
			After	0.0187	1.5153	16.8619	0.7759
			Change	-0.0027	-0.5077	-3.2590	-0.4406
15	1410	SC 170	**Before**	0.0123	0.9836	9.5588	0.4065
			After	0.0108	0.7983	8.8118	0.3348
			Change	-0.0015	-0.1853	-0.7470	-0.0718
Totals	**22,132**		**Before**	**0.2102**	**18.4641**	**180.1450**	**9.4505**
			After	**0.2103**	**18.9632**	**193.5432**	**10.3391**
			Change	**0.0001**	**0.4992**	**13.3982**	**0.8886**

Stats based on 7 BEFORE runs & 7 AFTER runs.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB PM**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Travel Time (sec) by Section

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
			Ribaut Rd PM After-NB-001	Ribaut Rd PM After-NB-002	Ribaut Rd PM After-NB-003	Ribaut Rd PM After-NB-004	Ribaut Rd PM After-NB-005	Ribaut Rd PM After-NB-006	Ribaut Rd PM After-NB-007	Ribaut Rd PM Before-N
1	0	Ladys Island								
2	2240	Mossy Oaks	46	47	43	50	64	46	68	87
3	1947	First	35	36	34	38	42	34	38	39
4	3159	Allison	56	56	57	92	86	66	57	65
5	687	Hospital	33	59	65	13	18	15	15	72
6	1509	Reynolds	42	27	27	29	29	27	28	28
7	1955	Hermitage	42	33	34	47	36	34	32	36
8	1978	Bay	40	38	38	46	40	38	41	39
9	728	North	14	16	15	15	16	28	27	15
10	898	Duke	17	17	20	36	21	18	18	21
11	1357	Ribaut	118	121	29	29	97	27	25	69
12	559	Marsh	19	20	89	39	22	105	14	19
13	1390	Beaufort Plaza	28	33	30	32	29	25	28	42
14	2315	Hogarth	41	49	47	45	43	43	43	49
15	1410	SC 170	27	27	28	27	27	31	27	29
Totals	**22132**		**558**	**579**	**556**	**538**	**570**	**537**	**461**	**610**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB PM**
Study Date **: 3/3/2011**
Page No. **: 6**

Detailed Statistics By Run

Travel Time (sec) by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13	Run #14
			Ribaut Rd PM Before-NB-002	Ribaut Rd PM Before-NB-003	Ribaut Rd PM Before-NB-004	Ribaut Rd PM Before-NB-005	Ribaut Rd PM Before-NB-006	Ribaut Rd PM Before-NB-007
1	0	Ladys Island						
2	2240	Mossy Oaks	50	45	46	59	71	45
3	1947	First	39	36	36	40	38	35
4	3159	Allison	57	57	58	113	54	56
5	687	Hospital	52	13	15	23	13	13
6	1509	Reynolds	33	32	30	44	27	28
7	1955	Hermitage	41	39	39	43	36	34
8	1978	Bay	39	60	54	64	38	41
9	728	North	14	13	14	18	36	36
10	898	Duke	16	18	19	20	17	19
11	1357	Ribaut	94	41	68	33	37	26
12	559	Marsh	18	80	17	15	18	99
13	1390	Beaufort Plaza	33	59	57	38	39	28
14	2315	Hogarth	58	52	61	52	45	46
15	1410	SC 170	40	30	25	63	29	36
Totals	**22132**		**584**	**575**	**539**	**625**	**498**	**542**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB PM**
Study Date **: 3/3/2011**
Page No. **: 7**

Detailed Statistics By Run

Number of Stops by Section

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
			Ribaut Rd PM After-NB-001	Ribaut Rd PM After-NB-002	Ribaut Rd PM After-NB-003	Ribaut Rd PM After-NB-004	Ribaut Rd PM After-NB-005	Ribaut Rd PM After-NB-006	Ribaut Rd PM After-NB-007	Ribaut Rd PM Before-N
1	0	Ladys Island								
2	2240	Mossy Oaks	0	0	0	0	1	0	1	1
3	1947	First	0	0	0	0	0	0	0	0
4	3159	Allison	0	0	0	1	1	1	0	1
5	687	Hospital	1	1	1	0	0	0	0	0
6	1509	Reynolds	0	0	0	0	0	0	0	0
7	1955	Hermitage	0	0	0	1	0	0	0	0
8	1978	Bay	0	0	0	0	0	0	0	0
9	728	North	0	0	0	0	0	1	0	0
10	898	Duke	0	0	0	1	0	0	0	0
11	1357	Ribaut	1	3	0	0	2	0	0	2
12	559	Marsh	0	0	1	1	0	1	0	0
13	1390	Beaufort Plaza	0	0	0	0	0	0	0	0
14	2315	Hogarth	0	0	0	0	0	0	0	0
15	1410	SC 170	0	0	0	0	0	0	0	0
Totals	**22132**		**2**	**4**	**2**	**4**	**4**	**3**	**1**	**4**

Stops based on a Stop Speed of 5 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB PM**
Study Date **: 3/3/2011**
Page No. **: 8**

Detailed Statistics By Run

Number of Stops by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13	Run #14
			Ribaut Rd PM Before-NB-002	Ribaut Rd PM Before-NB-003	Ribaut Rd PM Before-NB-004	Ribaut Rd PM Before-NB-005	Ribaut Rd PM Before-NB-006	Ribaut Rd PM Before-NB-007
1	0	Ladys Island						
2	2240	Mossy Oaks	0	0	0	0	1	0
3	1947	First	0	0	0	0	0	0
4	3159	Allison	0	0	0	1	0	0
5	687	Hospital	1	0	0	0	0	0
6	1509	Reynolds	0	0	0	0	0	0
7	1955	Hermitage	0	0	0	0	0	0
8	1978	Bay	0	1	1	1	0	0
9	728	North	0	0	0	0	1	1
10	898	Duke	0	0	0	0	0	0
11	1357	Ribaut	1	0	1	0	1	0
12	559	Marsh	0	1	0	0	0	1
13	1390	Beaufort Plaza	0	1	1	0	0	0
14	2315	Hogarth	0	0	1	0	0	0
15	1410	SC 170	0	0	0	1	0	0
Totals	**22132**		**2**	**3**	**4**	**3**	**3**	**2**

Stops based on a Stop Speed of 5 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB PM**
Study Date **: 3/3/2011**
Page No. **: 9**

Detailed Statistics By Run

Average Speed (MPH) by Section

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
			Ribaut Rd PM After-NB-001	Ribaut Rd PM After-NB-002	Ribaut Rd PM After-NB-003	Ribaut Rd PM After-NB-004	Ribaut Rd PM After-NB-005	Ribaut Rd PM After-NB-006	Ribaut Rd PM After-NB-007	Ribaut Rd PM Before-N
1	0	Ladys Island								
2	2240	Mossy Oaks	33.3	33.0	35.7	31.1	24.0	33.8	22.5	17.7
3	1947	First	38.3	37.2	39.9	34.7	31.4	39.5	35.4	34.6
4	3159	Allison	38.3	38.2	37.4	23.5	25.2	32.3	37.8	32.8
5	687	Hospital	14.0	7.9	7.6	37.2	27.4	32.8	30.7	6.9
6	1509	Reynolds	24.6	37.9	37.6	34.9	34.7	37.1	37.5	36.4
7	1955	Hermitage	32.3	40.5	39.1	28.5	37.2	39.0	41.8	36.8
8	1978	Bay	33.5	35.4	35.9	29.3	33.8	35.5	32.1	34.6
9	728	North	35.7	31.9	32.8	33.1	30.5	18.3	19.2	33.3
10	898	Duke	35.2	37.2	30.7	17.1	29.0	33.4	33.8	28.4
11	1357	Ribaut	7.8	7.5	31.2	31.6	9.5	34.3	37.2	13.5
12	559	Marsh	20.4	18.8	4.2	9.8	18.2	3.7	25.7	19.9
13	1390	Beaufort Plaza	34.3	29.4	32.0	30.4	32.2	38.7	34.3	22.6
14	2315	Hogarth	38.4	32.1	33.4	35.0	36.8	36.3	36.5	32.0
15	1410	SC 170	35.9	35.4	34.6	34.9	35.6	31.4	35.6	32.6
Totals	**22132**		**27.1**	**26.1**	**27.2**	**28.1**	**26.5**	**28.2**	**32.8**	**24.7**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB PM**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Average Speed (MPH) by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13	Run #14
			Ribaut Rd PM Before-NB-002	Ribaut Rd PM Before-NB-003	Ribaut Rd PM Before-NB-004	Ribaut Rd PM Before-NB-005	Ribaut Rd PM Before-NB-006	Ribaut Rd PM Before-NB-007
1	0	Ladys Island						
2	2240	Mossy Oaks	30.8	34.2	33.5	26.2	21.7	34.4
3	1947	First	34.5	37.9	37.5	32.7	34.7	38.4
4	3159	Allison	37.3	37.7	36.6	19.1	39.9	38.4
5	687	Hospital	9.4	37.7	32.2	20.0	38.7	36.0
6	1509	Reynolds	30.9	32.1	33.7	24.0	37.0	37.3
7	1955	Hermitage	32.5	33.7	34.5	31.0	37.8	38.5
8	1978	Bay	35.1	22.8	25.0	20.9	34.7	33.0
9	728	North	35.7	36.4	35.9	28.9	14.4	13.6
10	898	Duke	36.8	33.7	32.1	30.1	35.8	32.0
11	1357	Ribaut	9.7	22.8	13.6	28.1	24.5	35.6
12	559	Marsh	21.8	5.0	23.1	25.3	21.3	3.9
13	1390	Beaufort Plaza	28.7	15.9	16.5	24.6	24.0	34.4
14	2315	Hogarth	27.2	30.2	26.0	30.4	35.6	34.3
15	1410	SC 170	24.2	32.2	38.3	15.1	32.2	26.4
Totals	**22132**		**25.9**	**26.3**	**28.0**	**24.1**	**30.3**	**27.9**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB PM**
Study Date **: 3/3/2011**
Page No. **: 11**

Detailed Statistics By Run

Total Delay (sec) by Section

Ribaut Rd PM After-NB-001
Ribaut Rd PM After-NB-002
Ribaut Rd PM After-NB-003
Ribaut Rd PM After-NB-004
Ribaut Rd PM After-NB-005
Ribaut Rd PM After-NB-006
Ribaut Rd PM After-NB-007
Ribaut Rd PM Before-N

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
1	0	Ladys Island								
2	2240	Mossy Oaks	0	0	0	0	13	0	17	36
3	1947	First	0	0	0	0	0	0	0	0
4	3159	Allison	0	0	0	20	14	0	0	0
5	687	Hospital	17	43	48	0	1	0	0	55
6	1509	Reynolds	8	0	0	0	0	0	0	0
7	1955	Hermitage	0	0	0	2	0	0	0	0
8	1978	Bay	0	0	0	1	0	0	0	0
9	728	North	0	0	0	0	0	11	10	0
10	898	Duke	0	0	0	15	0	0	0	0
11	1357	Ribaut	87	90	0	0	66	0	0	38
12	559	Marsh	6	7	76	26	9	92	1	6
13	1390	Beaufort Plaza	0	1	0	0	0	0	0	10
14	2315	Hogarth	0	0	0	0	0	0	0	0
15	1410	SC 170	0	0	0	0	0	0	0	0
Totals	**22132**		**118**	**141**	**124**	**64**	**103**	**103**	**28**	**145**

Total Delay based on a Normal Speed of 30 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd NB PM**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Total Delay (sec) by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13	Run #14
			Ribaut Rd PM Before-NB-002	Ribaut Rd PM Before-NB-003	Ribaut Rd PM Before-NB-004	Ribaut Rd PM Before-NB-005	Ribaut Rd PM Before-NB-006	Ribaut Rd PM Before-NB-007
1	0	Ladys Island						
2	2240	Mossy Oaks	0	0	0	7	20	0
3	1947	First	0	0	0	0	0	0
4	3159	Allison	0	0	0	41	0	0
5	687	Hospital	36	0	0	7	0	0
6	1509	Reynolds	0	0	0	9	0	0
7	1955	Hermitage	0	0	0	0	0	0
8	1978	Bay	0	14	9	19	0	0
9	728	North	0	0	0	0	18	19
10	898	Duke	0	0	0	0	0	0
11	1357	Ribaut	63	10	37	2	6	0
12	559	Marsh	5	67	4	2	5	86
13	1390	Beaufort Plaza	1	27	25	6	7	0
14	2315	Hogarth	5	0	8	0	0	0
15	1410	SC 170	8	0	0	31	0	4
Totals	**22132**		**118**	**118**	**83**	**124**	**56**	**109**

Total Delay based on a Normal Speed of 30 MPH.

PC-Travel Reports for study: Ribaut Rd SB AM

Kimley-Horn
and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB AM**
Study Date **: 3/3/2011**
Page No. **: 2**

Study Summary

Runs Used in This Study

Run Title	Start Date	Start Time	Length	Before/ After	Run Type
Ribaut Rd AM After-SB-001	03/01/11	06:33	22428	After	Secondary
Ribaut Rd AM After-SB-002	03/01/11	06:51	22541	After	Secondary
Ribaut Rd AM After-SB-003	03/01/11	07:13	22423	After	Secondary
Ribaut Rd AM After-SB-004	03/01/11	07:31	22483	After	Secondary
Ribaut Rd AM After-SB-005	03/01/11	07:52	22516	After	Secondary
Ribaut Rd AM After-SB-006	03/01/11	08:30	22406	After	Secondary
Ribaut Rd AM After-SB-007	03/01/11	08:48	22351	After	Secondary
Ribaut Rd AM Before-SB-002	12/08/10	06:34	22115	Before	Secondary
Ribaut Rd AM Before-SB-003	12/08/10	06:56	22050	Before	Secondary
Ribaut Rd AM Before-SB-004	12/08/10	07:30	21950	Before	Secondary
Ribaut Rd AM Before-SB-005	12/08/10	07:49	22338	Before	Secondary
Ribaut Rd AM Before-SB-006	12/08/10	08:12	22100	Before	Secondary
Ribaut Rd AM Before-SB-007	12/08/10	08:34	22251	Before	Secondary
Ribaut Rd AM Before-SB-008	12/08/10	08:55	22194	Before	Secondary

Node Info

#	Len	Name
1	0	SC 170
2	1485	Hogarth
3	2256	Beaufort Plaza
4	1453	Marsh
5	562	Ribaut
6	1301	Duke
7	876	North
8	767	Bay
9	2069	Hermitage
10	2033	Reynolds
11	1466	Hospital
12	645	Allison
13	3223	First
14	1944	Mossy Oaks
15	2273	Ladys Island

Length of Study Route = 22,353 feet

Notes:

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB AM**
Study Date **: 3/3/2011**
Page No. **: 3**

Overall Output Statistics

Node #	Length	Node Name		Travel Time	# of Stops	Avg Speed	Total Delay	Time <= 0 MPH	Time <= 35 MPH	Time <= 55 MPH
1	0	SC 170								
2	1485	Hogarth	**Before**	31.1	0.0	32.5	0.0	0.0	19.3	31.1
			After	29.6	0.0	34.2	0.1	0.0	13.4	29.6
			Change	-1.6	0.0	1.7	0.1	0.0	-5.9	-1.6
3	2256	Beaufort Plaza	**Before**	44.4	0.1	34.6	0.0	0.0	12.3	44.4
			After	41.4	0.0	37.1	0.1	0.0	8.4	41.4
			Change	-3.0	-0.1	2.5	0.1	0.0	-3.9	-3.0
4	1453	Marsh	**Before**	36.9	0.3	26.9	6.3	2.9	26.3	36.9
			After	30.4	0.1	32.6	1.4	0.6	17.9	30.4
			Change	-6.4	-0.1	5.7	-4.9	-2.3	-8.4	-6.4
5	562	Ribaut	**Before**	16.6	0.0	23.1	3.4	0.0	16.1	16.6
			After	14.3	0.0	26.8	1.3	0.0	13.7	14.3
			Change	-2.3	0.0	3.7	-2.1	0.0	-2.4	-2.3
6	1301	Duke	**Before**	31.0	0.1	28.6	3.4	0.0	25.1	31.0
			After	28.1	0.0	31.5	0.1	0.0	15.9	28.1
			Change	-2.9	-0.1	2.9	-3.3	0.0	-9.3	-2.9
7	876	North	**Before**	19.9	0.3	30.1	1.7	0.0	9.3	19.9
			After	16.1	0.0	37.0	0.0	0.0	2.9	16.1
			Change	-3.7	-0.3	6.9	-1.7	0.0	-6.4	-3.7
8	767	Bay	**Before**	32.6	0.9	16.1	14.7	5.3	31.0	32.6
			After	18.7	0.1	27.9	2.9	0.7	12.6	18.7
			Change	-13.9	-0.7	11.9	-11.9	-4.6	-18.4	-13.9
9	2069	Hermitage	**Before**	52.0	0.3	27.1	8.4	4.7	28.7	52.0
			After	42.4	0.1	33.2	1.3	0.3	16.6	42.4
			Change	-9.6	-0.1	6.1	-7.1	-4.4	-12.1	-9.6
10	2033	Reynolds	**Before**	39.3	0.1	35.3	0.6	0.0	12.0	39.3
			After	39.0	0.0	35.5	0.0	0.0	8.0	39.0
			Change	-0.3	-0.1	0.3	-0.6	0.0	-4.0	-0.3
11	1466	Hospital	**Before**	29.4	0.1	34.0	1.1	0.0	10.6	29.4
			After	33.7	0.3	29.6	5.1	3.0	15.6	33.7
			Change	4.3	0.1	-4.3	4.0	3.0	5.0	4.3
12	645	Allison	**Before**	32.6	0.7	13.5	18.1	9.7	29.7	32.6
			After	12.6	0.0	35.0	0.0	0.0	5.1	12.6
			Change	-20.0	-0.7	21.5	-18.1	-9.7	-24.6	-20.0
13	3223	First	**Before**	61.4	0.0	35.8	0.0	0.0	15.1	61.4
			After	57.3	0.1	38.4	1.6	2.9	6.4	57.3
			Change	-4.1	0.1	2.6	1.6	2.9	-8.7	-4.1
14	1944	Mossy Oaks	**Before**	48.4	0.3	27.4	7.6	5.9	24.0	48.4
			After	42.6	0.3	31.1	6.1	6.0	14.1	42.6
			Change	-5.9	0.0	3.8	-1.4	0.1	-9.9	-5.9
15	2273	Ladys Island	**Before**	71.3	0.7	21.7	26.6	23.9	48.9	70.3
			After	54.4	0.4	28.5	10.3	8.6	24.1	54.3
			Change	-16.9	-0.3	6.7	-16.3	-15.3	-24.7	-16.0
Totals	**22,353**		**Before**	**546.9**	**4.0**	**27.9**	**92.0**	**52.3**	**308.4**	**545.9**
			After	**460.7**	**1.6**	**33.1**	**30.4**	**22.0**	**174.7**	**460.6**
			Change	**-86.1**	**-2.4**	**5.2**	**-61.6**	**-30.3**	**-133.7**	**-85.3**

Stats based on 7 BEFORE runs & 7 AFTER runs.
Stops based on a Stop Speed of 5 MPH.
Total Delay based on a Normal Speed of 30 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB AM**
Study Date **: 3/3/2011**
Page No. **: 4**

Fuel Consumption & Emissions

Node #	Length	Node Name		Fuel (gal)	HC (grams)	CO (grams)	NOx (grams)
1	0	SC 170					
2	1485	Hogarth	**Before**	0.0138	1.4125	15.3955	0.8982
			After	0.0139	1.3953	15.6723	0.9117
			Change	0.0001	-0.0173	0.2767	0.0135
3	2256	Beaufort Plaza	**Before**	0.0177	1.1969	13.3068	0.4425
			After	0.0183	1.3352	15.1610	0.6391
			Change	0.0006	0.1383	1.8542	0.1966
4	1453	Marsh	**Before**	0.0145	1.2642	11.1583	0.7110
			After	0.0121	0.9884	9.9016	0.5127
			Change	-0.0023	-0.2758	-1.2567	-0.1983
5	562	Ribaut	**Before**	0.0053	0.4911	4.2687	0.2474
			After	0.0045	0.3805	3.7139	0.1632
			Change	-0.0007	-0.1106	-0.5549	-0.0842
6	1301	Duke	**Before**	0.0136	1.4555	14.2529	0.9856
			After	0.0135	1.5162	15.2041	1.1027
			Change	-0.0001	0.0607	0.9512	0.1171
7	876	North	**Before**	0.0079	0.6273	6.2779	0.3148
			After	0.0075	0.6726	7.5727	0.4041
			Change	-0.0004	0.0453	1.2948	0.0893
8	767	Bay	**Before**	0.0118	1.1990	9.1817	0.7620
			After	0.0065	0.4956	4.6523	0.2088
			Change	-0.0053	-0.7034	-4.5294	-0.5532
9	2069	Hermitage	**Before**	0.0217	2.0306	20.5423	1.2077
			After	0.0180	1.6167	17.6016	0.9399
			Change	-0.0037	-0.4139	-2.9407	-0.2678
10	2033	Reynolds	**Before**	0.0172	1.3795	14.9483	0.7281
			After	0.0179	1.5945	17.0337	0.9692
			Change	0.0007	0.2150	2.0854	0.2411
11	1466	Hospital	**Before**	0.0126	0.9652	10.0135	0.4840
			After	0.0132	1.0546	10.4089	0.5176
			Change	0.0006	0.0894	0.3954	0.0335
12	645	Allison	**Before**	0.0101	0.9518	7.3657	0.4818
			After	0.0056	0.5364	6.1291	0.3327
			Change	-0.0045	-0.4154	-1.2366	-0.1491
13	3223	First	**Before**	0.0286	2.4104	26.4133	1.3851
			After	0.0271	1.9708	23.7603	0.9703
			Change	-0.0015	-0.4396	-2.6530	-0.4148
14	1944	Mossy Oaks	**Before**	0.0184	1.5140	14.6536	0.7467
			After	0.0176	1.3822	14.3074	0.6901
			Change	-0.0007	-0.1318	-0.3462	-0.0566
15	2273	Ladys Island	**Before**	0.0237	2.0973	20.6152	0.9525
			After	0.0216	1.8247	18.6022	0.9552
			Change	-0.0020	-0.2726	-2.0131	0.0027
Totals	**22,353**		**Before**	**0.2168**	**18.9952**	**188.3936**	**10.3475**
			After	**0.1974**	**16.7637**	**179.7208**	**9.3175**
			Change	**-0.0194**	**-2.2315**	**-8.6727**	**-1.0300**

Stats based on 7 BEFORE runs & 7 AFTER runs.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB AM**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Travel Time (sec) by Section

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
			Ribaut Rd AM After-SB-001	Ribaut Rd AM After-SB-002	Ribaut Rd AM After-SB-003	Ribaut Rd AM After-SB-004	Ribaut Rd AM After-SB-005	Ribaut Rd AM After-SB-006	Ribaut Rd AM After-SB-007	Ribaut Rd AM Before-S
1	0	SC 170								
2	1485	Hogarth	35	26	31	26	33	26	30	32
3	2256	Beaufort Plaza	42	39	42	35	52	42	38	44
4	1453	Marsh	24	25	42	25	36	29	32	29
5	562	Ribaut	13	15	13	13	17	13	16	21
6	1301	Duke	28	28	29	31	27	28	26	54
7	876	North	14	15	17	19	17	16	15	20
8	767	Bay	14	15	15	17	24	14	32	27
9	2069	Hermitage	35	41	40	39	43	43	56	61
10	2033	Reynolds	33	47	36	37	41	39	40	39
11	1466	Hospital	26	28	53	50	29	26	24	42
12	645	Allison	10	13	13	14	12	15	11	33
13	3223	First	54	55	50	56	52	84	50	59
14	1944	Mossy Oaks	62	33	31	35	35	70	32	34
15	2273	Ladys Island	40	69	37	88	71	38	38	52
Totals	**22353**		**430**	**449**	**449**	**485**	**489**	**483**	**440**	**547**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB AM**
Study Date **: 3/3/2011**
Page No. **: 6**

Detailed Statistics By Run

Travel Time (sec) by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13	Run #14
			Ribaut Rd AM Before-SB-003	Ribaut Rd AM Before-SB-004	Ribaut Rd AM Before-SB-005	Ribaut Rd AM Before-SB-006	Ribaut Rd AM Before-SB-007	Ribaut Rd AM Before-SB-008
1	0	SC 170						
2	1485	Hogarth	32	31	31	29	32	31
3	2256	Beaufort Plaza	39	51	44	39	48	46
4	1453	Marsh	25	35	46	27	34	62
5	562	Ribaut	14	17	17	15	16	16
6	1301	Duke	29	25	28	28	27	26
7	876	North	28	16	24	18	17	16
8	767	Bay	31	44	36	21	43	26
9	2069	Hermitage	39	38	39	80	49	58
10	2033	Reynolds	35	34	35	51	41	40
11	1466	Hospital	27	25	26	30	30	26
12	645	Allison	28	10	34	70	15	38
13	3223	First	64	56	62	59	63	67
14	1944	Mossy Oaks	82	42	39	43	61	38
15	2273	Ladys Island	40	36	161	85	44	81
Totals	**22353**		**513**	**460**	**622**	**595**	**520**	**571**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB AM**
Study Date **: 3/3/2011**
Page No. **: 7**

Detailed Statistics By Run

Number of Stops by Section

Ribaut Rd AM After-SB-001
Ribaut Rd AM After-SB-002
Ribaut Rd AM After-SB-003
Ribaut Rd AM After-SB-004
Ribaut Rd AM After-SB-005
Ribaut Rd AM After-SB-006
Ribaut Rd AM After-SB-007
Ribaut Rd AM Before-S

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
1	0	SC 170								
2	1485	Hogarth	0	0	0	0	0	0	0	0
3	2256	Beaufort Plaza	0	0	0	0	0	0	0	0
4	1453	Marsh	0	0	1	0	0	0	0	0
5	562	Ribaut	0	0	0	0	0	0	0	0
6	1301	Duke	0	0	0	0	0	0	0	1
7	876	North	0	0	0	0	0	0	0	0
8	767	Bay	0	0	0	0	0	0	1	1
9	2069	Hermitage	0	0	0	0	0	0	1	1
10	2033	Reynolds	0	0	0	0	0	0	0	0
11	1466	Hospital	0	0	1	1	0	0	0	1
12	645	Allison	0	0	0	0	0	0	0	1
13	3223	First	0	0	0	0	0	1	0	0
14	1944	Mossy Oaks	1	0	0	0	0	1	0	0
15	2273	Ladys Island	0	1	0	1	1	0	0	1
Totals	**22353**		**1**	**1**	**2**	**2**	**1**	**2**	**2**	**6**

Stops based on a Stop Speed of 5 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB AM**
Study Date **: 3/3/2011**
Page No. **: 8**

Detailed Statistics By Run

Number of Stops by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13	Run #14
			Ribaut Rd AM Before-SB-003	Ribaut Rd AM Before-SB-004	Ribaut Rd AM Before-SB-005	Ribaut Rd AM Before-SB-006	Ribaut Rd AM Before-SB-007	Ribaut Rd AM Before-SB-008
1	0	SC 170						
2	1485	Hogarth	0	0	0	0	0	0
3	2256	Beaufort Plaza	0	1	0	0	0	0
4	1453	Marsh	0	0	1	0	0	1
5	562	Ribaut	0	0	0	0	0	0
6	1301	Duke	0	0	0	0	0	0
7	876	North	1	0	1	0	0	0
8	767	Bay	1	1	0	1	1	1
9	2069	Hermitage	0	0	0	0	0	1
10	2033	Reynolds	0	0	0	1	0	0
11	1466	Hospital	0	0	0	0	0	0
12	645	Allison	1	0	1	1	0	1
13	3223	First	0	0	0	0	0	0
14	1944	Mossy Oaks	1	0	0	0	1	0
15	2273	Ladys Island	0	0	2	1	0	1
Totals	**22353**		**4**	**2**	**5**	**4**	**2**	**5**

Stops based on a Stop Speed of 5 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB AM**
Study Date **: 3/3/2011**
Page No. **: 9**

Detailed Statistics By Run

Average Speed (MPH) by Section

Ribaut Rd AM After-SB-001
Ribaut Rd AM After-SB-002
Ribaut Rd AM After-SB-003
Ribaut Rd AM After-SB-004
Ribaut Rd AM After-SB-005
Ribaut Rd AM After-SB-006
Ribaut Rd AM After-SB-007
Ribaut Rd AM Before-S

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
1	0	SC 170								
2	1485	Hogarth	29.2	39.7	32.7	40.6	31.2	39.7	34.8	31.8
3	2256	Beaufort Plaza	37.5	40.0	36.8	43.9	29.4	36.8	40.5	34.9
4	1453	Marsh	40.8	39.0	24.1	38.5	27.7	33.4	29.9	33.9
5	562	Ribaut	28.2	25.7	28.5	29.0	22.4	29.1	24.6	18.0
6	1301	Duke	32.6	31.9	30.7	28.7	32.7	31.8	35.0	16.4
7	876	North	40.7	39.7	35.8	31.1	35.9	38.7	38.0	30.2
8	767	Bay	38.8	34.3	33.5	31.4	21.1	36.4	16.8	19.6
9	2069	Hermitage	40.7	34.4	35.6	35.8	32.6	33.0	25.0	23.1
10	2033	Reynolds	41.2	30.1	38.9	37.8	34.5	35.8	35.0	35.9
11	1466	Hospital	39.5	35.1	18.4	20.0	34.6	38.2	42.4	23.7
12	645	Allison	41.8	32.7	35.8	31.6	37.2	28.6	40.1	13.3
13	3223	First	41.0	40.6	43.4	39.5	42.2	26.3	43.6	37.7
14	1944	Mossy Oaks	21.2	39.7	43.1	37.5	37.3	19.3	41.8	38.8
15	2273	Ladys Island	39.1	22.3	41.9	17.6	21.8	41.2	41.5	27.0
Totals	**22353**		**35.5**	**34.0**	**34.0**	**31.5**	**31.2**	**31.7**	**34.8**	**27.6**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB AM**
Study Date **: 3/3/2011**
Page No. **: 10**

Detailed Statistics By Run

Average Speed (MPH) by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13	Run #14
			Ribaut Rd AM Before-SB-003	Ribaut Rd AM Before-SB-004	Ribaut Rd AM Before-SB-005	Ribaut Rd AM Before-SB-006	Ribaut Rd AM Before-SB-007	Ribaut Rd AM Before-SB-008
1	0	SC 170						
2	1485	Hogarth	31.9	33.8	33.4	35.0	32.3	33.6
3	2256	Beaufort Plaza	39.7	29.4	34.8	40.5	31.8	33.1
4	1453	Marsh	39.6	28.5	21.2	35.9	29.6	16.0
5	562	Ribaut	26.9	23.0	23.2	25.0	24.1	24.7
6	1301	Duke	31.5	35.0	31.2	31.5	32.3	33.6
7	876	North	20.2	37.6	24.8	34.1	36.5	38.1
8	767	Bay	17.3	12.2	15.1	24.0	11.7	20.0
9	2069	Hermitage	36.9	37.3	36.6	17.8	29.2	24.2
10	2033	Reynolds	38.8	40.6	39.0	27.3	33.3	34.9
11	1466	Hospital	37.3	41.0	39.6	33.4	33.7	38.6
12	645	Allison	15.4	43.3	12.1	6.1	28.0	11.9
13	3223	First	34.5	39.4	36.0	37.5	35.4	32.6
14	1944	Mossy Oaks	16.3	31.3	33.4	30.4	21.4	35.5
15	2273	Ladys Island	33.8	35.9	9.6	16.2	34.1	17.7
Totals	**22353**		**29.4**	**32.6**	**24.6**	**25.4**	**29.2**	**26.6**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB AM**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Total Delay (sec) by Section

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
			Ribaut Rd AM After-SB-001	Ribaut Rd AM After-SB-002	Ribaut Rd AM After-SB-003	Ribaut Rd AM After-SB-004	Ribaut Rd AM After-SB-005	Ribaut Rd AM After-SB-006	Ribaut Rd AM After-SB-007	Ribaut Rd AM Before-S
1	0	SC 170								
2	1485	Hogarth	1	0	0	0	0	0	0	0
3	2256	Beaufort Plaza	0	0	0	0	1	0	0	0
4	1453	Marsh	0	0	8	0	2	0	0	0
5	562	Ribaut	0	2	0	0	4	0	3	8
6	1301	Duke	0	0	0	1	0	0	0	24
7	876	North	0	0	0	0	0	0	0	0
8	767	Bay	0	0	0	0	6	0	14	9
9	2069	Hermitage	0	0	0	0	0	0	9	14
10	2033	Reynolds	0	0	0	0	0	0	0	0
11	1466	Hospital	0	0	20	16	0	0	0	8
12	645	Allison	0	0	0	0	0	0	0	18
13	3223	First	0	0	0	0	0	11	0	0
14	1944	Mossy Oaks	18	0	0	0	0	25	0	0
15	2273	Ladys Island	0	17	0	36	19	0	0	5
Totals	**22353**		**19**	**19**	**28**	**53**	**32**	**36**	**26**	**86**

Total Delay based on a Normal Speed of 30 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB AM**
Study Date **: 3/3/2011**
Page No. **: 12**

Detailed Statistics By Run

Total Delay (sec) by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13	Run #14
			Ribaut Rd AM Before-SB-003	Ribaut Rd AM Before-SB-004	Ribaut Rd AM Before-SB-005	Ribaut Rd AM Before-SB-006	Ribaut Rd AM Before-SB-007	Ribaut Rd AM Before-SB-008
1	0	SC 170						
2	1485	Hogarth	0	0	0	0	0	0
3	2256	Beaufort Plaza	0	0	0	0	0	0
4	1453	Marsh	0	2	13	0	0	29
5	562	Ribaut	1	4	4	2	3	2
6	1301	Duke	0	0	0	0	0	0
7	876	North	8	0	4	0	0	0
8	767	Bay	13	26	18	4	25	8
9	2069	Hermitage	0	0	0	33	1	11
10	2033	Reynolds	0	0	0	4	0	0
11	1466	Hospital	0	0	0	0	0	0
12	645	Allison	13	0	19	55	0	22
13	3223	First	0	0	0	0	0	0
14	1944	Mossy Oaks	37	0	0	0	16	0
15	2273	Ladys Island	0	0	109	39	0	33
Totals	**22353**		**72**	**32**	**167**	**137**	**45**	**105**

Total Delay based on a Normal Speed of 30 MPH.

PC-Travel Reports for study: Ribaut Rd SB MD

Kimley-Horn
and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB MD**
Study Date **: 3/3/2011**

Study Summary

Runs Used in This Study

Run Title	Start Date	Start Time	Length	Before/ After	Run Type
Ribaut Rd MD After-SB-001	03/01/11	10:59	22472	After	Secondary
Ribaut Rd MD After-SB-002	03/01/11	11:20	22522	After	Secondary
Ribaut Rd MD After-SB-003	03/01/11	11:39	22524	After	Secondary
Ribaut Rd MD After-SB-005	03/01/11	12:29	22484	After	Secondary
Ribaut Rd MD After-SB-006	03/01/11	12:49	22498	After	Secondary
Ribaut Rd MD Before-SB-001	12/08/10	11:04	22233	Before	Secondary
Ribaut Rd MD Before-SB-002	12/08/10	11:27	22245	Before	Secondary
Ribaut Rd MD Before-SB-003	12/08/10	11:51	22318	Before	Secondary
Ribaut Rd MD Before-SB-004	12/08/10	12:12	22207	Before	Secondary
Ribaut Rd MD Before-SB-005	12/08/10	12:33	22275	Before	Secondary
Ribaut Rd MD Before-SB-006	12/08/10	12:54	22232	Before	Secondary

Node Info

#	Len	Name
1	0	SC 170
2	1485	Hogarth
3	2256	Beaufort Plaza
4	1453	Marsh
5	562	Ribaut
6	1301	Duke
7	876	North
8	767	Bay
9	2069	Hermitage
10	2033	Reynolds
11	1466	Hospital
12	645	Allison
13	3223	First
14	1944	Mossy Oaks
15	2273	Ladys Island

Length of Study Route = 22,353 feet

Notes:

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB MD**
Study Date **: 3/3/2011**
Page No. **: 3**

Overall Output Statistics

Node #	Length	Node Name		Travel Time	# of Stops	Avg Speed	Total Delay	Time <= 0 MPH	Time <= 35 MPH	Time <= 55 MPH
1	0	SC 170								
2	1485	Hogarth	**Before**	34.3	0.0	29.5	1.3	0.0	29.8	34.3
			After	30.0	0.0	33.8	0.0	0.0	12.2	30.0
			Change	-4.3	0.0	4.3	-1.3	0.0	-17.6	-4.3
3	2256	Beaufort Plaza	**Before**	46.7	0.0	33.0	0.2	0.0	26.5	46.7
			After	41.0	0.0	37.5	0.0	0.0	8.8	41.0
			Change	-5.7	0.0	4.6	-0.2	0.0	-17.7	-5.7
4	1453	Marsh	**Before**	52.3	0.8	18.9	20.0	6.5	44.7	52.3
			After	54.8	1.0	18.1	21.6	3.8	48.0	54.8
			Change	2.5	0.2	-0.9	1.6	-2.7	3.3	2.5
5	562	Ribaut	**Before**	16.2	0.0	23.7	3.2	0.0	15.8	16.2
			After	14.8	0.0	25.9	1.8	0.0	14.8	14.8
			Change	-1.4	0.0	2.2	-1.4	0.0	-1.0	-1.4
6	1301	Duke	**Before**	29.2	0.0	30.4	0.0	0.0	25.0	29.2
			After	28.4	0.0	31.2	0.0	0.0	18.8	28.4
			Change	-0.8	0.0	0.8	0.0	0.0	-6.2	-0.8
7	876	North	**Before**	17.5	0.0	34.1	0.5	0.0	7.5	17.5
			After	16.0	0.0	37.3	0.0	0.0	1.4	16.0
			Change	-1.5	0.0	3.2	-0.5	0.0	-6.1	-1.5
8	767	Bay	**Before**	31.0	0.5	16.9	13.8	11.0	24.7	31.0
			After	13.6	0.0	38.5	0.0	0.0	1.4	13.6
			Change	-17.4	-0.5	21.6	-13.8	-11.0	-23.3	-17.4
9	2069	Hermitage	**Before**	44.8	0.2	31.5	1.8	1.0	20.3	44.8
			After	36.0	0.0	39.2	0.0	0.0	4.2	36.0
			Change	-8.8	-0.2	7.7	-1.8	-1.0	-16.1	-8.8
10	2033	Reynolds	**Before**	43.7	0.3	31.7	2.0	0.5	16.7	43.7
			After	35.4	0.0	39.2	0.0	0.0	2.8	35.4
			Change	-8.3	-0.3	7.4	-2.0	-0.5	-13.9	-8.3
11	1466	Hospital	**Before**	35.7	0.2	28.0	4.8	0.8	27.0	35.7
			After	40.8	0.2	24.5	8.4	5.8	33.0	40.8
			Change	5.1	0.0	-3.5	3.6	5.0	6.0	5.1
12	645	Allison	**Before**	13.5	0.0	32.6	0.2	0.0	6.7	13.5
			After	14.0	0.0	31.4	0.0	0.0	10.0	14.0
			Change	0.5	0.0	-1.2	-0.2	0.0	3.3	0.5
13	3223	First	**Before**	65.2	0.3	33.7	1.5	1.3	16.5	65.2
			After	56.6	0.0	38.8	0.0	0.0	6.0	56.6
			Change	-8.6	-0.3	5.1	-1.5	-1.3	-10.5	-8.6
14	1944	Mossy Oaks	**Before**	47.2	0.3	28.1	7.3	1.5	29.3	47.2
			After	40.8	0.2	32.5	1.8	1.0	19.4	40.8
			Change	-6.4	-0.1	4.4	-5.5	-0.5	-9.9	-6.4
15	2273	Ladys Island	**Before**	65.3	0.3	23.7	19.2	14.2	45.2	64.3
			After	66.6	0.6	23.3	15.6	10.8	55.2	66.6
			Change	1.3	0.3	-0.5	-3.6	-3.4	10.0	2.3
Totals	**22,353**		**Before**	**542.5**	**3.0**	**28.1**	**75.8**	**36.8**	**335.7**	**541.5**
			After	**488.8**	**2.0**	**31.2**	**49.2**	**21.4**	**236.0**	**488.8**
			Change	**-53.7**	**-1.0**	**3.1**	**-26.6**	**-15.4**	**-99.7**	**-52.7**

Stats based on 6 BEFORE runs & 5 AFTER runs.
Stops based on a Stop Speed of 5 MPH.
Total Delay based on a Normal Speed of 30 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB MD**
Study Date **: 3/3/2011**
Page No. **: 4**

Fuel Consumption & Emissions

Node #	Length	Node Name		Fuel (gal)	HC (grams)	CO (grams)	NOx (grams)
1	0	SC 170					
2	1485	Hogarth	**Before**	0.0138	1.4058	14.2730	0.8632
			After	0.0147	1.6384	19.0143	1.1469
			Change	0.0010	0.2326	4.7414	0.2837
3	2256	Beaufort Plaza	**Before**	0.0184	1.4963	15.6757	0.7390
			After	0.0178	1.3344	15.7602	0.6397
			Change	-0.0006	-0.1619	0.0846	-0.0994
4	1453	Marsh	**Before**	0.0166	1.5306	12.3145	0.7604
			After	0.0171	1.6614	12.7317	0.9051
			Change	0.0006	0.1308	0.4172	0.1447
5	562	Ribaut	**Before**	0.0049	0.4530	4.0187	0.2122
			After	0.0057	0.6254	5.5403	0.4244
			Change	0.0008	0.1724	1.5216	0.2122
6	1301	Duke	**Before**	0.0131	1.4526	14.2291	1.0231
			After	0.0136	1.5544	15.4074	1.1438
			Change	0.0004	0.1018	1.1784	0.1207
7	876	North	**Before**	0.0069	0.4999	5.1876	0.2082
			After	0.0072	0.6139	7.4661	0.3365
			Change	0.0003	0.1140	2.2785	0.1283
8	767	Bay	**Before**	0.0090	0.7920	7.7755	0.2895
			After	0.0062	0.5016	6.1627	0.2625
			Change	-0.0028	-0.2905	-1.6128	-0.0270
9	2069	Hermitage	**Before**	0.0203	1.8311	17.4237	1.1392
			After	0.0164	1.1923	14.6722	0.5642
			Change	-0.0039	-0.6388	-2.7515	-0.5750
10	2033	Reynolds	**Before**	0.0177	1.4285	14.6848	0.7236
			After	0.0167	1.3074	15.8608	0.7001
			Change	-0.0010	-0.1211	1.1760	-0.0235
11	1466	Hospital	**Before**	0.0139	1.3142	12.4299	0.7704
			After	0.0149	1.4402	13.1981	0.8365
			Change	0.0009	0.1260	0.7682	0.0661
12	645	Allison	**Before**	0.0060	0.5597	5.9099	0.3429
			After	0.0064	0.7122	7.7897	0.4870
			Change	0.0005	0.1526	1.8797	0.1441
13	3223	First	**Before**	0.0263	1.9135	19.6805	0.8374
			After	0.0265	2.0686	25.0760	1.0913
			Change	0.0001	0.1551	5.3955	0.2539
14	1944	Mossy Oaks	**Before**	0.0179	1.5915	15.1889	0.8615
			After	0.0161	1.2971	13.5237	0.6485
			Change	-0.0018	-0.2943	-1.6652	-0.2130
15	2273	Ladys Island	**Before**	0.0214	1.8680	18.0687	0.8340
			After	0.0226	2.0976	20.3562	1.0591
			Change	0.0012	0.2297	2.2876	0.2251
Totals	**22,353**		**Before**	**0.2062**	**18.1367**	**176.8603**	**9.6047**
			After	**0.2019**	**18.0450**	**192.5593**	**10.2456**
			Change	**-0.0043**	**-0.0917**	**15.6990**	**0.6409**

Stats based on 6 BEFORE runs & 5 AFTER runs.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB MD**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Travel Time (sec) by Section

Ribaut Rd MD After-SB-001
Ribaut Rd MD After-SB-002
Ribaut Rd MD After-SB-003
Ribaut Rd MD After-SB-005
Ribaut Rd MD After-SB-006
Ribaut Rd MD Before-SB-001
Ribaut Rd MD Before-SB-002
Ribaut Rd MD Before-S

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
1	0	SC 170								
2	1485	Hogarth	29	31	34	28	28	32	32	35
3	2256	Beaufort Plaza	40	40	39	42	44	49	39	44
4	1453	Marsh	56	53	46	53	66	46	26	76
5	562	Ribaut	14	15	14	14	17	16	13	18
6	1301	Duke	29	31	28	26	28	29	27	30
7	876	North	17	16	15	16	16	16	16	17
8	767	Bay	15	14	13	13	13	18	55	14
9	2069	Hermitage	38	38	35	33	36	46	59	38
10	2033	Reynolds	40	36	33	33	35	43	38	41
11	1466	Hospital	39	30	30	69	36	29	25	29
12	645	Allison	15	15	14	13	13	12	12	13
13	3223	First	59	53	61	55	55	77	57	80
14	1944	Mossy Oaks	37	39	54	36	38	74	59	41
15	2273	Ladys Island	92	66	76	50	49	50	118	99
Totals	**22353**		**520**	**477**	**492**	**481**	**474**	**537**	**576**	**575**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB MD**
Study Date **: 3/3/2011**
Page No. **: 6**

Detailed Statistics By Run

Travel Time (sec) by Section

Node #	Length	Node Name	Run #9 (Ribaut Rd MD Before-SB-004)	Run #10 (Ribaut Rd MD Before-SB-005)	Run #11 (Ribaut Rd MD Before-SB-006)
1	0	SC 170			
2	1485	Hogarth	32	32	43
3	2256	Beaufort Plaza	48	47	53
4	1453	Marsh	51	62	53
5	562	Ribaut	17	15	18
6	1301	Duke	29	30	30
7	876	North	16	23	17
8	767	Bay	48	18	33
9	2069	Hermitage	43	39	44
10	2033	Reynolds	35	51	54
11	1466	Hospital	51	38	42
12	645	Allison	13	15	16
13	3223	First	57	55	65
14	1944	Mossy Oaks	35	35	39
15	2273	Ladys Island	40	46	39
Totals	**22353**		**515**	**506**	**546**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB MD**
Study Date **: 3/3/2011**
Page No. **: 7**

Detailed Statistics By Run

Number of Stops by Section

Ribaut Rd MD After-SB-001
Ribaut Rd MD After-SB-002
Ribaut Rd MD After-SB-003
Ribaut Rd MD After-SB-005
Ribaut Rd MD After-SB-006
Ribaut Rd MD Before-SB-001
Ribaut Rd MD Before-SB-002
Ribaut Rd MD Before-S

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
1	0	SC 170								
2	1485	Hogarth	0	0	0	0	0	0	0	0
3	2256	Beaufort Plaza	0	0	0	0	0	0	0	0
4	1453	Marsh	1	1	1	1	1	1	0	1
5	562	Ribaut	0	0	0	0	0	0	0	0
6	1301	Duke	0	0	0	0	0	0	0	0
7	876	North	0	0	0	0	0	0	0	0
8	767	Bay	0	0	0	0	0	0	1	0
9	2069	Hermitage	0	0	0	0	0	0	1	0
10	2033	Reynolds	0	0	0	0	0	0	0	0
11	1466	Hospital	0	0	0	1	0	0	0	0
12	645	Allison	0	0	0	0	0	0	0	0
13	3223	First	0	0	0	0	0	1	0	1
14	1944	Mossy Oaks	0	0	1	0	0	1	1	0
15	2273	Ladys Island	1	1	1	0	0	0	1	1
Totals	**22353**		**2**	**2**	**3**	**2**	**1**	**3**	**4**	**3**

Stops based on a Stop Speed of 5 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB MD**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Number of Stops by Section

Node #	Length	Node Name	Run #9 (Ribaut Rd MD Before-SB-004)	Run #10 (Ribaut Rd MD Before-SB-005)	Run #11 (Ribaut Rd MD Before-SB-006)
1	0	SC 170			
2	1485	Hogarth	0	0	0
3	2256	Beaufort Plaza	0	0	0
4	1453	Marsh	1	1	1
5	562	Ribaut	0	0	0
6	1301	Duke	0	0	0
7	876	North	0	0	0
8	767	Bay	1	0	1
9	2069	Hermitage	0	0	0
10	2033	Reynolds	0	1	1
11	1466	Hospital	1	0	0
12	645	Allison	0	0	0
13	3223	First	0	0	0
14	1944	Mossy Oaks	0	0	0
15	2273	Ladys Island	0	0	0
Totals	**22353**		**3**	**2**	**3**

Stops based on a Stop Speed of 5 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB MD**
Study Date **: 3/3/2011**
Page No. **: 9**

Detailed Statistics By Run

Average Speed (MPH) by Section

Ribaut Rd MD After-SB-001
Ribaut Rd MD After-SB-002
Ribaut Rd MD After-SB-003
Ribaut Rd MD After-SB-005
Ribaut Rd MD After-SB-006
Ribaut Rd MD Before-SB-001
Ribaut Rd MD Before-SB-002
Ribaut Rd MD Before-S

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
1	0	SC 170								
2	1485	Hogarth	35.1	33.8	30.8	37.1	37.3	32.3	31.8	29.9
3	2256	Beaufort Plaza	39.1	38.0	39.1	36.8	34.5	31.3	39.5	34.3
4	1453	Marsh	17.7	18.6	21.5	18.1	14.8	21.5	39.2	13.0
5	562	Ribaut	26.1	25.1	27.0	27.9	22.8	24.0	28.2	21.2
6	1301	Duke	30.8	29.6	32.0	34.1	31.9	30.8	32.8	30.5
7	876	North	35.6	37.0	39.8	37.7	37.7	36.6	38.0	34.8
8	767	Bay	35.1	35.9	40.6	39.5	39.5	28.3	9.3	35.9
9	2069	Hermitage	36.3	37.3	40.1	43.5	39.7	31.0	24.3	38.0
10	2033	Reynolds	34.8	38.4	42.1	41.9	39.6	32.4	36.6	33.6
11	1466	Hospital	26.1	33.6	33.5	14.4	27.3	33.7	39.2	34.9
12	645	Allison	28.0	29.7	31.3	34.0	35.2	36.6	39.1	32.8
13	3223	First	37.7	41.4	36.1	40.1	39.7	28.7	38.4	27.4
14	1944	Mossy Oaks	35.8	33.7	24.5	36.7	34.8	17.9	22.2	32.3
15	2273	Ladys Island	16.6	23.6	20.3	30.8	31.6	29.5	12.6	15.4
Totals	**22353**		**29.3**	**32.0**	**31.0**	**31.7**	**32.2**	**28.3**	**26.4**	**26.5**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB MD**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Average Speed (MPH) by Section

Ribaut Rd MD Before-SB-004
Ribaut Rd MD Before-SB-005
Ribaut Rd MD Before-SB-006

Node #	Length	Node Name	Run #9	Run #10	Run #11
1	0	SC 170			
2	1485	Hogarth	32.0	32.1	24.2
3	2256	Beaufort Plaza	32.0	33.0	28.8
4	1453	Marsh	19.5	16.0	18.7
5	562	Ribaut	22.2	24.9	21.3
6	1301	Duke	31.1	30.1	29.9
7	876	North	38.0	25.5	35.4
8	767	Bay	10.4	29.1	15.0
9	2069	Hermitage	33.3	36.6	32.8
10	2033	Reynolds	39.6	26.7	25.4
11	1466	Hospital	19.9	26.7	24.0
12	645	Allison	33.5	30.1	26.4
13	3223	First	38.4	39.6	34.0
14	1944	Mossy Oaks	38.4	38.7	33.8
15	2273	Ladys Island	36.7	32.8	38.4
Totals	**22353**		**29.5**	**30.1**	**27.8**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB MD**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Total Delay (sec) by Section

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
			Ribaut Rd MD After-SB-001	Ribaut Rd MD After-SB-002	Ribaut Rd MD After-SB-003	Ribaut Rd MD After-SB-005	Ribaut Rd MD After-SB-006	Ribaut Rd MD Before-SB-001	Ribaut Rd MD Before-SB-002	Ribaut Rd MD Before-S
1	0	SC 170								
2	1485	Hogarth	0	0	0	0	0	0	0	0
3	2256	Beaufort Plaza	0	0	0	0	0	0	0	0
4	1453	Marsh	22	20	13	20	33	12	0	43
5	562	Ribaut	1	2	1	1	4	3	0	5
6	1301	Duke	0	0	0	0	0	0	0	0
7	876	North	0	0	0	0	0	0	0	0
8	767	Bay	0	0	0	0	0	0	37	0
9	2069	Hermitage	0	0	0	0	0	0	11	0
10	2033	Reynolds	0	0	0	0	0	0	0	0
11	1466	Hospital	5	0	0	35	2	0	0	0
12	645	Allison	0	0	0	0	0	0	0	0
13	3223	First	0	0	0	0	0	3	0	6
14	1944	Mossy Oaks	0	0	9	0	0	29	15	0
15	2273	Ladys Island	40	14	24	0	0	0	68	47
Totals	**22353**		**68**	**36**	**47**	**56**	**39**	**47**	**131**	**101**

Total Delay based on a Normal Speed of 30 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB MD**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Total Delay (sec) by Section

Node #	Length	Node Name	Run #9 (Ribaut Rd MD Before-SB-004)	Run #10 (Ribaut Rd MD Before-SB-005)	Run #11 (Ribaut Rd MD Before-SB-006)
1	0	SC 170			
2	1485	Hogarth	0	0	8
3	2256	Beaufort Plaza	0	0	1
4	1453	Marsh	17	28	20
5	562	Ribaut	4	2	5
6	1301	Duke	0	0	0
7	876	North	0	3	0
8	767	Bay	30	0	16
9	2069	Hermitage	0	0	0
10	2033	Reynolds	0	5	7
11	1466	Hospital	17	4	8
12	645	Allison	0	0	1
13	3223	First	0	0	0
14	1944	Mossy Oaks	0	0	0
15	2273	Ladys Island	0	0	0
Totals	**22353**		**68**	**42**	**66**

Total Delay based on a Normal Speed of 30 MPH.

PC-Travel Reports for study: Ribaut Rd SB PM

Kimley-Horn
and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB PM**
Study Date **: 3/3/2011**
Page No. **: 2**

Study Summary

Runs Used in This Study

Run Title	Start Date	Start Time	Length	Before/ After	Run Type
Ribaut Rd PM After-SB-001	03/01/11	15:02	22449	After	Secondary
Ribaut Rd PM After-SB-002	03/01/11	15:25	22480	After	Secondary
Ribaut Rd PM After-SB-003	03/01/11	15:47	22348	After	Secondary
Ribaut Rd PM After-SB-004	03/01/11	16:18	22480	After	Secondary
Ribaut Rd PM After-SB-005	03/01/11	16:39	22463	After	Secondary
Ribaut Rd PM After-SB-006	03/01/11	17:06	22483	After	Secondary
Ribaut Rd PM After-SB-007	03/01/11	17:28	22517	After	Secondary
Ribaut Rd PM Before-SB-001	12/08/10	15:00	22226	Before	Secondary
Ribaut Rd PM Before-SB-002	12/08/10	15:31	22319	Before	Secondary
Ribaut Rd PM Before-SB-003	12/08/10	15:54	22078	Before	Secondary
Ribaut Rd PM Before-SB-004	12/08/10	16:20	22256	Before	Secondary
Ribaut Rd PM Before-SB-005	12/08/10	16:42	22094	Before	Secondary
Ribaut Rd PM Before-SB-006	12/08/10	17:09	22083	Before	Secondary
Ribaut Rd PM Before-SB-007	12/08/10	17:33	22086	Before	Secondary

Node Info

#	Len	Name
1	0	SC 170
2	1485	Hogarth
3	2256	Beaufort Plaza
4	1453	Marsh
5	562	Ribaut
6	1301	Duke
7	876	North
8	767	Bay
9	2069	Hermitage
10	2033	Reynolds
11	1466	Hospital
12	645	Allison
13	3223	First
14	1944	Mossy Oaks
15	2273	Ladys Island

Length of Study Route = 22,353 feet

Notes:

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB PM**
Study Date **: 3/3/2011**
Page No. **: 3**

Overall Output Statistics

Node #	Length	Node Name		Travel Time	# of Stops	Avg Speed	Total Delay	Time <= 0 MPH	Time <= 35 MPH	Time <= 55 MPH
1	0	SC 170								
2	1485	Hogarth	**Before**	33.1	0.1	30.5	1.3	0.0	24.1	33.1
			After	30.9	0.0	32.8	0.1	0.0	18.9	30.9
			Change	-2.3	-0.1	2.3	-1.1	0.0	-5.3	-2.3
3	2256	Beaufort Plaza	**Before**	54.7	0.4	28.1	4.9	1.4	30.7	54.7
			After	43.3	0.0	35.5	0.0	0.0	10.1	43.3
			Change	-11.4	-0.4	7.4	-4.9	-1.4	-20.6	-11.4
4	1453	Marsh	**Before**	56.0	0.7	17.7	22.7	11.0	53.9	56.0
			After	37.6	0.1	26.4	6.4	3.9	26.1	37.6
			Change	-18.4	-0.6	8.7	-16.3	-7.1	-27.7	-18.4
5	562	Ribaut	**Before**	17.0	0.0	22.5	4.0	0.0	17.0	17.0
			After	16.6	0.0	23.1	3.6	0.0	16.6	16.6
			Change	-0.4	0.0	0.6	-0.4	0.0	-0.4	-0.4
6	1301	Duke	**Before**	35.3	0.3	25.1	6.4	3.1	29.9	35.3
			After	28.6	0.1	31.0	1.3	0.6	16.3	28.6
			Change	-6.7	-0.1	5.9	-5.1	-2.6	-13.6	-6.7
7	876	North	**Before**	23.3	0.4	25.6	4.4	0.0	17.6	23.3
			After	17.0	0.0	35.1	0.1	0.0	5.4	17.0
			Change	-6.3	-0.4	9.5	-4.3	0.0	-12.1	-6.3
8	767	Bay	**Before**	19.9	0.1	26.3	3.6	1.7	16.1	19.9
			After	14.4	0.0	36.2	0.0	0.0	5.1	14.4
			Change	-5.4	-0.1	9.9	-3.6	-1.7	-11.0	-5.4
9	2069	Hermitage	**Before**	44.3	0.3	31.9	2.7	1.1	15.1	44.3
			After	41.3	0.1	34.2	1.6	1.4	10.9	41.3
			Change	-3.0	-0.1	2.3	-1.1	0.3	-4.3	-3.0
10	2033	Reynolds	**Before**	41.7	0.0	33.2	0.6	0.0	22.3	41.7
			After	41.0	0.3	33.8	0.0	0.0	13.7	41.0
			Change	-0.7	0.3	0.6	-0.6	0.0	-8.6	-0.7
11	1466	Hospital	**Before**	40.1	0.3	24.9	9.1	4.6	27.9	40.1
			After	36.1	0.3	27.7	6.4	4.0	22.0	36.1
			Change	-4.0	0.0	2.8	-2.7	-0.6	-5.9	-4.0
12	645	Allison	**Before**	24.0	0.6	18.3	9.4	0.4	21.9	24.0
			After	16.3	0.3	27.0	3.3	1.1	10.6	16.3
			Change	-7.7	-0.3	8.7	-6.1	0.7	-11.3	-7.7
13	3223	First	**Before**	60.3	0.0	36.5	0.0	0.0	14.9	60.3
			After	61.3	0.1	35.9	1.9	2.3	15.4	61.3
			Change	1.0	0.1	-0.6	1.9	2.3	0.6	1.0
14	1944	Mossy Oaks	**Before**	39.0	0.1	34.0	1.3	0.4	12.7	39.0
			After	58.7	0.6	22.6	17.4	14.1	38.0	58.7
			Change	19.7	0.4	-11.4	16.1	13.7	25.3	19.7
15	2273	Ladys Island	**Before**	59.7	0.4	26.0	14.4	12.0	37.7	58.7
			After	58.0	0.3	26.7	8.7	6.9	40.1	57.9
			Change	-1.7	-0.1	0.8	-5.7	-5.1	2.4	-0.9
Totals	**22,353**		**Before**	**548.4**	**3.9**	**27.8**	**84.9**	**35.9**	**341.7**	**547.4**
			After	**501.0**	**2.3**	**30.4**	**50.9**	**34.3**	**249.3**	**500.9**
			Change	**-47.4**	**-1.6**	**2.6**	**-34.0**	**-1.6**	**-92.4**	**-46.6**

Stats based on 7 BEFORE runs & 7 AFTER runs.
Stops based on a Stop Speed of 5 MPH.
Total Delay based on a Normal Speed of 30 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB PM**
Study Date **: 3/3/2011**
Page No. **: 4**

Fuel Consumption & Emissions

Node #	Length	Node Name		Fuel (gal)	HC (grams)	CO (grams)	NOx (grams)
1	0	SC 170					
2	1485	Hogarth	**Before**	0.0142	1.4315	15.0664	0.9015
			After	0.0139	1.5026	16.7046	1.0113
			Change	-0.0002	0.0711	1.6382	0.1097
3	2256	Beaufort Plaza	**Before**	0.0205	1.6900	15.5823	0.8525
			After	0.0185	1.4647	16.5285	0.7437
			Change	-0.0020	-0.2253	0.9462	-0.1088
4	1453	Marsh	**Before**	0.0181	1.8316	15.1453	1.0154
			After	0.0132	1.1316	10.5033	0.5536
			Change	-0.0049	-0.7001	-4.6420	-0.4618
5	562	Ribaut	**Before**	0.0054	0.5409	4.5683	0.2923
			After	0.0052	0.5034	4.2192	0.2689
			Change	-0.0002	-0.0374	-0.3491	-0.0234
6	1301	Duke	**Before**	0.0146	1.5640	14.4963	1.0448
			After	0.0133	1.4873	14.7224	1.0696
			Change	-0.0013	-0.0768	0.2262	0.0249
7	876	North	**Before**	0.0100	0.9506	8.2915	0.6212
			After	0.0072	0.5908	6.3289	0.3128
			Change	-0.0028	-0.3599	-1.9626	-0.3084
8	767	Bay	**Before**	0.0075	0.6890	6.6518	0.3777
			After	0.0060	0.4517	5.2398	0.2063
			Change	-0.0015	-0.2373	-1.4119	-0.1714
9	2069	Hermitage	**Before**	0.0186	1.4743	15.2553	0.7521
			After	0.0167	1.2268	13.7766	0.5303
			Change	-0.0019	-0.2476	-1.4788	-0.2218
10	2033	Reynolds	**Before**	0.0166	1.3425	13.9820	0.6624
			After	0.0188	1.7261	17.5739	1.0979
			Change	0.0022	0.3836	3.5919	0.4355
11	1466	Hospital	**Before**	0.0145	1.2644	11.6542	0.6397
			After	0.0144	1.3124	12.5605	0.7569
			Change	-0.0001	0.0481	0.9062	0.1172
12	645	Allison	**Before**	0.0081	0.8176	5.9287	0.5006
			After	0.0061	0.5304	5.0035	0.2782
			Change	-0.0020	-0.2872	-0.9253	-0.2225
13	3223	First	**Before**	0.0269	2.1769	24.0760	1.1539
			After	0.0268	2.0979	23.9020	1.0749
			Change	-0.0001	-0.0790	-0.1740	-0.0791
14	1944	Mossy Oaks	**Before**	0.0154	1.0868	11.2908	0.4334
			After	0.0220	2.1088	19.9804	1.2076
			Change	0.0066	1.0220	8.6896	0.7742
15	2273	Ladys Island	**Before**	0.0200	1.5976	15.3837	0.6470
			After	0.0211	1.9025	18.5501	1.0093
			Change	0.0012	0.3049	3.1664	0.3623
Totals	**22,353**		**Before**	**0.2103**	**18.4577**	**177.3726**	**9.8947**
			After	**0.2033**	**18.0369**	**185.5937**	**10.1214**
			Change	**-0.0071**	**-0.4208**	**8.2211**	**0.2267**

Stats based on 7 BEFORE runs & 7 AFTER runs.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB PM**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Travel Time (sec) by Section

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
			Ribaut Rd PM After-SB-001	Ribaut Rd PM After-SB-002	Ribaut Rd PM After-SB-003	Ribaut Rd PM After-SB-004	Ribaut Rd PM After-SB-005	Ribaut Rd PM After-SB-006	Ribaut Rd PM After-SB-007	Ribaut Rd PM Before-S
1	0	SC 170								
2	1485	Hogarth	30	30	30	31	30	36	29	31
3	2256	Beaufort Plaza	50	39	47	45	39	42	41	44
4	1453	Marsh	77	31	26	33	27	34	35	33
5	562	Ribaut	18	17	13	20	13	21	14	17
6	1301	Duke	39	28	27	26	26	27	27	31
7	876	North	21	16	16	16	16	18	16	16
8	767	Bay	17	16	13	14	13	15	13	43
9	2069	Hermitage	40	58	42	38	36	40	35	42
10	2033	Reynolds	38	40	46	38	44	47	34	47
11	1466	Hospital	70	24	26	28	31	31	43	45
12	645	Allison	13	11	11	28	12	25	14	36
13	3223	First	55	54	56	67	55	87	55	59
14	1944	Mossy Oaks	36	72	76	65	87	40	35	35
15	2273	Ladys Island	79	47	48	42	54	52	84	46
Totals	**22353**		**583**	**483**	**477**	**491**	**483**	**515**	**475**	**525**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB PM**
Study Date **: 3/3/2011**
Page No. **: 6**

Detailed Statistics By Run

Travel Time (sec) by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13	Run #14
			Ribaut Rd PM Before-SB-002	Ribaut Rd PM Before-SB-003	Ribaut Rd PM Before-SB-004	Ribaut Rd PM Before-SB-005	Ribaut Rd PM Before-SB-006	Ribaut Rd PM Before-SB-007
1	0	SC 170						
2	1485	Hogarth	31	30	37	31	31	41
3	2256	Beaufort Plaza	55	67	46	52	52	67
4	1453	Marsh	58	55	70	70	67	39
5	562	Ribaut	15	18	17	17	18	17
6	1301	Duke	46	27	27	28	52	36
7	876	North	18	33	30	28	20	18
8	767	Bay	14	18	17	17	15	15
9	2069	Hermitage	38	40	37	39	56	58
10	2033	Reynolds	35	41	36	42	51	40
11	1466	Hospital	27	27	27	34	67	54
12	645	Allison	27	24	24	30	15	12
13	3223	First	64	58	61	67	57	56
14	1944	Mossy Oaks	34	54	36	40	37	37
15	2273	Ladys Island	73	40	64	48	111	36
Totals	**22353**		**535**	**532**	**529**	**543**	**649**	**526**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB PM**
Study Date **: 3/3/2011**
Page No. **: 7**

Detailed Statistics By Run

Number of Stops by Section

Ribaut Rd PM After-SB-001
Ribaut Rd PM After-SB-002
Ribaut Rd PM After-SB-003
Ribaut Rd PM After-SB-004
Ribaut Rd PM After-SB-005
Ribaut Rd PM After-SB-006
Ribaut Rd PM After-SB-007
Ribaut Rd PM Before-S

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
1	0	SC 170								
2	1485	Hogarth	0	0	0	0	0	0	0	0
3	2256	Beaufort Plaza	0	0	0	0	0	0	0	0
4	1453	Marsh	1	0	0	0	0	0	0	0
5	562	Ribaut	0	0	0	0	0	0	0	0
6	1301	Duke	1	0	0	0	0	0	0	0
7	876	North	0	0	0	0	0	0	0	0
8	767	Bay	0	0	0	0	0	0	0	1
9	2069	Hermitage	0	1	0	0	0	0	0	0
10	2033	Reynolds	0	0	1	0	0	1	0	0
11	1466	Hospital	1	0	0	0	0	0	1	0
12	645	Allison	0	0	0	1	0	1	0	1
13	3223	First	0	0	0	0	0	1	0	0
14	1944	Mossy Oaks	0	1	1	1	1	0	0	0
15	2273	Ladys Island	1	0	0	0	0	0	1	0
Totals	**22353**		**4**	**2**	**2**	**2**	**1**	**3**	**2**	**2**

Stops based on a Stop Speed of 5 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB PM**
Study Date **: 3/3/2011**
Page No. **: 8**

Detailed Statistics By Run

Number of Stops by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13	Run #14
			Ribaut Rd PM Before-SB-002	Ribaut Rd PM Before-SB-003	Ribaut Rd PM Before-SB-004	Ribaut Rd PM Before-SB-005	Ribaut Rd PM Before-SB-006	Ribaut Rd PM Before-SB-007
1	0	SC 170						
2	1485	Hogarth	0	0	0	0	0	1
3	2256	Beaufort Plaza	1	1	0	0	1	0
4	1453	Marsh	1	1	1	1	1	0
5	562	Ribaut	0	0	0	0	0	0
6	1301	Duke	1	0	0	0	1	0
7	876	North	0	1	1	1	0	0
8	767	Bay	0	0	0	0	0	0
9	2069	Hermitage	0	0	0	0	1	1
10	2033	Reynolds	0	0	0	0	0	0
11	1466	Hospital	0	0	0	0	1	1
12	645	Allison	1	1	0	1	0	0
13	3223	First	0	0	0	0	0	0
14	1944	Mossy Oaks	0	1	0	0	0	0
15	2273	Ladys Island	1	0	1	0	1	0
Totals	**22353**		**5**	**5**	**3**	**3**	**6**	**3**

Stops based on a Stop Speed of 5 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB PM**
Study Date **: 3/3/2011**
Page No. **: 9**

Detailed Statistics By Run

Average Speed (MPH) by Section

Ribaut Rd PM After-SB-001
Ribaut Rd PM After-SB-002
Ribaut Rd PM After-SB-003
Ribaut Rd PM After-SB-004
Ribaut Rd PM After-SB-005
Ribaut Rd PM After-SB-006
Ribaut Rd PM After-SB-007
Ribaut Rd PM Before-S

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
1	0	SC 170								
2	1485	Hogarth	34.0	33.8	34.2	32.9	34.5	29.0	35.5	33.6
3	2256	Beaufort Plaza	31.0	40.4	33.1	34.1	39.9	36.3	37.4	34.7
4	1453	Marsh	12.7	31.2	37.2	30.2	36.4	28.9	28.8	29.6
5	562	Ribaut	21.3	22.2	29.5	19.7	29.0	18.2	26.4	22.5
6	1301	Duke	22.7	31.5	33.0	33.5	33.5	32.3	33.6	29.0
7	876	North	28.8	37.8	38.1	37.5	38.5	33.8	37.4	36.8
8	767	Bay	31.5	32.7	38.8	37.9	39.6	35.3	40.1	12.0
9	2069	Hermitage	35.1	24.2	33.5	37.2	39.5	34.9	40.3	33.6
10	2033	Reynolds	36.3	35.4	31.1	36.8	31.3	29.7	40.5	29.6
11	1466	Hospital	14.3	41.6	38.3	36.1	32.1	32.5	23.3	22.3
12	645	Allison	33.5	41.0	40.2	15.0	38.1	17.1	31.3	12.2
13	3223	First	39.9	40.1	38.8	32.8	40.0	25.3	40.1	37.1
14	1944	Mossy Oaks	37.5	18.4	17.6	20.5	15.3	33.6	37.7	37.7
15	2273	Ladys Island	19.3	33.2	32.4	36.9	28.8	29.4	18.4	32.4
Totals	**22353**		**26.2**	**31.6**	**32.0**	**31.1**	**31.6**	**29.6**	**32.1**	**28.9**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB PM**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Average Speed (MPH) by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13	Run #14
			Ribaut Rd PM Before-SB-002	Ribaut Rd PM Before-SB-003	Ribaut Rd PM Before-SB-004	Ribaut Rd PM Before-SB-005	Ribaut Rd PM Before-SB-006	Ribaut Rd PM Before-SB-007
1	0	SC 170						
2	1485	Hogarth	32.8	34.6	28.2	32.6	33.5	24.7
3	2256	Beaufort Plaza	28.0	22.8	32.9	29.8	29.4	23.1
4	1453	Marsh	17.3	17.8	14.4	14.0	14.6	25.6
5	562	Ribaut	24.8	22.1	22.3	22.4	21.7	21.5
6	1301	Duke	19.4	33.2	33.9	32.4	17.3	25.3
7	876	North	33.1	17.6	19.1	20.9	30.2	32.2
8	767	Bay	37.4	29.0	32.1	31.8	34.8	35.1
9	2069	Hermitage	37.6	35.5	38.4	36.3	24.9	24.4
10	2033	Reynolds	39.1	33.8	37.5	32.6	27.5	35.2
11	1466	Hospital	38.0	36.6	37.3	29.5	14.7	18.4
12	645	Allison	15.5	19.1	18.8	14.4	29.3	36.2
13	3223	First	34.6	37.8	36.3	33.1	38.6	39.2
14	1944	Mossy Oaks	39.0	24.6	37.9	33.0	35.6	35.4
15	2273	Ladys Island	20.8	34.5	23.2	28.8	12.3	39.0
Totals	**22353**		**28.5**	**28.4**	**28.9**	**27.8**	**23.2**	**28.7**

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB PM**
Study Date **: 3/3/2011**

Detailed Statistics By Run

Total Delay (sec) by Section

Node #	Length	Node Name	Run #1	Run #2	Run #3	Run #4	Run #5	Run #6	Run #7	Run #8
			Ribaut Rd PM After-SB-001	Ribaut Rd PM After-SB-002	Ribaut Rd PM After-SB-003	Ribaut Rd PM After-SB-004	Ribaut Rd PM After-SB-005	Ribaut Rd PM After-SB-006	Ribaut Rd PM After-SB-007	Ribaut Rd PM Before-S
1	0	SC 170								
2	1485	Hogarth	0	0	0	0	0	1	0	0
3	2256	Beaufort Plaza	0	0	0	0	0	0	0	0
4	1453	Marsh	44	0	0	0	0	0	1	0
5	562	Ribaut	5	4	0	7	0	8	1	4
6	1301	Duke	9	0	0	0	0	0	0	1
7	876	North	1	0	0	0	0	0	0	0
8	767	Bay	0	0	0	0	0	0	0	25
9	2069	Hermitage	0	11	0	0	0	0	0	0
10	2033	Reynolds	0	0	0	0	0	0	0	0
11	1466	Hospital	36	0	0	0	0	0	9	11
12	645	Allison	0	0	0	13	0	10	0	21
13	3223	First	0	0	0	0	0	13	0	0
14	1944	Mossy Oaks	0	28	31	21	42	0	0	0
15	2273	Ladys Island	27	0	0	0	2	0	32	0
Totals	**22353**		**122**	**43**	**31**	**41**	**44**	**32**	**43**	**62**

Total Delay based on a Normal Speed of 30 MPH.

Kimley-Horn and Associates, Inc.

Ribaut Road & Boundary Street

Travel Time Analysis

Study Name **: Ribaut Rd SB PM**
Study Date **: 3/3/2011**
Page No. **: 12**

Detailed Statistics By Run

Total Delay (sec) by Section

Node #	Length	Node Name	Run #9	Run #10	Run #11	Run #12	Run #13	Run #14
			Ribaut Rd PM Before-SB-002	Ribaut Rd PM Before-SB-003	Ribaut Rd PM Before-SB-004	Ribaut Rd PM Before-SB-005	Ribaut Rd PM Before-SB-006	Ribaut Rd PM Before-SB-007
1	0	SC 170						
2	1485	Hogarth	0	0	2	0	0	7
3	2256	Beaufort Plaza	4	15	0	0	0	15
4	1453	Marsh	24	22	37	37	34	5
5	562	Ribaut	2	5	4	4	5	4
6	1301	Duke	16	0	0	0	22	6
7	876	North	0	13	10	8	0	0
8	767	Bay	0	0	0	0	0	0
9	2069	Hermitage	0	0	0	0	9	10
10	2033	Reynolds	0	0	0	0	4	0
11	1466	Hospital	0	0	0	0	33	20
12	645	Allison	12	9	9	15	0	0
13	3223	First	0	0	0	0	0	0
14	1944	Mossy Oaks	0	9	0	0	0	0
15	2273	Ladys Island	21	0	14	1	65	0
Totals	**22353**		**79**	**73**	**76**	**65**	**172**	**67**

Total Delay based on a Normal Speed of 30 MPH.

APPENDIX B

Economic Analysis

Ribaut Road and Boundary Street

Economic Analysis

Kimley-Horn and Associates, Inc.
Suite 600, 3169 Holcomb Bridge Road
Norcross, Georgia 30071
TEL 770 825 0744
FAX 770 825 0074

Beaufort County

VOLUMES

	AM		MD		PM	
	NB	SB	NB	SB	NB	SB
VOLUME	1,261	1,163	1,374	1,319	1,594	1,591

Average Volumes calculated from ADT tube count stations within study corridor limits.
AM peak hour is 07:00 - 09:00
MD peak hour is 11:00 - 13:00
PM peak hour is 15:30 - 17:30

An analysis of the volume data reveals that the AM, MD & PM peaks are 2 hours in length. The above volumes represent the sum of this duration.

DELAY

AM		MD		PM	
NB	SB	NB	SB	NB	SB
32	86	71	54	25	47

Values represented are seconds of delay saved during typical travel.

FUEL SAVINGS

AM		MD		PM	
NB	SB	NB	SB	NB	SB
1,660	4,175	4,065	2,951	1,654	3,135

Values represented are gallons of fuel saved during a year of typical travel.

ANNUAL COST BENEFITS

	AM		MD		PM	
	NB	SB	NB	SB	NB	SB
Annual Benefit of Delay Reduction ($/yr)	$ 45,332	$ 112,543	$ 109,749	$ 80,079	$ 44,812	$ 84,182

Annual Benefit of Delay Redcution for System ($/yr): $ 476,700.00

Fuel Cost per Gallon	$ 3.00
Peak Periods per Year	250
User Cost ($/hour)	$ 12.00
Occupancy of Vehicle	$ 1.20

BENEFIT:COST RATIO

Total Contract Value $ 78,122 *Total cost to SCDOT for KHA's original scope of entire Traffic Signal Optimization Study*

One Year Benefit:Cost Ratio for System: 6 : 1

Three Year Benefit:Cost Ratio for System: 18 : 1