



## **KIAWAH RIVER** *Johns Island, SC*

### **DEVELOPMENT AGREEMENT**

BY AND AMONG KIAWAH RIVER INVESTMENT, L.L.C.; OCEAN  
BOULEVARD PROPERTIES, L.P.; AND

CHARLESTON COUNTY, SOUTH CAROLINA

Approved 12/22/2009 As Amended

- 10/09/2018;
- 3/10/2020; and
- 6/21/2022.

**KIAWAH RIVER**  
**DEVELOPMENT AGREEMENT**  
**BY AND AMONG**  
**KIAWAH RIVER PLANTATION, LP;**  
**OCEAN BOULEVARD PROPERTIES, A**  
**SOUTH CAROLINA LIMITED PARTNERSHIP;**  
**AND**  
**CHARLESTON COUNTY,**  
**SOUTH CAROLINA**



**Kiawah River Development Agreement  
By and Among Kiawah River Plantation, LP;  
Ocean Boulevard Properties, a South Carolina Limited Partnership; and  
Charleston County, South Carolina**

**THIS DEVELOPMENT AGREEMENT** is entered into this 22<sup>nd</sup> day of December, 2009 and is effective on the 1<sup>st</sup> day of January 2010, by and among Kiawah River Plantation, LP, a Delaware limited partnership; Ocean Boulevard Properties, a South Carolina Limited Partnership; and Charleston County, a political subdivision of the State of South Carolina (the "*County*"). This Development Agreement, together with the Kiawah River Planned Development District Plan, the recitals herein, and all exhibits and appendices attached hereto, shall be hereinafter referred to as the "*Agreement*." The date upon which this *Agreement* becomes effective shall be hereinafter referred to as the "*Effective Date*."

**RECITALS**

This *Agreement* is predicated upon the following:

1. Due to market variability and other factors, the *Property Owner* desires flexibility in its ability to develop the *Real Property*, as well as stability in the local *Laws* and regulations affecting the development of the *Real Property*.
2. The *County* desires an increased tax base, greater job opportunities for current and future residents of the *County*, certain infrastructure improvements designated more fully herein, and the protection or enhancement of certain natural resources, as explained more fully herein.
3. The South Carolina Local Government Development Agreement Act (the "*Act*"), codified at sections 6-31-10 to -160 of the South Carolina Code, enables counties to enter into binding development agreements with persons or entities having a legal or equitable interest in land intending to undertake any development, provided the land has certain minimum acreages of highland, and the development agreement and its approval complies with certain other conditions set forth in the *Act*.
4. The *Act* recognizes: "The lack of certainty in the approval of Development can result in a waste of economic and land resources, can discourage sound capital improvement planning and financing, can cause the cost of housing and Development to escalate, and can discourage commitment to comprehensive planning." S.C. Code Ann. § 6-31-10(B)(1).
5. The *Act* recognizes: "Development Agreements will encourage the vesting of property rights by protecting such rights from the effect of subsequently enacted local legislation or from the effects of changing policies and procedures of local government agencies which may conflict with any term or provision of the Development Agreement or in any way hinder, restrict, or prevent the Development of the project." S.C. Code Ann. § 6-31-10(B)(6).
6. This *Agreement* shall be read and interpreted in coordination with the Kiawah River Plantation Planned Development District Plan (the "*Plan*"), which has been submitted

simultaneously herewith, attached hereto as Appendix A, and incorporated herein by reference. This *Agreement*, together with the *Plan*, facilitates flexibility for the *Property Owner* in the development of the *Real Property*, while providing the *County* with an increased tax base, job opportunities, recreational facilities, and other infrastructure, as set forth more fully herein.

7. Pursuant to section 6-31-30 of the South Carolina Code, *County Council* has adopted Article 3.16 of the *ZLDR*, incorporating the procedures and requirements for considering and entering into development agreements set forth in sections 6-31-10 to -160 of the South Carolina Code.

8. In satisfaction of section 6-31-50 of the South Carolina Code and any other notice requirements, the *County* conducted public hearings regarding its consideration of this *Agreement* on November 17, 2009 and December 3, 2009, after timely publishing and announcing notice of its intent to consider this *Agreement*.

9. The *Real Property* subject to this *Agreement* is approximately 1427.81 acres, including 1083.2 acres of highland, 187.41 acres of freshwater wetland, and 157.2 acres of OCRM critical area. A portion of the *Real Property*, being approximately 810.22 acres of highland and freshwater wetland, is currently zoned AG-8 (agricultural preservation district). A second portion of the *Real Property*, being approximately 460.39 acres of highland and freshwater wetland, is currently zoned R-4 (single family residential 4). The *Real Property* is simultaneously herewith being rezoned to planned development (PD), with the *Plan* constituting the development plan for the *Real Property*, in accordance with the terms and conditions of this *Agreement*.

10. Pursuant to section 6-31-60(A)(7) of the South Carolina Code, on December 22, 2009, *County Council* found this *Agreement* to be consistent with the *Act*, the *Comprehensive Plan*, and the *ZLDR*, as more particularly described in the *Plan* and the Executive Summary submitted with this *Agreement*.

11. Pursuant to section 6-31-60(A)(8) of the South Carolina Code, in approving this *Agreement*, *County Council* has determined that, with respect to the *Project*, this *Agreement*, in conjunction with the *Plan* and applicable *Laws*, sufficiently provides for the public health, safety, and welfare of its citizens and that no additional conditions, terms, restrictions, or other requirements are necessary.

12. On December 22, 2009, *County Council* adopted Ordinance Number [insert ordinance number], amending its zoning ordinance and zoning map to rezone the *Real Property* to PD and adopting the *Plan* as the planned development district plan for the *Real Property*.

13. On December 22, 2009, *County Council* adopted Ordinance Number [insert ordinance number], approving this *Agreement*.

14. After the *Effective Date* of this *Agreement*, Kiawah River Investment, LLC acquired all right, title, and interest of Kiawah River Plantation, LP, and Ocean Boulevard Properties, LP in and to the *Real Property* and has become the *Property Owner*.

NOW THEREFORE, in consideration of the premises of this *Agreement* and the mutual benefits to the *Parties*, the *Parties* agree as follows:

**1. Definitions**

In this *Agreement*, italicized words or phrases are as defined in Exhibit 1.1. The definitions set forth in Exhibit 1.1 shall control the development of the *Real Property* in lieu of any contrary definitions in the *ZLDR*, the *Plan*, or other *Laws*. The definitions in Chapter 12 of the *ZLDR* on the *Effective Date* shall otherwise apply.

**2. Parties**

The *Parties* to this *Agreement* are the *Property Owner* and the *County*. When used herein with reference to a specific *Tract*, *Development Parcel*, *Lot*, or other portion of the *Real Property*, *Parties* shall mean and refer to the *County* and that specific person or entity that has legal title to such *Tract*, *Development Parcel*, *Lot*, or other portion of the *Real Property*. If portions of this *Agreement* apply to one or more, but not all, of the entities or persons comprising the *Property Owner*, those particular parties may be separately referred to herein.

**3. Relationship of the Parties**

This *Agreement* creates a contractual relationship between the *Parties*. This *Agreement* is not intended to create, and does not create, the relationship of master/servant, principal/agent, independent contractor/employer, partnership, joint venture, or any other relationship in which the *County* or *Property Owner* may be held responsible for the acts of the other party. Further, this *Agreement* is not intended to create, nor does it create, a relationship in which the conduct of the *Property Owner* constitutes “state action” for any purpose. This *Agreement* is not intended to grant to the *County* any authority over property lying beyond its corporate limits.

**4. The Real Property**

A. Legal Description/Plat: The *Real Property* is approximately 1427.81 acres, including 1083.2 acres of highland, 187.41 acres of freshwater wetland, and 157.2 acres of OCRM critical area. The *Real Property* is fully described in the legal description and plat attached hereto as Exhibits 4.1 and 4.2, respectively. Exhibit 4.2 contains a minor mathematical error. In the acreage table on the first page, under the column entitled “Ponds,” the total amount should be 235.94, and not 234.94. The total amount of the *Real Property* platted and recorded in Exhibit 4.2 is therefore 1427.81 acres, not 1426.81 acres. This error is mathematical only, as the maps delineate 235.94 acres of “Ponds” and 1427.81 total acres. An acreage breakdown of the *Real Property* pursuant to Exhibit 4.2 is attached hereto as Exhibit 4.3. The *Real Property* is a portion of Charleston County Tax Map Number 212-00-00-001.

B. Deed History/Unplatted Areas: The deeds reflecting the grant of the *Real Property*, together with approximately 576.65 acres of unplatted marshlands and small islands, to the *Property Owner* are attached hereto as Exhibits 4.4, 4.5, and 4.6. Although not included within the *Plan*, the *Property Owner* intends to preserve or enhance this unplatted area as open space.

Further, this unplatted area will be platted and recorded in compliance with the *ZLDR* prior to any *Development* or conveyance thereof, if any. This *Agreement* and the *Plan* do not and shall not interfere with the easement agreement by and between the Charleston County Park and Recreation Commission and W.L. Limehouse and Julian Limehouse, III, as Co-Personal Representatives of the Estate of Julian S. Limehouse, Jr., William Lawton Limehouse, Peggy K. Limehouse, Linda Anne L. McMurphy, a/k/a Anne Limehouse MacMurphy, Mary Ruth L. Schneider, J. Sidi Limehouse, III, a/k/a Julian S. Limehouse, III, Peggy Jo Gray, and Anne Limehouse MacMurphy, Trustee for Michael Linar Limehouse, dated June 7, 1994, and recorded in Book Z243 at Page 402 in the Charleston County RMC Office. Furthermore, this *Agreement* and the *Plan* do not and shall not interfere with the underground right-of-way easement granted by W.L. Limehouse to Berkeley Electric Cooperative, Inc., dated February 25, 1993, in Book K229 at Page 594 in the Charleston County RMC Office. These easement agreement are attached hereto and incorporated herein by reference as Exhibits 4.7 and 4.8, respectively.

C. Wetland Survey: A wetland survey of the *Real Property* is attached hereto as Exhibit 4.9. Exhibit 4.9 has been submitted to, but not yet approved by, *OCRM* and the *Corps* with respect to the current acreages of highland, freshwater wetland, and *OCRM* critical area on the *Real Property*. A letter from the *Corps* confirming receipt and on-going review of the wetland survey is attached hereto as Appendix N. The *Property Owner* will obtain an approved wetland survey from *OCRM* and the *Corps*, in compliance with the *ZLDR*, prior to obtaining development approvals or permits for the *Development* of a portion of the *Real Property* to which the survey applies.

D. Addition of Real Property: The *Property Owner* may notify the *County* from time to time of property proposed to be added to the legal description of *Real Property* by the filing of a legal description of subsequently acquired properties with the clerk of *County Council* and the *Planning Director*; provided, however, that no other property shall be added to the *Agreement* unless the *Agreement* and the *Plan* are duly amended to include the new land.

## **5. The Property Owner**

“*Property Owner*” means Kiawah River Investment, LLC, a limited liability company, together with all subsidiaries thereof and other entities, which may have a legal interest on the date of execution hereof in any of the *Real Property* described in Paragraph 4 and includes their successors in interest, successors in title (as to any portion of the *Real Property*), and/or assigns by virtue of assignment or other instrument compliant with this *Agreement*. When used herein with reference to a specific *Tract*, *Development Parcel*, *Lot*, or other portion of the *Real Property*, “*Property Owner*” shall mean and refer to that specific person or entity that has legal title to such *Tract*, *Development Parcel*, *Lot*, or other portion of the *Real Property*. The *Property Owner* warrants that there are no other legal or equitable owners of the *Real Property*.

## **6. Benefits and Burdens**

In accordance with section 6-31-120 of the South Carolina Code, the *Parties* agree that the burdens of this *Agreement* bind, and the benefits of this *Agreement* shall inure to, each of them and to their successors in interest and, in the case of the *Property Owner*, its heirs and personal

representatives, its successors in interest, successors in title and/or assigns pursuant to this *Agreement*. The burdens and benefits shall run with the land.

**7. Consistency with Comprehensive Plan and Land Development Regulations**

The *County* finds this *Agreement* and the *Plan* to be consistent with the *Act*, *County Ordinances*, *Comprehensive Plan*, and *ZLDR*, as more particularly described in the *Plan* and the Executive Summary submitted with this *Agreement*.

**8. Development Agreement Governs**

Whenever, in the *County's* determination, express substantive provisions of this *Agreement* are inconsistent or in conflict with the applicable standards set forth in the *County Ordinances*, *Comprehensive Plan*, *ZLDR*, or other *Laws*, the provisions and standards set forth in this *Agreement* shall govern. This rule of interpretation shall replace any contrary rule set forth in the *Comprehensive Plan*, *County Ordinances*, *ZLDR*, or other *Laws*. Whenever express substantive provisions of this *Agreement* are inconsistent or in conflict with the substantive provisions of the *Plan*, the more restrictive provision shall apply.

**9. Legislative Act**

Any change in the standards established by this *Agreement* or to the *Laws* pertaining to the same shall require the approval of *County Council*, subject to compliance with applicable statutory procedures and consistent with Paragraph 10.A of this *Agreement*. This *Agreement* constitutes a legislative act of *County Council*. *County Council* adopted this *Agreement* only after following the statutory procedures required by sections 6-31-10 to -160 of the South Carolina Code and Article 3.16 of the *ZLDR*. This *Agreement* shall not be construed to create a debt of the *County* as referenced in section 6-31-145 of the South Carolina Code.

**10. Applicable Land Development Regulations**

A. Applicable Laws and Land Development Regulations: Pursuant to section 6-31-80 of the South Carolina Code, except as limited by state or federal law, including section 6-31-140 of the South Carolina Code, the *Laws* applicable to *Development* of the *Real Property* shall be those in force on the *Effective Date*, as supplemented or modified by this *Agreement*. The *County* shall not apply subsequently adopted *Laws* or *Land Development Regulations* to the *Real Property* or the *Project* unless the *County* has held a properly noticed public hearing and has determined: (1) the proposed subsequent *Laws* or *Land Development Regulations* are not in conflict with the *Laws* or *Land Development Regulations* governing the *Agreement* and do not prevent the *Development* set forth in this *Agreement*; (2) the proposed subsequent *Laws* or *Land Development Regulations* are essential to the public health, safety, or welfare and the proposed subsequent *Laws* or *Land Development Regulations* expressly state that they apply to a *Development* that is subject to this *Agreement*; (3) the proposed subsequent *Laws* or *Land Development Regulations* are specifically anticipated and provided for in this *Agreement*; (4) substantial changes have occurred in pertinent conditions existing at the time of approval of this *Agreement* which changes, if not addressed by the *County*, would pose a serious threat to the public health, safety, or welfare; or (5) this



*Agreement* is based on substantially and materially inaccurate information supplied by the *Property Owner*. Nothing herein shall preclude the *Property Owner* from agreeing to abide by such new *Laws*, regulations, or ordinances subsequently passed by the *County* which the *Property Owner* deems appropriate.

B. Land Development Regulations: The Kiawah River Planned Development District Plan (the "*Plan*"), attached hereto and incorporated herein by reference as Appendix A, shall constitute the development plan applicable to the *Real Property*. Furthermore, the *County's* ZLDR, as amended by this *Agreement*, is attached hereto as Appendix B. Appendix B shall apply except as expressly set forth in the *Plan*. As reflected in Appendix B, chapters 1, 2, 3, 10, and 11 of the ZLDR and the appendices to the ZLDR, as these chapters and appendices exist on the *Effective Date*, shall apply to the *Real Property* unless otherwise expressly stated herein.

C. Building Codes and Laws and Other Land Development Regulations: Notwithstanding any provision in this *Agreement* which may be construed to the contrary, the *Property Owner* must comply with any applicable flood, building, housing, electrical, plumbing and gas codes now existing or subsequently adopted by the *County* or other governmental entity, as authorized by Chapter 9 of Title 6 of the South Carolina Code. This *Agreement* shall not be construed to supersede or contravene the requirements of any flood, building, housing, electrical, plumbing or gas codes subsequently adopted by the *County* or other governmental entity, as authorized by Chapter 9 of Title 6 of the South Carolina Code. The provisions of this *Agreement* are not intended, nor should they be construed in any way, to alter or amend the rights, duties and privileges of the *County* to exercise governmental powers and pass *Laws* not applicable to *Development* of the *Real Property* including, but not limited to, the power of eminent domain and the power to levy and collect taxes; provided, however, that *Laws* applicable to the *Development* of the *Real Property* shall be subject to Paragraph 10.A of this *Agreement*.

11. The Kiawah River Planned Development District Plan: The Kiawah River Planned Development District Plan (the "*Plan*") is attached hereto and incorporated herein by reference as Appendix A. Appendix A shall constitute the zoning and development plan for the *Real Property*. For the purpose of illustrating the development the *Property Owner* may institute on the *Real Property* pursuant to the *Agreement* and the *Plan*, an Illustrative Master Plan is attached to the *Plan* as Exhibit 1.1. While the Illustrative Master Plan may be used by the *County* and the *Property Owner* as a general guide for the overall development of the *Real Property*, the *Lots*, *Development Parcels*, *Thoroughfares*, green space, recreational areas, *Community Ways*, and other elements illustrated thereon are not intended to represent the exact configuration and location of the development that will occur on the *Real Property*. The more specific elements of the *Agreement* and the *Plan* should be used by the *County* and the *Property Owner* to help guide the precise configuration and location of the different aspects of development as the *Project* progresses. The remainder of this Paragraph 11 of the *Agreement* addresses each item required for planned development application submittals, including planned development stipulations and sketch plans.

1. Planned Development Name: The name of the planned development shall be Kiawah River; provided, however, the *Property Owner* may provide written notice to the *County* at any time before commencement of construction on the *Real Property* pursuant to the *Agreement* of a different name for the planned development which does not duplicate

the name of any other planned development or subdivision, the final plat of which has been recorded in the RMC Office for Charleston County, South Carolina at the time of such notice.

2. Statement of Objectives: The objectives of the *Plan* are set forth in Part 2, Intent and Results, of the *Plan*, and/or as follows:

A. Current Number of Dwelling Units/Density: The *Real Property* includes 1,270.61 acres of highland and freshwater wetland, which is currently "split-zoned." A portion of the *Real Property*, being approximately 810.22 acres of highland and freshwater wetland, is currently zoned Agricultural Preservation District (AG-8). The residential density requirements of the base zoning standards applicable to this portion of the *Real Property* would therefore facilitate the development of 101 *Dwelling Units*. A second portion of the *Real Property*, being approximately 460.39 acres of highland and freshwater wetland, is currently zoned Single Family Residential 4 (R-4). The residential density requirements of the base zoning standards applicable to this portion of the *Real Property* would therefore facilitate the development of 1,841 *Dwelling Units*. Accordingly, the combined density standards of the base zoning districts would facilitate the development of 1,942 *Dwelling Units* on the *Real Property*. Furthermore, the use regulations of the underlying zoning districts would prohibit the *Property Owner* from developing multi-family dwellings on the *Real Property* and permit single-family attached dwellings only on the portion of the *Real Property* currently zoned R-4 and only pursuant to a special exception. Moreover, many of the commercial, office, lodging, and retail uses necessary to serve the future residents of the *Real Property* would not be permitted in either district, necessitating that residents seek these amenities off-site.

B. Permitted Dwelling Units/Densities under the Comprehensive Plan/Rezoning to PD: The gross density requirements in the *Comprehensive Plan* would permit the development of up to 2,043 *Dwelling Units* on the *Real Property*. The *ZLDR* would further permit a density bonus of up to 25% in the Urban/Suburban portion of the *Real Property* for the provision of *Affordable Housing*.

C. Proposed Dwelling Units/Densities under the Plan: Pursuant to the *Plan*, the *Property Owner* may develop up to 1,285 *Dwelling Units* on the *Real Property* not including those *Dwelling Units* that are *Retirement Housing Units*. Furthermore, 117 of these *Dwelling Units* will be designed as *Housing for the Workforce*, 18 of which will constitute *Affordable Housing*. In addition, the *Property Owner* may develop up to 80,000 square feet of *GLA*, which includes those commercial, institutional, and similar uses designated as such in the *Plan*. The *Property Owner* may also develop a *Golf Course* or *Golf Courses*, consisting up to 36 total holes, and up to 450 *Guest Rooms* on the *Real Property*. The *Guest Rooms* may be dispersed among *Villas*, *Inns*, *Bed and Breakfasts*,

and/or up to two (2) *Hotels*. Finally, the *Property Owner* will develop or preserve at least fifty percent (50%) of the *Real Property*, exclusive of *OCRM* critical area, as open space (which may include the above-referenced *Golf Course(s)*, provided, however, that the *Golf Course(s)* shall not comprise the entire area designated as open space).

3. Site Information: The *Real Property* subject to the *Plan* consists of 1427.81 acres, including 1083.2 acres of highland, 187.41 acres of freshwater wetland, and 157.2 acres of saltwater wetland, or marsh. This area is platted in Exhibit 4.2.

4. Table of Proposed Land Uses: Table 5.1 illustrates the proposed maximum and average residential densities for each residential use; the maximum total acreage of each residential use; the maximum allowable number of each type of residential unit requested; and the maximum proposed floor area ratios (% of *Lot* in relation to building floor area) for each non-residential use. All dimensional and lot standards requested, including the maximum *Building Coverage*, for each land use type designated, are addressed in section 6 of the *Plan*.

**Table 5.1: Table of Proposed Land Uses**

Permitted Uses	Not to Exceed ("nte")	Minimum Acreage	Maximum Acreage	Maximum Density	Maximum Floor Area Ratio
<b>Single Family Detached</b>	nte 1285		550	4/acre	
<b>Single Family-Attached</b>	nte 320		50	10/acre	
<b>Multi-Family</b>	nte 320		50	20/acre	
<b>Housing for the Work Force</b>	up to 117		40	20/acre	
<b>Retirement Housing</b>	nte 160		50	Note 6	
<b>All Residential</b>	nte 1285 excluding <i>Retirement Housing</i>		600	1.01/acre	
<b>Commercial</b>	nte 80,000 square feet		12		2
<b>Self-Service Storage/Mini- Warehousing, Boat/RV Storage</b>	50% of the floor area shall count against <i>GLA</i>			Subject to 12 acre maximum for Commercial	
<b>Accommodations</b>	nte 450 <i>Guest Rooms</i> or <i>Villas</i>		50		2
<b>Open Space</b>		635.31			

The following standards shall apply to Table 5.1 and the location of densities within the *Development*:

1. As used in Table 5.1, "Density" refers to the number of *Dwelling Units* per unit of land area. Density is calculated by dividing the number of *Dwelling Units* on a site by the gross area (in acres) of highland (including freshwater wetlands) of the site on which the *Dwelling Units* are located, provided that all other requirements of the *Plan* are met.
2. The *Property Owner* may not exceed 50,000 square feet of *GLA* on the portion of the *Real Property* delineated in the *Plan* as the Bohicket Station.
3. The *Property Owner* may not exceed 80 *Dwelling Units* on the portion of the *Real Property* delineated in the *Plan* as the Bohicket Station.
4. The *Property Owner* may not exceed 580 *Dwelling Units* on the portion of the *Real Property* formerly zoned AG-8 which is also designated in the *Plan* as Rural Residential.
5. *Retirement Housing Units* shall count against the cap of 450 *Guest Rooms* with 2.0 *Retirement Housing Units* being equivalent to one (1) *Guest Room*, or stated differently, each *Retirement Housing Unit* equals 5 *Guest Room*. This conversion factor for *Retirement Housing* is based on accepted national standards for traffic counts that demonstrate that the vehicle trips per day for a *Retirement Housing Unit* are fewer than 50% of those for a *Guest Room*. The total number of *Retirement Housing Units* shall be rounded up to the nearest whole number of *Guest Rooms* for purposes of the nte cap above. *Retirement Housing Units* may be located only in the River Village and not in the Rural Residential or Bohicket Station.
6. The maximum density for *Retirement Housing* shall depend on the housing type and be subject to the same maximum density limitations for that particular residential housing type shown in Table 5.1.
7. The uses of Self-Service Storage/Mini-Warehousing, Boat/RV Storage must be exclusively for the use of the owners and tenants of any portion of the *Real Property* and of the contractors working on the *Real Property*. Only 50% of the floor area devoted to these uses shall count against *GLA*.
8. Commercial is limited to no more than 80,000 SF of *GLA* situated on no more than 12 acres.

5. Maximum Density/Open Space: The maximum residential densities set forth herein do not exceed the maximum densities permitted in the *Comprehensive Plan*. Density and lot area calculations within the *Plan* comply with the requirements contained in Article 4.2 of the *ZLDR*, Measurements, Computations and Exceptions.

6. Affordable Dwelling Units/Housing for the Workforce: "Housing for the Workforce Unit" means any residential unit designed to accommodate persons employed on the *Real Property*, persons employed on Kiawah Island, persons employed on Seabrook Island, persons employed within a ten (10) mile radius of the *Real Property*, and any residential unit meeting the definition of *Affordable Housing*. The *Property Owner* or its designated assignee shall design, build, and market up to 117 *Housing for the Workforce* units on the *Real Property* as part of the *Project*. Further, 18 of these *Housing for the Workforce* units shall constitute *Affordable Housing*. *Housing for the Workforce* units and *Affordable Housing* units may be developed anywhere on the *Real Property*. Moreover, any or all of these units may consist of accessory dwellings, single-family detached dwellings, single-family attached dwellings, or multi-family units. On or before the

*Property Owner's* development of 200 residential *Dwelling Units* on the *Real Property*, the *Property Owner* or its designated assignee shall design and market (for sale or rent) at least twenty (20) *Housing for the Workforce* units on the *Real Property*. On or before the development of every additional 200 residential *Dwelling Units* on the *Real Property* (not including *Dwelling Units* reserved or used for *Housing for the Workforce*), the *Property Owner* or its designated assignee shall design and market (for sale or rent) at least twenty (20) additional *Housing for the Workforce* units up to the maximum of 117 *Housing for the Workforce* units.

7. Impact Assessment/Analysis: An analysis of the impact of the proposed development on existing public facilities and services (e.g. roads and streets, water, sewer, etc.) is attached hereto and incorporated herein by reference as Appendix C. Furthermore, a Capital Improvements Program/Fiscal Impact Analysis is attached hereto as Exhibit D. Exhibits C and D include proposed future improvements to these facilities and services to be made as part of the planned development. These exhibits are addressed more fully in Paragraph 16 of this *Agreement*.

8. Traffic Study: A traffic study and mitigation plan that meets the requirements of Article 9.9 of the *ZLDR* is attached hereto and incorporated herein by reference as Appendix E. This traffic study and the proposed mitigation plan are addressed more fully in Paragraph 16 of this *Agreement*.

9. Development Schedule: The development schedule for the *Project* is included in section 7 of the *Plan*, as well as Paragraph 18 of this *Agreement*.

10. Open Space: Open space and common open space shall be provided and managed in accordance with Section 8 of the *Plan*.

11. Streets: All streets intended for dedication to the public shall comply with the *County's* Road Construction Standards (unless otherwise approved by the Charleston *County* Public Works Director), notwithstanding any other provision contained herein. Any and all streets and roads, curb cuts, and streetscape designed and constructed by the *Property Owner* may (1) be owned and maintained as *Common Areas*; (2) be owned and maintained by the *Property Owner* or a related entity; or (3) be dedicated to the public. The *Property Owner*, a related entity, and/or a duly constituted *Association* shall perform the maintenance and upkeep on any and all streets and roads on the *Real Property* or any portion thereof unless they have been dedicated to and accepted by the public. Upon tender of a deed from the *Property Owner* approved by the *County* attorney, the public may accept any and all streets and roads (including related infrastructure) tendered for dedication by the *Property Owner* provided they comply with the *County's* Road Construction Standards described in the *ZLDR*. All alleys shall be maintained and owned by the *Property Owner*, a related entity, or an *Association* as *Common Areas*.

12. Compliance with *ZLDR*:



a. The *Property Owner* shall comply with the processes in the *ZLDR*, as it exists on the *Effective Date* and as may be expressly amended herein.

b. The *Property Owner* intends to proceed with the proposed *Development* in accordance with the provisions of the *Agreement*, the *ZLDR*, applicable provisions of the *Comprehensive Plan*, and with such conditions as are included in the *Plan*.

c. The provisions of Article 3.10 of the *ZLDR*, Variances, shall apply to the planned development with respect to zoning-related dimensional, design or performance standards on individual *Lots*. Variance applications for trees, *Setbacks*, buffers, height, and maximum Lot/building coverage for individual *Lots* shall be processed pursuant to *ZLDR* Article 3.10, Zoning Variances. All other proposed changes to the Development Agreement and/or Planned Development must be processed as Development Agreement and Planned Development amendment applications. Variances from the tree regulations in the Plan may be granted in accordance with the processes in the Plan.

13. Letters of Coordination: Letters of coordination from all agencies from which the *Property Owner* must either (1) obtain permits or (2) obtain services and/or facilities are collectively attached hereto and incorporated herein by reference as Appendix F.

14. Dimensional Standards:

a. Waterfront Development: The *Property Owner* may develop up to 227 residential *Lots*, excluding *Lots* that have *Villas* or *Bed and Breakfasts* that are *Guest Rooms*, on the portion of the *Real Property* directly abutting the *OCRM Critical Line*. Moreover, the *Property Owner* shall enhance or preserve at least three (3) miles of the portion of the *Real Property* directly abutting the *OCRM Critical Line* as open space. Further, the *Property Owner* will limit, through restrictive covenants or a conservation easement, the number of private use (use for one person or family), joint, or community *Docks* developed on the *Real Property* to eighteen (18). In addition, the *Property Owner* shall adopt restrictive covenants with respect to single-family detached *Lots* on portion of the *Real Property* designated in the *Plan* as Rural Residential requiring that 50% of each *Lot* be preserved in its natural condition. In consideration of the foregoing, notwithstanding Article 4.27.6.B.1 of the *ZLDR*, the waterfront development standards set forth in section 6 of the *Plan*, and no others, shall apply to the *Real Property*. The waterfront development standards set forth therein shall apply to the *Real Property* in lieu of Articles 4.26, 4.27.6.B.1, and 9.7 of the *ZLDR*.

b. Pursuant to section 8 of the *Plan*, the *Property Owner* shall generally provide a 25-foot vegetative buffer between the perimeter of the *Real Property* and an adjacent property titled to an unrelated third party on the *Effective Date* (unless otherwise specified in the *Plan*). Rear *Setbacks* shall be as set forth in Table 6.1 in

the *Plan*. Article 4.27.6.B.2 of the *ZLDR* shall not apply to the planned development of the *Real Property*.

15. Architectural Guidelines: The Architectural and Landscaping Design requirements of the *ZLDR* do not apply. The *ARB* shall develop and administer the architectural and landscaping requirements for the *Real Property* as provided in the *Covenants*. The *Property Owner* shall provide the *Planning Director* a copy of the *ARB* approval of the architectural and landscaping design as part of each *Development* application. Architectural guidelines set forth in Article 9.6 of the *ZLDR* shall not apply to the *Real Property*.

16. Lots to Abut Common Open Space: Pursuant to section 8 of the *Plan*, residential parcels shall be designed to maximize orientation toward common open space or similar areas.

17. Access:

a. The *Property Owner* shall use best efforts to facilitate a connection with adjacent parcels at the approximate locations illustrated in Exhibit 4.1 to the *Plan*. The *Property Owner's* obligation under this section shall not require that the *Property Owner* purchase or otherwise finance the acquisition of any right, title, or interest in and to these adjoining properties. The *County* recognizes the *Property Owner's* abilities under this section are highly dependent upon and constricted by the actions or inactions of third parties.

b. Areas between structures shall be covered by easements where necessary for access and to provide for maintenance and utility service.

c. Primary vehicular access to office, commercial, or industrial development shall be through limited access roads.

18. Commercial Areas:

a. Commercial areas and adjacent residential, office, and industrial areas shall be directly connected through paved sidewalks, unpaved trails, or other pedestrian infrastructure.

b. Commercial areas shall be planned as groups having common parking areas and common ingress and egress points.

19. Industrial Areas:

a. A minimum vegetative buffer of forty (40) feet shall be required where industrial uses, if any, abut residential uses.

b. All intervening space between the right-of-way line and project building line and intervening spaces between buildings, drives, parking areas and improved areas shall be landscaped with trees and plantings and properly maintained at all times.

20. Areas Designated for Future Uses: All areas designated for future expansion or not intended for immediate improvement or development shall remain in a natural state until such time as development permits are approved; provided, however, with respect to this provision, the “natural state” of the property shall include those uses permitted under base zoning. The *County* agrees that undeveloped portions of the *Real Property* shall be held by the *Property Owner*, or its successors, for agricultural/silvi-cultural/forestry purposes or similar permitted uses until *Development* on that portion of the *Real Property*. The *County* agrees that it will permit said agricultural uses to continue on these undeveloped lands.

21. Signs: The *Property Owner* shall provide a master signage plan to the *ARB*, for review and approval, for each phase of the *Project* and must provide the *ARB*’s written approval of that phase’s master signage plan to the Planning Director prior to obtaining a certificate of occupancy for any portion of that phase of the *Project*. Notwithstanding the foregoing, the standards contained within Article 9.11 of the *ZLDR* shall apply to signs visible from Betsy Kerrison Parkway and Mullet Hall Road.

22. Parking: The parking and loading regulations in Article 9.3 of the *ZLDR*, as modified in Appendix B, and no others, shall apply to the *Real Property* or any portion thereof; provided, however, the amendments set forth in section 10 of the *Plan* shall apply.

23. Tree Protection: The tree regulations in Article 9.4 of the *ZLDR*, as modified in Appendix B, and no others, shall apply to the *Real Property* or any portion thereof.

24. Resource Areas: The *Plan* protects the resources determined significant by the *Planning Director*, as set forth more fully in section 14 of the *Plan*.

25. Common Open Space: Common open space and open space is located to preserve any significant resources on the *Real Property*. The standards applicable to common open space and open space on the *Real Property* are set forth in section 8 of the *Plan*. Article 4.27.7 of the *ZLDR* shall apply to the *Real Property* only to the extent set forth in section 8 of the *Plan*.

26. Affordable Dwelling Units: Affordable dwelling units and *Housing for the Workforce* shall be provided in accordance with this *Agreement*. Article 4.27.8 of the *ZLDR* shall not apply because the *Property Owner* is NOT requesting a density bonus from the maximum range in the *Comprehensive Plan* on the Urban/Suburban portion of the *Real Property*.

27. Land Use Sketch Plan: The general location and amount of land proposed for each land use, including single-family residential, multi-family residential, institutional,

office, commercial, industrial, common open space/recreation, street use, etc., is conceptually delineated in Exhibit 4.1 to the *Plan*. Moreover, the amount of land proposed for each such land use is set forth in Table 5.1 to the *Plan*.

28. Conceptual Lot Lines: The conceptual lines of the *Lots* proposed to be developed on the *Real Property* are delineated in Exhibit 1.2 to the *Plan*.

29. Pedestrian and Motor Traffic Circulation: The conceptual proposed pedestrian and motor traffic circulation for the proposed development is delineated in Exhibits 4.1 and 11.4 to the *Plan*.

30. Wetlands Survey: A wetland survey of the *Real Property* is attached hereto as Exhibit 4.9. Exhibit 4.9 has been submitted to, but not yet approved by, *OCRM* and the *Corps* with respect to the current acreages of highland, freshwater wetland, and *OCRM* critical area on the *Real Property*. A letter from the *Corps* confirming receipt and review of this survey is attached hereto as Appendix N. The *Property Owner* has no intention to develop upon any of these natural areas; provided, however, the *Property Owner* may construct portions of roads and/or utilities on these natural areas only after obtaining all applicable permits and approvals from *OCRM* and the *Corps* for such *Development* and obtaining site plan approval from the *County* pursuant to the *ZLDR*.

31. Tree Survey: The *Property Owner* has provided the *County* with a high-resolution aerial photograph of the *Real Property* in lieu of a tree survey. A tree survey showing all *Grand Trees* on proposed residential *Lots* of one acre or less and in road rights-of-way and easements on a portion of the *Real Property* proposed to be developed pursuant to the *Plan* shall be submitted as part of a site plan or preliminary plat application for that portion of the *Real Property*. Tree surveys for non-residential uses and lots greater than one acre shall conform to the standards in section 9 of the *Plan*. Article 4.27.9.C.1.b.v of the *ZLDR*, requiring a tree survey as part of a PD application, shall not apply.

32. Architectural Elevations: Architectural elevations for each type of residential and non-residential unit are attached to the *Plan* as Exhibit 12.1.

33. Phasing Schedule: A general delineation of the areas to be included in each phase of the proposed development is attached to the *Plan* as Exhibit 7.1. Notwithstanding Article 4.27.9.C.1.b.viii of the *ZLDR*, the location of common open space areas and/or affordable housing units to be included in each phase shall not be required at this time. The location of common open space areas and/or affordable housing units to be included within a phase of development shall be set forth as part of a site plan or preliminary plat application for that phase. Common open space and *Housing for the Workforce* shall be provided throughout the *Project* in conformity with this *Agreement*.

34. Construction Entrance: The location of the construction entrance is set forth in Exhibit 14.1 to the *Plan*.

35. Landscaping Sketch Plan: Notwithstanding Article 4.27.9.C.1.b.x of the *ZLDR*, a landscaping sketch plan shall not be required at this time. A landscaping sketch plan for each phase of the proposed development shall be submitted as part of a site plan or preliminary plat application for that phase.

36. Utility Sketch Plan: Notwithstanding Article 4.27.9.C.1.b.xi of the *ZLDR*, a utility sketch plan with the location of any on-site natural areas, buffers, trees and sidewalks that may be impacted by utility facilities including the existing and proposed location of any easements or rights-of-way shall not be required at this time. In lieu thereof, the *Property Owner* has submitted a series of conceptual plans for the provision of utilities and facilities, attached to the *Plan* as Exhibits 14.1 through 14.2. A more detailed utility sketch plan, in compliance with Article 4.27.9.C.1.b.xi of the *ZLDR*, for each phase of the proposed development shall be submitted as part of a site plan or preliminary plat application for that phase.

37. Current Aerial/Sketch Plan Overlay: An aerial of the *Real Property* with an overlay of the proposed Illustrative Master Plan is attached to the *Plan* as Exhibit 1.1.

## **12. Local Development Permits and Other Permits Needed**

Pursuant to section 6-31-60(A)(6) of the South Carolina Code, the *Parties* anticipate that the following local *Development Permits*, approvals, and other regulatory permits will be needed to complete the *Project*:

*County* plat approvals; *County* infrastructure permits; *County* land disturbance permits; *County* zoning, building, business license, stormwater/drainage, and contracting permits; *County* certificates of occupancy; applicable *DHEC* permits; and any other required local, state or federal approvals or permits.

The *County* will make a determination on the *Property Owner's* complete applications for approvals and permits within a reasonable time. The failure of this *Agreement* to address a particular permit, condition, term, or restriction does not relieve the *Property Owner* of the necessity of complying with the law governing permit requirements, conditions, terms, or restrictions.

## **13. Vested Rights Governing the Development of the Real Property**

A. Generally: Subject to Paragraph 10.A of this *Agreement*, all rights and prerogatives accorded to the *Property Owner* by this *Agreement* and the *Plan* shall immediately constitute vested rights for the *Development* of the *Real Property*. Nothing in this *Agreement*, including but not limited to Paragraph 10.A, is intended to abrogate and shall not abrogate or diminish rights conferred under sections 6-31-140 of the South Carolina Code, the "Vested Rights Act" (codified at sections 6-29-1510 to -1560 of the South Carolina Code), any provision of the *County Ordinances* adopted pursuant to the Vested Rights Act, or any rights that may have vested pursuant to common law or otherwise in the absence of a *Development Agreement*.



B. Vested Rights to Complete Development in Progress: Any permits or approvals granted to the *Property Owner* prior to the adoption of this *Agreement* shall continue to be valid, vested rights.

C. Vested Rights in the Plan: All permitted, conditional, accessory, and temporary uses set forth in the *Plan* shall constitute vested rights on the *Effective Date*. In addition, all *Building Development Standards* and other *Development* regulations, including but not limited to waterfront development standards, tree regulations, parking and loading regulations, open space and common open space regulations, architectural regulations, landscaping regulations, and buffer and screening regulations set forth in the *Plan* shall constitute vested rights on the *Effective Date*.

D. Entitlement Densities: The *Property Owner* shall have a vested right to the following entitlement densities on the *Effective Date*:

1. Dwelling Units: The *Property Owner* shall have the vested right to develop up to 1,285 *Dwelling Units* on the *Real Property*, not including those *Dwelling Units* that are *Retirement Housing Units*, and may determine the precise type, configuration and location of *Dwelling Units*, provided that:

- The *Property Owner* may not develop more than 580 *Dwelling Units* on the portion of the *Real Property* formerly zoned AG-8 which is designated as Rural Residential in the *Plan*; and
- The *Property Owner* may not develop more than 80 *Dwelling Units* on the portion of the *Real Property* delineated in the *Plan* as the Bohicket Station.

2. Retirement Housing. The *Property Owner* shall have a vested right to develop up to 160 *Retirement Housing Units*. These *Retirement Housing Units* shall be in addition to the other 1,285 *Dwelling Units* vested for the *Real Property*. *Retirement Housing Units* shall count against the cap of 450 *Guest Rooms* at the equivalence of 2.0 *Retirement Housing Units* for each *Guest Room*, with any fractions rounded up to the next whole number of *Guest Rooms*. *Retirement Housing Units* may be located only in the River Village and not in the Rural Residential or Bohicket Station.

3. Housing for the Workforce: Of the 1,285 total *Dwelling Units*, 117 shall constitute *Housing for the Workforce* units. Further, 18 of the *Housing for the Workforce* units shall constitute *Affordable Housing*. The *Property Owner* may determine the precise type, configuration and location of *Housing for the Workforce* and *Affordable Housing* on the *Real Property*, in compliance with the *Agreement* and the *Plan*; provided, however, that the *Housing for the Workforce* units and *Affordable Housing* units shall be located throughout the *Real Property* and the *Dwelling Unit* caps described in number 1, above, are not exceeded.

4. Commercial and Institutional Entitlement Densities: “*Gross Leasable Area*” or “*GLA*” means total floor area devoted to a use designated as such in Table 4.1 of the *Plan*. *GLA* does not include public or common areas, such as parking lots, utility rooms and stairwells, in a building or on a *Lot* otherwise devoted to a use designated as *GLA* in the *Plan*. For the purpose of this provision, the term “floor area” shall have the definition specified in Chapter 12 of the ZLDR on the *Effective Date*. The *Property Owner* shall have

the vested right to develop up to 80,000 square feet of *GLA* on the *Real Property*. This *GLA* shall constitute a vested right on the *Effective Date*. The *Property Owner* may determine the precise configuration and location of *GLA* on the *Real Property*, in compliance with the *Agreement* and the *Plan*.

5. Lodging: The *Property Owner* shall have a vested right to develop up to 450 *Guest Rooms* on the *Real Property*, which may be dispersed among *Villas, Inns, Bed and Breakfasts*, and/or up to two (2) *Hotels*. The *Property Owner* shall have a vested right to develop up to two (2) *Hotels* on the *Real Property*; provided, however, the total number of *Guest Rooms* on the *Real Property* may not exceed 450. The *Property Owner* may determine the precise type, configuration and location of *Guest Rooms* on the *Real Property*, in compliance with the *Agreement* and the *Plan*. *Guest Rooms* shall not count against any of the other entitlement densities in the *Agreement*.

6. Golf Course: "*Golf Course*" means a tract or tracts of land laid out for up to thirty-six (36) holes for playing the game of golf and improved with tees, greens, fairways, and hazards, and that may include club houses, driving ranges, training facilities, maintenance facilities, and shelters. *Golf Courses* shall constitute *Active Recreation Areas*. The *Property Owner* shall have the right to develop a portion of the *Real Property* for use as a *Golf Course* or *Golf Courses*, including up to 36 holes, any or all of which the *Property Owner* may develop as public or private, provided, however, that the *Golf Course(s)* shall not comprise the entire area designated as open space. The *Property Owner* shall have the right to build full-service club houses, practice ranges, training facilities and maintenance facilities accessory to the *Golf Course(s)* on the *Real Property* in any location the *Property Owner* deems appropriate, in compliance with the *Agreement* and the *Plan*. The *Property Owner* may determine the precise configuration and location of the *Golf Course(s)* and its/their accessory uses, in compliance with the *Agreement* and the *Plan*. The *Golf Course(s)*, including club houses and other accessory uses, shall not count against any of the other entitlement densities in this *Agreement*.

**14. Intentionally Omitted.**

**15. Configuration and Location**

The standards set forth in the Kiawah River Planned Development District Plan, attached hereto and incorporated herein by reference as Appendix A, shall control the configuration and location of vested rights and uses on the *Real Property* or any portion thereof. The conceptual illustrations or maps included in or attached as exhibits to this *Agreement* or the *Plan* are provided as examples only and shall not affirmatively bind the *Property Owner*. The planned *Development* is subject to change within the legal guidelines of this *Agreement* and the *Plan*, and the conceptual illustrations and maps included herein and attached hereto are therefore not commitments or representations to the *County* or any third party. The *Property Owner* may determine the precise configuration, names, acreage, amounts and location of any vested rights and uses in compliance with this *Agreement* and the *Plan*.

**16. Facilities and Services**

A. Generally: This section addresses the *Facilities*, including public infrastructure improvements, which are necessary to support the *Development*. The *Property Owner* shall only be responsible for those specific *Facilities* that the *Property Owner* expressly undertakes to install and maintain herein. The remainder of the *Facilities* listed herein shall be installed and maintained by the applicable service providers. Accordingly, letters of coordination with each of these service providers are included in Appendix F.

B. Certification of Completion Concurrent with Impact: Although the nature of this long term *Project* prevents the *Property Owner* from now providing exact completion dates, the *Property Owner* certifies that the specific services and *Facilities*, including public infrastructure improvements, that the *Property Owner* expressly undertakes to install will be in place, or if not fully in place, the cost of their construction fully bonded or letter of credit posted at a sufficient time to ensure availability concurrent with the impacts of the *Development* and consistent with the Schedule of *Development* set forth herein. Subject to compliance with applicable law and with all provisions of the *Agreement*, the *County* hereby authorizes the *Property Owner* to install all *Facilities* which the *Property Owner* has undertaken to provide herein.

C. Economic Impact Analysis: The *Property Owner* has procured an extensive economic and fiscal impact analysis of the proposed *Development*, prepared by The Regional Dynamics and Economic Modeling Laboratory at the Strom Thurmond Institute of Government at Clemson University and attached hereto as Appendix C. Further, a more detailed analysis of the fiscal impact of the *Project* on governmental services and infrastructure, as well as a capital improvements program designed to implement necessary infrastructure improvements as the *Project* progresses, is attached hereto as Appendix D (The Fiscal Impact of Kiawah River Plantation on Charleston County, dated December 18, 2009). Both of these analyses project a positive net fiscal impact for the *County*, with additional revenue received by the *County* as a result of the *Development* more than sufficient to cover the additional expenditure burden for the *County* generated by the *Development*.

#### D. Traffic Considerations

1. Traffic Study and Mitigation Plan: The *Property Owner* has procured a Traffic Impact Analysis and Mitigation Plan prepared by Kubilins Transportation Group, Inc., a copy of which is attached hereto as Appendix E. This study analyzes the traffic operations within the area of influence and provides recommended access management for the site and intersection improvements needed for mitigating traffic impacts. A proof-of-coordination letter with *DOT* is also included in Appendix E, attached hereto.

2. Scope of Study: The area of influence of the study site, as indicated by *DOT*, includes the following four (4) existing and one (1) proposed intersections:

- a. Maybank Highway (SC 700) and River Road (S-10-91) (signalized);
- b. Maybank Highway (SC 700) and Bohicket Road/Main Road (S-10-20) (signalized);

c. Bohicket Road/Betsy Kerrison Parkway and River Road (S-10-20) (signalized);

d. River Road (S-10-91) and Mullet Hall Road/Site Access (unsignalized);  
and

e. Betsy Kerrison Parkway and Village Site Access (proposed signal)

3. Site Access: The *Development* will be served by two (2) full-movement access points. The primary access point for the *Development* will be located at Betsy Kerrison Parkway. The secondary access point for the *Development* will be located at Mullet Hall Road. There are no recommended improvements to Mullet Hall Road. However, the following improvements are recommended to ensure proper site access at Betsy Kerrison Parkway:

a. Construct a full-movement access drive with one (1) ingress lane and two (2) egress lanes. The egress lanes should be configured as a separate left turn lane with 150 feet of storage and the through lane shall terminate as a right turn lane. 150 feet of internal protected storage should also be provided.

b. Construct a dedicated left-turn lane on the southbound approach of Betsy Kerrison Parkway with 150 feet of storage with appropriate tapers.

c. Construct a dedicated right-turn lane on the northbound approach of Betsy Kerrison Parkway with 100 feet of storage with appropriate tapers

d. Install traffic signal control upon meeting the appropriate MUTCD and SCDOT traffic signal control warrants.

The *Property Owner* shall construct or finance the construction of the above-stated improvements (or such other improvements as shall be recommended in consultation with *DOT*) after obtaining all applicable permits and approvals from *DOT* as these improvements are deemed necessary by *DOT*. The *Property Owner* shall complete the first three (a-c) of the above-stated improvements concurrently with the completion of Phase 1 construction. The *Property Owner* shall complete the final recommended improvement (d) when required in coordination with *DOT*. The *Property Owner* will dedicate any applicable public improvements associated with this primary access point to the public for maintenance in accordance with applicable law and provide any applicable maintenance bond in coordination with *DOT*.

4. Initial Development Capacity: The study analyzed the amount of development and resultant traffic that can be handled without operational impacts to the major facilities and intersections on Johns Island. The analysis determined that the following amount of development could be constructed over the next several years without any significant impact to the intersections or roadway network that would require improvements:

- 105 single family homes
- 315 recreational homes
- 40 workforce apartments
- 350 guest rooms
- 35,000 square feet of *GLA* in the Bohicket Station Tract, as delineated in Exhibit 4.1 of the *Plan*
- 20,000 square feet of *GLA* within the River Village Tract, as delineated in Exhibit 4.1 of the *Plan*
- An 18-hole golf course

Further, Kublins Transportation Group, Inc. has prepared a land-use equivalency matrix, attached hereto as Appendix E-1, which permits a ready conversion of the traffic impact (number of peak hour trips generated) from one proposed use to another. The *Property Owner* shall fund an independent supplemental traffic study (the cost of which shall not exceed \$20,000.00) and provide a proposed mitigation and implementation plan for the *County's* review and approval after the *Development* has reached 2/3 of the "Initial Development Capacity" set forth in the initial traffic impact analysis, prepared as part of this *Agreement*, as such "Initial Development Capacity" may be converted by Appendix E-1.

#### E. The Project's Thoroughfares:

1. Definition: "*Thoroughfare*" means a way for use by vehicular and pedestrian traffic and to provide access to *Lots* and open space, consisting of vehicular lanes and their adjacent rights-of-way.

2. County Road Construction Standards: Notwithstanding any provision in the *Agreement* or the *Plan* which may be construed to the contrary, the *Property Owner* shall comply with the standards for public roads set forth in the *County Road Construction Standards*, described in the *ZLDR*, with respect to any *Thoroughfares* the *Property Owner* intends to dedicate to the public. The *Agreement* and the *Plan* shall not be construed to supersede or contravene the *County Road Construction Standards* described in the *ZLDR* with respect to any *Thoroughfares* the *Property Owner* intends to dedicate to the public.

3. Design and Installation: The *Property Owner* shall develop and install *Thoroughfares* and their related infrastructure on the *Real Property*. The *Property Owner* may develop any or all of the *Thoroughfares* on the *Real Property* as public or private; provided, however, any *Thoroughfares* to be offered for dedication to the public will comply with the *County Road Construction Standards* described in the *ZLDR*.

4. Private Thoroughfares: Exhibits 11.1 and 11.2 to the *Plan* provide an illustration of the typical private *Thoroughfare* sections which may be implemented on the *Real Property*, including typical utility placements within private *Thoroughfares*. Exhibit 11.3 to the *Plan* shows the vehicular lanes and parking assemblies which may be utilized for private *Thoroughfares* on the *Real Property* or designated portions thereof. Exhibit 11.4



to the *Plan* shows the conceptual road framework which may be implemented for private *Thoroughfares* on the *Real Property*. Notwithstanding those exhibits, the *Property Owner* may determine the precise configuration and location of any and all private *Thoroughfares* on the *Real Property*; provided, however, the *Property Owner* has a qualified engineer determine that their configuration and location does not present a significant safety hazard.

5. Ownership and Maintenance: The *Property Owner*, a related entity, and/or a duly constituted *Association* shall perform the maintenance and upkeep on any and all *Thoroughfares* on the *Real Property* or any portion thereof unless they have been dedicated to and accepted by the public in conformity with the *County Road Construction Standards* described in the *ZLDR*. All alleys shall be maintained and owned by the *Property Owner*, a related entity, or an *Association*.

6. Paving: Any and all public *Thoroughfares* installed on the *Real Property* shall be paved in accordance with the *County Road Construction Standards*, described in the *ZLDR*. To preserve the existing rural character of the *Real Property* or portions thereof, the *Property Owner* may retain existing unpaved, private *Thoroughfares* and/or install other unpaved, private *Thoroughfares* on the *Real Property* or portions thereof.

7. Internal Access: The *Property Owner* may limit access to private *Thoroughfares* on the *Real Property* or portions thereof through the use of a security gate or other similar method. Access to public *Thoroughfares* may NOT be similarly limited. All *Thoroughfares* on the *Real Property*, whether public or private, shall have direct or indirect access to Betsy Kerrison Parkway and Mullet Hall Road.

8. Construction Access: Construction traffic will be routed along Mullet Hall Road, at the location illustrated in Exhibit 14.1 to the *Plan*. Prior to construction of Phase 1, the *Property Owner* shall finance an inspection of Mullet Hall Road to determine and record its current condition. The *Property Owner* will provide a report defining the base line condition of Mullet Hall Road and providing an ultimate road section recommendation to accommodate projected traffic for build-out of the *Project*. This report will be submitted to *DOT* for review and approval. The *Property Owner* will then provide *DOT* with an engineer-certified construction cost estimate for any repairs and other improvements needed as specified in the report, as well as a letter of credit or bond ensuring the work will take place within a mutually agreeable time frame. The *Property Owner* will continue to coordinate any improvements or maintenance of Mullet Hall Road with *DOT* during the *Project*. The Charleston County Parks and Recreation Commission, which uses Mullet Hall Road for primary access to the Johns Island County Park and Mullet Hall Equestrian Center, has consented to this procedure via letter of coordination attached to the *Plan* as Exhibit 11.5.

9. Connections with Adjacent Properties: The *Property Owner* shall use best efforts to facilitate a connection with adjacent parcels at the approximate locations illustrated in Exhibit 4.1 to the *Plan*. The *Property Owner's* obligation under this section shall not require that the *Property Owner* purchase or otherwise finance the acquisition of any right, title, or interest in and to these adjoining properties. The *County* recognizes the *Property*

*Owner's* abilities under this section are highly dependent upon and constricted by the actions or inactions of third parties.

F. Community Ways: As used herein, a "*Community Way*" means a walkway of any surface type (paved or unpaved), a bicycle lane, bicycle route, bicycle trail, leisure trail, or walking trail designed for pedestrian or bicycle traffic. The *Property Owner* shall install an interconnected system of *Community Ways* on the *Real Property*. The *Property Owner* may determine the configuration, location, type, number, size, location, lighting and path surfaces of private *Community Ways* on the *Real Property*. However, any and all public *Community Ways* shall comply with the *County's* Improvement Standards, as they exist on the *Effective Date*. The *Property Owner* shall use best efforts to facilitate a connection with adjacent parcels at the approximate locations delineated in Exhibit 4.1 to the *Plan*. The *Property Owner's* obligation under this section shall not require that the *Property Owner* purchase or otherwise finance the acquisition of any right, title, or interest in and to these adjoining properties. The *County* recognizes the *Property Owner's* abilities under this section are highly dependent upon and constricted by the actions or inactions of third parties. Any and all *Community Ways* designed and constructed by the *Property Owner* may (1) be owned and maintained as *Common Areas*; (2) be owned and maintained by the *Property Owner* or a related entity; or (3) be dedicated to the public. The *Property Owner*, a related entity, and/or a duly constituted *Association* shall perform the maintenance and upkeep of the *Community Ways* on the *Real Property* or any portion thereof unless they have been dedicated to and accepted by the public. Upon tender of a deed from the *Property Owner* approved by the *County* attorney, the public may accept any and all *Community Ways* tendered for dedication by the *Property Owner* provided they comply with the *County's* Improvement Standards, as they exist on the *Effective Date*.

G. Golf Carts and Personal Transportation Vehicles: Golf carts and personal transportation vehicles may be used on any *Thoroughfares*, causeways, *Community Ways*, and parking areas of the *Real Property* or any portion thereof that the *Property Owner* may designate, if consistent with state law.

H. Wastewater Treatment: The *Property Owner* will provide suitable wastewater treatment or septic to all *Lots* and *Dwelling Units* on the *Real Property* pursuant to the *Agreement* after obtaining all applicable permits and approvals from regulatory agencies and governmental entities. Any wastewater treatment system shall be subject to best management practices. The proposed wastewater treatment facility will comply with the Charleston County 208 Water Quality Management Plan and all BCDCOG and SCDHEC requirements, including the SCDHEC permitting requirements that the *Property Owner* provide financial protections for the continued economic viability of the system and that the system be managed by a class A licensed operator.

I. Potable Water: St. John's Water Company will provide potable water to all *Lots* and *Dwelling Units* on the *Real Property* pursuant to the *Agreement* after obtaining all applicable permits and approvals from regulatory agencies. Water supply for the *Development* will be via two (2) connections: (1) an existing, twenty-four-inch (24") diameter water transmission main on Betsy Kerrison Boulevard; and (2) an existing six-inch (6") diameter water main on Mullet Hall Road. The existing water main on Mullet Hall Road will likely need to be upsized in the future to supply sufficient fire-flow. The new system will be designed and constructed to supply sufficient fire suppressing flow based on the requirements of the Insurance Services Office (ISO), as well as

the Charleston County Building Department. A Preliminary Master Water Plan is attached to the *Plan* as Exhibit 14.1. Prior to the construction of Phase 1, a more in-depth water model will be created in order to properly size all mains. The new water distribution system will be designed to meet the requirements of the St. Johns Water Company and *DHEC*. Applicable impact fees will be paid to St. Johns Water Company in order to offset any capital improvement upgrades that will be needed for the system. A proof-of-coordination letter with St. Johns Water Company is included in Appendix F. Unless otherwise provided with respect to *Lots* served by a well, the *Property Owner* shall design and construct facilities necessary for the transmission and distribution of potable water to all *Lots* and *Dwelling Units* on the *Real Property*. The *Property Owner* shall transfer facilities for the transmission and distribution of potable water, including necessary easements, to St. Johns Water Co.

J. Drainage:

1. Stormwater Master Plan: A Stormwater Master Plan for the *Real Property* is attached hereto as Appendix H. The *Property Owner* shall provide sufficient drainage for the *Development* of the *Real Property*. The *Property Owner* shall not impair or diminish the drainage currently flowing through the *Real Property*. The *Property Owner* shall not impede such drainage during construction or during land disturbance activities on the *Real Property* and shall provide comparable drainage at a substitute location, if necessary.

2. County Stormwater Ordinance: Notwithstanding any provision in the *Agreement* or the *Plan* which may be construed to the contrary, the *Property Owner* shall comply with the standards for drainage set forth in the *County Stormwater Ordinance*. The *Agreement* and the *Plan* shall not be construed to supersede or contravene the *County Stormwater Ordinance*.

3. Coordination with County Public Works Department: The *Property Owner* will continue to coordinate with the Stormwater Division of the *County's* Public Works Department to ensure that all publicly dedicated, constructed and accepted drainage-related capital improvements (or portions thereof) and operating expenses directly attributable to the *Project* and the *Development* are paid for through property tax revenue or other revenues generated from the *Development* during the build-out of the *Project* and concurrent with impacts from the *Development*, as well as to ensure that all improvements constructed on the *Real Property* comply with the *County's* Stormwater Ordinance. The *Property Owner* shall obtain all applicable permits and approvals relating to drainage before beginning each phase of the *Project*.

4. Maintenance: Any and all drainage infrastructure designed and constructed by the *Property Owner* may (1) be owned and maintained as *Common Areas*; (2) be owned and maintained by the *Property Owner* or a related entity; or (3) be dedicated to the public. The *Property Owner*, a related entity, and/or a duly constituted *Association* shall perform the maintenance and upkeep of the drainage infrastructure and facilities on the *Real Property* or any portion thereof unless they have been dedicated to and accepted by the public.

K. Septic Tanks and Wells: The *Property Owner* may install septic systems and/or wells for drinking water to service *Lots* and *Dwelling Units* on the *Real Property* or portions thereof provided the septic systems and/or wells for drinking water meet state regulatory requirements. The number of *Lots* or *Dwelling Units* on the *Real Property* serviced by wells and/or septic systems shall not exceed any applicable state regulatory requirements. Any such *Lots* and *Dwelling Units* on the *Real Property* that are serviced by a septic system or well meeting applicable regulatory requirements shall not be considered non-conforming under the *County's Laws* because of such septic system or well.

L. Streetlights: The *Property Owner* shall have the right to decide the location, design and number of streetlights, if any, on the *Real Property*. Any and all streetlights designed and installed on the *Real Property* may (1) be owned and maintained as *Common Areas* or (2) be owned and maintained by the *Property Owner* or a related entity. If the location of any streetlight is to be in a public right-of-way, the location must be approved by the *County's* Director of Public Works.

M. Stoplights, Traffic Control, and Other Street Signage: The *Property Owner* may determine the configuration and location of all street and traffic control signs on the *Real Property*, the standards of which shall be determined in consultation with *DOT*. All traffic control devices within a public or private right-of-way must meet the requirements of the Manual on Uniform Traffic Control Devices.

N. Parks, Common Spaces and Buffers on the Real Property: Certain portions of the *Real Property* may contain parks, common spaces, and buffers. The *Property Owner* reserves the right to limit access and use of these to select owners, tenants or lessees on the *Real Property*, their guests, and others who may be their invitees.

O. Solid Waste Collection: Trash collection will be provided by the *Property Owner* for all residential, commercial, institutional, retail and office parcels on the *Real Property*. Trash collection for single-family parcels will be curb-side. Trash collection will be from a central location, such as a Dumpster, for each separate multi-family, commercial, institutional, retail, or office site on the *Real Property*. These Dumpsters (or other containers) will be located out-of-sight in approved areas with appropriate access and screening. A proof-of-coordination letter with Suburban Disposal Services is included in Appendix F. The *Property Owner* will continue to work with the Charleston County Environmental Management Department to coordinate solid-waste related activities.

P. Education: The *Development* will be served by the Charleston County School District and area private schools. The *Development* is planned to be similar in scope and nature to the Kiawah Island and Seabrook communities. The *Development* is expected to generate 39 new students who attend school in the district by the time of full build-out at year 20. A proof-of-coordination letter was received from the Charleston County School District stating that "all of the referenced schools currently have capacity on site to serve students in their attendance zones." A copy of this letter is included in Appendix F.

Q. Police: All access drives and parking areas will be lighted to improve security and reduce vehicle thefts. The proposed *Development* will foster community involvement, which will

aid in the prevention of crime through citizen activism. Also, the proposed traffic improvements referenced in Appendix E should maintain or improve current response times to this and adjacent sites. A proof-of-coordination letter with the Charleston County Sheriff's Office is included in Appendix F.

R. Fire Protection: All access roads and parking areas will be constructed to facilitate fire equipment access. Representatives of the *Property Owner* have coordinated with the St. John's Fire Department to discuss the *Development*, including proposed road sections. The *Property Owner* will continue to coordinate with St. Johns Fire Department through the life of this *Agreement*. The *Property Owner* will provide capital items as stated in Section 16(X) of this *Agreement*.

S. Emergency Medical Services: Charleston County EMS provides emergency medical services to the citizens of Charleston County. A proof-of-coordination letter with Charleston County EMS is included in Appendix F.

T. Utilities: Utilities, such as electrical and gas services, cable television, high speed internet access, and telephone service, shall be made available and maintained by the appropriate service providers. All utilities shall be installed underground. The *Property Owner* shall furnish necessary easements to utility providers for water, sewer, gas, electricity, telephone, cable television, and other utilities. Adequate easements for utilities shall be reserved by the *Property Owner* in conveyances of *Lots*, *Dwelling Units*, and *Development Parcels*. The location and size of such easements shall be determined by the *Property Owner* in consultation with the applicable service provider. Letters of coordination from Berkeley Electric Cooperative, Inc., Comcast, and Bellsouth are included in Appendix F.

U. Common Area Maintenance: Any *Association* established with respect to the *Real Property* or any portion thereof shall be responsible for maintaining the *Common Areas*, as described in any applicable *Covenants* and/or the *Agreement*.

V. Hurricane Preparedness Plan: The *Property Owner* has procured a Hurricane Evacuation Plan, which is attached hereto as Appendix I. The *Property Owner* will coordinate with the Charleston County Emergency Preparedness Division and the South Carolina Emergency Management Division to ensure that the *Development* complies with applicable laws and regulations.

W. Town of Kiawah Island: The *Property Owner* has conferred with the Town of Kiawah Island, the only municipality adjacent to the *Real Property*, which supports the *Project*. Furthermore, the *Property Owner* has conferred with the nearby municipality of Seabrook Island. Proof-of-coordination letters with the Town of Kiawah Island and Seabrook Island are included in Appendix F.

X. Mitigation Provided Directly by the Property Owner to the County: The *Property Owner* shall provide the following amounts to mitigate the impact of the *Development*:

1. Ladder Truck: The *Property Owner* will pay \$800,000 or the actual cost, whichever is lesser, towards the purchase of a ladder truck to service the *Real Property* for

St. John's Fire District on or before obtaining a building permit for the construction of any building on the *Real Property* requiring a ladder truck according to National Fire Prevention Association requirements.

2. Dedication of Land: During the term of this *Agreement*, the *Property Owner* shall set aside three (3) highland acres of the *Real Property* at a mutually agreeable location(s). At such time as the *County* requests the use of any or all of this acreage for the construction of a substation(s) for the use of St. John's Fire District, the Charleston County Sheriff's Office, the Charleston County Magistrate's Office, Charleston County EMS, and/or any other police, fire or EMS service which may acquire jurisdiction over the *Real Property* after the *Effective Date* (provided, however, the site(s) shall not be used solely by the Charleston County Magistrate's Office), the *Property Owner* shall dedicate the such acreage to the *County* as necessary for such use(s). If the *County* does not construct a substation on the dedicated site(s) within three (3) years of the dedication, the dedicated site(s) shall revert back to the *Property Owner*; provided, however, the *Property Owner* shall continue to hold the site(s) as set forth in this Paragraph 16.X.2 and all of the *County's* rights in this Paragraph 16.X.2 shall continue until the termination of this *Agreement*. The *County* may not request such dedication until after a certificate of occupancy has been issued for the 200<sup>th</sup> *Dwelling Unit*, unless otherwise agreed by the *Parties*.

## 17. Natural Resource Protection and Preservation

A. Cultural Resources Survey: The *Property Owner* has procured a Cultural Resources Survey of Mullet Hall Plantation, Johns Island, Charleston County, South Carolina, prepared by the Chicora Foundation, Inc., attached hereto as Appendix J. The study examined archaeological sites and cultural resources found on the *Real Property*.

1. Cemeteries: Three (3) cemeteries, designated in the study as 38CH1540, 38CH1548, and 38CH1549, will not be developed except as provided herein. Additionally, as recommended in the study, 38CH1540 will have a fifty foot (50') minimum buffer, 38CH1548 will have a twenty-five foot (25') minimum buffer, and 38CH1549 will have a fifty foot (50') minimum buffer. All three cemetery sites will have construction fences erected for their protection during all phases of construction activity. As further recommended in the study, the *Property Owner* will remove all trees in the cemeteries of 5-inches DBH or less in diameter. The remaining trees will be pruned for crown cleaning and overall restoration. No tree survey or other *County* permits shall be required for such clearing and restoration.

2. Archaeological Resources: Upon review and approval by the State Historic Preservation Office ("SHPO"), eligible and potentially eligible archaeological resources may be either green spaced (preserved in place) or subjected to additional investigation (data recovery in the case of eligible sites or additional testing in the case of potentially eligible sites). With additional testing, the potentially eligible sites may be designated as either eligible or not eligible. Contractors shall be advised to report the discovery of any archaeological remains encountered during construction activities to the *Project* engineer, who should, in turn, report the find to SHPO. No further land-altering activities shall take

place in the area of the discovery until they have been examined by an archaeologist and, if necessary, processed.

B. Memorandum of Agreement: The *Property Owner* will enter into a Memorandum of Agreement with *DHEC* and *SHPO*, a proposed draft of which is attached hereto as Appendix K, to certify the consistency of the *Development* with the Coastal Zone Management Plan and to mitigate potential impacts of the *Development* on sites which are eligible for, potentially eligible for, or currently listed in the National Register of Historic Places. The *Property Owner* will continue to coordinate with *DHEC* and *SHPO* to ensure that applicable natural and cultural resource areas on the *Real Property* are investigated, preserved and protected pursuant to state and federal law.

C. Threatened and Endangered Species Assessment: The *Property Owner* has procured a Threatened and Endangered Species Assessment, prepared by Newkirk Environmental, Inc., which, together with a May 21, 2009, update of this assessment, is attached hereto as Appendix L. The assessment was conducted to determine the occurrence of, or potential for, animal and plant species federally listed as endangered or threatened to exist within the *Real Property*. Completion of this survey complied with current state and federal regulations, including the Federal Endangered Species Act, the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, and the South Carolina Non-Game and Endangered Species Conservation Act. Field surveys have documented the presence of two (2) bald eagle nests within the boundaries of the *Real Property*. As a result, coordination with the Department of Natural Resources and the United States Fish & Wildlife Service is on-going in an attempt to establish guidelines for activities near the active nests. The proposed *Development* shall comply with these guidelines.

D. Flora and Fauna: The *Property Owner* will use best efforts to maintain and enhance the native plant material on the *Real Property*. Additional considerations in *Lot* configurations will be made to maintain wildlife corridors that connect this property with the surrounding natural environment.

## **18. Development Schedule for the Project**

A. Commencement Date: The *Project* will be deemed to commence *Development* upon the *Effective Date*.

B. Interim Completion Dates: The *Property Owner* estimates that during the years after the *Effective Date*, the following percentages of the undeveloped highland within the *Real Property* will be developed pursuant to the *Plan*:

<u>Year</u>	<u>Percentage Complete</u>
5	0-25%
10	26-50%
15	51-75%
20	76-100%

As such, a generalized phasing plan for the *Real Property*, showing a conceptual illustration of the *Development* which may be implemented on the *Real Property* 5 years, 10 years, 15 years, and 20 years after the *Effective Date* of the *Agreement* is attached to the *Plan* as Exhibit 7.1.

C. Completion Date: The *Property Owner* projects that the *Project* should be substantially completed (i.e. essentially all structures erected and/or all necessary infrastructure in place to serve the intended uses) twenty (20) years from the *Effective Date*.

D. Modification of Commencement or Completion Date: The *County* recognizes the *Development* on the *Real Property* will include a variety of uses and that demand, cost, environmental factors, and other pertinent financial and feasibility considerations fluctuate. Accordingly, the commencement date and schedule of completion set forth in this *Agreement* are estimates only. The timing of the actual *Development* of the *Project* will likely differ because of the multiple variables influencing it. The *Parties* agree that the commencement date, interim completion dates, and completion date are therefore subject to modification and that the *Property Owner* may provide to the *County* updated schedules which shall not constitute an amendment of this *Agreement* triggering the process for approval of amendments set forth in this *Agreement*.

E. Failure to Meet Commencement or Completion Date: The *Property Owner's* failure to meet the commencement date, an interim completion date, or the completion date shall not, in and of itself, constitute a material breach of this *Agreement* pursuant to section 6-31-90 of the South Carolina Code, but must be judged based on the totality of circumstances.

## 19. Term of the Agreement

A. Term: Pursuant to section 6-31-40 of the South Carolina Code, this *Agreement* shall expire twenty (20) years from the *Effective Date* unless extended pursuant to the remaining provisions of this Paragraph. The date of the expiration of the term of this *Agreement* is the termination date.

B. Extension of Term: If the *Property Owner* provides to the *County* a written certification during the initial or the first extension term of this *Agreement* but no later than ninety (90) days prior to the termination date that the gross highland acres within the *Real Property* then owned by the *Property Owner*, and/or an entity or entities that have substantially the same ownership as the *Property Owner*, is twenty-five acres or more, the *County*, the *Property Owner*, and/or such entity or entities shall enter an amendment to this *Agreement* extending the term for an additional five (5) year term from the date of certification; provided, however, the *Property Owner* is not in material breach of the *Agreement*. The *Property Owner* may exercise up to two such five-year extensions. Nothing in this *Agreement* shall be interpreted to preclude the *Parties* from extending the termination date by mutual *Agreement* or from entering into subsequent Development Agreements.

## 20. Intentionally Omitted.

## 21. Submission List



The following package of documents, exhibits, and appendices has been submitted simultaneously with this *Agreement* and is incorporated herein:

Development Agreement

- Exhibit 1.1-Definitions
- Exhibit 4.1-Legal Description
- Exhibit 4.2-Plat
- Exhibit 4.3-Acreage Breakdown
- Exhibit 4.4-Deed No. 1
- Exhibit 4.5-Deed No. 2
- Exhibit 4.6-Deed No. 3
- Exhibit 4.7-CCPRC Easement Agreement
- Exhibit 4.8-Berkeley Electric Easement Agreement
- Exhibit 4.9-Wetland Survey

Appendices

- Appendix A-The Kiawah River Planned Development District Plan (with exhibits)
- Appendix B-ZLDR, as modified
- Appendix C-Economic Impact Analysis
- Appendix D-Capital Improvements Program/Fiscal Impact Analysis
- Appendix E-Traffic Impact Analysis and Mitigation Plan
- Appendix E-1-Land Use Equivalency Matrix
- Appendix F-Letters of Coordination with Local Government Entities
  - 1-DOT
  - 2-BCDCOG
  - 3-St. John's Water Co.
  - 4-Suburban Disposal Services
  - 5-Charleston County School District
  - 6-Charleston County Sheriff's Office
  - 7-St. John's Fire Department
  - 8-Charleston County EMS
  - 9-Berkeley County Electric Cooperative, Inc.
  - 10-Comcast
  - 11-BellSouth
  - 12-Town of Kiawah Island
  - 13-Charleston County Parks and Recreation Commission
  - 14-Town of Seabrook
- Appendix G-Intentionally Omitted
- Appendix H-Stormwater Master Plan
- Appendix I-Hurricane Evacuation Plan
- Appendix J-Cultural Resource Survey
- Appendix K-Proposed Memorandum of Agreement with DHEC and SHPO
- Appendix L-Threatened and Endangered Species Assessment with May 21, 2009 Addendum
- Appendix M-Intentionally Omitted
- Appendix N-Letter of Receipt from the Corps

**22. Amending or Canceling the Agreement**

Subject to the provisions of section 6-31-100 of the South Carolina Code, this *Agreement* may be amended or canceled in whole or in part only by mutual written consent of the *Parties* or their successors in interest and, in the case of the *Property Owner*, its successors in legal title. Any amendment to this *Agreement* shall comply with the provisions of section 6-31-100. If an amendment affects less than all the persons and entities comprising the *Property Owner*, then only the *County* and those affected persons or entities who are *Property Owners* need to sign such written amendment for it to be effective. Any provision of this *Agreement* requiring consent or approval of one of the *Parties* shall not require amendment of this *Agreement*, unless the text expressly requires amendment. Wherever said consent or approval is required, the same shall not be unreasonably withheld. Pursuant to section 6-31-60(B) of the South Carolina Code, a major modification of this *Agreement* shall occur only after public notice and a public hearing by the *County*.

**23. Modifying or Suspending the Agreement**

Pursuant to section 6-31-130 of the South Carolina Code, in the event state or federal laws or regulations, including state or federal laws or regulations enacted after the *Effective Date*, prevent or preclude compliance with one or more provisions of this *Agreement*, the pertinent provisions of this *Agreement* shall be modified or suspended as may be necessary to comply with such state or federal laws or regulations.

**24. Periodic Review**

Pursuant to sections 6-31-40 and 6-31-90(a) of the South Carolina Code, the *County's Planning Director* shall review the *Project* and this *Agreement* every twelve months to determine the *Property Owner's* good faith compliance with the terms of this *Agreement*. If, as a result of its periodic review, the *County* finds and determines that the *Property Owner* has committed a material breach of the terms or conditions of this *Agreement*, the *County* shall serve notice in writing upon the *Property Owner* setting forth with reasonable particularity the nature of the breach and the evidence supporting the finding and determination, and providing the *Property Owner* a reasonable time in which to cure the material breach. If the *Property Owner* fails to cure any material breach within the time given, then the *County* unilaterally may terminate or modify this *Agreement*; provided, that the *County* has first given the *Property Owner* the opportunity: (1) to rebut the *County's* finding and determination; or (2) to consent to amend this *Agreement* to meet the concerns of the *County* with respect to the findings and determinations.

**25. Severability**

Subject to the provisions of section 6-31-150 of the South Carolina Code, if any word, phrase, sentence, paragraph or provision of this *Agreement* shall be finally adjudicated to be invalid, void, or illegal, it shall be deleted and in no way affect, impair, or invalidate any other provision hereof.

**26. Merger**

This *Agreement*, coupled with its exhibits, which are incorporated herein by reference, shall state the final and complete expression of the *Parties'* intentions. All prior negotiations and representations are superseded and merged herein.

**27. Contingencies**

This *Agreement* and the *Plan* are contingent upon (1) their execution and approval in this form by the *Parties*; and (2) the *County's* zoning of the *Real Property* as a planned development district (with this Appendix A to this *Agreement* constituting the development plan).

**28. Cooperation**

The *Parties* hereto agree to cooperate with each other to effectuate the provisions of this *Agreement* and to act reasonably and expeditiously in all performances required under the *Agreement*. In the event of any legal action instituted by a third party or other governmental entity or official challenging the validity of any provision of this *Agreement*, the *Parties* hereby agree to cooperate in defending such action. Such cooperation does not require, in the event of such challenge, that a party to this *Agreement* shall pay for the expense of litigation for any other party.

**29. Governing Law**

This *Agreement* shall be construed and enforced in accordance with the laws of the State of South Carolina.

**30. Remedies/Non-Binding Arbitration**

A. Remedies: If there is a material breach of this *Agreement*, the non-breaching party may pursue all available legal and equitable remedies. Each party recognizes that the other party may suffer irreparable harm from a material breach of this *Agreement* and that no adequate remedy at law may exist to enforce this *Agreement*. Consequently, the *Parties* agree that any non-breaching party who seeks enforcement of the *Agreement* may seek the equitable remedies of injunction and specific performance. The *County* will look solely to the *Property Owner* as to any rights it may have against the *Property Owner* under this *Agreement*, and hereby waives any right to assert claims against members, officers, managers, employees, agents, and contractors of the *Property Owner*, and further agrees that no member, officer, manager, employee, agent, and contractor of the *Property Owner* has any personal, joint, or several liability under this *Agreement*. Likewise, the *Property Owner* agrees to look solely to the *County's* assets as to any rights it may have against the *County* under this *Agreement*, and hereby waives any right to assert claims for personal liability against individuals acting on behalf of the *County*, its *County Council* members, officers, agencies, boards, or commissions.

B. Non-Binding Arbitration: If there is a dispute between the *County* and the *Property Owner* concerning the terms, meaning, interpretation, rights or obligations under this *Agreement*, the *Parties* agree to submit such issue(s) to prompt non-binding arbitration before invoking legal proceedings. This non-binding arbitration shall be initiated by one party's notifying the other in

writing of the dispute and that party's request for non-binding arbitration as described herein. Each side shall within five (5) days of receipt of such notice pick an arbitrator and these two (2) arbitrators shall pick the third. The *Parties* shall then promptly convene a conference with the arbitration panel and present their positions. In this conference, the rules of evidence and other legal formalities shall not apply; positions may be stated and need not be presented through testimony, exhibits, or evidence. The majority of the arbitrators shall promptly render their decision. Upon the rendering of the arbitration panel's decision, either side may then immediately pursue proceedings for legal or equitable remedies. The *Parties* shall each bear the cost of its appointed arbitrator and equally share the cost of the third arbitrator and any separate expenses associated with the arbitration conference.

### **31. Recording**

Within fourteen (14) days after execution of this *Agreement*, the *Property Owner* shall record the *Agreement* with the Charleston County Register of Mesne Conveyances against the *Real Property* described in Paragraph 4 of this *Agreement*. The provisions contained herein shall be deemed to run with the land. The burdens of this *Agreement* are binding upon, and the benefits of this *Agreement* shall inure to, all successors in interest, successors in title, and assigns of the *Parties* to this *Agreement*.

### **32. Third Parties**

Notwithstanding any provision herein to the contrary, this *Agreement* shall not be interpreted to create or bestow any rights, remedies, or obligations on persons or entities that are not *Parties* or successors or assigns to this *Agreement* under Paragraph 33 of this *Agreement*.

### **33. Successors and Assigns**

A. Binding Effect: This *Agreement* shall be binding on the personal representatives, successors in interest, successors in title, and assigns of the *Property Owner* in the ownership or *Development* of any portion of the *Real Property* or the *Project*. A purchaser or other successor in title of any portion of the *Real Property* shall be responsible for performance of the *Property Owner's* obligations hereunder as to the portion of the *Real Property* so transferred and shall have the rights afforded to the *Property Owner* hereunder with respect to the portion of the *Real Property* conveyed. The *Property Owner* shall be released from obligations under this *Agreement* upon the sale of *Tracts, Lots* or *Development Parcels* as to the property conveyed, and the purchaser shall become the responsible party with regard to this *Agreement* as to the *Tract, Lot* or *Development Parcel* so conveyed. This *Agreement* shall also be binding on the *County* and all future *County Councils* for the duration of this *Agreement*, even if the *County Council* members change.

B. Transfer of Real Property: The *Property Owner* shall be entitled to transfer any portion or all of the *Real Property* to a purchaser(s) and assign its rights and obligations under this *Agreement*. If the *Property Owner* transfers to an unrelated third party a *Lot* or *Development Parcel* within the *Real Property* on which the *Property Owner* is required to provide and/or construct certain *Facilities*, then the *Property Owner* shall be required to obtain a written

*Agreement* from the purchaser expressly assuming all such separate responsibilities and obligations with regard to the *Lot or Development Parcel* conveyed and the *Property Owner* shall provide a copy of such *Agreement* to the *County*. Notwithstanding anything to the contrary contained herein, the exceptions and restrictions to transfer contained in this Paragraph shall not apply: (i) to any mortgage lender either as the result of foreclosure of any mortgage secured by any portion of the *Real Property* or any other transfer in lieu of foreclosure; (ii) to any third party purchaser at such a foreclosure; or (iii) to any third party purchaser of such mortgage lender's interest subsequent to the mortgage lender's acquiring ownership of any portion of the *Real Property* as set forth above. Furthermore, nothing contained herein shall prevent, hinder or delay any transfer of any portion of the *Real Property* to any such mortgage lender or subsequent purchaser. Except as set forth herein, any such mortgage lender or subsequent purchaser shall be bound by and shall receive the benefits from this *Agreement* as the successor in title to the *Property Owner* in accordance with this *Agreement*.

C. Release of *Property Owner*: In the event of the sale or other conveyance of all or a portion of the *Real Property* and compliance with the conditions set forth herein, the *Property Owner* shall be released from any further obligations with respect to this *Agreement* as to the portion of the *Real Property* so transferred, and the transferee shall be considered as substituted as the *Property Owner* under the *Agreement* as to the portion of the *Real Property* so transferred.

D. Estoppel Certificate: Upon request in writing from the *Property Owner* (or its successors or assigns) to the *County*, sent by certified or registered mail or publicly licensed message carrier, return receipt requested, the *County* will provide a certificate in recordable form that, solely with respect to the portion of the *Real Property* described in the request, there are no violations or breaches of this *Agreement*, except as otherwise described in the certificate. The *County* will respond to such a request and may employ such professional consultants, municipal, *County* and state agencies and staff as may be necessary to assure the truth and completeness of the statements in the certificate. The reasonable costs and disbursements of private consultants will be paid by the party making the request.

#### **34. General Terms and Conditions**

A. No Waiver: Failure of a party hereto to exercise any right hereunder shall not be deemed a waiver of any such right and shall not affect the right of such party to exercise at some future time said right or any other right it may have hereunder. Unless this *Agreement* is amended by vote of *County Council* taken with the same formality as the vote approving this *Agreement*, no officer, official or agent of the *County* has the power to amend, modify or alter this *Agreement* or waive any of its conditions as to bind the *County* by making any promise or representation not contained herein. Any amendments are subject to Paragraph 22 of this *Agreement*.

B. Entire Agreement: This *Agreement* constitutes the entire *Agreement* between the *Parties* and supersedes all prior *Agreements*, whether oral or written, covering the same subject matter. This *Agreement* may not be modified or amended except in writing mutually agreed to and accepted by both *Parties* to this *Agreement*.

C. Intentionally Omitted.

D. Notices: All notices hereunder shall be given in writing by certified mail, postage prepaid, at the following addresses:

1. Notice to the *Property Owner*:

c/o  
Kiawah River Investment, LLC  
Attention: John Darby  
Post Office Box 242  
Charleston, South Carolina 29402

With Copy to:

G. Trenholm Walker  
Walker Gressette Freeman & Linton, LLC  
Post Office Drawer 22167  
Charleston, South Carolina 29413-2167

2. Notice to the *County*:

County of Charleston  
Attention: Planning Director  
Lonnie Hamilton, III Public Services Building  
4045 Bridge View Drive, Suite A-314  
Charleston, SC 29405-7464

With Copy to:

County of Charleston  
Attention: County Attorney  
Lonnie Hamilton, III Public Services Building  
4045 Bridge View Drive, Suite B-314  
Charleston, SC 29405-7464

The address for any party or person may be changed by proper notice to the other parties or persons involved.

E. Execution of *Agreement*: This *Agreement* may be executed in multiple parts as originals or by facsimile copies of executed originals; provided, however, if executed and evidence of execution is made by facsimile copy, then an original shall be provided to the other *Party* within seven (7) days of receipt of said facsimile copy.

**IN WITNESS WHEREOF** this *Agreement* has been executed, delivered, and sealed by the *Parties* on the day and year first above written.

WITNESSES:

\_\_\_\_\_

\_\_\_\_\_

WITNESSES:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**COUNTY OF CHARLESTON**

By: \_\_\_\_\_  
Elliott Summey  
Chairman, County Council

Attest: \_\_\_\_\_  
Kristen Salisbury  
Clerk to Council

**KIAWAH RIVER  
INVESTMENT, LLC**  
By: Beach O'Hear Pointe, LLC  
Its: Managing Member

By: The Beach Company  
Its: Manager

By: \_\_\_\_\_  
John C.L. Darby  
Its: President and CEO

By: \_\_\_\_\_  
Its: \_\_\_\_\_

STATE OF SOUTH CAROLINA   )  
COUNTY OF CHARLESTON       )

**ACKNOWLEDGMENT**

THE FOREGOING INSTRUMENT was acknowledged before me by CHARLESTON COUNTY, SOUTH CAROLINA, by Elliott Summey, its Council Chairman, and Kristen Salisbury, its Clerk of Council, this \_\_\_\_ day of \_\_\_\_\_, 2020.

\_\_\_\_\_  
(SEAL)

\_\_\_\_\_  
Notary Public for South Carolina  
My Commission Expires: \_\_\_\_\_

STATE OF SOUTH CAROLINA   )  
COUNTY OF CHARLESTON       )

**ACKNOWLEDGMENT**

THE FOREGOING INSTRUMENT was acknowledged before me by KIAWAH RIVER INVESTMENT, LLC, by Beach O'Hear Pointe, LLC, its Managing Member, by The Beach Company, its Manager, by John C.L. Darby, its President and Chief Executive Officer, and \_\_\_\_\_, its \_\_\_\_\_, this \_\_\_\_ day of \_\_\_\_\_, 2020.

\_\_\_\_\_  
(SEAL)

\_\_\_\_\_  
Notary Public for South Carolina  
My Commission Expires: \_\_\_\_\_



## EXHIBIT 1.1

### Definitions

The “*Act*” means the South Carolina Local Government Development Agreement Act, codified at sections 6-31-10 to -160 of the South Carolina Code.

“*Accessory Use*” means a use customarily incidental and subordinate to the principal use of a *Lot* or of a structure, or as allowed by the *ARB* in accordance with Article 6.5 of Appendix D, which is a red-line of the *ZLDR*. An *Accessory Use* is located on the same *Lot* as the principal use, except (i) in cases of off-street parking, temporary real estate sales office, and temporary construction facilities, and (ii) in cases of *Hotels* or *Inns* where *Accessory Uses* may be located on other *Lots*.

“*Accessory Dwelling Unit*” means a dwelling unit, with no more than 800 square feet of gross floor area that has been added to, onto, or created within, a single family house. This definition includes garage apartments. An *Accessory Dwelling Unit* may be detached from a single family house provided it complies with the conditions applicable to *Accessory Dwelling Units* in Appendix B to the *Agreement*.

“*Active Recreation Area*” means any park, recreational facility, or recreational area which is not dependent upon a specific environmental or natural resource and which is developed with recreation and support facilities. An *Active Recreation Area* includes, but is not limited to, playgrounds, *Golf Courses*, bicycle trails, baseball or softball fields, football or soccer fields, basketball courts, swimming pools, clubhouses, water-dependent uses, equestrian facilities, pickle courts, racquetball courts, and tennis courts. *Active Recreation Areas* shall constitute open space.

“*Affordable Housing*” means, in the case of dwelling units for sale, housing in which mortgage, amortization, taxes, insurance, and condominium or association fees, if any, constitute no more than twenty-eight percent (28%) of the annual household income for a household earning no more than eighty percent (80%) of the area median income, by household size, for the metropolitan statistical area as published from time to time by the U.S. Department of Housing and Community Development (HUD) and, in the case of dwelling units for rent, housing for which the rent and utilities constitute no more than thirty percent (30%) of the annual household income for a household earning no more than eighty percent (80%) of the area median income, by household size for the metropolitan statistical area as published from time to time by HUD.

“*Agreement*” means this Development Agreement, including the recitals and exhibits attached hereto. The *Agreement* shall also include the *Plan*.

“*ARB*” is the Kiawah River Architectural Review Board that is currently functional under the auspices of the *Property Owner* and/or as it may later function under applicable *Covenants*. The *ARB* may promulgate, modify, and enforce development guidelines, such as architectural and landscaping guidelines, assigned to it under the *Agreement* or the *Plan* with respect to any portion of the *Real Property*.

“*Association*” means one or more non-profit association(s) or corporation(s), which will be formally constituted and made up of the property owners and/or residents of the *Real Property*,

## EXHIBIT 1.1

or a particular portion or portions thereof. An *Association* may take responsibility for costs and maintenance of *Common Areas* on or affecting any portion of the *Real Property* subject to such *Association's* jurisdiction, as delineated in any applicable *Covenants*.

“*Bed and Breakfast*” means a lodging-type building or group of buildings on one *Lot* offering two (2) to twelve (12) *Guest Rooms*, with or without meal service, on a daily, weekly, monthly, or seasonal basis. A *Bed and Breakfast* may be owner-occupied and/or staff-occupied. Whether or not owner- or staff-occupied, a *Bed and Breakfast* shall contribute to *Guest Room* entitlement densities, and no others, in the *Agreement*.

“*Building Coverage*” means the area of a *Lot* covered by principal or accessory buildings or roofed areas, as measured along the outside wall at ground level, and including all projections, other than open porches, fire escapes, canopies, and the first two feet (2') of a roof overhang. This definition shall not include pools, pool decks, or pervious drives.

“*Building Development Standards*” means any applicable dimensional standards for *Lots*, *Development Parcels*, buildings, and structures, including but not limited to any minimum standards for *Lot* area, *Lot* width, *Setbacks*, and yard requirements and any maximum standards for *Building Height* and *Building Coverage* on *Lots* or *Development Parcels*.

“*Building Height*” means elevation from *Ground Floor Level* as measured in feet. *Building Height* does not include those items specifically excluded from consideration of *Building Height* in the *Plan*.

“*Common Areas*” means “Common Areas,” as defined under any *Covenants* encumbering all or portions of the *Real Property*, i.e., all real and personal properties which now or hereafter are deeded or leased to, or are the subject of a use agreement or easement with, an *Association* and wherein the property therein described is specifically denominated to be part of the *Common Areas*. The *Common Areas* may include but shall not be limited to open space; maintenance and drainage areas; *Facilities*; easements; alleys; *Thoroughfares*; parking lots; *Community Ways*; street lighting; signs; lagoons; ponds; wetlands; rights-of-way; and the area between any property line of an owner and the mean high water mark of any adjoining river tidal creek, marsh, or other water body. The designation of any land and/or improvements as a *Common Area* shall not mean or imply that the public at large acquires any easement of use or enjoyment therein.

“*Community Way*” means a walkway of any surface type (paved or unpaved), bike trail, leisure trail, or walking trail designed for pedestrian or bike traffic.

“*Comprehensive Plan*” means the Charleston County Comprehensive Plan, adopted pursuant to sections 6-29-510 to -540 of the South Carolina Code, as well as the official map of Charleston County, adopted pursuant to sections 6-7-1210 to -1280 of the South Carolina Code.

“*Corps*” means the United States Army Corps of Engineers.

“*County*” means Charleston County, a political subdivision of the State of South Carolina.

## EXHIBIT 1.1

“*County Council*” means the County Council of Charleston County, South Carolina.

“*County Ordinances*” means the Code of Ordinances of Charleston County, South Carolina.

“*Covenants*” means and refers to one or more declaration(s) of covenants, conditions, and restrictions encumbering all or portions of the *Real Property* that have been or will be recorded by the *Property Owner*.

“*Development*” means the planning for or carry out of a building activity, demolition, reclamation of on-site materials, the making of a material change in the use or appearance of any structure or property, or the dividing of land into two or more parcels, and is intended by the *Parties* to include all further uses of, activities upon, or changes to the *Real Property* as are authorized by the *Agreement*. “*Development*,” as designated in a land or *Development Permit*, includes the planning for and all other activity customarily associated with it unless otherwise specified. When appropriate to the context, “*Development*” refers to the planning for or the act of developing or to the result of *Development*. Reference to a specific operation is not intended to mean that the operation or activity, when part of other operations or activities, is not *Development*. Reference to particular operations is not intended to limit the generality of this term.

“*Development Parcel*” means any parcel of land on which *Development* may occur, including platted *Lots* and unplatted parcels, but excluding public or private street rights-of-way.

“*Development Permit*” includes a building permit, zoning permit, construction permit, subdivision or plat approval, rezoning certification, special exception, variance, certificate of occupancy or any other official action of *Local Government* having the effect of permitting or approving the *Development* or use of real property.

“*DHEC*” means the Department of Health and Environmental Control, as established pursuant to section 44-1-20 of the South Carolina Code.

“*Diameter Breast Height*” or “*DBH*” means the total diameter, in inches, of a tree trunk or trunks measured at a point four and one half feet above existing grade (at the base of the tree). In measuring *DBH*, the circumference of the tree shall be measured with a standard diameter tape, and the circumference shall be divided by 3.14.

“*District*” means the Kiawah River Planned Development District, as established in the *Plan*.

“*Dock*” or “*Pier*” means a structure built over and/or floating on water used to provide access to water and/or for the mooring of boats or other watercraft. A *Dock* or *Pier* may contain commercial uses as permitted by *DHEC* and shall constitute a water-dependent use.

“*DOT*” means the South Carolina Department of Transportation, as established in section 57-1-20 of the South Carolina Code.

## EXHIBIT 1.1

“*Dwelling Unit*” means one or more rooms, designed, occupied or intended for permanent occupancy as a separate living quarter, with cooking, sleeping and sanitary facilities contained therein. The term “*Dwelling Unit*” does not include *Guest Rooms*, *Villas*, *Accessory Dwelling Units*, or accessory buildings or structures.

“*Facilities*” means major capital or community improvements including, but not limited to, transportation, sanitary sewer, solid waste, drainage, potable water, electrical service, cable television, high speed internet access, and telephone service.

“*Golf Course*” means a tract or tracts of land laid out for up to thirty-six (36) holes for playing the game of golf and improved with tees, greens, fairways, and hazards, and that may include club houses, driving ranges, training facilities, maintenance facilities, and shelters. *Golf Courses* shall constitute *Active Recreation Areas*.

“*Grand Tree*” means any live, healthy tree with a *DBH* of 24 inches or greater, with the exception of pine tree, laurel oak, water oak, and sweet gum tree species.

“*Gross Leasable Area*” or “*GLA*” means floor area devoted to a use designated as such in the table of uses set forth in the *Plan*. *GLA* does not include public or common areas, such as parking lots, utility rooms and stairwells, in a building or on a *Lot* otherwise devoted to a use designated as *GLA* in the *Plan*. *GLA* does not include a community amenity center, such as a fitness club/aquatic center. For the purpose of this provision, the term “floor area” shall have the definition specified in Chapter 12 of the *ZLDR* on the *Effective Date*. Commercial uses on *Docks* or piers shall contribute to entitlement densities for *GLA*.

“*Ground Floor Level*” means *Natural Ground* or the lowest floor elevation for structures as set forth in the *County’s* flood management ordinance, as amended, whichever is higher; provided, however, that *Ground Floor Level* shall not exceed 14 feet above *Natural Ground*. This definition shall not be construed to prevent an owner from constructing his first finished floor higher than *Ground Floor Level*; provided, however, *Building Height* shall be measured from *Ground Floor Level*.

“*Guest Room*” means a room or suite designed for temporary occupancy by one (1) or more people in a single unit on a daily, weekly, monthly, or seasonal basis. A *Guest Room* may be individually owned or owned as a “time-share” unit without respect to other *Guest Rooms*. A *Guest Room* may be located within a *Hotel*, *Inn*, *Villa* or *Bed and Breakfast*. A *Guest Room* shall contribute to the *Guest Room* entitlement densities, and no others, in the *Agreement*.

“*Hotel*” means a lodging-type building or group of buildings offering twenty-five (25) or more *Guest Rooms*, with or without meal service, on a daily, weekly, monthly, or seasonal basis. The *Property Owner* shall have the vested right to develop up to two (2) *Hotels* on the *Real Property*. The amount of *Guest Rooms* permitted in a *Hotel* shall be limited only by the total *Guest Room* entitlement densities in the *Agreement*. A *Hotel* may be owner-occupied and/or staff-occupied. Whether or not owner- or staff-occupied, a *Hotel* shall contribute to *Hotel* and *Guest Room* entitlement densities, and no others, in the *Agreement*.

## EXHIBIT 1.1

“*Housing for the Workforce*” means all *Affordable Housing* and all dwelling units designed to accommodate persons employed on the *Real Property*, persons employed on Kiawah Island, persons employed on Seabrook Island, and/or persons employed within a ten (10) mile radius of the *Real Property*.

“*Inn*” means a lodging-type building or group of buildings offering thirteen (13) to twenty-four (24) *Guest Rooms*, with or without meal service, on a daily, weekly, monthly, or seasonal basis. An *Inn* may be owner-occupied and/or staff-occupied.

“*Land Development Regulations*” means ordinances and regulations enacted by the appropriate governing body for the regulation of any aspect of *Development* and includes, but is not limited to, *Local Government* zoning, rezoning, subdivision, building construction, occupancy, aesthetic, road, or sign regulations or any other regulations controlling the *Development* or use of property.

“*Laws*” means all ordinances, resolutions, regulations, comprehensive plans, *Land Development Regulations*, policies and rules, custom and usage (formal or informal) adopted by a *Local Government* affecting the *Development* of property and includes laws governing permitted uses of the property, governing density, and governing design, improvement, and construction standards and specifications, except as provided in section 6-31-140(A) of the South Carolina Code.

“*Local Government*” means any county, municipality, special district, or governmental entity of the state, county, municipality or region established pursuant to law which exercises regulatory control over, and grants *Development Permits* for land *Development* or which provides public *Facilities*. The *County* is a *Local Government*.

“*Lot*” means *Development Parcel* identified in a *Subdivision Plat* recorded in the Office of the Register of Mesne Conveyances for Charleston County, South Carolina.

“*Lot Line, Front*” means the lot line separating a *Lot* from the *Thoroughfare* that is used as the primary access point to the *Lot*. In cases where a *Lot* abuts open space, including passive recreation areas, on one side, and a *Thoroughfare* that is used as the primary access on the opposite side, the Property Owner may designate the lot line abutting the open space as the *Front Lot Line* and the opposite lot line (abutting the *Thoroughfare*) as the rear lot line. In cases where a *Lot* abuts more than one *Thoroughfare*, the *Property Owner* may designate the *Front Lot Line* pursuant to Section 6.1.c herein.

“*Mixed Use*” means a use, structure, or parcel containing both residential and non-residential elements.

“*Natural Ground*” means average elevation of a *Lot* or *Development Parcel* prior to *Development* activity.

“*OCRM*” means *DHEC*’s Office of Ocean and Coastal Resource Management.

## EXHIBIT 1.1

“*OCRM Critical Line*” means the critical area line defined by *OCRM*.

“*Parties*” are the *Property Owner* and the *County*. When used herein with reference to a specific *Tract, Development Parcel, Lot*, or other portion of the *Real Property*, *Parties* shall mean and refer to the *County* and that specific person or entity that has legal title to such *Tract, Development Parcel, Lot*, or other portion of the *Real Property*. If portions of the *Agreement* apply to one or more, but not all, of the entities or persons comprising the *Property Owner*, those particular parties may be separately referred to herein.

“*Passive Recreation Area*” means areas in and located due to the presence of a particular natural or environmental setting and that may include conservation lands or waters providing for both active and passive types of resource-based outdoor recreation activities that are less formalized or program-oriented than activity-based recreation. Resource-based outdoor recreation means and refers to activities requiring a natural condition such as boating, fishing, camping, nature trails and nature study. A farm or other agricultural use shall be considered a *Passive Recreation Area*. *Passive Recreation Areas* shall constitute open space.

“*Pervious Cover*” means water bodies, as well as land that permits the absorption of storm water into the ground. *Pervious Cover* may include, but is not limited to *Community Ways*, streets, roads, alleys, parking lots and driveways which are pervious to storm water.

“*Plan*” means the Kiawah River Planned Development District Plan. The *Plan* is attached to the *Agreement* and incorporated therein by reference. The *Plan* shall constitute a vested right of the *Property Owner* during the term of the *Agreement* (including any extensions or renewals thereof).

“*Planning Commission*” means the Charleston County Planning Commission as established under Article 2.2 of the *ZLDR*.

“*Planning Director*” means the Director of the Planning Department of Charleston County or the authorized designee or representative of the Director.

“*Project*” is the *Development* that has occurred and will occur on the *Real Property*.

“*Property Owner*” means Kiawah River Investment, LLC; together with all subsidiaries thereof and other entities, which may have a legal interest on the date of execution hereof in any of the *Real Property* described in Paragraph 4 of the *Agreement* and includes their successors in interest, successors in title (as to any portion of the *Real Property*), and/or assigns by virtue of assignment or other instrument compliant with the *Agreement*. When used herein with reference to a specific *Tract, Development Parcel, Lot*, or other portion of the *Real Property*, “*Property Owner*” shall mean and refer to that specific person or entity that has legal title to such *Tract, Development Parcel, Lot*, or other portion of the *Real Property*. The *Property Owner* warrants that there are no other legal or equitable owners of the *Real Property* on the *Effective Date*.

## EXHIBIT 1.1

“*Protected Trees*” means any tree on a parcel with a diameter breast height of eight inches or greater prior to development and all trees within required buffers or required landscape areas. Limited removal is allowed only when specified by the provisions of this Ordinance.

“*PSC*” means the Public Service Commission, as established pursuant to section 58-3-10 of the South Carolina Code, as amended.

“*Real Property*” is the *Real Property* referred to in Paragraph 4 of the *Agreement* and includes any improvements or structures customarily regarded as part of real property.

“*Retirement Housing*” means the use of a site for housing that qualifies under The Housing for Older Persons Act (HOPA) for the senior housing exemption from the anti-discrimination provisions related to familial status of Title VIII of the Civil Rights Act of 1968 (the Federal Fair Housing Act), as amended by the Fair Housing Amendments Act of 1988 (the Fair Housing Act). No *Retirement Housing* shall be used as a *Short-Term Rental Property*.

“*Retirement Housing Unit*” means a single housing unit intended for occupancy on a site that is designated as *Retirement Housing* that may be housing comprised of single family detached, single family attached, duplex, or multifamily units or any combination of these. ). No *Retirement Housing Unit* shall be used as a *Short-Term Rental Property*.

“*Setback*” means any required minimum distance from a *Lot* line or street right-of-way that establishes an area within which a structure shall not be erected. Any *Laws* applicable to *Setbacks* and exceptions to *Setbacks* are set forth in the *Plan*, which shall control in lieu of *Laws* applicable to *Setbacks* and exceptions to *Setbacks* in the *ZLDR* or other *Laws*.

“*Short-Term Rental Property*” or “*STRP*” means a residential dwelling or any part thereof that is offered, advertised, or provided to short-term rental tenants (excluding family members) for a fee or any form of compensation, for intervals of 29 days or less during a calendar year. No *Guest Room*, including a *Villa*, shall constitute a *Short-Term Rental Property*, and *Short-Term Rental Properties* shall not count against the cap on the maximum number of *Guest Rooms*.

“*Subdivision Plat*” means a recorded graphic description of property prepared and approved in compliance with the *ZLDR*, as modified by this *Agreement*.

“*Thoroughfare*” means a way for use by vehicular and pedestrian traffic and to provide access to *Lots* and open spaces, consisting of vehicular lanes and their adjacent rights-of-way.

“*Tract*” means and refers to composite parcels of the *Real Property* that have yet to be subdivided.

“*Villa*” means a lodging-style building offering one or more bedrooms and other areas (such as cooking and sanitary facilities) operating as a single unit, with or without meal service, on a daily, weekly, monthly, or seasonal basis. A *Villa* may be owned and temporarily occupied by an individual or entity without respect to ownership of other *Villas*. A *Villa* shall constitute one (1) *Guest Room* and shall contribute to *Guest Room* entitlement densities, and no others, in the *Agreement*.

## **EXHIBIT 1.1**

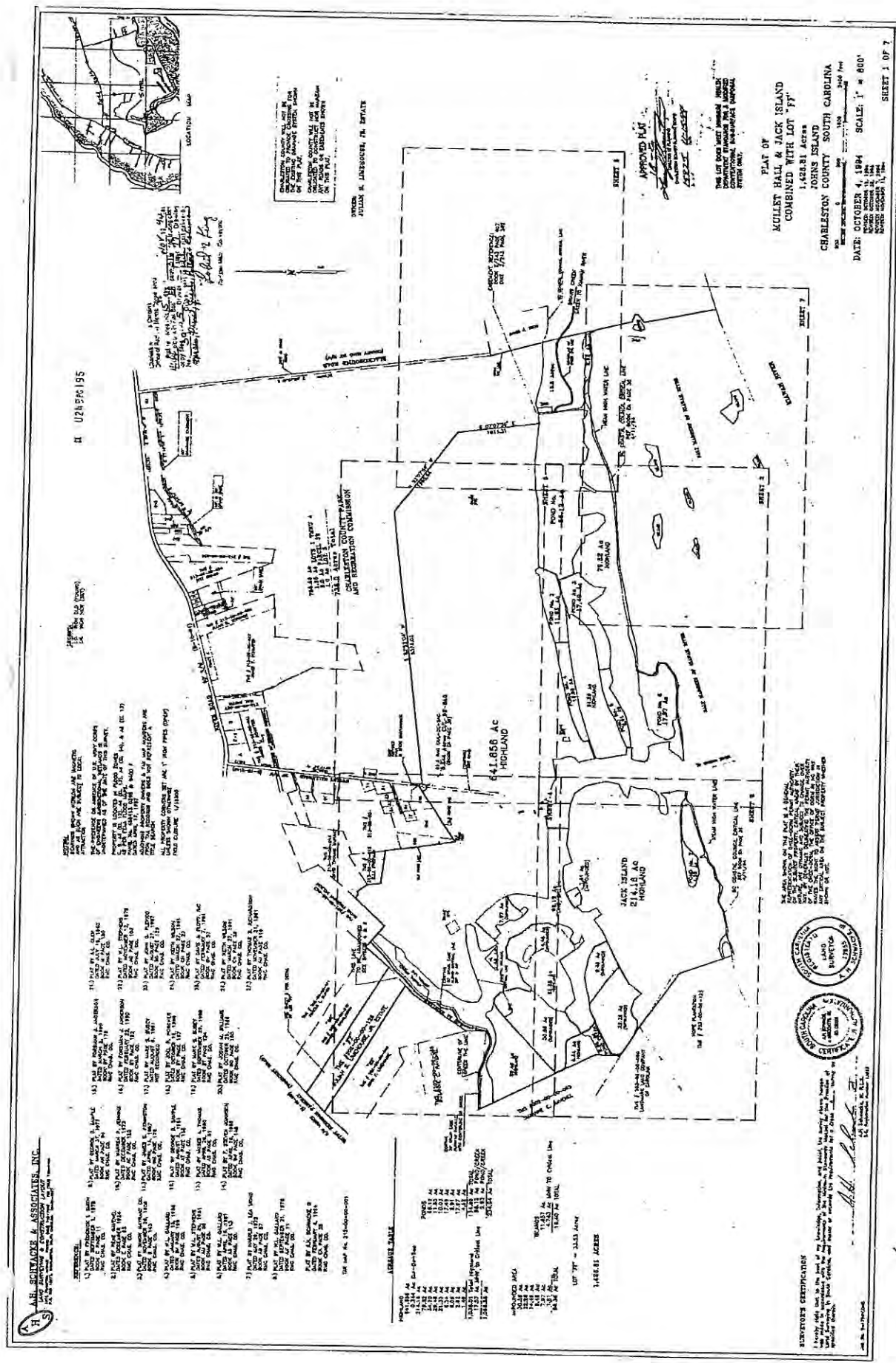
*“Zoning and Land Development Regulations”* or *“ZLDR”* means and refers to the Zoning and Land Development Regulations of Charleston County, South Carolina.

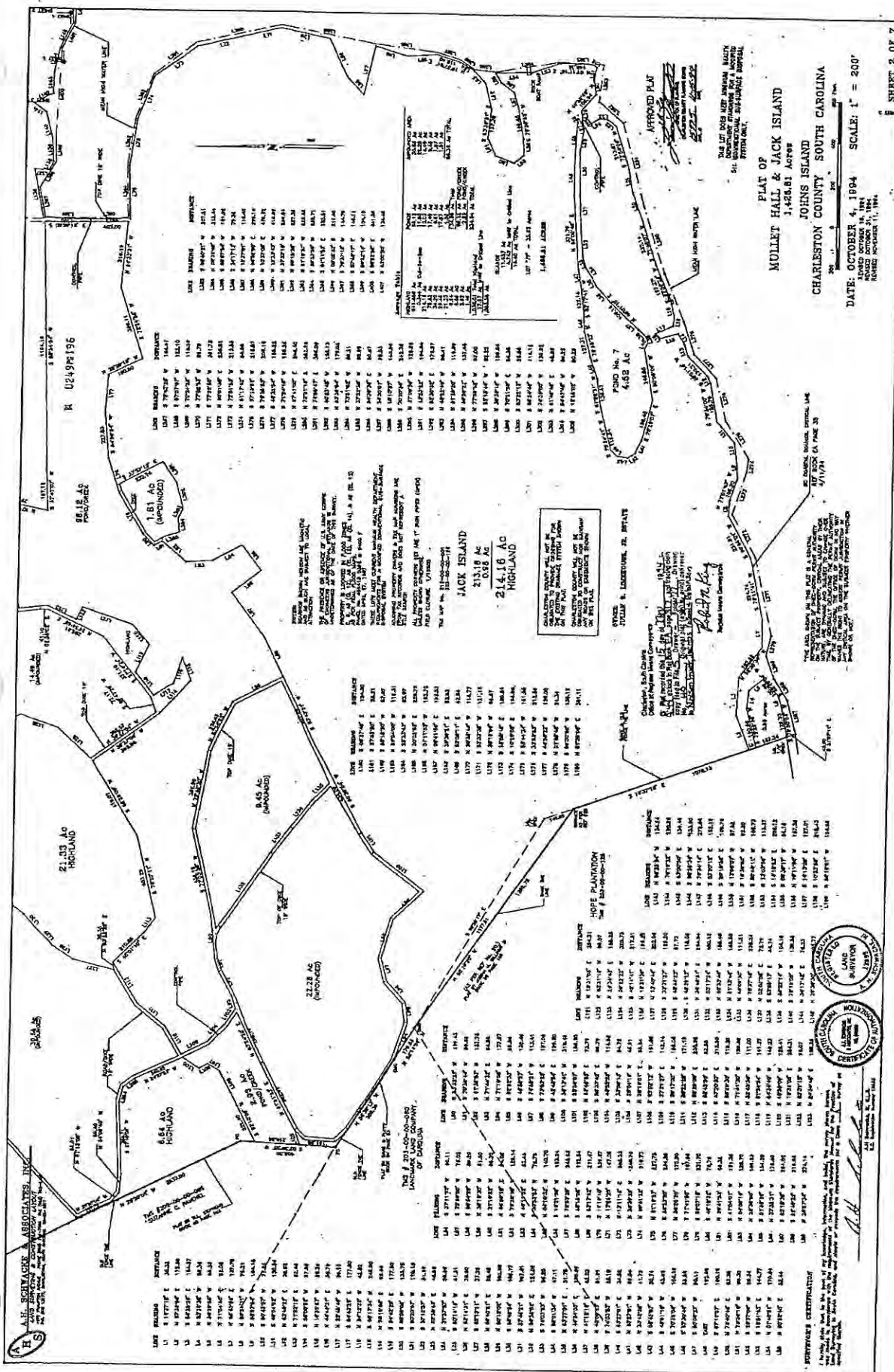


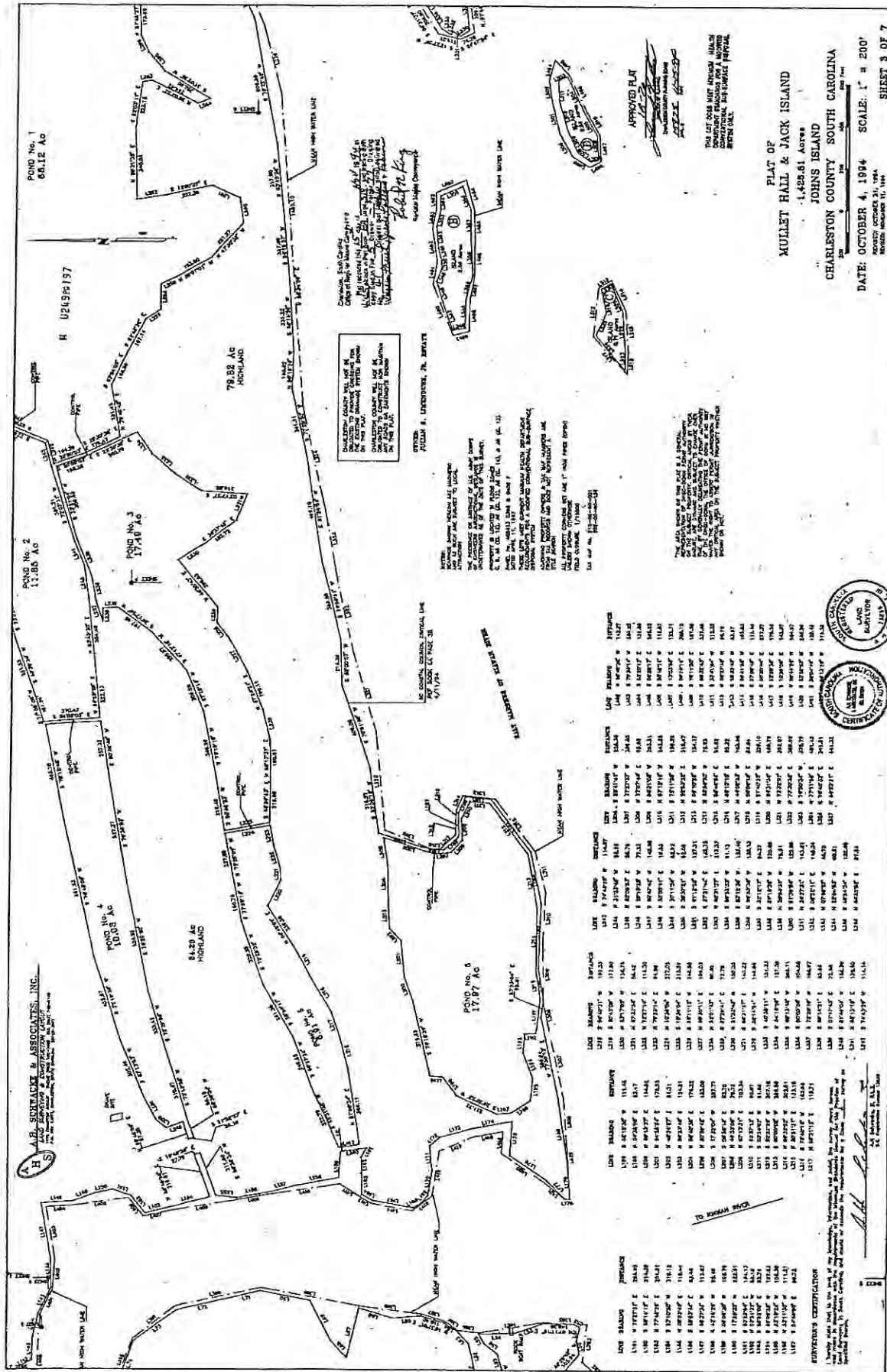
**Legal Description**

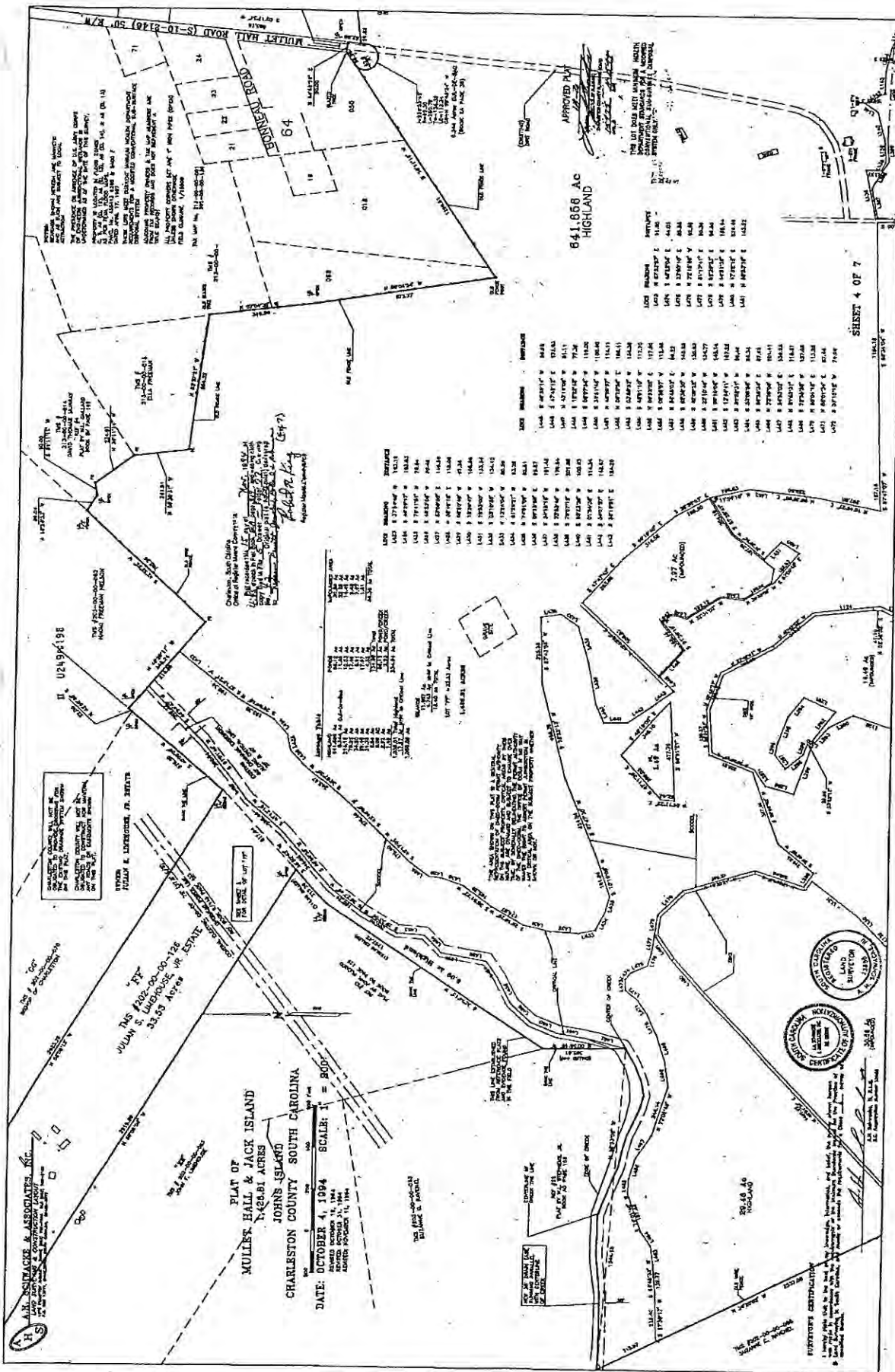
All that certain piece, parcel or tract of land, together with all buildings and improvements presently located thereon, situate, lying and being on Johns Island, in the County of Charleston, State of South Carolina, known generally as "Mullet Hall Plantation," containing 1083.197 acres of highland (including certain small islands), 235.94 acres of ponds and creeks, 86.36 acres of impounds, and 22.313 acres between mean high water and the DHEC-OCRM Critical Line, more or less, shown on a plat by A.H. Schwacke, & Associates entitled "PLAT OF MULLET HALL & JACK ISLAND 1426.81 ACRES JOHNS ISLAND CHARLESTON COUNTY SOUTH CAROLINA," dated October 4, 1994, last revised on November 11, 1994, and recorded in Plat Book EA, at Pages 316 through 322, in the RMC Office for Charleston County, South Carolina, (the "Plat"), said property having such location, butts and bounds, metes, courses and distances as will by reference to the Plat more fully appear.

Being a portion of TMS # 212-00-00-001.

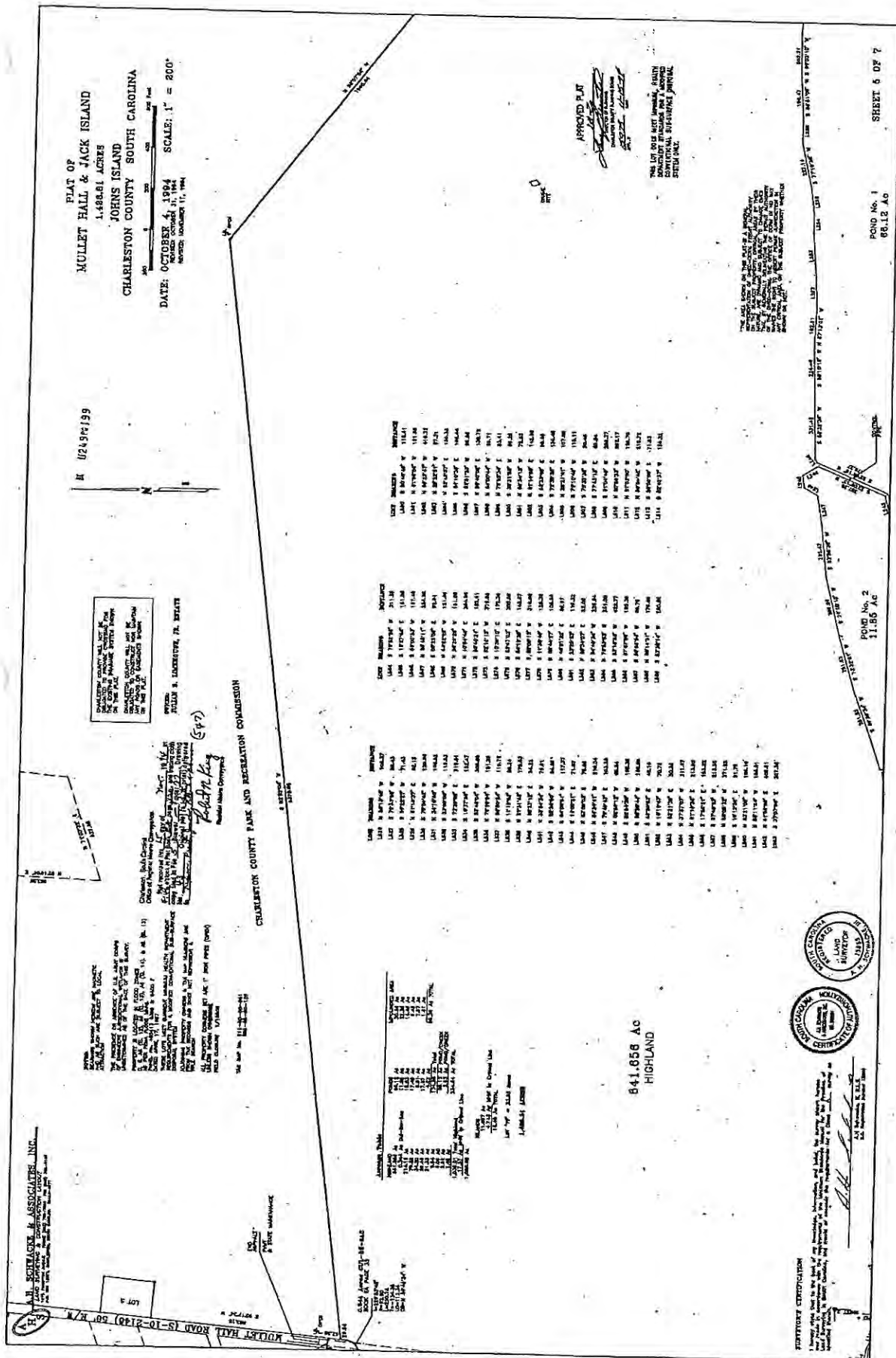


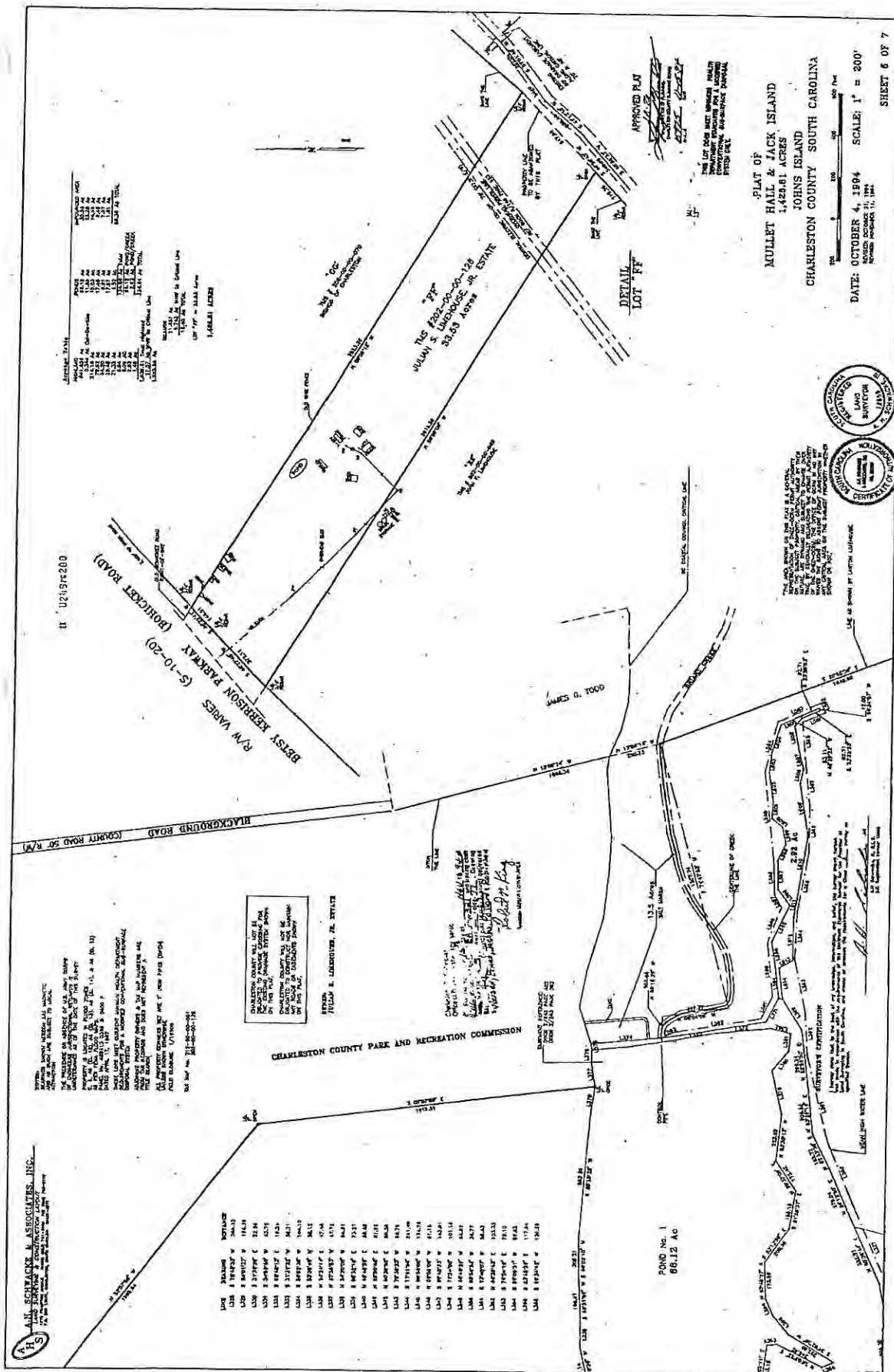


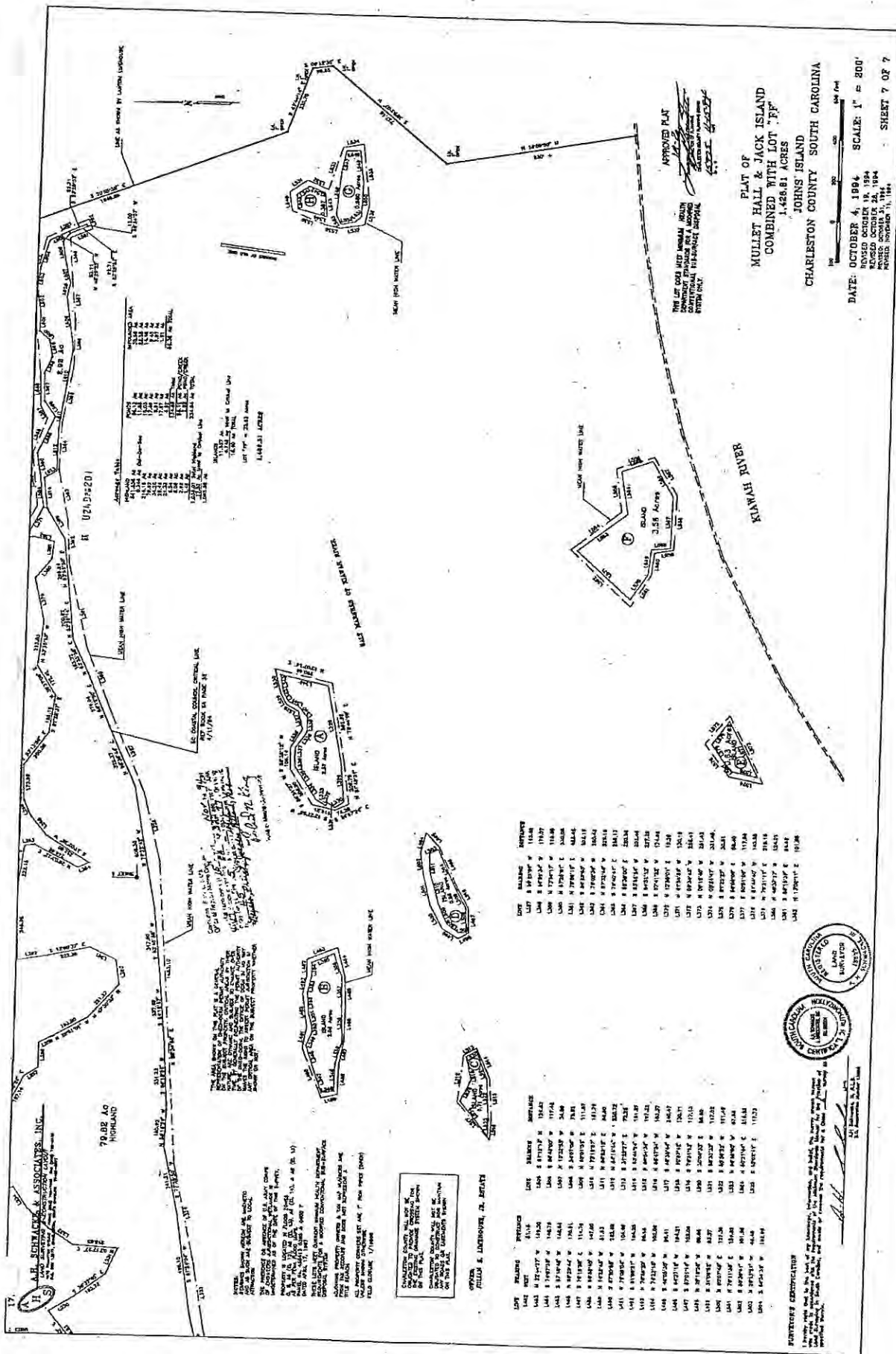














**KIAWAH RIVER PLANTATION ACRES FOR DEVELOPMENT AGREEMENT**

\* all are from the Schwacke survey - only recorded survey, deeds relate back to it

Highland Acres = 1,038.01 ("total highland") + 33.53 (Lot"FF") + 11.657 (Islands - above critical line)  
= 1083.197 acres - round to 1083.20

Freshwater Wetlands = 98.12 (Pond/Creek) + 2.93 (Pond/Creek) + 86.36 (Impounded Area)  
= 187.41 acres

**AG 8**

33.53

641.656

6.09

0.344

34.2

79.82

2.92

11.657**810.217** total**R-4**

29.46

6.54

21.33

1.49

214.16

86.36

2.93

98.12**460.39** total**Saltwater wetlands**

66.12 Pond 1

11.85 Pond 2

10.03 Pond 3

17.49 Pond 4

6.91 Pond 5

17.97 Pond 6

4.52 Pond 7**134.89** Sub-total

17.57 MHW to critical

4.743 MHW to critical -islands**22.313** total

Grand Total per Schwacke Survey:

**1427.81** \*Note: There is an addition error in the Schwacke Survey  
It shows **1426.81** acres

EX Y263PG813

dt 12-31-95  
RECORDED  
01-05-96

STATE OF SOUTH CAROLINA )  
COUNTY OF CHARLESTON )

TITLE TO REAL ESTATE

KNOW ALL MEN BY THESE PRESENTS, THAT KIAWAH RESORT ASSOCIATES, L.P., (a Delaware limited partnership), (hereinafter sometimes referred to as the "Grantor"), in the County and State aforesaid, for and in consideration of the sum of One Million Seven Hundred Twenty Thousand Three Hundred Twenty-Two and 57/100 (\$1,720,322.57) Dollars to it in hand paid at and before the sealing of these presents by KIAWAH RIVER PLANTATION, L.P., (a Delaware limited partnership), (hereinafter sometimes referred to as the "Grantee"), in the County and State aforesaid, the receipt whereof is hereby acknowledged, and the assumption of the mortgage hereinafter referred to, has granted, bargained, sold and released, and by these presents does grant, bargain, sell and release unto the said KIAWAH RIVER PLANTATION, L.P., an undivided seven-eighths interest of, in and to the following described property, to-wit:

SEE ATTACHED EXHIBIT "A" FOR DESCRIPTION  
OF PROPERTY CONVEYED

(the "Property")

TMS Number: 212-00-00-001  
Tax District: 5-1  
Address of Grantee: c/o The Beach Company  
200 Meeting Street, Suite 401  
Post Office Box 242  
Charleston, SC 29402

This conveyance is made subject to that certain mortgage from Kiawah Resort Associates, L.P. to William Lawton Limehouse, a/k/a W.L. Limehouse; Linda Anne L. McMurphy, a/k/a Ann Limehouse Macmurphy, a/k/a Anne Limehouse Macmurphy, a/k/a Linda L. McMurphy, n/k/a Anne Limehouse Macmurphy Griffin; Ann Limehouse Macmurphy, a/k/a Anne Limehouse Macmurphy Griffin; Ann Limehouse Macmurphy, a/k/a Anne Limehouse Macmurphy, n/k/a Anne Limehouse Macmurphy Griffin as Trustee for Michael Linar Limehouse; and as Personal Representative of the Estate of Betty Y. Limehouse; Mary Ruth L. Schneider; Peggy Jo L. Gray, a/k/a Peggy Joe L. Gray, a/k/a Peggy Jo Gray; and Peggy K. Limehouse, dated November 15, 1994, and recorded in P.O. 249, page 385, in the R.M.C. Office, having an outstanding principal balance of approximately \$7,175,075.00, the payment of which, together with interest thereon, is expressly assumed by the Grantee herein.

TOGETHER with all and singular, the Rights, Members, Hereditaments and Appurtenances to the said Premises belonging, or in anywise incident or appertaining.

EX Y263PG814

TO HAVE AND TO HOLD, all and singular, the said Premises before mentioned unto the said KIAWAH RIVER PLANTATION, L.P., its successors and assigns, forever,

AND THE SAID KIAWAH RESORT ASSOCIATES, L.P. does hereby bind itself and its successors and assigns, to warrant and forever defend, all and singular, the highland portion of the said premises, above the mean high water mark of abutting tidal waters, unto the said KIAWAH RIVER PLANTATION, L.P., its successors and assigns, against itself, its successors and assigns, and all other persons whomsoever lawfully claiming or to claim the same or any part thereof,

IN WITNESS WHEREOF, Kiawah Resort Associates, L.P., has caused these presents to be executed in its name by its General Partner thereunto duly authorized, and its seal to be hereunto affixed, this 31st day of December, in the year of our Lord One Thousand Nine Hundred and Ninety-Five, in the Two Hundred and Nineteenth year of the Sovereignty and Independence of the United States of America.

SIGNED, SEALED AND DELIVERED  
IN THE PRESENCE OF:

KIAWAH RESORT ASSOCIATES, L.P.  
(SEAL)

By: D&W Investments, Inc.,  
a South Carolina corporation

(CORP. SEAL)

Its: General Partner

By: Charles S. Way, Jr.  
Charles S. Way, Jr.  
Its: President

By: Charles P. Darby, III  
Charles P. Darby, III  
Its: Vice President

Walter J. Smith  
John C. Bryant

STATE OF SOUTH CAROLINA )  
COUNTY OF CHARLESTON )

THE FOREGOING INSTRUMENT was acknowledged before me by Kiawah Resort Associates, L.P., by D&W Investments, Inc., a South Carolina corporation its General Partner, by Charles S. Way, Jr., its President, and by Charles P. Darby, III, its Vice President, this 31st day of December, 1995.

John C. Bryant (SEAL)  
Notary Public for South Carolina  
My commission expires: 8-8-99



Property Description

All that certain piece, parcel or tract of land, together with all buildings and improvements presently located thereon, situate, lying and being on Johns Island, in the County of Charleston, State of South Carolina, known generally as "Mullet Hall Plantation", containing 1083.197 acres of highland (including certain small islands), 234.94 acres of ponds and creeks, 86.36 acres of impounds, and 22.313 acres between mean high water and the DHEC-OCRM Critical Line, more or less, shown on a plat by A.H. Schwacke, & Associates entitled "PLAT OF MULLET HALL & JACK ISLAND 1426.81 ACRES JOHNS ISLAND CHARLESTON COUNTY SOUTH CAROLINA", dated October 4, 1994, last revised on November 11, 1994, and recorded in Plat Book EA at pages 316 through 322, in the R.M.C. Office for Charleston County, South Carolina, (the "Plat"), said property having such location, butts and bounds, meters, courses and distances as will by reference to the Plat more fully appear.

TOGETHER WITH all right, title and interest of the Grantor in and to the marshlands, lowlands, small islands, causeways, wetlands and critical areas, and dikes adjoining and/or part of said tract, and as lie between any highland areas and the mean low water mark of the Kiawah River or its tributaries, and all such areas as lie between the DHEC - Office of Ocean and Coastal Resource Management Critical Line as shown on the Plat, and (i) the centerline of Briars Creek, (ii) the mean low water mark of the Kiawah River and (iii) the mean low water mark of Hope Creek; SAVING AND EXCEPTING therefrom, however, so much of the marshlands and small islands as lie between the easternmost boundary line of the above-described property as shown on the Plat, and the low water marks of Briars Creek and the Kiawah River.

BUTTING AND BOUNDING to the north on property now or formerly of Lorraine Glover, John F. Limehouse, the Beusy-Kerrison Parkway, Bishop of Charleston, Harold L. Glover, Naomi Freeman Nelson, David Thomas Murray, Nellie Freeman, Nancy A. Butler and Maybell Wright, Dorothy Green and Anna Lee Walker, Maybell Wright, et.al., Mullet Hall Road, and property of the Charleston County Park and Recreation Commission; to the east on property of the Charleston County Park and Recreation Commission, the centerline of Briars Creek, and lands now or formerly of William Lawton Limehouse, et.al.; to the south on the low water mark of the Kiawah River and Hope Creek; and to the west on Hope Plantation and property now or formerly of "Kiawah Real Estate Company, Inc.", and Suzanne C. Ravenel.

TOGETHER WITH a non-exclusive perpetual, transferable, appendant and appurtenant commercial easement for the purpose of providing access to Grantee, its successors and assigns and duly authorized agents, for repairs and maintenance from time to time, of the dike located at the eastern end of "Pond No. 1" as shown on the Plat, which said easement is more particularly set forth in that certain Easement Agreement (Access for Dike Repair and Maintenance) dated June 7, 1994, and recorded in Book Z243, page 392, in the R.M.C. Office.

EX Y26376816

It is the intention of the Grantor to convey to the Grantee, all of its undivided seven-eighths (7/8ths) interest of, in and to the real property and any interests in real property conveyed to Grantor by deed of conveyance of William Lawton Limehouse, a/k/a W.L. Limehouse, Linda Anne L. MacMurphy, a/k/a Ann Limehouse Macmurphy, Anne Limehouse Macmurphy and Linda L. MacMurphy, n/k/a Anne Limehouse Macmurphy Griffin; Ann Limehouse Macmurphy, a/k/a Anne Limehouse Macmurphy, n/k/a Anne Limehouse Macmurphy Griffin, as Trustee for Michael Linar Limehouse under the Last Will and Testament of Linar H. Limehouse, a/k/a Horace Linar Limehouse, deceased, Mary Ruth L. Schneider, Peggy Jo L. Gray, a/k/a Peggy Joe L. Gray, a/k/a Peggy Jo Gray and Peggy K. Limehouse, dated the 15th day of November, 1994, and recorded in Book U249, page 207, in the R.M.C. Office.

This conveyance is made subject to the following:

1. Charleston County, S.C. ad valorem taxes for 1995, now due and payable, and ad valorem taxes for all subsequent years.
2. Roll Back taxes as provided under Title 12, South Carolina Code, as amended, including Section 12-43-220 and others.
3. Easement Agreement (Dock) executed by and between the Charleston County Park and Recreation Commission and W.L. Limehouse and Julian Limehouse, III, as Co-Personal Representatives of the Estate of Julian S. Limehouse, Jr., William Lawton Limehouse, Peggy K. Limehouse, Linda Anne L. MacMurphy, a/k/a Anne Limehouse MacMurphy, Mary Ruth L. Schneider, J. Sidi Limehouse, III, a/k/a Julian S. Limehouse, III, Peggy Jo Gray, and Anne Limehouse MacMurphy, Trustee for Michael Linar Limehouse, dated June 7, 1994, and recorded in Book Z243, page 402, in the R.M.C. Office.
4. Right-of-Way Easement Underground granted by W.L. Limehouse to Berkeley Electric Cooperative, Inc., dated February 25, 1993, and recorded July 13, 1993, in Book K229, page 594, in the R.M.C. Office.
5. Any lawful, constitutional interest in either the State of South Carolina or Federal Government created, or limitations on use imposed, by the Federal Coastal Management Act or other Federal law or by S. C. Code Sections 48-39-10 through 48-39-220, as amended, and Sections 48-39-250 through 48-39-360, as amended, or any regulations promulgated pursuant to said State or Federal laws, inclusive of the DHEC -Office of Ocean and Coastal Resource Management and U. S. Army Corps of Engineers regulations, and such rights, if any, as the public may enjoy to the use of property lying below the mean high water mark of abutting tidal waters.
6. Notations, dedications, restrictions on use, easements and other matters shown on the Plat, and the DHEC-OCRM Critical Line as the same may vary from time to time.
7. All questions of accuracy, location of boundary lines, location of improvements, encroachments, area, and all other matters whatsoever which an accurate survey or inspection of the premises may reveal, subsequent to November 11, 1994, the last revision date of the Plat.



EX Y263PG817

This is the same property conveyed to the Grantor herein by deed of conveyance of William Lawton Limehouse, a/k/a W.L. Limehouse, Linda Anne L. McMurphy, a/k/a Ann Limehouse Macmurphy, Anne Limehouse Macmurphy and Linda L. McMurphy, n/k/a Anne Limehouse Macmurphy Griffin; Ann Limehouse Macmurphy, a/k/a Anne Limehouse Macmurphy, n/k/a Anne Limehouse Macmurphy Griffin, as Trustee for Michael Linar Limehouse under the Last Will and Testament of Linar H. Limehouse, a/k/a Horace Linar Limehouse, deceased, Mary Ruth L. Schneider, Peggy Jo L. Gray, a/k/a Peggy Joe L. Gray, a/k/a Peggy Jo Gray and Peggy K. Limehouse, dated the 15th day of November, 1994, and recorded in Book U249, page 207, in the R.M.C. Office,

15981.23

03 126376818

*MM* Nexsen Pruet Jacobs Pollard & Robinson  
POST OFFICE BOX 438  
CHARLESTON, SOUTH CAROLINA 29402

FILED

11.00

4473.30

1892.55-

6376.15B

REC Verified  
CTRL # 16  
int 92  
1-5-96

Y263-813  
95 JAN -5 PM 2:36

CHAMBERLAIN COUNTY SC

Received this 5 day of Jan Year 96  
On this my 5 day of Jan

THIS VERIFIED  
BAC                       
DTG 1/2/96

BK V648PG230

STATE OF SOUTH CAROLINA )  
COUNTY OF CHARLESTON )

QUIT CLAIM DEED

THIS QUITCLAIM DEED, made and entered into this 21<sup>st</sup> day of September, 2007, by and between KIAWAH RESORT ASSOCIATES, L.P., (a Delaware limited partnership hereinafter referred to as the "Grantor"), whose mailing address is 7 Beachwalker Road, Kiawah Island, South Carolina 29455, and OCEAN BOULEVARD PROPERTIES, A SOUTH CAROLINA LIMITED PARTNERSHIP (the "Grantee"), whose mailing address is c/o The Beach Co., 211 King Street, Suite 300, Charleston, SC 29401, Attn: John C.L. Darby.

WITNESSETH:

IN CONSIDERATION of the sum of Five and No/100 Dollars (\$5.00) to it in hand paid, the receipt and sufficiency of which is hereby acknowledged by Grantor, Grantor does hereby remise, release and forever quitclaim unto Grantee, the following real property (the "Property"):

SEE EXHIBIT A ATTACHED HERETO AND INCORPORATED HEREIN BY REFERENCE.

TOGETHER with all and singular the rights, members, hereditaments and appurtenances to the said Property belonging, or in any wise incident or appertaining.

TO HAVE AND TO HOLD all and singular, the said Property before mentioned unto the said Grantee, its successors and assigns forever, so that neither the Grantor nor any other person or persons claiming under Grantor, its successors and assigns, shall at any time hereafter, by any way or means, have, claim or demand any right or title to the aforesaid Property or appurtenances, or any part or parcel thereof, forever.



IN WITNESS WHEREOF, Kiawah Resort Associates, L.P., has caused these presents to be executed in its name by its General Partners thereunto duly authorized and its seal to be hereunto affixed, this 21<sup>st</sup> day of September, 2007.

SIGNED, SEALED AND DELIVERED  
IN THE PRESENCE OF:

J. E. Moss  
Charles J. Danner

J. E. Moss  
Charles J. Danner

KIAWAH RESORT ASSOCIATES, L.P.  
(SEAL)

By: D&W Investments, Inc.,  
a South Carolina corporation (CORP. SEAL)  
Its: General Partner

By: Lisa C. Bryant  
Lisa C. Bryant  
Its: Secretary

By: TWD Investments, LLC  
a South Carolina limited liability company  
(SEAL)

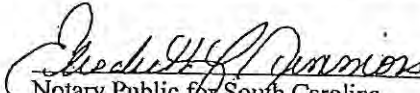
Its: General Partner

By: Lisa C. Bryant  
Lisa C. Bryant  
Its: Authorized Agent

BK V648PG232

STATE OF SOUTH CAROLINA   )  
                                          )  
COUNTY OF CHARLESTON    ).

THE FOREGOING INSTRUMENT was acknowledged before me by Kiawah Resort Associates, L.P., by D&W Investments, Inc., a South Carolina corporation, its General Partner, by its aforesaid officer thereunto duly authorized, this 21<sup>st</sup> day of September, 2007.

 (SEAL)  
Notary Public for South Carolina  
My commission expires: 1-19-11

STATE OF SOUTH CAROLINA   )  
                                          )  
COUNTY OF CHARLESTON    ).

THE FOREGOING INSTRUMENT was acknowledged before me by Kiawah Resort Associates, L.P., by TWD Investments, LLC, a South Carolina limited liability company, its General Partner, by its Authorized Agent thereunto duly authorized, this 21<sup>st</sup> day of September, 2007.

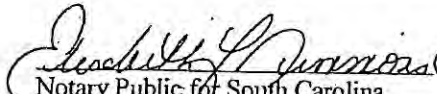
 (SEAL)  
Notary Public for South Carolina  
My commission expires: 1-19-11

EXHIBIT A

All that certain piece, parcel or tract of land, together with all buildings and improvements presently located thereon, containing 1,427.81 acres, more or less, situate, lying and being on Johns Island, in the County of Charleston, State of South Carolina, known generally as "Mullet Hall Plantation", containing 1083.197 acres of highland (including certain small islands), 235.94 acres of ponds and creeks, 86.36 acres of impounds, and 22.313 acres between mean high water and the DHEC-OCRM Critical Line, more or less, as shown on a plat by A.H. Schwacke & Associates entitled "PLAT OF MULLET HALL & JACK ISLAND 1426.81 ACRES JOHNS ISLAND CHARLESTON COUNTY SOUTH CAROLINA", dated October 4, 1994, last revised on November 11, 1994, and recorded in Plat Book EA at Pages 316-322, in the R.M.C. Office for Charleston County, South Carolina (the "Plat"), said property having such location, butts and bounds, metes, courses and distances as will by reference to the Plat more fully appear.

TOGETHER WITH all right, title and interest of the Grantor in and to the marshlands, lowlands, small islands, causeways, wetlands and critical areas, and dikes adjoining and/or part of said tract, and as lie between and highland areas and the mean low water mark of the Kiawah River or its tributaries, and all such areas as lie between the DHEC - Office of Ocean and Coastal Resource Management Critical Line as shown on the Plat, and (i) the centerline of Briars Creek, (ii) the mean low water mark of the Kiawah River and (iii) the mean low water mark of Hope Creek; SAVING AND EXCEPTING therefrom, however, so much of the marshlands and small islands as lie between the easternmost boundary line of the above-described property as shown on the Plat, and the low water marks of Briars Creek and the Kiawah River.

TOGETHER WITH a non-exclusive, perpetual, transferable, appendant and appurtenant commercial easement for the purpose of providing access for repairs and maintenance from time to time, of the dike located at the eastern end of "Pond No. 1" as shown on the Plat, which said easement is more particularly set forth in that certain Easement Agreement (Access for Dike Repair and Maintenance) dated June 7, 1994, and recorded in Book Z243, page 392, in the R.M.C. Office.

It is the intention of the Grantor to convey to the Grantee herein all of Grantor's undivided interest in the property known generally as Mullet Hall Plantation, including but not limited to all highland, ponds, impounded areas, lagoons, creeks, islands, salt marshes, dikes, causeways, lakes, streams, critical areas, wetlands, waters and waterways and generally all property of every kind and nature whatsoever.

This is the same property conveyed to the Grantor herein by (i) deed of conveyance of William H. Goodwin, III, Molly S. Goodwin, Matthew T. Goodwin, Alice T. Goodwin as Custodian for Sarah C. Goodwin under the Virginia Uniform Transfer to Minors Act and Alice T. Goodwin as Custodian for Peter O. Goodwin under the Virginia Uniform Transfer to Minors Act dated November 6, 1995, and recorded November 9, 1995, in

Book Y261, page 539, in the R.M.C. Office for Charleston County, S.C., and (ii) deed of conveyance of William Lawton Limehouse, a/k/a W.L. Limehouse; Linda Anne L. McMurphy, a/k/a Ann Limehouse Macmurphy, Anne Limehouse Macmurphy and Linda L. McMurphy, n/k/a Anne Limehouse Macmurphy Griffin; Ann Limehouse Macmurphy, a/k/a Anne Limehouse Macmurphy, n/k/a Anne Limehouse Macmurphy Griffin, as Trustee for Michael Linar Limehouse under the Last Will and Testament of Linar H. Limehouse a/k/a Horace Linar Limehouse, deceased; Mary Ruth L. Schneider; Peggy Jo L. Gray, a/k/a Peggy Joe L. Gray, a/k/a Peggy Jo Gray, and Peggy K. Limehouse, Ann Limehouse Macmurphy, a/k/a Anne Limehouse Macmurphy, n/k/a Anne Limehouse Macmurphy Griffin, as Executrix of the Estates of Betty Y. Limehouse and Linar H. Limehouse (a/k/a Horace Linar Limehouse) dated the 15<sup>th</sup> day of November, 1994, and recorded in Book U249 at Page 207 in the Charleston County RMC Office.

TMS Numbers: 212-00-00-001 and 212-00-00-004

STATE OF SOUTH CAROLINA )  
 )  
COUNTY OF CHARLESTON )

AFFIDAVIT FOR EXEMPT TRANSFERS

PERSONALLY appeared before me, the undersigned, who, being duly sworn, deposes and says:

1. I have read the information on the back of or following this affidavit and I understand such information.
2. The property being transferred is located on Johns Island, Charleston County, South Carolina, bearing a portion of Charleston County Tax Map Number 212-00-00-001, and was transferred by Kiawah Resort Associates, L.P. to Ocean Boulevard Properties, A South Carolina Limited Partnership on \_\_\_\_\_, 2007.
3. The deed is exempt from the deed recording fee because (See Information section of affidavit): Exemption #12  
\_\_\_\_\_  
If exempt under exemption #14 as described in the Information section of this affidavit, did the agent and principal relationship exist at the time of the original sale and was the purpose of this relationship to purchase the realty? Check Yes \_\_\_\_\_ or No \_\_\_\_\_.
4. As required by Code Section 12-24-70, I state that I am a responsible person who was connected with the transaction as: ~~officer of a general partnership of Charxxx~~ Attorney for Grantee
5. I understand that a person required to furnish this affidavit who willfully furnishes a false or fraudulent affidavit is guilty of a misdemeanor and, upon conviction, must be fined not more than one thousand dollars or imprisoned not more than one year, or both.

James B. Moore Jr.  
Attorney for Grantee

Print Name: James B. Moore Jr.

SWORN to before me this 11<sup>th</sup>  
day of Jan., 2007.

Abner J. Coker  
Notary Public for SC  
My Commission Expires: 9-10-11

(NOTARIAL SEAL)

BK V648PG236

## RECORDER'S PAGE

NOTE: This page MUST remain  
with the original document



Filed By:

McNair Law Firm  
Post Office Drawer 418  
Georgetown, SC 29442

Number of Pages:

7

**FILED**

January 15, 2008

2:53:45 PM

BK V648PG230

Charlie Lybrand, Register  
Charleston County, SC

AUDITOR STAMP HERE

RECEIVED FROM ROAD

JAN 18 2008

PEGGY A. ROSELEY  
CHARLESTON COUNTY AUDITOR

PID VERIFIED BY ASSESSOR

REP

JAN 17 2008

DATE

AMOUNT

DESCRIPTION

Recording Fee	\$ 12.00
State Fee	<Exempt>
County Fee	<Exempt>
Postage	

TOTAL

\$ 12.00

\$ Amount (in thousands):

DRAWER:

C - cfb

DO NOT STAMP BELOW THIS LINE

BK Y648PG237

STATE OF SOUTH CAROLINA     )  
                                          )  
COUNTY OF CHARLESTON     )

TITLE TO REAL ESTATE  
(DEED)

KNOW ALL MEN BY THESE PRESENTS, KIAWAH RESORT ASSOCIATES, L.P., (a Delaware limited partnership,) whose mailing address is 7 Beachwalker Road, Kiawah Island, SC 29455 (hereinafter whether singular or plural referred to collectively as the "Grantor"), in the State aforesaid, for and in consideration of Five Dollars (\$5.00) and other valuable consideration to the Grantor paid by OCEAN BOULEVARD PROPERTIES, A SOUTH CAROLINA LIMITED PARTNERSHIP, whose mailing address is c/o The Beach Co., 211 King Street, Suite 300, Charleston, SC 29401, Attn: John C.L. Darby (hereinafter whether singular or plural referred to as the "Grantee"), has granted, bargained, sold and released, and by these presents does grant, bargain, sell and release unto the Grantee, a one-eighth (1/8) undivided interest in and to the real estate together with all improvements thereon (the "Premises") described as follows:

SEE EXHIBIT A ATTACHED HERETO AND INCORPORATED HEREIN

TMS Number: 212-00-00-001

Tax District: 5-1

Address of Grantee: c/o The Beach Company  
Attn: John C.L. Darby  
211 King Street, Suite 300  
Charleston, SC 29401

TOGETHER with all and singular, the rights, members, hereditaments and appurtenances to the Premises belonging or in any wise incident or appertaining thereto.

TO HAVE AND TO HOLD all and singular the Premises unto the Grantee, its successors and assigns forever.

And the Grantor does hereby bind itself, its successors and assigns, and other lawful representatives, to warrant and forever defend all and singular, the highland portion of the Premises, above the mean high water mark of abutting tidal waters, unto the Grantee and the Grantee's successors and assigns, against Grantor and against Grantor's successors and assigns and against every person whomsoever lawfully claiming, or to claim, the same or any part thereof.

BK V648PG238

IN WITNESS WHEREOF, Kiawah Resort Associates, L.P., has caused these presents to be executed in its name by its General Partners thereunto duly authorized and its seal to be hereunto affixed, this 21<sup>st</sup> day of September, 2007.

SIGNED, SEALED AND DELIVERED  
IN THE PRESENCE OF:

J. E. Moss  
Elizabeth J. Summers

KIAWAH RESORT ASSOCIATES, L.P.  
(SEAL)

By: D&W Investments, Inc.,  
a South Carolina corporation (CORP. SEAL)  
Its: General Partner

By: Lisa C. Bryant  
Lisa C. Bryant  
Its: Secretary

By: TWD Investments, LLC  
a South Carolina limited liability company  
(SEAL)

Its: General Partner

J. E. Moss  
Elizabeth J. Summers

By: Lisa C. Bryant  
Lisa C. Bryant  
Its: Authorized Agent

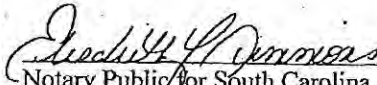


RK V648PG239

STATE OF SOUTH CAROLINA )

COUNTY OF CHARLESTON )

THE FOREGOING INSTRUMENT was acknowledged before me by Kiawah Resort Associates, L.P., by D&W Investments, Inc., a South Carolina corporation, its General Partner, by its aforesaid officer thereunto duly authorized, this 21<sup>st</sup> day of September, 2007.

 (SEAL)  
Notary Public for South Carolina  
My commission expires: 1-19-11

STATE OF SOUTH CAROLINA )

COUNTY OF CHARLESTON )

THE FOREGOING INSTRUMENT was acknowledged before me by Kiawah Resort Associates, L.P., by TWD Investments, LLC, a South Carolina limited liability company, its General Partner, by its Authorized Agent thereunto duly authorized, this 21<sup>st</sup> day of September, 2007.

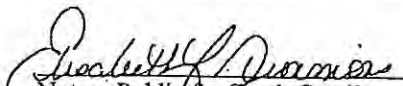
 (SEAL)  
Notary Public for South Carolina  
My commission expires: 1-19-11

EXHIBIT A

All those pieces, parcels or tracts of land situate lying and being on Johns Island, Charleston County, South Carolina, containing 1,427.81 acres, more or less, and being shown and designated on a plat by A.H. Schwacke, III, RLS, dated October 4, 1994, (revised November 11, 1994), entitled: "Plat of Mullet Hall & Jack Island Combined With Lot 'FF' 1,426.81 acres, Johns Island, Charleston County, South Carolina," which plat consists of seven sheets and is recorded at Plat Book EA at pages 316-322 in the R.M.C. Office for Charleston County, South Carolina, and including but not limited to those parcels shown on said plat as follows: "641.656 ac highland," a 0.344 acre cul-de-sac, "Jack Island, 214.16 ac highland," "79.82 ac highland," "34.20 ac highland," "29.46 ac highland," "21.33 ac highland," "6.54 ac highland," "6.09 ac highland," "2.92 ac highland," and "1.49 HL"; also impounded areas shown as "30.56 ac (impounded)," "22.28 ac (impounded)," "14.49 ac (impounded)," "9.45 ac (impounded)," "7.97 ac (impounded)," and "1.61 ac (impounded)"; and also ponds designated as "Pond No. 1, 66.12 ac," "Pond No. 2, 11.85 ac," "Pond No. 3, 17.49 ac," "Pond No. 4, 10.03 ac," "Pond No. 5, 6.91 ac," "Pond No. 6, 17.97 ac," and Pond No. 7, 4.52 ac"; and also pond/creek areas shown as "98.12 ac Pond/Creek," and "2.93 ac Pond/Creek"; and also 8 islands designated as islands "A," "B," "C," "D," "E," "F," "G," and "H", (containing 11.657 acres highland and 4.743 acres between the critical line and the mean high water mark of abutting tidal waters as shown on said plat); Lot "FF" also shown on said plat as "TMS #202-00-00-126, Julian S. Limehouse, Jr. Estate," containing 33.53 acres; and also all property between the critical line and the mean high water mark of abutting tidal waters shown on said plat as consisting of 17.57 acres. The within described property is all of the remaining portion of Mullet Hall Plantation not conveyed by deed of J. Sidi Limehouse, III a/k/a Julian S. Limehouse, III and others to Charleston County Park and Recreation Commission by deed dated June 1, 1994, and recorded June 7, 1994, in Book Y243, page 235, in said R.M.C. Office, together with Lot "FF."

Together with all of Grantor's right, title and interest (including but not limited to any contract right) of, in and to an easement of access, ingress and egress (whether presently existing or to exist), between the within conveyed property and Blackground Road and located or to be located upon, over and across that property previously conveyed by J. Sidi Limehouse, III, a/k/a Julian S. Limehouse, III and others to Charleston County Park and Recreation Commission by deed recorded in Book Y243, page 235, in said R.M.C. Office.

Together with all right, title and interest of the Grantor pursuant to instrument entitled "Easement Agreement (Access for Dike Repair and Maintenance)" dated June 7, 1994, and recorded June 7, 1994, in Book Z243, page 392, in said R.M.C. Office.

BK V648PG241

Together with all right, title and interest of Grantor in and to any and all rights and means of access to and from the within described property and any and all streets, roads, ways and easements (whether public or private) adjacent to, butting on or benefiting the within described property, including but not limited to, Mullet Hall Road.

It is the intention of the Grantor to convey to the Grantee herein all of Grantor's undivided interest in the property known generally as Mullet Hall Plantation, including but not limited to all highland, ponds, impounded areas, lagoons, creeks, islands, salt marshes, dikes, causeways, lakes, streams, critical areas, wetlands, waters and waterways and generally all property of every kind and nature whatsoever.

This conveyance is made subject to the same covenants, conditions and restrictions as are set forth in the deed of conveyance from Grantor to Kiawah River Plantation, L.P. dated December 31, 1995, and recorded in Book Y263, page 813, in the R.M.C. Office for Charleston County, S.C.

This is the same property conveyed to the Grantor herein by deed of conveyance of William H. Goodwin, III, Molly S. Goodwin, Matthew T. Goodwin, Alice T. Goodwin as Custodian for Sarah C. Goodwin under the Virginia Uniform Transfer to Minors Act and Alice T. Goodwin as Custodian for Peter O. Goodwin under the Virginia Uniform Transfer to Minors Act dated November 6, 1995, and recorded November 9, 1995, in Book Y261, page 539, in the R.M.C. Office for Charleston County, S.C.

STATE OF SOUTH CAROLINA )  
COUNTY OF CHARLESTON )

AFFIDAVIT

PERSONALLY appeared before me the undersigned, who being duly sworn, deposes and says:

1. I have read the information on this affidavit and I understand such information.
2. The property being transferred is located in Charleston County, South Carolina, bearing Charleston County Tax Map Number M009010100904, and was transferred by Kiawah Resort Associates, LP to Ocean Boulevard Properties A South Carolina Limited Partnership on \_\_\_\_\_, 2008..
3. Check one of the following: The deed is
  - (a) X subject to the deed recording fee as a transfer for consideration paid or to be paid in money or money's worth.
  - (b) \_\_\_\_\_ subject to the deed recording fee as a transfer between a corporation, a partnership, or other entity and a stockholder, partner, or owner of the entity, or is a transfer to a trust or as a distribution to a trust beneficiary.
  - (c) \_\_\_\_\_ exempt from the deed recording fee because (See Information section of affidavit): \_\_\_\_\_ (If exempt, please skip items 4-7, and go to item 8 of this affidavit.)
4. Check one of the following if either item 3(a) or item 3(b) above has been checked (See Information section of this affidavit.):
  - (a) \_\_\_\_\_ The fee is computed on the consideration paid or to be paid in money or money's worth in the amount of \$.0
  - (b) X The fee is computed on the fair market value of the realty which is \$5,857,143.00 for the land and improvements and \$7,142,857.00 consideration paid for the settlement of a disputed claim between co-tenants..
  - (c) \_\_\_\_\_ The fee is computed on the fair market value of the realty as established for property tax purposes which is \_\_\_\_\_
5. Check Yes \_\_\_\_\_ or No X to the following: A lien or encumbrance existed on the land, tenement, or realty before the transfer and remained on the land, tenement, or realty after the

transfer. If "Yes," the amount of the outstanding balance of this lien or encumbrance is:

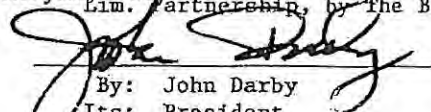
6. The deed recording fee is computed as follows:

- (a) Place the amount listed in item 4 above here: \$5,857,143.00 (plus \$7,142,857.00).
- (b) Place the amount listed in item 5 above here: \$0.00 (If no amount is listed, place zero here.)
- (c) Subtract Line 6(b) from Line 6(a) and place result here: \$13,000,000.00.

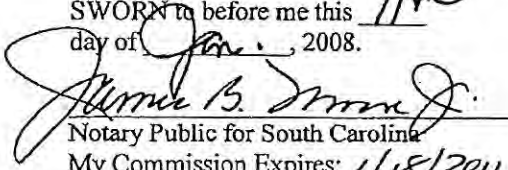
7. The deed recording fee due is based on the amount listed on Line 6(c) above and the deed recording fee due is: \$48,100.00

8. As required by Code Section 12-24-70, I state that I am a responsible person who was connected with the transaction as: ~~XXXXXXXXXXXXXXXXXXXX~~ GRANTEE

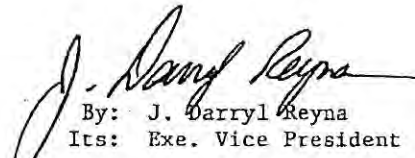
9. I understand that a person required to furnish this affidavit who willfully furnishes a false or fraudulent affidavit is guilty of a misdemeanor and, upon conviction, must be fined not more than one thousand dollars or imprisoned not more than one year, or both. OCEAN BOULEVARD PROPERTIES, A SC Lim. Partnership, by The Beach Co., A SC Cor.

  
By: John Darby  
Its: President

SWORN to before me this 11th  
day of Jan., 2008.

  
Notary Public for South Carolina  
My Commission Expires: 1/18/2011

(NOTARIAL SEAL)

  
By: J. Darryl Reyna  
Its: Exe. Vice President

BK V648PG244

# RECORDER'S PAGE

NOTE: This page MUST remain  
with the original document



Filed By:

McNair Law Firm  
Post Office Drawer 418  
Georgetown, SC 29442

Number of Pages:

8

**FILED**

January 15, 2008

2:54:36 PM

BK V648PG237

Charlie Lybrand, Register  
Charleston County, SC

AMOUNT

DESCRIPTION

Recording Fee	\$ 13.00
State Fee	\$ 33,800.00
County Fee	\$ 14,300.00
Postage	

TOTAL

\$ 48,113.00

\$ Amount (in thousands): 13000

DRAWER:

C - cfb

AUDITOR STAMP HERE

RECEIVED

JAN 18 2008

REC'D A. T. OSSELEY  
CHARLESTON COUNTY AUDITOR

PID VERIFIED BY ASSESSOR

REP

DATE JAN 17 2008

DO NOT STAMP BELOW THIS LINE



BK Z243PG402

STATE OF SOUTH CAROLINA )  
 )  
COUNTY OF CHARLESTON )

EASEMENT AGREEMENT  
(DOCK)

AGREEMENT made this 22<sup>nd</sup> day of June, 1994 by and between Charleston County Park and Recreation Commission ("Purchaser") and W.L. Limehouse and Julian Limehouse, III, as Co-Personal Representatives of the Estate of Julian S. Limehouse, Jr.; William Lawton Limehouse; Peggy K. Limehouse; Linda Anne L. McMurphy, a/k/a Anne Limehouse MacMurphy; Mary Ruth L. Schneider; J. Sidi Limehouse, III, a/k/a Julian S. Limehouse, III; Peggy Jo Gray; and Anne Limehouse MacMurphy, Trustee for Michael Linar Limehouse (collectively, the "Sellers");

WITNESSETH

WHEREAS, the Sellers and the Purchaser entered into a Purchase and Sale Agreement having an effective date of March 3, 1994 for the purchase of a parcel of property containing 738 acres (the "Property"); and

WHEREAS, Section 1.2 of the Purchase and Sale Agreement called for the conveyance by the Sellers of an easement for the extension of a crabbing and fishing dock from the Property into Pond No. 1 (66.12 acres) (the "Pond"); and

WHEREAS, the Purchaser has purchased the Property and the Sellers are now minded to grant the hereinbelow described easement to Purchaser;

NOW THEREFORE, subject to the provisions stated hereafter, for \$5.00 and other valuable consideration, the Sellers and Purchaser agree as follows:

- 1) Grant of Easement: Sellers hereby grant, bargain, sell and convey to Purchaser, a perpetual transferable, appendant and appurtenant, non-exclusive easement over and across the eastern portion of the Pond owned by Sellers for the purpose of extending a crabbing and fishing dock from the Property into the Pond.

TO HAVE AND TO HOLD the easement described above to the Purchaser and its Successors and Assigns forever.

- 2) Restriction on Easement: The dock to be placed in the easement shall be of a length not to exceed 250 feet and shall be used for crabbing, fishing and other activities consistent with the use of the Property as a park. The Purchaser, however, shall not be able to use the Pond for any swimming or boating activities.



- 3) Use of Property: The Sellers reserve the right to use the Pond over which the easement runs for any uses which are not inconsistent with the terms of this Agreement. Sellers may not drain, close or fill the Pond without the written consent of the Purchaser.
- 4) Running of Benefits & Burdens: All of the provisions of this Agreement, including the benefits and the burdens, shall run with the land and shall be binding upon and inure to the Heirs, Successors and Assigns of the parties hereto.
- 5) Commercial Purposes: It is the intent of the parties hereto that the easement granted herein is for commercial purposes and is appurtenant in nature since it inheres in, is essentially necessary to and runs with the land benefited thereby.
- 6) Hold Harmless: Purchaser shall indemnify and hold harmless the Sellers, and their Heirs and Assigns, from any and all claims, liabilities, judgments, damages, penalties, fines, losses and expenses, including reasonable attorney's fees and costs, to any person on property caused wholly or in part by or during the use of the easement herein created, by Purchaser, or Purchaser's successors, assigns, agents, employees, invitees, guests or contractors.

IN WITNESS WHEREOF, the Sellers and Purchaser have executed this Agreement on the date stated above.

PURCHASER:

CHARLESTON COUNTY PARK AND  
RECREATION COMMISSION

By: Harry Shaw

Its: Chairman

SELLERS:

W.L. Limehouse  
W.L. LIMEHOUSE, CO-PERSONAL  
REPRESENTATIVE OF THE ESTATE  
OF JULIAN S. LIMEHOUSE, JR.



BK Z243PG405

1/15/84  
[Signature]

1/15/84  
[Signature]

1/15/84  
[Signature]

James W. [Signature]  
Henry N. [Signature]

[Blank lines]

1/15/84  
[Signature]

[Signature]  
William N. [Signature]

James W. [Signature]  
Henry N. [Signature]

Julian Limehouse III  
JULIAN LIMEHOUSE, III,  
CO-PERSONAL REPRESENTATIVE OF  
THE ESTATE OF JULIAN S.  
LIMEHOUSE, JR.

William Lawton Limehouse  
WILLIAM LAWTON LIMEHOUSE

Peggy K. Limehouse  
PEGGY K. LIMEHOUSE

Linda Anne L. MacMurphy

Anne Limehouse MacMurphy  
LINDA ANNE L. MCMURPHY A/K/A  
ANNE LIMEHOUSE MACMURPHY

MARY RUTH L. SCHNEIDER

Julian Limehouse III  
J. BIDI LIMEHOUSE, III, A/K/A  
JULIAN S. LIMEHOUSE, III

X Peggy Jo Gray  
PEGGY JO GRAY

Anne Limehouse MacMurphy  
ANNE LIMEHOUSE MACMURPHY,  
TRUSTEE FOR MICHAEL LINAR  
LIMEHOUSE



BK 2243PG406

STATE OF SOUTH CAROLINA )  
 )  
COUNTY OF CHARLESTON )

PERSONALLY appeared before me the undersigned witness who, being duly sworn, deposes and says that (s)he saw the within named CHARLESTON COUNTY PARK AND RECREATION COMMISSION by Henry S. Jr, its Chairman, sign, seal, and as their act and deed, deliver the within written instrument, and that (s)he with the other above-subscribed witness witnessed the execution thereof.

James T. Eubank

SWORN to before me this  
17<sup>th</sup> day of June, 1994.

James T. Eubank (L.S.)  
NOTARY PUBLIC FOR SOUTH CAROLINA  
My Commission Expires: Sept 24, 2002

STATE OF SOUTH CAROLINA )  
 )  
COUNTY OF CHARLESTON )

PERSONALLY appeared before me the undersigned witness who, being duly sworn, deposes and says that (s)he saw the within named W.L. LIMEHOUSE, CO-PERSONAL REPRESENTATIVE OF THE ESTATE OF JULIAN S. LIMEHOUSE, JR., sign, seal, and as their act and deed, deliver the within written instrument, and that (s)he with the other above-subscribed witness witnessed the execution thereof.

James T. Eubank

SWORN to before me this  
7<sup>th</sup> day of July, 1994.

James T. Eubank (L.S.)  
NOTARY PUBLIC FOR SOUTH CAROLINA  
My Commission Expires: 3/15/15



BK Z243PG407

STATE OF SOUTH CAROLINA )  
COUNTY OF CHARLESTON )

PERSONALLY appeared before me the undersigned witness who, being duly sworn, deposes and says that (s)he saw the within named JULIAN LIMEHOUSE, III, CO-PERSONAL REPRESENTATIVE OF THE ESTATE OF JULIAN S. LIMEHOUSE, JR., sign, seal, and as their act and deed, deliver the within written instrument, and that (s)he with the other above-subscribed witness witnessed the execution thereof.

LA A LV

SWORN to before me this  
1<sup>st</sup> day of June, 1994.

(L.S.)

NOTARY PUBLIC FOR SOUTH CAROLINA  
My Commission Expires: 1/1/95

STATE OF SOUTH CAROLINA )  
COUNTY OF CHARLESTON )

PERSONALLY appeared before me the undersigned witness who, being duly sworn, deposes and says that (s)he saw the within named WILLIAM LAWTON LIMEHOUSE, sign, seal, and as their act and deed, deliver the within written instrument, and that (s)he with the other above-subscribed witness witnessed the execution thereof.

LA A LV

SWORN to before me this  
1<sup>st</sup> day of June, 1994.

(L.S.)

NOTARY PUBLIC FOR SOUTH CAROLINA  
My Commission Expires: 1/1/95



BK Z243PG408

STATE OF SOUTH CAROLINA )  
COUNTY OF CHARLESTON )

PERSONALLY appeared before me the undersigned witness who, being duly sworn, deposes and says that (s)he saw the within named PEGGY K. LIMEHOUSE, sign, seal, and as their act and deed, deliver the within written instrument, and that (s)he with the other above-subscribed witness witnessed the execution thereof.

SWORN to before me this  
1<sup>st</sup> day of July, 1994.

[Signature]  
(L.S.)

NOTARY PUBLIC FOR SOUTH CAROLINA  
My Commission Expires: 5/1/95

STATE OF SOUTH CAROLINA )  
COUNTY OF CHARLESTON )

PERSONALLY appeared before me the undersigned witness who, being duly sworn, deposes and says that (s)he saw the within named LINDA ANNE L. MCMURPHY A/K/A ANNE LIMEHOUSE MacMURPHY, sign, seal, and as their act and deed, deliver the within written instrument, and that (s)he with the other above-subscribed witness witnessed the execution thereof.

SWORN to before me this  
3<sup>rd</sup> day of July, 1994.

[Signature]  
(L.S.)

NOTARY PUBLIC FOR SOUTH CAROLINA  
My Commission Expires: 11-28-99



BK Z243PG409

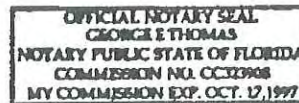
STATE OF FLORIDA )

COUNTY OF Dade )

PERSONALLY appeared before me the undersigned witness who, being duly sworn, deposes and says that (s)he saw the within named MARY RUTH L. SCHNEIDER, sign, seal, and as their act and deed, deliver the within written instrument, and that (s)he with the other above-subscribed witness witnessed the execution thereof.

SWORN to before me this  
27 day of May, 1994.

George E. Thomas (L.S.)  
NOTARY PUBLIC FOR FLORIDA  
My Commission Expires: 12/12/97



STATE OF SOUTH CAROLINA )

COUNTY OF CHARLESTON )

PERSONALLY appeared before me the undersigned witness who, being duly sworn, deposes and says that (s)he saw the within named J. SIDI LIMEHOUSE, III A/K/A JULIAN S. LIMEHOUSE, III, sign, seal, and as their act and deed, deliver the within written instrument, and that (s)he with the other above-subscribed witness witnessed the execution thereof.

SWORN to before me this  
7 day of June, 1994.

[Signature] (L.S.)  
NOTARY PUBLIC FOR SOUTH CAROLINA  
My Commission Expires: 5/5/98



BK 2243PG410

MARYLAND  
STATE OF )  
COUNTY OF )

PERSONALLY appeared before me the undersigned witness who, being duly sworn, deposes and says that (s)he saw the within named PEGGY JO GRAY, sign, seal, and as their act and deed, deliver the within written instrument, and that (s)he with the other above-subscribed witness witnessed the execution thereof.

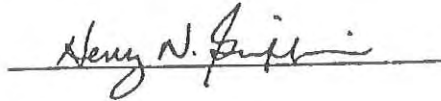


SWORN to before me this  
27 day of May, 1994.

Rapita Harmon (L.S.)  
NOTARY PUBLIC FOR MARYLAND  
My Commission Expires: March 1, 1997

STATE OF SOUTH CAROLINA )  
COUNTY OF CHARLESTON )

PERSONALLY appeared before me the undersigned witness who, being duly sworn, deposes and says that (s)he saw the within named ANNE LIMEHOUSE MacMURPHY, TRUSTEE FOR MICHAEL LINAR LIMEHOUSE, sign, seal, and as their act and deed, deliver the within written instrument, and that (s)he with the other above-subscribed witness witnessed the execution thereof.



SWORN to before me this  
15 day of June, 1994.

Henry N. Griffin (L.S.)  
NOTARY PUBLIC FOR SOUTH CAROLINA  
My Commission Expires: 11-28-94

LAW OFFICES OF C. J. MANOS  
ATTORNEY AT LAW  
P. O. BOX 1787  
CHARLESTON, SC 29402-1787

BK Z243PG411

15.00  
A

FILED

2243-402  
94 JUN -7 PM 2:07

ROBERT H. KING  
REGISTER  
CHARLESTON COUNTY SC

1  
80



## EXHIBIT 4.8

Berkeley Elec Coop Easement

BK K 229PG594

THE STATE OF SOUTH CAROLINA )

COUNTY OF Charleston )Location Number 557-70

RIGHT OF WAY EASEMENT

UNDERGROUND

KNOW ALL MEN BY THESE PRESENTS that I (we) W.L. Limehouse

, of the  
County of Charleston, State of South Carolina, hereinafter referred to as  
Grantor(s) for the sum of One Dollar (\$1.00) and other good and valuable consideration to me  
(us) in hand paid, receipt of which is hereby acknowledged, does hereby grant unto BERKELEY  
ELECTRIC COOPERATIVE, INC., a corporation, whose Post Office Address is Moncks Corner,  
South Carolina, hereinafter called Cooperative, and to its Successors or Assigns, a right-of-way  
over route selected by Cooperative, having a width of 10 feet, ~~that is~~  
~~to say, xxxxxxxxxxxx feet on the side of centerline,~~ upon, over and across land of Grantor(s),  
more particularly described as follows, to-wit:

A tract of land approximately 34.6 acres in Charleston County, in or near  
Johns Island community and bounded as follows:

North by Bishops of CharlestonEast by John F. LimehouseSouth by Bohicket RoadWest by Bohicket Road

T.M.S.# 202-00-00-126 - This is a 10 foot underground easement running along  
the westerly property line adjacent to Bohicket Road.

together with the right to place, construct, operate, maintain, relocate, patrol and replace  
thereon and in or upon all streets, roads or highways abutting said lands an electric transmis-  
sions or distribution line or system and communication system, including the right to erect,  
install and construct, either overhead or underground, its electrical facilities and other transmis-  
sion line structures, wires, cables and any necessary appurtenances and equipment deemed  
by the Cooperative to be necessary therefor, as well as the right to install, maintain and use  
anchors and guy wires on lands adjacent to the right-of-way herein granted; and to cut and trim  
trees and shrubbery to the extent necessary to keep them clear of said electric line or system  
and communication system and to cut down, from time to time, all dead, weak, leaning or  
dangerous trees that are tall enough to strike the wires in falling.

Together also with the right, from time to time, to redesign, rebuild or alter said lines and  
to install such additional lines, apparatus and equipment as the Cooperative may at any time  
deem necessary, and the right to remove any line or any part thereof.

Together also with all rights of ingress and egress necessary for the full and complete  
use, occupancy, and enjoyment of the easement hereby granted and all rights and privileges  
incident thereto.



R/Way  
10.00  
London  $\beta$

987  
A. 1)

Grantor(s) agrees that all poles, wires and other facilities, including any main service entrance equipment installed on the above described lands at the Cooperative's expense, shall remain the property of the Cooperative, removable at the option of the Cooperative upon termination of service to or on said lands.

PROVIDED, HOWEVER, any damage to the property of Grantor(s) (other than the property cleared or removed as hereinabove provided) caused by the Cooperative in the course of constructing, rebuilding or repairing said lines shall be borne by the Cooperative.

TO HAVE AND TO HOLD, all the singular the aforesaid rights and privileges unto the Cooperative, its Successors and Assigns, as aforesaid.

And Grantor(s) agree(s) to warrant and forever defend the above granted rights against himself or his heirs and against any other person lawfully claiming or to claim the same or any part thereof.

It is further understood that whenever necessary, words used in this instrument in the singular shall be construed to read in the plural and that words used in the masculine gender shall be construed to read in the feminine.

IN WITNESS WHEREOF, the undersigned has set this hand and seal this 25 day of Feb, 19 92.

**SIGNED, SEALED AND DELIVER  
IN THE PRESENCE OF**

James Cleveland  
Robert Bradley

X.W.L. Lime Louse (LS.)  
(LS.)

STATE OF SOUTH CAROLINA  
COUNTY OF BERKELEY

PERSONALLY appeared before me James E. Elwell, Jr.  
and made oath that (s)he saw the within named W.S. Linchhouse

sign the within instrument, and as h<sup>is</sup> act and deed, deliver the Right-of-Way for the uses and purposes therein mentioned, and that (s)he with Robert Bradley, in the presence of each other, witnessed the due execution thereof.

SWORN to and subscribed before me this 25 day of FEB, 1993.

Robert Bradley  
NOTARY PUBLIC FOR SOUTH CAROLINA  
My Commission Expires: 8-27-99

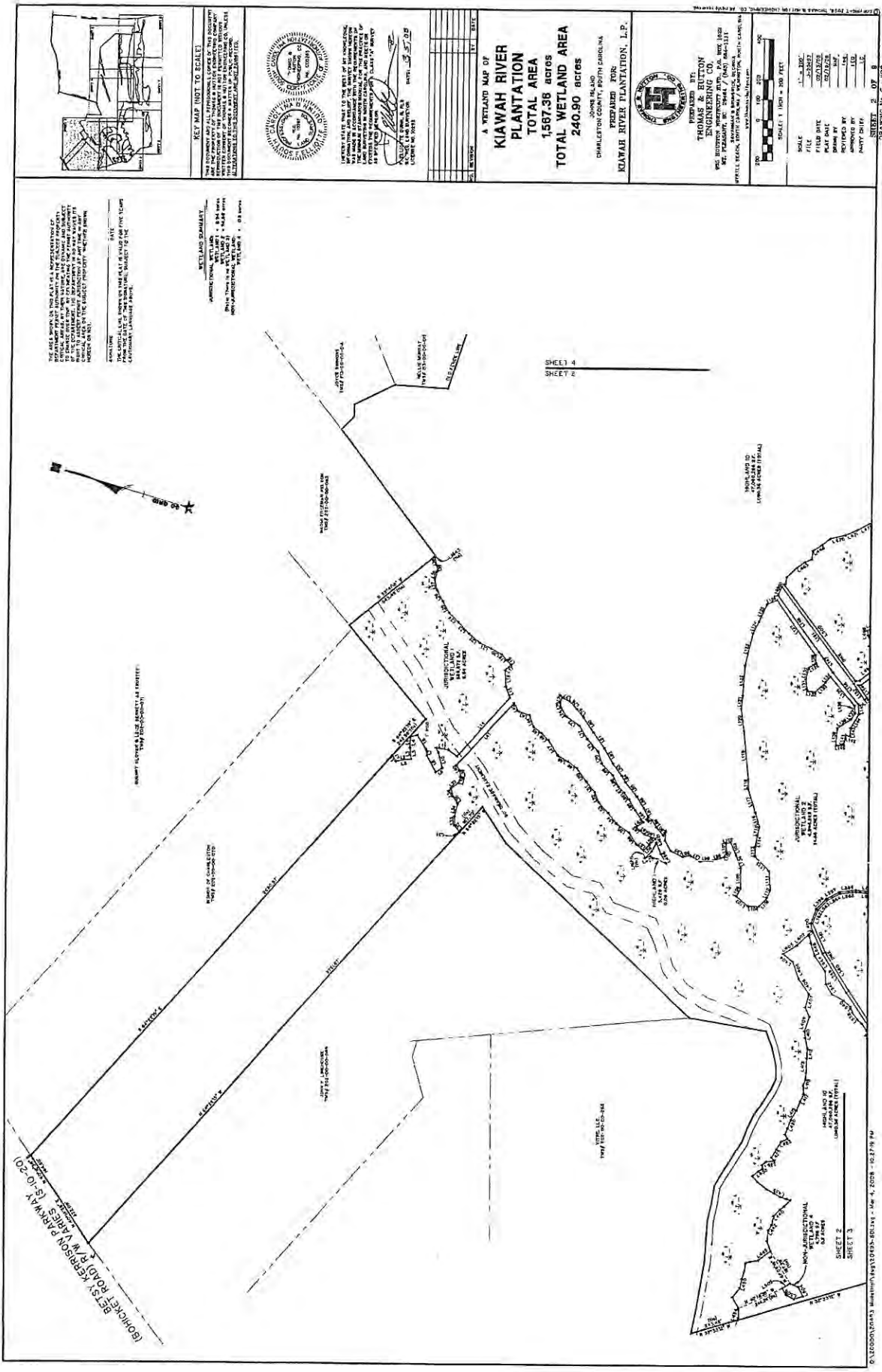
**FILED**

K229-594

93 JUL 13 AM 11:40

RETURN TO:  
BERKELEY ELECTRIC COOPERATIVE INC.  
P.O. Box 1234  
Moncks Corner, S.C. 29461





THE AREA SHOWN ON THIS MAP IS A REPRESENTATION OF THE ACTUAL WETLANDS AND IS NOT A GUARANTEE OF THE ACCURACY OF THE INFORMATION PROVIDED. THE ENGINEER HAS CONDUCTED A VISUAL INSPECTION OF THE AREA AND HAS FOUND THAT THE INFORMATION PROVIDED IS A REPRESENTATION OF THE ACTUAL WETLANDS AND IS NOT A GUARANTEE OF THE ACCURACY OF THE INFORMATION PROVIDED.

THE ENGINEER HAS CONDUCTED A VISUAL INSPECTION OF THE AREA AND HAS FOUND THAT THE INFORMATION PROVIDED IS A REPRESENTATION OF THE ACTUAL WETLANDS AND IS NOT A GUARANTEE OF THE ACCURACY OF THE INFORMATION PROVIDED.

WETLAND 1  
WETLAND 2  
WETLAND 3  
WETLAND 4  
WETLAND 5  
NON-WETLAND

WETLAND 1  
WETLAND 2  
WETLAND 3  
WETLAND 4  
WETLAND 5  
NON-WETLAND

WETLAND 1  
WETLAND 2  
WETLAND 3  
WETLAND 4  
WETLAND 5  
NON-WETLAND

WETLAND 1  
WETLAND 2  
WETLAND 3  
WETLAND 4  
WETLAND 5  
NON-WETLAND

WETLAND 1  
WETLAND 2  
WETLAND 3  
WETLAND 4  
WETLAND 5  
NON-WETLAND

WETLAND 1  
WETLAND 2  
WETLAND 3  
WETLAND 4  
WETLAND 5  
NON-WETLAND

WETLAND 1  
WETLAND 2  
WETLAND 3  
WETLAND 4  
WETLAND 5  
NON-WETLAND

WETLAND 1  
WETLAND 2  
WETLAND 3  
WETLAND 4  
WETLAND 5  
NON-WETLAND

WETLAND 1  
WETLAND 2  
WETLAND 3  
WETLAND 4  
WETLAND 5  
NON-WETLAND

WETLAND 1  
WETLAND 2  
WETLAND 3  
WETLAND 4  
WETLAND 5  
NON-WETLAND

WETLAND 1  
WETLAND 2  
WETLAND 3  
WETLAND 4  
WETLAND 5  
NON-WETLAND

WETLAND 1  
WETLAND 2  
WETLAND 3  
WETLAND 4  
WETLAND 5  
NON-WETLAND

WETLAND 1  
WETLAND 2  
WETLAND 3  
WETLAND 4  
WETLAND 5  
NON-WETLAND

WETLAND 1  
WETLAND 2  
WETLAND 3  
WETLAND 4  
WETLAND 5  
NON-WETLAND

GROCKE ROAD / M. J. KERRON PARKWAY  
10/20/2013

GROCKE ROAD / M. J. KERRON PARKWAY  
10/20/2013

GROCKE ROAD / M. J. KERRON PARKWAY  
10/20/2013

GROCKE ROAD / M. J. KERRON PARKWAY  
10/20/2013

GROCKE ROAD / M. J. KERRON PARKWAY  
10/20/2013

GROCKE ROAD / M. J. KERRON PARKWAY  
10/20/2013

GROCKE ROAD / M. J. KERRON PARKWAY  
10/20/2013

GROCKE ROAD / M. J. KERRON PARKWAY  
10/20/2013

GROCKE ROAD / M. J. KERRON PARKWAY  
10/20/2013

GROCKE ROAD / M. J. KERRON PARKWAY  
10/20/2013

GROCKE ROAD / M. J. KERRON PARKWAY  
10/20/2013

GROCKE ROAD / M. J. KERRON PARKWAY  
10/20/2013

GROCKE ROAD / M. J. KERRON PARKWAY  
10/20/2013

GROCKE ROAD / M. J. KERRON PARKWAY  
10/20/2013

KEY MAP (NOT TO SCALE)

THE ENGINEER HAS CONDUCTED A VISUAL INSPECTION OF THE AREA AND HAS FOUND THAT THE INFORMATION PROVIDED IS A REPRESENTATION OF THE ACTUAL WETLANDS AND IS NOT A GUARANTEE OF THE ACCURACY OF THE INFORMATION PROVIDED.



FRANK S. KELLY  
ENGINEER  
11111  
10/20/2013

NO.	DATE	DESCRIPTION
1	10/20/2013	WETLAND MAP

A WETLAND MAP OF  
KIWAH RIVER PLANTATION  
TOTAL AREA  
1,567.36 acres  
TOTAL WETLAND AREA  
240.90 acres

CHARLESTON COUNTY, SOUTH CAROLINA  
PREPARED FOR:  
KIWAH RIVER PLANTATION, L.P.

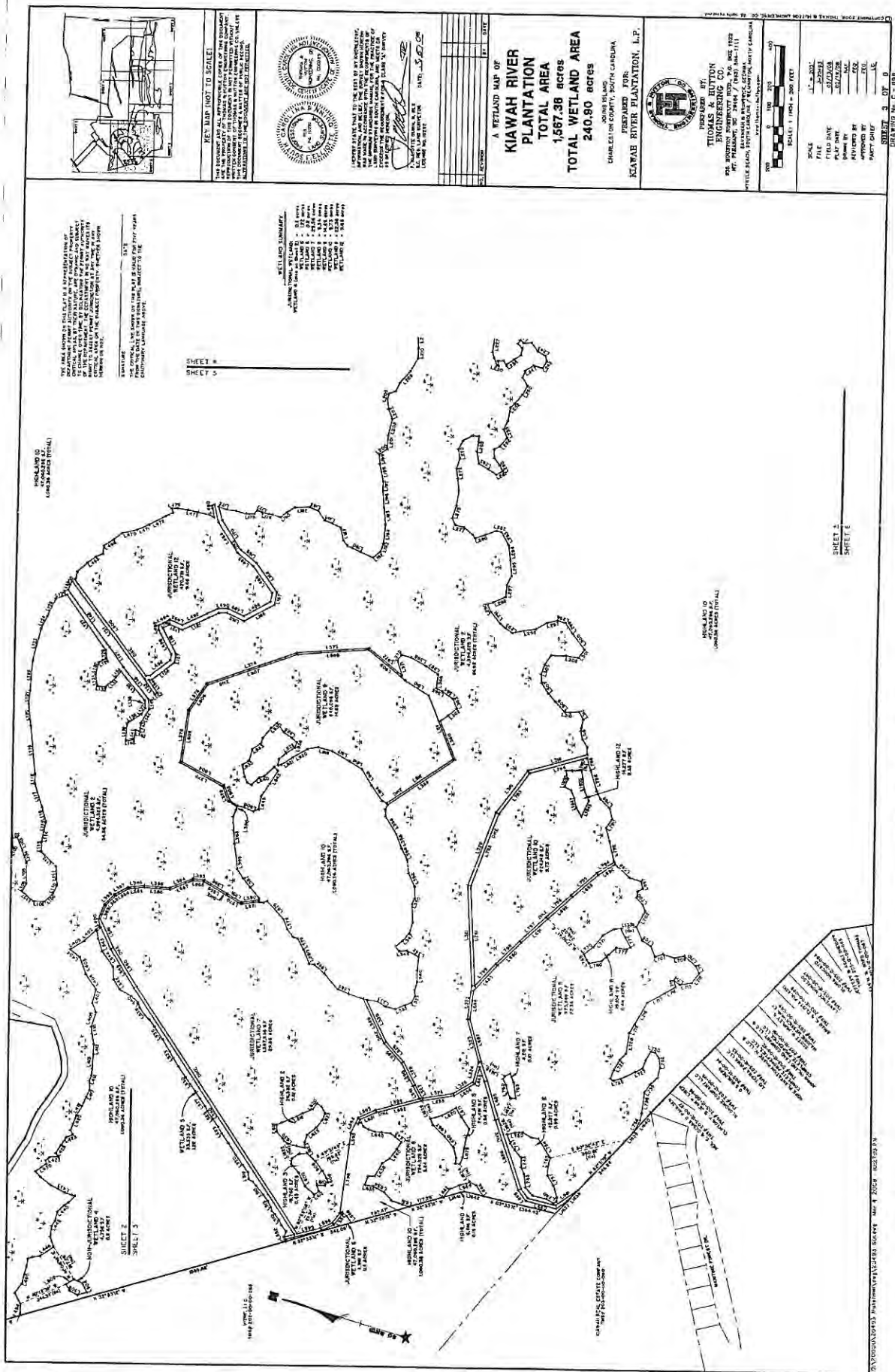


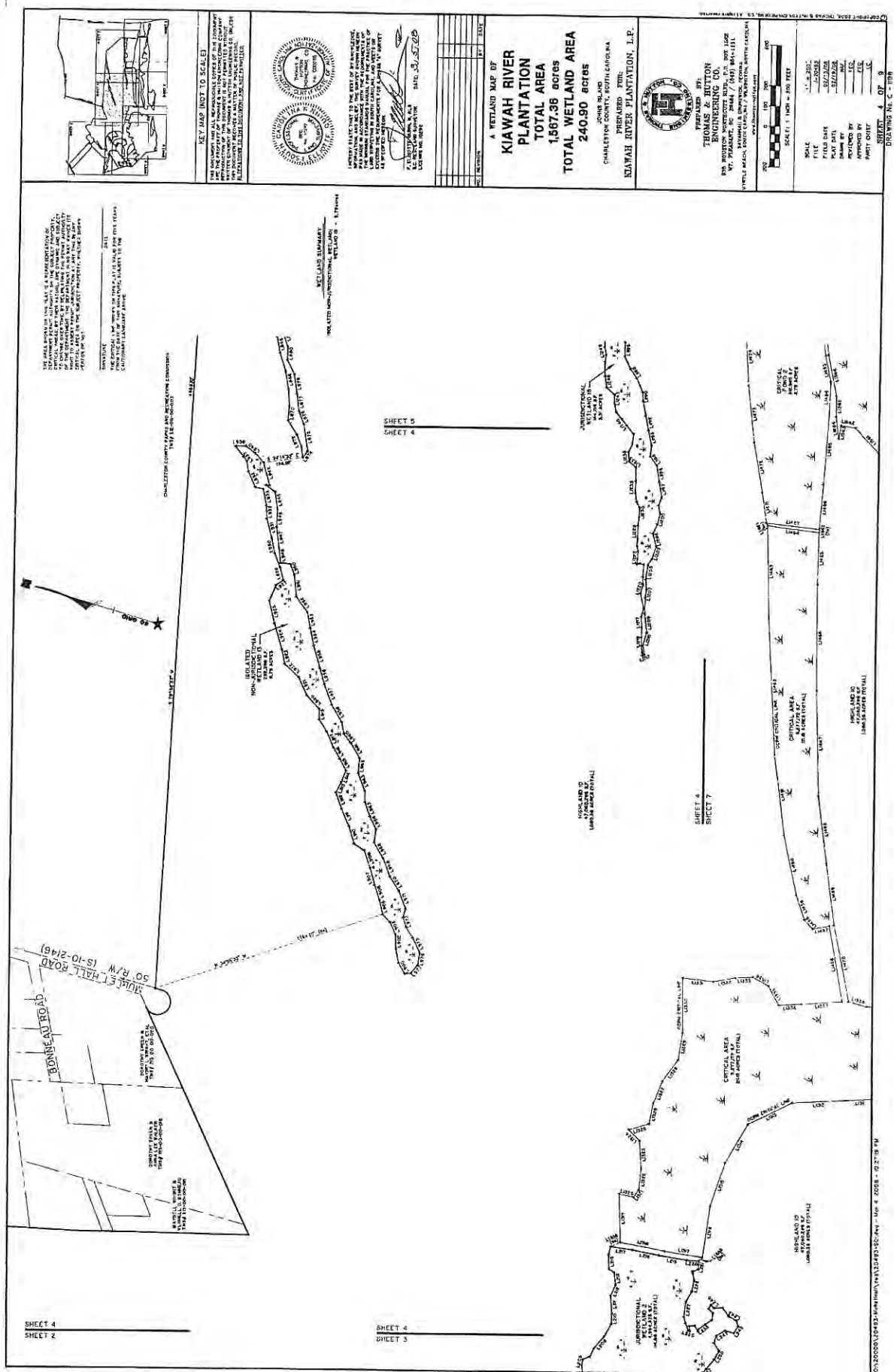
FRANK S. KELLY  
ENGINEERING CO., INC.  
11111  
10/20/2013

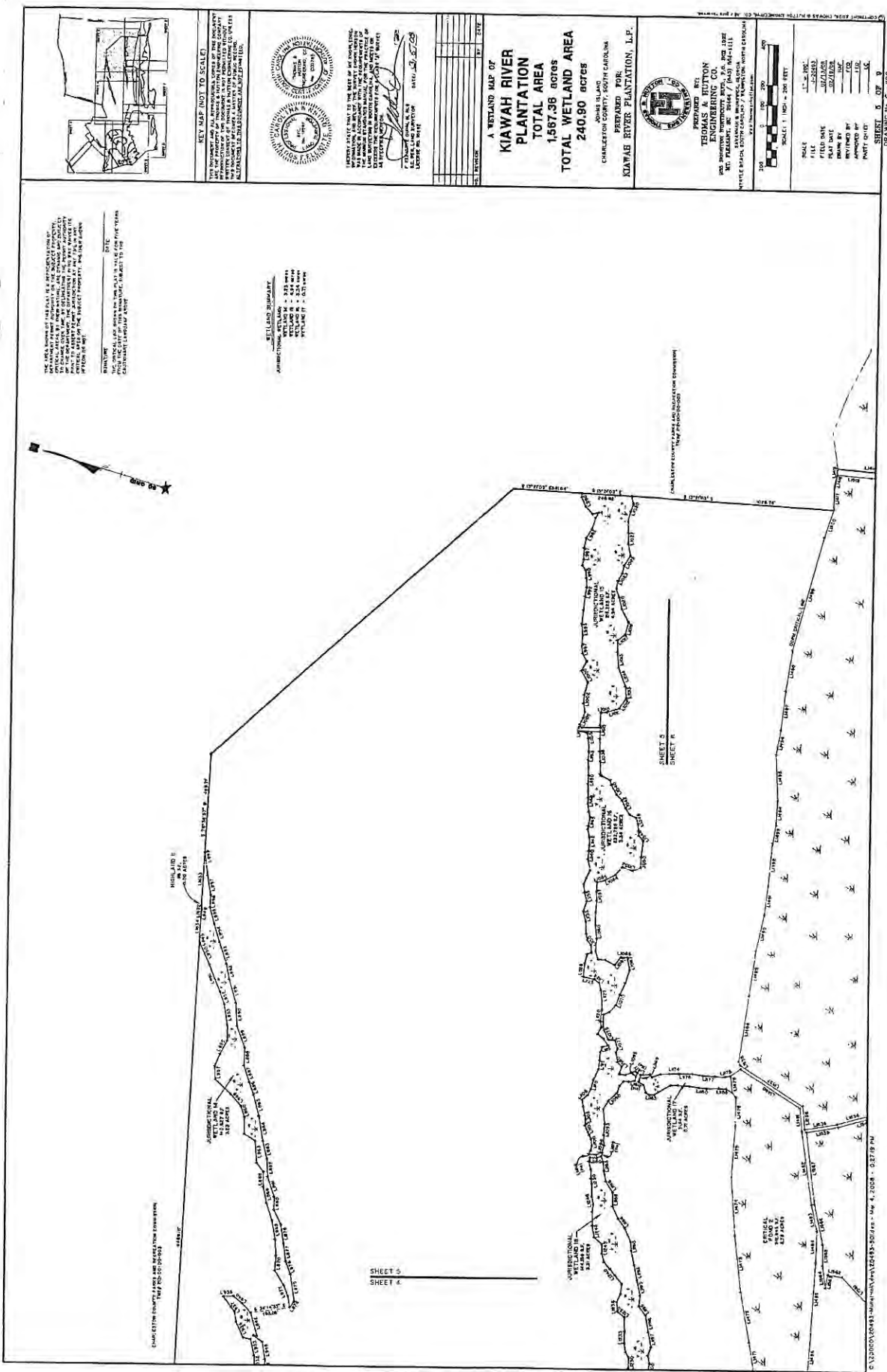
SCALE: 1 INCH = 100 FEET

SCALE	1" = 100'
FILED DATE	10/20/2013
FILED BY	FRANK S. KELLY
FILED AT	CHARLESTON, SOUTH CAROLINA
FILED FOR	KIWAH RIVER PLANTATION, L.P.

SHEET 2 OF 8  
DRAWING NO. C-198







KEY MAP NOT TO SCALE



STATE OF SOUTH CAROLINA  
COUNTY OF CHARLESTON  
I, the undersigned, being a duly qualified and licensed Professional Surveyor, do hereby certify that the foregoing is a true and correct copy of the original survey as shown to me by the owner of the land, and that the same has been compared with the original survey and found to be correct.

A WETLAND MAP OF  
KIAWAH RIVER  
PLANTATION  
TOTAL AREA  
1,587.38 ACRES  
TOTAL WETLAND AREA  
240.90 ACRES

PREPARED FOR:  
KIAWAH RIVER PLANTATION, L.P.

TECHNICAL  
SURVEYING  
ENGINEERING CO.  
1000 PINEHURST DRIVE, S.E., SUITE 100  
ALBUQUERQUE, NEW MEXICO 87102-1111  
PHONE (505) 263-1111  
FAX (505) 263-1112  
WWW.TECHNICALSURVEYING.COM

SCALE: 1" = 200' FT.  
FIELD DATE: 02/20/03  
DRAWN BY: JSC  
CHECKED BY: JSC  
APPROVED BY: JSC  
DATE: 02/20/03

PROJECT: KIAWAH RIVER PLANTATION  
SHEET 5 OF 9  
DRAWING NO. C-188

THE SURVEYOR'S OFFICE HAS BEEN ADVISED BY THE CLIENT THAT THE SURVEYED AREA IS A WETLAND AND THAT THE SURVEYOR IS NOT TO BE RESPONSIBLE FOR THE RESULTS OF THE SURVEY. THE SURVEYOR HAS BEEN ADVISED THAT THE SURVEYED AREA IS A WETLAND AND THAT THE SURVEYOR IS NOT TO BE RESPONSIBLE FOR THE RESULTS OF THE SURVEY.

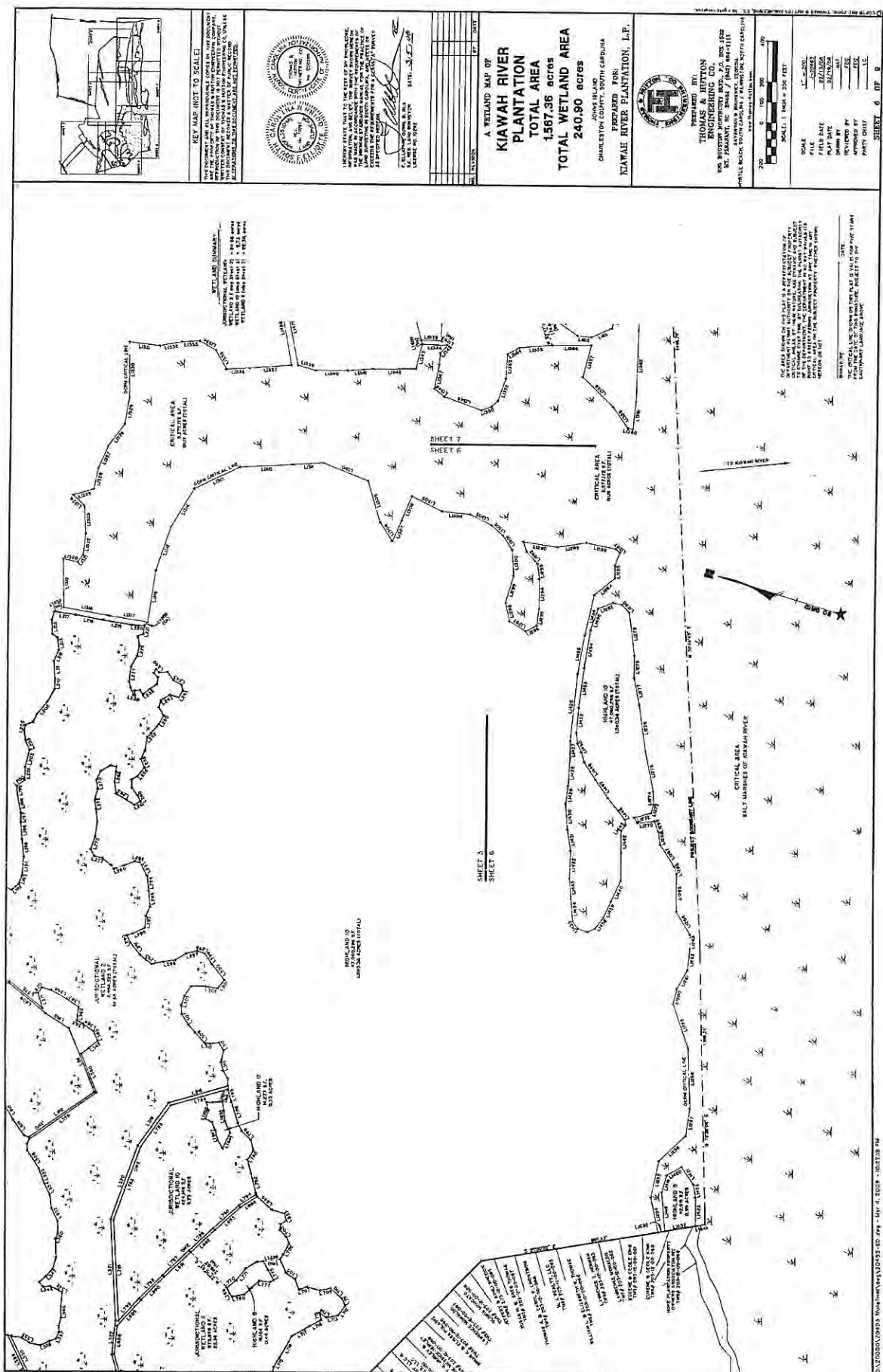
WETLAND SUMMARY  
WETLAND A - 1,587.38 ACRES  
WETLAND B - 240.90 ACRES  
WETLAND C - 1,587.38 ACRES  
WETLAND D - 1,587.38 ACRES  
WETLAND E - 1,587.38 ACRES  
WETLAND F - 1,587.38 ACRES

SHEET 4  
SHEET 5

DATE: 02/20/03  
DRAWN BY: JSC  
CHECKED BY: JSC  
APPROVED BY: JSC

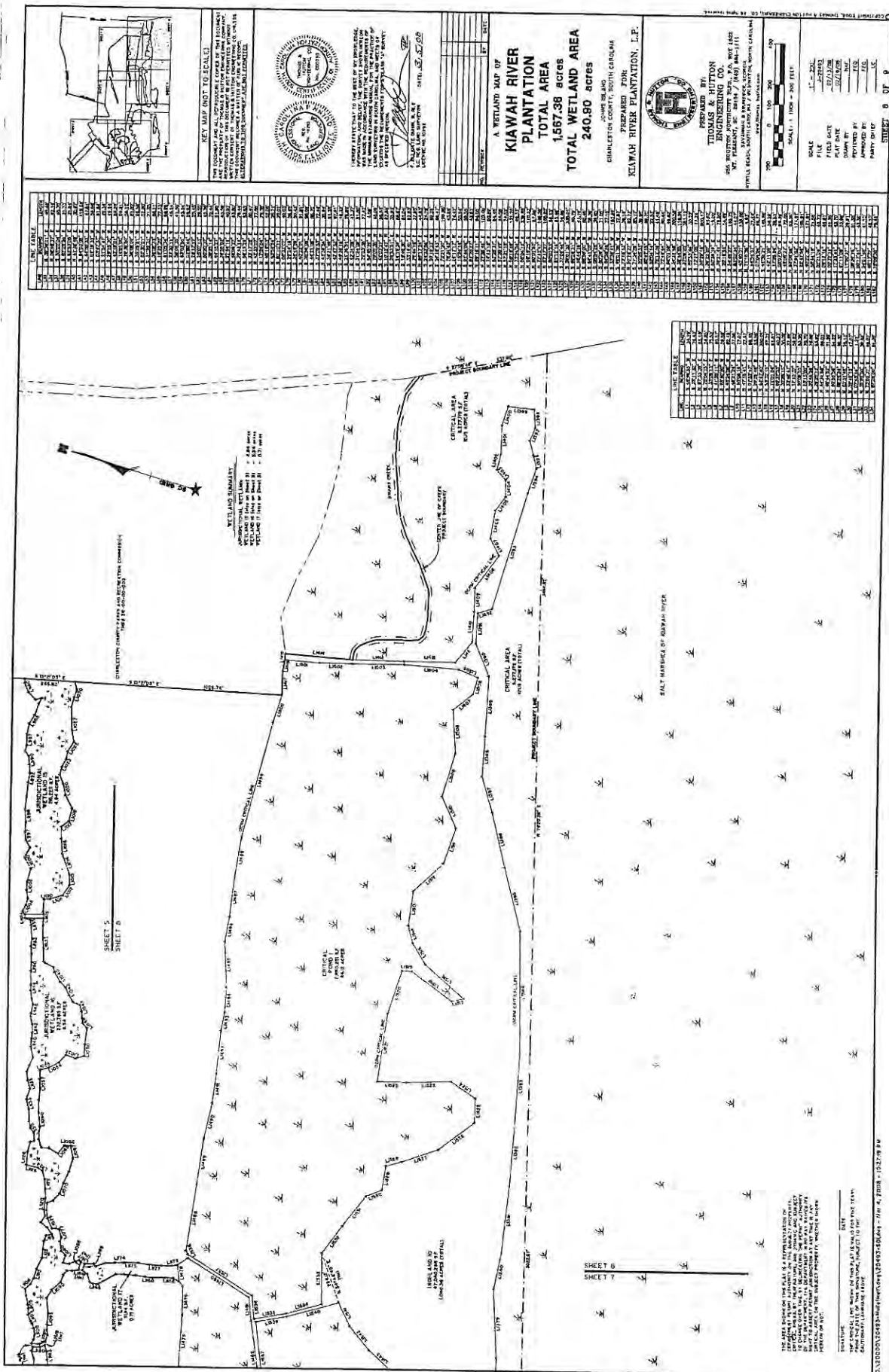
02/20/03 KIAWAH RIVER PLANTATION, L.P. 1,587.38 ACRES 240.90 ACRES 02/20/03













## SECTION 1 – STATEMENT OF OBJECTIVES

### 1.1 The Kiawah River Planned Development

The Kiawah River Planned Development Plan will provide significant benefits to the *Property Owner*, the future residents of the *Real Property*, and the *County*. The benefits and objectives of such a rezoning will include, but are not limited to, the following:

- Greater flexibility with respect to *Lot* dimensions, incentivizing the *Property Owner* to provide a variety of housing types and allowing the *Property Owner* to conform the *Development* to the natural characteristics on the *Real Property*;
- The provision of a significant amount of *Housing for the Workforce* and *Affordable Housing*, helping mitigate existing traffic issues on Johns Island, Kiawah Island, and Seabrook Island;
- An increase in the number of permitted uses on the *Real Property*, ensuring that the future residents and visitors to the *Real Property* enjoy recreational, commercial, retail, and office amenities within a short walk or bicycle ride from their homes or guest rooms;
- The protection of the waterfront environment by limiting the number of docks constructed thereon to eighteen (18) and utilizing restrictive covenants to ensure single-family detached lots in the Rural Residential portion of the *Real Property* are substantially maintained in their natural environment;
- The facilitation of greater economic opportunity for the *County* and its existing residents by creating several hundred jobs in the *County* and the State; increasing total revenues to area business; providing a net positive impact on the *County's* fiscal responsibilities; and introducing new lodging and recreational opportunities for visitors;
- The preservation and enhancement of green spaces, important cultural and historical sites, threatened and endangered species, and recreational areas on the *Real Property* and within the adjacent Johns Island County Park, including the preservation or development of at least fifty percent (50%) of the *Real Property* as open space;
- The provision of a smooth transition from the Suburban portion of the *County* to the Rural portion of the *County*, while ensuring a perpetual and clearly-defined Urban Growth Boundary on this portion of Johns Island; and
- A limitation on the total number of *Dwelling Units* which may be developed on the *Real Property*, to 1,285 *Dwelling Units*, 117 of which will be *Housing for the Workforce Units*. The *Plan* would allow greater flexibility in the location of these *Dwelling Units* but still preserve the rural flavor of the existing community with a gross residential density of .90 *Dwelling Units* per acre (including all acreage) or 1.01 *Dwelling Units* per acre (including only highland and freshwater wetland).

Accordingly, pursuant to sections 6-29-720 and -740 of the South Carolina Code, the *County* specifically finds that the *Plan* does the following:

- Helps achieve the objectives of the *Comprehensive Plan*;
- Permits flexibility in development;
- Results in improved design, character, and quality of new mixed use development;
- Preserves the natural and scenic features of open spaces;
- Encourages innovative site planning for residential, commercial, institutional, and industrial development;
- Provides for variation from other ordinances and the regulations of other established zoning districts concerning use, setbacks, lot size, density, bulk, and other requirements to

accommodate flexibility in the arrangement of uses for the general purpose of promoting and protecting the public health, safety, and general welfare;

- Comprises housing of different types and densities and of compatible commercial uses, office parks, and mixed-use development; and
- Includes a unified site design for a mixed use development.

## **1.2 Planned Development Name**

The name of the Planned Development shall be Kiawah River ; provided, however, the *Property Owner* may provide written notice to the *County* at any time before commencement of construction on the *Real Property* pursuant to the *Agreement* of a different name for the Planned Development which does not duplicate the name of any other Planned Development or subdivision, the final plat of which has been recorded in the RMC Office for Charleston County, South Carolina at the time of such notice.

## **1.3 The Illustrative Master Plan**

For the purpose of illustrating the *Development* the *Property Owner* may institute on the *Real Property* pursuant to the *Agreement* and the *Plan*, an Illustrative Master Plan is attached hereto as Exhibit 1.1. Exhibit 1.2 delineates the conceptual location of the individual *Lots* on the *Real Property*. While the Illustrative Master Plan may be used by the *County* and the *Property Owner* as a general guide for the overall *Development* of the *Real Property*, the *Lots*, *Development Parcels*, *Thoroughfares*, green space, recreational areas, *Community Ways*, and other elements illustrated thereon are not intended to represent the exact configuration and location of the *Development* that will occur on the *Real Property*. The more specific elements of the *Agreement* and the *Plan* should be used by the *County* and the *Property Owner* to help guide the precise configuration and location of the different aspects of *Development* as the *Project* progresses.

## SECTION 2 – REAL PROPERTY

### 2.1 Legal Description

All that certain piece, parcel or tract of land, together with all buildings and improvements presently located thereon, situate, lying and being on Johns Island, in the County of Charleston, State of South Carolina, known generally as “Mullet Hall Plantation,” containing 1083.197 acres of highland (including certain small islands), 235.94 acres of ponds and creeks, 86.36 acres of impounds, and 22.313 acres between mean high water and the DHEC-OCRM Critical Line, more or less, shown on a plat by A.H. Schwacke, & Associates entitled “PLAT OF MULLET HALL & JACK ISLAND 1426.81 ACRES JOHNS ISLAND CHARLESTON COUNTY SOUTH CAROLINA,” dated October 4, 1994, last revised on November 11, 1994, and recorded in Plat Book EA, at Pages 316 through 322, in the RMC Office for Charleston County, South Carolina, (the “Plat”), said property having such location, butts and bounds, metes, courses and distances as will by reference to the Plat more fully appear. The Plat is attached hereto as Exhibit 2.1.

Being a portion of TMS # 212-00-00-001.

### 2.2 Wetland Survey

A wetland survey delineating the location, acreage, and type (freshwater or critical area/marsh) of all wetlands on the *Real Property* as they exist prior to *Development* is attached hereto as Exhibit 2.3. The *Property Owner* has no intention to develop upon any of these natural areas; provided, however, the *Property Owner* may construct portions of roads and/or utilities on these natural areas only after obtaining all applicable permits and approvals from *OCRM* and the *Corps* for such *Development* and obtaining site plan approval from the *County* pursuant to the *ZLDR*.

### SECTION 3 – DEFINITIONS

The definitions set forth in this section of the *Plan* shall control the development of the *Real Property* in lieu of any contrary definitions in the *ZLDR* or other *Laws*. The definitions in Chapter 12 of the *ZLDR* on the *Effective Date* shall otherwise apply.

The “*Act*” means the South Carolina Local Government Development Agreement Act, codified at sections 6-31-10 to -160 of the South Carolina Code.

“*Accessory Use*” means a use customarily incidental and subordinate to the principal use of a *Lot* or of a structure, or as allowed by the *ARB* in accordance with Article 6.5 of Appendix D, which is a red-line of the *ZLDR*. An *Accessory Use* is located on the same *Lot* as the principal use, except (i) in cases of off-street parking, temporary real estate sales office, and temporary construction facilities, and (ii) in cases of *Hotels* or *Inns* where *Accessory Uses* may be located on other *Lots*.

“*Accessory Dwelling Unit*” means a dwelling unit, with no more than 800 square feet of gross floor area that has been added to, onto, or created within, a single family house. This definition includes garage apartments. An *Accessory Dwelling Unit* may be detached from a single family house provided it complies with the conditions applicable to *Accessory Dwelling Units* in Appendix B to the *Agreement*.

“*Active Recreation Area*” means any park, recreational facility, or recreational area which is not dependent upon a specific environmental or natural resource and which is developed with recreation and support facilities. An *Active Recreation Area* includes, but is not limited to, playgrounds, *Golf Courses*, bicycle trails, baseball or softball fields, football or soccer fields, basketball courts, swimming pools, clubhouses, water-dependent uses, equestrian facilities, pickle courts, racquetball courts, and tennis courts. *Active Recreation Areas* shall constitute open space.

“*Affordable Housing*” means, in the case of dwelling units for sale, housing in which mortgage, amortization, taxes, insurance, and condominium or association fees, if any, constitute no more than twenty-eight percent (28%) of the annual household income for a household earning no more than eighty percent (80%) of the area median income, by household size, for the metropolitan statistical area as published from time to time by the U.S. Department of Housing and Community Development (HUD) and, in the case of dwelling units for rent, housing for which the rent and utilities constitute no more than thirty percent (30%) of the annual household income for a household earning no more than eighty percent (80%) of the area median income, by household size for the metropolitan statistical area as published from time to time by HUD.

“*Agreement*” means this Development Agreement, including the recitals and exhibits attached hereto. The *Agreement* shall also include the *Plan*.

“*ARB*” is the Kiawah River Architectural Review Board that is currently functional under the auspices of the *Property Owner* and/or as it may later function under applicable *Covenants*. The *ARB* may promulgate, modify, and enforce development guidelines, such as architectural and landscaping guidelines, assigned to it under the *Agreement* or the *Plan* with respect to any portion of the *Real Property*.

“*Association*” means one or more non-profit association(s) or corporation(s), which will be formally constituted and made up of the property owners and/or residents of the *Real Property*, or a particular portion or portions thereof. An *Association* may take responsibility for costs and maintenance of *Common Areas* on or affecting any portion of the *Real Property* subject to such *Association*’s jurisdiction, as delineated in any applicable *Covenants*.

“*Bed and Breakfast*” means a lodging-type building or group of buildings on one *Lot* offering two (2) to twelve (12) *Guest Rooms*, with or without meal service, on a daily, weekly, monthly, or seasonal basis. A *Bed and Breakfast* may be owner-occupied and/or staff-occupied. Whether or not owner- or staff-occupied, a *Bed and Breakfast* shall contribute to *Guest Room* entitlement densities, and no others, in the *Agreement*.

“*Building Coverage*” means the area of a *Lot* covered by principal or accessory buildings or roofed areas, as measured along the outside wall at ground level, and including all projections, other than open porches, fire escapes, canopies, and the first two feet (2’) of a roof overhang. This definition shall not include pools, pool decks, or pervious drives.

“*Building Development Standards*” means any applicable dimensional standards for *Lots*, *Development Parcels*, buildings, and structures, including but not limited to any minimum standards for *Lot* area, *Lot* width, *Setbacks*, and yard requirements and any maximum standards for *Building Height* and *Building Coverage* on *Lots* or *Development Parcels*.

“*Building Height*” means elevation from *Ground Floor Level* as measured in feet. *Building Height* does not include those items specifically excluded from consideration of *Building Height* in the *Plan*.

“*Common Areas*” means “Common Areas,” as defined under any *Covenants* encumbering all or portions of the *Real Property*, i.e., all real and personal properties which now or hereafter are deeded or leased to, or are the subject of a use agreement or easement with, an *Association* and wherein the property therein described is specifically denominated to be part of the *Common Areas*. The *Common Areas* may include but shall not be limited to open space; maintenance and drainage areas; *Facilities*; easements; alleys; *Thoroughfares*; parking lots; *Community Ways*; street lighting; signs; lagoons; ponds; wetlands; rights-of-way; and the area between any property line of an owner and the mean high water mark of any adjoining river tidal creek, marsh, or other water body. The designation of any land and/or improvements as a *Common Area* shall not mean or imply that the public at large acquires any easement of use or enjoyment therein.

“*Community Way*” means a walkway of any surface type (paved or unpaved), bike trail, leisure trail, or walking trail designed for pedestrian or bike traffic.

“*Comprehensive Plan*” means the Charleston County Comprehensive Plan, adopted pursuant to sections 6-29-510 to -540 of the South Carolina Code, as well as the official map of Charleston County, adopted pursuant to sections 6-7-1210 to -1280 of the South Carolina Code.

“*Corps*” means the United States Army Corps of Engineers.

“*County*” means Charleston County, a political subdivision of the State of South Carolina.

“*County Council*” means the County Council of Charleston County, South Carolina.

“*County Ordinances*” means the Code of Ordinances of Charleston County, South Carolina.

“*Covenants*” means and refers to one or more declaration(s) of covenants, conditions, and restrictions encumbering all or portions of the *Real Property* that have been or will be recorded by the *Property Owner*.

“*Development*” means the planning for or carry out of a building activity, demolition, reclamation of on-site materials, the making of a material change in the use or appearance of any structure or property,

or the dividing of land into two or more parcels, and is intended by the *Parties* to include all further uses of, activities upon, or changes to the *Real Property* as are authorized by the *Agreement*. “*Development*,” as designated in a land or *Development Permit*, includes the planning for and all other activity customarily associated with it unless otherwise specified. When appropriate to the context, “*Development*” refers to the planning for or the act of developing or to the result of *Development*. Reference to a specific operation is not intended to mean that the operation or activity, when part of other operations or activities, is not *Development*. Reference to particular operations is not intended to limit the generality of this term.

“*Development Parcel*” means any parcel of land on which *Development* may occur, including platted *Lots* and unplatted parcels, but excluding public or private street rights-of-way.

“*Development Permit*” includes a building permit, zoning permit, construction permit, subdivision or plat approval, rezoning certification, special exception, variance, certificate of occupancy or any other official action of *Local Government* having the effect of permitting or approving the *Development* or use of real property.

“*DHEC*” means the Department of Health and Environmental Control, as established pursuant to section 44-1-20 of the South Carolina Code.

“*Diameter Breast Height*” or “*DBH*” means the total diameter, in inches, of a tree trunk or trunks measured at a point four and one half feet above existing grade (at the base of the tree). In measuring *DBH*, the circumference of the tree shall be measured with a standard diameter tape, and the circumference shall be divided by 3.14.

“*Dock*” or “*Pier*” means a structure built over and/or floating on water used to provide access to water and/or for the mooring of boats or other watercraft. A *Dock* or *Pier* may contain commercial uses as permitted by *DHEC* and shall constitute a water-dependent use.

“*DOT*” means the South Carolina Department of Transportation, as established in section 57-1-20 of the South Carolina Code.

“*Dwelling Unit*” means one or more rooms, designed, occupied or intended for permanent occupancy as a separate living quarter, with cooking, sleeping and sanitary facilities contained therein. The term “*Dwelling Unit*” does not include *Guest Rooms*, *Villas*, *Accessory Dwelling Units*, or accessory buildings or structures.

“*Facilities*” means major capital or community improvements including, but not limited to, transportation, sanitary sewer, solid waste, drainage, potable water, electrical service, cable television, high speed internet access, and telephone service.

“*Golf Course*” means a tract or tracts of land laid out for up to thirty-six (36) holes for playing the game of golf and improved with tees, greens, fairways, and hazards, and that may include club houses, driving ranges, training facilities, maintenance facilities, and shelters. *Golf Courses* shall constitute *Active Recreation Areas*.

“*Grand Tree*” means any live, healthy tree with a *DBH* of 24 inches or greater, with the exception of pine tree, laurel oak, water oak, and sweet gum tree species.

“*Gross Leasable Area*” or “*GLA*” means floor area devoted to a use designated as such in the table of uses set forth in the *Plan*. *GLA* does not include public or common areas, such as parking lots, utility rooms and stairwells, in a building or on a *Lot* otherwise devoted to a use designated as *GLA* in the *Plan*.



GLA does not include a community amenity center, such as a fitness club/aquatic center. For the purpose of this provision, the term “floor area” shall have the definition specified in Chapter 12 of the ZLDR on the *Effective Date*. Commercial uses on *Docks* or piers shall contribute to entitlement densities for *GLA*.

“*Ground Floor Level*” means *Natural Ground* or the lowest floor elevation for structures as set forth in the *County’s* flood management ordinance, as amended, whichever is higher; provided, however, that *Ground Floor Level* shall not exceed 14 feet above *Natural Ground*. This definition shall not be construed to prevent an owner from constructing his first finished floor higher than *Ground Floor Level*; provided, however, *Building Height* shall be measured from *Ground Floor Level*.

“*Guest Room*” means a room or suite designed for temporary occupancy by one (1) or more people in a single unit on a daily, weekly, monthly, or seasonal basis. A *Guest Room* may be individually owned or owned as a “time-share” unit without respect to other *Guest Rooms*. A *Guest Room* may be located within a *Hotel*, *Inn*, *Villa* or *Bed and Breakfast*. A *Guest Room* shall contribute to the *Guest Room* entitlement densities, and no others, in the *Agreement*.

“*Hotel*” means a lodging-type building or group of buildings offering twenty-five (25) or more *Guest Rooms*, with or without meal service, on a daily, weekly, monthly, or seasonal basis. The *Property Owner* shall have the vested right to develop up to two (2) *Hotels* on the *Real Property*. The amount of *Guest Rooms* permitted in a *Hotel* shall be limited only by the total *Guest Room* entitlement densities in the *Agreement*. A *Hotel* may be owner-occupied and/or staff-occupied. Whether or not owner- or staff-occupied, a *Hotel* shall contribute to *Hotel* and *Guest Room* entitlement densities, and no others, in the *Agreement*.

“*Housing for the Workforce*” means all *Affordable Housing* and all dwelling units designed to accommodate persons employed on the *Real Property*, persons employed on Kiawah Island, persons employed on Seabrook Island, and/or persons employed within a ten (10) mile radius of the *Real Property*.

“*Inn*” means a lodging-type building or group of buildings offering thirteen (13) to twenty-four (24) *Guest Rooms*, with or without meal service, on a daily, weekly, monthly, or seasonal basis. An *Inn* may be owner-occupied and/or staff-occupied.

“*Land Development Regulations*” means ordinances and regulations enacted by the appropriate governing body for the regulation of any aspect of *Development* and includes, but is not limited to, *Local Government* zoning, rezoning, subdivision, building construction, occupancy, aesthetic, road, or sign regulations or any other regulations controlling the *Development* or use of property.

“*Laws*” means all ordinances, resolutions, regulations, comprehensive plans, *Land Development Regulations*, policies and rules, custom and usage (formal or informal) adopted by a *Local Government* affecting the *Development* of property and includes laws governing permitted uses of the property, governing density, and governing design, improvement, and construction standards and specifications, except as provided in section 6-31-140(A) of the South Carolina Code.

“*Local Government*” means any county, municipality, special district, or governmental entity of the state, county, municipality or region established pursuant to law which exercises regulatory control over, and grants *Development Permits* for land *Development* or which provides public *Facilities*. The *County* is a *Local Government*.

“*Lot*” means *Development Parcel* identified in a *Subdivision Plat* recorded in the Office of the Register of Mesne Conveyances for Charleston County, South Carolina.

“*Lot Line, Front*” means the lot line separating a *Lot* from the *Thoroughfare* that is used as the primary access point to the *Lot*. In cases where a *Lot* abuts open space, including passive recreation areas, on one side, and a *Thoroughfare* that is used as the primary access on the opposite side, the Property Owner may designate the lot line abutting the open space as the *Front Lot Line* and the opposite lot line (abutting the *Thoroughfare*) as the rear lot line. In cases where a *Lot* abuts more than one *Thoroughfare*, the *Property Owner* may designate the *Front Lot Line* pursuant to Section 6.1.c herein.

“*Mixed Use*” means a use, structure, or parcel containing both residential and non-residential elements.

“*Natural Ground*” means average elevation of a *Lot* or *Development Parcel* prior to *Development* activity.

“*OCRM*” means *DHEC*’s Office of Ocean and Coastal Resource Management.

“*OCRM Critical Line*” means the critical area line defined by *OCRM*.

“*Parties*” are the *Property Owner* and the *County*. When used herein with reference to a specific *Tract*, *Development Parcel*, *Lot*, or other portion of the *Real Property*, *Parties* shall mean and refer to the *County* and that specific person or entity that has legal title to such *Tract*, *Development Parcel*, *Lot*, or other portion of the *Real Property*. If portions of the *Agreement* apply to one or more, but not all, of the entities or persons comprising the *Property Owner*, those particular parties may be separately referred to herein.

“*Passive Recreation Area*” means areas in and located due to the presence of a particular natural or environmental setting and that may include conservation lands or waters providing for both active and passive types of resource-based outdoor recreation activities that are less formalized or program-oriented than activity-based recreation. Resource-based outdoor recreation means and refers to activities requiring a natural condition such as boating, fishing, camping, nature trails and nature study. A farm or other agricultural use shall be considered a *Passive Recreation Area*. *Passive Recreation Areas* shall constitute open space.

“*Pervious Cover*” means water bodies, as well as land that permits the absorption of storm water into the ground. *Pervious Cover* may include, but is not limited to *Community Ways*, streets, roads, alleys, parking lots and driveways which are pervious to storm water.

“*Plan*” means the Kiawah River Planned Development District Plan. The *Plan* is attached to the *Agreement* and incorporated therein by reference. The *Plan* shall constitute a vested right of the *Property Owner* during the term of the *Agreement* (including any extensions or renewals thereof).

“*Planning Commission*” means the Charleston County Planning Commission as established under Article 2.2 of the *ZLDR*.

“*Planning Director*” means the Director of the Planning Department of Charleston County or the authorized designee or representative of the Director.

“*Project*” is the *Development* that has occurred and will occur on the *Real Property*.

“*Property Owner*” means Kiawah River Investment, LLC; together with all subsidiaries thereof and other entities, which may have a legal interest on the date of execution hereof in any of the *Real Property* described in Paragraph 4 of the *Agreement* and includes their successors in interest, successors in title (as to any portion of the *Real Property*), and/or assigns by virtue of assignment or other instrument

compliant with the *Agreement*. When used herein with reference to a specific *Tract*, *Development Parcel*, *Lot*, or other portion of the *Real Property*, “*Property Owner*” shall mean and refer to that specific person or entity that has legal title to such *Tract*, *Development Parcel*, *Lot*, or other portion of the *Real Property*. The *Property Owner* warrants that there are no other legal or equitable owners of the *Real Property* on the *Effective Date*.

“*Protected Trees*” means any tree on a parcel with a diameter breast height of eight inches or greater prior to development and all trees within required buffers or required landscape areas. Limited removal is allowed only when specified by the provisions of this Ordinance.

“*PSC*” means the Public Service Commission, as established pursuant to section 58-3-10 of the South Carolina Code, as amended.

“*Real Property*” is the *Real Property* referred to in Paragraph 4 of the *Agreement* and includes any improvements or structures customarily regarded as part of real property.

“*Retirement Housing*” means the use of a site for housing that qualifies under The Housing for Older Persons Act (HOPA) for the senior housing exemption from the anti-discrimination provisions related to familial status of Title VIII of the Civil Rights Act of 1968 (the Federal Fair Housing Act), as amended by the Fair Housing Amendments Act of 1988 (the Fair Housing Act). No *Retirement Housing* shall be used as a *Short-Term Rental Property*.

“*Retirement Housing Unit*” means a single housing unit intended for occupancy on a site that is designated as *Retirement Housing* that may be housing comprised of single family detached, single family attached, duplex, or multifamily units or any combination of these. ). No *Retirement Housing Unit* shall be used as a *Short-Term Rental Property*.

“*Setback*” means any required minimum distance from a *Lot* line or street right-of-way that establishes an area within which a structure shall not be erected. Any *Laws* applicable to *Setbacks* and exceptions to *Setbacks* are set forth in the *Plan*, which shall control in lieu of *Laws* applicable to *Setbacks* and exceptions to *Setbacks* in the *ZLDR* or other *Laws*.

“*Short-Term Rental Property*” or “*STRP*” means a residential dwelling or any part thereof that is offered, advertised, or provided to short-term rental tenants (excluding family members) for a fee or any form of compensation, for intervals of 29 days or less during a calendar year. No *Guest Room*, including a *Villa*, shall constitute a *Short-Term Rental Property*, and *Short-Term Rental Properties* shall not count against the cap on the maximum number of *Guest Rooms*.

“*Subdivision Plat*” means a recorded graphic description of property prepared and approved in compliance with the *ZLDR*, as modified by this *Agreement*.

“*Thoroughfare*” means a way for use by vehicular and pedestrian traffic and to provide access to *Lots* and open spaces, consisting of vehicular lanes and their adjacent rights-of-way.

“*Tract*” means and refers to composite parcels of the *Real Property* that have yet to be subdivided.

“*Villa*” means a lodging-style building offering one or more bedrooms and other areas (such as cooking and sanitary facilities) operating as a single unit, with or without meal service, on a daily, weekly, monthly, or seasonal basis. A *Villa* may be owned and temporarily occupied by an individual or entity without respect to ownership of other *Villas*. A *Villa* shall constitute one (1) *Guest Room* and shall contribute to *Guest Room* entitlement densities, and no others, in the *Agreement*.

“Zoning and Land Development Regulations” or “ZLDR” means and refers to the Zoning and Land Development Regulations of Charleston County, South Carolina.

## **SECTION 4 - USES**

Exhibit 4.1 illustrates the areas for the *Development* on the *Real Property*, including a general delineation of the allowed uses within each area. The configuration and location of these areas for *Development* are conceptual approximations only. Based on market demand and other considerations, the *Development* which may actually occur on the *Real Property* is subject to change within the legal guidelines of the *Agreement* and the *Plan* and not the illustrations in Exhibit 4.1. The conceptual illustrations and maps attached hereto are therefore not commitments or representations to the *County* or any third party.

### **4.1 Permitted Principal Uses**

A. Table of Uses: The Table of Uses attached hereto as Table 4.1 shall control the uses permitted, prohibited, and permitted with conditions on the *Real Property* or designated portions thereof. All of the uses listed in Table 4.1 shall be as defined in Chapter 12 of the *ZLDR*, as it exists on the *Effective Date*, unless specific definitions have been supplemented or modified in section 3 of this *Plan*.

B. Use Types: The following use types shall control Table 4.1:

1. Allowed Uses: An “A” indicates that a use type is allowed by right on the *Real Property* or a portion thereof. A special exception shall not be required.

2. Conditional Uses: A “C” indicates that a use type is allowed on the *Real Property* or a portion thereof only if it complies with use-specific conditions, as set forth further in the *Plan*. A cross-reference to the applicable use-specific conditions can be found in the “Conditions” column of Table 4.1. The number provides a cross-reference to a use-specific condition contained in Article 6.4 of Appendix D, which is a red-line of the *ZLDR*. The conditions set forth herein shall control use-specific conditions on the *Real Property*. A conditional use shall be permitted upon the *Property Owner’s* compliance with the applicable conditions herein.

3. New or Unlisted Uses: The *Planning Director* shall be authorized to make use determinations whenever there is a question regarding the category of use based on the definitions contained in Chapter 12 of the *ZLDR*, as it exists on the *Effective Date* and as specific definitions are modified or supplemented herein.

C. Mixed Uses: The *Property Owner* may utilize different permitted land uses on a particular *Lot* or *Development Parcel*.

D. Hunting: Hunting shall be permitted on any portion of the *Real Property* provided all applicable permits and approvals are obtained.

### **4.2 Accessory Uses**

*Accessory Uses* shall be permitted, permitted with conditions, or prohibited in accordance with Article 6.5 of Appendix D, which is a red-line of the *ZLDR*.

### **4.3 Temporary Uses**

1. Temporary Accessory Dwelling Units: The *ARB* may allow, allow with conditions, or prohibit temporary accessory dwelling units, such as dormitory-style farm or other labor housing, or other *Accessory Dwelling Units* on the *Real Property* or any portion thereof. The precise configuration, location and amount of temporary accessory dwelling units permitted on the *Real Property* or any portion thereof shall be in the *ARB*'s discretion.

2. Temporary Modular Units: The *ARB* may allow, allow with conditions, or prohibit temporary modular units for recreational, construction, commercial, retail, office or other uses (excluding residential uses) on the *Real Property* or any portion thereof. The precise configuration, location and amount of temporary modular units permitted on the *Real Property* or any portion thereof shall be in the *ARB*'s discretion. Temporary modular units shall not count toward any caps within the *Agreement*.

3. Temporary Sales: The *ARB* may permit, permit with conditions, or prohibit temporary sales on the *Real Property* or any portion thereof.

4. Assemblies and Special Events: The *ARB* may permit, permit with conditions, or prohibit temporary public or private assembly use and events of public or private interest, such as cultural events, weddings, outdoor concerts and parking for special events on the *Real Property* or any portion thereof. The *ARB* may promulgate, modify and enforce any regulations pertaining to assemblies and special events in applicable *Covenants*, and may impose such conditions on its approval of an individual special event to control noise, parking, or other aspects of the special event as it deems appropriate. Such special events on the *Real Property* owned by the declarant under the *Covenants*, the *Association*, or a *Hotel* or *Inn*, or the owner of the chapel on the *Real Property* shall be considered an *Accessory Use* and shall not require a zoning permit, special exception, conditional use permit, or other further approval from the County nor have a cap on the number in a calendar year, provided that daily event attendance shall be limited to no more than 750 people. The *Property Owner* shall provide County Sheriff's Office, County EMS, St. Johns Fire Department, and the *Planning Director* a written schedule of upcoming special events on a monthly basis for informational purposes. The *Property Owner* shall obtain County Building Services approval for any temporary structures for such special events that require inspection and approval. The provisions of Art. 6.7 of the *ZLDR* set forth in Exhibit 4.2 shall apply to special events on other *Lots* on the *Real Property* where special events are not an *Accessory Use*.

5. Construction Facilities: The *ARB* may permit, permit with conditions, or prohibit accessory construction facilities on any *Development Parcel, Tract* or other portion of the *Real Property*.

6. Short-Term Rentals: *Short-Term Rental Properties* shall be allowed in accordance with the standards and procedures set forth in Exhibit 4.3 and in accordance with the *Covenants*.

**4.4 Areas Designated for Future Use**: All areas designated for future expansion or not intended for immediate improvement or development shall remain in a natural state until such time as development permits are approved; provided, however, with respect to this provision, the "natural state" of the property shall include those uses permitted under base zoning.

**Table 4.1-Table of Uses**

<b>Use Designation</b>	<b>Uses</b>	<b>Classification or Conditions</b>
<b>Agricultural</b>	Animal Aquaculture, including Finfish Farming, Fish Hatcheries, or Shrimp or Shellfish Farming (in ponds)	
	Apiculture (Bee Keeping)	A
	Horse or Other Animal Production	
	Concentrated Animal Feeding Operations	
	Greenhouse Production or Food Crops Grown under Cover	A
	Horticultural Production or Commercial Nursery Operations	A
	Hydroponics	A
	Crop Production	A
	Bona Fide Forestry Operations	C, §6.4.23
	Lumber Mills, Planing, or Saw Mills, including chipping and mulching	
	Stable	C, §6.4.20
	Agricultural Processing	
	Agricultural Sales or Services	A
	Roadside Stands, including the sale of Sweetgrass Baskets	C, §6.4.58
<b>Residential</b>	Congregate Living for the elderly	A
	Duplex	A, Note 6 to Table 6.1
	Dwelling Group	C, §6.4.7
	Multi-Family, including Condominiums or Apartments	A, Note 6 to Table 6.1
	Retirement Housing	A
	Single Family Attached, also known as Townhouses or Rowhouses	C, §6.4.2, Note 6 to Table 6.1
	Single Family Detached	A
	Short-Term Rentals, Limited Home Rental (LHR)	C. Exhibit 4.3
	Short-Term Rentals, Extended Home Rental (EHR)	C. Exhibits 4.3 and 4.4 to the <i>Plan</i>
	Workforce Housing	A
	Affordable Housing	A
<b>Civic/Institutional</b>	Court of Law	A <sup>1</sup>
	Safety Services, including Emergency Medical or Ambulance Service, Fire Protection and Police Protection	A

<sup>1</sup> An asterisk (\*) indicates the use will contribute to GLA entitlement densities, and no others, in the Agreement.

	Adult Day Care Facilities	C*, §6.4.29
	Child Day Care Facilities, including Group Day Care Home or Child Care Center	C*, §6.4.29
	Family Day Care Home	A*
<b>Death Care Services</b>	Cemeteries or Crematories	A
	Funeral Services, including Funeral Homes or Mortuaries	A*
<b>Educational Services</b>	Pre-School or Educational Nursery	C, §6.4.29
	School, Primary	A
	School, Secondary	A
	College or University Facility	A*
	Business or Trade School	A*
	Personal Improvement Education, including Fine Arts Schools or Automobile Driving Schools	A*
<b>Health Care Services</b>	Medical Office or Outpatient Clinic, including Psychiatrist Offices, Abortion Clinics, Chiropractic Facilities, or Ambulatory Surgical Facilities	A*
	Convalescent Services, including Nursing Homes	A*
	Public or Community Health Care Centers	A*
	Health Care Laboratories, including Medical Diagnostic or Dental Laboratories	A*
	Home Health Agencies	A*
	Hospitals, including General Hospitals, Specialized Hospitals, Chronic Hospitals, Psychiatric or Substance Abuse Hospitals, or Hospices	A*
<b>Museums, Historical Sites and Similar Institutions</b>	Historical Sites (Open to the Public)	A
	Libraries or Archives	A
	Museums	A*
	Nature Exhibition	C, §6.4.10
	Botanical Gardens	A*
<b>Postal Service</b>	Postal Service	A
<b>Recreation and Entertainment</b>	Community Recreation, including Recreation Centers	A
	Community Amenity Center, such as a fitness club/aquatic center	A



	Fishing or Hunting Guide Service (commercial)	A*
	Fishing or Hunting Lodge (commercial)	A*
	Golf Courses or Country Clubs	C, §6.4.50
	Parks and Recreation	A
	Recreation and Entertainment, Indoor, including Bowling Centers, Ice or Roller Skating Rinks, Indoor Shooting Ranges, Theaters, or Video Arcades	C*, §6.4.11
	Recreation and Entertainment, Outdoor, including Amusement Parks, Fairgrounds, Miniature Golf Course, Race or Go-Cart Tracks, or Sports Arena	C*, §6.4.11
	Golf Driving Ranges	C*, §6.4.11
	Outdoor Shooting Ranges	C*, §6.4.11
	Recreation or Vacation Camps	C*, §6.4.11
	Equestrian	C, §6.4.11
<b>Religious, Civic, Professional and Similar Organizations</b>	Business, Professional, Labor or Political Organizations	A*
	Social or Civic Organizations, including Youth Organizations	A*
	Religious Assembly	A
	Social Club or Lounge	A
<b>Utility and Waste-Related Uses</b>	Utility Service, Major	C, §6.4.17 §6.4.21
	Electric or Gas Power Generation Facilities	C, §6.4.17 §6.4.21
	Utility Substation	C, §6.4.21
	Electrical or Telephone Switching Facility	C, §6.4.21
	Sewage Collector or Trunk Lines	C, §6.4.21
	Sewage Disposal Facilities	C, §6.4.17
	Utility Pumping Station	C, §6.4.21
	Water Mains	C, §6.4.21
	Water or Sewage Treatment Facilities	C, §6.4.21
	Water Storage Tank	C, §6.4.21
	Utility Service, Minor	C, §6.4.31
	Electric or Gas Power Distribution	C, §6.4.31
	Sewage Collection Service Line	C, §6.4.31
	Water Service Line	C, §6.4.31
	Septic Tank Installation, Cleaning or Related Services	C, §6.4.31
<b>Accommodations</b>	Hotels	A
	Inns	A
	Bed and Breakfasts	C, §6.4.4

	Villas	A
<b>Animal Services</b>	Kennel	C*, §6.4.54
	Pet Stores or Grooming Salons	A*
	Small Animal Boarding (enclosed building)	A*
	Veterinary Services	A*
<b>Commercial</b>	Banks	A*
-Financial	Financial Services, including Loan or Lending Services, Savings and Loan Institutions, or Stock and Bond Brokers	A*
-Food Services and Drinking Places	Bar or Lounge (Alcoholic Beverages), including Taverns, Cocktail Lounges, or Member Exclusive Bards or Lounges	A*
	Catering Service	A*
	Restaurant, Fast Food, including Snack or Non-Alcoholic Beverage Bars	A*
	Restaurant, General, including Cafeterias, Diners, Delicatessens, or Full Service Restaurants	A*
-Information and Industries	Communication Services, including Radio or Television Broadcasting Studios, News Syndicates, Film or Sound Recording Studios, Telecommunication Service Centers, or Telegraph Service Offices	A*
	Communication Towers	C*, §6.4.5
	Data Processing Services	A*
	Publishing Industries, including Newspaper, Periodical, Book, Database, or Software Publishers	A*
-Offices	Administrative of Business Office, including Bookkeeping Services, Couriers, Insurance Offices, Personnel Offices, Real Estate Services, Secretarial Services, or Travel Arrangement Services	A*
	Government Office	A*
	Professional Office, including Accounting, Tax Preparation, Architectural, Engineering, or Legal Services	A*
-Other Non-Residential Development	Convention Center or Visitors Bureau	A*
	Office/Warehouse Complex	A*
	Off-Premises Sign (e.g. Billboard)	C*, <u>See</u> section 13.2 of the <i>Plan</i>
	Special Trade Contractors (Offices/Storage)	C*, §6.4.36
	Building Equipment or Other Machinery Installation Contractors	C*, §6.4.36
	Carpentry Contractors	C*, §6.4.36
	Concrete Contractors	C*, §6.4.36
	Drywall, Plastering, Acoustical or Insulation Contractors	C*, §6.4.36
	Electrical Contractors	C*, §6.4.36

	Excavation Contractors	C*, §6.4.36
	Masonry or Stone Contractors	C*, §6.4.36
	Painting or Wall Covering Contractors	C*, §6.4.36
	Plumbing, Heating or Air Conditioning Contractors	C*, §6.4.36
	Roofing, Siding or Sheet Metal Contractors	C*, §6.4.36
	Tile, Marble, Terrazzo or Mosaic Contractors	C*, §6.4.36
<b>Parking</b>	Parking Lots	A
	Parking Garages	A
<b>Rental and Leasing Services</b>	Charter Boat or Other Recreational Watercraft Rental Services	C*, Article 5.3
	Construction Tools or Equipment Rentals	A*
	Consumer Goods Rental Centers	A*
	Consumer Goods Rental Service, including Electronics, Appliances, Formal Wear, Costume, Video or Disc, Home Health Equipment, Recreational Goods, or other Household Items	C*, §6.4.38
	Self-Service Storage/Mini-Warehousing (Subject to Note 1)	C*, §6.4.16
	Boat/RV Storage (Subject to Note 1)	A*
<b>Repair and Maintenance Services</b>	Boat Yard	C*, §6.4.39 Article 5.3
	Repair Service, Consumer, including Appliance, Shoe, Watch, Furniture, Jewelry, or Musical Instrument Repair Shops	C*, §6.4.40
	Repair Service, Commercial, including Electric Motor Repair, Scientific or Professional Instrument Repair, Tool Repair, Heavy Duty Truck or Machinery Servicing and Repair, Tire Retreading or Recapping, or Welding Shops	A*
	Vehicle Repair Consumer, including Muffler Shops, Auto Repair Garages, Tire or Break Shops, or Body or Fender Shops	C*, §6.4.22
	Vehicle Service, Limited, including Automotive Oil Change or Lubrication Shops, or Car Washes	C*, §6.4.22
<b>Retail Sales</b>	Nonstore Retailers	A*
	Direct Selling Establishments	A*
	Electronic Shopping or Mail-Order Houses	A*
	Fuel (except liquefied petroleum gas) Dealers, including Heating Oil Dealers	A*
	Liquefied Petroleum Gas (Bottled Gas) Dealers	C*, §6.4.41
	Vending Machine Operators	A*
	Building Materials or Garden Equipment and Supplies Retailers	C*, §6.4.42
	Hardware Stores	C*, §6.4.42
	Home Improvement Centers	A*
	Garden Supply Centers	C*, §6.4.42

	Outdoor Power Equipment Stores	C*, §6.4.42
	Paint, Varnish or Wallpaper Stores	C*, §6.4.42
	Food Sales, including Grocery Stores, Meat Markets or Butchers, Retail Bakeries, or Candy Shops	A*
	Liquor, Beer or Wine Sales	A*
	Retail Sales or Services, General	A*
	Art, Hobby, Musical Instrument, Toy, Sporting Goods, or Related Products Store	A*
	Clothing, Piece Goods, Shoes, Jewelry, Luggage, Leather Goods or Related Products Store	A*
	Convenience Stores	A*
	Drug Stores or Pharmacies	A*
	Duplicating or Quick Printing Services	A*
	Electronics, Appliance or Related Products Store	A*
	Florist	A*
	Furniture, Cabinet, Home Furnishings or Related Products Store	A*
	Pawn Shop	A*
	Private Postal or Mailing Service	A*
	Tobacconist	A*
	Sweetgrass Basket Stands	C*, §6.4.58
	Warehouse Clubs or Superstores	A*
	Service Stations, Gasoline (with or without convenience stores)	A*
	Motorcycle, Watercraft, or Recreational Vehicle Dealers	A*
	Vehicle Parts, Accessories or Tire Stores	A*
<b>Retail or Personal Services</b>	Consumer Convenience Service	A*
	Automated Bank/Teller Machines	A*
	Drycleaners or Coin-Operated Laundries	A*
	Drycleaning or Laundry Pick-up Service Stations	A*
	Locksmith	A*
	One-Hour Photo Finishing	A*
	Tailors or Seamstresses	A*
	Hair, Nail or Skin Care Services, including Barber Shops or Beauty Salons	A*
	Personal Improvement Service, including Dance Studios, Health or Physical Fitness Studios, Photography Studios, or Reducing Studios, excluding Swim Club	A*
	Services to Buildings or Dwellings, including Carpet or Upholstery Cleaning, Exterminating, or Janitorial services	A*
	Landscaping and Horticultural Services to commercial, industrial, or institutional buildings and residences	A*

<b>Water Dependent Uses</b>	Boat Ramps	C, §5.3.4 Article 5.3
	Dock or Pier	C, §5.3.3 Article 5.3
	Dry Stack Storage for Watercraft	C*, Article 5.3
<b>Recycling Services</b>	Recycling Center	A*
	Recycling Collection, Drop-Off	A*
<b>Transportation</b>	Sightseeing Transportation, Land or Water	C*, Article 5.3
	Taxi or Limousine Service	A*
	Urban Transit Systems	A*
	Water Transportation, including Coastal or Inland Water Passenger Transportation	C*, Article 5.3

Notes to Table 4.1:

1. These uses must be exclusively for the use of the owners and tenants of any portion of the *Real Property* and of the contractors working on the *Real Property*. Only 50% of the floor area devoted to these uses shall count against *GLA*.

## SECTION 5 – ENTITLEMENT DENSITIES

### 5.1 Entitlements

Exhibit 5.1 illustrates the *Development* the *Property Owner* may institute on the *Real Property* pursuant to the *Plan*. The configuration and location of the individual elements of the *Plan* are conceptual approximations only. Based on market demand and other considerations, the *Development* which may actually occur on the *Real Property* is subject to change within the legal guidelines of the *Agreement* and the *Plan* and not the illustrations in Exhibit 5.1. The conceptual illustrations and maps attached hereto are therefore not commitments or representations to the *County* or any third party. The *Property Owner* shall have a vested right to the following entitlement densities on the *Effective Date*:

1. Dwelling Units: The *Property Owner* shall have the vested right to develop up to 1,285 *Dwelling Units* on the *Real Property*, not including those *Dwelling Units* that are *Retirement Housing Units*, and may determine the precise type, configuration and location of *Dwelling Units*, provided that:

- The *Property Owner* may not develop more than 580 *Dwelling Units* on the portion of the *Real Property* formerly zoned AG-8 which is designated as Rural Residential in the *Plan*; and

The *Property Owner* may not develop more than 80 *Dwelling Units* on the portion of the *Real Property* delineated in the *Plan* as the Bohicket Station.

Table 5.1 illustrates the maximum and average residential densities for each residential use; the maximum total acreage of each residential unit requested (including *Housing for the Workforce* units); and the maximum allowable number of each type of residential unit requested (including *Housing for the Workforce* units).

2. Retirement Housing. The *Property Owner* shall have a vested right to develop up to 160 *Retirement Housing Units*. These *Retirement Housing Units* shall be in addition to the other 1,285 *Dwelling Units* vested for the *Real Property*. *Retirement Housing Units* shall count against the cap of 450 *Guest Rooms* at the equivalence of 2.0 *Retirement Housing Units* for each *Guest Room*, with any fractions rounded up to the next whole number of *Guest Rooms*. *Retirement Housing Units* may be located only in the River Village and not in the Rural Residential or Bohicket Station.

3. Housing for the Workforce: “*Housing for the Workforce*” means all *Affordable Housing* and all dwellings designed to accommodate persons employed on the *Real Property*, persons employed on Kiawah Island, persons employed on Seabrook Island, and/or persons employed within a ten (10) mile radius of the *Real Property*. Of the 1,285 total *Dwelling Units*, 117 shall constitute *Housing for the Workforce* units. Further, 18 of the *Housing for the Workforce* units shall constitute *Affordable Housing*. The *Property Owner* may determine the precise type, configuration and location of *Housing for the Workforce* and *Affordable Housing* on the *Real Property*, in compliance with the *Agreement* and the *Plan*; provided, however, that the *Housing for the Workforce* units and *Affordable Housing* units shall be located throughout the *Real Property* and the *Dwelling Unit* caps described in number 1, above, are not exceeded.

4. Commercial and Institutional Entitlement Densities: “*Gross Leasable Area*” or “*GLA*” means floor area devoted to a use designated as such in Table 4.1. *GLA* does not include public or common areas, such as parking lots, utility rooms and stairwells, in a building or on a *Lot* otherwise devoted to a use designated as *GLA* in Table 4.1. For the purpose of this provision, the term “floor area” shall have the definition specified in Chapter 12 of the *ZLDR* on the *Effective Date*. The *Property Owner* shall have the vested right to develop up to 80,000 square feet of *GLA* on the *Real Property*. This *GLA* shall constitute a

vested right on the *Effective Date*. The *Property Owner* may determine the precise configuration and location of *GLA* on the *Real Property*, in compliance with the *Agreement* and the *Plan*.

5. Lodging: The *Property Owner* shall have a vested right to develop up to 450 *Guest Rooms* on the *Real Property*, which may be dispersed among *Villas*, *Inns*, *Beds and Breakfasts*, and/or up to two (2) *Hotels*. The *Property Owner* shall have a vested right to develop up to two (2) *Hotels* on the *Real Property*; provided, however, the total number of *Guest Rooms* and *Villas* on the *Real Property* may not exceed 450. The *Property Owner* may determine the precise type, configuration and location of *Hotels*, *Villas*, and *Guest Rooms* on the *Real Property*, in compliance with the *Agreement* and the *Plan*. *Guest Rooms*, *Hotels*, and *Villas* shall not count against any of the other entitlement densities in the *Agreement*.

6. Golf Course: “*Golf Course*” means a tract or tracts of land laid out for up to thirty-six (36) holes for playing the game of golf and improved with tees, greens, fairways, and hazards, and that may include club houses, driving ranges, training facilities, maintenance facilities, and shelters. *Golf Courses* shall constitute *Active Recreation Areas*. The *Property Owner* shall have the right to develop a portion of the *Real Property* for use as a *Golf Course* or *Golf Courses*, including up to 36 holes, any or all of which the *Property Owner* may develop as public or private, provided, however, that the *Golf Course(s)* shall not comprise the entire area designated as open space. The *Property Owner* shall have the right to build full-service club houses, practice ranges, training facilities and maintenance facilities accessory to the *Golf Course(s)* on the *Real Property* in any location the *Property Owner* deems appropriate, in compliance with the *Agreement* and the *Plan*. The *Property Owner* may determine the precise configuration and location of the *Golf Course(s)* and its/their *Accessory Uses*, in compliance with the *Agreement* and the *Plan*. The *Golf Course(s)*, including club houses, pro shop and other *Accessory Uses*, shall not count against any of the other entitlement densities in the *Agreement*.

**Table 5.1 – Table of Proposed Land Uses**

<b>Permitted Uses</b>	<b>Not to Exceed ("nte")</b>	<b>Minimum Acreage</b>	<b>Maximum Acreage</b>	<b>Maximum Density</b>	<b>Maximum Floor Area Ratio</b>
<b>Single Family Detached</b>	nte 1285		550	4/acre	
<b>Single Family-Attached</b>	nte 320		50	10/acre	
<b>Multi-Family</b>	nte 320		50	20/acre	
<b>Housing for the Work Force</b>	up to 117		40	20/acre	
<b>Retirement Housing</b>	nte 160		50	Note 6	
<b>All Residential</b>	nte 1285 excluding <i>Retirement Housing</i>		600	1.01/acre	
<b>Commercial</b>	nte 80,000 <i>GLA</i>		12		2
<b>Self-Service Storage/Mini- Warehousing, Boat/RV Storage</b>	50% of the floor area shall count against <i>GLA</i>		Subject to 12 acre maximum for Commercial		
<b>Accommodations</b>	nte 450 <i>Guest Rooms</i>		50		2
<b>Open Space</b>		635.31 acres			



The following standards shall apply to Table 5.1 and the location of densities within the *Development*:

1. As used in Table 5.1, “Density” refers to the number of *Dwelling Units* per unit of land area. Density is calculated by dividing the number of *Dwelling Units* on a site by the gross area (in acres) of highland (including freshwater wetlands) of the site on which the *Dwelling Units* are located, provided that all other requirements of the *Plan* are met.
2. The *Property Owner* may not exceed 50,000 square feet of *GLA* on the portion of the *Real Property* delineated in the *Plan* as the Bohicket Station.
3. The *Property Owner* may not exceed 80 *Dwelling Units* on the portion of the *Real Property* delineated in the *Plan* as the Bohicket Station.
4. The *Property Owner* may not exceed 580 *Dwelling Units* on the portion of the *Real Property* formerly zoned AG-8 which is also designated in the *Plan* as Rural Residential.
5. *Retirement Housing Units* shall count against the cap of 450 *Guest Rooms* with 2.0 *Retirement Housing Units* being equivalent to one (1) *Guest Room*, or stated differently, each *Retirement Housing Unit* equals .5 *Guest Room*. This conversion factor for *Retirement Housing* is based on accepted national standards for traffic counts that demonstrate that the vehicle trips per day for a *Retirement Housing Unit* are fewer than 50% of those for a *Guest Room*. The total number of *Retirement Housing Units* shall be rounded up to the nearest whole number of *Guest Rooms* for purposes of the nte cap above. *Retirement Housing Units* may be located only in the River Village and not in the Rural Residential or Bohicket Station.
6. The maximum density for *Retirement Housing* shall depend on the housing type and be subject to the same maximum density limitations for that particular residential housing type shown in Table 5.1.
7. The uses of Self-Service Storage/Mini-Warehousing, Boat/RV Storage must be exclusively for the use of the owners and tenants of any portion of the *Real Property* and of the contractors working on the *Real Property*. Only 50% of the floor area devoted to these uses shall count against *GLA*.
8. Commercial is limited to no more than 80,000 SF of *GLA* situated on no more than 12 acres.

## SECTION 6 – PD DISTRICT STANDARDS

### 6.1 **Building Development Standards**

A. Generally: Table 6.1 sets forth any applicable standards for *Lot* area, *Lot* depth, *Lot* width, *Setbacks*, *Building Height*, *Building Coverage*, and all other dimensional standards for the *Real Property* or particular portions thereof. The measurements, computations, and exceptions to the *Building Development Standards* in Table 6.1 shall be as set forth further herein.

#### B. Lot Size:

1. Lot Area: *Lots* shall comply with the *Lot* area standards in Table 6.1 of the *Plan*.
2. Lot Depth: The depth of residential *Lots* shall not exceed five (5) times the width of the *Lot* (a 1:5 ratio); provided, however, the *ARB* may allow the *Lot* width to depth ratio of 1:5 to be exceeded when any of the following conditions occur:
  - a. When attached dwellings are proposed;

b. Where additional depth is provided for marsh frontage *Lots* when the *Lot* width to depth ratio is met and the property line is extended into the marsh or the property is bisected by or fronts on freshwater wetlands;

c. The subdivision of a parent *Tract*, provided any of the following requirements are met:

i. The minimum *Lot* frontage for each *Lot* is not less than 250 feet;

ii. In no case shall the average *Lot* width be less than 250 feet with the minimum *Lot* width at any one point less than 200 feet; or

iii. The property to be subdivided is located in the Rural Residential portion of the *Real Property*.

3. Prescribed *Lot* width requirements shall be for at least two-thirds of the depth of the *Lot*.

C. Lot Access:

1. Lot Frontage, Lot Access, and Double Frontage Lots:

a. The *Front Lot Line* for *Lots* that abut open space on one side and a *Thoroughfare* on the other shall be designated pursuant to the *Front Lot Line* definition contained herein. (Attached as Exhibit 6.3 is an illustration of a *Lot* fronting on open space illustrating the designation of the *Front Lot Line*).

b. *Lots* with more than one frontage on a *Thoroughfare* shall be allowed; however, only one vehicular access shall be allowed for each *Lot*. Where a *Lot* has more than one frontage on a *Thoroughfare*, the *Property Owner* shall identify one of the *Thoroughfare* frontages as the *Front Lot Line* and one as the rear lot line provided that there is an adequate vision clearance triangle for the lot line with the vehicular access. The remaining lot lines will be subject to side setback standards. An easement(s) with a minimum width of five feet may be required by the Zoning and Planning Department Director to restrict access from any *Thoroughfare* or other vehicular access other than that designated as the primary access.

2. Public Access: All *Lots* shall be provided with a direct or indirect means of access to Betsy Kerrison Parkway and Mullet Hall Road through the system of *Thoroughfares* on the *Real Property*. This provision shall not preclude the *Property Owner* from implementing a private *Thoroughfare* system with respect to the *Real Property* or any portion thereof and shall not be interpreted to require that all *Lots* front a public *Thoroughfare*.

3. Vehicular access: Streets within planned developments should connect to adjoining neighborhoods/developments. Cul-de-sacs, T-turnarounds, and dead-end streets are discouraged. Areas between structures shall be covered by easements where necessary for access and to provide for maintenance and utility service. Primary vehicular access to office, commercial, or industrial development shall be through limited access roads.

4. Miscellaneous: All flag *Lots*, *Lots* on a cul-de-sac, and privately-accessed *Lots* shall comply with the International Fire Code, as adopted by the *County*.

5. Flag Lots: The *Real Property* contains substantial areas of wetlands, which may necessitate the use of flag *Lots* in certain instances. Accordingly, with respect to residential *Lots*, the ARB may allow, allow with conditions, or prohibit flag *Lots* on the *Real Property* or any portion thereof. The flagpole portion of a flag lot shall have a minimum width of 20 feet for its entire depth, and the depth or length of the flagpole shall not exceed 450 feet.

6. Public Access vs. Publicly-Maintained: References herein to “public access” shall not be read to require that any or all access points must be publicly maintained.

D. Residential Density: The *Property Owner* shall be entitled to develop up to 1,285 *Dwelling Units* on the *Real Property*. This entitlement density correlates to a gross residential density of .90 *Dwelling Units* per acre (including all acreage) or 1.01 *Dwelling Units* per acre (including only highland and freshwater wetland). No other residential density requirements are applicable to the *Project*, except as provided in Table 6.1; provided, however (1) the *Property Owner* may not develop more than 580 *Dwelling Units* on the portion of the *Real Property* formerly zoned AG-8 which is designated as Rural Residential in the *Plan*; and (2) the *Property Owner* may not develop more than 80 *Dwelling Units* on the portion of the *Real Property* delineated in the *Plan* as the Bohicket Station.

E. Minimum Setbacks: *Setbacks* are the unobstructed, unoccupied open area between the furthestmost projection of a structure and the property line of the *Lot* on which the structure is located, except as modified herein. *Setback* standards on the *Real Property* are set forth in Table 6.1; provided, however, the following shall apply:

1. Negative or “Zero” Lot Lines: The *Property Owner* may employ negative or “zero” *Lot* lines. Refer to Table 6.1.

2. Exceptions to Setbacks: Every part of a required *Setback* must be open and unobstructed from the ground to the sky, except as follows:

a. Trees, shrubbery or other landscape features may be located within any required *Setback*;

b. Fences and walls may be located within any required *Setback*; provided, however, that for residential, office, and commercial uses, no fence, wall or hedge shall exceed:

(1) Four feet in height when located within any front or street side *Setback*;

(2) Six feet in height when located in any interior side, rear, or *OCRM Critical Line Setback*.

c. Driveways may be located in any required *Setbacks*;

d. *Community Ways* may be located within any required *Setbacks*;

e. Utility lines, transformers, pedestals, wires and associated structures, such as power poles, may be located within any required *Setbacks*;

f. Covered or uncovered porches, steps to building entrances, patio decks, garages, and balconies may extend up to five feet into any required *Setbacks*;

g. Openwork fire balconies and fire escapes may extend up to five feet into any required side *Setbacks*;

h. *Facilities*, utilities and maintenance areas, including easements, may be located within any required *Setbacks*;

i. Sills, belt courses, cornices, buttresses, eaves and other architectural features may extend up to two feet into any required *Setbacks*;

j. Chimneys and flues may extend up to two feet into any required *Setbacks*;

k. Satellite dish antennas may be placed within required rear *Setbacks*;

l. Mechanical equipment, including heating ventilation and air conditioning (HVAC) equipment, may be extended up to five feet into required side, *OCRM Critical Line*, or rear *Setbacks*.

3. Contextual Setbacks: Notwithstanding the *Setback* standards set forth in Table 6.1, the front building line of any structure or addition to a structure may be as close to the street as the front building line of a structure located on any *Lot* that is immediately adjacent to the subject *Lot*. If the subject *Lot* is located between two developed *Lots*, the front building line of the structure that is set back closest to the street shall apply to the subject *Lot*.

4. Reduction for Public Purpose: When an existing *Setback* is reduced because of conveyance to an *Association*, or a federal, state or *Local Government*, for a public purpose and the remaining *Setback* is at least fifty percent (50%) of the required *Setback*, as set forth herein, then that remaining *Setback* will be deemed to satisfy the *Setback* standards in Table 6.1. This provision shall also apply in the event the existing *Setback* is reduced because of a conservation easement, so long as the remaining *Setback* is at least fifty percent (50%) of the required *Setback* in Table 6.1.

#### F. Maximum Building Height:

1. Generally: “*Building Height*” means elevation from *Ground Floor Level* as measured in feet. The maximum *Building Height* for the *Real Property* or portions thereof is set forth in Table 6.1.

2. Definition of Height-Fences or Walls: Fences or walls shall be measured from finished grade on the lower side of the fence or wall.

3. Exceptions to Height Limits: The *Building Height* limitations herein shall not apply to any of the following:

- a. Farm buildings on the *Real Property*, if any;
- b. Electrical power transmission lines;
- c. Belfries, cupolas, spires, domes, monuments, flagpoles, chimneys, radio/television receiving antennas or chimney flues;
- d. Bulkhead, elevator, water tank, or any other similar structure or necessary mechanical appurtenance extending above the roof of any building, if such structure does not occupy more than fifty percent (50%) of the area of the roof.
- e. Solar panels.

4. Maximum Building Height for Hotels: Notwithstanding any other provision herein, the maximum *Building Height* for *Hotels* shall be 65 feet. Likewise, the maximum *Building Height* for a club house on any *Golf Course* shall be 50 feet; provided, however, the maximum *Building Height* for a *Hotel* shall apply if the club house is attached to or within a *Hotel*.

G. Building Coverage: *Building Coverage* means the area of a *Lot* covered by principal or accessory buildings or roofed areas, as measured along the outside wall at ground level, and including all projections, other than open porches, fire escapes, canopies, and the first two feet (2') of a roof overhang. Pools, pool decks and pervious drives are not included in *Building Coverage*. The maximum *Building Coverage* for the *Real Property* or any portion thereof is set forth in Table 6.1.

## **6.2 Proposed Waterfront Development Standards**

The *Plan* facilitates the *Development* of up to 227 residential *Lots*, excluding *Lots* that have *Villas* or *Bed and Breakfasts* that are *Guest Rooms*, on the portion of the *Real Property* directly abutting the *OCRM Critical Line*. A conceptual illustration of this *Development* is set forth in Exhibit 6.1. Further, pursuant to the Master Dock Plan attached hereto as Exhibit 6.2, the *Property Owner* will limit the number of docks developed on the *Real Property* to eighteen (18). In addition, the *Property Owner* shall adopt restrictive covenants with respect to single-family detached lots in the Rural Residential Area requiring that 50% of each *Lot* be preserved in its natural condition. In consideration of the foregoing and to incentivize the provision of a variety of housing types, the following minimum standards shall apply to single-family detached *Lots* abutting an *OCRM Critical Line* regardless of base zoning:

1. Lot Area: Any single-family detached *Lot* abutting an *OCRM Critical Line* shall have a minimum *Lot* area of 12,000 square feet.

2. Lot Width: Any single-family detached *Lot* abutting an *OCRM Critical Line* shall have a minimum *Lot* width of 90 feet. The average *Lot* width for all single-family detached *Lots* abutting an *OCRM Critical Line* shall be 100 feet.

3. OCRM Critical Line Buffer: Any single-family detached *Lot* abutting an *OCRM Critical Line* shall have a minimum *OCRM Critical Line* buffer of 15 feet. The portion of the *Real Property* abutting the *OCRM Critical Line* shall have an average buffer width of 35 feet. Notwithstanding the foregoing, for *Lots* directly abutting the marsh of the Kiawah River in the area zoned AG-8, the buffer from the *OCRM Critical Line* shall be 35 feet and the *Setback* from the *OCRM Critical Line* shall be 50 feet.

4. OCRM Critical Line Setback: Any single-family detached *Lot* abutting an *OCRM Critical Line* shall have a minimum *OCRM Critical Line Setback* of 35 feet. All accessory structures shall comply with these standards. The *ARB* shall have the ability to amend the *Setback* on the portion of the *Real Property* zoned AG-8, taking into consideration *Grand Trees* or other significant trees, topography of the land, adequate *Setbacks*, and the area needed for construction and landscaping of the roads or natural conditions. All accessory structures in the area zoned AG-8 shall comply with these standards.

**Table 6.1 – Building Development Standards**

	<b>Bohicket Station</b>	<b>River Village</b>	<b>Rural Residential (6)</b>	<b>Waterfront Development</b>
<b>A. LOT OCCUPATION</b>				
<b>Maximum Density (8)</b>	8 units per acre	4 units per acre	1 unit per acre	
<b>Lot Area</b>	1,600 sf.	1,600 sf.	9,000 sf.	12,000 sf.
<b>Lot Width (width/length) (3)</b>	20' min. (1:5)	18' min. (1:5)	75' min. (1:5)	90' min./100' ave.
<b>Building Coverage (4)</b>	80%	100%	50%	
<b>B. MIN. SETBACKS - PRINCIPAL BUILDING</b>				
<b>Front Setback (Principle)</b>	10' (1) (7)	10' (1) (7)	25'	
<b>Side Setback</b>	0/5' (1)	0/5' (1)	15'	
<b>Rear Setback</b>	5' min.	5' min.	25' min.	15' buffer / 35' setback(6)
<b>C. MIN. SETBACKS - ACCESSORY STRUCTURES</b>				
<b>Front Setback</b>	Bldg. setback	Bldg. setback	Bldg. setback	
<b>Side Setback</b>	3' min.	3' min.	12'	
<b>Rear Setback</b>	3'	3'	3'	
<b>D. BUILDING HEIGHT</b>				
<b>Principal Building</b>	50'	50'/65' (2)	50'/65' (2)	
<p>Notes:</p> <ol style="list-style-type: none"> <li>1. Zero lot line homes may be built with no setbacks on one side of the property, but must have at least 10 feet of separation between buildings.</li> <li>2. 65' building height should only apply to <i>Hotels</i>.</li> <li>3. Width /length ratio does not apply to single-family attached dwelling units.</li> <li>4. Pervious pavement for drives and pool decks, as well as the area of any pools, shall not count against <i>Building Coverage</i>.</li> <li>5. Any residential <i>Lot</i> abutting an <i>OCRM Critical Line</i> shall have a minimum <i>OCRM Critical Line</i> buffer of 15 feet and an <i>OCRM Critical Line Setback</i> of 35 feet. All other portions of the <i>Real Property</i> abutting the <i>OCRM Critical Line</i> shall have an average buffer width of 35 feet . Notwithstanding the foregoing, for <i>Lots</i> directly abutting the marsh of the Kiawah River in the area zoned AG-8, the buffer from the <i>OCRM Critical Line</i> shall be 35 feet and the <i>Setback</i> from the <i>OCRM Critical Line</i> shall be 50 feet. The <i>ARB</i> shall have the ability to amend the <i>Setback</i> on the portion of the <i>Real Property</i> zoned AG-8 taking</li> </ol>				



into consideration *Grand Trees* or other significant trees, topography of the land, adequate *Setbacks*, and the area needed for construction and landscaping of the roads or natural conditions. All accessory structures in the area zoned AG-8 shall comply with these standards.

6. The Building Development Standards of the River Village shall apply in lieu of the standards in this column to any single family attached housing or duplexes in the Rural Residential; however, no more than 175 single family attached units and duplexes shall be constructed in the Rural Residential. No multifamily units shall be allowed in the Rural Residential.

7. Front setback standards shall not apply to non-residential uses. There shall be no front setback requirement for non-residential uses, including retail commercial and office buildings, in Bohicket Station and the River Village, so that buildings may be constructed and sited in a more urban configuration right up to the right of way with entrances from the sidewalk and angled parking along the street.

8. The respective per-acre maximum densities for Bohicket Station, the River Village, and the Rural Residential shall be calculated for each based on the total acreage of each divided by the number of *Dwelling Units* on that entire tract, not per subdivision plat or per *Lot*.

## SECTION 7 – DEVELOPMENT SCHEDULE

A. Commencement Date: The *Project* will be deemed to commence *Development* upon the *Effective Date* of the *Agreement*.

B. Interim Completion Dates: The *Property Owner* estimates that during the years after the *Effective Date*, the following percentages of the undeveloped highlands within the *Real Property* will be developed:

<u>Year</u>	<u>Percentage Complete</u>
5	0-25%
10	26-50%
15	51-75%
20	76-100%

As such, a generalized phasing plan for the *Real Property*, showing a conceptual illustration of the *Development* which may be implemented on the *Real Property* 5 years, 10 years, 15 years, and 20 years after the *Effective Date* of the *Agreement* is attached hereto as Exhibit 7.1.

C. Completion Date: The *Property Owner* projects that the *Project* should be substantially completed (i.e. essentially all structures erected and/or all necessary infrastructure in place to serve the intended uses) twenty (20) years from the start of development.

D. Modification of Commencement or Completion Date: The *County* recognizes the *Development* on the *Real Property* will include a variety of uses and that demand, cost, environmental factors, and other pertinent financial and feasibility considerations fluctuate. Accordingly, the commencement date and schedule of completion set forth in this *Agreement* are estimates only. The timing of the actual *Development* of the *Project* will likely differ because of the multiple variables influencing it. The *Parties* agree that the commencement date, interim completion dates, and completion date are therefore subject to modification and that the *Property Owner* may provide to the *County* updated schedules which shall not constitute an amendment of this *Agreement* triggering the process for approval of amendments set forth in the *Agreement*.

## SECTION 8 – OPEN SPACE AND BUFFER STANDARDS

**8.1 Open Space:** 635.31 acres of the *Real Property*, as delineated in Table 8.1, will be preserved or enhanced as open space or common open space (both as defined in Chapter 12 of the *ZLDR*) to provide an amenity to the residents and visitors of the *Real Property*. The *Property Owner* shall preserve or develop a minimum of fifty percent (50%) of the combined highland and freshwater wetlands on the *Real Property* as open space/common open space, totaling 635.31 acres. Highland on the original wetland survey described on Exhibit 2.3 that is later determined to be critical area below the critical line as a result of a later delineation of the critical line shall be deemed to be highland open space for the purposes of this Section 8; and plats and surveys shall separately note the exact amount of acreage converted to highland open space in this manner as a result of the later delineation of the critical line as well as the exact amount of acreage converted from critical area to highland and from highland to critical area, as applicable. The following guidelines for all open space other than this particular highland open space, now critical area created by re-location of the critical line, and no others, shall apply to the *Real Property*:

1. Park Spaces: The *Property Owner* will provide the following park types in the approximate locations set forth in the Open Space Plan attached as Exhibit 8.1 and based upon the specifications set forth in Exhibit 8.2:

- (3) Neighborhood Focal Point Parks
- (1) Boat Landing
- (1) Recreational Park
- (2) Waterfront Parks
- Golf course(s) with up to 36 holes (or other active or passive outdoor recreational amenities of equivalent acreage)
- Playgrounds as, and where determined by, the *Property Owner*

2. The *Property Owner* shall use best efforts to locate open space as reasonably necessary to preserve significant natural, cultural, archaeological, and historical resources on the *Real Property*. The *Property Owner* shall preserve or enhance over three (3) miles of the waterfront edge (the portion of the *Real Property* directly abutting an *OCRM Critical Line*) as open space or common open space. This preserved area shall include, but not be limited to, the two (2) waterfront parks and one (1) boat landing referred to previously in this section 8 of the *Plan*.

3. Open space which the *Property Owner* designates to be set aside for dedication to the public or the residents of the *Real Property* or any portion thereof shall be detailed on each sketch plan and recorded with a final plat or separate instrument with respect to that portion of the *Real Property* as *Development* progresses.

4. Open space should be useable to the new residents and visitors of the *Real Property* (or portions thereof) and others.

5. Residential builders shall use best efforts to maximize the orientation of residential *Lots* toward open space, common open space, natural areas, parks, marshes, wetlands, and the adjacent Johns Island County Park and Mullet Hall Equestrian Center. Open space should be designed to provide a significant amenity to the residents, visitors, and others who will interact with the open space on a daily basis.

6. The total combined acreage of freshwater wetlands, detention ponds, and buffers to be used as open space shall not comprise more than forty percent (40%) of the proposed open space herein.

7. Land enhanced or preserved as open space shall not be occupied by streets, drives, parking areas, or structures, unless such streets, drives, parking areas, or structures are pervious to stormwater.

8. A minimum of four (4) acres of farmland will be retained as community gardens.

9. The transfer and maintenance of open space and common open space will depend upon the circumstances. With respect to freshwater wetlands, water bodies, salt marsh, salt water ponds, and marsh islands, the *Property Owner* may (1) retain, preserve, and maintain this area or any portion thereof itself or through a related entity; (2) subject this area or any portion thereof to a conservation easement in favor of a qualified entity for preservation and maintenance; or (3) transfer this area or any portion thereof for ownership and maintenance to the public, an *Association*, or a qualified *Local Government*. With respect to any and all *Golf Courses*, water-dependant uses, or other active outdoor recreational areas, these areas or any portion thereof may (1) be owned and maintained as *Common Areas*; (2) be owned and maintained by the *Property Owner* or a related entity (for profit or not for profit); (3) be owned and maintained by a third party (for profit or not for profit); or (4) be dedicated to the public for ownership and maintenance. With respect to the existing cemeteries, bald eagle nests, and other areas of natural, cultural, or historical significance specifically set forth further in the *Plan*, the *Property Owner* shall transfer, maintain, enhance, and/or preserve these areas as set forth further in section 14 of the *Plan*.

Table 8.1 Open Space

<b>Total Property</b>	1,427.81 acres			
<b>Total Highland</b>	1270.61 acres	100%		
<b>Minimum Highland Open Space</b>	635.31 acres	50%		
<b>Highland Open Space</b>			394.41 acres	28%
<b>Freshwater Wetland &amp; Impoundments</b>			240.90 acres	17%
<b>OCRM Critical Area Impoundments</b>			157.20 acres	11%
<b>Private Lots (50% of lot)</b>			130 acres (1)	9%
<b>Total</b>			922.51 acres	65%

Notes:

1. The total acreage of preserved area within private *Lot* lines will vary based on the number of *Lots* developed on the Rural Residential portion of the *Real Property*.

## **8.2 Buffers and Screening**

The following shall replace the processes set forth in Article 9.5 of the *ZLDR*:

A. Golf Course Use Permitted: When feasible, *Golf Course* uses shall be permitted within any required buffers on the *Real Property* excluding *OCRM* buffers and perimeter buffers. In the

event the *Property Owner* elects to designate a required buffer for *Golf Course* use, the requirements for materials, location, width, and other buffering criteria in this Paragraph shall not apply.

B. OCRM Critical Line Buffers: The following buffer standards shall apply to *OCRM Critical Line* buffers on the *Real Property*:

1. Minimum Buffers: The portion of the *Real Property* abutting the *OCRM Critical Line* shall have an average buffer width of 35 feet with a minimum *OCRM Critical Line* buffer of 15 feet. Notwithstanding the foregoing, for *Lots* directly abutting the marsh of the Kiawah River in the area zoned AG-8, the buffer from the *OCRM Critical Line* shall be 35 feet.

2. Prohibited Activities: The following activities are specifically prohibited in an *OCRM Critical Line* buffer area:

a. Removal, excavation or disturbance of the soil, except for minimal disturbance associated with the planting of shrubs or trees for landscaping;

b. Grassed lawns requiring regular maintenance such as herbicides, pesticides, fertilizers, and frequent mowing;

c. Gardens, fences, or structures, except for permitted crossings;

d. Paved or other impervious surfaces; however, unpaved or pervious *Community Ways* shall be permitted;

e. Destruction or addition of plant life which would alter the existing pattern of vegetation.

3. Exceptions to OCRM Critical Line Buffers. The *Property Owner* shall be allowed the following exceptions for alteration of the *OCRM Critical Line* Buffers:

a. Village Green: An Open Space area not to exceed 50 feet in width, which may include a deck, shall be allowed to intrude into the *OCRM Critical Line* setback and buffer up to the *OCRM Critical Line* in one location as generally shown on the non-binding illustration attached as Exhibit 8.3.

b. Saltwater Wetlands Mitigation. *Property Owner* shall be allowed to disturb the *OCRM Critical Line* Buffer and conduct activity in the *OCRM Critical Line* Buffer only as necessary, and with the minimal amount of impact and variance from the *OCRM Critical Line* Buffer requirements as determined by the Zoning and Planning Department Director, in order to accomplish the saltwater wetlands mitigation approved by the United States Army Corps of Engineers in its letter dated April 4, 2017, copy attached as Exhibit 8.4 hereto.

c. Causeways. Notwithstanding any other provisions herein, no *OCRM Critical Line* Buffer shall be required for the causeways within the *Real Property*.

d. Utilities. *Property Owner* shall be allowed to cross the *OCRM Critical Line Buffer* to install, maintain, and repair underground utilities if permitted by appropriate state and federal authorities where applicable. Any such underground utilities will require review and approval in accordance with the requirements of ZLDR Sec. 3.7, Site Plan Review, and all other applicable sections of the ZLDR. If the installation, maintenance, or repair of the underground utility results in the removal of vegetation in the *OCRM Critical Line Buffer*, the *Property Owner* shall submit a landscaping plan for the revegetation of the Buffer along with a planting schedule for review and approval by the Planning Director as part of the Site Plan Review process or subdivision review process. Removal of Protected or Grand Trees shall be in compliance with Section 9.B of the Plan.

C. Perimeter Buffers:

1. Generally: The *Property Owner* shall provide a natural buffer, at least twenty-five feet (25') wide, between the perimeter of the *Real Property* and an adjacent property titled to an unrelated party on the *Effective Date*; provided, however, this provision shall not require the *Property Owner* to provide a buffer between the *Real Property* and any adjacent property acquired by the *Property Owner* or a related entity after the *Effective Date*. This perimeter buffer is illustrated in the Perimeter Buffer Plan attached hereto as Exhibit 8.1.

2. Betsy Kerrison Parkway: The *Property Owner* shall provide for at least a fifty foot (50') wide buffer from the public right-of-way along Betsy Kerrison Parkway. This buffer is also illustrated in Exhibit 8.1.

3. Buffers Provided on Adjacent Property: A perimeter buffer will not be required when an adjacent property has a pre-existing natural or man-made buffer (e.g. Park) of at least twenty-five feet (25') or is used for a golf course on the *Effective Date*.

D. Internal Buffers: Certain internal buffers will be required for adjacent uses according to Table 8.2.

E. Right-of-Way Buffers. The provisions of Article 9.5.4.A of the ZLDR shall not apply to the right-of-ways within the *Real Property* except for the provisions in Section 8.2.C.2 above pertaining to the Betsy Kerrison Parkway.

F. Buffer Materials:

1. Perimeter Buffers: The existing vegetation within a required perimeter buffer will be protected, when reasonable. Unless otherwise precluded by state law, the *Property Owner* shall have the right to perform select clearing and landscaping within a required perimeter buffer; provided, however, the *Property Owner* shall eliminate or reduce dirt, litter, noise, glare of lights, and unsightly buildings or parking areas in a required perimeter buffer. Select clearing within a required perimeter buffer shall be consistent with improvements to the buffers in the general vicinity. Select clearing within a required perimeter buffer shall not allow for the removal of protected trees. Furthermore, this select clearing shall not include trimming limbs more than eight feet (8') above ground level. The desired effect is a mature, natural vegetative buffer. Gates, walls, fences, lighting, signage, driveways, *Community Ways*, and curb-cuts will be allowed in buffers to



complement edge conditions. Notwithstanding the foregoing, the *Property Owner* may establish a park or *Golf Course* use within a perimeter buffer when feasible.

2. Internal Buffers: Any material requirements for internal buffers will be considered on a case-by-case basis as deemed necessary by the *ARB* to complement and enhance the overall aesthetics and character of the *Real Property*; provided, however, gates, walls, fences, lighting, signage, driveways, *Community Ways*, and curb-cuts will be allowed in internal buffer areas on the *Real Property*, subject to *ARB* approval. Public or private parks, recreational areas, and *Golf Course* uses shall not require additional buffering material.

F. Cemetery Buffers: Three (3) cemeteries, designated in the Cultural Resources Survey procured by the *Property Owner* as 38CH1540, 38CH1548, and 38CH1549, will not be developed except as provided herein. Additionally, as recommended in the survey, 38CH1540 will have a fifty foot (50') minimum buffer, 38CH1548 will have a twenty-five foot (25') minimum buffer, and 38CH1549 will have a fifty foot (50') minimum buffer. All three cemetery sites will have construction fences erected for their protection during all phases of construction activity. As further recommended in the survey, the *Property Owner* will remove all trees in the cemeteries of 5-inches DBH or less in diameter. The remaining trees will be pruned for crown cleaning and overall restoration. No tree survey or other *County* permits shall be required for such clearing and restoration.

G. Determination of Required Buffers. The following procedure shall be used in determining which of the buffer types in the Land Use Buffer Table (Table 8.2) apply:

1. Determine the type of use proposed for the site that is being developed. This is the "Proposed Use" (Column 1);
2. Determine the use, or proposed use if undeveloped on the adjacent parcel. This is shown on Row 1;
3. The intersection of the proposed use in Column 1, and the adjacent use in Row 1 is the required landscape buffer width;
4. Contact the *ARB* for the required plantings within the buffer.

**8.3 Restrictions on Single-Family Detached Lots**: The *Property Owner* shall adopt restrictive covenants, enforced by the *ARB*, applicable to single-family detached *Lots* (as defined in Chapter 12 of the *ZLDR*) on the Rural Residential portion of the *Real Property* to ensure a greater percentage of these *Lots* are preserved in their natural state, as *Pervious Cover*. This acreage, which constitutes approximately 130 acres of the *Real Property*, is not included in the calculations for minimum highland open space and common open space in Table 8.1.

**Table 8.2 – Internal Buffers**

**Land Use Buffers shall be provided along side and rear yards in accordance with the minimum requirements contained in Table 8.2, Internal Buffers**

<b>Use or Zoning of Adjacent Property</b>											
<b>Proposed Uses</b>	<b>Single Family Detached</b>	<b>Commercial</b>	<b>Office</b>	<b>Civic/ Institutional</b>	<b>Golf</b>	<b>Multi-Family/Single Family Attached</b>	<b>Inn/ Hotel/ B&amp;B</b>	<b>Lodging - Villas</b>	<b>Retirement Housing</b>	<b>Wastewater Pump Station</b>	<b>Wastewater Treatment Plant</b>
<b>Single Family Detached</b>	0'	0'	0'	0'	0'	0'	0'	0'	0	0'	0'
<b>Commercial</b>	10'	0'	0'	0'	0'	0'	0'	0'	0	0'	0'
<b>Office</b>	10'	0'	0'	0'	0'	0'	0'	0'	0	0'	0'
<b>Civic/Institutional</b>	10'	0'	0'	0'	0'	0'	0'	0'	0	0'	0'
<b>Golf</b>	0'	20'	20'	20'	0'	0'	0'	0'	20	0'	0'
<b>Multi-Family/Single Family Attached</b>	0'	0'	0'	0'	0'	0'	0'	0'	0	0'	0'
<b>Lodging - Inn/Hotel/B&amp;B</b>	15'	0'	0'	0'	0'	0'	0'	15'	15	0'	0'
<b>Lodging - Villas</b>	0'	0'	0'	0'	0'	0'	0'	0'	0	0'	0'
<b>Retirement Housing</b>	10'	0'	0'	0'	0'	0'	0'	0'	0	0	0
<b>Wastewater Pump Station</b>	0'	0'	0'	0'	0'	0'	0'	0'	0	0	0
<b>Wastewater Treatment Plant</b>	25'	0'	0'	0'	0'	25'	0'	25'	25	0'	0'

\* Buffer width may be reduced to 5' with the addition of a 6' privacy fence.

Notes:

1. All landscape requirements for buffers shall be defined and governed by the ARB
2. Modifications to internal buffers may be reviewed and approved by the ARB on a case-by-case basis as deemed necessary by the ARB to complement and enhance the overall aesthetics and character of the *Real Property*.

Minimum buffer landscaping (Plants per 100 linear feet)

(2) Canopy Trees (2.5" caliper and  
12 feet in height)

(20) Shrubs (3 gallon and 18" to 24" in height or spread)

## SECTION 9 – TREE PROTECTION STANDARDS

A. Tree Surveys: The *Property Owner* shall provide a tree survey to the Planning Director delineating all *Grand Trees* and *Protected Trees* on a portion of the *Real Property* prior to obtaining any development approvals or permits for that phase of the *Project*. This tree survey shall comply with the requirements of Article 9.4 of the *ZLDR*, as modified in Appendix B.

B. Tree Removal, Replacement, Protection, Preservation and Mitigation: Article 9.4 of the *ZLDR*, as modified in Appendix B, shall apply with respect to tree removal, replacement, protection, preservation, and mitigation requirements on the *Real Property* or any portion thereof; provided, however, the *ARB* shall be permitted to modify these standards and, upon approval by the Planning Director, these modifications shall apply with respect to tree removal, replacement, protection, preservation, and mitigation requirements on the *Real Property* or any portion thereof. Notwithstanding the foregoing, the *ARB* shall not be permitted to modify the tree removal, replacement, protection, preservation and mitigation requirements for *Grand Trees* (as delineated on the tree survey) set forth in Article 9.4 of the *ZLDR*, as modified in Appendix B. The County Board of Zoning Appeals shall have sole and exclusive jurisdiction to grant variances from the tree removal, replacement, protection, preservation and mitigation requirements for *Grand Trees* (as delineated on the tree survey) set forth in Article 9.4 of the *ZLDR*, as modified in Appendix B. The Board of Zoning Appeals shall exercise this jurisdiction consistent with the procedural and approval criteria in the *ZLDR*. The *ARB* shall have sole jurisdiction to grant variances from the tree removal, replacement, protection, preservation and mitigation requirements for all other *Protected Trees* (as delineated in the tree survey). The *ARB* shall give special consideration to the *Golf Course*, wastewater treatment facility, and any portion of the *Real Property* developed pursuant to a traditional neighborhood design. For such portions of the *Real Property*, the *ARB* shall permit removal of *Protected Trees* upon appropriate mitigation by the *Property Owner*. If healthy laurel oaks or water oaks with a DBH of 24 inches or greater are removed, the *Property Owner* shall implement inch per caliper inch mitigation as directed or approved by the *Planning Director*. The health of the trees shall be determined by the *Planning Director* provided that the applicant shall pay the Grand Tree Variance application fee for each tree to be evaluated.

## SECTION 10 – PARKING STANDARDS

A. Generally: The Parking and Loading Regulations in Article 9.3 of the *ZLDR*, and no others, shall apply to the *Real Property* or any portion thereof; provided, however, the off-site parking standards of Article 9.3.4.B of the *ZLDR* shall be modified for non-residential *Development* and *Villas* that are *Guest Rooms* to allow up to 100% of the required parking to be off-site at a location on the *Real Property* and to allow portions of the required parking to be satisfied by on-street parking as further shown in the modifications to Article 9.3.4.B of the *ZLDR* in Appendix B to the Development Agreement for the *Real Property*; and, provided further, however, the following shared parking guidelines Table 10.2 may be utilized in the River Village and Bohicket Station to accommodate a mix of uses on the *Real Property*:

**Table 10.1: Required Parking Standards**

Use Type	Rural Residential	River Village and Bohicket Station
<b>Residential, including Retirement Housing</b>	2.0/Dwelling Unit	1.0/Dwelling Unit
<b>Lodging (incl. Hotels, Inns, Bed and Breakfasts, and Villas)</b>	1.0/Guest Room	1.0/Guest Room
<b>Office</b>	3.0/1,000 square feet	2.0/1,000 square feet
<b>Retail</b>	4.0/1,000 square feet	3.0/1,000 square feet
<b>All Other</b>	To be determined by ARB (1)	To be determined by ARB (1)

1. In establishing the required minimum of off-street parking, the ARB may consider the following in making a reasonable determination of the projected parking needs: the nature of the use(s), the availability of on-street parking, anticipated access by non-vehicular means (i.e., pedestrian, bicycle, golf cart, etc.), peak and off-peak parking projections, recognized standards for determining adequate parking spaces, any qualified professional assessments of particular parking needs, and any other factors the ARB deems pertinent.  
Nearby on-street parking may be counted towards the off-street parking requirements for non-residential uses.

**Table 10.2: Shared Parking Standards**

	Residential	Lodging	Office	Retail
<b>Residential, including Retirement Housing</b>	1	1.1	1.4	1.2
<b>Lodging</b>	1.1	1.0	1.7	1.3
<b>Office</b>	1.4	1.7	1.0	1.2
<b>Retail</b>	1.2	1.3	1.2	1.0

Notwithstanding the foregoing, the *Property Owner* shall have the right to utilize on-street parallel and angle parking (to include 90 degree parking) on private *Thoroughfares* on the *Real Property*, if such parking does not present a significant safety hazard with respect to the particular *Thoroughfare*.

## SECTION 11 – THOROUGHFARE STANDARDS

1. Definition: “*Thoroughfare*” means a way for use by vehicular and pedestrian traffic and to provide access to *Lots* and open space, consisting of vehicular lanes and their adjacent rights-of-way.

2. County Road Construction Standards: Notwithstanding any provision in the *Agreement* or the *Plan* which may be construed to the contrary, the *Property Owner* shall comply with the standards for public roads set forth in the County Road Construction Standards, described in the *ZLDR*, with respect to any *Thoroughfares* the *Property Owner* intends to dedicate to the public. The *Agreement* and the *Plan* shall not be construed to supersede or contravene the County Road Construction Standards described in the *ZLDR* with respect to any *Thoroughfares* the *Property Owner* intends to dedicate to the public.

3. Design and Installation: The *Property Owner* shall develop and install *Thoroughfares* and their related infrastructure on the *Real Property*. The *Property Owner* may develop any or all of the *Thoroughfares* on the *Real Property* as public or private; provided, however, any *Thoroughfares* to be offered for dedication to the public will comply with the County Road Construction Standards described in the *ZLDR*.

4. Private Thoroughfares: Exhibits 11.1 and 11.2 provide an illustration of the typical private *Thoroughfare* sections which may be implemented on the *Real Property*, including typical utility placements within private *Thoroughfares*. Exhibit 11.3 shows the vehicular lanes and parking assemblies which may be utilized for private *Thoroughfares* on the *Real Property* or designated portions thereof. Exhibit 11.4 shows the conceptual road framework which may be implemented for private *Thoroughfares* on the *Real Property*. Notwithstanding those exhibits, the *Property Owner* may determine the precise configuration and location of any and all private *Thoroughfares* on the *Real Property*; provided, however, the *Property Owner* has a qualified engineer determine that their configuration and location does not present a significant safety hazard.

5. Ownership and Maintenance: The *Property Owner*, a related entity, and/or a duly constituted *Association* shall perform the maintenance and upkeep on any and all *Thoroughfares* on the *Real Property* or any portion thereof unless they have been dedicated to and accepted by the public in conformity with the County Road Construction Standards described in the *ZLDR*. All alleys shall be maintained and owned by the *Property Owner*, a related entity, or an *Association*.

6. Paving: Any and all public *Thoroughfares* installed on the *Real Property* shall be paved in accordance with the public road standards in the County Road Construction Standards, described in the *ZLDR*. To preserve the existing rural character of the *Real Property* or portions thereof, the *Property Owner* may retain existing unpaved, private *Thoroughfares* and/or install other unpaved, private *Thoroughfares* on the *Real Property* or portions thereof.

7. Internal Access: The *Property Owner* may limit access to private *Thoroughfares* on the *Real Property* or portions thereof through the use of a security gate or other similar method. Access to public *Thoroughfares* may NOT be similarly limited. All *Thoroughfares* on the *Real Property*, whether public or private, shall have direct or indirect access to Betsy Kerrison Parkway and Mullet Hall Road.

8. Construction Access: Construction traffic will be routed along Mullet Hall Road, at the location illustrated in Exhibit 14.1. Prior to construction of Phase 1, the *Property Owner* shall finance an inspection of Mullet Hall Road to determine and record its current condition. The *Property Owner* will provide a report defining the base line condition of Mullet Hall Road and providing an ultimate road section recommendation to accommodate projected traffic for build-out of the *Project*. This report will be submitted to *DOT* for review and approval. The *Property Owner* will then provide *DOT* with an engineer-



certified construction cost estimate for any repairs and other improvements needed as specified in the report, as well as a letter of credit or bond ensuring the work will take place within a mutually agreeable time frame. The *Property Owner* will continue to coordinate any improvements or maintenance of Mullet Hall Road with *DOT* during the *Project*. The Charleston County Parks and Recreation Commission, which uses Mullet Hall Road for primary access to the Johns Island County Park and Mullet Hall Equestrian Center, has consented to this procedure via letter of coordination attached hereto as Exhibit 11.5. A letter of coordination from *DOT* will be obtained prior to phase 1 construction and such letter will address the use of Mullet Hall Road as a secondary entrance to the proposed development and will state any required mitigation.

9. Connections with Adjacent Properties: The *Property Owner* shall use best efforts to facilitate a connection with adjacent parcels at the approximate locations illustrated in Exhibit 4.1. The *Property Owner's* obligation under this section shall not require that the *Property Owner* purchase or otherwise finance the acquisition of any right, title, or interest in and to these adjoining properties. The *County* recognizes the *Property Owner's* abilities under this section are highly dependent upon and constricted by the actions or inactions of third parties.

## **SECTION 12 – ARCHITECTURAL AND LANDSCAPE DESIGN STANDARDS**

The Architectural and Landscaping Design requirements of the *ZLDR* do not apply. The *ARB* shall develop and administer the architectural and landscaping requirements for the *Real Property* as provided in the *Covenants*. The *Property Owner* shall provide the *Planning Director* a copy of the *ARB* approval of the architectural and landscaping design as part of each *Development* application. Exhibits 12.1, 12.2, 12.3, and 12.4 illustrate the architecture and landscaping which may be incorporated on the *Real Property* or portions thereof. The *Property Owner* shall adopt restrictive covenants with respect to Single-Family Detached *Lots* located on the Rural Residential portion of the *Real Property*, requiring at least 50% of each *Lot* be preserved in its natural habitat. These guidelines intend to be similar in content and character to Kiawah Island Community Association Guidelines “Designing with Nature”.

## **SECTION 13 – SIGNAGE STANDARDS**

1. The *Property Owner* shall provide a master signage plan to the *ARB*, for review and approval, for each phase of the *Project* and must provide the *ARB*'s written approval of that phase's master signage plan to the Planning Director prior to obtaining a certificate of occupancy for any portion of that phase of the *Project*. Notwithstanding the foregoing, the standards contained within Article 9.11 of the *ZLDR* shall apply to signs visible from Betsy Kerrison Parkway and Mullet Hall Road.

2. Upon approval by the *ARB*, off-premises signs shall be permitted on any portion of the *Real Property* to the extent such signs advertise a business or other area located or to be located on another portion of the *Real Property*. Upon approval by the *ARB*, off-premises signs may advertise more than one business or other area located on or to be located on the *Real Property*; provided, however, each business must be located on the *Real Property*.

## SECTION 14 – GENERAL FACILITIES

A. Generally: This section addresses the *Facilities*, including public infrastructure improvements, which are necessary to support the *Development*. The *Property Owner* shall only be responsible for those specific *Facilities* that the *Property Owner* expressly undertakes to install and maintain herein. The remainder of the *Facilities* listed herein shall be installed and maintained by the applicable service providers. Accordingly, letters of coordination with each of these service providers are included in Appendix F.

B. Certification of Completion Concurrent with Impact: Although the nature of this long term *Project* prevents the *Property Owner* from now providing exact completion dates, the *Property Owner* certifies that the specific services and *Facilities*, including public infrastructure improvements, that the *Property Owner* expressly undertakes to install will be in place, or if not fully in place, the cost of their construction fully bonded or letter of credit posted at a sufficient time to ensure availability concurrent with the impacts of the *Development* and consistent with the Schedule of *Development* set forth in section 7 of the *Plan*. Subject to compliance with applicable law and with all provisions of the *Agreement*, the *County* hereby authorizes the *Property Owner* to install all *Facilities* which the *Property Owner* has undertaken to provide herein.

C. Overall Economic and Fiscal Impact: The *Property Owner* has procured an extensive economic and fiscal impact analysis of the proposed *Development*, prepared by the Regional Dynamics and Economic Modeling Laboratory at the Strom Thurmond Institute of Government at Clemson University and attached hereto as Appendix C. Further, a more detailed analysis of the fiscal impact of the *Project* on governmental services and infrastructure, as well as a capital improvements program designed to implement necessary infrastructure improvements as the *Project* progresses, is attached hereto as Appendix D (The Fiscal Impact of Kiawah River Plantation on Charleston County, dated December 18, 2009). Both of these analyses project a positive net fiscal impact for the *County*, with additional revenue received by the *County* as a result of the *Development* more than sufficient to cover the additional expenditure burden for the *County* generated by the *Development*.

### D. Traffic Considerations

1. Traffic Study and Mitigation Plan: The *Property Owner* has procured a Traffic Impact Analysis and Mitigation Plan prepared by Kubilins Transportation Group, Inc., a copy of which is attached hereto as Appendix E. This study analyzes the traffic operations within the area of influence and provides recommended access management for the site and intersection improvements needed for mitigating traffic impacts. A proof-of-coordination letter with *DOT* is also included in Appendix F.

2. Scope of Study: The area of influence of the study site, as indicated by *DOT*, includes the following four (4) existing and one (1) proposed intersections:

- a. Maybank Highway (SC 700) and River Road (S-10-91) (signalized);
- b. Maybank Highway (SC 700) and Bohicket Road/Main Road (S-10-20) (signalized);
- c. Bohicket Road/Betsy Kerrison Parkway and River Road (S-10-20) (signalized);
- d. River Road (S-10-91) and Mullet Hall Road/Site Access (unsignalized); and

e. Betsy Kerrison Parkway and Village Site Access (proposed signal).

3. Site Access: The *Development* will be served by two (2) full-movement access points. The primary access point for the *Development* will be located at Betsy Kerrison Parkway. The secondary access point for the *Development* will be located at Mullet Hall Road. There are no recommended improvements to Mullet Hall Road. Unless otherwise required by *DOT* or the *County* for compliance with the County's Road Construction Standards as set forth in the *ZLDR*, the *Property Owner* shall use landscaping, turn lane improvements, and other similar devices to induce residents and visitors to use Betsy Kerrison Parkway as the primary access point for the *Real Property*. The Betsy Kerrison Parkway entrance will be used by the *Property Owner* as its "marketing window," and any on-line or other advertisements and marketing materials will direct people to the Betsy Kerrison Parkway entrance. The following improvements are recommended to ensure proper site access at Betsy Kerrison Parkway:

- i. Construct a full-movement access drive with one (1) ingress lane and two (2) egress lanes. The egress lanes should be configured as a separate left turn lane with 150 feet of storage and the through lane shall terminate as a right turn lane. 150 feet of internal protected storage should also be provided.
- ii. Construct a dedicated left-turn lane on the southbound approach of Betsy Kerrison Parkway with 150 feet of storage with appropriate tapers.
- iii. Construct a dedicated right-turn lane on the northbound approach of Betsy Kerrison Parkway with 100 feet of storage with appropriate tapers.
- iv. Install traffic signal control upon meeting the appropriate MUTCD and SCDOT traffic signal control warrants.

The *Property Owner* shall construct or finance the construction of the referenced improvements (or such other improvements as shall be recommended in consultation with *DOT*) after obtaining all applicable permits and approvals from *DOT* as these improvements are deemed necessary by *DOT*. The *Property Owner* shall complete the first three (iii) of the above-stated improvements concurrently with the completion of Phase 1 construction. The *Property Owner* shall complete the final recommended improvement (iv) when required in coordination with *DOT*. The *Property Owner* will dedicate any applicable public improvements associated with this primary access point to the public for maintenance in accordance with applicable law and provide any applicable maintenance bond in coordination with *DOT*.

4. Initial Development Capacity: The study analyzed the amount of *Development* and resultant traffic that can be handled without operational impacts to the major facilities and intersections on Johns Island. The analysis determined that the following amount of *Development* could be constructed over the next several years without any significant impact to the intersections or roadway network that would require improvements:

- 105 Single Family Homes
- 315 Recreational Homes
- 40 Workforce Apartments
- 350 Guest Rooms
- 35,000 square feet of *GLA* in the Bohicket Station Tract, as delineated in Exhibit 4.1 of the *Plan*

- 20,000 square feet of *GLA* within the Mullet Hall Tract, as delineated in Exhibit 4.1 of the *Plan*
- An 18-hole golf course

Further, Kublins Transportation Group, Inc. has prepared a land-use equivalency matrix, attached to the *Agreement* as Appendix E-1, which permits a ready conversion of the traffic impact (number of peak hour trips generated) from one proposed use to another. The *Property Owner* shall fund an independent supplemental traffic study (the cost of which shall not exceed \$20,000.00) and provide a proposed mitigation and implementation plan for the *County's* review and approval after the *Development* has reached 2/3 of the "Initial Development Capacity" as set forth in the initial traffic impact analysis, prepared as part of the *Agreement*, as such "Initial Development Capacity" may be converted by Appendix E-1.

E. Wastewater Treatment: The *Property Owner* will provide suitable wastewater treatment or septic to all *Lots* and *Dwelling Units* on the *Real Property* pursuant to the *Agreement* after obtaining all applicable permits and approvals from regulatory agencies and governmental entities. Any wastewater treatment system shall be subject to best management practices. The proposed wastewater treatment facility will comply with the Charleston County 208 Water Quality Management Plan and all BCDCOG and *DHEC* requirements, including the *DHEC* permitting requirements that the *Property Owner* provide financial protections for the continued economic viability of the system and that the system be managed by a class A licensed operator.

F. Potable Water: St. John's Water Company will provide potable water to all *Lots* and *Dwelling Units* on the *Real Property* pursuant to the *Agreement* after obtaining all applicable permits and approvals from regulatory agencies. Water supply for the *Development* will be via two (2) connections: (1) an existing, twenty-four-inch (24") diameter water transmission main on Betsy Kerrison Boulevard; and (2) an existing six-inch (6") diameter water main on Mullet Hall Road. The existing water main on Mullet Hall Road will likely need to be upsized in the future to supply sufficient fire-flow. The new system will be designed and constructed to supply sufficient fire suppressing flow based on the requirements of the Insurance Services Office (ISO), as well as the Charleston County Building Department. A Preliminary Master Water Plan is attached to the *Plan* as Exhibit 14.1. Prior to the construction of Phase 1, a more in-depth water model will be created in order to properly size all mains. The new water distribution system will be designed to meet the requirements of the St. Johns Water Company and *DHEC*. Applicable impact fees will be paid to St. Johns Water Company in order to offset any capital improvement upgrades that will be needed for the system. A proof-of-coordination letter with St. Johns Water Company is included in Appendix F. Unless otherwise provided with respect to *Lots* served by a well, the *Property Owner* shall design and construct facilities necessary for the transmission and distribution of potable water to all *Lots* and *Dwelling Units* on the *Real Property*. The *Property Owner* shall transfer facilities for the transmission and distribution of potable water, including necessary easements, to St. Johns Water Co.

#### G. Drainage:

1. Stormwater Master Plan: A Stormwater Master Plan for the *Real Property* is attached to the *Agreement* as Appendix H. The *Property Owner* shall provide sufficient drainage for the *Development* of the *Real Property*. The *Property Owner* shall not impair or diminish the drainage currently flowing through the *Real Property*. The *Property Owner* shall not impede such drainage during construction or during land disturbance activities on the *Real Property* and shall provide comparable drainage at a substitute location, if necessary.

2. County Stormwater Ordinance: Notwithstanding any provision in the *Agreement* or the *Plan* which may be construed to the contrary, the *Property Owner* shall comply with the standards

for drainage set forth in the *County Stormwater Ordinance*. The *Agreement* and the *Plan* shall not be construed to supersede or contravene the *County Stormwater Ordinance*.

3. Coordination with County Public Works Department: The *Property Owner* will continue to coordinate with the Stormwater Division of the *County's* Public Works Department to ensure that all publicly-dedicated, constructed and accepted drainage-related capital improvements (or portions thereof) and operating expenses relating to drainage directly attributable to the *Project* and the *Development* are paid for, through property tax revenue or otherwise, during the build-out of the *Project* and concurrent with impacts from the *Development*, as well as to ensure that all improvements constructed on the *Real Property* comply with the *County's* Stormwater Ordinance. The *Property Owner* shall obtain all applicable permits and approvals relating to drainage before beginning each phase of the *Project*.

4. Maintenance: Any and all drainage infrastructure designed and constructed by the *Property Owner* may (1) be owned and maintained as *Common Areas*; (2) be owned and maintained by the *Property Owner* or a related entity; or (3) be dedicated to the public. The *Property Owner*, a related entity, and/or a duly constituted *Association* shall perform the maintenance and upkeep of the drainage infrastructure and facilities on the *Real Property* or any portion thereof unless they have been dedicated to and accepted by the public.

H. Fire Protection: All access roads and parking areas will be constructed to facilitate fire equipment access. Representatives of the *Property Owner* have coordinated with the St. John's Fire Department to discuss the *Development*, including proposed road sections. The *Property Owner* will continue to coordinate with St. John's Fire Department through the life of this *Agreement*. The *Property Owner* will provide capital items as stated in section 14.P of this *Plan*.

I. Police Protection: All access drives and parking areas will be lighted to improve security and reduce vehicle thefts. The proposed *Development* will foster community involvement, which will aid in the prevention of crime through citizen activism. Also, the proposed traffic improvements referenced in Appendix E should maintain or improve current response times to this and adjacent sites. A proof-of-coordination letter with the Charleston County Sheriff's Office is included in Appendix F.

J. Emergency Medical Services: Charleston County EMS provides emergency medical services to the citizens of Charleston County. Accordingly, a proof-of-coordination letter with Charleston County EMS is included in Appendix F.

K. Solid Waste Collection: Trash collection will be provided by the *Property Owner* for all residential, commercial, institutional, retail and office parcels on the *Real Property*. Trash collection for single-family parcels will be curb-side. Trash collection will be from a central location, such as a Dumpster, for each separate multi-family, commercial, institutional, retail, or office site on the *Real Property*. These Dumpsters (or other containers) will be located out-of-sight in approved areas with appropriate access and screening. A proof-of-coordination letter with Suburban Disposal Services is included in Appendix F. The *Property Owner* will continue to work with the Charleston County Environmental Management Department to coordinate solid-waste related activities.

L. Education: The *Development* will be served by the Charleston County School District and area private schools. The *Development* is planned to be similar in scope and nature to the Kiawah Island and Seabrook communities. The *Development* is expected to generate 39 new students who attend school in the district by the time of full build-out at year 20. A proof-of-coordination letter was received from the Charleston County School District stating that "all of the referenced schools currently have capacity on site to serve students in their attendance zones." A copy of this letter is included in Appendix F.



M. Utilities: Utilities, such as electrical and gas services, cable television, high speed internet access, and telephone service, shall be made available and maintained by the appropriate service providers. All utilities shall be installed underground. The *Property Owner* shall furnish necessary easements to utility providers for water, sewer, gas, electricity, telephone, cable television, and other utilities. Adequate easements for utilities shall be reserved by the *Property Owner* in conveyances of *Lots*, *Dwelling Units*, and *Development Parcels*. The location and size of such easements shall be determined by the *Property Owner* in consultation with the applicable service provider. Letters of coordination from Berkeley Electric Cooperative, Inc., Comcast, and Bellsouth are included in Appendix E.

N. Hurricane Preparedness Plan: The *Property Owner* has procured a Hurricane Evacuation Plan, which is attached hereto as Appendix I. The *Property Owner* will coordinate with the Charleston County Emergency Preparedness Division and the South Carolina Emergency Management Division to ensure that the *Development* complies with applicable laws and regulations.

O. Cultural Resource Areas:

1. Cultural Resources Survey: The *Property Owner* has procured a Cultural Resources Survey of Mullet Hall Plantation, Johns Island, Charleston County, South Carolina, prepared by the Chicora Foundation, Inc., attached to the *Agreement* as Appendix J. The study examined archaeological sites and cultural resources found on the *Real Property*.

a. Cemeteries: Three (3) cemeteries, designated in the study as 38CH1540, 38CH1548, and 38CH1549, will not be developed except as provided herein. Additionally, as recommended in the study, 38CH1540 will have a fifty foot (50') minimum buffer, 38CH1548 will have a twenty-five foot (25') minimum buffer, and 38CH1549 will have a fifty foot (50') minimum buffer. All three cemetery sites will have construction fences erected for their protection during all phases of construction activity. As further recommended in the study, the *Property Owner* will remove all trees in the cemeteries of 5-inches DBH or less in diameter. The remaining trees will be pruned for crown cleaning and overall restoration. No tree survey or other *County* permits shall be required for such clearing and restoration.

b. Archaeological Resources: Upon review and approval by the State Historic Preservation Office ("SHPO"), eligible and potentially eligible archaeological resources may be either green spaced (preserved in place) or subjected to additional investigation (data recovery in the case of eligible sites or additional testing in the case of potentially eligible sites). With additional testing, the potentially eligible sites may be designated as either eligible or not eligible. Contractors shall be advised to report the discovery of any archaeological remains encountered during construction activities to the *Project* engineer, who should, in turn, report the find to SHPO. No further land-altering activities shall take place in the area of the discovery until they have been examined by an archaeologist and, if necessary, processed.

2. Memorandum of Agreement: The *Property Owner* will enter into a Memorandum of Agreement with DHEC and SHPO, a proposed draft of which is attached to the *Agreement* as Appendix K, to certify the consistency of the *Development* with the Coastal Zone Management Plan and to mitigate potential impacts of the *Development* on sites which are eligible for, potentially eligible for, or currently listed in the National Register of Historic Places. The *Property Owner* will continue to coordinate with DHEC and SHPO to ensure that applicable natural and cultural

resource areas on the *Real Property* are investigated, preserved and protected pursuant to state and federal law.

3. Threatened and Endangered Species Assessment: The *Property Owner* has procured a Threatened and Endangered Species Assessment, prepared by Newkirk Environmental, Inc., which, together with a May 21, 2009, update of this assessment, is attached hereto as Appendix L. The assessment was conducted to determine the occurrence of, or potential for, animal and plant species federally listed as endangered or threatened to exist within the *Real Property*. Completion of this survey complied with current state and federal regulations, including the Federal Endangered Species Act, the Bald and Golden Eagle Protection Act, the Migratory Bird Treaty Act, and the South Carolina Non-Game and Endangered Species Conservation Act. Field surveys have documented the presence of two (2) bald eagle nests within the boundaries of the *Real Property*. As a result, coordination with the Department of Natural Resources and the United States Fish & Wildlife Service is on-going in an attempt to establish guidelines for activities near the active nests. The proposed *Development* shall comply with these guidelines.

4. Flora and Fauna: The *Property Owner* will use best efforts to maintain and enhance the native plant material on the *Real Property*. Additional considerations in *Lot* configurations will be made to maintain wildlife corridors that connect this property with the surrounding natural environment.

P. Mitigation Provided Directly by the *Property Owner* to the *County*: The *Property Owner* shall provide the following amounts to mitigate the impact of the *Development*:

1. Ladder Truck: The *Property Owner* will pay \$800,000 or the actual cost, whichever is lesser, towards the purchase of a ladder truck to service the *Real Property* for St. John's Fire District on or before obtaining a building permit for the construction of any building on the *Real Property* requiring a ladder truck according to National Fire Prevention Association requirements.

2. Dedication of Land: During the term of this *Agreement*, the *Property Owner* shall set aside three (3) highland acres of the *Real Property* at a mutually agreeable location(s). At such time as the *County* requests the use of any or all of this acreage for the construction of a substation(s) for the use of St. John's Fire District, the Charleston County Sheriff's Office, the Charleston County Magistrate's Office, Charleston County EMS, and/or any other police, fire or EMS service which may acquire jurisdiction over the *Real Property* after the *Effective Date* (provided, however, the site(s) shall not be used solely by the Charleston County Magistrate's Office), the *Property Owner* shall dedicate the such acreage to the *County* as necessary for such use(s). If the *County* does not construct a substation on the dedicated site(s) within three (3) years of the dedication, the dedicated site(s) shall revert back to the *Property Owner*; provided, however, the *Property Owner* shall continue to hold the site(s) as set forth in Paragraph 16.X.2 of the *Agreement* and all of the *County's* rights in Paragraph 16.X.2 of the *Agreement* shall continue until the termination of this *Agreement*. The *County* may not request such dedication until after a certificate of occupancy has been issued for the 200<sup>th</sup> *Dwelling Unit*, unless otherwise agreed by the *Parties*.

Q. Community Ways: As used herein, a "Community Way" means a walkway of any surface type (paved or unpaved), a bicycle lane, bicycle route, bicycle trail, leisure trail, or walking trail designed for pedestrian or bicycle traffic. The *Property Owner* shall install an interconnected system of *Community Ways* on the *Real Property*. The *Property Owner* may determine the configuration, location, type, number, size, location, lighting and path surfaces of private *Community Ways* on the *Real Property*. However, any and all public *Community Ways* shall comply with the *County's* Improvement Standards, as they exist on

the *Effective Date*. The *Property Owner* shall use best efforts to facilitate a connection with adjacent parcels at the approximate locations delineated in Exhibit 4.1 to the *Plan*. The *Property Owner's* obligation under this section shall not require that the *Property Owner* purchase or otherwise finance the acquisition of any right, title, or interest in and to these adjoining properties. The *County* recognizes the *Property Owner's* abilities under this section are highly dependent upon and constricted by the actions or inactions of third parties. Any and all *Community Ways* designed and constructed by the *Property Owner* may (1) be owned and maintained as *Common Areas*; (2) be owned and maintained by the *Property Owner* or a related entity; or (3) be dedicated to the public. The *Property Owner*, a related entity, and/or a duly constituted *Association* shall perform the maintenance and upkeep of the *Community Ways* on the *Real Property* or any portion thereof unless they have been dedicated to and accepted by the public. Upon tender of a deed from the *Property Owner* approved by the *County* attorney, the public may accept any and all *Community Ways* tendered for dedication by the *Property Owner* provided they comply with the *County's* Improvement Standards, as they exist on the *Effective Date*.

R. Golf Carts and Personal Transportation Vehicles: Golf carts and personal transportation vehicles may be used on any *Thoroughfares*, causeways, *Community Ways*, and parking areas of the *Real Property* or any portion thereof that the *Property Owner* may designate, if consistent with state law.

S. Septic Tanks and Wells: The *Property Owner* may install septic systems and/or wells for drinking water to service *Lots* and *Dwelling Units* on the *Real Property* or portions thereof provided the septic systems and/or wells for drinking water meet state regulatory requirements. The number of *Lots* or *Dwelling Units* on the *Real Property* serviced by wells and/or septic systems shall not exceed any applicable state regulatory requirements. Any such *Lots* and *Dwelling Units* on the *Real Property* that are serviced by a septic system or well meeting applicable regulatory requirements shall not be considered non-conforming under the *County's* Laws because of such septic system or well.

T. Streetlights: The *Property Owner* shall have the right to decide the location, design and number of streetlights, if any, on the *Real Property*. Any and all streetlights designed and installed on the *Real Property* may (1) be owned and maintained as *Common Areas* or (2) be owned and maintained by the *Property Owner* or a related entity. If the location of any streetlight is to be in a public right-of-way, the location must be approved by the *County's* Director of Public Works.

U. Stoplights, Traffic Control, and Other Street Signage: The *Property Owner* may determine the configuration and location of all street and traffic control signs on the *Real Property*, the standards of which shall be determined in consultation with *DOT*. All traffic control devices within a public or private right-of-way must meet the requirements of the Manual on Uniform Traffic Control Devices.

V. Parks, Common Spaces and Buffers on the Real Property: Certain portions of the *Real Property* may contain parks, common spaces, and buffers. The *Property Owner* reserves the right to limit access and use of these to select owners, tenants or lessees on the *Real Property*, their guests, and others who may be their invitees.

W. Common Area Maintenance: Any *Association* established with respect to the *Real Property* or any portion thereof shall be responsible for maintaining the *Common Areas*, as described in any applicable *Covenants* and/or the *Agreement*.

## SECTION 15 – STATEMENTS OF COMPLIANCE

### 15.1 Agreement to Proceed with Development

The Property Owner intends to proceed with the proposed Development in accordance with the Plan, Agreement, ZLDR and Comprehensive Plan.

#### **15.2 Statement of Compliance with ZLDR**

This Plan complies with processes in the ZLDR.

#### **15.3 Variances**

The provisions of Article 3.10 of the ZLDR, relating to variances, shall apply to the planned Development with respect to zoning-related dimensional, design or performance standards on individual *Lots*. Variance applications for trees, *Setbacks*, buffers, height, and maximum Lot/building coverage for individual *Lots* shall be processed pursuant to ZLDR Article 3.10, Zoning Variances. All other proposed changes to the Development Agreement and/or Planned Development must be processed as Development Agreement and Planned Development amendment applications. Variances from the tree regulations in the Plan may be granted in accordance with the processes in the Plan.

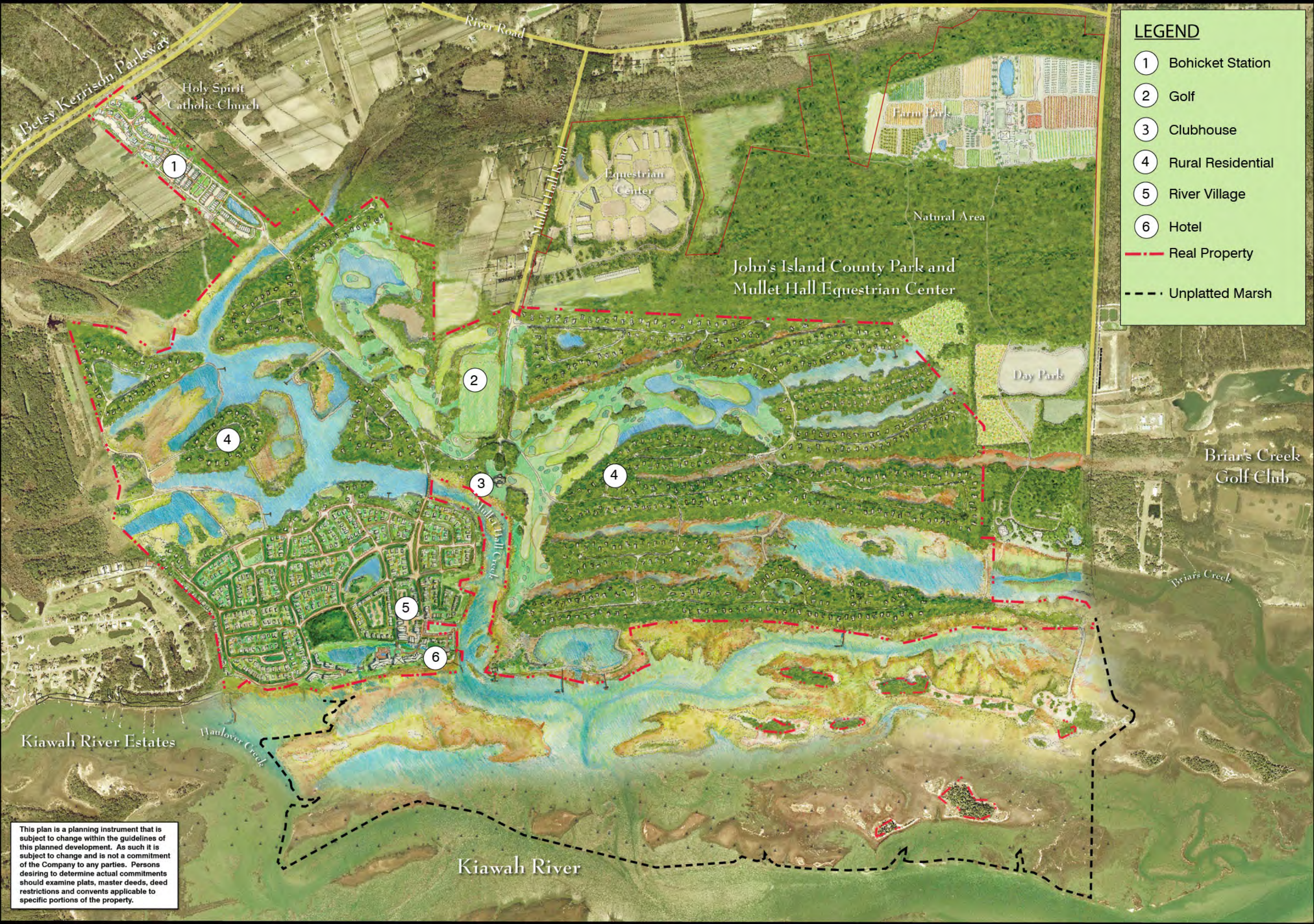
#### **15.4 Interpretation with Development Agreement**

Whenever express substantive provisions of the *Agreement* are inconsistent or in conflict with the substantive provisions of this *Plan*, the more restrictive provision shall apply.

## **SECTION 16 – EXHIBITS**

Exhibit 1.1 Illustrative Master Plan  
Exhibit 1.2 Conceptual Lot Lines  
Exhibit 2.1 Plat  
Exhibit 2.2 Aerial  
Exhibit 2.3 Wetland Survey  
Exhibit 4.1 Framework Plan  
Exhibit 4.2 ZLDR Art. 6.7  
Exhibit 4.3 Standards and Procedures for Short-Term Rental Properties  
Exhibit 4.4 Extended Home Rental Area  
Exhibit 5.1 Proposed Development Plan  
Exhibit 6.1 Waterfront Development Standards  
Exhibit 6.2 Dock Plan  
Exhibit 6.3 Illustration of Lots Fronting on Open Space (Vehicular access across rear lot line)  
Exhibit 7.1 Phasing Diagram  
Exhibit 8.1 Conceptual Open Space Master Plan  
Exhibit 8.2 Park Types  
Exhibit 8.3 Illustration of Village Green Intrusion into OCRM Buffer Line  
Exhibit 8.4 Letter from United States Army Corps of Engineers dated April 4, 2017  
Exhibit 11.1 Typical Utility Placement Diagram  
Exhibit 11.2 Typical Street Cross-Sections  
Exhibit 11.3 Vehicle Lane & Parking Assemblies  
Exhibit 11.4 Conceptual Road Framework Plan  
Exhibit 11.5 Charleston County Parks & Recreation Commission Coordination Letter  
Exhibit 12.1 Illustration of Architectural Style  
Exhibit 12.2 Illustration of Landscape Architectural Style  
Exhibit 12.3 Kiawah River Residential Design Guidelines  
Exhibit 12.4 Jack Island Architect Series Plan Book, Volume 1  
Exhibit 14.1 Water Distribution Master Plan  
Exhibit 15.1 Alternative Sketch Plans  
Exhibit 15.2 Alternative Sketch Plans  
Exhibit 15.3 Alternative Sketch Plans





**LEGEND**

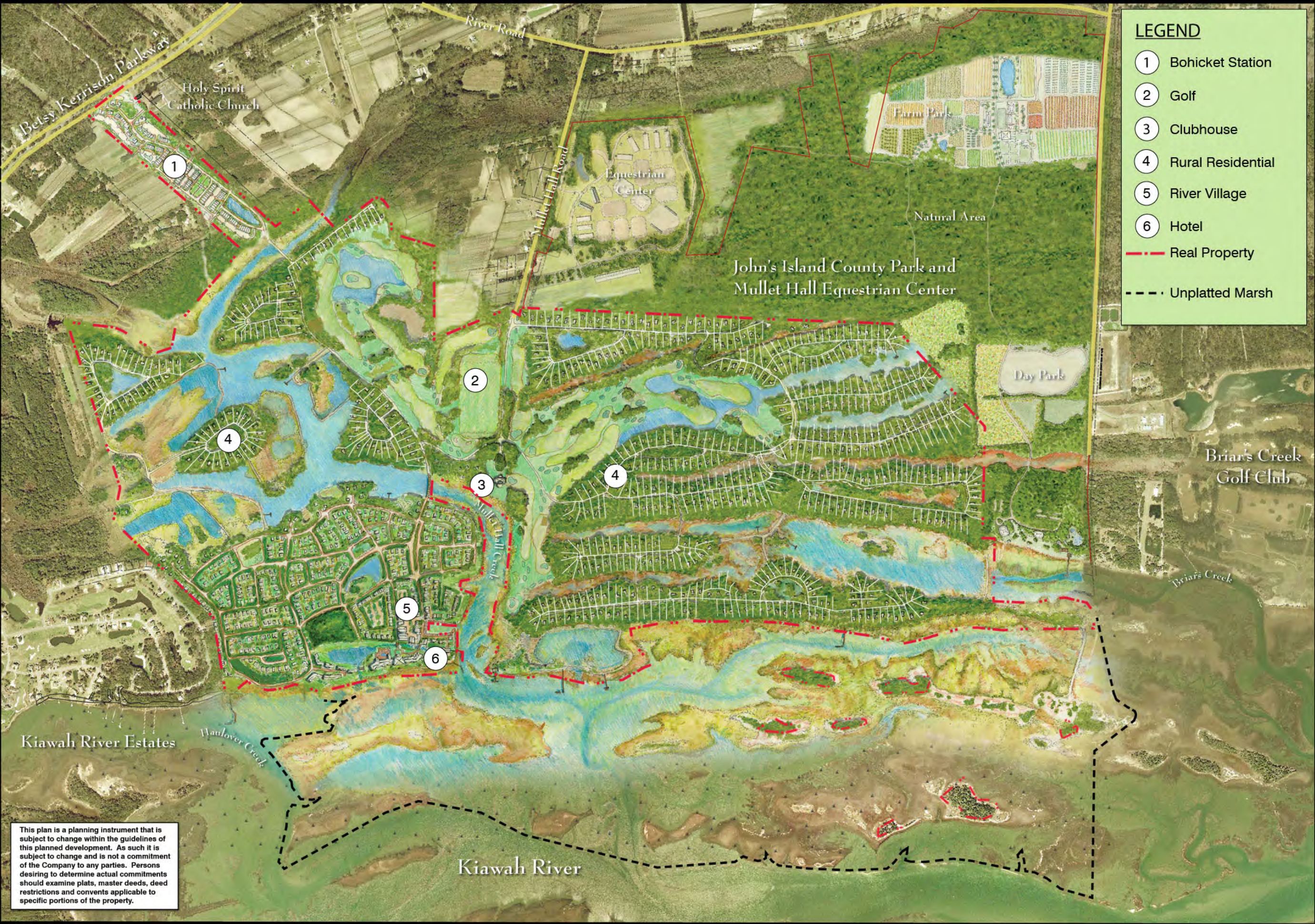
- 1 Bohicket Station
- 2 Golf
- 3 Clubhouse
- 4 Rural Residential
- 5 River Village
- 6 Hotel
- Real Property
- Unplatted Marsh

This plan is a planning instrument that is subject to change within the guidelines of this planned development. As such it is subject to change and is not a commitment of the Company to any parties. Persons desiring to determine actual commitments should examine plats, master deeds, deed restrictions and covenants applicable to specific portions of the property.



# Kiawah River Plantation





**LEGEND**

- 1 Bohicket Station
- 2 Golf
- 3 Clubhouse
- 4 Rural Residential
- 5 River Village
- 6 Hotel
- Real Property
- Unplatted Marsh

This plan is a planning instrument that is subject to change within the guidelines of this planned development. As such it is subject to change and is not a commitment of the Company to any parties. Persons desiring to determine actual commitments should examine plats, master deeds, deed restrictions and covenants applicable to specific portions of the property.



# Kiawah River Plantation



**REFERENCE:**

1. PLAT BY FREDERICK & SMITH DATED SEPTEMBER 1, 1978 BOOK C PAGE 11 RMC CHAS. CO.
2. PLAT BY HENRY HAYWARD DATED DECEMBER 1924 BOOK C PAGE 13 RMC CHAS. CO.
3. PLAT BY SHON HAYWARD CO. DATED NOVEMBER 26, 1908 BOOK B PAGE 143 RMC CHAS. CO.
4. PLAT BY W.L. GALLARD DATED JANUARY 15, 1986 BOOK B PAGE 189 RMC CHAS. CO.
5. PLAT BY W.L. STEPHENS DATED AUGUST 24, 1981 BOOK AU PAGE 82 RMC CHAS. CO.
6. PLAT BY W.L. GALLARD DATED APRIL 16, 1981 BOOK AS PAGE 113 RMC CHAS. CO.
7. PLAT BY HAROLD J. LEA WOND DATED MAY 25, 1972 BOOK AS PAGE 37 RMC CHAS. CO.
8. PLAT BY W.L. GALLARD DATED SEPTEMBER 21, 1978 BOOK AU PAGE 11 RMC CHAS. CO.
9. PLAT BY GEORGE D. SAMPLE DATED MARCH 31, 1972 BOOK AH PAGE 84 RMC CHAS. CO.
10. PLAT BY WARREN P. JENKINS DATED DECEMBER 1973 BOOK AC PAGE 119 RMC CHAS. CO.
11. PLAT BY JAMES C. FARMINGTON DATED APRIL 14, 1987 BOOK BM PAGE 176 RMC CHAS. CO.
12. PLAT BY GEORGE D. SAMPLE DATED AUGUST 3, 1981 BOOK AT PAGE 158 RMC CHAS. CO.
13. PLAT BY MISSIE A. THOMAS DATED APRIL 28, 1980 BOOK AS PAGE 81 RMC CHAS. CO.
14. PLAT BY F. STEVEN JOHNSON DATED APRIL 24, 1989 BOOK BM PAGE 145 RMC CHAS. CO.
15. PLAT BY FORSHAW J. ANDERSON DATED MARCH 2, 1990 BOOK BY PAGE 178 RMC CHAS. CO.
16. PLAT BY FORSHAW J. ANDERSON DATED FEBRUARY 22, 1990 BOOK BY PAGE 182 RMC CHAS. CO.
17. PLAT BY MARK S. BUSBY DATED AUGUST 5, 1991 NOT RECORDED
18. PLAT BY JOEL P. PORDNER DATED OCTOBER 11, 1989 BOOK BT PAGE 187 RMC CHAS. CO.
19. PLAT BY MARK S. BUSBY DATED MARCH 27, 1989 BOOK BT PAGE 134 RMC CHAS. CO.
20. PLAT BY JOSEPH M. WILLIAMS DATED OCTOBER 23, 1988 BOOK BO PAGE 180 RMC CHAS. CO.
21. PLAT BY A.L. GLEN DATED JULY 19, 1960 BOOK W PAGE 150 RMC CHAS. CO.
22. PLAT BY W.L. STEPHENS DATED NOVEMBER 12, 1978 BOOK AD PAGE 103 RMC CHAS. CO.
23. PLAT BY JOHN C. FLEWELL DATED AUGUST 27, 1987 BOOK BV PAGE 129 RMC CHAS. CO.
24. PLAT BY KEITH NELSON DATED MARCH 27, 1991 BOOK CH PAGE 27 RMC CHAS. CO.
25. PLAT BY DAVIS & FLOYD, INC. DATED FEBRUARY 7, 1988 BOOK CH PAGE 27 RMC CHAS. CO.
26. PLAT BY KEITH NELSON DATED MARCH 27, 1991 BOOK CH PAGE 28 RMC CHAS. CO.
27. PLAT BY THOMAS B. JOHNSON DATED NOVEMBER 21, 1991 BOOK AU PAGE 110 RMC CHAS. CO.

PLAT BY A.H. SCHWABE & ASSOCIATES, INC. DATED FEBRUARY 4, 1994 BOOK CA PAGE 38 RMC CHAS. CO.

TAX MAP No. 212-00-00-001

**ACREAGE TABLE**

HIGHLAND		
841.856 Ac		
0.244 Ac Cul-De-Sac		
214.16 Ac		
78.82 Ac		
34.20 Ac		
29.46 Ac		
21.30 Ac		
6.54 Ac		
8.08 Ac		
2.92 Ac		
1.48 Ac		
1,038.01 Total Highland		
17.57 Ac MHW to Critical Line		
1,055.58 Ac		
	PONDS	
	69.12 Ac	
	13.85 Ac	
	10.03 Ac	
	17.49 Ac	
	6.91 Ac	
	17.97 Ac	
	4.53 Ac	
	134.88 Ac TOTAL	
	86.12 Ac POND/CREEK	
	2.93 Ac POND/CREEK	
	234.34 Ac TOTAL	
	ISLANDS	
	11.657 Ac	
	4.743 Ac MHW to Critical Line	
	7.07 Ac	
	1.01 Ac	
	68.36 Ac TOTAL	

LOT "FF" = 33.53 Acres

1,428.81 ACRES

**SURVEYOR'S CERTIFICATION**

I hereby state that to the best of my knowledge, information, and belief, the survey shown hereon was made in accordance with the requirements of the Minimum Standards Manual for the Practice of Land Surveying in South Carolina, and meets or exceeds the requirements for a Class \_\_\_\_\_ survey as specified therein.

*A.H. Schwabe, II*  
A.H. Schwabe, II, R.L.S.  
S.C. Registration Number 14655



THE AREA SHOWN ON THIS PLAT IS A GENERAL REPRESENTATION OF ONE-DOZEN PERMIT AUTHORITY ON THE SUBJECT PROPERTY. CRITICAL AREAS BY THEIR NATURE ARE DYNAMIC AND SUBJECT TO CHANGE OVER TIME. BY GENERALLY DELINEATING THE PERMIT AUTHORITY OF THE ONE-DOZEN, THE OFFICE OF COEN IN NO WAY WAIVES THE RIGHT TO ASSERT PERMIT JURISDICTION IN ANY CRITICAL AREA ON THE SUBJECT PROPERTY WHETHER SHOWN OR NOT.

**NOTES:**  
BEARINGS SHOWN HEREON ARE MAGNETIC AND AS SUCH ARE SUBJECT TO LOCAL ATTRACTION.  
THE PRESENCE OR ABSENCE OF U.S. ARMY CORPS OF ENGINEERS JURISDICTIONAL WETLANDS IS UNDETERMINED AS OF THE DATE OF THIS SURVEY.  
PROPERTY IS LOCATED IN FLOOD ZONES C, S, AS (EL. 121), AA (EL. 135), AA (EL. 141), & AS (EL. 13) AS PER FEMA FLOOD MAPS. PANEL No. 458413 0195 & 0400 F DATED APRIL 17, 1987.  
ADJOINING PROPERTY OWNERS & TAX MAP NUMBERS ARE FROM TAX RECORDS AND DOES NOT REPRESENT A TITLE SEARCH.  
ALL PROPERTY CORNERS SET ARE 1" IRON PIPES (OPEN) UNLESS SHOWN OTHERWISE.  
FIELD CLOSURE 1/16500

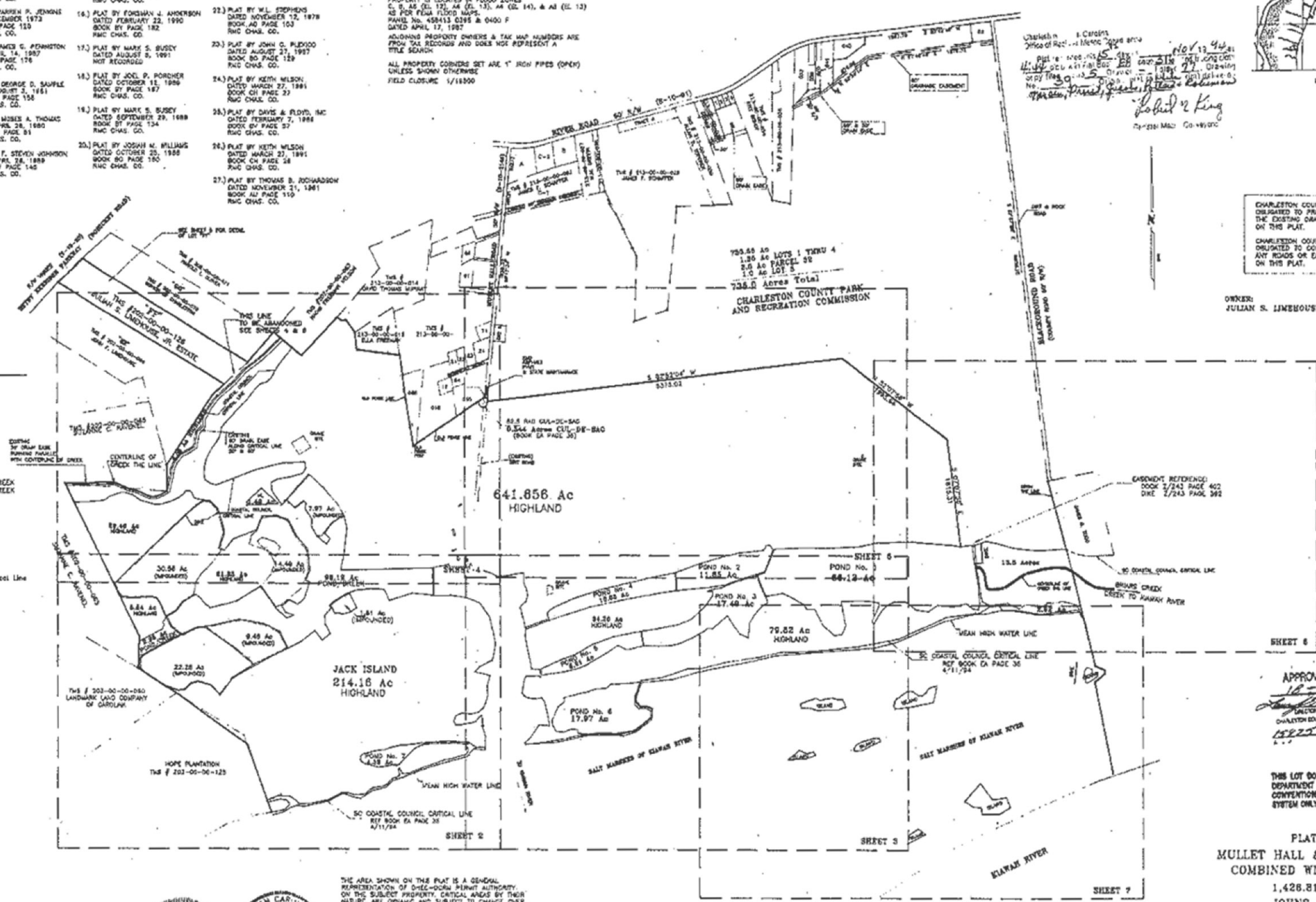
**LEGEND:**  
I.O. WOOD OLD (FOUND)  
I.N. WOOD NEW (SET)

U249PC195



CHARLESTON COUNTY WILL NOT BE OBLIGATED TO PROVIDE CROSSING FOR THE EXISTING DRAINAGE SYSTEM SHOWN ON THIS PLAT.  
CHARLESTON COUNTY WILL NOT BE OBLIGATED TO CONSTRUCT NOR MAINTAIN ANY ROADS OR EASEMENTS SHOWN ON THIS PLAT.

OWNER:  
JULIAN S. LIMEHOUSE, JR. ESTATE



**APPROVED PLAT**  
*[Signature]*  
DIRECTOR OF PLANNING  
CHARLESTON COUNTY PLANNING BOARD  
1997.11.15

THIS LOT DOES MEET MINIMUM HEALTH DEPARTMENT STANDARDS FOR A MODIFIED CONVENTIONAL SUB-SURFACE DISPOSAL SYSTEM ONLY.

PLAT OF  
MULLET HALL & JACK ISLAND  
COMBINED WITH LOT "FF"  
1,428.81 Acres  
JOHNS ISLAND  
CHARLESTON COUNTY SOUTH CAROLINA

800 0 800 1600 2400 Feet

DATE: OCTOBER 4, 1994 SCALE: 1" = 800'

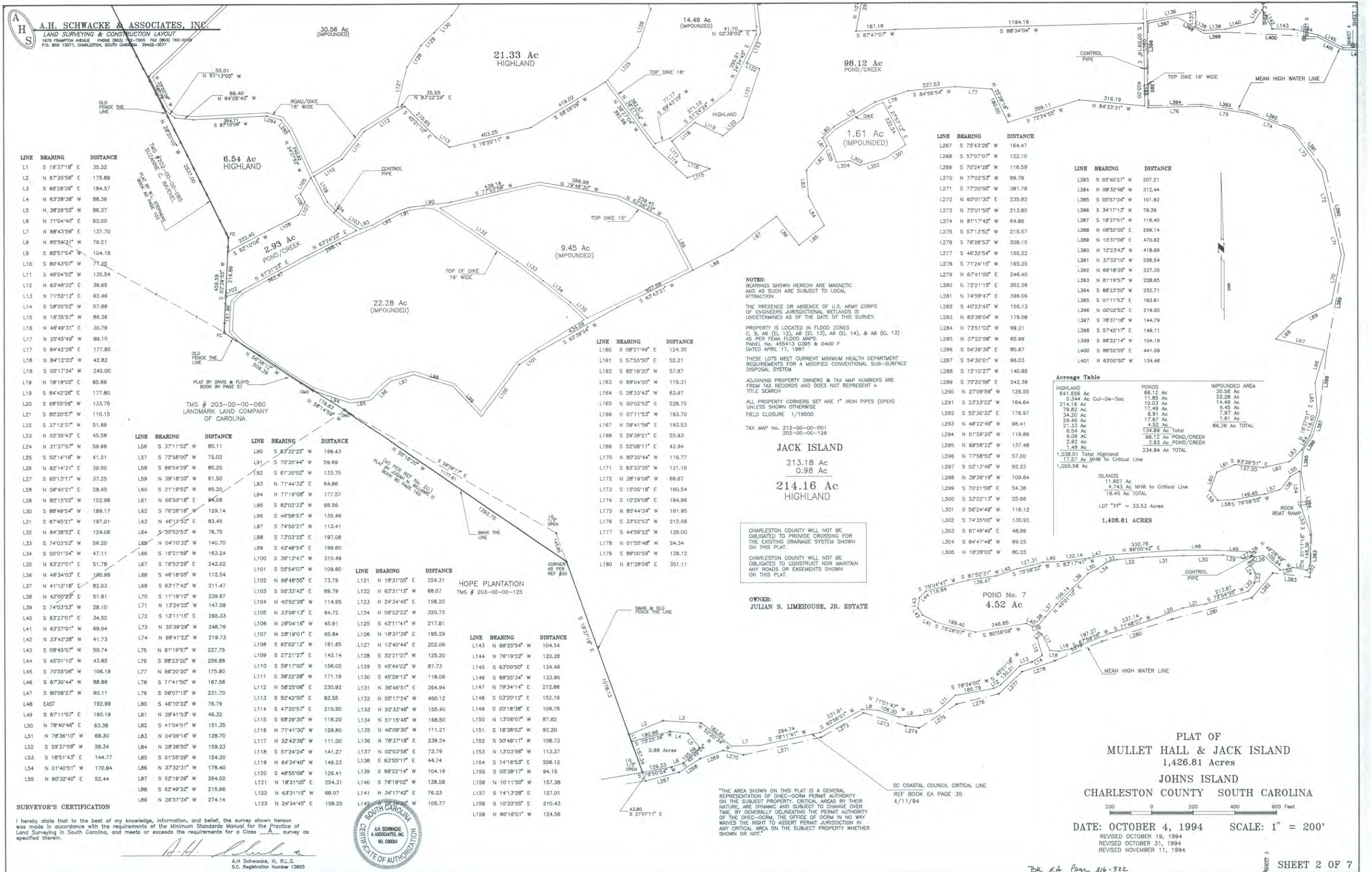
REVISED: OCTOBER 18, 1994  
REVISED: OCTOBER 28, 1994  
REVISED: NOVEMBER 7, 1994  
REVISED: NOVEMBER 11, 1994

SHEET 1 OF 7

*Kiawah River Plantation*

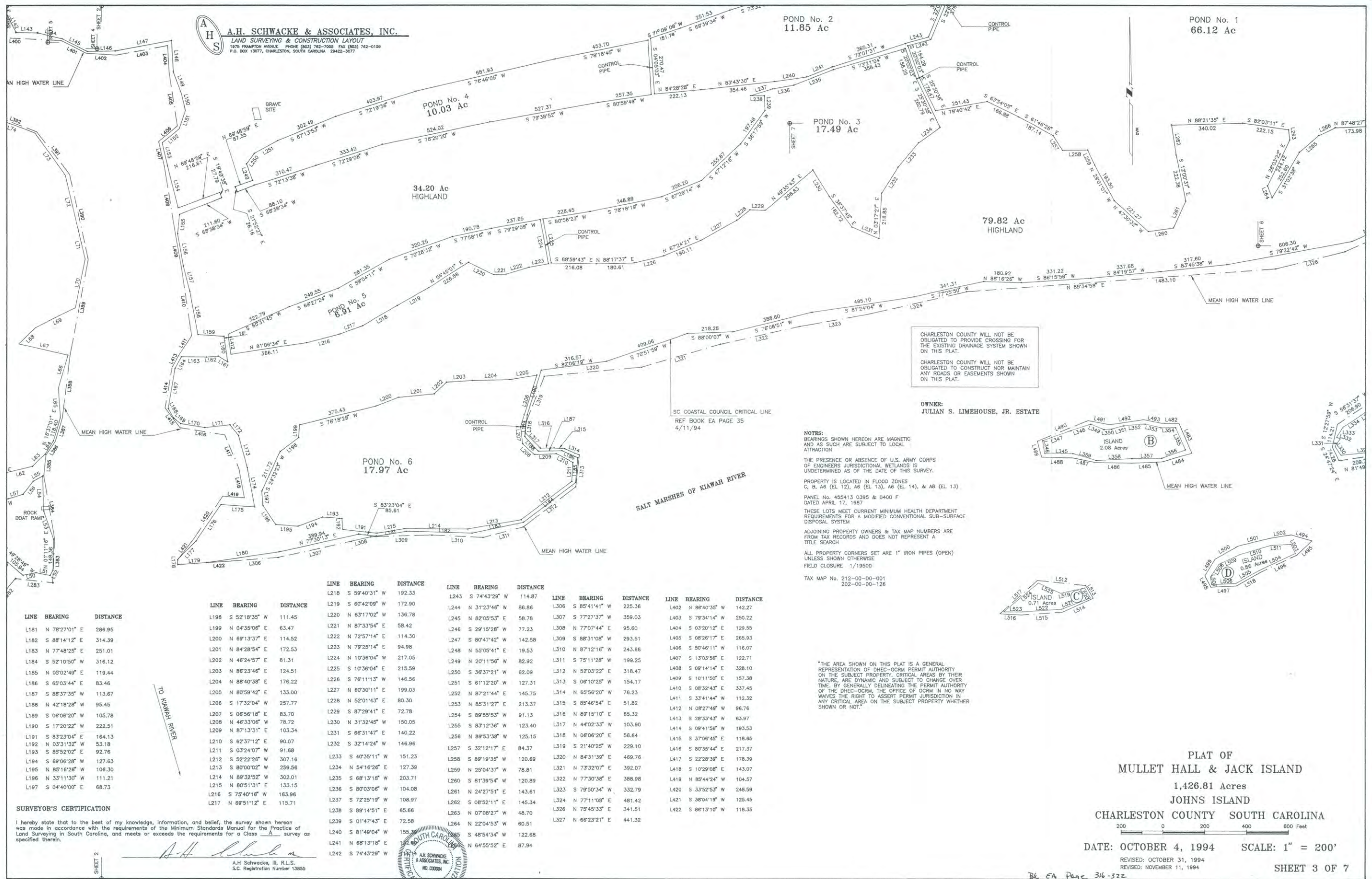
**EXHIBIT 2.1 - PLAT**





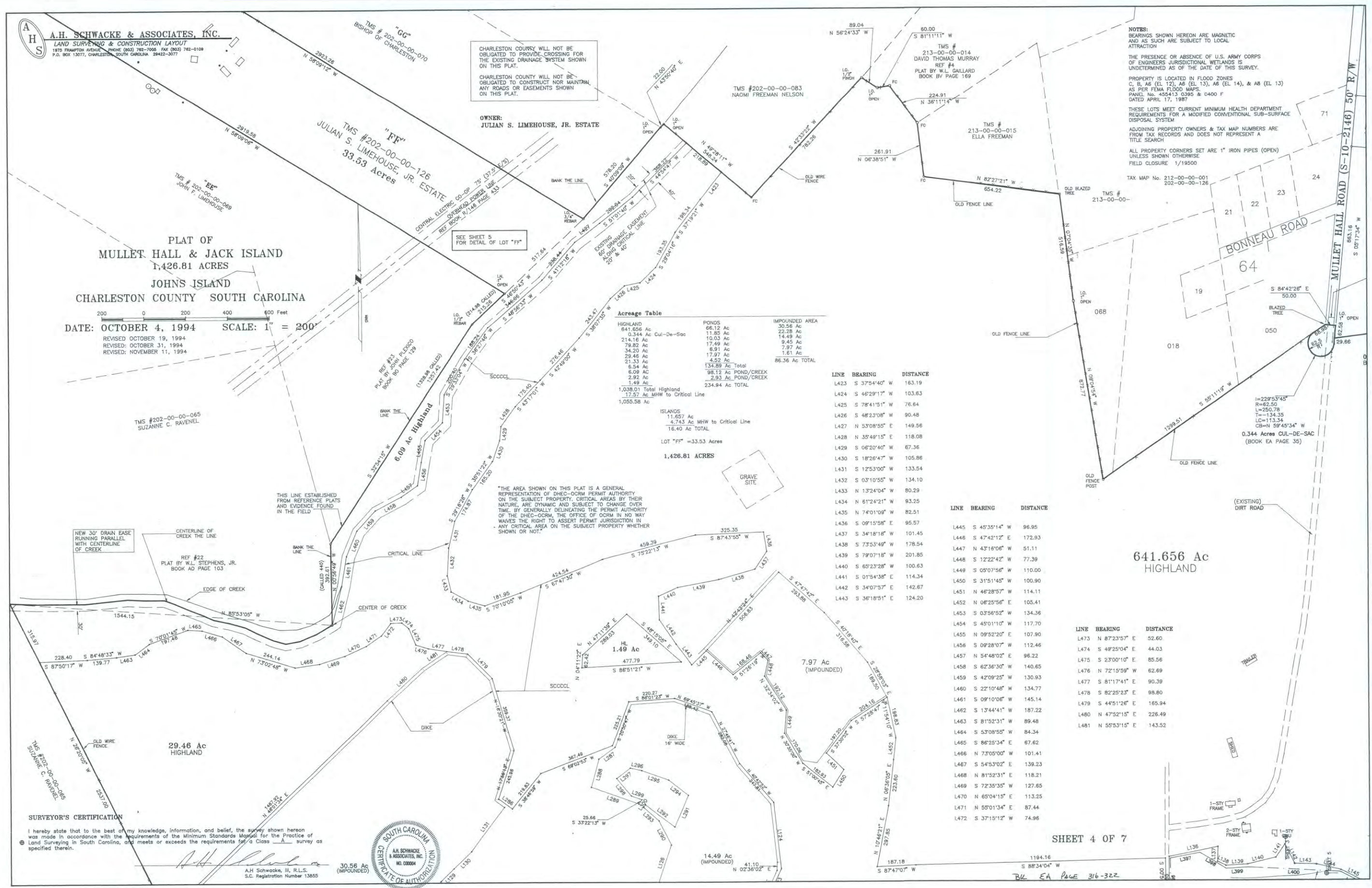
Kiawah River Plantation





Kiawah River Plantation





Kiawah River Plantation



A.H. SCHWACKE & ASSOCIATES, INC.  
LAND SURVEYING & CONSTRUCTION LAYOUT  
1875 FRAMPTON AVENUE PHONE (803) 782-7005 FAX (803) 782-0109  
P.O. BOX 13077, CHARLESTON, SOUTH CAROLINA 29422-3077

PLAT OF  
MULLET HALL & JACK ISLAND  
1,426.81 ACRES  
JOHNS ISLAND  
CHARLESTON COUNTY SOUTH CAROLINA

DATE: OCTOBER 4, 1994 SCALE: 1" = 200'  
REVISED: OCTOBER 31, 1994  
REVISED: NOVEMBER 11, 1994

NOTES:  
BEARINGS SHOWN HEREON ARE MAGNETIC  
AND AS SUCH ARE SUBJECT TO LOCAL  
ATTRACTION  
THE PRESENCE OR ABSENCE OF U.S. ARMY CORPS  
OF ENGINEERS JURISDICTIONAL WETLANDS IS  
UNDETERMINED AS OF THE DATE OF THIS SURVEY.  
PROPERTY IS LOCATED IN FLOOD ZONES  
C, B, A6 (EL. 12), A6 (EL. 13), A6 (EL. 14), & A8 (EL. 13)  
AS PER FEMA FLOOD MAPS.  
PANEL No. 455413 0395 & 0400 F  
DATED APRIL 17, 1987  
THESE LOTS MEET CURRENT MINIMUM HEALTH DEPARTMENT  
REQUIREMENTS FOR A MODIFIED CONVENTIONAL SUB-SURFACE  
DISPOSAL SYSTEM  
ADJOINING PROPERTY OWNERS & TAX MAP NUMBERS ARE  
FROM TAX RECORDS AND DOES NOT REPRESENT A  
TITLE SEARCH  
ALL PROPERTY CORNERS SET ARE 1" IRON PIPES (OPEN)  
UNLESS SHOWN OTHERWISE  
FIELD CLOSURE 1/19500

CHARLESTON COUNTY WILL NOT BE  
OBLIGATED TO PROVIDE CROSSING FOR  
THE EXISTING DRAINAGE SYSTEM SHOWN  
ON THIS PLAT.  
CHARLESTON COUNTY WILL NOT BE  
OBLIGATED TO CONSTRUCT NOR MAINTAIN  
ANY ROADS OR EASEMENTS SHOWN  
ON THIS PLAT.

OWNER:  
JULIAN S. LIMEHOUSE, JR. ESTATE

TAX MAP No. 212-00-00-001  
202-00-00-126

CHARLESTON COUNTY PARK AND RECREATION COMMISSION

0.344 Acres CUL-DE-SAC  
BOOK EA PAGE 35  
I=229°53'45"  
R=62.50  
L=250.78  
T=134.35  
LC=113.34  
CB=N 59°45'34" W

Acreage Table		
HIGHLAND	PONDS	IMPOUNDED AREA
641.656 Ac	66.12 Ac	30.56 Ac
0.344 Ac Cul-De-Sac	11.85 Ac	22.28 Ac
214.16 Ac	10.03 Ac	14.49 Ac
79.82 Ac	17.49 Ac	9.45 Ac
34.20 Ac	6.91 Ac	7.97 Ac
29.46 Ac	17.97 Ac	1.61 Ac
21.33 Ac	4.52 Ac	
6.54 Ac	134.89 Ac Total	86.36 Ac TOTAL
6.09 Ac	98.12 Ac POND/CREEK	
2.92 Ac	2.93 Ac POND/CREEK	
1.49 Ac	234.94 Ac TOTAL	
1,038.01 Total Highland		
17.57 Ac MHW to Critical Line		
1,055.58 Ac		
ISLANDS		
11.657 Ac		
4.743 Ac MHW to Critical Line		
16.40 Ac TOTAL		
LOT "FF" = 33.53 Acres		
1,426.81 ACRES		

LINE	BEARING	DISTANCE
L526	N 58°13'48" W	108.37
L527	S 75°33'55" W	88.43
L528	S 29°22'27" W	71.43
L529	N 61°18'37" E	62.13
L530	S 75°04'42" W	120.86
L531	N 34°10'40" W	106.52
L532	S 23°00'09" W	112.83
L533	S 72°29'08" E	219.61
L534	S 10°37'36" E	102.47
L535	S 82°46'04" W	300.00
L536	N 78°20'54" W	101.29
L537	N 09°50'24" W	119.78
L538	S 11°19'03" W	80.24
L539	N 21°31'45" E	175.93
L540	N 80°23'12" E	94.23
L541	N 33°54'34" W	76.91
L542	S 22°26'50" W	84.95
L543	S 84°08'01" W	117.37
L544	N 14°05'21" E	71.07
L545	N 83°09'03" E	70.89
L546	N 84°34'41" W	216.04
L547	S 78°49'47" E	103.55
L548	N 02°59'12" W	68.64
L549	S 82°54'29" W	158.35
L550	N 88°28'44" W	166.89
L551	S 42°20'53" E	42.16
L552	N 10°10'47" W	70.73
L553	N 62°21'39" E	50.38
L554	N 37°57'07" W	311.47
L555	N 81°15'35" E	213.92
L556	S 17°56'21" E	193.62
L557	S 57°48'23" W	213.55
L558	N 88°05'32" W	271.22
L559	S 10°12'39" E	91.75
L560	N 83°21'00" W	109.16
L561	N 58°11'24" W	185.01
L562	N 41°56'58" E	405.51
L563	S 37°07'06" E	307.36

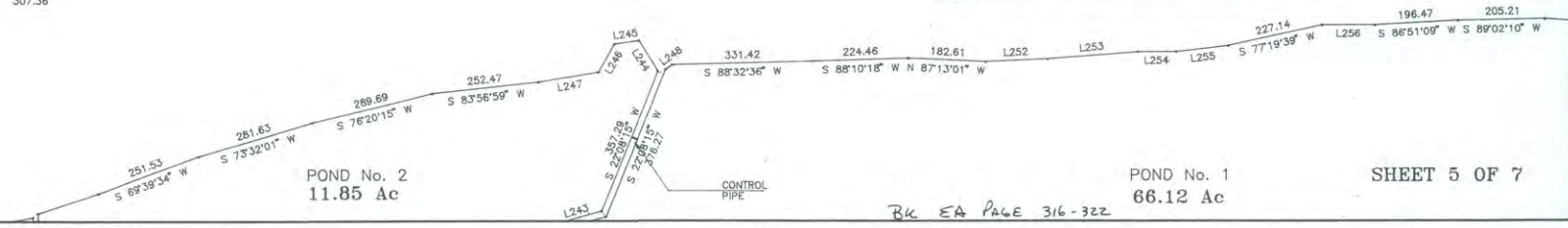
LINE	BEARING	DISTANCE
L564	S 79°52'55" W	211.39
L565	S 19°27'44" E	161.08
L566	S 59°00'33" W	197.48
L567	N 88°45'11" W	254.58
L568	S 05°25'08" E	92.94
L569	N 84°22'25" W	121.66
L570	N 56°26'29" W	151.05
L571	N 40°54'48" E	354.86
L572	S 50°40'24" E	182.91
L573	S 62°19'15" W	375.68
L574	N 10°39'10" E	172.39
L575	N 52°47'02" E	200.08
L576	S 54°18'28" E	142.07
L577	S 82°06'13" W	310.60
L578	S 11°38'49" W	128.35
L579	N 55°44'27" E	105.59
L580	N 46°51'22" E	62.97
L581	S 23°25'53" E	119.32
L582	N 66°34'07" E	52.00
L583	N 24°40'34" W	226.94
L584	N 75°53'53" W	251.00
L585	S 83°16'55" W	422.77
L586	S 87°47'56" W	165.39
L587	S 59°56'54" W	69.76
L588	N 68°14'31" W	179.89
L589	S 83°38'11" W	260.65

LINE	BEARING	DISTANCE
L590	S 80°45'45" W	118.41
L591	N 61°56'56" W	121.58
L592	N 09°23'47" W	419.32
L593	N 25°22'51" W	67.31
L594	N 82°42'37" E	150.32
L595	S 64°10'39" E	196.44
L596	S 52°51'23" W	95.98
L597	N 88°40'02" E	139.78
L598	N 64°00'44" W	85.71
L599	N 78°25'34" E	83.41
L600	S 38°31'58" W	66.28
L601	N 86°34'13" W	78.93
L602	N 81°14'06" E	142.98
L603	S 82°33'45" E	98.65
L604	S 72°38'35" E	136.48
L605	N 25°21'41" W	107.08
L606	S 79°10'49" W	118.11
L607	S 75°33'39" W	90.46
L608	S 77°43'13" E	69.84
L609	S 81°04'49" W	258.37
L610	N 80°56'33" W	262.17
L611	N 81°02'00" W	128.70
L612	N 89°04'45" W	210.72
L613	S 28°00'00" E	71.93
L614	S 82°42'37" W	150.32

\*THE AREA SHOWN ON THIS PLAT IS A GENERAL  
REPRESENTATION OF DHEC-OCRM PERMIT AUTHORITY  
ON THE SUBJECT PROPERTY. CRITICAL AREAS BY THEIR  
NATURE, ARE DYNAMIC AND SUBJECT TO CHANGE OVER  
TIME. BY GENERALLY DELINEATING THE PERMIT AUTHORITY  
OF THE DHEC-OCRM, THE OFFICE OF OCRM IN NO WAY  
WAIVES THE RIGHT TO ASSERT PERMIT JURISDICTION IN  
ANY CRITICAL AREA ON THE SUBJECT PROPERTY WHETHER  
SHOWN OR NOT.

SURVEYOR'S CERTIFICATION

I hereby state that to the best of my knowledge, information, and belief, the survey shown hereon  
was made in accordance with the requirements of the Minimum Standards Manual for the Practice of  
Land Surveying in South Carolina, and meets or exceeds the requirements for a Class A survey as  
specified therein.  
A.H. Schwacke, III, R.L.S.  
S.C. Registration Number 13855



Kiawah River Plantation





A.H. SCHWACKE & ASSOCIATES, INC.  
LAND SURVEYING & CONSTRUCTION LAYOUT  
1875 FRAMPTON AVENUE, PHONE (803) 782-7005 FAX (803) 782-0109  
P.O. BOX 13077, CHARLESTON, SOUTH CAROLINA 29422-3077

NOTES:  
BEARINGS SHOWN HEREON ARE MAGNETIC  
AND AS SUCH ARE SUBJECT TO LOCAL  
ATTRACTION

THE PRESENCE OR ABSENCE OF U.S. ARMY CORPS  
OF ENGINEERS JURISDICTIONAL WETLANDS IS  
UNDETERMINED AS OF THE DATE OF THIS SURVEY.

PROPERTY IS LOCATED IN FLOOD ZONES  
C, B, AB (EL. 12), AB (EL. 13), AB (EL. 14), & AB (EL. 13)  
AS PER FEMA FLOOD MAPS.  
PANEL No. 455413 0395 & 0400 F  
DATED APRIL 17, 1987

THESE LOTS MEET CURRENT MINIMUM HEALTH DEPARTMENT  
REQUIREMENTS FOR A MODIFIED CONVENTIONAL SUB-SURFACE  
DISPOSAL SYSTEM

ADJOINING PROPERTY OWNERS & TAX MAP NUMBERS ARE  
FROM TAX RECORDS AND DOES NOT REPRESENT A  
TITLE SEARCH

ALL PROPERTY CORNERS SET ARE 1" IRON PIPES (OPEN)  
UNLESS SHOWN OTHERWISE  
FIELD CLOSURE 1/19500

TAX MAP No. 212-00-00-001  
202-00-00-126

LINE	BEARING	DISTANCE
L328	S 78°45'33" W	384.33
L329	S 84°01'27" W	194.39
L330	S 31°39'59" E	52.56
L331	S 34°56'50" W	43.72
L332	S 68°48'13" E	19.24
L333	S 31°31'32" W	58.71
L334	S 56°52'35" W	104.10
L335	S 53°36'49" W	85.12
L336	N 84°24'14" E	47.45
L337	N 87°36'53" W	47.72
L338	N 54°20'00" W	94.91
L339	S 88°32'18" E	73.21
L340	N 49°46'58" E	68.65
L341	N 25°50'45" E	61.25
L342	N 60°39'50" E	50.38
L343	S 78°38'23" W	86.79
L344	S 11°41'56" W	241.49
L345	N 88°54'05" W	134.78
L346	N 09°08'09" W	61.18
L347	S 69°42'33" W	143.01
L348	S 71°24'00" W	101.18
L349	N 66°49'28" W	68.82
L350	S 85°56'53" W	36.77
L351	S 73°40'07" W	58.43
L352	N 84°35'43" E	103.33
L353	S 76°04'19" E	79.10
L354	S 89°08'31" W	69.83
L355	S 23°15'29" E	117.64
L356	S 69°34'42" W	120.56

CHARLESTON COUNTY WILL NOT BE  
OBLIGATED TO PROVIDE CROSSING FOR  
THE EXISTING DRAINAGE SYSTEM SHOWN  
ON THIS PLAT.

CHARLESTON COUNTY WILL NOT BE  
OBLIGATED TO CONSTRUCT NOR MAINTAIN  
ANY ROADS OR EASEMENTS SHOWN  
ON THIS PLAT.

OWNER:  
JULIAN S. LIMEHOUSE, JR. ESTATE

CHARLESTON COUNTY PARK AND RECREATION COMMISSION

EASEMENT REFERENCE:  
DOCK 2/243 PAGE 402  
DOCK 2/243 PAGE 392

POND No. 1  
66.12 Ac

13.5 Acres  
SALT MARSH

CENTERLINE OF CREEK  
THE LINE

SURVEYOR'S CERTIFICATION

I hereby certify that the best of my knowledge, information, and belief, the survey shown hereon  
was made in accordance with the requirements of the Minimum Standards Manual for the Practice of  
Land Surveying, and meets or exceeds the requirements for a Class A survey as  
specified in the Manual.



A.H. Schwacke, III, R.L.S.  
S.C. Registration Number 13855

"THE AREA SHOWN ON THIS PLAT IS A GENERAL  
REPRESENTATION OF DHEC-OCRM PERMIT AUTHORITY  
ON THE SUBJECT PROPERTY. CRITICAL AREAS BY THEIR  
NATURE, ARE DYNAMIC AND SUBJECT TO CHANGE OVER  
TIME. BY GENERALLY DELINEATING THE PERMIT AUTHORITY  
OF THE DHEC-OCRM, THE OFFICE OF OCRM IN NO WAY  
WAIVES THE RIGHT TO ASSERT PERMIT JURISDICTION IN  
ANY CRITICAL AREA ON THE SUBJECT PROPERTY WHETHER  
SHOWN OR NOT."

#### Acresage Table

HIGHLAND	PONDS	IMPOUNDED AREA
641.658 Ac	66.12 Ac	30.56 Ac
0.344 Ac Cul-De-Sac	11.85 Ac	22.28 Ac
214.16 Ac	10.03 Ac	14.49 Ac
79.82 Ac	17.49 Ac	9.45 Ac
34.20 Ac	6.91 Ac	7.97 Ac
29.46 Ac	17.97 Ac	1.61 Ac
21.33 Ac	4.52 Ac	
6.54 Ac	134.89 Ac Total	86.36 Ac TOTAL
6.09 Ac	98.12 Ac POND/CREEK	
2.92 Ac	2.93 Ac POND/CREEK	
1.49 Ac	234.94 Ac TOTAL	
1,038.01 Total Highland		
17.57 Ac MHW to Critical Line		
1,055.58 Ac		

ISLANDS  
11.657 Ac  
4.743 Ac MHW to Critical Line  
16.40 Ac TOTAL

LOT "FF" = 33.53 Acres

1,426.81 ACRES

"GG"  
TMS # 202-00-00-070  
BISHOP OF CHARLESTON

"FF"  
TMS # 202-00-00-126  
JULIAN S. LIMEHOUSE, JR. ESTATE  
33.53 Acres

DETAIL  
LOT "FF"

PLAT OF  
MULLET HALL & JACK ISLAND  
1,426.81 ACRES  
JOHNS ISLAND  
CHARLESTON COUNTY SOUTH CAROLINA

200 0 200 400 600 Feet

DATE: OCTOBER 4, 1994 SCALE: 1" = 200'

REVISED: OCTOBER 31, 1994  
REVISED: NOVEMBER 11, 1994

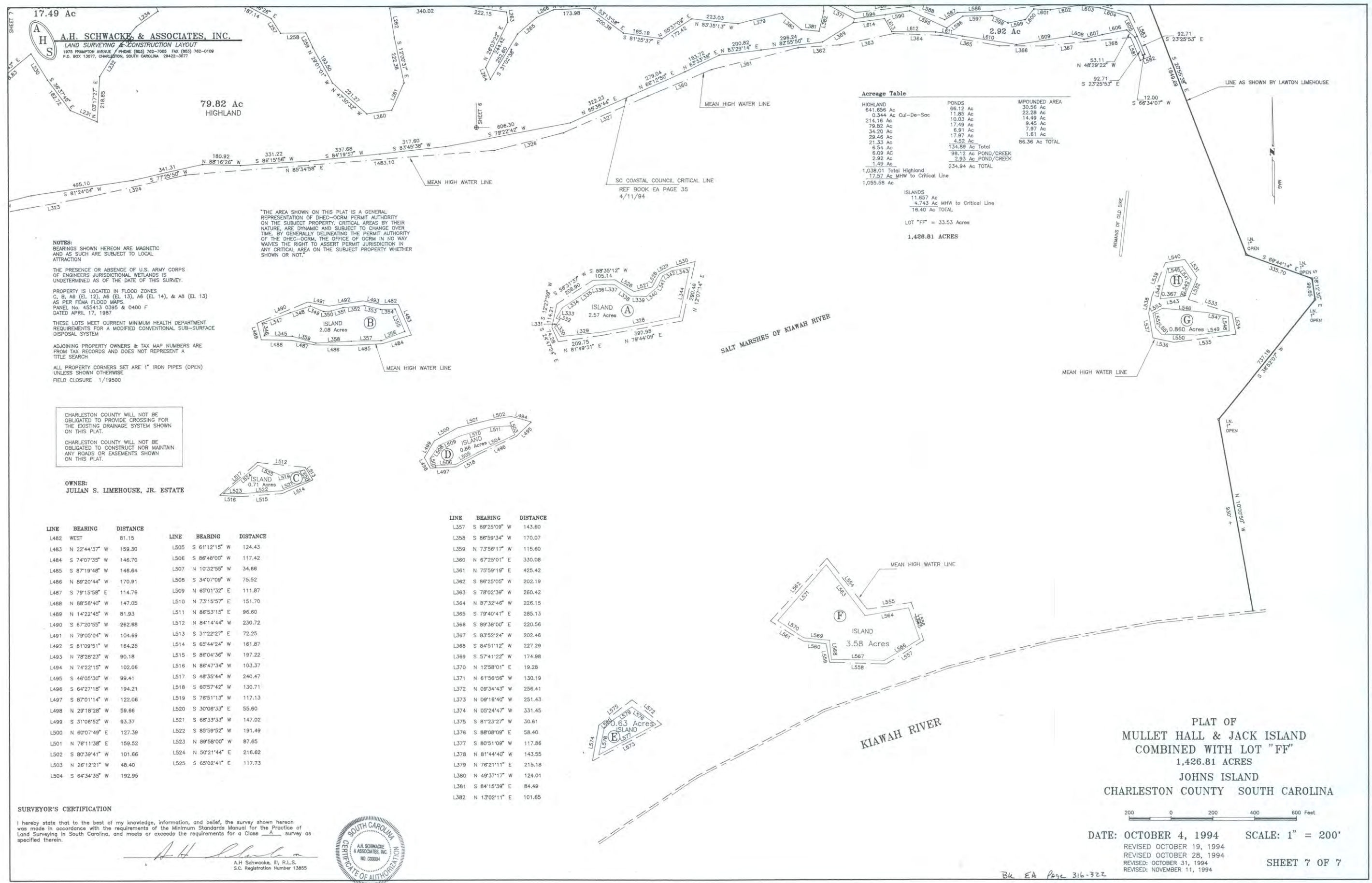
SHEET 6 OF 7

BA EA Page 316-322

Kiawah River Plantation

EXHIBIT 2.1 - PLAT





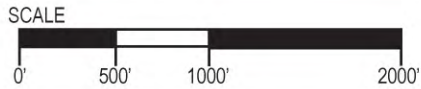
Kiawah River Plantation





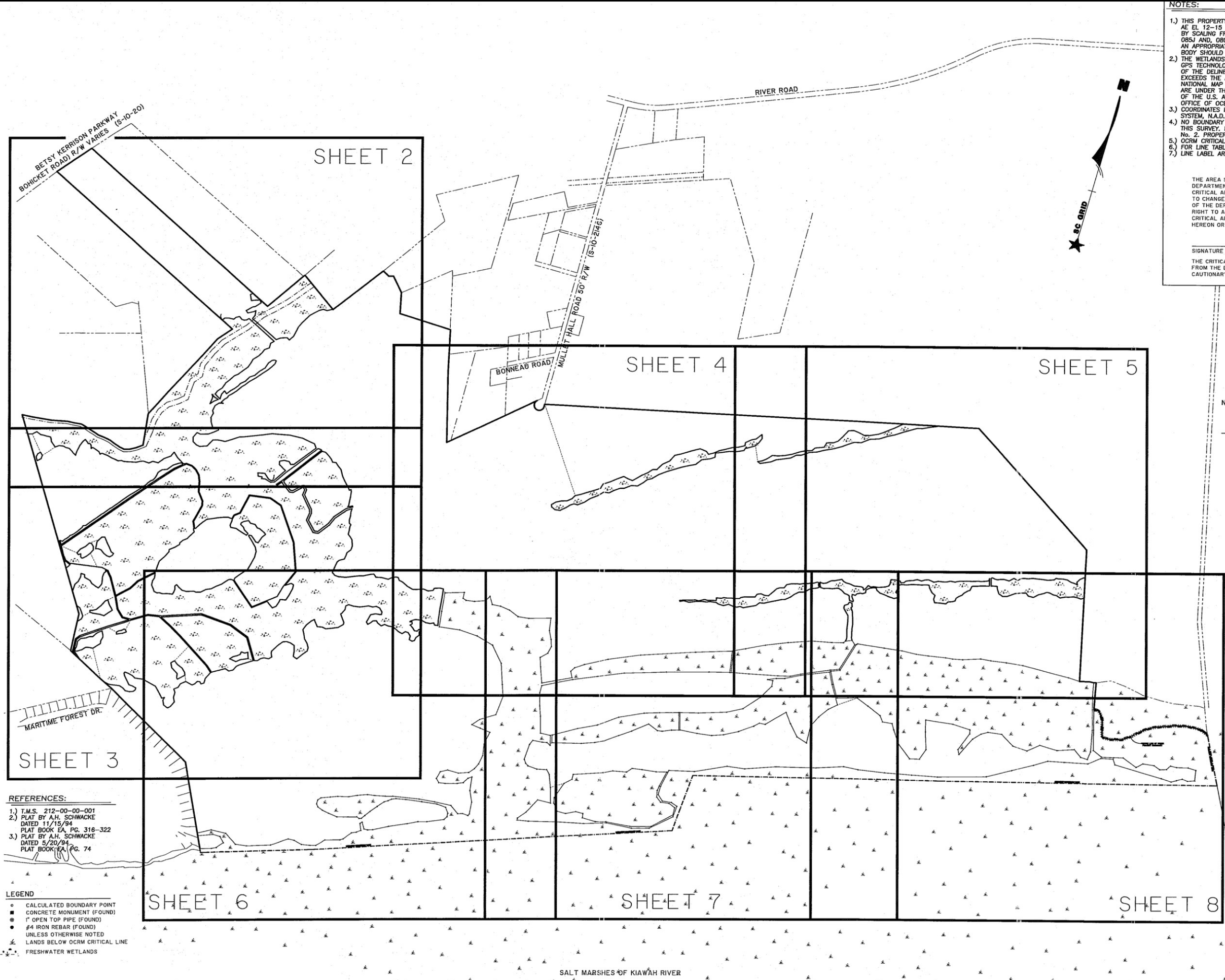
**Legend**

		Real Property
		Unplatted Marsh



*Kiawah River Plantation*





NOTES:

- 1.) THIS PROPERTY LIES IN FLOOD ZONE X, X (SHADED), AE EL 12-15 AND VE EL 14-15 (NGVD) AS DETERMINED BY SCALING FROM F.I.R.M. 45018C, PANEL 0645J, 0665J, 085J AND 0805J DATED 11/17/04. BEFORE CONSTRUCTION AN APPROPRIATE BUILDING OFFICIAL WITH THE GOVERNING BODY SHOULD VERIFY ZONES.
- 2.) THE WETLANDS SHOWN HEREON WERE LOCATED USING GPS TECHNOLOGY. THIS IS AN ACCURATE REPRESENTATION OF THE DELINEATED AND FLAGGED LINES AND MEETS OR EXCEEDS THE ALLOWABLE POSITIONAL TOLERANCE BY THE NATIONAL MAP ACCURACY STANDARDS. THESE WETLANDS ARE UNDER THE JURISDICTION AND PERMITTING AUTHORITY OF THE U.S. ARMY CORPS OF ENGINEERS AND/OR S.C. OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT.
- 3.) COORDINATES BASED ON S.C. STATE PLANE COORDINATE SYSTEM, N.A.D., 1983.
- 4.) NO BOUNDARY SURVEY HAS BEEN PERFORMED IN CONJUNCTION WITH THIS SURVEY. PROPERTY TIES ARE BASED ON PLAT REFERENCE No. 2. PROPERTY MONUMENTATION SHOWN WAS FIELD SURVEYED.
- 5.) OCRM CRITICAL LINE SHOWN HEREON WAS TAKEN FROM REFERENCE No. 2.
- 6.) FOR LINE TABLE SEE SHEETS 5 & 6.
- 7.) LINE LABEL ARE CONSECUTIVE. SOME LINE LABELS NOT SHOWN FOR CLARITY.

THE AREA SHOWN ON THIS PLAT IS A REPRESENTATION OF DEPARTMENT PERMIT AUTHORITY ON THE SUBJECT PROPERTY. CRITICAL AREAS, BY THEIR NATURE, ARE DYNAMIC AND SUBJECT TO CHANGE OVER TIME. BY DELINEATING THE PERMIT AUTHORITY OF THE DEPARTMENT, THE DEPARTMENT IN NO WAY WAIVES ITS RIGHT TO ASSERT PERMIT JURISDICTION AT ANY TIME IN ANY CRITICAL AREA ON THE SUBJECT PROPERTY, WHETHER SHOWN HEREON OR NOT.

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

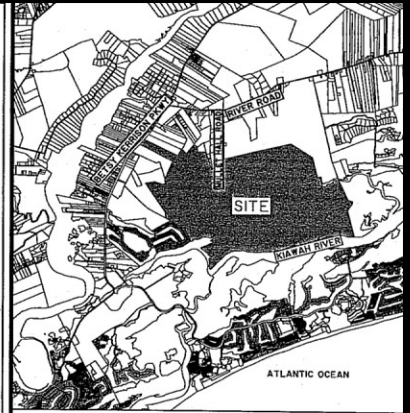
THE CRITICAL LINE SHOWN ON THIS PLAT IS VALID FOR FIVE YEARS FROM THE DATE OF THIS SIGNATURE, SUBJECT TO THE CAUTIONARY LANGUAGE ABOVE.

ACREAGE SUMMARY

JURISDICTIONAL WETLAND:	
CRITICAL AREA	= 241.40 acres
FRESHWATER	= 235.00 acres
NON-JURISDICTIONAL WETLAND:	
FRESHWATER	= 5.90 acres
HIGHLAND	= 1,085.06 acres
TOTAL ACREAGE	= 1,567.36 acres

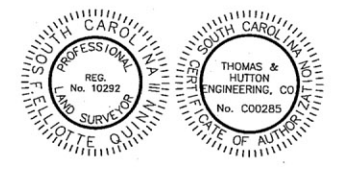
- REFERENCES:
- 1.) T.M.S. 212-00-00-001
  - 2.) PLAT BY A.H. SCHWACKE DATED 11/15/94 PLAT BOOK 5A, PG. 316-322
  - 3.) PLAT BY A.H. SCHWACKE DATED 5/20/94 PLAT BOOK 5A, PG. 74

- LEGEND
- CALCULATED BOUNDARY POINT
  - CONCRETE MONUMENT (FOUND)
  - 1" OPEN TOP PIPE (FOUND)
  - #4 IRON REBAR (FOUND)
  - UNLESS OTHERWISE NOTED
  - LANDS BELOW OCRM CRITICAL LINE
  - FRESHWATER WETLANDS



VICINITY MAP (NOT TO SCALE)

THIS DOCUMENT AND ALL REPRODUCIBLE COPIES OF THIS DOCUMENT ARE THE PROPERTY OF THOMAS & HUTTON ENGINEERING COMPANY. REPRODUCTION OF THIS DOCUMENT IS NOT PERMITTED WITHOUT WRITTEN CONSENT OF THOMAS & HUTTON ENGINEERING CO. UNLESS THIS DOCUMENT BECOMES A MATTER OF PUBLIC RECORD. ALTERATIONS TO THIS DOCUMENT ARE NOT PERMITTED.



I HEREBY STATE THAT TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF, THE SURVEY SHOWN HEREON WAS MADE IN ACCORDANCE WITH THE REQUIREMENTS OF THE MINIMUM STANDARDS MANUAL FOR THE PRACTICE OF LAND SURVEYING IN SOUTH CAROLINA, AND MEETS OR EXCEEDS THE REQUIREMENTS FOR A CLASS "A" SURVEY AS SPECIFIED HEREON.

F. ELLIOTTE QUINN, III, RLS  
S.C. REG. LAND SURVEYOR  
LICENSE NO. 10292

DATE: 3/5/08

NO.	REVISION	BY	DATE

A WETLAND MAP OF  
**KIAWAH RIVER PLANTATION**  
TOTAL AREA  
**1,567.36 acres**  
TOTAL WETLAND AREA  
**240.90 acres**

JOHNS ISLAND  
CHARLESTON COUNTY, SOUTH CAROLINA

PREPARED FOR:  
**KIAWAH RIVER PLANTATION, L.P.**

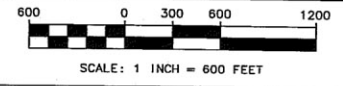
THOMAS & HUTTON  
ENGINEERING CO.

PREPARED BY:  
**THOMAS & HUTTON ENGINEERING CO.**

935 HOUSTON NORTHCUTT BLVD., P.O. BOX 1522  
MT. PLEASANT, SC 29484 / (843) 884-1111

SAVANNAH & BRUNSWICK, GEORGIA  
MYRTLE BEACH, SOUTH CAROLINA / WILMINGTON, NORTH CAROLINA

www.thomas-hutton.com



SCALE 1" = 600'

FILE J-20493

FIELD DATE 02/13/08

PLAT DATE 02/19/08

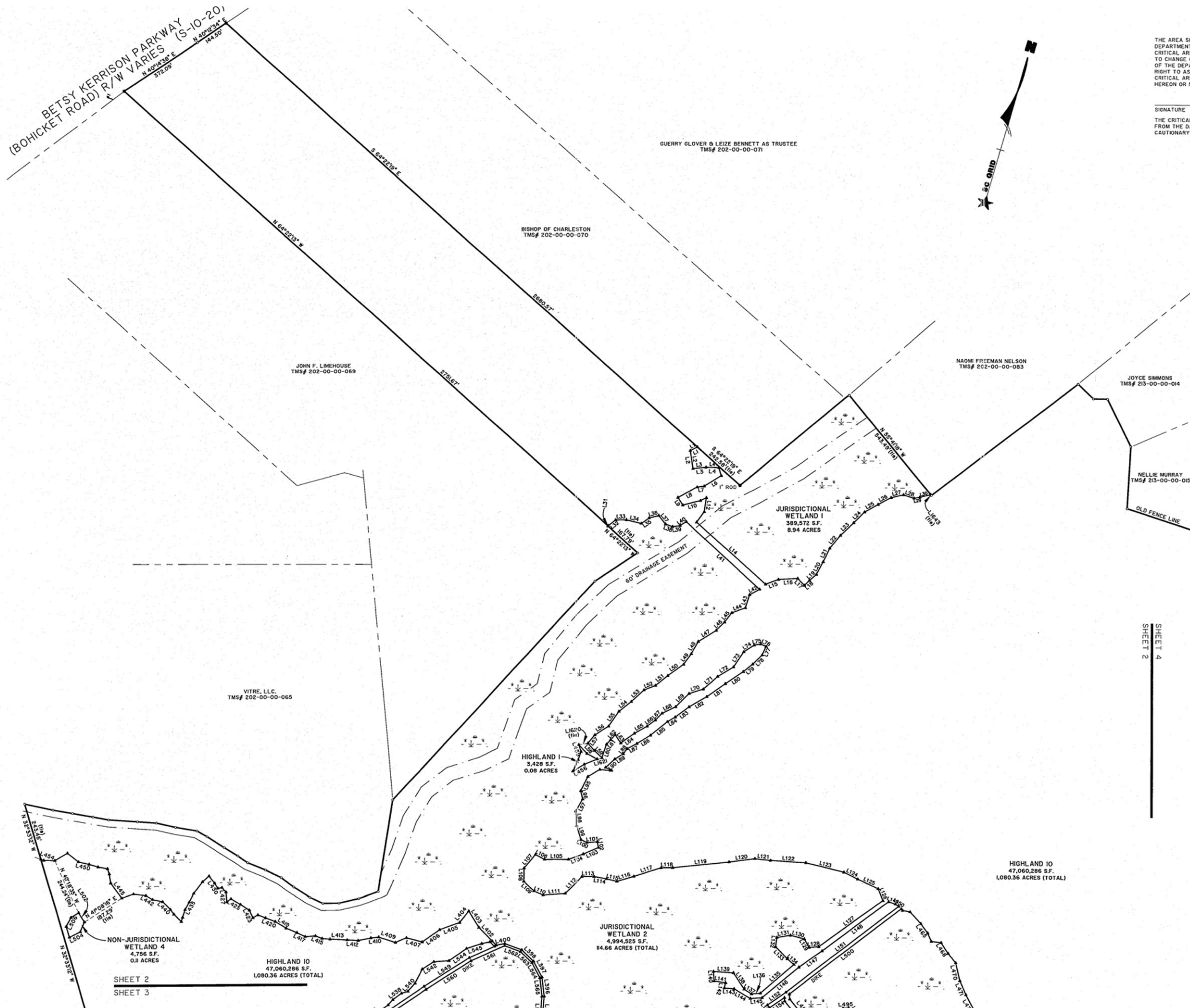
DRAWN BY NAF

REVIEWED BY FEQ

APPROVED BY FEQ

PARTY CHIEF LC

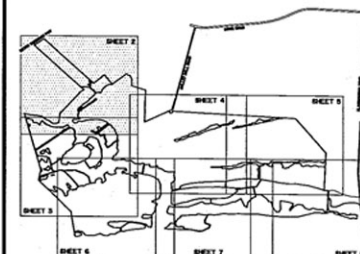
Kiawah River Plantation



THE AREA SHOWN ON THIS PLAT IS A REPRESENTATION OF DEPARTMENT PERMIT AUTHORITY ON THE SUBJECT PROPERTY. CRITICAL AREAS, BY THEIR NATURE, ARE DYNAMIC AND SUBJECT TO CHANGE OVER TIME, BY DELINEATING THE PERMIT AUTHORITY OF THE DEPARTMENT, THE DEPARTMENT IN NO WAY WAIVES ITS RIGHT TO ASSERT PERMIT JURISDICTION AT ANY TIME IN ANY CRITICAL AREA ON THE SUBJECT PROPERTY, WHETHER SHOWN HEREON OR NOT.

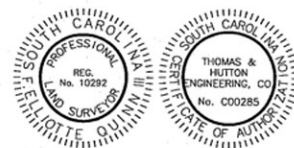
SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

THE CRITICAL LINE SHOWN ON THIS PLAT IS VALID FOR FIVE YEARS FROM THE DATE OF THIS SIGNATURE, SUBJECT TO THE CAUTIONARY LANGUAGE ABOVE.



#### KEY MAP (NOT TO SCALE)

THIS DOCUMENT AND ALL REPRODUCIBLE COPIES OF THIS DOCUMENT ARE THE PROPERTY OF THOMAS & HUTTON ENGINEERING COMPANY. REPRODUCTION OF THIS DOCUMENT IS NOT PERMITTED WITHOUT WRITTEN CONSENT OF THOMAS & HUTTON ENGINEERING CO. UNLESS THIS DOCUMENT BECOMES A MATTER OF PUBLIC RECORD. ALTERATIONS TO THIS DOCUMENT ARE NOT PERMITTED.



I HEREBY STATE THAT TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF, THE SURVEY SHOWN HEREON WAS MADE IN ACCORDANCE WITH THE REQUIREMENTS OF THE MINIMUM STANDARDS MANUAL FOR THE PRACTICE OF LAND SURVEYING IN SOUTH CAROLINA, AND MEETS OR EXCEEDS THE REQUIREMENTS FOR A CLASS "A" SURVEY AS SPECIFIED HEREON.

ELLIOTTE QUINN, III, RLS  
 S.C. REG. LAND SURVEYOR  
 LICENSE NO. 10292

DATE: 3/5/08

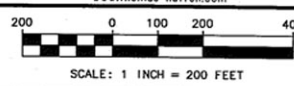
NO.	REVISION	BY	DATE

A WETLAND MAP OF  
**KIAWAH RIVER PLANTATION**  
 TOTAL AREA  
**1,567.36 acres**  
 TOTAL WETLAND AREA  
**240.90 acres**

JOHNS ISLAND  
 CHARLESTON COUNTY, SOUTH CAROLINA  
 PREPARED FOR:  
**KIAWAH RIVER PLANTATION, L.P.**



PREPARED BY:  
**THOMAS & HUTTON ENGINEERING CO.**  
 935 HOUSTON NORTHCUTT BLVD., P.O. BOX 1522  
 MT. PLEASANT, SC 29464 / (843) 884-1111  
 SAVANNAH & BRUNSWICK, GEORGIA  
 MYRTLE BEACH, SOUTH CAROLINA / WILMINGTON, NORTH CAROLINA  
 www.thomas-hutton.com



SCALE	1" = 200'
FILE	J-20493
FIELD DATE	02/13/08
PLAT DATE	02/19/08
DRAWN BY	NAF
REVIEWED BY	FEQ
APPROVED BY	FEQ
PARTY CHIEF	LC

*Kiawah River Plantation*

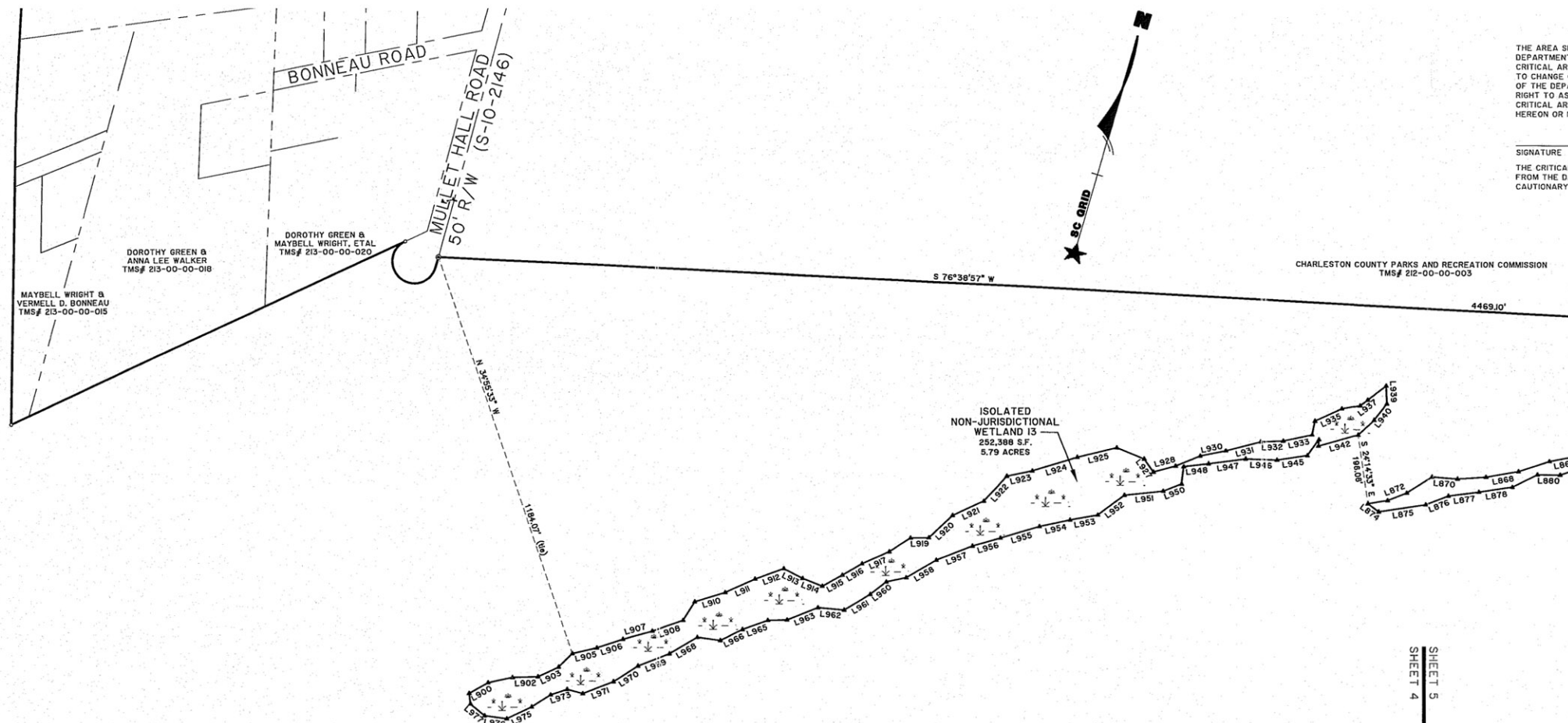






SHEET 2  
SHEET 4

SHEET 3  
SHEET 4



THE AREA SHOWN ON THIS PLAT IS A REPRESENTATION OF DEPARTMENT PERMIT AUTHORITY ON THE SUBJECT PROPERTY. CRITICAL AREAS, BY THEIR NATURE, ARE DYNAMIC AND SUBJECT TO CHANGE OVER TIME. BY DELINEATING THE PERMIT AUTHORITY OF THE DEPARTMENT, THE DEPARTMENT IN NO WAY WAIVES ITS RIGHT TO ASSERT PERMIT JURISDICTION AT ANY TIME IN ANY CRITICAL AREA ON THE SUBJECT PROPERTY, WHETHER SHOWN HEREON OR NOT.

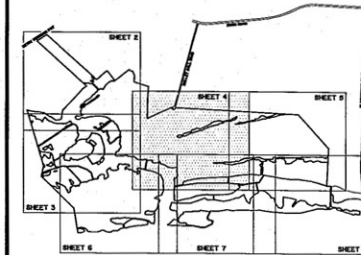
SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_  
THE CRITICAL LINE SHOWN ON THIS PLAT IS VALID FOR FIVE YEARS FROM THE DATE OF THIS SIGNATURE, SUBJECT TO THE CAUTIONARY LANGUAGE ABOVE.

CHARLESTON COUNTY PARKS AND RECREATION COMMISSION  
TMS# 212-00-00-003

ISOLATED  
NON-JURISDICTIONAL  
WETLAND I3  
252,388 S.F.  
5.79 ACRES

#### WETLAND SUMMARY

ISOLATED NON-JURISDICTIONAL WETLAND:  
WETLAND I3 = 5.79 acres



#### KEY MAP (NOT TO SCALE)

THIS DOCUMENT AND ALL REPRODUCIBLE COPIES OF THIS DOCUMENT ARE THE PROPERTY OF THOMAS & HUTTON ENGINEERING COMPANY. REPRODUCTION OF THIS DOCUMENT IS NOT PERMITTED WITHOUT WRITTEN CONSENT OF THOMAS & HUTTON ENGINEERING CO. UNLESS THIS DOCUMENT BECOMES A MATTER OF PUBLIC RECORD. ALTERATIONS TO THIS DOCUMENT ARE NOT PERMITTED.



I HEREBY STATE THAT TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF, THE SURVEY SHOWN HEREON WAS MADE IN ACCORDANCE WITH THE REQUIREMENTS OF THE MINIMUM STANDARDS MANUAL FOR THE PRACTICE OF LAND SURVEYING IN SOUTH CAROLINA, AND MEETS OR EXCEEDS THE REQUIREMENTS FOR A CLASS "A" SURVEY AS SPECIFIED HEREON.

F. ELZOTTE QUINN, III, RLS  
S.C. REG. LAND SURVEYOR  
LICENSE NO. 10292  
DATE: 3/5/08

NO.	REVISION	BY	DATE

A WETLAND MAP OF  
**KIAWAH RIVER PLANTATION**  
TOTAL AREA  
**1,567.36 acres**  
TOTAL WETLAND AREA  
**240.90 acres**

JOHNS ISLAND  
CHARLESTON COUNTY, SOUTH CAROLINA

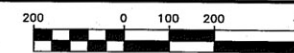
PREPARED FOR:  
**KIAWAH RIVER PLANTATION, L.P.**



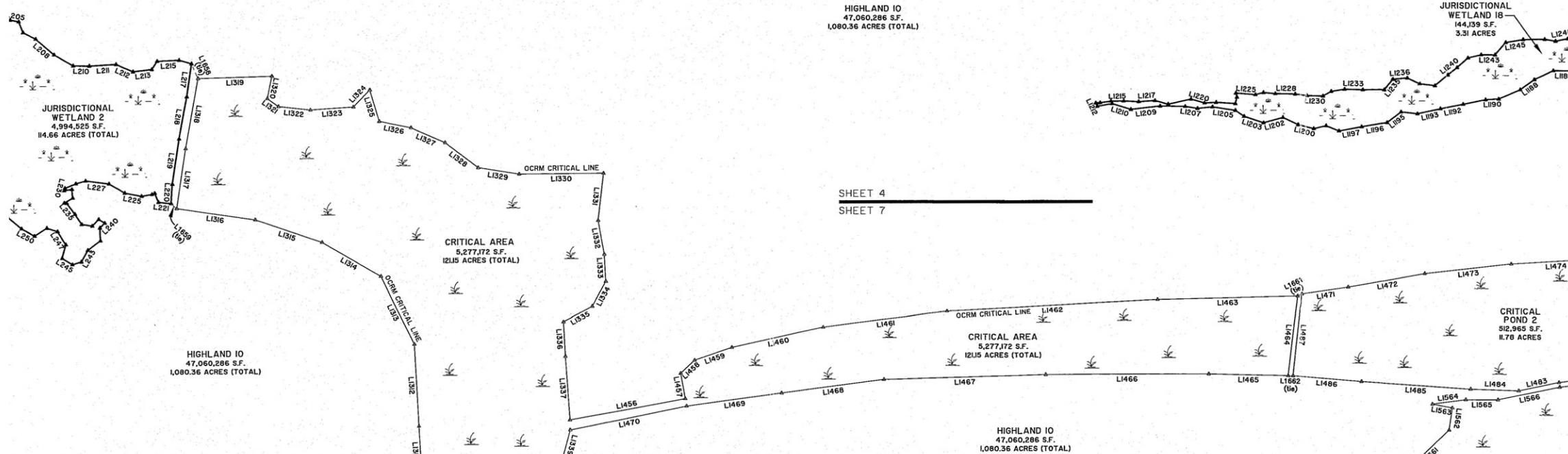
PREPARED BY:  
**THOMAS & HUTTON ENGINEERING CO.**

935 HOUSTON NORTHCUTT BLVD., P.O. BOX 1522  
MT. PLEASANT, SC 29464 / (843) 884-1111

SAVANNAH & BRUNSWICK, GEORGIA  
MYRTLE BEACH, SOUTH CAROLINA / WILMINGTON, NORTH CAROLINA  
www.thomas-hutton.com



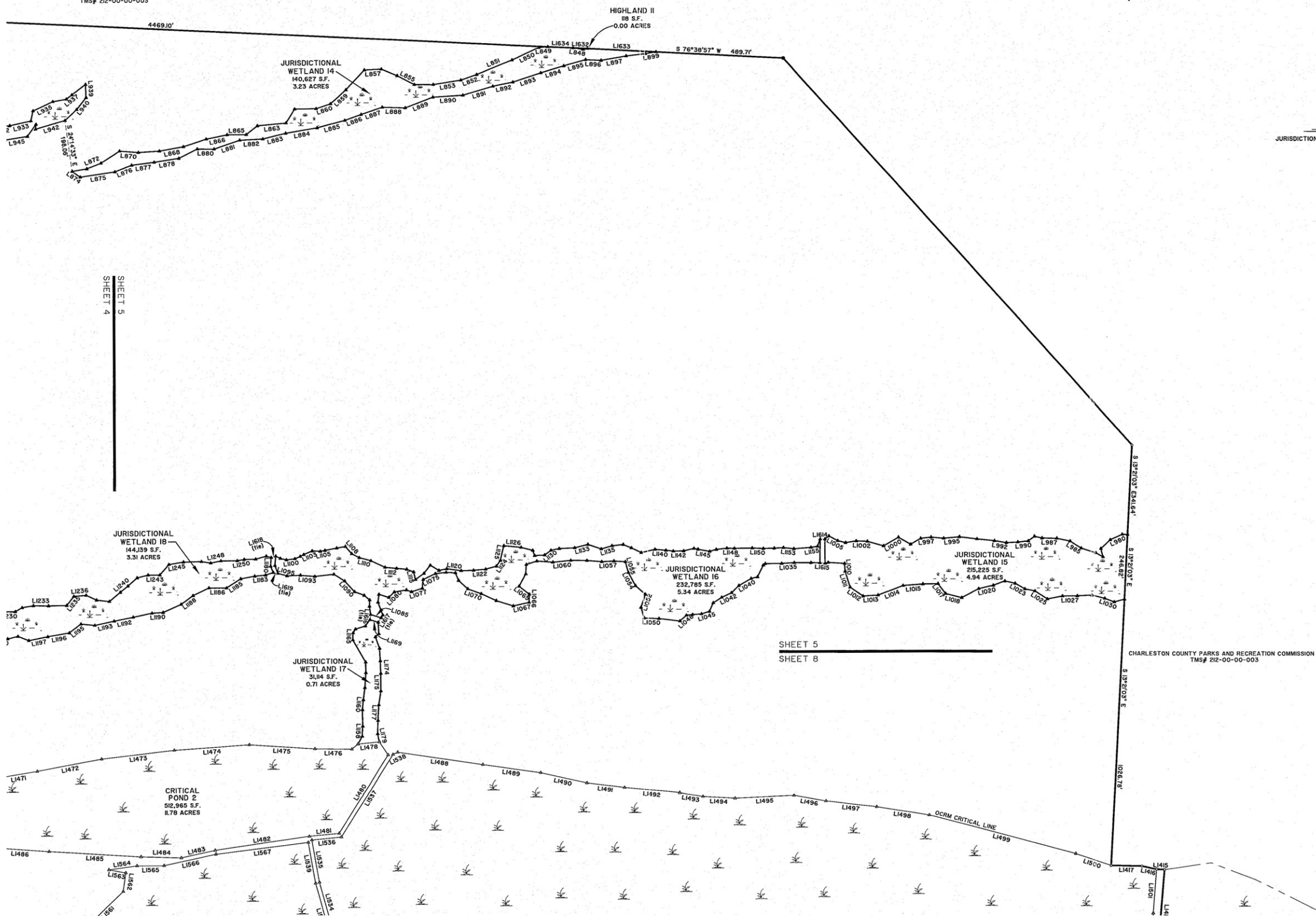
SCALE 1" = 200'  
FILE J-20493  
FIELD DATE 02/13/08  
PLAT DATE 02/19/08  
DRAWN BY NAF  
REVIEWED BY FEQ  
APPROVED BY FEQ  
PARTY CHIEF LC



SHEET 4  
SHEET 7

*Kiawah River Plantation*

CHARLESTON COUNTY PARKS AND RECREATION COMMISSION  
TMS# 212-00-00-003

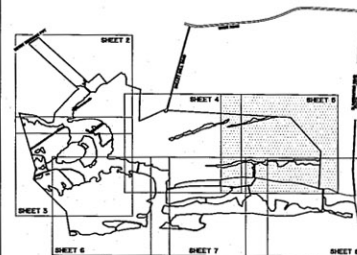


THE AREA SHOWN ON THIS PLAT IS A REPRESENTATION OF DEPARTMENT PERMIT AUTHORITY ON THE SUBJECT PROPERTY. CRITICAL AREAS, BY THEIR NATURE, ARE DYNAMIC AND SUBJECT TO CHANGE OVER TIME. BY DELINEATING THE PERMIT AUTHORITY OF THE DEPARTMENT, THE DEPARTMENT IN NO WAY WAIVES ITS RIGHT TO ASSERT PERMIT JURISDICTION AT ANY TIME IN ANY CRITICAL AREA ON THE SUBJECT PROPERTY, WHETHER SHOWN HEREON OR NOT.

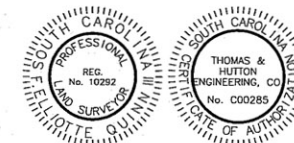
SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_  
THE CRITICAL LINE SHOWN ON THIS PLAT IS VALID FOR FIVE YEARS FROM THE DATE OF THIS SIGNATURE, SUBJECT TO THE CAUTIONARY LANGUAGE ABOVE.

#### WETLAND SUMMARY

JURISDICTIONAL WETLAND:  
WETLAND 14 = 3.23 acres  
WETLAND 15 = 4.94 acres  
WETLAND 16 = 5.34 acres  
WETLAND 17 = 0.71 acres



THIS DOCUMENT AND ALL REPRODUCIBLE COPIES OF THIS DOCUMENT ARE THE PROPERTY OF THOMAS & HUTTON ENGINEERING COMPANY. REPRODUCTION OF THIS DOCUMENT IS NOT PERMITTED WITHOUT WRITTEN CONSENT OF THOMAS & HUTTON ENGINEERING CO. UNLESS THIS DOCUMENT BECOMES A MATTER OF PUBLIC RECORD. ALTERATIONS TO THIS DOCUMENT ARE NOT PERMITTED.



I HEREBY STATE THAT TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF, THE SURVEY SHOWN HEREON WAS MADE IN ACCORDANCE WITH THE REQUIREMENTS OF THE MINIMUM STANDARDS MANUAL FOR THE PRACTICE OF LAND SURVEYING IN SOUTH CAROLINA, AND MEETS OR EXCEEDS THE REQUIREMENTS FOR A CLASS "A" SURVEY AS SPECIFIED HEREON.

F. ELZETTE QUINN, III, RLS  
S.C. REG. LAND SURVEYOR  
LICENSE NO. 10292  
DATE: 3/5/08

NO.	REVISION	BY	DATE

A WETLAND MAP OF  
**KIAWAH RIVER PLANTATION**  
TOTAL AREA  
1,567.36 acres  
TOTAL WETLAND AREA  
240.90 acres

JOHNS ISLAND  
CHARLESTON COUNTY, SOUTH CAROLINA  
PREPARED FOR:  
KIAWAH RIVER PLANTATION, L.P.



PREPARED BY:  
**THOMAS & HUTTON  
ENGINEERING CO.**  
935 HOUSTON NORTHCUTT BLVD., P.O. BOX 1522  
MT. PLEASANT, SC 29464 / (843) 884-1111  
SAVANNAH & BRUNSWICK, GEORGIA  
MYRTLE BEACH, SOUTH CAROLINA / WILMINGTON, NORTH CAROLINA  
www.thomas-hutton.com

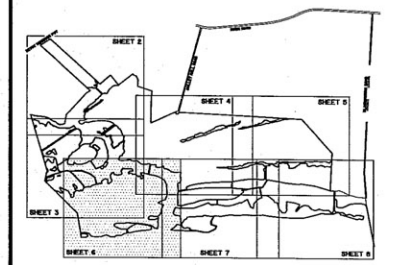
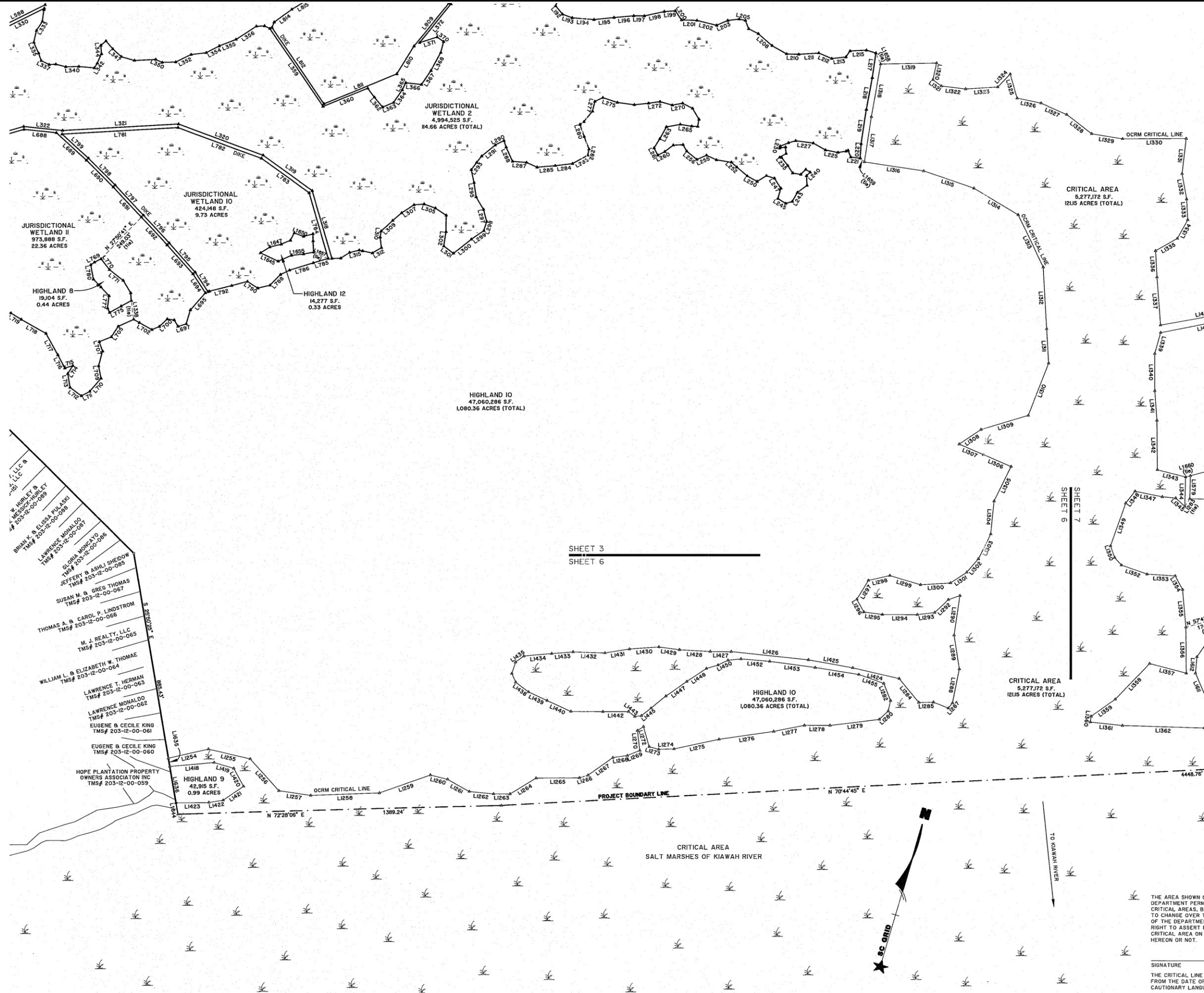
SCALE: 1" = 200'  
200 0 100 200 400  
SCALE: 1" = 200 FEET

SCALE	1" = 200'
FILE	J-20493
FIELD DATE	02/13/08
PLAT DATE	02/19/08
DRAWN BY	NAF
REVIEWED BY	FEQ
APPROVED BY	FEQ
PARTY CHIEF	LC

Kiawah River Plantation

EXHIBIT 2.3 - WETLAND SURVEY





KEY MAP (NOT TO SCALE)

THIS DOCUMENT AND ALL REPRODUCIBLE COPIES OF THIS DOCUMENT ARE THE PROPERTY OF THOMAS & HUTTON ENGINEERING COMPANY. REPRODUCTION OF THIS DOCUMENT IS NOT PERMITTED WITHOUT WRITTEN CONSENT OF THOMAS & HUTTON ENGINEERING CO. UNLESS THIS DOCUMENT BECOMES A MATTER OF PUBLIC RECORD. ALTERATIONS TO THIS DOCUMENT ARE NOT PERMITTED.

**WETLAND SUMMARY**

JURISDICTIONAL WETLAND:  
WETLAND 2 (also Sheet 2) = 14.66 acres  
WETLAND 10 (also Sheet 3) = 9.73 acres  
WETLAND 11 (also Sheet 3) = 22.36 acres

I HEREBY STATE THAT TO THE BEST OF MY KNOWLEDGE, INFORMATION, AND BELIEF, THE SURVEY SHOWN HEREON WAS MADE IN ACCORDANCE WITH THE REQUIREMENTS OF THE MINIMUM STANDARDS MANUAL FOR THE PRACTICE OF LAND SURVEYING IN SOUTH CAROLINA, AND MEETS OR EXCEEDS THE REQUIREMENTS FOR A CLASS "A" SURVEY AS SPECIFIED HEREON.

F. ELLIOTTE QUINN, III, RLS  
S.C. REG. LAND SURVEYOR  
LICENSE NO. 10292

DATE: 3/5/08

NO.	REVISION	BY	DATE

A WETLAND MAP OF  
**KIAWAH RIVER PLANTATION**  
TOTAL AREA  
**1,567.36 acres**  
TOTAL WETLAND AREA  
**240.90 acres**

JOHNS ISLAND  
CHARLESTON COUNTY, SOUTH CAROLINA

PREPARED FOR:  
**KIAWAH RIVER PLANTATION, L.P.**

**THOMAS & HUTTON ENGINEERING CO.**

PREPARED BY:  
**THOMAS & HUTTON ENGINEERING CO.**  
935 HOUSTON NORTHCUTT BLVD., P.O. BOX 1622  
MT. PLEASANT, SC 29404 / (843) 884-1111  
SAVANNAH & BRUNSWICK, GEORGIA  
MYRTLE BEACH, SOUTH CAROLINA / WILMINGTON, NORTH CAROLINA  
www.thomas-hutton.com

SCALE: 1" = 200'

200 0 100 200 400

SCALE	1" = 200'
FILE	J-20493
FIELD DATE	02/13/08
PLAT DATE	02/19/08
DRAWN BY	NAF
REVIEWED BY	FEQ
APPROVED BY	FEQ
PARTY CHIEF	LC

THE AREA SHOWN ON THIS PLAT IS A REPRESENTATION OF DEPARTMENT PERMIT AUTHORITY ON THE SUBJECT PROPERTY. CRITICAL AREAS, BY THEIR NATURE, ARE DYNAMIC AND SUBJECT TO CHANGE OVER TIME, BY DELINEATING THE PERMIT AUTHORITY OF THE DEPARTMENT, THE DEPARTMENT IN NO WAY WAIVES ITS RIGHT TO ASSERT PERMIT JURISDICTION AT ANY TIME IN ANY CRITICAL AREA ON THE SUBJECT PROPERTY, WHETHER SHOWN HEREON OR NOT.

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

THE CRITICAL LINE SHOWN ON THIS PLAT IS VALID FOR FIVE YEARS FROM THE DATE OF THIS SIGNATURE, SUBJECT TO THE CAUTIONARY LANGUAGE ABOVE.

Kiawah River Plantation





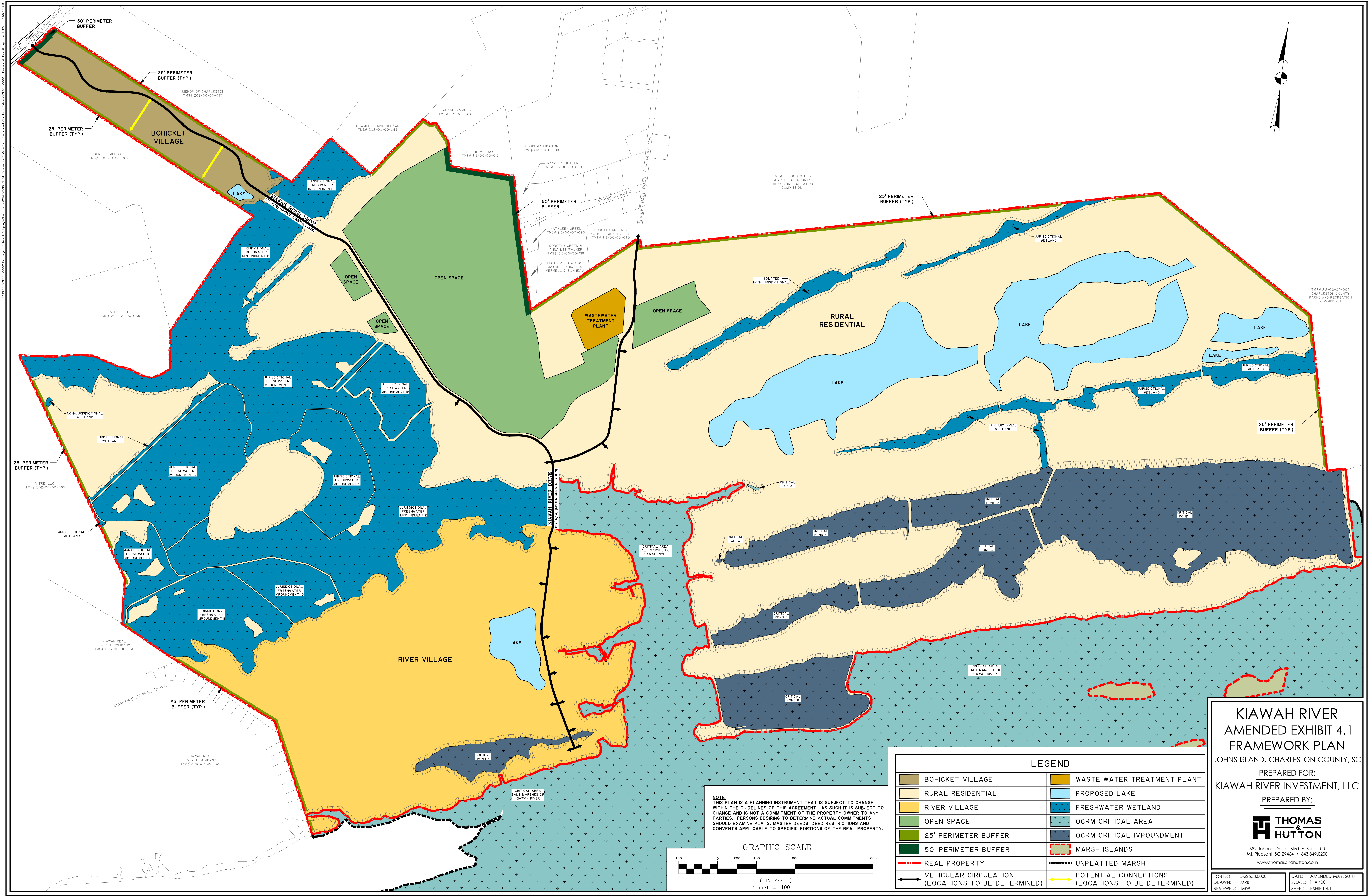
LINE	BEARING	LENGTH
L183	S 08°07'27" W	44.64'
L184	S 38°13'13" W	58.83'
L185	S 03°51'57" W	39.78'
L186	S 10°25'09" W	46.88'
L187	S 56°28'31" W	66.84'
L188	S 33°16'20" W	30.78'
L189	S 07°18'01" W	24.68'
L190	S 09°28'10" W	46.41'
L191	S 07°36'14" W	67.21'
L192	S 45°25'32" E	56.53'
L193	S 86°30'34" E	44.34'
L194	S 76°28'35" E	93.76'
L195	S 86°00'18" E	86.40'
L196	S 68°31'10" E	84.58'
L197	S 74°31'49" E	45.44'
L198	S 81°32'38" E	80.39'
L199	S 89°24'51" E	47.15'
L200	S 51°28'56" E	47.72'
L201	S 75°30'56" E	65.55'
L202	S 82°36'33" E	76.35'
L203	S 50°36'51" E	51.05'
L204	S 65°55'54" E	49.75'
L205	N 85°51'18" E	27.67'
L206	S 36°08'18" E	35.51'
L207	S 79°17'11" E	36.07'
L208	S 77°15'11" E	77.95'
L209	S 76°08'28" E	71.29'
L210	S 78°24'47" E	59.11'
L211	S 76°14'31" E	26.81'
L212	S 82°35'05" E	60.20'
L213	S 72°02'35" E	61.17'
L214	N 17°53'03" E	31.45'
L215	S 71°07'15" E	26.81'
L216	S 82°36'32" E	42.07'
L217	S 07°57'51" E	106.29'
L218	S 05°42'00" E	137.75'
L219	S 12°34'19" E	146.58'
L220	S 12°38'57" E	62.10'
L221	S 80°15'53" E	40.74'
L222	N 38°49'11" W	31.04'
L223	S 51°52'27" E	42.23'
L224	S 64°08'34" E	34.83'
L225	S 84°39'57" E	54.84'
L226	S 76°25'33" E	58.85'
L227	S 81°21'31" E	162.68'
L228	S 57°56'59" E	32.41'
L229	S 56°16'48" E	37.74'
L230	S 03°30'59" E	8.32'
L231	S 14°36'11" E	46.09'
L232	S 20°54'03" E	27.86'
L233	S 43°33'58" E	31.28'
L234	S 79°09'11" E	7.79'
L235	S 82°54'47" E	9.23'
L236	S 50°05'19" E	39.35'
L237	S 82°52'52" E	34.63'
L238	S 28°16'26" E	26.68'
L239	S 74°21'58" E	56.83'
L240	S 52°54'47" E	59.11'
L241	S 18°27'31" E	8.25'
L242	S 37°16'17" E	50.63'
L243	S 13°28'41" E	43.15'
L244	S 57°04'41" E	39.23'
L245	N 11°52'00" E	59.13'
L246	N 03°00'01" E	45.35'
L247	N 49°08'16" E	45.35'
L248	N 88°25'11" E	36.03'
L249	S 41°43'47" E	48.78'
L250	N 77°07'52" E	48.25'
L251	N 65°02'20" E	58.37'
L252	N 63°31'30" E	36.89'
L253	S 83°04'36" E	64.94'
L254	N 81°49'33" E	46.94'
L255	S 50°04'35" E	45.15'
L256	N 66°37'40" E	70.92'
L257	N 45°45'52" E	31.81'
L258	S 71°02'52" E	42.40'
L259	S 36°17'09" E	45.45'
L260	S 46°01'49" E	50.78'
L261	N 44°43'47" E	34.86'
L262	N 16°42'14" E	46.70'
L263	N 12°37'31" E	55.47'
L264	S 63°53'13" E	42.81'
L265	N 83°09'18" E	48.30'
L266	N 75°15'18" E	26.80'
L267	N 05°56'25" E	30.36'
L268	N 48°31'35" E	34.84'
L269	N 78°22'45" E	47.86'
L270	S 63°16'04" E	45.81'
L271	S 89°48'22" E	53.76'
L272	S 85°43'02" E	50.13'
L273	S 67°41'06" E	45.33'
L274	S 81°31'51" W	73.21'
L275	N 88°13'54" W	66.89'
L276	N 43°53'12" W	33.77'
L277	S 02°56'28" W	44.01'
L278	S 23°57'05" W	57.74'
L279	S 38°49'22" W	20.74'
L280	S 39°58'28" E	53.68'
L281	S 37°31'59" E	72.23'
L282	S 04°29'13" E	26.38'
L283	S 44°40'33" W	74.95'
L284	S 66°01'23" W	74.98'
L285	S 68°41'24" W	62.98'
L286	N 81°01'40" W	42.31'
L287	S 78°17'59" W	60.33'
L288	S 01°12'38" W	34.27'
L289	N 35°08'26" W	18.51'
L290	S 47°11'13" W	42.45'
L291	S 34°32'46" W	74.34'
L292	S 22°44'16" W	34.67'
L293	S 19°57'12" W	39.28'
L294	S 26°34'18" E	56.26'
L295	S 24°16'16" E	61.53'
L296	S 47°09'19" E	61.14'
L297	S 30°50'52" E	61.44'
L298	S 02°56'42" W	41.52'
L299	S 39°21'42" W	65.19'
L300	S 35°36'53" W	97.55'
L301	N 68°51'13" W	52.03'
L302	N 07°29'26" W	61.70'
L303	N 50°13'01" W	71.64'
L304	N 72°23'06" W	56.23'
L305	N 87°01'40" W	51.90'
L306	S 89°35'11" W	43.69'
L307	S 40°53'18" W	63.31'
L308	S 32°15'25" W	50.67'
L309	S 30°32'14" W	67.50'
L310	S 28°58'55" W	50.68'
L311	S 23°03'05" E	44.88'
L312	S 42°51'51" W	44.94'
L313	S 68°16'36" W	42.66'
L314	S 86°58'05" W	42.66'
L315	S 59°48'20" W	47.72'
L316	S 40°27'22" W	44.54'
L317	S 32°27'21" W	44.26'
L318	S 32°27'21" W	44.26'
L319	S 70°09'33" W	25.55'
L320	N 86°01'37" W	386.98'
L321	S 70°50'51" W	497.38'
L322	S 76°52'36" W	67.76'
L323	S 58°22'00" W	218.79'
L324	S 89°14'00" W	102.73'
L325	N 47°01'05" W	114.43'
L326	N 28°59'26" W	156.43'
L327	N 44°51'47" W	27.40'
L328	N 46°27'59" W	127.32'
L329	N 31°43'52" E	131.09'
L330	N 47°49'03" E	232.22'

LINE	BEARING	LENGTH
L331	S 01°48'09" E	6.36'
L332	S 08°50'43" E	49.58'
L333	S 17°00'32" E	59.20'
L334	S 03°23'52" E	52.85'
L335	S 39°58'18" E	50.33'
L336	S 35°28'23" E	34.65'
L337	S 73°02'48" E	37.95'
L338	S 73°02'48" E	37.95'
L339	S 89°08'34" E	43.84'
L340	N 72°37'45" E	56.15'
L341	N 79°17'32" E	66.71'
L342	N 18°51'14" E	23.95'
L343	N 07°34'14" E	44.53'
L344	N 20°36'52" W	29.21'
L345	N 52°45'53" E	36.29'
L346	N 56°02'41" E	45.44'
L347	N 64°03'03" E	50.10'
L348	N 89°49'30" E	57.61'
L349	N 71°09'18" E	91.23'
L350	S 82°36'33" E	30.50'
L351	N 72°09'09" E	57.83'
L352	N 48°00'06" E	73.63'
L353	N 67°25'29" E	65.44'
L354	N 46°25'38" E	62.59'
L355	N 52°40'21" E	77.44'
L356	N 41°14'13" E	103.14'
L357	N 71°26'57" E	35.19'
L358	N 79°31'51" E	42.81'
L359	S 50°36'51" E	403.76'
L360	N 51°48'04" E	206.09'
L361	N 52°45'52" E	48.16'
L362	S 89°53'53" E	48.94'
L363	N 51°15'24" E	51.04'
L364	N 18°03'30" E	65.75'
L365	N 10°14'33" E	33.60'
L366	N 80°09'31" E	67.43'
L367	N 18°38'47" E	71.36'
L368	N 12°26'47" E	66.15'
L369	N 01°33'49" E	48.49'
L370	N 70°33'25" W	42.10'
L371	S 51°52'27" E	78.99'
L372	N 23°07'58" E	211.92'
L373	N 24°07'03" W	361.78'
L374	N 35°36'37" E	58.85'
L375	N 72°02'30" E	162.68'
L376	S 81°20'40" W	263.44'
L377	N 51°59'38" W	243.63'
L378	S 82°03'08" E	78.38'
L379	S 14°36'11" E	46.09'
L380	S 83°24'22" W	14.97'
L381	N 83°09'45" W	38.38'
L382	N 70°45'42" W	68.48'
L383	S 68°41'24" W	62.98'
L384	S 64°53'18" W	58.97'
L385	N 67°15'01" W	66.83'
L386	S 39°32'28" W	59.63'
L387	S 34°42'04" W	56.05'
L388	S 31°18'33" W	69.11'
L389	S 78°50'14" W	8.25'
L390	N 20°03'22" W	8.25'
L391	N 14°10'50" W	61.46'
L392	N 13°33'13" E	133.32'
L393	N 12°02'06" W	59.13'
L394	N 36°31'20" W	124.10'
L395	N 11°48'01" W	64.26'
L396	N 23°17'16" W	80.07'
L397	N 44°22'41" W	75.78'
L398	N 61°47'37" W	70.50'
L399	N 83°42'38" W	75.75'
L400	N 83°11'30" W	36.89'
L401	N 81°14'42" W	24.18'
L402	N 60°57'30" W	80.83'
L403	N 52°45'52" W	45.15'
L404	S 22°54'34" W	61.54'
L405	S 54°00'37" W	90.41'
L406	S 38°49'05" W	89.27'
L407	S 89°27'38" W	59.62'
L408	S 50°45'47" W	50.78'
L409	N 88°22'17" W	74.27'
L410	S 67°45'10" W	33.47'
L411	S 67°36'31" W	55.47'
L412	S 76°51'33" W	42.81'
L413	S 77°01'35" W	72.01'
L414	S 78°31'19" W	34.13'
L415	N 64°20'37" W	30.19'
L416	S 69°25'47" W	44.16'
L417	N 78°59'23" W	38.55'
L418	N 83°43'59" W	49.15'
L419	N 81°47'37" W	54.24'
L420	N 85°12'56" W	68.23'
L421	N 80°04'32" W	35.20'
L422	S 43°57'08" W	24.44'
L423	N 40°25'49" W	35.99'
L424	S 48°28'14" W	44.01'
L425	S 02°56'28" W	47.90'
L426	S 36°34'32" W	21.85'
L427	N 21°05'21" W	42.41'
L428	N 58°25'56" W	44.16'
L429	S 63°24'46" W	17.64'
L430	S 48°33'12" W	25.60'
L431	N 54°45'56" W	38.44'
L432	S 42°30'53" W	38.83'
L433	S 68°41'24" W	62.98'
L434	S 10°21'14" W	42.31'
L435	S 13°08'50" W	36.37'
L436	S 01°12'38" W	34.27'
L437	S 02°56'42" W	41.52'
L438	N 61°56'50" W	43.74'
L439	N 51°55'55" W	25.91'
L440	N 61°00'14" W	46.91'
L441	S 86°26'54" W	43.25'
L442	N 74°46'49" W	33.42'
L443	S 81°28'55" W	53.04'
L444	S 54°28'38" W	52.85'
L445	N 51°18'38" W	79.96'
L446	N 79°50'07" W	82.75'
L447	S 39°21'42" W	65.19'
L448	S 84°02'05" W	40.80'
L449	N 89°14'49" W	47.18'
L450	S 86°32'37" W	46.44'
L451	N 88°15'01" W	56.40'
L452	S 44°08'23" W	61.52'
L453	S 75°23'20" W	13.18'
L454	S 89°35'11" W	43.69'
L455	S 40°53'18" W	58.83'
L456	S 42°36'18" W	50.67'
L457	N 08°25'02" E	53.39'
L458	N 04°10'06" E	36.29'
L459	S 35°19'00" W	30.37'
L460	S 59°22'55" E	50.93'
L461	S 77°47'35" E	46.50'
L462	S 57°12'33" E	46.50'
L463	N 84°26'13" E	67.06'
L464	S 59°20'37" E	32.43'
L465	S 52°33'23" E	60.93'
L466	S 49°34'34" E	38.13'
L467	N 81°02'58" E	41.57'
L468	S 49°47'41" E	54.27'
L469	S 58°31'35" E	51.38'
L470	S 28°32'46" E	67.76'
L471	S 40°17'14" E	64.10'
L472	S 42°46'00" E	91.86'
L473	S 40°36'41" E	41.82'
L474	N 53°49'11" E	22.85'
L475	N 50°45'47" E	27.40'
L476	S 08°19'04" E	54.91'
L477	S 03°57'18" E	51.90'
L478	S 04°38'46" E	69.89'

LINE TABLE		
LINE	BEARING	LENGTH
L479	S 16°08'14" W	23.17'
L480	N 85°13'34" E	45.92'
L481	N 40°03'44" E	13.47'
L482	S 42°32'52" E	15.84'
L483	S 60°20'13" W	90.08'
L484	S 40°22'30" W	178.92'
L485	N 10°41'36" E	108.41'
L486	S 73°10'02" W	182.74'
L487	S 83°08'08" W	43.42'
L488	N 45°08'27" W	150.22'
L489	N 08°07'00" W	48.39'
L490	N 12°25'04" W	39.95'
L491	N 44°11'05" W	61.08'
L492	N 07°30'15" W	135.54'
L493	N 07°30'15" W	87.49'
L494	N 44°54'00" W	45.44'
L495	S 71°18'56" W	23.71'
L496	S 45°01'51" W	138.13'
L497	N 07°30'15" W	26.11'
L498	N 54°49'22" W	125.37'
L499	N 20°18'51" W	21.00'
L500	N 36°28'16" E	59.67'
L501	N 44°16'02" E	37.15'
L502	N 49°34'11" W	44.40'
L503	S 07°22'46" W	44.40'
L504	S 47°02'36" W	51.78'
L505	S 32°36'43" W	47.29'
L506	N 36°10'10" W	40.46'
L507	N 86°25'30" E	32.46'
L508	N 34°34'09" E	37.55'
L509	N 43°33'49" E	27.50'
L510	N 03°00'00" W	26.81'
L511	N 27°43'17" E	23.47'
L512	N 38°31'02" E	17.46'
L513	N 49°19'52" E	35.22'
L514	N 40°10'12" E	26.11'
L515	N 34°58'47" E	59.05'
L516	N 33°14'42" E	28.64'
L517	N 13°12'50" E	22.51'
L518	N 33°12'50" E	35.30'
L519	N 36°19'32" E	43.48'
L520	N 38°14'40" E	60.21'
L521	N 07°29'49" E	69.50'
L522	N 24°15'42" E	58.10'
L523	N 44°40'41" E	36.86'
L524	N 38°15'51" E	46.84'
L525	N 36°16'49" E	47.16'
L526	N 44°54'34" E	21.45'
L527	N 38°01'01" E	43.97'
L528	N 39°50'29" E	44.87'
L529	N 37°56'11" E	43.30'
L530	N 39°40'02" E	38.95'
L531	N 39°30'45" E	63.95'
L532	N 41°11'16" E	70.85'
L533	N 43°50'19" E	36.42'
L534	N 35°02'02" E	49.22'
L535	N 40°34'50" E	74.23'
L536	N 37°52'40" E	43.69'
L537	N 25°34'35" E	30.30'
L538	N 25°12'12" E	28.15'
L539	N 56°27'59" E	68.15'
L540	N 25°44'53" E	45.75'
L541	N 11°52'50" E	67.35'
L542	N 13°12'58" E	27.05'
L543	N 89°54'33" E	64.26'
L544	N 38°15'45" E	90.60'
L545	N 55°58'36" E	67.61'
L546	N 67°49'22" E	36.24'
L547	N 67°49'22" E	36.24'
L548	S 49°44'38" W	117.31'
L549	S 41°39'07" W	228.49'
L550	S 39°48'26" W	1451.61'
L551	S 39°48'26" W	1451.61'
L552	N 51°18'42" E	10.87'
L553	S 30°17'31" E	187.71'
L554	S 43°32'26" E	68.14'
L555	S 43°32'26" E	68.14'
L556	N 81°08'40" E	9.00'
L557	S 44°34'12" W	29.57'
L558	S 37°12'46" W	39.55'
L559	N 48°08'26" E	1458.80'
L560	N 41°39'07" E	22.49'
L561	N 49°44'38" E	156.43'
L562	S 89°42'54" E	72.37'
L563	S 61°47'37" E	134.07'
L564	S 22°28'41" E	72.65'
L565	S 12°13'16" E	77.49'
L566	S 11°49'30" E	128.84'
L567	S 38°31'20" E	157.17'
L568	S 22°28'41" E	157.17'
L569	S 13°33'13" E	131.22'
L570	N 14°19'03" W	85.82'
L571	S 20°32'58" E	69.56'
L572	N 20°32'58" E	69.56'
L573	S 14°45'18" W	22.14'
L574	S 35°29'34" W	20.83'
L575	S 30°26'37" W	121.19'
L576	N 20°32'58" E	69.56'
L577	S 35°43'16" E	23.47'
L578	N 09°49'01" E	48.71'
L579	N 49°14'44" E	65.09'
L580	N 20°32'58" E	69.56'
L581	N 07°48'30" E	26.87'
L582	S 24°28'10" W	65.48'
L583	S 34°13'43" W	69.65'
L584	N 12°15'54" E	60.85'
L585	S 05°29'39" W	56.95'
L586	S 02°22'32" W	66.10'
L587	N 01°48'09" W	17.26'
L588	N 01°48'09" W	17.26'
L589	S 34°13'52" W	69.65'
L590	N 46°27'59" W	125.93'
L591	N 44°51'46" W	70.39'
L592	N 31°32'58" W	228.58'
L593	N 41°18'07" W	92.46'
L594	N 79°58'07" W	82.75'
L595	S 81°02'50" W	343.35'
L596	S 81°02'50" W	343.35'
L597	N 07°18'54" W	62.22'
L598	N 40°32'25" W	61.08'
L599	S 30°17'31" W	119.48'
L600	N 47°11'11" E	73.83'
L601	N 20°32'58" E	69.56'
L602	N 18°01'26" E	27.72'
L603	S 48°53'48" E	42.86'
L604	N 19°31'32" E	40.95'
L605	N 20°32'58" E	69.56'
L606	N 36°38'49" W	60.16'
L607	N 44°57'22" W	44.17'
L608	N 37°48'43" W	17.39'
L609	N 37°48'43" W	17.39'
L610	N 15°49'07" W	40.84'
L611	N 53°24'28" W	60.05'
L612	N 53°03'42" E	34.52'
L613	N 49°28'03" E	60.05'
L614	N 32°21'33" E	44.99'
L615	N 73°08'05" E	34.75'
L616	N 39°23'18" E	26.21'
L617	N 39°23'18" E	26.21'
L618	N 42°20'43" E	59.33'
L619	N 38°37'25" E	53.73'
L620	N 74°48'00" E	36.81'
L621	N 20°32'58" E	69.56'
L622	N 46°03'33" W	29.37'
L623	N 84°04'57" W	36.23'
L624	N 67°36'32" E	45.06'
L625	N 67°36'32" E	45.06'
L626	N 87°05'54" W	39.74'

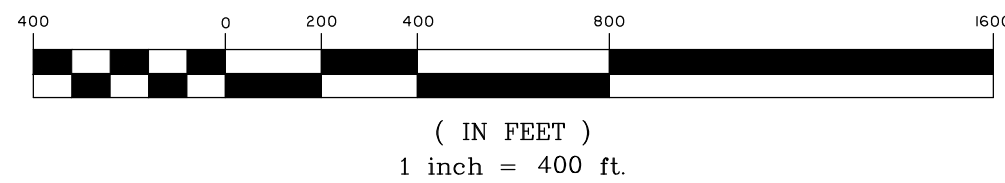


J:\22538\22538-0000\Exhibit 4.1\Kiwah River Investment\Drawings\4.1\Kiwah River Investment Framework Plan.dwg - J:\22538\22538-0000\Exhibit 4.1\Kiwah River Investment\Drawings\4.1\Kiwah River Investment Framework Plan.dwg - J:\22538\22538-0000\Exhibit 4.1\Kiwah River Investment\Drawings\4.1\Kiwah River Investment Framework Plan.dwg



NOTE  
THIS PLAN IS A PLANNING INSTRUMENT THAT IS SUBJECT TO CHANGE WITHIN THE GUIDELINES OF THIS AGREEMENT. AS SUCH IT IS SUBJECT TO CHANGE AND IS NOT A COMMITMENT OF THE PROPERTY OWNER TO ANY PARTIES. PERSONS DESIRING TO DETERMINE ACTUAL COMMITMENTS SHOULD EXAMINE PLATS, MASTER DEEDS, DEED RESTRICTIONS AND CONVENTS APPLICABLE TO SPECIFIC PORTIONS OF THE REAL PROPERTY.

GRAPHIC SCALE



LEGEND			
	BOHICKET VILLAGE		WASTE WATER TREATMENT PLANT
	RURAL RESIDENTIAL		PROPOSED LAKE
	RIVER VILLAGE		FRESHWATER WETLAND
	OPEN SPACE		OCRM CRITICAL AREA
	25' PERIMETER BUFFER		OCRM CRITICAL IMPOUNDMENT
	50' PERIMETER BUFFER		MARSH ISLANDS
	REAL PROPERTY		UNPLATTED MARSH
	VEHICULAR CIRCULATION (LOCATIONS TO BE DETERMINED)		POTENTIAL CONNECTIONS (LOCATIONS TO BE DETERMINED)

### KIAWAH RIVER AMENDED EXHIBIT 4.1 FRAMEWORK PLAN

JOHNS ISLAND, CHARLESTON COUNTY, SC

PREPARED FOR:  
KIAWAH RIVER INVESTMENT, LLC

PREPARED BY:  
**THOMAS & HUTTON**

682 Johnnie Dodds Blvd. • Suite 100  
Mt. Pleasant, SC 29464 • 843.849.0200  
www.thomasandhutton.com

JOB NO: J-22538.0000  
DRAWN: MRB  
REVIEWED: TMW

DATE: AMENDED MAY, 2018  
SCALE: 1" = 400'  
SHEET: EXHIBIT 4.1



# EXHIBIT 4.2

## Zoning and Land Development Regulations

### CHAPTER 6 | USE REGULATIONS

#### ARTICLE 6.7 SPECIAL EVENTS USE

##### §6.7.1 Purpose

The intent of this Article is to provide regulations that guide the [use](#) of unincorporated properties for the purpose of hosting [special events](#) of varying sizes and functions, while protecting the surrounding community. The regulations of this Article shall apply in conjunction with any other standards contained within this Ordinance.

Effective on: 11/20/2001, as amended

##### §6.7.2 Private Special Events

The following are exempt from the requirements of this Article: private parties and gatherings that do not meet the definition of “special event,” as defined in this Ordinance, auctions of private real estate, and estate auctions.

Effective on: 11/20/2001, as amended

##### §6.7.3 Temporary [Special Events](#)

Temporary public assembly [use](#) and [special events](#), such as [cultural events](#), outdoor concerts and parking for [Special Events](#), shall require a Temporary [Special Events](#) Permit from the [Planning Director](#). Such permit shall not be issued for periods in excess of ten (10) consecutive days, and no more than five (5) such permits may be issued per [lot](#), per calendar year, except as otherwise limited by this Article. The requirements of Section [6.7.5](#) shall apply in [addition](#) to the requirements of this Section. Any Temporary [Special Event](#) utilizing 25 acres of land area or more shall require [Special Exception](#) approval in accordance with the procedures contained in [CHAPTER 3](#) of this Ordinance.

Temporary [Special Events](#) Permits may be issued only if adequate parking and sanitary facilities are provided to serve the proposed [use](#) or activity and the site can safely support the proposed activity. The following information is required to be submitted with applications for Temporary [Special Events](#) Permits (in [addition](#) to the required fee):

1. A detailed Letter of Intent describing the purpose of the event indicating date(s) and time(s), anticipated number of participants, and whether alcohol will be served and if amplified sound (music or other amplified noise) will be utilized;

2. A legible site plan drawn to scale indicating vehicular traffic areas (parking, driveways, circulation etc.), gathering areas, restroom and vendor locations, and locations of existing and planned [structures](#) to be used as part of the event;
3. Letters of coordination from Fire, Police, and Emergency [Medical Services](#) and [Building Inspection Services](#) if applicable;
4. Documentation of Charleston County Business license issuance for the host and participating vendors and copy of valid Department of Revenue license if alcohol will be sold;
5. Documentation from pertinent service providers for restroom facilities and garbage collection; and
6. Other pertinent information as deemed necessary by the [Planning Director](#)

The following requirements shall, in [addition](#) to all other applicable requirements of this Ordinance, apply to property located in the Agricultural and Residential [Zoning Districts](#):

1. A maximum of five (5) Temporary [Special Events](#) Permits may be issued per [lot](#), per calendar year, and each permit shall be valid for a maximum of three (3) consecutive days;
2. Each Temporary [Special Events](#) Permit shall only be valid for a single [special event](#). Multiple Special Events within the same three (3) day time period shall require separate Temporary Special Events Permits;
3. Daily event attendance in the AG-15, AGR, RR-3, S-3, R-4, M-8, M-12, MHS, and MHP [Zoning Districts](#) shall be limited to 500;
4. Daily event attendance in the RM, AG-10, and AG-8 [Zoning Districts](#) shall be limited to 2,000; and
5. The maximum number of Temporary Special Events Permits allowed per calendar year and/or maximum daily attendance may only be increased if the requirements listed below, as well as all other applicable requirements of this Ordinance, are met and the request is approved in accordance with the [Special Exception](#) Procedures contained in this Ordinance. If approved by the Board of Zoning Appeals, the approval is only valid for one (1) calendar year from the date of [Zoning Permit](#) issuance.

1. Application.

1. Compliance with [ARTICLE 3.7](#), Site Plan Review, and [ARTICLE 3.6, Special Exceptions](#), of this Ordinance is required, provided, however, that the approval criteria contained in this Article shall apply instead of the approval criteria contained in Section [3.6.5](#).
2. All applications must be signed by the [property owner](#) or designated agent.
3. Letters of coordination from the following agencies shall be submitted during Site Plan Review: S.C. Department of Health and Environmental Control (SCDHEC), Charleston County Sheriff's Department, the Charleston County [Building](#) Inspections Department, Charleston County Emergency [Medical Services](#) (EMS), the appropriate Fire Service provider for the [subject property](#), and a designated solid waste collection/disposal company or a letter indicating a private method of waste collection/disposal.

2. Requirements.



- a. The [subject property](#) or properties shall contain a minimum of ten (10) combined acres of highland area and must border a public [Arterial Street](#), as defined in this Ordinance;
  - b. There shall be direct access to a public [Arterial Street](#), as defined in this Ordinance;
  - c. No more than twenty-five (25) events shall be allowed per calendar year;
  - d. Daily attendance shall not exceed 5,000;
  - e. All [structures](#) shall comply with the requirements of this Ordinance, including but not limited to, the density, intensity, and dimensional standards and [accessory structure](#) requirements;
  - f. All parking shall be contained on the [subject property](#) or on a contiguous property. A recorded, parking agreement shall be required if temporary off-street parking is provided on a [parcel](#) other than the [subject property](#). At no time shall associated event parking be allowed in a public or private [right-of-way](#) or access [easement](#);
  - g. The maximum occupancy of an individual permanent [structure](#) shall comply with the occupancy standards of the Charleston County [Building Code](#);
  - h. All events shall adhere to the Charleston County Noise Regulations and all other applicable Charleston County ordinances;
  - i. All existing or proposed [structures](#) shall retain a residential or agricultural character;
  - j. A one hundred foot (100') Type F Buffer shall be required around the perimeter of the property;
  - k. Special Events shall not begin before 10 am and shall end by 10 pm; and
  - l. The applicant must hold at least one (1) community workshop prior to the submittal of the [Special Exception](#) application and written documentation of the community workshop(s) must be submitted. Written documentation may include, but is not limited to, sign-in sheets, meeting summaries, memos and/or letters from the applicant describing the meeting(s), etc. The purpose of the workshop(s) is to ensure early citizen participation in an informal forum, in conjunction with the [development](#) applications and to provide an applicant the opportunity to understand and try to mitigate any impacts an application may have on an affected community. A community workshop is not intended to produce complete consensus on all applications, but to encourage applicants to be good neighbors.
3. [Special Exception](#) Approval Criteria

The approval criteria contained in this Article shall apply instead of the approval criteria contained in Section [3.6.5](#) of this Ordinance. Applications may be approved only if the Board of Zoning Appeals finds that the proposed [use](#):

- . Is compatible with existing uses in the vicinity and will not adversely affect the general welfare or character of the immediate community;
- a. Does not hinder or endanger vehicular traffic and pedestrian movement on adjacent roads;

- b. Includes adequate provisions for items such as: [setbacks](#) and buffering (including fences and/or landscaping) to protect adjacent properties from the possible adverse influence of the proposed [use](#), such as noise, [vibration](#), dust glare, odor, traffic congestion and similar factors;
- c. Where applicable, will be developed in a way that will preserve and incorporate any important natural features;
- d. The setup and disassembly of Special Events will not be detrimental to the surrounding community;
- e. Includes sufficient safeguards for the [use](#) of temporary [structures](#), if applicable;
- f. Complies with all applicable rules, regulations, laws and standards of this Ordinance, including but not limited to any [use](#) conditions, [zoning district](#) standards, or Site Plan Review requirements of this Ordinance; and
- g. Is consistent with the recommendations contained in the Charleston County Comprehensive Plan and the character of the underlying [zoning district](#) "Purpose and Intent".

If approved by the Board of Zoning Appeals, the approval is only valid for one (1) calendar year from the date of [Zoning Permit](#) issuance. In granting a [Special Exception](#), the Board of Zoning Appeals may attach to it such conditions regarding the location, character, or other features of the proposed [building](#) or [structure](#) as the Board may consider advisable to protect established property values in the surrounding area or to promote the public health, safety, or general welfare. Additionally, the Board of Zoning Appeals may require additional conditions of approval including, but not limited to: event days and hours, the number of events per calendar year, limitations on outdoor activities, parking, buffers, and [use](#) and location of temporary [structures](#).

If the proposed [use](#) is approved by the BZA, the Zoning/Planning Department shall provide written notification to the following agencies, as applicable: S.C. Department of Health and Environmental Control (SCDHEC), Charleston County Sheriff's Department, the Charleston County [Building](#) Inspections Department, Charleston County Emergency [Medical Services](#) (EMS), and the appropriate Fire Service provider for the [subject property](#).

Effective on: 11/20/2001, as amended

### **EXHIBIT 4.3**

#### **KIAWAH RIVER PLANNED DEVELOPMENT DISTRICT**

#### **STANDARDS AND PROCEDURES FOR SHORT-TERM RENTAL PROPERTIES**

##### **A. Applicability.**

1. Short-Term Rental Types. The following Short-Term Rental Properties shall be authorized on the *Real Property*:
  - a. *STRP*, Limited Home Rental (LHR); and
  - b. *STRP*, Extended Home Rental (EHR) in the area depicted on Exhibit 4.4.
2. Definitions.
  - a. Limited Home Rental (LHR): A property where lodging is offered, advertised, or provided to Short-Term Rental Tenants (excluding family members) for a fee or form of compensation, not to exceed 72 days in the aggregate during any calendar year, with individual rental terms not to exceed 29 consecutive days.
  - b. Extended Home Rental (EHR): A property where lodging is offered, advertised or provided to Short-Term Rental Tenants (excluding family members) for a fee or any form of compensation, for more than 72 days but not to exceed 144 days in the aggregate during any calendar year, with individual rental terms not exceeding 29 consecutive days.
  - c. Short Term Rental Tenant (STRT): Any Person (excluding Family members) who rents a Dwelling or part

thereof, for individual rental terms not exceeding 29 consecutive days for a fee or any form of compensation.

3. Application. Applications for *Short-Term Rental Properties (STRPs)* shall be made to the *County* in compliance with these processes and standards.

**B. Registration.** All *STRPs* require a Zoning Permit and Business License from the *County*, which must be renewed annually pursuant to these standards.

**C. Compliance with Other Regulations.** All *STRPs* shall comply with all applicable local, state, and federal rules and regulations.

**D. Permitting Processes.**

- A. Zoning Permit Application. No application for a *STRP* to the *County* shall be accepted as complete unless it includes the required fee and the information listed below.
  1. A letter or other writing from the *ARB* confirming that the particular property qualifies for the requested *STRP*.
  2. The name, address, email, and telephone number of all property owners of the *STRP*.
  3. Completed *STRP* application signed by all current property owner(s). For properties owned by corporations or partnerships, the applicant must submit a resolution of the corporation or partnership authorizing and granting the applicant signing and authority to act and conduct business on behalf of and bind the corporation or partnership.
  4. Restricted Covenants Affidavit(s) of the *County* signed by the applicant or current property owner(s) in compliance with state law.



5. Address and Property Identification Number of the property on which the *STRP* is located.
6. The type of *STRP* that is the subject of the application (LHR or EHR);
7. The type of *Dwelling Unit* that is proposed to be used as a *STRP*, either Single Family Detached *Dwelling Unit* or Single Family Attached *Dwelling Unit* or legally approved *Accessory Dwelling Unit*, and documentation of Zoning Permit and Building Permit approvals for the structures, as applicable. Tents, RVs, boats, sheds, garages, and similar structures shall not be used as *STRPs*; and,
8. The maximum number of bedrooms available at the *STRP*.

**E. Minimum Rental Term.** The minimum term of any Short-Term Rental shall be 7 days.

**F. Short-Term Rental Property Site Plan Review Categories.** *STRPs* must complete Site Plan Review with the *County* based on the permitting process provided in the Table below prior to obtaining a *STRP* Zoning Permit. The Building Inspection Services Department of the *County* may require a building safety inspection and/or Building Permit as a condition of the *STRP* Site Plan Review approval.

1. *STRP, Administrative Site Plan Review.* Requires a *County* Zoning Permit application, payment of the *County*'s fee, aerial photographs, and photographs of the property. At the discretion of the *Planning Director*, a site plan drawn to engineer's scale depicting existing and proposed conditions, including required parking, shall be submitted to the *County*, and site visits by the *County*'s Zoning and Planning Staff may be required.

2. STRP, Limited Site Plan Review. Requires a limited site plan review application and fee and must include a site plan drawn to engineer's scale depicting existing and proposed conditions, including required parking.

**G. Zoning Permit Issuance and Business Licenses.** After a STRP Application has been approved, a *STRP* Zoning Permit and a Business License must be obtained prior to a property owner offering, advertising, or providing *Short-Term Rental Properties* for lodging as provided for in these standards.

**H. Annual Zoning Permit Renewal.**

1. All *STRP* Zoning Permits must be renewed annually in compliance with these standards. An application to the *County* for annual renewal of the Zoning Permit must include:

- a. The application fee; and,
- b. A notarized affidavit signed by the property owner stating that the type of *STRP* use and the information submitted as part of the application for the previous year's *STRP* Zoning Permit has not changed in any manner whatsoever and that the *STRP* use complies with the processes and standards of this Exhibit 4.3 (form of Affidavit provided by the *County*).
- c. A letter or other writing from the *ARB* confirming that the particular property qualifies for the requested *STRP*.

2. The *Planning Director* may request *STRP* records including days the *STRP* was rented, *STRP* advertising records, *STRP* rental income, and *STRP* rental receipts. The records shall be provided to the *Planning Director* within 10 working days from the date requested; otherwise, the *STRP* Zoning Permit will be denied.

3. The applicant shall file an application for a new STRP Zoning Permit if the aforementioned requirements are not met.

4. If the *Planning Director* determines that the *STRP* use is not consistent with the Site Plan Review approval that authorizes the use, the applicant shall file an application for a new *STRP* Zoning Permit, including applicable Site Plan Review applications and fees, and all requirements of these standards at the time of *STRP* Zoning Permit application submittal shall apply.

5. The owners of all registered *STRPs* must renew the Zoning Permit for the *STRP* use by December 31st of each year or their existing Zoning Permit will expire. The Zoning Permit for the *STRP* use will terminate on December 31st of each year regardless of whether or not the applicant receives notice from the *Planning Director*.

**I. Table: Permitting Process for STRPs [1]**

	Limited Home Rental (LHR) [1]	Extended Home Rental (EHR)
Applicable Kiawah River Properties	Single Family Detached, Single Family Attached, and legally approved <i>Accessory Dwelling Units</i>	Properties Identified on Exhibit 4.4
Maximum Number of Days STRPs May be Rented (note: days apply per Lot and not per Dwelling)	72 days in the aggregate per calendar year	144 days in the aggregate per calendar year
Zoning Review Type	STRP, Administrative Site Plan Review	STRP, Limited Site Plan Review and Special Exception

**Table Notes:**

1. The following shall apply to all *STRP* types:
  - a. A *STRP* Zoning Permit is required and the *STRP* Zoning Permit Number for the current year must be visible on all advertisements. Zoning Permits must be renewed annually pursuant to this Article.

b. A Business License is required and the Business License Number for the current year must be visible on all advertisements. Business Licenses must be renewed annually.

c. Building safety inspection or Building Permit may be required, as determined by the Charleston County Building Inspection Services Department.

**J. General Standards.**

A. Use Limitations and Standards.

1. Legally permitted Principal *Dwelling Units* and *Accessory Dwelling Units* may be used as *STRPs*, even when they are located on the same property; however, accessory structures shall not be used as *STRPs*.

2. Parking for *STRPs* shall be in compliance with the off-street parking requirements of the *Plan*.

3. Signs advertising *STRPs* are prohibited.

B. Advertising. Whether by a hosting platform, via Internet or paid advertising, or other postings, advertisements, or announcements, the availability of a *STRP* shall include the *County* issued *STRP* Zoning Permit Number and Business License Number for the current year.

C. Short-Term Rental Property Tenant Notices. Each *STRP* must contain a Short-Term Rental Tenant notice posted in each room where Short-Term Rental Tenants may lodge. The notice must provide the following information:

1. Contact information for the owner of the *STRP*;
2. *STRP* Zoning Permit and Business License Numbers for the current year;
3. Trash collection location and schedules, if applicable; and
4. Fire and Emergency evacuation routes.



**K. Enforcement and Violations.**

A. Notwithstanding the provisions of CHAPTER 11, Violations, Penalties, and Enforcement, of the *ZLDR*, a *STRP* Zoning Permit may be administratively revoked by the *Planning Director* or his designee if the *STRP* has violated the provisions of these standards on three or more occasions within a 12-month period. However, a *STRP* Zoning Permit may be immediately revoked if the *Planning Director* determines the *STRP* has Building Code violations, there is no current Business License for the property, the property is being used in a manner not consistent with the Zoning Permit issued for the *STRP* use, or the advertisement for the *STRP* does not include the *County* issued *STRP* Zoning Permit Number and Business License Number for the current year. If a *STRP* Zoning Permit is revoked, no new *STRP* Zoning Permit and/or Business License shall be issued to the applicant for the same property for a period of one year from the date of revocation. Upon expiration of the revocation period, a new *STRP* Zoning Permit application may be filed and all requirements, processes, and fees in compliance with this Exhibit 4.3.

B. If a *STRP* Zoning Permit is administratively revoked or an application for a *STRP* Zoning Permit is administratively denied, a *STRP* owner (or authorized agent) may appeal the *Planning Director's* administrative decision revoking or denying the *STRP* Zoning Permit to the *County's* Board of Zoning Appeals within 30 calendar days from the date of the denial or revocation. All appeals shall be addressed in accordance with the appeal procedures of CHAPTER 3, Article 3.13, of the *ZLDR*.



# EXHIBIT 4.4 EXTENDED HOME RENTAL (EHR) PROPERTIES AT KIAWAH RIVER

LOCATION: CHARLESTON COUNTY, SOUTH CAROLINA  
DATE: OCTOBER 25, 2021  
JOB NUMBER: 22538.0000

DRAWN BY: CWW  
REVIEWED BY: TMW

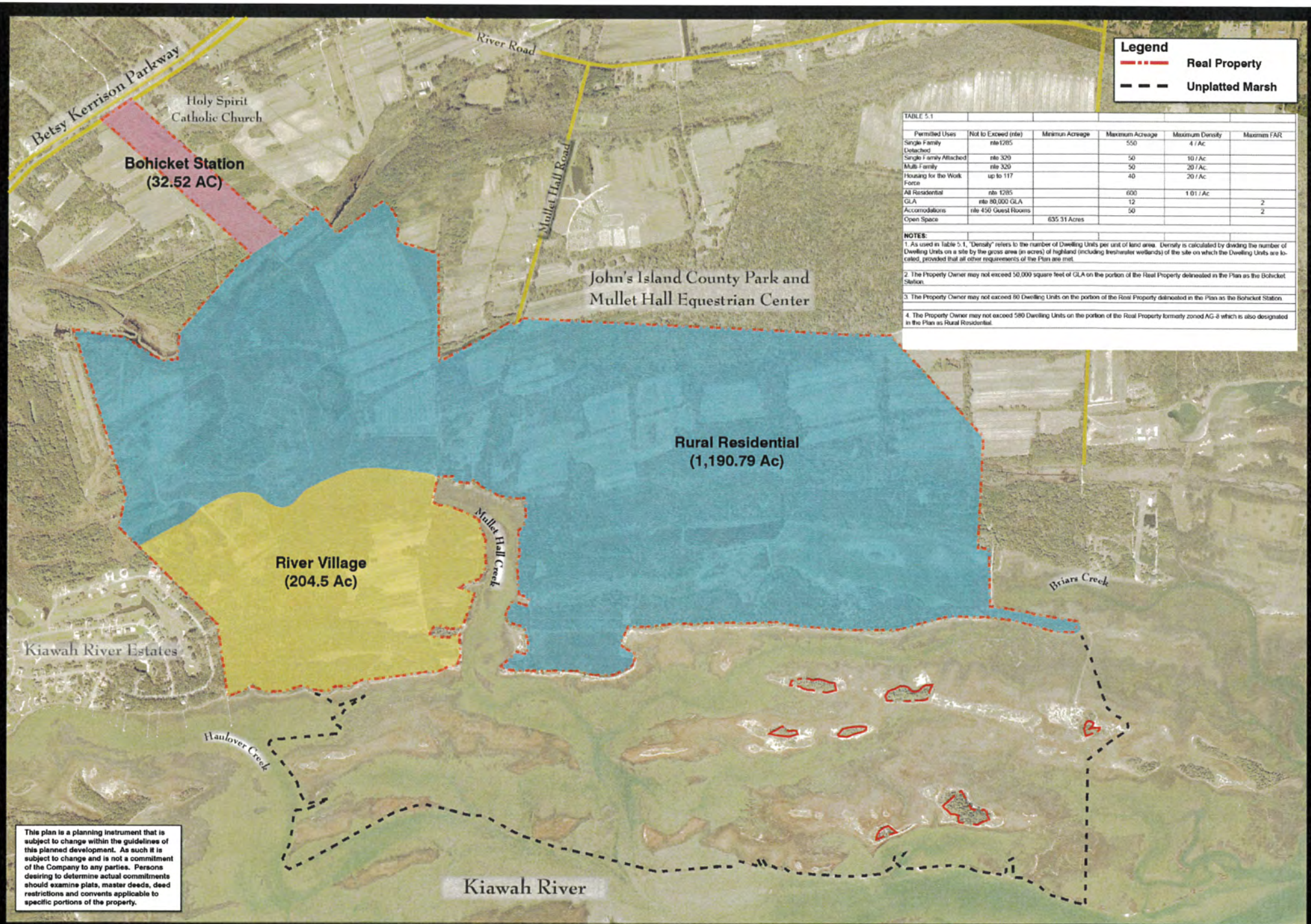
SHEET: 1 OF 1  
SCALE: 1" = 150'



682 Johnnie Dodds Blvd. • Suite 100  
Mt. Pleasant, SC 29464 • 843.849.0200

[www.thomasandhutton.com](http://www.thomasandhutton.com)





**Legend**

--- Real Property

--- Unplatted Marsh

TABLE 5.1

Permitted Uses	Not to Exceed (rule)	Minimum Acreage	Maximum Acreage	Maximum Density	Maximum FAR
Single Family Detached	n/a 1205		550	4 / Ac	
Single Family Attached	n/a 320		50	10 / Ac	
Multi Family	n/a 320		50	20 / Ac	
Housing for the Work Force	up to 117		40	20 / Ac	
All Residential	n/a 1205		600	1.01 / Ac	
GLA	n/a 80,000 GLA		12		2
Accommodations	n/a 450 Guest Rooms		50		2
Open Space		635.31 Acres			

**NOTES:**

1. As used in Table 5.1, "Density" refers to the number of Dwelling Units per unit of land area. Density is calculated by dividing the number of Dwelling Units on a site by the gross area (in acres) of highland (including freshwater wetlands) of the site on which the Dwelling Units are located, provided that all other requirements of the Plan are met.

2. The Property Owner may not exceed 50,000 square feet of GLA on the portion of the Real Property delineated in the Plan as the Bohicket Station.

3. The Property Owner may not exceed 80 Dwelling Units on the portion of the Real Property delineated in the Plan as the Bohicket Station.

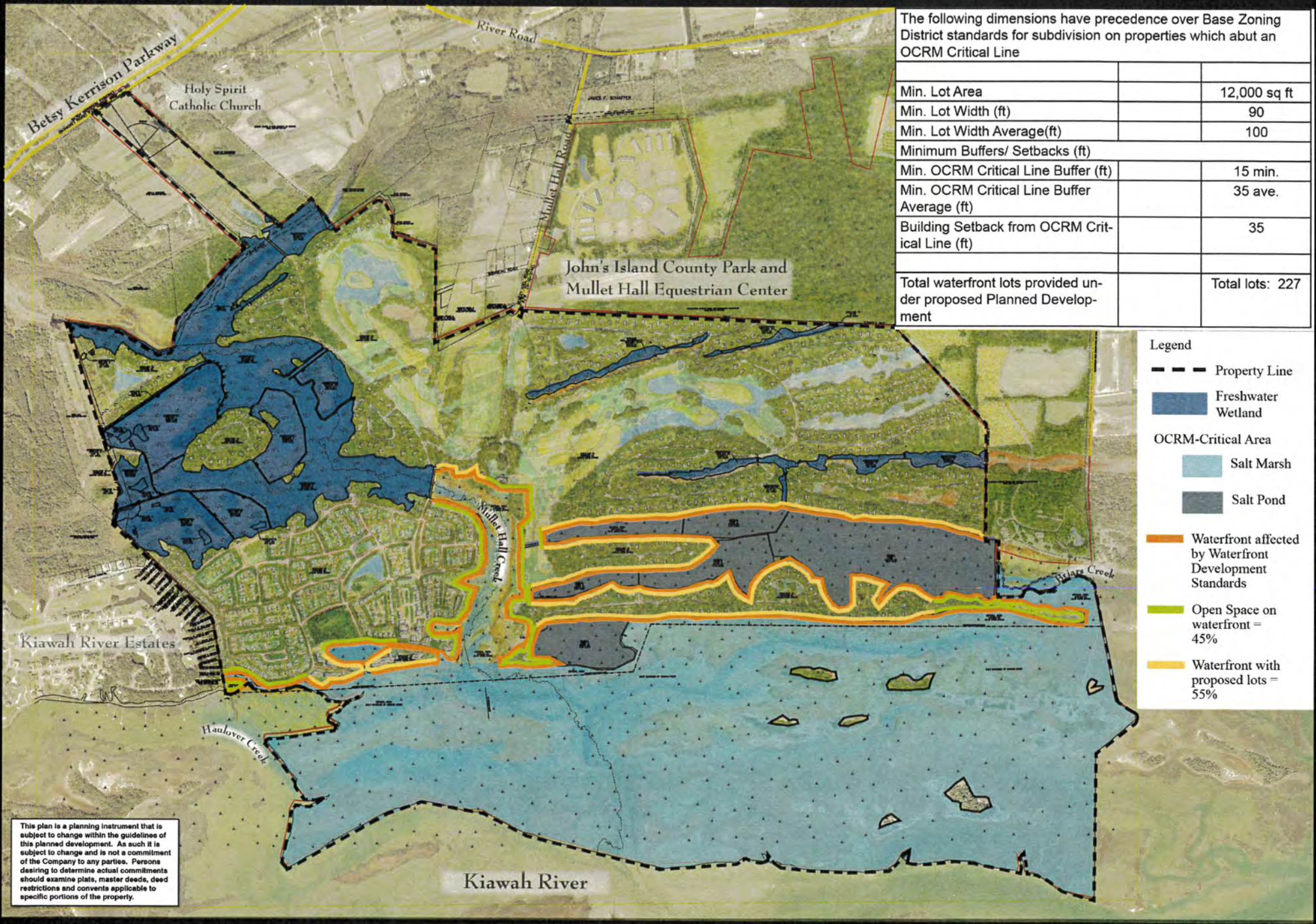
4. The Property Owner may not exceed 580 Dwelling Units on the portion of the Real Property formerly zoned AG-8 which is also designated in the Plan as Rural Residential.

This plan is a planning instrument that is subject to change within the guidelines of this planned development. As such it is subject to change and is not a commitment of the Company to any parties. Persons desiring to determine actual commitments should examine plats, master deeds, deed restrictions and covenants applicable to specific portions of the property.



# Kiawah River Plantation

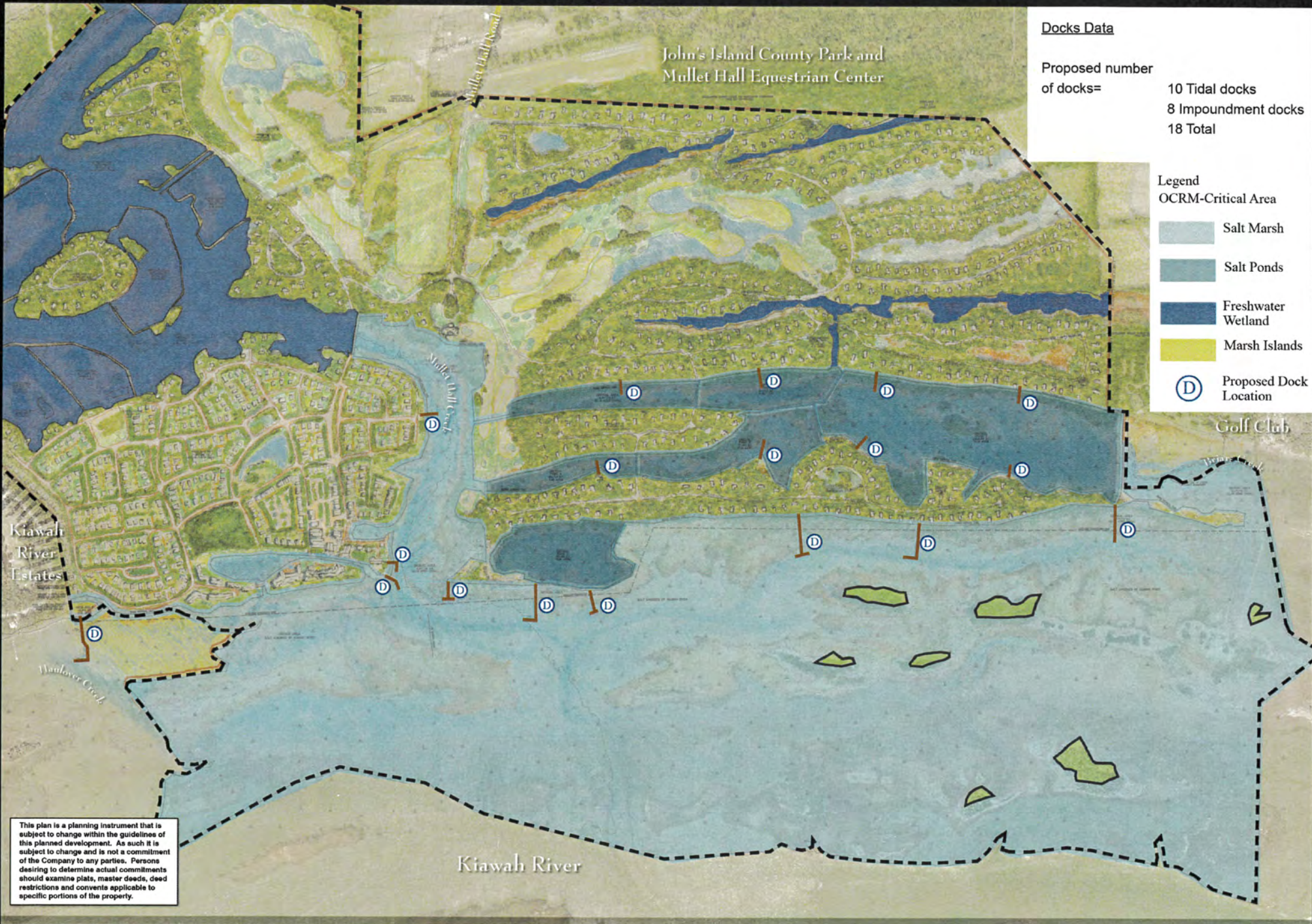




# Kiawah River Plantation

**EXHIBIT 6.1 - PROPOSED WATERFRONT DEVELOPMENT STANDARDS**





This plan is a planning instrument that is subject to change within the guidelines of this planned development. As such it is subject to change and is not a commitment of the Company to any parties. Persons desiring to determine actual commitments should examine plats, master deeds, deed restrictions and covenants applicable to specific portions of the property.



*Kiawah River Plantation*

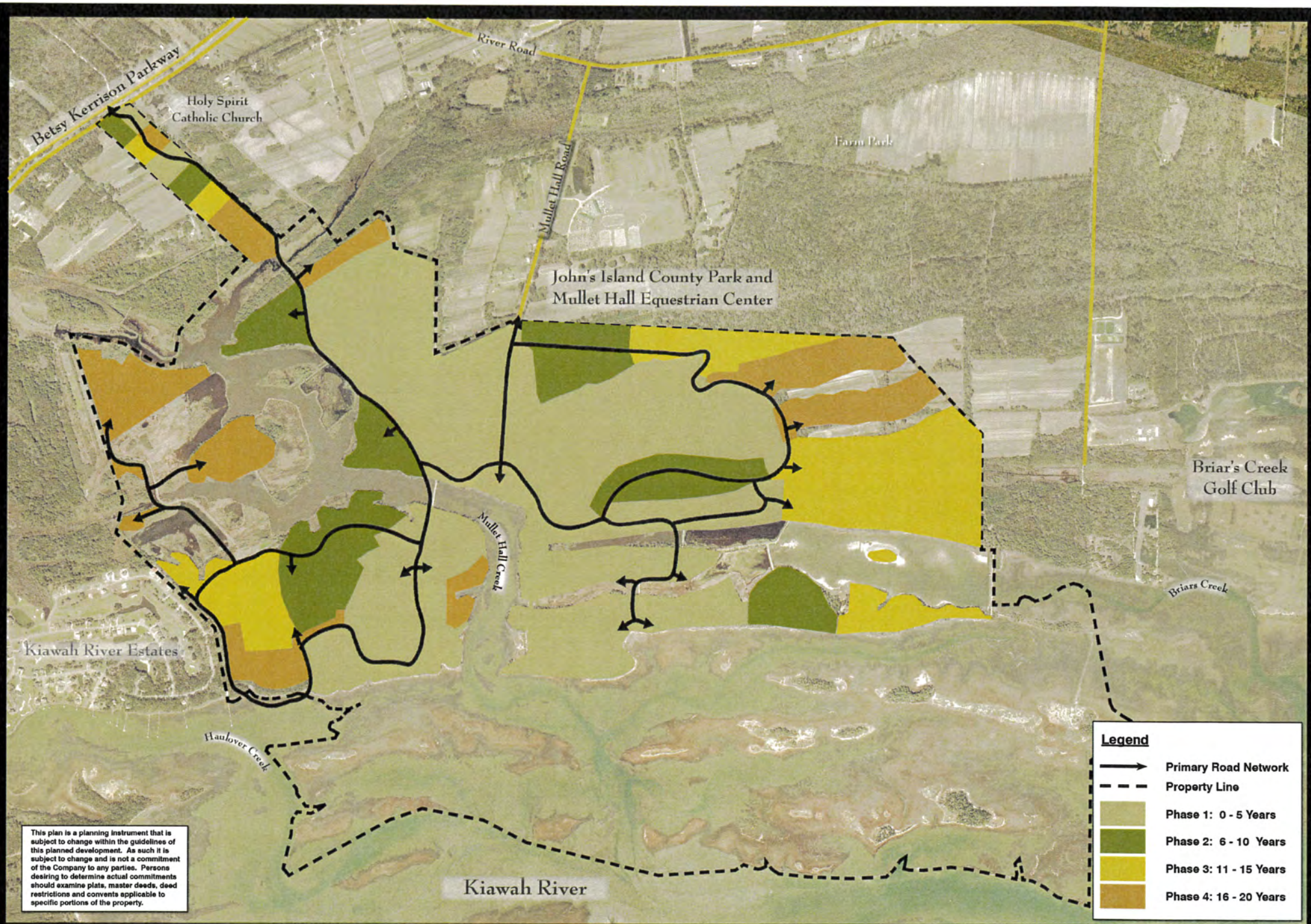
**EXHIBIT 6.2 - PROPOSED DOCK PLAN**



Elevation







SCALE  
0 200 400 800



*Kiawah River Plantation*

**EXHIBIT 7.1 - PHASING DIAGRAM**





- Legend**
- ↔ VEHICULAR CIRCULATION
  - RESIDENTIAL
  - HIGHLAND OPEN SPACE
  - MARSH ISLANDS
  - FRESHWATER WETLAND
  - OCRM CRITICAL AREA
  - 25' BUFFER
  - 50' BUFFER
  - ↔ POTENTIAL CONNECTION- (LOCATION TO BE DETERMINED)
  - STREET SYSTEM TRAIL
  - OPEN SPACE TRAIL

This plan is a planning instrument that is subject to change within the guidelines of this Agreement. As such it is subject to change and is not a commitment of the Property Owner to any parties. Persons desiring to determine actual commitments should examine plats, master deeds, deed restrictions and covenants applicable to specific portions of the Real Property.



ACRES	
10	
5	
1	

# *Kiawah River Plantation*

**EXHIBIT 8.1 - CONCEPTUAL OPEN SPACE MASTER PLAN**



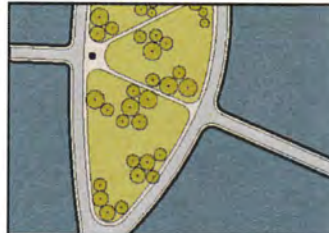
#### Recreational Park

A Park space that features fields and accessories used for structured recreational activities. These types of activities may include baseball and soccer fields, basketball courts, walking tracks, and fitness areas. Its landscape shall consist of lawn and trees arranged according to the active uses. The minimum size shall be 1 acre.



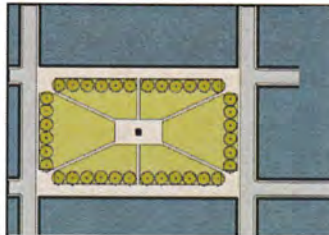
#### Waterfront Park

An Open Space, available for unstructured recreation. A Waterfront Park may be spatially defined by landscaping rather than building frontages. Its landscape shall consist of lawn and trees arranged in a natural fashion. The minimum size shall be 1/2 acre and the maximum shall be 8 acres and 1/3 of the perimeter must border a water body.



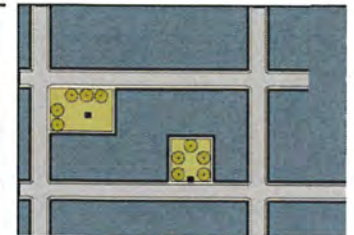
#### Neighborhood Focal Point Park

A Neighborhood Focal Point Park shall have at least 75% of its perimeter abutting public streets, or 50% of its perimeter not abutting a marsh, river or wetland. Its use is for unstructured recreation and civic uses. Its landscape shall consist of paths, lawns and trees, formally disposed. It shall be located at the intersection of important thoroughfares. The minimum size shall be 1/2 acre and the maximum shall be 5 acres.



#### Playground

An Open Space designed and equipped for the recreation of children. A Playground should be protected from direct conflicting uses and may include an open shelter. Playgrounds shall be interspersed within residential areas and may be placed within a block. Playgrounds may be included within parks and greens. There shall be no minimum or maximum size.



#### Boat Landing

Boat Landing means an open space available for the unloading and loading of watercraft into the water. These areas may feature docks where permitted and temporary parking areas for vehicles and trailers. Its landscaping shall consist of lawn and trees arranged in a natural fashion. There shall be no minimum or maximum size.

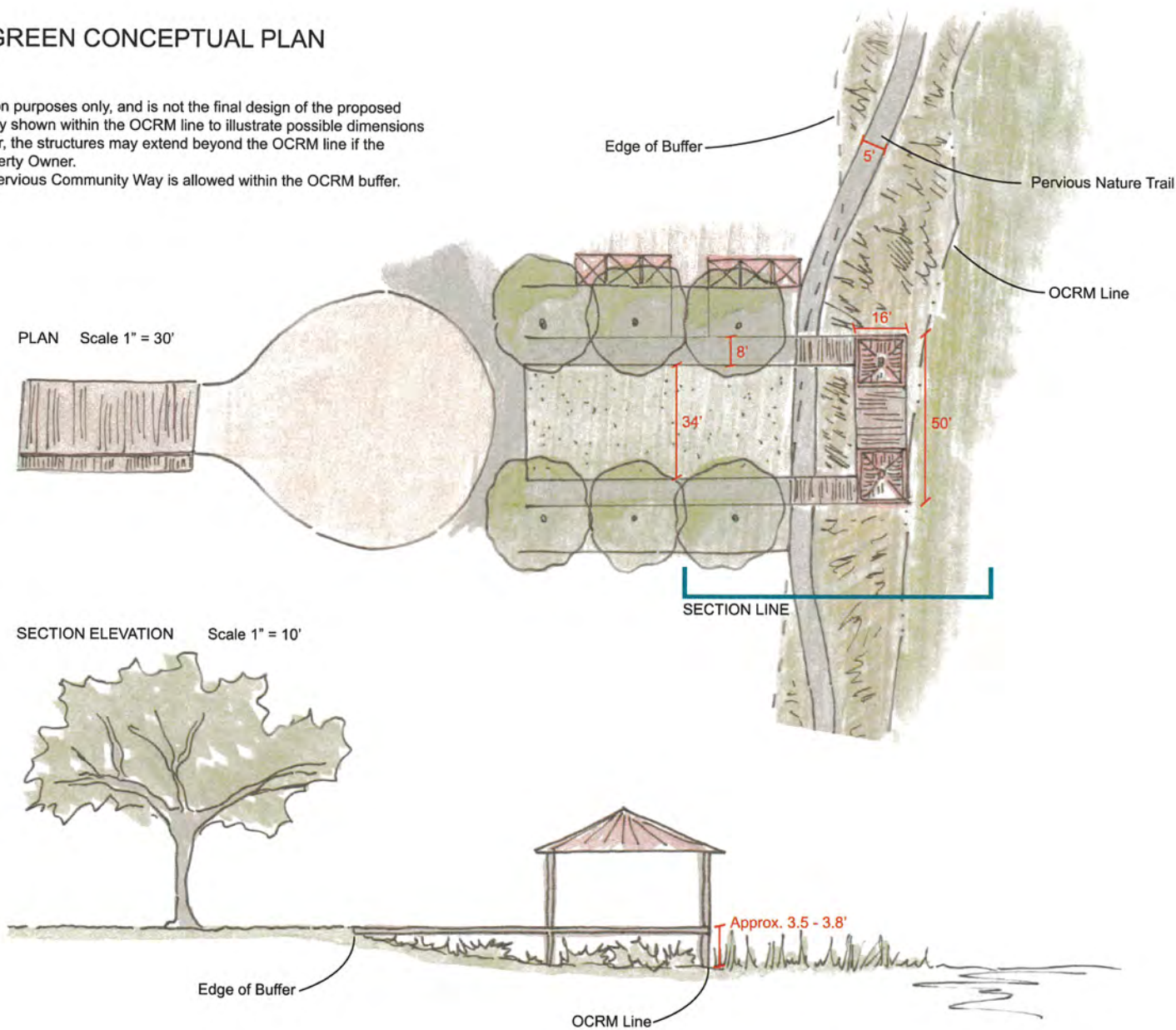


#### Conditions of Use

The images and diagrams appearing in SmartCode Version 9.2 are the property of Duany Plater-Zyberk & Company (DPZ). Modifications have been made to the original images and diagrams.

EXHIBIT 8.3 | VILLAGE GREEN CONCEPTUAL PLAN

Notes:  
1. This diagram is for conceptual illustration purposes only, and is not the final design of the proposed improvements. The structures are currently shown within the OCRM line to illustrate possible dimensions of the structures within the buffer; however, the structures may extend beyond the OCRM line if the required permits are obtained by the Property Owner.  
2. Per the PD plan, section 8.2.B.2.d., a pervious Community Way is allowed within the OCRM buffer.







DEPARTMENT OF THE ARMY  
CHARLESTON DISTRICT, CORPS OF ENGINEERS  
69A HAGOOD AVENUE  
CHARLESTON, SOUTH CAROLINA 29403-5107

APR - 4 2017

APR - 7 2017

Regulatory Division

Kiawah River Plantation Holdings, L.P.  
c/o Mr. Ryan Clarey  
Newkirk Environmental, Inc.  
P. O. Box 746  
Charleston, South Carolina 29465-0746

Dear Mr. Clarey:

**PLEASE READ THIS LETTER CAREFULLY AND  
COMPLY WITH ITS PROVISIONS**

This is in response to your letter dated February 7, 2017, requesting modifications to the onsite saltwater mitigation plan authorized by Department of the Army (DA) permit (SAC-2008-01605) to construct a master-planned community on Johns Island, South Carolina. The authorized project is for the construction of an economically viable resort destination that will offer multi-family and single family residences; a commercial village; a golf course; access to the Kiawah River and its natural amenities; and guest accommodations to include a resort hotel, villas, and conference facilities. The project is located on the Kiawah River on a 1,382.6 acre tract of land located between the marshes of the Kiawah River, River Road, and Betsy Kerrison Parkway and accessed by Mullet Hall Road, on John's Island, Charleston County, South Carolina. (Latitude: 32.6362 °N, Longitude: -80.1228 °W).

This is to inform you that your request for modifications to the saltwater mitigation plan is granted. The authorized modifications are described in the revised saltwater mitigation plan entitled "Mitigation Plan for Saltwater Creation at Kiawah River Plantation" last revised March, 2017. The modifications to the previously authorized mitigation plan consist of relocating the saltwater creation site from Critical Pond 1 to Critical Pond 4 to avoid an archaeological site and live oaks; reducing the creation area from 1.88 acres to 1.58 acres to be consistent with the reduced critical area impacts authorized in the final permit and to be consistent with the OCRM permit; and to allow for utilization of plant material from a nursery in lieu of or as a supplement to borrowed material as is feasible during planting of the site.

This letter and the referenced modified drawings should be attached to your copy of the signed permit. This permit was issued under the provisions of the Federal laws for the protection and preservation of the navigable waters of the United States. These laws provide that after the proposed work has been approved by the issuance of a Department of the Army permit,

**IT SHALL NOT BE LAWFUL TO DEVIATE FROM SUCH PLANS EITHER  
BEFORE OR AFTER COMPLETION OF THE WORK.**

unless modification of said plans has previously been submitted to and received the approval of the Department of the Army. All other conditions to which the work is made subject remain in full force and effect. In that this work appears subject to the jurisdiction of the South Carolina Department of Health and Environmental Control, it is highly recommended that you contact that agency to ascertain their requirements in this matter.

Your cooperation in the protection and preservation of our navigable waters and natural resources is appreciated. In all future correspondence concerning this matter, please refer to file number SAC-2008-01605. If you have any questions concerning this matter, please contact Mary Hope Green at (843) 329-8044.

FOR THE DISTRICT ENGINEER: Sincerely,

Robin Collier-Socha  
Chief, South Branch

Enclosures

"Mitigation Plan for Saltwater Creation at Kiawah River Plantation"

Last revised March, 2017

Notification of Appeal Options

Copies Furnished:

Mr. John Darby  
Kiawah River Plantation Holdings, L.P.  
211 King Street, Suite 300  
Charleston, South Carolina 29401

South Carolina Department of  
Health and Environmental Control  
Bureau of Water  
2600 Bull Street  
Columbia, South Carolina 29201

South Carolina Department of Health  
and Environmental Control  
Office of Ocean and Coastal  
Resource Management  
1362 McMillan Avenue, Suite 400  
Charleston, South Carolina 29405



rec'd 3/3/2017

# Mitigation Plan For Saltwater Creation at Kiawah River Plantation

April 2013

Revised: March 2015

Revised: March 2017

## 1.0 Background

The applicant and owner of the subject property, Kiawah River Plantation, LP (KRPLP) has applied to the USACE and SCDHEC for the appropriate permits and certifications to construct a masterplanned community on Johns Island, South Carolina (Figure 1). The project site, Kiawah River Plantation (KRP), consists of 1,382.61 total acres comprised of 1,005.89 acres of upland and 376.72 acres of aquatic resources. The aquatic resources at Kiawah River Plantation include a network of saltwater impoundments totaling 135.81 acres. These impoundments are intensely managed for fish and waterfowl and as such are subject to current impoundment management practices such as manipulating water regime.

Figure 1



Based on the landscape of the site and the position of the saltwater impoundments in relation to useable upland, it is necessary to supplement the current dike roads at KRP with fill material to satisfactorily meet design standards and anticipated carrying capacities of the development's roads. To accomplish this task, the project engineer has determined that it will be necessary to impact 0.79 acres of the saltwater impoundments to facilitate the needed road footprints.

In order to compensate for the loss of 0.79 acres of saltwater impoundment, KRPLP has proposed to create 1.58 acres of saltwater resources by expanding an area within one of the on-site impoundments, specifically Critical Pond 4 as depicted in Figure 2. The acreage of creation will meet the mitigation criteria set forth in *Section 30-4* of SCDHEC-OCRM's Critical Area Permitting Regulations, which requires a 2:1 ratio of mitigation acres to impact acres. This acreage also meets the compensatory mitigation requirement set forth by the USACE Charleston District SOP (Attached as Appendix A). This plan includes the proposed restoration activities, methods of implementation, monitoring and success criteria anticipated to meet the compensatory mitigation requirements for the proposed saltwater impacts associated with development at KRP.

Figure 2



## 2.0 Restoration Activities

The vegetation within the proposed creation area is currently dominated by a dense scrub layer of wax myrtle (*Myrica cerifera*), juvenile loblolly pine (*Pinus taeda*), groundsel trees (*Baccharis glomeruliflora*) and occasional live oaks (*Quercus virginiana*). The soils in the selected mitigation area are classified as Wando loamy fine sand and Seabrook loamy sand by the Natural Resource Conservation Service, which are characterized by sandy soils with small quantities of loam present throughout the upper horizons.

Upon approval of the mitigation activities presented in this plan and issuance of the required permit and certification from the USACE, SCDHEC and OCRM, the applicant will definitively identify the 1.58 acres of creation. This will be accomplished by locating grand trees as well as other significant live oaks and establishing a creation area boundary that will avoid these trees. This area will then be enclosed with construction fencing.

Once the boundary of the creation site is established, KRP will establish an elevation at which the creation area is expected to inundate with saltwater based on elevations in the adjacent vegetated portion of Critical Pond 4. The applicant will then excavate the creation area to the established elevation for inundation. Because of the dynamics of managed impoundments, it may be necessary to draw-down the water level in Critical Pond 4 to facilitate both excavation and planting in the creation area.

Once the established elevation is achieved within the creation area, the restoration site will be re-vegetated using *Spartina alterniflora* and/or *Juncus roemerianus* sprigs. As appropriate and necessary sprigs will either be "borrowed" from the adjacent impoundment, planted with nursery stock or a combination of both methods. Borrowed sprigs will be hand dug from random locations within adjacent areas so as not to borrow too much material from one location. Sprigs will be hand-planted on three (3) foot centers throughout the creation area. Combined with volunteer species provided by the seed and rhizome sources from the adjacent impoundment, it is anticipated that the planted species will successfully populate the creation area.

Upon approval of these restoration activities and corresponding issuance of the appropriate permits and certifications, KRPLP will schedule the activities to begin the following spring so as to validate the timing of a six-month follow up monitoring after the growing season.

### **3.0 Monitoring**

Following planting, four random plots will be established within the creation area. The center of each plot will be marked with PVC pipe and will serve as a basis for the evaluation of future monitoring designed to document the establishment and success of the created site. In addition, two plots will be established within any borrow areas to monitor and document re-growth. Finally, a reference plot will be established as a basis for the evaluation of success criteria.

An initial baseline monitoring will be conducted upon completion of planting the site to document planted species as well as proper inundation. This documentation will be submitted to OCRM and the USACE. After six months, a second monitoring and report will be completed to determine the success of the initial plantings. Monitoring will then occur annually for five years. In each successive year, percent coverage of volunteer vegetation and survivability of individual planted species within a 1 meter by 1 meter plot will be recorded in an annual report to be provided to OCRM and the USACE. Annual reports will include results of monitoring, general site descriptions and conditions, photographs of the site and any recommendations by the monitor that would improve timely success of the site. If after a monitoring event in which it has been determined that the site has completely established and meets success criteria before the end of the five year period, future monitoring may be suspended following consultation between KRPP and the permitting agencies.

### **4.0 Success**

The creation effort will be considered successful and complete if at the end of five years a minimum of 75% survival of planted species or suitable volunteer replacements exists within the creation area and mean stem densities of the monitoring plots is  $\geq 90\%$  of the



mean stem density of the reference plot.

## **5.0 Contingency**

If, at the end of the five year monitoring period, success criteria have not been met, the permittee will consult with the appropriate permitting agencies to determine what specific remedial actions should be taken. Remedial action may include replanting and/or re-grading and continued monitoring.

Appendix A: SOP Mitigation  
Calculation Worksheets

**Kiawah River Plantation  
Saltwater Creation Mitigation  
March 2017**

**PROPOSED WETLAND MITIGATION CREDIT TABLE**

Factors	Options				
Net Improvement	$0.0^{**}$ _____ $-10$ _____ $3.0$ (see Section 3.0 for examples of potential values)				
Upland Buffer	$0.0^{**}$ _____ $-10$ _____ $1.0$ (see Section 3.0 for examples of potential values)				
Credit Schedule	Not Applicable $0^{**}$	Alter $0.1$	Concurrent $0.3$	Before $0.5$	
Temporal Loss	Not Applicable $0^{**}$	0 to 5 Years $-0.1$	5 to 10 Years $-0.2$	10 to 20 Years $-0.3$	Over 20 Years $-0.4$
Kind	Out of Kind $0$		In Kind $0.4$		
Location	Case by Case $0$	Drainage Basin $0.1$	Adjacent 8-Digit HUC $0.2$	8-Digit HUC $0.4$	

\*\*Use this option to calculate credits for Preservation.

**PROPOSED WETLAND MITIGATION CREDITS WORKSHEET**

Factor	Area 1	Area 2	Area 3	Area 4	Area 5
Net Improvement	3.0				
Upland Buffer	0.0				
Credit Schedule	0.5				
Temporal Loss	-0.1				
Kind	0.4				
Location	0.4				
Sum of Factors	$M_1 = 4.2$	$M_2 = 1.3$	$M_3 =$	$M_4 =$	$M_5 =$
Mitigation Area	$A_1 = 1.58$	$A_2 =$	$A_3 =$	$A_4 =$	$A_5 =$
$M \times A =$	6.636				

Proposed Wetland Mitigation Credits  $= \sum (M \times A) =$

6.6

Area 1= Creation

**Kiawah River Plantation  
Saltwater Creation Mitigation  
March 2017**

**REQUIRED WETLAND MITIGATION WORKSHEET**

*Determination of Wetland Credits (Last Revised, October 7, 2010)*

Factors	Options				
Lost Type	Type C 0.2	Type B 2.0	Type A 3.0		
Priority Category	Tertiary 0.5	Secondary 1.5		Primary 2.0	
Existing Condition	Very Impaired 0.1	Impaired 1.0	Partially Impaired 2.0	Fully Functional 2.5	
Duration	0 to 1 year 0.2	1 to 3 years 0.5	3 to 5 years 1.0	5 to 10 years 1.5	Over 10 years 2.0
Dominant Impact	Shade 0.2	Clear 1.0	Drain 2.0	Dredge 2.5	Impound/Flood 2.5
Cumulative Impact	<0.25 Acre 0.1	0.25-0.99 Acres 0.2	1.0-2.99 Acres 0.5	3.0-9.99 Acres 1.0	≥10.0 Acres 2.0
					Fill 3.0

**Note:** The cumulative impact factor for the overall project should be included in the sum of factors for each impacted area on the Required Wetland Mitigation Credit Worksheet.

**Required Wetland Mitigation Credit Worksheet**

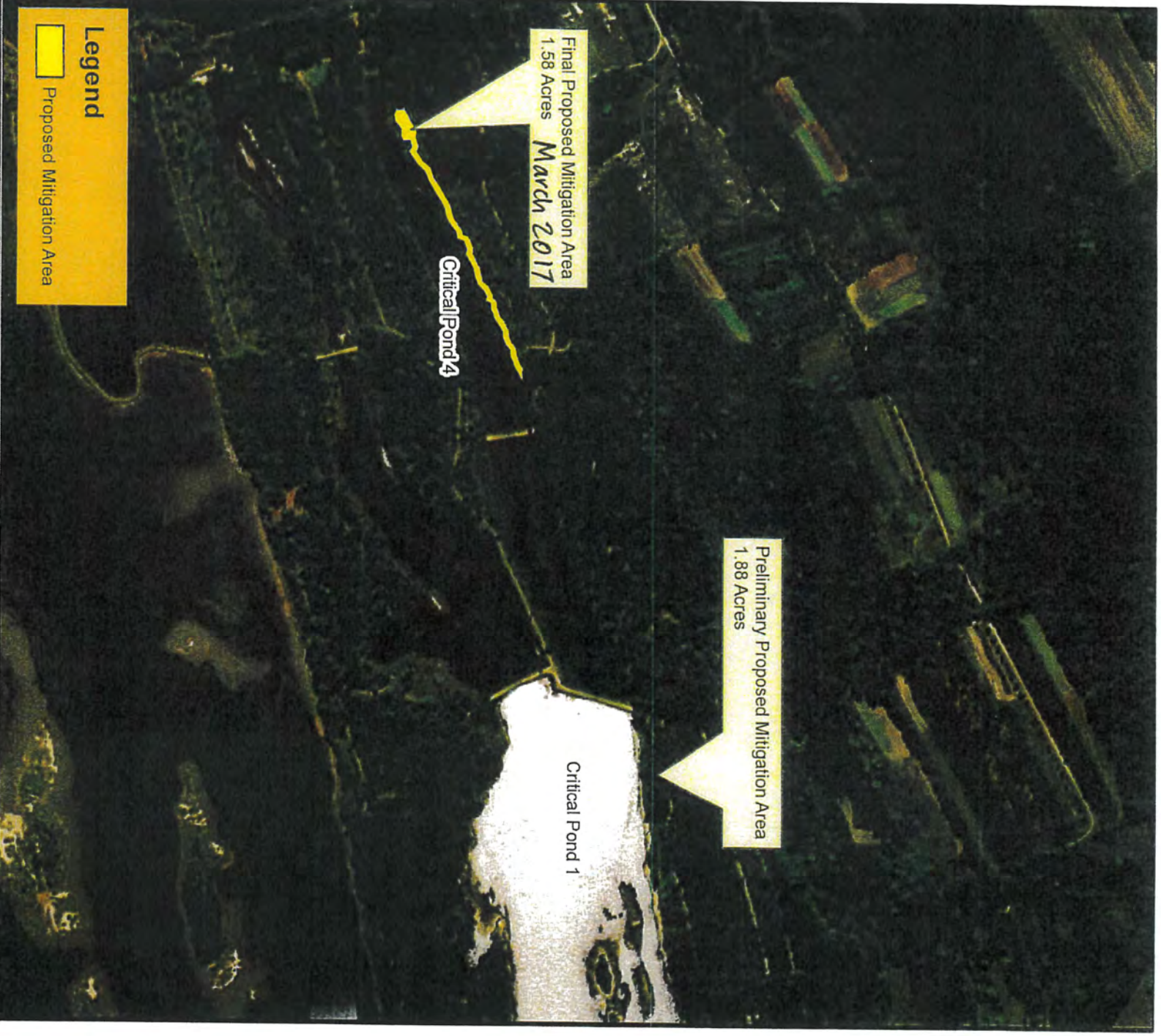
Factor	Area 1	Area 2	Area 3	Area 4	Area 5	Area 6
Lost Type	0.2					
Priority Category	2.0					
Existing Condition	1.0					
Duration	2.0					
Dominant Impact	3.0					
Cumulative Impact	0.2					
Sum of m Factors	R <sub>1</sub> = 8.4	R <sub>2</sub> =	R <sub>3</sub> =	R <sub>4</sub> =	R <sub>5</sub> =	R <sub>6</sub> =
Impacted Area	A <sub>1</sub> = 0.79	A <sub>2</sub> =	A <sub>3</sub> =	A <sub>4</sub> =	A <sub>5</sub> =	A <sub>6</sub> =
R x AA =	6.636					

Required Wetland Mitigation Credits =  $\sum (R \times A) =$

6.6

Area 1= Saltwater Impoundment Fill





SAC 2008-01605-21G

Project #: 01-2535b      Date: February 2017

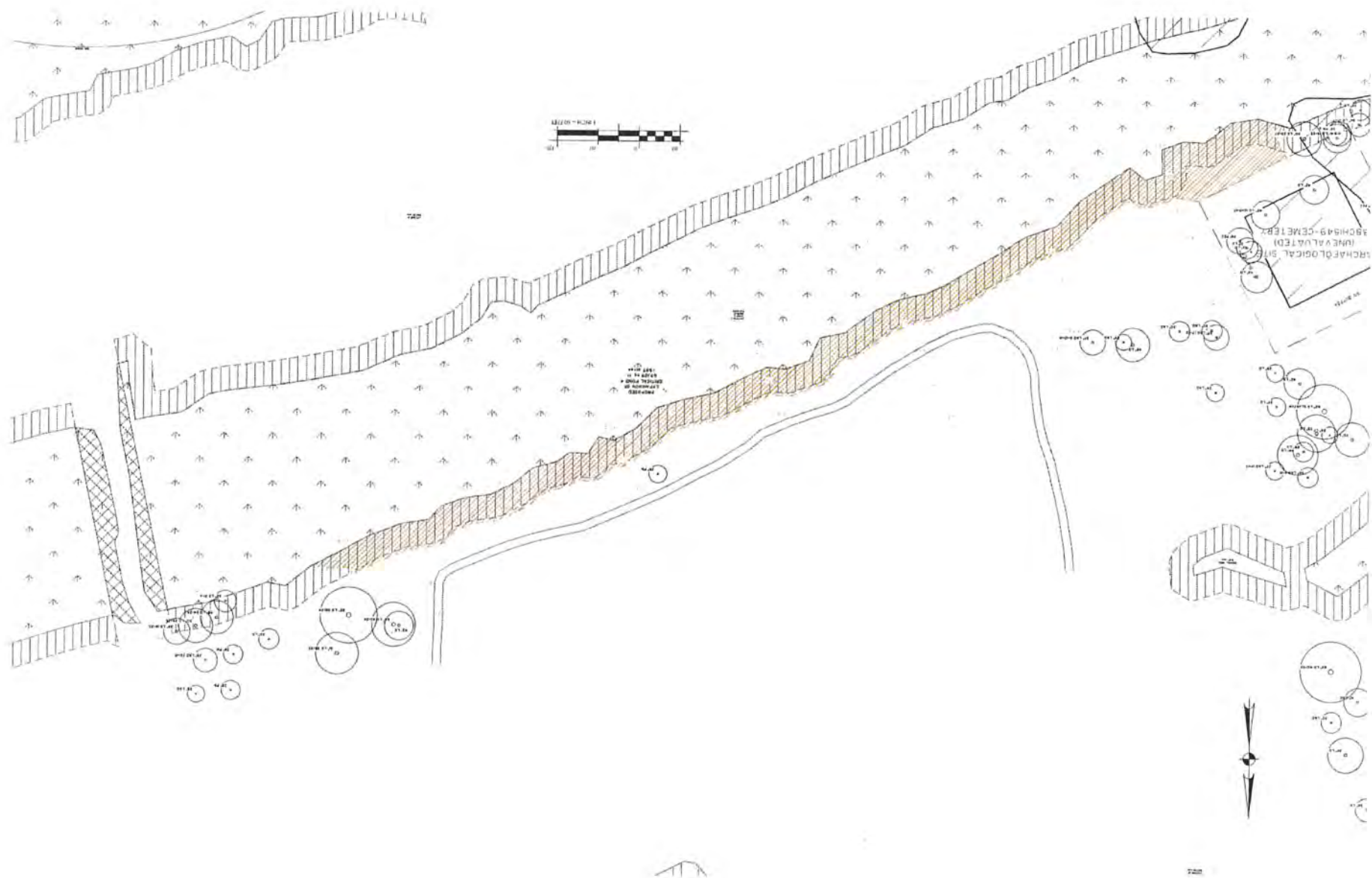
Created by: RC



**Newkirk**  
ENVIRONMENTAL INC.

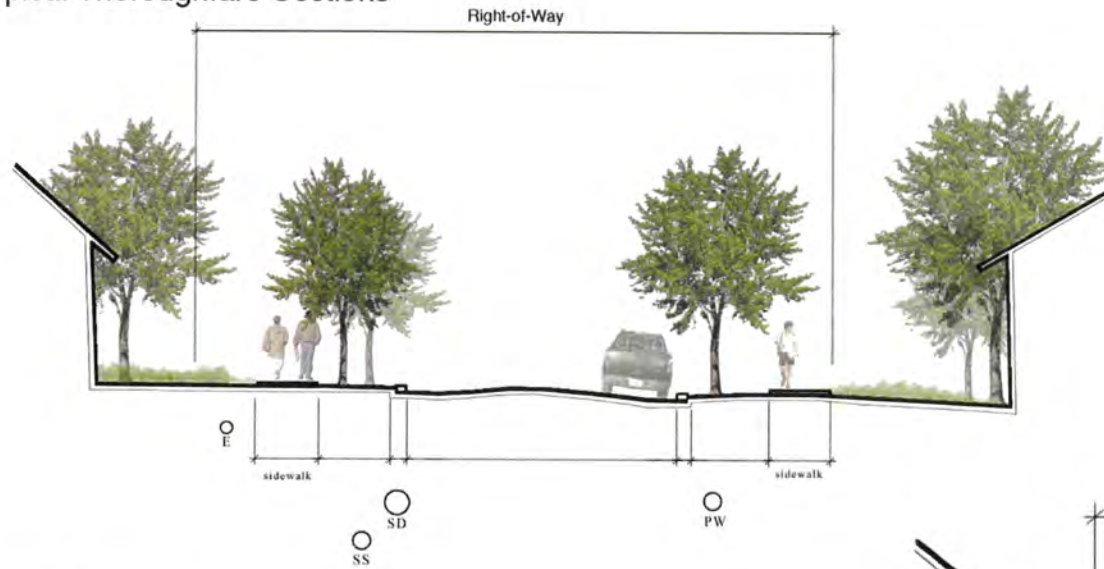
Final Proposed Saltwater Creation Site  
Kiawah River Plantation  
SAC 2008-01605-21G



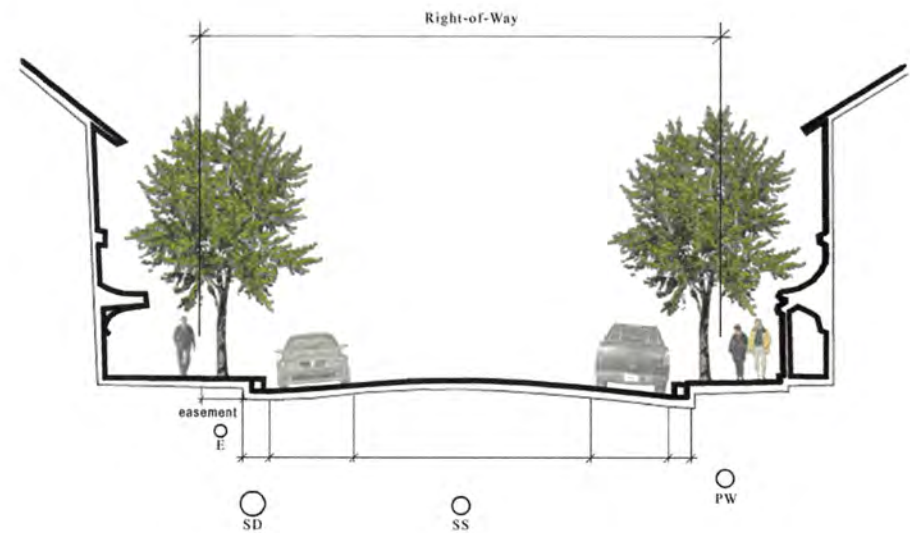




## Typical Thoroughfare Sections



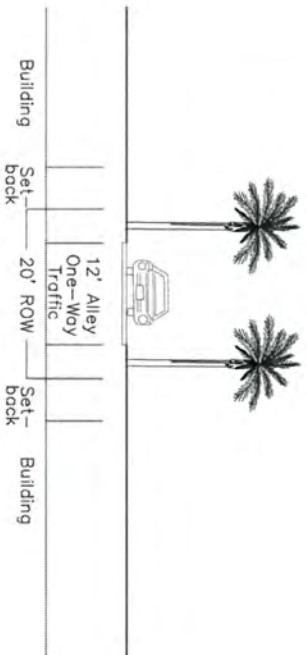
Utilities Key:  
 E - Electric (may also be located in street)  
 SD - Storm Drain  
 SS - Sanitary Sewer  
 PW - Potable Water



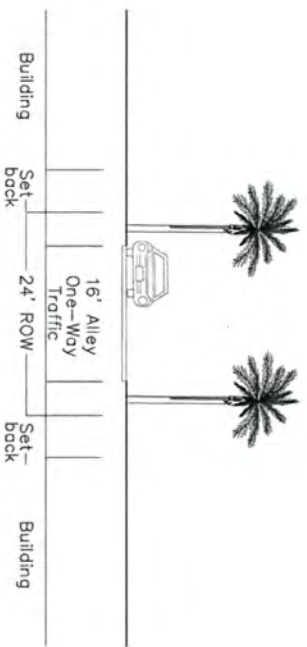
*Kiawah River Plantation*

EXHIBIT 11.1 - TYPICAL UTILITY PLACEMENT DIAGRAM

**EXHIBIT 11.2 - TYPICAL STREET CROSS-SECTIONS**  
Residential Alley/Commercial Alley



RESIDENTIAL ALLEY – SECTION



COMMERCIAL ALLEY – SECTION



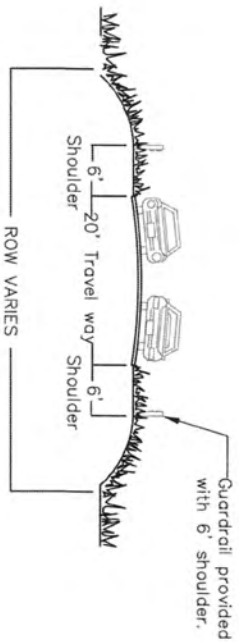
Residential Alley- A narrow throughfare intended to provide rear access to residential lots for parking, trash collection, utility and service areas. While discouraging through traffic, the alley promotes slow movement and allows one-way vehicular movement.

Commercial Alley- A narrow throughfare intended to provide rear access to commercial lots for parking, trash collection, utility and loading and service areas. While discouraging through traffic, the alley promotes slow movement and allows one-way vehicular movement.

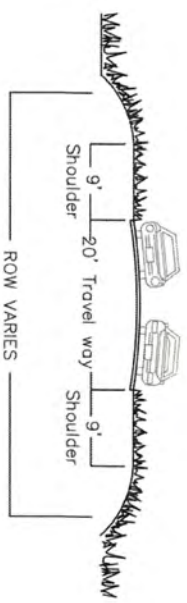
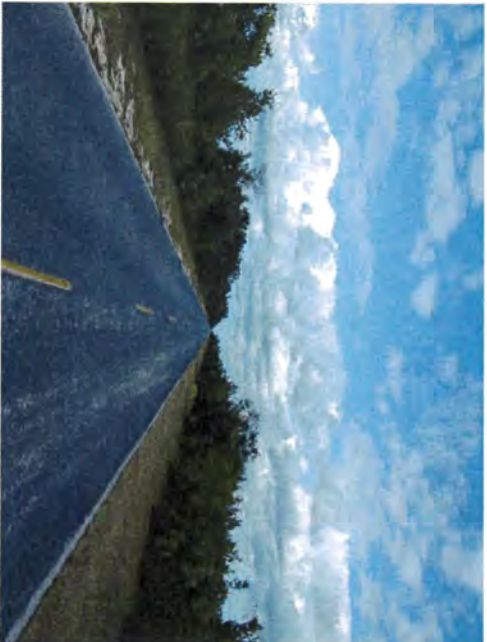


## EXHIBIT 11.2 - TYPICAL STREET CROSS-SECTIONS

Causeway



CAUSEWAY – OPTION 1  
SECTION



CAUSEWAY – OPTION 2  
SECTION



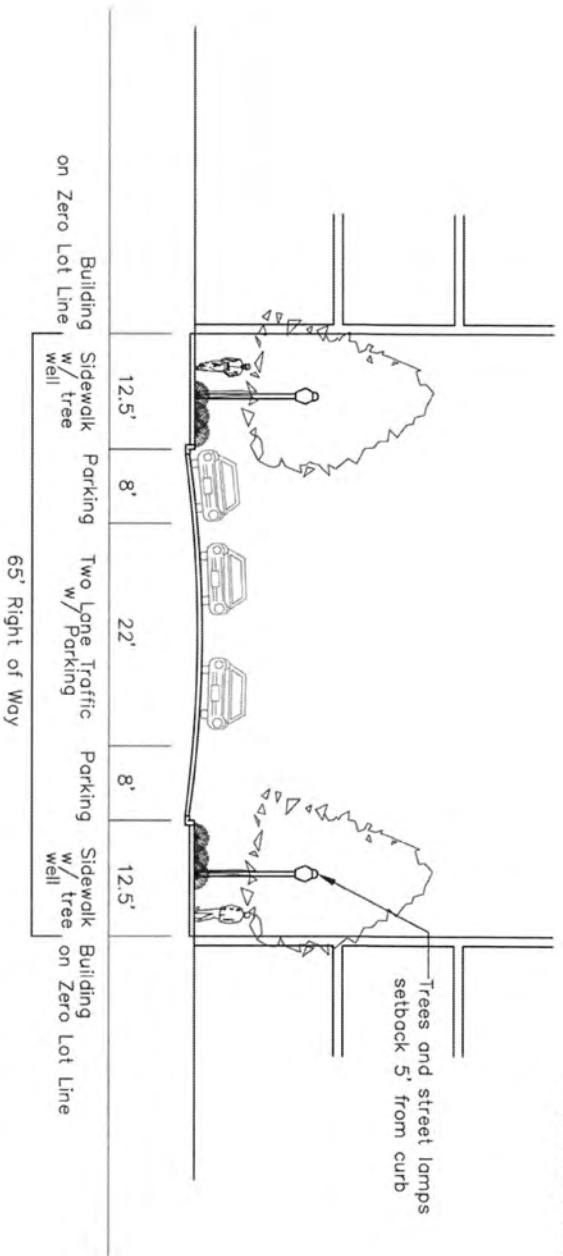
Option 1- A two-way elevated thoroughfare implemented to cross marshlands, wetlands and waterways. This section implements a guardrail and a six foot shoulder.

Option2- A two-way elevated thoroughfare implemented to cross marshlands, wetlands and waterways. This section implements a nine foot shoulder.

*Kiansah River Plantation*

## EXHIBIT 11.2 - TYPICAL STREET CROSS-SECTIONS

### Commercial Street 1

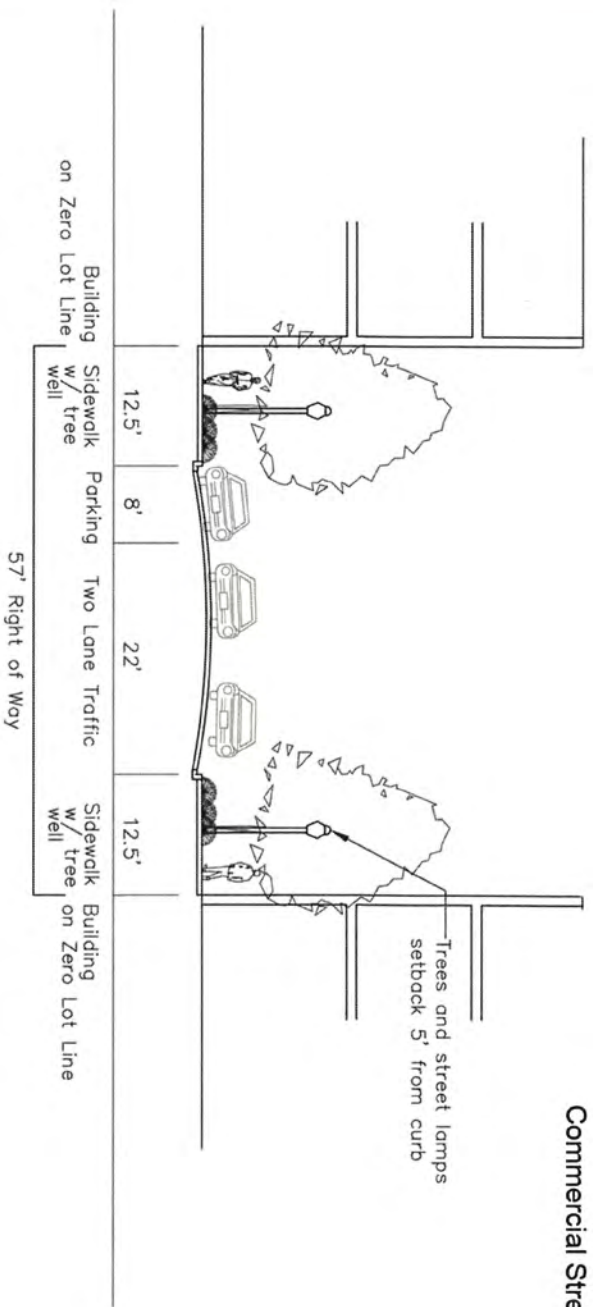


Commercial Street Section 1 - A small scale, low speed local connector providing frontage for high-density buildings such as offices and retail shops. This street is urban in character with raised curbs, on-street parking, wide sidewalks, street trees individual planters, and buildings aligned with minimal setbacks.

*Kiaulah River Plantation*



# **EXHIBIT 11.2 - TYPICAL STREET CROSS-SECTIONS** Commercial Street 2

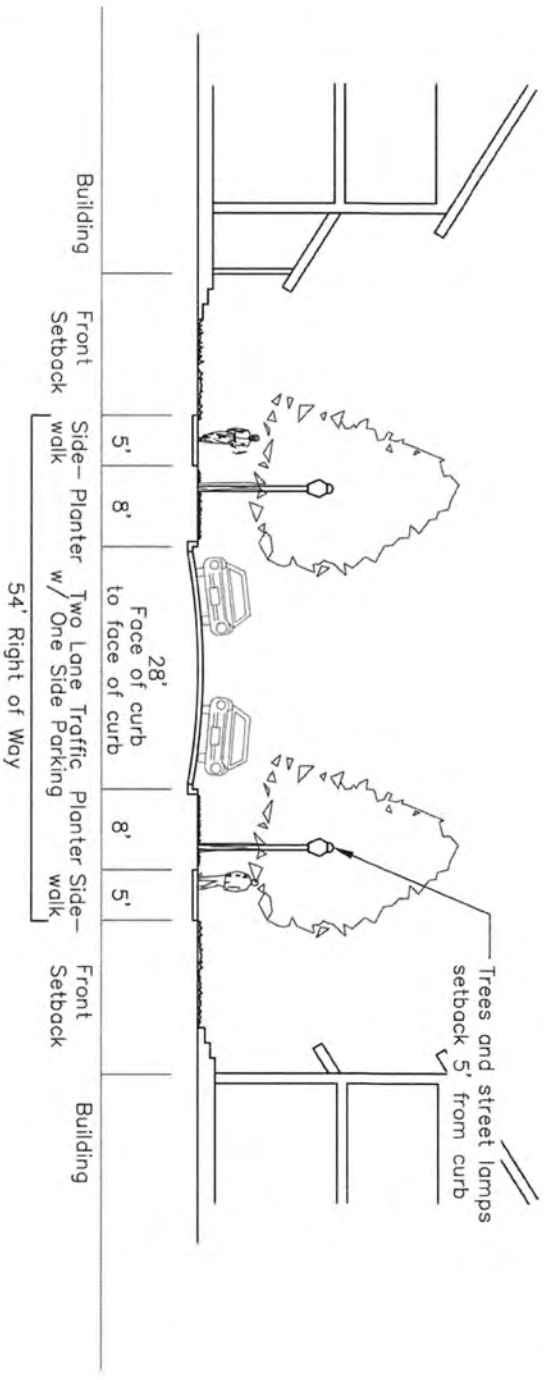


Commercial Street Section 2- Small-scale, low speed connector providing frontage for high-density buildings such as offices and retail shops. This street is urban in character with raised curbs, on-street parking (one side), sidewalks, street trees in individual planters, and buildings aligned with minimal setbacks.

*Kansas River Plantation*



# **EXHIBIT 11.2 - TYPICAL STREET CROSS-SECTIONS** Residential Street 1



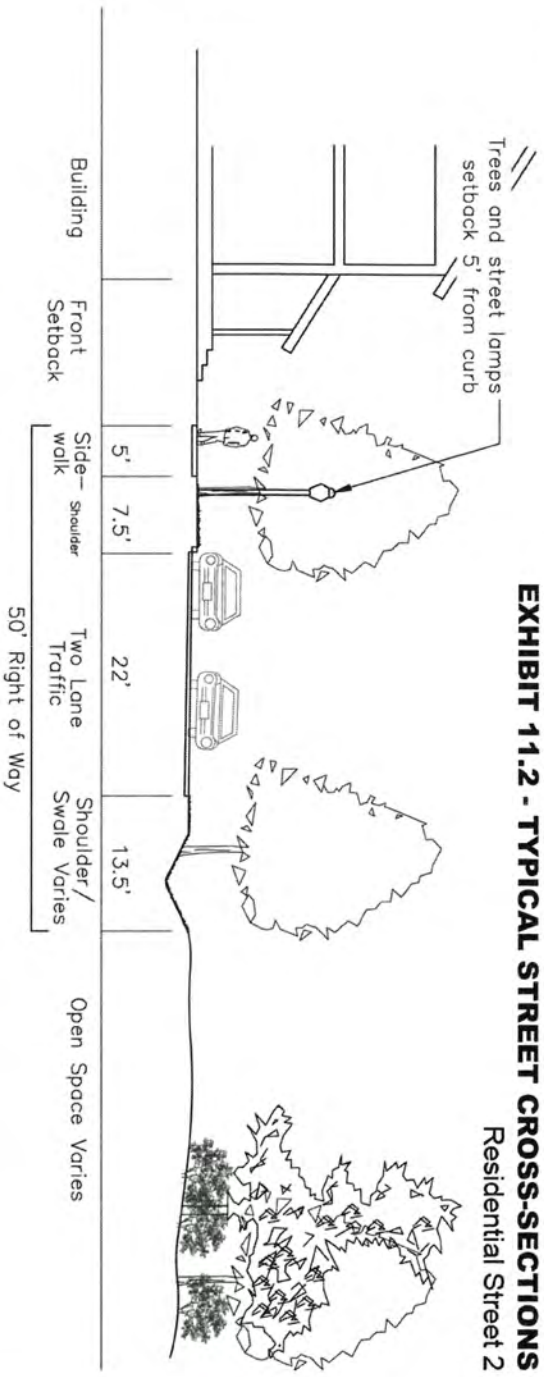
Residential Street Section 1 - A small-scale, low speed connector intended to provide frontage for acces to residential lots, and carries traffic having a destination or origin on the street itself. This street section has continuous planting strips and narrow sidewalks.

*Kiansah River Plantation*



## EXHIBIT 11.2 - TYPICAL STREET CROSS-SECTIONS

Residential Street 2

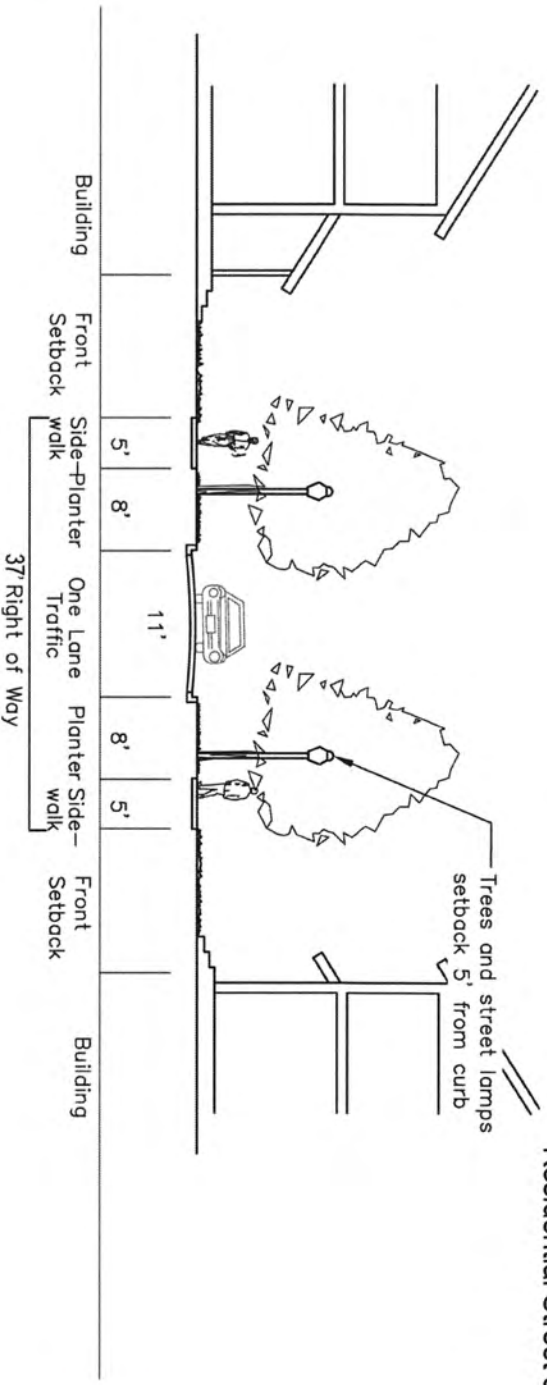


Residential Street Section 2- Small-scale, low speed connector intended to serve as the boundary along the residential development and an open space park or natural setting. One side of the thoroughfare has an urban character with continuous planting strips, sidewalks and residential buildings, while the opposite side has the qualities of a parkway with natural detailing.

*Kiansah River Plantation*





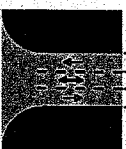

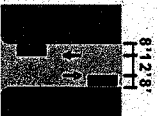
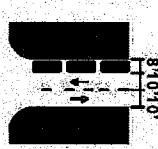
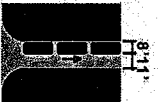

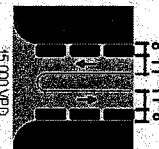
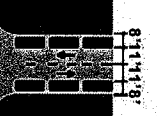
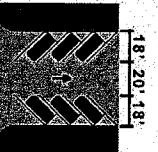
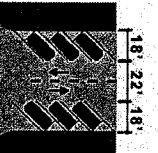


# **EXHIBIT 11.2 - TYPICAL STREET CROSS-SECTIONS** Residential Street 3



Residential Street Section 3- A small-scale, low speed, one-way roadway intended to provide frontage for access to residential lots, and carries traffic having a destination or origin on the street itself. This street section has continuous planting strips and narrow sidewalks.

*Kiawah River Plantation*

# EXHIBIT 11.3 - VEHICLE LANE & PARKING ASSEMBLIES

Allowable Districts		ONE WAY MOVEMENT		TWO WAY MOVEMENT		
All Districts	a. NO PARKING					
	Design ADT Pedestrian Crossing Design Speed 1,900 VPD 3 Seconds 20 - 30 MPH			2,900 VPD 5 Seconds 20-25 MPH	22,000 VPD 9 Seconds	
All Districts	b. YIELD PARKING					
	Design ADT Pedestrian Crossing Design Speed 1,000 VPD 5.9 seconds			1,000 VPD 7 Seconds	16,000 VPD 8.9 seconds 25-30 MPH	
All Districts	c. PARKING ONE SIDE PARALLEL					
	Design ADT Pedestrian Crossing Design Speed 5,000 VPD 5 Seconds 20-30 MPH			16,000 VPD 8 Seconds 25-30 MPH	15,000 VPD 11 Seconds 25-30 MPH	
All Districts	d. PARKING BOTH SIDES PARALLEL					
	Design ADT Pedestrian Crossing Design Speed 15,000 VPD 10 Seconds 25-30 MPH					
All Districts	e. PARKING BOTH SIDES DIAGONAL					
	Design ADT Pedestrian Crossing Design Speed 18,000 VPD 15 Seconds Below 20 MPH			15,000 VPD 17 Seconds 20-25 MPH		
All Districts	f. PARKING ACCESS					
	Design ADT Pedestrian Crossing Design Speed 15,000 VPD 17 Seconds 20-25 MPH			6.9 seconds	3.9 seconds	

\*Refer to the Roadway/Thoroughfare Standards for additional requirements

ADT = Average Daily Traffic

VPD = Vehicles Per Day

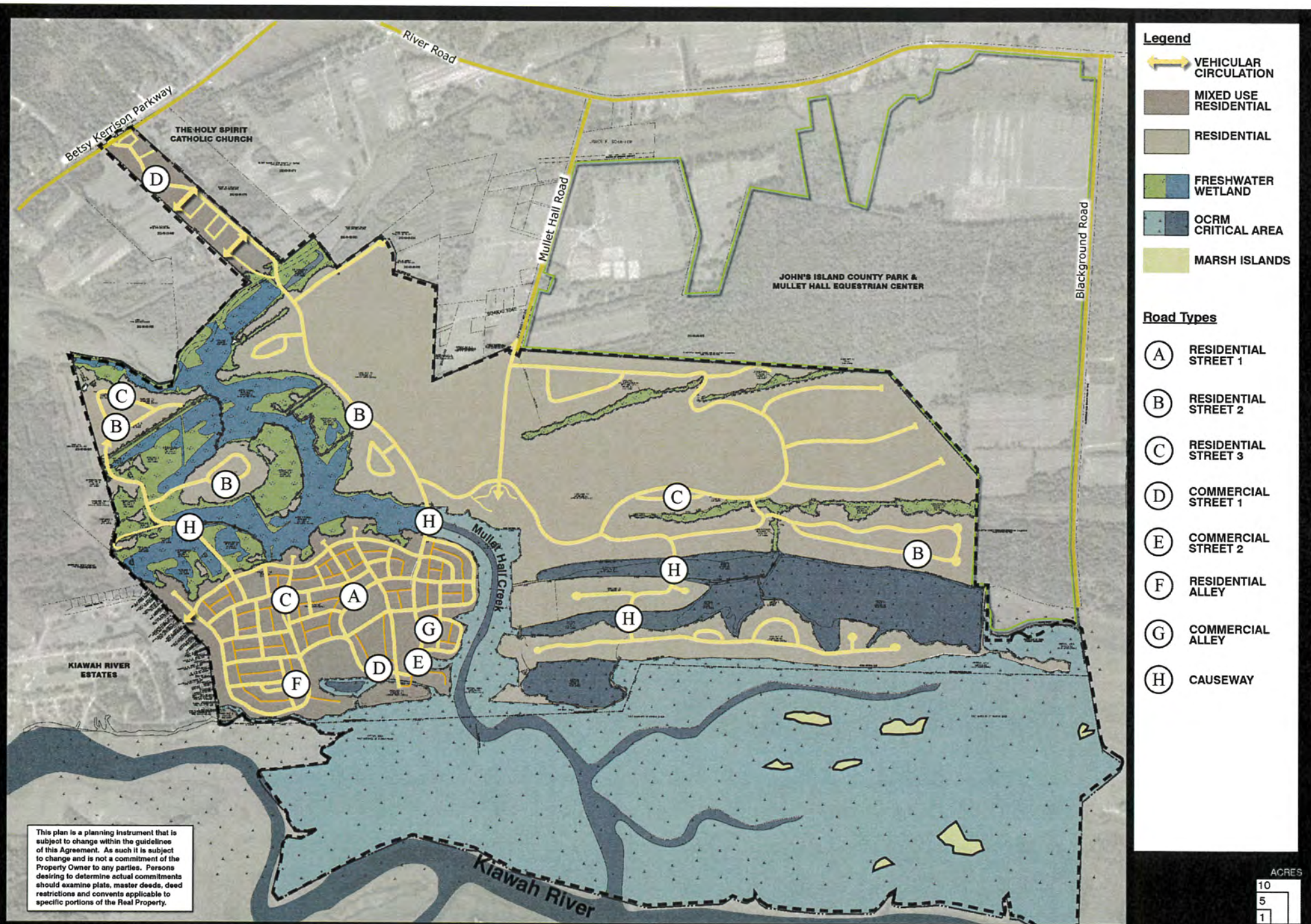
MPH = Miles Per Hour

Conditions of Use

The images and diagrams appearing in SmartCode Version 9.2 are the property of Duany Plater-Zyberk & Company (DPZ). Modifications have been made to the original images and diagrams.

*Kansas River Plantation*





# Kiawah River Plantation

EXHIBIT 11.4 - CONCEPTUAL ROAD FRAMEWORK PLAN





September 30, 2009

Mr. Kevin O'Neill  
Vice President  
Beach Development  
211 King Street  
Suite 300  
Charleston, SC 29401

Via email: [koneill@thebeachcompany.com](mailto:koneill@thebeachcompany.com)

Re: Project Coordination – Kiawah River Plantation

Dear Kevin,

Charleston County Park and Recreation Commission understands without objection that it will be necessary for Mullet Hall Road to be utilized as a construction access for the Kiawah River Plantation project. This will not present a problem for our adjacent property, provided that the road is maintained throughout the course of the project, and later repaired or rebuilt to SCDOT standards at a minimum.

Please continue to keep us informed of your progress.

Best regards,

A handwritten signature in blue ink, appearing to read "Julie Hensley".

Julie Hensley  
Director, Planning Division

Copy: Tom O'Rourke, David Bennett, Cynthia Montague

861 Riverland Drive  
Charleston, SC 29412  
843-762-2172  
[www.ccprc.com](http://www.ccprc.com)

**EXHIBIT 12.1 - ILLUSTRATION OF ARCHITECTURE STYLE**



Typical Residential Architecture



Typical Multi-Family Architecture



Typical Residential Architecture



Typical Commercial Architecture



Typical Hotel/Inn Architecture



Typical Commercial Architecture

*Kiawaha River Plantation*



**EXHIBIT 12.2 - ILLUSTRATION OF LANDSCAPE ARCHITECTURAL STYLE**



Typical Residential Street Landscape



Typical Trail/Open Space Landscape



Typical Residential Landscape



Typical Residential Landscape



Typical Residential Street Landscape



Typical Causeway Road Landscape

*Kiawah River Plantation*





# KIAWAH RIVER

RESIDENTIAL DESIGN GUIDELINES





# K I A W A H R I V E R

CHARLESTON SEA ISLANDS

*South Carolina*

## RESIDENTIAL DESIGN GUIDELINES

December 2017

Kiawah River Investments, LLC

A Partnership between The Beach Company and The McNair Group

**VITA**  
PLANNING & LANDSCAPE ARCHITECTURE  
Community Developer

© Copyright 2017. All rights with respect to these materials are reserved by copyright to the authors: VITA Planning and Landscape Architecture. These Guidelines may not be copied or reproduced in whole or in part without the express written consent of the authors. This document is intended to be used only for Kiawah River and shall not be reproduced in whole or part for any other project or publication without prior written consent of the authors.





# WELCOME

These Design Guidelines (Guidelines) are intended to provide guidance for all residential Development and construction within Kiawah River—new buildings, building additions, site work and landscaping—as well as any subsequent changes or alterations to previously approved plans or existing homes. The Guidelines will be administered by the Kiawah River Architectural Review Board (ARB) in accordance with procedures set forth herein and in the Kiawah River Development Covenants, Conditions and Restrictions (CC&R's). In the event of any conflict between the Design Guidelines and the CC&R's, the CC&R's shall govern and control.

The Guidelines may be amended from time to time by the Master Developer. It is the Guest Builder or Property Owners' responsibility to be sure that they have current Guidelines and have carefully reviewed all applicable sections of the CC&R's, project approval documents, and/or other governing ordinances or regulations that may affect their Improvements. Any conflicts identified by the Guest Builder or Property Owner or their Consultants shall be immediately brought to the attention of the Master Developer. In general, where regulations or Guidelines conflict with one another, the more restrictive regulations or requirements shall apply.

The illustrations in this document are intended to convey a concept and not to portray specific plans for construction. Plans may be modified at any time at the sole discretion of the Master Developer. The purpose of these Guidelines is not to create look-alike structures or other Improvements but to ensure that designs are compatible with the design objectives of the Community as a whole. To that end, the ARB reserves the right to require design modifications or additions that, though not specifically contained in the

Guidelines text or illustrations, are within the spirit and intent of the Guidelines and the design objectives of the Community.

These Guidelines are binding on any persons, company or firm that intends to construct, reconstruct or modify any permanent or temporary Improvements in the Community. The ARB evaluates all Development proposals on the basis of these Design Guidelines. Some of the Guidelines are written as broad standards and the interpretation of these standards is left up to the discretion of the ARB. Other Guidelines, such as Building Height or Setbacks, are more definitive, or absolute, design parameters and in many cases parallel Charleston County Zoning and Development Regulations or the Kiawah River Planned Development District Plan (PDD Plan). It is the intention of the Guidelines that all Improvements comply with these absolute standards. In the event of a conflict between these Guidelines and any local, State or Federal building or zoning code or Kiawah River PDD Plan; the local, State, or Federal building or zoning code or Kiawah River PDD Plan shall govern.



# TABLE OF CONTENTS

## 1 The Kiawah River Design Philosophy

- 1.1 AN INTRODUCTION TO KIAWAH RIVER
- 1.2 KIAWAH RIVER DESIGN PHILOSOPHY & COMMUNITY PLAN

## 2 Site Design

- 2.1 SITE DESIGN OBJECTIVES
- 2.2 CHARLESTON COUNTY ZONING & DEVELOPMENT REGULATIONS / KIAWAH RIVER PLANNED DEVELOPMENT DISTRICT PLAN (PDD PLAN)
- 2.3 FEMA REQUIREMENTS
- 2.4 MASTER DEVELOPER INSTALLED IMPROVEMENTS
- 2.5 LOT DIAGRAMS
- 2.6 BUILDABLE ENVELOPES
  - 2.6.1 Private Area
  - 2.6.2 The Facade Zone
  - 2.6.3 Transition Area
- 2.7 LOT TYPES
  - 2.7.1 Natural Area
- 2.8 COMBINING LOTS
- 2.9 BUILDING COVERAGE, MINIMUM FLOOR AREA, & MAXIMUM FLOOR AREA
- 2.10 ICON LOTS
- 2.11 GRADING & DRAINAGE
  - 2.11.1 Retaining Walls & Bulkheads
- 2.12 MARSHES, WETLANDS, & SALT PONDS (RIPARIAN LANDSCAPES)
- 2.13 DOCKS AND SLIPS

## 3 Architecture Guidelines

- 3.1 ARCHITECTURAL DESIGN OBJECTIVES
- 3.2 ARCHITECTURAL DESIGN CHARACTER
  - 3.2.1 Community Architecture
  - 3.2.2 Architectural Integrity & Quality
- 3.3 APPLICABLE BUILDING CODES & FLOOD REQUIREMENTS
- 3.4 BUILDING HEIGHTS AND FINISHED FLOOR ELEVATIONS
  - 3.4.1 At-Grade Home
  - 3.4.2 Elevated Homes
  - 3.4.3 Flat Roof Homes
  - 3.4.4 Minimum Finished Floor Elevation
- 3.5 BUILDING FORMS & MASSING
  - 3.5.1 Visual Building Mass
  - 3.5.2 Tower Design
  - 3.5.3 Entries
- 3.6 ROOFS
- 3.7 EXTERIOR WALLS & FINISHES
- 3.8 DOORS & WINDOWS
- 3.9 BUILDING PROJECTIONS & ACCESSORY STRUCTURES
  - 3.9.1 Entries, Front Porches & Side Porches
  - 3.9.2 Pergolas/Trellises, Colonnades
  - 3.9.3 Columns / Railings
  - 3.9.4 Mechanical Equipment, Vents & Flues
  - 3.9.5 Miscellaneous Projections
  - 3.9.6 Accessory Structures
  - 3.9.7 Chimneys
  - 3.9.8 Skylights
  - 3.9.9 Solar Equipment

- 3.10 BUILDING COLOR
- 3.11 DECORATIVE ELEMENTS
- 3.12 UTILITIES
- 3.13 HURRICANE PROTECTION

## 4 Architectural Styles

- 4.1 ARCHITECTURAL STYLES FOR KIAWAH RIVER
- 4.2 THE MARSH HOUSE
- 4.3 THE SEA ISLAND COTTAGE
- 4.4 THE ISLAND HOUSE
- 4.5 THE FARM HOUSE
- 4.6 THE SIDE YARD HOUSE

## 5 Landscape Design & Site Elements

- 5.1 PLANTING
  - 5.1.1 General Planting Guidelines
  - 5.1.2 Private Area Planting
  - 5.1.3 Transition Area Planting
  - 5.1.4 Natural Area Planting
- 5.2 TREE PROTECTION & PLANT SALVAGE
- 5.3 DRIVEWAYS & AUTO COURTS
  - 5.3.1 Shared Driveways
- 5.4 GARAGES & PARKING
- 5.5 COURTYARDS, TERRACES, PATHS & OUTDOOR STAIRS
- 5.6 WALLS, FENCES & GATES
- 5.7 LANDSCAPE STRUCTURES
- 5.8 SPAS, POOLS & WATER FEATURES
- 5.9 EXTERIOR SERVICE AREAS
- 5.10 IRRIGATION

- 5.11 LIGHTING
- 5.12 MISCELLANEOUS SITE ELEMENTS
  - 5.12.1 Patio Furniture
  - 5.12.2 Sculptures & Artwork
  - 5.12.3 Barbeques & Heat Lamps
  - 5.12.4 Flagpoles, Antennae, & Satellite Dishes
  - 5.12.5 Address Markers & Mail Boxes
  - 5.12.6 Sports / Tennis Courts
  - 5.12.7 Exterior Recreation or Play Equipment
  - 5.12.8 Basketball Hoops

## 6 Sustainable Building Strategies

- 6.1 SUSTAINABLE BUILDING STRATEGIES
- 6.2 REDUCE ENERGY DEMAND
- 6.3 BUILDING MATERIALS FOR A BETTER ENVIRONMENT
- 6.4 HEALTHIER AIR QUALITY FOR A BETTER LIFE
- 6.5 EFFICIENT USE OF WATER
- 6.6 REDUCE WASTE

## 7 Architectural Review Board

- 7.1 ARCHITECTURAL REVIEW BOARD MEMBERS
- 7.2 APPOINTMENT & TERM OF MEMBERS
- 7.3 MEMBERSHIP REQUIREMENTS
- 7.4 RESIGNATION OF MEMBERS
- 7.5 FUNCTIONS OF THE ARB
- 7.6 MEETINGS
- 7.7 COMPENSATION
- 7.8 AMENDMENT OF DESIGN GUIDELINES
- 7.9 NON-LIABILITY



8 Design Review Process

- 8.1 OVERVIEW OF DESIGN REVIEW PROCESS
- 8.2 APPROVED DESIGN PROFESSIONALS
- 8.3 PRE-DESIGN CONFERENCE & CONCEPT DESIGN
  - 8.3.1 Pre-Design Conference
  - 8.3.2 Concept Design
- 8.4 PRELIMINARY DESIGN REVIEW
  - 8.4.1 Preliminary Design Review
  - 8.4.2 Submission Materials
  - 8.4.3 Staking
  - 8.4.4 Preliminary Design Review Meeting
- 8.5 FINAL DESIGN REVIEW
  - 8.5.1 Final Design Review
  - 8.5.2 Submission Materials
  - 8.5.3 Final Design Review Meeting
  - 8.5.4 Final Design Approval
- 8.6 RESUBMITTAL OF PLANS
- 8.7 KIAWAH RIVER ARB
- 8.8 SUBSEQUENT CHANGES
- 8.9 WORK IN PROGRESS OBSERVATIONS
- 8.10 NOTICE TO COMPLY
- 8.11 NOTICE OF COMPLETION
- 8.12 RIGHT OF WAIVER
- 8.13 NON-LIABILITY
- 8.14 DESIGN REVIEW SCHEDULE
- 8.15 APPLICATION FEES
- 8.16 APPLICATION FORMAT
- 8.17 UNAUTHORIZED IMPROVEMENTS

9 Construction & Builder Regulations

- 9.1 PRE-CONSTRUCTION CONFERENCE
- 9.2 CONSTRUCTION AREA
  - 9.2.1 Fencing Requirements
  - 9.2.2 Access to Construction Area
- 9.3 BUILDER’S DEPOSIT
- 9.4 VEHICLES & PARKING AREAS
- 9.5 STORAGE OF MATERIALS & EQUIPMENT
- 9.6 CONSTRUCTION ACTIVITY TIMES
- 9.7 CONSTRUCTION TRAILERS / TEMPORARY STRUCTURES
- 9.8 SANITARY FACILITIES
- 9.9 DEBRIS & TRASH REMOVAL
- 9.10 HAZARDOUS WASTE MANAGEMENT
- 9.11 EXCAVATION & GRADING
- 9.12 FOUNDATIONS
- 9.13 LOT SURVEY
- 9.14 START OF CONSTRUCTION & TEMPORARY LANDSCAPE
- 9.15 DUST CONTROL
- 9.16 DAMAGE REPAIR AND RESTORATION
- 9.17 PROJECT COMPLETION & CLOSE-OUT
- 9.18 CONSTRUCTION OBSERVATIONS
- 9.19 CONSTRUCTION SIGNS
- 9.20 NO PETS
- 9.21 SECURITY
- 9.22 NOISE
- 9.23 NO SMOKING

- 9.24 NO FIREARMS
- 9.25 NO ALCOHOL OR DRUGS
- 9.26 CONSTRUCTION PERSONNEL CONDUCT
- 9.27 OCCUPATIONAL SAFETY AND HEALTH ACT (OSHA)
- 9.28 FIRE PROTECTION
- 9.29 TERMITE PRETREAT
- 9.30 STORM PREPARATION
- 9.31 EROSION CONTROL & MARSH PROTECTION REQUIREMENTS
- 9.32 CONSTRUCTION AREA

Appendices

- A DEFINITIONS
- B APPROVED PLANT LIST
- C PROHIBITED PLANT LIST
- D ICON LOT DIAGRAM
- E GOVERNING REGULATIONS
- F LOT SURVEY REQUIREMENTS
- G DESIGN REVIEW APPLICATION FORMS







1

## THE KIAWAH RIVER DESIGN PHILOSOPHY



1.1 An Introduction to Kiawah River

For centuries, rivers have drawn people to their banks to claim a spot of their own along their fertile lands. Around the globe, small settlements have grown into port cities along the rivers’ edge, reinforcing the time-proven connection we have with life-giving water. If one looks carefully, a common thread can often be found in each of these locations: they hold a special place in the heart of everyone who lives in or visits them.

Inspired by the visionaries of old, Kiawah River will take its place among the most desirable Charleston Sea Island addresses. It will grow organically, anticipating and fulfilling the needs of the residents who will provide life to its shores. Walking along the water’s edge, every home, restaurant, shop and amenity will connect with the other, echoing the tides and flowing with the rhythms of life lived as it should be. This organic growth will be guided by the following principles, acknowledging the unique setting and opportunity of this Charleston Sea Island place:

THE NATURAL LANDSCAPE AS A LEGACY

Charleston Sea Island residents possess a profound respect for the land and nature, managing their precious resources to ensure their bounty for future generations. The pattern of Development on Johns Island has traditionally followed the drainage patterns, wetlands, and ecological movement of animals throughout the land. At Kiawah River, open-space preservation, green building principles and responsible management practices will create a Community that is truly respectful of this magnificent natural setting, the natural systems that shape its landscape, and be committed to preserving it for future generations.

CONTEMPORARY COMMUNITY WITH TRADITIONAL SENSIBILITIES

Acknowledging its location in the Charleston Sea Islands and, specifically, Johns Island, the Kiawah River Community will pay respect to local culture and traditions through its layout, buildings and materials, creating a Community that belongs. Historic building forms, time-proven local materials, agricultural references and traditional landscape patterns combine to create a Community that is at once familiar yet forward looking.

A REAL PLACE TO LIVE

Like the early towns of the South, Kiawah River is designed to fulfill the needs of its residents with a diversity of home types and sizes that create a vibrant social mix of residents. Neighborhoods are laid out to encourage social interaction; a mixed-use village along the river’s edge creates local jobs and provides both services and entertainment; organic farms supply markets and restaurants with healthy produce; the communities’ parks and open spaces are places to play, explore, reflect and grow. In short, it is a place to call home.



THE LODGE AT RIVER VILLAGE





## 1.2 Kiawah River Design Philosophy & Community Plan

The spiritual qualities of the Charleston Sea Islands have attracted people for centuries, becoming a sanctuary in which to rest and renew ourselves and our relationships with others. The early inhabitants of Kiawah River, the Kiawah, Stono and Edisto Indians established village communities that were protected from the sometimes harsh Atlantic environment and in which they collaborated with each other and shared the wealth of nature’s resources. Kiawah River will be such a place, enabling its residents to create their own personal sanctuary amid a lush riverfront environment. This philosophy has shaped a Community plan with the following goals:

### CONNECTIVITY AND WALKABILITY

Providing a direct connection to the natural environment and easy access to the trails system is a key component to establishing the Community pattern and road networks. The Community Plan allows residents to experience the Community and the natural environment by foot, bicycle or boat. An extensive trail network connecting all Neighborhoods to open space, Jack Island, Community amenities or offsite trails has been installed to achieve this goal.

### VIEWS

Protecting and enhancing water, maritime forest, agricultural and open space views for residents from their homes and throughout the Community as a whole is a primary goal of these Guidelines. Landscaping, Architectural massing and other Improvements will be implemented in such a way to preserve open space corridors which enhance the Community’s view to its natural environment, ensuring that each Resident is able to enjoy the beautiful natural setting.

### CONNECTION TO THE WATER

The Community Plan allows for a direct connection to the water’s edge by providing a Common Area Setback with trails for most Lots along the water, allowing all residents access to the vast majority of coastline or lakefronts that are the hallmark of Kiawah River.

### DISTINCT NEIGHBORHOODS

Utilizing Traditional Neighborhood Development Patterns (TND) the road network creates a series of distinct Neighborhoods which connect people to the streets and places front porches and gathering spaces along a pedestrian friendly streetscape.





# 2

## SITE DESIGN

In an effort to preserve and enhance the natural environment, the following chapter outlines design strategies of the Master Developer that promote the protection of this unique ecosystem. These include standards for all site work relating to the Lot, including grading, siting of structures, design of outdoor areas and preservation and enhancement of the landscape.



2.1 Site Design Objectives

The following are the main objectives for the site design at Kiawah River.

- To protect, preserve, and enhance the existing landscape and natural features throughout the Community.
- To create landscapes that are appropriate to the Charleston Sea Islands and reinforce the Community and Architectural image.
- To enhance views to the water.
- To minimize tree removal by limiting site grading and disturbance.
- To ensure smooth transitions from Master Developer installed improvements to Guest Builder or private Property Owner installed Improvements.
- To create outdoor spaces that are natural extensions of the indoor spaces, taking advantage of the climate by providing shade and capturing breezes.

2.2 Charleston County Zoning & Development Regulations / Kiawah River Planned Development District Plan (PDDPlan)

The Guest Builder or Property Owner shall be responsible for ensuring all proposed Improvements comply with Charleston County Zoning and Development Regulations as well as the Kiawah River PDD Plan. The ARB shall not be responsible for checking an applications’ conformance with these documents or inadvertently approving an application that is not in conformance with any project approval document.

2.3 FEMA Requirements

The Guest Builder or Property Owner shall be responsible for ensuring all proposed Improvements comply with FEMA Flood Requirements. A copy of the FEMA Flood Map is available from the Kiawah River Development Office.

2.4 Master Developer Installed Improvements

To establish the overall Community character and form, the Master Developer may implement Common Area Improvements which may include streetscapes, parks, entry road, and Community amenity structures. Some of these Improvements may be contained within parcels that are sold to Guest Builders for implementation. It is the responsibility of the Guest Builder to verify what Improvements have been, or may be, installed by Master Developer within their development parcel. All Improvements which have been installed by the Master Developer shall be preserved and protected throughout the course of construction. In the event that Improvements must be removed in order for construction to proceed, it is the responsibility of the Guest Builder to replace these Improvements to the same level of quality installed by the Master Developer.

2.5 Lot Diagrams

A Lot Diagram has been prepared for each Lot type which describes the unique attributes of that Lot type and indicates important design parameters such as Buildable Envelope, easement areas, drainage areas, views, sun angles, landscape areas, special restrictions, suggested driveway access and other attributes that may affect the Residence and site design.

Lot numbers and layouts are designated on the Community Plan. Lot Diagrams that correspond to the Plan are available at the Kiawah River Sales or ARB offices. Buildable Envelope locations were determined based on the specific characteristics of each Lot and on the planning and design objectives for Kiawah River, specifically:

- Minimize tree removal
- Minimize grading
- Protect natural drainages throughout the Community
- Provide connections to open space
- Protect or enhance the natural landscape

Each Lot may have two areas, the Buildable Envelope and a Natural Area. The Buildable Envelope consists of the Private Area, the Transition Area, and the Facade Zone. See Figure 2.5 – Sample Lot Diagram

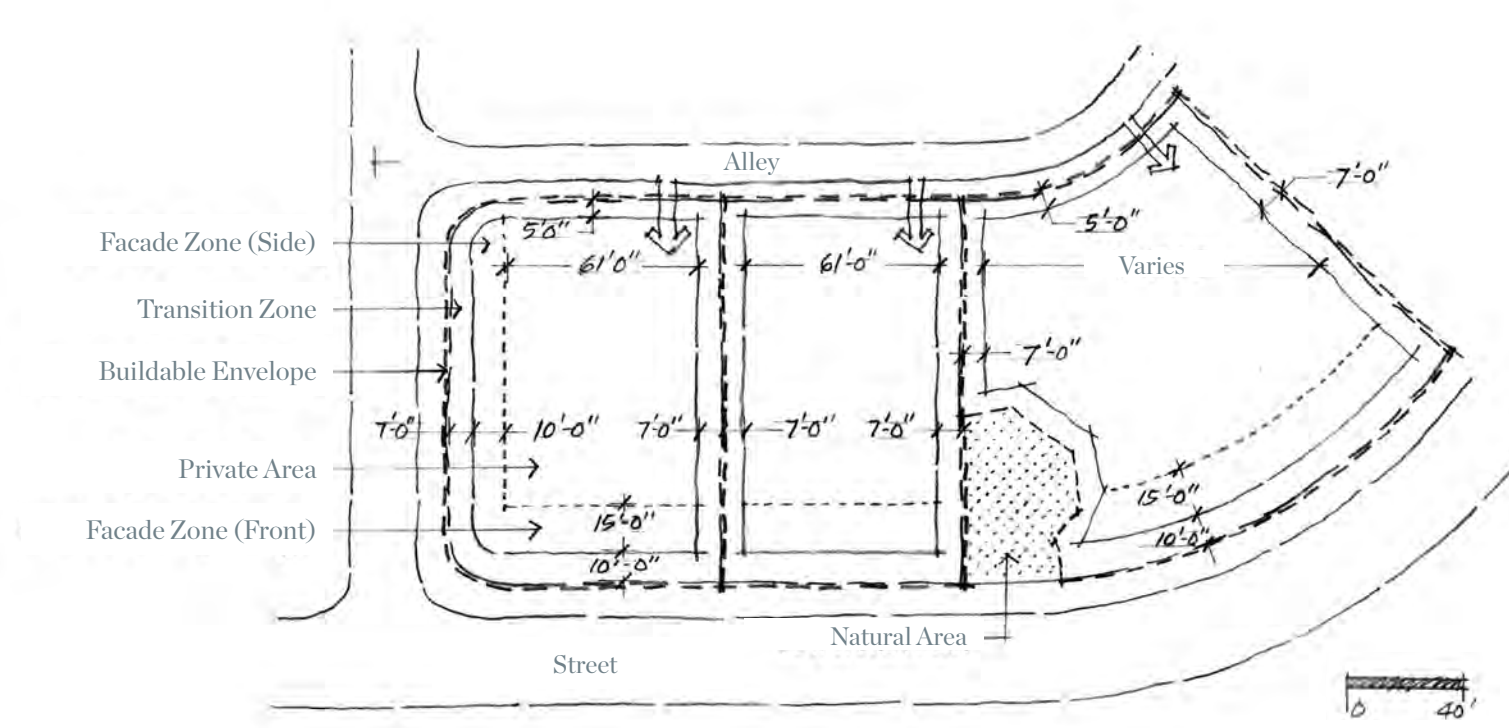


FIGURE 2.5 – SAMPLE LOT DIAGRAM



2.6 Buildable Envelopes

The Buildable Envelope is that portion of the Lot where all Improvements must take place. The Buildable Envelope consists of a Private Area where buildings, other vertical structures and landscape Improvements may occur and a Transition Area where only landscape or horizontal Improvements (patios, pools, paths, etc.) may occur.

Buildable Envelopes have been established for all Lot Diagrams to clearly identify the buildable area of the Lot and its relationship to the streetscape. Buildable Envelopes are areas designated on the Lot Diagrams within which all Improvements on the Lot (except utility connections, some landscape, drainage work and driveways) must take place.

Buildable Envelopes comply with Charleston County and Kiawah River PDD Plan and respond to natural features such as topography, existing trees and view orientation. The ARB will consider, on a case-by- case basis, adjustments to the Buildable Envelope if the benefits of such an adjustment to other Property Owners and Kiawah River Community as a whole are demonstrated.

Digital base plan files indicating property lines, topographic information, Lot Diagrams and utility information are available from the Kiawah River Development Office. These are offered only as a convenience to the Guest Builder or Property Owners and their Consultants and are not a substitute for a certified survey prior to beginning design work. *See Figure 2.5 – Sample Lot D.*

2.6.1 Private Area

The Private Area is that portion of the Buildable Envelope which includes buildings and outdoor private spaces. The buildings within the Private Area must conform to the maximum Building Height and massing requirements as well as the Architectural requirements set forth in these Guidelines and as indicated on the Lot Diagrams. Most of the landscape within this area is not visible from neighboring Lots or the street because it is screened by buildings and/or other landscape elements. Accordingly, within this area the Property Owner has more flexibility in creating a more ornamental and personal landscape. The Private Area includes the Facade Zone as detailed below.

2.6.2 The Facade Zone

The Facade Zone is part of the Private Area of the Lot that is dedicated specifically for Architectural elements of the building that contribute to the overall quality of the streetscape or shared Common Area. The Facade Zone of the Lot can occur both on a publicly facing street or a shared Common Area. Allowable Facade Zone uses include building entries, front porches, wrap-around porches, bay windows, sun porches, and other Architectural elements that articulate the facade and create visual interest. The ARB will carefully evaluate applications to ensure that the design of the building facade maintains the quality of the streetscape or Common Area and is complementary to adjacent buildings. *See Figure 2.6.2 – The Facade Zone*

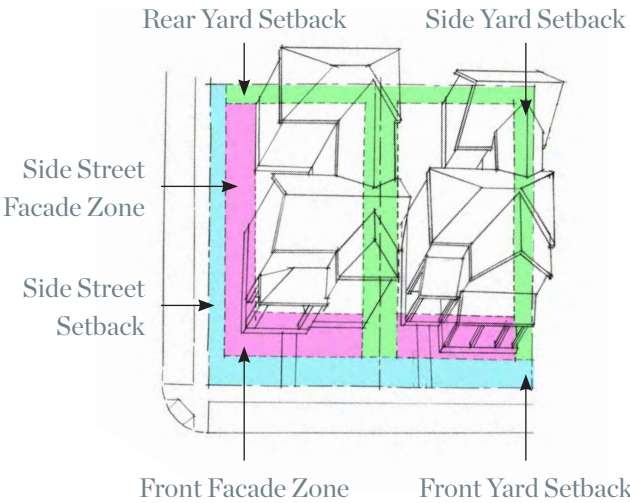


FIGURE 2.6.2 – THE FACADE ZONE

2.8 Combining Lots

In cases where a Guest Builder or Property Owner owns two or more contiguous Lots and wants to combine two or more Lots into a single Lot, the Property Owner must receive the consent of the Kiawah River ARB. A revised Buildable Envelope will be prepared by the ARB with input from the Property Owner and their Design Consultants. The total dimensions of the side yard Setback of the revised Buildable Envelope will be equal to or greater than the sum of the side yard Setbacks of the uncombined Lots. Additionally, the new Buildable Envelope area resulting from combining the Lots shall not exceed the sum of the Buildable Envelope areas of the uncombined Lots. Following approval by the ARB, any required regulatory approvals will be the responsibility of the Property Owner.

The ARB will carefully review issues relating to Building Mass and scale when reviewing a home on combined Lots. Property Owners and their Consultants are encouraged to be sensitive to these important issues when preparing their applications.

2.6.3 Transition Area

The Transition Area is located within the Buildable Envelope and is visible from the Common Areas, streets and neighboring Lots. No vertical structures may be located in the Transition Area, but pools, pool enclosure fences, low retaining walls and/or freestanding walls (maximum 4 feet in height), patios, spas, built-in barbeques, new plantings or other horizontal landscape Improvements are allowed. Landscape structures (such as trellises and/or arbors, etc.), walls higher than those described above, and landscape that has the potential to block views, are prohibited. Privacy walls and utility screening walls to a maximum of 6 feet in height along the side property line or located within the side yards may be allowed at the discretion of the ARB.

2.7 Lot Types

2.7.1 Natural Area

The Natural Area is that portion of the Lot that lies outside the Buildable Envelope and must remain as natural vegetation in

accordance with these Guidelines. Minimal grading for driveway access and to accommodate drainage and utility connections are allowed within the Natural Area. The Natural Area may include drainages that shall be preserved in their natural state or Master Developer installed landscape that is to be protected. Additional plant material may be added in the Natural Area if the existing native landscape is significantly less dense than other natural conditions because of man-made or natural disturbances. Not all Lots will contain a Natural Area.

The following Lot types are representative of the Lots at Kiawah River. Dimensions of Lots may vary, and new product may be added in later phases. Applicants are strongly encouraged to become familiar with their Lot type and its relationship to the Neighborhood & Common Areas prior to starting design

- A1 – 40’ x 110’ – Alley Loaded
- A2 – 40’ x 110’ – Front Loaded
- B1 – 50’ x 120’ – Alley Loaded
- B2 – 50’ x 120’ – Front Loaded
- C1 – 75’ x 120’ – Alley Loaded
- C2 – 75’ x 120’ – Front Loaded
- D1 – 100’ x 160’ – Alley Loaded
- D2 – 100’ x 160’ – Front Loaded
- E2 – 125’ x 180’ – Front Loaded
- F2 – +125’ x +180’ – Front Loaded Garden Cottage

2.9 Building Coverage, Minimum Floor Area, & Maximum Floor Area

The allowable Building Coverage for each Lot type is defined by the Lot Diagrams. The Minimum Floor Area for interior air-conditioned space will be 1,000 square feet. Although there is no Maximum Floor Area, the ARB will be reviewing applications to ensure that all Improvements are appropriately scaled to the Lot and surrounding landscape. Accordingly, homes larger than 3,500 square feet, including unheated garages but excluding non-air conditioned “outdoor rooms,” must be split into multiple building Masses. For Floor Area and Building Coverage definitions, refer to Appendix A – Definitions.

2.10 Icon Lots

Due to their location in the Community, size or elevation, certain Lots have the potential to have a significant visual impact when viewed from the Common Areas. These Lots have been given Icon Lot status and are identified as such on their Lot Diagram. Special design requirements are placed upon these Lots as described below. Property Owners and their design Consultants are required to discuss an Icon Lot with the ARB prior to proceeding with design and shall identify the Icon Lot designation in their application.

Icon Lots may have one or more of the following special design considerations:

ENHANCED LANDSCAPING

Certain Lots having side or front yards facing Common Areas are required to install additional landscape in an effort to soften the building elevation. Planting a greater number of larger trees, along with massing of shrubs for privacy, would satisfy this goal.

COLOR

A Community-wide objective of the Guidelines is to create homes that reside inconspicuously in their setting, allowing the landscape to dominate the scene. An important design tool in achieving this goal is the use of recessive colors. Enhanced Architectural Treatments: Though these Guidelines require four-sided Architecture for all buildings – that is, Architecture whose facade designs are all treated with equal aesthetic importance – certain Icon Lots will require their design Consultants to pay particular attention to the building elevations facing the Common Areas. These elevations should exhibit eclectic, handcrafted details reflective of the homes’ Architectural style or distinctive massing.

PARKING / ACCESS

Icon Lots must pay particular attention to the parking configuration and access to the Lot. In general, Icon Lots shall avoid a front-loaded or front-facing garage configuration and access the

parking from the rear or side. In the case of a raised home with parking on the ground floor, the parking should be accessed from the rear or side. Front yard terraces, retaining walls and steps will be encouraged by the ARB to provide a visual and physical connection from the front door to the street.



2.11 Grading & Drainage

OBJECTIVES

- To blend new Lot Improvements with adjacent Common Areas, wetland areas, and the river’s edge.
- To preserve existing trees by minimizing Cut / Fill
- To create natural and/or curvilinear landforms as a setting for the building Improvements, rather than straight and angular solutions.
- To ensure drainage Improvements are compatible with adjacent Lots, Common Areas, or existing landforms.
- To reduce storm water run-off
- To reduce non-point source pollution

GRADING GUIDELINES

- All Cuts, Fills and retaining walls must create smooth transitions at the top and bottom of slopes and appear to be extensions of natural landforms. Long, straight landforms shall be avoided, while rounded flowing forms are required.
- Building Pad elevations may not be raised or lowered without the expressed written approval by the ARB. Any changes in pad elevation must be approved by the Kiawah River ARB and it is the Guest Builder or Property Owner’s responsibility to obtain this approval prior to Final

Design Review. The ARB will closely review any proposal to change pad elevations, in particular as it relates to tie-in grading at the base of existing trees and the water’s edge.

- To the greatest extent possible, no grading shall be allowed within the drip line of trees to be retained.
- Grading operations shall not cause any on-or-off site erosion or sedimentation, even during construction.
- Grading at the outer edges of individual Lots shall not result in abrupt transitions to adjacent Common Areas, Lots or streets.
- Slopes shall not exceed 3:1 unless it can be demonstrated that a steeper slope will result in a more appropriate design solution. When 3:1 slopes are used, their visibility shall be minimized and have a landscape treatment that helps mitigate the abrupt visual character of the slope. Contour grading is to be used instead of structures wherever feasible.
- All grading shall be completed within the Buildable Envelope and shall not impose off-site drainage onto adjacent Common Areas, Lots or streets.
- Cut and Fill slopes are to be landscaped and restored with plant materials that blends with the adjacent



landscape Improvements or natural landscape. Landscaping of these slopes shall be completed as soon as possible and erosion control measures shall be implemented upon initiation of grading.

- In general, Cut and Fill quantities from grading operations shall be balanced on site.
- In general, grading within the Common Area is prohibited with the exception of minor “tie-in” grading for utilities and driveways. The ARB reserves the right to require field directed revisions to ensure that the final product meets the high Community expectation and standard.



DRAINAGE GUIDELINES

Many of the drainage guidelines for Kiawah River are based on proven and effective practices that residents can do on their own to reduce various sources of pollution to nearby water bodies or ground water. These Guidelines encourage the Guest Builder or Property Owners to:

- a. Reduce storm water run-off
- b. Decrease non-point source pollution
- c. Conserve water
- d. Enhance wildlife habitat



- In general, increased water flows on Lots shall be detained on-site and directed into retention basins or vegetated swales that detain water and encourage percolation. The established entry and exit patterns of water and flow rate onto a Lot must be maintained as shall the amount of water flow into existing drainage areas. Drainage from impervious surfaces may not be directly dispersed off the Lot without first passing through a permanent sediment control device and/or bio filter.
- Contractors shall utilize Best Management Practices (BMP's) at all times while performing grading and drainage work.

- Drainage design shall reduce erosion, runoff, and adverse impacts to water quality.
- Improved channels, retention basins and vegetated swales are to be designed to appear and function like natural drainage ways.
- Materials and sizes for all culverts, visible drainage structures and driveways are to be sized in accordance with these Guidelines and approved by the ARB. Concrete or metal flared-ends culverts shall be utilized rather than plastic. The ends of culverts shall be blended into the landscape by utilizing boulders, planting and/or painting

the interior of the culvert a dark color.

- All headwalls or similarly related drainage structures shall be constructed of concrete with a dark colored, textured finish.
- When appropriate, gutters and downspouts will direct drainage from the roofs to on-site drainage collection areas. In no event shall gutters and/or downspouts drain onto adjoining Lots or Common Areas. *See Figure 2.11 – Preferred Drainage Design*



FIGURE 2.11.1 - RETAINING WALL DESIGN

2.11.1 Retaining Walls & Bulkheads

OBJECTIVES

- To minimize grading for the preservation of existing trees, vegetation, and unique site features.
- To unify the Architecture with the site and landscape in a way that accentuates the natural features of the site.

RETAINING WALL GUIDELINES

- A retaining wall is defined as any wall that retains earth 2-feet or more in depth. In general, retaining walls shall be built to extend and/or blend with the existing topography.
- The maximum height of retaining walls within the Private Area is 4 feet as measured from the lowest finished grade level to the top of the wall. The maximum height for walls within the Transition Area is 3 feet, unless the wall is a side yard privacy wall, utility enclosure wall or auto

court screening wall. *See Figure 2.11.1 – Retaining Wall Design*

- Where grade changes exceed 4 feet, stepped-back or terraced wall structures with planting terraces (4 feet minimum width) are to be used. In extraordinary circumstances, higher retaining wall heights may be allowed if it can be demonstrated that such a solution has no adverse impact to neighboring Lots or Common Areas and it causes less disturbance to existing topography or landscaping.



- Acceptable materials for retaining walls include Tabby, brick, or dry stacked stone. If stone is used, a dry stack pattern, structural in appearance, is required. Thin stone veneers that are not structural in appearance are unacceptable. *See Figure 2.11.2 – Retaining Wall Materials*
- Stone or stone-faced walls are to be designed with a 1:12 batter if the overall wall height exceeds 4 feet.
- In general, retaining walls facing the river, salt marshes, street or other Common Areas may not delineate or parallel Buildable Envelope boundaries or property lines for more than a 40’ foot long distance without a vertical and/or horizontal offset. Walls are to utilize multiple vertical and horizontal offsets that step with the site’s topography and house design. All walls shall utilize a minimum vertical offset of 8 inches and minimum horizontal offset of 16 inches. The horizontal separation between vertical offsets shall be a minimum of 2 feet. Exceptions may be granted if the ARB determines that such offsets are aesthetically desirable in the context of a particular submittal. Retaining walls along stairs are excluded from this requirement.

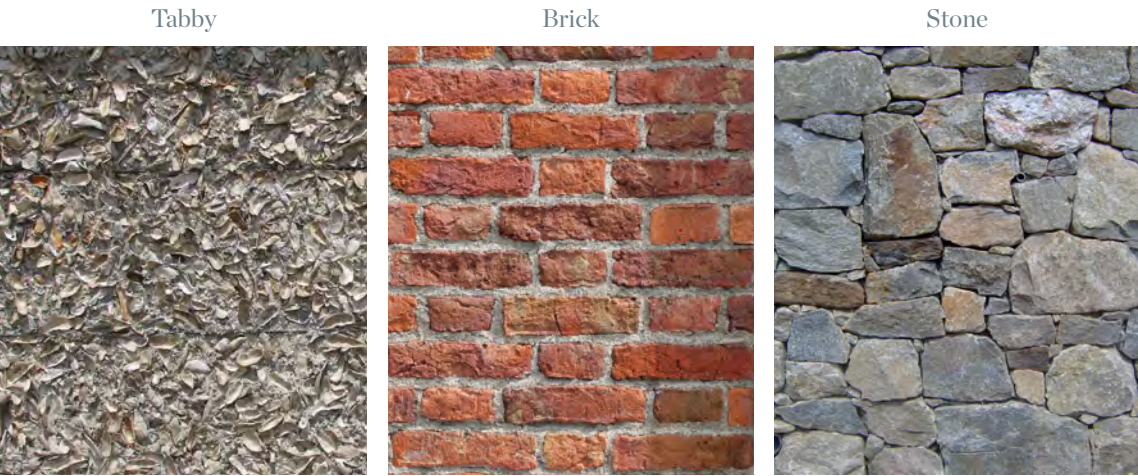


FIGURE 2.11.2 – RETAINING WALL MATERIALS

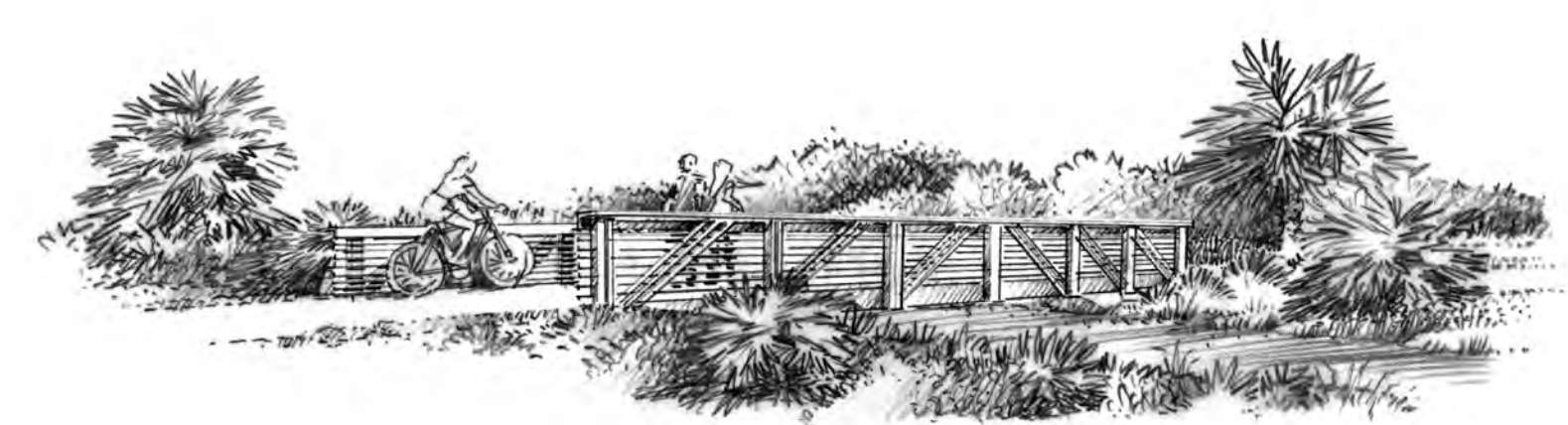


FIGURE 2.12–PEDESTRIAN BRIDGE OVER DRAINAGE AREA

## 2.12 Wetlands, Marshes & Salt Ponds

### OBJECTIVES

- To protect, preserve and integrate site design with the wetlands, marshes and salt ponds found throughout the Community.
- To ensure that Improvements on the Lot do not adversely affect any adjoining or neighboring wetlands, marshes and/or salt ponds.
- To encourage wildlife to remain an integral part of the Community and maintain the existing ecosystem.
- To facilitate the easy access to open space and the coastline by providing a Community-wide pervious trail system along the water’s edge.

### RIPARIAN LANDSCAPE GUIDELINES

- Any Lot abutting an OCRM Critical Line shall have a minimum OCRM Critical Line Setback of 35 feet or as indicated on the recorded plat. All Accessory Structures shall comply with these standards.
- The property line Setback from the edge of Wetlands, marshes and salt ponds has been established and is indicated on the Lot Diagrams. No disturbance of any kind is allowed within this Setback buffer or the adjacent Riparian Landscapes – they must remain in their natural state.
- Portions of the OCRM Critical Line Setback may include a Community-wide trail system that connects Lots and Common Areas to the wetlands and coastline.
- Residences, structures and other Improvements shall be sited to avoid drainage issues. The drainage design shall not direct water to riparian landscapes without first passing the water through a permanent sedimentation control mechanism. All permanent sedimentation control measures, such as settling basins or bioretention devices, are to appear as naturally occurring components of the existing drainage system. *See Figure 2.12–Pedestrian Bridge Over Drainage Area*





### 2.13 Dock & Slips

#### OBJECTIVES

- To facilitate water access for Neighborhoods and select Lots.
- To ensure all Docks and slips are visibly subordinate to the coastal landscape.

#### GUIDELINES

- All Docks or slips must receive specific written approval from the Master Developer and the ARB. The OCRM (Office of Coastal Resource Management), and the Army Corps of Engineers may review in some cases

- Structures for bulkheads and pilings must be concrete or wood, though wood is preferred. All decking on Docks or Piers must be wood.
- Any Dock or slip projecting into a navigable waterway must allow a minimum of 50' feet, inclusive of the Docked boat beam width, for two boats to pass.
- Covered shade structures are allowed provided they are open air, modest in scale and recessive in color. Wood construction is strongly encouraged.
- Docks and slips are to be sited so that, when a boat is Docked, there is minimal visual impact to adjacent Lots or Common Areas.
- All saltwater Docks and slips are subject to regulations of the OCRM with regards to allowable footprint areas and covered roof area.
- Lighting of Docks and Piers, except the minimum required for safety, is prohibited.







# 3

## ARCHITECTURE GUIDELINES

The following Architectural standards have been developed to achieve the environmental, Community and aesthetic objectives for Kiawah River. The intent of these Guidelines is to encourage a diversity of design solutions while at the same time producing high quality homes that are appropriate for the Community. Guest Builders, Property Owners, and Consultants are encouraged to review the portfolio of examples of appropriately designed homes which is available from the ARB office and that clearly illustrate the styles and quality expected for homes at Kiawah River.





3.1 Architectural Design Objectives

The following are the main objectives for Architectural design at Kiawah River.

- To create buildings which draw upon the Charleston Sea Island Development patterns that have evolved from rural homesteads to small villages.
- To design buildings that respond to the climate, landforms, landscape and surrounding built context.
- To create buildings which have a strong indoor/outdoor relationship.
- To create buildings that, through their design, massing and materials, convey a sense of casual, informal, and simple elegance.
- To create buildings that are resource efficient and environmentally responsible.

3.2 Architectural Design Character

3.2.1 Community Architecture

Taking inspiration from historical styles indigenous to the Southern region, the Architecture will produce an eclectic, diverse and sensitive mix of homes which reflect the Traditional towns found in the Charleston Sea Island region. These homes are generally a simple rectangular form, or collection of forms, with wide verandas and articulated entries. The buildings, in general, are to be designed to exude a casual “town” environment within Jack Island, and a more spacious and natural feel as you move out into the Rural Village areas. The homes are to respond to existing trees, landscape setting, Neighborhood context, microclimates, and unique attributes of the particular Lot.

3.2.2 Architectural Integrity & Quality

Although these guidelines are not intended to dictate specific Architectural styles for Kiawah River, they are crafted to promote Architectural solutions that are innovative, of the highest quality and appropriate to the surrounding landscape and Community context. This Architectural integrity expresses itself through designs that:

- Utilize natural materials in accordance with their physical nature and structural capabilities.
- Utilize materials and construction techniques that convey a sense of permanence and durability (stone, masonry and Tabby for example).
- Are respectful of site context and the Community as a whole.
- Are climate responsive.
- Are resource efficient and environmentally responsible.

To achieve buildings that possess Architectural integrity, the ARB will be evaluating submissions based upon the qualitative criteria described below as well as specific or absolute requirements (such as Building Height) detailed in these Guidelines.

SCALE

A building’s scale is critical in how one perceives its place within the Community. The ARB will review a building’s scale relative to the size of the Lot and Buildable Envelope, vertical massing and proportion of 1-Story to 2-Story elements. Guest Builders or Property Owners and their Consultants shall be mindful of scale as they move through the design process. Building masses that are primarily room- sized volumes are strongly encouraged.

PROPORTION

Each design element of the home has an inherent proportional relationship to each other and to the overall design, creating a balanced composition. Exaggerated or overly stylized elements shall be limited and approved based on design merit.

RHYTHM AND BALANCE

These Guidelines encourage the harmonious recurrence of building forms, elements, materials or color to create a sense of serenity and balance in the Architectural composition. The rhythm of the Architectural elements may be sequential, concentric or random.





### TEXTURE

Bold texturing can be visually disruptive, likewise, large expanses of flat walls and roofs reflect a greater amount of light. Accordingly, a rich and varied palette of textures created by random patterning is desired to minimize the reflectivity of walls and roofs.

### SHADE AND SHADOW

Large scale texturing of a building may also be achieved by shade and shadow. A series of transitional spaces, such as trellises, loggias, overhangs, deeply recessed doors and windows, courtyards or outdoor rooms, help create visually rich compositions, provide weather and sun protection and establish strong indoor/outdoor relationships throughout the home.

### APPROPRIATENESS

The degree of individual design expression will be measured relative to the home's Community or landscape context and the overall aesthetic goals for Kiawah River. A design deemed inappropriate may not be a reflection of the quality of the design but may be considered too individualistic or object oriented and therefore inappropriate. In essence, homes shall not strive to "make a statement."

### MATERIAL AUTHENTICITY

Building materials shall be used as honest expressions of their function, structural capabilities or regional context. This means utilizing natural materials rather than "manufactured" and/or local materials rather than imported.

## 3.3 Applicable Building Codes & Flood Requirements

The following are the main objectives for Architectural design at Kiawah River.

- To create buildings which draw upon the Charleston Sea Island Development patterns that have evolved from rural homesteads to small villages.
- To design buildings that respond to the climate, landforms, landscape and surrounding built context.
- To create buildings which have a strong indoor/outdoor relationship.
- To create buildings that, through their design, massing and materials, convey a sense of casual, informal, and simple elegance.
- To create buildings that are resource efficient and environmentally responsible.

### OBJECTIVES

- To minimize the visual impact of all buildings and to ensure that they are subordinate to and blend in with the surrounding landscape and Community context.
- To ensure that the view potential from each Lot is preserved.

## 3.4 Building Heights & Finished Floor Elevations

### BUILDING HEIGHT MEASUREMENT

The maximum Building Height shall be established by a plane measured vertically above the average existing grade at the center of the building footprint, or Ground Floor Level.

In areas that have been graded by Master Developer, the Building FFE shall be measured from the certified pad after grading is completed.

The overall height shall be measured from the highest parapet or roof ridge (excluding chimneys) to center of the building footprint and/or the existing grade adjacent to the building exterior directly below.

Building finished floor elevation (FFE) shall be measured from the Improved Pad. See Figure 3.4 – Building Height Diagram

### BUILDING HEIGHT AND STORY INFORMATION

Allowable Building Heights and Story Height information for each Lot are indicated on the Lot Diagram. Most homes at Kiawah River will be elevated above grade with parking on the Ground Floor Level. It is assumed that homes will incorporate ground floor parking underneath (tuck under parking). In some cases, the Lot will be elevated above the flood plain requirements, in which case parking will be provided in an attached or detached garage or carport at Ground Floor Level. For these reasons, the Building Height and Story Height requirements will vary depending on the Lot configuration on the site.





### 3.4.1 At-Grade Home

The At-Grade Home is constructed at or near the elevation of the building pad, provided it is above the FEMA Flood Elevation, and does not provide for parking beneath the building. The finished floor of this home must be 24”-36” above grade and may provide parking in an attached or detached garage or carport structure, along with Ground Floor living spaces of the home. Porches, decks and other outdoor living spaces may occur on the Ground Floor, or be terraced down to connect to the streetscape or Common Areas. *See Figure 3.4.1 - At-Grade Home*

#### ONE-STORY

For “One-Story” homes, the Building Height generally may not exceed 20’ feet. Chimneys may extend to 25’ feet. Additionally, a 150-square foot portion of the building may extend to 25’ feet. The intention of this guideline is to allow for vertical accent elements, such as a tower, on one-Story homes.

#### TWO-STORY

For “Two-Story” homes, the Building Height generally may not exceed 29’ feet. Chimneys may extend to 34’ feet. The second Story element may not exceed 75% of the total enclosed main Floor Area (excluding garage and Accessory Structures). Second Story elements that exceed the above 75% requirement may be permitted by the ARB if they meet the following criteria.

- Further the overall aesthetic goals of the Community
- Do not have an adverse impact of any kind upon adjacent Lots or Common Areas
- Is consistent with the proposed Architectural style

### 3.4.2 Elevated Homes

The Elevated Home may be built on a slightly elevated Lot, but the Ground Floor of the home still resides below the required FEMA Base Flood Protection Elevation. For this reason, the ground floor of the home is designed to accommodate parking or storage underneath the building, along with other non-habitable spaces. Building designs are encouraged to provide porches, decks, and other outdoor living spaces at the Ground Floor Level to provide a connection to the street and/or Common Areas. The Building Height is inclusive of the ground floor parking level. *See Figure 3.4.2 - Elevated Home*

#### ONE-STORY

For “One-Story” homes, the Building Height generally may not exceed 29’ feet. Chimneys may extend to 34’ feet. Additionally, a 150-square foot portion of the building may extend to 30’ feet. The intention of this guideline is to allow for vertical accent elements, such as a tower, on one-Story homes.

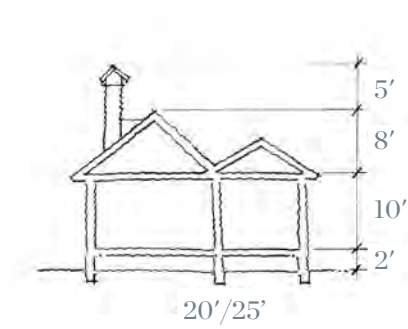
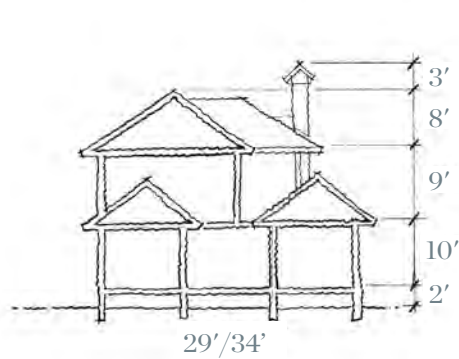


Figure 3.4.1 – At-Grade Home



#### TWO-STORY

For “Two-Story” homes, the Building Height generally may not exceed 38’ feet. Chimneys may extend to 41’ feet. The second Story area may not exceed 75% of the total enclosed main Floor Area. Second Story areas that exceed the above 75% requirement may be permitted by the ARB if they meet the following criteria.

- Further the overall aesthetic goals of the Community
- Do not have an adverse impact of any kind upon adjacent Lots or Common Areas
- Is consistent with the proposed Architectural style

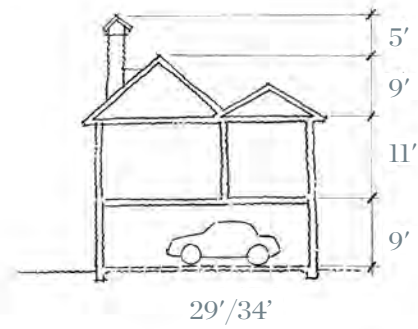


Figure 3.4.2 – Elevated Home

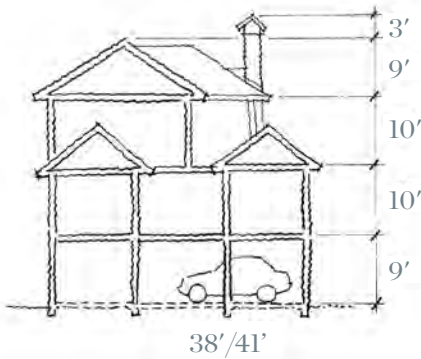


FIGURE 3.4 – BUILDING HEIGHT DIAGRAM

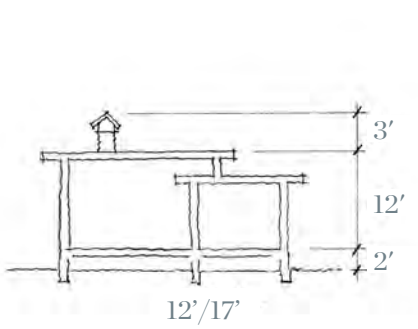


Figure 3.4.3 – Flat Roof Home

### 3.4.3 Flat Roof Homes

Flat Roof Homes are allowed at Kiawah River, however they are subject to additional Building Height restrictions. For any “One-Story” or “Two-Story” structure which exceeds 20% coverage of the total Floor Area with a flat roof the Building Height must be reduced by 8’ feet. Flat Roof Homes are subject to specific review and approval by the ARB. Property Owners and their design Consultants are required to discuss a Flat Roof Home with the ARB prior to proceeding with design. *See Figure 3.4.3 – Flat Roof Home*

### 3.4.4 Minimum Finished Floor elevation

The minimum finished floor elevation for each home must comply with Charleston County Zoning and Land Development Regulations, referencing the FEMA Flood Plain Maps. These are available from the ARB Office.





FIGURE 3.5 – MASSING CONCEPTS

### 3.5 Building Forms & Massing

#### OBJECTIVES

- To create buildings that are residentially scaled and contribute to creating a unified Community image
- To ensure that the Architectural Style informs the massing and overall building form

#### GUIDELINES

- In general, buildings shall be one or two-story masses with a simple, rectangular volume organized in a hierarchy of masses.
- The composition of structures shall have a clearly dominant volume (the main body) and complementary “secondary” volumes such as Accessory Structures, carriage houses or garages.

- The size, massing and placement of buildings is to be responsive to the context of its surroundings. Building design is to consider existing tree locations, future canopy spread and heights, available views, the character and scale of surrounding environment and structures, and any other climatic conditions such as prevailing breezes and sunlight.
- The play of light and shadow between Building Masses shall be carefully formulated to articulate masses, accentuate entries and/or building levels and to create texture. Buildings shall be articulated with deep porches, balconies, breezeways, dormers, overhangs, and vertically proportioned windows and exterior stairs.
- In general, larger masses shall be located in the middle of the Lot while smaller masses shall be located along the perimeter of the Private Area.

- Buildings shall be designed to be viewed from all sides. Screening and/or designing service areas as an integral part of the overall Architectural composition is required.
- Building masses shall have a strong indoor-outdoor relationship by incorporating courtyards, breezeways, colonnades, and patios. In addition, exterior stairways and/or breezeways may be used rather than relying on internal circulation.
- Entries shall be recessed and articulated with overhangs, porches, and/or courtyards. Entry elements shall be in scale with the home. Dominant or overly stylized entries shall be avoided.
- To avoid large bulky forms, detached garages which incorporate breezeways or trellises to connect the main Residence are encouraged. *See Figure 3.5– Massing Concepts*

#### 3.5.1 Visual Building Mass

In order to reflect the scale and character of the Community, buildings will follow the general massing guidelines below:

- Each building shall be constructed as a series of Visual Building Masses. To be classified as a Visual Building Mass, the mass shall have a minimum depth and width of at least 20’ feet, be a minimum of 500-square feet in area, and be offset

by at least 2’ feet horizontally or 4’ feet vertically from another mass. *See Figure 3.5– Massing Concepts*

- Massing shall reflect room size volumes or groups of masses rather than one dominate mass. Those styles lending themselves to a dominate symmetrical massing shall maintain a 40’ feet maximum dimension for ridges or walls. Ridges or walls in excess of this 40’ foot maximum shall be broken

by a vertical (2’ foot minimum) or horizontal (4’ foot minimum) offset or larger chimney mass. The ARB will consider longer wall or ridge dimensions if the design is stylistically appropriate, maintains an intimate residential scale and furthers the Community’s aesthetic objectives.

*See Figure 3.5– Massing Concepts*



FIGURE 3.5 – MASSING CONCEPTS



### 3.5.2 Tower Design

Towers shall be allowed (and required on some Icon Lots) to capture views and complete the aesthetic composition of the Residence. Towers shall be limited in area to 240 square feet. At least one wall of the tower must be expressed on the exterior of the primary Visual Building Mass and connect to the ground. The maximum plate height of any tower shall be eight 8' feet above the primary Visual Building Mass building plate height. See Figure 3.6.2 – Tower Design



FIGURE 3.5.2 – TOWER DESIGN

### 3.5.3 Entries

Entries shall be recessed and articulated with overhangs, porches and/or courtyards. Entry elements shall be in scale with the home. Dominant or overly stylized entries shall be avoided. See Figure 3.6.3 – Entry Design



Good



Unacceptable

FIGURE 3.5.3 – ENTRY DESIGN

## 3.6 Roofs

### OBJECTIVES

- To design roofs that are energy efficient and light in color.
- To create roof designs that are appropriate to the Architectural style.

### GUIDELINES

- All roofs shall be carefully designed in color, material and shape so that they help to integrate the structure with the site and neighboring buildings and minimize the overall Building Massing. Trellises and outdoor covered areas shall be incorporated into the overall massing to avoid a “tacked-on” appearance.

### ACCEPTABLE ROOF FORMS

Gable, Hipped, Double Pitched, Gambrel, or Shed roofs (typically used over porch elements, dormers or on outbuildings) are allowed. The gambrel roof form is not typical in the Charleston Sea Islands and shall be used sparingly and in less visible locations. See Figure 3.6 – Roof Forms

Flat roofs are allowed; however, they are subject to review and approval by the ARB. Property Owners and their design Consultants are required to discuss a Flat Roof Home with the ARB prior to proceeding with design.



FIGURE 3.6 – ROOF FORMS



ACCEPTABLE  
ROOF MATERIALS

Roofs are to be Class A fire rated. 5V-crimp, Standing Seam Metal, Corrugated Metal, Wood Shake Shingle, Copper Shingle and Slate are acceptable.

Flat roof materials must be reviewed and approved by the ARB. Property Owners and their design Consultants are required to discuss a flat roof material with the ARB. *See Figure 3.6.1 - Roof Materials*

UNACCEPTABLE  
ROOF MATERIALS

Reflective roof finishes, silver galvalume or any metal material that may cause excessive glare, ceramic tiles, and clay tiles are not acceptable. Simulated roof materials may be allowed upon approval of the ARB.

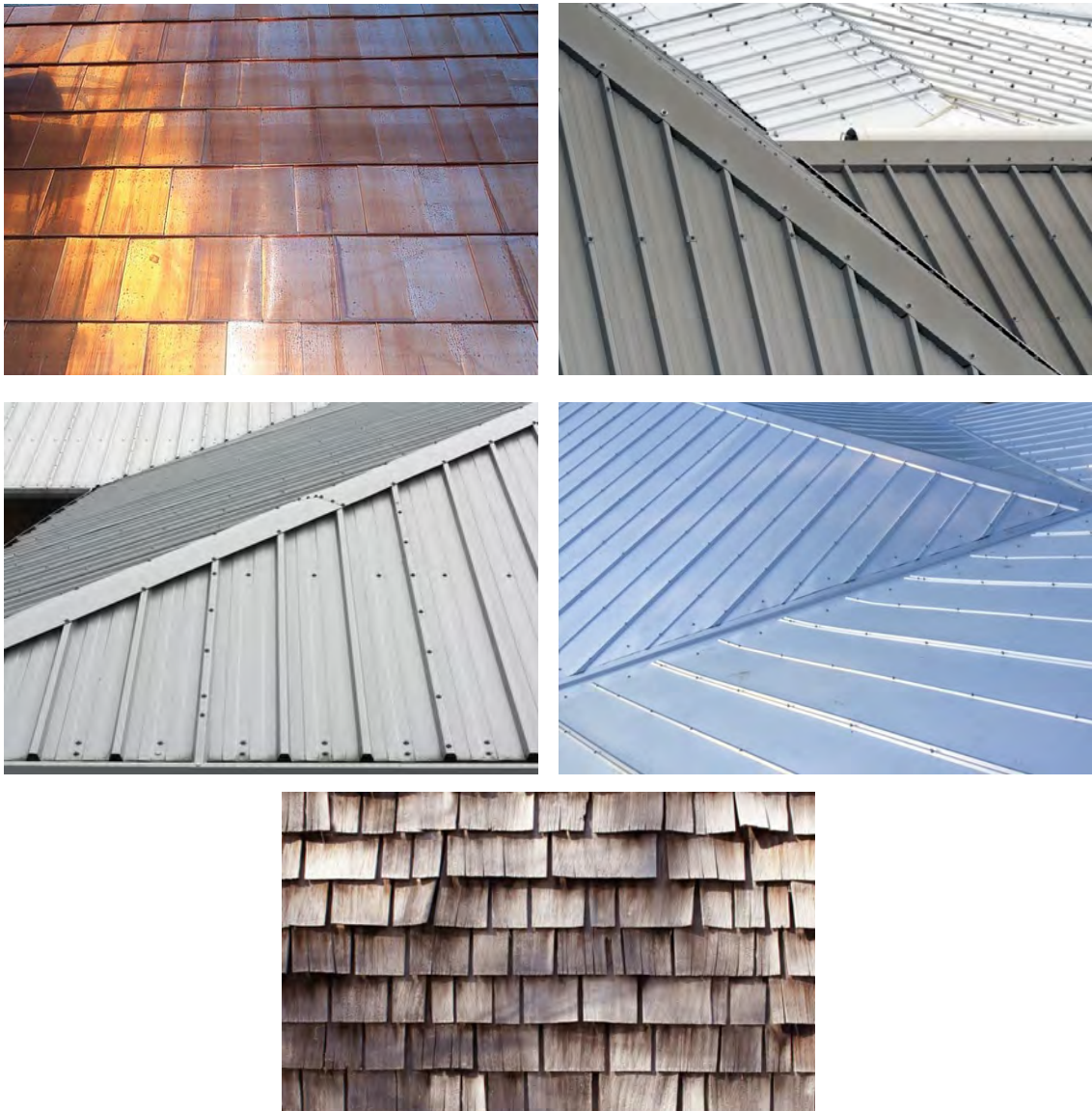


FIGURE 3.6.1 – ROOF MATERIALS

EAVES AND FASCIAS

Eaves shall be incorporated, where appropriate. Exposed rafter tails with wooden soffits are encouraged on traditional sloped roof designs. In general, pitched roof fascias shall be 6 inches, being of sufficient size to support a gutter. Flat roof fascias shall be appropriately scaled to the Building Massing, not be a dominant element in the overall composition and contain some texturing to achieve an interplay of light and shadow. Large, plain stucco fascias are unacceptable. *See Figure 3.6.2 – Eave Design*

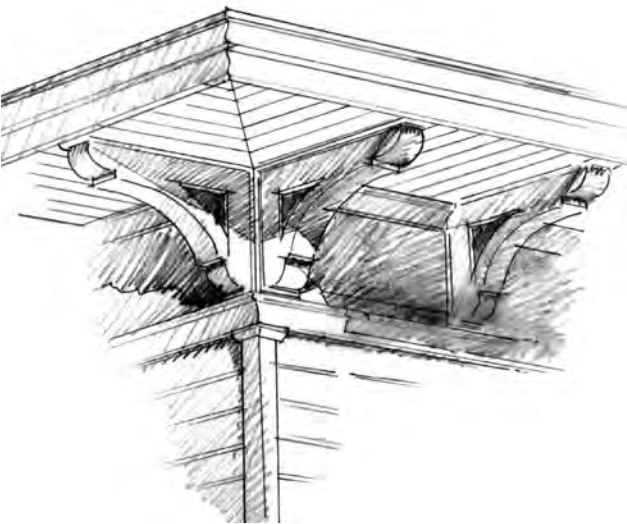


FIGURE 3.6.2 – EAVE DESIGN



GUTTERS AND DOWNSPOUTS

Gutters, if used, shall be incorporated into the overall design of the house. Gutters and downspouts shall not appear as if they were “tacked-on”. Integral gutters with concealed downspouts are encouraged at long overhangs. Exposed downspouts are to be located to avoid long return sections from the eave to the wall. Integrating downspouts with vertical elements, such as structural columns or trim, is encouraged. Half round gutters with round downspouts are strongly encouraged. *See Figure 3.6.3 – Gutter Design*

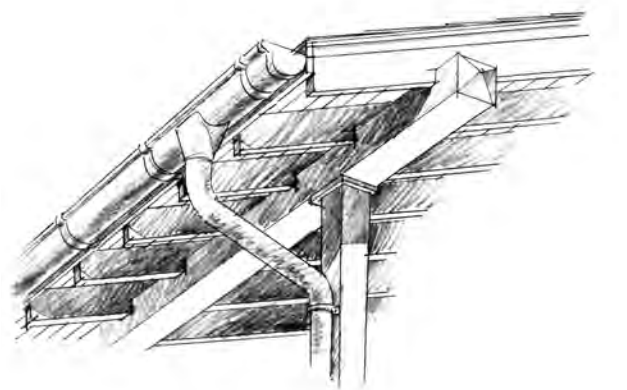


FIGURE 3.6.3 – GUTTER DESIGN





3.7 Exterior Walls & Finishes

OBJECTIVES

- To design wall systems that are energy efficient.
- To create wall compositions that are reminiscent of vernacular Architecture and appropriate to the Architectural style.

GUIDELINES

- In general, the exterior wall design of all Residences and Improvements may incorporate the use of at least two different complimentary materials in order to create subtle textural changes and to further articulate masses. Exterior walls of a single material may be acceptable if, in the opinion of the ARB, they meet the requirements of these Guidelines, are consistent with the Community’s aesthetic goals and are appropriate to the particular Architectural style. See Figure 3.7 - Exterior Wall Design

EXTERIOR WALL DESIGN

Walls shall be simple, refined compositions of one or two materials in a logical structural relationship and consistent in material use with Architectural design. Changes in material shall occur on the inside corners of masses. Porches, decks of balconies projecting beyond

a wall shall be supported by timber structures less than one-Story in height. Undersides are to be fully screened from off-site views by planting and/or darker color materials. Long, unbroken off-grade decks are not allowed. See Figure 3.7 – Exterior Wall Materials

EXTERIOR WALL HEIGHT

The exterior wall height from finish floor to top of wall plate shall be a minimum of 10’ feet for the First Floor and 9’ feet for the second floor. Flat roofed buildings may have a First Floor plate height up to a maximum of 15’ feet. In no case shall an unbroken vertical plane be more than 15’ feet in height. The ARB will consider, on a case by case basis, exceptions for details, such as gable end walls, if the exceptions are demonstrated to be part of the Architectural style and are in scale with the overall Community.

ACCEPTABLE MATERIALS

Painted and/or stained wood (clapboard, butt-board, board and batten and/or shingle applications), Tabby, stucco, stone (in limited quantities) and brick.

TABBY / STUCCO

Tabby or stucco is generally to be used for masonry and foundation elements. The appearance of Tabby shall be similar to local historic styles and textures, and utilize an oyster shell material. Tabby shall incorporate large or unbroken shell pieces, and not consist entirely of small ground up shell fragments.

Exterior Insulation Finish Systems (EIFS) are not permitted. Large stucco surfaces shall be broken up or recessed behind porches and columns. Walls shall have a “handcrafted” appearance utilizing wavy textures or troweled patterns in a light to medium texture. Heavily textured stucco patterns will not be permitted. Stucco is to have a smooth to lightly textured sand finish with a 3-coat application, (scratch coat, brown coat and sand finish coat). The use of stucco will be limited to stucco on block, stucco will not be allowed on wood frame construction.

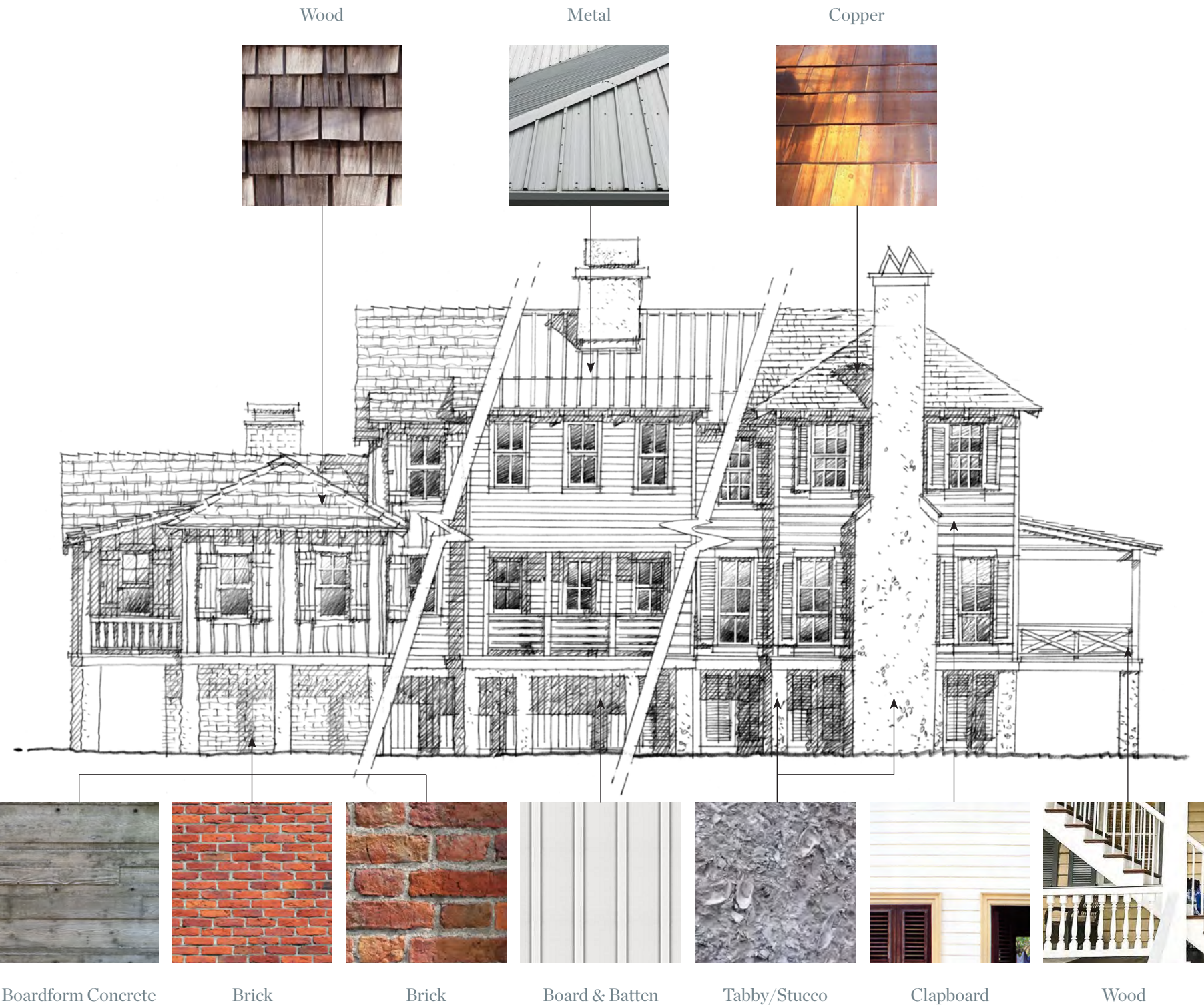


FIGURE 3.7 – EXTERIOR WALL DESIGN



MASONRY

Masonry construction, such as brick or concrete block, can be used as a foundation element with wood or stucco walls above, or as a full height wall when used as the predominate wall material. Brick patterns should follow local historic patterns, such as “Running Bond”, “Flemish Bond” or “1:3 Bond”, other patterns may be acceptable but must be reviewed and approved by the ARB.

The use of concrete block as a full height wall must be reviewed and approved by the ARB, based on its architectural merit and appropriateness for the style of architecture.

POURED CONCRETE

Poured Concrete may be used as a full height wall, or as a base for glass or other materials. Poured Concrete must be board-formed or in some other way “artfully” texturized. Large smooth expanses of concrete walls are not acceptable. Poured Concrete walls may be left in their natural color, integrally colored or stained. Painting of concrete walls is not acceptable on exposed faces.

GLASS

Glass may be used as a wall material. Glass walls shall be non-reflective and not mirrored. They shall be protected from direct sunlight with overhangs, trellises or other similar Architectural elements. Bronze tinted or any other color that will visually stand out is not allowed.

UNACCEPTABLE MATERIALS

Materials which are inappropriate are exterior plaster or stucco using a heavy texture such as a swirl pattern, heavy sand, Spanish Lace, or heavy troweled pattern; reflective surfaces other than glass; vinyl or aluminum siding; Plank; faux stone, cultured stone; large expanses of unshaded glass or metal cladding, or exposed, untextured concrete are not acceptable.

GUIDELINES

CASEMENT, DOUBLE OR SINGLE HUNG WINDOWS

- Window placement is to respond to site setting to capture daylight, take advantage of prevailing breezes and limit heat gain. Operable windows shall be used to take advantage of ambient cooling effects from prevailing breezes. Large areas of glass are to be shaded with projecting roof overhangs, awnings, balconies or porches to minimize the glare and decrease heat gain.
- Windows must be sized appropriately to the exterior walls on which they occur. Window design is to utilize a consistent style and/or vernacular throughout the building.

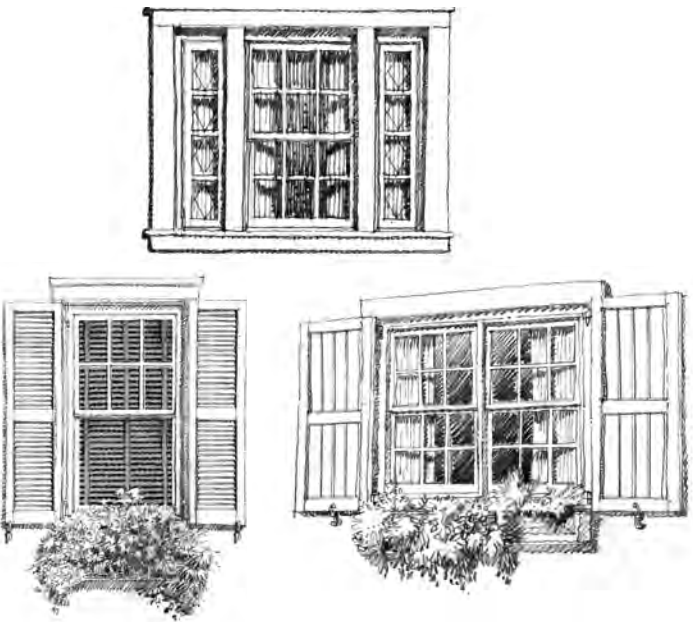
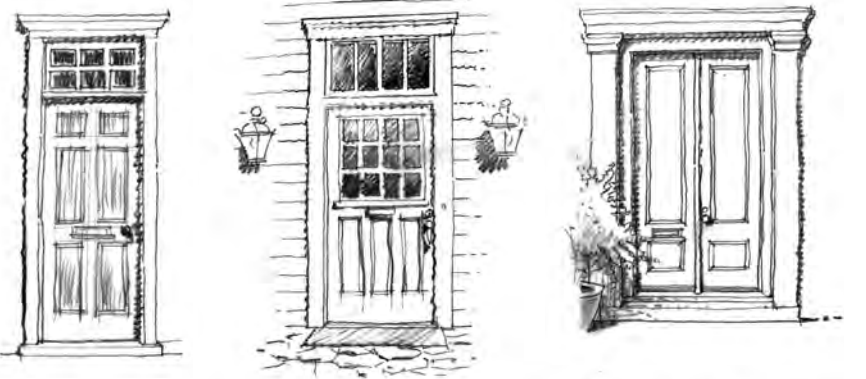


FIGURE 3.8.1 – WINDOW DESIGN

- Windows on wing extensions or on upper floors will typically be smaller than on the main volume and/or main floors.
- Window vocabulary is to be based on the traditional principles of multi-paned, square or vertically-oriented, 6 over 6, 4 over 4 or multi-paned over single-paned designs:
- Casement, double and/or triple-hung, with a 3-inch sill.
- Wood or wood-clad windows, and steel windows are permitted.
- Large windows that are subdivided with structural members or integral muntins.
- Accent windows that use a round or elliptical design are permitted.
- Divided lite patterns shall be consistent among all elevations of buildings.
- TDL (True Divided Light) or SDL (Simulated Divided Light) are the only window types permitted.
- Glass block is not permitted. *See Figure 3.8.1 – Window Design*

DOORS

Door designs and placement are to draw from the Charleston Sea Island traditions, which typically include multi-pane single and double door units that incorporate a panel design in the bottom third



of the door. Multi-pane French doors have often been used instead of windows on main floor living areas to open out to porches and terraces. Multiple doors to exterior spaces from main living areas are to be incorporated to highlight the connection to the outside. *See Figure 3.8.2 – Door Design*



SLIDING OR POCKET DOORS

Sliding, Pocket or Pivot Doors with large glazed openings may be used provided they are protected by a trellis or overhang providing deep shade over the glazed area. The depth of this trellis or overhang is encouraged to be 1.5 times the door head height but in no case, shall it be less than 10-feet in depth.



FIGURE 3.8.2 – DOOR DESIGN



WINDOW AND DOOR  
MATERIALS AND COLORS

Wood-clad or metal non-anodized finish are acceptable. Unfinished aluminum or shiny metals are not permitted. Certain vinyl or fiberglass clad windows and doors may be allowed upon approval of the ARB. Doors, window and door frames may be stained and/or painted.

ACCENT TRIM

Wood, decorative tile and/or stone accent materials shall be used in a consistent manner around the structure.

SHUTTERS

Shutters may be used both for doors and window elements and at porches. Shutters are to be operable and utilize board or louvered designs (wood or synthetic) in typical Charleston Sea Island design and patterns. Shutter colors are to complement the exterior finish materials and trim used on the building.

Single shutters are to be full sash height and the full sash width for the window or door they adjoin. Double shutters are to be full sash height and half the sash width for the window or door they adjoin. Composite shutters which are appropriately scaled and operable may be allowed upon approval of the ARB. The use of bi-fold shutters is permitted.

*See Figure 3.8.3 – Shutter Design*

GLAZING AND GLASS

All glazing shall meet energy codes. Glass may be coated or tinted to control solar heat gain, but a reflective, mirrored appearance is not permitted.

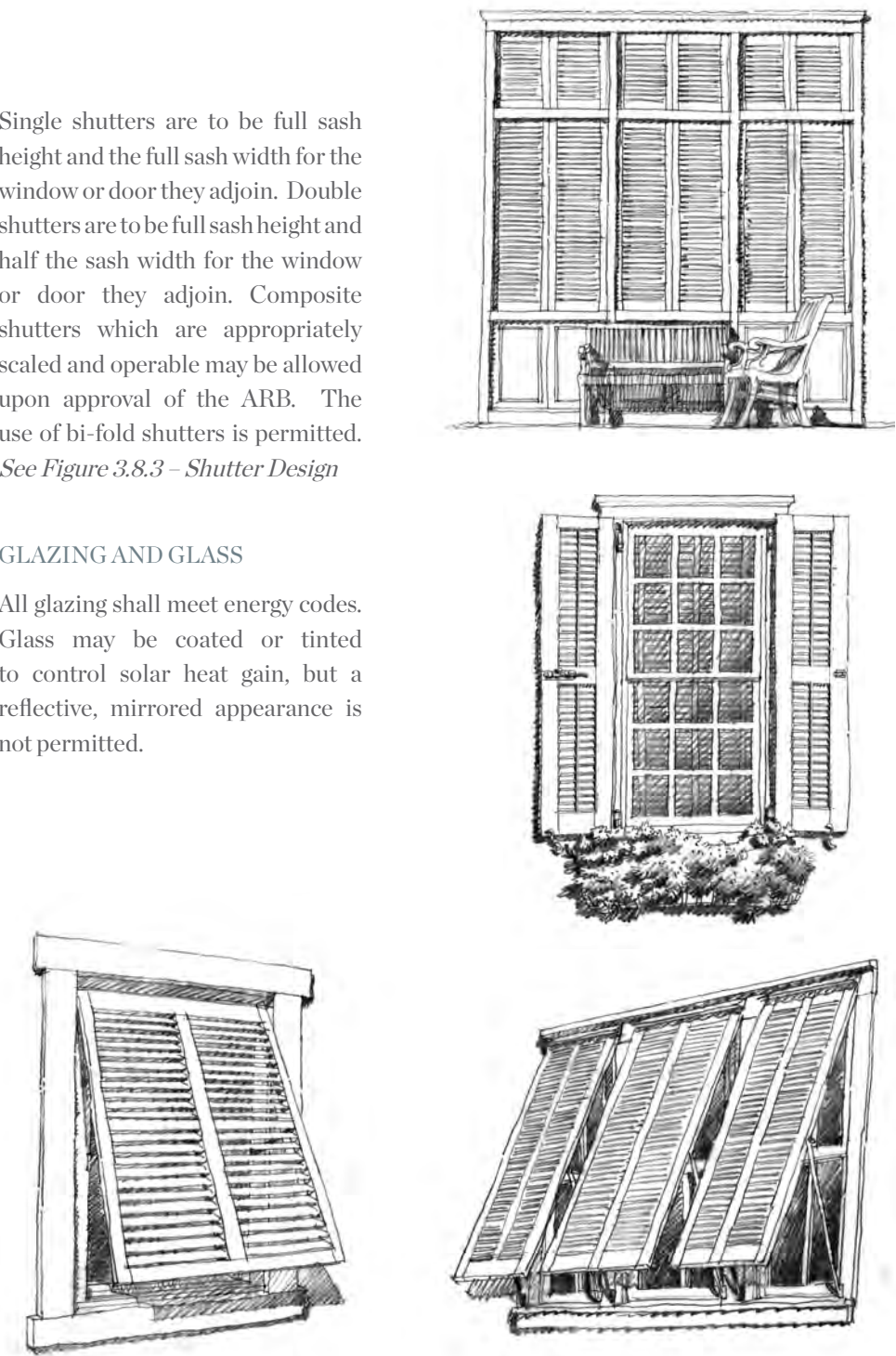


FIGURE 3.8.3 – SHUTTER DESIGN

3.9 Building Projections & Accessory Structures

The use of Architectural extensions to provide shade and shadow, protect buildings from the intense sun and create a strong indoor/outdoor relationship are outlined below. The style and details of these Architectural elements, such as column and eave treatments, shall be consistent with the Architectural design of the main building.

3.9.1 Entries, Front Porches & Side Porches

Porches that provide shelter from the sun and accentuate entry areas are to be a minimum of 6’ feet in depth. Flooring materials are to be wood, tile,

and/or colored concrete. In general, the flooring shall be an extension or natural complement to the flooring used in the interior of the building.

Porches, verandas, decks, and patios are to be designed as extensions of indoor rooms. Porch and deck design are to take advantage of natural ventilation opportunities. Porch enclosures may be enclosed with mesh screens, traditional wood shutters, or glass. Unacceptable enclosures include plastic infill systems, roll down shutters or shades. Porches should be raised a minimum of 15” above grade with framed lattice work to conceal the underneath side. *See Figure 3.9.1 – Porch Design*

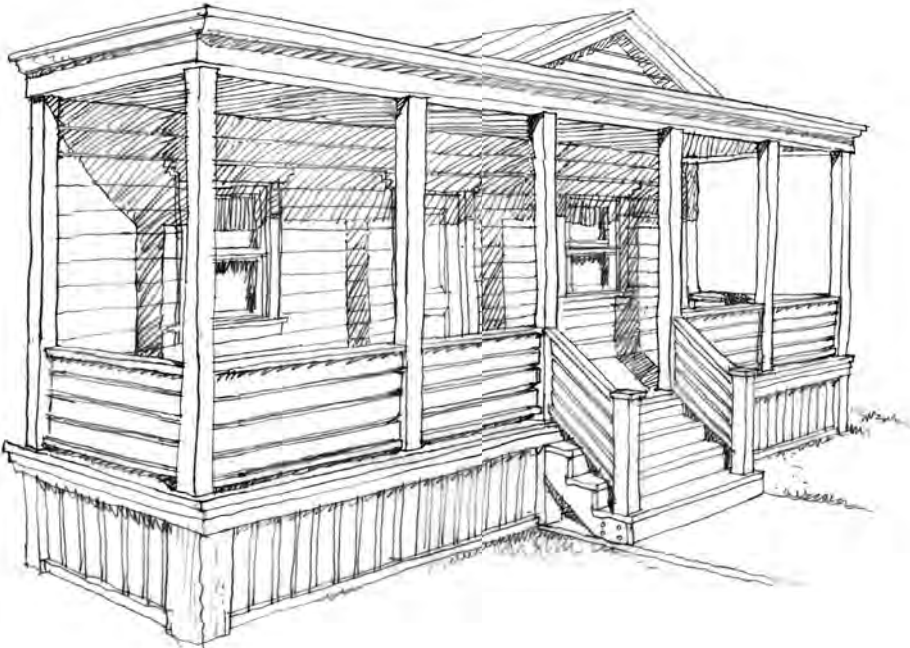


FIGURE 3.9.1 – PORCH DESIGN





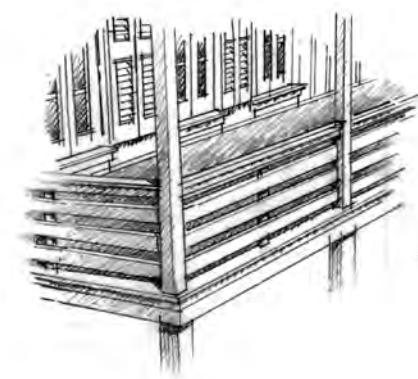
3.9.2 Pergolas / Trellises / Colonnades

Covered areas that connect separate Building Masses, extend the roofline and/or are freestanding are strongly encouraged.

3.9.3 Columns / Railings

Decorative iron or wood carved railing details shall borrow from building traditions consistent with the Architectural style of the Residence and employ local craftsmanship.

- Column and railing designs are to be consistent with the house detailing and the Neighborhood character of a relaxed, informal, coastal town.
- Square columns and posts are more appropriate in reflecting the relaxed character of Kiawah River. Simple, round, classical styles may be used in limited applications. Ornate capitals are not acceptable. See Figure 3.9.3 – Column and Railing Design

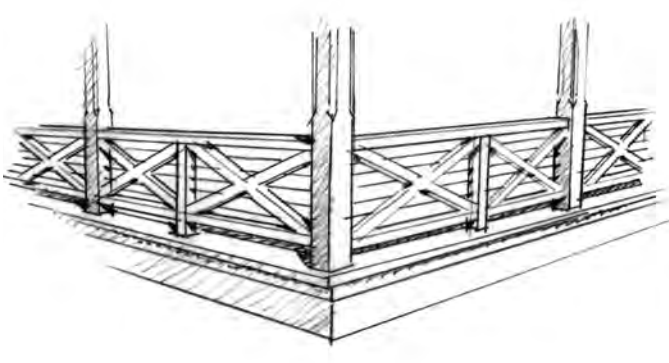


3.9.4 Mechanical Equipment, Vents & Flues

Roof mounted mechanical equipment, vents and flues must not be visible from adjacent Lots or Common Areas. On sloping roofs, these elements must be concealed within Architectural structures (i.e., chimneys). Small vents or flues may be painted to match the roof color. Ganging of vents/flues is required to minimize the number of projections.

On flat roofs, all equipment, vents and flues must be concealed behind parapet walls, chimneys or other Architectural elements and not be visible from adjacent Lots or Common Areas.

Condenser units are allowed within the Setback area of the Lot; however, they must comply with Charleston County Code Requirements for the proper elevation of equipment for flood protection. All mechanical equipment must meet flood elevation requirements.



3.9.5 Miscellaneous Projections

All projections, including but not limited to, chimneys, chimney caps, vents, gutters, down spouts, utility boxes, services, etc. must be incorporated into the overall design. These items must be included on the submittals and reviewed by the ARB for approval.

3.9.6 Accessory Structures

The design of Accessory Structures must be consistent with the main Residence, integrated into the overall Residence composition and are to be visually related to it by walls, courtyards, or major landscape elements. A freestanding carriage house must comply with applicable Charleston County and Kiawah River PDD Plan regulations and have the written approval of the ARB. See Figure 3.9.6 – Accessory Structures

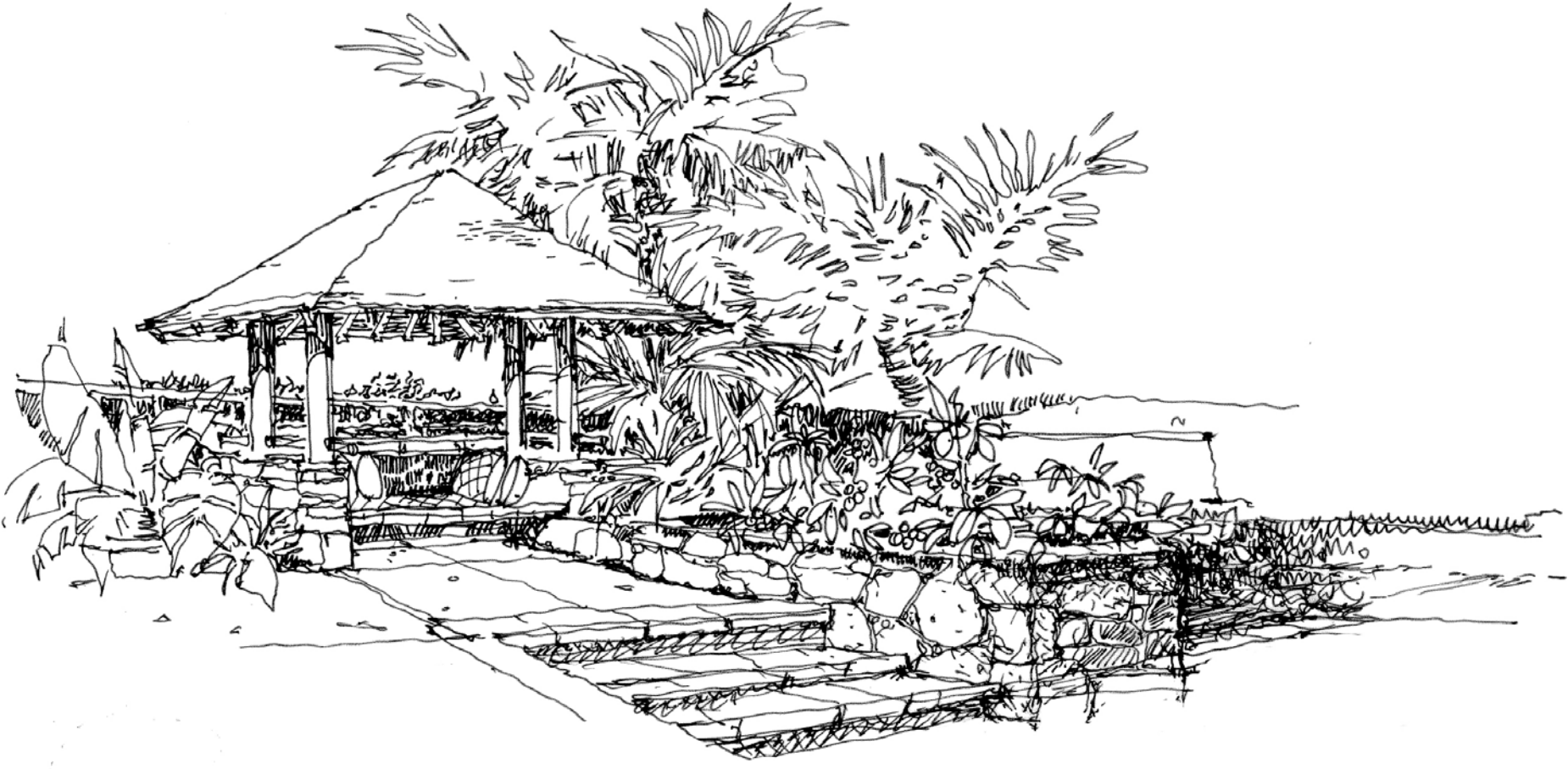
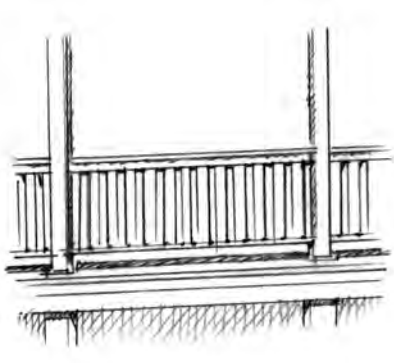


FIGURE 3.9.6 – ACCESSORY STRUCTURES



### 3.9.7 Chimneys

Fireplaces and chimneys can be dominant elements of an Architectural composition. Accordingly, they must be proportionate to and consistently detailed with the overall design. The horizontal dimension of chimneys shall be a maximum of 8 feet unless it can be demonstrated that a larger dimension is appropriate to the Architectural design and supports the aesthetic goals of the Community. Fireplaces must be equipped with an approved spark arrester that must be completely hidden from view. Flue pipes are required to be encased with a chimney enclosure of masonry or stucco and supported by a foundation at grade when located on an exterior wall. Chimneys located on exterior walls should be structural in appearance and relate to other expressed structural elements in the design. Exposed metal flues are unacceptable.

- All chimneys are to have masonry, stucco or Tabby finishes.
- If fireplaces are to be expressed as masonry on the exterior of the building, a chimney detail must be used even if a ventless system is being specified.

- Other projections such as vents and/or flues are to be located in areas not visible from the street and painted to match the roof color.
- Chimney designs must incorporate a cap detail that draws from Charleston Sea Island traditions. Appropriate cap designs include terra cotta chimney pots, metal standing-seam shrouds, bishop's hats, or simple rectilinear detailing.
- Chimney designs on Elevated Homes must be incorporated into a wall that extends to the Ground Floor Level. *See Figure 3.9.7 – Chimney Design*

### 3.9.8 Skylights

The primary aesthetic concerns regarding skylights are reflected glare during the day or light glare at night. Accordingly, they shall be located to minimize their visibility from off-site. Skylights on flat roofs must be surrounded by a parapet 12-inches minimum above the highest point of the skylight and located no more than 12-inches from the skylight. Skylights must be integrally designed into the roof structure. Skylight glazing shall not be back-lit or manufactured of reflective material. Skylight framing and glazing shall be colored or coated to match adjacent materials.

Light emanating from the interior through a skylight is subject to the same controls as light emanating from a window, as described in the Lighting section of these Guidelines. Glazing shall be either tinted bronze or gray. Bubble-type glazing is not permitted.

### 3.9.9 Solar Equipment

Solar power-generating and/or photo voltaic (“PV”) equipment is encouraged but shall integrate with the Architectural design of the roof structure or be ground mounted. Solar panels or PV roof-tiles may not be visible to adjacent properties, Common Areas or the street. All solar designs must be reviewed and approved by the ARB.

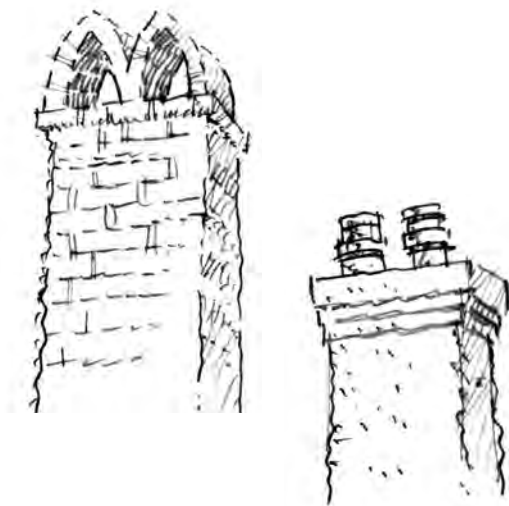


FIGURE 3.9.7 – CHIMNEY DESIGN





3.10 Building Color

OBJECTIVES

- To utilize colors that are appropriate to the Architectural style.
- To utilize color as a unifying feature throughout the Community.

GUIDELINES

- Colors shall draw from a Historic Charleston Sea Island palette.
- All colors must be submitted at the review stage, but final color approval is not given until the onsite mock up review that occurs during construction.

- Brick walls and paving shall utilize historic Carolina colors and patterns with deep varied colors.
- Rural Homesteads are typically more muted and neutral, colors which blend into their surroundings with low reflectivity may be considered. They shall limit the contrast between trim and wall colors.
- Jack Island Home Sites utilize shades of white with minimal trim or accent colors.
- The Jack Island color palette should utilize the following Historical Charleston shades of white:
  - Charleston White– DCR100 (Sherwin Williams)
  - Aunt Betty’s China – DCR101 NHR (Sherwin Williams) – 25%, 50% & Full Strength

- Quill – DCR102 (Sherwin Williams) – 25%, 50%, & Full Strength
- Wool Skein – SW6148 (Sherwin Williams)
- Super White – PM-1 (Benjamin Moore)
- Decorator’s White – PM-3 (Benjamin Moore)
- Inner Balance - #1522 (Benjamin Moore)

See Figure 3.10 – Color Palette Images

COLOR AND SITE CONTEXT

One of the goals of these Guidelines is to create a visually harmonious Community—one that has the appropriate balance of visual serenity contrasted with accent colors. To achieve this goal, the ARB will consider color in the context of the entire Community as well as the individual Residence for submission. For example, the Committee will be more inclined to approve a lighter colored home that is located within a stretch of homes with more muted colors than one that is located within an area that already has a number of lighter colored Residences.

COLOR APPROVAL PROCESS

The Committee will review and approve colors and textures in a three-step process. During the Concept Design phase, the applicant

may describe the color palette and indicate those colors on the exterior elevations. In the Preliminary Design and Final Design Submissions the applicant will submit actual color and material samples. Based on these, the applicant will, during the construction phase, then be required to provide a 4’x8’ foot panel on site of the intended colors, materials and textures of the major building elements for final approval.

The palette and following guidelines apply to all exterior surfaces of the house, including walls, parapets, roofs and all related fences and walls:

- No exterior materials used shall have a high gloss, glare, or reflective “mirror” type finish.
- Color application shall be used consistently throughout each home for all the building(s) and related outdoor areas and/or structures.
- In general, colors for roofing shall be darker in color or hue than the building’s exterior walls.
- Accent colors shall be carefully considered for front doors, window sashes, shutters and other Architectural elements so that they do not dominate or overwhelm the overall color composition.
- Exterior hardscape colors shall be complementary to exterior home colors.
- Changes in exterior wall color shall be at “interior” intersections of walls.

ROOFS

Roofs shall utilize colors consistent to the Charleston Sea Island region and the traditional colors for that roofing material. Roof color shall be complementary to the Architectural style of the Residence and surrounding neighboring homes.

WALLS

Walls shall be complementary in color to area of the Community in which they are located, IE: Rural Homesteads vs Jack Island Home Sites. Wall surfaces shall utilize texture and/or multi-layered applications of color where possible to achieve subtle color variation on walls.

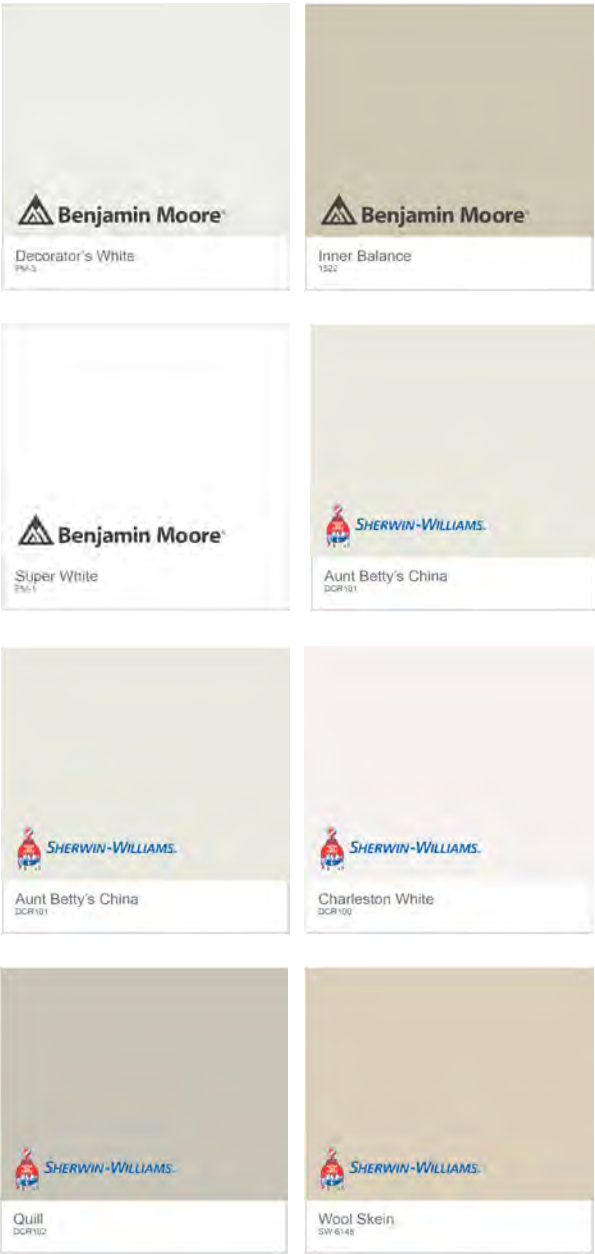


FIGURE 3.10 – COLOR PALETTE IMAGES



3.11 Decorative Elements

In general, decorative elements shall draw upon the local Charleston Sea Island culture, tradition and influences. Accent and decorative elements should be consistent with the Architectural Style of the home and not appear to be “tacked-on”

WROUGHT IRON

Wrought iron may be used for decorative railings, handrails, window treatments, and other architectural hardware.

WOOD ACCENT ELEMENTS

Carved wood designs shall draw inspiration from traditional Charleston Sea Island styles or local cultural designs.  
*See Figure 3.11 – Decorative Elements*

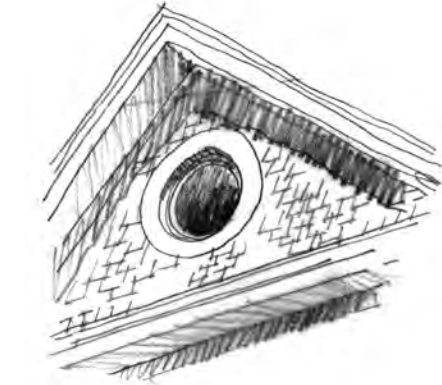


FIGURE 3.11 – DECORATIVE ELEMENTS

3.12 Utilities

OBJECTIVES

- To minimize visibility, noise, smell, vibrations or other nuisances that may be caused by poor utility design, location, or instillation

GUIDELINES

COOLING & HEATING

All equipment shall be located within the Buildable Envelope and fully screened from Common Areas, and adjoining Lots. In some instances, especially on small Lots, equipment may be located within the setback, however this is subject to review and approval by the ARB. The design shall locate units so as to minimize noise associated with the operation or maintenance of the units. Screen walls shall completely enclose the units, with the wall a minimum of 12” higher than the highest part of the unit. In some cases, privacy walls may be sufficient to achieve screening of equipment areas, eliminating the need for a ‘double’ wall. Roof-mounted units on sloped roofs are not allowed. Acoustic wall and/or covers may be required if it is discovered that noise emanating from enclosures are a nuisance to adjoining Lots or Common Areas.

SOLID WASTE DISPOSAL

Trash and refuse areas shall be designed as integral parts of the building design. These areas must be screened from Common Areas, and adjoining Lots. Covers on trash enclosures may be required if it is discovered that odors emanating from enclosures are a nuisance to adjoining Lots or Common Areas. All trash containers must have sealed lids.

3.13 Hurricane Protection

OBJECTIVES

- To allow for adequate storm protection for buildings within Kiawah River without distracting from the overall aesthetic properties of the Community.

GUIDELINES

- Hurricane protection systems must be approved by the ARB. Pre-approved systems include hurricane impact windows and doors, Bahamas shutters, butterfly shutters, and removable panels (metal, plywood and fabric). Any permanent grommets for systems that involve removable panels must be integrated within the surrounding trim and painted to match.
- Permanent protection systems located on the exterior of the home, which are not consistent with the architectural style of the home are not permitted. For example, metal accordion, clam shell, or roll-down systems.





# 4

## ARCHITECTURAL STYLES

The Architectural styles for Kiawah River embrace the Charleston Sea Island heritage and spirit of place. Each style represents a unique response to the climate, site and available building materials fostering an intimate connection between shelter and the environment, creating homes which “belong” to the land. The five Architectural styles all share the stylistic spirit of the evolution of homes of the Charleston Sea Islands. The following sections describe the design aesthetic and characteristics of each individual Architectural style.



4.1 Architectural Styles for Kiawah River

The Architectural styles for Kiawah River are represented by historical precedent of Charleston Sea Island Architecture combined with a contemporary sensibility that reflects the unique qualities of the Property Owner. The following styles listed below are considered appropriate for Kiawah River. The Guest Builder or Property Owner may propose other styles they consider appropriate.

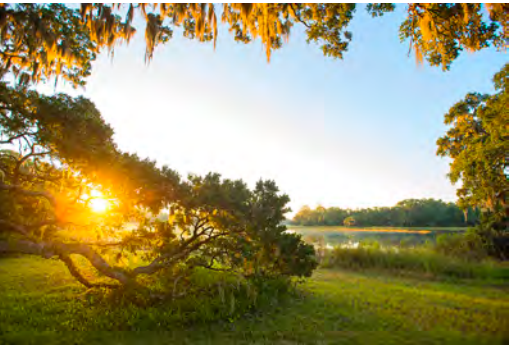
- The Marsh House
- Sea Island Cottage
- The Island Home
- The Farm House
- The Side Yard House



HISTORIC PRECEDENTS ARE THE INSPIRATION FOR THE HOMES AT KIAWAH RIVER

4.2 The Marsh House

A more relaxed style, the Marsh House is in contrast to the more ordered style of houses in Kiawah River. Broad overhangs with exposed rafters, wrap around porches and simple vernacular detailing allows this house to co-exist within the landscape in which it is placed. Outbuildings, either attached or detached, can tell the story of how the house evolved for changing needs and function. Outdoor stairs, covered porches and trellis’ help link various volumes together.





4.3 The Sea Island Cottage

Mainly 1-1/2 story, the Sea Island Cottage takes advantage of the proximity to the ground / terrace where possible and has a strong connection between the indoor and outdoor spaces. Typically, a smaller house, these cottages utilize simple, straightforward structures that respond to functional requirements while taking advantage of natural light on as many sides as possible. Roofs are typically steeper, and the materials used are honest and straightforward, allowing the building forms to read clearly. Private gardens are created with the architecture.



4.4 The Island Home

Drawing from the influences of West Indies trade and British Colonial details, a more refined style emerged in Charleston and its surrounding islands. Symmetrical, ordered fenestration along with the use of stucco on masonry for the core of the house defines this style. Attached secondary massing along with outbuildings can be either masonry or wood siding. More highly refined details are included in this style.





4.5 The Farm House

Typically wood construction, the Farm House style has a simplified architectural aesthetic. More utilitarian, the design can have more of a rural simplicity. Simple vernacular materials include board and batten siding, painted brick chimneys integrate the building with the land. Tall windows to the floor, dormer windows, broad roof overhangs help to bring in and control natural light. Gable roof forms are appropriate, although incorporating secondary roof forms that help to break up the overall building volume is acceptable.

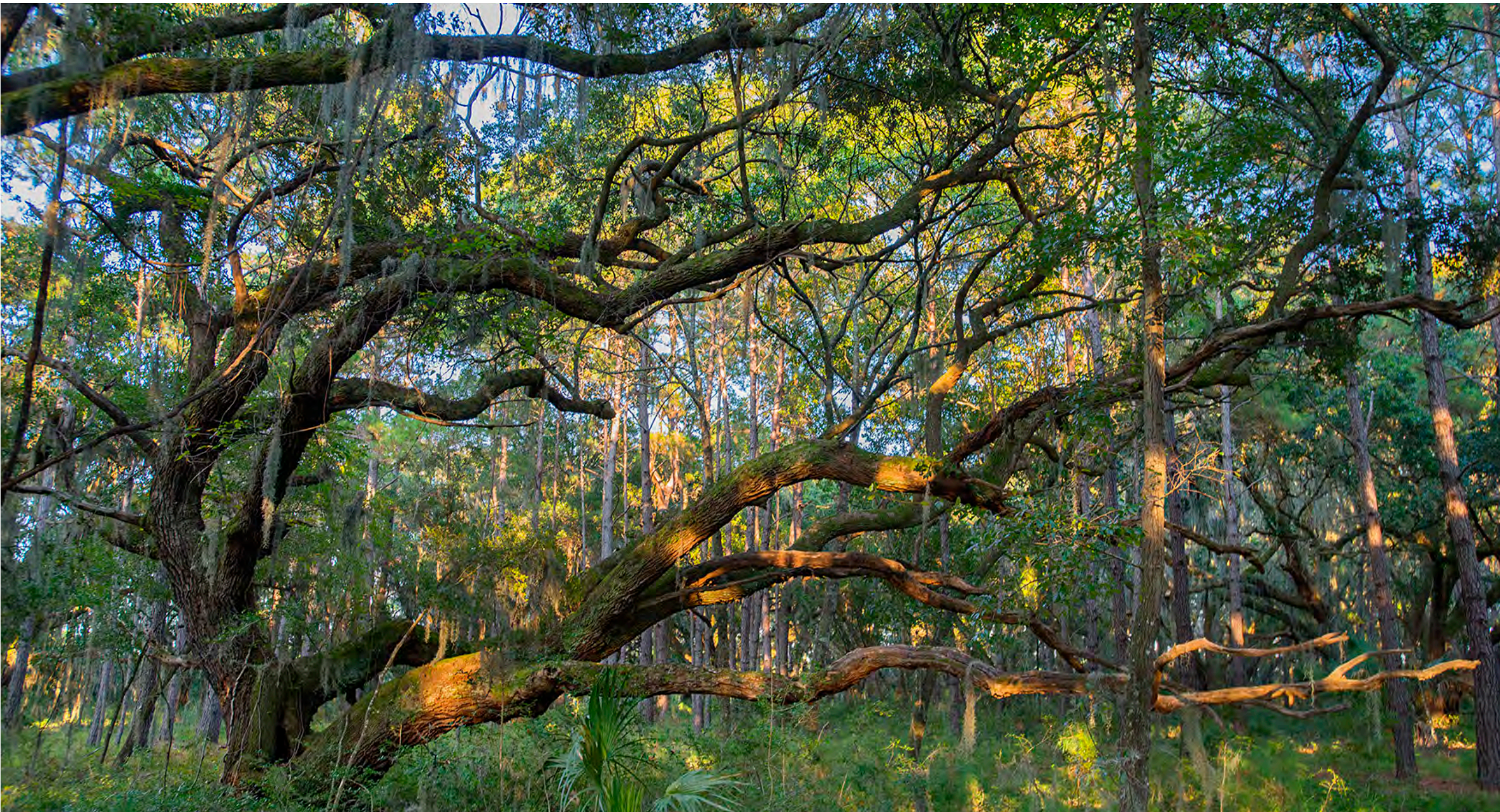


4.6 The Side Yard House

Well suited to long narrow properties, the Side Yard House is an adaptation from the Charleston Single House that allows airflow through the entire length of the house and courtyards. Influenced by Barbadian Long Houses, the massing of the house is located asymmetrically along or very near the side lot line, creating the opportunity for a side yard or garden along the opposite side lot line. Typically, one room wide and many rooms long, this house can be multiple stories in height with single or double courtyards.







# 5

## LANDSCAPE DESIGN & SITE ELEMENTS

The following landscape standards have been developed to help Guest Builders and Private Property Owners achieve the environmental, Community and aesthetic objectives for Kiawah River. The intent of these Guidelines is to encourage a high level of quality and consistency in construction methods and materials while providing for a diversity of custom design solutions.



5.1 Planting

OBJECTIVES

- To establish a consistent Community landscape that utilizes plant materials that are sensitive to the existing plant communities and enhance the natural beauty of the site.
- To have Property Owner landscapes contribute to creating a Community landscape that visually unifies the various Architectural styles.
- To utilize landscape techniques and native plant palettes that are sensitive to water conservation.
- To utilize plant materials to define outdoor rooms, frame views, create privacy and/or provide landscape focal points.
- To protect views from adjacent Lots and Common Areas through the use of appropriately scaled plant material and sensitive landscape planning.

5.1.1 General Planting Guidelines

- All plants must be selected from the Approved Plant List located in Appendix B. Proposed landscape plantings that are not on the Approved Plant List shall be identified on all landscape submissions with a full description of the plant and why it is proposed for use. The ARB reserves the right to disapprove of any plant they find incompatible with the Community’s overall design intent.
- A Prohibited Plant List is included in Appendix C. These plants represent species with characteristics that are potentially invasive to this environment, have weed-like tendencies or are in conflict with the intent of these Guidelines. Under no circumstances may a plant from the Prohibited Plant List be used.
- Plant materials shall envelop buildings and help to complete structures and provide shade, texture or a focal point for outdoor rooms. Shrubs may be used as informal low walls, vines may be used to fill in walls between structural components and trees may be used to provide scale for building masses.
- Planting of trees and palms must take into consideration views from adjoining Lots. The use of many tall palms or large canopy trees where views from adjoining Lots would be impacted are not permitted.
- Areas that have been previously landscaped by the Master Developer shall be protected from damage during construction. Any damage to previously landscaped areas by the Property Owners’ Contractor shall be promptly replaced with plant materials of the same size, quantity and species.
- All trees, shrubs, and ground covers

must be maintained properly. All dead or dying plants shall be replaced promptly. Maintenance for seasonal planting will be required in the off-season to remove all dead or frost damaged growth, leaf litter or other debris. Irrigation systems must be maintained to ensure survivability of plant material.

- Ground or shredded native materials, such as pine straw, shall be utilized for mulch. Colored gravel mulch is prohibited.
- The ARB may require additional tree planting on a Lot if, in the opinion, the Lot size, building siting, mass, character or any other circumstances specific to that Lot, warrants an increase in tree size or density.
- To create a more natural looking landscape character in the Transition Areas, the use of multi-trunked trees is preferable over the use of nursery “standards” in the landscape design.
- All plant material shall meet the requirements of the “American Standards for Nursery Stock – ANSI 260.1.” See Figure 5.1.1 – Planting Design Principles

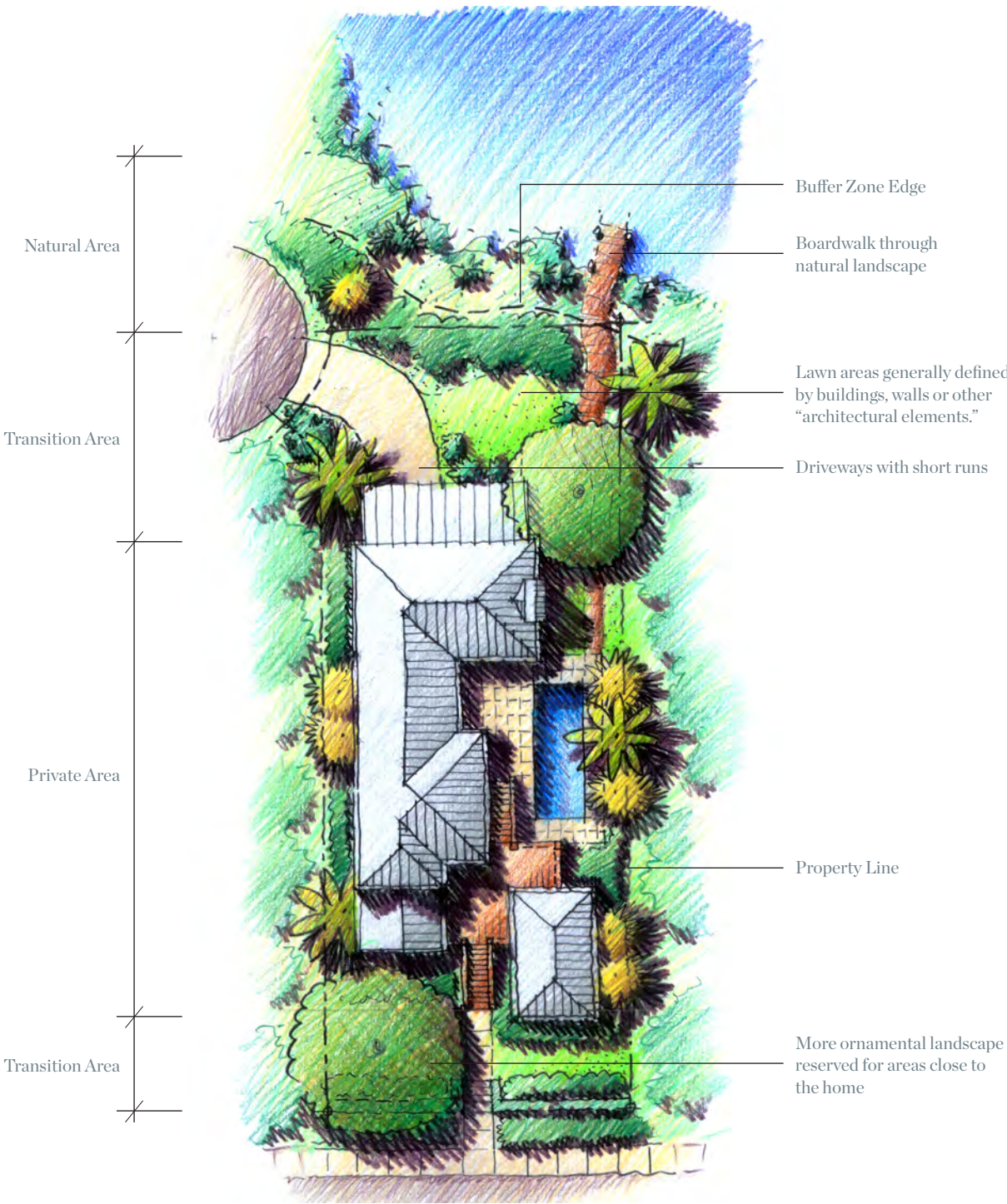


FIGURE 5.11 – PLANTING DESIGN PRINCIPLES



5.1.2 Private Area Planting

The Private Area is that area of the Lot defined by walls, Buildings, landscape structures and/or plant materials visible from public areas, including adjoining Lots or Common Areas. A larger variety of plant material, including non-native species, may be used in the Private Area. The use of trees is preferred in areas close to the house to help blend buildings with the site, accentuate entry areas, provide for climate amelioration, and help to define outdoor spaces. Plantings are to transition from the more intensively landscaped areas of the Private Area to the native landscapes of the Transition Area and Common Area. These areas shall be maintained so that they resemble the more natural landscapes. A low wall that separates the Private Area from the Transition Area and Common Area may also be used.

TREE AND SHRUB PLANTING WITHIN PRIVATE AREA

The following plant materials shall be planted:

- 1 tree per 1,000 sf of Buildable Envelope. (three inch caliper minimum)

- 10 shrubs per 500 sf of Buildable Envelope. (five gallon minimum size)
- Buildable Envelope area shall be rounded up the nearest 500 sf to calculate the number of required shrubs.
- Preserved Oak = 2 required trees

*Note: The preservation of existing oaks is strongly encouraged and will account for two of the required planted trees.*

5.1.3 Transition Area Planting

The Transition Area shall be planted with a similar pattern and density of the streetscape or Common Areas to create a gradual transition between the Property Owner’s landscape and Community landscape.

- Plant material within the Transition Area shall be located and maintained to not block oblique views from adjacent Lots.
- Portions of the Transition Area may be planted with more ornamental species, particularly when the Transition Area is separated from the Common Area by Architectural features such as walls, fences or other hardscape elements.

- The Transition Area may be treated with a more architectural approach that incorporates retaining walls, planted hedge, outdoor terrace or a fence along the Common Area. Incorporating a grade change with this approach would be encouraged.
- New planting within the Transition Area shall be installed so that the existing trees will be preserved and not damaged.
- Property Owners may be responsible for completing the streetscape design through the installation of plant material in their Transition Zone.

5.1.4 Natural Area Planting

The Natural Area shall only be planted to mitigate man-made damage or site adjustments. Planting within the Natural Areas shall be accomplished with only native plant material in a density and mix that would naturally occur in the adjacent areas. Refer to Appendix B - Approved Plant List for plants that are approved for planting in the Natural Area.



5.2 Tree Protection & Plant Salvage

The existing trees and native plant species are considered a great natural asset to Kiawah River. It is the Master Developer’s intent to preserve as much of the existing landscape as possible and integrate the Community into its natural setting.

OBJECTIVES

- To preserve as many Grand Trees and Protected Trees as possible.
- To encourage creative Architectural designs which integrate the building with the existing landscape.



GUIDELINES

- The Guest Builder or Property Owner shall provide a tree survey to the ARB delineating all Grand Trees and Protected Trees on the Lot prior to obtaining any Development approvals or permits. This tree survey shall comply with the requirements of Article 9.4 of the ZLDR, as modified in Appendix B of the Kiawah River PDD Plan, which is available from the ARB Office.
- A Clearing Plan must be submitted to the ARB at the final design review and prior to the start of construction. In the Clearing Plan, the Property Owner shall indicate the plant material they wish to preserve, relocate or remove. Upon review in the field, the ARB will notify the Property Owner of its intention of salvaging native plant species not designated to be preserved or relocated.

- Removal of plant material shall take place within four weeks of Property Owner’s approval. Following the completion of the plant salvage operation, the Property Owner shall be cleared to commence construction by written notification from the ARB.
- The Master Developer reserves the first right of refusal to salvage existing native species at no cost to the Property Owner.





5.3 Driveways & Auto Courts

OBJECTIVES

- To minimize visibility of paved areas from the street and neighboring Lots through careful siting, grading and use of Architectural devices and landscape.
  - To blend driveways into the natural terrain so that grading is minimized.
  - To utilize, where possible, local materials and/or pervious materials for paving.
  - To minimize the quantity of paving in Facade Zone or Transition Areas.
- Straight driveway alignments with front facing garage doors are strongly discouraged. Avoid straight driveway alignments, where possible, to screen parking and garage doors from the street.
  - The use of pervious paving for driveways and auto courts is highly encouraged. Approved materials for driveways and auto courts include pervious paving such as gravel, decomposed granite, plantation mix or crushed shell. Other materials such as colored and/or patterned concrete, precast concrete pavers, brick, or natural stone must be reviewed and approved by the ARB.
  - Coloring and texturing of concrete is required. Colors of finish paving materials shall complement proposed buildings and integrate well with the surrounding muted earth tone colors. No smooth or broom finishes will be allowed (only seeded, washed or exposed textures).
  - Generally, driveways shall be a maximum of 12 feet wide, except at curb line where they may flare to 14 feet wide but must transition to 12 feet within 15 feet from the edge of the adjoining street. Ribbon driveways or other solutions that minimize

GUIDELINES

- All driveways are to follow alignments that minimize grading, preserve existing trees and reduce disruption to the site. Driveways shall respect the general alignments shown in the Lot Diagrams or, if different, must be as approved by the ARB. The driveway and garage layouts are to minimize the visibility of the garage doors, driveways and off-street parking from the street, Common Areas and adjoining Lots.
- Only one driveway entry will be permitted for each Lot. A suggested driveway access point is indicated on the Lot Diagram. Alternate locations may be approved by the ARB if the applicant demonstrates that such a relocation furthers the objectives of the Community. Loop driveways are not permitted.

driveway paving are strongly encouraged.

- The quantity of hardscape in the auto court shall provide ample space for easy turning movements and vehicular parking. Excessive paving that impacts the surrounding landscape areas is discouraged.

5.3.1 Shared Driveways

- In an effort to minimize visual impacts along the entry drive and other areas, some Lots may gain access from a shared drive. Property Owners gaining access from the shared driveway shall be responsible for maintenance with reciprocal access and maintenance easements recorded over the driveway. *See Figure 5.3.1 – Shared Driveway Diagram*

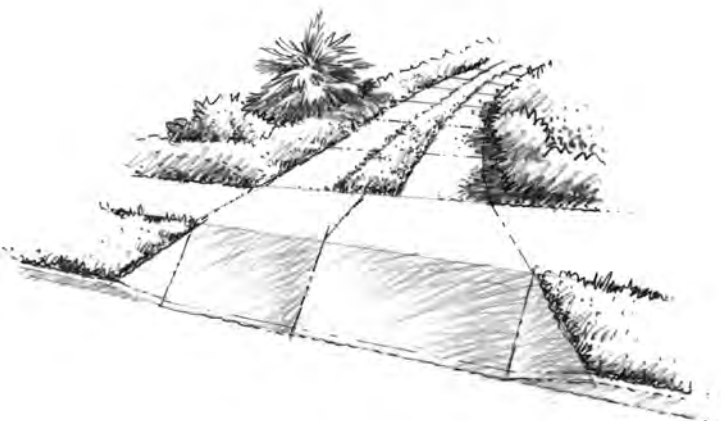


FIGURE 5.3.1 – SHARED DRIVEWAY DIAGRAM

5.4 Garages & Parking

OBJECTIVES

- To minimize the visibility of garages, parking areas, and driveways through planting, architectural projections and careful siting of garages..
- To accommodate all parking needs for the Residence on the Lot.

GUIDELINES

- All Lots shall include a garage or carport that can accommodate a minimum of one car. Garages and carports may be open air provided parked cars are not visible from the street or Common Areas.
- Garages must be sited and located so that visibility from the street is minimized. Side entry garages are strongly encouraged on all Lots. Separating a three-car garage into two masses (one single car and one two car garage) is required.
- Incorporating finished, livable space above the garage is strongly encouraged.
- Vehicular parking spaces shall have a minimum dimension of 9 feet by 20 feet.
- Golf cart parking spaces shall have a minimum dimension of 6 feet by 9 feet.
- A minimum of 24 feet of back-up space is ideal.



- Recessed (minimum of 1 foot) garage doors and single stall door openings are strongly encouraged.
- On-street parking of boats, trailers, RVs or similar types of secondary recreational vehicles is prohibited.
- Synthetic garage doors may be used, but a sample must be submitted and approved by the ARB.

*See Figure 5.4 – Garage Design*

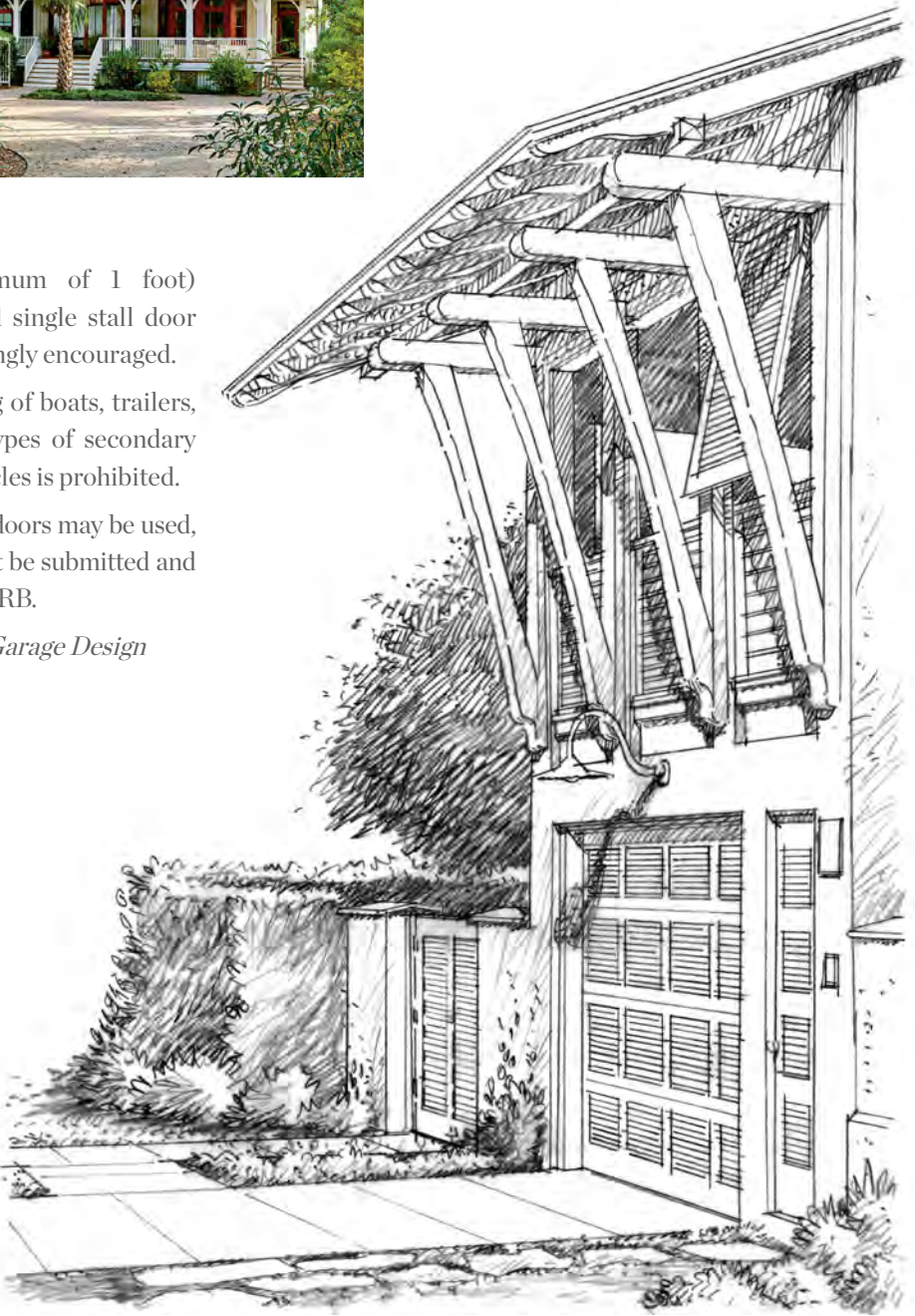


FIGURE 5.5 – OUTDOOR STAIR DESIGN



5.5 Courtyards, Terraces, Paths & Outdoor Stairs

OBJECTIVES

- To create outdoor spaces that enhance the site’s ambiance through the use of plantings, walls, Architectural devices and/or landscape structures.
- To create outdoor “rooms” which are natural extensions of the indoor rooms of the Residence.
- To utilize materials that complement the Architecture and materials of the building.

GUIDELINES

- The spatial organization of the Residence as well as the organization of the outdoor spaces is to be designed as one unified whole. The demarcation line between indoors and outdoors is to be blurred.
- All paths, outdoor stairs and terraces are to be located within the Buildable Envelope. Paths, outdoor stairs and terraces located within the Transition Area or Facade Zone shall be designed to make a smooth transition to the Common Area and/ or tie in to the streetscape design.
- The use of natural and local materials such as stone, chipped stone, crushed shell, plantation mix and/or gravel is encouraged. Concrete may be used provided it is colored and textured to complement

the Residence.

- Extending flooring materials from the inside of the Residence to the outdoor space is encouraged.
- The use of Architectural devices such as courtyards, arcades, trellises and/or porches to help create a gradual transition from indoors to outdoors is strongly encouraged.
- Designs shall minimize the use of several different types of paving materials in order to produce an understated, unified design. See Figure 5.5 – Outdoor Stair Design



FIGURE 5.5 – OUTDOOR STAIR DESIGN

5.6 Walls, Fences, & Gates

The following design objectives apply to all walls that are visible from other Lots, Common Areas, and the shoreline, regardless of whether they are retaining, free standing or if they are faced or structural.

OBJECTIVES

- To construct walls, fences and gates which emulate the Charleston Sea Island tradition. Generally, these are low brick or Tabby walls, and/or picket or cast-iron fences.
- To design walls, fences and gates that are related to and are natural extensions of the buildings.
- To achieve privacy through the use of berming, low walls and careful building and planting design, thereby minimizing the use of higher privacy walls and fences.

GUIDELINES

- Walls, in general, shall be a maximum height of 6’ feet, except where a partial retaining condition exists. Designers are strongly encouraged to design wall heights that are as low as possible, maintaining privacy, yet preserving views and the visual character of the Community. Wall designs shall be extensions of the Architecture of the building.
- Site walls that are visible from the streetscape or Common Areas shall incorporate multiple horizontal offsets and vertical variations to avoid long straight lines in the landscape. All such visible walls shall utilize a minimum vertical offset of 8 inches and a maximum vertical offset of 16 inches. The horizontal separation between vertical offsets shall be a minimum

of 24 inches. This guideline does not apply to walls along stairs or privacy walls on property lines that are not visible from the streetscape or Common Areas.

- On the view side of the Lot, privacy walls and fences shall not extend past the Private Area so that oblique views from adjacent Lots are preserved. See-through fences or low hedges may be allowed in this area if they do not obstruct oblique views. See Figure 5.6.1 - Oblique Views
- “View fences” are encouraged to preserve the openness of the Community landscape. These fences may utilize an open wood or metal picket or designs which are, in general, “see-through” and frame rather than block views of the Community landscape beyond. See Figure 5.6.1 - Oblique Views

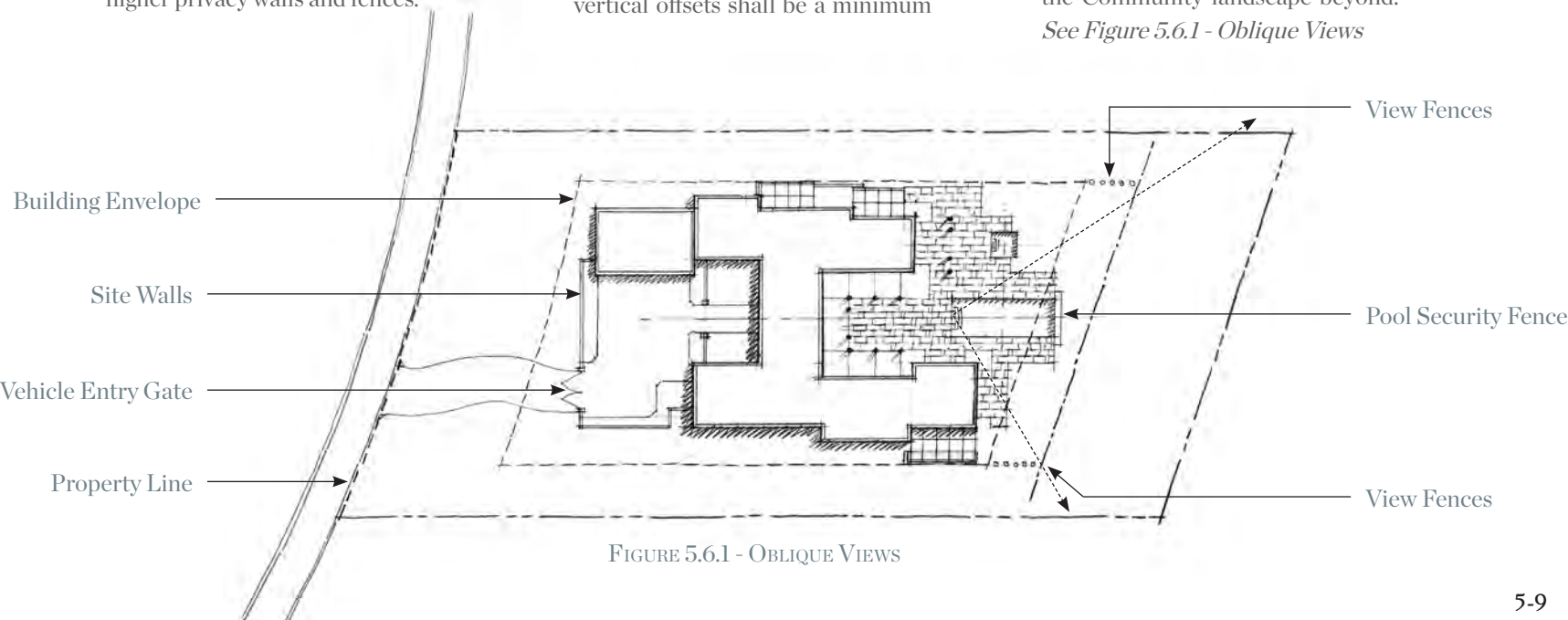


FIGURE 5.6.1 - OBLIQUE VIEWS





- Depending upon the Architectural style of the home, the ARB may require that the ends of walls incorporate decorative terminus details and not end abruptly.
- Wall and fence designs shall be designed to be compatible with walls and fences on adjacent Lots and/or Common Area. If an existing wall or fence abuts the applicant's property, these must be shown on the applicant's survey, site and landscape plans.
- Vehicle entry gates and/or entry columns must be located within the Buildable Envelope. In some instances, especially on large Lots, gates and columns may be located within the setback, however this is subject to review and approval by the

- ARB. Gates and columns shall be designed in an understated way and not make a design statement when viewed from the street, Common Areas or neighboring Lots.
- Pool security fencing shall meet the requirements of the Charleston County Zoning. Utilizing grade changes in conjunction with fencing to meet these requirement is encouraged.
  - Fencing or walls on Lots that face wetlands, marshes, or salt ponds are strongly discouraged, and must be located within the Private Area of the Lot. Fencing or walls directly adjacent to and facing the Kiawah River are prohibited. View fences in these locations are acceptable
  - Approved wall materials include

- Tabby, stacked stone or brick. The minimum thickness of walls shall be 8 inches.
- Approved fence materials include wood picket, horizontal barn fencing, or cast iron. Finishes on fences are to be similar to those of the Residence and treated, stained, painted and/or left to weather so that they blend in with the surrounding landscape. Cast iron fences are to be painted a dark color or left to weather. Living fences which incorporate landscape vines are highly encouraged, an example of this would be a wire fence planted with Jasmine.
  - Vinyl clad cyclone will not be permitted.

## 5.7 Landscape Structures

### OBJECTIVES

- To design landscape structures that appear as extensions and/or additional building components of the main Residence.
- To design landscape structures which are subordinate to the main Residence and visually recede into the surrounding landscape.
- To incorporate landscape structures which help to ameliorate the climate and create shade, shadow and textures.

### GUIDELINES

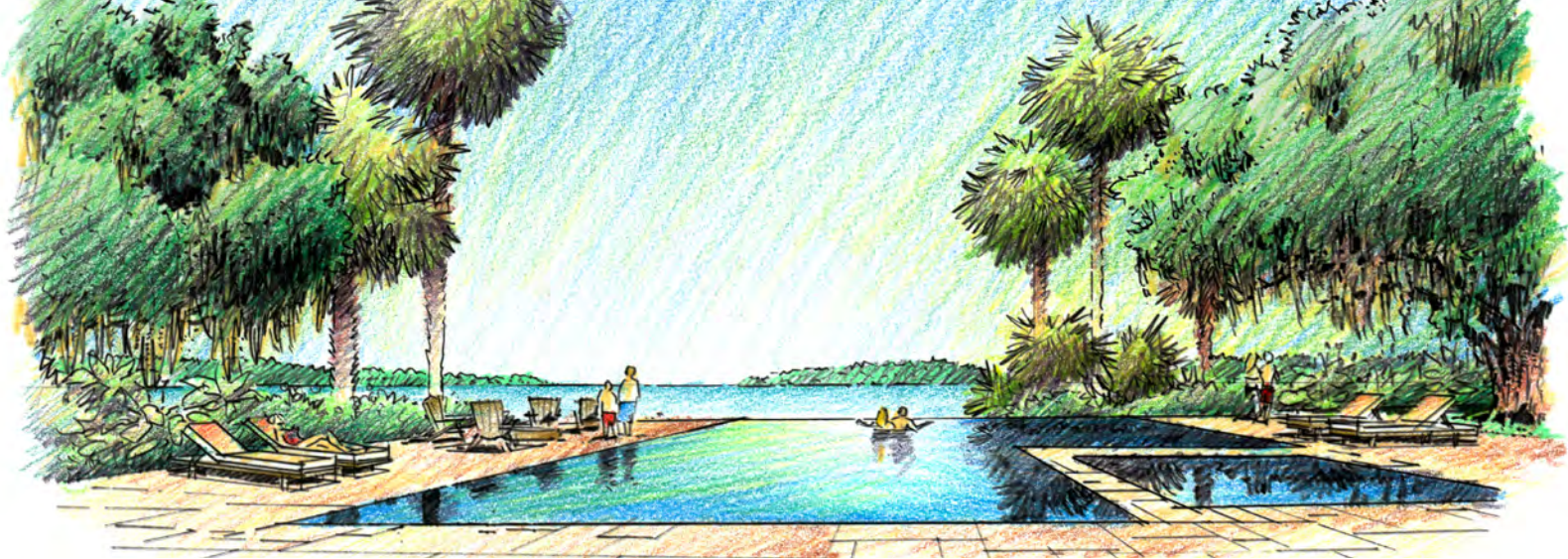
- Landscape structures such as arbors, pavilions, and/or decks are permitted but must be located within the Private Area of the Buildable Envelope. They must be sited and designed so that they do not impede views from neighboring Lots.
- The height, color, materials and style used for outdoor structures are to be the same or similar to the Residence. Heavy wood timbers, if used for

- rafters, posts or trellis elements, must be substantial in dimension and treated, stained, painted and/or left to weather so that they blend in with the surrounding Landscape.
- Landscape structures are to be visually subordinate to the main Residence. Accordingly, the height and visual mass of an outdoor structure shall be substantially less than that of the main Residence. The maximum height for a landscape structure shall be 14 feet.
  - In general, the same Guidelines that apply to Architecture apply to the design of landscape structures. (Refer to Chapter 3)  
*See Figure 5.7 – Landscape Structures*



FIGURE 5.7 – LANDSCAPE STRUCTURES





### 5.8 Spas, Pools & Water Features

OBJECTIVES

- To locate pools and/or water features where they are not highly visible from public areas.
- To design pools and water features which augment the outdoor spaces and complement the Architectural style of the main buildings.

GUIDELINES

- In general, pools, spas and water features are to be designed to be integral parts of the residential design and visually blend with the landscape. Landscaping shall be selected and arranged to complement the water feature and create “outdoor rooms.” *See 5.8.1 – Pool and Spa Design*
- Swimming pools, spas, ponds and other artificial water features must be built within the designated Buildable Envelope. Small water features located on side yard privacy walls may be exempt from this guideline if the applicant can demonstrate the water feature will not have a noise or visual impact on the adjacent

- Lot. Pools and spas in the rear Transition Areas may be allowed closer than 10 feet to the property line if it is demonstrated that such Improvements have no impact on Common Areas or adjacent Lots.
- The exposed edges of infinity or “negative” edge pools that are visible from adjacent Lots or Common Areas must utilize an approved natural stone or finish that blends with the adjacent landscape. Exposed pool walls or surfaces that are visible from off-site must be screened with shrubs, vines and/or ground cover plantings.
  - Swimming pool and spa areas must be screened with low landscape walls and/or plantings to minimize their visibility from adjacent Lots or Common Areas.
  - Swimming pools and spas, and the doors and gates leading to them, must be constructed in accordance with Charleston County Zoning regulations, including fence and enclosure heights. Pool enclosures

- shall utilize a combination of fencing and grade changes to meet wall requirements set forth by the regulations and Design Guidelines. Design solutions that eliminate the need for a pool fence are encouraged. Utilizing grade changes to achieve pool enclosure is strongly recommended.
- Mechanical equipment must not be visible or heard from adjacent Lots and shall be located below grade or enclosed by walls or other suitably effective screening and noise attenuation methods.

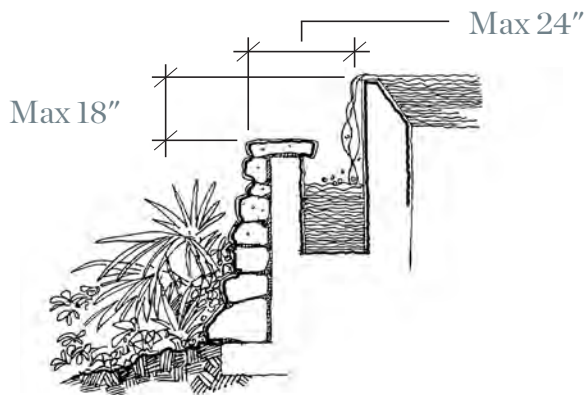


FIGURE 5.8.1 - POOL & SPA DESIGN

### 5.9 Exterior Service Areas 5.10 Irrigation

OBJECTIVES

- To screen service areas from off-site views.
- To ensure any noise or odors from trash or equipment are contained within the service areas.

GUIDELINES

- Service or storage areas, barbecues, satellite dishes, gates, outdoor sculpture or other outdoor site elements are to be located within the Buildable Envelope.
- Trash disposal areas, outdoor work areas, mechanical equipment and outside equipment (including antennae and satellite dishes) are to be completely screened from off-site views by the use of Architectural features or plant materials. Where feasible, these areas are to be integrated into the main buildings.
- Trash container storage areas must be located so that they are easily accessible to service personnel and offensive odors are contained. These areas shall require gates and sealed containers. Generally, these areas need to be within 3 feet of the street or alley to allow for walk-up collection service.
- Pool, spa equipment and air conditioning units shall be located behind walls or in underground vaults to contain noise. Solid noise absorbing covers for equipment may be required

after installation if it is discovered that noise emanating from the units is a nuisance to adjoining Lots or Common Areas.

OBJECTIVES

- To minimize the amount of landscape irrigation required through water sensitive landscape design.
- To utilize irrigation systems that provide efficient water coverage and minimize water usage and runoff.
- To ensure adequate levels of irrigation using automated systems to promote optimal plant growth and establishment of a mature landscape.

GUIDELINES

- All landscaped areas within the Lot must be irrigated. The use of salt tolerant and drought resistant plants combined with minimal irrigation must be the basis of all landscape submittals. Except for turf and some groundcover areas, where overhead or micro spray systems are more practical, the use of automatic underground drip irrigation systems will be encouraged in all landscape areas to ensure the establishment and sustainability of the landscape.
- Rainwater collected in cisterns or

gray water collected in an approved tank is encouraged to be used for irrigation by individual Property Owners.

- Group plant materials according to their water consumption needs.
- All irrigation systems will utilize an automatic, programmable controller to maximize efficiency. All irrigation systems must have rain sensors that automatically disabled the scheduled watering after recent rainfall. The HOA shall reserve the right to suggest appropriate adjustments to the watering cycle, volume and duration.
- The irrigation system must be designed and installed to preclude over-spray or runoff onto adjacent Lots, paved areas, streets, sidewalks or walls.
- Irrigation must be designed in accordance with Charleston County Zoning regulations. It is the Guest Builder or Property Owner’s responsibility to acquire, understand and adhere to any such regulations. The ARB assumes no responsibility related to these regulations.
- Mulch all new areas of planting to retain soil moisture and provide for weed control.



5.11 Lighting

OBJECTIVES

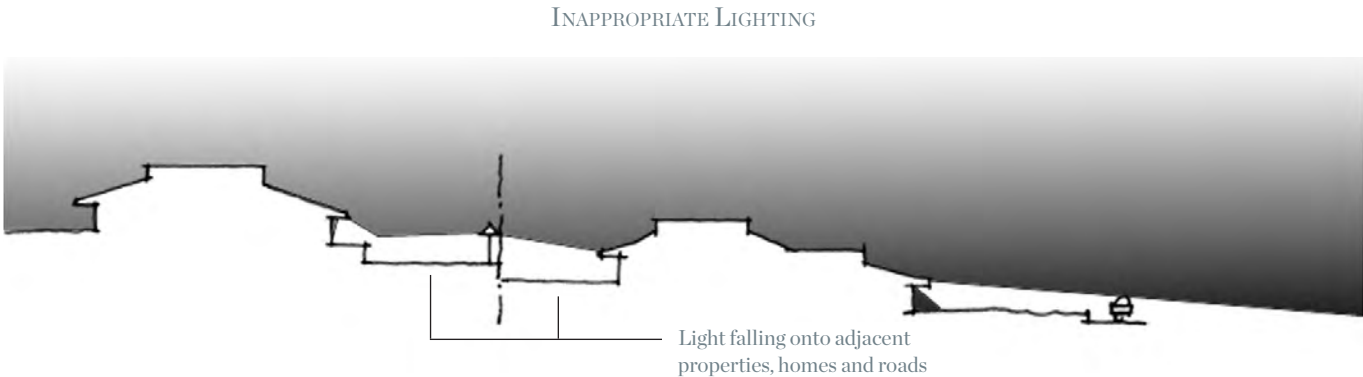
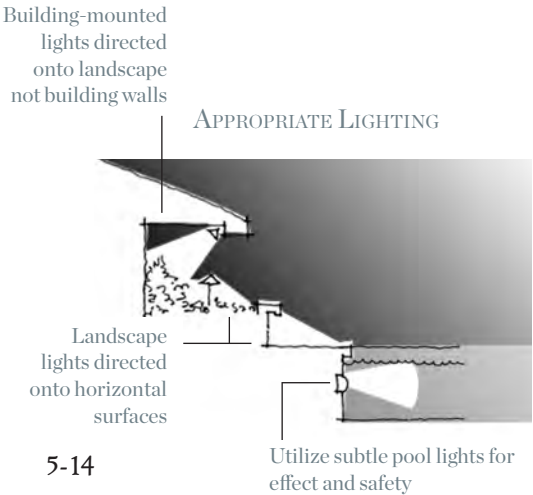
- To preserve the nighttime dark sky by minimizing the amount of exterior lighting.
- To utilize low intensity, indirect light sources to the extent required for safety and subtle drama.
- To utilize light fixtures which complement the architecture and enhance the landscape.

GUIDELINES

- Exterior building lighting, either attached to or as part of the building, shall be the minimum needed to provide for general illumination, safety, and security of entries, patios and outdoor spaces and associated landscape structures.
- Exterior site lighting shall be minimal, provide subtle drama and be directed onto vegetation or prominent site features and not upon the building. *See Figure 5.11 – Lighting Design Concepts*

- Lighting of plant materials shall be achieved with hidden light sources and down lights from above.
- Light fixtures shall be located and designed to avoid spillover onto adjacent Lots.
- To preserve the nighttime dark sky, lighting emanating from the Residence’s interior is also subject to ARB control. Interior lighting shall be concentrated at activity areas and minimized next to windows. Built-in lighting adjacent to windows shall be directed toward the Residence’s interior. Architectural or decorative elements, such as louvers or scrims, shall be employed to minimize the quantity of light escaping through the windows. The maximum level of foot-candles 20 feet from the building face shall be 0.01 foot-candles.
- Guest Builders and Property Owners are encouraged to install underwater pool, spa and water feature lights with rheostats / dimmers so that they may be easily dimmed if it is determined that spillover light from these sources is a nuisance to neighboring Lots or Common Areas or is adversely affecting the nighttime dark sky.

- Only low voltage lighting with a maximum of 25 watts may be used for all exterior site lighting applications. Line voltage may be used for lights on the building, but must be lamped with 25-watt maximum bulbs.
- The use of LED light sources is strongly encouraged and must be identified as such on all ARB submittals.
- The use of solar lighting is encouraged.
- Soffit lights over garage doors are not allowed.
- No light shining towards wetlands, marshes and the Kiawah River will be allowed.
- Security lighting may be installed on buildings provided it does not create a light nuisance to adjoining Lots or Common Areas. All motion sensitive security lighting must be on timers that automatically turn the lights off after 5 minutes. Motion detectors shall be located to avoid accidental triggering by wildlife or wind-blown vegetation. Light from these devices shall be directed downward and not into any adjacent Lots or Common Areas.



5.12 Miscellaneous Site Elements

OBJECTIVES

- To utilize site elements and details that are typical to the Charleston Sea Island character, have subdued colors, and are appropriate in this waterfront environment.

5.12.1 Patio Furniture

Exterior storage of patio furniture and outdoor living accessories in areas visible from off-site is allowed provided it meets the following requirements:

- If stored uncovered, the furniture is stored in the same locations as if it were in use.
- If stored with covers, the covers must be made from non-reflective material with dark, earth tone colors.
- Patio furniture and umbrella colors are to utilize subdued colors when their location is visible from other Residences or Common Areas. The ARB and/or the HOA reserves the right to reject any such items if it is deemed they are not consistent with the intent of these Guidelines and the Community’s aesthetic objectives.
- Plastic lawn furniture is not allowed.

5.12.2 Sculptures & Artwork

All sculptures and/or artwork visible from adjacent Residences or Common Areas must be approved by the ARB prior to installation. No reflective materials or bright colors will be allowed in areas visible from adjacent Lots or Common Areas. The

Final Design submittal is to include detailed information on size, location, materials, colors, mounting details and lighting.

5.12.3 Barbeques & Heat Lamps

Barbeques and heat lamps should be built within a walled enclosure that is architecturally consistent with the Residence. All equipment that is visible from other Residences or Common Areas shall be non-reflective and have muted coloration.

5.12.4 Flagpoles, Antennae, & Satellite Dishes

Antennae and satellite dishes are subject to special review by the ARB. They shall be installed so as not to be visible from any neighboring Lot or Common Areas, mounted in an inconspicuous manner and painted or colored to match the adjacent background color to blend with the surrounding building. Freestanding flagpoles must be approved by the ARB.

5.12.5 Address Markers & Mailboxes

An address marker may be located at the entry to the Lot using one of the Master Developer-supplied designs and mounting details.

5.12.6 Sport / Tennis Courts

Sports/tennis courts shall be allowed on Lots provided there is no lighting, the courts are screened from view from adjacent Lots and Common Areas and methods approved by the ARB are used for noise abatement.

5.12.7 Exterior Recreation or Play Equipment

All exterior recreational or play equipment, such as swing sets, slides, play structures, jungle gyms and similar equipment, must meet the intent and requirements of all sections of these Guidelines, including color. This type of equipment or structures shall be located in the least visible portions of the Lot and must not be visible from adjacent Lots or Common Areas. The height of this type of equipment shall be limited to a maximum of 10 feet above finished grade. All exterior recreational or play equipment requires specific approval of the ARB prior to installation.

5.12.8 Basketball Hoops

Basketball hoops and backboards shall be allowed on Lots provided they are not visible from adjacent Lots or Common Areas and methods approved by the ARB are used for noise abatement.





# 6

## SUSTAINABLE BUILDING STRATEGIES

This chapter presents ways in which to build site-friendly, resource efficient, healthier buildings. Site and building designs which consider energy and resource conservation early in the design process reduce the cost of operation while also greatly improving user comfort. In a climate like Kiawah River, these are important benefits for Property Owners.



6.1 Sustainable Building Strategies

Kiawah River is committed to demonstrate, educate and advocate environmental responsibility. To this end, Guest Builders and Property Owners are strongly encouraged to employ green building techniques, materials, systems and methods in both their building, site design and construction. Excellent guiding standards for these concepts may be obtained from the U.S. National Association of Home Builders. Regionally, additional resources can be referenced at both Environments for Living ([www.environmentsforliving.com](http://www.environmentsforliving.com)) or Earth Craft ([www.earthcraft.org/who-is-earthcraft](http://www.earthcraft.org/who-is-earthcraft)). These standards, while technical in nature, are complimentary to the aesthetic objectives of the Design Guidelines and shall not be seen as mutually exclusive. Good design, first and foremost, is site responsive, material efficient and appropriate for its climate and local culture.

As residential designs are submitted to the ARB, Guest Builders, Property Owners and their Consultants will also be requested to provide supporting documentation on how their designs comply with the green building techniques contained in either Environments for Living or Earth Craft as mentioned above.

The sustainable building strategies outlined in these Guidelines encompass five major ideas. These ideas, described below, provide an overview of the more detailed issues that shall be addressed in all designs.

To utilize site elements and details that are typical to the Charleston Sea Island character, have subdued colors, and are appropriate in this waterfront environment.

6.2 Reduce Energy Demand

An integrated approach to the design of the Residence that considers the entire energy system is key to creating the most efficient building without compromising human comfort. Important strategies include building orientation to capture cooling breezes and shade from intense sun, high levels of insulation and heat reflecting glazing, careful design of the home's heating and cooling system and then careful monitoring and testing of all systems before occupying the building. Other considerations include the selection of appliances for their energy efficiency (Energy Star Rated), and designing the rooms and public spaces to make the most of natural daylight.

6.3 Building Materials for a Better Environment

Many of today's building materials contain hidden chemicals with and long-term effects that most people never see, but over time realize have a negative impact on their health. Sometimes the impacts from building materials have occurred prior to their installation, either negatively impacting those who manufacture the material or have to prepare them for transport. Other materials continue emitting toxic gases long after installation. Finally, other materials have significant negative impacts associated with their disposal. The design team shall select materials that are durable and appropriate for the coastal climate of Kiawah River. By purchasing materials from local manufacturers, the Builders support local economies and greatly reduce the energy required to ship them long distances. An increasing number of materials are made with recyclable and recycled content, allowing Builders to avoid materials that unduly deplete limited natural resources, such as lumber from old-growth forests.



6.4 Healthier Air Quality for a Better Life

Research indicates that air pollutant levels in our homes and offices can be four to five times higher than the air outside. In environments like the Charleston Sea Islands where fireplaces play an important role, the quality of indoor air is a major concern. Health effects from exposure to indoor air pollutants (mold, smoke, dust and toxic gases from specific construction materials) range from short-term health effects (sneezing, itchy eyes, headaches, dizziness), to more serious long-term effects such as respiratory disorders. A healthy indoor environment can be achieved through designing natural ventilation, carefully constructing and testing air handling systems and avoiding materials that contain high levels of chemicals and toxins that emit gasses for months or even years after installation.

6.5 Efficient Use of Water

The Charleston Sea Island environment provides opportunities for managing water use and preservation by thinking about the entire water cycle – from rain, to domestic use and application for irrigating landscape features, to runoff into waterways and wetlands. At Kiawah River we have designed a sustainable water system – so the water the Master Developer provides to the Lot will be taken to a common sewage facility, cleansed and used for irrigation of the agricultural areas. Guest Builders and Property Owners can provide similar measures in the Community by reducing water demands through appropriate fixture selection and carefully managing storm water runoff to keep pollutants and chemicals out of the drainage areas. The use of a residential rainwater collection cistern is encouraged for individual Residents who wish to conserve water for landscape irrigation.

6.5 Reduce Waste

All waste generated at Kiawah River will need to be hauled away from site, consuming fossil fuels in the process and ultimately taking up precious land at its final destination – the landfill. Minimizing the amount of waste we generate will provide multiple benefits to Kiawah River and the region in general. This begins with more conscientious construction practices reducing required materials and recycling where possible.





# 7

## ARCHITECTURAL REVIEW BOARD

The following chapter outlines the functions and organization of the ARB.  
Please refer to the CC&R's for further information.



7.1 Architectural Review Board Members

The Architectural Review Board (ARB) will consist of a minimum of three, and a maximum of five, Members. Each person will hold office until such time as s/he has resigned, been removed or her/his successor has been appointed.

7.2 Appointment & Term of Members

All Members shall initially be appointed by the Master Developer on behalf of Kiawah River Home Owners Association (HOA). All of the members of the ARB will be appointed, removed, and replaced by the Declarant, in its sole discretion, until the expiration of the period of Declarant control or such earlier time as Declarant may elect to voluntarily waive this right by notice to the Association, and at the time the Board of Directors will succeed to Declarant’s right to appoint, or replace the members of the ARB. The term of office of each member of the ARB, subject to the CC&R’s, will be one-year, commencing January 1st of each year, and continuing until his successor shall have been appointed. Should a ARB member die, retire or become incapacitated, or in the event of a temporary absence of a member, a successor may be appointed.

7.3 Membership Requirements

Members of the ARB appointed by the Board or the Declarant need not be Members of the Association. Two Members of the ARB are required to be licensed design professionals in the fields of Architecture, Landscape Architecture or engineering. The ARB shall contract and/or assign some of the ARB’s administrative duties, but not authority, to any qualified design professional or manager as needed.

7.4 Resignation of Members

Any Member of the ARB may at any time resign from the ARB upon written notice stating the effective date of the Member’s resignation to the Committee, or to the Declarant, whichever then has the right to appoint and remove members. Any Member may be removed at any time by the body that appointed them, with or without cause.

7.5 Functions of the ARB

It will be the duty of the ARB to consider and act upon such proposals or plans from time to time submitted to it in accordance with the Design Review procedures established by these Design Guidelines; to amend the Design Guidelines as deemed appropriate with the approval of the Committee; and to perform any duties assigned to it by the Declarant, or the Committee as set forth in this document and the CC&R’s.

7.6 Meetings

The ARB will meet monthly or as needed to properly perform its duties. The ARB’s actions on matters will be by a majority vote of the ARB. Any action required to be taken by the ARB may be taken without a meeting if a consent in writing, setting forth the action so taken, will be signed by all of the ARB Members. The ARB will keep and maintain a record of all actions taken by it. The powers of this ARB relating to Design Review will be in addition to all Design Review requirements imposed by Charleston County Zoning and Development Regulations and any other authority having jurisdiction over Improvements at Kiawah River.

7.7 Compensation

The HOA or Declarant, whichever then has the greater number of appointed Members, will have the right to set the compensation for the ARB Members. Compensation may at any time be revoked or changed by Declarant or Committee with or without cause. All Members will be entitled to reimbursement for reasonable expenses incurred by them in connection with the performance of any ARB function or duty. The ARB shall contract and/or assign some of the ARB’s administrative duties, but not authority, to any qualified design professional as needed.

7.8 Amendment of Design Guidelines

The ARB may, from time to time with the approval of the HOA, adopt, amend and repeal by unanimous vote, rules and regulations to be incorporated into, or amendments of, the Design Guidelines, which, among other things, interpret, supplement or implement the provisions of the Design Guidelines. All such rules and regulations or amendments, as they may from time to time be adopted, amended or repealed, will be appended to and made a part of the Design Guidelines. Each Guest Builder and Property Owner is responsible for obtaining from the ARB a copy of the most recently revised Design Guidelines.

7.9 Non-Liability

Neither the ARB nor any Member will be liable to the Association, any Guest Builder or Property Owner or any other person for any damage, loss or prejudice suffered or claimed on account of:

- Approving or disapproving any plans, specifications and other materials, whether or not defective.
- Constructing or performing any work, whether or not pursuant to approved plans, specifications and other materials.
- The Development or manner of Development of any land within Kiawah River.
- Executing and recording a form of approval or disapproval, whether or not the facts stated therein are correct.
- Performing any other function pursuant to the provisions of the Design Guidelines.







# 8

## DESIGN REVIEW PROCESS

This section provides a guide for the Design Review Process for Kiawah River. The process involves a series of meetings between the Guest Builder or Property Owner, their design team and the ARB. The process begins with an informal introductory meeting and concludes with the completion of construction. Along the way are a series of meetings designed to ensure a smooth and efficient review of the building and site design. The ARB is committed to assisting Guest Builders and Property Owners through the Design Review Process and should be thought of as a member of the design team as opposed to a regulatory review agency.



8.1 Overview of Design Review Process

Improvement plans will be carefully reviewed by the ARB to ensure that the proposed design is compatible with the design intent at Kiawah River. This Design Review Process must be followed for any of the following Improvements:

- Construction of all new buildings;
- The renovation, expansion or refinishing of the exterior of an existing building;
- Major site and/or landscape Improvements (including pools, driveways and/or culverts)
- Construction of, or additions to, fences or enclosure structures.

The ARB evaluates all Development proposals on the basis of these Design Guidelines. Some of the Guidelines are written as broad standards and the interpretation of these standards is left up to the discretion of the ARB. Other Guidelines, such as Building Height or Setbacks, are more definitive, or absolute, design parameters and in many cases parallel Charleston County building code requirements or project approval documents. It is the intention of this Design Review Process that all Improvements comply with these absolute standards. In the event of a conflict between these Guidelines and any

Local, State or Federal building or zoning code or project approval documents, the Local, State, or Federal building or zoning code or project approval documents shall govern.

Kiawah River’s Design Review Process takes place in four steps:

1. Pre-Design Conference & Concept Design
2. Preliminary Design Review
3. Final Design Review
4. Construction Observation

Any Improvement as described above will require, and be preceded by, the submission of plans and specifications describing the proposed Improvements accompanied by an application fee.

The Guest Builder or Property Owner shall retain competent assistance from a licensed Architect, Civil Engineer, Landscape Architect, Soils Engineer and/or a licensed and bonded Contractor (Consultants) as appropriate. The Guest Builder or Property Owner and Consultant(s) shall carefully review the CC&R’s and these Design Guidelines prior to commencing with the Design Review Process.

Having secured Final Design approval from the ARB, the Guest Builder or

Property Owner is also required to meet all the submittal and approval requirements of the Charleston County Zoning and Development Planning and Building Department to obtain design approvals or any other discretionary permits and a building permit.

The Guest Builder or Property Owner is to commence construction within one year of the Final Design Approval. If construction does not commence within this timeframe, the design approval will expire, requiring resubmission of the application and payment of all associated fees.

8.2 Approved Design Professionals

The ARB may create a list of recommended design professionals to design all Residences and landscapes at Kiawah River. These professionals have demonstrated their ability and sensitivity toward implementing the established design objectives. Guest Builder or Property Owners may choose a design professional from this list or elect to choose a non-listed professional to design their Residence at Kiawah River. Although professionals not on this list may be employed, it is recommended that an approved design professional be considered because of their familiarity with these Guidelines and Charleston County codes.

8.3 Pre-Design Conference & Concept Design

8.3.1 Pre-Design Conference

Prior to the preparation of any materials for formal ARB review, the Guest Builder and/or Property Owner and/or the Consultant(s) are required to meet with representatives of the ARB for a Pre-Design Conference. An explanatory Pre-Design Conference package that includes a current copy of the Design Guidelines, the Lot Diagram and a conference request form is available from the ARB Office. The purpose of this meeting will be for the ARB to answer any questions the Guest Builder and/or Property Owners and/or Consultant(s) may have and to offer guidance on the following subjects:

- The particular characteristics and restrictions on the Lot, as shown on the Lot Diagram, to be provided by the ARB
- Optimal orientation of buildings and outdoor spaces
- Additional survey information requirements
- Preliminary building and site Development program ideas and requirements
- Clarification and review of Design Guideline objectives
- The requirements, fees, and schedule of the Design Review Process

8.3.2 Concept Design

After or during the Pre-Design Conference, the Applicant shall submit to the ARB a written application and appropriate fee for Concept Design Review together with the Concept Design Review submission materials as described below:

- Concept Design Review Application Form (Sample in Appendix G).
- Design Review Application Fee.
- Concept Site Plan: (1” = 20’, 16’, or 8’) indicating property lines and Lot Diagram areas, building location/ footprint, driveways, pools, water features and other major hardscape elements and basic grading concepts. The Applicant shall confirm and field verify the location of all utility connections to the Lot at this time to ensure that no conflicts exist with the proposed Improvements.
- Concept Floor Plan: (1” = 20’, 16’, or 8’) showing general room layout and circulation. This may be combined with the Concept Site Plan.
- Concept Elevations: (1” = 16’, or 8’) of the street and sides of the building showing general massing, roof forms, Building Height and materials.
- A brief description of the proposed Architectural style, including regional historic precedents (if any).

The purpose of this submittal is to confirm that the design professionals are headed in the right

direction, are correctly interpreting the Guidelines and that the Guest Builder or Property Owner’s program can be accommodated on the Lot. This submittal may be combined with the Pre-Design Conference.

8.4 Preliminary Design Review

After the Pre-Design Conference and Concept Design, the Guest Builder or Property Owner shall submit a written application for Preliminary Design Review together with Preliminary Design Review submission materials described.

8.4.1 Preliminary Design Review

Within this step, the Applicant shall prepare and submit to the ARB for review and approval a Preliminary Design Review package which shall adequately convey existing site conditions, constraints, building orientation and design, vehicular and pedestrian access, the proposed use of exterior materials and colors and conceptual landscape design.

8.4.2 Submission Materials

The package shall include two full-size sets and two sets of 11” x 17” reductions of the following drawings and/or materials:

- Preliminary Design Review Application Form (Sample in Appendix G)
- Location Map - indicating location of Lot within Kiawah River.
- Lot Survey - a property survey (minimum scale: 1" = 20') prepared by a licensed surveyor indicating property boundaries, the area of the property, all easements of record, utilities, 100-year flood plain, one-foot contours, any significant natural features such as existing trees, or any significant drainages as applicable. See Appendix F - Lot Survey Requirements.
- Preliminary Site Plan - 1" = 20' minimum, showing existing topography and proposed grading and drainage (1 foot contour interval), existing off-site elements (buildings, walls, trees, utility connections and Facilities, etc.) within 18 feet of the property boundary, building footprint with finished floor grades, Setbacks, Buildable Envelope and other zones as indicated on the Lot Diagram, driveway, parking area, turnarounds, drainage, fences/walls, roofs, patios, decks, pools, and any other site amenities.
- Preliminary Floor and Roof Plans – minimum 1/8" = 1' – 0", including all proposed uses, proposed walls, door and window locations and location of mechanical and electrical systems.
- Preliminary Elevations - minimum 1/8" = 1' – 0", including roof heights,

- existing and finish grades, Building Heights and notation of exterior materials. Two sets of elevations; one set shall be rendered in color.
- Site Sections - minimum scale 1" = 20', showing proposed buildings, Building Heights, elevations and existing and finished grades in relation to surrounding site, including adjacent Residences and roads as may be required by the ARB.
- Conceptual Landscape Plan - a conceptual plan at 1/8" = 1' – 0" minimum, showing irrigated areas, areas of planting, turf areas, preliminary plant list, Buildable Envelope and other zones as indicated on the Lot Diagram, water features, pools, patios, decks, and any other significant design elements. This may be combined with the Site Plan. Adjacent (15 feet min) hardscape and planting (Lots 20 feet min) to be shown.
- Grading, Drainage and Erosion Control Plans - 1/8" = 1' – 0" minimum, showing existing and proposed grading (1-foot contour interval), drainage elements and erosion control methods. Site plan shall include 20 feet beyond Property Owner's property line in order to depict relationship to adjacent Lots and Common Areas.
- Study model – minimum scale 1" = 20', illustrating the relationship between proposed building forms

- and topography, tree heights and prevailing site conditions. This need not be an expensively detailed model, but simply adequate to communicate basic three-dimensional massing concepts. Computer drafted 3D modeling and color rendering may be submitted in addition to the model or at the request of the ARB.
  - Material Samples – on 8-1/2" x 11" or 11" x 17" boards showing:
    - a. Roof material and color
    - b. Wall material and color
    - c. Exterior trim material and color
    - d. Stone/rock materials
    - e. Window/door materials and color
    - f. Fence/wall materials and color
    - g. Paving materials and color
- ### 8.4.3 Staking
- The Guest Builder or Property Owner may be required to stake the corner locations of the proposed buildings and all other major Improvements upon submittal of Preliminary Design Review documents. In some instances, the ARB may require that ridgeline flagging be erected to indicate proposed Building Heights.
- ### 8.4.4 Preliminary Design Review Meeting

Upon receipt of the required documents and staking of the property (if required), the ARB will notify the Guest Builder or Property Owner of the scheduled meeting date to review the Preliminary Design documents. The ARB will review and comment on the application at the meeting, allow time for discussion with the Guest Builder or Property Owner and/or Consultant(s) (if present, or via online meeting or by phone) and subsequently provide the Guest Builder or Property Owner with the conclusions of the meeting in writing.

The comments of the ARB on the Preliminary Design submittal shall be advisory only, and shall not be binding upon either the Guest Builder or Property Owner or the ARB. A second review meeting may be necessary to review corrected and/or new materials. Corrected materials will be provided to the ARB a minimum of five working days prior to the next regularly scheduled meeting. An itemized letter from the Guest Builder or Property Owner shall accompany any resubmittal noting all ARB comments and how each comment has been addressed in the resubmittal.

Within one year of Preliminary Design Review approval the Guest Builder or Property Owner shall initiate Final Design Review by submitting required Final Design documents. Required Final Design documents and procedures are described in Section 7.5.1 below.

## 8.5 Final Design Review

### 8.5.1 Final Design Review

The Applicant shall provide all information necessary to reflect the design of the proposed building(s), landscape or other features requiring the approval of the ARB. Final Design documents shall generally conform to the approved Preliminary Design Review documents. All Architectural plans are to be prepared by a licensed Architect. All Landscape Architectural plans are to be prepared by a South Carolina licensed Landscape Architect.

### 8.5.2 Submission Materials

The Final Design Review Documents shall be Construction Document level drawings. Submit two sets full size and two sets of 11"x 17" reductions of final plans that include the following:

- Final Design Review Application Form
- Site Plan - 1" = 20' minimum, showing existing topography and proposed grading (1-foot contour interval), building footprint with finished floor grades, Buildable Envelope and other zones as indicated on the Lot Diagram, driveway, parking area, turnarounds, fences/walls, patios, decks, utility connections and pad locations, pools and any other site amenities. Site plan shall include 20 feet beyond Property Owner's property line in order to depict relationship to adjacent Lots, and Common Areas.

- Grading, Drainage and Erosion Control Plans - 1" = 20' minimum, showing existing and proposed grading (1-foot contour interval), drainage elements and erosion control methods. Site plan shall include 20 feet beyond Property Owner's property line in order to depict relationship to adjacent Lots and Common Areas.
- Floor and Roof Plans – 1/4" = 1' – 0", indicate all room dimensions, door and window locations and sizes, location of mechanical and electrical systems and fire sprinkler and monitoring systems. Indicate the location and type of all exterior lighting fixtures, proposed fireplaces, and kitchen appliances. Provide floor plans of all Accessory Structures.
- Elevations – 1/4" = 1' – 0", illustrate the exterior appearance of all views labeled in accordance with the site plan. Indicate the highest ridge of the roof, the elevation of each floor, and existing and finished grades for each elevation. Describe all exterior materials, colors, and finishes (walls, roofs, trim, vents, windows, doors, etc.) and locate all exterior lighting fixtures. Indicate proposed Building Height. Provide one set of colored elevations.
- Sections - indicate building walls, floors, interior relationships, finished exterior grades and any other information to clearly describe the interior/exterior relationships of the building as well as the building's



- relationship to the site.
- Landscape Plans – 1/8” = 1’ – 0” minimum, including a planting plan, layout plan, irrigation plan, lighting plan, and any site details including retaining walls, landscape structures, pools, patios, fences and or gates. Call out all hardscape materials.
  - Sample Board - on 11” x 17” boards as needed:
    - a. Roof material and color
    - b. Wall materials and colors
    - c. Exterior trim material and color
    - d. Window material and color
    - e. Exterior door material and color
    - f. Stone/rock materials
    - g. Fence/wall materials
    - h. Exterior rails and paving materials

The ARB will review and comment on the sample board at the Final Design Review. Final approval is contingent upon field mock-ups of all colors and materials at the appropriate time in the construction process and in size / context that will allow a clear understanding of the final product. Regardless of previous approvals, the ARB reserves the right to require changes to the field mock-ups if they do not meet the objectives of the Design Guidelines.

CONSTRUCTION SCHEDULE

Include start and completion dates for both building and landscape construction. All construction shall be started within one year of Final Design approval and shall be completed within 18 months from start of construction.

8.5.3 Final Design Review Meeting

Upon receipt of the required documents, the ARB will notify the Guest Builder or Property Owner of the scheduled meeting date to review the Final Design documents. In some instances, the ARB may request a final staking of the location of all corners of proposed buildings if the Final Design documents vary substantially from approved Preliminary Design documents.

Attendance at the meeting by the Guest Builder or Property Owner and/or Consultant(s) is not mandatory. The ARB will review and comment on the application at the meeting, allow time for discussion with the Property Owner and/or Consultant(s) (if present), and subsequently provide the Guest Builder or Property Owner with an approval or conclusive recommendations in writing for refinements to the design. A second review meeting may be necessary to review refinements, revisions and/or new materials. These materials will be provided to the ARB a minimum of five working days prior to the next regularly scheduled meeting.

8.5.4 Final Design Approval

The ARB will issue Final Design approval in writing within ten working days of a vote for approval at a Final Design Review meeting. If the decision of the ARB is to disapprove the proposal, the ARB shall provide the Guest Builder or Property Owner with a written statement of the basis for such disapproval to assist the Guest Builder or Property Owner in redesigning the project so as to obtain the approval of the ARB.

8.6 Resubmittal of Plans

In the event that final submittals are not approved by the ARB, the Guest Builder or Property Owner will follow the same procedures for a resubmission as for original submittals. An itemized letter from the Property Owner shall accompany any resubmittal noting all ARB comments and how each comment has been addressed in the resubmittal. An additional Design Review fee must accompany each resubmission as required by the ARB.

It is possible that Charleston County Zoning and Development may, from time to time, amend its regulations such that they conflict with these Guidelines. It is the Applicant's responsibility to confirm plan consistency with the Charleston County Zoning and Development Regulations and the ARB assumes no responsibility for

changes that may be implemented as a result. In order to be considered for the next scheduled ARB meeting date, plans must be submitted no later than 5pm, seven calendar days in advance of the meeting date. The ARB will not generally meet to review comments outside the regular meeting schedule and any decision to do so must be based on compelling extenuating circumstances.

8.7 Kiawah River ARB

The Guest Builder or Property Owner shall apply for all applicable building permits from the Charleston County Planning & Zoning Board; and the Charleston County Building Department and any other governing agencies after receiving Final Design approval from the ARB. The Charleston County Planning and Building Department requires ARB review and approval before considering applications. Any adjustments to ARB-approved plans required by The Charleston County Building Department review must be resubmitted to the ARB for review and approval prior to commencing construction. The issuance of any approvals by the ARB implies no corresponding compliance with the legally required demands of other agencies.

8.8 Subsequent Changes

Subsequent construction, landscaping or other changes in the intended Improvements that differ from approved Final Design documents must be submitted in writing to the ARB for review and approval prior to making changes.

8.9 Work in Progress Observations

During construction, the ARB will check construction to ensure compliance with approved Final Design documents. If changes or alterations have been found that have not been approved, the ARB will issue a Notice to Comply.

8.10 Notice to Comply

When, as a result of a construction observation, the ARB finds changes and/or alterations that have not been approved, the ARB will issue a Notice to Comply within three working days of the observation. The ARB will describe the specific instances of non-compliance and will require the Guest Builder or Property Owner to comply or resolve the discrepancies.

8.11 Notice of Completion

The Guest Builder or Property Owner will provide the ARB with a Notice of Completion of any Improvement(s) given Final Design approval by the ARB. The ARB will make a final inspection of the property within seven working days of notification. The ARB will issue in writing a Notice of Completion within seven working days of observation. If it is found that the work was not done in compliance with the approved Final Design documents, the ARB will issue a Notice to Comply within three working days of observation.

8.12 Right of Waiver

The ARB recognizes that each Lot has its own characteristics and that each Guest Builder or Property Owner has their own individual needs and desires. For this reason, the ARB has the authority to approve deviations from any of the Design Guidelines or Regulations contained within this document. It should be understood, however, that any request to deviate from these Design Guidelines will be evaluated at the sole discretion of the ARB, and that the approval of deviations will be limited to only the most creative design solutions to unique situations. Prior to the ARB approving any deviation from a Design Guideline, it must be demonstrated that the proposal is consistent with the overall objectives of these Design Guidelines and that the deviation will not adversely affect adjoining Lots or

the Community of Kiawah River as a whole. Approval of any deviation from the Design Guidelines shall not set a precedent for other applicants to seek a similar deviation and shall not be used as justification in requesting a variance from the Design Guidelines. Rather, the request must stand on its own merits and present justification based on unique circumstances and creative design solutions.

The ARB also reserves the right to waive any of the procedural steps outlined in this Design Guideline document provided that the Guest Builder or Property Owner demonstrates there is good cause.

8.13 Non-Liability

Neither the ARB nor any member, employee or agent will be liable to any party for any action, or failure to act with respect to any matter.

8.14 Design Review Schedule

The ARB will make every reasonable effort to comply with the time schedule for Design Review. However, the ARB will not be liable for delays that are caused by circumstances beyond their control, including activity levels which burden the resources of the ARB to review plans and provide comments within a prescribed timeframe. The ARB will provide Design Review according to the following schedule:

1. Pre-Design Conference & Concept Design Review
2. Meeting scheduled within 14 working days of receipt of Pre-Design Conference request form.
3. Preliminary Design Review
  - Application documents to be submitted 14 working days prior to the next scheduled ARB meeting.
  - Written comments from ARB meeting provided to Guest Builder or Property Owner within seven working days.
  - A second review meeting may be necessary to review corrected and/or new materials. Corrected materials will be provided to the ARB a minimum of five working days prior to the next regularly scheduled meeting.
4. Final Design Review
  - Application documents to be submitted 14 working days prior to the next scheduled ARB meeting, and within one year of Preliminary Design approval.
  - Written comments from ARB meeting and/or written notice of Final Design approval provided to Guest Builder or Property Owner within 7 working days.
  - A second review meeting may be necessary to review refinements, revisions and/or new materials. These materials will be provided to the ARB a minimum of 5 working days prior to the next regularly scheduled meeting.

5. Building Permits
  - Guest Builder or Property Owner applies to the Charleston County Planning and Building Department for all applicable building and use permits.
6. Construction Observation
  - Site observation with the Builder prior to any site disturbance, and within 7 working days of receipt of written request.
  - Foundation staking observation within 7 working days of receipt of written request. Property line and Buildable Envelope must be staked for this inspection.
  - Framing observation within 7 working days of receipt of written request.
  - Final observation within 7 working days of receipt of written request and prior to request for a Certificate of Occupancy from the Charleston County Planning and Building Department.
  - Notice of Completion issued within seven working days of observation.

8.15 Application Fees

In order to defray the expense of reviewing plans, monitoring construction and related data,

and to compensate consulting Architects, Landscape Architects and other professionals, these Guidelines establish a total fee of \$1,250 payable upon submittal of the application for the Pre-Design Conference or Preliminary Design Review.

Fees for resubmission shall be established by the ARB on a case-by-case basis. This fee is subject to revision annually.

8.16 Application Format

An application and information package is available from the ARB for each submission. Each submission must be accompanied by the required information, as specified in the application package instructions and these Guidelines in order to be scheduled for review.

Incomplete submissions will not be reviewed and may be returned to the applicant for resubmission. To expedite the Design Review Process, Applications must be complete in order to submit. Applicants will be refunded 50% of the Design Review fee if the ARB does not issue a written approval or disapproval within ten working days of the date the application is reviewed by the ARB.

8.17 Unauthorized Improvements

Changes or modifications to the exterior of a home or its landscape and/or hardscape without the prior review and approval of the ARB pursuant to these Guidelines is prohibited. Guest Builder or Property Owners may be subject to fines at the discretion of the ARB as approved by the Board of Directors of Kiawah River Association for unauthorized Improvements. The Guest Builder or Property Owner may apply to the ARB to review and approve the modifications, which the ARB may allow or disallow at its sole discretion subject to these Guidelines. In the event the Improvements are disallowed, the Guest Builder or Property Owner shall be required to remove them and restore the property to the pre-existing condition as it was originally approved by the ARB or as subsequently modified. If the Guest Builder or Property Owner picks a Design Professional that is not on the list, the Guest Builder or Property Owner shall submit their qualifications to the ARB prior to moving forward for approval. Contact the ARB to determine if a Recommended Design Professional List has been created.

The ARB recognizes that each Lot has its own characteristics and that each Guest Builder or Property

Owner has their own individual needs and desires. For this reason, the ARB has the authority to approve deviations from any of the Design Guidelines or Regulations contained within this document. It should be understood, however, that any request to deviate from these Design Guidelines will be evaluated at the sole discretion of the ARB, and that the approval of deviations will be limited to only the most creative design solutions to unique situations. Prior to the ARB approving any deviation from a Design Guideline, it must be demonstrated that the proposal is consistent with the overall objectives of these Design Guidelines and that the deviation will not adversely affect adjoining Lots or the Community of Kiawah River as a whole. Approval of any deviation from the Design Guidelines shall not set a precedent for other applicants to seek a similar deviation and shall not be used as justification in requesting a variance from the Design Guidelines. Rather, the request must stand on its own merits and present justification based on unique circumstances and creative design solutions.

The ARB also reserves the right to waive any of the procedural steps outlined in this Design Guideline document provided that the Guest Builder or Property Owner demonstrates there is good cause.





# 9

## CONSTRUCTION & BUILDER REGULATIONS

This section provides a guide for the Design Review Process for Kiawah River. The process involves a series of meetings between the Guest Builder or Property Owner, their design team and the ARB. The process begins with an informal introductory meeting and concludes with the completion of construction. Along the way are a series of meetings designed to ensure a smooth and efficient review of the building and site design. The ARB is committed to assisting Guest Builders and Property Owners through the Design Review Process and should be thought of as a member of the design team as opposed to a regulatory review agency.



9.1 Pre-Construction Conference

Prior to commencement of design, it is the responsibility of the buyer to obtain a survey by a surveyor licensed in Charleston County to confirm existing grades, tops and toes of slopes and any other features or Lot attributes that would affect the design of any Lot Improvement. See Appendix F - Lot Survey Requirements.

9.2 Construction Area

Prior to the commencement of any Construction Activity the Builder will provide the ARB, for its approval, with a detailed plan of the proposed Construction Area showing the area in which all Construction Activities will be confined and how the remaining portions of the Lot will be protected.

This Construction Area Plan will designate the location and size of the construction material storage and parking areas, and the locations of the chemical toilet, temporary trailer/structure, dumpster, debris storage, firefighting equipment, utility trenching, limits of Excavation and erosion control.

The Builder shall be responsible for repair of any damage to Common Area or Master Developer installed irrigation or landscape to the satisfaction of the ARB. There shall be no staging of

construction equipment or materials on adjacent Lots to the Property Owner's Lot. All staging within Kiawah River must occur on the Property Owner's Lot.

9.2.1 Fencing Requirements

The Plan shall identify the area to be fenced using 4x4 wooden posts with green mesh screen or similar methods acceptable to the ARB for the protection of existing landscaped areas, to screen construction activities and to control dust. Such fence or screening material shall be maintained in good condition during the course of construction of the Residence and related Improvements.

Care must be taken to avoid, or if unavoidable, minimize the visual impact of the Construction Area on neighboring Lots, Public Common Areas and roads.

9.2.2 Access to Construction Area

One entrance into the fenced enclosure shall be located at the driveway entry. Kiawah River requires all Builders to comply with the following:

1. Restrict access to the Construction Area only through Kiawah River construction gate.
2. Identify all vehicles entering Kiawah River with the Builder's name and job site.
3. Enforce hours of access, speed limit and route of travel on Kiawah River road system as specified by the ARB.
4. Limit access to the Construction Area only on designated routes as specified by the ARB.
5. Consolidate all deliveries of materials and equipment to the extent feasible.
6. Acquire transponders per the club's requirements at their own expense.

9.3 Builder's Deposit

After the ARB approves a Guest Builder or Property Owner's proposed Construction Area Plan as described in Section 8.2, and prior to commencing any Construction Activity, a Builder's Master Deposit of \$7,500 shall be delivered to the ARB, on behalf of the Association, as security for the project's full and faithful performance of its Construction Activity in accordance with its approved final plans. This Builder's Deposit shall be a cash bond. In addition, the Builder's Deposit may be drawn upon to pay for repairs to adjacent Lots and/or Common Areas damaged during Construction.

The amount of the Builder's Deposit shall be \$5,000 each per Lot or such greater amount as determined by the ARB for all Lots within Kiawah River. This amount may be adjusted annually by the ARB.

As noted above, the ARB may use, apply or retain any part of a Builder's Deposit to the extent required to reimburse the ARB for any cost that the ARB may incur on behalf of the project's Construction Activity. Any monies shall be reimbursed to the ARB for any fees incurred by the ARB to restore the Builder's Deposit to its original amount. Construction Activity shall be halted until the Builder's Deposit is brought up to the original amount.

The ARB shall return the Builder's Deposit to the Guest Builder and Property Owner within 15 working days after the issuance of a Notice of Completion from the ARB.

9.4 Vehicles & Parking Areas

Only vehicles, equipment and machinery that are essential to any Construction Activity may park within the Construction Area or such other specific area designated by the ARB so as to minimize potential damage to existing vegetation, utilities, landscape, or other Improvements.

9.5 Storage of Materials & Equipment

All construction materials, equipment and vehicles will be stored within the fenced boundary of the ARB-approved Construction Area. Equipment and machinery will be stored on-site only while needed.

9.6 Construction Activity Times

The time of construction will be limited to:

Monday – Friday  
7:00 am – 7:00 pm

Saturday  
8:00 am – 5:00 pm

No construction operations may occur on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day or as may be prohibited by local ordinance. Essentially quiet activities that do not involve heavy equipment or machinery may occur at other times subject to the review and approval of the ARB. No personnel are to remain at the Construction Site after working hours.

9.7 Construction Trailers / Temporary Structures

Any Guest Builder or Property Owner who desires to bring a construction trailer or the like to Kiawah River must obtain written approval from the ARB. The ARB will work closely with the Guest Builder or Property Owner to site the trailer in the best possible location to minimize impacts to the site and to adjacent Property Owners. All such Facilities will be removed from the Lot prior to issuance of a Certificate of Occupancy. It is encouraged that construction trailers be painted colors that will not stand out in the landscape.

The suggested colors are:

- Body and/or Trim: Benjamin Moore, Flat 998
- Trim: Benjamin Moore, Flat 1000
- Temporary living quarters for the Guest Builder, Property Owner, or their Employees on the Lot will not be permitted.

9.8 Sanitary Facilities

Sanitary Facilities must be provided for construction personnel on-site in a location approved by the ARB. The facility must be located in an area on-site that does not impact adjacent Residences and Roads and be maintained regularly.



9.9 Debris & Trash Removal

9.10 Hazardous Waste Management

Contractors must clean up all trash and debris on the Construction Site at the end of each day. Trash and debris must be removed from each Construction Site at least once a week and transported to an authorized disposal site. Lightweight material, packaging and other items must be covered or weighted down to prevent wind from blowing such materials off the Construction Site.

Contractors are prohibited from dumping, burying or burning trash anywhere on the Lot or in Kiawah River Community. During the construction period, each Construction Site must be kept neat and tidy to prevent it from becoming a public eyesore or affecting adjacent Lots. Dirt, mud or debris resulting from activity on each Construction Site must be promptly removed from roads, open spaces and driveways or other portions of Kiawah River.

All excess earth generated by trenching and approved grading activities must be removed from the site.

Any cleanup costs incurred by the ARB or the Association in enforcing these requirements will be taken out of the Builder's Deposit or billed to the Guest Builder or Property Owner as needed.

In order to be able to respond and monitor hazardous material use and/or spills, the Contractor shall comply with the following criteria listed below:

- The Contractor shall provide a contact person and telephone number for a company experienced in emergency response for vacuuming and containing spills for oil or other petroleum products.
- Absorbent sheets will be used for spill prevention and clean up. Several boxes shall be located at fuel trucks, storage areas and in maintenance vehicles. Inventories must be maintained as necessary.
- A reportable spill is defined as a spill of one or more gallons and a significant spill is defined as more than ten gallons.
- The Contractor shall maintain a list of product names and a Materials Safety Data Sheet (MSDS) for all hazardous material products used or located on site.
- Before a hazardous material is stored, the Contractor shall check to ensure that:
- The material is stored in an approved container
- The container is tightly closed
- The container has the proper warning label
- The container is inspected for leaks
- Any Contractor determined to be

introducing hazardous materials into the sanitary sewer or storm drain system will be removed from the site

9.11 Excavation & Grading

During construction, erosion must be minimized on exposed Cut and/or Fill slopes through proper soil stabilization, water control and revegetation. Grading operations may be suspended by ARB during periods of heavy rains or high winds. Blowing dust resulting from grading and construction operations must be controlled by watering.

All topsoil disturbed by grading operations must be stockpiled and covered to minimize blowing dust within the Construction Area and reused as part of the site restoration/landscaping plans. All excess materials must be removed from the site.

9.12 Foundations

The Guest Builder or Property Owner is encouraged to seek the assistance of a licensed Soil Engineer to examine and test soil conditions on her/his Lot prior to undertaking any design or construction. Declarant makes no representations or warranties, expressed or implied, as to the soil conditions.

- The Guest Builder or Property Owner and engaged Architect, Engineer and Contractor shall give due consideration to the design of the foundation systems of all structures.
- It is the Guest Builder or Property Owner's responsibility to conduct an independent soils engineering investigation to determine the suitability and feasibility of any Lot for construction of the intended Improvement.

9.13 Lot Survey

Prior to commencement of design, it is the responsibility of the buyer to obtain a survey by a Surveyor licensed in South Carolina to confirm existing grades, tops and toes of slopes and any other features or Lot attributes that would affect the design of any Lot Improvement. See Appendix E- Lot Survey Requirements.

9.14 Start of Construction & Temporary Landscape

All Improvements commenced on a Lot shall be completed within 18 months after commencement according to approved Final Design Review plans unless an exception is granted in writing by the ARB. If an

9.16 Damage Repair & Restoration

Damage and scarring to other property, including open space, adjacent Lots, roads, driveways, irrigation and/or other Improvements will not be permitted. If any such damage occurs, it must be repaired and/or restored promptly at the expense of the person causing the damage or the Property Owner of the Lot.

1. To the Damaged Party's satisfaction, revegetate the area disturbed immediately and maintain said vegetation until established
2. Pay any fines imposed by the HOA and Charleston County or other governmental agencies.

9.17 Project Completion & Close-out

Upon completion of construction, each Property Owner and Builder will be responsible for cleaning up the Construction Site and for the repair of all property that was damaged, including, but not limited to, restoring grades, planting shrubs and trees as approved or required by the ARB, and repair of streets, driveways, pathways, drains, culverts, ditches, signs, lighting and fencing. Any property repair costs as mentioned above, incurred by the ARB or the Association, will be taken out of the Builder's Deposit or billed to the Guest Builder or Property Owner.

9.18 Construction Observations

In addition to the building inspections required by Charleston County, the following construction observations must be scheduled with the ARB:

- 1. Site Observation – This observation includes review of staking of the Construction Area including all corners of proposed buildings, driveways and extent of grading. In addition, flagging of all areas to be protected will be reviewed. An on-site mock-up for color and materials shall be constructed for approval by the ARB. A full-scale mock-up (minimum 4-feet by 8-feet) shall be constructed which accurately conveys all proposed exterior materials, colors, and detailing, including window, corner and trim details and/or details of areas where one material changes to another. This observation must be approved by the ARB prior to the framing observation.
- 2. Framing or Structure Observation – This observation must be done prior to enclosure of exterior walls and roof. Final approval is contingent upon field mock-ups of all colors and materials at the appropriate time in the construction process and in sizes / context that will allow a clear understanding of the final product.
- 3. Final Observation – This observation must be done prior to the Certificate of Occupancy issued by Charleston County and may be scheduled when

all Improvements, including all structures, landscaping and grading, have been completed.

9.19 Construction Signs

Temporary construction signage will be limited to one sign per Lot. The sign shall not exceed 6- square feet of total area, and shall be located within 10-feet of the Construction Site entrance. All construction signs must be reviewed and approved by the ARB prior to installation. Layout for the sign must be submitted to the ARB ten working days prior to a regularly scheduled meeting. Alternatively, the ARB may require the contractor to construct a standardized construction sign. The contractor shall contact the ARB prior to sign fabrication to confirm the required sign type.

9.20 No Pets

Construction personnel are prohibited from bringing pets, particularly dogs, into Kiawah River.

9.21 Security

Security precautions at the Construction Site may include temporary fencing approved by the ARB. Security lights, audible alarms and guard animals will not be permitted.

9.22 Noise

Builder will make every effort to keep noise to a minimum. Radios will not be allowed in order to minimize disturbance to neighbors and wildlife.

9.23 No Smoking

Smoking is only allowed in enclosed vehicles. Fines of up to \$1,000 will be taken out of the Builder’s Deposit or billed to the Property Owner in the event that smoking occurs out of vehicles on a Construction Site. Warning signs such as “No Smoking or Open Flame Allowed” must be posted at the Construction Site.

9.24 No Firearms

No firearms are allowed in Kiawah River.

9.25 No Alcohol or Drugs

No alcohol or illegal drugs are allowed on Kiawah River property at any time.

9.26 Construction Personnel Conduct

Offensive, loud or unmannerly behavior exhibited by the Builder, its employees or subcontractors is not allowed and will not be tolerated.

Builder shall be responsible for the behavior of his employees and subcontractors.

9.27 Occupational Safety & Health Act (OSHA)

All applicable OSHA regulations and guidelines must be strictly observed at all times.

9.28 Fire Protection

At least one full and operable 10-pound ABC rated dry chemical fire extinguisher shall be present and available in a conspicuous place on the Construction Site at all times. Absence of such a device may result in fines against the Builder or access of the Builder being denied to the Construction Site.

9.29 Termite Pretreat

A termite pretreatment is required during construction and must be accomplished during Kiawah River’s designated working hours with authorized access. No workmen or subcontractors are allowed to enter the property during “off” hours. Builders shall make certain to schedule work accordingly and

give subcontractors enough prior notice to schedule their crews within Kiawah River’s construction work hours.

9.30 Storm Preparation

Within 24 hours of impending storm, the Contractor shall be responsible for securing the site when a hurricane is declared imminent. Should a hurricane strike the site, the contractor will, within 30 days of the event, be responsible for securing and/or removing all damaged construction materials, equipment, landscape debris and/or displaced items so as to not, at the discretion of the building official, present a hazard to others.

9.31 Erosion Control & Marsh Protection Requirements

Erosion runoff must be controlled on exposed Cut and/or Fill through proper soil stabilization, water control, and revegetation. The Guest Builder or Property Owner, and Contractor, are responsible for the implementation of erosion control techniques and will be held liable for any damages that may result from inadequate control measures. During periods of heavy

rain, grading operation must be stockpiled and covered to minimize wind or water erosion. Fill or topsoil material brought to the site shall be free of insects, pest, organic and deleterious matter.

9.32 Construction Area

No hunting or fishing is allowed on Kiawah River by Guest Builders, Contractors, Subcontractors or other Agents / Employees hired by the Guest Builder or Property Owner to perform work on the property.

The ARB also reserves the right to waive any of the procedural steps outlined in this Design Guideline document provided that the Guest Builder or Property Owner demonstrates there is good cause.





# APPENDIX A

## Definitions

Unless the context otherwise specifies or requires, the following words or phrases when used in these Design Guidelines shall have the following meanings:

### ACCESSORY DWELLING UNIT

A dwelling unit, with no more than 800 square feet of gross floor area that has been added to, onto, or created within, a single family house. This definition includes garage apartments. An Accessory Dwelling Unit may be detached from a single family house provided it complies with the conditions applicable to Accessory Dwelling Units in Appendix B to the Agreement within the Planned Development District Plan (PDD Plan).

### ACCESSORY STRUCTURE

Any structure, not intended for habitation, which is detached from the main Residence a minimum of ten feet.

### ARB

Kiawah River Architectural Review Board that is currently functional under the auspices of the Property Owner and/or as it may later function under applicable Covenants. The ARB may promulgate, modify, and enforce development guidelines, such as architectural and landscaping guidelines, assigned to it under the Agreement or the Plan with

respect to any portion of the Real Property. The ARB appointed by the Declarant or Kiawah River Owners Association Board as provided in the CC&R's to review and either approve or disapprove proposals and/or plans and specifications for the construction, exterior additions, landscaping, or changes and alterations within Kiawah River.

### ARCHITECT / LANDSCAPE ARCHITECT / ENGINEER

A person licensed to practice architecture, landscape architecture or engineering in the State of South Carolina.

### ASSOCIATION

One or more non-profit Association(s) or corporation(s), which will be formally constituted and made up of the property owners and/or residents of the Real Property, or a particular portion or portions thereof. An Association may take responsibility for costs and maintenance of Common Areas on or affecting any portion of the Real Property subject to such Association's jurisdiction, as delineated in any applicable Covenants. See definition contained in the CC&R's.

### AT-GRADE HOME

The At-Grade Home is constructed at or near the elevation of the building pad, provided it is above the FEMA Flood Elevation, and does not provide for parking beneath the building. The minimum finished floor elevation for each home must comply with Charleston County Zoning and Land Development Regulations, referencing the FEMA Flood Plain Maps.

### BOARD

See definition contained in the CC&R's.

### BUILDER

A person or entity engaged by a Property Owner for the purpose of constructing any Improvement. The Builder and Owner may be the same person or entity. However, if the Owner elects to act as Builder, a superintendent must be designated who will be on the job site and accessible at all times during construction.

### BUILDER'S DEPOSIT

The deposit that is required to be delivered to the ARB prior to commencing a Construction Activity.

### BUILDING COVERAGE

The total area of a Lot covered by building(s), accessory building(s) or roofed areas. The Building Coverage is measured from outside of all exterior walls at ground level, it includes all exterior stairways, porches, covered parking, covered terraces, "outdoor rooms" and walkway areas. It does not include roof overhangs, uncovered walkways, terrace or pool/spa areas or above-grade decks. For Elevated Homes the furthest exterior walls would be projected down to Ground Level.

### BUILDING DEVELOPMENT STANDARDS

Any applicable dimensional standards for Lots, Development Parcels, buildings, and structures, including but not limited to any minimum standards for Lot area, Lot width, Setbacks, and yard requirements and any maximum standards for Building Height and Building Coverage on Lots or Development Parcels.

### BUILDABLE ENVELOPE

That portion of any Lot, designated as Private Area and Transition Area on the Lot Diagram, and within which the construction of the building(s), accessory structures and/or all Improvements are located.

### BUILDING HEIGHT

The maximum Building Height shall be established by a plane measured vertically above existing or proposed grade. As the natural and/or proposed grade rises, the maximum height will rise accordingly. The overall height shall be measured from the highest parapet or roof ridge to the existing natural or proposed grade adjacent to the building exterior directly below.

### COMMON AREAS

All real property (and the Improvements or amenities thereon) that may from time to time be owned or leased by the Association or otherwise held by the Association for the common use and enjoyment of the Property Owners. The Common Area may include but shall not be limited to open space, maintenance and drainage areas, common Facilities, easements, alleys, thoroughfares, parking lots, Community Ways, streets, lighting, signs, lagoons, ponds, wetlands, rights-of-way, and the area between any Property Line of a Property Owner and the mean high-water mark of any adjoining river, tidal creek, marsh or other water body. The designation of

any land and/or Improvements as a Common Area shall not mean or imply that the public at large acquires any easement of use or enjoyment therein.

### COMMUNITY

All the Property, and anything else that is part of the specific areas owned by Property Owners, Homeowners Association, and Common Areas within the boundary of Kiawah River.

### CONSTRUCTION ACTIVITY

Any site disturbance, construction, addition or alteration of any building, landscaping or any other Improvement on any Construction Site.

### CONSTRUCTION SITE

A site upon which Construction Activity takes place.

### CONSTRUCTION VEHICLE

Any car, truck, tractor, trailer or other vehicle used to perform any part of a Construction Activity or to transport equipment, supplies or workers to a Construction Site.

### CORPS

The United States Army Corps of Engineers.

COUNTY

Charleston County, a political subdivision of the State of South Carolina.

COUNTY COUNCIL

The County Council of Charleston County, South Carolina.

COUNTY ORDINANCES

The Code of Ordinances of Charleston County, South Carolina.

COVENANTS

Refers to one or more declaration(s) of covenants, conditions, and restrictions encumbering all or portions of the Real Property that have been or will be recorded by the Property Owner.

CUT

Any removal of earth, rock or other material in the natural or man-made elevation of the surface of the land.

DECLARANT

See definition contained in the CC&R's.

DESIGN GUIDELINES

The architectural, design and construction regulations, restrictions and review procedures adopted and enforced by the ARB as set forth in this document and as amended from time to time by the ARB.

DEVELOPMENT

The planning for or carry out of a building activity, demolition, reclamation of on-site materials, the making of a material change in the use or appearance of any structure or property, or the dividing of land into two or more parcels, and is intended by the Parties to include all further uses of, activities upon, or changes to the Real Property as are authorized by the Agreement. "Development," as designated in a land or Development Permit, includes the planning for and all other activity customarily associated with it unless otherwise specified. When appropriate to the context, "Development" refers to the planning for or the act of developing or to the result of Development. Reference to a specific operation is not intended to mean that the operation or activity, when part of other operations or activities, is not Development. Reference to particular operations is not intended to limit the generality of this term.

DEVELOPMENT PERMIT

A building permit, zoning permit, construction permit, subdivision or plat approval, rezoning certification, special exception, variance, certificate of occupancy or any other official action of

Local Government having the effect of permitting or approving the Development or use of real property.

DIAMETER BREST HEIGHT (DBH)

The total diameter, in inches, of a tree trunk or trunks measured at a point four and one half feet above existing grade (at the base of the tree). In measuring DBH, the circumference of the tree shall be measured with a standard diameter tape, and the circumference shall be divided by 3.14.

DOCK OR PIER

A structure built over and/or floating on water used to provide access to water and/or for the mooring of boats or other watercraft. A Dock or Pier may contain commercial uses as permitted by DHEC and shall constitute a water-dependent use.

ELEVATED HOME

The Elevated Home may be built on a slightly elevated Lot, but the Ground Floor of the home still resides below the required FEMA Base Flood Protection Elevation. For this reason, the Ground Floor of the home is designed to accommodate parking or storage underneath the building, along with other non-habitable spaces.

EXCAVATION

Any disturbance of the surface of the land (except to the extent reasonably necessary for planting of approved vegetation), including any trenching that results in the removal of earth, rock or other substance from a depth of more than 12-inches below the existing surface of the land or any grading of the surface.

FACADE ZONE

The Facade Zone is part of the Private Area of the Lot that is dedicated specifically for architectural elements of the building that contribute to the overall quality of the streetscape or shared Common Area. The Facade Zone of the Lot can occur both on a publicly facing street or a shared Common Area. Allowable Facade Zone uses include building entries, front porches, wrap-around porches, bay windows, sun porches, and other architectural articulation of the building that create interest along the facade of the building.

FACILITIES

Major capital or community improvements including, but not limited to, transportation, sanitary sewer, solid waste, drainage,

potable water, electrical service, cable television, high speed internet access, and telephone service.

FILL

Any addition of earth, rock or other materials to the surface of the land, which increases the existing elevation of such surface.

FINAL MAP

The recorded final Subdivision map or Lot map for any portion of Kiawah River.

FIRST FLOOR

The first habitable floor of a Building or Residence.

FLAT ROOF HOME

Any home with a roof pitch less than 1:12 on more than 40% of the structure.

FLOOR AREA

The sum of all horizontal Floor Areas of a building measured from the outside of all exterior walls.

GRAND TREE

Any live, healthy tree with a Diameter Brest Height (DBH) of 24 inches or greater, with the exception of pine tree species.

GROUND FLOOR

The lowest floor elevation for structures or Natural Ground as set forth in the County's flood management ordinance, as amended, whichever is higher; provided, however, that Ground Floor Level shall not exceed fourteen (14') feet above Natural Ground. This definition shall not be construed to prevent an owner from constructing his first finished floor higher than Ground Floor Level; provided, however, Building Height shall be measured from Ground Floor Level.

GUEST ROOM

A room or suite designed for temporary occupancy by one (1) or more people in a single unit on a daily, weekly, monthly, or seasonal basis. A Guest Room may be individually owned or owned as a "time-share" unit without respect to other Guest Rooms. A Guest Room may be located within a Hotel, Inn, or Bed and Breakfast. A Guest Room shall contribute to the Guest Room entitlement densities, and no others, in the Agreement.



HOMEOWNER

See definition for Property Owner.

ICON LOTS

Icon Lots are Lots that due to their location in the Community, size or elevation have been identified as having the potential to have a significant visual impact when viewed from the street or other Common Areas. Icon Lots may have one or more of the following special design considerations: enhanced landscaping, color or enhanced architectural treatment.

IMPROVEMENTS

See Definition contained in the CC&R's.

LAWS

All ordinances, resolutions, regulations, comprehensive plans, Land Development Regulations, policies and rules, custom and usage (formal or informal) adopted by a Local Government affecting the Development of property and includes laws governing permitted uses of the property, governing density, and governing design, improvement, and construction standards and specifications, except as provided in section 6-31-140(A) of the South Carolina Code.

LOCAL GOVERNMENT

Any county, municipality, special district, or governmental entity of the state, county, municipality or region established pursuant to law which exercises regulatory control over, and grants Development Permits for land Development or which provides public Facilities. The County is a Local Government.

LOT

The term “Lot” means any Development Parcel identified in a Subdivision Plat recorded in the Office of the Register of Mesne Conveyances for Charleston County, South Carolina, and as described in the purchaser’s purchase contract and illustrated by the Lot Diagram, on which the purchaser intends to construct Improvements.

LOT DIAGRAM

The term Lot Diagram shall refer to the individual site plans for each Lot provided to the Property Owner by the ARB at the commencement of the Design Review Process. Each Lot Diagram specifies setbacks, Building Height and any special restrictions pertinent to the Lot’s development as recorded with Charleston County, together with any additional factors that the ARB

may consider to be pertinent.

MAXIMUM FLOOR AREA

The maximum amount of Floor Area is the sum of horizontal areas of all floors of a building measured from the outside of all exterior walls.

MINIMUM FLOOR AREA

The minimum amount of Floor Area is the sum of horizontal areas of all floors of a building measured from the outside of all exterior walls.

NATURAL AREA

The Natural Area is that portion of the Lot that lies outside the Building Envelope and must remain in an essentially landscaped condition in accordance with these Guidelines.

NATURAL GROUND

Average elevation of a Lot or Development Parcel prior to development activity, mass grading or earthwork.

NEIGHBORHOOD

All the Property, and anything else that is part of the specific areas owned by Property Owners, Homeowners Association, and Common Areas.

OCRM

DHEC’s Office of Ocean and Coastal Resource Management.

OCRM CRITICAL LINE

The critical area line defined by OCRM.

OWNER

See definition for Property Owner

PARCEL

The term “Parcel” shall be those Lots of land, together with any appurtenances, described as Kiawah River subdivided by Declarant pursuant to the Charleston County subdivision approval for the Kiawah River Property.

PERVIOUS COVER

Water bodies, as well as land that permits the absorption of storm water into the ground. Pervious Cover may include, but is not limited to Community Ways, streets, roads, alleys, parking lots and driveways which are pervious to storm water.

PLAN

The Kiawah River Plantation Planned Development District Plan. The Plan is attached to the Agreement and incorporated therein by reference. The Plan shall constitute a vested right of the

Property Owner during the term of the Agreement (including any extensions or renewals thereof).

PLANNED DEVELOPMENT DISTRICT PLAN (PDD PLAN)

The master community design guidelines, controlling scenic features and open space, organizes development, and provides for variation within and around other regulations.

PROJECT

The Development that has occurred and will occur on the Real Property.

PRIMARY BUILDING MASS

The term “Primary Building Mass” shall refer to the largest volume of the Residence having a minimum depth and width of at least 20’ feet, be a minimum of five hundred (500) SF in area, and be offset by at least two (2’) feet horizontally and three (3’) feet vertically.

PRIVATE AREA

The Private Area is the portion of the Building Envelope in which all vertical Improvements must take place. All buildings in the Private Area must conform to the maximum Building Height and massing requirements set forth in

these Guidelines and as indicated on the Lot Diagrams.

PROPERTY OWNER

One or more persons, including natural persons, corporations, partnerships, trustee or any other legal entities, who hold the record title to any Lot, but excluding in all cases any party holding an interest merely as security for the performance of an obligation.

PROTECTED TREES

Any tree on a parcel with a Diameter Breast Height (DBH) of eight inches or greater prior to development and all trees within required buffers or required landscape areas. Limited removal is allowed only when specified by the provisions of this Ordinance.

RESIDENCE

The building or buildings, including any garage, or other accessory structure, used for residential purposes constructed on a Lot, and any Improvements constructed in connection therewith.

RIPARIAN LANDSCAPE

Landscape areas which contain wetlands, marshes, salt ponds, Transition Zones to the Kiawah River, and developer installed swales and detention areas.

SECONDARY BUILDING MASS

The term “Secondary Building Mass” shall refer to any other portion of the Residence that is not the Primary Building Mass and qualifies as a Visual Building Mass.

SETBACK

Any required minimum distance from a Lot line or street right-of-way that establishes an area within which a structure or Improvements shall not be erected. Any Laws applicable to Setbacks and exceptions to Setbacks are set forth in the Plan, which shall control in lieu of Laws applicable to Setbacks and exceptions to Setbacks in the ZLDR or other Laws.

STORY

That portion of any building (including garage) included between the surface of any floor and the surface of the floor above it, or if there is no floor above, then the space between the floor and the ceiling directly above it. Any portion

of a Story exceeding twenty (20’) feet in height shall be considered as an additional Story for each twenty (20’) feet or fraction thereof. If the finished floor level directly above a basement or cellar is more than six feet above grade, such basement or cellar shall be considered a Story.

TRANSITION AREA

The Transition Area is that portion of the Building Envelope in which all horizontal Improvements, including but not limited to pools, stairs, patios, spas, walls and fences to a maximum of four (4’) feet and landscaping, is allowed and is adjacent to the Natural Area.

TABBY

Tabby is a concrete stucco finish that uses a crushed oyster shell as an aggregate. The crushed oyster shells shall incorporate large or unbroken shell pieces, and not consist entirely of small ground up shell fragments.

VISUAL BUILDING MASS

The term “Visual Building Mass” shall refer to any portion of a Residence having a minimum depth and width of at least 20’ feet, be a minimum of five hundred (500) SF in area and be offset by at least two (2’) feet horizontally and three (3’) feet vertically from another building mass.

ZONING AND LAND DEVELOPMENT REGULATIONS (ZLDR)

Refers to the Zoning and Land Development Regulations of Charleston County, South Carolina.



APPENDIX B

Approved Plant List

TREES						
Botanical Name	Common Name	Natives	Size	Deciduous	Evergreen	Flowering
Acer rubrum	Red Maple	•	L	•		
Amelanchier arborea	Serviceberry	•	S	•		•
Betula nigra	River Birch	•	L	•		
Carpinus caroliniana	American Hop Hornbeam	•	S	•		•
Carya oata	Shagbark Hickory	•	L	•		
Cercis Canadensis	Redbud	•	S	•		•
Chionanthus virginicus	Fringe Tree	•	S	•		•
Cornus asperifolia	Rough-leafed Dogwood	•	L	•		•
Cornus florida	Flowering Dogwood	•	S	•		•
Crataegus spp	Hawthorne	•	S	•		•
Eriobotrya japonica	Loquat	•	S		•	
Fagus grandifolia	American Beech	•	L	•		
Fraxinum pennsylvanica	Green Ash	•	L	•		
Gordonia lasianthus	Loblolly Bay	•	S		•	
Halesia Carolina	Carolina Silverbell	•	S	•		•
Hammamelis virginiana	Witch Hazel	•	S	•		•
Ilex cassine	Dahoon holly	•	S		•	
Ilex cornuta 'Burfordii'	Burford Chinese Holly	•	S		•	
Ilex opaca	American Holly	•	L		•	
Ilex vomitoria	Yaupon Holly	•	S		•	
Juniperous salicifolia	Southern Red Cedar	•	L		•	
Lagestoemia indica	Crape Myrtle	•	S	•		•
Liriodendron tulipifera	Tulip Poplar	•	L	•		•
Liquidamber styraciflua	Sweet Gum	•	L	•		
Magnolia grandiflora	Southern Magnolia	•	L		•	•
Magnolia virginiana	Sweetbay Magnolia	•	S		•	•
Magnolia 'Little Gem'	Little Gem Magnolia		S	•		•
Nyssa sylvatica	Black Tupelo	•	L	•		
Pinus palustris	Longleaf Pine	•	L		•	
Platinus	London Plane Tree	•	L	•		
Quercus alba	White Oak	•	L	•		
Quercus falcate	Southern Red Oak	•	L	•		
Quercus luarifolia	Laurel Oak	•	L		•	
Quercus phellos	Willow Oak	•	L	•		
Quercus virginiana	Live Oak	•	L		•	
Taxodium disticum	Bald Cypress	•	L	•		
Ulmus parvifolia	Chinese Elm	•	L	•		
Vitex angus-castus	Vitex	•	S	•		•

PALMS						
Botanical Name	Common Name	Natives	Size	Deciduous	Evergreen	Flowering
Cycas revoluta	Sago Palm		M		•	
Rhapidophyllum hystrix	Needle Palm	•	S		•	
Sabal palmetto	Cabbage Palm	•	L		•	



SHRUBS						
Botanical Name	Common Name	Natives	Size	Deciduous	Evergreen	Flowering
Aesculus pavia	Red Buckeye	•	L	•		•
Callicarpa Americana	American Beautyberry	•	M	•		•
Callistemom rigidus	Bottlebush	•	L		•	•
Calycanthus floridus	Sweetshrub	•	M	•		•
Cephalanthus occidentialis	Buttonbush	•	M	•		
Clethra alnifolia	Sweet Pepperbush	•	M	•		•
Euonymous americanus	Strawberry Bush	•	S	•		•
Fatsia japonica	Fatsia	•	M		•	
Fothergillia major	Witch Alder	•	S	•		•
Hibiscus moscheutos	Rose Mallow	•	M	•		•
Hydrangea quercifolia	Oakleaf Hydrangea	•	M	•		•
Ilex deciduas	Deciduous holly	•	M	•		•
Ilex verticilatta	Winterberry	•	M	•		•
Itea virginica	Sweetspire	•	S	•		•
Rhododendron canescens	Wild Azalea	•	M	•		•
Rhus capallina	Winged Sumac	•	S	•		
Vaccinium arboretum	Sparkleberry	•	L	•		•
Virburnum denatum	Southern Arrowwood	•	M	•		•

GROUNDCOVERS						
Botanical Name	Common Name	Natives	Size	Deciduous	Evergreen	Flowering
Ajuga reptans	Carpet Bugle	•	S	•		•
Antennaria plantaginifolia	Pussytoes		S		•	•
Euonymous	Winter Creeper	•	S		•	
Ilex vomitoria (dwarf spp)	Yaupon Holly	•	S	•		•
Liriope muscari	Big Blue Lilyturf		S		•	•
Liriope spicata	Creeping Lilyturf		S	•		•
Lysimachia nummularia	Creeping Jenny		S		•	•
Mitchella repens	Partridgeberry	•	S		•	•
Rubus arguta	Creeping Blackberry	•	S	•		•
Trachelospermum asiaticum	Asiatic Jasmine	•	S	•		•
Uvularia sessilifolia	Bellwort		S		•	•

VINES						
Botanical Name	Common Name	Natives	Size	Deciduous	Evergreen	Flowering
Ampelopsis arborea	Peppervine	•	S	•		
Campsis radicans	Trumpet Creeper	•	S	•		
Gelsemium sempervirens	Yellow Jessamine	•	S	•		
Parthenocissus quinquefolia	Virginia Creeper	•	S	•		

FERNS						
Botanical Name	Common Name	Natives	Size	Deciduous	Evergreen	Flowering
Adiantum capillus-veneris	Southern Maidenhair Fern	•	S		•	
Aplenium platyneuron	Ebony Spleenwort	•	S		•	
Dryopteris ludoviciana	Southern Wood Fern	•	S		•	
Osmunda cinnamomea	Cinnamon Fern	•	S		•	
Phegopteris hexagonoptera	Broad Beech Fern	•	S		•	
Pleopeltis polypadiodes	Resurrection Fern	•	S		•	
Polystichum acrostichoides	Christmas Fern	•	S		•	
Thelypteris palusteris	Marsh Fern	•	S		•	
Woodwardia areolata	Netted Chain Fern	•	S		•	
Woodwardia virginica	Virginia Chain Fern	•	S		•	





APPENDIX C

Prohibited Plant List

SOUTH CAROLINA STATE-LISTED NOXIOUS WEEDS				
Symbol	Scientific Name	Noxious Common Name	State Noxious Status†	Native Status*
ACRE3	<i>Acroptilon repens</i> (L.) DC.			L48 (I), CAN (I)
AEGIN	<i>Aeginetia</i> L.		PP	
AGAD2	<i>Ageratina adenaphora</i> (Spreng.) R.M. King & H. Rob.	croftonweed	PP	L48 (I), HI (I)
AGGI	<i>Agrostemma githago</i> L.	corn cockle	PP	L48 (I), AK (I), CAN (I)
ALECT2	<i>Alectra Thunb.</i>		PP	
ALPH	<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	alligatorweed, alligatorweed, pigweed	ILAP, PP	L48 (I), PR (I)
ALSE4	<i>Alternanthera sessilis</i> (L.) R. Br. ex DC.	sessile joyweed	PP	(I), L48 (I), HI (I), PR (N), VI (N)
ASFI2	<i>Asphodelus fistulosus</i> L.	onionweed	PP	L48 (I)
AVST	<i>Avena sterilis</i> L.	sterile oats	PP	L48 (I), CAN (W)
AZPI	<i>Avicella pinnata</i> R. Br.	mosquito fern, pinnate mosquito fern, mosquito fern	ILAP, PP	L48 (I)
CAHA13	<i>Cardiospermum halicacabum</i> L.	balloonvine	PP	L48 (I), HI (I), PR (N), VI (N)
CAOX6	<i>Carthamus oxyacanthus</i> M. Bieb.			L48 (I)
CATA5	<i>Caulerpa taxifolia</i> (Vahl) C. Agardh1	caulerpa	ILAP, PP	L48 (I)
CHAC	<i>Chrysopsisgon aciculatus</i> (Retz.) Trin.	pillipillula	PP	(N), L48 (I), HI (I)
CIREU	<i>Citrus reticulata</i> Blanco ssp. unshiu (Marcow.) D.Rivera Núñez et al.	Unshiu orange	PP	
CNBE	<i>Cnicus benedictus</i> L.	blessed thistle	PP	L48 (I), CAN (I)
COBE2	<i>Camelina benghalensis</i> L.	tropical spiderwort	PP	(I), L48 (I), HI (I), PR (I)
CRVU2	<i>Crupina vulgaris</i> Cass.	common crupina	PP	L48 (I)
CUSCU	<i>Cuscuta</i> L.2	dodder	PP	
DIAB	<i>Digitaria abyssinica</i> (Hochst. ex A. Rich.) Stapf			HI (I)
DIVE2	<i>Digitaria velutina</i> (Forssk.) P. Beauv.	velvet fingergrass	PP	L48 (I)
DRAR7	<i>Drymaria arenarioides</i> Humb. & Bonpl. ex Schult. [excluded]	alfombrilla	PP	
EGDE	<i>Egeria densa</i> Planch.	Brazilian elodea	ILAP, PP	L48 (I), HI (I), PR (I), CAN (W)
EIAZ2	<i>Eichhornia azurea</i> (Sw.) Kunth	anchored water hyacinth, rooted water hyacinth, rooted water hyacinth	ILAP, PP	L48 (I), PR (I)
EICR	<i>Eichhornia crassipes</i> (Mart.) Solms	water hyacinth, water hyacinth	ILAP, PP	(I), L48 (I), HI (I), PR (I), VI (I), CAN (W)
EMAU	<i>Emex australis</i> Steinh.	three-cornered jack	PP	L48 (I)
EMSP	<i>Emex spinosa</i> (L.) Campd.	spiny emax	PP	L48 (I), HI (I)
EUHE4	<i>Euphorbia heterophylla</i> L.			(I), L48 (N), HI (I), PR (N), VI (N)
GAOF	<i>Galega officinalis</i> L.	goatsrue	PP	L48 (I), CAN (I)
HECI	<i>Helianthus ciliaris</i> DC.	Texas blueweed	PP	L48 (N)
HEMA17	<i>Henadeum mantegazzianum</i> Samnier & Levier	giant hogweed	PP	L48 (I), CAN (I)
HYVE3	<i>Hydrilla verticillata</i> (L. f.) Royle	hydrilla	ILAP, PP	L48 (I)
HYPO3	<i>Hydrophila polysperma</i> (Roxb.) T. Anderson	Indian hydrophila, Miramar weed, Miramar weed	ILAP, PP	L48 (I)
IMBR	<i>Imperata brasiliensis</i> Trin.	Brazilian satintail	PP	L48 (I), PR (I)
IMCY	<i>Imperata cylindrica</i> (L.) P. Beauv.	cogongrass	PP	(N), L48 (I)
IPAQ	<i>Ipomoea aquatica</i> Forssk.	water spinach, water spinach, swamp morning glory	ILAP, PP	(I), L48 (I), HI (I), PR (I)
IPTR2	<i>Ipomoea triloba</i> L.	three-lobed morning glory, little bell, A/ea morning glory	PP	(I), L48 (I), HI (I), PR (N), VI (N)
IPTU3	<i>Ipomoea turbinata</i> Lag.			L48 (I)
ISRU	<i>Ischaemum rugosum</i> Salisb.	soramollagrass	PP	(N), L48 (I)
IAMA15	<i>Lagarosiphon major</i> (Ridley) Moss	African oxygen weed, oxygen weed	ILAP, PP	
LECH2	<i>Leptochloa chinensis</i> (L.) Nees [excluded]	Chinese sprangletop	PP	
LISE3	<i>Limnophila sessiliflora</i> (Vahl) Blume	ambulia, limnophila, ambulia	ILAP, PP	L48 (I)
LOTE2	<i>Lolium temulectum</i> L.	darnei	PP	L48 (I), AK (I), HI (I), CAN (I)
LUGRG2	<i>Ludwigia grandiflora</i> (Michx.) Greuter & Burdet ssp. <i>grandiflora</i>			L48 (I)
LUGRH	<i>Ludwigia grandiflora</i> (Michx.) Greuter & Burdet ssp. <i>hexapetala</i> (Hook. & Arn.) G.L. Nesom & Kartesz			L48 (I)



LYFE4	<i>Lyctum feroacissimum</i> Miers			L48 (I)
LYSA2	<i>Lythrum salicaria</i> L.	purple loosestrife	ILAP, PP	L48 (I), CAN (I), SPM (I)
MEQU	<i>Melaleuca quinquenervia</i> (Cav.) S.F. Blake	melaleuca, paperbark tree	ILAP, PP	(I), L48 (I), HI (I), PR (I)
MEMA	<i>Melastoma malabathricum</i> L.	Banks melastoma, melastoma	PP	(N), HI (I)
MICO16	<i>Mikania cordata</i> (Burm. f.) B.L. Rob. [excluded]	African mile-a-minute	PP	
MIMI5	<i>Mikania micrantha</i> Kunth	mile-a-minute	PP	L48 (I), PR (N)
MIDI8	<i>Mimosa diplotricha</i> C. Wright			(I), HI (I), PR (I)
MIPE2	<i>Mimosa pellita</i> Kunth ex Willd.			L48 (N), PR (N)
MOHA2	<i>Monochoria hastata</i> (L.) Solms [excluded]	arrow-leaved monochoria, arrowleaf monochoria	ILAP, PP	
MOVA	<i>Monochoria vaginalis</i> (Burm. f.) C. Presl ex Kunth	monochoria	ILAP, PP	L48 (I), HI (I)
MYS2	<i>Myriophyllum spicatum</i> L.	Eurasian watermilfoil	ILAP, PP	L48 (I), AK (I), CAN (I)
NAMI	<i>Najas minor</i> All.	brittleleaf naiad, slender naiad	ILAP, PP	L48 (I), CAN (I)
NATR3	<i>Nassella trichotoma</i> (Nees) Hack.	serrated tussock	PP	L48 (I)
OPAU10	<i>Opuntia aurantiaca</i> Lindl.	jointed pricklypear	PP	
OROA	<i>Orobancha</i> L.2	broomrape	PP	
ORSA	<i>Oryza sativa</i> L.	wild red rice	PP	(I), L48 (I), PR (I), VI (I)
OTAL	<i>Ottelia alismoides</i> (L.) Pers.	duck-lettuce	ILAP, PP	L48 (I)
PASC6	<i>Paspalum scrobiculatum</i> L.	kodomillet	PP	(N), L48 (I), HI (I)
PECL2	<i>Pennisetum clandestinum</i> Hochst. ex Chiov.	kikuyugrass	PP	L48 (I), HI (I), PR (I), VI (I)
PEMA80	<i>Pennisetum macrourum</i> Trin.	African feathergrass	PP	L48 (I), HI (I)
PEPE24	<i>Pennisetum pedicellatum</i> Trin.	kyasumagrass	PP	L48 (I)
PHAU7	<i>Phragmites australis</i> (Cav.) Trin. ex Steud.	common reed	PP	L48 (N), HI (I), CAN (N)
PIST2	<i>Pistia stratiotes</i> L.	water lettuce	ILAP, PP	L48 (N), HI (I), PR (N), VI (N)
POPE10	<i>Polygonum perfoliatum</i> L.	mile-a-minute weed	PP	L48 (I)
PRAL11	<i>Prosopis</i> spp	mesquite	PP	
ROCO6	<i>Rattboellia cochinchinensis</i> (Lour.) W.D. Clayton	itchgrass, corngrass, raoulgrass	PP	L48 (I), PR (I)
RUF80	<i>Rubus fruticosus</i> L. [excluded]	wild raspberry	PP	
SASP	<i>Saccharum spontaneum</i> L.	wild sugarcane	PP	(N), HI (I), PR (I)
SASA7	<i>Sagittaria sagittifolia</i> L. [excluded]	arrowhead	ILAP, PP	
SAVE6	<i>Salsola vermiculata</i> L.	wormleaf salsola, Mediterranean saltwort	PP	L48 (I)
SAAU	<i>Salvinia</i> spp.	giant salvinia	ILAP, PP	PR (I)
SEPUP3	<i>Setaria pumila</i> (Poir.) Roem. & Schult. ssp. <i>pallidifusca</i> (Schumacher) B.K. Simon			L48 (I)
SOTA3	<i>Solanum tompicense</i> Dunal	wetland nightshade	ILAP, PP	L48 (I)
SOTO4	<i>Solanum torum</i> Sw.	turkeyberry	PP	(I), L48 (I), HI (I), PR (I), VI (I)
SOVI2	<i>Solanum viarum</i> Dunal	tropical soda apple	PP	L48 (I)
SPER	<i>Sparganium erectum</i> L.	branched burreed, exotic bur reed	ILAP, PP	L48 (I)
SPAL3	<i>Spermocoe alata</i> Aubl. [excluded]	winged false buttonweed	PP	
STRIG	<i>Striga</i> Lour.	witchweed	PP	
TRNA	<i>Trapa natans</i> L.	water chestnut, water chestnut, water nut	ILAP, PP	L48 (I), CAN (I)
TRPR5	<i>Tridax procumbens</i> L.	coatbuttons, tridax daisy	PP	(I), L48 (I), HI (I), PR (I), VI (I)
URPA	<i>Urochloa panicoides</i> P. Beauv.	liverseedgrass	PP	L48 (I)

†Code	Noxious Status	*Code	Native Status
ILAP	Invasive aquatic plant	I	Introduced
PP	Plant pest	N	Native
		W	Waif
*Code	Native Status	Jursdiction	
L48	Lower 48 States		
AK	Alaska		
HI	Hawaii		
PR	Puerto Rico		
VI	Virgin Islands		
CAN	Canada		
SPM	St. Pierre and Miquelon		





## APPENDIX D

### Icon Lot Diagram



APPENDIX E

Governing Regulations

All proposed Improvements shall comply with the following regulations:

- This Guideline document
- Kiawah River Declaration of Covenants, Conditions and Restrictions (CC&R's)
- All applicable Charleston County Ordinances, Regulations and Codes
- All project approval documents contained within the Kiawah River PDD Plan

- Electrical
- Potable water
- Gas
- Fiber optics/Cable TV lines
- Non-potable irrigation water service (if applicable)

At a minimum, the following will be shown on the survey and extend twenty (20') feet past the property boundary on all sides:

- Property boundaries
- Street edge of pavement
- Easements
- Utilities and/or site features
- One (1) foot topographic information
- Location and finished floor of existing structures on adjacent Lots
- Existing vegetation, particularly in Developer-landscaped areas.
- Location of existing lakes (if applicable)
- Rock outcrops with spot grades at base and high points (if applicable)
- Existing trees greater than 24" DBH, with spot grades at trunk. Type of tree to be shown with trunk diameter and approximate height and spread canopy
- Existing walls with TW and BW grades, if any
- Edges of existing pavement

All Lots are to show grades drawn with polylines in the following manner – 1 foot contours and 5 feet contours shown on separate layers with zero width to polylines.

It is the responsibility of the Lot Surveyor to ensure that the survey meets these requirements, as well as any requirements of Charleston County.

APPENDIX F

Lot Survey Requirements

The following information shall be included in all surveys of individual Lots at Kiawah River. These standards will allow for easier review and coordination of the designs within the entire project.

All drawings should be drawn in AutoCAD 2007 or later with the coordinate system and vertical datum conforming to the project engineer's coordinate system, which will be provided at the request of the surveyor. All AutoCAD entities (line types, colors, etc.) to be 'by layer.' All line type scales set at 1. Survey drawn at 1/1 formatted in architectural units. The survey is to be plotted at 1" = 20' for review purposes. X-refs should be placed on individual specific layers (i.e., x-diagram).

0.865 The following items should be shown on separate layers: property boundaries; Building Envelope and Transition Zones; easements; all utilities including but not limited to the following:

APPENDIX

Design Review Application Forms

Kiawah River Pre-Design Conference Request Form p.1 of 2

Applicant Name \_\_\_\_\_ Date \_\_\_\_\_

KIAWAH RIVER

Pre-Design Conference Request Form

Date of Request \_\_\_\_\_

Date of Pre-Design Conference (for ARB use only) \_\_\_\_\_

Date of Design Guidelines Edition \_\_\_\_\_

1. A Pre-Design Conference will be scheduled, per section 5.15, within 14 working days following the receipt of a completed Pre-Design Conference Request Form.
2. The design review fee must be submitted for each lot prior to the Concept Design Review.

Please make check payable to Kiawah River ARB.

3. Please contact the ARB Administrator with any questions.

Project Information

A. Lot Number(s): \_\_\_\_\_

B. Location of Lot(s): \_\_\_\_\_

Assessor's Parcel No.(s): \_\_\_\_\_

Street Address: \_\_\_\_\_

C. Name of Owner(s): \_\_\_\_\_

Street Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Telephone: ( ) \_\_\_\_\_ Fax: ( ) \_\_\_\_\_ E-mail: \_\_\_\_\_

D. Name of Architect: \_\_\_\_\_ Firm: \_\_\_\_\_

Street Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Telephone: ( ) \_\_\_\_\_ Fax: ( ) \_\_\_\_\_ E-mail: \_\_\_\_\_

License Number: \_\_\_\_\_

E. Name of Landscape Architect: \_\_\_\_\_ Firm: \_\_\_\_\_

Street Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Telephone: ( ) \_\_\_\_\_ Fax: ( ) \_\_\_\_\_ E-mail: \_\_\_\_\_

License Number: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



The Owner and their design team should review the most current edition of the Design Guidelines, and CC&R's for Kiawah River and the individual Lot Diagram prior to the Pre-Design Conference. These materials will be reviewed at the meeting. The purpose of the meeting will be for the ARB to answer any questions the Owners and their design team may have and to offer guidance on the following subjects:

- The particular characteristics and restrictions on the Lot Diagram;
- Optimal locations for building and site Improvements as illustrated on the Lot Diagram;
- Additional survey information requirements;
- Preliminary building and site development program ideas and requirements;
- The requirements, fees, and schedule of the Design Review Process.

KIAWAH RIVER

Concept Design Review Request Form

Date of Request \_\_\_\_\_

Date of Concept Design Review (for ARB use only) \_\_\_\_\_

Date of Design Guidelines Edition \_\_\_\_\_

The purpose of this submittal is to confirm that the design professionals are headed in the right direction, are correctly interpreting the Guidelines and that the Builder/Partner's program can be accommodated on the Lot. This submittal may be combined with the Pre-Design Conference.

Project Information

A. Lot Number(s): \_\_\_\_\_

B. Location of Lot(s): \_\_\_\_\_

Assessor's Parcel No.(s): \_\_\_\_\_

Street Address(es): \_\_\_\_\_

Items to include:

1. Pre-Design Conference Request and Concept Design Review Application Forms.
2. Design Review Application Fee for each lot.
3. Concept Site Plan: (1" = 20') indicating property lines and Lot Diagram areas, building location/ footprint, driveways, pools, water features and other major hardscape elements and basic grading concepts. The Applicant shall confirm and verify the field location of all utility connections to the Lot at this time to ensure that no conflicts exist with the proposed Improvements.
4. Concept Floor Plan: (1" = 20') showing general room layout and circulation. This may be combined with the Concept Site Plan.
5. Concept Elevations: (1" = 20') of the street and view sides of the building showing general massing, roof forms, Building Height and materials.
6. A brief description of the proposed architectural style, including regional historic precedents (if any).

Attach a separate piece of paper if additional space is required. At the top please note the Date, Applicant Name and Lot Numbers.

KIAWAH RIVER

Preliminary Design Review Request Form

Application date: \_\_\_\_\_

Concept Design Conference Date: \_\_\_\_\_

Date of ARB Meeting: (for ARB use only) \_\_\_\_\_

Type of Review Requested:    ☐ Preliminary Design                      ☐ Modification                      ☐ Miscellaneous

Application Fees (for ARB use only): Paid on \_\_\_\_\_ Check No \_\_\_\_\_ Rec'd By \_\_\_\_\_

1.    A meeting will be scheduled within 14 working days from the receipt of a complete submission.

2.    Please contact the ARB administrator regarding application questions.

3.    Please submit Section II, III and IV for each different product.

Section I - Project Information

A.   Lot Number(s): \_\_\_\_\_

B.   Location of Lot(s): \_\_\_\_\_  
Assessor's Parcel No.(s): \_\_\_\_\_  
Street Address(es): \_\_\_\_\_

C.   Name of Owner(s): \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Telephone: (                      ) \_\_\_\_\_ Fax: (                      ) \_\_\_\_\_ E-mail: \_\_\_\_\_

D.   Name of Architect: \_\_\_\_\_ Firm: \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Telephone: (                      ) \_\_\_\_\_ Fax: (                      ) \_\_\_\_\_ E-mail: \_\_\_\_\_  
License No: \_\_\_\_\_

E.   Name of Landscape Architect: \_\_\_\_\_ Firm: \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Telephone: (                      ) \_\_\_\_\_ Fax: (                      ) \_\_\_\_\_ E-mail: \_\_\_\_\_  
License No: \_\_\_\_\_

I have read and will comply with the Kiawah River Design Guidelines concerning construction activities and the Covenants, Conditions, Restrictions and Reservation of Easements (CC& R's) for Kiawah River.

Signature and Printed Name of Signatory \_\_\_\_\_ Date \_\_\_\_\_

KIAWAH RIVER

Preliminary Design Review Request Form

Date Submitted: \_\_\_\_\_

Lot Number(s): \_\_\_\_\_

☐ Submittal Complete, Accepted for Review

Date: \_\_\_\_\_

☐ Submittal Incomplete, Returned for Correction

Date: \_\_\_\_\_

☐ 2 sets full size, 2 sets half size and an electronic (PDF) version of Plans

Submitted	Complete	Incomplete	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1.    PRELIMINARY APPLICATION and SECTION II - PROJECT DATA FORM
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2.    LOCATION MAP Show location of Lot(s) within Kiawah River.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3.    PARCEL SURVEY (Scale: 1" = 20', minimum scale) Prepared by a licensed surveyor indicating property boundaries, the area of the property, all easements of record, utilities, 100-year flood plain, 1-foot con- tours, any significant natural features such as existing trees, or any significant drainages as applicable. See Appendix D.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4.    PRELIMINARY SITE PLAN (Scale: 1" = 20', minimum) Show existing topography and proposed grading and drainage (1 foot contour interval), existing off-site elements (buildings, walls, etc.) within 20 feet of the property boundary, building footprint with finished floor grades, setbacks, Building Envelope and other zones as indicated on the Lot Diagram, existing trees to be retained and/or removed, driveway, parking area, turnarounds, drainage, fences/walls, roofs, patios, decks, pools, and any other site amenities.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5.    PRELIMINARY FLOOR AND ROOF PLANS (Scale: 1/8" = 1' – 0" min.) Show all proposed uses, proposed walls, door and window locations and location of mechanical and electrical systems.



KIAWAH RIVER

Preliminary Design Review Request Form

Submitted    Complete    Incomplete

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6.    PRELIMINARY ELEVATIONS (Scale: 1/8" = 1' – 0" minimum) Show roof heights, existing and finish grades, building heights and notation of exterior materials. Front and rear elevations in color, remainder of elevations in black and white is acceptable.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7.    SITE SECTIONS (Scale: 1" = 20', minimum) Show proposed buildings, building heights, elevations and existing and finished grades in relation to surrounding site, including adjacent Residences and Roads as may be required by the ARB.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8.    CONCEPTUAL LANDSCAPE PLAN (Scale: 1/8" = 1' – 0", minimum) Show irrigated areas, areas of planting, turf areas, preliminary plant list, Building Envelope and other zones as indicated on the Lot Diagram, existing trees to be retained and/or removed, water features, pools, patios, decks, and any other significant design elements. This may be combined with the Site Plan.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9.    GRADING, DRAINAGE AND EROSION CONTROL PLANS, (Scale: 1/8" = 1' – 0", minimum) Show existing and proposed grading at 1 foot contour intervals, drainage elements and erosion control methods including silt fencing and driveway base rock. Include 20 feet beyond Homeowner's property line.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10.   STUDY MODEL or COLOR RENDERING (Scale: 1" = 20', minimum) Illustrate the relationship between proposed building forms and topography, tree heights and prevailing site conditions. This need not be an extensively detailed model, but simply adequate to communicate basic three-dimensional massing concepts.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	11.   MATERIAL SAMPLES 8½ x 11 or 11 x 17 board showing: Roof material and color; Wall material and color; Exterior trim material and color; Window materials and color; Exterior door material and color Stone/rock materials; Fence/wall materials and color; Exterior railing and paving materials and color.

KIAWAH RIVER

Preliminary Design Review Request Form

Section II – Project Data

Lot Numbers: \_\_\_\_\_

A.   Lot Sizes: \_\_\_\_\_

B.   Roof Pitch: \_\_\_\_\_

C.   Lot Type: \_\_\_\_\_

D.   Proposed Square Footage Calculation: \_\_\_\_\_

Please note that all measurements are to be taken from the outside of all exterior walls.

1) Main Floor \_\_\_\_\_ sq. ft.

2) Secondary Floor \_\_\_\_\_ sq. ft

3) Miscellaneous \_\_\_\_\_ sq. ft. (please describe)

4) Total Residence \_\_\_\_\_ sq. ft. (add lines, 1, 2 and 3)

5) Accessory Structures \_\_\_\_\_ sq. ft

6) Garages \_\_\_\_\_ sq. ft

TOTAL \_\_\_\_\_ sq. ft. (add lines 4-6)

E.   Number of Bedrooms, (total) \_\_\_\_\_

F.   Number of Enclosed Parking Spaces \_\_\_\_\_  
Number of Guest Parking Spaces \_\_\_\_\_  
Total Parking Spaces \_\_\_\_\_

G.   Number of Bathrooms \_\_\_\_\_  
Number of Fireplaces \_\_\_\_\_

H.   Maximum Slope of Driveway \_\_\_\_\_ %

I.   Height of tallest Proposed Building \_\_\_\_\_

(Please note on Building Elevations) \_\_\_\_\_

J.   Building Coverage \_\_\_\_\_ %

Kiawah River

Final Design Review Application

Application date: \_\_\_\_\_  
Preliminary Design Review Acceptance Date: \_\_\_\_\_  
Date of ARB Meeting: (for ARB use only) \_\_\_\_\_  
Type of Review Requested:    ☐ Final Design                      ☐ Modification                      ☐ Miscellaneous

1.

A meeting will be scheduled within 14 working days from the receipt of a complete submission.
2.

Please contact the ARB administrator regarding application questions.
3.

Please submit Section II, III and IV for each different product.

Section I - Project Information

- A.

Lot Number(s): \_\_\_\_\_
- B.

Location of Lot(s): \_\_\_\_\_  
Assessor's Parcel No.(s) \_\_\_\_\_  
Street Address(es): \_\_\_\_\_
- C.

Name of Owner(s): \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Telephone: (                      ) \_\_\_\_\_ Fax: (                      ) \_\_\_\_\_ E-mail: \_\_\_\_\_
- D.

Name of Architect: \_\_\_\_\_ Firm: \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Telephone: (                      ) \_\_\_\_\_ Fax: (                      ) \_\_\_\_\_ E-mail: \_\_\_\_\_  
  
License Number: \_\_\_\_\_
- E.

Name of Landscape Architect: \_\_\_\_\_ Firm: \_\_\_\_\_  
Street Address: \_\_\_\_\_  
City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_  
Telephone: (                      ) \_\_\_\_\_ Fax: (                      ) \_\_\_\_\_ E-mail: \_\_\_\_\_  
  
License Number: \_\_\_\_\_

I have read and will comply with Kiawah River Design Guidelines concerning construction activities and the Covenants, Conditions, Restrictions and Reservation of Easements (CC& R's) for Kiawah River.

Signature and Printed Name of Signatory \_\_\_\_\_ Date \_\_\_\_\_

Kiawah River

Final Design Review Application

Section II – Project Data

- Lot Numbers:

\_\_\_\_\_
- A.

Lot Sizes: \_\_\_\_\_
- B.

Roof Pitch: \_\_\_\_\_
- C.

Lot Type: \_\_\_\_\_
- D.

Proposed Square Footage Calculation: \_\_\_\_\_  
Please note that all measurements are to be taken from the outside of all exterior walls.  
1) Main Floor \_\_\_\_\_ sq. ft.  
  
2) Secondary Floor \_\_\_\_\_ sq. ft.  
  
3) Miscellaneous \_\_\_\_\_ sq. ft. (please describe)  
  
4) Total Residence \_\_\_\_\_ sq. ft. (add lines, 1, 2 and 3)  
  
5) Accessory Structures \_\_\_\_\_ sq. ft.  
  
6) Garages \_\_\_\_\_ sq. ft.  
  
TOTAL \_\_\_\_\_ sq. ft. (add lines 4-6)
- E.

Number of Bedrooms, (total) \_\_\_\_\_
- F.

Number of Enclosed Parking Spaces \_\_\_\_\_  
Number of Guest Parking Spaces \_\_\_\_\_  
Total Parking Spaces \_\_\_\_\_
- G.

Number of Bathrooms \_\_\_\_\_  
Number of Fireplaces \_\_\_\_\_
- H.

Maximum Slope of Driveway \_\_\_\_\_ %
- I.

Height of tallest Proposed Building \_\_\_\_\_  
  
(Please note on Building Elevations) \_\_\_\_\_
- J.

Building Coverage \_\_\_\_\_ %  
Amount of Proposed Irrigated Area \_\_\_\_\_



Kiawah River

Final Design Review Application

Section III – List of Materials

The following information must be completed for all applications.

A sample board must be prepared for each building type for the Final Design Review Submission.

Specification, Product

Building Materials:	Type of Material	Color, Material, etc.
Main Roof Pitch	_____	_____
Secondary Roof Pitch	_____	_____
Primary Wall Material	_____	_____
Retaining Wall Material	_____	_____
Other Wall Materials	_____	_____
Fascia	_____	_____
Gutters and Downspouts	_____	_____
Windows	_____	_____
Window Trim	_____	_____
Exterior Doors	_____	_____
Garage Doors	_____	_____
Door Trim	_____	_____
Hand or Deck Rails	_____	_____

Kiawah River

Final Design Review Application

Date Submitted: \_\_\_\_\_

Lot Number(s): \_\_\_\_\_

☐ Submittal Complete, Accepted for Review

Date: \_\_\_\_\_

☐ Submittal Incomplete, Returned for Correction

Date: \_\_\_\_\_

☐ 2 sets full size, 2 sets half size and an electronic (PDF) version of Plans

Submitted	Complete	Incomplete	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. DESIGN REVIEW APPLICATION FORM, MATERIAL LIST
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2. SITE PLAN (Scale: 1" = 20', minimum) Show existing topography, grading and drainage (1 foot contour interval), existing off-site elements (buildings, walls, etc.) within 20 feet of the property boundary in order to depict relationship to adjacent Lots and common areas. Include building footprint with finished floor grades, setbacks, Building Envelope and other zones as indicated on the Lot Diagram, existing trees to be retained and/or removed, driveway, parking area, turnarounds, drainage, fences/walls, roofs, patios, decks, pools, and any other site amenities.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3. GRADING, DRAINAGE AND EROSION CONTROL PLANS, (Scale: 1" = 20', minimum) Show existing and proposed grading at 1 foot contour intervals, drainage elements and erosion control methods including silt fencing and driveway base rock. Include 20 feet beyond Homeowner's property line.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4. FINAL FLOOR AND ROOF PLANS (Scale: 1/8" = 1' – 0" min.) Indicate all room dimensions, door and window locations and sizes, location of mechanical, electrical, fire sprinkler and monitoring systems. Indicate the location and type of all exterior lighting fixtures, proposed fireplaces and kitchen appliances. Provide floor plans of all Accessory Structures.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5. FINAL ELEVATIONS (Scale: 1/8" = 1' – 0" minimum) Illustrate the exterior appearance of all views and label in accordance with the site plan. Show the highest ridge of the roof, existing and finish grades, and the elevation of each floor. Describe all exterior materials, colors and finished (walls, roofs, trim, vents, windows, doors, etc.). Show exterior lighting fixtures. One set should be rendered in color.

Kiawah River

Final Design Review Application

Submitted	Complete	Incomplete	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6. SITE SECTIONS (Scale: 1" = 20' minimum) Indicate building walls, floors, interior relationships, finished exterior grades and any other information to describe the interior/exterior relationships of the building as well as the building's relationship to the site.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7. LANDSCAPE PLAN (Scale: 1/8" = 1' – 0", minimum) Show irrigated areas, areas of planting, turf areas, preliminary plant list, Building Envelope and other zones as indicated on the Lot Diagram, existing trees to be retained and/or removed, water features, pools, patios, decks, and any other significant design elements. This may be combined with the Site Plan.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8. MATERIAL SAMPLES 11 x 17 board showing: Roof material and color; Wall material and color; Exterior trim material and color; Window materials and color; Exterior door material and color Stone/rock materials; Fence/wall materials and color; Exterior sailing and paving materials and color.

The Beach Company

COMMUNITY DEVELOPERS

VITA Planning and Landscape Architecture

GUIDELINE AUTHORS AND COMMUNITY DESIGNERS

CONTRIBUTORS

Beau Clowney Architects  
Architects

Starr Sanford Design  
Architects

Thomas and Hutton  
Civil Engineer





# ARCHITECT SERIES PLAN BOOK

*Volume 1*

KIAWAH RIVER

CHARLESTON SEA ISLANDS

# Kiawah River



*“You’ve come to **Jack Island** to find peace amidst the Lowcountry’s ease and simplicity.  
That’s why your **road home** should be an exhilarating & inspiring adventure.”*



# GUIDING PRINCIPLES

## KIAWAH RIVER CHARACTER

The vision for Kiawah River is of a classic and timeless sea island village. A carefully curated palette of whites, soft grays and silver become the distinguishing elements that echo surrounding woodlands. Deep porches and shaded garden levels beckon for an afternoon nap or an evening meal with friends. A richness in materials exudes both quality and variety; and exacting details draw on the long history of Charleston's craftsmen. This is a place whose character is unmistakably coastal, and remarkably unrivaled.

## REGIONALLY INSPIRED

Sheltered among windswept oaks, the village promotes an attitude of preservation by embracing the traditions of the region, interweaving natural and built environments, each reinforcing an appreciation of the other. Streets meander through trees and homes are environmentally-sensitive, incorporating natural climate control: porches, balconies, large windows, and louvered shutters. Just as the tides have pulled people to the region for centuries, Kiawah River has its own draw for those seeking the next authentic sea island community.



## RESPONSIVE TO LIFESTYLE

Each home is designed specifically for the Kiawah River lifestyle, aiming to slow the heart rate and connect friends and accommodate outdoor living. All the desires of a modern life: open floor plans, master on main, and ample entertaining space abound in the Architect Series of homes. Low maintenance building materials and scaled-down yards reserve more time to enjoy the best of life. You will love your life at Kiawah River.





Our vision for this architectural book of home plans is to help guide the typology and architectural style of Kiawah River with inspired, appealing designs our residents would respond to and embrace. We are so honored to work with this esteemed group of designers, truly the finest in the Southeast and benefit from their energy, passion and love that we all share for Kiawah River.

The homes within have all been crafted specifically for Kiawah River and the environment and conditions along our river and maritime forests. Homes drawn reflecting historical precedents of the Charleston Sea Islands and Lowcountry, meanwhile looking forward to thoughtfully address the expectations of Kiawah River families here to make generational memories and celebrate our remarkable natural environment and relaxed way of life.

- Carter Redd, Managing Director





# WAYPOINTS TO OWNERSHIP

## 1. CHART YOUR PATH

A consultation with your Kiawah River Sales Representative will set you on the right path. In some cases, a custom home design process may be desired; but for others, selecting a home from the Architect Series may be the appropriate route. The Architect Series offers a more turn-key solution with abbreviated plan ARB submittal requirements. Once your needs and goals are established, your Representative will assist you in finding a plan and then determining its fit on your preferred lot.

## 2. EXPLORE THE OPPORTUNITIES

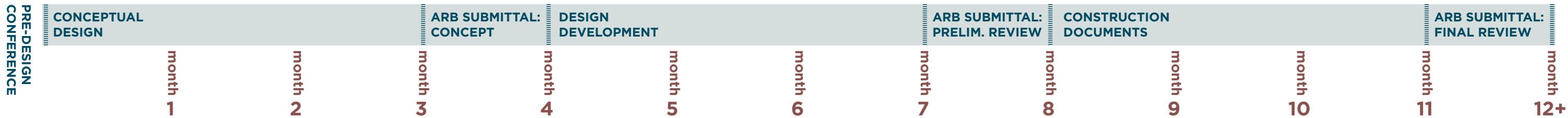
The process of narrowing your selection may involve exploring different plans or different lots or both. Upon finding a plan that fits your needs and matching it to a lot within Jack Island, you will be introduced to a member of the Kiawah River Builder Guild and Architect Guild to discuss the finer details of your home. This may include making finish and fixture selections or could involve personalizing your plan to a greater degree. For a glimpse into this process, see Page 7 Personalize Your Home.

## 3. SET YOUR COURSE

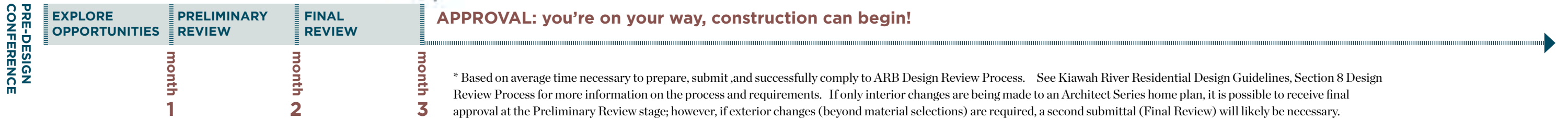
Once you have navigated the decisions of Steps 1 and 2, it is time to initiate a Lot Owner's Agreement and Plan Re-Use Agreement. This marks the beginning of the abbreviated submittals requirements afforded to you by working through the Architect Series. During this process, you will make two submittals (on average) to the Architectural Review Board that includes a landscape plan and exterior finishes. To understand more about this, see Page 5 Timeline Overview.

TIMELINE OVERVIEW: twelve weeks vs. twelve months\*

CUSTOM home plan\*



ARCHITECT SERIES home plan\*



4. ENJOY SMOOTH SAILING

The plans in the Jack Island Architect Series , Vol. 1 were created specifically for Kiawah River and, because they have been preapproved for architectural compatibility by the Architectural Review Board, they come with the benefit of an abbreviated review submittal process.

Offering the quickest path to move-in day, the selection of a plan from the Architect Series and a corresponding lot means you can expect to begin construction within approximately **TWELVE WEEKS** (subject to the level of changes).

Custom home plans are permitted, but are subject to the full Architectural Review Board review process. It may take **TWELVE MONTHS** or more to develop custom home plans and secure approvals.





BCA-C1



SSD-C1



TD-C1



HC-C2



SSD-B1



TD-B1



BCA-B2



HC-B2



BCA-A1



SSD-A1



BCA-A2

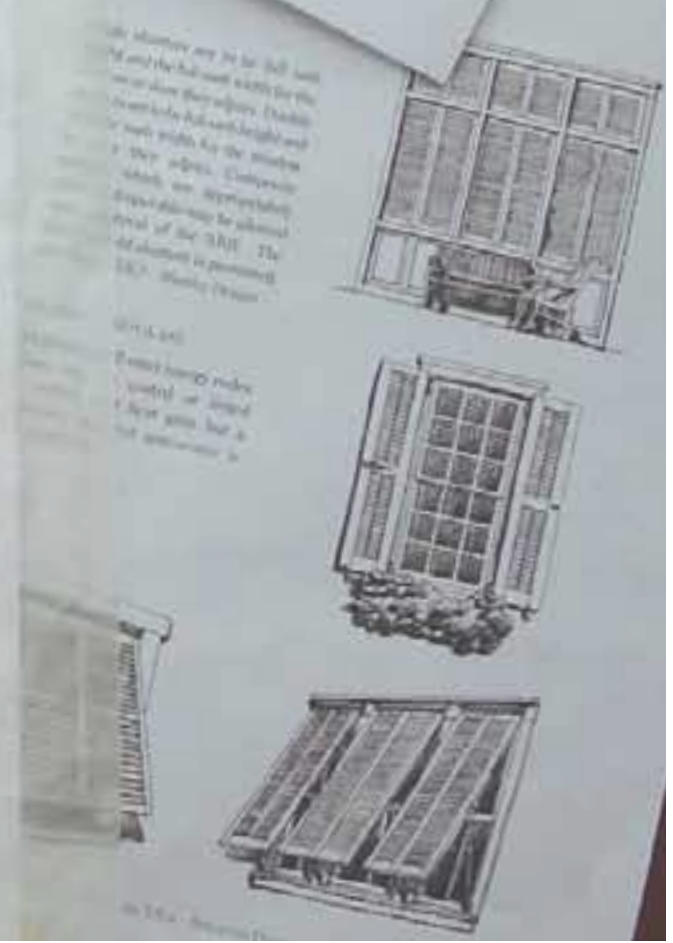
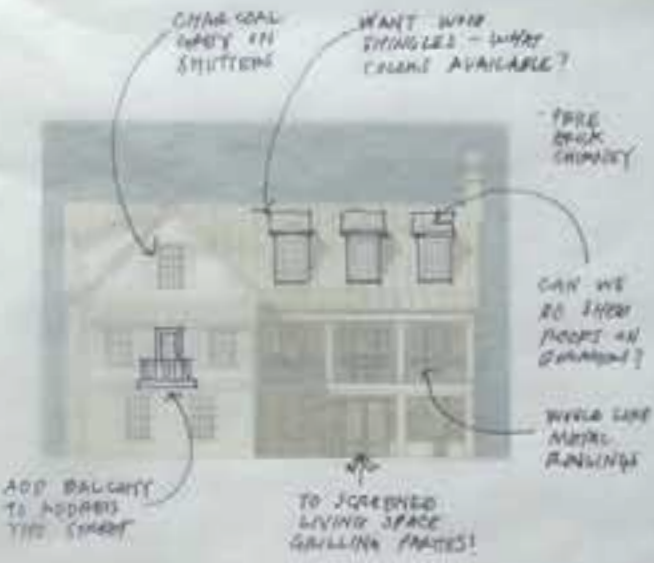
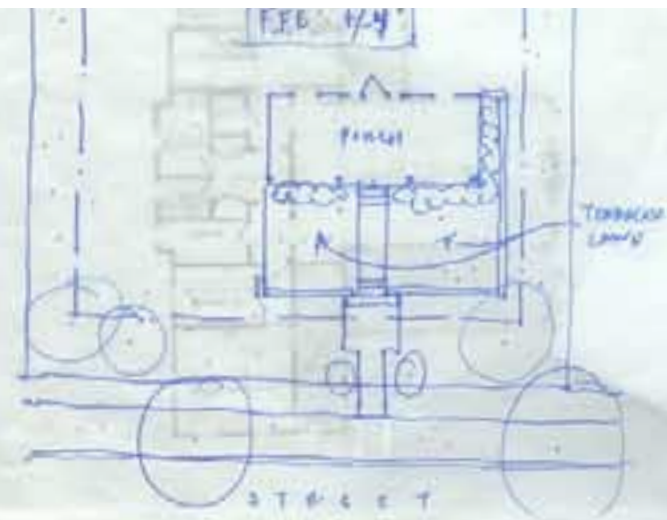


SSD-A2



# ARCHITECTURE GUIDELINES

The following Architectural standards have been developed to ensure the community's well-being and to encourage a sense of design excellence. The intent of these guidelines is to encourage a sense of design excellence while at the same time ensuring high quality homes that are appropriate for the community. These standards are intended to provide a framework for the community's future growth and development. The standards are intended to be flexible and to allow for future changes as the community evolves.



## PERSONALIZE YOUR HOME

Common considerations include:

- Reconfigure laundry and pantry layouts
- Reconfigure kitchen layout
- Floor and wall finishes
- Tub in master bathroom
- Roof material and dormer configuration
- Siding and foundation material selection
- Accent color for doors and shutters
- Porch configuration and detailing
- Door and window selections





# ARCHITECT GUILD



BEAU CLOWNEY ARCHITECTS

HISTORICAL CONCEPTS

STARR SANFORD DESIGN

THOMAS & DENZINGER

The brightest and best coastal homes come from a collaboration of the brightest and best coastal architects. The firms that make up the Kiawah River Architect Guild are leaders in the field of southern coastal design and each has a passion for this place. The Architect Series is more than just a plan book, it is a collection of thoughts, images and visions from our member architects, specifically chosen to open your mind, inspire your creativity and help you envision your life at Kiawah River. We invite you to get to know the members of the Kiawah River Architect Guild. On the pages that follow, each firm shares their distinctive vision for Kiawah River and some of the imagery, historic and contemporary, that guided their designs.



# BEAU CLOWNEY ARCHITECTS



Beau Clowney



Kate Campbell

## FIRM BIO

For over 20 years, Beau Clowney Architects has been working collaboratively with clients to create beautiful structures that seek to enhance life through good design. They have successfully designed a unique collection of homes throughout the U.S. and abroad that weave together the nature of the home's location with the unique character of the individual client. Architect Beau Clowney, a 6th generation South Carolina native, along with his partner Kate Campbell and talented leadership team, are passionate about the design and execution of each project. This widely published firm is located along the Battery in historic Charleston, South Carolina, which serves daily as a rich laboratory for continued research and design inspiration.

## DESIGN PHILOSOPHY

Our work seeks to exemplify the principals of design that most of our clients seek; creating timeless forms with an appropriate scale and proportion, truth in materials and crafting spaces where one can experience the integration of the landscape and architecture, all of which are critical for success in good design. We are a versatile design firm that brings a unique level of creativity to each project, focusing on the client, incorporating their desires into an overall creative vision for the project.

## OUTLOOK FOR KIAWAH RIVER

The collaboration between many varying stakeholders through the development of this project has been incredibly insightful and focused. From the beginning, we were aware that Kiawah River is a special place. Every activity and discussion as we moved forward with creating a vision was focused on generating designs that enhance the timeless quality of place that Kiawah River exudes. We feel that the principles of this community are grounded in core beliefs of stewardship, family and history. This will help Kiawah River maintain its vibrancy as a community into the future. We are very excited to be involved in the vision and strategy of Kiawah River.





*“the principles of this community are grounded in core beliefs of stewardship, family and history”*



# HISTORICAL CONCEPTS



Andrew Cogar



Ryan Yurcaba

## FIRM BIO

Contributing to the architectural landscape of the South since 1982, Historical Concepts is a traditional architecture and planning firm guided by historic precedent and the principles of classical design. Expressing these inspirations within the context of the regional architectural vernacular, the firm excels at conveying authenticity, tradition and an authentic sense of place through its designs. With a shared passion for historic architecture and a culture of creativity, the 40-person firm is perpetuating the time-honored principles of traditional design for a new generation.

## DESIGN PHILOSOPHY

Our roots are Southern, and our designs have long captured the spirit of Southern living, imbued with genteel grace, hospitality, casual elegance, and a deep sense of place - attributes which resonate profoundly with our national clientele and align seamlessly with the essence of Kiawah River. Our design philosophy embraces classical scale and proportion, vernacular ideology and historical precedent. By weaving the fundamental elements of scale, proportion and detail within the framework of each client's personal vision, Historical Concepts creates exceptional homes that capture the spirit of the past while fully embracing the present.

## OUTLOOK FOR KIAWAH RIVER

We strive to create residences that are comfortable, welcoming and enduring, with architecture that effortlessly fuses home and habitat. In each design challenge we also seek to discover the essence of its unique heritage and place. At Kiawah River, this means that the architectural history of the Lowcountry inspires our vision; the native beauty of the surroundings guides our designs. Here, we will connect past with present; tradition with innovation; and architecture with landscape, to create magical environments that affect the senses and nurture an authentic way of life.





*“the architectural history of the Lowcountry inspires our vision; the native beauty of the surroundings guides our designs”*



# STARR SANFORD DESIGN



Julia Starr Sanford

## FIRM BIO

Starr Sanford Design is an architecture and interiors firm excelling in coastal vernaculars and versed in a range of aesthetic traditions. Our practice encompasses custom home design, historic renovation and restoration, boutique commercial design, and full interior design, including our furniture and home accessories line, Sublime Original. Prominent in the emergence of the most celebrated, iconic urban planned communities worldwide, we draw universal principles from unique design experiences.

## DESIGN PHILOSOPHY

Appreciative of numerous geographies, we study the salient history and context of each site. Cosmopolitan designs unite urbanity with serenity. Agrarian estates are inspired by pastoral customs. Engaging all of the senses, we create spaces for a life well-lived. Homes throughout the South and along the Atlantic coast are distinctive in their attention to historical proportion and detail; the designs are distinguished by their old world techniques of wood joinery, heavy timber framing, and the grace of authentic detail. We emphasize fine craftsmanship as it promotes sustainability, and we take pride in the distinct artistry of each project.

## OUTLOOK FOR KIAWAH RIVER

Our branches extend internationally, but our roots lie in the South. We are honored to be among very short list of select designers known both regionally and nationally. The site is beautiful, the development team has a commitment to excellence, and the thought and attention that is going into the planning and design is unequalled. We have been given an opportunity to create a timeless village that is both traditional, and boldly new; authentic and carefully curated to be in harmony with, and not overshadow, the beautiful natural surroundings. The goal of maintaining lasting value is emphasized in every detail.





*“we have been given an opportunity to create a timeless village that is both traditional, and boldly new”*



# THOMAS & DENZINGER

## FIRM BIO

Thomas & Denzinger introduced a fresh interpretation of regional architecture to the South Carolina Low Country almost forty years ago. We borrow heavily from the rich historical context of the area as the basis for our contemporary designs. The firm's commitment to blending our work into the environment is recognized as sensitive, yet boldly unique in the use of material, form and interaction between the buildings and surrounding nature.

## DESIGN PHILOSOPHY

We consider the making of architecture to be a creative response to the land. The land comes first, and when our work is done, one should be able to feel how the features of the site inspired the form of the buildings and gardens. Our work weds three equally weighted components: site, the spiritual considerations and physical needs of the client into a balance where boundaries between nature and structure are fluid.



David Fisher

## OUTLOOK FOR KIAWAH RIVER

Thomas & Denzinger approaches Kiawah River with the intent to emphasize the natural beauty of the area. The trees, marshes, distant sea, breezes and sky will play integral parts informing our designs. The structure itself we understand is only a part of the adjacent land. Our homes are conceived to connect the senses and connect the homeowner to the world of Kiawah River.





*“connect the senses and connect the homeowner to the world of Kiawah River”*





# ARCHITECT SERIES Vol. I



C LOT

B LOT

A LOT

COTTAGE LOT

Home options at Kiawah River are categorized by Lot Type. The Jack Island Architect Series provides designs for four lot types as listed to the left. If you have selected a lot as a starting point, you may skip to the appropriate home series, otherwise we invite you to explore all that the series has to offer.





HOME NO. BCA-C1

2 STORIES  
4 or 5 BEDROOMS  
4-1/2 or 5-1/2 BATHROOMS

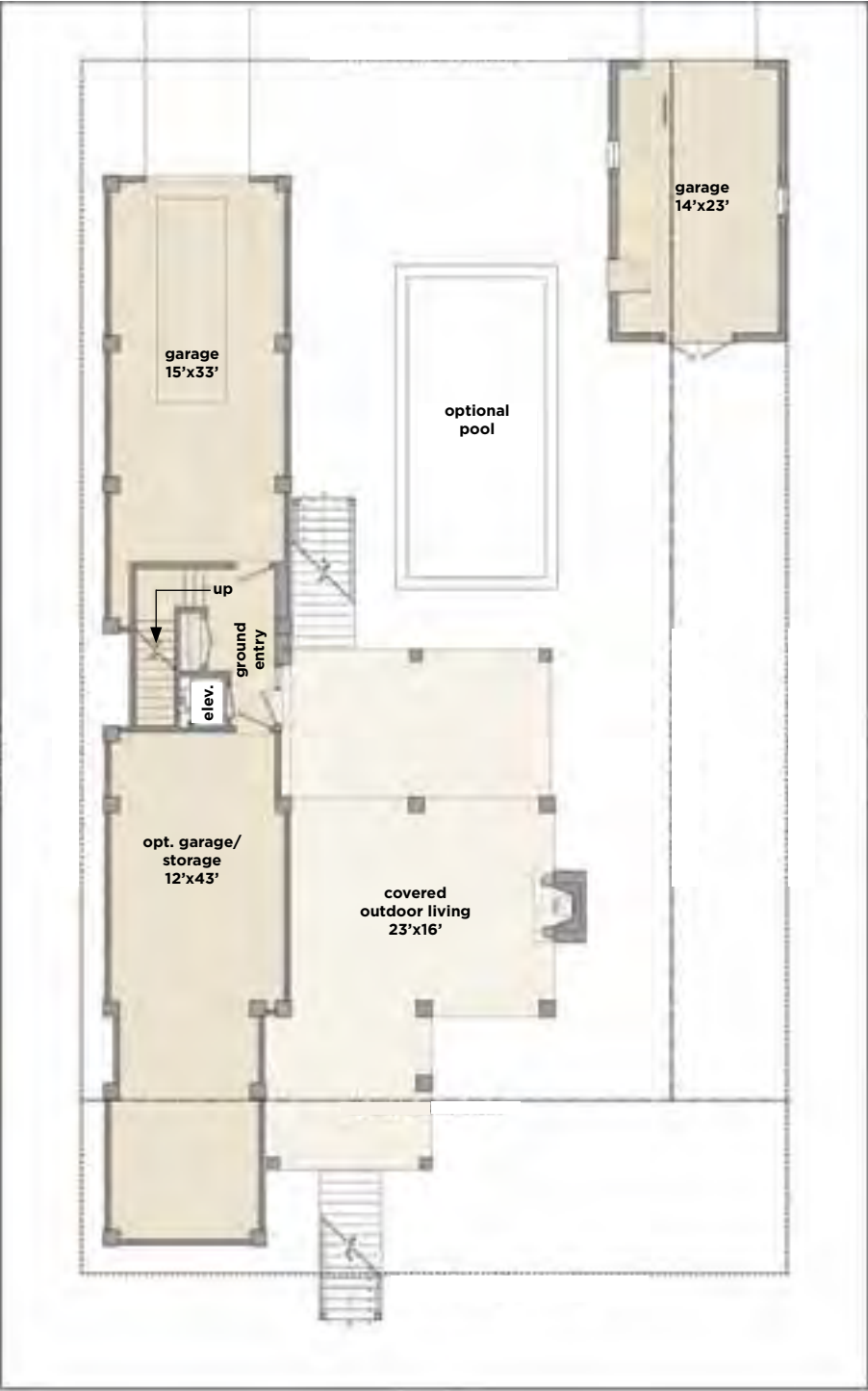
ARCHITECT: BEAU CLOWNEY ARCHITECTS

SQUARE FOOTAGE

Main Floor	1,958 sf
Upper Floor	1,188 sf
<b>Total Conditioned</b>	<b>3,146 sf</b>
Garden Level	2,501 sf
<i>incl. covered living, garage, &amp; storage</i>	
Main & Upper Level	385 sf
<i>incl. porches &amp; balconies</i>	
<b>Total Unconditioned</b>	<b>2,886 sf</b>
<b>Total Square Footage</b>	<b>6,032 sf</b>

DIMENSIONS

Suitable for C Lots  
Width: 39'-6"  
Length: 99'-0"



COVERED GARDEN LEVEL



MAIN LEVEL FLOOR PLAN



UPPER LEVEL FLOOR PLAN





## INSPIRATION

HOME NO. BCA-C1



- Open kitchen, dining and living plan
- Entry foyer
- Master on main with large master bath
- Study
- Second floor sitting room
- Three en suite guest bedrooms
- Covered garden level living with fireplace
- Pool option
- Optional detached garage
- Elevator option
- Parking from rear of property









HOME NO. SSD-C1

2 STORIES (PARTIAL)  
3 BEDROOMS  
3-1/2 BATHROOMS

ARCHITECT: STARR SANFORD DESIGN

SQUARE FOOTAGE

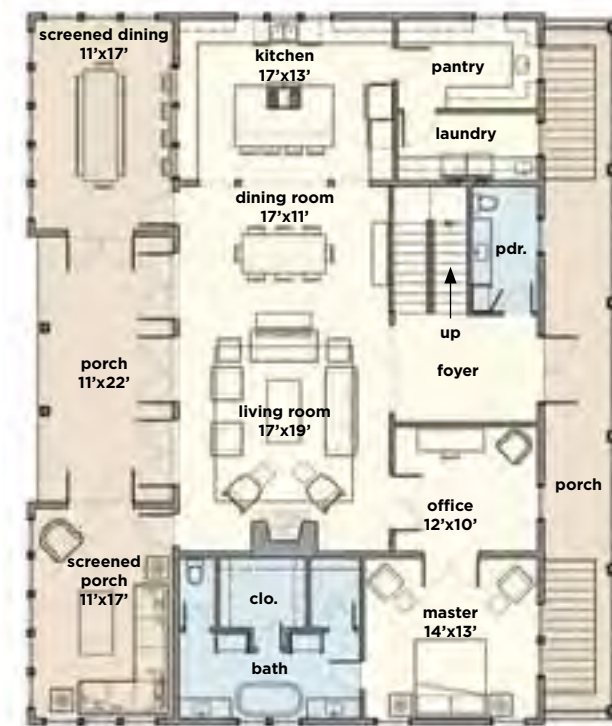
Main Floor	2,133 sf
Upper Floor	907 sf
<b>Total Conditioned</b>	<b>3,040 sf</b>
Garden Level	3,386 sf
<i>incl. covered living, garage &amp; storage</i>	
Main & Upper Level Porches	1,253 sf
<i>incl. porches &amp; balconies</i>	
<b>Total Unconditioned</b>	<b>4,639 sf</b>
<b>Total Square Footage</b>	<b>7,679 sf</b>

DIMENSIONS

Suitable for C Lots  
Width: 54'-6"  
Length: 64'-0"



COVERED GARDEN LEVEL



MAIN LEVEL FLOOR PLAN



UPPER LEVEL FLOOR PLAN





## INSPIRATION

### HOME NO. SSD-C1

- Main level master suite with attached office
- Generous screened porch off living room
- Al fresco dining screened porch
- Covered outdoor living at ground level with pool bar, space for hammocks and game room
- Pool and gardens
- Two guest bedrooms with en suite bathrooms
- Detached garage
- Upper level sitting room
- Many windows for daylighting and ventilation
- Garden level living
- Landscaped courtyard











## HOME NO. TD-C1

2 STORIES

4 BEDROOMS

4-1/2 BATHROOMS

ARCHITECT: THOMAS & DENZINGER

### SQUARE FOOTAGE

Main Floor	1,912sf
Upper Floor	1,056sf
<b>Total Conditioned</b>	<b>2,968 sf</b>

Garden Level	2,052 sf
<i>incl. covered living, garage &amp; storage</i>	
Main & Upper Level Porches	650 sf
<i>incl. porches &amp; balconies</i>	
<b>Total Unconditioned</b>	<b>2,702 sf</b>

<b>Total Square Footage</b>	<b>5,670 sf</b>
-----------------------------	-----------------

### DIMENSIONS

Suitable for C Lots  
Width: 53'  
Length: 92'



COVERED GARDEN LEVEL



MAIN LEVEL FLOOR PLAN



UPPER LEVEL FLOOR PLAN





## INSPIRATION

HOME NO. TD-C1

- Vaulted living room
- Large screened porch off kitchen
- Optional garden level fireplace
- Central open stair feature
- Open kitchen/dining/living
- Tall ceilings
- Optional garden level fireplace









HOME NO. HC-C2

1-1/2 STORIES

5 BEDROOMS

4-1/2 BATHROOMS

ARCHITECT: HISTORICAL CONCEPTS

SQUARE FOOTAGE

Main Floor	1,984 sf
Upper Floor	1,487 sf
<b>Total Conditioned</b>	<b>3,471 sf</b>
Garden Level	2,592 sf
<i>incl. covered living, garage &amp; storage</i>	
Main & Upper Level Porches	608 sf
<i>incl. porches &amp; balconies</i>	
<b>Total Unconditioned</b>	<b>3,200 sf</b>
<b>Total Square Footage</b>	<b>6,671 sf</b>

DIMENSIONS

Suitable for C Lots  
Width: 55'  
Length: 70'

*Plan also available in:  
alley-loaded configuration  
crawl-space configuration*



COVERED GARDEN LEVEL



MAIN LEVEL FLOOR PLAN



UPPER LEVEL FLOOR PLAN





## INSPIRATION

HOME NO. HC-C2

- Lowcountry vernacular charm
- Outdoor living at all levels
- Plentiful windows for natural light
- Open, generous living spaces
- Master on main level
- Spacious pantry, laundry & closets
- Optional vaulted dining & living











HOME NO. SSD-B1

2 STORIES

4 BEDROOMS

4-1/2 BATHROOMS

ARCHITECT: STARR SANFORD DESIGN

SQUARE FOOTAGE

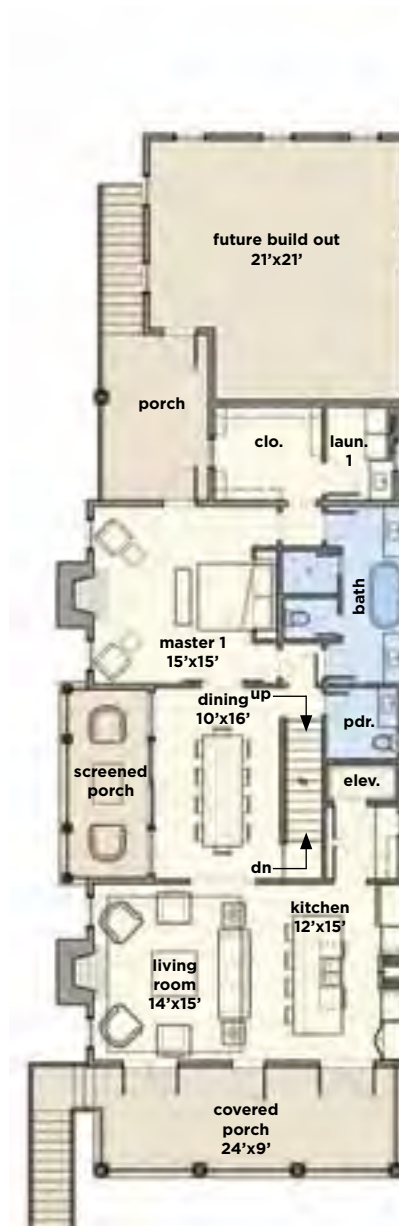
Main Floor	1,530 sf
Upper Floor	1,648 sf
<b>Total Conditioned</b>	<b>3,178 sf</b>
Garden Level	2,253 sf
<i>incl. covered living, garage, &amp; storage</i>	
Main & Upper Level	705 sf
<i>incl. porches &amp; balconies</i>	
<b>Total Unconditioned</b>	<b>2,958 sf</b>
<b>Total Square Footage</b>	<b>6,136 sf</b>

DIMENSIONS

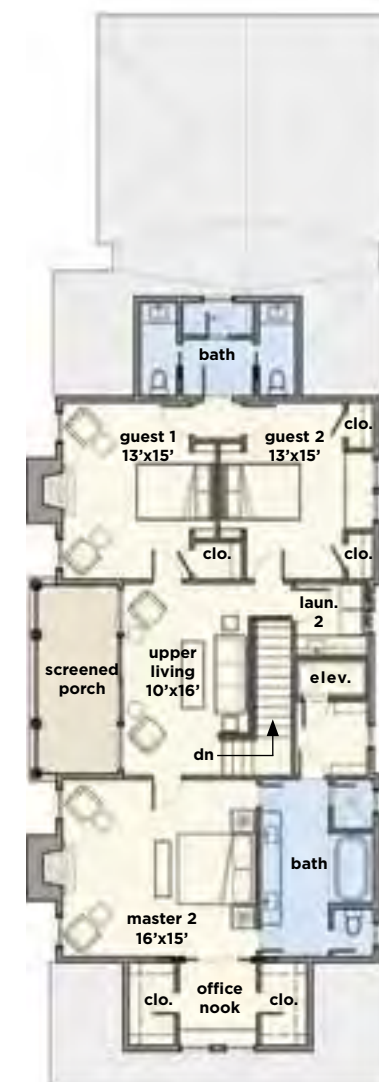
Suitable for B Lots  
Width: 27'-6"  
Length: 89'-6"



COVERED GARDEN LEVEL



MAIN LEVEL FLOOR PLAN



UPPER LEVEL FLOOR PLAN





## INSPIRATION

### HOME NO. SSD-B1

- o Screened porches and covered porch
- o Open kitchen and living room
- o Upper level living space with screened porch
- o Build out over garage
- o Garage and parking off the back of lot
- o Two master suites with fireplaces on separate floors
- o Office nook in upper level master suite
- o Many windows for daylighting and ventilation
- o Covered outdoor living with fireplace and bar
- o Screened porches and covered porch
- o Garden level living
- o Landscaped courtyard









HOME NO. TD-B1

2 STORIES

3 BEDROOMS

3-1/2 BATHROOMS

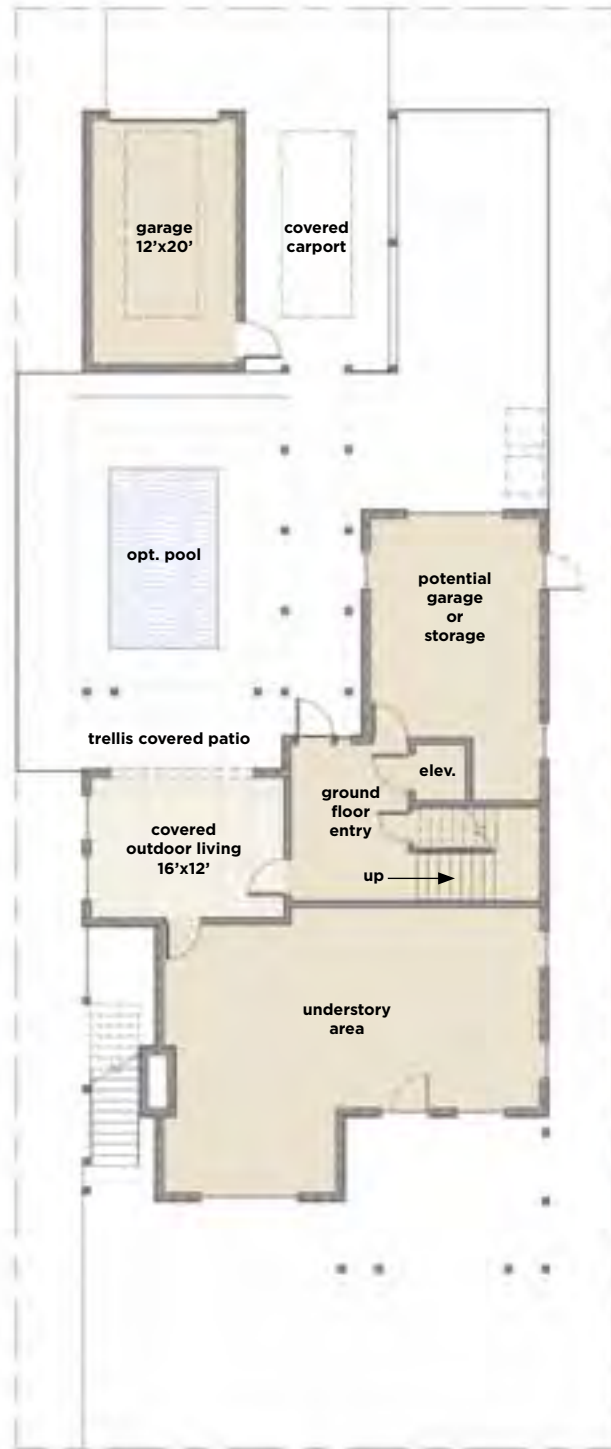
ARCHITECT: THOMAS & DENZINGER

SQUARE FOOTAGE

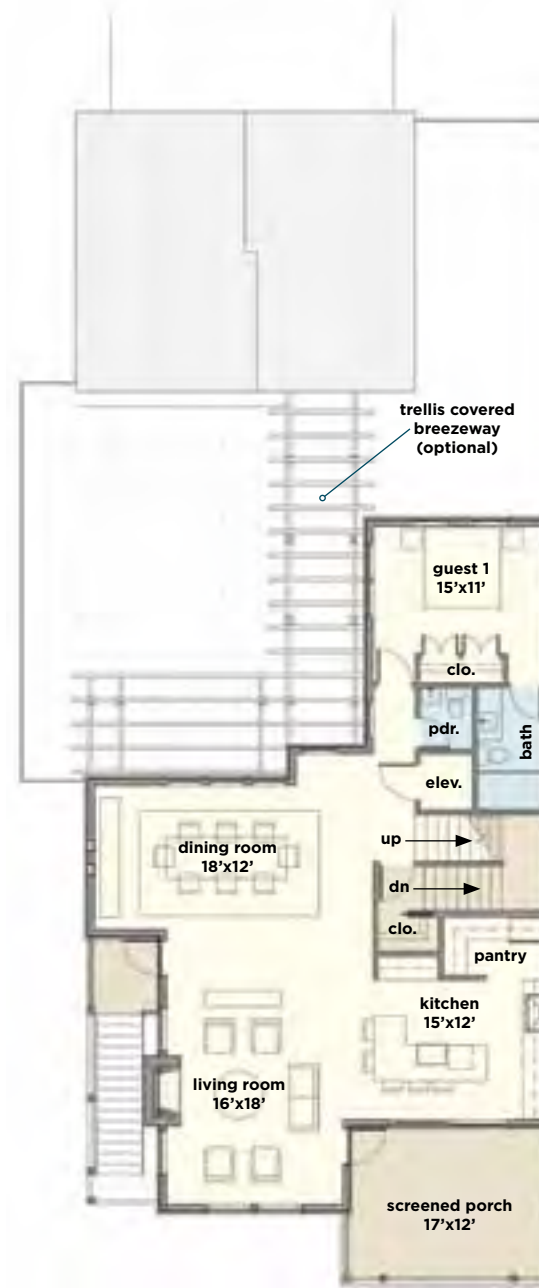
Main Floor	1,510sf
Upper Floor	1,010sf
<b>Total Conditioned</b>	<b>2,520 sf</b>
Garden Level	1,494 sf
<i>incl. covered living, garage, &amp; storage</i>	
Main & Upper Level	382 sf
<i>incl. porches &amp; balconies</i>	
<b>Total Unconditioned</b>	<b>1,876 sf</b>
<b>Total Square Footage</b>	<b>4,396 sf</b>

DIMENSIONS

Suitable for B Lots  
Width: 40'  
Length: 64'



COVERED GARDEN LEVEL



MAIN LEVEL FLOOR PLAN



UPPER LEVEL FLOOR PLAN





## INSPIRATION

HOME NO. TD-B1

- Open living/dining/kitchen for free flow
- Large windows for natural light and ventilation
- Destination bedrooms for peaceful contemplation
- Generous screened porch off living area
- Tall ceilings
- Optional detached garage









## HOME NO. BCA-B2

2 STORIES

4 BEDROOMS

4-1/2 BATHROOMS

ARCHITECT: BEAU CLOWNEY ARCHITECTS

### SQUARE FOOTAGE

Main Floor	1,723 sf
Upper Floor	1,363 sf
<b>Total Conditioned</b>	<b>3,086 sf</b>

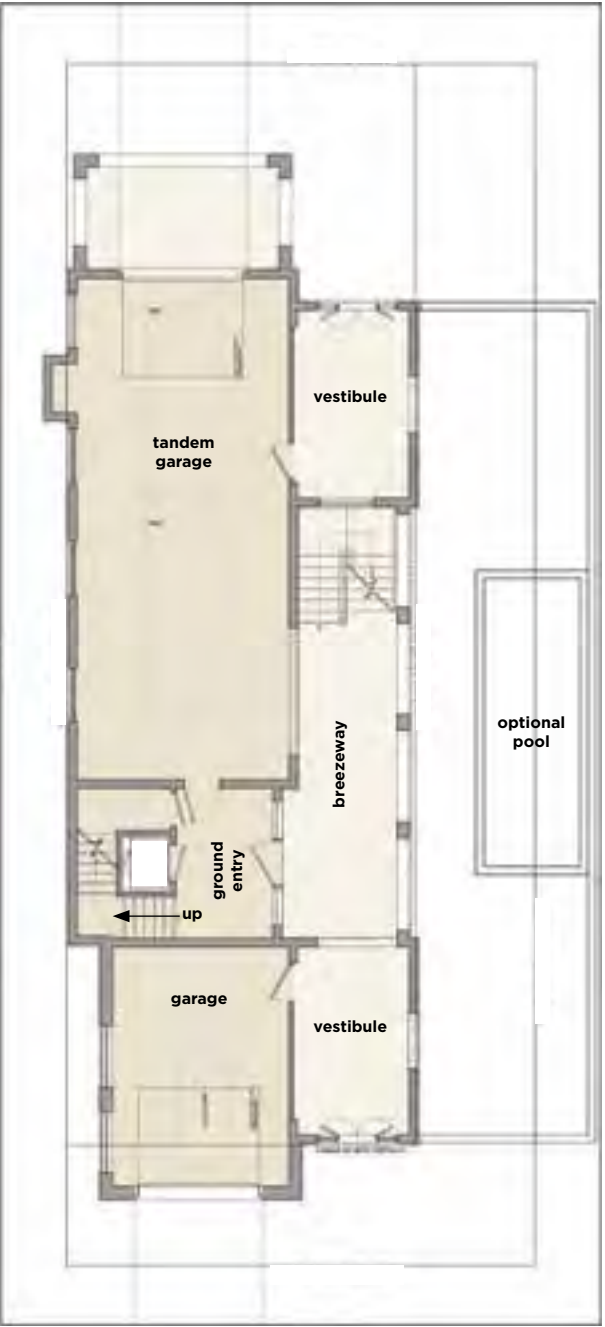
Garden Level	2,293 sf
<i>incl. covered living, garage, &amp; storage</i>	
Main & Upper Level	525 sf
<i>incl. porches &amp; balconies</i>	
<b>Total Unconditioned</b>	<b>2,818 sf</b>

<b>Total Square Footage</b>	<b>5,904 sf</b>
-----------------------------	-----------------

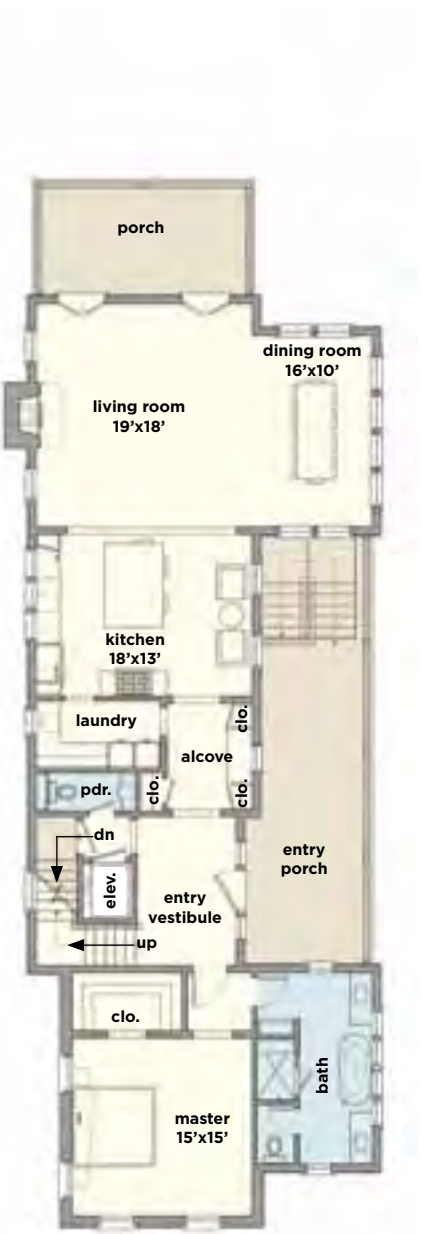
### DIMENSIONS

Suitable for B Lots  
Width: 29'-6"  
Length: 87'-0"

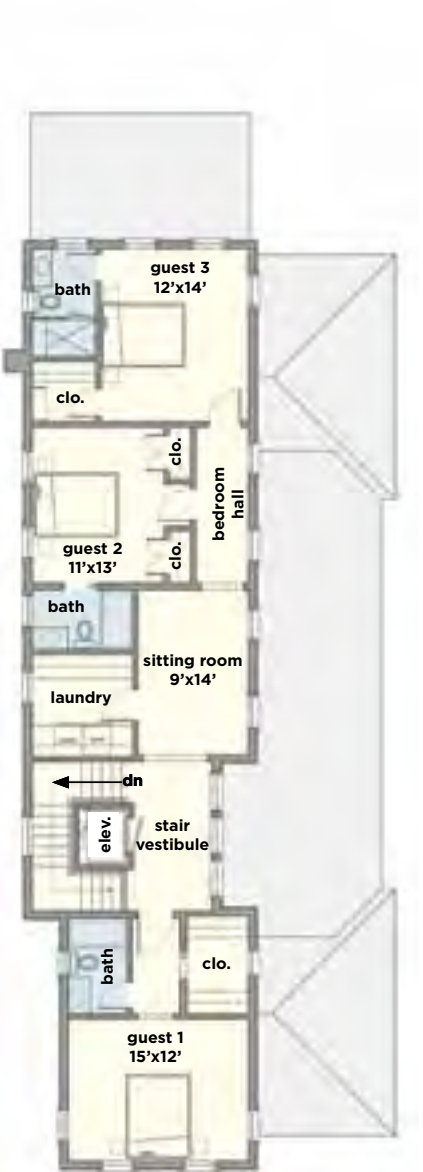
*Plan can be flipped front-to-back  
for alley-loaded lot*



COVERED GARDEN LEVEL



MAIN LEVEL FLOOR PLAN



UPPER LEVEL FLOOR PLAN





## INSPIRATION

### HOME NO. BCA-B2

- Covered entry along garden under side porch
- Dedicated dining room
- Master on main with large master bath
- Three en suite guest bedrooms
- Second floor sitting room
- Open kitchen and living plan
- Covered garden level living space
- Side and rear porch
- Pool option
- Side garden
- Elevator option
- Parking from front or rear of property









HOME NO. HC-B2

2 STORIES (PARTIAL)  
3 BEDROOMS  
3-1/2 BATHROOMS

ARCHITECT: HISTORICAL CONCEPTS

SQUARE FOOTAGE

Main Floor	1,769 sf
Upper Floor	1,074 sf
<b>Total Conditioned</b>	<b>2,843 sf</b>
Garden Level	2,010 sf
<i>incl. covered living, garage, &amp; storage</i>	
Main & Upper Level	607 sf
<i>incl. porches &amp; balconies</i>	
<b>Total Unconditioned</b>	<b>2,617 sf</b>
<b>Total Square Footage</b>	<b>5,460 sf</b>

DIMENSIONS

Suitable for B Lots  
Width: 39'  
Length: 76'



COVERED GARDEN LEVEL



MAIN LEVEL FLOOR PLAN



UPPER LEVEL FLOOR PLAN





## INSPIRATION

HOME NO. HC-B2



- o Coastal farmhouse appeal
- o En suite bathrooms
- o Fireplace on two levels
- o Master and study on main level
- o Spacious kitchen open to dining
- o Upper level sitting room
- o Dual garages with loads of storage









HOME NO. BCA-A1

2 STORIES

3 BEDROOMS

3-1/2 BATHROOMS

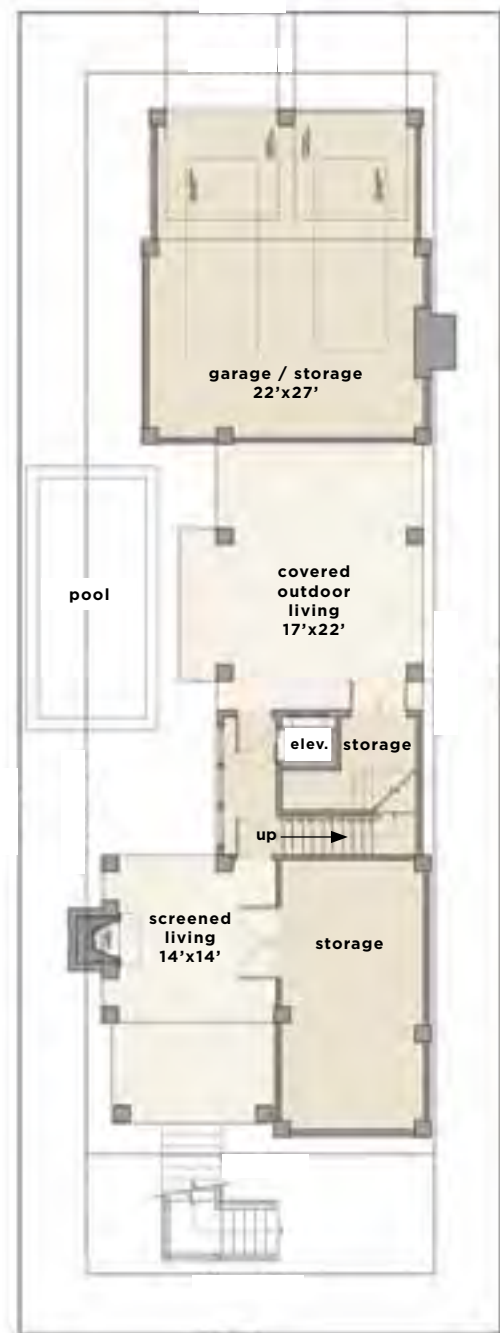
ARCHITECT: BEAU CLOWNEY ARCHITECTS

SQUARE FOOTAGE

Main Floor	1,529 sf
Upper Floor	994 sf
<b>Total Conditioned</b>	<b>2,523 sf</b>
Garden Level	1,904 sf
<i>incl. covered living, garage &amp; storage</i>	
Main & Upper Level	359 sf
<i>incl. porches &amp; balconies</i>	
<b>Total Unconditioned</b>	<b>2,263 sf</b>
<b>Total Square Footage</b>	<b>4,786 sf</b>

DIMENSIONS

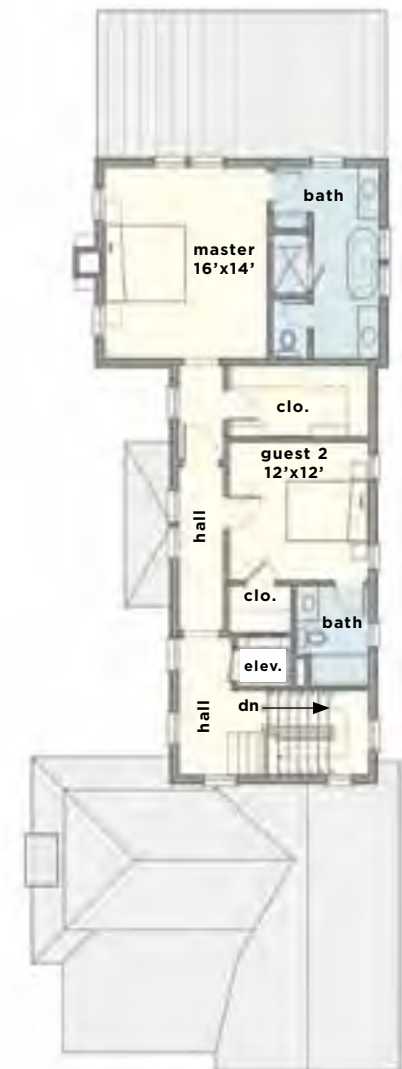
Suitable for A Lots  
Width: 28'  
Length: 96'



COVERED GARDEN LEVEL



MAIN LEVEL FLOOR PLAN



UPPER LEVEL FLOOR PLAN





## INSPIRATION

HOME NO. BCA-A1

- Front sitting room entry with fireplace
- Dining bay
- Master on second floor (optional first floor)
- Second floor sitting room
- Covered garden level living with fireplace
- Side porch
- Pool option
- Side garden
- Elevator option
- Rear loaded garage with side-by-side parking









## HOME NO. SSD-A1

2 STORIES

3 BEDROOMS

3-1/2 BATHROOMS

ARCHITECT: STARR SANFORD DESIGN

### SQUARE FOOTAGE

Main Floor	1,719 sf
Upper Floor	1,191 sf
<b>Total Conditioned</b>	<b>2,910 sf</b>

Garden Level	2,203 sf
<i>incl. covered living, garage &amp; storage</i>	
Main & Upper Level	484 sf
<i>incl. porches &amp; balconies</i>	
<b>Total Unconditioned</b>	<b>2,687 sf</b>

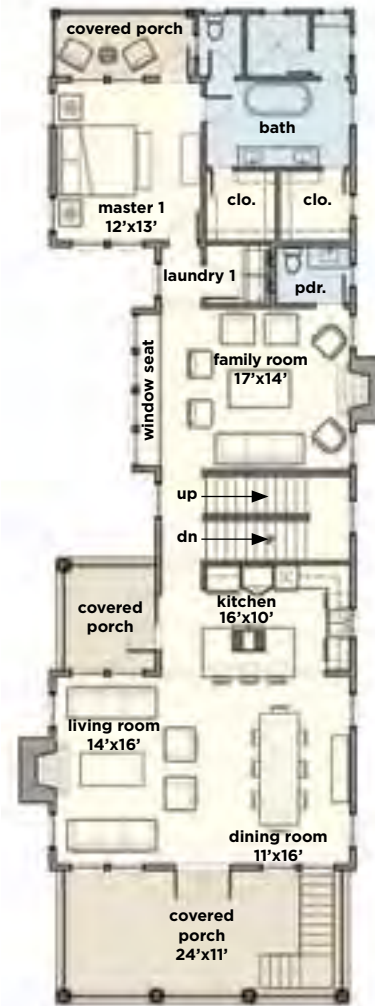
<b>Total Square Footage</b>	<b>5,597 sf</b>
-----------------------------	-----------------

### DIMENSIONS

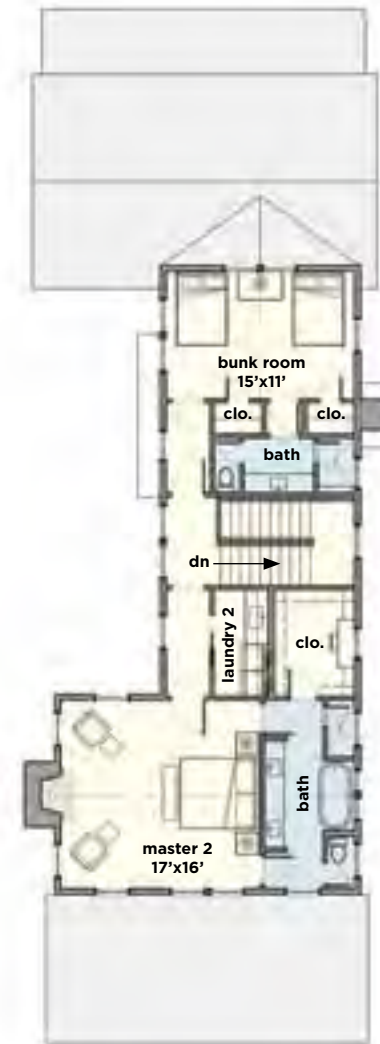
Suitable for A Lots  
Width: 27'-6"  
Length: 89'-6"



COVERED GARDEN LEVEL



MAIN LEVEL FLOOR PLAN



UPPER LEVEL FLOOR PLAN





## INSPIRATION

HOME NO. SSD-A1

- o Open floor plan for living, dining and kitchen
- o Family room with fireplace and window seat
- o Two master suites on separate floors
- o Multiple covered porches
- o Garage off the back of lot with storage
- o Many windows for daylighting and ventilation
- o Two laundry spaces (one on each floor)
- o Garden level living
- o Landscaped courtyard
- o Covered outdoor living with fireplace











## HOME NO. BCA-A2

2 STORIES (PARTIAL)

3 BEDROOMS

3-1/2 BATHROOMS

ARCHITECT: BEAU CLOWNEY ARCHITECTS

### SQUARE FOOTAGE

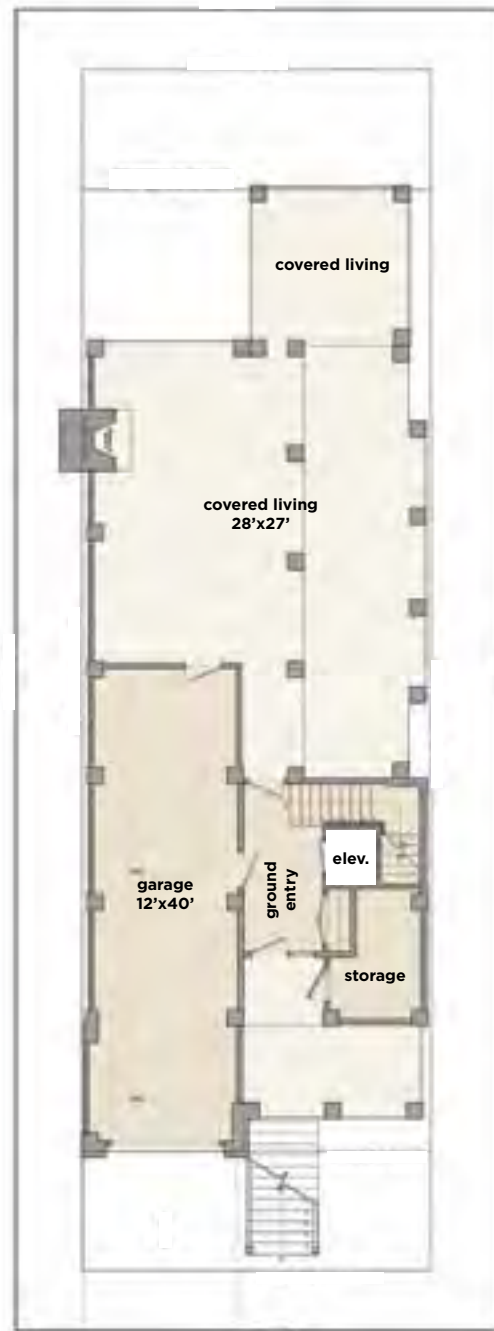
Main Floor	1,554 sf
Upper Floor	721 sf
<b>Total Conditioned</b>	<b>2,275 sf</b>

Garden Level	2,030 sf
<i>incl. covered living, garage, &amp; storage</i>	
Main & Upper Level	462 sf
<i>incl. porches &amp; balconies</i>	
<b>Total Unconditioned</b>	<b>2,492 sf</b>

<b>Total Square Footage</b>	<b>4,767 sf</b>
-----------------------------	-----------------

### DIMENSIONS

Suitable for A Lots  
Width: 29'  
Length: 89'



COVERED GARDEN LEVEL



MAIN LEVEL FLOOR PLAN



UPPER LEVEL FLOOR PLAN





## INSPIRATION

HOME NO. BCA-A2

- Center hall entry
- Open kitchen and living plan
- Vaulted ceilings
- Master on main
- Second floor sitting room
- Covered garden level living with fireplace
- Side porch
- Study
- Elevator option
- Front loaded garage











## HOME NO. SSD-A2

1-1/2 STORIES

3 BEDROOMS

3-1/2 BATHROOMS

ARCHITECT: STARR SANFORD DESIGN

### SQUARE FOOTAGE

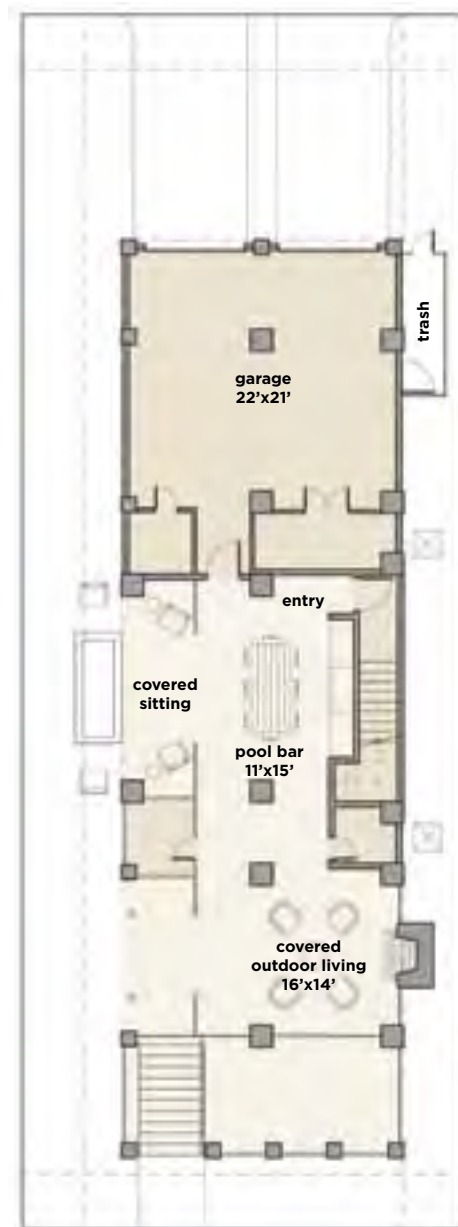
Main Floor	1,468 sf
Upper Floor	1,169 sf
<b>Total Conditioned</b>	<b>2,637 sf</b>

Garden Level	1,681 sf
<i>incl. covered living, garage, &amp; storage</i>	
Main & Upper Level	512 sf
<i>incl. porches &amp; balconies</i>	
<b>Total Unconditioned</b>	<b>2,193 sf</b>

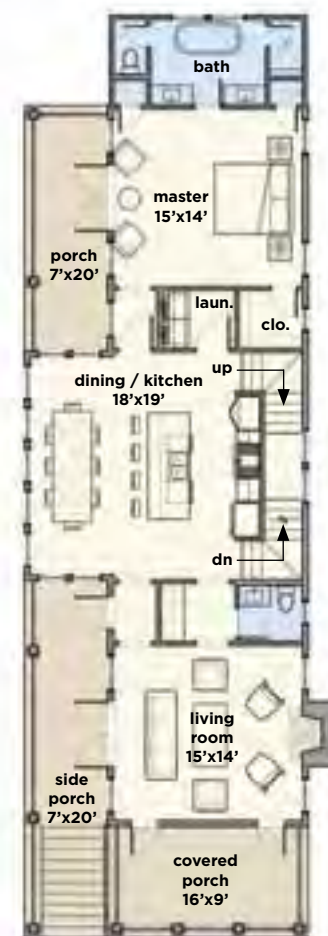
<b>Total Square Footage</b>	<b>4,830 sf</b>
-----------------------------	-----------------

### DIMENSIONS

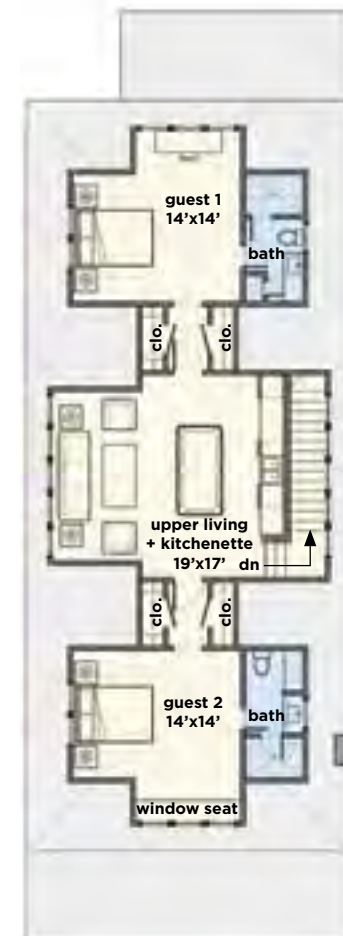
Suitable for A Lots  
Width: 25'-6"  
Length: 83'-0"



COVERED GARDEN LEVEL



MAIN LEVEL FLOOR PLAN



UPPER LEVEL FLOOR PLAN





## INSPIRATION

HOME NO. SSD-A2

- Upper level living space with kitchenette
- Master suite on main level with private porch
- Two guest rooms with en suite bathrooms
- Plunge pool
- Covered outdoor living with fireplace option
- Living room with fireplace and covered porch
- Many windows for daylighting and ventilation
- Garage off rear of lot with storage
- Garden level living







# THE BUTTERFLY COTTAGE COLLECTION

---



BUTTERFLY COTTAGE  
NO. 1

1.5 STORIES

2/3 BEDROOMS

2.5/3 BATHROOMS

ARCHITECT: STARR SANFORD DESIGN



MAIN LEVEL FLOOR PLAN



UPPER LEVEL FLOOR PLAN

SQUARE FOOTAGE

Main Floor	1,417 sf
Upper Floor	815 sf
<b>Total Conditioned</b>	<b>2,232 sf</b>
Interior Unconditioned	20 sf
Porches & Balconies	562 sf
<b>Total Unconditioned</b>	<b>582 sf</b>
<b>Total Square Footage</b>	<b>2,814 sf</b>

DIMENSIONS

Suitable for Cottage Lots  
Width: 35'  
Length: 72'

BUTTERFLY COTTAGE NO. 1





BUTTERFLY COTTAGE  
NO. 2

1.5 STORIES

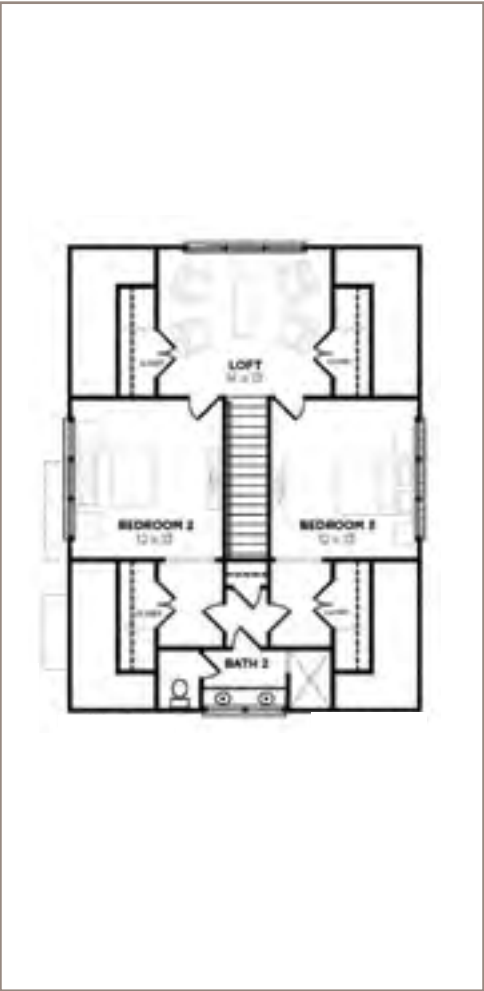
3 BEDROOMS

2.5 BATHROOMS

ARCHITECT: STARR SANFORD DESIGN



MAIN LEVEL FLOOR PLAN



UPPER LEVEL FLOOR PLAN

SQUARE FOOTAGE

Main Floor	1,208 sf
Upper Floor	939 sf
<b>Total Conditioned</b>	<b>2,147 sf</b>
Interior Unconditioned	228 sf
Porches & Balconies	237 sf
<b>Total Unconditioned</b>	<b>465 sf</b>
<b>Total Square Footage</b>	<b>2,612 sf</b>

DIMENSIONS

Suitable for Cottage Lots  
Width: 34'  
Length: 53'

BUTTERFLY COTTAGE NO. 2



BUTTERFLY COTTAGE  
NO. 3

1.5 STORIES

3 BEDROOMS

3.5 BATHROOMS

ARCHITECT: STARR SANFORD DESIGN



MAIN LEVEL FLOOR PLAN



UPPER LEVEL FLOOR PLAN

SQUARE FOOTAGE

Main Floor	889 sf
Upper Floor	889 sf
<b>Total Conditioned</b>	<b>1,778 sf</b>
Interior Unconditioned	0 sf
Porches & Balconies	250 sf
<b>Total Unconditioned</b>	<b>250 sf</b>
<b>Total Square Footage</b>	<b>2,028 sf</b>

DIMENSIONS

Suitable for Cottage Lots  
Width: 19'  
Length: 60'

BUTTERFLY COTTAGE NO. 3





Architect Series Vol. 1

PLAN MATRIX

----- LOT CHARACTERISTICS -----				----- SQUARE FOOTAGE -----						-- DIMENSIONS --		----- PLAN PROGRAM -----				----- FEATURES -----	
Plan No.	Lot Type	Lot Access	Parking Spaces	Main	Upper	Total Cond.	Uncond. Ground Level	Uncond. Living Levels	Total	Width	Length	Stories	Bedrooms	Baths	Master Location	Elevator	Fireplaces
BCA-C1	C1	FRONT/REAR	2.5 / 2.5	1,958	1,188	3,146	2,501	385	6,032	39.5'	99'	2	4 / 5	4.5 / 5.5	main	Yes	2
SSD-C1	C1	SIDE/FRONT	2	2,133	907	3,040	3,386	1,253	7,679	54.3'	64'	2	3	3.5	main	No	1
TD-C1	C1	FRONT/REAR	2.5 / 2	1,912	1,056	2,968	2,052	650	5,670	53'	92'	2	4	4.5	main	Yes	2
HC-C2	C2	FRONT	2	1,984	1,487	3,471	2,992	608	7,071	55'	70'	1.5	5	4.5	main	Yes	2
SSD-B1	B1	REAR	2	1,530	1,648	3,178	2,253	705	6,136	27.5'	89.5'	2	4	4.5	main	Yes	4
TD-B1	B1	REAR	2	1,510	1,010	2,520	1,494	382	4,396	40'	64'	2	3	3.5	upper	Yes	1
BCA-B2	B2	FRONT/REAR	1 / 2	1,723	1,363	3,086	2,293	525	5,904	29.5'	87'	2	4	4.5	main	Yes	2
HC-B2	B2	FRONT	2.5	1,769	1,074	2,843	2,010	607	5,460	39'	76'	1.5	3	3.5	main	Yes	2
BCA-A1	A1	REAR	2	1,529	994	2,523	1,904	359	4,786	28'	96'	2	3	3.5	upper	Yes	3
SSD-A1	A1	REAR	2	1,719	1,191	2,910	2,203	484	5,597	27.5'	89.5'	2	3	3.5	main	No	3
BCA-A2	A2	FRONT	2	1,554	721	2,275	2,030	462	4,767	29'	89'	2	3	3.5	main	Yes	2
SSD-A2	A2	REAR	2	1,468	1,169	2,637	1,681	512	4,830	25.5'	83'	1.5	3	3.5	main	No	1
COTTAGE 1	COTTAGE	REAR	2	1,417	815	2,232	0	582	2,814	35'	72'	1.5	2/3	2.5/3	main	No	0
COTTAGE 2	COTTAGE	REAR	2	1,208	939	2,147	0	465	2,612	34'	53'	1.5	3	2.5	main	No	1
COTTAGE 3	COTTAGE	REAR	2	889	889	1,778	0	250	2,028	19'	60'	1.5	3	3.5	main	No	0

THIS MATERIAL SHALL NOT CONSTITUTE A VALID OFFER IN ANY JURISDICTION WHERE PRIOR REGISTRATION IS REQUIRED, BUT NOT YET FULFILLED. THE FACILITIES AND AMENITIES DESCRIBED AND DEPICTED ARE PROPOSED, BUT NOT YET CONSTRUCTED. PHOTOGRAPHS AND ARTISTS' RENDERINGS ARE FOR ILLUSTRATIVE PURPOSES ONLY AND ARE MERELY REPRESENTATIVE OF CURRENT DEVELOPMENT PLANS. DEVELOPMENT PLANS, AMENITIES, FACILITIES, DIMENSIONS, SPECIFICATIONS, PRICES AND FEATURES DEPICTED OR DESCRIBED HEREIN ARE APPROXIMATE AND SUBJECT TO CHANGE WITHOUT NOTICE.





## JACK ISLAND ARCHITECT GUILD



**BEAU CLOWNEY ARCHITECTS**

[beauclooney.com](http://beauclooney.com)

One King Street, Suite 102

Charleston, SC 29401

(843) 722-2040



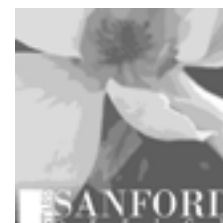
**HISTORICAL CONCEPTS**

[historicalconcepts.com](http://historicalconcepts.com)

490 Brasfield Square

Atlanta, GA 30316

(678) 325-6665



**STARR SANFORD DESIGN**

[starrsanford.com](http://starrsanford.com)

370 4th Avenue South

Jacksonville Beach, FL 32250

(904) 707-9761



**THOMAS & DENZINGER**

[thomasanddenzinger.com](http://thomasanddenzinger.com)

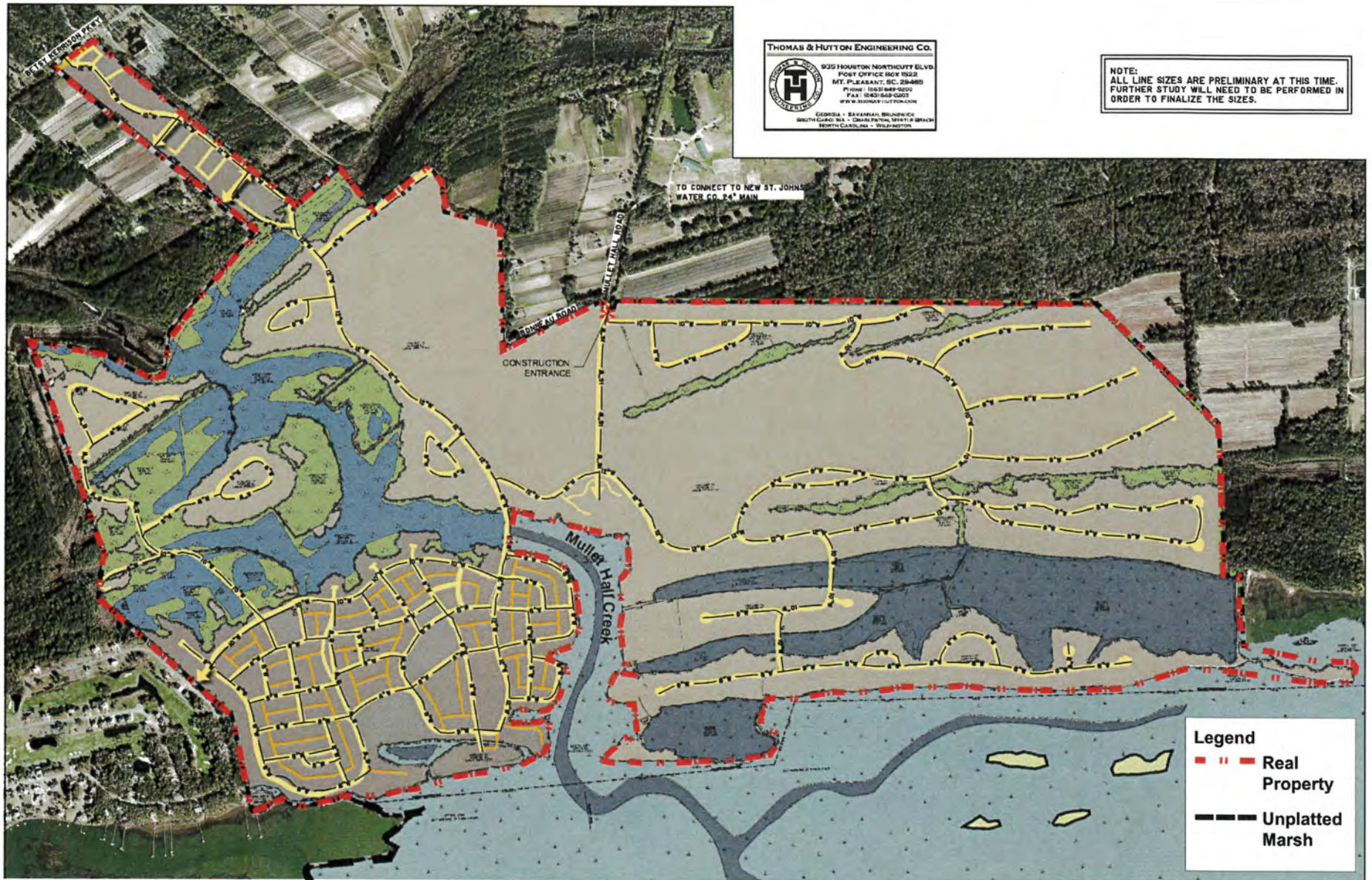
138 Saint Philip Street, Suite 200

Charleston, SC 29413

(843) 723-6651







THOMAS & HUTTON ENGINEERING CO.  
 935 HOUNTON NORTHCHURCH BLVD  
 POST OFFICE BOX 15522  
 MT. PLEASANT, SC 29485  
 PHONE: (843) 886-1000  
 FAX: (843) 886-0203  
 WWW.THOMASHTON.COM  
 GEORGIA • SAVANNAH • BIRMINGHAM  
 SOUTH CAROLINA • CHARLOTTE • WYOMING • WYOMING  
 NORTH CAROLINA • WELLS RICHMOND

NOTE:  
 ALL LINE SIZES ARE PRELIMINARY AT THIS TIME.  
 FURTHER STUDY WILL NEED TO BE PERFORMED IN  
 ORDER TO FINALIZE THE SIZES.

**Legend**  
 - - - Real Property  
 - - - Unplatted Marsh

SCALE  
 0 500' 1000' 2000'

*Kiawah River Plantation*

EXHIBIT 14.1 - WATER DISTRIBUTION MASTER PLAN



# GOLF SCORECARD - ROUTING PLAN 5

Hole	Par	Yards	Hole	Par	Yards
1	9	475	17	5	240
2	3	220	18	4	412
3	5	530	19	3	900
4	6	450	20	4	594
5	6	399	21	4	417
6	5	389	22	4	409
7	4	442	23	4	430
8	5	377	24	4	296
9	4	365	25	5	649
OUT	36	3727	IN	36	3936
		TOTAL	72	7663	

TOTAL AREA FOR  
PROPOSED LAKES - 25.0  
ACRES



## GOLF VARIETY ANALYSIS - ROUTING PLAN 5

HOLE	PAR	PROPORTION	EXISTING LIFT	PROPOSED LIFT	DIFFERENCE	TOTAL DIFFERENCE		
						PROPOSED LIFT	PROPOSED LIFT	PROPOSED LIFT
1	9	30						
2	3	10						
3	5	10						
4	6	10						
5	6	10						
6	5	10						
7	4	10						
8	5	10						
9	4	10						
10	5	10						
11	4	10						
12	5	10						
13	4	10						
14	4	10						
15	4	10						
16	4	10						
17	5	10						
18	4	10						
TOTAL	72		2	6	10	6	4	3



Kiawah River Plantation

EXHIBIT 15.1 - ALTERNATIVE SKETCH PLANS



# GOLF SCORECARD - ROUTING PLAN 3

Hole	Par	Yards	Hole	Par	Yards
1	3	172	17	3	234
2	3	234	18	4	303
3	4	471	19	4	306
4	4	447	20	3	303
5	4	177	21	3	303
6	5	306	22	4	432
7	4	427	23	4	490
8	3	163	24	3	224
9	4	452	25	3	303
OUT	36	5741	IN	36	3842
		TOTAL	72	7583	

TOTAL AREA OF  
PROPOSED LAKES - 40.2 ACRES

EXISTING TREES

PROPOSED TREES  
(over 10" dbh or 10' tall or more)

PROPOSED LANDFORM  
(over 10' high or 10' wide or more)

MULLEN HILL CREEK  
(over 10' high and 10' wide or more)

GOLF MAINTENANCE AREA  
(Proposed Existing Trees up  
to 10" dbh or 10' tall or more)

PROPOSED LAKE  
(over 10' high or 10' wide or more)

RESIDENTIAL DEVELOPMENT

RESIDENTIAL DEVELOPMENT

RESIDENTIAL DEVELOPMENT

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE

EXISTING LAKE</



# RESIDENTIAL PRODUCT SUMMARY

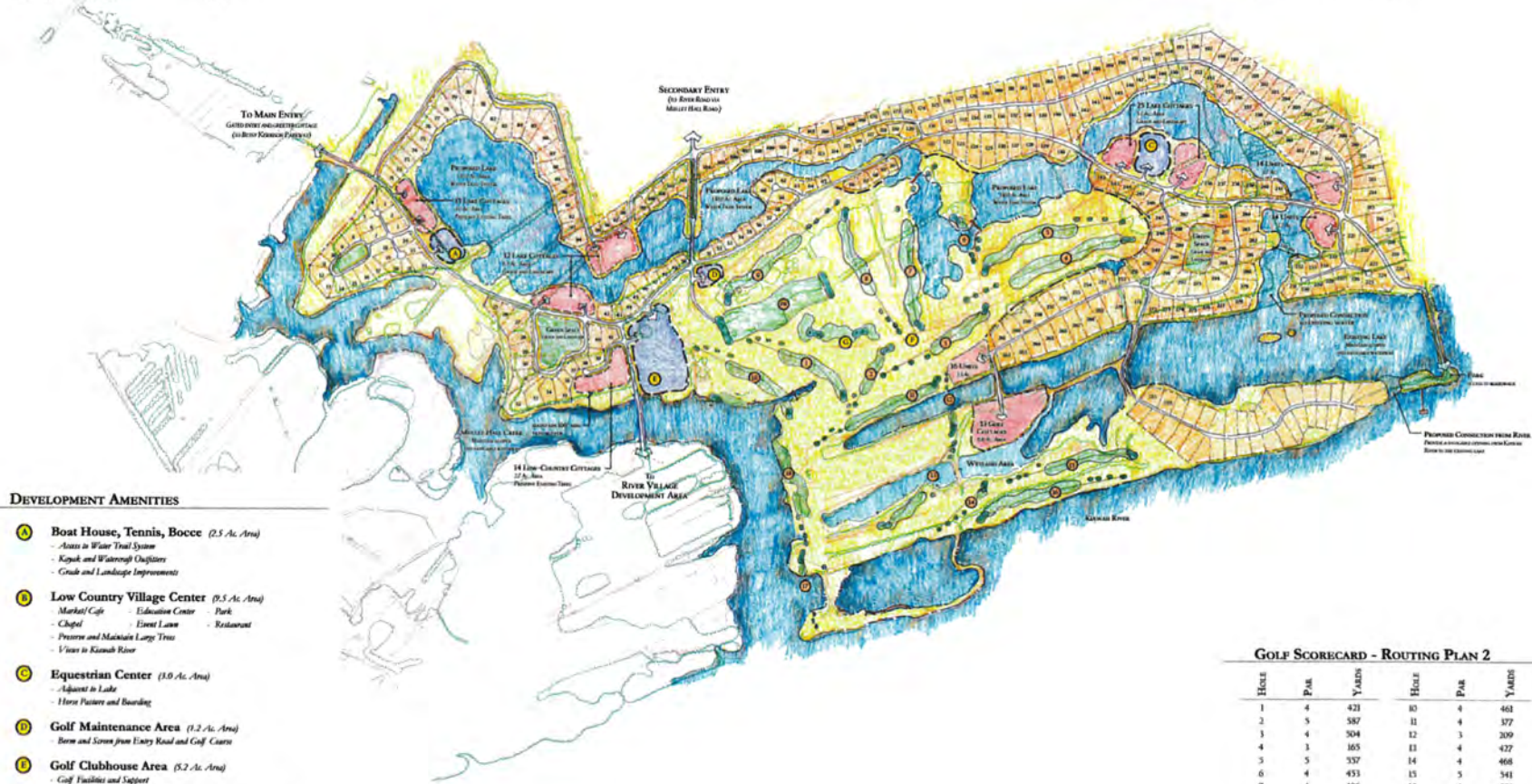
TYPE	DENSITY	YIELD	DESCRIPTION
Estate Lots	0.5 to 1 ac. per lot	297 lots	120' wide x 200' min. depth (except on "critical water" - then 135' min width)
Cottages	5 units per acre	222 lots	2,000 to 2,500 sq. units

TOTAL UNITS 519

# PROPOSED LAKE EXCAVATION SUMMARY

DEV. TYPE	AREA	DEPTH	VOLUME
Proposed Lake (at 10' Average Depth)	130.0 ac.	10 ft.	2,097,533 cu. yd.
Proposed Lake (at 11' Average Depth)	130.0 ac.	11 ft.	3,146,000 cu. yd.

\* Volume Calculations are approximate and for preliminary review purposes only. Requires engineering review.



# DEVELOPMENT AMENITIES

- A Boat House, Tennis, Bocce (2.5 Ac. Area)**
  - Access to Water Trail System
  - Kayak and Watersport Outfitters
  - Grub and Landscaping Improvements
- B Low Country Village Center (7.5 Ac. Area)**
  - Market/Cafe
  - Education Center
  - Park
  - Chapel
  - Equestrian Lawn
  - Restaurant
  - Preserve and Mature Large Trees
  - Views to Kiawah River
- C Equestrian Center (3.0 Ac. Area)**
  - Adjacent to Lake
  - Horse Pasture and Boarding
- D Golf Maintenance Area (1.2 Ac. Area)**
  - Broom and Screen from Entry Road and Golf Course
- E Golf Clubhouse Area (5.2 Ac. Area)**
  - Golf Facilities and Support
  - Views to Golf and Kiawah River
- F 18 Hole Championship Golf Course (210 Ac. Area)**
- G Golf Short Game Area**

\* Development Areas are approximate and for preliminary review purposes only.

# GOLF SCORECARD - ROUTING PLAN 2

HOLE	PIN	YARDS	HOLE	PIN	YARDS
1	4	423	10	4	463
2	5	582	11	4	377
3	4	504	12	3	309
4	3	165	13	4	427
5	5	337	14	4	468
6	4	433	15	5	541
7	4	496	16	4	501
8	4	331	17	3	255
9	3	181	18	5	637
OUT	36	3695	IN	36	3876
			TOTAL	72	7571



Kiawah River Plantation

EXHIBIT 15.3 - ALTERNATIVE SKETCH PLANS



## **CHAPTER 4 .BASE ZONING DISTRICTS**

### **Table of Contents**

ART. 4.1	GENERAL .....	4-1
ART. 4.2	MEASUREMENTS, COMPUTATIONS AND EXCEPTIONS .....	4-2
ART. 4.3	RM, RESOURCE MANAGEMENT DISTRICT .....	4-5
ART. 4.4	AG-15, AGRICULTURAL PRESERVATION DISTRICT.....	4-6
ART. 4.5	AG-10, AGRICULTURAL PRESERVATION DISTRICT.....	4-7
ART. 4.6	AG-8, AGRICULTURAL PRESERVATION DISTRICT.....	4-8
ART. 4.7	AGR, AGRICULTURAL/RESIDENTIAL DISTRICT .....	4-9
ART. 4.8	RR-3, RURAL RESIDENTIAL DISTRICT .....	4-10
ART. 4.9	S-1, SPECIAL MANAGEMENT 1 DISTRICT.....	4-11
ART. 4.10	S-2, SPECIAL MANAGEMENT 2 DISTRICT.....	4-12
ART. 4.11	S-3, SPECIAL MANAGEMENT 3 DISTRICT .....	4-13
ART. 4.12	R-2, SINGLE FAMILY RESIDENTIAL 2 DISTRICT .....	4-14
ART. 4.13	R-3, SINGLE FAMILY RESIDENTIAL 3 DISTRICT .....	4-15
ART. 4.14	R-4, SINGLE FAMILY RESIDENTIAL 4 DISTRICT .....	4-16
ART. 4.15	M-8, MIXED STYLE RESIDENTIAL 8 DISTRICT .....	4-17
ART. 4.16	M-12, MIXED STYLE RESIDENTIAL 12 DISTRICT .....	4-18
ART. 4.17	MHS, LOW DENSITY MANUFACTURED HOUSING SUBDIVISION DISTRICT .....	4-19
ART. 4.18	MHP, MANUFACTURED HOUSING PARK DISTRICT.....	4-20
ART. 4.19	OR, RESIDENTIAL OFFICE DISTRICT .....	4-21
ART. 4.20	OG, GENERAL OFFICE DISTRICT .....	4-23
ART. 4.21	CN, NEIGHBORHOOD COMMERCIAL DISTRICT .....	4-24
ART. 4.22	CT, COMMERCIAL TRANSITION DISTRICT.....	4-25
ART. 4.23	CR, RURAL COMMERCIAL DISTRICT .....	4-26
ART. 4.24	CC, COMMUNITY COMMERCIAL DISTRICT .....	4-27
ART. 4.25	I, INDUSTRIAL DISTRICT.....	4-28

ART. 4.26	WATERFRONT DEVELOPMENT STANDARDS.....	4-28
ART. 4.27	PD, PLANNED DEVELOPMENT DISTRICT .....	4-29



**Articles 4.1 through 4.26 of the ZLDR shall not apply to the Real Property. Instead, the zoning standards, building development standards, and waterfront development standards applicable to the Real Property shall be those set forth in the Plan, especially sections 4 and 6 of the Plan.**

---

**ARTICLE 4.27 PD, PLANNED DEVELOPMENT OISTRICT**

---

**§4.27.1 DESCRIPTION**

A "Planned Development," as defined by the South Carolina Government Comprehensive Planning Enabling Act of 1994, as amended, Code of Laws of South Carolina, Title 6, Chapter 29 (6-29-740) is a type of zoning district (PD) and a type of development plan. PD zoning districts are inextricably linked to Planned Development plans, in that no rights of development apply to a PD zoning designation other than those of the approved Planned Development plan.

Planned development provisions are intended to encourage innovative site planning for residential, commercial, institutional, and industrial developments within planned development districts. Planned development districts may provide for variations from other ordinances and the regulations of other established zoning districts concerning use, setbacks, lot size, density, bulk, and other requirements to accommodate flexibility in the arrangement of uses for the general purpose of promoting and protecting the public health, safety, and general welfare.

**§4.27.2 FINDINGS**

The County finds and determines that this Article is consistent with the following objectives of the *Comprehensive Plan*:

- A. Implement a farm and forest land and open space protection program (Objective FFL1);
- B. Provide families and youth with access to parks, recreation areas and facilities (Objective CD5);
- C. Encourage site design that will maintain as much of the development site as possible in natural open space where new development is proposed in rural and agricultural areas outside of existing settlements (Objective WR3, Policy 1);
- D. Implement a system of incentives that will encourage environmentally sensitive site planning that is responsive to the natural characteristics of the land.

New development should be encouraged that will retain buffers along rural and urban waterways, retain natural open space, and reduce impervious surfaces (Objective WR4, Policy 1);

- E. Promote a sufficient supply of a variety of housing units with access to facilities and services (Objective H1);
- F. Increase ownership of affordable housing through new construction, acquisition, and/or rehabilitation (Objective H5);
- G. Increase the housing alternatives for low and moderate income households (Objective H6); and
- H. Increase and preserve affordable housing development and reduce the number of households below the poverty level (Objective CD10).

#### **§4.27.3 DEFINITIONS**

In this Chapter, the following term shall have the following meanings unless a contrary meaning is required by the context or is specifically prescribed:

- A. Studio Unit: A dwelling unit that:
  - 1. Has only one combined living and sleeping room; or
  - 2. A living and sleeping room, along with a separate room that contains only kitchen facilities and also a separate room that contains only sanitary facilities.

#### **§4.27.4 INTENT AND RESULTS**

The PD, Planned Development, district regulations of this Article are intended to encourage achievement of the goals of the Charleston County *Comprehensive Plan* and to allow flexibility in development that will result in improved design, character, and quality of new mixed use developments and preserve natural and scenic features of open spaces. The following objectives may be attained through the use of the planned development process:

- A. A maximum choice in the types of environment available to the public by allowing a development that would not be possible under the strict application of the standards of this Ordinance that were designated primarily for development on individual lots;
- B. A greater freedom in selecting the means to provide access, light, open space and design amenities;
- C. Quality design and environmentally sensitive development by allowing development to take advantage of special site characteristics, locations and land use arrangements;
- D. A development pattern in harmony with the land use density, transportation facilities and community facilities objectives of the *Comprehensive Plan*;
- E. The permanent preservation of common open space, recreation areas and facilities;



- F. An efficient use of the land resulting in more economical networks of utilities, streets, schools, public grounds and buildings, and other facilities;
- G.. A creative approach to the use of land and related physical facilities that results in better development and design and the construction of amenities; and
- H. A development pattern that incorporates adequate public safety and transportation-related measures in its design and compliments the developed properties in the vicinity and the natural features of the site.

#### **§4.27.5 APPLICABILITY**

There shall be no minimum site area requirement for a Planned Development as long as the Planned Development meets all requirements of Article 4.27 of this Ordinance.

#### **§4.27.6 DEVELOPMENT STANDARDS**

Development standards of the underlying zoning district pertaining to density, lot size, location, and arrangement of buildings and structures, lot dimensions, and landscaping may be altered in Planned Development Districts. The underlying standards of the zoning district may be altered only if the development will serve an overriding public interest and/or public safety concern. The development standards listed below, those in the approved Planned Development Stipulations, and any in the approved Planned Development Sketch Plan(s) shall apply.

##### **A. Maximum Density**

The maximum allowed density increase in a planned development may not exceed the maximum density as stated in Table 3.2.1 of the Charleston County *Comprehensive Plan*, as amended; ***provided, however, when a property is "split-zoned" under base zoning standards, the maximum allowed density increase in a planned development shall be the combined maximum density suggested in the Comprehensive Plan. There shall be no separate density increase limitations for different portions of the property.*** Density and lot area calculations shall comply with the requirements contained in Article 4.2, Measurements, Computations and Exceptions. In order to achieve the maximum density, the following minimum amounts of common open space, as defined in this Ordinance, shall apply where applicable:

1. 0.2 acres of common open space per dwelling unit plus ten percent (10%) of the land area designated for office, commercial, and/or industrial uses is required for parcels located in the Rural and Agricultural Areas; or
2. If the parcel is located in the Suburban Area, the following standards shall apply:
  - a. Where the underlying zoning district is Single Family Residential (R-2, R-3, or R-4) and all requirements of this Ordinance are met, a maximum density of not more than two times the maximum allowable density in the underlying zoning district may be permitted when 0.05 acres of common open space per dwelling unit plus ten percent (10%) of the land area designated for office, commercial, and/or industrial uses is provided. A density bonus of up to 25% may be approved by County Council when affordable housing units are provided in accordance with the provisions of Section 4.27.8 of this Ordinance; and

- b. Where the underlying zoning district is Mixed Style Residential (M-8 or M-12) and all requirements of this Ordinance are met, a maximum density of not more than two times the maximum allowable density in the underlying zoning district may be permitted when 0.05 acres of common open space per dwelling unit plus ten percent (10%) of the land area designated for office, commercial, and/or industrial uses is provided. A density bonus may be approved by County Council when affordable housing units are provided in accordance with the provisions of Section 4.27.8 of this Ordinance.

## **B. Dimensional Standards**

1. The Waterfront Development Standards of the base zoning district, as set forth in Article 4.26 of this Ordinance; shall be applied to all waterfront lots within the planned development; ***provided, however, when a property is "split zoned" under base zoning standards, the waterfront development standards of the least restrictive base zoning district shall be applied if the applicant reduces the overall number of single-family lots on the waterfront edge and if the applicant restricts the number of docks permitted on the waterfront edge.***
2. ~~Each lot located on the perimeter of the planned development shall maintain the rear yard setback requirements and any buffer requirements of the adjacent zoning district.~~

## **C. Architectural Standards**

The Architectural Design Guidelines of Article 9.6 shall apply to all proposed planned developments. Modifications to the Architectural Design Guidelines may be proposed in a planned development request where the Planning Director determines that the architectural design of the proposed development is compatible with the architectural design of development on adjacent properties.

## **D. Lots to Abut Upon Common Open Space**

Residential parcels shall maximize orientation towards common open space or similar areas.

## **E. Access**

1. Streets within planned developments should connect to adjoining neighborhoods/developments. Cul-de-sacs, T-turnarounds, and dead-end streets are discouraged.
2. Areas between structures shall be covered by easements where necessary for access and to provide for maintenance and utility service.
3. Primary vehicular access to office, commercial, or industrial development shall be through limited access roads.

## **F. Commercial Areas**

1. Commercial areas and adjacent residential, office, and industrial areas shall be directly connected through paved sidewalks, trails, or other pedestrian infrastructure.



2. Commercial areas shall be planned as groups having common parking areas and common ingress and egress points.

**G. Industrial Areas**

1. A minimum vegetated buffer of forty (40) feet shall be required where industrial uses abut residential uses.
2. All intervening spaces between the right-of-way line and project building line and intervening spaces between buildings, drives, parking areas and improved areas shall be landscaped with trees and plantings and properly maintained at all times.

**H. Areas Designated for Future Use**

All areas designated for future expansion or not intended for immediate improvement or development shall remain in a natural state until such time as development permits are approved.

**I. Signs**

Specifications of size, type, height, setback, location, design, illumination, and number of signs shall be included in the planned development guidelines. Specifications shall be as restrictive or more restrictive than the standards set forth in this Ordinance.

**J. Parking**

Parking shall be provided in accordance with the standards set forth in Article 9.3 of this Ordinance. Modifications to the parking standards of Article 9.3 may be proposed in a planned development request where the Planning Director determines that the amount of parking requested and its location is sufficient for the use proposed.

**K. Resource Areas**

1. Planned developments shall protect any resources determined significant by the Planning Director including, but not limited to: agricultural soils and active farmland, buffer areas between active farmland and existing/planned future non-farm development, wetlands, mature trees, land adjacent to preserved farmland on neighboring properties, scenic views, water access and shoreline buffers, and habitat of species designated as of federal, state and local concern.
2. ~~Planned developments shall comply with all provisions of Article 0.4, Tree Protection and Preservation, of this Ordinance. All live oak trees of 24" DBH and greater shall be subject to Article 9.4 of this Ordinance. Modifications to the other tree protection and preservation standards of this Ordinance may be proposed in a planned development request when the Planning Director determines that the amount of tree protection and preservation requested is sufficiently similar to the County standards.~~

**§4.27.7 COMMON OPEN SPACE**

- A. Common open space area shall be located to preserve any significant

resources. Where common open space is designated, the following standards shall apply:

1. The common open space area shall be detailed on each Sketch Plan and recorded with the Final Plat (as approved under Article 8.5 of this Ordinance) or separate instrument.
2. The proposed common open space shall be usable and appropriate to the size of the development and to the new residents of the planned development. The purpose of common open space is to permit areas, which could otherwise be developed into buildable lots or otherwise sold individually, to provide a significant amenity to the residents who will interact with the open space on a daily basis. It is not the purpose of common open space to permit open space for land that is otherwise unusable on a daily basis by residents. Common open space may include unimproved land, landscaped areas, improved recreation areas, recreational buildings, and structures that are totally accessory to recreational uses, as well as freshwater wetland areas and water surfaces, all located within the development. Natural landscapes, such as wetlands, may also be considered as open space if preserved and meet the requirements of subsection C below. "Usable" means that the open space includes uses or facilities that are adaptable to recreational or leisure use and are accessible to the residents of the proposed development or the general public, such as seating areas, picnic shelter, community garden, pedestrian and bicycle trail access to a designated greenway, public square, swimming pools, playing fields, or a new playground. The use or facility must be approved by County Council in accordance with the approval and conveyance procedures below.
3. The total combined acreage of freshwater wetlands, detention ponds, and buffers to be used as open space shall not comprise more than forty percent (40%) of the open space requirement as stated in this Section.
4. Land designated as common open space shall not be occupied by streets, drives, parking areas, or structures, other than recreational structures; ***provided, however, streets, drives, parking areas or structures which are Pervious may be included within common open space.***
5. All property owners in the planned development shall have access to the open space by means of a public or private street ***in an easement a minimum of 20 feet in width*** or walkway ~~*in an easement a minimum of 20 feet in width.*~~
6. Common open space shall be provided within each phase of the planned development in sufficient amounts to serve the expected population of that phase.
7. The common open space shall be conveyed prior to recording the final plat, in accordance with one of the methods listed below. The applicant must have proof of commitment from the entity that will be responsible for the common open space prior to the Planning Commission Meeting for which the case is scheduled.



- a. By dedication to the County as publicly-owned open space. Parks, open space, and recreation facilities proposed for dedication to the County must be acceptable to the Parks and Recreation Commission, Planning Commission, County Council, and other governmental entities with regard to the size, shape, location, improvement, environmental condition (i.e., the applicant may be required to provide an environmental assessment), and budgetary and maintenance terms; or
- b. By leasing, conveying, or retaining title (including beneficial ownership) to a corporation, homeowner's association or other legal entity. The terms of such lease or other instrument of conveyance must restrict the use of the area to open space/recreational uses.

#### **§4.27.8 AFFORDABLE DWELLING UNITS**

- A. As an incentive to provide affordable dwelling units, County Council may approve a density bonus above the maximum allowable density provided for in Section 4.27.6A. This density bonus is only applicable to properties located in the Suburban Area and shall only apply to affordable housing units (no market rate units may be included in the density bonus).
- B. Zoning permit fees for affordable dwelling units shall be reimbursed upon the request of the developer and certification that the dwelling units are affordable, as defined in Section 4.27.3A.
- C. If affordable dwelling units are provided within a planned development **as part of a density bonus**, the following requirements shall apply:
  - 1. Affordable dwelling units shall be provided within each phase of the planned development in sufficient amounts to serve the expected population of that phase;
  - 2. Affordable dwelling units shall be integrated throughout the development and not located in a single area of the development;
  - 3. Any studio dwelling unit provided under this Section must be a minimum of 500 square feet in floor area; and
  - 4. In no instance shall more than fifty percent (50%) of the affordable dwelling units be provided in the form of studio units.

#### **§4.27.9 PLANNED DEVELOPMENT PROCEDURE**

This procedure involves a pre-application conference, a community workshop and approval of a PD development plan and PD zoning map amendment.

- A. **Pre-Application Conference**  
Before submitting a PD Development Plan for Planned Development, the applicant shall confer with the Planning Director and any other officials designated by the Planning Director. The purpose of this pre-application conference is to discuss the proposal and the applicable development review and approval procedures.

**B. Community Workshop**

After the pre-application conference, it is recommended that the applicant hold one (1) or more community workshops. The purpose of a community workshop is to ensure early citizen participation in an informal forum, in conjunction with the development applications and to provide an applicant the opportunity to understand and try to mitigate any impacts an application may have on an affected community. A community workshop is not intended to produce complete consensus on all applications, but to encourage applicants to be good neighbors.

**C. PD Development Plan****1. Application**

After the required pre-application conference, a complete application for PD Development Plan approval must be submitted to the Planning Director on a form established by the Planning Director including an approved and recorded plat showing the current property lines of the property/properties to be included in the planned development, a current recorded deed, and all applicable fees. If the proposed development is zoned R-2, R-3, or R-4 and would exceed the maximum density of the Residential Low Density Future Land Use Designation in the *Comprehensive Plan*, a *Comprehensive Plan* Amendment must be approved concurrently with a Planned Development application (see Article 3.2, *Comprehensive Plan* Amendment). County Council may waive the fees at their discretion. The PD Development Plan application shall include the requested Planned Development Stipulations and Sketch Plan. The Sketch Plan shall be drawn to scale.

- a. The following shall be included in the requested Planned Development Stipulations:
  - i. The name of the planned development, not duplicating the name of any other planned development or subdivision, the final plat of which has been recorded in Charleston County, South Carolina;
  - ii. A statement of objectives of the proposed development;
  - iii. The total acreage of the planned development, broken down into total acreage, total highland acreage, total freshwater wetland acreage, and total Critical Line wetland, or marsh, acreage;
  - iv. A table of proposed land uses including:
    - a. A table of proposed maximum and average residential densities for each residential use (The applicant may refer to the density ranges listed in the Charleston County *Comprehensive Plan* for residential densities);
    - b. The maximum total acreage of each residential use, including affordable dwelling units, if applicable;



- c. The maximum allowable number of each type of residential unit requested, including affordable dwelling units, if applicable;
  - d. The maximum proposed floor area ratios (% of lot in relation to building floor area), and the maximum building/lot coverage for each non-residential use; and
  - e. All dimensional and lot standards requested, for each land use type designated.
- 
- v. A description of the affordable dwelling units, if applicable, including location, unit type, and cost analysis;
  - vi. An analysis of the impact of the proposed development on existing public facilities and services (e.g. roads and streets, water, sewer, etc.). Any proposed future improvements to these facilities and services to be made as part of the planned development shall also be included;
  - vii. A traffic study that meets the requirements of Article 9.9 of this Ordinance for planned developments that contain (1) 50 or more dwelling units or (2) 5 or more acres of nonresidential development;
  - viii. A development schedule with a generalized phasing schedule, if appropriate. The phasing schedule ~~shall~~ *may* include the number of dwelling units, total acreage of each residential use, total gross floor area of each non-residential use, percentage and acreage of common open space to be included in each phase, and percentage, number and acreage of affordable dwelling units to be included in each phase (if applicable);
  - ix. A statement indicating how any common open space/recreation areas will be owned or managed;
  - x. A statement indicating how all roads and alleys will be owned and maintained;
  - xi. A statement of inclusion and compliance with processes included in the Charleston County Zoning and Land Development Regulations that are not mentioned in the planned development stipulations;
  - xii. A statement of agreement to proceed with proposed development in accordance with the provisions of these zoning regulations, applicable provisions of the Charleston County *Comprehensive Plan*, and with such conditions as may be attached to any rezoning to the applicable PD district;

- xiii. Letters of coordination from all agencies from which the applicant must either (1) obtain permits or (2) obtain services and/or facilities; and
  - xiv. Any other information that the Planning Director determines is necessary to determine whether the application complies with the standards established in this Article.
- b. The following shall be included on the requested Sketch Plan. Multiple Sketch Plans may be submitted. Sketch Plans shall be drawn to scale.
- i. The general location and amount of land proposed for each land use including single family residential, multi-family residential, institutional, office, commercial, industrial, common open space/recreation, street use, etc.;
  - ii. Conceptual lot lines;
  - iii. Pedestrian and motor traffic circulation;
  - iv. Location, acreage, and type (freshwater or Critical Line/marsh) of all wetlands as they exist prior to development. The location and acreage of all freshwater wetlands to be developed upon shall be indicated;
  - v. A tree survey to include all Grand trees (24 inches or greater) on residential lots of one acre or less and in road rights-of-way and easements. Significant trees shall be shown on residential lots greater than one acre. Tree surveys for non-residential uses shall conform with the standards of Section 9.4.3 of this Ordinance; ***provided, however, when the proposed planned development is part of a concept plan, the Planning Director may permit a high-resolution aerial photograph to be substituted for a tree survey, but a tree survey for a phase of the development must be provided as part of a site plan review or preliminary plat application for that phase;***
  - vi. Architectural elevations for each type of residential and nonresidential unit;
  - vii. The general location, size, and capacity of all existing and proposed water and sewer lines;
  - viii. Areas to be included in each phase of development, including the location of all common open space areas and/or affordable housing units to be included in each phase; ***provided, however, when the proposed planned development is part of a concept plan, the applicant may submit a conceptual***



*delineation of the phases of the development , but a more detailed delineation of the areas to be included in a phase, including the location of all common open space and/or affordable housing units to be included in the phase must be provided as part of a site plan review or preliminary plat application for that phase;*

- ix. The location of all construction entrances;
- x. A Landscaping Sketch Plan including the location and composition of all screening and buffering materials; *provided, however, when the proposed planned development is part of a concept plan, the applicant may submit a conceptual delineation of the landscaping proposed on the property combined with a set of regulations applicable to screening and buffering on the property, but a more detailed delineation of the screening and buffering materials to be included in a phase of the development must be provided as part of a site plan review or preliminary plat application for that phase;*
- xi. A Utility Sketch Plan with the location of any on-site natural areas, buffers, trees and sidewalks that may be impacted by utility facilities including existing and proposed location of any easements or rights-of-way; *provided, however, when the proposed planned development is part of a concept plan, the applicant may submit a conceptual delineation of the utilities infrastructure to be included on the property, but a more detailed delineation of the on-site natural areas, buffers, trees and sidewalks that may be impacted by utility facilities including existing and proposed location of any easements or rights-of-way to be included in a phase of the development must be provided as part of a site plan review or preliminary plat application for that phase;*and
- xii. Any other information that the Planning Director determines is necessary to determine whether the application complies with the standards established in this Article.

## **2. Public Hearing Notice**

Newspaper, Neighbor, Parties in Interest, and Posted notice of the County Council's public hearing shall be provided in accordance with the requirements of Section 3.1.6 of this Ordinance.

## **3. Planning Director Review and Report**

Once an application is deemed complete and to contain all information required herein by the Planning Director, the application will be scheduled for a Planning Commission meeting and the applicant and other interested parties will be notified in accordance with this Ordinance. The Planning Director shall prepare a staff report that reviews the PD Development Plan application.

## **4. Planning Commission Review and Recommendation**

The Planning Commission shall review the proposed PD Development

Plan and adopt a resolution, by majority vote of the entire membership, recommending that the County Council approve, approve with conditions or deny the proposed development plan. The Planning Commission's recommendation shall be based on the Approval Criteria of Section 4.27.

9.C.6. The Planning Commission shall submit its recommendation to the County Council within 30 calendar days of the Planning Commission meeting at which the PD Development Plan was introduced.

At any time prior to action by the Planning Commission, the applicant may request that the Planning Commission enter mediation. When mediation is requested, the Planning Commission shall assign one of its members as a representative in mediation proceedings and the Planning Director shall represent the Planning Staff. A majority vote of the entire Planning Commission membership in a public meeting shall be required to accept any mediated settlement. An accepted mediated settlement cannot waive the standards of this Ordinance. Prior to beginning talks, applicable time limits for review and action on complete applications must be extended by mutual agreement of the applicant and Planning Commission.

#### **5. County Council Hearing and Decision**

After receiving the recommendation of the Planning commission, the County Council shall hold at least 1 public hearing, and any time after the close of the public hearing, take action to approve, approve with conditions or deny the proposed PD Development Plan based on the Approval Criteria of Section 4.27.9.C.6 of this Chapter. If the County Council takes action to approve the PD Development Plan, it may require time-frames for development of the entire Planned Development and its individual phases, if any. Within ten (10) working days of approval by County Council of a planned development, the applicant shall submit three (3) copies of the approved Planned Development Guidelines and Sketch Plan to the Planning Department. This plan shall contain all changes and conditions approved by Council. The approval of a planned development shall deem it to be a new zoning district with its own zoning designation.

#### **6. Approval Criteria**

Applications for PD Development Plan approval may be approved only if the County Council determines that the following criteria are met:

- a. The PD Development Plan complies with the standards contained in this Article;
- b. The development is consistent with the intent of the *Comprehensive Plan* and other adopted policy documents; and
- c. The County and other agencies will be able to provide necessary public services, facilities, and programs to serve the development proposed, at the time the property is developed.

#### **§4.27.10 IDENTIFICATION OF ZONING MAPS**

Approved PDs shall be indicated on the official zoning map.

#### **§4.27.11 COMPLIANCE WITH OTHER REGULATIONS**

Unless expressly stated in this Section or approved at the time of a Planned Development



approval, all applicable standards of this Ordinance and other law shall apply to development within a Planned Development. Planned Developments may provide for variations from this Ordinance or other ordinances and the regulations of established zoning districts concerning use, setbacks, lot area, density, bulk and other requirements to accommodate flexibility in the arrangement of uses for the general purpose of promoting and protecting the public health, safety, and general welfare. All development other than single family residential, shall comply with the Site Plan Review Requirements of this Ordinance.

**§4.27.12 SUBDIVISION OF LAND LOCATED WITHIN APPROVED PLANNED DEVELOPMENTS**

All subdivision of land located within approved planned developments shall be deemed a Major Subdivision, as defined in Section 8.3.3 of this Ordinance.

## **CHAPTER 5 | OVERLAY AND SPECIAL PURPOSE ZONING DISTRICTS**

### **Table of Contents**

ART. 5.1	GENERAL .....	5-1
ART. 5.2	NRM, NATURAL RESOURCE MANAGEMENT DISTRICT .....	5-1
ART. 5.3	WDU, WATER-DEPENDENT USE DISTRICT.....	5-2
ART. 5.4	MHC-O, MAYBANK HIGHWAY CORRIDOR OVERLAY DISTRICT.....	5-9
ART. 5.5	MP-O, MOUNT PLEASANT OVERLAY DISTRICT.....	5-11
ART. 5.6	FRC-O, FOLLY ROAD CORRIDOR OVERLAY DISTRICT .....	5-27
ART. 5.7	DRC-O, DORCHESTER ROAD CORRIDOR OVERLAY DISTRICT ... ..	5-29
ART. 5.8	MUFZ, MULTIPLE USE FLOATING ZONE .....	5-32
ART. 5.9	UB-O, UNIVERSITY BOULEVARD OVERLAY DISTRICT .....	5-36
	CHAPTER 5 MAPS .....	5-41



**INTENTIONALLY BLANK**

***The Real Property is not included in an overlay or special purpose district. Therefore, Articles 5.1, 5.2, and 5.4 through 5.9 shall not apply. Article 5.3 shall apply as set forth herein.***

---

**ARTICLE 5.3 WDU, WATER-DEPENDENT USE OVERLAY DISTRICT**

---

**§5.3.1 DESCRIPTION**

The WDU, Water-Dependent Use Overlay District is intended to accommodate community docks, boat ramps, marinas and commercial docks and other nonresidential uses that require locations near water bodies.

- A. Private docks intended for the private use of one family shall be exempt from the requirements of this Ordinance.
- B. Joint use docks intended for the private use of two to four families shall be exempt from the requirements of this Article.

**§5.3.2 USES**

Community docks, boat ramps, marinas and commercial docks and other uses that require locations near water bodies may be allowed in the WDU District, if approved in accordance with the procedures of this Ordinance.

**§5.3.3 COMMUNITY DOCKS**

A community dock(s) is any docking facility that provides access for more than four families (greater than or equal to 5 watercraft slips and less than or equal to 10 watercraft slips) and is not a marina. All community docks shall be considered a Water-Dependent Use.

Community dock(s) shall be subject to the following standards:

1. All proposed community docks shall comply with the Site Plan Review procedures contained within this Ordinance;
2. All proposed community docks shall comply with all applicable regulatory requirements of State and Federal agencies including but not limited to South Carolina Department of Health and Environmental Control (SCDHEC) and U.S. Army Corps of Engineers;
3. All proposed community docks must have a minimum of 75 feet of lot frontage at the marsh edge (OCRM Critical Line) and a minimum of 75 feet between its extended property lines at the location in the waterbody of the proposed dock;
4. No leasing or other transfer of space to individuals who do not reside in the residential community or other commercial uses are allowed at community docks;



5. Project proposals shall include facilities for the proper handling of litter, waste, refuse and petroleum products in accordance with SCDHEC regulations;
6. A boat ramp may be allowed at a community dock subject to §5.3.4; and
7. Approval of this particular use by Charleston County shall not relieve the recipient (use) of responsibility for complying with all other applicable requirements of any other local, county, state or federal agency. In addition, approval by Charleston County does not guarantee nor recommend approval from any other legal entity or governmental agency.

#### **§5.3.4 STANDARDS FOR BOAT RAMPS**

Boat ramps provide access to the water for the launching and retrieving of watercraft not exceeding 12,000 pounds gross weight. Boat ramps providing launching and retrieving of watercraft in excess of 12,000 pounds gross weight shall follow the Special Exception provisions of this Ordinance in addition to the following requirements which shall apply to all boat ramps.

Boat ramps shall be subject to the following standards:

1. Filling or excavating of vegetated wetlands for boat ramp construction is prohibited unless no feasible alternatives exist in non-vegetated wetland areas. In addition, the area to be filled or excavated must be limited to that which is reasonable for the intended use;
2. Boat ramps must consist of environmentally acceptable materials, demonstrate sound design and construction so that they could reasonably be expected to be safe and effective, and minimize adverse effects;
3. Justification for boat ramp construction in environmentally sensitive areas shall be considered using the following priorities:
  - (i) Public use - open to all citizens;
  - (ii) Restricted use - open to citizens of a area or organization only;
  - (iii) Private use - use for one citizen or family.
4. In cases where private use is necessary, siting of ramps must, wherever feasible, be located in areas where the least environmental impact will accrue to the area and be limited to 12 feet in width;
5. Boat ramp location requiring dredging or filling of wetlands to provide deep water access to the ramp, parking areas for the ramp, or other associated facilities are prohibited unless no feasible alternatives exist and environmental impacts can be minimized;
6. The siting of "public use" boat ramps is encouraged in easily accessible

areas such as bridges and existing, abandoned causeways, provided that these sites comply with other applicable regulations;

7. All proposed boat ramps shall comply with the Site Plan Review procedures contained within this Ordinance;
8. All proposed boat ramps shall comply with all applicable regulatory requirements of State and Federal agencies including but not limited to South Carolina Department of Health and Environmental Control (SCDHEC) and U.S. Army Corps of Engineers;
- ~~9. All proposed "public use" boat ramps shall require review and approval in accordance with the Special Exception procedures of this Ordinance; and~~
9. Approval of this particular use by Charleston County shall not relieve the recipient (use) of responsibility for complying with all other applicable requirements of any other local, county, state or federal agency. In addition, approval by Charleston County does not guarantee nor recommend approval from any other legal entity or governmental agency.

#### **§5.3.5 STANDARDS FOR MARINAS**

A marina is any of the following: (a) lock harbor facility; (b) any facility which provides fueling , pump-out, maintenance, or repair services; or (c) any facility which has permanent docking space for 11 or more watercraft slips; (d) any water area with a structure which is used for docking or otherwise mooring vessels and constructed to provide temporary or permanent docking space for more than ten boats; (e) a dry stack facility. All marinas shall be considered a Water-Dependent Use. Marinas shall be subject to the following standards:

##### **A. Uses**

The following uses and activities shall be allowed in association with a Marina:

1. Marinas may provide the following services if specifically authorized by a Special Exception approval:
  - a. Launching ramps and small hoists (to accommodate primarily the launching of water craft not exceeding 12,000 pounds in Residential and Agricultural Residential districts);
  - b. Piers, wharfs and other facilities for the berthing and securing of recreational water craft;
  - c. Dockside maintenance and repair necessary to keep water craft in operable condition;
  - d. Wet storage and mooring of seaworthy pleasure craft in operable condition;
  - e. Dispensing of fuel, subject to all applicable Ordinance requirements;
  - f. Shower and laundry facilities for marina clientele only;



- g. Vending machines; and
  - h. Dry stack storage of water craft.
2. Excluding marinas in agricultural and residential districts, marinas providing 25 or more boat slips may provide the following additional services:
- a. Bait and tackle retail sales;
  - b. Retail sales of basic marine supplies and accessories necessary for boat operation, maintenance and upkeep (not to include the sale of boats and/or motors); and
  - c. Snack bars and retail groceries.

**B. Performance Standards**

In addition to any other applicable provisions of the Ordinance, marinas shall

be subject to the following performance standards.

<b>MARINA DENSITY/INTENSITY AND DIMENSIONAL STANDARDS</b>	
<b>MINIMUM LOT AREA</b>	1 Acre
<b>MINIMUM LOT WIDTH</b>	250 feet
<b>MINIMUM SETBACKS [1]</b>	
Front/Street Side	25 feet
Interior Side	15 feet
Rear	25 feet
<b>OCRM Critical Line</b>	50 feet
<b>MAXIMUM BUILDING COVER</b>	35% of lot
<b>MAXIMUM HEIGHT</b>	35 feet [2]

[1] Landscape buffer standards and Wetlands buffer standards of Chapter 9 also apply.

[2] Properties located within the Water-Dependent Use district that have a zoning district designation of Industrial (I) or Community Commercial (CC) are allowed a maximum height of sixty (60) feet.

**1. Lot Area and Location**

The property shall have frontage on a public-owned road or a privately maintained road built to county road and meet the following density/intensity and dimensional standards unless more restrictive standards are imposed at the time of Special Exception approval:

**2. Services**

All services provided by the marina shall be located on the same zoning lot or on the piers associated therewith.

**3. Structures**

All retail sales and services shall be enclosed. The maximum structure size or bulk shall be limited to ten square feet of net floor area for each boat slip.

**4. Setbacks**

All structures shall be setback a minimum of 100 feet from abutting agricultural and residential zoning districts except where the property line is the street right-of-way line, in which case the front setback established for the zoning lot shall apply.

**5. Parking**

Off-street parking shall be provided in accordance with the requirements contained in Chapter 9. Any parking associated with the use of the launching ramp and other marine activities must be accommodated on-site. Parking surfaces and off-street roads or driveways within the facility shall be graded and covered with a permanent dust proof surface.

**6. Storage**

Areas for boat trailer storage and open field boat storage shall be designated and screened in accordance with the Landscaping, Screening and Buffer requirements of Chapter 9. Open field boat storage on trailers may be provided at a ratio of one (10-foot x 20-foot space) for each two boat slips.

**7. Screening**

Marina developments, including areas for boat trailer storage and open field boat storage, shall be screened from adjacent uses in accordance with the Landscaping, Screening and Buffer requirements of Chapter 9.

**8. Signs**

Those signs that identify commercial activity shall be placed and designated so as not to distract the general public.

**9. Wastewater Disposal Facilities**

Wastewater disposal facilities shall meet the requirements of the regulatory agencies having jurisdiction.

**10. Fire Prevention**

Firefighting or fire prevention equipment shall be as specified by the local fire district in which the marina is located.

**11. Siting Standards**

Marinas shall meet all of the following requirements:

- a. All proposed marinas shall comply with the Site Plan Review procedures contained within this Ordinance;
- b. All proposed marinas shall comply with all applicable regulatory



requirements of State and Federal agencies including but not limited to South Carolina Department of Health and Environmental Control (SCDHEC) and U.S. Army Corps of Engineers;

- c. All proposed marinas shall require review and approval in accordance with the Special Exception procedures of this Ordinance;
- d. New marinas, which includes all structures defined as marinas in Chapter 12, are not allowed in waters classified for shellfish harvesting, except for any lock harbor, dry stack or expanded existing marina that does not close any additional waters for shellfish harvesting, as provided by SCDHEC;
- e. Marinas should be located in areas that will have minimal adverse impact on wetlands, water quality, wildlife and marine resources, or other critical habitats; and
- f. Approval of this particular use by Charleston County shall not relieve the recipient (use) of responsibility for complying with all other applicable requirements of any other local, county, state or federal agency. In addition, approval by Charleston County does not guarantee nor recommend approval from any other legal entity or governmental agency.

#### **§5.3.6 STANDARDS FOR COMMERCIAL DOCKS THAT ARE NOT MARINAS**

A Commercial dock(s) is a docking facility used for commercial purposes. A commercial dock is not necessarily a marina, a boat yard or a dry storage facility but shall be subject to the following standards:

- 1. All proposed commercial docks shall comply with the Site Plan Review procedures contained within this Ordinance;
- 2. All proposed commercial docks shall comply with all applicable regulatory requirements of State and Federal agencies including but not limited to South Carolina Department of Health and Environmental Control (SCDHEC) and U.S. Army Corps of Engineers;
- 3. All proposed commercial docks shall require review and approval in accordance with the Special Exception procedures of this Ordinance;
- 4. All proposed commercial docks must meet the Density/Intensity and Dimensional standards of §5.3.5.B.1.
- 5. Project proposals shall include facilities for the proper handling of litter, waste, refuse and petroleum products in accordance with SCDHEC regulations;
- 6. New commercial docks are not allowed in waters classified for shellfish harvesting if their proposed uses would result in closure of additional waters for shellfish harvesting, as provided by SCDHEC;

7. Commercial docks should be located in areas that will have minimal adverse impact on wetlands, wildlife and marine resources, or other critical habitats;
8. A boat ramp may be allowed at a commercial dock subject to §5.3.4; and
9. Approval of this particular use by Charleston County shall not relieve the recipient (use) of responsibility for complying with all other applicable requirements of any other local, county, state or federal agency. In addition, approval by Charleston County does not guarantee nor recommend approval from any other legal entity or governmental agency.

#### **§5.3.7 LEGAL NONCONFORMING WATER-DEPENDENT USES**

- A. Any Water-Dependent Use, as defined by this Article, that is a legal nonconforming use, has been permitted or application has been made for permitting to the State existing prior to June 17, 2008, shall be considered an existing Water-Dependent Use for the purposes of this Article. Any expansion of the existing use that is more intense or increases by 25 percent or more of the use shall be subject to all provisions contained within this Article.



## **CHAPTER 6 | USE REGULATIONS**

### **Table of Contents**

ART. 6.1	USE TABLE	6-1
ART. 6.2	DEFINITIONS .....	6-1
ART. 6.3	USE TYPES .....	6-1
ART. 6.4	USE CONDITIONS .....	6-17
ART. 6.5	ACCESSORY USES AND STRUCTURES.....	6-61
ART. 6.6	TEMPORARY USES .....	6-73

**INTENTIONALLY BLANK**



## CHAPTER 6 | USE REGULATIONS

---

*Articles 6.1 through 6.3 and Table 6.1.1 of the ZLDR shall not apply to the Real Property. Instead, section 4 of the Plan and Table 4-1 therein shall apply. Articles 6.4 and 6.5 of the ZLDR shall apply as modified herein. Article 6.6 shall not apply to the Real Property. Instead, section 4 of the Plan shall apply.*

---

**ARTICLE 6.4 USE CONDITIONS**

---

The following use conditions shall apply to principal uses ~~in any Zoning District~~ where these uses are allowed as "Conditional Uses" ~~or "Special Exceptions"~~ as shown in ~~Table 6.1-4 4.1 of the Plan.~~

**§6.4.1 ANIMAL PRODUCTION AND AGRICULTURAL PROCESSING USES**

Animal production and agricultural processing uses shall be subject to the following standards.

- A. In order to be permitted by right, such uses must be located on a lot with a minimum area of five acres. On lots with an area of under five acres, such uses are allowed only if reviewed and approved in accordance with the Special Exception procedures of this Ordinance.
- B. The use shall be set back at least 100 feet from road rights-of-way and property lines bordering undeveloped parcels. A minimum 200-foot setback shall be required from property lines abutting developed parcels.
- C. A minimum 50-foot buffer shall be maintained and planted within the setback area along all interior property lines.
- D. Any outdoor lighting shall be oriented and arranged to minimize spillover lighting and glare on surrounding roads and properties.

**§6.4.2 ATTACHED SINGLE-FAMILY DWELLINGS**

Attached Single family dwellings shall be subject to the following standards.

- A. **Number of Attached Units in a Single Structure**  
~~In R-4 and more restrictive districts, no single structure may contain more than two attached single-family dwellings. In all other districts n~~No single structure may contain more than eight attached single family dwellings.
- B. **Lot Area**  
The minimum lot area for attached dwellings shall comply with the minimum lot area standards of the ~~Plan underlying zoning district~~. Where a common area is provided, minimum lot area requirements may be calculated as an average lot area by counting a proportionate amount of the common area in calculating the area of each lot.
- C. **Accessory Structures**  
All accessory structures shall be located on the property of the Attached Single family Dwelling and for the private use of the property occupant(s). A minimum interior setback of three feet is required between an accessory structure and the interior lot lines, provided that an accessory structure may be located on one of the zero lot lines when constructed of a material finish matching the dwelling unit exterior or is the same height and materially a part of a fence or wall.
- D. **Design Standards**
  - 1. The front facade of an attached single family dwelling may not include



more than 40 percent garage wall area.

2. The roof of each attached single family dwelling must be distinct from the other through either separation of roof pitches or direction, or other variation in roof design.
3. At least ten percent of the area of each facade that faces a street must be comprised of windows.

**E. Other Requirements**

Prior to development or redevelopment of attached housing on parcels in these districts, an applicant must complete site plan review and meet all standards of ~~this Ordinance~~ **the Plan**. Single family detached residences are exempt from this requirement.

**§6.4.3 HAIR, NAIL OR SKIN CARE SERVICES**

Hair, Nail or Skin Care Services shall be subject to the following standards:

- A. Hair, Nail or Skin Care Services shall be limited to a maximum of one chair in those districts in which they are allowed as a use subject to conditions, otherwise this use shall fall under the special exception (S) provisions of this Ordinance. There shall be no limit on the number of chairs in those zoning districts in which they are a use allowed by right(A).
- B. Where Hair, Nail and Skin Care Services are allowed as a use with conditions (C), this use shall have a maximum floor area of 5,000 square feet, otherwise this use shall fall under the special exception provisions of this Ordinance.
- C. Barber Shops, Beauty Salons, and Nail salons are allowed as a home occupation in all residential and agricultural districts with a maximum of one chair.

**§6.4.4 BED AND BREAKFASTS**

Bed and Breakfasts shall be subject to the following standards.

- A. The Bed and Breakfast must be residential in nature and comply with the Home Occupation regulations of Section 6.5.9 of this Chapter.
- B. No exterior alterations, other than those necessary to assure the safety of the structure, shall be made to any building for the purpose of providing a Bed and Breakfast.
- C. Bed and Breakfasts shall contain no more than ~~ten~~ **twelve** guest rooms.
- D. There shall be an owner or innkeeper/manager residing on the premises **unless otherwise approved by the ARB**.
- E. Meals may be served by the resident owner to paying guests staying at the Bed and Breakfast.
- F. Parking areas for bed and breakfast uses located in agricultural or residential

zoning districts shall be screened from view of residential zoning districts and



public rights-of-way by evergreen plant material that will provide opaque screening at the time of plant maturity.

#### **§6.4.5 COMMUNICATIONS TOWERS**

##### **A. Purpose and Legislative Intent**

The Federal Telecommunications Act of 1996 affirmed Charleston County 's authority concerning the placement, construction and modification of Wireless Telecommunications Facilities. The regulations of this Section are designed to site communications towers in Charleston County. It is the intent of these regulations to allow for the harmonious coexistence of communications towers and other land uses. It is also the intent of these regulations to reduce the overall negative impact of communications towers by:

1. Reducing the number of towers needed through a policy of encouraging co-location; and
2. If co-location is not feasible, encouraging the following:
  - a. The use of Stealth Tower Design, as defined in Section 6.4.5.C.1;
  - b. The clustering of towers ("tower farms");
  - c. The placement of towers away from roadways;
  - d. The provision of effective screening; and
  - e. The location of communicationsequipment on existing structures or within existing utility substations or uses.

##### **B. Co-Location Exemption**

Proposed communications equipment co-locating on existing towers and structures without adding to their height shall require only a Zoning Permit and shall not be subject to the requirements of this Section.

##### **C. Stealth Tower Provision**

1. For the purposes of this Section, the term "Stealth Tower" shall mean a communications tower designed to unobtrusively blend into its existing surrounding so as not to have the appearance of a communications tower. Examples of Stealth Towers include, but are not limited to, antenna tower alternative structures, architecturally screened roof- mounted antennas, building-mounted antennas painted to match the existing or proposed trees and landscaping, and antenna structures designed to look like lightpoles.
2. All proposed Stealth Tower designs must be approved by the Planning Director.
3. A complete zoning permit application for a Stealth Tower that meets all requirements of this Ordinance shall be approved.

**D. Tower Abandonment**

A tower that is not used for communication purposes for more than 120 days (with no new application on file for any communication user) is presumed to be out of service and the owner of such tower must notify the staff and remove the tower within 50 days. Towers which are not maintained by the owner according to the County Building Code shall be removed by the owner within 60 days. To assure the removal of towers which do not meet requirements for continued use or proper maintenance, a statement of financial responsibility shall be submitted for each tower over 100 feet and a performance bond for the amount of anticipated removal costs shall be posted for each tower over 150 feet. Removal costs shall be charged to the tower owner. The bond must be renewed as necessary to ensure that it is maintained at all times during the existence of the tower.

**E. Pre-Application Meeting**

Prior to submitting a formal application for a Zoning Permit for Communications Tower the applicant is required to attend one or more pre-application meetings. The purpose of the pre-application meeting is to address key issues which will help to expedite the review and permitting process. The Planning Director may conduct a site visit at the pre-application meeting.

**F. Zoning Permit Submittal Requirements**

Prior to Zoning Permit approval, all applications for Communications Towers shall complete the Site Plan Review process as provided in Chapter 3 of this Ordinance. In addition to any Site Plan Review requirements, the application must contain the following items:

1. A site plan, drawn to engineer's scale, showing the location of the tower guy anchors (if any), existing or proposed buildings and structures or improvements, including parking, driveways or access roads, fences, and protected and Grand Trees affected by the proposed construction. If there are no Grand Trees affected, a surveyor's statement on the Site Plan must be shown. Adjacent land uses shall also be noted on the site plan, with precise measurements noted between the proposed tower and any residential structures on surrounding properties.
2. The Site Plan must show a vegetated buffer, either existing or installed, that provides an effective screen from public rights-of-way and adjacent property owners. If a buffer is to be installed, its placement on the site will vary in order to provide the most effective screening from public view. Required materials will be based on installation of a 25' buffer around the fenced area.
3. The height and typical design of the tower, typical materials to be used, color, and lighting shall be shown on elevation drawings. The applicant shall submit documentation justifying the total height of any Communications Towers, facility and/or antenna and the basis therefore. Additionally, color and material samples shall be provided.
4. The tower must be located no closer to a residential structure than a distance equal to 1 ½ feet for each 1 foot in height of the proposed tower



plus 50 feet as measured from the center of the proposed tower. At a minimum, there must be a 150-foot distance between the proposed tower and a residential structure.

5. A 6 foot non-climbable fence must be placed around the tower (except for those designed in a manner compatible with Section 6.4.5.A.2, Stealth Exemption) and any associated building. Guy wires may be fenced separately.
6. The proposed tower shall only be illuminated as required by the Federal Communications Commission or Federal Aviation Administration. Nighttime strobe lighting shall not be incorporated unless required by the Federal Communications Commission or Federal Aviation Administration. If lighting is required, the applicant shall provide a detailed plan for sufficient lighting that shall be as unobtrusive and inoffensive as permissible under State and Federal regulations, and an artist's rendering or other visual representation showing the effect of light emanating from the site on neighboring habitable structures within fifteen-hundred (1,500) feet of all property lines of the parcel on which the Communications Towers are located.
7. Communications Towers shall contain a sign no larger than four (4) square feet to provide adequate notification to persons in the immediate area of the presence of an Antenna that has transmission capabilities. The sign shall contain the name(s) of the owner(s) and operator(s) of the antenna(s) as well as emergency phone number(s). The sign shall be located so as to be visible from the access point of the site. No other signage, including advertising, shall be permitted on any facilities, Antennas, Antenna supporting structures or Antenna Towers, unless required by law.
8. The proposed tower must be located such that adequate setbacks are provided on all sides to prevent the tower's fall zone from encroaching onto adjoining properties. The fall zone shall be determined by an engineer certified by the State of South Carolina in a letter which includes the engineer's signature and seal.
9. Proposed towers may not be located within 1,000 feet of the center of an existing tower unless the applicant certifies that the existing tower does not meet the applicant's structural specifications and the applicant's technical design requirements, or that a co-location agreement could not be obtained at a reasonable market rate. In the event of the above situation, the clustering of new towers on the same parcel near existing towers is permitted.
10. A copy of the tower's search ring.
11. The Applicant shall supply the FAA study number for the proposed tower.
12. For the purposes of co-location review and review of efforts at siting a tower on the same lot near an existing tower, the applicant shall submit

satisfactory written evidence such as correspondence, agreements, contracts, etc., that alternative towers, buildings, or other structures are not available or suitable for use within the applicant's tower site search area that are structurally capable of supporting the intended antenna or meeting the applicant's necessary height criteria, providing a location free of interference from other communication towers, or available at the prevailing market rate (as determined by staff communication with persons doing business within the industry). Additionally, the applicant shall build the proposed tower in such a manner as may allow other telecommunication users to co-locate.

13. The tower shall be designed with excess capacity for future needs.
14. A statement of financial responsibility shall be submitted for each tower over 100 feet and a performance bond for the amount of anticipated removal costs shall be posted for each tower over 150 feet. The bond must be renewed as necessary to ensure that it is maintained at all times during the existence of the tower.
15. The applicant shall furnish a Visual Impact Assessment which shall include:
  - a. A "Zone Visibility Map" which shall be provided in order to determine locations where the Tower may be seen.
  - b. Pictorial representations of "before and after" view from key viewpoints both inside and outside the County, including but not limited to major highways and roads; state and local parks; historic districts; preserves and historic sites normally open to the public; and from any other location where the site is visible to a large number of visitors, travelers or residents.
  - c. An assessment of the visual impact of the tower base, guy wires and accessory buildings from abutting and adjacent properties and streets.

**G. Retention of Expert Assistance and Reimbursement by Applicant**

1. The County may hire any consultant and/or expert necessary to assist the County in reviewing and evaluating the application, including the construction and modification of the site, once permitted, and any requests for recertification.
2. For towers proposed to be 100 feet or higher, the applicant shall deposit with the County funds sufficient to reimburse the County for all reasonable costs of the consultant and expert evaluation and consultation to the County in connection with the review of any application including the construction and modification of the site, once permitted. The initial deposit shall be \$5,000.00. The application will not be processed until receipt of this initial deposit. The County will maintain a separate account for all such funds. The County's consultants/experts shall invoice the County for all its services in



reviewing the application, including the construction and modification the site, once permitted. If at any time during the process this account has a balance less than \$1,000.00, the applicant shall immediately, upon notification by the County, replenish said account so that it has a balance of at least \$5,000.00. Such additional account funds shall be deposited with the County before any further action or consideration is taken on the application. In the event that the amount held in the account by the County is more than the amount of the actual invoicing at the conclusion of the project, the remaining balance shall be promptly refunded to the applicant. The applicant shall not be entitled to receive any interest earnings on unused funds.

3. The total amount of the funds needed as set forth in subsection 2 of this Section may vary with the scope and complexity of the project, the completeness of the application and other information as may be needed to complete the necessary review, analysis and inspection of any construction or modification.
4. Additional fees may be required if additional hearings before the board of Zoning Appeals are caused by or requested by the applicant.

#### **H. Surrounding Property Owner Notification**

1. In order to better inform the public, in the case of a new Communications Towers, the applicant shall hold a "balloon test" as follows: the applicant shall arrange to fly, or raise upon a temporary mast, a minimum of three (3) foot diameter brightly colored balloon at the maximum height of the proposed new tower. The dates (including a second date, in case of poor visibility on the initial date) shall be provided to the Planning Director ten (10) days after receipt of the complete application notice. The dates shall be set a minimum of fifteen (15) days prior to the Planning Director making a final decision on the Zoning Permit. The balloons shall be flown for ten (10) consecutive hours between 8:00 a.m. and 6:00 p.m.
2. Once the application is deemed complete by the Planning Director for a Communications Tower Zoning Permit, the Planning Department shall provide Parties in Interest, Neighbor, Posted and Newspaper Notice in accordance with the requirements of Section 3.1.6 of this Ordinance. The public notice shall include the dates of the balloon tests as provided by the applicant and the date the Planning Director must make a final decision on the Zoning Permit.

#### **I. Time Limit for Staff Review**

Upon receipt of an application deemed complete by the Planning Director for a Communications Tower Zoning Permit, the Planning Director shall have a maximum of 45 days to act on the application. The 45 days begins from the date the applicant is sent written notice of a complete application from the Planning Director. Failure to act on the application within 45 days will result in the applicant being granted a Zoning Permit.

**J. Zoning Permit Approval Criteria**

1. A complete zoning permit application for a Stealth Tower that meets all requirements of this Ordinance shall be approved.
2. Upon review of a complete application, no Zoning Permit shall be issued for a communications tower until the Planning Director determines that the proposed tower complies with the following criteria and standards:
  - a. That the location and height of the proposed tower will not substantially impact the character of property listed in or eligible for the National Register of Historic Places, other significant environmental, cultural or historical sites, officially designated scenic roads or rivers, and that the tower is designed to blend into the environment and minimize visual impact.
  - b. If a completely new tower is necessary, the applicant must provide written proof of attempts at co-location and siting a tower on the same lot near an existing tower were proven not feasible or practical.
  - c. That the applicant has pursued any available publicly owned sites and privately owned sites occupied by a compatible use, and if not utilized, that these sites are unsuitable for operation of the facility under applicable communications regulations and the applicant's technical design requirements.
  - d. Staff shall review and approve the color and materials to be used for the proposed tower.
3. If the Planning Director finds a proposed communications tower will have a substantially negative impact on a surrounding area or adjoining property, the use shall fall under the Special Exception (S) provisions of this Ordinance.

In determining whether the use shall fall under the Special Exception (S) provisions, the Planning Director may consider one or more of the following items:

- a. The proposed use will be detrimental to adjacent land uses including historical sites;
- b. The proposed use will have a negative aesthetic visual impact;
- c. The proposed use will have an adverse affect on the environment (not including radio frequency emissions); and
- d. The proposed use is contrary to the public health, safety or welfare.



**§6.4.6 DRIVE-IN THEATERS**

Drive-in Theaters shall be subject to the following standards:

- A. A use for this purpose shall have a setback 200 feet from any agricultural, residential or office zoning district. Adult drive-in theaters are subject to Section 6.4.18 of this Chapter.
- B. Such use shall be located as to draw a minimum of vehicular traffic to and through local streets in nearby residential areas.
- C. The principal vehicular access for such use shall be on a major thoroughfare or collector street having a right-of-way at least 60 feet wide.
- D. Vehicular entrances and exits shall be provided separately and not less than 100 feet apart.
- E. Between the street entrance and the ticket gate there shall be an area for vehicles waiting to pass the gate. Said area shall have such capacity as will make it ordinarily unnecessary for entering vehicles to wait in the street.

**§6.4.7 DWELLING GROUPS**

Where two or more principal single family residential structures are located on the same zoning lot, the following criteria shall apply:

- A. **Density/Intensity and Dimensional Standards**  
Density/intensity and dimensional standards of the ~~underlying zoning district Plan~~ shall apply. In each case, the distance between structures shall not be less than the sum of the minimum interior setbacks required. This distance shall be measured from the closest protrusion of each structure. Where no building footprint is indicated, a maximum of a 100-foot by 100-foot area shall be shown for each dwelling to indicate the area where each dwelling is to be constructed.
- B. **Facing of Dwelling Units**  
Each dwelling unit shall face (front) either a street, courtyard or outdoor living space.
- C. **Vehicle Access**  
Each dwelling group shall provide an access consistent with the Road Construction Standards in Appendix A of this Ordinance.
- D. **Other Zoning Requirements**  
Unless specifically modified by this Section, Dwelling Groups shall comply with all other requirements of this Ordinance for the district in which located.
- A. ~~Such use shall be allowed only if reviewed and approved as a Special Exception in accordance with the procedures of this Ordinance.~~

**D.****§6.4.9 FARM LABOR HOUSING**

Farm Labor Housing shall be subject to the following standards:

- A. Such use shall be set back 100 feet from road rights-of-way and property lines bordering undeveloped parcels. A minimum 200-foot setback shall be required from property lines abutting developed parcels.
- B. A minimum 50-foot buffer shall be maintained and planted within the setback area along all interior lot lines.
- C. For Farm Labor Housing that is not dormitory style, the minimum lot area for such use as a use permitted by right shall be five acres. Such use shall be allowed as a Special Exception on parcels under five acres in area.
- D. Farm Labor Housing shall be used on a seasonal basis only, not as year-round housing.

**§6.4.10 NATURE EXHIBITIONS**

- A. Where nature exhibitions are of public ownership or listed in the National Registry of Natural Landmarks or registered as a Heritage Site with the South Carolina Heritage Trust in accordance with the provisions of Act #600 of the 1976 Acts and Joint Resolutions, either in public or private ownership, accessory uses to acquire maintenance revenue are permitted.
- B. Accessory uses are limited to the retail sale of gifts, novelties, souvenirs, food services, and bicycle, horse or boat rental for on-premises use.
- C. Accessory structures so used shall not exceed ten percent in size of the principal structures when the nature exhibit is housed, or 1,200 square feet for each acre when the nature exhibit is not enclosed.
- D. Parking requirements for each accessory use, in addition to the parking requirements for the principal use, shall comply with the parking requirements for the type of use as specified in the Off-Street Parking Schedule of Chapter 9 of this Ordinance.
- E. Signs advertising accessory uses shall *be* located on the premises and not visible from a public road.



**§6.4.11 PARKS, RECREATION AND OUTDOOR RECREATION/ENTERTAINMENT**

Any structure established in connection with such uses shall have a setback of not less than 100 feet from any **Lot or Development Parcel with an ~~property in an~~ agricultural, residential or office use zoning district,** except where such property line abuts a street. in which case the front setback established **in the Plan for the district** shall apply.

**§6.4.12 RECREATIONAL VEHICLE PARKS**

Recreational Vehicle Parks shall be subject to the following standards:

**A. Location and Access**

Recreational Vehicle Parks shall be located in a public park or with direct access to a state or federal numbered highway or an approved County road. No entrance to or exit from a Recreational Vehicle Park shall be through an agricultural, residential or office zoning district.

**B. Site Conditions**

Condition of soil, groundwater level, drainage and topography shall not create hazards to the property or the health or safety of the occupants. No portion of the site that is subject to unpredictable and/or sudden flooding, subsidence, or erosion shall be used for any purpose that would expose persons or property to hazards.

**C. Spaces for Occupancy; Uses Permitted; Lengths Of Stay**

Spaces in recreational vehicle parks may be used by recreation vehicles, as defined herein. Spaces shall be rented by the day, week, or month only, and no recreational vehicle shall remain in the same trailer park for more than six (6) months. The recreational vehicle park owner shall be responsible for maintaining records of all recreational vehicles and their lengths of stay and shall make these records available to the Planning Director for review upon request.

**D. Site Planning and Required Improvements**

Site Planning and Improvements shall provide for:

1. Facilities and amenities appropriate to the needs of the occupants;
2. Safe, comfortable, convenient and sanitary use by occupants under all weather conditions to be expected during periods of occupancy; and
3. Protection of occupants from adverse environmental influences, and where appropriate, protection of the neighborhood from potential adverse influences within the recreational vehicle park.

**E. Relation of Spaces to Public Streets**

No space shall be located so that any part intended for occupancy for sleeping purposes shall be within 50 feet of the right-of-way line of any major thoroughfare or collector street, or within 25 feet of the right-of-way line of any other street.

**§6.4.13 RELIGIOUS ASSEMBLY**

All religious assembly uses shall comply with the Site Plan Review requirements of this Ordinance.

**§6.4.14 RESOURCE EXTRACTION/MINING**

All uses involving resource extraction shall complete the Site Plan Review process, which includes representatives from the Planning Department, Department of Public Works, South Carolina Department of Health and Environmental Control (SCDHEC), South Carolina Department of Transportation, State Historic Preservation Office, U.S. Army Corps of Engineers, Office of Ocean and Coastal Resource Management, and other departmental representatives deemed necessary by the Planning Director to address issues relevant to respective issues of the project. Before submitting an application for a Special Exception for a Resource Extraction use, the applicant shall show proof of application to the South Carolina Department of Health and Environmental Control (SCDHEC). Prior to Site Plan Review approval, the applicant shall receive Special Exception approval and approval from the SCDHEC. The Board of Zoning Appeals may, on a case-by-case basis, also require that the excavation area be screened, that a drainage plan be submitted and approved for the restoration of the site when excavation has been completed. When approval by the Board of Zoning Appeals has been granted to the applicant, the Planning Department will provide locator data by tax map data to the Environmental Health section of DHEC as well as to the Mosquito Abatement section of the Public Works Department.

**§6.4.15 RESTAURANTS, BARS AND LOUNGES SERVING ALCOHOLIC BEVERAGES**

All proposed bars, lounges and restaurants serving beer or alcoholic beverages located within 500 feet of the property line of a lot in a residential zoning district or a lot containing a residential use shall require review and approval in accordance with the Special Exception procedures of this Ordinance. Distances shall be measured from the nearest property line of the subject parcel to the nearest property line of a lot containing a residential use or located in a residential zoning district.

**§6.4.16 SELF-SERVICE STORAGE (MINI-WAREHOUSE) FACILITY**

Self-Service Storage facilities shall be subject to the following standards.

**A. Performance Standards****1. Front Setback**

All structures, including the accessory manager's office/apartment, must be set back a minimum of 25 feet from the right-of-way or the district minimum setback, whichever is greater.

**2. Side and Rear Buffers/Screening**

- a. Where projects about lots ~~dedicated to zoned~~ office, commercial, or industrial ~~uses~~, no side and rear setbacks are required.
- b. Where sites about ~~residential or mixed use residentially zoned~~ properties, buildings adjacent to the perimeter must face inward with their doors away from such areas.



**3. Building Lengths and Access**

To ensure ease of access for emergency vehicles, no building shall exceed 300 feet in length. Spaces between ends of buildings shall be at least 30 feet.

**4. Accessory Office/Apartment**

One management office and/or accessory residence shall be permitted.

**5. Parking and Circulation**

- a. Project entrances shall be 30 feet in width.
- b. Roadway widths on interior drives shall be at least 24 feet in width where buildings face and open onto such drives on only one side. Where buildings face and open onto drives on both sides, widths of such drives shall be at least 34 feet.
- c. Turning radii, whether provided at the terminus of interior drives or at points between buildings, shall be at least 30 feet to provide for the maneuverability of emergency vehicles.

**6. Signs**

Signs shall comply with the requirements contained in Chapter 9 of this Ordinance. Signs shall not be attached to or displayed on walls or fences used as required screening.

**B. Operating Conditions****1. Commercial Activities**

The manufacture or sale of any commercial commodity or the provision of any service from the premises is prohibited.

**2. Commercial Repair Activities**

Commercial repairs of autos, boats, motors, furniture, or other items on the premises is prohibited.

**3. Storage of Flammable Substances**

Storage of flammable chemical substances within the complex is prohibited.

**4. Open Storage**

Open storage of automobiles and boats is permitted only where such areas are screened to comply with Landscaping, Screening and Buffer requirements contained in Chapter 9 of this Ordinance.

**§6.4.17 SEWAGE DISPOSAL FACILITIES**

Sewage Disposal Facilities shall be subject to the following standards:

- A. Sewage Disposal Facilities shall comply with the Site Plan Review requirements of this Ordinance; and

- B. Any structure established in connection with such uses shall have a setback of not less than 50 feet from any property line.

#### **§6.4.18 SEXUALLY ORIENTED BUSINESSES**

##### **A. Purpose and Intent**

It is the purpose of the regulations of this Section to regulate sexually oriented businesses in order to promote the health, safety and general welfare of the citizens of the county, and to establish reasonable and uniform regulations to prevent the continued deleterious locating and concentration of sexually oriented businesses within the county. The provisions of this Section have neither the purpose nor effect of imposing a limitation or restriction on the content of any communicative materials including sexually oriented materials. Similarly, it is not the intent or effect of this Section to restrict or deny access by adults to sexually oriented materials protected by the First Amendment, or to deny access by the distributors and exhibitors of sexually oriented entertainment to their intended market. Neither is it the intent or effect of this Section to condone or legitimize any use or act which is otherwise prohibited or punishable by law.

##### **Findings of Fact**

##### **B.**

1. There are a number of sexually oriented businesses in Charleston County and it is in the interests of the health, safety, and welfare of the patrons of such businesses, as well as the citizens of Charleston County, to provide certain minimum standards and regulations for sexually oriented businesses, as well as the operators and employees of such businesses.
2. Sexually oriented businesses generate secondary effects that are detrimental to the public health, safety and welfare. Additionally, sexually oriented businesses are frequently used for unlawful sexual activities, including public sexual indecency, prostitution and sexual encounters of a casual nature. Such businesses are of particular concern to the community when they are located in close proximity to each other, or close to schools, churches or parks and playgrounds.
3. The concern over sexually transmitted diseases is a legitimate health concern of the county which demands reasonable regulation of sexually oriented businesses in order to protect the health and well-being of our citizens.
4. Live entertainment presented by some sexually oriented businesses involves a considerable amount of bodily contact between patrons and semi-nude and nude employees and dancers, including physical contact, such as hugging, kissing and sexual fondling of employees and patrons. Many sexually oriented businesses have "couch" or "straddle" dancing, and in these "dances," employees sometimes do such things as sit in a patron's lap, place their breasts against the patron's face while physical contact is maintained, and gyrate in such a manner as to simulate sexual intercourse. Such behavior can lead to prostitution. The County Council recognizes that preventing prostitution and the spread of sexually



transmitted diseases are clearly within its police powers: *Southeastern Promotions, Inc. v. Conrad*, 341 F. Supp. 465, 477 (E.D. Tenn. 1972), rev'd on other grounds, 420 U.S. 546 (1975 ). The County Council believes that prohibiting physical contact between performers and patrons at a sexually oriented business establishment is a reasonable and effective means of addressing these legitimate governmental interests.

5. Licensing is a legitimate and reasonable means of accountability to ensure that operators of sexually oriented businesses comply with reasonable regulations, to facilitate the enforcement of legitimate location and distancing requirements, and to ensure that operators do not knowingly allow their establishments to be used as places of illegal sexual activity or solicitation.
6. The location of sexually oriented businesses close to residential areas diminishes property values and leads to conditions that give rise to crime in residential neighborhoods. Many studies performed in other communities indicate conclusively that property crimes and sexual crimes increase significantly in neighborhoods in which a sexually oriented business is located.
7. It is not the intent of this Section to suppress any speech activities protected by the First Amendment or to place any impermissible burden on any constitutionally-protected expression or expressive conduct by the enactment or enforcement of this Ordinance. Rather, it is the intent of the County Council to enact a "content neutral regulation" that addresses the secondary effects of sexually oriented businesses.

### **C. Definitions**

For the purposes of this Section, the following terms shall have the following meanings:

1. "Adult arcade" means any place to which the public is permitted or invited wherein coin-operated, slug-operated or electronically, electrically, or mechanically controlled still or motion picture machines, projectors or other image-producing devices are maintained to show images to one or more persons per machine at any one time, and where the images so displayed are distinguished or characterized by the depicting or describing of "specified sexual activities" or "specified anatomical areas."
2. "Adult bookstore", "Adult retail store" or "Adult video store" means a commercial establishment which excludes any person by virtue of age from all or part of the premises generally held opened to the public where products or equipment distinguished or characterized by a predominant emphasis or simulation of "specified sexual activities" or "specified anatomical areas" are sold, rented or displayed therein, (unless the business complies with the requirements of Section 6.4 .18C.2 .c. herein) or, which has as one of its principal business purposes, the sale or rental of any form, for consideration, one or more of the following:

- a. Books, magazines, periodicals or other printed matter, or photographs, films, motion picture, video cassettes or video reproductions, slides, or other visual representations which depict or describe "specified sexual activities" or "specified anatomical areas."
  - b. Instruments, devices, paraphernalia or clothing which are designed for use in connection with "specified sexual activities," excluding condoms and other birth control and disease prevention products. A commercial establishment may have other principal business purposes that do not involve the offering for sale or rental of material depicting or describing "specified sexual activities" or "specified anatomical areas" and still be categorized as an adult bookstore or adult video store. Such other business purposes will not serve to exempt such commercial establishment from being categorized as an adult bookstore or adult video store so long as one of its principal business purposes is the offering for sale or rental, the specified materials which depict or describe "specified sexual activities or "specified anatomical areas."
  - c. "Adult bookstore," "Adult retail store" or "Adult video store" does not mean any establishment which displays , rents or sells sexually-explicit materials in an enclosed room equal to less than ten percent of the business's total square footage, and which prohibits anyone under 18 years of age from entering the room.
  - d. "Principal business purpose," as used in this Section, means that more than 25 percent of the "stock in trade" of the business is devoted to the display, rent or sale of items, products or equipment distinguished or characterized by a predominant emphasis on, or simulation of, "specified sexual activities" or "specified anatomical areas."
  - e. "Stock in trade" for purposes of this subsection shall mean the greater of:
    - i. The retail dollar value of all items, products or equipment readily available for purchase, rental, viewing or use by patrons of the establishment, excluding material located in any storeroom or other portion of the premises not regularly open to patrons; or
    - ii. The total volume of shelf space and display area.
3. "Adult cabaret" means a nightclub, bar, restaurant or similar commercial eating or drinking establishment, which regularly features:
- a. Persons who appear in a state of nudity.
  - b. Live performances which are characterized by the exposure of "specified anatomical areas" or by "specified sexual activities."



- C. Films, motion pictures, video cassettes, slides or other photographic reproductions which are characterized by the depiction or description of "specified sexual activities" or "specified anatomical areas."
- 4. "Adult car wash" means a car wash where some or all of the employees are semi-nude or nude and/or where "specified sexual activities" occur or "specified anatomical areas" are exhibited.
- 5. "Adult motel" means a hotel, motel or similar commercial establishment which:
  - a. Offers accommodations to the public for any form of consideration; provides patrons with closed-circuit television transmissions, films, motion pictures, video cassettes, slides or other photographic reproductions. which are characterized by the depiction or description of "specified sexual activities" or "specified anatomical areas;" and which may have a sign visible from the public right-of- way which advertises the availability of these types of photographic reproductions, or
  - b. Routinely offers a sleeping room for rent for a period of time that is less than eight hours, or
  - c. Routinely allows a tenant or occupant of a sleeping room to sub-rent the room for a period of time that is less than eight hours, or
  - d. Evidence that a sleeping room in a hotel, motel, or a similar commercial establishment has been rented and vacated two or more times in a period of time that is less than eight hours creates a rebuttable presumption that the establishment is an adult motel as that term is defined in this Section.
- 6. "Adult motion picture theater" means a commercial motion picture theater, one of whose principal business purposes is, for any form of consideration, to regularly show films, motion pictures, video cassettes, slides or similar photographic reproductions which are characterized by the depiction or description of "specified sexual activities" or "specified anatomical areas."
- 7. "Adult theater" means a commercial theater, concert hall, auditorium, or similar commercial establishment, one of whose principal business purposes is to regularly feature persons who appear in a state of nudity, or which features live performances which are characterized by the exposure of "specified anatomical areas" or by "specified sexual activities."
- 8. "Certificate of Nonconformity" means a certificate issued by the Charleston County Planning Department to any sexually oriented business which is operating at the time of the enactment of this Chapter, and is not in compliance with one or more of its provisions.

9. "Dancer" means an employee of a sexually oriented business who entertains patrons through expressive forms of dance and/or movement.
10. "Employee" means an individual working and performing services for any sexually oriented business, including any independent contractor who provides services on behalf of any sexually oriented business to the patrons of such business.
11. "Established" or "establishment", as used in this Chapter, means and includes any of the following:
  - a. The opening or commencement of any sexually oriented business as a new business.
  - b. The conversion of an existing business, whether or not a sexually oriented business, to a sexually oriented business.
  - c. The addition of any sexually oriented business to any other existing sexually oriented business.
  - d. The relocation of any sexually oriented business.
12. "Health club", as used in this Chapter, means a health club where some or all of the employees are nude or semi-nude, or in which "specified sexual activities" occur or "specified anatomical activities" are exhibited.
13. "Licensee" means a person in whose name a Sexually Oriented Business Regulatory License to operate a sexually oriented business has been issued, as well as the individual listed as an applicant on the application for a Sexually Oriented Business Regulatory License.
14. "Live entertainment", for purposes of this Chapter, means a person who appears nude, semi-nude, or a performance which is characterized by the exposure of "specified anatomical areas" or "specified sexual activities."
15. "Nude model studio" means any place where a person appears in a state of nudity or displays "specified anatomical areas" and is observed, sketched, drawn, painted, sculptured, photographed, or similarly depicted by other persons who pay money or any other form of consideration, and such place is not subject to an exemption pursuant to any provision herein.
16. "Nude, Nudity or state of nudity" means: (a) the appearance, real or simulated, of a bare human buttock, anus, male genitals, female genitals, or the areola or nipple of the female breast; or (b) a state of dress which fails to completely cover a human buttocks, anus, male or female genitals, pubic region or areola or nipple of the female breast.
17. "Operate " or "causes to be operated", as used in the Chapter, means to cause to function or to put or keep in operation.



18. "Operator" means any person on the premises of a sexually oriented business who is authorized to exercise overall operational control of the business, or who causes to function or who puts or keeps in operation the business. A person may be found to be operating or causing to be operated a sexually oriented business whether or not the person is an owner, part owner, or licensee of the business.
19. "Patron" means any person who pays a sexually oriented business any form of consideration for services provided to him or her by the sexually oriented business.
20. "Person" means an individual proprietorship, partnership, corporation, association, or other legal entity.
21. "Semi-nude" or "semi-nudity" means a state of dress in which clothing covers no more than the genitals of a man, or the pubic region and areolae of the breasts of a woman.
22. "Sexually oriented business" includes an adult arcade, adult bookstore, adult retail store or adult video store, adult cabaret, adult motel, adult motion picture theater, adult theater, nude model studio, or any other business, such as a car wash or a health club, which offers, for consideration, materials or services characterized as depicting "specified sexual activities" or "specified anatomical areas", or whose employees perform services in a state of nudity or semi-nudity.
23. "Sexually Oriented Business Regulatory License" means a special annual operating license necessary for a sexually oriented business to do business in Charleston County. Such license is in addition to a Charleston County Business License, and is issued by the Charleston County Planning Department.
24. "Specified anatomical areas" means the male genitals in a state of sexual arousal and/or the vulva or more intimate parts of the female genitals.
25. "Specified sexual activities" means and includes any of the following:
  - a. The fondling or other erotic touching of human genitals, pubic region, buttocks, anus or female breasts.
  - b. Sex acts, normal or perverted, actual or simulated, including intercourse, oral copulation, or sodomy.
  - c. Masturbation, actual or simulated.
  - d. Excretory functions as part of or in connection with any of the activities set forth in A. through C. above.
26. "Substantial enlargement" of a sexually oriented business means the increase in floor areas occupied by the business by more than 25

percent, as the floor areas exist on the date the original Charleston County Zoning Permit was obtained.

27. "Transfer of ownership" or control of a sexually oriented business means and includes any of the following:
  - a. The sale, lease or sublease of the business.
  - b. The transfer of securities which constitute a controlling interest in the business, whether by sale, exchange or similar means.
  - c. The establishment of a trust, gift or other similar legal device which transfers the ownership or control of the business, except for transfer by bequest or other operation of law upon the death of the person possessing the ownership or control.
28. "Viewing Room" means the room, booth, or area where a patron of a sexually oriented business would ordinarily be positioned while watching a film, video cassette, video reproduction, or live production.

**D. Permits and Licenses; Application**

1. Every person engaged or intending to engage in a sexually oriented business is required to obtain a Sexually Oriented Business Regulatory License.
2. A person commits a misdemeanor if he or she operates a sexually oriented business without a valid Zoning Permit and Business License and Sexually Oriented Business Regulatory License issued by Charleston County.
3. An application for a Zoning Permit and/or a Sexually Oriented Business Regulatory License must be made on a form provided by the Planning Department. The application must be accompanied by a sketch or diagram showing the configuration of the premises, including a statement of total floor space occupied by the business. The sketch or diagram need not be prepared by an architect, engineer or surveyor, but must be drawn to a designated scale or drawn with marked dimensions of the interior of the premises to an accuracy of plus or minus 6 inches.
4. The applicant must be qualified according to the provisions of Article 6.4.18.E and the premises must be inspected and found to be in compliance with applicable State laws by the South Carolina Department of Health and Environmental Control (DHEC) and the Building Official.
5. If an entity wishing to operate a sexually oriented business is an individual, he or she must sign the application for a Sexually Oriented Business Regulatory License as applicant. If an entity wishing to operate a sexually oriented business is other than an individual, each individual



who has a ten percent or greater interest in the business must sign the application for a Sexually Oriented Business Regulatory License as an applicant.

6. The fact that a person possesses other types of state or county permits and/or licenses does not exempt him or her from the requirements to obtain a Sexually Oriented Business Regulatory License.
7. All licenses granted pursuant to this Chapter shall be for a term of one year. Said term shall commence on January 1 of each year and terminate upon December 31 of the same year. Applications for a license filed at any other time during the year shall be treated the same as if they were filed January 1 of that year and shall terminate on December 31 of that same year, and no proration shall be permitted.
8. The completed application shall contain the following information and shall be accompanied by the following documents:
  - a. If the applicant is:
    - i. An individual, the individual shall state his or her legal name and any aliases and shall submit satisfactory proof that he or she is eighteen (18) years of age;
    - ii. A partnership, the partnership shall state its complete name, and the names of all partners, whether the partnership is general or limited, and a copy of the partnership agreement, if any;
    - iii. A corporation, the corporation shall state its complete name, the date of its incorporation, evidence that the corporation is in good standing under the statutes of the state, or in the case of a foreign corporation, evidence that it is currently authorized to do business in the state, the names and capacity of all officers, directors and principal owners, and the name of the registered corporate agent and the address of the registered office for service of process;
    - iv. A limited liability company shall state its complete name, the date of filing of the articles of organization and operating agreement, the names of all managers and members.
  - b. Whether the applicant or any other individual listed under subsection (A) of this Section had worked under or has had a previous Sexually Oriented Business Regulatory License under this Chapter or other adult business or adult entertainment ordinance from another state, city or county denied, suspended or revoked, including the name and location of the adult business for which the permit was denied, suspended or revoked, as well as the date of the denial, suspension or revocation.

- c. Whether the applicant or any other individual listed under subsection (A) for this Section holds any other licenses under this Chapter or other similar adult business ordinance from another city, county or state and, if so, the names and locations of such other permitted business.
  - d. The location of the proposed sexually oriented business, including a legal description of the property, street address and telephone number(s), if any.
  - e. Proof of the applicant's right to possession of the premises wherein the sexually oriented business is proposed to be conducted.
  - f. The applicant's or any other individual's listed, pursuant to subsection (A) of this Section, mailing address and residential address.
  - g. A photocopy of the driver's license or other government issued identification card for the individuals listed in subsection (A) of this Section.
9. If the applicant is an individual, he/she must sign the application for a license. If the applicant is a corporation it must be signed by the president or vice president, attested to by the secretary or assistant secretary, and each individual having a 10 percent or greater interest in the corporation. If the applicant is a general or limited partnership it must be signed by a general partner. If the applicant is a limited liability company it must be signed by the manager and each individual having a 10 percent or greater interest in the company.
10. If an omission or error is discovered by the Planning Director, the application will be returned to the applicant for completion or correction without further action by the Planning Director. Any application rejected due to an omission or error shall be refiled only when the omission or error has been remedied. For the purposes of this Chapter, the date the Planning Director accepts an application which is complete shall be the date the application is deemed to be filed with the Planning Director.
11. In the event that the Planning Director determines that the applicant has improperly completed the application, he/she shall promptly notify the applicant of such fact and allow the applicant thirty (30) days to properly complete the application. The time period for granting or denying a license shall be stayed during the period in which the applicant is allowed an opportunity to properly complete the application.
12. Applicants for a license under this Chapter shall have a continuing duty to promptly supplement application information required by this Section in the event that said information changes in any way from what is stated on the application. The failure to comply with said continuing duty within thirty (30) days from the date of such change, by supplementing the



application on file with the Planning Director, shall be grounds for suspension or revocation of a Sexually Oriented Business Regulatory License.

**E. Approval/Denial of License:**

1. The Planning Director shall approve or deny the issuance of a Sexually Oriented Business Regulatory License to an applicant within thirty (30) days after receipt of a completed application. The Planning Director shall deny a license if:
  - a. The applicant (if a natural person) is under the age of eighteen (18) years;
  - b. The applicant has made a false statement upon the application or has given false information in connection with an application;
  - c. The applicant or any holder of any class of stock, or a director, officer, partner or principal of the applicant has had an adult business license revoked or suspended anywhere within the state within one year prior to the application;
  - d. The applicant has operated an adult business which has determined to be a public nuisance under state law or this code within one year prior to the application;
  - e. A corporate applicant is not in good standing or authorized to do business in the state;
  - f. The applicant is overdue in the payment to the County of taxes, fees, fines or penalties assessed against him/her/it or imposed against him/her/it in relation to an adult business;
  - g. The applicant has not obtained the required sales tax license; or
  - h. The applicant of the sexually oriented business is in violation of, or is not in compliance with, any of the provisions of this Section.
2. In the event that the Planning Director denies a license, he/she shall make written findings of fact stating the reasons for the denial, and a copy of such decision shall be sent by first class mail to the address shown in the application. An applicant shall have the right to a hearing before the Board of Zoning Appeals as set forth in subsection J below. A written request for such hearing shall be made to the Planning Director within ten (10) days of the date of the denial of the license by the Planning Director. This hearing shall be held within sixty (60) days from the date a timely request for hearing is received. If no such hearing is held or if no order is issued within the time set forth below following such hearing, the application shall be deemed approved.

- a. At the hearing referred to above, the Board of Zoning Appeals shall hear such statements and consider such evidence as the Planning staff, enforcement officers, the applicant or other party in interest, or any other witness shall offer which is relevant to the denial of the license application by the Planning Director.
  - b. If the Board of Zoning Appeals determines that the applicant is ineligible for a license per subsection (A) of this Section, it shall issue an order sustaining the Planning Director's denial of the application, within five (5) days after the hearing is concluded, which shall include findings of fact. A copy of the order shall be mailed to the applicant at the address supplied on the application.
  - c. The order of the Board of Zoning Appeals made pursuant to this Section shall be a final decision and may be appealed to the circuit court pursuant to the provisions of the SC Local Government Planning Act, as may be amended from time to time. Failure of an applicant to timely follow the limits specified above constitutes a waiver by him/her/it of any right he/she/it may otherwise have to contest denial of his/her/it license application.
3. If any county official or department fails to render a timely decision pursuant to the terms of this Section then said official or department shall be deemed to have approved or consented to the issuance of the requested license.
  4. The Sexually Oriented Business Regulatory License, if granted, shall state of its face the names of the persons to whom it is granted, the expiration date, and the address of the sexually oriented business. The Sexually Oriented Business Regulatory License shall be posted in a conspicuous place at or near the entrance of the sexually oriented business so that it may be easily read at any time.

**F. Temporary Permits**

1. An applicant may apply for a temporary permit if a Sexually Oriented Business Regulatory License has been denied by the Planning Director, an appeal has been denied by the Board of Zoning Appeals and an appeal or other legal challenge is pending in the circuit court.
2. The temporary permit application shall include all information required by the Sexually Oriented Business Regulatory Ordinance.
3. The temporary permit application shall also include written evidence of the pendency of the appeal to the circuit court.
4. The completeness of the temporary permit application will be determined within five (5) days of its submittal.
5. After submittal of a complete application, the Planning Director shall issue the temporary permit within five (5) days.



6. Upon issuance, the applicant may commence its sexually oriented business adult use as set forth in the permit, pending compliance with other applicable non-sexually oriented business laws, rules and regulations.
7. In the event that denial of a Sexually Oriented Business Regulatory License is upheld by the courts, an investment or construction undertaken during the time of temporary permit must be removed and the business ceased. The applicant shall not have the right to continue with any business or recoup any investment from the County. Revocation of the permit shall not be considered a taking.

**G. Inspection**

1. An applicant or licensee shall permit representatives of the Sheriff's Office, South Carolina Department of Health and Environmental Control (DHEC), local Fire Department, Planning Department, Legal Department and/or Building inspections department to inspect the premises of a sexually oriented business for the purpose of ensuring compliance with the law, at any time it is occupied open for business.
2. The licensee (or the licensee's agent or employee) of a sexually oriented business commits a misdemeanor if he or she refuses such lawful inspection of the premises at any time it is occupied or open for business. Such refusal is also grounds for suspension or revocation of a Sexually Oriented Business Regulatory License.

**H. Expiration of Sexually Oriented Business Regulatory License**

1. A Sexually Oriented Business Regulatory License must be renewed each year, at least 2 weeks prior to the expiration date.
2. If, after denying the issuance or renewal of a Sexually Oriented Business Regulatory License, the Planning Director finds that the basis for denial of the license has been corrected or abated, the applicant may then be granted a Sexually Oriented Business Regulatory License.

**I. Suspension of Sexually Oriented Business Regulatory License**

The Planning Director shall suspend a Sexually Oriented Business Regulatory License for a period not to exceed 30 days if the Planning Director determines that a licensee or an employee of a licensee:

1. Has violated or is not in compliance with any provision of this Section.
2. Has refused to allow an inspection of the sexually oriented business premises as authorized by this Section.
3. Has knowingly permitted gambling by any person on the sexually oriented business premises.

**J. Revocation of Sexually Oriented Business Regulatory License**

1. The Planning Director shall revoke a Sexually Oriented Business Regulatory License if a cause of suspension in Section 6.4.18H occurs and the Sexually Oriented Business Regulatory License has previously been suspended within the preceding 12 months.
2. The Planning Director shall revoke a Sexually Oriented Business Regulatory License if the Planning Director determines that:
  - a. The licensee gave false or misleading information in the material submitted to the Zoning or Business License Departments during the application process;
  - b. The licensee or an employee knowingly operated the sexually oriented business during a period of time when the licensee's Sexually Oriented Business Regulatory License was suspended; or
  - c. A licensee or an employee has knowingly allowed any act of sexually intercourse, sodomy, oral copulation or masturbation to occur in or on the permitted and/or licensed premises.
3. If subsequent to revocation, the Planning director finds that the basis for the revocation of the Sexually Oriented Business Regulatory License has been corrected or abated, the applicant may be granted a Sexually Oriented Business Regulatory License.

**K. Appeal of Designation, Suspension or Revocation of Sexually Oriented Business Regulatory License**

A sexually oriented business or a Licensee may appeal, in writing, the Planning Director's designation of a business as a sexually oriented business, or the suspension or revocation of a Sexually Oriented Business Regulatory License to the Board of Zoning Appeals in accordance with the procedures of Article 3.13.

**L. Transfer of Sexually Oriented Business Regulatory License**

Each Sexually Oriented Business Regulatory License issued hereunder is non-transferable. A licensee shall not transfer a Sexually Oriented Business Regulatory License to another sexually oriented business, nor shall a licensee operate a sexually oriented business under the authority of a Sexually Oriented Business Regulatory License at any place other than the address designated in the application.

**M. Location Restriction**

1. A person commits a misdemeanor if he or she operates or causes to be operated a sexually oriented business outside of the zoning district where the use is allowed. (See Article 6.1).
2. A person commits a misdemeanor if he or she operates or causes to be operated a sexually oriented business within 1,000 feet of:



- a. A facility for Religious Assembly;
  - b. A public or private school;
  - c. A boundary of any residential zoning district;
  - d. A public park adjacent to any residential zoning district; and
  - e. The property line of a lot occupied by a residential use.
3. A person commits a misdemeanor if he or she causes or allow the operation, establishment, or maintenance of more than 1 sexually oriented business in the same building, structure or portion thereof, or the substantial enlargement of floor areas of any sexually oriented business in any building, structure or portion thereof containing another sexually oriented business without the issuance of Sexually Oriented Business Regulatory License for each use and every expansion.
  4. For the purpose of this Section , measurement shall be made in a straight line, without regard to intervening structures or objects, from the nearest portion of the building or structure used as a part of the premises where a sexually oriented business is conducted, to the nearest property line of the premises of a facility for Religious Assembly, a public or private school, to the nearest boundary of any residential zoning district, a public park adjacent to any residential zoning district, or the nearest property line of a lot occupied by a residential use.
  5. No expansion of the uses or physical structure of a building housing a sexually oriented business shall occur without the issuance of a Sexually Oriented Business Regulatory License for each use and expansion.

**N. Regulation of Adult Car Washes**

Nude or semi-nude employees of adult car washes must not be able to be seen from any public right-of-way or adjoining parcels. Necessary fencing and/or buffers, as set forth in the relevant chapters of this Ordinance, must be placed around the establishment in order to ensure that patrons can only view the employees once the patrons are inside the establishment.

**O. No Fondling or Caressing**

It is a misdemeanor for any nude or semi-nude employee or dancer to fondle or caress any patron, and no patron shall fondle or caress any nude or semi-nude employee or dancer.

**P. Nonconforming Sexually Oriented Business**

1. Any sexually oriented business operating on the date the original Sexually Oriented Business Regulations were enacted by Charleston County Council (Section 6.4.18), that is found to be in violation of any of the location provisions of Article 6.4.18L above, shall be deemed a nonconforming use, and upon written notification by the Planning Director, must obtain a Certificate of Nonconformity from the Planning

Department. A certified nonconforming use will be permitted to continue to operate for a period not to exceed 1 year before being licensed.

2. If the sexually oriented business does not, within 6 months of notification by the Planning Director, obtain a Certificate of Nonconformity, then the business will be deemed in violation of the Ordinance, and will not be permitted to continue to operate more than 6 months after the date that the regulations of this Section (Article 6.4.18) first became effective.
3. No nonconforming use shall be increased, enlarged, extended or altered except that the use may be changed to a conforming use.
4. If 2 or more sexually oriented businesses are within 1,000 feet of one another and otherwise in a permissible location, the sexually oriented business which was first established and continually operating at that particular location is the conforming use and the later-established business is the nonconforming use.
5. Any sexually oriented business lawfully operating as a conforming use is not rendered a nonconforming use due to the subsequent location of a church, public or private elementary or secondary school, public park, residential district, or a residential lot within 1,000 feet of the sexually oriented business. This provision applies only to the renewal of a valid Sexually Oriented Business Regulatory License, and does not apply when an application for a Sexually Oriented Business Regulatory License is submitted after a Sexually Oriented Business Regulatory License has expired or has been revoked.

**Q. Adult Motels Prohibited**

A person in control of a sleeping room in a hotel, motel, or similar commercial establishment, commits a misdemeanor if he or she rents or sub-rents a sleeping room to a person, and then, within 8 hours from the time the room is rented, rents or sub-rents the same sleeping room again, as such creates a rebuttable presumption that the establishment is an adult motel as that term is defined in this Section. For purposes of this Section, "rent" or "sub-rent" means the act of permitting a room to be occupied for any form of consideration.

**R. Six-Foot Distance Rule**

1. No nude or semi-nude employee or nude or semi-nude dancer shall perform live entertainment within six feet of any patron, nor shall any patron experience live entertainment within six feet of any nude or semi-nude employee or nude or semi-nude dancer, in a sexually oriented business. In the case of adult car washes, the six-foot distance rule necessitates that patrons get out of their vehicles, and watch the vehicles being washed no less than 6 feet away from the nude or semi-nude employees.
2. Sexually oriented businesses with live entertainment shall conspicuously post a sign that advises patrons that they must be at least 6 feet away from nude or semi-nude dancers at all times.



**S. Gratuities**

1. No patrons shall personally pay or personally give a gratuity to any nude or semi-nude dancer or nude or semi-nude, employee in a sexually oriented business establishment. Gratuities can be placed in containers at a location away from the nude or semi-nude dancer, or handed to clothed employees. In the alternative sexually oriented businesses could charge a cover charge, and prohibit all gratuities.
2. No nude or semi-nude dancer or nude or semi-nude employee a sexually oriented business shall solicit or accept any pay or gratuity personally from a patron.
3. Sexually oriented businesses with nude or semi-nude dancers or nude or semi-nude employees shall conspicuously post a sign that advises patrons that gratuities to be paid personally to nude or semi-nude dancers and nude or semi-nude employees are prohibited.

**T. Additional Regulations Pertaining to the Exhibition of Sexually Explicit Films and Videos, Adult Arcades and Health Clubs**

A person who operated or causes to be operated a sexually oriented business, as defined in this Section, which exhibits on the premises in a viewing room of less than 150 square feet of floor space, a film, video cassette or other video reproduction which depicts "specified sexual activities" or "specified anatomical areas", or which allows "specified sexual activities" or "specified anatomical areas", or which allows "specified sexual activities" to occur in a separate room in the establishment shall comply with the following requirements:

1. Upon application for a Sexually Oriented Business Regulatory License, the application shall be accompanied by a diagram of the premises showing a plan thereof specifying the location of 1 or more manager's stations and the location of all overhead lighting fixtures, and designating any portion of the premises in which patrons will not be permitted. A manager's station may not exceed 32 square feet of floor area. The diagram shall also designate the place at which the permit will be conspicuously posted, if granted. A professionally prepared diagram in the nature of an engineer's or architect's blueprint shall not be required; however, each diagram should be oriented to the north or to some designated street or object, and should be drawn to a designated scale or with marked dimensions sufficient to show the various internal dimensions of all areas of the interior of the premises to an accuracy of plus or minus six inches. The Planning Director may waive the foregoing diagram for renewal applications if the applicant adopts a diagram that was previously submitted and certifies that the configuration of the premises has not been altered since it was prepared.
2. The application shall be sworn to be true and correct by the applicant.
3. No alteration in the configuration or location of a manager's station may be made without the prior approval of the Planning Director.

4. It is the duty of the owners and operator of the premises to ensure that at least 1 employee is on duty and situated in each manager's station at all times that any patron is present inside the premises.
5. The interior of the premises shall be configured in such a manner that there is an unobstructed view from a manager's station of every area of premises to which any patron is permitted access for any purpose, excluding restrooms. Restrooms may not contain video reproduction equipment. If the premises has 2 or more manager's stations. The view required in this subsection must be by direct line of sight from the manager's station.
6. It shall be the duty of the owners and operator, and also the duty of any agents and employees present in the premises, to ensure that the view area specified in subparagraph "5" remains unobstructed by any doors, walls, merchandise, display racks or other materials at all times and to ensure that no patron is permitted access to any area of the premises which has been designated as an area in which patrons will not be permitted in the application filed pursuant to subparagraph "1" of this Section.
7. No viewing room, nor any room or enclosed area in a health club that cannot be viewed from the manager's station, may be occupied by more than 1 person at any time.
8. In order to ensure that places to which patrons access are adequately illuminated, the premises shall be equipped with overhead lighting fixtures at an illumination at least 1 candle foot as measured at the floor level.
9. It shall be the duty of the owners and operator, and also the duty of any agents and employees present in the premises, to ensure that the illumination described above is maintained at all times that any patron is present in the premises.
10. A person having a duty under subparagraphs 1. through 9. above commits a misdemeanor if he or she knowingly fails to fulfill that duty.

#### **U. Exemptions**

It is a defense to prosecution under this Section that a person appearing in a state of nudity did so in a modeling class operated:

1. By a proprietary school licensed by the State of South Carolina; a college, junior college, or university supported entirely or partly by taxation.
2. By a private college or university which maintains and operates educational programs in which credits are transferable to a college, junior college, or university supported entirely or partly by taxation.



3. In a structure:
  - a. Which has no sign visible from the exterior of the structure and no other advertising that indicates a nude person is available for viewing.
  - b. Where, in order to participate in a class, a student must enroll at least three days in advance of the class.
  - c. Where no more than one nude model is on the premises at any one time.

**V. Violations**

Refer to provisions contained in Chapter 11, Violations, Penalties and Enforcement.

**W. Severability**

If any provision of this Chapter or its application to any circumstance is held by a court of competent jurisdiction to be invalid for any reason, this holding does not affect other provisions or applications of this Chapter which can be given effect without the invalid provision or application, and to this end, the provisions of this Chapter are severable.

**§6.4.19 SINGLE FAMILY DETACHED AFFORDABLE HOUSING UNITS**

To promote ownership or occupancy of affordable, quality housing by low-income households, property within the **PD**, AG-8 or any AGR, RR-3, S-1, S-2, S-3, or R-4 zoning district may be approved for subdivision and development in accordance with the density/intensity and dimensional standards of this Section (see Section 6.4.19F below). The entity developing the subject parcel must construct new residential housing for the provision of affordable housing as certified by Charleston County. The purchaser or tenant of the affordable household, at the time of closing or rental agreement, must meet the **HUD** definition of low-income. The following standards of this Section must also be met:

**A. Single Family Detached Affordable Housing Units**

Single family detached affordable housing units shall meet the low-moderate income standards as defined by the United States Department of Housing and Urban Development or the Low Income definition, which is a household income 80 percent or below the median household income for Charleston County.

**B. Ownership**

Single family detached affordable housing units shall be sold or rented to qualified low-moderate income households, as defined in Section 6.4.19A.

**C. Density/Intensity and Dimensional Standards**

1. The maximum density and minimum lot area standards listed in the ~~following table~~ **Plan** shall apply to single family detached affordable housing units, **notwithstanding the following table.**

Zoning District	Maximum Density	Minimum Lot Area
<b>AG-10</b>	1 dwelling unit per 5 acres	1 acre
<b>AG-8</b>	3 dwelling units per acre	8,000 square feet
<b>AGR and RR-3</b>	3 dwelling units per acre	8,000 square feet
<b>S-3</b>	4 dwelling units per acre	8,000 square feet
<b>R-4</b>	6 dwelling units per acre	4,000 square feet

2. Single family detached affordable housing units in the AG-10 Zoning District shall comply with the dimensional standards of the underlying base zoning district, as contained in Chapter 4, Base Zoning Districts, where no standard is listed in the table above.
3. Single family detached affordable housing units in the **AG-8**, AGR, RR-3, S-3, and R-4 Zoning Districts shall comply with the dimensional standards of the R-4 Zoning District, as contained in Chapter 4, Base Zoning Districts, where no standard is listed in the table above.

#### **D. Uses**

1. Single family attached housing units and duplexes are allowed in the R-4 Zoning District if they meet all requirements of this Section.
2. Only single family detached affordable housing units are allowed in the AG-10, **AG-8**, AGR, RR-3, and S-3 Zoning Districts.

#### **§6.4.20 STABLE**

Boarding or riding stables shall require a minimum lot area of five acres. Riding areas and trails shall be limited to the subject parcel upon which the stable is located unless documentation is provided granting access onto other lands. Such documentation shall be provided through written and recorded documents.

#### **§6.4.21 UTILITY SUBSTATIONS**

Electricity regulating substations, gas pressure control stations, or similar utility substations shall be subject to the following standards:

- A. Utility Substations shall comply with the Site Plan Review requirements of this Ordinance;
- B. Any structure shall have a setback of not less than 25 feet from all property lines or the minimum setback of the ~~underlying zoning district Plan~~, whichever is greater; and
- C. The storage of vehicles and equipment on the premises shall be prohibited except in Community Commercial (CC) or Industrial (I) Zoning Districts.

#### **§6.4.22 VEHICLE SERVICE, LIMITED**

Vehicle Service, Limited shall be subject to the following standards:

- A. No outdoor storage of vehicles shall be permitted in conjunction with a limited vehicle service use; and



- B. ~~In zoning districts subject to conditions (C), this use shall have a maximum floor area of 5,000 square feet, otherwise this use shall fall under the special exception procedures of this ordinance.~~

#### **§6.4.23 BONA FIDE FORESTRY OPERATIONS**

For this use to be allowed, the contiguous parcels must have five acres or more of forest land. Additionally, if a parcel is harvested of Grand Trees (excluding Live Oak species per section 9.4.1.B. 2.d.) ~~the mitigation requirements in section 9.4 of this Ordinance shall apply zoning permits or development applications may not be submitted within five years of issuing permit or development applications may not be submitted within five years of issuing permit for the harvest because, it shall be presumed that such harvest was done in anticipation of future development and is not considered a bona fide forestry activity as defined by this ordinance. Any person seeking to rebut this presumption shall have the burden of proving their claim by clear and convincing evidence.~~

"Bona fide forestry operations" shall mean that the property is eligible for, and actually used for forestry or timber operations, and written application has been approved by the County Assessor for the special assessment for agricultural use for the property in question pursuant to SC Code Section 12-43-220, SC Department of Revenue Regulation 117-1780.1. and other applicable statutes, rules and regulations.

#### **§6.4.24 MANUFACTURED HOUSING UNITS**

##### **A. Replacement in R-2, R-3, R-4, M-8, and M-12 Zoning Districts**

The replacement of manufactured housing units shall be allowed by right in the R-2, R-3, R-4, M-8, and M-12 Districts if the Manufactured Housing Unit has been removed within 60 days of the receipt of the application by the Planning Director. If the Manufactured Housing Unit was removed prior to 60 days of the receipt of the application, this use must comply with the requirements and procedures of 6.4.24B and C of this Section.

##### **B. Requirements in RR-3, S-1, S-2, S-3, R-2, R-3, R-4, M-8, and M-12 Zoning Districts**

Manufactured housing units placed in RR-3, S-1, S-2, S-3, R-2, R-3, R-4, M-8, and M-12 Zoning Districts shall be skirted by: manufactured skirting, or other materials suitable for exterior use, including corrosion-resistant metal, fiberglass/plastic, wood/wood siding (both must be protected from the elements by water resistant solution/substance), decay resistant wood/pressure treated lumber, and masonry concrete. The enclosed crawl space under the manufactured housing unit must be ventilated. Skirting placed on manufactured housing units in any Federal Emergency Management Agency (FEMA) Flood Hazard Boundary Area must comply with any applicable FEMA requirements.

##### **C. Placement in R-4, M-8, and M-12 Zoning Districts**

Placement of a manufactured home within the R-4, M-8, and M-12 Zoning Districts is conditional upon determination by the Planning Director that:

1. The area within 300 feet of the parcel proposed for manufactured home placement is characterized either entirely of manufactured homes or a mix of site built and manufactured homes. (The mix shall contain a minimum number of manufactured homes equivalent to twenty-five percent (25%) of the number of existing principal residences located on

parcels within 300 feet of the subject property); and

2. If the Planning Director determines that the area is not characterized either entirely of manufactured homes or by a mix of site built and manufactured homes, the use shall fall under the Special Exception procedures of this Ordinance.

#### **§6.4.25 SINGLE FAMILY DETACHED DWELLING UNITS IN NON-RESIDENTIAL ZONING DISTRICTS**

Single family detached dwelling units shall be allowed in all non-residential zoning districts subject to the following conditions:

- A. A maximum of one single family detached dwelling unit shall be allowed per zoning lot in non-residential zoning districts;
- B. Dwelling units for security or maintenance personnel as accessory structures, per Section 6.5.1C of this Ordinance, shall not be permitted on the same zoning lot as a single family detached dwelling unit; and
- C. The single family detached dwelling unit must meet all dimensional standards of the non-residential zoning district in which it is located.

#### **§6.4.26 PERSONAL IMPROVEMENT EDUCATION**

In zoning districts subject to conditions (C), personal improvement education shall have a maximum floor area of 5,000 square feet or less; otherwise this use shall fall under the special exception procedures of this Ordinance.

#### **§6.4.27 HISTORICAL SITE**

In zoning districts subject to conditions (C), the operation of historical sites shall be restricted to the hours between 7:00 a.m. and 8:00 p.m., otherwise this use shall fall under the special exception procedures of this Ordinance.

#### **§6.4.28 POSTAL SERVICE, UNITED STATES**

In zoning districts subject to conditions (C), any postal service facility shall have a maximum floor area of 5,000 square feet or less; otherwise this use shall fall under the special exception procedures of this Ordinance.

#### **§6.4.29 ADULT OR CHILD DAY CARE FACILITY**

All adult or child day care facilities shall comply with the Site Plan Review procedures contained within this Ordinance.

#### **§6.4.30 RECREATION OR ENTERTAINMENT, INDOOR**

No indoor shooting ranges shall be allowed in the Commercial Transition (CT) zoning district.

#### **§6.4.31 UTILITY SERVICE, MINOR**

Minor Utility Service uses shall comply with the Limited Site Plan Review requirements of this Ordinance and shall obtain a clearing and grubbing permit prior to commencement of such activities.

Minor Utility Service shall be underground in the Commercial Transition (CT) zoning district.



**§6.4.32 PET STORES OR GROOMING SALONS, SMALL ANIMAL BOARD, AND VETERINARY SERVICES**

In the nonresidential zoning districts, pet stores, grooming salons, small animal boarding and veterinary services shall have a maximum floor area of 2,000 square feet or less; otherwise these uses shall fall under the special exception procedures of this Ordinance. In the agricultural and residential zoning districts, pet stores, grooming salons, small animal boarding and veterinary services shall have a maximum floor area of 1,500 square feet, otherwise these uses shall fall under the special exception procedures of this Ordinance.

**§6.4.33 BANKS AND FINANCIAL SERVICES**

In zoning districts subject to conditions (C), banks and financial services shall have a maximum floor area of 5,000 square feet or less; otherwise these uses shall fall under the special exception provisions of this Ordinance.

**§6.4.34 CATERING SERVICE**

- A. In zoning districts subject to conditions (C), a structure or structures used for catering services shall have a maximum floor area of 5,000 square feet.
- B. In zoning districts subject to Special Exception provisions (S), a structure or structures used for catering services shall have a maximum floor area of 2, 000 square feet.
- C. On-site retail sales are prohibited.
- D. All catering service uses shall comply with the Site Plan Review requirements of this Ordinance.

**§6.4.35 ADMINISTRATIVE OR BUSINESS OFFICE, GOVERNMENT OFFICE, AND PROFESSIONAL OFFICE**

In zoning districts subject to conditions (C), administrative or business office, government offices, and professional offices shall have a maximum floor area of 5,000 square feet or less; otherwise these uses shall fall under the special exception provisions of this Ordinance.

**§6.4.36 SPECIAL TRADE CONTRACTORS**

Special Trade Contractors shall be subject to the following standards:

- A. This use excludes any tractor trailer containers in outside storage areas; and
- B. ~~In zoning districts subject to conditions (C), this use shall have a maximum area of 5,000 square feet including the building and any outside storage, otherwise this use shall fall under the special exemption procedures of this Ordinance.~~

**§6.4.37 PARKING LOTS**

In the Commercial Transition (CT) zoning district, all parking lots shall have one canopy tree per six parking spaces and a maximum of fifteen spaces in a row between trees.

**§6.4.38 CONSUMER GOODS RENTAL SERVICE**

In zoning districts subject to conditions (C), consumer goods rental services shall have a maximum floor area of 5,000 square feet or less; otherwise this use shall fall under the special exception procedures of this Ordinance.

**§6.4.39 BOAT YARD**

If a boat yard provides dry stack or wet slip storage of watercraft or direct access to the water, this use shall be considered a Water-Dependent Use and subject to the Water-Dependent Use requirements contained in Chapter 5 of this Ordinance. .

**§6.4.40 REPAIR SERVICE, CONSUMER**

Repair Service, Consumer shall be subject to the following standards:

- A. ~~In zoning districts subject to conditions (C), consumer repair services shall have a maximum floor area of 5,000 square feet or less; otherwise this use shall fall under the special exception procedures of this Ordinance.~~
- A. ~~In the Neighborhood Commercial (CN) zoning district, n~~ No outside storage will be allowed.

**§6.4.41 LIQUIFIED PETROLEUM GAS DEALERS**

The amount of storage for liquid petroleum gas dealers shall be limited to 40,000 gallons per site.

**§6.4.42 BUILDING MATERIALS OR GARDEN EQUIPMENT AND SUPPLIES DEALERS**

Building Materials or Garden Equipment and Supplies Dealers shall be subject to the following standards:

- A. This use excludes any tractor trailer containers in outside storage areas; and
- B. ~~In zoning districts subject to conditions (C), this use shall have a maximum area of 5,000 square feet including the building and any outside storage, otherwise this use shall fall under the special exception procedures of this Ordinance.~~

**§6.4.43 FOOD SALES**

In zoning districts subject to conditions (C), food sales shall have a maximum floor area of 5,000 square feet or less; otherwise this use shall fall under the special exception procedures of this Ordinance.

**§6.4.44 RETAIL SALES OR SERVICE, GENERAL**

In zoning districts subject to conditions (C), retail sales or service, general shall have a maximum floor area of 5,000 square feet or less; otherwise the use shall fall under the special exception procedures of this Ordinance.

**§6.4.45 SERVICE STATION, GASOLINE**

In zoning districts subject to conditions (C), gasoline service stations shall have a maximum floor area of 5,000 square feet or less; otherwise this use shall fall under the special exception procedures of this Ordinance.



**§6.4.46 CONSUMER CONVENIENCE SERVICES**

In zoning districts subject to conditions (C), consumer convenience services shall have a maximum floor area of 5,000 square feet or less; otherwise this use shall fall under the special exception procedures of this Ordinance.

**§6.4.47 PERSONAL IMPROVEMENT SERVICES**

In zoning districts subject to conditions (C), personal improvement services shall have a maximum floor area of 5,000 square feet or less; otherwise this use shall fall under the special exception procedures of this Ordinance.

**§6.4.48 SERVICES TO BUILDING OR DWELLINGS****A. Services to Buildings or Dwellings**

In zoning districts subject to conditions (C), services to buildings or dwellings shall have a maximum floor area of 5,000 square feet or less; otherwise this use shall fall under the special exception procedures of this Ordinance.

**B. Landscaping Services**

1. In zoning districts subject to conditions (C), a structure or structures used for landscaping services shall have a maximum floor area of 2,000 square feet; and
2. All landscaping service uses shall comply with the Site Plan Review requirements of this Ordinance.

**§6.4.49 FREIGHT FORWARDING FACILITIES**

In zoning districts subject to conditions (C), freight forwarding facilities shall have a maximum floor area of 10,000 square feet or less; otherwise this use shall fall under the special exception procedures of this Ordinance.

**§6.4.50 GOLF COURSES**

Golf courses shall be subject to the following standards and criteria:

- A. An impact analysis must be submitted that indicates the potential number of members, the characteristics of the golf course membership, a traffic impact analysis and a complete site analysis as detailed below:

**1. Required Site Analysis**

The layout of any golf course shall be determined after preparing the required site analysis. The detailed site analysis will be done in order to identify the site's most significant environmental, historic, cultural, and natural resources. The site analysis will include:

**a. Vegetation**

Characteristics of a vegetation survey related to land use will describe principal, predominant, and significant vegetation, by type, condition, age, use, and general or specific location. Features in the survey will include trees and shrubs, agricultural fields, treelines, native vegetation, orchards, groves, woodlots, pastures, wetlands,

forests, and grasslands. The vegetation survey shall indicate any significantly large trees or endangered plant or animal species that may reside on the site and is protected by law.

- b. **Historical, Archaeological and Cultural Resources**  
Historical resources located within the proposed golf course development must be identified on the plat. Sources such as the County of Charleston Historical Survey (1991), state registers, and federal registers such as the National Register of Historic Places shall be utilized in identifying these resources. The historical survey is important for noting structures and areas that must be protected as designated landmarks.
- c. **Adjacent Land Use Patterns**  
Land use on adjacent properties shall be identified. Features such as, but not limited to, roads, rice dams, traditional settlement areas, cemeteries, clusters of structures, parks, marinas, and logging areas shall be shown.
- d. **Hydrography**  
All water features including streams and sensitive areas on the site, such as wetlands and riparian corridors, must be located. The purpose of locating these features is to limit disturbance of soil and vegetation that affect water quality features. Hydrography shall be used to determine where water required wetland buffers and other requirements such as drainage easements will be located. Wetland buffers of 50 feet are required on all saltwater marshes, and 35 feet on all protected freshwater wetlands. All water bodies - rivers, streams, drainage channels, marshes or wetland, floodplains and aquifers must be inventoried or identified.
- e. **Wildlife Habitat Areas**  
The purpose of identifying wildlife areas is to assess the ecological conditions of the landscape and to provide continuation of these habitat areas. Features of this survey shall include the presence of any threatened or endangered species, natural areas vital to wildlife species, habitat areas that are connected to larger undisturbed natural habitat (connected habitat system). Through this method the study will develop key points or areas that should be left undeveloped, then define those areas most suitable for development.

~~B. Within the RM, AG, AGR, RR-3, S-1, S-2, S-3, R-2, R-3, and R-4 Zoning Districts, only Audubon International "Signature Program" golf courses will be allowed.~~

- B. Potential sites should be selected which allow the golf course to be routed in such a way as to minimize the need to alter, create or remove existing native landscapes, trees, and vegetation, and which provide opportunities for restoration/enhancement of valuable habitat.



- C. Sites which have Archaeologically or Geologically significant and sensitive or critical habitat or environmental features shall be identified and either relocated or preserved through careful golf course design. Permanent open space easements or other techniques may be used, as appropriate, to effect preservation. The site design shall identify areas for restoration, replanting, and enhancement of riparian and littoral habitat to re-establish wildlife migration corridors and lineages between fragmented habitat areas. Protection and planned restoration/enhancements for such areas during construction and ongoing operation must be ensured. Native habitats and communities of special value to threatened/endangered species shall be preserved to the greatest extent possible, consistent with State and Federal regulation.
- D. Each site selected [as a] golf course development will likely have a variety of habitat types present. These habitat types must be identified and provisions made for routing of the course or relocation of the species.
- E. The site plan should protect drainage systems that support retained vegetation. Ponds shall be developed which mimic conditions in terms of both aesthetics and habitat.
- F. Structures and buildings should be located such that impacts to habitats and significant natural areas are avoided.
- G. Design and Construction Standards

#### **1. Marshes, Creeks and Wetlands**

- a. The golf course design must attempt to minimize the number of marsh, creek or wetland crossings. Marsh, creek or wetland crossings must be designed in such a way to minimize erosion and harmful effects of significant habitat and migration corridors.
- b. Bridges must minimize alteration of the marsh, creek or wetland environment.
- c. Design must create and restore riparian habitat, especially in previously degraded habitat areas, and must reduce the impact of alterations necessitated by design and construction of the course.
- d. The course design must employ vegetated buffer strips of sufficient width to mitigate impacts to riparian corridors and other significant habitat which may result from surface drainage of the golf course, cart paths, and other developed areas. In certain circumstances where riparian vegetation has been degraded or does not exist, turf grass and rough areas may be located in closer proximity to the marshes, creeks and wetlands.
- e. Cart paths must be graded such that runoff from them generally does not flow directly into any marsh, creek or wetland.
- f. Construction fencing/siltation barriers must be utilized during the

construction phase where needed to protect habitat and marsh, creek or wetland areas.

## **2. Trees**

- a. The selected site must not be heavily forested (with more than 60 percent tree canopy coverage).
- b. The design of the course and related facilities must maximize the preservation of clusters or significant stands of trees, particularly grand trees, and otherwise preserve "interior" habitat areas.
- c. Irrigation systems shall be designated to avoid impacting existing oaks or other sensitive vegetation.
- d. If required by the Planning Director, a certified professional arborist, botanist, or forester shall be employed by the applicant to evaluate the status of the trees and related habitats on the site and provide direction for restoration and/or enhancement of impacted trees.
- e. Cart paths within the drip lines of trees slated for preservation must be grated in such a way as to not damage or stress the tree.
- f. Barriers (curbs, fencing, vegetation, etc.) should be established to discourage cart and pedestrian travel off paths located within or adjacent to sensitive habitat.

## **3. Water Quality**

- a. Lined artificial storage ponds must not be located in prime groundwater recharge areas.
- b. Turf grass species and landscaping around buildings should be selected which are drought resistant or tolerant and which are suited for any special site characteristics or soil conditions.
- c. State-of-the-art irrigation systems with site meteorological monitoring capability should be used to minimize water use.
- d. If on-site wells or ponds are to be used as the irrigation water source, analysis will be required to determine the safe yield in order to prevent aquifer, off-site wells and/or marsh, creek or wetland depletion. The developer will be held responsible for any negative impact on water supplies to adjacent or nearby properties.
- e. Paved areas should be limited in order to minimize impermeable surfaces, and thereby reduce surface runoff.
- f. The project should employ established best management practices pursuant to the Non-Point Source Program guidelines to control non-point source (stormwater) runoff pollution. For example:



impervious liners for detention/retention ponds and water hazards to protect ground and surface water quality; buffer strips, oil/grease separators or other recommended techniques for parking area drainage systems; grease traps and other recommended technologies for facilities such as golf cart maintenance or wash areas to prevent untreated runoff from entering the natural aquatic environmental berms, vegetative strips, grease traps, or other recommended technologies in parking areas for drainage controls to minimize pollution to nearby riparian areas and surface waters.

- g. The overall drainage system should be designed to insure that there is no increase in the velocity or amount of off-site flows during major storm events.

#### 4. Archaeology

- a. The design of the course must preserve significant archaeological areas and/or historical features present on the site.
- b. Significant archaeological sites must be staked, flagged, or fenced off to insure their protection.

#### 5. Noise

- a. Where possible, clubhouse facilities and other noise-generating uses and facilities should be located away from neighbors who might be impacted.
- b. Roads must be sited such that traffic noise is minimized for adjacent areas.

#### 6. Growth-Inducing Impacts

- ~~a. This project should not provide infrastructure improvements that would be capable of serving new development other than the proposed project.~~
- ~~b. The project should not stimulate economic expansion or growth (e.g. major changes in tax revenue base, employment expansion, etc.) other than that necessary to serve this proposed project.~~
- e-a. The project should not establish a precedent for significant change in current *Comprehensive Plan* policy.
- eb. In cases where the golf course developer owns lands adjacent to the project site, a plan for the potential development of those adjacent lands should be submitted for evaluation.
- e.c. Deed restrictions, open space easements, or other appropriate techniques must be used to mitigate or prevent growth-inducing impacts inside the development.

- I. Notification  
Upon the receipt of a complete application for a golf course, the Planning Department shall notify neighbors within a 300-foot radius, parties in interest and place notification in the newspaper within ten (10) days. All notifications shall be done in accordance with the provisions contained in Chapter 3 of this Ordinance.
- J. Time Limit for Staff Review  
Upon the receipt of a complete application for a golf course, the Planning Department shall have a maximum of 45 days to act on the application. Staffs failure to act on the application within 45 days will result in the applicant being granted a Zoning Permit.

#### **§6.4.51 SOLID WASTE DISPOSAL FACILITY**

- A. Solid Waste Disposal Facilities located in the Resource Management (RM) Zoning District shall comply with all of the requirements contained in the South Carolina Solid Waste Policy and Management Act of 1991, as amended.
- B. The following requirements shall apply to Solid Waste Disposal Facilities located in or proposed to be located in the Industrial (I) Zoning District:
  - 0. Solid Waste Disposal Facilities that were legally established before April 21, 1999 shall be deemed Uses Permitted by Right, as defined in Chapter 12 of this Ordinance.
  - 1. Any proposed Solid Waste Disposal Facilities, except existing Solid Waste Disposal Facilities, shall fall under the special exception procedures of this Ordinance.
  - 2. All Solid Waste Disposal Facilities shall comply with all of the requirements contained in the South Carolina Waste Policy and Management Act of 1991, as amended.

#### **§6.4.52 CONTAINER STORAGE FACILITIES**

- A. Facilities for or including container storage (whether temporary or permanent), shall be subject to the following additional standards:
  - 1. Uses shall be separated from any adjoining uses or public or private rights-of-way, excluding points of ingress or egress, by way of one of the following:
    - a. A suitably landscaped earthen berm sufficient to screen neighboring or nearby property from the facility; and in no event less than eight (8) feet in height above finished grade; or
    - b. A solid concrete, brick or masonry wall of not less than ten (10) feet in height above finished grade and completely screened from view from public rights-of-way by way of a vegetative buffer; or



- c. A minimum vegetative buffer depth of two hundred (200) feet along the boundaries adjacent to any property zoned Residential (R) and a minimum vegetative buffer depth of fifty (50) feet otherwise. This buffer shall be located within the required setback as described in Section 6.4.52.3.b.
  2. Container yard light fixtures installed after January 1, 2005, shall be a type that minimizes fugitive light scatter and shall be directed into the container yard away from neighborhoods. In addition, yard light fixtures installed after January 1, 2005, shall not be visible above the tree line from adjacent residential neighborhoods.
  3. Storage within a container yard shall be restricted by the following:
    - a. Container stacking may be permitted, where appropriate, pursuant to an approved container stacking plan. Such plan shall, at a minimum, include a site plan showing the location of all abutting streets and sidewalks, all internal travel-ways, a stagger stacking schedule, and the proposed maximum stacking heights. A suitable stacking plan shall feature a slope not exceeding a rise/run of  $\frac{1}{2}$ , shall include a perimeter setback of not less than thirty (30) feet from the nearest stored container, the nearest sidewalk edge, or right-of-way edge, and shall indicate how the stacking plan meets all other requirements of this Ordinance; and
    - b. Container and chassis storage is not permitted within three-hundred fifty (350) feet of the boundary adjacent to any property zoned Residential (R) and within fifty (50) feet otherwise. In addition, containers stacked in the yard shall not be visible above the tree line from adjacent residential neighborhoods. Structures may be allowed in the area beyond the required buffer where container and chassis storage is prohibited, provided that proposed structures meet all requirements of this Ordinance and receive Site Plan Review Approval.
  4. In those instances which proposed container storage facilities are viewed by the Planning Director as having a substantially negative impact on a surrounding area(s) or adjoining property(ies), based on the facility's location, proposed use, permitted use, or actual use of the property, the Planning Director shall bring the matter to the next available meeting of the Board of Zoning Appeals for hearing and decision, pursuant to Article 3.13.
- B. Amortization Provided
- Any facility involved in, or location used for, the purposes provided within Section 6.4.52 and not zoned Industrial (I) as of November 20, 2001 shall cease operations no later than November 20, 2004. Any facilities engaged in stacked storage as of November 20, 2001, shall come into compliance with Section 6.4.52 by November 20, 2004, and shall be bound by the three (3) year general amortization schedule provided for herein above.

**§6.4.53 CEMETERIES**

Cemeteries require ~~a minimum five-acre lot area~~, a minimum 25-foot landscaped buffer from adjacent properties, and completion of the Site Plan Review process. Non-commercial, family cemeteries shall be allowed. Cemeteries on the same lot as or on a lot adjacent to a religious facility shall be allowed as a use of right.

**§6.4.54 KENNEL**

A minimum of a five-acre lot, and a minimum of a 100-foot screened and landscaped buffer from all adjacent properties is required.

**§6.4.55 RECYCLING COLLECTION, DROP-OFF**

Facilities providing recycling collection drop-off centers shall comply with the Site Plan Review procedures contained within this Ordinance.

**§6.4.56 AIRPORTS, HELIPORTS AND OTHER AIRCRAFT LANDING/TAKEOFF FACILITIES**

Facilities providing landing and/or takeoff areas, service, hanger, or storage for aircraft, helicopters, lighter than air aircraft, hot-air balloons, or other similar craft, must comply with the Planned Development Procedures contained within this Ordinance.

**§6.4.57 SPECIALIZED MANUFACTURING**

- A. In zoning districts subject to condition (C), a structure or structures used for specialized manufacturing shall have a maximum floor area of 2,000 square feet and shall have no more than five (5) non-resident employees.
- B. All activities related to the specialized manufacturing use shall be confined to a structure that is entirely enclosed.
- C. On-site retail sales are prohibited.
- D. All specialized manufacturing uses shall comply with the Site Plan Review requirements of this Ordinance.

**§6.4.58 SWEETGRASS BASKET STANDS**

Vehicle parking for sweetgrass basket stands shall be located entirely out of all travel lanes with a minimum of two (2) feet of clearance between the edge of the travel lane and any parked vehicle or sweetgrass basket stand.

**§6.4.59 TATTOO FACILITIES**

- A. Tattoo facilities shall be prohibited within 1,000 feet of a church, school, or playground. This distance shall be the shortest route of the ordinary pedestrian or vehicular travel along the public thoroughfare from the nearest point of the grounds in use as part of the church, school, or playground;
- B. All proposed tattoo facilities located within 1,000 feet of a property line of a lot in a residential zoning district, or a lot containing a residential use shall require review and approval in accordance with the Special Exception procedures of this Ordinance. The distance shall be measured from the nearest property line



of the subject parcel to the nearest property line of a lot containing a residential use or located in a residential zoning district;

- C. All proposed tattoo facilities may only provide tattooing and may not engage in any other retail business including, but not limited to, the sale of goods or performing any form of body piercing other than tattooing;
- D. All proposed tattoo facilities shall comply with all regulatory requirements of the State of South Carolina;
- E. Tattoo facility uses shall comply with the Site Plan Review requirements of this Ordinance and all other applicable provisions of this Ordinance and all other applicable laws, rules, and regulations; and
- F. When the provisions of this Ordinance require that Neighbor Notice be provided, the requirements of Section 3.1.6.B.3 shall apply with the exception that all property owners within 1,000 feet of the subject property shall be included in the Neighbor Notice.

---

## ARTICLE 6.5 ACCESSORY USES AND STRUCTURES

---

### §6.5.1 ACCESSORY USES AND STRUCTURES ALLOWED

Permitted uses and approved Special Exception uses shall be deemed to include accessory uses and structures that are necessarily and customarily associated with, and appropriate, incidental, and subordinate to the allowed principal use. **These uses may be located on the same Lot as the principal use or other Lots. The ARB may permit, permit with conditions, or prohibit any accessory uses on the Real Property or any portion thereof which are not necessarily and customarily associated with, and appropriate, incidental, and subordinate to the allowed principal use.** Accessory uses and structures shall be subject to the same regulations as apply to principal uses and structures in ~~the Plan each zoning district~~, unless otherwise expressly stated.

#### A. Agricultural

Accessory Agricultural uses shall include all residential accessory uses and those accessory uses and activities customarily associated with agricultural operations, as determined by the Planning Director. Barns and farm-related structures, including roadside stands selling sweetgrass baskets or indigenous produce grown or produced on the farm where the roadside stand is located, shall be allowed on all parcels in Agricultural zoning districts, even if the subject parcel does not contain a primary structure. Manufactured homes, modular building units, and pre-manufactured container units may be used for non-residential purposes only in all agricultural zoning districts subject to the following requirements as well as those in the Charleston County building Code, as amended.

##### 1. Applicability

This Section applies to any Permanent Storage Unit, as defined in subsection B.

##### 2. Definitions

For purposes of this Section the following definitions apply:



- a. "Manufactured Housing Unit", "Modular Building Unit", and "Pre-Manufactured Container Units" are defined in Article 12.
- b. "Rear Yard" means the area between the rear of the principal building and the rear lot line.
- c. "Permanent Storage Unit" means any manufactured housing unit, modular building unit, or pre-manufactured container unit exceeding 120 square feet in size that is used solely for non-residential purposes.

### **3. Location**

- a. Permanent Storage Units may be established as an accessory use to any dwelling unit in an AGR, AG-8, AG-10, AG-15, **RM**, Community Commercial (CC), or Industrial (I) Zoning District. Permanent Storage Units are not permitted in any other zoning district.
- b. Permanent Storage Units are permitted only in the rear yard.

### **4. Permitting**

Permanent Storage Units shall not be established or placed on lots or parcels unless the Planning Director has issued a zoning permit authorizing the unit. (See Article 3.8)

### **5. Screening**

- a. Permanent Storage Units shall be completely screened from view along any lot line except the rear lot line, and along any lot line abutting a waterway. The screening must conform to subsection 2, below.
- b. Screening shall include at least one (1) of the following:
  - i. The principal building and any existing vegetation on the lot; or
  - ii. If the methods in subsection a, above, are not sufficient to provide complete screening, a minimum Residential Class A buffer (refer to Section 9.5.4.B.5) or a minimum six (6) foot high masonry wall must be provided between the Permanent Storage Unit and the required lot lines.
- c. The Planning Director may waive the screening requirements if the Residential Storage Unit complies with the Building Design Standards in subsection 6, below.

## **6. Building Design**

### **a. Applicability**

Subsections i. through v., below, apply to all Permanent Storage Units, regardless of screening.

- i. The building footprint of the Permanent Storage Unit shall not occupy more than five hundred (500) square feet.
- ii. The building height of the Permanent Storage Unit shall not exceed twelve (12) feet.
- iii. Permanent Storage Units must be installed, underskirted, and anchored in the same manner as the principal building.
- iv. All moving or towing apparatus must be removed or concealed with skirting, including hitch, wheels and axles.
- v. Bare metal is prohibited as an exterior building material.

## **7. Existing Permanent Storage Units**

Permanent Storage Units in existence prior to July 19, 2006 shall be considered to be existing legal non-conforming structures.

## **B. Residential**

The following uses and structures shall be allowed as accessory uses and structures to allowed Residential uses:

1. Fences and walls;
2. Garages, carports and off-street parking areas;
3. Gate houses and guardhouses;
4. Home occupations, subject to Section 6.5.9;
5. Playhouses, patios, cabanas, porches, gazebos and incidental household storage buildings;
6. Radio and television receiving antennas;
7. Recreational and play facilities for the use of residents;
8. Solar collectors, subject to Section 6.5.4;
9. Tennis courts, swimming pools and hot tubs;
10. Accessory Dwelling Units, subject to Section 6.5.7;
11. Barns and farming-related structures even if the subject parcel does not contain a primary structures or use, provided that no agricultural or farm-



related structure on a parcel of one acre or less in an R-2, R-3, R-4, M-8, or M-12 district shall exceed 250 square feet in area;

12. The selling of sweetgrass baskets is allowed as an accessory use in all Agricultural Zoning Districts and in RR-3, S-1, S-2, S-3, R-2, R-3, and R-4 Zoning Districts;
13. Other necessary and customary uses determined by the **ARB Planning Director** to be appropriate, incidental and subordinate to the principal use of the property, subject to compliance with any standards contained within this Ordinance.

**C. Commercial and Industrial**

The following uses and structures shall be allowed as accessory uses and structures to allowed Commercial and Industrial uses:

1. One dwelling unit for security or maintenance personnel;
2. Fences and walls;
3. Gates and guard houses;
4. **Off-street** parking **and loading** areas (which may be located on a separate parcel pursuant to the requirements contained in Chapter 9);
5. Radio and television receiving antennas and support structures;
6. Recreation areas and facilities for the use of employees;
7. Cafeterias, dining halls and similar food services when operated exclusively for the convenience of employees, clients, or visitors to the principal use;
8. Day care facilities when operated exclusively for the convenience of employees of the principal use;
9. Gift shops, news stands and similar commercial activities operated exclusively for the convenience of employees, clients, or visitors to the principal use; -
10. Solar Collectors, subject to Section 6.5.4;

**11. Off street parking**

**12. Temporary Real Estate office**

**13. Temporary construction facilities**

14. Other necessary and customary uses determined by the **Planning Director ARB** to be appropriate, incidental and subordinate to the principal use on the lot, subject to compliance with any standards contained within this Ordinance.

**D. Institutional and Civic**

The following uses and structures shall be allowed as accessory uses and structures to allowed Institutional and Civic uses:

1. Refreshment stands and food and beverage sales located in uses



involving public assembly;

2. Cafeterias, dining halls and similar food services when operated primarily for the convenience of employees, residents, clients, patients or visitors to the principal use;
3. Gift shops, news stands and similar commercial activities operated primarily for the convenience of employees, residents, clients, patients or visitors to the principal use;
4. Recreation areas and facilities for the use of employees;
5. Solar Collectors, subject to Section 6.5.4 of this Chapter;

**6. Off street parking**

**7. Temporary real estate offices**

**8. Temporary construction facilities; and**

9. Other necessary and customary uses determined by the Planning Director ARB to be appropriate, incidental and subordinate to the principal use on the lot, subject to compliance with any standards contained within this Ordinance.

### **§6.5.2 TIME ESTABLISHMENT**

Unless otherwise expressly permitted by the in this Ordinance ARB, no accessory use shall be established and no accessory structures shall be allowed on the subject parcel until after all required permits and approvals for the principal use or activity have been obtained and there are no current zoning and/or building code violations on the property.

### **§6.5.3 ACCESSORY STRUCTURES IN RESIDENTIAL, OR, AND CT ZONING DISTRICTS**

Unless otherwise expressly stated and in addition to any other applicable provisions of this Ordinance, accessory structures in Residential, OR and CT zoning districts shall be subject to the following standards:

- A. An accessory structure erected as an integral part of the principal structure shall be made structurally a part thereof, shall have a common wall therewith, and shall comply in all respects with the requirements of these and other regulations applicable to principal structures.
- B. A detached accessory structure shall be located:
  1. On the rear of the lot, behind the principal structure. This limitation shall not apply to carports or garages;
  2. At least six feet from any existing dwelling or dwelling under construction;
  3. At least three feet from any interior lot line in a residential district; if in an OR or CT district that abuts a residential district, the accessory structure in the OR or CT district shall be located at least ten feet from the abutting interior lot line; when an OR or CT district abuts another O , C or I district, setbacks for accessory structures are not required; and
  4. If on a corner lot, the accessory structure shall not project in front of the

front building line required or existing on the adjacent lot.



- C. A detached accessory structure may be constructed on an adjacent vacant lot if both lots are in the same ownership.
- D. Accessory structures shall be included in lot coverage;
- E. See also the Accessory Dwelling Unit provisions of Section 6.5.7 contained within this Chapter.

#### **§6.5.4 SOLAR COLLECTORS**

Solar Collectors shall be permitted provided that the following performance standards are met:

- A. Roof-mounted residential building Solar Collectors located on front or side building roofs visible from the public right-of-way shall not extend above the peak of the roof plane where it is mounted, and no portion of any such Solar Collector shall extend more than 24 inches as measured perpendicularly to the roof at the point where it is mounted.
- B. Roof-mounted residential building Solar Collectors located on the rear or interior side building roofs shall not extend above the peak of the roof plane where it is mounted and no portion of any such Solar Collector shall extend more than four feet as measured perpendicularly to the roof at the point where it is mounted.
- C. Ground-mounted Solar Collectors shall not exceed eight feet in total height and shall be located to meet all setback requirements.
- D. All utility service lines serving a ground-mounted solar system shall be located underground.
- E. Any system incorporated into a nonresidential building shall be integrated into the basic form and main body of the building. If roof mounted, all collector panels shall fit into the form of the roof; if the building's roof is sloped or if "rack" mounting is used on a flat roof, the mounting must be concealed from view at street level. Exposed rack supports and free-standing collectors apart from the main building shall not be permitted.
- F. Roof mounted solar energy systems mounted on "accessory or detached buildings" are allowed on detached garages or swimming pool equipment buildings. Detached "greenhouses" are also acceptable. No free-standing panels shall be allowed.
- G. If an active solar or photovoltaic solar system is utilized, all components servicing the collector panels shall be concealed, including mechanical piping and conduits.
- H. All exposed metal shall be of a color that will blend into its surroundings.

#### **§6.5.5 ACCESSORY STORAGE OF MAJOR RECREATIONAL EQUIPMENT**

No such equipment shall be used for living, sleeping or housekeeping purposes when parked or stored on a residential lot or in any location not approved for such use.

*No major recreational vehicles or equipment shall be parked or stored on a residential lot (unless fully enclosed within a garage) or in any location not approved for such use*

*by the ARB. Notwithstanding the foregoing, the ARB may permit, permit with conditions, or prohibit any recreational vehicles or equipment from being parked or stored on the Real Property or any portion thereof.*



**§6.5.6 ACCESSORY RETAIL SALES AND PERSONAL SERVICES**

Personal services and retail sales established with the express purpose of providing a convenience for tenants of multi-family or office development shall be permitted, subject to the following limits:

- A. The accessory activity shall be located on the same zoning lot as the principal use.

**§6.5.7 ACCESSORY DWELLING UNITS**

~~In Agricultural and Residential zoning districts~~ one accessory dwelling unit may be established on an existing zoning lot if reviewed and approved, subject to the following standards:

- A. ~~The zoning lot must have a minimum area at least 50 percent larger than the minimum area required for a principal residential structure.~~
- B. Only one accessory unit shall be permitted per zoning lot.
- C. The heated gross floor area of the accessory dwelling unit shall not exceed 800 square feet ~~in any Residential district or shall not exceed 1,500 square feet in any Agricultural district.~~
- D. Separate electrical meters shall not be allowed for attached accessory dwellings.

**§6.5.8 MANUFACTURED HOUSING UNITS**

- A. In Agricultural zoning districts, a manufactured housing unit may be used for one caretaker's quarters. It shall not be permitted for other than residential use unless authorized elsewhere in this Ordinance.
- B. Applications to use manufactured housing units for temporary use while construction is in progress on a permanent structure shall be submitted to the Planning Director for a Construction Permit in accordance with Temporary Zoning Permit requirements of this Ordinance. Such a temporary unit shall be removed from the premises within 30 days of issuance of a Certificate of Occupancy for the permanent structure.
- C. Manufactured housing units may be utilized for classroom and related use for a two-year period or as otherwise expressly provided in the approval of a Special Exception. The period of use may be extended upon application and proper findings by the Board of Zoning Appeals.
- D. Where needed for the general welfare of the public, governmental entities may utilize manufactured housing units as classrooms, clinics, offices and caretaker's quarters, provided Special Exception approval has been obtained.
- E. Manufactured housing units, modular building units and pre-manufactured container units shall not be allowed as accessory uses nor as accessory structures for purposes of permanent storage units unless they are located in an AGR, AG-8, A-10, AG-15, RM, Community Commercial (CC), or Industrial (I) Zoning District and comply with the provisions of Section 6.5.1.A.

## §6.5.9 HOME OCCUPATIONS

### A. General

Some types of work can be conducted at home with little or no effect on the surrounding neighborhood. The home occupation regulations of this Section are intended to permit residents to engage in home occupations, while ensuring that home occupations will not be a detriment to the character and livability of the surrounding area. The regulations require that home occupations (an accessory use) remain subordinate to the principal residential use of the property and that the viability of the residential use is maintained. Zoning Permits shall be required for all home occupations. ***Nothing contained herein shall prohibit the Property Owner or other entity from establishing restrictive covenants prohibiting or imposing more restrictive conditions on home occupations on the Real Property or any portion thereof.***

### B. Where Allowed

Home occupations that comply with the regulations of this Section shall be allowed as an accessory use to any allowed Residential or Agricultural principal use.

### C. Allowed Uses

The home occupation regulations of this Section establish performance standards rather than detailed lists of allowed home occupations. Uses that comply with all of the standards of this Section will be allowed as home occupations unless they are specifically prohibited.

### D. Prohibited Uses

#### 1. Vehicle/Equipment Repair, Rental or Sales

Any type of repair, rental, sales or assembly of vehicles or equipment with internal combustion engines (such as autos, motorcycles, scooters, outboard marine engines, lawn mowers, chain saws, and other small engines) or of large appliances (such as washing machines, dryers, and refrigerators) or any other work related to automobiles and their parts is prohibited as a home occupation in the R-2, R-3, R-4, M-8, M-12, MHS, and MHP Zoning Districts, unless these types of repairs, rentals, or sales take place in an enclosed structure and pose no noise or safety concerns.

#### 2. Restaurants

Restaurants and food service establishments are not allowed as home occupations. Food service for Bed and Breakfasts shall be allowed under this Ordinance.

#### 3. Employee Dispatch Centers

Dispatch centers, where employees come to the site to be dispatched to other locations, are not allowed as home occupations.

#### 4. Animal Care or Boarding

Animal care or boarding facilities (including animal hospitals, kennels, stables and all other types of animal boarding and care facilities) are not allowed as home occupations in the R-2, R-3, R-4, M-8, M-12, MHS and



## MHP Residential Zoning Districts.

**5. Medical Offices or Clinics**

Medical offices and medical clinics are not allowed as home occupations in the R-2, R-3, R-4, M-8, M-12, MHS and MHP Residential Zoning Districts. This includes doctors' offices, dentists' offices, psychologists' offices, hospitals and all other medical care facilities. The prohibition shall not be interpreted as preventing medical practitioners from seeing patients in the practitioner's home on an emergency basis.

**6. Funeral Homes**

Funeral homes and funeral service activities are not allowed as home occupations.

**7. Barber Shops, Beauty Shops and Nail Salons**

Barber and Beauty Shops with more than one chair are not allowed as a home occupation.

**8. Dancing Schools**

Dancing schools are not allowed as home occupations.

**E. Employees**

Only one full-time or one part-time employee, who is not a full-time resident of the home where the home occupation is located, is allowed. The home occupation may have other employees who are not working at the residence, but work at other off-site locations, if applicable. For the purpose of this provision, the term "nonresident employee" includes an employee, business partner, co-owner, or other person affiliated with the home occupation, who does not live at the site, but who visits the site as a part of the home occupation.

**F. Resident Operator**

The operator of a home occupation shall be a full-time resident of the dwelling unit.

**G. Customers**

Customers may visit the site of a home occupation only during the hours of 8:00 a.m. to 8:00 p.m., with no more than an average of one customer or client per hour being allowed.

**H. Floor Area**

No more than 25 percent of the total floor area of the dwelling unit may be used to house a home occupation, except that Bed and Breakfasts allowed by this Ordinance are exempt from this provision. Up to 1,000 square feet of an accessory structure, such as a garage, may be used for a home occupation.

**I. Outdoor Activities**

All activities and storage areas associated with home occupations must be conducted in completely enclosed structures.

**J. Exterior Appearance**

There shall be no visible evidence of the conduct of a home occupation when viewed from the street right-of-way or from an adjacent lot. Signs for a home



What about fitness centers? You exempted them from GLA in the definitions, but not here.

occupation are expressly prohibited. There may be no change in the exterior appearance of the dwelling unit that houses a home occupation or the site upon which it is conducted that will make the dwelling appear less residential in nature or function. Examples of such prohibited alterations include construction of parking lots, paving of required setbacks, adding additional entrances to the dwelling unit or adding signs or commercial-like exterior lighting.

**K. Operational Impacts**

No home occupation or equipment used in conjunction with a home occupation may cause odor, vibration, noise, electrical interference or fluctuation in voltage that is perceptible beyond the lot line of the lot upon which the home occupation is conducted. No hazardous substances may be used or stored in conjunction with a home occupation.

**L. Trucks**

Not more than one truck, truck cab, or van used in conjunction with a home occupation may be parked at the site of the home occupation in any S-1, S-2, S-3, R-2, R-3, R-4, M-8, M-12, MHS, or MHP Zoning District. No semi-truck trailers shall be allowed in these zoning districts.

1. The following requirements shall apply to the unincorporated area of Charleston County lying within the boundaries of the North Charleston District:
  - a. Not more than one commercial vehicle, heavy commercial vehicle, or truck cab, used in conjunction with a home occupation, in combination with one heavy commercial trailer used in conjunction with a home occupation may be parked at the site of the home occupation unless:
    - i. The property on which the home occupation is located is  $\frac{1}{2}$  acre or greater in size; and
    - ii. All heavy commercial vehicles, truck cabs, and heavy commercial trailers used in conjunction with the home occupation are completely screened from view from surrounding residences when parked at the site of the home occupation. (Commercial vehicles are not subject to the requirement of Section 6.5.9.L.1.a.ii).
  - b. Any variation from the standards of subsection 1, above, shall require Special Exception approval, per Article 3.6 of this Ordinance.

**M. Deliveries**

No more than four deliveries or pick-ups of supplies or products associated with home occupations are allowed between the hours of 8:00 a.m. and 8:00 p.m.

**N. Sales**

No article, product, or service may be sold in connection with a home occupation, other than those produced on the premises or comprise 25 percent or less of the gross receipts.

**§6.5.10 ANIMALS**

- A. The keeping of household pets shall be allowed as an accessory use in all zoning districts in which residential dwelling units are permitted.
- B. The keeping of exotic or wild animals shall not be allowed as an accessory use and shall only be allowed if approved as a Special Exception in accordance with the procedures contained in Chapter 3 of this Ordinance.

**§6.5.11 VEHICLE SALES**

Not more than two operable or inoperable motor vehicles may be offered for sale upon any lot unless such sales activities are otherwise expressly authorized by this Ordinance. A vehicle for sale upon a lot in a Residential zoning district must be owned by the owner of the subject lot and must comply with Section 6.5.12.

**§6.5.12 STORAGE AND REPAIR OF INOPERABLE MOTOR VEHICLES**

- A. In all zoning districts, the open storage and or repair of inoperable motor vehicles is not permitted within the required front setback.
- B. ~~In all Agricultural and Rural Residential zoning districts,~~ **When permitted**, the open storage or repair of inoperable motor vehicles must be screened by a fence, wall, building, or vegetative buffer that completely shields the vehicles from view off-site.
- C. Open storage and/or repair of more than two (2) inoperable motor vehicles is prohibited on all lots in suburban residential zoning districts, as well as in all office, commercial and industrial zoning districts unless specifically authorized for use as a salvage yard. Inoperable motor vehicles must be screened by a fence, wall, building, or vegetative buffer that completely shields the vehicles from view off-site.
- D. In all Suburban Residential zoning districts, storage of motor vehicle parts is permitted only within a completely enclosed accessory structure located on the same lot as the principal dwelling unit.
- E. Storage of commercial vehicles in Residential zoning districts, unless otherwise expressly authorized by this Ordinance, is limited to one vehicle used as personal transportation.

**§6.5.13 TEMPORARY PORTABLE STORAGE UNITS**

Temporary portable storage units are permitted if located on the same zoning lot as the permanent structure subject to the following conditions:

- A. If the temporary portable storage unit is located on a lot with a non-residential use or zoning district designation for a period exceeding fifteen (15) days, the

Limited Site Plan Review procedures of Article 3.7 of this Ordinance shall apply;

- B. The maximum size of a temporary portable storage unit shall not exceed 160 square feet of indoor storage;
- C. A maximum of 160 square feet of indoor temporary portable storage shall be permitted per zoning lot in residential zoning districts;
- D. Temporary portable storage units are allowed for a period not to exceed a total of sixty (60) days in one calendar year. Temporary Zoning Permits shall be required for temporary portable storage units that remain on a property for a time period exceeding fifteen (15) consecutive days;
- E. Temporary portable storage units shall not be placed in any right-of-way, retention area, septic field, easement, or on public property and shall not create a site obstruction for any vehicular or pedestrian traffic;
- F. Temporary portable storage units shall conform to the accessory structure requirements contained in this Ordinance;
- G. The maximum area of a temporary portable storage unit dedicated to signage shall be limited to 27 square feet per side or 58 square feet total;
- H. Temporary portable storage units shall be kept in good condition, free from evidence of deterioration, weathering, mildew, discoloration, rust, ripping, tearing, or other holes or breaks;
- I. Temporary portable storage units shall not be used for the storage of hazardous or flammable substances, live animals, or human habitation;
- J. All vendors providing service related to the transportation of household goods and/or rental/delivery of portable storage containers shall be in compliance with the State of South Carolina's Regulatory Laws and licensing requirements through the Public Service Commission. Proof that the liability insurance of the company owning the temporary portable storage unit is equal to the minimum amount required by the Public Service Commission shall be required at the time of permitting; and
- K. The regulations listed above in Section 6.5.13 shall not apply to temporary storage units that are:
  - 1. Placed for construction purposes and in conjunction with building permits, which may exceed the permitted time period, as long as the building permit remains active with continuous construction; and
  - 2. Placed during any period of declared emergency by Federal, State or Local official action.

#### **§6.5.14      Accessory Storage**



*A reasonable amount of accessory storage space, the configuration, location and amount of which the Property Owner may determine, shall be permitted on the Real Property to accommodate any and all uses on the Real Property or any portion thereof: Such accessory storage space may be located on a separate Lot or Development Parcel, from the principal use which it accommodates. Such accessory storage space shall include but not be limited to space to accommodate the Development of the Real Property or the administration of the Real Property by any person or entity after Development. Accessory storage space shall be permitted on any Lot or Development Parcel on the Real Property, whether developed or undeveloped. The ARB shall determine appropriate buffering for these uses.*

## **CHAPTER 8 | SUBDIVISION REGULATIONS**

### **Table of Contents**

ART. 8.1	GENERAL	8-1
ART. 8.2	PRE-APPLICATION INFORMATION.....	8-3
ART. 8.3	MINOR AND MAJOR SUBDIVISIONS.....	8-4
ART. 8.4	PRELIMINARY PLAT .....	8-6
ART. 8.5	FINAL PLATS .....	8-12
ART. 8.6	MARKERS	8-17
ART. 8.7	LOTS	8-18
ART. 8.8	TREE PRESERVATION .....	8-20
ART. 8.9	TREES, SHRUBS, AND PAVEMENT .....	8-21
ART. 8.10	PEDESTRIAN WAY .....	8-21
ART. 8.11	STREET NAMES, STREET SIGNS.....	8-22
ART. 8.12	UNDERGROUND UTILITIES AND SERVICES .....	8-22
ART. 8.13	WATER SUPPLY AND SEWAGE DISPOSAL.....	8-22
ART. 8.14	FINANCIAL GUARANTEES (SURETY).....	8-23

**INTENTIONALLY BLANK**



---

**CHAPTER 8 SUBDIVISION REGULATIONS**

---

***Chapter 8 shall apply to the Real Property unless otherwise provided herein. However, any references to "public" water or sewer shall include public and private water or sewer.***

---

**ARTICLE 8.1 GENERAL**

---

**§8.1.1 PURPOSE**

The public health, safety, economy, good order, appearance, convenience, morals and general welfare require the harmonious, orderly, and progressive development of land within Charleston County. In furtherance of this general intent, the Subdivision Regulations are authorized for the following purposes, among others:

- A. To implement the goals, objectives and policies of the Charleston County *Comprehensive Plan*;
- B. To facilitate the adequate provision or availability of transportation, police and fire protection, water, sewage, schools, parks and other recreational facilities, affordable housing, disaster evacuation, and other public services and requirements;
- C. To assure the provision of needed public open spaces and building sites in new land developments through the dedication or reservation of land for recreational, educational, environmental, transportation, and other public purposes;
- D. To assure, in general, the wise and timely development of new areas and redevelopment of previously developed areas in harmony with the adopted or amended *Comprehensive Plan* for Charleston County and any adopted or amended municipal *Comprehensive Plan* within or adjacent to the County;
- E. To implement land use policies that will preserve agricultural uses of land and the rural character of unincorporated Charleston County;
- F. To identify, protect and preserve scenic, historic, and ecologically sensitive areas;
- G. To prevent overcrowding of land, avoiding undue concentration of population, and lessening congestion in the streets;
- H. To regulate the density and distribution of populations and the uses of buildings, structures and land for trade, industry, residence, recreation, agriculture, forestry, conservation, airports and approaches thereto, water supply, sanitation, protection against floods, public activities, and other purposes; and
- I. To ensure protection from fire, flood, and other dangers, and furthering the public welfare in any other regard specified by a local governing body.

**APPLICABILITY****§8.1.2**

Unless expressly exempted, no subdivision shall be made, platted, or recorded for any purpose nor shall parcels resulting from such subdivisions be sold, unless such subdivision meets all applicable standards of this Ordinance and has been approved in accordance with the procedures of this Ordinance.

- A. All lots shown on plats whether subdivided or not, shall have the Planning Commission Stamp of either approval or exemption on said plat; the Register of Mesne Conveyance shall not record any plat without such stamp. The plat for an individual lot exempted by virtue of pre-existence must be accompanied by a surveyor's statement on the plat that the lot is a single, individual lot, and not newly created.
- B. Parcels that were recorded by deed or plat prior to the adoption of the County's original Subdivision Regulations on January 1, 1955, will receive automatic approval under a Grandfather Clause, provided the parcel involved is still in the same size and shape as when recorded prior to 1955 and is properly platted in accordance with present standards. The recorded information must be provided and attested to by the surveyor or attorney involved.
- C. Preliminary Plats submitted for approval shall expire two years from the date of preliminary approval if all conditions for preliminary plat approval have not been met. The Planning Director shall be authorized to grant a one-time extension of this time frame if a written request is submitted by the applicant prior to the expiration date. The time period of the extension shall not exceed one year.
- D. Upon submission of a Subdivision application, no additional Subdivision applications shall be accepted for the subject property until the original application has been withdrawn or the Decision-Making Body has rendered its final decision and all applicable time limits on refilling have expired.

### **§8.1.3 EXEMPTIONS**

#### **A. Procedures**

The following shall be exempt from the Subdivision Plat Procedures, if the Planning Director determines that all engineering and survey standards of this Ordinance have been met:

1. The combination or re-combination of portions of previously platted lots where the total number of lots is not increased. When the plat is finalized, it shall be submitted to the Planning Director for recording. Deeds and plats shall be recorded simultaneously.
2. The public acquisition of land for right-of-way or drainage easements or any lot or parcel created therefrom.
3. Contiguous properties that are to be divided for the purpose of exchanging or trading parcels of land. When the plat is finalized, it shall be submitted to the Planning Director for recording. Deeds and plats shall be recorded simultaneously.
4. A parcel of land that is proposed to be used as the site for a utility

substation, power line easements or right-of-way, pumping station, pressure regulating station, electricity regulating substation, gas pressure control station, or similar facilities.

5. The combination or recombination of entire lots of record where no new street or change in existing streets is involved.
6. The division of land into parcels of five acres or more, where no new street or easement is involved. Plats of these exceptions must be received as information by the Planning Director, which fact shall be indicated on the plats.

#### **B. Standards**

Lots created and recorded prior to August 15, 1971, shall be exempt from compliance with the standards of this Chapter, provided that the subject property:

1. Was or is surveyed and platted in accordance with prescribed standards;
2. Has the approval of the South Carolina Department of Health and Environmental control (DHEC); and
3. Contains no drainage ways or easements needed to drain surrounding properties, as determined by the Public Works Director.

#### **§8.1.4 CHARLESTON COUNTY ROAD CONSTRUCTION STANDARDS**

The regulations and standards of this Chapter are intended to supplement the Charleston County Road Construction Standards, as amended, in Appendix A of this Ordinance, which shall be considered the minimum design standards for roads and drainage systems in Charleston County. (Note: Road and drainage systems not meeting the Standard Specifications for Local Governments' Road and Street Construction will not be eligible for maintenance from the State "C" or donor County funds.)

#### **§8.1.5 RELATIONSHIP TO DEVELOPMENT REVIEW PROCEDURES OF ARTICLE 3.1**

The "General" procedural requirements and standards of Article 3.1 of this Ordinance shall apply to the subdivision plat procedures of this Chapter.

#### **§8.1.6 SURVEY COMPLIANCE**

All Land Surveys in the County shall be in accord with the land use designated for the proposed subdivision of property and the criteria specified in Urban Land Surveys as promulgated by the South Carolina Code of Regulations, 1991, Chapter 49, Article 3, R.400-490, as amended, and described as the "Minimum Standards Manual for the Practice of Land Surveying in South Carolina."

---

### **ARTICLE 8.2 PRE-APPLICATION INFORMATION**

---

#### **§8.2.1 PRE-APPLICATION CONFERENCE**

Pre-Application Conferences offer an opportunity for Planning, Public Works and other affected agencies to familiarize applicants with applicable procedures, submittal requirements,



development standards, and other pertinent matters before finalizing the development proposal or laying out the proposed subdivision. Applicants requesting Minor Subdivisions are suggested to schedule a pre-application process before submittal of an application. Applicants for Major Subdivisions are required to have a pre-application conference before submittal of an application. Applicants shall be responsible for scheduling pre-application conferences with the Planning Director who shall be responsible for contacting the Public Works Director and other affected agencies.

---

**ARTICLE 8.3 MINOR AND MAJOR SUBDIVISIONS**

---

**§8.3.1 MINOR SUBDIVISION**

A Minor Subdivision is a division of any tract of land into ten (10) or fewer lots, provided that:

- A. No public street right-of-way dedications are involved;
- B. The Public Works Director does not require a Preliminary Plat for a drainage easement;
- C. The lots meet South Carolina Department of Health and Environmental Control (DHEC) requirements for sewage disposal systems. Systems that are determined by DHEC to be properly functioning or "grandfathered" must comply with DHEC regulations as a condition of minor subdivision approval;
- D. Off-site sewage disposal systems must be approved by DHEC and an off-site utility easement must be shown along with all lots served by the off-site system if public sewer is accessible and is provided to each lot;
- E. No new or residual parcels will be created that do not comply with all applicable requirements of this Ordinance; and
- F. The tract to be subdivided is not located within an approved planned development or an area that is subject to an application for planned development approval by the landowner. All such subdivisions are considered Major Subdivisions.
- G. Non-Buildable Lots
  - 1. For the purpose of this subsection, non-buildable lots are lots that meet all requirements of this Ordinance, with the exception of water and/or sewer availability requirements;
  - 2. For all non-buildable lots, all new parcels being created less than five (5) acres in size shall meet the minimum lot size and comply with applicable requirements of this Ordinance;
  - 3. Non-buildable lots may be approved by the Planning Commission as a Minor Subdivision ten (10) lots or less without certification by DHEC for on-site waste disposal systems and water or where public water and sewer is not available;

4. The property owner(s) shall sign the "Certification of Non-Evaluation". This certification statement shall be placed on the plat and signed by the property owner(s);
5. The property owner(s) shall have a deed prepared by an attorney for each non-buildable lot less than five (5) acres in size explaining the "Certification of Non-Evaluation" to be recorded with the plat;
6. The "Certification of Non-Evaluation" for water and sewer availability shall be used in conjunction with Minor Subdivision (development) plats when no evaluation regarding the availability of public water/sewer or on-site septic systems and water have been approved; and
7. The following certification shall be placed on the plat and deed and signed by the property owners:

"The Property owner(s) of record hereby acknowledge(s) that the surveyed parcel(s) and/or tract remainder has not been approved to determine the availability of on-site waste disposal systems or provisions of public water/sewer services. Recordation of this plat and deed shall not be an implied or expressed consent of Charleston County that the lots or other land divisions shown hereon are capable of being serviced by on-site waste disposal or public water/sewer systems. Unless otherwise stated hereon, all surveyed parcels and/or tract remainders have not been reviewed for on-site waste disposal systems or public water/sewer services."

Property Owner(s) Signature \_\_\_\_\_  
 Date \_\_\_\_\_

### **§8.3.2 MINOR SUBDIVISION PROCESS**

Applications for Minor Subdivisions shall be submitted to the Planning Director on forms available in the Planning Department. There is one required step in the Minor Subdivision process which is Final Plat review and approval. Generally, Minor Subdivisions are reviewed in the Planning Department and approved by the Planning Director. However, the Planning Director may send Minor Subdivision applications to the Planning Commission for approval in order to determine whether or not the proposed subdivision is consistent with the goals and objectives of the *Comprehensive Plan*. Applicants for Minor Subdivisions are strongly encouraged to schedule and attend a Pre-Application Conference prior to filing a minor subdivision.

### **§8.3.3 MAJOR SUBDIVISION**

- A. Any land division that is not a Minor Subdivision shall be processed as a "Major Subdivision." All Major Subdivision applicants are required to attend a Pre-Application Conference.
- B. Subdivision Roads and Utilities  
 A Zoning Permit is required for grading, drainage, or the construction of roads and utilities in a subdivision.

### **§8.3.4 MAJOR SUBDIVISION PROCESS**

Applicants for Major Subdivisions are required to schedule and attend a Pre-Application Conference prior to filing a Major Subdivision application. After the Pre-Application Conference, there are three required steps in the process: (1) Preliminary Plat review and approval; (2) Final Plat review and approval; and (3) Letters of Coordination. Each step of the process shall be completed before initiating the next step. Applications for Major Subdivisions shall be submitted to the Planning Director and shall include a completed application form (available from the Planning Department). Additional components for consideration of a Major Subdivision that are necessary at the Pre-Application Conference are:

- A. A plat, or survey of the subject property, if available, or a tax map that identifies the subject property; and
- B. A Concept Plan that includes the following information:
  - 1. The proposed means of access to a public road;
  - 2. Surrounding landuses;
  - 3. All adjacent roads;
  - 4. A preliminary map and analysis of natural resources present on the subject property and surrounding property; and
  - 5. A conceptual layout of the proposed subdivision, which shall be overlaid on the preliminary site analysis and which shall show streets, drainage, lots, parks and other facilities located to protect natural resource areas.

[Commentary: Approval from other local, state or federal agencies may be necessary in the development of land in Charleston County, particularly in regard to environmental concerns. Pre-application conferences should be held with these agencies, including the South Carolina Department of Health and Environmental Control, Coastal Resources Management, U.S. Army Corps of Engineers and the U.S. Fish & Wildlife Service.]

### **§8.3.5 REQUIRED TREE PROTECTION FOR MINOR AND MAJOR SUBDIVISIONS**

Trees shall be protected in accordance with Chapter 9 of this Ordinance.

### **§8.3.6 LETTERS OF COORDINATION FOR MAJOR AND MINOR SUBDIVISIONS**

Letters of coordination are required that acknowledge that the County and other agencies will be able to provide necessary public services, facilities and programs to service the development proposed, at the time the subdivision plat is processed.

---

## **ARTICLE 8.4 PRELIMINARY PLAT**

---

### **§8.4.1 APPLICABILITY**

Preliminary Plats shall be required for all Major Subdivisions.

### **§8.4.2 APPLICATION**

#### **A. Requirements**

The following shall be submitted:

- 1. Completed applications for Preliminary Plat approval shall be submitted to



the Planning Director on forms available in the Planning Department. Ten (10) copies of the Preliminary Plat shall be filed with the application.

2. Preliminary Plats shall be drawn to engineer's scale no smaller than one inch equals 200 feet. Where large areas are being platted, they may be drawn on one or more sheets, 22 inches by 34 inches in size. For small areas being platted, a scale of one inch equals 100 feet shall be used.
3. ~~Even~~ if the applicant intends to subdivide only a portion of a parcel or tract of land initially, the Preliminary Plat ~~-shall need not~~ show a proposed street and lot layout, drainage plan and other requirements for the entire parcel or tract of land in which such portion is contained; ~~except that unless required by the Planning Director, with the recommendation of the Public Works Director, may waive this requirement on a finding that such a complete layout is not necessary to carry out the purpose of these regulations.~~
4. The following information shall be required on each plat:
  - a. The courses and distances of the perimeter of the land involved shall be indicated on the plat shown with all courses marked to show which are actual field observations and which are computed.
  - b. References to a known point or points such as street intersections and railroad crossings shall be shown.
  - c. The total acreage of the land involved in the subdivision, and the acreage of high land above the Office of Coastal Resource Management Critical Line. Date of Critical Line certification shall be indicated. (Aerial photography may not be used to determine OCRM Critical Line location.)
  - d. The names of adjacent land owners and streets where known or available shall be given (with the tax parcel numbers), and all intersecting boundaries or property lines shall be shown.
  - e. Proposed divisions to be created shall be shown, including building envelopes for each lot, right-of-way widths, roadway widths, road surface types, sidewalks (if applicable), proposed drainage easements, and names of streets; the locations of proposed utility installations and utility easements; lot lines, dimensions and angles; sites reserved or dedicated for public uses; and sites for apartments, civic/institutional commercial and industrial uses. The status of the existing lot access and the concept of the type of road construction being proposed shall be indicated (e.g., Ingress/Egress Easement, Private Road constructed or unconstructed, Public Secondary or Primary Rural Road, Public Secondary or Primary County Road, and other details as appropriate; i.e., curb and gutter, asphalt swales, inverted crown, roadside open ditch, etc.).
  - f. The title, scale (including graphic scale), north arrow (magnetic,

grid, or true), date, name of applicant and the name and seal of engineer or surveyor with South Carolina Registration Number shall be shown.

- g. All existing structures and physical features of the land, including contours (contours not required on proposed private subdivisions, and only within the rights-of-way of proposed rural public streets), drainage ditches, roads and wooded areas shall be shown. The contour interval shall be one foot, unless otherwise approved in advance of submission by the Public Works Director. All contour information shall be based on mean sea level datum and shall be accurate within one-half foot. The Bench Mark, with its description, and the datum used for the survey shall be clearly noted on the plat.
- h. General drainage features, including proposed drainage easements and detention/retention basins. Also the proposed direction of drainage on each street, ditch and lot shall be indicated by the use of arrows and proposed street names.
- i. The location of required landscape buffers as specified in Chapter 9 of this Ordinance, which shall not be located within drainage easements unless expressly approved by the Public Works Director.
- j. Jurisdictional wetlands, with the date of certification, on lots of five acres or less in size and within all publicly dedicated rights-of-way and easements.
- k. A notation shall be made on the plat clearly indicating the applicable OCRM Critical Line buffers and setbacks.
- l. Tree Surveys on lots of one acre or less are to include Grand Trees on the entire lot. Tree surveys of Grand Trees may be requested upon site inspection if lots greater than one acre appear to be unbuildable due to the presence of Grand Trees.
- m. Tree Surveys of all Grand Trees are required within access easements, drainage easements, and rights-of-way.

- n. A signature block on the plat, signed by the owner(s) of the property and notarized indicating that the proposed preliminary plat being put forth is an action of the owner, heirs thereto or assigns.
- o. A vacant block shall be provided on each page of the plat that is three inches by eight inches in dimension for Charleston County approval stamps and notations.
- p. A statement that any easements for utilities or other encroachments in the area to be dedicated for streets, highways, drainage or other public or private use are subject to binding provision that the costs of future relocation of any such encroachments due to the construction or maintenance of public improvements shall be borne by the holder of the easement and/or utility company.

5. Accompanying Data

- a. The Preliminary Plat shall be accompanied by a statement as to the availability of and specific indication of the distance to and location of the nearest public water supply and public sanitary sewers.
- b. The Preliminary Plat shall be accompanied by a statement indicating what provisions are to be made for water supply and sewage disposal.
- c. Proposed subdivisions encompassing 100 or more acres of land area shall provide a master plan showing the general layout of future development of the entire tract and on adjacent lands that are under common ownership or control. This master plan shall provide a generalized description and plan that addresses the following future development considerations: traffic circulation, drainage, environmental preservation, utility placement, land use, density and any areas that are to remain undeveloped.
- d. The engineer and/or surveyor who prepared the Preliminary Plat shall affix their seal(s), name(s), and South Carolina Registration Number(s). Only engineers or surveyors registered in the State of South Carolina shall attest and fix their seal on the Preliminary Plat.

**[Commentary-For the purpose of Preliminary Plat applications, a complete application means one that includes all required information and fees and that addresses the findings of the inspection report and has received all approvals from other agencies that are a prerequisite to Preliminary Plat approval.]**

### **§8.4.3 PLANNING DIRECTOR-REVIEW AND REPORT**

Upon receipt of a complete application for Preliminary Plat approval, the Planning Director shall have 30 calendar days to (1) review the proposed Preliminary Plat; (2) compile a staff report on the proposed plat (which includes the comments and recommendations of the Public Works Director and other affected agencies); and (3) forward the report and any recommendations to the Planning Commission.



**§8.4.4 PLANNING COMMISSION-REVIEW AND DECISION**

Within 30 calendar days of receipt of a report from the Planning Director, the Planning Commission shall review the proposed Preliminary Plat and act to approve, approve with conditions, or deny the Preliminary Plat based on whether it complies with all applicable requirements of this Ordinance and the adopted Charleston County *Comprehensive Plan*.

**§8.4.5 EFFECT OF PRELIMINARY PLAT APPROVAL**

Approval of a Preliminary Plat shall constitute general acceptance of the overall planning concepts for the proposed subdivision and is a prerequisite for the filing of a Final Plat application.

**§8.4.6 LAPSE OF PRELIMINARY PLAT APPROVAL**

An approved Preliminary Plat shall lapse and be of no further force and effect if a Final Plat for the subdivision (or a phase of the subdivision) has not been approved within two years of the date of approval of the Preliminary Plat. If the subdivision is to be developed in phases, a phasing plan, including a timetable for development of the entire subdivision, shall be approved as part of the Preliminary Plat approval. No final plats shall be accepted and no construction shall be allowed for any phase not approved as part of the Preliminary Plat.

**§8.4.7 APPEALS OF PLANNING DIRECTOR'S PRELIMINARY PLAT DECISION**

Any Party in Interest in a Preliminary Plat decision of the Planning Director regarding a complete or incomplete application may appeal the decision to the Planning Commission by filing an appeal with the Planning Director within 30 calendar days of the date of the decision.

**A. Appeal Powers**

In exercising its appeal power the Planning Commission may reverse or affirm, wholly or partly, or may modify the decision on appeal. In acting upon the appeal the Planning Commission shall be authorized only to determine whether the decision of the Planning Director was made in error. The Planning Commission shall not be authorized to approve modifications or waivers of Ordinance standards through the appeal process. If the Planning Commission determines that it is necessary to obtain additional evidence in order to resolve the matter it may remand the matter to the Planning Director with directions to obtain such evidence and to reconsider the decision in light of such evidence.

**B. Consideration of Evidence**

The decision of the Planning Commission shall be a matter of record; it shall consider only the same application, plans, and related project materials that were the subject of the original decision and only the issues raised by the appeal.

**C. Burden of Persuasion of Error**

In acting on the appeal, the Planning Commission shall grant to the decision of the Planning Director a presumption of correctness, placing the burden of persuasion of error on the appellant.

**D. Approval Criteria**

An appeal shall be sustained only if the Planning Commission finds that the decision of the Planning Director was in error.

**E. Vote Required**

A quorum of the Planning Commission shall be achieved when the number of members in attendance equals more than one-half of its total membership. At least two-thirds of the members present and voting shall be required to reverse a final plat decision of the Planning Director.

[Commentary-Appeals of Planning Director and other subdivision-related administrative decisions [including decisions to reject applications as incomplete], shall be processed in accordance with Article 3.14 described in Chapter 3.)

**§8.4.8 APPEALS OF PLANNING COMMISSION PRELIMINARY PLAT DECISION**

Any party in interest in a Preliminary Plat decision of the Planning Commission or any officer, board, or bureau of the County may appeal the Planning Commission decision to the Circuit Court of Charleston County. Appellants shall file with the Court Clerk a written petition plainly and fully setting forth how such decision is contrary to law. Such appeal shall be filed within 30 calendar days after actual written notice of the Planning Commission's decision.

**§8.4.9 CONSTRUCTION PLANS**

After approval of a Preliminary Plat and before commencing any work within the proposed subdivision (including land clearing and grading), road and drainage plans prepared by an engineer registered in the State of South Carolina shall be submitted to the Public Works Director for review and approval in accordance with the Charleston County Road Construction Standards in Appendix A of this Ordinance.

**§8.4.10 INSPECTIONS**

- A. Subdivision plats that are submitted for review are field inspected by Planning and Public Works staff to ensure compliance with any applicable Ordinance requirements and County standards.
- B. Prior to submitting a Preliminary Plat where no public sewer is provided to any proposed lot, the applicant shall contact a representative of South Carolina Department of Health and Environmental Control (DHEC) and arrange for a test of the soil on any proposed lot. DHEC staff will inspect the proposed lot(s) in order to identify areas that meet minimum septic system requirements required by the State of South Carolina. The results of this test shall be submitted by the applicant at the time of the Preliminary Plat application.
- C. Where subdivision streets and/or drainageways are being constructed, the Public Works Director or the authorized representative will make periodic visits to the site as indicated in Charleston County Road Construction Standards, Appendix A, to ensure construction compliance with County-approved road and drainage plans. The Public Works Director's or the authorized representative's certification that all roads and drainage systems have been constructed in compliance with the plans is required prior to final approval of the development. This approval is only necessary for public subdivisions.

**§8.4.11 CONDITIONAL PLAT APPROVAL**

- A. Prior to approval of a Final Plat, the developer shall install all required public improvements or post an approved financial guarantee of performance, in

accordance with the requirements of this Ordinance. If financial guarantees are posted, the Planning Director shall be authorized to grant conditional plat approval on plats that involve two (2) or more guaranteed public improvements, with final approval contingent upon completion and acceptance of all required improvements. No Certificates of Occupancy shall be issued until all required improvements have been installed and accepted, and the Final Plat has been recorded by the Charleston County Register of Mesne Conveyance. Conditional Plat approval shall be valid for a period not to exceed two years from the date Conditional Plat Approval is granted.

- B. Where plats are submitted under an approved financial guarantee for Conditional approval the following three (3) notes shall be placed on the plat;
1. Approval of this plat does not authorize occupancy;
  2. Duration of approval shall be limited to two (2) years; and
  3. The approval of this plat in no way obligates the County of Charleston to accept for continued maintenance any of the roads or easements shown hereon.
- C. The duration of the financial guarantee for a conditional plat shall be no longer than twenty-four (24) months unless extended by the Planning Commission. No later than two (2) months before the expiration, the applicant shall notify the County that the applicant has completed the final plat or is securing a replacement bond to be issued within 30 days of expiration of the original bond. If no action is taken by the applicant, the County shall execute the provisions of the performance bond.

---

## **ARTICLE 8.5 FINAL PLATS**

---

### **§8.5.1 APPLICABILITY**

Final Plats shall be required for all Subdivisions.

### **§8.5.2 APPLICATION**

**A. Final Plat Applications Requirements:**

1. Applications for Final Plat approval shall be submitted to Planning Director on forms available in the Planning Department. Ten (10) copies of the Final Plat shall be filed with the application.
2. Written certification from the design engineer that the subdivision's road and drainage infrastructure and any other required improvements have been constructed in accordance with the approved plans.
3. The Final Plat shall be drawn in ink on a material specified by the Register of Mesne Conveyance for recording, on sheets 22 inches by 34 inches in size, and at an engineer's scale of one inch equals 100 feet or larger. Where necessary the plat may be on several sheets accompanied



by an index sheet or key map insert showing the entire subdivision. Where necessary, the size of the plat may be adjusted to a smaller scale than 1"=100' with the approval of the Planning Director.

**B. The Final Plat Shall Show the Following:**

1. All proposed divisions of land shall be shown, including: each lot showing lot lines, with bearings and distances; all rights-of-way; all drainage easements; names of all streets; the locations of all utility rights-of-way and utility easements; all structures; and all sites reserved or dedicated for public uses.
2. The title, scale (including graphic scale), north arrow (magnetic, grid, or true), date, name of applicant and the name of engineer or surveyor with South Carolina Registration Number shall be shown.
3. Block and lot numbers suitably arranged by simple system.
4. The full names of adjacent land owners and streets where known or available shall be given (with the tax parcel numbers), and all intersecting boundaries or property lines shall be shown. Names of adjacent property owners may be omitted in established residential platted subdivisions; however, Legal Block and Lot Numbers and County Parcel ID Numbers are required.
5. Certificates:
  - a. The signature and seal of the registered land surveyor in accordance with the current Minimum Standard Manual for the Practice of Land Surveying in South Carolina.
  - b. A statement of dedication by the property owner of streets, rights-of-way, easements, and any other sites for public or private use and warranty of title of property offered for dedication. If any change in ownership is made subsequent to the submission of the plat and prior to the granting of final approval, the statement of dedication shall be corrected accordingly.
  - c. For any public dedication, a warranty deed for the transfer of the right(s)-of-way(s), easement(s), or other sites for public use to the County on legal documents of the form suitable to the County must be provided.
  - d. A statement that any easements for utilities or other encroachments in the area to be dedicated for streets, highways, drainage or other public or private use are subject to a binding provision that the costs of future relocation of any such encroachments due to the construction or maintenance of public improvements shall be borne by the holder of the easement and/or utility company.
6. All easements shall include their location, width and centerline.

7. The approved Office of Coastal Resource Management (OCRM) Critical Line with signed approval statement on the final plat.
8. At the Planning Director's discretion, the applicant/surveyor may be required to show buffers and setbacks on lots less than one acre in size or on newly created lots that may appear to have encroachment of structures into a buffer or setback.
9. Freshwater Wetlands/Waterways on lots of five acres or less in size.
10. High land acreage and low land acreage (Freshwater Wetlands or acreage below the Office of Coastal Resource Management Critical Line).
11. Tree Surveys on lots of one acre or less are to include Grand Trees on the entire lot. Tree Surveys of Grand Trees may be requested upon site inspection if lots greater than one acre appear to be unbuildable due to the presence of Grand Trees.
12. Tree Surveys of all Grand Trees are required within access easements, drainage easements, and rights-of-way.
13. Ownership and maintenance status of the lot access shall be indicated for any newly-created lots.
14. A vacant block shall be provided on each page of the plat that is three inches by eight inches in dimension for Charleston County approval stamps and notations.

**C. Accompanying Data**

1. A certificate of title or a sworn affidavit establishing the ownership of the land to be recorded. If any change in ownership occurs subsequent to the date of the certificate of title or affidavit and prior to the granting of final approval, a new certificate of title or sworn affidavit establishing the ownership of the land shall be submitted to the Planning Director.
2. In subdivisions where existing public water and public sewer systems have been extended and/or a new system installed, a certification of inspection and associated operating permits from the South Carolina Department of Health and Environmental Control (DHEC) shall be submitted.
3. Restrictive covenants affidavit(s) signed by the applicant or current property owner(s) in compliance with State law.
4. Should the Landowner/Developer decide to utilize Article A.2, Private Road Standards, of Appendix A, the following five (5) notes shall be placed on the plat:
  - a. Any future subdivision of this parcel, or road construction or extension of the existing roads shown hereon shall require

compliance with the Charleston County Ordinances. Before Charleston County will consider acceptance of any dedication of roads into the County road system, the property owner(s) shall construct the roads to County of Charleston Road Construction Standards;

- b. It is hereby expressly understood by the property owner, developer or any subsequent purchaser of any lots shown on the plat that the County of Charleston is not responsible for the maintenance of the streets, roads, common areas, drainage systems and any other municipal services which include, but are not limited to, garbage disposal, public sewage, fire protection or emergency medical service;
  - c. Be aware that the County of Charleston is not responsible for drainage and flooding problems relevant to the real property, and that emergency vehicles may have difficulty accessing the property;
  - d. No public funds shall be used for the maintenance of the roads shown on the plat; and
  - e. This approval in no way obligates the County of Charleston to maintain the 50 foot right-of-way until it has been constructed to County standards and accepted for maintenance by Charleston County Council.
5. Letters of Coordination  
Letters of Coordination are required which acknowledge that the County and other agencies will be able to provide necessary public services, facilities, and programs to service the development proposed, at the time the subdivision plat is processed.

**D. Certification of Approval**

When the Planning Director has approved the plat, a certificate noting such approval and carrying the signature of the Planning Director shall be placed on the original drawing of said plat.

**§8.5.3 PLANNING DIRECTOR-REVIEW AND DECISION**

Within 45 days of receipt of a complete Final Plat application, the Planning Director shall review the proposed Final Plat and the reports from the Public Works Director and other affected agencies and act to approve, approve with conditions or deny the Final Plat, based on whether it complies with the approved Preliminary Plat, all applicable requirements of this Ordinance, and the purposes and intent of Article 1.5.

**§8.5.4 ACCEPTANCE OF DEDICATIONS**

Approval of a Final Plat shall not constitute acceptance of any public improvements. Such acceptance will require County Council acceptance of dedication.

Documents or instruments granting easements within the area to be dedicated must provide that:

- A Future relocation or replacement costs of any encroachments, including, but



not limited to utilities, due to maintenance or construction of public improvements, is to be borne solely by the easement holder/utility company; and

- B. The County will not be responsible for costs relating to future relocation or replacement of utilities or other encroachments made necessary by maintenance and/or construction of public improvements; and
- C. All expenses pertaining to said relocation shall be paid for by the easement holder/utility company; and
- D. Relocation shall be completed within 90 days from receipt of written request by the County or as otherwise agreed to by the County.

#### **§8.5.5 RECORDING**

Approved Final Plats shall be recorded by the Planning Director with the Register of Mesne Conveyance within 30 days of final approval. Notice to the applicant shall be sent within a reasonable time following the date of the recording with the Register of Mesne Conveyance.

#### **§8.5.6 APPEALS OF PLANNING DIRECTOR'S FINAL PLAT DECISION**

Any person with a substantial interest in a Final Plat decision of the Planning Director may appeal the decision to the Planning Commission by filing an appeal with the Planning Director within 30 calendar days after the actual notice of the decision.

##### **A. Appeal Powers**

In exercising the appeal power, the Planning Commission may reverse or affirm, wholly or partly, or may modify the decision being appealed. In acting upon the appeal, the Planning Commission shall be authorized only to determine whether the decision of the Planning Director was made in error. The Planning Commission shall not be authorized to approve modifications or waivers of Ordinance standards through the appeal process. If the Planning Commission determines that it is necessary to obtain additional evidence in order to resolve the matter, it may remand the matter to the Planning Director, with directions to obtain such evidence and to reconsider the decision in light of such evidence.

##### **B. Consideration of Evidence**

The Planning Commission's decision shall be on the record; it shall consider only the same application, plans, and related project materials that were the subject of the original decision and only the issues raised by the appeal.

**C. Burden of Persuasion or Error**

In acting on the appeal, the Planning Commission shall grant to the Planning Director's decision a presumption of correctness, placing the burden of persuasion of error on the appellant.

**D. Approval Criteria**

An appeal shall be sustained only if the Planning Commission finds that the Planning Director erred.

**E. Vote Required**

A quorum of the Planning Commission shall be achieved when the number of members in attendance equals more than one-half of the total membership of the Planning Commission. At least two-thirds of the members present and voting shall be required to reverse a final plat decision of the Planning Director.

[Commentary-Appeals of Planning Director and other subdivision-related administrative decisions (including decisions to reject applications as incomplete), shall be processed in accordance with Article 3.14 described in Chapter 3.]

**§8.5.7 APPEALS OF PLANNING COMMISSION'S DECISION**

- A. Any person with a substantial interest in a Final Plat (appeal) decision of the Planning Commission may appeal the Planning Commission decision to the Circuit Court of Charleston County. Appellants shall file with the Court Clerk a written petition plainly and fully setting forth how such decision is contrary to law. Such appeal shall be filed within 30 calendar days after actual notice of the Planning Commission's decision.
- B. At any time prior to appeal of a Planning Commission decision on a Final Plat (appeal) decision, the applicant may request that the Planning Commission enter mediation. When mediation is requested, the Planning Commission shall assign one of its members as a representative in mediation proceedings. A vote of the Planning Commission in a public meeting shall be required to accept any mediated settlement. An accepted mediated settlement cannot waive the standards of this Ordinance. Prior to beginning talks, applicable time limits for review and action on complete applications must be extended by mutual agreement of the applicant and Planning Commission.

---

**ARTICLE 8.6 MARKERS**

---

**§8.6.1 PLACEMENT**

A marker shall be set on the right-of-way line at the ends of the block for every block length of street. When blocks occur that have a curve or curves in them, markers shall be set on both sides of the street at the ends of tangents. Markers shall also be set on right-of-way lines (on each side of the centerline) at angle points when curves are not used. All interior lot corners shall be marked. The location and type of markers used shall be indicated on the Final Plat.

**§8.6.2 TIMING**

Markers shall be installed prior to the submission of and approval of the Final Plat.

---

**ARTICLE 8.7 LOTS**

---

*Article 8.7 of the ZLDR shall not apply to the Real Property. The layout, design, and other dimensional standards for lots shall be as set forth in the Plan, especially section 6 thereof.*



---

**ARTICLE 8.8 TREE PRESERVATION**

---

**§8.8.1 TREE SURVEYS**

Tree surveys shall comply with the following:

- A. Lots within subdivisions shall be laid out and designed to provide a buildable area on each lot that does not require the removal of Grand Trees.
- B.** Tree protection standards are described in Chapter 9 of this Ordinance **(as modified herein) and section 9 of the Plan.**
- C. Tree Surveys on lots of one acre or less are to include Grand Trees on the entire lot. Tree Surveys of Grand Trees may be requested upon site inspection if lots greater than one acre appear to be unbuildable due to the presence of Grand trees.
- D. Tree Surveys of all Grand Trees are required within access easements, drainage easements, and rights-of-way.

## ARTICLE 8.9 TREES, SHRUBS, AND PAVEMENT

### §8.9.1 MINIMUM OFFSET OF TREES AND SHRUBS FROM ROAD PAVEMENT

- A. Trees and shrubs shall be set back from **public** street and road pavement in accordance with the following minimum requirements:

Roadside Feature	Speed (MPH)	Offset from Edge of Pavement (feet)	
		Canopy Trees	Understory Trees/Shrubs
Guiderail	All	5*	3*
Barrier Curb	40 and less	5*	3*
	45 to 50	8*	5*
	55 and greater	12*	5*
Open Shoulder	40 and less	10	5
	45 to 50	15	7
	55 and greater	20	10

\*Tree limbs hanging below 15 feet in height shall be trimmed so that they do not encroach beyond the back of the curb. Minimum overhead clearance of 14 feet should be maintained for safe passage. When a barrier curb or guide rail exists, offset is measured from the face of the curb or guide rail to the face of the tree at ground level.

- B. Understory trees may be located two feet from the edge of pavement with the approval of the Planning Director and Public Works Director.

## ARTICLE 8.10 PEDESTRIANWAYS

***Community Ways shall be provided on the Real Property as set forth in the Agreement and the Plan. This Article 8.10 shall therefore not apply to the Real Property; provided, however, any pedestrian ways within publicly dedicated rights-of-way shall comply with County standards.***

### §8.10.1 WHERE REQUIRED

Pedestrian ways shall be provided in all major subdivisions within the Urban and Suburban Areas of the County. If development characteristics warrant, the Planning Director may waive this requirement for any portion of the proposed subdivision. Requests for such waivers shall be submitted along with written justification to the Planning Director for approval.

### §8.10.2 PLACEMENT

Paved pedestrian ways within publicly dedicated rights-of-way shall conform to the construction details for paved sidewalks contained in Charleston County Road Construction Standards, Appendix A. Unpaved, alternative surface walkways that are not within a right-of-way or drainage easement, and bike trails or walking trails that are designed to connect neighborhoods

and provide access to common areas may be provided when approved by the Planning Director.



**§8.10.3 TIMING OF SIDEWALK INSTALLATION**

The installation of required sidewalks within proposed publicly dedicated rights-of-way can be postponed until after the Final Plat has been recorded, provided the following criteria have been met:

- A. The other required road and drainage system improvements have been completed and accepted;
- B. All final plat conditions and stipulations have been finalized;
- C. An approved Financial Guarantee is posted of an amount sufficient to guarantee completion of the required sidewalk improvements (150 percent (150%) of the actual cost, verified by the Directors of the Public Works and Planning Departments and certified by the subdivision project engineer, a minimum of \$10,000) within a time period not to exceed two (2) years; and
- D. The subdivision Developer must be issued an encroachment permit for construction of the entire subdivision sidewalk system within the proposed right-of-way.

The subdivision's required two (2) year maintenance guarantee period will start once the entire sidewalk system has been completed and approved. The construction of the sidewalk on each individual lot must be completed prior to issuing the Certificates of Occupancy.

---

**ARTICLE 8.11 STREET NAMES AND STREET SIGNS**

---

**§8.11.1 STREET NAMES**

Street names proposed by the applicant must be placed on reserve with the Planning Department prior to submitting a plat. See Article 3.15, Addressing and Street Names.

**§8.11.2 STREET SIGNS**

Installation and maintenance of street signs on private roads or easements are the responsibility of the applicant, developer, Home Owners Association, or property owners in accordance with the Charleston County Road Construction Standards in Appendix A of this Ordinance, MUTCD Standards, and with Chapter 4; and Article VII of the Charleston County Code of Ordinances, as amended.

---

**ARTICLE 8.12 UNDERGROUND UTILITIES AND SERVICES**

---

All electrical, telephone, cable television and similar distribution lines providing service to a development site should be installed underground.

---

**ARTICLE 8.13 WATER SUPPLY AND SEWAGE DISPOSAL**

---

In accordance with South Carolina Department of Health and Environmental Control (DHEC) regulations, all subdivisions shall be served by approved public water and sewer systems, if accessible for connection, or if in the opinion of DHEC, the public's health and the environment would best be protected by the installation of such systems. Where public sewer is not available, all new lots must meet minimum soil requirements established by DHEC. This provision shall not be interpreted to require that subdivisions be annexed in order to obtain public water or sewer service.

---

**ARTICLE 8.14 FINANCIAL GUARANTEES (SURETY)**

---

**§8.14.1 PERFORMANCE GUARANTEES**

- A. In lieu of completing the required subdivision improvements of this Chapter, a financial guarantee in the form of a no-contest, irrevocable bank letter of credit, or performance and payment bond underwritten by an acceptable South Carolina licensed corporate surety, subject to County attorney approval of the guarantee to determine that the interests of Charleston County are fully protected.
- B. The applicant shall submit to the appropriate governmental agency a detailed itemized unit cost estimate for the proposed public improvements to be included in the financial guarantee. Performance Guarantees are for Public Improvements only; Public Roads, Public Water and Public Sewer. (Example: public roads constructed to County Road Standards dedicated to the public and accepted into the road system by Charleston County Council, or a public water system approved and accepted by another public entity). Charleston County will only accept a Financial Guarantee (Surety) for two (2) or more of the above public improvements. The amount of the financial guarantee shall be verified by the appropriate governmental agency that exercises operational control (Commissioners of Public Works for public water, Commissioners of the appropriate Public Service Districts for street name signs and public sewer, and the Public Works Director for all other public improvements covered in this Chapter). The amount shall be sufficient to guarantee completion of the required improvement (125 percent of the actual cost of the improvements with a minimum of \$10,000) within a time period specified by the government agencies, not to exceed two years. The governmental agencies determining the amount of financial guarantee shall provide a letter to the Planning Director (copy to the applicant) setting forth the amount of bond, conditions of acceptance and the period covered. The Planning Director will inform all interested governmental agencies, particularly the County Building Inspection Director.
- C. Upon completion of the improvements as required by this Chapter, written notice thereof shall be given by the applicant to the bond holder, who shall cause an inspection of the improvements to be made. The bond holder will, within 30 days of the date of notice, authorize in writing the release of the security given, provided improvements have been completed in accordance with the required specifications. Should the improvements not be completed in accordance with the required specifications by the date originally stipulated in writing by the bond holder, the funds derived from said bond will be used by the bond holder to complete the improvements according to required specifications, at the earliest reasonable time. Where it appears that the bond was insufficient to finance the required improvements after the applicant has defaulted, County Council will assess the individual applicant the cost of the improvements over and above the surety amount.
- D. In no instance will the bond issuer or bond holder be authorized to extend for the applicant the completion date originally stipulated.

- E. Pro-rated refunds based on a percentage of overall completion shall not be authorized, with the exception of an irrevocable bank letter of credit.
- F. In lieu of completed subdivision improvements, the decision-making body may accept the written guarantee of a governmental agency to complete required improvements within 90 days of the date of such acceptance by County Council. Failure to complete required improvements within the 90-day period shall void, any subdivision approvals received by the applicant.
- G. The acceptance of performance bonds in lieu of completed performance is made possible only by the introduction of effective occupancy control. This control will be coordinated with final approvals so as to ensure that all conditions covered by one or more bonds are completely fulfilled, except as specified in the Charleston County Building Code, before an occupancy permit can be issued by the County Building Inspection Director.

#### **§8.14.2 MAINTENANCE GUARANTEES**

Street and stormwater management/drainage systems that are to be dedicated to Charleston County for public maintenance shall be under warranty for all defects and failures for a period of two years. Prior to Final Plat approval, the developer shall provide written verification of financial responsibility for the correction of any defects and/or failures in those related improvements that will be dedicated to the county. The warranty shall be in an amount of at least ten percent of the construction costs. The cost amounts shall be verified by the Public Works Director. The warranty shall be effective for a period of two years from the date of acceptance by the County Council. The financial warranty shall be in the form of a no-contest, irrevocable bank letter of credit, a performance and payment bond underwritten by an acceptable South Carolina licensed corporate surety. Payment is subject to County Attorney approval of the guarantee to determine that the interests of Charleston County are protected. The Public Works Director shall maintain surveillance over the system and provide written notification to the developer if repair work is required during the warranty period. The Public Works Director shall identify defects not considered to be a public safety issue and notify the developer of such defects. The developer shall then have 30 days to prepare a schedule of corrective actions and begin such corrective actions. If not completed within the approved schedule, the Public Works Director shall make the repairs and bill the bonding company. Public safety defects shall be addressed immediately by the Public Works Director, with reimbursement from the bonding company.



## **CHAPTER 9 | DEVELOPMENT STANDARDS**

### **Table of Contents**

ART. 9.1	PURPOSE AND INTENT.....	9-1
ART. 9.2	APPLICABILITY.....	9-1
ART. 9.3	OFF-STREET PARKING AND LOADING .....	9-1
ART. 9.4	TREE PROTECTION AND PRESERVATION .....	9-16
ART. 9.5	LANDSCAPING, SCREENING AND BUFFERS.....	9-24
ART. 9.6	ARCHITECTURAL AND LANDSCAPE DESIGN STANDARDS.....	9-36
ART. 9.7	WETLANDS, WATERWAYS AND OCRM CRITICAL LINE.....	9-41
ART. 9.8	HISTORIC PRESERVATION.....	9-43
ART. 9.9	TRAFFIC IMPACT STUDIES.....	9-43
ART. 9.10	VISION CLEARANCE .....	9-46
ART. 9.11	SIGNS .....	9-47
ART. 9.12	DRAINAGE DESIGN .....	9-55
	CHAPTER 9 EXHIBITS .....	9-56

INTENTIONALLY BLANK

**CHAPTER 9 | DEVELOPMENT STANDARDS****ARTICLE 9.1 PURPOSE AND INTENT**

The purpose of the regulations contained in this Chapter is to protect the public health, safety, and general welfare; to promote harmonious and orderly development; and to foster civic beauty by improving the appearance, character and economic value of civic, commercial and industrial development within the unincorporated areas. The Development Standards are authorized for the following purposes, among others:

- A. Implement the goals, objectives, and policies of the County of Charleston *Comprehensive Plan*;
- B. Facilitate safe transportation, access, vehicular circulation, and parking;
- C. Assure the protection and preservation of natural resources, such as trees and wetlands;
- D. Implement the use of vegetated buffers in order to mitigate the effects of incompatible adjacent uses, to provide transition between neighboring properties and streets, to moderate climatic effects, and to minimize noise and glare;
- E. Implement basic architectural standards, right-of-way buffer standards, and sign standards that will promote attractive, well-designed development, foster balanced streetscapes, and reduce visual clutter along major roadways, thus enhancing safe traffic flow; and
- F. Insure protection from fire, flood and other dangers, and furthering the public welfare in any regard specified by a local governing body.

**ARTICLE 9.2 Applicability**

Unless expressly stated, the articles in this Chapter apply to development occurring on property within unincorporated Charleston County.



---

**ARTICLE 9.3 OFF-STREET PARKING-AND LOADING**

---

**§9.3.1 GENERAL****A. Applicability****1. New Development**

The off-street parking and loading standards of this Article apply to any new building constructed and to any new use established.

**2. Expansions and Alterations**

The off-street parking and loading standards of this Article apply when an existing structure or use is expanded or enlarged. Additional off-street parking and loading spaces will be required only to serve the enlarged or expanded area, not the entire building or use, provided that in all cases the number of off-street parking and loading spaces provided for the entire use (preexisting + expansion) must equal at least 75 percent of minimum ratio established in Off-Street Parking Schedule "A" of this Article.

**B. Timing of Installation**

Required parking spaces and drives shall be ready for use and approved by the Planning Director prior to issuance of a Certificate of Occupancy.

**C. Reduction Below Minimums**

The Planning Director shall be authorized to reduce the number of required parking spaces by no more than 10 percent (10%) when more than ten (10) spaces are required with the following conditions:

1. The site can support the minimum required number of parking spaces and meet all development standards in this Ordinance including buffers and landscaping requirements; or
2. The reduction is necessary to meet the Tree Protection and Preservation regulations contained in Article 9.4 of this Ordinance.

This allowable reduction excludes medical offices and restaurant uses. Any change in use that increases applicable off-street parking or loading requirements will be deemed a violation of this Ordinance unless parking and loading spaces are provided in accordance with the provisions of this Article.

**§9.3.2 OFF-STREET PARKING SCHEDULE A**

***Off-street parking spaces shall be provided in accordance with section 10 of the Plan. Unless otherwise expressly allowed, off-street parking spaces shall be provided in accordance with the following.***



**§9.3.3 RULES FOR COMPUTING PARKING AND LOADING REQUIREMENTS**

The following rules apply when computing off-street parking and loading requirements:

**A. Multiple Uses**

Lots containing more than one use must provide parking and loading in an amount equal to the total of the requirements for all uses.

**B. Fractions**

When measurements of the number of required spaces result in a fractional number, any fraction of one-half or less will be rounded down to the next lower whole number and any fraction of more than one-half will be rounded up to the next higher whole number.

**C. Area Measurements**

Unless otherwise expressly stated, all square-footage-based parking and loading standards must be computed on the basis of gross floor area. Storage areas or common areas incidental to the principle use shall be exempt from this measurement when the following conditions are met:

1. The storage area or common area is a minimum of two hundred fifty (250) square feet; and
2. The applicant has provided documentation that such areas will not be used as space for employees, customers, or residents.

**D. Occupancy-Based Standards**

For the purpose of computing parking requirements based on employees, students, residents or occupants, calculations shall be based on the largest number of persons working on any single shift, the maximum enrollment or the maximum fire-rated capacity, whichever is applicable and whichever results in the greater number of spaces.

**E. Unlisted Uses**

Upon receiving a development application for a use not specifically listed in an off-street parking schedule, the Planning Director shall apply the off-street parking standard specified for the listed use that is deemed most similar to the proposed use or require parking spaces in accordance with a parking study prepared by the applicant.

**§9.3.4 LOCATION OF REQUIRED PARKING****A. On-Site Parking**

1. Except as expressly stated in this Section, all required off-street parking spaces may be located on any lot and or street right-of-way within the Real Property must be located on the same lot as the principal use and shall be arranged and laid out so as to ensure that no parked or maneuvering vehicle will encroach upon a sidewalk, public right-of-way or property line.

2. ~~Parking lots in Office (O) and Commercial (C) districts containing more than ten parking spaces shall be located to the side or rear of the principal structure's front facade or within a courtyard surrounded by a structure on at least three sides.~~



## B. Off-Site Parking

~~A maximum of 50% of off-street parking spaces may be located on a separate lot from the lot on which the principal use is located if the off-site parking complies with the all of following standards. If any one of the following standards cannot be met, Special Exception approval shall be required.~~

~~1. Off-site parking may not be used to satisfy the off-street parking standards for residential uses (except for guest parking), restaurants, convenience stores or other convenience-oriented uses. Required parking spaces reserved for persons with disabilities shall not be located off-site.~~

~~2. No off-site parking space may be located more than 600 feet from the primary entrance of the use served, unless shuttle bus service is provided to the remote parking area. Off-site parking spaces may not be separated from the use that it serves they serve by a street right-of-way with a width of more than 80 feet, unless a grade-separated pedestrian walkway is provided, or other traffic control or shuttle bus service is provided to the remote parking area.~~

~~3. Parking spaces located off-site in accordance with this Section shall be considered accessory to the primary use, regardless of the fact that such accessory use is not located on the same parcel as the principal use.~~

~~4. Off-site parking areas serving uses located in Nonresidential zoning districts must be located in non-residential zoning districts. Off-site parking areas serving uses located in Residential or Agricultural zoning districts may be located in Residential, Agricultural or Nonresidential zoning districts.~~

1. In the event that an off-site parking area is not under the same ownership as the principal use served, a written agreement will be required. An attested copy of the agreement between the owners of record must be submitted to the Planning Director for recording on forms made available in the Planning Department. Recording of the agreement with the Register of Mesne Conveyance must take place before issuance of a zoning permit, building permit or Certificate of Occupancy for any use to be served by the off-site parking area. An off-site parking agreement may be revoked only if all required off-street parking spaces will be provided in accordance with this Article

~~6. Shared parking areas must be connected by a continuous network of sidewalks and pedestrian crosswalks.~~

## C. Shared Parking

***Notwithstanding the following, the shared parking standards in the Plan, including Table 10.2, shall apply to the Real Property.***

1. Uses with different operating hours or peak business periods may share off-street parking spaces if the shared parking complies with the all of following standards. If any one of the following standards cannot be met, Special Exception approval shall be required.
- ~~2. Shared parking spaces may be located anywhere on the Real Property, must be located within 600 feet of the primary entrance of the use served, unless shuttle bus service is provided to the shared parking area. Shared parking may not be separated from the use that it serves by a street right-of-way with a width of more than 80 feet, unless a grade-separated pedestrian walkway is provided, or other traffic control or shuttle bus service is provided to the parking area.~~
- ~~3. Shared parking areas serving uses located in Nonresidential zoning districts must be located in non-residential zoning districts. Shared parking areas serving uses located in Residential or Agricultural zoning districts may be located in Residential, Agricultural or Nonresidential zoning districts.~~
2. Those wishing to use shared parking as a means of satisfying **off-street** the parking requirements must submit a shared parking analysis to the Planning Director that clearly demonstrates the feasibility of shared parking. The study must be provided in a form established by the Planning Director and made available to the public. It must address, at a minimum, the size and type of the proposed development, the composition of tenants, the anticipated rate of parking turnover and the anticipated peak parking and traffic loads for all uses that will be sharing off-street parking spaces.
3. A shared parking plan will be enforced through written agreement among all owners of record. An attested copy of the agreement between the owners of record must be submitted to the Planning Director for recording on forms made available in the Planning Department. Recording of the agreement with the Register of Mesne Conveyance must take place before issuance of a building permit or Certificate of Occupancy for any use to be served by the off-site parking area. A shared parking agreement may be revoked only if all required off-street parking spaces will be provided in accordance with this Article.
- ~~6. Shared parking areas must be connected by a continuous network of sidewalks and pedestrian crosswalks.~~

### **§9.3.5 ACCESSIBLE PARKING FOR PHYSICALLY DISABLED PERSONS**

The parking standards of this Article are intended to ensure compliance with the Americans with Disabilities Act (ADA). A portion of the total number of required off-street parking spaces in each off-street parking area shall be specifically designated, located and reserved for use by persons with physical disabilities.

#### **A. Number of Spaces**

The minimum number of accessible spaces to be provided shall be a portion of the total number of off-street parking spaces required, as determined from the following schedule. Parking spaces reserved for persons with disabilities shall be counted toward fulfilling off-street parking standards.





Total Parking Spaces Provided	Minimum Number of Accessible Spaces	Minimum Number of Van- Accessible Spaces	Minimum Number of Car-Accessible Spaces
1-25	1	1	0
26-50	2	1	1
51-75	3	1	2
76-100	4	1	3
101-150	5	1	4
151-200	6	1	5
201-300	7	1	6
301-400	8	1	7
401-500	9	2	7
501-1,000	2% of total spaces	1 out of every 8 accessible spaces	7 out of every 8 accessible spaces
Over 1,000	20 + 1 per each 100 spaces over 1,000		

#### 8. Minimum Dimensions

All parking spaces reserved for persons with disabilities shall comply with the parking space dimension standards of this Section, provided that access aisles shall be provided immediately abutting such spaces, as follows:

1. Car-accessible spaces shall have at least a five-foot-wide access aisle located abutting the designated parking space.
2. Van-accessible spaces shall have at least an eight-foot-wide access aisle located abutting the designated parking space.

### §9.3.6

#### PARKING SPACE AND PARKING LOT DESIGN

##### A. Parking Lot Design

**Parking layouts shall be approved by the ARB.** Dead end type of parking layouts that cause or contribute to poor vehicular circulation will not be allowed unless all other site configurations and parking options of the required number of parking spaces have been exhausted.

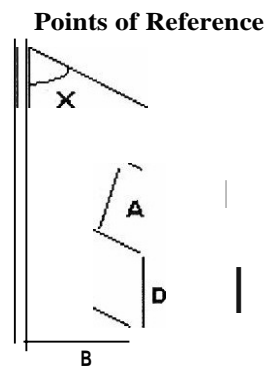
#### 8.

##### Aisle Widths and Parking Space Dimensions

Drive aisle widths and parking space dimensions shall comply with the standards in the following table. Twenty percent (20%) of the minimum number of required parking for a development may utilize compact and sub-compact vehicle parking dimensions. These dimensions shall be a minimum of 7 feet 6 inches x 15 feet (7'6" x 15') and clearly marked for compact vehicles only.

XO	Stall Width A	Stall Depth B	Aisle Width C	Skew Width D
60°	8' 0" 8' 6" 9' 0"	19' 7" 18' 0" 17' 0"	19' 0" 18' 0" 17' 0" *One Way	9' 3" 9' 10" 10' 5"
45°	8' 0" 8' 6" 9' 0"	18' 5" 18' 8" 19' 1"	12' 0" 11' 0" 11' 0" *One Way	11' 4" 12' 0" 12' 9"
30°	8' 0" 8' 6" 9' 0"	15' 11" 16' 5" 16' 10"	11' 0" 10' 0" 9' 0" *One Way	16' 0" 17' 0" 18' 0"
90°	8' 0" 8' 6" 9' 0"	22' 0" 22' 0" 23' 0"	11' 0" 11' 6" 12' 0" *One Way	N/A (PARALLEL)
	8' 0" 8' 6" 9' 0"	18' 0" 18' 0" 18' 0"	28' to 32' 25' to 29' 23' to 27' *Two Way	N/A

Note: Two Way drive aisles shall always require a minimum width of 23 feet.



**Figure 2**

**C. Parking Lot Landscaping**

See Article 9.5 of this Chapter.

**D. Markings and Surface Treatment**

- In paved parking areas, each off-street parking space shall be identified by surface markings at least four inches in width. Markings shall be visible at all times. Such markings shall be arranged to provide for orderly and safe loading, unloading, parking and storage of vehicles. In unpaved parking lots, all parking spaces must have a curb stop (minimum height of four inches) or another feature approved by the ARB to delineate the location of the space and to prevent the encroachment of parking onto adjoining properties, rights-of-way, or landscaped areas.

2. One-Way ~~and Two-Way~~ accesses into required parking facilities shall be identified ~~by directional arrows.~~
3. ~~Unpaved parking lots must have an all weather surface such as gravel, slag or other pervious surface, not including asphalt shingles. Entrance and exit drives serving unpaved parking lots accessed from a paved street must be paved from the edge of the street pavement to a distance of 20 feet into the property. No more than 120 percent of the required number of off-street parking spaces may be paved and no more than 70 percent of all developable land within parcels may be paved, unless approved by the Planning Director.~~

#### E. Access

1. Required parking spaces shall not have direct access to a street ~~unless the street and the parking spaces are appropriately designed for such maneuvers as determined by the directors of Planning and Public Works. or highway. Access to required parking spaces shall be provided by on-site driveways. Off-street parking spaces shall be accessible without backing into or otherwise reentering a public right-of-way.~~
2. Parking lot entrance and exit drive curb cuts within the River Village ~~shall be located based on conditions as determined by the ARB.~~ Parking lot entrance and exit drive curb cuts in all other locations will not be more than 30 feet in width. Entrances or exits which include a median strip to separate traffic flow in opposite directions may be expanded to 60 feet. Curb cuts shall be allowed in accordance with the following table:

LENGTH OFFRONTAGE	MAXIMUM NUMBER OF DRIVEWAYS
250 feet or less	1*
251 feet to 1,500 feet	2
1,500 feet or more	3

\* On frontages of 250 feet or less, a pair of one-way driveways may be substituted only if the internal circulation on the site is compatible with the one-way driveways and wrong-way movements on the driveways are rendered impossible or extremely difficult for motorists. Refer to the South Carolina Department of Transportation's Access and Roadside Management Standards Manual for recommended spacing of driveways based on speed of traffic.

3. ~~Except within the River Village entrance~~ and exit drives shall be located at least 100 feet from the edge of the right-of-way of any street intersection. If the subject lot has less than 100 feet of frontage, the Planning Director shall be authorized to alter these requirements. Suitable provisions will be made to prevent ingress or egress at other than designated entrance or exit drives. ~~Within the River Village entrance and exit drives shall be located a safe distance from the right-of-way as determined by the design engineer.~~
4. The Planning Director shall be authorized to require that access to dwelling units comply with the International Fire Code, as adopted by County Council.
5. Shared access between parcels may be allowed with written agreement among all owners of record. An attested copy of the access agreement between the owners of record must be submitted to the Planning Director for recording on forms made available in the Planning Department.



9-14

County of Charleston Zoning and Land Development Regulations

Recording of the agreement with the Register of Mesne Conveyance must take place before issuance of a zoning permit or certificate of occupancy for any use to be served by shared access. Any shared access must meet all dimensional requirements of this Ordinance and any applicable SCOOT requirements.

### **§9.3.7 USE OF REQUIRED PARKING SPACES**

Required off-street parking areas shall be used solely for the parking of licensed, motor vehicles in operating condition. Required spaces may not be used for the display of goods for sale or lease, for motor vehicle repair or service work of any kind, or for long-term storage of vehicles, boats, motor homes, campers, manufactured housing units, or building materials.

### **§9.3.8 Vehicle Stacking Areas**

#### **A. Minimum Number of Spaces**

Off-street stacking spaces shall be provided as follows:

<b>Activity Type</b>	<b>Minimum Spaces</b>	<b>Measured From</b>
Bank teller lane	3	Teller Window
Automated teller machine	2	ATM
Restaurant drive-through	5	Order Box
Restaurant drive-through	4	Order Box to Pick-Up Window
Car wash stall, automatic	4	Entrance
Car wash stall, self-service	3	Entrance
Dry Clean Service	3	Pick up Window
Gasoline pump island	2	Pump Island
Other	Determined by Planning Director	

#### **B. Parking Area Design and Layout**

Required stacking spaces are subject to the following design and layout standards:

1. Stacking spaces must be a minimum of eight feet by 20 feet in size.
2. Stacking spaces may not impede on or off-site traffic movements or movements into or out of off-street parking spaces.
3. Stacking spaces must be separated from other internal driveways by raised medians if deemed necessary by the Director of Public Works for traffic movement and safety.
4. The Planning Director may require pick-up and drop-off loop drives with sufficient vehicle stacking lanes to prevent vehicle backups into internal

travel lanes and parking lots for school uses, adult and child day care facility uses, public assembly uses, and conference facility uses.

### §9.3.9 OFF-STREET LOADING

**A. Spaces Required**

For every retail sales, service, wholesaling, warehousing, or manufacturing establishment and each bus or truck terminal, there shall be provided sufficient space to accommodate the maximum number of trucks that will be loading, unloading, or standing at any one time.

**B. Size of Space**

Each off-street loading space shall be of a size commensurate with the buildings to be accommodated. In no case shall required off-street loading space encroach upon off-street parking space required under this Article.

**C. Location**

All required off-street loading spaces shall be located near the on the same lot as the building which they are intended to serve.

**D. Entrances and Exits**

Off-street loading entrance and exit drives shall be located at least 25 feet from any street intersection.

**E. Loading Spaces Adjacent to Sidewalks**

Where a loading space is adjacent to a public sidewalk or other public pedestrian way, it shall be so located, arranged, and improved with curbs or other barriers, as to provide adequate protection for pedestrians.

**F. Maneuvering Areas**

All off-street loading spaces shall be provided with adequate off-street maneuvering areas.

**G. Exception: River Village area may load from the public right-of-way and or drive isle as approved by the ARB.**

**Landscaping, Buffers and Screening**

See Article 9.5 of this Chapter.

### §9.3 .10 PEDESTRIAN WAYS

**A. Where Required**

1. Paved *or unpaved pedestrian* ways shall be provided in all non-residential development within the Urban and Suburban Areas of the County; and
2. Paved *or unpaved* pedestrian ways shall link surrounding roadways with the front entrance and shall provide pedestrian linkages between the proposed development and uses on adjoining lots.

**B. Placement**

Paved pedestrian ways within publicly dedicated right-of-ways shall conform to the construction details for paved sidewalks contained in Charleston County





Road Construction Standards, Appendix A. Alternative surface walkways may be used outside of right-of-ways when deemed appropriate to surrounding development characteristics by the Planning Director.

---

**ARTICLE 9.4 TREE PROTECTION AND PRESERVATION**

---

**§9.4.1 GENERAL****A. Findings**

Trees are an essential natural resource, an invaluable economic resource, and a priceless aesthetic resource. Trees play a critical role in purifying air and water, providing wildlife habitat, and enhancing natural drainage of stormwater and sediment control. They also help conserve energy by providing shade and shield against noise and glare. Trees promote commerce and tourism by buffering different land uses and beautifying the landscape. The Tree Protection and Preservation regulations of this Article are intended to enhance the health, safety and welfare of Charleston County citizens.

**B. Applicability and Exemptions****1. Applicability**

The provisions of this Article in their entirety shall apply to all real property in unincorporated Charleston County, except as otherwise expressly exempted.

**2. Exemptions**

- a. Single family detached residential lots of record shall be exempt from all provisions in this Article except for the Grand Tree documentation, protection and replacement provisions. ~~This exemption does not include applications for Major or Minor Subdivisions for which landscape buffers may be required per Section 9.5.4~~
- b. The Planning Director shall be authorized to modify or reduce the standards of this Article for commercial nursery operations.
- c. This Article shall not restrict public utilities and electric suppliers from maintaining safe clearance around existing utility lines, and existing easements in accordance with applicable state laws. Siting and construction of future gas, telephone, communications, electrical lines or other easements shall not be exempt from the provisions of this Article.
- d. Removal of trees for the purpose of conducting "bona fide forestry operations" shall be exempt from the provisions of this Article except for removal of Live Oak species of Grand ~~T~~rees.
- e. Removal of trees for the purpose of establishing bona fide agricultural uses, as specified in Section 3.8.2A of this Ordinance,

shall be exempt from the provisions of this Article except for the *Grand Tree* documentation, protection and replacement provisions.

- f. Removal of trees for the purposes of maintaining safe clearance for aircraft as required by federal law or the establishment of facilities exclusively dedicated to aviation operations are exempt from this Article.
- g. Removal of trees on *Lots or Development Parcels properties to be developed for use as in-the a Golf Course(s), wastewater treatment facility, commercial area or any area developed pursuant to a traditional neighborhood design Industrial Zoning District* is permitted pursuant to the following conditions:
  - i. Tree removal cannot occur prior to site plan approval;
  - ii. This exemption shall not apply to Live Oak species of *Grand Trees* or any ~~*P*~~*protected T*~~*r*~~*ees* within required buffers and parking lots; and
  - iii. Mitigation of removed trees, as stated in this Section, is required. ~~*Staff*~~***The ARB*** shall approve the mitigation of such trees in accordance with Section 9.4.6 of this Ordinance. ***Evidence of such mitigation shall be provided to the Planning Director.***

### **3. Partial Exemptions for SCDOT and CCPW**

The South Carolina Department of Transportation (SCDOT) and Charleston County Public Works (CCPW) shall be exempt from the provisions of this Article except the following:

- a. All trees species measuring 6 inches or greater *DBH* located in rights-of-way along Scenic Highways as designated in this Ordinance shall be protected and require a variance from the Charleston County Board of Zoning Appeals for removal per Article 9.4.5B and 9.4.6.
- b. *Grand Tree* Live Oak species in all present and future rights-of-way shall be protected and require a variance from the Charleston County Board of Zoning Appeals for removal per Article 9.4.5.B and 9.4.6.
- c. All *Grand Trees* other than Live Oak species not located on a Scenic Highway are protected but may be permitted to be removed administratively when mitigated per Article 9.4.6.

### **C. DEFINITION OF "TREE REMOVAL"**

For the purpose of this Article, the term "tree removal" shall include, but not be limited to, damage inflicted to the root system by machinery; girdling; storage of materials and soil compaction, changing the natural grade above or below the root system or around the trunk; damage inflicted on the tree permitting fungus



infection or pest infestation; excessive pruning; excessive thinning; paving with concrete, asphalt or other impervious material within such proximity as to be harmful to the tree; or any act of malicious damage to a tree. Excessive pruning or thinning shall be pruning or thinning that exceeds more than 25 percent of the leaf surface on both the lateral branch and the overall foliage of a mature tree that is pruned within a growing season. Additionally, one-half of the foliage of a mature tree is to remain evenly distributed in the lower two thirds of the crown and individual limbs upon completion of any pruning.

## D. MEASUREMENTS AND DEFINITIONS

### 1. **Diameter Breast Height**

~~Diameter Breast Height is used for measuring all trees greater than 23 inch caliper. The Diameter Breast Height (DBH) of a tree is the total diameter, in inches, of a tree trunk or trunks measured 4 ½ feet above existing grad (at the base of the tree). In measuring DBH, the circumference of the tree shall be measured with a measuring tape design specifically to calculate diameter. A standard measuring tape may be used to measure diameter when the circumference is divided by 3.14. If a tree trunk splits at ground level and the trunks and do does not share a common base (separated by earth at natural grade), then each trunk shall be measured as a separate tree. If a multi-trunk tree splits below the 4.5 feet mark and the trunks share a common base, all trunks shall be measured separately, added together, and count as one tree. Any trunk measuring less than 8 inches DBH is not included in the calculation. Diameter Breast Height or DBH shall be as defined in section 3 of the Plan.~~

### ~~2,~~1. **Caliper**

Caliper is the diameter of a tree trunk measured six inches above the ground on trees with calipers of four inches or less. For trees between four-inch and 12-inch caliper, the trunk is measured 12 inches above the ground.

### ~~3.~~ **Grand Tree**

~~Any tree measuring 24 inches or greater diameter breast height (DBH) except pines. All Grand Trees are prohibited from removal unless a Grand Tree Removal Permit is issued. Grand Tree. shall be as defined in section 3 of the Plan.~~

### ~~4.~~ **Protected Trees**

~~Any tree on a parcel with a diameter breast height of eight inches or greater prior to development and all trees within required buffers or required landscape areas. Limited removal is allowed only when specified by the provisions of this Ordinance. Protected Tree shall be as defined in section 3 of the Plan.~~

## §9.4.2

## ADMINISTRATION

### A. Zoning Permit Required

### 1. Tree Removal

Removal of required trees is prohibited prior to the issuance of a Zoning Permit by the Planning Director. Zoning Permits will be issued only after a tree plan is approved by the ~~Planning Director ARB~~ **(with respect to any Protected Trees other than Grand Trees) and the Planning Director (with respect to Grand Trees)**, as outlined below.

### 2. Excess Canopy (Limb) Removal

- a. Removal of three or more limbs with an individual diameter of six inches or greater shall require ~~a Zoning Permit approval by the ARB~~.
- b. Removal of any size limbs which contribute to more than one hundred continuous linear feet of canopy over public roadways shall require Variance approval from the Board of Zoning Appeals. This requirement shall not preclude the SCOOT, CCPW or other entities from maintaining height clearances of 14' or less and width clearances within designated travel ways and from removing unprotected trees along right-of-ways for road widening projects.

### 8. Documentation

Tree plans, prepared by a licensed registered surveyor, civil engineer or landscape architect shall be required on all non-exempt parcels before any zoning permits are issued.

## §9.4.3

### TREE PLANS AND SURVEYS

#### A. General

Tree plans of the same scale as, and superimposed on, a development site plan or preliminary plat shall include location, number, size (*j*) *BH*), and species with a scaled graphic representation of each *Grand Tree*, canopy size and shape, and the trunk location. All required tree surveys shall include the name, phone number, address, signature, and seal of a licensed surveyor, landscape architect, or civil engineer registered in the State of South Carolina. The survey shall include all trees to be protected or preserved, and those scheduled to be removed, including dead and damaged trees. In cases where a previously approved recorded plat is utilized for the purpose of tree plans the name, address, phone number, signature and seal of the licensed landscape architect, civil engineer, forester or surveyor, registered in the State of South Carolina shall be provided. A scaled infrared or high resolution black and white aerial photograph or print of equal quality may be substituted in cases where the ~~Planning Director ARB~~ determines that it would provide the same information as a tree plan. However, all *Grand Trees* within 40 feet of proposed construction and land disturbance areas and trees within required buffers must be surveyed and mapped.

#### B. Major and Minor Subdivision Preliminary Plats

Refer to Section 8.4.2.A.4 Preliminary Plat Application in the Subdivision Regulations of Chapter 8 of this Ordinance.

#### C. Commercial, Industrial and Multi-Family Parcels

1. All tree surveys must show the location, number, size and species of all ~~Trees 8 inches or greater DBH (Diameter Breast Height)~~ **Protected Trees**, including those scheduled to be removed.
2. When there are **Protected Trees** ~~trees 8 inches or greater DBH~~, documentation of this fact shall be provided from a registered surveyor, engineer or landscape architect.

[Commentary: Assistance in tree identification and condition should be provided by a forester or qualified arborist.]

#### **D. Single Family Detached Residential Parcels**

1. Single family detached residential parcels shall show all *Grand Trees* within the area of construction and land disturbance and in conjunction with the subdivision regulations of this Ordinance at the time a zoning or building permit application is made.

### **§9.4.4 REQUIRED TREE PROTECTION**

#### **A. General**

All *Grand Trees* and any other trees required to remain on a site as outlined in this Ordinance must be protected during construction and development of the parcel. Tree protection must be shown on all development plans prior to site plan approval. A site inspection of the tree barricades must be scheduled by the applicant with the Planning Department for approval prior to the issuance of permits or the start of development activities.

Prior to issuance of a zoning permit, a pre-construction planning conference for tree preservation is required on site with the Planning Director's representative **and the ARB's representative**, the applicants, and any parties deemed appropriate for the purpose of determining if there is a need for additional tree protection techniques and for designating placement of tree barricades, construction employee parking, temporary construction office and dumpsters.

#### **B. Tree Protection During Development and Construction**

Protective barricades shall be placed around all required trees in or near development areas on all zoning parcels, prior to the start of development activities. These barricades, constructed of wood or plastic fencing or other approved materials shall be erected in accordance with standards by the Planning Director **(with respect to *Grand Trees* only) and standards by the ARB (with respect to all other *Protected Trees*)** and placed beneath the canopy drip line or one and one-half feet times the *DBH* of the tree. Other protective devices or construction techniques may be used as approved by the Planning Director. The barricades shall remain in place until development activities are complete. The area within the protective barricade shall remain free of all building materials, dirt, fill, or other construction debris, vehicles, and development activities. All ***Grand Trees*** ~~required trees are~~ also subject to the provisions of Section 9.5.6 of this Chapter and subject to the enforcement criteria of Chapter 11.



**C. Partial Exception for Limited Clearing**

Limited clearing and grubbing may be authorized by the Planning Director **(with respect to Grand Trees only) and the ARB (with respect to all other Protected Trees)** prior to the installation of protective tree barricades on sites that exhibit unusually heavy undergrowth where access to the interior of the site and its protected trees would be otherwise highly impractical. Limited clearing shall be for the express purpose of accessing the property and ~~P~~**protected T**~~rees~~ to erect the required tree protection and silt fencing. For the purposes of this Article, limited clearing shall be clearing done with hand tools, push or walk behind equipment or lightweight bush-hog type equipment designed specifically for brush and undergrowth clearing that is not capable of removing vegetation greater than 3 inches in diameter. Under no circumstances will metal tracked bulldozers, loaders, or similar rider/operator types of equipment be allowed on the site until the protective barricades are erected and a zoning permit is issued.

**D. Separation of Trees from Pavement, Grading and Structures**

Paved areas shall be separated from trees by a minimum distance of the drip line or one and one-half feet times the *P BH* or as modified by the Planning Director **(with respect to Grand Trees only) or the ARB (with respect to all other Protected Trees)** as deemed necessary to protect the root system of the tree. Paved areas shall not constitute more than 25 percent of the protected area beneath a tree. Any paving, grading, trenching, or filling within the remaining 75 percent of the protected area must be approved by the Planning Director **(with respect to Grand Trees only) or the ARB (with respect to all other Protected Trees)** and may require specific construction techniques be used in order to preserve the health of the tree. Refer to Chapter 9 exhibits for examples. When grading and construction within the protected area of a tree has been approved, all damaged roots shall be severed clean and inspected by the County Landscape Architect or Inspector **(with respect to Grand Trees only) or a representative of the ARB (with respect to all other Protected Trees)** prior to the receipt of a Zoning Permit.

**E. Quantity and Location of Trees to be Protected**

Before the issuance of a Zoning Permit for Commercial, Industrial, Multi-Family, and Civic/Institutional uses, the following number of **Protected Trees** ~~trees with a diameter breast height of 8 inches or greater~~ shall be preserved and protected in accordance with the provisions of Section 9.4.4.B of this Ordinance. All trees located within required buffers as outlined in Article 9.5 shall be protected.

1. 20 trees per acre; or
2. Any number of trees with a combined DBH (diameter breast height) of at least 160 inches per acre.
3. Required drainage improvements such as detention and retention ponds and wetlands may be subtracted from the area used to calculate tree preservation requirements.

**4. Exception: This section does not apply to the River Village area**

**§9.4.5****TREE REMOVAL****A. Generally**

Permits for tree removal may be approved where one or more of the following conditions are deemed to exist by the Planning Director **(with respect to Grand Trees only) or the ARB (with respect to all other Protected Trees):**

1. Trees are not required to be retained by the provisions of this Article.
2. Trees are diseased, dead or dying (as determined by the Planning Director **(with respect to Grand Trees only) or the ARB (with respect to all other Protected Trees)** or a qualified arborist);
3. Trees pose an imminent safety hazard to nearby buildings, or pedestrian or vehicular traffic (as determined by the Planning Director **(with respect to Grand Trees only), or the ARB (with respect to all other Protected Trees)** or a qualified arborist); or
4. Removal of required trees has been approved by the Board of Zoning Appeals **(with respect to Grand Trees only) or the ARB (with respect to all other Protected Trees).**

**B. Variances**

~~Grand Trees and protected trees~~ that do not meet the above criteria may be removed only where approved by the Board of Zoning Appeals, and shall be replaced according to a schedule determined by the Board. The Planning Director will make recommendations to the Board concerning the number, species, DBH or caliper, and placement of such trees. **Protected Trees that do not meet the above criteria may be removed only where approved by the ARB and shall be replaced according to a schedule determined by the ARB. The applicant shall provide evidence of mitigation to the Planning Director.**

**C. Emergency Provisions**

In the event that a tree poses a serious and imminent threat to public safety due to death, disease or damage resulting from emergencies including, but not limited to, fires, flooding, storms, and natural disasters, the Planning Director may waive requirements of this Article. Documentation must later be submitted for review outlining the threat to public safety which initiated the removal. Documentation must include any written findings by a qualified arborist and photographs supporting the tree removal emergency. The Planning Director may require replacement of required trees that are removed where it is determined that death or disease resulted from negligence.

**D. Violations and Penalties**

Violations and penalties are specified in Chapter 11 of this Ordinance.

**§9.4.6****TREE REPLACEMENT****A. Generally**

Tree replacement shall be required accompanying development on all non-

exempt properties in the manner described below:

1. When replacement canopy trees are required in fulfillment of the requirements of this Article, they shall be no smaller than two and one-half-inch caliper.
2. **With respect to Grand Trees only,** ~~the~~ The Planning Director or Board of Zoning Appeals is empowered to require trees of larger caliper as determined appropriate for site-specific conditions and the circumstances, lawful or illegal, under which removal occurred.
3. **With respect to all other Protected Trees, the ARB is empowered to require trees of larger caliper as determined appropriate for site-specific conditions and the circumstances, lawful or illegal, under which removal occurred.**

**B. Wooded Site with 160 Inches per Acre or More DBH**

The requirements of this section apply to all areas of the development except the River Village. ~~When trees of 8 inches DBH or greater Protected Trees have been removed in violation of this Ordinance, replacement trees shall be planted in the same general area according to a replacement schedule approved by the Planning Director (with respect to Grand Trees only) and the ARB (with respect to all other Protected Trees).~~

**C. Sites with Less Than 160 Inches per Acre Combined DBH**

The requirements of this section apply to all areas of the development except the River Village. When lots lack a sufficient number of trees to meet the requirement for DBH/number of trees per acre, all ~~Protected Trees trees six inches DBH or greater~~ shall be preserved and protected in accordance with Section 9.4.4.B of this Chapter during development and must equal no less than 40 inches per acre combined DBH. On lots with less than 40 inches per acre combined DBH, additional trees shall be planted on the lot equaling or exceeding 40 inches per acre combined DBH. Planting schedules shall be approved by the ~~ARB Planning Director~~.

**D. Previously Cleared Sites**

Where sites were completely cleared of trees prior to adoption of this Article or have been cleared subsequently for activities exempted from this Article, replacement trees shall be planted, the combined caliper of which equals or exceeds 40 inches per acre. Replacement schedules, including number, species, caliper and placement shall be approved by the ~~ARB Planning Director~~.

**E. Tree Fund**

The Tree Fund is a fund established to receive monies exacted from tree removal violation fines to include, but not be limited to, removal, damage, destruction, or as defined in Section 9.4.1.C of this Chapter, and as a form of mitigation when planting of the required trees is determined to be detrimental to the overall health of existing trees or impractical for the intended site design. The Planning Director shall impose a Tree Mitigation fee based on the current market retail value of two- to three-inch caliper trees installed to the American Association of Nurserymen Standards. If the applicant disagrees with the amount of the Tree Mitigation fee imposed, they may file appeal with the Board



of Zoning Appeals in accordance with the provisions contained in this Ordinance. All Tree Mitigation fees collected shall be paid to the County Treasurer and placed in an account established exclusively for public beautification through the planting of trees in Charleston County.

**F. Bankruptcy or Abandonment of Site**

When trees have been removed through an approved mitigation program and the project will not be completed for any reason (i.e., bankruptcy, abandonment, change in ownership, etc.), the owners of the subject property are responsible for the mitigation of the removed trees as outlined and agreed or subject to Section 9.4.6E of this Chapter.

**§9.4.7 INSPECTIONS AND FINAL APPROVAL**

- A. The Planning Director **and a representative of the ARB** shall periodically visit development sites prior to completion to monitor compliance with the tree plan approved for a project.
- B. Prior to issuance of a Certificate of Occupancy for a completed structure by the Director of Building Services, the Planning Director **(with respect to Grand Trees only) and the ARB (with respect to all other Protected Trees)** shall issue a statement of approval attesting to the developer's compliance with the site plan approved for the project (including landscaping, parking, drainage, etc.). The Director of Building Services shall withhold certificates of occupancy pending verification of compliance. It is the responsibility of the owner or agent to contact the Planning Director **and ARB** regarding the compliance inspection. Such inspections will occur within five working days of contact. Failure to obtain a Certificate of Occupancy prior to occupying or using the building for its intended purpose will result in ticketing and fines. However, the Planning Director shall approve a delayed schedule for planting materials (provided by the applicant's contractor) when the immediate planting schedule would impair the health of the plants. When a delayed planting schedule is approved, the applicant shall provide a bond equivalent to one and one-half times the projected cost of the planting materials. This is designed to include severe weather, such as droughts, heat waves, and floods.
- C. Within three years of the issuance of the Certificate of Occupancy, the ARB Planning Director shall perform a site inspection to verify the health of trees which were retained to meet the requirements of this Article and which may have suffered damage due to insufficient protective measures during development. **The results of this inspection shall be immediately provided to the Planning Director.**
- D. Each required tree that is determined by the ARB Planning Director to be diseased or injured to the extent it is irreparably damaged shall be approved for removal. The burden of proof of the extent of the disease or injury shall rest with the applicant, who must provide documentation from a qualified arborist. Any tree damaged during or as a result of construction shall be repaired to the satisfaction of the ARB Planning Director and in accordance with accepted ANSI A300 or International Society of Arboriculture practices. Tree damage must be repaired prior to issuance of a Certificate of Occupancy.

- E. The owners of a non-exempt property or properties shall be responsible for the maintenance of all required trees. No department or agent of the County of Charleston is in any way responsible for the maintenance of required trees on private property.

---

**ARTICLE 9.5 LANDSCAPING, SCREENING AND BUFFERS**

---

**§9.5.1 APPLICABILITY**

Unless expressly exempted, the landscaping, screening and buffering standards of this Article shall apply to all new non-residential development and all new major roadways that serve Residential Major Subdivisions (ten or more lots). Minor Subdivisions (those with fewer than ten lots) may be required to provide landscaping, screening or buffering on major roadways when the Planning Director determines that such landscaping, screening or buffering is necessary to ensure that the purposes of this Ordinance are met. When modifications or additions are being made to an existing non-residential building or site, the standards of this Article shall apply to those portions of the subject parcel that are directly affected by the proposed improvements, as determined by the Planning Director, provided that when modifications or additions are proposed that would increase the number of parking spaces, the area of vehicular use areas or

gross floor area of buildings by more than 25 percent (above existing), then the entire parcel shall be brought into compliance with all applicable standards of this Article. Before calculating the percentage of area for re-development and improvement, any proposed demolition of structures and parking is subtracted from the existing gross floor area of buildings and number of parking spaces.

#### **§9.5.2 EXHIBITS**

Drawings included as exhibits at the end of this Chapter are meant to compliment the language of the Ordinance. In the event of a conflict with the text of the Ordinance, the text shall apply.

#### **§9.5.3 PARKING, LOADING AND VEHICULAR USE AREA LANDSCAPING**

**A. Parking, Loading and Vehicular Area Perimeters** **THE REQUIREMENTS OF THIS SECTION APPLY TO ALL AREAS OF THE DEVELOPMENT EXCEPT THE RIVER VILLAGE.**

Unless otherwise expressly stated, perimeter landscaping shall be required around the outer perimeter of all off-street, surface parking, loading and vehicular use areas. Parking areas for the exclusive use of single family or agricultural uses shall be exempt from these requirements. Any off-street parking, loading or vehicular use area that will be entirely screened from view by an intervening building or structure or by a buffer provided to satisfy the standards of this Chapter shall also be exempt from these (parking, loading and vehicular use Area) perimeter landscaping requirements.

1. A perimeter landscape area at least eight feet in-depth shall be provided at the perimeter of all off-street parking, loading and vehicular use areas, except where permitted driveway openings are to be provided. Where drainage or other utility easements exist along property lines, the perimeter landscape area shall be located adjacent to the easement.
2. Required perimeter landscape areas shall be planted in accordance with the following minimum standards:
  - c. One canopy tree shall be provided for each 50 linear feet of parking, loading or vehicular use area perimeter. These trees may be used to satisfy the interior parking lot landscaping requirements.
  - d. A hedge or other landscape material of at least three feet in height (at maturity) shall be planted within the perimeter landscape area to provide a continuous landscape element, or a combination of trees, hedge, other durable landscape material or approved wall, fence or earth berm may be used to form the continuous landscape element;
  - e. All portions of the perimeter landscape area not planted with shrubs or trees or covered by a wall or fence barrier shall be planted in grass or ground cover; and
  - f. Parked vehicles may overhang a landscaped area if curbing or wheel stops are installed to prevent any damage to plants within the required perimeter landscape area. Landscaping, walls, fences and earth berms will be so located as to prevent their damage and/or destruction by overhanging vehicles.



**B. Interior Areas THE REQUIREMENTS OF THIS SECTION APPLY TO ALL AREAS OF THE DEVELOPMENT EXCEPT THE RIVER VILLAGE.**

The following interior parking lot landscaping requirements shall apply to all parking lots except those exclusively serving single family residential or agricultural uses.

3. A minimum of one landscape island shall be provided for each ten parking spaces within an off-street parking area. Required landscape islands shall have a minimum of 325 square feet, variably dependent upon the species of the canopy tree proposed by the designer. Each parking lot bay must terminate with a tree island.
4. Each required landscaping island shall contain at least one canopy tree and there shall be no more than ten parking spaces in a row between tree islands. Interior parking landscape islands that separate double loaded parking bays shall be a minimum of nine feet wide. Canopy trees planted in these islands must be planted in line with the parking stripes (between vehicles) and may be used to satisfy the parking lot tree requirements, however, all parking lot bays must terminate with a tree island. Example shown in Chapter 9 exhibits.
5. Curbs, wheel stops or other approved protective barriers shall be installed around all required landscape islands, as approved by the Planning Director.
6. Landscaping provided to meet the right-of-way buffer standards of Section 9.5.4 of this Chapter may not be used to satisfy interior parking lot landscaping requirements. Canopy trees provided to meet perimeter adjacent use buffer landscaping requirements may be counted to satisfy interior parking lot landscaping requirements.

**C. Parking, Loading and Vehicular Area Perimeters THE REQUIREMENTS OF THIS SECTION APPLY TO THE RIVER VILLAGE.**

1. If required by the ARB a perimeter landscape area shall be provided at the perimeter of all off-street parking, loading and vehicular use areas, except where permitted driveway openings are to be provided. Where drainage or other utility easements exist along property lines, the perimeter landscape area shall be located adjacent to the easement.
2. Required perimeter landscape areas shall be planted as required by the ARB

**D. Interior Areas THE REQUIREMENTS OF THIS SECTION APPLY TO THE RIVER VILLAGE.**

Interior parking lot landscaping requirements shall be as determined by the ARB.

**LANDSCAPE  
BUFFERS****(APPLIES TO  
BETSY KARRIS  
ON PARKWAY ONLY)****A. Right-of-Way  
Buffers****1. Applicability**

Right-of-way buffers shall be required adjacent to road rights-of-way for all uses except for the following: agricultural and residential uses existing on or prior to November 20, 2001. Minor Subdivisions may not have to comply with the requirements of this Section if the Planning Director determines that compliance is not necessary to satisfy the purposes of this Ordinance.

**2. Buffer Reductions**

The Planning Director shall be authorized to reduce the depth of a required right-of-way buffer by up to one-third its depth if the following circumstances exist:

- a. The parcel is located on a corner lot with required right-of-way buffers of 35 feet or more; or
- b. The area of all required buffers, including Land Use Buffers and Tree

Protection Areas exceeds 30 percent of the site.

### **3. Buffer Types by Roadway**

Landscape buffers shall be required along roadways in accordance with the following table. Streets and roads not indicated in the table shall comply with the S2 buffer requirements. Section 9.5.4 of this Chapter describes buffer types and planting requirements.

### **4. Development Within Buffer Areas**

- a. No development may occur within required buffer areas; with the exception of sidewalks and permitted drives and signs;
- b. All buffer areas shall accommodate required plant material within the buffer;
- c. Drainage swales and stormwater detention ponds may be placed in the buffer only when trees are not endangered and only when they meander through the buffer in a natural manner; and
- d. Stormwater detention ponds may not occupy more than twenty-five percent (25%) of the buffer area.



ROADWAY	BUFFER	ROADWAY	BUFFER
Abbapoola Road	S4	Magwood Road	S3
Ashley Hall Road	S1	Main Road (Limehouse Bridge to Maybank Hwy.)	S5
Hwy. 61/Ashley River Road (Saint Andrews Boulevard to Sam Rittenberg Boulevard)	S4	Main Road (Bees Ferry Road to Limehouse Bridge)	S4
Hwy. 61/Ashley River Road (Sam Rittenberg Boulevard to Mark Clark Expressway)	S2	Manse Road	S4
Hwy. 61/Ashley River Road (Mark Clark Expressway to Church Creek)	S3	Mark Clark Expressway	S6
Hwy. 61/Ashley River Road (Church Creek to Muirfield Parkway/Maclaura Hall Ave.) (I-11)	S5	Mary Ann Point Road	S3
Hwy. 61/Ashley River Road (Muirfield Parkway/ Maclaura Hall Avenue intersection to Charleston County Line) (I-11)	S6	Mathis Ferry Road (1)	S4
Bears Bluff Road	S5	Maybank Highway Corridor Overlay District	[2]
Bees Ferry Road	S4	Maybank Highway (James Island)	S1
Belvedere Road	S4	Maybank Hwy (Main Road to Reekville)	S5
Betsy Kerrison Parkway (1)	S5	Meeting Street	S1
Behicket Road (1)	S5	Murraywood Road	S4
Botany Bay Road	S4	Old Georgetown Road	S4
Brownswood Road	S4	Liberia Road	S4
Abbapoola Road	S4	Old Georgetown Road in the "Loop" area (designated on the Mount Pleasant Overlay map)	S1
Cane Slash Road	S4	Old Jacksonville Road	S4
Chisolm Road	S4	Old Pond Road	S4
Chuck Dawley Boulevard	S1	Old Towne Road	S1
Coleman Boulevard	S1	Orange Grove Road	S1
Dear Road	S4	Orleans Road	S1
Dorchester Road	S1	Parkers Ferry Road	S4
Eddingsville Beach Road	S4	Patton Avenue/Fickling Hill Road	S4
Edenvale Road	S4	Peters Point Road	S4

ROADWAY	BUFFER TYPE	ROADWAY	BUFFER TYPE
Fordham Road	S4	Pine Landing Road	S2
Fort Johnson Road [1]	S3	Plow Ground Road	S3
Hamlin Road	S3	Raccoon Island Road	S3
Harborview Road	S4	Rifle Range Road	S2
Highway 162	S4	River Road [1]	S3
Highway 166	S4	Riverland Drive [1]	S3
Highway 17 (Hwy. 41 to County Line)	S5	Rivers Avenue	S2
Highway 17 (east of Isle of Palms Connector to Hwy. 41, not including Old Georgetown Hwy. "Loop" Area)	S4	Rutledge Road	S2
Highway 17 in the Old Georgetown Road "Loop" area (as designated on the Mount Pleasant Overlay map)	S4	Saint Andrews Boulevard	S2
Highway 17 (west of the Isle of Palms Connector including bypass)	S4	Savannah Highway (Bees Ferry Rd. to County Line) otherwise S2	S3
Highway 174 (Highway 164 to Edisto Beach) [1]	S5	Seewee Road	S3
Highway 174 (Highway 17 to Highway 164)	S3	South Santee Road	S3
Highway 41	S4	Steamboat Landing Road (Jenkins Hill Rd. to Steamboat Creek)	S3
Highway 46	S4	Tibwin Road	S2
Humbert Road	S3	Toogoodoo Road	S3
James Island Bridge/Highway 64 Connector	S3	Venning Road	S3
James Island Expressway	S4	Wappee Road	S2
Liberia Road	S4	Wescott Road	S3
Long Point Road (SPA Wando Terminal to 1-526)	S1	Willtown Road	S3
Long Point Road (Outside of MP-C district) [1]	S4		

[1]— Denotes Scenic Road designation that shall require protection under the provisions of this Ordinance of all trees 6 inches or greater in diameter breast height (DBH) which are located within rights-of-way.

[2]— S6 for industrial use; S5 all other uses.

### 5. Buffer Depth and Planting Standards

STANDARD	BUFFER TYPE					
	S1	S2	S3	S4	S5	S6
MIN. BUFFER DEPTH (ft. from right-of-way) [1]	15	20	35	50	75	100
MINIMUM BUFFER LANDSCAPING (Plants per 100 linear feet) [2][3]						
Canopy Trees [4]	2	2	4	6	9	12
Understory Trees (at least 50 percent evergreen)	3	4	6	9	12	15
Shrubs	25	30	40	50	60	75
Street Trees (may be counted toward canopy tree req.) [5]	2	2	2	2	2	NA

All trees with a diameter breast height (DBH) of 6 inches or greater within buffers shall be preserved.

[1] Buffers may be traversed by permitted driveways and pedestrian ways.

[2] The retention of natural buffers shall be required along all road or street rights-of-way of S3 designation or greater. The Planning Director shall be authorized to waive/modify minimum buffer planting requirements when an undisturbed natural buffer exists that is the same depth and amount of plant material as that which is required.

[3] Bradford Pears cannot be used to fulfill any of the tree requirements of this Ordinance. Any exotic species which are proposed by the designer are subject to approval of the Planning Director.

[4] When existing overhead utility lines are located such that they may pose interference with required canopy trees, Palmetto trees may be substituted to fulfill the canopy tree requirements. These trees are to be planted at a ratio of three Palmetto trees to one canopy tree and are to be planted in groupings of three.

[5] Street trees are trees planted in rights-of-way for the purpose of fulfilling these requirements. Any planting in rights-of-way must be approved by party(ies) authorized to grant encroachment.

Note: The Planning Director shall be authorized to require the installation of berms within required buffers where deemed necessary to protect the visual quality of a road corridor or ensure land use compatibility.

## B. Land Use Buffers

### 1. Applicability

Land use buffers shall be provided in accordance with the standards of this Section, provided that the Planning Director shall be authorized to modify or waive buffer or landscape planting requirements if it is determined that:

- a. Buffers will not serve any useful purpose due to the fact that fences, walls, berms, or landscaping of at least equivalent height, opacity, and maintenance already exist on the adjacent parcel;
- b. Buffers will not serve any useful purpose due to the location of uses, vehicles, buildings, structures, or storage, loading, display or service areas; or



- c. The area of required buffers would exceed 25 percent of the site proposed for development.

When landscape buffer requirements are modified or waived, the Planning Director may require that additional plant material be added within remaining buffers or elsewhere on the site.

## 2. Exemptions

Single family development on individual lots shall be exempt from the land use buffer requirements of this Section.

### 3. Determination of Required Buffers

The following procedure shall be used in determining which of the buffer types in the Land Use Buffer Table (Section 9.5.4.B.4) of this Chapter apply:

- a. Determine the type of use proposed for the site that is being developed. This is the "Proposed Use" (Column 1).
- b. Determine the residential use type that exists on the adjacent parcel (if residential) or the zoning district classification that applies to the adjacent parcel. This is the "Adjacent Site's Use or Zoning".
- c. Identify the type of landscape buffer required along the developing site's boundary (A, B, C, D, E, or F).
- d. Refer to Section 9.5.4.B.5 of this Chapter to identify the buffer depth and landscaping standards for the required buffer type.

## 4. Land Use Buffer Table

Land use Buffer Table located in Section 8.2 of the PD Document. Land Use Buffers shall be provided along side and rear yards in accordance with the following minimum requirements:

Proposed Use	Use or Zoning of Adjacent Site											
	Residential Type			Zoning District								Agricultural Use
	R-1	R-2	R-3	R-4	OR	OG	CN	CT	CR	CC	I	
Residential Type 1	1	2	3	1	A	B	B	B	B	C	C	1
Residential Type 2	A	1	2	1	A	B	B	B	B	C	C	1
Residential Type 3	B	2	1	1	A	A	B	B	B	C	C	1
Civic/Institutional	B	B	B	A	1	1	1	1	1	1	1	1
Commercial Type 1	B	B	B	B	1	1	1	1	1	1	1	1
Commercial Type 2	C	C	C	C	C	B	B	1	1	1	1	1
Industrial Type 1	1	1	B	C	B	B	C	C	C	B	1	1
Industrial Type 2	1	1	1	1	1	1	D	C	C	C	A	1

[1] Applies to undeveloped (vacant) Rand AGR-zoned property.

**Residential Use Types:** Type 1 — Single-family Detached; Type 2 — Duplex and Single-family Attached; Type 3 — Multi-Family and all other residential use types, including manufactured housing parks.

**Commercial Use Types:** Type 1 — Any commercial use allowed by right in an OR, OG or CN district; Type 2 — all other commercial uses that are allowed in commercial (c) zoning districts (commercial uses are those listed in the "Commercial" rows of Use Table 6.1-1)

**Industrial Use Types:** Type 1 — Any industrial or commercial use that is first allowed in an industrial (I) zoning district; Type 2 — Waste-Related uses, Resource Extraction uses and Recycling Centers.

## 5. Buffer Depth and Landscaping Standards

Standard	Buffer Type					
	A	B	C	D	E	F
<b>MINIMUM BUFFER DEPTH</b> (feet from property line)	10	15	25	40	60	100
<b>MINIMUM LAND-USE BUFFER LANDSCAPING</b> (Plants per 100 linear feet) [1][2]						
Canopy Trees	2	3	3	5	7	9
Understory Trees (at least 50 percent evergreen)	3	4	4	7	8	11
Shrubs	20	20	25	30	40	50

[1] — The Planning Director shall be authorized to require the installation of fences, walls or berms within required buffers where deemed necessary to ensure land use compatibility or otherwise protect the visual quality of an area.

[2] — All trees with a diameter breast height (DBH) of 8 inches or greater within buffers shall be preserved.

**C. General****1. Location of Buffers**

Buffers shall be located along the perimeter of a lot or parcel and shall extend to the boundary of the lot parcel. They shall not be located on any portion of public right-of-way. Where drainage or other utility easements exist along property lines, required landscape buffers shall be located adjacent to the easement and may be reduced in width by the width of the easement, but in no case shall the buffer width be less than ten feet. Required buffers shall be noted on all plats, plans and permit requests submitted for review and approval under this Ordinance.

**2. Use of Buffers**

The following items shall be Planning Director shall be authorized to allowed within required buffers: on-premises signs, fences, walls, berms, mailboxes, access to community boat ramps, permitted driveways, and sidewalks, and trails, drainage, and other utilities within required buffers. Drainage and other utilities shall be installed perpendicular to minimize the impact. Other improvements may be allowed within buffers if the Planning Director determines that such improvements will not detract from the intended purpose and function of the buffer or have any adverse affect on adjacent property.

**§9.5.5 Landscape Plans**

Landscape and Planting Plans submitted to meet the requirements of the Ordinance are to be drawn to the same scale as the Site Plan depicting proposed shrubs and trees at maturity. It is strongly encouraged that all Landscape Plans be prepared by a licensed registered Landscape Architect or Landscape Designer familiar with the growth habits and characteristics of plant material available in the Charleston area. Landscape Plans shall be prepared by a licensed, registered Landscape Architect whenever the area of land disturbance or development activity exceeds one acre or when the total area of proposed building footprint exceeds 5,000 square feet.

**§9.5.6 Landscape Material Standards**

Landscape and plant material used to satisfy the standards of this Ordinance shall comply with the minimum standards of this Section. The requirements of this section apply to all areas of the Development except the River Village. The ARB shall review and approval all landscape materials for the River Village, and the Property Owner shall provide the Planning Director a copy of the ARB approval as part of each Development application.

**A. Plant Material****1. Existing Plant Material**

Vegetation and plant material that exists on a parcel prior to its development may be used to satisfy the landscaping standards of this Section provided that it meets the size and locational requirements of this Article.

**2. Size**

Unless otherwise expressly stated, all plant materials used to satisfy the requirements of this Ordinance shall meet the following minimum size standards:



PLANT TYPE	MINIMUM SIZE
Canopy Tree	2 1/2 inches caliper and 12 feet in height
Understory/Ornamental Tree	8 feet (height)
Evergreen/Conifer Tree	5 feet (height)
Shrubs	3 gallon and 18" to 24" in height or spread

Note: At least 50 percent of required understory trees shall be evergreens. Any plant material that grows to an ultimate height of less than 18 inches shall be considered a groundcover and cannot be used to fulfill any of the shrub requirements of this Ordinance.

### 3. Species

Species of plant material used to satisfy the requirements of this Section shall be indigenous to the Charleston County area or are cultivated to survive in the climate of this area. No single plant species shall represent more than 40 percent of total landscape plantings, except for projects whose landscape requirements for canopy trees are lower than ten.

### 4. Quality

Plants installed to satisfy the requirements of this Section shall meet or exceed the plant quality standards of the most recent edition of American Standard for Nursery Stock, published by the American Association of Nurserymen. Plants shall be nursery-grown and balled and burlapped or container-grown.

### 5. Additional Landscape Treatment

All required landscape areas, including drainageways and detention/retention ponds, and buffers not dedicated to trees, shrubs or preservation of existing vegetation shall be landscaped with grass, ground cover, or other landscape treatment, not including sand, rock or pavement. All grass areas are to be installed using proper and accepted landscape methods to assure germination and erosion control.

## B. Berms and Landscape Structures

Berms and landscape structures shall comply with the following minimum standards.

### 1. Fences and Walls

Fences and walls used as a screen shall be at least 95 percent opaque, with a minimum height of six feet.

### 2. Berms

Earthen berms shall have a minimum height of three feet, with a slope not to exceed 3:1, variable dependent upon the plant materials and soil type used. The toe of any berm shall be located at least three feet from the ultimate right-of-way or property line

**§9.5.7 Installation, Maintenance and Replacement****A. Installation**

All landscaping shall be installed according to American Association of Nurserymen Standards and sound nursery practices in a manner designed to encourage vigorous growth. Sites for plant material shall be prepared or improved in accordance with American Association of Nurserymen Standards for soil preparation and drainage. Subsurface drainage shall be provided where berms, elevated planting areas or other suitable means for providing proper drainage do not exist.

**B. Irrigation**

The Planning Director shall be authorized to require the installation of automatic irrigation (sprinkler) systems when deemed necessary to ensure plant survival and proper growth.

**C. Maintenance and Replacement**

Required trees, shrubs, walls and other landscape features shall be considered as elements of the project in the same manner as parking, building materials and other details are elements of the plan. The land owner, or successors in interest, shall be jointly and severally responsible for the following:

1. Regular maintenance of all landscaping in good condition and in a way that presents a healthy, neat, and orderly appearance. All landscaping shall be maintained free from disease, pests, weeds and litter. This maintenance shall include weeding, watering, fertilizing, pruning, mowing, edging, mulching or other maintenance, as needed and in accordance with acceptable horticultural practices, including ANSI standards for Tree Care Operations and American Association of Nurserymen Standards;
2. The repair or replacement of required landscape structures (e.g., fences) to a structurally sound condition;
3. The regular maintenance, repair, or replacement, where necessary, of any landscaping required by this Section; and
4. Continuous maintenance of the site as a whole

When replacement of trees, plant material or other landscape features is required, such replacement shall be accomplished within one growing season, one year or such time-frame as required by the Planning Director, whichever is shorter.

---

**ARTICLE 9.6 ARCHITECTURAL AND LANDSCAPE DESIGN STANDARDS**

---

**§9.6.1 PURPOSE**

The purpose of these standards is to promote attractive, well-designed development that is built to human scale; to promote and protect the appearance, character and economic value of new development; to encourage creativity in new development (as opposed to homogeneity or "look-alike" projects); and to foster attractive streetscapes and pedestrian environments, while accommodating safe vehicular movement and access.

**§9.6.2 APPLICABILITY**

These standards shall apply to all developments that are subject to Site Plan Review.

(See Article 3.7)

**§9.6.3 ARCHITECTURAL DESIGN GUIDELINES**

The intent of the Architectural Design Guidelines is to assure respect for the character, integrity, and quality of the built and natural environments of the county; it is not intended to stifle innovative architecture. The following criteria shall be used in evaluating applications:

**A. General Design**

1. Single, large building masses shall be avoided. Structures with walls of more than 1,500 square feet should incorporate fascias, canopies, arcades, building setbacks of three feet or more or other multidimensional design features to break up large wall surfaces on their street-facing elevations. Wall surfaces shall be visually divided by such features into areas of 750 square feet or less.
2. All elevations of a structure shall be in harmony, one with another, in terms of scale, proportion, detail, material, color, and high design quality.
3. The side and rear elevations of buildings shall be as visually attractive as the front elevation, especially where those side or rear elevations are most often viewed by the public. Rooflines and architectural detailing shall present a consistency in quality design.
4. All structures within a proposed development, including gasoline canopies, shall utilize a uniform architectural theme and shall be designed to create a harmonious whole. It is not to be inferred that buildings must look alike to achieve a harmony of style. Harmony of style can be created through property considerations of scale, proportion, detail, materials, color, site planning, and landscaping.
5. The scale of buildings and accessory structures (including canopies) shall be appropriate to the scale of structures located in the surrounding area. Canopies designed as demineering or overpowering architectural features are strongly discouraged.
6. Long, monotonous facade design, including, but not limited to, those characterized by unrelieved repetition of shape or form, or by unbroken extension of line, shall not be permitted.



7. The architectural design and material finish of buildings, signage, gasoline pump canopies, and other necessary structures shall be compatible with one another and with adjacent and surrounding structures where such structures are substantially in compliance with these requirements.

8. Structures which are of symbolic design for reasons of advertising shall not be permitted. A symbol or symbols attached to a building shall not be allowed unless it is secondary in appearance to the structure and landscape, and is an aesthetic asset to the building and surrounding area.

9. The location and dimension of wall signs shall be indicated upon the architectural elevations of proposed structures and shall maintain compatibility with the architectural features of the structure.

### **B. Building Materials**

1. Concrete finishes or precast concrete panels (till wall) that are not exposed aggregate, hammered, sandblasted or covered with a cement-based acrylic coating shall be prohibited as an exterior building material along any building elevation visible from public rights-of-way.

2. Unpainted or bare metal panels, regardless of depth or thickness, shall be prohibited as an exterior building material.

3. Corrugated or sheet metal, except stainless steel, copper, or galvanized metal shall be prohibited as an exterior building material along any building elevation visible from public rights-of-way.

4. Mirrored glass with a reflectance greater than 40 percent shall be prohibited from covering more than 40 percent of the exterior walls of any building.

5. Materials shall express their function clearly and honestly and shall not appear as materials which are foreign to the character of the rest of the building.

6. Any building exterior elevation shall consist of architectural materials which are equal in quality, appearance, and detail to all other exterior elevations of the same structure. Nothing in this Section shall preclude the use of different materials on different exterior elevations of the same structure so long as those materials maintain the architectural unity and integrity of the entire structure.

7. Shingles, metal standing seam, tile, or other roofing materials with similar appropriate texture and appearance shall be utilized. Flat roofs will not be discouraged where they are appropriate to the design theme of a structure.

**C. Building Color**

1. Color shades shall be used to unify the development.
2. Color combinations of paints shall be complimentary complementary. In no case shall garish colors be permitted. In general, no more than three different colors per building shall be allowed.

**D. Multiple Building Developments**

Each individual building within a development shall feature predominant characteristics including, but not limited to, consistent rooflines, use of compatible proportions in building mass and outdoor spaces, complementary relationships to the street, similar window and door patterns, and the use of complementary building materials in terms of color, shades, and textures. Monotony of identically designed multiple building projects shall be avoided. Variation of detail, form, and siting shall be used to provide visual interest. The use of different textures, shadow lines and contrasting shapes may also be used to provide visual interest.

**E. Building Orientation**

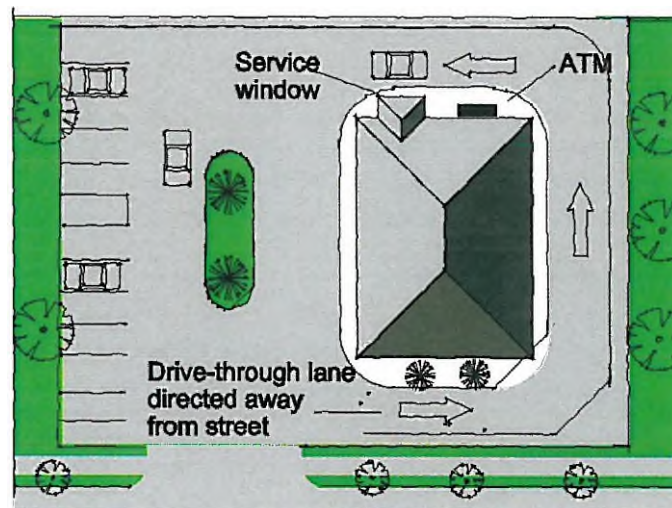
1. To the maximum extent feasible, primary facades and entries should face the adjacent street. Except in industrial districts, a main entrance shall face the adjacent street or a connecting walkway with a direct pedestrian connection to the street without requiring pedestrians to walk through parking lots or cross driveways.
2. Where it is reasonably practical, proposed structures shall not impede scenic rural views from the main road, from existing structures, or from natural settings.
3. Structures shall be oriented so that loading areas are in no manner visible from Residential districts, from existing rights-of-way or from planned future public rights-of-way. Loading areas may be oriented toward adjoining developed properties which are commercially zoned or toward adjoining properties eligible for future commercial development if and only if they are entirely screened from view by the use of fencing which is compatible with the overall architectural scheme of the project and/or are appropriately landscaped.
4. All corner developments shall have buildings located close to the corner with majority of parking to the side and rear.
5. All buildings shall be sited so that a direct relationship with the primary street is established. The architecture, landscaping and building siting must work in concert to create a unified appearance.
6. Gas Stations:  
Buildings shall be sited so that gasoline pump dispensers are located to the side of the building or located behind the buildings so that the building is between the pumps and the primary street frontage. If located on a

corner lot, the building would have to be situated in the corner of the lot at the intersection.

**F. Mechanical Equipment and Trash Receptacle Screening**

Locations of all mechanical equipment and dumpsters shall be shown on all site plans. All mechanical equipment and trash receptacles shall be shielded and screened from public view. Mechanical equipment shall be shielded with walls, fencing or landscaping that screens the equipment entirely. Dumpsters shall be screened with a minimum 6-foot opaque fence or wall on all four sides and located toward the side or rear of the principle structure.

**G.** All order boxes, menu stands, pickup windows, service/teller windows, and required vehicle stacking associated with drive thru services shall be located to the side or rear of buildings. For the purpose of this Section, the side or rear shall mean the area behind a projected line running parallel from the front (street facing) side(s) of the structure to the side property lines. This concept is depicted in the graphic below.



**§9.6.4 LANDSCAPING DESIGN GUIDELINES**

The purpose and intent of Landscaping Design Guidelines is to reduce the visibility of paved areas from adjacent properties and streets, moderate climatic effects, minimize noise and glare, and enhance public safety by defining spaces to influence traffic movement. Landscaping will reduce the amount of stormwater runoff and provide transition between neighboring properties. The following criteria shall be used in evaluating applications:

**A. General Design**

1. Landscaping shall be required between buildings and sidewalks, and parking lots and driveways. The scale of the proposed landscaping shall be in proportion to the building.
2. Landscaping does not only include trees and plantings but also paving, benches, fountains, exterior lighting fixtures, fences, and any other item of exterior furniture. All items of the landscape are to be selected not only



for their functional value but [also] for their aesthetic value and must compliment [complement] the whole.

3. All utility lines in the suburban areas such as electric, telephone, CATV, or other similar lines serving individual sites as well as all utility lines necessary within the property shall be placed underground. All junction and access boxes shall be screened with appropriate landscaping. All utility pad fixtures and meters should be shown on the site plan. The necessity for utility connections, meter boxes, and the like, should be recognized and integrated with the architectural elements of the site plan. All properties shall comply with the County's Right-of-Way Management Ordinance where applicable.

4. Ease of pedestrian access between proposed developments and adjacent developments shall be a required consideration in the development of a proposed project's site and circulation plans.

#### **B. Parking/Drives**

1. Parking areas and driveways shall be paved with material which is appropriate to the comprehensive design scheme of the project and to the intensity of use to which parking areas and driveways will be subject.

2. Buildings shall be sited so that the majority of parking is located to the side and rear of the building. The placement of the major portion of a proposed development's parking area to the rear of a main structure's corridor facade, or within a courtyard surrounded on three sides by a proposed structure, is strongly encouraged. The rationale for this guideline is to promote good proportional spatial definition for the corridors to be accomplished through a reduction in the distance required for a building's setback.

3. Drive-through access shall be integrally designed with the building and not dominate the design. Only single lane drive-throughs are allowed. Multi-lane drive-throughs are only allowed for banks (or similar financial institutions), post offices or utilities.

#### **C. Site Lighting**

Site lighting shall be from a concealed light source fixture and shall not interfere with the vision of vehicular traffic. A lighting plan with photometrics shall be stamped and signed by a registered professional engineer and comply with the following criteria:

1. Maximum average foot-candles shall not exceed 5-foot candles as depicted on photometric plans with a maximum not to exceed 12 foot candles close to light sources. Maximum foot candles under gasoline canopies and outdoor sales lots shall not exceed 30-foot candles.

2. All exterior lights shall be arranged and installed so that the direct or reflected illumination does not exceed one-half foot candle above the

background measured at the lot line of any adjoining residential or agricultural parcel and public right-of-way.

3. Lighting shall enhance the overall aesthetics of the site.

4. Security lighting shall be provided, particularly at pedestrian walkways.

5. Lighting shall be integrated with architectural design of the buildings.

6. Light sources (light bulbs) shall not be visible. They shall be shielded to reflect down onto the ground and not out onto the streets or neighboring property.

### §9.6.1 APPLICABILITY

The Kiawah River ARB shall develop and administer the architectural and landscaping requirements for the Real Property as provided in the Covenants. The Property Owner shall provide the Planning Director a copy of the ARB approval of the architectural and landscaping design as part of each Development application.

## ARTICLE 9.7 WETLANDS, WATERWAYS AND OCRM CRITICAL LINE

### §9.7.1 WETLAND BUFFERS AND SETBACKS

#### A. Intent

The buffer standards of this Article are intended to provide a natural vegetated area between the furthestmost projection of a structure, parking or driveway area, or any other building elements, and all saltwater wetlands, waterways and OCRM (saltwater) critical lines. The purpose of these required buffers is to provide a visual, spatial, and ecological transition zone between development and the County's saltwater wetlands and waterways, and to protect water quality and wildlife habitat.

#### B. Wetland, Waterway and OCRM Critical Line Buffer Depth and Setbacks

##### 1. Standards

The following minimum wetland/waterway buffers/setbacks shall be required:

***OCRM Critical Line Buffer:*** Any Single-Family Detached Lot abutting an OCRM Critical Line shall have a minimum OCRM Critical Line buffer of 15 feet.

***OCRM Critical Line Setback:*** Any Single-Family Detached Lot abutting an OCRM Critical Line shall have a minimum OCRM Critical Line Setback of 35 feet.

Minimum Buffers/Setbacks (feet)	RM	AG-15	AG-10	AG-8	AGR	RR-3	S-1	S-2	S-3	R-2	R-3	R-4	M-8	M-12
OCRM Critical Line Buffer	35	35	35	35	35	35	35	45	45	45	45	45	45	45
Setback from OCRM Critical Line	60	60	60	60	60	60	60	35	35	35	35	35	35	35





Minimum Buffers/Setbacks--(feet)	MHS	MHP	OR	OG	GT	CN	CR	CC	I
OCRM Critical Line Buffer	45	45	35	35	35	35	35	35	35
Setback from OCRM Critical Line	35	35	50	50	50	50	50	50	50

## 2. Reduction of OCRM Critical Line Setbacks

The Planning Director shall be authorized to reduce OCRM Critical Line setbacks to a distance not less than the buffer depth, when deemed necessary by the Director to accommodate reasonable development of the parcel and when it is determined by the Director that the setback reduction will not have a significant adverse impact on public health or safety.

## 3. Reduction of Buffers and Setbacks on Parcels Created Prior to April 21, 1999

When the application of buffer/setback requirements contained within this Ordinance render a parcel that existed prior to April 21, 1999, unbuildable, the Planning Director shall be authorized to reduce front, side and rear yard buffers/setbacks as necessary to make a parcel buildable. The Planning Director cannot reduce any front and/or rear yard buffer in an amount which would result in the placement of a structure closer to either the front or rear property line than any structure on an adjacent property. Any further reduction in any required buffer shall be made by appeal to the Board of Zoning Appeals.

## C. Measurement

Required OCRM critical line buffers and setbacks shall be measured from the OCRM critical line, whether the critical line or wetland/waterway is located on, adjacent to, or near the subject parcel.

~~E) Lot Width~~

~~The minimum lot width standards of the underlying zoning district shall apply at the required buffer or setback line.~~

## §9.7.2 PROHIBITED ACTIVITIES

The following activities are specifically prohibited in a buffer area:

- A. Removal excavation, or disturbance of the soil, except for minimal disturbance associated with the planting of shrubs or trees for landscaping **and for the installation of utility crossings, pursuant to PD Section 8.2B3.d.**
- B. Grassed lawns requiring regular maintenance such as herbicides; pesticides, fertilizers and frequent mowing;
- C. Gardens, fences, or structures, except for permitted crossings;
- D. Paved or other impervious surfaces; and
- E. Destruction or addition of plant life which would alter the existing pattern of vegetation.

---

**ARTICLE 9.8 HISTORIC PRESERVATION**

---

**~~§9.8.1 INTENT~~**

~~The standards of this Section are intended to safeguard the integrity of historic structures, sites, and their context, and to protect public views of these resources along public rights-of-way.~~

**~~§9.8.2 APPLICABILITY~~**

~~The standards of this Section shall apply to all sites (existing and future) listed on the National Register of Historic Places.~~

**~~§9.8.3 DEMOLITION~~**

~~No demolition of a historic structure or site may occur until a Special Exception has been approved in accordance with the provisions of this Ordinance.~~

**~~§9.8.4 MOVING~~**

~~No relocation of a historic structure or site may occur until a Special Exception has been approved in accordance with the provisions of this Ordinance. Relocation should not be considered, except as a final alternative to demolition.~~

**~~§9.8.5 NEW CONSTRUCTION; EXTERIOR ALTERATIONS~~**

~~No new construction located on a historic structure or site or significant exterior alteration of a historic structure or site may occur until a Special Exception has been approved in accordance with the provisions of this Ordinance. The applicant must demonstrate that all proposed renovations are consistent with the National Register of Historic Places (NRHP) such that the structure shall remain listed on the NRHP following the completion of the proposed new construction and exterior alterations.~~

**~~§9.8.6 NEARBY DEVELOPMENT~~**

~~Subdivision plats for multi-family, manufactured housing park, office, commercial, or industrial development or residential subdivisions proposed to be located within 300 feet of a historic structure or site should be reviewed to determine their impact on the historic site. The Planning Director shall require that potential negative impacts be minimized through the location of vehicular access points, screening/buffering and other site design tools.~~

**~~9.8.1 APPLICABILITY~~**

~~The County's Historic Preservation Ordinance, Art. 21 of the County's Code of Ordinances also does not apply. A Cultural Resources Study has been completed and approved by the State History and Preservation Office (SHPO). Sites found to be eligible for the National Register are being preserved. The remaining areas of the property are not historic.~~

---

**ARTICLE 9.9 TRAFFIC IMPACT STUDIES**

---

**§9.9.1 APPLICABILITY**

A traffic impact study shall be required with applications for zoning map amendments, preliminary plats and planned developments that are projected to generate 100 or more peak hour vehicle trips, based on trip generation rates from the latest edition of the Institute of Transportation Engineers Trip Generation manual. The Planning or Public Works Director shall also be authorized to require traffic impact studies when it is determined that a proposed development is likely to have a significant impact on transportation capacity, transportation levels of service or traffic safety in the vicinity of the proposed development.

County of Charleston Zoning and Land Development Regulations

9-45



**§9.9.2 STUDY SCOPE**

When a traffic impact study is required, the type and scope of the study shall be determined during a scoping meeting with the Planning and Public Works Directors. The meeting may also involve representatives of or request assessments from other agencies and departments. The elements to be determined during the scoping session shall include:

- A. Type of Study**  
The possible types of reports include: a letter report, full traffic impact analysis report or special report (e.g., sight distance survey).
- B. Definition of Impact Area**  
The points of access and key streets and intersections that may be affected by development of the subject tract constitute the impact area. Traffic recorder and turning movement assessment locations shall be determined.
- C. Period of Analysis**  
Periods of analysis may include daily traffic, a.m., p.m. or weekend peak hour.
- D. Analysis Scenarios**  
Scenarios for analysis include: existing conditions, opening year conditions with and without development, and 10 years after opening with and without development.
- E. Process**  
Process for determining trip generation and distribution including: trip generation category, diversion assumptions and distribution assumptions.
- F. Growth Rate Assumption**  
The rate of growth assumed in background traffic assumptions.
- G. Pipeline Development**  
Developments in the area that have been approved or are under review.

**§9.9.3 TRAFFIC STUDY ELEMENTS**

A letter report or special report shall include those elements agreed upon in the scoping meeting. A full traffic impact study shall include the following elements:

- A. Existing Condition Survey**
  - 1. Street System Description**  
The street system shall be described including geometric features, lane usage, traffic control, signage, sight distances and adjacent uses and curb cuts.
  - 2. Traffic Volumes**  
Existing traffic volumes shall be provided for the impact area including both AADT (Average Annual Daily Traffic) and "Design" peak hour volumes. MDT may be derived from current counts of the South Carolina Department of Transportation (if available) and peak hour volumes shall be done from field counts. Data shall be adjusted for daily and seasonal

variations. Turning movement counts for the peak hour shall be provided for critical intersections. Peak hour periods shall be as determined at the scoping meeting.

**3. Capacity Analysis**

Existing capacity of signalized and unsignalized intersections.

**4. Other**

Other items may be required at the discretion of the Public Works Director depending upon the type and scale of the project. These may include but are not limited to queue length analysis, pedestrian counts, accident data, traffic speeds (both 50th and 85th percentile), and stopping sight distances.

**B. Future without Development**

Capacity analysis is to be provided for opening year and plus ten-year for key intersections (and roadway segments where appropriate) without the development but including any planned developments. The analysis shall be based upon the Highway Capacity Manual or other methodologies approved in advance by the Public Works Director.

**C. Future with Development**

1. Projections of the daily and peak hour traffic generation of the project shall be made using the latest edition of the Institute of Transportation Engineers Trip Generation manual unless the Public Works Director determines that locally derived data will provide more accurate forecasts. Data from similar facilities may be used where the information is not available from the Institute of Transportation Engineers.
2. The projected trips shall be distributed onto the road network as agreed in the scoping meeting.
3. Capacity analysis for opening year and plus ten-year for key intersections (and roadway segments where appropriate).
4. Special analysis as may be required to determine warrants for signalization, minimum safe sight distances, gap analysis, turning radius requirements, queue length analysis, turning lane length analysis, curb cut locations or similar requirements.

**D. Mitigation Plan**

Where the analysis indicates that the project will create deficiencies in the impact area, improvements shall be recommended which shall include projected cost estimates. The design of improvements shall be in accordance with specifications of the Public Works Director and, where appropriate, the South Carolina Department of Transportation. Where a Decision-Making Body determines that a mitigation plan is not adequate to address the traffic impacts of the project, it may serve as a basis for denial of the rezoning, preliminary plat or planned development request.

**E. Consultants**

The Public Works Director may require that a mutually agreed upon independent consultant be hired by the County to perform required traffic impact studies or to review all or part of a study prepared by the applicant's consultants. The Public Works Director is authorized to administer the contracts for such consultants.

1. The Public Works Director shall determine the scope of services to be performed by the independent consultant and receive a cost estimate of such services.
2. The applicant shall provide an amount equal to the estimate to the Public Works Director, who will deposit the amount in an escrow or special account set up for this purpose. Any funds not used for the independent consultant shall be returned to the applicant in a timely manner without interest.
3. The Public Works Director may require additional fees for the independent review if: the Decision-Making Body expands the scope of the required review; the applicant substantially amends the application; additional meetings involving the consultants are requested by the applicant; the consultant's appearance is requested at Planning Commission or County Council meetings beyond what was initially anticipated; or the consultant's attendance is required at meetings with regional, state, or federal agencies or boards which were not anticipated in the earlier scope of services.

---

**ARTICLE 9.10 VISION CLEARANCE**


---

**§9.10.1 MAJOR ROADWAYS**

Corner lots on major roadways shall have no structure or obstruction that obscures travel vision from 30 inches to ten feet above ground level in a triangular area formed by measuring from the point of intersection of the front and side lot lines a distance of 40 feet along the lot lines and connecting the points to form a triangle.

**§9.10.2 COLLECTOR STREETS**

On Collector Streets, the triangular area formed by measuring from the point of intersection of the front and side lot lines is 30 feet.

**§9.10.3 SUB-COLLECTOR STREETS**

On Sub-Collector Streets, the triangular area formed by measuring from the point of intersection of the front and side lot lines is 20 feet.

**§9.10.4 PRIVATE DRIVES AND PRIVATE LANES**

On private driveways of commercial or industrial activities, the triangular area formed by measuring from the point of intersection of the drive edge is 15 feet.



---

**ARTICLE 9.11 SIGNS**

---

County of  
Charleston  
Zoning  
and Land  
Development  
Regulations  
9-49

9-50

County of Charleston Zoning and Land Development Regulations

immediately upon notice.

**§9.11.2 ON-PREMISES SIGNS Visible from Betsy Kerrison Parkway Only**

**A. Free-Standing Signs**

1. Maximum size, height, width, length, number of sign faces, number of signs per establishment and required minimum height and setbacks are based upon establishment size and shall conform with Table 9.11.2-A.
2. A maximum of one reader board shall be allowed per zoning lot for single or multi-tenant structures containing office, commercial, or industrial uses if attached to permanent free-standing signs. The area of the reader board shall be included in the site's total sign area allowance.
3. All new free-standing signs are to be designed as monument signs, pedestal style signs or pole mounted signs.
4. All pedestal style signs shall have a pole skirt.
5. The predominate materials used for free-standing signs, excluding copy material or materials not visible from the public right-of-way, must incorporate the following:
  - a. If the predominate building materials colors and design elements on the principal building conform to Section 9.6.3B. of this Ordinance, the exterior sign materials must compliment those found on the principal structure as reviewed and approved through the site plan review process. Materials, design and color of the sign do not need to be the same as those found on the principle structure to be considered complimentary.
6. Signs that are located in parking lots (such as directional signs) may be internally lit when constructed with routed letters or an opaque background.
7. The hanging or attachment of objects is not permitted unless they are shown on the drawings approved for sign construction and meet all the requirements of this Ordinance.
8. When calculating the sign area of a "monument sign", "pedestal sign", or "pole sign", the internal structural framework supporting the sign or other solid structural features (not containing copy or any graphic, word, symbol, insignia, text sample, model, device, or combination thereof which is primarily intended to advertise, identify or notify, exclusive of a frame or border) shall not be used in the calculation of the maximum area of the sign. Signs may be mounted on a base or foundation that will not be included in the square footage; however, the base for monument signs must be as wide as the sign.



**B. Wall/Facade Signs**

1. A maximum of two signs shall be allowed per wall/facade, with a maximum of four per building. Total area of all signs shall not exceed square footage of Table 9.11.2-B.
2. Maximum size of wall/facade signs is dependent upon building frontage and setback, in accordance with Table 9.11.2-B.
3. The hanging or attachment of objects is not permitted unless they are shown on the drawings approved for sign construction and meet all the requirements of this Ordinance.
4. Awning Signs
  - a. The use of awnings for the purpose of providing signage will be considered a wall sign. The awning signage must meet all dimensional and intensity standards applicable to wall signs in this Article.
  - b. For purposes of the subsection, an awning sign is a sign used for the purpose of providing signage and must be located above a display window or entryway.
  - c. Text or graphic shall be limited to the face of anawning.

**TABLE 9.11.2-A  
FREE-STANDING ON-PREMISES SIGNS**

<b>ZONING DISTRICT USE</b>			
<b>Requirement [1] [2]</b>	<b>Agricultural</b>	<b>Residential</b>	<b>Non-Residential</b>
Maximum Area (sq. ft.)	10 (32 with Special Exception)	10	Bldg. Size (sq. ft.)      Sign Size
			0 sq. ft. to 2,500 sq. ft.      = 50
			2,500 sq. ft. to 25,000 sq. ft.      = 100
			25,000 sq. ft. to 100,000 sq. ft.      = 150
			100,000 sq. ft. +      = 200
Maximum Height (ft.)	14	5	5-foot setback = 20 ft. maximum height  OR Districts: 5 ft. minimum setback-6 ft. maximum height
Minimum Height (ft.)	None	None	None
Maximum Width (height of sign with face) (ft.)	N/A	5	Ratio-Longest side: Shortest side 5:1
Maximum Length (ft.)	N/A	5	Ratio-Longest side: Shortest side 5:1
Setbacks (Front/Int) (ft.)	10/10	10/10	5/10
Max. No. Sign Faces	2 per sign	2 per sign	2 per sign
Max. No. Signs	1 per major frontage	1 per major frontage	1 per major road frontage

[1] Sign regulations for the CT Zoning District can be found in Section 4.22.4.

[2] Sign regulations for properties located in overlay districts can be found in Chapter 5.

**TABLE 9.11.2-B WALL/FACADE SIGNS**

<b>Building Length Facing Street</b>	<b>Setback</b>	<b>Maximum Size (sq. ft.)</b>
50 feet or less	0-99 ft.	50
	100-399 ft.	100
	400 or more ft.	150
More than 50 feet	0-99 ft.	Bldg. Frontage x 1
	100-399 ft.	Bldg. Frontage x 2
	400 or more ft.	Bldg. Frontage x 3

**C. Special Signs**

1. Maximum size, number, and height of special signs shall conform with Table 9.11.2-C.
2. Temporary Signs
  - a. **Size, Number and Height**  
Maximum size, number and height of temporary signs shall conform with Table 9.11.2-C.
  - b. **Types**  
Commercial and Non-Commercial Temporary Signs of the following varieties are permitted:
    - i. Banners are permitted only in the Savannah Highway/St. Andrews Boulevard Overlay District.
    - ii. Portable signs are permitted in accordance with standards of the National Electrical Code and anchoring provisions of the Standard Building Code.
  - c. **Duration**
    - i. Non-Commercial Temporary Signs shall be allowed for a maximum of 30 days per event.
    - ii. Commercial signs temporary [Temporary Signs] shall be allowed for a maximum of 30 days, starting with the opening of a business.

**D. Real Estate Signs**

1. Maximum size, number and height of real estate signs shall conform with Table 9.11.2-C of this Chapter.
2. Signs shall face a maximum of two directions, and may be mounted back-to-back or V'ed.
3. Where signs are V'ed, the space between panels shall not exceed 3 feet at the point at which panels are closest, and the interior angle formed by signs shall not exceed 60 degrees. For purposes of these requirements, V'ed signs shall be counted as one sign.
4. Where signs face two directions, whether back-to-back or V'ed, both signs must be the same standard size.

**E. Flags Used As Signs**

1. A permit shall be required for the installation of all flag poles or flag display devices erected on lots zoned for multi-family office, commercial,



or industrial use or occupied by a multi-family, office, commercial, or industrial use.

2. Applicants must submit with the permit application a scaled site plan giving the location of all flag poles and complete dimensional and installation engineering data.
3. Applicants must provide documentation of minimum clearance from electric, telephone or cable TV lines as certified by the proper utility prior to issuance of permit, or installation.
4. Maximum size and number of flags used as signs, and height of flag poles shall conform with Table 9.11.2-C of this Chapter.
5. The American flag and the flag of the State of South Carolina are exempt from the provisions for maximum size of flags and maximum size of flagpoles in Table 9.11.2-C of this Chapter.

**TABLE 9.11.2-C  
SPECIAL SIGNS**

Type	Maximum Size	Maximum Number	Minimum Setback Maximum Height
Subdivision/Multi-Family I.D. Signs	32 sq. ft.	2 per entrance	Minimum setback: 5 ft. Maximum height: 12 ft.
Directional	3 sq. ft.	Unlimited	4 ft.
Temporary Signs: Includes real estate signs, grand openings and permitted special events	48 sq. ft. Time Limit: Shall be removed no later than 15 days after the conclusion of the sale, event, or first day of grand opening	1 per 1500 ft. frontage Maximum: 3 per lot	Minimum setback: 5 ft. Maximum height: 12 ft. Maximum 6 ft. height in residential zoning districts
Flags	60 sq. ft.	3 per zoning lot	35 ft. or 15 ft. above highest point of roof
Civic/Institutional	100 sq. ft. 50 sq. ft. in Residential or Agricultural uses	1 per zoning lot	Min. setback: 5 ft. Max. height 12 ft. Sign must have opaque background except the marquee. Marquee cannot exceed 25% of total sign size

- F. Nonconforming Signs**  
Refer to Chapter 10, Nonconformities.

### **§9.11.3 OFF-PREMISES SIGNS**

- A. Outdoor Advertising of America Standards**  
All Off-Premises Signs shall be constructed in compliance with Outdoor Advertising of America Standards.

**B. Location and Setbacks**

1. Off-Premises Signs shall be allowed ~~in these zoning districts indicated in Chapter 6~~ **on the Real Property; provided, however, ARB approval of each Off-Premises Sign on the Real Property must first be obtained."** Upon approval by the ARB, such signs may be shared by two or more businesses; provided, however, all such businesses must be located on the Real Property.
2. Permitted sizes, maximum height, minimum setbacks and location criteria shall be as indicated in Table 9.11.3-A of this Chapter.

**C. Orientation**

1. Signs shall face a maximum of two directions, and may be mounted back to back or V'ed.
2. Where signs are V'ed, the space between panels shall not exceed three feet at the point at which panels are closest, and the interior angle formed by signs shall not exceed 90 degrees.

**D. Compatible Size Signs**

Where signs face two directions, whether back to back or V'ed, both signs must be the same standard size.

**E. Nonconforming Signs**

Refer to Chapter 10, Nonconformities.

**TABLE 9.11.3-A  
OFF-PREMISES SIGNS**

<b>Maximum Length</b>	48 ft.
<b>Maximum Width</b>	14 ft.
<b>Maximum Area</b>	672 sq. ft.
<b>Maximum Height</b>	40 ft.
<b>Minimum Setback</b> (front/side)	25/20 ft.
<b>Location Criteria</b> <sup>1</sup>	1,000 ft.
Minimum distance to nearest off-premises sign	
Minimum distance to nearest on-premises Sign	500 ft.

<sup>1</sup> The A R B may approve an increase in the location criteria for signs advertising a business on the Real Property so long as the sign is also located on the Real Property.

---

**ARTICLE 9.12 DRAINAGE DESIGN**

---

Refer to the Charleston County Stormwater Management Ordinance # 1518 approved on August 14, 2007 and found in Appendix B of this Ordinance.

**CHAPTER 9 EXHIBITS**

**Note: The following exhibits are for illustration purposes only. In case of any difference of meaning or implication between the text of this Ordinance and any heading, drawing, table, figure, or illustration, the text shall control.**



# **The Estimated Economic Impact of the Proposed Kiawah River Plantation Development on Charleston County, South Carolina**

**Prepared for  
Kiawah River Plantation, LP**

**By  
Dr. Thomas Tanner, Director  
Regional Dynamics and Economic Modeling Laboratory**

**December, 2008**

**REGIONAL DYNAMICS & ECONOMIC  
MODELING LABORATORY**

**CLEMSON UNIVERSITY RESEARCH FOUNDATION**

---

**THE STROM THURMOND INSTITUTE**

The views presented here are not necessarily those of the Strom Thurmond Institute of Government and Public Affairs or of Clemson University. The Institutes sponsor research and public service programs to enhance civic awareness of public policy issues and provide community and economic development information to improve the quality of state, and local government. The Institutes, a Public Service Activity (PSA) of Clemson University, are nonprofit, nonpartisan, tax-exempt public policy research organizations.

## Contents

Executive Summary.....	1
About The Kiawah River Plantation Development Project.....	5
About the Vinson Institute's Regional Dynamics Model.....	6
Data and Underlying Assumptions .....	9
Impacts Not Included in the Analysis .....	12
Estimated Economic Impact of the Kiawah River Plantation Development .....	13
Employment.....	14
Gross Output.....	14
Real Disposable Personal Income .....	16
Local Government Net Fiscal Impact.....	17
Conclusion.....	21
Appendix A: .....	22
Appendix B: .....	61
Appendix C:.....	63
Appendix D:.....	65
Appendix E: .....	66
Appendix F: .....	68



## **Executive Summary**

In the interest of providing facts and analysis that will allow the citizens of Charleston County to make informed decisions and substantively debate the merits of the proposed Kiawah River Plantation mixed use development, The Regional Dynamics and Economic Modeling Laboratory at the Strom Thurmond Institute of Government and Public Affairs at Clemson University was asked to conduct an extensive economic and fiscal impact analysis of the proposed development. The Laboratory conducted the economic and fiscal impact analysis using their Regional Dynamics economic modeling system, a massive and very detailed county level model of the United States economy. At 7.6 terabytes in size, the model is currently the largest and most sophisticated computerized economic model in the world. The model was designed by Dr. Tanner, director of the Economic Modeling Laboratory at the Institute and the individual who conducted the Kiawah River Plantation analysis.

Kiawah River Plantation is a mixed-use development, with a mix of single family housing, denser residential, hospitality, and retail uses, and significant recreational open space and other environmental amenities.

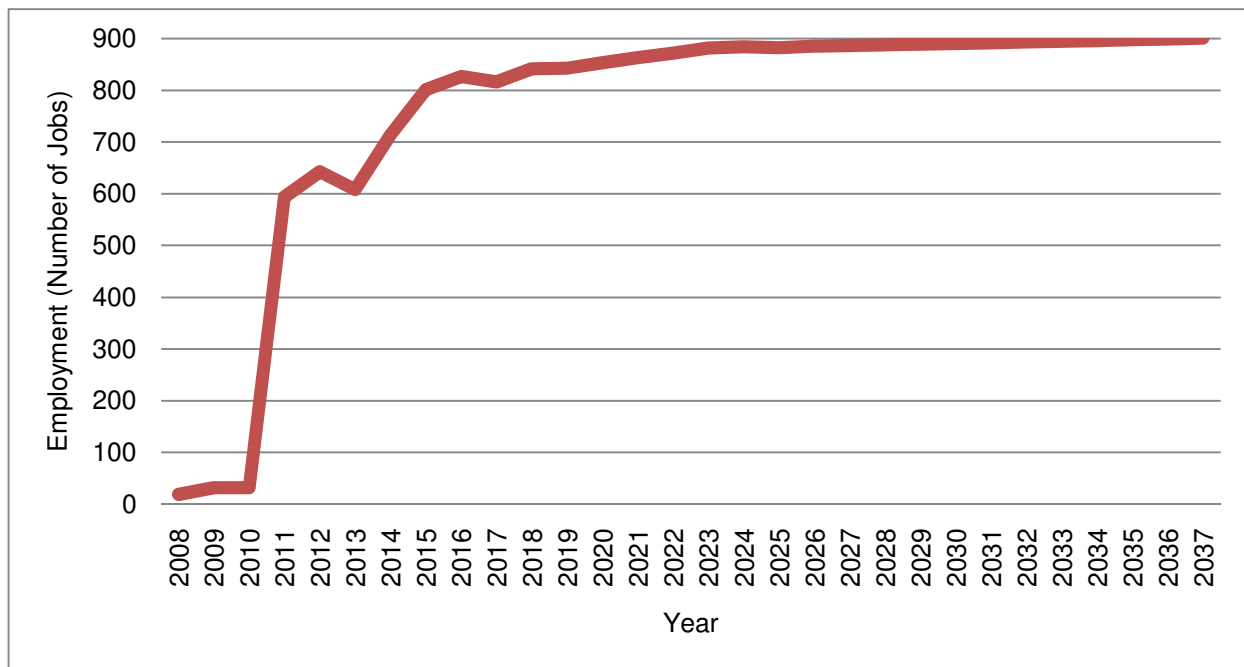
Because the Kiawah River Plantation Development project involves Tax Increment Financing, it was essential to estimate the gross economic and fiscal impact of the development on the economy of Charleston County. Thus, this project represents a departure from the traditional analyses conducted by the Regional Dynamics and Economic Modeling Lab, in that the analysis that was conducted did not attempt to isolate the impact of the Kiawah River Plantation development from the underlying growth that would take place in Charleston. This analysis thus reports the amount of additional economic activity and the net fiscal impacts that would take place in Charleston County as a result of the development through the 2008-2037 time frame, as though none of the businesses or residents of the development would otherwise choose to locate in the County. Other alternative scenarios were run, testing the importance of various assumptions in the model, but the final report concentrates on the gross economic impact of the development.

Regardless of the assumptions used, the economic impact of the Kiawah River Plantation project is forecast to be significant and positive for Charleston County, in terms of jobs generated, output, and disposable income in the County. In addition, the impact analysis demonstrates a positive net fiscal impact for the County, with additional revenue received by the County as a result of the project more than sufficient to cover the additional expenditure burden for the County generated by the project. The project is thus expected to be a significant net revenue generator for the county, independent of the assumptions used in the analysis.

The impact analysis suggests that the Kiawah River Plantation project would generate approximately 850-900 jobs in Charleston County in the long term, and an additional 1400-1500 jobs statewide. Total output (that is, total gross sales of all businesses located in Charleston County) is forecast to be approximately \$70-\$77 million dollars per year greater as a result of the Kiawah River Plantation Development. In addition, total yearly disposable income of all Charleston County residents (total income after taxes) is expected to be approximately \$29-\$33 million greater as a result of the Kiawah River Plantation development.

There is some year-by-year fluctuation in the employment and other economic impact numbers for Charleston County in the estimate, a result of the fluctuating spending on the development project itself, and on minor long term fluctuations in the structure of the Charleston County economy as a result of the project. The impact of Kiawah River Plantation grows steadily through the first ten years of the build-out period for the project and the sales cycle for the housing units and commercial property. The employment impact of Kiawah River Plantation on Charleston County is shown in Figure 1; changes in other economic variables roughly parallel that demonstrated in the employment graph.

Figure 1 - Estimated Impact of Kiawah River Plantation Development on Total Employment in Charleston County, South Carolina, 2008-2037

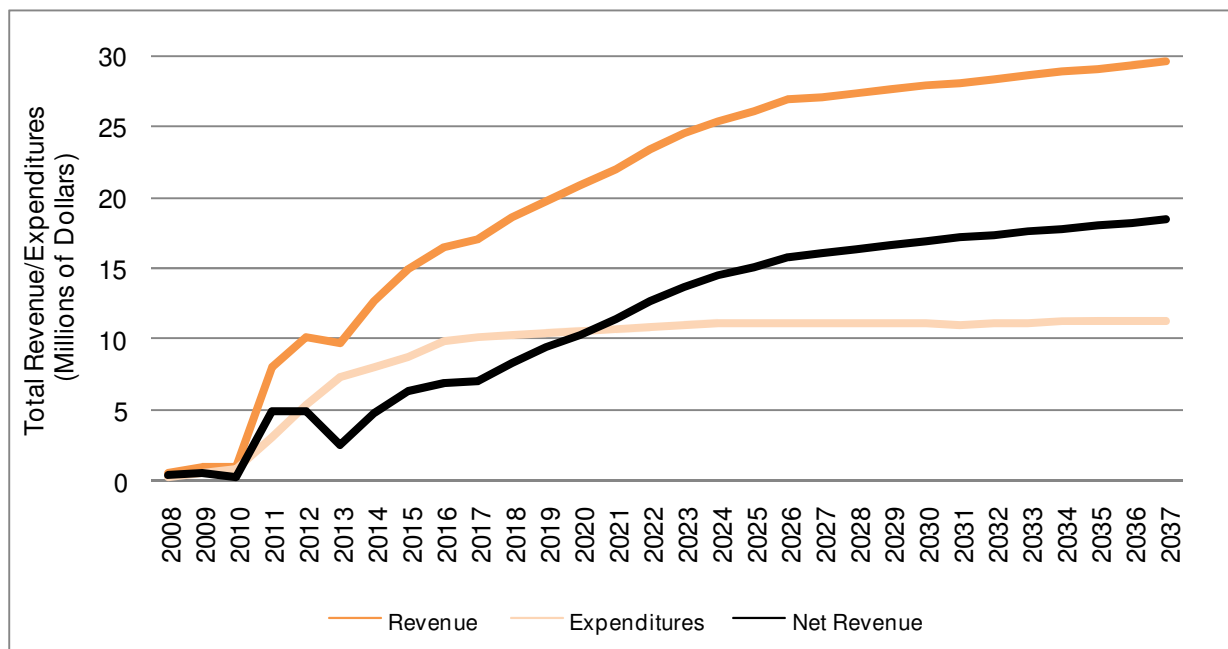


In addition to the economic impact of such a project, it is critical to consider the fiscal implications of a project like Kiawah River Plantation on local government revenue and expenditures. To that end, the analysis conducted by the Thurmond Institute included a detailed fiscal impact analysis. The analysis suggests that the Kiawah River Plantation project would generate additional expenditure requirements for local (county and municipal) governments in Charleston County of approximately \$10-\$11 million dollars per year once complete. These additional expenditures are required primarily to provide a level of services to new Charleston County residents generated by the project at a level consistent with that enjoyed by current Charleston County residents. However, the project is also estimated to generate a total of \$15-\$30 million dollars worth of revenue per year in the long term for Charleston County governments. The result is an estimated average annual net fiscal gain to Charleston County of over \$16



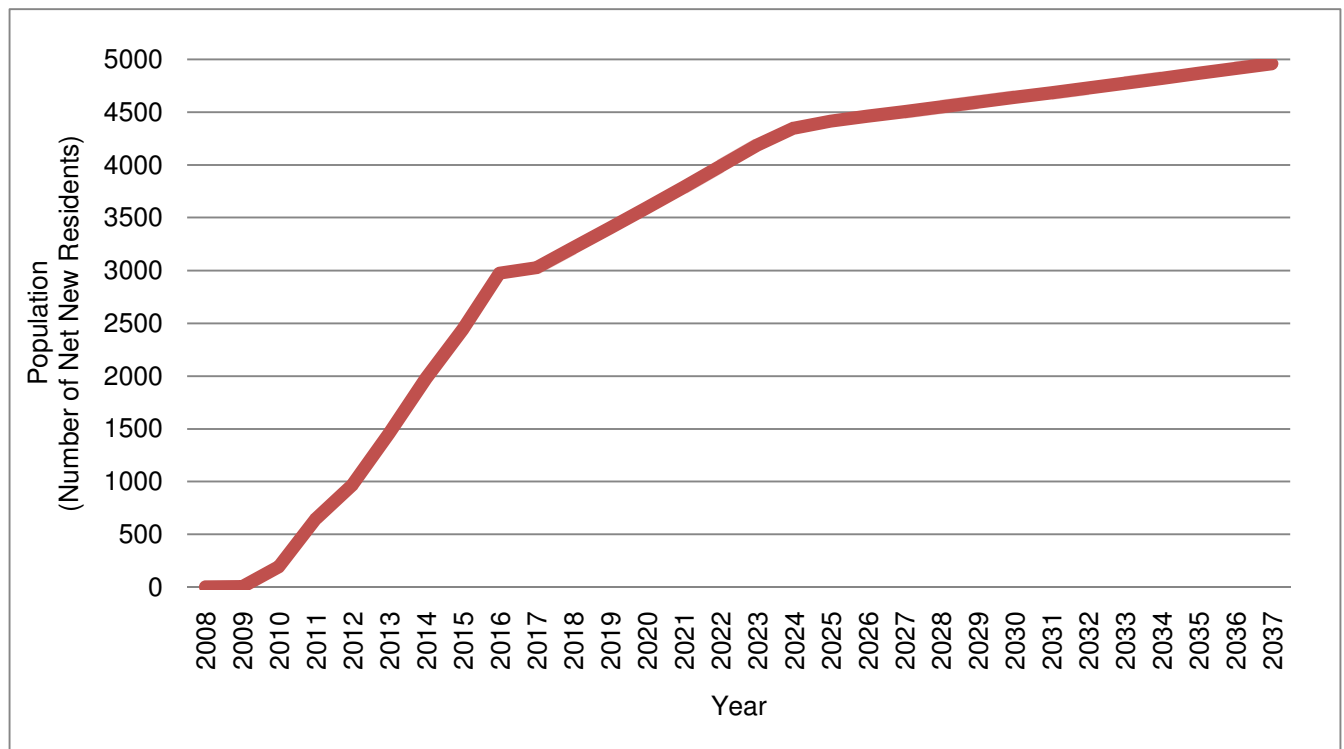
million dollars per year in the long run. Note also that these impact estimates are in addition to any exceptional impact fees paid by the developers, and any exceptional public infrastructure paid for by the developer, which were disregarded by the analysis for the sake of keeping all assumptions as conservative as possible. The annual estimated impact of the project on county government revenue and expenditures are shown in Figure 2.

Figure 2 - Estimated Impact of Kiawah River Plantation Development on Charleston County Government Revenue and Expenditures, 2008-2037



The gross impact of the development on Charleston County population is shown in Figure 3. This gross population impact is generated primarily by the new residences built at the development, of course, but also some modest population gains that are generated as a result of the economic growth in Charleston County generated by the project.

Figure 3 - Estimated Net Impact of Kiawah River Plantation Development on Charleston County Population, 2008-2037



### **About The Kiawah River Plantation Development Project**

Kiawah River Plantation is a mixed use community proposed for development by Kiawah River Plantation, LP, on 2003.46 acres of land on John's Island in Charleston County, South Carolina. Primary access to the property is from Betsy Kerrison Parkway (Bohicket Road), with secondary access from River Road.

The community will include up to 1,274 single family detached and attached homes and condominium units, 127 units of workforce housing, 85,000 square feet of retail commercial and office space, 2 hotels and related cottages with a total of 450 rooms, a golf course, several parks and open spaces and recreational amenities including trails, community docks, boathouse, pools, fitness center, playgrounds and tennis, pickleball and other courts. In addition, the community is located adjacent to the

Charleston County Parks Commission Mullet Hall Equestrian Center and Community Park. Kiawah River Plantation is designed to be a highly amenitized community, with a strong orientation to water, nature and recreation. The Kiawah River Plantation development is designed to be particularly attractive to second home owners nearing retirement and active retirees, an important consideration in determining both the expected economic and fiscal impacts of the development.

### **About the Thurmond Institute's Regional Dynamics Model**

Researchers at the Regional Dynamics and Economic Modeling Lab at Clemson University used the Regional Dynamics (REDYN) model, developed by Dr. Tom Tanner specifically for conducting state and local economic and fiscal impact analysis and forecasting. The REDYN model is the largest computer model of the U.S. economy ever built (currently approximately 7.6 terabytes in size); the model uses detailed county level economic, demographic and fiscal data from the Bureau of Economic Analysis, the Bureau of Labor Statistics, the Department of Energy, the Bureau of Census, and other public sources.

REDYN is structural in nature, meaning that it clearly includes cause-and-effect relationships. The model is based on two key underlying assumptions from mainstream economic theory: (1) households maximize utility and (2) producers maximize profits. Because these assumptions make sense to most people, lay people as well as trained economists can understand the model.

In the model, businesses produce goods to sell to other firms, consumers, investors, governments, and purchasers outside the region. Output is produced using labor, capital, fuel, and intermediate inputs. Demand for labor, capital, and fuel per unit



of output depends on relative costs because an increase in the price of any one of these inputs leads to substitution away from that input to other inputs.

In the model, supply and demand for labor determine wage rates. These wage rates, along with other prices and productivity, determine the cost of doing business for every industry in the model. An increase in the cost of doing business causes either an increase in prices or a decrease in profits, depending on the market for the product. In either case, an increase in costs would decrease the share of the local and U.S. market supplied by local firms. This market share, combined with the demand previously described, determines the amount of local output. The model has many other feedbacks. For example, changes in wages and employment affect income and consumption, while economic expansion changes investment and population growth influences government spending.

Within the model, firms produce goods and services that are purchased either by final consumers or by other firms as inputs to their own production processes. Firms also purchase labor, capital, and other inputs. Labor and capital requirements depend on both output and relative costs. Population and labor supply contribute to demand and to wage determination. Economic migrants, in turn, respond to wages and other labor market conditions. Supply and demand interact in the wages, prices, and profits block. Prices and profits determine market shares. Output depends on market shares and the components of demand.

The model brings together all of the elements to determine the value of each variable for each year in the baseline forecasts. Interindustry interactions that are included in input-output models are used to estimate the values of other regional

economic variables. In order to broaden the model in this way, it was necessary to estimate key relationships. Extensive data sets covering all areas in the country and two decades worth of research were used to ensure that the model was theoretically sound and based on all of the relevant data available.

The model has strong dynamic properties; that is, it forecasts not only what will happen but also when it will happen. It enables long-term predictions that have general equilibrium properties, meaning that the long-term properties of general equilibrium models are preserved, accurate year-by-year predictions are maintained, and key equations can be estimated by using primary data sources. A complete technical description of the model can be found in Appendix A.

The effects of the Kiawah River Plantation development on the state and local economies are determined by comparing a baseline forecast with an alternative forecast that incorporates the assumptions used for this study. The baseline forecast uses recent data (data from 2000-2006) and thousands of equations to generate projected economic activity for a particular region or set of regions for a specified time period of up to 60 years (2000-2060). The impact of Kiawah River Plantation is estimated by providing the model with information about the magnitude of the project, and those same equations are then used to calculate a new forecast for every region in the model.

This analysis was conducted strictly for the purpose of assessing the economic and fiscal impact of the Kiawah River Plantation development on Charleston County. However, for the sake of guaranteeing an accurate assessment of the impact within a larger economic framework, a nine region REDYN model of the U.S. economy was assembled for the project. The nine regions explicitly modeled were Charleston County,

Jasper County, Colleton County, Hampton County, the Charleston-North Charleston Metropolitan Statistical Area (Berkeley, Charleston and Dorchester Counties), the Savannah, GA Metropolitan Statistical Area (Bryan, Chatham and Effingham Counties in Georgia), the rest of the state of South Carolina, the rest of the state of Georgia, and the rest of the United States. This multiregional structure helps to guarantee the accurate representation of Charleston County's relationship to its neighbors and trading partners, and allows the analyst to assess the reasonableness of the impact simulations being run.

### **Data and Underlying Assumptions**

Three key impacts of the Kiawah River Plantation project were explicitly modeled for this analysis. The most straightforward component of the Kiawah River Plantation Project is the economic impact of the development and construction expenditures on Charleston County, each of the neighboring counties, the rest of South Carolina, the states of North Carolina and Georgia, and the rest of the United States. As money is routed to the construction of Kiawah River Plantation residential and nonresidential structures and related infrastructure, and away from other economic activities in other places, this will have impacts on the economies of all regions included in the analysis. Additional demand for construction in Charleston County will lead to additional construction employment in Charleston County and other neighboring counties (as construction activity in Charleston can be done by firms that are located nearby, but not necessarily in the county). The increase in construction will also increase the demand for lumber, concrete, hardware, and all of the other commodities used in the construction process, which will create additional economic activity to satisfy the so-



called “supply chain.” In addition, the construction employment and wages will lead to increased demand for groceries, gasoline, clothing, and all of the other economic activities associated with this increase in household consumption. The detailed forecast construction schedule for the Kiawah River Plantation development (the amount spent on various development and construction activities each year of the project), was provided by the project developers; the REDYN model used this information to calculate all of the expected spillover effects, and where and when these spillover effects will take place.

The second element of the Kiawah River Plantation Development that has potentially serious impacts is the total number of new residents brought to the region as a result of the development. Based upon the number of residential units forecast for Kiawah River Plantation provided by the developers, and based upon the information on United States household size and demographic characteristics by age and income group, we were able to estimate the number of new residents brought in during each stage of the development, and their estimated demographic characteristics, to create a complete population projection for Kiawah River Plantation. In light of the development design, the expected population skews both slightly wealthier and distinctly older than the average US household, with slightly fewer individuals per household. A key component of the economic impact of Kiawah River Plantation residents is their spending profile (what they buy, where, and when), which will clearly be affected by how much income they have. An income distribution was generated for Kiawah River Plantation residents, based upon the property characteristics and the profile presented by the developer. It was felt that this estimate would more accurately reflect the income

of Kiawah River Plantation residents then would any simpler estimate such as the current average household income for Charleston County. This income estimate was inflated year-over-year to reflect the average forecast household income growth for the labor market area.

This final aspect of the Kiawah River Plantation project that was considered was the economic impact of the nonresidential components of the project. Because Kiawah River Plantation is envisioned to be a mixed use development, included in the development are extensive nonresidential construction elements, meant to house businesses in the Kiawah River Plantation community. The question that remains to be addressed is how much economic activity will be housed in these nonresidential structures, and what economic activity these businesses would generate in the County. In order to estimate the total economic activity generated in the County, the region, and the state, it is first necessary to produce some estimate of the sizes and types of businesses that might be attracted to these structures. For the general retail portion of the development, since no specific businesses are yet identified, we chose to estimate that the mix of businesses attracted to the Kiawah River Plantation nonresidential elements would be the same mix of commercial and service sector businesses currently found in Charleston County (as defined by the Bureau of Labor Statistics and Bureau of Economic Analysis). That is, the new businesses would be the same mix of retail and service industries currently found in the county. To find the total size of industry we used national data from the Bureau of Labor Statistics to identify the total level of employment and wages per square foot of structures associated with the industry. By scaling this set of numbers to the total nonresidential structure square footage on the

Kiawah River Plantation project, we get an estimated direct employment and wage bill for each type of industry locating in Kiawah River Plantation. By introducing this information to the REDYN model, we can estimate the total economic impact of this activity across all of the regions and years in the model. We used the same approach to estimate the hotel employment and the two hotel properties to be developed, and employment associated with the golf course to be located on the property.

A summary of annual expenditures associated with all phases of the Kiawah River Plantation project can be found in Appendix B, and a summary of all annual housing and other sales at Kiawah River Plantation can be found in Appendix C.

### **Impacts Not Included in the Analysis**

While we feel that we have captured all of the critical elements of the Kiawah River Plantation project in our analysis, there are certain aspects of the Kiawah River Plantation project that have not been considered, either because they are not expected to have any economic impact (recall that the REDYN model is designed only to capture economic effects), or because no reliable data or methodology exists to quantify the impact.

Elements of the Kiawah River Plantation that were not included in the analysis are what economists refer to as the amenity values of the project; that is, the effect of the Kiawah River Plantation development of the quality of life of Charleston County residents both within and outside of Kiawah River Plantation. These amenity impacts can have real economic effects (either positive or negative), as people are willing to pay the price of living in a high quality of life region either through higher cost of living or lower wages, and must be compensated to live in a low quality of life region either through lower cost of living or higher wages. While these quality of life issues can have



real economic impacts, they are very difficult to reliably estimate. In the case of Kiawah River Plantation, there is certainly no reason to believe that quality of life would be significantly lowered in Charleston County, since this would lower home values and run counter to the developer's goal of earning a profit. In light of the significant amenities that are included in the design of the community, there is some reason to believe the project would increase the overall amenity value ("attractiveness") of Charleston County, but since quantifying the amenity value would be highly speculative, we have chosen to disregard the amenity aspects of the project.

With this caveat in mind, we can now explore the estimated economic impact of Kiawah River Plantation, to get some idea of the magnitude of the project's impact on the county.

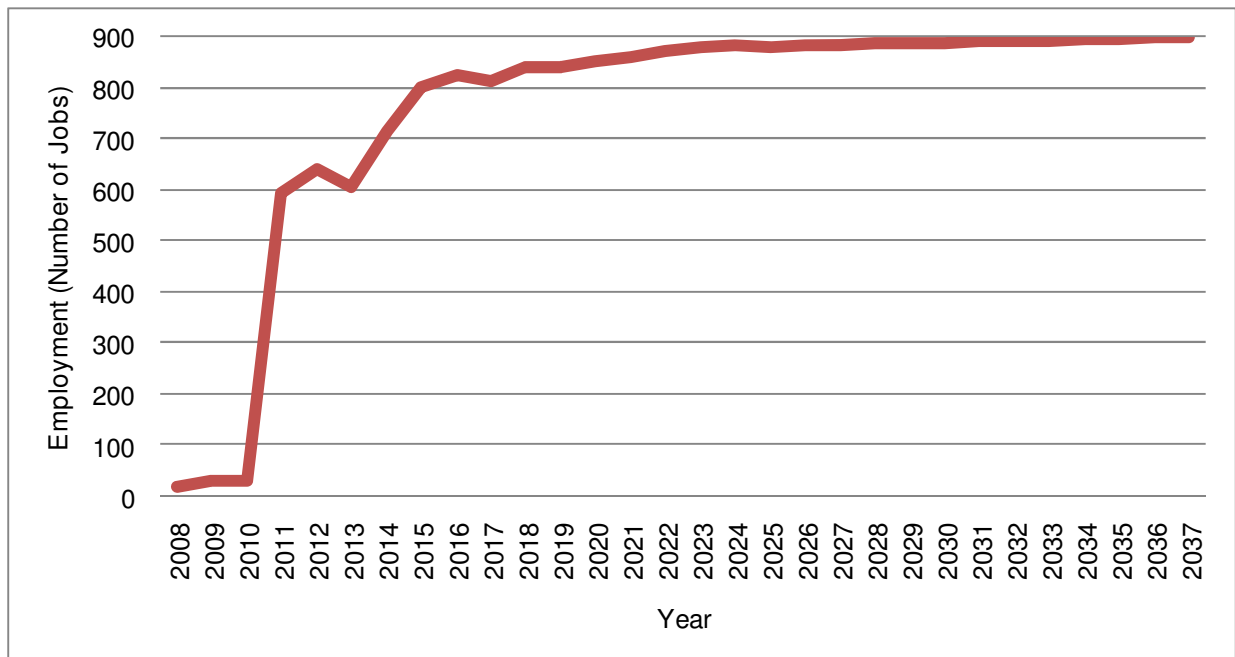
### **Estimated Economic Impact of the Kiawah River Plantation Development**

This section of the report presents the best estimate of the economic impact of the Kiawah River Plantation project on Charleston County for the 2009–2028 study period. Recall that this estimate is based upon the presumption that all Kiawah River Plantation residents are net new residents to Charleston County; that is, in the absence of Kiawah River Plantation they would choose to live somewhere other than Charleston County. The estimates outlined below were produced by comparing baseline and alternative forecasts of Charleston County, as outlined in the description of the REDYN model. These summary estimates represent the effects of Kiawah River Plantation on three key measures of the state and local economies: employment, gross regional product, and real disposable personal income.

## Employment

The initial employment impact of Kiawah River Plantation (in terms of number of jobs) on Charleston County is expected to be significant in the long run, but generating only approximately 30 jobs in the initial construction years of 2008-2010. The employment impact is projected to jump significantly as the first commercial/retail lots are filled, and to grow steadily for the remainder of the construction phase of the project, reaching just under 900 additional jobs in Charleston County as a result of the Kiawah River Plantation by 2037. The average employment impact of the Kiawah River Plantation project on Charleston County, throughout the forecast period is approximately 750 jobs. Figure 4 illustrates the estimated annual employment impact of the Kiawah River Plantation on Charleston County.

**Figure 4 - Estimated Impact of Kiawah River Plantation Development on Total Employment in Charleston County, South Carolina, 2008-2037**



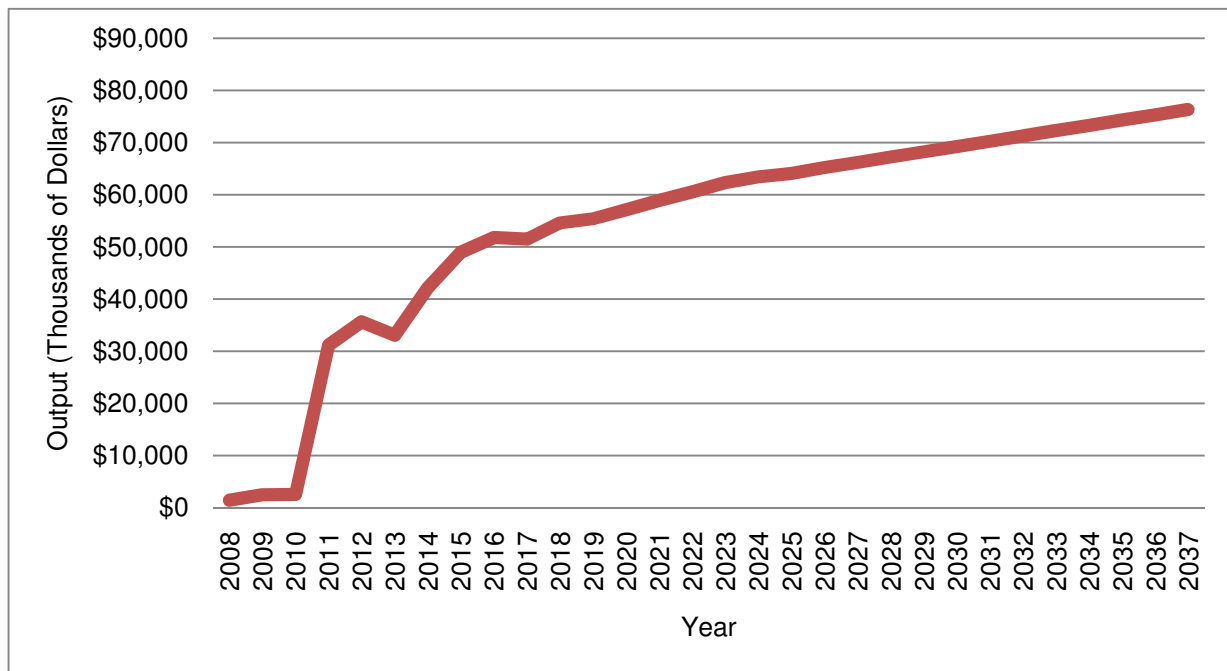
## Gross Output

Figure 5 illustrates the estimated impact of Kiawah River Plantation on total

output (that is, total gross sales) for Charleston County. As might be expected, the impact of Kiawah River Plantation on output follows very much the same pattern as the impact of the development on employment. In the first years of the project, the impact of Kiawah River Plantation on output is quite modest, increasing output for Charleston County in 2010 by \$2.6 million above what would otherwise be sold in the county. The “leakage” of construction and resident spending into neighboring counties, nearby metropolitan areas, and other regions in the model causes output increases for the state as a whole to be larger than the Charleston County impact throughout the forecast period. The impact of Kiawah River Plantation on total output in Charleston County is forecast to grow throughout the forecast period, to over \$75 million (in inflation adjusted dollars) by 2037. The average annual impact of Kiawah River Plantation on county output over the forecast period is approximately \$54 million dollars per year. For further detail, a table showing the project’s impact on annual output of the retail trade industries in Charleston County is provided in Appendix D.



**Figure 5 - Estimated Impact of Kiawah River Plantation Development on Total Output in Charleston County, South Carolina, 2008-2037**

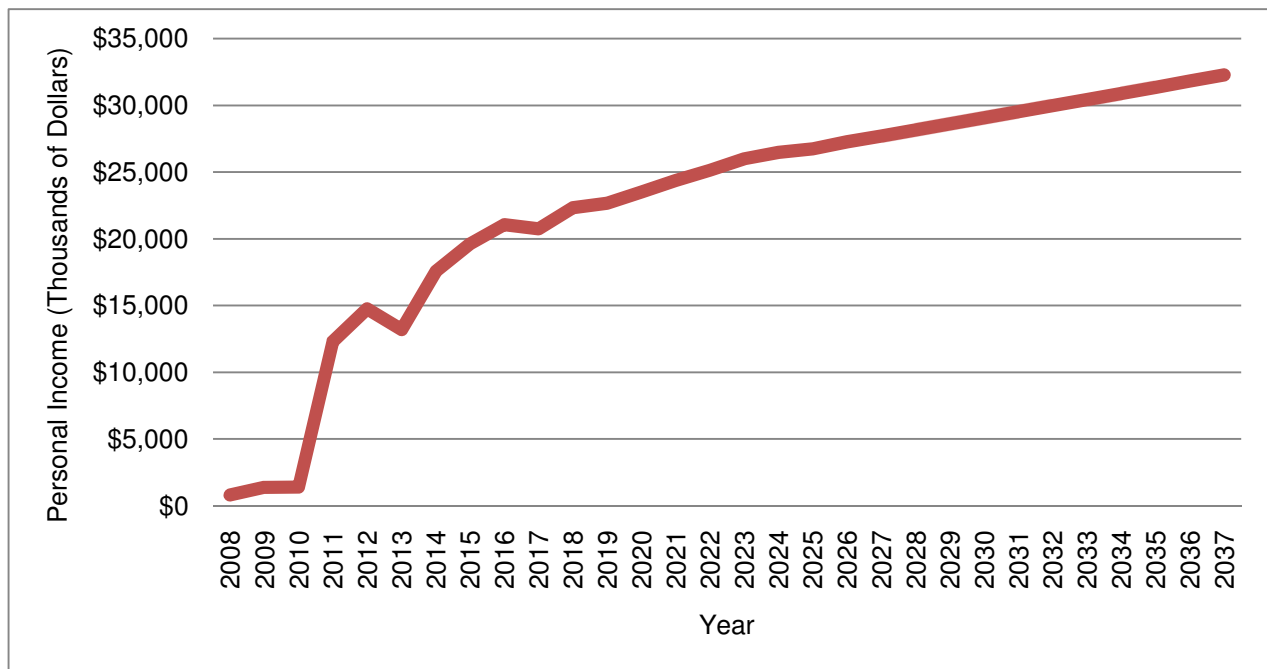


### **Real Disposable Personal Income<sup>1</sup>**

The impact of Kiawah River Plantation on total disposable (after tax) personal income in Charleston County follows a similar pattern to the employment and output impacts. The income is generated in part in the county through the additional gross sales described in the previous section. In addition, the large retirement age portion of the Kiawah River Plantation community is expected to bring significant retirement and investment income to the region. By 2037, Kiawah River Plantation is forecast to generate approximately \$32 million per year in additional disposable income for Charleston County. Figure 6 illustrates the impact of Kiawah River Plantation on personal income in Charleston County throughout the forecast period. A detailed annual table of all elements of personal income is provided in Appendix E.

<sup>1</sup> Real Disposable Personal income consists of employee compensation (wages and salaries), minus personal contributions to social insurance, minus net residence adjustment (wages moved from place of work to place of residence), plus dividends, interest and rent and transfer payments, minus taxes and adjusted for inflation.

**Figure 6 - Estimated Impact of Kiawah River Plantation Development on Total Personal Income in Charleston County, South Carolina, 2008-2037**



### **Local Government Net Fiscal Impact**

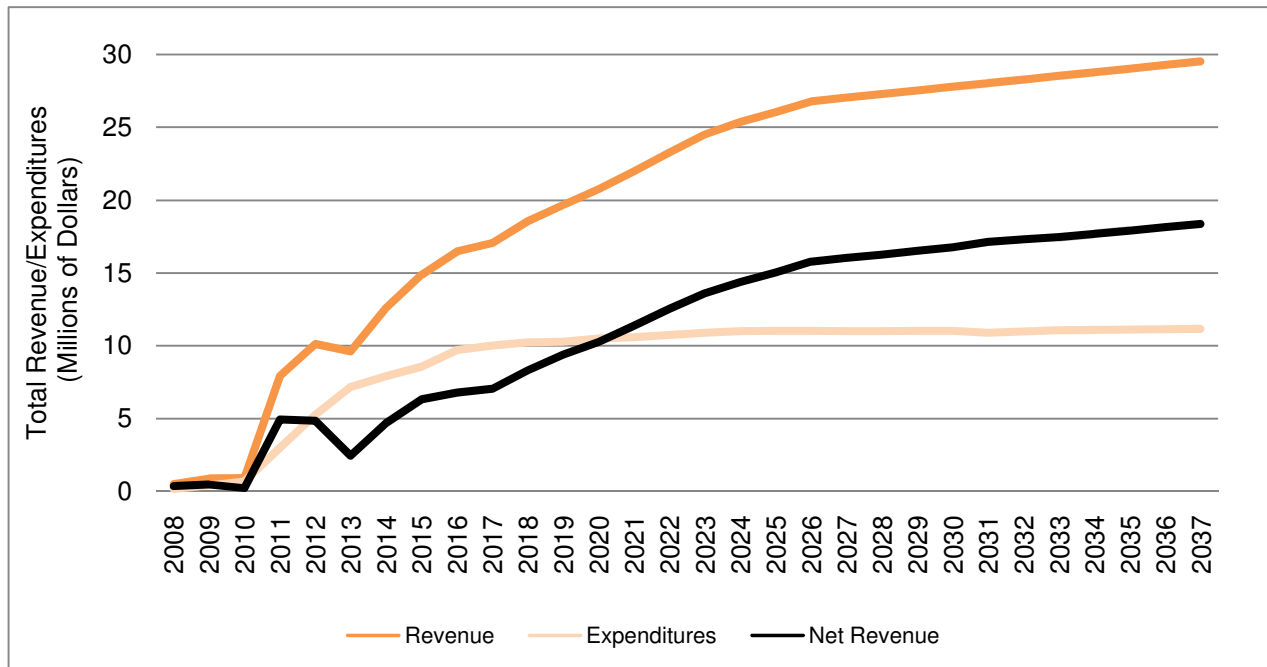
The Kiawah River Plantation project can clearly be expected to have a significant positive impact on the Charleston County economy, as measured by employment, output, total income, or any number of other measures; while careful modeling can give us a good idea of the magnitude of the impact, the direction of the impact is immediately clear even without a model. However, the net fiscal impact of such a project on Charleston County government is not at all immediately obvious. On the one hand, the development generates income and business activity in the region, which can be expected (generally) to generate additional tax revenue for the county from multiple sources. At the same time, the project can be expected to attract additional people to the region, which is expected to generate additional government expenditures required to maintain the current level of government services, but might be expected to generate

additional transfers of money from the state government as well. The net result of all of the changes in all government revenue and expenditure streams is far from clear prior to analysis.

The Regional Dynamics model uses data on local government revenue and expenditures from the federal Census of Governments (from the U.S. Census Bureau). The data set provides very comprehensive, standardized revenue and expenditure data for all government entities with taxing authority in the United States, with over 50 individual revenue and expenditure line items. The REDYN model associates each revenue stream with an associated economic/demographic variable in the model (for example, gas tax revenue is associated with total gasoline sales) to determine a rate of revenue collection, and associates each expenditure category with an appropriate economic/demographic variable (for example, primary education expenditure is associated with total population age 5-18) to determine a rate of expenditure. Once a simulation is run, the appropriate economic and demographic variables are multiplied by the calculated effective revenue and expenditure rates to determine the fiscal impact on each revenue and expenditure line item. Summing up the revenue items provides an estimate of the simulated impact on total revenue, summing up the expenditure items provides an estimate of the simulated impact on total expenditures, and subtracting the latter from the former provides an estimate of the simulated impact on net revenue. For this project, a significant adjustment to the direct property tax was included, exogenous to the model, to reflect the much higher rate of second home ownership (taxed at 6% rather than the 4% tax rate on primary residences) in the Kiawah River Plantation development than in the county as a whole.



**Figure 7 - Estimated Impact of Kiawah River Plantation Development on Charleston County Government Revenue and Expenditures, 2008-2037**



The net impact of the project on Charleston County revenue, expenditures, and net revenue is shown in Figure 7. The fiscal analysis clearly shows that the expected net fiscal impact of the project is positive and significant throughout the forecast period. Total revenue and total expenditures both grow gradually throughout the build out and sales of Kiawah River Plantation. The net fiscal impact fluctuates through 2017 as various phases of the development come on line, and then trends gradually but definitively upward through the balance of the forecast period. Once the development is fully built and occupied, the net annual fiscal impact averages approximately \$17 million per year, with total expenditures increasing by somewhat less than \$11 million per year by 2037, and total revenue increasing by just under \$30 million per year by 2037, over what would be collected in Charleston County without the project. Through the entire forecast period, the net fiscal impact averages just over \$11 million per year. A detailed table of revenue for all revenue streams is provided in Appendix F.

There are two key reasons the project is clearly revenue positive. First, the project includes significant commercial components, which are generally revenue-positive. Second, a significant portion of the development is directed toward retirees. Because these households do demand relatively little primary education services, they are associated with much lower expenditure rates than households in general.

**Figure 8 - Estimated Impact of Kiawah River Plantation Development on Charleston County Government Revenue by Category, 2008-2037**

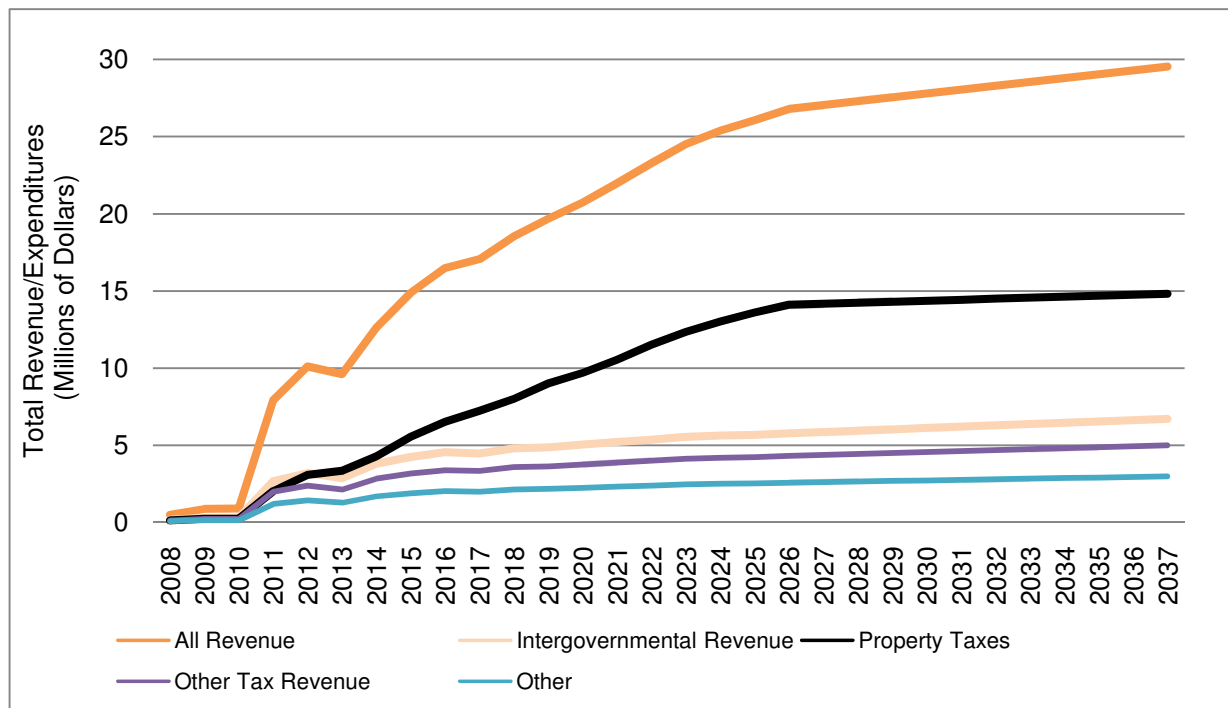


Figure 8 shows the sources of additions to county revenue that result from the Kiawah River Plantation project. As might be expected, addition to property taxes accounts for much of the increased revenue stream. The revenue expected from Kiawah River Plantation is significantly larger than might be expected from examination of the total property value being developed; this is because Kiawah River property is expected to sell largely to second home owners, and hence to be subject to the higher

second home property tax rate of 6%. However, only approximately half of the local government revenue impact is expected to come from property taxes. Other significant sources include intergovernmental transfers (additional revenue from other levels of government, largely brought in due to the county's additional population), which accounts for approximately 25% of the total impact on government revenue, and other taxes and fees, which account for approximately 20% of the total revenue impact. A comprehensive summary of revenue and expenditure impact by county, using Census of Governments revenue and expenditure categories, is available in appendix F.

### **Conclusion**

The economic impact of the Kiawah River Plantation development project is forecast to be significant for Charleston County, South Carolina, in terms of jobs generated, output, and income earned in the county and in the state as a whole. The impact of the project is forecast to grow over time for the county, and the impact is expected to last long after the Kiawah River Plantation development is completely built out in 2026. The assumption that all residents of the community are new residents to the county is clearly very pessimistic, but the economic and fiscal impact of the project is clearly positive, regardless. Indeed, for every simulation and every alternative forecast scenario conducted as part of the final analysis, the county can clearly expect a net positive economic and fiscal impact from Kiawah River Plantation, given the characteristics of the project as provided by the developers.



## **Appendix A:**

# **The Regional Dynamics Modeling System: A Multi-Sector, Multi-Year, Multi-Modal, County Level Computable Geographical Equilibrium Model of the United States Economy**

## **Introduction**

Paul Krugman (1998) expressed a hope that the new economic geography research might one day develop “‘computable geographical equilibrium’ models, which can be used to predict the effects of policy changes, technological shocks, etc. on the economy’s spatial structure in the same way that such models are currently used to predict the effects of changes in taxes and trade policy on the economy’s industrial structure.” However, he acknowledges that “preliminary efforts in this direction by several researchers, myself included, have found that such models are not at all easy to calibrate to actual data.” It is the objective of this paper to unite several different threads of economic research to develop the framework for just such a regional “computable geographic equilibrium” model of the United States economy. Key tools and concepts that will be incorporated into the model will include: input-output analysis, Social Accounting Matrices, gravity modeling, and new economic geography. The model framework that is developed is extremely simple, at least by the standards of most computable general equilibrium models, yet is capable of generating a wide range of extremely complex economic behaviors/outcomes, can model these behaviors at an extremely fine level of geographic and sectoral detail, and can be calibrated to “real world” data.

## **The Sector-Commodity Relationships in the Model: A Merged IO-SAM**

### **Framework**

The data framework for the model is based on blending the traditional input-output tables of Leontief (1941), Stone and Brown (1962), with the closely related Social Accounting Matrix (SAM) framework as formalized by Pyatt and Round (1985) based upon the earlier work of Stone that has become widely used in recent decades. The beauty of the IO framework originally developed by Leontief is its utter simplicity – each industry sells its output to itself, to other industries, or to final demanders. Therefore, on a single table, you can capture all the activity in an economy. Stone and Brown, however, observed that the Leontief IO table implicitly failed to recognize that every industry uses a mix of commodities, and that every industry makes a mix of commodities. The commodities are a necessary component to describe accurately and explicitly the system's behavior. Mathematically, under the make and use table configuration of Stone and Brown, “industries” can be interpreted as a transformation system that converts a menu of commodities and factor inputs into a menu of commodities. Generally, the Stone and Brown IO tables can be used to model industry behavior using either Leontief or Cobb-Douglas production functions. The configuration is particularly well suited to Cobb-Douglas functions because all cells can be interpreted as the constant budget share of a Cobb-Douglas production function.

However, these traditional IO tables (consisting of a “make” table that identifies total spending on each commodity by each sector in the economy, and a “use” table that identifies the total sales of each commodity by each sector in the economy) have very little to contribute when we attempt to examine or model anything beyond the

industry-commodity-industry interactions. Social Accounting Matrices attempt to address these shortcomings by explicitly introducing household, government, and capital markets, and a host of behaviors such as taxation, intergovernmental transfers, etc. The SAM framework has the advantage of being absolutely comprehensive, because every transaction type is accounted for in some cell of a SAM matrix. However, while a SAM is comprehensive from an accounting perspective (every transaction shows up in some cell in the matrix), it is not complete in an economic sense, in that each cell does not represent a unique exchange of a commodity for money, as it does in an IO make and use table. This model begins with an alternative framework that draws on the comprehensiveness of the SAM, and the simplicity and economic cohesion of the IO make and use tables. The proposed framework involves viewing the economy as a continuous process where every sector of the economy is identified according to the menu of commodities they purchase and the menus of commodities they sell. The resulting merged framework is presented in figure 1.

Figure 1: A merged SAM/IO framework for the make and use tables.

#### MAKE TABLE

<b>Commodities</b> <b>Sectors</b>	Producer Commodities	Labor	Transfer Payments	Government Goods	Financial Capital	Physical Capital	Land
Producers							
Employed Labor							
Remittance Cohorts							
Government							
Investors							
Speculators							
Land							

#### USE TABLE



<b>Sector</b> <b>Commodities</b>	Producers	Employed Labor	Remittance Cohorts	Government	Investors	Speculators	Land
Producer Commodities							
Labor							
Tran Pmts/Taxes/Fees							
Government Goods							
Financial Capital							
Physical Capital							
Land							

Note that the gray cells in the figure represent areas that are likely to contain either zeros or insignificantly small transactions.

It is now possible to merge the IO and SAM methods of conceptualizing an economy into a unified system. The unified system's row elements in the make table include all the various producer industries generally included in make tables. They also include rows for a labor sector, "remittance cohort" sector (remembering that unemployed labor, retirees, and other transfer recipients are accounted for explicitly within this sector), and government rows. Finally, the make table adds "investor" rows to produce financial capital and "speculator" rows to produce physical capital as will be described in a moment.

The unified system also adds several columns to the traditional make table. The new columns include a "labor commodity" representing the wage bill produced by the labor sector added above as a make table row; a transfer payments commodity; and federal, state and local government commodities. They also include "financial capital" columns to represent commodities (dividends, interest, and rent) produced by the investor sector through the savings process; and "physical capital" columns to represent

the residential and nonresidential capital commodity outputs of the speculator industries.

Several columns in the make table require additional discussion. A transfer payment column is added to represent the “commodity” produced by remittance cohorts such as unemployed labor and retirees. Conceptually, we are simply saying that unemployed labor and retirees are producing a commodity because the very fact that they are being compensated is evidence for the commodity itself. One might debate the wisdom or rationale behind the transfer payments, but what is beyond doubt is that unemployed labor and retirees are producing some commodity, which some entity or entities are purchasing, based upon some decision making criterion (optimizing function). This is all that matters from a modeling perspective. Similarly, additional make table columns include several government commodities, which are produced by the government “industries” rows added to the make table. Again, we will infer the presence of the commodity from the presence of the transaction (taxes). The make table also will include additional columns for residential and nonresidential physical capital, which will be the commodity produced by the speculator industries that were added as rows in the make table.

A use table can be constructed along similar lines. As with make table rows, the use table will add columns for a labor sector, remittance cohorts, government, investors, and speculators. The use table also will add rows for labor; transfer payments, government taxes, and fees; financial capital; and residential and nonresidential physical capital. The labor sector will use a mix of commodities once relegated to the use table’s final demand portion. In the same manner, remittance cohorts and

government also will use a mix of commodities from the final demand portion of the traditional use table.

The role of the proposed speculator industries deserves a brief explanation. Each speculator sector will use the mix of commodities identified in the traditional use table under investment final demand, in addition to the financial capital good, to produce the physical capital good(s) identified in the make table. The speculator sector is something of a “ghost in the machine” because it is a mechanism the model will use to insure that the presumably quite mobile financial capital commodity flows through speculator intermediaries to purchase presumably relatively immobile physical capital. As we develop an economic geography model of the United States, it is critical accurately to model where demand actually occurs, and introducing the speculator intermediary helps facilitate this. Finally, producer industries, in addition to using the commodities identified in a traditional IO table, also use labor, government, and physical capital commodities, which traditionally are identified as value added components in the use table.

Two industries receive very special treatment in the model, as they will both figure prominently in the behavioral equations and in the ultimate geographic equilibrium: the “real estate” sector (North American Industry Classification System code 531) and the “owner occupied dwellings” sector, which is not identified in the NAICS coding system, but is rather a constructed sector used in the make and use tables produced by both the Bureau of Economic Analysis (BEA) and Bureau of Labor Statistics (BLS) to guarantee compatibility with the United States national Income and Product Accounts. These industries are critical for the model, in that they include land



values, which is the one fixed geographic commodity in our model. Land, as we shall see shortly, is the only completely immobile commodity in the model, and land prices are the one factor that will invariably act to disperse economic activity. As such, the “other value added” components of these two industries are extracted, and are labeled as a separate land sector, producing a completely immobile land commodity. The only commodity used by the land sector is financial capital, specifically the rent (real or imputed) paid to landowners.

Several data sources are used to estimate county-level employment for the merged IO-SAM at the NAICS five-digit detail level (709 industries). A complete description of the process used to populate the model can be found in Tanner (2005). The primary data sources are the County Business Patterns (CBP) from the Bureau of the Census, and the Regional Economic Information System (REIS) from the Bureau of Economic Analysis (BEA). Wage Bill (payroll) data, which will populate the regional “labor sector” output in the model and also determine output for many other industries, are derived with the same techniques and from the same sources as the employment data. Specifically, the CBP reports the total annual payroll for each NAICS code up to the five-digit level of detail for the United States and for every region, state, and county. However, total employment and total payroll data are subject to suppressions for privacy. Rather than rely strictly on the various RAS and statistical systems traditionally used to fill all data suppressions, I developed a unique “range constraining” approach, which uses all information available in the CBP series and guarantees internal consistency with unsuppressed wage and employment data (Tanner 2005). All the furnished and estimated CBP wage bill and employment data are then totaled and

scaled to match the wage bill and employment data reported in the BEA's REIS, which includes all county and state wages at the two-digit NAICS level of detail and all employment data at one-digit NAICS detail. The REIS directly provides wage bill and employment data for the government and agriculture sectors, and also disposable personal income data by county.

The process used to build a complete set of historical and forecast IO-SAMs is also outlined in greater detail in Tanner (2005). Annual IO tables are constructed using BEA IO make and use tables, as well as biennial 11-year IO forecast tables from the Bureau of Labor Statistics (BLS). The very detailed BEA IO make and use tables are extended year-by-year to match the annual changes in make and use composition implied by the current 10-year BLS IO tables. This generates a detailed annual forecast series of national IO make and use tables. These national merged IO-SAM tables will serve as the US national forecast that will drive the model, and hence, some key characteristics of the resulting national merged IO-SAM make and use tables are in order. First, the national tables explicitly identify international exports of commodities by sector, and international imports of commodities by sector, for each year; these proportions are held constant across all regions in the model, so regardless of location in the US all industries of the same type will be importing the same proportion of their inputs and will be exporting the same proportion of their output. This amounts to an assumption that barriers to international trade in goods and services are sufficiently large that differences in US regional shipment of goods/services do not generate any substantial regional price differences for either imports or exports. Second, the resulting annual IO tables. Include explicit estimates of total US change in business inventories

by sector. As with imports and exports, these are held proportional in all regions in the model, so all industries of a particular type will experience the same change in business inventory, regardless of region. As such, the profitability variations between regions, which are explicitly calculated in the model, do not manifest through differences in the annual change in business inventory. Finally, with respect to the labor sector, The merged IO-SAM is denominated exclusively in terms of dollars of labor bought/sold, and is mute on the point of number of people employed, and hence does not say anything about the degree of slack in the national labor market. As the BLS IO tables that underlie the merged IO-SAM are an element of the BLS long term forecast, the roll of labor market dynamics in the forecast is implicitly imbedded in the IO data, but is not explicit. However, the regional model will explicitly estimate the “profitability” of the labor sector in every region, and as such there will be regional differences in labor market dynamics. Because the purpose of this model is primarily to estimate how total US economic activity is distributed across the 3,110 regions in the model, and because all of the behavioral equations are adapted to estimate the proportion of total economic activity in each region, any US forecast could be imbedded in the model structure without need to revise the allocation equations.

Once the National Merged IO-SAM is constructed, each county’s wage bill by sector is used to allocate each sector’s national output to counties, the BEA Regional Economic Information System (REIS) income data is used to allocate the other sectors (labor, remittance cohorts, government, and investors) to their respective counties,. and then the regional output by sector is allocated to commodities based on the national merged IO-SAM market proportions, for the years 2000 and 2001.



This assumes that the commodities produced by a sector are truly joint in the production process, as dictated by a nationally uniform production function for all firms in each industry based on competitive pressures to diffuse advantages quickly across all firms in an industry. Rather than relying upon the traditional matrix inversion technique used in most IO models (but unwieldy in a model with 3,110 interacting regions), in baseline and simulation forecasting the model will apply the national IO tables to estimate a complete multi-regional supply response to indirect and induced demand, and to exogenous final demand, in a search cycle that looks for the suppliers of suppliers across industries and regions. Each cycle in the search process starts up in every region where the gravity-based production function's previous cycle estimated a supply output response, and so on, until the process reaches a minimum incremental output cutoff point.

### **The New Economic Geography Behavioral Assumptions**

Regardless of the entity in question, in our model all will face a Dixit-Stiglitz (1977) constant elasticity of substitution (CES) nested Cobb-Douglas production function of the form:

$$\prod_{g=1}^G (\tilde{g}_{msrt})^{\theta_{\tilde{g}st}} = E_{st} + q_{msrt} \quad (1)$$

For manufacturer  $m$ , belonging to sector (industry, labor, government, etc.)  $s$ , located in region  $r$ , at time  $t$ .  $G$  represents the total number of goods in the economy.  $\tilde{g}_{msrt}$  is the quantity of composite commodity good  $\tilde{g}$  used by manufacturer  $m$ , in sector  $s$ , in region  $r$ , at time  $t$ .  $\theta_{\tilde{g}st}$  is the share of composite commodity good  $\tilde{g}$  used

in sector  $s$  at time  $t$ . Note that the production function, at any point in time, is sector and time specific, but not region or manufacturer specific.  $E_{st}$  is the fixed cost of production for sector  $i$  at time  $t$ . Finally,  $q_{msrt}$  is the total output of manufacturer  $m$ , in sector  $s$ , in region  $r$ , at time  $t$ .

This behavioral equation will apply to all sectors, regardless of the “type” of entity in the traditional sense.

Every sector also faces the traditional constant returns to scale Cobb-Douglas budget share constraint given by

$$\sum_{g=1}^G \theta_{gst} = 1 \quad (2)$$

This is completely consistent with agglomeration economies in the new economic geography framework, which is based on increasing returns at the sector level, but not at the firm level. In addition, a constant returns to scale technology is consistent with the input-output data structure used throughout the model.

Because we wish to allow for the possibility of joint production, as implied by the data structure described earlier, we must devise a mechanism for translating between sector production and commodity production. To that end, we specify:

$$q_{msrt} = \sum_{g=1}^G \vartheta_{gst} q_{gst} \quad (3)$$

Where

$$\sum_{g=1}^G \vartheta_{gst} = 1 \quad (4)$$

Where  $\vartheta_{gst}$  is the output share of good  $g$  in sector  $s$  total output, at time  $t$ . For joint production, we shall calculate the U.S. average inputs for commodity  $g$  at time  $t$ , given by:

$$\theta_{\tilde{g}gt} = \sum_{i=1}^I \left( \theta_{gst} \frac{Q_{gst}}{\sum_{i=1}^I Q_{gst}} \right) \quad (5)$$

Where  $\theta_{\tilde{g}gt}$  is the input share of commodity  $\tilde{g}$  used in the production of commodity  $g$  at time  $t$ , and  $S$  is the total number of sectors. To simplify the process of calculating prices across all regions and commodities in the model, we shall use these input shares in all price and trade calculations. Industries will only reenter the equation when we allow for sector expansion/contraction in a region in response to price changes in the various commodities across regions.

The model we are developing will not rely upon traditional iceberg costs. Instead, we will model the transportation component of the economy as an explicit subset of inputs into the Dixit-Stiglitz production function. The iceberg transportation cost assumption is so thoroughly embedded in the new economic geography literature, that it is identified by Krugman, Fujita and Venables (1999) as one of the three cornerstones of the literature. At the same time, Krugman (1998) says of iceberg transportation costs, “it’s too bad that actual transport costs look nothing like that.” Since tractability can be maintained with a more realistic transportation assumption, for this model, transportation cost will be given by:



$$\frac{P_{g\tilde{r}t}}{P_{g\tilde{r}t}} = \prod_{\delta=1}^{\Delta} \gamma_{g\delta} d_{\tilde{r}t}^{\theta_{\delta t}} \quad (6)$$

Where the left hand side of the equation,  $\frac{P_{g\tilde{r}t}}{P_{g\tilde{r}t}}$ , represents the ratio of the profit-maximizing price as delivered to region  $r$  to the profit-maximizing Ex Works (EXW, the price at the factory door before any transportation expenses) price for good  $g$ , produced in region  $\tilde{r}$ , at time  $t$ .  $\Delta$  represents the number of modes of transportation. Each mode of transportation, as mentioned earlier, is a commodity in the overall economy, hence  $\Delta \in G$ .  $d_{\tilde{r}t}$  represents the effective distance from region  $\tilde{r}$  to region  $r$  by mode  $\delta$ , at time  $t$ .  $\theta_{\delta t}$  is the share of transportation commodity  $\delta$ , used in production of commodity  $g$ , at time  $t$ , and  $\gamma_{g\delta}$  represents the unit distance cost of shipping commodity  $g$ , by mode  $\delta$ , at time  $t$ . In estimating NEG models, the concept of  $d_{\tilde{r}t}$  is often approximated inclusively by straight-line distance or an average travel time between two regions.

Under this formulation of prices, and with the CES assumption of our Dixit-Stiglitz production function, the aggregate profit maximizing behavior of producers will lead to a trade relationship for every commodity-county-county combination of:

$$T_{g\tilde{r}t} = \frac{Q_{g\tilde{r}t} \cdot P_{g\tilde{r}t}^{-\sigma_g}}{\left( \sum_{\tilde{r}=1}^R Q_{g\tilde{r}t} \cdot P_{g\tilde{r}t}^{-\sigma_g} \right)} \cdot D_{grt} \quad (7)$$

Where  $T_{g\tilde{r}t}$  represents the volume of trade in commodity  $g$ , from region  $\tilde{r}$  to region  $r$ .  $Q_{g\tilde{r}t}$  is the aggregate amount of commodity  $g$ , produced in region  $\tilde{r}$ , at time

$t$ , and  $D_{grt}$  is the aggregate demand for commodity  $g$ , in region  $r$ , at time  $t$ . Note that this is a completely traditional gravity model, in that the degree of interaction is a function of the relative size of the producer, the size of the demander, and the relative distance (shipping cost) between them. The specification encompasses any number of regions and commodities, and sheds the restrictive iceberg price assumption.

### Estimating Price Elasticities and Trade Flows in the Model

The gravity model specified above is, by design, demand constrained. If we sum across all supplier regions  $\tilde{r}$ , we discover that

$$\sum_{\tilde{r}=1}^R T_{g\tilde{r}t} = \sum_{\tilde{r}=1}^R \left( \frac{Q_{g\tilde{r}t} \cdot P_{g\tilde{r}t}^{-\sigma_g}}{\left( \sum_{\tilde{r}=1}^R Q_{g\tilde{r}t} \cdot P_{g\tilde{r}t}^{-\sigma_g} \right)} \cdot D_{grt} \right) \Rightarrow \sum_{\tilde{r}=1}^R T_{g\tilde{r}t} = D_{grt} \forall g, r, t \quad (8)$$

That is, the total trade in commodity  $g$  from all regions, terminating in region  $r$ , is equal to the total demand for good  $g$ , in region  $r$ , an accounting condition that must be true by definition.

While theoretically complete, accurate empirical estimation of the above model requires one additional step: The addition of an explicit supply constraint to insure that every region in the model sells all output. As we wish to build an applied regional economic model of the United States economy, it is necessary to guarantee that our estimation process also meets the supply constraint that

$$\sum_{r=1}^R T_{g\tilde{r}t} = Q_{g\tilde{r}t} \forall g, \tilde{r}, t \quad (9)$$

If the model captured all trade perfectly, this would not be a concern, but in the presence of error in the estimation, we must transform equation (7) into a classic, doubly constrained gravity model following the form developed by Wilson (1970, 1974):

$$T_{g\tilde{r}t} = \frac{Q_{g\tilde{r}t} \left( P_{g\tilde{r}t} \cdot \prod_{\tilde{\delta}=1}^{\Delta} (\gamma_{g\tilde{\delta}} d_{\tilde{r}t})^{\theta_{\tilde{\delta}t}} \right)^{-\sigma_g}}{\sum_{\tilde{r}=1}^R \left( Q_{g\tilde{r}t} \left( P_{g\tilde{r}t} \cdot \prod_{\tilde{\delta}=1}^{\Delta} (\gamma_{g\tilde{\delta}} d_{\tilde{r}t})^{\theta_{\tilde{\delta}t}} \right)^{-\sigma_g} \right)} \cdot D_{grt} \quad (10)$$

$$P_{g\tilde{r}t}^{-\sigma_g} = \left( \sum_{r=1}^R D_{grt} \left( B_{grt} \cdot \prod_{\tilde{\delta}=1}^{\Delta} (\gamma_{g\tilde{\delta}} d_{\tilde{r}t})^{\theta_{\tilde{\delta}t}} \right)^{-\sigma_g} \right)^{-1} \quad (11)$$

$$B_{grt}^{-\sigma_g} = \left( \sum_{\tilde{r}=1}^R Q_{g\tilde{r}t} \left( P_{g\tilde{r}t} \cdot \prod_{\tilde{\delta}=1}^{\Delta} (\gamma_{g\tilde{\delta}} d_{\tilde{r}t})^{\theta_{\tilde{\delta}t}} \right)^{-\sigma_g} \right)^{-1} \quad (12)$$

Where  $P_{g\tilde{r}t}$  is the profit maximizing price in region  $r$  of commodity  $g$ , produced in region  $\tilde{r}$ , at time  $t$ , which will drive the distance decay function in the gravity model.  $B_{grt}$  is a balancing factor that insures that all output is sold in all regions in the model; that is, that equation (11) is satisfied. As such, the model of trade flows will closely follow Alonso's (1973) General Theory of Movement, though applied to trade rather than migration, and built from an explicit microeconomic foundation.

Unfortunately, there is no reliable, comprehensive, and timely data source for regional trade flows within the United States. However, if we first difference the trade gravity equation, and are willing to make the simplifying assumption that  $B_{grt} = B_{grt-1}$  then we arrive at the following trade relationship:



$$\frac{Q_{g\tilde{r}t}}{Q_{g\tilde{r}t-1}} = \frac{\sum_{r=1}^R D_{grt} (B_{grt-1} \cdot P_{g\tilde{r}rt})^{-\sigma_g}}{\sum_{r=1}^R D_{grt-1} (B_{grt-1} \cdot P_{g\tilde{r}rt-1})^{-\sigma_g}} \quad (13)$$

Where  $Q_{g\tilde{r}t}$  and  $Q_{g\tilde{r}t-1}$  represent the total quantities of commodity  $g$  produced in region  $\tilde{r}$  at times  $t$  and  $t-1$ ,  $B_{grt-1}$  is the demand-balancing term for commodity  $g$  in region  $r$  at time  $t-1$ , and  $D_{grt-1}$  represents total quantity of commodity  $g$  demanded in region  $r$  at time  $t-1$ .  $P_{g\tilde{r}rt}$  and  $P_{g\tilde{r}rt-1}$  are the profit-maximizing prices of commodity  $g$  in region  $r$ , produced in region  $\tilde{r}$ , at times  $t$  and  $t-1$ , and  $\sigma_g$  is the elasticity of substitution between individual varieties of commodity  $g$ . Derivation of the trade relationship can be found in Tanner (2005).

The estimated share of each transportation mode devoted to the shipment of each commodity will be estimated by:

$$\theta_{g\tilde{\alpha}} = \sum_{s=1}^S \left( \theta_{\tilde{\alpha}st} \cdot \frac{\vartheta_{gst} q_{st}}{\sum_{i=1}^I \vartheta_{gst} q_{st}} \right) \quad (14)$$

Where  $S$  is the total number of industries,  $\theta_{\tilde{\alpha}st}$  is the budget share of sector  $s$  devoted to the purchase of transportation mode  $\tilde{\alpha}$  at time  $t$  (identified by the IO table for time  $t$ ),  $q_{st}$  is the total national output of sector  $s$  at time  $t$ , and  $\vartheta_{gst}$  is the share of sector  $s$  output that is commodity  $g$  at time  $t$ . This equation enables the model to estimate the budget share of commodity  $g$  that is devoted to transportation mode  $\tilde{\alpha}$  as being the average of each sector's budget share devoted to transportation mode  $\tilde{\alpha}$ ,

weighted by the sector's total share of the output of commodity  $g$ . Note that most commodities are produced almost entirely by a single sector, and hence the commodity share is determined almost entirely by the production function of that sector.

The distance variables  $d_{\tilde{\delta}rt}$ ,  $d_{\tilde{\delta}rt}$ ,  $d_{\tilde{\delta}rt-1}$ , and  $d_{\tilde{\delta}rt-1}$  are normally approximated by some inclusive straight-line distance or time measure, such that:

$$d_{\tilde{\delta}rt} = d_{\tilde{\delta}rt} = d_{\tilde{\delta}rt-1} = d_{\tilde{\delta}rt-1} = d_{\tilde{\delta}rt} = d_{\tilde{\delta}rt} = d_{\tilde{\delta}rt-1} = d_{\tilde{\delta}rt-1} \quad (15)$$

However, rather than using an inclusive straight-line distance or time measure, this model applies a unique and comprehensive database of transportation impedance measures developed by the Oak Ridge National Laboratories from impedance information for 1997 (Southworth, 1997 and Southworth, Peterson and Chin, 1998). Based on the Oak Ridge impedance database, the impedance in this model can differ between two regions both with the mode and with the direction of travel, but in the currently supported analysis,

$$d_{\tilde{\delta}rt} = d_{\tilde{\delta}rt-1} \quad (16)$$

As additional years of transportation data become available, impedance measures could be expanded to change over time, as well as with the mode and with the direction of travel.

Under the current assumptions, we can substitute the delivered price equation into our gravity equation and perform some simple algebra to get:

$$\frac{Q_{g\tilde{r}t}}{Q_{g\tilde{r}t-1}} = \frac{\sum_{r=1}^R D_{grt} \cdot \left( B_{grt} \cdot \prod_{\delta=1}^{\Delta} d_{\tilde{r}t}^{\theta_{\delta g t}} \right)^{-\sigma_g}}{\sum_{r=1}^R D_{grt-1} \cdot \left( B_{grt-1} \cdot \prod_{\delta=1}^{\Delta} d_{\tilde{r}t-1}^{\theta_{\delta g t-1}} \right)^{-\sigma_g}} \quad (17)$$

At this point we have an equation where the only unknowns are the elasticity of substitution  $\sigma_g$  and the balancing factor  $B_{grt}$ . Estimates of  $\sigma_g$  are calculated for each commodity  $g$ , using non-linear least squares. The estimation is made using data for all 3,110 regions in the U.S. database for the years 1999-2001.

Once  $\sigma_g$  has converged, we have effectively estimated the elasticities of substitution for each commodity in the model, subject to our initial condition that  $P_{g\tilde{r}t}$  and  $B_{grt}$  are 1. These EXW balancing factors  $P_{g\tilde{r}t}$  and  $B_{grt}$  are solved iteratively (of necessity, since they enter into the trade flow calculations nonlinearly), and the iterative estimation of  $P_{g\tilde{r}t}$  and  $B_{grt}$  is followed by a re-estimation of  $\sigma_g$ . The entire process is repeated until convergence is achieved.

While trade flows are calculated for every commodity in our conjoined IO/SAM framework, some restrictions and assumptions will be imposed upon the various entities in the model to capture specific behavioral limitations. Specifically:

1. No local government commodity can be shipped across county lines. This, effectively, prevents the export of local government commodities across region borders, which means that local government is paid for entirely by those entities in the region. Because this model will use counties as regions, this amounts to an assumption that local government does not cross county borders, but is provided uniformly within any given county; this is certainly a simplifying abstraction from reality, to the extent that some local government entities cross



county borders, while others may have a footprint that does not cover an entire county.

2. No state government commodity can be shipped across state borders. This has the same effect for state government as our first assumption did for local government – state government does not cross state borders, but may be transported within the state, though such shipments are subject to the explicitly estimated transportation cost for the commodity.
3. Land cannot be shipped across county borders. Recall that the land area in a region fixes the supply of the land commodities in the region. This means that any region has a fixed supply of land, and this will act as the fundamental dispersing force in the model, counteracting any tendency toward catastrophic agglomeration that might occur in the presence of transportation costs alone.

### **Creating CGE and Dynamic Adjustment Paths for the Model**

Recall from equation (6) that, under our explicit transportation cost assumption, the profit-maximizing price in region  $r$  of commodity  $g$ , produced in region  $\tilde{r}$ , at time  $t$  becomes:

$$P_{g\tilde{r}t} = P_{g\tilde{r}t} \cdot \prod_{\delta=1}^{\Delta} \gamma_{g\delta} d_{\tilde{r}rt}^{\theta_{\delta g}} \quad (18)$$

The next task is to define the vector of EXW profit-maximizing prices for all commodities manufactured in region  $\tilde{r}$  at time  $t$ :

$$P_{g\tilde{r}t} = \frac{\sigma_g}{\sigma_g - 1} \Omega_{g\tilde{r}t} \quad (19)$$

Where  $\sigma_g$  represents the elasticity of substitution between individual varieties of commodity  $g$ , and  $\Omega_{g\tilde{r}t}$  is the marginal cost function for producing commodity  $g$  in region  $\tilde{r}$  at time  $t$ .

By working within price space (rather than quantity space), as dictated by the isomorphic discovery of Robert-Nicoud (2004), the EXW marginal cost function  $\Omega_{g\tilde{r}t}$  is in turn given by:

$$\Omega_{g\tilde{r}t} = \prod_{\tilde{g}=1}^{G-\Delta} (P_{\tilde{g}rt})^{\theta_{g\tilde{g}t}} \quad (20)$$

Where  $G - \Delta$  is the number of non-transportation commodities,  $P_{\tilde{g}rt}$  is the price index of commodity  $\tilde{g}$ , in region  $r$ , at time  $t$ , and  $\theta_{g\tilde{g}t}$  is the share of commodity  $\tilde{g}$  used in production of commodity  $g$  at time  $t$ . This vastly simplifies the marginal cost functions used by others (e.g. Fan, Treyz & Treyz, 2000) in developing multi-sector NEG models.

The price index  $P_{\tilde{g}rt}$  is given by:

$$P_{\tilde{g}rt} = \sum_{\tilde{r}=1}^R \left( \frac{T_{\tilde{g}\tilde{r}rt}}{\sum_{\tilde{r}=1}^R T_{\tilde{g}\tilde{r}rt}} P_{\tilde{g}\tilde{r}rt} \right)^{\frac{\sum_{\tilde{r}=1}^R D_{\tilde{g}rt}}{\sum_{\tilde{r}=1}^R Q_{\tilde{g}\tilde{r}t}}} \quad (21)$$

Where  $R$  represents the total number of regions in the model.  $T_{\tilde{g}\tilde{r}rt}$  is the total trade in commodity  $\tilde{g}$ , originating in region  $\tilde{r}$  and sold to region  $r$ , at time  $t$ , and  $P_{\tilde{g}\tilde{r}rt}$  is the profit-maximizing price in region  $r$  of commodity  $\tilde{g}$ , produced in region  $\tilde{r}$ , at time

$t$ . The ratio of total demand in all markets,  $\sum_{r=1}^R D_{\tilde{g}rt}$  to total supply in all markets  $\sum_{\tilde{r}=1}^R Q_{\tilde{g}\tilde{r}t}$ , might seem superfluous. Remember that the national IO tables are balanced by design, and hence, this ratio should equal 1 and be irrelevant to the calculation – and indeed, for most commodities, this is the case. However, in the case of the state and local government commodities and, critically, the land commodity, markets are not national in scope, and this ratio is likely not going to be 1.

To generate our dynamic new economic geography model of the economy, it is critical that we unwrap the concept of the EXW price of good  $g$ . Within a new economic geography framework, the EXW price can be decomposed as:

$$P_{grt} = \frac{\sum_{r=1}^R D_{grt}}{\sum_{r=1}^R Q_{grt}} \cdot \prod_{\tilde{g}=1}^{G-\Delta} (P_{\tilde{g}rt})^{\theta_{\tilde{g}gt}} \cdot A_{gr} \quad (22)$$

That is, the EXW price  $P_{grt}$ , is equal to the demand to supply ratio of the commodity in the market times the production function weighted price index for all nontransportation intermediate inputs. The refinement that we must introduce at this point is the variable  $A_{gr}$ , which is the first nature production cost of commodity  $g$  in region  $r$ , and is calibrated from the EXW price equation (19). The EXW price equation (19) is correct, only if there are no location-specific price differences in production for any region, except those originating from the price of intermediate inputs. However, in the real world, regions are intrinsically heterogeneous. For example, coal mining is intrinsically more profitable in Wyoming than in Delaware, not because market access is better in Wyoming than in Delaware, but because Wyoming is intrinsically different than



Delaware – Wyoming has lots of rich coal deposits, and Delaware does not. Likewise, boat building will tend to be more profitable when there is a body of water in the region, agriculture will be more profitable for regions that have the appropriate soil, etc. In a completely homogenous world, there would be no such first nature differences, all  $A_{gr}$  values would be expected to equal 1, and the only other force driving the location decision would be market access. But with our CGE behavioral equations, and with our trade flow calculations from the previous section, we can estimate a completely new economic geography model.

For each origin region  $\tilde{r}$  and destination region  $r$ , for each good  $g$ , we calculate the delivered price equation (18) for the last history year using our calculated EXW price  $P_{g\tilde{r}t}$  from equations (19) and (20). Once we have calculated the delivered price for all regions and commodities in the last history year, we can use equation (21) to calculate the price index for every commodity and region in the last history year. Finally, the EXW price for every commodity is decomposed into its respective elements, per equation (22), specifically to calibrate the first nature differences,  $A_{gr}$ , for each good and region in the last history year. We shall assume that these first nature differences do not fluctuate over time.

Once these calculations are made, there is certainly no guarantee that profits of all industries, in all regions, will be equal. Given the monopolistic competition configuration of the model, any potential for profit will be realized in regions that can produce and deliver output at a low relative price within the various markets they serve.

As such, given the behavioral equations outlined in the previous section, we can estimate an index of relative profitability for firms in sector  $i$  in region  $r$  at time  $t$  as:

$$\pi_{srt} = \sum_{\tilde{g}=1}^G \left( \vartheta_{\tilde{g}st} \cdot \sum_{r=1}^R \left( \frac{T_{\tilde{g}\tilde{r}rt}}{\sum_{r=1}^R T_{\tilde{g}\tilde{r}rt}} \cdot \frac{P_{\tilde{g}rt}}{P_{\tilde{g}\tilde{r}rt}} \right) \right) \quad (23)$$

Where  $\pi_{srt}$  is an index of relative profitability for sector  $s$ , in region  $r$ , at time  $t$ .

At this point, we must develop an output adjustment process for the CGE model in order to recognize that the adjustment to a stable, long run equilibrium is not an instantaneous process, but rather a series of myopic steps as each sector in each region makes adjustments, over time, in response to their profitability signals. An output adjustment process is estimated by

$$\frac{Q_{s\tilde{r}t+1}}{\sum_{\tilde{r}=1}^R Q_{s\tilde{r}t+1}} = \frac{Q_{s\tilde{r}t}}{\sum_{\tilde{r}=1}^R Q_{s\tilde{r}t}} + \lambda_s \cdot \left( \sum_{\tilde{g}=1}^G \left( \vartheta_{\tilde{g}st+1} \cdot \sum_{r=1}^R \left( T_{\tilde{g}\tilde{r}rt} \cdot \frac{P_{\tilde{g}rt}}{P_{\tilde{g}\tilde{r}rt}} \right) \right) - 1 \right) \cdot \frac{Q_{s\tilde{r}t}}{\sum_{\tilde{r}=1}^R Q_{s\tilde{r}t}} \quad (24)$$

Where  $Q_{s\tilde{r}t}$  and  $Q_{s\tilde{r}t+1}$  are the quantity of output in sector  $s$ , in region  $\tilde{r}$ , at times  $t$  and  $t+1$ , respectively, and  $\lambda_s$  is the speed of adjustment of sector  $s$  to the relative profitability signal, and must be econometrically estimated.

Then, using our historical data, we can use equation (24) to calculate profitability response  $\lambda_s$  for each sector by least squares, using:

$$\frac{\frac{Q_{srt+1}}{\sum_{\tilde{r}=1}^R Q_{s\tilde{r}t+1}}}{\frac{Q_{srt}}{\sum_{\tilde{r}=1}^R Q_{s\tilde{r}t}}} = 1 + \lambda_s (\pi_{srt} - 1) \quad (25)$$

Based upon the calculated profitability  $\pi_{srt}$  and profitability response  $\lambda_s$ , we can then calculate the expected market shares for the first forecast year, and allocate supply and demand accordingly. Based upon the new allocation of supply and demand, and the estimated elasticity of substitution, we can calculate a complete and balanced set of trade flows for the first forecast year.

Then, we calculate the EXW price for each commodity, in each region, in the first forecast year, by using equation (20) and the value of  $P_{\tilde{g}rt-1}$  as an estimate of  $P_{\tilde{g}rt}$ . Using the EXW price we have just calculated, we use equation (19) to calculate the delivered price  $P_{\tilde{g}rt}$  for every good  $g$ , and for every origin region  $\tilde{r}$ , and destination region  $r$ .

Using this estimate of delivered price, we calculate the price index for each good  $g$ , and region  $r$ , in the first forecast year using equation (22). Once all price indices have been updated, we can recalculate the complete menu of EXW prices, to recalculate a complete set of delivered prices, then recalculate all price indices. This process is repeated until it converges completely. Because each iteration is capturing prices across a greater number of regions, the process necessarily converges very quickly.

With the delivered price and price index data for all regions and goods for the first forecast year, we can calculate sector  $i$  profitability for all industries in all regions, using equation (23). Based upon the calculated profitability  $\pi_{srt}$  and profitability response  $\lambda_s$ , we calculate the expected market shares for the second forecast year, and allocate supply and demand accordingly. The whole process is then repeated for each and



every year of the forecast period, to build a complete county level CGE model of the United States Economy that is consistent with the new economic geography framework.

### **Characteristics and Behavior of the Model**

Because of the switch from the SIC (Standard Industrial Classification) to NAICS (North American Industrial Classification System) system for coding industries and commodities that took place over the 1997-2000 time frame, and because the U.S. Bureau of Economic Analysis chose not to collect data in both formats for a single overlapping year, there exists no technique that will generate even a remotely useful county level time series that overlaps the two coding systems (Tanner & Hearn, 2005). Because the model we have developed ultimately is to be applied to regional planning activity, it has been built entirely in NAICS, which means that the data series cannot be extended before 1999. As such, the model is constructed using a complete historical database that covers only the years 1999-2001. The major shortcoming of this arrangement is that the model's forecasting capability cannot yet be tested against historical data; the estimation of trade flows in chapter 2 requires two years of historical data, and that leaves a measly one year of historical data that could be used to test the model. This is clearly insufficient to test a structural model. So, we are left to explore characteristics of the model forecast, while having to rely upon the integrity of the model logic, as opposed to its historical performance.

Because the model forecasts an enormous number of concepts, identifying data that will capture the overarching concepts of the New Economic Geography framework is a challenge. The challenge is intensified by the fact that the model forecasts the market share accruing to each county in every market, and hence, the U.S. aggregate

forecast tells us nothing about the nature of the regional model. Because the NEG model is fundamentally driven by market shares and the amount of land available, it seems the single metric that best captures the model behavior is “relative total sector output per acre.” That is, the total amount of output per acre in a county, relative to the total amount of output per acre in the United States. By this metric, a county with a relative total sector output per acre of 1, is producing exactly as much per acre as the U.S. as a whole. A county with a metric greater than 1 is, to some degree, a core county (a county that has experienced economic agglomeration), and a county with a metric smaller than one is, to some degree, a periphery county ( a county that has experienced economic dispersion). If the metric for a county is increasing over time, this would reflect a county that is experiencing economic agglomeration, and if the metric is decreasing over time, this would reflect a county dominated by dispersion forces, the key features of the new economic geography literature.

To provide a frame of reference, in 2002 the “most peripheral” county in the United States was the Yukon-Koyukuk Census Area in Alaska. With a relative output per acre measure of 0.00031, this region had an “economic density” that was .031% of the national average. By this same metric, the five “most peripheral” counties in the United States in 2001 were: Yukon-Koyukuk Census Area, Alaska, Lake and Peninsula Borough, Alaska, Loving County, Texas, Petroleum County, Montana, and Yakutat City and Borough, Alaska.

At the other extreme, the most economically dense (or “most core”) county in the United States was New York County, New York, with a relative economic density of 5803.38, meaning that output per acre in New York County is over 5800 times the

national average output per acre. The top five “most core” counties in the United States in 2001 were: New York County, New York, San Francisco County, California, Suffolk County, Massachusetts, the District of Columbia, and Arlington, Virginia.

Under this measure of economic density, using what we know of the new economic geography structure of the model, we can begin to picture how various counties might be forecast to behave within this structure. We would expect that periphery regions like Yukon-Koyukuk, are likely to be very stable periphery counties, and that they are likely to see little change in their economic density over time. Likewise, we might expect the “most core” regions, like New York County, will be relatively stable in their market share. Between these two extremes, we have an array of regions that might, over the forecast period, be moving toward “greater coreness” or “greater peripheriness” if they are near their so-called “break point” (the point where the benefits of economic agglomeration outweigh the costs, and economic agglomeration/dispersion occurs). And we might have yet another group of midsize regions that are losing their “coreness” or “peripheryness” as they pass the sustain point for their particular equilibrium. If we look at the behavior of these counties in the aggregate, we expect to see a number of counties that are stable within their core, periphery, or dispersed equilibrium, and some counties that, across the forecast period, will be making the transition from core or periphery. We have compared our forecast to two alternative, naïve forecasts, and we see a result that is largely as expected. The first alternative forecast assumes the county share of U.S. output to remain constant throughout the forecast period, and a second assumes that the county share of U.S. output will grow at the average annual rate exhibited in the 1999-2001 historical period.



Both of these forecasts would be expected to correspond well with the counties that do not approach a break or sustain point. The constant growth forecast is expected to perform comparatively well over the short term with counties that are in transition, but will likely perform very poorly as those counties approach their new core or periphery position. The constant share forecast will not accurately reflect the counties while they are in transition, but will not be wildly incorrect over time, as those counties approach their new equilibrium and settle into a more-or-less fixed output share. By examination of the correlation coefficients over the forecast period between our model, the constant shares model, and the constant growth model, we see results consistent with our intuition (see figure1) For the first fifteen to twenty years of the forecast period, the forecasts of county level relative output per acre are very tightly correlated among the three forecast types. The correlation of the model forecast with the constant share forecast then begins to drop off, and by the close of the forecast period, the correlation between the constant growth forecast and the NEG model forecast is virtually zero. This is consistent with the idea that counties that are experiencing share growth are in transition, and not exhibiting a permanent relative growth behavior as suggested by the naïve model.

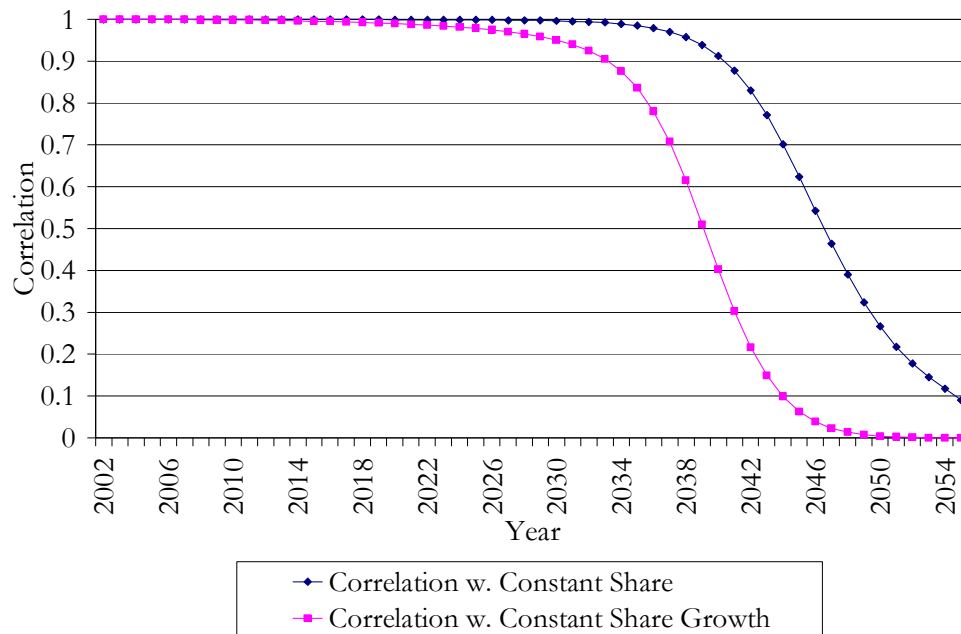


Figure 1: Correlation of the NEG model with the constant output share and constant output growth models.

The constant share forecast is much more tightly correlated with the NEG model forecast, for a much longer period of time. By the close of the forecast period, there is still approximately 9% correlation between the constant shares forecast and the NEG model forecast. Once again, this is consistent with our intuition regarding market behavior in an NEG format.

We can capture this behavior in another way, by looking at the behavior of our chosen metric, relative output per acre, within deciles. With a total of 3,110 counties, each year we divide these counties into ten groups of 311, based upon their relative output per acre. The 311 counties in the smallest decile are, in a sense, the “most peripheral,” and the 311 in the largest decile are the “most core.” Because our metric is a county aggregate, it necessarily abstracts from the more in depth model behavior,

since every sector, in every county, can have any degree of “coreness” or “peripheryness.” Nonetheless, if we expect that movement toward core and periphery solutions fundamentally drive the economy, we can expect some specific behaviors to appear in the data. In an economy moving toward increasing heterogeneity, we would expect the average growth rate in the very smallest regions to be either constant (if they are as peripheral as they can get) or shrinking, and the growth rate of the very largest regions to be, in general, either constant (if they have reached a point of maximum “coreness”) or growing. Somewhere in the middle of the distribution, we might expect to see counties that are in transition to a core position, or perhaps to a periphery position. A look at the growth rates by decile in Table 6.1 reveals some interesting patterns. First, the relative output of the smallest 311 counties is shrinking, and is shrinking slightly faster than it is for any other decile. Deciles 2 through 6 are shrinking slightly as well, though each successive decile is shrinking slightly less. The 622 regions in deciles 8 and 9 are actually growing in share of U.S. output, suggesting that they are moving toward becoming cores. The largest 311 regions, however, are exhibiting almost no growth in share of U.S. output, suggesting that the most core U.S. counties simply cannot get any more “core” than they already are. These counties are likely running into the model barrier created by land prices, which simply precludes further agglomeration.

Table 1: County relative growth in share of US output, by decile, 2002-2055.

<b>Decile</b>	<b>Average Growth Rate</b>	<b>Decile</b>	<b>Average Growth Rate</b>
Smallest	0.9814	6	0.9990



<b>Decile</b>	<b>Average Growth Rate</b>	<b>Decile</b>	<b>Average Growth Rate</b>
2	0.9883	7	0.9995
3	0.9913	8	1.0045
4	0.9923	9	1.0074
5	0.9950	Largest	1.0002

### **Agglomeration from a Homogeneous Economy**

At this point, we have evidence that the model will maintain core/periphery economies when presented with a heterogeneous economy as a starting point; in this case, we started the model with our clearly heterogeneous 2001 economy, and allowed the model to go from there. However, it is interesting to test whether the model can develop a heterogeneous economy from a completely homogeneous starting point, and what characteristics this artificial economy might have. To that end, the forecasting model was adjusted in a few fundamental ways. First, the input-output matrix, which evolves over time in the forecasting model, is “locked down” as the 2001 input-output matrix, which means that changes in production technology will not take place, so the economy is evolving toward some fixed equilibrium, rather than an equilibrium that is, itself, changing due to input-output changes. Secondly, the total US output for every sector in the model was spread evenly across every county, in proportion to each county’s share of total U.S. land area. So, a county that represents .1% of U.S. land area also was assigned .1% of total U.S. output of every sector. Thus, the model was starting from a truly dispersed “backyard capitalism” scenario.

With this starting point, a total of five alternative model specifications were built. In the first model specification, first difference values were set to 1 for all goods in all regions. That is, the model assumed that there were no first nature differences for any production activity in any region (so, coal mines, for example, could be located anywhere). Second, all impedance values, for all modes, for every region-region combination were set to 1. This means that there was also no transportation related advantage for any region in the model; any region would produce their output and sell it in every region (including their own) for the same price. All other characteristics of the model were left unchanged. This model was then allowed to run through 54 simulated years. It should come as absolutely no surprise that, under these restrictions, no agglomeration whatsoever takes place. The economy at the end of the 54 cycles remains completely homogeneous for the simple reason that, with no first nature price differences and no potential for second nature differences, there is no force to encourage any movement from the dispersed equilibrium.

For the second scenario, we reintroduce the first difference values, that were calculated for the model, but we continued to allow all goods to be shipped from any region, to any region, for the same price. This model effectively allows for first nature differences, but removes all second nature differences. When this model was allowed to cycle through 54 years, the result was spectacular agglomeration; agglomeration that is much greater than that actually seen in the U.S. economy in 2001 (as measured by the standard deviation in county output per acre). The reason for the spectacular level of agglomeration is simply that, with transportation costs not entering into the picture, all economic activity is strongly attracted to the places with the greatest first nature

advantage in production. Many activities that we intuitively know are significantly constrained by transportation (restaurants, gas stations, grocery stores) will, nonetheless, cluster in a relatively small number of counties, even if the first nature price advantage is small, simply because the transportation effect has been removed.

The next incarnation of the model again removed the first nature differences, but this time the impedance values for every mode of transportation was set to equal the straight line distance between county centroids. Internal distances for every region were set equal to the square root of the region's land area. Under this configuration, we are removing any first nature differences among regions, and allowing second nature differences, but those second nature differences use the simplifying assumption that transportation costs are simply proportional to straight line distance. When this model is allowed to continue for 54 years, it generates economic agglomerations, though the agglomerations are much more modest than those created by the first nature difference model. The agglomeration is, of course, generated strictly through the second nature differences in this model.

The next incarnation of the model was very similar, except that the straight line distances were replaced with the Oak Ridge impedance data. Therefore, this model included all transportation infrastructure data for second nature differences, but still included no information about first nature differences. Not surprisingly, this model also generated economic agglomeration over the forecast period; the agglomeration was somewhat more pronounced than that generated by the straight line distance model, but still much less than the agglomeration generated by the first nature differences themselves. The agglomeration in this model is greater than that of the straight line



distance model, simply because the transportation data is much more heterogeneous than the straight line distances. Two adjacent counties will face almost the same menu of straight line distances, and will, therefore, be almost equally preferable if that is the metric used for transportation costs. However, when a major highway, a rail line, and a port are located in one county and not the other, the difference between the two, from a profitability standpoint, becomes quite dramatic.

The final incarnation of the model included all of the transportation infrastructure data, and all of the first nature difference data. This version was simply the full model, but run on an initially homogenous distribution and with a constant IO table. This model exhibited somewhat more agglomeration than the model with transportation, but not first order differences. However, the model still showed much less agglomeration than the model of first nature differences alone.

The purpose of this experiment was not simply to look at the models compared to one another, but also to look at how the models might compare to the actual 2001 U.S. economy. We know that history matters, and that there are a near infinite number of potential equilibria in an NEG mode with this many regions and sectors. However, it seems reasonable that given the distribution of first nature differences, and given our heterogeneously distributed transportation infrastructure, we might gravitate to a similar spatial distribution of economic activity, even from very different starting points. In this case, we are taking our starting point of a homogeneous economy, with a fixed 2001 technology, and letting each of our alternative model specifications run for 54 years, to see how the resulting economy compares to the actual U.S. economy in 2001 (which obviously started from a very different starting point). Once again, we use our metric of

relative output per acre for each county, and will see whether any of our model configurations are correlated with the actual 2001 economy. The summary results are reported in Table 2.

Table 2: The degree of correlation between the distribution of economic activity in the U.S. in 2001 and the distribution of economic activity 54 years removed from a homogeneous distribution, for various model configurations.

<b>Forecast Method:</b>	<b>Correlation with 2001 Output per County:</b>
No First Nature Difference	NA
First Nature Effect Only	.0593
Distance Effect Only	.1314
Transportation Effect Only	.5727
Transportation and First Nature Effects	.6502

The model with no first or second nature differences, of course, exhibits no heterogeneity at the end of 54 years, so there is no correlation to discuss. The model with first nature differences, but no transportation had a very high degree of agglomeration, but the agglomeration is only minimally correlated with the agglomeration in the actual economy. While the first nature model might perform very well for some industries, such as mining, which are clearly driven by location specific cost factors, it tells us little about industries that are more affected by market access, rather than by first nature differences.

The models that capture transportation (and hence shipping cost) are each much more strongly correlated with the actual U.S. 2001 data. The model that imbeds impedance data (but without first nature differences) generates a correlation of over 57%. Finally, the full model, with first nature differences and transportation infrastructure, manages to endogenously generate a heterogeneous economy that is over 65% correlated with the 2001 U.S. economy. These correlations are surprisingly high, and are no doubt driven largely by the fact that transportation generates economic agglomeration, which drives economic development, so the model is capturing the correlation between level of infrastructure and the size of the economy. In this way, the model is generating results very similar to Sutton, Roberts, Elvidge, and Meij (1997). They tested the simple correlation between the light levels from nighttime satellite photos of the United States, and the county level income data for the United States. Their analysis found a correlation of 84% to 93%, which is in line with the numbers found in this analysis.

While the exercise of building these alternative models has no immediate practical application, it is certainly reassuring to note the model's ability to spontaneously agglomerate a homogeneous economy in a manner consistent with NEG theory. In examining the degree of correlation between the model and the 2001 data, it also suggests a certain degree of inevitability in the specific pattern of heterogeneity observed in the U.S. economy.

While we do not yet have a sufficient historical record against which to test the model, these results can at least reassure us that the model is behaving as we would expect, given the theory.



## Conclusions

In this paper, we have integrated concepts, theories, and data from a number of different areas into a comprehensive regional economic modeling methodology consistent with the theoretical New Economic Geography literature. The case for using this approach to develop a computable general equilibrium model appears compelling, and on that basis we believe the model takes several important steps forward in the field of applied regional economic modeling, forecasting, and impact analysis. While the model development effort has been significant, what has been built to this point only scratches the surface of what might be possible, as additional data, computing power, and theoretical work enable making increasingly simple models that can capture increasingly complex behaviors in an increasingly accurate manner.

## References

- Alonso, William. 1973. "National Interregional Demographic Accounts: A Prototype," Institute of Urban and Regional Development Monograph 17, <http://www-iurd.ced.berkeley.edu/>.
- Batten, David and David Boyce. 1986. "Spatial Interaction, Transportation, and Interregional Commodity Flow Models," in *Handbook of Regional and Urban Economics*. Peter Nijkamp, Edwin Mills, P. C. Cheshire eds. Amsterdam: North-Holland, pp. 357-406.
- Beaumont, Paul. 1990. "Supply and Demand Interaction in Integrated Econometric and Input-Output Models." *International Regional Science Review*, 13:2, pp. 167-81.
- Bröcker, Johannes. 1990. "Derivatives of Flows in a Doubly Constrained Gravity Model." *Journal of Regional Science*, 30:2, pp. 259-268.
- Ciccone, Antonio and Robert E. Hall. 1996. "Productivity and the Density of Economic Activity." *American Economic Review*, 86:1, pp. 54-70.
- Dixit, Avinash K. and Joseph E. Stiglitz. 1977. "Monopolistic Competition and Optimum Product Diversity," *American Economic Review*, 67:3, pp. 297-308.

- Fan, Wei, Frederick Treyz and George Treyz. 2000. "An Evolutionary New Economic Geography Model." *Journal of Regional Science*, 40:4, pp. 671-695.
- Fotheringham, A. Stewart. and Morton O'Kelly. 1989. *Spatial Interaction Models: Formulations and Applications*. Dordrecht: Kluwer.
- Fujita, Masahisa, Paul R. Krugman and Anthony Venables. 1999. *The Spatial Economy*. Cambridge, MA: MIT Press.
- Hewings, Geoffery, Michael Sonis and David Boyce, Eds. 2002. *Trade, Networks and Hierarchies: Modeling Regional and Interregional Economies*. Berlin: Springer.
- Jensen, Rodney. 1990. "Construction and Use of Regional Input-Output Models: Progress and Prospects." *International Regional Science Review*, 13:1, pp. 9-25.
- Krugman, Paul R. 1980. "Scale Economies, Product Differentiation and the Pattern of Trade." *American Economic Review*, 70, pp. 950-9.
- Krugman, Paul R. 1991. "Increasing Returns and Economic Geography." *Journal of Political Economy*, 99:3, pp. 483-99.
- Krugman, Paul R. 1998. "Space: The Final Frontier." *Journal of Economic Perspectives*, 12:2, pp. 161-74.
- Leontief, Wassily. 1941. *The Structure of the American Economy, 1919-1939*. New York: Oxford University Press.
- Neary, J. Peter. 2001. "Of Hype and Hyperbolas: Introducing the New Economic Geography." *Journal of Economic Literature*, 39:2, pp. 536-561.
- Pyatt, Graham and Jeffery Round. 1985. *Social Accounting Matrices: A Basis for Planning*. Washington, DC: The World Bank.
- Robert-Nicoud, Frederic. 2004. "The Structure of Simple 'New Economic Geography' Models (or, On Identical Twins)." *Journal of Economic Geography*, 4, pp. 1-34.
- Round, Jeffrey I. 2003. "Constructing SAMs for Development Policy Analysis: Lessons learned and Challenges Ahead." *Economic Systems Research*, 15:2, pp. 161-183.
- Southworth, Frank. 1997. *Development of Data and Analysis Tools in Support of a National Intermodal Network Analysis Capability*. Washington, DC: US Department of Transportation Bureau of Transportation Statistics.
- Southworth, Frank. 1998. Bruce E. Peterson and Shih-Miao Chin. 1998. *Methodology for Estimating Freight Shipment Distances for the 1997 Commodity Flow Survey*.

- Washington, DC: US Department of Transportation Bureau of Transportation Statistics.
- Stone, Richard and Alan Brown. 1962. *A Programme for Growth, vol.1: A Computable Model of Economic Growth*. London: Chapman and Hall.
- Tanner, Thomas. 2005. "Applications of New Economic Geography in Regional Economic Analysis and Forecasting." University of Georgia Dissertation.
- Tanner, Thomas C. and Will Hearn. 2005. "Economic Impact Analysis," in *The Regional Economic Development Handbook*. Robert Pittman, ed. Washington, DC: International Economic Development Council, pp. 132-165.
- Treyz, George Dan Rickman and Gang Shao. 1992. "The REMI Economic-Demographic Forecasting and Simulation Model." *International Regional Science Review*, 14:3, pp. 221-253.
- Wilson, Alan. 1970. *Entropy in Urban and Regional Modeling*. London: Pion.
- Wilson, Alan. 1974. *Urban and Regional Models in Geography and Planning*. Chichester: John Wiley.



## Appendix B:

### Annual Development Costs of the Proposed Kiawah River Plantation

#### Development in Charleston County, South Carolina

Concept (millions of dollars)	2008	2009	2010	2011	2012
Total Costs	\$4.162	\$7.240	\$7.648	\$10.950	\$16.031
-Total Direct Costs	\$ -	\$ -	\$2.506	\$3.165	\$2.635
--Total Residential Investment	\$ -	\$ -	\$2.460	\$3.165	\$2.635
---Total Single Family Lots Direct Costs	\$ -	\$ -	\$2.460	\$3.165	\$2.635
---Total Multi-Family & Cottages Direct Costs	\$ -	\$ -	\$ -	\$ -	\$ -
--Total Commercial Direct Costs	\$ -	\$ -	\$0.046	\$ -	\$ -
---Mixed Use	\$ -	\$ -	\$0.012	\$ -	\$ -
---Hotel Site	\$ -	\$ -	\$0.033	\$ -	\$ -
---Conventional Commercial	\$ -	\$ -	\$0.002	\$ -	\$ -
-Total Common Costs	\$3.767	\$6.922	\$3.135	\$1.832	\$3.723
-Total Master Plan Costs	\$0.395	\$0.230	\$0.115	\$0.105	\$0.095
-Total Amenity Costs	\$ -	\$0.088	\$1.892	\$5.848	\$9.578

Concept (millions of dollars)	2013	2014	2015	2016	2017
Total Costs	\$7.077	\$14.622	\$6.546	\$7.471	\$1.603
-Total Direct Costs	\$4.086	\$4.453	\$3.856	\$4.288	\$0.145
--Total Residential Investment	\$4.085	\$4.453	\$3.856	\$4.288	\$0.145
---Total Single Family Lots Direct Costs	\$4.085	\$4.425	\$3.810	\$4.285	\$0.145
---Total Multi-Family & Cottages Direct Costs	\$ -	\$0.028	\$0.046	\$0.003	\$ -
--Total Commercial Direct Costs	\$0.001	\$ -	\$ -	\$ -	\$ -
---Mixed Use	\$ -	\$ -	\$ -	\$ -	\$ -
---Hotel Site	\$ -	\$ -	\$ -	\$ -	\$ -
---Conventional Commercial	\$ -	\$ -	\$ -	\$ -	\$ -
-Total Common Costs	\$2.420	\$0.089	\$0.072	\$2.862	\$0.120
-Total Master Plan Costs	\$0.095	\$0.080	\$0.080	\$0.075	\$0.076
-Total Amenity Costs	\$0.476	\$10.000	\$2.538	\$0.246	\$1.262

Concept (millions of dollars)	2018	2019	2020	2021	2022
Total Costs	\$4.447	\$2.789	\$2.813	\$2.861	\$2.635
-Total Direct Costs	\$2.627	\$2.600	\$2.600	\$2.600	\$2.600
--Total Residential Investment	\$2.627	\$2.600	\$2.600	\$2.600	\$2.600
---Total Single Family Lots Direct Costs	\$2.600	\$2.600	\$2.600	\$2.600	\$2.600
---Total Multi-Family & Cottages Direct Costs	\$0.027	\$ -	\$ -	\$ -	\$ -
--Total Commercial Direct Costs	\$ -	\$ -	\$ -	\$ -	\$ -
---Mixed Use	\$ -	\$ -	\$ -	\$ -	\$ -
---Hotel Site	\$ -	\$ -	\$ -	\$ -	\$ -
---Conventional Commercial	\$ -	\$ -	\$ -	\$ -	\$ -
-Total Common Costs	\$1.280	\$0.149	\$0.125	\$0.170	\$ -
-Total Master Plan Costs	\$0.070	\$0.040	\$0.035	\$0.035	\$0.035
-Total Amenity Costs	\$0.470	\$ -	\$0.053	\$0.056	\$ -

Concept (millions of dollars)	2023	2024	2025	2026
Total Costs	\$2.635	\$1.915	\$0.395	\$0.035
-Total Direct Costs	\$2.600	\$1.880	\$0.360	\$ -
--Total Residential Investment	\$2.600	\$1.880	\$0.360	\$ -
---Total Single Family Lots Direct Costs	\$2.600	\$1.880	\$0.360	\$ -
---Total Multi-Family & Cottages Direct Costs	\$ -	\$ -	\$ -	\$ -
--Total Commercial Direct Costs	\$ -	\$ -	\$ -	\$ -
---Mixed Use	\$ -	\$ -	\$ -	\$ -
---Hotel Site	\$ -	\$ -	\$ -	\$ -
---Conventional Commercial	\$ -	\$ -	\$ -	\$ -
-Total Common Costs	\$ -	\$ -	\$ -	\$ -
-Total Master Plan Costs	\$0.035	\$0.035	\$0.035	\$0.035
-Total Amenity Costs	\$ -	\$ -	\$ -	\$ -

## Appendix C:

### Annual Sales of the Proposed Kiawah River Plantation Development in Charleston County, South Carolina

Concept (millions of dollars)	2008	2009	2010	2011	2012
Total Sales	\$ -	\$ -	\$ -	\$49.597	\$30.300
-Total Residential Investment	\$ -	\$ -	\$ -	\$27.225	\$26.900
--Total Single Family Lots Direct Costs	\$ -	\$ -	\$ -	\$27.225	\$26.900
--Total Multi-Family & Cottages Direct Costs	\$ -	\$ -	\$ -	\$ -	\$ -
-Total Commercial Direct Costs	\$ -	\$ -	\$ -	\$18.972	\$ -
--Mixed Use	\$ -	\$ -	\$ -	\$2.320	\$ -
--Hotel Site	\$ -	\$ -	\$ -	\$16.500	\$ -
--Conventional Commercial	\$ -	\$ -	\$ -	\$0.152	\$ -
-Total Golf Club & Social Memberships	\$ -	\$ -	\$ -	\$3.400	\$3.400
--Golf Memberships	\$ -	\$ -	\$ -	\$2.400	\$2.400
--Social Memberships	\$ -	\$ -	\$ -	\$1.000	\$1.000

Concept (millions of dollars)	2013	2014	2015	2016	2017
Total Sales	\$35.875	\$37.847	\$36.075	\$29.632	\$36.850
-Total Residential Investment	\$32.475	\$34.325	\$31.595	\$26.140	\$33.450
--Total Single Family Lots Direct Costs	\$32.475	\$34.325	\$27.350	\$25.900	\$32.700
--Total Multi-Family & Cottages Direct Costs	\$ -	\$ -	\$4.245	\$0.240	\$0.750
-Total Commercial Direct Costs	\$ -	\$0.122	\$1.080	\$0.092	\$ -
--Mixed Use	\$ -	\$ -	\$ -	\$ -	\$ -
--Hotel Site	\$ -	\$ -	\$ -	\$ -	\$ -
--Conventional Commercial	\$ -	\$0.122	\$1.080	\$ -	\$ -
-Total Golf Club & Social Memberships	\$3.400	\$3.400	\$3.400	\$3.400	\$3.400
--Golf Memberships	\$2.400	\$2.400	\$2.400	\$2.400	\$2.400
--Social Memberships	\$1.000	\$1.000	\$1.000	\$1.000	\$1.000

Concept (millions of dollars)	2018	2019	2020	2021	2022
Total Sales	\$37.442	\$36.725	\$29.850	\$29.450	\$34.075
-Total Residential Investment	\$34.000	\$32.275	\$26.500	\$26.100	\$30.725
--Total Single Family Lots Direct Costs	\$26.350	\$32.275	\$26.500	\$26.100	\$30.725
--Total Multi-Family & Cottages Direct Costs	\$7.650	\$ -	\$ -	\$ -	\$ -
-Total Commercial Direct Costs	\$0.092	\$1.100	\$ -	\$ -	\$ -
--Mixed Use	\$ -	\$ -	\$ -	\$ -	\$ -
--Hotel Site	\$ -	\$ -	\$ -	\$ -	\$ -
--Conventional Commercial	\$ -	\$ -	\$ -	\$ -	\$ -
-Total Golf Club & Social Memberships	\$3.350	\$3.350	\$3.350	\$3.350	\$3.350
--Golf Memberships	\$2.325	\$2.325	\$2.325	\$2.325	\$2.325
--Social Memberships	\$1.025	\$1.025	\$1.025	\$1.025	\$1.025



Concept (millions of dollars)	2023	2024	2025	2026
Total Sales	\$23.275	\$14.750	\$18.650	\$16.500
-Total Residential Investment	\$23.275	\$14.750	\$18.650	\$16.500
--Total Single Family Lots Direct Costs	\$23.275	\$14.750	\$18.650	\$16.500
--Total Multi-Family & Cottages Direct Costs	\$ -	\$ -	\$ -	\$ -
-Total Commercial Direct Costs	\$ -	\$ -	\$ -	\$ -
--Mixed Use	\$ -	\$ -	\$ -	\$ -
--Hotel Site	\$ -	\$ -	\$ -	\$ -
--Conventional Commercial	\$ -	\$ -	\$ -	\$ -
-Total Golf Club & Social Memberships	\$ -	\$ -	\$ -	\$ -
--Golf Memberships	\$ -	\$ -	\$ -	\$ -
--Social Memberships	\$ -	\$ -	\$ -	\$ -

## **Appendix D:**

### **The Estimated Economic Impact of the Proposed Kiawah River Plantation**

#### **Development on Retail Sales in Charleston County, South Carolina**

<b>Concept (millions of dollars)</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>	<b>2013</b>
Total Retail Trade Output <sup>2</sup>	\$0.681	\$1.177	\$1.145	\$15.469	\$17.910	\$18.585

<b>Concept (millions of dollars)</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>	<b>2019</b>
Total Retail Trade Output	\$23.252	\$26.893	\$30.158	\$33.755	\$35.820	\$36.539

<b>Concept (millions of dollars)</b>	<b>2020</b>	<b>2021</b>	<b>2022</b>	<b>2023</b>	<b>2024</b>	<b>2025</b>
Total Retail Trade Output	\$37.741	\$38.968	\$40.127	\$41.366	\$42.230	\$42.819

<b>Concept (millions of dollars)</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>
Total Retail Trade Output	\$43.698	\$44.491	\$45.267	\$46.044	\$46.822	\$47.600

<b>Concept (millions of dollars)</b>	<b>2032</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>	<b>2036</b>	<b>2037</b>
Total Retail Trade Output	\$48.380	\$49.160	\$49.940	\$50.722	\$51.504	\$52.287

---

<sup>2</sup> Total retail trade output is equal to the total gross sales less cost of goods sold, or total retail markup, as opposed to total gross sales

## Appendix E:

### The Estimated Economic Impact of the Proposed Kiawah River Plantation

#### Development on Personal Income in Charleston County, South Carolina

Concept (millions of dollars)	2008	2009	2010	2011	2012	2013
Disposable Income	\$0.794	\$1.376	\$1.403	\$12.313	\$14.740	\$13.187
Wage Bill by Place of Work	\$0.781	\$1.339	\$1.363	\$14.814	\$17.315	\$15.596
Personal Contributions to Social Insurance	\$0.085	\$0.145	\$0.148	\$1.605	\$1.876	\$1.690
Residence Adjustment	\$0.028	\$0.037	\$0.036	\$2.851	\$3.039	\$2.813
Wage Bill by Place of Residence	\$0.668	\$1.157	\$1.180	\$10.357	\$12.399	\$11.093
Dividends, Interest, and Rent	\$0.206	\$0.356	\$0.363	\$3.190	\$3.819	\$3.416
Taxes	\$0.080	\$0.138	\$0.141	\$1.235	\$1.478	\$1.322
Transfer Payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

Concept (millions of dollars)	2014	2015	2016	2017	2018	2019
Disposable Income	\$17.548	\$19.623	\$21.059	\$20.735	\$22.324	\$22.660
Wage Bill by Place of Work	\$20.879	\$23.263	\$24.625	\$25.165	\$26.610	\$27.070
Personal Contributions to Social Insurance	\$2.262	\$2.521	\$2.668	\$2.727	\$2.884	\$2.933
Residence Adjustment	\$3.855	\$4.236	\$4.242	\$4.996	\$4.947	\$5.075
Wage Bill by Place of Residence	\$14.761	\$16.507	\$17.714	\$17.442	\$18.779	\$19.061
Dividends, Interest, and Rent	\$4.546	\$5.084	\$5.456	\$5.372	\$5.783	\$5.870
Taxes	\$1.759	\$1.967	\$2.111	\$2.079	\$2.238	\$2.272
Transfer Payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

Concept (millions of dollars)	2020	2021	2022	2023	2024	2025
Disposable Income	\$23.497	\$24.352	\$25.133	\$25.992	\$26.478	\$26.731
Wage Bill by Place of Work	\$28.025	\$28.992	\$29.891	\$30.865	\$31.455	\$31.861
Personal Contributions to Social Insurance	\$3.037	\$3.142	\$3.239	\$3.345	\$3.409	\$3.453
Residence Adjustment	\$5.222	\$5.365	\$5.510	\$5.656	\$5.773	\$5.922
Wage Bill by Place of Residence	\$19.766	\$20.485	\$21.142	\$21.864	\$22.273	\$22.486
Dividends, Interest, and Rent	\$6.087	\$6.309	\$6.511	\$6.734	\$6.860	\$6.925
Taxes	\$2.356	\$2.442	\$2.520	\$2.606	\$2.655	\$2.680
Transfer Payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

Concept (millions of dollars)	2026	2027	2028	2029	2030	2031
Disposable Income	\$27.260	\$27.700	\$28.153	\$28.606	\$29.061	\$29.516
Wage Bill by Place of Work	\$32.502	\$33.015	\$33.568	\$34.122	\$34.677	\$35.234
Personal Contributions to Social Insurance	\$3.522	\$3.578	\$3.638	\$3.698	\$3.758	\$3.818
Residence Adjustment	\$6.050	\$6.136	\$6.248	\$6.361	\$6.474	\$6.587
Wage Bill by Place of Residence	\$22.931	\$23.301	\$23.682	\$24.064	\$24.446	\$24.829
Dividends, Interest, and Rent	\$7.062	\$7.176	\$7.293	\$7.411	\$7.529	\$7.647
Taxes	\$2.733	\$2.777	\$2.823	\$2.868	\$2.914	\$2.959
Transfer Payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -



Concept (millions of dollars)	2032	2033	2034	2035	2036	2037
Disposable Income	\$29.973	\$30.431	\$30.890	\$31.350	\$31.812	\$32.274
Wage Bill by Place of Work	\$35.792	\$36.351	\$36.912	\$37.475	\$38.039	\$38.606
Personal Contributions to Social Insurance	\$3.879	\$3.939	\$4.000	\$4.061	\$4.122	\$4.183
Residence Adjustment	\$6.700	\$6.814	\$6.928	\$7.043	\$7.158	\$7.273
Wage Bill by Place of Residence	\$25.213	\$25.598	\$25.984	\$26.371	\$26.760	\$27.149
Dividends, Interest, and Rent	\$7.765	\$7.884	\$8.002	\$8.122	\$8.241	\$8.361
Taxes	\$3.005	\$3.051	\$3.097	\$3.143	\$3.190	\$3.236
Transfer Payments	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

## **Appendix F:**

### **The Estimated Economic Impact of the Proposed Kiawah River Plantation Development on Local Government Revenue in Charleston County, South Carolina**

<b>Revenue Source (millions of dollars)</b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2011</b>	<b>2012</b>
All Revenue	\$0.515	\$0.890	\$0.906	\$7.938	\$10.123
-General revenue	\$0.462	\$0.799	\$0.813	\$7.125	\$9.151
--Intergovernmental revenue	\$0.174	\$0.301	\$0.307	\$2.687	\$3.210
---From federal government	\$0.013	\$0.023	\$0.023	\$0.202	\$0.242
---From state government	\$0.161	\$0.279	\$0.284	\$2.484	\$2.969
---From local government	\$-	\$-	\$-	\$-	\$-
--General revenue from own sources	\$0.288	\$0.498	\$0.507	\$4.438	\$5.941
---Taxes	\$0.158	\$0.273	\$0.278	\$2.433	\$3.545
----Property	\$0.133	\$0.230	\$0.234	\$2.048	\$3.085
----Sales and gross receipts	\$0.011	\$0.020	\$0.020	\$0.177	\$0.212
-----General sales	\$0.004	\$0.007	\$0.008	\$0.067	\$0.080
-----Selective sales	\$0.007	\$0.012	\$0.013	\$0.111	\$0.132
-----Motor fuel	\$-	\$-	\$-	\$-	\$-
-----Alcoholic beverage	\$-	\$-	\$-	\$-	\$-
-----Tobacco products	\$-	\$-	\$-	\$-	\$-
-----Public utilities	\$0.003	\$0.005	\$0.005	\$0.048	\$0.057
-----Other selective sales	\$0.004	\$0.007	\$0.007	\$0.063	\$0.075
----Individual income	\$-	\$-	\$-	\$-	\$-
----Corporate income	\$-	\$-	\$-	\$-	\$-
----License taxes	\$0.001	\$0.001	\$0.001	\$0.013	\$0.015
-----Motor vehicle license	\$0.001	\$0.001	\$0.001	\$0.013	\$0.015
-----Other license taxes	\$-	\$-	\$-	\$-	\$-
----Other taxes	\$0.013	\$0.022	\$0.022	\$0.195	\$0.233
--Charges and miscellaneous general revenue	\$0.130	\$0.225	\$0.229	\$2.005	\$2.396
---Current charges	\$0.097	\$0.168	\$0.171	\$1.502	\$1.795
----Education	\$0.001	\$0.002	\$0.002	\$0.013	\$0.016
-----Institutions of higher education	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000
-----School lunch sales (gross)	\$0.000	\$0.001	\$0.001	\$0.005	\$0.006
-----Other education	\$0.001	\$0.001	\$0.001	\$0.008	\$0.010
----Hospitals	\$0.062	\$0.107	\$0.109	\$0.954	\$1.139
----Highways	\$-	\$-	\$-	\$-	\$-
----Air transportation (airports)	\$0.003	\$0.005	\$0.005	\$0.042	\$0.050
----Parking facilities	\$0.001	\$0.002	\$0.002	\$0.020	\$0.024
----Sea and inland port facilities	\$-	\$-	\$-	\$-	\$-

Revenue Source (millions of dollars)	2008	2009	2010	2011	2012
----Natural resources	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000
----Parks and recreation	\$0.002	\$0.003	\$0.003	\$0.028	\$0.034
----Housing and community development	\$0.001	\$0.002	\$0.002	\$0.016	\$0.019
----Sewerage	\$0.011	\$0.020	\$0.020	\$0.174	\$0.208
----Solid waste management	\$0.006	\$0.010	\$0.010	\$0.091	\$0.109
----Other charges	\$0.011	\$0.018	\$0.019	\$0.163	\$0.195
----Miscellaneous general revenue	\$0.033	\$0.056	\$0.057	\$0.503	\$0.601
----Interest earnings	\$0.018	\$0.030	\$0.031	\$0.272	\$0.325
----Special assessments	\$0.001	\$0.002	\$0.002	\$0.017	\$0.021
----Sale of property	\$0.001	\$0.001	\$0.001	\$0.010	\$0.012
----Other general revenue	\$0.013	\$0.023	\$0.023	\$0.204	\$0.244
-Other than general revenue	\$0.053	\$0.091	\$0.093	\$0.813	\$0.972
--Utility revenue	\$0.053	\$0.091	\$0.093	\$0.814	\$0.973
---Water supply	\$0.024	\$0.042	\$0.043	\$0.374	\$0.447
---Electric power	\$0.017	\$0.030	\$0.030	\$0.267	\$0.319
---Gas supply	\$0.011	\$0.019	\$0.019	\$0.166	\$0.199
---Transit	\$0.000	\$0.001	\$0.001	\$0.007	\$0.009
--Liquor store revenue	\$-	\$-	\$-	\$-	\$-
--Insurance trust revenue	\$(0.000)	\$(0.000)	\$(0.000)	\$(0.001)	\$(0.001)
---Unemployment compensation	\$-	\$-	\$-	\$-	\$-
---Employee retirement	\$(0.000)	\$(0.000)	\$(0.000)	\$(0.001)	\$(0.001)
---Workers' compensation	\$-	\$-	\$-	\$-	\$-
---Other insurance trust revenue	\$-	\$-	\$-	\$-	\$-

Revenue Source (millions of dollars)	2013	2014	2015	2016	2017
All Revenue	\$9.628	\$12.624	\$14.891	\$16.495	\$17.068
-General revenue	\$8.760	\$11.471	\$13.605	\$15.117	\$15.714
--Intergovernmental revenue	\$2.866	\$3.807	\$4.249	\$4.551	\$4.473
---From federal government	\$0.216	\$0.287	\$0.320	\$0.343	\$0.337
---From state government	\$2.651	\$3.520	\$3.929	\$4.209	\$4.136
---From local government	\$-	\$-	\$-	\$-	\$-
--General revenue from own sources	\$5.893	\$7.664	\$9.355	\$10.566	\$11.241
---Taxes	\$3.754	\$4.823	\$6.185	\$7.169	\$7.904
----Property	\$3.343	\$4.277	\$5.575	\$6.517	\$7.262
----Sales and gross receipts	\$0.189	\$0.251	\$0.280	\$0.300	\$0.295
-----General sales	\$0.071	\$0.094	\$0.105	\$0.113	\$0.111
-----Selective sales	\$0.118	\$0.157	\$0.175	\$0.187	\$0.184
-----Motor fuel	\$-	\$-	\$-	\$-	\$-
-----Alcoholic beverage	\$-	\$-	\$-	\$-	\$-
-----Tobacco products	\$-	\$-	\$-	\$-	\$-
-----Public utilities	\$0.051	\$0.068	\$0.075	\$0.081	\$0.079
-----Other selective sales	\$0.067	\$0.089	\$0.099	\$0.107	\$0.105



Revenue Source (millions of dollars)	2013	2014	2015	2016	2017
---Individual income	\$-	\$-	\$-	\$-	\$-
---Corporate income	\$-	\$-	\$-	\$-	\$-
---License taxes	\$0.014	\$0.018	\$0.020	\$0.022	\$0.021
----Motor vehicle license	\$0.014	\$0.018	\$0.020	\$0.022	\$0.021
----Other license taxes	\$-	\$-	\$-	\$-	\$-
---Other taxes	\$0.208	\$0.277	\$0.309	\$0.331	\$0.325
--Charges and miscellaneous general revenue	\$2.139	\$2.841	\$3.171	\$3.396	\$3.338
---Current charges	\$1.602	\$2.128	\$2.375	\$2.544	\$2.500
----Education	\$0.014	\$0.019	\$0.021	\$0.023	\$0.022
-----Institutions of higher education	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000
-----School lunch sales (gross)	\$0.005	\$0.007	\$0.008	\$0.009	\$0.009
-----Other education	\$0.009	\$0.012	\$0.013	\$0.014	\$0.014
----Hospitals	\$1.017	\$1.351	\$1.508	\$1.615	\$1.587
----Highways	\$-	\$-	\$-	\$-	\$-
----Air transportation (airports)	\$0.045	\$0.060	\$0.067	\$0.071	\$0.070
----Parking facilities	\$0.022	\$0.029	\$0.032	\$0.034	\$0.034
----Sea and inland port facilities	\$-	\$-	\$-	\$-	\$-
----Natural resources	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000
----Parks and recreation	\$0.030	\$0.040	\$0.045	\$0.048	\$0.047
----Housing and community development	\$0.017	\$0.023	\$0.025	\$0.027	\$0.027
----Sewerage	\$0.186	\$0.247	\$0.275	\$0.295	\$0.290
----Solid waste management	\$0.097	\$0.129	\$0.144	\$0.154	\$0.152
----Other charges	\$0.174	\$0.231	\$0.258	\$0.276	\$0.271
---Miscellaneous general revenue	\$0.537	\$0.713	\$0.796	\$0.852	\$0.837
---Interest earnings	\$0.290	\$0.385	\$0.430	\$0.460	\$0.452
----Special assessments	\$0.019	\$0.025	\$0.028	\$0.030	\$0.029
----Sale of property	\$0.010	\$0.014	\$0.016	\$0.017	\$0.016
----Other general revenue	\$0.218	\$0.289	\$0.323	\$0.346	\$0.340
-Other than general revenue	\$0.868	\$1.153	\$1.286	\$1.378	\$1.354
--Utility revenue	\$0.869	\$1.153	\$1.287	\$1.379	\$1.355
---Water supply	\$0.399	\$0.530	\$0.591	\$0.633	\$0.622
---Electric power	\$0.284	\$0.378	\$0.422	\$0.452	\$0.444
---Gas supply	\$0.177	\$0.236	\$0.263	\$0.282	\$0.277
---Transit	\$0.008	\$0.010	\$0.012	\$0.012	\$0.012
--Liquor store revenue	\$-	\$-	\$-	\$-	\$-
--Insurance trust revenue	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)
---Unemployment compensation	\$-	\$-	\$-	\$-	\$-
---Employee retirement	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)
---Workers' compensation	\$-	\$-	\$-	\$-	\$-
---Other insurance trust revenue	\$-	\$-	\$-	\$-	\$-

Revenue Source (millions of dollars)	2018	2019	2020	2021	2022
All Revenue	\$18.554	\$19.687	\$20.752	\$21.981	\$23.293
-General revenue	\$17.099	\$18.213	\$19.226	\$20.402	\$21.667
--Intergovernmental revenue	\$4.807	\$4.870	\$5.040	\$5.213	\$5.371
---From federal government	\$0.362	\$0.367	\$0.380	\$0.393	\$0.405
---From state government	\$4.445	\$4.503	\$4.660	\$4.821	\$4.966
---From local government	\$-	\$-	\$-	\$-	\$-
--General revenue from own sources	\$12.293	\$13.343	\$14.186	\$15.189	\$16.296
---Taxes	\$8.706	\$9.709	\$10.425	\$11.298	\$12.289
----Property	\$8.017	\$9.011	\$9.702	\$10.551	\$11.519
----Sales and gross receipts	\$0.317	\$0.321	\$0.332	\$0.344	\$0.354
-----General sales	\$0.119	\$0.121	\$0.125	\$0.129	\$0.133
-----Selective sales	\$0.198	\$0.200	\$0.207	\$0.215	\$0.221
-----Motor fuel	\$-	\$-	\$-	\$-	\$-
-----Alcoholic beverage	\$-	\$-	\$-	\$-	\$-
-----Tobacco products	\$-	\$-	\$-	\$-	\$-
-----Public utilities	\$0.085	\$0.086	\$0.089	\$0.092	\$0.095
-----Other selective sales	\$0.113	\$0.114	\$0.118	\$0.122	\$0.126
----Individual income	\$-	\$-	\$-	\$-	\$-
----Corporate income	\$-	\$-	\$-	\$-	\$-
----License taxes	\$0.023	\$0.023	\$0.024	\$0.025	\$0.026
----Motor vehicle license	\$0.023	\$0.023	\$0.024	\$0.025	\$0.026
----Other license taxes	\$-	\$-	\$-	\$-	\$-
----Other taxes	\$0.349	\$0.354	\$0.366	\$0.379	\$0.390
--Charges and miscellaneous general revenue	\$3.587	\$3.634	\$3.761	\$3.890	\$4.008
---Current charges	\$2.687	\$2.722	\$2.817	\$2.914	\$3.002
----Education	\$0.024	\$0.024	\$0.025	\$0.026	\$0.027
-----Institutions of higher education	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000
-----School lunch sales (gross)	\$0.009	\$0.009	\$0.010	\$0.010	\$0.010
-----Other education	\$0.015	\$0.015	\$0.015	\$0.016	\$0.016
-----Hospitals	\$1.706	\$1.728	\$1.789	\$1.850	\$1.906
-----Highways	\$-	\$-	\$-	\$-	\$-
-----Air transportation (airports)	\$0.075	\$0.076	\$0.079	\$0.082	\$0.084
-----Parking facilities	\$0.036	\$0.037	\$0.038	\$0.040	\$0.041
-----Sea and inland port facilities	\$-	\$-	\$-	\$-	\$-
-----Natural resources	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000
-----Parks and recreation	\$0.051	\$0.051	\$0.053	\$0.055	\$0.056
-----Housing and community development	\$0.029	\$0.029	\$0.030	\$0.031	\$0.032
-----Sewerage	\$0.311	\$0.316	\$0.327	\$0.338	\$0.348
-----Solid waste management	\$0.163	\$0.165	\$0.171	\$0.177	\$0.182
-----Other charges	\$0.292	\$0.295	\$0.306	\$0.316	\$0.326
---Miscellaneous general revenue	\$0.900	\$0.912	\$0.944	\$0.976	\$1.006
-----Interest earnings	\$0.486	\$0.492	\$0.510	\$0.527	\$0.543

Revenue Source (millions of dollars)	2018	2019	2020	2021	2022
----Special assessments	\$0.031	\$0.032	\$0.033	\$0.034	\$0.035
----Sale of property	\$0.018	\$0.018	\$0.018	\$0.019	\$0.020
----Other general revenue	\$0.365	\$0.370	\$0.383	\$0.396	\$0.408
-Other than general revenue	\$1.455	\$1.474	\$1.526	\$1.578	\$1.626
--Utility revenue	\$1.456	\$1.475	\$1.527	\$1.580	\$1.627
---Water supply	\$0.669	\$0.678	\$0.701	\$0.725	\$0.747
---Electric power	\$0.477	\$0.483	\$0.500	\$0.517	\$0.533
---Gas supply	\$0.297	\$0.301	\$0.312	\$0.323	\$0.332
---Transit	\$0.013	\$0.013	\$0.014	\$0.014	\$0.015
--Liquor store revenue	\$-	\$-	\$-	\$-	\$-
--Insurance trust revenue	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)
---Unemployment compensation	\$-	\$-	\$-	\$-	\$-
---Employee retirement	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)
---Workers' compensation	\$-	\$-	\$-	\$-	\$-
---Other insurance trust revenue	\$-	\$-	\$-	\$-	\$-

Revenue Source (millions of dollars)	2023	2024	2025	2026	2027
All Revenue	\$24.517	\$25.382	\$26.065	\$26.797	\$27.041
-General revenue	\$22.838	\$23.675	\$24.345	\$25.047	\$25.266
--Intergovernmental revenue	\$5.544	\$5.637	\$5.680	\$5.782	\$5.864
---From federal government	\$0.418	\$0.425	\$0.428	\$0.435	\$0.442
---From state government	\$5.126	\$5.212	\$5.252	\$5.346	\$5.423
---From local government	\$-	\$-	\$-	\$-	\$-
--General revenue from own sources	\$17.295	\$18.038	\$18.665	\$19.265	\$19.401
---Taxes	\$13.158	\$13.831	\$14.426	\$14.951	\$15.025
----Property	\$12.363	\$13.023	\$13.612	\$14.121	\$14.184
----Sales and gross receipts	\$0.365	\$0.372	\$0.374	\$0.381	\$0.387
-----General sales	\$0.137	\$0.140	\$0.141	\$0.143	\$0.145
-----Selective sales	\$0.228	\$0.232	\$0.234	\$0.238	\$0.241
-----Motor fuel	\$-	\$-	\$-	\$-	\$-
-----Alcoholic beverage	\$-	\$-	\$-	\$-	\$-
-----Tobacco products	\$-	\$-	\$-	\$-	\$-
-----Public utilities	\$0.098	\$0.100	\$0.101	\$0.103	\$0.104
-----Other selective sales	\$0.130	\$0.132	\$0.133	\$0.135	\$0.137
----Individual income	\$-	\$-	\$-	\$-	\$-
----Corporate income	\$-	\$-	\$-	\$-	\$-
----License taxes	\$0.026	\$0.027	\$0.027	\$0.028	\$0.028
-----Motor vehicle license	\$0.026	\$0.027	\$0.027	\$0.028	\$0.028
-----Other license taxes	\$-	\$-	\$-	\$-	\$-
----Other taxes	\$0.403	\$0.410	\$0.413	\$0.420	\$0.426
---Charges and miscellaneous general revenue	\$4.137	\$4.206	\$4.239	\$4.315	\$4.376
----Current charges	\$3.099	\$3.151	\$3.175	\$3.232	\$3.278



Revenue Source (millions of dollars)	2023	2024	2025	2026	2027
-----Education	\$0.028	\$0.028	\$0.028	\$0.029	\$0.029
-----Institutions of higher education	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000
-----School lunch sales (gross)	\$0.011	\$0.011	\$0.011	\$0.011	\$0.011
-----Other education	\$0.017	\$0.017	\$0.017	\$0.018	\$0.018
-----Hospitals	\$1.967	\$2.001	\$2.016	\$2.052	\$2.081
-----Highways	\$-	\$-	\$-	\$-	\$-
-----Air transportation (airports)	\$0.087	\$0.088	\$0.089	\$0.091	\$0.092
-----Parking facilities	\$0.042	\$0.043	\$0.043	\$0.044	\$0.044
-----Sea and inland port facilities	\$-	\$-	\$-	\$-	\$-
-----Natural resources	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000
-----Parks and recreation	\$0.058	\$0.059	\$0.060	\$0.061	\$0.062
-----Housing and community development	\$0.033	\$0.034	\$0.034	\$0.035	\$0.035
-----Sewerage	\$0.359	\$0.365	\$0.368	\$0.375	\$0.380
-----Solid waste management	\$0.188	\$0.191	\$0.193	\$0.196	\$0.199
-----Other charges	\$0.336	\$0.342	\$0.344	\$0.351	\$0.356
-----Miscellaneous general revenue	\$1.038	\$1.055	\$1.063	\$1.083	\$1.098
-----Interest earnings	\$0.561	\$0.570	\$0.574	\$0.585	\$0.593
-----Special assessments	\$0.036	\$0.037	\$0.037	\$0.037	\$0.038
-----Sale of property	\$0.020	\$0.021	\$0.021	\$0.021	\$0.021
-----Other general revenue	\$0.421	\$0.428	\$0.432	\$0.439	\$0.446
-Other than general revenue	\$1.678	\$1.707	\$1.720	\$1.751	\$1.776
--Utility revenue	\$1.680	\$1.708	\$1.721	\$1.752	\$1.777
---Water supply	\$0.771	\$0.784	\$0.790	\$0.804	\$0.816
---Electric power	\$0.550	\$0.559	\$0.564	\$0.574	\$0.582
---Gas supply	\$0.343	\$0.349	\$0.351	\$0.358	\$0.363
---Transit	\$0.015	\$0.015	\$0.015	\$0.016	\$0.016
--Liquor store revenue	\$-	\$-	\$-	\$-	\$-
--Insurance trust revenue	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)
---Unemployment compensation	\$-	\$-	\$-	\$-	\$-
---Employee retirement	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)
---Workers' compensation	\$-	\$-	\$-	\$-	\$-
---Other insurance trust revenue	\$-	\$-	\$-	\$-	\$-

Revenue Source (millions of dollars)	2028	2029	2030	2031	2032
All Revenue	\$27.292	\$27.542	\$27.792	\$28.042	\$28.292
-General revenue	\$25.491	\$25.715	\$25.940	\$26.164	\$26.388
--Intergovernmental revenue	\$5.949	\$6.034	\$6.119	\$6.203	\$6.288
---From federal government	\$0.448	\$0.454	\$0.461	\$0.467	\$0.474
---From state government	\$5.501	\$5.579	\$5.658	\$5.736	\$5.814
---From local government	\$-	\$-	\$-	\$-	\$-
--General revenue from own sources	\$19.541	\$19.681	\$19.821	\$19.961	\$20.100
---Taxes	\$15.102	\$15.179	\$15.255	\$15.332	\$15.408

Revenue Source (millions of dollars)	2028	2029	2030	2031	2032
----Property	\$14.249	\$14.314	\$14.378	\$14.442	\$14.507
----Sales and gross receipts	\$0.392	\$0.398	\$0.403	\$0.409	\$0.414
-----General sales	\$0.147	\$0.149	\$0.152	\$0.154	\$0.156
-----Selective sales	\$0.245	\$0.248	\$0.252	\$0.255	\$0.259
-----Motor fuel	\$-	\$-	\$-	\$-	\$-
-----Alcoholic beverage	\$-	\$-	\$-	\$-	\$-
-----Tobacco products	\$-	\$-	\$-	\$-	\$-
-----Public utilities	\$0.106	\$0.107	\$0.109	\$0.110	\$0.112
-----Other selective sales	\$0.139	\$0.141	\$0.143	\$0.145	\$0.147
----Individual income	\$-	\$-	\$-	\$-	\$-
----Corporate income	\$-	\$-	\$-	\$-	\$-
----License taxes	\$0.028	\$0.029	\$0.029	\$0.030	\$0.030
----Motor vehicle license	\$0.028	\$0.029	\$0.029	\$0.030	\$0.030
----Other license taxes	\$-	\$-	\$-	\$-	\$-
----Other taxes	\$0.433	\$0.439	\$0.445	\$0.451	\$0.457
---Charges and miscellaneous general revenue	\$4.439	\$4.503	\$4.566	\$4.629	\$4.692
---Current charges	\$3.326	\$3.373	\$3.420	\$3.467	\$3.515
-----Education	\$0.030	\$0.030	\$0.031	\$0.031	\$0.031
-----Institutions of higher education	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000
-----School lunch sales (gross)	\$0.011	\$0.012	\$0.012	\$0.012	\$0.012
-----Other education	\$0.018	\$0.018	\$0.019	\$0.019	\$0.019
-----Hospitals	\$2.111	\$2.141	\$2.171	\$2.201	\$2.231
-----Highways	\$-	\$-	\$-	\$-	\$-
-----Air transportation (airports)	\$0.093	\$0.095	\$0.096	\$0.097	\$0.099
-----Parking facilities	\$0.045	\$0.046	\$0.046	\$0.047	\$0.048
-----Sea and inland port facilities	\$-	\$-	\$-	\$-	\$-
-----Natural resources	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000
-----Parks and recreation	\$0.063	\$0.063	\$0.064	\$0.065	\$0.066
-----Housing and community development	\$0.036	\$0.036	\$0.037	\$0.037	\$0.038
-----Sewerage	\$0.385	\$0.391	\$0.396	\$0.402	\$0.407
-----Solid waste management	\$0.202	\$0.205	\$0.207	\$0.210	\$0.213
-----Other charges	\$0.361	\$0.366	\$0.371	\$0.376	\$0.381
---Miscellaneous general revenue	\$1.114	\$1.130	\$1.146	\$1.161	\$1.177
-----Interest earnings	\$0.602	\$0.610	\$0.619	\$0.627	\$0.636
-----Special assessments	\$0.039	\$0.039	\$0.040	\$0.040	\$0.041
-----Sale of property	\$0.022	\$0.022	\$0.022	\$0.023	\$0.023
-----Other general revenue	\$0.452	\$0.458	\$0.465	\$0.471	\$0.478
-Other than general revenue	\$1.801	\$1.827	\$1.852	\$1.878	\$1.904
--Utility revenue	\$1.803	\$1.828	\$1.854	\$1.879	\$1.905
---Water supply	\$0.828	\$0.840	\$0.851	\$0.863	\$0.875
---Electric power	\$0.590	\$0.599	\$0.607	\$0.616	\$0.624
---Gas supply	\$0.368	\$0.373	\$0.379	\$0.384	\$0.389

Revenue Source (millions of dollars)	2028	2029	2030	2031	2032
---Transit	\$0.016	\$0.016	\$0.017	\$0.017	\$0.017
--Liquor store revenue	\$-	\$-	\$-	\$-	\$-
--Insurance trust revenue	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)
---Unemployment compensation	\$-	\$-	\$-	\$-	\$-
---Employee retirement	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)
---Workers' compensation	\$-	\$-	\$-	\$-	\$-
---Other insurance trust revenue	\$-	\$-	\$-	\$-	\$-

Revenue Source (millions of dollars)	2033	2034	2035	2036	2037
All Revenue	\$28.541	\$28.790	\$29.039	\$29.289	\$29.538
-General revenue	\$26.612	\$26.835	\$27.059	\$27.283	\$27.506
--Intergovernmental revenue	\$6.372	\$6.456	\$6.541	\$6.625	\$6.709
---From federal government	\$0.480	\$0.486	\$0.493	\$0.499	\$0.505
---From state government	\$5.892	\$5.970	\$6.048	\$6.126	\$6.204
---From local government	\$-	\$-	\$-	\$-	\$-
--General revenue from own sources	\$20.240	\$20.379	\$20.518	\$20.658	\$20.797
---Taxes	\$15.485	\$15.561	\$15.638	\$15.714	\$15.790
----Property	\$14.571	\$14.635	\$14.700	\$14.764	\$14.828
----Sales and gross receipts	\$0.420	\$0.426	\$0.431	\$0.437	\$0.442
-----General sales	\$0.158	\$0.160	\$0.162	\$0.164	\$0.166
-----Selective sales	\$0.262	\$0.266	\$0.269	\$0.273	\$0.276
-----Motor fuel	\$-	\$-	\$-	\$-	\$-
-----Alcoholic beverage	\$-	\$-	\$-	\$-	\$-
-----Tobacco products	\$-	\$-	\$-	\$-	\$-
-----Public utilities	\$0.113	\$0.115	\$0.116	\$0.118	\$0.119
-----Other selective sales	\$0.149	\$0.151	\$0.153	\$0.155	\$0.157
----Individual income	\$-	\$-	\$-	\$-	\$-
----Corporate income	\$-	\$-	\$-	\$-	\$-
----License taxes	\$0.030	\$0.031	\$0.031	\$0.032	\$0.032
-----Motor vehicle license	\$0.030	\$0.031	\$0.031	\$0.032	\$0.032
-----Other license taxes	\$-	\$-	\$-	\$-	\$-
----Other taxes	\$0.463	\$0.469	\$0.476	\$0.482	\$0.488
--Charges and miscellaneous general revenue	\$4.755	\$4.818	\$4.881	\$4.944	\$5.007
----Current charges	\$3.562	\$3.609	\$3.656	\$3.703	\$3.750
-----Education	\$0.032	\$0.032	\$0.033	\$0.033	\$0.033
-----Institutions of higher education	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000
-----School lunch sales (gross)	\$0.012	\$0.012	\$0.013	\$0.013	\$0.013
-----Other education	\$0.019	\$0.020	\$0.020	\$0.020	\$0.021
-----Hospitals	\$2.261	\$2.291	\$2.321	\$2.351	\$2.381
-----Highways	\$-	\$-	\$-	\$-	\$-
-----Air transportation (airports)	\$0.100	\$0.101	\$0.103	\$0.104	\$0.105
-----Parking facilities	\$0.048	\$0.049	\$0.050	\$0.050	\$0.051



Revenue Source (millions of dollars)	2033	2034	2035	2036	2037
-----Sea and inland port facilities	\$-	\$-	\$-	\$-	\$-
-----Natural resources	\$0.000	\$0.000	\$0.000	\$0.000	\$0.000
-----Parks and recreation	\$0.067	\$0.068	\$0.069	\$0.070	\$0.071
-----Housing and community development	\$0.038	\$0.039	\$0.039	\$0.040	\$0.040
-----Sewerage	\$0.413	\$0.418	\$0.424	\$0.429	\$0.435
-----Solid waste management	\$0.216	\$0.219	\$0.222	\$0.225	\$0.228
-----Other charges	\$0.386	\$0.392	\$0.397	\$0.402	\$0.407
-----Miscellaneous general revenue	\$1.193	\$1.209	\$1.225	\$1.240	\$1.256
-----Interest earnings	\$0.644	\$0.653	\$0.661	\$0.670	\$0.678
-----Special assessments	\$0.041	\$0.042	\$0.042	\$0.043	\$0.044
-----Sale of property	\$0.023	\$0.024	\$0.024	\$0.024	\$0.024
-----Other general revenue	\$0.484	\$0.491	\$0.497	\$0.503	\$0.510
-Other than general revenue	\$1.929	\$1.955	\$1.980	\$2.006	\$2.031
--Utility revenue	\$1.931	\$1.956	\$1.982	\$2.007	\$2.033
---Water supply	\$0.887	\$0.898	\$0.910	\$0.922	\$0.934
---Electric power	\$0.632	\$0.641	\$0.649	\$0.658	\$0.666
---Gas supply	\$0.394	\$0.399	\$0.405	\$0.410	\$0.415
---Transit	\$0.017	\$0.018	\$0.018	\$0.018	\$0.018
--Liquor store revenue	\$-	\$-	\$-	\$-	\$-
--Insurance trust revenue	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)
---Unemployment compensation	\$-	\$-	\$-	\$-	\$-
---Employee retirement	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)	\$(0.001)
---Workers' compensation	\$-	\$-	\$-	\$-	\$-
---Other insurance trust revenue	\$-	\$-	\$-	\$-	\$-

**THE FISCAL IMPACT OF  
KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY**

**PREPARED FOR**

**KIAWAH RIVER PLANTATION, L.P.  
CHARLESTON, SC**

**PREPARED BY**

**MILEY, GALLO & ASSOCIATES, LLC  
COLUMBIA, SOUTH CAROLINA**



**DECEMBER 18, 2009**

**FISCAL IMPACTS OF KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY**

**TABLE OF CONTENTS**

<b>1.</b>	<b>EXECUTIVE SUMMARY .....</b>	<b>1</b>
<b>2.</b>	<b>INTRODUCTION .....</b>	<b>3</b>
<b>3.</b>	<b>FISCAL IMPACT ON CHARLESTON COUNTY .....</b>	<b>5</b>
<b>4.</b>	<b>FISCAL IMPACT ON CHARLESTON COUNTY SCHOOLS .....</b>	<b>10</b>
<b>5.</b>	<b>FISCAL IMPACT ON ST JOHNS FIRE DISTRICT .....</b>	<b>15</b>
<b>6.</b>	<b>SUMMARY .....</b>	<b>17</b>
	<b>METHODOLOGY .....</b>	<b>22</b>
	<b>APPENDIX .....</b>	<b>28</b>



## **FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY**

### **EXECUTIVE SUMMARY**

This study analyzes the projected revenues and expenditures which will be generated by Kiawah River Plantation during the build-out of the project and in subsequent years. The projected County expenditures include, among other things, a project list compiled from various department agencies and provided to the property owner by the County on December 7, 2009.

The study confirms that the expected revenues generated from the project are more than sufficient to cover the projected expenditures (including those items included in the referenced project list) of the County, the school district and other impacted governmental agencies during the build-out of the project. This study further confirms that the surplus to the County and other governmental agencies evaluated herein will be maintained throughout the build-out of the project. In other words, the project will more than pay for itself.

The Kiawah River Plantation project will increase the total tax base in Charleston County by more than \$1.3 billion by the time the project is completed. This \$1.3 billion includes an increase of \$1.2 billion in the residential tax base and approximately \$150 million in the commercial and retail tax base. Over the 20-year buildout period, the project generates a positive surplus of revenues over costs of \$111.5 million. After the initial 20-year period, the positive surplus increases each year by about \$10 million per year and is estimated to be approximately \$160 million by the 25<sup>th</sup> year.

The project is expected to produce total tax revenues of approximately \$147.4 million and about \$35.9 million in total operating and capital expenditures over the 20-year period. The project will generate property taxes and other revenues for Charleston County general fund of more than \$30.1 million over this 20-year period. The costs of services to the County will also increase during this period. It is estimated that the cost of services will total almost \$20.3 million over this period.

## FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY

As outlined in this analysis, it is clear that the Kiawah River Plantation project will have a positive net fiscal impact on Charleston County government operations. Over the 20-year period, the net fiscal benefits (Revenues minus Costs) to the County general fund are estimated to total almost \$9.9 million. This net fiscal benefit is considered to be a conservative one. While the cost estimate is for all County services, this net surplus is based upon property tax revenue and only a portion of other County revenue sources. The revenue estimate does not include significant other revenue the County will receive such as, business personal property taxes, accommodation taxes and other revenues.

Kiawah River Plantation will generate a net surplus to the Charleston County School District of \$81.4 million once the project is built out. The annual net benefit, from property taxes alone, will be more than \$8.1 million at the project's build out.

Kiawah River Plantation will generate a net surplus to the St. Johns Fire District of more than \$11.0 million once the project is built out. The annual net benefit, from property taxes alone, will be more than \$1.0 million in the 20<sup>th</sup> year.



## **FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY**

### **INTRODUCTION**

This analysis evaluates the fiscal benefits of The Beach Company's proposed Kiawah River Plantation development on Johns Island on Charleston County's government, the Charleston County School District (CCSD) and the St. Johns Fire District. The study is intended to provide these governments with information that will facilitate the evaluation of the developments' projected impact on the community. This information will also help the County, CCSD and the St. Johns Fire District plan for changes in the demand for services that will occur over the project's buildout.

Kiawah River Plantation expects the buildout of the project to take up to twenty years to complete, dependent upon market conditions. This 20-year time period has been adopted for the purpose of this analysis. Some components will be completed within the next few years while others will be completed in latter years. However, regardless of Kiawah River Plantation's plans, unanticipated fluctuations in the national, international, state, and local economies can cause variations in the actual buildout schedule planned by Kiawah River Plantation. Substantial changes in market conditions and their impact on the buildout schedule planned by Kiawah River Plantation might alter the projected benefits and costs outlined in this analysis.

### **PROJECT DESCRIPTION**

Kiawah River Plantation is planned as a mixed-use development with residential and commercial components. The master plan on the following pages includes a variety of mixed-use communities with residential, recreational, commercial and hotel components. In total, build out of the completed project would include up to 1,285 residential units (1,168 single family units and 117 workforce units). In addition, the project will include approximately 80,000 square feet of office/commercial/retail space. It is anticipated that the residential units will build out within 20 years with annual unit construction of about 60 units. Commercial and retail space is assumed to be built out over a 15-year period with approximately 8,000 square feet completed per year. There are 450 hotel rooms planned for the project that are anticipated to be built within the first 10 years.



FISCAL IMPACTS OF KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY

**Table 1**

**Kiawah River Plantation  
Major Development Components**

<b>Residential Units</b>	<b>1,168</b>
<b>Workforce Units</b>	<b><u>117</u></b>
<b>Total Residential Units</b>	<b>1,285 Units</b>
<b>Commercial/Retail</b>	<b>80,000 sf</b>
<b>Hotels</b>	<b>450 rooms</b>
<b>Golf Course/Club House</b>	<b>1 Course</b>

## **FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY**

### **FISCAL IMPACTS ON CHARLESTON COUNTY GENERAL FUND**

#### **REVENUE IMPACTS**

The impacts of the Kiawah River Plantation project on the property tax revenues of Charleston County government are outlined in this section.

The primary revenues generated by the Kiawah River Plantation project will be from property taxes. In FY 2009-10, the County generated approximately 31.4% of total operating funds from property taxes (\$101.7 mil/\$324.5 mil). In that same year, the County generated 47.3% of General Fund Revenues from property taxes. (Property taxes were \$74.9 million and total General Funds in FY 2009-10 totaled \$158.3 million.)

In addition to property taxes, the residents and economic activity in the County generated approximately \$83.6 million (\$238 per capita) in other General Fund revenues in the form of fees, licenses, fines, intergovernmental transfers, etc. Likewise, the construction and ongoing activities and residents in Kiawah River Plantation will generate additional General Fund revenues in addition to property taxes. To be conservative, it is assumed in this analysis that the residents at Kiawah River Plantation generate only \$198 per capita (\$436 per household) of additional General Fund revenues. Over the 20-year period these revenues total approximately \$5.2 million.

The estimated revenues from property taxes and other revenues from all components of the project generated over the 20-year period are provided in Table 2a. Annual Charleston County revenues grow from about \$41,000 in Year 1 to more than \$2.6 million a year in the 20th year – and total more than \$24.8 million over the 20-year period (after deductions are made for the LOST credit of .00071). Total revenues from all sources and property taxes total \$30.1 million over the 20-year period.

The residential property values in the Kiawah River Plantation project are expected to increase by \$1.2 billion at buildout. The commercial and retail property values in the Kiawah River Plantation project are expected to increase by \$144.6 million at buildout for a total increase in property values in the County of over \$1.3 billion. Assessed values will increase by almost \$90 million by the project's buildout.

As seen in Table 3, the Kiawah River Plantation project will generate a net benefit of more than \$13.0 million for the County over the period (more detail estimates are included in the Appendix).

**FISCAL IMPACTS OF KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY**

**Table 2a**  
**Kiawah River Plantation**  
**Charleston County Fiscal Impacts**  
**Revenues**

<b>Year</b>	<b>County Property Tax Revenues</b>	<b>LOST Credit (0.00071)</b>	<b>County Property Tax Revenues Net of LOST Credit</b>	<b>Other County GOF* Revenues**</b>	<b>Total County GOF* Revenues</b>
1	\$61,024	\$19,759	\$41,264	\$0	\$41,264
2	\$183,901	\$58,957	\$124,944	\$33,569	\$158,513
3	\$379,662	\$118,133	\$261,529	\$55,368	\$316,897
4	\$508,264	\$157,356	\$350,908	\$80,654	\$431,562
5	\$665,376	\$203,966	\$461,410	\$117,275	\$578,685
6	\$818,649	\$249,137	\$569,512	\$143,869	\$713,381
7	\$1,027,957	\$308,355	\$719,601	\$165,232	\$884,833
8	\$1,188,943	\$353,587	\$835,356	\$190,518	\$1,025,874
9	\$1,399,463	\$411,561	\$987,901	\$217,112	\$1,205,013
10	\$1,673,722	\$486,791	\$1,186,931	\$255,041	\$1,441,972
11	\$1,809,064	\$521,558	\$1,287,507	\$280,327	\$1,567,834
12	\$1,962,905	\$560,672	\$1,402,233	\$305,177	\$1,707,410
13	\$2,107,719	\$596,645	\$1,511,075	\$333,515	\$1,844,590
14	\$2,335,103	\$654,453	\$1,680,650	\$359,673	\$2,040,323
15	\$2,575,860	\$715,468	\$1,860,393	\$393,242	\$2,253,635
16	\$2,798,027	\$769,962	\$2,028,065	\$426,812	\$2,454,877
17	\$2,904,842	\$791,732	\$2,113,110	\$441,199	\$2,554,309
18	\$3,125,661	\$844,163	\$2,281,498	\$472,152	\$2,753,650
19	\$3,377,627	\$903,909	\$2,473,717	\$507,466	\$2,981,183
20	\$3,594,119	\$952,675	\$2,641,444	\$541,907	\$3,183,351
<b>Totals</b>	<b>\$34,497,888</b>	<b>\$9,678,840</b>	<b>\$24,819,048</b>	<b>\$5,320,108</b>	<b>\$30,139,156</b>

\* GOF = General Operating Fund  
\*\* Other Revenues: Vehicle taxes, fines, fees, forfeitures, licenses, LOST rebate



## **FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY**

### **EXPENDITURE IMPACTS – OPERATING**

Along with the revenue impacts generated by the Kiawah River Plantation project, there will be increased demands on Charleston County to meet the needs of the residents of the development. This section of the report describes the Kiawah River Plantation project's impacts on the expenditures required of the County government to meet those needs. The expenditure analysis assumes the existing levels of service currently provided by Charleston County will be provided to all citizens and businesses in the Kiawah River Plantation development.

The analysis estimates the additional costs of the services to the County on a per capita basis for all major departments funded from General Fund Revenues. Based on discussions with the County, these services are delineated into three cost components: All Other services, Sheriff Department Law Enforcement, and EMS services. Together these three cost components comprise all County services funded from the County's General Fund. Table 2b highlights estimates of the annual costs at existing service levels to the County for the 20-year period for these three components. The "All Other" component costs are for all departments funded through the General Fund, including General Government, Judicial, Public Safety, Public Works, Debt Service, etc., except for Law Enforcement and EMS.<sup>1</sup>

All Other per capita costs are calculated from the County's FY2009-10 budget and are estimated to be \$198 per person (\$436 per household). Based on data from the Sheriff's Department, it is assumed that the department will need to add an additional deputy every three years at an annual cost of \$125,493 per deputy. EMS services are assumed to be equal to the current level of service in the County and are estimated to be \$34 per capita (\$76 per household).

It is estimated that the Kiawah River Plantation project will result in the County's cost of services to increase by approximately \$131,000 in Year 1 and increase to \$1.8 million per year in the 20<sup>th</sup> year – totaling \$20.3 million over the 20-year period.

### **EXPENDITURE IMPACTS – CAPITAL COSTS**

The Kiawah Island Plantation will also require certain capital expenditures by the County, Fire District and the developer. The capital costs of the County are included in with other capital costs in a later section of this report that summarizes all capital costs for all jurisdictions.

---

<sup>1</sup> All other services includes costs identified by the County such as costs in the Assessor's office, Environmental Management and Consolidated Dispatch.

**FISCAL IMPACTS OF KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY**

**Table 2b**  
**Kiawah River Plantation**  
**Charleston County Fiscal Impacts**  
**Operating Costs**

<b>Year</b>	<b>County GOF* Operating Costs All Other</b>	<b>County Operating Costs Sheriff Dept</b>	<b>County Operating Costs EMS</b>	<b>Total County GOF* Operating Costs</b>
1	\$0	\$125,493	\$5,828	\$131,321
2	\$66,024	\$125,493	\$9,612	\$201,129
3	\$108,897	\$125,493	\$14,001	\$248,391
4	\$158,629	\$250,986	\$20,358	\$429,974
5	\$230,656	\$250,986	\$24,975	\$506,617
6	\$282,961	\$250,986	\$28,683	\$562,630
7	\$324,976	\$376,480	\$33,073	\$734,528
8	\$374,708	\$376,480	\$37,690	\$788,878
9	\$427,013	\$376,480	\$44,274	\$847,767
10	\$501,612	\$501,973	\$48,663	\$1,052,248
11	\$551,344	\$501,973	\$52,977	\$1,106,294
12	\$600,219	\$501,973	\$57,897	\$1,160,089
13	\$655,954	\$627,466	\$62,438	\$1,345,858
14	\$707,401	\$627,466	\$68,265	\$1,403,132
15	\$773,425	\$627,466	\$74,093	\$1,474,984
16	\$839,450	\$627,466	\$76,590	\$1,543,506
17	\$867,746	\$627,466	\$81,963	\$1,577,175
18	\$928,625	\$627,466	\$88,094	\$1,644,185
19	\$998,079	\$627,466	\$94,073	\$1,719,618
20	\$1,065,818	\$627,466	\$97,251	\$1,790,535
<b>Totals</b>	<b>\$10,463,538</b>	<b>\$8,784,524</b>	<b>\$1,020,797</b>	<b>\$20,268,859</b>

\* GOF = General Operating Fund

**NET FISCAL IMPACTS ON CHARLESTON COUNTY**

**FISCAL IMPACTS OF KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY**

As seen in Table 3, it is estimated that once Kiawah River Plantation is completed as anticipated, it will result in Charleston County realizing a net fiscal surplus of \$1.4 million per year in the 20th year. As seen in Table 3, it is estimated that once Kiawah River Plantation is completed as anticipated, it will result in Charleston County realizing a net fiscal surplus of \$9.9 million during the 20-year period.

**Table 3**

**Net Fiscal Impacts -- Charleston County**

**20-Year Cumulative Totals**

<b>Year</b>	<b>Total County GOF* Revenues</b>	<b>Total County GOF* Operating Costs</b>	<b>Total County GOF* Surplus/Deficit</b>
1	\$41,264	\$131,321	-\$90,056
2	\$158,513	\$201,129	-\$42,616
3	\$316,897	\$248,391	\$68,506
4	\$431,562	\$429,974	\$1,588
5	\$578,685	\$506,617	\$72,068
6	\$713,381	\$562,630	\$150,751
7	\$884,833	\$734,528	\$150,304
8	\$1,025,874	\$788,878	\$236,996
9	\$1,205,013	\$847,767	\$357,246
10	\$1,441,972	\$1,052,248	\$389,724
11	\$1,567,834	\$1,106,294	\$461,539
12	\$1,707,410	\$1,160,089	\$547,321
13	\$1,844,590	\$1,345,858	\$498,732
14	\$2,040,323	\$1,403,132	\$637,191
15	\$2,253,635	\$1,474,984	\$778,651
16	\$2,454,877	\$1,543,506	\$911,371
17	\$2,554,309	\$1,577,175	\$977,134
18	\$2,753,650	\$1,644,185	\$1,109,466
19	\$2,981,183	\$1,719,618	\$1,261,566
20	\$3,183,351	\$1,790,535	\$1,392,816
<b>Totals</b>	<b>\$30,139,156</b>	<b>\$20,268,859</b>	<b>\$9,870,297</b>

\* GOF = General Operating Fund



## **FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY**

### **FISCAL IMPACTS ON CHARLESTON COUNTY SCHOOL DISTRICT**

#### **REVENUE IMPACTS - OPERATING**

The impacts of the Kiawah River Plantation project on the operating revenues of the Charleston County School District are outlined in this section. The primary School District revenues generated by the Kiawah River Plantation project will be from property taxes on non-owner occupied residential units and commercial properties. These estimates do not include any state sales taxes that would be generated from the development of the project or the expenditures by the permanent residents in the residential communities once they are completed.

The estimated operating revenues from property taxes on all components of the project generated over the 20-years are provided in Table 4. Annual School District Operating revenues grow from about \$120,000 in Year 1 to over \$6.0 million a year in the 20th year and total \$61.8 million for the 20-year period. (Twenty-five percent of the residential units are assumed to be owner occupied and therefore exempt from any school operating taxes.)

#### **EXPENDITURE IMPACTS – OPERATING**

Along with the substantial revenue impacts generated by the Kiawah River Plantation project, there will be relatively small increased demands on the Charleston County School District to meet the needs of the children of residents in the developments. This section of the report describes the Kiawah River Plantation project's impacts on the operating expenditures required of the Charleston County School District to meet those needs. The residential components of the Kiawah River Plantation communities will include 1,168 new dwelling units and 117 workforce units. The development is planned to be similar in scope and nature to the Kiawah Island and Seabrook communities. Based on the latest Census data available, the student generation rates (SGR) for these two communities are 0.019 and 0.013, respectively. In this analysis it is assumed that Kiawah River Plantation's SGR will be similar to the higher of these and is 0.019 per dwelling unit for the 1,168 units and 0.245 per workforce unit<sup>2</sup>. Based on a SGR of 0.019 and 0.245, respectively, it is estimated that 50 new students will be generated by Kiawah River Plantation and attend school in the District by the 20<sup>th</sup> year. The estimated cumulative increase in school enrollment is also shown in Table 4.

---

<sup>2</sup> The SGR for the entire Charleston District is estimated to be 0.245.

**FISCAL IMPACTS OF KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY**

**Table 4  
Kiawah River Plantation  
Estimated Fiscal Impacts - Operating  
Charleston County School District**

<b>Year</b>	<b>Cumulative Student Enrollment</b>	<b>School Operating Costs (\$7,500/pp)*</b>	<b>School Operating Property Tax Revenues</b>	<b>Net School Operating Property Tax Revenues</b>
1	0	\$0	\$119,861	\$119,861
2	1	\$10,973	\$357,638	\$346,666
3	2	\$18,098	\$770,708	\$752,610
4	4	\$26,363	\$1,008,639	\$982,276
5	11	\$79,013	\$1,307,206	\$1,228,194
6	12	\$87,705	\$1,581,215	\$1,493,510
7	13	\$94,688	\$1,988,891	\$1,894,204
8	14	\$102,953	\$2,269,728	\$2,166,775
9	15	\$111,645	\$2,653,709	\$2,542,064
10	24	\$178,283	\$3,151,564	\$2,973,282
11	25	\$186,548	\$3,362,461	\$3,175,914
12	26	\$194,670	\$3,606,192	\$3,411,522
13	27	\$203,933	\$3,824,404	\$3,620,471
14	28	\$212,483	\$4,195,263	\$3,982,781
15	37	\$277,695	\$4,570,549	\$4,292,854
16	38	\$288,668	\$4,907,579	\$4,618,911
17	39	\$293,370	\$5,039,635	\$4,746,265
18	40	\$303,488	\$5,357,688	\$5,054,200
19	42	\$315,030	\$5,720,111	\$5,405,081
20	50	\$375,443	\$6,020,610	\$5,645,168
<b>Totals</b>		<b>\$3,361,043</b>	<b>\$61,813,652</b>	<b>\$58,452,609</b>

\* pp = Per Pupil costs from local sources

## **FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY**

The current district-wide per pupil expenditure that is required from local sources is estimated to be \$4,467.<sup>3</sup> However, based on discussions with the CCSD staff, \$7,500 per pupil may be more appropriate for the Johns Island area and therefore is assumed in this analysis. Based on this per pupil cost from local sources and the estimated new enrollment, it is estimated that operating expenditures will increase for the District from about \$11,000 in Year 2 to over \$375,000 per year at the time of buildout. As seen in Table 4, total operating expenditures over the 20-year period to serve these students are estimated to total about \$3.4 million.

### **REVENUE IMPACTS – CAPITAL CAPACITY**

The Charleston County School District generates revenues for capital projects from debt service millage on all property classes. Property tax revenues for debt service on all components of the Kiawah River Plantation project are estimated to be about \$42,000 in Year 1 and increase to \$2.5 million per year in year 20 and total over \$24.0 million over the 20-year period.

### **EXPENDITURE IMPACTS – CAPITAL CAPACITY**

Capital costs for the District may increase to accommodate new students. However, given the relatively small number of new students generated per year and over the entire 20-year period, there may be no capital costs associated with the new students generated by Kiawah River Plantation. However, even at an estimated capital cost of \$20,000 per student, the total capital cost for the 50 new students is about \$1,000,000. Given that the debt service revenues generated by the project are almost \$24 million, it is assumed that the net benefit to District will be positive (see Table 5).

---

<sup>3</sup> The total cost per pupil is much higher. However, only \$4,467 is required from local sources. The balance of the cost is provided from state and federal sources. .



**FISCAL IMPACTS OF KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY**

**Table 5**

**Kiawah River Plantation  
Estimated Fiscal Impacts - Capital  
Charleston County School District**

<b>School Debt Service Property Tax Revenues</b>	
<b>Year</b>	
<b>1</b>	<b>\$42,352</b>
<b>2</b>	<b>\$127,633</b>
<b>3</b>	<b>\$263,497</b>
<b>4</b>	<b>\$352,751</b>
<b>5</b>	<b>\$462,014</b>
<b>6</b>	<b>\$568,392</b>
<b>7</b>	<b>\$713,660</b>
<b>8</b>	<b>\$825,392</b>
<b>9</b>	<b>\$971,501</b>
<b>10</b>	<b>\$1,162,160</b>
<b>11</b>	<b>\$1,256,097</b>
<b>12</b>	<b>\$1,362,872</b>
<b>13</b>	<b>\$1,463,384</b>
<b>14</b>	<b>\$1,621,200</b>
<b>15</b>	<b>\$1,788,627</b>
<b>16</b>	<b>\$1,942,827</b>
<b>17</b>	<b>\$2,016,969</b>
<b>18</b>	<b>\$2,170,233</b>
<b>19</b>	<b>\$2,345,113</b>
<b>20</b>	<b>\$2,495,688</b>
<b>Totals</b>	<b>\$23,952,360</b>

**FISCAL IMPACTS OF KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY**

**NET FISCAL IMPACTS ON THE CHARLESTON COUNTY SCHOOL DISTRICT**

It is estimated that the Kiawah River Plantation project will result in the Charleston County School District realizing a net fiscal surplus (operating and capital). The net positive benefits to the District's budget are estimated to total more than \$81 million over the 20-year period. As seen in Table 6, Kiawah River Plantation will result in substantial net benefits in operating and capital revenues for the school district over the 20-year period.

**Table 6**  
**Charleston County School District**  
**20-Year Cumulative Totals**

	<u>Operating</u>	<u>Capital</u>	<u>Total</u>
<b>Revenues</b>	<b>\$ 61.8 M</b>	<b>\$ 24.0 M</b>	<b>\$ 85.8 M</b>
<b>Expenditures</b>	<b><u>\$ 3.4 M</u></b>	<b><u>\$ 1.0 M</u></b>	<b><u>\$ 4.4 M</u></b>
<b>Net Benefit</b>	<b>\$ 58.4 M</b>	<b>\$ 23.0 M</b>	<b>\$ 81.4 M</b>

M = Million

Totals may not add due to rounding

## **FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY**

### **FISCAL IMPACTS ON ST JOHNS FIRE DISTRICT**

#### **REVENUE IMPACTS - OPERATING**

The impacts of the Kiawah River Plantation project on the operating revenues of the St. Johns Fire District are outlined in this section. The primary Fire District revenues generated by the Kiawah River Plantation project will be from property taxes on residential units and commercial properties. Property tax revenues for operating purposes on all components of the Kiawah River Plantation project are estimated to be about \$31,000 in Year 1 and increase to \$1.8 million per year in year 20 and total over \$17.3 million over the 20-year period.

Property tax revenues for debt service on all components of the Kiawah River Plantation project are estimated to be about \$3,500 in Year 1 and increase to \$200,000 per year in year 20 and total almost 2.0 million over the 20-year period.

#### **EXPENDITURE IMPACTS – OPERATING**

The St. Johns Fire District's estimated per housing unit cost is estimated to be \$648. This is based on a household size of 2.2 persons and a per capita cost of \$294.61. Based on the anticipated new housing units at Kiawah River Plantation, the projected cost to the Fire District will be almost \$50,000 in Year 2 and increase to \$805,000 in Year 20. Total costs to the District over the 20-year period are estimated to be \$7.9 million.

### **NET FISCAL IMPACTS ON THE ST JOHNS FIRE DISTRICT**

It is estimated that the Kiawah River Plantation project will result in the St Johns Fire District realizing a net fiscal surplus (revenues less expenditures). The net positive benefits to the District's budget are estimated to total approximately \$11.4 million over the 20-year period.



**FISCAL IMPACTS OF KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY**

**Table 7  
Net Fiscal Impacts  
St. Johns Fire District  
20-Year Cumulative Totals**

<b>Revenues</b>	<b>\$ 19.3 Million</b>
<b>Expenditures</b>	<b><u>\$ 7.9 Million</u></b>
<b>Net Benefit</b>	<b>\$ 11.4 Million</b>

**Totals may not add due to rounding**

## **FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY**

### **SUMMARY -- FISCAL IMPACTS ON ALL JURISDICTIONS**

This study analyzes the projected revenues and expenditures which will be generated by Kiawah River Plantation during the build-out of the project and in subsequent years. The projected County expenditures include, among other things, a project list compiled from various department agencies and provided to the property owner by the County on December 7, 2009.

The study confirms that the expected revenues generated from the project are more than sufficient to cover the projected expenditures (including those items included in the referenced project list) of the County, the school district and other impacted governmental agencies during the build-out of the project. This study further confirms that the surplus to the County and other governmental agencies evaluated herein will be maintained throughout the build-out of the project. In other words, the project will more than pay for itself.

The Kiawah River Plantation project will increase the total tax base in Charleston County by more than \$1.3 billion by the time the project is completed. This \$1.3 billion includes an increase of \$1.2 billion in the residential tax base and approximately \$144 million in the commercial and retail tax base.

The project is expected to produce total tax revenues of almost \$147.4 million and about \$35.9 million in total operating and capital expenditures over the a 20-year period – for a net positive fiscal benefit of more than \$111.5 million over the 20-year period. This net benefit increases by about \$10 million a year and is estimated to be approximately \$160 million by the 25<sup>th</sup> year.

The project will generate property tax and other revenues for Charleston County General Fund of almost \$30.1 million over this 20-year period. The costs of services to the County will also increase during this period. It is estimated that the cost of services will total almost \$20.3 million over this period.

As outlined in this analysis, it is clear that the Kiawah River Plantation project will have a positive net fiscal impact on Charleston County government operations. Over the 20-year period, the net fiscal benefits (Revenues minus Costs) to the County are estimated to total more than \$9.9 million.

**FISCAL IMPACTS OF KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY**

Kiawah River Plantation will generate a net surplus to the Charleston County School District of more than \$81.0 million once the project is built out. The annual net benefit will be almost \$8.1 million at build out.

Kiawah River Plantation will generate a net surplus to the St. Johns Fire District of about \$11.4 million once the project is built out. The annual net benefit will be more than \$1.0 million in the 20<sup>th</sup> year.

Table 8 summarizes all of the property tax revenues for all jurisdictions for the initial 20-year period. Table 9 summarizes all operating costs for all jurisdictions for the initial 20-year period. Table 10 identifies all capital costs for all jurisdictions for the initial 20-year period. And finally, Table 11 summarizes the net fiscal benefits to the County, School District and Fire District from Kiawah River Plantation over the 20-year period.

**Table 8  
Total Tax Revenues – All Jurisdictions  
20-Year Cumulative Totals**

**Summary Public Revenues Generated by Kiawah River Plantation**

<u>Jurisdiction/Department</u>	<u>Estimated 20-Year Revenues</u>
Charleston County General Fund Operating	\$30,139,156
Charleston County Bonds	\$5,663,832
Parks and Recreation - Operating	\$3,089,363
Parks and Recreation - Bonds	\$1,716,313
Charleston County School District - Operating	\$61,813,652
Charleston County School District - Debt Service	\$23,942,564
St Johns Island Fire District -- Operating	\$17,334,760
St Johns Island Fire District -- Bonds	\$1,973,760
Trident Tech	\$1,716,313
<b>TOTAL</b>	<b>\$147,389,712</b>



**FISCAL IMPACTS OF KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY**

**Table 9  
Total Operating Expenditures – All Jurisdictions  
20-Year Cumulative Totals**

**Estimated Public Operating Costs to serve Kiawah River Plantation**

<u>Jurisdiction/Department</u>	<u>Estimated 20-Year Operating Costs</u>
Charleston County General Fund Operating Costs	\$10,463,538
Charleston County Sheriff Dept Costs	\$8,784,524
Charleston County EMS Costs	\$1,020,797
Charleston County School District - Operating	\$3,361,043
St Johns Island Fire District -- Operating	\$7,909,316
TOTAL	<u>\$31,539,218</u>

**FISCAL IMPACTS OF KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY**

**Table 10**  
**Total Capital Expenditures – All Jurisdictions**  
**20-Year Cumulative Totals**

**Estimated Capital Costs for Kiawah River Plantation<sup>1</sup>**

<u>Facility</u>	<u>Estimated Capital Costs</u>	
Deputy Sheriff		
4 Officers & Equipment	\$488,176	
Satellite SubStation	\$250,000	\$738,176
St Johns Island Fire District -- Fire Station		\$1,782,000
St Johns Island Fire District -- Ladder Truck		\$800,000
Charleston County School District Allowance for New Pupils*		<u>\$1,000,000</u>
TOTAL		\$4,320,176

Source: Charleston County Sheriff's Department, St Johns Fire District, MGA

Notes:

1. These capital costs do not include extensive capital expenditures for internal roads, stormwater, water and sewer and other improvements that will be paid for by the developer and not the County.

\* CCSD Capital costs per pupil of \$20,000 times 50 students

**FISCAL IMPACTS OF KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY**

**Table 11**

**Summary -- Net Benefits to All Jurisdictions**

**20-Year Cumulative Totals**

	All Jurisdictions/Departments
<b>Estimated 20-Year Operating Costs (Table 9)</b>	<b>\$31,539,218</b>
<b>Estimated Capital Costs (Table 10)</b>	<b>\$4,320,176</b>
<b>Estimated Total Costs</b>	<b>\$35,859,394</b>
 <b>Estimated 20-Year Revenues (Table 8)</b>	 <b>\$147,389,712</b>
 <b>Estimated 20-Year Net Benefit</b>	 <b>\$111,530,319</b>



## FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY

### FISCAL IMPACT METHODOLOGY

The objective of fiscal impact analysis is to estimate the financial impacts of a development or land use change on the revenues and expenditures of the governmental units affected by the development. The analysis evaluates the fiscal characteristics of the proposed development and is designed to help Charleston County measure the estimated difference between anticipated revenues and the related costs of the new development.

All revenues and expenditures are based on constant, 2009 dollars and assume no inflation during the project's buildout. This assumption is based on the fact that over the buildout period, both net revenues and expenditures will rise proportionately, and therefore, inflation will have little if any affect on the net results of the analysis. The constant dollar assumption applies to all estimates in this analysis, including: County and School District revenues and expenditures. Property values are assumed to increase a modest 1% per year.

### MAJOR ASSUMPTIONS

The rationale for each major assumption is outlined in this section.

**AD VALOREM MILLAGE RATES** - Millage rates adopted for the FY08-09 budget cycle were assumed for Charleston County as follows:

Charleston County	40.2	mills
Charleston County Bonds	6.6	mills
Parks & Recreation Operating	3.6	mills
Parks & Recreation Bonds	2.0	mills
Trident Tech	2.0	mills
St Johns FD Operating	20.2	mills
St Johns FD Bonds	2.3	mills
Charleston County School District		
Operating	98.7	mills
Debt Service	27.9	mills

Based on data from the Charleston County Finance Office, the LOST credit is assumed to be 0.00071 and is assumed to be constant throughout the 20-year period. The LOST credit is applied to the estimated total appraised value of the residential and commercial property.

In addition, it is assumed that these millage rates remain constant throughout the 20-year period.

## **FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY**

### **CHARLESTON COUNTY POPULATION**

The 2009 population for the County is estimated to be 351,157. This is extrapolated from the County's Comprehensive Plan.

### **PERSONS PER HOUSEHOLD**

The number of persons per household is assumed to be 2.2 for the County (County's Comprehensive Plan).

### **GENERAL FUND REVENUE ASSUMPTIONS**

The estimates for Charleston County General Fund revenues are based on property taxes generated by the improvements on property in Kiawah River Plantation. Real property is assessed at 4% for owner-occupied housing units, 6% for commercial and rental property. Given the recreational and second-home nature of the development, 25% of the homes are assumed to be owner-occupied and assessed at 4% and 75% of the units are assessed at 6%. Of the 25% of the homes that are assumed to be owner-occupied, it is further assumed that 80% of these homes will be eligible for the \$50,000 homestead exemption.

In addition to property taxes, the County generated approximately \$83.6 million (\$238 per capita) in other General Fund revenues in the form of fees, licenses, fines, intergovernmental transfers, etc. The construction and ongoing activities and residents in Kiawah River Plantation will generate additional General Fund revenues in addition to property taxes. To be conservative, it is assumed in this analysis that the residents at Kiawah River Plantation generate only \$198 per capita (\$436 per household) of additional General Fund revenues. See Table 12 below for details of all other revenue categories.

Housing values were assumed to be constant during the buildout phase. The average price per residential unit assumed in the analysis varies from about \$600,000 to \$2.7 million and averages slightly more than \$1.0 million. The average value of the 117 workforce units is \$100,000. It is assumed that 24 units will be built in the 5<sup>th</sup> year, 32 units built in the 10<sup>th</sup> and 15<sup>th</sup> years and 29 units completed in year 20.

The average value for non-residential investment is assumed to be \$200 sf.

**FISCAL IMPACTS OF KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY**

**Table 12**

**All Other General Fund  
Revenue Sources**

<b>2010 Total General Fund Revenues</b>	<b>\$158,362,916</b>
Motor Vehicle	\$6,600,000
Sales Tax	\$39,000,000
Licenses & Permits	\$4,369,600
Charges & Fees	\$17,634,100
Fines & Forfeitures	\$1,984,000
Subtotal All Other	\$69,587,700
County Population	351,157
All Other Revenues Per Capita	\$198
Household Size	2.2
Other Revenue Per HH	\$436

**GENERAL FUND EXPENDITURE ASSUMPTIONS**

In order to estimate the additional cost to Charleston County for the services required for the new residents and employees of the Kiawah River Plantation project, it was necessary to estimate the per household costs of County services.

The expenditure analysis assumes the existing levels of service currently provided by Charleston County will be provided to all citizens and businesses in the Kiawah River Plantation development.



## **FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY**

The analysis estimates the additional costs of the services to the County on a per capita basis for all major departments funded from General Fund Revenues. These services are delineated into three cost components: All Other services, Sheriff Department Law Enforcement, and EMS services. Together these three cost components comprise all County services funded from the County's General Fund. The "All Other" component costs are for all departments funded through the General Fund, including General Government, Judicial, Public Safety, Public Works, Debt Service, etc., except for Law Enforcement and EMS.

The total general fund budget for Charleston County in FY 2009-2010 is \$158.4 million. Since the Law Enforcement Division of the Sheriff's Department is treated as a separate cost component, the budget of that department (\$22.3 million) was deducted from the total General Fund of \$158.4 million. The budget for the EMS department of \$12.1 million was deducted as well, leaving \$136.9 million. This equates to a per capita "all other" cost factor of \$390 or \$857 per household for County services other than Law Enforcement and EMS ( $\$136.9 \text{ million} / 351,117 = \$390$ ). Based on data from the Sheriff's Department, the department will need to add an additional deputy every three years at an annual cost of \$125,493 per deputy. Therefore, the cost of a new deputy is added every third year. EMS services are assumed to be equal to the current level of service in the County and are estimated to be \$34 per capita or \$76 per household ( $\$12.1 \text{ million} / 351,157 = \$34$ ). The County population is estimated to be 351,157 based on in the County's Comprehensive Plan.

### **CHARLESTON COUNTY SCHOOL DISTRICT OPERATING REVENUE ASSUMPTIONS**

The estimates for the Charleston County School District (CCSD) revenues are based on a similar methodology as the County revenues described above although with several modifications. The school district millages for operations of 98.7 mills and debt service 27.9 mills were assumed to be constant for the period.

Due to Act 388, the CCSD will not receive any revenues from the 98.7 mills on the 25% owner-occupied housing units. The law provides tax relief on owner-occupied units for all of the millage from school operations. It is assumed in this analysis that 25% of all the homes will be owner-occupied and thus exempt from paying operating millage. All other classes of property (non-owner occupied residential, commercial, etc.) will pay school operating taxes.

## FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY

### CHARLESTON COUNTY SCHOOL DISTRICT DEBT SERVICE REVENUE ASSUMPTIONS

For the purposes of debt service revenues, the exemption from Act 388 does not apply. Therefore, to estimate the debt service revenues to the CCSD, the total assessed value of the property in Kiawah River Plantation was multiplied by the millage rate for debt service (27.9 mills).

### CHARLESTON COUNTY SCHOOL DISTRICT OPERATING EXPENDITURE ASSUMPTIONS

According to the latest Census data (2007), there were 164,788 housing units in Charleston County. According to the South Carolina Department of Education, the ADM for Charleston was 40,363 students. Thus the average student generation rate (SGR) for all housing in the Charleston County School District is approximately 0.245

However, Kiawah River Plantation is not a typical Charleston County residential development. The residential components of the Kiawah River Plantation communities will include 1,285 new dwelling units. The development is planned to be similar in scope and nature to the Kiawah Island and Seabrook communities. Based on the latest Census data available, the student generation rates (SGR) for these two communities are 0.019 and 0.013, respectively. It is assumed in this analysis that Kiawah River Plantation's SGR will be similar to the higher of these and is 0.019 per dwelling unit and 0.245 per workforce unit<sup>4</sup>.

**Table 13**

#### Estimated Student Generation Rates

	Population 5-18	Housing Units	Estimated SGR
<b>Kiawah Island</b>	<b>58</b>	<b>3,070</b>	<b>0.019</b>
<b>Seabrook Island</b>	<b>22</b>	<b>1,649</b>	<b>0.013</b>
<b>Charleston County*</b>	<b>40,343</b>	<b>164,788</b>	<b>0.245</b>

Source: 2000 Census  
\* 135 ADM South Carolina Department of Education

<sup>4</sup> The SGR for the entire Charleston District is estimated to be 0.245.

## **FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY**

Based on SGR's of 0.019 and 0.245, it is estimated that 50 new students will attend public schools in the District by the 20<sup>th</sup> year.

Based on the 2008-09 budget, the district will spend approximately \$180.3 million from local sources. Based on the South Carolina Department of Education data, the CCSD had an ADM of 40,313 students in 2009. This results in an expenditure of \$4,467 in local funds per pupil for operations. However, based on discussions with the CCSD staff, \$7,500 per pupil is assumed in this analysis. The estimate for additional operating costs to the CCSD resulting from the Kiawah River Plantation projects was estimated by multiplying the estimated number of new students times the per student costs (local costs) of \$7,500.

### **CHARLESTON COUNTY SCHOOL DISTRICT CAPITAL EXPENDITURE ASSUMPTIONS**

The capital costs to the CCSD are estimated using a per student cost approach. However, given the relatively small number of new students generated per year and over the entire 20-year period, it is doubtful that there will be any capital costs associated with the new students. However, even at an estimated capital cost of \$20,000 per student, the total capital cost for the 50 new students is about \$1,000,000.

### **ST JOHNS FIRE DISTRICT OPERATING REVENUE ASSUMPTIONS**

Revenue projections for the St Johns Fire District are based on the millage rates listed above and the assessed values included in the buildout of the project. The millage rate of 20.2 mills is assumed to be constant throughout the 20-year period.

### **ST JOHNS FIRE DISTRICT OPERATING EXPENDITURE ASSUMPTIONS**

Expenditures for the St Johns Fire District are estimated using a per capita cost approach. The budget for the FY 2009-2010 budget year is projected to be \$9,195,708. The District is comprised of four barrier islands covering a land mass of approximately 185 square miles. These islands are John's, Kiawah, Seabrook and Wadmalaw. The population of the District area is estimated to be 31,213. The results in a per capita cost of \$294.61. Based on the household size of 2.2 persons per unit, the dwelling unit cost equals \$648 per unit. This per unit cost is multiplied by the cumulative housing unit buildout anticipated by Kiawah River Plantation to estimate the annual operating costs for the District to serve Kiawah River Plantation.



FISCAL IMPACTS OF KIAWAH RIVER PLANTATION  
ON CHARLESTON COUNTY

**Appendix A**

## Appendix A

Date	Year	Residential Assessed Value	Residential Appraised Value*	Commercial Assessed Value	Commercial Appraised Value	Total Assessed Value*	Total Assessed Value For CCSD Operating	County Property Tax Revenues	County LOST Credit 0.00071	Net County Property Tax Revenues	County Other Revenues \$436 per HH	Total County Revenues
2011	1	\$1,518,000	\$27,830,000	\$0	\$0	\$1,518,000	\$1,214,400	\$61,024	\$19,759	\$41,264	\$0	\$41,264
2012	2	\$4,529,360	\$83,038,267	\$0	\$0	\$4,574,654	\$3,623,488	\$183,901	\$58,957	\$124,944	\$33,569	\$158,513
2013	3	\$7,248,235	\$132,884,308	\$2,010,000	\$33,500,000	\$9,444,326	\$7,808,588	\$379,662	\$118,133	\$261,529	\$55,368	\$316,897
2014	4	\$10,261,550	\$188,128,417	\$2,010,000	\$33,500,000	\$12,643,390	\$10,219,240	\$508,264	\$157,356	\$350,908	\$80,654	\$431,562
2015	5	\$13,307,795	\$243,976,242	\$2,598,000	\$43,300,000	\$16,551,634	\$13,244,236	\$665,376	\$203,966	\$461,410	\$117,275	\$578,685
2016	6	\$16,778,025	\$307,597,125	\$2,598,000	\$43,300,000	\$20,364,397	\$16,020,420	\$818,649	\$249,137	\$569,512	\$143,869	\$713,381
2017	7	\$19,691,095	\$361,003,408	\$4,398,000	\$73,300,000	\$25,571,060	\$20,150,876	\$1,027,957	\$308,355	\$719,601	\$165,232	\$884,833
2018	8	\$22,947,785	\$420,709,392	\$4,638,000	\$77,300,000	\$29,575,695	\$22,996,228	\$1,188,943	\$353,587	\$835,356	\$190,518	\$1,025,874
2019	9	\$26,310,765	\$482,364,025	\$5,838,000	\$97,300,000	\$34,812,506	\$26,886,612	\$1,399,463	\$411,561	\$987,901	\$217,112	\$1,205,013
2020	10	\$30,688,425	\$562,621,125	\$7,380,000	\$123,000,000	\$41,634,876	\$31,930,740	\$1,673,722	\$486,791	\$1,186,931	\$255,041	\$1,441,972
2021	11	\$33,359,365	\$611,588,358	\$7,380,000	\$123,000,000	\$45,001,604	\$34,067,492	\$1,809,064	\$521,558	\$1,287,507	\$280,327	\$1,567,834
2022	12	\$36,146,125	\$662,678,958	\$7,620,000	\$127,000,000	\$48,828,480	\$36,536,900	\$1,962,905	\$560,672	\$1,402,233	\$305,177	\$1,707,410
2023	13	\$38,909,700	\$713,344,500	\$7,620,000	\$127,000,000	\$52,430,831	\$38,747,760	\$2,107,719	\$596,645	\$1,511,075	\$333,515	\$1,844,590
2024	14	\$42,669,000	\$782,265,000	\$8,370,000	\$139,500,000	\$58,087,143	\$42,505,200	\$2,335,103	\$654,453	\$1,680,650	\$359,673	\$2,040,323
2025	15	\$47,181,860	\$865,000,767	\$8,562,000	\$142,700,000	\$64,076,130	\$46,307,488	\$2,575,860	\$715,468	\$1,860,393	\$393,242	\$2,253,635
2026	16	\$51,150,220	\$937,754,033	\$8,802,000	\$146,700,000	\$69,602,666	\$49,722,176	\$2,798,027	\$769,962	\$2,028,065	\$426,812	\$2,454,877
2027	17	\$52,822,660	\$968,415,433	\$8,802,000	\$146,700,000	\$72,259,760	\$51,060,128	\$2,904,842	\$791,732	\$2,113,110	\$441,199	\$2,554,309
2028	18	\$56,850,690	\$1,042,262,650	\$8,802,000	\$146,700,000	\$77,752,772	\$54,282,552	\$3,125,661	\$844,163	\$2,281,498	\$472,152	\$2,753,650
2029	19	\$61,440,645	\$1,126,411,825	\$8,802,000	\$146,700,000	\$84,020,563	\$57,954,516	\$3,377,627	\$903,909	\$2,473,717	\$507,466	\$2,981,183
2030	20	\$65,028,865	\$1,192,195,858	\$8,976,000	\$149,600,000	\$89,405,940	\$60,999,092	\$3,594,119	\$952,675	\$2,641,444	\$541,907	\$3,183,351
<b>Totals</b>								<b>\$34,497,888</b>	<b>\$9,678,840</b>	<b>\$24,819,048</b>	<b>\$5,320,108</b>	<b>\$30,139,156</b>
<b>Major Assumptions:</b> * Net of \$50,000 Homestead Exemption ** Total units = 1,285 --- 42 SF units will be built in year 21 Property Appreciation Rate = 1% MGA Millage Rate Annual Change = 0% MGA Single Family SGR = 0.019 2000 Census Workforce Units SGR = 0.245 2000 Census % Units with Children= 20% KRP Per Pupil Cost= \$7,500 Local GOF per pupil HH Size = 2.2 County Comp Plan Other County Revenue Per HH = \$436 County Budget 2009-10 (Motor Veh, LOST, Lic & Permits, Fines & Fort, Charges & Fees) County Other GOF Costs Per HH= \$857 County Budget 2009-10 Sheriff Dept Costs Per FTE = \$ 125,493 Sheriff Dept EMS Costs Per HH = \$76 County Budget 2009-10 County Pop 2009= 351,157 County Comp Plan/MGA St Johns Fire District Cost/HH = \$648 St Johns FD, MGA												

## Appendix A (Cont'd)

Date	Year	Annual Housing Units**	Workplace Housing Units	Cumulative Housing Units	Homestead Exemption Assessed Value	County Costs GOF- All Other \$857 Per HH	Sheriff Dept Costs 1 FTE every 3 Yrs	EMS Costs \$76 per HH	Total County Costs	Net County GOF Surplus/Deficit	County Bonds	Parks & Rec Operating
2011	1	0		0	\$0	\$0	\$125,493	\$5,828	\$131,321	-\$90,056	\$10,019	\$5,465
2012	2	77		77	\$24,640	\$66,024	\$125,493	\$9,612	\$201,129	-\$42,616	\$30,193	\$16,469
2013	3	50		127	\$40,640	\$108,897	\$125,493	\$14,001	\$248,391	\$68,506	\$62,333	\$34,000
2014	4	58		185	\$59,200	\$158,629	\$250,986	\$20,358	\$429,974	\$1,588	\$83,446	\$45,516
2015	5	60	24	269	\$86,080	\$230,656	\$250,986	\$24,975	\$506,617	\$72,068	\$109,241	\$59,586
2016	6	61		330	\$105,600	\$282,961	\$250,986	\$28,683	\$562,630	\$150,751	\$134,405	\$73,312
2017	7	49		379	\$121,280	\$324,976	\$376,480	\$33,073	\$734,528	\$150,304	\$168,769	\$92,056
2018	8	58		437	\$139,840	\$374,708	\$376,480	\$37,690	\$788,878	\$236,996	\$195,200	\$106,473
2019	9	61		498	\$159,360	\$427,013	\$376,480	\$44,274	\$847,767	\$357,246	\$229,763	\$125,325
2020	10	55	32	585	\$187,200	\$501,612	\$501,973	\$48,663	\$1,052,248	\$389,724	\$274,790	\$149,886
2021	11	58		643	\$205,760	\$551,344	\$501,973	\$52,977	\$1,106,294	\$461,539	\$297,011	\$162,006
2022	12	57		700	\$224,000	\$600,219	\$501,973	\$57,897	\$1,160,089	\$547,321	\$322,268	\$175,783
2023	13	65		765	\$244,800	\$655,954	\$627,466	\$62,438	\$1,345,858	\$498,732	\$346,043	\$188,751
2024	14	60		825	\$264,000	\$707,401	\$627,466	\$68,265	\$1,403,132	\$637,191	\$383,375	\$209,114
2025	15	45	32	902	\$288,640	\$773,425	\$627,466	\$74,093	\$1,474,984	\$778,651	\$422,902	\$230,674
2026	16	77		979	\$313,280	\$839,450	\$627,466	\$76,590	\$1,543,506	\$911,371	\$459,378	\$250,570
2027	17	33		1,012	\$323,840	\$867,746	\$627,466	\$81,963	\$1,577,175	\$977,134	\$476,914	\$260,135
2028	18	71		1,083	\$346,560	\$928,625	\$627,466	\$88,094	\$1,644,185	\$1,109,466	\$513,168	\$279,910
2029	19	81		1,164	\$372,480	\$998,079	\$627,466	\$94,073	\$1,719,618	\$1,261,566	\$554,536	\$302,474
2030	20	50	29	1,243	\$397,760	\$1,065,818	\$627,466	\$97,251	\$1,790,535	\$1,392,816	\$590,079	\$321,861
<b>Totals</b>		1,126	117	1,243**		\$10,463,538	\$8,784,524	\$1,020,797	\$20,268,859	\$9,870,297	\$5,663,832	\$3,089,363

**Major Assumptions:**

- \* Net of \$50,000 Homestead Exemption
- \*\* Total units = 1,285 --- 42 SF units will be built in year 21
- Property Appreciation Rate = 1% MGA
- Millage Rate Annual Change = 0% MGA
- Single Family SGR = 0.019 2000 Census
- Workforce Units SGR = 0.245 2000 Census
- % Units with Children= 20% KRP
- Per Pupil Cost= \$7,500 Local GOF per pupil
- HH Size = 2.2 County Comp Plan
- Other County Revenue Per HH = \$436 County Budget 2009-10 (Motor Veh, LOST, Lic & Permits, Fines & Fort, Charges & Fees)
- County Other GOF Costs Per HH= \$857 County Budget 2009-10
- Sheriff Dept Costs Per FTE = \$ 125,493 Sheriff Dept
- EMS Costs Per HH = \$76 County Budget 2009-10
- County Pop 2009= 351,157 County Comp Plan/MGA
- St Johns Fire District Cost/HH = \$648 St Johns FD, MGA



## Appendix A (Cont'd)

Date	Year	Annual Enrollment SGR = .019	Cumulative Student Enrollment	School Operating Costs (\$7,500/pp)	School Oper Property Tax Revenues	Net School Oper Property Tax Revenues	School DS Property Tax Revenues	St Johns FD Property Tax Oper Revenues	St Johns FD Oper Costs \$648 per HH	St Johns FD Property Tax Bonds Revenues	Trident Tech	Potential Surplus Revenues (All Jurisdictions)	
2011	1	0	0	\$0	\$119,861	\$119,861	\$42,352	\$30,664	\$0	\$3,491	\$3,036	\$127,868	
2012	2	1	1	\$10,973	\$357,638	\$346,666	\$127,633	\$92,408	\$49,907	\$10,522	\$9,149	\$599,573	
2013	3	1	2	\$18,098	\$770,708	\$752,610	\$263,497	\$190,775	\$82,314	\$21,722	\$18,889	\$1,431,219	
2014	4	1	4	\$26,363	\$1,008,639	\$982,276	\$352,751	\$255,396	\$119,907	\$29,080	\$25,287	\$1,800,627	
2015	5	7	11	\$79,013	\$1,307,206	\$1,228,194	\$461,791	\$334,343	\$174,351	\$38,069	\$33,103	\$2,369,497	
2016	6	1	12	\$87,705	\$1,581,215	\$1,493,510	\$568,167	\$411,361	\$213,888	\$46,838	\$40,729	\$2,959,801	
2017	7	1	13	\$94,688	\$1,988,891	\$1,894,204	\$713,433	\$516,535	\$245,647	\$58,813	\$51,142	\$3,696,399	
2018	8	1	14	\$102,953	\$2,269,728	\$2,166,775	\$825,162	\$597,429	\$283,239	\$68,024	\$59,151	\$4,314,362	
2019	9	1	15	\$111,645	\$2,653,709	\$2,542,064	\$971,269	\$703,213	\$322,776	\$80,069	\$69,625	\$5,148,198	
2020	10	9	24	\$178,283	\$3,151,564	\$2,973,282	\$1,161,613	\$841,024	\$379,165	\$95,760	\$83,270	\$6,052,618	
2021	11	1	25	\$186,548	\$3,362,461	\$3,175,914	\$1,255,545	\$909,032	\$416,757	\$103,504	\$90,003	\$6,544,557	
2022	12	1	26	\$194,670	\$3,606,192	\$3,411,522	\$1,362,315	\$986,335	\$453,702	\$112,306	\$97,657	\$7,113,163	
2023	13	1	27	\$203,933	\$3,824,404	\$3,620,471	\$1,462,820	\$1,059,103	\$495,831	\$120,591	\$104,862	\$7,506,235	
2024	14	1	28	\$212,483	\$4,195,263	\$3,982,781	\$1,620,631	\$1,173,360	\$534,720	\$133,600	\$116,174	\$8,372,401	
2025	15	9	37	\$277,695	\$4,570,549	\$4,292,854	\$1,787,724	\$1,294,338	\$584,627	\$147,375	\$128,152	\$9,210,823	
2026	16	1	38	\$288,668	\$4,907,579	\$4,618,911	\$1,941,914	\$1,405,974	\$634,534	\$160,086	\$139,205	\$10,026,615	
2027	17	1	39	\$293,370	\$5,039,635	\$4,746,265	\$2,016,047	\$1,459,647	\$655,923	\$166,197	\$144,520	\$10,391,379	
2028	18	1	40	\$303,488	\$5,357,688	\$5,054,200	\$2,169,302	\$1,570,606	\$701,941	\$178,831	\$155,506	\$11,186,495	
2029	19	2	42	\$315,030	\$5,720,111	\$5,405,081	\$2,344,174	\$1,697,215	\$754,441	\$193,247	\$168,041	\$12,094,375	
2030	20	8	50	\$375,443	\$6,020,610	\$5,645,168	\$2,494,426	\$1,806,000	\$805,645	\$205,634	\$178,812	\$12,813,607	
Totals			50		\$3,361,043	\$61,813,652	\$58,452,609	\$23,942,564	\$17,334,760	\$7,909,316	\$1,973,760	\$1,716,313	\$123,759,811

Major Assumptions:

\* Net of \$50,000 Homestead Exemption

\*\* Total units = 1,285 --- 42 SF units will be built in year 21

Property Appreciation Rate = 1% MGA

Millage Rate Annual Change = 0% MGA

Single Family SGR = 0.019 2000 Census

Workforce Units SGR = 0.245 2000 Census

% Units with Children= 20% KRP

Per Pupil Cost= \$7,500 Local GOF per pupil

HH Size = 2.2 County Comp Plan

Other County Revenue Per HH = \$436 County Budget 2009-10 (Motor Veh, LOST, Lic & Permits, Fines & Fort, Charges & Fees)

County Other GOF Costs Per HH= \$857 County Budget 2009-10

Sheriff Dept Costs Per FTE = \$ 125,493 Sheriff Dept

EMS Costs Per HH = \$76 County Budget 2009-10

County Pop 2009= 351,157 County Comp Plan/MGA

St Johns Fire District Cost/HH = \$648 St Johns FD, MGA

## **FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY**

### **GENERAL LIMITING CONDITIONS**

This economic impact analysis is not a budget or forecasting document and is not intended to depict a definitive course of action. Moreover, economic impact analysis is not designed as a space or facility-planning document. Many assumptions underlying fiscal and economic impact analyses are based on policy decisions which, if modified, would affect the overall results.

This study is based on estimates, assumptions and other information developed by Miley, Gallo & Associates, LLC from its independent research effort, consultations with the client and its representatives, and primary and secondary sources. We have utilized sources that are deemed to be reliable but cannot guarantee their accuracy. Moreover, estimates and analysis are based on trends and assumptions and, therefore, there will usually be differences between projected and actual results because events and circumstances frequently do not occur as expected, and those differences may be material. No responsibility is assumed for inaccuracies in reporting by the client, the client's agent and representatives or any other data source used in preparing this study.

This report is based on information that was current as of November 2009 and Miley, Gallo & Associates, LLC has not undertaken any update of its research effort since that date. We have no obligation, unless subsequently engaged, to update this report or revise this analysis as presented due to events or conditions occurring after the date of this report.

Possession of this study does not carry with it the right of publication thereof or to use the name of "Miley, Gallo & Associates, LLC" in any manner without first obtaining the prior written consent of Miley, Gallo & Associates, LLC. No abstracting, excerpting or summarization of this study may be made without first obtaining the prior written consent of Miley, Gallo & Associates, LLC. This report is not to be used in conjunction with any public or private offering of securities or other similar purpose. This study may not be used for purposes other than that for which it is prepared or for which prior written consent has first been obtained from Miley, Gallo & Associates, LLC.

This study is qualified in its entirety by, and should be considered in light of, these limitations, conditions and considerations.

## FISCAL IMPACTS OF KIAWAH RIVER PLANTATION ON CHARLESTON COUNTY

### **MILEY, GALLO & ASSOCIATES, LLC**

Miley, Gallo & Associates is one of the Southeast's leading economic and financial consulting firms. The firm specializes in economic impact analyses, fiscal impact analyses, feasibility reports, impact fee studies and benefit/cost modeling. Our clients include national and prominent local real estate developers, school districts, local governments, regional development agencies, and other private sector development firms. Miley, Gallo & Associates partners appear regularly before decision-makers at all levels of government and understand the values, needs and desires of the clients they represent. With offices located in Research Triangle Park, North Carolina and Columbia, South Carolina, the firm is well positioned to provide clients with hands-on service for projects throughout the entire Southeast region.

Miley, Gallo & Associates appreciates that every research project is unique and deserves a custom solution. Public policy decisions are not made overnight, and we excel at providing advice and counsel along the way. We represent our clients. Our business plan is simple: we focus on exceeding our client's expectations and building long-term relationships.

The roots of Miley, Gallo & Associates, LLC can be traced to 1993 when Harry W. Miley, Jr. Ph. D. founded Miley & Associates, Inc. After several years of successful client collaborations, Lucy L. Gallo and Dr. Harry Miley decided to leverage the depth of their experience in the accounting, finance and economic aspects of real estate transactions to form Miley, Gallo & Associates, LLC. The Company is an economic and financial consulting firm providing a range of analytical services to public and private sector clients. Miley, Gallo & Associates conducts fiscal and economic impact analyses of proposed new developments and has extensive experience in assisting clients with their economic development and community revitalization projects.





#### Charlotte

800 West Hill Street  
Suite 202  
Charlotte, NC 28208  
980.321.0202  
980.321.0108 fax

#### Hampton Roads

201 Production Drive  
Second Floor  
Yorktown, VA 23693  
757.594.1419  
757.594.9010 fax

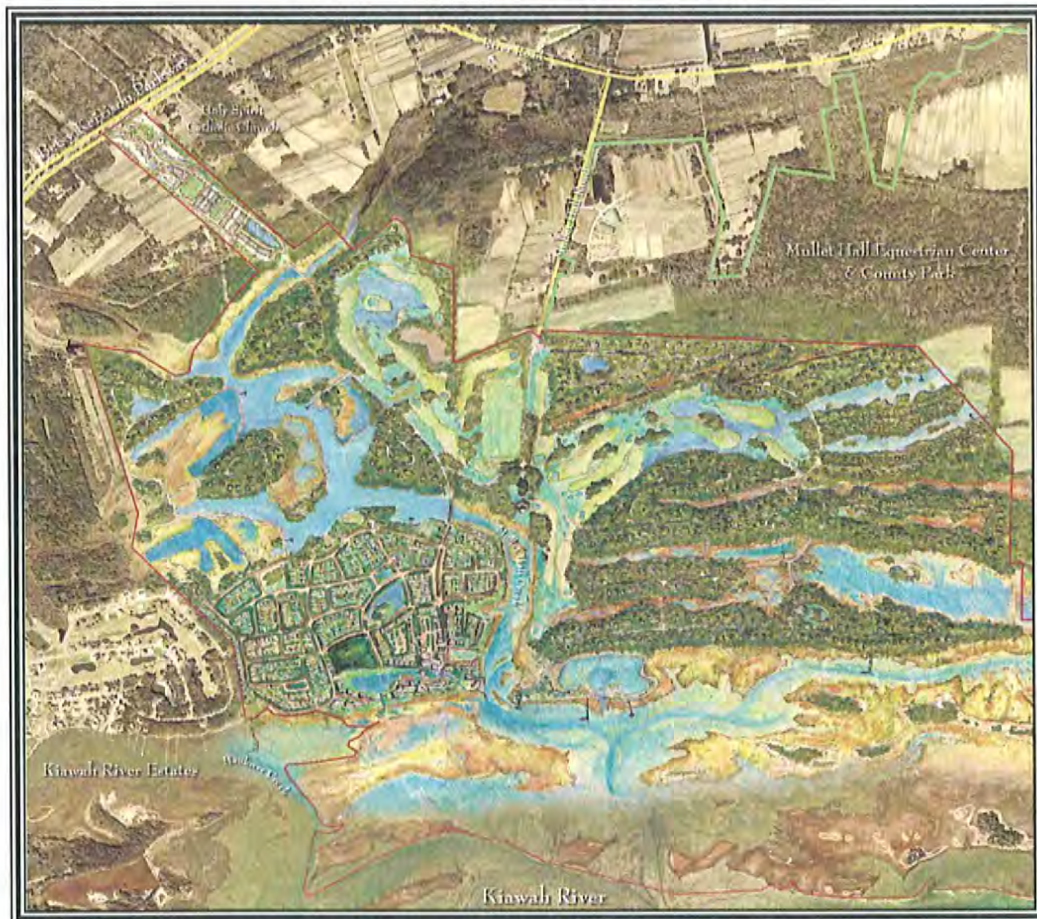
Access Management  
Traffic Signal Design  
Traffic Control Plans  
Air Quality Modeling  
Traffic Impact Analysis  
Roadway Signing Plans  
Traditional Neighborhoods

[www.kubilins.com](http://www.kubilins.com)

## TRAFFIC IMPACT ANALYSIS

### KIAWAH RIVER PLANTATION

Betsy Kerrison Parkway/Bohicket Road & River Road  
Johns Island, South Carolina



for:

Kiawah River Plantation, LP

November 2008

C08092.02



*Margaret A. Kubilins*  
11-2008

*Creating a higher quality of life through partnerships for innovative transportation solutions*

## Table of Contents

EXECUTIVE SUMMARY .....	1
PROPOSED DEVELOPMENT .....	4
AREA CONDITIONS .....	8
PROJECTED TRAFFIC .....	11
CONCLUSIONS .....	22
APPENDIX .....	23

## List of Tables

Table 1a: Site Trip Generation – Full Buildout .....	11
Table 1b: Site Trip Generation – Phased .....	12
Table 2: Levels of Service .....	19

## List of Figures

Figure 1: Vicinity Map .....	6
Figure 2: Concept Master Plan .....	7
Figure 3: 2008 Existing Traffic Volumes .....	10
Figure 4: Directional Distribution .....	13
Figure 5: 2018 No Build Traffic Volumes .....	14
Figure 6a: 2018 Build AM Peak Traffic Volumes .....	15
Figure 6b: 2018 Build PM Peak Traffic Volumes .....	16
Figure 7a: 2008 Existing Laneage .....	20
Figure 7b: 2018 Recommended Laneage .....	21





## EXECUTIVE SUMMARY

Kiawah River Plantation, LP has proposed to develop a mixed use community with 319 single family detached homes, 955 recreation homes, 127 apartments, a 350 room hotel, 80,000 SF of Retail, and an 18-hole golf course. The development is proposed on a 2,003 acre parcel located on Mullett Hall Road, southeast of the intersection of Betsy Kerrison Parkway/Bohicket Road and River Road in Johns Island (Charleston County), SC. Full buildout of the site is expected to occur by 2031 (20 year build out plan).

This report provides analysis of the traffic operations within the area of influence as well as provides recommended access management for the site and intersection improvements needed for mitigating traffic impacts. This analysis presents a "worst case" scenario for the development of the Kiawah River Plantation assuming no regional roadway improvements across Johns Island. There are three regional initiatives listed below, in various stages of planning and programming that could have a direct impact on the regional travel characteristics and future operational conditions on Maybank Highway, River Road, Bohicket Road/Betsy Kerrison Parkway.



Eastbound Maybank Highway at  
River Road

- Maybank Highway Widening/ "Pitchfork"
- I-526 Extension
- Cross Island Parkway

Since there are several firm proposals in play that can significantly change the complexion of travel conditions and network on Johns Island, this study is intended to stage the amount of development and resultant traffic that can be handled without significant operational impacts to the major facilities and intersections on Johns Island, and to reevaluate the traffic conditions at a later date when the regional roadway initiative program has been settled. In this way, the developer can be sure that nothing is done to preclude any of the proposed initiatives and to protect the character of the roads and context that makes Johns Island unique.

The area of influence of the study site as indicated by the South Carolina Department of Transportation (SCDOT) includes the following four existing and one proposed intersections:

1. Maybank Highway (SC 700) and River Road (S-10-91) (signalized)
2. Maybank Highway (SC 700) and Bohicket Road/Main Road (S-10-20) (signalized)
3. Bohicket Road/Betsy Kerrison Parkway and River Road (S-10-91) (signalized)
4. River Road (S-10-91) and Mullett Hall Road/Site Access (unsignalized)
5. Betsy Kerrison Parkway and Village Site Access (proposed signal)





According to the current site plan, the development will be served by two full movement access points. The proposed access along Betsy Kerrison Parkway (Main Site Access) will be constructed approximately 3,000 feet southwest of the intersection of Betsy Kerrison Parkway and River Road. Mullet Hall Road currently intersects River Road 4,200 feet east of Betsy Kerrison Parkway and will be extended into the proposed site for use as a second access point.



Westbound River Road at  
Bohicket Road/Betsy Kerrison Parkway

The trip generation results indicate that with full buildout of the development, the site has the potential to generate 791 new morning-peak-hour trips and 964 new afternoon-peak-hour trips. Neither SCDOT nor Charleston County staff identified any approved offsite developments for inclusion in this analysis. A 3% per year background growth was applied through year 2013, with a 1% per year growth rate applied from year 2013 to 2031.

Typically, a signalized intersection is said to be operating acceptably at a LOS "D" or better and is operating at capacity at a volume-to-capacity (v/c) ratio of 1.00. LOS for a two-way stop-controlled (TWSC) intersection is determined by the control delay and is defined for the minor movements. Control delay includes initial deceleration delay, queue move up time, stopped delay, and final acceleration delay. With respect to field measurements, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue to the time the vehicle departs from the stop line. LOS is not defined for a TWSC intersection as a whole. For descriptive purposes, results between LOS "A" and LOS "C" for the side street approach are assumed to represent short delays. Results between LOS "D" and LOS "E" for the side street approach are assumed to represent moderate delays, and LOS "F" for the side street approach is assumed to represent long delays. It is typical for stop sign controlled side streets and driveways intersecting major streets to experience long delays during peak hours, particularly for left-turn movements. The majority of the traffic moving through the intersection on the major street experiences little or no delay.

Currently, as indicated by the 2008 Existing Conditions analyses, all of the existing intersections operate at a LOS of "C" or better during both the morning and afternoon peak hours. Per the SCDOT Access and Roadside Management Standards, 2008 Edition, *"The traffic impact study shall include proposed improvements or access management techniques that will mitigate any changes in the levels of service."*

This study analyzed the amount of development and resultant traffic that can be handled without operational impacts to the major facilities and intersections on Johns Island. The analysis determined that the following amount of development could be constructed over the next ten years without any significant impact to the intersections or roadway network that would require improvements:

- 105 Single Family Homes
- 315 Recreation Homes





- 40 Workforce Apartments
- 350 Room Hotel
- 35,000 SF Commercial (entry)
- 20,000 SF Commercial (village)
- 18 Hole Golf Course

Under the phased development plan above, the trip generation results indicate that the site has the potential to generate 478 new morning-peak-hour trips and 527 new afternoon-peak-hour trips.

Under the 2018 No Build Conditions analyses, with the growth in the background traffic, all of the intersections continue to operate at acceptable conditions, with the exception of the signalized intersection of Maybank Highway (SC 700) and River Road, which operates at a LOS "E" and 11% over capacity during the afternoon peak hour.

Under the 2018 Build analyses, with the addition of the phased site development and access management by the developer, all of the existing intersections continue to operate at the same LOS as they do in the 2018 No Build analyses.

The two full movement access driveways operate below capacity and at acceptable LOS in both the morning and afternoon peak hours. There are no improvements recommended for the access connection to Mullet Hall Road; however, to ensure proper site access at the main access driveway to Betsy Kerrison Parkway, the following improvements are recommended to be constructed:

- Construct a full movement access drive with one ingress lane and two egress lanes. The egress lanes should be configured as a separate left turn lane with 150 feet of storage and the through lane shall terminate as a right turn lane. 150 feet of internal protected storage should also be provided for.
- Construct a dedicated left turn lane on the southbound approach of Betsy Kerrison Parkway with 150 feet of storage with appropriate tapers.
- Construct a dedicated right turn lane on the northbound approach of Betsy Kerrison Parkway with 100 feet of storage with appropriate tapers.
- Install traffic signal control upon meeting the appropriate MUTCD and SCDOT traffic signal control warrants.



Mullet Hall Road at River Road



## PROPOSED DEVELOPMENT

Kiawah River Plantation, LP has proposed to develop a mixed use community with 319 single family detached homes, 955 recreation homes, 127 apartments, a 350 room hotel, 80,000 SF of Retail, and an 18-hole golf course. The development is proposed on a 2,003 acre parcel located on Mullet Hall Road, southeast of the intersection of Betsy Kerrison Parkway/Bohicket Road and River Road in Johns Island (Charleston County), SC (Figure 1 – Vicinity Map). Full buildout of the site is expected to occur by 2031 (20 year build out plan).

According to the current site plan, the development will be served by two full movement access points. The proposed access along Betsy Kerrison Parkway (Main Site Access) will be constructed approximately 3,000 feet southwest of the intersection of Betsy Kerrison Parkway and River Road. Mullet Hall Road currently intersects River Road 4,200 feet east of Betsy Kerrison Parkway and will be extended into the proposed site for use as a second access point (Figure 2 – Site Plan).

This analysis presents a “worst case” scenario for the development of the Kiawah River Plantation assuming no regional roadway improvements across Johns Island. There are three regional initiatives in various stages of planning and programming that could have a direct impact on the regional travel characteristics and future operational conditions on Maybank Highway, River Road, Bohicket Road/Betsy Kerrison Parkway. Each potential regional initiative is described below:

- Maybank Highway Widening/ “Pitchfork” - SCDOT and Charleston County had previously identified the widening of Maybank Highway to a five-lane section between the Stono River Bridge and Bohicket/Main Road. The proposal has been met with much opposition from the residents of Johns Island and the City of Charleston due to the impacts the widening would have in the tree canopy and character of Johns Island. Recently, the City has commissioned a study that has developed an alternative to the widening; called the “Pitchfork Plan,” the proposal replaces the multiple lanes on Maybank with a series of parallel 2-lane roadways designed to carry the projected traffic loadings for Maybank Highway. Funding is committed for one of the projects and coordination among all parties is continuing to decide on which alternative will be adopted and constructed; either way, the project will greatly improve the operational situation along Maybank and at the intersections with River Road and Main Road/Bohicket Road.
- I-526 Extension – This proposal includes an initiative to extend I-526 from its current terminus at US 17 in West Ashley south through the eastern shore of Johns Island and across the Stono River to James Island. Some funding is currently programmed and available; pre-NEPA activities have begun with a recently-completed purpose and need statement. Some right-of-way has been purchased along the eastern shore of Johns Island as well. Considered as a four-lane Parkway, the project will allow for quick movement of vehicles from North Charleston to Johns and James Islands, with current projections assuming as many as 60,000 vehicles per day using the roadway by 2030. The project has one interchange on Johns Island, east of River Road on Maybank Highway, and





its construction would put significant amounts of additional traffic on Maybank Highway; however, both the Maybank widening and Pitchfork proposals account for the additional traffic.

- Cross Island Parkway - Conceived as a way of moving traffic quickly and safely from the Stono River Bridge south to Kiawah and Seabrook Islands, the Cross Island Parkway is being pushed by Kiawah and Seabrook residents and stakeholders as an alternative to Maybank, River, and Bohicket Roads. Initial projections show that if the Cross Island Parkway were constructed, reductions of more than 50% of the traffic currently using the other Johns Island roads could be realized. The project is currently unfunded and is even being considered as a tolled facility in order to advance its construction.

As demonstrated above, there are several firm proposals in play that can significantly change the complexion of travel conditions and network on Johns Island. For that reason, this study is intended to stage the amount of development and resultant traffic that can be handled without significant operational impacts to the major facilities and intersections on Johns Island, and to reevaluate the traffic conditions at a later date when the regional roadway initiative program has been settled. In this way, the Developer can be sure that nothing is done to preclude any of the proposed initiatives and to protect the character of the roads and context that makes Johns Island unique.



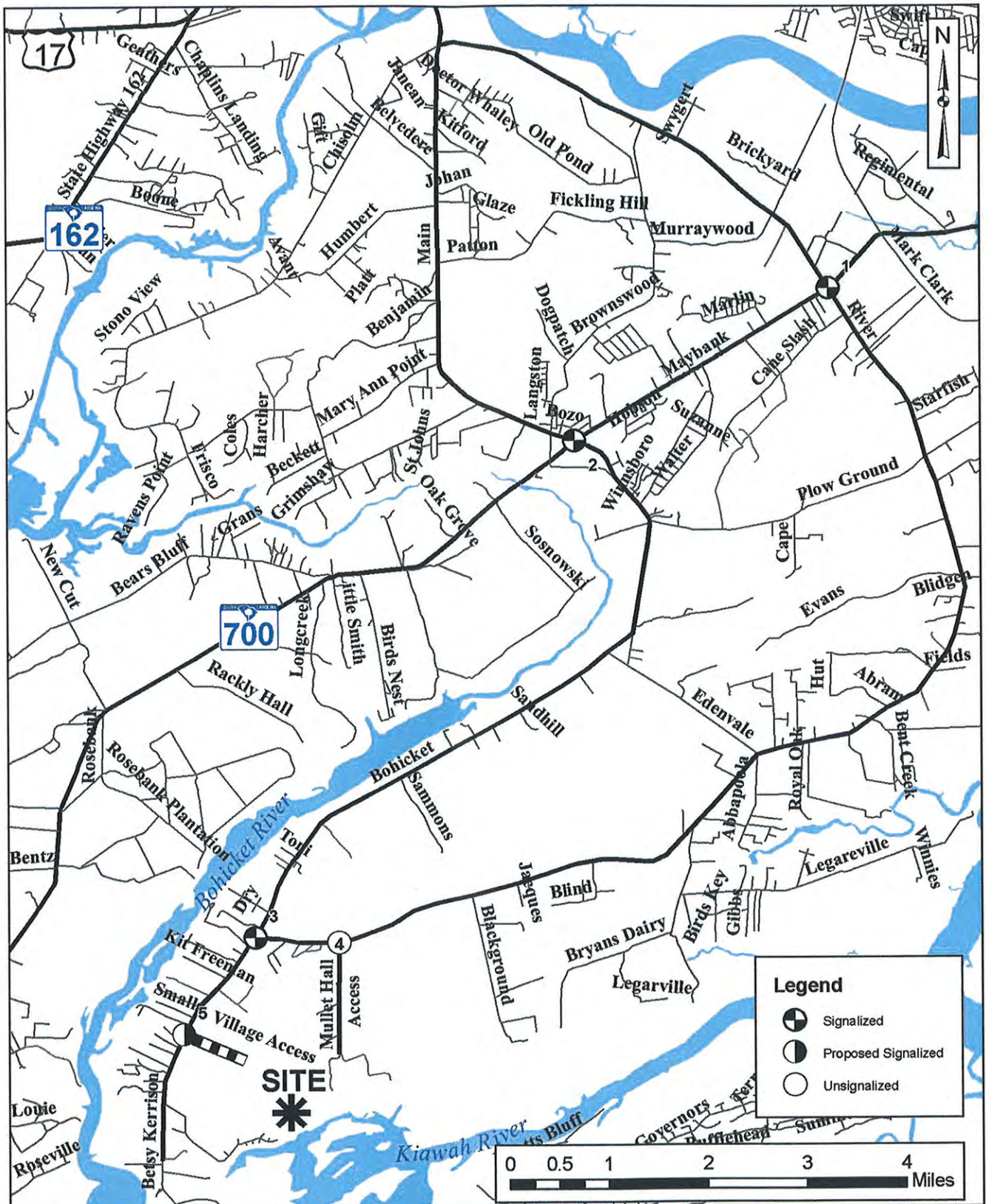
Northbound River Road at  
Maybank Highway (SC 700)



Northbound Betsy Kerrison Parkway at  
River Road









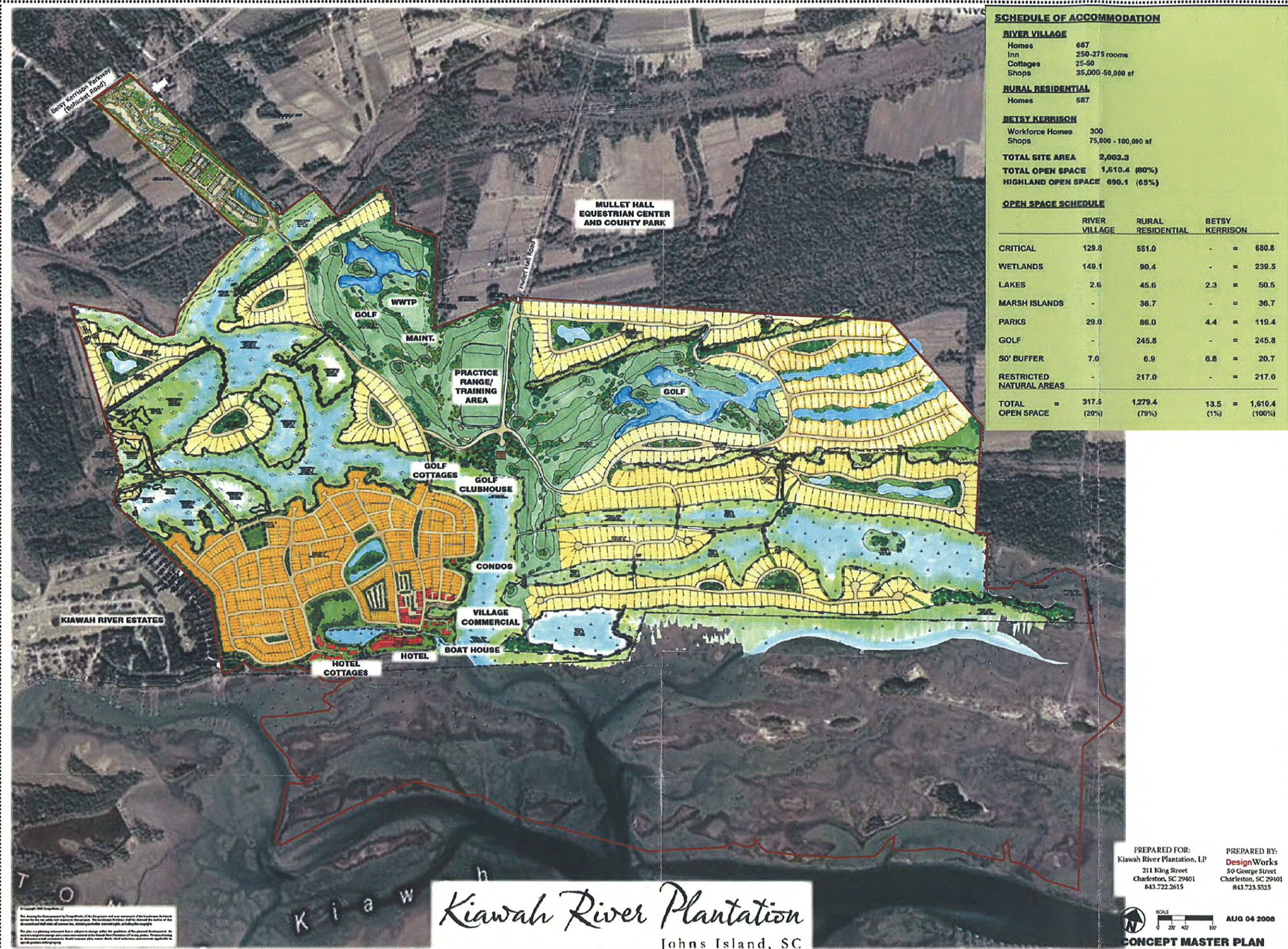


Figure 2

Concept  
Master Plan

Kiawah River  
Plantation TIA



## AREA CONDITIONS

The area of influence of the study site as indicated by the SCDOT includes the following four existing and one proposed intersections:

1. Maybank Highway (SC 700) and River Road (S-10-91) (signalized)
2. Maybank Highway (SC 700) and Bohicket Road/Main Road (S-10-20) (signalized)
3. Bohicket Road/Betsy Kerrison Parkway and River Road (S-10-91) (signalized)
4. River Road (S-10-91) and Mullett Hall Road/Site Access (unsignalized)
5. Betsy Kerrison Parkway and Village Site Access (proposed signal or roundabout)

Maybank Highway (SC 700) is a two-lane, rural arterial with a posted speed limit of 45 mph in the vicinity of the site. The Annual Average Daily Traffic (AADT) between River Road and Main Road on Maybank Highway is about 15,000 vehicles per day (2007 AADT data provided by the South Carolina Department of Transportation). Maybank Highway has no sidewalks, no curb and gutter, and no apparent sight distance issues at either of the two intersections potentially affected by the proposed development.

Bohicket Road (S-10-20) is a rural arterial with a posted speed limit of 50 mph in the vicinity of the site. The road name "Bohicket Road" is only applicable to the portion of road between Maybank Highway and River Road. Northeast of Maybank Highway it is known as "Main Road", and southwest of River Road it is known as "Betsy Kerrison Parkway."

Nearest the site, particularly between River Road and the proposed Village Access, Betsy Kerrison Parkway exists as a four-lane divided road with a posted speed limit of 50 mph and an Annual Average Daily Traffic (AADT) of about 12,000 vehicles per day. Other than a few brief sections of sidewalk on the southbound portion of Betsy Kerrison Parkway near the proposed site access, the roadway has no sidewalks, no curb and gutter, and no apparent sight distance issues.

River Road (S-10-91) is a two-lane, undivided, rural facility with a posted speed limit of 45 mph in the vicinity of the site. The road serves many homes and small neighborhoods and supports over 5000 vehicles per day between Maybank Highway (SC 700) and Bohicket Road. It has no sidewalks, no curb and gutter, and no apparent sight distance issues at the major intersections within the vicinity of the site.

Mullett Hall Road is a local street with no posted speed limit and limited amounts of daily traffic. The pavement is in poor condition and there is no striping on the roadway. The road has no sidewalks, no curb and gutter, and no apparent sight distance issues at its stop-sign controlled intersection with River Road. Currently, Mullett Hall Road is a dead-end street, but it is proposed that this roadway be extended into the Kiawah River Plantation Development to serve as a secondary access point.



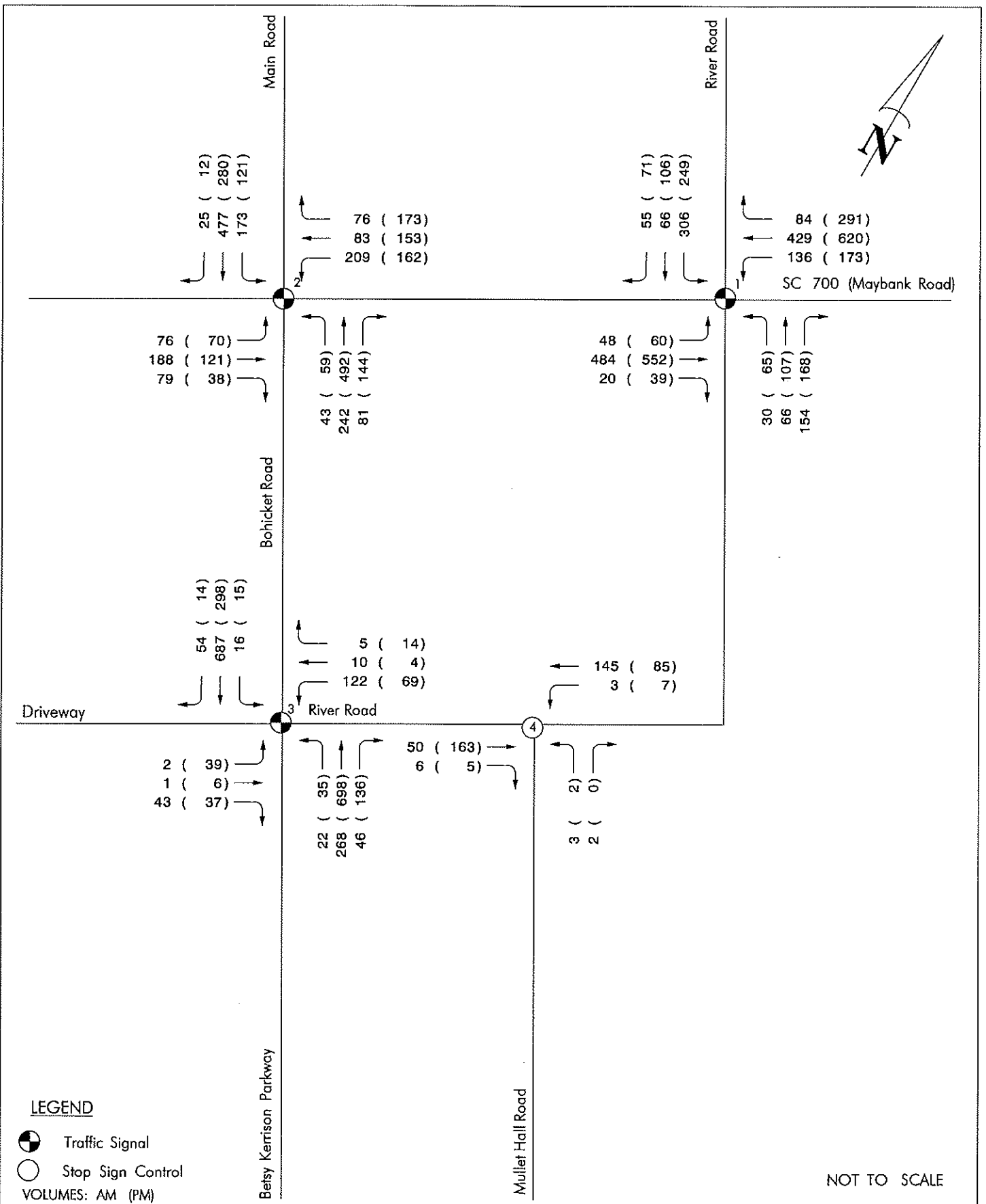
Morning (7-9 AM) and afternoon (4-6 PM) peak period turning movement counts were conducted at the intersections of Maybank Highway and River Road Maybank Highway and Bohicket Road/Main Road on July 9<sup>th</sup>, 2008. Peak hour turning movement counts were conducted at the intersections of Bohicket Road and River Road and River Road and Mullet Hall Road on July 10<sup>th</sup>, 2008.

Count data is provided in the Appendix. Figure 3 shows the existing 2008 traffic volumes for the morning and afternoon peak hours.



**Southbound River Road at  
Maybank Highway (SC 700)**







The projected background traffic volumes used in the analyses were developed from the existing peak-hour turning-movement count data. The existing intersection turning-movement volumes were increased using a 3 percent assumed growth rate until 2013 with a 1 percent growth rate for the remaining years (2013-2031) in order to obtain the background volumes.

### Table 1a: Site Trip Generation – Full Buildout

Land Use			AM Peak Hour			PM Peak Hour		
			Enter	Exit	Total	Enter	Exit	Total
Single Family Detached Home (LUC 210) [EQUATIONS]	319	DUs	58	175	233	192	113	305
Recreation Homes (LUC 260) [RATES] <sup>1</sup>	955	DUs	105	48	153	105	143	248
Apartments (LUC 220) [EQUATIONS]	127	DUs	13	53	66	57	31	88
Hotel (LUC 310) [RATES]	350	Rooms	119	77	196	109	98	207
Commercial {Entry} (LUC 820) [EQUATIONS]	50,000	SF	63	40	103	190	206	396
Commercial {Village} (LUC 820) [EQUATIONS] <sup>2</sup>	30,000	SF	46	30	76	136	147	283
Golf Course (LUC 430) [RATES]	18	Holes	32	8	40	22	28	50
<b>Subtotal</b>			<b>436</b>	<b>431</b>	<b>867</b>	<b>811</b>	<b>766</b>	<b>1,577</b>
<i>retail</i>			<i>0</i>	<i>0</i>	<i>0</i>	<i>-29</i>	<i>-42</i>	<i>-71</i>
<i>residential</i>			<i>0</i>	<i>0</i>	<i>0</i>	<i>-42</i>	<i>-29</i>	<i>-71</i>
<i>PassBy Reduction (PM Retail)*</i>			<i>0</i>	<i>0</i>	<i>0</i>	<i>-90</i>	<i>-98</i>	<i>-188</i>
<b>Total New Trips</b>			<b>390</b>	<b>401</b>	<b>791</b>	<b>514</b>	<b>450</b>	<b>964</b>

Trip Generation, 7th Edition, Institute of Transportation Engineers, Washington, DC. 2003.

AM peak hour pass-by & internal capture not applicable per the 2003 ITE Trip Generation Manual.

<sup>2</sup>The Village commercial is anticipated to only serve residents of the homes and patrons of the hotel. No trips from the external network are anticipated. Therefore, these trips are included for internal capture purposes. They are not included in the pass-by calculations. They are subtracted from the final total of new trips.

The trip generation results indicate that with full buildout of the development, the site has the potential to generate 791 new morning-peak-hour trips and 964 new afternoon-peak-hour trips. Under the phased development plan, the trip generation results indicate that the site has the potential to generate 478 new morning-peak-hour trips and 527 new afternoon-peak-hour trips. This information is presented in Table 1b.

Land Use			AM Peak Hour			PM Peak Hour		
			Enter	Exit	Total	Enter	Exit	Total
Single Family Detached Home (LUC 210) [EQUATIONS]	105	DUs	21	62	83	71	41	112
Recreation Homes (LUC 260) [RATES] <sup>1</sup>	315	DUs	35	16	51	35	47	82
Apartments (LUC 220) [EQUATIONS]	40	DUs	5	19	24	26	14	40
Hotel (LUC 310) [RATES]	350	Rooms	119	77	196	109	98	207
Commercial {Entry} (LUC 820) [EQUATIONS]	35,000	SF	51	33	84	150	163	313
Commercial {Village} (LUC 820) [EQUATIONS] <sup>2</sup>	20,000	SF	36	23	59	104	113	217
Golf Course (LUC 430) [RATES]	18	Holes	32	8	40	22	28	50
<b>Subtotal</b>			<b>299</b>	<b>238</b>	<b>537</b>	<b>517</b>	<b>504</b>	<b>1,021</b>
<i>retail</i>			<i>0</i>	<i>0</i>	<i>0</i>	<i>-23</i>	<i>-33</i>	<i>-56</i>
<i>residential</i>			<i>0</i>	<i>0</i>	<i>0</i>	<i>-33</i>	<i>-23</i>	<i>-56</i>
<i>PassBy Reduction (PM Retail) *</i>			<i>0</i>	<i>0</i>	<i>0</i>	<i>-79</i>	<i>-86</i>	<i>-165</i>
<b>Total New Trips</b>			<b>263</b>	<b>215</b>	<b>478</b>	<b>278</b>	<b>249</b>	<b>527</b>

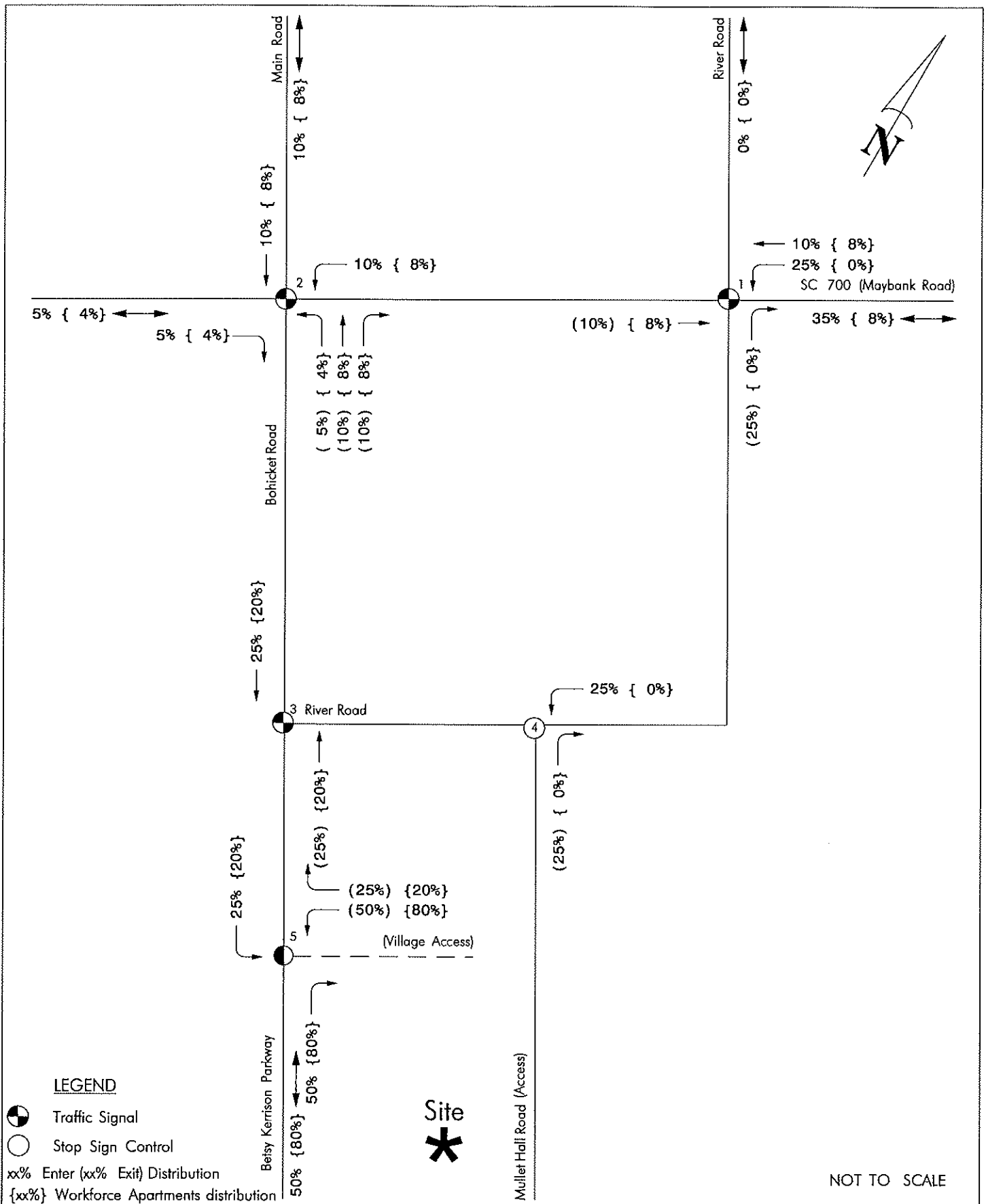
Trip Generation, 7th Edition, Institute of Transportation Engineers, Washington, DC. 2003.

AM peak hour pass-by & internal capture not applicable per the 2003 ITE Trip Generation Manual.

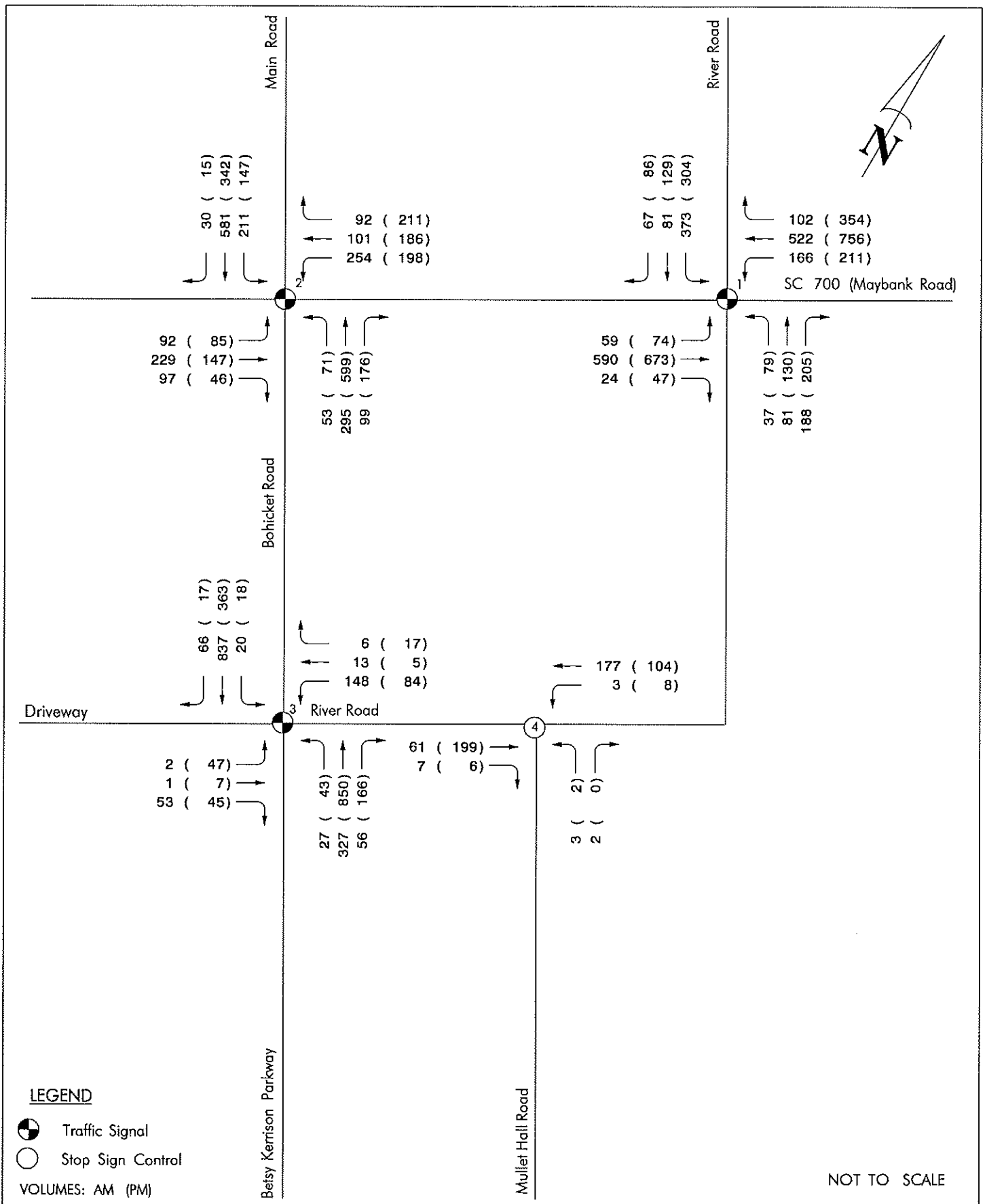
<sup>2</sup>The Village commercial is anticipated to only serve residents of the homes and patrons of the hotel. No trips from the external network are anticipated. Therefore, these trips are included for internal capture purposes. They are not included in the pass-by calculations. They are subtracted from the final total of new trips.

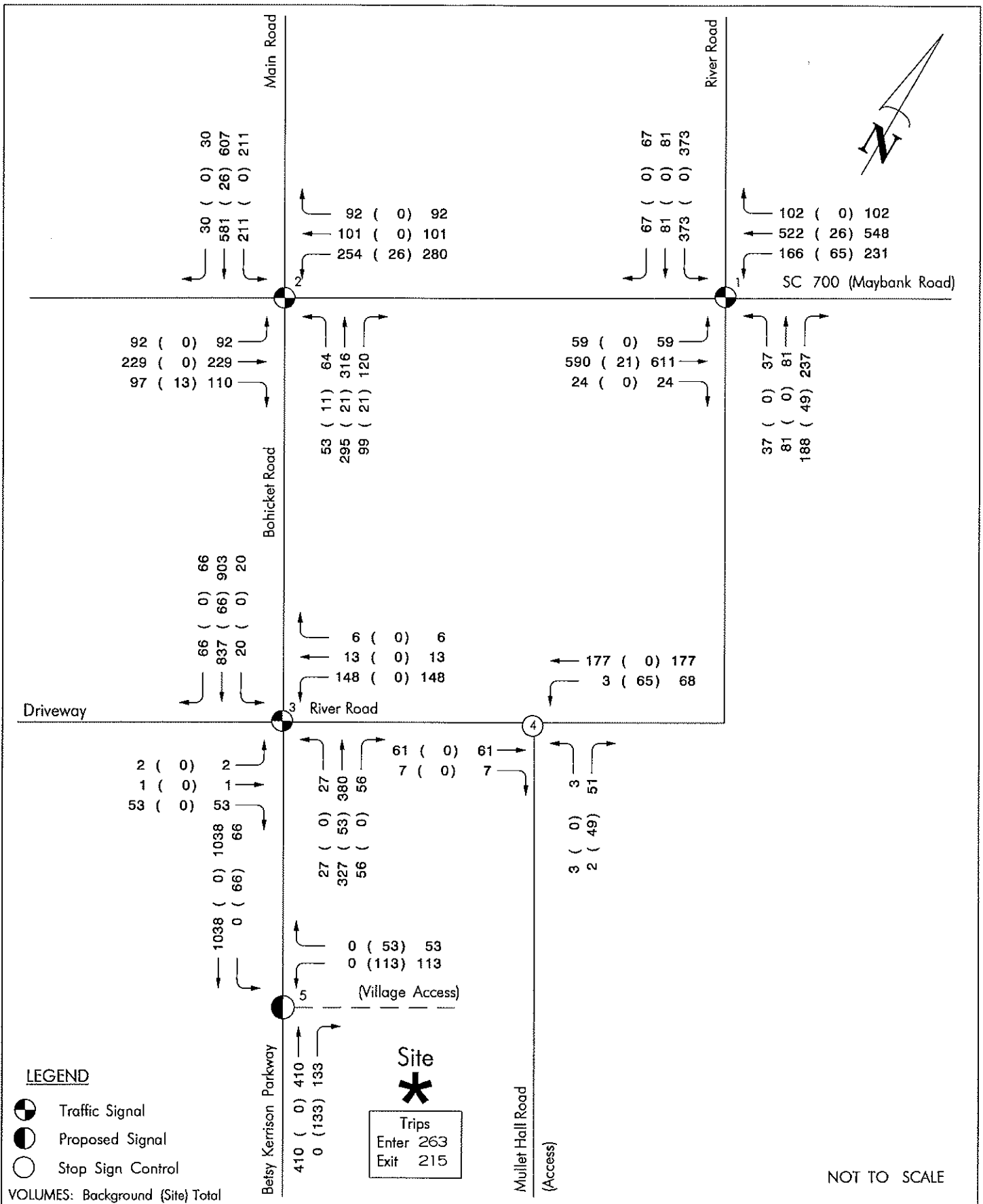
Having mixed land uses in close proximity to each other encourages one trip to the development combining multiple destinations. The residential and retail components are combined where the origin and destination are within the neighborhood center development. This adjustment is termed internal capture. The internal capture reductions were taken in accordance to the ITE Trip Generation Handbook.

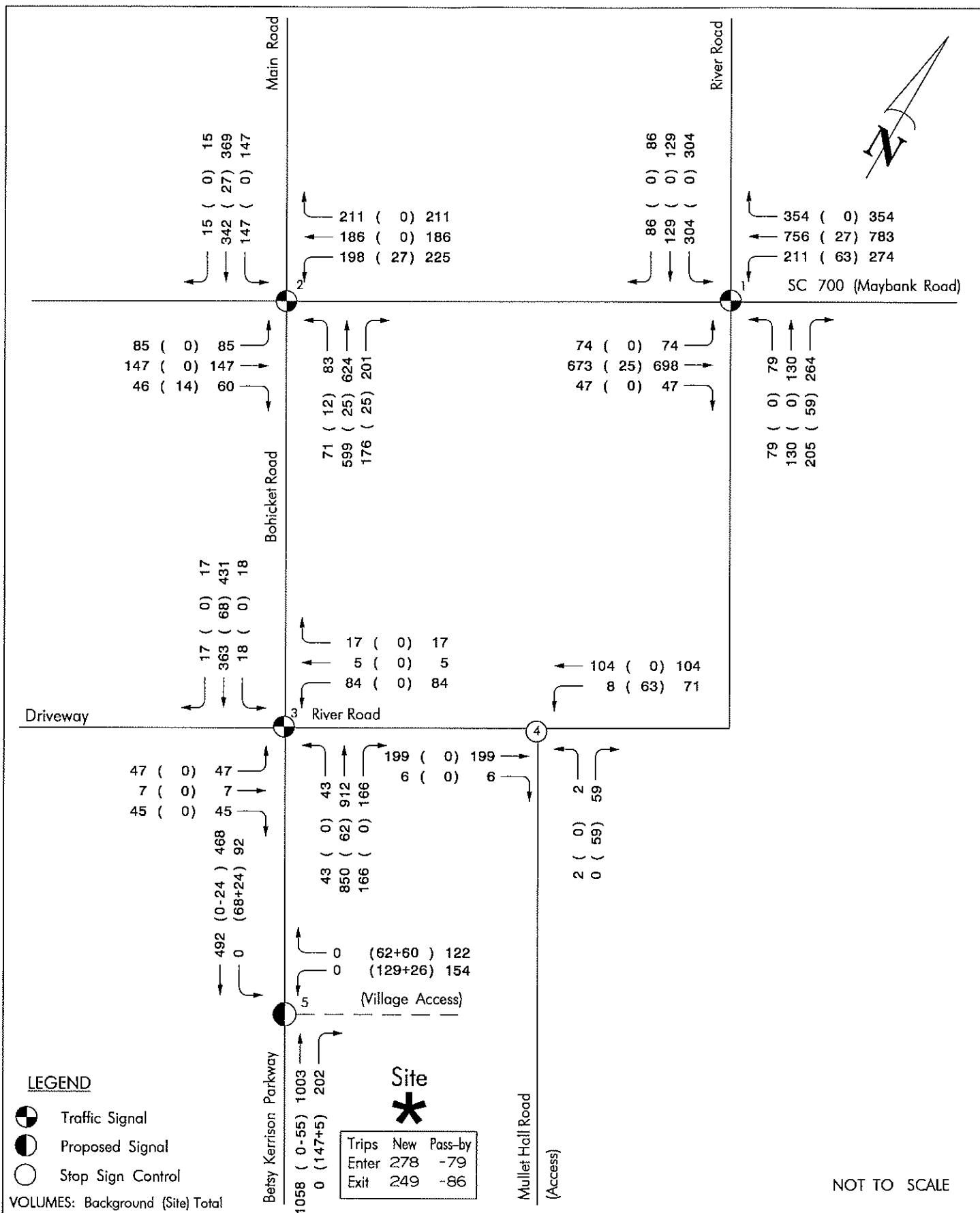
Figure 4 depicts the directional distribution for the site that has been submitted to SCDOT and Charleston County. Figure 5 depicts the 2018 No Build Traffic Volumes. The trip assignments for the 2018 Build morning and afternoon peak hour traffic volumes are presented in Figures 6a and 6b.













## TRAFFIC ANALYSIS

The intersections identified within the area of influence were analyzed to identify the traffic impact that the site development has under different scenarios. Recommendations for roadway improvements to accommodate the traffic are a result of the analysis. The traffic analysis is based on the LOS analysis at the identified intersections.

LOS is a qualitative measurement of traffic operations. It is a measure of delay time. The Transportation Research Board's Highway Capacity Manual<sup>1</sup> (HCM) defines six levels of service for intersections with LOS "A" representing the best operating condition and LOS "F" the worst. Table 16-2 of the HCM gives the criteria for signalized intersections and Table 17-2 gives the criteria for stop sign controlled intersections.

HCM Table 16-2		HCM Table 17-2	
Signalized Level of Service	Signal Delay per Vehicle (sec/veh)	Unsignalized Level of Service	Stopped Delay per Vehicle (sec/veh)
A	$\leq 10.0$	A	$\leq 10.0$
B	$> 10.0$ and $\leq 20.0$	B	$> 10.0$ and $\leq 15.0$
C	$> 20.0$ and $\leq 35.0$	C	$> 15.0$ and $\leq 25.0$
D	$> 35.0$ and $\leq 55.0$	D	$> 25.0$ and $\leq 35.0$
E	$> 55.0$ and $\leq 80.0$	E	$> 35.0$ and $\leq 50.0$
F	$> 80.0$	F	$> 50.0$

SYNCHRO Pro 7.0 was the software package used in determining the delay, capacity and corresponding level of service at the signalized and unsignalized intersections. This software is based on the analysis procedures defined in the Highway Capacity Manual. The analysis optimizes the intersection splits for the approach volumes. The intersection worksheet reports are provided in the Appendix.

Typically, a signalized intersection is said to be operating acceptably at a LOS "D" or better and is operating at capacity at a volume-to-capacity (v/c) ratio of 1.00. LOS for a two-way stop-controlled (TWSC) intersection is determined by the control delay and is defined for the minor movements. Control delay includes initial deceleration delay, queue move up time, stopped delay, and final acceleration delay. With respect to field measurements, control delay is defined as the total elapsed time from the time a vehicle stops at the end of the queue to the time the vehicle departs from the stop line. LOS is not defined for a TWSC intersection as a whole. For descriptive purposes, results between LOS "A" and LOS "C" for the side street approach are assumed to represent short delays. Results between LOS "D" and LOS "E" for the side street approach are assumed to represent moderate delays, and LOS "F" for the side street approach is assumed to represent long delays. It is typical for stop sign controlled side streets and driveways intersecting major streets to experience long delays during peak hours, particularly for left-turn movements. The majority of the traffic moving through the intersection on the major street experiences little or no delay.

<sup>1</sup> National Research Council. Transportation Research Board. Highway Capacity Manual, Washington, DC. 2002. Chapters 2, 16, and 17.



Currently, as indicated by the 2008 Existing Conditions analyses, all of the existing intersections operate at a LOS of “C” or better during both the morning and afternoon peak hours. Per the SCDOT Access and Roadside Management Standards, 2008 Edition, *“The traffic impact study shall include proposed improvements or access management techniques that will mitigate any changes in the levels of service.”*

This study analyzed the amount of development and resultant traffic that can be handled without operational impacts to the major facilities and intersections on Johns Island. The analysis determined that the following amount of development could be constructed over the next ten years without any significant impact to the intersections or roadway network that would require improvements:

- 105 Single Family Homes
- 315 Recreation Homes
- 40 Workforce Apartments
- 350 Room Hotel
- 35,000 SF Commercial (entry)
- 20,000 SF Commercial (village)
- 18 Hole Golf Course

Under the phased development plan above, the trip generation results indicate that the site has the potential to generate 478 new morning-peak-hour trips and 527 new afternoon-peak-hour trips.

Under the 2018 No Build Conditions analyses, with the growth in the background traffic, all of the intersections continue to operate at acceptable conditions, with the exception of the signalized intersection of Maybank Highway (SC 700) and River Road, which operates at a LOS “E” and 11% over capacity during the afternoon peak hour.

Under the 2018 Build analyses, with the addition of the phased site development and access management by the developer, all of the existing intersections continue to operate at the same LOS as they do in the 2018 No Build analyses.

In all future cases (both No Build and Build), the intersection of Maybank Highway with River Road is projected to operate above the minimal acceptable LOS “D” threshold. However, it is anticipated that either the Maybank Widening or “Pitchfork” implementation will address these operational constraints. It is also important to note that these initiatives are the most imminent of that discussed from a funding and approval standpoint.

The two full movement access driveways operate below capacity and at acceptable LOS in both the morning and afternoon peak hours. There are no improvements recommended for the access connection to Mullet Hall Road; however, to ensure proper site access at the main access driveway to Betsy Kerrison Parkway, improvements are recommended.

The delay, capacity and LOS results are indicated for each of the intersections in Table 2.



Table 2: Levels of Service

Intersection	AM Peak			PM Peak		
	Delay	Capacity	Level Of	Delay	Capacity	Level Of
	(sec/veh)	(v/c)	Service	(sec/veh)	(v/c)	Service
<b>2008 Existing Conditions</b>						
1. Maybank Highway (SC 700) and River Road	26.2	0.74	C	32.8	0.89	C
2. Maybank Highway (SC 700) and Bohicket Road/Main Road	23.8	0.67	C	27.8	0.72	C
3. Bohicket Road/Betsy Kerrison Pkwy and River Road	11.8	0.40	B	13.8	0.59	B
4. River Road and Mullet Hall Road <sup>1</sup>	9.3	0.01	A	10.2	0.01	B
<b>2018 No Build</b>						
1. Maybank Highway (SC 700) and River Road	35.6	0.85	D	72.6	1.11	E
2. Maybank Highway (SC 700) and Bohicket Road/Main Road	29.3	0.81	C	36.7	0.87	D
3. Bohicket Road/Betsy Kerrison Pkwy and River Road	12.2	0.47	B	16.8	0.70	B
4. River Road and Mullet Hall Road <sup>1</sup>	9.5	0.01	A	10.7	0.01	B
<b>2018 Build - Phase I</b>						
1. Maybank Highway (SC 700) and River Road	41.3	0.96	D	78.3	1.13	E
2. Maybank Highway (SC 700) and Bohicket Road/Main Road	32.8	0.86	C	38.6	0.89	D
3. Bohicket Road/Betsy Kerrison Pkwy and River Road	12.2	0.49	B	19.4	0.74	B
4. River Road and Mullet Hall Road (Access) <sup>1</sup>	9.0	0.06	A	9.9	0.08	A
5. Betsy Kerrison Pkwy and Village Site Access <sup>2</sup>	7.1	0.51	A	9	0.51	A

\* The results are not meaningful.

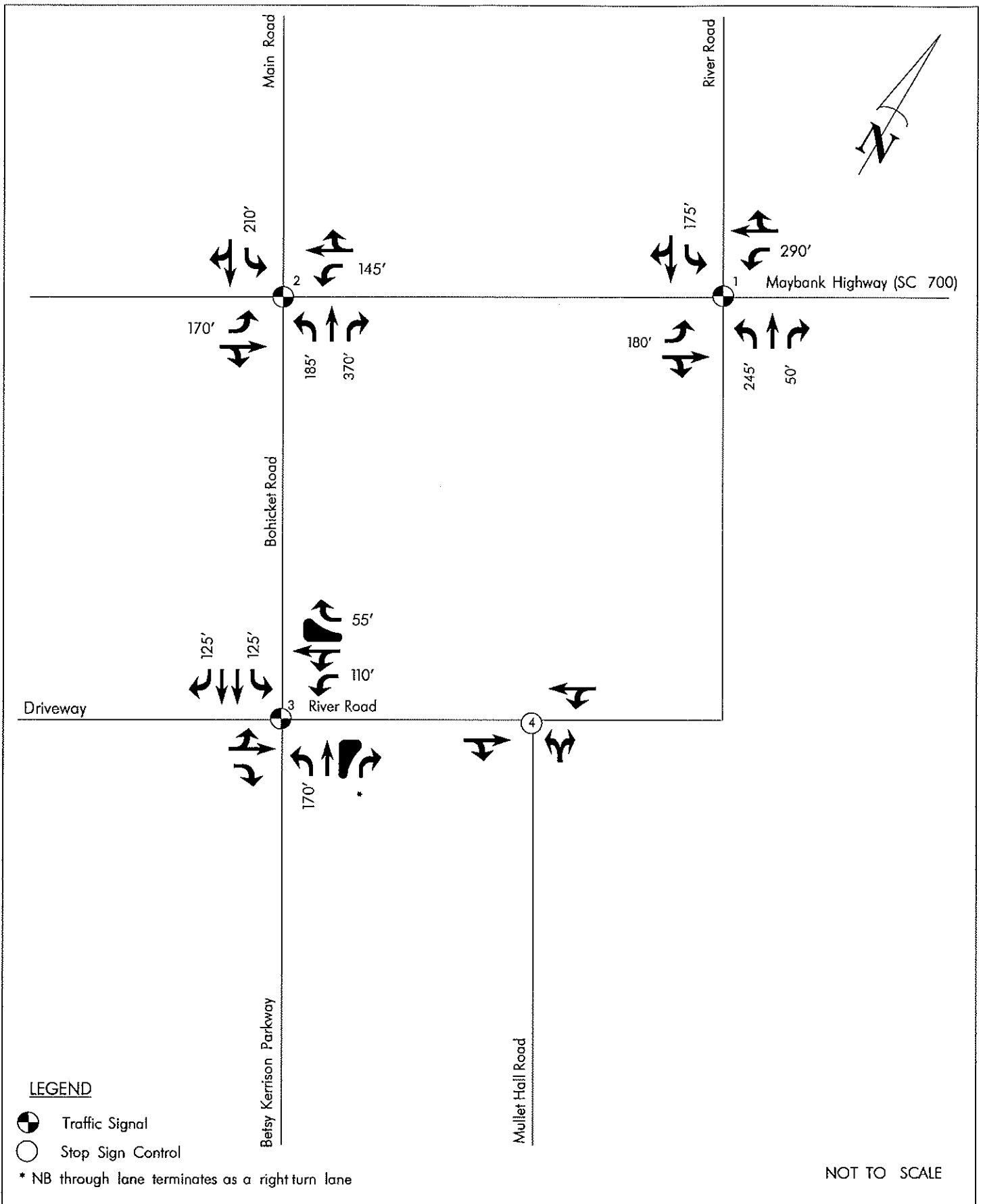
<sup>1</sup> Flow Rate/Capacity and LOS correspond to the most critical movement of the unsignalized intersection.

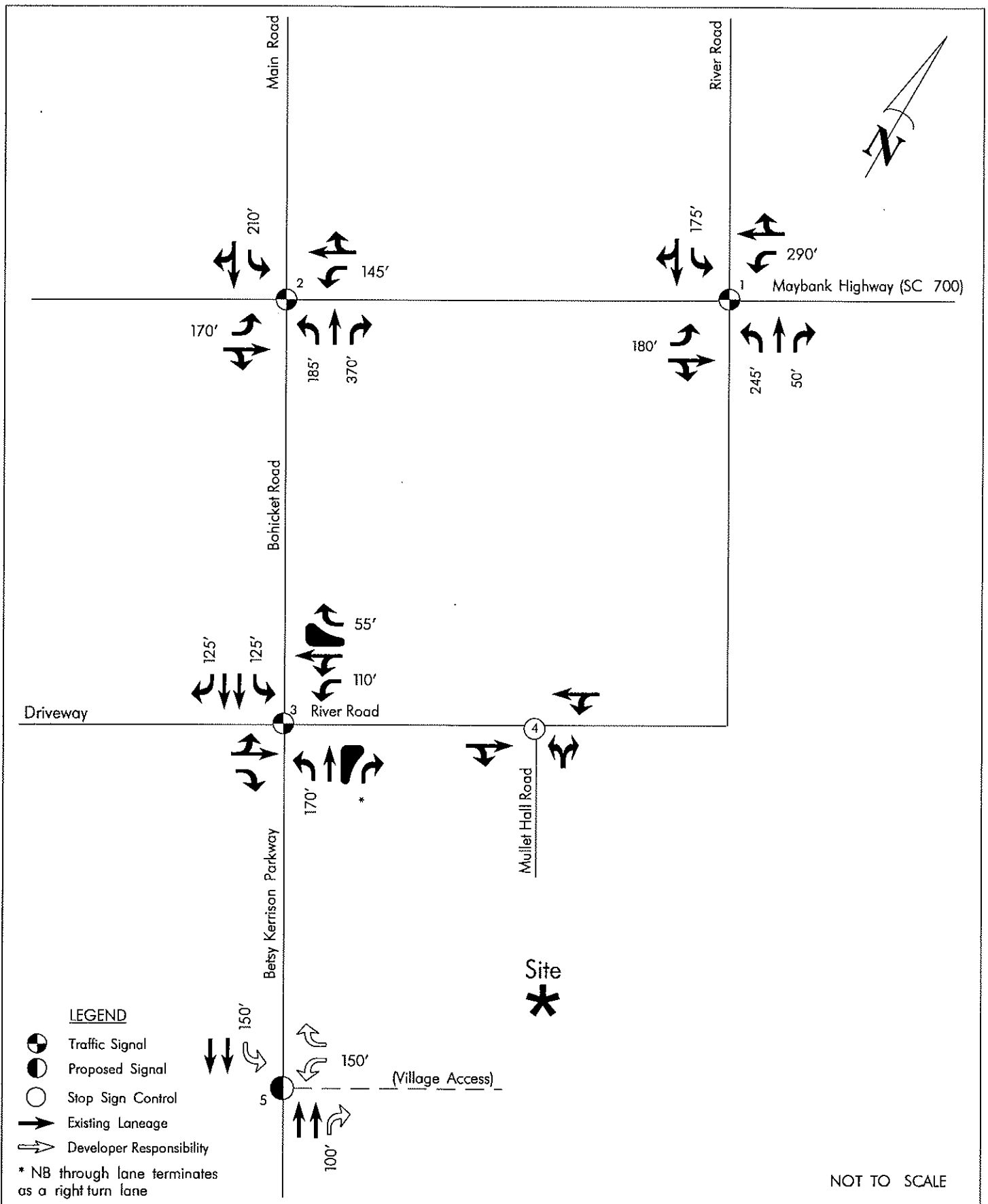
<sup>2</sup> Improvements to the Village Access include left and right turn lane into and out of the site along with traffic signal control.

The 2008 existing and 2018 future laneage conditions are presented schematically in Figures 7a and 7b.









## CONCLUSIONS

In conclusion, this study recommends the following development plan be approved with no road improvements to the existing network since there are several firm proposals in play that can significantly change the complexion of travel conditions and network on Johns Island:

- 105 Single Family Homes
- 315 Recreation Homes
- 40 Workforce Apartments
- 350 Room Hotel
- 35,000 SF Commercial (entry)
- 20,000 SF Commercial (village)
- 18 Hole Golf Course

The existing roadway network and infrastructure can accommodate this amount of development without any significant operational impacts to the major facilities and intersections on Johns Island. It is recommended that the traffic conditions be reevaluated at a later date when the regional roadway initiative program has been settled and/or when the remainder of the Kiawah River Plantation development is at a point to move forward with completion.

There are no improvements recommended for the access connection to Mullet Hall Road, however, to ensure proper site access at the main access driveway to Betsy Kerrison Parkway the following improvements are recommended to be constructed:

- Construct a full movement access drive with one ingress lane and two egress lanes. The egress lanes should be configured as a separate left turn lane with 150 feet of storage and the through lane shall terminate as a right turn lane. 150 feet of internal protected storage should also be provided for.
- Construct a dedicated left turn lane on the southbound approach of Betsy Kerrison Parkway with 150 feet of storage with appropriate tapers.
- Construct a dedicated right turn lane on the northbound approach of Betsy Kerrison Parkway with 100 feet of storage with appropriate tapers.
- Install traffic signal control upon meeting the appropriate MUTCD and SCDOT traffic signal control warrants.





## APPENDIX





# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1934  
Counted By: JFU  
Weather: Mild  
Other: KTG

File Name : 08523-01  
Site Code : 00852301  
Start Date : 7/9/2008  
Page No : 1

## Groups Printed- Cars - Trucks & Buses

	River Rd Northbound					River Rd Southbound					Maybank Hwy Eastbound					Maybank Hwy Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	6	14	31	0	51	58	23	7	0	88	6	100	4	0	110	21	81	15	0	117	366
07:15 AM	4	12	48	0	64	55	13	20	0	88	2	118	3	0	123	24	90	30	0	144	419
07:30 AM	4	18	49	0	71	76	20	7	0	103	5	99	6	0	110	20	96	12	0	128	412
07:45 AM	1	24	47	0	72	82	15	11	0	108	9	118	10	0	137	26	132	21	0	179	496
Total	15	68	175	0	258	271	71	45	0	387	22	435	23	0	480	91	399	78	0	568	1693
08:00 AM	7	17	44	0	68	90	24	13	1	128	11	124	8	0	143	48	110	21	0	179	518
08:15 AM	7	10	36	0	53	70	19	11	0	100	8	104	2	0	114	27	108	20	0	155	422
08:30 AM	9	26	29	0	64	74	10	13	0	97	14	127	3	0	144	23	97	13	2	135	440
08:45 AM	7	13	45	0	65	72	13	18	1	104	15	129	7	0	151	38	114	30	0	182	502
Total	30	66	154	0	250	306	66	55	2	429	48	484	20	0	552	136	429	84	2	651	1882
Break																					
04:00 PM	15	28	38	0	81	58	25	17	0	100	15	148	8	0	171	43	161	72	0	276	628
04:15 PM	17	25	41	0	83	63	22	21	0	106	11	144	11	0	166	49	158	74	0	281	636
04:30 PM	14	25	48	0	87	61	28	18	0	107	16	90	9	0	115	47	166	71	0	284	593
04:45 PM	16	27	46	0	89	63	29	16	0	108	14	146	9	0	169	37	159	78	0	274	640
Total	62	105	173	0	340	245	104	72	0	421	56	528	37	0	621	176	644	295	0	1115	2497
05:00 PM	17	22	47	0	86	65	25	19	0	109	13	138	11	0	162	40	155	78	2	275	632
05:15 PM	14	28	44	0	86	64	31	19	0	114	16	140	10	0	166	32	159	68	1	260	626
05:30 PM	18	30	31	0	79	57	21	17	0	95	17	128	9	0	154	64	147	67	0	278	606
05:45 PM	7	31	29	0	67	46	32	18	0	96	26	89	6	0	121	51	156	74	0	281	565
Total	56	111	151	0	318	232	109	73	0	414	72	495	36	0	603	187	617	287	3	1094	2429
06:00 PM	15	18	32	0	65	37	11	18	0	66	17	99	4	0	120	44	149	83	0	276	527
Grand Total	178	368	685	0	1231	1091	361	263	2	1717	215	2041	120	0	2376	634	2238	827	5	3704	9028
Apprch %	14.5	29.9	55.6	0		63.5	21	15.3	0.1		9	85.9	5.1	0		17.1	60.4	22.3	0.1		
Total %	2	4.1	7.6	0	13.6	12.1	4	2.9	0	19	2.4	22.6	1.3	0	26.3	7	24.8	9.2	0.1	41	
Cars	174	337	673	0	1184	1082	348	258	2	1690	207	2011	114	0	2332	617	2196	805	5	3623	8829
% Cars	97.8	91.6	98.2	0	96.2	99.2	96.4	98.1	100	98.4	96.3	98.5	95	0	98.1	97.3	98.1	97.3	100	97.8	97.8
Trucks & Buses	4	31	12	0	47	9	13	5	0	27	8	30	6	0	44	17	42	22	0	81	199
% Trucks & Buses	2.2	8.4	1.8	0	3.8	0.8	3.6	1.9	0	1.6	3.7	1.5	5	0	1.9	2.7	1.9	2.7	0	2.2	2.2

Note: Pedestrian data shown for each approach is crossing the approach from either direction combined.

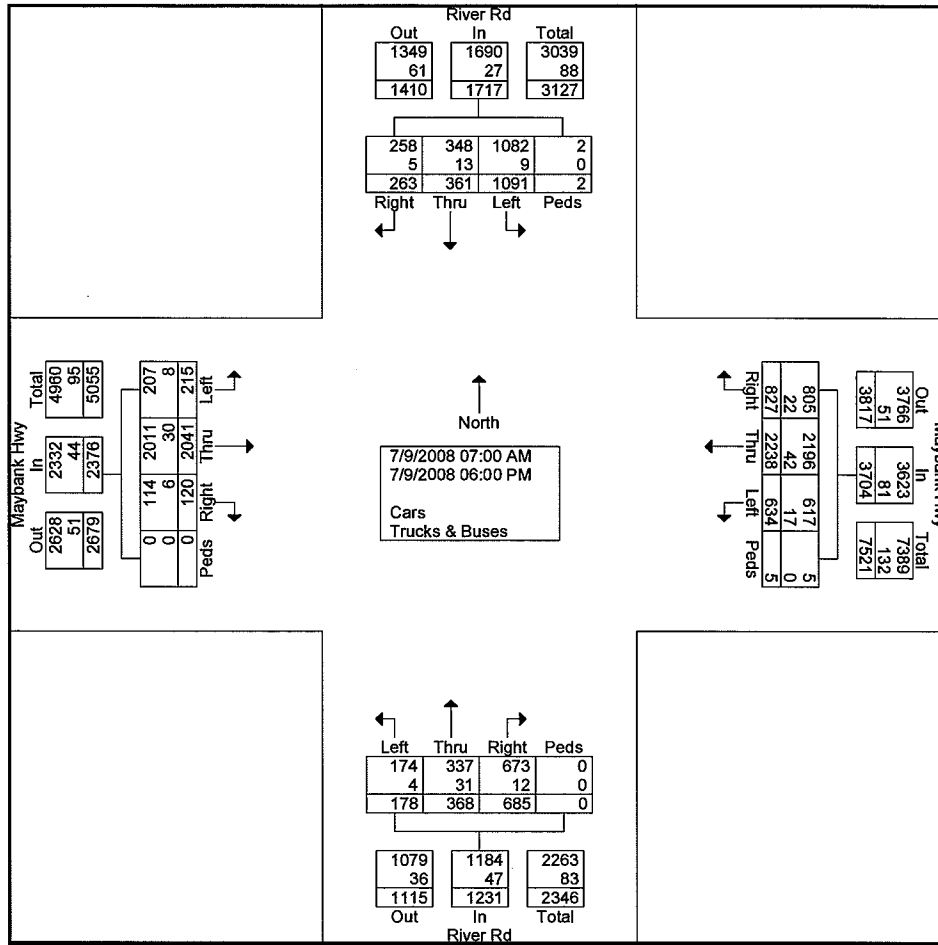


# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1934  
Counted By: JFU  
Weather: Mild  
Other: KTG

File Name : 08523-01  
Site Code : 00852301  
Start Date : 7/9/2008  
Page No : 2







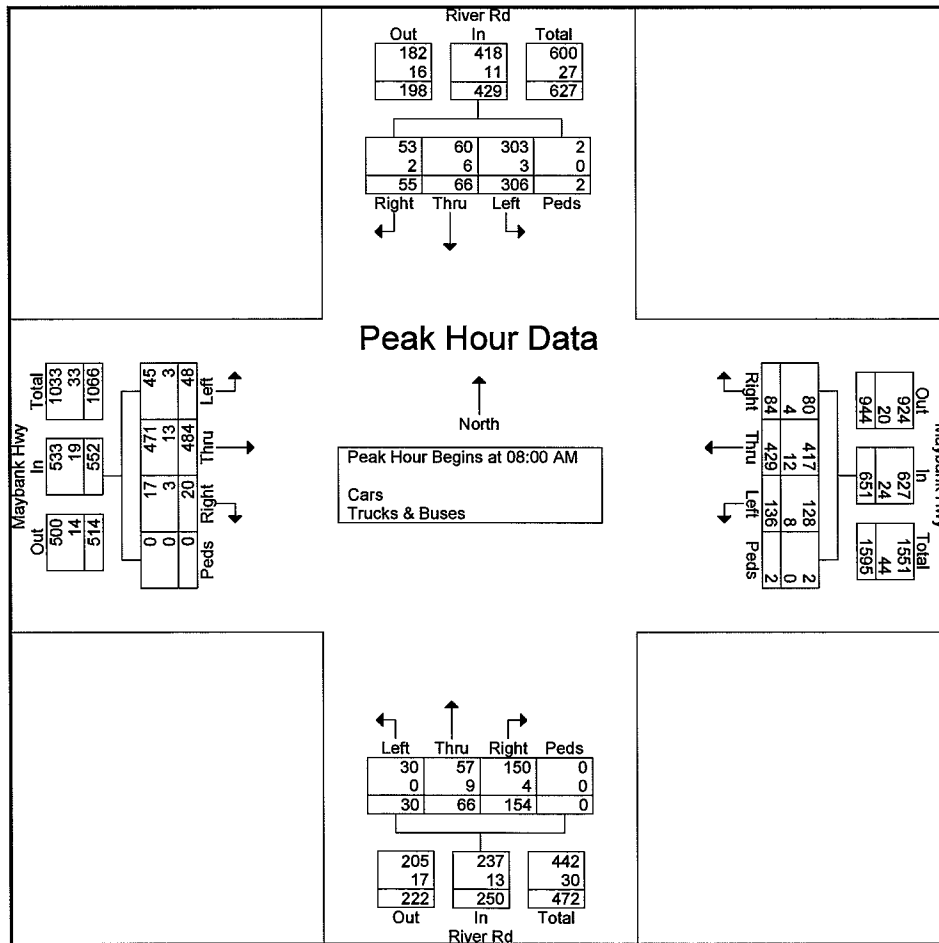
# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1934  
Counted By: JFU  
Weather: Mild  
Other: KTG

File Name : 08523-01  
Site Code : 00852301  
Start Date : 7/9/2008  
Page No : 3

	River Rd Northbound					River Rd Southbound					Maybank Hwy Eastbound					Maybank Hwy Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	7	17	44	0	68	90	24	13	1	128	11	124	8	0	143	48	110	21	0	179	518
08:15 AM	7	10	36	0	53	70	19	11	0	100	8	104	2	0	114	27	108	20	0	155	422
08:30 AM	9	26	29	0	64	74	10	13	0	97	14	127	3	0	144	23	97	13	2	135	440
08:45 AM	7	13	45	0	65	72	13	18	1	104	15	129	7	0	151	38	114	30	0	182	502
Total Volume	30	66	154	0	250	306	66	55	2	429	48	484	20	0	552	136	429	84	2	651	1882
% App. Total	12	26.4	61.6	0		71.3	15.4	12.8	0.5		8.7	87.7	3.6	0		20.9	65.9	12.9	0.3		
PHF	.833	.635	.856	.000	.919	.850	.688	.764	.500	.838	.800	.938	.625	.000	.914	.708	.941	.700	.250	.894	.908
Cars	30	57	150	0	237	303	60	53	2	418	45	471	17	0	533	128	417	80	2	627	1815
% Cars	100	86.4	97.4	0	94.8	99.0	90.9	96.4	100	97.4	93.8	97.3	85.0	0	96.6	94.1	97.2	95.2	100	96.3	96.4
Trucks & Buses																					
% Trucks & Buses	0	13.6	2.6	0	5.2	1.0	9.1	3.6	0	2.6	6.3	2.7	15.0	0	3.4	5.9	2.8	4.8	0	3.7	3.6





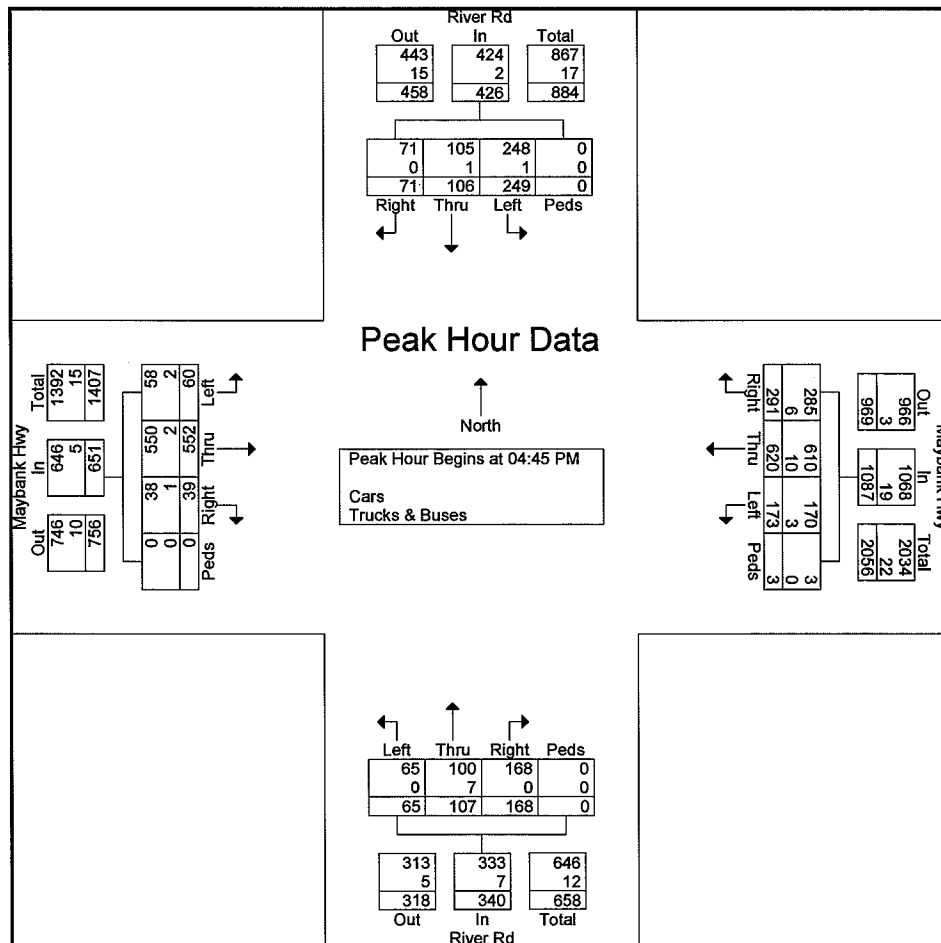
# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1934  
Counted By: JFU  
Weather: Mild  
Other: KTG

File Name : 08523-01  
Site Code : 00852301  
Start Date : 7/9/2008  
Page No : 4

	River Rd Northbound					River Rd Southbound					Maybank Hwy Eastbound					Maybank Hwy Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 06:00 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	16	27	46	0	89	63	29	16	0	108	14	146	9	0	169	37	159	78	0	274	640
05:00 PM	17	22	47	0	86	65	25	19	0	109	13	138	11	0	162	40	155	78	2	275	632
05:15 PM	14	28	44	0	86	64	31	19	0	114	16	140	10	0	166	32	159	68	1	260	626
05:30 PM	18	30	31	0	79	57	21	17	0	95	17	128	9	0	154	64	147	67	0	278	606
Total Volume	65	107	168	0	340	249	106	71	0	426	60	552	39	0	651	173	620	291	3	1087	2504
% App. Total	19.1	31.5	49.4	0		58.5	24.9	16.7	0		9.2	84.8	6	0		15.9	57	26.8	0.3		
PHF	.903	.892	.894	.000	.955	.958	.855	.934	.000	.934	.882	.945	.886	.000	.963	.676	.975	.933	.375	.978	.978
Cars	65	100	168	0	333	248	105	71	0	424	58	550	38	0	646	170	610	285	3	1068	2471
% Cars	100	93.5	100	0	97.9	99.6	99.1	100	0	99.5	96.7	99.6	97.4	0	99.2	98.3	98.4	97.9	100	98.3	98.7
Trucks & Buses																					
% Trucks & Buses	0	6.5	0	0	2.1	0.4	0.9	0	0	0.5	3.3	0.4	2.6	0	0.8	1.7	1.6	2.1	0	1.7	1.3





# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1935  
Counted By: JRM  
Weather: Mild  
Other: KTG

File Name : 08523-02  
Site Code : 00852302  
Start Date : 7/9/2008  
Page No : 1

## Groups Printed- Cars - Trucks & Buses

	Bohicket Rd Northbound					Main Rd Southbound					Maybank Hwy Eastbound					Maybank Hwy Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	9	43	12	0	64	26	125	3	0	154	14	30	15	0	59	31	16	22	0	69	346
07:15 AM	10	51	13	0	74	43	134	6	0	183	22	37	9	0	68	43	15	15	1	74	399
07:30 AM	4	39	7	0	50	40	130	3	0	173	19	46	18	0	83	55	23	18	0	96	402
07:45 AM	9	57	21	0	87	42	120	8	0	170	26	45	18	0	89	57	20	16	0	93	439
Total	32	190	53	0	275	151	509	20	0	680	81	158	60	0	299	186	74	71	1	332	1586
08:00 AM	9	58	12	0	79	52	118	9	0	179	20	40	24	0	84	40	18	25	0	83	425
08:15 AM	9	71	18	0	98	34	114	3	0	151	18	45	21	0	84	63	23	22	1	109	442
08:30 AM	16	56	30	0	102	45	125	5	0	175	12	58	16	0	86	49	22	13	0	84	447
08:45 AM	10	83	26	0	119	48	86	1	0	135	17	35	19	0	71	52	14	24	0	90	415
Total	44	268	86	0	398	179	443	18	0	640	67	178	80	0	325	204	77	84	1	366	1729
Break																					
04:00 PM	15	81	28	0	124	35	73	4	0	112	17	35	12	0	64	37	41	36	1	115	415
04:15 PM	12	134	54	0	200	42	79	2	0	123	17	26	10	0	53	44	38	35	0	117	493
04:30 PM	16	152	31	0	199	21	67	3	0	91	11	27	4	0	42	31	46	50	0	127	459
04:45 PM	16	125	31	0	172	23	61	3	0	87	25	33	12	0	70	50	28	52	0	130	459
Total	59	492	144	0	695	121	280	12	0	413	70	121	38	0	229	162	153	173	1	489	1826
05:00 PM	13	89	32	0	134	31	57	3	0	91	15	27	9	0	51	43	36	45	1	125	401
05:15 PM	16	118	39	0	173	37	66	4	0	107	12	23	15	0	50	46	39	51	0	136	466
05:30 PM	15	100	41	0	156	23	78	6	0	107	13	28	8	0	49	52	45	35	0	132	444
05:45 PM	21	91	49	0	161	32	72	7	0	111	17	21	14	0	52	44	26	47	3	120	444
Total	65	398	161	0	624	123	273	20	0	416	57	99	46	0	202	185	146	178	4	513	1755
Grand Total	200	1348	444	0	1992	574	1505	70	0	2149	275	556	224	0	1055	737	450	506	7	1700	6896
Apprch %	10	67.7	22.3	0		26.7	70	3.3	0		26.1	52.7	21.2	0		43.4	26.5	29.8	0.4		
Total %	2.9	19.5	6.4	0	28.9	8.3	21.8	1	0	31.2	4	8.1	3.2	0	15.3	10.7	6.5	7.3	0.1	24.7	
Cars	198	1320	433	0	1951	562	1460	68	0	2090	273	556	224	0	1053	728	446	500	7	1681	6775
% Cars	99	97.9	97.5	0	97.9	97.9	97	97.1	0	97.3	99.3	100	100	0	99.8	98.8	99.1	98.8	100	98.9	98.2
Trucks & Buses	2	28	11	0	41	12	45	2	0	59	2	0	0	0	2	9	4	6	0	19	121
% Trucks & Buses	1	2.1	2.5	0	2.1	2.1	3	2.9	0	2.7	0.7	0	0	0	0.2	1.2	0.9	1.2	0	1.1	1.8

Note: Pedestrian data shown for each approach is crossing the approach from either direction combined.



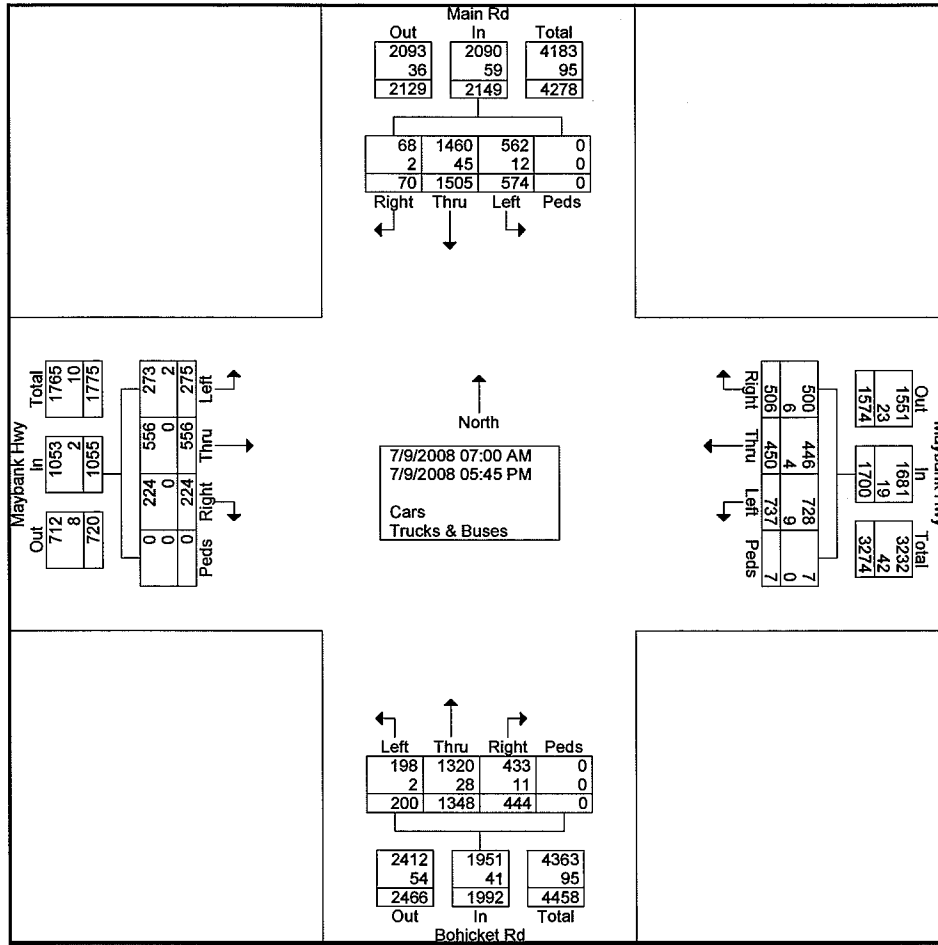


# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1935  
Counted By: JRM  
Weather: Mild  
Other: KTG

File Name : 08523-02  
Site Code : 00852302  
Start Date : 7/9/2008  
Page No : 2





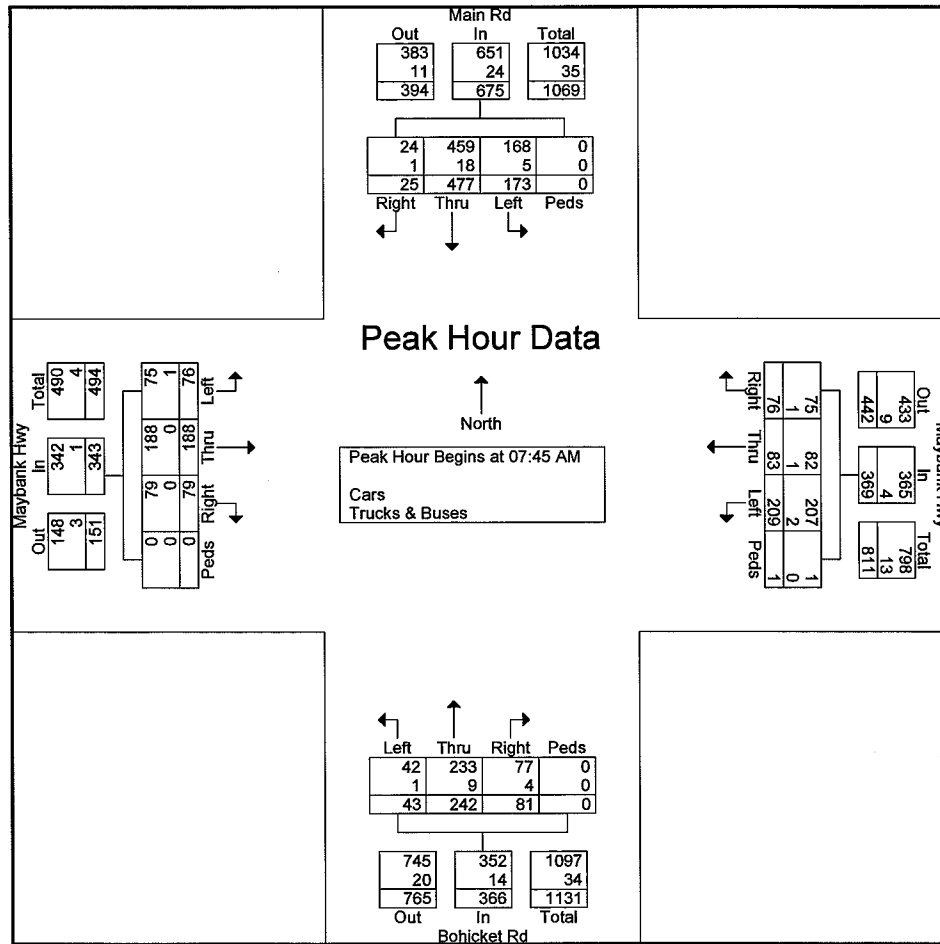
# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1935  
Counted By: JRM  
Weather: Mild  
Other: KTG

File Name : 08523-02  
Site Code : 00852302  
Start Date : 7/9/2008  
Page No : 3

	Bohicket Rd Northbound					Main Rd Southbound					Maybank Hwy Eastbound					Maybank Hwy Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:45 AM																					
07:45 AM	9	57	21	0	87	42	120	8	0	170	26	45	18	0	89	57	20	16	0	93	439
08:00 AM	9	58	12	0	79	52	118	9	0	179	20	40	24	0	84	40	18	25	0	83	425
08:15 AM	9	71	18	0	98	34	114	3	0	151	18	45	21	0	84	63	23	22	1	109	442
08:30 AM	16	56	30	0	102	45	125	5	0	175	12	58	16	0	86	49	22	13	0	84	447
Total Volume	43	242	81	0	366	173	477	25	0	675	76	188	79	0	343	209	83	76	1	369	1753
% App. Total	11.7	66.1	22.1	0		25.6	70.7	3.7	0		22.2	54.8	23	0		56.6	22.5	20.6	0.3		
PHF	.672	.852	.675	.000	.897	.832	.954	.694	.000	.943	.731	.810	.823	.000	.963	.829	.902	.760	.250	.846	.980
Cars	42	233	77	0	352	168	459	24	0	651	75	188	79	0	342	207	82	75	1	365	1710
% Cars	97.7	96.3	95.1	0	96.2	97.1	96.2	96.0	0	96.4	98.7	100	100	0	99.7	99.0	98.8	98.7	100	98.9	97.5
Trucks & Buses																					
% Trucks & Buses	2.3	3.7	4.9	0	3.8	2.9	3.8	4.0	0	3.6	1.3	0	0	0	0.3	1.0	1.2	1.3	0	1.1	2.5





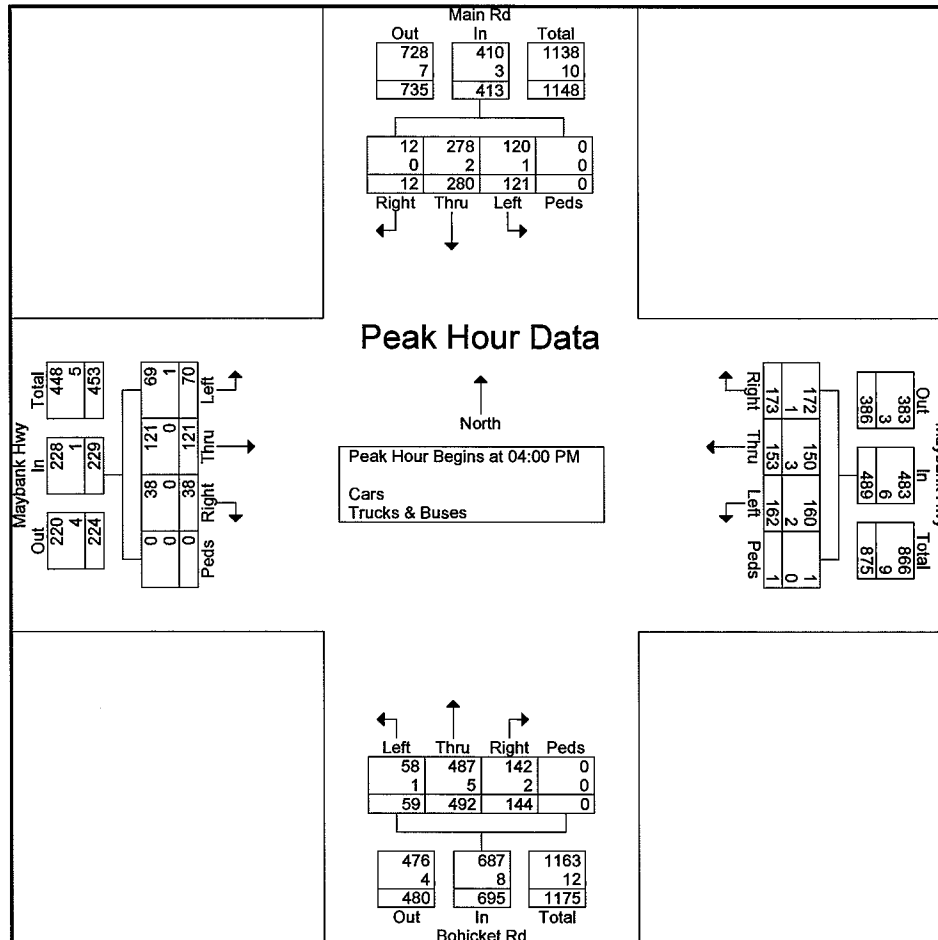
# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1935  
Counted By: JRM  
Weather: Mild  
Other: KTG

File Name : 08523-02  
Site Code : 00852302  
Start Date : 7/9/2008  
Page No : 4

	Bohicket Rd Northbound					Main Rd Southbound					Maybank Hwy Eastbound					Maybank Hwy Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	15	81	28	0	124	35	73	4	0	112	17	35	12	0	64	37	41	36	1	115	415
04:15 PM	12	134	54	0	200	42	79	2	0	123	17	26	10	0	53	44	38	35	0	117	493
04:30 PM	16	152	31	0	199	21	67	3	0	91	11	27	4	0	42	31	46	50	0	127	459
04:45 PM	16	125	31	0	172	23	61	3	0	87	25	33	12	0	70	50	28	52	0	130	459
Total Volume	59	492	144	0	695	121	280	12	0	413	70	121	38	0	229	162	153	173	1	489	1826
% App. Total	8.5	70.8	20.7	0		29.3	67.8	2.9	0		30.6	52.8	16.6	0		33.1	31.3	35.4	0.2		
PHF	.922	.809	.667	.000	.869	.720	.886	.750	.000	.839	.700	.864	.792	.000	.818	.810	.832	.832	.250	.940	.926
Cars	58	487	142	0	687	120	278	12	0	410	69	121	38	0	228	160	150	172	1	483	1808
% Cars	98.3	99.0	98.6	0	98.8	99.2	99.3	100	0	99.3	98.6	100	100	0	99.6	98.8	98.0	99.4	100	98.8	99.0
Trucks & Buses	1.7	1.0	1.4	0	1.2	0.8	0.7	0	0	0.7	1.4	0	0	0	0.4	1.2	2.0	0.6	0	1.2	1.0
% Trucks & Buses																					







# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1935  
Counted By: JRM  
Weather: Mild  
Other: KTG

File Name : 08523-03  
Site Code : 00852303  
Start Date : 7/10/2008  
Page No : 1

## Groups Printed- Cars - Trucks & Buses

	Bohicket Rd Northbound					Bohicket Rd Southbound					River Rd Eastbound					River Rd Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:15 AM	3	46	9	0	58	2	157	5	0	164	1	0	3	0	4	30	2	3	0	35	261
07:30 AM	2	49	11	0	62	1	163	4	0	168	1	0	2	0	3	38	0	5	0	43	276
07:45 AM	4	58	11	0	73	3	174	9	0	186	0	1	3	0	4	34	4	0	0	38	301
Total	9	153	31	0	193	6	494	18	0	518	2	1	8	0	11	102	6	8	0	116	838
08:00 AM	4	67	11	0	82	3	169	17	0	189	1	1	11	0	13	36	3	1	0	40	324
08:15 AM	3	74	12	0	89	2	182	15	0	199	1	0	8	0	9	23	2	1	0	26	323
08:30 AM	4	63	14	0	81	6	107	10	0	123	0	0	8	0	8	30	1	2	0	33	245
08:45 AM	11	64	9	0	84	5	229	12	0	246	0	0	16	0	16	33	4	1	0	38	384
Total	22	268	46	0	336	16	687	54	0	757	2	1	43	0	46	122	10	5	0	137	1276
09:00 AM	7	81	14	0	102	8	160	8	0	176	1	0	10	0	11	26	1	2	0	29	318
09:15 AM	9	80	18	0	107	3	123	6	0	132	1	2	6	0	9	21	1	5	0	27	275
Break																					
Total	16	161	32	0	209	11	283	14	0	308	2	2	16	0	20	47	2	7	0	56	593
Break																					
04:00 PM	15	200	38	0	253	0	74	4	0	78	11	2	9	0	22	16	2	4	0	22	375
04:15 PM	7	185	31	0	223	4	77	4	0	85	9	0	12	0	21	22	0	3	0	25	354
04:30 PM	8	177	33	0	218	7	92	4	0	103	14	2	10	0	26	15	0	3	0	18	365
04:45 PM	5	136	34	0	175	4	55	2	0	61	5	2	6	0	13	16	2	4	0	22	271
Total	35	698	136	0	869	15	298	14	0	327	39	6	37	0	82	69	4	14	0	87	1365
05:00 PM	4	186	39	0	229	6	64	7	0	77	7	4	14	0	25	12	1	10	0	23	354
05:15 PM	2	175	37	0	214	6	58	2	0	66	9	4	5	0	18	13	0	10	0	23	321
05:30 PM	4	121	27	0	152	7	78	4	0	89	4	1	6	0	11	21	1	6	0	28	280
05:45 PM	4	104	17	0	125	3	64	1	0	68	5	0	5	0	10	13	0	2	0	15	218
Total	14	586	120	0	720	22	264	14	0	300	25	9	30	0	64	59	2	28	0	89	1173
Grand Total	96	1866	365	0	2327	70	2026	114	0	2210	70	19	134	0	223	399	24	62	0	485	5245
Apprch %	4.1	80.2	15.7	0		3.2	91.7	5.2	0		31.4	8.5	60.1	0		82.3	4.9	12.8	0		
Total %	1.8	35.6	7	0	44.4	1.3	38.6	2.2	0	42.1	1.3	0.4	2.6	0	4.3	7.6	0.5	1.2	0	9.2	
Cars	94	1810	347	0	2251	69	1973	113	0	2155	69	18	133	0	220	378	24	62	0	464	5090
% Cars	97.9	97	95.1	0	96.7	98.6	97.4	99.1	0	97.5	98.6	94.7	99.3	0	98.7	94.7	100	100	0	95.7	97
Trucks & Buses	2	56	18	0	76	1	53	1	0	55	1	1	1	0	3	21	0	0	0	21	155
% Trucks & Buses	2.1	3	4.9	0	3.3	1.4	2.6	0.9	0	2.5	1.4	5.3	0.7	0	1.3	5.3	0	0	0	4.3	3

Note: Pedestrian data shown for each approach is crossing the approach from either direction combined.

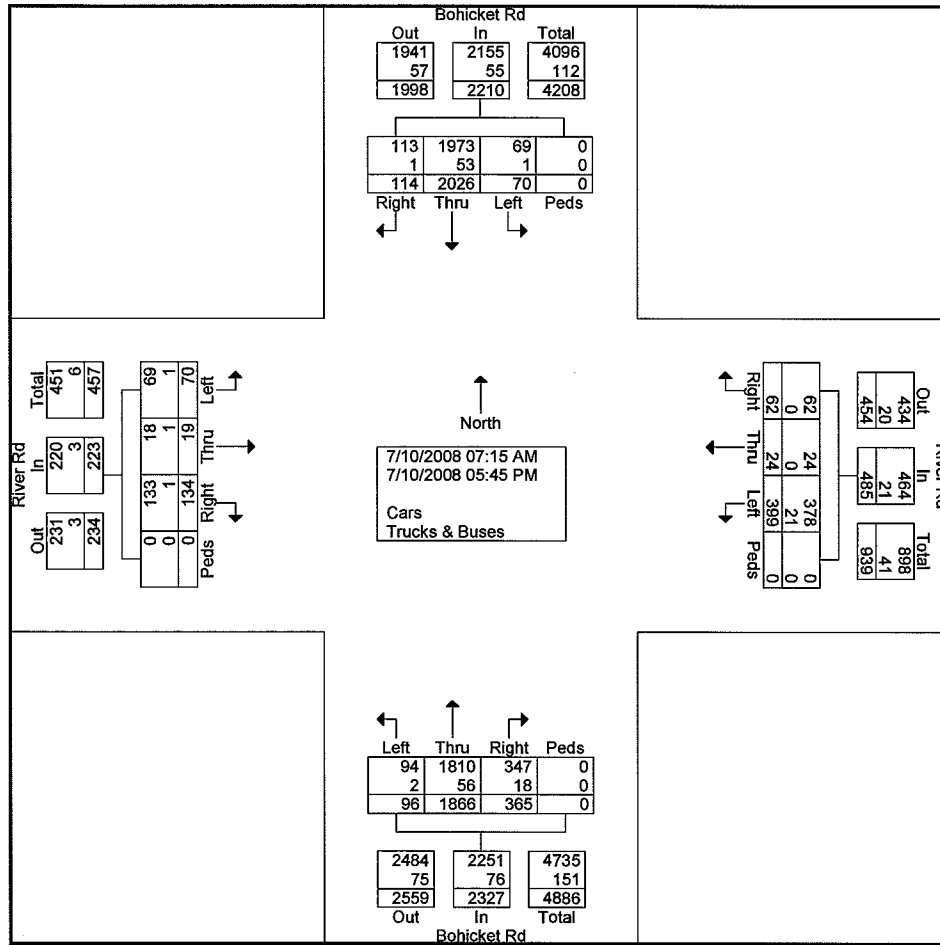


# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1935  
Counted By: JRM  
Weather: Mild  
Other: KTG

File Name : 08523-03  
Site Code : 00852303  
Start Date : 7/10/2008  
Page No : 2





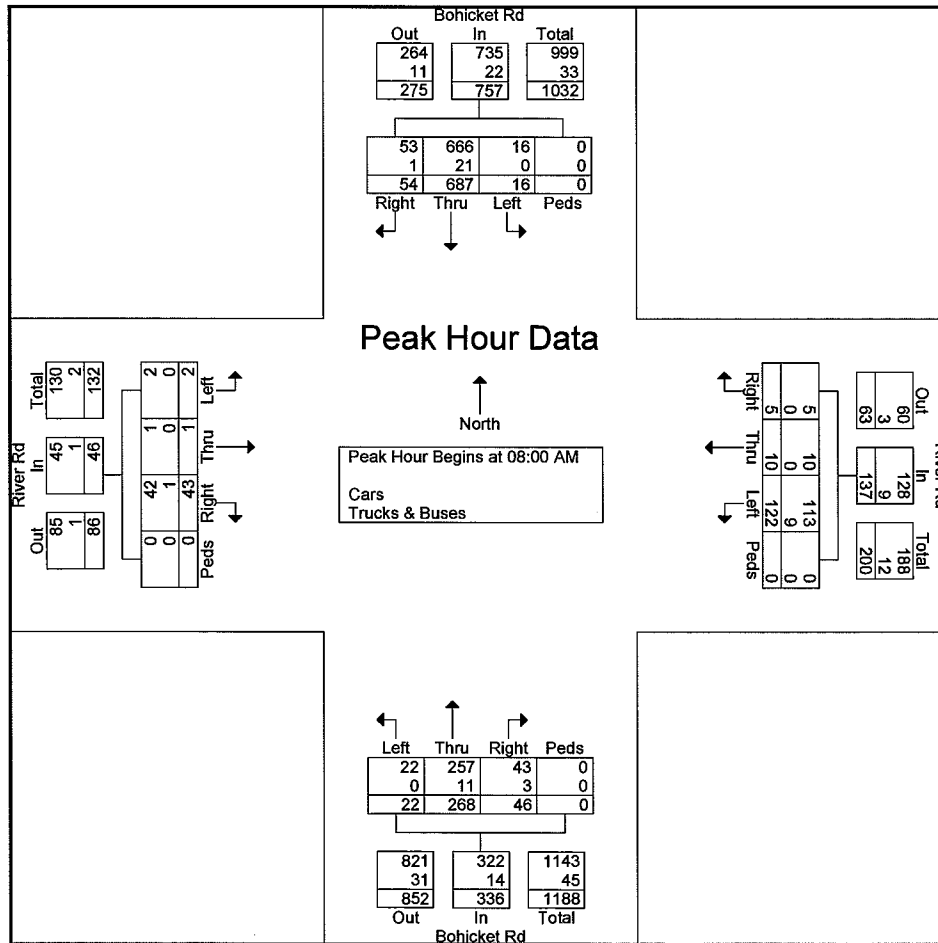
# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1935  
Counted By: JRM  
Weather: Mild  
Other: KTG

File Name : 08523-03  
Site Code : 00852303  
Start Date : 7/10/2008  
Page No : 3

	Bohicket Rd Northbound					Bohicket Rd Southbound					River Rd Eastbound					River Rd Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:15 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 08:00 AM																					
08:00 AM	4	67	11	0	82	3	169	17	0	189	1	1	11	0	13	36	3	1	0	40	324
08:15 AM	3	74	12	0	89	2	182	15	0	199	1	0	8	0	9	23	2	1	0	26	323
08:30 AM	4	63	14	0	81	6	107	10	0	123	0	0	8	0	8	30	1	2	0	33	245
08:45 AM	11	64	9	0	84	5	229	12	0	246	0	0	16	0	16	33	4	1	0	38	384
Total Volume	22	268	46	0	336	16	687	54	0	757	2	1	43	0	46	122	10	5	0	137	1276
% App. Total	6.5	79.8	13.7	0		2.1	90.8	7.1	0		4.3	2.2	93.5	0		89.1	7.3	3.6	0		
PHF	.500	.905	.821	.000	.944	.667	.750	.794	.000	.769	.500	.250	.672	.000	.719	.847	.625	.625	.000	.856	.831
Cars	22	257	43	0	322	16	666	53	0	735	2	1	42	0	45	113	10	5	0	128	1230
% Cars	100	95.9	93.5	0	95.8	100	96.9	98.1	0	97.1	100	100	97.7	0	97.8	92.6	100	100	0	93.4	96.4
Trucks & Buses																					
% Trucks & Buses	0	4.1	6.5	0	4.2	0	3.1	1.9	0	2.9	0	0	2.3	0	2.2	7.4	0	0	0	6.6	3.6







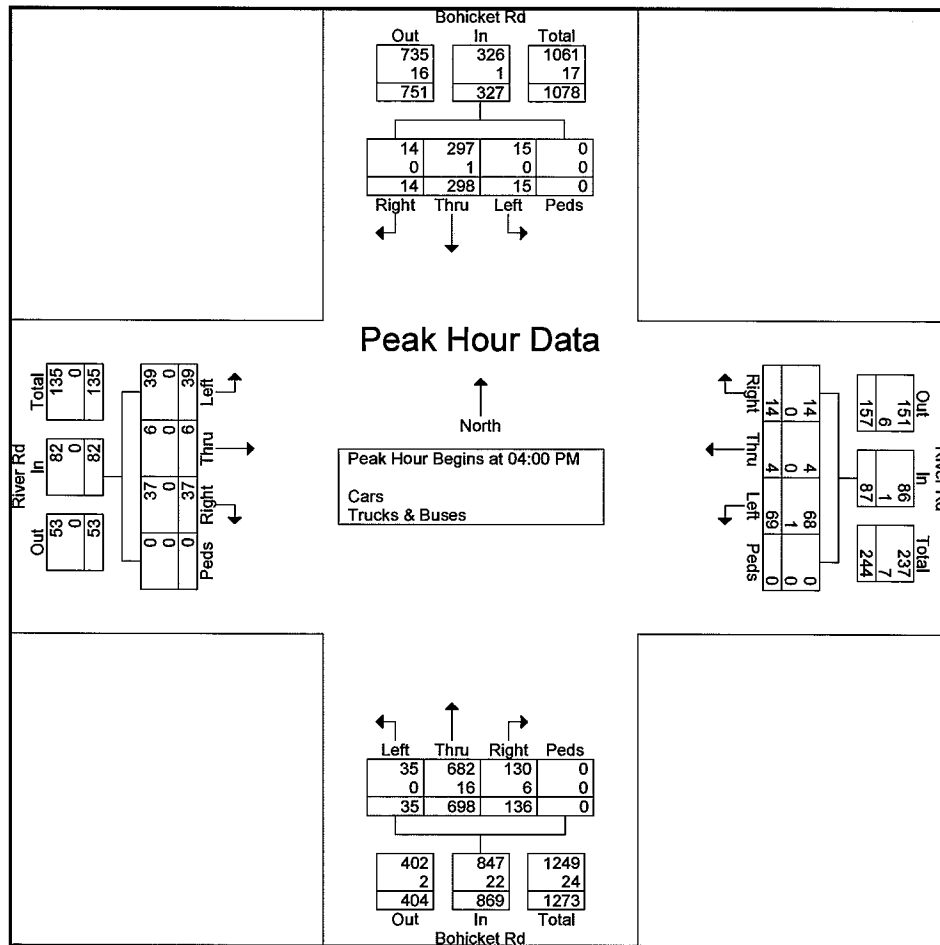
# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1935  
Counted By: JRM  
Weather: Mild  
Other: KTG

File Name : 08523-03  
Site Code : 00852303  
Start Date : 7/10/2008  
Page No : 4

	Bohicket Rd Northbound					Bohicket Rd Southbound					River Rd Eastbound					River Rd Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	15	200	38	0	253	0	74	4	0	78	11	2	9	0	22	16	2	4	0	22	375
04:15 PM	7	185	31	0	223	4	77	4	0	85	9	0	12	0	21	22	0	3	0	25	354
04:30 PM	8	177	33	0	218	7	92	4	0	103	14	2	10	0	26	15	0	3	0	18	365
04:45 PM	5	136	34	0	175	4	55	2	0	61	5	2	6	0	13	16	2	4	0	22	271
Total Volume	35	698	136	0	869	15	298	14	0	327	39	6	37	0	82	69	4	14	0	87	1365
% App. Total	4	80.3	15.7	0		4.6	91.1	4.3	0		47.6	7.3	45.1	0		79.3	4.6	16.1	0		
PHF	.583	.873	.895	.000	.859	.536	.810	.875	.000	.794	.696	.750	.771	.000	.788	.784	.500	.875	.000	.870	.910
Cars	35	682	130	0	847	15	297	14	0	326	39	6	37	0	82	68	4	14	0	86	1341
% Cars	100	97.7	95.6	0	97.5	100	99.7	100	0	99.7	100	100	100	0	100	98.6	100	100	0	98.9	98.2
Trucks & Buses																					
% Trucks & Buses	0	2.3	4.4	0	2.5	0	0.3	0	0	0.3	0	0	0	0	0	1.4	0	0	0	1.1	1.8





# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1934  
Counted By: JFU  
Weather: Mild  
Other: KTG

File Name : 08523-04  
Site Code : 00852304  
Start Date : 7/10/2008  
Page No : 1

## Groups Printed- Cars - Trucks & Buses

	Mullett Hall Rd Northbound					Southbound					River Rd Eastbound					River Rd Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	7	0	0	7	0	28	0	0	28	35
07:15 AM	1	0	1	0	2	0	0	0	0	0	0	8	0	0	8	0	33	0	0	33	43
07:30 AM	1	0	0	0	1	0	0	0	0	0	0	10	1	0	11	1	41	0	0	42	54
07:45 AM	0	0	1	0	1	0	0	0	0	0	0	15	1	0	16	1	39	0	0	40	57
Total	2	0	2	0	4	0	0	0	0	0	0	40	2	0	42	2	141	0	0	143	189
08:00 AM	1	0	0	0	1	0	0	0	0	0	0	14	0	0	14	0	37	0	0	37	52
08:15 AM	1	0	1	0	2	0	0	0	0	0	0	11	4	0	15	1	28	0	0	29	46
08:30 AM	2	0	1	0	3	0	0	0	0	0	0	16	0	0	16	3	31	0	0	34	53
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	11	3	0	14	2	35	0	0	37	51
Total	4	0	2	0	6	0	0	0	0	0	0	52	7	0	59	6	131	0	0	137	202
09:00 AM	1	0	0	0	1	0	0	0	0	0	0	14	1	0	15	0	27	0	0	27	43
Break																					
Total	1	0	0	0	1	0	0	0	0	0	0	14	1	0	15	0	27	0	0	27	43
Break																					
04:00 PM	1	0	1	0	2	0	0	0	0	0	0	38	2	0	40	1	21	0	0	22	64
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	34	0	0	34	1	24	0	0	25	59
04:30 PM	1	0	1	0	2	0	0	0	0	0	0	40	1	0	41	1	17	0	0	18	61
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	37	2	0	39	0	22	0	0	22	61
Total	2	0	2	0	4	0	0	0	0	0	0	149	5	0	154	3	84	0	0	87	245
05:00 PM	1	0	0	0	1	0	0	0	0	0	0	48	1	0	49	3	18	0	0	21	71
05:15 PM	1	0	0	0	1	0	0	0	0	0	0	45	0	0	45	1	21	0	0	22	68
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	33	2	0	35	3	24	0	0	27	62
05:45 PM	0	0	0	0	0	0	0	0	0	0	0	19	1	0	20	1	13	0	0	14	34
Total	2	0	0	0	2	0	0	0	0	0	0	145	4	0	149	8	76	0	0	84	235
Grand Total	11	0	6	0	17	0	0	0	0	0	0	400	19	0	419	19	459	0	0	478	914
Apprch %	64.7	0	35.3	0		0	0	0	0		0	95.5	4.5	0		4	96	0	0		
Total %	1.2	0	0.7	0	1.9	0	0	0	0	0	0	43.8	2.1	0	45.8	2.1	50.2	0	0	52.3	
Cars	11	0	6	0	17	0	0	0	0	0	0	385	19	0	404	19	435	0	0	454	875
% Cars	100	0	100	0	100	0	0	0	0	0	0	96.2	100	0	96.4	100	94.8	0	0	95	95.7
Trucks & Buses	0	0	0	0	0	0	0	0	0	0	0	15	0	0	15	0	24	0	0	24	39
% Trucks & Buses	0	0	0	0	0	0	0	0	0	0	0	3.8	0	0	3.6	0	5.2	0	0	5	4.3

Note: Pedestrian data shown for each approach is crossing the approach from either direction combined.

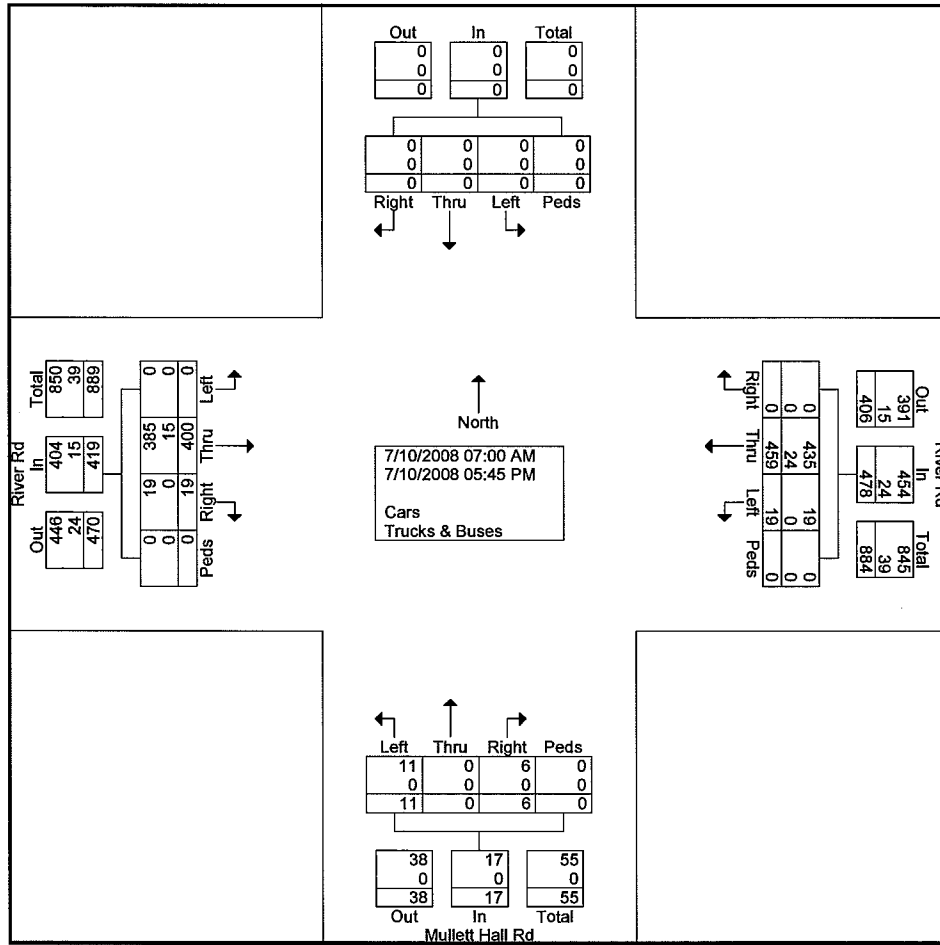


# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1934  
Counted By: JFU  
Weather: Mild  
Other: KTG

File Name : 08523-04  
Site Code : 00852304  
Start Date : 7/10/2008  
Page No : 2





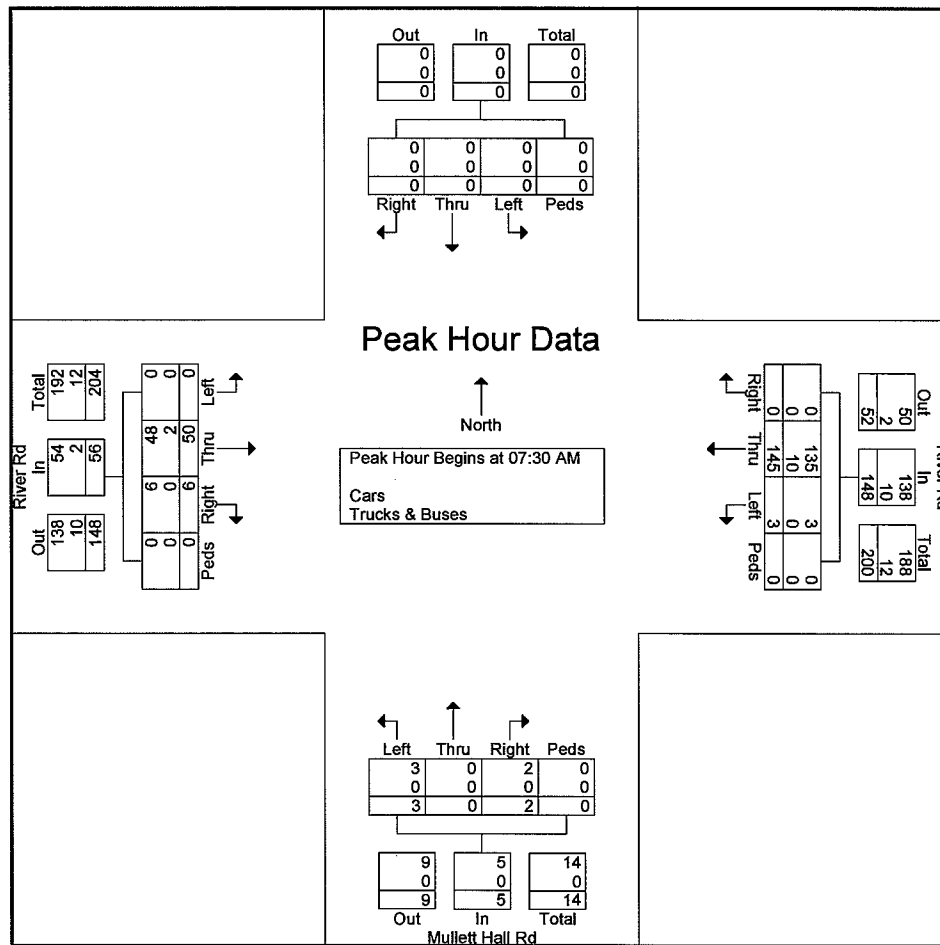
# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1934  
Counted By: JFU  
Weather: Mild  
Other: KTG

File Name : 08523-04  
Site Code : 00852304  
Start Date : 7/10/2008  
Page No : 3

	Mullett Hall Rd Northbound					Southbound					River Rd Eastbound					River Rd Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 07:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:30 AM																					
07:30 AM	1	0	0	0	1	0	0	0	0	0	0	10	1	0	11	1	41	0	0	42	54
07:45 AM	0	0	1	0	1	0	0	0	0	0	0	15	1	0	16	1	39	0	0	40	57
08:00 AM	1	0	0	0	1	0	0	0	0	0	0	14	0	0	14	0	37	0	0	37	52
08:15 AM	1	0	1	0	2	0	0	0	0	0	0	11	4	0	15	1	28	0	0	29	46
Total Volume	3	0	2	0	5	0	0	0	0	0	0	50	6	0	56	3	145	0	0	148	209
% App. Total	60	0	40	0		0	0	0	0	0	0	89.3	10.7	0		2	98	0	0	93.2	94.3
PHF	.750	.000	.500	.000	.625	.000	.000	.000	.000	.000	.000	.833	.375	.000	.875	.750	.884	.000	.000	.881	.917
Cars	3	0	2	0	5	0	0	0	0	0	0	48	6	0	54	3	135	0	0	138	197
% Cars	100	0	100	0	100	0	0	0	0	0	0	96.0	100	0	96.4	100	93.1	0	0	93.2	94.3
Trucks & Buses																					
% Trucks & Buses	0	0	0	0	0	0	0	0	0	0	0	4.0	0	0	3.6	0	6.9	0	0	6.8	5.7







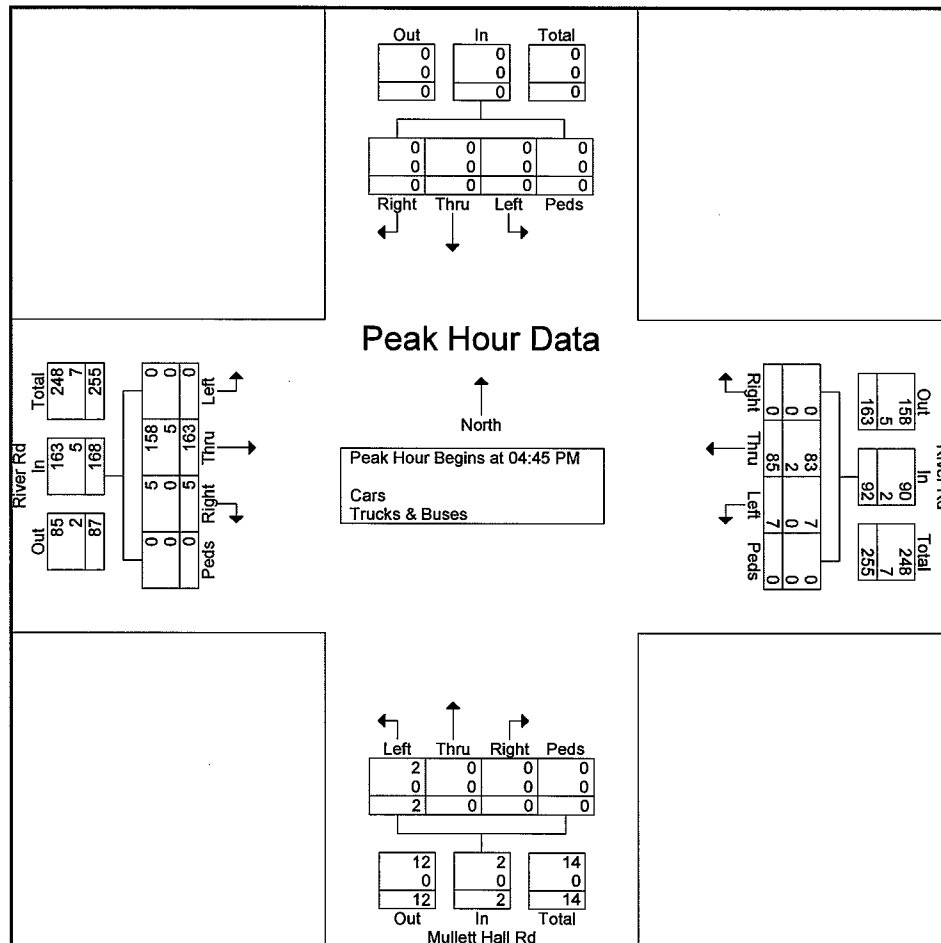
# TRAFFIC DATA COLLECTION, INC.

Atlanta - Hilton Head  
www.trafficdatacollection.com

Counter: 1934  
Counted By: JFU  
Weather: Mild  
Other: KTG

File Name : 08523-04  
Site Code : 00852304  
Start Date : 7/10/2008  
Page No : 4

	Mullett Hall Rd Northbound					Southbound					River Rd Eastbound					River Rd Westbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:45 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:45 PM																					
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	37	2	0	39	0	22	0	0	22	61
05:00 PM	1	0	0	0	1	0	0	0	0	0	0	48	1	0	49	3	18	0	0	21	71
05:15 PM	1	0	0	0	1	0	0	0	0	0	0	45	0	0	45	1	21	0	0	22	68
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	33	2	0	35	3	24	0	0	27	62
Total Volume	2	0	0	0	2	0	0	0	0	0	0	163	5	0	168	7	85	0	0	92	262
% App. Total	100	0	0	0		0	0	0	0		0	97	3	0		7.6	92.4	0	0		
PHF	.500	.000	.000	.000	.500	.000	.000	.000	.000	.000	.000	.849	.625	.000	.857	.583	.885	.000	.000	.852	.923
Cars	2	0	0	0	2	0	0	0	0	0	0	158	5	0	163	7	83	0	0	90	255
% Cars	100	0	0	0	100	0	0	0	0	0	0	96.9	100	0	97.0	100	97.6	0	0	97.8	97.3
Trucks & Buses																					
% Trucks & Buses	0	0	0	0	0	0	0	0	0	0	0	3.1	0	0	3.0	0	2.4	0	0	2.2	2.7





KRP - 2018  
 Summary of Multi-Use Trip Generation  
 Average Weekday Driveway Volumes  
 October 31, 2008

Land Use	Size	24 Hour Two-Way Volume	AM Pk Hour		PM Pk Hour	
			Enter	Exit	Enter	Exit
Single Family Detached Housing						
	105 Dwelling Units	1088	21	62	71	41
Recreation Homes	315 Dwelling Units	995	35	16	35	47
Apartments	40 Dwelling Units	391	5	19	26	14
Hotel	350 Rooms	2860	119	77	109	98
Shopping Center	35.000 T.G.L.A.	3432	51	33	150	163
Shopping Center	20.000 T.G.L.A.	2386	36	23	104	113
Golf Course	18 Holes	643	32	8	22	28
Total		11795	299	238	517	504

Note: A zero indicates no data available.

TRIP GENERATION BY MICROTRANS

Passby  
 Summary of Pass-By Trips  
 For 35.000 T.G.L.A. of Shopping Center  
 October 31, 2008

	Driveway Volume	Pass-By Trips	Volume Added to Adjacent Streets
Average Weekday			
7-9 AM Peak Hour Enter	51	0	51
7-9 AM Peak Hour Exit	33	0	33
7-9 AM Peak Hour Total	83	0	83
4-6 PM Peak Hour Enter	150	79	71
4-6 PM Peak Hour Exit	163	86	77
4-6 PM Peak Hour Total	313	165	148
Saturday			
Saturday Peak Hour Enter	227	86	141
Saturday Peak Hour Exit	210	79	131
Saturday Peak Hour Total	437	165	272

Note: A zero indicates no data available.

Source: Institute of Transportation Engineers  
 Trip Generation Handbook, March, 2001

TRIP GENERATION BY MICROTRANS



Approach	SITE Entering / Exiting Percentages Movement			Workforce Apartments Entering / Exiting Percentages Movement			2008			2013			2018			Site Traffic Full Buildout AM		
	Left	Thru	Right	Left	Thru	Right	Movement AM Peak			Movement AM Peak			Movement AM Peak			Left	Thru	Right
							Left	Thru	Right	Left	Thru	Right	Left	Thru	Right			
1. Maybank Highway (SC 700) and River Road	River Road																	
	NB		25%															
	EB	10%			8%													
	SB																	
Maybank Highway (SC 700)	WB	25%	10%		8%													
2. Maybank Highway (SC 700) and Main Road/Bohicket Road	Bohicket Road																	
	NB	5%	10%		4%	8%												
	EB				4%													
	SB																	
Main Road	WB																	
Maybank Highway (SC 700)	WB	10%			8%													
3. Bohicket Road/Betsy Kerrison Parkway and River Road	Bohicket Road																	
	NB	25%			20%													
	EB																	
	SB																	
River Road	WB																	
4. River Road and Mullet Hall Road	Mullet Hall Road																	
	NB		25%															
	EB																	
	WB	25%																
5. Village Access & Betsy Kerrison Parkway	Mullet Hall Road																	
	NB		50%		80%													
	EB	50%	25%		20%													
	SB	25%																
Entering Workforce Apartments	AM	5																
	PM	28																
	Entering Workforce Apartments	19																
	Exiting Workforce Apartments	14																
Entering Remainder of Site	AM	258																
	PM	252																
	Entering Remainder of Site	196																
	Exiting Remainder of Site	135																
total enter	AM	263																
	PM	249																
	total enter	263																
	total exit	215																

2008	2013			2018			Site Traffic			Pass By Traffic			TOTAL AM Peak			TOTAL PM Peak		
	Growth:			Growth:			Full Buildout PM			Full Buildout PM			2018			2018		
	Movement PM Peak	Thru	Right	Movement PM Peak	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
65	107	168		75	124	195			59				37	81	237	79	130	264
60	552	39		70	640	45		25					59	611	24	74	698	47
249	106	71		289	123	82							373	81	67	304	129	86
173	620	291		201	719	337	63	27					231	548	102	274	783	354
59	492	144		68	570	167	12	25	25				64	316	120	83	624	201
70	121	38		81	140	44			14				92	229	110	85	147	60
121	280	12		140	325	14		27					211	607	30	147	369	15
162	153	173		188	177	201	27						280	101	92	225	186	211
35	698	136		41	809	158		62					27	380	56	43	912	168
39	6	37		45	7	43							2	1	53	47	7	45
15	298	14		17	345	16		68					20	903	66	18	431	17
69	4	14		80	5	16							148	13	6	84	5	17
2	0	0		2	0	0			59				3	0	51	2	0	59
0	163	5		0	189	6							0	61	7	0	199	6
7	85	0		8	99	0	63						68	177	0	71	104	0
869				1007				147					0	410	133	0	1003	202
404				468			129	62					113	0	53	154	0	122
							68						66	1038	0	92	468	0
							enter site	278		passby enter	79							
							exit site	249		passby exit	86							






















996  
 NB 70%  
 SB 30%  
 passby distribution calc



Kiawah River Plantation TIA  
2008 Existing Conditions

1: Maybank Highway (SC 700) & River Road

Timing Plan: AM Peak













												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	48	484	20	136	429	84	30	66	154	306	66	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	290		0	180		0	245		50	175		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.976				0.850		0.932	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1852	0	1770	1818	0	1770	1863	1583	1770	1736	0
Flt Permitted	0.400			0.142			0.671			0.528		
Satd. Flow (perm)	745	1852	0	265	1818	0	1250	1863	1583	984	1736	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		4802			2003			1572			1313	
Travel Time (s)		72.8			30.3			23.8			19.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	53	538	22	151	477	93	33	73	171	340	73	61
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	560	0	151	570	0	33	73	171	340	134	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm			pm+pt			Perm		Perm	pm+pt		
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2			6			8		8	4		
Detector Phase	2	2		1	6		8	8	8	7	4	



Kiawah River Plantation TIA  
2008 Existing Conditions

1: Maybank Highway (SC 700) & River Road

Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	12.0	12.0		5.0	12.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	20.0	20.0		12.0	20.0		20.0	20.0	20.0	12.0	20.0	
Total Split (s)	46.0	46.0	0.0	12.0	58.0	0.0	22.0	22.0	22.0	20.0	42.0	0.0
Total Split (%)	46.0%	46.0%	0.0%	12.0%	58.0%	0.0%	22.0%	22.0%	22.0%	20.0%	42.0%	0.0%
Maximum Green (s)	40.0	40.0		6.0	52.0		16.0	16.0	16.0	14.0	36.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	3.0
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Min	Min	Min	None	None	
Act Effct Green (s)	32.1	32.1		44.3	44.3		14.4	14.4	14.4	34.6	34.6	
Actuated g/C Ratio	0.36	0.36		0.50	0.50		0.16	0.16	0.16	0.39	0.39	
v/c Ratio	0.20	0.84		0.60	0.63		0.16	0.24	0.67	0.66	0.20	
Control Delay	21.5	38.4		22.8	20.1		36.7	37.0	50.4	29.6	20.8	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	21.5	38.4		22.8	20.1		36.7	37.0	50.4	29.6	20.8	
LOS	C	D		C	C		D	D	D	C	C	
Approach Delay		36.9			20.6			45.2			27.1	
Approach LOS		D			C			D			C	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 89.1

Natural Cycle: 70

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.84

Intersection Signal Delay: 30.1

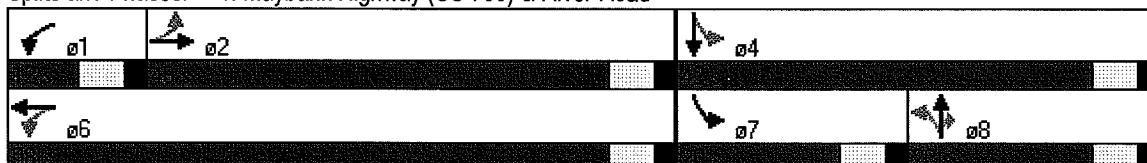
Intersection Capacity Utilization 75.1%

Analysis Period (min) 15

Intersection LOS: C

ICU Level of Service D























Splits and Phases: 1: Maybank Highway (SC 700) & River Road



Kiawah River Plantation TIA  
2008 Existing Conditions

1: Maybank Highway (SC 700) & River Road






















Timing Plan: AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	48	484	20	136	429	84	30	66	154	306	66	55
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1852		1770	1817		1770	1863	1583	1770	1736	
Flt Permitted	0.40	1.00		0.14	1.00		0.67	1.00	1.00	0.53	1.00	
Satd. Flow (perm)	745	1852		264	1817		1250	1863	1583	983	1736	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	53	538	22	151	477	93	33	73	171	340	73	61
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	53	560	0	151	570	0	33	73	171	340	134	0
Turn Type	Perm			pm+pt			Perm			Perm	pm+pt	
Protected Phases	2			1			8			7		
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	31.2	31.2		43.3	43.3		13.5	13.5	13.5	33.6	33.6	
Effective Green, g (s)	32.2	32.2		44.3	44.3		14.5	14.5	14.5	34.6	34.6	
Actuated g/C Ratio	0.36	0.36		0.50	0.50		0.16	0.16	0.16	0.39	0.39	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	270	671		252	905		204	304	258	516	676	
v/s Ratio Prot		c0.30		0.05	c0.31			0.04		c0.11	0.08	
v/s Ratio Perm	0.07			0.25			0.03		0.11	c0.14		
v/c Ratio	0.20	0.83		0.60	0.63		0.16	0.24	0.66	0.66	0.20	
Uniform Delay, d1	19.5	25.9		16.7	16.3		32.0	32.4	34.9	20.7	18.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	8.8		3.8	1.4		0.4	0.4	6.3	3.0	0.1	
Delay (s)	19.8	34.7		20.5	17.7		32.4	32.8	41.2	23.8	18.1	
Level of Service	B	C		C	B		C	C	D	C	B	
Approach Delay (s)		33.4			18.3			37.9			22.2	
Approach LOS		C			B			D			C	
Intersection Summary												
HCM Average Control Delay			26.2		HCM Level of Service				C			
HCM Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			88.9		Sum of lost time (s)				15.0			
Intersection Capacity Utilization			75.1%		ICU Level of Service				D			
Analysis Period (min)			15									
c Critical Lane Group												

Kiawah River Plantation TIA  
2008 Existing Conditions

2: Maybank Highway (SC 700) & Main Road













Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	76	188	79	209	83	76	43	242	81	173	477	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	170		0	145		0	185		370	210		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.956			0.928				0.850		0.992	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1781	0	1770	1729	0	1770	1863	1583	1770	1848	0
Flt Permitted	0.531			0.579			0.421			0.311		
Satd. Flow (perm)	989	1781	0	1079	1729	0	784	1863	1583	579	1848	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1276			4802			919			3477	
Travel Time (s)		19.3			72.8			13.9			52.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	84	209	88	232	92	84	48	269	90	192	530	28
Shared Lane Traffic (%)												
Lane Group Flow (vph)	84	297	0	232	176	0	48	269	90	192	558	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt			Perm			Perm		Perm	pm+pt		
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6			8		8	4		
Detector Phase	5	2		6	6		8	8	8	7	4	

Kiawah River Plantation TIA  
2008 Existing Conditions

2: Maybank Highway (SC 700) & Main Road

Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	5.0	25.0		25.0	25.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	12.5	32.5		32.5	32.5		20.0	20.0	20.0	12.0	20.0	
Total Split (s)	12.6	55.5	0.0	42.9	42.9	0.0	33.0	33.0	33.0	17.0	50.0	0.0
Total Split (%)	11.9%	52.6%	0.0%	40.7%	40.7%	0.0%	31.3%	31.3%	31.3%	16.1%	47.4%	0.0%
Maximum Green (s)	6.6	49.5		36.9	36.9		27.0	27.0	27.0	11.0	44.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	3.0
Lead/Lag	Lead			Lag	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Recall Mode	None	Min		Min	Min		None	None	None	None	None	
Act Effct Green (s)	39.5	39.5		29.9	29.9		19.6	19.6	19.6	36.2	36.2	
Actuated g/C Ratio	0.46	0.46		0.35	0.35		0.23	0.23	0.23	0.42	0.42	
v/c Ratio	0.16	0.36		0.62	0.29		0.27	0.63	0.25	0.48	0.72	
Control Delay	15.0	17.2		34.3	24.3		33.7	38.6	31.0	21.7	27.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	15.0	17.2		34.3	24.3		33.7	38.6	31.0	21.7	27.9	
LOS	B	B		C	C		C	D	C	C	C	
Approach Delay		16.7			30.0			36.3			26.3	
Approach LOS		B			C			D			C	

Intersection Summary

Area Type: Other

Cycle Length: 105.5

Actuated Cycle Length: 86

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.72

Intersection Signal Delay: 27.3

Intersection Capacity Utilization 93.3%

Analysis Period (min) 15

Intersection LOS: C

ICU Level of Service F

Splits and Phases: 2: Maybank Highway (SC 700) & Main Road


























Kiawah River Plantation TIA  
2008 Existing Conditions

2: Maybank Highway (SC 700) & Main Road
























Timing Plan: AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	76	188	79	209	83	76	43	242	81	173	477	25
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.96		1.00	0.93		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1780		1770	1729		1770	1863	1583	1770	1849	
Flt Permitted	0.53	1.00		0.58	1.00		0.42	1.00	1.00	0.31	1.00	
Satd. Flow (perm)	990	1780		1078	1729		785	1863	1583	579	1849	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	84	209	88	232	92	84	48	269	90	192	530	28
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	84	297	0	232	176	0	48	269	90	192	558	0
Turn Type	pm+pt			Perm			Perm			Perm		pm+pt
Protected Phases	5	2			6			8			7	4
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	39.9	39.9		28.9	28.9		18.8	18.8	18.8	35.2	35.2	
Effective Green, g (s)	40.9	40.9		29.9	29.9		19.8	19.8	19.8	36.2	36.2	
Actuated g/C Ratio	0.47	0.47		0.34	0.34		0.23	0.23	0.23	0.42	0.42	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	519	836		370	594		178	424	360	397	768	
v/s Ratio Prot	0.01	c0.17			0.10			0.14		0.06	c0.30	
v/s Ratio Perm	0.06			c0.22			0.06		0.06	0.14		
v/c Ratio	0.16	0.36		0.63	0.30		0.27	0.63	0.25	0.48	0.73	
Uniform Delay, d1	13.1	14.7		23.9	20.9		27.7	30.4	27.6	17.7	21.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.1	0.4		3.7	0.4		1.1	3.5	0.5	0.9	3.7	
Delay (s)	13.2	15.1		27.7	21.3		28.8	33.9	28.1	18.6	25.0	
Level of Service	B	B		C	C		C	C	C	B	C	
Approach Delay (s)		14.7			24.9			32.0			23.3	
Approach LOS		B			C			C			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			23.8			HCM Level of Service				C		
HCM Volume to Capacity ratio			0.67									
Actuated Cycle Length (s)			87.1			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			93.3%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Kiawah River Plantation TIA  
2008 Existing Conditions

3: Driveway & Bohicket Road













Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	1	43	122	10	5	22	268	46	16	687	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	110		55	170		0	125		125
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.968		0.950	0.959		0.950			0.950		
Satd. Flow (prot)	0	1803	1583	1681	1697	1583	1770	1863	1583	1770	3539	1583
Flt Permitted		0.968		0.950	0.959		0.310			0.556		
Satd. Flow (perm)	0	1803	1583	1681	1697	1583	577	1863	1583	1036	3539	1583
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			45			50			50	
Link Distance (ft)		482			1366			2053			2154	
Travel Time (s)		13.1			20.7			28.0			29.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	2	1	48	136	11	6	24	298	51	18	763	60
Shared Lane Traffic (%)				46%								
Lane Group Flow (vph)	0	3	48	73	74	6	24	298	51	18	763	60
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split		Perm	Split		Perm	Perm		Perm	Perm		Perm
Protected Phases	8	8		4	4			6			2	
Permitted Phases			8			4	6		6	2		2
Detector Phase	8	8	8	4	4	4	6	6	6	2	2	2

Kiawah River Plantation TIA  
2008 Existing Conditions

3: Driveway & Bohicket Road

Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	15.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	21.7	21.7	21.7	21.7	21.7	21.7
Total Split (s)	22.0	22.0	22.0	23.0	23.0	23.0	45.0	45.0	45.0	45.0	45.0	45.0
Total Split (%)	24.4%	24.4%	24.4%	25.6%	25.6%	25.6%	50.0%	50.0%	50.0%	50.0%	50.0%	50.0%
Maximum Green (s)	16.0	16.0	16.0	17.0	17.0	17.0	39.0	39.0	39.0	39.0	39.0	39.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	Min	Min	Min	Min	Min	Min
Act Effct Green (s)		11.7	11.7	11.8	11.8	11.8	26.5	26.5	26.5	26.5	26.5	26.5
Actuated g/C Ratio		0.23	0.23	0.23	0.23	0.23	0.52	0.52	0.52	0.52	0.52	0.52
v/c Ratio		0.01	0.13	0.19	0.19	0.02	0.08	0.31	0.06	0.03	0.42	0.07
Control Delay		21.7	22.2	22.0	22.0	21.0	13.1	13.3	11.9	12.0	13.0	12.0
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		21.7	22.2	22.0	22.0	21.0	13.1	13.3	11.9	12.0	13.0	12.0
LOS		C	C	C	C	C	B	B	B	B	B	B
Approach Delay		22.2			22.0			13.1			12.9	
Approach LOS		C			C			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 51.1

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.42

Intersection Signal Delay: 14.2

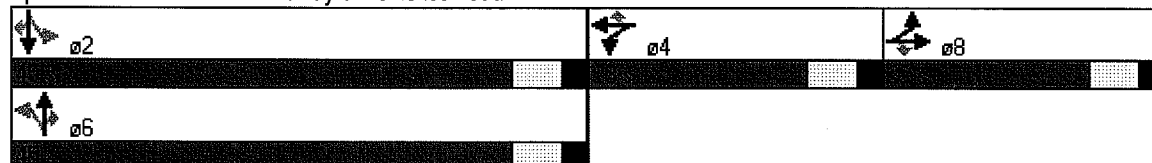
Intersection Capacity Utilization 48.2%

Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service A
























Splits and Phases: 3: Driveway & Bohicket Road



Kiawah River Plantation TIA  
2008 Existing Conditions

3: Driveway & Bohicket Road










Timing Plan: AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	1	43	122	10	5	22	268	46	16	687	54
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1803	1583	1681	1697	1583	1770	1863	1583	1770	3539	1583
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.31	1.00	1.00	0.56	1.00	1.00
Satd. Flow (perm)		1803	1583	1681	1697	1583	577	1863	1583	1036	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	2	1	48	136	11	6	24	298	51	18	763	60
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	3	48	73	74	6	24	298	51	18	763	60
Turn Type	Split		Perm	Split		Perm	Perm		Perm	Perm		Perm
Protected Phases	8	8		4	4			6			2	
Permitted Phases			8			4	6		6	2		2
Actuated Green, G (s)		5.1	5.1	7.9	7.9	7.9	24.0	24.0	24.0	24.0	24.0	24.0
Effective Green, g (s)		6.1	6.1	8.9	8.9	8.9	25.0	25.0	25.0	25.0	25.0	25.0
Actuated g/C Ratio		0.11	0.11	0.16	0.16	0.16	0.45	0.45	0.45	0.45	0.45	0.45
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		200	176	272	275	256	262	847	720	471	1609	720
v/s Ratio Prot		0.00		0.04	c0.04			0.16			c0.22	
v/s Ratio Perm			c0.03			0.00	0.04		0.03	0.02		0.04
v/c Ratio		0.02	0.27	0.27	0.27	0.02	0.09	0.35	0.07	0.04	0.47	0.08
Uniform Delay, d1		21.8	22.4	20.2	20.2	19.4	8.5	9.7	8.5	8.3	10.4	8.5
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.0	0.8	0.5	0.5	0.0	0.2	0.3	0.0	0.0	0.2	0.0
Delay (s)		21.8	23.3	20.7	20.7	19.4	8.7	10.0	8.5	8.4	10.7	8.6
Level of Service		C	C	C	C	B	A	A	A	A	B	A
Approach Delay (s)		23.2			20.7			9.7			10.5	
Approach LOS		C			C			A			B	
<b>Intersection Summary</b>												
HCM Average Control Delay			11.8			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.40									
Actuated Cycle Length (s)			55.0							15.0		
Intersection Capacity Utilization			48.2%							A		
Analysis Period (min)			15									
c Critical Lane Group												



Kiawah River Plantation TIA  
2008 Existing Conditions

4: River Road & Mullet Hall Road  
Timing Plan: AM Peak

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	50	6	3	145	3	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.985				0.946	
Flt Protected				0.999	0.971	
Satd. Flow (prot)	1835	0	0	1861	1711	0
Flt Permitted				0.999	0.971	
Satd. Flow (perm)	1835	0	0	1861	1711	0
Link Speed (mph)	45			45	45	
Link Distance (ft)	1366			1051	1134	
Travel Time (s)	20.7			15.9	17.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	56	7	3	161	3	2
Shared Lane Traffic (%)						
Lane Group Flow (vph)	63	0	0	164	5	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized










Intersection Capacity Utilization 20.0%

ICU Level of Service A

Analysis Period (min) 15

Kiawah River Plantation TIA  
2008 Existing Conditions






















4: River Road & Mullet Hall Road  
Timing Plan: AM Peak

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	50	6	3	145	3	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	56	7	3	161	3	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			62		227	59
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			62		227	59
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1541		760	1007
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	62	164	6			
Volume Left	0	3	3			
Volume Right	7	0	2			
cSH	1700	1541	843			
Volume to Capacity	0.04	0.00	0.01			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.2	9.3			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.2	9.3			
Approach LOS			A			
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			20.0%	ICU Level of Service		A
Analysis Period (min)			15			

Kiawah River Plantation TIA  
2008 Existing Conditions

1: Maybank Highway (SC 700) & River Road













Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	552	39	173	620	291	65	107	168	249	106	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	290		0	180		0	245		50	175		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	100		0	100		0	100		100	100		0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.952				0.850		0.940	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1844	0	1770	1773	0	1770	1863	1583	1770	1751	0
Flt Permitted	0.095			0.182			0.634			0.479		
Satd. Flow (perm)	177	1844	0	339	1773	0	1181	1863	1583	892	1751	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		4802			2003			1572			1313	
Travel Time (s)		72.8			30.3			23.8			19.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	67	613	43	192	689	323	72	119	187	277	118	79
Shared Lane Traffic (%)												
Lane Group Flow (vph)	67	656	0	192	1012	0	72	119	187	277	197	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm			pm+pt			Perm		Perm	pm+pt		
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2			6			8		8	4		
Detector Phase	2	2		1	6		8	8	8	7	4	

Kiawah River Plantation TIA  
2008 Existing Conditions

1: Maybank Highway (SC 700) & River Road

Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	12.0	12.0		5.0	12.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	20.0	20.0		12.0	20.0		20.0	20.0	20.0	12.0	20.0	
Total Split (s)	55.0	55.0	0.0	12.0	67.0	0.0	20.0	20.0	20.0	13.0	33.0	0.0
Total Split (%)	55.0%	55.0%	0.0%	12.0%	67.0%	0.0%	20.0%	20.0%	20.0%	13.0%	33.0%	0.0%
Maximum Green (s)	49.0	49.0		6.0	61.0		14.0	14.0	14.0	7.0	27.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	3.0
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Min	Min	Min	None	None	
Act Effct Green (s)	45.5	45.5		57.6	57.6		14.3	14.3	14.3	27.4	27.4	
Actuated g/C Ratio	0.48	0.48		0.61	0.61		0.15	0.15	0.15	0.29	0.29	
v/c Ratio	0.79	0.74		0.62	0.94		0.41	0.42	0.79	0.83	0.39	
Control Delay	79.1	26.1		17.3	35.1		46.1	43.4	64.2	54.3	31.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	79.1	26.1		17.3	35.1		46.1	43.4	64.2	54.3	31.2	
LOS	E	C		B	D		D	D	E	D	C	
Approach Delay		31.0			32.3			54.2			44.7	
Approach LOS		C			C			D			D	

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 95.1

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 37.0

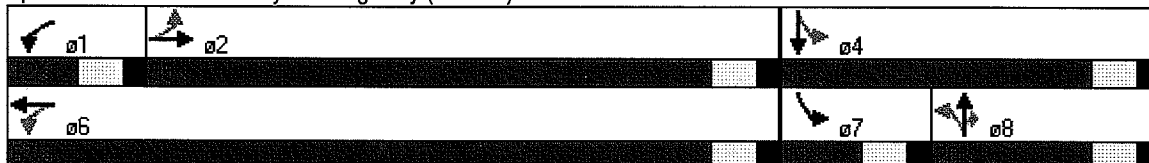
Intersection Capacity Utilization 96.5%

Analysis Period (min) 15

Intersection LOS: D

ICU Level of Service F

Splits and Phases: 1: Maybank Highway (SC 700) & River Road


























Kiawah River Plantation TIA  
2008 Existing Conditions

1: Maybank Highway (SC 700) & River Road























Timing Plan: PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	60	552	39	173	620	291	65	107	168	249	106	71
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.95		1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1844		1770	1774		1770	1863	1583	1770	1751	
Flt Permitted	0.10	1.00		0.18	1.00		0.63	1.00	1.00	0.48	1.00	
Satd. Flow (perm)	178	1844		339	1774		1181	1863	1583	892	1751	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	67	613	43	192	689	323	72	119	187	277	118	79
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	67	656	0	192	1012	0	72	119	187	277	197	0
Turn Type	Perm			pm+pt			Perm			Perm		pm+pt
Protected Phases		2		1	6			8			7	4
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	44.5	44.5		56.6	56.6		13.3	13.3	13.3	26.4	26.4	
Effective Green, g (s)	45.5	45.5		57.6	57.6		14.3	14.3	14.3	27.4	27.4	
Actuated g/C Ratio	0.48	0.48		0.61	0.61		0.15	0.15	0.15	0.29	0.29	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	85	883		312	1076		178	280	238	332	505	
v/s Ratio Prot		0.36		0.05	c0.57			0.06		c0.07	0.11	
v/s Ratio Perm	0.38			0.33			0.06		0.12	c0.17		
v/c Ratio	0.79	0.74		0.62	0.94		0.40	0.42	0.79	0.83	0.39	
Uniform Delay, d1	20.7	20.0		13.9	17.1		36.5	36.6	38.9	30.9	27.1	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	37.0	3.4		3.6	15.2		1.5	1.0	15.6	16.3	0.5	
Delay (s)	57.7	23.4		17.5	32.4		38.0	37.7	54.4	47.2	27.6	
Level of Service	E	C		B	C		D	D	D	D	C	
Approach Delay (s)		26.6			30.0			46.0			39.0	
Approach LOS		C			C			D			D	
<b>Intersection Summary</b>												
HCM Average Control Delay			32.8			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			95.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			96.5%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Kiawah River Plantation TIA  
2008 Existing Conditions

2: Maybank Highway (SC 700) & Main Road













Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	121	38	162	153	173	59	492	144	121	280	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	170		0	145		0	185		370	210		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	100		0	100		0	100		100	100		0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.964			0.920				0.850		0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1796	0	1770	1714	0	1770	1863	1583	1770	1852	0
Flt Permitted	0.279			0.646			0.564			0.136		
Satd. Flow (perm)	520	1796	0	1203	1714	0	1051	1863	1583	253	1852	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1276			4802			919			3477	
Travel Time (s)		19.3			72.8			13.9			52.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	78	134	42	180	170	192	66	547	160	134	311	13
Shared Lane Traffic (%)												
Lane Group Flow (vph)	78	176	0	180	362	0	66	547	160	134	324	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt			Perm			Perm		Perm	pm+pt		
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6			8		8	4		
Detector Phase	5	2		6	6		8	8	8	7	4	

Kiawah River Plantation TIA  
2008 Existing Conditions

2: Maybank Highway (SC 700) & Main Road

Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	5.0	25.0		25.0	25.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	12.5	32.5		32.5	32.5		20.0	20.0	20.0	12.0	20.0	
Total Split (s)	12.5	49.5	0.0	37.0	37.0	0.0	44.0	44.0	44.0	12.0	56.0	0.0
Total Split (%)	11.8%	46.9%	0.0%	35.1%	35.1%	0.0%	41.7%	41.7%	41.7%	11.4%	53.1%	0.0%
Maximum Green (s)	6.5	43.5		31.0	31.0		38.0	38.0	38.0	6.0	50.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	3.0
Lead/Lag	Lead			Lag	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Recall Mode	None	Min		Min	Min		None	None	None	None	None	
Act Effct Green (s)	38.8	38.8		29.4	29.4		33.6	33.6	33.6	45.9	45.9	
Actuated g/C Ratio	0.41	0.41		0.31	0.31		0.35	0.35	0.35	0.48	0.48	
v/c Ratio	0.25	0.24		0.48	0.68		0.18	0.83	0.29	0.57	0.36	
Control Delay	20.6	20.2		34.5	38.6		23.6	40.9	24.4	24.6	17.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	20.6	20.2		34.5	38.6		23.6	40.9	24.4	24.6	17.5	
LOS	C	C		C	D		C	D	C	C	B	
Approach Delay		20.3			37.2			36.0			19.6	
Approach LOS		C			D			D			B	

Intersection Summary

Area Type: Other

Cycle Length: 105.5

Actuated Cycle Length: 95

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.83

Intersection Signal Delay: 30.6

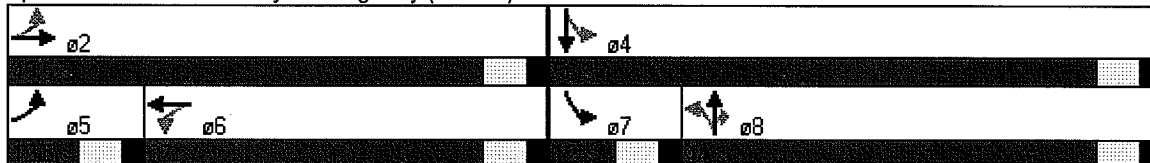
Intersection Capacity Utilization 90.9%

Analysis Period (min) 15

Intersection LOS: C

ICU Level of Service E






















Splits and Phases: 2: Maybank Highway (SC 700) & Main Road



Kiawah River Plantation TIA  
2008 Existing Conditions

2: Maybank Highway (SC 700) & Main Road

Timing Plan: PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	70	121	38	162	153	173	59	492	144	121	280	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Fr <sub>t</sub>	1.00	0.96		1.00	0.92		1.00	1.00	0.85	1.00	0.99	
Fl <sub>t</sub> Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1796		1770	1715		1770	1863	1583	1770	1852	
Fl <sub>t</sub> Permitted	0.28	1.00		0.65	1.00		0.56	1.00	1.00	0.14	1.00	
Satd. Flow (perm)	519	1796		1204	1715		1052	1863	1583	253	1852	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	78	134	42	180	170	192	66	547	160	134	311	13
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	78	176	0	180	362	0	66	547	160	134	324	0
Turn Type	pm+pt			Perm			Perm			Perm		pm+pt
Protected Phases	5	2			6			8			7	4
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	39.3	39.3		28.4	28.4		32.7	32.7	32.7	44.9	44.9	
Effective Green, g (s)	40.3	40.3		29.4	29.4		33.7	33.7	33.7	45.9	45.9	
Actuated g/C Ratio	0.42	0.42		0.31	0.31		0.35	0.35	0.35	0.48	0.48	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	294	752		368	524		369	653	555	234	884	
v/s Ratio Prot	0.02	c0.10			c0.21			c0.29		c0.04	0.17	
v/s Ratio Perm	0.09			0.15			0.06		0.10	0.23		
v/c Ratio	0.27	0.23		0.49	0.69		0.18	0.84	0.29	0.57	0.37	
Uniform Delay, d1	18.6	18.0		27.3	29.4		21.7	28.7	22.6	18.8	15.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.5	0.2		1.4	4.2		0.3	9.6	0.4	3.4	0.4	
Delay (s)	19.1	18.2		28.7	33.6		22.0	38.3	23.0	22.2	16.3	
Level of Service	B	B		C	C		C	D	C	C	B	
Approach Delay (s)		18.5			32.0			33.7			18.0	
Approach LOS		B			C			C			B	

Intersection Summary
























HCM Average Control Delay	27.8	HCM Level of Service	C
HCM Volume to Capacity ratio	0.72		
Actuated Cycle Length (s)	96.2	Sum of lost time (s)	20.0
Intersection Capacity Utilization	90.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			



Kiawah River Plantation TIA  
2008 Existing Conditions

3: Driveway & Bohicket Road













Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	39	6	37	69	4	14	35	698	136	15	298	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	110		55	170		0	125		125
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (ft)	0		0	100		100	100		0	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.959		0.950	0.957		0.950			0.950		
Satd. Flow (prot)	0	1786	1583	1681	1694	1583	1770	1863	1583	1770	3539	1583
Flt Permitted		0.959		0.950	0.957		0.552			0.201		
Satd. Flow (perm)	0	1786	1583	1681	1694	1583	1028	1863	1583	374	3539	1583
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			45			50			50	
Link Distance (ft)		482			1366			2053			2154	
Travel Time (s)		13.1			20.7			28.0			29.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	43	7	41	77	4	16	39	776	151	17	331	16
Shared Lane Traffic (%)				48%								
Lane Group Flow (vph)	0	50	41	40	41	16	39	776	151	17	331	16
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split		Perm	Split		Perm	Perm		Perm	Perm		Perm
Protected Phases	8	8		4	4			6			2	
Permitted Phases			8			4	6		6	2		2
Detector Phase	8	8	8	4	4	4	6	6	6	2	2	2

Kiawah River Plantation TIA  
2008 Existing Conditions

3: Driveway & Bohicket Road

Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	15.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	21.7	21.7	21.7	21.7	21.7	21.7
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	55.6%	55.6%	55.6%	55.6%	55.6%	55.6%
Maximum Green (s)	14.0	14.0	14.0	14.0	14.0	14.0	44.0	44.0	44.0	44.0	44.0	44.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	Min	Min	Min	Min	Min	Min
Act Effct Green (s)		12.2	12.2	12.1	12.1	12.1	42.9	42.9	42.9	42.9	42.9	42.9
Actuated g/C Ratio		0.18	0.18	0.17	0.17	0.17	0.62	0.62	0.62	0.62	0.62	0.62
v/c Ratio		0.16	0.15	0.14	0.14	0.06	0.06	0.67	0.15	0.07	0.15	0.02
Control Delay		32.2	32.3	32.1	32.1	31.4	9.4	17.6	10.2	10.1	9.3	8.7
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		32.2	32.3	32.1	32.1	31.4	9.4	17.6	10.2	10.1	9.3	8.7
LOS		C	C	C	C	C	A	B	B	B	A	A
Approach Delay		32.2			32.0			16.1			9.3	
Approach LOS		C			C			B			A	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 69.5

Natural Cycle: 80

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.67

Intersection Signal Delay: 16.5

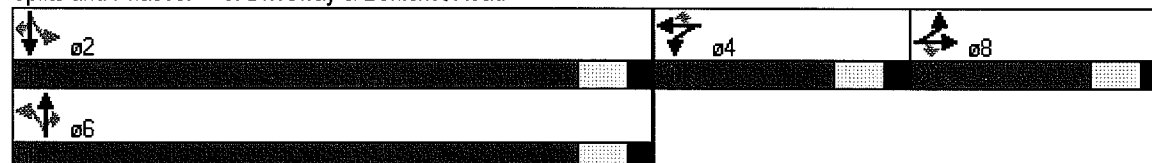
Intersection Capacity Utilization 65.9%

Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service C

Splits and Phases: 3: Driveway & Bohicket Road












### Timing Plan: PM Peak

Synchro 7 - Report  
Page 9

Kiawah River Plantation TIA  
2008 Existing Conditions

4: River Road & Mullet Hall Road

Timing Plan: PM Peak

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	163	5	7	85	2	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.996					
Flt Protected				0.996	0.950	
Satd. Flow (prot)	1855	0	0	1855	1770	0
Flt Permitted				0.996	0.950	
Satd. Flow (perm)	1855	0	0	1855	1770	0
Link Speed (mph)	45			45	45	
Link Distance (ft)	1366			330	1134	
Travel Time (s)	20.7			5.0	17.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	181	6	8	94	2	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	187	0	0	102	2	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

Intersection Summary

Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 20.3%

ICU Level of Service A










Analysis Period (min) 15



Kiawah River Plantation TIA  
2008 Existing Conditions

4: River Road & Mullet Hall Road

Timing Plan: PM Peak






















						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	163	5	7	85	2	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	181	6	8	94	2	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			187		294	184
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			187		294	184
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	100
cM capacity (veh/h)			1388		693	858
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	187	102	2			
Volume Left	0	8	2			
Volume Right	6	0	0			
cSH	1700	1388	693			
Volume to Capacity	0.11	0.01	0.00			
Queue Length 95th (ft)	0	0	0			
Control Delay (s)	0.0	0.6	10.2			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.6	10.2			
Approach LOS			B			
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			20.3%	ICU Level of Service		A
Analysis Period (min)			15			















Kiawah River Plantation TIA  
2018 No Build

1: Maybank Highway (SC 700) & River Road

Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	59	590	24	166	522	102	37	81	188	373	81	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	290		0	180		0	245		50	175		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.976				0.850		0.932	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1852	0	1770	1818	0	1770	1863	1583	1770	1736	0
Flt Permitted	0.294			0.093			0.653			0.522		
Satd. Flow (perm)	548	1852	0	173	1818	0	1216	1863	1583	972	1736	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		4802			2003			1572			1313	
Travel Time (s)		72.8			30.3			23.8			19.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	66	656	27	184	580	113	41	90	209	414	90	74
Shared Lane Traffic (%)												
Lane Group Flow (vph)	66	683	0	184	693	0	41	90	209	414	164	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm			pm+pt			Perm		Perm	pm+pt		
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2			6			8		8	4		
Detector Phase	2	2		1	6		8	8	8	7	4	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	12.0	12.0		5.0	12.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	20.0	20.0		12.0	20.0		20.0	20.0	20.0	12.0	20.0	
Total Split (s)	49.0	49.0	0.0	12.0	61.0	0.0	20.0	20.0	20.0	19.0	39.0	0.0
Total Split (%)	49.0%	49.0%	0.0%	12.0%	61.0%	0.0%	20.0%	20.0%	20.0%	19.0%	39.0%	0.0%
Maximum Green (s)	43.0	43.0		6.0	55.0		14.0	14.0	14.0	13.0	33.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	3.0
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Min	Min	Min	None	None	
Act Effct Green (s)	39.3	39.3		51.4	51.4		14.8	14.8	14.8	33.9	33.9	
Actuated g/C Ratio	0.41	0.41		0.54	0.54		0.16	0.16	0.16	0.36	0.36	
v/c Ratio	0.29	0.89		0.87	0.71		0.22	0.31	0.85	0.89	0.27	
Control Delay	22.4	41.8		55.1	21.0		40.5	40.8	71.3	52.1	24.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	22.4	41.8		55.1	21.0		40.5	40.8	71.3	52.1	24.6	
LOS	C	D		E	C		D	D	E	D	C	
Approach Delay		40.1			28.1			59.5			44.3	
Approach LOS		D			C			E			D	

#### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 95.3

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.89

Intersection Signal Delay: 39.5

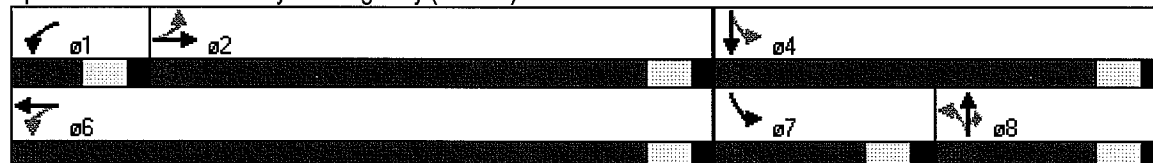
Intersection Capacity Utilization 85.3%

Analysis Period (min) 15

Intersection LOS: D

ICU Level of Service E

#### Splits and Phases: 1: Maybank Highway (SC 700) & River Road



























Kiawah River Plantation TIA  
2018 No Build

1: Maybank Highway (SC 700) & River Road

Timing Plan: AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	59	590	24	166	522	102	37	81	188	373	81	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Fr <sub>t</sub>	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1852		1770	1817		1770	1863	1583	1770	1737	
Flt Permitted	0.29	1.00		0.09	1.00		0.65	1.00	1.00	0.52	1.00	
Satd. Flow (perm)	548	1852		172	1817		1217	1863	1583	973	1737	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	66	656	27	184	580	113	41	90	209	414	90	74
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	66	683	0	184	693	0	41	90	209	414	164	0
Turn Type	Perm			pm+pt			Perm			Perm	pm+pt	
Protected Phases			2	1		6			8	7		4
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	38.3	38.3		50.3	50.3		13.8	13.8	13.8	32.9	32.9	
Effective Green, g (s)	39.3	39.3		51.3	51.3		14.8	14.8	14.8	33.9	33.9	
Actuated g/C Ratio	0.41	0.41		0.54	0.54		0.16	0.16	0.16	0.36	0.36	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	226	765		210	979		189	290	246	465	619	
v/s Ratio Prot		0.37		0.06	c0.38			0.05		c0.13	0.09	
v/s Ratio Perm	0.12			c0.41			0.03		0.13	c0.19		
v/c Ratio	0.29	0.89		0.88	0.71		0.22	0.31	0.85	0.89	0.26	
Uniform Delay, d1	18.7	26.0		20.8	16.4		35.1	35.7	39.1	27.3	21.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.7	12.8		30.9	2.4		0.6	0.6	23.0	18.8	0.2	
Delay (s)	19.4	38.8		51.7	18.7		35.7	36.3	62.1	46.1	22.0	
Level of Service	B	D		D	B		D	D	E	D	C	
Approach Delay (s)		37.1			25.7			52.1			39.3	
Approach LOS		D			C			D			D	






















Intersection Summary













HCM Average Control Delay	35.6	HCM Level of Service	D
HCM Volume to Capacity ratio	0.85		
Actuated Cycle Length (s)	95.2	Sum of lost time (s)	10.0
Intersection Capacity Utilization	85.3%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Kiawah River Plantation TIA  
2018 No Build

2: Maybank Highway (SC 700) & Main Road

Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	229	97	254	101	92	53	295	99	211	581	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	170		0	145		0	185		370	210		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.955			0.929				0.850		0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1779	0	1770	1730	0	1770	1863	1583	1770	1850	0
Flt Permitted	0.491			0.545			0.190			0.283		
Satd. Flow (perm)	915	1779	0	1015	1730	0	354	1863	1583	527	1850	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1276			4802			919			3477	
Travel Time (s)		19.3			72.8			13.9			52.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	102	254	108	282	112	102	59	328	110	234	646	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	102	362	0	282	214	0	59	328	110	234	679	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt			Perm			Perm		Perm	pm+pt		
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6			8		8	4		
Detector Phase	5	2		6	6		8	8	8	7	4	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	5.0	25.0		25.0	25.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	12.5	32.5		32.5	32.5		20.0	20.0	20.0	12.0	20.0	
Total Split (s)	12.5	55.5	0.0	43.0	43.0	0.0	36.0	36.0	36.0	14.0	50.0	0.0
Total Split (%)	11.8%	52.6%	0.0%	40.8%	40.8%	0.0%	34.1%	34.1%	34.1%	13.3%	47.4%	0.0%
Maximum Green (s)	6.5	49.5		37.0	37.0		30.0	30.0	30.0	8.0	44.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	3.0
Lead/Lag	Lead			Lag	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Recall Mode	None	Min		Min	Min		None	None	None	None	None	
Act Effct Green (s)	43.1	43.1		33.7	33.7		25.8	25.8	25.8	40.3	40.3	
Actuated g/C Ratio	0.46	0.46		0.36	0.36		0.28	0.28	0.28	0.43	0.43	
v/c Ratio	0.21	0.44		0.77	0.34		0.61	0.64	0.25	0.67	0.85	
Control Delay	16.2	19.5		44.8	25.7		59.9	37.4	29.7	30.6	37.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	16.2	19.5		44.8	25.7		59.9	37.4	29.7	30.6	37.7	
LOS	B	B		D	C		E	D	C	C	D	
Approach Delay		18.8			36.6			38.3			35.9	
Approach LOS		B			D			D			D	

#### Intersection Summary

Area Type: Other

Cycle Length: 105.5

Actuated Cycle Length: 93.7

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 33.2

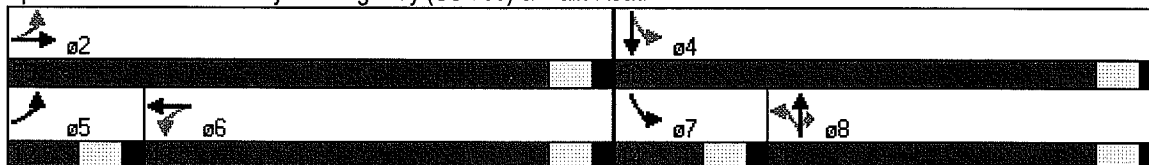
Intersection Capacity Utilization 99.1%






















Analysis Period (min) 15

Intersection LOS: C

ICU Level of Service F

#### Splits and Phases: 2: Maybank Highway (SC 700) & Main Road



												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	229	97	254	101	92	53	295	99	211	581	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.96		1.00	0.93		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1779		1770	1730		1770	1863	1583	1770	1849	
Flt Permitted	0.49	1.00		0.55	1.00		0.19	1.00	1.00	0.28	1.00	
Satd. Flow (perm)	915	1779		1016	1730		355	1863	1583	527	1849	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	102	254	108	282	112	102	59	328	110	234	646	33
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	102	362	0	282	214	0	59	328	110	234	679	0
Turn Type	pm+pt			Perm			Perm			Perm	pm+pt	
Protected Phases	5	2			6			8			7	4
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	43.6	43.6		32.7	32.7		24.9	24.9	24.9	39.2	39.2	
Effective Green, g (s)	44.6	44.6		33.7	33.7		25.9	25.9	25.9	40.2	40.2	
Actuated g/C Ratio	0.47	0.47		0.36	0.36		0.27	0.27	0.27	0.42	0.42	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	484	837		361	615		97	509	432	345	784	
v/s Ratio Prot	0.01	c0.20			0.12			0.18		0.07	c0.37	
v/s Ratio Perm	0.09			c0.28			0.17		0.07	0.22		
v/c Ratio	0.21	0.43		0.78	0.35		0.61	0.64	0.25	0.68	0.87	
Uniform Delay, d1	14.5	16.7		27.3	22.5		30.0	30.4	26.9	19.7	24.8	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.5		11.1	0.5		11.9	3.1	0.4	5.2	10.2	
Delay (s)	14.7	17.2		38.3	22.9		41.9	33.5	27.3	24.9	35.1	
Level of Service	B	B		D	C		D	C	C	C	D	
Approach Delay (s)		16.6			31.7			33.1			32.5	
Approach LOS		B			C			C			C	

Intersection Summary

HCM Average Control Delay	29.3	HCM Level of Service	C
HCM Volume to Capacity ratio	0.81		
Actuated Cycle Length (s)	94.8	Sum of lost time (s)	15.0
Intersection Capacity Utilization	99.1%	ICU Level of Service	F
Analysis Period (min)	15		
























c Critical Lane Group



Kiawah River Plantation TIA  
2018 No Build

3: Driveway & Bohicket Road













Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	1	53	148	13	6	27	327	56	20	837	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	110		55	170		0	125		125
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.968		0.950	0.960		0.950			0.950		
Satd. Flow (prot)	0	1803	1583	1681	1699	1583	1770	1863	1583	1770	3539	1583
Flt Permitted		0.968		0.950	0.960		0.241			0.495		
Satd. Flow (perm)	0	1803	1583	1681	1699	1583	449	1863	1583	922	3539	1583
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			45			50			50	
Link Distance (ft)		482			1366			2053			2154	
Travel Time (s)		13.1			20.7			28.0			29.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	2	1	59	164	14	7	30	363	62	22	930	73
Shared Lane Traffic (%)				46%								
Lane Group Flow (vph)	0	3	59	89	89	7	30	363	62	22	930	73
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split		Perm	Split		Perm	Perm		Perm	Perm		Perm
Protected Phases	8	8		4	4			6			2	
Permitted Phases			8			4	6		6	2		2
Detector Phase	8	8	8	4	4	4	6	6	6	2	2	2

Kiawah River Plantation TIA  
2018 No Build

3: Driveway & Bohicket Road

Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	15.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	21.7	21.7	21.7	21.7	21.7	21.7
Total Split (s)	22.0	22.0	22.0	22.0	22.0	22.0	46.0	46.0	46.0	46.0	46.0	46.0
Total Split (%)	24.4%	24.4%	24.4%	24.4%	24.4%	24.4%	51.1%	51.1%	51.1%	51.1%	51.1%	51.1%
Maximum Green (s)	16.0	16.0	16.0	16.0	16.0	16.0	40.0	40.0	40.0	40.0	40.0	40.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	Min	Min	Min	Min	Min	Min
Act Effct Green (s)		12.1	12.1	12.4	12.4	12.4	31.2	31.2	31.2	31.2	31.2	31.2
Actuated g/C Ratio		0.22	0.22	0.22	0.22	0.22	0.56	0.56	0.56	0.56	0.56	0.56
v/c Ratio		0.01	0.17	0.24	0.24	0.02	0.12	0.35	0.07	0.04	0.47	0.08
Control Delay		25.0	25.8	25.6	25.5	24.3	13.6	13.1	11.5	11.8	13.1	11.5
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		25.0	25.8	25.6	25.5	24.3	13.6	13.1	11.5	11.8	13.1	11.5
LOS		C	C	C	C	C	B	B	B	B	B	B
Approach Delay		25.8			25.5			12.9			13.0	
Approach LOS		C			C			B			B	

Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 56.1

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.47

Intersection Signal Delay: 14.8

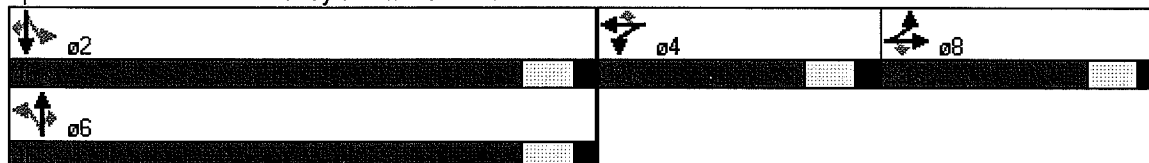
Intersection Capacity Utilization 52.3%

Analysis Period (min) 15

Intersection LOS: B

ICU Level of Service A
























Splits and Phases: 3: Driveway & Bohicket Road












Kiawah River Plantation TIA  
2018 No Build

3: Driveway & Bohicket Road

Timing Plan: AM Peak










												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	1	53	148	13	6	27	327	56	20	837	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.97	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1803	1583	1681	1698	1583	1770	1863	1583	1770	3539	1583
Flt Permitted		0.97	1.00	0.95	0.96	1.00	0.24	1.00	1.00	0.50	1.00	1.00
Satd. Flow (perm)		1803	1583	1681	1698	1583	449	1863	1583	922	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	2	1	59	164	14	7	30	363	62	22	930	73
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	3	59	89	89	7	30	363	62	22	930	73
Turn Type	Split		Perm	Split		Perm	Perm		Perm	Perm		Perm
Protected Phases	8	8		4	4			6			2	
Permitted Phases			8			4	6		6	2		2
Actuated Green, G (s)		5.2	5.2	8.2	8.2	8.2	28.5	28.5	28.5	28.5	28.5	28.5
Effective Green, g (s)		6.2	6.2	9.2	9.2	9.2	29.5	29.5	29.5	29.5	29.5	29.5
Actuated g/C Ratio		0.10	0.10	0.15	0.15	0.15	0.49	0.49	0.49	0.49	0.49	0.49
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		187	164	258	261	243	221	918	780	454	1743	780
v/s Ratio Prot		0.00		c0.05	0.05			0.19			c0.26	
v/s Ratio Perm			c0.04			0.00	0.07		0.04	0.02		0.05
v/c Ratio		0.02	0.36	0.34	0.34	0.03	0.14	0.40	0.08	0.05	0.53	0.09
Uniform Delay, d1		24.1	25.0	22.7	22.6	21.6	8.3	9.6	8.0	7.9	10.5	8.1
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.0	1.4	0.8	0.8	0.0	0.3	0.3	0.0	0.0	0.3	0.1
Delay (s)		24.1	26.4	23.5	23.4	21.6	8.5	9.9	8.1	7.9	10.8	8.1
Level of Service		C	C	C	C	C	A	A	A	A	B	A
Approach Delay (s)		26.2			23.4			9.5			10.5	
Approach LOS		C			C			A			B	
<b>Intersection Summary</b>												
HCM Average Control Delay			12.2			HCM Level of Service				B		
HCM Volume to Capacity ratio			0.47									
Actuated Cycle Length (s)			59.9							15.0		
Intersection Capacity Utilization			52.3%							A		
Analysis Period (min)			15									
c Critical Lane Group												

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	61	7	3	177	3	2
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.986				0.946	
Flt Protected				0.999	0.971	
Satd. Flow (prot)	1837	0	0	1861	1711	0
Flt Permitted				0.999	0.971	
Satd. Flow (perm)	1837	0	0	1861	1711	0
Link Speed (mph)	45			45	45	
Link Distance (ft)	1366			1051	1134	
Travel Time (s)	20.7			15.9	17.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	68	8	3	197	3	2
Shared Lane Traffic (%)						
Lane Group Flow (vph)	76	0	0	200	5	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

#### Intersection Summary

Area Type: Other  
Control Type: Unsignalized  
Intersection Capacity Utilization 21.7% ICU Level of Service A  
Analysis Period (min) 15




































						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	61	7	3	177	3	2
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	68	8	3	197	3	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			76		275	72
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			76		275	72
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	100
cM capacity (veh/h)			1524		713	991
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	76	200	6			
Volume Left	0	3	3			
Volume Right	8	0	2			
cSH	1700	1524	803			
Volume to Capacity	0.04	0.00	0.01			
Queue Length 95th (ft)	0	0	1			
Control Delay (s)	0.0	0.1	9.5			
Lane LOS		A	A			
Approach Delay (s)	0.0	0.1	9.5			
Approach LOS			A			
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			21.7%	ICU Level of Service		A
Analysis Period (min)			15			

Kiawah River Plantation TIA  
2018 No Build

1: Maybank Highway (SC 700) & River Road

Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	74	673	47	211	756	354	79	130	205	304	129	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	290		0	180		0	245		50	175		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	100		0	100		0	100		100	100		0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.990			0.952				0.850		0.940	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1844	0	1770	1773	0	1770	1863	1583	1770	1751	0
Flt Permitted	0.080			0.099			0.610			0.419		
Satd. Flow (perm)	149	1844	0	184	1773	0	1136	1863	1583	780	1751	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		4802			2003			1572			1313	
Travel Time (s)		72.8			30.3			23.8			19.9	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	82	748	52	234	840	393	88	144	228	338	143	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	82	800	0	234	1233	0	88	144	228	338	239	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm			pm+pt			Perm		Perm	pm+pt		
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2			6			8		8	4		
Detector Phase	2	2		1	6		8	8	8	7	4	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	12.0	12.0		5.0	12.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	20.0	20.0		12.0	20.0		20.0	20.0	20.0	12.0	20.0	
Total Split (s)	55.0	55.0	0.0	12.0	67.0	0.0	20.0	20.0	20.0	13.0	33.0	0.0
Total Split (%)	55.0%	55.0%	0.0%	12.0%	67.0%	0.0%	20.0%	20.0%	20.0%	13.0%	33.0%	0.0%
Maximum Green (s)	49.0	49.0		6.0	61.0		14.0	14.0	14.0	7.0	27.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	3.0
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Min	Min	Min	None	None	
Act Effct Green (s)	50.0	50.0		62.0	62.0		15.0	15.0	15.0	28.0	28.0	
Actuated g/C Ratio	0.50	0.50		0.62	0.62		0.15	0.15	0.15	0.28	0.28	
v/c Ratio	1.09	0.87		1.04	1.12		0.52	0.52	0.96	1.13	0.49	
Control Delay	163.0	34.1		91.0	88.4		51.1	46.5	93.5	126.7	34.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	163.0	34.1		91.0	88.4		51.1	46.5	93.5	126.7	34.1	
LOS	F	C		F	F		D	D	F	F	C	
Approach Delay		46.1			88.8			70.7			88.3	
Approach LOS		D			F			E			F	

#### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Natural Cycle: 110

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.13

Intersection Signal Delay: 75.1

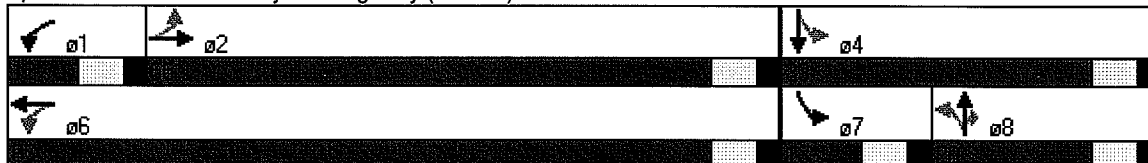
Intersection Capacity Utilization 111.7%

Analysis Period (min) 15

Intersection LOS: E

ICU Level of Service H























Splits and Phases: 1: Maybank Highway (SC 700) & River Road



Kiawah River Plantation TIA  
2018 No Build

1: Maybank Highway (SC 700) & River Road

Timing Plan: PM Peak























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	74	673	47	211	756	354	79	130	205	304	129	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.95		1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1845		1770	1774		1770	1863	1583	1770	1751	
Flt Permitted	0.08	1.00		0.10	1.00		0.61	1.00	1.00	0.42	1.00	
Satd. Flow (perm)	149	1845		185	1774		1136	1863	1583	781	1751	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	82	748	52	234	840	393	88	144	228	338	143	96
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	82	800	0	234	1233	0	88	144	228	338	239	0
Turn Type	Perm			pm+pt			Perm			Perm		pm+pt
Protected Phases		2		1	6			8			7	4
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	49.0	49.0		61.0	61.0		14.0	14.0	14.0	27.0	27.0	
Effective Green, g (s)	50.0	50.0		62.0	62.0		15.0	15.0	15.0	28.0	28.0	
Actuated g/C Ratio	0.50	0.50		0.62	0.62		0.15	0.15	0.15	0.28	0.28	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	75	923		226	1100		170	279	237	298	490	
v/s Ratio Prot		0.43		0.07	c0.70			0.08		c0.09	0.14	
v/s Ratio Perm	0.55			0.57			0.08		0.14	c0.23		
v/c Ratio	1.09	0.87		1.04	1.12		0.52	0.52	0.96	1.13	0.49	
Uniform Delay, d1	25.0	22.1		24.5	19.0		39.2	39.2	42.2	35.3	30.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	131.7	8.6		69.4	66.8		2.6	1.6	47.6	93.4	0.8	
Delay (s)	156.7	30.7		93.9	85.8		41.8	40.8	89.8	128.7	30.8	
Level of Service	F	C		F	F		D	D	F	F	C	
Approach Delay (s)		42.4			87.1			65.3			88.1	
Approach LOS		D			F			E			F	
<b>Intersection Summary</b>												
HCM Average Control Delay			72.6			HCM Level of Service			E			
HCM Volume to Capacity ratio			1.11									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			10.0			
Intersection Capacity Utilization			111.7%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												















Kiawah River Plantation TIA  
2018 No Build

2: Maybank Highway (SC 700) & Main Road

Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	147	46	198	186	211	71	599	176	147	342	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	170		0	145		0	185		370	210		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	100		0	100		0	100		100	100		0
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.964			0.920				0.850		0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1796	0	1770	1714	0	1770	1863	1583	1770	1852	0
Flt Permitted	0.172			0.624			0.528			0.092		
Satd. Flow (perm)	320	1796	0	1162	1714	0	984	1863	1583	171	1852	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1276			4802			919			3477	
Travel Time (s)		19.3			72.8			13.9			52.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	94	163	51	220	207	234	79	666	196	163	380	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	94	214	0	220	441	0	79	666	196	163	397	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt			Perm			Perm		Perm	pm+pt		
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6			8		8	4		
Detector Phase	5	2		6	6		8	8	8	7	4	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	5.0	25.0		25.0	25.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	12.5	32.5		32.5	32.5		20.0	20.0	20.0	12.0	20.0	
Total Split (s)	12.5	48.5	0.0	36.0	36.0	0.0	45.0	45.0	45.0	12.0	57.0	0.0
Total Split (%)	11.8%	46.0%	0.0%	34.1%	34.1%	0.0%	42.7%	42.7%	42.7%	11.4%	54.0%	0.0%
Maximum Green (s)	6.5	42.5		30.0	30.0		39.0	39.0	39.0	6.0	51.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	3.0
Lead/Lag	Lead			Lag	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Recall Mode	None	Min		Min	Min		None	None	None	None	None	
Act Effct Green (s)	39.6	39.6		30.1	30.1		38.4	38.4	38.4	50.5	50.5	
Actuated g/C Ratio	0.39	0.39		0.30	0.30		0.38	0.38	0.38	0.50	0.50	
v/c Ratio	0.40	0.30		0.63	0.86		0.21	0.93	0.32	0.82	0.43	
Control Delay	24.6	22.2		41.2	51.9		24.1	52.7	24.6	50.9	18.4	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	24.6	22.2		41.2	51.9		24.1	52.7	24.6	50.9	18.4	
LOS	C	C		D	D		C	D	C	D	B	
Approach Delay		22.9			48.4			44.4			27.8	
Approach LOS		C			D			D			C	

Intersection Summary

Area Type: Other

Cycle Length: 105.5

Actuated Cycle Length: 100.3

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 39.0

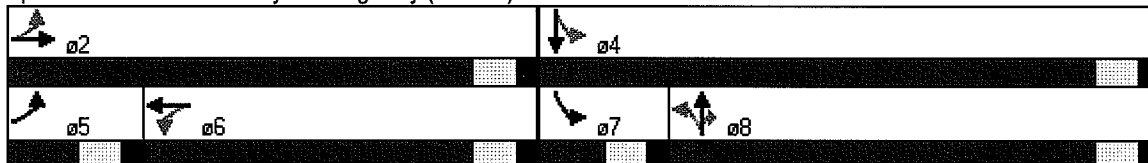
Intersection Capacity Utilization 98.0%























Analysis Period (min) 15

Intersection LOS: D

ICU Level of Service F
























Splits and Phases: 2: Maybank Highway (SC 700) & Main Road















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	147	46	198	186	211	71	599	176	147	342	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.96		1.00	0.92		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1796		1770	1714		1770	1863	1583	1770	1851	
Flt Permitted	0.17	1.00		0.62	1.00		0.53	1.00	1.00	0.09	1.00	
Satd. Flow (perm)	320	1796		1163	1714		983	1863	1583	171	1851	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	94	163	51	220	207	234	79	666	196	163	380	17
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	94	214	0	220	441	0	79	666	196	163	397	0
Turn Type	pm+pt			Perm			Perm			Perm	pm+pt	
Protected Phases	5	2			6			8			7	4
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	40.0	40.0		29.1	29.1		37.5	37.5	37.5	49.6	49.6	
Effective Green, g (s)	41.0	41.0		30.1	30.1		38.5	38.5	38.5	50.6	50.6	
Actuated g/C Ratio	0.40	0.40		0.30	0.30		0.38	0.38	0.38	0.50	0.50	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	213	725		345	508		372	706	600	197	922	
v/s Ratio Prot	c0.03	0.12			c0.26			c0.36		c0.06	0.21	
v/s Ratio Perm	0.15			0.19			0.08		0.12	0.35		
v/c Ratio	0.44	0.30		0.64	0.87		0.21	0.94	0.33	0.83	0.43	
Uniform Delay, d1	22.0	20.5		31.0	33.9		21.3	30.5	22.4	22.0	16.3	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.5	0.3		4.3	15.0		0.4	21.2	0.4	23.9	0.4	
Delay (s)	23.5	20.8		35.3	48.8		21.7	51.7	22.8	45.8	16.7	
Level of Service	C	C		D	D		C	D	C	D	B	
Approach Delay (s)		21.6			44.3			43.2			25.2	
Approach LOS		C			D			D			C	
Intersection Summary												
HCM Average Control Delay			36.7			HCM Level of Service			D			
HCM Volume to Capacity ratio			0.87									
Actuated Cycle Length (s)			101.6			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			98.0%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Kiawah River Plantation TIA  
2018 No Build

3: Driveway & Bohicket Road  
Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	7	45	84	5	17	43	850	166	18	363	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	110		55	170		0	125		125
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (ft)	0		0	100		100	100		0	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.958		0.950	0.958		0.950			0.950		
Satd. Flow (prot)	0	1785	1583	1681	1695	1583	1770	1863	1583	1770	3539	1583
Flt Permitted		0.958		0.950	0.958		0.515			0.114		
Satd. Flow (perm)	0	1785	1583	1681	1695	1583	959	1863	1583	212	3539	1583
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			45			50			50	
Link Distance (ft)		482			1366			2053			2154	
Travel Time (s)		13.1			20.7			28.0			29.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	52	8	50	93	6	19	48	944	184	20	403	19
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	60	50	49	50	19	48	944	184	20	403	19
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split		Perm	Split		Perm	Perm		Perm	Perm		Perm
Protected Phases	8	8		4	4			6			2	
Permitted Phases			8			4	6		6	2		2
Detector Phase	8	8	8	4	4	4	6	6	6	2	2	2



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	15.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	21.7	21.7	21.7	21.7	21.7	21.7
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	55.6%	55.6%	55.6%	55.6%	55.6%	55.6%
Maximum Green (s)	14.0	14.0	14.0	14.0	14.0	14.0	44.0	44.0	44.0	44.0	44.0	44.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	Min	Min	Min	Min	Min	Min
Act Effct Green (s)		11.4	11.4	11.4	11.4	11.4	49.1	49.1	49.1	49.1	49.1	49.1
Actuated g/C Ratio		0.15	0.15	0.15	0.15	0.15	0.64	0.64	0.64	0.64	0.64	0.64
v/c Ratio		0.23	0.21	0.20	0.20	0.08	0.08	0.80	0.18	0.15	0.18	0.02
Control Delay		34.3	34.4	34.1	34.2	32.4	9.6	22.9	9.9	13.2	9.0	8.9
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		34.3	34.4	34.1	34.2	32.4	9.6	22.9	9.9	13.2	9.0	8.9
LOS		C	C	C	C	C	A	C	A	B	A	A
Approach Delay		34.4			33.9			20.3			9.2	
Approach LOS		C			C			C			A	

#### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 77.1

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 19.3

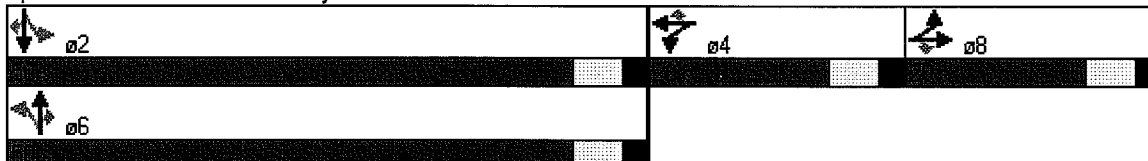
Intersection Capacity Utilization 73.9%
























Analysis Period (min) 15










Intersection LOS: B

ICU Level of Service D

Splits and Phases: 3: Driveway & Bohicket Road



												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	7	45	84	5	17	43	850	166	18	363	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1785	1583	1681	1695	1583	1770	1863	1583	1770	3539	1583
Flt Permitted		0.96	1.00	0.95	0.96	1.00	0.51	1.00	1.00	0.11	1.00	1.00
Satd. Flow (perm)		1785	1583	1681	1695	1583	959	1863	1583	212	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	52	8	50	93	6	19	48	944	184	20	403	19
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	60	50	49	50	19	48	944	184	20	403	19
Turn Type	Split		Perm	Split		Perm	Perm		Perm	Perm		Perm
Protected Phases	8	8		4	4			6			2	
Permitted Phases			8			4	6		6	2		2
Actuated Green, G (s)		7.7	7.7	7.6	7.6	7.6	46.7	46.7	46.7	46.7	46.7	46.7
Effective Green, g (s)		8.7	8.7	8.6	8.6	8.6	47.7	47.7	47.7	47.7	47.7	47.7
Actuated g/C Ratio		0.11	0.11	0.11	0.11	0.11	0.60	0.60	0.60	0.60	0.60	0.60
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		194	172	181	182	170	572	1111	944	126	2110	944
v/s Ratio Prot		c0.03		0.03	c0.03			c0.51			0.11	
v/s Ratio Perm			0.03			0.01	0.05		0.12	0.09		0.01
v/c Ratio		0.31	0.29	0.27	0.27	0.11	0.08	0.85	0.19	0.16	0.19	0.02
Uniform Delay, d1		32.9	32.8	32.8	32.8	32.2	6.9	13.2	7.4	7.2	7.4	6.6
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.9	0.9	0.8	0.8	0.3	0.1	6.2	0.1	0.6	0.0	0.0
Delay (s)		33.8	33.8	33.6	33.7	32.5	6.9	19.5	7.5	7.8	7.4	6.6
Level of Service		C	C	C	C	C	A	B	A	A	A	A
Approach Delay (s)		33.8			33.5			17.1			7.4	
Approach LOS		C			C			B			A	
<b>Intersection Summary</b>												
HCM Average Control Delay			16.8			HCM Level of Service			B			
HCM Volume to Capacity ratio			0.70									
Actuated Cycle Length (s)			80.0			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			73.9%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	199	6	8	104	2	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.996					
Flt Protected				0.996	0.950	
Satd. Flow (prot)	1855	0	0	1855	1770	0
Flt Permitted				0.996	0.950	
Satd. Flow (perm)	1855	0	0	1855	1770	0
Link Speed (mph)	45			45	45	
Link Distance (ft)	1366			330	1134	
Travel Time (s)	20.7			5.0	17.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	221	7	9	116	2	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	228	0	0	125	2	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

#### Intersection Summary










Area Type: Other

Control Type: Unsignalized

Intersection Capacity Utilization 22.1%

ICU Level of Service A

Analysis Period (min) 15

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	199	6	8	104	2	0
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	221	7	9	116	2	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			228		358	224
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			228		358	224
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			99		100	100
cM capacity (veh/h)			1340		636	815
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	228	124	2			
Volume Left	0	9	2			
Volume Right	7	0	0			
cSH	1700	1340	636			
Volume to Capacity	0.13	0.01	0.00			
Queue Length 95th (ft)	0	1	0			
Control Delay (s)	0.0	0.6	10.7			
Lane LOS		A	B			
Approach Delay (s)	0.0	0.6	10.7			
Approach LOS			B			
Intersection Summary						
Average Delay			0.3			
Intersection Capacity Utilization			22.1%	ICU Level of Service		A
Analysis Period (min)			15			






































Kiawah River Plantation TIA  
2018 Build

1: Maybank Highway (SC 700) & River Road

Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	59	611	24	231	548	102	37	81	237	373	81	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	290		0	180		0	245		50	175		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.994			0.977				0.850		0.932	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1852	0	1770	1820	0	1770	1863	1583	1770	1736	0
Flt Permitted	0.257			0.092			0.653			0.577		
Satd. Flow (perm)	479	1852	0	171	1820	0	1216	1863	1583	1075	1736	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		4802			2003			1572			3100	
Travel Time (s)		72.8			30.3			23.8			47.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	66	679	27	257	609	113	41	90	263	414	90	74
Shared Lane Traffic (%)												
Lane Group Flow (vph)	66	706	0	257	722	0	41	90	263	414	164	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm			pm+pt			Perm		Perm	pm+pt		
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2			6			8		8	4		
Detector Phase	2	2		1	6		8	8	8	7	4	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	12.0	12.0		5.0	12.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	20.0	20.0		12.0	20.0		20.0	20.0	20.0	12.0	20.0	
Total Split (s)	48.0	48.0	0.0	12.0	60.0	0.0	23.0	23.0	23.0	17.0	40.0	0.0
Total Split (%)	48.0%	48.0%	0.0%	12.0%	60.0%	0.0%	23.0%	23.0%	23.0%	17.0%	40.0%	0.0%
Maximum Green (s)	42.0	42.0		6.0	54.0		17.0	17.0	17.0	11.0	34.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-3.0	-3.0	-1.0	-1.0	-1.0	-1.0	-2.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	3.0	3.0	3.0	3.0	5.0	5.0	5.0	4.0	5.0	3.0
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Min	Min	Min	None	None	
Act Effct Green (s)	40.2	40.2		54.2	54.2		17.9	17.9	17.9	35.9	34.9	
Actuated g/C Ratio	0.41	0.41		0.56	0.56		0.18	0.18	0.18	0.37	0.36	
v/c Ratio	0.33	0.92		1.05	0.71		0.18	0.26	0.90	0.84	0.26	
Control Delay	24.9	46.1		97.6	20.4		37.2	37.5	73.9	44.6	24.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	24.9	46.1		97.6	20.4		37.2	37.5	73.9	44.6	24.3	
LOS	C	D		F	C		D	D	E	D	C	
Approach Delay		44.3			40.7			61.7			38.9	
Approach LOS		D			D			E			D	

#### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 97.2

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.05

Intersection Signal Delay: 44.4

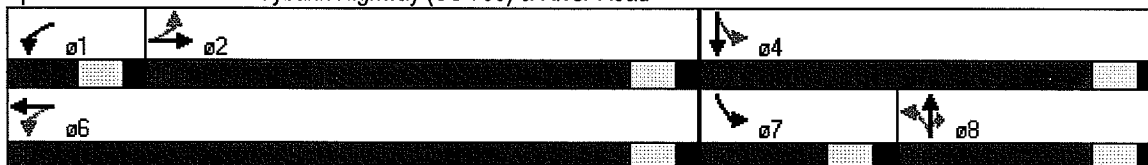
Intersection Capacity Utilization 86.3%























Analysis Period (min) 15

Intersection LOS: D

ICU Level of Service E

Splits and Phases: 1: Maybank Highway (SC 700) & River Road

























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	59	611	24	231	548	102	37	81	237	373	81	67
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		3.0	3.0		5.0	5.0	5.0	4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.98		1.00	1.00	0.85	1.00	0.93	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1852		1770	1819		1770	1863	1583	1770	1737	
Flt Permitted	0.26	1.00		0.09	1.00		0.65	1.00	1.00	0.58	1.00	
Satd. Flow (perm)	479	1852		171	1819		1217	1863	1583	1074	1737	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	66	679	27	257	609	113	41	90	263	414	90	74
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	66	706	0	257	722	0	41	90	263	414	164	0
Turn Type	Perm			pm+pt			Perm			Perm	pm+pt	
Protected Phases		2		1	6			8			7	4
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	39.2	39.2		51.2	51.2		16.9	16.9	16.9	33.9	33.9	
Effective Green, g (s)	40.2	40.2		54.2	54.2		17.9	17.9	17.9	35.9	34.9	
Actuated g/C Ratio	0.41	0.41		0.56	0.56		0.18	0.18	0.18	0.37	0.36	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	198	767		244	1015		224	343	292	490	624	
v/s Ratio Prot		0.38		c0.10	0.40			0.05		c0.11	0.09	
v/s Ratio Perm	0.14			c0.49			0.03		0.17	c0.20		
v/c Ratio	0.33	0.92		1.05	0.71		0.18	0.26	0.90	0.84	0.26	
Uniform Delay, d1	19.3	26.9		26.8	15.7		33.4	33.9	38.7	26.7	22.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.0	16.3		72.3	2.4		0.4	0.4	28.6	12.6	0.2	
Delay (s)	20.3	43.2		99.2	18.1		33.8	34.4	67.4	39.3	22.2	
Level of Service	C	D		F	B		C	C	E	D	C	
Approach Delay (s)		41.3			39.4			56.3			34.5	
Approach LOS		D			D			E			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			41.3			HCM Level of Service				D		
HCM Volume to Capacity ratio			0.96									
Actuated Cycle Length (s)			97.1			Sum of lost time (s)			7.0			
Intersection Capacity Utilization			86.3%			ICU Level of Service			E			
Analysis Period (min)			15									
c Critical Lane Group												















Kiawah River Plantation TIA  
2018 Build

2: Maybank Highway (SC 700) & Main Road

Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	229	110	280	101	92	64	316	120	211	607	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	170		0	145		0	185		370	210		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.951			0.929				0.850		0.993	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1771	0	1770	1730	0	1770	1863	1583	1770	1850	0
Flt Permitted	0.490			0.538			0.152			0.296		
Satd. Flow (perm)	913	1771	0	1002	1730	0	283	1863	1583	551	1850	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1276			4802			919			3477	
Travel Time (s)		19.3			72.8			13.9			52.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	102	254	122	311	112	102	71	351	133	234	674	33
Shared Lane Traffic (%)												
Lane Group Flow (vph)	102	376	0	311	214	0	71	351	133	234	707	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt			Perm			Perm		Perm	pm+pt		
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6			8		8	4		
Detector Phase	5	2		6	6		8	8	8	7	4	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	5.0	25.0		25.0	25.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	12.5	32.5		32.5	32.5		20.0	20.0	20.0	12.0	20.0	
Total Split (s)	12.5	54.5	0.0	42.0	42.0	0.0	39.0	39.0	39.0	12.0	51.0	0.0
Total Split (%)	11.8%	51.7%	0.0%	39.8%	39.8%	0.0%	37.0%	37.0%	37.0%	11.4%	48.3%	0.0%
Maximum Green (s)	6.5	48.5		36.0	36.0		33.0	33.0	33.0	6.0	45.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	3.0
Lead/Lag	Lead			Lag	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Recall Mode	None	Min		Min	Min		None	None	None	None	None	
Act Effct Green (s)	44.2	44.2		35.0	35.0		30.3	30.3	30.3	42.7	42.7	
Actuated g/C Ratio	0.45	0.45		0.36	0.36		0.31	0.31	0.31	0.44	0.44	
v/c Ratio	0.21	0.47		0.86	0.34		0.81	0.61	0.27	0.70	0.87	
Control Delay	16.9	20.8		55.9	26.5		90.2	34.4	28.1	33.6	39.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	16.9	20.8		55.9	26.5		90.2	34.4	28.1	33.6	39.3	
LOS	B	C		E	C		F	C	C	C	D	
Approach Delay		20.0			43.9			40.0			37.9	
Approach LOS		B			D			D			D	

#### Intersection Summary

Area Type: Other

Cycle Length: 105.5

Actuated Cycle Length: 97.3

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 36.2

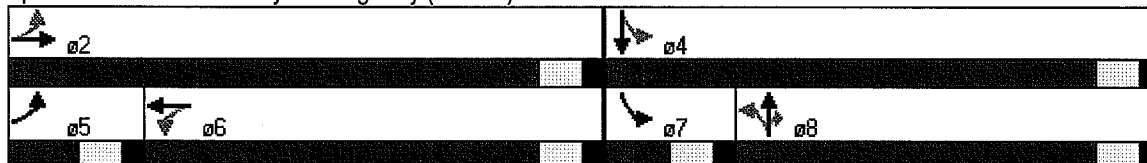
Intersection Capacity Utilization 100.4%























Analysis Period (min) 15

Intersection LOS: D

ICU Level of Service G

#### Splits and Phases: 2: Maybank Highway (SC 700) & Main Road


























												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	92	229	110	280	101	92	64	316	120	211	607	30
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	0.93		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1772		1770	1730		1770	1863	1583	1770	1850	
Flt Permitted	0.49	1.00		0.54	1.00		0.15	1.00	1.00	0.30	1.00	
Satd. Flow (perm)	913	1772		1003	1730		282	1863	1583	551	1850	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	102	254	122	311	112	102	71	351	133	234	674	33
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	102	376	0	311	214	0	71	351	133	234	707	0
Turn Type	pm+pt			Perm			Perm			Perm	pm+pt	
Protected Phases	5	2			6			8			7	4
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	44.7	44.7		33.9	33.9		29.5	29.5	29.5	41.7	41.7	
Effective Green, g (s)	45.7	45.7		34.9	34.9		30.5	30.5	30.5	42.7	42.7	
Actuated g/C Ratio	0.46	0.46		0.35	0.35		0.31	0.31	0.31	0.43	0.43	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	475	823		356	614		87	577	491	328	803	
v/s Ratio Prot	0.01	c0.21			0.12			0.19		0.05	c0.38	
v/s Ratio Perm	0.09			c0.31			0.25		0.08	0.26		
v/c Ratio	0.21	0.46		0.87	0.35		0.82	0.61	0.27	0.71	0.88	
Uniform Delay, d1	15.4	17.9		29.7	23.4		31.4	28.9	25.6	21.8	25.5	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	0.6		20.9	0.5		44.0	2.1	0.4	7.2	11.3	
Delay (s)	15.6	18.5		50.6	23.8		75.4	31.0	26.0	29.0	36.9	
Level of Service	B	B		D	C		E	C	C	C	D	
Approach Delay (s)		17.9			39.7			35.5			34.9	
Approach LOS		B			D			D			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			32.8			HCM Level of Service			C			
HCM Volume to Capacity ratio			0.86									
Actuated Cycle Length (s)			98.4			Sum of lost time (s)			15.0			
Intersection Capacity Utilization			100.4%			ICU Level of Service			G			
Analysis Period (min)			15									
c Critical Lane Group												













Kiawah River Plantation TIA  
2018 Build

3: Driveway & Bohicket Road

Timing Plan: AM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	2	1	53	148	13	6	27	380	56	20	903	66
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	110		55	170		0	125		125
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.968		0.950	0.960		0.950			0.950		
Satd. Flow (prot)	0	1803	1583	1681	1699	1583	1770	1863	1583	1770	3539	1583
Flt Permitted		0.968		0.950	0.960		0.218			0.446		
Satd. Flow (perm)	0	1803	1583	1681	1699	1583	406	1863	1583	831	3539	1583
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			45			50			50	
Link Distance (ft)		482			1366			2983			2154	
Travel Time (s)		13.1			20.7			40.7			29.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	2	1	59	164	14	7	30	422	62	22	1003	73
Shared Lane Traffic (%)				46%								
Lane Group Flow (vph)	0	3	59	89	89	7	30	422	62	22	1003	73
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split		Perm	Split		Perm	Perm		Perm	Perm		Perm
Protected Phases	8	8		4	4			6			2	
Permitted Phases			8			4	6		6	2		2
Detector Phase	8	8	8	4	4	4	6	6	6	2	2	2



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	15.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	21.7	21.7	21.7	21.7	21.7	21.7
Total Split (s)	20.0	20.0	20.0	22.0	22.0	22.0	48.0	48.0	48.0	48.0	48.0	48.0
Total Split (%)	22.2%	22.2%	22.2%	24.4%	24.4%	24.4%	53.3%	53.3%	53.3%	53.3%	53.3%	53.3%
Maximum Green (s)	14.0	14.0	14.0	16.0	16.0	16.0	42.0	42.0	42.0	42.0	42.0	42.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	Min	Min	Min	Min	Min	Min
Act Effct Green (s)		12.2	12.2	12.6	12.6	12.6	33.6	33.6	33.6	33.6	33.6	33.6
Actuated g/C Ratio		0.21	0.21	0.22	0.22	0.22	0.57	0.57	0.57	0.57	0.57	0.57
v/c Ratio		0.01	0.18	0.25	0.24	0.02	0.13	0.39	0.07	0.05	0.49	0.08
Control Delay		26.7	27.5	27.2	27.2	25.8	13.5	13.2	11.0	11.5	13.0	11.1
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		26.7	27.5	27.2	27.2	25.8	13.5	13.2	11.0	11.5	13.0	11.1
LOS		C	C	C	C	C	B	B	B	B	B	B
Approach Delay		27.4			27.1			13.0			12.9	
Approach LOS		C			C			B			B	

#### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 58.5

Natural Cycle: 65

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.49

Intersection Signal Delay: 14.8

Intersection Capacity Utilization 54.1%

Analysis Period (min) 15

Intersection LOS: B










ICU Level of Service A

#### Splits and Phases: 3: Driveway & Bohicket Road



### 3: Driveway & Bohicket Road










Kubilins Transportation Group, Inc. 11/6/2008 Synchro 7 - Report Page 9

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	61	7	68	177	3	51
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.986				0.872	
Flt Protected				0.986	0.998	
Satd. Flow (prot)	1837	0	0	1837	1621	0
Flt Permitted				0.986	0.998	
Satd. Flow (perm)	1837	0	0	1837	1621	0
Link Speed (mph)	45			45	45	
Link Distance (ft)	1366			1051	1134	
Travel Time (s)	20.7			15.9	17.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	68	8	76	197	3	57
Shared Lane Traffic (%)						
Lane Group Flow (vph)	76	0	0	273	60	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	













#### Intersection Summary







Area Type: Other  
Control Type: Unsignalized  
Intersection Capacity Utilization 29.7%  
Analysis Period (min) 15

ICU Level of Service A

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	61	7	68	177	3	51
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	68	8	76	197	3	57
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			76		419	72
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			76		419	72
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			95		99	94
cM capacity (veh/h)			1524		561	991
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	76	272	60			
Volume Left	0	76	3			
Volume Right	8	0	57			
cSH	1700	1524	950			
Volume to Capacity	0.04	0.05	0.06			
Queue Length 95th (ft)	0	4	5			
Control Delay (s)	0.0	2.4	9.0			
Lane LOS		A	A			
Approach Delay (s)	0.0	2.4	9.0			
Approach LOS			A			
Intersection Summary						
Average Delay			2.9			
Intersection Capacity Utilization			29.7%	ICU Level of Service		A
Analysis Period (min)			15			



						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	113	53	410	133	68	1038
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	0		150	150	
Storage Lanes	1	1		1	1	
Taper Length (ft)	100	100		100	100	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.950				0.489	
Satd. Flow (perm)	1770	1583	3539	1583	911	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	25		45			45
Link Distance (ft)	657		2050			2983
Travel Time (s)	17.9		31.1			45.2
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	126	59	456	148	76	1153
Shared Lane Traffic (%)						
Lane Group Flow (vph)	126	59	456	148	76	1153
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Number of Detectors	1	1	2	1	1	2
Detector Template	Left	Right	Thru	Right	Left	Thru
Leading Detector (ft)	20	20	100	20	20	100
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	20	6	20	20	6
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)			94			94
Detector 2 Size(ft)			6			6
Detector 2 Type			CI+Ex			CI+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type		Perm		Perm	Perm	
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	6	6

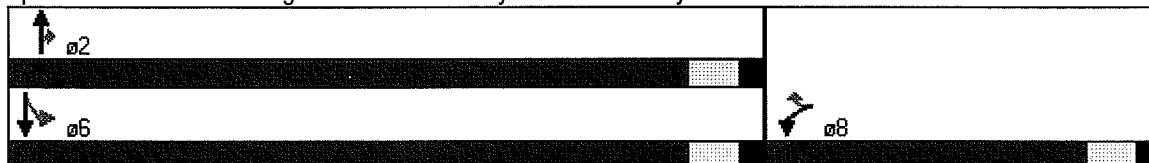
						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Switch Phase						
Minimum Initial (s)	12.0	12.0	12.0	12.0	8.0	8.0
Minimum Split (s)	27.0	27.0	27.0	27.0	20.0	20.0
Total Split (s)	31.0	31.0	59.0	59.0	59.0	59.0
Total Split (%)	34.4%	34.4%	65.6%	65.6%	65.6%	65.6%
Maximum Green (s)	25.0	25.0	53.0	53.0	53.0	53.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Act Effct Green (s)	13.7	13.7	29.8	29.8	29.8	29.8
Actuated g/C Ratio	0.29	0.29	0.63	0.63	0.63	0.63
v/c Ratio	0.25	0.13	0.20	0.15	0.13	0.52
Control Delay	17.5	16.6	5.9	6.3	6.5	8.1
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	17.5	16.6	5.9	6.3	6.5	8.1
LOS	B	B	A	A	A	A
Approach Delay	17.2		6.0			8.0
Approach LOS	B		A			A













#### Intersection Summary

Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 47.3  
 Natural Cycle: 55  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.52  
 Intersection Signal Delay: 8.2  
 Intersection Capacity Utilization 47.0%  
 Analysis Period (min) 15

Intersection LOS: A  
 ICU Level of Service A

#### Splits and Phases: 5: Village Site Access & Betsy Kerrison Parkway

























						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	113	53	410	133	68	1038
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.49	1.00
Satd. Flow (perm)	1770	1583	3539	1583	911	3539
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	126	59	456	148	76	1153
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	126	59	456	148	76	1153
Turn Type	Perm			Perm	Perm	
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	9.2	9.2	27.4	27.4	27.4	27.4
Effective Green, g (s)	10.2	10.2	28.4	28.4	28.4	28.4
Actuated g/C Ratio	0.21	0.21	0.58	0.58	0.58	0.58
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	371	332	2068	925	532	2068
v/s Ratio Prot	c0.07		0.13			c0.33
v/s Ratio Perm		0.04		0.09	0.08	
v/c Ratio	0.34	0.18	0.22	0.16	0.14	0.56
Uniform Delay, d1	16.3	15.8	4.8	4.6	4.6	6.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.3	0.1	0.1	0.1	0.3
Delay (s)	16.9	16.0	4.9	4.7	4.7	6.6
Level of Service	B	B	A	A	A	A
Approach Delay (s)	16.6		4.8			6.4
Approach LOS	B		A			A
Intersection Summary						
HCM Average Control Delay			6.9	HCM Level of Service		A
HCM Volume to Capacity ratio			0.50			
Actuated Cycle Length (s)			48.6	Sum of lost time (s)		10.0
Intersection Capacity Utilization			47.0%	ICU Level of Service		A
Analysis Period (min)			15			
c Critical Lane Group						













Kiawah River Plantation TIA  
2018 Build

1: Maybank Highway (SC 700) & River Road

Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	74	698	47	274	783	354	79	130	264	304	129	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	290		0	180		0	245		50	175		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.991			0.953				0.850		0.940	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1846	0	1770	1775	0	1770	1863	1583	1770	1751	0
Flt Permitted	0.080			0.093			0.610			0.466		
Satd. Flow (perm)	149	1846	0	173	1775	0	1136	1863	1583	868	1751	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		4802			2003			1572			3100	
Travel Time (s)		72.8			30.3			23.8			47.0	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	82	776	52	304	870	393	88	144	293	338	143	96
Shared Lane Traffic (%)												
Lane Group Flow (vph)	82	828	0	304	1263	0	88	144	293	338	239	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm			pm+pt			Perm		Perm	pm+pt		
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2			6			8		8	4		
Detector Phase	2	2		1	6		8	8	8	7	4	



												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	12.0	12.0		5.0	12.0		5.0	5.0	5.0	5.0	5.0	
Minimum Split (s)	20.0	20.0		12.0	20.0		20.0	20.0	20.0	12.0	20.0	
Total Split (s)	55.0	55.0	0.0	12.0	67.0	0.0	21.0	21.0	21.0	12.0	33.0	0.0
Total Split (%)	55.0%	55.0%	0.0%	12.0%	67.0%	0.0%	21.0%	21.0%	21.0%	12.0%	33.0%	0.0%
Maximum Green (s)	49.0	49.0		6.0	61.0		15.0	15.0	15.0	6.0	27.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-3.0	-3.0	-3.0	-1.0	-1.0	-1.0	-2.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	3.0	3.0	3.0	1.0	5.0	5.0	5.0	4.0	5.0	3.0
Lead/Lag	Lag	Lag		Lead			Lag	Lag	Lag	Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Recall Mode	None	None		None	None		Min	Min	Min	None	None	
Act Effct Green (s)	50.0	50.0		64.0	64.0		16.0	16.0	16.0	29.0	28.0	
Actuated g/C Ratio	0.50	0.50		0.64	0.64		0.16	0.16	0.16	0.29	0.28	
v/c Ratio	1.09	0.90		1.20	1.11		0.48	0.48	1.16	1.04	0.49	
Control Delay	163.0	37.1		143.2	83.3		48.2	44.4	145.3	96.3	34.1	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	163.0	37.1		143.2	83.3		48.2	44.4	145.3	96.3	34.1	
LOS	F	D		F	F		D	D	F	F	C	
Approach Delay		48.5			94.9			101.3			70.5	
Approach LOS		D			F			F			E	

#### Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Natural Cycle: 120

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 1.20

Intersection Signal Delay: 80.1

Intersection Capacity Utilization 111.5%























Analysis Period (min) 15

Intersection LOS: F

ICU Level of Service H

Splits and Phases: 1: Maybank Highway (SC 700) & River Road




































												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	74	698	47	274	783	354	79	130	264	304	129	86
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		3.0	3.0		5.0	5.0	5.0	4.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.99		1.00	0.95		1.00	1.00	0.85	1.00	0.94	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1845		1770	1776		1770	1863	1583	1770	1751	
Flt Permitted	0.08	1.00		0.09	1.00		0.61	1.00	1.00	0.47	1.00	
Satd. Flow (perm)	149	1845		173	1776		1136	1863	1583	867	1751	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	82	776	52	304	870	393	88	144	293	338	143	96
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	82	828	0	304	1263	0	88	144	293	338	239	0
Turn Type	Perm			pm+pt			Perm		Perm	pm+pt		
Protected Phases		2		1	6			8		7	4	
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	49.0	49.0		61.0	61.0		15.0	15.0	15.0	27.0	27.0	
Effective Green, g (s)	50.0	50.0		64.0	64.0		16.0	16.0	16.0	29.0	28.0	
Actuated g/C Ratio	0.50	0.50		0.64	0.64		0.16	0.16	0.16	0.29	0.28	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	75	923		254	1137		182	298	253	324	490	
v/s Ratio Prot		0.45		c0.11	0.71			0.08		c0.08	0.14	
v/s Ratio Perm	0.55			c0.66			0.08		0.19	c0.22		
v/c Ratio	1.09	0.90		1.20	1.11		0.48	0.48	1.16	1.04	0.49	
Uniform Delay, d1	25.0	22.7		27.7	18.0		38.2	38.2	42.0	34.9	30.0	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	131.7	11.3		120.3	62.5		2.0	1.2	106.1	61.7	0.8	
Delay (s)	156.7	33.9		148.0	80.5		40.3	39.5	148.1	96.7	30.8	
Level of Service	F	C		F	F		D	D	F	F	C	
Approach Delay (s)		45.0			93.6			100.2			69.4	
Approach LOS		D			F			F			E	
<b>Intersection Summary</b>												
HCM Average Control Delay			78.3			HCM Level of Service			E			
HCM Volume to Capacity ratio			1.13									
Actuated Cycle Length (s)			100.0			Sum of lost time (s)			7.0			
Intersection Capacity Utilization			111.5%			ICU Level of Service			H			
Analysis Period (min)			15									
c Critical Lane Group												

Kiawah River Plantation TIA  
2018 Build

2: Maybank Highway (SC 700) & Main Road

Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	147	60	225	186	211	83	624	201	147	369	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	170		0	145		0	185		370	210		0
Storage Lanes	1		0	1		0	1		1	1		0
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.956			0.920				0.850		0.994	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1770	1781	0	1770	1714	0	1770	1863	1583	1770	1852	0
Flt Permitted	0.163			0.615			0.514			0.089		
Satd. Flow (perm)	304	1781	0	1146	1714	0	957	1863	1583	166	1852	0
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		45			45			45			45	
Link Distance (ft)		1276			4802			2503			3477	
Travel Time (s)		19.3			72.8			37.9			52.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	94	163	67	250	207	234	92	693	223	163	410	17
Shared Lane Traffic (%)												
Lane Group Flow (vph)	94	230	0	250	441	0	92	693	223	163	427	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2	1	1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru	Right	Left	Thru	
Leading Detector (ft)	20	100		20	100		20	100	20	20	100	
Trailing Detector (ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Position(ft)	0	0		0	0		0	0	0	0	0	
Detector 1 Size(ft)	20	6		20	6		20	6	20	20	6	
Detector 1 Type	CI+Ex	CI+Ex		CI+Ex	CI+Ex		CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		CI+Ex			CI+Ex			CI+Ex			CI+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	pm+pt			Perm			Perm		Perm	pm+pt		
Protected Phases	5	2			6			8		7	4	
Permitted Phases	2			6			8		8	4		
Detector Phase	5	2		6	6		8	8	8	7	4	

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	5.0	25.0		25.0	25.0		10.0	10.0	10.0	5.0	10.0	
Minimum Split (s)	12.5	32.5		32.5	32.5		20.0	20.0	20.0	12.0	20.0	
Total Split (s)	12.5	48.5	0.0	36.0	36.0	0.0	45.0	45.0	45.0	12.0	57.0	0.0
Total Split (%)	11.8%	46.0%	0.0%	34.1%	34.1%	0.0%	42.7%	42.7%	42.7%	11.4%	54.0%	0.0%
Maximum Green (s)	6.5	42.5		30.0	30.0		39.0	39.0	39.0	6.0	51.0	
Yellow Time (s)	4.0	4.0		4.0	4.0		4.0	4.0	4.0	4.0	4.0	
All-Red Time (s)	2.0	2.0		2.0	2.0		2.0	2.0	2.0	2.0	2.0	
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	3.0	5.0	5.0	3.0	5.0	5.0	5.0	5.0	5.0	3.0
Lead/Lag	Lead			Lag	Lag		Lag	Lag	Lag	Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Recall Mode	None	Min		Min	Min		None	None	None	None	None	
Act Effct Green (s)	39.7	39.7		30.0	30.0		40.1	40.1	40.1	52.2	52.2	
Actuated g/C Ratio	0.39	0.39		0.29	0.29		0.39	0.39	0.39	0.51	0.51	
v/c Ratio	0.42	0.33		0.74	0.87		0.24	0.95	0.36	0.83	0.45	
Control Delay	25.2	22.9		48.1	54.3		24.6	54.5	25.1	53.3	18.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0	0.0	0.0	0.0	
Total Delay	25.2	22.9		48.1	54.3		24.6	54.5	25.1	53.3	18.7	
LOS	C	C		D	D		C	D	C	D	B	
Approach Delay		23.6			52.1			45.3			28.3	
Approach LOS		C			D			D			C	

#### Intersection Summary

Area Type: Other

Cycle Length: 105.5

Actuated Cycle Length: 101.9

Natural Cycle: 90

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.95

Intersection Signal Delay: 40.6

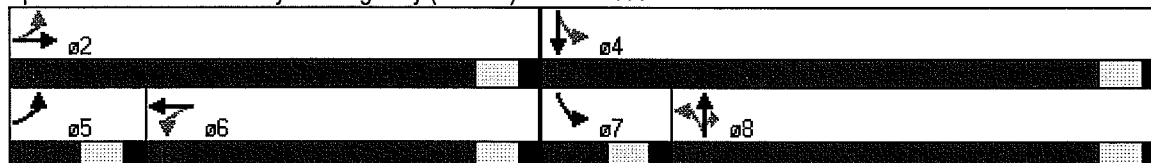
Intersection Capacity Utilization 99.3%

Analysis Period (min) 15























Intersection LOS: D

ICU Level of Service F

#### Splits and Phases: 2: Maybank Highway (SC 700) & Main Road








































												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	85	147	60	225	186	211	83	624	201	147	369	15
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0		5.0	5.0	5.0	5.0	5.0	
Lane Util. Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.96		1.00	0.92		1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1770	1781		1770	1714		1770	1863	1583	1770	1852	
Flt Permitted	0.16	1.00		0.62	1.00		0.51	1.00	1.00	0.09	1.00	
Satd. Flow (perm)	304	1781		1146	1714		957	1863	1583	165	1852	
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	94	163	67	250	207	234	92	693	223	163	410	17
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	94	230	0	250	441	0	92	693	223	163	427	0
Turn Type	pm+pt			Perm			Perm			Perm	pm+pt	
Protected Phases	5	2			6			8			7	4
Permitted Phases	2			6			8		8	4		
Actuated Green, G (s)	40.0	40.0		29.0	29.0		39.1	39.1	39.1	51.1	51.1	
Effective Green, g (s)	41.0	41.0		30.0	30.0		40.1	40.1	40.1	52.1	52.1	
Actuated g/C Ratio	0.40	0.40		0.29	0.29		0.39	0.39	0.39	0.51	0.51	
Clearance Time (s)	6.0	6.0		6.0	6.0		6.0	6.0	6.0	6.0	6.0	
Vehicle Extension (s)	3.0	4.0		4.0	4.0		4.0	4.0	4.0	3.0	4.0	
Lane Grp Cap (vph)	206	708		333	499		372	725	616	192	936	
v/s Ratio Prot	c0.03	0.13			c0.26			c0.37		c0.06	0.23	
v/s Ratio Perm	0.15			0.22			0.10		0.14	0.37		
v/c Ratio	0.46	0.32		0.75	0.88		0.25	0.96	0.36	0.85	0.46	
Uniform Delay, d1	22.8	21.5		33.2	34.9		21.3	30.6	22.4	22.5	16.4	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	1.6	0.4		9.7	17.2		0.5	23.1	0.5	27.8	0.5	
Delay (s)	24.4	21.8		42.9	52.1		21.8	53.8	22.9	50.3	16.9	
Level of Service	C	C		D	D		C	D	C	D	B	
Approach Delay (s)		22.6			48.7			44.0			26.1	
Approach LOS		C			D			D			C	
<b>Intersection Summary</b>												
HCM Average Control Delay			38.6			HCM Level of Service			D			
HCM Volume to Capacity ratio			0.89									
Actuated Cycle Length (s)			103.1			Sum of lost time (s)			20.0			
Intersection Capacity Utilization			99.3%			ICU Level of Service			F			
Analysis Period (min)			15									
c Critical Lane Group												

Kiawah River Plantation TIA  
2018 Build

3: Driveway & Bohicket Road  
Timing Plan: PM Peak

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	7	45	84	5	17	43	912	166	18	431	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	110		55	170		0	125		125
Storage Lanes	0		0	1		1	1		0	1		1
Taper Length (ft)	100		100	100		100	100		100	100		100
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.958		0.950	0.958		0.950			0.950		
Satd. Flow (prot)	0	1785	1583	1681	1695	1583	1770	1863	1583	1770	3539	1583
Flt Permitted		0.958		0.950	0.958		0.475			0.082		
Satd. Flow (perm)	0	1785	1583	1681	1695	1583	885	1863	1583	153	3539	1583
Right Turn on Red			No			No			No			No
Satd. Flow (RTOR)												
Link Speed (mph)		25			45			50			50	
Link Distance (ft)		482			1366			3001			2154	
Travel Time (s)		13.1			20.7			40.9			29.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	52	8	50	93	6	19	48	1013	184	20	479	19
Shared Lane Traffic (%)				47%								
Lane Group Flow (vph)	0	60	50	49	50	19	48	1013	184	20	479	19
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Right	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split		Perm	Split		Perm	Perm		Perm	Perm		Perm
Protected Phases	8	8		4	4			6			2	
Permitted Phases			8			4	6		6	2		2
Detector Phase	8	8	8	4	4	4	6	6	6	2	2	2

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Switch Phase												
Minimum Initial (s)	10.0	10.0	10.0	10.0	10.0	10.0	15.0	15.0	15.0	15.0	15.0	15.0
Minimum Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	21.7	21.7	21.7	21.7	21.7	21.7
Total Split (s)	20.0	20.0	20.0	20.0	20.0	20.0	50.0	50.0	50.0	50.0	50.0	50.0
Total Split (%)	22.2%	22.2%	22.2%	22.2%	22.2%	22.2%	55.6%	55.6%	55.6%	55.6%	55.6%	55.6%
Maximum Green (s)	14.0	14.0	14.0	14.0	14.0	14.0	44.0	44.0	44.0	44.0	44.0	44.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	None	None	None	Min	Min	Min	Min	Min	Min
Act Effct Green (s)		11.3	11.3	11.2	11.2	11.2	50.3	50.3	50.3	50.3	50.3	50.3
Actuated g/C Ratio		0.14	0.14	0.14	0.14	0.14	0.64	0.64	0.64	0.64	0.64	0.64
v/c Ratio		0.24	0.22	0.21	0.21	0.08	0.09	0.85	0.18	0.21	0.21	0.02
Control Delay		34.5	34.6	34.3	34.3	32.4	9.7	26.6	9.8	17.0	9.1	8.9
Queue Delay		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		34.5	34.6	34.3	34.3	32.4	9.7	26.6	9.8	17.0	9.1	8.9
LOS		C	C	C	C	C	A	C	A	B	A	A
Approach Delay		34.5			34.0			23.5			9.4	
Approach LOS		C			C			C			A	

#### Intersection Summary

Area Type: Other

Cycle Length: 90

Actuated Cycle Length: 78.9

Natural Cycle: 100

Control Type: Actuated-Uncoordinated

Maximum v/c Ratio: 0.85

Intersection Signal Delay: 21.1

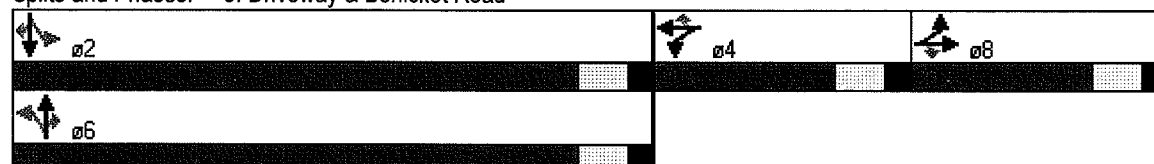
Intersection Capacity Utilization 77.2%

Analysis Period (min) 15

Intersection LOS: C

ICU Level of Service D
























Splits and Phases: 3: Driveway & Bohicket Road












Kiawah River Plantation TIA  
2018 Build

3: Driveway & Bohicket Road

Timing Plan: PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	47	7	45	84	5	17	43	912	166	18	431	17
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor		1.00	1.00	0.95	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected		0.96	1.00	0.95	0.96	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)		1785	1583	1681	1695	1583	1770	1863	1583	1770	3539	1583
Flt Permitted		0.96	1.00	0.95	0.96	1.00	0.48	1.00	1.00	0.08	1.00	1.00
Satd. Flow (perm)		1785	1583	1681	1695	1583	885	1863	1583	152	3539	1583
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	52	8	50	93	6	19	48	1013	184	20	479	19
RTOR Reduction (vph)	0	0	0	0	0	0	0	0	0	0	0	0
Lane Group Flow (vph)	0	60	50	49	50	19	48	1013	184	20	479	19
Turn Type	Split		Perm	Split		Perm	Perm		Perm	Perm		Perm
Protected Phases	8	8		4	4			6			2	
Permitted Phases			8			4	6		6	2		2
Actuated Green, G (s)		7.9	7.9	7.8	7.8	7.8	48.0	48.0	48.0	48.0	48.0	48.0
Effective Green, g (s)		8.9	8.9	8.8	8.8	8.8	49.0	49.0	49.0	49.0	49.0	49.0
Actuated g/C Ratio		0.11	0.11	0.11	0.11	0.11	0.60	0.60	0.60	0.60	0.60	0.60
Clearance Time (s)		6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		194	172	181	183	171	531	1117	949	91	2123	949
v/s Ratio Prot		c0.03		0.03	c0.03			c0.54			0.14	
v/s Ratio Perm			0.03			0.01	0.05		0.12	0.13		0.01
v/c Ratio		0.31	0.29	0.27	0.27	0.11	0.09	0.91	0.19	0.22	0.23	0.02
Uniform Delay, d1		33.6	33.5	33.5	33.5	32.9	6.9	14.3	7.4	7.5	7.6	6.6
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.9	0.9	0.8	0.8	0.3	0.1	10.5	0.1	1.2	0.1	0.0
Delay (s)		34.5	34.4	34.3	34.3	33.2	7.0	24.9	7.5	8.8	7.6	6.6
Level of Service		C	C	C	C	C	A	C	A	A	A	A
Approach Delay (s)		34.5			34.1			21.6			7.6	
Approach LOS		C			C			C			A	
<b>Intersection Summary</b>												
HCM Average Control Delay			19.4									
HCM Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			81.7									
Intersection Capacity Utilization			77.2%									
Analysis Period (min)			15									
c Critical Lane Group												



						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (vph)	199	6	71	104	2	59
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.996				0.869	
Flt Protected				0.980	0.999	
Satd. Flow (prot)	1855	0	0	1825	1617	0
Flt Permitted				0.980	0.999	
Satd. Flow (perm)	1855	0	0	1825	1617	0
Link Speed (mph)	45			45	45	
Link Distance (ft)	1366			1051	1134	
Travel Time (s)	20.7			15.9	17.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	221	7	79	116	2	66
Shared Lane Traffic (%)						
Lane Group Flow (vph)	228	0	0	195	68	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	

#### Intersection Summary










Area Type: Other













Control Type: Unsignalized







Intersection Capacity Utilization 34.0%

ICU Level of Service A

Analysis Period (min) 15

						
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	199	6	71	104	2	59
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Hourly flow rate (vph)	221	7	79	116	2	66
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	None			None		
Median storage veh						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			228		498	224
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol			228		498	224
tC, single (s)			4.1		6.4	6.2
tC, 2 stage (s)						
tF (s)			2.2		3.5	3.3
p0 queue free %			94		100	92
cM capacity (veh/h)			1340		501	815
Direction, Lane #	EB 1	WB 1	NB 1			
Volume Total	228	194	68			
Volume Left	0	79	2			
Volume Right	7	0	66			
cSH	1700	1340	799			
Volume to Capacity	0.13	0.06	0.08			
Queue Length 95th (ft)	0	5	7			
Control Delay (s)	0.0	3.5	9.9			
Lane LOS		A	A			
Approach Delay (s)	0.0	3.5	9.9			
Approach LOS			A			
Intersection Summary						
Average Delay			2.8			
Intersection Capacity Utilization			34.0%	ICU Level of Service		A
Analysis Period (min)			15			

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	154	122	1003	202	92	468
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)	150	0		150	150	
Storage Lanes	1	1		1	1	
Taper Length (ft)	100	100		100	100	
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt		0.850		0.850		
Flt Protected	0.950				0.950	
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.950				0.194	
Satd. Flow (perm)	1770	1583	3539	1583	361	3539
Right Turn on Red		No		No		
Satd. Flow (RTOR)						
Link Speed (mph)	25		45			45
Link Distance (ft)	657		2529			3001
Travel Time (s)	17.9		38.3			45.5
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	171	136	1114	224	102	520
Shared Lane Traffic (%)						
Lane Group Flow (vph)	171	136	1114	224	102	520
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Number of Detectors	1	1	2	1	1	2
Detector Template	Left	Right	Thru	Right	Left	Thru
Leading Detector (ft)	20	20	100	20	20	100
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	20	20	6	20	20	6
Detector 1 Type	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex	CI+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)			94			94
Detector 2 Size(ft)			6			6
Detector 2 Type			CI+Ex			CI+Ex
Detector 2 Channel						
Detector 2 Extend (s)			0.0			0.0
Turn Type		Perm		Perm	Perm	
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Detector Phase	8	8	2	2	6	6

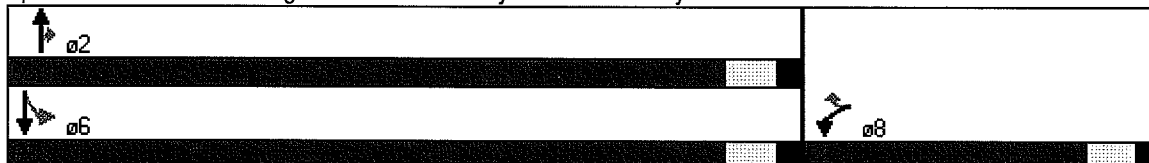
						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Switch Phase						
Minimum Initial (s)	12.0	12.0	12.0	12.0	8.0	8.0
Minimum Split (s)	27.0	27.0	27.0	27.0	20.0	20.0
Total Split (s)	28.0	28.0	62.0	62.0	62.0	62.0
Total Split (%)	31.1%	31.1%	68.9%	68.9%	68.9%	68.9%
Maximum Green (s)	22.0	22.0	56.0	56.0	56.0	56.0
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	Min	Min	Min	Min
Act Effct Green (s)	13.8	13.8	27.2	27.2	27.2	27.2
Actuated g/C Ratio	0.27	0.27	0.53	0.53	0.53	0.53
v/c Ratio	0.36	0.32	0.59	0.27	0.53	0.28
Control Delay	19.4	19.3	9.6	7.3	19.7	6.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	19.4	19.3	9.6	7.3	19.7	6.9
LOS	B	B	A	A	B	A
Approach Delay	19.4		9.2			9.0
Approach LOS	B		A			A

#### Intersection Summary













Area Type: Other  
 Cycle Length: 90  
 Actuated Cycle Length: 51.2  
 Natural Cycle: 60  
 Control Type: Actuated-Uncoordinated  
 Maximum v/c Ratio: 0.59  
 Intersection Signal Delay: 10.5  
 Intersection Capacity Utilization 56.9%  
 Analysis Period (min) 15

Intersection LOS: B  
 ICU Level of Service B

#### Splits and Phases: 5: Village Site Access & Betsy Kerrison Parkway





						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Volume (vph)	154	122	1003	202	92	468
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00	0.95	1.00	1.00	0.95
Frt	1.00	0.85	1.00	0.85	1.00	1.00
Flt Protected	0.95	1.00	1.00	1.00	0.95	1.00
Satd. Flow (prot)	1770	1583	3539	1583	1770	3539
Flt Permitted	0.95	1.00	1.00	1.00	0.19	1.00
Satd. Flow (perm)	1770	1583	3539	1583	362	3539
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	171	136	1114	224	102	520
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	171	136	1114	224	102	520
Turn Type		Perm		Perm	Perm	
Protected Phases	8		2			6
Permitted Phases		8		2	6	
Actuated Green, G (s)	12.8	12.8	26.1	26.1	26.1	26.1
Effective Green, g (s)	13.8	13.8	27.1	27.1	27.1	27.1
Actuated g/C Ratio	0.27	0.27	0.53	0.53	0.53	0.53
Clearance Time (s)	6.0	6.0	6.0	6.0	6.0	6.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	480	429	1884	843	193	1884
v/s Ratio Prot	c0.10		c0.31			0.15
v/s Ratio Perm		0.09		0.14	0.28	
v/c Ratio	0.36	0.32	0.59	0.27	0.53	0.28
Uniform Delay, d1	15.0	14.8	8.1	6.5	7.7	6.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.5	0.4	0.5	0.2	2.6	0.1
Delay (s)	15.4	15.2	8.6	6.7	10.3	6.6
Level of Service	B	B	A	A	B	A
Approach Delay (s)	15.3		8.3			7.2
Approach LOS	B		A			A
<b>Intersection Summary</b>						
HCM Average Control Delay			9.0		HCM Level of Service	A
HCM Volume to Capacity ratio			0.51			
Actuated Cycle Length (s)			50.9		Sum of lost time (s)	10.0
Intersection Capacity Utilization			56.9%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						



## Land Use Equivalency Matrix Kiawah River Plantation - Full Buildout

		TO					
		Single Fam Home	Rec Home	Apartments	Hotel	Comm	Golf Course
FROM	ITE Code	(DU)	(DU)	(DU)	(Rooms)	(KSF)	(Holes)
Single Family Detached Home	210	1.00	3.68	1.38	1.62	0.11	0.34
Recreational Homes	260	0.27	1.00	0.37	0.44	0.03	0.09
Apartments	220	0.72	2.67	1.00	1.17	0.08	0.25
Hotel	310	0.62	2.28	0.85	1.00	0.07	0.21
Commercial	820	8.88	32.68	12.25	14.35	1.00	3.06
Golf Course	430	2.91	10.70	4.01	4.70	0.33	1.00

Land Use	Unit Size	Units	PM Peak Hr. Trips	Rate
Single Family Detached Home	1	DUs	305	0.96 trips/DU (based on 319 DU)
Recreational Homes	1	DUs	248	0.26 trips/DU (based on 955 DU)
Apartments	1	DUs	88	0.69 trips/DU (based on 127 DU)
Hotel	1	Rooms	207	0.59 trips/Room (based on 350 Rooms)
Commercial	1	KSF	679	8.49 trips/KSF (based on 80 KSF)
Golf Course	1	Holes	50	2.78 trips/Hole (based on 18 Holes)

Full Buildout Devm't Program	
319	DUs
955	DUs
127	DUs
350	Rooms
80	KSF
18	Holes

### Example Application of Equivalency Matrix

30 KSF Commercial = 30 KSF commercial x 12.25 DU/commerical KSF= 368 apartment units OR  
 = 30 KSF commercial x 8.88 DU/commercial KSF= 266 single family homes



Prepared by Kubilins Transportation Group, Inc  
 8-Dec-08



South Carolina  
Department of Transportation

March 13, 2009

Mr. Kevin O'Neill  
The Beach Company  
PO Box 242  
Charleston, SC 29401

RE: Kiawah River Plantation Development on Betsy Kerrison Parkway (S-10-20)

Dear Mr. O'Neill:

This letter is to inform you that we have reviewed the preliminary submittal for the above project and the SCDOT has determined the proposed plan to be feasible in scope. SCDOT looks favorably on a design that allows for connections to/from adjacent properties as well as a potential ingress/egress on Mullet Hall Rd. (S-10- 2146). Please note that improvements may be deemed necessary to Mullet Hall Rd. due to the potential increase in traffic loads.

Please be aware that a full review has not been performed nor has an SCDOT Encroachment Permit been approved. Also, please note that only the southbound side of Betsy Kerrison Parkway is owned and maintained by the Department. The northbound side from Kiawah/Seabrook to River Road is owned and maintained by Charleston County and subject to review through the Charleston County Planning Office. When the plans for this development are finalized, please submit (2) full size sets and (1) half-size set for a full review by the Department.

If you have any questions or concerns, please contact me at (843) 740-1655.

Respectfully,

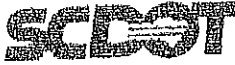
**Marcie Timmons, EIT**  
Assistant Resident Maintenance Engineer  
Permit Coordinator

Charleston Maintenance  
2401 Maintenance Way  
North Charleston, South Carolina 29405

Phone: (843) 740-1655  
Fax: (843) 740-1648

AN EQUAL OPPORTUNITY  
AFFIRMATIVE ACTION EMPLOYER





South Carolina  
Department of Transportation

Beaufort County  
Berkeley County  
Charleston County  
Colleton County  
Dorchester County  
Jasper County

February 5, 2009

Mr. Kevin O'Neill  
The Beach Company  
PO Box 242  
Charleston, South Carolina 29401

Re: S-10-20 -- Betsy Kerrison Parkway -- Kiawah River Plantation - Draft Traffic  
Impact Analysis

Dear Mr. O'Neill:

Thank you for recently providing us with a copy of the draft traffic impact study for the future development known at the Kiawah River Plantation. I have reviewed the study and have the following comments.

The study recommends that both right and left auxiliary turn lanes be constructed on Betsy Kerrison Parkway. Please note that only the southbound side of Betsy Kerrison Parkway is owned and maintained by the State. The northbound side from Kiawah/Seabrook to River Road is owned and maintained by Charleston County. You will most likely be required to obtain an encroachment permit from the County as well as the State for this project.

It is unclear exactly where the new road will connect with Betsy Kerrison Parkway. It is assumed the intent is to use the existing median cut located about 400' south of the median cut at Holy Spirit Catholic Church. The study states that signalization may be warranted at this location in the future. When and if the SCDOT authorizes a signal at this location, all costs associated with the design, equipment, and construction of the signal will be the responsibility of the developer.

The study does not recommend any geometric improvements to the River Road and Mullet Hall Road intersection as a result of this development. It is recommended that the SCDOT Charleston maintenance office review the existing condition of Mullet Hall Road and determine if any improvements due to the increased traffic loads might be required.

As you have plans developed please feel free to send them to me for preliminary review. If you have any questions, please call me at 843-740-1667 ext 118.

Sincerely,

B. Mark Nesbit, P.E.  
District Traffic Engineer

DMN:nsr

cc: Richard Turner, Resident Maintenance Engineer  
Jim Neal, Charleston County Public Works Director  
File: D6/Charleston/NSR

District Six Engineering  
6355 Fain Boulevard  
North Charleston, SC 29406-4880

Phone: (843) 740-1665  
Fax: (843) 740-1660



AN EQUAL OPPORTUNITY/  
AFFIRMATIVE ACTION EMPLOYER



## Berkeley-Charleston-Dorchester Council of Governments

CHAIRMAN:  
R. Keith Summey

VICE CHAIRMAN:  
Larry Hargett

SECRETARY:  
Michael J. Heitzler

TREASURER:  
Mary R. Miller

EXECUTIVE DIRECTOR:  
Ronald E. Mitchum

July 21, 2009

Mr. Dan Pennick, Planning Director  
Charleston County  
4045 Bridgeview Drive  
Charleston, SC 29405

Re: Kiawah River Plantation, John's Island, Charleston County, SC  
TMS# 212-00-00-001  
Letter of Coordination

Dear Dan:

We are aware that The Beach Company proposes to develop a 2003 acre property on John's Island, Charleston County, as a new mixed use community to be known as Kiawah River Plantation. We are also aware that The Beach Company is working to identify an acceptable mechanism for providing wastewater treatment for the development.

In this respect, we confirm that the Berkeley-Charleston-Dorchester Council of Governments (BCDCOG) has met with Thomas and Hutton and members of The Beach Company regarding the development of a wastewater treatment facility. Further, we are currently reviewing a draft policy on privately owned wastewater treatment facilities that was prepared by Thomas and Hutton -- "Special Requirements for Privately Owned Facilities." The document sets out requirements for approval of private utilities as well as specific criteria for their management, operation, maintenance and financial guarantees. It is my intent to discuss this issue at our next Committee meeting currently scheduled for August 11th.

The Beach Company has continued to coordinate with BCDCOG regarding the proposed Kiawah River Plantation community. The BCDCOG is committed to working with The Beach Company to find an acceptable wastewater treatment solution for the project. Therefore, the BCDCOG would encourage Charleston County to proceed with the review of the proposed development agreement.

Sincerely,

Ronald E. Mitchum  
Executive Director

**ST. JOHN'S WATER COMPANY, INC.**

Post Office Box 629  
John's Island, South Carolina 29457-0629  
(843) 559-0186

Original: August 13, 2008  
Reissued: May 6, 2009

Ms. Ashley Hamlett  
Thomas & Hutton Engineering  
935 Houston Northcutt Boulevard  
Mt. Pleasant, SC 29464

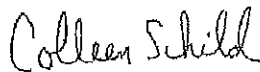
Re: Kiawah River Plantation at TMS Number 212-00-00-001  
Water Availability and Willingness to Serve Letter  
Letter of Coordination

Dear Ms. Hamlett:

This letter is to confirm that Kiawah River Plantation at TMS number 212-00-00-001 proposing to develop approximately 1,554 residential units, 275 inn rooms, 50 cottages, and 150,000 square feet of commercial units off Mullet Hall Road and Betsy Kerrison Parkway on Johns Island are within the water service area of the St. John's Water Company, Inc. (SJWC). SJWC does have water available from an existing 24-inch water line located on Betsy Kerrison Parkway and a 6-inch water line located on Mullet Hall Road. Our system is SC DHEC approved and we have the capacity and willingness to provide potable water service to the above referenced development.

If you have any questions, please feel free to give me a call.

Sincerely,



Colleen Schild  
Assistant Manager/Engineer



## Suburban Disposal Service, Inc.

---

150 Suburban Lane • P.O. Box 2748 • Summerville, SC 29484 • Telephone: (843) 873-4810 • Fax: (843) 873-2173

---

April 23, 2009

To Whom It May Concern:

Suburban Disposal is able to service this property (TMS#212-00-00-001), once it is developed. We would service this area for household waste removal. If you have further questions please feel free to contact me directly.

Sincerely,

Laura Joyner  
Suburban Disposal Service  
843-285-2784 office  
843-873-2173 fax



Charleston EXCELLENCE IS OUR STANDARD  
County SCHOOL DISTRICT

May 22, 2009

Ms. Ashley Hamlett  
Thomas & Hutton Engineering Co.  
965 Houston Northcutt Boulevard  
Mount Pleasant, South Carolina 29465-1522

Administration

**Dr. Nancy J. McGinley**  
Superintendent of Schools

**Dr. J. Douglas Gepford**  
Chief Academic Officer

**Mr. Louis J. Martin, Jr.**  
Associate Superintendent

**Ms. Terri Nichols**  
Associate Superintendent

**Dr. Vashiti Washington**  
Associate Superintendent

**Ms. Patricia Yandie**  
Associate Superintendent

Dear Ms. Hamlett:

This is an updated response to your letter of August 7, 2008 which proposes to develop approximately 1624 residences off Betsy Kerrison Parkway, John's Island. Mt. Zion Elementary, Haut Gap Middle and St. John's High School will serve this site. All the above schools currently have capacity on site to serve students in their attendance zones; however there are mobile classrooms currently at Mt. Zion. This letter will serve as your "Proof of Coordination" letter to meet County of Charleston requirements.

This District is required by state law to provide educational services to all county residents without regard to potential impact from future development. Therefore, public educational services at the above listed schools will be provided to residents who will reside in the new development.

Please call me if you need additional information.

Sincerely,



Terri H. Nichols  
Associate Superintendent

TN/ggh

c: Dr. Nancy McGinley  
Dr. J. Douglas Gepford  
Mr. Ralph Watkins  
Mr. Bill Lewis

J. Al Cannon, Jr., Esq.  
Sheriff, Charleston County



3505 Pinehaven Drive  
Charleston Heights, SC 29405-7789

June 1, 2009

Thomas & Hutton Engineering Co.  
935 Houston Northcutt Boulevard  
P.O. Box 1522  
Mt. Pleasant, SC 29465

RE: Letter of Coordination  
Kiawah River Plantation  
TMS #212-00-00-001

Dear Ms. Hamlett:

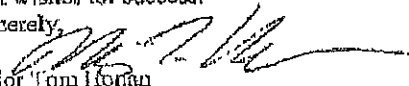
I have reviewed the proposed development for the 2,000.3 acre Planned Development District "Kiawah River Plantation" proposed by Thomas and Hutton Engineering Company.

It has been our experience that thefts and vandalism would impact the agency during the construction phase. Additionally, trucks, supplies and other large equipment would impact traffic on River and Bohicket Roads. The roads in the area are rural and two-lane, and are easily adversely affected by delays and obstructions.

Once the project is completed, burglaries, larcenies and other calls for service can be anticipated. Additionally, complaints regarding speeding and stop signs can also be anticipated, and may require the application of Selective Traffic Enforcement. The presence or absence of a gate will not have a great impact on operations. If an unmanned gate is planned, the Sheriff's Office should be provided with access cards or codes. Golf carts may be operated on right-of-ways in compliance with South Carolina Code, Section 56-3-115, which requires a licensed driver, and a permit from the Department of Motor Vehicles, as well as proof of financial responsibility. Operation is restricted to daylight hours.

While response times may not be significantly affected, the proposed district is located within a large response area, with patrol units being responsible for all 75,000 acres. Due to the extensive response area, Kiawah contracts for full time law enforcement presence on the island. If you have any further questions feel free to contact me for any further information you may need.

Best wishes for success.  
Sincerely,

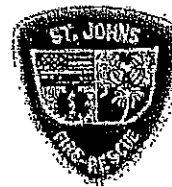
  
Major Tom Hutton  
Operations  
Charleston County Sheriff's Office  
(843) 554-2449 / (843) 308-7354

## ST. JOHN'S FIRE DISTRICT

### COMMISSIONERS:

J. BARRY HART, Chairman  
ERIC P. BRITTON, Vice-Chairman  
THOMAS KULICK  
RAMMET, BROWNLEE  
WANDA FORD  
SUSANNE HOLLOMAN  
GENEVA SMITH

P.O. BOX 56  
JOHNS ISLAND, S.C. 29457  
PHONE: (843) 559-9194  
FAX: (843) 559-3687



KARL E. RISTOW, Fire Chief

1 Jun 2009

Ms. Ashley Hamlett  
Permit Coordinator  
Thomas & Hutton Engineering Co.  
935 Houston Northcutt Blvd.  
Mt Pleasant, SC 29464

Re: Letter of Coordination

Dear Ms. Hamlett:

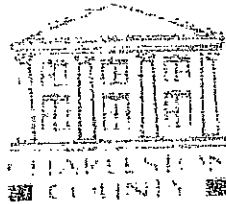
Thank you for giving St. Johns Fire District the opportunity to serve you. I have reviewed your proposal for a new development of single family dwellings, TMS Nos. 212-00-00-001 off of Mullet Hall Rd on Johns Island. All proposed family single dwellings shall be constructed in accordance with the International Residential Code, 2003 Edition and planned development shall be constructed in accordance with NFPA 1141, Standard for Fire Protection on Infrastructure and Land Development in Suburban and Rural Areas, 2008 Edition. Additionally, adequate fire flow (available water supply for structure firefighting) shall be required from the established water supply to ratify size and access to any prospective commercial or residential structures.

If you require any additional assistance regarding this issue or any further explanation regarding these requirements, please contact the St. Johns Fire Prevention Division.

Sincerely,

C.W. Waffington  
Chief Fire Inspector

c.c. Karl E. Ristow  
Chief of Department



Captain Cliff Parker  
EMS Safety Office  
cparker@charlestoncounty.org

Thomas Hutton, III Public Services Building  
Office: 843.202.6711  
Fax: 843.202.6711  
4045 Bridge View Drive  
North Charleston, SC 29405-7466

#### EMERGENCY SERVICES

22 April, 2009

Ms. Ashley Hamlett:  
Thomas & Hutton Engineering Co.  
935 Houston Northcutt Blvd.  
Mount Pleasant, SC 29464-3448  
(843) 725-5324  
(843) 849-0203 Fax  
Hamlett.a@thomas-hutton.com

Proof of Coordination Letter  
Kiawah River Plantation project  
Mullet Hall Road, Johns Island, SC.

Dear Ms. Hamlett;

Charleston County Emergency Medical Service (EMS) has the responsibility for providing 911 emergency medical responses to the Kiawah River Plantation project area, off Mullet Hall Road, Johns Island, SC.

Charleston County EMS is a 24 hour/day, 7 day/week operation, always ready to respond to the emergency medical needs of the citizens and guests of Charleston County.

There are two EMS stations located on Johns Island. One is located at 1527 Main Rd., near St. Johns High School, and the other located at 4305 Bohicket Rd., near the entrance to Kiawah River Estates.

Additionally, Charleston County EMS has a long standing *Medical First Responder* program relationship with both the City of Charleston Fire Department and the St. Johns Fire-Rescue Department. Both departments have trained emergency medical personnel who respond to assist at the request of EMS.

An emergency response for medical care by Charleston County EMS can be activated by dialing "911" from the project location on Mullet Hall Road.

If we can be of further assistance, please do not hesitate to call.


Sincerely,

Cliff Parker  
Captain





**BERKELEY**  
**ELECTRIC COOPERATIVE, INC.**

Your Touchstone Energy Partner 

June 1, 2009

Thomas & Hutton Engineering Co.  
C/o: Ashley Hamlett  
935 Houston Northcutt Blvd.  
Mt. Pleasant, SC 29464

**RE: Power Availability - Kiawah River Plantation - Charleston County**  
**TMS #: 212-00-00-001**

Dear Ashley:

Berkeley Electric Cooperative, Inc. is willing and able to provide the electric energy requirements to the above referenced project.

Berkeley Electric will supply electrical service to the development. A Contribution in Aid of Construction will be required. A written utility agreement must be entered into by the developer and Berkeley Electric Cooperative, Inc. Service will be governed by our Service Rules and Regulations. All services provided will be extended as outlined in our Service Rules and Regulations, which are in effect at the time of service rendered. Enclosed is a copy of our Service Rules and Regulations.

If you have any questions, please don't hesitate to give me a call.

Sincerely,

*Richard L. Walker/lc*  
Richard L. Walker  
Superintendent of Field Engineering

c: Timothy Mobley

RLW/lc

Encl.

Post Office Box 1234  
Moncks Corner, SC 29461  
(843) 761-8200  
(843) 825-3383  
Fax (843) 572-1280

Post Office Box 128  
Johns Island, SC 29457  
(843) 559-2458  
Fax (843) 559-3876

Post Office Box 1549  
Goose Creek, SC 29445  
(843) 553-5020  
Fax (843) 553-6761

3745 N. Highway 17  
Awendaw, SC 29429  
(843) 884-7525  
Fax (843) 884-3044



April 21, 2009

Ashley Hamlett  
Permit Coordinator  
Thomas & Hutton Engineering Co.  
935 Houston Northcutt Blvd.  
Mt. Pleasant, SC 29464

RE: Klawah River Plantation TMS #212-00-00-001

Dear Ms. Hamlett:

Comcast Cable will be able and willing to provide cable television, digital telephone and high speed internet service to the above referenced development.

Depending on the type of construction required, Comcast may pass some of or all of the cost to build this plant extension to the developer.

Should you have any questions, please don't hesitate to give me a call.

Sincerely,

A handwritten signature in cursive script that reads "Charles Yonkman".

Charles Yonkman  
Bulk/MDU Coordinator  
Comcast of Carolina, Inc.  
4400 Belle Oaks Drive  
North Charleston, SC 29405

(843) 266-3094  
Charles\_yonkman@cable.comcast.com

FROM

(WED) 4. 22' 09 8:39/ST. 8:39/NO. 4865109144 P 2



BellSouth Telecommunications, Inc.  
2600 Meeting Street Road  
Charleston, SC 29405-8307

April 22, 2009

Thomas & Hutton Engineering Co.  
% Ashley Hamlett  
935 Houston Northcut Blvd.  
Mount Pleasant, SC 29464

Re: Letter of Coordination

To Ashley Hamlett:

This is to confirm that AT&T will be able to provide telephone service to the property of Charleston tax ID# 212-00-00-001 in the Johns Island area for 2,000 acres. Service is contingent upon our receiving detailed plans of the development with utility easements granted, proper lead-time to install these services (three months), the correct 911 street addresses, and 30 x 30 easement for remote equipment to provide service (if needed). Plans should be submitted to Alan Squires (tel.# 843-722-5179) at the following address 2600 Meeting St., Charleston, S.C. 29405-8307

Should you have any questions or concerns, please contact me.

Sincerely,

A handwritten signature in cursive script that reads "Alan Squires".

Alan Squires  
Designer-AT&T



# TOWN OF KIAWAH ISLAND

21 BEACHWALKER DRIVE • KIAWAH ISLAND, SC 29455 • (843) 768-9166 • FAX (843) 768-4764

William G. Wert, Mayor

Council Members

Alan L. Burnaford  
Charles R. Lipuma  
Harry M. McHugh  
G. Steven Orban

Town Administrator

Tumiko Rucker

OCT 14 2009

October 12, 2009

Mr. John C.L. Darby,  
Chief Executive Officer,  
The Beach Company  
211 King Street, Suite 300  
Charleston, SC 29401

**Re: Kiawah River Plantation**

Dear John:

Thank you for discussing the plans for Kiawah River Plantation and for providing me an opportunity to comment.

I believe Kiawah River Plantation will compliment the Town of Kiawah Island and provide a much needed boost to the local economy. I look forward to the day construction begins.

I will be sure to monitor the approval process. In that regard, if I can be of any assistance, please do not hesitate to let me know.

The Beach Company and Darby/Way families have created a wonderful environment at Kiawah Island. I am sure Kiawah River Plantation will be as impressive. For all those reasons, I am excited about your plans and am pleased to offer my support.

With kindest regards,

William G. Wert  
Mayor  
Town of Kiawah Island





May 28, 2009

Mr. Kevin O'Neill  
Vice President  
Beach Development  
211 King Street  
Suite 300  
Charleston, SC 29401

Via email: [koneill@thebeachcompany.com](mailto:koneill@thebeachcompany.com)

Re: Project Coordination -- Klawah River Plantation

Dear Kevin,

I would like to thank you for working with the Charleston County Park and Recreation Commission staff on your Klawah River Plantation project to create a community vision that is compatible with our future park plans.

Additionally, we would welcome the opportunity to accept any parkland that the Beach Company might be willing to dedicate, provided that it is consistent with our goals and objectives.

Please continue to keep us informed as your plans progress, and we will do the same as we proceed with master planning our adjacent property. We look forward to the opportunity to continue to work together as our plans proceed for the future Johns Island County Park.

Best regards,

Julie Hensley  
Director, Planning Division

Copy: Tom O'Rourke, David Bennett, Cynthia Montague

861 Riverland Drive  
Charleston, SC 29412  
843-762-2172  
[www.ccprc.com](http://www.ccprc.com)



September 30, 2009

Mr. Kevin O'Neill  
Vice President  
Beach Development  
211 King Street  
Suite 300  
Charleston, SC 29401

Via email: [koneill@thebeachcompany.com](mailto:koneill@thebeachcompany.com)

Re: Project Coordination – Kiawah River Plantation

Dear Kevin,

Charleston County Park and Recreation Commission understands without objection that it will be necessary for Mullet Hall Road to be utilized as a construction access for the Kiawah River Plantation project. This will not present a problem for our adjacent property, provided that the road is maintained throughout the course of the project, and later repaired or rebuilt to SCDOT standards at a minimum.

Please continue to keep us informed of your progress.

Best regards,

A handwritten signature in cursive script, appearing to read "Julie Hensley".

Julie Hensley  
Director, Planning Division

Copy: Tom O'Rourke, David Bennett, Cynthia Montague

861 Riverland Drive  
Charleston, SC 29412  
843-762-2172  
[www.ccprc.com](http://www.ccprc.com)

# **TOWN OF SEABROOK ISLAND**

2001 Seabrook Island Road • Seabrook Island, SC 29455  
Phone: (843) 768-9121 • Fax: (843) 768-9830

Mayor:  
Frank W. McNulty  
Municipal Judge:  
Dennis E. O'Neill, Esq.  
Associate Judge:  
Edward L. Phipps, Esq.  
Council:  
John B. DuBals  
G. Jeremy Cummin  
William F. Holtz  
Robert M. Savin, M.D.  
Town Administrator:  
Randy M. Pierce  
Clerk:  
Faye Ailbritton  
Administrative Assistant:  
Lynda Whitworth

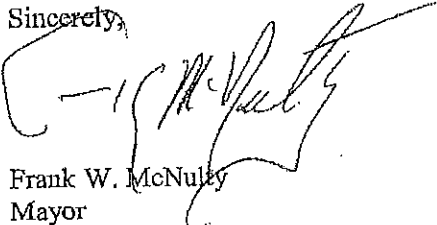
August 24, 2009

Mr. John C.L. Darby  
The Beach Company  
P.O. Box 242  
Charleston, SC 29402

Dear Mr. Darby:

Thank you for taking the time to share your Master Plan for Kiawah River Plantation with us. I have reviewed your plans with Town Council and we have no further questions at this time.

Sincerely,



Frank W. McNulty  
Mayor

FWM:jfa

AUG 26 2009

# **STORMWATER MASTER PLAN**

**FOR**

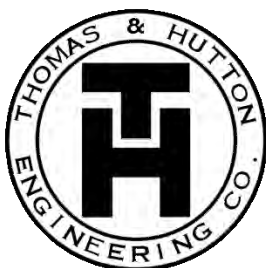
**KIAWAH RIVER PLANTATION**

**PREPARED FOR**

**KIAWAH RIVER PLANTATION, LP**

**MAY 29, 2009**

**J – 17091**



**THOMAS & HUTTON ENGINEERING CO.**

SAVANNAH, GEORGIA ♦ BRUNSWICK, GEORGIA  
CHARLESTON, SOUTH CAROLINA ♦ MYRTLE BEACH, SOUTH CAROLINA  
WILMINGTON, NORTH CAROLINA



## **TABLE OF CONTENTS**

Background and Introduction .....	Page 2
Project Narrative .....	Page 2
Purpose.....	Page 2
Pre Development Drainage System .....	Page 2-3
Post Development Drainage System.....	Page 3
Methodology .....	Page 3-4
Hydrology .....	Page 4
Water Quality.....	Page 5-6
Conclusion .....	Page 6

## **FIGURES**

Location Map .....	Figure 1
--------------------	----------

## **TABLES**

Summary of Results/Peak Flows .....	Table 1
-------------------------------------	---------

## **APPENDICES**

Pre-Development Conditions ICPR Model Input .....	A
Pre-Development Conditions ICPR Model - Node Min/Max Report .....	B
Pre-Development Conditions Stormwater Design Considerations.....	C
Post-Development (Build Out) Conditions ICPR Model Input.....	D
Post-Development (Build Out) ICPR Model - Node Min/Max Report.....	E
Post-Development (Build Out) Stormwater Design Considerations .....	F
FEMA Flood Map (FIRM) .....	G
Web Soil Survey (NRCS) .....	H
2008 South Carolina List of Impaired Waters/SCDHEC .....	I

## **EXHIBITS**

Pre-Development Drainage Exhibit .....	PRE
Post-Development Drainage Exhibit .....	POST
SCDHEC Monitoring Station Exhibit .....	1

## **BACKGROUND AND INTRODUCTION**

Kiawah River Plantation is located in Charleston County, South Carolina on Johns Island. The property is roughly bounded by the Charleston County Parks and Recreation Commission (CCPRC) Equestrian Center to the north, the Kiawah River to the south, marshland to the east and Hope Plantation to the west. Kiawah River Plantation is located approximately 20 miles from downtown Charleston, and approximately 4 miles from Kiawah Island, a popular resort and golf course community.

The property was intensely farmed from Colonial days until the 1970's. An extensive network of agricultural ditches was installed to drain the property. Many of these ditches are now considered wetlands. The road system necessary for farming operations provides vehicular access throughout the property. The existing impoundments provide habitat for a wide variety of wildlife. In recent years, the property has been used for farming and as a hunting preserve.

## **PROJECT NARRATIVE**

Kiawah River Plantation is part of a 4,600-acre drainage basin that discharges to the Kiawah River. Of this total area, 1,384 acres is Kiawah River Plantation property. To see these areas graphically, refer to the large pre and post development exhibits at the end of this report.

## **PURPOSE**

The purposes of this report are:

1. To define the existing drainage basins affected by this project.
  - To determine the Pre Development runoff rate from the Kiawah River Plantation Site for 2, 10, 25, 50, and 100 year storm events.
  - To determine and document compliance with the State of South Carolina regulations for Pre development and Post development runoff.

## **PRE DEVELOPMENT DRAINAGE SYSTEM**

The most significant aspect of the existing Kiawah River Plantation drainage system is the presence of several large impoundments. A single impoundment on the western portion of the property is about 170 acres. It discharges to a creek that flows into the Kiawah River. On the eastern portion of the property, an interconnected network of five impoundments discharges to two separate creeks that flow into the Kiawah River. In addition to the two large impoundments, two smaller independent impoundments discharge to marshes of the Kiawah River. Most of the drainage basin flows into one of these impoundments. The portion of the basin that does not flow into an impoundment discharges directly to marshes of the Kiawah River through existing channels.

## **POST DEVELOPMENT DRAINAGE SYSTEM**

The proposed Kiawah River Plantation community includes multifamily residential, single family residential and an 18-hole golf course. The existing impoundments serve both as amenities and as part of the stormwater management system. The post developed drainage system, as anticipated at build out, includes a series of interconnected lakes that detain the post development runoff and release stormwater to the existing impoundments and tributaries of the Kiawah River. All developed areas including roads, residential properties, and golf course areas, drain to proposed or existing ponds and impoundments. Water levels in these ponds and impoundments are regulated by control structures which provide detention and water quality control.

## **METHODOLOGY**

The pre development and post development conditions were analyzed using the Advanced Interconnected Channel and Pond Routing (ICPR) computer program developed by Streamline Technologies. The program is used to model rainfall and stormwater runoff and to perform hydraulic routing through the storm drainage system. The ICPR program is a FEMA-approved model that has undergone extensive testing and application. ICPR has the ability to analyze complex interconnected drainage systems dynamically over extended time periods.

The hydrologic input data consists of information for each drainage basin, or subwatershed, within the project. Input variables include runoff curve number, rainfall distribution pattern, hydrograph peaking factor, area of each drainage basin, and time of concentration. The ICPR program generates runoff hydrographs for each subwatershed based on the user-specified variables. Hydrographs are generated by ICPR using the SCS Unit Hydrograph Method.

The model hydraulic input data consists of a system of nodes and links. Nodes represent locations where flows enter or exit the system, pipe or channel characteristics change, or where stage/storage/time relationships are provided. Links represent traditional types of hydraulic conveyance such as pipes, channels, drop structures, weirs, etc. The sizes, inverts, lengths, and Mannings “n” values for all pipes connecting the ponds or lakes are input into the model. In addition to pipe information, all pond, lake, and detention area stage-area information and the respective outfall structure information is input into the model. The node and link conditions are analyzed within the model for a given storm, and flow conditions are determined.

The basic equation used by ICPR to route flows through the system is:

$$\Delta S = (Q_{in} - Q_{out}) \Delta t$$

Where:

$\Delta S$  = Change in storage for time step

$Q_{in}$  = Flow into a node at time "t"

$Q_{out}$  = Flow out of a node at time "t"

$\Delta t$  = Length of time step

Hydrographs for each drainage area are merged within the ICPR program, and the hydrologic results are then combined with the hydraulic information to model the hydraulic interactions of the entire drainage system. The results include pond area and discharge rates and stage/storage information during the design storm.

For the design of the storm drainage system, a warning stage elevation is set for each pond and node location to check for flooding during the various storm events. In addition, the ultimate discharge rate from the system cannot exceed the pre-developed runoff rate.

## HYDROLOGY

The following hydrologic parameters have been used as input to the ICPR models:

1. The SCS Unit Hydrograph Method is used.
2. The depth of rainfall for each storm frequency was obtained from the *South Carolina Stormwater Management and Sediment Control Handbook for Land Disturbance Activities* (August, 2003) – Appendix C, South Carolina Rainfall Data for Charleston County (South). The following rainfall depths were used in the model simulations:
  - a. 2-year, 24-hour Design Storm = 4.6 inches
  - b. 10-year, 24-hour Design Storm = 6.8 inches
  - c. 25-year, 24-hour Design Storm = 7.8 inches
  - d. 50-year, 24-hour Design Storm = 8.8 inches
  - e. 100-year, 24-hour Design Storm = 10.0 inches
3. The SCS Type III Statistical Rainfall Distribution is used. This distribution pattern is determined by the Soil Conservation Service comparing regional rain gauge data.
4. A 323 Hydrograph Peaking Factor is used. The 323 Factor is based on statistical analysis of actual rainfall and runoff data from the Southeastern United States, and is typical for coastal areas.
5. All A/D and B/D soils are assumed A or B when located within a developed areas and D in undeveloped areas, due to the presence of a drainage system in developed areas.



## **WATER QUALITY**

The drainage basin analyzed in this study is contained within the Santee Watershed. The South Carolina Department of Health and Environmental Control (DHEC) maintains a network of water quality monitoring stations within this watershed. The stations immediately downstream of Kiawah River Plantation are 11-28, 11-29, and 11-30. See the exhibit in back of the report for the location of these stations with respect to the Kiawah River Plantation property. None of these stations appears on the 2008 South Carolina List of Impaired Waters.

While DHEC does not consider the water bodies to which the Kiawah River Plantation discharges impaired, the developers are eager to minimize the impact of this project on the natural environment. Much of the property's value lies in the existing impoundments and surrounding marshes and rivers. To minimize impact on these assets, the project will seek to implement principles of Low Impact Development (LID). Practices like infiltration, evapotranspiration, grass swales, and bioretention will be used to minimize disruption of the property's natural water cycle and to minimize discharge of pollutants into receiving water bodies.

## **CONCLUSIONS**

This study demonstrates that the stormwater management system for Kiawah River Plantation can be designed to meet applicable Federal, State, and Local regulations. The results of this study are preliminary in nature. The data used to create the pre and post models should be refined with additional field survey data before the model results are used for design purposes. We recommend a careful review of the drainage study for Hope Plantation in order to more accurately quantify the stormwater runoff discharging into the large impoundment on the western portion of the property. We also recommend that detailed survey data be obtained on the many existing rice trunks and other impoundment control structures. The post development model should be revised to reflect changes in the proposed land plan as they occur.



QUADRANGLE MAP  
LEGAREVILLE, ROCKVILLE,  
KIAWAH ISLAND, WADMALAW ISLAND QUADRANGLE

KIAWAH RIVER PLANTATION  
CHARLESTON COUNTY, SOUTH CAROLINA  
DATE: 5/29/09

SCALE: 1" = 4000'

PROPOSED ACTIVITY:  
LOCATION MAP  
COUNTY: CHARLESTON  
APPLICANT:  
KIAWAH RIVER PLANTATION, LP



**Table 1**  
**Kiawah River Plantation**  
**Summary of Results / Peak Flows**

Date: 5/29/2009

Peak Runoff (cfs)		Storm Event (Year)				
		2	10	25	50	100
Pre Development	Boundary	293	563	669	829	992
Post Development	Boundary	165	324	395	466	551

Pond Elevations (ft-NAVD88)		Normal Water Elevation (ft)	Storm Event (Year)				
			2	10	25	50	100
Pre Development	Pond 01	4.0	5.6	6.3	6.5	6.8	7.1
	Pond 02	3.5	3.7	4.0	4.1	4.2	4.4
	Pond 03	3.5	3.8	4.1	4.2	4.3	4.5
	Pond 04	3.5	3.8	4.1	4.2	4.4	4.5
	Pond 05	3.5	4.1	4.7	4.9	5.2	5.5
	Pond 06	3.5	4.1	4.7	4.9	5.2	5.5
	Pond 07	3.7	4.5	5.1	5.3	5.6	5.9
	Pond 08	3.7	3.9	4.1	4.2	4.3	4.4

Post Development	Pond 01	4.0	5.5	6.1	6.4	6.6	6.9
	Pond 02	3.5	3.9	4.4	4.6	4.8	5.0
	Pond 03	3.5	3.9	4.3	4.5	4.7	5.0
	Pond 04	3.5	3.9	4.2	4.4	4.6	4.8
	Pond 05	3.5	4.0	4.5	4.7	5.0	5.3
	Pond 06	3.5	4.1	4.7	5.0	5.3	5.6
	Pond 07	3.7	5.3	6.3	6.7	7.1	7.6
	Pond 08	3.7	4.0	4.2	4.3	4.5	4.6
	Future Pond 04A	5.0	5.6	6.3	6.7	7.1	7.6
	Future Pond 07A	5.0	5.5	6.2	6.6	7.0	7.5
	Future Pond 09A	4.5	5.5	6.1	6.4	6.6	6.9
	Future Pond 10A	5.0	5.5	6.1	6.4	6.8	7.2
	Future Pond 12	7.0	7.8	8.7	9.2	9.7	10.3
	Future Pond 14	8.0	8.4	9.2	9.7	10.3	11.1
	Future Pond 15	7.0	7.8	8.7	9.2	9.7	10.3
	Future Pond 15A	4.5	7.0	8.0	8.4	8.8	9.2
	Future Pond 16	7.0	7.8	8.7	9.2	9.7	10.3
	Future Pond 20	4.5	5.5	6.5	6.9	7.4	8.0
	Future Pond 20A	4.5	5.6	6.7	7.2	7.7	8.3
	Future Pond 22	4.5	5.8	6.6	7.0	7.4	7.9
	Future Pond 23	4.5	5.7	6.3	6.7	7.1	7.6

KIAWAH RIVER PLANTATION  
DRAINAGE BASIN STUDY

**Appendix A**

PRE-DEVELOPMENT ICPR MODEL INPUT

PREPARED BY

THOMAS & HUTTON ENGINEERING CO.



==== Basins =====

Name: BASIN 01	Node: NODE 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 149.00	
Area(ac): 132.790	Time Shift(hrs): 0.00	
Curve Number: 74.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

Name: BASIN 02	Node: NODE 02	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 332.00	
Area(ac): 640.020	Time Shift(hrs): 0.00	
Curve Number: 75.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

Name: BASIN 03	Node: NODE 03	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 356.00	
Area(ac): 359.670	Time Shift(hrs): 0.00	
Curve Number: 75.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

Name: BASIN 04	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 138.00	
Area(ac): 228.730	Time Shift(hrs): 0.00	
Curve Number: 76.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

Name: BASIN 05	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 98.00	
Area(ac): 49.050	Time Shift(hrs): 0.00	
Curve Number: 76.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

Name: BASIN 06	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 98.00	
Area(ac): 84.000	Time Shift(hrs): 0.00	
Curve Number: 76.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

Name: BASIN 07	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 101.00	
Area(ac): 104.930	Time Shift(hrs): 0.00	
Curve Number: 75.00	Max Allowable Q(cfs): 999999.000	

DCIA(%): 0.00

---

Name: BASIN 08	Node: NODE 04	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 188.00	
Area(ac): 498.350	Time Shift(hrs): 0.00	
Curve Number: 69.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 09	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 180.00	
Area(ac): 662.590	Time Shift(hrs): 0.00	
Curve Number: 72.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 09A	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 78.00	
Area(ac): 18.540	Time Shift(hrs): 0.00	
Curve Number: 77.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 10	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 79.00	
Area(ac): 156.800	Time Shift(hrs): 0.00	
Curve Number: 76.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 11	Node: NODE 05	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 119.00	
Area(ac): 145.130	Time Shift(hrs): 0.00	
Curve Number: 77.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 12	Node: NODE 08	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 85.00	
Area(ac): 79.540	Time Shift(hrs): 0.00	
Curve Number: 78.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 13	Node: BOUNDARY	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 118.00	
Area(ac): 247.070	Time Shift(hrs): 0.00	
Curve Number: 78.00	Max Allowable Q(cfs): 999999.000	

DCIA(%): 0.00

---

Name: BASIN 14	Node: BOUNDARY	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 88.00	
Area(ac): 141.520	Time Shift(hrs): 0.00	
Curve Number: 77.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 15	Node: NODE 06	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 89.00	
Area(ac): 38.500	Time Shift(hrs): 0.00	
Curve Number: 76.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 16	Node: NODE 07	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 86.00	
Area(ac): 35.690	Time Shift(hrs): 0.00	
Curve Number: 76.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 17	Node: NODE 08	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 92.00	
Area(ac): 31.960	Time Shift(hrs): 0.00	
Curve Number: 77.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 18	Node: POND 02	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 68.00	
Area(ac): 18.480	Time Shift(hrs): 0.00	
Curve Number: 39.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 19	Node: POND 03	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 68.00	
Area(ac): 9.120	Time Shift(hrs): 0.00	
Curve Number: 46.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 20	Node: POND 04	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 68.00	
Area(ac): 24.820	Time Shift(hrs): 0.00	
Curve Number: 77.00	Max Allowable Q(cfs): 999999.000	

---

DCIA(%): 0.00

---

Name: BASIN 21	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 24.00	
Area(ac): 315.520	Time Shift(hrs): 0.00	
Curve Number: 64.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 22	Node: BOUNDARY	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 80.00	
Area(ac): 73.260	Time Shift(hrs): 0.00	
Curve Number: 76.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 23	Node: POND 07	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 68.00	
Area(ac): 42.130	Time Shift(hrs): 0.00	
Curve Number: 77.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 24	Node: BOUNDARY	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 68.00	
Area(ac): 11.490	Time Shift(hrs): 0.00	
Curve Number: 77.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 25	Node: POND 05	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 61.00	
Area(ac): 36.400	Time Shift(hrs): 0.00	
Curve Number: 77.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 26	Node: POND 04	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 64.00	
Area(ac): 30.340	Time Shift(hrs): 0.00	
Curve Number: 77.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 27	Node: POND 08	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 65.00	
Area(ac): 12.270	Time Shift(hrs): 0.00	
Curve Number: 77.00	Max Allowable Q(cfs): 999999.000	

---



DCIA(%): 0.00

---

Name: BASIN 28	Node: BOUNDARY	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 61.00	
Area(ac): 18.650	Time Shift(hrs): 0.00	
Curve Number: 77.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 29	Node: POND 06	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 61.00	
Area(ac): 33.100	Time Shift(hrs): 0.00	
Curve Number: 77.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: POND 01	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 5.00	
Area(ac): 172.130	Time Shift(hrs): 0.00	
Curve Number: 98.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: POND 02	Node: POND 02	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 5.00	
Area(ac): 6.490	Time Shift(hrs): 0.00	
Curve Number: 98.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: POND 03	Node: POND 03	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 5.00	
Area(ac): 7.730	Time Shift(hrs): 0.00	
Curve Number: 98.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: POND 04	Node: POND 04	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 5.00	
Area(ac): 58.820	Time Shift(hrs): 0.00	
Curve Number: 98.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: POND 05	Node: POND 05	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 5.00	
Area(ac): 3.820	Time Shift(hrs): 0.00	
Curve Number: 98.00	Max Allowable Q(cfs): 999999.000	

---

DCIA(%): 0.00

```

-----
Name: POND 06          Node: POND 06          Status: Onsite
Group: BASE           Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323          Peaking Factor: 323.0
Rainfall File: Scsiii          Storm Duration(hrs): 24.00
Rainfall Amount(in): 4.600      Time of Conc(min): 5.00
Area(ac): 8.040                Time Shift(hrs): 0.00
Curve Number: 98.00            Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

```

```

-----
Name: POND 07          Node: POND 07          Status: Onsite
Group: BASE           Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323          Peaking Factor: 323.0
Rainfall File: Scsiii          Storm Duration(hrs): 24.00
Rainfall Amount(in): 4.600      Time of Conc(min): 5.00
Area(ac): 4.250                Time Shift(hrs): 0.00
Curve Number: 98.00            Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

```

```

-----
Name: POND 08          Node: POND 08          Status: Onsite
Group: BASE           Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323          Peaking Factor: 323.0
Rainfall File: Scsiii          Storm Duration(hrs): 24.00
Rainfall Amount(in): 4.600      Time of Conc(min): 5.00
Area(ac): 18.460               Time Shift(hrs): 0.00
Curve Number: 98.00            Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00

```

=====  
Nodes  
=====

```

Name: BOUNDARY          Base Flow(cfs): 0.000          Init Stage(ft): 3.000
Group: BASE             Warn Stage(ft): 4.000
Type: Time/Stage

```

Boundary stages determined by NOAA elevation information; the NAVD 88 elevations related to MLLW were computed from Bench Mark, Station I

Time(hrs)	Stage(ft)
0.00	3.000
1.00	2.500
2.00	2.000
3.00	1.500
4.00	1.000
5.00	0.500
6.00	0.000
7.00	0.500
8.00	1.000
9.00	1.500
10.00	2.000
11.00	2.500
12.00	3.000
13.00	2.500
14.00	2.000
15.00	1.500
16.00	1.000
17.00	0.500
18.00	0.000
19.00	0.500
20.00	1.000
21.00	1.500
22.00	2.000
23.00	2.500
24.00	3.000
25.00	2.500
26.00	2.000
27.00	1.500
28.00	1.000
29.00	0.500
30.00	0.000
31.00	0.500
32.00	1.000
33.00	1.500
34.00	2.000
35.00	2.500

36.00	3.000
37.00	2.500
38.00	2.000
39.00	1.500
40.00	1.000
41.00	0.500
42.00	0.000
43.00	0.500
44.00	1.000
45.00	1.500
46.00	2.000
47.00	2.500
48.00	3.000
49.00	2.500
50.00	2.000
51.00	1.500
52.00	1.000
53.00	0.500
54.00	0.000
55.00	0.500
56.00	1.000
57.00	1.500
58.00	2.000
59.00	2.500
60.00	3.000
61.00	2.500
62.00	2.000
63.00	1.500
64.00	1.000
65.00	0.500
66.00	0.000
67.00	0.500
68.00	1.000
69.00	1.500
70.00	2.000
71.00	2.500
72.00	3.000
73.00	2.500
74.00	2.000
75.00	1.500
76.00	1.000
77.00	0.500
78.00	0.000
79.00	0.500
80.00	1.000
81.00	1.500
82.00	2.000
83.00	2.500
84.00	3.000
85.00	2.500
86.00	2.000
87.00	1.500
88.00	1.000
89.00	0.500
90.00	0.000
91.00	0.500
92.00	1.000
93.00	1.500
94.00	2.000
95.00	2.500
96.00	3.000
97.00	2.500
98.00	2.000
99.00	1.500
100.00	1.000
101.00	0.500
102.00	0.000
103.00	0.500
104.00	1.000
105.00	1.500
106.00	2.000
107.00	2.500
108.00	3.000
109.00	2.500
110.00	2.000
111.00	1.500
112.00	1.000
113.00	0.500
114.00	0.000
115.00	0.500
116.00	1.000
117.00	1.500
118.00	2.000
119.00	2.500
120.00	3.000
121.00	2.500
122.00	2.000
123.00	1.500
124.00	1.000
125.00	0.500
126.00	0.000

127.00	0.500
128.00	1.000
129.00	1.500
130.00	2.000
131.00	2.500
132.00	3.000
133.00	2.500
134.00	2.000
135.00	1.500
136.00	1.000
137.00	0.500
138.00	0.000
139.00	0.500
140.00	1.000
141.00	1.500
142.00	2.000
143.00	2.500
144.00	3.000
145.00	2.500
146.00	2.000
147.00	1.500
148.00	1.000
149.00	0.500
150.00	0.000
151.00	0.500
152.00	1.000
153.00	1.500
154.00	2.000
155.00	2.500
156.00	3.000
157.00	2.500
158.00	2.000
159.00	1.500
160.00	1.000
161.00	0.500
162.00	0.000
163.00	0.500
164.00	1.000
165.00	1.500
166.00	2.000
167.00	2.500
168.00	3.000
169.00	2.500
170.00	2.000
171.00	1.500
172.00	1.000
173.00	0.500
174.00	0.000
175.00	0.500
176.00	1.000
177.00	1.500
178.00	2.000
179.00	2.500
180.00	3.000
181.00	2.500
182.00	2.000
183.00	1.500
184.00	1.000
185.00	0.500
186.00	0.000
187.00	0.500
188.00	1.000
189.00	1.500
190.00	2.000
191.00	2.500
192.00	3.000
193.00	2.500
194.00	2.000
195.00	1.500
196.00	1.000
197.00	0.500
198.00	0.000
199.00	0.500
200.00	1.000
201.00	1.500
202.00	2.000
203.00	2.500
204.00	3.000
205.00	2.500
206.00	2.000
207.00	1.500
208.00	1.000
209.00	0.500
210.00	0.000
211.00	0.500
212.00	1.000
213.00	1.500
214.00	2.000
215.00	2.500
216.00	3.000
217.00	2.500



218.00	2.000
219.00	1.500
220.00	1.000
221.00	0.500
222.00	0.000
223.00	0.500
224.00	1.000
225.00	1.500
226.00	2.000
227.00	2.500
228.00	3.000
229.00	2.500
230.00	2.000
231.00	1.500
232.00	1.000
233.00	0.500
234.00	0.000
235.00	0.500
236.00	1.000
237.00	1.500
238.00	2.000
239.00	2.500
240.00	3.000
241.00	2.500
242.00	2.000
243.00	1.500
244.00	1.000
245.00	0.500
246.00	0.000
247.00	0.500
248.00	1.000
249.00	1.500
250.00	2.000
251.00	2.500
252.00	3.000
253.00	2.500
254.00	2.000
255.00	1.500
256.00	1.000
257.00	0.500
258.00	0.000
259.00	0.500
260.00	1.000
261.00	1.500
262.00	2.000
263.00	2.500
264.00	3.000
265.00	2.500
266.00	2.000
267.00	1.500
268.00	1.000
269.00	0.500
270.00	0.000
271.00	0.500
272.00	1.000
273.00	1.500
274.00	2.000
275.00	2.500
276.00	3.000
277.00	2.500
278.00	2.000
279.00	1.500
280.00	1.000
281.00	0.500
282.00	0.000
283.00	0.500
284.00	1.000
285.00	1.500
286.00	2.000
287.00	2.500
288.00	3.000
289.00	2.500
290.00	2.000
291.00	1.500
292.00	1.000
293.00	0.500
294.00	0.000
295.00	0.500
296.00	1.000
297.00	1.500
298.00	2.000
299.00	2.500
300.00	3.000

Name: NODE 01	Base Flow(cfs): 0.000	Init Stage(ft): 10.500
Group: BASE		Warn Stage(ft): 15.000
Type: Stage/Area		

Stage(ft)	Area(ac)
10.500	5.0000
11.500	10.0000
12.500	20.0000
13.500	40.0000
14.500	60.0000

Name: NODE 01A      Base Flow(cfs): 0.000      Init Stage(ft): 10.500  
Group: BASE      Warn Stage(ft): 15.000  
Type: Stage/Area

Stage(ft)	Area(ac)
-----------	----------

Name: NODE 02      Base Flow(cfs): 0.000      Init Stage(ft): 10.500  
Group: BASE      Warn Stage(ft): 15.000  
Type: Stage/Area

Stage(ft)	Area(ac)
10.500	5.0000
11.500	10.0000
12.500	40.0000
13.000	80.0000
14.000	168.7100

Name: NODE 02A      Base Flow(cfs): 0.000      Init Stage(ft): 10.500  
Group: BASE      Warn Stage(ft): 15.000  
Type: Stage/Area

Stage(ft)	Area(ac)
-----------	----------

Name: NODE 03      Base Flow(cfs): 0.000      Init Stage(ft): 10.500  
Group: BASE      Warn Stage(ft): 15.000  
Type: Stage/Area

Stage(ft)	Area(ac)
10.500	5.0000
11.500	10.0000
12.500	20.0000
13.000	60.0000
14.000	166.3900

Name: NODE 03A      Base Flow(cfs): 0.000      Init Stage(ft): 10.500  
Group: BASE      Warn Stage(ft): 15.000  
Type: Stage/Area

Stage(ft)	Area(ac)
-----------	----------

Name: NODE 04      Base Flow(cfs): 0.000      Init Stage(ft): 5.000  
Group: BASE      Warn Stage(ft): 8.000  
Type: Stage/Area

Stage(ft)	Area(ac)
5.000	55.7400
8.000	100.7200

Name: NODE 04A      Base Flow(cfs): 0.000      Init Stage(ft): 5.000  
Group: BASE      Warn Stage(ft): 8.000  
Type: Stage/Area

Stage(ft)	Area(ac)
-----------	----------

Base Flow(cfs): 0.000

```
Init Stage(ft): 7.000
Warn Stage(ft): 11.000
```

Stage(ft)	Area(ac)
-----------	----------

Base Flow(cfs): 0.000

```
Init Stage(ft): 7.000
Warn Stage(ft): 11.000
```

Stage(ft)	Area(ac)
-----------	----------

Base Flow(cfs): 0.000

```
Init Stage(ft): 5.000
Warn Stage(ft): 7.000
```

Stage(ft)	Area(ac)
-----------	----------

Base Flow(cfs): 0.000

```
Init Stage(ft): 5.000
Warn Stage(ft): 7.000
```

Stage(ft)	Area(ac)
-----------	----------

Base Flow(cfs): 0.000

```
Init Stage(ft): 5.000
Warn Stage(ft): 7.000
```

Stage(ft)	Area(ac)
-----------	----------

Base Flow(cfs): 0.000

```
Init Stage(ft): 3.850
Warn Stage(ft): 6.000
```

Stage(ft)	Area(ac)
-----------	----------

Base Flow(cfs): 0.000

```
Init Stage(ft): 3.250
Warn Stage(ft): 6.000
```

Stage(ft)	Area(ac)
-----------	----------

```

-----
Name: POND 03          Base Flow(cfs): 0.000          Init Stage(ft): 3.250
Group: BASE                               Warn Stage(ft): 6.000
Type: Stage/Area

```

```

-----
Stage(ft)      Area(ac)
-----
3.250          7.7300
6.000          8.7300

```

```

-----
Name: POND 04          Base Flow(cfs): 0.000          Init Stage(ft): 3.250
Group: BASE                               Warn Stage(ft): 6.000
Type: Stage/Area

```

```

-----
Stage(ft)      Area(ac)
-----
3.250          58.8200
6.000          60.8200

```

```

-----
Name: POND 05          Base Flow(cfs): 0.000          Init Stage(ft): 3.250
Group: BASE                               Warn Stage(ft): 6.000
Type: Stage/Area

```

```

-----
Stage(ft)      Area(ac)
-----
3.250          3.8200
6.000          4.8200

```

```

-----
Name: POND 06          Base Flow(cfs): 0.000          Init Stage(ft): 3.250
Group: BASE                               Warn Stage(ft): 6.000
Type: Stage/Area

```

```

-----
Stage(ft)      Area(ac)
-----
3.250          8.0400
6.000          10.0400

```

```

-----
Name: POND 07          Base Flow(cfs): 0.000          Init Stage(ft): 3.500
Group: BASE                               Warn Stage(ft): 6.000
Type: Stage/Area

```

```

-----
Stage(ft)      Area(ac)
-----
3.500          4.2500
6.000          5.0000

```

```

-----
Name: POND 08          Base Flow(cfs): 0.000          Init Stage(ft): 3.500
Group: BASE                               Warn Stage(ft): 6.000
Type: Stage/Area

```

```

-----
Stage(ft)      Area(ac)
-----
3.500          18.4600
6.000          19.4600

```

```

=====
=== Pipes =====
=====

```

```

Name: PIPE 01          From Node: NODE 01          Length(ft): 40.00
Group: BASE            To Node: NODE 01A          Count: 1
                                Friction Equation: Automatic
                                Solution Algorithm: Most Restrictive
                                Flow: Both
                                Entrance Loss Coef: 0.00
                                Exit Loss Coef: 1.00
                                Bend Loss Coef: 0.00
                                Outlet Ctrl Spec: Use dc or tw
                                Inlet Ctrl Spec: Use dc
                                Stabilizer Option: None

UPSTREAM      DOWNSTREAM
Geometry: Circular
Span(in): 36.00      36.00
Rise(in): 36.00      36.00
Invert(ft): 10.500   10.500
Manning's N: 0.013000 0.013000
Top Clip(in): 0.000   0.000
Bot Clip(in): 6.000   6.000

```



Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

```
-----
Name: PIPE 02          From Node: NODE 02          Length(ft): 40.00
Group: BASE            To Node: NODE 02A           Count: 1
                                     Friction Equation: Automatic
                                     Solution Algorithm: Most Restrictive
                                     Flow: Both
      UPSTREAM          DOWNSTREAM
Geometry: Circular      Circular
Span(in): 36.00         36.00
Rise(in): 36.00         36.00
Invert(ft): 10.500      10.500
Manning's N: 0.013000   0.013000
Top Clip(in): 0.000     0.000
Bot Clip(in): 0.000     0.000
      Entrance Loss Coef: 0.00
      Exit Loss Coef: 1.00
      Bend Loss Coef: 0.00
      Outlet Ctrl Spec: Use dc or tw
      Inlet Ctrl Spec: Use dc
      Stabilizer Option: None
-----
```

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

```
-----
Name: PIPE 03          From Node: NODE 03          Length(ft): 40.00
Group: BASE            To Node: NODE 03A           Count: 1
                                     Friction Equation: Automatic
                                     Solution Algorithm: Most Restrictive
                                     Flow: Both
      UPSTREAM          DOWNSTREAM
Geometry: Circular      Circular
Span(in): 36.00         36.00
Rise(in): 36.00         36.00
Invert(ft): 10.500      10.500
Manning's N: 0.013000   0.013000
Top Clip(in): 0.000     0.000
Bot Clip(in): 0.000     0.000
      Entrance Loss Coef: 0.00
      Exit Loss Coef: 1.00
      Bend Loss Coef: 0.00
      Outlet Ctrl Spec: Use dc or tw
      Inlet Ctrl Spec: Use dc
      Stabilizer Option: None
-----
```

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

```
-----
Name: PIPE 04          From Node: NODE 04          Length(ft): 30.00
Group: BASE            To Node: NODE 04A           Count: 2
                                     Friction Equation: Automatic
                                     Solution Algorithm: Most Restrictive
                                     Flow: Both
      UPSTREAM          DOWNSTREAM
Geometry: Circular      Circular
Span(in): 48.00         48.00
Rise(in): 48.00         48.00
Invert(ft): 5.000       5.000
Manning's N: 0.013000   0.013000
Top Clip(in): 0.000     0.000
Bot Clip(in): 0.000     0.000
      Entrance Loss Coef: 0.00
      Exit Loss Coef: 1.00
      Bend Loss Coef: 0.00
      Outlet Ctrl Spec: Use dc or tw
      Inlet Ctrl Spec: Use dc
      Stabilizer Option: None
-----
```

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

```
-----
Name: PIPE 05          From Node: NODE 05          Length(ft): 30.00
Group: BASE            To Node: NODE 05A           Count: 1
                                     Friction Equation: Automatic
                                     Solution Algorithm: Most Restrictive
                                     Flow: Both
      UPSTREAM          DOWNSTREAM
Geometry: Circular      Circular
Span(in): 18.00         18.00
Rise(in): 18.00         18.00
Invert(ft): 7.000       7.000
Manning's N: 0.013000   0.013000
Top Clip(in): 0.000     0.000
Bot Clip(in): 0.000     0.000
      Entrance Loss Coef: 0.00
      Exit Loss Coef: 1.00
      Bend Loss Coef: 0.00
      Outlet Ctrl Spec: Use dc or tw
      Inlet Ctrl Spec: Use dc
      Stabilizer Option: None
-----
```

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

```
-----
Name: PIPE 6                From Node: POND 02      Length(ft): 450.00
Group: BASE                  To Node: BOUNDARY      Count: 1
                                Friction Equation: Automatic
                                Solution Algorithm: Most Restrictive
                                Flow: Both
Geometry: Circular           Circular
Span(in): 48.00              48.00
Rise(in): 48.00              48.00
Invert(ft): 3.250            3.000
Manning's N: 0.013000        0.013000
Top Clip(in): 0.000          0.000
Bot Clip(in): 0.000          0.000
Entrance Loss Coef: 0.00
Exit Loss Coef: 0.00
Bend Loss Coef: 0.00
Outlet Ctrl Spec: Use dc or tw
Inlet Ctrl Spec: Use dc
Stabilizer Option: None
-----
```

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

```
=====
==== Channels =====
=====
```

```
Name: CHANNEL 01            From Node: NODE 01A      Length(ft): 2700.00
Group: BASE                  To Node: POND 01        Count: 1
                                Friction Equation: Automatic
                                Solution Algorithm: Automatic
                                Flow: Both
                                Contraction Coef: 0.100
                                Expansion Coef: 0.300
                                Entrance Loss Coef: 0.000
                                Exit Loss Coef: 0.000
                                Outlet Ctrl Spec: Use dc or tw
                                Inlet Ctrl Spec: Use dc
                                Stabilizer Option: None
                                UPSTREAM      DOWNSTREAM
Geometry: Trapezoidal        Trapezoidal
Invert(ft): 10.500           4.100
TClpInitZ(ft): 9999.000      9999.000
Manning's N: 0.040000        0.040000
Top Clip(ft): 0.000          0.000
Bot Clip(ft): 0.000          0.000
Main XSec:
AuxElev1(ft):
Aux XSec1:
AuxElev2(ft):
Aux XSec2:
Top Width(ft):
Depth(ft):
Bot Width(ft): 5.000         5.000
LtSdSlp(h/v): 1.00          1.00
RtSdSlp(h/v): 1.00          1.00
-----
```

```
Name: CHANNEL 02            From Node: NODE 02A      Length(ft): 2200.00
Group: BASE                  To Node: POND 01        Count: 1
                                Friction Equation: Automatic
                                Solution Algorithm: Automatic
                                Flow: Both
                                Contraction Coef: 0.100
                                Expansion Coef: 0.300
                                Entrance Loss Coef: 0.000
                                Exit Loss Coef: 0.000
                                Outlet Ctrl Spec: Use dc or tw
                                Inlet Ctrl Spec: Use dc
                                Stabilizer Option: None
                                UPSTREAM      DOWNSTREAM
Geometry: Trapezoidal        Trapezoidal
Invert(ft): 10.500           4.100
TClpInitZ(ft): 9999.000      9999.000
Manning's N: 0.040000        0.040000
Top Clip(ft): 0.000          0.000
Bot Clip(ft): 0.000          0.000
Main XSec:
AuxElev1(ft):
Aux XSec1:
AuxElev2(ft):
Aux XSec2:
Top Width(ft):
Depth(ft):
Bot Width(ft): 5.000         5.000
LtSdSlp(h/v): 2.00          2.00
RtSdSlp(h/v): 2.00          2.00
-----
```

```
Name: CHANNEL 03            From Node: NODE 03A      Length(ft): 2400.00
Group: BASE                  To Node: POND 01        Count: 1
                                Friction Equation: Automatic
                                Solution Algorithm: Automatic
                                Flow: Both
                                Contraction Coef: 0.100
                                UPSTREAM      DOWNSTREAM
Geometry: Trapezoidal        Trapezoidal
Invert(ft): 10.500           4.100
TClpInitZ(ft): 9999.000      9999.000
-----
```

Manning's N:	0.040000	0.040000	Expansion Coef:	0.300
Top Clip(ft):	0.000	0.000	Entrance Loss Coef:	0.000
Bot Clip(ft):	0.000	0.000	Exit Loss Coef:	0.000
Main XSec:			Outlet Ctrl Spec:	Use dc or tw
AuxElev1(ft):			Inlet Ctrl Spec:	Use dc
Aux XSec1:			Stabilizer Option:	None
AuxElev2(ft):				
Aux XSec2:				
Top Width(ft):				
Depth(ft):				
Bot Width(ft):	5.000	5.000		
LtSdSlp(h/v):	2.00	2.00		
RtSdSlp(h/v):	2.00	2.00		

---

Name:	CHANNEL 04	From Node:	NODE 04A	Length(ft):	2300.00
Group:	BASE	To Node:	POND 01	Count:	1
	UPSTREAM	DOWNSTREAM	Friction Equation:	Automatic	
Geometry:	Trapezoidal	Trapezoidal	Solution Algorithm:	Automatic	
Invert(ft):	5.000	4.100	Flow:	Both	
TClpInitZ(ft):	9999.000	9999.000	Contraction Coef:	0.100	
Manning's N:	0.015000	0.015000	Expansion Coef:	0.300	
Top Clip(ft):	0.000	0.000	Entrance Loss Coef:	0.000	
Bot Clip(ft):	0.000	0.000	Exit Loss Coef:	0.000	
Main XSec:			Outlet Ctrl Spec:	Use dc or tw	
AuxElev1(ft):			Inlet Ctrl Spec:	Use dc	
Aux XSec1:			Stabilizer Option:	None	
AuxElev2(ft):					
Aux XSec2:					
Top Width(ft):					
Depth(ft):					
Bot Width(ft):	10.000	10.000			
LtSdSlp(h/v):	2.00	2.00			
RtSdSlp(h/v):	2.00	2.00			

---

Name:	CHANNEL 05	From Node:	NODE 05A	Length(ft):	2600.00
Group:	BASE	To Node:	POND 01	Count:	1
	UPSTREAM	DOWNSTREAM	Friction Equation:	Automatic	
Geometry:	Trapezoidal	Trapezoidal	Solution Algorithm:	Automatic	
Invert(ft):	7.000	4.100	Flow:	Both	
TClpInitZ(ft):	9999.000	9999.000	Contraction Coef:	0.100	
Manning's N:	0.030000	0.030000	Expansion Coef:	0.300	
Top Clip(ft):	0.000	0.000	Entrance Loss Coef:	0.000	
Bot Clip(ft):	0.000	0.000	Exit Loss Coef:	0.000	
Main XSec:			Outlet Ctrl Spec:	Use dc or tw	
AuxElev1(ft):			Inlet Ctrl Spec:	Use dc	
Aux XSec1:			Stabilizer Option:	None	
AuxElev2(ft):					
Aux XSec2:					
Top Width(ft):					
Depth(ft):					
Bot Width(ft):	8.000	8.000			
LtSdSlp(h/v):	2.00	2.00			
RtSdSlp(h/v):	2.00	2.00			

---

Name:	CHANNEL 06	From Node:	NODE 06	Length(ft):	2250.00
Group:	BASE	To Node:	BOUNDARY	Count:	1
	UPSTREAM	DOWNSTREAM	Friction Equation:	Automatic	
Geometry:	Trapezoidal	Trapezoidal	Solution Algorithm:	Automatic	
Invert(ft):	5.000	3.000	Flow:	Both	
TClpInitZ(ft):	9999.000	9999.000	Contraction Coef:	0.100	
Manning's N:	0.030000	0.030000	Expansion Coef:	0.300	
Top Clip(ft):	0.000	0.000	Entrance Loss Coef:	0.000	
Bot Clip(ft):	0.000	0.000	Exit Loss Coef:	0.000	
Main XSec:			Outlet Ctrl Spec:	Use dc or tw	
AuxElev1(ft):			Inlet Ctrl Spec:	Use dc	
Aux XSec1:			Stabilizer Option:	None	
AuxElev2(ft):					
Aux XSec2:					
Top Width(ft):					
Depth(ft):					
Bot Width(ft):	10.000	10.000			
LtSdSlp(h/v):	8.00	8.00			
RtSdSlp(h/v):	8.00	8.00			

---

Name:	CHANNEL 07	From Node:	NODE 07	Length(ft):	2700.00
Group:	BASE	To Node:	NODE 08	Count:	1

UPSTREAM		DOWNSTREAM	Friction Equation: Automatic
Geometry: Trapezoidal		Trapezoidal	Solution Algorithm: Automatic
Invert(ft): 5.000	5.000		Flow: Both
TClpInitZ(ft): 9999.000	9999.000		Contraction Coef: 0.100
Manning's N: 0.030000	0.030000		Expansion Coef: 0.300
Top Clip(ft): 0.000	0.000		Entrance Loss Coef: 0.000
Bot Clip(ft): 0.000	0.000		Exit Loss Coef: 0.000
Main XSec:			Outlet Ctrl Spec: Use dc or tw
AuxElev1(ft):			Inlet Ctrl Spec: Use dc
Aux XSec1:			Stabilizer Option: None
AuxElev2(ft):			
Aux XSec2:			
Top Width(ft):			
Depth(ft):			
Bot Width(ft): 10.000	10.000		
LtSdSlp(h/v): 8.00	8.00		
RtSdSlp(h/v): 8.00	8.00		

-----  
 Name: CHANNEL 08      From Node: NODE 08      Length(ft): 4100.00  
 Group: BASE      To Node: BOUNDARY      Count: 1

UPSTREAM		DOWNSTREAM	Friction Equation: Automatic
Geometry: Trapezoidal		Trapezoidal	Solution Algorithm: Automatic
Invert(ft): 5.000	3.000		Flow: Both
TClpInitZ(ft): 9999.000	9999.000		Contraction Coef: 0.100
Manning's N: 0.030000	0.030000		Expansion Coef: 0.300
Top Clip(ft): 0.000	0.000		Entrance Loss Coef: 0.000
Bot Clip(ft): 0.000	0.000		Exit Loss Coef: 0.000
Main XSec:			Outlet Ctrl Spec: Use dc or tw
AuxElev1(ft):			Inlet Ctrl Spec: Use dc
Aux XSec1:			Stabilizer Option: None
AuxElev2(ft):			
Aux XSec2:			
Top Width(ft):			
Depth(ft):			
Bot Width(ft): 10.000	10.000		
LtSdSlp(h/v): 8.00	8.00		
RtSdSlp(h/v): 8.00	8.00		

-----  
 Name: CHANNEL 6-7      From Node: NODE 07      Length(ft): 50.00  
 Group: BASE      To Node: NODE 06      Count: 1

UPSTREAM		DOWNSTREAM	Friction Equation: Automatic
Geometry: Trapezoidal		Trapezoidal	Solution Algorithm: Automatic
Invert(ft): 5.000	5.000		Flow: Both
TClpInitZ(ft): 9999.000	9999.000		Contraction Coef: 0.100
Manning's N: 0.040000	0.040000		Expansion Coef: 0.300
Top Clip(ft): 0.000	0.000		Entrance Loss Coef: 0.000
Bot Clip(ft): 0.000	0.000		Exit Loss Coef: 0.000
Main XSec:			Outlet Ctrl Spec: Use dc or tw
AuxElev1(ft):			Inlet Ctrl Spec: Use dc
Aux XSec1:			Stabilizer Option: None
AuxElev2(ft):			
Aux XSec2:			
Top Width(ft):			
Depth(ft):			
Bot Width(ft): 10.000	10.000		
LtSdSlp(h/v): 8.00	8.00		
RtSdSlp(h/v): 8.00	8.00		

=====  
 Drop Structures  
 =====

Name: CS 01      From Node: POND 03      Length(ft): 35.00  
 Group: BASE      To Node: POND 02      Count: 1

UPSTREAM		DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular		Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00		Flow: Both
Rise(in): 36.00	36.00		Entrance Loss Coef: 0.200
Invert(ft): 3.250	3.250		Exit Loss Coef: 1.000
Manning's N: 0.020000	0.020000		Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000		Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000		Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
 Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
 Rectangular Box: 0° wingwall flares



Spillway Box

\*\*\* Weir 1 of 1 for Drop Structure CS 01 \*\*\*

Count: 1	Bottom Clip(in): 0.000
Type: Vertical: Mavis	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 48.00	Invert(ft): 3.250
Rise(in): 12.00	Control Elev(ft): 3.250

TABLE

Name: CS 02	From Node: POND 04	Length(ft): 35.00
Group: BASE	To Node: BOUNDARY	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Both
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.200
Invert(ft): 3.250	3.250	Exit Loss Coef: 1.000
Manning's N: 0.020000	0.020000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Rice Trunk

\*\*\* Weir 1 of 1 for Drop Structure CS 02 \*\*\*

Count: 1	Bottom Clip(in): 0.000
Type: Vertical: Mavis	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 48.00	Invert(ft): 3.250
Rise(in): 10.00	Control Elev(ft): 3.250

TABLE

Name: CS 03	From Node: POND 04	Length(ft): 35.00
Group: BASE	To Node: BOUNDARY	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Both
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.200
Invert(ft): 3.250	3.250	Exit Loss Coef: 1.000
Manning's N: 0.020000	0.020000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Rice Trunk

\*\*\* Weir 1 of 1 for Drop Structure CS 03 \*\*\*

Count: 1	Bottom Clip(in): 0.000
Type: Vertical: Mavis	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 48.00	Invert(ft): 3.250
Rise(in): 10.00	Control Elev(ft): 3.250

TABLE

Name: CS 04	From Node: POND 08	Length(ft): 35.00
Group: BASE	To Node: BOUNDARY	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Both
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.200
Invert(ft): 3.500	3.500	Exit Loss Coef: 1.000
Manning's N: 0.020000	0.020000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:

Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Existing Rice Trunk

\*\*\* Weir 1 of 1 for Drop Structure CS 04 \*\*\*

Count: 1	Bottom Clip(in): 0.000	TABLE
Type: Vertical: Mavis	Top Clip(in): 0.000	
Flow: Both	Weir Disc Coef: 3.200	
Geometry: Rectangular	Orifice Disc Coef: 0.600	
Span(in): 48.00	Invert(ft): 3.500	
Rise(in): 10.00	Control Elev(ft): 3.500	

Name: CS 05	From Node: POND 08	Length(ft): 35.00
Group: BASE	To Node: BOUNDARY	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Positive
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.200
Invert(ft): 3.500	3.500	Exit Loss Coef: 1.000
Manning's N: 0.020000	0.020000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Spillway Box

\*\*\* Weir 1 of 1 for Drop Structure CS 05 \*\*\*

Count: 1	Bottom Clip(in): 0.000	TABLE
Type: Vertical: Mavis	Top Clip(in): 0.000	
Flow: Both	Weir Disc Coef: 3.200	
Geometry: Rectangular	Orifice Disc Coef: 0.600	
Span(in): 48.00	Invert(ft): 3.500	
Rise(in): 10.00	Control Elev(ft): 3.500	

Name: CS 06	From Node: POND 07	Length(ft): 35.00
Group: BASE	To Node: BOUNDARY	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Positive
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.200
Invert(ft): 3.500	3.500	Exit Loss Coef: 1.000
Manning's N: 0.020000	0.020000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Rice Trunk

\*\*\* Weir 1 of 1 for Drop Structure CS 06 \*\*\*

Count: 1	Bottom Clip(in): 0.000	TABLE
Type: Vertical: Mavis	Top Clip(in): 0.000	
Flow: Both	Weir Disc Coef: 3.200	
Geometry: Rectangular	Orifice Disc Coef: 0.600	
Span(in): 48.00	Invert(ft): 3.500	
Rise(in): 12.00	Control Elev(ft): 3.500	

Name: CS 07	From Node: BOUNDARY	Length(ft): 35.00
Group: BASE	To Node: POND 07	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Both
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.200
Invert(ft): 3.500	3.500	Exit Loss Coef: 1.000

Manning's N: 0.020000	0.020000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Spillway Box

\*\*\* Weir 1 of 1 for Drop Structure CS 07 \*\*\*

Count: 1	Bottom Clip(in): 0.000	TABLE
Type: Horizontal	Top Clip(in): 0.000	
Flow: Both	Weir Disc Coef: 3.200	
Geometry: Rectangular	Orifice Disc Coef: 0.600	
Span(in): 48.00	Invert(ft): 3.500	
Rise(in): 48.00	Control Elev(ft): 3.500	

Name: CS 08	From Node: POND 06	Length(ft): 35.00
Group: BASE	To Node: POND 05	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Both
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.200
Invert(ft): 3.250	3.250	Exit Loss Coef: 1.000
Manning's N: 0.020000	0.020000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Spillway Box

\*\*\* Weir 1 of 1 for Drop Structure CS 08 \*\*\*

Count: 1	Bottom Clip(in): 0.000	TABLE
Type: Vertical: Mavis	Top Clip(in): 0.000	
Flow: Both	Weir Disc Coef: 3.200	
Geometry: Rectangular	Orifice Disc Coef: 0.600	
Span(in): 48.00	Invert(ft): 3.250	
Rise(in): 10.00	Control Elev(ft): 3.250	

Name: CS 09	From Node: POND 03	Length(ft): 35.00
Group: BASE	To Node: POND 04	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Both
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.200
Invert(ft): 3.250	3.250	Exit Loss Coef: 1.000
Manning's N: 0.020000	0.020000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Spillway Box

\*\*\* Weir 1 of 1 for Drop Structure CS 09 \*\*\*

Count: 1	Bottom Clip(in): 0.000	TABLE
Type: Vertical: Mavis	Top Clip(in): 0.000	
Flow: Both	Weir Disc Coef: 3.200	
Geometry: Rectangular	Orifice Disc Coef: 0.600	
Span(in): 48.00	Invert(ft): 3.250	
Rise(in): 10.00	Control Elev(ft): 3.250	

Name: CS 10	From Node: POND 06	Length(ft): 35.00
Group: BASE	To Node: POND 04	Count: 1

UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Both
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.200
Invert(ft): 3.250	3.250	Exit Loss Coef: 1.000
Manning's N: 0.020000	0.020000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Spillway Box

\*\*\* Weir 1 of 1 for Drop Structure CS 10 \*\*\*

	TABLE
Count: 1	Bottom Clip(in): 0.000
Type: Vertical: Mavis	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 48.00	Invert(ft): 3.250
Rise(in): 10.00	Control Elev(ft): 3.250

Name: DS 01	From Node: POND 01	Length(ft): 50.00
Group: BASE	To Node: BOUNDARY	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Automatic
Geometry: Circular	Circular	Solution Algorithm: Most Restrictive
Span(in): 60.00	60.00	Flow: Both
Rise(in): 60.00	60.00	Entrance Loss Coef: 0.000
Invert(ft): 3.000	3.000	Exit Loss Coef: 0.000
Manning's N: 0.024000	0.024000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dc
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Circular CMP: Projecting

Downstream FHWA Inlet Edge Description:  
Circular CMP: Projecting

\*\*\* Weir 1 of 2 for Drop Structure DS 01 \*\*\*

	TABLE
Count: 1	Bottom Clip(in): 0.000
Type: Vertical: Mavis	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 96.00	Invert(ft): 3.850
Rise(in): 24.00	Control Elev(ft): 3.850

\*\*\* Weir 2 of 2 for Drop Structure DS 01 \*\*\*

	TABLE
Count: 1	Bottom Clip(in): 0.000
Type: Horizontal	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Circular	Orifice Disc Coef: 0.600
Span(in): 96.00	Invert(ft): 5.850
Rise(in): 96.00	Control Elev(ft): 5.850

Name: DS 02	From Node: POND 05	Length(ft): 25.00
Group: BASE	To Node: BOUNDARY	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Both
Rise(in): 48.00	48.00	Entrance Loss Coef: 0.200
Invert(ft): 3.250	3.000	Exit Loss Coef: 1.000
Manning's N: 0.020000	0.020000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 30° to 75° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 30° to 75° wingwall flares

Rice Trunk



\*\*\* Weir 1 of 2 for Drop Structure DS 02 \*\*\*

Count: 1 Bottom Clip(in): 0.000  
Type: Vertical: Mavis Top Clip(in): 0.000  
Flow: Both Weir Disc Coef: 3.200  
Geometry: Rectangular Orifice Disc Coef: 0.600  
  
Span(in): 48.00 Invert(ft): 3.250  
Rise(in): 12.00 Control Elev(ft): 3.250

TABLE

\*\*\* Weir 2 of 2 for Drop Structure DS 02 \*\*\*

Count: 1 Bottom Clip(in): 0.000  
Type: Horizontal Top Clip(in): 0.000  
Flow: Positive Weir Disc Coef: 3.200  
Geometry: Rectangular Orifice Disc Coef: 0.600  
  
Span(in): 48.00 Invert(ft): 3.500  
Rise(in): 48.00 Control Elev(ft): 3.500

TABLE

=====

==== Weirs =====

=====

Name: Road 05 From Node: NODE 05  
Group: BASE To Node: NODE 05A  
Flow: Both Count: 1  
Type: Vertical: Paved Geometry: Trapezoidal  
  
Bottom Width(ft): 100.00  
Left Side Slope(h/v): 20.00  
Right Side Slope(h/v): 20.00  
Invert(ft): 11.000  
Control Elevation(ft): 11.000  
Struct Opening Dim(ft): 9999.00  
  
Bottom Clip(ft): 0.000  
Top Clip(ft): 0.000  
Weir Discharge Coef: 2.500  
Orifice Discharge Coef: 0.600

TABLE

=====

==== Hydrology Simulations =====

=====

Name: 002  
Filename: N:\17091\DSGN\PRE DEVELOPMENT\ICPR\002.R32  
  
Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Scsiii  
Rainfall Amount(in): 4.60

Time(hrs)	Print Inc(min)
12.000	30.00
15.000	15.00
24.000	30.00
360.000	30.00

Name: 010  
Filename: N:\17091\DSGN\PRE DEVELOPMENT\ICPR\010.R32  
  
Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Scsiii  
Rainfall Amount(in): 6.80

Time(hrs)	Print Inc(min)
12.000	30.00
15.000	15.00
24.000	30.00
360.000	30.00

Name: 025  
Filename: N:\17091\DSGN\PRE DEVELOPMENT\ICPR\025.R32  
  
Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Scsiii  
Rainfall Amount(in): 7.60

Time(hrs)	Print Inc(min)
12.000	30.00

15.000 15.00  
 24.000 30.00  
 360.000 30.00

Name: 050  
 Filename: N:\17091\DSGN\PRE DEVELOPMENT\ICPR\050.R32

Override Defaults: Yes  
 Storm Duration(hrs): 24.00  
 Rainfall File: Scsiii  
 Rainfall Amount(in): 8.80

Time(hrs)	Print	Inc(min)
12.000	30.00	
15.000	15.00	
24.000	30.00	
360.000	30.00	

Name: 100  
 Filename: N:\17091\DSGN\PRE DEVELOPMENT\ICPR\100.R32

Override Defaults: Yes  
 Storm Duration(hrs): 24.00  
 Rainfall File: Scsiii  
 Rainfall Amount(in): 10.00

Time(hrs)	Print	Inc(min)
12.000	30.00	
15.000	15.00	
24.000	30.00	
360.000	30.00	

==== Routing Simulations =====

Name: 002 Hydrology Sim: 002  
 Filename: N:\17091\DSGN\PRE DEVELOPMENT\ICPR\002.I32

Execute: Yes Restart: No Patch: No  
 Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500  
 Time Step Optimizer: 10.000  
 Start Time(hrs): 0.000 End Time(hrs): 360.00  
 Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000  
 Boundary Stages: Boundary Flows:

Time(hrs)	Print	Inc(min)
12.000	30.000	
15.000	15.000	
24.000	30.000	
360.000	30.000	

Group	Run
BASE	Yes

Name: 010 Hydrology Sim: 010  
 Filename: N:\17091\DSGN\PRE DEVELOPMENT\ICPR\010.I32

Execute: Yes Restart: No Patch: No  
 Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500  
 Time Step Optimizer: 10.000  
 Start Time(hrs): 0.000 End Time(hrs): 360.00  
 Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000  
 Boundary Stages: Boundary Flows:

Time(hrs)	Print	Inc(min)
12.000	30.000	
15.000	15.000	
24.000	30.000	
360.000	30.000	

Group	Run
BASE	Yes

-----  
Name: 025                      Hydrology Sim: 025  
Filename: N:\17091\DSGN\PRE DEVELOPMENT\ICPR\025.I32

Execute: Yes                  Restart: No                  Patch: No  
Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 360.00  
Min Calc Time(sec): 0.5000                  Max Calc Time(sec): 60.0000  
Boundary Stages:                      Boundary Flows:

Time(hrs)	Print Inc(min)
12.000	30.000
15.000	15.000
24.000	30.000
360.000	30.000

Group	Run
-----	-----
BASE	Yes

-----  
Name: 050                      Hydrology Sim: 050  
Filename: N:\17091\DSGN\PRE DEVELOPMENT\ICPR\050.I32

Execute: Yes                  Restart: No                  Patch: No  
Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 360.00  
Min Calc Time(sec): 0.5000                  Max Calc Time(sec): 60.0000  
Boundary Stages:                      Boundary Flows:

Time(hrs)	Print Inc(min)
12.000	30.000
15.000	15.000
24.000	30.000
360.000	30.000

Group	Run
-----	-----
BASE	Yes

-----  
Name: 100                      Hydrology Sim: 100  
Filename: N:\17091\DSGN\PRE DEVELOPMENT\ICPR\100.I32

Execute: Yes                  Restart: No                  Patch: No  
Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 360.00  
Min Calc Time(sec): 0.5000                  Max Calc Time(sec): 60.0000  
Boundary Stages:                      Boundary Flows:

Time(hrs)	Print Inc(min)
12.000	30.000
15.000	15.000
24.000	30.000
360.000	30.000

Group	Run
-----	-----
BASE	Yes

KIAWAH RIVER PLANTATION  
DRAINAGE BASIN STUDY

**Appendix B**

PRE-DEVELOPMENT CONDITIONS  
ICPR MODEL OUTPUT – NODE MIN/MAX REPORT

PREPARED BY  
THOMAS & HUTTON ENGINEERING CO.



Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
BOUNDARY	BASE	002	0.00	3.00	4.00	-0.0083	1633	13.25	292.83	0.00	0.00
BOUNDARY	BASE	010	0.00	3.00	4.00	-0.0083	1633	13.25	563.43	0.00	0.00
BOUNDARY	BASE	025	0.00	3.00	4.00	-0.0083	1633	13.25	668.51	0.00	0.00
BOUNDARY	BASE	050	0.00	3.00	4.00	-0.0083	1633	13.25	829.11	0.00	0.00
BOUNDARY	BASE	100	0.00	3.00	4.00	-0.0083	1633	13.25	992.09	0.00	0.00
NODE 01	BASE	002	23.30	12.19	15.00	0.0025	734614	13.75	46.13	23.30	7.30
NODE 01	BASE	010	22.37	12.83	15.00	0.0029	1162674	13.75	90.08	22.37	14.88
NODE 01	BASE	025	22.27	13.03	15.00	0.0035	1328674	13.75	106.96	22.27	17.44
NODE 01	BASE	050	22.22	13.28	15.00	0.0031	1553801	13.75	132.77	22.22	21.10
NODE 01	BASE	100	22.25	13.52	15.00	0.0031	1758437	13.75	159.01	22.25	24.50
NODE 01A	BASE	002	23.19	11.27	15.00	0.0017	9358	23.30	7.30	23.47	7.30
NODE 01A	BASE	010	22.16	11.69	15.00	0.0024	10596	22.37	14.88	22.51	14.89
NODE 01A	BASE	025	22.09	11.80	15.00	0.0026	10963	22.27	17.44	22.40	17.45
NODE 01A	BASE	050	22.15	11.96	15.00	0.0025	11472	22.22	21.10	22.35	21.11
NODE 01A	BASE	100	22.36	12.09	15.00	0.0023	11935	22.25	24.50	22.36	24.50
NODE 02	BASE	002	30.15	13.19	15.00	0.0037	4226511	16.50	128.37	30.15	23.70
NODE 02	BASE	010	31.22	13.83	15.00	0.0030	6685846	16.00	244.68	31.22	34.64
NODE 02	BASE	025	31.47	14.02	15.00	0.0034	7431767	16.00	289.60	31.47	38.53
NODE 02	BASE	050	31.80	14.29	15.00	0.0030	8458518	16.00	358.36	31.80	44.12
NODE 02	BASE	100	32.08	14.53	15.00	0.0031	9399850	16.00	428.23	32.08	49.39
NODE 02A	BASE	002	28.39	12.02	15.00	0.0022	12233	30.15	23.70	30.32	23.72
NODE 02A	BASE	010	30.52	12.18	15.00	0.0018	13457	31.22	34.64	31.32	34.65
NODE 02A	BASE	025	31.14	12.25	15.00	0.0018	13941	31.47	38.53	31.59	38.54
NODE 02A	BASE	050	31.77	12.36	15.00	0.0016	14645	31.80	44.12	31.97	44.12
NODE 02A	BASE	100	31.76	12.47	15.00	0.0016	15316	32.08	49.39	32.16	49.39
NODE 03	BASE	002	28.37	12.92	15.00	0.0031	2321451	16.50	68.54	28.37	19.55
NODE 03	BASE	010	29.84	13.43	15.00	0.0031	4608029	16.50	130.74	29.84	27.44
NODE 03	BASE	025	30.25	13.58	15.00	0.0028	5284156	16.50	154.60	30.25	29.85
NODE 03	BASE	050	30.73	13.77	15.00	0.0029	6191499	16.50	191.08	30.73	33.54
NODE 03	BASE	100	31.11	13.95	15.00	0.0030	7008844	16.50	228.16	31.11	37.04
NODE 03A	BASE	002	26.35	11.84	15.00	0.0024	12665	28.37	19.55	28.52	19.58
NODE 03A	BASE	010	29.26	11.99	15.00	0.0020	13963	29.84	27.44	29.96	27.45
NODE 03A	BASE	025	29.70	12.04	15.00	0.0016	14419	30.25	29.85	30.37	29.85
NODE 03A	BASE	050	30.62	12.13	15.00	0.0017	15131	30.73	33.54	30.83	33.54
NODE 03A	BASE	100	31.36	12.22	15.00	0.0017	15821	31.11	37.04	31.23	37.04
NODE 04	BASE	002	27.47	5.97	8.00	0.0011	3060454	14.50	115.36	27.45	9.27
NODE 04	BASE	010	26.31	6.68	8.00	0.0023	3525304	14.25	242.20	26.06	27.04
NODE 04	BASE	025	26.04	6.93	8.00	0.0025	3685926	14.25	292.65	25.75	34.96
NODE 04	BASE	050	25.72	7.28	8.00	0.0027	3918130	14.25	370.80	25.33	47.80
NODE 04	BASE	100	25.43	7.62	8.00	0.0030	4141134	14.25	451.07	24.93	61.54
NODE 04A	BASE	002	31.02	5.76	8.00	0.0011	15977	27.45	9.27	27.62	9.24
NODE 04A	BASE	010	28.02	6.40	8.00	0.0019	18879	26.06	27.04	26.16	26.99
NODE 04A	BASE	025	27.62	6.61	8.00	-0.0050	19853	25.75	34.96	25.85	34.89
NODE 04A	BASE	050	27.28	6.92	8.00	0.0050	21263	25.33	47.80	25.43	47.71
NODE 04A	BASE	100	27.11	7.21	8.00	-0.0050	22615	24.93	61.54	25.01	61.42
NODE 05	BASE	002	19.19	10.43	11.00	0.0050	689629	13.50	67.51	19.19	15.96
NODE 05	BASE	010	18.46	11.15	11.00	0.0050	1111338	13.25	125.50	18.46	32.91
NODE 05	BASE	025	17.51	11.25	11.00	0.0050	1167932	13.25	147.74	17.51	49.34
NODE 05	BASE	050	16.61	11.37	11.00	0.0050	1236778	13.25	181.54	16.61	74.04
NODE 05	BASE	100	16.06	11.47	11.00	0.0050	1297082	13.25	215.68	16.06	100.22
NODE 05A	BASE	002	15.56	8.13	11.00	0.0023	15977	19.19	15.96	18.45	16.08
NODE 05A	BASE	010	18.52	8.55	11.00	0.0031	18761	18.46	32.91	18.64	32.95
NODE 05A	BASE	025	17.54	9.06	11.00	-0.0037	20897	17.51	49.34	17.68	49.43
NODE 05A	BASE	050	16.65	9.61	11.00	0.0050	23226	16.61	74.04	16.75	74.09

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
NODE 05A	BASE	100	16.11	10.06	11.00	0.0050	25160	16.06	100.22	16.18	100.23
NODE 06	BASE	002	16.35	6.08	7.00	0.0018	124078	15.09	20.56	16.35	19.36
NODE 06	BASE	010	15.48	6.57	7.00	0.0029	183041	14.11	46.59	15.48	43.19
NODE 06	BASE	025	15.32	6.72	7.00	0.0041	201122	13.88	57.39	15.32	52.89
NODE 06	BASE	050	15.13	6.92	7.00	0.0046	225804	13.70	74.35	15.13	68.14
NODE 06	BASE	100	14.99	7.11	7.00	0.0039	239820	13.64	92.06	14.99	84.25
NODE 07	BASE	002	16.38	6.10	7.00	0.0021	197410	13.00	20.13	17.22	6.95
NODE 07	BASE	010	15.50	6.59	7.00	0.0032	240174	13.00	38.07	15.89	15.36
NODE 07	BASE	025	15.34	6.74	7.00	0.0044	253269	13.00	44.86	15.59	18.80
NODE 07	BASE	050	15.15	6.94	7.00	0.0047	271137	13.00	55.16	15.36	24.22
NODE 07	BASE	100	15.00	7.13	7.00	0.0039	287495	13.00	65.57	15.20	29.90
NODE 08	BASE	002	16.25	6.19	7.00	0.0021	500518	13.00	65.39	16.25	17.72
NODE 08	BASE	010	15.51	6.68	7.00	0.0032	683064	13.00	118.54	15.51	37.97
NODE 08	BASE	025	15.36	6.83	7.00	0.0044	739002	13.00	138.19	15.36	46.14
NODE 08	BASE	050	15.19	7.04	7.00	0.0046	807197	13.00	168.05	15.19	58.94
NODE 08	BASE	100	15.04	7.23	7.00	0.0037	838437	13.00	198.21	15.04	72.54
POND 01	BASE	002	52.22	5.60	6.00	0.0018	18067499	12.25	841.27	52.22	35.13
POND 01	BASE	010	52.59	6.26	6.00	0.0034	24776099	12.25	1528.88	52.59	60.90
POND 01	BASE	025	50.94	6.46	6.00	0.0039	25766597	12.25	1798.05	50.94	71.09
POND 01	BASE	050	48.93	6.77	6.00	0.0049	27226670	12.25	2213.14	48.93	85.21
POND 01	BASE	100	47.22	7.07	6.00	0.0050	28641366	12.25	2638.11	47.22	99.19
POND 02	BASE	002	29.60	3.72	6.00	0.0013	290621	12.25	20.04	29.60	0.88
POND 02	BASE	010	24.96	3.99	6.00	0.0020	295083	12.25	30.08	24.96	2.46
POND 02	BASE	025	24.64	4.09	6.00	0.0022	296733	12.25	33.97	24.64	3.27
POND 02	BASE	050	24.53	4.23	6.00	0.0026	298987	12.25	40.08	24.53	4.58
POND 02	BASE	100	24.10	4.37	6.00	0.0029	301246	12.25	46.60	24.10	6.12
POND 03	BASE	002	26.57	3.75	6.00	0.0013	344601	12.25	23.83	37.49	0.50
POND 03	BASE	010	24.46	4.05	6.00	0.0020	349352	12.25	35.83	33.07	1.10
POND 03	BASE	025	24.39	4.16	6.00	0.0022	351162	12.25	40.39	31.79	1.86
POND 03	BASE	050	23.57	4.32	6.00	0.0027	353698	12.25	47.38	29.82	1.92
POND 03	BASE	100	24.10	4.46	6.00	0.0030	355964	12.25	54.59	35.98	2.20
POND 04	BASE	002	24.14	3.79	6.00	0.0014	2579266	12.25	200.37	24.14	4.41
POND 04	BASE	010	23.86	4.09	6.00	0.0022	2588914	12.25	307.73	23.86	9.09
POND 04	BASE	025	23.67	4.20	6.00	0.0024	2592347	12.25	347.44	23.67	11.00
POND 04	BASE	050	23.62	4.37	6.00	0.0029	2597586	12.25	406.72	23.62	13.50
POND 04	BASE	100	23.51	4.53	6.00	0.0032	2602853	12.25	466.69	23.51	15.91
POND 05	BASE	002	14.71	4.11	6.00	0.0020	179985	12.75	26.85	14.71	8.46
POND 05	BASE	010	14.44	4.67	6.00	0.0035	188930	12.75	47.87	14.44	16.56
POND 05	BASE	025	14.40	4.88	6.00	0.0039	192291	12.75	55.74	14.40	19.81
POND 05	BASE	050	14.35	5.20	6.00	0.0050	197309	12.75	68.45	14.35	24.91
POND 05	BASE	100	14.31	5.52	6.00	0.0050	202281	12.75	81.44	14.31	30.22
POND 06	BASE	002	16.27	4.10	6.00	0.0017	377161	12.25	37.55	17.85	6.68
POND 06	BASE	010	15.94	4.65	6.00	0.0029	394722	12.25	62.28	17.57	12.67
POND 06	BASE	025	15.91	4.86	6.00	0.0033	401220	12.25	71.56	17.60	14.67
POND 06	BASE	050	15.91	5.17	6.00	0.0041	410962	12.25	85.65	17.64	17.52
POND 06	BASE	100	15.93	5.47	6.00	0.0043	420663	12.25	99.82	17.71	20.18
POND 07	BASE	002	14.86	4.46	6.00	0.0020	197696	12.75	28.37	14.86	5.65
POND 07	BASE	010	14.47	5.05	6.00	0.0035	205337	12.75	49.99	14.47	10.63
POND 07	BASE	025	14.41	5.26	6.00	0.0040	208115	12.75	57.80	14.41	12.21
POND 07	BASE	050	14.32	5.57	6.00	0.0049	212224	12.75	69.43	14.32	14.46
POND 07	BASE	100	14.26	5.88	6.00	0.0049	216249	12.75	80.85	14.26	16.55
POND 08	BASE	002	17.51	3.90	6.00	0.0014	811111	12.25	61.13	17.51	2.69
POND 08	BASE	010	16.82	4.11	6.00	0.0021	814746	12.25	92.90	16.82	5.41

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
POND 08	BASE	025	16.71	4.18	6.00	0.0023	816049	12.25	104.58	16.71	6.53
POND 08	BASE	050	16.58	4.30	6.00	0.0028	817978	12.25	122.00	16.58	8.33
POND 08	BASE	100	16.52	4.41	6.00	0.0031	819934	12.25	139.56	16.52	9.90

KIAWAH RIVER PLANTATION  
DRAINAGE BASIN STUDY

**Appendix C**

PRE-DEVELOPMENT CONDITIONS  
STORMWATER DESIGN CONSIDERATIONS

PREPARED BY  
THOMAS & HUTTON ENGINEERING CO.





# STORMWATER DESIGN CONSIDERATIONS

**PROJECT: 17091 KIAWAH RIVER PLANTATION**

**PREPARED BY:** Thomas and Hutton Engineering Company

**PREPARED FOR:**

**Job: J-17091**

Date: 5/18/09

Revised:

By: CGB

## DRAINAGE BASIN 1

## DRAINAGE BASIN 1

### Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

#### Calculate Time of Concentration:

Use Travel Time Concept:

##### Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Light Underbrush = 0.400

l = 100 ft

P2 = 4.60 in

S = 0.0010 ft/ft

t<sub>1</sub> = 59.4 min

##### Shallow Concentrated Flow:

t = 1/60v

where

l = 3900 ft

Paved ? No

Slope, S = 0.0020 ft/ft

v = 0.72 ft/s

t<sub>2</sub> = 90.1 min

**Basin 1: Tc = 149.0 min**

##### Channel Flow: t = 1/60v

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

l = 0 ft

S = 0.0000 ft/ft

n = Not maintained, dense brush, high stage = 0.1200

A = 0.00 sf

P = 0.00 ft => Hydraulic Radius, R = n/a

v = n/a

t<sub>3</sub> = n/a

##### Pipe Flow: t = 1/60v

l = 0 ft

v = 0.00 ft/s

t = 0.0 min

#### Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Woods: Good (no grazing or burning)	A	30	8.92	268
Resi: 1 acre (20% avg. imp.)	B	68	1.50	102
Commercial or Industrial (85% avg. imp.)	B	92	4.87	448
B/D Woods: Good (no grazing or burning)	D	77	117.50	9,048
			132.79	9,865

**Basin 1: Composite CN = 74**

## DRAINAGE BASIN 2

## DRAINAGE BASIN 2

### Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

#### Calculate Time of Concentration:

Use Travel Time Concept:

##### Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Dense Underbrush = 0.800

l = 100 ft

P2 = 4.60 in

S = 0.0020 ft/ft

t<sub>1</sub> = 78.3 min

##### Shallow Concentrated Flow:

t = 1/60v

where

l = 11000 ft

Paved ? No

Slope, S = 0.0020 ft/ft

v = 0.72 ft/s

t<sub>2</sub> = 254.1 min

**Basin 2: Tc = 332.0 min**

##### Channel Flow: t = 1/60v

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

l = 0 ft

S = 0.0000 ft/ft

n = Earth, fairly uniform, some weeds = 0.0280

A = 0.00 sf

P = 0.00 ft => Hydraulic Radius, R = n/a

v = n/a

t<sub>3</sub> = n/a

##### Pipe Flow: t = 1/60v

l = 0 ft

v = 0.00 ft/s

t = 0.0 min

#### Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1 acre (20% avg. imp.)	B	68	7.80	530
Woods: Good (no grazing or burning)	A	30	31.16	935
B/D Woods: Good (no grazing or burning)	D	77	601.06	46,282
			640.02	47,747

**Basin 2: Composite CN = 75**

## Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

## Calculate Time of Concentration:

Use Travel Time Concept:

## Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0020 \text{ ft/ft}$$

$$t_1 = 78.3 \text{ min}$$

## Shallow Concentrated Flow:

$$t = l/60v$$

where

$$l = 12000 \text{ ft}$$

Paved ? No

$$\text{Slope, } S = 0.0020 \text{ ft/ft}$$

$$v = 0.72 \text{ ft/s}$$

$$t_2 = 277.2 \text{ min}$$

$$\text{Basin 3: } T_c = 356.0 \text{ min}$$

Channel Flow:  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

Pipe Flow:  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

## Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1 acre (20% avg. imp.)	B	68	0.78	53
Crops (SR) Straight Row: Good	A	63	46.95	2,958
Woods: Good (no grazing or burning)	D	77	14.29	1,100
B/D Woods: Good (no grazing or burning)	D	77	297.65	22,919
			359.67	27,030

$$\text{Basin 3: Composite CN} = 75$$

## Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

## Calculate Time of Concentration:

Use Travel Time Concept:

## Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0020 \text{ ft/ft}$$

$$t_1 = 78.3 \text{ min}$$

## Shallow Concentrated Flow:

$$t = l/60v$$

where

$$l = 2800 \text{ ft}$$

Paved ? No

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 52.8 \text{ min}$$

$$\text{Basin 4: } T_c = 138.0 \text{ min}$$

Channel Flow:  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 1800 \text{ ft}$$

$$S = 0.0030 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 42.00 \text{ sf}$$

$$P = 23.97 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = 1.75 \text{ ft}$$

$$v = 4.22 \text{ ft/s}$$

$$t_3 = 7.1 \text{ min}$$

Pipe Flow:  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

## Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1 acre (20% avg. imp.)	B	68	20.31	1,381
Crops (SR) Straight Row: Good	B	75	52.01	3,901
B/D Woods: Good (no grazing or burning)	D	77	156.41	12,044
			228.73	17,325

$$\text{Basin 4: Composite CN} = 76$$

**Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Dense Underbrush = 0.800

l = 100 ft

P2 = 4.60 in

S = 0.0020 ft/ft

t<sub>1</sub> = 78.3 min**Shallow Concentrated Flow:**

t = 1/60v

where

l = 800 ft

Paved ? No

Slope, S = 0.0030 ft/ft

v = 0.88 ft/s

t<sub>2</sub> = 15.1 min**Basin 5: Tc = 98.0 min****Channel Flow:** t = 1/60v

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

l = 1300 ft

S = 0.0040 ft/ft

n = Earth, fairly uniform, some weeds = 0.0280

A = 42.00 sf

P = 23.97 ft =&gt; Hydraulic Radius, R = 1.75 ft

v = 4.88 ft/s

t<sub>3</sub> = 4.4 min**Pipe Flow:** t = 1/60v

l = 0 ft

v = 0.00 ft/s

t = 0.0 min

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1 acre (20% avg. imp.)	B	68	2.64	180
Crops (SR) Straight Row: Good	B	75	14.00	1,050
B/D Woods: Good (no grazing or burning)	D	77	32.41	2,496
			49.05	3,725

**Basin 5: Composite CN = 76****Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Light Underbrush = 0.400

l = 100 ft

P2 = 4.60 in

S = 0.0020 ft/ft

t<sub>1</sub> = 45.0 min**Shallow Concentrated Flow:**

t = 1/60v

where

l = 2300 ft

Paved ? No

Slope, S = 0.0020 ft/ft

v = 0.72 ft/s

t<sub>2</sub> = 53.1 min**Basin 6: Tc = 98.0 min****Channel Flow:** t = 1/60v

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

l = 0 ft

S = 0.0000 ft/ft

n = Earth, fairly uniform, some weeds = 0.0280

A = 0.00 sf

P = 0.00 ft =&gt; Hydraulic Radius, R = n/a

v = n/a

t<sub>3</sub> = n/a**Pipe Flow:** t = 1/60v

l = 0 ft

v = 0.00 ft/s

t = 0.0 min

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1 acre (20% avg. imp.)	B	68	9.16	623
Crops (SR) Straight Row: Good	C	83	5.96	495
B/D Woods: Good (no grazing or burning)	D	77	68.88	5,304
			84.00	6,421

**Basin 6: Composite CN = 76**

**Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Dense Underbrush = 0.800

l = 100 ft

P2 = 4.60 in

S = 0.0020 ft/ft

t<sub>1</sub> = 78.3 min**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

l = 1000 ft

Paved ? No

Slope, S = 0.0020 ft/ft

v = 0.72 ft/s

t<sub>2</sub> = 23.1 min**Basin 7: Tc = 101.0 min****Channel Flow:** t = l/60v

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

l = 0 ft

S = 0.0000 ft/ft

n = Earth, fairly uniform, some weeds = 0.0280

A = 0.00 sf

P = 0.00 ft =&gt; Hydraulic Radius, R = n/a

v = n/a

t<sub>3</sub> = n/a**Pipe Flow:** t = l/60v

l = 0 ft

v = 0.00 ft/s

t = 0.0 min

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Woods: Good (no grazing or burning)	A	30	2.85	86
Crops (SR) Straight Row: Good	B	75	36.14	2,711
B/D Woods: Good (no grazing or burning)	D	77	65.94	5,077
			104.93	7,873

**Basin 7: Composite CN = 75****Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Dense Underbrush = 0.800

l = 100 ft

P2 = 4.60 in

S = 0.0020 ft/ft

t<sub>1</sub> = 78.3 min**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

l = 1425 ft

Paved ? No

Slope, S = 0.0020 ft/ft

v = 0.72 ft/s

t<sub>2</sub> = 32.9 min**Basin 8: Tc = 188.0 min****Channel Flow:** t = l/60v

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

l = 3700 ft

S = 0.0020 ft/ft

n = Not maintained, dense brush, high stage = 0.1200

A = 42.00 sf

P = 23.97 ft =&gt; Hydraulic Radius, R = 1.75 ft

v = 0.80 ft/s

t<sub>3</sub> = 76.6 min**Pipe Flow:** t = l/60v

l = 0 ft

v = 0.00 ft/s

t = 0.0 min

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Woods: Good (no grazing or burning)	B	55	58.28	3,205
Crops (SR) Straight Row: Good	B	75	153.10	11,483
Woods: Good (no grazing or burning)	A	30	54.23	1,627
B/D Woods: Good (no grazing or burning)	D	77	232.74	17,921
			498.35	34,236

**Basin 8: Composite CN = 69**



**Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0030 \text{ ft/ft}$$

$$t_1 = 66.6 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 6000 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 113.2 \text{ min}$$

$$\text{Basin 9: } T_c = 180.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Woods: Good (no grazing or burning)	A	30	58.85	1,766
Resi: 1 acre (20% avg. imp.)	B	68	16.83	1,144
Crops (SR) Straight Row: Good	B	75	27.90	2,093
Woods: Good (no grazing or burning)	C	70	9.59	671
B/D Woods: Good (no grazing or burning)	D	77	386.68	29,774
Woods: Good (no grazing or burning)	D	77	162.74	12,531
			662.59	47,979

$$\text{Basin 9: Composite CN} = 72$$

**Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0030 \text{ ft/ft}$$

$$t_1 = 66.6 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 600 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 11.3 \text{ min}$$

$$\text{Basin 9A: } T_c = 78.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
B/D Woods: Good (no grazing or burning)	D	77	18.54	1,428
-	-	-	0.00	-
			18.54	1,428

$$\text{Basin 9A: Composite CN} = 77$$

**Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Light Underbrush} = 0.400$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0030 \text{ ft/ft}$$

$$t_1 = 38.3 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 2500 \text{ ft}$$

$$\text{Paved? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 40.8 \text{ min}$$

$$\text{Basin : } T_c = 79.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Woods: Good (no grazing or burning)	D	77	24.76	1,907
Resi: 1 acre (20% avg. imp.)	B	68	7.31	497
Crops (SR) Straight Row: Good	B	75	63.96	4,797
B/D Woods: Good (no grazing or burning)	D	77	60.77	4,679
			156.80	11,880

$$\text{Basin : Composite CN} = 76$$

**Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Light Underbrush} = 0.400$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0030 \text{ ft/ft}$$

$$t_1 = 38.3 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 4300 \text{ ft}$$

$$\text{Paved? No}$$

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 81.1 \text{ min}$$

$$\text{Basin 11: } T_c = 119.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
B/D Woods: Good (no grazing or burning)	D	77	121.85	9,382
Crops (SR) Straight Row: Good	B	75	18.82	1,412
Woods/grass combination: Good	D	79	4.46	352
			145.13	11,146

$$\text{Basin 11: Composite CN} = 77$$

**Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Light Underbrush = 0.400

l = 100 ft

P2 = 4.60 in

S = 0.0020 ft/ft

t<sub>1</sub> = 45.0 min**Shallow Concentrated Flow:**

t = l/60v

where

l = 2450 ft

Paved ? No

Slope, S = 0.0040 ft/ft

v = 1.02 ft/s

t<sub>2</sub> = 40.0 min**Basin 12: Tc = 85.0 min****Channel Flow:** t = l/60v

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

l = 0 ft

S = 0.0000 ft/ft

n = Earth, fairly uniform, some weeds = 0.0280

A = 0.00 sf

P = 0.00 ft =&gt; Hydraulic Radius, R = n/a

v = n/a

t<sub>3</sub> = n/a**Pipe Flow:** t = l/60v

l = 0 ft

v = 0.00 ft/s

t = 0.0 min

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 2 acre (12% avg. imp.)	B	65	2.39	155
Crops (SR) Straight Row: Good	B	75	17.53	1,315
B/D Woods/grass combination: Good	D	79	59.62	4,710
			79.54	6,180

**Basin 12: Composite CN = 78****Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Light Underbrush = 0.400

l = 100 ft

P2 = 4.60 in

S = 0.0030 ft/ft

t<sub>1</sub> = 38.3 min**Shallow Concentrated Flow:**

t = l/60v

where

l = 3500 ft

Paved ? No

Slope, S = 0.0030 ft/ft

v = 0.88 ft/s

t<sub>2</sub> = 66.0 min**Basin 13: Tc = 118.0 min****Channel Flow:** t = l/60v

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

l = 3600 ft

S = 0.0030 ft/ft

n = Earth, fairly uniform, some weeds = 0.0280

A = 42.00 sf

P = 23.97 ft =&gt; Hydraulic Radius, R = 1.75 ft

v = 4.22 ft/s

t<sub>3</sub> = 14.2 min**Pipe Flow:** t = l/60v

l = 0 ft

v = 0.00 ft/s

t = 0.0 min

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Crops (SR) Straight Row: Good	B	75	17.53	1,315
Woods: Good (no grazing or burning)	C	70	6.59	461
Woods: Good (no grazing or burning)	D	77	25.03	1,927
B/D Woods/grass combination: Good	D	79	197.92	15,636
			247.07	19,339

**Basin 13: Composite CN = 78**

**Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Light Underbrush} = 0.400$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0030 \text{ ft/ft}$$

$$t_1 = 38.3 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 2400 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 45.3 \text{ min}$$

$$\text{Basin 14: } T_c = 88.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 1100 \text{ ft}$$

$$S = 0.0030 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 42.00 \text{ sf}$$

$$P = 23.97 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = 1.75 \text{ ft}$$

$$v = 4.22 \text{ ft/s}$$

$$t_3 = 4.3 \text{ min}$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1 acre (20% avg. imp.)	B	68	2.46	167
Crops (SR) Straight Row: Good	B	75	38.82	2,912
Woods: Good (no grazing or burning)	A	30	2.33	70
B/D Woods/grass combination: Good	D	79	97.91	7,735
			141.52	10,884

$$\text{Basin 14: Composite CN} = 77$$

**Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0030 \text{ ft/ft}$$

$$t_1 = 66.6 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 800 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 15.1 \text{ min}$$

$$\text{Basin 15: } T_c = 89.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 1800 \text{ ft}$$

$$S = 0.0030 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 42.00 \text{ sf}$$

$$P = 23.97 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = 1.75 \text{ ft}$$

$$v = 4.22 \text{ ft/s}$$

$$t_3 = 7.1 \text{ min}$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Crops (SR) Straight Row: Good	B	75	15.49	1,162
B/D Woods: Good (no grazing or burning)	D	77	23.01	1,772
			38.50	2,934

$$\text{Basin 15: Composite CN} = 76$$



Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Dense Underbrush = 0.800

l = 100 ft

P2 = 4.60 in

S = 0.0030 ft/ft

t<sub>1</sub> = 66.6 min**Shallow Concentrated Flow:**

t = 1/60v

where

l = 750 ft

Paved ? No

Slope, S = 0.0040 ft/ft

v = 1.02 ft/s

t<sub>2</sub> = 12.2 min**Basin 16: Tc = 86.0 min****Channel Flow:** t = l/60v

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

l = 1700 ft

S = 0.0030 ft/ft

n = Earth, fairly uniform, some weeds = 0.0280

A = 42.00 sf

P = 23.97 ft =&gt; Hydraulic Radius, R = 1.75 ft

v = 4.22 ft/s

t<sub>3</sub> = 6.7 min**Pipe Flow:** t = l/60v

l = 0 ft

v = 0.00 ft/s

t = 0.0 min

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Crops (SR) Straight Row: Good	B	75	9.90	743
B/D Woods: Good (no grazing or burning)	D	77	25.79	1,986
			35.69	2,728

**Basin 16: Composite CN = 76**Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Dense Underbrush = 0.800

l = 100 ft

P2 = 4.60 in

S = 0.0020 ft/ft

t<sub>1</sub> = 78.3 min**Shallow Concentrated Flow:**

t = 1/60v

where

l = 100 ft

Paved ? No

Slope, S = 0.0030 ft/ft

v = 0.88 ft/s

t<sub>2</sub> = 1.9 min**Basin 17: Tc = 92.0 min****Channel Flow:** t = l/60v

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

l = 2400 ft

S = 0.0020 ft/ft

n = Earth, fairly uniform, some weeds = 0.0280

A = 42.00 sf

P = 23.97 ft =&gt; Hydraulic Radius, R = 1.75 ft

v = 3.45 ft/s

t<sub>3</sub> = 11.6 min**Pipe Flow:** t = l/60v

l = 0 ft

v = 0.00 ft/s

t = 0.0 min

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
B/D Woods: Good (no grazing or burning)	D	77	13.49	1,039
Woods: Good (no grazing or burning)	D	77	18.47	1,422
			31.96	2,461

**Basin 17: Composite CN = 77**

Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0030 \text{ ft/ft}$$

$$t_1 = 66.6 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 100 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 18: } T_c = 68.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Woods: Good (no grazing or burning)	A	30	15.08	452
Woods: Good (no grazing or burning)	D	77	3.40	262
			18.48	714

$$\text{Basin 18: Composite CN} = 39$$

Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0030 \text{ ft/ft}$$

$$t_1 = 66.6 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 100 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 19: } T_c = 68.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
	Woods: Good (no grazing or burning)	A	30	5.96	179
B/D	Woods: Good (no grazing or burning)	D	77	1.28	99
	Woods: Good (no grazing or burning)	D	77	1.88	145
				9.12	422

$$\text{Basin 19: Composite CN} = 46$$

**Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0030 \text{ ft/ft}$$

$$t_1 = 66.6 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 100 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 20: } T_c = 68.0 \text{ min}$$

Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
B/D	Woods: Good (no grazing or burning)	D	77	24.82	1,911
	-	-	-	0.00	-
				24.82	1,911

$$\text{Basin 20: Composite CN} = 77$$

**Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Grass: Bermuda} = 0.410$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0050 \text{ ft/ft}$$

$$t_1 = 18.3 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 200 \text{ ft}$$

$$\text{Paved ? Yes}$$

$$\text{Slope, } S = 0.0050 \text{ ft/ft}$$

$$v = 1.44 \text{ ft/s}$$

$$t_2 = 2.3 \text{ min}$$

$$\text{Basin 21: } T_c = 24.0 \text{ min}$$

Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
	Resi: 1/3 acre (30% avg. imp.)	B	72	121.07	8,717
	Open Space, Good (grass > 75%)	B	61	155.23	9,469
	Open Space, Good (grass > 75%)	A	39	26.29	1,025
	Open Space, Good (grass > 75%)	D	80	12.93	1,034
				315.52	20,246

$$\text{Basin 21: Composite CN} = 64$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

**Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Dense Underbrush = 0.800

l = 100 ft

P2 = 4.60 in

S = 0.0020 ft/ft

t<sub>1</sub> = 78.3 min**Shallow Concentrated Flow:**

t = l/60v

where

l = 100 ft

Paved ? No

Slope, S = 0.0030 ft/ft

v = 0.88 ft/s

t<sub>2</sub> = 1.9 min**Basin 22: Tc = 80.0 min****Channel Flow:** t = l/60v

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

l = 0 ft

S = 0.0000 ft/ft

n = Earth, fairly uniform, some weeds = 0.0280

A = 0.00 sf

P = 0.00 ft =&gt; Hydraulic Radius, R = n/a

v = n/a

t<sub>3</sub> = n/a**Pipe Flow:** t = l/60v

l = 0 ft

v = 0.00 ft/s

t = 0.0 min

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Woods: Good (no grazing or burning)	D	77	11.37	875
Crops (SR) Straight Row: Good	B	75	23.41	1,756
B/D Woods: Good (no grazing or burning)	D	77	38.48	2,963
			73.26	5,594

**Basin 22: Composite CN = 76****Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Dense Underbrush = 0.800

l = 100 ft

P2 = 4.60 in

S = 0.0030 ft/ft

t<sub>1</sub> = 66.6 min**Shallow Concentrated Flow:**

t = l/60v

where

l = 100 ft

Paved ? No

Slope, S = 0.0030 ft/ft

v = 0.88 ft/s

t<sub>2</sub> = 1.9 min**Basin 23: Tc = 68.0 min****Channel Flow:** t = l/60v

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

l = 0 ft

S = 0.0000 ft/ft

n = Earth, fairly uniform, some weeds = 0.0280

A = 0.00 sf

P = 0.00 ft =&gt; Hydraulic Radius, R = n/a

v = n/a

t<sub>3</sub> = n/a**Pipe Flow:** t = l/60v

l = 0 ft

v = 0.00 ft/s

t = 0.0 min

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
B/D Woods: Good (no grazing or burning)	D	77	37.61	2,896
Woods: Good (no grazing or burning)	D	77	4.52	348
			42.13	3,244

**Basin 23: Composite CN = 77**



**Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0030 \text{ ft/ft}$$

$$t_1 = 66.6 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 100 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 1.6 \text{ min}$$

$$\text{Basin 24: } T_c = 68.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
B/D	Woods: Good (no grazing or burning)	D	77	11.49	885
	Woods: Good (no grazing or burning)	D	77	0.00	0
				11.49	885

$$\text{Basin 24: Composite CN} = 77$$

**Calculate Pre-Development "Tc" and Composite "CN"****"PRE"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 59.4 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 100 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 1.6 \text{ min}$$

$$\text{Basin 25: } T_c = 61.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
B/D	Woods: Good (no grazing or burning)	D	77	21.66	1,668
	Woods: Good (no grazing or burning)	D	77	14.74	1,135
				36.40	2,803

$$\text{Basin 25: Composite CN} = 77$$

Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 59.4 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 300 \text{ ft}$$

Paved ? No

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 4.9 \text{ min}$$

$$\text{Basin 26: } T_c = 64.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
B/D	Woods: Good (no grazing or burning)	D	77	20.80	1,602
	Woods: Good (no grazing or burning)	D	77	9.54	735
				30.34	2,336

$$\text{Basin 26: Composite CN} = 77$$

Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 59.4 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 350 \text{ ft}$$

Paved ? No

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 5.7 \text{ min}$$

$$\text{Basin 27: } T_c = 65.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
B/D	Woods: Good (no grazing or burning)	D	77	12.27	945
	-	-	-	0.00	-
				12.27	945

$$\text{Basin 27: Composite CN} = 77$$

Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 59.4 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 100 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 1.6 \text{ min}$$

$$\text{Basin 28: } T_c = 61.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
B/D	Woods: Good (no grazing or burning)	D	77	18.65	1,436
	-	-	-	0.00	-
				18.65	1,436

$$\text{Basin 28: Composite CN} = 77$$

Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 59.4 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 100 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 1.6 \text{ min}$$

$$\text{Basin 29: } T_c = 61.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
B/D	Woods: Good (no grazing or burning)	D	77	20.68	1,592
	Woods: Good (no grazing or burning)	D	77	12.42	956
				33.10	2,549

$$\text{Basin 29: Composite CN} = 77$$

Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Dense Underbrush = 0.800

l = 0 ft

P2 = 4.60 in

S = 0.0010 ft/ft

t<sub>1</sub> = 0.0 min**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

l = 0 ft

Paved ? No

Slope, S = 0.0040 ft/ft

v = 1.02 ft/s

t<sub>2</sub> = 0.0 min**Basin Pond 1: Tc = 0.0 min****Channel Flow:** t=l/60v

where: t=Travel time for Pipe Flow (min)

l=Length of flow (ft)

S=Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A=Cross-Sectional Area (ft<sup>2</sup>)

P=Wetted Perimeter (ft)

R=Hydraulic Radius (ft)

v=Velocity (ft/s)- From TR-55

l = 0 ft

S = 0.0000 ft/ft

n = Earth, fairly uniform, some weeds = 0.0280

A = 0.00 sf

P = 0.00 ft =&gt; Hydraulic Radius, R = n/a

v = n/a

t<sub>3</sub> = n/a**Pipe Flow:** t=l/60v

l= 0 ft

v= 0.00 ft/s

t= 0.0 min

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	172.13	16,869
-	-	-	0.00	-
			172.13	16,869

**Basin Pond 1: Composite CN = 98**Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Dense Underbrush = 0.800

l = 0 ft

P2 = 4.60 in

S = 0.0010 ft/ft

t<sub>1</sub> = 0.0 min**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

l = 0 ft

Paved ? No

Slope, S = 0.0040 ft/ft

v = 1.02 ft/s

t<sub>2</sub> = 0.0 min**Basin Pond 2: Tc = 0.0 min****Channel Flow:** t=l/60v

where: t=Travel time for Pipe Flow (min)

l=Length of flow (ft)

S=Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A=Cross-Sectional Area (ft<sup>2</sup>)

P=Wetted Perimeter (ft)

R=Hydraulic Radius (ft)

v=Velocity (ft/s)- From TR-55

l = 0 ft

S = 0.0000 ft/ft

n = Earth, fairly uniform, some weeds = 0.0280

A = 0.00 sf

P = 0.00 ft =&gt; Hydraulic Radius, R = n/a

v = n/a

t<sub>3</sub> = n/a**Pipe Flow:** t=l/60v

l= 0 ft

v= 0.00 ft/s

t= 0.0 min

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	6.49	636
-	-	-	0.00	-
			6.49	636

**Basin Pond 2: Composite CN = 98**



Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 0 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0010 \text{ ft/ft}$$

$$t_1 = 0.0 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 0 \text{ ft}$$

Paved ? No

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 0.0 \text{ min}$$

$$\text{Basin Pond 3: } T_c = 0.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	7.73	758
-	-	-	0.00	-
			7.73	758

$$\text{Basin Pond 3: Composite CN} = 98$$

Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 0 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0010 \text{ ft/ft}$$

$$t_1 = 0.0 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 0 \text{ ft}$$

Paved ? No

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 0.0 \text{ min}$$

$$\text{Basin Pond 4: } T_c = 0.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	58.82	5,764
-	-	-	0.00	-
			58.82	5,764

$$\text{Basin Pond 4: Composite CN} = 98$$

Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 0 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0010 \text{ ft/ft}$$

$$t_1 = 0.0 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 0 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 0.0 \text{ min}$$

$$\text{Basin Pond 5: } T_c = 0.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	3.82	374
-	-	-	0.00	-
			3.82	374

$$\text{Basin Pond 5: Composite CN} = 98$$

Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 0 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0010 \text{ ft/ft}$$

$$t_1 = 0.0 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 0 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 0.0 \text{ min}$$

$$\text{Basin Pond 6: } T_c = 0.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	8.04	788
-	-	-	0.00	-
			8.04	788

$$\text{Basin Pond 6: Composite CN} = 98$$

Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 0 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0010 \text{ ft/ft}$$

$$t_1 = 0.0 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 0 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 0.0 \text{ min}$$

$$\text{Basin Pond 7: } T_c = 0.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	4.25	417
-	-	-	0.00	-
			4.25	417

$$\text{Basin Pond 7: Composite CN} = 98$$

Calculate Pre-Development "Tc" and Composite "CN"

"PRE"

Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 0 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0010 \text{ ft/ft}$$

$$t_1 = 0.0 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 0 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 0.0 \text{ min}$$

$$\text{Basin Pond 8: } T_c = 0.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	18.46	1,809
-	-	-	0.00	-
			18.46	1,809

$$\text{Basin Pond 8: Composite CN} = 98$$

KIAWAH RIVER PLANTATION  
DRAINAGE BASIN STUDY

**Appendix D**

POST-DEVELOPMENT (BUILD OUT)  
ICPR MODEL INPUT

PREPARED BY  
THOMAS & HUTTON ENGINEERING CO.



=====

Basins

=====

Name: BASIN 01	Node: NODE 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 149.00	
Area(ac): 132.790	Time Shift(hrs): 0.00	
Curve Number: 74.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

Name: BASIN 02	Node: NODE 02	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 332.00	
Area(ac): 640.020	Time Shift(hrs): 0.00	
Curve Number: 75.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

Name: BASIN 03	Node: NODE 03	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 356.00	
Area(ac): 359.670	Time Shift(hrs): 0.00	
Curve Number: 75.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

Name: BASIN 04	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 138.00	
Area(ac): 207.130	Time Shift(hrs): 0.00	
Curve Number: 76.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

Name: BASIN 04A	Node: FUTURE POND 04A	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 16.00	
Area(ac): 35.330	Time Shift(hrs): 0.00	
Curve Number: 66.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

Name: BASIN 05	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 98.00	
Area(ac): 49.050	Time Shift(hrs): 0.00	
Curve Number: 76.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

Name: BASIN 06	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 98.00	
Area(ac): 84.000	Time Shift(hrs): 0.00	

Curve Number: 76.00      Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

-----  
Name: BASIN 07      Node: POND 01      Status: Onsite  
Group: BASE      Type: SCS Unit Hydrograph CN  
  
Unit Hydrograph: Uh323      Peaking Factor: 323.0  
Rainfall File: Scsiii      Storm Duration(hrs): 24.00  
Rainfall Amount(in): 4.600      Time of Conc(min): 101.00  
Area(ac): 44.950      Time Shift(hrs): 0.00  
Curve Number: 76.00      Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

-----  
Name: BASIN 07A      Node: FUTURE POND 07A      Status: Onsite  
Group: BASE      Type: SCS Unit Hydrograph CN  
  
Unit Hydrograph: Uh323      Peaking Factor: 323.0  
Rainfall File: Scsiii      Storm Duration(hrs): 24.00  
Rainfall Amount(in): 4.600      Time of Conc(min): 42.00  
Area(ac): 97.400      Time Shift(hrs): 0.00  
Curve Number: 65.00      Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

-----  
Name: BASIN 07B      Node: POND 01      Status: Onsite  
Group: BASE      Type: SCS Unit Hydrograph CN  
  
Unit Hydrograph: Uh323      Peaking Factor: 323.0  
Rainfall File: Scsiii      Storm Duration(hrs): 24.00  
Rainfall Amount(in): 4.600      Time of Conc(min): 13.00  
Area(ac): 55.700      Time Shift(hrs): 0.00  
Curve Number: 72.00      Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

-----  
Name: BASIN 08      Node: NODE 04      Status: Onsite  
Group: BASE      Type: SCS Unit Hydrograph CN  
  
Unit Hydrograph: Uh323      Peaking Factor: 323.0  
Rainfall File: Scsiii      Storm Duration(hrs): 24.00  
Rainfall Amount(in): 4.600      Time of Conc(min): 129.00  
Area(ac): 498.350      Time Shift(hrs): 0.00  
Curve Number: 69.00      Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

-----  
Name: BASIN 09      Node: POND 01      Status: Onsite  
Group: BASE      Type: SCS Unit Hydrograph CN  
  
Unit Hydrograph: Uh323      Peaking Factor: 323.0  
Rainfall File: Scsiii      Storm Duration(hrs): 24.00  
Rainfall Amount(in): 4.600      Time of Conc(min): 180.00  
Area(ac): 491.770      Time Shift(hrs): 0.00  
Curve Number: 71.00      Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

-----  
Name: BASIN 09A      Node: FUTURE POND 09A      Status: Onsite  
Group: BASE      Type: SCS Unit Hydrograph CN  
  
Unit Hydrograph: Uh323      Peaking Factor: 323.0  
Rainfall File: Scsiii      Storm Duration(hrs): 24.00  
Rainfall Amount(in): 4.600      Time of Conc(min): 12.00  
Area(ac): 26.840      Time Shift(hrs): 0.00  
Curve Number: 85.00      Max Allowable Q(cfs): 999999.000  
DCIA(%): 0.00

-----  
Name: BASIN 09B      Node: POND 01      Status: Onsite  
Group: BASE      Type: SCS Unit Hydrograph CN  
  
Unit Hydrograph: Uh323      Peaking Factor: 323.0  
Rainfall File: Scsiii      Storm Duration(hrs): 24.00  
Rainfall Amount(in): 4.600      Time of Conc(min): 12.00

---

Area(ac): 18.540	Time Shift(hrs): 0.00
Curve Number: 72.00	Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00	

---

Name: BASIN 09C	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 17.00	
Area(ac): 73.240	Time Shift(hrs): 0.00	
Curve Number: 85.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 10	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 57.00	
Area(ac): 30.670	Time Shift(hrs): 0.00	
Curve Number: 75.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 10A	Node: FUTURE POND 10A	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 41.00	
Area(ac): 57.670	Time Shift(hrs): 0.00	
Curve Number: 62.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 11	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 114.00	
Area(ac): 133.990	Time Shift(hrs): 0.00	
Curve Number: 77.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 12	Node: FUTURE POND 12	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 15.00	
Area(ac): 41.900	Time Shift(hrs): 0.00	
Curve Number: 77.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 13	Node: BOUNDARY	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 113.00	
Area(ac): 160.710	Time Shift(hrs): 0.00	
Curve Number: 78.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 14	Node: FUTURE POND 14	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	

---

Rainfall Amount(in):	4.600	Time of Conc(min):	16.00
Area(ac):	41.150	Time Shift(hrs):	0.00
Curve Number:	60.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

---

Name: BASIN 15	Node: FUTURE POND 15	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 42.00	
Area(ac): 140.290	Time Shift(hrs): 0.00	
Curve Number: 68.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 15A	Node: FUTURE POND 15A	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 44.00	
Area(ac): 34.000	Time Shift(hrs): 0.00	
Curve Number: 64.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 16	Node: FUTURE POND 16	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 16.00	
Area(ac): 53.570	Time Shift(hrs): 0.00	
Curve Number: 75.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 17	Node: BOUNDARY	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 78.00	
Area(ac): 41.570	Time Shift(hrs): 0.00	
Curve Number: 77.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 18	Node: POND 02	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 16.00	
Area(ac): 26.170	Time Shift(hrs): 0.00	
Curve Number: 72.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 19	Node: POND 03	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 10.00	
Area(ac): 20.450	Time Shift(hrs): 0.00	
Curve Number: 72.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 20	Node: FUTURE POND 20	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	



---

Rainfall File: Scsiii	Storm Duration(hrs): 24.00
Rainfall Amount(in): 4.600	Time of Conc(min): 12.00
Area(ac): 14.590	Time Shift(hrs): 0.00
Curve Number: 76.00	Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00	

---

Name: BASIN 20A	Node: FUTURE POND 20A	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 13.00	
Area(ac): 29.540	Time Shift(hrs): 0.00	
Curve Number: 74.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 21	Node: POND 01	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 24.00	
Area(ac): 315.520	Time Shift(hrs): 0.00	
Curve Number: 64.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 22	Node: FUTURE POND 22	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 18.00	
Area(ac): 67.310	Time Shift(hrs): 0.00	
Curve Number: 84.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 23	Node: FUTURE POND 23	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 21.00	
Area(ac): 58.570	Time Shift(hrs): 0.00	
Curve Number: 86.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 23A	Node: POND 07	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 13.00	
Area(ac): 11.940	Time Shift(hrs): 0.00	
Curve Number: 85.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 24	Node: POND 05	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	
Unit Hydrograph: Uh323	Peaking Factor: 323.0	
Rainfall File: Scsiii	Storm Duration(hrs): 24.00	
Rainfall Amount(in): 4.600	Time of Conc(min): 10.00	
Area(ac): 23.350	Time Shift(hrs): 0.00	
Curve Number: 68.00	Max Allowable Q(cfs): 999999.000	
DCIA(%): 0.00		

---

Name: BASIN 25	Node: POND 06	Status: Onsite
Group: BASE	Type: SCS Unit Hydrograph CN	

---

Unit Hydrograph:	Uh323	Peaking Factor:	323.0
Rainfall File:	Scsiii	Storm Duration(hrs):	24.00
Rainfall Amount(in):	4.600	Time of Conc(min):	12.00
Area(ac):	16.050	Time Shift(hrs):	0.00
Curve Number:	72.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

---

Name:	BASIN 26	Node:	POND 08	Status:	Onsite
Group:	BASE	Type:	SCS Unit Hydrograph CN		

Unit Hydrograph:	Uh323	Peaking Factor:	323.0
Rainfall File:	Scsiii	Storm Duration(hrs):	24.00
Rainfall Amount(in):	4.600	Time of Conc(min):	10.00
Area(ac):	24.010	Time Shift(hrs):	0.00
Curve Number:	70.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

---

Name:	BASIN 27	Node:	POND 06	Status:	Onsite
Group:	BASE	Type:	SCS Unit Hydrograph CN		

Unit Hydrograph:	Uh323	Peaking Factor:	323.0
Rainfall File:	Scsiii	Storm Duration(hrs):	24.00
Rainfall Amount(in):	4.600	Time of Conc(min):	18.00
Area(ac):	31.590	Time Shift(hrs):	0.00
Curve Number:	72.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

---

Name:	BASIN 28	Node:	POND 04	Status:	Onsite
Group:	BASE	Type:	SCS Unit Hydrograph CN		

Unit Hydrograph:	Uh323	Peaking Factor:	323.0
Rainfall File:	Scsiii	Storm Duration(hrs):	24.00
Rainfall Amount(in):	4.600	Time of Conc(min):	17.00
Area(ac):	35.750	Time Shift(hrs):	0.00
Curve Number:	72.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

---

Name:	POND 01	Node:	POND 01	Status:	Onsite
Group:	BASE	Type:	SCS Unit Hydrograph CN		

Unit Hydrograph:	Uh323	Peaking Factor:	323.0
Rainfall File:	Scsiii	Storm Duration(hrs):	24.00
Rainfall Amount(in):	4.600	Time of Conc(min):	5.00
Area(ac):	223.050	Time Shift(hrs):	0.00
Curve Number:	93.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

---

Name:	POND 02	Node:	POND 02	Status:	Onsite
Group:	BASE	Type:	SCS Unit Hydrograph CN		

Unit Hydrograph:	Uh323	Peaking Factor:	323.0
Rainfall File:	Scsiii	Storm Duration(hrs):	24.00
Rainfall Amount(in):	4.600	Time of Conc(min):	5.00
Area(ac):	6.490	Time Shift(hrs):	0.00
Curve Number:	98.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

---

Name:	POND 03	Node:	POND 03	Status:	Onsite
Group:	BASE	Type:	SCS Unit Hydrograph CN		

Unit Hydrograph:	Uh323	Peaking Factor:	323.0
Rainfall File:	Scsiii	Storm Duration(hrs):	24.00
Rainfall Amount(in):	4.600	Time of Conc(min):	5.00
Area(ac):	7.730	Time Shift(hrs):	0.00
Curve Number:	98.00	Max Allowable Q(cfs):	999999.000
DCIA(%):	0.00		

---

Name:	POND 04	Node:	POND 04	Status:	Onsite
Group:	BASE	Type:	SCS Unit Hydrograph CN		

---

Unit Hydrograph: Uh323	Peaking Factor: 323.0
Rainfall File: Scsiii	Storm Duration(hrs): 24.00
Rainfall Amount(in): 4.600	Time of Conc(min): 5.00
Area(ac): 58.820	Time Shift(hrs): 0.00
Curve Number: 98.00	Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00	

-----  
Name: POND 05                      Node: POND 05                      Status: Onsite  
Group: BASE                      Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323	Peaking Factor: 323.0
Rainfall File: Scsiii	Storm Duration(hrs): 24.00
Rainfall Amount(in): 4.600	Time of Conc(min): 5.00
Area(ac): 3.820	Time Shift(hrs): 0.00
Curve Number: 98.00	Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00	

-----  
Name: POND 06                      Node: POND 06                      Status: Onsite  
Group: BASE                      Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323	Peaking Factor: 323.0
Rainfall File: Scsiii	Storm Duration(hrs): 24.00
Rainfall Amount(in): 4.600	Time of Conc(min): 5.00
Area(ac): 8.040	Time Shift(hrs): 0.00
Curve Number: 98.00	Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00	

-----  
Name: POND 07                      Node: POND 07                      Status: Onsite  
Group: BASE                      Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323	Peaking Factor: 323.0
Rainfall File: Scsiii	Storm Duration(hrs): 24.00
Rainfall Amount(in): 4.600	Time of Conc(min): 5.00
Area(ac): 4.250	Time Shift(hrs): 0.00
Curve Number: 98.00	Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00	

-----  
Name: POND 08                      Node: POND 08                      Status: Onsite  
Group: BASE                      Type: SCS Unit Hydrograph CN

Unit Hydrograph: Uh323	Peaking Factor: 323.0
Rainfall File: Scsiii	Storm Duration(hrs): 24.00
Rainfall Amount(in): 4.600	Time of Conc(min): 5.00
Area(ac): 18.460	Time Shift(hrs): 0.00
Curve Number: 98.00	Max Allowable Q(cfs): 999999.000
DCIA(%): 0.00	

=====  
Nodes =====  
=====

Name: BOUNDARY	Base Flow(cfs): 0.000	Init Stage(ft): 3.000
Group: BASE		Warn Stage(ft): 4.000
Type: Time/Stage		

Boundary stages determined by NOAA elevation information; the NAVD 88 elevations related to MLLW were computed from Bench Mark, Station I

Time(hrs)	Stage(ft)
0.00	3.000
1.00	2.500
2.00	2.000
3.00	1.500
4.00	1.000
5.00	0.500
6.00	0.000
7.00	0.500
8.00	1.000
9.00	1.500
10.00	2.000
11.00	2.500
12.00	3.000
13.00	2.500
14.00	2.000
15.00	1.500

16.00	1.000
17.00	0.500
18.00	0.000
19.00	0.500
20.00	1.000
21.00	1.500
22.00	2.000
23.00	2.500
24.00	3.000
25.00	2.500
26.00	2.000
27.00	1.500
28.00	1.000
29.00	0.500
30.00	0.000
31.00	0.500
32.00	1.000
33.00	1.500
34.00	2.000
35.00	2.500
36.00	3.000
37.00	2.500
38.00	2.000
39.00	1.500
40.00	1.000
41.00	0.500
42.00	0.000
43.00	0.500
44.00	1.000
45.00	1.500
46.00	2.000
47.00	2.500
48.00	3.000
49.00	2.500
50.00	2.000
51.00	1.500
52.00	1.000
53.00	0.500
54.00	0.000
55.00	0.500
56.00	1.000
57.00	1.500
58.00	2.000
59.00	2.500
60.00	3.000
61.00	2.500
62.00	2.000
63.00	1.500
64.00	1.000
65.00	0.500
66.00	0.000
67.00	0.500
68.00	1.000
69.00	1.500
70.00	2.000
71.00	2.500
72.00	3.000
73.00	2.500
74.00	2.000
75.00	1.500
76.00	1.000
77.00	0.500
78.00	0.000
79.00	0.500
80.00	1.000
81.00	1.500
82.00	2.000
83.00	2.500
84.00	3.000
85.00	2.500
86.00	2.000
87.00	1.500
88.00	1.000
89.00	0.500
90.00	0.000
91.00	0.500
92.00	1.000
93.00	1.500
94.00	2.000
95.00	2.500
96.00	3.000
97.00	2.500
98.00	2.000
99.00	1.500
100.00	1.000
101.00	0.500
102.00	0.000
103.00	0.500
104.00	1.000
105.00	1.500



106.00	2.000
107.00	2.500
108.00	3.000
109.00	2.500
110.00	2.000
111.00	1.500
112.00	1.000
113.00	0.500
114.00	0.000
115.00	0.500
116.00	1.000
117.00	1.500
118.00	2.000
119.00	2.500
120.00	3.000
121.00	2.500
122.00	2.000
123.00	1.500
124.00	1.000
125.00	0.500
126.00	0.000
127.00	0.500
128.00	1.000
129.00	1.500
130.00	2.000
131.00	2.500
132.00	3.000
133.00	2.500
134.00	2.000
135.00	1.500
136.00	1.000
137.00	0.500
138.00	0.000
139.00	0.500
140.00	1.000
141.00	1.500
142.00	2.000
143.00	2.500
144.00	3.000
145.00	2.500
146.00	2.000
147.00	1.500
148.00	1.000
149.00	0.500
150.00	0.000
151.00	0.500
152.00	1.000
153.00	1.500
154.00	2.000
155.00	2.500
156.00	3.000
157.00	2.500
158.00	2.000
159.00	1.500
160.00	1.000
161.00	0.500
162.00	0.000
163.00	0.500
164.00	1.000
165.00	1.500
166.00	2.000
167.00	2.500
168.00	3.000
169.00	2.500
170.00	2.000
171.00	1.500
172.00	1.000
173.00	0.500
174.00	0.000
175.00	0.500
176.00	1.000
177.00	1.500
178.00	2.000
179.00	2.500
180.00	3.000
181.00	2.500
182.00	2.000
183.00	1.500
184.00	1.000
185.00	0.500
186.00	0.000
187.00	0.500
188.00	1.000
189.00	1.500
190.00	2.000
191.00	2.500
192.00	3.000
193.00	2.500
194.00	2.000
195.00	1.500

196.00	1.000
197.00	0.500
198.00	0.000
199.00	0.500
200.00	1.000
201.00	1.500
202.00	2.000
203.00	2.500
204.00	3.000
205.00	2.500
206.00	2.000
207.00	1.500
208.00	1.000
209.00	0.500
210.00	0.000
211.00	0.500
212.00	1.000
213.00	1.500
214.00	2.000
215.00	2.500
216.00	3.000
217.00	2.500
218.00	2.000
219.00	1.500
220.00	1.000
221.00	0.500
222.00	0.000
223.00	0.500
224.00	1.000
225.00	1.500
226.00	2.000
227.00	2.500
228.00	3.000
229.00	2.500
230.00	2.000
231.00	1.500
232.00	1.000
233.00	0.500
234.00	0.000
235.00	0.500
236.00	1.000
237.00	1.500
238.00	2.000
239.00	2.500
240.00	3.000
241.00	2.500
242.00	2.000
243.00	1.500
244.00	1.000
245.00	0.500
246.00	0.000
247.00	0.500
248.00	1.000
249.00	1.500
250.00	2.000
251.00	2.500
252.00	3.000
253.00	2.500
254.00	2.000
255.00	1.500
256.00	1.000
257.00	0.500
258.00	0.000
259.00	0.500
260.00	1.000
261.00	1.500
262.00	2.000
263.00	2.500
264.00	3.000
265.00	2.500
266.00	2.000
267.00	1.500
268.00	1.000
269.00	0.500
270.00	0.000
271.00	0.500
272.00	1.000
273.00	1.500
274.00	2.000
275.00	2.500
276.00	3.000
277.00	2.500
278.00	2.000
279.00	1.500
280.00	1.000
281.00	0.500
282.00	0.000
283.00	0.500
284.00	1.000
285.00	1.500

286.00	2.000
287.00	2.500
288.00	3.000
289.00	2.500
290.00	2.000
291.00	1.500
292.00	1.000
293.00	0.500
294.00	0.000
295.00	0.500
296.00	1.000
297.00	1.500
298.00	2.000
299.00	2.500
300.00	3.000

```

-----
Name: FUTURE POND 04A      Base Flow(cfs): 0.000      Init Stage(ft): 5.000
Group: BASE                Warn Stage(ft): 7.000
Type: Stage/Area

```

Stage(ft)	Area(ac)
5.000	1.7800
6.000	1.8800
7.000	1.9800

```

-----
Name: FUTURE POND 07A      Base Flow(cfs): 0.000      Init Stage(ft): 5.000
Group: BASE                Warn Stage(ft): 7.000
Type: Stage/Area

```

Pond Acreage needed/added 6ac

Stage(ft)	Area(ac)
5.000	13.1900
6.000	13.5200
7.000	13.8500
8.000	14.1800

```

-----
Name: FUTURE POND 09A      Base Flow(cfs): 0.000      Init Stage(ft): 4.500
Group: BASE                Warn Stage(ft): 7.000
Type: Stage/Area

```

Pond Acreage needed/added 2ac

Stage(ft)	Area(ac)
4.500	3.5100
5.000	3.5900
6.000	3.6800
7.000	3.7700

```

-----
Name: FUTURE POND 10A      Base Flow(cfs): 0.000      Init Stage(ft): 5.000
Group: BASE                Warn Stage(ft): 8.000
Type: Stage/Area

```

Pond needed

Stage(ft)	Area(ac)
5.000	3.0000
6.000	3.0300
7.000	3.1900
8.000	3.3400
9.000	3.5000

```

-----
Name: FUTURE POND 12      Base Flow(cfs): 0.000      Init Stage(ft): 7.000
Group: BASE                Warn Stage(ft): 10.000
Type: Stage/Area

```

Stage(ft)	Area(ac)
7.000	6.5200
8.000	6.8100
9.000	7.1000
10.000	7.4000

```

-----
Name: FUTURE POND 14      Base Flow(cfs): 0.000      Init Stage(ft): 8.000
Group: BASE                Warn Stage(ft): 11.000
Type: Stage/Area

```

Stage(ft)	Area(ac)
8.000	1.6600
9.000	1.7500
10.000	1.8400
11.000	1.9300

Name: FUTURE POND 15      Base Flow(cfs): 0.000      Init Stage(ft): 7.000  
Group: BASE      Warn Stage(ft): 10.000  
Type: Stage/Area

Stage(ft)	Area(ac)
7.000	14.0200
8.000	14.7000
9.000	15.3800
10.000	16.0600

Name: FUTURE POND 15A      Base Flow(cfs): 0.000      Init Stage(ft): 4.500  
Group: BASE      Warn Stage(ft): 8.000  
Type: Stage/Area

Pond needed

Stage(ft)	Area(ac)
4.500	2.6100
5.000	2.8400
6.000	3.0700
7.000	3.3000
8.000	3.5400

Name: FUTURE POND 16      Base Flow(cfs): 0.000      Init Stage(ft): 7.000  
Group: BASE      Warn Stage(ft): 10.000  
Type: Stage/Area

Stage(ft)	Area(ac)
7.000	6.0300
8.000	6.3700
9.000	6.7200
10.000	7.0600

Name: FUTURE POND 20      Base Flow(cfs): 0.000      Init Stage(ft): 4.500  
Group: BASE      Warn Stage(ft): 8.000  
Type: Stage/Area

Stage(ft)	Area(ac)
4.500	0.4900
5.000	0.5400
6.000	0.5900
7.000	0.6500
8.000	0.7000

Name: FUTURE POND 20A      Base Flow(cfs): 0.000      Init Stage(ft): 4.500  
Group: BASE      Warn Stage(ft): 8.000  
Type: Stage/Area

Stage(ft)	Area(ac)
4.500	2.7900
5.000	2.9500
6.000	3.1100
7.000	3.2800
8.000	3.4500

Name: FUTURE POND 22      Base Flow(cfs): 0.000      Init Stage(ft): 4.500  
Group: BASE      Warn Stage(ft): 8.000  
Type: Stage/Area

Pond Acreage needed/added 2ac



Stage(ft)	Area(ac)
4.500	3.0700
5.000	3.1900
6.000	3.7400
7.000	3.9400
8.000	4.1400

Name: FUTURE POND 23      Base Flow(cfs): 0.000      Init Stage(ft): 4.500  
Group: BASE      Warn Stage(ft): 7.000  
Type: Stage/Area

Pond needed

Stage(ft)	Area(ac)
4.500	5.8800
5.000	6.0200
6.000	6.1600
7.000	6.3000
8.000	6.4500

Name: NODE 01      Base Flow(cfs): 0.000      Init Stage(ft): 10.500  
Group: BASE      Warn Stage(ft): 15.000  
Type: Stage/Area

Stage(ft)	Area(ac)
10.500	5.0000
11.500	10.0000
12.500	20.0000
13.500	40.0000
14.500	60.0000

Name: NODE 01A      Base Flow(cfs): 0.000      Init Stage(ft): 10.500  
Group: BASE      Warn Stage(ft): 15.000  
Type: Stage/Area

Stage(ft)	Area(ac)
-----------	----------

Name: NODE 02      Base Flow(cfs): 0.000      Init Stage(ft): 10.500  
Group: BASE      Warn Stage(ft): 15.000  
Type: Stage/Area

Stage(ft)	Area(ac)
10.500	5.0000
11.500	10.0000
12.500	40.0000
13.000	80.0000
14.000	168.7100

Name: NODE 02A      Base Flow(cfs): 0.000      Init Stage(ft): 10.500  
Group: BASE      Warn Stage(ft): 15.000  
Type: Stage/Area

Stage(ft)	Area(ac)
-----------	----------

Name: NODE 03      Base Flow(cfs): 0.000      Init Stage(ft): 10.500  
Group: BASE      Warn Stage(ft): 15.000  
Type: Stage/Area

Stage(ft)	Area(ac)
10.500	5.0000
11.500	10.0000
12.500	20.0000
13.000	60.0000
14.000	166.3900

Name: NODE 03A      Base Flow(cfs): 0.000      Init Stage(ft): 10.500

Group: BASE Warn Stage(ft): 15.000  
Type: Stage/Area

Stage(ft) Area(ac)

Name: NODE 04 Base Flow(cfs): 0.000 Init Stage(ft): 5.000  
Group: BASE Warn Stage(ft): 8.000  
Type: Stage/Area

Stage(ft) Area(ac)

5.000 55.7400  
8.000 100.7200

Name: NODE 04A Base Flow(cfs): 0.000 Init Stage(ft): 5.000  
Group: BASE Warn Stage(ft): 8.000  
Type: Stage/Area

Stage(ft) Area(ac)

Name: POND 01 Base Flow(cfs): 0.000 Init Stage(ft): 3.850  
Group: BASE Warn Stage(ft): 6.000  
Type: Stage/Area

Stage(ft) Area(ac)

3.850 156.8000  
4.500 172.1300  
5.000 223.0200  
6.000 539.0900  
7.000 647.7100

Name: POND 02 Base Flow(cfs): 0.000 Init Stage(ft): 3.250  
Group: BASE Warn Stage(ft): 6.000  
Type: Stage/Area

Stage(ft) Area(ac)

3.250 6.4900  
6.000 7.4900

Name: POND 03 Base Flow(cfs): 0.000 Init Stage(ft): 3.250  
Group: BASE Warn Stage(ft): 6.000  
Type: Stage/Area

Stage(ft) Area(ac)

3.250 7.7300  
6.000 8.7300

Name: POND 04 Base Flow(cfs): 0.000 Init Stage(ft): 3.250  
Group: BASE Warn Stage(ft): 6.000  
Type: Stage/Area

Stage(ft) Area(ac)

3.250 58.8200  
6.000 60.8200

Name: POND 05 Base Flow(cfs): 0.000 Init Stage(ft): 3.250  
Group: BASE Warn Stage(ft): 6.000  
Type: Stage/Area

Stage(ft) Area(ac)

3.250      3.8200  
6.000      4.8200

Name: POND 06      Base Flow(cfs): 0.000      Init Stage(ft): 3.250  
Group: BASE      Warn Stage(ft): 6.000  
Type: Stage/Area

Stage(ft)	Area(ac)
3.250	8.0400
6.000	10.0400

Name: POND 07      Base Flow(cfs): 0.000      Init Stage(ft): 3.500  
Group: BASE      Warn Stage(ft): 6.000  
Type: Stage/Area

Stage(ft)	Area(ac)
3.500	4.2500
6.000	5.0000

Name: POND 08      Base Flow(cfs): 0.000      Init Stage(ft): 3.500  
Group: BASE      Warn Stage(ft): 6.000  
Type: Stage/Area

Stage(ft)	Area(ac)
3.500	18.4600
6.000	19.4600

=====  
===== Pipes =====  
=====

Name: PIPE 01	From Node: NODE 01	Length(ft): 40.00
Group: BASE	To Node: NODE 01A	Count: 1
	Friction Equation: Automatic	
	Solution Algorithm: Most Restrictive	
	Flow: Both	
UPSTREAM	DOWNSTREAM	Entrance Loss Coef: 0.00
Geometry: Circular	Circular	Exit Loss Coef: 1.00
Span(in): 36.00	36.00	Bend Loss Coef: 0.00
Rise(in): 36.00	36.00	Outlet Ctrl Spec: Use dc or tw
Invert(ft): 10.500	10.500	Inlet Ctrl Spec: Use dc
Manning's N: 0.013000	0.013000	Stabilizer Option: None
Top Clip(in): 0.000	0.000	
Bot Clip(in): 6.000	6.000	

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Name: PIPE 02	From Node: NODE 02	Length(ft): 40.00
Group: BASE	To Node: NODE 02A	Count: 1
	Friction Equation: Automatic	
	Solution Algorithm: Most Restrictive	
	Flow: Both	
UPSTREAM	DOWNSTREAM	Entrance Loss Coef: 0.00
Geometry: Circular	Circular	Exit Loss Coef: 1.00
Span(in): 36.00	36.00	Bend Loss Coef: 0.00
Rise(in): 36.00	36.00	Outlet Ctrl Spec: Use dc or tw
Invert(ft): 10.500	10.500	Inlet Ctrl Spec: Use dc
Manning's N: 0.013000	0.013000	Stabilizer Option: None
Top Clip(in): 0.000	0.000	
Bot Clip(in): 0.000	0.000	

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Name: PIPE 03      From Node: NODE 03      Length(ft): 40.00

Group: BASE	To Node: NODE 03A	Count: 1
		Friction Equation: Automatic
UPSTREAM	DOWNSTREAM	Solution Algorithm: Most Restrictive
Geometry: Circular	Circular	Flow: Both
Span(in): 36.00	36.00	Entrance Loss Coef: 0.00
Rise(in): 36.00	36.00	Exit Loss Coef: 1.00
Invert(ft): 10.500	10.500	Bend Loss Coef: 0.00
Manning's N: 0.013000	0.013000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dc
Bot Clip(in): 0.000	0.000	Stabilizer Option: None

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Name: PIPE 04	From Node: NODE 04	Length(ft): 30.00
Group: BASE	To Node: NODE 04A	Count: 2
		Friction Equation: Automatic
UPSTREAM	DOWNSTREAM	Solution Algorithm: Most Restrictive
Geometry: Circular	Circular	Flow: Both
Span(in): 48.00	48.00	Entrance Loss Coef: 0.00
Rise(in): 48.00	48.00	Exit Loss Coef: 1.00
Invert(ft): 5.000	5.000	Bend Loss Coef: 0.00
Manning's N: 0.013000	0.013000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dc
Bot Clip(in): 0.000	0.000	Stabilizer Option: None

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Name: PIPE 07A	From Node: FUTURE POND 07A	Length(ft): 400.00
Group: BASE	To Node: FUTURE POND 10A	Count: 2
		Friction Equation: Automatic
UPSTREAM	DOWNSTREAM	Solution Algorithm: Most Restrictive
Geometry: Circular	Circular	Flow: Both
Span(in): 36.00	36.00	Entrance Loss Coef: 0.00
Rise(in): 36.00	36.00	Exit Loss Coef: 1.00
Invert(ft): 3.500	3.500	Bend Loss Coef: 0.00
Manning's N: 0.013000	0.013000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dc
Bot Clip(in): 0.000	0.000	Stabilizer Option: None

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Name: PIPE 12	From Node: FUTURE POND 12	Length(ft): 400.00
Group: BASE	To Node: FUTURE POND 15	Count: 1
		Friction Equation: Automatic
UPSTREAM	DOWNSTREAM	Solution Algorithm: Most Restrictive
Geometry: Circular	Circular	Flow: Both
Span(in): 48.00	48.00	Entrance Loss Coef: 0.00
Rise(in): 48.00	48.00	Exit Loss Coef: 1.00
Invert(ft): 3.000	3.000	Bend Loss Coef: 0.00
Manning's N: 0.013000	0.013000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dc
Bot Clip(in): 0.000	0.000	Stabilizer Option: None

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting



```

-----
Name: PIPE 16          From Node: FUTURE POND 16   Length(ft): 40.00
Group: BASE           To Node: FUTURE POND 15   Count: 1
                                Friction Equation: Automatic
                                Solution Algorithm: Most Restrictive
                                Flow: Both
                                Entrance Loss Coef: 0.00
                                Exit Loss Coef: 1.00
                                Bend Loss Coef: 0.00
                                Outlet Ctrl Spec: Use dc or tw
                                Inlet Ctrl Spec: Use dc
                                Stabilizer Option: None

      UPSTREAM      DOWNSTREAM
Geometry: Circular  Circular
Span(in): 48.00     48.00
Rise(in): 48.00     48.00
Invert(ft): 3.000   3.000
Manning's N: 0.013000 0.013000
Top Clip(in): 0.000 0.000
Bot Clip(in): 0.000 0.000

```

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

```

-----
Name: PIPE 20A        From Node: FUTURE POND 20A   Length(ft): 800.00
Group: BASE           To Node: FUTURE POND 20   Count: 1
                                Friction Equation: Automatic
                                Solution Algorithm: Most Restrictive
                                Flow: Both
                                Entrance Loss Coef: 0.00
                                Exit Loss Coef: 1.00
                                Bend Loss Coef: 0.00
                                Outlet Ctrl Spec: Use dc or tw
                                Inlet Ctrl Spec: Use dc
                                Stabilizer Option: None

      UPSTREAM      DOWNSTREAM
Geometry: Circular  Circular
Span(in): 36.00     36.00
Rise(in): 36.00     36.00
Invert(ft): 3.500   3.500
Manning's N: 0.013000 0.013000
Top Clip(in): 0.000 0.000
Bot Clip(in): 0.000 0.000

```

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

```

-----
Name: PIPE 22          From Node: FUTURE POND 22   Length(ft): 1100.00
Group: BASE           To Node: POND 01          Count: 2
                                Friction Equation: Automatic
                                Solution Algorithm: Most Restrictive
                                Flow: Both
                                Entrance Loss Coef: 0.00
                                Exit Loss Coef: 1.00
                                Bend Loss Coef: 0.00
                                Outlet Ctrl Spec: Use dc or tw
                                Inlet Ctrl Spec: Use dc
                                Stabilizer Option: None

      UPSTREAM      DOWNSTREAM
Geometry: Circular  Circular
Span(in): 48.00     48.00
Rise(in): 48.00     48.00
Invert(ft): 3.000   3.000
Manning's N: 0.013000 0.013000
Top Clip(in): 0.000 0.000
Bot Clip(in): 0.000 0.000

```

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

```

-----
Name: PIPE 23          From Node: FUTURE POND 23   Length(ft): 225.00
Group: BASE           To Node: FUTURE POND 22   Count: 1
                                Friction Equation: Automatic
                                Solution Algorithm: Most Restrictive
                                Flow: Both
                                Entrance Loss Coef: 0.00
                                Exit Loss Coef: 1.00
                                Bend Loss Coef: 0.00
                                Outlet Ctrl Spec: Use dc or tw
                                Inlet Ctrl Spec: Use dc
                                Stabilizer Option: None

      UPSTREAM      DOWNSTREAM
Geometry: Circular  Circular
Span(in): 48.00     48.00
Rise(in): 48.00     48.00
Invert(ft): 3.000   3.000
Manning's N: 0.013000 0.013000
Top Clip(in): 0.000 0.000
Bot Clip(in): 0.000 0.000

```

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

```

-----
Name: PIPE 6                      From Node: POND 02          Length(ft): 450.00
Group: BASE                      To Node: BOUNDARY          Count: 1
                                Friction Equation: Automatic
                                Solution Algorithm: Most Restrictive
                                Flow: Both
                                Entrance Loss Coef: 0.00
                                Exit Loss Coef: 0.00
                                Bend Loss Coef: 0.00
                                Outlet Ctrl Spec: Use dc or tw
                                Inlet Ctrl Spec: Use dc
                                Stabilizer Option: None

UPSTREAM      DOWNSTREAM
Geometry: Circular      Circular
Span(in): 48.00         48.00
Rise(in): 48.00         48.00
Invert(ft): 3.250       3.000
Manning's N: 0.013000   0.013000
Top Clip(in): 0.000     0.000
Bot Clip(in): 0.000     0.000

```

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Groove end projecting

=====  
Channels =====  
=====

```

Name: CHANNEL 01                From Node: NODE 01A          Length(ft): 2703.00
Group: BASE                    To Node: POND 01          Count: 1

UPSTREAM      DOWNSTREAM
Geometry: Trapezoidal      Trapezoidal
Invert(ft): 10.500         4.100
TClpInitZ(ft): 9999.000    9999.000
Manning's N: 0.030000      0.030000
Top Clip(ft): 0.000        0.000
Bot Clip(ft): 0.000        0.000
Main XSec:
AuxElev1(ft):
Aux XSec1:
AuxElev2(ft):
Aux XSec2:
Top Width(ft):
Depth(ft):
Bot Width(ft): 5.000        5.000
LtSdSlp(h/v): 1.00         1.00
RtSdSlp(h/v): 1.00         1.00

Friction Equation: Automatic
Solution Algorithm: Automatic
Flow: Both
Contraction Coef: 0.100
Expansion Coef: 0.300
Entrance Loss Coef: 0.000
Exit Loss Coef: 0.000
Outlet Ctrl Spec: Use dc or tw
Inlet Ctrl Spec: Use dc
Stabilizer Option: None

```

```

Name: CHANNEL 02                From Node: NODE 02A          Length(ft): 2178.00
Group: BASE                    To Node: POND 01          Count: 1

UPSTREAM      DOWNSTREAM
Geometry: Trapezoidal      Trapezoidal
Invert(ft): 10.500         4.100
TClpInitZ(ft): 9999.000    9999.000
Manning's N: 0.030000      0.030000
Top Clip(ft): 0.000        0.000
Bot Clip(ft): 0.000        0.000
Main XSec:
AuxElev1(ft):
Aux XSec1:
AuxElev2(ft):
Aux XSec2:
Top Width(ft):
Depth(ft):
Bot Width(ft): 5.000        5.000
LtSdSlp(h/v): 2.00         2.00
RtSdSlp(h/v): 2.00         2.00

Friction Equation: Automatic
Solution Algorithm: Automatic
Flow: Both
Contraction Coef: 0.100
Expansion Coef: 0.300
Entrance Loss Coef: 0.000
Exit Loss Coef: 0.000
Outlet Ctrl Spec: Use dc or tw
Inlet Ctrl Spec: Use dc
Stabilizer Option: None

```

```

Name: CHANNEL 03                From Node: NODE 03A          Length(ft): 2400.00
Group: BASE                    To Node: POND 01          Count: 1

UPSTREAM      DOWNSTREAM
Geometry: Trapezoidal      Trapezoidal
Invert(ft): 10.500         4.100
TClpInitZ(ft): 9999.000    9999.000
Manning's N: 0.030000      0.030000
Top Clip(ft): 0.000        0.000
Bot Clip(ft): 0.000        0.000
Main XSec:
AuxElev1(ft):
Aux XSec1:

Friction Equation: Automatic
Solution Algorithm: Automatic
Flow: Both
Contraction Coef: 0.100
Expansion Coef: 0.300
Entrance Loss Coef: 0.000
Exit Loss Coef: 0.000
Outlet Ctrl Spec: Use dc or tw
Inlet Ctrl Spec: Use dc
Stabilizer Option: None

```

AuxElev2(ft):  
Aux XSec2:  
Top Width(ft):  
Depth(ft):  
Bot Width(ft): 5.000 5.000  
LtSdSlp(h/v): 2.00 2.00  
RtSdSlp(h/v): 2.00 2.00

```
-----
Name: CHANNEL 04      From Node: NODE 04A      Length(ft): 2320.00
Group: BASE           To Node: POND 01          Count: 1

      UPSTREAM      DOWNSTREAM      Friction Equation: Automatic
Geometry: Trapezoidal Trapezoidal      Solution Algorithm: Automatic
Invert(ft): 5.000    4.100            Flow: Both
TClpInitZ(ft): 9999.000 9999.000      Contraction Coef: 0.100
Manning's N: 0.030000 0.030000      Expansion Coef: 0.300
Top Clip(ft): 0.000    0.000      Entrance Loss Coef: 0.000
Bot Clip(ft): 0.000    0.000      Exit Loss Coef: 0.000
Main XSec:           Outlet Ctrl Spec: Use dc or tw
AuxElev1(ft):        Inlet Ctrl Spec: Use dc
Aux XSec1:           Stabilizer Option: None
AuxElev2(ft):
Aux XSec2:
Top Width(ft):
Depth(ft):
Bot Width(ft): 10.000 10.000
LtSdSlp(h/v): 2.00 2.00
RtSdSlp(h/v): 2.00 2.00
=====
```

==== Drop Structures =====

```
-----
Name: CS 01           From Node: POND 02      Length(ft): 35.00
Group: BASE           To Node: POND 03        Count: 1

      UPSTREAM      DOWNSTREAM      Friction Equation: Average Conveyance
Geometry: Rectangular Rectangular      Solution Algorithm: Automatic
Span(in): 48.00      48.00            Flow: Both
Rise(in): 36.00      36.00      Entrance Loss Coef: 0.200
Invert(ft): 3.250    3.250      Exit Loss Coef: 1.000
Manning's N: 0.020000 0.020000      Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000    0.000      Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000    0.000      Solution Incs: 10
=====
```

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

\*\*\* Weir 1 of 1 for Drop Structure CS 01 \*\*\*

		TABLE
Count:	1	Bottom Clip(in): 0.000
Type:	Vertical: Mavis	Top Clip(in): 0.000
Flow:	Both	Weir Disc Coef: 3.200
Geometry:	Rectangular	Orifice Disc Coef: 0.600
Span(in):	48.00	Invert(ft): 3.250
Rise(in):	12.00	Control Elev(ft): 3.250

```
-----
Name: CS 02           From Node: POND 04      Length(ft): 35.00
Group: BASE           To Node: BOUNDARY       Count: 1

      UPSTREAM      DOWNSTREAM      Friction Equation: Average Conveyance
Geometry: Rectangular Rectangular      Solution Algorithm: Automatic
Span(in): 48.00      48.00            Flow: Both
Rise(in): 36.00      36.00      Entrance Loss Coef: 0.200
Invert(ft): 3.250    3.250      Exit Loss Coef: 1.000
Manning's N: 0.020000 0.020000      Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000    0.000      Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000    0.000      Solution Incs: 10
=====
```

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

\*\*\* Weir 1 of 1 for Drop Structure CS 02 \*\*\*

TABLE

Count: 1  
Type: Vertical: Mavis  
Flow: Both  
Geometry: Rectangular  
Span(in): 48.00  
Rise(in): 10.00  
Bottom Clip(in): 0.000  
Top Clip(in): 0.000  
Weir Disc Coef: 3.200  
Orifice Disc Coef: 0.600  
Invert(ft): 3.250  
Control Elev(ft): 3.250

-----  
Name: CS 03                      From Node: POND 04                      Length(ft): 35.00  
Group: BASE                      To Node: BOUNDARY                      Count: 1  
  
UPSTREAM                      DOWNSTREAM                      Friction Equation: Average Conveyance  
Geometry: Rectangular                      Rectangular                      Solution Algorithm: Automatic  
Span(in): 48.00                      48.00                      Flow: Both  
Rise(in): 36.00                      36.00                      Entrance Loss Coef: 0.200  
Invert(ft): 3.250                      3.250                      Exit Loss Coef: 1.000  
Manning's N: 0.020000                      0.020000                      Outlet Ctrl Spec: Use dc or tw  
Top Clip(in): 0.000                      0.000                      Inlet Ctrl Spec: Use dn  
Bot Clip(in): 0.000                      0.000                      Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

\*\*\* Weir 1 of 1 for Drop Structure CS 03 \*\*\*

TABLE

Count: 1  
Type: Vertical: Mavis  
Flow: Both  
Geometry: Rectangular  
Span(in): 48.00  
Rise(in): 10.00  
Bottom Clip(in): 0.000  
Top Clip(in): 0.000  
Weir Disc Coef: 3.200  
Orifice Disc Coef: 0.600  
Invert(ft): 3.250  
Control Elev(ft): 3.250

-----  
Name: CS 04                      From Node: POND 08                      Length(ft): 35.00  
Group: BASE                      To Node: BOUNDARY                      Count: 1  
  
UPSTREAM                      DOWNSTREAM                      Friction Equation: Average Conveyance  
Geometry: Rectangular                      Rectangular                      Solution Algorithm: Automatic  
Span(in): 48.00                      48.00                      Flow: Both  
Rise(in): 36.00                      36.00                      Entrance Loss Coef: 0.200  
Invert(ft): 3.500                      3.500                      Exit Loss Coef: 1.000  
Manning's N: 0.020000                      0.020000                      Outlet Ctrl Spec: Use dc or tw  
Top Clip(in): 0.000                      0.000                      Inlet Ctrl Spec: Use dn  
Bot Clip(in): 0.000                      0.000                      Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

\*\*\* Weir 1 of 1 for Drop Structure CS 04 \*\*\*

TABLE

Count: 1  
Type: Vertical: Mavis  
Flow: Both  
Geometry: Rectangular  
Span(in): 48.00  
Rise(in): 10.00  
Bottom Clip(in): 0.000  
Top Clip(in): 0.000  
Weir Disc Coef: 3.200  
Orifice Disc Coef: 0.600  
Invert(ft): 3.500  
Control Elev(ft): 3.500

-----  
Name: CS 05                      From Node: POND 08                      Length(ft): 35.00  
Group: BASE                      To Node: BOUNDARY                      Count: 1  
  
UPSTREAM                      DOWNSTREAM                      Friction Equation: Average Conveyance  
Geometry: Rectangular                      Rectangular                      Solution Algorithm: Automatic  
Span(in): 48.00                      48.00                      Flow: Positive  
Rise(in): 36.00                      36.00                      Entrance Loss Coef: 0.200  
Invert(ft): 3.500                      3.500                      Exit Loss Coef: 1.000  
Manning's N: 0.020000                      0.020000                      Outlet Ctrl Spec: Use dc or tw  
Top Clip(in): 0.000                      0.000                      Inlet Ctrl Spec: Use dn  
Bot Clip(in): 0.000                      0.000                      Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares



Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

\*\*\* Weir 1 of 1 for Drop Structure CS 05 \*\*\*

TABLE

Count: 1	Bottom Clip(in): 0.000
Type: Vertical: Mavis	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 48.00	Invert(ft): 3.500
Rise(in): 10.00	Control Elev(ft): 3.500

Name: CS 06	From Node: POND 07	Length(ft): 35.00
Group: BASE	To Node: BOUNDARY	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Positive
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.200
Invert(ft): 3.500	3.500	Exit Loss Coef: 1.000
Manning's N: 0.020000	0.020000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

\*\*\* Weir 1 of 1 for Drop Structure CS 06 \*\*\*

TABLE

Count: 1	Bottom Clip(in): 0.000
Type: Vertical: Mavis	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 48.00	Invert(ft): 3.500
Rise(in): 12.00	Control Elev(ft): 3.500

Name: CS 07	From Node: BOUNDARY	Length(ft): 35.00
Group: BASE	To Node: POND 07	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Positive
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.200
Invert(ft): 3.500	3.500	Exit Loss Coef: 1.000
Manning's N: 0.020000	0.020000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

\*\*\* Weir 1 of 1 for Drop Structure CS 07 \*\*\*

TABLE

Count: 1	Bottom Clip(in): 0.000
Type: Horizontal	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 48.00	Invert(ft): 3.500
Rise(in): 48.00	Control Elev(ft): 3.500

Name: CS 08	From Node: POND 06	Length(ft): 35.00
Group: BASE	To Node: POND 05	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Both
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.200
Invert(ft): 3.250	3.250	Exit Loss Coef: 1.000

Manning's N: 0.020000	0.020000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

\*\*\* Weir 1 of 1 for Drop Structure CS 08 \*\*\*

Count: 1	Bottom Clip(in): 0.000	TABLE
Type: Vertical: Mavis	Top Clip(in): 0.000	
Flow: Both	Weir Disc Coef: 3.200	
Geometry: Rectangular	Orifice Disc Coef: 0.600	
Span(in): 48.00	Invert(ft): 3.250	
Rise(in): 10.00	Control Elev(ft): 3.250	

Name: CS 09	From Node: POND 03	Length(ft): 35.00
Group: BASE	To Node: POND 04	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Both
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.200
Invert(ft): 3.250	3.250	Exit Loss Coef: 1.000
Manning's N: 0.020000	0.020000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

\*\*\* Weir 1 of 1 for Drop Structure CS 09 \*\*\*

Count: 1	Bottom Clip(in): 0.000	TABLE
Type: Vertical: Mavis	Top Clip(in): 0.000	
Flow: Both	Weir Disc Coef: 3.200	
Geometry: Rectangular	Orifice Disc Coef: 0.600	
Span(in): 48.00	Invert(ft): 3.250	
Rise(in): 10.00	Control Elev(ft): 3.250	

Name: CS 10	From Node: POND 06	Length(ft): 35.00
Group: BASE	To Node: POND 04	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Both
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.200
Invert(ft): 3.250	3.250	Exit Loss Coef: 1.000
Manning's N: 0.020000	0.020000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dn
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 0° wingwall flares

\*\*\* Weir 1 of 1 for Drop Structure CS 10 \*\*\*

Count: 1	Bottom Clip(in): 0.000	TABLE
Type: Vertical: Mavis	Top Clip(in): 0.000	
Flow: Both	Weir Disc Coef: 3.200	
Geometry: Rectangular	Orifice Disc Coef: 0.600	
Span(in): 48.00	Invert(ft): 3.250	
Rise(in): 10.00	Control Elev(ft): 3.250	

Name: DS 01	From Node: POND 01	Length(ft): 30.00
Group: BASE	To Node: BOUNDARY	Count: 1

UPSTREAM	DOWNSTREAM	Friction Equation: Automatic
Geometry: Circular	Circular	Solution Algorithm: Most Restrictive
Span(in): 60.00	60.00	Flow: Both
Rise(in): 60.00	60.00	Entrance Loss Coef: 0.000
Invert(ft): 3.000	3.000	Exit Loss Coef: 0.000
Manning's N: 0.024000	0.024000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dc
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Circular CMP: Projecting

Downstream FHWA Inlet Edge Description:  
Circular CMP: Projecting

\*\*\* Weir 1 of 2 for Drop Structure DS 01 \*\*\*

	TABLE
Count: 1	Bottom Clip(in): 0.000
Type: Vertical: Mavis	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 96.00	Invert(ft): 3.850
Rise(in): 24.00	Control Elev(ft): 3.850

\*\*\* Weir 2 of 2 for Drop Structure DS 01 \*\*\*

	TABLE
Count: 1	Bottom Clip(in): 0.000
Type: Horizontal	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Circular	Orifice Disc Coef: 0.600
Span(in): 96.00	Invert(ft): 5.850
Rise(in): 96.00	Control Elev(ft): 5.850

-----  
Name: DS 01A                      From Node: POND 01                      Length(ft): 30.00  
Group: BASE                      To Node: BOUNDARY                      Count: 1

UPSTREAM	DOWNSTREAM	Friction Equation: Automatic
Geometry: Circular	Circular	Solution Algorithm: Most Restrictive
Span(in): 60.00	60.00	Flow: None
Rise(in): 60.00	60.00	Entrance Loss Coef: 0.000
Invert(ft): 3.000	3.000	Exit Loss Coef: 0.000
Manning's N: 0.024000	0.024000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dc
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Circular CMP: Projecting

Downstream FHWA Inlet Edge Description:  
Circular CMP: Projecting

\*\*\* Weir 1 of 2 for Drop Structure DS 01A \*\*\*

	TABLE
Count: 1	Bottom Clip(in): 0.000
Type: Vertical: Mavis	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 96.00	Invert(ft): 4.100
Rise(in): 24.00	Control Elev(ft): 4.100

\*\*\* Weir 2 of 2 for Drop Structure DS 01A \*\*\*

	TABLE
Count: 1	Bottom Clip(in): 0.000
Type: Horizontal	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Circular	Orifice Disc Coef: 0.600
Span(in): 96.00	Invert(ft): 6.100
Rise(in): 96.00	Control Elev(ft): 6.100

-----  
Name: DS 02                      From Node: POND 05                      Length(ft): 25.00  
Group: BASE                      To Node: BOUNDARY                      Count: 1

UPSTREAM	DOWNSTREAM	Friction Equation: Average Conveyance
Geometry: Rectangular	Rectangular	Solution Algorithm: Automatic
Span(in): 48.00	48.00	Flow: Both
Rise(in): 48.00	48.00	Entrance Loss Coef: 0.200
Invert(ft): 3.250	3.000	Exit Loss Coef: 1.000

Manning's N:	0.020000	0.020000	Outlet Ctrl Spec:	Use dc or tw
Top Clip(in):	0.000	0.000	Inlet Ctrl Spec:	Use dn
Bot Clip(in):	0.000	0.000	Solution Incs:	10

Upstream FHWA Inlet Edge Description:  
Rectangular Box: 30° to 75° wingwall flares

Downstream FHWA Inlet Edge Description:  
Rectangular Box: 30° to 75° wingwall flares

\*\*\* Weir 1 of 2 for Drop Structure DS 02 \*\*\*

Count:	1	Bottom Clip(in):	0.000
Type:	Vertical: Mavis	Top Clip(in):	0.000
Flow:	Both	Weir Disc Coef:	3.200
Geometry:	Rectangular	Orifice Disc Coef:	0.600
Span(in):	48.00	Invert(ft):	3.250
Rise(in):	12.00	Control Elev(ft):	3.250

TABLE

\*\*\* Weir 2 of 2 for Drop Structure DS 02 \*\*\*

Count:	1	Bottom Clip(in):	0.000
Type:	Horizontal	Top Clip(in):	0.000
Flow:	Positive	Weir Disc Coef:	3.200
Geometry:	Rectangular	Orifice Disc Coef:	0.600
Span(in):	48.00	Invert(ft):	3.500
Rise(in):	48.00	Control Elev(ft):	3.500

TABLE

Name:	DS 04A	From Node:	FUTURE POND 04A	Length(ft):	50.00
Group:	BASE	To Node:	POND 01	Count:	2
UPSTREAM	DOWNSTREAM	Friction Equation:	Automatic		
Geometry:	Circular	Solution Algorithm:	Most Restrictive		
Span(in):	30.00	Flow:	Both		
Rise(in):	30.00	Entrance Loss Coef:	0.000		
Invert(ft):	4.000	Exit Loss Coef:	1.000		
Manning's N:	0.013000	Outlet Ctrl Spec:	Use dc or tw		
Top Clip(in):	0.000	Inlet Ctrl Spec:	Use dc		
Bot Clip(in):	0.000	Solution Incs:	10		

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

\*\*\* Weir 1 of 1 for Drop Structure DS 04A \*\*\*

Count:	1	Bottom Clip(in):	0.000
Type:	Horizontal	Top Clip(in):	0.000
Flow:	Both	Weir Disc Coef:	3.200
Geometry:	Rectangular	Orifice Disc Coef:	0.600
Span(in):	72.00	Invert(ft):	5.000
Rise(in):	36.00	Control Elev(ft):	5.000

TABLE

Name:	DS 07A	From Node:	FUTURE POND 07A	Length(ft):	475.00
Group:	BASE	To Node:	POND 01	Count:	1
UPSTREAM	DOWNSTREAM	Friction Equation:	Automatic		
Geometry:	Circular	Solution Algorithm:	Most Restrictive		
Span(in):	36.00	Flow:	None		
Rise(in):	36.00	Entrance Loss Coef:	0.000		
Invert(ft):	4.000	Exit Loss Coef:	1.000		
Manning's N:	0.013000	Outlet Ctrl Spec:	Use dc or tw		
Top Clip(in):	0.000	Inlet Ctrl Spec:	Use dc		
Bot Clip(in):	0.000	Solution Incs:	10		

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

\*\*\* Weir 1 of 1 for Drop Structure DS 07A \*\*\*

Count:	1	Bottom Clip(in):	0.000
Type:	Horizontal	Top Clip(in):	0.000

TABLE



Flow: Both  
Geometry: Rectangular  
Span(in): 60.00  
Rise(in): 36.00  
Weir Disc Coef: 3.200  
Orifice Disc Coef: 0.600  
Invert(ft): 5.000  
Control Elev(ft): 5.000

Name: DS 09A  
Group: BASE  
From Node: FUTURE POND 09A  
To Node: POND 01  
Length(ft): 300.00  
Count: 2  
UPSTREAM  
Geometry: Circular  
Span(in): 30.00  
Rise(in): 30.00  
Invert(ft): 3.500  
Manning's N: 0.013000  
Top Clip(in): 0.000  
Bot Clip(in): 0.000  
DOWNSTREAM  
Geometry: Circular  
Span(in): 30.00  
Rise(in): 30.00  
Invert(ft): 3.500  
Manning's N: 0.013000  
Top Clip(in): 0.000  
Bot Clip(in): 0.000  
Friction Equation: Automatic  
Solution Algorithm: Most Restrictive  
Flow: Both  
Entrance Loss Coef: 0.000  
Exit Loss Coef: 1.000  
Outlet Ctrl Spec: Use dc or tw  
Inlet Ctrl Spec: Use dc  
Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

\*\*\* Weir 1 of 1 for Drop Structure DS 09A \*\*\*

Count: 1  
Type: Horizontal  
Flow: Both  
Geometry: Rectangular  
Span(in): 72.00  
Rise(in): 36.00  
Bottom Clip(in): 0.000  
Top Clip(in): 0.000  
Weir Disc Coef: 3.200  
Orifice Disc Coef: 0.600  
Invert(ft): 4.500  
Control Elev(ft): 4.500  
TABLE

Name: DS 10A  
Group: BASE  
From Node: FUTURE POND 10A  
To Node: BOUNDARY  
Length(ft): 275.00  
Count: 2  
UPSTREAM  
Geometry: Circular  
Span(in): 36.00  
Rise(in): 36.00  
Invert(ft): 3.500  
Manning's N: 0.013000  
Top Clip(in): 0.000  
Bot Clip(in): 0.000  
DOWNSTREAM  
Geometry: Circular  
Span(in): 36.00  
Rise(in): 36.00  
Invert(ft): 3.500  
Manning's N: 0.013000  
Top Clip(in): 0.000  
Bot Clip(in): 0.000  
Friction Equation: Automatic  
Solution Algorithm: Most Restrictive  
Flow: Both  
Entrance Loss Coef: 0.000  
Exit Loss Coef: 1.000  
Outlet Ctrl Spec: Use dc or tw  
Inlet Ctrl Spec: Use dc  
Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

\*\*\* Weir 1 of 1 for Drop Structure DS 10A \*\*\*

Count: 1  
Type: Horizontal  
Flow: Both  
Geometry: Rectangular  
Span(in): 60.00  
Rise(in): 36.00  
Bottom Clip(in): 0.000  
Top Clip(in): 0.000  
Weir Disc Coef: 3.200  
Orifice Disc Coef: 0.600  
Invert(ft): 5.000  
Control Elev(ft): 5.000  
TABLE

Name: DS 14  
Group: BASE  
From Node: FUTURE POND 14  
To Node: FUTURE POND 15  
Length(ft): 900.00  
Count: 1  
UPSTREAM  
Geometry: Circular  
Span(in): 42.00  
Rise(in): 42.00  
Invert(ft): 3.500  
Manning's N: 0.013000  
Top Clip(in): 0.000  
Bot Clip(in): 0.000  
DOWNSTREAM  
Geometry: Circular  
Span(in): 42.00  
Rise(in): 42.00  
Invert(ft): 3.500  
Manning's N: 0.013000  
Top Clip(in): 0.000  
Bot Clip(in): 0.000  
Friction Equation: Automatic  
Solution Algorithm: Most Restrictive  
Flow: Both  
Entrance Loss Coef: 0.000  
Exit Loss Coef: 1.000  
Outlet Ctrl Spec: Use dc or tw  
Inlet Ctrl Spec: Use dc  
Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

\*\*\* Weir 1 of 1 for Drop Structure DS 14 \*\*\*

TABLE

Count: 1	Bottom Clip(in): 0.000
Type: Horizontal	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 60.00	Invert(ft): 8.000
Rise(in): 36.00	Control Elev(ft): 8.000

Name: DS 15	From Node: FUTURE POND 15	Length(ft): 325.00
Group: BASE	To Node: FUTURE POND 15A	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Automatic
Geometry: Circular	Circular	Solution Algorithm: Most Restrictive
Span(in): 48.00	48.00	Flow: Both
Rise(in): 48.00	48.00	Entrance Loss Coef: 0.000
Invert(ft): 3.500	3.500	Exit Loss Coef: 1.000
Manning's N: 0.013000	0.013000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dc
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

\*\*\* Weir 1 of 1 for Drop Structure DS 15 \*\*\*

TABLE

Count: 1	Bottom Clip(in): 0.000
Type: Horizontal	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 72.00	Invert(ft): 7.000
Rise(in): 48.00	Control Elev(ft): 7.000

Name: DS 15A	From Node: FUTURE POND 15A	Length(ft): 400.00
Group: BASE	To Node: BOUNDARY	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Automatic
Geometry: Circular	Circular	Solution Algorithm: Most Restrictive
Span(in): 48.00	48.00	Flow: Both
Rise(in): 48.00	48.00	Entrance Loss Coef: 0.000
Invert(ft): 3.500	3.500	Exit Loss Coef: 1.000
Manning's N: 0.013000	0.013000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dc
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

\*\*\* Weir 1 of 1 for Drop Structure DS 15A \*\*\*

TABLE

Count: 1	Bottom Clip(in): 0.000
Type: Horizontal	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 72.00	Invert(ft): 4.500
Rise(in): 36.00	Control Elev(ft): 4.500

Name: DS 20	From Node: FUTURE POND 20	Length(ft): 600.00
Group: BASE	To Node: POND 04	Count: 1
UPSTREAM	DOWNSTREAM	Friction Equation: Automatic
Geometry: Circular	Circular	Solution Algorithm: Most Restrictive
Span(in): 36.00	36.00	Flow: Both
Rise(in): 36.00	36.00	Entrance Loss Coef: 0.000
Invert(ft): 3.500	3.500	Exit Loss Coef: 1.000
Manning's N: 0.013000	0.013000	Outlet Ctrl Spec: Use dc or tw
Top Clip(in): 0.000	0.000	Inlet Ctrl Spec: Use dc
Bot Clip(in): 0.000	0.000	Solution Incs: 10

Upstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

Downstream FHWA Inlet Edge Description:  
Circular Concrete: Square edge w/ headwall

\*\*\* Weir 1 of 1 for Drop Structure DS 20 \*\*\*

Count: 1	Bottom Clip(in): 0.000
Type: Horizontal	Top Clip(in): 0.000
Flow: Both	Weir Disc Coef: 3.200
Geometry: Rectangular	Orifice Disc Coef: 0.600
Span(in): 60.00	Invert(ft): 4.500
Rise(in): 36.00	Control Elev(ft): 4.500

TABLE

==== Weirs =====

Name: WEIR 23	From Node: FUTURE POND 23
Group: BASE	To Node: POND 07
Flow: Both	Count: 1
Type: Vertical: Fread	Geometry: Trapezoidal

Bottom Width(ft): 20.00  
Left Side Slope(h/v): 6.00  
Right Side Slope(h/v): 6.00  
Invert(ft): 5.000  
Control Elevation(ft): 5.000  
Struct Opening Dim(ft): 9999.00

TABLE

Bottom Clip(ft): 0.000  
Top Clip(ft): 0.000  
Weir Discharge Coef: 2.800  
Orifice Discharge Coef: 0.600

==== Hydrology Simulations =====

Name: 002  
Filename: N:\17091\Dsgn\Post Development\002.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Scsiii  
Rainfall Amount(in): 4.60

Time(hrs)	Print Inc(min)
12.000	30.00
15.000	15.00
24.000	30.00
360.000	30.00

Name: 010  
Filename: N:\17091\Dsgn\Post Development\010.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Scsiii  
Rainfall Amount(in): 6.80

Time(hrs)	Print Inc(min)
12.000	30.00
15.000	15.00
24.000	30.00
360.000	30.00

Name: 025  
Filename: N:\17091\Dsgn\Post Development\025.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Scsiii  
Rainfall Amount(in): 7.80

Time(hrs)	Print Inc(min)
12.000	30.00
15.000	15.00

24.000 30.00  
360.000 30.00

Name: 050  
Filename: N:\17091\Dsgn\Post Development\050.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Scsiii  
Rainfall Amount(in): 8.80

Time(hrs)	Print	Inc(min)
12.000	30.00	
15.000	15.00	
24.000	30.00	
360.000	30.00	

Name: 100  
Filename: N:\17091\Dsgn\Post Development\100.R32

Override Defaults: Yes  
Storm Duration(hrs): 24.00  
Rainfall File: Scsiii  
Rainfall Amount(in): 10.00

Time(hrs)	Print	Inc(min)
12.000	30.00	
15.000	15.00	
24.000	30.00	
360.000	30.00	

==== Routing Simulations =====

Name: 002 Hydrology Sim: 002  
Filename: N:\17091\Dsgn\Post Development\002.I32

Execute: Yes Restart: No Patch: No  
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000 End Time(hrs): 360.00  
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000  
Boundary Stages: Boundary Flows:

Time(hrs)	Print	Inc(min)
12.000	30.000	
15.000	15.000	
24.000	30.000	
360.000	30.000	

Group	Run
BASE	Yes

Name: 010 Hydrology Sim: 010  
Filename: N:\17091\Dsgn\Post Development\010.I32

Execute: Yes Restart: No Patch: No  
Alternative: No

Max Delta Z(ft): 1.00 Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000 End Time(hrs): 360.00  
Min Calc Time(sec): 0.5000 Max Calc Time(sec): 60.0000  
Boundary Stages: Boundary Flows:

Time(hrs)	Print	Inc(min)
12.000	30.000	
15.000	15.000	
24.000	30.000	
360.000	30.000	

Group	Run
BASE	Yes



-----  
Name: 025                      Hydrology Sim: 025  
Filename: N:\17091\Dsgn\Post Development\025.I32

Execute: Yes                  Restart: No                  Patch: No  
Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 360.00  
Min Calc Time(sec): 0.5000                  Max Calc Time(sec): 60.0000  
Boundary Stages:                      Boundary Flows:

Time(hrs)	Print Inc(min)
12.000	30.000
15.000	15.000
24.000	30.000
360.000	30.000

Group	Run
-----	-----
BASE	Yes

-----  
Name: 050                      Hydrology Sim: 050  
Filename: N:\17091\Dsgn\Post Development\050.I32

Execute: Yes                  Restart: No                  Patch: No  
Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 360.00  
Min Calc Time(sec): 0.5000                  Max Calc Time(sec): 60.0000  
Boundary Stages:                      Boundary Flows:

Time(hrs)	Print Inc(min)
12.000	30.000
15.000	15.000
24.000	30.000
360.000	30.000

Group	Run
-----	-----
BASE	Yes

-----  
Name: 100                      Hydrology Sim: 100  
Filename: N:\17091\Dsgn\Post Development\100.I32

Execute: Yes                  Restart: No                  Patch: No  
Alternative: No

Max Delta Z(ft): 1.00                      Delta Z Factor: 0.00500  
Time Step Optimizer: 10.000  
Start Time(hrs): 0.000                      End Time(hrs): 360.00  
Min Calc Time(sec): 0.5000                  Max Calc Time(sec): 60.0000  
Boundary Stages:                      Boundary Flows:

Time(hrs)	Print Inc(min)
12.000	30.000
15.000	15.000
24.000	30.000
360.000	30.000

Group	Run
-----	-----
BASE	Yes

KIAWAH RIVER PLANTATION  
DRAINAGE BASIN STUDY

**Appendix E**

POST-DEVELOPMENT (BUILD OUT)  
ICPR MODEL OUTPUT – NODE MIN/MAX REPORT

PREPARED BY

THOMAS & HUTTON ENGINEERING CO.

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
BOUNDARY	BASE	002	0.00	3.00	4.00	-0.0083	45	13.50	164.54	0.00	0.00
BOUNDARY	BASE	010	0.00	3.00	4.00	-0.0083	45	13.50	324.25	0.00	0.00
BOUNDARY	BASE	025	0.00	3.00	4.00	-0.0083	45	13.34	395.17	0.00	0.00
BOUNDARY	BASE	050	0.00	3.00	4.00	-0.0083	45	13.25	466.18	0.00	0.00
BOUNDARY	BASE	100	0.00	3.00	4.00	-0.0083	45	13.25	551.26	0.00	0.00
FUTURE POND 04A	BASE	002	12.72	5.55	7.00	0.0024	79933	12.25	32.13	12.72	17.28
FUTURE POND 04A	BASE	010	12.72	6.27	7.00	0.0035	83087	12.25	70.89	12.72	34.99
FUTURE POND 04A	BASE	025	12.73	6.66	7.00	0.0037	84770	12.25	90.08	12.73	42.60
FUTURE POND 04A	BASE	050	12.74	7.06	7.00	0.0037	86532	12.25	109.84	12.74	50.32
FUTURE POND 04A	BASE	100	12.75	7.57	7.00	0.0038	88726	12.25	134.03	12.75	58.99
FUTURE POND 07A	BASE	002	15.83	5.52	7.00	0.0011	583216	12.50	50.85	17.56	10.22
FUTURE POND 07A	BASE	010	15.60	6.20	7.00	-0.0013	592493	12.50	117.31	17.63	20.84
FUTURE POND 07A	BASE	025	15.71	6.57	7.00	-0.0017	597247	12.50	150.69	18.01	25.28
FUTURE POND 07A	BASE	050	15.83	6.97	7.00	-0.0021	602939	12.50	185.29	18.41	28.95
FUTURE POND 07A	BASE	100	15.96	7.48	7.00	-0.0026	610227	12.50	227.95	18.61	32.98
FUTURE POND 09A	BASE	002	41.54	5.49	7.00	0.0033	158317	12.25	59.59	13.06	15.85
FUTURE POND 09A	BASE	010	43.94	6.13	7.00	0.0032	160805	12.25	98.10	12.92	26.12
FUTURE POND 09A	BASE	025	42.59	6.38	7.00	0.0032	161789	12.25	115.59	12.88	29.60
FUTURE POND 09A	BASE	050	41.80	6.63	7.00	0.0031	162758	12.25	133.00	12.86	33.61
FUTURE POND 09A	BASE	100	41.17	6.92	7.00	0.0031	163893	12.25	153.78	12.85	38.43
FUTURE POND 10A	BASE	002	15.35	5.47	8.00	0.0012	132435	12.50	19.04	15.35	15.44
FUTURE POND 10A	BASE	010	15.09	6.09	8.00	0.0014	133403	12.50	49.71	15.09	31.39
FUTURE POND 10A	BASE	025	15.05	6.43	8.00	0.0018	135254	12.50	65.46	15.05	37.34
FUTURE POND 10A	BASE	050	15.01	6.79	8.00	-0.0021	137520	12.50	81.76	15.01	42.97
FUTURE POND 10A	BASE	100	14.99	7.24	8.00	-0.0023	140612	12.50	101.85	14.99	49.42
FUTURE POND 12	BASE	002	15.02	7.76	10.00	0.0016	293664	12.25	65.77	12.30	14.08
FUTURE POND 12	BASE	010	16.68	8.68	10.00	0.0021	305238	12.25	120.01	12.30	19.14
FUTURE POND 12	BASE	025	16.97	9.17	10.00	0.0022	311533	12.25	145.36	12.31	21.60
FUTURE POND 12	BASE	050	17.20	9.67	10.00	0.0024	318137	12.25	170.82	12.31	24.10
FUTURE POND 12	BASE	100	17.40	10.29	10.00	0.0025	326167	12.25	201.41	12.30	26.93
FUTURE POND 14	BASE	002	12.71	8.44	11.00	0.0023	74034	12.25	24.90	12.71	14.93
FUTURE POND 14	BASE	010	12.82	9.15	11.00	0.0030	76825	12.25	64.84	12.47	31.45
FUTURE POND 14	BASE	025	12.93	9.70	11.00	0.0036	78957	12.25	85.39	12.45	33.95
FUTURE POND 14	BASE	050	12.99	10.30	11.00	0.0039	81339	12.25	106.90	12.50	36.73
FUTURE POND 14	BASE	100	13.07	11.08	11.00	0.0041	84400	12.25	133.63	12.56	40.36
FUTURE POND 15	BASE	002	14.88	7.75	10.00	0.0019	633014	12.50	130.56	14.36	41.17
FUTURE POND 15	BASE	010	16.65	8.66	10.00	0.0019	660059	12.50	266.27	13.33	63.56
FUTURE POND 15	BASE	025	16.95	9.16	10.00	0.0022	674628	12.50	326.54	13.10	67.87
FUTURE POND 15	BASE	050	17.12	9.66	10.00	0.0023	689567	12.50	388.20	12.93	71.15
FUTURE POND 15	BASE	100	17.26	10.27	10.00	0.0024	707725	12.50	462.91	12.77	73.30
FUTURE POND 15A	BASE	002	17.47	7.02	8.00	0.0031	143920	14.18	47.43	17.47	34.44
FUTURE POND 15A	BASE	010	16.96	8.04	8.00	-0.0037	154626	12.92	89.19	16.96	48.25
FUTURE POND 15A	BASE	025	16.97	8.41	8.00	-0.0037	158460	12.75	107.71	16.97	53.48
FUTURE POND 15A	BASE	050	17.00	8.78	8.00	-0.0037	162335	12.75	124.38	17.00	58.56
FUTURE POND 15A	BASE	100	16.96	9.22	8.00	0.0039	166984	12.64	142.55	16.96	64.53
FUTURE POND 16	BASE	002	14.92	7.76	10.00	0.0018	273895	12.25	75.27	12.33	23.86
FUTURE POND 16	BASE	010	16.62	8.67	10.00	0.0024	287742	12.25	141.66	12.34	36.46
FUTURE POND 16	BASE	025	16.92	9.17	10.00	0.0025	295179	12.25	172.99	12.35	42.28
FUTURE POND 16	BASE	050	17.13	9.67	10.00	0.0025	302663	12.25	204.60	12.35	47.80
FUTURE POND 16	BASE	100	17.31	10.29	10.00	0.0026	311765	12.25	242.67	12.35	53.95
FUTURE POND 20	BASE	002	13.14	5.52	8.00	0.0050	25776	12.25	18.87	13.14	9.35
FUTURE POND 20	BASE	010	12.96	6.47	8.00	0.0050	27123	12.25	33.87	12.94	17.19
FUTURE POND 20	BASE	025	12.95	6.94	8.00	0.0050	28208	12.25	41.51	12.95	19.90

Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
FUTURE POND 20	BASE	050	12.93	7.40	8.00	0.0050	29239	12.25	49.90	12.93	23.03
FUTURE POND 20	BASE	100	12.90	7.95	8.00	0.0050	30443	12.25	60.34	12.90	26.78
FUTURE POND 20A	BASE	002	13.73	5.62	8.00	0.0035	133955	12.25	44.05	14.44	6.19
FUTURE POND 20A	BASE	010	13.59	6.66	8.00	0.0043	140481	12.25	83.29	14.79	11.62
FUTURE POND 20A	BASE	025	13.70	7.18	8.00	0.0043	144255	12.25	101.83	15.40	13.39
FUTURE POND 20A	BASE	050	13.74	7.69	8.00	0.0044	148062	12.25	120.54	15.11	15.21
FUTURE POND 20A	BASE	100	13.79	8.31	8.00	0.0044	152628	12.25	143.10	15.26	17.42
FUTURE POND 22	BASE	002	12.88	5.75	8.00	0.0050	161367	12.25	108.98	13.06	41.43
FUTURE POND 22	BASE	010	12.73	6.60	8.00	0.0050	171530	12.25	179.89	12.81	65.73
FUTURE POND 22	BASE	025	12.73	7.01	8.00	0.0050	173070	12.25	211.65	12.90	74.25
FUTURE POND 22	BASE	050	12.72	7.42	8.00	0.0050	176608	12.25	242.92	12.78	82.81
FUTURE POND 22	BASE	100	12.73	7.90	8.00	0.0050	180744	12.25	280.48	12.82	94.28
FUTURE POND 23	BASE	002	13.01	5.74	7.00	0.0040	267151	12.25	104.13	13.18	42.90
FUTURE POND 23	BASE	010	12.87	6.32	7.00	0.0043	270612	12.25	171.97	12.99	80.49
FUTURE POND 23	BASE	025	13.60	6.70	7.00	0.0046	272829	12.25	202.79	12.83	101.71
FUTURE POND 23	BASE	050	13.64	7.12	7.00	0.0050	275224	12.25	233.48	12.69	123.69
FUTURE POND 23	BASE	100	13.66	7.61	7.00	0.0049	278437	12.25	270.07	12.56	145.52
NODE 01	BASE	002	23.30	12.19	15.00	0.0018	734607	13.75	46.13	23.30	7.29
NODE 01	BASE	010	22.36	12.83	15.00	0.0023	1162644	13.75	90.08	22.36	14.88
NODE 01	BASE	025	22.25	13.07	15.00	0.0026	1367902	13.75	111.22	22.25	18.07
NODE 01	BASE	050	22.23	13.28	15.00	0.0024	1553757	13.75	132.78	22.23	21.10
NODE 01	BASE	100	22.24	13.52	15.00	0.0025	1758410	13.75	159.00	22.24	24.50
NODE 01A	BASE	002	23.40	11.14	15.00	0.0013	9114	23.30	7.29	23.44	7.29
NODE 01A	BASE	010	22.49	11.49	15.00	0.0016	10223	22.36	14.88	22.48	14.88
NODE 01A	BASE	025	22.44	11.61	15.00	0.0017	10636	22.25	18.07	22.37	18.07
NODE 01A	BASE	050	22.48	11.72	15.00	0.0016	11018	22.23	21.10	22.33	21.10
NODE 01A	BASE	100	22.34	11.84	15.00	0.0014	11434	22.24	24.50	22.34	24.49
NODE 02	BASE	002	30.15	13.19	15.00	0.0030	4226478	16.50	128.37	30.15	23.70
NODE 02	BASE	010	31.21	13.83	15.00	0.0030	6685863	16.00	244.68	31.21	34.64
NODE 02	BASE	025	31.54	14.07	15.00	0.0030	7609898	16.00	300.95	31.54	39.45
NODE 02	BASE	050	31.80	14.29	15.00	0.0030	8458478	16.00	358.35	31.80	44.12
NODE 02	BASE	100	32.08	14.53	15.00	0.0034	9399862	16.00	428.23	32.08	49.39
NODE 02A	BASE	002	29.67	11.70	15.00	0.0016	11021	30.15	23.70	30.25	23.70
NODE 02A	BASE	010	30.96	11.90	15.00	0.0013	12349	31.21	34.64	31.29	34.64
NODE 02A	BASE	025	31.40	11.99	15.00	0.0013	12927	31.54	39.45	31.60	39.45
NODE 02A	BASE	050	31.87	12.08	15.00	0.0013	13484	31.80	44.12	31.92	44.12
NODE 02A	BASE	100	32.18	12.17	15.00	0.0013	14117	32.08	49.39	32.15	49.39
NODE 03	BASE	002	28.37	12.92	15.00	0.0031	2321446	16.50	68.54	28.37	19.55
NODE 03	BASE	010	29.83	13.43	15.00	0.0031	4608118	16.50	130.74	29.83	27.45
NODE 03	BASE	025	30.34	13.61	15.00	0.0030	5443195	16.50	160.62	30.34	30.49
NODE 03	BASE	050	30.73	13.77	15.00	0.0030	6191529	16.50	191.08	30.73	33.54
NODE 03	BASE	100	31.12	13.95	15.00	0.0031	7008896	16.50	228.15	31.12	37.04
NODE 03A	BASE	002	28.09	11.58	15.00	0.0016	11687	28.37	19.55	28.49	19.56
NODE 03A	BASE	010	29.81	11.75	15.00	0.0015	13072	29.83	27.45	29.93	27.45
NODE 03A	BASE	025	30.39	11.82	15.00	0.0015	13629	30.34	30.49	30.44	30.49
NODE 03A	BASE	050	30.88	11.89	15.00	0.0015	14185	30.73	33.54	30.82	33.54
NODE 03A	BASE	100	31.37	11.98	15.00	0.0015	14829	31.12	37.04	31.20	37.04
NODE 04	BASE	002	26.32	5.99	8.00	0.0010	3072113	13.50	150.48	25.77	7.87
NODE 04	BASE	010	25.36	6.73	8.00	0.0019	3560953	13.50	319.61	24.86	22.19
NODE 04	BASE	025	25.05	7.06	8.00	0.0021	3770539	13.50	403.24	24.35	30.60
NODE 04	BASE	050	24.72	7.36	8.00	0.0023	3971774	13.50	489.41	23.37	39.95
NODE 04	BASE	100	24.23	7.72	8.00	0.0025	4203291	13.50	595.27	22.68	52.24



Name	Group	Simulation	Max Time Stage hrs	Max Stage ft	Warning Stage ft	Max Delta Stage ft	Max Surf Area ft2	Max Time Inflow hrs	Max Inflow cfs	Max Time Outflow hrs	Max Outflow cfs
NODE 04A	BASE	002	26.64	5.91	8.00	0.0014	16556	25.77	7.87	26.04	7.86
NODE 04A	BASE	010	25.56	6.63	8.00	0.0027	19779	24.86	22.19	25.06	22.16
NODE 04A	BASE	025	25.27	6.92	8.00	0.0023	21107	24.35	30.60	24.60	30.55
NODE 04A	BASE	050	25.00	7.21	8.00	0.0021	22371	23.37	39.95	23.50	39.88
NODE 04A	BASE	100	24.70	7.53	8.00	0.0023	23807	22.68	52.24	22.82	52.16
POND 01	BASE	002	41.44	5.49	6.00	0.0020	16570678	12.25	1229.89	41.44	34.28
POND 01	BASE	010	43.88	6.13	6.00	0.0024	24154689	12.25	2189.22	43.88	57.99
POND 01	BASE	025	42.52	6.38	6.00	0.0025	25345056	12.25	2649.83	42.52	71.90
POND 01	BASE	050	41.73	6.63	6.00	0.0027	26518258	12.25	3117.32	41.73	85.30
POND 01	BASE	100	41.10	6.92	6.00	0.0028	27890404	12.25	3682.67	41.10	101.05
POND 02	BASE	002	16.57	3.93	6.00	0.0019	294092	12.25	52.27	13.87	3.86
POND 02	BASE	010	14.05	4.35	6.00	0.0019	300902	12.25	93.29	13.33	10.80
POND 02	BASE	025	13.84	4.55	6.00	0.0020	304115	12.25	112.72	13.24	13.96
POND 02	BASE	050	13.59	4.75	6.00	0.0021	307383	12.25	132.36	13.20	17.65
POND 02	BASE	100	13.45	5.00	6.00	0.0022	311296	12.25	156.08	13.16	22.47
POND 03	BASE	002	17.29	3.91	6.00	0.0019	347111	12.25	55.22	15.85	2.90
POND 03	BASE	010	16.08	4.33	6.00	0.0018	353750	12.25	96.48	14.72	6.46
POND 03	BASE	025	15.43	4.52	6.00	0.0018	356846	12.25	115.96	14.51	7.80
POND 03	BASE	050	15.14	4.72	6.00	0.0019	359976	12.25	135.67	14.19	9.04
POND 03	BASE	100	14.77	4.96	6.00	0.0019	363729	12.25	159.84	13.96	10.43
POND 04	BASE	002	24.35	3.87	6.00	0.0012	2581715	12.25	233.68	24.35	5.50
POND 04	BASE	010	23.73	4.24	6.00	0.0011	2593578	12.25	374.46	23.73	11.62
POND 04	BASE	025	23.65	4.41	6.00	0.0011	2598944	12.25	439.82	23.65	14.13
POND 04	BASE	050	23.85	4.58	6.00	0.0011	2604372	12.25	504.56	23.85	16.60
POND 04	BASE	100	24.00	4.79	6.00	0.0011	2610891	12.25	583.44	24.00	19.36
POND 05	BASE	002	14.76	3.96	6.00	0.0025	177571	12.25	41.69	14.76	6.53
POND 05	BASE	010	13.95	4.49	6.00	0.0025	185993	12.25	78.07	13.95	13.77
POND 05	BASE	025	13.74	4.73	6.00	0.0026	189817	12.25	94.93	13.74	17.40
POND 05	BASE	050	13.46	4.97	6.00	0.0026	193690	12.25	112.56	13.46	21.19
POND 05	BASE	100	13.33	5.27	6.00	0.0026	198335	12.25	133.99	13.33	25.98
POND 06	BASE	002	14.76	4.06	6.00	0.0024	375833	12.25	84.00	14.80	7.83
POND 06	BASE	010	14.24	4.67	6.00	0.0025	395314	12.25	153.32	14.67	15.61
POND 06	BASE	025	14.21	4.97	6.00	0.0025	404814	12.25	186.24	14.74	18.90
POND 06	BASE	050	14.20	5.28	6.00	0.0026	414443	12.25	219.53	14.78	21.98
POND 06	BASE	100	14.21	5.64	6.00	0.0027	426062	12.25	259.79	14.87	25.45
POND 07	BASE	002	47.22	5.29	6.00	0.0025	208457	12.91	49.50	47.22	12.40
POND 07	BASE	010	13.70	6.27	6.00	0.0031	221331	12.72	127.46	13.70	19.01
POND 07	BASE	025	13.66	6.68	6.00	0.0037	226742	12.69	167.51	13.66	21.48
POND 07	BASE	050	13.68	7.11	6.00	0.0036	232262	12.66	208.61	13.68	23.84
POND 07	BASE	100	13.70	7.60	6.00	0.0035	238709	12.55	253.41	13.70	26.43
POND 08	BASE	002	16.90	3.95	6.00	0.0014	811974	12.25	90.19	16.90	3.28
POND 08	BASE	010	16.45	4.22	6.00	0.0013	816619	12.25	150.46	16.45	7.05
POND 08	BASE	025	16.09	4.34	6.00	0.0012	818740	12.25	178.60	16.09	9.05
POND 08	BASE	050	15.43	4.46	6.00	0.0013	820909	12.25	207.05	15.43	11.18
POND 08	BASE	100	15.31	4.62	6.00	0.0013	823570	12.25	241.40	15.31	13.49

KIAWAH RIVER PLANTATION  
DRAINAGE BASIN STUDY

# **Appendix F**

POST-DEVELOPMENT (BUILD OUT)  
STORMWATER DESIGN CONSIDERATIONS

PREPARED BY

THOMAS & HUTTON ENGINEERING CO.



# STORMWATER DESIGN CONSIDERATIONS

**PROJECT: 17091 KIAWAH RIVER PLANTATION**

**PREPARED BY:** Thomas and Hutton Engineering Company  
**PREPARED FOR:**

**Job: J-17091**

Date: 5/21/09

Revised:

By: CGB

## DRAINAGE BASIN 1

## DRAINAGE BASIN 1

### Calculate Post-Development "Tc" and Composite "CN"

"POST"

#### Calculate Time of Concentration:

Use Travel Time Concept:

#### Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Light Underbrush = 0.400

l = 100 ft

P2 = 4.60 in

S = 0.0010 ft/ft

t<sub>1</sub> = 59.4 min

#### Shallow Concentrated Flow:

$$t = l / 60v$$

where

l = 3900 ft

Paved ? No

Slope, S = 0.0020 ft/ft

v = 0.72 ft/s

t<sub>2</sub> = 90.1 min

**Basin 1: Tc = 149.0 min**

#### Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)

l=Length of flow (ft)

S=Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A=Cross-Sectional Area (ft<sup>2</sup>)

P=Wetted Perimeter (ft)

R=Hydraulic Radius (ft)

v=Velocity (ft/s)- From TR-55

l = 0 ft

S = 0.0000 ft/ft

n = Not maintained, dense brush, high stage = 0.1200

A = 0.00 sf

P = 0.00 ft => Hydraulic Radius, R = n/a

v = n/a

t<sub>3</sub> = n/a

#### Pipe Flow: t=l/60v

l = 0 ft

v = 0.00 ft/s

t = 0.0 min

#### Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Woods: Good (no grazing or burning)	A	30	8.92	268
Resi: 1 acre (20% avg. imp.)	B	68	1.50	102
Commercial or Industrial (85% avg. imp.)	B	92	4.87	448
B/D Woods: Good (no grazing or burning)	D	77	117.50	9,048
			132.79	9,865

**Basin 1: Composite CN = 74**

## DRAINAGE BASIN 2

## DRAINAGE BASIN 2

### Calculate Post-Development "Tc" and Composite "CN"

"POST"

#### Calculate Time of Concentration:

Use Travel Time Concept:

#### Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Woods: Dense Underbrush = 0.800

l = 100 ft

P2 = 4.60 in

S = 0.0020 ft/ft

t<sub>1</sub> = 78.3 min

#### Shallow Concentrated Flow:

$$t = l / 60v$$

where

l = 11000 ft

Paved ? No

Slope, S = 0.0020 ft/ft

v = 0.72 ft/s

t<sub>2</sub> = 254.1 min

**Basin 2: Tc = 332.0 min**

#### Channel Flow: t=l/60v

where: t=Travel time for Pipe Flow (min)

l=Length of flow (ft)

S=Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A=Cross-Sectional Area (ft<sup>2</sup>)

P=Wetted Perimeter (ft)

R=Hydraulic Radius (ft)

v=Velocity (ft/s)- From TR-55

l = 0 ft

S = 0.0000 ft/ft

n = Earth, fairly uniform, some weeds = 0.0280

A = 0.00 sf

P = 0.00 ft => Hydraulic Radius, R = n/a

v = n/a

t<sub>3</sub> = n/a

#### Pipe Flow: t=l/60v

l = 0 ft

v = 0.00 ft/s

t = 0.0 min

#### Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1 acre (20% avg. imp.)	B	68	7.80	530
Woods: Good (no grazing or burning)	A	30	31.16	935
B/D Woods: Good (no grazing or burning)	D	77	601.06	46,282
			640.02	47,747

**Basin 2: Composite CN = 75**

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0020 \text{ ft/ft}$$

$$t_1 = 78.3 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 12000 \text{ ft}$$

$$\text{Paved? No}$$

$$\text{Slope, } S = 0.0020 \text{ ft/ft}$$

$$v = 0.72 \text{ ft/s}$$

$$t_2 = 277.2 \text{ min}$$

$$\text{Basin 3: } T_c = 356.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1 acre (20% avg. imp.)	B	68	0.78	53
Crops (SR) Straight Row: Good	A	63	46.95	2,958
Woods: Good (no grazing or burning)	D	77	14.29	1,100
B/D Woods: Good (no grazing or burning)	D	77	297.65	22,919
			359.67	27,030

$$\text{Basin 3: Composite CN} = 75$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5})(S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0020 \text{ ft/ft}$$

$$t_1 = 78.3 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l/60v$$

where

$$l = 2800 \text{ ft}$$

$$\text{Paved? No}$$

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 52.8 \text{ min}$$

$$\text{Basin 4: } T_c = 138.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 1800 \text{ ft}$$

$$S = 0.0030 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 42.00 \text{ sf}$$

$$P = 23.97 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = 1.75 \text{ ft}$$

$$v = 4.22 \text{ ft/s}$$

$$t_3 = 7.1 \text{ min}$$

**Pipe Flow:**  $t = l/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1 acre (20% avg. imp.)	B	68	20.31	1,381
Crops (SR) Straight Row: Good	B	75	52.01	3,901
B/D Woods: Good (no grazing or burning)	D	77	134.81	10,380
			207.13	15,662

$$\text{Basin 4: Composite CN} = 76$$



**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Pvmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0050 \text{ ft/ft}$$

$$t_1 = 5.9 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved ? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 4A: } T_c = 16.0 \text{ min}$$

**Channel Flow:**  $t = 1/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 1000 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 8.3 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1 acre (20% avg. imp.)	B	68	24.36	1,656
B/D Open Space, Good (grass > 75%)	B	61	10.97	669
			35.33	2,326

$$\text{Basin 4A: Composite CN} = 66$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0020 \text{ ft/ft}$$

$$t_1 = 78.3 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 800 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 15.1 \text{ min}$$

$$\text{Basin 5: } T_c = 98.0 \text{ min}$$

**Channel Flow:**  $t = 1/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 1300 \text{ ft}$$

$$S = 0.0040 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 42.00 \text{ sf}$$

$$P = 23.97 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = 1.75 \text{ ft}$$

$$v = 4.88 \text{ ft/s}$$

$$t_3 = 4.4 \text{ min}$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1 acre (20% avg. imp.)	B	68	2.64	180
Crops (SR) Straight Row: Good	B	75	14.00	1,050
B/D Woods: Good (no grazing or burning)	D	77	32.41	2,496
			49.05	3,725

$$\text{Basin 5: Composite CN} = 76$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Light Underbrush} = 0.400$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0020 \text{ ft/ft}$$

$$t_1 = 45.0 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 2300 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0020 \text{ ft/ft}$$

$$v = 0.72 \text{ ft/s}$$

$$t_2 = 53.1 \text{ min}$$

$$\text{Basin 6: } T_c = 98.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1 acre (20% avg. imp.)	B	68	9.16	623
Crops (SR) Straight Row: Good	C	83	5.96	495
B/D Woods: Good (no grazing or burning)	D	77	68.88	5,304
			84.00	6,421

$$\text{Basin 6: Composite CN} = 76$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0020 \text{ ft/ft}$$

$$t_1 = 78.3 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 1000 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0020 \text{ ft/ft}$$

$$v = 0.72 \text{ ft/s}$$

$$t_2 = 23.1 \text{ min}$$

$$\text{Basin 7: } T_c = 101.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Crops (SR) Straight Row: Good	B	75	11.31	848
B/D Woods: Good (no grazing or burning)	D	77	33.64	2,590
			44.95	3,439

$$\text{Basin 7: Composite CN} = 76$$

## Calculate Post-Development "Tc" and Composite "CN"

"POST"

## Calculate Time of Concentration:

Use Travel Time Concept:

## Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Grass: Bermuda

l = 100 ft

P2 = 4.60 in

S = 0.0050 ft/ft

t<sub>1</sub> = 31.8 min

= 0.410

## Shallow Concentrated Flow:

t=1/60v

where

l = 500 ft

Paved ? No

Slope, S = 0.0040 ft/ft

v = 1.02 ft/s

t<sub>2</sub> = 8.2 min

Basin 7A: Tc = 42.0 min

## Channel Flow: t=1/60v

where: t=Travel time for Pipe Flow (min)

l=Length of flow (ft)

S=Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A=Cross-Sectional Area (ft<sup>2</sup>)

P=Wetted Perimeter (ft)

R=Hydraulic Radius (ft)

v=Velocity (ft/s)- From TR-55

l = 0 ft

S = 0.0000 ft/ft

n = Earth, fairly uniform, some weeds

= 0.0280

A = 0.00 sf

P = 0.00 ft

=&gt; Hydraulic Radius, R = n/a

v = n/a

t<sub>3</sub> = n/a

## Pipe Flow: t=1/60v

l= 300 ft

v= 2.00 ft/s

t= 2.5 min

## Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Open Space, Good (grass > 75%)	A	39	1.85	72
Wet Ponds or Saturated Wetlands	B	98	8.18	802
Open Space, Good (grass > 75%)	D	80	8.41	673
B/D Open Space, Good (grass > 75%)	B	61	78.96	4,817
			97.40	6,363

Basin 7A: Composite CN = 65

## Calculate Post-Development "Tc" and Composite "CN"

"POST"

## Calculate Time of Concentration:

Use Travel Time Concept:

## Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

n = Pvmt. &amp; Grass Combo (50/50) = 0.100

l = 50 ft

P2 = 4.60 in

S = 0.0040 ft/ft

t<sub>1</sub> = 6.5 min

= 0.100

## Shallow Concentrated Flow:

t=1/60v

where

l = 150 ft

Paved ? No

Slope, S = 0.0040 ft/ft

v = 1.02 ft/s

t<sub>2</sub> = 2.4 min

Basin 7B: Tc = 13.0 min

## Channel Flow: t=1/60v

where: t=Travel time for Pipe Flow (min)

l=Length of flow (ft)

S=Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A=Cross-Sectional Area (ft<sup>2</sup>)

P=Wetted Perimeter (ft)

R=Hydraulic Radius (ft)

v=Velocity (ft/s)- From TR-55

l = 0 ft

S = 0.0000 ft/ft

n = Earth, fairly uniform, some weeds

= 0.0280

A = 0.00 sf

P = 0.00 ft

=&gt; Hydraulic Radius, R = n/a

v = n/a

t<sub>3</sub> = n/a

## Pipe Flow: t=1/60v

l= 500 ft

v= 2.00 ft/s

t= 4.2 min

## Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
B/D Resi: 1/3 acre (30% avg. imp.)	B	72	55.70	4,010
			55.70	4,010

Basin 7B: Composite CN = 72

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0020 \text{ ft/ft}$$

$$t_1 = 78.3 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 1425 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0020 \text{ ft/ft}$$

$$v = 0.72 \text{ ft/s}$$

$$t_2 = 32.9 \text{ min}$$

$$\text{Basin 8: } T_c = 129.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 3700 \text{ ft}$$

$$S = 0.0020 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 42.00 \text{ sf}$$

$$P = 23.97 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = 1.75 \text{ ft}$$

$$v = 3.45 \text{ ft/s}$$

$$t_3 = 17.9 \text{ min}$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Woods: Good (no grazing or burning)	B	55	58.28	3,205
Crops (SR) Straight Row: Good	B	75	153.10	11,483
Woods: Good (no grazing or burning)	A	30	54.23	1,627
B/D Woods: Good (no grazing or burning)	D	77	232.74	17,921
			498.35	34,236

$$\text{Basin 8: Composite CN} = 69$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0030 \text{ ft/ft}$$

$$t_1 = 66.6 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 6000 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 113.2 \text{ min}$$

$$\text{Basin 9: } T_c = 180.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Woods: Good (no grazing or burning)	A	30	58.85	1,766
Resi: 1 acre (20% avg. imp.)	B	68	16.83	1,144
Crops (SR) Straight Row: Good	B	75	27.90	2,093
Woods: Good (no grazing or burning)	C	70	9.59	671
B/D Woods: Good (no grazing or burning)	D	77	215.86	16,621
Woods: Good (no grazing or burning)	D	77	162.74	12,531
			491.77	34,826

$$\text{Basin 9: Composite CN} = 71$$



**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Pvmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved ? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 9A: } T_c = 12.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 450 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 3.8 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1/3 acre (30% avg. imp.)	C	81	9.16	742
Wet Ponds or Saturated Wetlands	C	98	1.78	174
B/D Resi: 1/3 acre (30% avg. imp.)	B	72	15.90	1,145
			26.84	2,061

$$\text{Basin 9A: Composite CN} = 77$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Pvmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved ? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 9B: } T_c = 12.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 450 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 3.8 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
B/D Resi: 1/3 acre (30% avg. imp.)	B	72	18.54	1,335
			18.54	1,335

$$\text{Basin 9B: Composite CN} = 72$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Pvmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 9C: } T_c = 17.0 \text{ min}$$

**Channel Flow:**  $t = 1/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 1000 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 8.3 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1/8 acre or less; townhouse (65% imp.)	A	77	2.31	178
B/D Resi: 1/8 acre or less; townhouse (65% imp.)	B	85	70.93	6,029
			73.24	6,207

$$\text{Basin 9C: Composite CN} = 85$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Light Underbrush} = 0.400$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0030 \text{ ft/ft}$$

$$t_1 = 38.3 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 1150 \text{ ft}$$

$$\text{Paved? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 18.8 \text{ min}$$

$$\text{Basin 10: } T_c = 57.0 \text{ min}$$

**Channel Flow:**  $t = 1/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1 acre (20% avg. imp.)	B	68	2.49	169
Crops (SR) Straight Row: Good	B	75	27.04	2,028
B/D Woods: Good (no grazing or burning)	D	77	1.14	88
			30.67	2,285

$$\text{Basin 10: Composite CN} = 75$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Grass: Bermuda} = 0.410$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 34.8 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 2.4 \text{ min}$$

$$\text{Basin 10A: } T_c = 41.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 500 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 4.2 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	B	98	3.03	297
B/D Open Space, Good (grass > 75%)	B	61	54.64	3,333
			57.67	3,630

$$\text{Basin 10A: Composite CN} = 63$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Light Underbrush} = 0.400$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0030 \text{ ft/ft}$$

$$t_1 = 38.3 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 4000 \text{ ft}$$

$$\text{Paved? No}$$

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 75.4 \text{ min}$$

$$\text{Basin 11: } T_c = 114.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
B/D Woods: Good (no grazing or burning)	D	77	110.71	8,525
Crops (SR) Straight Row: Good	B	75	18.82	1,412
Woods/grass combination: Good	D	79	4.46	352
			133.99	10,289

$$\text{Basin 11: Composite CN} = 77$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = P_{vmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved ? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 12: } T_c = 15.0 \text{ min}$$

**Channel Flow:**  $t = 1/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 750 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 6.3 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	B	98	7.40	725
B/D Resi: 1/3 acre (30% avg. imp.)	B	72	34.50	2,484
			41.90	3,209

$$\text{Basin 12: Composite CN} = 77$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Light Underbrush} = 0.400$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0030 \text{ ft/ft}$$

$$t_1 = 38.3 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 3200 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 60.4 \text{ min}$$

$$\text{Basin 13: } T_c = 113.0 \text{ min}$$

**Channel Flow:**  $t = 1/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 3600 \text{ ft}$$

$$S = 0.0030 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 42.00 \text{ sf}$$

$$P = 23.97 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = 1.75 \text{ ft}$$

$$v = 4.22 \text{ ft/s}$$

$$t_3 = 14.2 \text{ min}$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Crops (SR) Straight Row: Good	B	75	17.53	1,315
Woods: Good (no grazing or burning)	C	70	6.59	461
Woods: Good (no grazing or burning)	D	77	25.03	1,927
B/D Woods/grass combination: Good	D	79	111.56	8,813
			160.71	12,517

$$\text{Basin 13: Composite CN} = 78$$



**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Pvmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 2.8 \text{ min}$$

$$\text{Basin 14: } T_c = 16.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 775 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 6.5 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	B	98	1.93	189
Open Space, Good (grass > 75%)	B	61	4.11	251
B/D Woods/grass combination: Good	B	58	35.11	2,036
			41.15	2,476

$$\text{Basin 14: Composite CN} = 60$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Grass: Bermuda} = 0.410$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 34.8 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 200 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 3.3 \text{ min}$$

$$\text{Basin 15: } T_c = 42.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 500 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 4.2 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	B	98	16.06	1,574
Resi: 1/3 acre (30% avg. imp.)	B	72	31.55	2,272
B/D Open Space, Good (grass > 75%)	B	61	92.68	5,653
			140.29	9,499

$$\text{Basin 15: Composite CN} = 68$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Grass: Bermuda} = 0.410$$

$$l = 100 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 34.8 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 250 \text{ ft}$$

$$\text{Paved? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 4.1 \text{ min}$$

$$\text{Basin 15A: } T_c = 44.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 600 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 5.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	B	98	2.61	256
Resi: 1/3 acre (30% avg. imp.)	B	72	1.98	143
B/D Open Space, Good (grass > 75%)	B	61	29.41	1,794
			34.00	2,192

$$\text{Basin 15A: Composite CN} = 64$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Pvmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 16: } T_c = 16.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 950 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 7.9 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	B	98	7.06	692
B/D Resi: 1/3 acre (30% avg. imp.)	B	72	46.51	3,349
			53.57	4,041

$$\text{Basin 16: Composite CN} = 75$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0020 \text{ ft/ft}$$

$$t_1 = 45.0 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 100 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0030 \text{ ft/ft}$$

$$v = 0.88 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 17: } T_c = 78.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 6500 \text{ ft}$$

$$S = 0.0020 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 42.00 \text{ sf}$$

$$P = 23.97 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = 1.75 \text{ ft}$$

$$v = 3.45 \text{ ft/s}$$

$$t_3 = 31.4 \text{ min}$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Woods: Good (no grazing or burning)	D	77	41.57	3,201
			41.57	3,201

$$\text{Basin 17: Composite CN} = 77$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Pvmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved ? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 18: } T_c = 16.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = \text{n/a}$$

$$v = \text{n/a}$$

$$t_3 = \text{n/a}$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 900 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 7.5 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1/3 acre (30% avg. imp.)	B	72	26.17	1,884
-	-	-	0.00	-
			26.17	1,884

$$\text{Basin 18: Composite CN} = 72$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Smooth/Paved Surfaces} = 0.011$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 1.1 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved ? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 19: } T_c = 10.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 850 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 7.1 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Resi: 1/3 acre (30% avg. imp.)	B	72	20.45	1,472
			20.45	1,472

$$\text{Basin 19: Composite CN} = 72$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Pvmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved ? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 20: } T_c = 12.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 400 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 3.3 \text{ min}$$

Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
B/D	Resi: 1/3 acre (30% avg. imp.)	B	72	12.59	906
	Wet Ponds or Saturated Wetlands	B	98	2.00	196
				14.59	1,102

$$\text{Basin 20: Composite CN} = 76$$



## Calculate Post-Development "Tc" and Composite "CN"

"POST"

## Calculate Time of Concentration:

Use Travel Time Concept:

## Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Pvmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

## Shallow Concentrated Flow:

$$t = l / 60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 20A: } T_c = 13.0 \text{ min}$$

Channel Flow:  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

Pipe Flow:  $t = l / 60v$ 

$$l = 550 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 4.6 \text{ min}$$

## Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
B/D	Resi: 1/3 acre (30% avg. imp.)	B	72	27.39	1,972
	Wet Ponds or Saturated Wetlands	B	98	2.15	211
				29.54	2,183

$$\text{Basin 20A: Composite CN} = 74$$

## Calculate Post-Development "Tc" and Composite "CN"

"POST"

## Calculate Time of Concentration:

Use Travel Time Concept:

## Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Grass: Bermuda} = 0.410$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0050 \text{ ft/ft}$$

$$t_1 = 18.3 \text{ min}$$

## Shallow Concentrated Flow:

$$t = l / 60v$$

where

$$l = 200 \text{ ft}$$

$$\text{Paved? Yes}$$

$$\text{Slope, } S = 0.0050 \text{ ft/ft}$$

$$v = 1.44 \text{ ft/s}$$

$$t_2 = 2.3 \text{ min}$$

$$\text{Basin 21: } T_c = 24.0 \text{ min}$$

Channel Flow:  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

Pipe Flow:  $t = l / 60v$ 

$$l = 400 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 3.3 \text{ min}$$

## Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
	Resi: 1/3 acre (30% avg. imp.)	B	72	121.07	8,717
	Open Space, Good (grass > 75%)	B	61	155.23	9,469
	Open Space, Good (grass > 75%)	A	39	26.29	1,025
	Open Space, Good (grass > 75%)	D	80	12.93	1,034
				315.52	20,246

$$\text{Basin 21: Composite CN} = 64$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Pvmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved ? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 22: } T_c = 18.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 1200 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 10.0 \text{ min}$$

Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
	Wet Ponds or Saturated Wetlands	B	98	2.14	210
	Open Space, Good (grass > 75%)	B	61	3.49	213
B/D	Resi: 1/8 acre or less; townhouse (65% imp.)	B	85	61.68	5,243
				67.31	5,665

$$\text{Basin 22: Composite CN} = 84$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Pvmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved ? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 23: } T_c = 21.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 1500 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 12.5 \text{ min}$$

Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
B/D	Resi: 1/8 acre or less; townhouse (65% imp.)	B	85	52.69	4,479
	Wet Ponds or Saturated Wetlands	B	98	5.88	576
				58.57	5,055

$$\text{Basin 23: Composite CN} = 86$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Pvmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved ? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 23A: } T_c = 13.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 500 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 4.2 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
B/D Resi: 1/8 acre or less; townhouse (65% imp.)	B	85	11.94	1,015
			11.94	1,015

$$\text{Basin 23A: Composite CN} = 85$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Pvmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved ? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 24: } T_c = 10.0 \text{ min}$$

**Channel Flow:**  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 150 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 1.3 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
B/D Resi: 1/3 acre (30% avg. imp.)	B	72	14.62	1,053
Open Space, Good (grass > 75%)	B	61	8.73	533
			23.35	1,585

$$\text{Basin 24: Composite CN} = 68$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = P_{vmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 125 \text{ ft}$$

$$\text{Paved ? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.6 \text{ min}$$

$$\text{Basin 25: } T_c = 12.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 500 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 4.2 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
B/D Resi: 1/3 acre (30% avg. imp.)	B	72	16.05	1,156
			16.05	1,156

$$\text{Basin 25: Composite CN} = 72$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = P_{vmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved ? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 26: } T_c = 10.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 150 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 1.3 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
B/D Resi: 1/3 acre (30% avg. imp.)	B	72	20.31	1,462
Open Space, Good (grass > 75%)	B	61	3.70	226
			24.01	1,688

$$\text{Basin 26: Composite CN} = 70$$



**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Pvmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 27: } T_c = 18.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 1100 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 9.2 \text{ min}$$

Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
B/D	Resi: 1/3 acre (30% avg. imp.)	B	72	31.59	2,274
	-	-	-	0.00	-
				31.59	2,274

$$\text{Basin 27: Composite CN} = 72$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Pvmt. \& Grass Combo (50/50)} = 0.100$$

$$l = 50 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0040 \text{ ft/ft}$$

$$t_1 = 6.5 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = l / 60v$$

where

$$l = 150 \text{ ft}$$

$$\text{Paved? Yes}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.29 \text{ ft/s}$$

$$t_2 = 1.9 \text{ min}$$

$$\text{Basin 28: } T_c = 17.0 \text{ min}$$

**Channel Flow:**  $t = l / 60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = l / 60v$ 

$$l = 1000 \text{ ft}$$

$$v = 2.00 \text{ ft/s}$$

$$t = 8.3 \text{ min}$$

Determine Composite Curve Number

	Description	HSG	CN	A (acres)	CN x A
B/D	Resi: 1/3 acre (30% avg. imp.)	B	72	35.75	2,574
	-	-	-	0.00	-
				35.75	2,574

$$\text{Basin 28: Composite CN} = 72$$

## Calculate Post-Development "Tc" and Composite "CN"

"POST"

## Calculate Time of Concentration:

Use Travel Time Concept:

## Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 0 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0010 \text{ ft/ft}$$

$$t_1 = 0.0 \text{ min}$$

## Shallow Concentrated Flow:

$$t = 1/60v$$

where

$$l = 0 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 0.0 \text{ min}$$

$$\text{Basin Pond 1: } T_c = 0.0 \text{ min}$$

Channel Flow:  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

Pipe Flow:  $t = 1/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

## Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	172.13	16,869
Woods: Good (no grazing or burning)	D	77	50.92	3,921
			223.05	20,790

$$\text{Basin Pond 1: Composite CN} = 93$$

## Calculate Post-Development "Tc" and Composite "CN"

"POST"

## Calculate Time of Concentration:

Use Travel Time Concept:

## Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 0 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0010 \text{ ft/ft}$$

$$t_1 = 0.0 \text{ min}$$

## Shallow Concentrated Flow:

$$t = 1/60v$$

where

$$l = 0 \text{ ft}$$

$$\text{Paved ? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 0.0 \text{ min}$$

$$\text{Basin Pond 2: } T_c = 0.0 \text{ min}$$

Channel Flow:  $t = l/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

Pipe Flow:  $t = 1/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

## Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	6.49	636
-	-	-	0.00	-
			6.49	636

$$\text{Basin Pond 2: Composite CN} = 98$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 0 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0010 \text{ ft/ft}$$

$$t_1 = 0.0 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 0 \text{ ft}$$

$$\text{Paved? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 0.0 \text{ min}$$

$$\text{Basin Pond 3: } T_c = 0.0 \text{ min}$$

**Channel Flow:**  $t = 1/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	7.73	758
-	-	-	0.00	-
			7.73	758

$$\text{Basin Pond 3: Composite CN} = 98$$

**Calculate Post-Development "Tc" and Composite "CN"****"POST"**Calculate Time of Concentration:

Use Travel Time Concept:

**Overland Sheet Flow:**

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 0 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0010 \text{ ft/ft}$$

$$t_1 = 0.0 \text{ min}$$

**Shallow Concentrated Flow:**

$$t = 1/60v$$

where

$$l = 0 \text{ ft}$$

$$\text{Paved? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 0.0 \text{ min}$$

$$\text{Basin Pond 4: } T_c = 0.0 \text{ min}$$

**Channel Flow:**  $t = 1/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

**Pipe Flow:**  $t = 1/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	58.82	5,764
-	-	-	0.00	-
			58.82	5,764

$$\text{Basin Pond 4: Composite CN} = 98$$

## Calculate Post-Development "Tc" and Composite "CN"

"POST"

## Calculate Time of Concentration:

Use Travel Time Concept:

## Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 0 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0010 \text{ ft/ft}$$

$$t_1 = 0.0 \text{ min}$$

## Shallow Concentrated Flow:

$$t = 1/60v$$

where

$$l = 0 \text{ ft}$$

$$\text{Paved? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 0.0 \text{ min}$$

$$\text{Basin Pond 5: } T_c = 0.0 \text{ min}$$

Channel Flow:  $t = 1/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

Pipe Flow:  $t = 1/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

## Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	3.82	374
-	-	-	0.00	-
			3.82	374

$$\text{Basin Pond 5: Composite CN} = 98$$

## Calculate Post-Development "Tc" and Composite "CN"

"POST"

## Calculate Time of Concentration:

Use Travel Time Concept:

## Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 0 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0010 \text{ ft/ft}$$

$$t_1 = 0.0 \text{ min}$$

## Shallow Concentrated Flow:

$$t = 1/60v$$

where

$$l = 0 \text{ ft}$$

$$\text{Paved? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 0.0 \text{ min}$$

$$\text{Basin Pond 6: } T_c = 0.0 \text{ min}$$

Channel Flow:  $t = 1/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s)- From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

Pipe Flow:  $t = 1/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

## Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	8.04	788
-	-	-	0.00	-
			8.04	788

$$\text{Basin Pond 6: Composite CN} = 98$$



## Calculate Post-Development "Tc" and Composite "CN"

"POST"

## Calculate Time of Concentration:

Use Travel Time Concept:

## Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 0 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0010 \text{ ft/ft}$$

$$t_1 = 0.0 \text{ min}$$

## Shallow Concentrated Flow:

$$t = 1/60v$$

where

$$l = 0 \text{ ft}$$

$$\text{Paved? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 0.0 \text{ min}$$

$$\text{Basin Pond 7: } T_c = 0.0 \text{ min}$$

Channel Flow:  $t = 1/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

Pipe Flow:  $t = 1/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

## Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	4.25	417
-	-	-	0.00	-
			4.25	417

$$\text{Basin Pond 7: Composite CN} = 98$$

## Calculate Post-Development "Tc" and Composite "CN"

"POST"

## Calculate Time of Concentration:

Use Travel Time Concept:

## Overland Sheet Flow:

$$t = (0.007(nl)^{0.8}) / ((P2^{0.5}) * (S^{0.4}))$$

where: t = Travel time for Overland Flow (min)

n = Manning's coefficient - from TR-55

l = Length of flow (ft)

P2 = 2-yr rainfall depth (in)

S = Hydraulic slope (ft/ft)

$$n = \text{Woods: Dense Underbrush} = 0.800$$

$$l = 0 \text{ ft}$$

$$P2 = 4.60 \text{ in}$$

$$S = 0.0010 \text{ ft/ft}$$

$$t_1 = 0.0 \text{ min}$$

## Shallow Concentrated Flow:

$$t = 1/60v$$

where

$$l = 0 \text{ ft}$$

$$\text{Paved? No}$$

$$\text{Slope, } S = 0.0040 \text{ ft/ft}$$

$$v = 1.02 \text{ ft/s}$$

$$t_2 = 0.0 \text{ min}$$

$$\text{Basin Pond 8: } T_c = 0.0 \text{ min}$$

Channel Flow:  $t = 1/60v$ 

where: t = Travel time for Pipe Flow (min)

l = Length of flow (ft)

S = Average watercourse slope (ft/ft)

n = Manning's Coefficient for Channel Flow

A = Cross-Sectional Area (ft<sup>2</sup>)

P = Wetted Perimeter (ft)

R = Hydraulic Radius (ft)

v = Velocity (ft/s) - From TR-55

$$l = 0 \text{ ft}$$

$$S = 0.0000 \text{ ft/ft}$$

$$n = \text{Earth, fairly uniform, some weeds} = 0.0280$$

$$A = 0.00 \text{ sf}$$

$$P = 0.00 \text{ ft} \Rightarrow \text{Hydraulic Radius, } R = n/a$$

$$v = n/a$$

$$t_3 = n/a$$

Pipe Flow:  $t = 1/60v$ 

$$l = 0 \text{ ft}$$

$$v = 0.00 \text{ ft/s}$$

$$t = 0.0 \text{ min}$$

## Determine Composite Curve Number

Description	HSG	CN	A (acres)	CN x A
Wet Ponds or Saturated Wetlands	D	98	18.46	1,809
-	-	-	0.00	-
			18.46	1,809

$$\text{Basin Pond 8: Composite CN} = 98$$

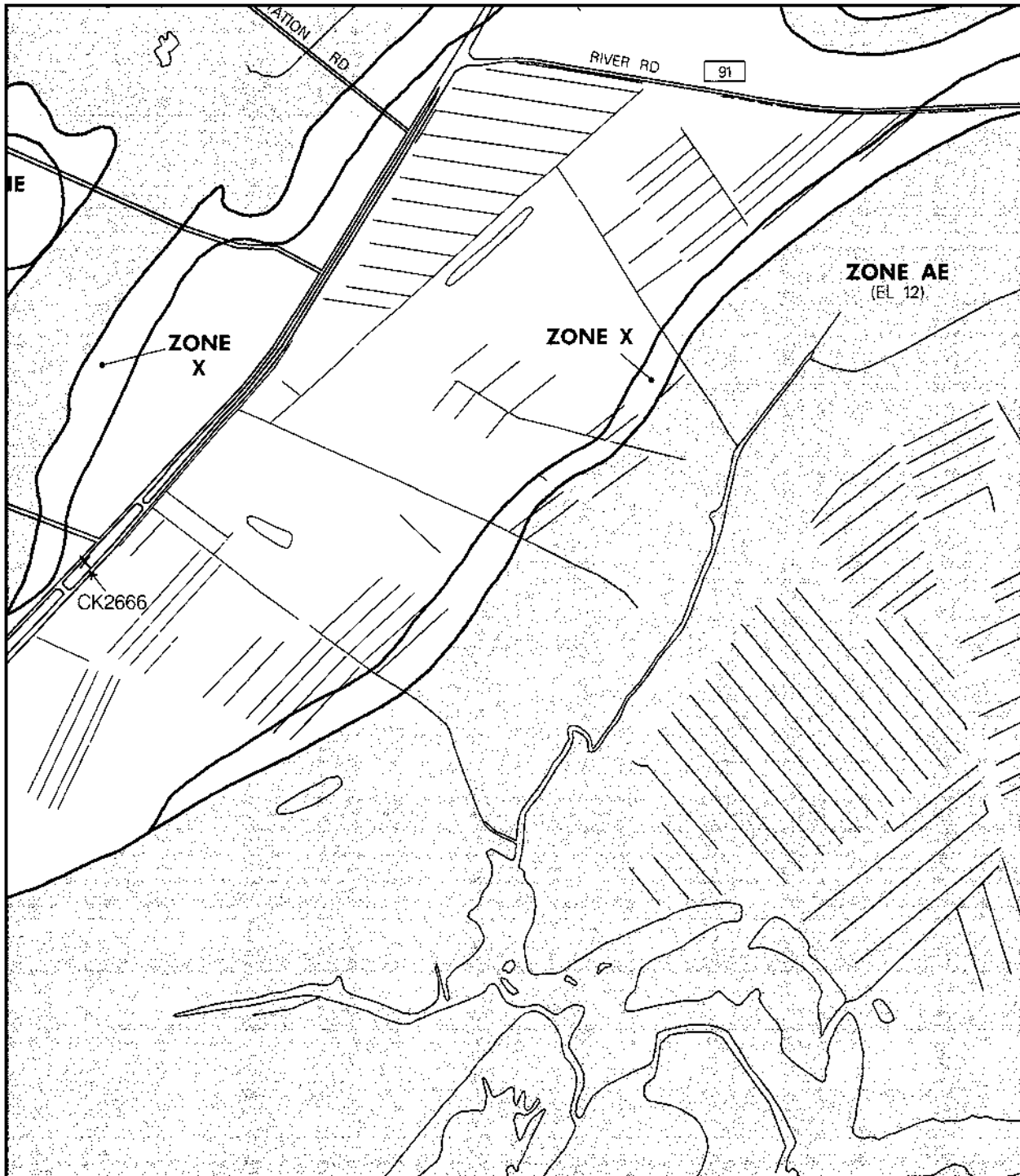
KIAWAH RIVER PLANTATION  
DRAINAGE BASIN STUDY

**Appendix G**

FEMA FLOOD MAP (FIRM)

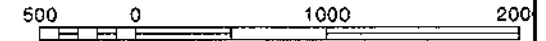
PREPARED BY

THOMAS & HUTTON ENGINEERING CO.



APPROXIMATE SCALE

MAP SCALE 1" = 1000'



# NATIONAL FLOOD INSURANCE PROGRAM

## **FIRM** FLOOD INSURANCE RATE MAP CHARLESTON COUNTY, SOUTH CAROLINA AND INCORPORATED AREAS

PANEL 645 OF 855

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CHARLESTON COUNTY	45019C0645J		

Notice to User: The MAP NUMBER shown below should be used when placing map orders. The COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

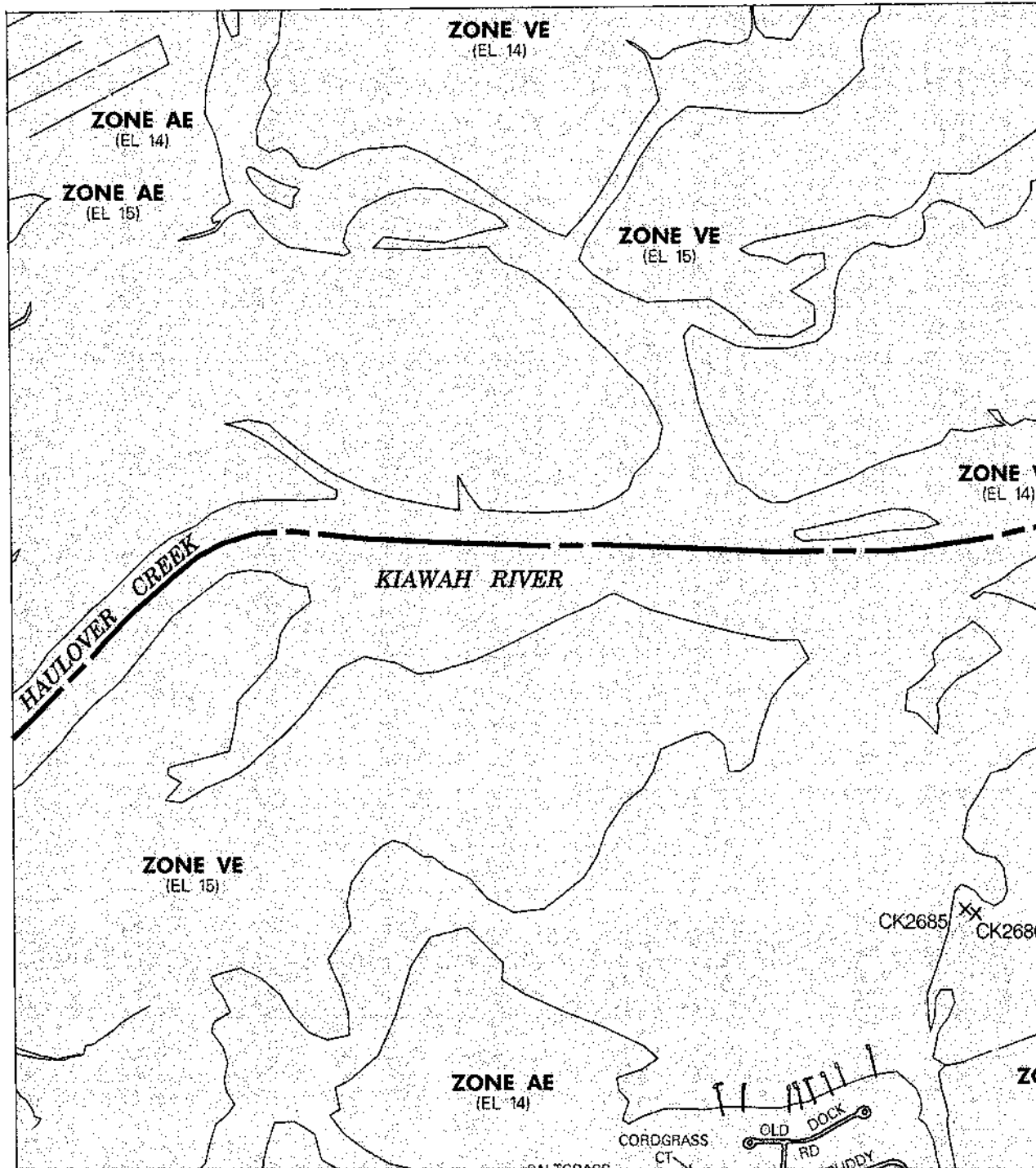
**MAP NUMBER**  
**45019C0645J**

**EFFECTIVE DATE:**  
**NOVEMBER 17, 2004**



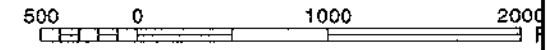
Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)



APPROXIMATE SCALE

MAP SCALE 1" = 1000'



**NATIONAL FLOOD INSURANCE PROGRAM**

**FIRM**  
**FLOOD INSURANCE RATE MAP**  
 CHARLESTON COUNTY,  
 SOUTH CAROLINA  
 AND INCORPORATED AREAS

**PANEL 805 OF 855**

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CHARLESTON COUNTY	450413	0805	J
KIAWAH ISLAND, TOWN OF	480267	0895	J

NOTES:

THIS MAP INCORPORATES APPROXIMATE BOUNDARIES OF COASTAL BARRIER RESOURCES SYSTEM UNITS AND/OR OTHERWISSE-REGULATED AREAS ESTABLISHED UNDER THE COASTAL BARRIER IMPROVEMENT ACT OF 1990 (PL 101-580)

NOTE: TO USE THE MAP NUMBER SHOWN BELOW, IT SHOULD BE USED WHEN PLACING MAP ORDERS; THE COMMUNITY NUMBER SHOWN ABOVE SHOULD BE USED ON INSURANCE APPLICATIONS FOR THE SUBJECT COMMUNITY.

**MAP NUMBER**  
**45019C0805J**

**EFFECTIVE DATE:**  
**NOVEMBER 17, 2004**



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)



KIAWAH RIVER PLANTATION  
DRAINAGE BASIN STUDY

**Appendix H**

WEB SOIL SURVEY (NRCS)


PREPARED BY  
THOMAS & HUTTON ENGINEERING CO.

This geological map of the Abbotsford area, British Columbia, displays topographic contours and geological units. The map is bounded by UTM coordinates (579000 to 587000 Easting, 3609000 to 3614000 Northing) and geographic coordinates (80° 9' 45" W to 80° 4' 3" W, 32° 40' 7" N to 32° 36' 49" N). Key features include State Hwy S-10-91, State Hwy S-10-20, and Governors Dr. Geological units are labeled with codes like Ka, Sk, WnB, Da, Yo, Ch, Ed, St, Wa, Cg, Ts, Me, and Le. Water bodies include Abbotsford Creek, Skimp, and Charlton Creek.

Soil Map—Charleston County Area, South Carolina  
(Kiawah River Plantation)

## MAP LEGEND






















### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

 Soil Map Units

### Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot
-  Spoil Area
-  Stony Spot



Very Stony Spot



Wet Spot



Other

### Special Line Features



Gully



Short Steep Slope



Other

### Political Features



Cities

### Water Features



Oceans



Streams and Canals

### Transportation



Rails



Interstate Highways



US Routes



Major Roads

## MAP INFORMATION

Map Scale: 1:43,000 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>

Coordinate System: UTM Zone 17N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Charleston County Area, South Carolina

Survey Area Data: Version 7, Jan 8, 2009

Date(s) aerial images were photographed: 6/7/2006; 6/10/2006; 6/9/2006; 7/21/2005; 6/17/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.



## Map Unit Legend

Charleston County Area, South Carolina (SC690)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Cg	Capers silty clay loam	989.2	10.0%
Ch	Charleston loamy fine sand	26.7	0.3%
Da	Dawhoo and rutlege loamy fine sand	1,877.4	19.0%
Ed	Edisto loamy fine sand	159.6	1.6%
HoA	Hockley loamy fine sand, 0 to 2 percent slopes	3.3	0.0%
Ka	Kiawah loamy fine sand	1,567.7	15.9%
Le	Leon fine sand	31.6	0.3%
Me	Meggett clay loam	3.6	0.0%
Sc	Santee clay loam	140.0	1.4%
Se	Santee loam	1.5	0.0%
Sk	Seabrook loamy fine sand	1,572.2	15.9%
St	Stono fine sandy loam	348.0	3.5%
Ts	Tidal marsh, soft	1,164.0	11.8%
W	Water	527.7	5.3%
Wa	Wadmalaw fine sandy loam	317.0	3.2%
WnB	Wando loamy fine sand, 0 to 6 percent slopes	851.4	8.6%
Yo	Yonges loamy fine sand	294.6	3.0%
<b>Totals for Area of Interest</b>		<b>9,875.2</b>	<b>100.0%</b>



KIAWAH RIVER PLANTATION  
DRAINAGE BASIN STUDY

**Appendix I**

2008 SOUTH CAROLINA  
LIST OF IMPAIRED WATERS/SCDHEC

PREPARED BY  
THOMAS & HUTTON ENGINEERING CO.

TMDL TARGET DATE(S) ++	NOTE	BASIN	HUC	LOCATION	STATION	COUNTY	USE	CAUSE
2013		SALUDA	030501100401	TOM'S CREEK AT RED BLUFF RD.	S-950	RICHLAND	REC	FC
2015		SALUDA	030501100402	BUCKHEAD CREEK AT S-09-151 2.1 MINE OF FORT MOTTE	RS-04521	CALHOUN	AL	BIO
2011	#	SALUDA	030501100403	CONGAREE RVR AT US 801 (SC-001)	C-007	CALHOUN	AL	CU
2011		SALUDA	030501100403	CONGAREE RVR AT US 801 (SC-001)	C-007	CALHOUN	REC	FC
2017		SALUDA	030501100403	CONGAREE RVR AT US 801 (SC-001)	C-007	CALHOUN	FISH	HG
2013		SANTEET	030501110101	WARLEY CREEK AT CO RD S-08-287 3.4 MI NW OF LONE STAR	RS-04389	CALHOUN	AL	BIO
2010		SANTEET	030501110102	DUCKFORD BRANCH AT S-43-52 3.2 MI SW OF PINEWOOD	RS-05585	SUMTER	REC	FC
2009	*	SANTEET	030501110102	SPRING GROVE CREEK @ SECONDARY ROAD 26 BRIDGE	SC-009	CLARENDON	REC	FC
2013, 2013, 2013		SANTEET	030501110103	LK INSPIRATION - ST MATTHEWS (FRONT OF HEALTH DEPT)	C-058	CALHOUN	AL	TN, TP, TURBIDITY
2015		SANTEET	030501110103	FURTTICK BRANCH @ COUNTY RD. 11	CW-517	CALHOUN	REC	FC
2018		SANTEET	030501110103	LYONS CREEK @ COUNTY RD. 20	CW-546	CALHOUN	REC	FC
2013		SANTEET	030501110103	LYONS CREEK AT SC 6	ST-533	CALHOUN	AL	BIO
2014	#	SANTEET	030501110104	UPPER LAKE MARION @ THE MOUTH OF HALFWAY SWAMP CREEK	SC-038	CALHOUN	AL	TP
2013		SANTEET	030501110104	HALFWAY SWAMP CREEK AT SR 157	ST-534	CALHOUN	AL	BIO
2021		SANTEET	030501110105	BIG POPLAR CREEK @ SECONDARY ROAD 105 BRIDGE	SC-011	CALHOUN	AL	DO
2009	*	SANTEET	030501110106	BIG BRANCH AT S-14-41 (SC-047)	CW-243	CLARENDON	REC	FC
2009	*	SANTEET	030501110107	UNNAMED TRIBUTARY TO TAWCAW CREEK AT S-14-559 (WILLIAM BRUNSON ROAD) 4.6 MI SE OF SUMMERTON	RS-03505	CLARENDON	REC	FC
2016		SANTEET	030501110107	MID LAKE MARION @ TAW CAW CREEK EMBAYMENT	SC-017	CLARENDON	AL	TP
2014		SANTEET	030501110107	TAWCAW CK AT S-14-127 3.2 MI S OF SUMMERTON (SC-018)	ST-018	CLARENDON	AL	DO
2008	*	SANTEET	030501110107	TAWCAW CK AT S-14-127 3.2 MI S OF SUMMERTON (SC-018)	ST-018	CLARENDON	REC	FC
2008	*	SANTEET	030501110108	WHITE OAK CREEK AT COUNTY RD 345, 4.5 M ESE OF SUMMERTON	RS-01051	CLARENDON	REC	FC
2009	*	SANTEET	030501110108	POTATO CREEK AT S-14-715 (ROGERS ROAD) 5.5 MI SE OF SUMMERTON	RS-03501	CLARENDON	REC	FC
2017		SANTEET	030501110108	LAKE MARION @ WYBOO CREEK	ST-024	CLARENDON	FISH	HG
2014		SANTEET	030501110108	POTATO CK AT S-14-127 3.2 MI S OF SUMMERTON (SC-020)	ST-035	CLARENDON	AL	DO
2008	*	SANTEET	030501110108	POTATO CK AT S-14-127 3.2 MI S OF SUMMERTON (SC-020)	ST-035	CLARENDON	REC	FC
2017		SANTEET	030501110109	LAKE MARION @ TREZVANT'S LANDING	C-007K	CALHOUN	FISH	HG
2017		SANTEET	030501110109	LAKE MARION @ DANIELS 4H CAMP	C-057	CALHOUN	FISH	HG
2014		SANTEET	030501110109	LAKE MARION FOREBAY, SPILLWAY MARKER 44 (SC-022)	CL-042	ORANGEBURG	AL	CU
2016		SANTEET	030501110109	LK MARION @ CHANNEL MARKER 69, USE Santee COOPER SC-016	RL-02308	CLARENDON	AL	TP
2016	#	SANTEET	030501110109	LAKE MARION 0.5 MI NE OF CALHOUN LANDING (USE SC-044)	RL-04388	CALHOUN	AL	TP
2014, 2014		SANTEET	030501110109	UPPER LAKE MARION NEAR PACK'S LANDING	SC-005	SUMTER	AL	DO, TP
2016		SANTEET	030501110109	LAKE MARION AT RR TRESTLE AT LONE STAR (SC-008)	SC-008	CALHOUN	AL	TP
2014, 2014	#	SANTEET	030501110109	UPPER LAKE MARION AT CHANNEL MARKER 150	SC-010	CALHOUN	AL	TP
2014		SANTEET	030501110109	UPPER LAKE MARION @ HEADWATERS OF CHAPEL BRANCH CREEK	SC-014	ORANGEBURG	AL	PH, TP
2014		SANTEET	030501110109	UPPER LAKE MARION 2.0 KM BELOW RIMINI RAILROAD TRESTLE	SC-039	CLARENDON	AL	TP
2016		SANTEET	030501110109	MID LAKE MARION @ CHANNEL MARKER 79	SC-040	ORANGEBURG	AL	TP
2008	*	SANTEET	030501110109	STREAM FLOWING THRU SANTEE NATIONAL GOLF COURSE POND @ HWY 6	SC-045	ORANGEBURG	REC	FC
2015		SANTEET	030501110109	SURFACE DRAINAGE FROM SAFETY KLEEN HAZARDOUS LANDFILL	SC-057	SUMTER	AL	NI
2016		SANTEET	030501110109	LK MARION AT OLD US 301/15 BRDG AT SANTEE (SC-015)	ST-025	ORANGEBURG	AL	TP
2017		SANTEET	030501110109	LAKE MARION @ DAM	ST-027	CLARENDON	FISH	HG

TMDL TARGET DATE(S) ++	NOTE	BASIN	HUC	LOCATION	STATION	COUNTY	USE	CAUSE
2017		SANTEE	030501110109	LAKE MARION @ RIMINI	ST-519	SUMTER	FISH	HG
2017		SANTEE	030501110109	LAKE MARION @ LOW FALLS LANDING	ST-529	CALHOUN	FISH	HG
2017		SANTEE	030501120101	SANTEE RIVER BELOW LAKE MARION (WILSONS)	ST-532	BERKELEY	FISH	HG
2013		SANTEE	030501120102	BENNETTS BRANCH AT S-14-351 11.5 MI SSE OF MANNING	RS-05399	CLARENDON	REC	FC
2015		SANTEE	030501120102	BENNETTS BRANCH AT SR 351	ST-536	CLARENDON	AL	BIO
2013		SANTEE	030501120102	DOCTOR BRANCH AT SR 48	ST-537	CLARENDON	AL	BIO
2017		SANTEE	030501120105	REDIVERSION CANAL AT US 52 (SC-037A)	ST-031	BERKELEY	FISH	HG
2017		SANTEE	030501120106	SANTEE RIVER @ US 52 (HWY 52 LANDING)	ST-528	WILLIAMSBURG	FISH	HG
2009	*	SANTEE	030501120205	ECHAW CK AT PITCH LANDING FRANCIS MARION NAT'L FOREST	RS-02467	BERKELEY	REC	FC
2017		SANTEE	030501120206	SANTEE RIVER @ SC 41/US 17A	ST-001	BERKELEY	FISH	HG
2017		SANTEE	030501120302	WAMBAW CREEK (STILL'S LANDING)	CSTL-112	CHARLESTON	FISH	HG
2012		SANTEE	030501120303	SOUTH SANTEE RIVER AT ALLIGATOR CREEK	06A-01	GEORGETOWN	SHELLFISH	FC
2012		SANTEE	030501120303	SOUTH SANTEE RIVER NEAR THE MIDPOINT OF GRACE ISL (C-3/01)	06A-01A	CHARLESTON	SHELLFISH	FC
2012		SANTEE	030501120303	SOUTH SANTEE INLET	06A-02	GEORGETOWN	SHELLFISH	FC
2013		SANTEE	030501120303	ALLIGATOR CREEK NEAREST S. SANTEE RVR BTWN MKRS 24&25	06B-13	CHARLESTON	SHELLFISH	FC
2009	*	SANTEE	030501120303	CEDAR CREEK AT CNTY RD 857 HAMPTON PLANTATION STATE PARK	RS-01056	CHARLESTON	REC	FC
2017		SANTEE	030501120303	S SANTEE RVR AT US 17	ST-006	CHARLESTON	FISH	HG
2017		SANTEE	030501120402	WADMACON CREEK @ SANDHOLE	CSTL-586	GEORGETOWN	FISH	HG
2017		SANTEE	030501120402	WADMACON CREEK @ THE BLUFF	CSTL-587	GEORGETOWN	FISH	HG
2012		SANTEE	030501120403	NORTH SANTEE RIVER AT BEACH CREEK	06A-03	GEORGETOWN	SHELLFISH	FC
2012		SANTEE	030501120403	NORTH SANTEE INLET	06A-04	GEORGETOWN	SHELLFISH	FC
2012		SANTEE	030501120403	NORTH SANTEE BAY - E OF CANE ISLAND (C6-97)	06A-04A	GEORGETOWN	SHELLFISH	FC
2012		SANTEE	030501120403	NORTH SANTEE RVR NEAR THE NORTHWESTERN TIP OF CONE ISL (C-3/01)	06A-04B	GEORGETOWN	SHELLFISH	FC
2012		SANTEE	030501120403	NORTH SANTEE RVR NEAR THE NORTHWESTERN TIP OF CONE ISL (C-3/01)	06A-04C	GEORGETOWN	SHELLFISH	FC
2012		SANTEE	030501120403	NORTH SANTEE RIVER AND MOSQUITO CREEK	06A-05	GEORGETOWN	SHELLFISH	FC
2017		SANTEE	030501120403	AIWWAT MINUM CREEK	06A-11	GEORGETOWN	SHELLFISH	FC
2017		SANTEE	030501120403	NORTH SANTEE RIVER @ HARRIS LANDING	CSTL-593	GEORGETOWN	FISH	HG
2010		SANTEE	030501120403	MINIM CREEK, 9 M S OF GEORGETOWN	RT-01654	GEORGETOWN	AL	TURBIDITY
2017		SANTEE	030501120403	NORTH SANTEE RIVER @ POLE YARD	ST-005	GEORGETOWN	FISH	HG
2017		SANTEE	030502010101	DIVERSION CANAL	CSTL-079	BERKELEY	FISH	HG
2017		SANTEE	030502010101	LAKE MOULTRIE @ DAM	CSTL-080	BERKELEY	FISH	HG
2011		SANTEE	030502010101	TRIBUTARY 0.6 KM UPSTR OF SC HWY 6 NEAR CROSS HS	SC-026	BERKELEY	REC	FC
2009	*	SANTEE	030502010101	TRIBUTARY FLOWING TO LAKE MOULTRIE FROM CROSS GENER. STATION	SC-043	BERKELEY	REC	FC
2017		SANTEE	030502010101	LAKE MOULTRIE @ FRED L. DAY LANDING	ST-530	BERKELEY	FISH	HG
2017		SANTEE	030502010101	LAKE MOULTRIE @ HATCHERY LANDING	ST-531	BERKELEY	FISH	HG
2008	*	SANTEE	030502010201	WADBOO SWAMP AT S-08-447 THIRD BRIDGE FROM WEST	RS-02461	BERKELEY	REC	FC
2008	*	SANTEE	030502010201	WALKER SWAMP AT US 52 2.5 MI S ST STEPHENS	ST-007	BERKELEY	REC	FC
2017		SANTEE	030502010203	WADBOO CREEK @ REMBERT C. DENNIS RAMP	CSTL-113	BERKELEY	FISH	HG
2009	*	SANTEE	030502010203	CANE GULLEY BRANCH AT S-08-97 6.1 MI NE OF MONCK'S CORNER	RS-03333	BERKELEY	REC	FC
2011		SANTEE	030502010301	TURKEY CK AT FOREST SERVICE RD 251 IRISHTOWN FM SC 402	RS-02483	BERKELEY	REC	FC

TMDL TARGET DATE(S) ++	NOTE	BASIN	HUC	LOCATION	STATION	COUNTY	USE	CAUSE
2017		SANTEE	030502010304	EAST FORK OF COOPER RIVER NEAR QUINBYCR	CSTL-564	BERKELEY	FISH	HG
2017		SANTEE	030502010401	WANDO RIVER AT DEEP CREEK	09B-04	CHARLESTON	SHELLFISH	FC
2017		SANTEE	030502010401	WANDO RIVER OPPOSITE BIG PARADISE ISLAND	09B-05	CHARLESTON	SHELLFISH	FC
2017		SANTEE	030502010401	WANDO RIVER AT PARADISE BOAT LANDING	09B-06	CHARLESTON	SHELLFISH	FC
2017		SANTEE	030502010401	DEEP CREEK - 1 MILE FROM CONFLUENCE WITH WANDO RIVER	09B-09	CHARLESTON	SHELLFISH	FC
2017		SANTEE	030502010401	WANDO RIVER AT ALSTON CREEK CONFLUENCE	09B-10	CHARLESTON	SHELLFISH	FC
2017		SANTEE	030502010401	WANDO RIVER AT GUERIN CREEK	09B-11	CHARLESTON	SHELLFISH	FC
2017		SANTEE	030502010401	GUERIN CREEK AT OLD HOUSE CREEK	09B-12	BERKELEY	SHELLFISH	FC
2020		SANTEE	030502010401	TOOMER CREEK 2.5 MI E SC 41 BRIDGE OVER WANDO RIVER	RT-06012	CHARLESTON	AL	DO
2017		SANTEE	030502010402	BOONE HALL CREEK OPPOSITE COUNTY RECREATION AREA	09B-07	CHARLESTON	SHELLFISH	FC
2017		SANTEE	030502010402	RAT HALL CRK AT CONFLUENCE WITH WANDO RVR. (C6-97/U4/01)	09B-18	CHARLESTON	SHELLFISH	FC
2017		SANTEE	030502010402	WANDO RIVER AT I-526 MARK CLARK EXPRESSWAY (09B-15)	MD-264	CHARLESTON	AL	NH3N
2021		SANTEE	030502010402	BERESFORD CREEK 5.3 MI NNE OF WANDO AND COOPER RIVER CONFLUENCE	RO-056092	BERKELEY	AL	DO
2017		SANTEE	030502010402	BOONE HALL CREEK 1.5 MI WNW OF INTERSECTION OF US 17 AND SC 41	RT-052100	CHARLESTON	REC	FC
2017		SANTEE	030502010505	CYPRESS SWP AT US 78	CSTL-078	DORCHESTER	REC	FC
2014, 2014		SANTEE	030502010601	DORCHESTER CK AT SC 165	CSTL-013	DORCHESTER	AL	DO, NH3N
2014		SANTEE	030502010601	SAWMILL BR AT SC 78 E OF SUMMERVILLE	CSTL-043	DORCHESTER	AL	DO
2010		SANTEE	030502010602	ASHLEY RVR AT SC 165 4.8 MI SSW OF SUMMERVILLE	CSTL-102	DORCHESTER	REC	FC
2009	*	SANTEE	030502010603	EAGLE CK AT SC 642 5 MI SSE OF SUMMERVILLE	CSTL-099	DORCHESTER	REC	FC
2010		SANTEE	030502010603	EAGLE CK AT SC 642 5 MI SSE OF SUMMERVILLE	CSTL-099	DORCHESTER	AL	TURBIDITY
2017		SANTEE	030502010604	ASHLEY RIVER @ DORCHESTER STATE PARK	CSTL-560	DORCHESTER	FISH	HG
2010		SANTEE	030502010604	ASHLEY RVR AT MAGNOLIA GARDENS	MD-049	CHARLESTON	REC	FC
2010		SANTEE	030502010604	ASHLEY RVR AT MAGNOLIA GARDENS	MD-049	CHARLESTON	AL	TURBIDITY
2009	*	SANTEE	030502010604	ASHLEY RV 1.8 MI NW RUNNYMEDE PLANTATION	RT-032046	CHARLESTON	REC	FC
2009	*	SANTEE	030502010605	CHURCH CK MOUTH	MD-246	CHARLESTON	REC	FC
2016		SANTEE	030502010605	JAMES ISLAND CREEK N OF WHITE HALL PLANTATION	RT-052098	CHARLESTON	AL	DO
2016		SANTEE	030502010605	JAMES ISLAND CREEK N OF WHITE HALL PLANTATION	RT-052098	CHARLESTON	REC	FC
2017		SANTEE	030502010701	COOPER RIVER @ US 17A	CSTL-062	BERKELEY	FISH	HG
2014		SANTEE	030502010703	FOSTER CREEK AT CHARLESTON CPW WATER INTAKE	MD-240	BERKELEY	AL	DO
2014		SANTEE	030502010704	BACK RIVER RES IN FOREBAY EQUIDISTANT FROM DAM AND SHORELINES	CSTL-124	BERKELEY	AL	DO
2017		SANTEE	030502010704	COOPER RIVER @ BUSHY PARK	MD-042	BERKELEY	FISH	HG
2017		SANTEE	030502010704	BACK RIVER RESERVOIR	MD-152	BERKELEY	FISH	HG
2017		SANTEE	030502010704	DURHAM CREEK	MD-217	BERKELEY	FISH	HG
2009	*	SANTEE	030502010706	GOOSE CK AT S-08-136 BRIDGE	MD-039	BERKELEY	REC	FC
2015		SANTEE	030502010706	GOOSE CK AT US 52 N CHTN	MD-114	CHARLESTON	AL	DO
2015		SANTEE	030502010706	GOOSE CK RES 2.3 M S OF GOOSE CREEK TOWN CENTER	RL-01008	BERKELEY	AL	DO
2015, 2015, 2015		SANTEE	030502010706	GOOSE CREEK RESERVOIR 1.0 MI NW OF SPILLWAY NEAR W SHORELINE	RL-03340	BERKELEY	AL	CHLA, DO, TP
2015, 2015		SANTEE	030502010706	GOOSE CREEK RESERVOIR 2.8 MI NW OF SPILLWAY NEAR OTRANTO	RL-04390	BERKELEY	AL	DO, TP
2015		SANTEE	030502010706	GOOSE CREEK RESERVOIR 0.55 MI W OF DAM	RL-05412	BERKELEY	AL	TP
2015, 2015		SANTEE	030502010706	GOOSE CREEK RESERVOIR 2 MI N OF SPILLWAY	RL-06434	BERKELEY	AL	DO, TP



2008 SC List of Impaired Waters by 12-Digit HUC

TMDL TARGET DATE(S) ++	NOTE	BASIN	HUC	LOCATION	STATION	COUNTY	USE	CAUSE
2015, 2015		SANTE	030502010706	GOOSE CREEK RESERVOIR 100 M US OF DAM	ST-032	BERKELEY	AL	CHLA, TP
2017		SANTE	030502010706	GOOSE CREEK RESERVOIR 100 M US OF DAM	ST-032	BERKELEY	FISH	HG
2015, 2015, 2015		SANTE	030502010706	GOOSE CK RESERVOIR AT 2ND POWERLINES US OF BOAT RAMP	ST-033	BERKELEY	AL	CHLA, PH, TP
2018		SANTE	030502010707	BLOCK ISL CREEK - 100 YDS S. OF SPLIT FROM SPOIL AREA	10A-32	CHARLESTON	SHELLFISH	FC
2018		SANTE	030502010707	BLOCK ISLAND CREEK - 100 YDS S. OF SPLIT FROM SPOIL AREA	10A-32	CHARLESTON	SHELLFISH	FC
2017	#	SANTE	030502010707	INTRACOASTAL WATERWAY AT SC 703 E MT PLEASANT	MD-069	CHARLESTON	AL	CU
2017	#	SANTE	030502010707	SHEM CK AT BRDG ON US 17	MD-071	CHARLESTON	AL	CU
2010		SANTE	030502010707	SHEM CK AT BRDG ON US 17	MD-071	CHARLESTON	REC	FC
2017	#	SANTE	030502010707	CHAS HBR AT FT JOHNSON PIER AT MARINE SCI LAB	MD-165	CHARLESTON	AL	CU
2009	*	SANTE	030502010707	FILBIN CREEK AT VIRGINIA AVE, NORTH CHARLESTON	MD-249	CHARLESTON	REC	FC
2017	#	SANTE	030502010707	CHARLESTON HARBOR 0.5 MI SE OF MOUTH OF SHEM CK	RO-036044	CHARLESTON	AL	CU
2014	#	SANTE	030502010707	UNNAMED TRIBUTARY TO PARROT POINT CREEK 0.8 MI S OF FT JOHNSON	RT-042072	CHARLESTON	AL	TURBIDITY
2018		SANTE	030502020105	RANTOWLES CREEK AT CONFLUENCE OF STONO RIVER	11-18	CHARLESTON	SHELLFISH	FC
2008	*	SANTE	030502020201	LOG BRIDGE CK AT SC 162	MD-121	CHARLESTON	REC	FC
2018		SANTE	030502020202	STONO RIVER (AIWW) AT MARKER #27	11-12	CHARLESTON	SHELLFISH	FC
2018		SANTE	030502020202	STONO RIVER (AIWW) AT MARKER #51	11-16	CHARLESTON	SHELLFISH	FC
2018		SANTE	030502020202	STONO RIVER (LOG BRIDGE CREEK) AT MARKER #54	11-17	CHARLESTON	SHELLFISH	FC
2018		SANTE	030502020202	STONO RIVER AT MOUTH OF PENNY CREEK NEAR MARKER #25	11-27	CHARLESTON	SHELLFISH	FC
2014		SANTE	030502020202	STONO RVR AT SC 700	MD-026	CHARLESTON	AL	DO
2017		SANTE	030502020202	STONO RVR AT S-10-20 2 MI UPSTRM OF CLEMSON EXP STA	MD-202	CHARLESTON	AL	CU
2017		SANTE	030502020204	FOLLY RIVER AT SC 171	MD-130	CHARLESTON	AL	CU
2018		SANTE	030502020205	ABBAPOOLA CREEK AT FIRST LARGE BEND	11-06	CHARLESTON	SHELLFISH	FC
2018		SANTE	030502020205	ABBAPOOLA CREEK AT CONFLUENCE WITH SMALL CREEK ON WEST BANK AT SEVENTH BEND (C-4/99)	11-06A	CHARLESTON	SHELLFISH	FC
2018		SANTE	030502020205	BASS CREEK AT CONFLUENCE WITH CINDER CREEK	11-32	CHARLESTON	SHELLFISH	FC
2018		SANTE	030502020205	CINDER CREEK AT PUBLIC DOCK (3RD BEND FROM CONFLUENCE WITH BASS CREEK) (C5-01)	11-34	CHARLESTON	SHELLFISH	FC
2018		SANTE	030502020205	BASS CREEK AT PUBLIC DOCK (5TH BEND FROM CONFLUENCE WITH CINDER CREEK) (C5-01)	11-35	CHARLESTON	SHELLFISH	FC
2018		SANTE	030502020205	ABBAPOOLA CREEK@ BLIND ROAD	MD-802	CHARLESTON	REC	FC
2010		SANTE	030502020205	TRIBUTARY TO STONO INLET, 11 M SW OF CHARLESTON	RT-01642	CHARLESTON	AL	TURBIDITY
2013		SANTE	030502090101	ALLIGATOR CREEK AND OCEAN INLET	06B-06	CHARLESTON	SHELLFISH	FC
2013		SANTE	030502090101	ALLIGATOR CREEK AT MARKER #26	06B-07	CHARLESTON	SHELLFISH	FC
2013		SANTE	030502090101	CASINO CREEK AT MARKER #29	06B-08	CHARLESTON	SHELLFISH	FC
2013		SANTE	030502090101	DUPREE CREEK - 500 FEET N. OF NEW DOCK (S OF MRKR #30)	06B-09	CHARLESTON	SHELLFISH	FC
2013		SANTE	030502090101	AIWW AT MARKER #32	06B-10	CHARLESTON	SHELLFISH	FC
2013		SANTE	030502090101	ALLIGATOR CREEK STATE SHELLFISH GROUND	06B-12	CHARLESTON	SHELLFISH	FC
2013		SANTE	030502090101	CASINO CREEK MIDWAY BETWEEN STATIONS 19 AND 24 (AT SMALL UNNAMED CREEK ON RIGHT, SOUTHBOUND)	06B-16	CHARLESTON	SHELLFISH	FC
2013		SANTE	030502090101	CASINO CREEK AND SKRINE CREEK CONFLUENCE	06B-19	CHARLESTON	SHELLFISH	FC
2013		SANTE	030502090101	DUPREE CREEK 1,000 YARDS UP FROM CLUBHOUSE CREEK	06B-20	CHARLESTON	SHELLFISH	FC
2013		SANTE	030502090101	ALLIGATOR CREEK AND RAMHORN CREEK CONFLUENCE	06B-21	CHARLESTON	SHELLFISH	FC
2013		SANTE	030502090101	RAMHORN CREEK AND MILL CREEK CONFLUENCE	06B-22	CHARLESTON	SHELLFISH	FC
2013		SANTE	030502090101	SKRINE CREEK AND CONGAREE BOAT CREEK CONFLUENCE	06B-23	CHARLESTON	SHELLFISH	FC
2019, 2012		SANTE	030502090101	ALLIGATOR CREEK AT STATE SHELLFISH GROUND (06B-12)	MD-265	CHARLESTON	AL	CU, TURBIDITY
2019		SANTE	030502090101	CASINO CREEK AT CLOSURE LINE (06B-16)	MD-266	CHARLESTON	AL	CU

TMDL TARGET DATE(S) ++	NOTE	BASIN	HUC	LOCATION	STATION	COUNTY	USE	CAUSE
2008	*	SANTEE	030502090101	E FORK OF DEVILS DEN CK HEADWATERS	RT-02016	CHARLESTON	AL	CU
2009	*	SANTEE	030502090201	AWENDAW CREEK AT US 17	MD-250	CHARLESTON	REC	FC
2014		SANTEE	030502090202	GRAHAM CREEK AT MARKER #84	07-02	CHARLESTON	SHELLFISH	FC
2014		SANTEE	030502090202	AWENDAW CREEK AT MARKER #57	07-03	CHARLESTON	SHELLFISH	FC
2014		SANTEE	030502090202	HARBOR RIVER AT MARKER #48	07-04	CHARLESTON	SHELLFISH	FC
2014		SANTEE	030502090202	TIBWIN CREEK AT MARKER #42	07-05	CHARLESTON	SHELLFISH	FC
2014		SANTEE	030502090202	DOEHALL CREEK AT CONFLUENCE OF AIWW - NORTH OF MARKER #46	07-09	CHARLESTON	SHELLFISH	FC
2014		SANTEE	030502090202	DOEHALL CREEK-THIRD BEND	07-14	CHARLESTON	SHELLFISH	FC
2014		SANTEE	030502090202	SANDY POINT CREEK - 4TH BEND	07-15	CHARLESTON	SHELLFISH	FC
2014, 2010		SANTEE	030502090202	JEREMY CK NEAR BOAT LANDING AT MCCLELLANVILLE TOWN HALL	MD-203	CHARLESTON	AL	DO, TURBIDITY
2010		SANTEE	030502090202	JEREMY CK NEAR BOAT LANDING AT MCCLELLANVILLE TOWN HALL	MD-203	CHARLESTON	REC	FC
2015		SANTEE	030502090202	FIVE FATHOM CREEK AT BULL RIVER (07-06A)	MD-267	CHARLESTON	AL	TURBIDITY
2019, 2012		SANTEE	030502090202	AWENDAW CREEK AT MARKER #57 (07-03)	MD-268	CHARLESTON	AL	CU, TURBIDITY
2012		SANTEE	030502090202	AIWW MIDWAY BETWEEN AWENDAW AND GRAHAM CREEK	MD-793	CHARLESTON	REC	FC
2010		SANTEE	030502090202	TRIBUTARY TO MATHEWS CREEK, 1 M S OF MCLELLANVILLE	RT-01623	CHARLESTON	AL	TURBIDITY
2016		SANTEE	030502090203	AIWW ADJACENT TO WILD DUNES GOLF COURSE STORM DRAINAGE OUTFALL	09A-18	CHARLESTON	SHELLFISH	FC
2016		SANTEE	030502090203	HAMLIN SOUND (08-02)	MD-271	CHARLESTON	AL	NH3N
2016		SANTEE	030502090204	AIWW AT 25TH STREET - ISLE OF PALMS	09A-19	CHARLESTON	SHELLFISH	FC
2016		SANTEE	030502090204	UPPER REACHES OF INLET CREEK	09A-24	CHARLESTON	SHELLFISH	FC
2016		SANTEE	030502090204	UPPER INLET CREEK AT JENNIE CREEK	09A-30	CHARLESTON	SHELLFISH	FC
2016		SANTEE	030502090204	BAY AT END OF UPPER INLET CREEK	09A-31	CHARLESTON	SHELLFISH	FC
2013		SANTEE	030502090204	LOWER HAMLIN CREEK AT SITE OF NEW BRIDGE (09A-29)	MD-272	CHARLESTON	AL	CU
2014		SANTEE	030502090205	GRAHAM CREEK AND BULLS BAY	07-02A	CHARLESTON	SHELLFISH	FC
2017		SAVANNAH	030502060308	LITTLE RIVER @ SC 81	SV-699	MCCORMICK	FISH	HG
2017		SAVANNAH	030601010102	LAKE JOCASSEE TOXAWAY RIVER ARM	CL-018	OCONEE	FISH	HG
2017		SAVANNAH	030601010104	LAKE JOCASSEE @ END OF SEC RD 25	SV-313	OCONEE	FISH	HG
2011		SAVANNAH	030601010202	LITTLE EASTATOE CREEK@ MOCCASIN ROAD ( ACROSS BOGGS PROPERTY)	SV-806	PICKENS	REC	FC
2008	*	SAVANNAH	030601010302	BURGESS CK AT S-37-171	RS-02466	OCONEE	REC	FC
2015		SAVANNAH	030601010304	LITTLE RVR AT S-37-24 7.1 MI NE OF WALHALLA	SV-203	OCONEE	REC	FC
2010		SAVANNAH	030601010305	UNNAMED TRIB TO LITTLE CANE CREEK	SV-811	OCONEE	REC	FC
2010		SAVANNAH	030601010305	UNNAMED TRIB TO LITTLE CANE CREEK @ TAYLOR ROAD	SV-812	OCONEE	REC	FC
2013		SAVANNAH	030601010402	NORTH FORK AT US 178 2.9 MI N OF PICKENS	SV-206	PICKENS	AL	BIO
2014		SAVANNAH	030601010405	RICES CREEK AT SR 158	SV-740	PICKENS	AL	BIO
2014		SAVANNAH	030601010406	GOLDEN CREEK AT GOLDEN CRK RD	SV-738	PICKENS	AL	BIO

KIAWAH RIVER PLANTATION  
STORMWATER MASTER PLAN

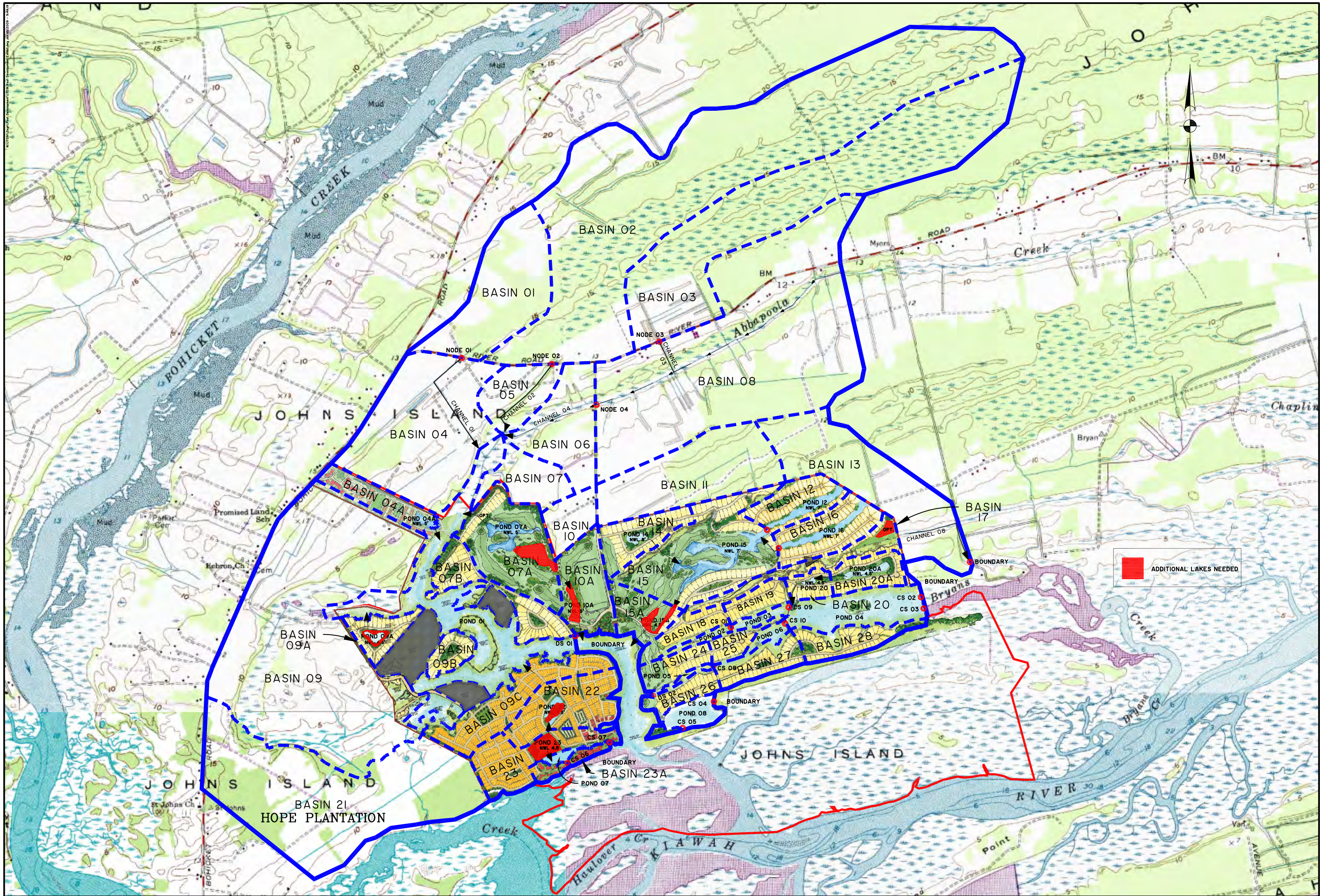
**Exhibits**

PREPARED BY  
THOMAS & HUTTON ENGINEERING CO.









<b>THOMAS &amp; HUTTON ENGINEERING CO.</b> 935 HOUSTON NORTHWAY BLVD. POST OFFICE BOX 1922 MT PLEASANT, SC 29565 TEL: 843/346-0465 FAX: 843/346-0203 WWW.THOMAS-HUTTON.COM		GEORGIA • SAVANNAH, BRUNSWICK NORTH CAROLINA • WILMINGTON	
<b>KIAWAH RIVER PLANTATION, LP</b> CHARLESTON COUNTY, SOUTH CAROLINA		<b>POST DEVELOPMENT EXHIBIT</b>	
JOB NO: J-17091.0000 DATE: 5/18/09 DRAWN: CGB DESIGNED: CGB REVIEWED: ERG APPROVED: ERG SCALE: 1" = 1000'		NO. BY DATE REVISIONS	

**POST**

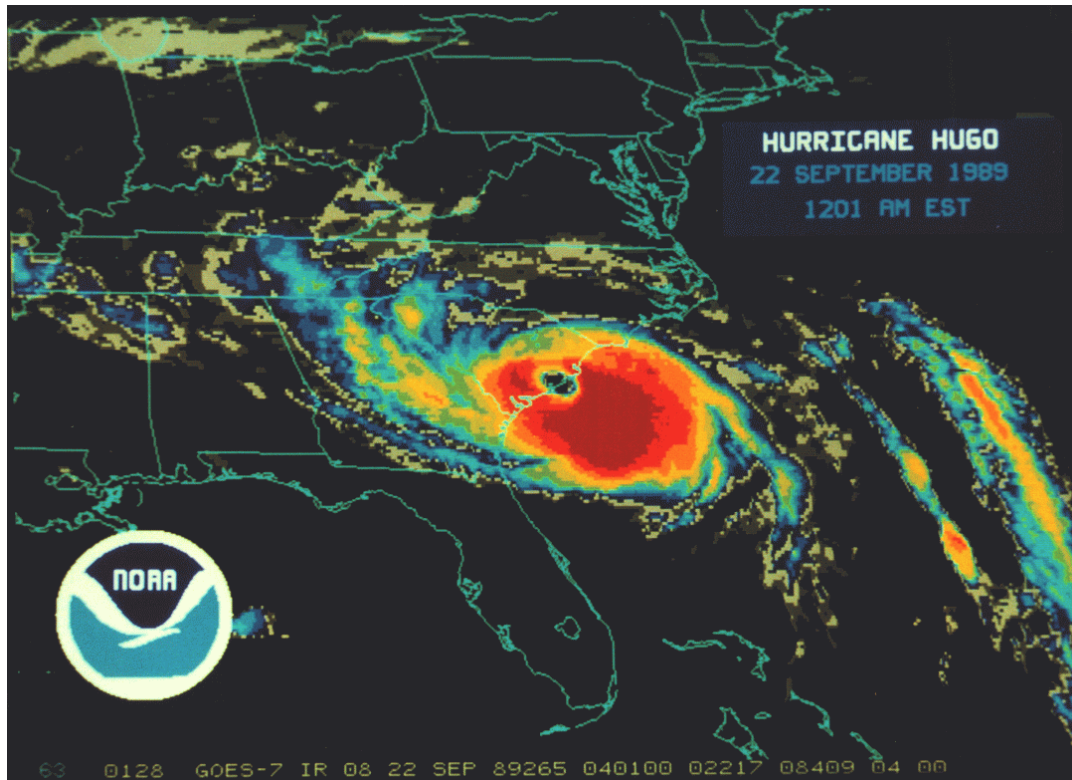




SCDHEC  
MONITORING  
STATION EXHIBIT 1



# Kiawah River Plantation Hurricane Preparedness Plan



Prepared by:  
**Thomas & Hutton Engineering Co.**

# What is a Hurricane?

**A hurricane is a type of tropical cyclone, the general term for all circulating weather systems over tropical waters (counterclockwise in the Northern Hemisphere). Tropical cyclones are classified as follows:**

## **Tropical Depression:**

An organized system of clouds and thunderstorms with a defined circulation and maximum sustained winds of 38 mph (33 knots) or less.

## **Tropical Storm:**

An organized system of strong thunderstorms with a defined circulation and maximum sustained winds of 39 to 73 mph (34-63 knots).

## **Hurricane:**

An intense tropical weather system with a well-defined circulation and maximum sustained winds of 74 mph (64 knots) or higher. In the western Pacific, hurricanes are called "typhoons," and similar storms in the Indian Ocean are called "cyclones."

Hurricanes are products of a tropical ocean and atmosphere. Powered by heat from the sea, they are steered by the easterly trade winds and the temperate westerlies as well as by their own ferocious energy. Around their core, winds grow with great velocity, generating violent seas. Moving ashore, they sweep the ocean inward while spawning tornadoes and producing torrential rains and floods. Each year, on average, 10 tropical storms, of which six become hurricanes, develop over the Atlantic Ocean, Caribbean Sea, or Gulf of Mexico. Many of these remain over the ocean; however, about five hurricanes strike the United States coastline every three years. Of these five, two will be major hurricanes, category 3 or greater on the Saffir-Simpson Hurricane Scale.



# Hurricane Watches and Warnings

## **Tropical Storm Watch:**

Tropical Storm conditions are possible in the specified area of the Watch, usually within 36 hours.

## **Tropical Storm Warning:**

Tropical Storm conditions are expected in the specified area of the Warning, usually within 24 hours.

## **Hurricane Watch:**

Hurricane conditions are possible in the specified area of the Watch, usually within 36 hours. During a Hurricane Watch, prepare to take immediate action to protect your family and property in case a Hurricane Warning is issued.

## **Hurricane Warning:**

Hurricane conditions are expected in the specified area of the Warning, usually within 24 hours. Complete all storm preparations and evacuate if directed by local officials.

---

Prepared by:

**Thomas & Hutton Engineering Co.**

# Important Contact Information

In the event of a hurricane, go to [www.scemd.org](http://www.scemd.org) for up-to-date information.

## Local Government:

- **Charleston County:**
  - [www.charlestoncounty.org](http://www.charlestoncounty.org)
- **Berkeley County Emergency Management:**
  - <http://GIS.BerkeleyCountySC.gov/hurricane>
- **Colleton County:**
  - [www.colletoncounty.org](http://www.colletoncounty.org)
- **Dorchester County:**
  - [www.dorchestercounty.net](http://www.dorchestercounty.net)

## Getting Help and Information:

- **American Red Cross:**
  - [www.redcross.org](http://www.redcross.org)
  - [www.lowcountryredcross.org](http://www.lowcountryredcross.org)
- **Centers for Disease Control:**
  - [www.bt.cdc.gov](http://www.bt.cdc.gov)
- **Federal Emergency Management Agency:**
  - [www.fema.gov](http://www.fema.gov)
- **National Weather Service Hurricane Center:**
  - [www.nhc.noaa.gov](http://www.nhc.noaa.gov)
- **National Hurricane Center:**
  - [www.hurricanesafety.org](http://www.hurricanesafety.org)
- **S.C. Emergency Management Division:**
  - [www.scemd.org](http://www.scemd.org)

## Phone Numbers:

- **Charleston County Emergency Preparedness Division:**
  - 843-202-7400
- **Charleston County Emergency Public Information Line:**
  - 843-202-7100 (English)
  - 843-202-7191 (Spanish – working during emergencies)
- **Disabilities Resource Center:**
  - 843-225-5080
- **S.C. Department of Transportation (Evacuation Traffic Information):**
  - 1-888-877-9151
- **Public Information Phone System (PIPS):**
  - 1-866-246-0133 (Only activated when needed. Spanish interpreters available)
- **Hispanic Outreach of South Carolina:**
  - 1-803-419-5112
- **S. C. Insurance News Service**
  - 1-803-252-3455

---

Prepared by:

Thomas & Hutton Engineering Co.

# Storm Surge

## The Saffir-Simpson Hurricane Scale

The greatest potential for loss of life in coastal areas related to a hurricane is from the storm surge, which historically has claimed nine of ten victims.

Storm surge is simply water that is pushed toward the shore by the force of the winds swirling around the storm. This advancing surge combines with the normal tides to create the hurricane storm tide, which can increase the mean water level 15 feet or more. In addition, wind-driven waves are superimposed on the storm tide. This rise in water level can cause severe flooding in coastal areas, particularly when the storm tide coincides with the normal high tides. Because much of the United States' densely populated Atlantic and Gulf Coast coastlines lie less than 10 feet above mean sea level, the danger from storm tides is tremendous.



The level of surge in a particular area is also determined by the slope of the continental shelf. A shallow slope off the coast will allow a greater surge to inundate coastal communities. Communities with a steeper continental shelf will not see as much surge inundation, although large breaking waves can still present major problems. Storm tides, waves, and currents in confined harbors severely damage ships, marinas, and pleasure boats

---

Prepared by:

**Thomas & Hutton Engineering Co.**

**These surge values are averages for these storm categories. Actual surge depths may be much greater.**

**Category 1: Minimal Damage**

**Winds: 74-95 mph**

**Along the South Carolina coast, surges of up to 4 to 5 feet can be expected.**

No real damage to building structure. Damage primarily to unanchored mobile homes, shrubbery, and trees. Also, some coastal road flooding and minor pier damage.



**Category 2: Moderate Damage**

**Winds: 96-110 mph**

**Along the South Carolina coast, surges of up to 6 to 8 feet can be expected.**

Some roofing material, door, and window damage to buildings. Considerable damage to shrubbery and trees with some trees blown down. Considerable damage to mobile homes, poorly constructed signs, and piers. Small craft in unprotected anchorages break moorings.



**Category 3: Extensive Damage**

**Winds: 111-130 mph**

**Along the South Carolina coast, surges of up to 9 to 12 feet can be expected.**

Some structural damage to small residences and utility buildings with a minor amount of curtainwall failure. Damage to shrubbery and trees with foliage blown off trees and large trees blown down. Mobile homes and poorly constructed signs are destroyed. Flooding near the coast destroys smaller structures with larger structures damaged by battering of floating debris.



**Category 4: Extreme Damage**

**Winds: 131-155 mph**

**Along the South Carolina coast, surges of up to 13 to 18 feet can be expected.**

More extensive curtainwall failures with some complete roof structure failures on small residences. Shrubs, trees and most signs are blown down. Complete destruction of mobile homes.

Extensive damage to doors and windows. Major damage to lower floors of structures near the shore.

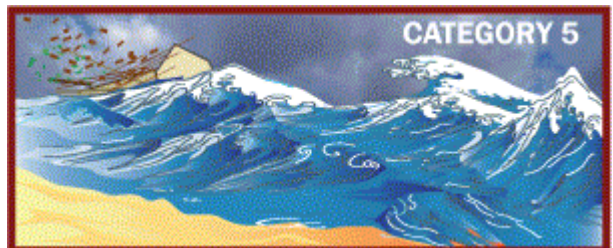


**Category 5: Catastrophic Damage**

**Winds: More than 155 mph**

**Along the South Carolina coast, a surge higher than 18 feet can be expected.**

Complete roof failure on many residences and industrial buildings. Some complete building failures with small utility buildings blown over or away. Most shrubs, trees, and signs blown down. Complete destruction of mobile homes. Severe and extensive window and door damage. Massive evacuation of residential areas on low ground may be required.



---

Prepared by:

**Thomas & Hutton Engineering Co.**



## **“911” Reverse Notification System**

The POA/HOA, as development of the community occurs, may **establish the “911” Reverse Notification System** to contact residents of the community during emergency situations. The Reverse Notification System can target precise geographic areas with immediate notification of helpful information for the residents and to help aid in rapid response by emergency personnel.

The POA/HOA can contact the REVERSE 911 Interactive Community Notification System by calling 1-800-247-2363 ext. 2 or by email at [help@reverse911.com](mailto:help@reverse911.com) to setup the notification system for the community.

## **Emergency / Evacuation Staging Areas**

The POA/HOA may work with the emergency personnel and Law Enforcement to develop staging areas for emergency equipment and personnel in common areas throughout the community. These areas may include Clubhouses, Community Centers, Play Fields, open spaces, etc. All staging areas shall be coordinated with the Charleston County Emergency Preparedness Division, Law Enforcement, Charleston County Fire & EMS and other emergency personnel.

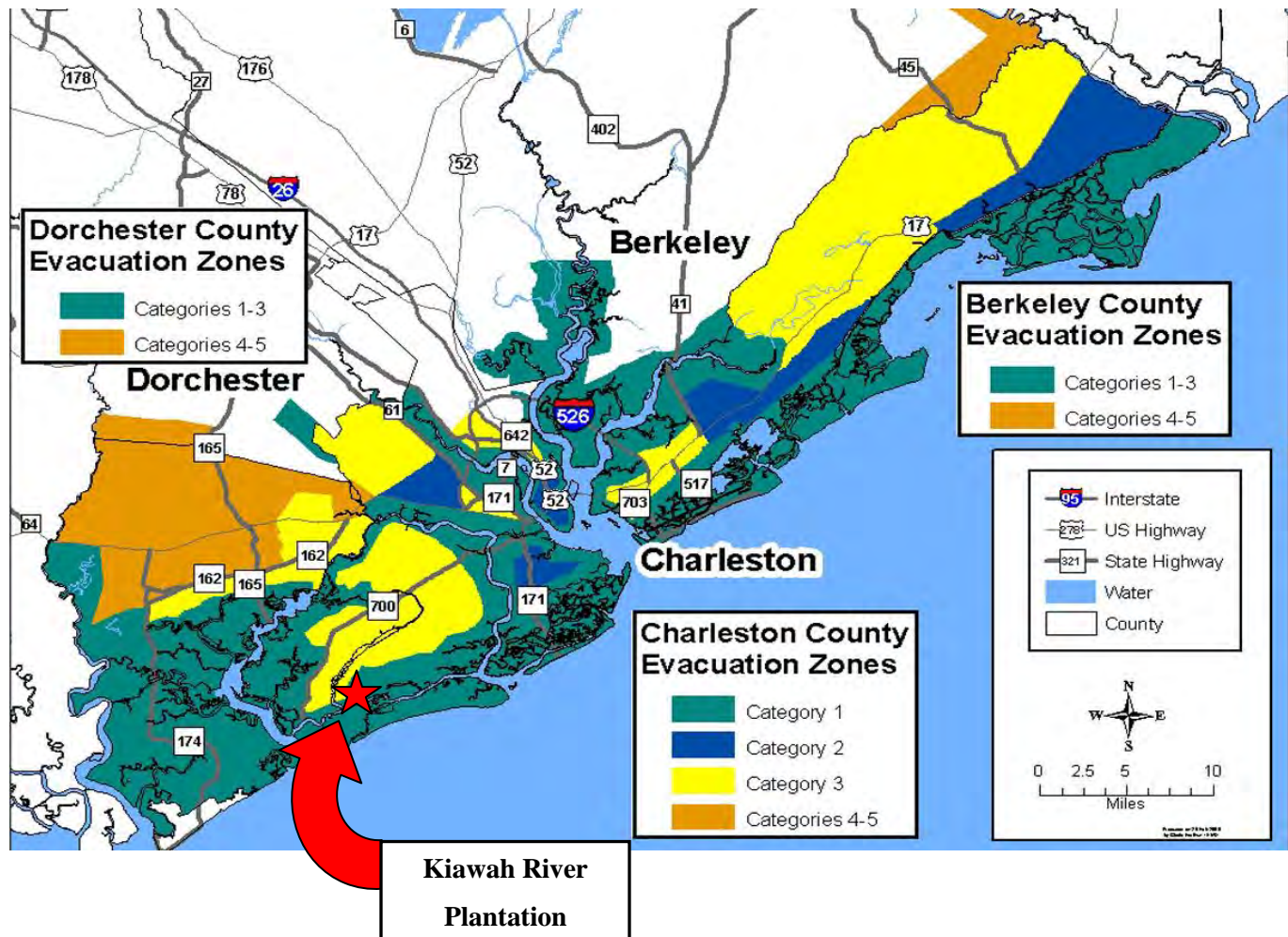
---

**Prepared by:**

**Thomas & Hutton Engineering Co.**

# Coastal Evacuation Zones

The map below show areas that are subject to possible evacuation based on the category of the hurricane. Actual storm conditions may require changes to the planned evacuation zones. Local officials encourage citizens to stay tuned to state and local media for specific emergency management evacuation instructions

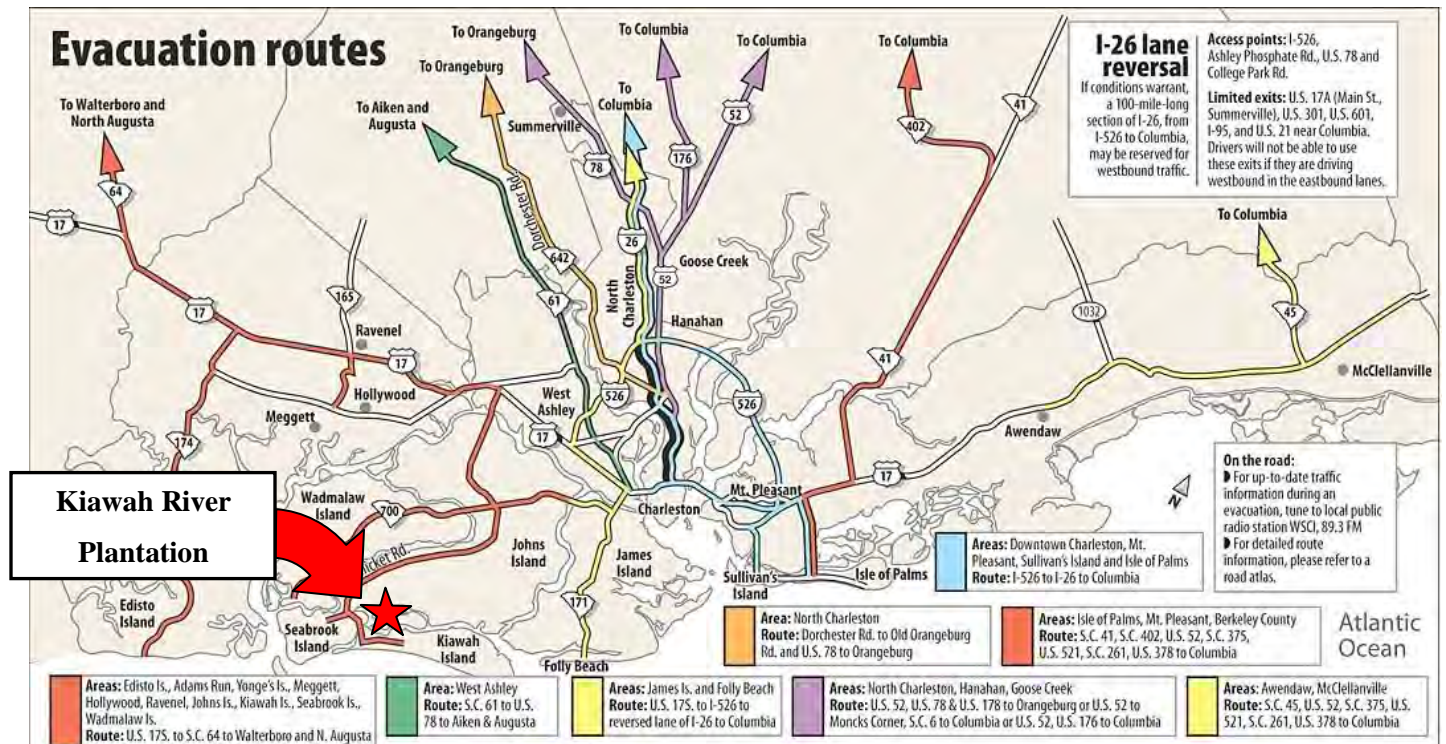


**Note that Kiawah River Plantation is located in an area that is subject to evacuation during a Category 1 storm.**

Prepared by:

Thomas & Hutton Engineering Co.

# Low Country Evacuation Routes

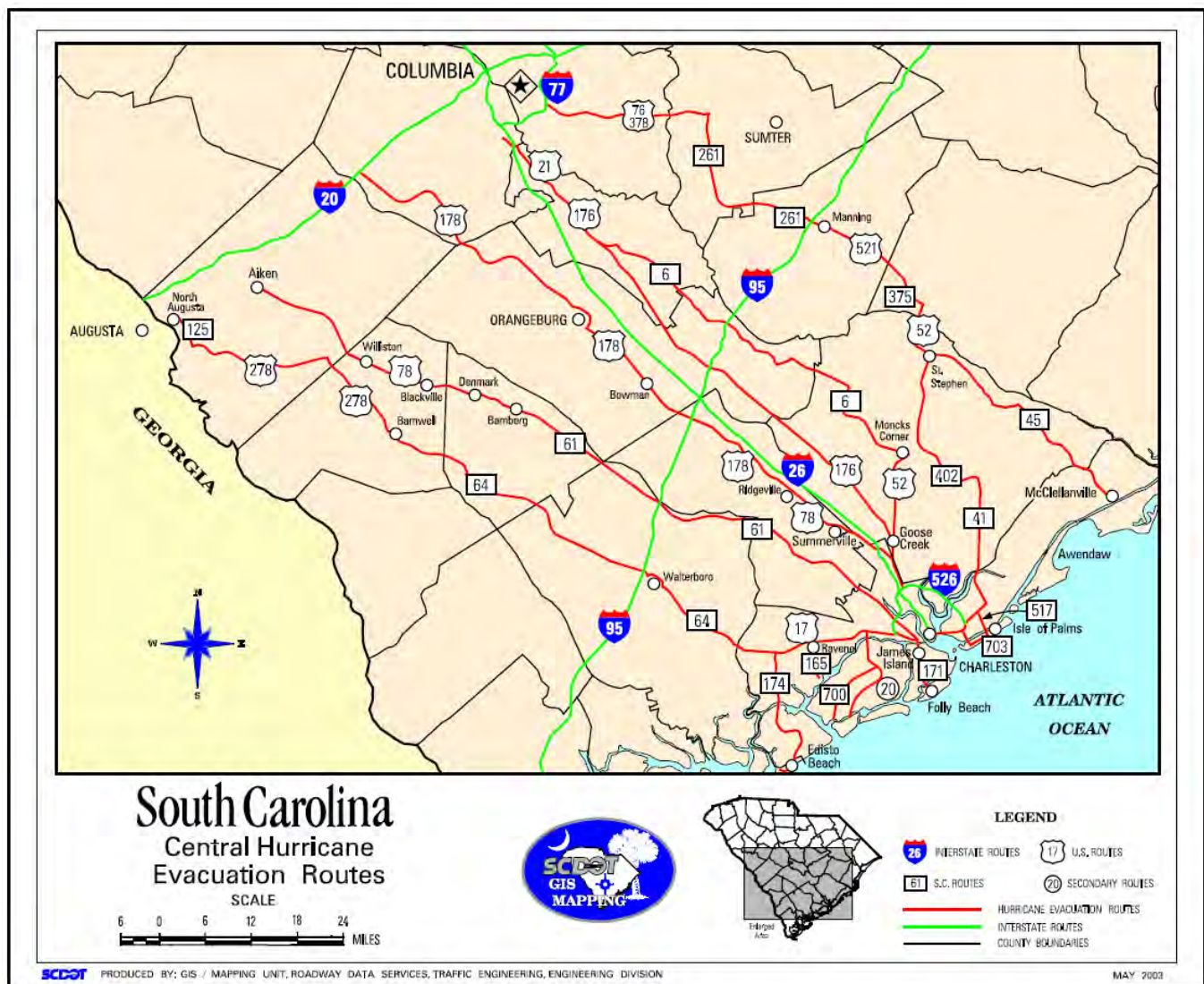


**From Kiawah River Plantation, take Bohicket Road (S-20) to US 17. On US 17, travel south to SC 64 to Walterboro, and on to North Augusta.**

Prepared by:

Thomas & Hutton Engineering Co.





**Voluntary Evacuations:** If you live in a low-lying area (i.e. a barrier island or areas subject to flooding) or a mobile home, you should strongly consider evacuating if emergency officials issue a voluntary evacuations order. The earlier you leave, the less congestion you will face. Those of you not living in such areas should still have evacuation plans in place in case a mandatory evacuation order is issued.

**Mandatory Evacuations:** Evacuation orders are very serious and only issued when there is sufficient evidence that the area in danger. **It is important to note that under mandatory evacuations, your route is determined for you.**

**Evacuation:** When evacuating, it is important to know the evacuation route from your home, along with several emergency-meeting locations along the route. This is especially helpful for families traveling in more than one vehicle. In an emergency situation it is also important that the vehicle you will be traveling in is in working condition and has a sufficient amount of fuel. **If you wait until a mandatory evacuation is called, you must take the evacuation route assigned by the South Carolina Department of Transportation in order to quickly and effectively evacuate your specific area.**

Prepared by:

**Thomas & Hutton Engineering Co.**



# What to do Before, During, and After a Hurricane

## BEFORE

### ***Be prepared***

Plan an evacuation route. Consider staying in a motel or with family and friends outside the vulnerable area. Learn safe routes inland and the locations of official shelters. Be ready to drive at least 20 to 50 miles inland to locate a safe place.

### ***Basic Disaster Supplies Kit***

Gather disaster supplies and create a basic supplies kit, which you can use at home or take if you evacuate. Include:

- "2009 South Carolina Hurricane Guide"
- Non-perishable food (including canned goods)
- Drinking water (two quarts per person per day)
- Flashlights, extra batteries, and bulbs
- Battery-powered AM/FM or hand crank radio and NOAA weather radio with extra batteries
- First-aid kit and manual
- Non-electric can opener
- Essential medicines, including prescriptions
- Sturdy shoes
- Baby supplies (including baby food and diapers)
- Games and books
- Fire extinguisher
- Important documents (insurance policies, family records, photo identification, important telephone numbers, tax records, bank information)
- Toiletries and other personal hygiene items
- Cash and credit cards

### ***Before You Leave Home***

- Make arrangements for pets. Pets are not allowed in official shelters.
- Fuel up family vehicles and service them.
- Turn off gas, electricity, and water.
- Stay tuned to your local television and radio stations for emergency information.

### ***Pickup Assistance Support***

- Residents that do not have or require transportation support should notify the community CERT members of a specific need in the event of evacuation. Residents requiring transportation for evacuation shelters should meet at the identified pickup point located at: **Newton Farm, 149 Village Green Lane on Kiawah Island**
- Residents requiring special medical needs and transportation should register with **SCHDEC (843) 953-2450** and the **Disabilities Resource Center (843) 225-5080**.

---

Prepared by:

**Thomas & Hutton Engineering Co.**

### ***On The Road (See Evacuation Route Maps)***

The South Carolina Emergency Management Division has been working in partnership with the petroleum industry in an attempt to make extra fuel available at certain filling stations along **major evacuation routes; once you're on the road, tune to your radio to find out which filling stations are participating.** Rest areas along I-26 will be enhanced with additional facilities to accommodate motorists efficiently. Department of Public Safety weigh stations will also be available as comfort stations. In addition to the items listed above in your Basic Disaster Supplies Kit, **ALSO CARRY:**

- Road maps
- Jumper cables
- Tire repair kit

### ***At The Public Shelter (See Shelter Locations)***

Before heading to a public shelter, first consider staying with family and friends or in a motel out of the area. If those are not available, the American Red Cross will provide a safe place to stay when you have no other place to go. Cots and blankets will not be provided in the public shelter, and although food will be provided, specialty items for infants and individuals on restricted diets may not be available.

If you plan to evacuate to a shelter, you will want to carry the supplies listed above in your Basic Disaster Supplies Kit, **PLUS:**

- Blankets, sleeping bags, pillows and cots
- Special foods, if you are on a restricted diet

## **DURING**

### ***Protect Yourself***

- Stay tuned to your local television and radio stations for emergency information.
- Stay inside a well-constructed building away from windows and doors, even if they are covered. Go to an interior first-floor room, basement, closet, or under the stairs.
- Be alert. Tornadoes are often spawned during hurricanes.
- **If the "eye" of the storm passes over your area, be aware that severe conditions will return with winds from the other direction in a very short time.**

## **AFTER**

### ***Returning Home***

- Check with local law enforcement, news service broadcasts and your community CERT personnel prior to returning to see if your community has been declared safe before entering. Roads may be closed for your protection. Do not drive in flooded areas.
- Check gas, water, electrical lines and appliances for damage.
- Avoid using candles and other open flames indoors. Use a flashlight to inspect damage.
- Report life-threatening emergencies only.
- Contact your Insurance Company Claims Department.

---

**Prepared by:**

**Thomas & Hutton Engineering Co.**

# Re-Entry Plan

## *Charleston County Emergency Preparedness Division Re-Entry Plan*

- Residents should familiarize the approved re-entry plan by going to the website <http://www.charlestoncounty.org/departments/EPD/Re-Entry-Plan.pdf>. The community Lowcountry CERT members may be asked to help with local law enforcement and emergency response personnel with re-entry into your community.

# Debris Cleanup Preparations

Major debris cleanup will be coordinated by local Municipal Public Works Departments and will occur following the event to open major roadways and emergency facilities to ensure access for rapid response by emergency personnel once areas have been determined safe. Cleanup will be prioritized by emergency personnel to vital facilities such as hospitals, fire stations, police stations and EMS stations in order to provide emergency services to the surrounding communities.

Community residents should remain patient. Cleanup operations will take time and may be extensive. Residents are encouraged to localize debris from their homes and neighborhood, but should be careful not to block roadways and access in the event of the need for emergency personnel.

# Community Based Organizations

## **Lowcountry CERT (Community Emergency Response Team)**

As development occurs and residents begin to inhabit homes in the development, the members of the community are encouraged to initiate and join the Lowcountry CERT program as a valuable asset for your community during times of emergencies. As trained personnel, you will learn how to respond and help others in need of help during emergency situations prior to, during and after the response of emergency assistance. Members of the Lowcountry CERT program will be asked to participate in planned training activities for not only their development but also for the surrounding community. Interested parties can contact the Emergency Preparedness Division at **(843) 202-7405** to enroll in the program or you can download an application from [www.LCERT.org](http://www.LCERT.org). CERT training is provided free of charge in Charleston County to anyone 18 years old or over.

---

Prepared by:

**Thomas & Hutton Engineering Co.**

## **Insurance Claims Contact Information**

Allstate Insurance:

Claims #: 1-800-54-STORM (1-800-547-8676)

Builders Mutual Insurance Company:

Claims #- 1-800-809-4861

Companion Property & Casualty Insurance:

Claims #: (800) 845-2724, option 2 or fax at (803) 419-8063

GEICO:

Claims # 1-800-841-3000

General Casualty Insurance Company:

Claims: 1-800-334-0241

GMAC Insurance:

Claims # - 1-800-468-3466

Grange Insurance:

Claims #: 1-800-445-3030

Harleysville Insurance:

Claims #: 1-800-892-8877

Johnson & Johnson Inc Managing general Agent:

Claims #: 1-800-487-7565 Ext. 3029

Nationwide Insurance:

Claims # - 1-800-421-3535

Progressive Insurance:

Claims # - 1-800-274-4499

PURE High Value Homeowners Insurance

Claims Hotline: 888-813-PURE (7873) or e-mail [claims@purehnw.com](mailto:claims@purehnw.com) or fax claims to 914-328-3883.

South Carolina Farm Bureau Mutual Insurance Company:

Claims Hotline: 1-800-799-7500

South Carolina Wind & Hail Underwriting Association:

Claims #: Call your insurance broker/agent

The Seibels Bruce Group, Inc.:

Catawba Insurance Company

Claims: 1-800-525-8835

Southern Mutual Insurance Company:

Claims #: 1-800-226-1919

---

**Prepared by:**

**Thomas & Hutton Engineering Co.**



## **Insurance Claims Contact Information Contd.**

Southern Mutual Church Insurance:  
Claims #: 1-800-922-5332

State Farm:  
Claims #: Contact your agent or 1-800-SF-CLAIM

State Auto Insurance:  
Claims #: 1-800-766-1853 or e-mail [claims@stateauto.com](mailto:claims@stateauto.com)

USAA:  
Claims #: 1-800-531-8222

Universal North America Insurance Company:  
Claims #: 866-999-0898

Utica National Insurance Group:  
Claims #: (Fax) 315-266-4121 or 1-800-274-1914 ext. 2772

---

**Prepared by:**

**Thomas & Hutton Engineering Co.**

# Charleston County Shelter Locations

## **Stall High School**

7749 Pinehurst Street  
N. Charleston, SC 29420

## **Midland Park Elementary**

2415 Midland Park Road  
N. Charleston, SC 29418

## **Morningside Middle School**

1999 Singley Lane  
N. Charleston, SC 29405

## **Garrett Academy of Technology**

2731 Gordon Street  
N. Charleston, SC 29405

## **A.C. Corcoran Elementary**

8585 Vistavia Road  
N. Charleston, SC 29406

## **Pepperhill Elementary School**

3300 Creola Road  
N. Charleston, SC 29420

## **Brentwood Middle School**

2685 Leeds Avenue  
N. Charleston, SC 29405

## **Lambs Elementary School**

6800 Dorchester Road  
N. Charleston, SC 29418

**\*RESIDENTS SHOULD CONTINUE TO BE APPRISED OF IDENTIFIED  
SHELTER LOCATIONS AS THEY CONTINUE TO BE REVISED OVER TIME.  
GO TO [www.charlestoncounty.org/pdfs/HurricaneGuide-PrintAtHomeColor.pdf](http://www.charlestoncounty.org/pdfs/HurricaneGuide-PrintAtHomeColor.pdf) FOR  
CURRENT SHELTER LOCATIONS.**

---

Prepared by:

**Thomas & Hutton Engineering Co.**

## Sources:

- South Carolina Department of Transportation
- Charleston County
- City of Charleston
- Charleston Post & Courier
- South Carolina Insurance News Service
- Reverse 911 Interactive Community Notification System
- Charleston County Lowcountry CERT

**As information continues to evolve, residents are encouraged to review and update the Hurricane Preparedness Plan for current contact information, addresses and telephone numbers for State and Local agencies, emergency personnel, municipalities, shelter locations and community programs on a yearly basis.**

**Early preparation and continued awareness by all the residents is vital and warranted during times of emergency events.**

---

Prepared by:

**Thomas & Hutton Engineering Co.**

**CULTURAL RESOURCES SURVEY OF  
MULLET HALL PLANTATION,  
JOHNS ISLAND,  
CHARLESTON COUNTY, SOUTH CAROLINA**



**CHICORA RESEARCH CONTRIBUTION 498**



# **CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION, JOHNS ISLAND CHARLESTON COUNTY, SOUTH CAROLINA**

Prepared By:  
Michael Trinkley, Ph.D., RPA  
Nicole Southerland  
and  
Sarah Fick

Prepared For:  
Mr. Kevin O'Neill  
Kiawah River Plantation, LP  
211 King Street, Suite 300  
Charleston, SC 29401

**CHICORA RESEARCH CONTRIBUTION 498**



Chicora Foundation, Inc.  
PO Box 8664  
Columbia, SC 29202-8664  
803/787-6910  
Email: [chicora@earthlink.net](mailto:chicora@earthlink.net)  
[www.chicora.org](http://www.chicora.org)

July 28, 2008

This report is printed on permanent paper ∞

©2008 by Chicora Foundation, Inc. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, transmitted, or transcribed in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise without prior permission of Chicora Foundation, Inc. except for brief quotations used in reviews. Full credit must be given to the authors, publisher, and project sponsor.

## ABSTRACT

This study reports on an intensive cultural resources survey of a nearly 1,427 acre tract, located on Johns Island in Charleston County, South Carolina. The work was conducted to assist Mr. Kevin O'Neill of Kiawah River Plantation, LP comply with Section 106 of the National Preservation Act and the regulations codified in 36CFR800.

The tract, which is located at the southern edge of Johns Island, bordering the Kiawah River, will be developed for single family occupancy. While still relatively rural, the surrounding area is being developed with neighborhoods and commercial structures.

The proposed undertaking will require the clearing of the tract, followed by construction of various infrastructure elements, such as roads, stormwater drainage, and utilities. Individual lot construction will involve grading, additional utility construction, and subsequent building of structures. These activities have the potential to affect archaeological and historical sites and this survey was conducted to identify and assess archaeological and historical sites that may be in the project tract. For this study, an area of potential effect (APE) 0.5 mile from the proposed tract was assumed.

An investigation of the archaeological site files at the South Carolina Institute of Archaeology and Anthropology identified four previously recorded sites (38CH629, 38CH1730, 38CH1731, 38CH1732) in the APE. An additional 13 sites (38CH487, 38CH487A, and 38CH1539-1549) were identified on the Mullet Hall Property during a 1994 reconnaissance by Chicora Foundation.

The four sites outside the Mullet Hall property (38CH629 and 38CH1730-1732) were identified during a 1999 survey for an adjacent

residential development. Site 38CH629 is a Mississippian and nineteenth to twentieth century scatter; 38CH1730 is an unidentifiable prehistoric and eighteenth century site; 38CH1731 is a nineteenth to twentieth century scatter; and 38CH1732 is a Woodland and nineteenth to twentieth century site. All four of these sites were recommended not eligible for the National Register.

Of the sites previously identified on the Mullet Hall property, 38CH487 is described as a nineteenth century slave row; however, there is some confusion about the site described as 38CH487A. The site shown on the topographic maps at SCIAA was recorded in 1980 during a seventeenth century survey by Stanley South and Michael Hartley. While the site did not contain any seventeenth century materials, it was described a "house ruin," although no other description was given. The 1994 reconnaissance of the property revisited 38CH487A and reassigned the site number as 38CH1540, however the locations of 38CH487A and 38CH1540 are still shown in separate locations. It is believed that 38CH487A is shown incorrectly on the 1980 site form.

Other previously identified sites on the property include 38CH1539, an area of redeposited materials; 38CH1540, a plantation complex; 38CH1541, an eighteenth to nineteenth century main house; 38CH1542, two nineteenth century slave rows; 38CH1543, an eighteenth century main house; 38CH1544, a nineteenth century tenant site; 38CH1545, and late nineteenth century house; 38CH1546, a nineteenth to twentieth century scatter; 38CH1547, an eighteenth to nineteenth century slave row; 38CH1548, Bishop Cemetery, and 38CH1549, a cemetery. Although only examined at a reconnaissance level, five sites (38CH1540,

38CH1541, 38CH1542, 38CH1547, and 38CH1548) were thought to be eligible for the National Register. Four sites (38CH487, 38CH1543, 38CH1545, and 38CH1549) were potentially eligible and three sites (38CH1539, 38CH1544, and 38CH1546) were recommended not eligible for the National Register of Historic Places.

The S.C. Department of Archives and History GIS was also consulted for any National Register of Historic Places sites were in the vicinity of the project area. There is one NRHP property, the Bass Pond Site, located south of the Mullet Hall Property. In addition, twelve historic structures (365-0380, 1391, 1392, and 1464-1468 and 1470-1473) were identified in the vicinity; they were recorded either during a survey of James and Johns islands (Fick et al. 1989) or Charleston County (Fick 1992). Site 365-0380 are the c. 1808 Shoolbred graves; 1391, 1392, 1472, and 1473 are unidentified structures that have all been recommended not eligible for the National Register. Site 1464 is the St. John AME Church Cemetery; 1465 is the Hope Plantation Cemetery; 1466 is the Freeman House; 1467 is the James and Hattie Freeman House (Brickley House); 1468 is the Mt. Hebron Presbyterian Church (St. Francis Center); 1470 is the Promised Land Reformed Episcopal Church; and 1471 is the Lee Glover House. All resources are not eligible for the National Register except 1468, which was recommended eligible.

In preparation of the field investigation, a detailed historical context for Johns Island was prepared using a variety of primary sources. Areas of special interest include the military history of the island, as well as the development of a plantation economy. Careful attention was paid to comparing the agricultural schedules for Johns Island with surrounding areas in order to explore events specific to the island setting. An area of the island's history that has received far too little attention is the development of truck farming. The tract specific history took ownership back to the late eighteenth century, identifying that today's Mullet Hall consisted of three primary properties during the antebellum -- from west to east, the plantation of James Legare, Solomon Legare, and Benjamin Roper (The Oaks). This historical

research addressed the economic activities of each of these owners, as well as the convergence of the properties under the modern ownership of Limehouse. Detailed plats and maps were found to be invaluable in the identification and assessment of the archaeological resources on the property.

The archaeological survey of the tract incorporated shovel testing at 100-foot intervals on transects that were placed at 100-foot intervals along the roads running throughout the tract. All shovel test fill was screened through ¼-inch mesh and the remains were recorded. A total of 4,199 shovel tests were excavated along 375 transect

Sites Identified on the Mullet Hall tract

Site No.	Site Type	Eligibility
38CH487	slave settlement	E
38CH487A	not identified	-
38CH1539	redeposited	NE
38CH1540	plantation settlement	E
38CH1541	plantation settlement	E
38CH1542	slave settlements	E
38CH1543	plantation settlement	PE
38CH1544	tenant	PE
38CH1545	late 19th c house	PE
38CH1546	historic scatter	NE
38CH1547	slave settlements	E
38CH1548	Bishop Cemetery	PE
38CH1549	cemetery	PE
38CH2240	pottery scatter	NE
38CH2241	historic scatter	NE
38CH2242	prehistoric & historic scatter	PE
38CH2243	prehistoric & historic scatter	NE
38CH2244	prehistoric & historic scatter	PE
38CH2245	historic scatter	NE
38CH2246	prehistoric scatter	NE
38CH2247	prehistoric scatter	NE
38CH2248	historic settlement	E
38CH2249	prehistoric scatter	NE
38CH2250	prehistoric & historic scatter	PE
38CH2251	20th c trash dump	NE
38CH2252	historic scatter	PE
38CH2253	prehistoric & historic scatter	NE
38CH2254	historic scatter	NE

lines.

As a result of these investigations, 26 sites were identified. These include eleven originally identified sites (38CH487, 38CH1539-1543, and 38CH1545-38CH1549) and fifteen newly identified sites (38CH2240-2254). The area of 38CH487A was revisited, but no remains were found. In addition,



site 38CH1544 was found to be located off the Mullet Hall property, so no further work was performed.

For the newly identified sites, 38CH2240 is a prehistoric pottery scatter; 38CH2241 is a nineteenth to twentieth century scatter; 38CH2242 is a prehistoric and eighteenth century scatter; 38CH2243 is a prehistoric and eighteenth to nineteenth century scatter; 38CH2244 is a prehistoric and eighteenth to twentieth century scatter; 38CH2245 is a nineteenth to twentieth century scatter; 38CH2246 is a prehistoric pottery scatter; 38CH2247 is a Middle Woodland scatter; 38CH2248 is an early nineteenth century site; 38CH2249 is a prehistoric scatter; 38CH2250 is a prehistoric and eighteenth century scatter; 38CH2251 is a twentieth century trash dump; 38CH2252 is an eighteenth to twentieth century scatter; site 38CH2253 is a prehistoric and nineteenth century scatter; and 38CH2254 is a nineteenth to twentieth century scatter.

The National Register assessment for the

sites recommends five sites eligible (38CH487, 38CH1540, 38CH1541, 38CH1542, and 38CH2248), 12 not eligible (38CH1539, 38CH1546, 38CH1549, 38CH2240-2241, 38CH2243, 38CH2245-2247, 38CH2249, and 38CH2253-2254), and nine potentially eligible (38CH1543, 38CH1545, 38CH1547-1549, 38CH2242, 2244, 38CH2250, and 38CH2252).

Finally, it is possible that archaeological remains may be encountered in the project area during clearing activities. Crews should be advised to report any discoveries of concentrations of artifacts (such as bottles, ceramics, or projectile points) or brick rubble to the project engineer, who should in turn report the material to the State Historic Preservation Office or to Chicora Foundation (the process of dealing with late discoveries is discussed in 36CFR800.13(b)(3)). No construction should take place in the vicinity of these late discoveries until they have been examined by an archaeologist and, if necessary, have been processed according to 36CFR800.13(b)(3).



## TABLE OF CONTENTS

List of Figures		vii
List of Tables		ix
Introduction		1
Natural Environment		5
<i>Physiography</i>	5	
<i>Geology and Soils</i>	6	
<i>Climate</i>	8	
<i>Floristics</i>	10	
Prehistoric Background		13
<i>Previous Research</i>	13	
<i>Prehistoric Overview</i>	14	
Historical Synthesis		25
<i>Overview of Johns Island</i>	25	
<i>Tract Specific History</i>	78	
Methods		101
<i>Introduction</i>	101	
<i>Archaeological Methods</i>	101	
<i>Architectural Survey</i>	104	
<i>Site Evaluation</i>	105	
<i>Laboratory Analysis</i>	106	
Results of Survey		109
<i>Introduction</i>	109	
<i>Archaeological Resources</i>	109	
<i>Architectural and Other Historic Resources</i>	169	
Conclusions		171
<i>Resource Management</i>	171	
<i>Site Locations</i>	172	
<i>Historic Research</i>	173	
Sources Cited		177





## LIST OF FIGURES

### Figure

1. Project vicinity in Charleston County	2
2. Project tract and previously identified sites	3
3. View of typical forest on the property	5
4. Map of Johns Island showing the project area	6
5. View of field planted in corn	7
6. Soils in the study tract	8
7. View of a pond in the project area	9
8. View of alligators on the property	10
9. Generalized cultural sequence for South Carolina	14
10. Late prehistoric and early historic ceramic sequence for the Wateree River Valley	21
11. Portion of the 1711 Crisp map, <i>A Compleat Description of the Province of Carolina</i>	25
12. Growth of the African American slave population in Carolina	29
13. Portion of Stuart's 1780 map showing the vicinity of the two Yemassee War forts	30
14. Portion of a 1786 plat showing the three redoubts at Stono Ferry from the 1779 battle	31
15. Portion of the ca. 1780 Sproul map showing the Johns Island vicinity	32
16. Plan of Stono Ferry in 1780	33
17. Comparison of white, slave, and free blacks on Wadmalaw, Edisto, and Johns islands	37
18. Portion of the ca. 1819 Kinsey Burden map of Johns Island, showing the project vicinity	38
19. Portion of the Mills' Charleston District showing Johns and Wadmalaw islands	39
20. Two views of the project area at the end of the antebellum	44
21. Legareville in 1863	47
22. Johns Island in 1863 showing most of the locations referenced in the Civil War discussions	48
23. 1893 Postal Route map showing Johns Island had a post office at Mullet Hall	61
24. Wilson's photograph after the Charleston earthquake entitled, "Track out of line"	62
25. Acreage devoted to six major crops between 1900 and 1940	67
26. Cotton prices from the late antebellum through early 1930s	67
27. Johns Island area in 1912	68
28. One of William C. Geraty's rail cars	69
29. Farm operators in Charleston County from 1900 through 1940	70
30. Mullet Hall area in 1919	72
31. Johns Island in 1938	76
32. Genealogical chart for the Legares involved with Mullet Hall	79
33. Undated plat of Thomas Mullet's Johns Island property conveyed to James Legare	80
34. 1884 plat of Rosebank Plantation	87
35. 1879 plat of Solomon Legare's Home Place or Mullet Hall	92
36. Examples of the F.Y. Legare store tokens	93
37. 1816 plat of Benjamin Roper's Oaks Plantation	99
38. Data incorporated in the survey methodology	102

39. Topo showing tract boundaries, transects, and areas covered with pedestrian survey	103
40. Previously recorded architectural sites within a 0.5 mile APE	104
41. Topo showing sites evaluated during the current study	109
42. Sketch map of 38CH487	110
43. Historic maps and aerial showing the vicinity of 38CH487	114
44. View of brick remains at 38CH1539	115
45. Sketch map of 38CH1540	117
46. Sketch map from the 1994 reconnaissance showing 38CH1540	118
47. Nineteenth century map showing J. Roper's Oaks Plantation	118
48. 1948 and 1973 aerials showing the approximate location of the cemetery at 38CH1540	124
49. Sketch map of 38CH1541	125
50. Portion of the T-491 tracing, ca. 1863 showing James Legare settlement	130
51. Sketch map of 38CH1542	131
52. Historic maps and aerial showing vicinity of 38CH1542	131
53. Sketch map of 38CH1543	134
54. Sketch map of 38CH1545	136
55. View of 38CH1545	137
56. View of the well at 38CH1545	138
57. Views of 38CH1545	138
58. Sketch map of 38CH1546	139
59. Sketch map of 38CH1547	141
60. View of 38CH1547	142
61. T-491 chart showing Sol Legare's Cott. Hs. At 38CH1547	144
62. View of dense vegetation surrounding 38CH1548	145
63. View of the headstone of Pompey Scott at 38CH1548	146
64. Aerial photos of the cemetery at 38CH1548 in 1948 and 1973	146
65. 1933 sketch map of Mullet Reference Point 1, showing the cemetery at 38CH1549	147
66. View of a piece of manganese glass found at 38CH1549	147
67. Sketch map of 38CH2240	148
68. Sketch map of 38CH2241	149
69. 1919 Wadmalaw map showing the structures at 38CH2241	149
70. Sketch map of 38CH2242	151
71. Sketch map of 38CH2243	152
72. Sketch map of 38CH2244	154
73. Sketch map of 38CH2245	155
74. Sketch map of 38CH2246	156
75. Sketch map of 38CH2247	157
76. Sketch map of 38CH2248	158
77. View of brick in the dirt road at 38CH2248	159
78. View of Test Unit 1 at 38CH2248	159
79. 1816 plat showing 38CH2248	161
80. Sketch map of 38CH2249	161
81. Sketch map of 38CH2250	162
82. Sketch map of 38CH2251	164
83. View of the push pile at 38CH2252	164
84. Sketch map of 38CH2252	166
85. Sketch map of 38CH2253	168
86. Sketch map of 38CH2254	169
87. View of structure on the Mullet Hall property	170
88. Identification of site locations on the Mullet Hall soil drainage map	172

## LIST OF TABLES

### Table

1. Sites identified at Mullet Hall and eligibility recommendations	4
2. Population and Wealth in St. Johns Colleton in 1860	36
3. Occupations in St. Johns Colleton District from the 1850 and 1860 Federal Census	37
4. Agricultural Census Data for Charleston District, 1850-1860	42
5. Agricultural Wealth Comparisons, 1860	43
6. Losses Claimed by Johns Island Planters During the Civil War	50
7. 1870 Agricultural Census for Johns Island	55
8. 1880 Agricultural Statistics for Charleston by Township	56
9. Agricultural Data for Johns Island, 1880	56
10. 1870 Commercial Gins on Johns Island	59
11. Stores operated in the Johns Island area, 1889	60
12. Stores operated in the Johns Island area, 1912	64
13. Charleston County Truck Crops in 1915	64
14. List of Farmers Using the Mullet Hall Post Office, 1905-1910	65
15. Agricultural schedule data for Charleston County, 1900-1940	66
16. New Income per Family by Tenure Status and Region, 1934	74
17. Agricultural schedules for Plantations in the Study Area	81
18. 1870 Agricultural Schedules for Plantations and Farms in the Study Area	83
19. Dill, Ball Renters at Mullet Hall in 1907	95
20. Artifacts from 38CH487	111-112
21. Pattern analysis of 38CH487	113
22. Mean ceramic date of 38CH487	113
23. Pattern analysis of 38CH1540	119
24. Artifacts from 38CH1540, Locus 1	119
25. Mean ceramic date of 38CH1540, Locus 1	120
26. Artifact from 38CH1540, Locus 3	120
27. Mean ceramic date of 38CH1540, Locus 3	121
28. Mean ceramic date of 38CH1540, Locus 4	121
29. Artifacts from 38CH1540, Locus 4	122-123
30. Artifacts from 38CH1541	126-129
31. Mean ceramic date of 38CH1541	130
32. Artifacts from 38CH1542	132
33. Mean ceramic date of 38CH1542	133
34. Artifacts from 38CH1543	134
35. Mean ceramic date of 38CH1543	135
36. Pattern analysis of 38CH1543	135
37. Artifacts from 38CH1545	137
38. Artifacts from 38CH1546	139

39. Artifacts from 38CH1547	143
40. Mean ceramic date of 38CH1547	143
41. Pattern analysis of 38CH1547	144
42. Individuals with stones identified at 38CH1548	145
43. Artifacts from 38CH2241	150
44. Artifacts from 38CH2242	151
45. Artifacts from 38CH2243	153
46. Artifacts from 38CH2244	155
47. Artifacts from 38CH2245	156
48. Artifacts from 38CH2248	160
49. Pattern analysis of 38CH2248	160
50. Artifacts from 38CH2250	163
51. Artifacts from 38CH2251	165
52. Artifacts from 38CH2252	166
53. Pattern analysis of 38CH2252	167
54. Mean ceramic date of 38CH2252	167
55. Artifacts from 38CH2253	169
56. Sites and eligibility on the Mullet Hall property	171



## INTRODUCTION

This investigation was conducted by Dr. Michael Trinkley of Chicora Foundation, Inc. for Mr. Kevin O'Neill of Kiawah River Plantation, LP in Charleston, South Carolina. The work was conducted to assist the client with Section 106 of the National Historic Preservation Act and the regulations codified in 36CFR800.

The project site consists of a 1,427 acre tract proposed to be used for residential development on the southern tip of Johns Island, South Carolina (Figure 1). The tract, irregular in shape, is in an area of Charleston County already seeing significant growth. At least three large tracts have been surveyed for residential development in the vicinity within the last decade.

The tract consists of low, level topography with marsh and creeks encompassing the southern half. Currently used as a hunt club, much of the once cultivated fields have been allowed to grow up into a mixed pine and hardwood forest, although several fields are still being cultivated. Some fields have been turned into planted pines. Multiple ponds are also found on the property.

While still in the planning stages, the property will likely include several phases of residential housing, as well as several commercial areas and golf courses. This work will require the construction of utilities such as electrical lines, sewer, and water, as well as an expanded road system and possibly even connector routes. There will also be construction on the individual house lots. As with any development there is the possibility of increased short-term noise, traffic, and dust levels associated with construction activities. All have the potential to damage or otherwise affect cultural resources that may be present on the tract. This study, however, does not consider

any future secondary impact of the project, including increased or expanded development of this section of Charleston County.

We were requested by Mr. Kevin O'Neill of Kiawah River Plantation, LP to provide a proposal for a cultural resource survey on January 9, 2008. A proposal was provided on January 30. An agreement was signed on March 18, 2008. The survey, which involved background investigations at the South Carolina Institute of Archaeology and Anthropology, the South Carolina Department of Archives and History, the South Carolina Historical Society, Charleston County Register of Mesne Conveyance, and the South Caroliniana Library, and subsequent fieldwork, was begun shortly thereafter.

An investigation of the archaeological site files at the South Carolina Institute of Archaeology and Anthropology identified four (38CH629, 38CH1730, 38CH1731, 38CH1732) previously recorded sites in the 0.5 mile APE. An additional 13 sites (38CH487, 38CH487A, and 38CH1539-1549) were identified on the Mullet Hall Property during a 1994 reconnaissance (Adams and Trinkley 1994).

The four sites off the Mullet Hall property (38CH629 and 38CH1730-1732) were identified during a 1999 survey for an adjacent residential development (Bridgman et al. 1999). Site 38CH629 is a Mississippian and nineteenth to twentieth century scatter; 38CH1730 is an unidentifiable prehistoric and eighteenth century site; 38CH1731 is a nineteenth to twentieth century scatter; and 38CH1732 is a Woodland and nineteenth to twentieth century site. All four of these sites were recommended not eligible for the National Register.

Of the sites found on the Mullet Hall

## INTRODUCTION

property, 38CH487 is described as a nineteenth century slave row; however, there is some confusion about the site described as 38CH487A. The site shown on the topographic maps at SCIAA was recorded in 1980 during a seventeenth century survey by Stanley South and Michael Hartley (South and Hartley 1980). While the site did not contain any seventeenth

the site number as 38CH1540, however the locations of 38CH487A and 38CH1540 are shown in separate locations. It is believed that 38CH487A is shown incorrectly on the 1980 site form and is in fact 38CH1540.

Other sites on the property include 38CH1539, an area of redeposited materials;

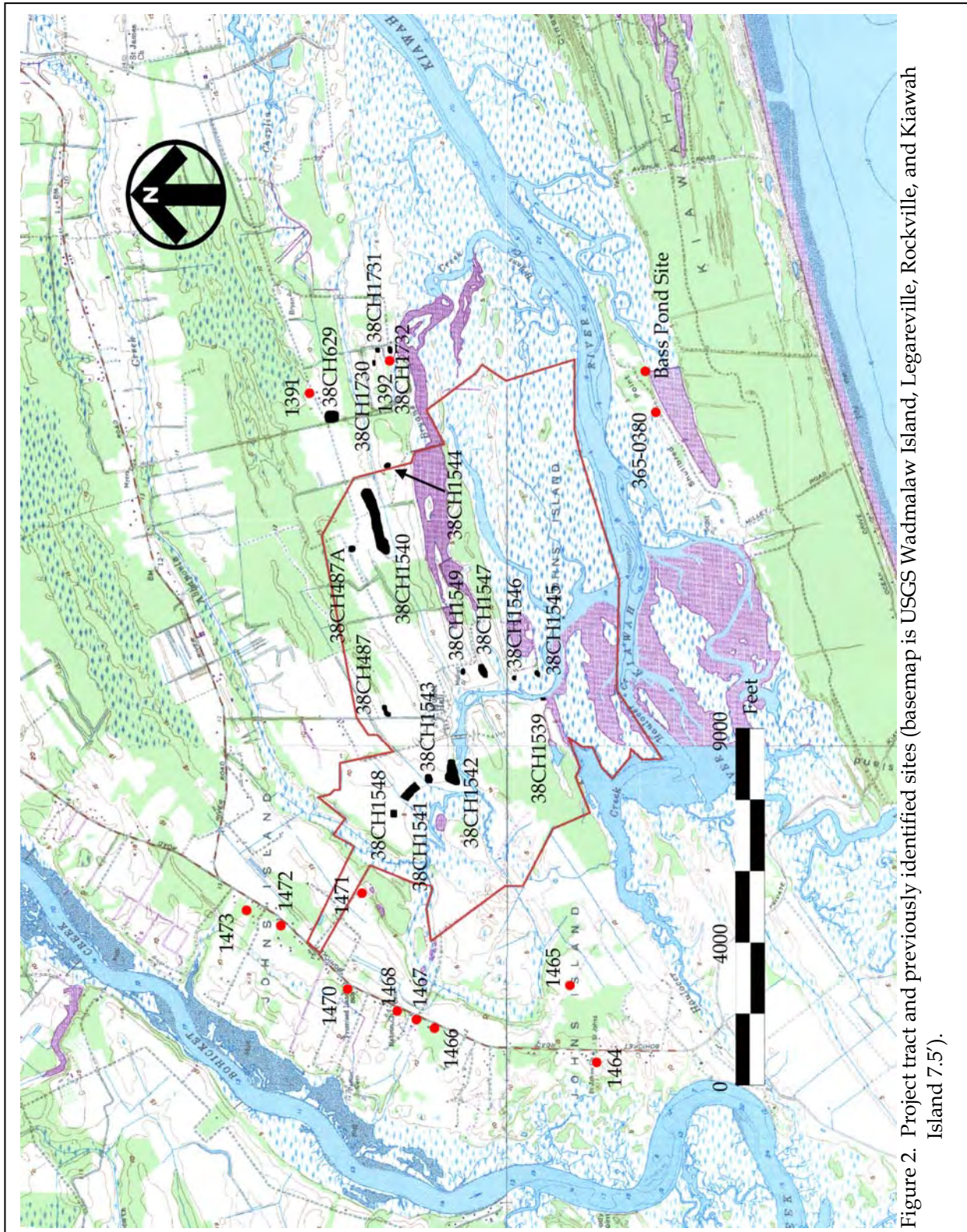


Figure 1. Project vicinity in Charleston County (basemap is USGS 1:500,000).

century materials, it was described a “house ruin,” although no other description was given. The report that includes the site (South and Hartley 1980:59) describes it as early nineteenth century. The 1994 reconnaissance of the property revisited 38CH487A and reassigned

38CH1540, a plantation complex; 38CH1541, an eighteenth to nineteenth century main house; 38CH1542, two nineteenth century slave rows; 38CH1543, an eighteenth century main house; 38CH1544, a nineteenth century tenant site; 38CH1545, and late nineteenth century house;





## INTRODUCTION

38CH1546, a nineteenth to twentieth century scatter; 38CH1547, an eighteenth to nineteenth century slave row; 38CH1548, Bishop Cemetery, and 38CH1549, a cemetery.

Although only examined at a reconnaissance level, five sites (38CH1540, 38CH1541, 38CH1542, 38CH1547, and 38CH1548) were thought to be eligible for the National Register. Four sites (38CH487, 38CH1543, 38CH1545, and 38CH1549) were potentially eligible and three sites (38CH1539, 38CH1544, and 38CH1546) were recommended not eligible for the National Register of Historic Places.

The S.C. Department of Archives and History GIS was also consulted to see if any National Register of Historic Places sites were in the vicinity of the project area. There is one NRHP property, the Bass Pond Site, located south of the Mullet Hall Property. In addition, twelve historic structures (365-0380, 1391, 1392, and 1464-1468 and 1470-1473) were identified in the vicinity, which were recorded either from a survey of James and Johns islands (Fick et al. 1989) or Charleston County (Fick 1992). Site 365-0380 are the c. 1808 Shoolbred graves; 1391, 1392, 1472, and 1473 are unidentified structures that have all been recommended not eligible for the National Register. Site 1464 is the St. John AME Church Cemetery; 1465 is the Hope Plantation Cemetery; 1466 is the Freeman House; 1467 is the James and Hattie Freeman House (Brickley House); 1468 is the Mt. Hebron Presbyterian Church (St. Francis Center); 1470 is the Promised Land Reformed Episcopal Church; and 1471 is the Lee Glover House. All resources are not eligible for the National Register except 1468, which was recommended eligible.

Table 1.  
Sites identified at Mullet Hall and eligibility recommendations

Site Number	Description	Size (in feet)	Central UTM <sup>1</sup>		Soil	Eligibility
			Easting	Northing		
38CH487	18th-19th c. scatter	900 x 600	582408	3610894	Seabrook	E
38CH1539	19th c. scatter	50 x 10	582480	3609560	Kiawah	NE
38CH1540	18th-19th c. plantation complex	2,400 x 950	583972	3610963	Seabrook	E
38CH1541	18th-20th c. domestic	700 x 900	581720	3610682	Seabrook	E
38CH1542	19th-20th c. settlement	1,200 x 500	581841	3610310	Seabrook	E
38CH1543	18th-19th c. scatter	300 x 300	581842	3610534	Seabrook	PE
38CH1545	prehistoric/20th c. scatter	350 X 200	582743	3609623	Kiawah	PE
38CH1546	prehistoric/18th-19th c. scatter	200 x 250	582671	3609837	Seabrook	NE
38CH1547	prehistoric/18th-19th c. scatter	650 x 450	582686	3610045	Kiawah	PE
38CH1548	19th-20th c. cemetery	200 x 200 <sup>2</sup>	581509	3610818	Kiawah	PE
38CH1549	cemetery	250 x 250 <sup>2</sup>	582734	3610249	Wando	PE
38CH2240	prehistoric scatter	150 x 200	584231	3610883	Seabrook	NE
38CH2241	19th-20th c. scatter	150 x 200	582369	3609721	Kiawah	NE
38CH2242	prehistoric/18th c. settlement	400 x 300	582376	3610096	Wando	PE
38CH2243	prehistoric/18th-19th c. scatter	1,850 x 400	583003	3609935	Seabrook	NE
38CH2244	prehistoric/18th-20th c. scatter	500 x 250	582663	3610209	Wando	PE
38CH2245	19th-20th c. scatter	150 x 150	583345	3610070	Seabrook	NE
38CH2246	prehistoric scatter	150 x 50	583482	3610108	Seabrook	NE
38CH2247	Middle Woodland scatter	50 x 50	583702	3610141	Seabrook	NE
38CH2248	Early 19th c. scatter	150 x 100	584432	3610336	Seabrook	E
38CH2249	prehistoric scatter	500 x 200	582899	3610344	Wando	NE
38CH2250	prehistoric/18th c. scatter	1,000 x 550	583944	3610691	Seabrook	PE
38CH2251	20th c. trash dump	200 x 200	582704	3610444	Wando	NE
38CH2252	18th-20th c. possible overseer	450 x 250	580877	3610417	Yonges	PE
38CH2253	prehistoric/19th c. scatter	550 x 350	582682	3610696	Seabrook	NE
38CH2254	19th-20th c. scatter	100 x 200	580916	3611205	Wando	NE

<sup>1</sup> Zone 17, NAD27 datum

<sup>2</sup> Includes buffer as discussed

The fieldwork took place from May 7 through June 13 by Ms. Nicole Southerland and Ms. Ashley Guba under the direction of Dr. Michael Trinkley. Ms. Sarah Fick prepared the historical overview of the study tract. The results of the archaeological and historical investigations are included in this report.



## NATURAL ENVIRONMENT

### Physiography

Charleston County is located in the lower Atlantic Coastal Plain of South Carolina and is bounded to the east by the Atlantic Ocean and a series of marsh, barrier, and sea islands (Mathews et al. 1980:133). Elevations in the County range from sea level to about 70 feet above mean sea level (AMSL).

The mainland topography consists of subtle ridge and bay undulations, characteristic of beach ridge plains.

Seven major drainages are found in Charleston County. Four of these, the Wando, Ashley, Stono, and North Edisto, are dominated by tidal flows and are saline. Nearby portions of the Stono were historically used for the cultivation of rice by plantations such as Fenwick Hall. The three drainages with significant freshwater flow are the Santee, forming the northern boundary of the County, the South Edisto, forming the southern boundary, and the Cooper, which bisects the County.

Johns Island is a sea island consisting of about 84 square miles. It is located south of the City of Charleston, bordered to the north and east by the Stono River and James Island, to the northwest by Church Flats and the mainland, to the west by Church and Bohicket creeks and, beyond them, Wadmalaw Island. To the south of Johns Island is the Kiawah River and the barrier islands of Seabrook and Kiawah. Johns Island has

a crescent shape (Figure 4), with its western neighbor, Wadmalaw, about half its size (42 square miles). Extensive tidal marshes occupy the low-lying area immediately between Kiawah and Johns Island.

At a general level, elevations on Johns Island range from sea level at Kiawah River to



Figure 3. View of typical forest on the property.

about 30 feet above mean sea level (AMSL) in the center of the island. However, when topography is more carefully examined, the island consists of well preserved Pleistocene barrier island ridges separated by troughs. These troughs are characterized by broad, low gradient interior drains. The larger ones, such as Hut and Abbapolla, are named and consist of well defined creeks. Many others, however, are unnamed and appear only as swampy sloughs. The ridges follow a southwest-northeast orientation and the largest runs from Bohicket Creek northeast to the Johns Island airport. A second area of high ground is found along Maybank Highway, while a less well

defined third area is situated in the Hickory Hill area of the island.

The tidal range on the Stono varies from about 5.3 feet at its mouth (Snake Island) to 6.4 feet at Church flats. The Wadmalaw has a tidal range of 6.9 feet at the Church Creek bridge.

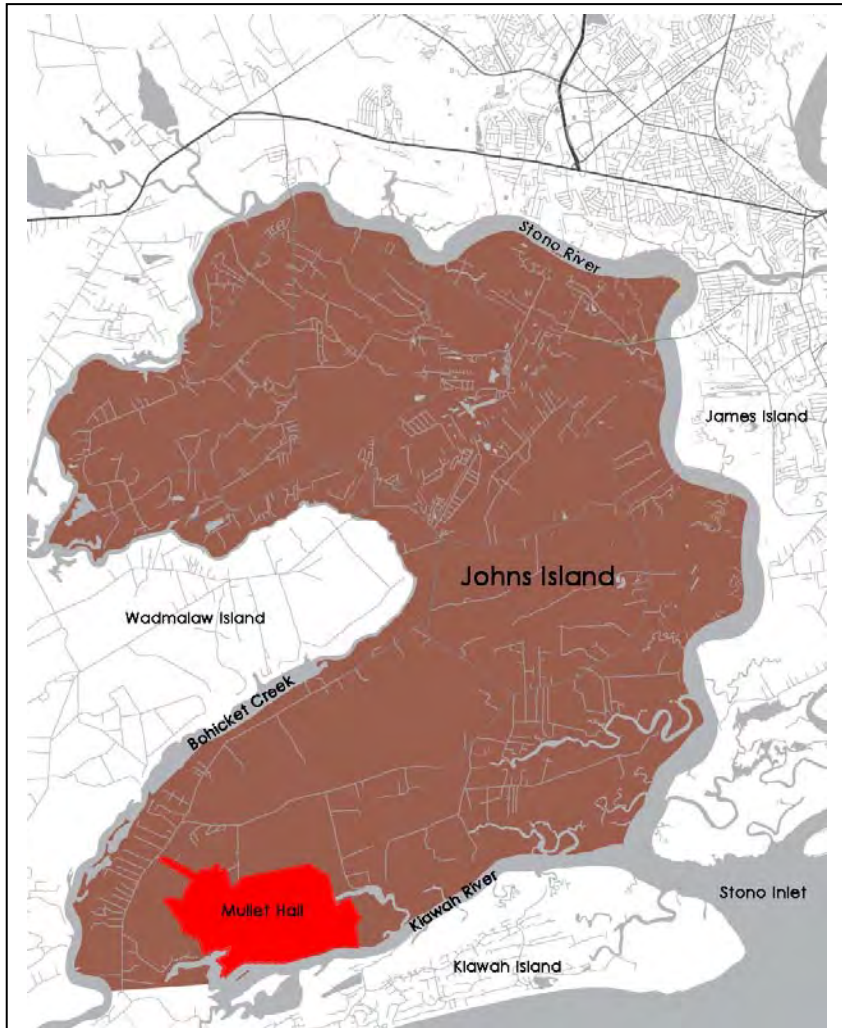


Figure 4. Map of Johns Island showing the project area.

Throughout this area the creeks vary from very high salinities to brackish water. For example, the salinity of the lower Stono is about 32‰, but drops to about 9‰ at its upper end.

Because of the low topography, many broad, low gradient interior drains are present as either extensions of the tidal rivers or as flooded

bays and swales. Extensions include Bryans Creek, which flows into the Kiawah River.

### Geology and Soils

Coastal Plain geological formations are unconsolidated sedimentary deposits of very recent age (Pleistocene and Holocene) lying unconformably on ancient crystalline rocks (Cooke 1936; Miller 1971:74). The Pleistocene sediments are organized into topographically distinct, but lithologically similar, geomorphic units, or terraces, parallel to the coast. The sites are located in an area identified by Cooke (1936) as part of the Pamlico terrace, which includes the land between the recent shore and an abandoned shore line about 25 feet AMSL. Cooke (1936:7) notes that evidence of ancient beaches and swales can still be seen in the Pamlico formation and this likely contributed to the ridge and trough topography present in some areas.

Within the coastal zone, the soils are Holocene and Pleistocene in age and were formed from materials that were deposited during the various stages of coastal submergence. The formation of soils is affected by this parent material (primarily sands and clays), the temperate climate, the various

soil organisms, topography, and time.

The mainland soils are Pleistocene in age and tend to have more distinct horizon development and diversity than the younger soils of the sea and barrier islands. Sandy to loamy soils predominate in the level to gently sloping mainland areas. The island soils are less diverse



and less well developed, frequently lacking a well-defined B horizon. Organic matter is low and the soils tend to be acidic. The Holocene deposits typical of barrier islands and found as a fringe on some sea islands, consist almost entirely of quartz sand, which exhibits little organic matter. Tidal marsh soils are Holocene in age and consist of fine sands, clay, and organic matter deposited over older Pleistocene sands. The soils are frequently covered by up to 2 feet of saltwater during high tides. Historically, marsh soils have been used as compost or fertilizer for a variety of crops, including cotton (Hammond 1884:510) and Allston mentions that the sandy soil of the coastal region "bears well the admixture of salt and marsh mud with the compost" (Allston 1854:13).

Eleven soil types are found in the survey area (Figure 6) including one excessively drained soil, Wando; two moderately well drained soils, Charleston and Seabrook; three somewhat poorly drained soils, Edisto, Kiawah, and Leon; three poorly drained soils, Dawhoo/Rutledge, Wadmalaw, and Yonges; and two very poorly drained soils, Capers and Stono.

Wando soils have an Ap horizon of dark brown (10YR4/3) loamy fine sand to 0.7 foot in depth over a brown (7.5YR5/4) loamy fine sand that extends to 2.7 feet. These soils account for 2.2% of the entire Mullet Hall property.

Charleston soils have an Ap horizon of

dark brown (10YR3/3) loamy fine sand to 0.7 foot over a yellowish brown (10YR5/4) loamy fine sand to a depth of 1.3 feet. Seabrook soils have an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to a depth of 0.8 foot over a dark brown (10YR4/3) or dark yellowish brown (10YR4/4) loamy fine sand to a depth of 1.7 feet. The moderately well drained soils cover approximately 16% of the entire property.

The somewhat poorly drained soils cover about 17.3% of the entire property. These include Edisto, which have an Ap horizon of very dark



Figure 5. View of field planted in corn.

grayish brown (10YR3/2) loamy fine sand to 0.8 foot in depth over a pale brown (10YR6/3) loamy fine sand; Kiawah soils, which have an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to 0.7 foot over a dark grayish brown (10YR4/2) loamy fine sand to 1.2 feet in depth; and Leon soils, which have an A horizon of very dark gray (10YR3/1) fine sand to 0.8 foot in depth over a gray (10YR6/1) coarse sand to 1.7 feet in depth.

## CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION

The Dawhoo and Rutlege Series has an Ap horizon of black (10YR2/1) loamy fine sand to just under 1.0 foot over a very dark grayish brown (10YR3/2) loamy fine sand to a depth of 1.5 feet. Wadmalaw soils have an A horizon of black (10YR2/1) fine sandy loam to 0.4 foot in depth over a very dark gray (10YR3/1) fine sandy loam

silty clay to a depth of 1.5 feet. Stono soils have an Ap horizon of black (10YR2/1) fine sandy loam to 0.8 foot in depth over a black (10YR2/1) fine sandy loam to 1.4 feet in depth. These soils will exhibit water at grade or within the upper foot during most periods.

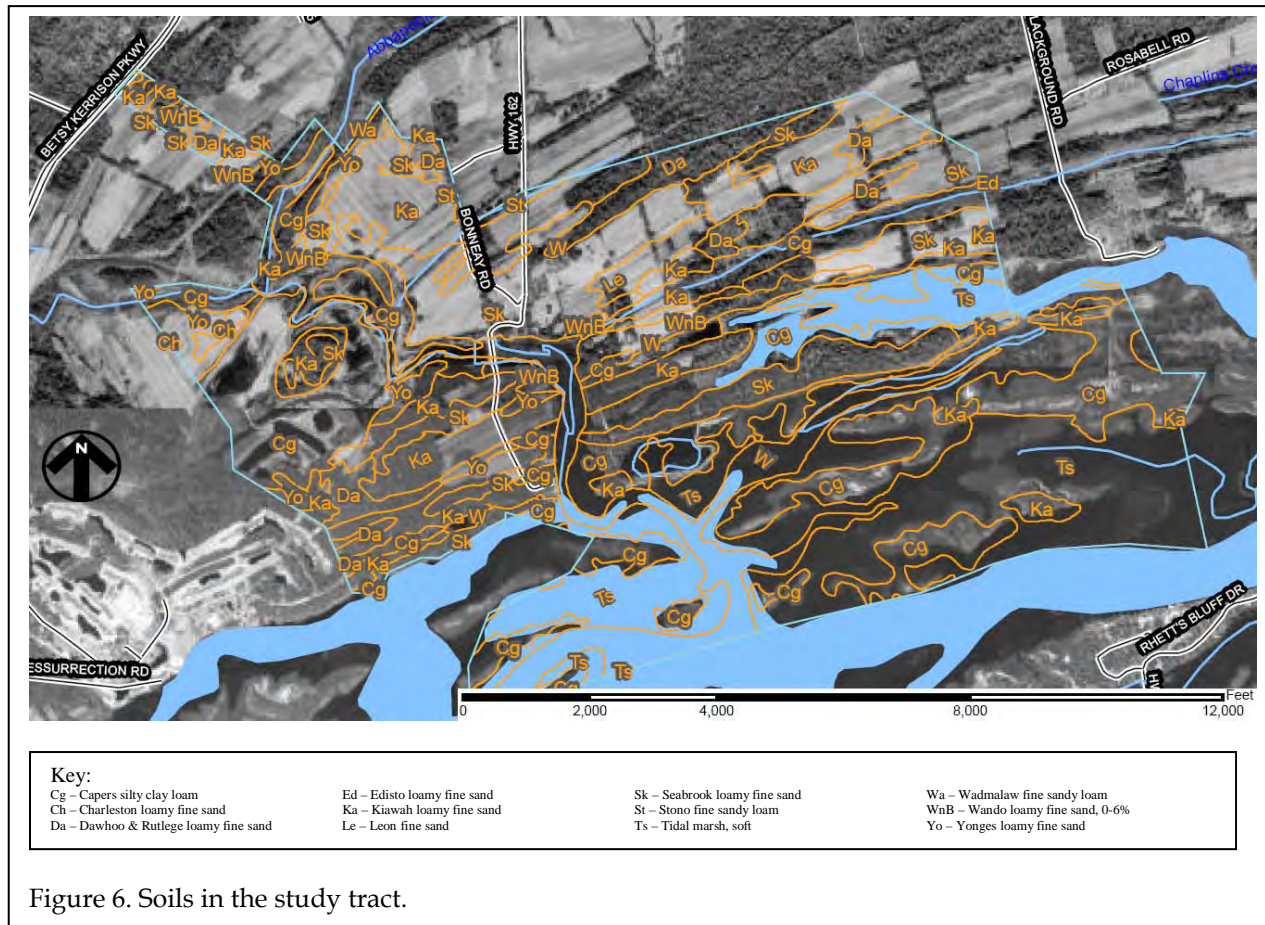


Figure 6. Soils in the study tract.

to 0.8 foot in depth. The Yorges Series has an Ap horizon of dark grayish brown (10YR4/2) loamy fine sand to 0.8 foot over a light brownish gray (10YR6/2) loamy fine sand to 1.2 feet in depth. The poorly drained soils account for 6.6% of the Mullet Hall property.

The very poorly drained soils are the most common soils within the tract and account for 27.3% of the property. Capers soils have an A horizon of dark gray (5Y4/1) silty clay loam to 0.4 foot in depth over a dark grayish brown (2.5Y4/2)

In addition, tidal marsh accounts for 22.4% of the property while water covers 8.4% of the property.

### Climate

John Lawson described South Carolina in 1700 as having, “a sweet Air, moderate Climate, and fertile Soil” (Lefler 1967:86). Of course, Lawson tended to romanticize Carolina. In December 1740, Robert Pringle remarked that Charleston was having “hard frosts & Snow”



characterized as “a great Detriment to the Negroes” (Edgar 1972:282), while in May 1744 Pringle states, “the weather having already Come is very hot” (Edgar 1972:685).

The major climatic controls of the area are latitude, elevation, distance from the ocean, and location with respect to the average tracks of migratory cyclones. Charleston’s latitude of 32°37’N places it on the edge of the balmy subtropical climate typical of Florida, further south.

August, 1752, the weather in Charleston was warmer than any of the inhabitants before had ever experienced. The mercury in the shade often rose above 90°, and for nearly twenty successive days varied between that and 101° (Mills 1972:444).

The area normally experiences a high relative humidity, adding greatly to the discomfort.



Figure 7. View of a pond in the project area.

As a result, there are relatively short, mild winters and long, warm, humid summers. The large amount of nearby warm ocean water surface produces a marine climate, which tends to moderate both the cold and hot weather. The Appalachian Mountains, about 220 miles to the northwest, block the shallow cold air masses from the northwest, moderating them before they reach the sea islands (Mathews et al. 1980:46).

The average high temperature in Charleston in July is 81°F, although temperatures are frequently in the 90s during much of the month (Kjerfve 1975:C-4). Mills noted:

in the months of June, July, and

Kjerfve (1975:C-5) found an annual mean value of 73.5% RH, with the highest levels occurring during the summer. Pringle remarked in 1742 that guns “suffer’d with the Rust by Lying so Long here, & which affects any Kind of Iron Ware, much more in this Climate than in Europe” (Edgar 1972:465).

The annual rainfall in this portion of Charleston is about 49 inches,

fairly evenly spaced over the year. While adequate for most crops, there may be periods of both excessive rain and drought. The Charleston area has recorded up to 20 inches of rain in a single month and the rainfall over a three month period has exceeded 30 inches no less than nine times in the past 37 years. Likewise, periods of drought can occur and cause considerable damage to crops and livestock. Mills remarks that the “Summer of 1728 was uncommonly hot; the face of the earth was completely parched; the pools of standing water dried up, and the field reduced to the greatest distress” (Mills 1972:447-448). Another significant historical drought occurred in 1845, affecting both the coastal areas and the piedmont.

The annual growing season is 295 days, one of the longest in South Carolina. This mild climate, adequate rainfall, and long growing season, as Hilliard (1984:13) notes, is largely responsible for the presence of many southern crops, such as cotton and sugar cane.

### Floristics

The survey area exhibits three major ecosystems: the maritime forest ecosystem, which consists of the upland forest areas, the palustrine ecosystem, which consists of essentially fresh water, non-tidal wetlands, and the riverine



Figure 8. View of alligators on the property.

ecosystem, which is derived from salt water and is characterized by a tidal influence (Sandifer et al. 1980:7-9).

The maritime forest ecosystem has been found to consist of five principal forest types, including the Oak-Pine forests, the Mixed Oak Hardwood forests, the Palmetto forests, the Oak thickets, and other miscellaneous wooded areas (such as salt marsh thickets and wax myrtle thickets).

Of these, the Oak-Pine forests are most common, constituting large areas of Charleston's original forest community. In some areas palmetto

becomes an important sub-dominant. Typically these forests are dominated by the laurel oak with pine (primarily loblolly with minor amounts of longleaf pine) as the major canopy co-dominant. Hickory is present, although uncommon. Other trees found are the sweet gum and magnolia, with sassafras, red bay, American holly, and wax myrtle and palmetto found in the understory.

Mills, in the early nineteenth century, remarked that:

South Carolina is rich in native and exotic productions; the varieties of its soil, climate, and geological positions, afford plants of rare, valuable, and medicinal qualities; fruits of a luscious, refreshing, and nourishing nature; vines and shrubs of exquisite beauty, fragrance, and luxuriance, and forest trees of noble growth, in great variety (Mills 1972:66).

The loblolly pine was called the "pitch or Frankincense Pine" and was used to produce tar and turpentine; the longleaf pine was "much used in building and for all other domestic purposes"; trees such as the red bay and red cedar were often used in furniture making and cedar was a favorite for posts; and live oaks were recognized as yielding "the best of timber for ship building"; (Mills 1972:66-85). Mills also observed that:

in former years cypress was much used in building, but the difficulty of obtaining it now, compared with the pine, occasions little of it to be cut for

sale, except in the shape of shingles; the cypress is a most valuable wood for durability and lightness. Besides the two named we have cedar, poplar, beech, oak, and locust, which are or may be also used in building (Mills 1972:460).

Being managed as a hunt club, the property played host to numerous animals including deer, turkey, and alligators (Figure 8).

The "Oak and hickory high lands" according to Mills were, "well suited for corn and provisions, also for indigo and cotton" (Mills 1972:443). The value of these lands in the mid-1820s was from \$10 to \$20 per acre, less expensive than the tidal swamp or inland swamp lands (where rice and, with drainage, cotton could be grown).

Today, virtually all of the project area's higher ground evidences some form of disturbance. Many of the trees on the tract are young pines and hardwoods that have recently grown into previously cultivated fields (Figure 3).

There are still cultivated fields on the property, which were planted in corn (Figure 5), tomatoes, squash, zucchini, and cabbage. Some fields have been converted into planted pines. There are also several dug ponds on the property (Figure 7).

The palustrine ecosystem, which includes all wetland ecosystems, such as the swamps, bays, savannas, potholes, and creeks where the salinities measure less than 0.5 ppt, is found throughout the project area. These palustrine ecosystems tend to be diverse, although not well studied (Sandifer et al. 1980:295). Many of these freshwater areas are likely associated with the various troughs scattered across the area. A number of forest types may be found in the palustrine areas which would attract a variety of terrestrial mammals. The typical vegetation might consist of red maple, swamp tupelo, sweet gum, red bay, cypress, and various hollies. Also expected in these areas would be wading birds and reptiles. It seems likely that these freshwater environs were of particular importance to the prehistoric occupants, but posed only a passing hindrance to the historic plantation owners.





## PREHISTORIC BACKGROUND

### Previous Research

Charleston County has received a significant amount of archaeological attention. Nearly two decades ago, Derting and his colleagues listed over 430 reports for the county (Derting et al. 1991:127-182). A very large number of these studies represent cultural resource surveys conducted by agencies such as the U.S. Forest Service and the S.C. Department of Transportation. Many others have been conducted by various consultants, such as Carolina Archaeological Services and Brockington and Associates. Others focus on the urban archaeology of downtown Charleston, conducted primarily by The Charleston Museum. Recently, Chicora Foundation completed a major data recovery project on a small Thom's Creek site in Mount Pleasant (Trinkley and Hacker 2007).

There seems to be little research specific to Johns Island. Jordan and Stringfellow (1998:10-13) deal with the 10,000 plus years of prehistory in three pages. Most cultural resource studies – such as this – review prehistory in very generic terms (as we do below).

Nevertheless, both nearby Kiawah and Seabrook have produced prehistoric sites worthy of brief mention. Investigations on Kiawah resulted in data recovery excavations at the Bass Pond Site (38CH124) (Trinkley 1993). Those investigations compared the site to another Thom's Creek occupation on Kiawah, 38CH125/126, revealing striking differences in the Thom's Creek ceramics. At CH124 Thom's Creek Finger Pinched dominated and the radiocarbon date was 2090 B.C. At CH125/126 Thom's Creek Reed Punctate was the dominant pottery (and no finger pinched wares were recovered). Pottery, however, was not the only difference. At CH124 structural features, relatively dense shell middens,

and a diverse artifact assemblage including projectile points, flakes, bone awls, atlatl weights, fired clay objects, hones, shell tools, and antler tools were recovered. Well preserved floral and faunal materials were also recovered. In contrast, CH125/126 produced a very Spartan assemblage, lacking structural remains and the variety of tools found at Bass Pond (for a detailed examination of non-shell ring Thom's Creek sites, see Trinkley and Hacker 2007:7-24).

Also examined on Kiawah was a Deptford midden, 38CH1219 (Trinkley et al. 1995). At this site excavation revealed that the "midden" actually consisted of multiple small piles, each with low artifact density. Almost immediately adjacent to the midden piles, however, were areas with appreciably higher artifact density. Both Deptford and St. Catherines pottery was found in the middens. The lithics were limited, with most specimens appearing to represent unsuccessful experimentation with local mudstone or siltstone. Floral remains, exclusively from non-midden areas, included both hickory nutshell and palmetto seeds.

Investigations on nearby Seabrook Island explored a poorly documented site (38CH1257) that produced not only Deptford remains, but also Mississippian materials (Trinkley 1999). The latter were of special interest, being associated with at least one structure and a feature filled with peach pits – dating the settlement to the protohistoric.

To the east, on James Island, Chicora archaeologists examined one feature – a 12 foot diameter shellfish steaming pit (Trinkley and Hacker 1997). This work, while limited to one feature, is nevertheless notable since the level of analysis is exceptional and the work demonstrates the level of detail that can be obtained from even limited archaeological data.

# CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION

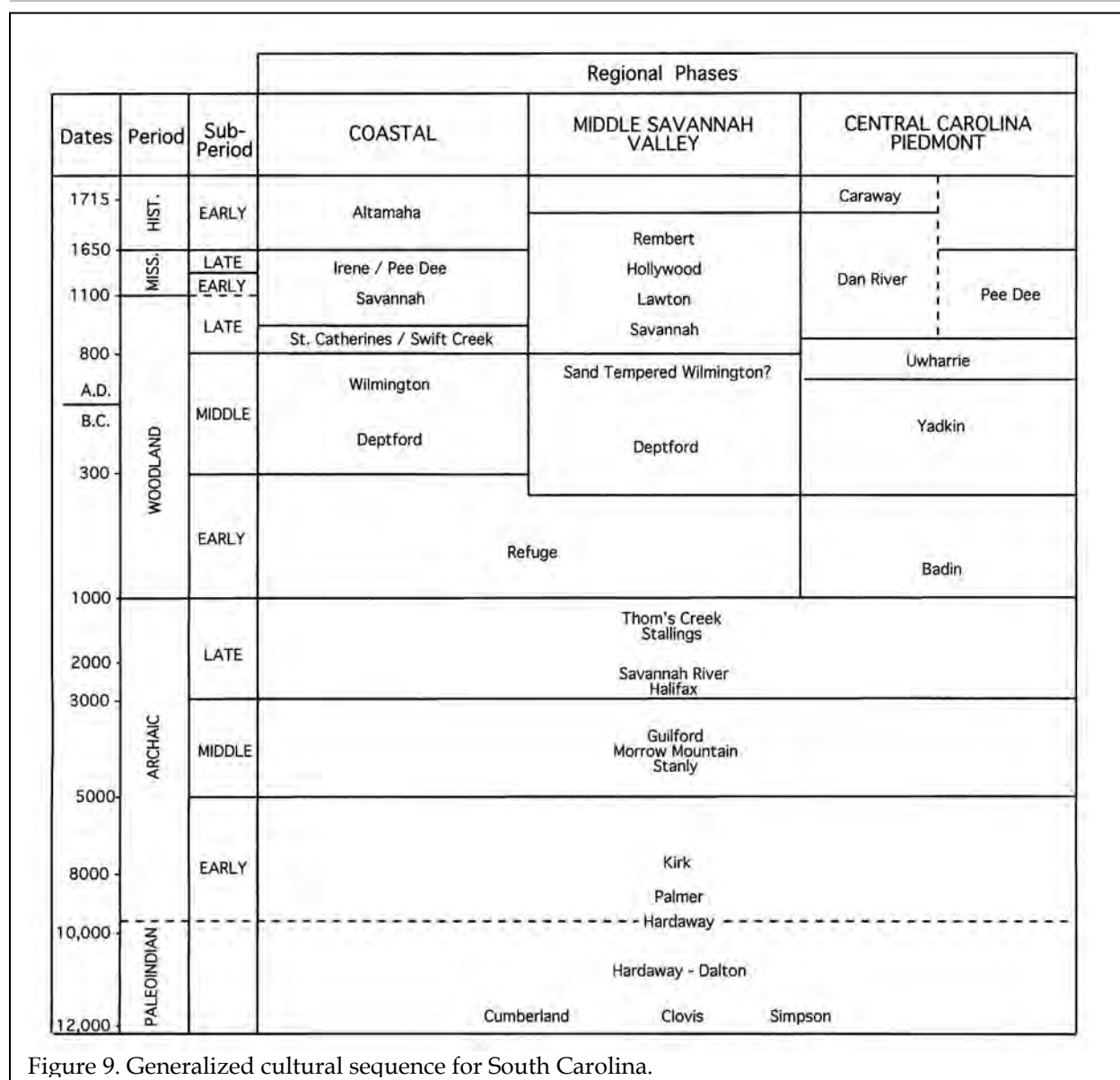


Figure 9. Generalized cultural sequence for South Carolina.

Taken together these studies help provide a good overview of the types of prehistoric sites likely to be identified on Johns Island.

## Prehistoric Overview

### Paleoindian Period

The Paleoindian Period, most commonly dated from about 12,000 to 10,000 B.P., is evidenced by basally thinned, side-notch projectile

points; fluted, lanceolate projectile points; side scrapers; end scrapers; and drills (Coe 1964; Michie 1977; Williams 1965). Oliver (1981, 1985) has proposed to extend the Paleoindian dating in the North Carolina Piedmont to perhaps as early as 14,000 B.P., incorporating the Hardaway Side-Notched and Palmer Corner-Notched types, usually accepted as Early Archaic, as representatives of the terminal phase. This view, verbally suggested by Coe for a number of years,

has considerable technological appeal.<sup>1</sup> Oliver suggests a continuity from the Hardaway Blade through the Hardaway-Dalton to the Hardaway Side-Notched, eventually to the Palmer Side-Notched (Oliver 1985:199-200). While convincingly argued, this approach is not universally accepted.

The Paleoindian occupation, while widespread, does not appear to have been intensive. Artifacts are most frequently found along major river drainages, which Michie interprets to support the concept of an economy "oriented toward the exploitation of now extinct mega-fauna" (Michie 1977:124). Survey data for Paleoindian tools, most notably fluted points, is somewhat dated, but has been summarized by Charles and Michie (1992). They reveal a widespread distribution across the state (see also Anderson 1992b:Figure 5.1) with at least several concentrations relating to intensity of collector activity. What is clear is that points are found fairly far removed from the origin of the raw material. Charles and Michie suggest that this may "imply a geographically extensive settlement system" (Charles and Michie 1992:247).

Although data are sparse, one of the more attractive theories that explains the widespread distribution of Paleoindian sites is the model tracking the replacement of a high technology forager (or HTF) adaptation by a "progressively adaptation" accompanied by increasingly distinct more generalized band/microband foraging regional traditions (perhaps reflecting movement either along or perhaps even between river

drainages) (Anderson 1992b:46).

Distinctive projectile points include lanceolates such as Clovis, Dalton, perhaps the Hardaway, and Big Sandy (Coe 1964; Phelps 1983; Oliver 1985). A temporal sequence of Paleoindian projectile points was proposed by Williams (1965:24-51), but according to Phelps (1983:18) there is little stratigraphic or chronometric evidence for it. While this is certainly true, a number of authors, such as Anderson (1992a) and Oliver (1985) have assembled impressive data sets. We are inclined to believe that while often not conclusively proven by stratigraphic excavations (and such proof may be an unreasonable expectation), there is a large body of circumstantial evidence. The weight of this evidence tends to provide considerable support.

Unfortunately, relatively little is known about Paleoindian subsistence strategies, settlement systems, or social organization (see, however, Anderson 1992b for an excellent overview and synthesis of what is known). Generally, archaeologists agree that the Paleoindian groups were at a band level of society, were nomadic, and were both hunters and foragers. While population density, based on isolated finds, is thought to have been low, Walthall suggests that toward the end of the period, "there was an increase in population density and in territoriality and that a number of new resource areas were beginning to be exploited" (Walthall 1980:30).

### Archaic Period

The Archaic Period, which dates from 10,000 to 3,000 B.P.<sup>2</sup>, does not form a sharp break

---

<sup>1</sup> While never discussed by Coe at length, he did observe that many of the Hardaway points, especially from the lowest contexts, had facial fluting or thinning which, "in cases where the side-notches or basal portions were missing, . . . could be mistaken for fluted points of the Paleo-Indian period" (Coe 1964:64). While not an especially strong statement, it does reveal the formation of the concept. Further insight is offered by Ward's (1983:63) all too brief comments on the more recent investigations at the Hardaway site (see also Daniel 1992).

---

<sup>2</sup> The terminal point for the Archaic is no clearer than that for the Paleoindian and many researchers suggest a terminal date of 4,000 B.P. rather than 3,000 B.P. There is also the question of whether ceramics, such as the fiber-tempered Stallings ware, will be included as Archaic, or will be included with the Woodland. Oliver, for example, argues that the inclusion of ceramics with Late Archaic attributes "complicates and confuses classification and

with the Paleoindian Period, but is a slow transition characterized by a modern climate and an increase in the diversity of material culture. Associated with this is a reliance on a broad spectrum of small mammals, although the white tailed deer was likely the most commonly exploited animal. Archaic period assemblages, exemplified by corner-notched and broad-stemmed projectile points, are fairly common, perhaps because the swamps and drainages offered especially attractive ecotones.

Many researchers have reported data suggestive of a noticeable population increase from the Paleoindian into the Early Archaic. This has tentatively been associated with a greater emphasis on foraging. Diagnostic Early Archaic artifacts include the Kirk Corner Notched point. As previously discussed, Palmer points may be included with either the Paleoindian or Archaic period, depending on theoretical perspective. As the climate became hotter and drier than the previous Paleoindian period, resulting in vegetational changes, it also affected settlement patterning as evidenced by a long-term Kirk phase midden deposit at the Hardaway site (Coe 1964:60). This is believed to have been the result of a change in subsistence strategies.

Settlements during the Early Archaic suggest the presence of a few very large, and apparently intensively occupied, sites which can best be considered base camps. Hardaway might be one such site. In addition, there were numerous small sites which produce only a few artifacts — these are the "network of tracks" mentioned by

Ward (1983:65). The base camps produce a wide range of artifact types and raw materials which has suggested to many researchers long-term, perhaps seasonal or multi-seasonal, occupation. In contrast, the smaller sites are thought of as special purpose or foraging sites (see Ward 1983:67).

Middle Archaic (8,000 to 6,000 B.P.) diagnostic artifacts include Morrow Mountain, Guilford, Stanly and Halifax projectile points. Much of our best information on the Middle Archaic comes from sites investigated west of the Appalachian Mountains, such as the work by Jeff Chapman and his students in the Little Tennessee River Valley (for a general overview see Chapman 1977, 1985a, 1985b). There is good evidence that Middle Archaic lithic technologies changed dramatically. End scrapers, at times associated with Paleoindian traditions, are discontinued, raw materials tend to reflect the greater use of locally available materials, and mortars are initially introduced. Associated with these technological changes there seem to also be some significant cultural modifications. Prepared burials begin to more commonly occur and storage pits are identified. The work at Middle Archaic river valley sites, with their evidence of a diverse floral and faunal subsistence base, seems to stand in stark contrast to Caldwell's Middle Archaic "Old Quartz Industry" of Georgia and the Carolinas, where axes, choppers, and ground and polished stone tools are very rare.

Among the most common of all Middle Woodland artifacts is the Morrow Mountain Stemmed projectile point. This type was originally divided into two varieties by Coe (1964:37,43), based primarily on the size of the blade and the stem. Morrow Mountain I points had relatively small triangular blades with short, pointed stems. Morrow Mountain II points had longer, narrower blades with long, tapered stems. Coe suggested a temporal sequence from Morrow Mountain I to Morrow Mountain II. While this has been rejected by some archaeologists, who suggest that the differences are entirely related to the life-stage of the point, the debate is far from settled and Coe

---

interpretation needlessly" (Oliver 1981:20). He comments that according to the original definition of the Archaic, it "represents a preceramic horizon" and that "the presence of ceramics provides a convenient marker for separation of the Archaic and Woodland periods (Oliver 1981:21). Others would counter that such an approach ignores cultural continuity and forces an artificial, and perhaps unrealistic, separation. Sassaman and Anderson (1994:38-44), for example, include Stallings and Thom's Creek wares in their discussion of "Late Archaic Pottery."



has considerable support for his scenario.

The Morrow Mountain point is also important in our discussions since it represents a departure from the Carolina Stemmed Tradition. Coe has suggested that the groups responsible for the Middle Archaic Morrow Mountain (and the later Guilford points) were intrusive ("without any background" in Coe's words) into the North Carolina Piedmont, from the west, and were contemporaneous with the groups producing Stanly points (Coe 1964:122-123; see also Phelps 1983:23). Phelps, building on Coe, refers to the Morrow Mountain and Guilford as the "Western Intrusive horizon." Sassaman (1995) has proposed a scenario for the Morrow Mountain groups which would support this west-to-east time-transgressive process. Abbott and his colleagues, perhaps unaware of Sassaman's data, dismiss the concept, commenting that the shear distribution and number of these points "makes this position wholly untenable" (Abbott et al. 1995:9).

The controversy surrounding Morrow Mountain also includes its posited date range. Coe (1964:123) did not expect the Morrow Mountain to predate 6500 B.P., yet more recent research in Tennessee reveals a date range of about 7500 to 6500 B.P. Sassaman and Anderson (1994:24) observe that the South Carolina dates have never matched the antiquity of their more western counterparts and suggest continuation to perhaps as late as 5500 B.P. In fact they suggest that even later dates are possible since it can often be difficult to separate Morrow Mountain and Guilford points.

The MALA point was defined over 20 years ago. The term is an acronym standing for Middle Archaic and Late Archaic, the strata in which these points were first encountered at the Pen Point site (38BR383) in Barnwell County, South Carolina (Sassaman 1985). These stemmed and notched lanceolate points were originally found in a context suggesting a single-episode event with variation not based on temporal variation. The original discussion was explicitly worded to avoid application of a typology,

although as Sassaman and Anderson (1994:27) note, the "type" has spread into more common usage. There are possible connections with both the Halifax points of North Carolina and the Benton points of the middle Tennessee River valley, while the "heartland" for the MALA appears confined to the lower middle Coastal Plain of South Carolina.

The available information has resulted in a variety of competing settlement models. Some argue for increased sedentism and a reduction of mobility (see Goodyear et al. 1979:111). Ward argues that the most appropriate model is one which includes relatively stable and sedentary hunters and gatherers "primarily adapted to the varied and rich resource base offered by the major alluvial valleys" (Ward 1983:69). While he recognizes the presence of "inter-riverine" sites, he discounts explanations which focus on seasonal rounds, suggesting "alternative explanations . . . [including] a wide range of adaptive responses." Most importantly, he notes that:

the seasonal transhumance model and the sedentary model are opposite ends of a continuum, and in all likelihood variations on these two themes probably existed in different regions at different times throughout the Archaic period (Ward 1983:69).

Others suggest increased mobility during the Archaic (see Cable 1982). Sassaman (1983) has suggested that the Morrow Mountain phase people had a great deal of residential mobility, based on the variety of environmental zones they are found in and the lack of site diversity. The high level of mobility, coupled with the rapid replacement of these points, may help explain the seemingly large numbers of sites with Middle Archaic assemblages. Curiously, the later Guilford phase sites are not as widely distributed, perhaps suggesting that only certain micro-environments were used (cf. Ward [1983:68-69] who would likely reject the notion that

substantially different environmental zones are, in fact, represented).

Abbott et al. have argued for a combination of these models, noting that the almost certain increase in population levels probably resulted in a contraction of local territories. With small territories there would have been significantly greater pressure to successfully exploit the limited resources by more frequent movement of camps. They discount the idea that these territories could have been exploited from a single base camp without horticultural technology. Abbott and his colleagues conclude, "increased residential mobility under such conditions may in fact represent a common stage in the development of sedentism" (Abbott et al. 1995:9).

From excavations at a Sandhills site in Chesterfield County, South Carolina, Gunn and his colleague (Gunn and Wilson 1993) offer an alternative model for Middle Archaic settlement. He accepts that the uplands were desiccated from global warming, but rather than limiting occupation, this environmental change made the area more attractive for residential base camps. Gunn and Wilson suggest that the open, or fringe, habitat of the upland margins would have been attractive to a wide variety of plant and animal species.

The Late Archaic, usually dated from 6,000 to 3,000 or 4,000 B.P., is characterized by the appearance of large, square stemmed Savannah River projectile points (Coe 1964). These people continued to intensively exploit the uplands much like earlier Archaic groups with, the bulk of our data for this period coming from the Uwharrie region in North Carolina.

One of the more debated issues of the Late Archaic is the typology of the Savannah River Stemmed and its various diminutive forms. Oliver, refining Coe's (1964) original Savannah River Stemmed type and a small variant from Gaston (South 1959:153-157), developed a complete sequence of stemmed points that

decrease uniformly in size through time (Oliver 1981, 1985). Specifically, he sees the progression from Savannah River Stemmed to Small Savannah River Stemmed to Gypsy Stemmed to Swannanoa from about 5000 B.P. to about 1,500 B.P. He also notes that the latter two forms are associated with Woodland pottery.

This reconstruction is still debated with a number of archaeologists expressing concern with what they see as typological overlap and ambiguity. They point to a dearth of radiocarbon dates and good excavation contexts at the same time they express concern with the application of this typology outside the North Carolina Piedmont (see, for a synopsis, Sassaman and Anderson 1990:158-162, 1994:35).

In addition to the presence of Savannah River points, the Late Archaic also witnessed the introduction of steatite vessels (see Coe 1964:112-113; Sassaman 1993), polished and pecked stone artifacts, and grinding stones. Some also include the introduction of fiber-tempered pottery about 4000 B.P. in the Late Archaic (for a discussion see Sassaman and Anderson 1994:38-44). This innovation is of special importance along the Georgia and South Carolina coasts, but seems to have had only minimal impact in the uplands of South or North Carolina.

There is evidence that during the Late Archaic the climate began to approximate modern climatic conditions. Rainfall increased resulting in a more lush vegetation pattern. The pollen record indicates an increase in pine which reduced the oak-hickory nut masts which previously were so widespread. This change probably affected settlement patterning since nut masts were now more isolated and concentrated. From research in the Savannah River valley near Aiken, South Carolina, Sassaman has found considerable diversity in Late Archaic site types with sites occurring in virtually every upland environmental zone. He suggests that this more complex settlement pattern evolved from an increasingly complex socio-economic system. While it is unlikely that this model can be simply transferred

to the Sandhills of South Carolina without an extensive review of site data and micro-environmental data, it does demonstrate one approach to understanding the transition from Archaic to Woodland.

### Woodland Period

As previously discussed, there are those who see the Woodland beginning with the introduction of pottery. Under this scenario the Early Woodland may begin as early as 4,500 B.P. and continued to about 2,300 B.P. Diagnostics would include the small variety of the Late Archaic Savannah River Stemmed point (Oliver 1985) and pottery of the Stallings and Thoms Creek series. These sand tempered Thoms Creek wares are decorated using punctations, jab-and-drag, and incised designs (Trinkley 1976). Also potentially included are Refuge wares, also characterized by sandy paste, but often having only a plain or dentate-stamped surface (Waring 1968). Others would have the Woodland beginning about 3,000 B.P. and perhaps as late as 2,500 B.P. with the introduction of pottery which is cord-marked or fabric-impressed and suggestive of influences from northern cultures.

There remains considerable ambiguity regarding the pottery series found in the South Carolina Sandhills and their association with coastal plain and piedmont types. The earliest pottery found at many sites may be called either Deptford or Yadkin, depending on the research or their inclination at any given moment.

The Deptford phase, which dates from 3050 to 1350 B.P., is best characterized by fine to coarse sandy paste pottery with a check stamped surface treatment. The Deptford settlement pattern involves both coastal and inland sites.

Inland sites such as 38AK228-W, 38LX5, 38RD60, and 38BM40 indicate the presence of an extensive Deptford occupation on the Fall Line and the Inner Coastal Plain/Sand Hills, although sandy, acidic soils preclude statements on the subsistence base (Anderson 1979; Ryan 1972;

Trinkley 1980). These interior or upland Deptford sites, however, are strongly associated with the swamp terrace edge, and this environment is productive not only in nut masts, but also in large mammals such as deer. Perhaps the best data concerning Deptford "base camps" comes from the Lewis-West site (38AK228-W), where evidence of abundant food remains, storage pit features, elaborate material culture, mortuary behavior, and craft specialization has been reported (Sassaman et al. 1990:96-98; see also Sassaman 1993 for similar data recovered from 38AK157).

Further to the north and west, in the Piedmont, the Early Woodland is marked by a pottery type defined by Coe (1964:27-29) as Badin.<sup>3</sup> This pottery is identified as having very fine sand in the paste with an occasional pebble. Coe identified cord-marked, fabric-marked, net-impressed, and plain surface finishes. Beyond this pottery little is known about the makers of the Badin wares and relatively few of these sherds are reported from South Carolina sites.

Somewhat more information is available for the Middle Woodland, typically given the range of about 2,300 B.P. to 1,200 B.P. In the Piedmont and even into the Sand Hills, the dominant Middle Woodland ceramic type is typically identified as the Yadkin series. Characterized by a crushed quartz temper the pottery includes surface treatments of cord-marked, fabric-marked, and a very few linear check-stamped sherds (Coe 1964:30-32). It is regrettable that several of the seemingly "best" Yadkin sites, such as the Trestle site (31An19) explored by Peter Cooper (Ward 1983:72-73), have never been published. The Yadkin series in South Carolina was first observed by Ward (1978, 1983) from the White's Creek drainage in Marlboro County, South Carolina. Since then, a large

---

<sup>3</sup> The ceramics suggest clear regional differences during the Woodland which seem to only be magnified during the later phases. Ward (1983:71), for example, notes that there "marked distinctions" between the pottery from the Buggs Island and Gaston Reservoirs and that from the south-central Piedmont.

Yadkin village has been identified by DePratter at the Dunlap site (38DA66) in Darlington County, South Carolina (Chester DePratter, personal communication 1985) and Blanton et al. (1986) and have excavated a small Yadkin site (389SU83) in Sumter County, South Carolina. Research at 38FL249 on the Roche Carolina tract in northern Florence County revealed an assemblage including Badin, Yadkin, and Wilmington wares (Trinkley et al. 1993:85-102). Anderson et al. (1982:299-302) offer additional typological assessments of the Yadkin wares in South Carolina.

Yadkin ceramics are associated with medium-sized triangular points, although Oliver (1981) suggests that a continuation of the Piedmont Stemmed Tradition to at least 1650 B.P. coexisted with this Triangular Tradition. The Yadkin in South Carolina has been best explored by research at 38SU83 in Sumter County (Blanton et al. 1986) and at 38FL249 in Florence County (Trinkley et al. 1993).

Over the years the suggestion that Cape Fear might be replaced by such types as Deep Creek and Mount Pleasant has raised considerable controversy. Taylor, for example, rejects the use of the North Carolina types in favor of those developed by Anderson et al. (1982) from their work at Mattassee Lake in Berkeley County (Taylor 1984:80). Cable (1991) is even less generous in his denouncement of ceramic constructs developed nearly a decade ago, also favoring adoption of the Mattassee Lake typology and chronology. This construct, recognizing five phases (Deptford I-III, McClellanville, and Santee I), uses a type variety system.

Regardless of terminology, these Middle Woodland Coastal Plain and Coastal Zone phases continue the Early Woodland Deptford pattern of mobility. While sites are found all along the coast and inland to the Fall Line, shell midden sites evidence sparse shell and artifacts. Gone are the abundant shell tools, worked bone items, and clay balls. Recent investigations at Coastal Zone sites such as 38BU747 and 38BU1214, however, have

provided some evidence of worked bone and shell items at Deptford phase middens (see Trinkley 1990).

In some respects the Late Woodland (1,200 B.P. to 400 B.P.) may be characterized as a continuation of previous Middle Woodland cultural assemblages. While outside the Carolinas there were major cultural changes, such as the continued development and elaboration of agriculture, the Carolina groups settled into a lifeway not appreciably different from that observed for the previous 500-700 years. From the vantage point of the Middle Savannah Valley Sassaman and his colleagues note that, "the Late Woodland is difficult to delineate typologically from its antecedent or from the subsequent Mississippian period" (Sassaman et al. 1990:14). This situation would remain unchanged until the development of the South Appalachian Mississippian complex (see Ferguson 1971).

### **South Appalachian Mississippian**

As Schnell and Wright (1993:2) observe, "Mississippian" means different things to different people — even to its earliest researchers. To Willey (1966) it meant a particular group of traits. To Griffin (1985) it meant a complex social and technological interaction sphere. To Smith (1986) it was defined as an adaptive strategy. The meaning is further distorted, or at least affected, when the issue is viewed from a strict temporal or chronological orientation, such as this presentation (since to us, the period covers the time span from about A.D. 900 to A.D. 1500).

The Mississippian may be viewed rather basically by focusing on a simple coastal chronology based almost entirely on the results of excavations at Irene (Caldwell and McCann 1941) and the resulting synthesis by DePratter (1979:Table 30; 1991:183-193). In this scenario the Savannah Phase, consisting of three subphases, is followed by the Irene, broken into two subphases.

The Savannah I Phase, characterized by cord marking, is seen as developing from earlier



# PREHISTORIC BACKGROUND

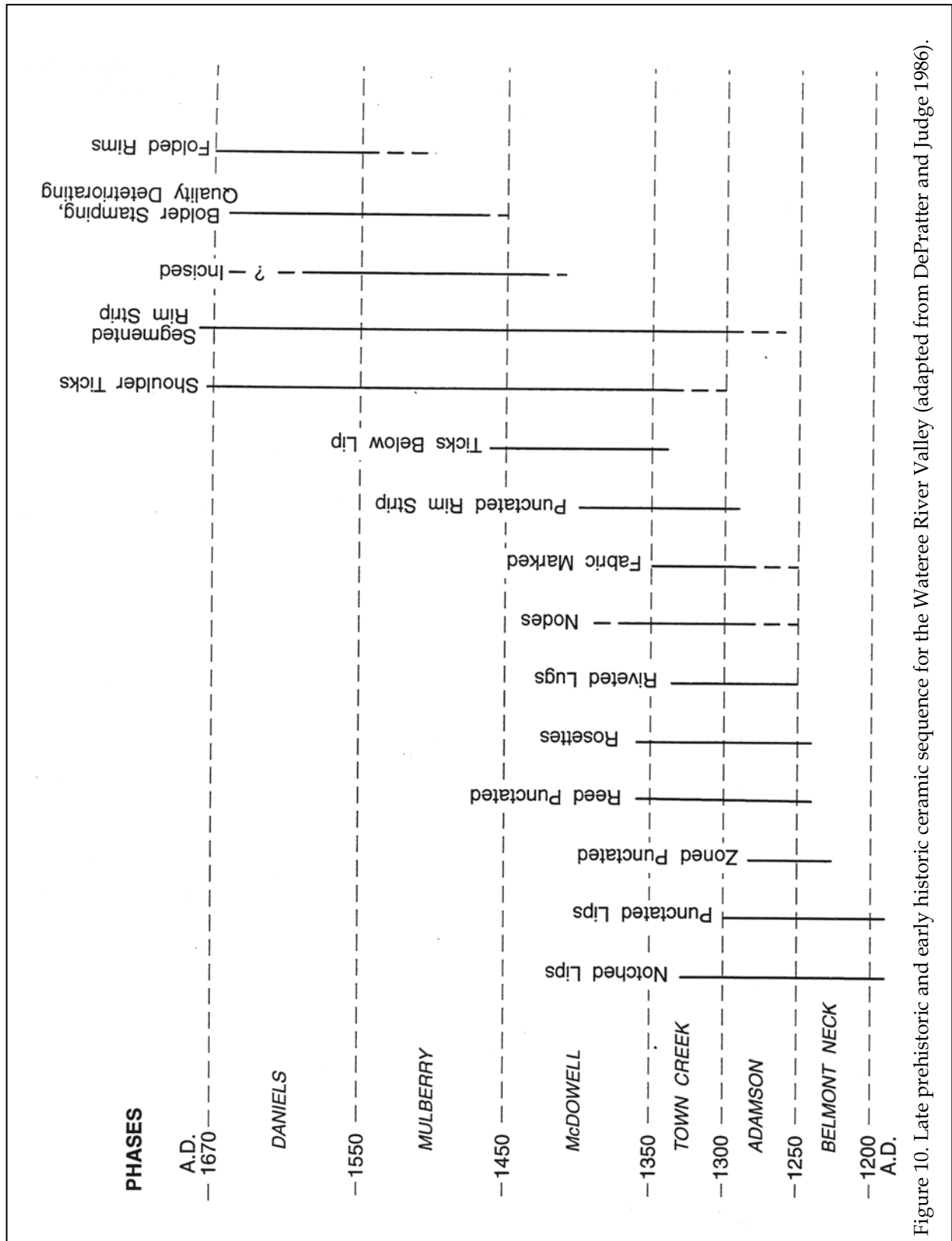


Figure 10. Late prehistoric and early historic ceramic sequence for the Wateree River Valley (adapted from DePratter and Judge 1986).

cultures. Present are flat-topped temple mounds, although these seem to decline dramatically from the mouth of the Savannah River northward. While the settlement system is very similar to that of the Late Woodland, there are also nucleated settlements found near estuaries and along freshwater rivers further inland. Although agriculture is seen by many as almost essential, there is no good evidence for corn or other domesticated crops.

Savannah II is distinguished by the introduction of check stamping and Savannah III is defined by the presence of complicated stamping. The Savannah III Complicated Stamped pottery is primarily curvilinear, often of concentric circles or oval motifs. Sassaman et al. (1990:207) suggest that the current temporal ranges are likely too restrictive for these subphases and suggest instead broader period of perhaps A.D. 1100 to 1200 for Savannah II and perhaps A.D. 1200 to 1300 for Savannah III.

The Savannah phase gives way to what is often called the Irene Phase, probably beginning about A.D. 1300. The Irene I Phase is identified by the appearance of Irene Complicated Stamped pottery using the filfot cross and line block motifs. Not only are these motifs different from the earlier Savannah Complicated Stamped designs, but the Irene ware is characterized by grit inclusions and a coarse texture, compared to the Savannah's sandy inclusions and fine to medium-grained paste.

Also present in Irene collections are a range of rim decorations, including nodes, rosettes, and fillet appliques. Although incising is found in very low quantities during this early period, the succeeding Irene II phase is characterized by bold incising. The mouth of the Savannah River, however, was likely abandoned by the end of the Irene I Phase since little incising is found in this area.

From the more northern region, the Pee Dee culture was defined through the excavations of Joffre Coe at Town Creek which is located about 150 miles due north of Charleston (Coe 1995; Reid

1967). The site, generally accepted to represent a northern intrusion of a Mississippian chiefdom, was originally dated from about A.D. 1550 to 1750, although more recent analyses suggests a date more likely between A.D. 900 and 1400 (Coe 1995:159).

In the Charleston area the only reasonably documented Mississippian excavations are those undertaken by Stanley South at the moundless ceremonial center at Charles Town Landing (South 1971). Anderson (1994:115) notes with regret that there has been "no broad-scale comparative analyses of Mississippian ceramics" for the South Carolina area, although there has been some effort to untangle the typology of the Middle Wateree valley. In particular DePratter and Judge (1986, 1990:56-58) have proposed a fairly detailed six phase division encompassing the period from A.D. 1200 through 1670. Although it is unclear how well their chronology and associated ceramic changes can be transposed from the Middle Wateree to the coast, it seems to be an excellent starting point (Figure 10 provides a generalized scheme).

The Belmont Neck Phase pottery (A.D. 1200-1250) is characterized by complicated stamped motifs with plain or notched rims. In the Wateree Valley these motifs are primarily concentric circles, with other various curvilinear designs and perhaps a cross bar diamond motif. Burnishing, while present, is a minority. Tempering ranges from fine to coarse sand.

The Adamson Phase pottery (A.D. 1250-1300) becomes dominated by the filfot motif, along with a minor amount of line block stamping. Burnished pottery is about twice as common as in the earlier Belmont Neck Phase. Lip notching and reed punctates below the lip are more common. There doesn't seem to be any significant change in tempering, although there may be a trend for the fine sands to drop out.

During the Town Creek Phase (A.D. 1300-1350) the pottery motifs are similar to those found earlier, with the addition of punctated and

segmented rim strips. Fabric marking, which is rare in earlier phases, becomes more noticeable during the Town Creek Phase and then drops out quickly. Burnishing is only slightly more common and the temper does not seem to change.

The McDowell Phase (A.D. 1350-1450) is characterized by pottery with larger, bolder stamped motifs. The filfot motifs are still most common, although DePratter and Judge seem to suggest that simple stamping increases during this phase. Burnishing now accounts for nearly a quarter of the typical collection.

The most noticeable change during the Mulberry Phase (A.D. 1450-1550) is the addition of incising. In addition, there may be a shift away from the filfot to other motifs, apparently at the expense of plain burnished pottery, which declines in frequency. Segmented applique strips are the most common rim decoration.

During the final Daniels Phase (A.D. 1550-1670) the pottery is recognizable by a deterioration in stamping quality and larger, more abstract motifs (or perhaps just less recognizable motifs?). Burnished pottery is again more common with incising remaining stable. Applique rim strips are larger and located farther down from the lip. Tempering remains a medium sand.

After A.D. 1670 we have virtually no information since no well documented coastal sites have been excavated and adequately reported.





## HISTORICAL SYNTHESIS

### Overview of Johns Island

#### Protohistoric

There are three Native American groups that may have been on the sea islands in the study area during the protohistoric and early historic periods, including the Kiawah, Stono, and Bohicket. Regrettably little is known about any of these groups.



Figure 11. Portion of the 1711 Crisp map, *A Compleat Description of the Province of Carolina*, showing three "Indian Settlements." None, however, are identified.

It seems likely that Sandford first saw the Bohicket Indians and their agricultural fields along Bohicket Creek in 1666 (Waddell 1980:95-96) – a location they continued to hold for a number of years. In ca. 1685, for example, they are shown by Mathews east of the head of Bohicket Creek and by ca. 1695 they are shown on the Thornton-Morden map on the north side of the creek near the headwaters (Waddell 1980:96) – a location they held on the Crisp

map of 1711 (Waddell 1980:97; Figure 11). In 1707 an act establishing Indian lookout posts reveals that the "Jones Island" outlook was to be manned by "Bohiccott Indians." Waddell (1980:97) suggests that Jones Island was likely Seabrook.

The early location of the Kiawah is problematic, although it seems likely that by the early 1670s they were on the Ashley, in the immediate vicinity of the Albemarle settlement. Waddell (1980:236) comments on an early account by Cheves, which points out that there was an Indian village just beyond the palisade and that an Indian grave (with "trade beads") had been found near "Old Town" (Waddell 1980:234). The Kiawah were still on the banks of the Ashley in 1682 when Ferguson made his account of Indian tribes (Waddell 1980:237) and Gaycoyne shows them, in 1682, about two miles south of the Stono, on an island. Waddell points out that the map is far too crude to allow any accurate placement, and suggests that the most important feature of this map is that it indicates some movement of the Kiawah southward had taken place by this time.

Mathews, in 1685, places the Kiawah directly on Kiawah Island and Waddell suggests a location near where the Kiawah flows into the Stono (Waddell 1980:238). Although there is uncertainty, it may be that their location remained unchanged a decade later, when they are still shown on Kiawah Island by the Thornton-Morden map.

Perhaps the best evidence pointing to a Kiawah settlement is provided by the Diamond

plat of Trescott's Plantation east of the Cooper River. Waddell comments that the plat may even show an Indian mound and the historic documents reveal that Trescott even dug through Indian burials in laying out his plantation house (Waddell 1980:241-242). This may be the only clear link to the Kiawah that remains.

In 1671 the Stono were reported to be living north of the Edisto and south of the Kiawah (at the English settlement) (Waddell 1980:303). The location seems to remain constant, in spite of their problems with the English, since in 1682 Ferguson remarks that the Stono were south of the Kiawah, "upon the River Stonoh, adjoining to Edisto" (Waddell 1980:305). By 1695, however, the Thornton-Morden map shows the Stono on Seabrook Island, at the mouth of the North Edisto River (Waddell 1980:307). In fact, the Stono continue to be closely associated with Seabrook through at least the first decade of the 1700s, when Seabrook Island was even called "Stonoe" Island (Waddell 1980:307).

In spite of the Seabrook Island connection, it seems that the most promising lead for a Stono settlement might be the Frances Hext plantation known as Indian Graves on Johns Island. It doesn't appear that too much has been made of the name of the plantation (see Jordan and Stringfellow 1998:246, 263, 280).

These brief discussions clearly point out the frequent movement of low country Indians. For example, the Kiawah moved away from the pressures of the Ashley River settlement, eventually to Kiawah Island. The Stono may have moved from along the Stono River to Seabrook. The Bohicket seem to have been the most stable, largely staying north of Bohicket Creek, although perhaps sharing some of Seabrook Island with the Stono. In spite of the maps and review of the historical documents, none of these settlements have been found and

we have no real information on any of these early tribes.<sup>1</sup>

One of the earliest accounts, by Maurice Matthews in 1671, lumps them all together,

The Indians all About us are our friends; all y<sup>t</sup> we have knowledge of by theyre Appearance and traid with us) . . . some of these have 4 or 5 Cassikaes . . . I finde no tributaries among them, butt intermarriages & poverty causeth them to visitt one Another; never quarelling who is ye better man; they are generally poore & Spanish; Affraid of ye very foot step of a Westoe; A sort of people y<sup>t</sup> live up to the westward [which these say eat people and are great warriors] (Cheves 2000:334)

In 1696 Governor Archdale signed a law requiring Indians, including the Stonoe, Kiaway, and others, to pay one deerskin yearly to the government. This resulted from the colonists noting that the Indians had been "furnished with clothes and all sorts of tools necessary for making their provisions and have from time to time as often they have had need thereof been protected and defended." Yet the bill complained that these same Indians, "have not hitherto been any ways useful or serviceable or contributing to the inhabitants of this province" (Hicks 1998:75).

Mills, in the early nineteenth century, expressed the situation concisely,

---

<sup>1</sup> It may be that South's "moundless ceremonial center" uncovered at Charles Towne Landing is a Kiawah settlement, but unfortunately these excavations have never been fully reported.

[a] number of tribes of Indians inhabited this country originally; but little care has been taken to preserve either their names or locations (Mills 1972:749 [1826]).

Nevertheless, as late as 1847 there was at least one settlement Indian, William Beamer, living on Johns Island. He had served with American forces during the Revolution and afterwards had been an overseer for various planters, including William Sams (Hicks 1998:275).

Although contact period archaeological studies have not been conducted on Johns Island, Polhemus (1972) did report on the accidental discovery of four burials with trade goods. No archaeological study of the site, however, was conducted and when this site was recently developed, the site was quickly dismissed (Bridgman et al. 1999).

#### **Parish and Administrative Divisions**

The study area falls within the Proprietary county of Colleton, created in 1682. The 640 square mile Colleton County, however, was effectively eliminated with the creation of the seven original judicial districts in 1769. The Charleston District included 4,180 square miles and incorporated today's Charleston, Colleton, Dorchester, and Berkeley counties, as well as a small portion of Orangeburg County.

The boundaries of Charleston were constantly changing. For a few years, between 1785 and 1791 Charleston was reduced to the peninsula, James Island, and Sullivans Island, with Johns Island being subsumed by Colleton County. By 1791, however, the boundaries were restored and although Charleston changed in shape and size, Johns Island remained in Charleston District until 1882, when the southern portion of the area, including Johns Island, was lost to Berkeley County. The islands returned to Charleston in 1893 and there has been no substantive change since that time.

In addition to the judicial districts, South Carolina was also divided into a series of parishes as a result of the 1706 Church Act. Our study area of Johns Island falls within the original St. Paul Parish. The boundaries ran from the South Edisto River to the Stono River. In 1734, however, St. Paul lost to the creation of St. John-Colleton. This new parish included the sea islands of Edisto, Seabrook, Kiawah, Johns, and Wadmalaw, with the mainland north of the Stono being retained by St. Paul. James Island has remained part of St. Andrews Parish from the 1706 division through the present. These parishes were eliminated as governmental units by the 1865 state constitution, although some local government and public service districts are still parish based in unincorporated sections of St. Andrews and St. Pauls.

Given the instability of political boundaries throughout the nineteenth century, the more stable parish boundaries – used by nineteenth century census takers – provide more accurate statistics for researchers than county-level data (Fick 1992:1).

#### **Eighteenth Century Life**

The English established the first permanent settlement in what is today South Carolina in 1670 on a low rise on the west bank of the Ashley River. This original settlement encompassed about 9 acres; just beyond was a spring and a Kiawah Indian village (Cheves 2000:173). Like other European powers, the English were lured to the New World for a variety of reasons, including the acquisition of land and the promotion of agriculture. The Lord Proprietors, who owned the colony until 1719-1720, intended to discover a staple crop, the marketing of which would provide great wealth through the mercantile system.

By 1680 the settlers of Albemarle Point had moved the village across the bay to the tip of the peninsula formed by the Ashley and Cooper rivers. This new settlement at Oyster Point would become modern-day Charleston.

The original settlement became part of Old Town Plantation owned by Lynch Horry in the antebellum. Evidence of the earlier Kiawah settlement, however, was still obvious as late as the 1880s, when a burial containing trade beads was uncovered (Cheves 2000:353).

The move provided not only a more healthful climate and an area of better defense, but:

the situation of this Town is so convenient for public Commerce that it rather seems to be the design of some skillful Artist than the accidental position of nature (Mathews 1954:153).

Early settlers came from the English West Indies, directly from England, and from other colonies. But perhaps more than any others, it was the Barbadian elite who would set the Carolina culture apart from that of the more northern colonies, such as Virginia, and who would also establish the roots of cash monoculture and slavery (Sirmans 1966; Waterhouse 1975). Coclanis notes that almost as many Carolina settlers came from the small island of Barbados in the decade of the 1670s as from England herself, remarking that:

Carolina - alone among the English colonies on the mainland of North America - felt the heat of the tropics from the start. Those that wish to understand the torridity of South Carolina's later history, its passion and its zeal, would do well to remember this point (Coclanis 1989:22).

Clowse (1971:60-61) suggests that cattle raising began as a response to the initial inability to find salable tropical or semitropical crops. Ranching, especially on the islands, was an easy way to exploit the region's land and resources,

offering a relatively secure return for very little investment. Few slaves were necessary to manage the herd. The mild climate of the islands made winter forage more abundant and winter shelters unnecessary. The salt marshes, useless for other purposes, provided excellent grazing and eliminated the need to provide salt licks. Further, the islands were self-contained, eliminating the need for fences (Coon 1972; Dunbar 1961). Fick et al. (1989:9) comment that the estate inventory of Bernard Schencklingh, who died in 1692, included "134 head of cattle" and "one negro man."

Production of cattle, hogs, and sheep quickly outstripped local consumption and by the late seventeenth century beef and pork were principal exports of the Colony to the West Indies (Ver Steeg 1975:114-116).

The slaughtered meat, once salted, found a ready market in the West Indies where the focus on sugar prevented planters from feeding their slaves. The tanning of the resulting hides supplied additional income (as well as supplying local needs). Moreover, the herds represented a food reservoir, providing a buffer for the colonists themselves.

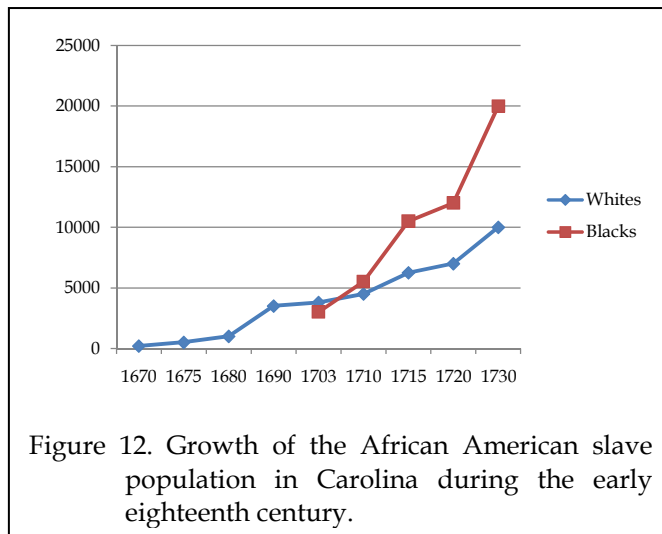
Weir also comments on the prevalence of cattle raising throughout colonial Carolina, with at least 60,000 head present as late as 1751. He notes, however, that as lucrative as it might be for a few, it was not a source of fortunes for many. In fact, those that prospered during the earliest years, "appear to have done so mainly by the aggressive and simultaneous pursuit of various opportunities" (Weir 1997:142).

Other early eighteenth century economic activity around Charleston focused on naval stores (such as lumber and tar) and Indian trade (prior to 1715) (Fick 1992:10). Weir notes that deerskins paled in comparison to the value of tar and pitch. By 1699 a royal official noted that Carolina was the only source for these commodities in America and in 1705 parliament granted a subsidy for their production (Weir



1997:143). Large amounts were easily produced and shipped from South Carolina.

Clowse provides details on Charleston exports. Deerskins fluctuate widely by year, beginning with 64,488 skins in 1699, dipping to 22,133 the following year and peaking at 121,355



in 1707. The Yemassee War dramatically reduced the trade in 1717 and it took five years for the levels to return to pre-war levels of around 50-60,000 skins.

The Yemassee War left its mark on Johns Island when a band of Apalachee Indians, allies of the Yemassee, crossed the Edisto and raided as far north as the Stono River in July 1715. About 20 plantations were destroyed before the Indians retreated southward, burning the Pon Pon River bridge behind them (Milling 1969:145, 174).

Two forts were constructed as a result. One was LaRoche's Bridge Fort. It was constructed to guard the bridge (named for nearby planter James LaRoche) that connected Wadmalaw and Johns islands. Situated on Johns Island, just north of where Maybank Highway crosses from Johns to Wadmalaw, the fort was garrisoned from August 1715 to March 1716 (Fick et al 1989:9; Ivers 1970:55). A second fort, known as Stono Bridge Fort, was constructed on

John Beamer's (or Beamor) plantation.<sup>2</sup> This fort was also garrisoned from August 1715 to March 1716 (Ivers 1970:74).

By 1720 the naval stores market was glutted. In addition, British ropemakers complained that Carolina tar "scorched" the rope and preferred tar from Sweden. The most significant difference was that Swedish tar was rendered from live or green trees, Carolina tar was taken from deadwood. The Carolina producers refused to change production because of the cost and by 1724 parliament allowed the bounty on naval stores to lapse. Lobbyists for Carolina producers and British merchants succeeded in getting a new, albeit lower, bounty passed by parliament in 1729. Significant quantities continued to be shipped throughout the colonial period (Clowse 1971:Table III).

### Development of A Market Economy

Upland rice was the first valuable commodity that the Carolina planters identified. The development and evolution of this crop on interior swamps in the eighteenth century is discussed at length in Trinkley et al. (2003:13-42) and it relied on a complex network of drained and diked interior lowlands combined with interior reservoirs. Beginning about 1720, rice exports climb dramatically, with the price increasing from 5.17 shillings per hundredweight in 1722 to 8.98 shillings in 1750 (Trinkley et al. 2003:33). There were downturns, but overall interior swamp rice brought the first staple commodity to Carolina and created planters of great wealth.

There were, however, consequences. One of these was the dramatic increase in African American slaves during the early

<sup>2</sup> We have found no obvious connection between this individual and the Indian, William Beamer. John Beamer was likely the son of James Beamer, who Baldwin (1985:18) identifies as immigrating to South Carolina in 1682.

colonial period. Although the number of enslaved Africans can't be readily determined prior to about 1703, Figure 12 shows the dramatic rise of the black population beginning about 1710.

This rise in the black population brought increasing concern over the possibility of a slave rebellion. In 1739 this fear became reality with the Stono Rebellion. Lead by the Angolan slave Jemmy, a band of 20 slaves began their rebellion on Johns Island south of the vicinity of the Limehouse Bridge and Chisolm Road (Fick et al. 1989:14). They attacked the Hutchinson warehouse or store, killing the two guards and gaining access to weapons and

The primary result of the rebellion was the development of a "negro act" that severely limited the privileges of the slaves. African American slaves were no longer allowed to grow their own food, assemble in groups, earn their own money, or learn to read. While some restrictions were in force prior to the Negro Act, the rebellion caused stricter enforcement.

Early experiments with indigo in Carolina were abandoned in the face of West Indian competition. Beginning in the first decades of the eighteenth century, however, Jamaica and the other islands turned to sugar, which was more profitable. Leaving the English dyers without a British supplier, they turned to the French islands.

However, about 1740 tensions with France threatened to cut off "French Blue" and Carolina was presented with a second opportunity. This was further buttressed by English bounties that made the production - even given its rather mediocre quality (typically the cheapest "copper indigo" quality) - profitable. South Carolina enjoyed the luxury of this second staple for about three decades before the American Revolution

interrupted shipments and the bounty that supported inferior Carolina indigo was lost.

Indigo cultivation was fairly simple. The crop was planted from seed in middle April, with a preference for dry, loose soil typical of "hickory lands and pine barrens." The plant was harvested in late June or early July, immediately after it blossomed, by cutting it off at ground level. This allowed the roots to produce a

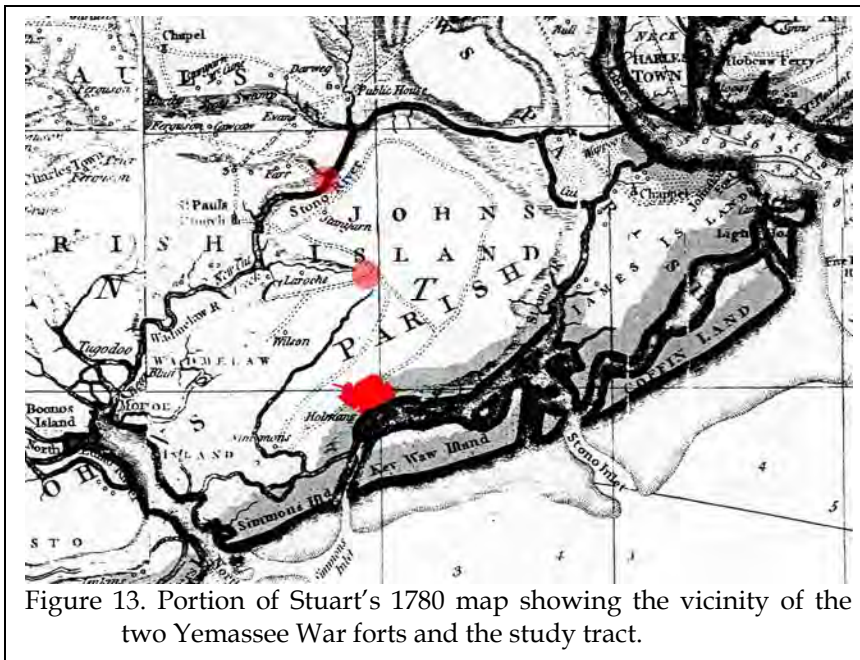


Figure 13. Portion of Stuart's 1780 map showing the vicinity of the two Yemassee War forts and the study tract.

ammunition (Stono Rebellion National Register of Historic Places Nomination, SCDAH). The band swelled to about 80 slaves marching southward to seek their freedom in Spanish St. Augustine. They were overtaken by the Provincial militia in the vicinity of Parkers Ferry close to the Edisto River crossing. About thirty slaves were killed outright; about the same number escaped, but were gradually captured over the next months and executed. One, however, remained a fugitive for three years.

second, and sometimes a third, crop before it was killed by frost.

If cultivation was simple, processing indigo was difficult. The plants were hauled to the indigo vats and placed in a steeper made from pine or cypress planks measuring 16 feet square and 3½ to 5 feet deep. The plants were weighted down, covered with water, and allowed to ferment for 10 to 14 hours to remove the dye. The "liquor" was drained off to the wooden beating vats, which were typically 15 feet long, 8 feet wide, and 5 feet deep. There the solution was oxidized by beating. After visible precipitation began, limewater was added from the adjacent lime vat to aid coagulation of the dye. Agitation was continued for about an hour. Afterwards the liquid was drained from the vat and strained through woolen cloth to catch the dye. As Carman notes, "indigo has a very disagreeable smell, while making and curing; and the foeces, when taken out of the steeper, if not immediately buried in the ground (for which it is excellent manure) breeds incredible swarms of flies" (Carman 1939:288 [1775]).

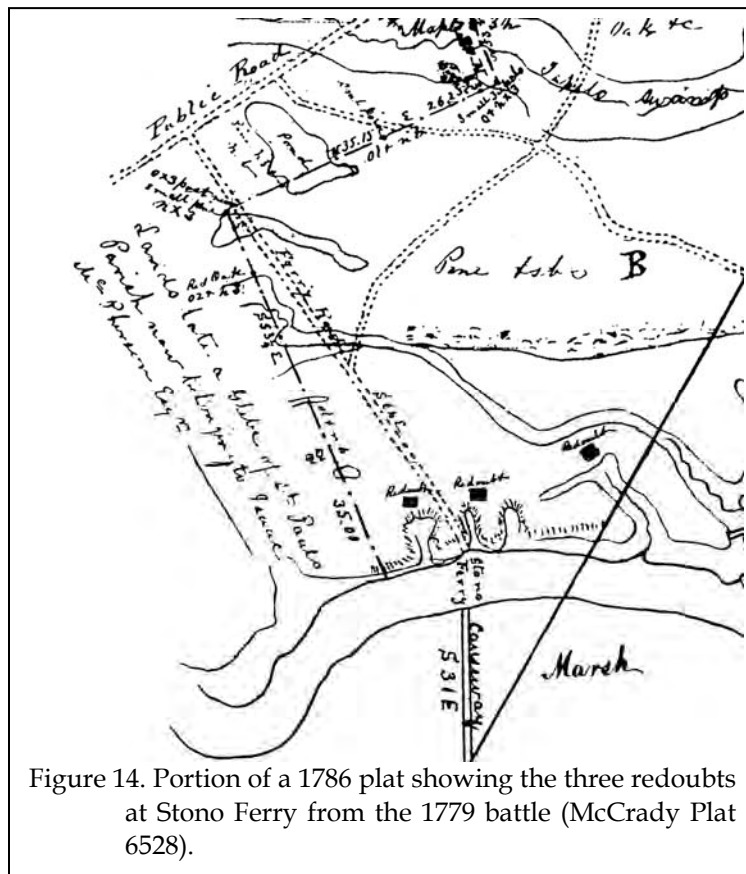
The wet dye was carried to the curing shed where it was pressed to remove as much water as possible and cut into cubes about 2 inches square. It was dried on trays in the shade, then placed in barrels with damp moss, where it was allowed to mold for several days. Afterwards it was brushed off and graded into four categories -- fine blue, ordinary blue, fine purple, and ordinary copper, the least desirable (Copenhaver 1930:895).

#### Early Settlement on Johns Island

The earliest warrant for land that specifically mentions Johns Island (called St. Johns Island) dates from 1707 (Salley and

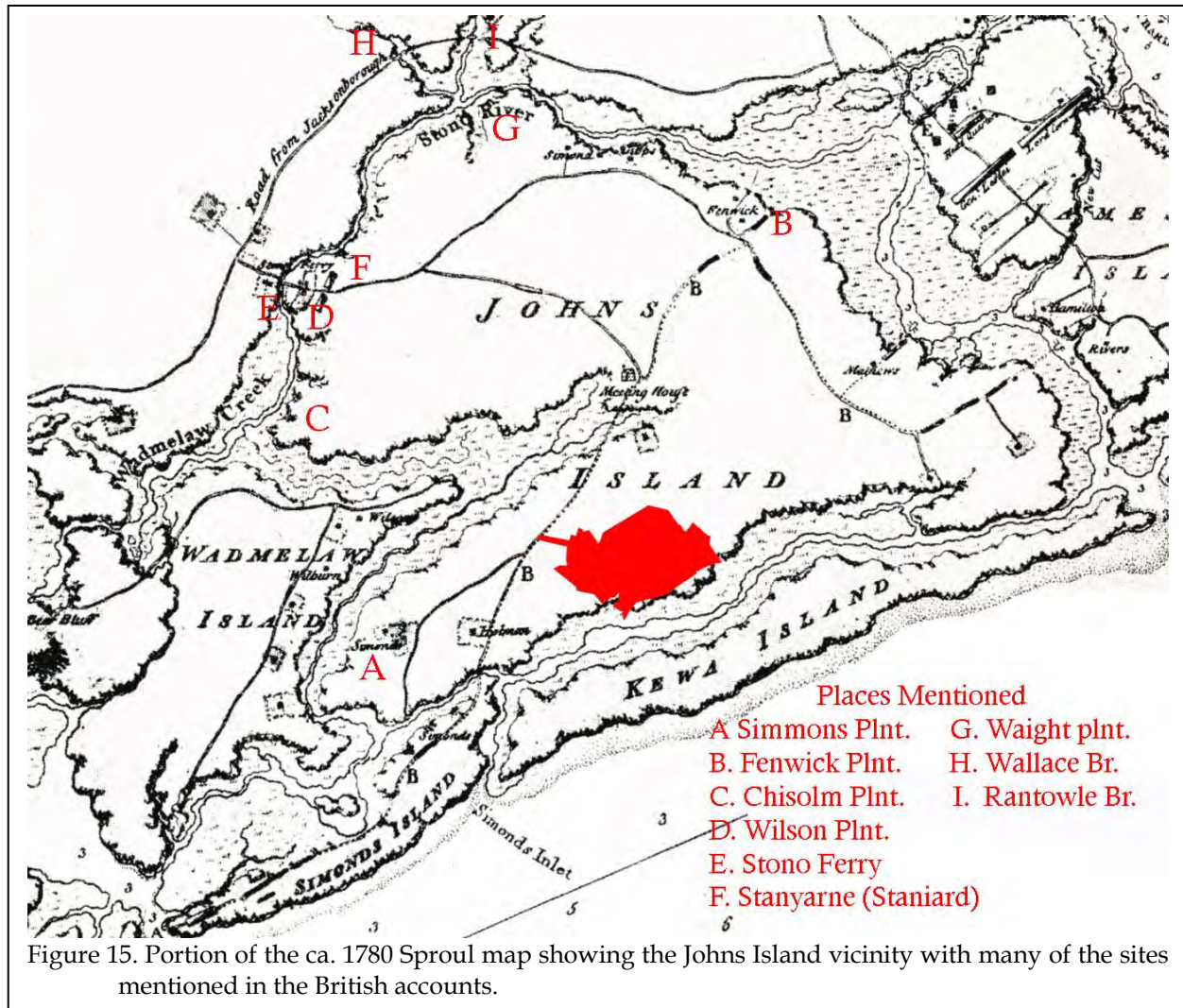
Olsberg 1973:640). Fick et al. (1989:8) mention early grants on Johns Island to Thomas Stanyarne (1698), Thomas Weatherly (1707), and Elizabeth Godfrey (1710). Clowse reports that the first land grants for Colleton County, created in 1682, did not occur until 1694. By 1700, the 63 grants known for Colleton totaled 33,635 acres -- averaging 534 acres each. Between 1710 and 1719 an additional 151 grants were entered, totaling 71,506 acres. Nevertheless, Mathews comments that in 1680 the land between the Ashley and Stono Rivers to the west was populated fairly thickly (Mathews 1954).

The Holman shown on early maps of Johns Island (see Figure 13) is likely Thomas Holman, who is known to have at least 500 acres



by 1718 (SCDAH, Colonial Plat Book (copy series), vol. 12, pg. 171).





### The Revolution

After the abortive attempt by the British to take Charleston in June 1776, the American Revolution was largely fought in the North. However, in May 1779, a British Army marched from Savannah to besiege Charleston. On May 10, Augustine Prevost reached Ashley Ferry on the Ashley River about 7 miles north of the city, crossed the river and defeated a small cavalry detachment sent by Francis Marion to delay their advance. The British camped at the Ferry for about two weeks and then marched southward across James and Johns islands to Stono Ferry. During this crossing of Johns Island a number of plantations were burned, including

those of Abraham Bosomworth and Robert Gibbes (Fick et al. 1989:17).

Fludd offers a brief mention of a lookout post established by the Johns Island planters on Chaplin's Point on the Kiawah River, near the Stono Inlet (Fludd 1886:81). There do not, however, appear to have been any fortifications at this point.

The bulk of the British forces crossed the Stono and continued along the coast to Beaufort. Prevost, however, left about 900 troops at a series of three redoubts that were enclosed in an



abatis on the eastern shore.<sup>3</sup> American general Benjamin Lincoln mounted an attack on June 20. He was able to obtain only 1,200 men, mostly militia units that were unable to match the resolve and discipline of professional soldiers in a defensive position. The battle lasted only an hour and half. During that time the two forces were within easy killing range of one another – less than 60 yards. The British lost 26 killed and 103 wounded. The American forces suffered 34 killed, 113 wounded, and 18 missing.

Lincoln realized that he would be unable to force the British out and retreated to Charleston. Their mission of shielding Prevost's retreat accomplished, the British forces broke camp and also marched to Beaufort, arriving there on July 8, 1779 (Morrill 1993:53-54). Lincoln put a positive spin on the campaign, writing to Governor Rutledge, "Our men now see that little is to be feared either from musquetry or field pieces; they are full of spirit, & are sure they can beat the enemy on equal grounds at any time" (Mattern 1995:74). Ramsay, however, observed that, "immediately after this attack, the American militia impatient of absence from their homes returned to their plantations" (Ramsay 1990:446 [1789]).

In the fall of 1779 the combined American and French armies failed to liberate

Savannah (and Georgia) from Prevost. The heavily fortified British suffered relatively few losses. The American forces, however, lost nearly a fifth of the entire allied army (Morrill 1993:64). If this wasn't bad enough, it laid the groundwork for the second Royal invasion of South Carolina.

On December 26, 1779 Sir Henry Clinton debarked from New York with a British armada of 90 transports under Admiral Marriot Arbuthnot. After briefly anchoring off the Georgia coast to make repairs and final preparation, the fleet set sail for the North Edisto River on February 11, 1780. They arrived off Simmons (today's Seabrook) Island the

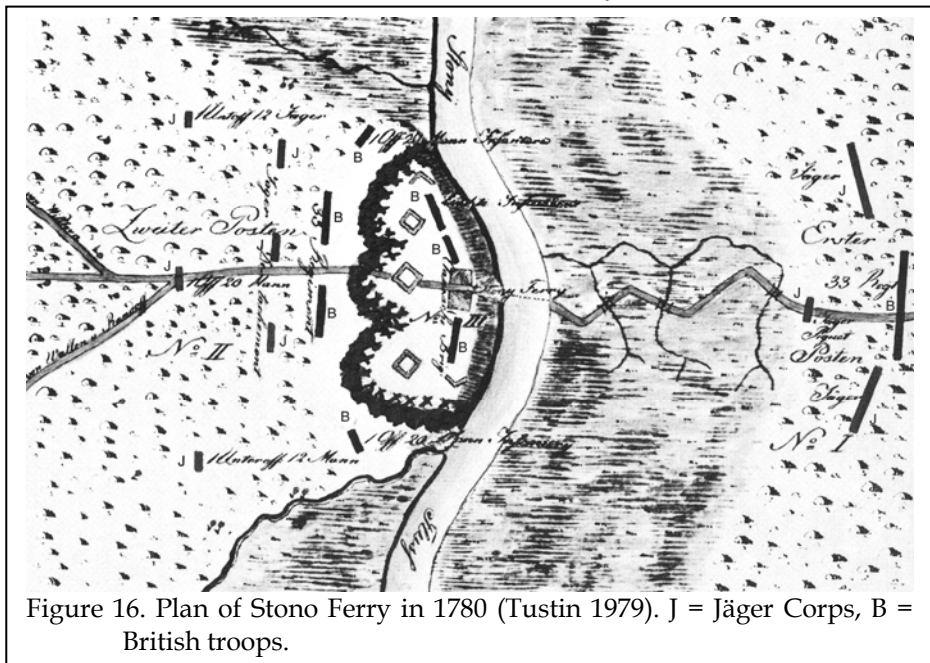


Figure 16. Plan of Stono Ferry in 1780 (Tustin 1979). J = Jäger Corps, B = British troops.

evening of the 11<sup>th</sup> and began putting troops ashore, with the process not completed until the following day. Those disembarking included English grenadiers and light infantry under General Leslie, Hessian grenadiers, a Jäger detachment, and the 33<sup>rd</sup> Regiment.

One account reports that,

towards ten o'clock the troops set out through a pathless and marshy wood, which continued

<sup>3</sup> These redoubts and their associated archaeological remains were destroyed by development of Stono Ferry Plantation at the north side of the ferry, opposite Johns Island, in 1985. No archaeological study was conducted.

with the greatest difficulty until five o'clock in the evening. A path often had to be cut through the bushes with axes and bayonets in water up to the waist.

By this time we reached a prepared road and discovered a plantation, from whose owners this island had derived its name (Tustin 1979:196)

Another diarist, Captain Johann Hinrichs, reported that Simmons Island "is a part of Johns Island, desolate and salty, and full of cabbage trees" (Ulhendorf 1938:181). This account also remarks on the dense thickets, marshy conditions, and "impenetrable woods where human feet had never trod!" (Ulhendorf 1938:183). A third account by General Von Huyn reported, "All the white inhabitants were on their way to the city with their guns, arms, and ammunition, leaving behind their wives and children, as well as their Negroes" (Ulhendorf 1938:371).

Some of the troops continued, crossing over onto Johns Island, where they took camp,

The jäger detachment and the 33<sup>rd</sup> Regiment . . . occupied a road leading to Stono Ferry . . . the remaining troops encamped on Simmons Island.

At midnight we had to move forward over a mile to Wilson's plantation, where the landing place for the provisions and baggage ships was situated. We had nothing but stinking water in this area (Tustin 1979:196).

In addition to his diary, Ewald also wrote at least one letter that describes these events. He adds that on February 13 and 14 the armies advanced to Stono Ferry, as well as to the

houses of Chisolm and Fenwick. On the 16<sup>th</sup> part of the army crossed the Stono at what he called White's house, probably the settlement of Abraham Waight, while the remainder crossed at Stono Ferry. They occupied the old redoubts constructed the year before. Additional troops cross over to James Island from Fenwick's plantation (Ulhendorf 1938:27). Other accounts suggests that the British crossed the Stono at a variety of other locations, including "Sucky Staniard's" and landing at "Ingles' plantation on pleasant, rising ground" (Ulhendorf 1938:187). Additional troops camped at William Ashley's plantation on Johns Island, where they were joined by the 71<sup>st</sup> Scottish Regiment (Tustin 1979:203). In February 1780, Captain John Peebles of the Scottish Grenadiers, was briefly headquartered at the Simmons estate, "a large Plantation and house" (Gruber 1998:339) at the south tip of Johns Island, the former home of James Simmons (d. 1775) and his wife Ann Holmes (d. 1773). Francis Simmons (ca. 1765-1814), the heir to the property, had been sent abroad by his trustees for his safety and education. Peebles mentioned two other Johns Island landmarks, describing Headquarters (Fenwick Hall) as "a large modern house with offices" and the nearby Gibbes House (Peaceful Retreat) as "a good house on the bank of Stono River" (Gruber 1998:339).

For their part, the few American forces present retreated toward Charleston using Wallace's and Rantowle's bridges, destroying them both after crossing (Ulhendorf 1938:187). The British appear to have been proceeding slowly, at least in part because of the "horses, cattle, and Negroes" that they had removed from plantations. In fact, a portion of the British forces remained on John's Island and Hinrichs' diary comments that daily foraging parties scoured the island, "thus great quantity of livestock has been driven in" (Ulhendorf 1938:197). In fact, the British spread out, raiding plantations on Wadmalaw (Ulhendorf 1938:199). Hough reported that "Major Hay and Captain Moncrieff are appointed Commissaries of all captured Goods, and the Troops are amply

supplied with fresh Provisions and Rice by them" (Hough 1867:37). At least some plantations - like the Vanderhorst house on Kiawah - were burned during the British advance on Charleston (Trinkley 1993:57). Even the Anglican church on Johns Island was not spared. The assessment was bleak, "not a door, window, shutter, or pew to be seen, a large part of the floor missing, aisle pavement in many places destroyed" (quoted in MacCallum 1970:12).

The accounts reveal that a number of British fortifications dotted the area surrounding Charleston. For example, two are noted at Peronneau's house at the Wappoo River (on James Island, just south of the better known McLeod plantation) which were "heavily fortified." At least two redoubts were constructed at Fenwick's Point on Wappoo where nine 32 pounders were put into position (Ulhendorf 1938:375, 379).<sup>4</sup>

By March 29, 1780, Clinton had moved from Johns to James Island, occupied Fort Johnson, crossed the Wappoo Cut, and arrived at Drayton Hall, about 7 miles northwest of Charleston. The British navy with its 216 guns had blocked Charleston harbor. On April 10 Clinton called on Lincoln to surrender Charleston; Lincoln refused. Rather than retreat, the patriots continuing sending troops into Charleston; in fact civil officials in Charleston threatened to help the British destroy Lincoln's army should he attempt to flee the city (Morrill 1993:70). The Charleston battle lasted one evening, May 9, and on May 12 Lincoln surrendered, allowing Clinton to capture 5,466 armed troops, 391 artillery pieces, 5,916 muskets, 33,000 rounds of small arms ammunition, over 8,000 rounds of shot, and 376 barrels of powder. Charleston - and the surrounding countryside - was held by British forces for the next 2½ years.

Clinton issued a proclamation allowing his troops to seize "all such Valuable Property as shall be found belonging to any person in Rebellion" for the armies' use. He declared all unoccupied property to be forfeited under the assumption that if the owner had fled, he must have been fighting against the Crown. Brannon notes that one British captain remarked that the local population "hated us from the bottom of their hearts because we carried off their belongings" (Brannon 2007:37).

On September 16, the British announced that the real and personal estates of 83 "wicked and dangerous traitors" would be sequestered. It was seen by the conquerors as "both just and expedient" that the property of those defying the King should be used to put down the revolution.

When these names (McCowen 1972:153-154) are compared to those offered by Jordan and Stringfellow (1998:237) as residing on Johns, Seabrook, Wadmalaw, and Kiawah islands, the only certain matches are those of Arnoldus Vanderhorst on Kiawah and William Gibbes on Johns Island.

This does not mean, however, that the British were the masters of South Carolina. The active war shifted to the upstate, but American raids in the low country continued. At first the British sought to bring Loyalist estates back to productivity. They found that most were so damaged by war that their productivity was low. As the frequency of raids increased, the British abandoned many of these plantations. The British also abandoned efforts to ship goods overland and used heavily armed boats instead. Eventually even this effort proved useless (Cruden 1890:13; McCowen 1972:94).

When Charleston was finally abandoned by the British in December 1782, McCowen estimates that of the 9,127 civilians, over 5,000 were African Americans. He observes, "this loss of manpower at a critical period of reconstruction greatly undermined the economy" (McCowen 1972:109).

---

<sup>4</sup> These fortifications have never been identified archaeologically.

The Jacksonboro Assembly, meeting in January 1782, approved the confiscation and amercement of various properties. The Confiscation Act was directed toward those who were British subjects or steadfast Loyalists. Based on the official lists, 239 Loyalist estates were confiscated. In contrast, amercement was directed toward those who had wavered in their allegiance, but had repented and taken a loyalty oath. Again based on the published lists 47 estates were amerced at 12% of their value (McCowen 1972:135-137). However, it has been shown that these lists are incomplete and there

### Recovery and the Antebellum

The period from 1790 through the early 1800s was one of reorganization and expansion. Indigo was no longer a profitable crop, although rice continued to be the gold upon which much of the low country was built. Gradually, however, cotton came to replace indigo, although it too was based on specialization in the production of a staple crop using slave labor. As Coclanis notes, "such specialization, under prevailing market conditions, generally proved highly profitable to those individuals in both the

Table 2  
Population and Wealth in St. Johns Colleton in 1860

	Acres	White Population	Slaves	No. of Slave Owners	Average No. Slaves per owner	Value of Real Estate	No. Reporting	Average Value of Real Estate	Value of Personal Estate	No. Reporting	Average Value of Personal Estate
Johns Island	48,605	129	2,346	62	38	\$594,500	34	\$17,485	\$1,796,203	36	\$49,895
Edisto	38,447	301	4,506	123	37	\$2,246,850	50	\$44,937	\$4,585,285	75	\$61,137
Wadmalaw	27,433	190	2,800	80	35	\$720,500	39	\$18,474	\$2,137,811	46	\$46,474

were at least 400 estates either confiscated or amerced (Brannon 2007:172).

At least five Johns Island planters were affected. Richard Russell Ash, Alexander Chisolm, John Freer, William Sams, and John Wells all petitioned the Assembly requesting relief from amercement. Chisolm and Freer were even able to provide petitions from other residents on Johns Island in support of their requests. In Freer's case the petitioners explained that they knew "of no Act that he has Committed whereby to deserve, Amercement, unless his having taken British protection" (SCDAH, Petitions to the General Assembly, 1783).

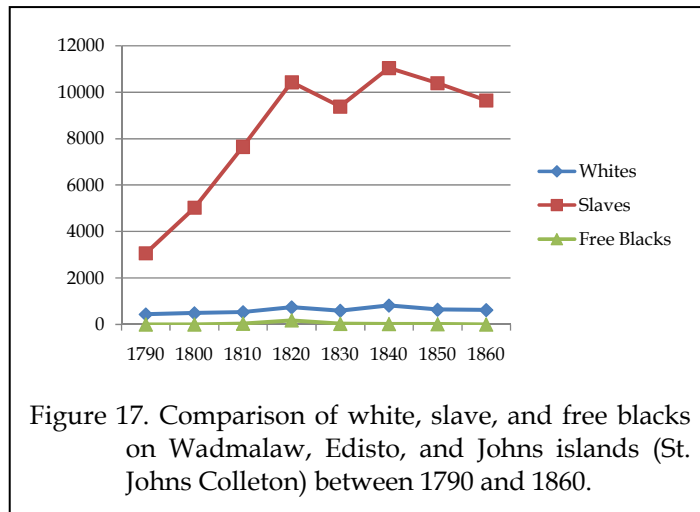
After the Revolution a number of citizens came forward with claims for supplies, service, loans, and other issues. At least 14 of those reported to be on Johns Island by Jordan and Stringfellow (1993:237) appear to have submitted claims (Ravill 1941).

low country and in Europe with capital directly involved in the production or distribution of such staples" (Coclanis 1989:130).

Cotton planting spread throughout the south after the Revolution, encouraged by improvements in ginning machinery (the best-known being Eli Whitney's wire-toothed saw gin, patented in 1794). Sea Island cotton, a distinct type characterized by its long staples and black seeds, became the pre-eminent crop on Johns Island. Unlike the more common upland green-seed cotton, distinguished by its short fibers, Sea Island cotton was not ginned with Whitney's machine. Its long fibers required planters to continue using the traditional roller gins usually in the form of slave-powered foot gins. Only in the 1850s, with the development of the improved Fones McCarthy gin, did mechanical equipment become popular (Porcher and Fick 2005:221).

Sea Island cotton was developed on the Georgia Sea Islands in about 1785, and in 1790 William Elliott grew South Carolina's first commercial crop on Hilton Head Island. By the





early 1800s, several planters, notably Kinsey Burden of Johns Island, had developed improved strains that commanded the highest prices on the European market (Porcher and Fick 2005: 95-96).

The new emphasis on cotton dramatically changed the area's racial makeup. Figure 17 shows that African American slaves – other than a slight dip in 1830 (perhaps the result of the crash of cotton prices in 1819), steadily increased in numbers, from 3,065 in 1790 to their peak in 1840 at 11,044. There was a slight decline in slaves after 1840, with St. Johns Colleton containing 9,652 slaves at the eve of the Civil War.

In contrast, the white population increased from 433 to only 819 in 1840, declining in St. Johns Colleton to 620 in 1860. The free black population in the district was small – peaking at 179 in 1820, then declining to only four in the 1860 census. In spite of the fluctuation in raw numbers, the proportion of black slaves to whites steadily increased from 7:1 in 1790 to 16:1 in 1830. This ratio held fairly stable until the Civil War.

We are able to obtain an even better view of slave holding on the islands that compose St. Johns Colleton

when we look at the 1860 census. Johns Island was the most heavily populated by African Americans – with 2,346 slaves and only 129 whites, the ratio was 18:1 compared to the 15:1 found on both Wadmalaw and Edisto. While the difference in average slave holds between Edisto and Johns Island is not significant, owners on both islands held more slaves than did those on Wadmalaw.

The wealth of the Edisto planters is clearly revealed by their reported real estate holdings and personal estates. Johns and Wadmalaw islands come in distant second and third whether total value or average value is considered. Farm values on Wadmalaw were slightly greater than those on Johns Island, but the personal estate value was higher on Johns Island.

There are other changes in the district over time. For example, the 1840 census indicates the importance of agricultural pursuits – there are only 12 individuals enumerated that did not list their occupation as planter. All 12 were classified as “learned professionals,”

Table 3.  
Occupations in St. Johns Colleton District from the 1850 and 1860 Federal Census

	1850		1860		1860 Johns Island		1860 Edisto Island		1860 James Island	
	No.	%	No.	%	No.	%	No.	%	No.	%
Planter	82	58.6	88	65.7	23	76.7	35	53.8	27	36.5
Farmer									7	9.5
Physician/Dentist	14	10.0	7	5.2	2	6.7	3	4.6	4	5.4
Overseer	12	8.6	12	9.0	1	3.3	10	15.4	9	12.2
Clergy	7	5.0	7	5.2	1	3.3	4	6.1	3	4.0
Lawyer									2	2.7
Carpenter	7	5.0	1	0.7			1	1.5		
Factor									1	1.4
Storekeeper	5	3.6	5	3.7			2	3.1	2	2.7
Blacksmith	3	2.1	1	0.7			1	1.5		
Clerk	3	2.1							3	4.0
Nurse			3	2.2			2	3.1		
Butcher	2	1.4								
Laborer	2	1.4							3	4.0
Boat Builder			2	1.5			2	3.1		
Mechanic			2	1.5	2	6.7	2	3.1	3	4.0
Seaman	2	1.4							2	2.7
Teacher	1	0.7	5	3.7	1	3.3	2	3.1	2	2.7
Mantua Maker			1	0.7			1	1.5		
Other									6	8.1
	140		134		30		65		74	

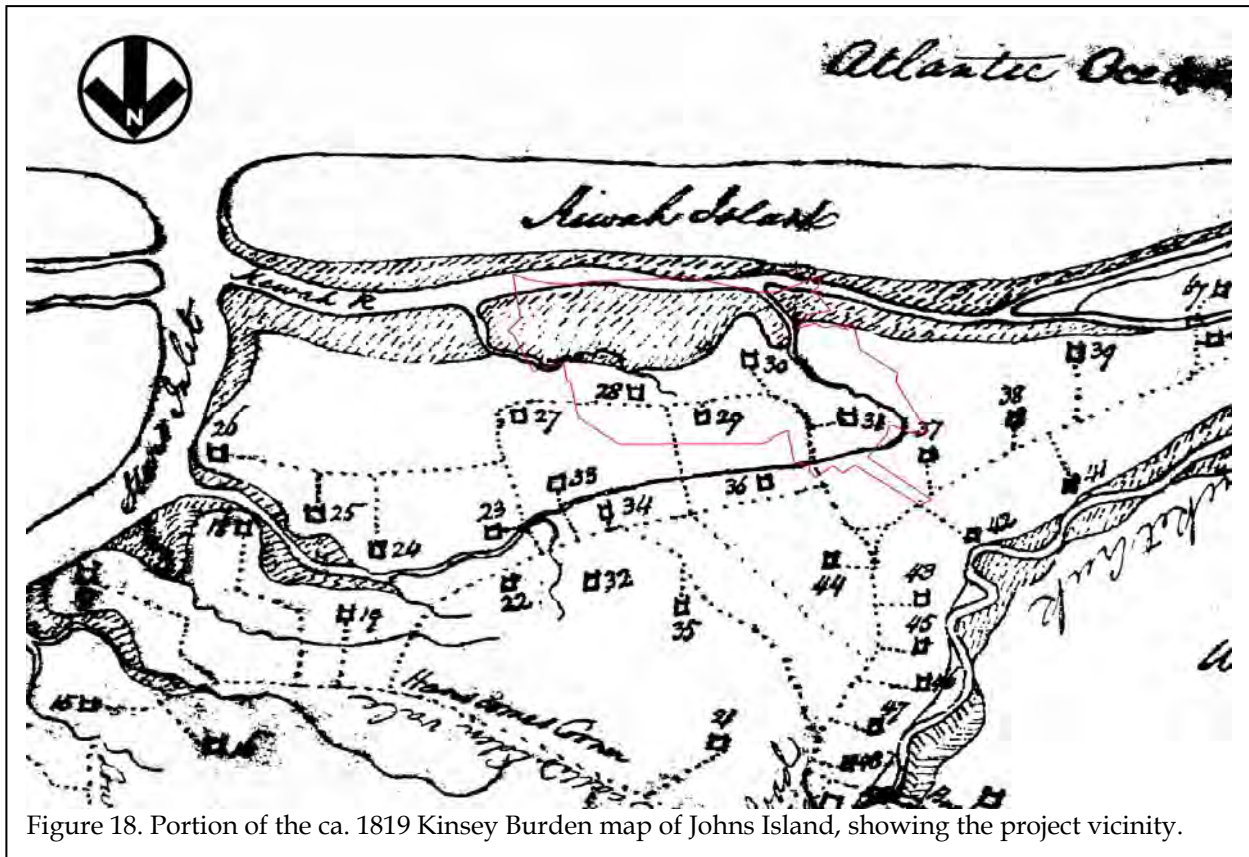


Figure 18. Portion of the ca. 1819 Kinsey Burden map of Johns Island, showing the project vicinity.

probably physicians and ministers (Johns and Edisto islands both had two year-round churches). Most, however, were also planters.

The 1850 and 1860 data are more revealing since they provide occupations. These are shown in Table 3. Although the category of physician continues to be prominent, it is clear from the census data that many of these physicians were also very successful planters. The quantity of overseers enumerated remains constant, as does the number of clergy and storekeepers or merchants. The number of teachers increases from 1850 to 1860.

Interestingly, we find three young Irish women in planter households with occupations listed as nurse, a task typically assigned to African American slaves. In England the nurse was not uniformly regarded, with many accused of drunkenness, thievery, and licentiousness. They were typically drawn from the working

class and were domestic servants rather than medical staff (Olsen 1999:264). The mantua maker seen in 1860 was a mulatto woman living on Edisto Island. While this trade was common in cities such as Charleston, it seems uncommon on the islands where sewing was done by both plantation mistresses and slaves alike.

For the 1860 census we can separate out occupants on Johns Island and we get the impression that this island was more rural – or at least more agrarian – than other nearby islands. The community was composed almost exclusively of planters, with only two physicians, one clergyman, and one teacher. The proportion of overseers was also considerably lower, suggesting that more of the land owners either tended their own lands or used slave drivers. When we compare Johns Island to neighboring Edisto and James islands, we do notice that proximity to Charleston no doubt played a role. Edisto, which was further





Figure 19. Portion of Mills' Charleston District showing Johns and Wadmalaw islands, and the study tract. Jenkins is not in the study tract, indicating some distortion in mapping.

removed from Charleston than Johns, had a lower proportion of planters and greater range of occupations.

The War of 1812 left little impact on St. Johns Colleton, although two fortifications were constructed in the area – one on the north end of Kiawah (shown on the 1822 "Map of South Carolina," by John Wilson) and another on Cole's Island. These two batteries were intended to maintain control of the Stono and Kiawah rivers, preventing British forces from repeating their Revolutionary War land assaults on Charleston. Mistakenly referred to in later years

as a "tabby" fort, the Kiawah fortifications were little more than piled up shell embankments in the hard marsh at the edge of the river. The fortification was connected to the island's high ground by means of a causeway.

The ca. 1819 Kinsey Burden map and the 1826 Mills' *Atlas* provide two early antebellum views of the area. The Burden map must be viewed cautiously since it is uncertain if each numbered square designates a dwelling or if some may simply represent property owners. However, the map does provide us with a view of the island, showing 66 listed owners, as well

as the island's road system. The map must be seen as schematic since the shape of the island is significantly distorted.

In the vicinity of the study tract, Burden shows four owners: Hugh Wilson, B.D. Roper, S. Witter, and James Legare (from east to west).

Mills' map of Charleston District is more topographically correct and many of the same owners are shown. Mills' placement of these owners, while similar to Burden, is somewhat different. Thus, on Figure 19 we see that Jenkins and Fripp are both in the approximately correct locations, except that Jenkins has been shifted eastward. We know from detailed title examination that Jenkins was not an owner of the Mullet Hall tract. It is important to carefully interpret Mills' placement of properties. With Jenkins disposed of, we see that Mills fails to show any of the owners on the study parcel in the early antebellum. Although Mills does not show the Kiawah fort, he does show the Cole's Island fort. He also shows the two fortifications guarding the North Edisto – one on Seabrook and another close to Point of Pines on Edisto Island.

Speaking of the district as a whole, Mills explained that while rice and indigo were the staple crops of the eighteenth century, indigo lands, "being suitable for raising cotton" had been abandoned in favor of cotton, "being equally productive [and] being safer culture, both in regard to health and certainty of crops" (Mills 1972:389 [1826]). It may be that "certainty" was a euphemism for profitability, since by this time indigo was virtually extinct in South Carolina (Gray 1958:2:610-611).

While rice was still being grown, Mills suggests that many planters were turning their banked lowlands over to the cultivation of cotton, as well as "corn and pulse [legumes such as beans and peas] of various kinds" (Mills 1972:387 [1826]).

Mills explained that Charleston's sea islands had a "delightful" climate in the winter and spring. In the summer months, however, planters were obliged to "retire to the seashore, to enjoy the breezes of the ocean." Otherwise, the summer and autumn brought "bilious fevers and dysenteries" (Mills 1972:473 [1826]). Summer villages, such as Edingsville and Johnsonville, were developed all over Charleston District. Fick briefly mentions Rockville on Wadmalaw Island and Adams Run on the South Edisto (Fick 1992:30). Legareville was the retreat for Johns Island planters after 1838. Before that time it is suggested that planters erected summer cottages close to salt water, where mosquitoes were less common. Elias Vanderhorst on nearby Kiawah Island was routinely building a small house on the beach for a summer residence by at least the 1820s (Trinkley 1993:48-49), and the pattern of building "seashore houses" has been well documented on Waccamaw Neck (see Hobcaw Barony NRHP nomination, SCDAH, Columbia).

On nearby James Island, the plantation known today as McLeod was advertised for sale by the Estate of Mrs. Sarah P. Parker in 1850. On the tract was a dwelling house with outbuildings, accommodations for 90 slaves, and a "summer settlement" (advertisement in *Charleston Courier* beginning December 1850). Although the village of Rockville was well-established on Wadmalaw Island in 1851, when Benjamin S. Whaley bought Red House Plantation, the property description noted that the tract was bounded "east by William C. Bailey's summer residence and Bohicket Creek" – indicating that summer residences were still present. We even note their occurrence in Prince William's Parish. William Fripp's claim to the South Carolina State Auditor for losses during the Civil War included not only his winter residence, valued at \$1,500, but also his summer residence, valued at only slightly less – \$1,200 (SCDAH, Comptroller General/ State Auditor, Claims of property loss due to the enemy).



Although silent concerning Johns Island, Mills does provide a detailed discussion of Edisto, noting that like the rest of the district, indigo lands had been uniformly devoted to cotton and that the Edisto area was a poor producer of rice. Edisto lands sold for \$30 to \$60/acre. Mills commented that,

The proximity of the island to Charleston, affords the planters an opportunity of disposing of the various productions of their plantations to advantage. They do not, however, in every case, make the most of these (Mills 1972:473 [1826]).

It would take another hundred years for the islands to turn to truck crops. He also mentions that the islands were major producers of sweet potatoes, with an acre typically producing about 300 bushels (Mills 1972:480 [1826]). On the other hand, he observed that Irish potatoes “are not planted in any quantity or extent” largely because “the negroes are averse to their use, and can hardly be prevailed upon to receive them as a substitute for the sweet potato” (Mills 1972:481 [1826]). The most common standing provision, however, was corn, with an acre producing between 15 and 25 bushels.

Mills also mentioned, for both the district and Edisto, that while the roads were in generally good condition most transportation was by boat except for travel on each island. Barely a decade before William Seabrook’s inter-island steamboat, Mills notes that for Edisto,

the islanders carry on their intercourse altogether by water. In transporting themselves, and the productions of their plantations to Charleston, &c they use boats made after the canoe models. These boats are built of cypress, and other curable materials; and are well adapted to the purposes of

inland navigation; but ill calculated for encountering heavy seas., They are of various dimensions, from half a ton to six tons burden, and cost from one hundred to one thousand dollars. There are five or six workmen advantageously employed in constructing and repairing these boats [two were specifically mentioned in the 1860 census] (Mills 1972:476 [1826]).

Beyond these general observations, it is difficult to obtain good agricultural statistics for the early antebellum since published data has been merged by district. This blurs distinctions between areas such as Christ Church and Johns Island. For example, in 1860 the average value of Johns Island plantation was nearly \$14,000, while a Christ Church plantation had an average value of less than \$8,000. Edisto plantations had an average value of over \$44,000. Consequently, we tabulated the agricultural census data for St. Johns Colleton. For 1860 it was possible to further refine the data, breaking St. Johns into Johns, Edisto, and Wadmalaw islands. James Island (St. Andrews) is also listed for comparison. These data are shown in Table 4.

For Charleston district as a whole, the number of farms increased by a mere 3% between 1850 and 1860 and acreage actually decreased (improved acreage by 30% and unimproved by 8%). The average farm value in 1850 was just over \$7,100, declining by about \$700 to \$6,420 in 1860 – still significantly less than farm values in either Christ Church or Johns Island (in contrast, the average plantation value in St. James Goose Creek was only \$3,007). This indicates that while there were pockets of very productive – and valuable – farm land in Charleston, there were also very modest farms on less than spectacular soils. On the other hand, we see that the value of farm implements per farm increased by 25% in the decade between 1850 and 1860. This suggests that the Charleston

## HISTORICAL SYNTHESIS

Table 4.  
Agricultural Census Data for Charleston District, 1850-1860

		Land Occupied or Improved					Livestock							
		Farms	Acres improved	Acres Unimproved	Value of farm	Value of farm (2006\$)	Value of implements	Horse, asses, mules	Milch cows	Working oxen	Other cattle	Sheep	Swine	Value of livestock
Charleston	1850	786	183,236	636,056	5,599,093	147,344,542	265,377	5,023	14,887	2,482	24,564	13,415	30,247	663,250
St. Johns	1850	104	55,652	46,617	1,917,550	50,461,842	90,871	1,136	4,126	714	3,207	3,304	3,790	137,350
Charleston	1860	810	127,194	584,739	5,202,502	130,062,550	332,808	4,360	9,863	967	17,990	10,849	39,741	912,399
St. Johns	1860	132	63,183	175,010	3,559,010	88,975,250	111,972	1,239	3,725	1,039	4,531	4,303	5,014	294,511
Wadmalaw	1860	40	16,441	9,814	801,200	20,030,000	18,760	353	904	162	1,174	1,017	1,087	72,835
Edisto	1860	49	27,361	150,754	2,164,910	54,122,750	75,053	553	1,733	639	2,423	2,062	3,457	149,446
Johns Island	1860	43	19,381	14,442	592,900	14,822,500	18,159	333	1,088	238	934	1,224	470	72,230
Charleston Neck	1860	70	1,269	1,346	536,500	13,412,500	12,475	146	97	-	32	1	295	21,845
St. Andrews	1860	71	18,547	28,814	889,375	22,234,375	58,900	511	1,888	71	705	879	1,457	107,540

		Agricultural Products												
		Rye & oats, bu	Corn, bu	Rice, lbs	Cotton, bales	Wool, lbs	Peas & beans, bu	Irish potatoes, bu	Sweet potatoes, bu	\$ Orchard Produce	\$ Garden Produce	Butter, lbs	Hay, tons	Value animals slaughtered
Charleston	1850	40,664	416,577	16,906,273	7,757	18,636	77,673	7,728	657,172	-	-	104,847	2,440	97,084
St. Johns	1850	2,070	97,840	1,205,670	3,536	4,062	13,482	160	158,200	-	-	21,856	-	18,998
Charleston	1860	14,218	383,316	18,899,512	6,381	19,381	52,456	28,144	323,042	5,009	106,213	54,068	13,551	185,304
St. Johns	1860	280	102,666	1,500,000	4,265	16,297	15,894	2,135	223,858	500	4,900	29,860	2,665	132,104
Wadmalaw	1860	-	31,425	-	1,053	4,405	5,320	200	43,050	-	-	7,180	898	6,060
Edisto	1860	280	44,961	1,500,000	2,208	7,424	7,774	335	122,280	500	-	13,320	1,152	8,184
Johns Island	1860	-	26,280	-	1,004	4,468	2,800	1,600	58,528	-	4,900	9,360	615	117,860
Charleston Neck	1860	-	3,795	-	3	170	22,934	3,686	-	-	64,295	-	517	10,000
St. Andrews	1860	1,630	44,021	215,350	929	855	6,330	11,897	51,990	800	32,200	12,050	1,335	4,920

planters were active in seeking to maximize the profits from land that had been in cultivation for generations.

Cattle and milk production declined over the period, although the value of the county's livestock increased by nearly 38%. Given the decline in cattle and sheep, this increase must be attributable to swine and horses. However, even the value of animals slaughtered countywide more than doubled, and horses were not valued for slaughter.

Turning to crops, the decline from 1850 is dramatic. Cotton production was down by 18%, peas by 33%, and sweet potatoes by 49%. Corn production was the bright spot – it was down by only 8%. The decline in cotton production may be related to the spike in prices – from 27.8¢/pound in 1850 to 47.0¢/pound in 1860. In an 1826 letter from Johns Island planter Kinsey Burden to Whitemarsh Seabrook, Burden explains that the island's soils were “partly of a low, heavy loam and sand, on a clay foundation, and partly high brown mould on sand and clay” and that his favorite manure was a combination of “salt mud, salt marsh, and the compost of salt

marsh and rushes combined with animal manure.” Using this combination his average crop was about 98 pounds of cotton per acre (Seabrook 1826:27-30).

Production of the other staple, rice, increased by nearly 12% in Charleston District. The price of rice, however, declined from 3.4¢ to 3.2¢/pound (Gray 1958:2:1027, 1030-1031).

In 1850 St. Johns (composed of Edisto, Wadmalaw, and Johns islands) consisted of 104 enumerated farms – 15% of the total in Charleston District. These plantations, however, account for over 43% of the tilled land in the district and over half of the farm value. We find 30% of the horses and mules, 38% of the milk cows, 40% of the oxen, nearly 33% of the sheep, and 26% of the livestock value in this parish. Only cattle and swine are proportionate to the number of farms.

Looking at agricultural production, St. Johns produced nearly 84% of Charleston's cotton, 30% of the corn, and 32% of the sweet potatoes. Only 8% of the district's rice was produced in St. Johns Parish, however.

Between 1850 and 1860 there were significant changes. While the number of farms increased district-wide by about 19% (although improved acreage remained flat), the

sweet potato yields increased by 41%. Even Irish potatoes saw a 13 fold increase. The production of hay in St. Johns Colleton in 1860 was greater than the yield of all of Charleston County in 1850. Only oat production fell.

Table 5.  
Agricultural Wealth Comparisons, 1860

	\$ Value/ Improved Acre	\$ Average Value/Farm	\$ Value Livestock/Fa rm	Acres per bale Cotton	Acres per bu Corn
Charleston	40.90	6,422	1,126	19.93	0.33
St. Andrews	47.95	12,526	1,515	19.96	0.42
St. Johns Colleton	56.33	26,962	2,231	14.81	0.61
Edisto Is.	79.12	44,182	3,050	12.39	0.61
Johns Is.	30.59	13,788	1,680	19.30	0.74
Wadmalaw Is.	48.73	20,030	1,821	15.61	0.52

enumerated farms in St. Johns increased by 27% (with the improved acreage increasing by 13%). The value of the farms in St. Johns increased by 86% (this is about a 76% increase when inflation is factored in). The value of farm implements did not keep pace with the value of land, but there was still an increase of about 23% (in addition, the most valuable – and costly – farming “implements” were the enslaved African Americans who are not included in this tabulation).

The quantities of livestock in St. Johns Colleton did increase between 1850 and 1860 – horses and mules by 9%, oxen by 46%, cattle by 41%, sheep by 30%, and swine by 32%. In fact, only milch cows declined (by 10%) and in spite of this decline, butter production rose by nearly 37%. The increase in numbers alone, however, does not seem to account for livestock value more than doubling. As both McGaw (1984) and Gray (1958:2:856) note, livestock breeding advanced during the late antebellum. Gray suggests that major advances coincide with the cotton depression of the 1850s. Thus, we believe that, at least in part, the increased value may reflect improved breeds.

Agricultural production also increased in St. Johns Colleton, following the county-wide trend. While improved acreage increased by a modest 13%, cotton production increased by 21%, corn increased by 5%, pease by 18%, and

The 1850 census shows that St. Johns was a very wealthy parish. Much of this wealth, however, was concentrated on Edisto Island and this becomes clear when the more refined 1860 census is examined (Table 5). For St. Johns Colleton, Edisto has the highest value per improved acre and highest average farm value, Johns Island has the lowest. This same trend is found in the value of livestock on the three islands. Edisto also produced the most cotton on the fewest acres – Johns Island took the most acreage. Only in acres per bushel of corn did Edisto come in second to Wadmalaw – with Johns Island still ranking third. Johns Island compares best to St. Andrews Parish (which includes James Island).

The 1860 census also enumerates eight tracts totaling 53 improved acres (average of 7 acres) and 8 unimproved acres. No individual owned more than 24 acres and most owned 4 or less acres. Three tracts had no value listed; the remainder were valued at \$29,000, with an average value of \$5,800. Only three listed livestock – horses, mules, and (primarily) milch cows – although three others listed significant values for slaughtered animals – \$35,000 to \$40,000. Three showed production of Irish potatoes, one a very small quantity of sweet potatoes, two produced hay, and four reported yields ranging from \$300 to \$3,000 worth of garden produce.

Of the eight owners, seven could be found in the 1860 census. Four lived in the 7<sup>th</sup> Ward, two lived in the 5<sup>th</sup>, and one lived on the neck – none appear to have lived on Johns Island. The occupations included a policeman, butcher, four farmers, and a salesman. Five of the seven owned slaves. Although three owned only one slave each, one person – the butcher,

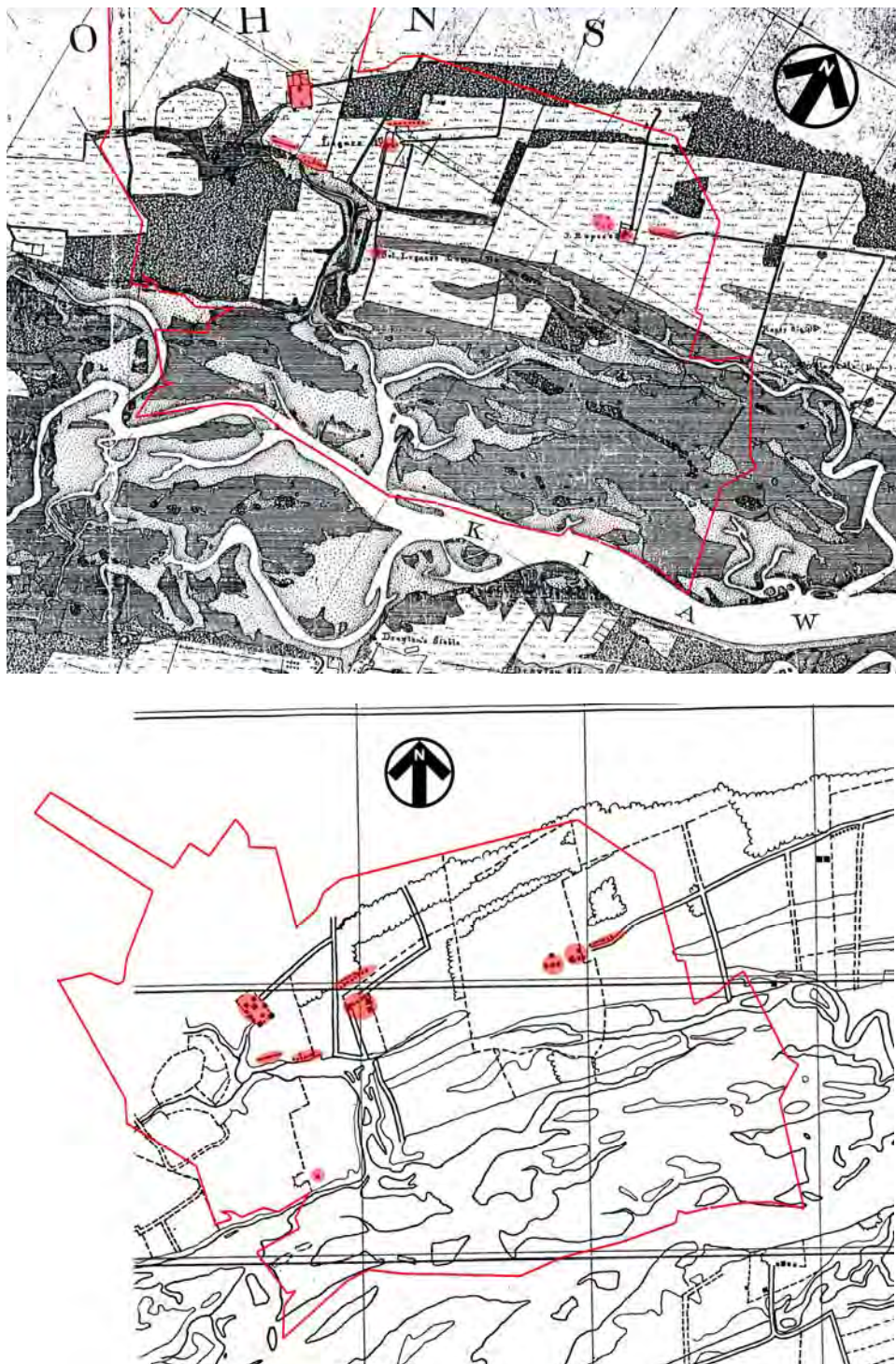


Figure 20. Two views of the project area at the end of the antebellum. Top is Coast Survey T491. Bottom is a tracing of T491 prepared during the Civil War. Structures or clusters are shown highlighted. From west to east these include James Legare, Solomon Legare, and M.J. Roper.



James Dunning – owned 17 and the farmer – W.R. Disher – owned 49. All of the slaves, however, are shown in Charleston.

Thus, while we have the large and small plantations on Johns Island, there are also small holdings for both intensive cattle production and an early form of truck farming – neither of which has been reported in any detail before.

Of course, the 1860 agricultural census for the Charleston Neck reveals significant truck farming of Irish potatoes and other garden produce.

By the eve of the Civil War we have two additional views of Johns Island, shown in Figure 20. Shown are portions of three plantations: the “Legare” plantation belonging to the widow Lydia B. Legare, “Mullet Hall” or the “Home Place” of Solomon Legare, and Roper’s plantation, The Oaks. The plans are most useful in helping to identify archaeological sites, but they also reveal the complexity of plantation landscapes at the time.

All three plantations consist of a network of interconnected roads and drainages in order to maximize the productivity of the fields for cotton. Relatively few areas have been retained in woods, in order that as much land could be cultivated as possible. As early as 1826 Mills warned that districts were “beginning already to experience a want of timber, even for common purposes” – the result of uncontrolled clearing for planting of cash crops (Mills 1972:383 [1826]).

A sea island cotton plantation was a commercial agricultural enterprise as well as the home of a sizeable residential community. Service buildings were required for every aspect of the plantation’s operation. On every plantation were slave cabins, corn houses, pea houses, and blade houses (for the corn shucks used as animal fodder). There were other special-purpose buildings: kitchen, smoke house, meat house; wagon sheds and carriage

houses; gin house, moting house, packing house. These last structures were crop-specific. Because high-grade cotton could be ruined by trash and fragments of seed, processing and storage buildings were kept free of dust and litter. The best cotton barns were two-story buildings with glassed windows to light the interior without admitting breezes (Porcher and Fick 2005:370-371). Surrounding these settlements were fences, suggesting orderly yards and perhaps kitchen gardens.

The majority of auxiliary buildings on every plantation were slave cabins. There might be a few close to the main house, but the dwellings of field laborers were grouped in clusters or lines set near the main house, along the entry drive, or near the working areas. Slave settlements laid out in single or double rows provided a tidy appearance while allowing convenient oversight and supervision (Porcher and Fick 2005:375). They also reinforced the world view of the planter, creating order and the appearance of a small English village.

At least four slave settlements are present on these plans, with 30 structures visible. The 1860 slave schedule for Johns Island enumerates 2,228 slaves living in 682 houses – yielding an average of 3.3 occupants per house, assuming that all houses were occupied at the time of the census. This average, however, ranges from 2 slaves per structure up to almost nine per structure.

### **The Civil War**

One regiment was raised on Johns Island, called Captain Walpole’s Cavalry or the Stono Scouts. They were an independent company of mounted infantry composed largely of the sons of plantation owners. They patrolled Johns Island to prevent looting, acted as lookouts, and provide videttes (sentries on horseback) for the coast between the North Edisto and Stono rivers. A portion of the muster roll is reproduced by Haynie (2007:23) and the roll is also available online at

[http://www.geocities.com/screbels\\_1864/StonoScouts.html](http://www.geocities.com/screbels_1864/StonoScouts.html).

With the fall of Hilton Head and Beaufort in November 1861, the entire coast of South Carolina was placed at risk. General Robert E. Lee was sent to South Carolina to assume command of the department of South Carolina, Georgia, and East Florida. Seeing the impossibility of holding the sea island, his strategy was to concede the islands – including Johns Island – and create a mobile defense relying on securing the Charleston and Savannah Railroad. In that way he hoped to protect the mainland and, in particular Charleston and Savannah. A string of fortifications were created to guard the railroad.

Johns Island was ordered evacuated in late November, although as late as May 22-23, 1862 Confederate forces moved to Johns Island to remove slaves that had been left behind – 200 were found and were sent to the Charleston “workhouse to be fed and taken care of by the owners.” The Confederates were also destroying cotton on the island to prevent it from being seized by Union forces (OR20, pg. 18-19).

In March 1862 Lee was replaced by Major General John C. Pemberton, who set about devising a string of defenses on James Island. Meanwhile the Union forces were jumping from island to island, approaching Charleston. Edisto was almost continuously occupied by Union forces, with the William Seabrook house and Oak Island plantation used as the headquarters and for billeting officers.

In contrast, Seabrook, Kiawah, and Johns Island were less important to the Union strategy and were occupied repeatedly by both sides. In April 1862 the Third New Hampshire Infantry made a brief reconnaissance to Seabrook Island. Evidently little activity was found on either Seabrook or Kiawah, although Confederate troops were clearly established on John's Island (OR14, pg. 3-4). Johns Island in

particular became a no-man's land. This resulted in destruction by troops from both sides.

When Arnoldus Vanderhorst IV visited Kiawah in March 1862 he told Adele (his wife):

Our own troops had broken into the fine dwelling house [of his neighbor, Isaac Wilson] and maliciously destroyed the furniture, and left the house in such a condition that it scarcely ever will be habitable for a decent family. The Vandals were not satisfied with this shameful destruction of private property, but were low enough to rob the poor old negro who was left to take care of the place of all his chickens, and they even went in his house, and stole a new pair of shoes that his master had given him. Is it not melancholy to think that we have such Barbarians amongst us, and that these are the men that the country looks to to fight its battles (South Carolina Historical Society 12/200/12).

In October 1863 Confederate General Harry A. Wise complained of the constant movement of men through his area. He noted that many were involved in various “depredations” in the area (OR47, pg. 387; see also Jordan and Stringfellow 1998:149). Wise's headquarters on Johns Island were at the “Fripp House” (OR65, pg. 590), one of several plantations owned by members of the Fripp family on the island.

The Coles Island fort, constructed during the War of 1812, was apparently reworked in early 1861 to guard the Stono River entrance. A February 6, 1861 *New York Times* article remarks that on February 2 “Fort Palmetto, on Cole's Island, in the harbor of South Carolina, was completed, and the soldiers

there celebrated." The article explains that the work was conducted by "some fifty negroes."

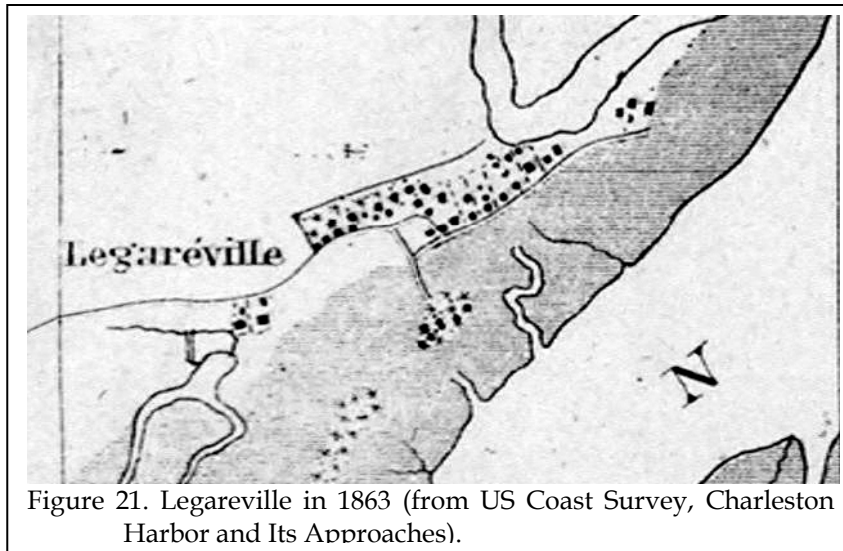


Figure 21. Legareville in 1863 (from US Coast Survey, Charleston Harbor and Its Approaches).

By March 7, however, the commanding officer, J.J. Pope, Jr. was complaining "the planters of John's Island, who volunteered to complete it, as I was informed, left it not half finished, and the troops have bestowed much labor upon it, to bring it to a defensible condition" (OR1, pg. 268). Of perhaps greater concern, the two 18 pound guns at the fort were unable to command the Stono. When fired their "balls failed to reach the Stono Channel."

Concerned that Charleston had insufficient men and artillery to protect itself, Confederate General John C. Pemberton ordered troops to abandon the Cole's and Folly Island defenses in March 1862 (Hagood 1910). The abandonment of these defensive lines allowed Union troops to move into the area without opposition in the Spring of 1862. It was at this time that the siege of Charleston began and the Civil War came to Johns Island.

The first major offensive on Charleston was the ill-fated June 1862 land attack of James Island. Just prior to this there was a brief skirmish on Johns Island with the Union troops overtaking a small party of Confederate pickets on June 7 at the "fork of the roads leading to Legareville and Haulover Bridge" (OR20, pg.

32). On June 9, Confederate troops sought to engage the Union forces in the vicinity of "Bryan's," but found that they had retired to Legareville (OR20, pg. 34).

On January 30, 1863 the Confederate batteries at Legare's Point Place on Johns Island (this was James Legare's "new" 1830 home west of Hancome's Point) and Grimball's on James Island, succeed in capturing the Union ship *Isaac Smith* on the Stono (OR20, pg. 201).

The second, equally disastrous, effort by the Union forces to take James Island was the combined naval and land attack in April 1863. In June 1863 the command of the islands around Charleston was given to General Quincy A. Gillmore and the previously defensive efforts were transformed into preparations to again launch an attack on Charleston. In July 1863 Union troops on Folly Island attacked adjacent Morris Island, easily establishing control over the southern end of the island. Three efforts to storm Battery Wagner were repulsed and the Union troops once again began siege tactics. In September the Confederate troops abandoned Morris Island, giving the Union forces a hollow victory and beginning the next phase in the long siege of Charleston. Union troops held a tenuous line along portions of Seabrook, Kiawah, Folly, and Morris islands, but failed to hold any significant portions of Johns or James Island.

The next mention of activities in the Johns Island area occurs on November 15, 1863. Union forces had been shelling the Haulover Cut area using a position at the bridge between Seabrook and Kiawah Island. A small contingent of Confederate forces sought to destroy the bridge, but discovered that the Union forces were much larger than anticipated. The Confederate dispatch revealed that Union

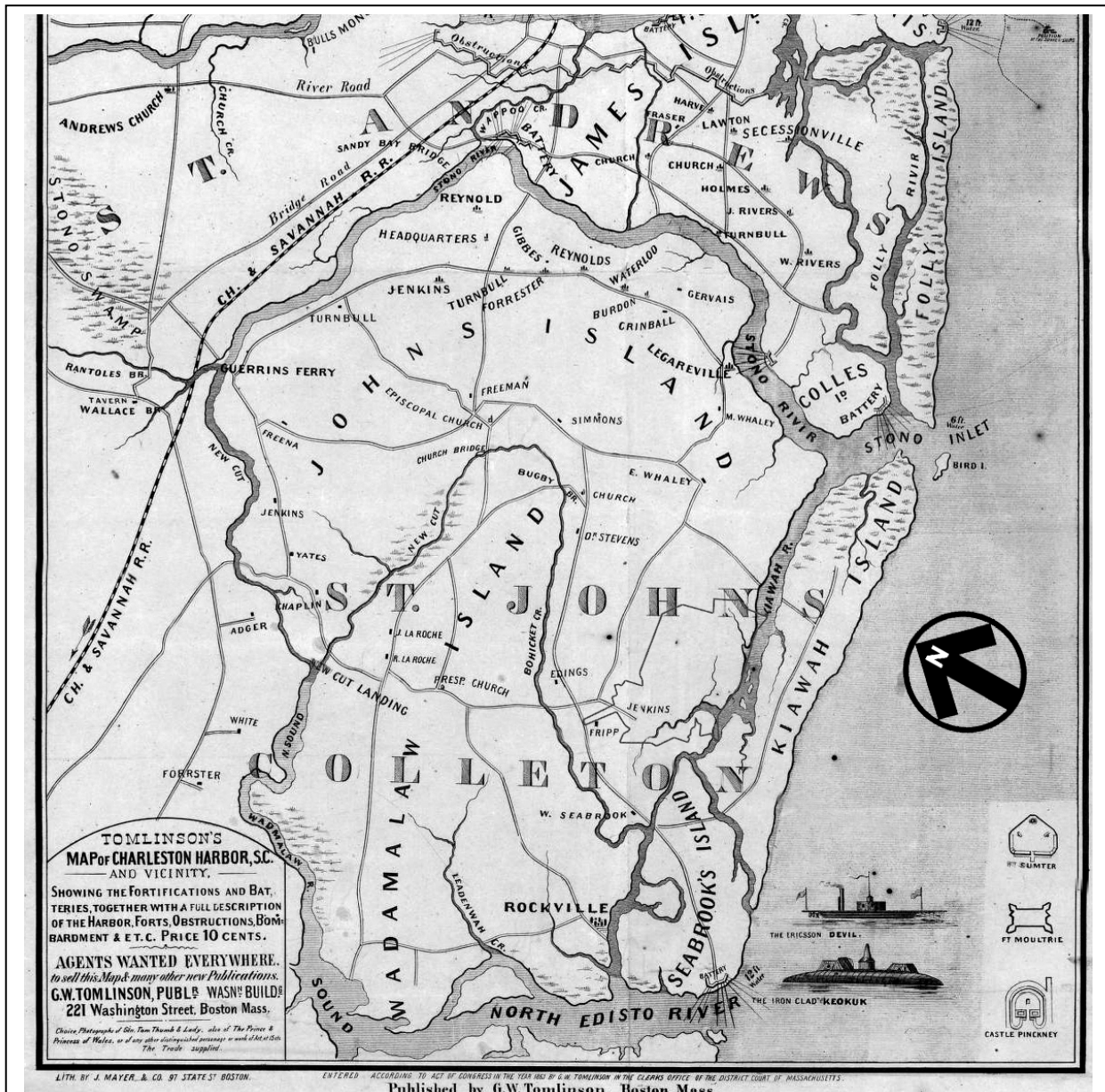


Figure 22. Johns Island in 1863 showing most of the locations referenced in the Civil War discussions (from Tomlinson's Map of Charleston Harbor, SC and Vicinity). Jenkins is misplaced and is actually west of the study area.

forces were well in control of Seabrook and were in the process of constructing an "observatory" at Clark's Bay (OR46, pg. 737-738).

This observatory was one of the signal towers being constructed from Hilton Head to Folly Island in an effort to allow uninterrupted communications along the coast. The tower was

placed on the east end of Kiawah, "as so much smoke arises from the camps there and on Folly Island as to render it impossible to see a station on Folly Island from there [Botany Bay on Edisto Island]" (OR46, pg. 54).

The Legareville fortifications must have been reworked around December 1863. At that



time these emplacements held field artillery that fired on the Union gunboat *Marblehead* in the Stono River (December 25, 1863). The two upper batteries were sunken positions, while the one southern battery was a raised position. Other vessels came to the aid of the *Marblehead*, driving off the Confederate forces. The fortifications and two 8-inch siege howitzers were captured by the Union forces (OR46, pg. 752; OR111, pg. 16, 21).

It was probably these events that resulted in efforts by the Confederate forces to improve the defenses on Johns Island. Plans were developed for a "battery in embrasure for four field pieces at Ingle's old landing, opposite Thomas Becket's, on John's Island" (OR47, pg. 549). Even more elaborate works were suggested running across the island from the Stono to Bohicket Creek (OR65, pg. 527). None of this work, however, was ever conducted (OR65, pg. 528).

Always desperate for raw materials, in January 1864 Confederate General Harry A. Wise "ordered all the old iron to be picked up at and about deserted houses on John's Island and elsewhere throughout the district" (OR65, pg. 523).

Activities continued on Johns Island unabated in 1864. On February 9-11, 1864 the Union forces made a demonstration on Johns Island as a feint (OR65, pg. 31, 469, 582). The Union forces crossed over from Kiawah to Seabrook and from there crossed Haulover onto Johns Island. They traveled the Bohicket Road, meeting strong Confederate resistance at the junction of Bohicket and River roads - at what is called "the cocked hat." The Union forces retreated, leaving the Confederates again in control of Johns Island.

On June 3, 1864 Union forces conducted a reconnaissance of Johns Island as far as 3 miles west of Legareville (OR65, pg. 62). Another reconnaissance was conducted on June 19-22, 1864, this time with the battery near Legareville destroyed (OR65, pg. 13, 66).

Another major Union expedition to Johns Island resulted in a series of battles around Isaac Grimbail's Waterloo Plantation on the Stono between July 2 and 10, 1864 (OR64, pg. 14-15; OR65, pg. 84-85, 266). These battles focused on the old ricefields, with the dikes serving as breastworks. The battle culminated in the July 9 action at Burden's causeway. Again Union forces retreated.

Although a small victory, the battle had no bearing on the war. Moreover, it did nothing to deter Union forces from returning to Johns Island. In mid-August the Union forces began tearing down some of the buildings at Legareville to use the lumber in their own camps. No longer able to mount any serious offensive against the incursion, the Confederate commander ordered the village burned rather than allow the Union forces to use the materials. Thus, on August 20, 1864 a Confederate raiding party under Major John Jenkins burned Legareville (OR65, pg. 268-269). It was about this time that the St. John's Parish Episcopal church, rebuilt after its loss during the Revolution, was destroyed by fire (MacCallum 1970:22).

By January 1865 the Confederate forces had again erected new batteries on Johns Island near the Stono. Although the communication does not indicate the location, it seems likely that it would have been in the same approximate location as those destroyed in June 1864 (OR99, pg. 49).

Although the Confederates held Johns Island, Charleston was a "mere desolated wreck." What remained of the Confederate forces after the fall of Atlanta and Savannah abandoned the city in February 1865. The city surrendered and, while it avoided Sherman, was nevertheless occupied by Federal troops on February 18, 1865.

The loss of the Civil War caused exceptional social and economic disruption throughout South Carolina. A labor force that

## HISTORICAL SYNTHESIS

Table 6.  
Losses Claimed by Johns Island Planters During the Civil War

Planter	Plantation Name	Date of Loss	Slaves		House		Other Bldg.		Other Goods	
			#	\$	#	\$	#	\$	#	\$
Brown, James		May 1862	3	525.00						
Grimball, Isaac P.		May 20, 1862	79							
Townsend, Mrs. Mary S.	Head Quarters		42	37,800.00			steam engine, gins, machinery	2,000.00	utensils, carts, &c	200.00
Townsend, Mrs. Mary S.	Oakland		10	9,000.00						
Curtis, Dr. Thomas			13	11,550.00	damaged		2 corn hs, dairy, kitchen, poultry hs, cotton hs, stables, carriage hs, 8 negro houses		fencing	
Curtis, Francis S.		April 1862	4	4,000.00						
McElhenny, E.T.			7	7,000.00						
Burden, Est. Kinsey			10	8,300.00			cotton hs	500.00	sundaries, whippers, cotton frames, grain seive. Seives, foot seive, plough, hoes, corn sheller, xcut saws, whip saws, carpenter tools, anvils, fodder cutters, wheel barrows, tool chest, pick ax, grubbing hoe, weights, scale, block & tackle	1,119.00
Whaley, Edward C.		May 1862	6	5,500.00			corn hs	150.00		
Angel, Mrs. M.			6	1,800.00		4,000.00	machine hs	700.00		
Angel, Dr. J.W.			3	1,800.00						
Angel, Miss J.H.			3	3,000.00						
Pelot, Mrs. M.C.										
Totals				\$90,275.00		\$4,000.00		\$3,350.00		\$1,319.00

Planter	Household Goods		Boats		Carriages		Cotton (bales)		Corn		Pease		Stock	
	#	\$	#	\$	#	\$	#	\$	#	\$	#	\$	#	\$
Brown, James			1 - 10 oar 1 - 4 oar 1 - 12 oar 1 - 6 oar 4 oar	1 - 4 -	1 carriage	100.00	7	903.00	600 bu	750.00	4a		10 cattle	125.00
Grimball, Isaac P.	furniture	2,500.00	flats	1,000.00									40 cattle 24 sheep 3 mules	560.00
Townsend, Mrs. Mary S.	furniture	500.00					3,000.00							
Townsend, Mrs. Mary S.	furniture	500.00					2,200.00							
Curtis, Dr. Thomas	furniture	1,349.00	1 - 8 oar	230.00				259a	6a	32a			1 horse	275.00
Curtis, Francis S.													6 sheep 6 cattle	250.00
McElhenny, E.T.	furniture	200.00						110 bu	165.00					
Burden, Est. Kinsey	negro clothing, blankets; furniture, bedding, crookery &c	700.00	2 - canoes 2 - flats	350.00	1 carriage 5 wheels	290.00							3 horses 18 cattle 30 sheep	130.00
Whaley, Edward C.	furniture	200.00	1 - boat	80.00				250 bu	375.00				2 horses	610.00
Angel, Mrs. M.		500.00												
Angel, Dr. J.W.														
Angel, Miss J.H.														
Pelot, Mrs. M.C.														
Totals		\$6,449.00		\$1,960.00		\$390.00	\$6,103.00		\$1,290.00					\$1,950.00

had been previously depended on to make planters wealthy was no longer available. In fact, the entire financial system had collapsed.

These losses are perhaps nowhere better documented in the "Losses Due to the Enemy" where families itemized losses in the hopes of being reimbursed by the state. These data are shown in Table 6. Although interesting, they be carefully interpreted and certainly tell us more about a few of the individual properties than either about the island or the nature of the losses. For example, we do see an interesting assortment of structures, clearly supporting the wide variety described by Porcher and Fick (2005). We see that several plantations had steam engines to power their gins; we also get an idea of the cost of utilitarian buildings, such as cotton houses and corn houses – and the data again supports the assertion by Porcher and Fick (2005:370) concerning the care taken in construction of cotton houses. The data from the Kinsey Burden plantation gives us a better understanding of the range of tools and supplies present on a cotton plantation. Included are items of critical importance, such as the scale and weights for the cotton. We also see the range of "plantation boats," obtaining a better idea of their value.

Only three of the 16 accounts list cotton. Since the losses occurred in May the current year's crop would have only recently been planted. Thus, the cotton destroyed must have been held back from the previous year, perhaps in hope of better prices. The value of .43¢ a pound used by one claimant seems reasonable. Another, however, claimed for "cotton . . . abandoned in the field," which seems optimistic – and clearly a practice not followed by most claimants.

While corn was valued by the planters, those making claims for potatoes and pease simply listed the acreage – no value was assigned. This may suggest that these crops were not as highly regarded as either cotton or corn.

Some claims also make some general reference to the occurrence of the loss – most indicate that the losses were the result of abandonment (the property fell "into the hands of the enemy" or was abandoned "to them"). Some, however indicate other causes. Grimball, for example, explains that his sheep and mules were taken by Confederate forces. Thomas Curtis "regretted" that the losses "had been done by the troops of Confederacy." Burden claimed that some of blacks escaped as a result of the "insufficient guard of the Cavalry." Several planters also reported that their cotton houses and other plantation items were destroyed upon the orders of "Brig. Gen [N.G.] Evans."

### Reconstruction

As the various Civil War accounts reveal, the abandonment of the sea islands was not complete. Many African Americans remained on plantations for the entire war (Schwalm 1997:157). In June 1862 Congress adopted legislation enforcing the Direct Tax Act of 1861 in the seceded states; it provided for forfeiture to the government of land whose owners failed to pay the tax and for its subsequent lease or sale.

General Sherman's Field Order No. 15 allotted the sea islands south of Charleston to the freedmen, a move that brought confusion among whites and ultimately disappointment to the black population. President Andrew Johnson rescinded the order in February 1866, but there were many delays in the restoration process.

While Assistant Commissioner of the Freedmen's Bureau in South Carolina, Robert K. Scott, sought to delay the process of restoration, General James C. Beecher, the brother of Harriet Beecher Stowe, was one of several military officers who took control of the low country out of the hands of Bureau, following military policy instead. Stationed in Summerville as a subassistant commissioner, Beecher developed his own policy of what would be recognized as a

valid claim to land, intending to bring the possessory land titles of African Americans to a quick test.

To be valid, the claim had to be a written certificate, it must specify the number of acres, the plot had to have been "duly measured and staked out," and had to have been occupied by the claimant. If these tests were met, the claimant had a right to the soil only – "no land claim or warrant includes any buildings upon the ground claimed or upon the plantation, or right to occupy the same" (Saville 1996:83).

Using this approach, the more than 11,000 claims on Johns and Wadmalaw islands were reduced to a mere 11 valid certificates. By mid-February Federal troops under Beecher's command began to "clean out" settlers who refused contracts after their claims were judged invalid.

Island blacks struggled against these efforts. Schwalm explains that on Johns and Wadmalaw,

freed people held public meetings, organized commissions, appointed delegations, and formed paramilitary guards to protest the accelerating process of restoration, and to prevent white landowners from setting foot on the islands and usurping their own claims to the land (Schwalm 1997:80).

Powell recounts an event on Johns Island when island blacks arrested a party of Northerners who landed on the island to visit land they were thinking of purchasing. The blacks marched the party to see the resident bureau chief. During the march the group grew to more than 150 armed and angry African Americans, threatening to kill any "cursed white man who cum on Jim or Jon for take he property" (Powell 1980:99-100).

Beecher's response was to arrest the black instigators. Elsewhere he issued orders prohibiting blacks from holding meetings. He also used the dispensing of rations as a control mechanism (Powell 1980:100).

By March 1866 the state office issued instructions on possessory titles. While more liberal, these rules allowed only about 450 certificates to be recognized on the islands (Saville 1996:84). This amounted to less than one-fifth of the African American families on Edisto, Johns, and Wadmalaw islands. By June 1866 Freedmen's Bureau inspectors found only 141 possessory titles survived to "encumber" 32 plantations – only a tenth of the 310 plantations that had originally been identified as abandoned on Edisto, Johns, Wadmalaw, and James islands in August 1865 (Saville 1996:85).

Beecher's reputation began to sour by the end of 1866 and he was not allowed to reenlist at the end of this tour. Critics accused him of doing the planters' bidding, rather than working for the best interests of the freedmen. One critic wrote, "The job of turning out of house and home the poor loyal freedmen, to make place for rebels steeped in treason, was given to Col. Beecher, because his name and his antecedents might make the inhumanity seem less inhuman" (Singleton 1999). Twenty years later, after suffering severe depression, Beecher took his own life in upstate New York (James C. Beecher's Suicide, *New York Times*, August 26, 1886, pg. 1).

Ultimately the efforts by blacks to retain their lands were unsuccessful and by the close of 1866, the planters were again in possession of almost all of the islands that had not been sold outright by the Direct Tax Commission. Former slaves had little choice but to work as wage laborers and tenant farmers (Bleser 1969:12).

In March 1869 the legislature created the Land Commission – a unique Reconstruction program intended to provide freedmen with affordable land. The commission was to



purchase land for the state, then subdivide it for sale on reasonable terms to the poor of both races. The law effectively excluded speculators; poor whites largely refused to participate. The program was abandoned in 1890 because of corruption, but not before at least 960 deeds were issued (Bleser 1969:146).

White planters in the St. Johns Colleton area, like elsewhere in South Carolina, experimented with wage labor immediately after the Civil War. Faced with uncertainty, but the need to begin planting immediately, many accepted the wage labor solution begun by the Union Army and later espoused by the Freedmen's Bureau. To support the wage system no less than seven major types of contracts were used by Southern planters (see Shlomowitz 1979).

For example, the Freedmen's Bureau "Register of land and occupants, 1865-1868" (Series M869, Reel 30) lists the population at the 670 acre Briars Plantation, east of the study tract, on January 26, 1866, when it was restored to Dr. B. D. Roper, Jr. Twenty-one people – six men, seven women, and eight children – were in residence, and Roper was required to draw up a labor contract with them (Series M869, Reel 32, pg. 586).

A number of white planters applied for government rations in February 1868. Among them was James Legare Walpole, who was,

desirous of obtaining . . . provisions for the freedmen and women now on my plantation [Acorn Hill] on Johns Island who are in a destitute condition. I intend planting if I can procure this aid seventy acres of cotton, sixty acres of corn. I have now on my plantation eighteen men, twenty-one women, two infirm, and seventeen children. On account of the failure of crops last year the people have no

means of support and I am unable to render any. My plantation is in thorough discipline and hope General that you will endeavor to aid us if it is in your power as soon as possible as we cannot commence operations until we receive aid." Approved, S. B. Thompson, Feb. 21, 1868 (Series 1910, Reel 85, pg. 227).

The St. Stephens planter Thomas L. Gourdin used a contract that agreed to share crops equally with the freedmen, except for cotton, two-third of which was retained by Gourdin. While he allowed them to remain in their houses, they must furnish all of their own food and clothing. They agreed to "submit at all times" to the Gourdin's control, "to behave in a respectfull [sic] and orderly manner" and to do a "reasonable days work," defined as 10 hours "such as formerly done on the plantation." The freedmen were prohibited from possessing firearms or liquor, entertaining company, or bringing animals onto the plantation (Theodor L. Gourdin Papers, Folder 16, South Carolina Historical Society). Such restrictive contracts were the norm and often resulted in appeals by planters to the Freedmen's Bureau to help restore order on plantations.

This system was doomed to failure, being disliked by both the Freedmen, who found it too reminiscent of slavery, and the plantation owners, who found that it gave the Freedmen too much liberty. While discussing the task system characteristic of the low country, Morgan observed that, "the preferences and ambitions of the freedmen reflected, above all, a desire for autonomy not only from the impersonal marketplace but also from individual whites" (Morgan 1981:596).

While land and labor policies generally worked to the disadvantage of island blacks, the Freedmen's Bureau did establish schools on Johns Island. In December 1865 a school was

established at McIlhenny's Plantation, north of Legareville, on the southwest side of Plowground Road and River Road and the school at Townsend Plantation (Rushland) was opened in March 1866 (Freedmen's Bureau Records, Series 803, Reel 29, pg. 35). At the end of 1866 the McIlhenny School had one African American teacher, 62 students, with an average attendance of 47. These schools expanded to five by November 1868, supported by Methodist Freedmen's Aid Association. The teachers were listed as Miss Mary L. Sharp, Israel Seabrook, Rev. W. H. Hunter, Mrs. Scudder (Freedmen's Bureau Records, Series 803, Reel 29).

Jackson provides another view of Johns Island schools, noting that the May 1866 issue of the *American Freedman* reported one school on Johns Island, operated by the non-sectarian New England Freedmen's Aid Society (Jackson 1923:22). As late as 1872 the Freedmen's Aid Society of the Methodist Episcopal Church was still teaching on Johns Island (Jackson 1923:26).

The Freedmen's Bureau also provided medical assistance to the island's blacks. While most of this work responded to immediate problems, there were also preventative health programs. On September 12, 1867, Col. M. K. Hogan, Surgeon in Chief, at Charleston wrote to J. L. Beckett, the Assistant Surgeon with the Bureau on John's Island,

You will at once commence a thorough system of vaccination amongst the Refugees and Freed People of your sub district, and to make it as complete as possible, measurers should be taken to find out all persons who have not been vaccinated who, either through carelessness or from any other cause, fail to report themselves to you for this purpose. . . . On the reopening of schools, no person should be admitted who has not previously been

vaccinated. . . as the subject of vaccination is a very important one, you are requested to give it due encouragement amongst the people generally (Freedmen's Bureau Records, Series 1910, Reel 85, pg. 197).

### Post Reconstruction

Ninety percent of the farm labor was African American, and local plantation owners complained that not only was adequate labor generally unavailable, but the quality of the labor had noticeably declined over the past five years (Anonymous 1884:47-48).

The monthly wage for farm labor was between \$8 a month plus rations. Another reports that day labor, "while becoming very scarce" was paid at the rate of 50¢ a day (Anonymous 1880). "The system most in vogue is for the laborers to give two days in every week to the landowner for 8 to 10 acres of land and a house" (Anonymous 1884:48). This was the same system described by the 1880 census taker as "rent paid in labour. The Black's work 1 to 1¼ acre of Land for the Manager or owner for 5 to 8 acres for themselves." Hilgard (1884:516) reports the same system for Johns Island, "most . . . are engaged for two days' work a week by allowing them a house, fuel, and 6 or 7 acres of land free of rent." He notes, however, that the whites were already finding the system unsatisfactory. Land worked by whites was improving, while that worked by the blacks on their own account was deteriorating rapidly. He observed, "the labor is not so easily controlled as when cash wages are paid."

The comments concerning South Carolina lien law are particularly revealing:

it demoralizes the labor, is bad for the farmers and is good for the merchants. It works injury to the white and colored farmers, as it induces idleness as

# CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION

Table 7.  
1870 Agricultural Census for Johns Island (NR = not reported in published compendium)

		Land Occupied or Improved						Livestock						
	Farms	Acres improved	Acres Unimproved	Value of farm	Value of implements	Wages pd./year	Horse, asses, mules	Milch cows	Working oxen	Other cattle	Sheep	Swine	Value of livestock	
Charleston	1870	2,494	168,393	437,739	2,984,178	124,021	226,576	2,264	2,565	353	NR	2,869	10,390	433,011
St. Johns	1870	522	31,215	21,883	154,853	55,160	78,614	431	102	16	163	250	622	120,837
Johns Island	1870	400	9,759	9,607	138,424	11,151	16,533	119	39	12	149	189	388	21,385
		Agricultural Production												
		Rye & oats, bu	Corn, bu	Irish potatoes, bu	Sweet potatoes, bu	Peas & beans, bu	Butter, lbs	Rice, lbs	Value of garden produce	Cotton, bales	Wool, lbs	Value animals slaughtered		
Charleston	1870	1,915	170,087	NR	62,984	NR	NR	4,329,217	43,601	5,512	2,257	36,302		
St. Johns	1870	669	24,241	358	11,693	3,584	50	1,200,000	3,980	3,584	-	40		
Johns Island	1870	618	16,709	84	9,492	1,824	-	-	3,980	385	-	-		

long as their supplies last. Farmers who run on liens entirely rarely if ever do more than pay out at the end of the year (Anonymous 1884:48).

South Carolina's lien law was first passed in 1866, allowing the lender the first lien on the crop when the agreement was properly registered in the county clerk's office. The concept of the lien law was simple – it was intended to help farmers get credit in order to allow them to plant. It bolstered an economy that had been struggling since the end of the Civil War by allowing merchants to take a lien on the crop being raised.

The Republicans dramatically altered this law in 1873, allowing the renter the first claim on any crops he produced – thereby protecting the freedman farmer. Often liens would be issued by the landowner for use of the land, the merchant who provided supplies, and the fertilizer company that sold the guano. Some planters also required a lien against not only the prospective crop, but also the debtor's personal property, such as horses, mules, and oxen (Williamson 1965:171-172).

The 1877 legislature repealed the Republican's lien law. Suddenly realizing what they had done, in 1878 during Wade Hampton's administration the legislature reenacted the lien

laws before the state's agricultural system was paralyzed.

However valuable the lien system may have been, it caused serious pain for the small farmer, especially blacks. The merchants who offered loans for planting also sold their goods for two prices – a lesser price being charged for cash. Goods bought on credit, in anticipation of a successful harvest, were more expensive and the interest charges were not assessed separately, but were buried in the inflated credit price. Estimates of these credit charges range from 30% to 110% (Woodman 1968:303; Hilgard 1883:517 reports similar figures – from 20 to 100% above the market value).

In 1882 it was reported that Charleston posted 1,331 liens, totaling \$180,117.20 (South Carolina Legislative Reports and Resolutions, 1882).

## Postbellum Agriculture

The first agricultural census after the Civil War reveals a proliferation of farms – representing the large number of freedmen in Charleston. On Johns Island the number of farms increased from 43 prior to the Civil War, to 400 in 1870. The average number of improved acres in a holding prior to the Civil War was about 450 acres. By 1870, this had declined to

## HISTORICAL SYNTHESIS

just 24 acres. The total farm value for the island declined by more than three quarters.

Milk cows declined by 96%, from 1,088 to just 39. The overall value of livestock declined by 70%. Cotton production declined by over 60%, corn by over 50%, sweet potatoes by 84%. The agricultural economy of the island was devastated.

The value of garden produce shows the least severe drop – “only” 19%, suggesting that the islanders continued to engage in early truck farming. Johns Island was also the only district in St. Johns Colleton to report garden produce, although the island contributed only 9% of the county’s total.

If the census data are correct, then Johns Island’s cotton production was dwarfed by that of Edisto, which in 1870 produced 1,245 bales. On Edisto it seems clear that blacks and whites alike planted little besides cotton – they produced only 2,053 bushels of corn and 1,678 bushels of sweet potatoes. Edisto also produced the only rice from St. Johns Colleton – 1,200,000 pounds, nearly 28% of that reported from Charleston District. These data leave unaddressed the issue of decision making – exactly why we see the differences between the islands.

In 1879 the *New York Times* remarked that truck farming, which sprang up “almost immediately after the close of the war” was certain to be the “solution of the low-country problem” being as profitable if not more so than cotton. The article explains how the

planting of crops such as strawberries and potatoes had taken over the Neck area between the Ashley and Cooper Rivers with 1,543 acres being planted. The article notes that truck farming, even this early, was not confined to the Neck, but was to be found in Christ Church, on James Island, in St. Andrew’s Parish, and on Johns, Wadmalaw, and Edisto islands (Anonymous 1879).

By 1880 the number of farms in St. Johns more than doubled, increasing from 522 in 1870 to 1,285. In addition, 10,000 acres went out of production. Cotton fell from 3,584 bales to 3,079. On the other hand, the production of corn more than doubled, from 24,241 bushels to 56,796 bushels.

On Johns Island we find 115 owners

Table 8.  
1880 Agricultural Statistics for Charleston by Township  
(adapted from Butler 1883:Table V)

Township	No. Farms	Acres Tilled	Cotton			
			Acres	Bales	Rice, bu.	Corn, bu.
Christ Church	51	24,919	627	394	860	6,700
City of Charleston	-	696	-	-	-	-
St. Andrews	408	10,476	1,498	887	2,070	11,011
St. James Goose Creek	874	23,920	5,875	2,477	45,134	102,548
St. James Santee	210	6,126	158	71	50,703	8,982
St. Johns Berkeley	938	19,720	5,649	1,890	145,414	35,434
St. Johns Colleton (% of aggregate)	1,285 (45.2%)	21,073 (18.0%)	9,826 (39.6%)	3,079 (33.7%)	34,565 (10.6%)	56,796 (23.2%)
St. Stephens	300	6,394	990	290	3,300	18,929
St. Thomas/St. Dennis	60	3,419	177	53	45,108	4,766
Totals	2,841	95,670	14,974	6,062	292,589	188,370

compared to the 43 antebellum owners. This indicates around 72 new property owners, many of whom were African Americans.

Some were the blacks that had purchased the Townsend property, Rushland,

Table 9.  
Agricultural Data for Johns Island, 1880

Operator			Improved		Unimproved		Farm Value \$	Livestock Value \$	Corn		Cotton		Sweet Potatoes		Tilled Acres With Other Crops
Owner	Fixed Rental	Shares	Acres Tilled	Pasture	Forest	Other			Acres	Bushels	Acres	Bales	Acres	Bushels	
115	284	40	7,106	2,301	7,737	2,280	26,309,224	25,548	2,967	15,995	2,994	901	450	12,898	695



on the Stono. The property was sold by the Land Commission in small tracts and by 1872 there were 44 certificates of purchase. In 1880 there were still 29 blacks (two-thirds) in residence (Bleser 1969:162).

These owners, black or white, were in a minority – there were 324 tenants. Most of these were identified as paying a fixed rental. Forty (12%), however, were identified by the enumerator as “rent paid in labour. The Black’s work 1 to 1¼ acre of Land for the Manager or owner for 5 to 8 acres for themselves.” A relatively small proportion of the island’s land – just over a third – was being cultivated. The remainder was in pasture (12%), woods (40%), or were old fields (12%). The quantity of old fields indicates that much of what was once cultivated had been abandoned.

The cultivated land was about evenly split between corn and cotton. The 439 farms raised 901 bales of cotton. Although this yields an average of 2 bales per farm, nearly double the production in 1870, the number is deceiving. A very large number of the small African American farmers, tilling only a few acres, reported harvesting as little as 1/8 or 1/6 bale – 50 to 70 pounds of cotton. At an 1880 market value of 31¢ a pound, they would have made only \$15 to \$20 gross, before any expenses were deducted. The per acre yield was also less than 1/3 bale or about 120 pounds per acre.

Corn production was roughly stable compared to a decade earlier. Sweet potato production, however, was up dramatically – from 9,492 bushels in 1870 to 12,898 bushels in 1880. It may be that the African Americans, realizing that they would be unable to feed their families on cotton and perhaps even resistant to planting the crop of slavery, sought to maximize their self reliance through corn and sweet potatoes.

An early review of the area is offered by the *News and Courier* in an 1880 article. Readers were told that the island contained around

40,000 acres (only 19,424 acres were enumerated) and that only about 17,560 acres were arable, the rest being swamp (this essentially agrees with the census data). The paper notes that, “the most fertile lands are on the outskirts running along the waters which surround it [the island], and the interior is one vast and almost impenetrable swamp.” The population of the island was reported to be 5,000 Africans Americans and 200 whites, with cotton planted by only 26 of the whites, none had more than 45 acres in cotton. If correct, this indicates the difficulty of obtaining workers and the uncertainty that prevailed during this time.

Readers were told that, “the spirit of progress is not apparent among the John’s Islanders as on the other islands, and they are much behind in their mode of cultivation.” This complaint focused almost entirely on the failure to install “underdrainage” or tile drains to promote the drainage of fields for cotton.

The article explains that prior to the increased use of fertilizer, 100 pounds of cotton to the acre was about the best to be hoped for, with most blacks producing only 50 to 75 pounds. With fertilizer these yields doubled – the 120 pounds per acre reported by the census does seem to support this boosterism.

### Postbellum Island Conditions

While the article reports that the price of land on Johns Island was about \$10 an acre, Hilgard values Johns Island land from \$2.50 to \$20 an acre (Hilgard 1884:516). There were two white churches (the Episcopal and the Presbyterian) and 13 African American churches. There was no white school on the island, but there were 12 black schools, although “the attendance is not very regular, and the improvement in education is not so marked as on the other islands.” The roads and bridges were reported to be in good condition and “well worked,” although the residents were anxious to have the Bugby Bridge (connecting Wadmalw

and Johns islands), burned during the Civil War, replaced (Anonymous 1880).

It was around this time that Johns Island briefly joined Berkeley County, so the study area is included in Berkeley by the *News and Courier* in its 1880-1884 review. Unfortunately Berkeley County included over 2,000 square miles and ranged from Edisto Island at the southern tip to the Santee River in the north. Even a small portion of what is today southern Orangeburg County was included.

Nevertheless, Berkeley included 51 grist mills, 15 steam rice threshing mills, eight lumber mills, 30 turpentine stills, and three brick works (on the Wando and Cooper rivers). Given the agricultural variation, the author explained:

Berkeley County is peculiarly an agricultural district, the products being mainly confined to sea island cotton and garden vegetables. John's Island, Wadmalaw Island and Edisto Island form the southern boundary of the county and produce the bulk of the sea island crop. Vegetable gardening is carried on most extensively in Christ Church and St. Andrew's Parishes and upon Wadmalaw Island. St. Andrew's Parish is largely devoted to phosphate mining. In the parishes of St. James Santee, Goosecreek, St. John's and St. Stephen's lie large and extensive rice lands (Anonymous 1884:47).

In spite of the size, the county could boast of only 17 sowers, 22 reapers, nine sulky plows, and 70 harrows. As an indicator of the fertilizer rage, however, there were 220 guano spreaders. The general complaint was that farm labor – meaning blacks – was less productive than last year and far less productive than five

years ago. This may be seen in the increasing tendency for blacks to plant corn and sweet potatoes, rather than cotton.

There were 189 cotton gins, “mostly for long cotton.” The average haul was 5 miles and the average cost of ginning was \$9 a bale for long and \$2 a bale for short.

The commentator summed up his observations by noting,

It is a notorious fact that those farmers who have met with success have not made their money solely by cotton planting, but by combining with cotton planting; ginning for toll and store-keeping. The great mistake is that the farms have not been made self-supporting. Too little attention is paid to the raising of provision crops and to the raising of hogs and cattle (Anonymous 1884:48).

Butler (1883:668) fails to note any stores on Johns Island, although there were nine on Edisto Island, one in Rockville (on Wadmalaw Island), and seven in Enterprise (also on Wadmalaw Island, across the Wadmalaw River from the community of Yonges Island). This suggests that at the end of the nineteenth century Johns Island remained a very isolated, and largely self-sufficient, location.

### Cotton

Cotton was the cash crop, with one respondent reporting 3,200 pounds of seed cotton per acre. The cost of raising cotton was \$40 per 500 pound bale. With cotton selling at .12¢/pound in the mid-1870s, a bale would bring about \$60, providing a reasonable margin of profit. By 1880 cotton was averaging about 9.8¢/pound, cutting the profit on a bale to only \$9 (Woodman 1968:343).

Hilgard (1884) provides an overview of cotton cultivation on the sea islands. Although two of his informants were from James Island and a third was from Edisto, the fourth was W. Edings Fripp of Johns Island.

One of the most notable features of cotton tillage were the “remarkably high beds on which cotton is planted here, being from 18 inches to 2 feet high” (Hilgard 1884:505). These, he noted, in conjunction with open drains, were in lieu of the subsurface drainage used in other locations. Tile drains are mentioned only for James Island. Plows were coming into more common use throughout the area. Cotton was planted on fields every other year, with stock turned out on the fields during the intervening years. Hilgard notes that about half of the land had passed out of cultivation since the Civil War, with the proportion about the same on Wadmalaw, but much lower on the other islands (Hilgard 1884:502).

The planting began with hoeing off the weeds (“hurricane”), cutting up the cotton stalks, and burning off the litter. In early February “two furrows of a single-horse turning-plow are run in the old alleys, making a trench 7 to 8 inches deep.” A subsoil plow may be used next, based on the character of the subsoil. In the trench made by the subsoiler, or in the middle of the alley if no subsoiler was used, manure was placed. This manure was generally about 20 cart-loads of marsh mud mixed with 1,000 to 1,400 pounds of cottonseed. Commercial fertilizer is then drilled into this compost. He comments that on Johns Island the typical fertilizer was a mixture of 250 pounds of acid phosphate, 200 pounds of kainit (German potash salt), and 200 pounds of calcined marl per acre (Hilgard 1884:510).

With this done the land was ready for listing – using a hoe to place soil from the tops and sides of the old bed on the manure. Some of the more modern farmers used a turning plow to accomplish this, the advantage being that the labor of a plow cost about 17½¢ an acre, compared to 80¢ for hoeing. He points out, however, that hoeing is far more accurate in getting the soil exactly where it needs to be. Afterwards, a double roller weighing about 800 pounds was used to compact the soil.

Planting might begin anytime after March 20, although April 1 through 10 was preferred. Hilgard contends that mechanical cotton planters weren’t used on the sea islands,

Table 10.  
1870 Commercial Gins on Johns Island (Industrial Schedule)

Firm	Capital	Gin	#	Males 16+	Females 16+	Child.	Total Yearly Wages	# Months	Production		Value
									Cotton	Seed (lbs)	
Beckett & Walpole	\$1,000	saw	1	4	1	1	\$100	2	18 bales	24,000	\$7,064
Beckett & Walpole	\$1,000	McCarthy	2	4	1	1	\$200	3	20 bags	14,000	\$1,680
W.S. Whaley	\$1,350	McCarthy	3	7	8	1	\$240	4	11 bags	14,000	\$1,970
William Gregg	\$2,000	McCarthy	3	6	12	-	\$1,000	3	50 bags	60,000	\$9,000

a view endorsed by Porcher and Fick (2005:168). Instead the work was done by three hands. The one in front chopped a hole on top of the bed at intervals of 12 to 18 inches using a hoe. Another dropped eight to 10 seeds in each hole, and the third hand followed, covering the seeds. Germination occurred in about eight to 12 days and the stand was “perfected” from the second week in April to the first week in May.

Next came cultivation – a hoeing in early May, another in late May when some of the cotton would be thinned. Then a plow was used to “break out the middles (the spaces between the new beds where the old beds stood” (Hilgard 1884:511). Hands followed the plow, using hoes to pull up the loose soil to the foot of the cotton plants – a practice called “hauling.” This prevented the cotton from “flagging” or falling down from its own weight. It also reduced competition from grass. There were four hoeing and hauling by the last week in July. During each one, additional cotton

would be thinned, so that by July only one stalk per bunch was left. At this time a side sweep plow would be used to sweep between the rows in August to destroy grass.

The first blooms appeared about the middle of June, when the cotton was about 15 inches high. The bolls opened toward the end of August, when the plants were about 4 to 5 feet high.

Store	Possible Location	Financial Strength (\$)	General Credit
Johns Island			
Andell, William	Andell's Bluff	5,000-10,000	good
Bailey, Charles E.		<1,000	limited
Brown, Charles (AA)		<1,000	limited
Bryan, Edward B.	Chaplin	<1,000	limited
Ellison, J.W.		<500	
Harding, George M.			fair
Legare, F.Y.	Mullet Hall	10,000-20,000	good
Nelson, F.L. (AA)		<500	
Nelson, W.A. (AA)			
Seabrook, E.M.	Ferry Field	<500	
Seile [Seele], Charles			
Struhs, H. (grocery & liquor)			
Walpole & Co.		<1,000	fair
Whaley, C.G.	Auld Reeckie	<500	
Enterprise			
Bailey, H.J.		<500	
Jenkins, R.H.		<1,000	
Lancaster, H.C.			fair
LaRoche, J.E.		<500	
Martin's Point			
Geraty & Towles			
Wadmalaw			
Jenkins, A.H.		<500	
Schaffer, E.A.	New Cut	1,000-2,000	fair

Cotton picking began the last week in August to the second week in September. For this first picking, when the crop was "thin" planters paid pickers 1½¢ per pound of seed cotton. The price fell to 1¢ a pound for subsequent pickings until the last of November, when it rose again to 1½ to 2¢ per pound. By December 15 the entire crop had been gathered.

Fripp observed for Johns Island that no improved planting implements were necessary – "any one hand, with ordinary implements and management, can make four times as much cotton as he can gather" (Hilgard 1884:511). It

was complained that the cotton picker "already pockets one-sixth of the gross value of the crop, and is a heavy burden on the producer" (Hilgard 1884:511). While not discussed by Hilgard, it is likely that this "surplus" labor contributed to the large number of African Americans who left the cotton plantations to work in the phosphate mines during certain times of the year (Trinkley et al. 2006).

Hilgard (1884:514) observes that ginning, baling, and shipping the cotton are standard activities and there is nothing unusual about the practices in the coastal region. However, there were significant differences between Sea Island cotton ginning and packing and the methods used on the mainland.

Instead of the saw gin common elsewhere, long-staple cotton planters continued to rely on roller gins. With human-powered foot gins having largely been abandoned, the McCarthy roller gin, powered by either steam or animals, was ubiquitous (Porcher and Fick 2005: 219).

Hilgard observed that the roller gin (used for long staple cotton) with steam power made 400 to 600 pounds of lint in a 10 hour day. This lint was packed in round bags 7½ feet long. Fripp explained that it was done using "a hole in the floor, hung bag, iron pestle, and a negro" (Hilgard 1884:514). Three bags can be pressed a day, with the bag weight being about 350 pounds. He notes that 1,600 pounds of seed cotton is required to yield 400 pounds of lint. These bags were also not bound with ties, as were the bales of short staple cotton.

The 1870 Industrial Schedules note a steam-powered grist mill and a steam-powered cotton gin on James Island. At Enterprise Landing on Wadmalaw Island there was a steam grist mill and a steam gin with five McCarthy gins, operating six months a year with an average of twenty-five hands. The grist mill had a much smaller force, averaging one



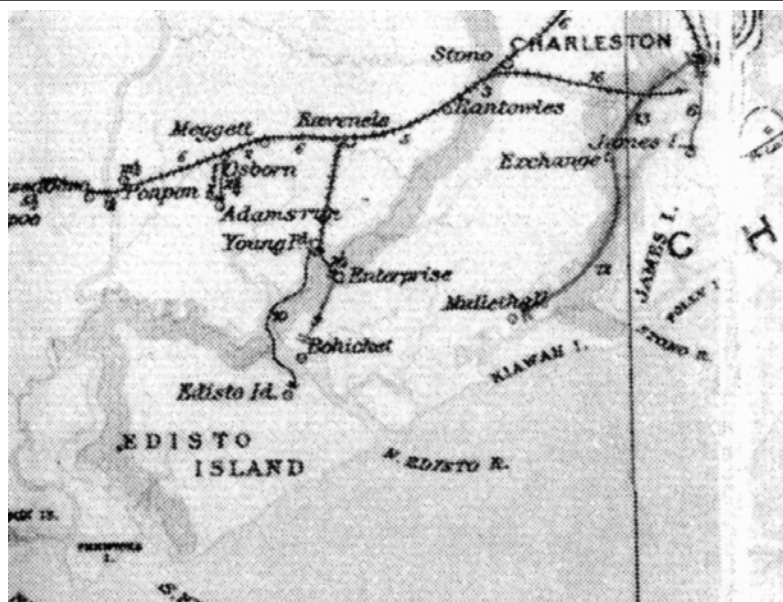


Figure 23. 1893 Postal Route map showing Johns Island had a post office at Mullet Hall by this time. Mail arrived by steamer from Charleston after a stop at the Exchange Post Office.

### The End of the Nineteenth Century

In 1889 the Johns Island area (including the Johns Island station on the mainland) boasted 12 general stores and one grocer (Table 11). Five of the general merchandise stores may be commissaries operated by planters. Three of the stores were operated by African Americans. A list from 1890-1891 includes six general merchandise stores, including Andell, Seabrook, Seel [Seele], Walpole & Co., and Whaley & Co. The only individual not on the earlier list was F.Y. Legare - who operated the Mullet Hall commissary (Anonymous 1890:268).

man and two women. There were four commercial gins on Johns Island (Table 10).

There was also a steam sawmill on Johns Island, operated by J. M. Humbert. He reported to the census that he operated for ten months of the year, averaging thirty hands (all men at least sixteen years old) and paying total wages of \$8000 in 1869. He produced 1.4 million board feet of lumber, valued at \$16,000.

We could not find individual industrial statistics for St. Johns, Colleton Parish in 1880. Nine commercial gin operations were enumerated on James Island.

The major threat to the crop was the cotton caterpillar (the boll weevil wouldn't arrive until 1919). The caterpillar arrived during warm, wet spells during the late summer and quickly ate the foliage. Planters, however, learned to control the pest with Paris green (copper(II)-acetoarsenite) using a mixture of 1 pound Paris green, 1 pound of rosin, and 40 pounds of flour. It was dusted over the crops by hand when the caterpillar was first seen.

At the end of the nineteenth century the sad state of the state's agricultural economy is clearly outlined by Edgar (1998:428), who notes that the economy was in shambles. Not only were cotton prices down dramatically from the immediate post-war boom; but with a single-minded focus, the state's farmers planted cotton at the expense of provision crops, further compounding their problems. Add to this a series of droughts and other natural disasters, and the situation was bleak.

Edgar also observes that in spite of these problems, South Carolina's governors were out of touch with reality. For example, in 1882 Governor Johnson Hagood extolled to the Legislature the virtues of the state, with "happy and prosperous" citizens and a "well-ordered, smooth working, and economic" government. Four years later Governor John R. Richardson was equally out-of-touch by proclaiming that the "sun of prosperity" had "arisen from the dark clouds" (quoted in Edgar 1998:429). Yet during the 1880s thousands were losing their farms - statewide in just two years over a

million acres went on the auction block, with almost 8% of the farmland being foreclosed and auctioned (Edgar 1998:431). These frustrations



Figure 24. Wilson's photograph after the Charleston earthquake entitled, "Track out of line." This image was taken about 3 miles west of the Rantowles Station, northwest of Johns Island and east of Ravenel.

helped propel Edgefield's Ben Tillman into the governor's seat in 1890.

Although a populist and appealing to the rural agrarian farmer, Tillman offered no substantial programs to address the needs of the debt-ridden farming class. Instead he promoted violence against blacks.

### Natural Disasters

On August 31, 1886 at approximately 9:50 p.m. an estimated magnitude 7.3 earthquake struck the Charleston area, resulting in at least 83 deaths and extensive damage to the buildings of Charleston. Damage extended across an elliptical area measuring about 20 by 30 miles trending northeast between Charleston and Jdburg and including Summerville, centered at Middleton Place.

In Earl Sloan's detailed review of damage along the Charleston-Savannah Railroad, he noted "prostrated chimneys" and "craterlets" throughout the area, including on Wadmalaw at Enterprise, Martins Point, and in the center of the island (Peters and Herrmann 1986:61). The damage continued to Rockville

and onto Seabrook Island. The rail line at the Rantowles Bridge was distorted and twisted (Peters and Herrmann 1986:63). On the north side of the Stono, Sloan observed a "large two story frame building of square plan" that was twisted, plaster walls were cracked, a partition wall was distorted, and the chimneys were damaged. On Johns Island he observed displaced stones in the Presbyterian cemetery, "craterlets . . . in great profession" interspersed with cracks. The store at Andells had goods thrown off shelves (Peters and Herrmann 1986:64). Although chimneys were damaged, it appears that the "very small frame structures" - probably tenant houses - were largely undamaged.

Jordan and Stringfellow (1998:198) report that the earthquake produced a "large pond" at Fair Oaks Plantation (situated between Legareville Road and River Road), although no pond is shown on the USGS topographic map. Côté (2006:74, 267) indicates relatively minor damage on the islands.

The South Carolina coast was hit by at least 11 hurricanes in the eighteenth and nineteenth centuries. At least six are thought to have been Category 4 or higher storms. None did more damage or caused more loss of life than the hurricane of August 1893.

The storm formed east of the Cape Verde Islands on August 15, becoming a hurricane on the 19<sup>th</sup> while crossing the Atlantic. By the evening of August 25<sup>th</sup>, the storm was a Category 3 approaching the Bahamas. During its approach it deviated arcing west-northwest, making landfall near Savannah, Georgia on August 27 as a Category 3 storm. The wind was reported to be 120 mph, the pressure is estimated to have been about 954 mbar at landfall and possibly as low as 931 mbar, and the storm surge - hitting at high tide - was 16

feet. The hurricane passed over South Carolina on August 28 and moved up the East Coast.

The destruction along the South Carolina coast was greatest in the Beaufort area, but extended along the entire coast. An estimated 1,000 to 2,000 were killed, although this figure is quite conservative. A February 1894 *Scribners Magazine* article reported the heaviest damage on those islands between Beaufort and Charleston – including Johns Island (Harris 1894). The initial report in the *Charleston News and Observer* on August 30 explained that while reports from Edisto, James, Johns, and Yorges islands were “meager,” they all “describe the storm in those localities as the most terrible visitation which the inhabitants have had.” Water in the Wappoo Cut was reported to have reached 18 feet, spreading “itself over the surrounding country like an endless inland lake.”

An article on August 31, 1893 reported Kiawah “fearfully damaged.” Dill and Ball reported, “We have heard from John’s Island and the reports are that the crop has been under water and is stripped of its fruit . . . . Mr. Hofstetter, of Wadmalaw Island, reports that the cotton crop on the island is a complete loss.” G.M. Pollitzer reported, “the losses on John’s Island were very serious. The colored farmers felt it more especially, and I understand, lost all their cattle, crops, provisions and, in fact, are in a most destitute condition.” Another reported that the Johns Island plantations along the riverfront “were under water and the cotton stalks were completely submerged” (Anonymous 1893:1).

On September 1 the news was much the same with reports of all the wharfs between Charleston and Kiawah destroyed. The steamer *St. Helena* was found stranded at the high water mark of the storm on F.Y. Legare’s place (Mullet Hall), with the report that “she will have to be dredged out.” Houses near Legare’s were reported destroyed, as was the stock. Ravenel &

Company reported that the cotton at Andell’s Bluff on Johns Island was destroyed.

After four days, news describing the extent of the devastation began to reach Columbia and Governor Tillman responded by asking for donations. Local relief committees were formed and eventually very minor aid began to arrive. The governor grossly underestimated the damage and what it would take to help the area recover and it wasn’t until mid-September before Tillman finally called on assistance from the American Red Cross. Clara Barton arrived on October 1.

After the Red Cross arrived, a warehouse of clothing and food was started in Beaufort. The Red Cross established rations, began organizing parties to dig over 300 miles of ditches in order to drain agricultural fields, and bought a million board feet of lumber to rebuild houses – in spite of both the South Carolina Legislature and the U.S. Congress denying appeals for assistance. The relief efforts were closed in May 1894 (Nash 2006).

### **The Phosphate Industry**

Charleston’s phosphate industry was a significant source of short-term revenue during the late nineteenth century (for a more detailed discussion see Trinkley et al. 2006). The plants involved the old elite in management and operations; the former slaves found mining an excellent supplement to farming. For a time phosphate was an economic boom for the low country. The 1892 political opposition led by Ben Tillman to state subsidies, new competition and better resources in Florida, and the 1893 hurricane all combined to seriously cripple the industry, which ceased entirely in 1911.

While Johns Island blacks worked in the nearby phosphate works on the mainland, we know of no mining on the island.

## HISTORICAL SYNTHESIS

**Table 12.**  
**Stores Operated in the Johns Island Area, 1912**  
**(R.G. Dunn & Co. 1912)**

Store	Financial Strength (\$)	General Credit
<b>Johns Island</b>		
Banov, A. (clothing, shoes)	<500	
Bolton Mines Co,	20,000-35,000	good
Bradley, P.B. & S.S.	>1,000,000	high
Ferri, E.		
Gadsden, Cyrus	<500	limited
Glover, J.E.	<500	
Harrod & Limehouse (Gin)		fair
Hart, Joseph S.	20,000-35,000	high
Limehouse, J.J.	3,000-5,000	fair
Linstedt, J.G.		
Lowrey, I.H.	<500	
Rivers, Frank W.	<500	limited
Struhs, Henry		
<b>Enterprise</b>		
Bailey, J.S.	<500	
Bailey & Barnwell (Gin, Cotton Buyers)	3,000-5,000	limited
Baxter, F.D.	<500	
Hart, W.R.		
Wadmalaw Mercantile Co.	3,000-5,000	fair
Wilson, W.H. (G.S. & Gin)		
<b>Martin's Point</b>		
Clement, R.L.	<500	
Cox, H.L.		
Towles, F.W.	20,000-35,000	high
Venning, W.C.	<500	
Whaley, H.S.	<500	
Wise & Wise	<500	
<b>Mullet Hall</b>		
Andell, William		
Johnson, J.J.	<500	
Muhler, H.C.	3,000-5,000	fair

### The Beginning of the Twentieth Century

Mercantile interests in the Johns Island area increased from 21 in 1889 to 28 in 1912, although two of these later stores were associated with operating phosphate mines, and two others were primarily ginning establishments – thus the increase is minor. Moreover, as with the earlier listing, many of these establishments are located at the Johns Island station on the mainland, not on the island. Wadmalaw drops from the listings, being replaced by Mullet Hall. At Mullet Hall there are three listings. William Andell continued to be the owner of Andell's Bluff and this store was likely a commissary on that plantation. The H.C. Muhler listed in 1912 was the overseer on Andell's Bluff,

in addition to the owner of the store on Legare's Mullet Hall (which he acquired after the 1905 death of F.Y. Legare). J.J. Johnson was the founder of the Edisto Island Industrial School for African Americans in 1897 (Tindall 1952:226). The 1900 census shows him as an African American clergyman living on Edisto. Seemingly absent is the Johns Island store of John F. Limehouse (Jordan and Stringfellow 1998:172), but this is almost certainly listed as J.J. Limehouse.

A 1905-1910 directory listed Mullet Hall, describing it as “a small town 35 miles from Charleston” and noting that the only merchant at the location was Francis Y. Legare, who operated a “general store and grist mill” (Anonymous 1905:435-436). The entry also lists 162 “farmers” for the community – the closest document we have providing a comprehensive list of both whites and blacks on the island (Table 14). Since all portions are represented, we believe this may be a listing of those using the Mullet Hall Post Office, which was, of course, the only post office on the island. Most, although not all, of these names are found in either the 1900 or 1910 census.

Although phosphates were still on the mind of low country property owners, there were only six mining companies listed by Watson in 1907 and they produced just over a

**Table 13.**  
**Charleston County Truck Crops in 1915 (Watson 1915:44)**

Crop	Acres	Yield/acre	Total Yield	FOB Price	Total \$
Irish potatoes	7,000	50 barrels	350,000	1.50 per barrel	525,000
Cabbage	5,500	180 crates	900,000	1.35 crate	1,336,500
Cucumbers	2,000	200 baskets	400,000	.50 basket	200,000
Beans	2,000	150 baskets	300,000	1.00 basket	300,000
Peas	600	100 baskets	60,000	1.25 basket	75,000
Sweet potatoes	1,000	100 sacks	100,000	1.25 sack	125,000
Cabbage plants	600	500,000	300,000,000	0.70/1000	210,000
Misc. vegetables	2,000				200,000
					<u>\$2,971,500</u>

\$1.1 million in 1906 (Watson 1907:142). Agriculture remained the focus of South Carolina's economy with the state's 176,000 farms producing nearly \$142,000,000 of products in 1909. Even the state's textile industry didn't



# CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION

Table 14.  
List of Farmers Using the Mullet Hall Post Office, 1905-1910

	1900 Census				1910 Census					1900 Census				1910 Census				
	White	Black	Census District	Other	White	Black	Census District	Other		White	Black	Census District	Other	White	Black	Census District	Other	
Aimer, O.A.									Grimball, Eliza A.	x		123			x		73	
Andell, William	x		125		x		76		Hamilton, Morris						x		75	
Ball, J.A.									Harrison, Joseph	x	x	123			x		74	
Bennett, Richard		x	125			x	76		Hart, R[ichard] J.H.	x		123			x		73	
Bennett, S.W.									Heyward, M.W.									
Bishop, Frank		x	124	Mathews		x	75		Heyward, William	x	x	124	Mathews		x		75	Mullet Hall Rd.
Bishop, Lydia		x	124						Hollingsston, Peter						x		74	
Bishop, Paul B.									Hoyt, Emon [Emon]	x	x	124	Mathews					
Blake, L.R.									Hunt, William	x		123						
Blake, Marcus		x	123			x	74		Jenkins, A.M.									
Blake, M.F.									Jenkins, C.B.									
Blake, P.H.D.									Jenkins, M[ary] J.	x		123						
Blake, Ralph		x	123			x	74		Jenkins, T.Y.									
Boggs [Boags], Robb	x		125						Jenkins, William	x	x	123/124			x		73	
Brisbane, James						x	73		Johnson, John	x		124	Johnson's					
Brisbane, Richard						x	75		Johnson, Robert									
Brown, Byas [Bias]	x		123			x	73		Johnson, Robin		x	124	Creek Side		x		76	
Brown, Clarence	x		123			x	73		Johnson, William	x	x	123			x		75	Mullet Hall Rd.
Brown, Daniel						x	73		Jones, Stepeny						x		75	
Brown, George P.	x		123			x	73		Jones, T.S.						x		75	
Brown, Isabella	x		123						Judge, Moses									
Brown, James	x		124/125			x	74/76		Laborde, John	x		124						
Brown, Robert	x		124			x	73		Lee, A.M.									
Brown, January									Legare, F.Y.	x			Mullet Hall		x			Mullet Hall
Brown, M.C.									Legare, John		x	124	Miller Mill					
Brown, Robert									Legare, J.C.W.									
Brown, Sarah	x		123			x	74/75/76		Legare, T.S.						x		75	
Brown, Simon									Logan, Richard							x	74	
Brown, Thomas	x		123/125			x	73/76		McCoy, Jack									
Brown, Titus	x		125						McNeil, Alex									
Bryan, Ellen	x		124	Chaplin		x	74	Briars Pnt.	McPherson, Benjamin						x		76	
Bryan, E.B.									Mack, Henry	x	x	123/124/125			x		75	
Butler, Susan									Mack, Richard	x		123			x		73	
Bynum [Binnun], George	x		125						Magill [McGill], Jackson						x		76	
Campbell, Jacob						x	75	Mullet Hall Rd.	Manigault, Frederick						x		75	
Capers, Ezekiel [Zekiel]	x		124						Mathews, J.E.									
Capers, G.A.									Middleton, Frank, Sr.	x	x	125			x		76	
Capers, Samuel	x		125			x	76		Middleton, Thomas	x	x	125						
Capers, W.C.									Mickell, William, Sr.	x	x	124			x		75	
Cash, Cyrus	x		125	Caper Pnt.		x	76		Mitchell, M.F.									
Chisolm, Isabella	x		125			x	76		Morrison, London									
Chisolm, [John] C.	x		123			x	74		Murray, Tony									
Chisolm, Phillip									Prioleau, Edward									
Chisolm, Samuel									Reese, Joe		x	123						
Chisolm, Thomas									Richardson, Chris									
Chisolm, Thomas									Richardson, Richard									
Chisolm, William									Riley, M.J.						x		73	
Choice, Lewis	x		123						Robinson, Roger							x	76	
Cool, Dennis									Ryan, Jack									
Crawford, Abram	x		123						Seabrook, A.E. [A.C.]						x		76	
Crawford, Joseph	x		123						Seabrook, C[lar]k B.						x		74	
Crawford, Prince	x		123						Seabrook, R[em] J.	x	x	122			x		75	Creek Side Pnt.
Crawford, Ransom									Seabrook, M.E.						x		76	
Crawford, Sharper	x		123			x	73		Saunders, Israel									
Cunningham, Andrew	x		123						Simons, Cyrus	x	x	124						
Dent, Hannah	x		125						Simons, Dennis	x	x	124						
Dent, Samuel	x		123			x	73		Simons, Joe	x	x	124						
Eady [Eddy], Robert	x		123			x	73		Simons [Simmons], Moses	x	x	124			x		75	Mullet Hall Rd.
Emanuel, A.J.									Singleton, Isaac						x		75	Legareville Rd.
Fenn, W.H.						x	75	Legareville	Small [Smalls], Sam	x		125						
Fludd, Fortune									Smith, David	x	x	124	Mathews		x		75	Mullet Hall Rd.
Fludd, Harry									Stevens, A.J.									
Ford, August	x		124						Stevens, W[illiam] F.	x	x	124	Kiawah		x		74	
Francis, Moses	x		123			x	74		Taylor, Richard	x	x	124	Hopes		x		75	Mullet Hall Rd.
Francis, Samuel	x		123			x	73		Taylor, Robert	x	x	125						
Fraser, Isaac	x		123			x	76		Waite [Wate], Jeffrey						x		73	
Freeman, Cain	x		124			x	75		Waite [Wate], Joe	x	x	122			x		73	
Freeman, James	x		125			x	76		Waite [Wate], John						x		73	
Freeman, Kit	x		125						Waite, Paul									
Freeman, Richard									Walpole, H.E.	x	x	124	Auld Ricke		x		75	
Frip, A.R.									Washington, Caesar									
Fripp, J.E.	x		124	Saxbie		x	75		Whaley, A.K.									
Fripp, W.E.	x		124	Legareville					Wigger, J.H.									
Frost, F.R.									Williams, Adam	x	x	123			x		74	
Gaillard, Charles	x		124	Rosebank					Wilson, J.S.									
Gaillard [Gilliard], Robert	x		124	Blacklock		x	74		Wilson, M.V.									
Geddes, Achy						x	74		Wine, A.W.									
Geddes, Robert	x		125	Capers Pnt.					Wright, Edgar									
Gibbes, Laurence [Lawrence]	x		124	Legareville		x	75	Legareville Rd.	Wright, Joseph	x	x	125			x		76	
Green, Andrew	x		125			x	76		Wright, Thomas	x	x	123/124			x		74/75	
Green, Richard	x		123/124			x	76											
Green, Mingo																		

## HISTORICAL SYNTHESIS

Table 15  
Agricultural schedule data for Charleston County, 1900-1940  
(\* rice, where reported in bushels, was converted to pounds as 1 bu. = 45 lbs.)

		Land Occupied or Improved					Livestock								
		Farms	Acres improved	Acres Unimproved	Value of farm	Value of implem nts	Horse, asses, mules	Milch cows	Working oxen	Other cattle	Sheep	Swine	Value of livestock		
Charleston	1900	3,801	80,323	116,481	2,790,670	143,330	3,104	2,795	NR	4,588	3,358	6,921	328,944		
Charleston	1910	3,403	66,492	111,194	4,445,157	217,182	3,718	3,028	NR	4,367	1,880	8,360	679,236		
Charleston	1920	3,850	85,267	127,272	9,106,354	641,536	5,306	4,890	NR	7,617	2,606	22,710	1,891,221		
Charleston	1930	1,957	56,402	99,544	9,043,677	494,253	2,812	1,470	NR	3,880	1,334	8,809	525,346		
Charleston	1940	2,124	59,164	107,327	5,745,815	627,227	2,089	1,767	NR	672	603	5,136	440,274		
Agricultural Products															
		Rye & oats, bu	Corn, bu	Irish potatoes, bu	Sweet potatoes, bu	Peas & beans, bu	Value misc. vegetables	Butter, lbs	Hay, tons	Rice, lbs*	Cotton, bales	Wool, lbs	Beeswax, lbs	Honey, lbs	Value animals slaughtered
Charleston	1900	5,390	178,350	225,404	203,817	18,314	328,860	75,541	376	2,034,744	5,658	10,200	260	3,970	13,479
Charleston	1910	8,956	216,647	112,301	114,632	9,720	507,248	6,507	781	289,800	10,461	NR	58	1,205	9,503
Charleston	1920	9,854	451,195	312,880	233,804	38,681	2,068,578	13,374	572	420,210	9,620	4,835	8	503	NR
Charleston	1930	240	343,201	1,303,000	129,314	19,980	913,936	13,105	374	50,580	1,506	2,473	NR	353	NR
Charleston	1940	5,805	215,818	1,047,686	59,658	10,435	661,494	4,614	527	26,730	434	1,649	NR	157	NR

compare, with production of only \$49 million in 1905 (Watson 1907:432). By 1907 Watson also remarked that the "trucking branch of the industry [of agriculture] has developed with remarkable speed" (Watson 1907:236). In fact, the future was "full of promise" to those tilling the soil.

Cotton remained the king. Between 1900 and 1906 the acreage statewide devoted to cotton increased by 5.9%. The number of bales produced increased by 19%; and the value of the cotton increased by 23%. In Charleston cotton acreage did increase, although by only 3.3%. Production, however, increased by nearly 35% (between 1900 and 1906 and by nearly 85% between 1900 and 1910). Corn production in Charleston also increased - by 21.5% between 1900 and 1910.

The cause of this increased production between 1920 and 1930 is not entirely clear. The per farm spending for fertilizer did increase appreciably from \$252 in 1920 to \$579 in 1930. However, the proportion of farms using purchased fertilizer declined from 67% in 1920 to 51% in 1930.

In addition, the agricultural statistics must be viewed cautiously since in 1911 St.

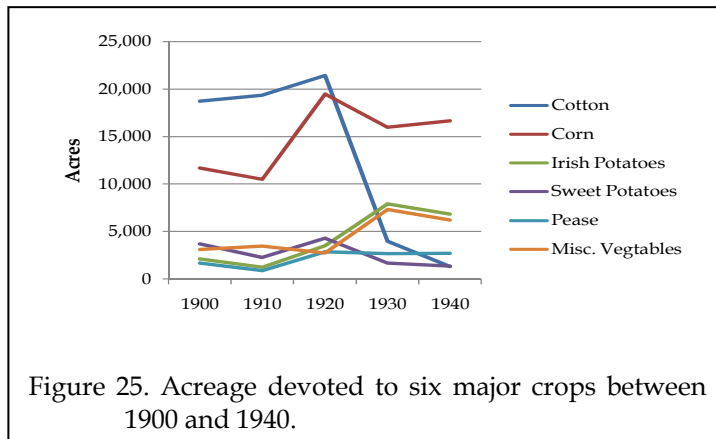
Pauls Parish was added to Charleston. Thus, the 1920 statistics are not directly comparable to those of 1910.

The increase in cotton production was accompanied by about a 10% decline in the number of farms and a 17% decline in improved acreage in Charleston County. Farm value, however, increased by 59%.

There was, however, a price to pay for the focus on cotton. Irish potato production dropped by over 50%. Sweet potato production declined by 44%. Peas and beans also dropped by nearly half. Butter production dropped by over 90%. The value of home slaughtered animals dropped by nearly 30%.

The federal census shows a 54% increase in vegetable production between 1900 and 1910, although the 1910 production was still just \$507,248. Watson, however, offered different data, indicating a 1210% increase between 1900 and the 1905 figure of \$2,787,000 (Watson 1907:291). Even if this were significantly overstated, there was an increasing interest in vegetable production for Eastern markets.

The development of this industry was attributed by Watson to Wadmalaw Island,

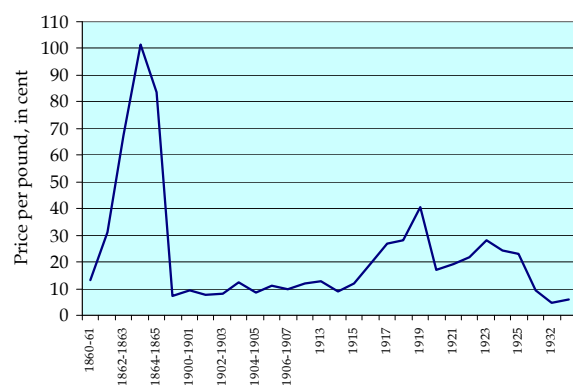


where William C. Geraty and his partner, Frank W. Towles developed small scale operations at Martin's Point. Watson (1907:291) pointed out that Geraty was by 1907 the largest shipper of cabbage plants in the world, having shifted his operations to Yonge's Island. Other truck crops increased: asparagus, cucumbers, beets, strawberries, lettuce, beans, peas, Irish potatoes, and sweet potatoes (the last four items are enumerated separately in the federal census, perhaps explaining the differences in values). The Charleston truck crop area was described as including the,

mainland, Yonge's Island, Mount Pleasant, McClellanville, St. Andrew's Parish, Edisto, Wadmalaw, and James Islands. Meggett's at Yonge's Island, is the center of the truck area in respect of business activity, although not the geographical center of the truck belt. About Meggett's are the largest farms and greater diversification of crops. Here are the farms of Norman H. Blitch, the "Cabbage King," so called from the fact that he raises a larger number of cabbages than any other individual planter in the world; W. C. Geraty, who makes a specialty of raising cabbage plants for replanting and cultivation in other sections,

and other substantial truck raisers who have achieved reputation in the market in other respects (Watson 1907:297).

Watson did not mention Johns Island in his truck area, although his reasoning is uncertain. The Seaboard Coast Line opened a branch line across the Stono River to Johns Island in 1916. As a result, a complex of packing sheds was built at the junction of Main Road and Belvedere Road, near Chisolm Road. Where access to this rail line was difficult, such as along the Kiawah River and Abbapoola Creek, farmers used water transportation. Haynie (2007:62)



notes that the Legare family operated a very large potato farm at Hanscome Point in the 1920s and 1930s. We also know that Reubin Bishopp operated a truck that shuttled between Charleston and the southern end of Johns Island during the late 1920s.

The huge crops of cabbage, Irish potatoes and early-spring vegetables were grown strictly for packing and shipping to northern markets. Although we have not examined island-level agricultural statistics for the twentieth century, anecdotal evidence suggests that some island farmers grew



Figure 27. Johns Island area in 1912 showing the end of the mail route from the community of Johns Island on the mainland to Exchange and terminating at the Mullet Hall (shown as Mullethall) post office. Also shown is the route from Yonge's Island to Enterprise and terminating at Bohicket (Rockville).

vegetables for the Charleston market. Because of Johns Island's distance from the city, they were not as successful as the vegetable farmers on James Island.

Watson was no less enthusiastic about the vegetable industry in 1915, noting the center remained in the Charleston area (Watson 1915:43). Table 13 provides his data on Charleston truck crops, including the FOB prices.

By 1927 the truck crop industry had spread to Barnwell, Bamberg, Allendale, Edgefield, Saluda, Calhoun, Dorchester, and

Hampton counties. Some crops were even grown in Sumter, Richland, and Lexington counties (Anonymous 1927:151). Charleston County, however, remained the center of the shipments, supplying 2,236 train cars or 61% of the state's total (Anonymous 1927:153). Cabbage that sold for \$1.35 a crate in 1915 was selling for \$2.50 a crate in 1927.

As late as 1937 Meggett continued to be known for its cabbage production, taking on the name, "Cabbage Patch." The cabbage season typically opened April 1 and closed May 10, with 11,517,000 pounds of cabbage being shipped out in Atlantic Coast Line cars



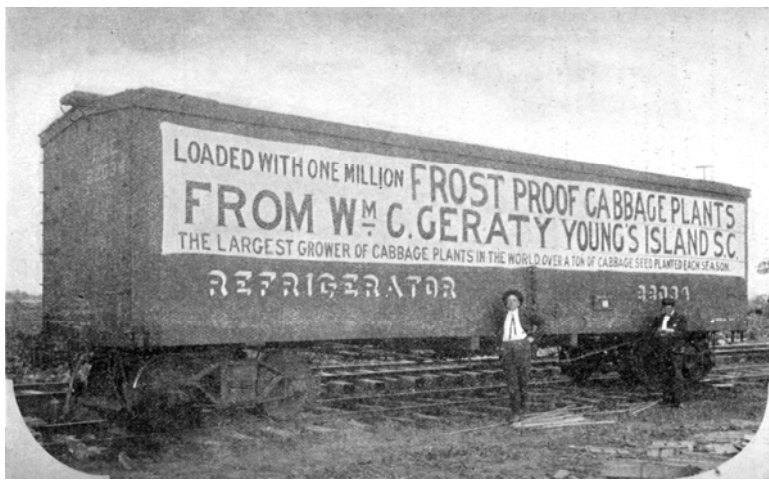


Figure 28. One of William C. Geraty's rail cars used for the shipment of cabbage plants from Meggett on Yonge's Island (adapted from Watson 1907:296).

(Anonymous 1937:8). In addition to the cabbage, the Yonge's Island area also produced Irish potatoes, broccoli, radishes, peas, beans, cucumbers, and tomatoes.

Figure 25 shows the variation in acreage, revealing that the land devoted to truck crops (as well as sweet potatoes, Irish potatoes, and pease) remained relatively stable through 1920. In contrast, acreage for corn and cotton both increased.

Cotton prices, like production, fluctuated (Figure 26). In general, American agriculture prospered during World War I and cotton prices were typically higher than they had been in years – accounting for increased production. Southern agriculture, however, contracted after the war, as European farmers recovered. Nevertheless, cotton farming was "not highly prosperous even during the war years." Although most sectors of the economy recovered relatively quickly, "agriculture did not ever fully recover," and in the "years following 1920, the cotton industry experienced little, if any, prosperity" (Dimsdale 1970:5).

One of the disruptions in South Carolina agriculture was the arrival of the boll weevil. At the door to Savannah in 1917, the weevil had

spread through much of South Carolina by 1919 (including Charleston County) and by 1922 had covered most of North Carolina as well. Planters are said to have paid their tenants a penny per weevil in an effort to slow the spread and millions of pounds of arsenical dusts (primarily calcium arsenate) were applied. In spite of these efforts losses ranged between 30 and 60% of a crop (Haney et al. 1996). The most devastating year was 1922, when production statewide was only 30% of what it had been two years earlier (Anonymous 1927:130).

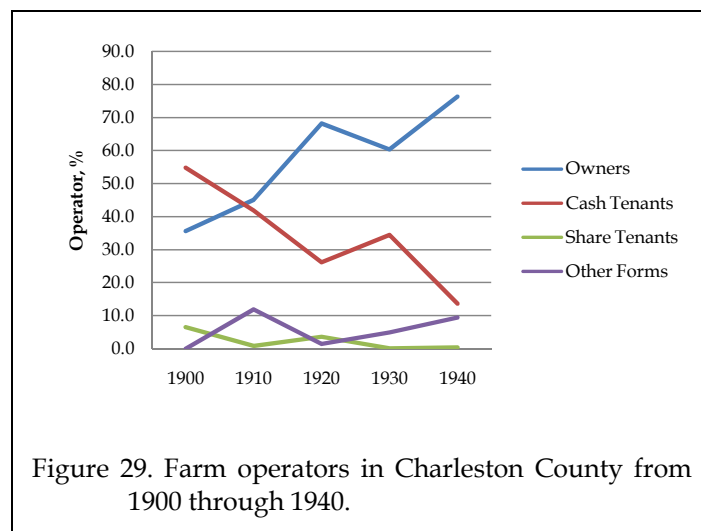
Sea Island cotton, with bolls softer than upland cotton, could never be made resistant to weevils, and planters abandoned it. However, short-staple cotton could be managed, given sufficient chemicals, and Johns Island farmers continued planting with this variety. Any remaining stands of Sea Island cotton produced hybridized seed, and the pure Sea Island type was lost.

In April 1930, John Rivers of the Dill, Ball Company sent to S. M. Hasell & Co., cotton merchants in Columbia, "samples of twenty-five bales of the long-length cotton which you request. This lot of 102 bales is still on hand . . . . We cannot get the parties who own the Sea Islands to name a firm price." A year later, in May 1931, Rivers wrote to Mr. Hue Thomas in Savannah, "The only Sea Island cotton that we know of was raised at the U. S. government experiment station on Wadmalaw Island" (Dill, Ball Company papers, The Charleston Museum).

The boll weevil, the flight of black labor, the rise of the mills – all were viewed as the reason for the cotton farmer's predicament. The decline in cotton production, however, was more than anything else the result of the expansion of cotton growing in the West and abroad. Southern farmers were competitively

handicapped by worn out land, expensive fertilizer, small farms, weeds, the boll weevil, and undependable rainfall. Speculators and a shaky economy added to these fundamental problems. The South's dependency on cotton has been claimed to be perhaps the most important factor leading to the agricultural depression of the 1920s (Holmes 1974:316). Forty-five banks failed in 1926 alone and between 1921 and 1929, 225 South Carolina banks, or roughly half of those active at the end of WWI, had failed. These failures were largely the result of the decline in the value of lands that served as loan collateral (Schultz 1992:3).

In spite of its problems, the state continued to hold an almost delusional sense of optimism. The 1927 state handbook's motto was,



"South Carolina: The Comfortable State," and it extolled the state's virtues. Charleston County, in spite of its size and population had only four incorporated cities: Charleston, Maryville, Mount Pleasant, and McClellanville. In many respects Charleston remained a very rural area. By 1915 there was only one gasoline station outside the city (Yonge's Island Oil Company on Yonge's Island). Other industries included only the Bryan Spring Carbonating Company and the Hollywood Manufacturing Company that produced boxes, both on Yonge's Island, as well as McClellanville's Bull Bay Canning Company (Watson 1915: 129, 135-136, 237).

One of the needs recognized for the area and its improvement was the discontinuation "of long-time consumption credit, based on the mortgaging of crops and labor, which so long has operated to limit the accumulation of wealth by individuals working the soil" (Hager 1927:244).

### Tenancy

Statewide tenancy increased every year between 1880 and 1930 - from 50.3 to 65.1%. Charleston, however, took a different path. Although there were fluctuations, the proportion of owner operated farms increased from 35.6% in 1900 (compared to the state average of 38.9%) to 76.4% in 1940 (compared to the state average of 43.9%). When South Carolina had the highest proportion of tenancy in 1930 of 65.1%, the tenancy rate in Charleston County was 39.5%.

While there were different forms of tenancy in Charleston - as revealed by Figure 29 - most tenants in the Charleston area were cash tenants, also known as cash renters. In this form of tenancy, the landlord furnished the tenant only with land, a house, and fuel at a fixed rental to be paid either in cash, which was most often the case, or its equivalent in crop value, typically lint cotton. The tenant furnished labor, work stock, feed for the work stock, tools, seed, fertilizer, and received all income after his rent was paid. The landlord only exercised supervision to prevent depletion, damage, or deterioration of the land and associated structures.

This type of tenant was slightly better off than most since the defined agreement on the amount of rent to be paid made him somewhat more independent. The landlord had no lien on his crop and the tenant could market his lint cotton wherever he chose.

Nevertheless, tenancy created a class from which escape was nearly impossible. In order to maximize profits and limit the mobility of the labor, owners of larger holdings – such as Mullet Hall – often began commissaries, limiting the options of croppers and tenants and ensuring indebtedness. Some issued their own coinage – also like Mullet Hall – that ensured ongoing debt peonage.

At the same time, planters became indebted to their own suppliers. F. Y. and Kate Legare, owners of Mullet Hall, received seed and fertilizer on credit, and they also took cash loans from Dill, Ball Company. While large farmers amassed large debts, small farmers also relied on Dill, Ball Company, their factor, to advance not only fertilizer and seed, but also cash and food rations. One small tenant on Johns Island, Caleb Chisolm wrote to Mr. Rivers, “I want you to send me three sacks of minnare [manure] and two bushels cotton seed. Please to try and send it today, I want to plant it by Thursday next week. Please sir to send the change for me, I need it very bad to get some rope for my horse. If I had a job to make anything I wouldn’t worry you. PS - please to send it by Bellenger truck” (Letters 1920-1932, Dill, Ball Company Papers, The Charleston Museum).

In June 1929, Cephas Drayton wrote John Rivers from Mullet Hall, saying he needed \$5 “very bad. Please send it, please sir don’t disappoint me.” Drayton requested \$4.50 in June 1932, asking Rivers to “lend it on my wages.” Cain Freeman asked Rivers to “please send me one sack corn today so I can finish plowing my cotton.” In about 1930, one tenant on Johns Island sent an urgent note asking for an advance and trusting a good cotton crop,

please let me have a little something to eat for I can go no more. The crop is fine, six acres cotton. Please sir send me, if only one bushel of rice and a bushel of grits and twenty-four

pounds of flour and ten pounds of meat. And I was dependent on the potatoes and I didn’t get nothing of the potatoes and now I don’t got nothing to eat. Please sir send it with Joe Bishop (Dill, Ball Company Papers, Box 60, Folder 5A, The Charleston Museum).

As the economic situation became more desperate, merchants were unable to collect their debts. In the summer of 1932, W. S. Howell, proprietor of a gin and general merchandise store on Johns Island (at the corner of River Road and Edenville), wrote to the Dill, Ball Company regarding their mutual debtors, many of whom had turned to Howell for their “seed cash.” John Rivers replied that he “had no idea that you had advanced to so many of them,” and agreed that they should share information. He sent a list of about 120 names (almost a third of them women) and their corresponding debts. Most were less than \$25: the highest figure was \$58.17, and there were credit balances as low as \$3.14. He directed Howell, “if any of these send cotton to your gin, you will protect us to the amount of our account before paying them. . . . I would be glad to receive your list and to protect you against debt-dodging.” In December 1932, Howell forwarded to Dill, Ball Company three bales of ginned cotton and the accounts of the growers. The cotton was remitted to Dill, Ball “all for loans” (Dill, Ball Company papers, Box 5E, The Charleston Museum).

With credit entanglements and competition among various gins and storekeepers, even African-American small producers had some flexibility in selecting their markets. In November 1929, John Rivers wrote to Christopher Freeman, “you are so slow in sending down your cotton” only one bale so far and “it is now high time that you send down the rest of it. We have understood that the gins on Johns Island are about to close down ginning, but we expect to run our gin on James Island

this coming Friday and so if you cannot get it ginned on Johns Island we can gin it out for you on Friday next." He also wrote to Harry Freeman "we have understood that you ginned a second bale of cotton . . . but have not brought it to us. Please send it as soon as possible" (Dill, Ball Company papers, The Charleston Museum).

In January 1930 John Rivers wrote to Mrs. C. R. Jones on Johns Island, "I have found out that John Fields has a bale on Johns Island, and Reubin Bishopp can haul this cotton to the gin . . . we will operate the gin . . . and can get your cotton ginned . . . Bishopp will pick it up" (Dill, Ball Company papers, The Charleston Museum).

In spite of the somewhat better conditions offered by Charleston, the county - as well as the state - saw a significant out migration. The first waves occurred in the late nineteenth century. Known as "Exodusters"

after the biblical exodus from Egypt, many went west to Kansas, Oklahoma, and California. The Great Migration, however, took place between about 1916 and 1920 as blacks took advantage of a severe labor shortage during World War I. Destinations were primarily northern cities such as Chicago, Detroit, Washington, and Baltimore, although even some southern cities, such as Atlanta, gained.

This movement crippled cotton planters who relied on tenant labor to pick cotton. Resentment mounted among many who remained and,

their protests were not always verbal. Some cotton pickers filled their sacks with green bolls or rocks before weighing (Cobb 1992:203).

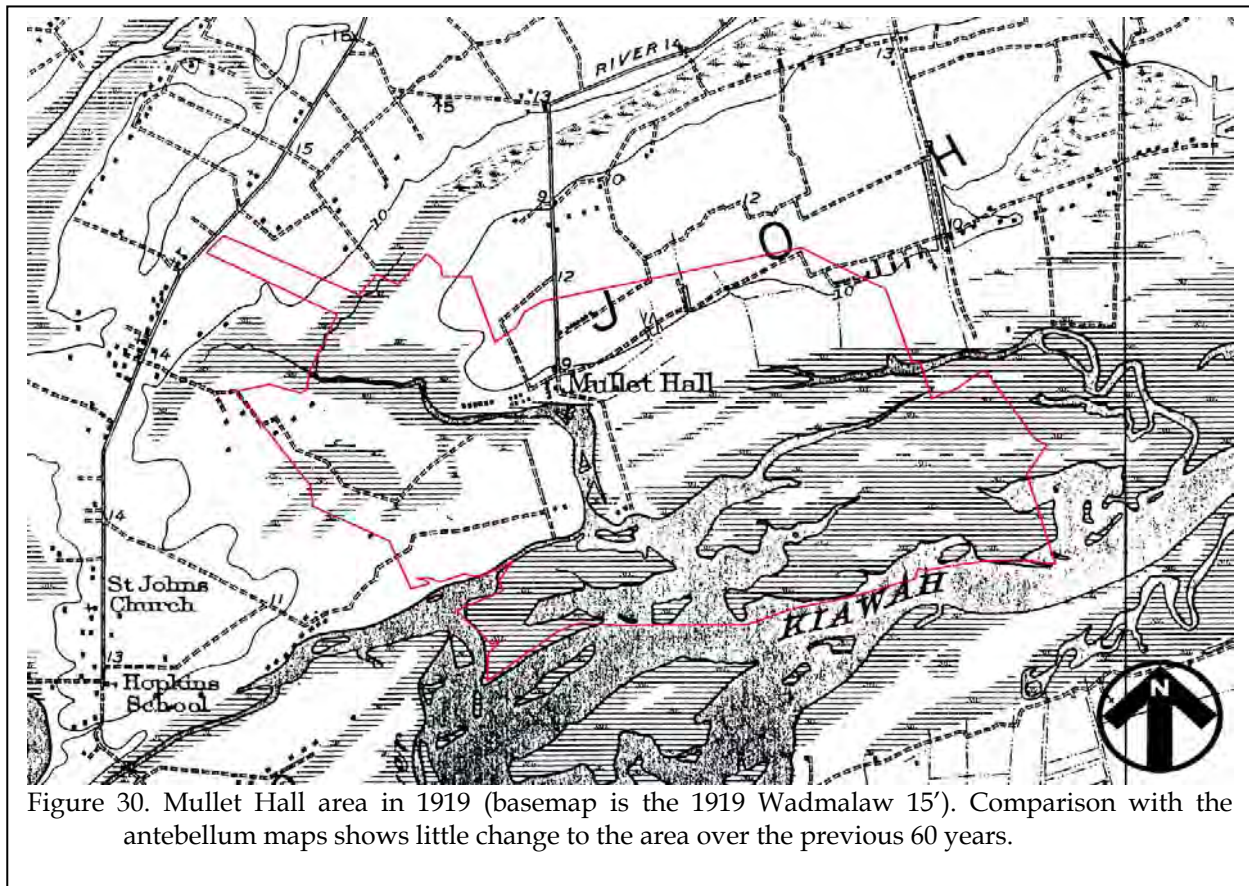


Figure 30. Mullet Hall area in 1919 (basemap is the 1919 Wadmalaw 15'). Comparison with the antebellum maps shows little change to the area over the previous 60 years.



The decline in African American population was not seen as devastating by all South Carolinians; one account said,

This means a new freedom for South Carolina. It is the removal of a vague but always present shadow. South Carolina at last has become a white state (Anonymous 1927:22).

Although uncertain, it seems that the abundance of truck farming in Charleston County may have ameliorated the problems caused by the decline in African American labor.

### **Arrival of the Depression**

Edgar notes that in 1930 the situation among South Carolina farmers was dire. Having gone on a spending spree when money was flowing, they had no reserves, and the decade of the 1920s was so bad that:

South Carolina agriculture was about to go under. Farmland and buildings had lost more than one-half their value. One-third of the state's farms were mortgaged, and 70 percent of the state's farmers survived on borrowed money (Edgar 1998:485).

Schultz remarks that many remember the Depression years not for the "coming" of hard times, but instead "recall those days as a continuation of long-standing hardship" (Schultz 1992:3). By 1933 state government itself was on the verge of collapse - state employees were laid off and those that remained were paid with "state I.O.U.'s."

Statewide the average farm value dropped over 40% from \$4,222 in 1920 to \$2,400 in 1930. Yet in Charleston County the average farm value actually increased from an average of \$2,365 in 1920 to \$4,621 in 1930. A decline

isn't seen until 1940, when the value sank to \$2,705. In addition, while statewide a third of all farms were mortgaged, only 9.2% of Charleston farms had a mortgage on them. The debt to value ratio for Charleston farms was also slightly better (30.06) than the statewide average (40.06).

There were earlier signs of the depression in Charleston County, however; between 1920 and 1930 the value of farm implements declined by 23% and the value of livestock declined by a staggering 72%. Perhaps most ominously, the value of vegetable production fell from \$2,068,578 to \$913,936 - indicating that the truck farmers were being hit hard. Cotton production declined by 84%. In addition, while the rate of mortgaged farms in Charleston was low, the per farm mortgage was actually quite high. The state average was \$1,747, but in Charleston the average mortgage was \$4,150.

The 1930 census also gives us a view of the living conditions in Charleston County. Of the 1,957 farms, only 478 reported having automobiles and only 60 (about 3.1%) had electricity. Telephones were found in 134 farms and 127 had piped water into their houses. Over 40% of the farms were located on unimproved dirt roads; only 0.3% were adjacent to sand-clay roads. The average cash rent for farms in Charleston County was \$89. In comparison, the average cash rental for Berkeley farms was \$102 and \$58 in Beaufort.

The situation is made even clearer by the Bureau of Home Economics (1939). This research surveyed over 15,000 tenant homes in South Carolina to arrive at a profile of the "typical" tenant house. They found that 38% of these houses were 25-49 years old, with another third between 10 and 24 years old. Nearly 80% were of unpainted frame construction (and slightly over 2% - as late as 1939 - were still constructed of logs). Islander G.C. Brown provided an oral history in which he remembers the numerous Johns Island houses made of logs

Table 16.  
Net Income per Family by Tenure Status and Region, 1934  
(Woofter 1936:Table 38) (2006\$)

Region	Wage Hands	Croppers	Share Tenants	Renters
Atlantic Coastal Plain	199 (3,015)	519 (7,863)	833 (12,621)	536 (8,121)
Upper Piedmont	153 (2,318)	336 (5,090)	440 (6,667)	444 (6,727)
Black Belt	156 (2,363)	334 (5,060)	313 (4,742)	471 (7,136)

with stick and mud chimneys (Carawan and Carawan 1989:10).

Foundations were generally in fair to poor condition and roofs were largely in poor condition. Exterior walls were about evenly split between good, fair, and poor conditions. Doors and windows were typically in poor condition. Window screens were largely absent and, where present, were in poor condition. Interior walls and floors were generally in fair to poor condition.

Turning to household facilities statewide, less than 1% had gas, less than 4% had electricity, and only 0.1% had piped heating (meaning that virtually all depended on either fireplaces or wood stoves). In terms of refrigeration less than 1% had mechanical units (refrigerators). An additional 14.5% could boast of ice boxes, while the remaining 85% had no refrigeration at all. Only 0.1% had a power washing machine. Cooking was almost universally done using wood or coal stoves since less than 0.5% had either a gas stove or electric range.

Woofter (1936) also provides similar details, recounting that in South Carolina 97.4% of all tenants used a wood or coal stove. Over two-thirds of all tenants used an "unimproved" outdoor privy and over 28% had no toilet facilities whatsoever. As late as 1934, 72.1% of South Carolina tenants had a dug or bored well. An additional 13% relied on a spring for fresh water (absent on the sea islands). The typical tenant house in South Carolina had 2.7 bedrooms and 1.8 "other" rooms, including

kitchens and parlors. In these 4.5 rooms there was an average of 1.3 occupants per room.

The disparity between black and white was clear. The average South Carolina value of white tenant houses was \$454, compared to \$238 for black

tenants.

Woofter (1936:Table 38) also provides information on the average tenant incomes by region in South Carolina. These are shown in Table 16 – where we can begin to see the reality of tenancy. The modern HHS poverty level for a family of six (an average tenant family) would be just less than \$26,000 – over eight times what a wage hand might be making in Charleston County and three times what a renter would be making.

Nearly two-thirds of the tenant's income was spent on food. The bulk of the food budget was spent on three items – flour (or cornmeal), lard and meat (almost universally fat salt pork). What may be surprising is the relatively significant portion of the income spent on condiments – 5.4%. Presumably this was an effort to make otherwise bland food palatable or it was because condiments could not be made at home.

These dietary habits – responsible for a variety of health ailments, such as the dietary deficiency pellagra – were deeply rooted in Southern tenants. Two studies from the late nineteenth century found African American diets dominated by "bacon, flour, corn meal, and molasses," and per man per day costs averaged between 8¢ and 11¢ (\$1.86 and \$2.56 in 2006\$) (Atwater and Woods 1897, Frissell and Bevier 1899). It is, however, uncertain if the abundance of readily available vegetable crops in the truck farming area made a difference in these dietary practices.

Using even the lowest figure for the two adults in an average tenant family and assuming only one meal a day, a year's food would cost approximately \$1,324 – about 60% of the wage hand's net family income. When we factor in children and at least some minor supper meal costs, we can sense the depth of poverty that tenants faced.

### **Partial Recovery**

The effect of the Great Depression was devastating to all sectors of South Carolina's economy. Between 1920 and 1935, 80% of all high school and college graduates left the state. The value of the state's timber industry declined by 68%, its cotton mill industry declined by 33%, and mineral products declined by 63%. One reporter commented, "in almost every form of human progress South Carolina has sunk about as far as a state can sink" (quoted in Edgar 1984:4).

A bright spot in Charleston was the Navy Yard, which benefited from WPA and PWA activities, as well as the war boom (Hamer 2005). In 1937 *The News and Courier* would brag that the WPA projects, which had employed an average of 1,200 men a year, had helped make Charleston "the Navy's youngest and fastest growing yard." By 1938 the WPA had spent \$895,000 on improvements and the PWA \$1,782,800. In 1939, the Navy Yard had a \$3.5 million expansion and improvement program underway employing nearly 1,800 WPA and PWA workers. By the time WWII was declared, the yard had nearly 2,000 production workers compared to 241 in 1932.

A number of Depression era programs were initiated by President Franklin D. Roosevelt. One critical effort for the state's rural farmers and tenants was the Farm Security Administration. It began in 1933 as the Agricultural Adjustment Administration (AAA) and was initially responsible for the efforts to pay farmers to reduce agricultural production. This effort was successful – 10 million acres of

cotton were plowed under and 5 million hogs were butchered. South Carolina was expected to plow under 30% of her 1.77 million acres of cotton (Charleston County's share would have been about 1,188 acres – far less than many surrounding counties). The AAA graduated payment was about \$14 per acre (Hayes 2001:122). Ultimately 68,200 contracts were negotiated and 424,000 acres were taken out of cotton production, 24% of the crop.

Initially the AAA made payments to landowners, not tenants, for whom the reduced production meant the elimination of their tenancy or livelihood. In Charleston County the early efforts failed to reduce tenancy – the number of tenant operated farms nearly doubled between 1930 and 1935, going from 623 to 1,227.

By 1935, however, the AAA required that cash renters (the bulk of Charleston tenants) were to receive the entire payment – parity plus rental (Hayes 2001:126). With this incentive tenancy was significantly reduced, with Charleston losing 808 tenants (the number dropping 419 in 1940). Statewide, tenancy was reduced by nearly 30,000 farmers (Cooper and Terrill 1991:648).

Island life during this time is still remembered by the island's African American residents. Nancy Butler remembers the pay on the truck farms – 10¢ per sack of potatoes (Behre 2004). Belle Green reported being paid \$3 a week for harvesting cabbage and potatoes on Johns Island (Carawan and Carawan 1989:7). Many of the island's blacks continued to live off the resources of the creeks, including fish, shrimp, and oysters. Carawan and Carawan (1989:8) report oral histories speaking of a plate of shrimp for 5¢ or islanders selling a string of fish for 10¢. While the City of Charleston was the recipient of much WPA funding through the political machinery of Mayor Burnet Maybank (Fraser 1989:379-383), the only WPA project we have identified on Johns Island was the construction of a 2-story brick school for white

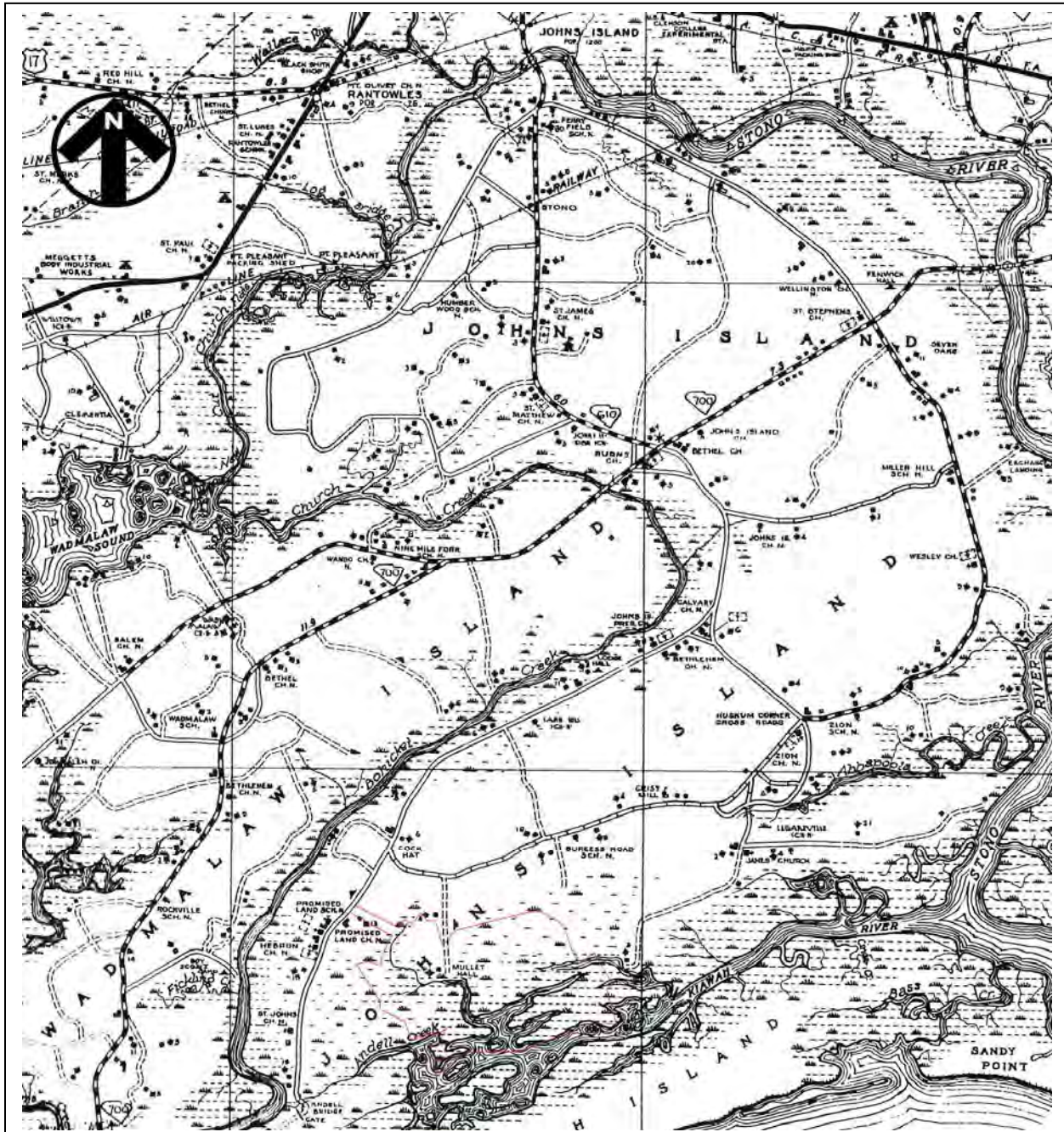


Figure 31. Johns Island in 1938 (General Highway and Transportation Map of Charleston County).

high school students (Carawan and Carawan 1989:9).

The WPA organized at least two small handwork businesses on Johns Island. The 1920 Agricultural Hall on Angel Oak Road hosted a sewing room where white women made clothes

for weekly wages. On Main Road, close to John F. Limehouse's store, was a moss factory. Here African-American women collected Spanish moss, steamed and dried it, and packed it for use as mattress stuffing (Haynie 2007:70-71).



The 1938 General Transportation and Highway Map of Charleston County (Figure 31) shows the area around Mullet Hall as it was prior to World War II. There were two bituminous paved state highways on Johns Island – SC 610 or Main Road ran from the mainland community of Johns Island south through the island terminating at SC 700 or Maybank Highway. This highway had been paved only a decade earlier. Prior to that time many preferred to travel to Charleston by boat, a trip that required up to 6 hours (Vinson 2004:40).

Swing bridges had been built for both highways across the Stono in 1929 (with the Limehouse Bridge connecting the island to the mainland replacing a ca. 1917 swing bridge). SC 700 continued from James Island onto Wadmalaw. Main Road became an unimproved road that ran to Andell Bridge and a gate onto Seabrook Island. River Road, which ran from SC 700 along the edge of the Stono on the island's east side was also paved as far as Huskum [Hanscome] Corner. The continuation of River Road along the southern edge of the island was graded and drained, tying into Bohicket Road at what was by this time called "Cock Hat" (rather than "Cocked Hat").

At the terminus of Mullet Hall Road was a farm dwelling and a single tenant house. These are the only structures shown for the tract, although a second farm house and four tenant houses were found on the west side of the Mullet Hall Road, perhaps off the tract. On the east side of the road was a portable sawmill.

In close proximity to the west of Mullet Hall were three black churches: Hebron, Promised Land, and St. Johns. Both Hebron and Promised Land had graveyards. Just a few buildings to the north of the Promised Land Church was the Promised Land School (identified as for "Negroes"). Today Hebron Church is still shown on the modern USGS topographic map, although the cemetery is no longer shown. Promised Land School is shown,

although both the church and the cemetery are no longer shown. St. John's Church is still shown and with it is a cemetery.

Along River Road to the east of Mullet Hall was Burgess Road School – also for the island's black community. A little further to the east was a grist mill. Neither are shown on the modern map.

Other landmarks no longer found today include Sand Hill School (N), Calvary Church (N), the cemetery for Bethlehem Church (N), Johns Island Church (N), Miller Hill School (N), Wellington Church (N), Ferry Field School (N), Humber School (N), Zion School (N), and Legareville School (N).

The 1940 census provides additional support for the idea that the depression continued to affect Charleston later than the rest of the state. While SC as a whole began to show some signs of improvement in 1940, Charleston's farms were still in trouble. The proportion mortgaged had increased from 9.2% in 1930 to 9.8% in 1940, although the amount of the average mortgage had dropped to \$2,833 and the value to debt ratio had decreased slightly to stand at 28% – significantly lower than the state average of 34.9%. The average value of the Charleston farm dropped from the 1930 level of \$4,621 to only \$1,709 in 1940. The average farm size, however, remained relatively stable at 78.4 acres.

Rural electrification had made an impact, with 450 farms having electricity by 1940, although this still represented only 21.2% of the county's farming community. The number of automobiles rose very little – up from 478 to 544 – and the number of telephones on farms actually declined by 25%.

Truck cropping continued to decline in Charleston. In 1930 there were 1,018 farms with 7,311 acres harvesting vegetables for sale. By 1940 there were only 693 farms with 6,193 acres.

The value of the produce declined from \$913,916 to \$661,504 – a decline of 27.6%.

In 1940 Johns Island contained 937 dwellings, 663 or 70.7% of which were farm units. The remaining 274 were non-farm units. Of the total, 500 or 53.4% were owner occupied; the remainder were tenant housing. Nearly 74% of the houses were occupied by African Americans. Twenty-eight percent of the houses on Johns Island were classified as late as 1940 as needing major repairs and 90% lacked an indoor bath.

Even as late as 1950 the census study of farm housing units (conducted by economic subregions and looking at African American dwellings) found that 45% of the occupied units were dilapidated. Regardless of condition, 92% of farm houses in the area still lacked running water. Nearly 97% of the occupants, in 1950, were making less than \$1,000/year (\$8,333 in 2006\$).

### **Tract Specific History**

#### **Introduction**

The study tract, today owned by Kiawah River Plantation, LP, is part of a plantation that was known as Mullet Hall during the twentieth century and for much of the nineteenth century. The historic Mullet Hall Plantation was created by combining several tracts during the eighteenth and nineteenth centuries, with additional expansion during the late nineteenth and early twentieth centuries.

Members of the Legare family have been associated with Johns Island since at least the eighteenth century. The Huguenot Solomon Legare (d. 1760) was a goldsmith by profession; his son Solomon Legare Jr. (1703-1774) became a “currier” – one who prepares tanned hides for working as leather. His workyard on Tradd Street was supplied from his rural lands, first in Christ Church Parish and soon on the more convenient islands southwest of Charleston. In

1729, Solomon Legare Jr. of Charles Town paid £250 for 510 acres on Wambaw Creek (Christ Church Parish), then in 1744 he paid £2,000 for a 540-acre plantation on the Stono River on Johns Island. Although he kept a town house near the tanning business in Charleston, Solomon Legare, Jr. described himself as a planter “of St. Johns, Colleton,” in 1750 when he bought another 100-acre plantation from the executors of Thomas Jinks. In 1768, Legare paid £2500 for 650 acres on Wadmalaw Island.

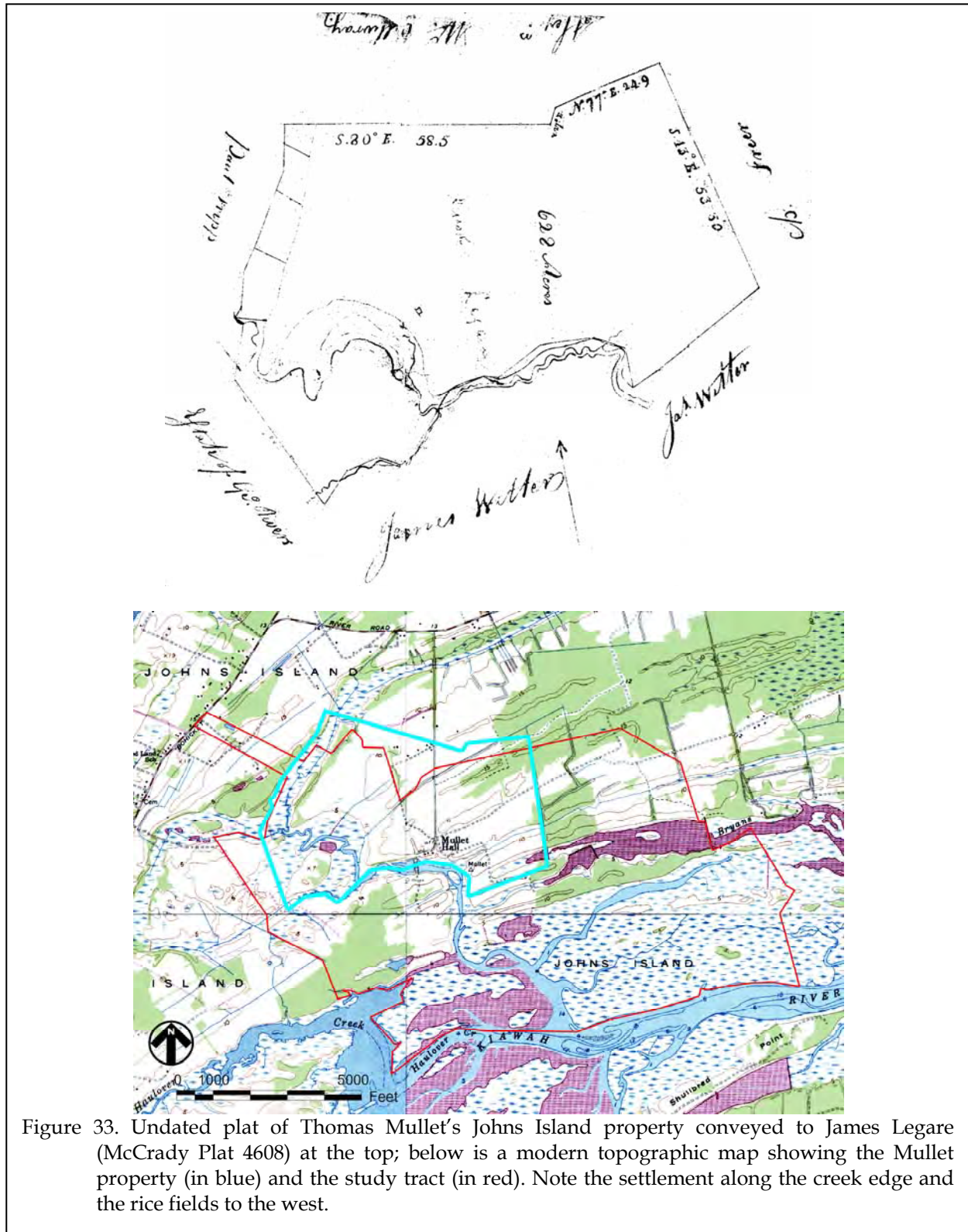
Solomon Legare gave some of his Johns Island land to his son Thomas Legare (1732-1801) the father of three men whose families were associated with Mullet Hall Plantation: James Legare (1762-1830), Thomas Legare (1766-1842), and Solomon Legare (1770-1799). James Legare occupied the Mullet tract and adjoining properties; Thomas Legare acquired land to the north. Solomon Legare’s granddaughter married James Legare’s son, and as his widow she managed Mullet Hall from 1850 to 1868.

Our study tract was historically made up of four plantations: Mullet Hall, “Home Place,” Rosebank, and The Oaks. Mullet Hall and Home Place, each 600+ acres, were the halves of a larger Mullet Hall assembled by James Legare and divided between two of his children in 1830. The larger Mullet Hall was recombined from its two halves during the 1880s, with the Home Place name being lost. Rosebank (only a small part of which is part of our study tract) was a Fripp plantation added to Mullet Hall in 1855. The Oaks was a Roper plantation added to Mullet Hall in 1897.

#### **Mullet Hall to 1830**

James Legare was already a Johns Island planter in 1788 when he paid fellow-planter Peter Herne £930 current money of South Carolina for a “233-acre plantation, part of a tract formerly of Est. William Stanyarne. Butting and bounding east on part of Est. William Stanyarne, south on Charles Freer, southwest on Alexander McGillivray, northwest on Thomas Townsend” (Charleston County RMC DB D7,

[illegible]





# CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION

pg. 59; recorded December 1800). In 1792 he acquired the adjacent McGillivray tract at auction, a “very valuable plantation or tract of land, on John’s Island, about 370 acres. Seized, taken in execution, and to be sold as late the property of Alexander McGillivray” (*Charleston City Gazette*, November 5, 1792). McGillivray’s plantation had been seized by the sheriff to cover judgments in two suits, one of them brought by Benjamin Mathewes, a Johns Island

McGillivray, deceased.” This was the Mullet tract which gave the subject property its name.

In March 1793, Thomas Mullet of the City of London, merchant, had given his power of attorney to Thomas Morris, Joshua Ward and John Ward, Esquires, of Charleston, authorizing them to sell his property on Johns Island. The deed (Charleston County RMC DB D7, pg. 49; recorded December 1800) described a parcel that

Table 17.  
Agricultural Schedules for Plantations in the Study Area\*

	Slaves/H ouses	Improved Acres	Unimproved Acres	Horses	Mules	Milch Cows	Oxen	Other Cattle	Sheep	Swine	Corn, bu.	Rice, lb.	Cotton, bales	Wool, lb.	Peas, bu.	Sweet Potatoes, bu.	Butter, lb.
<b>1850</b>																	
<b>M. Jenkins Roper (The Oaks)</b>	<b>78</b>	<b>500</b>	<b>500</b>	<b>7</b>		<b>40</b>	<b>12</b>	<b>28</b>	<b>40</b>	<b>20</b>	<b>538</b>		<b>20</b>	<b>40</b>	<b>30</b>	<b>800</b>	
Horace Walpole (Creekside)	124	500	160	2	3	69	8	20	40		600		41		100	1,200	200
Solomon Legare (Home Place, Legareville, etc.)	248	700	908	40	10	105	20	80	70	70	3,000	15,000	172	400	200	3,000	192
Est. Elipha White (n of Home Place)	50	647	200	2	2	30	6	20	4	5	500	900	15		50	1,00	120
<b>1860</b>																	
Simon Legare	230/59	1,530	734	16	10	160	24	20	95	45	25,000		89	255	150	6,500	1,560
James Walpole (Acorn Hill)	26/7	600	200	3	2	20	3	20	11	24	1,000		50	60	30	2,000	250
<b>Lydia Legare (Mullet Hall)</b>	<b>107/30</b>	<b>650</b>	<b>225</b>	<b>14</b>	<b>2</b>	<b>30</b>	<b>3</b>	<b>40</b>	<b>52</b>	<b>60</b>	<b>1,300</b>		<b>45</b>	<b>200</b>	<b>20</b>	<b>3,000</b>	<b>250</b>
William Roper (Brick House)	80/23	600	324	5	4	40	10	40	47		1,000		50	200	130	1000	300
B.D. Roper (Briars)		500	250	4	2	20	6	30	40	50	500		20	150	50	800	100

\*Owners in red represent a portion of the study tract; others are surrounding tracts. The 1850 data for Solomon Legare include a portion of the study tract, although it is combined with multiple other St. Johns Colleton tracts. Owners of the study tract in 1850/1860 not shown in this table could not be identified in the agriculture schedules.

planter who held McGillivray’s mortgage (dated March 18, 1788). William Mathewes had owned a 470-acre plantation, but when James Legare paid £342.11/3 for 374.5 acres of it, Charles Freer already owned the east 95.5 acres. The portion purchased by Legare was bounded “northwest on the public road, northeast on Thomas Townsend and Peter Herne, east on Charles Freer (being the other part of the 470 acres), southwest on aforesaid Benjamin Mathewes and Paul Fripp” (Charleston County RMC DB D7, pg. 53; recorded December 1800).

We have not determined where James Legare and his wife, whom he had married in 1784, lived during this period. Although the Herne and McGillivray tracts comprised a sizable plantation, the Legare residence might have been elsewhere on Johns Island. In 1794, James Legare nearly doubled the size of his 607.5 acre plantation, paying £554 sterling money for a 597-acre plantation “bounding north on land late the property of Alexander

had been conveyed to Mullet by Benjamin Mathewes and Mary his wife in 1791, and was bounded west on Paul Fripp and on George Rivers, south on James Witter, and east on Micah Jenkins. Paul Fripp’s tract became Rosebank, see below; the Witter tract was later acquired by Solomon Legare as part of his “Home Place,” see below; and the Micah Jenkins tract became known as The Oaks, see below.

Little is known about Thomas Mullet, other than that he was a book dealer at 11 Size Lane, Budge Row, London from at least 1783 through 1786 (Lowndes 1783, 1786). Raven (2002:302-303) notes that bills were paid to Thomas Mullet, Esq. and Thomas Mullet & Company in 1795.

Much earlier – in 1735 – the marriage of Nicholas Mullet to Mary Brown shows up in the St. Philip’s Church Register (Holcomb 1995:181). Nicholas died by 1747 when Mary was married to Abel Inman. The relationship of Nicolas and

Mary Mullet, if any, to Thomas Mullet is unknown.

It is also uncertain whether Thomas Mullet ever visited Johns Island. He owned his island property from 1791 to early 1793. The only record of his activity in Charleston that we have been able to find are two court cases dating from the late 1780s resulting in unpaid loans he made (Judgment Roll, Charleston Series, 1794, item 104A; 1798, item 412A).

However, archaeological evidence is clear that from an early date, there was a house on the tract conveyed by Mullet to Legare. This house seems to have predated William Mathewes, who sold the land to Mullet, but might have been built by an earlier generation of Mathews. Regardless, its location is clear on the plat of James Legare's 622 acres (Figure 33). Legare must have named his residence plantation "Mullet Hall" after the house on a tract briefly owned by Thomas Mullet.

James Legare retained Mullet Hall, about 1100 acres between the public road and the Kiawah River, for the rest of his life. At some point, he moved his primary residence to the northwest part of his property, then in the 1820s he bought two plantations on Abbapoola Creek. Over sixty years old in 1824, he paid taxes on 1,936 acres of land and 132 slaves (SCDAH, Individual Tax Returns 1824, item 2572). At about this time, he moved his residence from Mullet Hall to his Point Plantation on Stono River. Legare bought The Point from Thomas Hanscome in 1825, paying \$9,720 for the 324 acres fronting the river (Charleston County RMC DB Q9, pg. 139), where he lived at the time of his death in 1830. This tract adjoined a larger plantation (later known as Creekside, home of his daughter Martha L. Walpole) which Legare had bought from Hanscome in 1821, paying \$19,000 for 650 acres at the north side of Abbapoola Creek (Charleston County RMC DB J9, pg. 98).

When James Legare wrote his will in June 1828, he bequeathed Mullet Hall to two of his children, directing that it be divided by "a line running from the creek on the south to the line of Estate Jenkins" (Charleston County Will Book 38, pg. 682). He left the west part of Mullet Hall containing "the Settlement and Mansion house I lately resided in" to his son James C. W. Legare (1806-1850). To his daughter Eliza Slann Wilkinson Legare, the wife of Solomon Legare Jr., he left the ca. 600-acre east tract "so much of the plantation whereon I lately resided, called Mullet-Hall, as will make about six hundred acres taken from the eastern side ... as it has been ... laid out by a line lately run from the creek on the south to the line of Estate Jenkins."

The will specified that Eliza S. W. Legare was to have undisturbed use of the canal running from the division line between the two Mullet Hall tracts down to the Creek for the purpose of draining. In addition to the plantation, Legare also left slaves to James C. W. Legare (twenty-five people in seven families) and Eliza S. W. Legare (twenty-six people in six families).

### **Mullet Hall (West Half) After 1830**

Upon his father's death in 1830, James C. W. Legare (1806-1850) inherited the west half of Mullet Hall Plantation, just over 600 acres including his parents' "Settlement and Mansion House" (Will of James Legare, Charleston County Will Book 38, pg. 682). Whether he occupied the residence immediately is not certain, but after his 1833 marriage to his cousin Lydia Ball Bryan (1816-1868) they settled at Mullet Hall.

James C. W. Legare planted Mullet Hall until his death in late 1850. The appraisal of his personal estate made in January 1851 details a large operation: 126 slaves, twenty-two gins, five plows, eleven oxen, and two mules. There was evidently no ginned cotton on the premises, but foodstuffs and feed included fodder, peas, corn, rice, seed potatoes, and cow potatoes. The

# CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION

inventory of household goods indicates a residence of four bedchambers, equipped for year-around occupancy (Charleston County Inventory Book C, pg. 105). Although we have no plats for this tract, we believe that Legare continued to occupy the Mullet settlement shown in Figure 33.

Legare also owned land in St. Pauls Parish, near Toogoodoo Creek where other members of his family planted cotton. There he held thirty-three slaves, ten oxen, one mule, a plow, and two gins (Charleston County Inventory Book C, pg. 105).

managed to get some cotton picked before the mandatory evacuation in late fall, selling seven bales in April 1862, five in December, and eight in January 1863. The cotton sold in 1863 was probably grown near Orangeburg, where the family and “negroes” had moved in June 1862. Some of the slaves might have been sent there earlier, for Legare bought 217 bushels of corn (\$217) in February 1862. Other corn purchases were necessary in May 1863 (\$612) and January 1864 (\$600) (Charleston County, Estate Account, audited and approved December 27, 1866, Probate Case 063025).

Table 18.  
1870 Agricultural Schedules for Plantations and Farms in the Study Area

	Improved Acres	Unimproved Acres	Value of Farm (\$)	Value of Implements (\$)	Wages Paid (\$)	Horses	Mules	Oxen	Sheep	Swine	Corn (bu)	Cotton (bales)	Peas (bu)	Sweet Potatoes (bu)	Market Produce (\$)
Est. J.C.W. Legare (Mullet Hall)	350	300	5,000	10	100		1				25	4	25	25	
J.C.W. Legare (Rosebank)	225	90	1,500	25	50		1				50	2	25	25	
J.B.L. Walpole (Creekside)	450	1,100	5,000	600	200	2	4	6	5	1	125	10	40	20	
J.L. Walpole (Acorn Hill)	200	400	3,000	50	50	1	1				150	3	20	10	
James Brown	10	-	60	5		1					40	1	15	10	10
James Brown	6	-	60	2							22	1	15	11	25
Kitt Bishop	18	-	?	?		1				3	70	2	10	25	70
Johns Island mean	24.39	24.01	346.06	27.87	41.33	0.30	0.10	0.03	0.47	0.97	41.77	0.96	4.56	23.73	9.95

Known to be associated with the plantation was a James Brown among the freedmen Solomon Legare contracted with in 1865. Kitt Bishop is said to have been F. Y. Legare's foreman during the early twentieth century (Jordan and Stringfellow 1998, pg. 266).

James C. W. Legare's will provided for his widow to sell his Toogoodoo Plantation at her discretion, bequeathing his house and lot at Legareville to her for life, and the “rest and residue” of his estate, including his home plantation – Mullet Hall, to his widow Lydia Ball Bryan Legare and their children (Charleston County Probate Records, Case 063025).

In 1860 Lydia B. Legare held 110 slaves on Johns Island, all of them on Mullet Hall (Davidson 1970: 219).

Legare's Estate was handled by Lydia Legare while her children were minors. She was a successful planter, and the Estate accounts give an interesting picture of the early years of the Civil War. In the first quarter of 1861, Lydia Legare paid \$5.88 for five gallons of gin oil. She

In September, 1865, Reuben Tomlinson reported to the Bureau of Refugees, Freedmen, and Abandoned Lands concerning the plantations which comprise the subject property and neighboring tracts:

These lands have never yet been reported having been but lately settled. No crops were raised on them. The aggregate number on these places are 43 men, 60 women, 98 children. . . . All are dependent on government for support (Freedmen's Bureau Records, Series 1910, Reel 85).

The names of the “former owners” were given as Joseph Stephens, Sol Legare, Benjamin Roper, Jenkins Roper, A. Brown, Lydia Legare. James Legare, Widow Mathews, and William Jenkins (Freedmen's Bureau Records, Series

1910, Reel 85, pg. 253). The owners of the study tract were Sol Legare (eastern half of Mullet Hall, discussed below), Lydia Legare and her son James (west side of Mullet Hall and Rosebank), and Jenkins Roper (The Oaks, discussed below).

Lydia Legare died in 1868, leaving four children, her “only estate an undivided interest in certain real property worth about \$1500: a plantation and a lot at Legareville” (Charleston County Probate Court, Case 212016). Her son James C. W. Legare was planting at Rosebank, her daughters were married, and her youngest son, Francis Y. Legare (1850-1905) took over Mullet Hall, managing the plantation and his father’s estate.

In June 1872 F. Y. Legare settled his father’s estate, selling some of Mullet Hall to effect a partition. In February 1873, Augustine Smythe, the family’s attorney, bought 387 acres (Charleston County RMC DB H16, pg. 343) and immediately resold it to F. Y. Legare for the same price, giving him clear title (Charleston County RMC DB J16, pg. 120).

Also in February 1873, 169 acres of Mullet Hall was sold to Mary Legare and her husband Thomas Whaley. Six months later, the Whaleys sold their parcel to Alexander McLoy and J. W. Rice, trading partners doing business as McLoy and Rice. McLoy & Rice sold about sixty acres to Washington Capers, Samuel Robertson, and Richard Singleton, then in May, 1876, they lost the rest of the tract to a foreclosure suit, and in December it was sold at auction, together with storehouses, gins, engines, and all other buildings (Charleston County RMC DB G16, pg. 138). F. Y. Legare paid \$1878 for the land and buildings.

It appears that McLoy and Rice had invested in a commercial gin operation on Mullet Hall. At least since the 1850s, one of the partners, McLoy, had been in Charleston, where he operated a dry goods store on King Street (Charleston City Directories, 1859, 1860).

Sometime after the Civil War, J. W. Rice, formerly of Erie, New York, joined him in business. Rice was a prominent businessman in New York and Macon, Georgia. The company continued in business for a number of years after the 1876 sale of their land on Johns Island. The deed for that sale is complicated, with other parties besides McLoy and Rice having been objects of the foreclosure suit, and it does not indicate whether their gin had run profitably, if at all.

Francis Legare had already established himself as a mercantile operator when he bought McLoy and Rice’s gin equipment. As early as 1871, his brother, who was planting at Rosebank (see below), agreed to market his crop through F. Y. Legare. Other small farmers in the area gave him crop liens in exchange for advances of planting supplies or cash credit. For example, in April 1874, John Small and Joseph Wright (who signed his own name) were planting at Hopkinsons, north of Mullet Hall. To secure repayment of up to \$105 in goods or cash to be advanced to them, they gave him a lien on the crops grown on twenty-one acres (Charleston County RMC DB R15, pg. 387). In June, they increased their credit line, giving a mortgage on four horses to Legare (Charleston County RMC DB R15, pg. 387). In January, 1875, Small and Wright each agreed to a crop lien in exchange for advances of up to \$200 (Charleston County RMC DB R15, pg. 388, 400), and a few months later each sold a horse to F. Y. Legare. He paid \$60 each for a two-year old bay stallion and a four-year old black stallion (Charleston County RMC DB P16, pg. 565, 617). As his brother’s estate administrator in 1874-1876, Legare was ginning cotton grown at Rosebank, and probably for other farmers as well.

By 1880, F. Y. Legare owned one farm (Mullet Hall) and rented additional acreage – either on “Home Place” (the east half of the original Mullet Hall), or Rosebank. His own land, 596 acres, was worth \$5,000, comprising 155 acres improved, 160 pasture, 120 woods and forest, and 161 acres of fallow or “old field” land. There were implements and equipment



worth about \$1,000, and he had spent \$1,300 on buildings and repairs. The land he rented was 135 acres: 35 improved, 50 woods and forest, and 50 fallow, worth altogether \$1,800. Production on the two tracts was dissimilar. He had spent only \$20 to fertilize the rented tract, but \$200 on his own land, where he paid \$195 in laborers' (all African-Americans) wages for fifty weeks. The rented land produced crops worth \$700: 100 bushels of corn on 15 acres, 7 bales cotton on 15 acres, 70 bushels sweet potatoes on 10 acres. At his own Mullet Hall he made \$4,500 in crops: 200 bushels corn on 30 acres, 150 bushels oats on three acres, 42 bales cotton on 64 acres, and 200 bushels sweet potatoes on 10 acres. Legare held little livestock: four horses, two mules, 18 cows, and 8 chickens.

Without inherited land or access to capital, Legare's African-American neighbors operated much different farms than he did. Discussed below are three men, Jack Ryan, Henry Wright, and Joseph Wright. There were men by these names among the fourteen freedmen who signed contracts with Solomon Legare in 1866, but it is not certain that these are the same farmers.

In 1880 Jack Ryan was 32, being born in 1848. He was married to Phyllis and had four children. Ryan rented ten acres worth \$120. The previous year he had spent \$25 on buildings and/or repairs. Without buying any fertilizer, he produced 30 bushels of corn on four acres, two bales of cotton on four acres, and ten bushels of sweet potatoes on a quarter-acre. He had a horse, a milking cow (whose calf he sold), three pigs and forty chickens (collecting 50 dozen eggs in 1879). Ryan did not report growing any market produce for sale. His total production for the year was worth \$200.

Henry Wright was 60 years old in 1880 and lived on Johns Island with his wife, Betty, and their four children. Wright rented eleven acres worth \$100 in 1880. In 1879, he had produced crops worth \$60. Four acres planted in corn gave him 40 bushels, he got two bales of

cotton from six acres, ten bushels of sweet potatoes on one acre, and two bushels of peas from marginal land. Wright kept fewer animals than Ryan – one pig and six chickens; a milk cow and an ox, one of which died during 1879.

Joseph Wright, born in 1847, was married to 29 year old Lydia. They lived on Johns Island with their 6 children. Joseph Wright was slightly more prosperous than the others in 1880. He owned 28 acres, 20 improved and eight in pasture, worth \$120 altogether. He spent \$25 on fertilizer during the previous year, producing crops worth \$400: 12 bushels of corn from two acres, four bales cotton from eight acres, 40 bushels sweet potatoes from a half-acre. He also kept 20 chickens, nine swine, three cattle (one a milk cow), and a horse.

### **Rosebank**

Rosebank Plantation was appended to the 610-acre west half of James Legare's Mullet Hall in 1855. It had earlier been owned by Paul Fripp and his son Charles E. Fripp, whose heirs sold it to Lydia B. Legare, widow of James C. W. Legare.

Rosebank's earlier history has been generally researched. In 1783 Paul Fripp (1737-1800) of St. Helena Island paid £806/18/6 sterling money of Great Britain to Benjamin Mathewes and his wife Mary for a plantation of 185.5 acres bounding southeast on said Benjamin Mathewes, northeast on William Mathews Esq., northwest on Dr. Patrick Simpson, and southwest on Mr. George Rivers (Charleston County RMC DB O9, pg. 446-447).

In 1826 Charles Edward Fripp (1785-1843), a son of Paul Fripp (Rosengarten 1987:722-723), paid \$1,600 to Thomas Philson and his wife Martha M. Philson for 92.75 acres, half of a 185.5-acre plantation that Paul Fripp had bought from Benjamin Mathews. The description of the tract gave its boundaries as southeast by the other half, owned by Charles E. Fripp; northeast on James Legare, northwest on

Est. Joseph Jenkins and the high road, southwest on Est. Richard Jenkins (Charleston County RMC DB R9, pg. 102-104). We have not explored how half the tract had come into Philson's ownership.

There might have been a planter's residence at Rosebank, and at least by 1840 the Fripp family kept a house at Rockville on Wadmalaw Island. Charles Fripp's will devised to his wife Mary Minott a 594-acre rice plantation at Chehaw in St. Bartholomews Parish, slaves, and the "use and occupation of my house at Rockville," which she was free to dwell in or to rent out for income. Fripp directed that his 194.5-acre plantation be "retained under the management of my executor until my children are of age. When the youngest is 21, then my plantation to be sold with stock, cattle horses, boats, and plantation utensils" (Charleston County WPA Will Book 43, pg. 717). In 1844, Fripp's will was probated and an inventory made of his personal estate. In St. Johns Colleton Parish, the Estate held thirty-one named slaves, nine iron foot gins, a cotton whipper, picking sheets and bags, steel yards, cotton bags, a six-oared boat, fishing boat, sailboat and sails, as well as 28 head cattle, a lot of tacky horses [marsh tackys; small ponies common to the coastal marshes and often used on plantations], two carriage horses, two cart horses, and a saddle horse. Although household furniture was noted and appraised, the inventory is not specific how many residences were furnished, and as is common, no indication of the number of buildings on any of Fripp's lands (Charleston County Inventory Book A, pg. 540).

The Fripp heirs held Rosebank until 1855, when the adult children confirmed their mother's sale of the plantation to Lydia B. Legare, widow and executrix of James C. W. Legare (Charleston County RMC DB P13, pg. 308, 309). The next year, James C. W. Legare (1834-1874), son of Lydia B. Legare, gave a mortgage on the land to Mary M. Fripp, securing a debt of \$9,000. The mortgage was

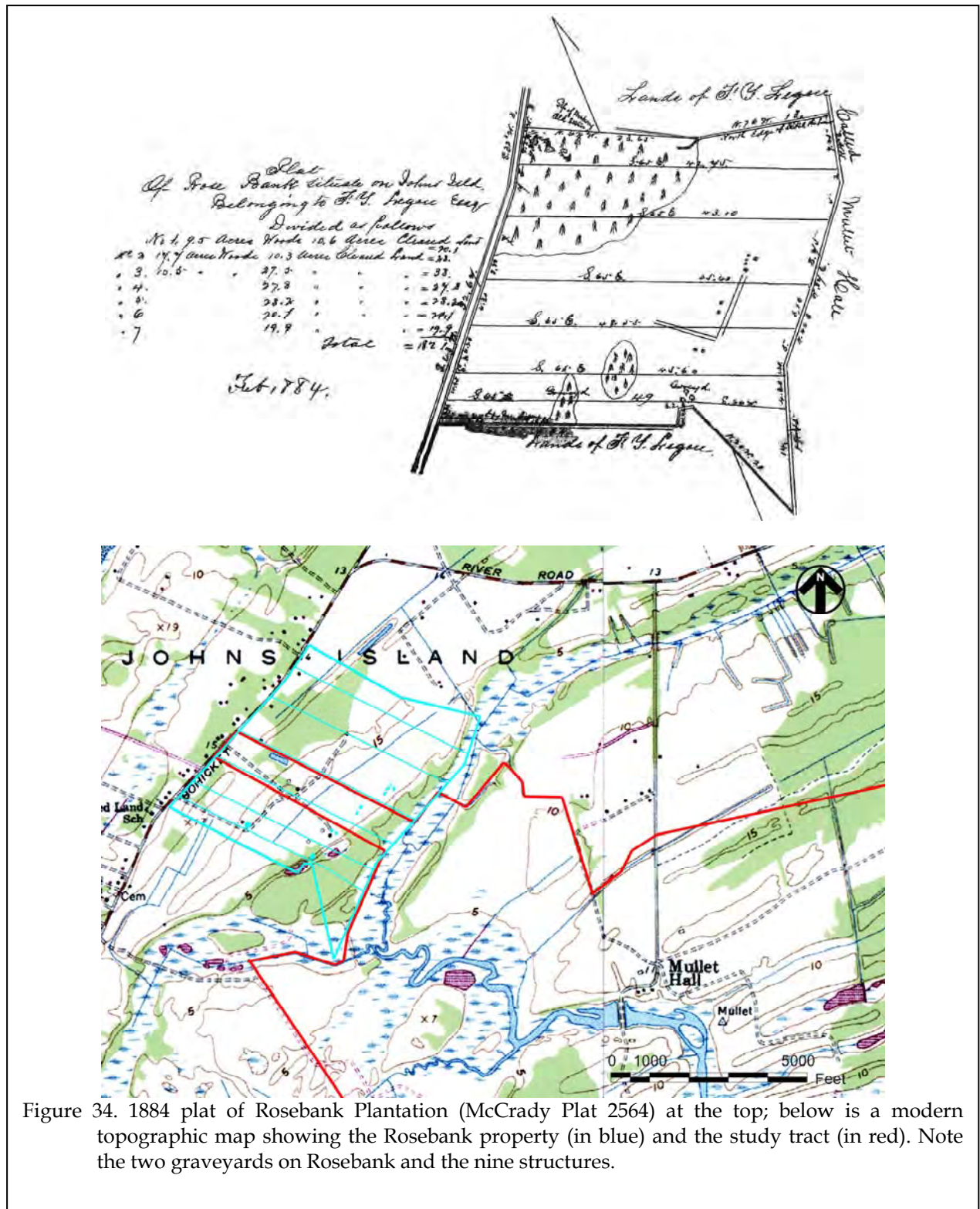
satisfied and released, evidently without incident (Charleston County RMC DB S13, pg. 329).

On March 23, 1868, J. C. W. Legare on Johns Island applied to R. K. Scott with the Freedmen's Bureau for

government provisions to aid me in carrying on my plantation situated on Johns Island. My plantation known as Rose Bank is well organized there are on my plantation sixteen hands or adults. I intend planting forty acres of cotton, thirty acres corn, 12 acres potatoes. I have failed to obtain assistance from other sources to carry on my planting and unless I obtain rations from the government I will be unable to carry on my planting. I will need these rations until 1<sup>st</sup> of August (Freedmen's Bureau Records, Series 1910, Reel 85, pg. 241).

In March 1871, J. C. W. Legare was cultivating Rosebank, where he seems to have been living, and entered into an agreement with his brother F. Y. Legare. F. Y. Legare agreed to advance up to \$100, either in supplies or hard money, in exchange for a crop lien and J. C. W. Legare's promise to sell his crop through F. Y. Legare. Further, he would send enough market crop by December to cover the total advanced (Charleston County RMC DB R15, pg. 265).

James C. W. Legare died intestate in December 1874, leaving a widow and four children. Francis Y. Legare became administrator of his brother's estate. He sold Rosebank's cotton through factors R. Roper and Son (Richard Roper and B. S. Roper), collecting \$110.95 for a 317-pound bag in November 1874 (he kept \$10.93 of the proceeds for the gin toll) and netting \$300.05 for 776 pounds (two bags and a partial bag) in December 1875. This cotton



had all been grown during 1875, as there was none on hand when the estate inventory was taken in March (Charleston County Probate Court, Case 230013).

There is a reference to a plat (not found) made in 1880 by Simons and Huger, dividing Rosebank into 13 lots. A later plat, dated 1884, shows the plantation as 182.1 acres, divided into 7 lots for FY Legare (McCrary Plat 2564; Figure 34), and in 1886 he sold Lots 6 and 7, 40 acres together to Paul White.

#### **Mullet Hall "Home Place" (East Half) After 1830**

When she came into ownership of the east half of Mullet Hall in 1830, Eliza S. W. Legare had been married to Solomon Legare, Jr. (1797-1878) for several years. He was her first cousin, a son of Thomas Legare of Johns Island. Thomas Legare was a landowner and planter, but we have not found any record of his having deeded property to his son Solomon, and his will of 1842 (Charleston County WPA Will Book 43, pg. 469) does not mention land previously given to any of his children (six sons and three daughters living at his death). The will directs only that his real and personal estate be sold after his death, the proceeds to be divided among the heirs. The assumption, therefore, is that Solomon Legare established his first independent planting career on his wife's Mullet Hall plantation, before her father's death.

Solomon Legare purchased other land on Johns Island. In 1831, his mother-in-law was living in Charleston, and decided to release The Point to her sons and sons-in-law. James C. W. Legare, Francis Y. Legare, Solomon Legare, and Horace Walpole agreed to pay Mary W. Legare \$1,500 annually for her lifetime, in exchange for use of the 324-acre property (Charleston County RMC DB A10, pg. 435). After her death, in 1843 Legare bought the Point for \$15,100 (Charleston County RMC DB I11, pg. 416).

In 1837, Solomon Legare purchased from Edward Whaley a "certain and well-known plantation," paying \$23,500 for the 450 acres on the Stono River at the south side of Abbapoola Creek (Charleston County RMC DB R10, pg. 361), across from The Point plantation. Here Legare established a summer village, in 1838 selling lots to his fellow planters on condition that "if they use the public landing at the village" they would keep it in repair (Charleston County RMC DB W10, pg. 428, 430; DB O11, pg. 427 et. seq.). The village and the plantation became known as Legareville.

In 1839 Solomon Legare extended his "Home Place" to the south, acquiring most of James Witter's 238-acre tract on Kiawah River and Coles Creek. This plantation had been divided into thirds: for \$4,753 Susannah Witter conveyed to Legare one-third (79.3 acres) of the land, and an undivided half-share of another third (RMC Deed Book V10, pg. 607). The remaining third, the southwest corner, was held by Mrs. Jane Holmes (the widow of John Holmes of nearby Hope Plantation, Jane was Susannah Witter's sister, and her parcel, too, eventually came into Mullet Hall). Upon Miss Witter's death, by prior agreement her executor conveyed an additional 100 acres to Solomon Legare in 1849. The boundaries were described as north partly on Solomon Legare (Home Place), partly on M. Jenkins Roper (The Oaks), east on M. J. Roper (The Oaks), west on Coles' Creek, south on marshes of Kiawah River (Charleston County RMC DB E11, p. 418).

In 1847, the year of his wife's death, Solomon Legare bought a nearby parcel from Charles Edmonston and James Louis Petigru, who had acquired a number of plantations in 1836 from the executors of merchant Adam Tunno. They sold 430.55 acres to Legare for the low price of \$1,000, describing it as bounding northeast on public road and Paul Grimball Esq., south and east on Benjamin Roper Esq., and southwest on Dr. J. Stevens (Charleston County RMC DB X11, pg. 282). Tunno himself had purchased the plantation at auction in 1832



as 500 acres bounded west on the Est. William Stanyarne and Mrs. Ball, south and southwest by William Robertson deceased (Charleston County RMC DB N10, pg. 124). The boundary descriptions indicate that this parcel was separated from Mullet Hall by neighboring properties, being closer to Benjamin Roper's Rush Plantation.

James Legare had bequeathed Mullet Hall to his daughter Eliza for her life only, entailing it to her children. Her children were mostly grown when she died in 1847 and they filed for a division of her estate after their father's second marriage in 1849. The plantation was advertised for sale as,

That valuable and well settled Plantation formerly belonging to the late James Legare Esq., containing upwards of 600 acres of Cotton and Provision Land, and some Rice Land, of which 150 or 200 acres are uncleared. It is contiguous to a bold landing on a creek which empties into Keewah or Stono; is under good banking and fencing, and was planted the past season by Mr. Solomon Legare. It contains a handsome and comfortable Dwelling House of 10 upright rooms and two garrets, Kitchen, Stable, a large Barn, Cotton and Gin House, with good negro Houses" (*Charleston Courier* 12/2/1850).

Solomon Legare paid \$21,050 for the six hundred acres, keeping it in his ownership while allowing a distribution among the heirs. The January 1851 deed recites the boundaries of the plantation "known as Home Plantation" as south on Solomon Legare formerly Miss Witter, east on Dr. William J. Roper (The Oaks), west on James C. W. Legare (the western half of Mullet Hall), north on Estate Jenkins (Walnut Hill) and

of John A. Fripp (Rosebank) (Charleston County RMC DB I12, pg. 139).

Solomon Legare owned his Home Plantation, the east half of Mullet Hall, together with the Witter tract, until his death in 1878. In 1857 he added to it again, purchasing about 200 acres from J. E. Mathews for \$2500. The parcel was described as a "portion of the Richfield tract" south of the public road running east to west, and west of the road that ran south to the plantations of Dr. M. J. Roper (The Oaks) and B. D. Roper (Briars). Mathews also granted Legare "all the rights and privileges of digging, draining, and cleaning of all the old canals and water courses through the swamps . . . for the benefit of the 200 acres" (Charleston County RMC DB X13, pg. 135).

The 1860 census shows Solomon Legare holding 230 slaves on his Johns Island plantations, where there were 59 slave houses altogether. He organized the people by age for the census: 20 were more than 55 years old (some of them in their 80s), 30 between 40 and 55 years of age, 11 from 35 to 39, 25 between 26 and 34, 22 from 20 to 25 years old, 32 teenagers between 14 and 19, and 86 children under 14.

Solomon Legare was living in Charleston after the Civil War, and in October 1865 he applied for restoration of his residence on Greenhill Street as well as another dwelling on Tradd Street (Freedmen's Bureau Records, Series M869, Reel 28). He soon petitioned the U. S. government for restoration of his plantation lands. In January 1866, his two Stono River plantations on James Island, totaling 1,400 acres, were restored to him as being unoccupied by freedmen (Freedmen's Bureau Records, Series M869, Reel 32, pg. 490-494).

The freedmen living on Mullet Hall executed an agreement with Solomon Legare on March 25, 1866:

*Article of Agreement between  
Solomon Legare and Freedmen and*

*Women on Plantation on Johns Island known as Mullet Hall*

Solomon Legare . . . agree with the Freedmen and Women, heads of families, to work my plantation on Johns Island known as Mullet Hall until the 1<sup>st</sup> of Jany. 1867, on the following terms - viz, to give them ½ of the Cotton Crop, to be divided when ginned and prepared for Market, and also ¾ of the corn raised by said Freedmen and Women, they agreeing to feed themselves, and furnish everything needed for planting and working the crop. They also agree to furnish from their own number a foreman to be selected conjointly by the employer and themselves, who shall be responsible for the order and subordination of the plantation. They agree to plant not less than 3 acres of cotton, and \_ acres of provisions to each full hand (other than full hands in proportion).

Neither party shall sell or use any portion of the crop, until after the division of the same, without the consent of the other party. The crop to be worked by families, but all cotton to be placed in separate lots in one or more buildings, which shall be in charge of the foreman. It is agreed that the employees shall have the privilege of visiting the city, but in no case shall the crop be neglected by their so doing (National Archives Record Group 105, Records of the Bureau of Refugees, Freedmen and Abandoned Lands, copy in Pivnick Papers, Avery Institute, Charleston).

The agreement was approved by Assistant Commissioner for Refugees, Freedmen, and Abandoned Lands on April 14, 1866. Fourteen people signed using their marks: Primous Brown, Rector (?) Wise (?), James Henry (?), Ben Fludd, illeg, illeg, John Rivers, Jack Ryne (Ryan), July Jenkins, Henry Wright, Jerry Smith, Jim Johnson, Stany (?) Wright, illeg.

Solomon Legare also put his other plantations back into production, although we have not located those contracts. However, by 1868, the lack of available food provisions on some farms created an impossible situation. In March 1868, urgent appeals were sent to the Freedmen's Bureau. Whether Mullet Hall was involved is uncertain, although documents from at least two other Legare plantations survive. In one case, the Bureau was told,

application for government provisions to assist in planting the Hanscome Point plantation on this island, the term of our contract is to pay the owner of the plantation, Solomon Legare, one half the cotton we raise and one bushel corn to each family. The plantation is in a good state of organization, we have the necessary implements and three work animals.

We shall require provisions for 13 adults and 8 children. We expect to plant 36 acres cotton, 51 acres corn, and three acres potatoes. We are entirely out of provisions and without this assistance from the government immediately we will be unable to plant.

Signed [by mark] John Brown and James Brown (Freedmen's Bureau Records, Series 1910, Reel 85, pg. 231).

In another case, the Bureau received a letter from John B. L. Walpole,

soliciting assistance for the freed people on Mr. Solomon Legare's plantation known as the Legareville Place, Johns Island.

There are on this plantation twenty-nine working hands and six old persons who are entirely destitute of provisions and cannot plant a crop unless assistance is rendered.

The plantation is organized and the people have begun to work under such a contract as will ensure the future support of all parties, each full hand agreeing to plant two acres of cotton and three of corn (Freedmen's Bureau Records, Series 1910, Reel 85, pg. 240).

We assume these requests were approved, but we have not examined the Freedmen's Bureau records in sufficient detail to provide documentation.

Solomon Legare died at the age of seventy-five on April 30, 1878, leaving one grown son, Thomas Legare, to whom he bequeathed Edenvale Plantation and Point Place (near Hanscome Point and Legareville). His will, written on March 30, 1878 and probated on May 27, 1878, directed that his "Home Place" (the eastern half of Mullet Hall) should be sold as soon as his wife Amelia thought best, the proceeds divided among her as the widow, Legare's three daughters, and a grandson, Charles E. Carrere. The remainder of his land on Johns Island, and all his James Island property, were left to Amelia to rent or sell, dividing the proceeds among herself and the three daughters (Charleston County Estate Files 251-12).

Solomon Legare's house had been burned or otherwise demolished during the Civil War or shortly afterward. As a step in managing the Home Place, Amelia Legare had it sold at auction on August 29, 1878. The buyer, William M. Bruns of Charleston, paid only \$500

for the 1,130 acres, known as Mullet Hall or the Home Place (Charleston County RMC Deed Book L17, p. 221). The low price is explained by the fact that Bruns, a lawyer practicing in Charleston, was acting as agent for the Legare family. He had a new survey drawn (Charleston County RMC PB C, pg. 11) and then conveyed parcels back to the family members beginning in September 1878. Figure 35 shows this plat, revealing that most of the Home Place soon came into the ownership of Francis Y. Legare, proprietor of James C. W. Legare's 1830 portion of Mullet Hall, but not all of it is within the study area.

Maynard E. Carrere (father of Charles Carrere) paid \$200 for Tract No. 2, a long strip extending along the east side of the plantation's entry road, 207.3 acres which included Solomon Legare's Mullet Hall house (Charleston County RMC DB O17, pg. 208). Just two years later, in 1880 Charles Carrere sold this acreage to his cousin Francis Y. Legare (RMC Deed Book A16, pg. 94). Legare and his wife Kate built a new house east of the Solomon Legare house site (Limehouse, 2008).

Also in 1878, Ann Eliza Seabrook paid \$150 for 140 acres known as "the island" (formerly James Witter's land, and called Summer House Island by later owners) and the 80-acre Tract No. 7 below Cocked Hat Road (Charleston County RMC DB O17, pg. 310). Martha E. Legare Holmes paid \$125 for Tract 4, 227.9 acres in two portions: a strip of 143.3 acres parallel to Carrere, and 84.6 acres south of Cocked Hat Road (Charleston County RMC DB O17, pg. 311). Julia Harrison, the third Legare daughter, had inherited her portion as a trust managed by her mother. She paid Bruns \$150 for Tract 3, being 228 acres in two portions: a 150.3-acre strip between Carrere and Holmes, and 77.77 acres south of Cocked Hat Road (Charleston County RMC DB O17, pg. 309). We did not find a conveyance of Tract No. 5 on the 1878 plat, but assume it was conveyed to Mrs. Amelia Legare.

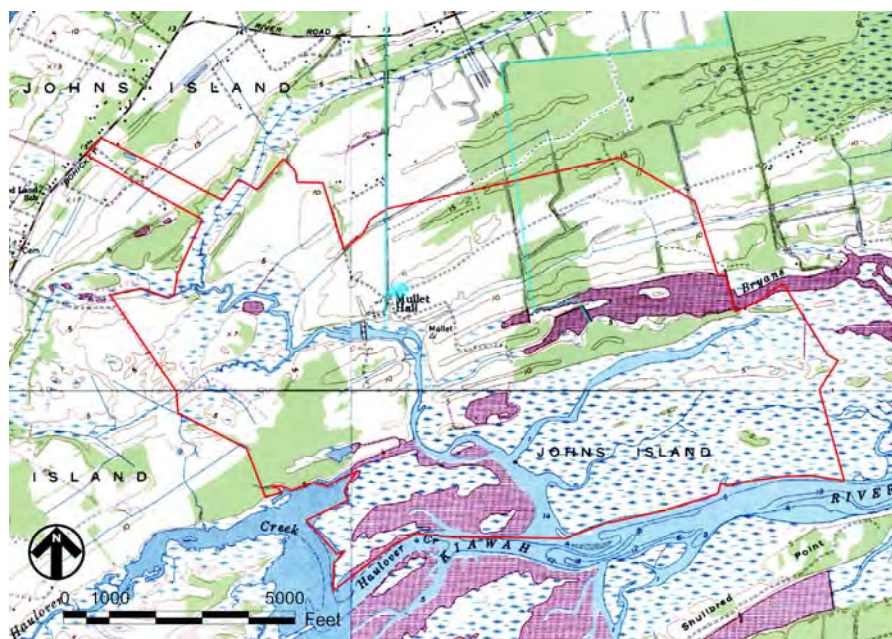
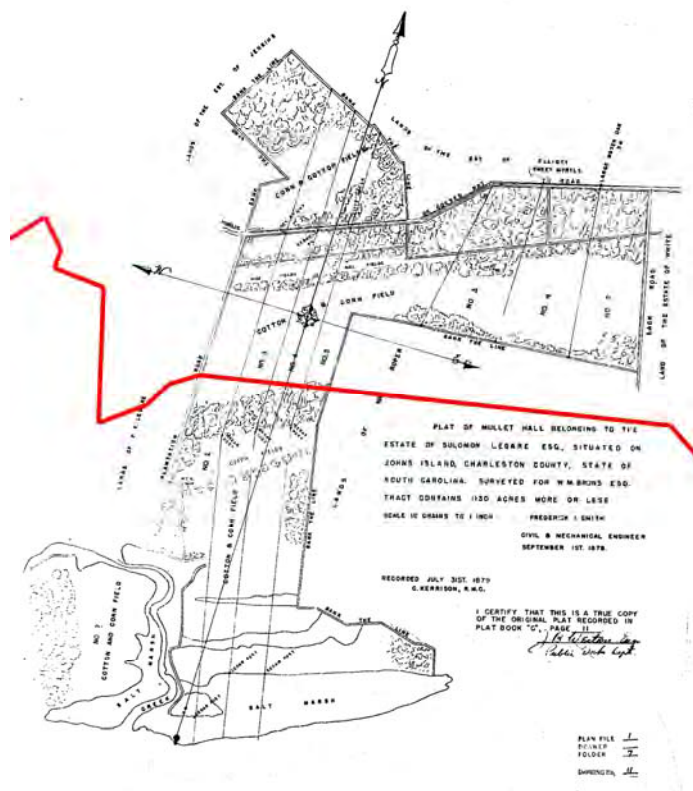


Figure 35. 1879 plat of Solomon Legare's Home Place or Mullet Hall (Charleston County RMC PB C, pg. 11) at the top; below is a modern topographic map showing the portion of the Home Place property (in blue) in the study tract (in red).



In 1879, the Solomon Legare Estate managed by his widow had twenty-three tenants paying rent at the "Village Place" near Legareville, and twelve on James Island. Some of the James Island land, as well as Legareville Plantation, were sold in that year. Other portions of these lands were held for tenant farming until 1887 (Charleston County Estate Files 251-12). With Mullet Hall divided among the heirs, the assumption is that the tracts were rented separately to one or more tenants after 1879, but we have not found records of its use. Records were filed with the Probate Court for the portion owned by Mrs. Julia Legare Harrison. Under the management of her mother, Mrs. Harrison's 228 acres of Mullet Hall was rented for \$190 each year through 1887 (Charleston County Estate Files 251-12), and then sold to Francis Y. Legare in 1889 (Charleston County RMC DB A27, pg. 192).

After a decade of absentee management, the other heirs also conveyed their portions of the Mullet Hall Home Place to Francis Y. Legare. Ann Seabrook was first, in 1888 selling him the 140-acre island nearest Kiawah River for \$1,000 (Charleston County RMC DB A32, pg. 201). The next year Martha Holmes sold him her 143-acre Tract 4 for \$1000 (Charleston County RMC DB A32, pg. 242). We did not find the conveyance to F. Y. Legare of Tract 5, which we assume to have been held by Mrs. Amelia Legare.

### Mullet Hall after the 1880s

Francis Yonge Legare (1850-1905) and his wife Catherine Walpole (Kate S. Legare, 1859-1945) operated Mullet Hall (both the western and eastern tracts, 610 acres and 1,180 acres) and Rosebank together, managing a total of almost 2,000 acres of farmland. In 1897, F. Y. Legare added the adjacent Oaks Plantation (see below). For the years between 1880 and 1920, deed indexes show dozens of conveyances of small parcels of land by the Legares to other individuals, and numerous acquisitions of land

by them. Small independent farmers as well as their own tenants traded at the Mullet Hall store.

As discussed in the previous overview, in 1890 F. Y. Legare's general merchandise store had at least five competitors: the businesses of William Andell, E. M. Seabrook, Charles Seel, Walpole & Co., and C. G. Whaley. Legare had a decided advantage in the fact that Mullet Hall was a regular landing on the steamboat route connecting Exchange Landing (Wadmalaw Island) with the truck farms and cotton farms throughout southern Charleston County. Payroll for commercial farmers, including Legare's neighbor William Andell, was delivered to the Mullet Hall landing (Sidi Limehouse, personal communication 2008). The Mullet Hall Post Office, begun in 1893 with Francis Y. Legare the first postmaster, operated until 1918 when Frank Legare left Mullet Hall ([http://carolana.com/SC/Towns/All\\_SC\\_POs\\_1783\\_to\\_1971\\_Sorted.htm](http://carolana.com/SC/Towns/All_SC_POs_1783_to_1971_Sorted.htm)).

The state business directory for 1905 shows Francis Y. Legare with a general store and grist mill near the Mullet Hall post office. Other farmers in the area included John Legare, J. C. W. Legare, and T. S. Legare (see previous



Figure 36. Examples of the F.Y. Legare store tokens.

discussion). However, Francis Y. Legare died in 1905, leaving his widow Kate and a fifteen year old son, Francis Y. (Frank) Legare. Henry Muhler, previously the farm overseer for William Andell's nearby operation, had been managing the store for Legare, and upon his death began renting the operation from Kate Legare for \$120/year (Haynie 2007:36). Acting

on the advice of her lawyers and factors, Mrs. Legare sold the stock of goods in the store to Henry Muhler for \$414.84 in January 1906 (Charleston County Probate Court, Case 461029 and 461030). By 1912, R. G. Dun & Co. listed three merchants near Mullet Hall Post Office, including Muhler, with \$3,000 to \$5,000 capital, and fair credit worthiness (discussed in the overview). We have not learned how late the Mullet Hall store operated, or how long Muhler retained use of the commissary tokens marked "F. Y. Legare." A previous owner of the property remembers the commissary building standing at least through the early 1940s (Sidi Limehouse, personal communication 2008; we were not able to identify the structure in the 1948 aerial photographs of the tract).

The Legares traditionally relied on the Charleston firm of Dill, Ball Company for credit and cash advances. As early as 1886, F. Y. Legare gave the company a mortgage on his 610-acre Mullet Hall to secure a loan (Charleston County RMC DB A31, pg. 262). After years of operating as a partnership, Dill, Ball, Company was incorporated in 1898 with officers Joseph T. Dill, J. Alwyn Ball, and John Rivers. Their charter allowed a "general factorage and commission business, advancing to planters and selling of Sea Island and upland cotton," also buying and selling Sea Island cotton bagging and twine, and selling cotton seed and "such other produce as may be consigned to it" (Charleston County RMC DB L23, pg. 37; Acts and Resolutions of 1899, pg. 263). Between 1901 and 1929, the firm also acquired a number of farms on Johns Island, evidently resulting from forced sales by indebted farmers. Most of the parcels were less than ten acres (Charleston County RMC Deed Index, 1898-1930).

Upon the death of Francis Y. Legare in New York, "where he had temporarily gone for his health for a few weeks," his widow Kate turned to the Dill, Ball Company. His death came in early October, "the midst of a business season," and they took over business management of his property – a total of 2,627

acres on Mullet Hall, Rosebank, The Oaks, and Briars.

The family's attorneys handled debts and legal affairs. On their advice, she sold the Briars Plantation, and began foreclosing on bad debts. She forced a sale of Lots 6 and 7 on Rosebank Plantation to recover a judgment against Richard Johnson, and bought the forty acres back in her own name, paying \$100 (Charleston County RMC DB W23 pg. 118). Other parcels of Rosebank came back to her as well. The same day she bought in Lots 6 and 7, she paid \$100 at the public auction of Lot 9, also 20 acres, which was being sold as a result of her claims against Susan Green (Charleston County RMC DB W23 pg. 119).

The lawyers arranged management of the gin, and authorized repairs to the Legares' house and other buildings. For several years, Dill, Ball Company continued to manage the farm and its tenants. In December 1908, they received \$750 from E. M. Bailey, "½ rent for Mullet Hall," and in January 1909 W. B. Hills paid in \$500 for an unspecified tract. The 1900 census has Hills, a white 21-year old farmer, living on Edisto Island.

Other rents were probably collected from cotton receipts: in the last six weeks of 1908, Dill, Ball credited Henry Mack, Cain Ryan, Pompey Scott, Joe LaBorde, Annie Ryan, Tom Murray, Jimmy White, Katie Capers, and July Mikell each with \$25. Others paid smaller amounts - Elizabeth King, \$22.50, John Ryan \$5.38 - but Alfred Heyward paid \$35. Only two of these names are on the 1905-1910 list for Mullet Hall (Table 14). Eight of these individuals can be identified in the 1910 census (Table 19).

Two entries on the rent rolls seem to indicate business tenants, P. S. Co, and W & R, but the amounts were small (\$90 and \$15) (Charleston County Probate Cases 461029 and 461030). W & R is likely Whaley and Rivers, while P.S. Co. is probably Porter-Snowden

Company. Both were cotton factors in Charleston (R.G. Dun & Co. 1907).

When Francis Yonge Legare (1890-1955) reached adulthood in 1911, the Estate of Francis Y. Legare, Sr., was closed. After graduating from The Citadel in 1912, Frank Legare (1890-1955) married Mary V. Lee and returned to Mullet Hall for a few years (Ben Legare, person communication 2008).

When the boll weevil reached the Sea Islands, the Legares and their young children left Johns Island. Kate Legare continued the agricultural operation with the help of the Dill, Ball Company. Their records between 1914 and 1918 show many small advances, either fertilizer or seed money, in the early spring each year: \$35

Table 19. Dill, Ball Renters at Mullet Hall in 1907 Found in the 1910 Census		
Name	Age	Family
Capers, Katie	48	Widow, 1 child
LaBoord, Joe	35	Wife, 2 children
Mack, Henry	3 listed	
Mickell, July	70	Wife, 2 children
Murray, Tom	45	Wife, 4 children, 4 step children
Ryan, Cain	38	Wife, no children
Scott, Pompey	68	Wife, 2 children
Wright, Jimmy	59	Wife, 2 children

in 1914, 1915, and 1916, increasing thereafter to \$55 in 1917, \$45 in 1918, and \$60 in 1919 (Dill, Ball Co. Ledger Book 1909-1918, Charleston Museum, Charleston, South Carolina). In 1920 they advanced \$1500 to F. Y. and Kate Legare (Dill, Ball Co. loose papers, Charleston Museum, Charleston, South Carolina).

In March, 1920, Kate S. Legare repurchased Briars Plantation. E. B. Bryan, the 1906 buyer of Briars, had subdivided its 764 acres for sale in small parcels (see Charleston County RMC PB D, pg. 143). Seventeen purchasers are shown on the plat, but only the tracts conveyed to Alonzo S. Gray (30 acres) and Isaac Singleton (52.5 acres) were exempted from Briars when Bryan sold it to Ravenel & Company (J. R. P. Ravenel and John H. Roper) in

1908 (Charleston County RMC DB N25, pg. 95), or when they conveyed it to Kate Legare (Charleston County RMC DB P29, pg. 114). Although not researched, it may be that the other purchases defaulted.

Now the owner of Briars Plantation, free of the mortgages and liens that entangled Mullet Hall, Kate Legare presumably consented to a foreclosure action brought by Dill, Ball Company in 1923 against Mullet Hall. In July 1923 Mullet Hall was sold at public auction to the Dill, Ball Company for \$10,000. It was described as the acreage that remained in Mullet Hall (originally 1,790 acres) after various conveyances by the Legares, together with 660 acres (The Oaks): 1675 acres in all, with an undetermined acreage of salt marsh (Charleston County RMC DB P31, pg. 572).

### The Dill, Ball Company Years

The Charleston Museum's Dill, Ball Company notes include ledger and account books from several periods in the twentieth century (1914-1917; 1935-38; 1939-40). These primarily concern land on James Island - Centerville (WB Seabrook) and the Dills' Stono Plantation, and the James Island Ginning Company. There is no evidence that the firm held any large tracts besides these and Mullet Hall (Dill, Ball Company papers, Charleston Museum). They certainly forced the sales of other tracts in order to collect debts, occasionally buying the land, but there is no evidence of a systematic effort to amass large holdings.

Overtime the company grew significantly. In 1907 it was listed as having \$35,000 to \$50,000 in capital and good credit. By 1921 its capital had grown to \$75,000 to \$125,000 with high credit (R.G. Dun 1907, 1921).

We did not find records of the Dill, Ball Company for the first few years it owned Mullet Hall. Twentieth century deeds refer to a plat, "Map showing holdings of Dill-Ball Co.,

formerly of F. Y. and Kate S. Legare . . . 1685 acres surveyed December 1924 by Rene Ravenel," but this was not recorded with the deed and could not be found in the RMC plat indexes.

By 1928, the company had rented much or all of the land to Johns Island farmers. Their December 1928 lease agreement with F. L. Glover concerned a portion of the "Grave Yard Field," run from the creek opposite Glover's ownership

on a straight line to the east of and including the grave yard and to run as far as the rod which runs east and west along a dam about 1/16 mile south of the graveyard. From this point you are to run your fence in a generally westerly direction to the creek, and to fence as much of this marsh land as the creek allows. The fence is yours and you will have the right to remove it. The rent is \$30/year. Either party may terminate the lease before October 1<sup>st</sup> . . . you have the right to gather all crops remaining after the termination of the lease, provided it does not extend so far into the succeeding year as to prevent the preparation of the land for crops for that year (Dill, Ball Company papers, Charleston Museum, Charleston, South Carolina).

The firm also undertook some improvements, the nature of which remains unclear. In an undated letter from Caleb Chisolm, John Rivers was informed that,

I went to Mullet Hall Friday but the lumber did not come till late. I did make a little start but I did not do much. I will try to

make a good stand by Monday." Chisolm followed with the report that "this window size is 2'6" X 4'6" . . . and I want you to send me one gallon of roofing cement because the cement that is in the roof will not be enough (Dill, Ball Company Letters 1920-1932, Charleston Museum, Charleston, South Carolina).

Mullet Hall farmers could be expected to send their cotton to Dill, Ball Company for ginning. Following established custom, each bale was tagged with its owner's name and sold when the factors deemed the best price had been obtained. The cotton seed, too, was marketed for sale, some to be pressed for oil and some for planting. In November 1928, Reubin Bishopp, whose pickup truck hauled bagged cotton and supplies for his neighbors, wrote, "Dear Mr. Rivers, this is just to remind you of the planting cotton seed I told you about some time ago. I want to get 15 bushel of the Mullet Hall seed. I will try and be down soon" (Dill, Ball Company Letters 1920-1932, Charleston Museum, Charleston, South Carolina).

In May 1929, John Rivers saw the possibility of selling Mullet Hall but retaining the management of it. He wrote to Cephas Drayton, one of the tenants there, "I have a party who wishes to go over Mullet Hall on horseback on Friday afternoon. Please have two horses with saddles for this gentleman and myself to ride. We also want you to go along to show us the lines, and so need three horses. We should be there 3:30 or 4 o'clock" (Dill, Ball Company Letters 1920-1932, Charleston Museum, Charleston, South Carolina).

This "gentleman" was a potential buyer, John Knapp Hollins. A son of Wall Street millionaire Harry B. Hollins, John K. Hollins was one of the many Long Island sportsmen who bought South Carolina plantations between 1890 and 1930. Harry B. Hollins was a founder



of the Pineland Club, member of the Okeetee Club, and late-nineteenth century owner of Good Hope Plantation in Jasper County (obituary, *New York Times* February 25, 1938). John K. Hollins, like his brothers Gerald V. Hollins (obituary, *New York Times* November 30, 1955) and H. B. Hollins, Jr., (obituary, *New York Times* December 8, 1956) grew up wintering in South Carolina, and eventually bought property in the Lowcountry.

John K. Hollins and his father were very active in real estate in Beaufort and Jasper counties, between 1898 and 1931 acquiring some fifty parcels as recorded in the Beaufort County RMC (Stephen G. Hoffius personal communication 2008). In 1906 he donated Indian artifacts to the Peabody Museum. John K. Hollins owned a share of Paul and Dalton Plantation in Colleton County (Anonymous 1931) and briefly owned Cotton Hall and Laurium, together 1,797 acres (Anonymous 1930) in Beaufort County as well as Brays Island. His brother Gerald owned Tomotley, and Harry B. Hollins, Jr., owned Cunningham's Bluff and Hall's Island, together 2000 acres, and Broadmarsh Plantation.

Although Dill, Ball Co. conveyed Mullet Hall and The Oaks to John K. Hollins in 1929, the deed was not filed with the RMC. We have not determined how long he held the property or how much he paid to Dill, Ball Company (he gave them a mortgage for the purchase price).

Hollins must have intended to resell Mullet Hall, and he began to consider ways to "improve" it. His attorney in Beaufort wrote John Rivers at Dill, Ball Company for permission to "destroy the old dilapidated buildings around the building site, and generally improve conditions around this spot, and repair and make passable the avenue . . . [we think you will agree] the buildings right around the old home site are valueless and I will be indeed fortunate if I can have them removed for the material to be salvaged" (J. Heyward Jenkins to John Rivers, October 8, 1929, Dill, Ball Company papers,

Charleston Museum, Charleston, South Carolina).

Rivers consented immediately: "relative to pulling down the old buildings on Mullet Hall around the building site. It is perfectly agreeable to us to have you do this. I agree with you that the buildings are of not much value and you have our permission to take them down. . . . the quarters occupied by the several tenants on Mullet Hall are in quite bad repair, and we would suggest that you allow these tenants the use of this lumber in repairing their quarters if they would take it down for the material. We are glad you intend fixing up the road - in wet weather it is a great source of annoyance" (John Rivers to J. H. Jenkins, October 10, 1929, Dill, Ball Company papers, Charleston Museum, Charleston, South Carolina). Some of the work was carried out, but the correspondence is not specific about which "building site" was in discussion.

Hollins had paid for Mullet Hall with a mortgage; nevertheless, he was the owner and the rent money was due to him. However, Dill, Ball Company was his plantation manager, and retained half the rent. Rivers reported to Hollins' attorney "Enclosed is list of renters at Mullet Hall, with the amounts paid by each . . . . We have collected \$190.50. Mr. Hollins' portion of this will be one-half, so we enclose our check for \$95" (John Rivers to J. H. Jenkins, November 26, 1929, Dill, Ball Company papers, Charleston Museum, Charleston, South Carolina; no list of renters found in file). In 1931 there were four tenants paying rent: Joe LaBorde, Caesar Simons, Emma Jenkins, and Mary Wright (Folder 5C, Dill, Ball Company papers, Charleston Museum, Charleston, South Carolina).

Only Mary Jenkins can be identified in the 1930 census as living on Johns Island. Caesar Simons may have moved to Johns Island from the Beaufort area where an individual with the same name is shown in the 1920 census.

William Seabrook of Johns Island acted as Rivers' agent in financial dealings with the Mullet Hall tenants. Their affairs were complicated - advances to the tenants of fertilizer and seed; rent payments owed to Dill, Ball; payments to tenants for cotton; ginning and hauling tolls due. When the 1930 crop was being picked, Seabrook and Rivers spelled out the arrangement. The ginning toll was taken in seed. Remaining seed was sold to a cotton oil company, or held for sale as planting seed. First out of the proceeds of each tenant's baled cotton came Dill, Ball's repayment for fertilizer advances, and then the rent was taken out. Anything left after the rent was collected went toward other advances made by Dill, Ball; anything left after that could be paid to the tenant. (William Seabrook to Dill, Ball Co., October 2; Rivers to Seabrook October 4, 1930, Dill, Ball Company papers, Charleston Museum, Charleston, South Carolina).

Clearly the rents at Mullet Hall could not carry Hollins' mortgage, and although there were still northerners eager to buy a southern hunting plantation, he does not seem to have tried to resell it as such. Instead, in 1931 he sent his \$1,400 interest five months late, thanking John Rivers for allowing the late payment: "You may be interested to know that by so doing you are allowing me to continue the employment of three families" (J. K. Hollins to John Rivers, June 22, 1931, Dill, Ball Company papers, Charleston Museum, Charleston, South Carolina).

Hollins eventually lost any inclination to improve or otherwise use Mullet Hall. In December 1931, Dill, Ball Company requested an interest payment; he replied that he was "in no position to pay interest." In June, Rivers ordered a Bradstreet report on Hollins, receiving a positive reply as to his financial stability, but a year later the company said,

we have no recent  
correspondence with Mr. J. K.  
Hollins. In January 1932 we  
corresponded with him at

Beaufort, and June 1931 his  
address was Meadow Farm,  
East Islip, Long Island. We  
think a letter to him at Beaufort  
would be forwarded" (John  
Rivers to Julian Mitchell, July  
13, 1933, Dill, Ball Company,  
Charleston Museum,  
Charleston, South Carolina).

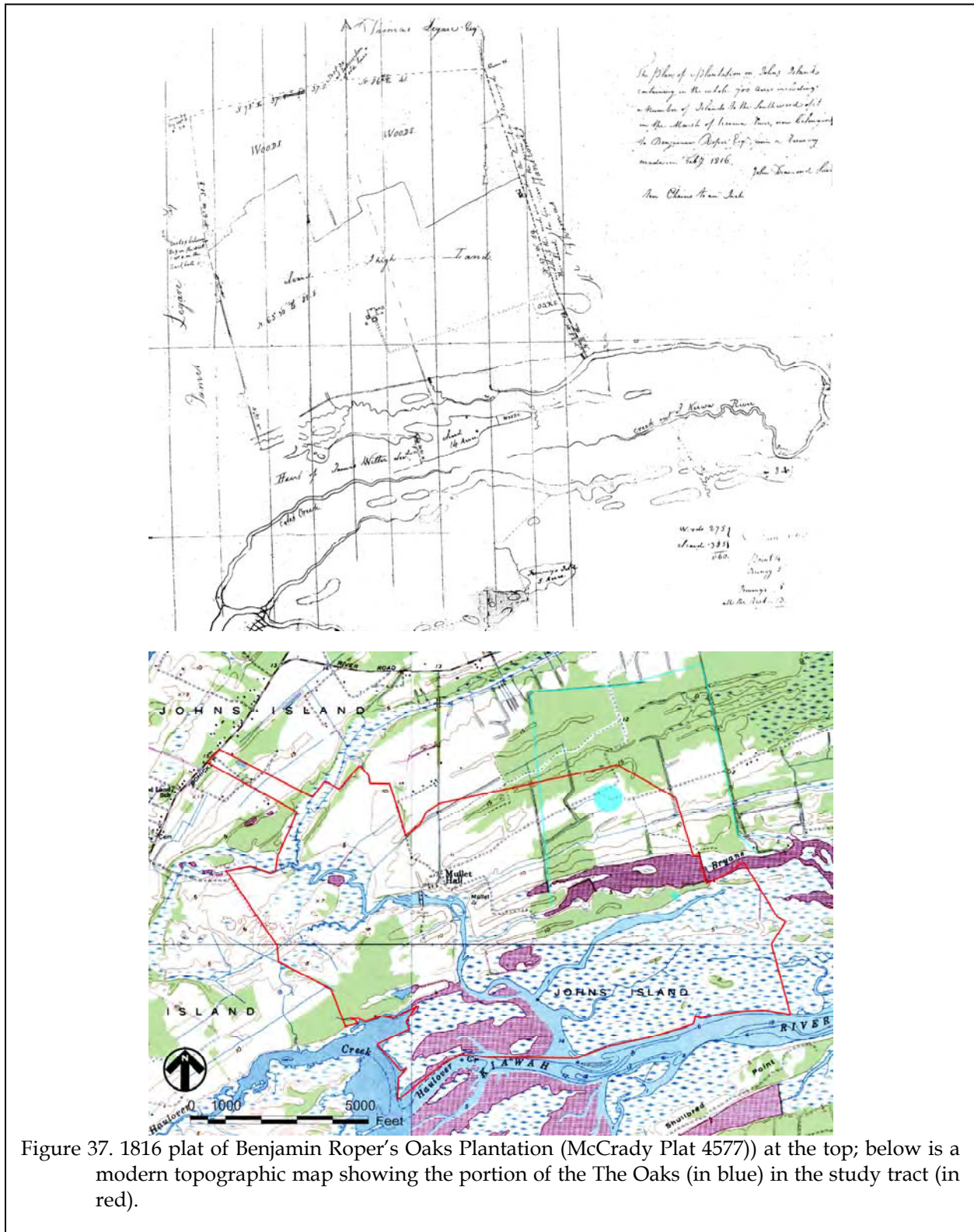
### **Mullet Hall and The Oaks into Julian S. Limehouse**

Six years after losing John K. Hollins as a buyer, in about 1938 the Dill, Ball Company leased or sold Mullet Hall and The Oaks to Julian S. Limehouse, Jr. (Sidi Limehouse, personal communication 2008), giving him title in June 1942. Limehouse paid \$12,000 for 1,685 acres plus salt marsh with two fingers of high land, south to the Kiawah River (Charleston County RMC DB L43, pg. 197).

The residence built by Francis Y. Legare, and several tenant houses remained on Mullet Hall at the time Limehouse purchased it. His father soon built a new two-story house near the water. Although delayed by World War II-era shortages, Limehouse managed the evolution of Mullet Hall from a tenant-based cotton farm to a productive vegetable and livestock operation. Equipment sheds and trailer houses replaced tenant houses, and tractors with subsoil tillers replaced hoes and plows.

### **Mullet Hall in the Modern Age**

In 1994, the heirs of Julian S. Limehouse, Jr., conveyed 738 acres of their Mullet Hall plantation (which included The Oaks) to Charleston County Park and Recreation Commission (Charleston County RMC DB Y243, pg. 235). The remainder of the property, about 2,207 acres, was sold to The Beach Company. Portions remained in agricultural production under the management of Rosebank Farms/ Sidi Limehouse.



### **The Oaks – into Francis Yonge Legare 1897**

In 1897 Francis Y. Legare acquired the plantation adjoining the east side of Mullet Hall, known as The Oaks. This tract, described variously as 700 acres or 660 acres, had been held by the Roper family since the nineteenth century. Figure 37 shows the tract in 1816.

In 1843, planter Benjamin Dart Roper gave The Oaks to his son, planter/physician Micah Jenkins Roper (1812-1859) (Will of Benjamin Dart Roper, Charleston WPA Will Book 46, pg. 201). With his wife Susan Elizabeth Edwards, M. Jenkins Roper settled at The Oaks, which was bounded to the east by the Briars Plantation, owned by his brother Benjamin Dart Roper, Jr., also a medical doctor.

M. J. Roper died a fairly young man, but the inventory of his personal property made in early 1860 shows him to have been a wealthy planter, with 119 slaves on Johns Island. The appraisal of household goods included the furniture and furnishings typical of a planter's residence, being notable for its inclusion of three bookcases with valuable books, and several medicine chests: one mahogany, two of leather, and two of wood. Livestock on the plantation was counted as eighteen oxen, sixty steers, twenty-nine cows, two bulls, and twenty calves and yearling. There were also eighty sheep (45 ewes, 32 lambs, 3 rams) and several horses, four ox carts, several plows, a carriage, buggy, and sulky. The appraisers included five hundred bushels of corn and a corn sheller, but did not record any gins or ginned cotton (Charleston County Inventory Book F, pg. 25).

After the Civil War, William Roper of Brick House Plantation, who was M. Jenkins Roper's brother and also a practicing physician, managed The Oaks for Susan Roper and her children. In February 1868, Dr. Roper applied to the Freedmen's Bureau for,

aid from the government to  
enable me to plant my own

plantation and that of the Estate of M. J. Roper [Oaks] which is under my charge . . . . I have failed to obtain aid elsewhere and unless assisted by the government will not be able to plant the plantations. I require corn and bacon for 120 adults and eight children. I shall plant 260 acres of cotton and 260 acres of corn. I shall require these provisions for five months. Approved by Special Agent S. B. Thompson (Freedmen's Bureau Records, Series 1910, Reel 85, pg. 226).

Susan E. Roper and her two children held the Oaks until 1897 when F. Y. Legare paid M. Jenkins Roper, Jr. \$3,200 for the "plantation known as 'Oaks' 660 acres, bounded north and west on a plantation formerly belonging to Solomon Legare, south on Kiawah River, east by a road separating it from the plantation formerly of BD Roper [Briars]" (Charleston County RMC DB X15, 227, Q22, pg. 128).



# METHODS

## Introduction

The primary goals of this survey are to identify, record, and assess the significance of archaeological sites within the approximately 1,083 acre tract. No major analytical hypotheses were created prior to the field work and data analysis. This research design proposed for this study is, as discussed by Goodyear et al. (1979:2), fundamentally explorative and explicative.

In spite of this, several lines of research were used to maximize the results of the study in an effort to ensure that all significant sites were identified. One line was the use of the previous reconnaissance level archaeological study (Adams and Trinkley 1994). Twelve sites were examined during that study with seven identified as potentially eligible and worthy of both protection and additional investigation during an intensive survey stage. A second line of research was the use of oral history. Discussions with individuals who were familiar with and had farmed the property, provided information not only on site locations, but also on land use history that might affect archaeological preservation. Finally, the results of the historical research were used to identify areas of suspected settlement.

## Archaeological Methods

The field techniques involved the placement of shovel tests at 100-foot intervals along transects placed at 100-foot intervals. All soil was screened through ¼-inch mesh, with each test numbered sequentially by transect. Each measured about 1 foot square and was taken to a depth of at least 1.0 foot or until subsoil was encountered. All cultural remains were collected, except for mortar and brick, which were qualitatively noted in the field and

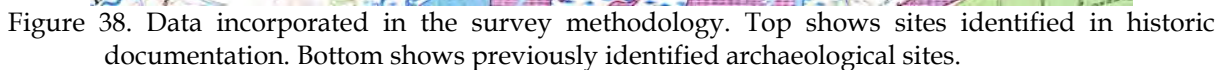
discarded. Notes were maintained for profiles at encountered sites.

At most sites additional, close interval, shovel testing was also conducted. This consisted of filling in the transect grid around the identified sites with shovel tests at 25 to 50 foot intervals. For this work the shovel tests were given grid coordinates, rather than transect and sequential shovel test numbers. We used a modified Chicago grid based on an arbitrary OR0 point located at the southwest edge of the site. Shovel tests are identified by their coordinates relative to this datum. Thus, 100R50 is 100 feet to the north and 50 feet right (or east) of the data.

In a few instances ambiguous site results prompted additional investigation beyond shovel testing. In these cases we chose to use 3-foot test units. These units were excavated by natural soil zones – typically an Ap horizon overlying subsoil. The larger units allowed clearer profiles to be recorded and also provided larger artifact assemblages for analysis. The units, while still unlikely to produce features, do better allow evidence of deep plowing to be identified. The deep plowzone (extending up to 2.0 feet in depth) was apparent in much of the project area, so only a sample of shovel tests extended below the A horizon to test for intact remains.

The information required for completion of South Carolina Institute of Archaeology and Anthropology revisit site forms was collected and photographs were taken, if warranted in the opinion of the field investigators.

A total of 375 transects were set up covering the study tract (Figure 38). A total of





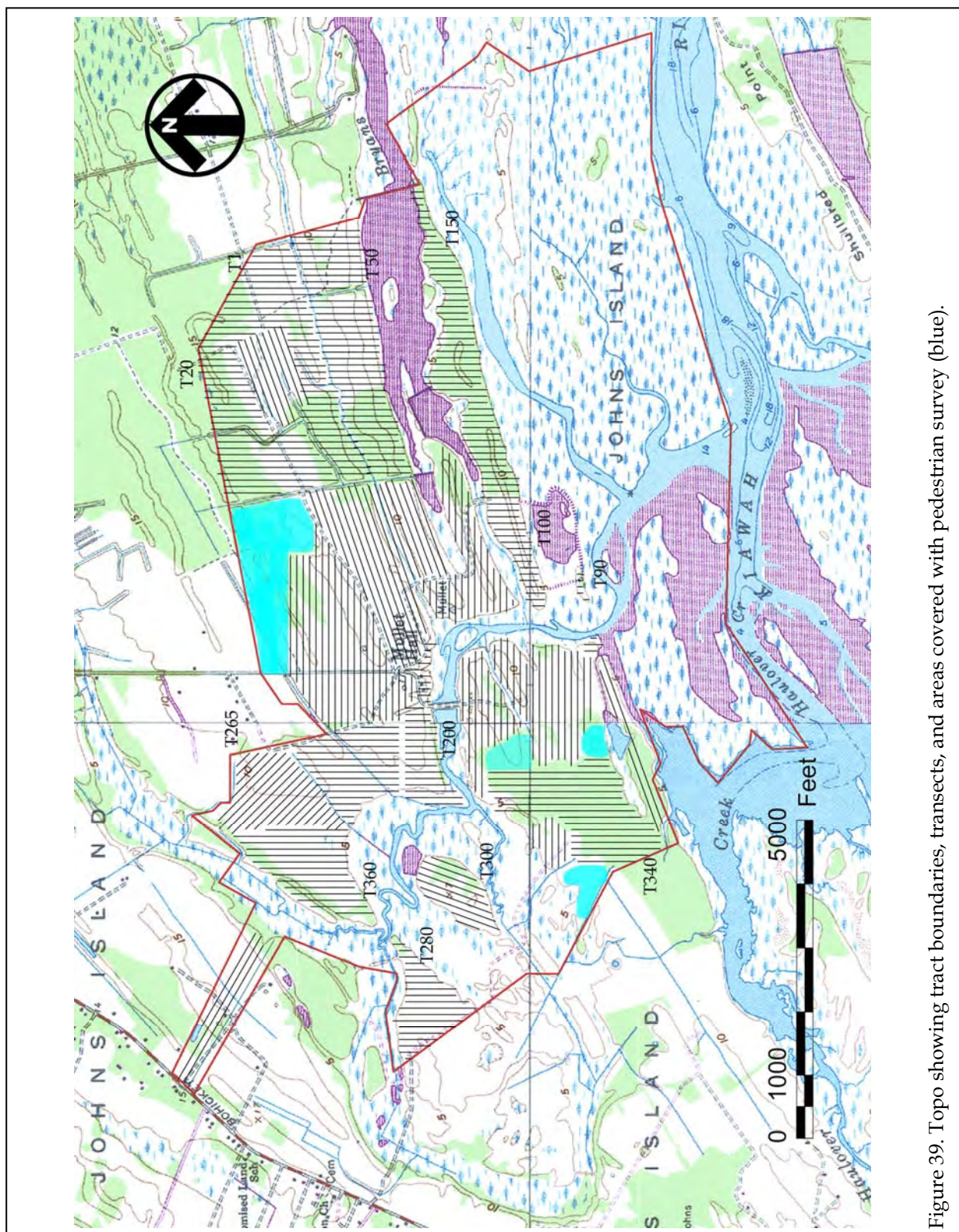


Figure 39. Topo showing tract boundaries, transects, and areas covered with pedestrian survey (blue).



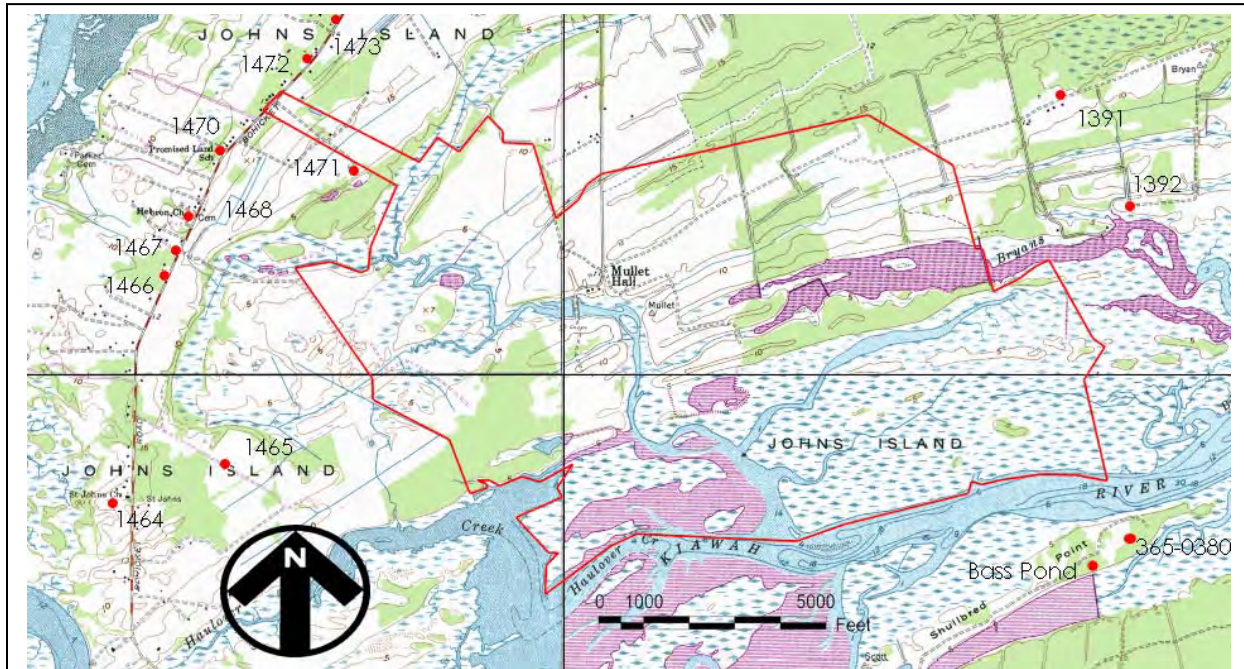


Figure 40. Previously recorded architectural sites within a 0.5 mile APE.

4,199 shovel tests were excavated. The wetland areas were subjected to a pedestrian survey. The offshore marsh islands were identified as not being proposed for development. As a result, these islands were not incorporated in this study.

The GPS positions of the sites were taken with a WAAS enabled Garmin 76 rover that tracks up to twelve satellites, each with a separate channel that is continuously being read. The benefit of parallel channel receivers is their improved sensitivity and ability to obtain and hold a satellite lock in difficult situations, such as in forests or urban environments where signal obstruction is a frequent problem. WAAS or Wide Area Augmentation System, is a system of satellites and ground stations that provide GPS signal corrections, yielding higher position accuracy – generally an accuracy of 10 feet or better 95% of the time in open areas of the study tract.

#### Architectural Survey

The 0.5 mile APE for the study tract identified thirteen previously identified architectural sites – seven of which are along Bohicket Road to the west, and two others are in an area already being developed to the east. These thirteen structures were identified during the very detailed, comprehensive survey of Johns Island (Fick et al. 1989). Only one of these sites, 1468, Mount Hebron Presbyterian Church, is eligible; the remaining sites have all been determined not eligible for inclusion on the National Register of Historic Places. The NRHP, Bass Pond Site, has been subjected to data recovery and is no longer an issue.

Given the thoroughness of the 1989 study, we elected to focus on the identification of any structures on the study tract that, since not accessible by public roads, would not have been recorded by Fick and her colleagues during the 1989 work. As with other studies, in order to be recorded, buildings, sites, structures, and objects must appear to have been constructed before 1950 and must retain “some measure of . . . historic integrity” (Vivian n.d.:5)



For any such identified resource we would complete a Statewide Survey Site Form and take at least two representative photographs. Permanent control numbers would be assigned by the Survey Staff of the S.C. Department of Archives and History at the conclusion of the study. The Site Forms for the resources identified during this study would be submitted to the S.C. Department of Archives and History.

### **Site Evaluation**

Archaeological sites will be evaluated for further work based on the eligibility criteria for the National Register of Historic Places. Chicora Foundation only provides an opinion of National Register eligibility and the final determination is made by the lead federal agency, in consultation with the State Historic Preservation Officer at the South Carolina Department of Archives and History.

The criteria for eligibility to the National Register of Historic Places is described by 36CFR60.4, which states:

the quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and

a. that are associated with events that have made a significant contribution to the broad patterns of our history; or

b. that are associated with the lives of persons significant in our past; or

c. that embody the distinctive characteristics of a type, period,

or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or  
d. that have yielded, or may be likely to yield, information important in prehistory or history.

*National Register Bulletin 36* (Townsend et al. 1993) provides an evaluative process that contains five steps for forming a clearly defined explicit rationale for either the site's eligibility or lack of eligibility. Briefly, these steps are:

- identification of the site's data sets or categories of archaeological information such as ceramics, lithics, subsistence remains, architectural remains, or sub-surface features;
- identification of the historic context applicable to the site, providing a framework for the evaluative process;
- identification of the important research questions the site might be able to address, given the data sets and the context;
- evaluation of the site's archaeological integrity to ensure that the data sets were sufficiently well preserved to address the research questions; and
- identification of important research questions among all of those which might be asked and answered at the site.

This approach, of course, has been developed for use documenting eligibility of sites being actually nominated to the National Register of Historic Places where the evaluative process must stand alone, with relatively little reference to other documentation and where

typically only one site is being considered. As a result, some aspects of the evaluative process have been summarized, but we have tried to focus on an archaeological site's ability to address significant research topics within the context of its available data sets.

For architectural sites the evaluative process would be somewhat different. Given the relatively limited architectural data available for most properties, we would focus on evaluating these sites using National Register Criterion C, looking at the site's "distinctive characteristics." Key to this concept is the issue of integrity. This means that the property needs to have retained, essentially intact, its physical identity from the historic period.

Particular attention would be given to the integrity of design, workmanship, and materials. Design includes the organization of space, proportion, scale, technology, ornamentation, and materials. As *National Register Bulletin* 36 observes, "Recognizability of a property, or the ability of a property to convey its significance, depends largely upon the degree to which the design of the property is intact" (Townsend et al. 1993:18). Workmanship is evidence of the artisan's labor and skill and can apply to either the entire property or to specific features of the property. Finally, materials – the physical items used on and in the property – are "of paramount importance under Criterion C" (Townsend et al. 1993:19). Integrity here is reflected by maintenance of the original material and avoidance of replacement materials.

### **Laboratory Analysis**

The cleaning and analysis of artifacts was conducted in Columbia at the Chicora Foundation laboratories. These materials have been catalogued and accessioned for curation at the South Carolina Institute of Archaeology and Anthropology, the closest regional repository. The site forms for the identified archaeological sites – as well as revisit forms for those previously recorded – have been filed with the

South Carolina Institute of Archaeology and Anthropology. Field notes have been prepared for curation using archival standards and will be transferred to that agency as soon as the project is complete. Non-archival digital photographic materials will be retained by Chicora for 60 days.

Analysis of the collections followed professionally accepted standard with a level of intensity suitable to the quantity and quality of the remains. In general, the temporal, cultural, and typological classifications of prehistoric materials were defined by such authors as Blanton et al. (1986), Oliver et al. (1986), and Yohe (1996). The temporal, cultural, and typological classifications of the historic remains follow such authors as Noël Hume (1978), Price (1970), and South (1977).

Mean dates rely on South's (1977) mean ceramic dating technique, using primarily the mean dates that he has developed. A very few of our colleagues occasionally use Carlson (1983) in addition to South. Carlson observes that a drawback to South's technique is that it gives the same weight to ceramics manufactured for long periods (say from 1700 to 1800, yielding a mean date of 1750) as it does to those produced for only short periods (say from 1740 to 1760, with the same mean date of 1750). While this is true – and is certainly an understandable issue – it seems that overall it results in only a few years error (especially with larger collections). Moreover, it seems that relatively few investigators have chosen to implement the changes proposed by Carlson.

Also of importance in an area such as Mullet Hall, where at least a portion of our research focuses on when different structures or site areas were used, is the occupation span reflected by the ceramics. One method used to determine the occupation span of the excavations is South's (1977) bracketing technique. This method consists of creating a time line where the manufacturing spans of the various ceramics are placed. Determining where at least half of the ceramic type bars

touch places the left bracket. The right bracket is placed the same way, however, it is placed far enough to the right to touch at least the beginning of the latest type present (South 1977:214). We have chosen to alter South's bracketing technique slightly by placing the left bar at the earliest ending date when that ending date does no overlap with the rest of the ceramic type bars.

Since South's method only uses ceramic types to determine approximate period of occupation, Salwen and Bridges (1977) argue that ceramic types that have high counts are poorly represented in the ceramic assemblage. Because of this valid complaint, a second method – a ceramic probability contribution chart – was used to determine occupation spans. Albert Bartovics (1981) advocates the calculation of probability distributions for ceramic types within an assemblage. Using this technique, an approximation of the probability of a ceramic type contribution to the site's occupation is derived. This formula is expressed:

$$P_j/\text{yr.} = \frac{f_j}{F \times D_j} \quad \text{where}$$

$P_j$ =partial probability contribution

$f_j$ =number of sherds in type  $j$

$F$ =number of sherds in sample

$D_j$ =duration in range of years.





## RESULTS OF SURVEY

### Introduction

As a result of this cultural resources survey, 11 of the previously identified sites (38CH487, 38CH1539-1543, and 38CH1545-1549) were revisited and evaluated and 15 additional sites (38CH2240-2254) were identified. See Table 1 for a summary of these sites. Figure 41 shows all these sites with new boundaries.

The architectural survey did not identify any structures or other resources beyond those identified by the 1992 survey of Charleston County (Fick 1992) or the 1989 survey of James and Johns islands (Fick et al. 1989). None of the eligible structures or the NRHP property can be seen from the current project area. The standing

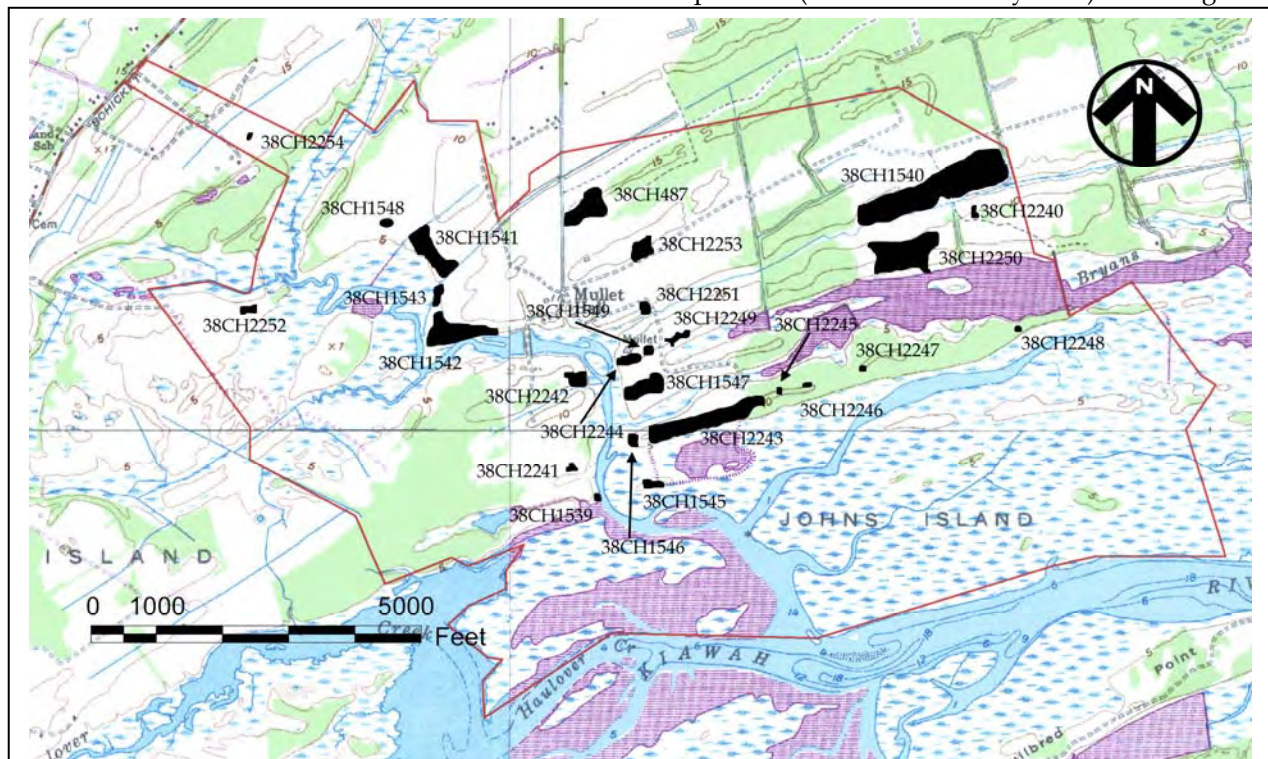
structure on the Mullet Hall property does not retain the integrity needed to warrant a National Register nomination.

### Archaeological Resources

#### 38CH487

Site 38CH487 (Figure 42) is an eighteenth to twentieth century settlement located on a ridge at an elevation of about 10 feet AMSL. A GPS UTM for the site is 582389E 3610809N (NAD27 datum). The site is currently located in a fallow field.

The site was initially recorded in 1980 during a survey of seventeenth century settlement patterns (South and Hartley 1980). Although no



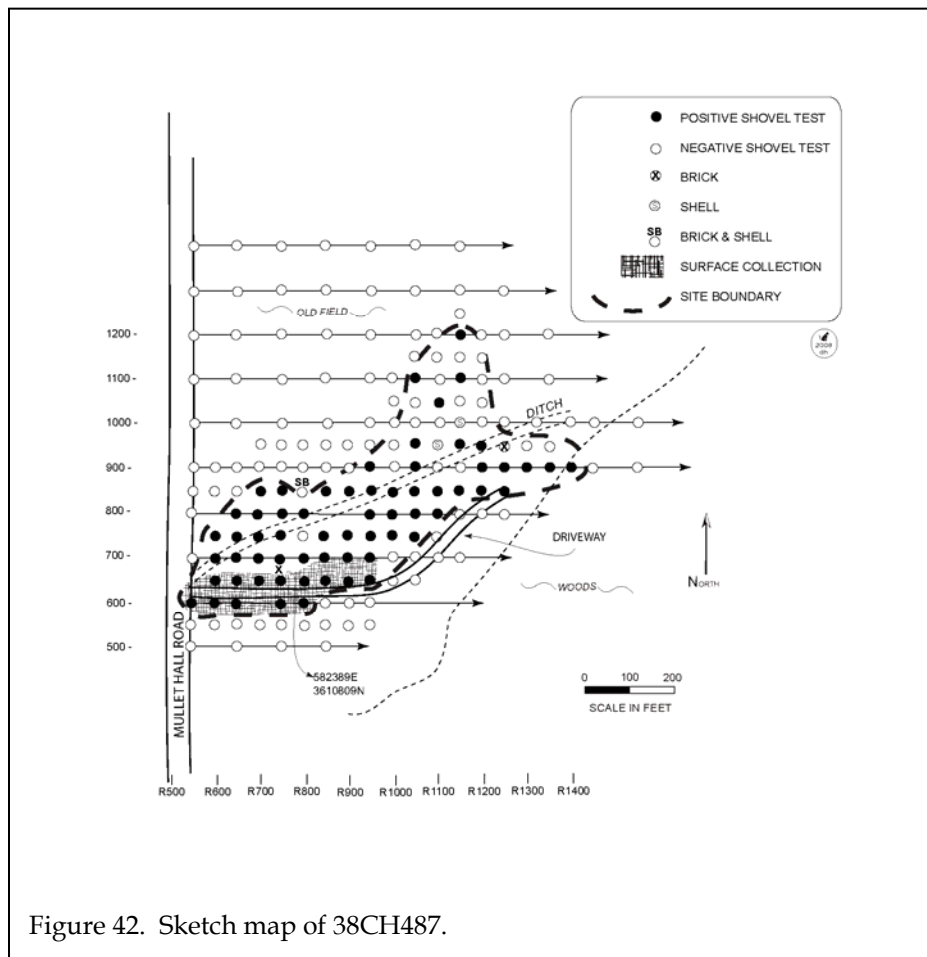


Figure 42. Sketch map of 38CH487.

seventeenth century artifacts were found at the site, it was still briefly recorded. No description of artifacts was given in the site form.

The 1994 reconnaissance revisited and examined the site area (Adams and Trinkley 1994:27). A total of 24 shovel tests were excavated with eight positive (33%). The artifact collection, found in an area about 850 feet east-west by 100 feet north-south, produced artifacts dating from the nineteenth to twentieth centuries.

Additional work was suggested, including stripping, to look for possible subsurface features. The site was recommended potentially eligible for the National Register.

The current survey excavated 100 shovel tests with 63 positive (63%) with artifacts. Shovel

tests were performed at 50-foot intervals until two consecutive negative shovel tests were encountered along the cardinal directions. This work expanded the site dimensions to 900 by 600 feet. The soil profiles resembled Seabrook soils, which have an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to a depth of 0.8 foot over a dark brown (10YR4/3) or dark yellowish brown (10YR4/4) loamy fine sand. All artifacts were recovered in the plowzone or Ap horizon.

As previously mentioned, the site produced artifacts dating from the eighteenth to the nineteenth centuries (Table 20). Seven artifact groups are represented at

this site including Kitchen (73%), Architecture (19%), Arms (0.5%), Tobacco (3%), Clothing (2%), Personal (0.2%), and Activities (2%).

This assemblage does not precisely match any of the previously proposed artifact patterns, although it certainly bears close resemblance to the Revised Carolina Artifact Pattern, generally associated with late eighteenth and early nineteenth century main settlements. The pattern most commonly associated with antebellum slave settlements bears little or no resemblance to the pattern from 38CH487, nor does the pattern associated with Piedmont tenant farmers (there is no well developed coastal tenancy pattern). The overall pattern also does not compare well for the one other low country store that has been briefly examined (Table 21). The failure to achieve a clear

Table 20.  
Artifacts from 38CH487

[illegible]

**CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION**

Table 20 continued.  
Artifacts from 38CH487

	900	750	800	820	650	750	800	850	900	950	1100	650	800	850	1050	650	850	950	1100	1250	650	850	900	950	900	900	900	900	Surface	Subtotal	Total	
	R960	R990	R1010	R1010	R1040	R1040	R1060	R1060	R1060	R1060	R1090	R1110	R1110	R1110	R1140	R1140	R1140	R1140	R1140	R1160	R1160	R1190	R1210	R1210	R1210	R1260	R1360	R1310	R1410	Collection		
Kitchen Group																														274		
English Porcelain, undec.							1				1																		1	4		
Refined earthenware, burned												1																	1	1		
Coarse red earthenware																													1	1		
Stoneware, Ginger Beer							1																						1	1		
Stoneware, Bristol																												1	2	2		
Stoneware, Albany glazed								1																					1	1		
Stoneware, alkaline glazed																													2	2		
Stoneware, brown SG					1			1																					1	4		
Stoneware, brown																													2	2		
Creamware, poly HP																								1					1	1		
Creamware, annular, banded		1																											1	1		
Creamware, annular, cabeled																													1	1		
Creamware, annular																													1	1		
Creamware, undec.								1								1													4	4		
Pearlware, green edged																													1	1		
Pearlware, blue edged																													1	1		
Pearlware, blue HP																													1	1		
Pearlware, blue TP																													2	2		
Pearlware, annular, banded																													1	1		
Pearlware, annular								1																					1	1		
Pearlware, undec.																													1	4		
Whiteware, blue edged			1																										1	4		
Whiteware, poly HP											1					1	1												5	5		
Whiteware, blue HP			1																										1	1		
Whiteware, purple TP																													1	1		
Whiteware, black TP																1													3	3		
Whiteware, blue TP																													4	6		
Whiteware, annular, banded																													1	1		
Whiteware, annular								1																					4	4		
Whiteware, tinted, modern																													1	1		
Whiteware, undec.			6			1	1	3			1																		3	7	45	
Yellow ware, milled																													2	2		
Yellow ware, annular, banded																													1	1		
Yellow ware, undec.								1	2				1			5													10	10		
Coleonware																													1	1		
Glass, milled																													1	1		
Glass, manganese			6				1	1						5			3												5	33		
Glass, cobalt																													2	3		
Glass, blue																													1	1		
Glass, aqua																													5	13		
Glass, green				1											2	1	1	1											7	7		
Glass, light green			5	3					1	1																			16	16		
Glass, brown			3												1														2	11		
Glass, clear			5	3		2	1	5	1								1	4		1									2	49		
Glass, milk																													1	1		
Glass, black			4	1			1								1		3	1								1	1		1	19		
Architecture Group																														77		
Window glass			2				1					1					1												11	11		
Cut nails			2																									1	3	3		
Cut nail fragments				2																									2	2		
Nail, fragment			4	3	1	1	7	10	5	1				3		3													1	61		
Tobacco Group																														11		
Tobacco, pipe bowl, Kaolin			2											1			1												9	9		
Tobacco, pipe stem, Kaolin																													2	2		
Clothing Group																														7		
Button, brass																														2	2	
Button, milk glass																														2	2	
Clothes hook																														1	1	
Eyebolt, brass			1																											2	2	
Activities Group																														17		
Metal, LLD														1			2													6	6	
Barb wire																														1	1	
Slate																														1	1	
Faunal																														9	9	
Personal Group																														1		
Jewelry setting, brass																														1	1	
Arms Group																														2		
Percussion cap, brass			1																											1	1	
Shell casing, .38 caliber																														1	1	
Prehistoric Group																														2		
Sherd, small																														2	2	
Subtotal			1	43	14	1	6	18	26	13	1	1	2	4	11	8	1	8	24	1	2	2	2	2	2	2	2	1	13	1	36	391
TOTAL																															391	
	HP : Hand paint				LG : Lead glaze				SG : Salt glaze					TP : Transfer print					undec : undecorated													

HP : Hand paint      LG : Lead glaze      SG : Salt glaze      TP : Transfer print      undec : undecorated



## RESULTS OF SURVEY

match is likely the result of mixing at the site, the consequence of the long and varied occupation (slave, tenant, and commissary).

Within the Kitchen Group, glass makes up the bulk with 57% of the total group. Black glass appears to be one of the earliest dating to the seventeenth century at the earliest (Jones and Sullivan 1985:14). Manganese glass was common in the late nineteenth century.

European ceramics comprise about 42% of the Kitchen Group. The mean ceramic date (MCD) for the site is 1846.4 (Table 22). The earliest ceramic is undecorated creamware, which has a MCD of 1791. The most recent ware is a piece green tinted whiteware, which may be associated with a structure located on the site at least into the mid-twentieth century. A single piece of Colono ware, a slave-made pottery, was found.

The Arms Group produced a .38 caliber shell casing and a brass percussion cap. Percussion caps were first patented in 1818, and were used through the Civil War (Peterson

Table 21.  
Pattern analysis of 38CH487

	38CH487 Pattern	Revised Carolina Artifact Pattern <sup>1</sup>	Townhouse Pattern <sup>2</sup>	Dual- Function Pattern <sup>2</sup>	Georgia Slave Artifact Pattern <sup>3</sup>	Carolina Slave Artifact Pattern <sup>1</sup>	Yeoman Pattern <sup>4</sup>
Kitchen Group	73.0	51.8 - 65.0	58.4	63.1	20.0 - 25.8	70.9 - 84.2	40.0 - 61.2
Architectural Group	19.0	25.2 - 31.4	36.0	25.0	67.9 - 73.2	11.8 - 24.8	35.8 - 56.3
Furniture Group	-	0.2 - 0.6	0.2	0.1	0.0 - 0.1	0.1	0.4
Arms Group	0.5	0.1 - 0.3	0.3	0.2	0.0 - 0.2	0.1 - 0.3	-
Tobacco Group	3.0	1.9 - 13.9	2.8	6.0	0.3 - 9.7	2.4 - 5.4	-
Clothing Group	2.0	0.6 - 5.4	0.9	1.2	0.3 - 1.7	0.3 - 0.8	1.8
Personal Group	0.2	0.2 - 0.5	0.2	0.1	0.1 - 0.2	0.1	0.4
Activities Group	2.0	0.9 - 1.7	1.1	4.1	0.2 - 0.4	0.2 - 0.9	1.8

<sup>1</sup> Garrow 1982

<sup>2</sup> Zierden et al. 1988

<sup>3</sup> Singleton 1980

<sup>4</sup> Drucker et al. 1984

1964:228-230).

The collection also produced ten pieces of faunal material, one piece of slate, and two small prehistoric sherds.

Table 22.  
Mean ceramic date of 38CH487

Ceramic	Date Range	Mean Date (xi)	(fi)	fi x xi
Creamware, annular	1780-1815	1798	2	3596
Creamware, hand painted	1790-1820	1805	1	1805
Creamware, undecorated	1762-1820	1791	4	7164
Pearlware, blue hand painted	1780-1820	1800	1	1800
Pearlware, blue trans printed	1795-1840	1818	2	3636
Pearlware, edged	1780-1830	1805	2	3610
Pearlware, annular/cable	1790-1820	1805	3	5415
Pearlware, undecorated	1780-1830	1805	5	9025
Whiteware, blue edged	1826-1880	1853	2	3706
Whiteware, poly hand painted	1826-1870	1848	7	12936
Whiteware, blue trans printed	1831-1865	1848	6	11088
Whiteware, non-blue trans printed	1826-1875	1851	4	7404
Whiteware, annular	1831-1900	1866	7	13062
Whiteware, undecorated	1813-1900	1860	46	85560
Yellow ware	1826-1880	1853	9	16677
Total			101	186484
Mean Ceramic Date	1846.4			

For the Architecture Group, unidentifiable nails make up 81% of the group. The identifiable machine cut nails were common by the 1820s (Howard 1989:54).

Bartovics' (1980) dating analysis shows a small occupation from around 1760 to 1810, then a distinct increase in occupation that remains steady until 1900.

Historic research also revealed at least three maps showing structures in this area. The earliest, dated 1860 (Figure 43), shows a slave row and main house (part of Solomon Legare's property). Two 1919 maps (Wadmalaw (see Figure 30) and Legareville) still show the slave rows, which had likely turned into tenant structures, accounting for some of the later wares at the site. Oral history described a trailer and modern house on the site into the twentieth century (Sidi Limehouse, personal communication 2008).

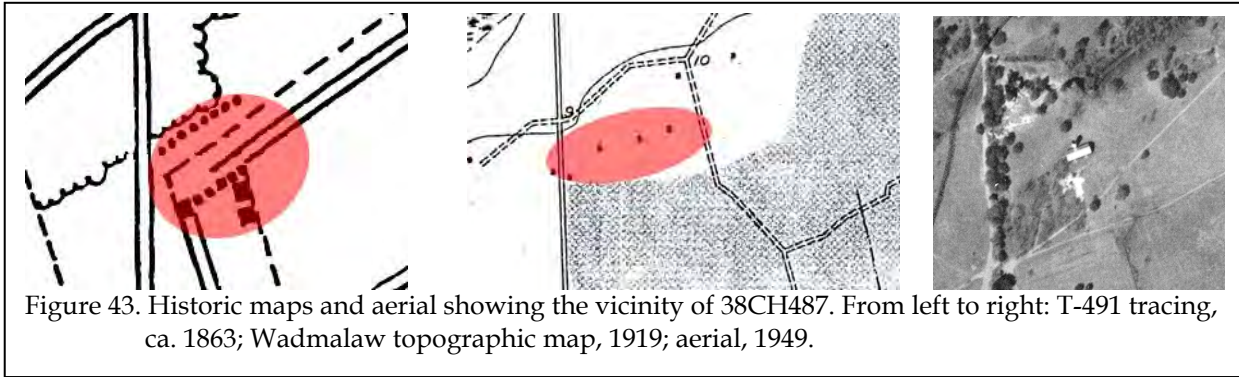


Figure 43. Historic maps and aerial showing the vicinity of 38CH487. From left to right: T-491 tracing, ca. 1863; Wadmalaw topographic map, 1919; aerial, 1949.

Mr. Limehouse (personal communication 2008) also reveals a commissary was located at the site that was said to have been standing into the 1940s. Mullet Hall tokens have been found at this site. Used in lieu of money, several of these tokens (see Figure 36) are at the Johns Island museum, Rosebank Farms.

Site 38CH487 exhibits a variety of data sets, including a large and varied assortment of artifacts. Contributing to this data set are detailed maps of the settlement. We also have both economic and oral history concerning the commissary thought to be found at this site. The shovel testing, while failing to reveal features, does indicate dense remains – a conclusion also documented by the number of artifacts found in the bisecting ditch.

This report has clearly established several contexts for investigation, including the lifeways of African American slaves on the island, as well as the transition to tenancy. At Mullet Hall these topics are of special interest since we are dealing with several contiguous plantations. A context for which there is very little data is that of plantation commissary. Although such stores are frequently mentioned by both historians and archaeologists, there has not been the opportunity to examine one in any detail. The only comparable research is the very limited testing conducted at 38CH886 (Trinkley 1987:75-80). The problem anticipated from any such investigation is the inability to clearly separate commercial from domestic refuse. This, however, is no different from the situation encountered by Martha Zierden in her urban archaeology research in downtown Charleston. In

spite of the problem, she has managed to devise the dual-function pattern, reflecting street level commercial operations with overhead dwellings (Zierden et al. 1988).

Thus, 38CH487 may represent an opportunity to begin the exploration of these plantation commissaries. Even if the results are not conclusive, we believe it is an opportunity that should not be dismissed. Although we see mixing of patterns at this macroscopic level of investigation, there are viable studies suggesting that plow zone artifacts are not entirely mixed. Julia A. King, for example, clearly notes that,

While the damage to these archaeological resources cannot be minimized, the spatial distributions of artifacts and soil chemicals remain relatively intact. Information about room and building use and yard organization and layout, for example, are easily recovered from plow-disturbed soils ("The Importance of Plow Zone Archaeology, Julia A. King, <http://www.chesapeakearchaeology.org/AboutTheProject/PZArchaeology.htm>, accessed July 21, 2008).

This same conclusion was reached by NPS researchers several decades earlier (Talmage and Chesler 1977). Thus, while plowing may have been extensive, this does not necessarily affect the integrity of the site. We believe that the site can

address significant research questions through a process of more intensive site sampling, followed by stripping, and careful investigation of identified structures.

Site 38CH487 is recommended eligible for the National Register of Historic Places. No work should be performed in this area pending review by the State Historic Preservation Office and the development of a data recovery plan.

### 38CH1539

Site 38CH1539 is a dump site created with fill containing nineteenth century artifacts. It is



Figure 44. View of brick remains at 38CH1539.

located on a creek edge in an attempt to prevent erosion. The elevation is about 5 feet AMSL. The site's location on Jacks Island is at 582480E 3609560N (NAD27 datum).

The site was originally recorded during a reconnaissance in 1994 and was described as "a scatter of structural debris and artifacts along the bank of Mullet Hall Creek" (Adams and Trinkley 1994:28). At that time, eight shovel tests were excavated with only one test, located near the shoreline, positive. The collection, which also

consisted of surface artifacts, included pearlwares, whitewares, pipe stems, and bottle glass. A conversation at the time with Mr. W.L. Limehouse revealed that the fill was brought from Charleston, although no information concerning when this happened and from was available. The site was recommended not eligible for the National Register since it was "out of context and cannot address significant questions about Charleston area lifeways" (Adams and Trinkley 1994:28).

The current investigations excavated six shovel tests at 50-foot intervals around the site area and revealed results similar to those from the 1994 reconnaissance. Only one shovel test was positive, which was located on the edge of the creek. This test produced two pieces of creamware, which, given the history of the site, were noted and discarded in the field.

Brick building remains are still located in the flood zone of the creek and look to be found exactly as they were in 1994 (Figure 44). The site encompasses an area of about 50 feet north-south by 10 feet east-west.

The current investigations produced identical results as the 1994 reconnaissance. This site is unable to address significant research questions about the history at Mullet Hall.

Site 38CH1539 is recommended not eligible for the National Register of Historic Places. No additional management activity is recommended pending the review and concurrence by the State Historic Preservation Office.

**38CH1540**

Site 38CH1540 (Figure 45) is an eighteenth to twentieth century plantation complex, located on a ridge at an elevation of about 10 feet AMSL. A GPS UTM, taken toward the western end of the site, is 583841E 3610905N (NAD27 datum). The site is located in areas of planted long-leaf pines, plowed fields, and dense pine and hardwood forests.

The site was originally recorded as part of the 1994 reconnaissance of the property (Adams and Trinkley 1994:28-30). Four different loci were recorded as a result of the brief study – the main house, cemetery, early slave row, and late slave row (Figure 46). Intact brick deposits were recorded in the main house area, so it was believed that the site would probably be found eligible for the National Register of Historic Places. At the time, the site dimensions were estimated to be 2,400 feet east-west by 500 feet north-south.

The current survey performed shovel testing at 50-foot intervals across the site area. A total of 540 shovel tests were excavated with 151 positive (28%) with artifacts. An additional 31 shovel tests contained only shell, 15 contained brick, and 9 contained only brick and shell.

Soils in the area generally resemble the moderately well drained Seabrook Series, which has an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to a depth of 0.8 foot over a dark brown (10YR4/3) or dark yellowish brown (10YR4/4) loamy fine sand to a depth of 1.7 feet. Most of the shovel tests had an Ap horizon of at least 2.0 feet in depth, the result of subsoiling in the site area.

As with the reconnaissance, several loci were identified, however, the cemetery (Locus 2) was not found. The three loci include the western portion of the site (originally identified as Locus 3 -- an early slave row), the middle portion of the site (originally identified as Locus 1 -- the main house), and the eastern portion of the site

(originally identified as Locus 4 -- a late slave row and later tenant structures). The new site dimensions are estimated to be 2400 feet east-west by 950 feet north-south.

The site is shown on a nineteenth century map as J. Roper's Oaks Plantation (Figure 47), which has the main house, a row of seven slave structures to the east, and four structures to the west. The entire site encompasses several status occupations, so the initial analysis of artifacts will cover the site as a whole.

The artifacts collected represent five different groups – Kitchen (71%), Architecture (23%), Tobacco (2%), Clothing (0.6%), and Activities (4%). The prehistoric component, which accounts for 9% of the artifact total, only produced one diagnostic artifact – a plain Deptford sherd. The remaining artifacts were small sherds (n=48) and chert fragments (n=2), which are not diagnostic and cannot address any significant research questions about prehistoric life.

The Kitchen Group produced the largest amount of artifacts for the site. Within this group, ceramics account for 47% of the collection. A MCD for the site is 1841.9. Eight pieces of Colono ware, a slave-made pottery, were also identified, which is attributed to the eighteenth century.

Bartovics (1980) dating analysis shows an increase in density from around 1760 to 1810. Around 1810, there is an increase in occupation until around 1900 when disposal ends abruptly. We do know that some tenant structures were around into the twentieth century, but those artifacts were not found in high enough quantities to register on the analysis. Salwen and Bridges' analysis shows a fairly lengthy occupation span from around 1735 to at least 1905.

The Architecture Group is dominated by nails, which account for 75% of the collection. Three types of nails are represented, hand wrought, machine cut, and wire nails. Hand wrought nails are the earliest, generally predating 1800 (Howard 1989:54). Machine cut nails were



Figure 45. Sketch map of 38CH1540.

common by the 1820s and wire nails were generally used after 1880 (Howard 1989:54-55). Window glass (n=26), a strap hinge, and a roofing tack were also found at the site. In the field, a large number of shovel tests contained brick, but it

Slave Artifact Pattern, with exception of the Activities Group artifacts, which are higher at 38CH1540. We know, however, that this information is skewed since an entire plantation complex is represented by 38CH1540.

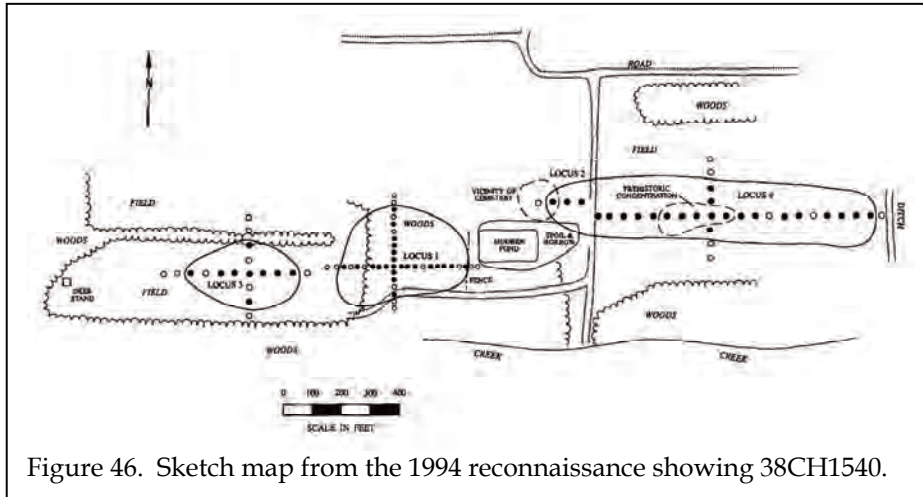


Figure 46. Sketch map from the 1994 reconnaissance showing 38CH1540.

was in the main house area (Locus 1) where some tests produced dense brick rubble. The 1994 reconnaissance reported rubble in the area (Adams and Trinkley 1994:28), however vegetation was extremely dense. With testing at 50-foot intervals, an area of dense brick remains could have been overlooked.

The Tobacco Group contained mostly pipe stems, which account for 75% of the group total. Pipe bowls account for the rest of the group. All of the artifacts are made of kaolin, except two pipe stems that are made of red clay. One of the red clay pipe stems has the words "CLASC" on one side and "ELMAN" on the other side.

The Clothing Group includes two buttons and a brass eye. One button is white porcelain and the other is milk glass.

The Activities Group contains mostly unidentifiable iron. Also present is an iron staple, a nut, and part of a hoe.

A pattern analysis (Table 23) of this site shows that it very closely resembles the Carolina

If the patterns are examined for the two largest loci – the main house area and the slave settlement – we begin to see some distinctions. For example, the main house exhibits significantly reduced kitchenware and increased architectural remains – as we expect for the Revised Carolina Artifact Pattern. The one anomaly is the large proportion of activities

items. Thus, Locus 1 provides a good match for the main settlement. The slave settlement area (Locus 4) exhibits a pattern not significantly different from that identified as the Carolina Slave Artifact Pattern. What is unusual here is that this pattern is typically associated with eighteenth

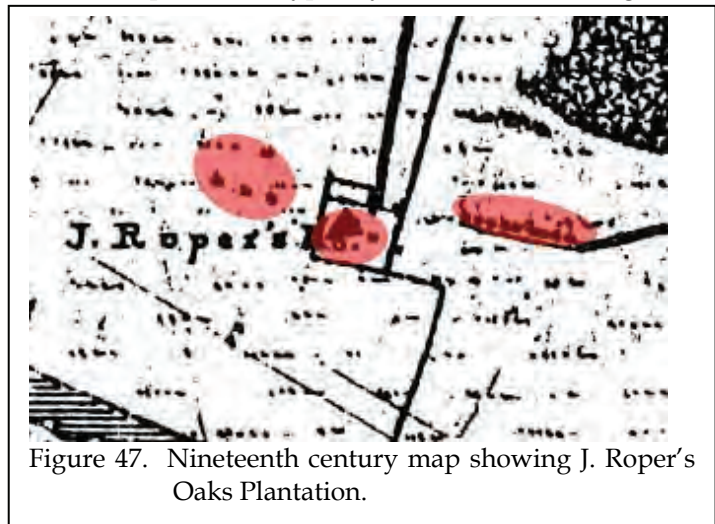


Figure 47. Nineteenth century map showing J. Roper's Oaks Plantation.

century settlements where the slave structures are of wall trench construction – affecting the low proportion of architectural remains. The reason for this anomalous pattern is uncertain.

## RESULTS OF SURVEY

Table 23.  
Pattern Analysis for 38CH1540

	38CH1540 Combined	38CH1540 Locus 1 Main Hs.	38CH1540 Locus 4 Slave	Revised Carolina Artifact Pattern <sup>1</sup>	Georgia Slave Artifact Pattern <sup>2</sup>	Carolina Slave Artifact Pattern <sup>1</sup>
Kitchen Group	71.0	52.4	73.8	51.8 - 65.0	20.0 - 25.8	70.9 - 84.2
Architectural Group	23.0	36.2	20.5	25.2 - 31.4	67.9 - 73.2	11.8 - 24.8
Furniture Group	0.0	0.0	0.0	0.2 - 0.6	0.0 - 0.1	0.1
Arms Group	0.0	0.0	0.0	0.1 - 0.3	0.0 - 0.2	0.1 - 0.3
Tobacco Group	2.0	1.9	1.4	1.9 - 13.9	0.3 - 9.7	2.4 - 5.4
Clothing Group	0.6	0.9	0.6	0.6 - 5.4	0.3 - 1.7	0.3 - 0.8
Personal Group	0.0	0.0	0.0	0.2 - 0.5	0.1 - 0.2	0.1
Activities Group	4.0	8.6	3.7	0.9 - 1.7	0.2 - 0.4	0.2 - 0.9

<sup>1</sup> Garrow 1982

<sup>2</sup> Singleton 1980

Locus 3 (Table 26) (western slave settlement) provided a MCD (Table 27) of 1828.1, similar to that of the main house in Locus 1. Bartovics (1980) analysis shows a somewhat interesting graph. It shows a short occupation from 1740 to 1770, then a drop for 10 years before there is a substantial increase that remains relatively stable until 1900 when, like the main house and site as a whole, there appears to be a sudden end of the occupation. One anomaly shown on this graph is a spike that occurs from 1820 to 1830.

A brief look at the ceramics (Table 24) from Locus 1 (the main house area) shows a MCD of 1826.5, close to fifteen years early than the MCD for the entire site (Table 25). The Bartovics' (1980) analysis shows a pattern similar to that of the entire site – a slow increase in density until 1810, when there is a steep increase until 1900, at which

The MCD of Locus 4 (eastern slave settlement/tenant) is 1846.8, around 20 years later than the main house MCD (Table 28 and 29). It is this locus that seems to have made the largest imprint on the site area – the Bartovics' (1980) analysis is exactly the same as the site as a whole. South's (1977) bracketing technique shows a span from about 1795 to 1905, accounted for by the later

Table 24.  
Artifacts from 38CH1540, Locus 1

	900	950	1000	1050	1100	1150	1200	1250	Surface	Subtotal	Total
	R500	R500	R500	R550	R550	R600	R600	R600	R600	R600	R600
<b>Kitchen Group</b>											55
Chinese Porcelain, blue HP										2	
English Porcelain, undec.										1	
Rockingham										1	
Stoneware, grey SG										1	
Stoneware, alkaline glazed										1	
Creamware, undec.										1	
Pearlware, green edged										1	
Pearlware, undec.										1	
Whiteware, blue edged										1	
Whiteware, blue TP										1	
Whiteware, undec.										5	
Yellow ware, annular										2	
Glass, aqua										1	
Glass, light green										1	
Glass, black										3	
Glass, clear										2	
<b>Architecture Group</b>											38
Window glass										14	
Nail										2	
Nail, fragment										22	
<b>Tobacco Group</b>											2
Tobacco, pipe stem, Kaolin										1	
<b>Clothing Group</b>											1
Button										1	
<b>Activities Group</b>											21
Iron, UID										8	
Iron, staple										1	
Faunal										12	
<b>Prehistoric Group</b>											5
Sherd, small										5	
<b>Subtotal</b>										122	
<b>TOTAL</b>											122

point there is a seemingly sudden end to the occupation. The only difference is the beginning of the occupation, which at Locus 1 starts at around 1660 and remains stable until 1760.

tenancy in this area.

The purported cemetery within the site area is an issue of concern. The 1994

**CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION**

**Table 25.**  
**Mean ceramic date of 38CH1540, Locus 1**

Ceramic	Date Range	Mean Date (xi)	(fi)	fi x xi
Underglazed blue porc	1660-1800	1730	2	3460
English porc	1745-1795	1770	1	1770
Creamware, undecorated	1762-1820	1791	2	3582
Pearlware, edged	1780-1830	1805	2	3610
Pearlware, undecorated	1780-1830	1805	2	3610
Whiteware, blue edged	1826-1880	1853	1	1853
Whiteware, non-blue trans printed	1826-1875	1851	1	1851
Whiteware, undecorated	1813-1900	1860	9	16740
Yellow ware	1826-1880	1853	2	3706
Total			22	40182
Mean Ceramic Date	1826.5			

reconnaissance (Adams and Trinkley 1994) attempted to locate the cemetery, but found no evidence of stones or depressions. The report says

current survey again attempted to locate the cemetery, however dense vegetation prevented any possible depressions or stones from being seen. Two aerial photographs, from 1948 and 1973 (Figure 48), show plowed fields in this area with a wooded area among the fields. This wooded area seems to stay the same size in the 25 year time span and it is probable that a cemetery would be avoided by agricultural activities. Kiawah River Plantation, LP has already taken a proactive approach to the cemetery by recording it on the modern survey of the property. The cemetery, however, is likely much larger than has been recorded. If construction is to take place in this area, we would recommend an area the size of the woods from the historic aerials be greenspaced or, alternatively, stripping be conducted to accurately identify cemetery boundaries.

Apart from the cemetery, site 38CH1540 produced a large number of artifacts from many data sets. Although the site has been subjected to cultivation and logging, features, such as areas of brick rubble, still remain.

**Table 26.**  
**Artifacts from 38CH1540, Locus 3**

	700 R-250	800 R-250	750 R-200	800 R-200	750 R-150	750 R-100	800 R-100	750 R-50	800 R-50	850 R-50	750 R-0	700 R-0	850 R-0	900 R-0	750 R-50	800 R-50	850 R-50	900 R-50	750 R-100	Subtotal	Total
<b>Kitchen Group</b>																				<b>27</b>	
Stoneware, white SG													1							1	
Stoneware, brown SG													1							1	
Creamware, undec.																	1			1	
Pearlware, blue HP									1											1	
Pearlware, blue TP													1							1	
Pearlware, undec.														1						2	
Whiteware, green edged		1														1				1	
Whiteware, undec.				1			1						1						1	6	
Colonoware											1						1			2	
Glass, black					1	1			2			1					4		1	10	
Glass, clear								1												1	
<b>Tobacco Group</b>																				<b>1</b>	<b>1</b>
Tobacco, pipe bowl, Kaolin			1																	1	
<b>Activities Group</b>																				<b>3</b>	<b>3</b>
Faunal, bone									3											3	
<b>Prehistoric Group</b>																				<b>1</b>	<b>1</b>
Sherd, small							1													1	
<b>Subtotal</b>		1	1	1	1	1	2	1	6	1	1	1	4	1	5	1	1	1	1	32	
<b>TOTAL</b>																					<b>32</b>
HP : Hand painted																					
SG : Salt glazed																					
TP : Transfer print																					
undec : undecorated																					

that Ms. Betty Stringfellow heard that the stones were removed and used as the base for a causeway (Adams and Trinkley 1994:28). The

Site 38CH1540 provides an excellent opportunity to study a complete eighteenth century plantation complex.



## RESULTS OF SURVEY

Site 38CH1540 is recommended eligible for the National Register of Historic Places. No

At the time of the reconnaissance, enough specimens were recovered, dating from the eighteenth to twentieth centuries, for investigators to believe that the site was likely eligible for the National Register of Historic Places.

Table 27.  
Mean ceramic date of 38CH1540, Locus 3

Ceramic	Date Range	Mean Date (xi)	(fi)	fi x xi
White salt glazed stoneware	1740-1775	1758	1	1758
Creamware, undecorated	1762-1820	1791	1	1791
Pearlware, blue hand painted	1780-1820	1800	1	1800
Pearlware, blue trans printed	1795-1840	1818	1	1818
Pearlware, undecorated	1780-1830	1805	2	3610
Whiteware, green edged	1826-1830	1828	1	1828
Whiteware, undecorated	1813-1900	1860	6	11160
Total			13	23765
Mean Ceramic Date	1828.1			

work should be performed in this area until sufficient testing or data recovery has been implemented. This recommendation is pending the review and concurrence by the State Historic Preservation Office.

### 38CH1541

Site 38CH1541 (Figure 49) is an eighteenth to twentieth century settlement once belonging to James Legare. It is situated on the edge of a marsh at an elevation of about 5 feet AMSL. A GPS UTM taken at the western portion of the site is 581630E 3610691N (NAD27 datum).

The site was first recorded during the 1994 reconnaissance (Adams and Trinkley 1994:30). A series of 29 shovel tests were excavated at 50-foot intervals in a cruciform pattern with 14 positive (48%). Based on the shovel testing and surface scatter, the site dimensions were estimated at 300 feet east-west by 600 feet north-south.

Soils in the site area resemble the moderately well drained Seabrook Series. These have an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to a depth of 0.8 foot over a dark brown (10YR4/3) or dark yellowish brown (10YR4/4) loamy fine sand.

Table 28.  
Mean ceramic date of 38CH1540, Locus 4

Ceramic	Date Range	Mean Date (xi)	(fi)	fi x xi
English porc	1745-1795	1770	2	3540
Lead glazed slipware	1670-1795	1733	1	1733
Creamware, undecorated	1762-1820	1791	4	7164
Pearlware, blue hand painted	1780-1820	1800	3	5400
Pearlware, blue trans printed	1795-1840	1818	1	1818
Pearlware, edged	1780-1830	1805	3	5415
Pearlware, undecorated	1780-1830	1805	7	12635
Whiteware, green edged	1826-1830	1828	1	1828
Whiteware, poly hand painted	1826-1870	1848	3	5544
Whiteware, blue trans printed	1831-1865	1848	6	11088
Whiteware, non-blue trans printed	1826-1875	1851	4	7404
Whiteware, annular	1831-1900	1866	13	24258
Whiteware, tinted glaze	1911-1970	1941	1	1941
Whiteware, undecorated	1813-1900	1860	53	98580
Yellow ware	1826-1880	1853	4	7412
Total			106	195760
Mean Ceramic Date	1846.8			

# CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION

Table 29.  
Artifacts from 38CH1540, Locus 4

[illegible]

	1500	1100	1200	1250	1300	1350	1400	1550	1600	1250	1300	1350	1400	1450	1500	1250	1300	1350	1400	1450	1500	1250	1300	1350	1400	1450	1500	1650	1300	1350	1400	1450	1200	1250	1300
Kitchen Group	R1350	R1400	R1400	R1400	R1400	R1400	R1400	R1400	R1400	R1450	R1450	R1450	R1450	R1450	R1500	R1500	R1500	R1500	R1500	R1500	R1500	R1550	R1550	R1550	R1550	R1550	R1550	R1650	R1600	R1600	R1600	R1600	R1600	R1650	R1650
English Porcelain, HP overglaze																																			
English Porcelain, underc.																																			
Redware, clear LG																																			
Stoneware, alkaline glazed																																			
Stoneware, brown 5G																																			
Stoneware, brown																																			
Red Coarse earthenware, clear LG																																			
Refined earthenware																																			
Slipware, lead glazed																																			
Creamware, underc.																																			
Pearlware, blue edged																																			
Pearlware, blue HP																																			
Pearlware, blue TP																																			
Pearlware, underc.																																			
Whiteware, green edged																																			
Whiteware, poly HP																																			
Whiteware, black TP																																			
Whiteware, green TP																																			
Whiteware, blue TP																																			
Whiteware, aridular																																			
Whiteware, tinted																																			
Whiteware, underc.																																			
Yellow ware, annular																																			
Coleware																																			
Glass, melted																																			
Glass, manganese																																			
Glass, aqua																																			
Glass, blue																																			
Glass, green																																			
Glass, light green																																			
Glass, amber																																			
Glass, brown																																			
Glass, black																																			
Glass, clear																																			
Architecture Group																																			
Window glass																																			
Nail																																			

# RESULTS OF SURVEY

Table 29 continued.  
Artifacts from 38CH1540, Locus 4

	1350	1400	1450	1500	1600	1650	1700	1750	1800	1850	1900	1950	2000	2050	2100	2150	2200	2250	2300	2350	2400	2450	2500	2550	2600	2650	2700	2750	2800	2850	2900	2950	3000	3050	3100	3150	3200	3250	3300	3350	3400	3450	3500	3550	3600	3650	3700	3750	3800	3850	3900	3950	4000	4050	4100	4150	4200	4250	4300	4350	4400	4450	4500	4550	4600	4650	4700	4750	4800	4850	4900	4950	5000	5050	5100	5150	5200	5250	5300	5350	5400	5450	5500	5550	5600	5650	5700	5750	5800	5850	5900	5950	6000	6050	6100	6150	6200	6250	6300	6350	6400	6450	6500	6550	6600	6650	6700	6750	6800	6850	6900	6950	7000	7050	7100	7150	7200	7250	7300	7350	7400	7450	7500	7550	7600	7650	7700	7750	7800	7850	7900	7950	8000	8050	8100	8150	8200	8250	8300	8350	8400	8450	8500	8550	8600	8650	8700	8750	8800	8850	8900	8950	9000	9050	9100	9150	9200	9250	9300	9350	9400	9450	9500	9550	9600	9650	9700	9750	9800	9850	9900	9950	10000	10050	10100	10150	10200	10250	10300	10350	10400	10450	10500	10550	10600	10650	10700	10750	10800	10850	10900	10950	11000	11050	11100	11150	11200	11250	11300	11350	11400	11450	11500	11550	11600	11650	11700	11750	11800	11850	11900	11950	12000	12050	12100	12150	12200	12250	12300	12350	12400	12450	12500	12550	12600	12650	12700	12750	12800	12850	12900	12950	13000	13050	13100	13150	13200	13250	13300	13350	13400	13450	13500	13550	13600	13650	13700	13750	13800	13850	13900	13950	14000	14050	14100	14150	14200	14250	14300	14350	14400	14450	14500	14550	14600	14650	14700	14750	14800	14850	14900	14950	15000	15050	15100	15150	15200	15250	15300	15350	15400	15450	15500	15550	15600	15650	15700	15750	15800	15850	15900	15950	16000	16050	16100	16150	16200	16250	16300	16350	16400	16450	16500	16550	16600	16650	16700	16750	16800	16850	16900	16950	17000	17050	17100	17150	17200	17250	17300	17350	17400	17450	17500	17550	17600	17650	17700	17750	17800	17850	17900	17950	18000	18050	18100	18150	18200	18250	18300	18350	18400	18450	18500	18550	18600	18650	18700	18750	18800	18850	18900	18950	19000	19050	19100	19150	19200	19250	19300	19350	19400	19450	19500	19550	19600	19650	19700	19750	19800	19850	19900	19950	20000	20050	20100	20150	20200	20250	20300	20350	20400	20450	20500	20550	20600	20650	20700	20750	20800	20850	20900	20950	21000	21050	21100	21150	21200	21250	21300	21350	21400	21450	21500	21550	21600	21650	21700	21750	21800	21850	21900	21950	22000	22050	22100	22150	22200	22250	22300	22350	22400	22450	22500	22550	22600	22650	22700	22750	22800	22850	22900	22950	23000	23050	23100	23150	23200	23250	23300	23350	23400	23450	23500	23550	23600	23650	23700	23750	23800	23850	23900	23950	24000	24050	24100	24150	24200	24250	24300	24350	24400	24450	24500	24550	24600	24650	24700	24750	24800	24850	24900	24950	25000	25050	25100	25150	25200	25250	25300	25350	25400	25450	25500	25550	25600	25650	25700	25750	25800	25850	25900	25950	26000	26050	26100	26150	26200	26250	26300	26350	26400	26450	26500	26550	26600	26650	26700	26750	26800	26850	26900	26950	27000	27050	27100	27150	27200	27250	27300	27350	27400	27450	27500	27550	27600	27650	27700	27750	27800	27850	27900	27950	28000	28050	28100	28150	28200	28250	28300	28350	28400	28450	28500	28550	28600	28650	28700	28750	28800	28850	28900	28950	29000	29050	29100	29150	29200	29250	29300	29350	29400	29450	29500	29550	29600	29650	29700	29750	29800	29850	29900	29950	30000	30050	30100	30150	30200	30250	30300	30350	30400	30450	30500	30550	30600	30650	30700	30750	30800	30850	30900	30950	31000	31050	31100	31150	31200	31250	31300	31350	31400	31450	31500	31550	31600	31650	31700	31750	31800	31850	31900	31950	32000	32050	32100	32150	32200	32250	32300	32350	32400	32450	32500	32550	32600	32650	32700	32750	32800	32850	32900	32950	33000	33050	33100	33150	33200	33250	33300	33350	33400	33450	33500	33550	33600	33650	33700	33750	33800	33850	33900	33950	34000	34050	34100	34150	34200	34250	34300	34350	34400	34450	34500	34550	34600	34650	34700	34750	34800	34850	34900	34950	35000	35050	35100	35150	35200	35250	35300	35350	35400	35450	35500	35550	35600	35650	35700	35750	35800	35850	35900	35950	36000	36050	36100	36150	36200	36250	36300	36350	36400	36450	36500	36550	36600	36650	36700	36750	36800	36850	36900	36950	37000	37050	37100	37150	37200	37250	37300	37350	37400	37450	37500	37550	37600	37650	37700	37750	37800	37850	37900	37950	38000	38050	38100	38150	38200	38250	38300	38350	38400	38450	38500	38550	38600	38650	38700	38750	38800	38850	38900	38950	39000	39050	39100	39150	39200	39250	39300	39350	39400	39450	39500	39550	39600	39650	39700	39750	39800	39850	39900	39950	40000	40050	40100	40150	40200	40250	40300	40350	40400	40450	40500	40550	40600	40650	40700	40750	40800	40850	40900	40950	41000	41050	41100	41150	41200	41250	41300	41350	41400	41450	41500	41550	41600	41650	41700	41750	41800	41850	41900	41950	42000	42050	42100	42150	42200	42250	42300	42350	42400	42450	42500	42550	42600	42650	42700	42750	42800	42850	42900	42950	43000	43050	43100	43150	43200	43250	43300	43350	43400	43450	43500	43550	43600	43650	43700	43750	43800	43850	43900	43950	44000	44050	44100	44150	44200	44250	44300	44350	44400	44450	44500	44550	44600	44650	44700	44750	44800	44850	44900	44950	45000	45050	45100	45150	45200	45250	45300	45350	45400	45450	45500	45550	45600	45650	45700	45750	45800	45850	45900	45950	46000	46050	46100	46150	46200	46250	46300	46350	46400	46450	46500	46550	46600	46650	46700	46750	46800	46850	46900	46950	47000	47050	47100	47150	47200	47250	47300	47350	47400	47450	47500	47550	47600	47650	47700	47750	47800	47850	47900	47950	48000	48050	48100	48150	48200	48250	48300	48350	48400	48450	48500	48550	48600	48650	48700	48750	48800	48850	48900	48950	49000	49050	49100	49150	49200	49250	49300	49350	49400	49450	49500	49550	49600	49650	49700	49750	49800	49850	49900	49950	50000	50050	50100	50150	50200	50250	50300	50350	50400	50450	50500	50550	50600	50650	50700	50750	50800	50850	50900	50950	51000	51050	51100	51150	51200	51250	51300	51350	51400	51450	51500	51550	51600	51650	51700	51750	51800	51850	51900	51950	52000	52050	52100	52150	52200	52250	52300	52350	52400	52450	52500	52550	52600	52650	52700	52750	52800	52850	52900	52950	53000	53050	53100	53150	53200	53250	53300	53350	53400	53450	53500	53550	53600	53650	53700	53750	53800	53850	53900	53950	54000	54050	54100	54150	54200	54250	54300	54350	54400	54450	54500	54550	54600	54650	54700	54750	54800	54850	54900	54950	55000	55050	55100	55150	55200	55250	55300	55350	55400	55450	55500	55550	55600	55650	55700	55750	55800	55850	55900	55950	56000	56050	56100	56150	56200	56250	56300	56350	56400	56450	56500	56550	56600	56650	56700	56750	56800	56850	56900	56950	57000	57050	57100	57150	57200	57250	57300	57350	57400	57450	57500	57550	57600	57650	57700	57750	57800	57850	57900	57950	58000	58050	58100	58150	58200	58250	58300	58350	58400	58450	58500	58550	58600	58650	58700	58750	58800	58850	58900	58950	59000	59050	59100	59150	59200	59250	59300	59350	59400	59450	59500	59550	59600	59650	59700	59750	59800	59850	59900	59950	60000	60050	60100	60150	60200	60250	60300	60350	60400	60450	60500	60550	60600	60650	60700	60750	60800	60850	60900	60950	61000	61050	61100	61150	61200	61250	61300	61350	61400	61450	61500	61550	61600	61650	61700	61750	61800	61850	61900	61950	62000	62050	62100	62150	62200	62250	62300	62350	62400	62450	62500	62550	62600	62650	62700	62750	62800	62850	62900	62950	63000	63050	63100	63150	63200	63250	63300	63350	63400	6
--	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	-------	---

Seven different artifact groups were represented in the collection (Table 30), including Kitchen (82.7%), Architecture (8.4%), Furniture (0.1%), Tobacco (5.9%), Clothing (0.3%), Personal (0.1%), and Activities (2.5%) groups.

This pattern is not dissimilar to both the Revised Carolina Artifact Pattern and the Carolina Slave Artifact Pattern. We suspect that at least some of the ambiguity here is the result of the shovel tests blurring several structural areas together. Reference to Figure 50 reveals that there were nine structures surrounding the main house and enclosed within the fenced yard. It seems likely that at least some of these structures may represent dwellings for those slaves serving in the owner's house. Thus, we again have a blurring of several patterns at this survey stage.

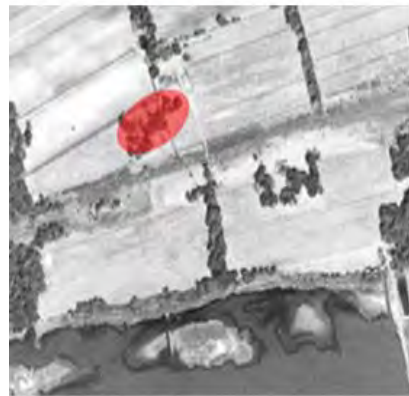


Figure 48. 1948 and 1973 aerials showing the approximate location of the cemetery at 38CH1540.

The Kitchen Group produced the highest percentage of artifacts. Ceramics (excluding Colono ware) account for 80% of the group total, while Colono ware makes up 4% of the total. The MCD for 38CH1541 is 1801 and contains a variety of ceramics (Table 31). The assemblage includes lead glazed slipware, a common eighteenth century pottery that was exported to the colonies in great numbers. As John Cushion observes, the slipware potters were "primarily concerned with producing the everyday necessities for the more humble table" (Cushion 1976:79). This common ware, however, stands in contrast to the white salt glazed stones and porcelains – both far more characteristic of a planter of higher status and both

likely evidencing the British participation in the Chinese tea ritual (e.g., Hobhouse 1987:111).

The Architecture Group predominately produced window glass (60% of the group total). Unidentifiable nail fragments account for 35% of the total. Only one identifiable nail, machine cut, was identified in the collections. Machine cut nails were commonly used by the 1820s (Howard 1989:55). Four pieces of mortar were found as was brick, however, the brick was noted and discarded on site.

Tobacco Group artifacts accounted for the third highest group percentage. Both kaolin pipe stems and bowls were represented with the stems accounting for 68% of the group total.

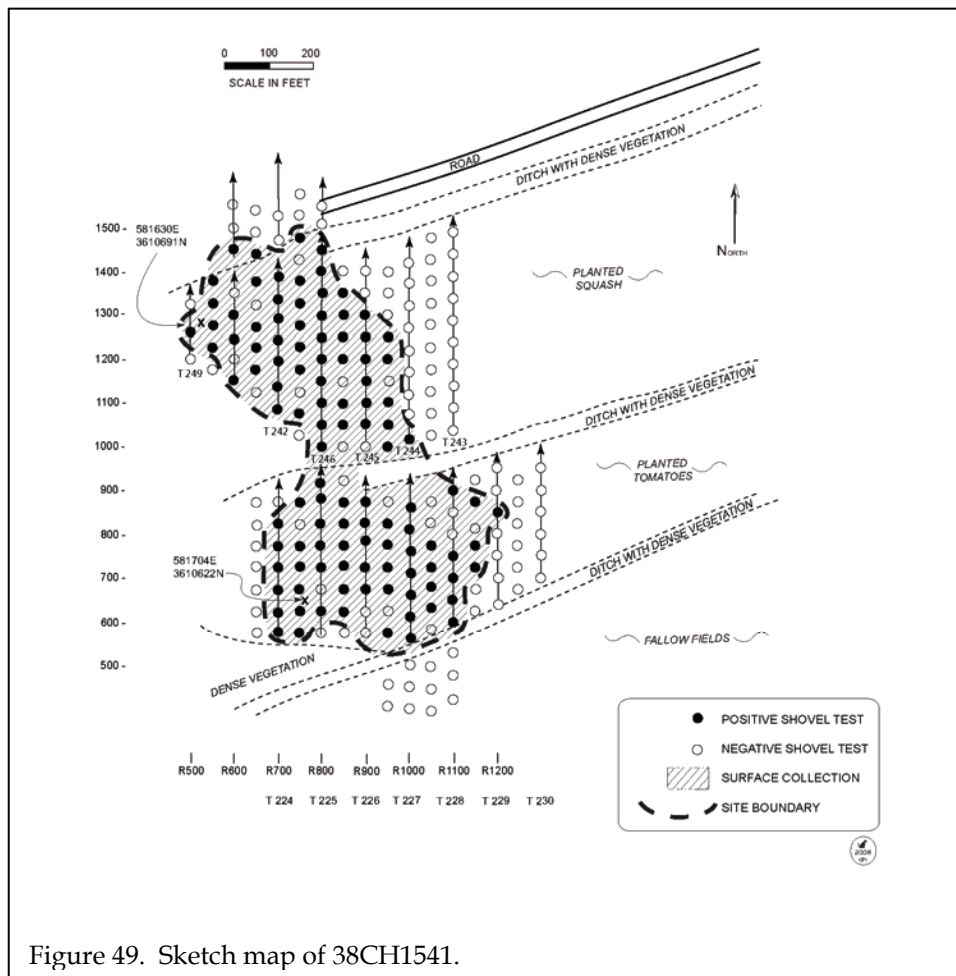
The Clothing Group contained three buttons – one milk glass and two brass. One of the brass buttons has a design worn by the U.S. Navy. The button dates c. 1830-1849 (Luscomb 1967:11).

For the Personal Group, a wire wound black bead was found.

The Activities Group primarily produced unidentifiable iron fragments. One tool, an iron wrench fragment, was recorded.

Bartovics' (1980) dating technique shows limited occupation from about 1740 to 1760 then a steep increase that lasts until around 1820. There is a decrease in occupation until around 1830 when another steady occupation is apparent, lasting to 1900, when the settlement appears to cease. This is consistent with the historic research, suggesting site occupation prior to its late eighteenth century ownership by Mathews and Mullet, with the most intensive settlement being developed by James Legare.





## CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION

Table 30.  
Artifacts from 38CH154

	1250	1270	1280	1330	1360	1150	1250	1300	1400	1450	1170	1220	1270	1370	1440	580	630	680	730	780	830	1080	1130	1180	1230	1280	1330	1380
	R500	R550	R550	R550	R550	R600	R600	R600	R600	R600	R650	R650	R650	R650	R650	R700	R700	R700	R700	R700	R700	R700	R700	R700	R700	R700	R700	R700
Kitchen Group																												
Chinese Porcelain, poly HP																												
Chinese Porcelain, blue HP																												
Chinese Porcelain, undec.																												
English Porcelain, blue HP																												
English Porcelain, TP																												
English Porcelain, undec.																												
Refined earthenware, burned			1																1	1								
Etern ware																												
Rockingham									1																			
Westenwald																												
Stoneware, white SG; scratch blue																												
Stoneware, white SG; annular																												
Stoneware, white SG; slip dip																												
Stoneware, white SG																												
Stoneware, grey SG																												
Stoneware, Bristol																												
Stoneware, Ginger Beer																												
Stoneware, alkaline glazed													1															
Stoneware, brown SG																												
Stoneware, burned																												
Refined red earthenware, clear LG												1																
Coarse red earthenware, black LG																												
Coarse red earthenware, brown LG																												
Coarse red earthenware, green LG																												
Coarse red earthenware, clear LG																												
Coarse red earthenware																												
Spanish Olive jar																						1						
Tortoise shell																												
Slipware, LG												1								1				1				1
Delftware, blue HP																												
Delftware, sponge																												
Delftware, undec.																												
Delftware, no glaze																								1				
North Devon, gravel temper											1																	
Creamware, green edge																		1										
Creamware, poly HP overglaze																												
Creamware, blue HP																												
Creamware, clouded																												
Creamware, annular																									1		1	1
Creamware, undec.				1	1		1	1					1						2	2	1					1	1	1
Pearlware, green edged																												
Pearlware, blue edged																												
Pearlware, poly HP																												
Pearlware, blue HP																												
Pearlware, blue TP														1														
Pearlware, annular																												
Pearlware, undec.									1																			
Whiteware, green edged																			2	1	1					1		
Whiteware, blue edged																												
Whiteware, poly HP																												
Whiteware, red TP																												
Whiteware, brown TP																												
Whiteware, black TP																												
Whiteware, blue TP																												
Whiteware, annular																												
Whiteware, sponge dec.																												
Whiteware, undec.													1						1									
Yellow ware, annular																												
Yellow ware, undec.								1																				
Colonware, rim												1																
Colonware							2			2	1		2	2														
Glass, melted																												
Glass, manganese				1																								
Glass, aqua																												
Glass, green																												
Glass, light green				1																								
Glass, clear																												
Glass, black					1		1		1			1		1						1	1					1		1
Architecture Group														2						2								
Window glass																												
Nail, fragment																1	1			1				1				
Mortar																1	1		1									
Furniture Group																												
Furniture tack																												
Single																												
Tobacco Group																												
Tobacco, pipe bowl, Kaolin																			1						2			1
Tobacco, pipe stem, Kaolin		1					1										1											1
Clothing Group																												
Button																												
Personal Group																												
Seal																												
Activities Group																												
Metal, UID									1				1												1			1
State																												
Faunal																												
Tool Group																												
Iron wrench fragment													1															
Prehistoric Group																												
Sherd, small												1																
Flake, chert																												
UID point fragment, chert																									1			2
Core, flint																												

Figure 30 continued.  
Artifacts from 38CH1541

[illegible]

# CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION

Figure 30 continued.  
Artifacts from 38CH1541

	630	680	730	780	830	880	1050	1100	1200	1250	1300	1350	680	760	780	830	880	1050	1100	1150	1200	1250	1300	570	670	720	770	820
	R850	R850	R850	R850	R850	R850	R850	R850	R850	R850	R850	R850	R850	R900	R900	R900	R900	R900	R900	R900	R900	R900	R900	R950	950	R950	R950	R950
Kitchen Group	Chinese Porcelain, poly HP																											
	Chinese Porcelain, blue HP																											
	Chinese Porcelain, undec.																											
	English Porcelain, blue HP																									1		
	English Porcelain, TP																											
	English Porcelain, undec.																											
	Refined earthenware, burned					1																						
	Elers ware																											
	Rockingham																											
	Westward					1																						
	Stoneware, white SG, scratch blue							1																				
	Stoneware, white SG, annular																											
	Stoneware, white SG, slip dip																											
	Stoneware, white SG																											
	Stoneware, grey SG																											
	Stoneware, Bristol																											
	Stoneware, Ginger Beer																											
	Stoneware, alkaline glazed																											
	Stoneware, brown SG																											
	Stoneware, burned																											
	Refined red earthenware, clear LG																											
	Coarse red earthenware, black LG																											
	Coarse red earthenware, brown LG																											
	Coarse red earthenware, green LG																											
	Coarse red earthenware, clear LG																											
	Coarse red earthenware																											
	Spanish Olive jar																											
	Tortoise shell																											
	Slipware, LG																											
	Delftware, blue HP		1																									



Figure 30 continued.  
Artifacts from 38CH1541

129

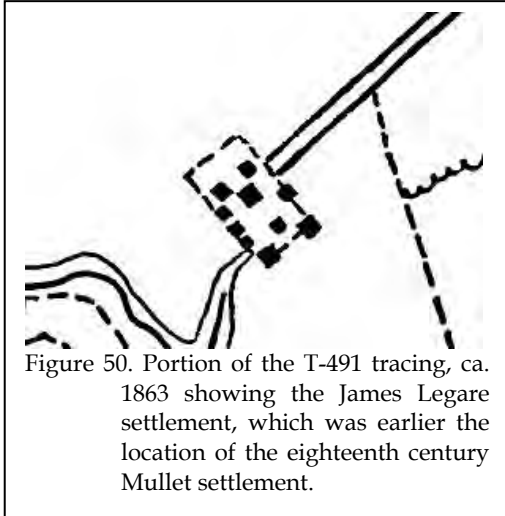


Figure 50. Portion of the T-491 tracing, ca. 1863 showing the James Legare settlement, which was earlier the location of the eighteenth century Mullet settlement.

information potential of early plantation life. No work should be performed in this site until sufficient testing and data recovery have been performed. Of course, this is pending the review and concurrence by the State Historic Preservation Office.

### 38CH1542

Site 38CH1542 (Figure 51) is a prehistoric and nineteenth to twentieth century settlement located on the edge of what is referred to as Mullet Hall Creek at an elevation of about 5 feet AMSL. A GPS UTM taken at the eastern end of the site is 582043E 3610341N (NAD27 datum).

The site was originally recorded during the 1994 reconnaissance of the Mullet Hall property (Adams and Trinkley 1994:30-31). Shovel testing was performed at 50-foot intervals in a cruciform pattern on the eastern side (with 8 of 11 positive) and the western side with 12 of 18 positive). The site, which appears as two separate slave rows on an 1863 map and the 1919 topographic survey, had largely disappeared by the mid-twentieth century (Figure 52). Artifacts collected during the reconnaissance dated from the mid-nineteenth to twentieth century at the eastern portion and late eighteenth to twentieth century at the western portion

(Adams and Trinkley 1994:30-31). Although testing was limited, the site was assumed to be eligible for the National Register of Historic Places.

The current survey set up a series of transects along Mullet Hall Creek from east to west at 50-foot intervals. Shovel testing was performed at 50-foot intervals to the north until two consecutive negative tests were encountered. A total of 190 shovel tests were excavated with 78 positive (41%). An additional nine shovel tests contained only shell, two contained only brick, and six contained brick and shell.

Shovel tests produced soil profiles that closely resemble the moderately well drained Seabrook soils. This series has an Ap horizon of very dark grayish brown (10YR3/2) loamy fine

Table 31.  
Mean ceramic date of 38CH1541

Ceramic	Date Range	Mean Date (xi)	(fi)	fi x xi
Overglazed enamelled porc	1660-1800	1730	1	1730
Underglazed blue porc	1660-1800	1730	27	46710
English porc	1745-1795	1770	26	46020
Westerwald	1700-1775	1738	9	15642
White salt glazed stoneware	1740-1775	1758	27	47466
White sg sw, scratch blue	1744-1775	1760	1	1760
White sg sw, slip dip	1715-1775	1745	1	1745
Lead glazed slipware	1670-1795	1733	28	48524
Clouded wares	1740-1770	1755	4	7020
Decorated delft	1600-1802	1750	10	17500
Plain delft	1640-1800	1720	12	20640
North Devon	1650-1775	1713	3	5139
Creamware, annular	1780-1815	1798	7	12586
Creamware, hand painted	1790-1820	1805	6	10830
Creamware, undecorated	1762-1820	1791	120	214920
Pearlware, poly hand painted	1795-1815	1805	7	12635
Pearlware, blue hand painted	1780-1820	1800	1	1800
Pearlware, blue trans printed	1795-1840	1818	15	27270
Pearlware, edged	1780-1830	1805	23	41515
Pearlware, annular/cable	1790-1820	1805	5	9025
Pearlware, undecorated	1780-1830	1805	65	117325
Whiteware, green edged	1826-1830	1828	3	5484
Whiteware, blue edged	1826-1880	1853	5	9265
Whiteware, poly hand painted	1826-1870	1848	5	9240
Whiteware, blue trans printed	1831-1865	1848	18	33264
Whiteware, non-blue trans printed	1826-1875	1851	3	5553
Whiteware, annular	1831-1900	1866	19	35454
Whiteware, sponge/splatter	1836-1870	1853	1	1853
Whiteware, undecorated	1813-1900	1860	93	172980
Yellow ware	1826-1880	1853	9	16677
Total			554	997572
Mean Ceramic Date		1800.7		

## RESULTS OF SURVEY

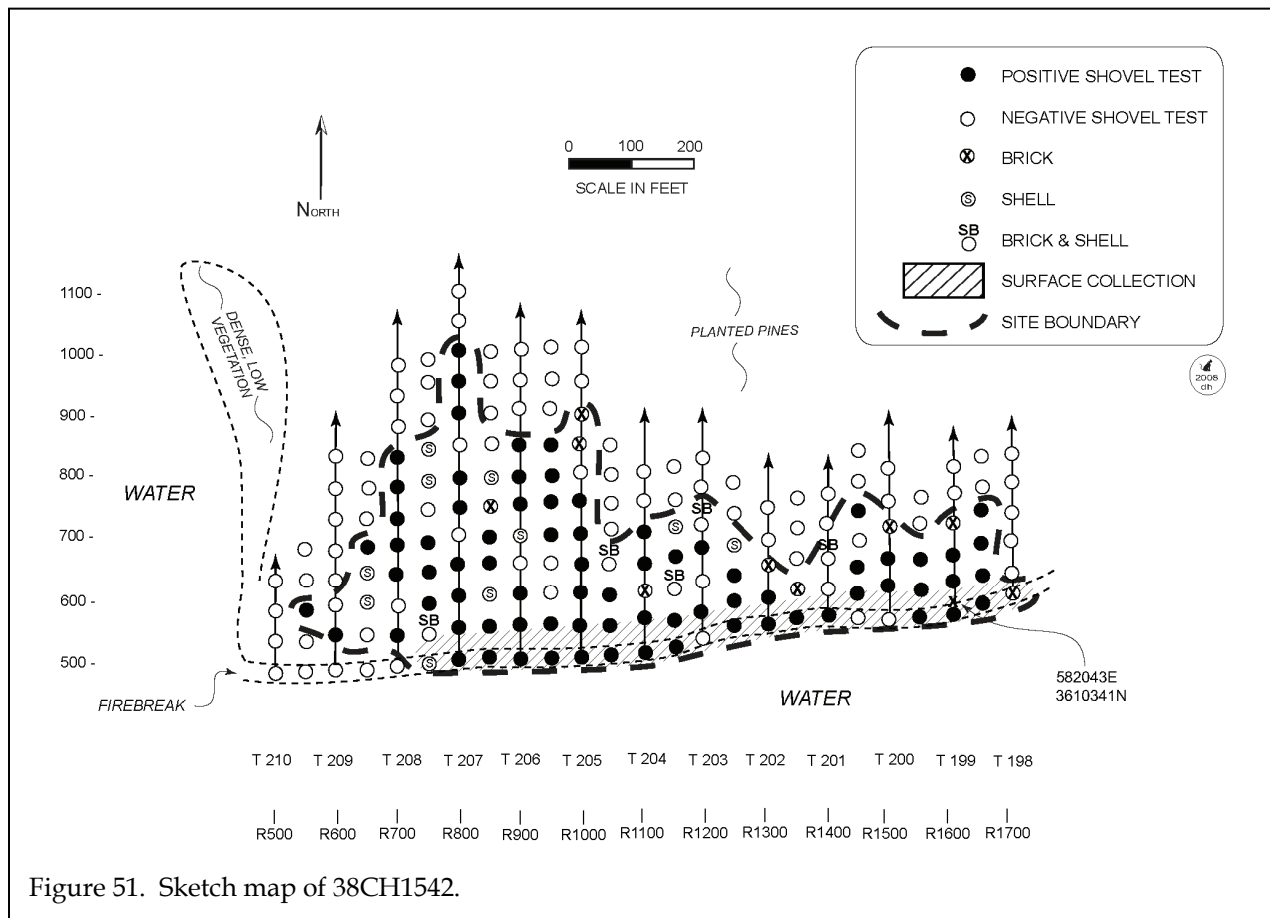


Figure 51. Sketch map of 38CH1542.

sand to a depth of 0.8 foot over a dark brown (10YR4/3) or dark yellowish brown (10YR4/4) loamy fine sand. All artifacts were found in the plow zone.

The prehistoric component of the site (11% of the total artifact assemblage) consists of small sherds, a chert flake, and a chert projectile point fragment. None of the artifacts are

The historic assemblage contained six different data sets – Kitchen (83.7%), Architecture (10%), Furniture (0.3%), Tobacco (2.0%), Clothing (1.4%), and Activities (2.6%) groups (Table 32). This pattern closely resembled the Carolina Slave Artifact Pattern, typically associated with eighteenth century slave settlements where the structures are ground fast (i.e., of wall trench construction). As we have noted for several other

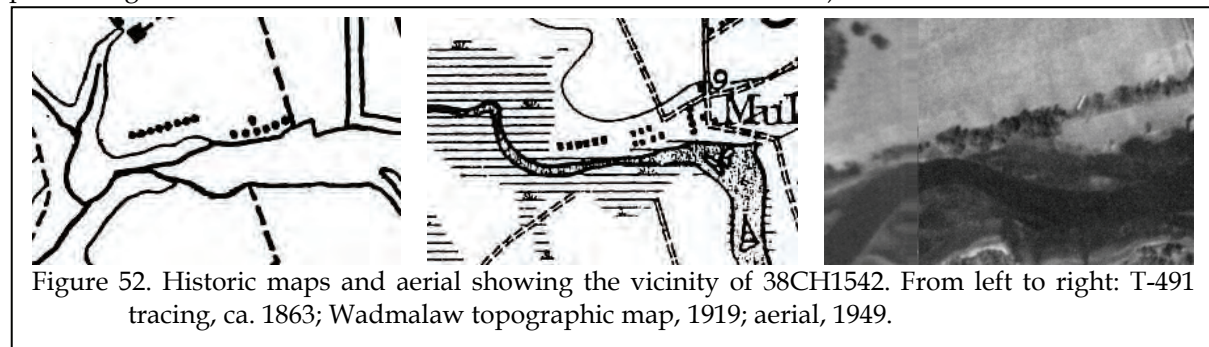


Figure 52. Historic maps and aerial showing the vicinity of 38CH1542. From left to right: T-491 tracing, ca. 1863; Wadmalaw topographic map, 1919; aerial, 1949.

diagnostic.

sites, this seems unusual given the abundance of nineteenth century specimens. It is tempting to

# CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION

Table 32.  
Artifacts from 38CH1542

[illegible][illegible]

use the tenant occupation as an explanation, but the Yeoman pattern should slightly ameliorate the abundance of kitchen items, not further emphasize these materials at the cost of architectural remains. Since this has been seen at several sites, it may be

a pattern development specific to these owners or perhaps to Johns Island - in any event, the anomaly is worthy of additional study.

Some decorative motifs tend to be more



## RESULTS OF SURVEY

Table 33.  
Mean ceramic date of 38CH1542

Ceramic	Date Range	Mean Date (xi)	(fi)	fi x xi
Creamware, undecorated	1762-1820	1791	7	12537
Pearlware, blue hand painted	1780-1820	1800	1	1800
Pearlware, blue trans printed	1795-1840	1818	4	7272
Pearlware, edged	1780-1830	1805	4	7220
Pearlware, undecorated	1780-1830	1805	6	10830
Whiteware, green edged	1826-1830	1828	1	1828
Whiteware, blue edged	1826-1880	1853	1	1853
Whiteware, poly hand painted	1826-1870	1848	3	5544
Whiteware, blue trans printed	1831-1865	1848	2	3696
Whiteware, non-blue trans printed	1826-1875	1851	1	1851
Whiteware, poly decalcomania	1901-1950	1926	4	7704
Whiteware, annular	1831-1900	1866	14	26124
Whiteware, sponge/splatter	1836-1870	1853	3	5559
Whiteware, tinted glaze	1911-1970	1941	3	5823
Whiteware, undecorated	1813-1900	1860	87	161820
Total			141	261461
Mean Ceramic Date	1854.3			

expensive than others and this can serve as a rough guide to the status of the site's occupants. For example, annular wares tend to be very inexpensive. Transfer prints tend to be more expensive. Plain wares are problematical since they begin their history as expensive but rather quickly become less expensive. When we examine the 38CH1542 collection we find that, excluding the plain wares, nearly two-thirds (63.3%) of the decorative motifs are those associated with inexpensive ceramics – annularwares, mocha, and edged wares. If the undecorated ceramics are added, then nearly 92% of the collection represents low status wares. This is certainly consistent with African American slavery (and tenancy).

The Kitchen Group was composed of ceramics (57% of the group) and glass (43%). The MCD of the ceramics is 1854.3 (Table 33). The assemblage contains no wares that are noticeably earlier. Even Colono ware is nearly absent from the collection, as are slipwares and delft. Evidence of tenant occupation is provided by the seven examples of decalcomania and tinted whitewares – ceramics that are characteristic of the twentieth century (and which are consistent with the 1919 topographic map showing dwellings still at this

location).

The Architecture Group contained mostly unidentifiable nail fragments, which accounted for 73% of the group total. Window glass was also found.

Bartovics' (1980) dating analysis shows little occupation prior to 1810, at which time occupation increases dramatically and occupation remains steady until about 1900. We then see only a thin smear through the mid twentieth century – suggesting that the tenant

dwellings may have been only in limited use.

The site area is approximately 1,200 feet east-west by 500 feet north-south. It is today located in an area of planted pines, although during the 1994 reconnaissance it was a plowed field.

The data sets identified for 38CH1542 include a variety of artifact groups expected to be associated with a slave settlement. The pattern analysis, while somewhat ambiguous supports this interpretation, as does an examination of the decorative motifs present in the assemblage. Another data set is the presence of faunal remains. We need to also add the abundant historic research as a valuable data set. For example, we know that James Legare's widow, Lydia, reported 30 slave houses on the 1860 census. The available historic plat of the property, however, reveals only 15 in these two settlements – thus we must recognize that we have a sample of perhaps only half was what was originally present.

The exploratory potential at Mullet Hall is exceptional – not only do we have three different plantations – each with its own slave settlement –

# CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION

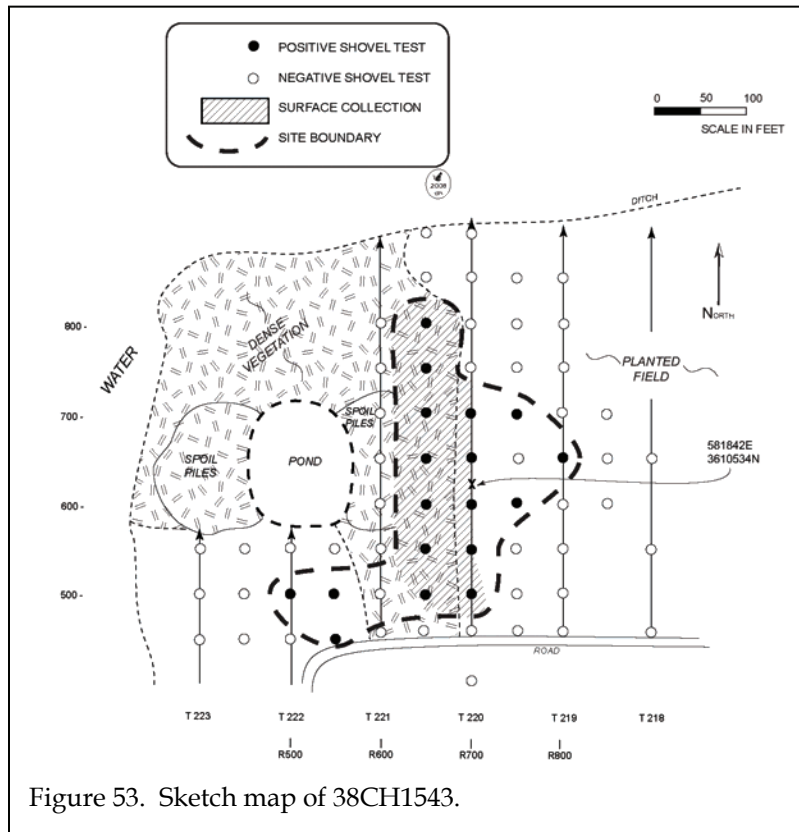


Figure 53. Sketch map of 38CH1543.

but at James Legare's settlement we have two distinct settlements. Was one settlement older than another? If so, might this difference be seen in architecture or identified in the artifact assemblages? Were the settlements representative

of two different groups of slaves? This need not be as drastic as field and house slaves, but may perhaps represent groups that worked different fields. If so, will we see any artifactual or dietary differences? Certainly, we have a variety of significant research questions available for study.

Site integrity here, as at other sites, has been affected by plowing. Yet the presence of relatively large historic ceramics – as well as the recovery of faunal remains in plow zone contexts – suggests that plowing may not be as dramatic as might be presumed. We have also cited commentary by other archaeologists who have examined plow zone contexts in detail and find that they remain worthy of careful study.

Site 38CH1542 is recommended eligible for the National Register of Historic Places for its potential to address significant research questions. No work should be performed in this area until an MOA can be established and implemented. Of

Table 34.  
Artifacts from 38CH1543

	500 R500	450 R550	500 R650	550 R650	600 R650	650 R650	700 R650	750 R650	800 R650	500 R700	550 R700	600 R700	650 R700	700 R750	600 R750	650 R800	Surface Collection	Subtotal	Total
Kitchen Group																			24
Canton Porcelain, blue HP																	1	1	
Stoneware, grey SG																	1	1	
Stoneware, Ginger Beer										1								1	
Slipware, lead glazed																	2	2	
Delftware, plain													1					1	
Creamware, annular																	1	1	
Creamware, undec.																	1	1	
Pearlware, blue HP			1															1	
Pearlware, blue TP																	1	1	
Whiteware, undec.														1				1	
Colonware							3	1					2	1		1	2	10	
Glass, black	1			1										1				3	
Architecture Group																			3
Nail, fragment				1				1		1								3	
Tobacco Group																			6
Tobacco, pipe bowl, Kaolin															1		1	2	
Tobacco, pipestem, Kaolin																	4	4	
Activities Group																			8
Metal, UID		5			1	2												8	
Prehistoric Group																			5
Sherd, small					1							2					2	5	
Subtotal	1	5	1	2	2	2	3	1	1	1	2	2	3	1	1	1	2	46	
TOTAL																			46
HP : Hand painted	TP : Transfer print			undec. : undecorated			SG : Salt glazed												

## RESULTS OF SURVEY

course, this is pending the concurrence by the State Historic Preservation Office.

### 38CH1543

Site 38CH1543 (Figure 53) is an eighteenth to nineteenth century scatter located on a marsh edge at an elevation of about 5 feet AMSL. A central GPS UTM is 581800E 3610520N (NAD27 datum).

The site was originally recorded during the 1994 reconnaissance (Adams and Trinkley 1994:31). The site was described as “a small scatter of 18<sup>th</sup> century materials in a plowed field” (site form dated 9/12/94). An agricultural pond was north of the site and appeared to have damaged the site since artifacts were observed eroding out of the wall of the pond. The site dimensions were estimated to be 75 feet north-south by 100 feet east-west.

foot over a dark brown (10YR4/3) or dark yellowish brown (10YR4/4) loamy fine.

The site expanded to an area of about 300 feet square. A large portion of the site (to the east) is located in a cultivated field. The pond identified during the 1994 reconnaissance is still

Table 35.  
Mean ceramic date of 38CH1543

Ceramic	Date Range	Mean Date (xi)	(fi)	fi x xi
Underglazed blue porc	1660-1800	1730	1	1730
Lead glazed slipware	1670-1795	1733	2	3466
Plain delft	1640-1800	1720	1	1720
Creamware, annular	1780-1815	1798	1	1798
Creamware, undecorated	1762-1820	1791	1	1791
Pearlware, blue hand painted	1780-1820	1800	1	1800
Pearlware, blue trans printed	1795-1840	1818	1	1818
Whiteware, undecorated	1813-1900	1860	1	1860
Total			9	15983
Mean Ceramic Date	1775.9			

visible and while a few positive shovel tests were found south of the pond, the pond and spoil piles do appear to bisect the site. Most of the positive shovel tests found to the east of the pond.

The current survey revisited and

Table 36.  
Artifact Pattern Analysis for 38CH1543

	38CH1543	Revised Carolina Artifact Pattern <sup>1</sup>	38BK1900 Area B 18th Cen. Overseer <sup>2</sup>	38CH1278 18th Cen. Overseer <sup>3</sup>	Carolina Slave Artifact Pattern <sup>1</sup>	Georgia Slave Artifact Pattern <sup>4</sup>
Kitchen	58.5	51.8-65.0	65.2	78.1	70.9-84.2	20.0-25.8
Architecture	7.3	25.2-31.4	21.2	8.9	11.8-24.8	67.9-73.2
Furniture	0.0	0.2-0.6	0	0.1	0.1	0.0-0.1
Arms	0.0	0.1-0.3	0.3	0.2	0.1-0.3	0.0-0.2
Tobacco	14.6	1.9-13.9	10.2	11.4	2.4-5.4	0.3-9.7
Clothing	0.0	0.6-5.4	0.1	0.2	0.3-0.8	0.3-1.7
Personal	0.0	0.2-0.5	0.1	0.2	0.1	0.1-0.2
Activities	19.5	0.9-1.7	2.9	1.1	0.2-0.9	0.2-0.4

<sup>1</sup>Garrow 1982

<sup>2</sup>Trinkley et al. 2003

<sup>3</sup>Trinkley et al. 2005

<sup>4</sup>Sington 1980

examined 38CH1543 with 50-foot interval shovel tests. A total of 65 shovel tests were excavated in the site area with 18 positive (28%). Soils resemble the moderately well-drained Seabrook Series, which has an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to a depth of 0.8

(Table 35).

The Architecture Group consists of only unidentifiable nail fragments. The Tobacco Group contained both kaolin pipe bowls and stems. The Activities Group may be somewhat skewed since

The artifacts are representative of four artifact groups including Kitchen (58.5%), Architecture (7.3%), Tobacco (14.6%), and Activities (19.5%) groups (Table 34). In the Kitchen Group, ceramics make up the bulk (88% of the group total) of the collection. Colono ware, an eighteenth century slave-made pottery, accounts for almost half of the ceramics at 38CH1542. The MCD for the site is estimated to be 1775.9

the entire collection is unidentifiable metal pieces.

The site is located in an area that was historically part of the Mullet Hall property, owned by James Legare. Around 1795 the property was purchased by Legare and he built his house, which is thought to be 38CH1541, to the north. Site 38CH1543 does not contain the density of artifacts to be considered a main plantation house, but appears to possibly represent either a summer house (James Legare's?) or overseer

inexpensive (annular) wares are present – and even overseer and slave sites have exhibited small quantities of porcelain. Likewise, colono wares can be found at the owner's table as easily as a slave's – although the quantity in a larger assemblage will be dramatically different. Thus, at the present time, we do not have adequate data to suggest a clear site function.

38CH1543 is the earliest site identified on the property and, as such, assumes some

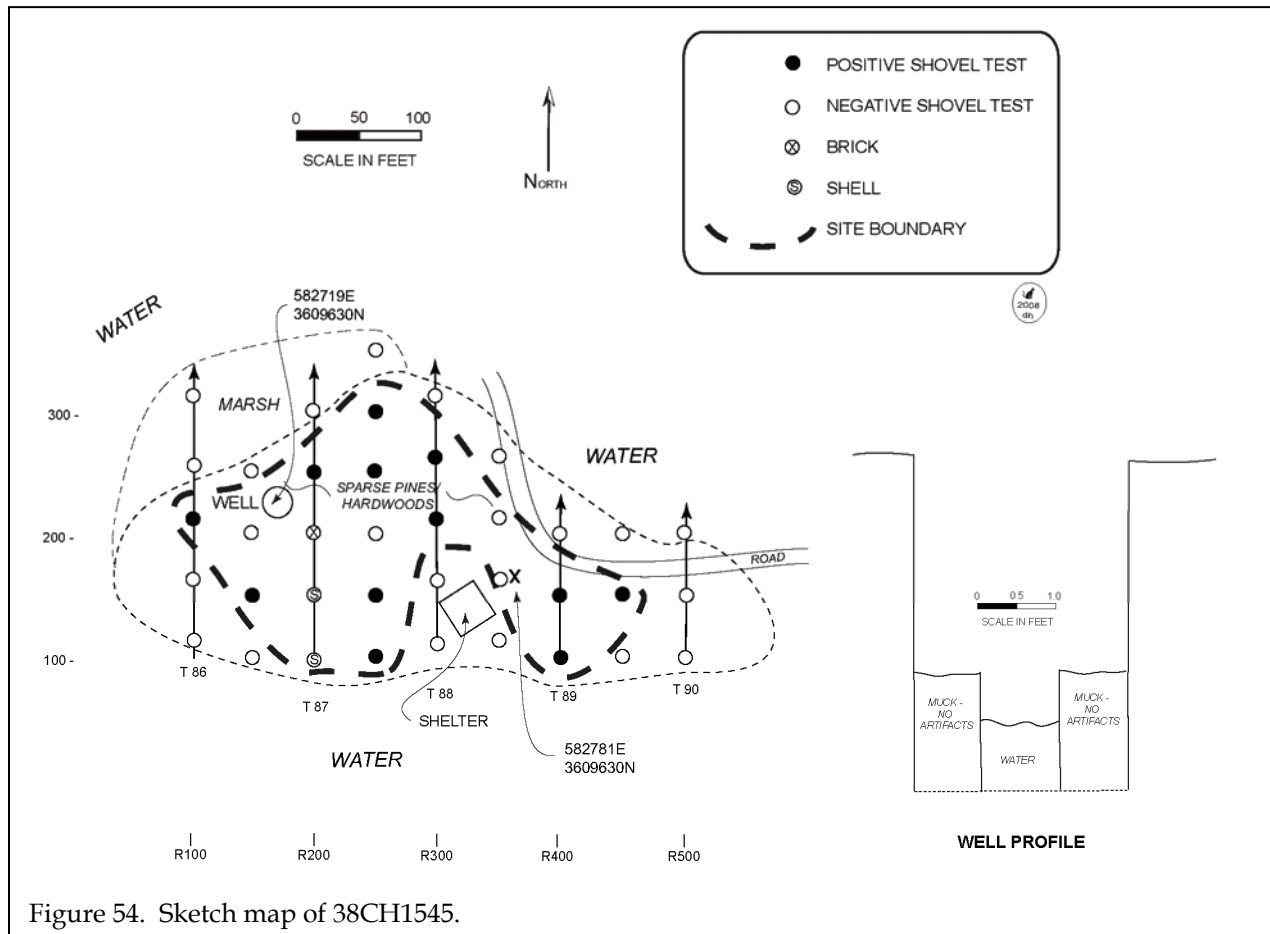


Figure 54. Sketch map of 38CH1545.

settlement.

The pattern analysis of the settlement, based on a rather small collection, is ambiguous. As Table 36 suggests, the collection could represent an eighteenth century slave settlement, an eighteenth century overseer, or an eighteenth to nineteenth century main settlement (or perhaps summer home). But expensive (porcelains) and

considerable significance. Nevertheless, we cannot define appropriate research questions since the site context is not well established. As a result, we recommend the site potentially eligible; additional testing should be conducted with goals being to achieve a larger collection and better assess how much of the site remains. We recommend auger testing at 15 foot intervals. Keel (1999) recently demonstrated that structures could be defined in a



## RESULTS OF SURVEY

plantation context using 25 foot intervals, although he notes that a closer interval might be preferable (Keel 1999:78). We believe that a closer interval is of special importance at 38CH1543 given its circumscribed site dimensions.

This close interval testing should be followed by the excavation of two 10-foot units. This large unit provides the best opportunity to determine if features are present and will provide a good representation of the site stratigraphy. It will unambiguously demonstrate the effects of plowing and the potential for subsurface remains.

No work should be performed at 38CH1543 until additional testing can be



Figure 55. View of 38CH1545.

performed and the integrity and function of the site is evaluated.

Bartovics' (1980) probability distribution shows a gradual increase in settlement from about 1640 to 1670, then a stable occupation until about 1780. The peak of occupation appears to be from 1780 to 1820, then there is a steady decline.

### 38CH1545

Site 38CH1545 (Figure 54) is a twentieth century and prehistoric scatter located on an

Table 37. Artifacts from 38CH1545													
	210 R100	150 R150	250 R200	100 R250	150 R250	250 R250	300 R250	210 R300	260 R300	100 R400	150 R400	150 R450	Subtotal
<b>Kitchen Group</b>													<b>2</b>
Glass, clear			1										1
Glass, black										1			1
<b>Architecture Group</b>													<b>11</b>
Window glass	1	1											2
Nail, fragment			9										9
<b>Activities Group</b>													<b>3</b>
Metal, UID					3								3
<b>Prehistoric</b>													<b>11</b>
Sherd, small				1	2	1	1	1	1	1	1		9
Sherd, Deptford, plain								1				1	2
<b>Subtotal</b>	<b>1</b>	<b>1</b>	<b>10</b>	<b>1</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>27</b>
<b>TOTAL</b>													<b>27</b>

island off a branch of the Kiawah River referred to as Mullet Hall Creek (Figure 55). The elevation of the site is about 5 feet AMSL. A central GPS UTM is 582781E 3609630N (NAD27 datum).

The site was originally recorded during the 1994 reconnaissance of the property (Adams and Trinkley 1994:31-32). During that

recommended since there was possible structural debris and a well located in the area. The site was described as a late nineteenth and early twentieth century domestic scatter.

During the current investigations of the site, a total of 38 shovel tests were excavated with 12 positive (31%). Soils resemble the somewhat

poorly drained Kiawah Series. Kiawah soils have an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to 0.7 foot over a dark grayish brown (10YR4/2) loamy fine sand to 1.2 feet in depth.

Of the positive shovel tests, only 5 or 42% contained historic artifacts (Table 37). The prehistoric component comprised 75% of the site (or 9 out of 12 positive shovel tests). No diagnostic historic artifacts were found during the investigation. While the prehistoric assemblage produced some large



Figure 56. View of the well at 38CH1545.

investigation, a total of 12 shovel tests were excavated with 7 positive (58%). The site was estimated at 175 feet east-west by 150 feet north-south. An area of dense brick rubble was noted at the site (described as structural debris) and a well was described as being present although it was not located during the reconnaissance (Adams and Trinkley 1994:32).

The site form (Natalie Adams 9/14/94) listed the artifacts as prehistoric sherds, whiteware, and glass. Additional work was

sherds (n=2 Deptford plain), all of these were

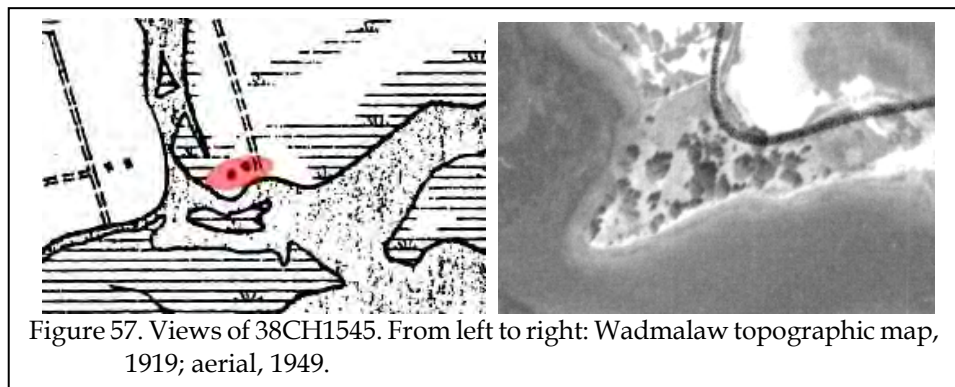


Figure 57. Views of 38CH1545. From left to right: Wadmalaw topographic map, 1919; aerial, 1949.

found in the upper Ap horizon of soil. The size of the site, which incorporates both the historic and prehistoric components is about 350 feet east-west by 200 feet north-south.

No evidence of the brick debris was found

## RESULTS OF SURVEY

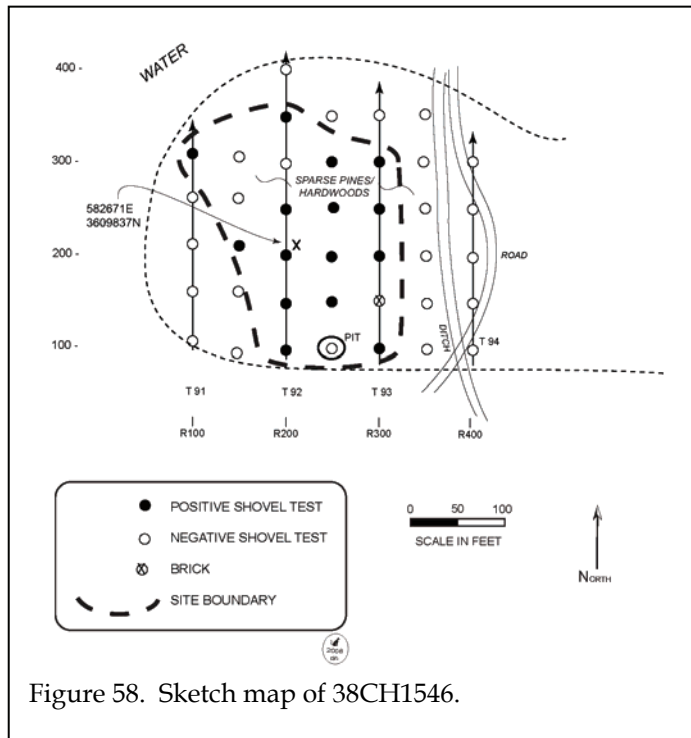


Figure 58. Sketch map of 38CH1546.

during the current survey; however, the well was identified (Figure 56). The well is brick lined with an ovular opening about 2.8 by 2.4 feet. Soil was found starting at a depth of 2.8 feet below the ground surface. Post hole diggers were used to sample the soil in an attempt to identify any artifacts that may be present. The “soil” was found to consist of humic debris and water was encountered at 0.8 feet below grade (3.6 feet below the ground surface). The water level appears to be tide dependent and we failed to find clear evidence that the well had ever been intentionally filled. The consistently damp conditions would

offer exceptional preservation to organic debris that might have been lost – or discarded – in the well.

The earliest document showing any structures on this island is the 1919 topographic map (Figure 57), which reveals two buildings. The island is accessed by a road that runs along the east side of Mullet Hall Creek across a tidal flat. The structures do not appear on the 1948 aerial photograph, although the tidal flat and the access road are still clearly visible. The modern impoundment to the east had not yet been constructed. The island is relatively open, suggesting that the area had been cultivated in the past. These views suggest that the structures were present by 1919, but had been abandoned or demolished by 1949. While helping to provide a terminal date, this does not resolve the origin – or function – of the structures and well at 38CH1545 since the brickwork appears to predate the twentieth century.

Oral history identifies this site as a summer home for a previous plantation owner (Sidi Limehouse, personal communication 2008), although this seems in conflict with the historic documents and the archaeology.

Although more abundant than historic remains, the prehistoric specimens are still sparse. The data set consists entirely of pottery, most of which is under an inch in size. No lithics, faunal remains, or intact midden were encountered. All

Table 38.  
Artifacts from 38CH1546

	310	210	100	150	200	250	350	150	200	250	300	100	200	250	300	Subtotal	Total
	R100	R150	R200	R200	R200	R200	R200	R250	R250	R250	R250	R300	R300	R300	R300		
<b>Kitchen Group</b>																	<b>3</b>
Creamware, undec.							1									1	
Glass, manganese													1			1	
Glass, aqua		1														1	
<b>Architecture Group</b>																	<b>5</b>
Window glass							3								1	4	
Nail, fragment											1					1	
<b>Activities Group</b>																	<b>1</b>
Faunal												1				1	
<b>Prehistoric Group</b>																	<b>20</b>
Sherd, small			1	1	2	2	1	3	3	1		4	1		1	20	
<b>Subtotal</b>		1	1	1	2	2	1	4	3	3	1	2	4	1	1	29	
<b>TOTAL</b>																	<b>29</b>

of the prehistoric material was found in a plow zone context (consistent with the 1949 aerial's suggestion of previous plowing). The combination of sparse remains and lack of integrity indicate that the prehistoric component cannot make a significant research contribution. This component is recommended not eligible for inclusion on the National Register.

The historic component is more difficult to assess. These data sets are also very sparse – glass and a few architectural items. The historical documents are largely silent concerning the site and the oral history is almost certainly incorrect. The most significant data set may be the well itself and it is difficult to write off this unusual feature. Preservation in place is unlikely since the feature might be considered an attractive nuisance that requires filling.

If preservation in place is not possible, then we recommend the site as potentially eligible. Testing should focus on exploration of the well as well as stripping of open areas to determine if structural remains can be identified.

### 38CH1546

Site 38CH1546 (Figure 58) is an eighteenth to twentieth century and prehistoric scatter. It is located at the tip of an island east of what is referred to as Mullet Hall Creek at an elevation of about 10 feet AMSL. A central GPS UTM is 582671E 3609837N (NAD27 datum).

The site was originally recorded during the 1994 reconnaissance when six shovel tests were excavated in the area (Adams and Trinkley 1994:32). Three of those tests were positive and a small surface scatter was collected. The remains were described as late nineteenth to early twentieth century consisting of whiteware, aqua glass, and manganese glass. The site was described as consisting “entirely of ceramics and bottle glass” (Adams and Trinkley 1994:32). The site dimensions were estimated at 100 feet north-south by 25 feet east-west.

The current survey excavated a total of 35

shovel tests with 15 positive (43%). While the reconnaissance recorded an entirely historic site, the current survey produced a 69% prehistoric assemblage. All of the prehistoric artifacts, however, were small undiagnostic sherds.

Soils in the area resemble the moderately well drained Seabrook Series. Seabrook soils have an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to a depth of 0.8 foot over a dark brown (10YR4/3) or dark yellowish brown (10YR4/4) loamy fine sand to a depth of 1.7 feet. All of the artifacts were found in the upper Ap horizon.

Artifact density for the historic assemblage is sparse, producing only eight artifacts (Table 38). One piece of faunal material was found, but its association is uncertain. The only diagnostic artifact is a single piece of undecorated creamware, which was manufactured from 1762 to 1820. Two pieces of glass, one manganese and one aqua, both generally date to the late nineteenth century (Jones and Sullivan 1985).

The testing during the current survey increased the site dimensions to 200 feet east-west by 250 feet north-south.

The site lacks the quantity and quality of remains necessary to address significant research questions about both prehistoric and historic sites. In addition, the site area has been cultivated and logged, which has caused damage to the site (evidenced by the prehistoric materials located within the plow zone). Site 38CH1546 is recommended not eligible for the National Register of Historic Places. No additional management activity is recommended pending the review and concurrence of the State Historic Preservation Office.

### 38CH1547

Site 38CH1547 (Figure 59) is a prehistoric and eighteenth to nineteenth century scatter situated on a ridge at an elevation of about 10 feet AMSL. A central GPS UTM is 582706E 3610070N



## RESULTS OF SURVEY

(NAD27 datum). There is a dirt road running north-south through the site area with the

Shovel tests resemble the somewhat poorly drained Kiawah Series. These soils have an

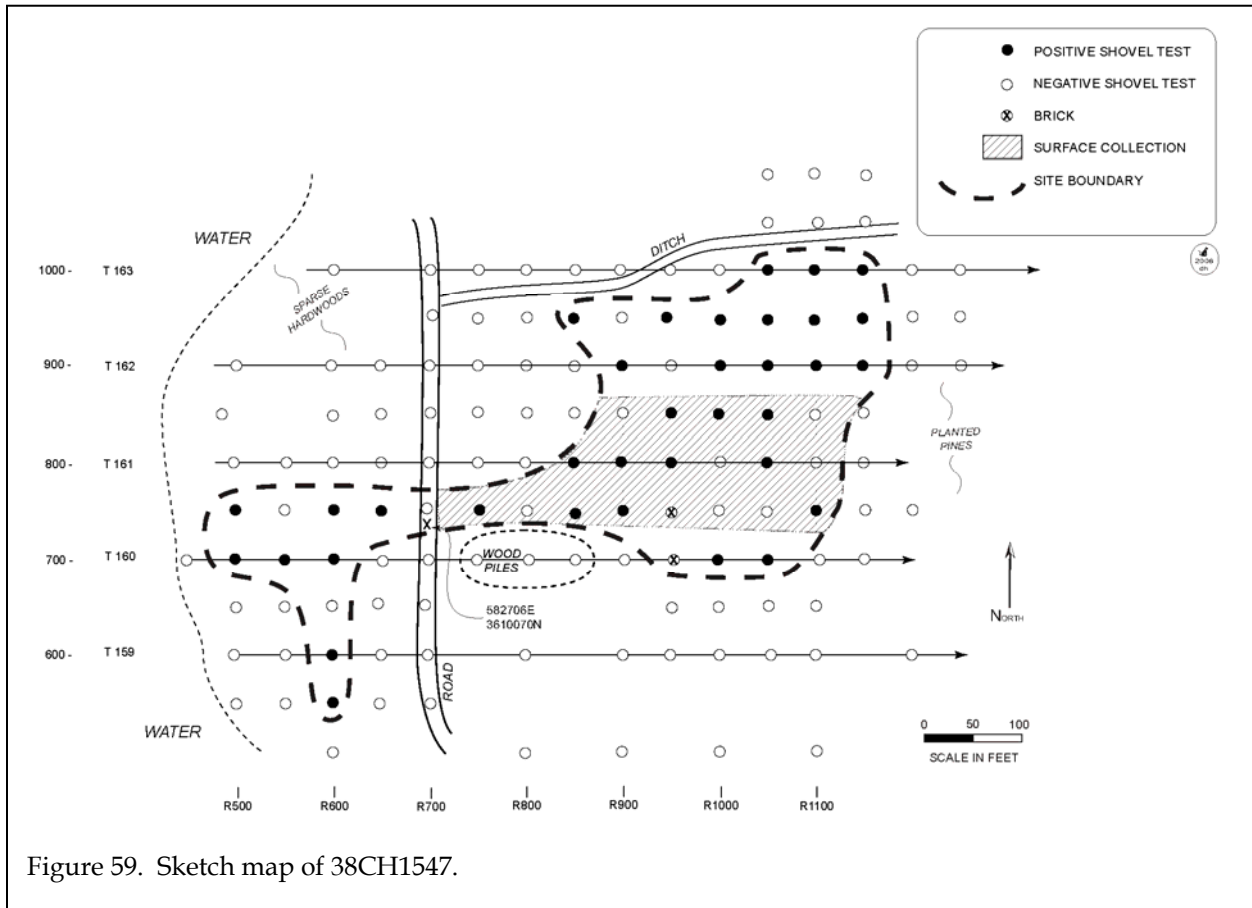


Figure 59. Sketch map of 38CH1547.

vegetation to the west consisting of sparse hardwoods, while to the east are planted pines (Figure 60).

The site was originally recorded during the 1994 reconnaissance when artifacts were found in a plowed field (Adams and Trinkley 1994:32). Thirteen shovel tests were excavated at 50-foot intervals in a cruciform pattern with six positive (46%). The site dimensions were identified as 300 feet east-west by 100 feet north-south.

The current survey relocated the site, testing it at 50-foot intervals until two consecutive negative shovel tests were found along the cardinal directions. A total of 120 shovel tests were excavated with 35 positive (29%). A collection of surface artifacts was also made from the site.

Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to 0.7 foot over a dark grayish brown (10YR4/2) loamy fine sand to 1.2 feet in depth.

The prehistoric remains consist of small sherds and a chert core. This component accounts for 4% of the entire artifact assemblage.

The historic assemblage is represented by four artifact groups - Kitchen (97.5%), Architecture (0.4%), Personal (0.4%), and Activities (1.7%) (Table 39). The Kitchen Group is composed entirely of ceramics and glass. Ceramics make up 81% of this group and has a MCD of 1801.6 (Table 40). Five pieces of Colono ware, a slave-made pottery, were also found. One interesting piece of ceramic is a brown stoneware with "WEESP ANCHOR GIN" written on it.

Weesp is a town in Holland that was known for its

may be affected iron preservation.



Figure 60. View of 38CH1547.

porcelain factory and its distilling center (Forbes 1970). According to Forbes (1970:190) the "production of gin rose to fourfold in the period from 1733 to 1792" and by "the end of the eighteenth century [Holland] found the United States of America as a large consumer of Dutch gin."

Bartovics' (1980) probability distribution of ceramics shows the site starting about 1760 and ending somewhat suddenly at about 1830, although a very small occupation extends to about 1880.

The site, measuring about 650 feet east-west by 450 feet north-south, appears to be an early slave settlement, although the pattern analysis of artifacts does not closely identify with any previously recorded pattern. 38CH1547 seems closest to the Carolina Slave Artifact Pattern (Table 41), which has a high percentage of Kitchen Group artifacts, however the Architecture Group from 38CH1547 is very low. The low proportion of Architecture Group artifacts could be representative of wall trench construction, which would have produced few architectural remains. Also, the soils with their high acidity and salinity

An examination of the decorative motifs is also equivocal. Inexpensive motifs such as annular and edged account for only 43% of the assemblage, while expensive motifs such as hand painted and transfer print account for 58%. Only when the plain wares are added, does the balance shift to support a low status occupation. This does not preclude a slave settlement since many owners provided their slaves with discarded pieces from their own tables.

The lack of Furniture and Arms groups artifacts is not unusual, but the absence of Tobacco and Clothing groups, while generally quite low for slaves, creates more questions about the function of this site. Personal Group artifacts at 38CH1547, even though represented by only one specimen, gives a higher percentage than slave artifact patterns generally produce. The Activities Group percentage seems similar to patterns of slave artifacts.

The only map showing activity at this location is the antebellum Coast Survey Chart (Figure 61) where Solomon Legare's Cotton House (typically a prominent, two story structure) was used as a back sight. Cotton houses were centers of plantation activity during the harvest season and it would be reasonable to find a variety of artifacts associated with them. The one cotton house explored archaeologically was identified on nearby Kiawah Island by Chicora archaeologists in 1990-1991 (Trinkley 1993:213-216). It produced an assemblage not dissimilar from the nearby Shoolbred mansion, offering no clear indication of its function without careful excavation. What is

[illegible]

collection best fits an eighteenth century slave settlement – and we know that James Legare pieced together his holdings from several earlier tracts, each of which may have had a slave settlement – additional field investigations are necessary to confirm this interpretation.

fi x xi	
1738	
3516	
10398	
3596	
111042	
12635	
12600	
16362	
12635	
12635	
66785	
9265	
3696	
7392	
1866	
9300	

Ceramic	Date Range	Mean Date (xi)	(fi)	fi x xi
Westerwald	1700-1775	1738	1	1738
White salt glazed stoneware	1740-1775	1758	2	3516
Lead glazed slipware	1670-1795	1733	6	10398
Creamware, annular	1780-1815	1798	2	3596
Creamware, undecorated	1762-1820	1791	62	111042
Pearlware, poly hand painted	1795-1815	1805	7	12635
Pearlware, blue hand painted	1780-1820	1800	7	12600
Pearlware, blue trans printed	1795-1840	1818	9	16362
Pearlware, edged	1780-1830	1805	7	12635
Pearlware, annular/cable	1790-1820	1805	7	12635
Pearlware, undecorated	1780-1830	1805	37	66785
Whiteware, blue edged	1826-1880	1853	5	9265
Whiteware, poly hand painted	1826-1870	1848	2	3696
Whiteware, blue trans printed	1831-1865	1848	4	7392
Whiteware, annular	1831-1900	1866	1	1866
Whiteware, undecorated	1813-1900	1860	5	9300
Total			164	295461
Mean Ceramic Date	1801.6			

**38CH1548**

Site 38CH1548 is the nineteenth to twentieth century Bishop Cemetery, located on an interior plain at an elevation of about 5 feet AMSL. A UTM for the site is 581490E 3610820N (NAD27 datum). This cemetery is situated on what would have originally been the western half of Mullet Hall, initially owned by James Legare. Vegetation

Table 41.  
Pattern analysis of 38CH1547

38CH1547	Revised Carolina Artifact Pattern <sup>1</sup>	Townhouse Pattern <sup>2</sup>	Dual- Function Pattern <sup>2</sup>	Georgia Slave Artifact Pattern <sup>3</sup>	Carolina Slave Artifact Pattern <sup>1</sup>	Yeoman Pattern <sup>4</sup>
Kitchen Group	98.0	51.8 - 65.0	58.4	63.1	20.0 - 25.8	70.9 - 84.2
Architectural Group	0.4	25.2 - 31.4	36.0	25.0	67.9 - 73.2	11.8 - 24.8
Furniture Group	-	0.2 - 0.6	0.2	0.1	0.0 - 0.1	0.1
Arms Group	-	0.1 - 0.3	0.3	0.2	0.0 - 0.2	0.1 - 0.3
Tobacco Group	-	1.9 - 13.9	2.8	6.0	0.3 - 9.7	2.4 - 5.4
Clothing Group	-	0.6 - 5.4	0.9	1.2	0.3 - 1.7	0.3 - 0.8
Personal Group	0.4	0.2 - 0.5	0.2	0.1	0.1 - 0.2	0.1
Activities Group	1.2	0.9 - 1.7	1.1	4.1	0.2 - 0.4	0.2 - 0.9

<sup>1</sup> Garrow 1982

<sup>2</sup> Zierden et al. 1988

<sup>3</sup> Singleton 1980

<sup>4</sup> Drucker et al. 1984

at the site is extremely dense with hardwoods and undergrowth (Figure 62).

The 1994 reconnaissance identified five headstones, but the dense vegetation prevented accurate boundary determinations (Adams and Trinkley 1994:32-33). At that time, although the site form associated with the site (documented by Natalie Adams 1994) recommended additional work, the reconnaissance report said that the cemetery was likely eligible for the National Register (Adams and Trinkley 1994:34).

The current survey made an attempt to locate the original five headstones identified during the 1994 reconnaissance. All but one (Mary E. Bishop) were found and representative photographs were taken of their condition. In addition, six more headstones were found and recorded. Table 42 lists the stones located in the cemetery.

Only one death date was recent enough (post-1915) to find a death certificate – Pompey

Scott, an African-American male who died October 12, 1915 (Figure 63). The death certificate lists his occupation as farmer who died at age 68. The cause of death is listed as “other.” The headstone in the cemetery lists his age as 66 and has the words “Faithful Servant” on the marble stone. The death certificate (#21316) lists the place of burial as Johns Island and the address as Mullet Hall, so unfortunately the historic name of the cemetery is still unknown. The undertaker is listed as P.P. Deas, who was also from Mullet Hall. Deas is not listed as a South Carolina undertaker (Trinkley 2005), although he is found in the 1910 census as Paris P. Deas. His occupation was listed as farmer on his own account, although he appears to have rented his home on Mullet Road. At the time he was a 47 year old widower and her probably practiced undertaking as a part-time activity.

There were several Bishops (also spelled Bishopp) in the Mullet Hall area who are listed as farmers in the 1900 census (see Table 14). It appears that these farmers, along with many of the people buried in this cemetery,

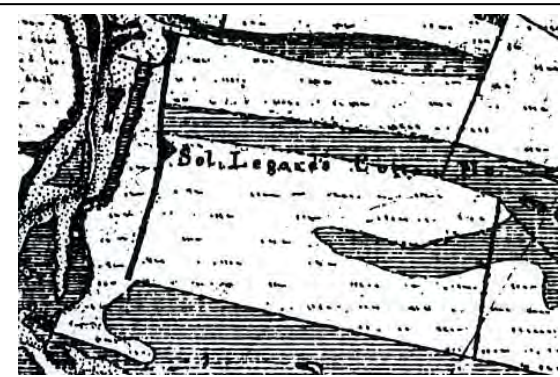


Figure 61. T-491 chart showing Sol. Legare's Cott. Hs. at 38CH1547.

are African- American. At first look, 38CH1548 does not appear to possess characteristics typical of African-American cemeteries.

For example, all of the stones in this



## RESULTS OF SURVEY



Figure 62. View of dense vegetation surrounding 38CH1548.

Once vegetation is removed, we may find more evidence of the burial customs (i.e. kin-based groupings), folkways, and artistic traditions. A brief penetrometer survey was attempted within the cemetery, however, the dense vegetation prevented much of the area from being examined. Figure 64 shows aerials from 1948 and 1973 of the cemetery. The penetrometer measures soil compaction in an attempt to locate unmarked graves as

cemetery are marble headstones – no hand-made markers or field stones were located. In addition, we failed to identify any grave goods, such as ceramics, within the cemetery. Although some purposefully planted bulbs were noticed, no

revealed by a lower soil compaction, generally between 75 and 150 pounds per square inch (psi). The areas of the cemetery that were subjected to the penetrometer revealed a low soil compaction, generally at about 100 psi. We also measured the

Table 42.  
Individuals with Stones Identified at 38CH1548

Name	Born	Died	Footstone	Notes regarding stone	Genealogical Notes
Annie S. Bishopp	July 26, 1858	November 3, 190[1]	A.S.B.	Headstone is broken into 2 pieces; wife of P.B. Bishop	Annie Bishopp in 1900 census, born 1860, wife of Paul Bishopp; mother of 7 children, 5 living, occupation listed as "Farm Laborer"
Hannah Bishopp	February 15, 1868	October 20, 1908	H.B.	Headstone is broken into 3 pieces; wife of Kit Bishop	Hannah Bishopp in 1900 census, born 2/1873, mother of 7 children, 4 still living, occupation listed as "Farm Laborer," married to Kit Bishop (b. 1865)
Kitt Bishopp	July 26, 1826	February 26, 1900	n/a		Kit Bishopp in 1880 census, occupation listed as "Laborer;" wife was Lydia Bishopp, occupation listed as "Washing"
Kitt Bishopp		September 1885	n/a	"Aged 95 years"	
Kitt L. Bishopp			K.L.B.	"In Memoriam"	
Lydia Bishopp		February 29, 1906	L.B.	"Aged 90 Years" not identified during current survey	Lydia Bishopp in 1900 census, born ca. 1840, occupation "Chamber Maid"
Mary E. Bishop	September 15, 1887	February 10, 1919	unknown		Mary Bishopp in 1900 census, daughter of Paul and Annie Bishop; born 9/1887; shown "At School"
Oliver C. Bishop	January 15, 1879	January 2[8], 1895	no inscription		Oliver Bishopp in 1880 census; born ca. 1878, son of Paul and Annie Bishopp
Paul B. Bishopp	June 15, 1855	June 26, 1901	n/a		Paul Bishopp in 1900 census, born 1/1855, occupation listed as "Farmer," owned farm
James Chisolm	October 27, 1882	March 26, 1904	n/a		Shown in the 1900 census as living at 14 Tradd St. in Charleston; occupation listed as "Steamboat Deckhand"
Pompey Scott		October 12, 1915	n/a	"Aged 66 Years"	Pompie Scott in the 1900 census, born 6/1847, married to Emma Scott who had 6 children; occupation listed as "Farmer," renting; SC Death Certificate 21316

evidence of yucca, common in African-American cemeteries, was found. Several grave depressions were noticed.

area around the cemetery to see if the current delineation was correct. The soil compaction was higher, generally over 200 psi. While this higher compaction could be the result of logging in the

vicinity, the boundary of the cemetery appears to be accurate.

Site 38CH1548 is potentially eligible for the National Register of Historic Places.



Figure 63. View of the headstone of Pompey Scott at 38CH1548.

Cemeteries may generally provide good bioanthropological data about lifeways and give good insight to diet, disease, and ethnicity. A more in depth archival study of the people buried here may provide additional information concerning the relationship of those using the cemetery.

The State Historic Preservation Office has mandated a minimum 25-foot buffer around all cemeteries. We have estimated the boundary to be about 150 feet square, so with the buffer, no construction should take place within an area measuring about 200 feet by 200 feet. Care should be taken by construction crews to avoid the cemetery. Kiawah River Plantation, LP has already taken a proactive approach to the

cemetery by recording it on modern survey maps of the property.

### 38CH1549

Site 38CH1549 is a cemetery located on an interior ridge at an elevation of about 10 feet AMSL. It is situated amidst a second growth pine and hardwood forest. A GPS UTM is 582726E 3610248N (NAD27 datum). This graveyard is situated on the eastern half of Mullet Hall, on the portion owned historically by Solomon Legare.

The 1994 reconnaissance recorded this cemetery when Mr. W.L. Limehouse pointed out the area (Adams and Trinkley 1994:33). At the time, Limehouse remarked that the cemetery was damaged by hurricane Hugo in 1989 and that existing markers were knocked over (W.L. Limehouse, personal communication 1994). The report also explains that the markers may have been removed with the logging that took place during the hurricane clean-up (Adams and Trinkley 1994:33). Regardless, no stones were found during the reconnaissance.

This cemetery was clearly visible to USGS surveyor Ray L. Schoppe in 1933 when the Mullet Horizontal Control Point was laid out adjacent to a small creek running into the Kiawah River (Figure 65). It was situated on the edge of

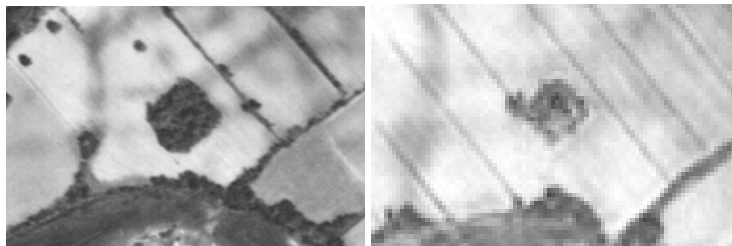


Figure 64. Aerial photos of the cemetery at 38CH1548 in 1948 (left) and 1973 (right).

what was described at that time as an “old field” and was just north of the Mullet Reference Point 1 (U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Ocean Survey, Quad 320801, Station 1138).



The current survey attempted to define the boundaries of the cemetery by visual inspection of grave depressions and the use of a penetrometer to measure soil compaction. An attempt to locate stones was also made during the investigation.

The cemetery was relocated by the original UTM coordinates given by the 1994 site form. The area is covered in a second growth of vegetation, which was dense. While probing the ground in an attempt to locate fallen stones was unsuccessful, we did observe multiple depressions that gave the topography an undulating appearance.

We were unable to discern the boundaries through the penetrometer survey. Inside the known area of the cemetery, readings were around 100 psi. Outside the cemetery in areas known to not contain remains also gave readings similar to the cemetery. Without a more intensive effort such as GPR or stripping, the boundaries may remain imprecise.



Figure 66. View of a piece of manganese glass found at 38CH1549.

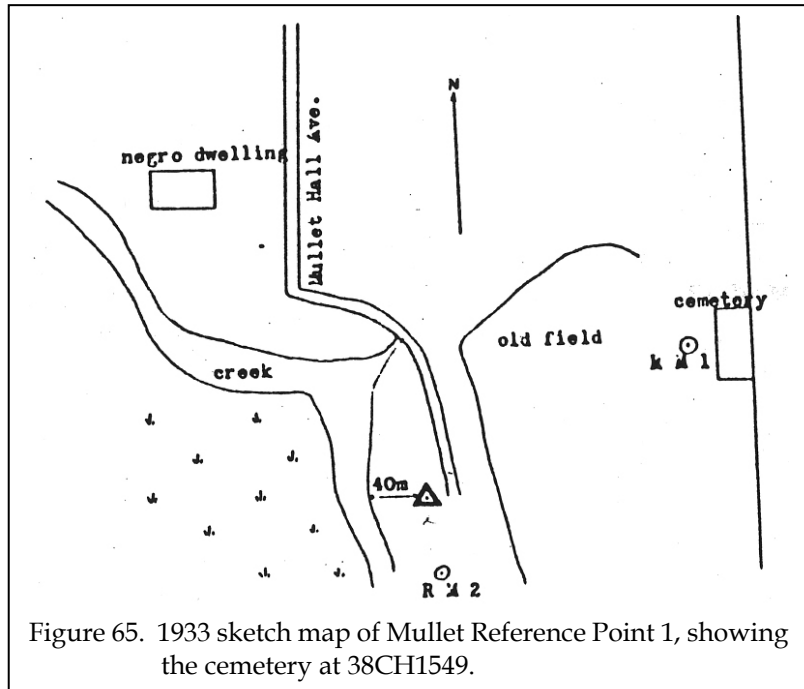


Figure 65. 1933 sketch map of Mullet Reference Point 1, showing the cemetery at 38CH1549.

Within the cemetery, we were unable to identify any plants or "living memorials" or grave goods, possibly the result of logging activities resulting from the 1989 Hurricane Hugo clean-up. Identification was also hindered by the dense second growth vegetation. One piece of manganese glass, a handle to a cup (Figure 66), was identified, however it did not appear to be directly associated with a grave depression. A push pile of soil was also located in the cemetery, so it is uncertain the extent of damage is uncertain.

We recommend this site as potentially eligible for inclusion on the National Register of Historic Places for its information potential. An assessment of eligibility would require careful hand cleaning of the cemetery to reduce the second growth vegetation and allow plotting of graves identified through depressions, additional penetrometer study, and possibly ground penetrating radar. With careful plotting it may be possible to distinguish grave clusters representative of kin-based burial patterns. The work may also identify stones that have fallen, providing additional information on those buried in the cemetery. The cemetery should also be examined in the fall to determine if flowering bulbs are present since these, too, may help define

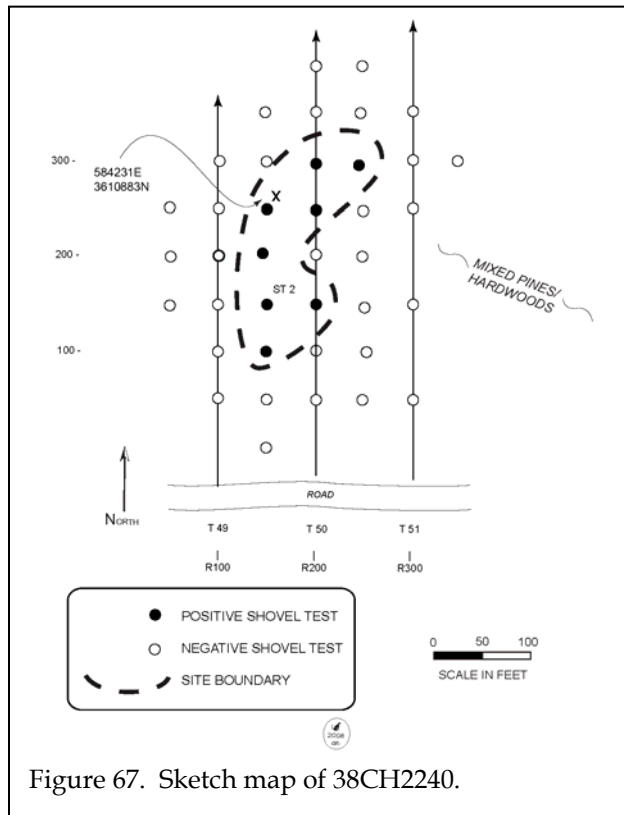


Figure 67. Sketch map of 38CH2240.

individual burials. It is possible that oral history may provide information on this cemetery; no attempt has thus far been made to inquire concerning the cemetery in the African American community on the island. Another avenue of potential research is the scanning of Charleston County death certificates for additional references to Mullet Hall; this may provide information not only on burials, but also on the original name of the cemetery.

Kiawah River Plantation LP has already taken a proactive step in protecting this cemetery by recording it on the development maps. Although the exact dimensions have not been determined, this plan shows the cemetery measuring about 150 feet square. While this may be accurate, the 0.5 acre seems somewhat small for a traditional African American burial ground. With the State Historic Preservation Office mandated minimum 25-foot buffer, the total site area would expand to about 1 acre. We recommend increasing the buffer to 50 feet – setting aside approximately 1.4 acres. This area should have a temporary construction fence

erected and maintained through all construction phases for the protection of the cemetery. In addition, construction crews should be instructed to monitor for any remains that might be found outside the fenced area, immediately reporting them to Chicora. Any finds of human remains would necessitate that work in the area stop and the Charleston County Coroner be notified.

### 38CH2240

Site 38CH2240 (Figure 67) is a prehistoric pottery scatter located on an interior ridge at an elevation of about 10 feet AMSL. A central UTM for the site is 584231E 3610883N (NAD27 datum). Mixed pines and hardwoods surround the site.

The site was identified during shovel testing when Transect 50, Shovel Test 2 was positive, producing a small sherd. Close interval shovel testing was resumed at 50-foot intervals until two consecutive negative tests were encountered along the cardinal directions. A total of 40 shovel tests were excavated with 9 positive (23%). Site dimensions are 150 feet east-west by 200 feet north-south.

Soils in the site area resemble the moderately well drained Seabrook Series. Seabrook soils have an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to a depth of 0.8 foot over a dark brown (10YR4/3) or dark yellowish brown (10YR4/4) loamy fine sand to a depth of 1.7 feet. All of the artifacts were found in the upper Ap horizon.

All of the artifacts consist of small sherds. A total of nine sherds were found with all shovel tests containing one artifact, except Transect 49.5, Shovel Test 2, which contained two sherds. A modern topographic map, dated 1971, shows this area as being cultivated, which may explain the small size of the artifacts and sparseness of the site.

Site 38CH2240 failed to produce any diagnostic artifacts, which would be necessary to address significant research questions about prehistoric life. In addition, site integrity has been



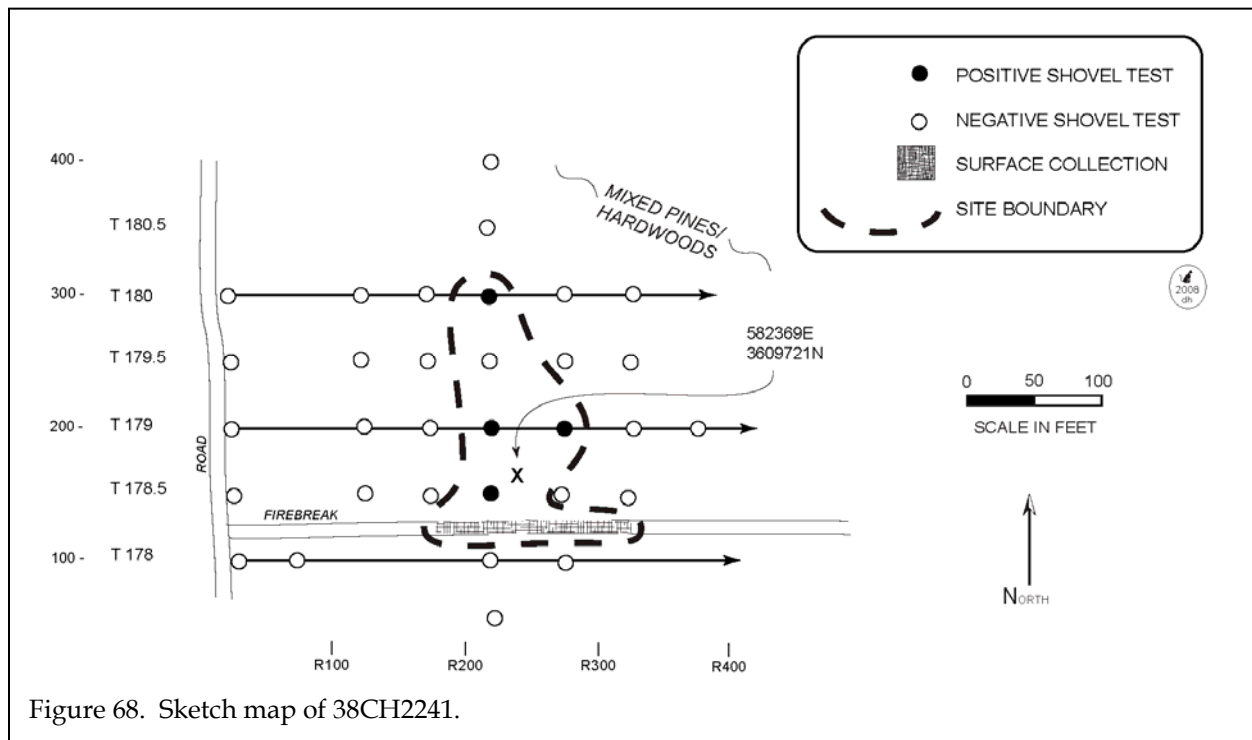


Figure 68. Sketch map of 38CH2241.

damaged by cultivation and probable logging - we were unable to identify any intact remains.

This site is recommended not eligible for the National Register of Historic Places. No additional management activity is recommended pending the review and concurrence by the State Historic Preservation Office.

### 38CH2241

Site 38CH2241 (Figure 68) is a nineteenth to twentieth century domestic site. It is situated on a branch of the Kiawah River, sometimes referred to as Mullet Hall Creek at an elevation of about 5 feet AMSL. A central UTM coordinated is 582369E 3609721N (NAD27 datum).

The site was identified during shovel testing when Transect 179, Shovel Test 3 produced a piece of manganese glass. Close interval testing continued at 50-foot intervals until two consecutive negative tests were encountered in the cardinal directions. A total of 27 shovel tests were excavated with 4 positive (15%). A small surface collection was also found in a firebreak south of the tests.

Soils in the site area, which was covered in a new growth of pines and hardwoods, resemble the somewhat poorly drained Kiawah Series. Kiawah soils have an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to 0.7 foot over a dark grayish brown (10YR4/2) loamy fine sand to 1.2 feet in depth.

The 1919 Wadmalaw map shows two structures in this vicinity (Figure 69). The artifacts

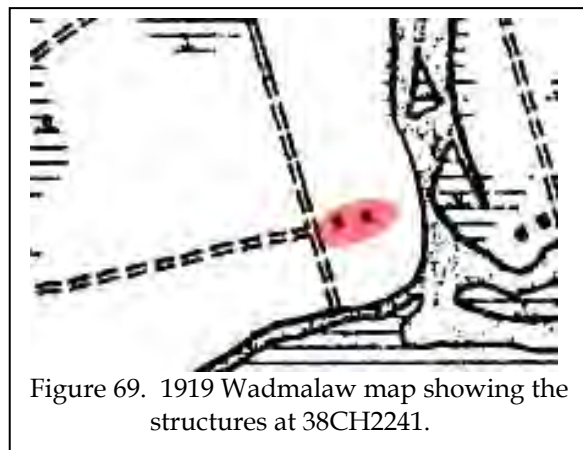


Figure 69. 1919 Wadmalaw map showing the structures at 38CH2241.

recovered confirm this date for the site, which measured about 150 feet east-west by 200 feet

Table 43.  
Artifacts from 38CH2241

	300 R220	150 R230	200 R230	200 R280	Surface	Subtotal	Total
<b>Kitchen Group</b>							<b>14</b>
Whiteware, undec.				1	4	5	
Glass, manganese			1			1	
Glass, clear					5	5	
Glass, aqua					1	1	
Glass, brown				1	1	2	
<b>Architecture Group</b>							<b>1</b>
Nail, fragment	1					1	
<b>Activities Group</b>							<b>1</b>
UID iron		1				1	
<b>Subtotal</b>	<b>1</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>11</b>	<b>16</b>	
<b>TOTAL</b>							<b>16</b>
undec. : undecorated							

north-south (Table 43). For example, manganese glass was common from the late nineteenth to early twentieth century (Jones and Sullivan 1985:13). Whiteware has a broader range, generally giving a mean ceramic date (MCD) of 1860, but actually being made well into the twentieth century.

This site produced somewhat sparse remains given that two structures were once located here. The modern topographic map (dated 1971), however, shows the area as being cultivated. The firebreak to the south may have also contributed in the destruction of the site.

Although this site has been identified on a historic map, no architectural remains were found that could identify the function of the site. Only a few small pieces of brick were identified. In addition, the integrity of the site has been damaged by cultivation and a bulldozed firebreak. The artifacts in the collection are common to turn-of-the-century sites, so it is unlikely that this site will be able to address significant research questions about tenancy on the property.

Site 38CH2241 is recommended not eligible for the National Register of Historic Places. No additional management activity is recommended pending the review and concurrence of the State Historic Preservation Office.

### 38CH2242

Site 38CH2242 (Figure 70) appears to be an eighteenth century slave settlement and prehistoric pottery scatter, situated on a ridge nose at an elevation ranging from 5-10 feet AMSL. A GPS UTM, taken from the southern edge of the site, is 582391E 3610077N (NAD27

datum).

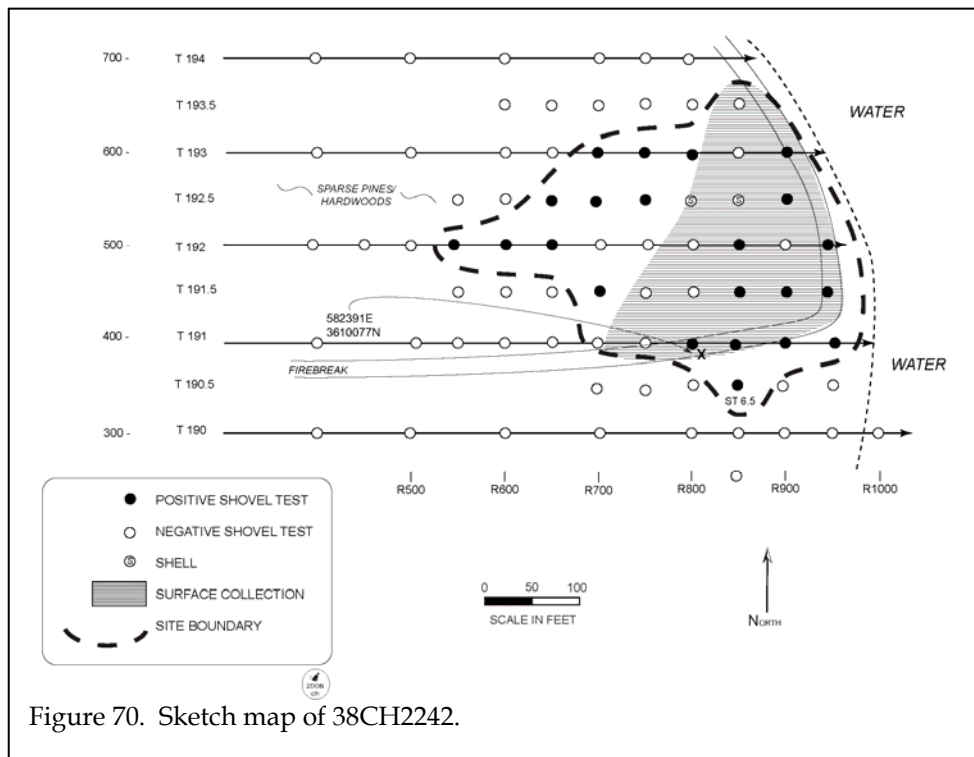
The site was encountered in shovel testing when Transect 191, Shovel Test 6 (400R800) was positive, producing one colono ware and one small prehistoric sherd. Shovel testing was continued at 50-foot intervals until two consecutive negative tests were encountered in the cardinal directions. A total of 65 shovel tests were excavated with 22 positive (34%). An additional two shovel tests produced only shell.

Soils in the area resemble the excessively drained Wando Series, which has an Ap horizon of dark brown (10YR4/3) loamy fine sand to 0.7 foot in depth over a brown (7.5YR5/4) loamy fine sand. Most of the shovel tests in the site area, however, produced the dark brown Ap horizon to well over 1.0 foot in depth, typical of subsoiling.

A sparse pine and hardwood second growth has replaced this once cultivated field, but surface visibility is still relatively high, especially in a plowed firebreak, which borders the southern and eastern portion of the site. The site dimensions, including shovel testing and the surface collection, measure approximately 400 feet east-west by 300 feet north-south.

As previously mentioned, this site has both a prehistoric (18% of the total) and historic (82% of the total) component (Table 44). All of the prehistoric sherds are small, so they cannot be attributed to a specific time period. The historic

## RESULTS OF SURVEY



addition, black glass can be found as early as the seventeenth century (Jones and Sullivan 1985:14).

Four artifact groups make up this site, including Kitchen (87%), Tobacco (10%), Personal (2%), and Activities (1%) groups. The absence of any architectural remains, including brick, is somewhat problematic, however, a very early slave site would probably incorporated wall and trench

component had four pieces of ceramic that could be used for a MCD for the site – white salt-glazed stoneware (n=2) and lead glazed slipware (n=2). Using these ceramics, we get a MCD of 1745.5. While this number may not be entirely accurate given the small sample of datable ceramic, we feel that it is close. Most of the remaining artifacts appear to fit with this time period. For example, Colono ware is generally recognized as an eighteenth century slave-made pottery. In

construction. While architectural remains – such as nails – are found associated with wall trench structures (see, for example, Trinkley et al. 2003:110), they are not widely distributed across the site, even with plowing. Instead, they tend to be excellent indicators of structure locations (for example, compare the smear produced by plotting ceramics with the plot of nails using 25-foot test intervals in Keel 1999:72-74). We suspect that our 50-foot testing interval was simply unable to

Table 44.  
Artifacts from 38CH2242

	500	500	500	550	450	550	600	550	600	400	600	350	400	450	500	400	450	550	600	400	450	500	Surface	Subtotal	Total
	R550	R600	R650	R650	R700	R700	R700	R750	R750	R800	R800	R850	R850	R850	R850	R900	R900	R900	R900	R950	R950	R950			
Kitchen Group																								80	
Stoneware, white saltglaze																							2	2	
Lead glaze slipware																							2	2	
Tortoiseshell																							1	1	
Colono ware			3			2	1		2	1					2	3		2	3	2		1	47	69	
Glass, black																							3	3	
Glass, brown																							1	1	
Glass, manganese																							1	1	
Glass, green and milk																							1	1	
Tobacco Group																								9	
Pipebowl, kaolin																							4	4	
Pipestem, kaolin																1							4	5	
Personal Group																								2	
Bead																						1	1	2	
Activities Group																								1	
Lead fragment																1							1		
Prehistoric Group																								21	
Sherd, small	1	3		1	1		1	2		1	1	1	1	1		1						6	21		
Subtotal	1	3	3	1	1	2	2	2	2	2	1	1	1	1	2	5	1	2	3	2	1	1	73	113	
TOTAL																								113	

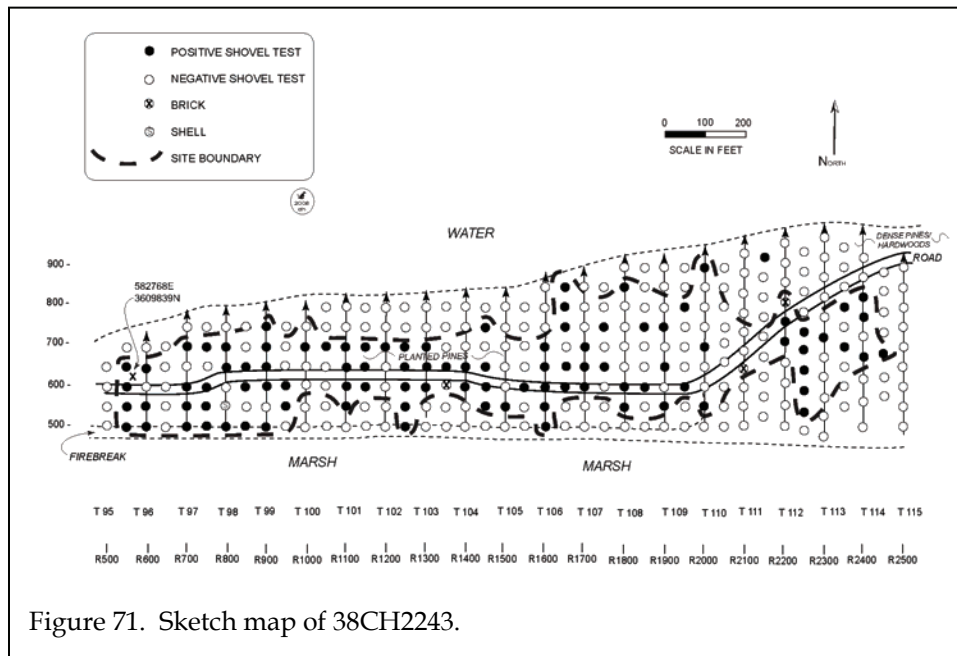


Figure 71. Sketch map of 38CH2243.

structure locations. Even with the absence of obvious architectural artifacts, the presence of other artifacts such as tobacco pipes/stems and beads lead us to believe that this site may have the potential to provide some interesting information about the lifeways of early slaves.

We recommend 38CH2242 potentially eligible for inclusion on the National Register. If green spacing is not possible, we recommend additional testing, consisting of very close interval (15-20 feet) augering followed by the excavation of 2-3 10-foot units. This strategy will provide very detailed aerial coverage, allowing identification of artifact concentrations. The use of several large test units will permit better identification of features, while at the same time assisting with the recovery of a collection better able to identify site function. No work should be conducted in the site area until plans for either green spacing have been approved by the State Historic Preservation Office or additional site assessment and evaluation have been completed.

### 38CH2243

Site 38CH2243 (Figure 71) is a prehistoric and eighteenth to nineteenth century scatter located in an area of planted pines along a ridge at an elevation of about 10 feet AMSL. A GPS UTM

taken at the western end of the site is 582768E 3609839N (NAD27 datum).

The site was first encountered during shovel testing at 100-foot intervals when Transect 96, Shovel Test 0 (500R600) was positive, producing a small sherd. Transects were completed at 50-foot intervals and additional transects were added at 50-foot intervals. A total of 300 shovel tests were excavated in the site

vicinity with 97 positive (32%).

Soils resemble the moderately well drained Seabrook Series. This soil has an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to a depth of 0.8 foot over a dark brown (10YR4/3) or dark yellowish brown (10YR4/4) loamy fine sand. All artifacts were found in the upper Ap horizon.

The site, which covered an area of approximately 1,850 feet east-west by 400 feet north-south, was dominated by the prehistoric component, which accounted for 79% of the total artifact assemblage. A total of 98% of the prehistoric component consisted of small sherds, none of which are identifiable as to type. Two pieces of worked chert were also recovered.

The historic component, which accounted for 21% of the total artifact assemblage, produced only 35 artifacts (Table 45). The majority are representative of the Kitchen Group (63%). Ceramics dominate this group with 68% of all the ceramics consisting of Colono ware, a slave-made pottery. Only three other European ceramics were recovered, yielding a MCD of 1818.7.

The Architecture Group accounts for 34%



[illegible]

Places. No additional management activity is recommended pending the review and concurrence by the State Historic Preservation Office.

Site 38CH2244 (Figure 72) is a prehistoric pottery scatter and eighteenth to twentieth century site. It is located on a ridge side slope at an elevation of 10 feet AMSL. A central UTM for the site is 582663E 3610209N (NAD27 datum).

The site was located when shovel testing produced a positive at Transect 166, Shovel Test 0 (600R750). Ten artifacts (Table 46) were found in this test including salt glazed stoneware, Colono ware, and prehistoric sherds. Testing commenced at 50-foot intervals until two consecutive shovel tests were found in each of the cardinal directions. A total of 85 shovel tests were excavated with 28

153

positive (33%). Two additional tests were found with only brick; one test was found with only shell; and one test was found with brick and shell.

Based on this shovel testing the site measures 500 east-west feet by 250 feet north-south.

divided between early slave (eighteenth century) and the nineteenth-twentieth century artifacts. The twentieth century artifacts appear to be located at the western portion of the site, closer to the water, while the earlier eighteenth to nineteenth century artifacts are found primarily in

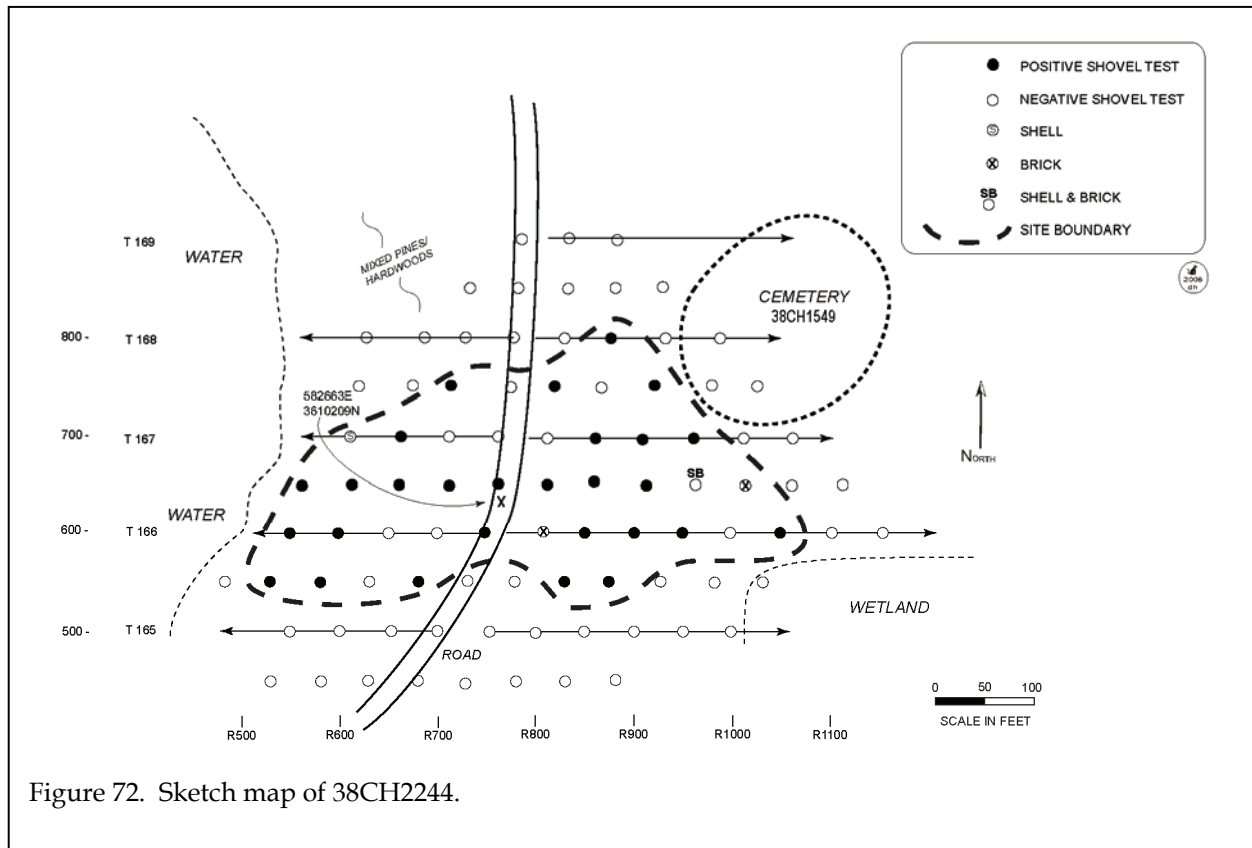


Figure 72. Sketch map of 38CH2244.

The soils in the site area resemble the excessively drained Wando Series, which has an Ap horizon of dark brown (10YR4/3) loamy fine sand to 0.7 foot in depth over a brown (7.5YR5/4) loamy fine sand to a depth of 2.7 feet. The prehistoric sherds from this site were all found in the upper Ap horizon.

Artifacts from the prehistoric component (consisting of 16% of the total) consisted entirely of small sherds, none of which could be attributed to a specific time period. No other prehistoric remains, such as lithics or worked tools were identified.

The historic component, while ranging over three decades in time, can still be somewhat

the eastern half of the site.

The only piece of ceramic that could be accurately dated was a single piece of lead glazed slipware, which has a MCD of 1733. The other ceramics at the site including Colono ware and stoneware can generally be attributed to the eighteenth century. The more recent artifacts consist of such items as milk glass, which became popular in the late nineteenth century (Jones and Sullivan 1985:14).

Kitchen Group artifacts dominate the collection accounting for 57% of the total with both the Architecture and Activities groups providing 2% of the total. (The remaining 39% of the total consists of the prehistoric sherds.)

## RESULTS OF SURVEY

Table 46.  
Artifacts from 38CH2244

	550	550	550	550	550	600	600	600	600	600	600	600	650	650	650	650	650	650	650	700	700	700	750	750	800	Subtotal	Total				
	R530	R580	R680	R830	R880	R550	R600	R750	R850	R900	R950	R1050	R560	R610	R660	R710	R760	R810	R860	R910	R660	R860	R910	R960	R720	R820	R920	R880			
Kitchen Group																													45		
Stoneware, grey SG								1																				1	1		
Earthenware																									1			1	1		
Slipware, LG										1																		1	1		
Colonoware			2		1	1		3	1	4	1	1					2		3	1		2	4	1	1			28	2		
Glass, milk													1			1							2	4				2	1		
Glass, light green															1													1	1		
Glass, clear													2	1					1		2	1						7	7		
Glass, black									2	1	1																	4	4		
Architecture Group																													2		
Nail			1		1																							2	2		
Activities Group														1	1														3		
Iron, UID																													2	2	
Faunal																				1									1	1	
Prehistoric Group																													27		
Sherd, small				1		1	2	6										1	7	5	2						1	1	27	27	
Subtotal	1	2	2	1	1	1	2	10	3	6	2	1	4	2	1	1	2	2	10	9	3	2	4	1	1	1	1	1	77	77	
TOTAL																															
LG : Lead glaze																															
SG : Salt glazed																															

LG : Lead glaze      SG : Salt glazed

This site is situated next to a reported slave cemetery (site 38CH1549) to the east.

We recommend the historic component at 38CH2244 potentially eligible for inclusion on the National Register (the prehistoric component is a non-contributing resource). If green spacing is not possible, we recommend additional testing, consisting of very close interval (15-20 feet)

at the same time assisting with the recovery of a collection better able to identify site function. No work should be conducted in the site area until plans for either green spacing have been approved by the State Historic Preservation Office or additional site assessment and evaluation have been completed.

### 38CH2245

Site 38CH2245 (Figure 73) is a nineteenth to twentieth century scatter located on a ridge at an elevation of about 10 feet AMSL. The vegetation consists of a dense pine and hardwood forest. A UTM, taken at the north edge of the site is 583345E 3610070N (NAD27 datum).

Although shovel testing was performed in this area at 100-foot intervals, the site was initially identified through the surface scatter along the road. Because of this, shovel testing was performed at 50-foot intervals, however, only one shovel test, Transect 116, Shovel Test 1 south, was positive (4% of all the tests excavated), producing a piece of whiteware and a piece of clear glass.

Soils around the site area were the well drained Seabrook Series. Seabrook soils have an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to a depth of 0.8 foot over a dark brown (10YR4/3) or dark yellowish brown (10YR4/4) loamy fine sand to a depth of 1.7 feet.

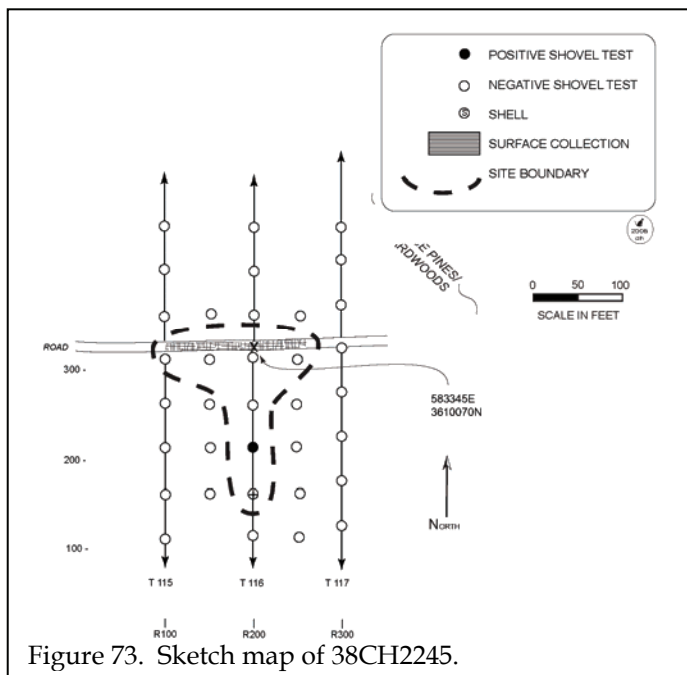


Figure 73. Sketch map of 38CH2245.

augering followed by the excavation of 1-2 10-foot units. This strategy will provide very detailed aerial coverage, allowing identification of artifact concentrations. The use of several large test units will permit better identification of features, while

is recommended pending the review and concurrence by the State Historic Preservation Office.

Table 47. Artifacts from 38CH2245				
	210 R200	Surface	Subtotal	Total
<b>Kitchen Group</b>				<b>12</b>
Whiteware, undec.	1	1	2	
Whiteware, annular		2	2	
Stoneware, alkaline glaze		1	1	
Glass, black		1	1	
Glass, manganese		1	1	
Glass, brown		2	2	
Glass, clear	1	2	3	
<b>Architecture Group</b>				<b>1</b>
Window glass		1	1	
<b>Subtotal</b>	<b>2</b>	<b>11</b>	<b>13</b>	
<b>TOTAL</b>				<b>13</b>

The site, which encompasses an area of about 150 feet square, produced 13 artifacts, 92% of which were Kitchen related (Table 47). The other 8% consisted of a single piece of window glass. The artifacts appear to be consistent with a small turn-of-the-century tenant site. The undecorated whiteware ranges in date from 1813 to 1900, while annular whiteware tends to be a bit later, from 1831 to 1900. Manganese glass became common at the end of the nineteenth century. A piece of clear glass that appears to have a portion of a palm frond as decoration was also recovered. This decoration appears to be part of a South Carolina dispensary bottle. The dispensary system in South Carolina lasted from 1893 to 1907 (Huggins 1971:v).

Site 38CH2245 has lost its integrity through logging and cultivation. The majority of the site was found exposed in the road. While it may be possible to find additional artifacts through closer interval shovel testing, we do not feel that the quality of the remains warrant that intensive a survey.

Site 38CH2245 is recommended not eligible for the National Register of Historic Places. No additional management activity

### 38CH2246

Site 38CH2246 (Figure 74) is a prehistoric pottery scatter located on a ridge at an elevation of about 10 feet AMSL. The site is located in a dense pine and hardwood forest. A central UTM for 38CH2246 is 583482E 3610108N (NAD27 datum).

Shovel testing was performed at the originally proposed 100-foot intervals until Transect 121, Shovel Test 1 north (450R500) was positive, producing two small sherds. Shovel testing

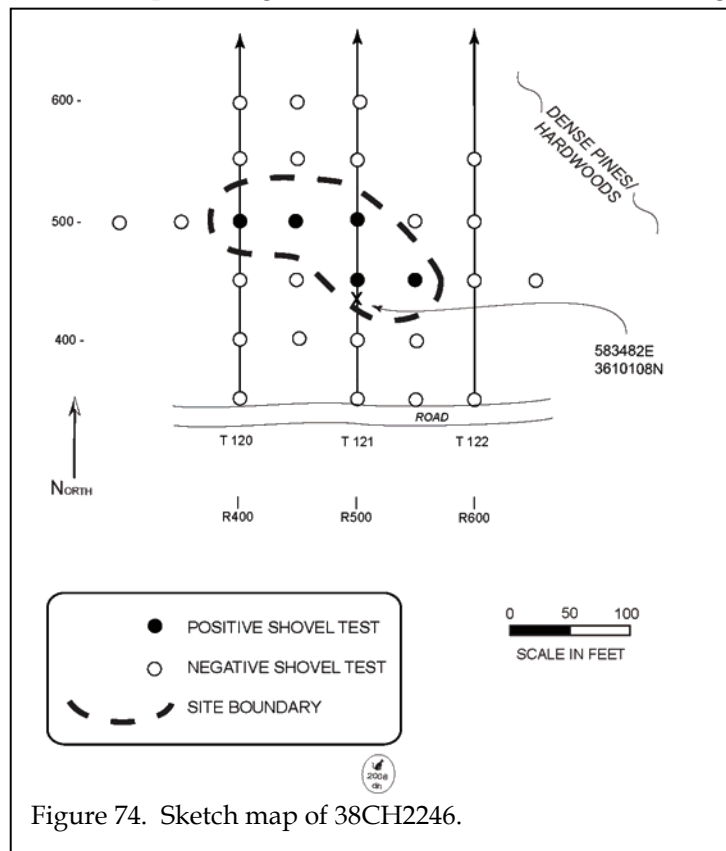


Figure 74. Sketch map of 38CH2246.



## RESULTS OF SURVEY

resumed at 50-foot intervals until two consecutive negative tests were found in all directions. A total of 28 shovel tests were excavated with five being positive (18%).

Soils in the site area resemble the moderately well drained Seabrook Series. Seabrook soils have an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to a depth of 0.8 foot over a dark brown (10YR4/3) or dark yellowish brown (10YR4/4) loamy fine sand to a depth of 1.7 feet. All of the artifacts were found in the upper Ap horizon.

likely the result of intensive cultivation and logging in the area. It is unlikely that this site will be able to address significant research questions about prehistoric life.

Site 38CH2246 is recommended not eligible for the National Register of Historic Places. No additional management activity is recommended pending the review and concurrence by the State Historic Preservation Office.

### 38CH2247

Site 38CH2247 (Figure 75) is a small Middle Woodland pottery scatter, situated on a ridge at an elevation of about 10 feet AMSL. The site is in a mixed pine and hardwood forest with a UTM coordinate of 583702E 3610141N (NAD27 datum).

The site was identified through shovel testing when Transect 129, Shovel Test 1 was positive, producing a small sherd. Shovel testing resumed at 50-foot intervals until two consecutive negative tests were encountered along the cardinal directions. A total of 20 shovel tests were excavated with 4 positive (20%).

Soils in the site are attributed to the Seabrook Series, which has an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to a depth of 0.8 foot over a dark brown (10YR4/3) or dark yellowish brown (10YR4/4) loamy fine sand to a depth of 1.7 feet. All of the artifacts were found in the upper Ap horizon.

A total of five artifacts were found, consisting of four small sherds and one large

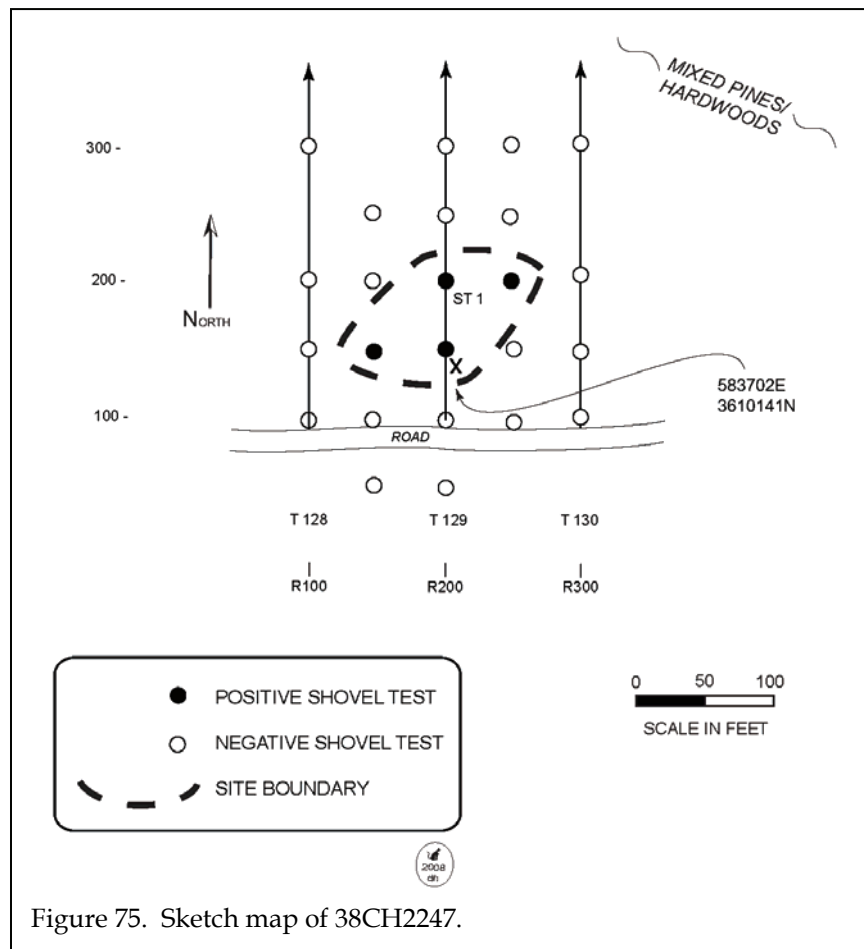


Figure 75. Sketch map of 38CH2247.

As previously mentioned, the site consisted of only prehistoric pottery. A total of eight small sherds were found, which comprise an area of approximately 150 feet east-west by 50 feet north-south. Because of their small size (under 1-inch), none of the sherds are diagnostic. This is

sherd. The large sherd was identified as Deptford cord-marked. The four positive tests make up an area about 50 feet square.

Although we can identify the time period with which the site is associated, remains are too sparse to address significant research questions about prehistoric life. In addition, no evidence of

to nineteenth century domestic scatter located on a peninsula at an elevation of about 5 feet AMSL. The area is currently covered in sparse pines and hardwoods. A central GPS UTM is 584432E 3610336N (NAD27 datum).

The site was originally identified through a brick scatter in the dirt road (Figure 77). Shovel

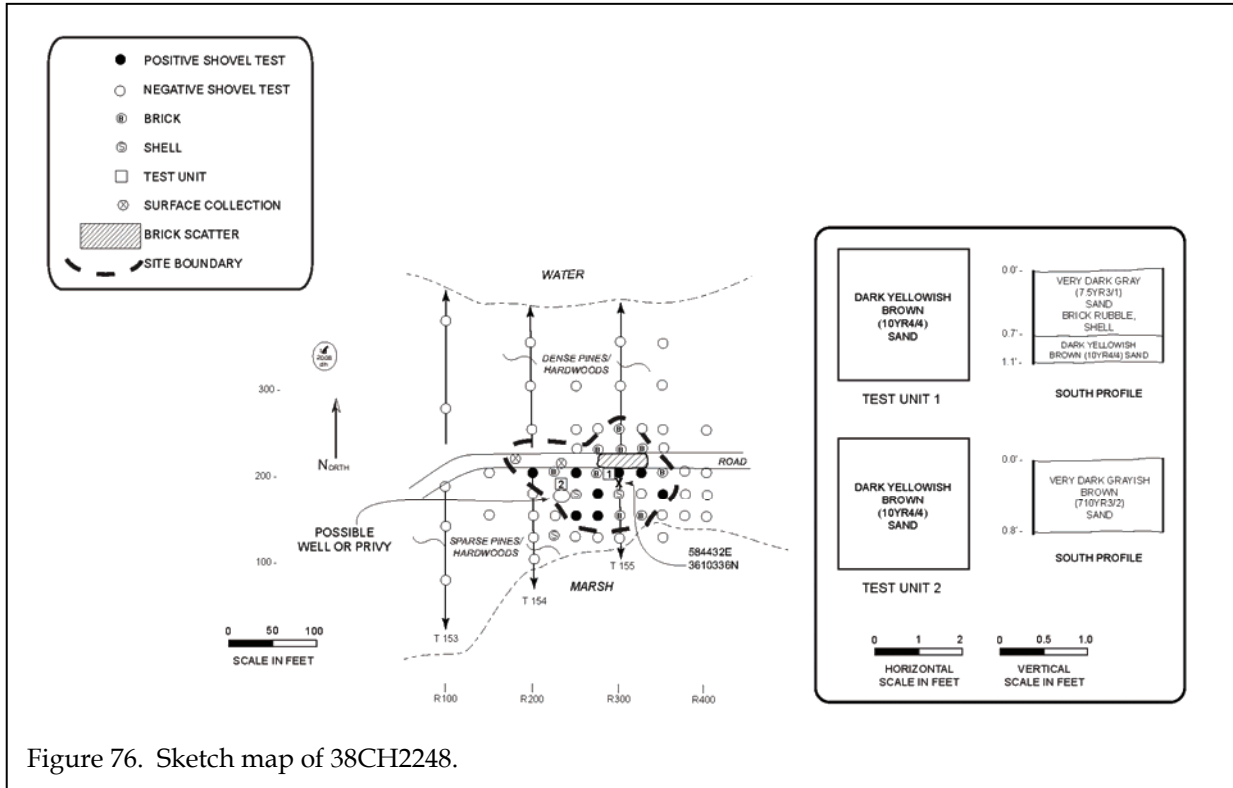


Figure 76. Sketch map of 38CH2248.

bone, shell, or ethnobotanical remains were found that might have aided in the development of significant research questions. All of the remains were encountered in the site's Ap horizon or plow zone.

Because of the lack of integrity and the inability to address significant research questions, 38CH2247 is recommended not eligible for the National Register of Historic Places. No additional management activity is recommended pending the review and concurrence by the State Historic Preservation Office.

### 38CH2248

Site 38CH2248 (Figure 76) is an eighteenth

century site. Testing, however, produced a positive at Transect 154, Shovel Test 0 (200R200). This test contained a whiteware ceramic, lead glaze slipware, and window glass. Close interval testing was performed at 25-foot intervals until two consecutive negative tests were encountered in the cardinal directions. A total of 45 shovel tests were excavated with nine positive (20%). At least eight additional shovel tests contained only brick and two shovel tests contained only shell.

Two 3-foot square units were also excavated in the site area. Test unit 1 was placed near 200R300 where the shovel test produced high numbers of nails and brick (Figure 78). Test unit 2 was placed near 175R235, where a shovel test produced a high density of brick.

## RESULTS OF SURVEY

The testing yielded 617 historic artifacts (Table 48). Table 49 shows the resulting artifact pattern in comparison with several other typical patterns. The collection does not clearly match any

moderately high status dwelling – certainly not a slave dwelling.



Figure 77. View of brick in the dirt road at 38CH2248.

of the previously defined patterns. When decorative motifs are examined, we find that the collection is too small to be of much assistance – while porcelains are present, so too is annular ware.

Turning to the architectural remains, the collection is dominated by machine cut nails. These became popular in the first quarter of the nineteenth century (Howard 1989:55) and the size of nails can be used to obtain some general indication of the nature of the structure. For example, 2d to 4d nails were commonly used to fasten small timber (such as lathe) and shingles, while 6d to 8d nails were used to attach sheathing or siding. At 38CH2248, these two sizes are found in equal proportions and together account for 83% of the nails (n=136). Nails used for framing (9d to 12d) were the third most common accounting for an additional 28 specimens (17%). This suggests that we have a frame dwelling with wood shingles. Interior finish likely included plaster – verified by the recovery of plaster debris in the excavation units. Thus, while the ceramics are ambiguous, the architectural remains suggest a

An 1816 plat of the lands of Benjamin Roper's Oaks Plantation, shows a structure at the location of these remains (Figure 79). The proximity of the structure to salt water suggests that 38CH2248 may represent a planter's summer house, predating the formation of Legareville. As discussed earlier, we have no good archaeological data for summer house assemblages, but we anticipate that they generally reflect the Revised Carolina Artifact Pattern. The results from this site may be anomalous because of the location of the two test pits and their focus on recognizable architectural remains. Excavation units in the immediate vicinity of structure walls

routinely distort the prevalence of architectural materials such as nails and window glass.

One of the shovel tests was placed within a depression that may represent a well or similar feature. Excavation failed to identify the base of the feature. A unit placed outside the posited feature did not identify the edge of the feature and



Figure 78. View of Test Unit 1 at 38CH2248.

its function remains uncertain.

Site 38CH2248 has produced a range of

**CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION**

**Table 48.**  
**Artifacts from 38CH2248**

	200 R200	150 R250	200 R250	150 R275	175 R275	200 R300	200 R325	175 R350	Test Unit #1	Test Unit #2	Subtotal	Total
<b>Kitchen Group</b>												<b>264</b>
Canton Porcelain, blue HP									2		2	
English Porcelain, blue HP									1		1	
Rockingham										1	1	
Slipware, lead glazed	1										1	
Pearlware, undec.		1									1	
Whiteware, annular, mended			2							2	4	
Whiteware, undec.	1				1				3		5	
Glass, melted							1	1	246		248	
Glass, fulgurite									1		1	
<b>Architecture Group</b>												<b>358</b>
Window glass	1			1						2	4	
Cut nails						17			148		165	
Cut nail fragments						13			160		173	
Nail, fragment						8	1			1	10	
Plaster						3			3		6	
<b>Activities Group</b>												<b>1</b>
Metal, UID										1	1	
<b>Prehistoric</b>												<b>1</b>
Sherd, small										1	1	
<b>Subtotal</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>41</b>	<b>2</b>	<b>1</b>	<b>564</b>	<b>8</b>	<b>624</b>	
<b>TOTAL</b>												<b>624</b>

HP : Hand painted

undec. : undecorated

data sets, including early antebellum artifacts, architectural remains indicative of a frame dwelling with plaster and glazed windows, and a possible well or other feature. Another data set includes the historic documentation, especially the 1816 plat showing a structure at this location. These data sets offer an opportunity to examine the site as a possible early antebellum summer residence, predating the organization of Legareville - and perhaps offering an opportunity to develop a context for other, similar sites. This is a topic for which there is little existing research (see, however, Brewster 1947; Helsley 2004 discusses this topic in the context of planters' migrations to the upstate of South Carolina) and we believe it represents an important topic. For example, there are anecdotal accounts of planters annually moving everything from kitchen utensils to pianos to their summer homes, suggesting that their lifeways were simply moved from one location to another. On the other hand, there is competing evidence that the summer homes were far more rustic and spartan. While one study will

certainly not resolve this issue, it will begin to provide clear data to compare and contrast to the available historical accounts.

This survey suggests that 38CH2248 exhibits a high degree of integrity, with well preserved artifactual collections, including even

**Table 49.**  
**Artifact Pattern Comparison for 38CH2248**

	38CH2248	Revised Carolina Artifact Pattern <sup>1</sup>	Georgia Slave Artifact Pattern <sup>2</sup>	Carolina Slave Artifact Pattern <sup>1</sup>
Kitchen Group	42.8	51.8 - 65.0	20.0 - 25.8	70.9 - 84.2
Architectural Group	57.0	25.2 - 31.4	67.9 - 73.2	11.8 - 24.8
Furniture Group	0.0	0.2 - 0.6	0.0 - 0.1	0.1
Arms Group	0.0	0.1 - 0.3	0.0 - 0.2	0.1 - 0.3
Tobacco Group	0.0	1.9 - 13.9	0.3 - 9.7	2.4 - 5.4
Clothing Group	0.0	0.6 - 5.4	0.3 - 1.7	0.3 - 0.8
Personal Group	0.0	0.2 - 0.5	0.1 - 0.2	0.1
Activities Group	0.2	0.9 - 1.7	0.2 - 0.4	0.2 - 0.9

<sup>1</sup> Garrow 1982

<sup>2</sup> Singleton 1980



## RESULTS OF SURVEY

fragile architectural materials such as plaster, as well as the preservation of possible features.

As a result, we recommend 38CH2248 eligible for inclusion on the National Register of Historic Places. No additional activities at the site

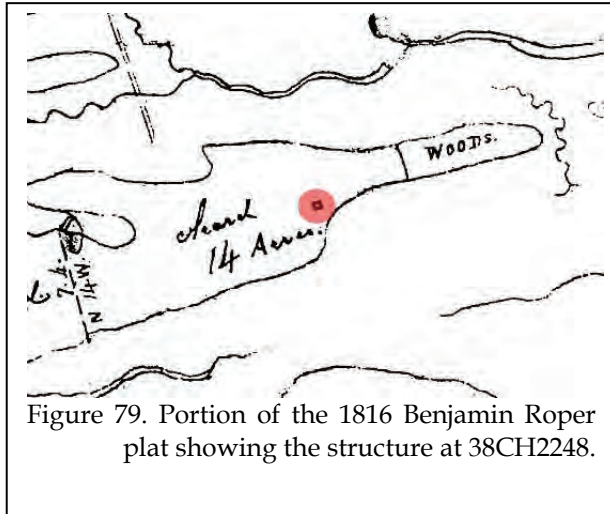


Figure 79. Portion of the 1816 Benjamin Roper plat showing the structure at 38CH2248.

are recommended pending the review and concurrence by the State Historic Preservation Office.

### 38CH2249

Site 38CH2249 (Figure 80) is a prehistoric scatter of artifacts located on a ridge side slope at an elevation of about 8 feet AMSL. The site is located in an area of planted pines and has a UTM coordinate of 582899E 3610344N (NAD27 datum).

The site was identified through routine shovel testing at 100-foot intervals when Transect 270, Shovel Test 10 was positive, producing a small sherd. Additional close-

interval testing was performed at 50-foot intervals along the cardinal directions until two consecutive negative tests were encountered. A total of 70 shovel tests were excavated in the site vicinity with 20 positive (29%).

Shovel testing produced soils representative of Wando loamy fine sand. This Series has an Ap horizon of dark brown (10YR4/3) loamy fine sand to 0.7 foot in depth over a brown (7.5YR5/4) loamy fine sand to a depth of 2.7 feet.

A total of 27 artifacts were recovered with 25 of the specimens representing small sherds. One chert flake and one unidentifiable nail fragment were also found. None of the sherds were identifiable as to type (all were under 1-inch in size) and all the artifacts were found in the upper 1.0 foot of soil - no intact subsurface remains were found.

The site, defined by the positive shovel tests, encompasses an area of about 500 feet east-west by 200 feet north-south. Site integrity has been damaged through logging and cultivation (as shown by the modern topographic map). With no bone, shell, or ethnobotanical remains, it is unlikely that this site is able to address significant

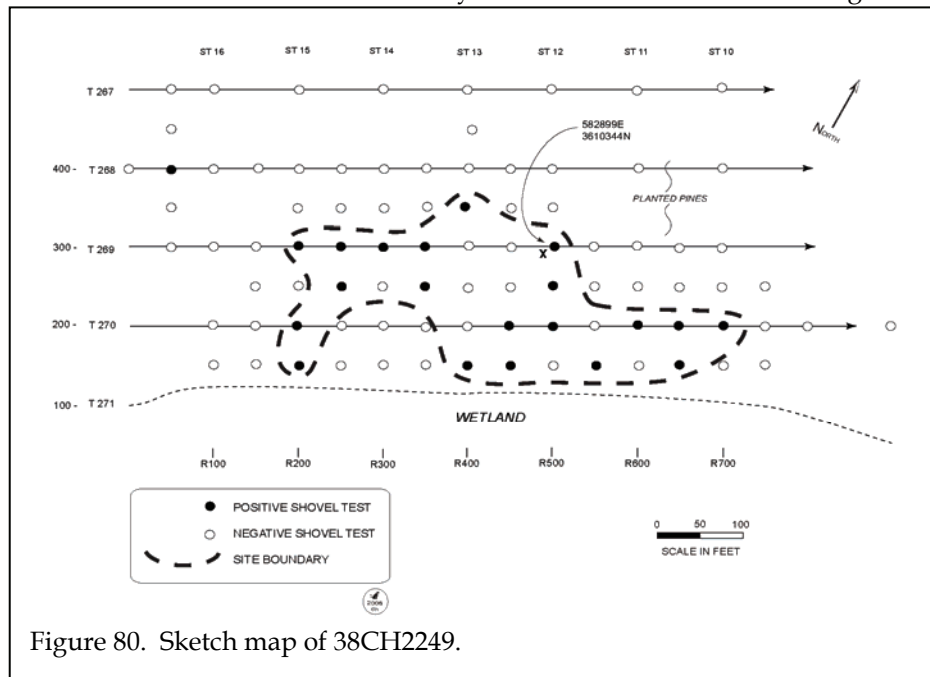
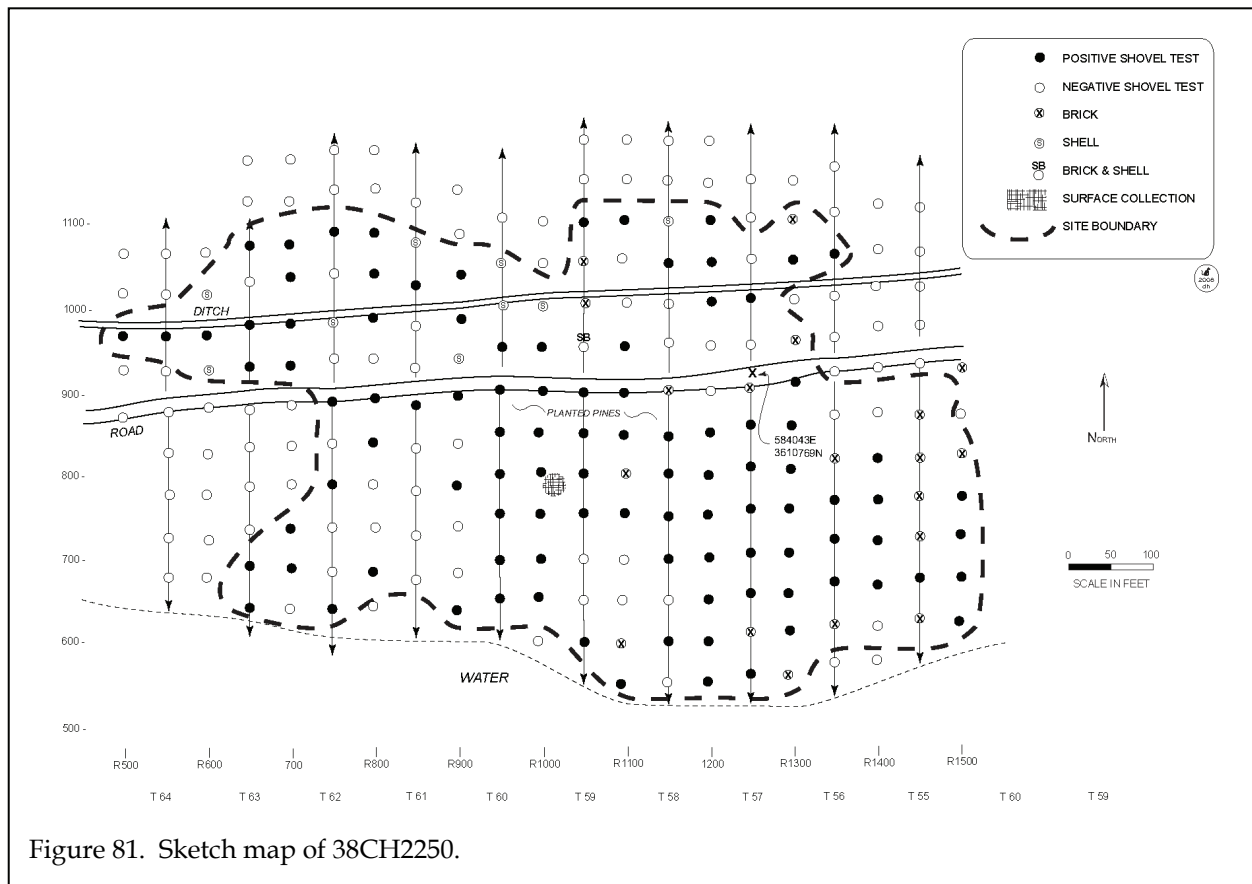


Figure 80. Sketch map of 38CH2249.

research questions.



Site 38CH2249 is recommended not eligible for the National Register of Historic Places. No additional management activity is recommended pending the review and concurrence by the State Historic Preservation Office.

### 38CH2250

Site 38CH2250 (Figure 81) is a prehistoric and eighteenth century scatter, which is located on a ridge and side slope at elevations ranging from 5 to 10 feet AMSL. The site is situated in an area currently in planted pines. A UTM coordinate, taken toward the eastern edge of the site is 584043E 3610769N (NAD27 datum).

The site was encountered during shovel testing at 100-foot intervals when Transect 64, Shovel Test 1 North (970R550) was positive, producing two small prehistoric sherds.

Investigation was continued at 50-foot intervals until two consecutive negative tests were encountered in the cardinal directions. A total of 232 shovel tests were excavated with 91 positive tests (39%).

Soils in the area resemble the Seabrook Series, which has an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to a depth of 0.8 foot over a dark brown (10YR4/3) or dark yellowish brown (10YR4/4) loamy fine sand to a depth of 1.7 feet. All of the artifacts were found in the upper Ap horizon, which sometimes extended up to 1.3 feet in depth - indicative of subsoiling.

The site, which encompassed an area of about 1,000 feet east-west by 550 feet north-south, produced both prehistoric and historic artifacts (Table 50). The prehistoric component was found primarily in the western portion of the site (although it covered almost the entire site area),

## RESULTS OF SURVEY

Table 50.  
Artifacts from 38CH2250

	970	970	970	630	680	930	980	1080	670	730	930	980	1050	1080	640	790	890	1090	690	840	890	990	1040	1090	880	1030	640	790	890	990	1040	650	700	750	800	850	900	950	
	R500	R550	R600	R650	R650	R650	R650	R650	R700	R700	R700	R700	R700	R700	R750	R750	R750	R800	R800	R800	R800	R800	R800	R800	R800	R800	R800	R800	R800	R800	R800	R800	R800	R800	R800	R800	R800	R800	R800
<b>Kitchen Group</b>																																							
Agateware																																							
Stoneware, grey SG																																							
Earthenware																																							
Delfware, undec.																																							
Colonware																																							
Glass, melted																																							
Glass, green																																							
Glass, black																																							
<b>Architecture Group</b>																																							
Nail, fragment																																							
<b>Tobacco Group</b>																																							
Tobacco, pipe bowl, Kaolin																																							
<b>Activities Group</b>																																							
Faunal, bone																																							
<b>Prehistoric Group</b>																																							
Sherd, small	1	2	2	1	1	1	1	1	1	1	3	1	2	1	1	1	1	1	1	1	1	2	3	1	1	1	3	1	1	1	2	4	3	1	1	1	2	2	
UID lithic																																							
Chert, fragment																																							
<b>Subtotal</b>	1	2	2	1	1	1	1	1	1	1	3	1	2	1	1	1	1	1	1	1	1	2	3	1	1	1	3	1	1	1	2	4	3	1	1	1	4	2	2
<b>TOTAL</b>	1	2	2	1	1	1	1	1	1	1	3	1	2	1	1	1	1	1	1	1	1	2	3	1	1	1	3	1	1	1	2	4	3	1	1	1	4	2	2
SG : Salt glazed																																							

	650	700	750	800	850	900	950	600	750	800	850	900	1100	550	750	850	900	950	1100	600	700	750	800	850	1050	550	600	650	700	750	800	850	1000	1050	1100	560	660	710
	R1000	R1000	R1000	R1000	R1000	R1000	R1000	R1050	R1050	R1050	R1050	R1050	R1100	R1100	R1100	R1100	R1100	R1100	R1150	R1150	R1150	R1150	R1150	R1150	R1200	R1200	R1200	R1200	R1200	R1200	R1200	R1200	R1200	R1200	R1250	R1250	R1250	
<b>Kitchen Group</b>																																						
Agateware																																						
Stoneware, grey SG																																						
Earthenware																																						
Delfware, undec.																																						
Colonware																																						
Glass, melted																																						
Glass, green																																						
Glass, black																																						
<b>Architecture Group</b>																																						
Nail, fragment																																						
<b>Tobacco Group</b>																																						
Tobacco, pipe bowl, Kaolin																																						
<b>Activities Group</b>																																						
Faunal, bone																																						
<b>Prehistoric Group</b>																																						
Sherd, small	1	1	1	1	1	2	1	1					1	2	2	1	1	1	2	2	2	3	1		2	1	1	1	5									
UID lithic																																						
Chert, fragment																																						
<b>Subtotal</b>	1	1	1	3	2	2	1	1					1	2	2	1	1	1	2	2	2	3	1		2	1	1	1	5	2	1	1	1	2	2	3	3	
<b>TOTAL</b>	1	1	1	3	2	2	1	1					1	2	2	1	1	1	2	2	2	3	1		2	1	1	1	5	2	1	1	1	2	2	3	3	
SG : Salt glaze																																						

	760	810	860	1010	610	660	710	760	810	860	910	1060	670	720	770	1070	670	720	770	820	730	630	680	730	780	Subtotal	Total
	R1250	R1250	R1250	R1250	R1300	R1300	R1300	R1300	R1300	R1300	R1300	R1350	R1350	R1350	R1350	R1400	R1400	R1400	R1400	R1450	R1500	R1500	R1500	R1500	R1500	R1500	R1500
<b>Kitchen Group</b>																										62	
Agateware																										1	
Stoneware, grey SG																										2	
Earthenware																										4	
Delfware, undec.																										1	
Colonware																										40	
Glass, melted																										1	
Glass, green																										1	
Glass, black																										4	
<b>Architecture Group</b>																										4	
Nail, fragment																										4	
<b>Tobacco Group</b>																										3	
Tobacco, pipe bowl, Kaolin																										3	
<b>Activities Group</b>																										8	
Faunal, bone																										8	
<b>Prehistoric Group</b>																										117	
Sherd, small																										115	
UID lithic																										1	
Chert, fragment																										1	
<b>Subtotal</b>	4	7	1	1	1	5	12	3	2	2	1	1	1	5	1	1	1	1	1	1	1	1	1	1	1	194	
<b>TOTAL</b>	4	7	1	1	1	5	12	3	2	2	1	1	1	5	1												

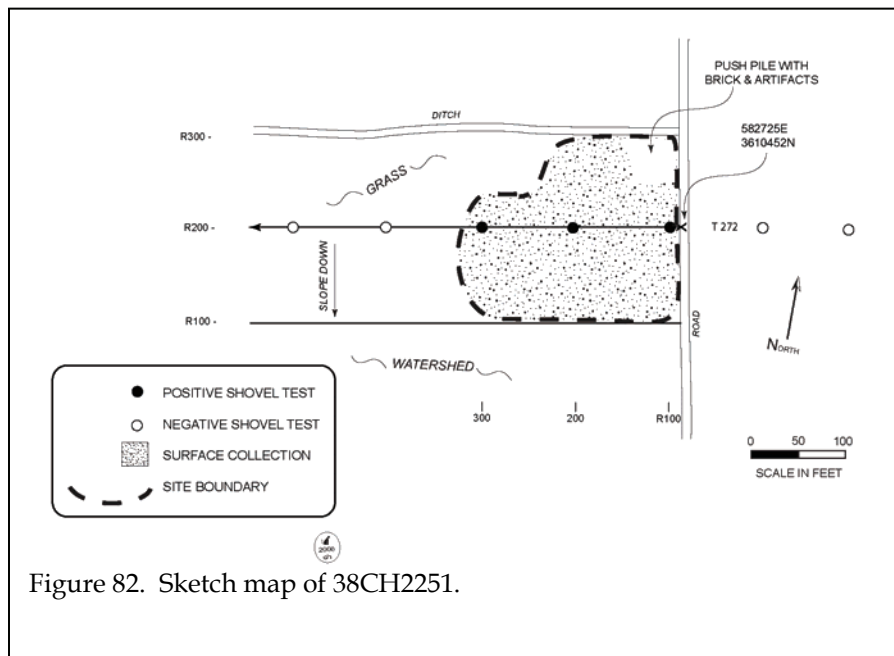


Figure 82. Sketch map of 38CH2251.

The previous owner, Sidi Limehouse (personal communication 2008), said that his grandfather contracted with the Navy during World War II to get the trash from the Charleston mess hall in order to create swill for the pigs on his property. The remaining trash was dumped along the water's edge, just to the west of the site. In fact, other dump areas are said to be located in the area. The utensils and dishes are what was accidentally thrown away (or purposely thrown away

until the site has been properly studied and site function and integrity have been determined.

if they were broken) at the mess hall.

### 38CH2251

Site 38CH2251 (Figure 82) is a twentieth century trash dump that is situated on a side slope at an elevation of about 10 feet AMSL. It is located in an old field that is now growing up in grass. A UTM for the site, taken on the road at the southern end is 582725E 3610452N (NAD27 datum).

With this information, no additional testing was performed in the area. The site is superficial, only deposited into the subsurface by cultivation, which has spread the site to an area of approximately 200 feet square.

While an interesting anecdote to the property, there is nothing else that we can learn

The site was identified through the large amounts of surface trash located in the old field, along with a push pile located at the southeast portion of the site (Figure 83). A single row of shovel tests was excavated west along the site at 100-foot intervals.

Three shovel tests were positive, producing items such as milk glass, mass produced porcelain, and a utensil handle with "U.S.N." on the handle (Table 51). Although large pieces of artifacts were found on the surface, no collection was made.



Figure 83. View of the push pile (at right) at 38CH2252.



## RESULTS OF SURVEY

from this site pertaining to Mullet Hall. Site

a light brownish gray (10YR6/2) loamy fine sand to 1.2 feet in depth. The site was in an old field that has grown into pines. The artifacts were found in the Ap horizon, although this layer sometimes extended to 1.5 feet in depth.

Table 51.  
Artifacts from 38CH2251

	120 R200	220 R200	320 R200	Subtotal	Total
<b>Kitchen Group</b>					<b>17</b>
Whiteware, undec.	1			1	
Porcelain, stripe	2			2	
Glass, clear	3	1	1	5	
Glass, black			1	1	
Glass, milk	1	3	2	6	
Glass, aqua		1		1	
Utensil Handle, stainless steel	1			1	
<b>Architecture Group</b>					<b>1</b>
Nail, fragment		1		1	
<b>Clothing Group</b>					<b>1</b>
Leather	1			1	
<b>Activities Group</b>					<b>1</b>
Metal, UID			1	1	
<b>Prehistoric</b>					<b>1</b>
Sherd, small			1	1	
<b>Subtotal</b>	<b>9</b>	<b>6</b>	<b>6</b>	<b>21</b>	
<b>TOTAL</b>					<b>21</b>

38CH2251 is recommended not eligible for the National Register of Historic Places. No additional management activity is recommended pending the review and concurrence by the State Historic Preservation Office.

### 38CH2252

Site 38CH2252 (Figure 84) is an eighteenth to twentieth century and prehistoric scatter located in the interior plain at an elevation of about 5 feet AMSL. A GPS UTM, taken toward the eastern edge, is 580916E 3610414N (NAD27 datum).

The site was first encountered when Transect 283, Shovel Test 0 (720R900) was positive, producing lead glaze slipware and an unidentifiable fragment of iron. Close interval testing was performed at 50-foot intervals in the cardinal directions until two consecutive negative tests were encountered. A total of 50 shovel tests were excavated with 29 positive (58%). The site dimensions are 450 feet east-west by 250 feet north-south.

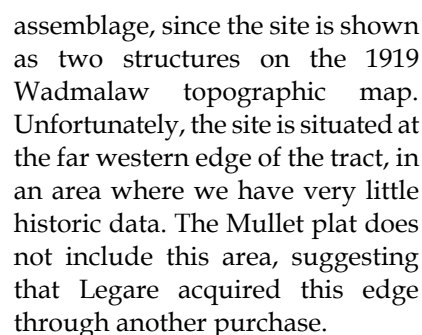
Soils resemble the poorly drained Yonges Series, which has an Ap horizon of dark grayish brown (10YR4/2) loamy fine sand to 0.8 foot over

The prehistoric component, which accounts for 19% of the total artifact assemblage, produced sherds (Table 52). Only one sherd was diagnostic – a Pee Dee complicated stamped, dating to the Mississippian.

In contrast to the prehistoric remains, the historic collection reveals considerable diversity, with a modest collection of domestic refuse identified from the site. As revealed by Table 53 the assemblage includes Kitchen Group (62%), Architecture Group (22%), Tobacco (2%), Clothing (2%), and Activities Group artifacts (13%). These remains closely resemble the eighteenth century overseer pattern identified at 38BK1900. The Activities Group is anomalous, but we suspect this is related to the small sample and abundance of unidentifiable metal fragments that are recovered in shovel testing. With a larger collection this issue would likely be resolved.

Within the Kitchen Group, ceramics and glass are represented almost equally. The ceramics, which include small quantities of a wide range of materials, produce a mean ceramic date of 1806.5 (Table 54). The glass, however, does include at least one specimen – a fragment of a South Carolina Dispensary bottle – that takes the assemblage into at least the late nineteenth century (the dispensary system operated from 1893 to 1907, see Huggins 1971:v).

Although the assemblage does contain single specimens of Chinese and English porcelain, the bulk of the collection appears far more modest, including annular and plain



Assessment of this site is difficult, since it does appear sparse. However, when the density of this site is compared to other eighteenth century overseer sites identified by Chicora research (Trinkley et al. 2003, Trinkley et al. 2005), it appears easily within the anticipated range. Likewise, agricultural activities here – as elsewhere on the tract – have been

intensive. Nevertheless, we do not believe the site should be dismissed without a more intensive effort to define intact deposits.

Consequently, we recommend the historic component at 38CH2252 potentially eligible for

Table 52.

		750	800	850	700	750	800	650	700	750	800	700	750	850	800	750	800	580	630	680	730	780	620	670	720	770	820	620	Surface	Subtotal	Total
		R500	R500	R500	R550	R550	R550	R600	R600	R600	R600	R650	R650	R650	R700	R700	R750	R750	R800	R850	R850	R850	R900	R900	R900	R900	R900	R950	Collection		
Kitchen Group																															37
	Chinese Porcelain, blue HP																												1	1	
	English Porcelain, undec.	1																											1	1	
	Stoneware, brown																											1	1	1	
	Stoneware, brown SG																					1							1	1	
	Slipware, lead glazed																							1					1	1	
	Creamware, undec.												1																4	5	
	Pearlware, annular																											1	1	1	
	Pearlware, undec.																									1			1	1	
	Whiteware, undec.			1	1			1											1								1			5	
	Colonoware													1															1	1	
	Glass, manganese					1	1			1				1											1					4	
	Glass, green																	1												1	
	Glass, brown											1																		1	
	Glass, clear			1		1		1	1		3		1	1	1															10	
	Glass, black							1					1															1		3	
Architecture Group																															14
	Window glass														1															1	
	Nail, fragment					1	2			1	1						2	1				1	1			1		1		12	
	Nut			1																										1	
Tobacco Group																															1
	Tobacco, pipe bowl, Kaolin											1																		1	
Clothing Group																															1
	Button																			1										1	
Activities Group																															10
	Iron, UID		1		1	2																1			1					6	
	Brass fragment					2																								2	
	Slate				1																									1	
	Faunal							1																						1	
Prehistoric Group																															15
	Pee Dee, complicated stamp		1																											1	
	Sherd, small		2					2				1				1	1		1	1						1				14	
Subtotal		1	5	1	5	6	4	1	6	2	4	2	3	1	2	3	2	1	1	1	1	1	5		1	1	1	1	1	8	78
TOTAL																															78
	HP : Hand painted																														
	SG : Salt glazed																														
	undec. : undecorated																														

inclusion on the National Register (the prehistoric component is a non-contributing resource). If green spacing is not possible, we recommend

**Table 53.**  
**Artifact Pattern Analysis for 38CH2252**

	38CH2252	Revised Carolina Artifact Pattern <sup>1</sup>	38BK1900 Area B 18th Cen. Overseer <sup>2</sup>	38CH1278 18th Cen. Overseer <sup>3</sup>
Kitchen	62.0	51.8-65.0	65.2	78.1
Architecture	22.0	25.2-31.4	21.2	8.9
Furniture	0.0	02-0.6	0	0.1
Arms	0.0	0.1-0.3	0.3	0.2
Tobacco	2.0	1.9-13.9	10.2	11.4
Clothing	2.0	0.6-5.4	0.1	0.2
Personal	0.0	0.2-0.5	0.1	0.2
Activities	13.0	0.9-1.7	2.9	1.1

<sup>1</sup>Garrow 1982  
<sup>2</sup>Trinkley et al. 2003  
<sup>3</sup>Trinkley et al. 2005

additional testing, consisting of very close interval (15-20 feet) augering followed by the excavation of 2-3 10-foot units. This strategy will provide very detailed aerial coverage, allowing identification of artifact concentrations. The use of several large test units will permit better identification of features, while at the same time assisting with the recovery of a collection better able to identify site function. No work should be conducted in the site area until plans for either green spacing have been approved by the State Historic Preservation Office or additional site assessment and evaluation have been completed.

### 38CH2253

Site 38CH2253 (Figure 85) is a prehistoric and nineteenth century scatter located on an interior plain at an elevation of 10 feet AMSL. A GPS UTM, taken at the southwest corner of the site, is 582646E 3610622N (NAD27 datum).

The site was identified during shovel testing when Transect 370, Shovel Test 2 (600R750) was positive, producing a piece of pearlware and three fragments of clear glass. Close interval testing was resumed at 50-foot intervals until two

consecutive negative tests were encountered along the cardinal directions. A total of 95 shovel tests were excavated in the site area with 25 being positive (26%).

Soils in the area resemble the Seabrook Series, which has an Ap horizon of very dark grayish brown (10YR3/2) loamy fine sand to a depth of 0.8 foot over a dark brown (10YR4/3) or dark yellowish brown (10YR4/4) loamy fine sand to a depth of 1.7 feet. All of the artifacts were found in the upper Ap horizon.

The prehistoric loci, which was found predominately in the western portion of the site, consisted entirely of small sherds (n=11). None of the sherds were diagnostic. The historic loci produced a total of 42 artifacts, consisting of Kitchen (83%), Architecture (12%), and Activities (5%) groups (Table 55).

In the Kitchen Group, glass makes up 77% of the total, however, only clear and milk glass are

**Table 54.**  
**Mean ceramic date of 38CH2252**

Ceramic	Date Range	Mean Date (xi)	(fi)	fi x xi
Underglazed blue porc	1660-1800	1730	1	1730
English porc	1745-1795	1770	1	1770
Lead glazed slipware	1670-1795	1733	1	1733
Creamware, undecorated	1762-1820	1791	5	8955
Pearlware, annular/cable	1790-1820	1805	1	1805
Pearlware, undecorated	1780-1830	1805	1	1805
Whiteware, undecorated	1813-1900	1860	5	9300
Total			15	27098
Mean Ceramic Date	1806.5			

represented. Of the ceramics, only a single piece of pearlware, which has a MCD of 1805, was diagnostic.

For the Architecture Group, only unidentifiable nail fragments were found. In the Activities Group, the only artifacts were unidentifiable iron. The site area measures approximately 550 east-west by 350 feet north-south.

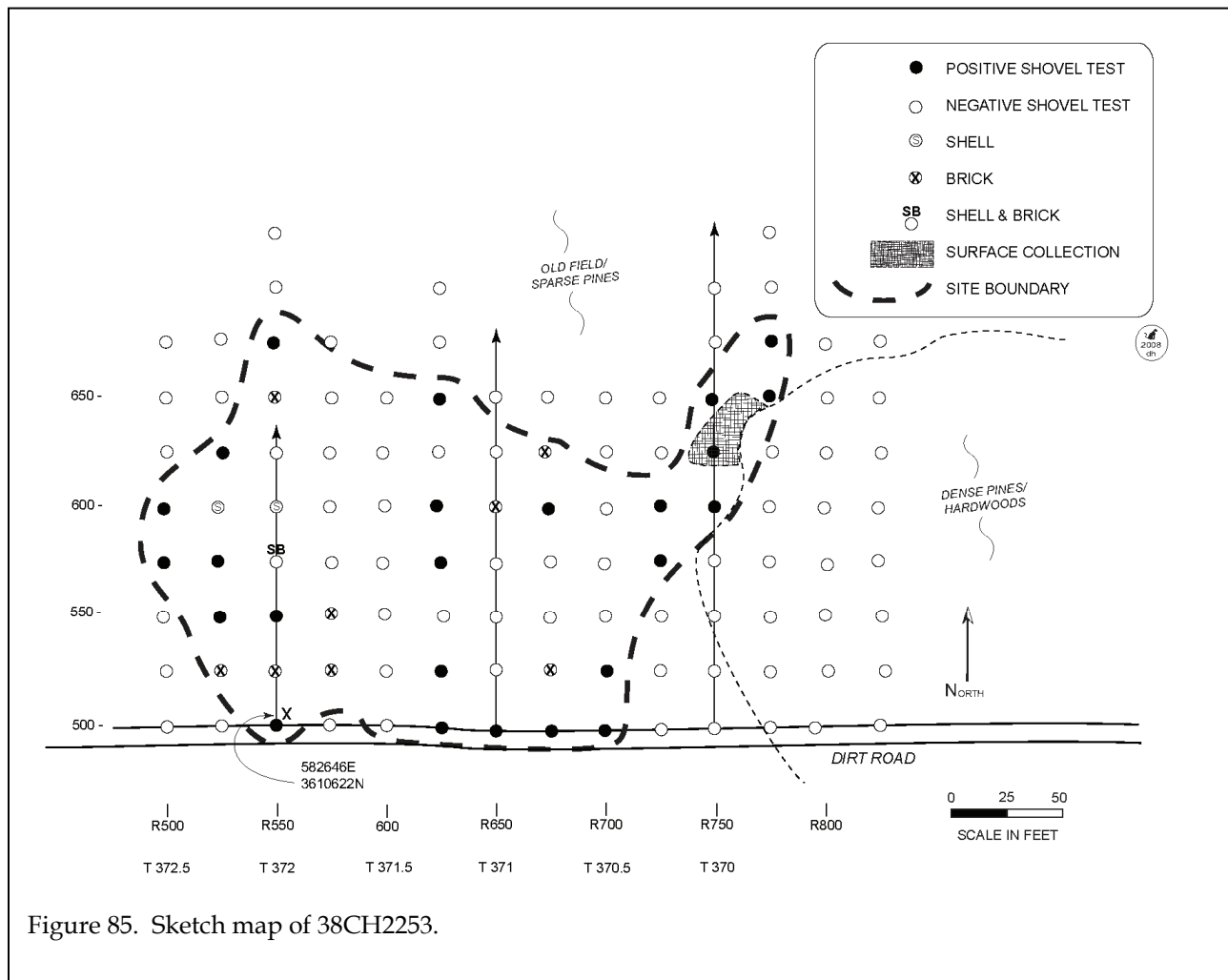


Figure 85. Sketch map of 38CH2253.

The examination of an 1879 plat for Sol. Legare shows three structures in the vicinity. While there is a record of when these structures existed, the remains do not reflect the quality needed to be able to address significant questions. The area has also been heavily cultivated, with extensive subsoiling. A second growth of pines is now covering the fallow field.

Site 38CH2253 is recommended not eligible for the National Register of Historic Places. No additional management activity is recommended pending the review and concurrence by the State Historic Preservation Office.

### 38CH2254

Site 38CH2254 (Figure 86) is a sparse nineteenth to twentieth century scatter located on the interior plain of Johns Island at an elevation of about 10 feet AMSL. A central GPS UTM is 580916E 3611205N (NAD27 datum).

The site was found during shovel testing when Transect 369, Shovel Test 13 was positive producing a piece of clear glass and an unidentifiable nail fragment. Limited close interval testing was performed at 50-foot intervals with 20 shovel tests excavated in the site area. Of those tests, four were positive (20%).

Soils in the area resemble Wando loamy



## RESULTS OF SURVEY

Table 55.  
Artifacts from 38CH2253

	574	600	500	575	625	500	550	675	500	525	575	600	650	500	500	600	500	525	575	600	600	625	650	650	675	Surface	Subtotal	Total
	R500	R500	R525	R525	R525	R550	R550	R550	R625	R625	R625	R625	R625	R650	R675	R675	R700	R700	R725	R725	R750	R750	R750	R775	R775	Collection		
Kitchen Group																											33	
White porcelain, stripe																										2	2	
White porcelain, undec.																										5	5	
Pearlware, undec.																						1				1	1	
Glass, milk																							1	1		5	7	
Glass, clear						1					1			1	1		1	1	1	1	3				1	2	4	18
Architecture Group																											6	
Window glass																	1									1	1	
Nail, fragment						1			4																	5	5	
Activities Group																											2	
Iron, UID								1							1											2	2	
Prehistoric Group																											11	
Sherd, small		1	1	1	4			1				1	1			1										11	11	
Subtotal		1	1	1	4	1	1	1	4	1	0	1	2	1	1	2	1	1	1	1	4	1	1	1	2	16	52	
TOTAL																											52	
undec. : undecorated																												

fine sand. This Series has an Ap horizon of dark brown (10YR4/3) loamy fine sand to 0.7 foot in depth over a brown (7.5YR5/4) loamy fine sand.

The site produced a total of seven artifacts: three clear glass, one brown glass, one wire nail, one unidentifiable nail, and one piece of asbestos siding. Wire nails were common after c. 1880 (Howard 1989:55). Asbestos was first used in the late nineteenth century in houses, although it was used into the 1970s. The glass is not

diagnostic artifacts, such as ceramics, were recovered. It is unlikely that remains would be able to address significant research questions about turn-of-the-century tenancy in the Low Country.

Site 38CH2254 is recommended not eligible for the National Register of Historic Places. No additional management activity is recommended pending the review and concurrence of the State Historic Preservation Office.

### Architectural and Other Historic Resources

The previously identified historic structures were revisited and reevaluated by the current survey. The structures originally determined not eligible through by Fick and her colleagues (1989, 1992) are still thought to be not eligible. The project development tract may be visible from the Lee Glover House (1471), but this structure has been found not eligible by the State Historic Preservation Office.

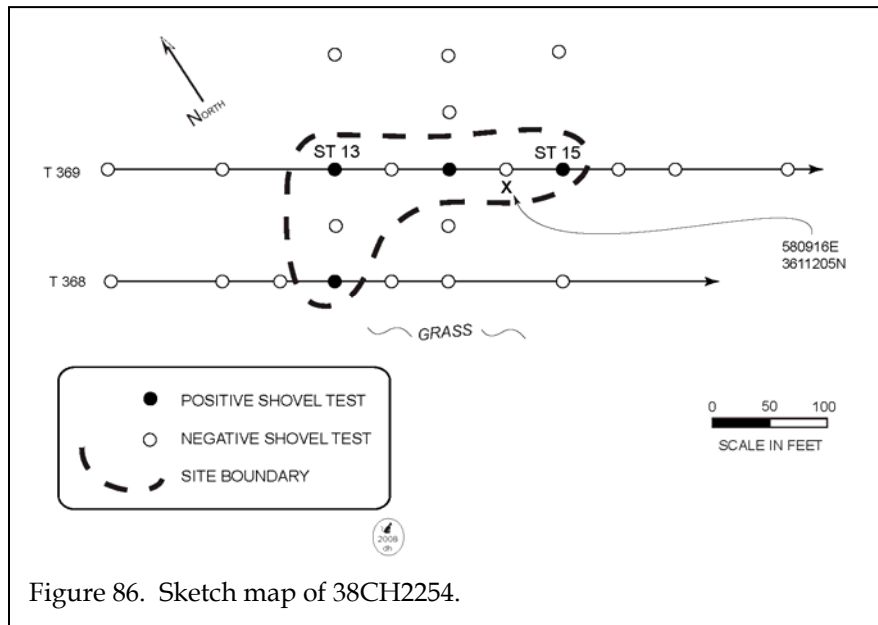


Figure 86. Sketch map of 38CH2254.

diagnostic. An 1884 plat shows two structures in the vicinity. The site area covers about 100 feet north-south by 200 feet east-west.

The site area, although grassed at the time of the survey, has been heavily cultivated for years. Very few remains were found and no

The Bass Pond archaeological site on Kiawah has been subjected to data recovery and is no longer an issue of consideration. In addition, the Mullet Hall tract will have a vegetative barrier along the river, reducing or eliminating visual intrusion. The remaining eligible structure, 1468,

Mt. Hebron Presbyterian Church, is situated at such a distance that the development tract will not be visible. In addition, construction in this area of Johns Island has been ongoing since the historic surveys and there has already been a significant change in the visual integrity surrounding these structures. We do not believe that the Mullet Hall tract will have any significant affect on the property.

One structure is situated on the Mullet Hall tract (Figure 87) built by Julian S. Limehouse ca. 1940. Since that time it has been extensively modified (ca. 1960 and 1980). Neither the interior nor exterior retain any integrity and this structure is recommended not eligible for inclusion on the National Register.



Figure 87. View of the structure located on the Mullet Hall property.

## CONCLUSIONS

### Resource Management

This study involved the examination of a tract of approximately 1,427 acres on Johns Island in Charleston County to be used for single family homes. This work, conducted for Mr. Kevin O'Neill of Kiawah River Plantation, LP examined archaeological sites and cultural resources found in the proposed project area and is intended to assist the company in complying with their historic preservation responsibilities.

38CH2253-2254) are recommended not eligible.

Additional testing should be performed at 38CH1543, 38CH1545, 38CH1547-1549, 38CH2242, 38CH2244, 38CH2250, and 38CH2252) to determine eligibility for the National Register of Historic Places. The two cemeteries, 38CH1548 and 38CH1549, will not be developed, but are nevertheless recommended potentially eligible for the National Register. For 38CH1548 we recommend the SHPO minimum buffer of 25 feet,

while for the less well defined 38CH1549 we recommend expanding that buffer to 50 feet. Both sites should have construction fences erected for their protection during all phases of construction activity. The third cemetery is part of site 38CH1540, which is recommended eligible for its historic resources. The boundary for the cemetery at this site should be established based on the woods line as observed in the 1948 aerial photograph with a 50 foot buffer.

Kiawah River Plantation, LP may wish to improve the appearance of these cemeteries, helping to make them more attractive amenities. This can be

accomplished *by hand removal* of all trees 5-inches and less in diameter (dbh) (we understand that Charleston County's tree ordinance identifies protected trees as 8-inches or greater dbh and grand trees as 24-inches or greater dbh except for pines). The remaining trees should be pruned for crown cleaning and overall restoration. We

Table 56.  
Sites Identified on the Mullet Hall Property

Site Number	Description	Size (in feet)	Central UTM <sup>1</sup>		Soil	Eligibility
			Easting	Northing		
38CH487	18th-19th c. scatter	900 x 600	582408	3610894	Seabrook	E
38CH1539	19th c. scatter	50 x 10	582480	3609560	Kiawah	NE
38CH1540	18th-19th c. plantation complex	2,400 x 950	583972	3610963	Seabrook	E
38CH1541	18th-20th c. domestic	700 x 900	581720	3610682	Seabrook	E
38CH1542	19th-20th c. settlement	1,200 x 500	581841	3610310	Seabrook	E
38CH1543	18th-19th c. scatter	300 x 300	581842	3610534	Seabrook	PE
38CH1545	prehistoric/20th c. scatter	350 X 200	582743	3609623	Kiawah	PE
38CH1546	prehistoric/18th-19th c. scatter	200 x 250	582671	3609837	Seabrook	NE
38CH1547	prehistoric/18th-19th c. scatter	650 x 450	582686	3610045	Kiawah	PE
38CH1548	19th-20th c. cemetery	200 x 200 <sup>2</sup>	581509	3610818	Kiawah	PE
38CH1549	cemetery	250 x 250 <sup>2</sup>	582734	3610249	Wando	PE
38CH2240	prehistoric scatter	150 x 200	584231	3610883	Seabrook	NE
38CH2241	19th-20th c. scatter	150 x 200	582369	3609721	Kiawah	NE
38CH2242	prehistoric/18th c. settlement	400 x 300	582376	3610096	Wando	PE
38CH2243	prehistoric/18th-19th c. scatter	1,850 x 400	583003	3609935	Seabrook	NE
38CH2244	prehistoric/18th-20th c. scatter	500 x 250	582663	3610209	Wando	PE
38CH2245	19th-20th c. scatter	150 x 150	583345	3610070	Seabrook	NE
38CH2246	prehistoric scatter	150 x 50	583482	3610108	Seabrook	NE
38CH2247	Middle Woodland scatter	50 x 50	583702	3610141	Seabrook	NE
38CH2248	Early 19th c. scatter	150 x 100	584432	3610336	Seabrook	E
38CH2249	prehistoric scatter	500 x 200	582899	3610344	Wando	NE
38CH2250	prehistoric/18th c. scatter	1,000 x 550	583944	3610691	Seabrook	PE
38CH2251	20th c. trash dump	200 x 200	582704	3610444	Wando	NE
38CH2252	18th-20th c. possible overseer	450 x 250	580877	3610417	Yonges	PE
38CH2253	prehistoric/19th c. scatter	550 x 350	582682	3610696	Seabrook	NE
38CH2254	19th-20th c. scatter	100 x 200	580916	3611205	Wando	NE

<sup>1</sup> Zone 17, NAD27 datum

<sup>2</sup> Includes buffer as discussed

As a result of this investigation, 26 sites were assessed on the property (Table 56). A total of five sites (38CH487, 38CH1540, 38CH1541, 38CH1542, and 38CH2248) are recommended eligible for the National Register. Fourteen sites (38CH1539, 38CH1546, 38CH2240-2241, 38CH2243, 38CH2245-2247, 38CH2249, 38CH2251,





---

## CONCLUSIONS

---

(Cable and Reed 1996) correlates site density with well-drained soils in close proximity to streams or other hydrologic features (such as interior swamps or salt marsh) or to areas of increased soil patch diversity. This is, of course, a simple refinement of the long-held understanding that sites will be found close to water sources. Unfortunately, the model provides little assistance in a setting such as Johns Island since the ridge and trough topography provides numerous areas meeting these criteria. Even a cursory examination of Figure 88 reveals that there are many more areas where sites might be found than there are actual soil locations. More significantly, the model does not actually eliminate any of the tracts nearly 1,500 acres. Thus, while the model is certainly accurate, it would provide a very large number of false positives – that is, it would predict that a number of areas have a high probability for site locations when no sites are present.

In addition, the Mullet Hall study reveals a surprising range in site density on Johns Island. This particular survey yields a density of one site every 57 acres. Three surrounding surveys yield extremely variable densities – one site every 55 acres for the Orange Hill tract, one site for every 64 acres at the Briars Creek tract, and one site every 417 acres for the Anchorage Plantation tract. Whether these data reflect actual variations in density or variations in the thoroughness or effectiveness of survey effort is not certain.

### Historic Research

If site modeling is thus far not particularly useful in a setting such as Johns Island, certainly detailed historical research may be (although we acknowledge that it can only provide information on historic settlement). For Mullet Hall, detailed examination of maps and plats produced 19 separate potential site locations. Using Figure 38, each will be briefly discussed, starting in the northwest corner of the tract with “Bldgs. 1884” and moving clockwise.

### **Bldgs. 1884**

Two structures are shown on a February 1884 plat of Rose Bank, which belonged to F.Y. Legare. These structures were identified in the field and given the site number 38CH2254.

### **Commissary**

There were no maps identifying the commissary – its location is based on oral history. Early business directories (e.g., 1890 and 1905) list the F.Y. Legare general store on Mullet Hall. The site is found within 38CH487.

### **Tenants 1919**

The 1919 Wadmalaw 15' topographic map shows a series of eight tenant structures along the north side of a road, running approximately northeast. This area was recorded as 38CH487, although this tenant assemblage blurs with other materials.

### **Slave Row ca. 1850-1865**

Two maps, ca. 1850-1865, show a series of eight structures running approximately northeast from Mullet Hall Road. They have been identified as 38CH487. It seems likely that these structures survived the Civil War and continued to be used by tenants in the postbellum.

### **Sol. Legare Settlement ca 1850-1865**

Two maps, ca. 1850-1865, show the location of Solomon Legare's antebellum settlement, situated in the vicinity of the junction of four roads in the center of the Mullet Hall property. It is our assessment that this site is slightly misplaced on the historic maps and should be further north, part of 38CH487.

### **Oaks 1816, 1850-1865**

The Oaks main house, which belonged to Roper, is shown in the approximate location of 38CH1540.

### **Tenants 1919**

Plotting of these five structures places them north of 38CH1540. Our survey efforts, however, suggest the tenant occupation is actually included within 38CH1540, suggesting some inaccuracy in the topographic map.

### **Slave Row 1850-1865**

The slave row is part of the Oaks Plantation and was identified as the eastern end of 38CH1540.

### **Bldg. 1816**

This structure is shown on an 1816 plat of Benjamin Roper's lands and was identified in this location as 38CH2248.

### **Graveyard 1933**

A cemetery was identified by USGS surveyors placed the Mullet Hall control datum. Their location is identical to the cemetery identified as 38CH1549. Perhaps the most interesting aspect of this discovery is that few archaeologists take advantage of the USGS Horizontal Control Notes, which provide excellent data dating into the first quarter of the twentieth century.

### **Cotton Hs. 1850-1865**

Solomon Legare's cotton house was apparently used as a back sight for survey work preparing the antebellum maps. It appears to be at the site identified as 38CH1547.

### **Bldg. 1919**

Two structures are shown on the 1919 Wadmalaw topographic map. They were identified as 38CH2241, although cultivation has blurred the remains and two distinct loci cannot be identified based on survey work.

### **Bldg. 1879**

A series of three structures are shown on an 1879 plat of Solomon Legare's tract. We mislocated the site based on overlays, but once in the field the road network is still extant and the site was identified as 38CH2253.

### **Bldg. 1860**

This building was one of the only structures not identified in the field. The location of the structure according to an 1860 map is on the southern portion of the property, adjacent to the marshes of Haulover Creek and Kiawah River. Shovel testing failed to produce any remains in this area. We believe the structure has been destroyed by the creation of a pond in this area.

### **Slave Rows 1850-1865**

These structures were found and recorded as 38CH1542.

### **James Legare Settlement ca. 1850-1865**

This settlement was found and recorded as 38CH1541, although the location appears to be slightly further north than projected.

### **Bldgs. 1919**

The two buildings identified on the 1919 Wadmalaw topographic map were identified as 38CH2252.

### **Mullet ca. 1794**

The 1794 Mullet plat shows a single settlement symbol at the location identified as 38CH1543.

All but one of the 18 projected historic sites were identified in the field investigations - reflecting 95% accuracy. The failure to identify the one structure is likely associated with its destruction by a modern pond. Granted, we did find inaccuracies of up to 1,000 feet - and this may

## CONCLUSIONS

---

be either a map error or a failure on the part of our location efforts – although most locations were very accurate.

Thus, for the identification of historic sites, we believe the use of historic research is far more likely to yield accurate predictive modeling than anything else readily available. There is considerable value in the time and effort placed in historic research. Conversely, when little effort is expended on historic research, we believe that it becomes not only far more difficult to identify properties that should be present, but to also accurately and effectively assess their significance.





## SOURCES CITED

Abbott, Lawrence E., Jr., John S. Cable, Mary Beth Reed, and Erica E. Sanborn

- 1995 *An Archaeological Survey and Testing of the McLean-Thompson Property Land Acquisition, and the Ambulatory Health Care Clinic Project, Fort Bragg, Cumberland County, North Carolina*. Technical Report 349. New South Associates, Stone Mountain, Georgia.

Adams, Natalie and Michael Trinkley

- 1994 *Archaeological Reconnaissance of the Mullet Hall Tract, Johns Island, Charleston County, South Carolina*. Research Contribution 153. Chicora Foundation, Inc., Columbia.

Allston, R.F.W.

- 1854 *Essay on Sea Coast Crops*. A.E. Miller, Charleston.

Anderson, David G.

- 1979 *Excavations at Four Fall Line Sites: The Southeastern Beltway Project*. Commonwealth Associates, Inc., Jacksonville, Michigan. Submitted to the South Carolina Department of Highways and Public Transportation, Columbia.

- 1992a A History of Paleoindian and Early Archaic Research in the South Carolina Area. In *Paleoindian and Early Archaic Period Research in the Lower Southeast: A South Carolina Perspective*, edited by David G. Anderson, Kenneth E. Sassaman, and Christopher Judge, pp. 7-18.

Council of South Carolina Professional Archaeologists, Columbia.

- 1992b Models of Paleoindian and Early Archaic Settlement in the Lower Southeast. In *Paleoindian and Early Archaic Period Research in the Lower Southeast: A South Carolina Perspective*, edited by David G. Anderson, Kenneth E. Sassaman, and Christopher Judge, pp. 28-47. Council of South Carolina Professional Archaeologists, Columbia.

- 1994 *The Savannah River Chiefdoms: Political Change in the Late Prehistoric Southeast*. University of Alabama Press, Tuscaloosa.

Anderson, David G., Charles E. Cantley, and A. Lee Novick

- 1982 *The Mattassee Lake Sites: Archaeological Investigations Along the Lower Santee River in the*

Anonymous

- 1879 Early Southern Produce – Truck Farms Near Charleston. *New York Times*, March 23.

- 1880 Sea Islands. *News and Courier*, April 22, pg. 1.

- 1884 *South Carolina in 1884, A View of the Industrial Life of the State*. News and Courier, Charleston, South Carolina.

- 1890 *South Carolina State Gazetteer and Business Directory, 1890-1891*.

---

CULTURAL RESOURCES SURVEY OF MULLET HALL PLANTATION

---

- |                                    |                                                                                                                                                                                          |                                                                             |                                                                                                                                                                                                                     |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                    | Lucas & Richardson, Charleston, South Carolina.                                                                                                                                          |                                                                             | Providence.                                                                                                                                                                                                         |
| 1893                               | That Cruise to Kiawah - The Crops on the Coast. <i>News and Courier</i> (Charleston, SC), August 31, pg. 1.                                                                              | Behre, Robert                                                               |                                                                                                                                                                                                                     |
|                                    |                                                                                                                                                                                          | 2004                                                                        | Is Rural Life Overrated? <i>The Post and Courier</i> , June 6.                                                                                                                                                      |
| 1905                               | <i>South Carolina state gazetteer and business directory, 1905-1910.</i> Lucas & Richardson, Charleston, South Carolina.                                                                 | Blanton, Dennis B., Christopher T. Espenshade, and Paul E. Brockington, Jr. |                                                                                                                                                                                                                     |
|                                    |                                                                                                                                                                                          | 1986                                                                        | <i>An Archaeological Study of 38SU83: A Yadkin Phase Site in the Upper Coastal Plain of South Carolina.</i> Garrow and Associates, Inc., Atlanta.                                                                   |
| 1927                               | <i>South Carolina: A Handbook.</i> Department of Agriculture, Commerce and Industries and Clemson College, Columbia.                                                                     | Bleser, Carol K. Rothrock                                                   |                                                                                                                                                                                                                     |
|                                    |                                                                                                                                                                                          | 1969                                                                        | <i>The Promised Land: The History of the South Carolina Land Commission, 1869-1890.</i> University of South Carolina Press, Columbia.                                                                               |
| 1930                               | Northerner Buys Beaufort Estate. <i>News and Courier</i> , April 6.                                                                                                                      |                                                                             |                                                                                                                                                                                                                     |
| 1931                               | Engine Designer Plays in Colleton. <i>News and Courier</i> , March 15.                                                                                                                   | Brannon, Rebecca N.                                                         |                                                                                                                                                                                                                     |
|                                    |                                                                                                                                                                                          | 2007                                                                        | <i>Reconciling the Revolution: Resolving Conflict and Rebuilding Community in the Wake of Civil War in South Carolina, 1775-1860.</i> Ph.D. dissertation, University of Michigan, University Microfilms, Ann Arbor. |
| 1937                               | Meggetts Deserves Its Name "Cabbage Patch." <i>Florence Morning News</i> , May 9, pg. 8.                                                                                                 |                                                                             |                                                                                                                                                                                                                     |
| Atwater, W.O. and Charles D. Woods |                                                                                                                                                                                          | Brewster, Lawrence F.                                                       |                                                                                                                                                                                                                     |
| 1897                               | <i>Dietary Studies with Reference to the Food of the Negro in Alabama in 1895 and 1896.</i> Bulletin 38. U.S. Department of Agriculture, Office of Experiment Stations, Washington, D.C. | 1947                                                                        | Summer Migrations and Resorts of South Carolina Low Country Planters. <i>Historical Papers of the Trinity College Historical Society</i> 26:3-134.                                                                  |
| Baldwin, Agnes Leland              |                                                                                                                                                                                          | Bridgman, Kara, Bruce Harvey, and Ralph Bailey, Jr.                         |                                                                                                                                                                                                                     |
| 1985                               | <i>First Settlers of South Carolina, 1670-1700.</i> Southern Historical Press, Easley, South Carolina.                                                                                   | 1999                                                                        | <i>Cultural Resources Inventory of the Briars Creek Tract, Johns Island, Charleston County, South Carolina.</i> Brockington & Associates, Inc., Charleston.                                                         |
| Bartovics, Albert                  |                                                                                                                                                                                          | Bureau of Home Economics                                                    |                                                                                                                                                                                                                     |
| 1980                               | <i>The Archaeology of Daniels Village: An Experiment in Settlement Archaeology.</i> Unpublished Ph.D. dissertation, Department of Anthropology, Brown University,                        | 1939                                                                        | <i>The Farm-Housing Survey.</i> Miscellaneous Publications No.                                                                                                                                                      |

# SOURCES CITED

323. U.S. Department of Agriculture, Washington, D.C.
- Burton, Milby E.
  - 1970 *The Siege of Charleston 1861-1865*. University of South Carolina Press, Columbia.
- Butler, A.P.
  - 1883 *South Carolina. Resources and Population. Institutions and Industries*. State Board of Agriculture of South Carolina. Walker, Evans and Cogswell, Charleston.
- Cable, John
  - 1982 Organizational Variability in Piedmont Hunter-Gatherer Lithic Assemblages. In *The Haw River Sites: Archaeological Investigations at Two Stratified Sites in the North Carolina Piedmont*, assembled by Stephen R. Claggett and John S. Cable, pp. 637-688. Report 2386, Commonwealth Associates, Inc., Jackson, Michigan.
  - 1991 *Archaeological Test Excavations on the Northeastern Perimeter of the Buck Hall Site (38CH644), Francis Marion National Forest, South Carolina*. New South Associates, Irmo, South Carolina.
- Cable, John S. and Mary Beth Reed
  - 1996 *A Study of Archaeological Predictive Modelling in the Charleston Harbor Watershed, South Carolina*. Technical Report 414, New South Associates, Stone Mountain, Georgia.
- Caldwell, Joseph R. and Catherine McCann
  - 1941 *Irene Mound Site, Chatham County, Georgia*. University of Georgia Press, Athens.
- Carawan, Guy and Candie Carawan
  - 1989 *Ain't You Got a Right to the Tree of Life? The People of Johns Island, South Carolina - Their Faces, Their Words, and Their Songs*. University of Georgia Press, Athens.
- Carlson, David L.
  - 1983 *Computer Analysis of Dated Ceramics: Estimating Dates and Occupational Ranges*. *Southeastern Archaeology* 2:8-20.
- Carman, Harry J., editor
  - 1939 [1775] *American Husbandry*. London. Reprinted Columbia University Press, New York.
- Chapman, Jefferson
  - 1977 *Archaic Period Research in the Lower Little Tennessee River Valley, 1975: Icehouse Bottom, Harrison Branch, Thirty Acre Island, Calloway Island*. Report of Investigations 18. University of Tennessee, Knoxville.
  - 1985a *Archaeology and the Archaic Period in the Southern Ridge-an-Valley Province*. In *Structure and Process in Southeastern Archaeology*, edited by Roy S. Dickens and H. Trawick Ward, pp. 137-179. The University of Alabama Press, University.
  - 1985b *Tellico Archaeology: 12,000 Years of Native American History*. Reports of Investigations 43, Occasional Paper 5, University of Tennessee, Knoxville.
- Charles, Tommy and James L. Michie
  - 1992 *South Carolina Paleo Point Data*. In *Paleoindian and Early Archaic Period Research in the Lower Southeast: A South Carolina Perspective*, edited by David G.

- Anderson, Kenneth E. Sassaman,  
and Christopher Judge, pp. 242-  
247. Council of South Carolina  
Professional Archaeologists,  
Columbia.
- Cheves, Langdon  
2000 *The Shaftsbury Papers and Other  
Records*. Tempus Publishing,  
Charleston, South Carolina.
- Clowse, Converse D.  
1971 *Economic Beginnings in Colonial  
South Carolina, 1670-1730*.  
University of South Carolina  
Press, Columbia.
- Cobb, James C.  
1992 *The Most Southern Place on Earth:  
The Mississippi Delta and the Roots  
of Regional Identity*. Oxford  
University Press, New York.
- Coclanis, Peter A.  
1989 *The Shadow of a Dream: Economic  
Life and Death in the South Carolina  
Low Country 1670-1920*. Oxford  
University Press, New York.
- Coe, Joffre L.  
1964 *The Formative Cultures of the  
Carolina Piedmont*. Transactions of  
the American Philosophical  
Society 54(5).
- 1995 *Town Creek Indian Mound: A  
Native American Legacy*.  
University of North Carolina  
Press, Chapel Hill.
- Cooke, C. Wythe  
1936 *Geology of the Coastal Plain of  
South Carolina*. Bulletin 867. U.S.  
Geological Survey, Washington,  
D.C.
- Coon, David L.  
1972 *The Development of Market  
Agriculture in South Carolina*.  
Ph.D. dissertation, University of  
Illinois. University Microfilms,  
Ann Arbor.
- Cooper, William J., Jr. and Thomas E. Terrill  
1991 *The American South: A History*.  
Second Edition. McGraw Hill,  
New York.
- Copenhaver, J.E.  
1930 Culture of Indigo in the  
Provinces of South Carolina and  
Georgia. *Industrial and  
Engineering Chemistry* 22:894-896.
- Côté, Richard N.  
2006 *City of Heros: The Great Charleston  
Earthquake of 1886*. Corinthian  
Books, Mount Pleasant, South  
Carolina.
- Cruden, John  
1890 *Report on the Management of the  
Estates Sequestered in South  
Carolina by Order of Lord  
Cornwallis in 1780-1782*. Historical  
Printing Club, Brooklyn, New  
York.
- Cushion, John P.  
1976 *Pottery and Porcelain Tablewares*.  
Studio Vista, London.
- Daniel, I. Randolph, Jr.  
1992 Early Archaic Settlement in the  
Southeast: A North Carolina  
Perspective. In *Paleoindian and  
Early Archaic Period Research in the  
Lower Southeast: A South Carolina  
Perspective*, edited by David G.  
Anderson, Kenneth E. Sassaman,  
and Christopher Judge, pp. 68-77.  
Council of South Carolina  
Professional Archaeologists,  
Columbia.



---

# SOURCES CITED

---

- Davidson, Chalmers Gaston  
1970 *The Last Foray – The South Carolina Planters of 1860: A Sociological Study*. University of South Carolina Press, Columbia.
- DePratter, Chester  
1979 Ceramics. In *The Anthropology of St. Catherine's Island 2. The Refuge-Deptford Mortuary Complex*, edited by David Hurst Thomas and Clark Spencer Larsen, pp. 109-132. *Anthropological Papers of the American Museum of Natural History* 56(1). New York.
- DePratter, Chester and Christopher Judge  
1986 A Provisional Late Prehistoric and Early Historic Ceramic Sequence for the Wateree River Valley, South Carolina. Paper presented at the LAMAR Institute Conference on South Appalachian Mississippian, Macon, Georgia.
- 1990 Wateree River. In *Lamar Archaeology: Mississippian Chiefdoms in the Deep South*, edited by Mark Williams and Gary Shapiro, pp. 56-58. University of Alabama Press, Tuscaloosa.
- Derting, Keith M., Sharon L. Pehrul, and Charles J. Rinehart  
1991 *A Comprehensive Bibliography of South Carolina Archaeology*. Research Manuscript 211. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.
- Dimsdale, Parks B. Jr.  
1970 *A History of the Cotton Producers Association*. The Cotton Producers Association, Atlanta.
- Dunbar, Gary S.  
1961 Colonial Carolina Cowpens. *Agriculture History* 35:125-130.
- Dunn, R.G. and Co.  
1889 *The Mercantile Agency Reference Book – South Carolina*. R.G. Dunn Mercantile Agency, New York.
- 1907 *The Mercantile Agency Reference Book – Charleston, South Carolina*. R.G. Dunn Mercantile Agency, New York.
- 1912 *The Mercantile Agency Reference Book – South Carolina*. R.G. Dunn Mercantile Agency, New York.
- 1921 *The Mercantile Agency Reference Book – Charleston, South Carolina*. R.G. Dunn Mercantile Agency, New York.
- Edgar, Walter B., editor  
1972 *The Letterbook of Robert Pringle*. 2 vols. University of South Carolina Press, Columbia.
- 1984 *History of Santee Cooper, 1934-1984*. R.L. Bryan, Columbia.
- 1998 *South Carolina: A History*. University of South Carolina Press, Columbia.
- Ferguson, Leland G.  
1971 *South Appalachian Mississippian*. Ph.D. dissertation, University of North Carolina, Chapel Hill. University Microfilms, Ann Arbor, Michigan.
- Fick, Sarah  
1992 *Charleston County Historical and Architectural Survey*. Preservation Consultants, Inc., Charleston, South Carolina.

- Fick, Sarah, David Schneider, and Robert P. Stockton  
1989 *James Island and Johns Island Historic Survey*. Preservation Consultants, Inc., Charleston, South Carolina.
- Fletcher, Joshua N., Pat Hendrix, and Ralph Bailey  
2001 *Cultural Resources Survey of the Orange Hill Tract, Charleston County, South Carolina*. Brockington & Associates, Inc., Charleston
- Fludd, Eliza C.K.  
1886 *Biographical Sketches of the Huguenot Solomon Legaré and of his Family*. E. Perry, Charleston, South Carolina.
- Forbes, R.J.  
1970 *A Short History of the Art of Distillation*. Brill, Botston.
- Fraser, Walter J., Jr.  
1989 *Charleston! Charleston! The History of a Southern City*. University of South Carolina Press, Columbia.
- Frissell, H.B. and Isabel Bevier  
1899 *Dietary Studies of Negroes in Eastern Virginia in 1897 and 1898*. Bulletin 71. U.S. Department of Agriculture, Office of Experiment Stations, Washington, D.C.
- Garrow, Patrick  
1982 *Archaeological Investigations on the Washington, D.C. Civic Center Site*. Soil Systems, Inc., n.p. Submitted to Historic Preservation Office, Department of Housing and Community Development, Government of the District of Columbia.
- Goodyear, Albert C., John H. House, and Neal W. Ackerly  
1979 *Laurens-Anderson: An Archaeological Study of the South Carolina Inter-riverine Piedmont*. Anthropological Study 4. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.
- Gray, Lewis Cecil  
1958 *History of Agriculture in the Southern United States to 1860*. 2 vols. Carnegie Institution, Washington, D.C.
- Griffin, James B.  
1985 *Changing Concepts of the Prehistoric Mississippian Cultures of the Eastern United States*. In *Alabama and the Borderlands: From Prehistory to Statehood*, edited by R.R. Badger and L.A. Clayton, pp. 40-63. University of Alabama Press, University, Alabama.
- Gruber, Ira D., editor  
1998 *John Peebles' American War: The Diary of a Scottish Grenadier, 1776-1782*. Stackpole Books Mechanicsburg.
- Gunn, Joel D. and Kathy Wilson  
1993 *Archaeological Data Recovery Investigations at Sites 38CT54 and 38CT58 Along the S.C. 151 Jefferson Bypass, Chesterfield County, South Carolina*. Garrow and Associates, Raleigh. Submitted to the S.C. Department of Highways and Public Transportation, Columbia.
- Hager, John M.  
1927 *Commercial Survey of the Southeast*. Domestic Commerce Series 19. U.S. Department of Commerce, Washington, D.C.

---

# SOURCES CITED

---

- Hagood, Johnson  
1910 *Memoirs of the War of Secession*. The State Company, Columbia.
- Hamer, Fritz  
2005 *Charleston Reborn: A Southern City, its Navy Yard and World War II*. History Press, Charleston, South Carolina.
- Hammond, Henry  
1884 Report on Cotton Production of the State of South Carolina. In *Report on the Cotton Production in the United States*, edited by Eugene W. Hilgard, pp. 451-526. Census Office, Department of the Interior, Washington, D.C.
- Haney, P.B., W.J. Lewis, and W.R. Lambert  
1996 *Cotton Production and the Boll Weevil in Georgia: History, Cost of Control, and Benefits of Eradication*. Research Bulletin 428. Georgia Agricultural Experiment Stations, University of Georgia, Athens.
- Harris, Joel Chandler  
1894 The Sea Island Hurricanes. I. The Devastation. *Scribner's Magazine* 15(1):229-247.
- Hayes, Jack Irby, Jr.  
2001 *South Carolina and the New Deal*. University of South Carolina Press, Columbia.
- Haynie, Connie Walpole.  
2007 *Images of America: Johns Island*. Arcadia Press, Charleston, South Carolina.
- Helsley, Alexia Jones  
2004 Mitchell King Builds His Dream House: A Chapter in the Life of Mitchell King. *The Proceedings of the South Carolina Historical Society*, 13-26.
- Hicks, Theresa M.  
1998 *South Carolina Indians, Indian Traders, and Other Ethnic Connections Beginning in 1670*. Reprint Company, Spartanburg, South Carolina.
- Hilgard, Eugene W.  
1884 *Report on Cotton Production in the United States*. Part II: Eastern Gulf, Atlantic, and Pacific States. Department of the Interior, Census Office, Washington, D.C.
- Hilliard, Sam B.  
1984 *Atlas of Antebellum Southern Agriculture*. Louisiana State University, Baton Rouge.
- Hobhouse, Henry  
1987 *Seeds of Change: Five Plants that Transformed Mankind*. Harper and Row, New York.
- Holcomb, Brent H.  
1995 *South Carolina Marriages, 1688-1799*. Genealogical Publishing Co., Baltimore.
- Holmes, Michael S.  
1974 From Euphoria to Cataclysm: Georgia Confronts the Great Depression. *Georgia Historical Quarterly* 57: 313-330.
- Hough, Franklin Benjamin  
1867 *The Siege of Charleston by the British Fleet and Army*. J. Munsell, Albany.
- Howard, Hugh  
1989 *How Old is This House?* The Noonday Press, New York.
- Huggins, Phillip Kenneth  
1971 *The South Carolina Dispensary: A Bottle Collector's Atlas and History of the System*. Sandlapper Press,

- Inc., Columbia.
- Huneycutt, Philip K.  
1949 *The Economics of the Indigo Industry in South Carolina*. Unpublished MA thesis. Department of Economics, University of South Carolina, Columbia.
- Ivers, Larry E.  
1970 *Colonial Forts of South Carolina, 1670-1775*. Tricentennial Booklet Number 3. University of South Carolina Press, Columbia.
- Jackson, Luther P.  
1923 *The Educational Efforts of the Freedmen's Bureau and Freedmen's Aid Societies in South Carolina, 1862-1872*. *The Journal of Negro History* 8(1):1-40.
- Jones, Olive and Catherine Sullivan  
1985 *Glass Glossary*. National Historic Parks and Sites Branch, Parks Canada.
- Jordan, Laylon W. and Elizabeth H. Stringfellow  
1998 *A Place Called St. John's*. Reprint Company, Spartanburg, South Carolina.
- Karklins, Karlis  
1985 *Glass Beads*. National Historic Parks and Sites Branch, Parks Canada.
- Keel, Bennie C.  
1999 *A Comprehensive Subsurface Investigation at Magnolia Plantation, 16NA295, Cane River Creole National Historical Park, Natchitoches, Louisiana*. Southeast Archaeological Center, National Park Service, Tallahassee.
- Kjerfve, Bjorn  
1975 *Climatology of Kiawah Island*. In *Environmental Inventory of Kiawah Island*, edited by William M. Campbell and John Mark Dean, pp. C-1 - C-34. Environmental Research Center, Inc., Columbia.
- Kovel, Ralph and Terry Kovel  
1986 *Kovels' New Dictionary of Marks*. Crown Publishers, Inc., New York.
- Lefler, Hugh T., editor  
1967 *Lawson's A New Voyage to Carolina*. University of North Carolina Press, Chapel Hill.
- Lowndes, W.  
1783 *Lowndes's London Directory for the year 1783*. n.p., London.  
1786 *Lowndes's London Directory for the year 1786*. n.p., London.
- Luscomb, Sally C.  
1967 *The Collector's Encyclopedia of Buttons*. Bonanza Books, New York.
- MacCallum, Robert N.  
1970 *Commemorative History of St. John's Parish, John's Island and Wadmalaw Island, S.C., 1734-1934*. Walker, Evans & Cogswell, Charleston, South Carolina.
- Mason, Robert E.  
1976 *A Historical Geography of South Carolina's Sea Island Cotton Industry*. Unpublished MA thesis, Department of Geography, University of South Carolina, Columbia.
- Mathew, William M., editor  
1992 *Agriculture, Geology, and Society in Antebellum South Carolina: The*



## SOURCES CITED

- Private Diary of Edmund Ruffin, 1843.* University of Georgia Press, Athens.
- Mathews, Maurice  
1954 A Contemporary View of Carolina in 1686. *South Carolina Historical Magazine* 55:153-159.
- Mathews, Thomas, Frank Stapor, Jr., Charles Richter, John Miglarese, Michael McKenzie, and Lee Barclay  
1980 *Ecological Characterization of the Sea Island Region of South Carolina and Georgia*, volume 1. Office of Biological Services, United States Fish and Wildlife Service, Washington, D.C.
- Mattern, David B.  
1995 *Benjamin Lincoln and the American Revolution.* University of South Carolina Press, Columbia.
- McCowen, George Smith, Jr.  
1972 *The British Occupation of Charleston, 1870-82.* Tricentennial Studies, Number 5. University of South Carolina Press, Columbia.
- McGaw, Judith A.  
1984 Specialization and American Agricultural Innovation in the Early Industrial Era: John Hare Powel and Livestock Breeding. *Business and Economic History* 13:134-149.
- Michie, James  
1977 The Late Pleistocene Human Occupation of South Carolina. Unpublished Honor's Thesis, Department of Anthropology, University of South Carolina, Columbia.
- Miller, E.N.  
1971 *Soil Survey of Charleston County, South Carolina.* U.S. Department of Agriculture, Washington, D.C.
- Milling, Chapman J.  
1969 *Red Carolinians.* University of South Carolina Press, Columbia.
- Mills, Robert  
1972[1826] *Statistics of South Carolina.* Hurlbut and Lloyd, Charleston, South Carolina. 1972 facsimile ed. The Reprint Company, Spartanburg, South Carolina.
- Morgan, Patrick H., Susannah Munson, and Eric C. Poplin  
2002 *Cultural Resources Survey of the Anchorage Plantation III Tract, Charleston County, South Carolina.* Brockington & Associates, Inc., Charleston.
- Morgan, Philip D.  
1977 *Development of Slave Culture in Eighteenth Century Plantation America.* Unpublished Ph.D. dissertation, University College, London.
- 1981 Work and Culture: The Task System and the World of Lowcountry Blacks, 1700s to 1880. *William and Mary Quarterly*, 3<sup>rd</sup> Series 39:563-599.
- Morrill, Dan L.  
1993 *Southern Campaigns of the American Revolution.* Nautical and Aviation Publishing Company of America, Mount Pleasant, South Carolina.
- Nash, Betty Joyce  
2006 The Sea Island Hurricane of 1893. *Region Focus*, Winter, pp. 45-47.
- Noël Hume, Ivor  
1978 *A Guide to Artifacts of Colonial*

- America. Alfred A. Knopf, New York.
- Oliver, Billy L.  
1981 *The Piedmont Tradition: Refinement of the Savannah River Stemmed Point Type*. Unpublished Master's Thesis, Department of Anthropology, University of North Carolina, Chapel Hill.
- 1985 Tradition and Typology: Basic Elements of the Carolina Projectile Point Sequence. In *Structure and Process in Southeastern Archaeology*, edited by Roy S. Dickens and H. Trawick Ward, pp. 195-211. The University of Alabama Press, University.
- Oliver, Billy L., Stephen R. Claggett, and Andrea Lee Novick  
1986 Lithic Analysis. In *Indian and Freedmen Occupation at the Fish Hall Site (38BU805), Beaufort County, South Carolina.*, edited by Michael Trinkley, pp. 183-207. Research Series 1. Chicora Foundation, Inc., Columbia.
- Olsen, Kirstin  
1999 *Daily Life in 18<sup>th</sup> Century England*. Greenwood Press, Westport, Connecticut.
- Orser, Charles E., Jr., Annette M. Nekola, and James L. Roark  
1982 *Exploring the Rustic Life: Multi-Disciplinary Research at Millwood Plantation, a Large Piedmont Plantation in Abbeville County, South Carolina and Elbert County, Georgia*. National Park Service, Archaeological Services Branch, Atlanta.
- Peters, Kenneth E. and Robert B. Herrmann, editors  
1986 *First-Hand Observations of the Charleston Earthquake of August 31, 1886, and Other Earthquake Materials*. Bulletin 41. South Carolina Geological Survey, Columbia.
- Peterson, Drexel  
1971 *Time and Settlement in the Archaeology of Groton Plantation, South Carolina*. Unpublished Ph.D. dissertation. Department of Anthropology, Harvard University, Cambridge.
- Peterson, Harold L.  
1964 *Encyclopedia of Firearms*. E.P. Dutton and Company Inc., New York.
- Phelps, David S.  
1983 Archaeology of the North Carolina Coast and Coastal Plain: Problems and Hypotheses. In *The Prehistory of North Carolina: An Archaeological Symposium*, edited by Mark A. Mathis and Jeffrey J. Crow, pp. 1-52. North Carolina Division of Archives and History, Department of Cultural Resources, Raleigh.
- Polhemus, Richard R.  
1972 *John's Island Burial (38CH68)*. Research Manuscript Series 24. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.
- Porcher, Richard Dwight, and Sarah Fick  
2005 *The Story of Sea Island Cotton*. Wyrick and Company, Charleston, South Carolina.

# SOURCES CITED

- Powell, Lawrence N.  
1980 *New Masters: Northern Planters During the Civil War and Reconstruction*. Yale University Press, New Haven.
- Price, Cynthia  
1979 *19<sup>th</sup> Century Ceramics in the Eastern Ozark Boarder Region*. Monograph Series 1. Center of Archaeological Research, Southwest Missouri University, Springfield.
- Ramsay, David  
1990 [1789] *The History of the American Revolution*. 2 vol. R. Aitken and Son, Philadelphia.  
1990 edition LibertyClassics, Indianapolis.
- Raven, James  
2002 *London Booksellers and American Customers: Transatlantic Literary Community and the Charleston Library Society, 1748-1811*. University of South Carolina Press, Columbia.
- Ravill, Janie  
1941 *Copy of the Original Index Book Showing the Revolutionary Claims Files in South Carolina*. Clearfield Company, Baltimore.
- Reid, James Jefferson, Jr.  
1967 *Pee Dee Pottery from the Mound at Town Creek*. Unpublished M.A. thesis, Department of Anthropology, University of North Carolina, Chapel Hill.
- Rosen, Robert  
1982 *A Short History of Charleston*. Lexikos, San Francisco.
- Rosengarten, Theodore  
1987 *Tombee: Portrait of a Cotton Planter*. McGraw-Hill, New York.
- Ryan, Thomas M.  
1972 *Archaeological Survey of the Columbia Zoological Park, Richland and Lexington Counties, South Carolina*. Research Manuscript Series 37. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.
- Salley, A.S., Jr. and R. Nicholas Olsberg  
1973 *Warrants for Land in South Carolina, 1672-1711*. University of South Carolina Press, Columbia.
- Salwen, Bert and Sarah T. Bridges  
1977 *Cultural Differences and the Interpretation of Archaeological Evidence, Problems with Dates. Research and Transactions of the New York Archaeological Association* 17(1): 165-173.
- Sandifer, Paul A., John V. Miglarese, Dale R. Calder, John J. Manzi, and Lee A. Barclay  
1980 *Ecological Characterization of the Sea Island Coastal Region of South Carolina and Georgia*, vol. 3. Office of Biological Services, Fish and Wildlife Service, Washington, D.C.
- Sassaman, Kenneth E.  
1983 *Middle and Late Archaic Settlement in the South Carolina Piedmont*. Unpublished master's thesis. Department of Anthropology, University of South Carolina, Columbia.
- 1985 *A Preliminary Typological Assessment of MALA Hafted Bifaces from the Pen Point Site, Barnwell County, South Carolina*.
- 1993 *Early Woodland Settlement in the*

- Aiken Plateau: Archaeological Investigations at 38AK157, Savannah River Site, Aiken County, South Carolina.* Savannah River Archaeological Research Papers 3. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.
- 1995 The Cultural Diversity of Interactions Among Mid-Holocene Societies of the American Southeast. In *Native American Interactions: Multiscalar Analyses and Interpretations in the Eastern Woodlands*, edited by M.S. Nassanmey and K.E. Sassaman. University of Tennessee Press, Knoxville (in press).
- Sassaman, Kenneth E. and David G. Anderson

  - 1990 Typology and Chronology. In *Native-American Prehistory of the Middle Savannah River Valley*, edited by Kenneth E. Sassaman, Mark J. Brooks, Glen T. Hanson, and David G. Anderson, pp. 143-216. Savannah River Archaeological Research Publication 1. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.
  - 1994 *Middle and Late Archaic Archaeological Records of South Carolina: A Synthesis for Research and Resource Management.* Council of South Carolina Professional Archaeologists, Columbia.
- Sassaman, Kenneth E., Mark J. Brooks, Glen T. Hanson, and David G. Anderson

  - 1990 *Native American Prehistory of the Middle Savannah River Valley.* Savannah River Archaeological Research Papers 1. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.
- Saville, Julie

  - 1996 *The Work of Reconstruction: From Slave to Wage Laborer in South Carolina, 1860-1870.* Cambridge University Press, New York.
- Schnell, Frank T. and Newell O. Wright, Jr.

  - 1993 *Mississippian Period Archaeology of the Georgia Coastal Plain.* Laboratory of Archaeology Series Report 26. University of Georgia, Athens.
- Schultz, Constance B.

  - 1992 *A South Carolina Album, 1936-1948: Documentary Photography in the Palmetto State.* University of South Carolina Press, Columbia.
- Schwalm, Leslie A.

  - 1997 *A Hard Fight for We: Women's Transition from Slavery to Freedom in South Carolina.* University of Illinois Press, Chicago.
- Seabrook, Whitemarsh B.

  - 1826 *A Report Accompanied With Sundry Letters on the Causes Which Contribute to the Production of Fine Sea-Island Cotton.* A.E. Miller, Charleston, South Carolina.
- Shlomowitz, Ralph

  - 1979 The Origins of Southern Sharecropping. *Agricultural History* 53:557-575.
- Singleton, Robert R.

  - 1999 James C. Beecher and the Freedmen's Bureau. *The Mississippi Quarterly* 53(1):5-40.



---

# SOURCES CITED

---

- Singleton, Teresa  
1980 *The Archaeology of Afro-American Slavery in Coastal Georgia: A Regional Perception of Slave Household and Community Patterns*. Ph.D. dissertation, University of Florida. University Microfilms, Ann Arbor.
- Sirmans, H. Eugene  
1966 *Colonial South Carolina: A Political History, 1663-1763*. University of North Carolina, Chapel Hill.
- Smith, Bruce  
1986 *The Archaeology of the Southeastern United States: From Dalton to DeSoto, 10,500 -500 B.P. Advances in World Archaeology* 5:1-88.
- South, Stanley  
1959 *A Study of the Prehistory of the Roanoke Rapids Basin*. Master's thesis, Department of Sociology and Anthropology, University of North Carolina, Chapel Hill.
- 1962 *Analysis of the Buttons from Brunswick Town and Fort Fisher. The Florida Anthropologist* 17(2):113-133.
- 1971 *Archaeology at the Charles Towne Site (38CH1) on Albemarle Point in South Carolina*. Research Manuscript Series 10. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.
- 1972 *The Unabridged Version of Tribes of the Carolina Lowlands: Pedee-Sewee-Winyaw-Waccamaw-Cape Fear-Congaree-Wateree-Santee*. Research Manuscript Series 20. South Carolina Institute of Archaeology and Anthropology, University of South Carolina, Columbia.
- 1977 *Method and Theory in Historical Archaeology*. Academic Press, New York.
- South, Stanley and Michael Hartley  
1980 *Deep Water and High Ground: Seventeenth Century Low Country Settlement*. Research Manuscript Series 166. University of South Carolina, Institute of Archaeology and Anthropology, Columbia.
- Talmage, Valerie and Olga Chesler  
1977 *The Importance of Small, Surface, and Disturbed Sites as Sources of Significant Archeological Data*. Interagency Archeological Services, United States Department of Interior, National Park Service, Washington, D.C.
- Taylor, Richard L. (editor)  
1984 *Cultural Resources Survey of the Proposed Pee Dee Electric Generating Facility in Florence County, South Carolina*. Commonwealth Associates, Jackson, Michigan.
- Thomas, David H. and Clark S. Larsen  
1979 *The Anthropology of St. Catherine's Island: The Refuge-Deptford Mortuary Complex*. Anthropological Papers 56(1). American Museum of Natural History, New York.
- Tindall, George Brown  
1952 *South Carolina Blacks, 1877-1900*. University of South Carolina Press, Columbia.

Townsend, Jan, John H. Sprinkle, Jr., and John Knoerl

- 1992 *Guidelines for Evaluating and Registering Historical Archaeological Sites and Districts*. Bulletin 36. National Park Service, National Register of Historic Places, Washington, D.C.

Trinkley, Michael

- 1976 *A Typology of Thom's Creek Pottery from the South Carolina Coast*. Unpublished Master's thesis. Department of Anthropology, University of North Carolina, Chapel Hill.
- 1980 *Additional Investigations at Site 38LX5*. South Carolina Department of Highways and Public Transportation, Columbia.
- 1981 *Studies of Three Woodland Period Sites in Beaufort County, South Carolina*. South Carolina Department of Highways and Public Transportation, Columbia.
- 1982 *A Summary Report of Excavations at Alligator Creek, Charleston County, South Carolina*. U.S.D.A., Forest Service, Columbia.
- 1983 *Ceramics of the Central South Carolina Coast*. *South Carolina Antiquities* 15:43-53.
- 1987 *An Archaeological Survey of Longpoint Development, Charleston County, South Carolina: Palmetto Grove Plantation*. Research Series 8. Chicora Foundation, Inc., Columbia.
- 1990 *An Archaeological Context for the South Carolina Woodland Period*. Chicora Foundation Research Series 22. Chicora Foundation,

Inc., Columbia, S.C.

- 1999 *Archaeology at the Western Portion of 38CH1257 and at 38CH1259: A Glimpse of Woodland and Civil War Archaeology on Seabrook Island, Charleston County, South Carolina*. Research Series 56. Chicora Foundation, Inc., Columbia.

- 2005 *A List of South Carolina Undertakers During the Late Nineteenth and Early Twentieth Centuries*. Chicora Research Contribution 420. Chicora Foundation, Inc., Columbia.

Trinkley, Michael, editor

- 1993 *The History and Archaeology of Kiawah Island, Charleston County, South Carolina*. Research Series 30. Chicora Foundation, Inc., Columbia.

Trinkley, Michael and Debi Hacker

- 1997 *Excavations at a Portion of the Secessionville Archaeological Site (38CH1456), James Island, Charleston County, South Carolina*. Research Series 52. Chicora Foundation, Inc., Columbia.
- 2007 *Data Recovery at 38CH1693, A Small Thom's Creek Site in Charleston County, South Carolina*. Research Series 69. Chicora Foundation, Inc., Columbia.

Trinkley, Michael, Debi Hacker, and Natalie Adams

- 1993 *Life in the Pee Dee: Prehistoric and Historic Research on the Roche Carolina Tract, Florence County, South Carolina*. Research Series 39. Chicora Foundation, Inc., Columbia.

Trinkley, Michael, Debi Hacker, and Sarah Fick

- 2003 *Liberty Hall: A Small Eighteenth*

## SOURCES CITED

- Century Rice Plantation in Goose Creek, Berkeley County, South Carolina*. Research Series 62. Chicora Foundation, Inc., Columbia.
- Trinkley, Michael, Debi Hacker, and Nicole Southerland  
 2003 *Archaeology at an Eighteenth Century Slave Settlement in Goose Creek, South Carolina*. Research Series 57. Chicora Foundation, Inc., Columbia.
- Trinkley, Michael, Nicole Southerland, and Sarah Fick  
 2006 *Cultural Resources Survey of the Campbell Tract, Charleston County, South Carolina*. Research Contribution 442. Chicora Foundation, Inc., Columbia.
- Trinkley, Michael, Missy Trushel and David R. Lawrence  
 1995 *Archaeological Data Recovery Excavations at 38CH1219, Kiawah Island: "Another" Deptford and St. Catherines Shell Midden*. Research Contribution 180. Chicora Foundation, Inc., Columbia.
- Trinkley, Michael, Debi Hacker, Nicole Southerland, and Julie Poppell  
 2006 *Data Recovery at 38RD1249, 38RD1260 and 38RD1262: Tenancy in Richland County, South Carolina*. Research Series 68. Chicora Foundation, Inc., Columbia.
- Tustin, Joseph P., translator and editor  
 1979 *Diary of the American War: A Hessian Journal by Captain Johann Ewald, Field Jäger Corps*. Yale University Press, New Haven.
- Ullendorff, Bernard A., translator and editor  
 1938 *The Siege of Charleston With an Account of the Province of South Carolina: Diaries and Letters of Hessian Officers*. University of Michigan Press, Ann Arbor.
- Ver Steeg, Clarence L.  
 1975 *Origins of a Southern Mosaic*. University of Georgia Press, Athens.
- Vinson, Charles A.  
 2004 *Dwelling on Wadmalaw: Landscape Change and Changing African American Lifeways on a South Carolina Sea Island*. Unpublished M.A. Thesis, Department of Anthropology, University of Florida, Gainesville.
- Vivian, Daniel J.  
 n.d. *South Carolina Statewide Survey of Historic Properties*. State Historic Preservation Office, Columbia.
- Waddell, Gene  
 1980 *Indians of the South Carolina Lowcountry, 1562-1751*. Reprint Company, Spartanburg, South Carolina.
- Walthall, John A.  
 1980 *Prehistoric Indians of the Southeast: Archaeology of Alabama*. University of Alabama Press, University.
- Ward, Trawick  
 1978 *The Archaeology of Whites Creek, Marlboro County, South Carolina*. Research Laboratories of Anthropology, University of North Carolina, Chapel Hill.
- 1983 *Whites Creek: The Second Time Around*. *South Carolina Antiquities* 15:63-65.
- Waring, Antonio J., Jr.  
 1968 *The Refuge Site, Jasper County*,

- South Carolina. In *The Waring Papers: The Collected Works of Antonio J. Waring, Jr.*, edited by Stephen B. Williams, pp. 198-208. Papers of the Peabody Museum of Archaeology and Ethnology 58.
- Waterhouse, Richard  
1975 England, the Caribbean, and the Settlement of Carolina. *Journal of American Studies* 9:259-281.
- Watson, E.J.  
1907 *Handbook of South Carolina - Resources, Institutions and Industries of the State*. The State Company, Columbia.
- 1916 *Twelfth Annual Report of the Commissioner of Agriculture, Commerce, and Industries*. Gonzales & Bryan, Columbia.
- Weir, Robert M.  
1997 *Colonial South Carolina: A History*. University of South Carolina Press, Columbia.
- Wheaton, Thomas R., Amy Friedlander, and Patrick Garrow  
1983 *Yaughan and Curriboo Plantations: Studies in African American Archaeology*. Soil Systems, Inc., Marietta, Georgia.
- Wheaton, Thomas R., Mary Beth Reed, and Cindy Rhodes  
1997 *An Archaeological Survey of Alternate 2F Testing of Two Sites (38CH1550 and 38CH1656) The Mark Clark Expressway Project From U.S. Highway 17 to Folly Beach Road*. New South Associates. Technical Report 463.
- Willey, Gordon R.  
1966 *An Introduction to American Archaeology*. Vol. 1: North and Middle America. Prentice-Hall, Englewood Cliffs, New Jersey.
- Williams, Stephen B., editor  
1965 The Paleoindian era: Proceedings of the 20th Southeastern Archaeological Conference. *Southeastern Archaeological Conference Bulletin* 2.
- 1968 *The Waring Papers: The Collected Works of Antonio J. Waring, Jr.* Papers of the Peabody Museum of Archaeology and Ethnology 58.
- Williamson, Joel  
1965 *After Slavery: The Negro in South Carolina During Reconstruction, 1861-1877*. University of North Carolina Press, Chapel Hill.
- Wilson, Homes H.  
1982 *An Analysis of Skeletal Material from Bw<sup>o</sup>67, Brunswick County, North Carolina*. Unpublished MA thesis, Department of Anthropology, University of North Carolina, Chapel Hill.
- Woodman, Harold D.  
1968 *King Cotton and his Retainers: Financing and Marketing the Cotton Crop of the South, 1800-1925*. University of South Carolina Press, Columbia.
- Woofter, T.J., Jr.  
1936 *Landlord and Tenant of the Cotton Plantation*. Research Monograph 5. Division of Social Research, Works Progress Administration, Washington, D.C.



---

#### SOURCES CITED

---

Yohe, Robert M. II

- 1996    Analysis    of    Flaked    Stone  
         Artifacts.    In    *Archaeological*  
         *Laboratory    Methods:    An*  
         *Introduction*, edited by Mark Q.  
         Sutton and Brooke S. Arkush, pp.  
         39-68. Kendall/Hunt Publishing,  
         Dubuque, Iowa.

Zierden, Martha and Jeanne Calhoun

- 1984    *An Archaeological Preservation Plan*  
         *for Charleston, South Carolina.*  
         Archaeological Contribution 8.  
         Charleston Museum, Charleston.

Zierden, Martha and Kimberly Grimes, David  
Hudgins, and Cherie Black

- 1988    *Charleston's    First    Suburb:*  
         *Excavations at 66 Society Street.*  
         Archaeological Contributions 20.  
         The Charleston Museum,  
         Charleston, South Carolina.



**Archaeological  
Investigations**

**Historical Research**

**Preservation**

**Education**

**Interpretation**

**Heritage Marketing**

**Museum Support  
Programs**



**Chicora Foundation, Inc.**  
PO Box 8664 • 861 Arbutus Drive  
Columbia, SC 29202-8664  
Tel: 803-787-6910  
Fax: 803-787-6910  
Email: [Chicora@earthlink.net](mailto:Chicora@earthlink.net)  
[www.chicora.org](http://www.chicora.org)

**MEMORANDUM OF AGREEMENT**  
**Among**  
**South Carolina Department of Health and Environmental Control,**  
**South Carolina State Historic Preservation Office,**  
**Kiawah River Plantation LP**  
**For**  
**38CH487, 1539-1549, 2240-2254**  
**Charleston County, South Carolina**

Whereas, the South Carolina Department of Health and Environmental Control's Office of Ocean and Coastal Resource Management ("Department") has the responsibility to certify that all projects requiring State or Federal permits in the Coastal Zone of South Carolina are consistent with the Coastal Zone Management Program; and

Whereas, the State Historic Preservation Officer ("SHPO"), as the State official with recognized expertise in historical and archaeological matters, assists the Department in determining potential impacts on sites which are potentially eligible for, eligible for, or currently listed in the National Register of Historic Places (NRHP) ("historic properties"); and

Whereas, such sites are defined as Geographic Areas of Particular Concern ("GAPCs") by the Coastal Zone Management Program and must be given special consideration; and

Whereas, Kiawah River Plantation, LP is the owner of real property in Charleston County, S.C. ("Owner") and proposes to develop the tract with single family homes and associated infrastructure at and on the project site as further described in the Coastal Zone Consistency Certification associated with Department NPDES General Permit for Stormwater Discharges from Large and Small Construction Activities (NPDES CGP) Coverage No. 2003-1N-043-P; and

Whereas, upon consultation with the SHPO, the Department has determined that the Development will adversely affect the historic properties/GAPCs designated as 38CH487, 1539-1549, 2240-2254 and whose defining qualities are described in Exhibit A. The site locations are shown on the attached map (Exhibit B);

Now, therefore, the Owner of the project area associated with Department NPDES CGP Coverage No. 2003-1N-043-P, SHPO, and the Department under the direction of the Department's Coastal Zone Management Program, agree that the proposed project, if constructed, shall be



undertaken in accordance with the following provisions in order to minimize and mitigate adverse effects of the proposed development on the GAPCs.

### **Applicability**

1. This Memorandum of Agreement (MOA) shall become void if Department NPDES CGP Coverage No. 2003-1N-043-P is not issued or if Department NPDES CGP Coverage No. 2003-1N-043-P expires and no work is initiated prior to the expiration.
2. The Department will incorporate the requirements of this MOA as conditions of the certification of the project under the Coastal Zone Management Program and will monitor the progress of the stipulated tasks. Failure to comply may result in the Department referring the noncompliance to appropriate enforcement staff.

### **General Management of Development**

1. The Owner shall allow representatives from the SHPO and the Department to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of this MOA.
2. Prior to any construction activities the Developer shall ensure that:
  - a. Each GAPC, including a buffer of 50 feet, is cordoned off in the field with orange tree-save fencing, or a similar highly visible barrier;
  - b. A licensed surveyor has surveyed all GAPCs and identified buffers of 50 feet; and
  - c. All surveyed GAPCs are marked on construction and maintenance plans with treatment notes and this MOA referenced.
3. All GAPCs within the Development will be evaluated, mitigated, and/or preserved as described herein.
4. Prior to Owner initiating work under Department NPDES CGP Coverage No. 2003-1N-043-P, if authorized, Owner must record a restrictive covenant for protection of the GAPCs, which will remain in effect until such time as the individual GAPC or portion of a GAPC may be released after testing or data recovery. Exhibit C shall be used as a template for the restrictive covenants, which will reference this MOA and grant enforcement rights to the Department. The term Owner shall include Kiawah River Plantation LP and all successors, heirs, and assigns associated with this permit or the property subject to this permit. The Department and SHPO shall review and approve of the restrictive covenant prior to Owner recording it. Owner shall provide a copy of the recorded restrictive covenant to the Department and SHPO prior to initiating work.

### **Evaluation**

1. Known GAPCs may need further investigation to determine NRHP eligibility as described below. Late-discovered sites may similarly be investigated to determine NRHP eligibility status.
2. If additional investigations result in a determination by the SHPO and the Department that one or more of the GAPCs are not eligible for the NRHP, those sites will no longer be considered GAPCs and the permit and restrictive covenants conditions as to those specific GAPCs can be modified to remove those sites from protection. Covenant modification will be done in consultation with Department and SHPO.
3. If Phase II archaeological testing investigations indicate that significant deposits are present, indicating NRHP eligibility, the GAPC will be preserved or mitigated through data recovery as described herein.

### **Mitigation**

#### **Archaeological**

1. If a resource is determined to be eligible for the NRHP by the SHPO, the significant sections of the resource (as determined through testing) that will be impacted by development will be mitigated through data recovery and a public information component. The Owner's archaeological consultant will submit research designs and data recovery plans to the SHPO and the Department for review. The Department and SHPO will make a reasonable effort to review and comment on the plans no later than thirty (30) calendar days after their receipt. Following approval of the plans, data recovery investigations will be initiated.
2. For each GAPC mitigated through data recovery, a detailed Management Summary and draft public information plan will be prepared by the Owner's archaeological consultant and submitted to the SHPO and the Department for review and approval within thirty (30) calendar days of the last day of fieldwork. The Management Summary will include a discussion of the research methods, field investigations, and data recovery results consistent with the requirements of *South Carolina Standards and Guidelines for Archaeological Investigations* (2005). Upon review and approval of the Management Summary by the SHPO and the Department, the Owner may proceed with its development plans.
3. A minimum of one copy of the draft technical report of data recovery investigations and final public information plans will be prepared by the Owner's archaeological consultant and submitted to the SHPO for review and approval within one (1) year from the last day of fieldwork. The SHPO reserves the right to submit the draft technical report to qualified

professional archaeologists for the purpose of peer review. If the SHPO elects to utilize this option, the Owner's archaeological consultant will be advised and additional report copies may be requested. If revisions of the draft report are recommended, the Owner is responsible for ensuring that these are addressed.

4. Within three (3) months of draft report approval, the Owner shall provide, or have his consultant provide, one bound copy and one compact disk containing a Portable Document Format (PDF) file of the final technical report for the SHPO, and two bound copies, one unbound copy, and one PDF copy of the final technical report for the South Carolina Institute of Archaeology and Anthropology, all submitted to SHPO. Additionally, please provide to the SHPO a separate digital Abstract document in Word or html format (not PDF). This Abstract file can be included on the same CD as the PDF file.
5. The public information component also will be completed by the time the final report is submitted unless a completion date is otherwise negotiated at the time of draft report submittal. The Owner will provide, at a minimum, one PDF or HTML copy of the public information component to the SHPO, as appropriate. The PDF shall be the smallest appropriate size for on-line viewing and distribution over the Internet. It will be downloadable and printable and may be used for posting on the SHPO website, or another agreed-upon website. To facilitate posting and to comply with Section 508 of the Americans with Disabilities Act, please apply the guidance for "Creating Accessible PDF Documents with Adobe Acrobat" at the following link: <http://www.adobe.com/accessibility/index.html>. The accessible PDF should include an alternative text description for all figures.
6. The Owner shall ensure that all artifacts recovered during archaeological investigations are stabilized and processed for curation at a repository meeting professional curation standards as established in 36 CFR Part 79. Copies of all records, including but not limited to field notes, maps, catalogue sheets, and representative photographs and negatives shall be submitted for curation with the artifacts. The Owner by approval of this MOA releases to the curatorial facility any claim of ownership of all collections and field records. Documentation that the repository has received and accepted these materials will be supplied to the SHPO and the Department.

### **Document Guidelines and Standards**

All plans and reports developed for the evaluation or mitigation of a GAPC shall incorporate guidance provided by the Secretary of Interior's *Standards and Guidelines for Archeological Documentation* (48 FR 44734-37), the President's Advisory Council on Historic Preservation publication *Treatment of Archeological Properties* (ACHP 1980), and the Secretary of the Interior's *Standards and Guidelines for Historical Documentation* and the *Standards for Architectural and Engineering Documentation*. In addition, these plans and reports will be consistent with the *South Carolina Standards and Guidelines for Archaeological Investigations* (2005). Plans may be implemented only after approval by the SHPO and the Department.

### **Preservation**

1. For archaeological sites being preserved, unless otherwise indicated under Treatment of Specific GAPCs, no construction, alteration, demolition, disturbance of the ground surface, or other action shall be undertaken or permitted to be undertaken that would materially affect the integrity or appearance of the attributes of the archaeological site without the prior written permission of the SHPO and Department.
2. Portions of an archaeological site may be thinned by hand. Extensive clearing is prohibited unless specified in individual site treatment plans. If timber maintenance activities (such as burning, removal or trimming of dead, diseased, or damaged trees, and the plowing of existing firebreaks) are needed, they will be conducted by hand or with the use of rubber tired machinery IN DRY CONDITIONS ONLY. Stumps may be ground or shredded level with the existing ground surface but not extracted. In all instances, equipment operators will be advised by the Owner of the need to prevent disturbances to buried deposits within the site.
3. Within the GAPC boundaries, the removal of stumps, alteration of the ground surface, installation of utility lines, and the planting of trees and shrubs are prohibited without the prior written permission of the SHPO and Department.

### **Late Discoveries**

If unanticipated cultural materials (*e.g.*, large, intact artifacts or animal bones; large clusters of artifacts or animal bones; large soil stains or patterns of soil stains; buried brick or stone structures; clusters of brick or stone) or human skeletal remains are discovered on the Development site prior to or during land altering or construction activities, then the Owner will temporarily halt any activities and immediately notify the Department and the SHPO of the late discoveries.

A minimum 50-foot buffer shall be immediately established around the cultural materials by the construction project manager. The buffer will be flagged by appropriate personnel. All project personnel will be notified by the Owner that no land altering activities will be allowed within this buffer zone until the course of action hereinafter described has been established. The halt will afford the Department and the SHPO the opportunity to assess the situation and recommend a course of action within two (2) business days of such notification.

If unanticipated cultural materials or human skeletal remains are discovered within a GAPC during data recovery investigations, the Owner or the Owner's archaeological consultant will consult with the SHPO and the Department to determine whether additional excavations or investigations are needed.



If human remains are found or suspected, they should be left in place and protected until appropriate consultation is completed. The Owner is responsible for notifying the SHPO, the Department, the local coroner or medical examiner, and interested parties, such as Native American tribes, of the find to initiate consultation. Please note that human remains and burial grounds are subject to South Carolina law that addresses abandoned cemeteries and burials, including but not limited to S.C. Code Ann. §§ 27-43-10 to -30; 16-16-600; and 61-19-28 to -29.

### **Dispute Resolution**

As between the Department and SHPO, they shall attempt informal resolution of any disagreement arising from the implementation of this MOA for a period of sixty days. However, this does not constrain any enforcement action that may be appropriate against Owner.

### **Amendment and Modification**

Any party to this MOA may request that it be amended or modified at any time, whereupon the parties will consult with each other to consider such amendment or modification. Amendment is exclusively based on the concurrence of SHPO and the Department, which shall be discretionary determinations. Amendment of this MOA may require a concurrent request to amend applicable permits and easements or restrictive covenants.

### **Final Project Approval**

Owner shall notify the Department when Owner believes all of the above stipulations are complete. The Department and SHPO will review Owner's performance and provide written notification to Owner if the terms of this MOA are deemed complete.

### **Execution of MOA**

This MOA may be executed in counterparts. A copy with all original executed signature pages affixed shall constitute the original MOA. The date of execution shall be the date of the signature of the last party to sign.

IN WITNESS WHEREOF, the parties hereto have caused this MOA to be executed by their duly authorized representatives as of the last date signed.

**South Carolina Department of Health and Environmental Control**

Office of Ocean and Coastal Resource Management

By: \_\_\_\_\_, 2008

\_\_\_\_\_(Name)

\_\_\_\_\_(Title)

**South Carolina State Historic Preservation Office**

By: \_\_\_\_\_, 2008

\_\_\_\_\_(Name)

\_\_\_\_\_(Title)

**Kiawah River Plantation, LP**

By: \_\_\_\_\_, 2007

\_\_\_\_\_(Name)

\_\_\_\_\_(Title)

## EXHIBIT A

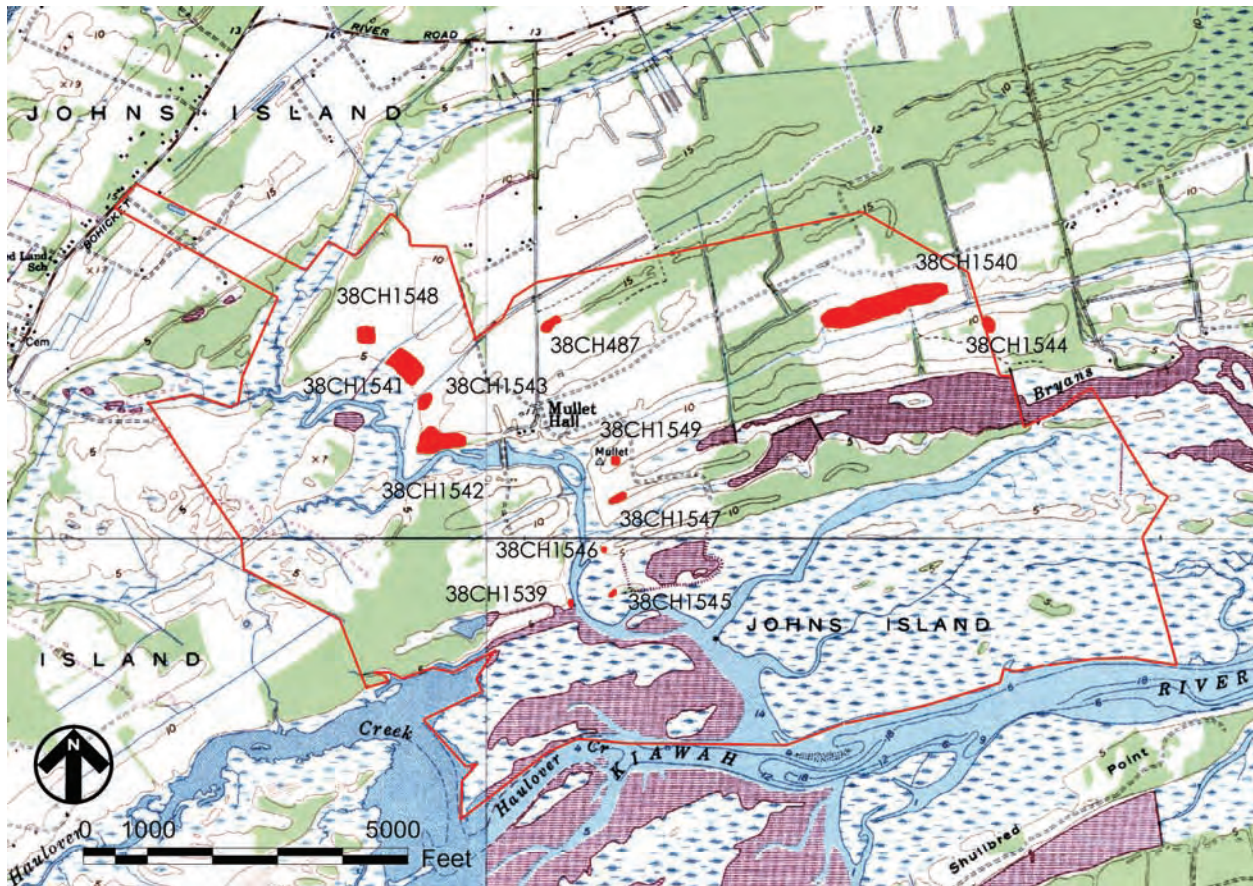
Table 56.  
Sites Identified on the Mullet Hall Property

Site Number	Description	Size (in feet)	Central UTM <sup>1</sup>		Soil	Eligibility
			Easting	Northing		
38CH487	18th-19th c. scatter	900 x 600	582408	3610894	Seabrook	E
38CH1539	19th c. scatter	50 x 10	582480	3609560	Kiawah	NE
38CH1540	18th-19th c. plantation complex	2,400 x 950	583972	3610963	Seabrook	E
38CH1541	18th-20th c. domestic	700 x 900	581720	3610682	Seabrook	E
38CH1542	19th-20th c. settlement	1,200 x 500	581841	3610310	Seabrook	E
38CH1543	18th-19th c. scatter	300 x 300	581842	3610534	Seabrook	PE
38CH1545	prehistoric/20th c. scatter	350 X 200	582743	3609623	Kiawah	PE
38CH1546	prehistoric/18th-19th c. scatter	200 x 250	582671	3609837	Seabrook	NE
38CH1547	prehistoric/18th-19th c. scatter	650 x 450	582686	3610045	Kiawah	PE
38CH1548	19th-20th c. cemetery	200 x 200 <sup>2</sup>	581509	3610818	Kiawah	PE
38CH1549	cemetery	250 x 250 <sup>2</sup>	582734	3610249	Wando	PE
38CH2240	prehistoric scatter	150 x 200	584231	3610883	Seabrook	NE
38CH2241	19th-20th c. scatter	150 x 200	582369	3609721	Kiawah	NE
38CH2242	prehistoric/18th c. settlement	400 x 300	582376	3610096	Wando	PE
38CH2243	prehistoric/18th-19th c. scatter	1,850 x 400	583003	3609935	Seabrook	NE
38CH2244	prehistoric/18th-20th c. scatter	500 x 250	582663	3610209	Wando	PE
38CH2245	19th-20th c. scatter	150 x 150	583345	3610070	Seabrook	NE
38CH2246	prehistoric scatter	150 x 50	583482	3610108	Seabrook	NE
38CH2247	Middle Woodland scatter	50 x 50	583702	3610141	Seabrook	NE
38CH2248	Early 19th c. scatter	150 x 100	584432	3610336	Seabrook	E
38CH2249	prehistoric scatter	500 x 200	582899	3610344	Wando	NE
38CH2250	prehistoric/18th c. scatter	1,000 x 550	583944	3610691	Seabrook	PE
38CH2251	20th c. trash dump	200 x 200	582704	3610444	Wando	NE
38CH2252	18th-20th c. possible overseer	450 x 250	580877	3610417	Yonges	PE
38CH2253	prehistoric/19th c. scatter	550 x 350	582682	3610696	Seabrook	NE
38CH2254	19th-20th c. scatter	100 x 200	580916	3611205	Wando	NE

<sup>1</sup> Zone 17, NAD27 datum

<sup>2</sup> Includes buffer as discussed

## EXHIBIT B



IDENTIFIED ARCHAEOLOGICAL SITES



# EXHIBIT C

STATE OF SOUTH CAROLINA                    )  
                                                          )  
COUNTY OF \_\_\_\_\_                    )     **DECLARATION OF COVENANTS  
                                                          )                   AND RESTRICTIONS**

THIS DECLARATION OF COVENANTS AND RESTRICTIONS is made and entered into this \_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_, by Kiawah River Plantation, LP (“Declarant”).

## RECITALS

WHEREAS, Declarant is the owner of certain real property in Charleston County, South Carolina, more particularly described in Exhibit A {**legal description and/or plat or reference to recorded plat**} attached hereto and incorporated herein by reference (“Property”); and

WHEREAS, the Property is also currently identified by tax map parcel number \_\_\_\_\_; and

WHEREAS, Declarant desires to obtain from or enjoy the benefit of a {**permit/authorization type**} which requires the South Carolina Department of Health and Environmental Control’s Office of Ocean and Coastal Resource Management, including any successor agency, (Department) to determine whether the proposed activity is consistent with the Coastal Zone Management Program; and

WHEREAS, the State Historic Preservation Officer (“SHPO”), as the State official with recognized expertise in historical and archaeological matters, assists the Department in determining potential impacts on sites which are eligible for, potentially eligible for, or currently listed in the National Register of Historic Places; and

WHEREAS, such sites are defined as Geographic Areas of Particular Concern (“GAPCs”) by the Coastal Zone Management Program and must be given special consideration; and

WHEREAS, upon consultation with the SHPO, the Department has determined that activities proposed for the Property will adversely affect significant historical and cultural resources present on the Property, as expressed more fully in the attached Memorandum of Agreement (Exhibit B), which was executed between the SHPO, the Department, and Declarant on {**MOA date of execution**} and is incorporated herein by reference; and

WHEREAS, the Department requires as a condition to the consistency determination associated with {**permit number**} - {**applicant / project name**}, authorizing {**brief project description**}, that Declarant properly record this Declaration of Covenants and Restrictions for the Property.

NOW, THEREFORE, IT IS AGREED, that Declarant hereby declares and covenants that the Property described in Exhibit A shall be held, mortgaged, transferred, sold, conveyed, leased, occupied, and used subject to the following restrictions, which shall touch and concern and run with the title to the Property and be binding on all heirs, successors, assigns, lessees, or other occupiers and users (all included in the term Declarant below).

1. **Restrictions.** Declarant shall hold and manage the Property as explained in the attached MOA. Accordingly, no construction, alteration, demolition, or disturbance, or other actions shall be taken or permitted on the Property that would materially and negatively affect the integrity of the designated GAPCs (including any buffer, if designated) without prior written authorization from the Department.

2. **Amendment.** After recording, these restrictive covenants may only be amended by a recorded document signed by the Department and Declarant. Any request by Declarant to amend these restrictive covenants shall be submitted in writing to the Department. Amendment of these restrictive covenants shall be at the discretion of the Department.
  
3. **Notice.** Declarant shall include the following notice on all deeds, mortgages, plats, or any other legal instruments used to convey any interest in the Property (failure to comply with this paragraph does not impair the validity or enforceability of these covenants):  
  
 NOTICE: This Property Subject to Declaration of Covenants and Restrictions, and any subsequent amendments, Recorded in Book \_\_\_\_\_, at Page \_\_\_\_\_, in \_\_\_\_\_ County on \_\_\_\_\_.
  
4. **Department's Authority.** This Declaration only applies to the Property expressly identified in Exhibit A and does not impair the Department's general authorities with respect to the Property.
  
5. **Severability.** Should any separable part of these restrictive covenants be held contrary to law, the remainder shall continue in full force and effect.
  
6. **Inspection.** Declarant will allow the Department and SHPO or their respective designees, at all reasonable times and upon reasonable advance notice to Declarant, to inspect the GAPCs and buffers in order to ascertain whether Declarant is complying with the conditions of this preservation covenant.
  
7. **Enforcement.** Declarant grants to the Department a discretionary right to enforce these restrictive covenants in a judicial action against any person or entity violating or attempting to violate these restrictive covenants; provided, however that no violation of these restrictive covenants shall result in a forfeiture or reversion of title. In any enforcement action, the Department shall be entitled to complete restoration for any violation, as well as any other judicial remedy such as civil penalties. Failure of the Department to exercise any right or remedy granted under these restrictive covenants shall not have the effect of waiving or limiting the exercise by the Department of any other right or remedy at any other time. Nothing herein shall limit the right of the Department to act according to its regulatory authority.

IT IS FURTHER AGREED, that Declarant, by signing below, authorize the recording of this Declaration and will promptly and properly file this Declaration of Covenants and Restrictions in the \_\_\_\_\_ County Office of Register of Deeds. Afterwards, a copy of the recorded Declaration of Covenants and Restrictions shall be provided to the Department and accompanied by an opinion of an attorney, licensed to practice in South Carolina, certifying that the Declaration of Covenants and Restrictions has been properly recorded and indexed.

IN WITNESS WHEREOF, Kiawah River Plantation LP has caused this Declaration of Covenants and Restrictions to be executed as of the date first above written.

WITNESSES: Kiawah River Plantation, LP

\_\_\_\_\_

By: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(Name and Title)

STATE OF \_\_\_\_\_)

)

ACKNOWLEDGEMENT

COUNTY OF \_\_\_\_\_)

I, \_\_\_\_\_ (Notary Public), do hereby certify that, \_\_\_\_\_, an authorized representative of the Kiawah River Plantation, LP, personally appeared before me this day and acknowledged the due execution of the foregoing instrument, on behalf of the Limited Partnership.

Witness my hand and official seal this \_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_

Notary Public for \_\_\_\_\_

My Commission Expires: \_\_\_\_\_

IN WITNESS WHEREOF, Kiawah River Plantation, LP has caused this Declaration of Covenants and Restrictions to be executed as of the date first above written.

WITNESSES:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

STATE OF \_\_\_\_\_)

)

ACKNOWLEDGEMENT

COUNTY OF \_\_\_\_\_)

I, \_\_\_\_\_ (Notary Public), do hereby certify that, \_\_\_\_\_, personally appeared before me this day and acknowledged the due execution of the foregoing instrument.

Witness my hand and official seal this \_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_

Notary Public for \_\_\_\_\_

My Commission Expires: \_\_\_\_\_

**[FOR AMENDMENTS ONLY]**

IN WITNESS WHEREOF, the Department has caused this [First, Second, etc.] Amendment to Declaration of Covenants and Restrictions to be executed as of the date first above written.

**WITNESSES:**

South Carolina Department of Health  
and Environmental Control

By:

\_\_\_\_\_  
  
\_\_\_\_\_

\_\_\_\_\_  
Carolyn R. Boltin, Deputy Commissioner  
South Carolina Department of  
Health and Environmental Control

STATE OF SOUTH CAROLINA )  
                                          )  
COUNTY OF CHARLESTON    )

**ACKNOWLEDGEMENT**

I, \_\_\_\_\_ (Notary Public), do hereby certify that Carolyn R. Boltin, Deputy Commissioner of the South Carolina Department of Health and Environmental Control, personally appeared before me this day and acknowledged the due execution of the foregoing instrument.

Witness my hand and official seal this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
Notary Public for South Carolina  
My Commission Expires: \_\_\_\_\_





**NEWKIRK**  
ENVIRONMENTAL, INC

CHARLESTON, SC • BLUFFTON, SC

21 May 2009

Mr. Kevin O'Neill, Vice President  
Beach Development  
211 King Street, Suite 300  
Charleston, SC 29401

**RE: Update to Threatened and Endangered Species Assessment  
For Kiawah River Plantation  
Charleston County, South Carolina**

Dear Mr. O'Neill,

In May of 2008, Newkirk Environmental, Inc. (NEI) prepared a report of findings for comprehensive surveys and assessments of Kiawah River Plantation with regards to federally threatened and endangered species. The conclusion of the report stipulates that should significant time (i.e. the passing of annual breeding or migratory seasons) lapse between issuance of the report and development of the property or any other type of legal reliance, it is recommended that an update of the report be completed. In order to satisfy this stipulation, NEI has revisited the site, interviewed the current land manager, solicited comments from SCDNR, and searched the South Carolina Heritage Trust Database.

A site visit was performed by NEI on 15 May 2009. During the visit, it was discovered that there had been no significant change to the habitat types on site. Also, it was observed that work approved by an OCRM permit issued in 2008 had been completed in the on site impoundments. With regards to the on-site eagles, this work was completed in accordance with suggestions made by agents of SCDNR, USFWS and in accordance with the current Habitat Management Guidelines for the Bald Eagle in the Southeast Region.

A telephone interview with the current land manager, Mr. Jeff Snyder, was also performed on 15 May 2009. During this interview Mr. Snyder informed NEI of the active status of the two bald eagle nests on site. Mr. Snyder stated that the two nests are active and bald eagles were observed at both sites during the most recent nesting period. Mr. Snyder also stated that he has supplied this information to SCDNR and has encouraged further coordination with SCDNR and USFWS as those agencies see necessary.

During a telephone conversation with Ms. Charlotte Hope of SCDNR on 19 May 2009, Ms. Hope verified the active status of the two nest sites at Kiawah River Plantation. Ms. Hope also said that additional nest sites were not discovered during SCDNR's most recent aerial survey of the area. Ms. Hope had no further recommendations or suggestions in addition to the recommendations or comments made during coordination of the initial report in May 2008.

Post Office Box 746, Mt. Pleasant, South Carolina 29465-0746 • 1887 Clements Ferry Road, Charleston, South Carolina 29492  
Telephone: (843) 388-6585 • Facsimile: (843) 388-6580

E-Mail: [general@newkirkenv.com](mailto:general@newkirkenv.com)  
[www.newkirkenvironmental.com](http://www.newkirkenvironmental.com)

Existing data from the South Carolina Heritage Trust Database was reviewed to locate recorded occurrences of threatened and/or endangered species within or near Kiawah River Plantation since the issuance of the May 2008 report. This review did not indicate any new occurrences. In addition, during the aforementioned phone conversation with Ms. Hope, Ms. Hope stated that she was not aware of any other federally listed threatened and/or endangered species that had been discovered on or near the site that had not yet been entered into the South Carolina Heritage Trust Database.

As a result of the most recent coordination detailed in this letter regarding potential threatened and/or endangered species, it is the opinion of NEI that there has been no significant change to the onsite habitat types nor is there any new information that would void the original conclusion of the May 2008 report and warrant further surveys or coordination. Therefore, NEI reaffirms its conclusions of May 2008.

Should significant time (i.e. the passing of annual breeding or migratory seasons) lapse between the issuance of this letter and development of the property or any other type of legal reliance, it is strongly recommended that an update be completed. Also, any potential findings at a later date should be fully investigated.

Please do not hesitate to contact me with any questions you may have regarding this project. At your request, a copy of this update has been sent to agents of USFWS and SCDNR.

Sincerely,



Ryan Clarey  
Newkirk Environmental, Inc.  
Charleston Office

Cc: Charlotte Hope, SCDNR  
Melissa Bimbi, USFWS

**Threatened and Endangered Species Assessment  
For Kiawah River Plantation  
Charleston County, South Carolina**

**May 2008**

Prepared by:

**Newkirk Environmental, Inc.**  
P.O. Box 746  
Mt. Pleasant, SC 29465

**Threatened and Endangered Species Assessment**  
**Kiawah River Plantation**  
**Charleston County, South Carolina**  
**May 2008**

---

## **1.0 INTRODUCTION:**

The following report details methodology and an assessment of survey results for a threatened and endangered species survey completed in April of 2008 at Kiawah River Plantation located on Johns Island adjacent to the Kiawah River at the terminus of Mullet Hall Road in Charleston County, South Carolina (See Figure 1). While the date of this report reflects a completion date of April 2008, the data and evaluations represented herein were collected and completed over the last several months beginning in the winter of 2007. Conclusions are based upon all of the collected data including assessments and coordination completed within the last 30 days. This endangered species survey was conducted to determine the occurrence of, or potential for, animal and plant species federally listed as endangered or threatened to exist within the referenced site. Completion of this survey was directed by and complies with current state and federal regulations including the Federal Endangered Species Act (16 U.S.C. 1531-1543), the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c), the Migratory Bird Treaty Act (16 U.S.C. 703-712) and the South Carolina Non-Game and Endangered Species Conservation Act (58-2384).

## **2.0 METHODOLOGY:**

The US Fish & Wildlife Service lists the following threatened and endangered species as occurring in or potentially occurring in Charleston County, South Carolina:

Common Name	Scientific Name	Federal Status
West Indian manatee*	<i>Trichechus manatus</i>	Federally Endangered
Bachman's warbler <sup>†*</sup>	<i>Vermivora bachmanii</i>	Federally Endangered
Wood stork	<i>Mycteria americana</i>	Federally Endangered
Red-cockaded woodpecker	<i>Picoides borealis</i>	Federally Endangered
Piping plover*	<i>Charadrius melodus</i>	Federally Threatened
Kemp's ridley sea turtle*	<i>Lepidochelys kimprii</i>	Federally Endangered
Leatherback sea turtle*	<i>Cermochelys coriacea</i>	Federally Endangered
Loggerhead sea turtle*	<i>Caretta caretta</i>	Federally Threatened
Green sea turtle*	<i>Chelonia mydas</i>	Federally Threatened
Flatwoods salamander	<i>Ambystoma cingulatum</i>	Federally Threatened





## Kiawah River Plantation Charleston County, South Carolina

Figure 1:  
Location Map

Project #: 01-2535c  
Date: 5/2007  
Scale: NTS





Kiawah River Plantation  
Charleston County, South Carolina

Figure 2:  
Nest Locations

Project #: 01-2535c  
Date: 5/2007  
Scale: NTS



Shortnose sturgeon*	<i>Acipenser brevirostrum</i>	Federally Endangered
Sea-beach amaranth *	<i>Amaranthus pumilus</i>	Federally Threatened
Canby's dropwort	<i>Oxypolis canbyi</i>	Federally Endangered
Pondberry	<i>Lindera melissifolia</i>	Federally Endangered
American chaffseed	<i>Schwalbea Americana</i>	Federally Endangered
Bald Eagle **	<i>Haliaeetus leucocephalus</i>	Protected

† Last recorded occurrence in 1988. Believed to be extinct.

\*\* Protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c) and the Migratory Bird Treaty Act (16 U.S.C. 703-712).

Existing data from the South Carolina Department of Natural Resources (DNR) was reviewed to locate recorded occurrences of threatened and endangered species within or near the subject site. Some of the species listed as potentially occurring in Charleston County were eliminated from the survey based upon broad habitat requirements; these species has been indicated with an asterisk. The remaining species were included in the assessment.

At the time of this report, SCDNR has documented the location of a bald eagle nest near the project boundary of the referenced site. This recorded occurrence was assigned number 10 of the Legareville Quad and appeared to be close to the project boundary based on the maps of DNR's Heritage Trust Database. However, during further coordination with Charlotte Hope of DNR through March 2008 and April 2008, Mrs. Hope confirmed that the recorded bald eagle number 10 is no longer considered an active bald eagle nest. Therefore, further coordination regarding this site was deemed unnecessary.

Two additional eagle nests that have been observed and are known to exist within the boundary of the site were documented during this survey (Figure 2). Both of these nests have been located using sub meter GPS and, at the request of the landowner, the coordinates were provided to both the USFWS and DNR in March 2008. Since that time, both DNR and USFWS have been on site to confirm the existence of the two eagle nests and to make recommendations in regards to any future plans for the property.

No other listed species are recorded within or near the site according to the Heritage Trust Database. However, as noted by DNR, their records are not assumed to be complete and they should not be assumed comprehensive; therefore, field surveys are necessary for more thorough evaluations. This report outlines the methodology and results of a preliminary survey for the listed species and further assessment of the occurrences of bald eagle nests within the project boundary of the site.

Field surveys to identify suitable habitat were initially conducted in the winter of 2007. Subsequent assessments have been conducted during coordination with the USFWS and DNR in regards to bald eagle locations. The most recent assessments have been completed within 30 days of this report. During the field surveys, plant communities and habitats were observed and noted to determine if they match habitat types where the listed species have the potential to occur. If potential habitat was identified on site, all species observed were, at a minimum, identified to the genus taxonomic level.

A survey for Red-Cockaded Woodpecker was conducted using the "Guidelines for the Preparation of Biological Assessments and Evaluation for the Red-Cockaded Woodpecker", V. Gary Henry. These guidelines include methods for identifying areas to survey as well as actual survey methods for determining the presence of the Red-Cockaded Woodpecker. The guidelines state that timber stands exhibiting any of the following criteria should be surveyed when making a determination for the occurrence of Red-Cockaded Woodpeckers. The criteria are:

- \* mixed pine hardwood stands over 60 years of age
- \* mixed pine and hardwood stands under 60 years of age that contain clumps of pine trees over 60 years of age
- \* stands containing pine saw timber, including stands thought to be less than 60 years of age but containing scattered or clumped trees over 60 years of age
- \* hardwood-pine over 60 years of age adjacent to pine and pine-hardwood over 30 years in age

### **3.0 HABITAT CLASSIFICATIONS:**

The following is a description and classification of major habitat/community types identified within the site. Also noted is an assessment of suitability for federally listed threatened and endangered species.

#### **3.1 Harwood Wetland Run**

The central most part of the site contains both USACE jurisdictional and non-jurisdictional hardwood wetland runs. The location of these wetlands has been



documented and surveyed through a comprehensive wetland delineation and verification of the delineation is currently pending. The southern most stand of this community type was very narrow, appeared to have been clear-cut in the past 15 to 20 years and is relatively dense with a rather low canopy. The soils were inundated in the upper twelve inches and there were obvious signs of hydrology including drainage patterns and water stained leaves. The dominant flora consisted of tallow tree (*Sapium sebiferum*), cotton wood (*Populus deltoids*), and wax myrtle (*Myrica cerifera*). The herbaceous stratum was a mix of patchy to dense cover consisting mostly of wetland grasses. To the north, are two stands of this habitat type that had not exhibited any type of recent timber harvest and contained a high tree canopy of species such as swamp chestnut oak (*Quercus michauxii*), black gum (*Nyssa sylvatica*), and red maple (*Acer rubrum*). There was little to no herbaceous species in these mature runs. This community type is not considered critical habitat for any of the federally listed species.

### **3.2 Maritime Forest**

A large portion of the upland acreage on site can be characterized as a maritime forest dominated by live oak (*Quercus virginiana*), palmetto trees (*Sabal palmetto*), loblolly pine (*Pinus taeda*), and red cedar (*Juniperus virginiana*). In some areas the midstory was relatively dense with saplings of the tree stratum as well as wax myrtle (*Myrica cerifera*) and groundsel tree (*Baccharis glomeruliflora*). Other areas of the on site maritime forest exhibited an open subcanopy with little to no herbaceous or shrub layer. This area is not considered critical habitat for any of the federally listed species.

The two known locations of bald eagle nests occur within large mature loblolly pines present within this habitat type near the transition from upland maritime forest to salt marsh flat. However, the presence of the nests are not directly attributed to the classification or condition of the habitat type, rather, they are ascribed to the presence of suitable trees near suitable foraging habitat.

### **3.3 Salt Marsh/Salt Flats**

The site is bordered to the south by the Kiawah River and its associated marshes and tidal creeks. This community is dominated by cord grass (*Spartina alterniflora*). The adjacent salt marsh does provide suitable foraging habitat for the bald eagles on-site and bald eagles have been observed foraging over the marshes during site assessments. In addition, this habitat type could also be utilized as foraging habitat for wood storks, although no wood storks were observed during the on-site field surveys. Due to the nature of protection afforded to saltwater habitats in the coastal counties of South

Carolina, it is the opinion of NEI that development of the tract will unlikely alter or negatively affect the use or potential use of this habitat by bald eagles or wood storks. This area is not considered critical habitat for any of the other federally listed species.

### **3.4 Fresh/Brackish Water Impoundments**

Historically, one of the main uses for the property was hunting waterfowl. As such, a large acreage of fresh and brackish water impoundments and associated dikes in the western portion of the property has been maintained and managed throughout the years for duck hunting. Like all duck impoundments, the amount of water in these areas is lowered and raised as needed by a series of water control structures including risers and traditional rice trunks. Most of the impoundments can be described as shallow, open water habitats with the occasional patches of soft rush (*Juncus effusus*) and needlegrass rush (*Juncus roemeranus*) in the shallower areas and around the edges of the dike system. The impoundments are potential foraging habitat for both bald eagles and woodstorks; however, this area is not considered critical habitat for these species and is no different than thousands of acres spread throughout the coasts of South Carolina and Georgia that could provide habitat. This area is not considered critical habitat for any of the other federally listed species.

### **3.5 Saltwater Impoundments**

There are a series of impoundments on the southeastern portion of the tract that are distinguishably separate from the fresh/brackish water impoundments due to a much higher salinity caused by significant saltwater intrusion into the system. These impoundments are also utilized for duck hunting and are for the most part open water habitats interspersed with patches of needlegrass rush in the shallower portions of the impoundments. Like the other impoundments, this area is not considered critical habitat for any of the listed species, however this area could be used as foraging habitat for both bald eagles and woodstorks.

### **3.6 Loblolly Pine Plantation**

Besides the aforementioned maritime forest, the remainder of the wooded portions of the tract are planted loblolly pine. These areas are managed for timber harvest and are subject to normal silvicultural practices including bedding, mechanical land clearing, and burning. The average age of the pine trees in this community is 15 to 25 years. The understory of this habitat is relatively dense and therefore it is the opinion of NEI that this habitat type does not offer suitable foraging or nesting habitat for the Red-Cockaded Woodpecker. This area is not considered critical habitat for any of the other federally

listed species.

### **3.7 Agricultural Fields**

Several active agricultural fields are located throughout Kiawah River Plantation. These fields are seasonally planted with crops attractive to game animals such as turkey, deer, and dove. These areas are not considered critical habitat for any of the federally listed species.

## **4.0 LISTED SPECIES AND ACKNOWLEDGED HABITATS:**

The following is a brief description of each listed species included in the survey, its recognized habitat and comments regarding survey results for that species.

- 4.1** The **Bald Eagle** is a very large raptor with a wingspread of nearly seven (7) feet. After being nearly extinct, the bald eagle has recovered to occupy territories in all of the lower 48 states except Vermont. The bald eagle is normally associated with coasts, rivers and lakes with adjacent suitable nesting habitat and is known to forage over the adjacent rivers and marshes. Nest sites include mature old-growth trees, snags, cliffs, and increasingly on human-made structures (USFWS).

DNR and USFWS have recently been made aware of two bald eagle nests within the project boundaries of Kiawah River Plantation. The surrounding vegetative communities are characterized as a densely stocked maritime forest adjacent to salt marsh and the associated flats of the nearby Kiawah River to the south of the nests. The existing vegetative community to the north, east, and west acts as a natural screen in respect to the visibility from the nest to any potential residential development referred to in the current National Bald Eagle Management Guidelines. While the exact flight patterns of the nesting birds are unknown, it is assumed that the majority of foraging and hunting is done over the adjacent marshes to the south and the impoundments to the west and north.

As stated, NEI located the nest trees using sub meter GPS and supplied the latitude and longitude coordinates to both DNR and USFWS. Nest 1, which is the eastern most nest, is located at 32° 37' 19.5" N and 80° 07' 34.6" W. The coordinates for Nest 2 are 32° 37' 33.8" N and 80° 06' 42.9" W. These coordinates have been provided to the project engineer and incorporated into preliminary development plans. As preliminary development plans have



progressed, NEI and representatives of the land owner, The Beach Company, have met several times with DNR and USFWS to coordinate and incorporate recommended setbacks to ensure that proposed development activities do not cause an adverse effect to this species. The "*National Bald Eagle Management Guidelines*" are included as (Appendix A).

- 4.2** The **Wood Stork** is a large wading bird characterized by its black featherless head and black and white markings. This species nests in colonies known as rookeries and roosts and feeds in flocks, often in association with other species of long-legged water birds. Wood storks utilize freshwater and estuarine wetlands for feeding, nesting and roosting. These sites are utilized for many years and are characterized by woody vegetation, primary cypress or swamp hummocks over open water (USFWS).

Only a few nesting sites (rookeries) are known in South Carolina, none of which are within or near the site. However, because this species covers vast areas during active foraging, it may occur over a broad region. Wood storks commonly feed throughout the estuarine marshes along the coast and are frequently observed in the surrounding areas during the summer months. Estuarine marshes and impoundments tend to be preferred foraging habitat, however, this species will also use open mature forested wetlands (USFWS). No wood storks were observed during field investigations and the hardwood wetland runs on site are not considered preferred habitat. It is possible that this species could utilize the adjacent tidal marshes or impoundments for foraging; however, these areas are not considered critical habitat for woodstorks and are not unlike thousands of acres of similar habitat found along the southeastern coast.

- 4.3** **Red-Cockaded Woodpeckers** are small birds requiring old growth pine forest for cavity excavation, foraging and nesting. The particular habitat associated with this species requires many years to develop and is fire dependant to maintain open mid-story conditions. Due to the lack of any mature pine stands near or within the tract, no suitable foraging or nesting habitat for the Red-Cockaded Woodpecker is present.

- 4.4** The **Flatwoods Salamander** requires open, mesic woodland of longleaf pine (*Pinus palustris*) and slash pine (*Pinus elliottii*) maintained by frequent fire. Pine flatwoods are typically flat, low-lying open woodlands that lie between the drier



sandhill community up slope and the wetlands down slope. Wiregrasses (*Aristida* spp.), especially *Aristida beyrichiana*, are often the dominate grasses in the herbaceous layer. Adult flatwoods salamanders move to their wetland breeding site during the rainy weather from October to December. The breeding sites are isolated pond cypress (*Taxodium ascendens*), swamp gum (*Nyssa biflora*), or slash pine dominated depressions that dry completely on a cyclic basis. These wetlands are generally shallow and relatively small and have a marsh-like appearance with sedges (*Carex* spp.) growing throughout; wiregrasses, panic grasses (*Panicum* spp.) and other herbaceous species concentrated in shallow water edges. A relatively open canopy is necessary to maintain the herbaceous species component that serves as cover for the flatwoods salamander larvae. The property has no freshwater wetlands that maintain the “open” conditions or adjacent pine forests necessary to support this species; therefore, there is no habitat on site that matches the acknowledged habitat for the flatwoods salamander.

- 4.5 Canby’s dropwort** is a medium sized shrub found in the coastal plain of South Carolina where it occupies pond savannahs, the shallow edges of cypress/pond pine sloughs and wet pine savannahs. These sites are characterized by open conditions with savannah like herbaceous layers and are almost always associated with a sandy loam or loam soil underlain with a clay layer. Additionally, these sites require that the groundwater regime remain stable and that the sites must be protected from adverse alterations such as ditching, dams, etc.

The white flower of this species is noted as occurring from May through August, although past surveys indicate blooming in this region occurs during late July-October. There are no habitats that match the acknowledged habitat for this species within the subject property.

- 4.6 Pondberry** is a small fragrant shrub also found in and around small depressional wetlands and sinks with a semi-open canopy. Surveys for this species and its habitat were completed in concert with the surveys for Canby’s dropwort. No occurrences of this species were noted during the surveys, and there are no habitats that match the acknowledged habitat for this species within the subject property.

- 4.7 Chaffseed** is an upland herbaceous species indigenous to open fire maintained

pine forest that also typically contain blackjack oak (*Quercus marilandica*) and goat's rue (*Tephrosia virginiana*) as dominants and indicator species. No occurrences of this species or indicator species were noted during the surveys nor was longleaf pine habitat identified.

## **5.0 CONCLUSION**

Comprehensive surveys and assessments of the project site have been completed to document and classify on-site habitat types and their suitability for listed federally threatened and endangered species. Field surveys have documented the presence of two bald eagle nests within the boundaries of the subject property. As a result, coordination with DNR and USFWS is on going in an attempt to establish guidance for activities near the active nests. Ultimately, it is anticipated that a Bald Eagle Management Plan will be developed based upon proposed plans and incorporated in forthcoming Federal wetlands permits.

The saltwater communities on site, as well as the impoundments, provide potential foraging habitat for woodstorks. However, as stated, these areas are not considered critical habitat for woodstorks and are not unlike thousands of acres of similar habitat found along the southeastern coast.

Although unlikely because of the habitat available on site, it should be noted that because of the transitory nature of some of the listed threatened and endangered plants and animals, it is possible that endangered species populations and locations may change over time. Therefore, any potential findings at a later date should be fully investigated. Should significant time lapse between the issuance of this report and development of the property or any other type of legal reliance, it is strongly recommended that an update of this report be completed. The definition of significant time is not absolute but would include passing of annual breeding or migratory seasons.

## **APPENDIX A**

### **Habitat Management Guidelines for the Bald Eagle in the Southeast Region**

**(Current Federal Guidelines)**

# **NATIONAL BALD EAGLE MANAGEMENT GUIDELINES**

**U.S. Fish and Wildlife Service**

**May 2007**



## TABLE OF CONTENTS

INTRODUCTION .....	1
LEGAL PROTECTIONS FOR THE BALD EAGLE .....	2
The Bald and Golden Eagle Protection Act.....	2
The Migratory Bird Treaty Act .....	3
State laws and regulations .....	3
Where do bald eagles nest? .....	4
When do bald eagles nest? .....	5
Chronology of typical reproductive activities of bald eagles in the United States.....	6
How many chicks do bald eagles raise? .....	7
What do bald eagles eat?.....	7
The impact of human activity on nesting bald eagles.....	7
The impact of human activity on foraging and roosting bald eagles .....	8
RECOMMENDATIONS FOR AVOIDING DISTURBANCE AT NEST SITES .....	9
Existing Uses .....	10
ACTIVITY-SPECIFIC GUIDELINES.....	10
Alternate nests.....	11
Temporary Impacts .....	11
RECOMMENDATIONS FOR AVOIDING DISTURBANCE AT FORAGING AREAS AND COMMUNAL ROOST SITES.....	14
ADDITIONAL RECOMMENDATIONS TO BENEFIT BALD EAGLES .....	15
CONTACTS .....	16
GLOSSARY.....	17
RELATED LITERATURE .....	19

## INTRODUCTION

The bald eagle (*Haliaeetus leucocephalus*) is protected by the Bald and Golden Eagle Protection Act (Eagle Act) and the Migratory Bird Treaty Act (MBTA). The MBTA and the Eagle Act protect bald eagles from a variety of harmful actions and impacts. The U.S. Fish and Wildlife Service (Service) developed these National Bald Eagle Management Guidelines to advise landowners, land managers, and others who share public and private lands with bald eagles when and under what circumstances the protective provisions of the Eagle Act may apply to their activities. A variety of human activities can potentially interfere with bald eagles, affecting their ability to forage, nest, roost, breed, or raise young. The Guidelines are intended to help people minimize such impacts to bald eagles, particularly where they may constitute "disturbance," which is prohibited by the Eagle Act.

The Guidelines are intended to:

- (1) Publicize the provisions of the Eagle Act that continue to protect bald eagles, in order to reduce the possibility that people will violate the law,
- (2) Advise landowners, land managers and the general public of the potential for various human activities to disturb bald eagles, and
- (3) Encourage additional nonbinding land management practices that benefit bald eagles (see Additional Recommendations section).

While the Guidelines include general recommendations for land management practices that will benefit bald eagles, the document is intended primarily as a tool for landowners and planners who seek information and recommendations regarding how to avoid disturbing bald eagles. Many States and some tribal entities have developed state-specific management plans, regulations, and/or guidance for landowners and land managers to protect and enhance bald eagle habitat, and we encourage the continued development and use of these planning tools to benefit bald eagles.

Adherence to the Guidelines herein will benefit individuals, agencies, organizations, and companies by helping them avoid violations of the law. However, the Guidelines themselves are not law. Rather, they are recommendations based on several decades of behavioral observations, science, and conservation measures to avoid or minimize adverse impacts to bald eagles.

The U.S. Fish and Wildlife Service strongly encourages adherence to these guidelines to ensure that bald and golden eagle populations will continue to be sustained. The Service realizes there may be impacts to some birds even if all reasonable measures are taken to avoid such impacts. Although it is not possible to absolve individuals and entities from liability under the Eagle Act or the MBTA, the Service exercises enforcement discretion to focus on those individuals, companies, or agencies that take migratory birds without regard for the consequences of their actions and the law, especially when conservation measures, such as these Guidelines, are available, but have not been implemented. The Service will prioritize its enforcement efforts to focus on those individuals or entities who take bald eagles or their parts, eggs, or nests without implementing appropriate measures recommended by the Guidelines.

The Service intends to pursue the development of regulations that would authorize, under limited circumstances, the use of permits if "take" of an eagle is anticipated but unavoidable. Additionally, if the bald eagle is delisted, the Service intends to provide a regulatory mechanism to honor existing (take) authorizations under the Endangered Species Act (ESA).

During the interim period until the Service completes a rulemaking for permits under the Eagle Act, the Service does not intend to refer for prosecution the incidental "take" of any bald eagle under the MBTA or Eagle Act, if such take is in full compliance with the terms and conditions of an incidental take statement issued to the action agency or applicant under the authority of section 7(b)(4) of the ESA or a permit issued under the authority of section 10(a)(1)(B) of the ESA.

The Guidelines are applicable throughout the United States, including Alaska. The primary purpose of these Guidelines is to provide information that will minimize or prevent violations only of *Federal* laws governing bald eagles. In addition to Federal laws, many states and some smaller jurisdictions and tribes have additional laws and regulations protecting bald eagles. In some cases those laws and regulations may be more protective (restrictive) than these Federal guidelines. If you are planning activities that may affect bald eagles, we therefore recommend that you contact both your nearest U.S. Fish and Wildlife Service Field Office (see the contact information on p.16) and your state wildlife agency for assistance.

## LEGAL PROTECTIONS FOR THE BALD EAGLE

### **The Bald and Golden Eagle Protection Act**

The Eagle Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal and civil penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." "Disturb" means:

"Disturb means to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior."

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.



A violation of the Act can result in a criminal fine of \$100,000 (\$200,000 for organizations), imprisonment for one year, or both, for a first offense. Penalties increase substantially for additional offenses, and a second violation of this Act is a felony.

**The Migratory Bird Treaty Act**

The MBTA (16 U.S.C. 703-712), prohibits the taking of any migratory bird or any part, nest, or egg, except as permitted by regulation. The MBTA was enacted in 1918; a 1972 agreement supplementing one of the bilateral treaties underlying the MBTA had the effect of expanding the scope of the Act to cover bald eagles and other raptors. Implementing regulations define "take" under the MBTA as "pursue, hunt, shoot, wound, kill, trap, capture, possess, or collect."

Copies of the Eagle Act and the MBTA are available at: <http://permits.fws.gov/ltr/ltr.shtml>.

**State laws and regulations**

Most states have their own regulations and/or guidelines for bald eagle management. Some states may continue to list the bald eagle as endangered, threatened, or of special concern. If you plan activities that may affect bald eagles, we urge you to familiarize yourself with the regulations and/or guidelines that apply to bald eagles in your state. Your adherence to the Guidelines herein does not ensure that you are in compliance with state laws and regulations because state regulations can be more specific and/or restrictive than these Guidelines.

**NATURAL HISTORY OF THE BALD EAGLE**

Bald eagles are a North American species that historically occurred throughout the contiguous United States and Alaska. After severely declining in the lower 48 States between the 1870s and the 1970s, bald eagles have rebounded and re-established breeding territories in each of the lower 48 states. The largest North American breeding populations are in Alaska and Canada, but there are also significant bald eagle populations in Florida, the Pacific Northwest, the Greater Yellowstone area, the Great Lakes states, and the Chesapeake Bay region. Bald eagle distribution varies seasonally. Bald eagles that nest in southern latitudes frequently move northward in late spring and early summer, often summering as far north as Canada. Most eagles that breed at northern latitudes migrate southward during winter, or to coastal areas where waters remain unfrozen. Migrants frequently concentrate in large numbers at sites where food is abundant and they often roost together communally. In some cases, concentration areas are used year-round: in summer by southern eagles and in winter by northern eagles.

Juvenile bald eagles have mottled brown and white plumage, gradually acquiring their dark brown body and distinctive white head and tail as they mature. Bald eagles generally attain adult plumage by 5 years of age. Most are capable of breeding at 4 or 5 years of age, but in healthy populations they may not start breeding until much older. Bald eagles may live 15 to 25 years in the wild. Adults weigh 8 to 14 pounds (occasionally reaching 16 pounds in Alaska) and have wingspans of 5 to 8 feet. Those in the northern range are larger than those in the south, and females are larger than males.



**Where do bald eagles nest?**

Breeding bald eagles occupy "territories," areas they will typically defend against intrusion by other eagles. In addition to the active nest, a territory may include one or more alternate nests (nests built or maintained by the eagles but not used for nesting in a given year). The Eagle Act prohibits removal or destruction of both active and alternate bald eagle nests. Bald eagles exhibit high nest site fidelity and nesting territories are often used year after year. Some territories are known to have been used continually for over half a century.

Bald eagles generally nest near coastlines, rivers, large lakes or streams that support an adequate food supply. They often nest in mature or old-growth trees; snags (dead trees); cliffs; rock promontories; rarely on the ground; and with increasing frequency on human-made structures such as power poles and communication towers. In forested areas, bald eagles often select the tallest trees with limbs strong enough to support a nest that can weigh more than 1,000 pounds. Nest sites typically include at least one perch with a clear view of the water where the eagles usually forage. Shoreline trees or snags located in reservoirs provide the visibility and accessibility needed to locate aquatic prey. Eagle nests are constructed with large sticks, and may be lined with moss, grass, plant stalks, lichens, seaweed, or sod. Nests are usually about 4-6 feet in diameter and 3 feet deep, although larger nests exist.



Copyright *Birds of North America*, 2000

The range of breeding bald eagles in 2000 (shaded areas). This map shows only the larger concentrations of nests; eagles have continued to expand into additional nesting territories in many states. The dotted line represents the bald eagle's wintering range.

**When do bald eagles nest?**

Nesting activity begins several months before egg-laying. Egg-laying dates vary throughout the U.S., ranging from October in Florida, to late April or even early May in the northern United States. Incubation typically lasts 33-35 days, but can be as long as 40 days. Eaglets make their first unsteady flights about 10 to 12 weeks after hatching, and fledge (leave their nests) within a few days after that first flight. However, young birds usually remain in the vicinity of the nest for several weeks after fledging because they are almost completely dependent on their parents for food until they disperse from the nesting territory approximately 6 weeks later.

The bald eagle breeding season tends to be longer in the southern U.S., and re-nesting following an unsuccessful first nesting attempt is more common there as well. The following table shows the timing of bald eagle breeding seasons in different regions of the country. The table represents the range of time within which the majority of nesting activities occur in each region and does not apply to any specific nesting pair. Because the timing of nesting activities may vary within a given region, you should contact the nearest U.S. Fish and Wildlife Service Field Office (see page 16) and/or your state wildlife conservation agency for more specific information on nesting chronology in your area.



## Chronology of typical reproductive activities of bald eagles in the United States.

Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.
SOUTHEASTERN U.S. (FL, GA, SC, NC, AL, MS, LA, TN, KY, AR, eastern 2 of TX)											
Nest Building											
Egg Laying/Incubation											
Hatching/Rearing Young											
Fledging Young											
CHESAPEAKE BAY REGION (NC, VA, MD, DE, southern 2 of NJ, eastern 2 of PA, panhandle of WV)											
Nest Building											
Egg Laying/Incubation											
Hatching/Rearing Young											
Fledging Young											
NORTHERN U.S. (ME, NH, MA, RI, CT, NY, northern 2 of NJ, western 2 of PA, OH, WV exc. panhandle, IN, IL, MI, WI, MN, IA, MO, ND, SD, NB, KS, CO, UT)											
Nest Building											
Egg Laying/Incubation											
Hatching/Rearing Young											
Fledging Young											
PACIFIC REGION (WA, OR, CA, ID, MT, WY, NV)											
Nest Building											
Egg Laying/Incubation											
Hatching/Rearing Young											
Fledging Young											
SOUTHWESTERN U.S. (AZ, NM, OK panhandle, western 2 of TX)											
Nest Building											
Egg Laying/Incubation											
Hatching/Rearing Young											
Fledging Young											
ALASKA											
Nest Building											
Egg Laying/Incubation											
Hatching/Rearing Young											
Ing Young						Fledg-					
Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July	Aug.

**How many chicks do bald eagles raise?**

The number of eagle eggs laid will vary from 1-3, with 1-2 eggs being the most common. Only one eagle egg is laid per day, although not always on successive days. Hatching of young occurs on different days with the result that chicks in the same nest are sometimes of unequal size. The overall national fledging rate is approximately one chick per nest, annually, which results in a healthy expanding population.

**What do bald eagles eat?**

Bald eagles are opportunistic feeders. Fish comprise much of their diet, but they also eat waterfowl, shorebirds/colonial waterbirds, small mammals, turtles, and carrion. Because they are visual hunters, eagles typically locate their prey from a conspicuous perch, or soaring flight, then swoop down and strike. Wintering bald eagles often congregate in large numbers along streams to feed on spawning salmon or other fish species, and often gather in large numbers in areas below reservoirs, especially hydropower dams, where fish are abundant. Wintering eagles also take birds from rafts of ducks at reservoirs and rivers, and congregate on melting ice shelves to scavenge dead fish from the current or the soft melting ice. Bald eagles will also feed on carcasses along roads, in landfills, and at feedlots.

During the breeding season, adults carry prey to the nest to feed the young. Adults feed their chicks by tearing off pieces of food and holding them to the beaks of the eaglets. After fledging, immature eagles are slow to develop hunting skills, and must learn to locate reliable food sources and master feeding techniques. Young eagles will congregate together, often feeding upon easily acquired food such as carrion and fish found in abundance at the mouths of streams and shallow bays and at landfills.

**The impact of human activity on nesting bald eagles**

During the breeding season, bald eagles are sensitive to a variety of human activities. However, not all bald eagle pairs react to human activities in the same way. Some pairs nest successfully just dozens of yards from human activity, while others abandon nest sites in response to activities much farther away. This variability may be related to a number of factors, including visibility, duration, noise levels, extent of the area affected by the activity, prior experiences with humans, and tolerance of the individual nesting pair. The relative sensitivity of bald eagles during various stages of the breeding season is outlined in the following table.



**Nesting Bald Eagle Sensitivity to Human Activities**

Phase	Activity	Sensitivity to Human Activity	Comments
I	Courtship and Nest Building	Most sensitive period; likely to respond negatively	Most critical time period. Disturbance is manifested in nest abandonment. Bald eagles in newly established territories are more prone to abandon nest sites.
II	Egg laying	Very sensitive period	Human activity of even limited duration may cause nest desertion and abandonment of territory for the breeding season.
III	Incubation and early nestling period (up to 4 weeks)	Very sensitive period	Adults are less likely to abandon the nest near and after hatching. However, flushed adults leave eggs and young unattended; eggs are susceptible to cooling, loss of moisture, overheating, and predation; young are vulnerable to elements.
IV	Nestling period, 4 to 8 weeks	Moderately sensitive period	Likelihood of nest abandonment and vulnerability of the nestlings to elements somewhat decreases. However, nestlings may miss feedings, affecting their survival.
V	Nestlings 8 weeks through fledging	Very sensitive period	Gaining flight capability, nestlings 8 weeks and older may flush from the nest prematurely due to disruption and die.

If agitated by human activities, eagles may inadequately construct or repair their nest, may expend energy defending the nest rather than tending to their young, or may abandon the nest altogether. Activities that cause prolonged absences of adults from their nests can jeopardize eggs or young. Depending on weather conditions, eggs may overheat or cool too much and fail to hatch. Unattended eggs and nestlings are subject to predation. Young nestlings are particularly vulnerable because they rely on their parents to provide warmth or shade, without which they may die as a result of hypothermia or heat stress. If food delivery schedules are interrupted, the young may not develop healthy plumage, which can affect their survival. In addition, adults startled while incubating or brooding young may damage eggs or injure their young as they abruptly leave the nest. Older nestlings no longer require constant attention from the adults, but they may be startled by loud or intrusive human activities and prematurely jump from the nest before they are able to fly or care for themselves. Once fledged, juveniles range up to ¼ mile from the nest site, often to a site with minimal human activity. During this period, until about six weeks after departure from the nest, the juveniles still depend on the adults to feed them.

**The impact of human activity on foraging and roosting bald eagles**

Disruption, destruction, or obstruction of roosting and foraging areas can also negatively affect bald eagles. Disruptive activities in or near eagle foraging areas can interfere with feeding, reducing chances of survival. Interference with feeding can also result in reduced productivity (number of young successfully fledged). Migrating and wintering bald eagles often congregate at specific sites for purposes of feeding and sheltering. Bald eagles rely on established roost sites because of their proximity to sufficient food sources. Roost sites are usually in mature trees where the eagles are somewhat sheltered from the wind and weather. Human activities near or within communal roost sites may prevent eagles

from feeding or taking shelter, especially if there are not other undisturbed and productive feeding and roosting sites available. Activities that permanently alter communal roost sites and important foraging areas can altogether eliminate the elements that are essential for feeding and sheltering eagles.

Where a human activity agitates or bothers roosting or foraging bald eagles to the degree that causes injury or substantially interferes with breeding, feeding, or sheltering behavior and causes, or is likely to cause, a loss of productivity or nest abandonment, the conduct of the activity constitutes a violation of the Eagle Act's prohibition against disturbing eagles. The circumstances that might result in such an outcome are difficult to predict without detailed site-specific information. If your activities may disturb roosting or foraging bald eagles, you should contact your local Fish and Wildlife Service Field Office (see page 16) for advice and recommendations for how to avoid such disturbance.

### **RECOMMENDATIONS FOR AVOIDING DISTURBANCE AT NEST SITES**

In developing these Guidelines, we relied on existing state and regional bald eagle guidelines, scientific literature on bald eagle disturbance, and recommendations of state and Federal biologists who monitor the impacts of human activity on eagles. Despite these resources, uncertainties remain regarding the effects of many activities on eagles and how eagles in different situations may or may not respond to certain human activities. The Service recognizes this uncertainty and views the collection of better biological data on the response of eagles to disturbance as a high priority. To the extent that resources allow, the Service will continue to collect data on responses of bald eagles to human activities conducted according to the recommendations within these Guidelines to ensure that adequate protection from disturbance is being afforded, and to identify circumstances where the Guidelines might be modified. These data will be used to make future adjustments to the Guidelines.

To avoid disturbing nesting bald eagles, we recommend (1) keeping a distance between the activity and the nest (distance buffers), (2) maintaining preferably forested (or natural) areas between the activity and around nest trees (landscape buffers), and (3) avoiding certain activities during the breeding season. The buffer areas serve to minimize visual and auditory impacts associated with human activities near nest sites. Ideally, buffers would be large enough to protect existing nest trees and provide for alternative or replacement nest trees.

The size and shape of effective buffers vary depending on the topography and other ecological characteristics surrounding the nest site. In open areas where there are little or no forested or topographical buffers, such as in many western states, distance alone must serve as the buffer. Consequently, in open areas, the distance between the activity and the nest may need to be larger than the distances recommended under Categories A and B of these guidelines (pg. 12) if no landscape buffers are present. The height of the nest above the ground may also ameliorate effects of human activities; eagles at higher nests may be less prone to disturbance.

In addition to the physical features of the landscape and nest site, the appropriate size for the distance buffer may vary according to the historical tolerances of eagles to human activities in particular localities, and may also depend on the location of the nest in relation



to feeding and roosting areas used by the eagles. Increased competition for nest sites may lead bald eagles to nest closer to human activity (and other eagles).

Seasonal restrictions can prevent the potential impacts of many shorter-term, obtrusive activities that do not entail landscape alterations (e.g. fireworks, outdoor concerts). In proximity to the nest, these kinds of activities should be conducted only outside the breeding season. For activities that entail both short-term, obtrusive characteristics and more permanent impacts (e.g., building construction), we recommend a combination of both approaches: retaining a landscape buffer *and* observing seasonal restrictions.

For assistance in determining the appropriate size and configuration of buffers or the timing of activities in the vicinity of a bald eagle nest, we encourage you to contact the nearest U.S. Fish and Wildlife Service Field Office (see page 16).

### Existing Uses

Eagles are unlikely to be disturbed by routine use of roads, homes, and other facilities where such use pre-dates the eagles' successful nesting activity in a given area. Therefore, in most cases *ongoing* existing uses may proceed with the same intensity with little risk of disturbing bald eagles. However, some *intermittent, occasional, or irregular* uses that pre-date eagle nesting in an area may disturb bald eagles. For example: a pair of eagles may begin nesting in an area and subsequently be disturbed by activities associated with an annual outdoor flea market, even though the flea market has been held annually at the same location. In such situations, human activity should be adjusted or relocated to minimize potential impacts on the nesting pair.

## ACTIVITY-SPECIFIC GUIDELINES

The following section provides the Service's management recommendations for avoiding bald eagle disturbance as a result of new or intermittent activities proposed in the vicinity of bald eagle nests. Activities are separated into 8 categories (A – H) based on the nature and magnitude of impacts to bald eagles that usually result from the type of activity. Activities with similar or comparable impacts are grouped together.

In most cases, impacts will vary based on the visibility of the activity from the eagle nest and the degree to which similar activities are already occurring in proximity to the nest site. Visibility is a factor because, in general, eagles are more prone to disturbance when an activity occurs in full view. For this reason, we recommend that people locate activities farther from the nest structure in areas with open vistas, in contrast to areas where the view is shielded by rolling topography, trees, or other screening factors. The recommendations also take into account the existence of similar activities in the area because the continued presence of nesting bald eagles in the vicinity of the existing activities indicates that the eagles in that area can tolerate a greater degree of human activity than we can generally expect from eagles in areas that experience fewer human impacts. To illustrate how these factors affect the likelihood of disturbing eagles, we have incorporated the recommendations for some activities into a table (categories A and B).

First, determine which category your activity falls into (between categories A – H). If the activity you plan to undertake is not specifically addressed in these guidelines, follow the recommendations for the most similar activity represented.

If your activity is under A or B, our recommendations are in table form. The vertical axis shows the degree of visibility of the activity from the nest. The horizontal axis (header row) represents the degree to which similar activities are ongoing in the vicinity of the nest. Locate the row that best describes how visible your activity will be from the eagle nest. Then, choose the column that best describes the degree to which similar activities are ongoing in the vicinity of the eagle nest. The box where the column and row come together contains our management recommendations for how far you should locate your activity from the nest to avoid disturbing the eagles. The numerical distances shown in the tables are the closest the activity should be conducted relative to the nest. In some cases we have included additional recommendations (other than recommended *distance* from the nest) you should follow to help ensure that your activity will not disturb the eagles.

### **Alternate nests**

For activities that entail permanent landscape alterations that may result in bald eagle disturbance, these recommendations apply to both active and alternate bald eagle nests. Disturbance becomes an issue with regard to alternate nests if eagles return for breeding purposes and react to land use changes that occurred while the nest was inactive. The likelihood that an alternate nest will again become active decreases the longer it goes unused. If you plan activities in the vicinity of an alternate bald eagle nest and have information to show that the nest has not been active during the preceding 5 breeding seasons, the recommendations provided in these guidelines for avoiding disturbance around the nest site may no longer be warranted. The nest itself remains protected by other provisions of the Eagle Act, however, and may not be destroyed.

If special circumstances exist that make it unlikely an inactive nest will be reused before 5 years of disuse have passed, and you believe that the probability of reuse is low enough to warrant disregarding the recommendations for avoiding disturbance, you should be prepared to provide all the reasons for your conclusion, including information regarding past use of the nest site. Without sufficient documentation, you should continue to follow these guidelines when conducting activities around the nest site. If we are able to determine that it is unlikely the nest will be reused, we may advise you that the recommendations provided in these guidelines for avoiding disturbance are no longer necessary around that nest site.

This guidance is intended to minimize disturbance, as defined by Federal regulation. In addition to Federal laws, most states and some tribes and smaller jurisdictions have additional laws and regulations protecting bald eagles. In some cases those laws and regulations may be more protective (restrictive) than these Federal guidelines.

### **Temporary Impacts**

For activities that have temporary impacts, such as the use of loud machinery, fireworks displays, or summer boating activities, we recommend seasonal restrictions. These types of activities can generally be carried out outside of the breeding season without causing disturbance. The recommended restrictions for these types of activities can be lifted for alternate nests within a particular territory, including nests that were attended during the current breeding season but not used to raise young, after eggs laid in another nest within the territory have hatched (depending on the distance between the alternate nest and the active nest).



In general, activities should be kept as far away from nest trees as possible; loud and disruptive activities should be conducted when eagles are not nesting; and activity between the nest and the nearest foraging area should be minimized. If the activity you plan to undertake is not specifically addressed in these guidelines, follow the recommendations for the most similar activity addressed, or contact your local U.S. Fish and Wildlife Service Field Office for additional guidance.

If you believe that special circumstances apply to your situation that increase or diminish the likelihood of bald eagle disturbance, or if it is not possible to adhere to the guidelines, you should contact your local Service Field Office for further guidance.

#### **Category A:**

Building construction, 1 or 2 story, with project footprint of ½ acre or less.  
Construction of roads, trails, canals, power lines, and other linear utilities.  
Agriculture and aquaculture – new or expanded operations.  
Alteration of shorelines or wetlands.  
Installation of docks or moorings.  
Water impoundment.

#### **Category B:**

Building construction, 3 or more stories.  
Building construction, 1 or 2 story, with project footprint of more than ½ acre.  
Installation or expansion of marinas with a capacity of 6 or more boats.  
Mining and associated activities.  
Oil and natural gas drilling and refining and associated activities.

	<i><b>If there is no similar activity within 1 mile of the nest</b></i>	<i><b>If there is similar activity closer than 1 mile from the nest</b></i>
<i><b>If the activity will be visible from the nest</b></i>	660 feet. Landscape buffers are recommended.	660 feet, or as close as existing tolerated activity of similar scope. Landscape buffers are recommended.
<i><b>If the activity will not be visible from the nest</b></i>	Category A: 330 feet. Clearing, external construction, and landscaping between 330 feet and 660 feet should be done outside breeding season.  Category B: 660 feet.	330 feet, or as close as existing tolerated activity of similar scope. Clearing, external construction and landscaping within 660 feet should be done outside breeding season.

The numerical distances shown in the table are the closest the activity should be conducted relative to the nest.

**Category C. Timber Operations and Forestry Practices**

- Avoid clear cutting or removal of overstory trees within 330 feet of the nest at any time.
- Avoid timber harvesting operations, including road construction and chain saw and yarding operations, during the breeding season within 660 feet of the nest. The distance may be decreased to 330 feet around alternate nests within a particular territory, including nests that were attended during the current breeding season but not used to raise young, after eggs laid in another nest within the territory have hatched.
- Selective thinning and other silviculture management practices designed to conserve or enhance habitat, including prescribed burning close to the nest tree, should be undertaken outside the breeding season. Precautions such as raking leaves and woody debris from around the nest tree should be taken to prevent crown fire or fire climbing the nest tree. If it is determined that a burn during the breeding season would be beneficial, then, to ensure that no take or disturbance will occur, these activities should be conducted only when neither adult eagles nor young are present at the nest tree (i.e., at the beginning of, or end of, the breeding season, either before the particular nest is active or after the young have fledged from that nest). Appropriate Federal and state biologists should be consulted before any prescribed burning is conducted during the breeding season.
- Avoid construction of log transfer facilities and in-water log storage areas within 330 feet of the nest.

**Category D. Off-road vehicle use** (including snowmobiles). No buffer is necessary around nest sites outside the breeding season. During the breeding season, do not operate off-road vehicles within 330 feet of the nest. In open areas, where there is increased visibility and exposure to noise, this distance should be extended to 660 feet.

**Category E. Motorized Watercraft use** (including jet skis/personal watercraft). No buffer is necessary around nest sites outside the breeding season. During the breeding season, within 330 feet of the nest, (1) do not operate jet skis (personal watercraft), and (2) avoid concentrations of noisy vessels (e.g., commercial fishing boats and tour boats), except where eagles have demonstrated tolerance for such activity. Other motorized boat traffic passing within 330 feet of the nest should attempt to minimize trips and avoid stopping in the area where feasible, particularly where eagles are unaccustomed to boat traffic. Buffers for airboats should be larger than 330 feet due to the increased noise they generate, combined with their speed, maneuverability, and visibility.

**Category F. Non-motorized recreation and human entry** (e.g., hiking, camping, fishing, hunting, birdwatching, kayaking, canoeing). No buffer is necessary around nest sites outside the breeding season. If the activity will be visible or highly audible from the nest, maintain a 330-foot buffer during the breeding season, particularly where eagles are unaccustomed to such activity.

**Category G. Helicopters and fixed-wing aircraft.**

Except for authorized biologists trained in survey techniques, avoid operating aircraft within 1,000 feet of the nest during the breeding season, except where eagles have demonstrated tolerance for such activity.

**Category H. Blasting and other loud, intermittent noises.**

Avoid blasting and other activities that produce extremely loud noises within 1/2 mile of active nests, unless greater tolerance to the activity (or similar activity) has been demonstrated by the eagles in the nesting area. This recommendation applies to the use of fireworks classified by the Federal Department of Transportation as Class B explosives, which includes the larger fireworks that are intended for licensed public display.

**RECOMMENDATIONS FOR AVOIDING DISTURBANCE AT FORAGING AREAS AND COMMUNAL ROOST SITES**

1. Minimize potentially disruptive activities and development in the eagles' direct flight path between their nest and roost sites and important foraging areas.
2. Locate long-term and permanent water-dependent facilities, such as boat ramps and marinas, away from important eagle foraging areas.
3. Avoid recreational and commercial boating and fishing near critical eagle foraging areas during peak feeding times (usually early to mid-morning and late afternoon), except where eagles have demonstrated tolerance to such activity.
4. Do not use explosives within 1/2 mile (or within 1 mile in open areas) of communal roosts when eagles are congregating, without prior coordination with the U.S. Fish and Wildlife Service and your state wildlife agency.
5. Locate aircraft corridors no closer than 1,000 feet vertical or horizontal distance from communal roost sites.



### **ADDITIONAL RECOMMENDATIONS TO BENEFIT BALD EAGLES**

The following are additional management practices that landowners and planners can exercise for added benefit to bald eagles.

1. Protect and preserve potential roost and nest sites by retaining mature trees and old growth stands, particularly within ½ mile from water.
2. Where nests are blown from trees during storms or are otherwise destroyed by the elements, continue to protect the site in the absence of the nest for up to three (3) complete breeding seasons. Many eagles will rebuild the nest and reoccupy the site.
3. To avoid collisions, site wind turbines, communication towers, and high voltage transmission power lines away from nests, foraging areas, and communal roost sites.
4. Employ industry-accepted best management practices to prevent birds from colliding with or being electrocuted by utility lines, towers, and poles. If possible, bury utility lines in important eagle areas.
5. Where bald eagles are likely to nest in human-made structures (e.g., cell phone towers) and such use could impede operation or maintenance of the structures or jeopardize the safety of the eagles, equip the structures with either (1) devices engineered to discourage bald eagles from building nests, or (2) nesting platforms that will safely accommodate bald eagle nests without interfering with structure performance.
6. Immediately cover carcasses of euthanized animals at landfills to protect eagles from being poisoned.
7. Do not intentionally feed bald eagles. Artificially feeding bald eagles can disrupt their essential behavioral patterns and put them at increased risk from power lines, collision with windows and cars, and other mortality factors.
8. Use pesticides, herbicides, fertilizers, and other chemicals only in accordance with Federal and state laws.
9. Monitor and minimize dispersal of contaminants associated with hazardous waste sites (legal or illegal), permitted releases, and runoff from agricultural areas, especially within watersheds where eagles have shown poor reproduction or where bioaccumulating contaminants have been documented. These factors present a risk of contamination to eagles and their food sources.



## CONTACTS

The following U.S. Fish and Wildlife Service Field Offices provide technical assistance on bald eagle management:

<u>Alabama</u>	Daphne	(251) 441-5181	<u>New Hampshire</u>	Concord	(603) 223-2541
<u>Alaska</u>	Anchorage	(907) 271-2888	<u>New Jersey</u>	Pleasantville	(609) 646-9310
	Fairbanks	(907) 456-0203	<u>New Mexico</u>	Albuquerque	(505) 346-2525
	Juneau	(907) 780-1160	<u>New York</u>	Cortland	(607) 753-9334
<u>Arizona</u>	Phoenix	(602) 242-0210		Long Island	(631) 776-1401
<u>Arkansas</u>	Conway	(501) 513-4470	<u>North Carolina</u>	Raleigh	(919) 856-4520
<u>California</u>	Arcata	(707) 822-7201		Asheville	(828) 258-3939
	Barstow	(760) 255-8852	<u>North Dakota</u>	Bismarck	(701) 250-4481
	Carlsbad	(760) 431-9440	<u>Ohio</u>	Reynoldsburg	(614) 469-6923
	Red Bluff	(530) 527-3043	<u>Oklahoma</u>	Tulsa	(918) 581-7458
	Sacramento	(916) 414-6000	<u>Oregon</u>	Bend	(541) 383-7146
	Stockton	(209) 946-6400		Klamath Falls	(541) 885-8481
	Ventura	(805) 644-1766		La Grande	(541) 962-8584
	Yreka	(530) 842-5763		Newport	(541) 867-4558
<u>Colorado</u>	Lakewood	(303) 275-2370		Portland	(503) 231-6179
	Grand Junction	(970) 243-2778		Roseburg	(541) 957-3474
<u>Connecticut</u>	(See New Hampshire)		<u>Pennsylvania</u>	State College	(814) 234-4090
<u>Delaware</u>	(See Maryland)		<u>Rhode Island</u>	(See New Hampshire)	
<u>Florida</u>	Panama City	(850) 769-0552	<u>South Carolina</u>	Charleston	(843) 727-4707
	Vero Beach	(772) 562-3909	<u>South Dakota</u>	Pierre	(605) 224-8693
	Jacksonville	(904) 232-2580	<u>Tennessee</u>	Cookeville	(931) 528-6481
<u>Georgia</u>	Athens	(706) 613-9493	<u>Texas</u>	Clear Lake	(281) 286-8282
	Brunswick	(912) 265-9336	<u>Utah</u>	West Valley City	(801) 975-3330
	Columbus	(706) 544-6428	<u>Vermont</u>	(See New Hampshire)	
<u>Idaho</u>	Boise	(208) 378-5243	<u>Virginia</u>	Gloucester	(804) 693-6694
	Chubbuck	(208) 237-6975	<u>Washington</u>	Lacey	(306) 753-9440
<u>Illinois/Iowa</u>	Rock Island	(309) 757-5800		Spokane	(509) 891-6839
<u>Indiana</u>	Bloomington	(812) 334-4261		Wenatchee	(509) 665-3508
<u>Kansas</u>	Manhattan	(785) 539-3474	<u>West Virginia</u>	Elkins	(304) 636-6586
<u>Kentucky</u>	Frankfort	(502) 695-0468	<u>Wisconsin</u>	New Franken	(920) 866-1725
<u>Louisiana</u>	Lafayette	(337) 291-3100	<u>Wyoming</u>	Cheyenne	(307) 772-2374
<u>Maine</u>	Old Town	(207) 827-5938		Cody	(307) 578-5939
<u>Maryland</u>	Annapolis	(410) 573-4573			
<u>Massachusetts</u>	(See New Hampshire)				
<u>Michigan</u>	East Lansing	(517) 351-2555			
<u>Minnesota</u>	Bloomington	(612) 725-3548			
<u>Mississippi</u>	Jackson	(601) 965-4900			
<u>Missouri</u>	Columbia	(573) 234-2132			
<u>Montana</u>	Helena	(405) 449-5225			
<u>Nebraska</u>	Grand Island	(308) 382-6468			
<u>Nevada</u>	Las Vegas	(702) 515-5230			
	Reno	(775) 861-6300			

### National Office

U.S. Fish and Wildlife Service  
Division of Migratory Bird Management  
4401 North Fairfax Drive, MBSP-4107  
Arlington, VA 22203-1610  
(703) 358-1714  
<http://www.fws.gov/migratorybirds>

### State Agencies

To contact a state wildlife agency, visit the Association of Fish & Wildlife Agencies' website at [http://www.fishwildlife.org/where\\_us.html](http://www.fishwildlife.org/where_us.html)

## GLOSSARY

The definitions below apply to these National Bald Eagle Management Guidelines:

**Communal roost sites** – Areas where bald eagles gather and perch overnight – and sometimes during the day in the event of inclement weather. Communal roost sites are usually in large trees (live or dead) that are relatively sheltered from wind and are generally in close proximity to foraging areas. These roosts may also serve a social purpose for pair bond formation and communication among eagles. Many roost sites are used year after year.

**Disturb** – To agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, 1) injury to an eagle, 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.

In addition to immediate impacts, this definition also covers impacts that result from human-caused alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes, or is likely to cause, a loss of productivity or nest abandonment.

**Fledge** – To leave the nest and begin flying. For bald eagles, this normally occurs at 10-12 weeks of age.

**Fledgling** – A juvenile bald eagle that has taken the first flight from the nest but is not yet independent.

**Foraging area** – An area where eagles feed, typically near open water such as rivers, lakes, reservoirs, and bays where fish and waterfowl are abundant, or in areas with little or no water (i.e., rangelands, barren land, tundra, suburban areas, etc.) where other prey species (e.g., rabbit, rodents) or carrion (such as at landfills) are abundant.

**Landscape buffer** – A natural or human-made landscape feature that screens eagles from human activity (e.g., strip of trees, hill, cliff, berm, sound wall).

**Nest** – A structure built, maintained, or used by bald eagles for the purpose of reproduction. An **active** nest is a nest that is attended (built, maintained or used) by a pair of bald eagles during a given breeding season, whether or not eggs are laid. An **alternate** nest is a nest that is not used for breeding by eagles during a given breeding season.

**Nest abandonment** – Nest abandonment occurs when adult eagles desert or stop attending a nest and do not subsequently return and successfully raise young in that nest for the duration of a breeding season. Nest abandonment can be caused by altering habitat near a nest, even if the alteration occurs prior to the breeding season. Whether the eagles migrate during the non-breeding season, or remain in the area throughout the non-breeding season, nest abandonment can occur at any point between the time the eagles return to the nesting site for the breeding season and the time when all progeny from the breeding season have

dispersed.

**Project footprint** – The area of land (and water) that will be permanently altered for a development project, including access roads.

**Similar scope** – In the vicinity of a bald eagle nest, an existing activity is of similar scope to a new activity where the types of impacts to bald eagles are similar in nature, and the impacts of the existing activity are of the same or greater magnitude than the impacts of the potential new activity. Examples: (1) An existing single-story home 200 feet from a nest is similar in scope to an additional single-story home 200 feet from the nest; (2) An existing multi-story, multi-family dwelling 150 feet from a nest has impacts of a greater magnitude than a potential new single-family home 200 feet from the nest; (3) One existing single-family home 200 feet from the nest has impacts of a lesser magnitude than three single-family homes 200 feet from the nest; (4) an existing single-family home 200 feet from a communal roost has impacts of a lesser magnitude than a single-family home 300 feet from the roost but 40 feet from the eagles' foraging area. The existing activities in examples (1) and (2) are of similar scope, while the existing activities in example (3) and (4) are not.

**Vegetative buffer** – An area surrounding a bald eagle nest that is wholly or largely covered by forest, vegetation, or other natural ecological characteristics, and separates the nest from human activities.



## RELATED LITERATURE

- Andrew, J.M. and J.A. Mosher. 1981. Bald eagle nest site selection and nesting habitat in Maryland. *Journal of Wildlife Management* 46:382-390.
- Anonymous. 1977. Bald Eagle Habitat Management Guidelines, Forest Service – California Region. U.S Forest Service, San Francisco, CA.
- Anthony, R.G. 2001. Low productivity of bald eagles on Prince of Wales Island, southeast Alaska. *Journal of Raptor Research* 35:1-8.
- Anthony, R.G., R.W. Frenzel, F.B. Isaacs, and M.G. Garrett. 1994. Probable causes of nesting failures in Oregon's bald eagle population. *Wildlife Society Bulletin* 22:576-582.
- Anthony, R.G. and F.B. Isaacs. 1989. Characteristics of bald eagle nest sites in Oregon. *Journal of Wildlife Management* 53:148-158.
- Arizona Game and Fish Department. 1999. Bald Eagle Conservation Assessment and Strategy (draft).
- Avian Power Line Interaction Committee (APLIC). 1996. Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996. Edison Electric Institute, Raptor Research Foundation, Washington, D.C.
- Bangs, E.E., T.N. Bailey and V.D. Berns. Ecology of nesting bald eagles on the Kenai National Wildlife Refuge, Alaska. (USFWS staff)
- Becker, J.M. 2002. Response of wintering bald eagles to industrial construction in southeastern Washington. *Wildlife Society Bulletin* 30:875-878.
- Brauning, D.W. and J.D. Hassinger. 2000. Pennsylvania Recovery and Management Plan for the Bald Eagle (draft). Pennsylvania Game Commission. Harrisburg, PA.
- Brown, B.T., G.S. Mills, C. Powels, W.A. Russell, G.D. Therres and J.J. Pottie. 1999. The influence of weapons-testing noise on bald eagle behavior. *Journal of Raptor Research* 33:227-232.
- Brown, B.T. and L.E. Stevens. 1997. Winter bald eagle distribution is inversely correlated with human activity along the Colorado River, Arizona. *Journal of Raptor Research* 31:7-10.
- Buehler, D.A. 2000. Bald Eagle (*Haliaeetus leucocephalus*). In *The Birds of North America*, No. 506 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.
- Buehler, D.A., T.J. Mersmann, J.D. Fraser, and J.K.D. Seegar. 1991. Effects of human activity on bald eagle distribution on the northern Chesapeake Bay. *Journal of Wildlife Management* 55:282-290.
- Buehler, D.A., T.J. Mersmann, J.D. Fraser, and J.K.D. Seegar. 1991. Nonbreeding bald eagle communal and solitary roosting behavior and roost habitat on the northern Chesapeake Bay. *Journal of Wildlife Management* 55:273-281.



- Chandler, SK., J.D. Fraser, D.A. Buehler and J.K.D. Seegar. 1995. Perch trees and shoreline development as predictors of bald eagle distribution on the Chesapeake Bay. *Journal of Wildlife Management* 59:325-332.
- Cline, K. 1985. *Bald Eagles in the Chesapeake: A Management Guide for Landowners*. National Wildlife Federation. Washington, D.C.
- Dell, D.D. and P.J. Zwank. 1986. Impact of a high-voltage transmission line on a nesting pair of southern bald eagles in southeast Louisiana. *Journal of Raptor Research* 20(3/4):117-119.
- Dunwiddie, P.W. and R.C. Kuntz. 2001. Long-term trends of bald eagles in winter on the Skagit River, Washington. *Journal of Wildlife Management* 65(2):290-299.
- Fletcher, R.J. et. al. 1999. Effects of recreational trails on wintering diurnal raptors along riparian corridors in a Colorado grassland. *Journal of Raptor Research* 33(3):233-239.
- Fraser, J.D. 1981. The breeding biology and status of the bald eagle on the Chippewa National Forest. PhD. Dissertation, University of Minnesota.
- Fraser, J.D., LD. Frenzel and J.E. Mathisen. 1985. The impact of human activities on breeding bald eagles in north-central Minnesota. *Journal of Wildlife Management* 49(3):585-592.
- Garrett, M.G., J.W. Watson, and R.G. Anthony. 1993. Bald eagle home range and habitat use in the Columbia River Estuary. *Journal of Wildlife Management* 57(1):19-27.
- Gerrard J.M. and G.R. Bortolotti. 1988. *The Bald Eagle: Haunts and Habits of a Wilderness Monarch*. Smithsonian Institution Press. Washington, D.C.
- Grier, J.W. 1969. Bald eagle behavior and productivity responses to climbing to nests. *Journal of Wildlife Management* 33:961-966.
- Grier, J.W. and J.E. Guinn. 2003. Bald eagle habitats and responses to human disturbance in Minnesota. Report to the Minnesota Department of Natural Resources.
- Grubb, T.G. 1976. Survey and analysis of bald eagle nesting in western Washington. M.S. thesis, Univ. of Washington, Seattle.
- Grubb, T.G. and R.M. King. 1991. Assessing human disturbance of breeding bald eagles with classification tree models. *Journal of Wildlife Management* 55:500-511.
- Grubb, T.G., W.L. Robinson and W.W. Bowerman. 2002. Effects of watercraft on bald eagles nesting in Voyageurs National Park, Minnesota. *Wildlife Society Bulletin* 30:156-161.
- Grubb, T.G. and W.W. Bowerman. 1997. Variations in breeding bald eagle response to jets, light planes and helicopters. *Journal of Raptor Research* 31:213-222.

- Grubb, T.G., W.W. Bowerman, A.J. Bath, J.P. Giesy, D.V.C. Weseloh. 2003. Evaluating Great Lakes bald eagle nesting habitat with Bayesian inference. RMRS-RP-45. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO, 10 pp.
- Hansen, J.A. 1977. Population dynamics and night roost requirements of bald eagles wintering in the Nooksack River Valley, WA. Huxley College of Environmental Studies, Western Washington State College, Bellingham, WA. (Problem Series)
- Hansen, J.A., M.V. Stalmaster and J.R. Newman. 1980. Habitat characteristics, function, and destruction of bald eagle communal roosts in western Washington. Huxley college of Environmental Studies, Western Washington University.
- Hunt, W.G., D.E. Driscoll, E.W. Bianchi, and R.E. Jackman. 1992. Ecology of bald eagles in Arizona. Report to U.S. Bureau of Reclamation, Contract 6-CS-30-04470. BioSystems Analysis Inc., Santa Cruz, California.
- Isaacs, F.B and R.G. Anthony. 1987. Abundance, foraging, and roosting of bald eagles wintering in the Harney Basin, Oregon. Northwest Science 61(2), pp. 114-121.
- Juenemann, B.G. 1973. Habitat evaluations of selected bald eagle nest sites on the Chippewa National Forest. M.S. thesis, University of Minnesota, Minneapolis.
- Keister, G.P., R.G. Anthony and E.J. O'Neill. 1987. Use of communal roosts and foraging area by bald eagles wintering in the Klamath Basin. Journal of Wildlife Management 51(2):415-420.
- Knight, R. and S.K. Knight. 1984. Responses of wintering bald eagles to boating activity. Journal of Wildlife Management 48:999-1004.
- Linscombe, J.T., T.J. Hess, Jr., and V.L. Wright. 1999. Effects of seismic operations on Louisiana's nesting bald eagles. Proceedings of the Southeastern Association of Fish and Wildlife Agencies. 54:235-242.
- Maine (State of) Inland Fisheries and Wildlife Rules. Chapter 8.05 Essential Habitat for Species Listed as Threatened or Endangered.
- Mathisen, J.E. 1968. Effects of human disturbance on nesting bald eagles. Journal of Wildlife Management 32(1): 1-6.
- McGarigal, K., R.G. Anthony and F.B. Isaacs. 1991. Interactions of humans and bald eagles on the Columbia River estuary. Wildlife Monographs 115:1-47.
- McKay, K.J., J.W. Stravers, B.R. Conklin, U. Konig, S. Hawks, C.J. Kohrt, J.S. Lundh and G.V. Swenson. 2001. Potential human impacts on bald eagle reproductive success along the Upper Mississippi River.
- McKewan, L.C. and D.H. Hirth. 1979. Southern bald eagle productivity and nest site selection. Journal of Wildlife Management 43:585-594.



- Millsap, B.A. Status of wintering bald eagles in the conterminous 48 States. 1986. *Wildlife Society Bulletin* 14:433-440.
- Millsap, B.A., T. Breen, E. McConnell, T. Steffer, L. Phillips, N. Douglass, and S. Taylor. In Press. Comparative fecundity and survival of bald eagles fledged from suburban and rural natal areas in Florida. *Journal of Wildlife Management* 68(4).
- Montana Bald Eagle Working Group. 1986. Montana Bald Eagle Management Plan. Department of the Interior, Bureau of Land Management. Billings, MT.
- Nesbitt, S.A., M.J. Folk and D.A. Wood. 1993. Effectiveness of bald eagle habitat protection guidelines in Florida. *Proceedings of the Annual Conference of the Southeast Association of Fish and Wildlife Agencies*.
- Newman, J.R., W.H. Brennan and L.M. Smith. 1977. Twelve-year changes in nesting patterns of bald eagles on San Juan Island, Washington. *The Murrelet* 58(2):37-39.
- Postapulsky, S. 1974. Raptor reproductive success: some problems with methods, criteria, and terminology. Pages 21-31 in F.N. Hammerstrom, Jr., B.E. Harrell, and R.R. Olendorff, eds. *Management of raptors*. Raptor Res. Found., Vermillion, S.D.
- Rodgers, J.A. and Schwikert, S.T. 2003. Buffer zone distances to protect foraging and loafing waterbirds from disturbance by airboats in Florida. *Waterbirds* 26(4): 437-443.
- Russell, D. 1980. Occurrence and human disturbance sensitivity of wintering bald eagles on the Sauk and Suiattle Rivers, Washington. In R.L. Knight, G.T. Allen, M.V. Stalmaster and C.W. Servheen [eds.]. *Proceedings of the Washington Bald Eagle Symposium*. Nature Conservancy, Seattle, Washington, pp. 165-174.
- Shapiro, A.E., F. Montalbano, and D. Mager. 1982. Implications of construction of a flood control project upon bald eagle nesting activity. *Wilson Bulletin* 94(1), pp. 55-63.
- Skagen, S.K. 1980. Behavioral responses of wintering bald eagles to human activity on the Skagit River, Washington. In R.L. Knight, G.T. Allen, M.V. Stalmaster and C.W. Servheen [eds.]. *Proceedings of the Washington Bald Eagle Symposium*. Nature Conservancy, Seattle, Washington, pp. 231-241.
- Skagen, S.K., R.L. Knight and G.J.H. Orians. 1991. Human disturbance of an avian scavenging guild. *Ecological Applications* 1:215-225. (Internet)
- Stalmaster, M.V. 1976. Winter ecology and effects of human activity on bald eagles in the Nooksack River Valley, Washington. MS Thesis, Western Washington State College, Bellingham.
- Stalmaster, M.V. 1980. Management strategies for wintering bald eagles in the Pacific Northwest. *Proceedings of the Washington Bald Eagle Symposium*, pp 49-67.
- Stalmaster, M.V. and J.L. Kaiser. 1998. Effects of recreational activity on wintering bald eagles. *Wildlife Monographs* 137:1-46.

- Stalmaster, M.V. and J.L. Kaiser. 1997. Flushing responses of wintering bald eagles to military activity. *Journal of Wildlife Management* 61:1307-1313.
- Stalmaster, M.V. and J.R. Newman. 1978. Behavioral responses of wintering bald eagles to human activity. *Journal of Wildlife Management* 42:506-513.
- Steenhof, K. 1978. Management of Wintering Bald Eagles. FWS/OBS-78/79. U.S. Fish and Wildlife Service, Department of the Interior, Washington D.C.
- Steidl, R.J. and R.G. Anthony. 2000. Experimental Effects of Human Activity on Breeding Bald Eagles. *Ecological Applications* 10(1), pp. 258-268.
- Therres, G.D., M.A. Byrd and D.S. Bradshaw. 1993. Effects of development on nesting bald eagles: case studies from Chesapeake Bay. *Transactions of the North American Wildlife and Natural Resources Conference* 58:62-69.
- U.S. Fish and Wildlife Service. 1979. Bald Eagle Management Guidelines: Oregon – Washington. Portland, OR.
- U.S. Fish and Wildlife Service. 1983. Northern States bald eagle recovery plan. Appendices E, F, and G. U.S. Fish and Wildlife Service, Region 6, Denver, CO.
- U.S. Fish and Wildlife Service. 1987. Habitat Management Guidelines for the Bald Eagle in the Southeast Region. U.S. Fish and Wildlife Service, Region 4. Atlanta, GA.
- U.S. Fish and Wildlife Service. 1993. Bald Eagle Basics. Anchorage, AK.
- U.S. Fish and Wildlife Service. 1993. Habitat Management Guidelines for Bald Eagles in Texas. Austin, TX.
- U.S. Fish and Wildlife Service and Virginia Department of Game and Inland Fisheries. 2001. Bald Eagle Protection Guidelines for Virginia. Gloucester and Richmond, VA.
- Watson, J.W. 1993. Responses of nesting bald eagles to helicopter surveys. *Wildlife Society Bulletin* 21:171-178.
- Watson, J.W. 2004. Responses of nesting bald eagles to experimental pedestrian activity. *Journal of Raptor Research* 38:295-305.
- Wood, P.B. 1999. Bald eagle response to boating activity in northcentral Florida. *Journal of Raptor Research* 33:97-101.
- Wood, P.B., T.C. Edwards Jr. and M.W. Collopy. 1989. Characteristics of bald eagle nesting habitat in Florida. *Journal of Wildlife Management* 53(2):441-449.
- Young, L.S. 1980. A quantitative evaluation of human disturbance impacts on breeding eagle ecology of bald eagles in the San Juan Islands, Washington. Washington Department of Game, Olympia.





**NEWKIRK**  
ENVIRONMENTAL, INC

CHARLESTON, SC • BLUFFTON, SC

14 October 2009

Mr. Kevin O'Neill, Vice President  
Beach Development  
211 King Street, Suite 300  
Charleston, SC 29401

RE: **Kiawah River Plantation**  
**Charleston County, South Carolina**

Dear Mr. O'Neill,

In a standard reply from the USACE on 7 August 2008, attached to this letter, the USACE acknowledges receipt of the wetland verification request by NEI for the referenced project. The USACE has since performed a field inspection of the site and subsequently verbally verified the freshwater wetlands delineated by NEI. I am currently coordinating with the USACE to obtain a final wetland verification letter.

Until receipt of the final verification, there will be no official correspondence from the USACE. If you have any questions, please do not hesitate to contact me.

Sincerely,

Ryan Clarey  
Newkirk Environmental, Inc.  
Charleston Office

Enclosure



REPLY TO  
ATTENTION OF

**DEPARTMENT OF THE ARMY**  
**CHARLESTON DISTRICT, CORPS OF ENGINEERS**  
68A Hagood Avenue  
CHARLESTON, SOUTH CAROLINA 29403-5107

AUG - 7 2008

Regulatory Division

To Whom It May Concern:

This is to acknowledge receipt of your project submittal to the Charleston District  
Regulatory Division for review.

SAC Number: 2008-01605-25y  
Applicant: The Beach Company  
Project: Kiawah River Plantation  
Project Manager: David Chamberlain

All future inquiries regarding this matter should be directed to the Project Manager at  
(843) 329-8044. Additional information about the Charleston District Regulatory Program and  
Public Notice postings can be found at our web site located at <http://www.sac.usace.army.mil/>

U.S. Army Corps of Engineers  
Regulatory Division  
Charleston District

*The Real Property is not included in an overlay or special purpose district. Therefore, Articles 5.1, 5.2, and 5.4 through 5.9 shall not apply. Article 5.3 shall apply as set forth herein.*

#### **ARTICLE 5.3 WDU, WATER-DEPENDENT USE OVERLAY DISTRICT**

##### **§5.3.1 DESCRIPTION**

The WDU, Water-Dependent Use Overlay District is intended to accommodate community docks, boat ramps, marinas and commercial docks and other nonresidential uses that require locations near water bodies.

- A. Private docks intended for the private use of one family shall be exempt from the requirements of this Ordinance.
- B. Joint use docks intended for the private use of two to four families shall be exempt from the requirements of this Article.

##### **§5.3.2 USES**

Community docks, boat ramps, marinas and commercial docks and other uses that require locations near water bodies may be allowed in the WDU District, if approved in accordance with the procedures of this Ordinance.

##### **§5.3.3 COMMUNITY DOCKS**

A community dock(s) is any docking facility that provides access for more than four families (greater than or equal to 5 watercraft slips and less than or equal to 10 watercraft slips) and is not a marina. All community docks shall be considered a Water-Dependent Use.

Community dock(s) shall be subject to the following standards:

1. All proposed community docks shall comply with the Site Plan Review procedures contained within this Ordinance;
2. All proposed community docks shall comply with all applicable regulatory requirements of State and Federal agencies including but not limited to South Carolina Department of Health and Environmental Control (SCDHEC) and U.S. Army Corps of Engineers;
- 3.
4. No leasing or other transfer of space to individuals who do not reside in the residential community or other commercial uses are allowed at community docks;